POWERHOUSE THEATRE

MITSUBISHI AND BOILER WORK

OPERATION AND MAINTENANCE MANUAL
Job 5090

Eastern Mechanical Services, Inc.
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MITSUBISHI ELECTRIC

SPLIT-TYPE AIR CONDITIONERS

INDOOR UNIT

MSZ-FH06NA MSZ-FH09NA MSZ-FH12NA
MSZ-FH15NA MSZ-FH18NA MSZ-FH18NA2

OPERATING INSTRUCTIONS For user

- To use this unit correctly and safely, be sure to read these operating instructions before use.

English

MANUAL DE INSTRUCCIONES Para los clientes

- Para utilizar esta unidad de forma correcta y segura, lea previamente estas instrucciones de funcionamiento.

Español

NOTICE D'UTILISATION A l'attention des clients

- Pour avoir la certitude d'utiliser cet appareil correctement et en toute sécurité, veuillez lire cette notice d'instructions avant de mettre le climatiseur sous tension.

Français

CONTENTS

SAFETY PRECAUTIONS

- Since rotating parts and parts which could cause an electric shock are used in this product, be sure to read these “Safety Precautions” before use.
- Since the cautionary items shown here are important for safety, be sure to observe them.
- After reading this manual, keep it together with the installation manual in a handy place for easy reference.
- Be sure to receive a guarantee card from your dealer and check that the purchased date and shop name, etc. are entered correctly.

Marks and their meanings

⚠ WARNING : Incorrect handling could cause serious hazard, such as death, serious injury, etc. with a high probability.

⚠ CAUTION : Incorrect handling could cause serious hazard depending on the conditions.

Meanings of symbols used in this manual

: Be sure not to do.

: Be sure to follow the instruction.

: Never insert your finger or stick, etc.

: Never step onto the indoor/outdoor unit and do not put anything on them.

: Danger of electric shock. Be careful.

: Be sure to disconnect the power supply plug from the power outlet.

: Be sure to shut off the power.

⚠ WARNING

Do not connect the power cord to an intermediate point, use an extension cord, or connect multiple devices to a single AC outlet.
- This may cause overheating, fire, or electric shock.

Make sure the power plug is free of dirt and insert it securely into the outlet.
- A dirty plug may cause fire or electric shock.

Do not bundle, pull, damage, or modify the power cord, and do not apply heat or place heavy objects on it.
- This may cause fire or electric shock.

Do not turn the breaker OFF/ON or disconnect/connect the power plug during operation.
- This may create sparks, which can cause fire.
- After the indoor unit is switched OFF with the remote controller, make sure to turn the breaker OFF or disconnect the power plug.

Do not expose your body directly to cool air for a prolonged length of time.
- This could be detrimental to your health.

The unit should not be installed, relocated, disassembled, altered, or repaired by the user.
- An improperly handled air conditioner may cause fire, electric shock, injury, or water leakage, etc. Consult your dealer.
- If the power supply cord is damaged, it must be replaced by the manufacturer or its service agent in order to avoid a hazard.

When installing, relocating, or servicing the unit, make sure that no substance other than the specified refrigerant (R410A) enters the refrigerant circuit.
- Any presence of foreign substance such as air can cause abnormal pressure rise and may result in explosion or injury.
- The use of any refrigerant other than that specified for the system will cause mechanical failure, system malfunction, or unit breakdown. In the worst case, this could lead to a serious impediment to securing product safety.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

Do not insert your finger, a stick, or other objects into the air inlet or outlet.
- This may cause injury, since the fan inside rotates at high speeds during operation.

In case of an abnormal condition (such as a burning smell), stop the air conditioner and disconnect the power plug or turn the breaker OFF.
- A continued operation in the abnormal state may cause a malfunction, fire, or electric shock. In this case, consult your dealer.

When the air conditioner does not cool or heat, there is a possibility of refrigerant leakage. In this case, consult your dealer. If a repair involves recharging the unit with refrigerant, ask the service technician for details.
- The refrigerant used in the air conditioner is safe. Normally, it does not leak. However, if refrigerant leaks and comes in contact with a heat source such as a fan heater, kerosene heater, or cooking stove, it will create a harmful gas.

The user should never attempt to wash the inside of the indoor unit. Should the inside of the unit require cleaning, contact your dealer.
- Unsuitable detergent may cause damage to plastic material inside the unit, which may result in water leakage. Should detergent come in contact with electrical parts or the motor, it will result in a malfunction, smoke, or fire.

⚠ CAUTION

Do not touch the air inlet or the aluminum fins of the indoor/outdoor unit.
- This may cause injury.

Do not use insecticides or flammable sprays on the unit.
- This may cause a fire or deformation of the unit.

SAFETY PRECAUTIONS

⚠ CAUTION

Do not expose pets or houseplants to direct airflow.
- This may cause injury to the pets or plants.

Do not place other electric appliances or furniture under the indoor/outdoor unit.
- Water may drip down from the unit, which may cause damage or malfunction.

Do not leave the unit on a damaged installation stand.
- The unit may fall and cause injury.

Do not step on an unstable bench to operate or clean the unit.
- This may cause injury if you fall down.

Do not pull the power cord.
- This may cause a portion of the core wire to break, which may cause overheating or fire.

Do not charge or disassemble the batteries, and do not throw them into a fire.
- This may cause the batteries to leak, or cause a fire or explosion.

Do not operate the unit for more than 4 hours at high humidity (80% RH or more) and/or with windows or outside door left open.
- This may cause the water condensation in the air conditioner, which may drip down, wetting or damaging the furniture.
- The water condensation in the air conditioner may contribute to growth of fungi, such as mold.

Do not use the unit for special purposes, such as storing food, raising animals, growing plants, or preserving precision devices or art objects.
- This may cause deterioration of quality, or harm to animals and plants.

Do not expose combustion appliances to direct airflow.
- This may cause incomplete combustion.

Never put batteries in your mouth for any reason to avoid accidental ingestion.
- Battery ingestion may cause choking and/or poisoning.

Before cleaning the unit, switch it OFF and disconnect the power plug or turn the breaker OFF.
- This may cause injury, since the fan inside rotates at high speeds during operation.

When the unit will be unused for a long time, disconnect the power plug or turn the breaker OFF.
- The unit may accumulate dirt, which may cause overheating or fire.

Replace all batteries of the remote controller with new ones of the same type.
- Using an old battery together with a new one may cause overheating, leakage, or explosion.

If the battery fluid comes in contact with your skin or clothes, wash them thoroughly with clean water.
- If the battery fluid comes in contact with your eyes, wash them thoroughly with clean water and immediately seek medical attention.

Ensure that the area is well-ventilated when the unit is operated together with a combustion appliance.
- Inadequate ventilation may cause oxygen starvation.

Turn the breaker OFF when you hear thunder and there is a possibility of a lightning strike.
- The unit may be damaged if lightning strikes.

After the air conditioner is used for several seasons, perform inspection and maintenance in addition to normal cleaning.
- Dirt or dust in the unit may create an unpleasant odor, contribute to growth of fungi, such as mold, or clog the drain passage, and cause water to leak from the indoor unit. Consult your dealer for inspection and maintenance, which require specialized knowledge and skills.

Do not operate switches with wet hands.
- This may cause electric shock.

Do not clean the air conditioner with water or place an object that contains water, such as a flower vase, on it.
- This may cause fire or electric shock.

Do not step on or place any object on the outdoor unit.
- This may cause injury if you or the object falls down.

❗ IMPORTANT

Dirty filters cause condensation in the air conditioner which will contribute to the growth of fungi such as mold. It is therefore recommended to clean air filters every 2 weeks.

Before starting the operation, ensure that the horizontal vanes are in the closed position. If operation starts when the horizontal vanes are in the open position, they may not return to the correct position.

For installation

⚠ WARNING

Consult your dealer for installing the air conditioner.
- It should not be installed by the user since installation requires specialized knowledge and skills. An improperly installed air conditioner may cause water leakage, fire, or electric shock.

Provide a dedicated power supply for the air conditioner.
- A non-dedicated power supply may cause overheating or fire.

Do not install the unit where flammable gas could leak.
- If gas leaks and accumulates around the outdoor unit, it may cause an explosion.

Ground the unit correctly.
- Do not connect the ground wire to a gas pipe, water pipe, lightning rod, or a telephone ground wire. Improper grounding may cause electric shock.

⚠ CAUTION

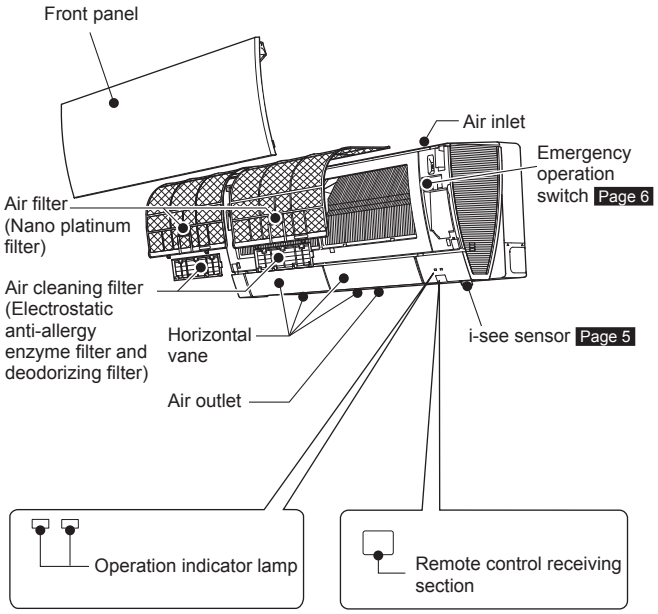
Install a Ground Fault Interrupt (GFI) circuit breaker depending on the installation location of the air conditioner (such as highly humid areas).
- If the Ground Fault Interrupt (GFI) breaker is not installed, it may cause electric shock.

Ensure that the drain water is properly drained.
- If the drain passage is improper, water may drip down from the indoor/outdoor unit, wetting and damaging the furniture.

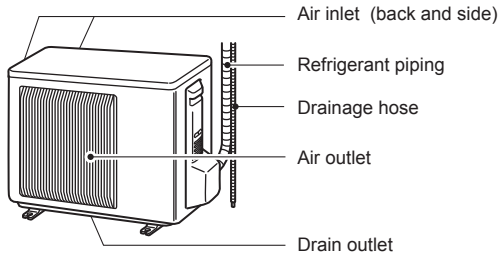
In case of an abnormal condition
Immediately stop operating the air conditioner and consult your dealer.

NAME OF EACH PART

Indoor unit

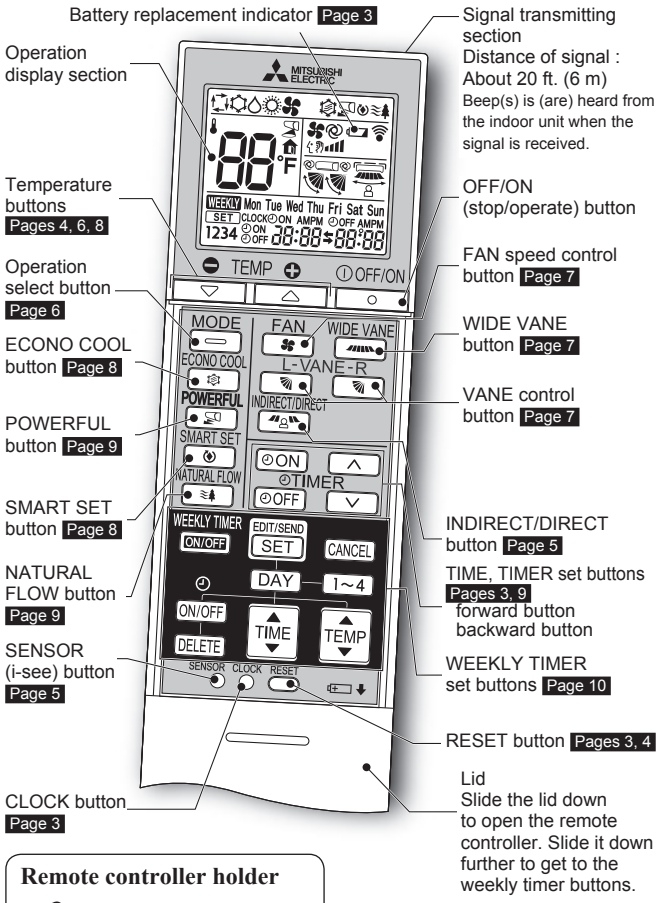


Outdoor unit

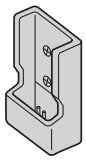


Outdoor units may be different in appearance.

Remote controller



Remote controller holder



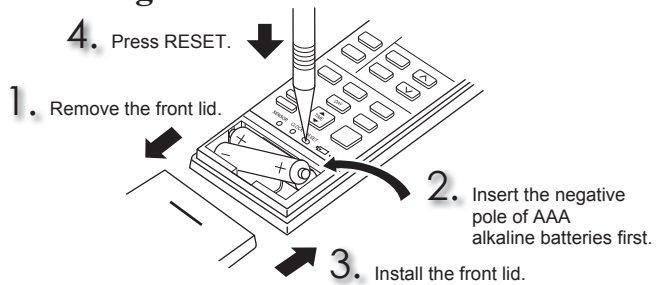
- Install the remote controller holder in a place where the signal can be received by the indoor unit.
- When the remote controller is not used, place it in this holder.

Only use the remote controller provided with the unit.
Do not use other remote controllers.
If two or more indoor units are installed in proximity to one another, an indoor unit that is not intended to be operated may respond to the remote controller.

PREPARATION BEFORE OPERATION

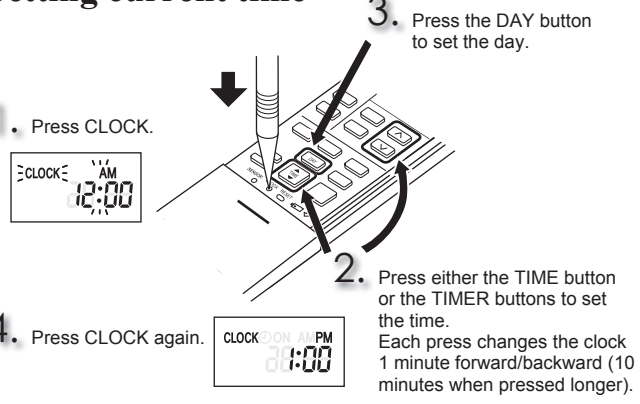
Before operation: Insert the power supply plug into the power outlet and/or turn the breaker on.

Installing the remote controller batteries

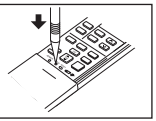


- Make sure the polarity of the batteries is correct.
- Do not use manganese batteries and leaking batteries. The remote controller could malfunction.
- Do not use rechargeable batteries.
- The battery replacement indicator lights up when the battery is running low. In about 7 days after the indicator starts lights up, the remote controller stops working.
- Replace all batteries with new ones of the same type.
- Batteries can be used for approximately 1 year. However, batteries with expired shelf lives last shorter.
- Press RESET gently using a thin instrument.
  If the RESET button is not pressed, the remote controller may not operate correctly.

Setting current time



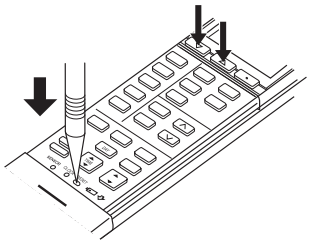
- Press CLOCK gently using a thin instrument.



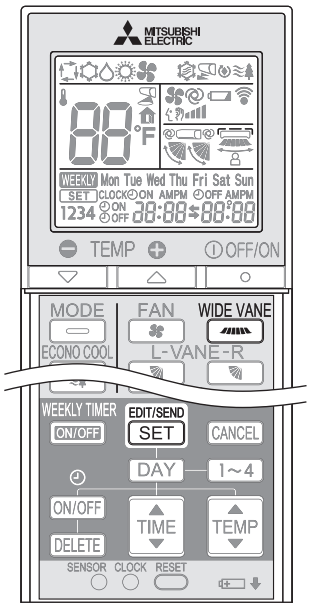
Changing temperature units (°F→°C)

Unit is preset with °F.

1. Press RESET while the temperature buttons are pressed.



- Press RESET gently using a thin instrument.
- To change temperature unit from °C to °F, press RESET.



Setting the installation position

Be sure to set the remote controller in accordance with the installed position of the indoor unit.

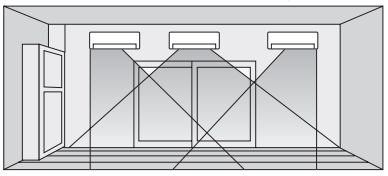
Installation position:

Left: Distance to objects (wall, cabinet, etc.) is less than 19-11/16 in. (50 cm) to the left

Center: Distance to objects (wall, cabinet, etc.) is more than 19-11/16 in. (50 cm) to the left and right

Right: Distance to objects (wall, cabinet, etc.) is less than 19-11/16 in. (50 cm) to the right

(Left) (Center) (Right)



Area	Left	Center	Right
Remote controller display			

1 Hold down WIDE VANE on the remote controller for 2 seconds to enter the position setting mode.

2 Select the target installation position by pressing WIDE VANE. (Each press of the WIDE VANE displays the positions in order:)

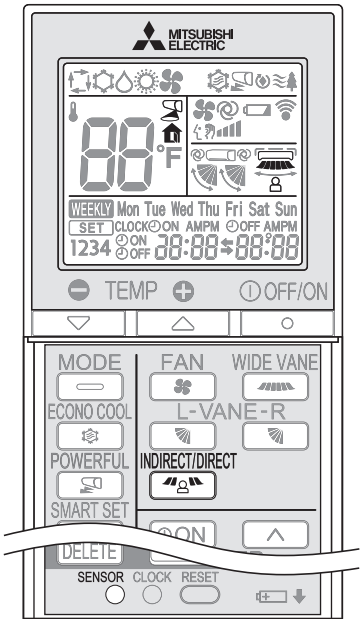
(Center) → (Right) → (Left) →

3 Press EDIT/SEND SET to complete the position setting.

Note:

The installation position can be set only when all the following conditions are met:
- The remote controller is powered off.
- Weekly timer is not set.
- Weekly timer is not being edited.

I-SEE OPERATION

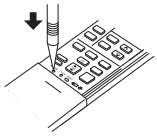


i-see control mode

In the i-see control mode, the room temperature is controlled based on the sensible temperature.

1 Press SENSOR during COOL, DRY, HEAT and AUTO mode to activate the i-see control mode.

- Press gently using a thin instrument.
- lights. (Operation display section)
- The default setting is “active”.



2 Press SENSOR again to activate ABSENCE DETECTION.

- lights. (Operation display section)

3 Press SENSOR again to release the i-see control mode.

Note:

Any person at the following places cannot be detected:
- Along the wall on which the air conditioner is installed
- Directly under the air conditioner
- Where any obstacle, such as furniture, is between the person and the air conditioner

A person may not be detected in the following situations:
- Room temperature is high.
- A person wears heavy clothes and his/her skin is not exposed.
- A heating element of which temperature changes significantly is present.
- Some heat sources, such as a small child or pet, may not be sensed.
- A heat source and the air conditioner are more than 20 ft. (6 m) apart.
- A heat source does not move for a long time.

ABSENCE DETECTION

This function automatically changes the operation to energy-saving operation when nobody is in the room.

1 To activate this function, press SENSOR until appears on the operation display of the remote controller.

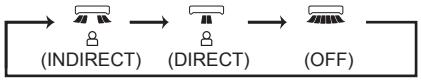
2 Press SENSOR again to release ABSENCE DETECTION.

INDIRECT/DIRECT mode

The INDIRECT/DIRECT mode offers finely-tuned operation by locating where an occupant is in the room.

1 Press INDIRECT/DIRECT during COOL, DRY, HEAT or AUTO mode to activate the INDIRECT/DIRECT mode. This mode is only available when the i-see control mode is effective.

2 Each press of INDIRECT/DIRECT changes INDIRECT/DIRECT in the following order:



(INDIRECT): An occupant will be less exposed to direct airflow.
(DIRECT) : Mainly the vicinity of an occupant will be air-conditioned.

- Horizontal and vertical airflow directions will be automatically selected.
- When more than a couple of people are in a room, the INDIRECT/DIRECT mode may work less effectively.
- If you still feel uncomfortable with the air direction determined by the INDIRECT mode, adjust the air direction manually. Page 7

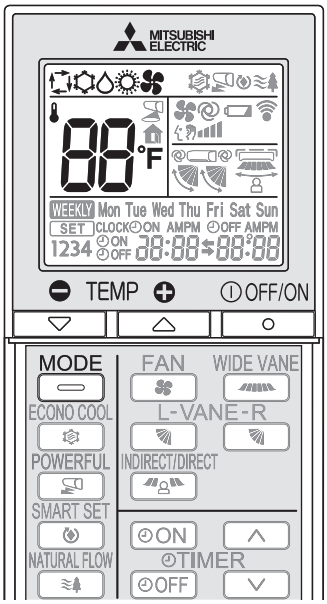
3 Canceling the i-see control mode automatically cancels the INDIRECT/DIRECT mode.

- The INDIRECT/DIRECT mode is also cancelled when the VANE or WIDE VANE buttons is pressed.

Note:

- Do not touch the i-see sensor. This may cause malfunction of the i-see sensor.
- The intermittent operating sound is a normal sound produced when the i-see sensor is moving from side to side.

SELECTING OPERATION MODES



1 Press OFF/ON to start the operation.

2 Press MODE to select operation mode. Each press changes mode in the following order:

(AUTO) → (COOL) → (DRY) → (HEAT) → (FAN)

3 Press ▲ or ▼ to set the temperature. Each press raises or lowers the temperature by 1°F (0.5°C).

Press OFF/ON to stop the operation.

Note:

Multi system operation

Two or more indoor units can be operated by one outdoor unit. When several indoor units are operated simultaneously, cooling/dry/fan and heating operations cannot be done at the same time. When COOL/DRY/FAN is selected with one unit and HEAT with another or vice versa, the unit selected last goes into standby mode.

Operation indicator lamp

The operation indicator lamp shows the operation state of the unit.

Indication	Operation state	Room temperature
☀ ☀	The unit is operating to reach the set temperature	About 4°F (2°C) or more away from set temperature
☀ ○	The room temperature is approaching the set temperature	About 2 to 4°F (1 to 2°C) from set temperature
☀ ☼	Standby mode (only during multi system operation)	—

☀ Lighted ☼ Blinking ○ Not lighted

AUTO mode (Auto change over)

The unit selects the operation mode according to the difference between the room temperature and the set temperature. During AUTO mode, the unit changes mode (COOL↔HEAT) when the room temperature is about 4°F (2°C) away from the set temperature for more than 15 minutes.

Note:

Auto Mode is not recommended if this indoor unit is connected to a MXZ type outdoor unit. When several indoor units are operated simultaneously, the unit may not be able to switch operation mode between COOL and HEAT. In this case, the indoor unit becomes standby mode (Refer to table of Operation indicator lamp).

COOL mode

Enjoy cool air at your desired temperature.

Note:

Do not operate COOL mode at very low outside temperatures (less than 14°F [-10°C]). Water condensed in the unit may drip and wet or damage furniture, etc.

DRY mode

Dehumidify your room. The room may be cooled slightly.
Temperature cannot be set during DRY mode.

HEAT mode

Enjoy warm air at your desired temperature.

FAN mode

Circulate the air in your room.

Note:

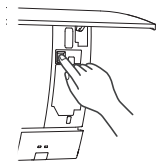
After COOL/DRY mode operation, it is recommended to operate in the FAN mode to dry inside the indoor unit.

Emergency operation

When the remote controller cannot be used...

Emergency operation can be activated by pressing the emergency operation switch (E.O.SW) on the indoor unit.

Each time the E.O.SW is pressed, the operation changes in the following order:



Operation indicator lamp

☀ ○ Emergency COOL
○ ☀ Emergency HEAT
○ ○ Stop

Set temperature : 75°F (24°C)
Fan speed : Medium
Horizontal vane : Auto

Note:

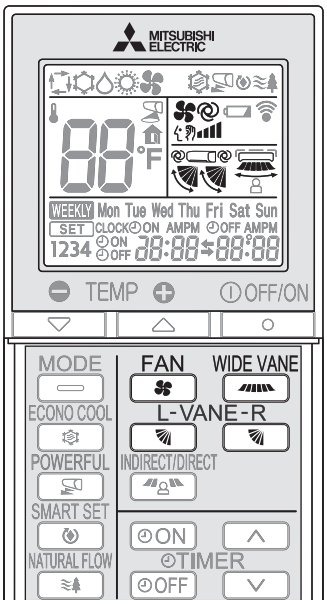
- The first 30 minutes of operation is test run. Temperature control does not work, and fan speed is set to High.
- In the emergency heating operation, the fan speed gradually rises to blow out warm air.
- In the emergency cooling operation, the horizontal vanes' position will be reset in about a minute, then the operation will start.

Auto restart function

If a power failure occurs or the main power is turned off during operation, "Auto restart function" automatically starts operation in the same mode as the one set with the remote controller just before the shutoff of the main power. When timer is set, timer setting is cancelled and the unit starts operation when power is resumed.

If you do not want to use this function, please consult the service representative because the setting of the unit needs to be changed.

FAN SPEED AND AIRFLOW DIRECTION ADJUSTMENT



Press FAN to select fan speed. Each press changes fan speed in the following order:

(AUTO) → (Quiet) → (Low) → (Med.) → (High) → (Super High)

- Two short beeps are heard from the indoor unit when set to AUTO.
- Use higher fan speed to cool/heat the room quicker. It is recommended to lower the fan speed once the room is cool/warm.
- Use lower fan speed for quiet operation.

Note:

Multi system operation

When several indoor units are operated simultaneously by one outdoor unit for heating operation, the temperature of the airflow may be low. In this case, it is recommended to set the fan speed to AUTO.

Press L-VANE-R to select airflow direction. Each press changes airflow direction in the following order:

(AUTO) → (1) → (2) → (3) → (4) → (5) → (SWING)

- Two short beeps are heard from the indoor unit when set to AUTO.
- Always use the remote controller when changing the direction of airflow. Moving the horizontal vanes with your hands causes them to malfunction.
- When the breaker is turned on, the horizontal vanes' position will be reset in about a minute, then the operation will start. The same is true in the emergency cooling operation.
- When the horizontal vanes seem to be in an abnormal position, see page 12.
- The right and left horizontal vanes set to the same level may not align perfectly.

Press WIDE VANE to select horizontal airflow direction. Each press changes airflow direction in the following order:

→ → → → → (SWING)

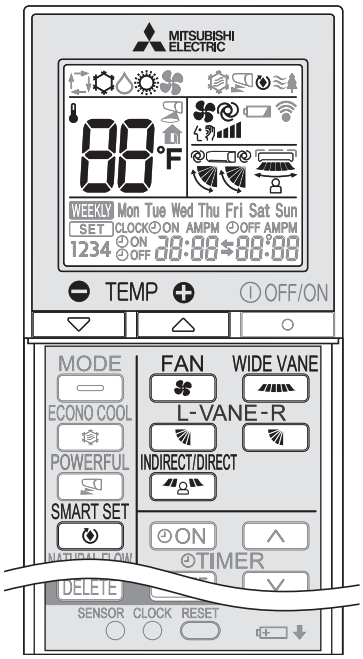
Airflow direction

(AUTO).....The vane is set to the most efficient airflow direction. COOL/DRY/FAN:horizontal position. HEAT:position (4).

(Manual).....For efficient air conditioning, select the upper position for COOL/DRY, and the lower position for HEAT. If the lower position is selected during COOL/DRY, the vane automatically moves to the upward position (3) after 0.5 to 1 hour to prevent any condensation from dripping.

(Swing).....The vane moves up and down intermittently.

SMART SET OPERATION



1 Press SMART SET during COOL, or HEAT mode to select SMART SET mode.

2 Set the temperature, fan speed, and airflow direction.

- The same setting is selected from the next time by simply pressing SMART SET.
- Two settings can be saved. (One for COOL, one for HEAT)
- Select the appropriate temperature, fan speed, and airflow direction according to your room.
- Normally, the minimum temperature setting in HEAT mode is 61°F (16°C). However, during SMART SET operation only, the minimum temperature setting is 50°F (10°C).

Press SMART SET again to cancel SMART SET operation.

- SMART SET operation also is cancelled when the MODE button is pressed.

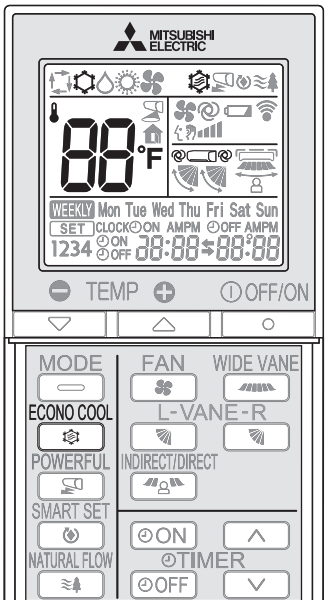
SMART SET operation

- A simplified set back function enables to recall the preferred (preset) setting with a single push of the SMART SET button. Press the button again and you can go back to the previous setting in an instance.
- SMART SET operation cannot be set on the weekly timer.

Example of use:

1. Low energy mode
   Set the temperature 4°F (2°C) to 6°F (3°C) warmer in COOL and cooler in HEAT mode. This setting is suitable for unoccupied room, and while you are sleeping.
2. Saving frequently used settings
   Save your preferred setting for COOL and HEAT. This enables you to select your preferred setting with a single push of the button.

ECONO COOL OPERATION



Press ECONO COOL during COOL mode page 6 to start ECONO COOL operation.

The unit performs swing operation vertically in various cycles according to the temperature airflow.

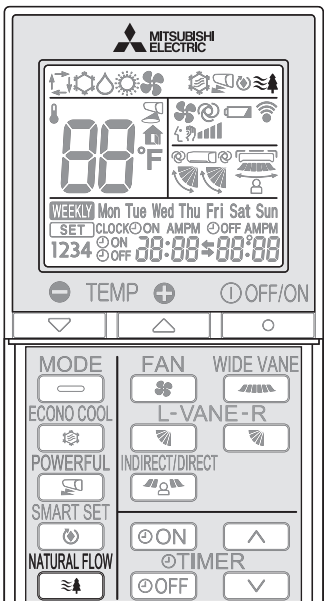
Press ECONO COOL again to cancel ECONO COOL operation.

- ECONO COOL operation is also cancelled when the VANE, POWERFUL, or NATURAL FLOW button is pressed.

What is “ECONO COOL”?

Swing airflow (change of air flow) makes you feel cooler than stationary airflow. The set temperature and the airflow direction are automatically changed by the microprocessor. It is possible to perform cooling operation with keeping comfort. As a result energy can be saved.

NATURAL FLOW OPERATION



Press NATURAL FLOW during COOL or FAN mode page 6 to start NATURAL FLOW operation.

Press NATURAL FLOW again to cancel NATURAL FLOW operation.

- NATURAL FLOW operation is also canceled when the POWERFUL or ECONO COOL button is pressed.

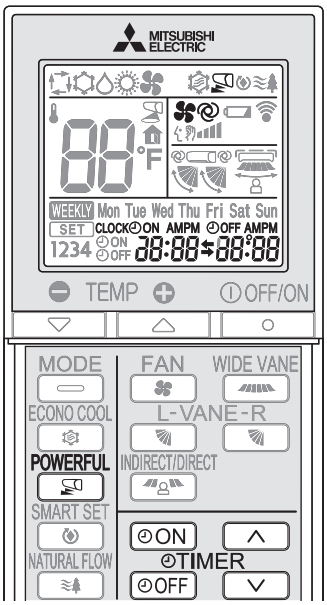
What is "NATURAL FLOW"?

Airflow that imitates a natural breeze is produced in this mode. The discomfort of being hit directly by constant, unnatural airflow will be reduced.

Note:

As the fan speed changes constantly during NATURAL FLOW operation, the sound of air flow, wind velocity and air flow temperature also change. This is not a malfunction.

POWERFUL OPERATION



Press POWERFUL during COOL or HEAT mode page 6 to start POWERFUL operation.

Fan speed : Exclusive speed for POWERFUL mode
Horizontal vane : Set position, or downward airflow position during AUTO setting

- Temperature cannot be set during POWERFUL operation.

Press POWERFUL again to cancel POWERFUL operation.

- POWERFUL operation is also cancelled automatically in 15 minutes, or when the ON/OFF, FAN, ECONO COOL, NATURAL FLOW, or i-save button is pressed.

TIMER OPERATION (ON/OFF TIMER)

1 Press ON or OFF during operation to set the timer.

ON (ON timer) : The unit turns ON at the set time.

OFF (OFF timer) : The unit turns OFF at the set time.

*** ON or OFF blinks.**
*** Make sure that the current time and day are set correctly.** Page 3

2 Press ∧ (forward) and ∨ (backward) to set the time of timer.
Each press changes the set time 10 minutes forward/backward.

- Set the timer while ON or OFF is blinking.

3 Press ON or OFF again to cancel timer.

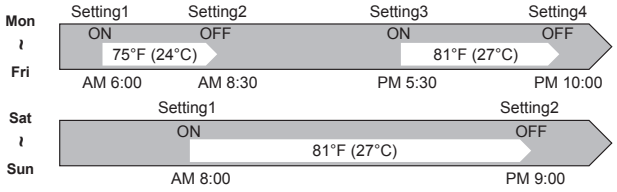
Note:

- ON and OFF timers can be set together. ⇆ mark indicates the order of timer operations.
- If power failure occurs while ON/OFF timer is set, see page 6 "Auto restart function".

WEEKLY TIMER OPERATION

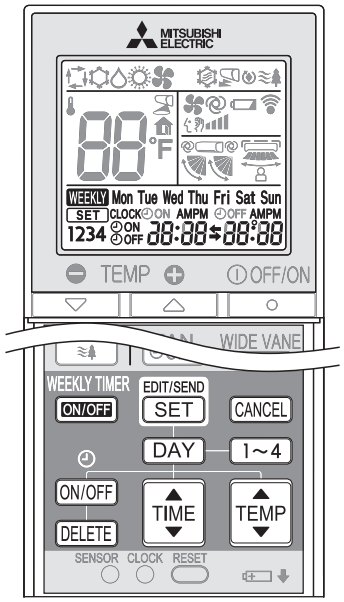
- A maximum of 4 ON or OFF timers can be set for individual days of the week.
- A maximum of 28 ON or OFF timers can be set for a week.

E.g. : Runs at 75°F (24°C) from waking up to leaving home, and runs at 81°F (27°C) from getting home to going to bed on weekdays.
Runs at 81°F (27°C) from waking up late to going bed early on weekends.



Note:

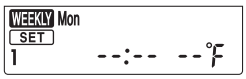
The simple ON/OFF timer setting is available while the weekly timer is on. In this case, the ON/OFF timer has priority over the weekly timer; the weekly timer operation will start again after the simple ON/OFF timer is complete.



Setting the weekly timer

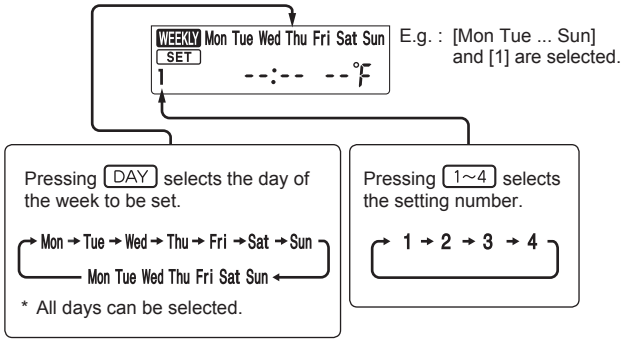
* Make sure that the current time and day are set correctly.

1 Press EDIT/SEND SET to enter the weekly timer setting mode.

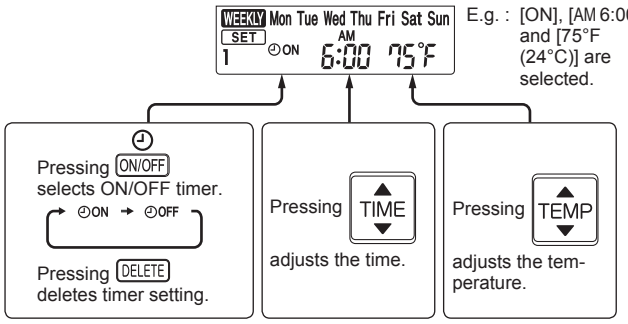


* SET blinks.

2 Press DAY and 1~4 to select setting day and number.



3 Press ON/OFF, TIME, and TEMP to set ON/OFF, time, and temperature.



* Hold down the button to change the time quickly.
* The temperature can be set between 61°F and 88°F (16°C and 31°C) at weekly timer.

Press DAY and 1~4 to continue setting the timer for other days and/or numbers.

4 Press EDIT/SEND SET to complete and transmit the weekly timer setting.

* SET which was blinking goes out, and the current time will be displayed.

Note:

- Press EDIT/SEND SET to transmit the setting information of weekly timer to the indoor unit. Point the remote controller toward the indoor unit for 3 seconds.
- When setting the timer for more than one day of the week or one number, EDIT/SEND SET does not have to be pressed per each setting. Press EDIT/SEND SET once after all the settings are complete. All the weekly timer settings will be saved.
- Press EDIT/SEND SET to enter the weekly timer setting mode, and press and hold DELETE for 5 seconds to erase all weekly timer settings. Point the remote controller toward the indoor unit.

5 Press WEEKLY TIMER ON/OFF to turn the weekly timer ON. (WEEKLY lights.)

* When the weekly timer is ON, the day of the week whose timer setting is complete, will light.

Press WEEKLY TIMER ON/OFF again to turn the weekly timer OFF. (WEEKLY goes out.)

Note:

The saved settings will not be cleared when the weekly timer is turned OFF.

Checking weekly timer setting

1 Press EDIT/SEND SET to enter the weekly timer setting mode.

* SET blinks.

2 Press DAY or 1~4 to view the setting of the particular day or number.

Press CANCEL to exit the weekly timer setting.

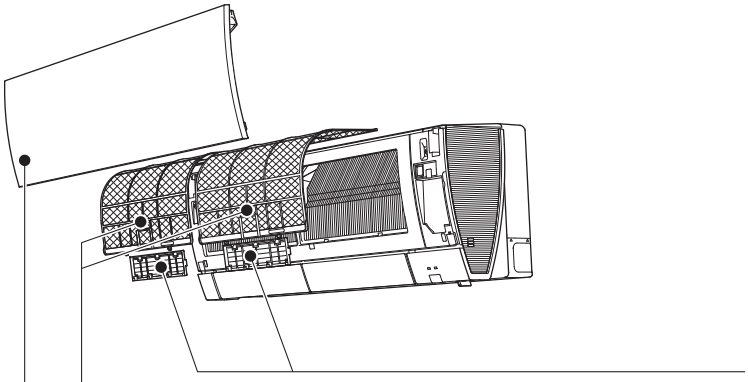
Note:

When all days of the week are selected to view the settings and a different setting is included among them, --:-- --°F will be displayed.

CLEANING

Instructions:

- Switch off the power supply or turn off the breaker before cleaning.
- Be careful not to touch the metal parts with your hands.
- Do not use benzine, thinner, polishing powder, or insecticide.
- Use only diluted mild detergents.
- Do not expose parts to direct sunlight, heat, or fire to dry.
- Do not use water hotter than 122°F (50°C).



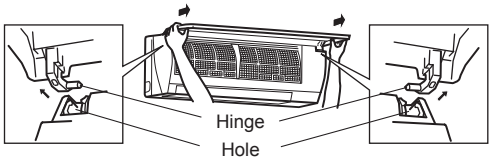
Air filter (Nano platinum filter)

- **Clean every 2 weeks**
- Remove dirt by a vacuum cleaner, or rinse with water.
- After washing with water, dry it well in shade.

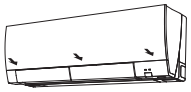
What is “Nano platinum filter”?

Nano platinum is a ceramic particle that includes a platinum nanoparticle. The particles are incorporated into the filter material, which results in providing semi-permanent antibacterial and deodorizing characteristics for the filter. Nano platinum surpasses the catechin (a bioflavonoid that is found in green tea) in performance. Nano platinum filter uses this compound not only to improve air quality but also to eliminate bacteria and viruses. This air filter has a semi-permanent lasting effect even after washing it with water.

Front panel



1. Lift the front panel until a “click” is heard.
2. Hold the hinges and pull to remove as shown in the illustration above.
   - Wipe with a soft dry cloth or rinse it with water.
   - Do not soak it in water for more than two hours.
   - Dry it well in shade.
3. Install the front panel by following the removal procedure in reverse. Close the front panel securely and press the positions indicated by the arrows.

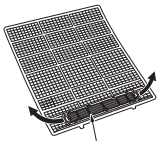


Air cleaning filter (Electrostatic anti-allergy enzyme filter, blue)

Every 3 months:
- Remove dirt by a vacuum cleaner.

When dirt cannot be removed by vacuum cleaning:
- Soak the filter and its frame in lukewarm water before rinsing it.
- After washing, dry it well in shade. Install all tabs of the air filter.

Every year:
- Replace it with a new air cleaning filter for best performance.
- Parts Number MAC-2330FT-E



Pull to remove from the air filter

and

(Deodorizing filter, black)

Every 3 months:
- Remove dirt by a vacuum cleaner, or soak the framed filter in lukewarm water 86 to 104°F [30 to 40°C] for about 15 minutes. Rinse well.
- After washing, dry it well in shade.
- Deodorizing feature recovers by cleaning the filter.

When dirt or smell cannot be removed by cleaning:
- Replace it with a new air cleaning filter.
- Parts Number MAC-3000FT-E

! Important

- **Clean the filters regularly for best performance and to reduce power consumption.**
- **Dirty filters cause condensation in the air conditioner which will contribute to the growth of fungi such as mold. It is therefore recommended to clean air filters every 2 weeks.**

WHEN YOU THINK THAT TROUBLE HAS OCCURRED

Even if these items are checked, when the unit does not recover from the trouble, stop using the air conditioner and consult your dealer.

Symptom	Explanation & Check points
Indoor Unit	
The unit cannot be operated.	• Is the breaker turned on? • Is the power supply plug connected? • Is the ON timer set? Page 9
The horizontal vane does not move.	• Are the horizontal vane and the vertical vane installed correctly? • Is the fan guard deformed? • When the breaker is turned on, the horizontal vanes' position will be reset in about a minute. After the reset has completed, the normal horizontal vanes' operation resumes. The same is true in the emergency cooling operation.
The unit cannot be operated for about 3 minutes when restarted.	• This protects the unit according to instructions from the microprocessor. Please wait.
Mist is discharged from the air outlet of the indoor unit.	• The cool air from the unit rapidly cools moisture in the air inside the room, and it turns into mist.
The swing operation of the HORIZONTAL VANE is suspended for a while, then restarted.	• This is for the swing operation of the HORIZONTAL VANE to be performed normally.
When SWING is selected in COOL/DRY/FAN mode, the lower horizontal vane does not move.	• It is normal that the lower horizontal vane does not move when SWING is selected in COOL/DRY/FAN mode.
The airflow direction changes during operation. The direction of the horizontal vane cannot be adjusted with the remote controller.	• When the unit is operated in COOL or DRY mode, if the operation continues with air blowing down for 0.5 to 1 hour, the direction of the airflow is automatically set to upward position to prevent water from condensing and dripping. • In the heating operation, if the airflow temperature is too low or when defrosting is being done, the horizontal vane is automatically set to horizontal position.
The operation stops for about 10 minutes in the heating operation.	• Outdoor unit is in defrost. Since this is completed in max.10 minutes, please wait. (When the outside temperature is too low and humidity is too high, frost is formed.)
The unit starts operation by itself when the main power is turned on, but hasn't received sign from the remote controller.	• These models are equipped with an auto restart function. When the main power is turned off without stopping the unit with the remote controller and is turned on again, the unit starts operation automatically in the same mode as the one set with the remote controller just before the shutoff of the main power. Refer to "Auto restart function" page 6.
The two horizontal vanes touch each other. The horizontal vanes are in an abnormal position. The horizontal vanes do not return to the correct "close position".	Perform one of the following: • Turn off and on the breaker. Make sure the horizontal vanes move to the correct "close position". • Start and stop the emergency cooling operation and make sure the horizontal vanes move to the correct "close position".
The indoor unit discolors over time.	• Although plastic turns yellow due to the influence of some factors such as ultraviolet light and temperature, this has no effect on the product functions.
Multi system	
The indoor unit which is not operating becomes warm and a sound, similar to water flowing, is heard from the unit.	• A small amount of refrigerant continues to flow into the indoor unit even though it is not operating.
When heating operation is selected, operation does not start right away.	• When operation is started during defrosting of outdoor unit is done, it takes a few minutes (max. 10 minutes) to blow out warm air.
Outdoor Unit	
The fan of the outdoor unit does not rotate even though the compressor is running. Even if the fan starts to rotate, it stops soon.	• When the outside temperature is low during cooling operation, the fan operates intermittently to maintain sufficient cooling capacity.
Water leaks from the outdoor unit.	• During COOL and DRY operations, pipe or pipe connecting sections are cooled and this causes water to condense. • In the heating operation, water condensed on the heat exchanger drips down. • In the heating operation, the defrosting operation makes ice forming on the outdoor unit melt and drip down.
White smoke is discharged from the outdoor unit.	• In the heating operation, vapor generated by the defrosting operation looks like white smoke.

Symptom	Explanation & Check points
Remote controller	
The display on the remote controller does not appear or it is dim. The indoor unit does not respond to the remote control signal.	• Are the batteries exhausted? Page 3 • Is the polarity (+, -) of the batteries correct? Page 3 • Are any buttons on the remote controller of other electric appliances being pressed?
Does not cool or heat	
The room cannot be cooled or heated sufficiently.	• Is the temperature setting appropriate? Page 6 • Is the fan setting appropriate? Please change fan speed to High or Super High. Page 7 • Are the filters clean? Page 11 • Is the fan or heat exchanger of the indoor unit clean? • Are there any obstacles blocking the air inlet or outlet of the indoor or outdoor unit? • Is a window or door open? • It may take a certain time to reach the setting temperature or may not reach that depending on the size of the room, the ambient temperature, and the like.
The room cannot be cooled sufficiently.	• When a ventilation fan or a gas cooker is used in a room, the cooling load increases, resulting in an insufficient cooling effect. • When the outside temperature is high, the cooling effect may not be sufficient.
The room cannot be heated sufficiently.	• When the outside temperature is low, the heating effect may not be sufficient.
Air does not blow out soon in the heating operation.	• Please wait as the unit is preparing to blow out warm air.
Airflow	
The air from the indoor unit smells strange.	• Are the filters clean? Page 11 • Is the fan or heat exchanger of the indoor unit clean? • The unit may suck in an odor adhering to the wall, carpet, furniture, cloth, etc. and blow it out with the air.
Sound	
Cracking sound is heard.	• This sound is generated by the expansion/contraction of the front panel, etc. due to change in temperature.
"Burbling" sound is heard.	• This sound is heard when the outside air is absorbed from the drain hose by turning on the range hood or the ventilation fan, making water flowing in the drain hose to spout out. This sound is also heard when the outside air blows into the drain hose in case the outside wind is strong.
Mechanical sound is heard from the indoor unit.	• This is the switching sound in turning on/off the fan or the compressor.
The sound of water flowing is heard.	• This is the sound of refrigerant or condensed water flowing in the unit.
Hissing sound is sometimes heard.	• This is the sound when the flow of refrigerant inside the unit is changed.
Timer	
Weekly timer does not operate according to settings.	• Is the ON/OFF timer set? Pages 9, 10 • Transmit the setting information of the weekly timer to the indoor unit again. When the information is successfully received, a long beep will sound from the indoor unit. If information fails to be received, 3 short beeps will be heard. Ensure information is successfully received. Page 10 • When a power failure occurs and the main power turns off, the indoor unit built-in clock will be incorrect. As a result, the weekly timer may not work normally. Be sure to place the remote controller where the signal can be received by the indoor unit. Page 3
The unit starts/stops the operation by itself.	• Is the weekly timer set? Page 10

In the following cases, stop using the air conditioner and consult your dealer.

- When water leaks or drips from the indoor unit.
- When the operation indicator lamp blinks. Except for when the lamp of a multi unit blinks while the unit is on standby.
- When the breaker trips frequently.
- The remote control signal is not received in a room where an electronic ON/OFF type fluorescent lamp (inverter-type fluorescent lamp, etc.) is used.
- Operation of the air conditioner interferes with radio or TV reception. An amplifier may be required for the affected device.
- When an abnormal sound is heard.
- When any refrigerant leakage is found.

WHEN THE AIR CONDITIONER IS NOT GOING TO BE USED FOR A LONG TIME

1 Set to the highest temperature in manual COOL mode, and operate for 3 to 4 hours. Page 6
- This dries the inside of the unit.
- Moisture in the air conditioner contributes to favorable conditions for growth of fungi, such as mold.

2 Press ⏻ OFF/ON to stop the operation.

3 Turn off the breaker and/or disconnect the power supply plug.

4 Remove all batteries from the remote controller.

When using the air conditioner again:

1 Clean the air filter. Page 11

2 Check that the air inlet and outlet of the indoor and outdoor units are not blocked.

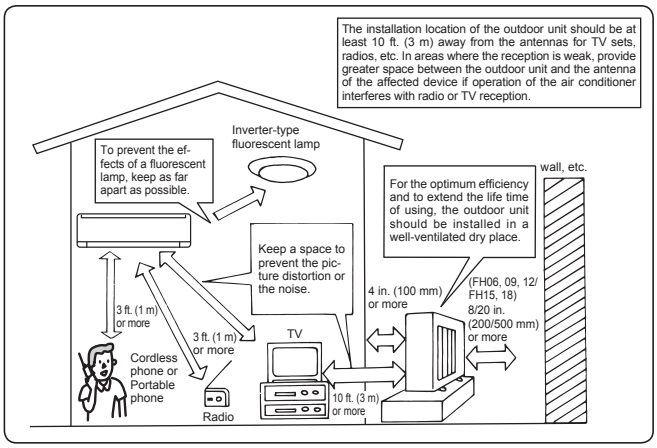
3 Check that the ground is connected correctly.

4 Refer to the “PREPARATION BEFORE OPERATION”, and follow the instructions. Page 3

INSTALLATION PLACE AND ELECTRICAL WORK

Installation place

Avoid installing the air conditioner in the following places.
- Where there is much machine oil.
- Salty places such as the seaside.
- Where sulfide gas is generated such as hot spring, sewage, waste water.
- Where oil is splashed or where the area is filled with oily smoke (such as cooking areas and factories, in which the properties of plastic could be changed and damaged).
- Where there is high-frequency or wireless equipment.
- Where the air from the outdoor unit air outlet is blocked.
- Where the operation sound or air from the outdoor unit bothers the house next door.
- The mounting height of indoor unit 5.9 ft. to 7.5 ft. (1.8 m to 2.3 m) is recommended. If it is impossible, please consult your dealer.



Electrical work

- Provide an exclusive circuit for the power supply of the air conditioner.
- Be sure to observe the breaker capacity.

If you have any questions, consult your dealer.

SPECIFICATIONS

Guaranteed operating range

		Indoor	Outdoor
Cooling	Upper limit	90°F (32.2°C) DB 73°F (22.8°C) WB	115°F (46.1°C) DB —
	Lower limit	67°F (19.4°C) DB 57°F (13.9°C) WB	14°F (-10°C) DB —
Heating	Upper limit	80°F (26.7°C) DB —	75°F (23.9°C) DB 65°F (18.3°C) WB
	Lower limit	70°F (21.1°C) DB —	-13°F (-25°C) DB -14°F (-25.6°C) WB

DB: Dry Bulb
WB: Wet Bulb

Note:

1. The guaranteed operating range value is for 1:1 System Application.
2. If the outdoor temperature is below the lower limit of guaranteed operating range, the outdoor unit may stop operation until the outdoor temperature exceeds the lower limit.

MITSUBISHI ELECTRIC

SPLIT-TYPE AIR CONDITIONERS

OUTDOOR UNIT

Revision H:
- **MSZ-FS·NA** series have been added to INDOOR / OUTDOOR UNIT COMPATIBILITY TABLE.
- 2. SAFETY PRECAUTION has been added.
- 9-2. CAPACITY AND THE INPUT CURVES has been modified.
- 12. TROUBLESHOOTING has been modified.

OBH702 REVISED EDITION-G is void.

HFC utilized R410A

No. OBH702
REVISED EDITION-H

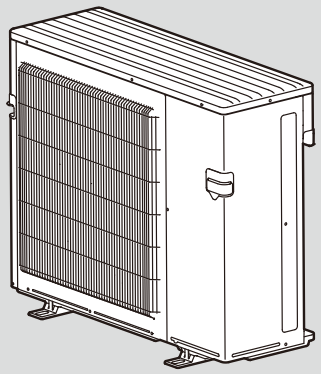
SERVICE MANUAL

Models

MXZ-2C20NA2 - U1

MXZ-3C24NA	MXZ-3C24NA2 - U1
MXZ-3C30NA	MXZ-3C30NA2 - U1
MXZ-4C36NA	MXZ-4C36NA2 - U1
MXZ-5C42NA	MXZ-5C42NA2 - U1
MXZ-2C20NAHZ	MXZ-2C20NAHZ2 - U1
MXZ-3C24NAHZ	MXZ-3C24NAHZ2 - U1
MXZ-3C30NAHZ	MXZ-3C30NAHZ2 - U1

Indoor unit service manual
- MSZ-FE·NA Series (OBH542)
- MSZ-FH·NA Series (OBH683)
- MSZ-GE·NA Series (OBH548)
- MSZ-GL·NA Series (OBH732)
- MSZ-EF·NA Series (OBH736)
- MSZ-FS·NA Series (OBH872)
- MFZ-KA·NA Series (OBH568)
- MFZ-KJ·NA Series (OBH752)
- SLZ-KA·NA Series (OCH487)
- SLZ-KF·NA.TH Series (OCH669)
- PLA-A·BA Series (OCH420)
- PLA-A·EA Series (OCH640)
- SEZ-KD·NA Series
- PEAD-A·AA Series
- PCA-A·KA Series (OCH455)
- MVZ-A·AA Series
- SVZ-KP·NA Series



MXZ-3C24NA MXZ-3C24NA2
MXZ-3C30NA MXZ-3C30NA2
MXZ-4C36NA MXZ-4C36NA2

CONTENTS

Mr.SLIM™

Use the specified refrigerant only

Never use any refrigerant other than that specified.

Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

Revision A:
• **MXZ-3C24NA, MXZ-3C30NA** and **MXZ-4C36NA** have been added.

Revision B:
• **MXZ-3C24/3C30/4C36/5C42NA2** and **MXZ-2C20/3C24/3C30NAHZ2-**U1 have been added.

Revision C:
• 4. SPECIFICATION has been changed.
• Some descriptions have been modified.

Revision D:
• Connectable indoor unit lineups have been modified.
• WIRING DIAGRAM (7.) and TEST POINT DIAGRAM AND VOLTAGE (12-7.) have been changed.

Revision E:
• Capacity and input curve have been corrected.

Revision F:
• **MXZ-2C20NA2 -** U1 has been added.

Revision G:
• 5. NOISE CRITERIA CURVES has been changed.

Revision H:
• **MSZ-FS·NA** series have been added to INDOOR / OUTDOOR UNIT COMPATIBILITY TABLE.
• 2. SAFETY PRECAUTION has been added.
• 9-2. CAPACITY AND THE INPUT CURVES has been modified.
• 12. TROUBLESHOOTING has been modified.

INDOOR / OUTDOOR UNIT COMPATIBILITY TABLE

<MXZ-5C42NA>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA		●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA								
	MSZ-GE**NA	●	●	●	●	●	●		
	MSZ-GL**NA-U1	●	●	●	●		●		
	MSZ-EF**NA-U1								
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1								
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH								
	PLA-A**BA6					●	●		
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5						●		
Ceiling suspended	PCA-A**KA6.TH						●		
Multi-position	MVZ-A**AA4			●		●	●		
	SVZ-KP**NA								

<MXZ-5C42NA2-U1>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA	●	●	●	●	●			
	MSZ-FH**NA2					●			
	MSZ-FS**NA	●	●	●	●	●			
	MSZ-GE**NA	●	●	●	●	●	●		
	MSZ-GL**NA-U1	●	●	●	●	●	●		
	MSZ-EF**NA-U1		●	●	●	●			
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1		●	●	●	●			
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH		●	●	●				
	PLA-A**BA6					●	●		
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5		●	●	●	●	●		
Ceiling suspended	PCA-A**KA6.TH						●		
Multi-position	MVZ-A**AA4			●		●	●		
	SVZ-KP**NA			●		●	●		

<MXZ-4C36NA>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA		●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA								
	MSZ-GE**NA	●	●	●	●	●	●		
	MSZ-GL**NA-U1	●	●	●	●	●	●		
	MSZ-EF**NA-U1								
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1								
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH								
	PLA-A**BA6					●	●		
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5						●		
Ceiling suspended	PCA-A**KA6.TH						●		
Multi-position	MVZ-A**AA4			●		●	●		
	SVZ-KP**NA								

<MXZ-4C36NA2-U1>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA	●	●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA	●	●	●	●	●			
	MSZ-GE**NA	●	●	●	●	●	●		
	MSZ-GL**NA-U1	●	●	●	●	●	●		
	MSZ-EF**NA-U1		●	●	●	●			
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1		●	●	●	●			
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH		●	●	●				
	PLA-A**BA6					●	●		
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5		●	●	●	●	●		
Ceiling suspended	PCA-A**KA6.TH						●		
Multi-position	MVZ-A**AA4			●		●	●		
	SVZ-KP**NA			●		●	●		

<MXZ-3C30NA>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA		●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA								
	MSZ-GE**NA	●	●	●	●	●	●		
	MSZ-GL**NA-U1	●	●	●	●	●	●		
	MSZ-EF**NA-U1								
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1								
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH								
	PLA-A**BA6					●	●		
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5						●		
Ceiling suspended	PCA-A**KA6.TH						●		
Multi-position	MVZ-A**AA4			●		●	●		
	SVZ-KP**NA								

<MXZ-3C30NA2-U1>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA	●	●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA	●	●	●	●	●			
	MSZ-GE**NA	●	●	●	●	●	●		
	MSZ-GL**NA-U1	●	●	●	●	●	●		
	MSZ-EF**NA-U1		●	●	●	●			
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1		●	●	●	●			
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH		●	●	●				
	PLA-A**BA6					●	●		
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5		●	●	●	●	●		
Ceiling suspended	PCA-A**KA6.TH						●		
Multi-position	MVZ-A**AA4			●		●	●		
	SVZ-KP**NA			●		●	●		

<MXZ-3C30NAHZ>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA		●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA								
	MSZ-GE**NA	●	●	●	●	●	●		
	MSZ-GL**NA-U1	●	●	●	●		●		
	MSZ-EF**NA-U1								
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1								
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH								
	PLA-A**BA6					●	●		
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5						●		
Ceiling suspended	PCA-A**KA6.TH						●		
Multi-position	MVZ-A**AA4			●		●	●		
	SVZ-KP**NA								

<MXZ-3C30NAHZ2-U1>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA	●	●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA	●	●	●	●	●			
	MSZ-GE**NA	●	●	●	●	●	●		
	MSZ-GL**NA-U1	●	●	●	●	●	●		
	MSZ-EF**NA-U1		●	●	●	●			
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1		●	●	●	●			
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH		●	●	●				
	PLA-A**BA6					●	●		
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5		●	●	●	●	●		
Ceiling suspended	PCA-A**KA6.TH						●		
Multi-position	MVZ-A**AA4			●		●	●		
	SVZ-KP**NA			●		●	●		

<MXZ-3C24NA>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA		●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA								
	MSZ-GE**NA	●	●	●	●	●			
	MSZ-GL**NA-U1	●	●	●	●	●			
	MSZ-EF**NA-U1								
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1								
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH								
	PLA-A**BA6					●			
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5								
Ceiling suspended	PCA-A**KA6.TH								
Multi-position	MVZ-A**AA4			●		●			
	SVZ-KP**NA								

<MXZ-3C24NA2-U1>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA	●	●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA	●	●	●	●	●			
	MSZ-GE**NA	●	●	●	●	●			
	MSZ-GL**NA-U1	●	●	●	●	●			
	MSZ-EF**NA-U1		●	●	●	●			
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1		●	●	●	●			
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH		●	●	●				
	PLA-A**BA6					●			
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5		●	●	●	●			
Ceiling suspended	PCA-A**KA6.TH								
Multi-position	MVZ-A**AA4			●		●			
	SVZ-KP**NA			●		●			

<MXZ-3C24NAHZ>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA		●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA								
	MSZ-GE**NA	●	●	●	●	●			
	MSZ-GL**NA-U1	●	●	●	●				
	MSZ-EF**NA-U1								
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1								
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH								
	PLA-A**BA6					●			
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5								
Ceiling suspended	PCA-A**KA6.TH								
Multi-position	MVZ-A**AA4			●		●			
	SVZ-KP**NA								

<MXZ-3C24NAHZ2-U1>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA	●	●	●	●	●			
	MSZ-FH**NA2								
	MSZ-FS**NA	●	●	●	●	●			
	MSZ-GE**NA	●	●	●	●	●			
	MSZ-GL**NA-U1	●	●	●	●	●			
	MSZ-EF**NA-U1		●	●	●	●			
Floor standing	MFZ-KA**NA		●	●		●			
	MFZ-KJ**NA-U1		●	●	●	●			
4-way cassette	SLZ-KA**NA.TH		●	●	●				
	SLZ-KF**NA.TH		●	●	●				
	PLA-A**BA6					●			
	PLA-A**EA7					●			
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●	●			
	PEAD-A**AA5		●	●	●	●			
Ceiling suspended	PCA-A**KA6.TH								
Multi-position	MVZ-A**AA4			●		●			
	SVZ-KP**NA			●		●			

<MXZ-2C20NAHZ>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA		●	●	●				
	MSZ-FH**NA2								
	MSZ-FS**NA								
	MSZ-GE**NA	●	●	●	●				
	MSZ-GL**NA-U1	●	●	●	●				
	MSZ-EF**NA-U1								
Floor standing	MFZ-KA**NA		●	●					
	MFZ-KJ**NA-U1								
4-way cassette	SLZ-KA**NA.TH		●	●					
	SLZ-KF**NA.TH								
	PLA-A**BA6								
	PLA-A**EA7								
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●				
	PEAD-A**AA5								
Ceiling suspended	PCA-A**KA6.TH								
Multi-position	MVZ-A**AA4			●					
	SVZ-KP**NA								

<MXZ-2C20NAHZ2-U1>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA	●	●	●	●				
	MSZ-FH**NA2								
	MSZ-FS**NA	●	●	●	●				
	MSZ-GE**NA	●	●	●	●				
	MSZ-GL**NA-U1	●	●	●	●				
	MSZ-EF**NA-U1		●	●	●				
Floor standing	MFZ-KA**NA		●	●					
	MFZ-KJ**NA-U1		●	●	●				
4-way cassette	SLZ-KA**NA.TH		●	●					
	SLZ-KF**NA.TH		●	●					
	PLA-A**BA6								
	PLA-A**EA7								
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●				
	PEAD-A**AA5		●	●					
Ceiling suspended	PCA-A**KA6.TH								
Multi-position	MVZ-A**AA4			●					
	SVZ-KP**NA			●					

<MXZ-2C20NA2-U1>

Connectable indoor unit lineups (Heat pump inverter type)									
Model type	Model name	Capacity class [kBTU/h]							
		06	09	12	15	18	24	30	36
Wall mounted	MSZ-FE**NA		●	●					
	MSZ-FH**NA	●	●	●	●				
	MSZ-FH**NA2								
	MSZ-FS**NA	●	●	●	●				
	MSZ-GE**NA	●	●	●	●				
	MSZ-GL**NA-U1	●	●	●	●				
	MSZ-EF**NA-U1		●	●	●				
Floor standing	MFZ-KA**NA		●	●					
	MFZ-KJ**NA-U1		●	●	●				
4-way cassette	SLZ-KA**NA.TH		●	●					
	SLZ-KF**NA.TH		●	●					
	PLA-A**BA6								
	PLA-A**EA7								
Ceiling concealed	SEZ-KD**NA4.TH		●	●	●				
	PEAD-A**AA5		●	●					
Ceiling suspended	PCA-A**KA6.TH								
Multi-position	MVZ-A**AA4			●					
	SVZ-KP**NA			●					

1 TECHNICAL CHANGES

MXZ-5C42NA
MXZ-2C20NAHZ
MXZ-3C24NAHZ
MXZ-3C30NAHZ
1. New model

MXZ-3C24NA
MXZ-3C30NA
MXZ-4C36NA
1. New model

MXZ-3C24NA ➔ MXZ-3C24NA2 -U1
MXZ-3C30NA ➔ MXZ-3C30NA2 -U1
MXZ-4C36NA ➔ MXZ-4C36NA2 -U1
MXZ-5C42NA ➔ MXZ-5C42NA2 -U1
MXZ-2C20NAHZ ➔ MXZ-2C20NAHZ2 -U1
MXZ-3C24NAHZ ➔ MXZ-3C24NAHZ2 -U1
MXZ-3C30NAHZ ➔ MXZ-3C30NAHZ2 -U1
1. Outdoor control P.C. board has been changed.

MXZ-2C20NA2 -U1
1. New model

2 SAFETY PRECAUTION

2-1. ALWAYS OBSERVE FOR SAFETY

Before obtaining access to terminal, all supply circuit must be disconnected.

Preparation before the repair service

- Prepare the proper tools.
- Prepare the proper protectors.
- Provide adequate ventilation.
- After stopping the operation of the air conditioner, turn off the power-supply breaker.
- Discharge the condenser before the work involving the electric parts.

Precautions during the repair service

- Do not perform the work involving the electric parts with wet hands.
- Do not pour water into electric parts.
- Do not touch the refrigerant.
- Do not touch the hot or cold areas in the refrigerating cycle.
- When the repair or the inspection of the circuit needs to be done without turning off the power, exercise great caution not to touch the live parts.
- When opening or closing the valve below freezing temperatures, refrigerant may spurt out from the gap between the valve stem and the valve body, resulting in injuries.

2-2. CAUTIONS RELATED TO R410A REFRIGERANT

Cautions for units utilizing refrigerant R410A

Make sure that the inside and outside of refrigerant piping is clean and it has no contaminants such as sulfur, oxides, dirt, shaving particles, etc., which are hazard to refrigerant cycle.
In addition, use pipes with specified thickness.

Contamination inside refrigerant piping can cause deterioration of refrigerant oil, etc.

Store the piping indoors, and keep both ends of the piping sealed until just before brazing.
(Leave elbow joints, etc. in their packaging.)

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

The refrigerant oil applied to flare and flange connections must be ester oil, ether oil or alkylbenzene oil in a small amount.

If large amount of mineral oil enters, that can cause deterioration of refrigerant oil, etc.

Charge refrigerant from liquid phase of gas cylinder.

If the refrigerant is charged from gas phase, composition change may occur in refrigerant and the efficiency will be lowered.

Do not use refrigerant other than R410A.

If other refrigerant (R22, etc.) is used, chlorine in refrigerant can cause deterioration of refrigerant oil, etc.

Use a vacuum pump with a reverse flow check valve.

Vacuum pump oil may flow back into refrigerant cycle and that can cause deterioration of refrigerant oil, etc.

Use the following tools specifically designed for use with R410A refrigerant.

The following tools are necessary to use R410A refrigerant.

Tools for R410A	
Gauge manifold	Flare tool
Charge hose	Size adjustment gauge
Gas leak detector	Vacuum pump adaptor
Torque wrench	Electronic refrigerant charging scale

Handle tools with care.

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

Use the specified refrigerant only.

Never use any refrigerant other than that specified.
Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

Do not use a charging cylinder.

If a charging cylinder is used, the composition of refrigerant will change and the efficiency will be lowered.

Ventilate the room if refrigerant leaks during operation. If refrigerant comes into contact with a flame, poisonous gases will be released.

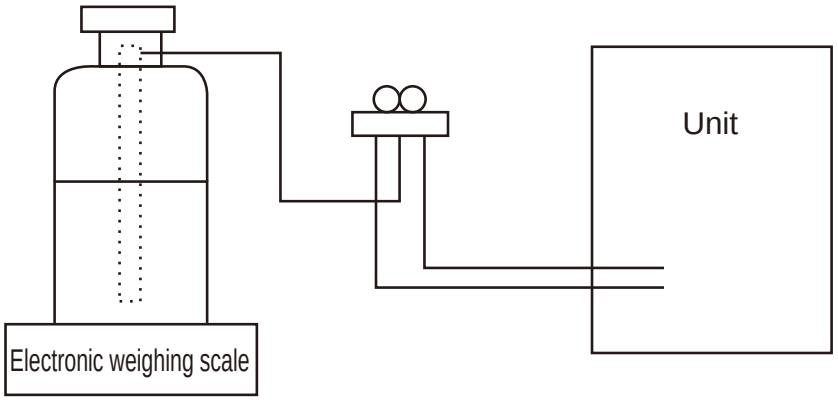
[1] Cautions for service

(1) Perform service after recovering the refrigerant left in unit completely.
(2) Do not release refrigerant in the air.
(3) After completing service, charge the cycle with specified amount of refrigerant.
(4) If moisture or foreign matter might have entered the refrigerant piping during service, ensure to remove them.

[2] Additional refrigerant charge

When charging directly from cylinder

(1) Check that cylinder for R410A on the market is a siphon type.
(2) Charging should be performed with the cylinder of siphon stood vertically. (Refrigerant is charged from liquid phase.)



[3] Service tools

(1) Use the below service tools as exclusive tools for R410A refrigerant.

No.	Tool name	Specifications
1	Gauge manifold	·Only for R410A ·Use the existing fitting specifications. (UNF1/2) ·Use high-tension side pressure of 768.7 PSIG [5.3 MPaG] or over.
2	Charge hose	·Only for R410A ·Use pressure performance of 738.2 PSIG [5.09MPaG] or over.
3	Electronic weighing scale	—
4	Gas leak detector	·Use the detector for R134a, R407C or R410A.
5	Adaptor for reverse flow check	·Attach on vacuum pump.
6	Refrigerant charge base	—
7	Refrigerant cylinder	·Only for R410A ·Top of cylinder (Pink) ·Cylinder with siphon
8	Refrigerant recovery equipment	—

2-3. Cautions for refrigerant piping work

Refrigerant R410A is adopted for replacement inverter series. Although the refrigerant piping work for R410A is the same as for R22, exclusive tools are necessary so as not to mix with different kind of refrigerant. Furthermore as the working pressure of R410A is 1.6 times higher than that of R22, their sizes of flared sections and flare nuts are different.

① Thickness of pipes

Since the working pressure of R410A is higher compared to R22, be sure to use refrigerant piping with thickness shown below. (Never use pipes of 7/256 in [0.7 mm] or below.)

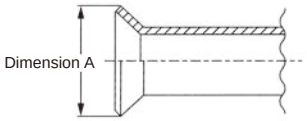
Diagram below: Piping diameter and thickness

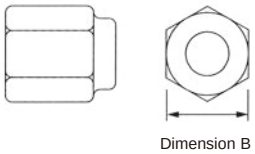
Nominal dimensions (inch)	Outside diameter (mm)	Thickness: in [mm]	
		R410A	R22
1/4	6.35	1/32 [0.8]	1/32 [0.8]
3/8	9.52	1/32 [0.8]	1/32 [0.8]
1/2	12.70	1/32 [0.8]	1/32 [0.8]
5/8	15.88	5/128 [1.0]	5/128 [1.0]
3/4	19.05	—	5/128 [1.0]

② **Dimensions of flare cutting and flare nut**

The component molecules in HFC refrigerant are smaller compared to conventional refrigerants. In addition to that, R410A is a refrigerant, which has higher risk of leakage because its working pressure is higher than that of other refrigerants. Therefore, to enhance airtightness and strength, flare cutting dimension of copper pipe for R410A has been specified separately from the dimensions for other refrigerants as shown below. The dimension B of flare nut for R410A also has partly been changed to increase strength as shown below. Set copper pipe correctly referring to copper pipe flaring dimensions for R410A below. For 1/2 and 5/8 inch pipes, the dimension B changes.

Use torque wrench corresponding to each dimension.





Flare cutting dimensions Unit: in [mm]

Nominal dimensions (in)	Outside diameter (mm)	Dimension A ($^{+0}_{-0.4}$)	
		R410A	R22
1/4	6.35	11/32-23/64 [9.1]	9.0
3/8	9.52	1/2-33/64 [13.2]	13.0
1/2	12.70	41/64-21/32 [16.6]	16.2
5/8	15.88	49/64-25/32 [19.7]	19.4
3/4	19.05	—	23.3

Flare nut dimensions Unit: in [mm]

Nominal dimensions (in)	Outside diameter (mm)	Dimension B	
		R410A	R22
1/4	6.35	43/64 [17.0]	17.0
3/8	9.52	7/8 [22.0]	22.0
1/2	12.70	1-3/64 [26.0]	24.0
5/8	15.88	1-9/64 [29.0]	27.0
3/4	19.05	—	36.0

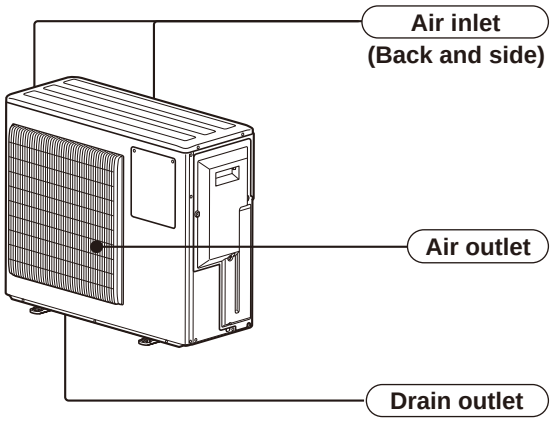
③ **Tools for R410A (The following table shows whether conventional tools can be used or not.)**

Tools and materials	Use	R410A tools	Can R22 tools be used?	Can R407C tools be used?
Gauge manifold	Air purge, refrigerant charge and operation check	Tool exclusive for R410A	×	×
Charge hose		Tool exclusive for R410A	×	×
Gas leak detector	Gas leak check	Tool for HFC refrigerant	×	○
Refrigerant recovery equipment	Refrigerant recovery	Tool exclusive for R410A	×	×
Refrigerant cylinder	Refrigerant charge	Tool exclusive for R410A	×	×
Applied oil	Apply to flared section	Ester oil, ether oil and alkylbenzene oil (minimum amount)	×	Ester oil, ether oil: ○ Alkylbenzene oil: minimum amount
Safety charger	Prevent compressor malfunction when charging refrigerant by spraying liquid refrigerant	Tool exclusive for R410A	×	×
Charge valve	Prevent gas from blowing out when detaching charge hose	Tool exclusive for R410A	×	×
Vacuum pump	Vacuum drying and air purge	Tools for other refrigerants can be used if equipped with adopter for reverse flow check	△(Usable if equipped with adopter for reverse flow)	△(Usable if equipped with adopter for reverse flow)
Flare tool	Flaring work of piping	Tools for other refrigerants can be used by adjusting flaring dimension	△(Usable by adjusting flaring dimension)	△(Usable by adjusting flaring dimension)
Bender	Bend the pipes	Tools for other refrigerants can be used	○	○
Pipe cutter	Cut the pipes	Tools for other refrigerants can be used	○	○
Welder and nitrogen gas cylinder	Weld the pipes	Tools for other refrigerants can be used	○	○
Refrigerant charging scale	Refrigerant charge	Tools for other refrigerants can be used	○	○
Vacuum gauge or thermistor vacuum gauge and vacuum valve	Check the degree of vacuum. (Vacuum valve prevents back flow of oil and refrigerant to thermistor vacuum gauge)	Tools for other refrigerants can be used	○	○
Charging cylinder	Refrigerant charge	Tool exclusive for R410A	×	–

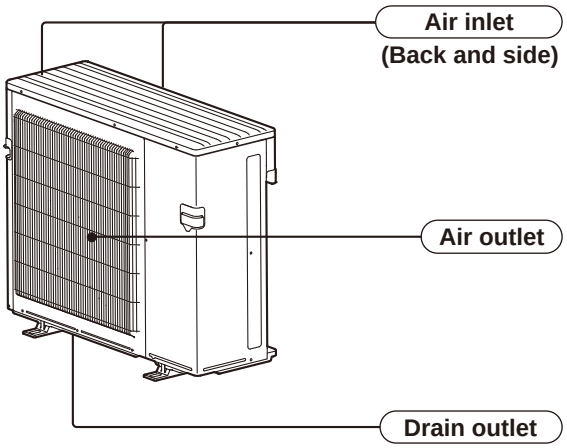
×: Prepare a new tool. (Use the new tool as the tool exclusive for R410A.)
△: Tools for other refrigerants can be used under certain conditions.
○: Tools for other refrigerants can be used.

3 PART NAMES AND FUNCTIONS

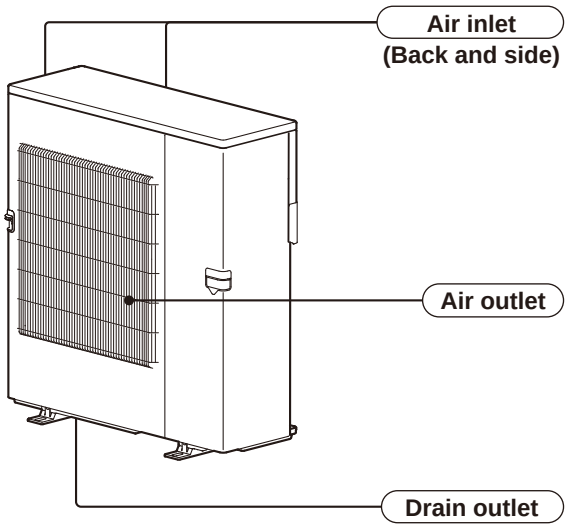
MXZ-2C20NA2



MXZ-3C24NA MXZ-3C24NA2
MXZ-3C30NA MXZ-3C30NA2
MXZ-4C36NA MXZ-4C36NA2



MXZ-5C42NA MXZ-5C42NA2
MXZ-2C20NAHZ MXZ-2C20NAHZ2
MXZ-3C24NAHZ MXZ-3C24NAHZ2
MXZ-3C30NAHZ MXZ-3C30NAHZ2



4 SPECIFICATION

Item			Outdoor model	MXZ-2C20NA2	
			Indoor type	Non-Duct (09+09)	Duct (09+12)
Capacity	Cooling	*1	Btu/h	18,000	20,000
	Heating 47	*1	Btu/h	22,000	22,000
	Heating 17	*2	Btu/h	1,2500	13,500
Power consumption	Cooling	*1	W	1,417	2,000
	Heating 47	*1	W	1,641	1,771
	Heating 17	*2	W	1,300	1,350
EER	Cooling			12.7	10.0
SEER	Cooling			20.0	16.0
HSPF IV(V)	Heating			10.0	9.3
COP	Heating			3.93	3.64
External finish				Munsell 3.0Y 7.8/1.1	
Power supply			V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)			A	20	
Min. circuit ampacity			A	17.2	
Fan motor			F.L.A	1.77	
Compressor	Model			SNB140FQUH2T	
	Winding resistance (at 68 ºF)		Ω	U-V1.99 V-W 1.99 W-U 1.99	
			R.L.A	10.7	
			L.R.A	15.5	
Refrigerant control				LEV	
Sound level			dB(A)	50/54	
Defrost method				Reverse cycle	
Dimensions	W		in.	33-1/16	
	D		in.	13	
	H		in.	27-15/16	
Weight			lb.	126	
Remote controller				Wireless type	
Control voltage (by built-in transformer)				12 - 24 VDC	
Refrigerant piping				Not supplied (optional parts)	
Valve size	Liquid		in.	1/4	
	Gas		in.	3/8	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Refrigerant charge (R410A)			lb.	5 lb. 15 oz.	
Refrigeration oil (Model)			fl oz. (L)	20.3 (0.6) (NEO22)	

NOTE: Test conditions are based on ARI 210/240.

Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	*1: "A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	*1: Standard rating-heating at rated compressor speed	70	60	47	43
	*2: Low temperature heating at maximum compressor speed	70	60	17	15
	Maximum temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

Item			Outdoor model	MXZ-3C24NA MXZ-3C24NA2	
			Indoor type	Non-Duct (06+09+09)	Duct (09+09+09)
Capacity	Cooling	*1	Btu/h	22,000	23,600
	Heating 47	*1	Btu/h	25,000	24,600
	Heating 17	*2	Btu/h	19,600	19,600
Power consumption	Cooling	*1	W	1,620	2,100
	Heating 47	*1	W	1,750	1,900
	Heating 17	*2	W	2,580	2,440
EER	Cooling			13.6	11.2
SEER	Cooling			20.0	16.0
HSPF IV(V)	Heating			9.8 (7.6)	9.2 (7.6)
COP	Heating			4.20	3.80
External finish				Munsell 3.0Y 7.8/1.1	
Power supply			V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)			A	25	
Min. circuit ampacity			A	22.1	
Fan motor			F.L.A	2.43	
Compressor	Model			SNB220FQGMC	
	Winding resistance (at 68 ºF)		Ω	U-V 0.95 V-W 0.95 W-U 0.95	
			R.L.A	12	
			L.R.A	13.7	
Refrigerant control				LEV	
Sound level			dB(A)	51/55	
Defrost method				Reverse cycle	
Dimensions	W		in.	37-13/32	
	D		in.	13	
	H		in.	31-11/32	
Weight			lb.	**NA**: 135/**NA2**: 137	
Remote controller				Wireless type	
Control voltage (by built-in transformer)				12-24 VDC	
Refrigerant piping				Not supplied (optional parts)	
Valve size	Liquid		in.	1/4	
	Gas		in.	A:1/2 B,C:3/8	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Refrigerant charge (R410A)			lb.	6lb. 13oz.	
Refrigeration oil (Model)			fl oz. (L)	23.7 (0.7) (FV50S)	

NOTE: Test conditions are based on ARI 210/240.

Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	*1: "A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	*1: Standard rating-heating at rated compressor speed	70	60	47	43
	*2: Low temperature heating at maximum compressor speed	70	60	17	15
	Maximum temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

Item			Outdoor model	MXZ-3C30NA MXZ-3C30NA2	
			Indoor type	Non-Duct (09+09+12)	Duct (09+09+12)
Capacity	Cooling	*1	Btu/h	28,400	27,400
	Heating 47	*1	Btu/h	28,600	27,600
	Heating 17	*2	Btu/h	21,000	21,000
Power consumption	Cooling	*1	W	2,680	2,840
	Heating 47	*1	W	2,150	2,220
	Heating 17	*2	W	2,740	2,820
EER	Cooling			10.6	9.6
SEER	Cooling			19.0	16.2
HSPF IV(V)	Heating			10.6 (8.0)	9.6 (8.0)
COP	Heating			3.90	3.64
External finish				Munsell 3.0Y 7.8/1.1	
Power supply			V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)			A	25	
Min. circuit ampacity			A	22.1	
Fan motor			F.L.A	2.43	
Compressor	Model			SNB220FQGMC	
	Winding resistance (at 68 ºF)		Ω	U-V 0.95 V-W 0.95 W-U 0.95	
			R.L.A	12	
			L.R.A	13.7	
Refrigerant control				LEV	
Sound level			dB(A)	52/56	
Defrost method				Reverse cycle	
Dimensions	W		in.	37-13/32	
	D		in.	13	
	H		in.	31-11/32	
Weight			lb.	**NA**: 135/**NA2**: 137	
Remote controller				Wireless type	
Control voltage (by built-in transformer)				12-24 VDC	
Refrigerant piping				Not supplied (optional parts)	
Valve size	Liquid		in.	1/4	
	Gas		in.	A:1/2 B,C:3/8	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Refrigerant charge (R410A)			lb.	6lb. 13oz.	
Refrigeration oil (Model)			fl oz. (L)	23.7 (0.7) (FV50S)	

NOTE: Test conditions are based on ARI 210/240.

Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	*1: "A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	*1: Standard rating-heating at rated compressor speed	70	60	47	43
	*2: Low temperature heating at maximum compressor speed	70	60	17	15
	Maximum temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

Item			Outdoor model	MXZ-4C36NA MXZ-4C36NA2	
			Indoor type	Non-Duct (09+09+09+09)	Duct (09+09+09+09)
Capacity	Cooling	*1	Btu/h	35,400	34,400
	Heating 47	*1	Btu/h	36,000	34,400
	Heating 17	*2	Btu/h	26,600	26,600
Power consumption	Cooling	*1	W	3,760	3,940
	Heating 47	*1	W	3,020	3,100
	Heating 17	*2	W	3,440	3,540
EER	Cooling			9.4	8.7
SEER	Cooling			19.2	16.0
HSPF IV(V)	Heating			11.0 (8.4)	9.8 (8.4)
COP	Heating			3.50	3.25
External finish				Munsell 3.0Y 7.8/1.1	
Power supply			V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)			A	25	
Min. circuit ampacity			A	22.1	
Fan motor			F.L.A	2.43	
Compressor	Model			SNB220FQGMC	
	Winding resistance (at 68 ºF)		Ω	U-V 0.95 V-W 0.95 W-U 0.95	
			R.L.A	12	
			L.R.A	13.7	
Refrigerant control				LEV	
Sound level			dB(A)	54/56	
Defrost method				Reverse cycle	
Dimensions	W		in.	37-13/32	
	D		in.	13	
	H		in.	31-11/32	
Weight			lb.	**NA**: 137/**NA2**: 139	
Remote controller				Wireless type	
Control voltage (by built-in transformer)				12-24 VDC	
Refrigerant piping				Not supplied (optional parts)	
Valve size	Liquid		in.	1/4	
	Gas		in.	A:1/2 B,C,D:3/8	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Refrigerant charge (R410A)			lb.	6lb. 13oz.	
Refrigeration oil (Model)			fl oz. (L)	23.7 (0.7) (FV50S)	

NOTE: Test conditions are based on ARI 210/240.

Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	*1: "A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	*1: Standard rating-heating at rated compressor speed	70	60	47	43
	*2: Low temperature heating at maximum compressor speed	70	60	17	15
	Maximum temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

Item			Outdoor model	MXZ-5C42NA MXZ-5C42NA2	
			Indoor type	Non-Duct (06+09+09+09+09)	Duct (09+09+09+09+09)
Capacity	Cooling	*1	Btu/h	40,500	37,500
	Heating 47	*1	Btu/h	45,000	41,000
	Heating 17	*2	Btu/h	30,500	29,100
Power consumption	Cooling	*1	W	4,403	4,112
	Heating 47	*1	W	3,575	3,463
	Heating 17	*2	W	4,800	5,500
EER	Cooling			9.2	9.0
SEER	Cooling			19.7	15.2
HSPF IV(V)	Heating			10.3 (7.7)	9.1 (7.7)
COP	Heating			3.69	3.47
External finish				Munsell 3.0Y 7.8/1.1	
Power supply			V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)			A	40	
Min. circuit ampacity			A	**NA**: 31.9/**NA2**: 32.5	
Fan motor			F.L.A	**NA**: 1.9 /**NA2**: 2.43	
Compressor	Model			MNB33FBTMC-L	
	Winding resistance (at 68 ºF)		Ω	U-V 0.30 V-W 0.30 W-U 0.30	
			R.L.A	20	
			L.R.A	28.8	
Refrigerant control				LEV	
Sound level			dB(A)	56/58	
Defrost method				Reverse cycle	
Dimensions	W		in.	37-13/32	
	D		in.	13	
	H		in.	41-17/64	
Weight			lb.	189	
Remote controller				Wireless type	
Control voltage (by built-in transformer)				12-24 VDC	
Refrigerant piping				Not supplied (optional parts)	
Valve size	Liquid		in.	1/4	
	Gas		in.	A:1/2 B,C,D,E: 3/8	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Refrigerant charge (R410A)			lb.	8 lb. 13 oz.	
Refrigeration oil (Model)			fl oz. (L)	37.2 (1.1) (FV50S)	

NOTE: Test conditions are based on ARI 210/240.

Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	*1: "A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	*1: Standard rating-heating at rated compressor speed	70	60	47	43
	*2: Low temperature heating at maximum compressor speed	70	60	17	15
	Maximum temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

Item			Outdoor model	MXZ-2C20NAHZ MXZ-2C20NAHZ2	
			Indoor type	Non-Duct (09+09)	Duct (09+12)
Capacity	Cooling	*1	Btu/h	18,000	20,000
	Heating 47	*1	Btu/h	22,000	22,000
	Heating 17	*2	Btu/h	22,000	22,000
Power consumption	Cooling	*1	W	1,334	1,819
	Heating 47	*1	W	1,612	1,748
	Heating 17	*2	W	3,071	3,224
EER	Cooling			13.5	11.0
SEER	Cooling			17.0	15.0
HSPF IV(V)	Heating			9.8 (7.8)	9.5 (7.8)
COP	Heating			4.00	3.69
External finish				Munsell 3.0Y 7.8/1.1	
Power supply			V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)			A	40	
Min. circuit ampacity			A	**NA**: 28.9/**NA2**: 29.5	
Fan motor			F.L.A	**NA**: 1.9/**NA2**: 2.43	
Compressor	Model			MNB33FBTMC-L	
	Winding resistance (at 68 ºF)		Ω	U-V 0.30 V-W 0.30 W-U 0.30	
			R.L.A	20	
			L.R.A	28.8	
Refrigerant control				LEV	
Sound level			dB(A)	54/58	
Defrost method				Reverse cycle	
Dimensions	W		in.	37-13/32	
	D		in.	13	
	H		in.	41-17/64	
Weight			lb.	187	
Remote controller				Wireless type	
Control voltage (by built-in transformer)				12-24 VDC	
Refrigerant piping				Not supplied (optional parts)	
Valve size	Liquid		in.	1/4	
	Gas		in.	A,B: 3/8	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Refrigerant charge (R410A)			lb.	8 lb. 13 oz.	
Refrigeration oil (Model)			fl oz. (L)	37.2 (1.1) (FV50S)	

NOTE: Test conditions are based on ARI 210/240.

Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	*1: "A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	*1: Standard rating-heating at rated compressor speed	70	60	47	43
	*2: Low temperature heating at maximum compressor speed	70	60	17	15
	Maximum temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

Item			Outdoor model	MXZ-3C24NAHZ MXZ-3C24NAHZ2	
			Indoor type	Non-Duct (06+06+09)	Duct (09+09+09)
Capacity	Cooling	*1	Btu/h	22,000	23,600
	Heating 47	*1	Btu/h	25,000	24,600
	Heating 17	*2	Btu/h	25,000	24,600
Power consumption	Cooling	*1	W	1,630	2,360
	Heating 47	*1	W	1,725	1,871
	Heating 17	*2	W	3,557	3,795
EER	Cooling			13.5	10.0
SEER	Cooling			19.0	15.5
HSPF IV(V)	Heating			10.0 (7.4)	9.0 (7.4)
COP	Heating			4.25	3.80
External finish				Munsell 3.0Y 7.8/1.1	
Power supply			V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)			A	40	
Min. circuit ampacity			A	**NA**: 29.9/**NA2**: 30.5	
Fan motor			F.L.A	**NA**: 1.9/**NA2**: 2.43	
Compressor	Model			MNB33FBTMC-L	
	Winding resistance (at 68 ºF)		Ω	U-V 0.30 V-W 0.30 W-U 0.30	
			R.L.A	20	
			L.R.A	28.8	
Refrigerant control				LEV	
Sound level			dB(A)	54/58	
Defrost method				Reverse cycle	
Dimensions	W		in.	37-13/32	
	D		in.	13	
	H		in.	41-17/64	
Weight			lb.	189	
Remote controller				Wireless type	
Control voltage (by built-in transformer)				12-24 VDC	
Refrigerant piping				Not supplied (optional parts)	
Valve size	Liquid		in.	1/4	
	Gas		in.	A: 1/2 B,C: 3/8	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Refrigerant charge (R410A)			lb.	8 lb. 13 oz.	
Refrigeration oil (Model)			fl oz. (L)	37.2 (1.1) (FV50S)	

NOTE: Test conditions are based on ARI 210/240.

Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	*1: "A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	*1: Standard rating-heating at rated compressor speed	70	60	47	43
	*2: Low temperature heating at maximum compressor speed	70	60	17	15
	Maximum temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

Item			Outdoor model	MXZ-3C30NAHZ MXZ-3C30NAHZ2	
			Indoor type	Non-Duct (09+09+12)	Duct (09+09+12)
Capacity	Cooling	*1	Btu/h	28,400	27,400
	Heating 47	*1	Btu/h	28,600	27,600
	Heating 17	*2	Btu/h	28,600	27,600
Power consumption	Cooling	*1	W	2,272	2,661
	Heating 47	*1	W	2,096	2,187
	Heating 17	*2	W	4,192	4,258
EER	Cooling			12.5	10.3
SEER	Cooling			18.0	16.0
HSPF IV(V)	Heating			11.0 (8.5)	9.8 (7.7)
COP	Heating			4.00	3.70
External finish				Munsell 3.0Y 7.8/1.1	
Power supply			V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)			A	40	
Min. circuit ampacity			A	**NA**: 29.9/**NA2**: 30.5	
Fan motor			F.L.A	**NA**: 1.9/**NA2**: 2.43	
Compressor	Model			MNB33FBTMC-L	
	Winding resistance (at 68 ºF)		Ω	U-V 0.30 V-W 0.30 W-U 0.30	
			R.L.A	20	
			L.R.A	28.8	
Refrigerant control				LEV	
Sound level			dB(A)	54/58	
Defrost method				Reverse cycle	
Dimensions	W		in.	37-13/32	
	D		in.	13	
	H		in.	41-17/64	
Weight			lb.	189	
Remote controller				Wireless type	
Control voltage (by built-in transformer)				12-24 VDC	
Refrigerant piping				Not supplied (optional parts)	
Valve size	Liquid		in.	1/4	
	Gas		in.	A: 1/2 B,C: 3/8	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Refrigerant charge (R410A)			lb.	8 lb. 13 oz.	
Refrigeration oil (Model)			fl oz. (L)	37.2 (1.1) (FV50S)	

NOTE: Test conditions are based on ARI 210/240.

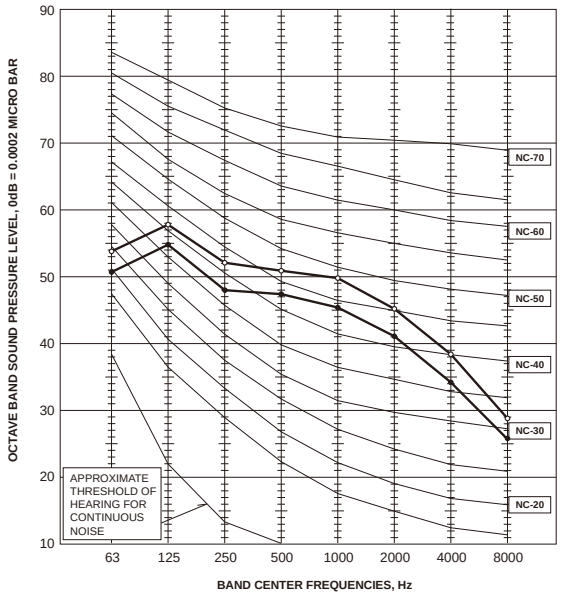
Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	*1: "A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	*1: Standard rating-heating at rated compressor speed	70	60	47	43
	*2: Low temperature heating at maximum compressor speed	70	60	17	15
	Maximum temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

5 NOISE CRITERIA CURVES

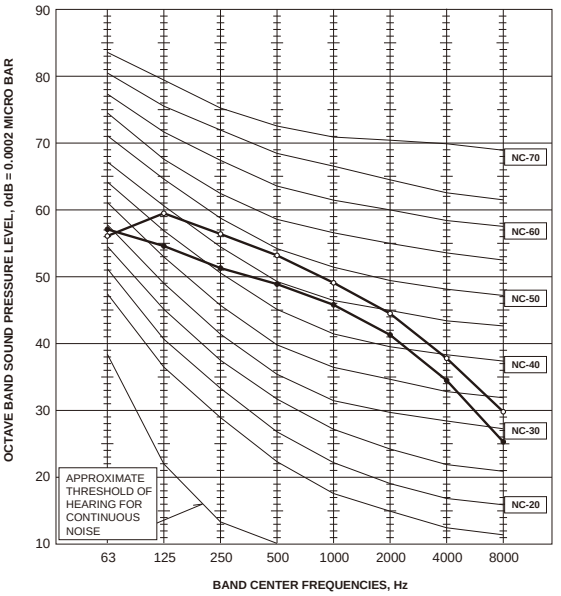
MXZ-2C20NA2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	50	●—●
High	Heating	54	○—○



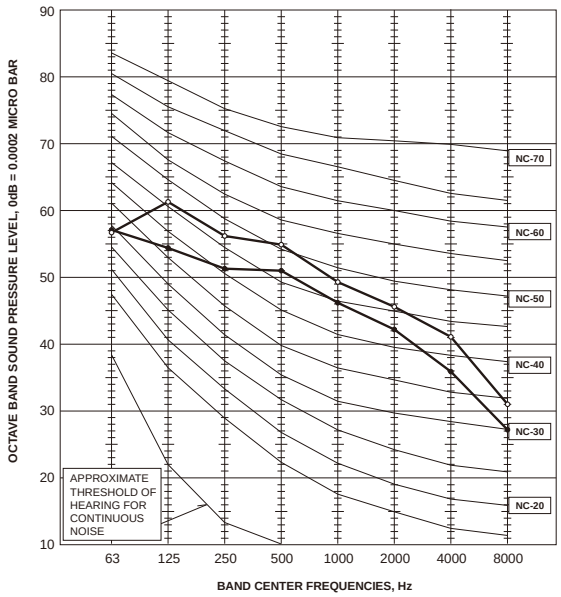
MXZ-3C24NA
MXZ-3C24NA2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	51	●—●
High	Heating	55	○—○



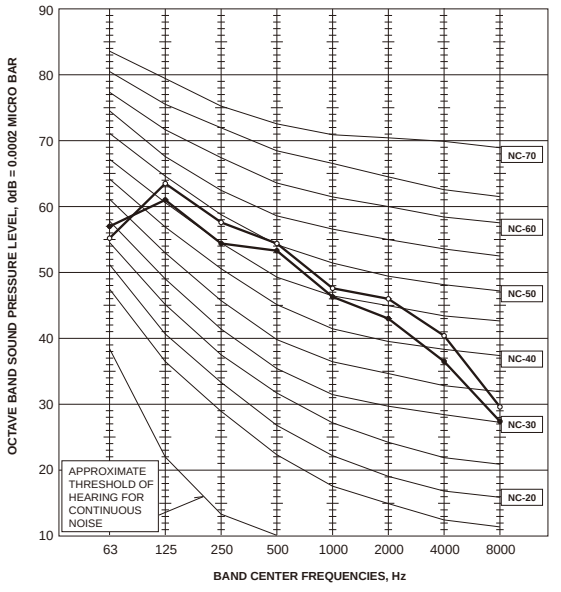
MXZ-3C30NA
MXZ-3C30NA2

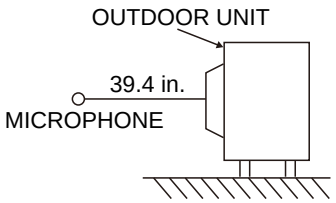
FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	52	●—●
High	Heating	56	○—○



MXZ-4C36NA
MXZ-4C36NA2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	54	●—●
High	Heating	56	○—○

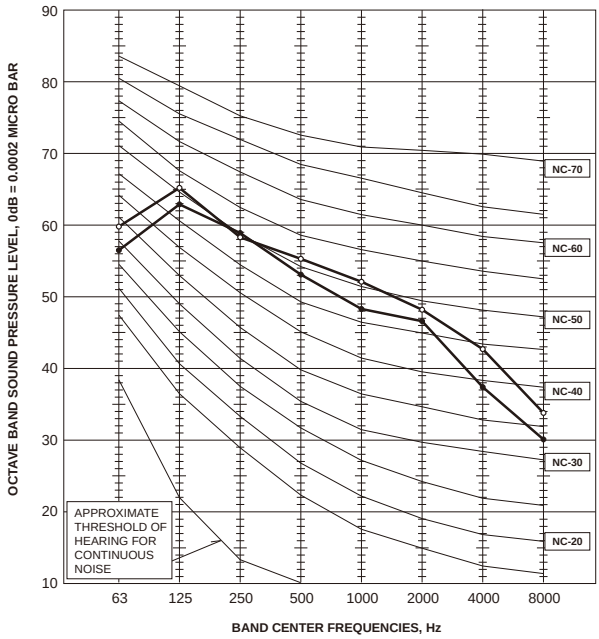




Test conditions
Cooling: Dry-bulb temperature 95°F Wet-bulb temperature 75°F
Heating: Dry-bulb temperature 45°F Wet-bulb temperature 43°F

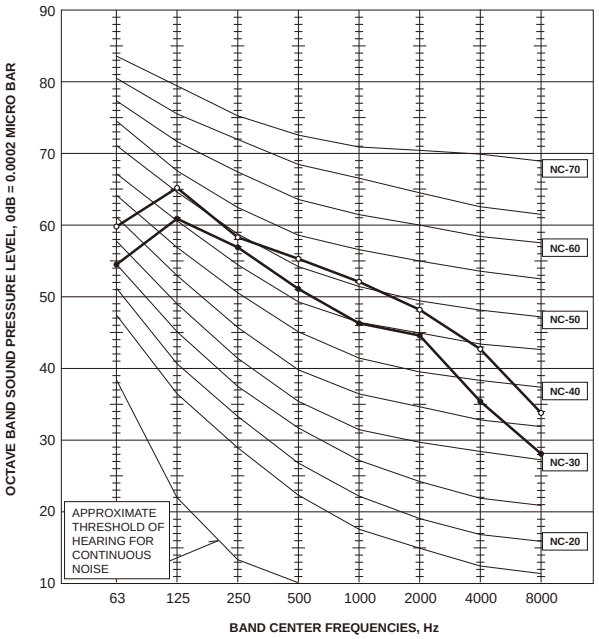
MXZ-5C42NA
MXZ-5C42NA2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	56	●—●
High	Heating	58	○—○



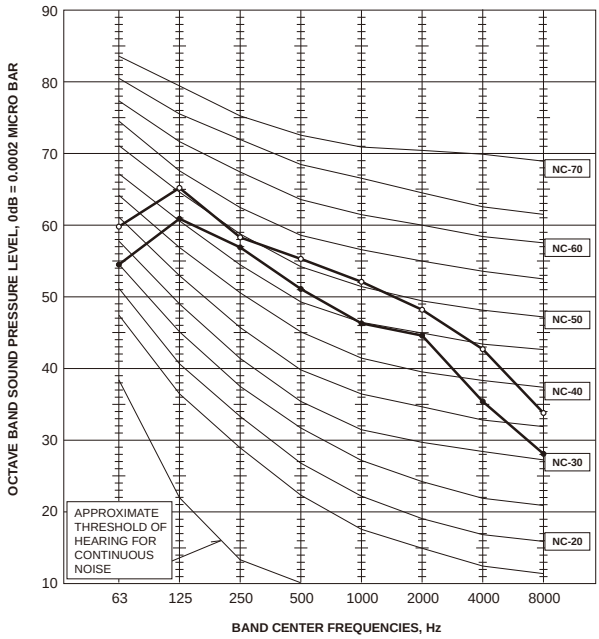
MXZ-2C20NAHZ
MXZ-2C20NAHZ2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	54	●—●
High	Heating	58	○—○



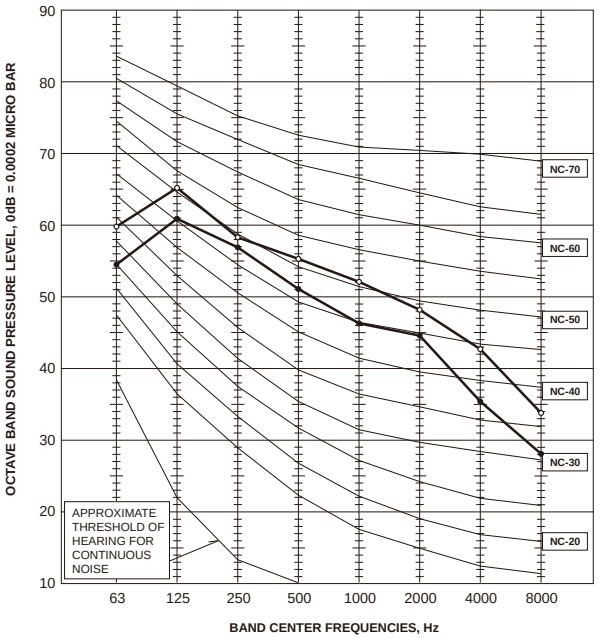
MXZ-3C24NAHZ
MXZ-3C24NAHZ2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	54	●—●
High	Heating	58	○—○



MXZ-3C30NAHZ
MXZ-3C30NAHZ2

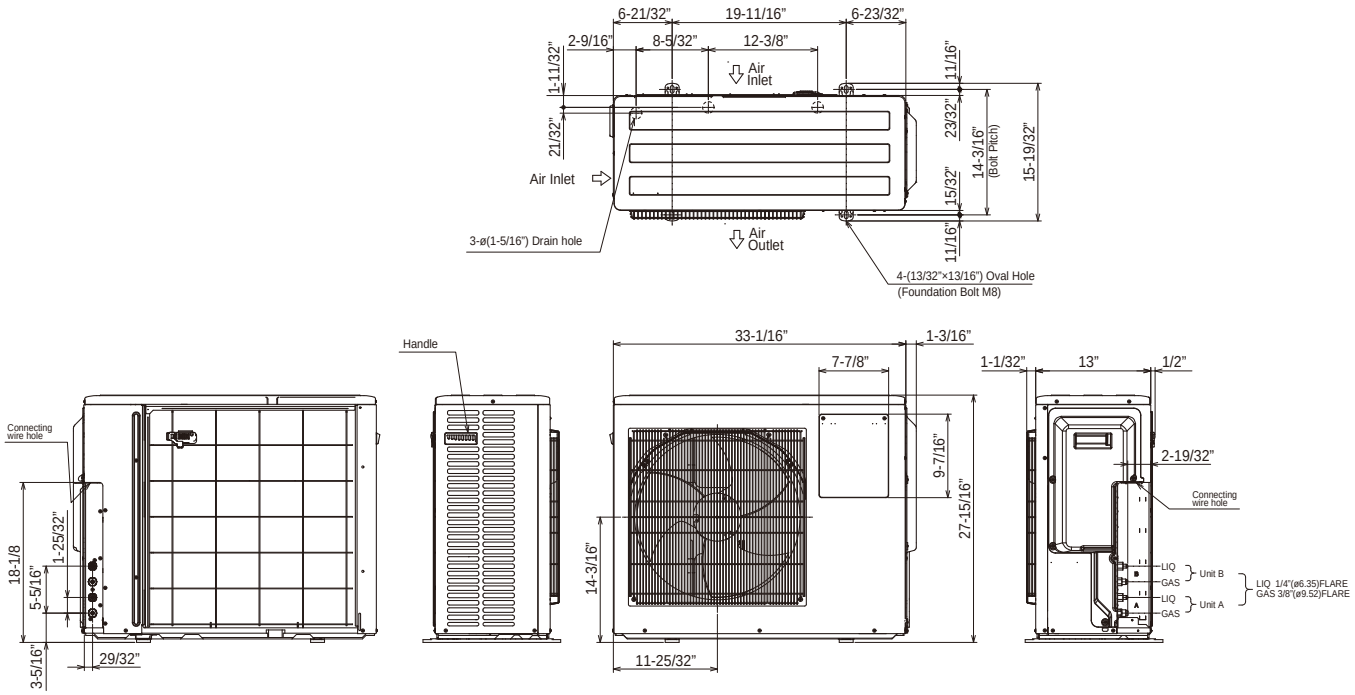
FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	54	●—●
High	Heating	58	○—○



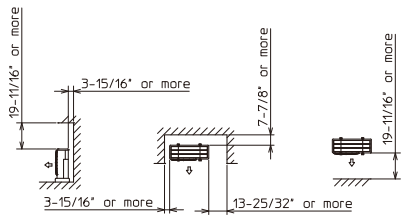
6 OUTLINES AND DIMENSIONS

MXZ-2C20NA2

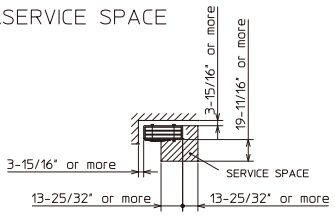
Unit: inch (mm)

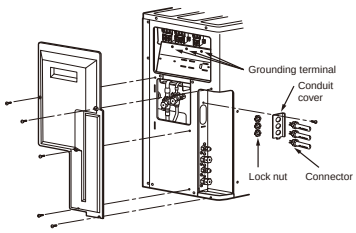


1.FREE SPACE



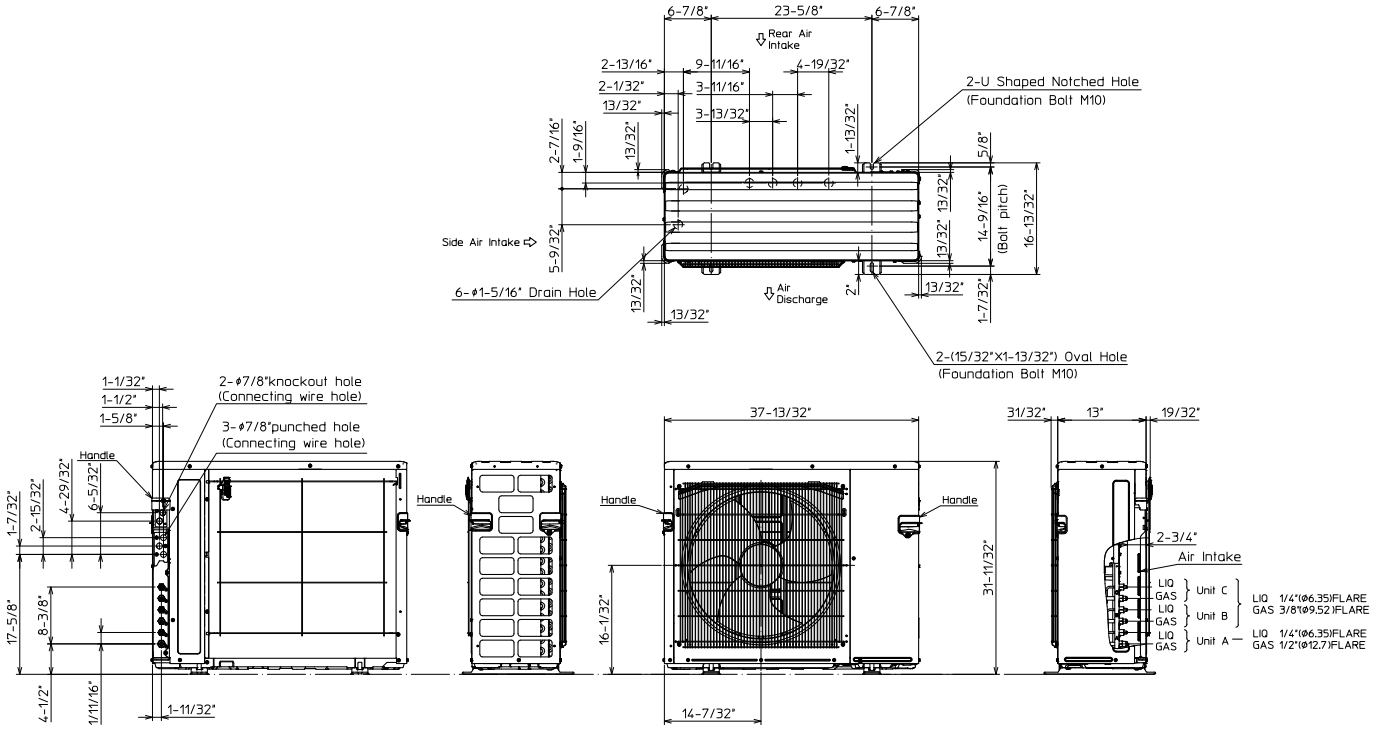
2.SERVICE SPACE



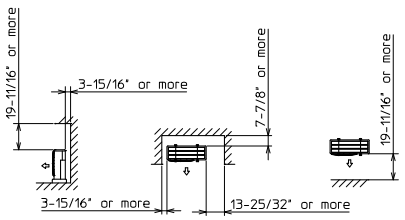


MXZ-3C24NA MXZ-3C24NA2
MXZ-3C30NA MXZ-3C30NA2

Unit: inch (mm)



1.FREE SPACE



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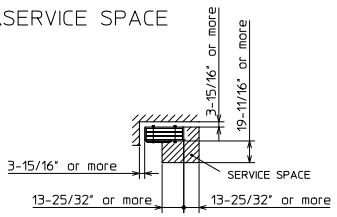
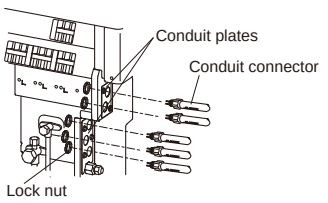
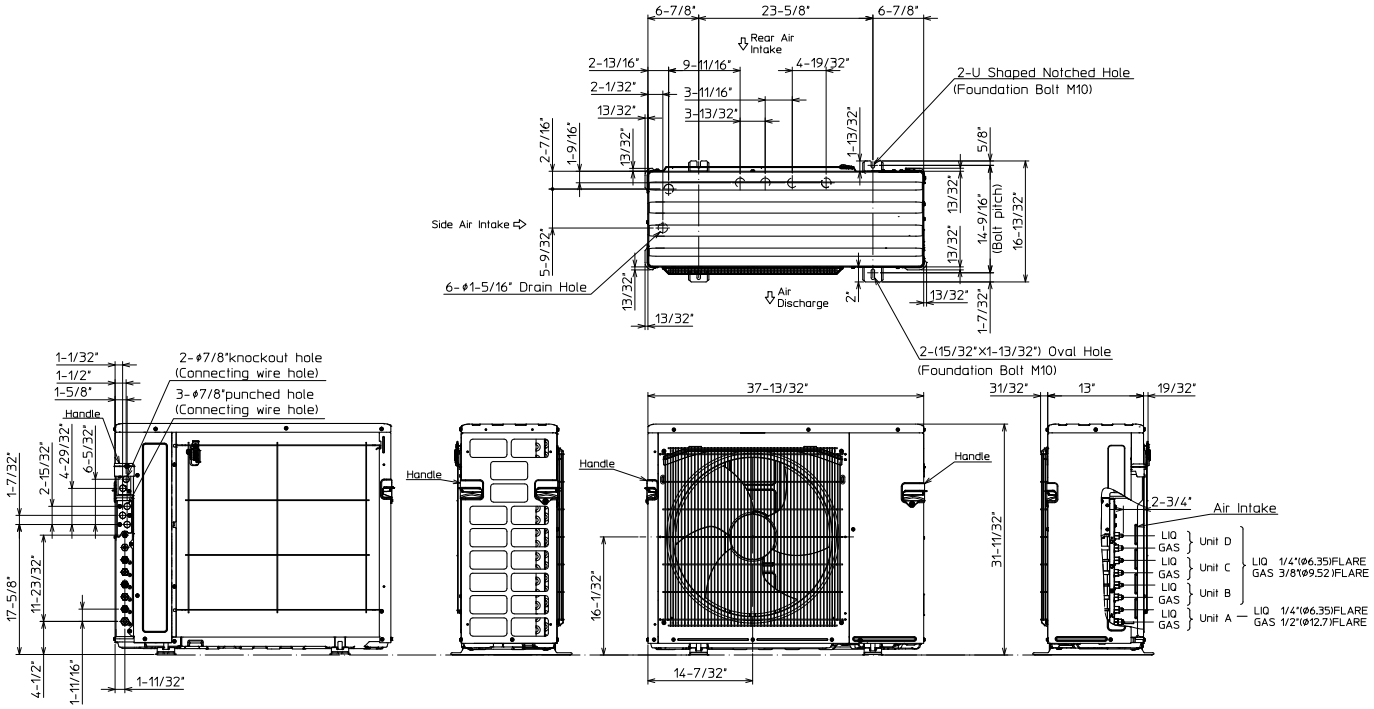


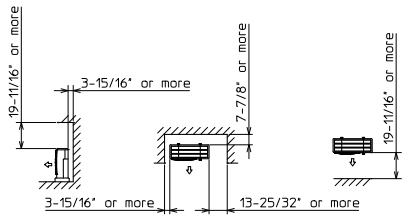


MXZ-4C36NA MXZ-4C36NA2

Unit: inch (mm)



1.FREE SPACE



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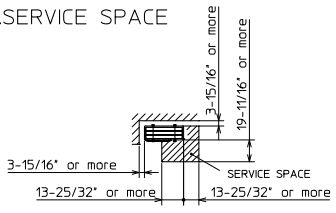
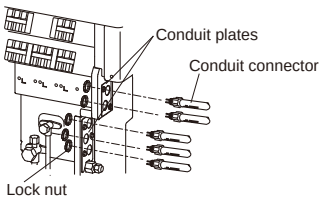
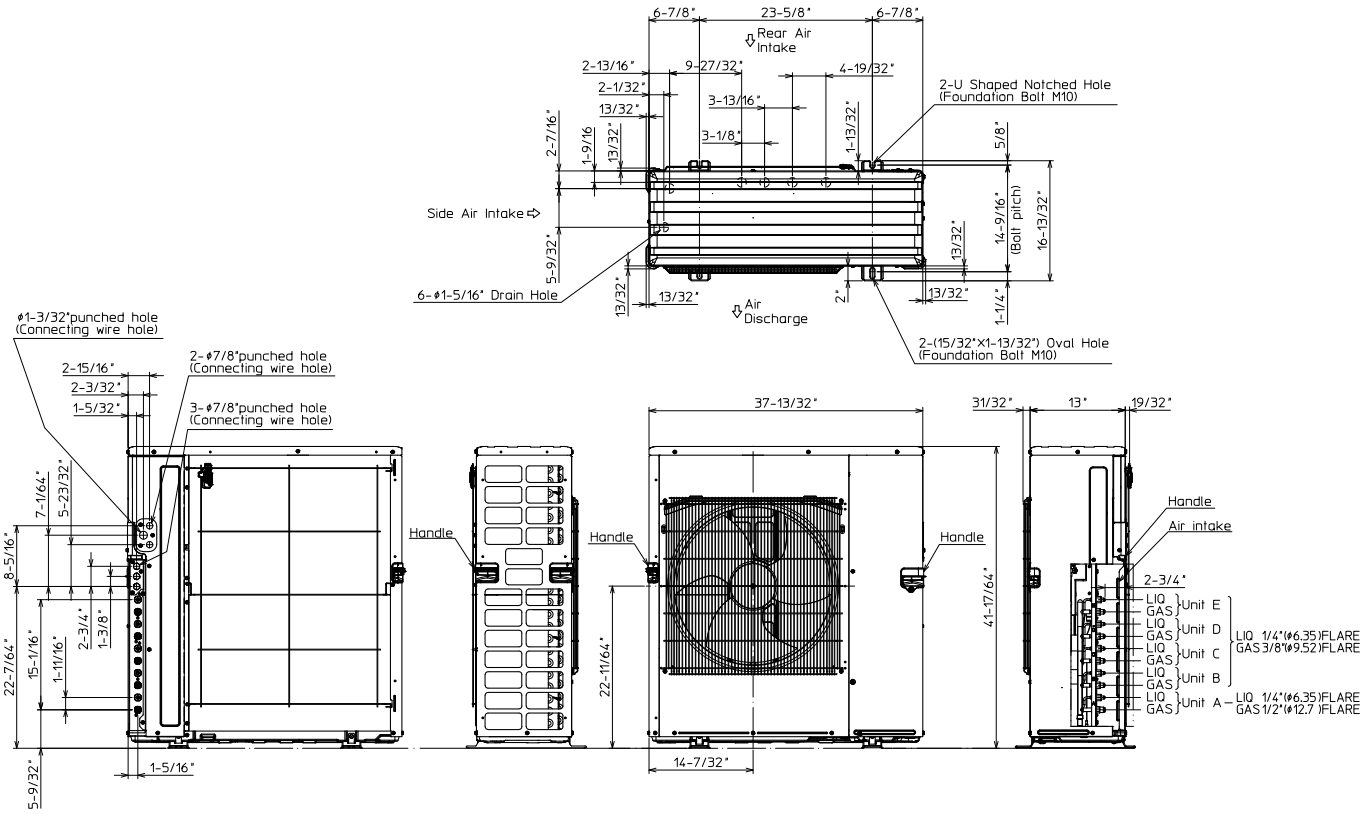




MXZ-5C42NA MXZ-5C42NA2

Unit: inch (mm)



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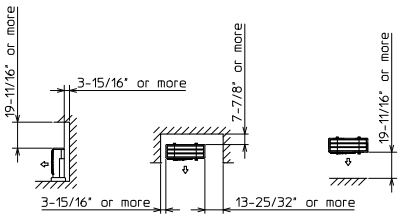

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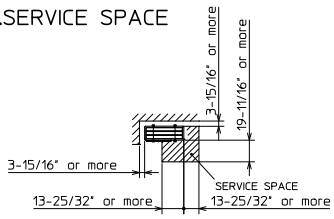
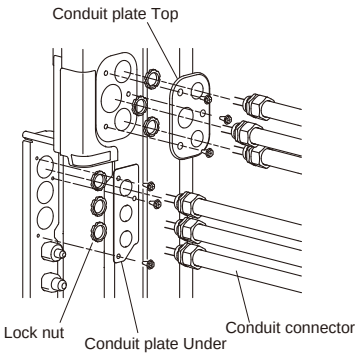
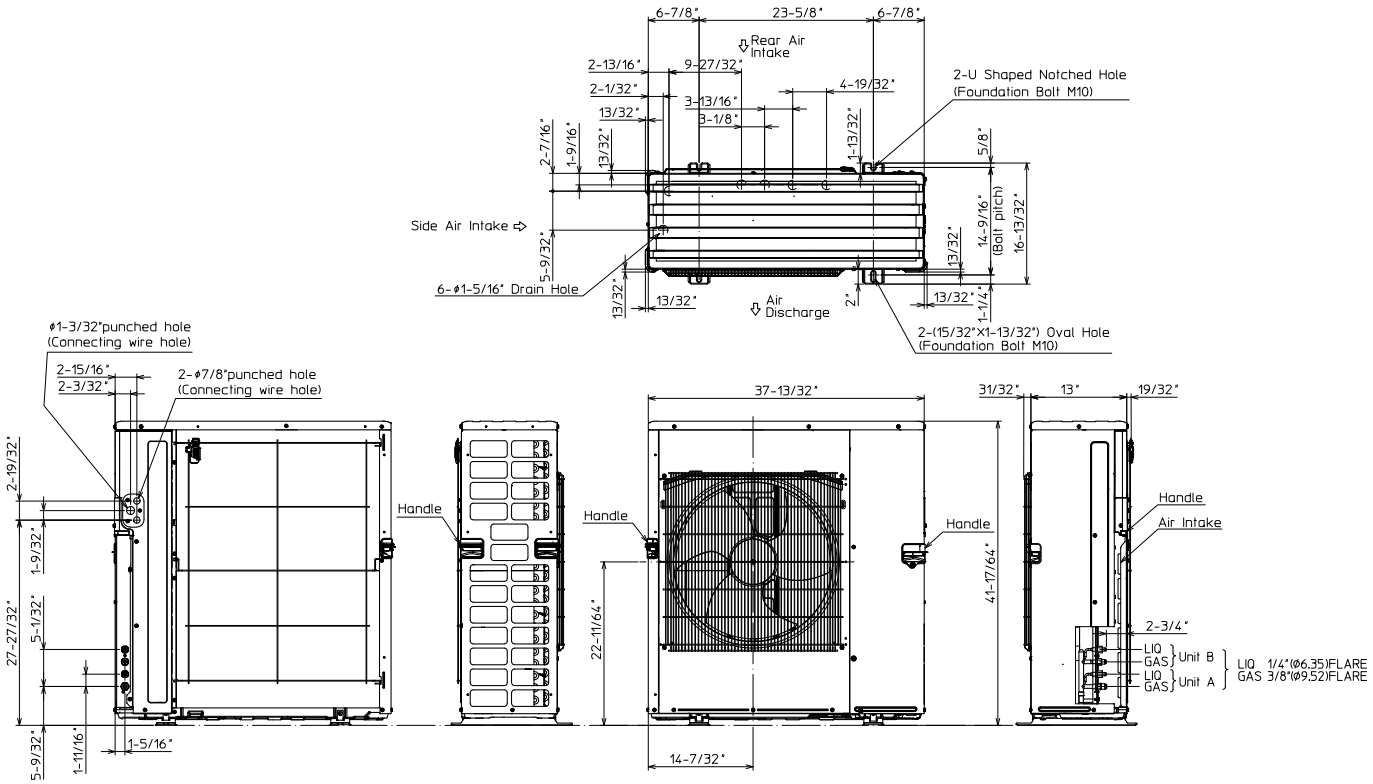




MXZ-2C20NAHZ MXZ-2C20NAHZ2

Unit: inch (mm)



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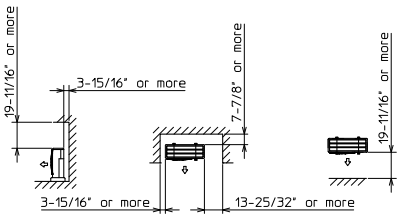

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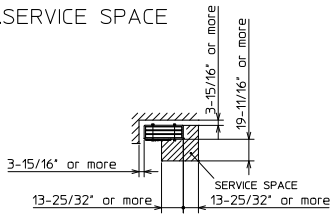
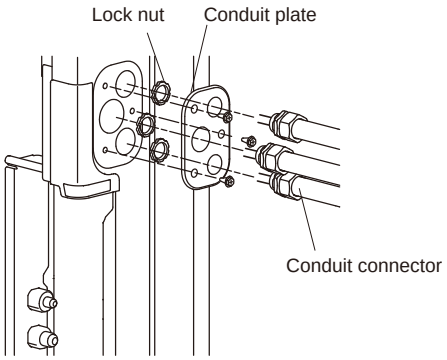
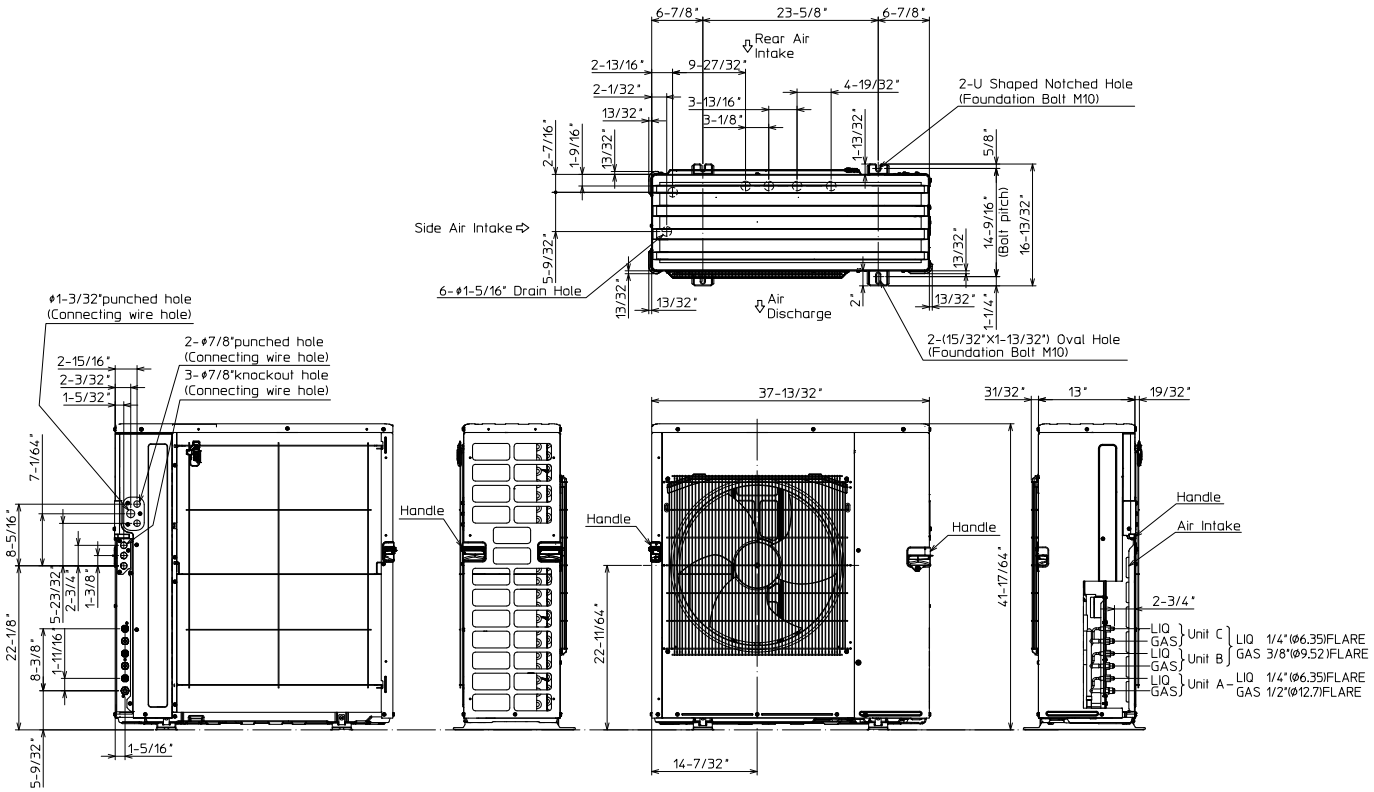




MXZ-3C24NAHZ MXZ-3C24NAHZ2
MXZ-3C30NAHZ MXZ-3C30NAHZ2

Unit: inch (mm)



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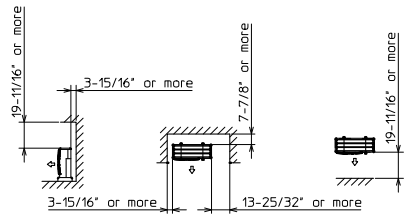

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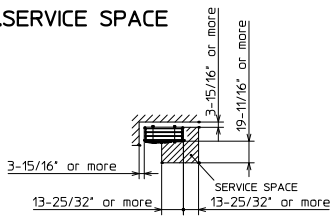
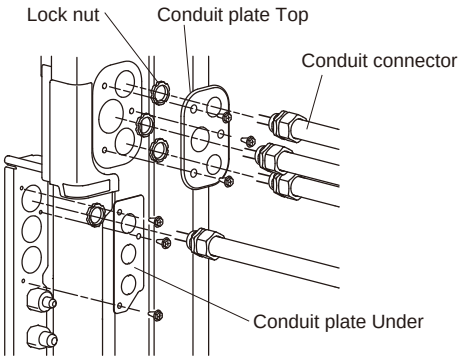
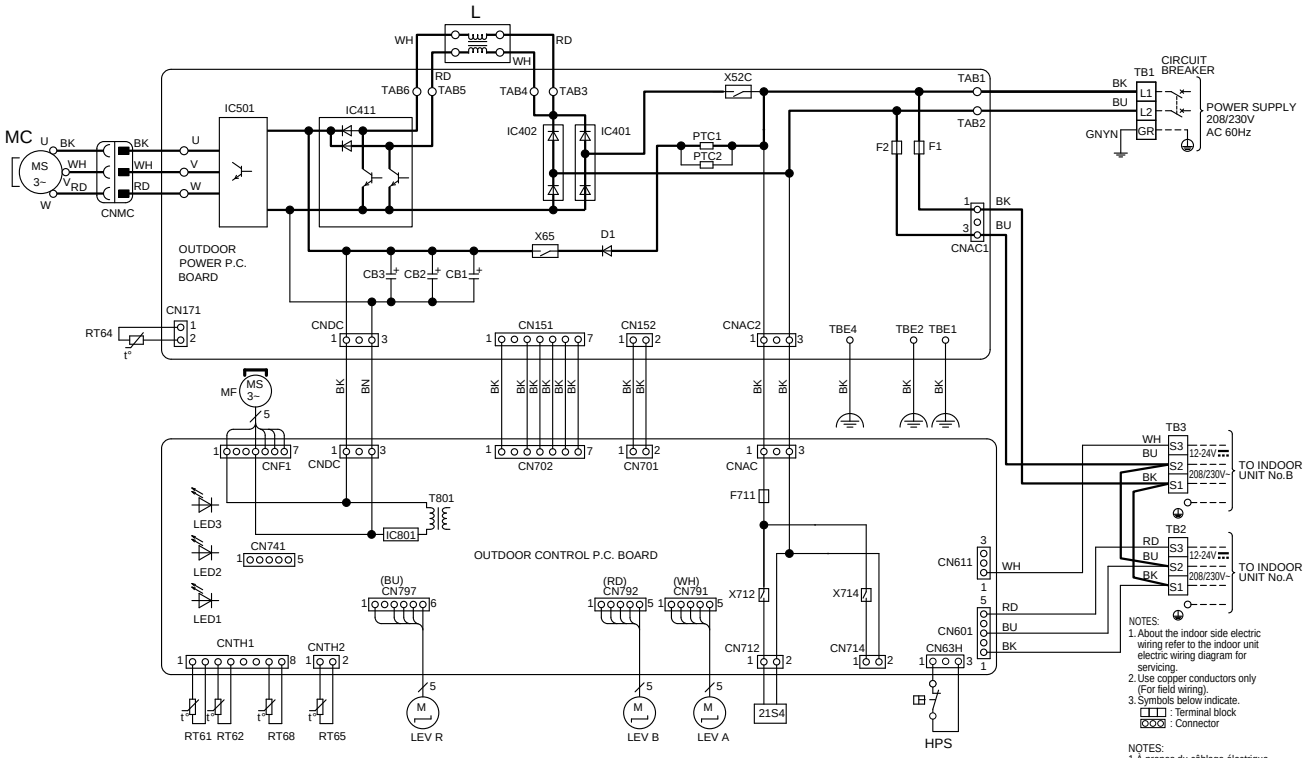




7 WIRING DIAGRAM

MXZ-2C20NA2

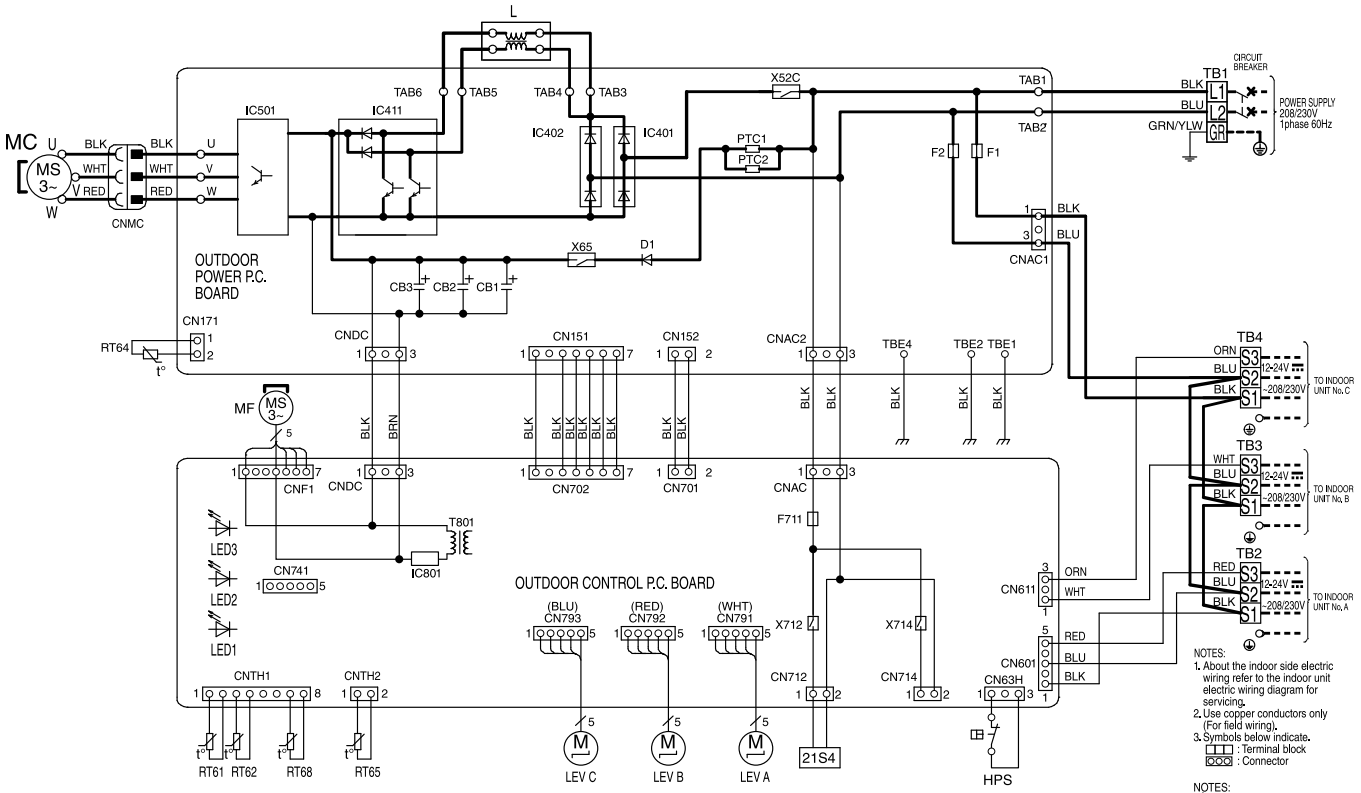


NOTES:
1. About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
2. Use copper conductors only (For field wiring).
3. Symbols below indicate.
: Terminal block
: Connector

NOTES:
1. À propos du câblage électrique de côté intérieur se référer à l'unité intérieure câblage schéma électrique pour l'entretien.
2. Utiliser des conducteurs en cuivre (Pour le câblage).
3. Symbole ci-dessous indique.
:Bornier
:Connecteur

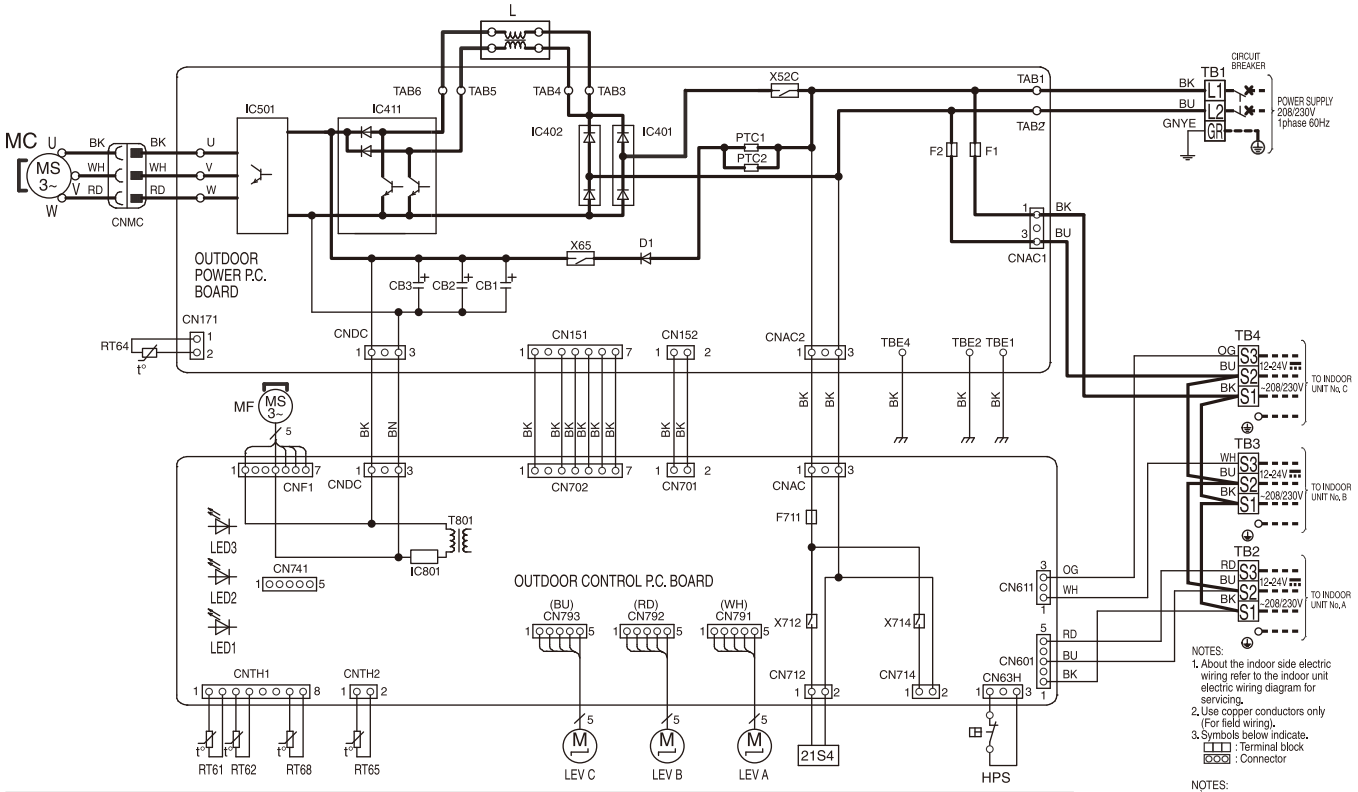
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
CB1~3	SMOOTHING CAPACITOR	IC401, 402	DIODE BRIDGE	LEV A, B, R	EXPANSION VALVE COIL	RT64	FIN TEMP. THERMISTOR	X52C	RELAY
D1	DIODE	IC411	POWER FACTOR CONTROLLER	MC	COMPRESSOR	RT65	AMBIENT TEMP. THERMISTOR	X65	RELAY
F1	FUSE (T6.3AL250V)	IC501	POWER MODULE	MF	FAN MOTOR	RT68	OUTDOOR HEAT EXCHANGER	X712	RELAY
F2	FUSE (T6.3AL250V)	IC801	POWER DEVICE	PTC1, 2	CIRCUIT PROTECTION		TEMPERATURE THERMISTOR	X714	RELAY
F711	FUSE (T3.15AL250V)	L	REACTOR	RT61	DEFROST THERMISTOR	T801	TRANSFORMER	21S4	REVERSING VALVE SOLENOID COIL
HPS	HIGH PRESSURE SWITCH	LED1~3	LED	RT62	DISCHARGE TEMP. THERMISTOR	TB1~3	TERMINAL BLOCK		

MXZ-3C24NA
MXZ-3C30NA



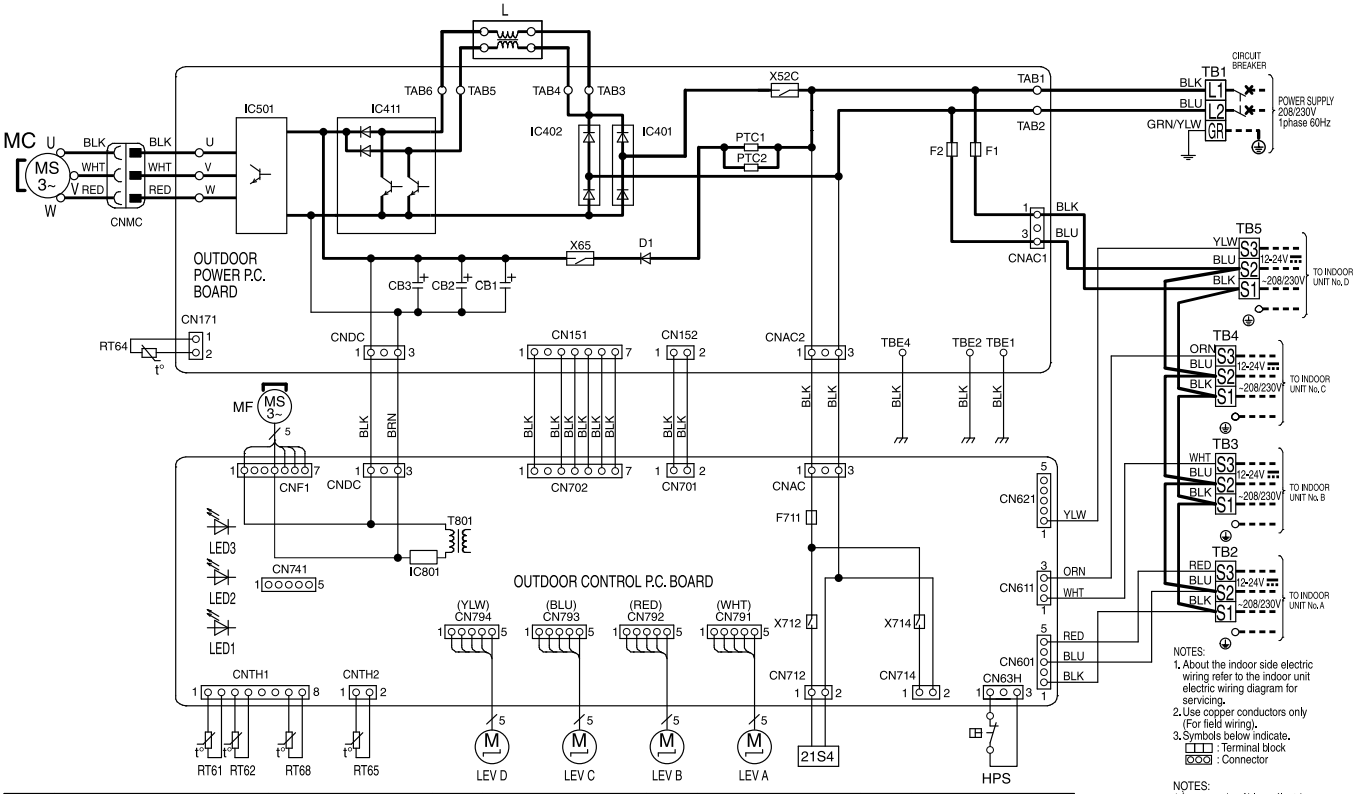
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
CB1~3	SMOOTHING CAPACITOR	IC401, 402	DIODE BRIDGE	LEV A~C	EXPANSION VALVE COIL	RT64	FIN TEMP. THERMISTOR	X52C	RELAY
D1	DIODE	IC411	POWER FACTOR CONTROLLER	MC	COMPRESSOR	RT65	AMBIENT TEMP. THERMISTOR	X65	RELAY
F1	FUSE (T6.3AL 250V)	IC501	POWER MODULE	MF	FAN MOTOR	RT68	OUTDOOR HEAT EXCHANGER	X712	RELAY
F2	FUSE (T6.3AL 250V)	IC801	POWER DEVICE	PTC1, 2	CIRCUIT PROTECTION		TEMPERATURE THERMISTOR	X714	RELAY
F711	FUSE (T3.15AL 250V)	L	REACTOR	RT61	DEFROST THERMISTOR	T801	TRANSFORMER	21S4	REVERSING VALVE SOLENOID COIL
HPS	HIGH PRESSURE SWITCH	LED1~3	LED	RT62	DISCHARGE TEMP. THERMISTOR	TB1~4	TERMINAL BLOCK		

MXZ-3C24NA2
MXZ-3C30NA2



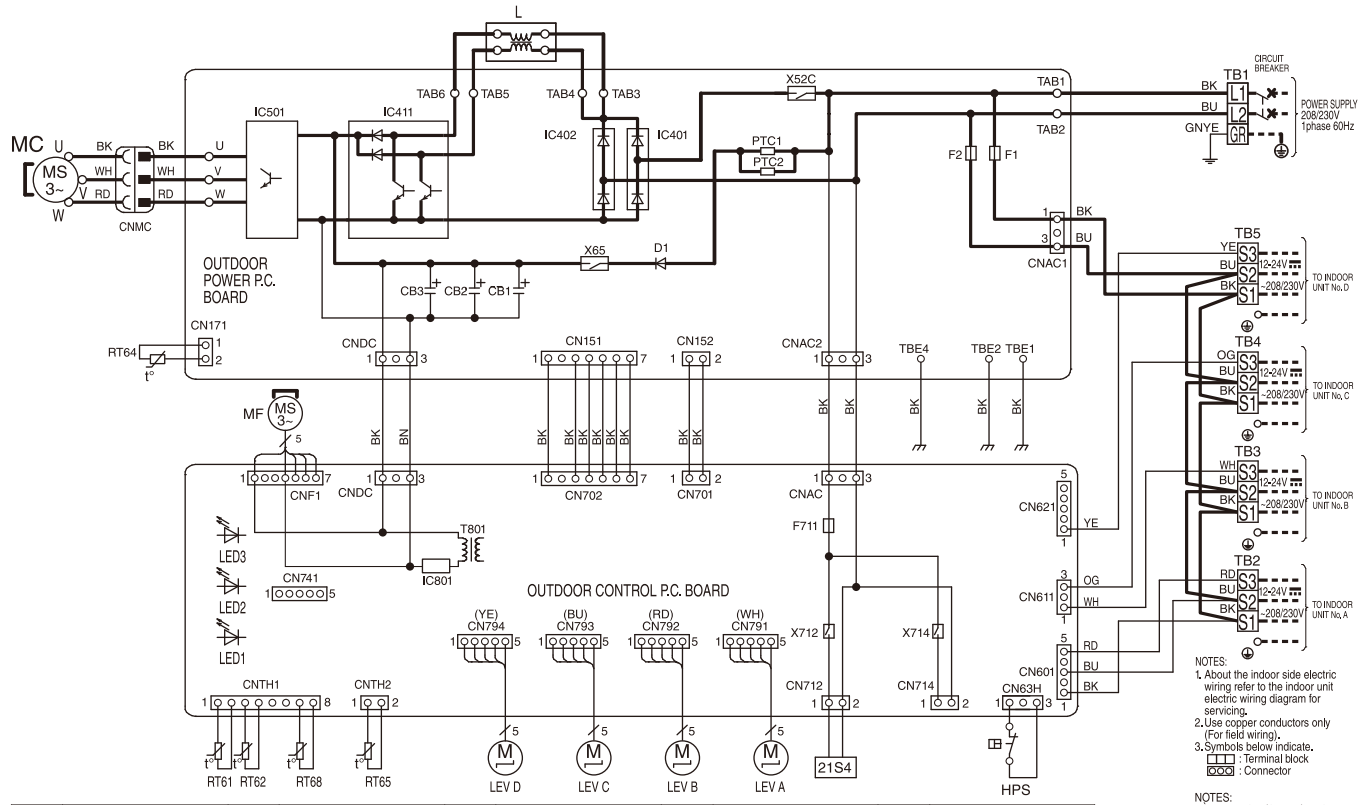
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
CB1~3	SMOOTHING CAPACITOR	IC401, 402	DIODE BRIDGE	LEV A~C	EXPANSION VALVE COIL	RT64	FIN TEMP.THERMISTOR	X52C	RELAY
D1	DIODE	IC411	POWER FACTOR CONTROLLER	MC	COMPRESSOR	RT65	AMBIENT TEMP.THERMISTOR	X65	RELAY
F1	FUSE (T6.3AL 250V)	IC501	POWER MODULE	MF	FAN MOTOR	RT68	OUTDOOR HEAT EXCHANGER	X712	RELAY
F2	FUSE (T6.3AL 250V)	IC801	POWER DEVICE	PTC1, 2	CIRCUIT PROTECTION		TEMPERATURE THERMISTOR	X714	RELAY
F711	FUSE (T3.15AL 250V)	L	REACTOR	RT61	DEFROST THERMISTOR	T801	TRANSFORMER	21S4	REVERSING VALVE SOLENOID COIL
HPS	HIGH PRESSURE SWITCH	LED1~3	LED	RT62	DISCHARGE TEMP.THERMISTOR	TB1~4	TERMINAL BLOCK		

MXZ-4C36NA



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
CB1~3	SMOOTHING CAPACITOR	IC401, 402	DIODE BRIDGE	LEV A~D	EXPANSION VALVE COIL	RT64	FIN TEMP. THERMISTOR	X52C	RELAY
D1	DIODE	IC411	POWER FACTOR CONTROLLER	MC	COMPRESSOR	RT65	AMBIENT TEMP. THERMISTOR	X65	RELAY
F1	FUSE (T6.3AL 250V)	IC501	POWER MODULE	MF	FAN MOTOR	RT68	OUTDOOR HEAT EXCHANGER TEMPERATURE THERMISTOR	X712	RELAY
F2	FUSE (T6.3AL 250V)	IC801	POWER DEVICE	PTC1, 2	CIRCUIT PROTECTION			X714	RELAY
F711	FUSE (T3.15AL 250V)	L	REACTOR	RT61	DEFROST THERMISTOR	T801	TRANSFORMER	21S4	REVERSING VALVE SOLENOID COIL
HPS	HIGH PRESSURE SWITCH	LED1~3	LED	RT62	DISCHARGE TEMP. THERMISTOR	TB1~5	TERMINAL BLOCK		

MXZ-4C36NA2

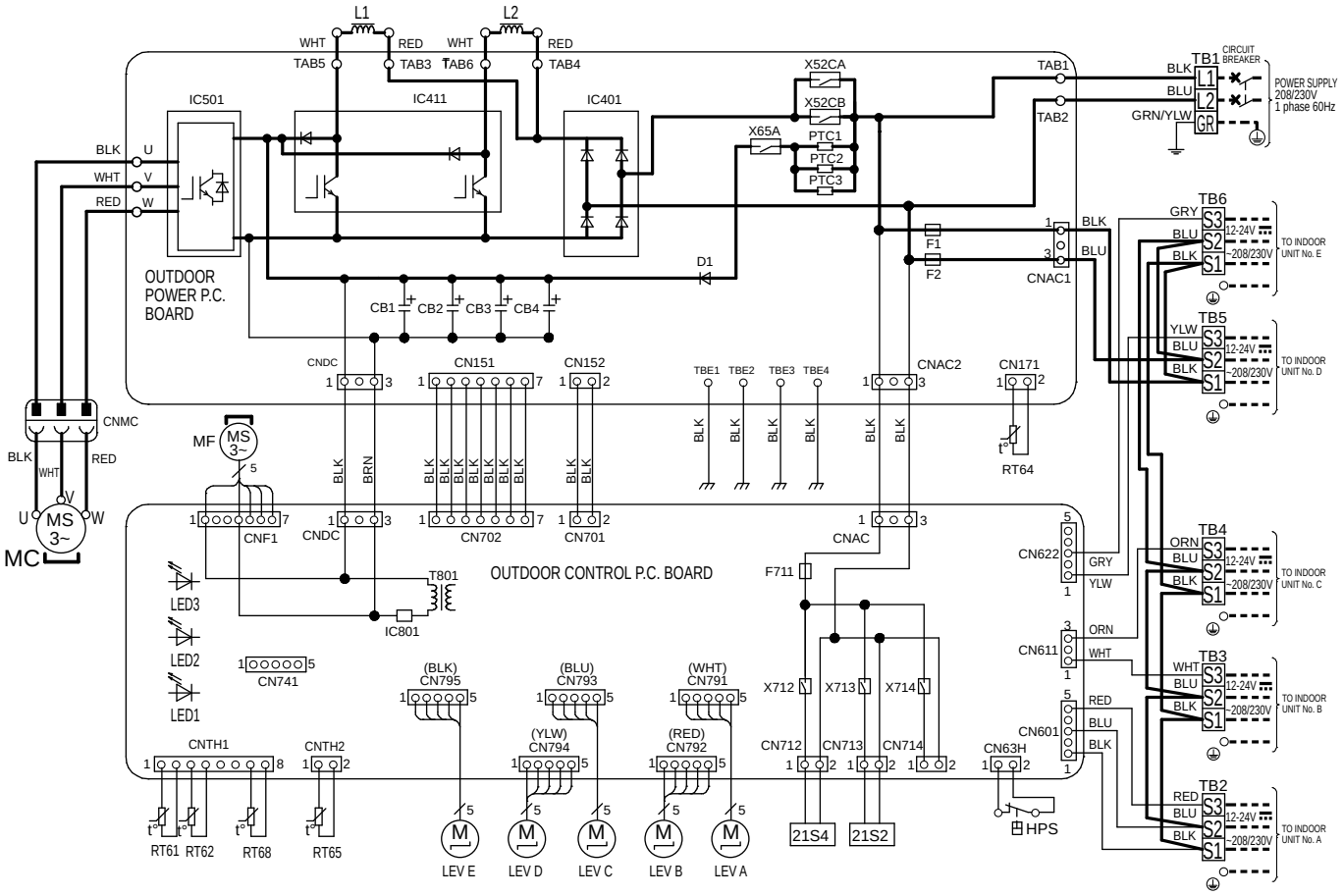


NOTES:
1. About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
2. Use copper conductors only (For field wiring).
3. Symbols below indicate.
: Terminal block
: Connector

NOTES:
1. A propos du câblage électrique de côté intérieur se référer à l'unité intérieure câblage schéma électrique pour l'entretien.
2. Utiliser des conducteurs en cuivre (Pour le câblage).
3. Symbole ci-dessous indique.
:Bornier
:Connecteur

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
CB1~3	SMOOTHING CAPACITOR	IC401, 402	DIODE BRIDGE	LEV A~D	EXPANSION VALVE COIL	RT64	FIN TEMP. THERMISTOR	X52C	RELAY
D1	DIODE	IC411	POWER FACTOR CONTROLLER	MC	COMPRESSOR	RT65	AMBIENT TEMP. THERMISTOR	X65	RELAY
F1	FUSE (T6.3AL 250V)	IC501	POWER MODULE	MF	FAN MOTOR	RT68	OUTDOOR HEAT EXCHANGER	X712	RELAY
F2	FUSE (T6.3AL 250V)	IC801	POWER DEVICE	PTC1, 2	CIRCUIT PROTECTION		TEMPERATURE THERMISTOR	X714	RELAY
F711	FUSE (T3.15AL 250V)	L	REACTOR	RT61	DEFROST THERMISTOR	T801	TRANSFORMER	21S4	REVERSING VALVE SOLENOID COIL
HPS	HIGH PRESSURE SWITCH	LED1~3	LED	RT62	DISCHARGE TEMP. THERMISTOR	TB1~5	TERMINAL BLOCK		

MXZ-5C42NA

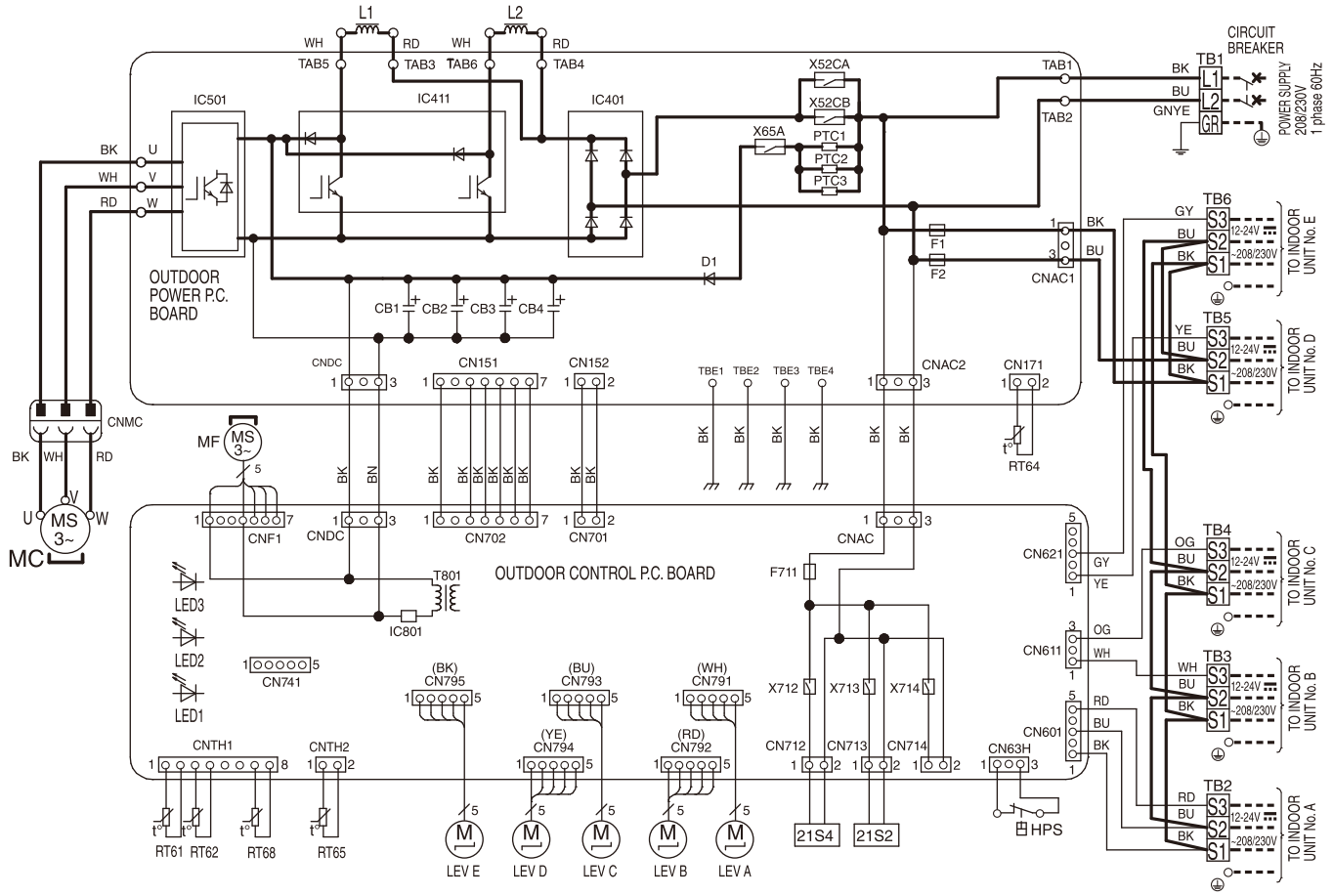


SYMBOL	NAME	SYMBOL	NAME
CB1~4	SMOOTHING CAPACITOR	L1, L2	REACTOR
D1	DIODE	LED 1~3	LED
F1, F2	FUSE (T6.3AL 250V)	LEV A~E	EXPANSION VALVE
F711	FUSE (T3.15AL 250V)	MC	COMPRESSOR
HPS	HIGH PRESSURE SWITCH	MF	FAN MOTOR
IC401	DIODE BRIDGE	T801	TRANSFORMER
IC411	POWER MODULE	TB1~6	TERMINAL BLOCK
IC501	POWER MODULE	X52CA, B	RELAY
IC801	POWER DEVICE	X65A	RELAY
PTC1~3	CIRCUIT PROTECTION	X712	RELAY
RT61	DEFROST THERMISTOR	X713	RELAY
RT62	DISCHARGE TEMP. THERMISTOR	X714	RELAY
RT64	FIN TEMP. THERMISTOR	21S2	2WAY VALVE SOLENOID COIL
RT65	AMBIENT TEMP. THERMISTOR	21S4	REVERSING VALVE SOLENOID COIL
RT68	OUTDOOR HEAT EXCHANGER TEMPERATURE THERMISTOR		

NOTES:
1.About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
2.Use copper conductors only (For field wiring).
3.Symbols below indicate.
□□□ : Terminal block
⊙⊙⊙ : connector

NOTES:
1.À propos du câblage électrique de côté intérieur se référer à l'unité intérieure câblage schéma électrique pour l'entretien.
2.Utiliser des conducteurs en cuivre (pour le câblage).
3.Symbole ci-dessous indique.
□□□:bornier
⊙⊙⊙:connecteur

MXZ-5C42NA2

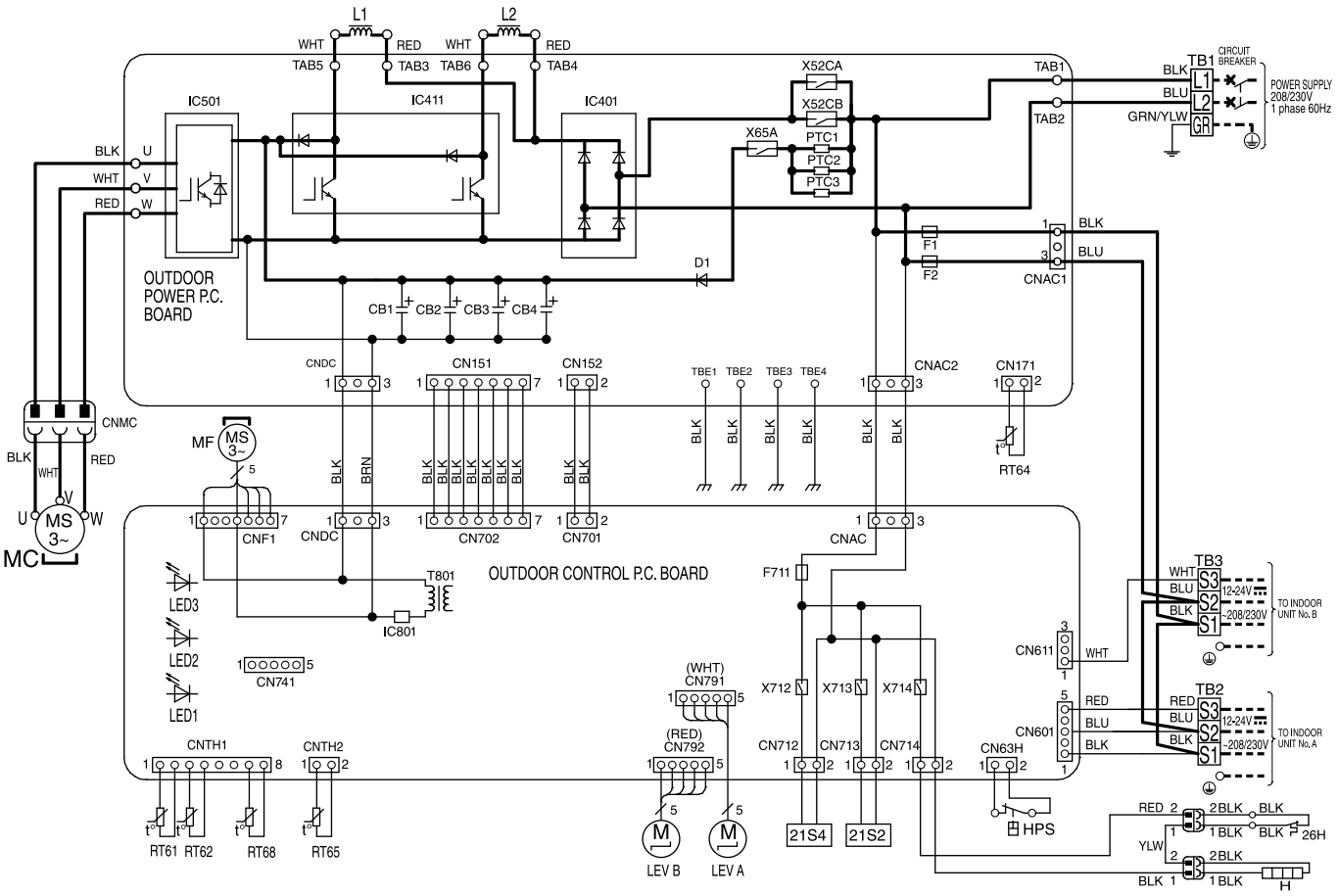


SYMBOL	NAME	SYMBOL	NAME
CB1~4	SMOOTHING CAPACITOR	RT62	DISCHARGE TEMP. THERMISTOR
D1	DIODE	RT64	FIN TEMP. THERMISTOR
F1, F2	FUSE (T6.3AL 250V)	RT65	AMBIENT TEMP. THERMISTOR
F711	FUSE (T3.15AL 250V)	RT68	OUTDOOR HEAT EXCHANGER TEMPERATURE THERMISTOR
HPS	HIGH PRESSURE SWITCH		
IC401	DIODE BRIDGE	T801	TRANSFORMER
IC411	POWER MODULE	TB1~6	TERMINAL BLOCK
IC501	POWER MODULE	X52CA, B	RELAY
IC801	POWER DEVICE	X65A	RELAY
L1, L2	REACTOR	X712	RELAY
LED 1~3	LED	X713	RELAY
LEV A~E	EXPANSION VALVE COIL	X714	RELAY
MC	COMPRESSOR	21S2	2WAY VALVE SOLENOID COIL
MF	FAN MOTOR	21S4	REVERSING VALVE SOLENOID COIL
PTC1~3	CIRCUIT PROTECTION		
RT61	DEFROST THERMISTOR		

NOTES:
1. About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
2. Use copper conductors only (For field wiring).
3. Symbols below indicate.
   □□□ : Terminal block
   ⊏⊐⊐ : Connector

NOTES:
1. À propos du câblage électrique de côté intérieur se référer à l'unité intérieure câblage schéma électrique pour l'entretien.
2. Utiliser des conducteurs en cuivre (pour le câblage).
3. Symbole ci-dessous indique.
   □□□: Bornier
   ⊏⊐⊐: Connecteur

MXZ-2C20NAHZ

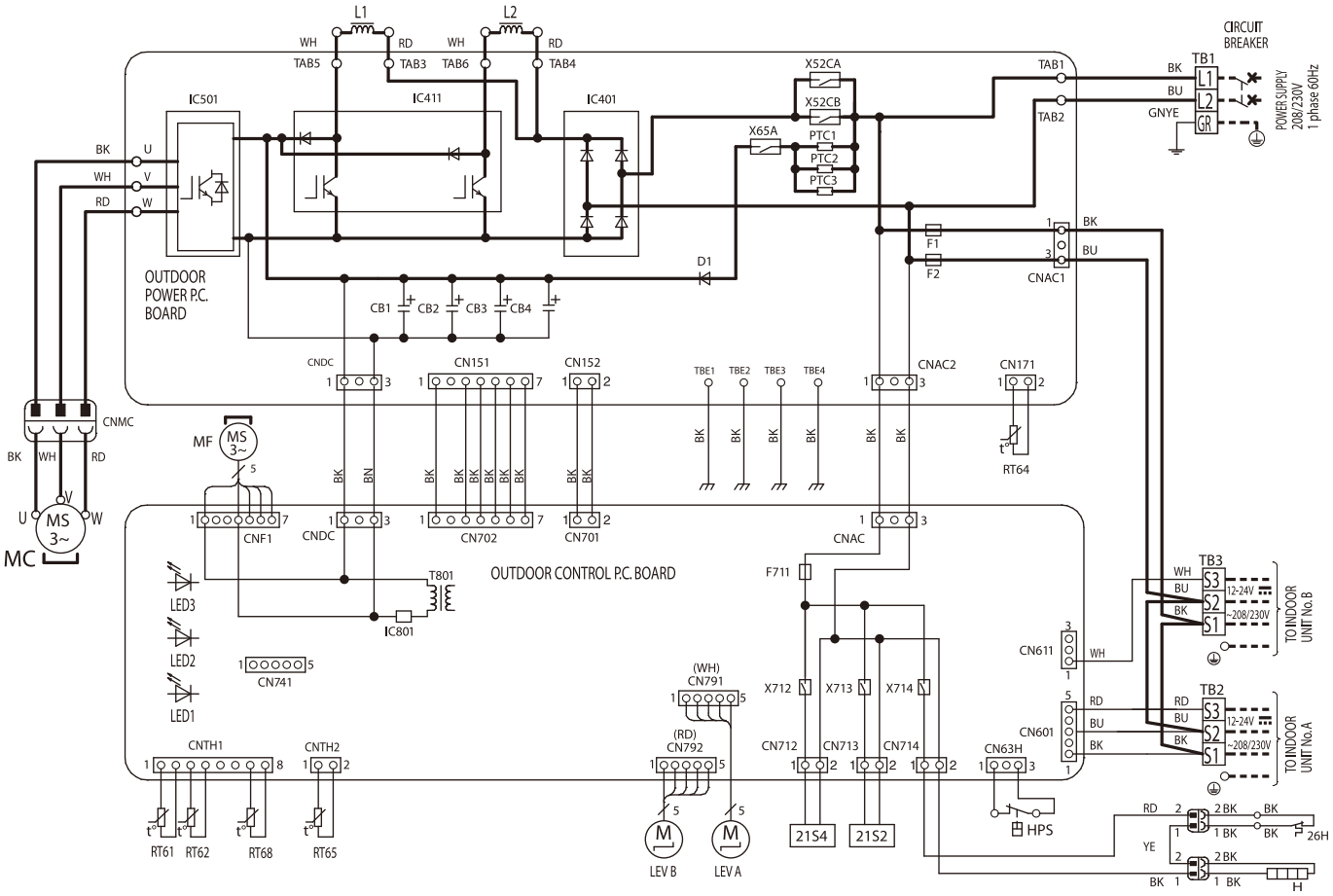


SYMBOL	NAME	SYMBOL	NAME
CB1~4	SMOOTHING CAPACITOR	L1, L2	REACTOR
D1	DIODE	LED 1~3	LED
F1, F2	FUSE (T6.3AL 250V)	LEV A, B	EXPANSION VALVE
F711	FUSE (T3.15AL 250V)	MC	COMPRESSOR
HPS	HIGH PRESSURE SWITCH	MF	FAN MOTOR
IC401	DIODE BRIDGE	T801	TRANSFORMER
IC411	POWER MODULE	TB1~3	TERMINAL BLOCK
IC501	POWER MODULE	X52CA, B	RELAY
IC801	POWER DEVICE	X65A	RELAY
PTC1~3	CIRCUIT PROTECTION	X712	RELAY
RT61	DEFROST THERMISTOR	X713	RELAY
RT62	DISCHARGE TEMP. THERMISTOR	X714	RELAY
RT64	FIN TEMP. THERMISTOR	21S2	2WAY VALVE SOLENOID COIL
RT65	AMBIENT TEMP. THERMISTOR	21S4	REVERSING VALVE SOLENOID COIL
RT68	OUTDOOR HEAT EXCHANGER TEMPERATURE THERMISTOR	26H	HEATER PROTECTOR
		H	DEFROST HEATER

NOTES:
1. About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
2. Use copper conductors only (For field wiring).
3. Symbols below indicate.
   □□□: Terminal block
   ⊡⊡⊡: connector

NOTES:
1. À propos du câblage électrique de côté intérieur se référer à l'unité intérieure câblage schéma électrique pour l'entretien.
2. Utiliser des conducteurs en cuivre (pour le câblage).
3. Symbole ci-dessous indique.
   □□□:bornier
   ⊡⊡⊡:connecteur

MXZ-2C20NAHZ2

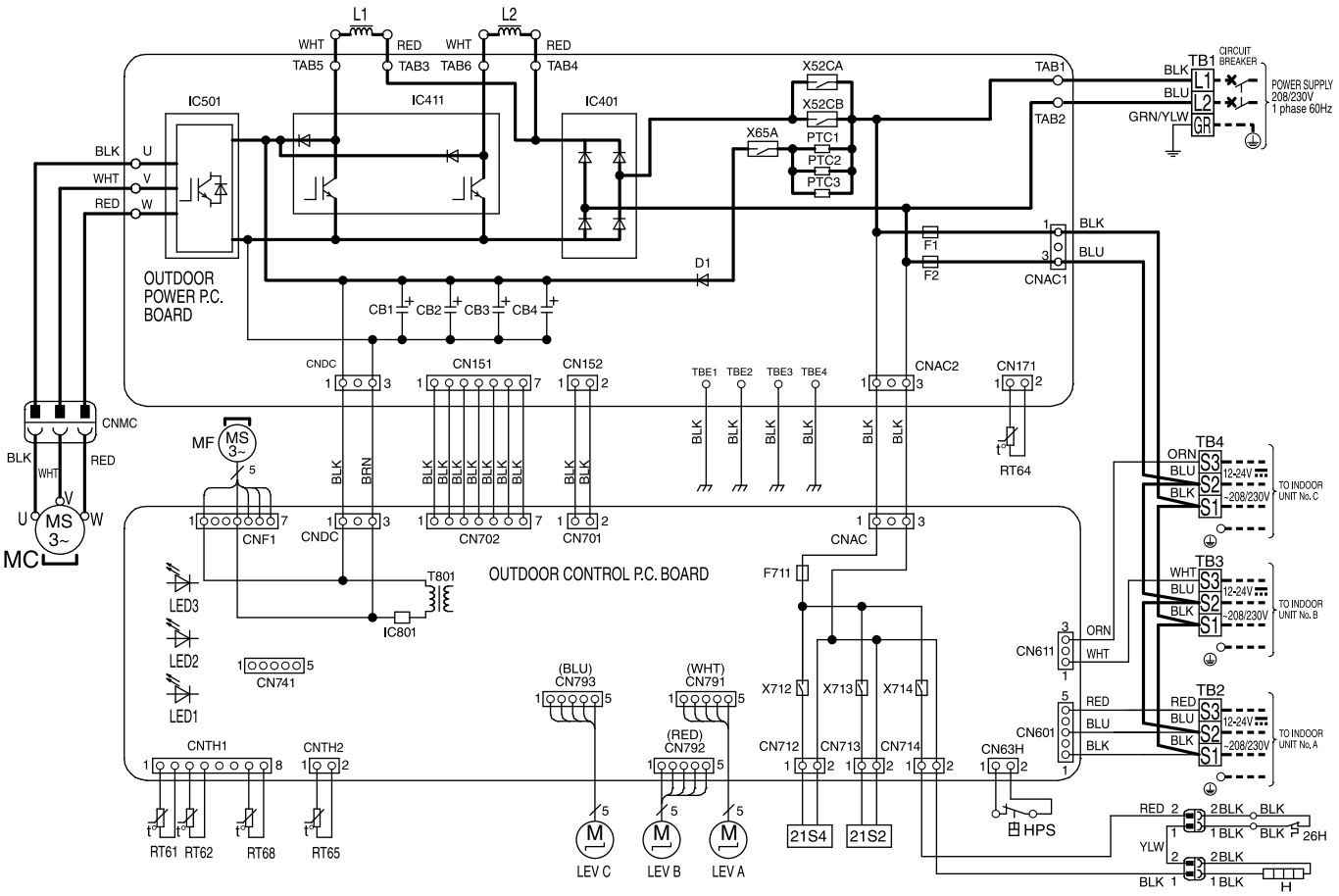


SYMBOL	NAME	SYMBOL	NAME
CB1~4	SMOOTHING CAPACITOR	RT61	DEFROST THERMISTOR
D1	DIODE	RT62	DISCHARGE TEMP.THERMISTOR
F1, F2	FUSE (T6.3AL 250V)	RT64	FIN TEMP.THERMISTOR
F711	FUSE (T3.15AL 250V)	RT65	AMBIENT TEMP.THERMISTOR
HPS	HIGH PRESSURE SWITCH	RT 68	OUTDOOR HEAT EXCHANGER
H	DEFROST HEATER		TEMPERATURE THERMISTOR
IC401	DIODE BRIDGE	T801	TRANSFORMER
IC411	POWER MODULE	TB1~3	TERMINAL BLOCK
IC501	POWER MODULE	X52CA, B	RELAY
IC801	POWER DEVICE	X65A	RELAY
L1, L2	REACTOR	X712	RELAY
LED 1~3	LED	X713	RELAY
LEV A, B	EXPANSION VALVE COIL	X714	RELAY
MC	COMPRESSOR	21S2	2WAY VALVE SOLENOID COIL
MF	FAN MOTOR	21S4	REVERSING VALVE SOLENOID COIL
PTC1~3	CIRCUIT PROTECTION	26H	HEATER PROTECTOR

NOTES:
1.About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
2.Use copper conductors only (For field wiring).
3.Symbols below indicate.
□□□ : Terminal block
⊡⊡⊡ : Connector

NOTES:
1.À propos du câblage électrique de côté intérieur se référer à l'unité intérieure câblage schéma électrique pour l'entretien.
2.Utiliser des conducteurs en cuivre (pour le câblage).
3.Symbole ci-dessous indique.
□□□ : Bornier
⊡⊡⊡ : Connecteur

MXZ-3C24NAHZ
MXZ-3C30NAHZ

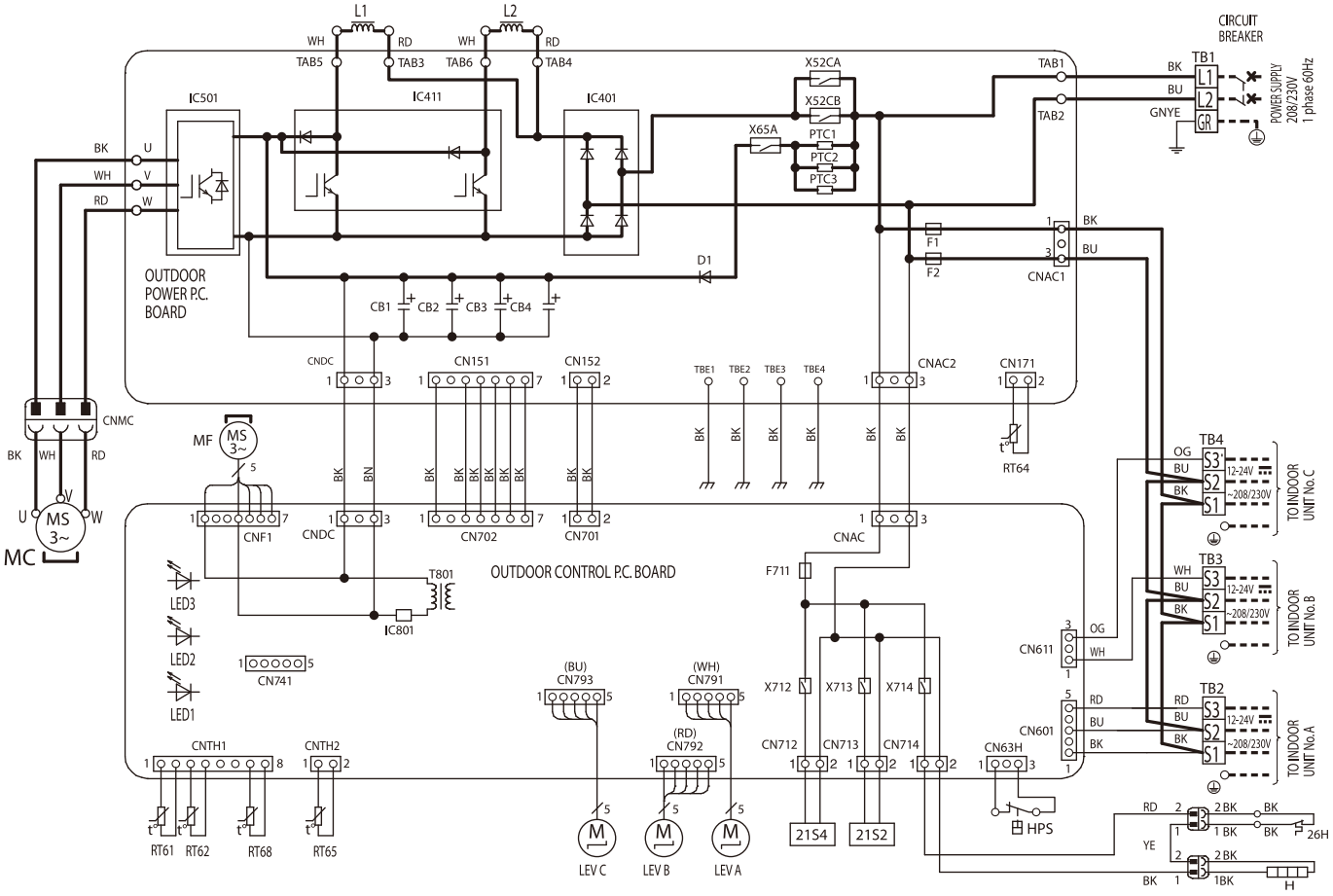


SYMBOL	NAME	SYMBOL	NAME
CB1~4	SMOOTHING CAPACITOR	L1, L2	REACTOR
D1	DIODE	LED 1~3	LED
F1, F2	FUSE (T6.3AL 250V)	LEV A~C	EXPANSION VALVE
F711	FUSE (T3.15AL 250V)	MC	COMPRESSOR
HPS	HIGH PRESSURE SWITCH	MF	FAN MOTOR
IC401	DIODE BRIDGE	T801	TRANSFORMER
IC411	POWER MODULE	TB1~4	TERMINAL BLOCK
IC501	POWER MODULE	X52CA, B	RELAY
IC801	POWER DEVICE	X65A	RELAY
PTC1~3	CIRCUIT PROTECTION	X712	RELAY
RT61	DEFROST THERMISTOR	X713	RELAY
RT62	DISCHARGE TEMP. THERMISTOR	X714	RELAY
RT64	FIN TEMP. THERMISTOR	21S2	2WAY VALVE SOLENOID COIL
RT65	AMBIENT TEMP. THERMISTOR	21S4	REVERSING VALVE SOLENOID COIL
RT68	OUTDOOR HEAT EXCHANGER TEMPERATURE THERMISTOR	26H	HEATER PROTECTOR
		H	DEFROST HEATER

NOTES:
1. About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
2. Use copper conductors only (For field wiring).
3. Symbols below indicate.
   □□□ : Terminal block
   ⊙⊙⊙ : connector

NOTES:
1. À propos du câblage électrique de côté intérieur se référer à l'unité intérieure câblage schéma électrique pour l'entretien.
2. Utiliser des conducteurs en cuivre (pour le câblage).
3. Symbole ci-dessous indique.
   □□□ :bornier
   ⊙⊙⊙ :connecteur

MXZ-3C24NAHZ2
MXZ-3C30NAHZ2



SYMBOL	NAME	SYMBOL	NAME
CB1~4	SMOOTHING CAPACITOR	RT61	DEFROST THERMISTOR
D1	DIODE	RT62	DISCHARGE TEMP. THERMISTOR
F1, F2	FUSE (T6.3AL 250V)	RT64	FIN TEMP. THERMISTOR
F711	FUSE (T3.15AL 250V)	RT65	AMBIENT TEMP. THERMISTOR
HPS	HIGH PRESSURE SWITCH	RT68	OUTDOOR HEAT EXCHANGER TEMPERATURE THERMISTOR
H	DEFROST HEATER		
IC401	DIODE BRIDGE	T801	TRANSFORMER
IC411	POWER MODULE	TB1~4	TERMINAL BLOCK
IC501	POWER MODULE	X52CA, B	RELAY
IC801	POWER DEVICE	X65A	RELAY
L1, L2	REACTOR	X712	RELAY
LED 1~3	LED	X713	RELAY
LEV A~C	EXPANSION VALVE COIL	X714	RELAY
MC	COMPRESSOR	21S2	2WAY VALVE SOLENOID COIL
MF	FAN MOTOR	21S4	REVERSING VALVE SOLENOID COIL
PTC1~3	CIRCUIT PROTECTION	26H	HEATER PROTECTOR

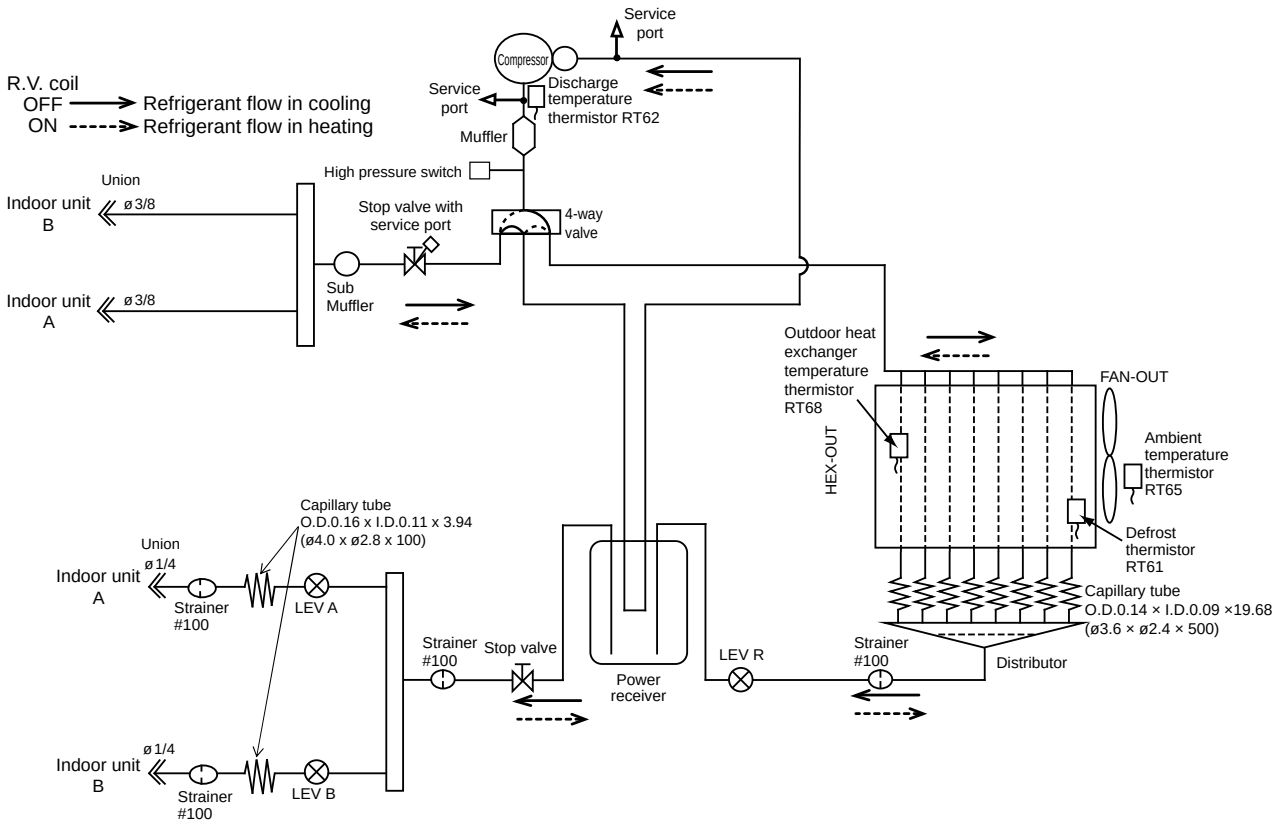
NOTES:
1. About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
2. Use copper conductors only (For field wiring).
3. Symbols below indicate.
   : Terminal block
   : Connector

NOTES:
1. À propos du câblage électrique de côté intérieur se référer à l'unité intérieure câblage schéma électrique pour l'entretien.
2. Utiliser des conducteurs en cuivre (pour le câblage).
3. Symbole ci-dessous indique.
   : Bornier
   : Connecteur

8 REFRIGERANT SYSTEM DIAGRAM

MXZ-2C20NA2

Unit: inch (mm)



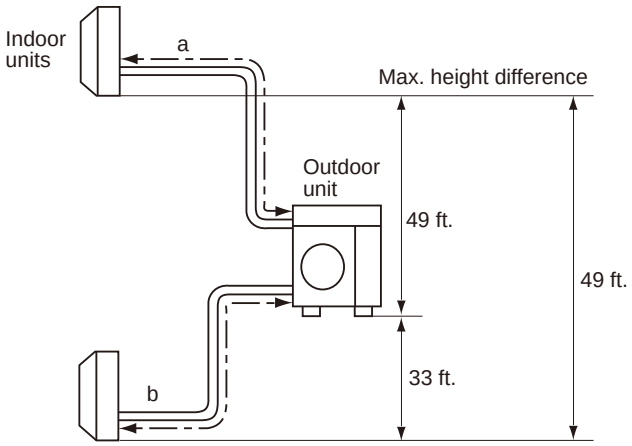
Operating Range MXZ-2C20NA2

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°FWB	115°FDB
	Minimum	67°FDB, 57°FWB	14°FDB
Heating	Maximum	80°FDB, 67°FWB	75°FDB, 65°FWB
	Minimum	70°FDB, 60°FWB	6°FDB, 5°FWB

MAX. REFRIGERANT PIPING LENGTH & PIPE SIZE SELECTION MXZ-2C20NA2

Piping length each indoor unit (a, b)	82 ft. MAX.
Total piping length (a+b)	164 ft. MAX.
Bending point for each unit	25 MAX.
Total bending point	50 MAX.

✻It is irrelevant which unit is higher.



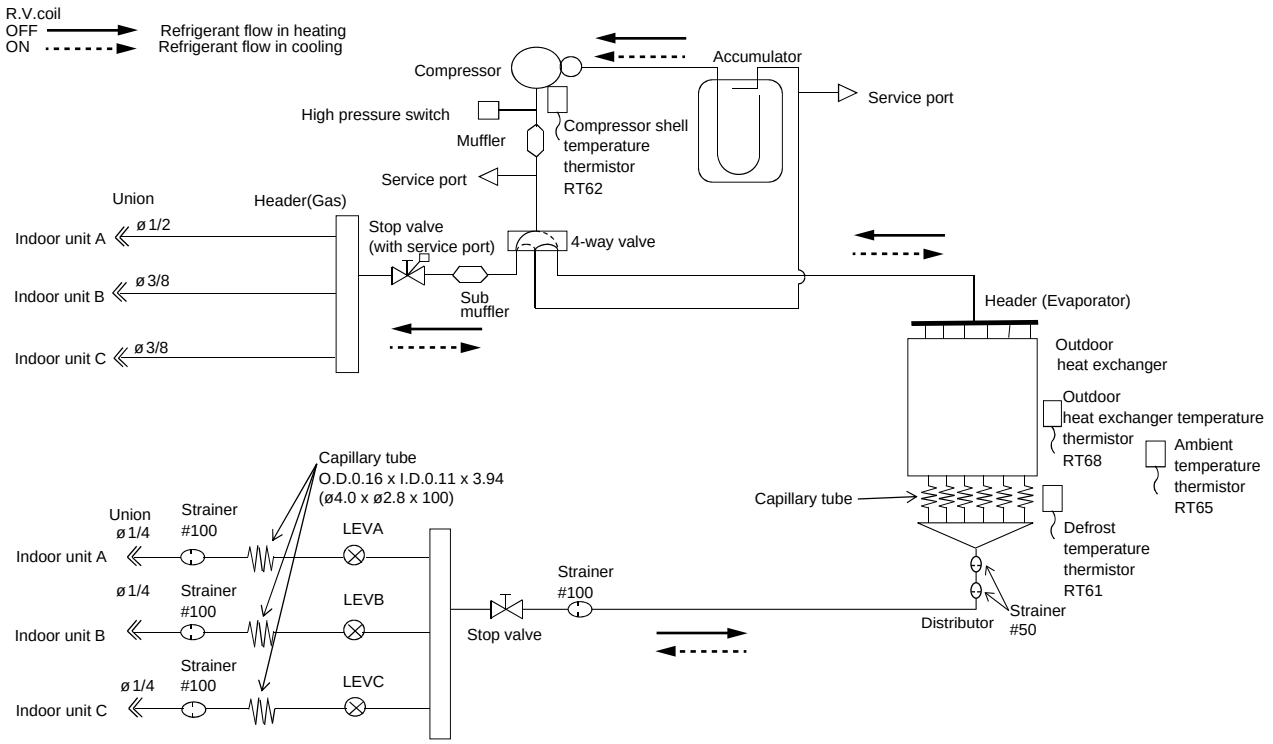
- Refrigerant pipe diameter is different according to indoor unit to be connected. When using extension pipes, refer to the tables below.
- When the diameter of refrigerant pipe is different from that of outdoor unit union, use optional Different-diameter pipe. For further information on Different-diameter pipe, refer to "PARTS CATALOG".

Unit: inch

Outdoor unit union diameter		
For		
Indoor unit A	Liquid	1/4
	Gas	3/8
Indoor unit B	Liquid	1/4
	Gas	3/8

MXZ-3C24NA MXZ-3C24NA2
MXZ-3C30NA MXZ-3C30NA2

Unit: inch (mm)



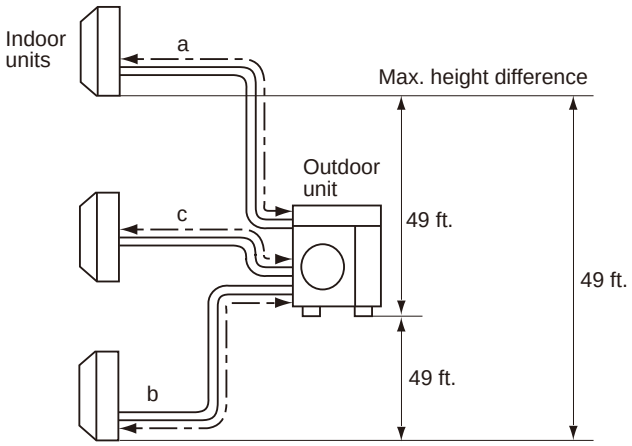
Operating Range MXZ-3C24NA MXZ-3C30NA MXZ-3C24NA2 MXZ-3C30NA2

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°FWB	115°FDB
	Minimum	67°FDB, 57°FWB	14°FDB
Heating	Maximum	80°FDB, 67°FWB	75°FDB, 65°FWB
	Minimum	70°FDB, 60°FWB	6°FDB, 5°FWB

MAX. REFRIGERANT PIPING LENGTH & PIPE SIZE SELECTION MXZ-3C24NA MXZ-3C30NA MXZ-3C24NA2 MXZ-3C30NA2

Piping length each indoor unit (a, b, c)	82 ft. MAX.
Total piping length (a+b+c)	230 ft. MAX.
Bending point for each unit	25 MAX.
Total bending point	70 MAX.

✻It is irrelevant which unit is higher.



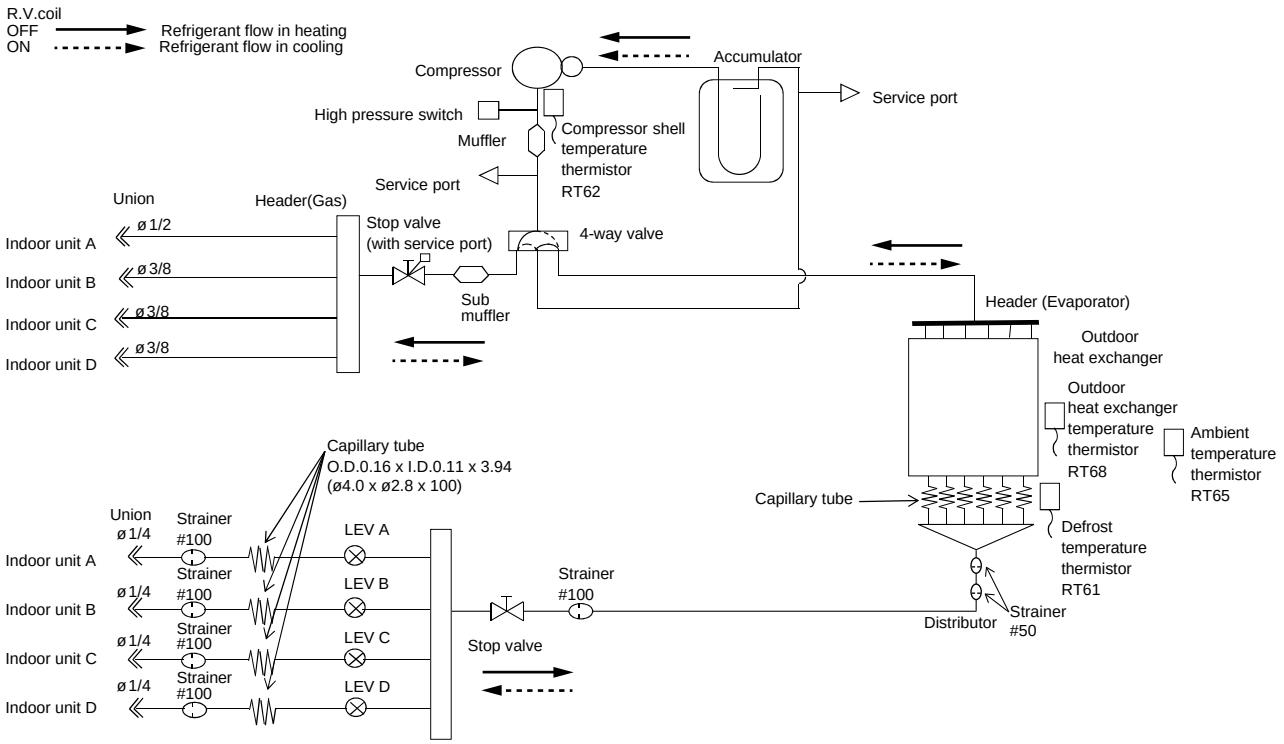
- Refrigerant pipe diameter is different according to indoor unit to be connected. When using extension pipes, refer to the tables below.
- When the diameter of refrigerant pipe is different from that of outdoor unit union, use optional Different-diameter pipe. For further information on Different-diameter pipe, refer to "PARTS CATALOG".

Unit: inch

Outdoor unit union diameter		
For		
Indoor unit A	Liquid	1/4
	Gas	1/2
Indoor unit B	Liquid	1/4
	Gas	3/8
Indoor unit C	Liquid	1/4
	Gas	3/8

MXZ-4C36NA MXZ-4C36NA2

Unit: inch (mm)



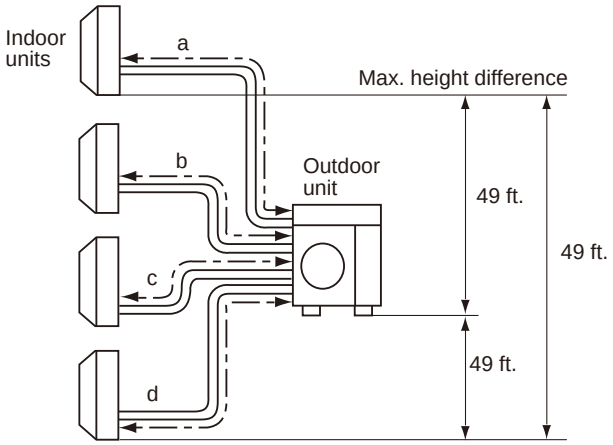
Operating Range MXZ-4C36NA MXZ-4C36NA2

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°FWB	115°FDB
	Minimum	67°FDB, 57°FWB	14°FDB
Heating	Maximum	80°FDB, 67°FWB	75°FDB, 65°FWB
	Minimum	70°FDB, 60°FWB	6°FDB, 5°FWB

MAX. REFRIGERANT PIPING LENGTH & PIPE SIZE SELECTION MXZ-4C36NA MXZ-4C36NA2

Piping length each indoor unit (a, b, c, d)	82 ft. MAX.
Total piping length (a+b+c+d)	230 ft. MAX.
Bending point for each unit	25 MAX.
Total bending point	70 MAX.

✻It is irrelevant which unit is higher.



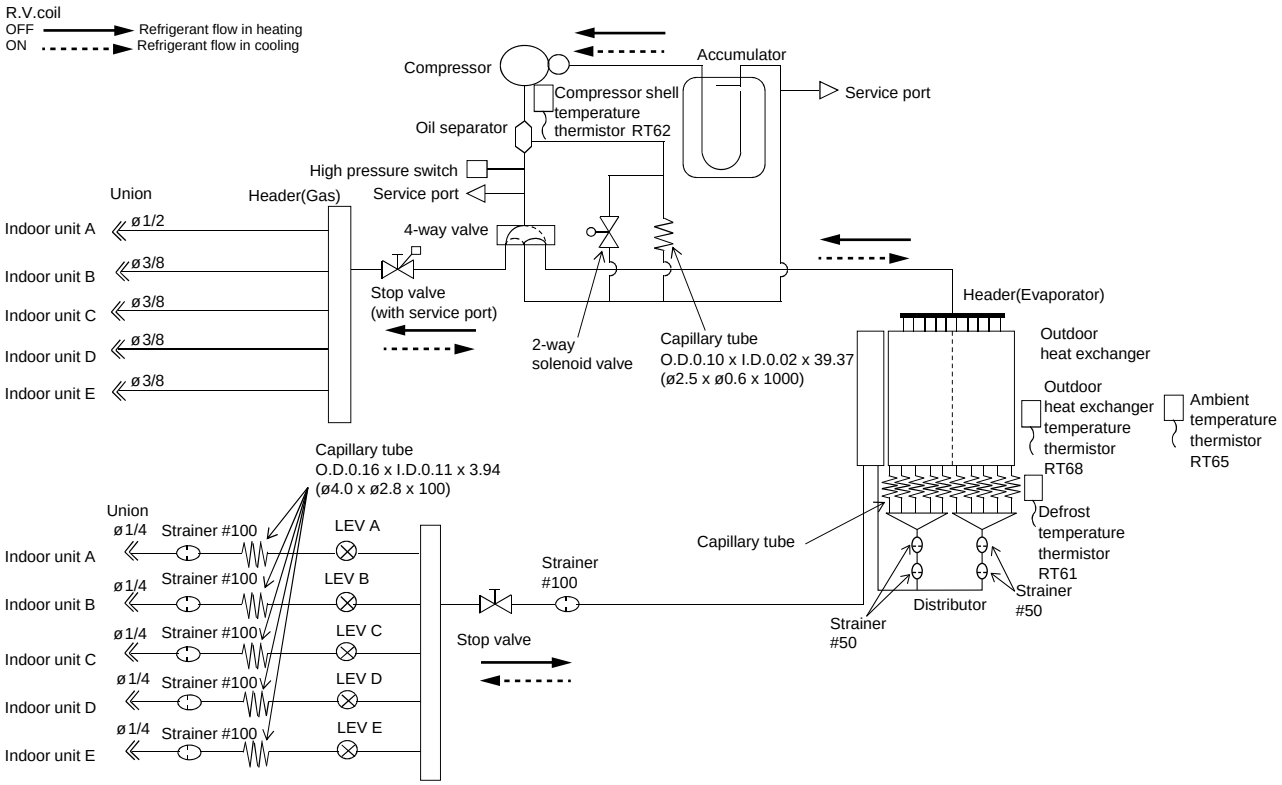
- Refrigerant pipe diameter is different according to indoor unit to be connected. When using extension pipes, refer to the tables below.
- When the diameter of refrigerant pipe is different from that of outdoor unit union, use optional Different-diameter pipe. For further information on Different-diameter pipe, refer to "PARTS CATALOG".

Unit: inch

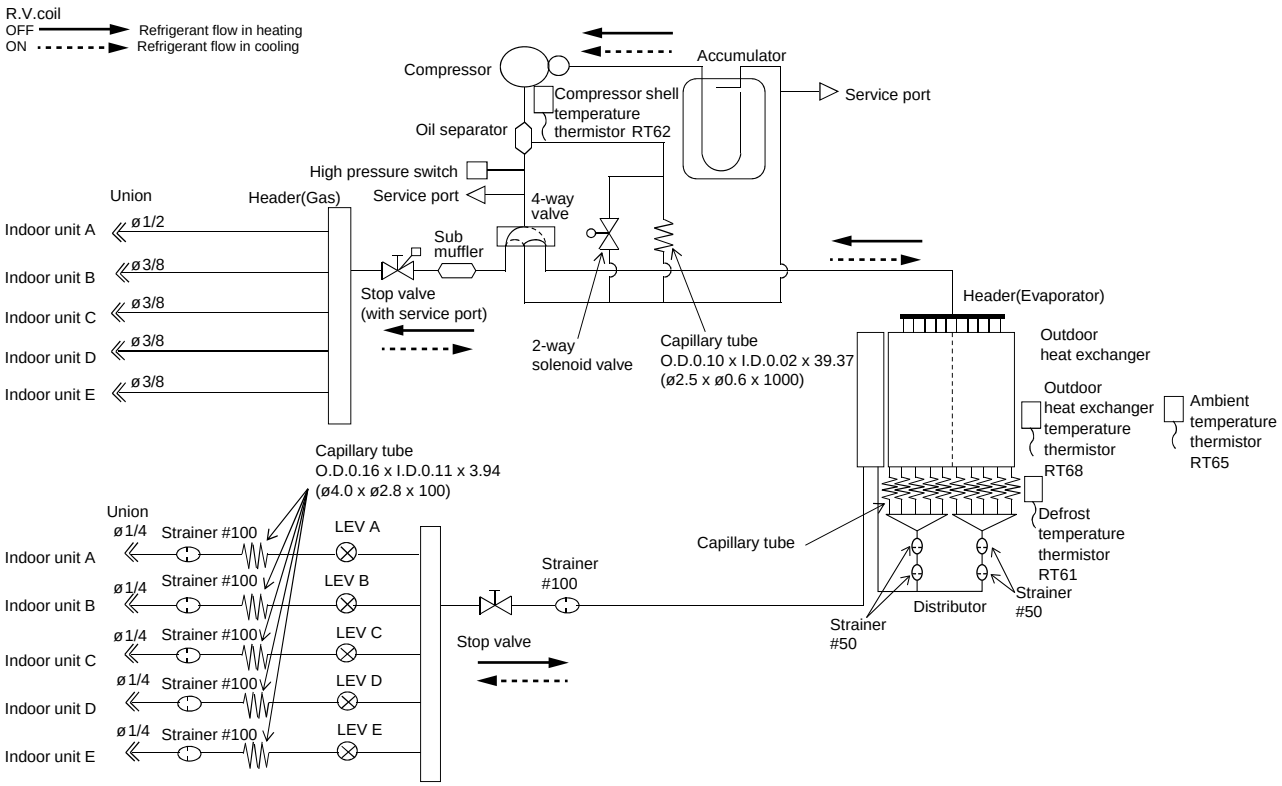
Outdoor unit union diameter		
For		
Indoor unit A	Liquid	1/4
	Gas	1/2
Indoor unit B	Liquid	1/4
	Gas	3/8
Indoor unit C	Liquid	1/4
	Gas	3/8
Indoor unit D	Liquid	1/4
	Gas	3/8

MXZ-5C42NA

Unit: inch (mm)



MXZ-5C42NA2



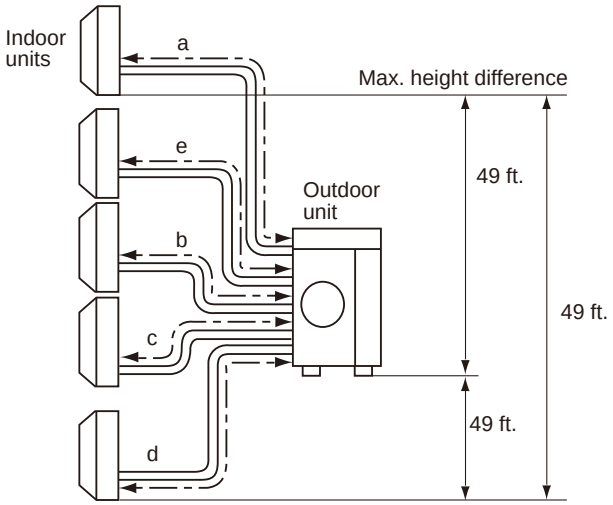
Operating Range MXZ-5C42NA MXZ-5C42NA2

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°FWB	115°FDB
	Minimum	67°FDB, 57°FWB	14°FDB
Heating	Maximum	80°FDB, 67°FWB	75°FDB, 65°FWB
	Minimum	70°FDB, 60°FWB	6°FDB, 5°FWB

MAX. REFRIGERANT PIPING LENGTH & PIPE SIZE SELECTION MXZ-5C42NA MXZ-5C42NA2

Piping length each indoor unit (a, b, c, d, e)	82 ft. MAX.
Total piping length (a+b+c+d+e)	262 ft. MAX.
Bending point for each unit	25 MAX.
Total bending point	80 MAX.

✻It is irrelevant which unit is higher.



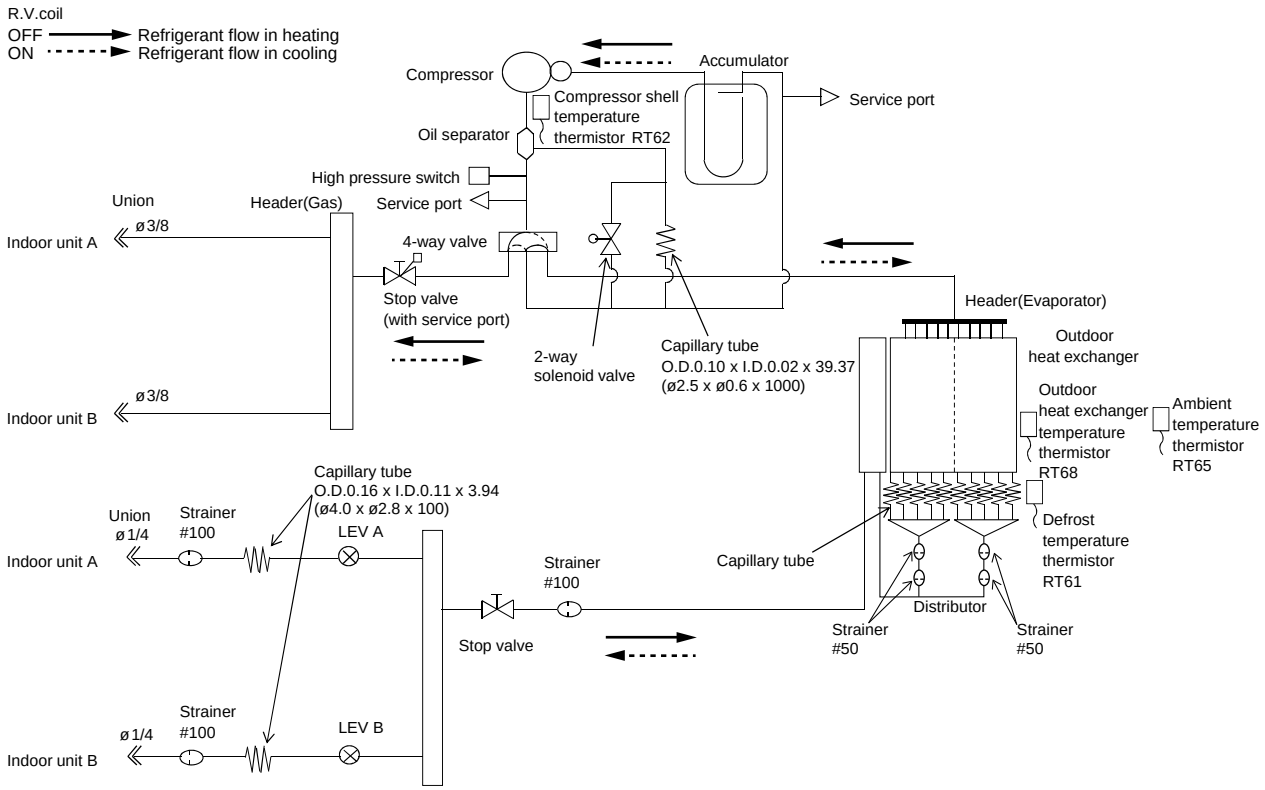
- Refrigerant pipe diameter is different according to indoor unit to be connected. When using extension pipes, refer to the tables below.
- When diameter of refrigerant pipe is different from that of outdoor unit union, use optional Different-diameter pipe. For further information on Different-diameter pipe, refer to "PARTS CATALOG".

Unit: inch

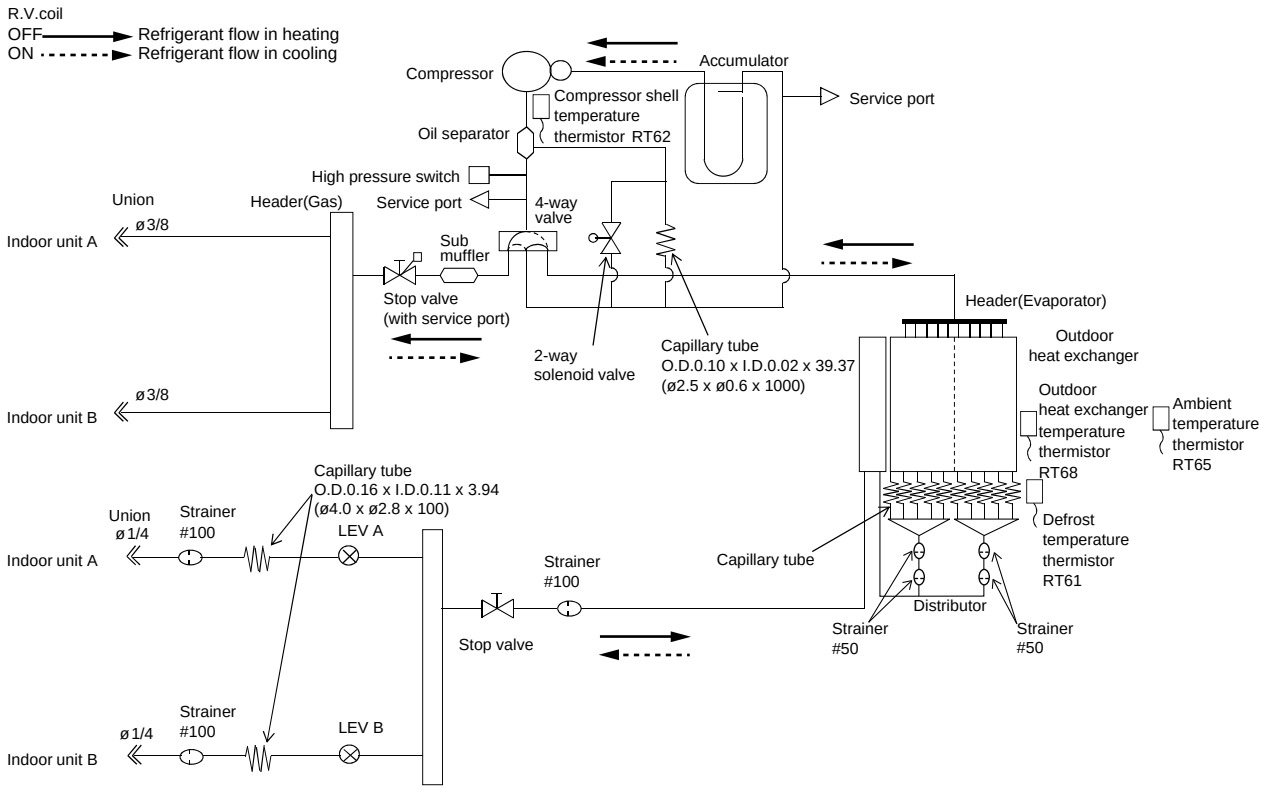
Outdoor unit union diameter		
For		
Indoor unit A	Liquid	1/4
	Gas	1/2
Indoor unit B	Liquid	1/4
	Gas	3/8
Indoor unit C	Liquid	1/4
	Gas	3/8
Indoor unit D	Liquid	1/4
	Gas	3/8
Indoor unit E	Liquid	1/4
	Gas	3/8

MXZ-2C20NAHZ

Unit: inch (mm)



MXZ-2C20NAHZ2



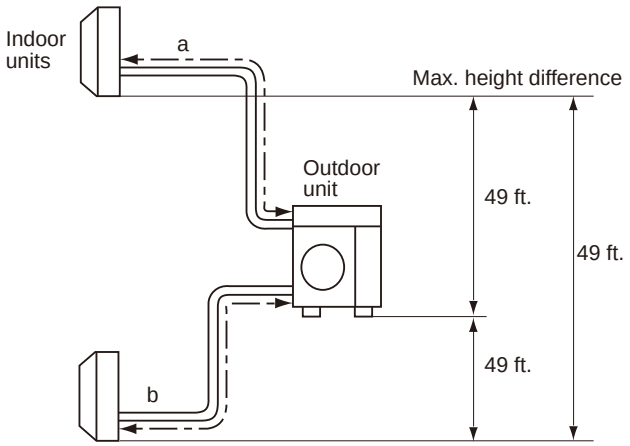
Operating Range MXZ-2C20NAHZ MXZ-2C20NAHZ2

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°FWB	115°FDB
	Minimum	67°FDB, 57°FWB	14°FDB
Heating	Maximum	80°FDB, 67°FWB	75°FDB, 65°FWB
	Minimum	70°FDB, 60°FWB	-12°FDB, -13°FWB

MAX. REFRIGERANT PIPING LENGTH & PIPE SIZE SELECTION MXZ-2C20NAHZ MXZ-2C20NAHZ2

Piping length each indoor unit (a, b)	82 ft. MAX.
Total piping length (a+b)	164 ft. MAX.
Bending point for each unit	25 MAX.
Total bending point	50 MAX.

✻It is irrelevant which unit is higher.



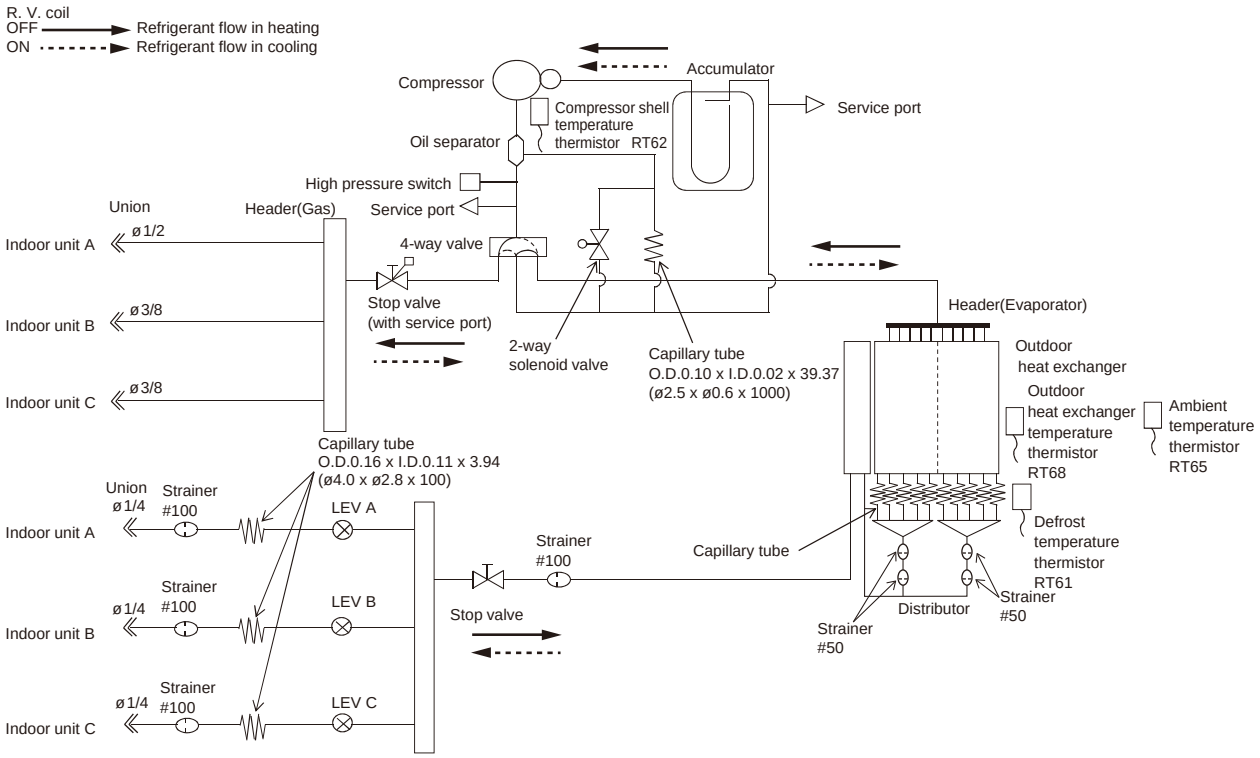
- Refrigerant pipe diameter is different according to indoor unit to be connected. When using extension pipes, refer to the tables below.
- When the diameter of refrigerant pipe is different from that of outdoor unit union, use optional Different-diameter pipe. For further information on Different-diameter pipe, refer to "PARTS CATALOG".

Unit: inch

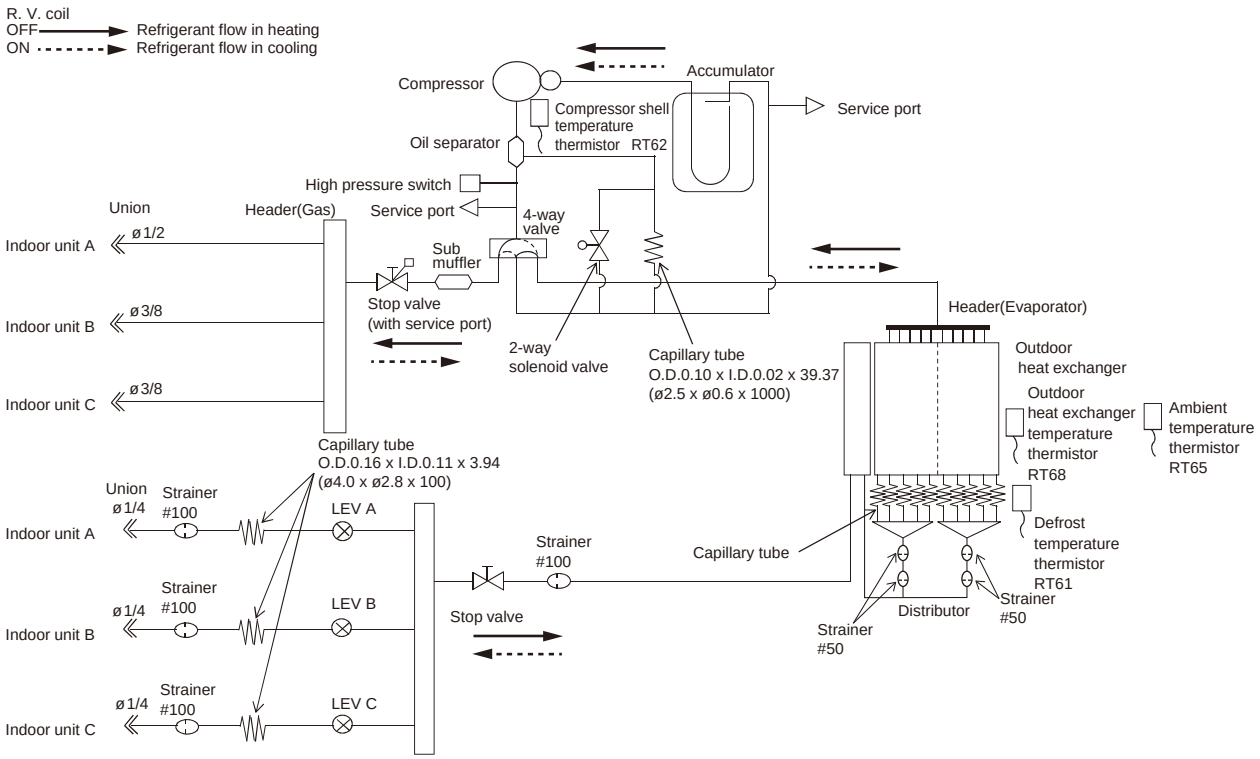
Outdoor unit union diameter		
For		
Indoor unit A	Liquid	1/4
	Gas	3/8
Indoor unit B	Liquid	1/4
	Gas	3/8

MXZ-3C24NAHZ MXZ-3C30NAHZ

Unit: inch (mm)



MXZ-3C24NAHZ2 MXZ-3C30NAHZ2



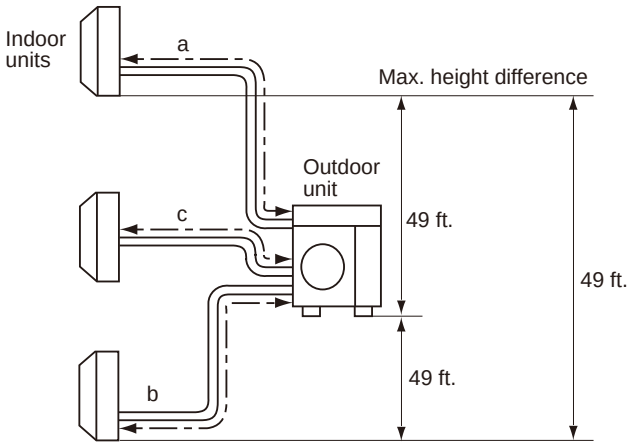
Operating Range MXZ-3C24NAHZ MXZ-3C30NAHZ MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°FWB	115°FDB
	Minimum	67°FDB, 57°FWB	14°FDB
Heating	Maximum	80°FDB, 67°FWB	75°FDB, 65°FWB
	Minimum	70°FDB, 60°FWB	-12°FDB, -13°FWB

MAX. REFRIGERANT PIPING LENGTH & PIPE SIZE SELECTION MXZ-3C24NAHZ MXZ-3C30NAHZ MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

Piping length each indoor unit (a, b, c)	82 ft. MAX.
Total piping length (a+b+c)	230 ft. MAX.
Bending point for each unit	25 MAX.
Total bending point	70 MAX.

✻It is irrelevant which unit is higher.



- Refrigerant pipe diameter is different according to indoor unit to be connected. When using extension pipes, refer to the tables below.
- When the diameter of refrigerant pipe is different from that of outdoor unit union, use optional Different-diameter pipe. For further information on Different-diameter pipe, refer to "PARTS CATALOG".

Unit: inch

Outdoor unit union diameter		
For		
Indoor unit A	Liquid	1/4
	Gas	1/2
Indoor unit B	Liquid	1/4
	Gas	3/8
Indoor unit C	Liquid	1/4
	Gas	3/8

PUMPING DOWN

When relocating or disposing of the air conditioner, pump down the system following the procedure below so that no refrigerant is released into the atmosphere.

1) Turn off the breaker.
2) Connect the gauge manifold valve to the service port of the stop valve on the gas pipe side of the outdoor unit.
3) Fully close the stop valve on the liquid pipe side of the outdoor unit.
4) Turn on the breaker.
5) Start the emergency COOL operation on all the indoor units.
6) When the pressure gauge shows 0.1 to 0 psi [Gauge] (0.05 to 0 MPa), fully close the stop valve on the gas pipe side of the outdoor unit and stop the operation. (Refer to the indoor unit installation manual about the method for stopping the operation.)
   * If too much refrigerant has been added to the air conditioner system, the pressure may not drop to 0.1 to 0 psi [Gauge] (0.05 to 0 MPa), or the protection function may operate due to the pressure increase in the high pressure refrigerant circuit. If this occurs, use a refrigerant collecting device to collect all of the refrigerant in the system, and then recharge the system with the correct amount of refrigerant after the indoor and outdoor units have been relocated.
7) Turn off the breaker. Remove the pressure gauge and the refrigerant piping.

WARNING

When pumping down the refrigerant, stop the compressor before disconnecting the refrigerant pipes. The compressor may burst and cause injury if any foreign substance, such as air, enters the pipes.

9 DATA

Model				MXZ-2C20NA2			
Indoor type				Non-Duct (09+09)		Duct (09+12)	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity		Btu/h	18,000	22,000	20,000	22,000
	SHF		–	–	–	–	–
	Input		kW	1.417	1.641	2.000	1.771
Electrical circuit	Power supply (V, phase, Hz)			208/230, 1, 60			
	Input		kW	1.373	1.597	1.880	1.691
	Comp. current (208/230V)		A	6.82 / 6.17	8.03 / 7.26	9.61 / 8.69	8.55 / 7.73
	Fan motor current		A	0.2	0.2	0.2	0.2
Refrigerant circuit	Condensing pressure		PSIG	396	328	419	351
	Suction pressure		PSIG	146	94	130	100
	Discharge temperature		ºF	174	165	170	168
	Condensing temperature		ºF	116	100	160	101
	Suction temperature		ºF	74	47	55	49
	Comp. shell bottom temp.		ºF	173	163	160	157
	Ref. pipe length [Total pipe length for multi-system]		ft	25 [50]			
	Refrigerant charge (R410A)		–	5 lb. 15 oz.			
Outdoor unit	Intake air temperature	DB	ºF	95	47	95	47
		WB	ºF	–	43	–	43
	Fan speed		rpm	650	700	650	700
	Airflow		CFM	1,342	1,458	1,342	1,458

Model				MXZ-3C24NA MXZ-3C24NA2			
Indoor type				Non-Duct (06+06+09)		Duct (09+09+09)	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity		Btu/h	22,000	25,000	23,600	24,600
	SHF		–	–	–	–	–
	Input		kW	1.62	1.75	2.10	1.90
Electrical circuit	Power supply (V, phase, Hz)			208/230, 1, 60			
	Input		kW	1.554	1.684	1.920	1.780
	Comp. current (208/230V)		A	7.47 / 6.76	8.1 / 7.32	9.23 / 8.35	8.56 / 7.74
	Fan motor current		A	0.3	0.3	0.3	0.3
Refrigerant circuit	Condensing pressure		PSIG	395	310	419	345
	Suction pressure		PSIG	162	101	138	102
	Discharge temperature		ºF	143	137	155	141
	Condensing temperature		ºF	116	98	120	106
	Suction temperature		ºF	59	36	50	34
	Comp. shell bottom temp.		ºF	137	128	146	131
	Ref. pipe length [Total pipe length for multi-system]		ft	25[75]			
	Refrigerant charge (R410A)		–	6lb. 13 oz.			
Outdoor unit	Intake air temperature	DB	ºF	95	47	95	47
		WB	ºF	-	43	-	43
	Fan speed		rpm	720	750	720	750
	Airflow		CFM	2,287	2,382	2,287	2,382

Model				MXZ-3C30NA MXZ-3C30NA2			
Indoor type				Non-Duct (09+09+12)		Duct (09+09+12)	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity		Btu/h	28,400	28,600	27,400	27,600
	SHF		–	–	–	–	–
	Input		kW	2.68	2.15	2.84	2.22
Electrical circuit	Power supply (V, phase, Hz)			208/230, 1, 60			
	Input		kW	2.614	2.084	2.650	2.090
	Comp. current (208/230V)		A	12.57 / 11.37	10.02 / 9.06	12.74 / 11.52	10.05 / 9.09
	Fan motor current		A	0.3	0.3	0.3	0.3
Refrigerant circuit	Condensing pressure		PSIG	432	323	439	323
	Suction pressure		PSIG	137	97	132	99
	Discharge temperature		ºF	159	136	165	136
	Condensing temperature		ºF	122	101	124	101
	Suction temperature		ºF	49	32	47	32
	Comp. shell bottom temp.		ºF	145	121	156	128
	Ref. pipe length [Total pipe length for multi-system]		ft	25[75]			
	Refrigerant charge (R410A)		–	6 lb.13 oz.			
Outdoor unit	Intake air temperature	DB	ºF	95	47	95	47
		WB	ºF	-	43	-	43
	Fan speed		rpm	720	750	720	750
	Airflow		CFM	2,287	2,382	2,287	2,382

Model				MXZ-4C36NA MXZ-4C36NA2			
Indoor type				Non-Duct (09+09+09+09)		Duct (09+09+09+09)	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity		Btu/h	35,400	36,000	34,400	34,400
	SHF		–	–	–	–	–
	Input		kW	3.76	3.02	3.94	3.10
Electrical circuit	Power supply (V, phase, Hz)			208/230, 1, 60			
	Input		kW	3.672	2.932	3.700	2.940
	Comp. current (208/230V)		A	17.65 / 15.97	14.1 / 12.75	17.79 / 16.09	14.13 / 12.78
	Fan motor current		A	0.3	0.3	0.3	0.3
Refrigerant circuit	Condensing pressure		PSIG	461	297	470	334
	Suction pressure		PSIG	141	89	129	91
	Discharge temperature		ºF	172	138	176	147
	Condensing temperature		ºF	127	95	129	103
	Suction temperature		ºF	51	28	46	29
	Comp. shell bottom temp.		ºF	162	130	165	139
	Ref. pipe length [Total pipe length for multi-system]		ft	25[100]			
	Refrigerant charge (R410A)		–	6 lb.13 oz.			
Outdoor unit	Intake air temperature	DB	ºF	95	47	95	47
		WB	ºF	-	43	-	43
	Fan speed		rpm	720	750	720	750
	Airflow		CFM	2,287	2,382	2,287	2,382

Model				MXZ-5C42NA MXZ-5C42NA2			
Indoor type				Non-Duct (06+09+09+09+09)		Duct (09+09+09+09+09)	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity		Btu/h	40,500	45,000	37,500	41,000
	SHF		-	-	-	-	-
	Input		kW	4.41	3.58	4.12	3.47
Electrical circuit	Power supply (V, phase, Hz)			208/230, 1, 60			
	Input		kW	4.300	3.465	3.870	3.270
	Comp. current (208/230V)		A	20.67 / 18.7	16.66 / 15.07	18.61 / 16.83	15.72 / 14.22
	Fan motor current		A	0.43 / 0.39	0.43 / 0.39	0.43 / 0.39	0.43 / 0.39
Refrigerant circuit	Condensing pressure		PSIG	466	305	446	326
	Suction pressure		PSIG	153	93	137	98
	Discharge temperature		ºF	172	155	165	143
	Condensing temperature		ºF	127	97	124	102
	Suction temperature		ºF	53	27	47	29
	Comp. shell bottom temp.		ºF	156	138	145	121
	Ref. pipe length [Total pipe length for multi-system]		ft	25 [80]			
	Refrigerant charge (R410A)		-	8 lb. 13 oz.			
Outdoor unit	Intake air temperature	DB	ºF	95	47	95	47
		WB	ºF	-	43	-	43
	Fan speed		rpm	630	730	630	730
	Airflow		CFM	2,118	2,542	2,118	2,542

Model				MXZ-2C20NAHZ MXZ-2C20NAHZ2			
Indoor type				Non-Duct (09+09)		Duct (09+12)	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity		Btu/h	18,000	22,000	20,000	22,000
	SHF		-	-	-	-	-
	Input		kW	1.34	1.62	1.82	1.75
Electrical circuit	Power supply (V, phase, Hz)			208/230, 1, 60			
	Input		kW	1.296	1.574	1.670	1.660
	Comp. current (208/230V)		A	6.23 / 5.63	7.57 / 6.84	8.03 / 7.26	7.98 / 7.22
	Fan motor current		A	0.43 / 0.39	0.43 / 0.39	0.43 / 0.39	0.43 / 0.39
Refrigerant circuit	Condensing pressure		PSIG	406	341	406	334
	Suction pressure		PSIG	154	110	133	113
	Discharge temperature		ºF	158	131	148	141
	Condensing temperature		ºF	108	105	112	103
	Suction temperature		ºF	60	37	46	37
	Comp. shell bottom temp.		ºF	137	107	127	117
	Ref. pipe length [Total pipe length for multi-system]		ft	25 [50]			
	Refrigerant charge (R410A)		-	8 lb. 13 oz.			
Outdoor unit	Intake air temperature	DB	ºF	95	47	95	47
		WB	ºF	-	43	-	43
	Fan speed		rpm	630	730	630	730
	Airflow		CFM	2,118	2,542	2,118	2,542

Model				MXZ-3C24NAHZ MXZ-3C24NAHZ2			
Indoor type				Non-Duct (06+06+09)		Duct (09+09+09)	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity		Btu/h	22,000	25,000	23,600	24,600
	SHF		-	-	-	-	-
	Input		kW	1.63	1.73	2.36	1.88
Electrical circuit	Power supply (V, phase, Hz)			208/230, 1, 60			
	Input		kW	1.564	1.661	2.180	1.760
	Comp. current (208/230V)		A	7.52 / 6.8	7.99 / 7.22	10.48 / 9.48	8.46 / 7.65
	Fan motor current		A	0.43 / 0.39	0.43 / 0.39	0.43 / 0.39	0.43 / 0.39
Refrigerant circuit	Condensing pressure		PSIG	397	302	377	329
	Suction pressure		PSIG	164	106	136	109
	Discharge temperature		ºF	144	122	152	127
	Condensing temperature		ºF	114	97	115	103
	Suction temperature		ºF	59	42	48	36
	Comp. shell bottom temp.		ºF	128	105	136	109
	Ref. pipe length [Total pipe length for multi-system]		ft	25 [70]			
	Refrigerant charge (R410A)		-	8 lb. 13 oz.			
Outdoor unit	Intake air temperature	DB	ºF	95	47	95	47
		WB	ºF	-	43	-	43
	Fan speed		rpm	630	730	630	730
	Airflow		CFM	2,118	2,542	2,118	2,542

Model				MXZ-3C30NAHZ MXZ-3C30NAHZ2			
Indoor type				Non-Duct (09+09+12)		Duct (09+09+12)	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity		Btu/h	28,400	28,600	27,400	27,600
	SHF		-	-	-	-	-
	Input		kW	2.28	2.10	2.67	2.19
Electrical circuit	Power supply (V, phase, Hz)			208/230, 1, 60			
	Input		kW	2.214	2.031	2.480	2.060
	Comp. current (208/230V)		A	10.64 / 9.63	9.76 / 8.83	11.92 / 10.78	9.9 / 8.96
	Fan motor current		A	0.43 / 0.39	0.43 / 0.39	0.43 / 0.39	0.43 / 0.39
Refrigerant circuit	Condensing pressure		PSIG	404	321	416	329
	Suction pressure		PSIG	146	103	131	107
	Discharge temperature		ºF	146	131	153	128
	Condensing temperature		ºF	117	101	118	103
	Suction temperature		ºF	52	35	45	35
	Comp. shell bottom temp.		ºF	129	111	135	108
	Ref. pipe length [Total pipe length for multi-system]		ft	25 [70]			
	Refrigerant charge (R410A)		-	8 lb. 13 oz.			
Outdoor unit	Intake air temperature	DB	ºF	95	47	95	47
		WB	ºF	-	43	-	43
	Fan speed		rpm	650	730	650	730
	Airflow		CFM	2,224	2,542	2,224	2,542

9-1. OPERATING RANGE

(1) POWER SUPPLY

	Model		Rating	Guaranteed Voltage
Outdoor unit	**MXZ-3C24NA** **MXZ-3C30NA** **MXZ-4C36NA** **MXZ-5C42NA** **MXZ-2C20NA2** **MXZ-3C24NA2** **MXZ-3C30NA2** **MXZ-4C36NA2** **MXZ-5C42NA2**	**MXZ-2C20NAHZ** **MXZ-3C24NAHZ** **MXZ-3C30NAHZ** **MXZ-2C20NAHZ2** **MXZ-3C24NAHZ2** **MXZ-3C30NAHZ2**	208/230 V 60 Hz 1ø	Min. 198 V 208 V 230 V Max. 253 V

(2) OPERATION

Function	Intake air temperature / Condition	Indoor		Outdoor	
		DB (°F)	WB (°F)	DB (°F)	WB (°F)
Cooling	"A" Cooling steady state at rated compressor speed	80	67	95	(75)
	"B-2" Cooling steady state at rated compressor speed	80	67	82	(65)
	"B-1" Cooling steady state at minimum compressor speed	80	67	82	(65)
	Low ambient cooling steady state at minimum compressor speed	80	67	67	(53.5)
	Intermediate cooling steady state at intermediate compressor speed	80	67	87	(69)
Heating	Standard rating-heating at rated compressor speed	70	60	47	43
	Low temperature heating at rated compressor speed	70	60	17	15
	Max. temperature heating at minimum compressor speed	70	60	62	56.5
	High temperature heating at minimum compressor speed	70	60	47	43
	Frost accumulation at rated compressor speed	70	60	35	33
	Frost accumulation at intermediate compressor speed	70	60	35	33

MXZ-2C20NA2 MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2 MXZ-5C42NA2
MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

The standard specifications apply only to the operation of the air conditioner under normal conditions.
Since operating conditions vary according to the areas where these units are installed, the following information has been provided to clarify the operating characteristics of the air conditioner under the conditions indicated by the performance curve.

(1) GUARANTEED VOLTAGE

198 ~ 253 V 60 Hz

(2) AIR FLOW

Air flow should be set at MAX.

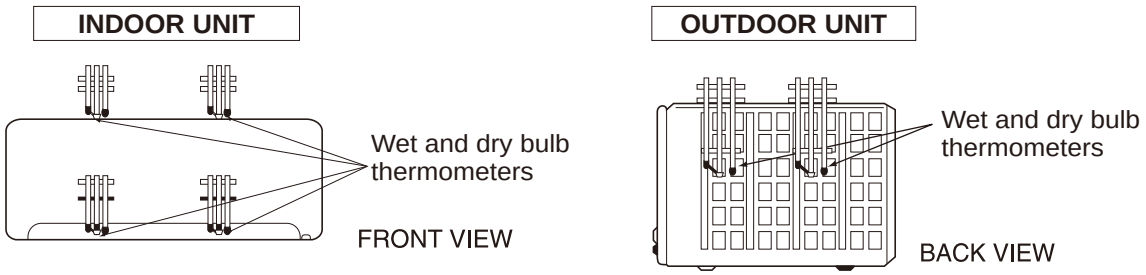
(3) MAIN READINGS

(1) Indoor intake air wet-bulb temperature :	°FWB	Cooling
(2) Indoor outlet air wet-bulb temperature :	°FWB	
(3) Outdoor intake air dry-bulb temperature :	°FDB	
(4) Total input:	W	
(5) Indoor intake air dry-bulb temperature :	°FDB	Heating
(6) Outdoor intake air wet-bulb temperature :	°FWB	
(7) Total input :	W	

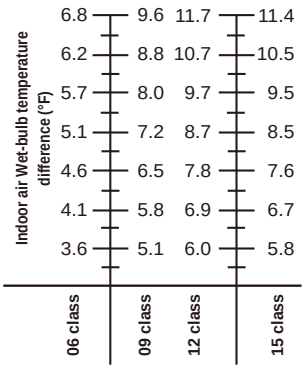
Indoor air wet and dry bulb temperature difference on the left side of the following chart shows the difference between the indoor intake air wet and dry bulb temperature and the indoor outlet air wet and dry bulb temperature for your reference at service.

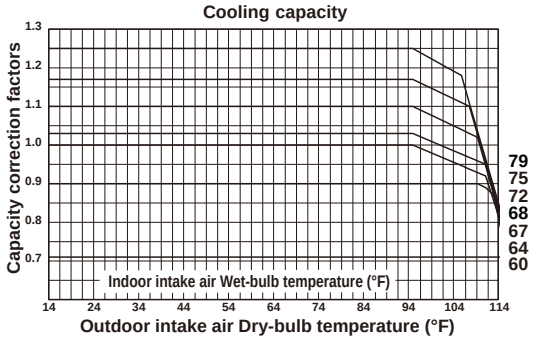
How to measure the indoor air wet and dry bulb temperature difference

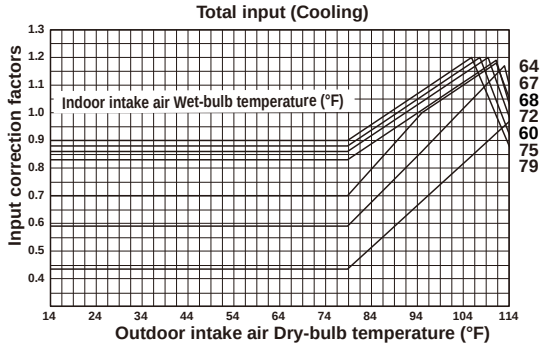
1. Attach at least 2 sets of wet and dry bulb thermometers to the indoor air intake as shown in the figure, and at least 2 sets of wet and dry bulb thermometers to the indoor air outlet. The thermometers must be attached to the position where air speed is high.
2. Attach at least 2 sets of wet and dry bulb thermometers to the outdoor air intake.
   Cover the thermometers to prevent direct rays of the sun.
3. Check that the air filter is cleaned.
4. Open windows and doors of room.
5. Press the EMERGENCY OPERATION switch once (twice) to start the EMERGENCY COOL (HEAT) MODE.
6. Compressor starts running at 33 Hz (COOL) or 45 Hz (HEAT). The frequency at each operation mode is fixed.
7. When system stabilizes after more than 15 minutes, measure temperature and take an average temperature.
8. 10 minutes later, measure temperature again and check that the temperature does not change.

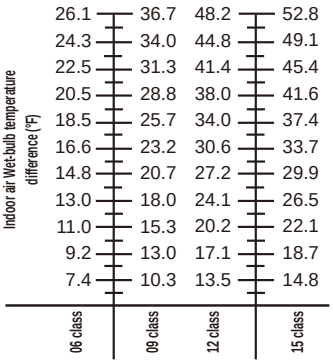


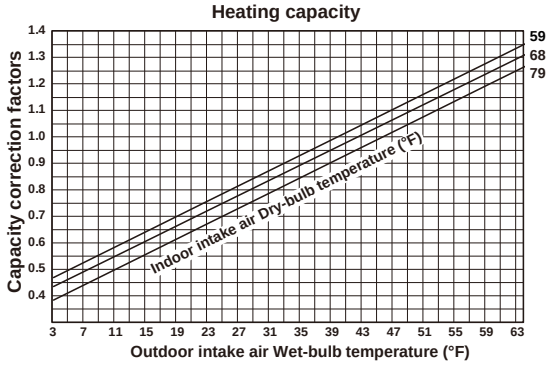
9-2. CAPACITY AND THE INPUT CURVES
MXZ-2C20NA2

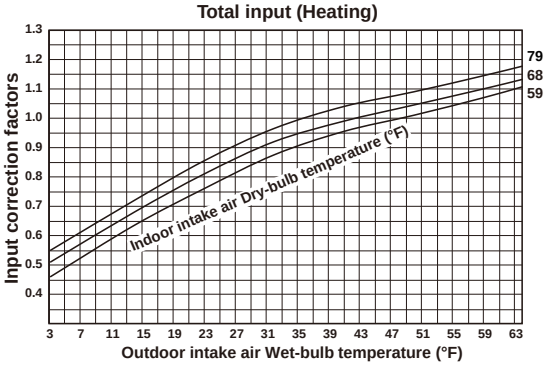




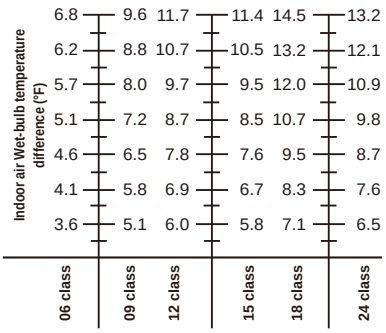


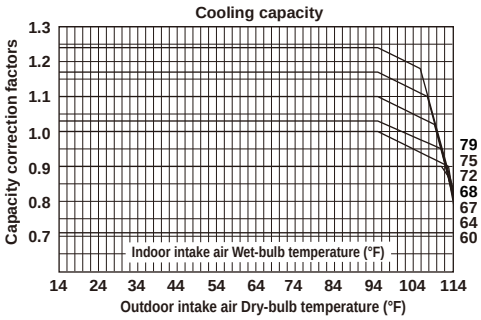


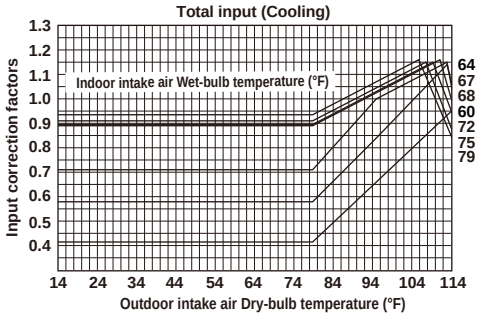


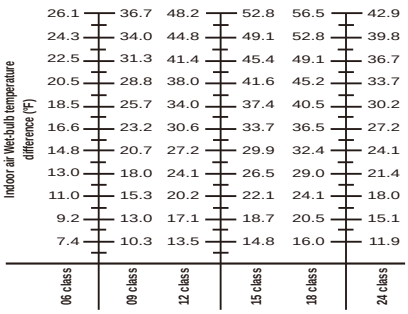


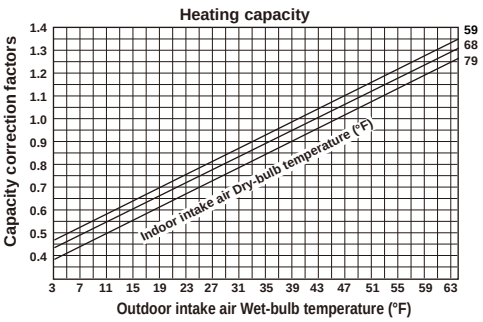
MXZ-3C24NA **MXZ-3C30NA** **MXZ-4C36NA**
MXZ-3C24NA2 **MXZ-3C30NA2** **MXZ-4C36NA2**

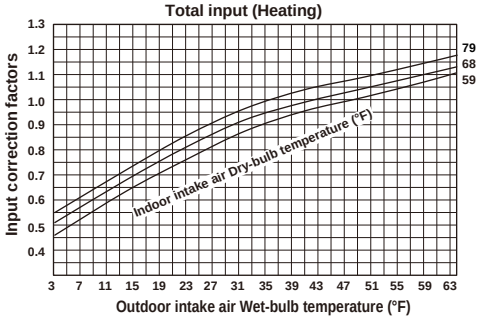




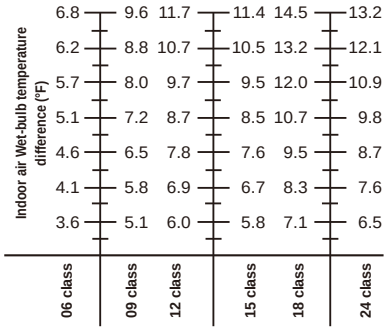


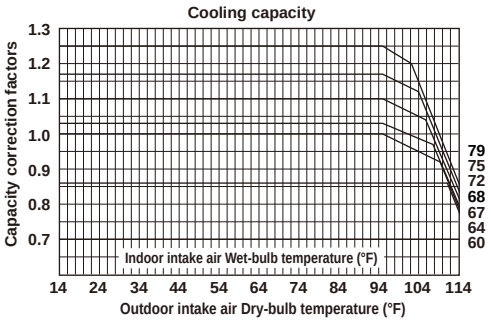


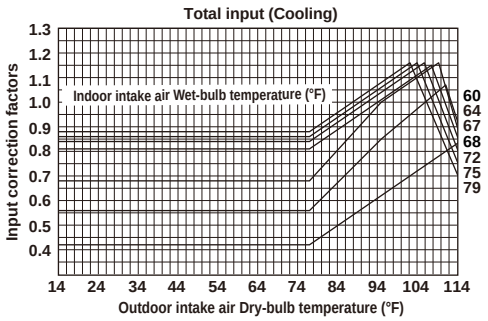


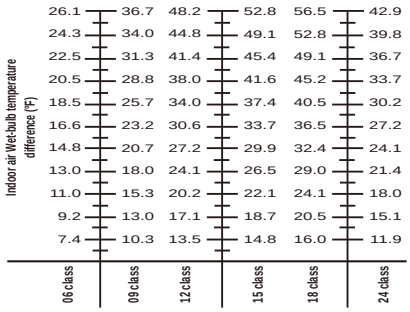


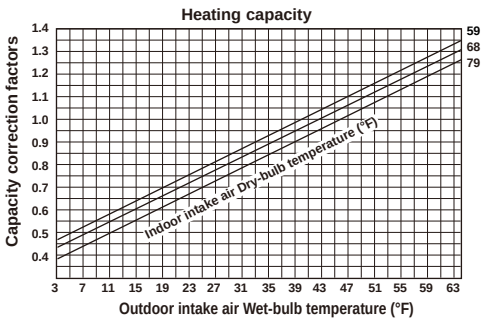
MXZ-5C42NA
MXZ-5C42NA2

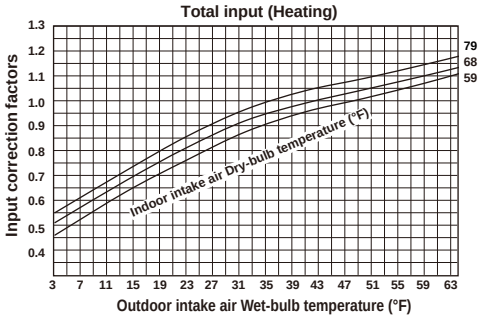




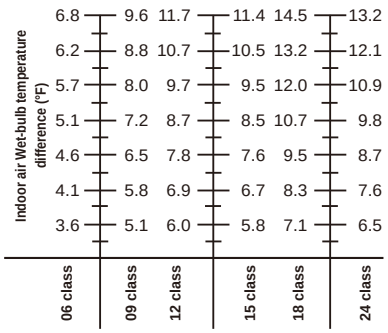


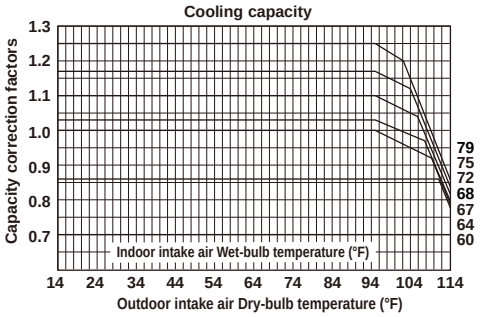


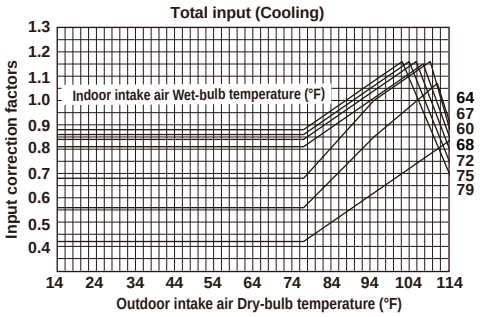


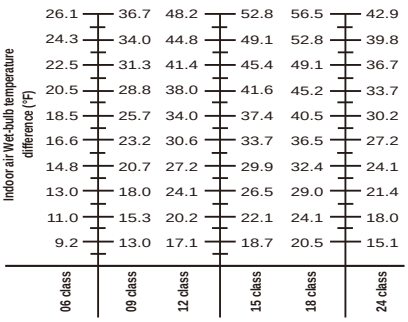


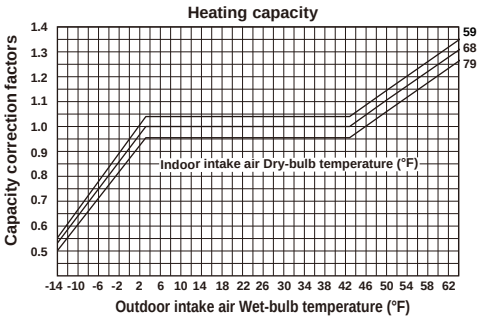
MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

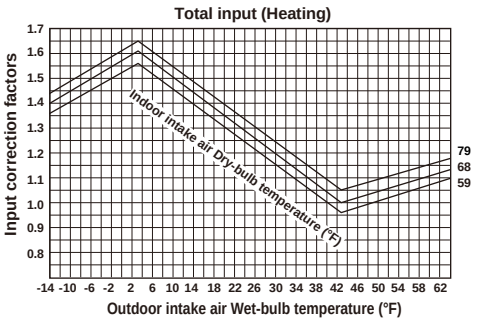






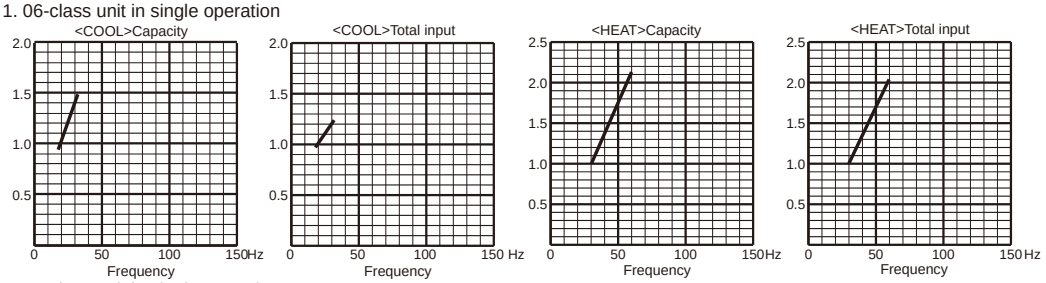




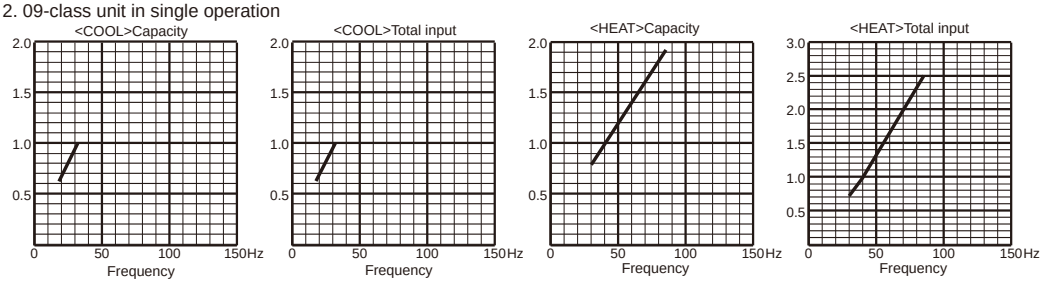


9-3. CAPACITY AND INPUT CORRECTION BY MEANS OF INVERTER OUTPUT FREQUENCY
(OUTDOOR UNIT: MXZ-2C20NA2)

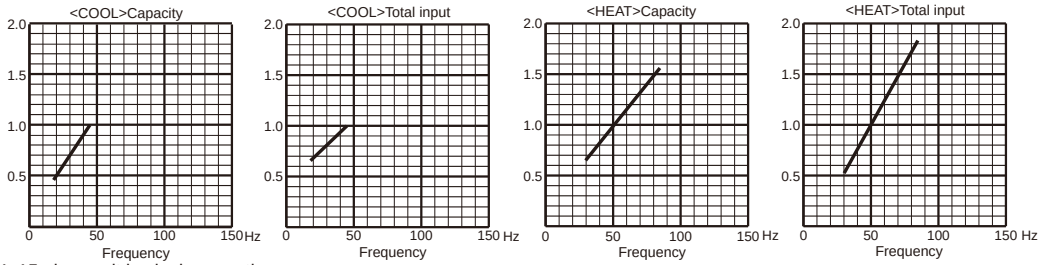
1. 06-class unit in single operation



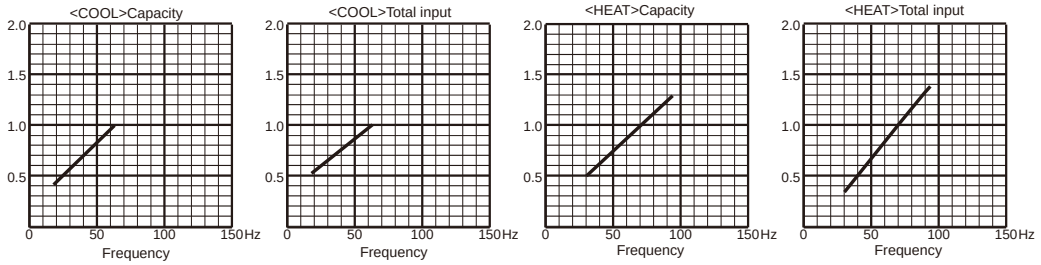
2. 09-class unit in single operation



3. 12-class unit in single operation

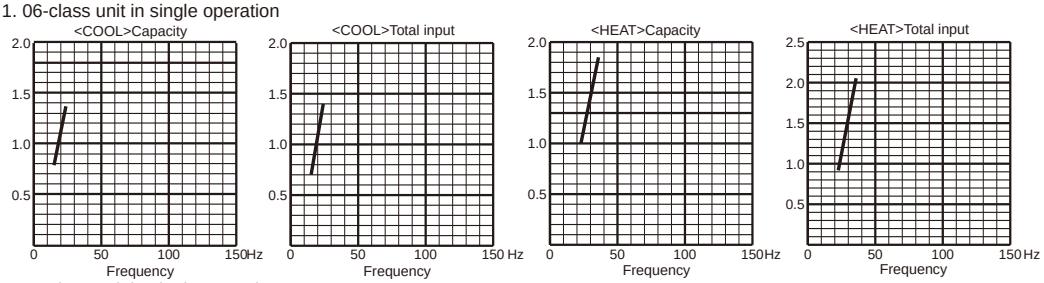


4. 15-class unit in single operation

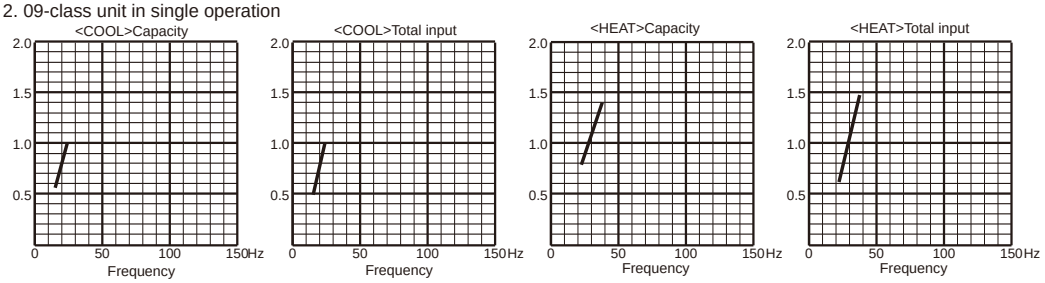


(OUTDOOR UNIT: MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2)

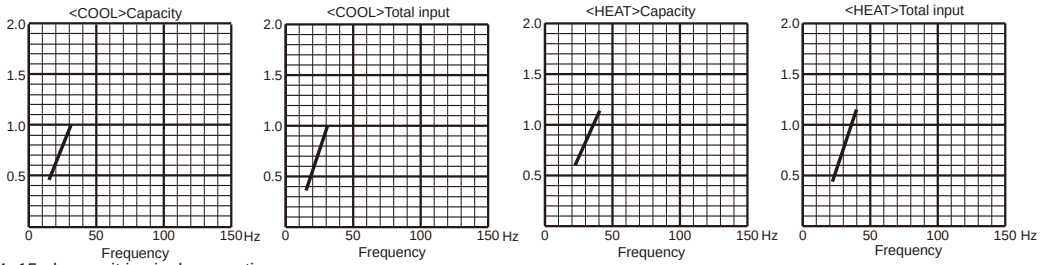
1. 06-class unit in single operation



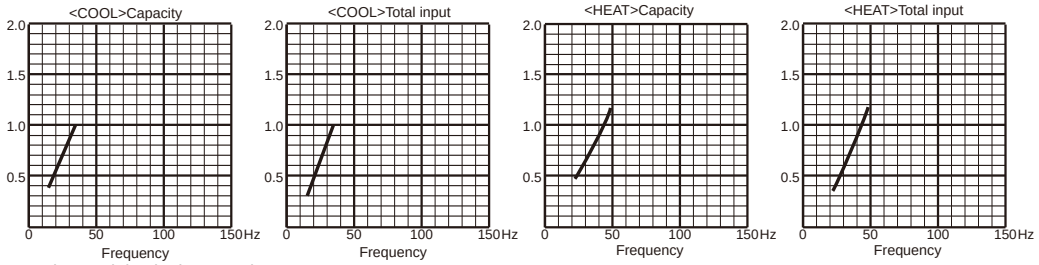
2. 09-class unit in single operation



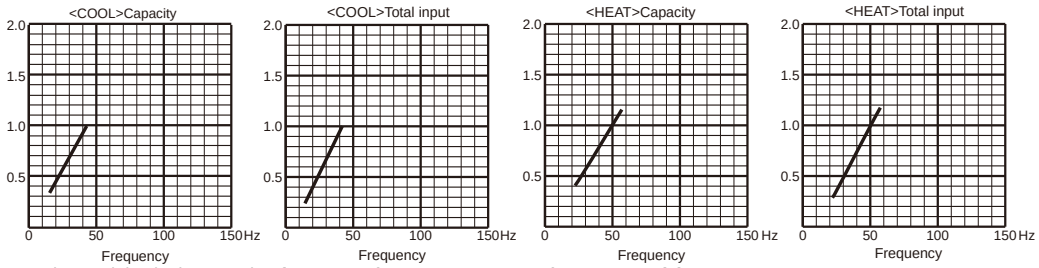
3. 12-class unit in single operation



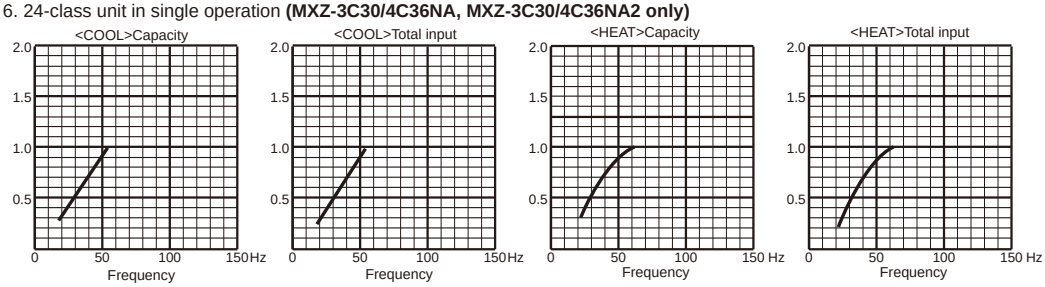
4. 15-class unit in single operation



5. 18-class unit in single operation

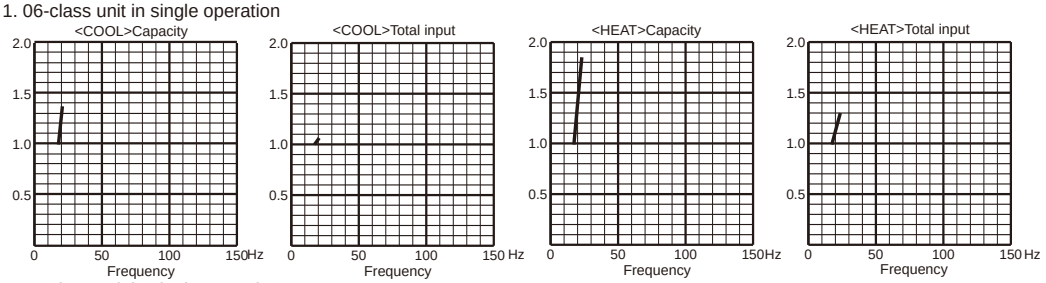


6. 24-class unit in single operation **(MXZ-3C30/4C36NA, MXZ-3C30/4C36NA2 only)**

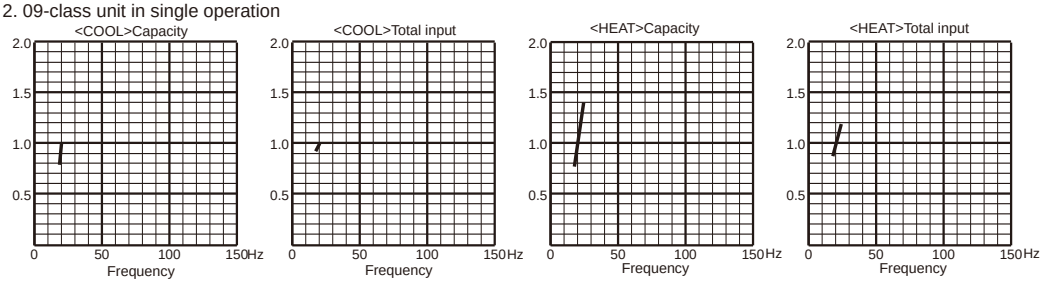


(OUTDOOR UNIT: MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2)

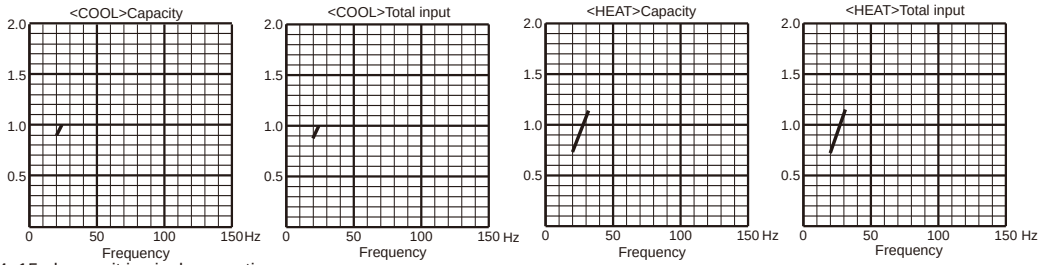
1. 06-class unit in single operation



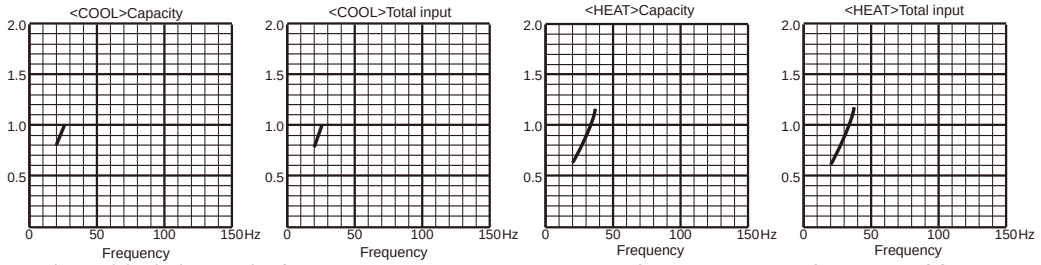
2. 09-class unit in single operation



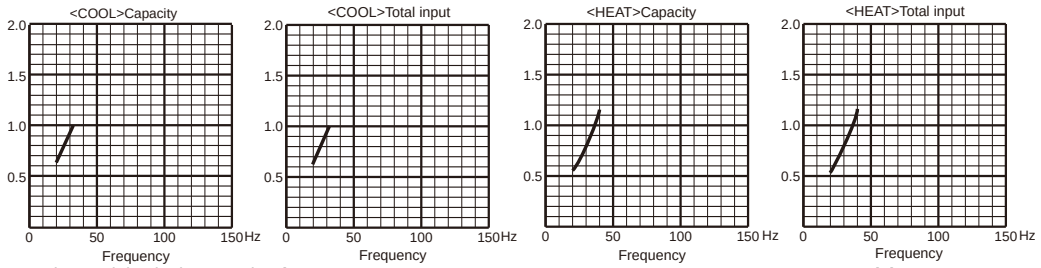
3. 12-class unit in single operation



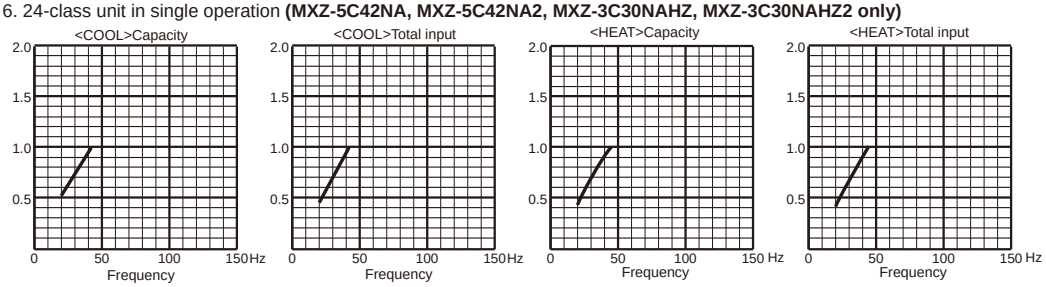
4. 15-class unit in single operation



5. 18-class unit in single operation **(MXZ-5C42NA, MXZ-5C42NA2, MXZ-3C24/30NAHZ, MXZ-3C24/30NAHZ2 only)**



6. 24-class unit in single operation **(MXZ-5C42NA, MXZ-5C42NA2, MXZ-3C30NAHZ, MXZ-3C30NAHZ2 only)**



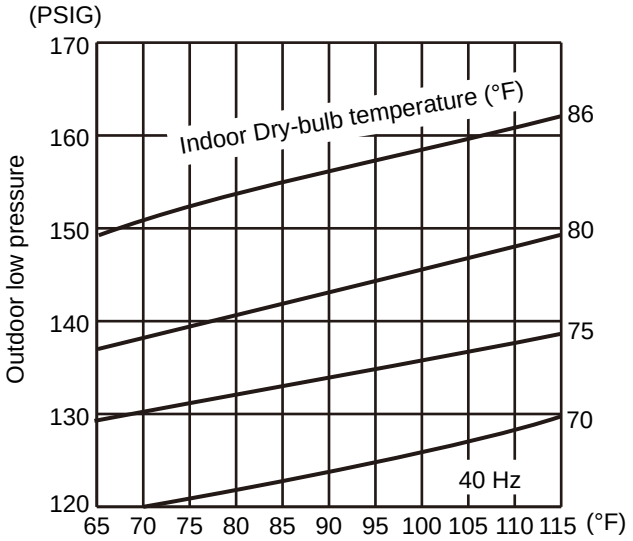
9-4. OUTDOOR LOW PRESSURE AND OUTDOOR UNIT CURRENT

1. 06-class unit in single operation (OUTDOOR UNIT: MXZ-2C20NA2)

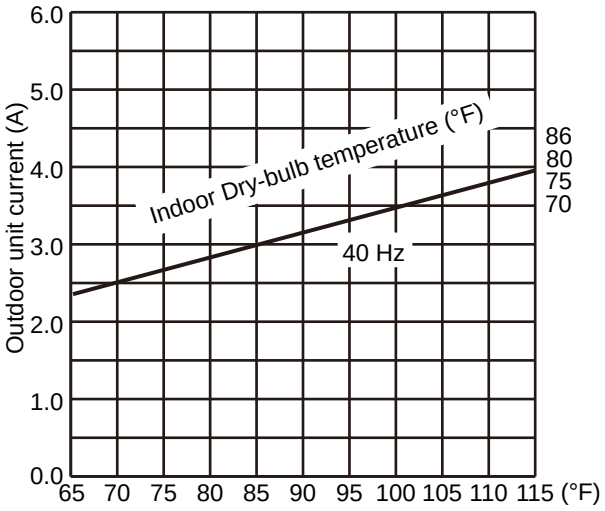
(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 40 Hz

<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 40 Hz (COOL) or 48 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.



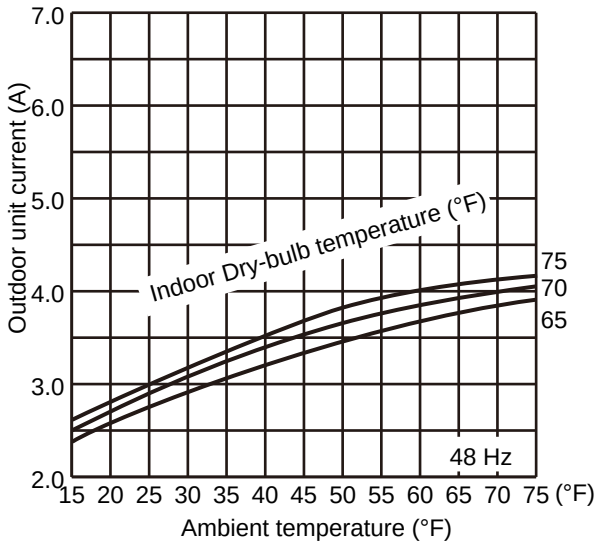
Ambient temperature (°F)



Ambient temperature (°F)

(2) HEAT operation

① Data is based on the condition of indoor humidity 75%
② Set air flow to High speed.
③ Inverter output frequency is 48 Hz.

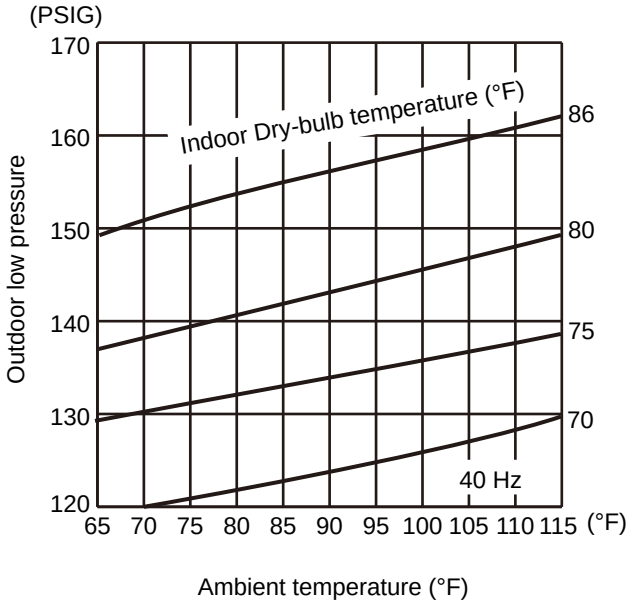


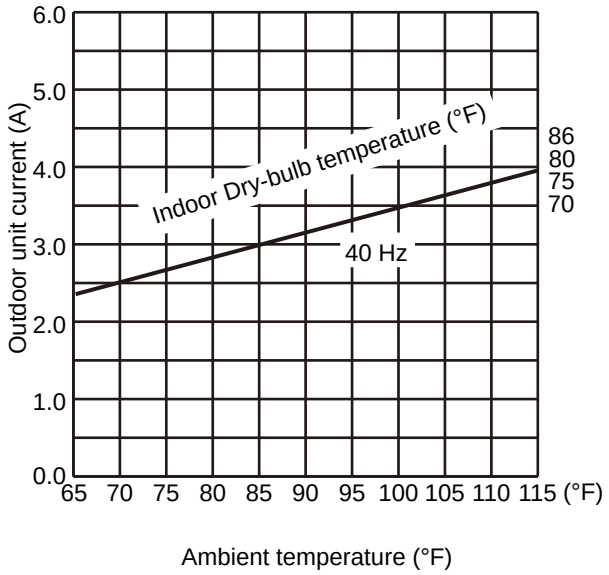
Ambient temperature (°F)

2. 09-class unit in single operation (OUTDOOR UNIT: MXZ-2C20NA2)
(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 40 Hz

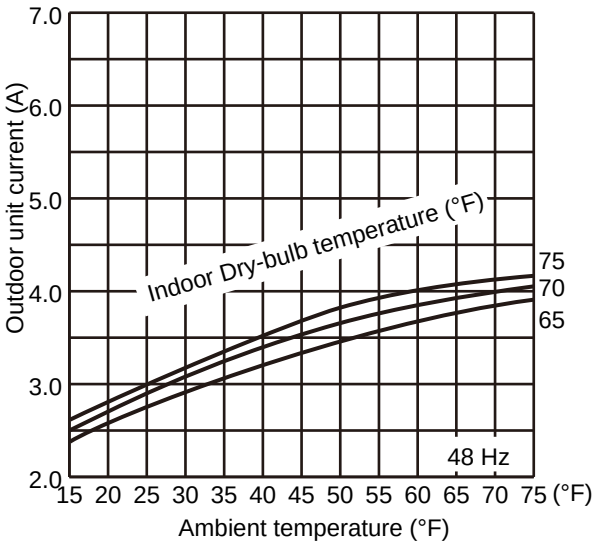
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 40 Hz (COOL) or 48 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of indoor humidity 75%
② Set air flow to High speed.
③ Inverter output frequency is 48 Hz.

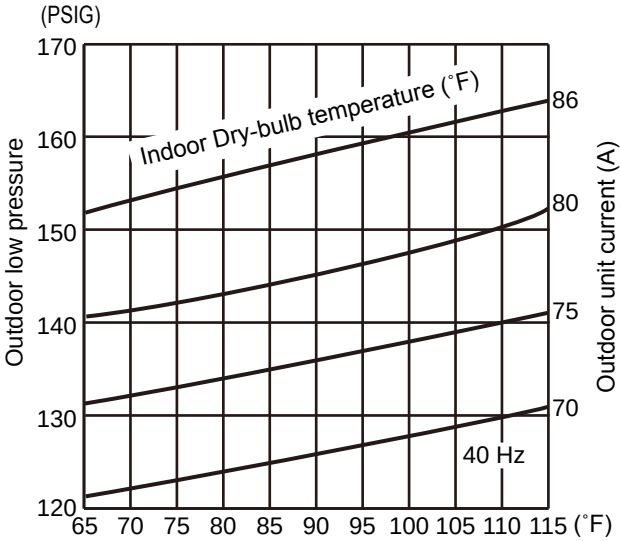


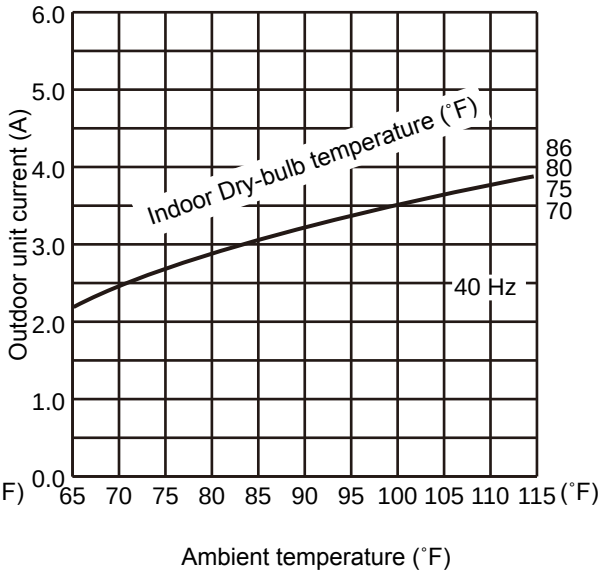
3. 12-class unit in single operation (OUTDOOR UNIT: MXZ-2C20NA2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 40 Hz

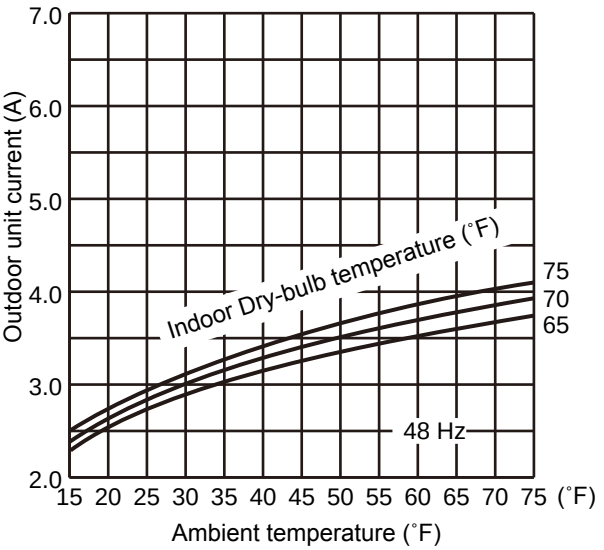
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 40 Hz (COOL) or 48 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of indoor humidity 75%
② Set air flow to High speed.
③ Inverter output frequency is 48 Hz.

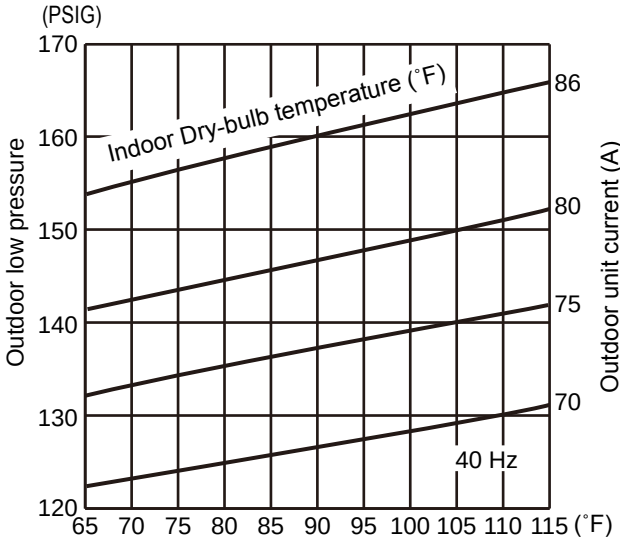


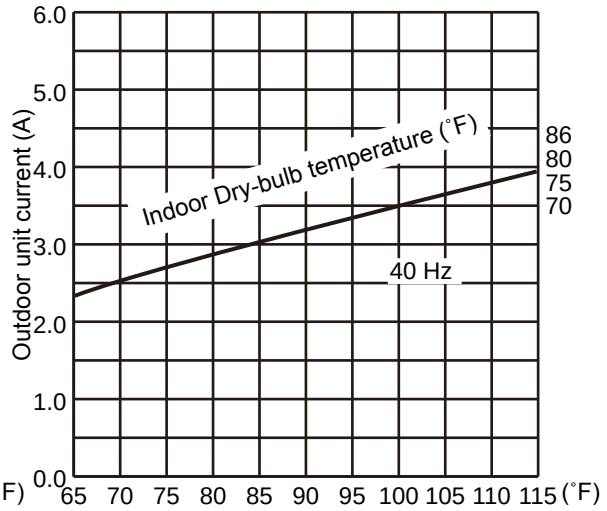
4. 15-class unit in single operation (OUTDOOR UNIT: MXZ-2C20NA2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 40 Hz

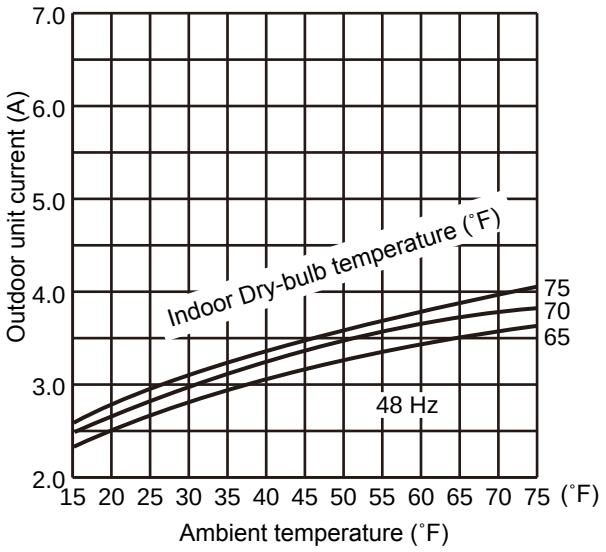
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 40 Hz (COOL) or 48 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of indoor humidity 75%
② Set air flow to High speed.
③ Inverter output frequency is 48 Hz.

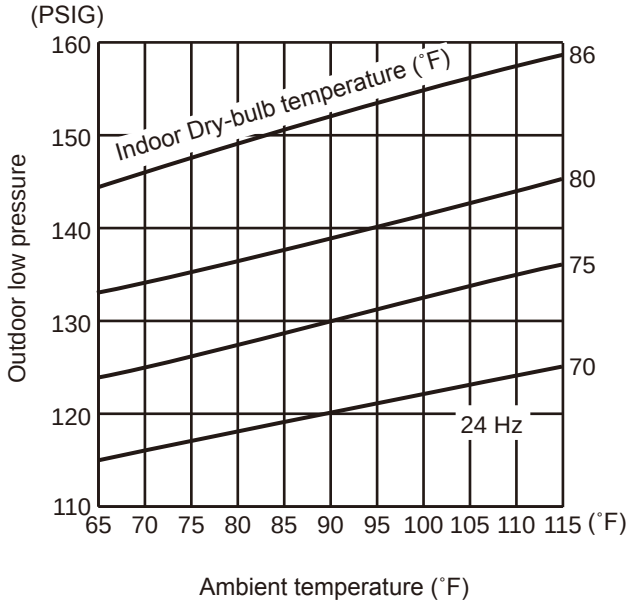


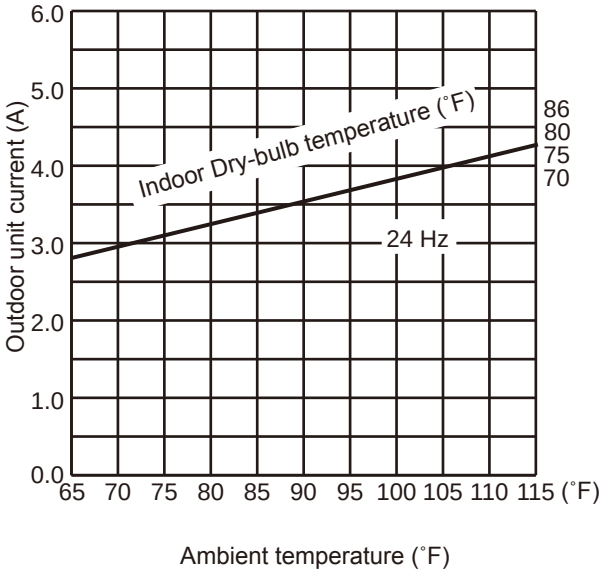
5. 06-class unit in single operation (OUTDOOR UNIT: MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 24 Hz

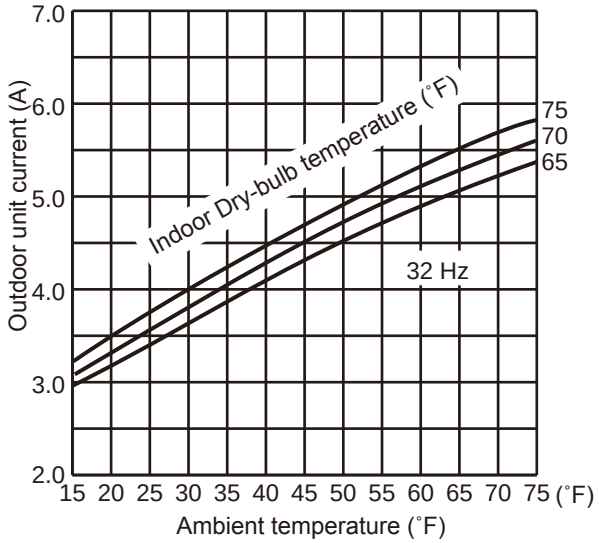
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 24 Hz (COOL) or 32 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 32 Hz.

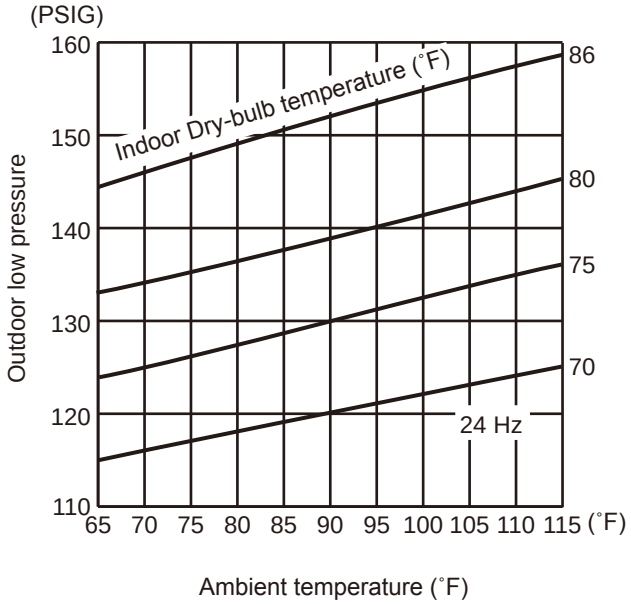


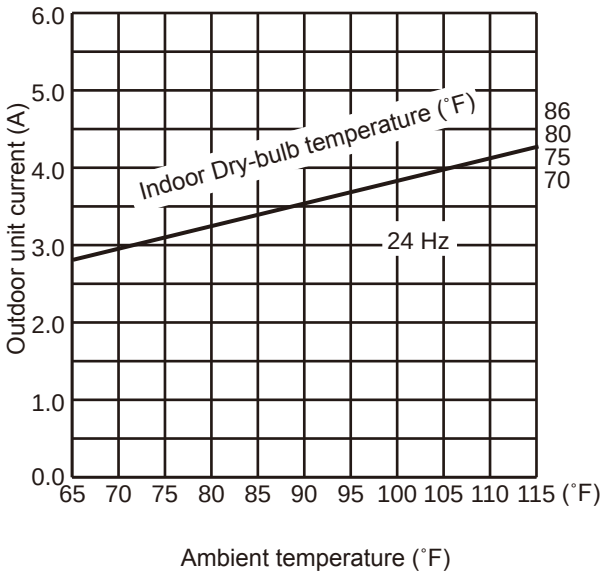
6. 09-class unit in single operation (OUTDOOR UNIT: MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 24 Hz

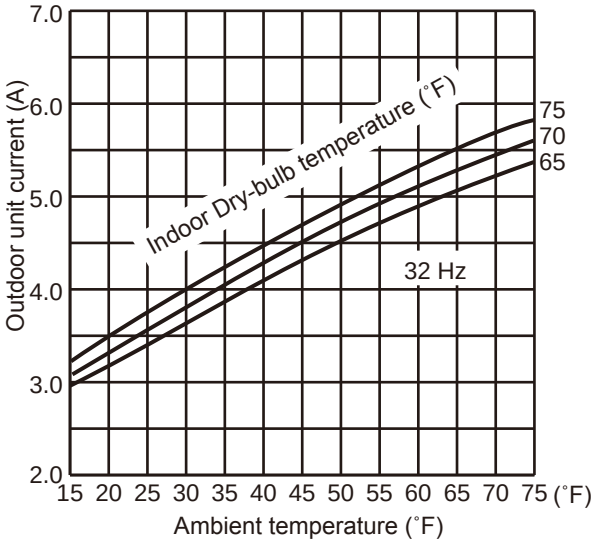
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 24 Hz (COOL) or 32 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 32 Hz.

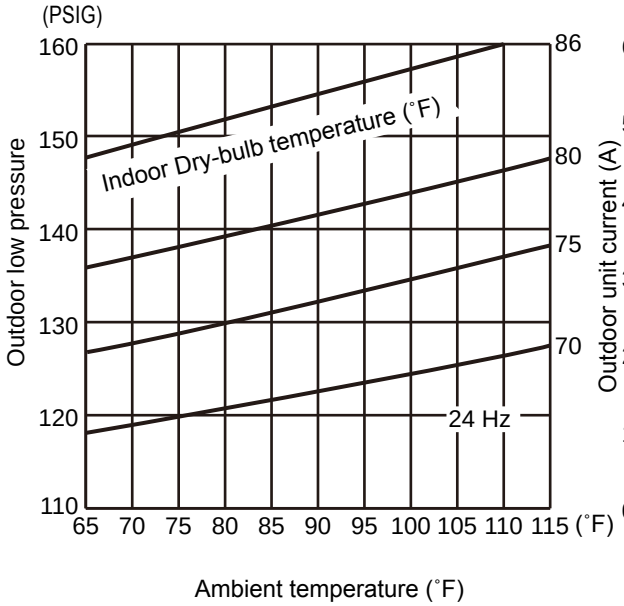


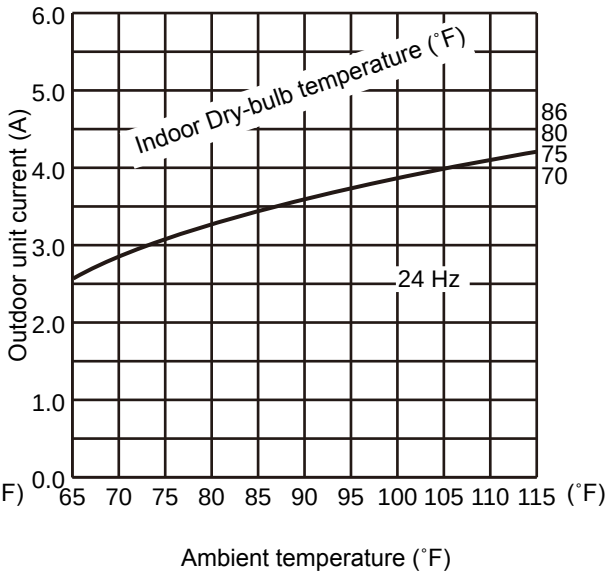
7. 12-class unit in single operation (OUTDOOR UNIT: MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 24 Hz

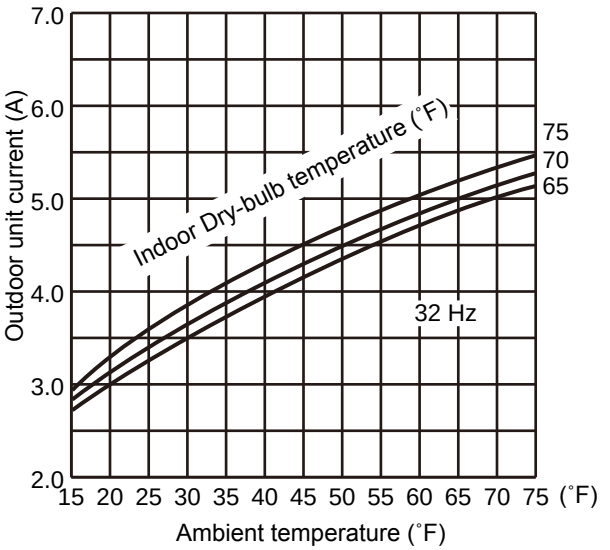
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 24 Hz (COOL) or 32 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 32 Hz.

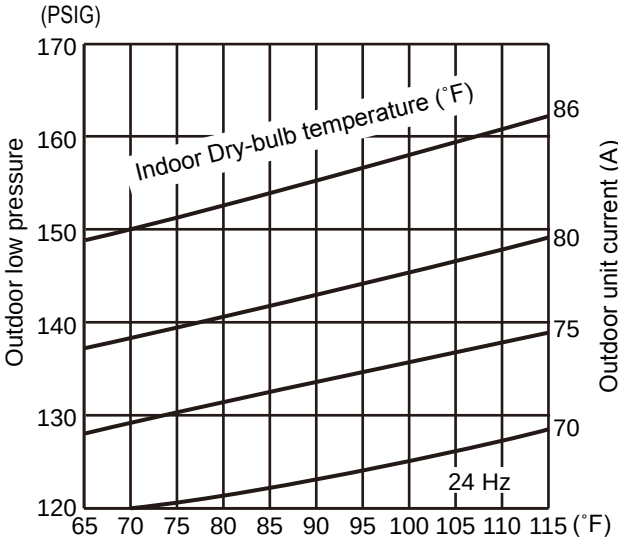


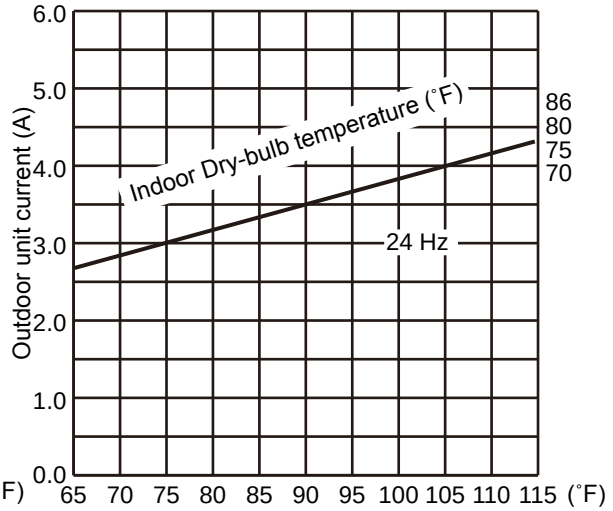
8. 15-class unit in single operation (OUTDOOR UNIT: MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 24 Hz

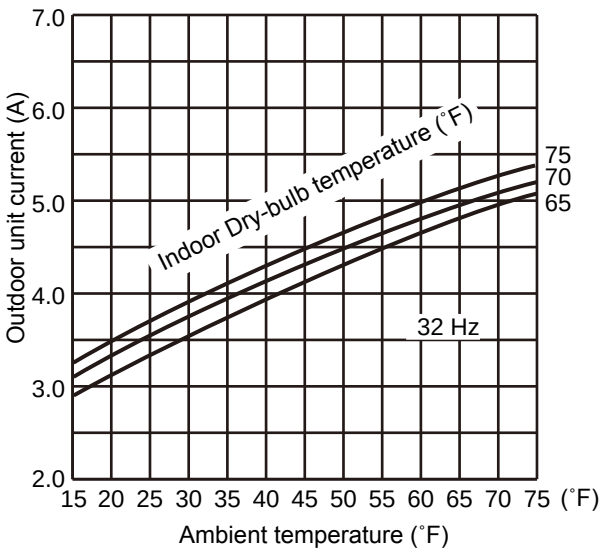
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 24 Hz (COOL) or 32 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%
② Set air flow to High speed.
③ Inverter output frequency is 32 Hz.

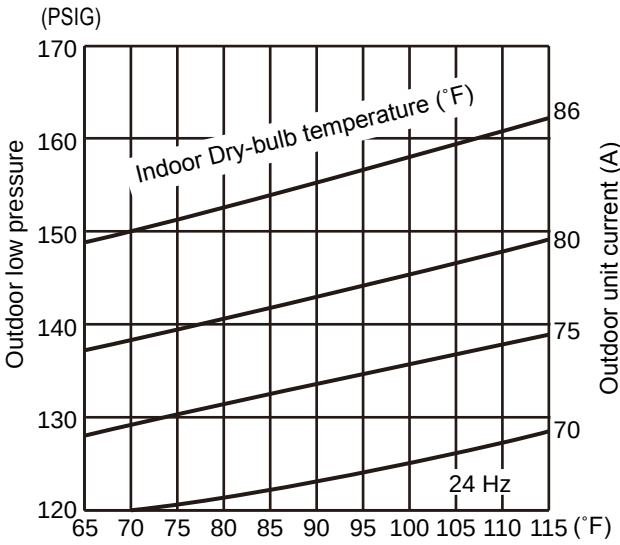


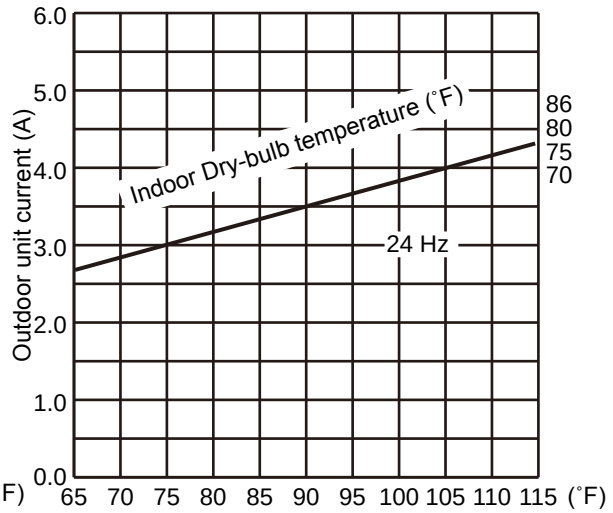
9. 18-class unit in single operation (OUTDOOR UNIT: MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 24 Hz

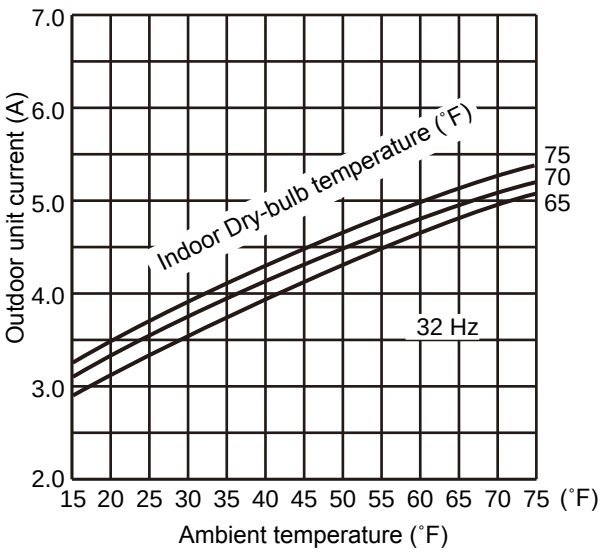
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 24 Hz (COOL) or 32 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 32 Hz.

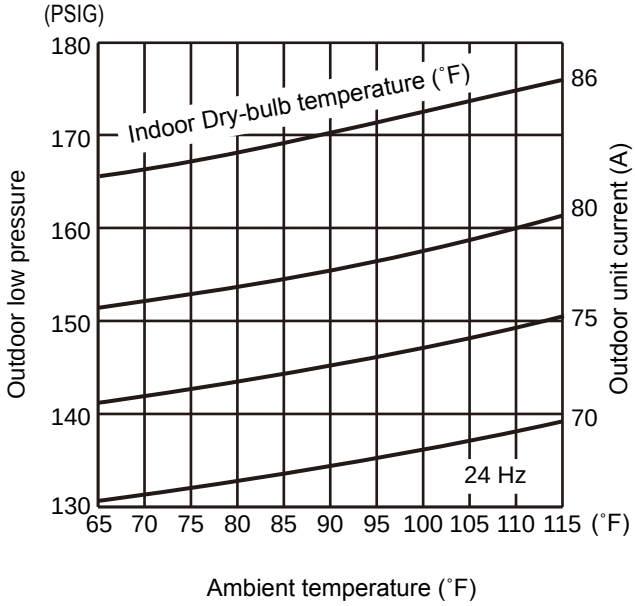


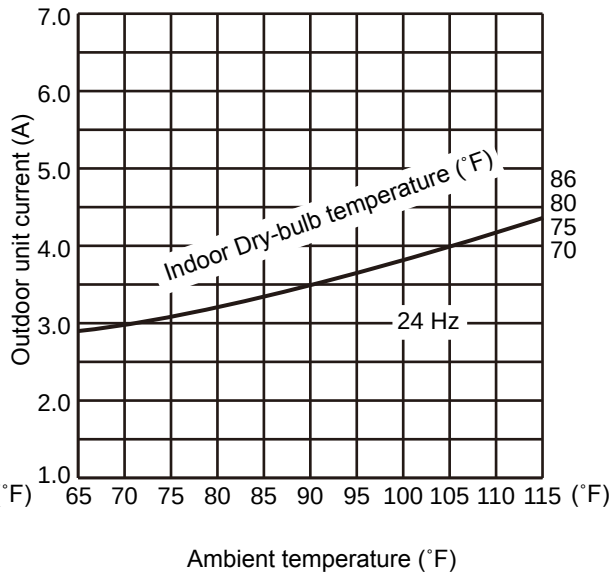
10. 24-class unit in single operation (OUTDOOR UNIT: MXZ-3C30NA MXZ-4C36NA MXZ-3C30NA2 MXZ-4C36NA2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 24 Hz

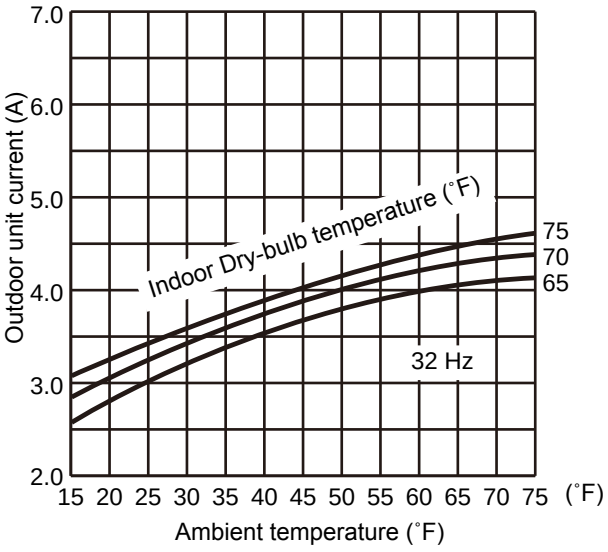
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 24 Hz (COOL) or 32 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%
② Set air flow to High speed.
③ Inverter output frequency is 32 Hz.

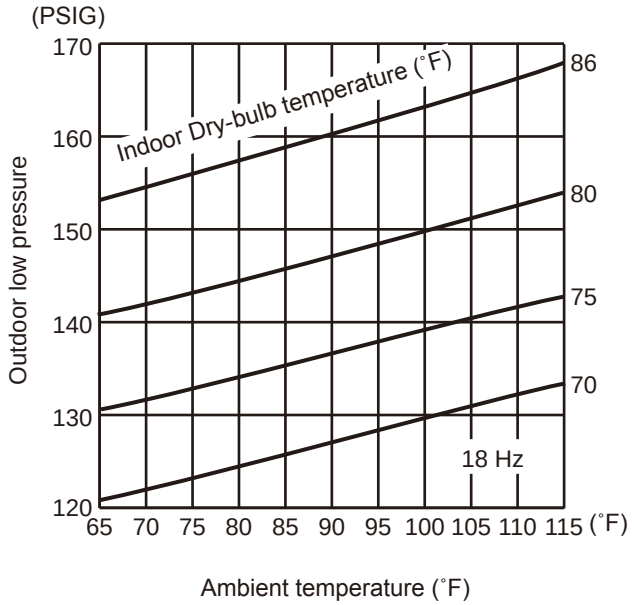


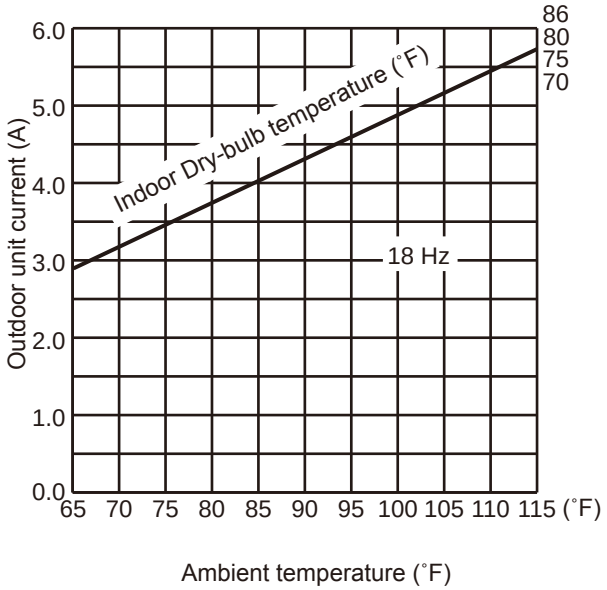
11. 06-class unit in single operation
(OUTDOOR UNIT: MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 18 Hz

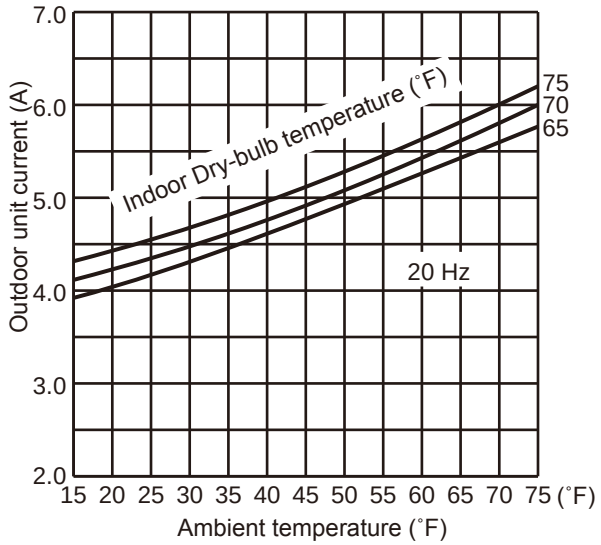
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 18 Hz (COOL) or 20 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 20 Hz.

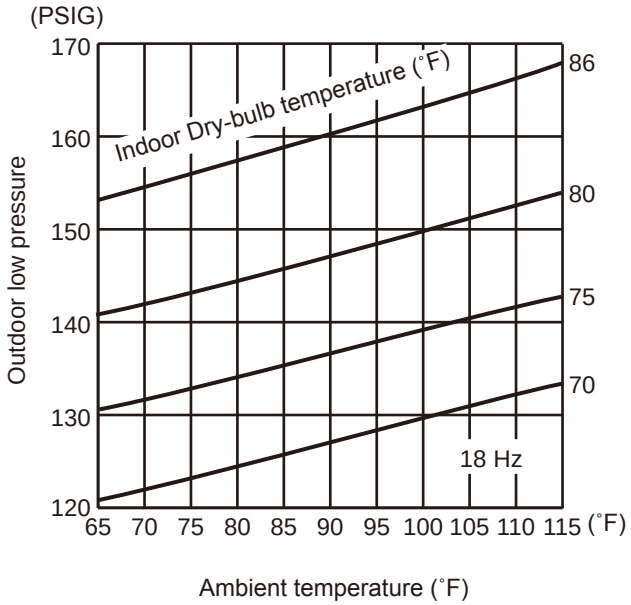


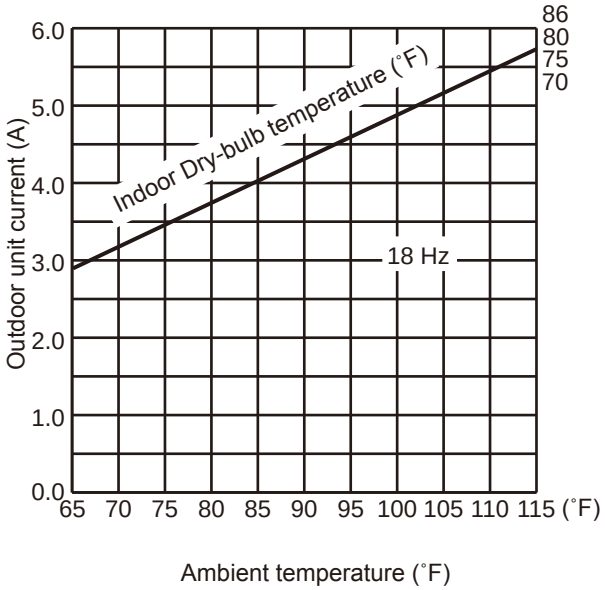
12. 09-class unit in single operation
(OUTDOOR UNIT: MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 18 Hz

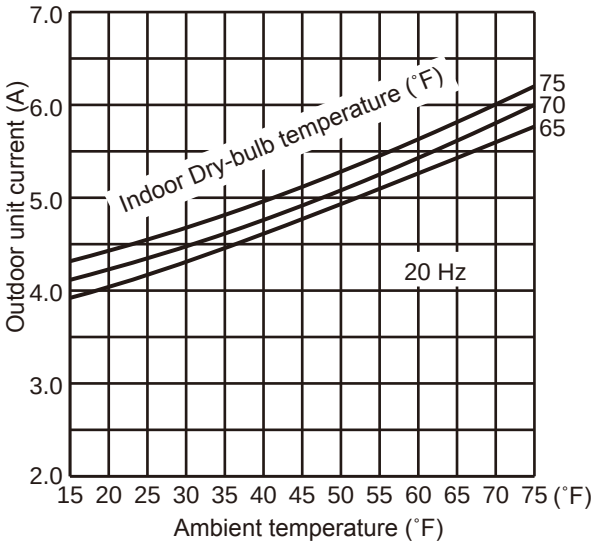
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 18 Hz (COOL) or 20 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 20 Hz.

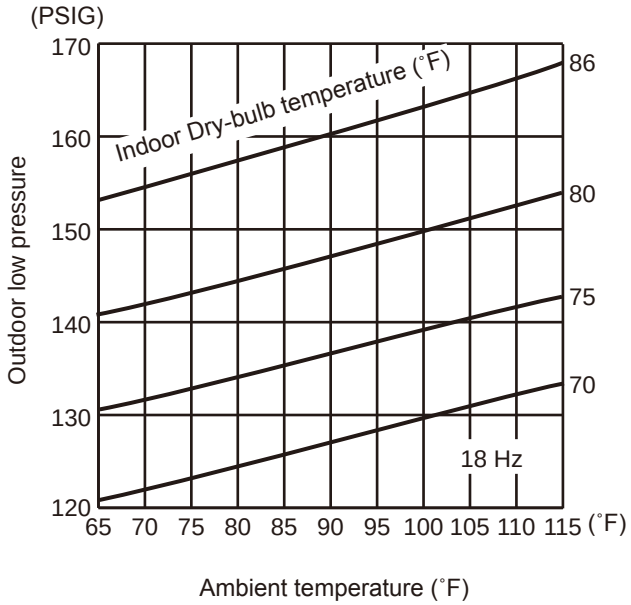


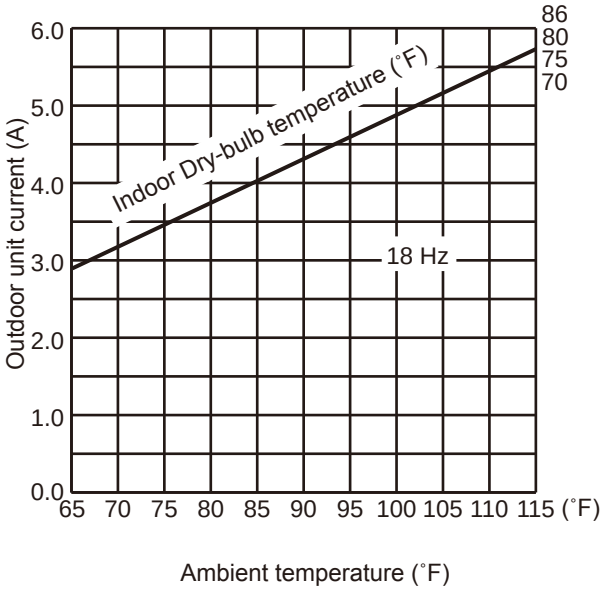
13. 12-class unit in single operation
(OUTDOOR UNIT: MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 18 Hz

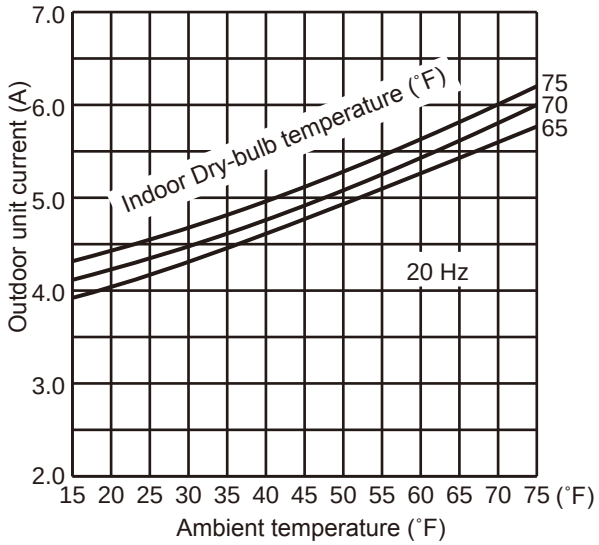
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 18 Hz (COOL) or 20 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 20 Hz.

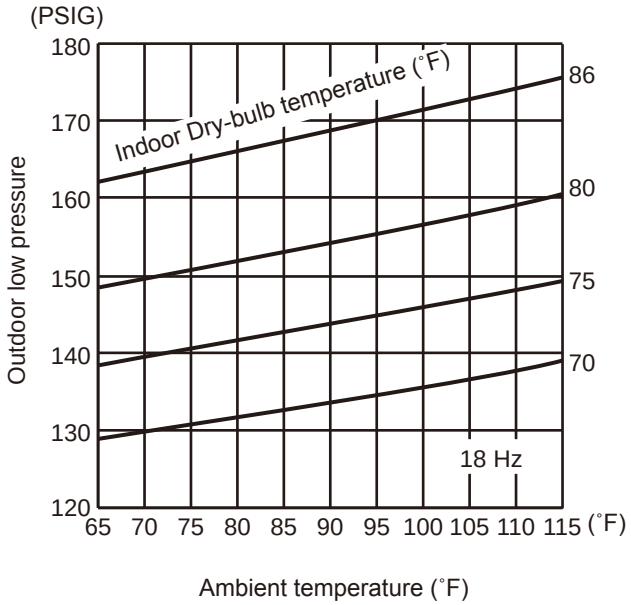


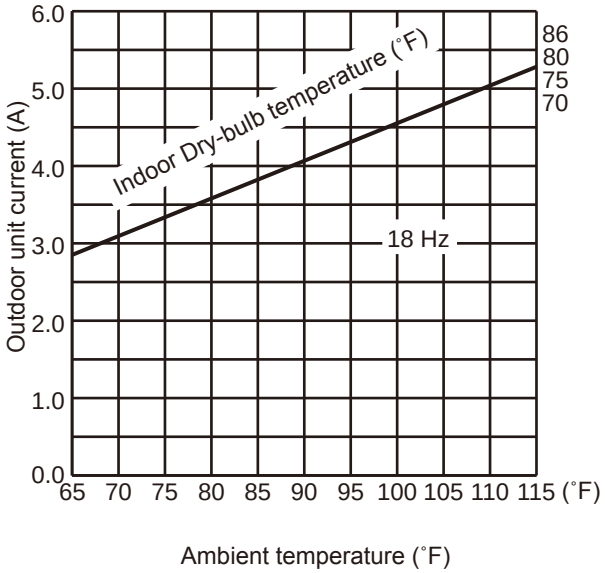
14. 15-class unit in single operation
(OUTDOOR UNIT: MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 18 Hz

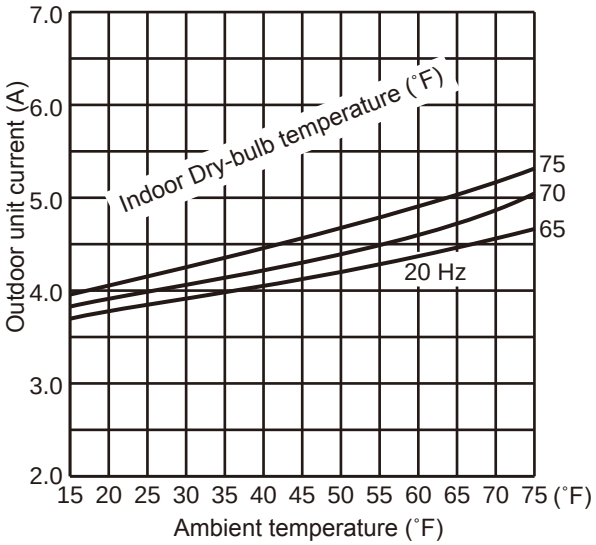
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 18 Hz (COOL) or 20 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 20 Hz.

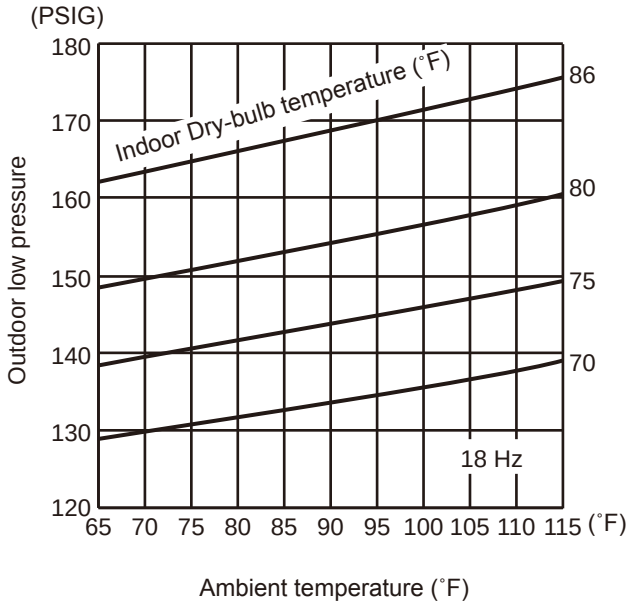


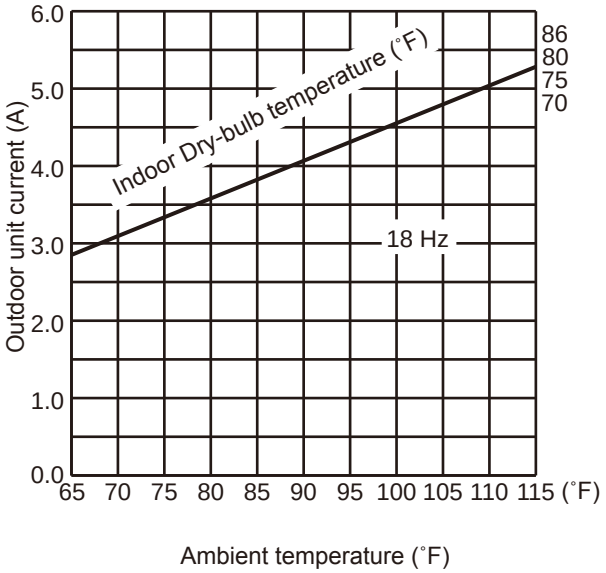
15. 18-class unit in single operation
(OUTDOOR UNIT: MXZ-5C42NA MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 18 Hz

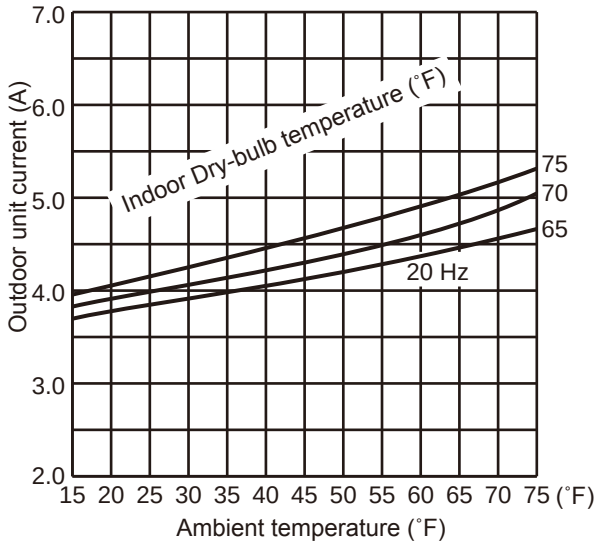
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 18 Hz (COOL) or 20 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 20 Hz.

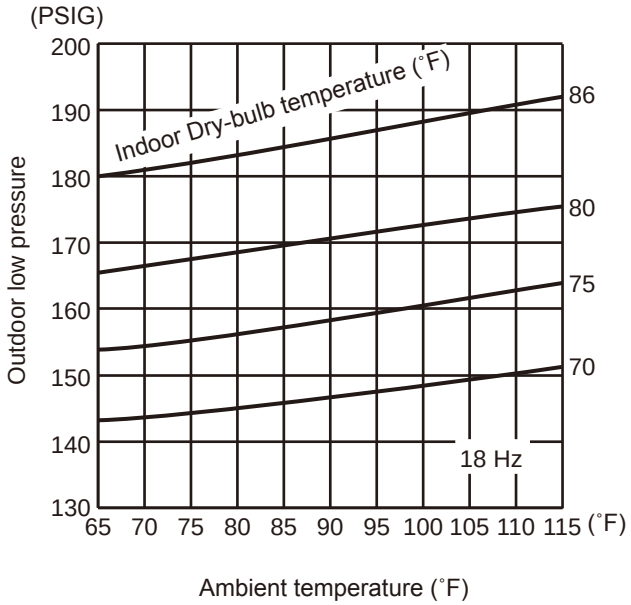


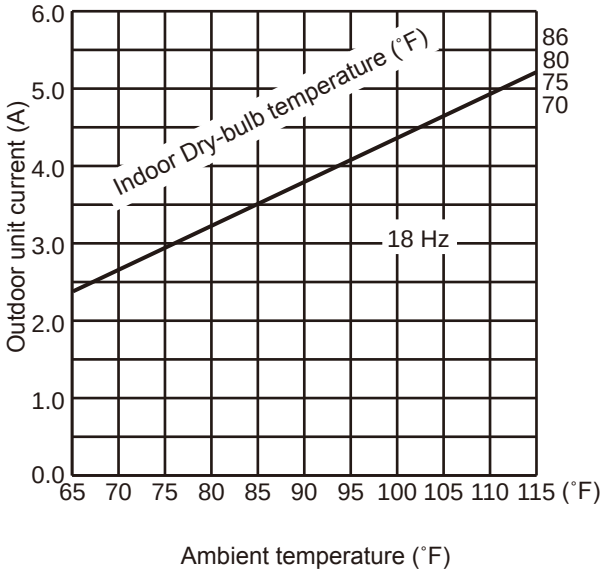
16. 24-class unit in single operation
(OUTDOOR UNIT: MXZ-5C42NA MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-3C30NAHZ2)

(1) COOL operation

① Data is based on the condition of indoor humidity 50%
② Air flow speed: High
③ Inverter output frequency: 18 Hz

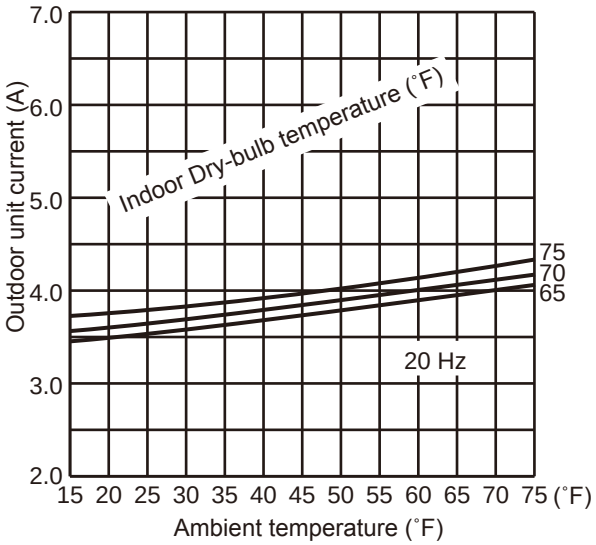
<How to work fixed-frequency operation>
1. Set emergency switch to COOL or HEAT. The switch is located on indoor unit.
2. Press emergency run ON/OFF button.
3. Compressor starts running at 18 Hz (COOL) or 20 Hz (HEAT).
4. Indoor fan runs at High speed and continues for 30 minutes.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Data is based on the condition of outdoor humidity 75%.
② Set air flow to High speed.
③ Inverter output frequency is 20 Hz.



10 ACTUATOR CONTROL

MXZ-2C20NA2 MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2 MXZ-5C42NA2
MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

Relation between main sensor and actuator

Sensor	Purpose	Actuator					
		Compressor	LEV	Outdoor fan motor	4-way valve	2-way solenoid valve (MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2)	Defrost heater (MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2)
Discharge temperature thermistor	Protection	○	○			○	
Indoor coil temperature thermistor	Cooling: Coil frost prevention	○				○	
	Heating: High pressure protection	○	○				
Defrost thermistor	Heating: Defrosting	○	○	○	○		
Fin temperature thermistor	Protection	○		○			
Ambient temperature thermistor	Control/Protection	○	○	○		○	
	Heating: Defrosting (Heater)						○
Outdoor heat exchanger temperature thermistor	Cooling: Control/ Protection	○	○	○		○	
Capacity code	Control	○	○				

11 SERVICE FUNCTIONS

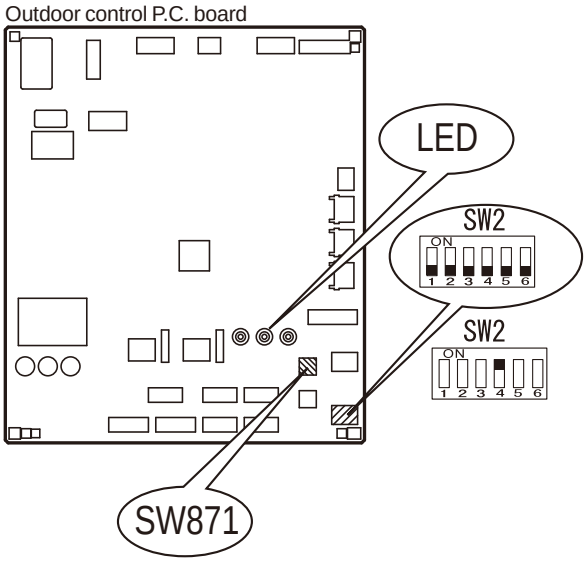
MXZ-2C20NA2 MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2 MXZ-5C42NA2
MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

11-1. PRE-HEAT CONTROL

If moisture gets into the refrigerant cycle, or when refrigerant is liquefied and collected in the compressor, it may interfere the startup of the compressor.
To improve start-up condition, the compressor is energized even while it is not operating.
This is to generate heat at the winding.
The compressor uses about 50 W when pre-heat control is turned ON.
Pre-heat control is ON at initial setting.

[How to deactivate pre-heat control]

① Turn OFF the power supply for the air conditioner before making the setting.
② Set the "4" of SW2 on the outdoor control P.C. board to ON to deactivate pre-heat control function.



③ Turn ON the power supply for the air conditioner.

NOTE: Pre-heat control will be turned OFF when the breaker is turned OFF.

11-2. AUTO LINE CORRECTING

Outdoor unit has an auto line correcting function which automatically detects and corrects improper wiring or piping.

Improper wiring or piping can be automatically detected by pressing the piping/wiring correction switch (SW871).
When improper wiring or piping is detected, wiring lines are corrected.
This will be completed in about 10 to 20 minutes.

[How to activate this function]

1. Check that outside temperature is above 32˚F.
   (This function does not work when outside temperature is not above 32˚F.)
2. Check that the stop valves of the liquid pipe and gas pipe are open.
3. Check that the wiring between indoor and outdoor unit is correct.
   (If the wiring is not correct, this function does not work.)
4. Turn ON the power supply and wait at least 1 minute.
5. Press the piping/wiring correction switch (SW871) on the outdoor control P.C. board.
   Do not touch energized parts.

   LED indication during detection:

LED1 (Red)	LED2 (Yellow)	LED3 (Green)
Lit	Lit	Once

   LED indication after detection:

LED1 (Red)	LED2 (Yellow)	LED3 (Green)	Indication
Lit	Not lit	Lit	Completed (Problem corrected/ nomal)
Once	Once	Once	Not completed (Detection failed)
Other indications			Refer to "SAFETY PRECAUTIONS WHEN LED BLINKS" located behind the service panel.

   ※ Make sure that the valves are open and the pipes are not collapsed or clogged.
6. Press the switch to cancel.

   LED indication after cancel :

LED1 (Red)	LED2 (Yellow)	LED3 (Green)
Lit	Lit	Not lit

NOTE : Indoor unit cannot be operated while this function is activated.
When this function is activated while indoor unit is operating, the operation will be stopped.
Operate indoor unit after the auto line correcting is finished.
Pressing the switch during detection cancels this function.

The record of auto line correcting can be confirmed in the following way:

Press the switch for more than 5 seconds.
LED will show the record of auto correcting for about 30 seconds as shown in the table below:

Number of blinks			Wiring line
LED1 (Red)	LED2 (Yellow)	LED3 (Green)	
Once	Once	Lit	Not corrected
3 times	3 times	Lit	Corrected

NOTE: Activate this function to confirm the correct wiring after replacing the outdoor control P.C. board.
(Previous records are deleted when the outdoor control P.C. board is replaced.)
The record cannot be shown if auto line correcting is not canceled (Refer to "How to activate this function").

12 TROUBLESHOOTING

MXZ-2C20NA2 MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2 MXZ-5C42NA2
MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

12-1. CAUTIONS ON TROUBLESHOOTING

1. Before troubleshooting, check the following:

1) Check the power supply voltage.
2) Check the indoor/outdoor connecting wire for miswiring.

2. Take care of the following during servicing.

1) Before servicing the air conditioner, be sure to turn OFF the unit first with the remote controller, and then after confirming the horizontal vane is closed, turn OFF the breaker and/or disconnect the power plug.
2) Be sure to turn OFF the power supply before removing the front panel, the cabinet, the top panel, and the outdoor control P.C. board.
3) When removing the electrical parts, be careful of the residual voltage of smoothing capacitor.
4) When removing the electronic control P.C. board, hold the edge of the board with care NOT to apply stress on the components.
5) When connecting or disconnecting the connectors, hold the connector housing. DO NOT pull the lead wires.

<Incorrect> <Correct>

Lead wiring **Connector housing**

3. Troubleshooting procedure

1) Check if the OPERATION INDICATOR lamp on the indoor unit is blinking on and off to indicate an abnormality. To make sure, check how many times the OPERATIONAL INDICATOR lamp is blinking on and off before starting service work.
2) When the outdoor control P.C. board seems to be defective, check for disconnection of the copper foil pattern and burnt or discolored components.
3) When troubleshooting, refer to 12-2, 12-3 and 12-4.

12-2. FAILURE MODE RECALL FUNCTION

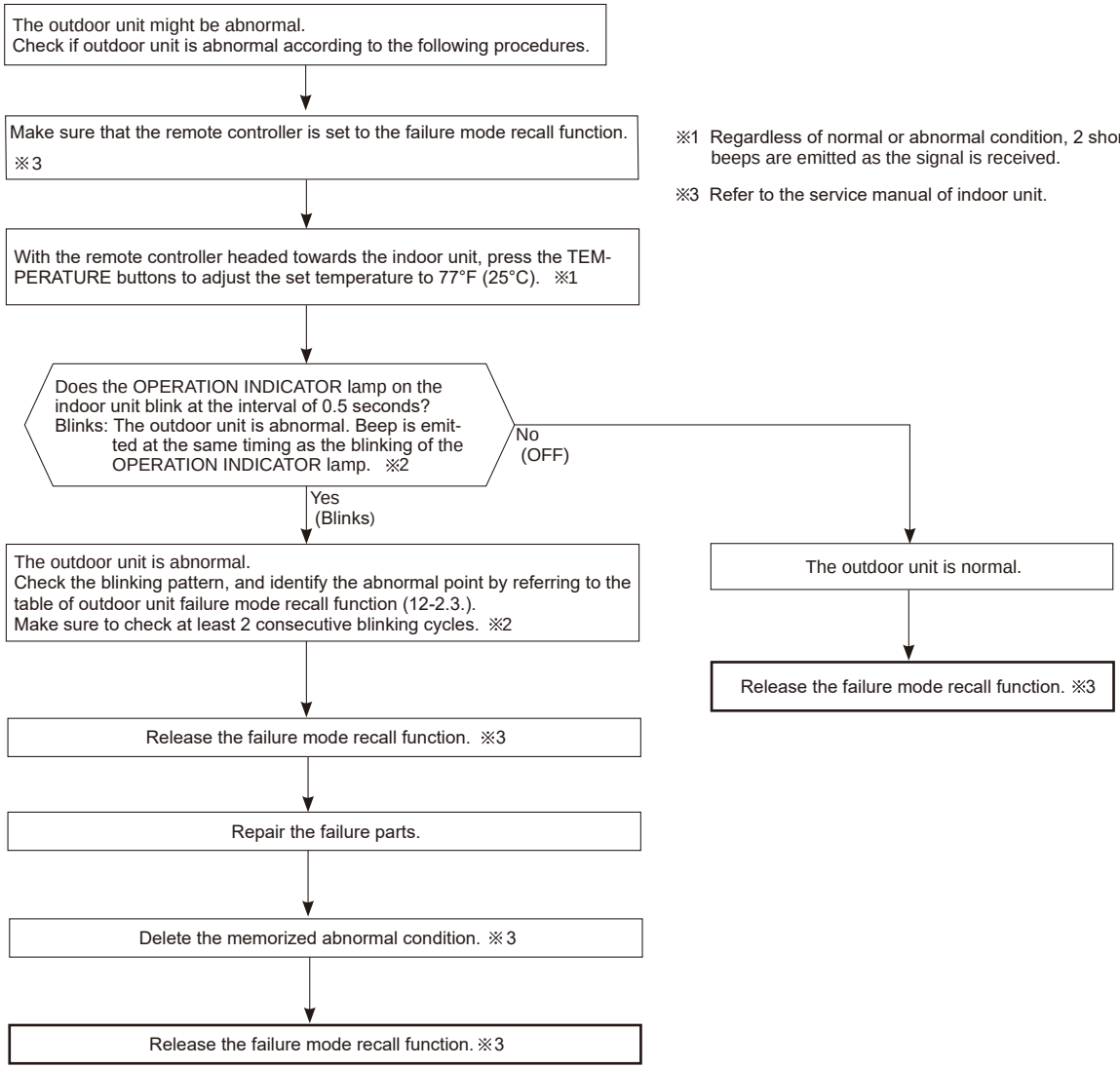
This air conditioner can memorize the abnormal condition which has occurred once.
Even though LED indication listed on the troubleshooting check table (12-4) disappears, the memorized failure details can be recalled.

1. Flow chart of failure mode recall function for the indoor/outdoor unit

Refer to the service manual of indoor unit.

2. Flow chart of the detailed outdoor unit failure mode recall function

Operational procedure

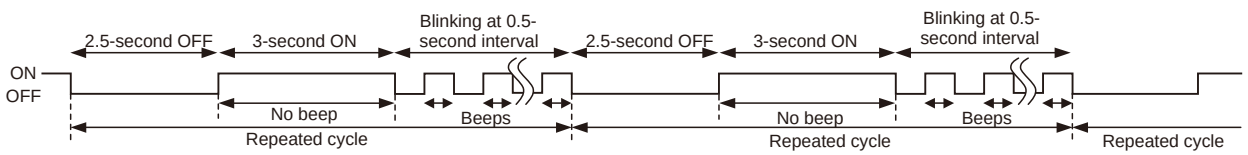


※1 Regardless of normal or abnormal condition, 2 short beeps are emitted as the signal is received.

※3 Refer to the service manual of indoor unit.

NOTE: 1. Make sure to release the failure mode recall function after it is set up, otherwise the unit cannot operate properly.
2. If the abnormal condition is not deleted from the memory, the last abnormal condition is kept memorized.

※2.Blinking pattern when outdoor unit is abnormal:



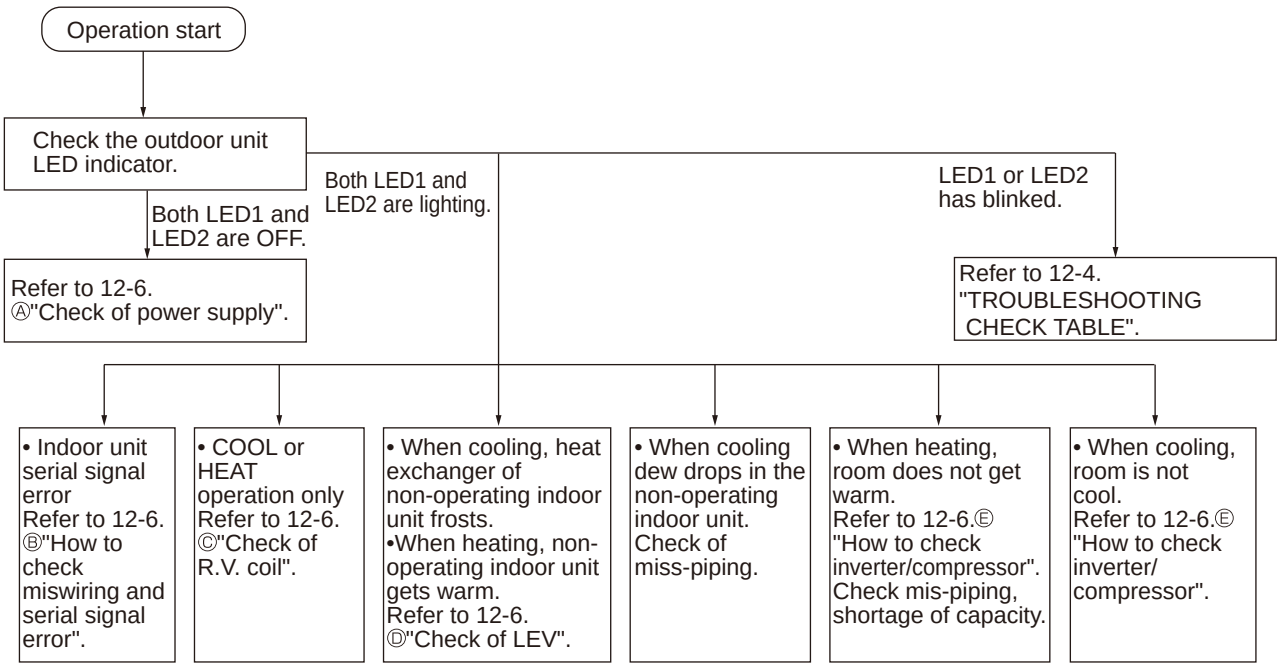
3. Table of outdoor unit failure mode recall function

NOTE: Blinking patterns of this mode differ from the ones of TROUBLESHOOTING CHECK TABLE (12-4.).

The left lamp of OPERATION INDICATOR lamp (Indoor unit)	Abnormal point (Failure mode/protection)	LED indication (Outdoor P.C. board)		Condition	Remedy	Indoor/outdoor unit failure mode recall function
		LED 1	LED 2			
OFF	None (Normal)	Lit	Lit			
2-time blink	Outdoor power system	Lit	Lit	Overcurrent protection cut-out operates 3 consecutive times within 1 minute after the compressor gets started, or converter protection cut-out or bus-bar voltage protection cut-out operates 3 consecutive times within 3 minutes after startup.	• Check the connection of the compressor connecting wire. • Refer to 12-6. Ⓔ "How to check inverter/compressor". • Check the stop valve.	○
3-time blink	Discharge temperature thermistor	Lit	Once	A thermistor shorts or opens during compressor running.	• Refer to 12-6. Ⓕ "Check of outdoor thermistors".	○
	Defrost thermistor	Lit	Once			
	Ambient temperature thermistor	Lit	Twice			
	Fin temperature thermistor	Lit	3 times			
	P.C. board temperature thermistor	Lit	4 times		• Replace the outdoor control P.C. board.	
	Outdoor heat exchanger temperature thermistor	Lit	9 times		• Refer to 12-6. Ⓕ "Check of outdoor thermistors".	
4-time blink	Overcurrent	Once	Not lit	18A (**MXZ-2C20NA2**)/21 A (**MXZ-3C24/3C30/4C36NA, MXZ-3C24/3C30/4C36NA2**)/28 A (**MXZ-5C42NA, MXZ-2C20/3C24/3C30NAHZ, MXZ-5C42NA2, MXZ-2C20/3C24/3C30NAHZ2**) current flows into power module.	• Reconnect compressor connector. • Refer to 12-6. Ⓔ "How to check inverter/compressor". • Check the stop valve.	—
5-time blink	Discharge temperature	Lit	Lit	The discharge temperature exceeds 239°F (**MXZ-2C20NA2**)/222.8°F (**MXZ-3C24/3C30/4C36NA, MXZ-3C24/3C30/4C36NA2**)/240.8°F (**MXZ-2C20/3C24/3C30NAHZ, 5C42NA, MXZ-2C20/3C24/3C30NAHZ2, 5C42NA2**) during operation. Compressor can restart if discharge temperature thermistor reads 176°F (**MXZ-2C20NA2**)/203°F (**MXZ-3C24/3C30/4C36NA, MXZ-3C24/3C30/4C36NA2**)/212°F (**MXZ-2C20/3C24/3C30NAHZ, 5C42NA, MXZ-2C20/3C24/3C30NAHZ2, 5C42NA2**) or less 3 minutes later.	• Check refrigerant circuit and refrigerant amount. • Refer to 12-6. Ⓓ "Check of LEV".	—
6-time blink	High pressure	Lit	Lit	The outdoor heat exchanger temperature exceeds 158°F during cooling or the indoor gas pipe temperature exceeds 158°F during heating.	• Check refrigerant circuit and refrigerant amount. • Check the stop valve.	—
7-time blink	Fin temperature	3 times	Not lit	The fin temperature exceeds 190°F (**MXZ-3C24/3C30/4C36NA, MXZ-2C20/3C24/3C30/4C36NA2**)/192°F (**MXZ-2C20/3C24/3C30NAHZ, 5C42NA, MXZ-2C20/3C24/3C30NAHZ2, 5C42NA2**) during operation.	• Check around outdoor unit. • Check outdoor unit air passage. • Refer to 12-6. Ⓖ "Check of outdoor fan motor".	—
	P.C. board temperature	4 times	Not lit	The P.C. board temperature exceeds 152°F (**MXZ-3C24/3C30/4C36NA, MXZ-2C20/3C24/3C30/4C36NA2**)/189°F (**MXZ-2C20/3C24/3C30NAHZ, MXZ-5C42NA, MXZ-2C20/3C24/3C30NAHZ2, 5C42NA2**) during operation.		
8-time blink	Outdoor fan motor	Lit	Lit	A failure occurs 3 consecutive times within 30 seconds after the fan gets started.	• Refer to 12-6. Ⓖ "Check of outdoor fan motor".	—
	4-way valve switching operation abnormality.	Lit	12 times	Connector of R.V. coil is disconnected, poorly connected or 4-way valve is faulty.	• Refer to 12-6. Ⓒ "Check of R.V. coil". • Check the 4-way valve.	○
9-time blink	Outdoor control system	Lit	5 times	Nonvolatile memory data cannot be read properly.	• Replace the outdoor control P.C. board.	○
10-time blink	Low discharge temperature protection	Lit	Lit	The frequency of the compressor is kept 80 Hz or more and the discharge temperature is kept under 102.2°F for more than 20 minutes.	• Check refrigerant circuit and refrigerant amount. • Refer to 12-6. Ⓓ "Check of LEV".	—
11-time blink	Communication error between P.C. boards	Lit	6 times	Communication error occurs between the outdoor control P.C. board and outdoor power P.C. board for more than 10 seconds.	• Check the connecting wire between outdoor control P.C. board and outdoor power P.C. board.	—
				The communication between boards protection cut-out operates 2 consecutive times.		○
	Current sensor	Lit	7 times	A short or open circuit is detected in the current sensor during compressor operating.	—	—
				Current sensor protection cut-out operates 2 consecutive times.		○
	Zero cross detecting circuit	5 times	Not lit	Zero cross signal cannot be detected while the compressor is operating.	• Check the connecting wire among outdoor control P.C. board and outdoor power P.C. board.	—
				The protection cut-out of the zero cross detecting circuit operates 10 consecutive times.		○
	Converter	5 times	Not lit	A failure is detected in the operation of the converter during operation.	• Check the voltage of power supply. • Replace the outdoor power P.C. board.	—
	Bus-bar voltage	5 times	Not lit	The bus-bar voltage exceeds 400 V or falls to low level during compressor operating.	• Check the voltage of power supply. • Replace the outdoor power P.C. board or the outdoor control P.C. board.	
14-time blink	4-way valve switching operation abnormality.	Lit	12 times	Connector of R.V. coil is disconnected, poorly connected or 4-way valve is faulty.	• Refer to 12-6. Ⓒ "Check of R.V. coil". • Check the 4-way valve.	○
15-time blink	LEV and drain pump	Lit	Lit	The indoor unit detects an abnormality in the LEV and drain pump.	• Refer to 12-6. Ⓓ "Check of LEV". • Check the drain pump of the indoor unit.	—

12-3. INSTRUCTION OF TROUBLESHOOTING

• Check the indoor unit with referring to the indoor unit service manual, and confirm that there is any problem in the indoor unit.
Then, check the outdoor unit with referring to this page.



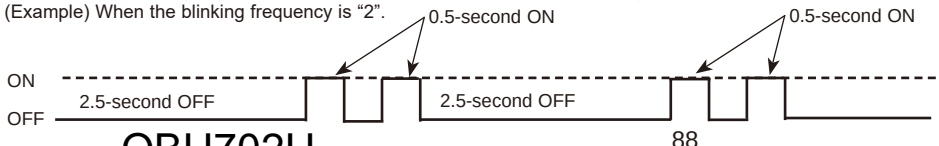
12-4. TROUBLESHOOTING CHECK TABLE

No.	Symptom	Indication		Abnormal point / Condition	Condition	Remedy
		LED1(Red)	LED2(Yellow)			
1	Outdoor unit does not operate.	Lit	Once	LEV and drain pump	The indoor unit detects an abnormality in the LEV and drain pump.	• Refer to 12-6. Ⓓ "Check of LEV". • Check the drain pump of the indoor unit.
2		Lit	Twice	Outdoor power system	Overcurrent protection cut-out operates 3 consecutive times within 1 minute after the compressor gets started, or converter protection cut-out or bus-bar voltage protection cut-out operates 3 consecutive times within 3 minutes after startup.	• Check the connection of the compressor connecting wire. • Refer to 12-6. Ⓔ "How to check inverter/compressor". • Check the stop valve.
3		Lit	3 times	Discharge temperature thermistor	A short circuit is detected in the thermistor during operation, or an open circuit is detected in the thermistor after 10 minutes of compressor startup.	• Refer to 12-6. Ⓕ "Check of outdoor thermistors".
4		Lit	4 times	Fin temperature thermistor	A short or open circuit is detected in the thermistor during operation.	• Refer to 12-6. Ⓕ "Check of outdoor thermistors".
				P. C. board temperature thermistor		• Replace the outdoor control P.C. board.
5		Lit	5 times	Ambient temperature thermistor	A short or open circuit is detected in the thermistor during operation.	• Refer to 12-6. Ⓕ "Check of outdoor thermistors".
				Outdoor heat exchanger temperature thermistor	A short circuit is detected in the thermistor during operation, or an open circuit is detected in the thermistor after 5 minutes (in cooling) and 10 minutes (in heating) of compressor startup.	
				Defrost thermistor	A short circuit is detected in the thermistor during operation, or an open circuit is detected in the thermistor after 5 minutes of compressor startup.	
6		Lit	6 times	Zero cross detecting circuit (Outdoor control P.C. board)	Zero cross signal cannot be detected.	• Replace the outdoor control P.C. board.
7		Lit	7 times	Outdoor control system	The nonvolatile memory data cannot be read properly.	• Replace the outdoor control P.C. board.
8		Lit	8 times	Current sensor	Current sensor protection cut-out operates 2 consecutive times.	• Replace the outdoor power P.C. board.
9		Lit	11 times	Communication error between P.C. boards	The communication protection cut-out between boards operates 2 consecutive times.	• Check the connecting wire between outdoor control P.C. board and outdoor power P.C. board.
				M-NET communication error	M-NET adapter P.C. board detects an abnormality in the communication error.	• Check the connecting wire between M-NET adapter P.C. board and outdoor control P.C. board, or terminal bed.
10		Lit	12 times	Zero cross detecting circuit (Outdoor power P.C. board)	The protection cut-out of the zero cross detecting circuit operates 10 consecutive times.	• Replace the outdoor power P.C. board.
11		Lit	13 times	Current sensor	A short or open circuit is detected in the input current detection circuit during operation.	• Replace the outdoor power P.C. board.
12		Lit	14 times	Voltage sensor	A short or open circuit is detected in the input voltage detection circuit during operation.	• Replace the outdoor power P.C. board.
13		Lit	15 times	Relay operation	No relay operation is detected during operation.	• Replace the outdoor power P.C. board.
14		Lit	21 times	4-way valve	Connector of R.V. coil is disconnected, poorly connected or 4-way valve is faulty.	• Refer to 12-6. Ⓒ "Check of R.V. coil". • Check the 4-way valve.
15	'Outdoor unit stops and restarts 3 minutes later' is repeated.	Twice	Not lit	IPM protection	Overcurrent is detected after 30 seconds of compressor startup.	• Reconnect compressor connector. • Refer to 12-6. Ⓔ "How to check inverter/compressor". • Check the stop valve. • Check the power module (PAM module).
				Lock protection	Overcurrent is detected within 30 seconds of compressor startup.	
16		3 times	Not lit	Discharge temperature protection	The discharge temperature exceeds 239°F (**MXZ-2C20NA2**)/222.8°F (**MXZ-3C24/3C30/4C36NA, MXZ-3C24/3C30/4C36NA2**)/240.8°F (**MXZ-2C20 /3C24/3C30NAHZ, 5C42NA,MXZ-2C20/3C24/ 3C30NAHZ2, 5C42NA2**) during operation. Compressor can restart if discharge temperature thermistor reads 176°F (**MXZ-2C20NA2**)/203°F (**MXZ-3C24/3C30/4C36NA, MXZ-3C24/3C30/4C36NA2**)/212°F (**MXZ-2C20/3C24/3C30NAHZ, 5C42NA, MXZ-2C20/ 3C24/3C30NAHZ2, 5C42NA2**) or less 3 minutes later.	• Check the amount of gas and refrigerant circuit. • Refer to 12-6. Ⓓ "Check of LEV".
17		4 times	Not lit	Fin temperature protection	The fin temperature exceeds during operation.	•Check refrigerant circuit and refrigerant amount. •Refer to 12-6. Ⓖ "Check of outdoor fan motor".
				P.C. board temperature protection	The P.C. board temperature exceeds during operation.	
18		5 times	Not lit	High pressure protection	High pressure is detected with the high pressure switch (HPS) during operation.	• Check around of gas and the refrigerant circuit. • Check the stop valve.
					The outdoor heat exchanger temperature exceeds 158°F during cooling or the indoor gas pipe temperature exceeds 158°F during heating.	
19		6 times	Not lit	Pre-heating protection	Overcurrent is detected during pre-heating.	• Reconnect compressor connector. • Refer to 12-6.Ⓔ "How to check inverter/compressor". • Check the power module.
20		8 times	Not lit	Converter protection	A failure is detected in the operation of the converter during operation.	• Replace the outdoor power P.C. board.
21		9 times	Not lit	Bus-bar voltage protection	The bus-bar voltage exceeds 400 V or falls to low level during compressor operating.	• Check the voltage of power supply. • Replace the outdoor power P.C. board or the outdoor control P.C. board. • Refer to 12-6. Ⓙ "Check of bus-bar voltage".

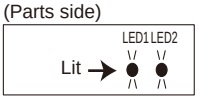
No.	Symptom	Indication		Abnormal point / Condition	Condition	Remedy
		LED1(Red)	LED2(Yellow)			
22	'Outdoor unit stops and restarts 3 minutes later' is repeated.	11 times	Not lit	Low out side temperature protection(cooling)	The ambient became 10.4°F or less.	—
				Low out side temperature protection(Heating)	The ambient became 1.4°F or less. (**MXZ-3C24/3C30/4C36/5C42NA, MXZ-3C24/3C30/4C36/5C42NA2**)	
					The ambient became -18°F or less. (**MXZ-2C20/3C24/3C30NAHZ, MXZ-2C20/3C24/3C30NAHZ2**)	
23		13 times	Not lit	Outdoor fan motor	A failure occurs 3 consecutive times within 30 seconds after the fan gets started.	• Refer to 12-6. Ⓖ "Check of outdoor fan motor".
24		14 times	Not lit	4-way valve switching operation	Connector of R.V. coil is disconnected, poorly connected or 4-way valve is faulty.	• Refer to 12-6. Ⓒ "Check of R.V. coil". • Check the 4-way valve.
25		Lit	8 times	Current sensor protection	A short or open circuit is detected in the current sensor during compressor operating.	• Replace the outdoor power P.C. board.
26		Lit	11 times	Communication between P.C. boards protection	Communication error occurs between the outdoor control P.C. board and outdoor power P.C. board for more than 10 seconds.	• Check the connecting wire between outdoor control P.C. board and outdoor power P.C. board.
27		Lit	12 times	Zero cross detecting circuit protection (Outdoor power P.C. board)	Zero cross signal cannot be detected while the compressor is operating.	• Replace the outdoor power P.C. board.
28	Outdoor unit operates.	Once	Lit	Primary current protection	The input current exceeds 15.0 A (**MXZ-2C20NA2**) /18.4 A (**MXZ-3C24/3C30/4C36NA, MXZ-3C24/3C30/4C36NA2**)/26.8 A (**MXZ-2C20/3C24/3C30NAHZ, 5C42NA, MXZ-2C20/3C24/3C30NAHZ2, MXZ-5C42NA2**).	These symptoms do not mean any abnormality of the product, but check the following points. • Check if indoor filters are clogged. • Check if refrigerant is short. • Check if indoor/outdoor unit air circulation is short cycled.
29		Twice	Lit	High pressure protection	The indoor gas pipe temperature exceeds 113°F during heating.	
				Defrosting in cooling	The indoor gas pipe temperature falls 37.4°F or below during cooling.	
30		3 times	Lit	Discharge temperature protection	The frequency of the compressor is kept 80 Hz or more and the discharge temperature is kept under 122°F(COOL mode)/104°F(HEAT mode) for more than 40 minutes.	• Check refrigerant circuit and refrigerant amount. • Refer to 12-6. Ⓓ "Check of LEV". • Refer to 12-6. Ⓕ "Check of outdoor thermistors".
31		4 times	Lit	Low discharge temperature protection	The frequency of the compressor is kept 80 Hz or more and the discharge temperature is kept under 102.2°F for more than 20 minutes.	• Refer to 12-6. Ⓓ "Check of LEV". • Check refrigerant circuit and refrigerant amount.
32		5 times	Lit	Cooling high pressure protection	The outdoor heat exchanger temperature exceeds 136.4°F during operation.	This symptom does not mean any abnormality of the product, but check the following points. • Check if indoor filters are clogged. • Check if refrigerant is short. • Check if indoor/outdoor unit air circulation is short cycled.
33		7 times	Lit	High → Low Pressure bypass valve Cooling evaporating temperature drop prevention control	During cooling operation, the temperature of indoor heat exchanger becomes 37.4°F or less within 1 hour after the compressor starts running, or it becomes less than 53.6°F - 60.8°F* later than that. * It depends on the difference between the set temperature and the room temperature. (**MXZ-2C20/3C24/3C30NAHZ, MXZ-5C42NA, MXZ-2C20/3C24/3C30NAHZ2, MXZ-5C42NA2**)	This symptom does not mean any abnormality of the product, but check the following points. • Check the indoor filters are not clogged. • Check there is sufficient refrigerant. • Check the indoor/outdoor unit air circulation is not short cycled.
34		11 times	Lit	M-NET communication error	M-NET adapter P.C. board detects an abnormality in the communication error.	• Check the connecting wire between M-NET adapter P.C. board and outdoor control P.C. board, or terminal block.
35	Outdoor unit operates normally.	7 times	Lit	High → Low pressure bypass valve High pressure protection control at startup of heating operation	The room temperature is 75.2°F or more when 1 or 2 unit(s) start(s) the heating operation. (**MXZ-2C20/3C24/3C30NAHZ, MXZ-5C42NA, MXZ-2C20/3C24/3C30NAHZ2, MXZ-5C42NA2**)	This symptom does not mean any abnormality of the product.
				High → Low pressure bypass valve Compressor oil tempering control at startup of heating operation	Both the following are true: • The outside temperature is 28.4°F or less when the heating operation is started. • [(Discharge temperature) - (Indoor heat exchanger temperature)] < 9°F (**MXZ-2C20/3C24/3C30NAHZ, MXZ-5C42NA, MXZ-2C20/3C24/3C30NAHZ2, MXZ-5C42NA2**)	
36		8 times	Lit	Cooling evaporating temperature protection	During cooling operation, the temperature of indoor heat exchanger becomes 44.6°F - 51.8°F* or less within 1 hour after the compressor starts running, or it becomes 48.2°F - 62.6°F* or less later than that. * It depends on the indoor unit type/model or the difference between the set temperature and the room temperature.	
37		9 times	Lit	Inverter check mode	The unit is operated with emergency operation switch.	—
38		Lit	Lit	Normal	—	—

NOTE: 1. The location of LED is illustrated at the right figure. Refer to 12-7.1.
2. LED is lit during normal operation.

The blinking frequency shows the number of times the LED blinks after every 2.5-second OFF.
(Example) When the blinking frequency is "2".



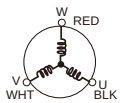
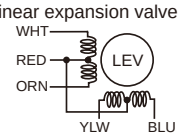
Outdoor control P.C. board
(Parts side)



12-5. TROUBLE CRITERION OF MAIN PARTS

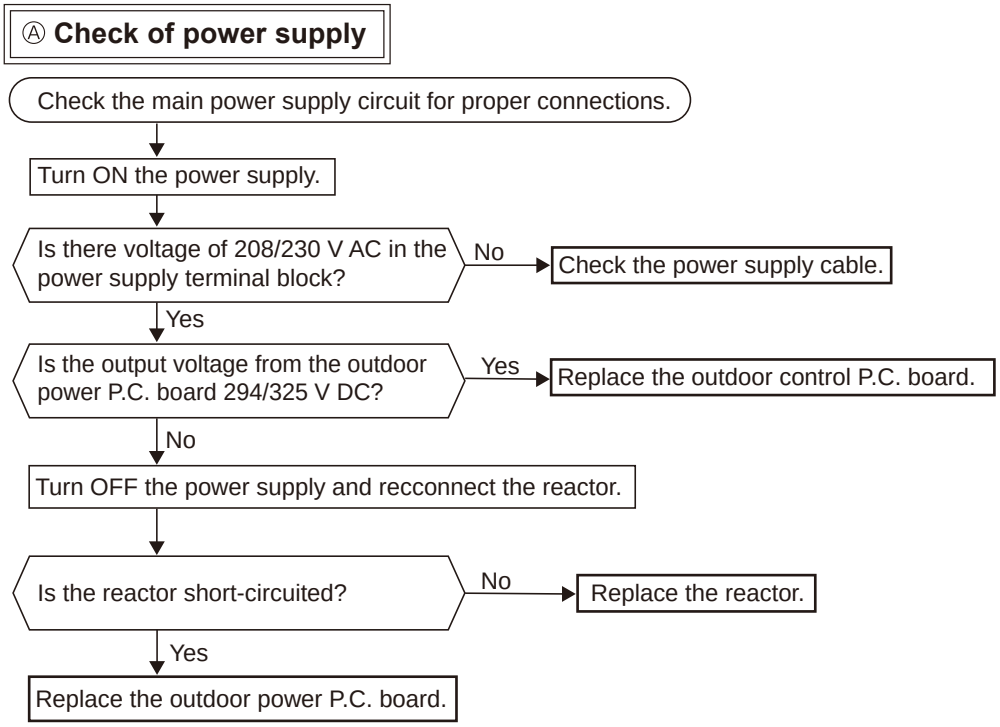
MXZ-2C20NA2 MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2 MXZ-5C42NA2
MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

<table>
<tr><th>Part name</th><th>Check method and criterion</th></tr>
<tr><td>Defrost thermistor (RT61)
Fin temperature thermistor (RT64)
Ambient temperature thermistor (RT65)
Outdoor heat exchanger temperature thermistor (RT68)</td><td>Measure the resistance with a tester.

Refer to 12-7. “TEST POINT DIAGRAM AND VOLTAGE”, 1. ”Outdoor control P.C.board”, 2. ”Outdoor power P.C. board”, for the chart of thermistor.</td></tr>
<tr><td>Discharge temperature thermistor (RT62)</td><td>Measure the resistance with a tester.
Before measurement, hold the thermistor with your hands to warm it up.
Refer to 12-7. “TEST POINT DIAGRAM AND VOLTAGE”,1. ”Outdoor control P.C. board” for the chart of thermistor.</td></tr>
<tr><td>Compressor
 
</td><td>Measure the resistance between terminals using a tester.
(Winding temperature: 14°F - 104°F)
<table>
<tr><th colspan="2">Normal (Each phase)</th></tr>
<tr><td>MXZ-2C20NA2</td><td>MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2</td></tr>
<tr><td>0.63 kΩ - 0.78 kΩ</td><td>0.83 Ω - 1.03 Ω</td></tr>
</table>
Measure the resistance between terminals using a tester.
(Winding temperature: 14°F - 104°F)
<table>
<tr><th>Normal (Each phase)</th></tr>
<tr><td>MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2</td></tr>
<tr><td>0.77 Ω - 0.95 Ω</td></tr>
</table></td></tr>
<tr><td>Outdoor fan motor</td><td>• Refer to 12-6.Ⓖ.</td></tr>
<tr><td>R.V. coil</td><td>Measure the resistance using a tester. (Part temperature: 14°F - 104°F)
<table>
<tr><th colspan="2">Normal (Each phase)</th></tr>
<tr><td>MXZ-2C20NA2</td><td>MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2</td></tr>
<tr><td>1.26 kΩ - 1.62 kΩ</td><td>1.20 kΩ - 1.77 kΩ</td></tr>
</table>
Measure the resistance using a tester. (Part temperature: 14°F - 104°F)
<table>
<tr><th>Normal (Each phase)</th></tr>
<tr><td>MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2</td></tr>
<tr><td>1.24 kΩ - 1.86 kΩ</td></tr>
</table></td></tr>
<tr><td>2-way valve solenoid coil
MXZ-5C42NA
MXZ-2C20NAHZ
MXZ-3C24NAHZ
MXZ-3C30NAHZ
MXZ-5C42NA2
MXZ-2C20NAHZ2
MXZ-3C24NAHZ2
MXZ-3C30NAHZ2</td><td>Measure the resistance using a tester. (Part temperature: 14°F - 104°F)
<table>
<tr><th colspan="2">Normal</th></tr>
<tr><td>MXZ-5C42NA</td><td>MXZ-5C42NA2</td></tr>
<tr><td>MXZ-2C20NAHZ</td><td>MXZ-2C20NAHZ2</td></tr>
<tr><td>MXZ-3C24NAHZ</td><td>MXZ-3C24NAHZ2</td></tr>
<tr><td>MXZ-3C30NAHZ</td><td>MXZ-3C30NAHZ2</td></tr>
<tr><td colspan="2">0.97 kΩ - 1.37 kΩ</td></tr>
</table></td></tr>
<tr><td>Linear expansion valve
 
</td><td>Measure the resistance using a tester. (Part temperature: 14°F - 104°F)
<table>
<tr><th>Color of lead wire</th><th>Normal</th></tr>
<tr><td>WHT - RED</td><td rowspan="4">37.4 Ω - 53.9 Ω</td></tr>
<tr><td>RED - ORN</td></tr>
<tr><td>YLW - RED</td></tr>
<tr><td>RED - BLU</td></tr>
</table></td></tr>
<tr><td>High pressure switch (HPS)</td><td>
<table>
<tr><th></th><th>Pressure</th><th>Normal</th></tr>
<tr><td rowspan="2">HPS</td><td>537 ± 22 PSIG</td><td>Close</td></tr>
<tr><td>696^{+7}_{-15} PSIG</td><td>Open</td></tr>
</table></td></tr>
<tr><td>Defrost heater
MXZ-2C20NAHZ
MXZ-3C24NAHZ
MXZ-3C30NAHZ
MXZ-2C20NAHZ2
MXZ-3C24NAHZ2
MXZ-3C30NAHZ2</td><td>Measure the resistance using a tester. (Part temperature: 14°F - 104°F)
<table>
<tr><th>Normal</th></tr>
<tr><td>0.35 kΩ - 0.50 kΩ</td></tr>
</table></td></tr>
</table>

12-6. TROUBLESHOOTING FLOW

Outdoor unit does not operate.



- **When unit cannot operate neither by the remote controller nor by EMERGENCY OPERATION switch. Indoor unit does not operate.**
- **When OPERATION INDICATOR lamp blinks ON and OFF in every 0.5-second. Outdoor unit does not operate.**

Ⓑ How to check miswiring and serial signal error (when outdoor unit does not work)

LED indication for communication status

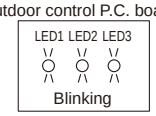
Communication status is indicated by the LED.

Unit status
Blinking: normal communication
Lit: abnormal communication or not connected

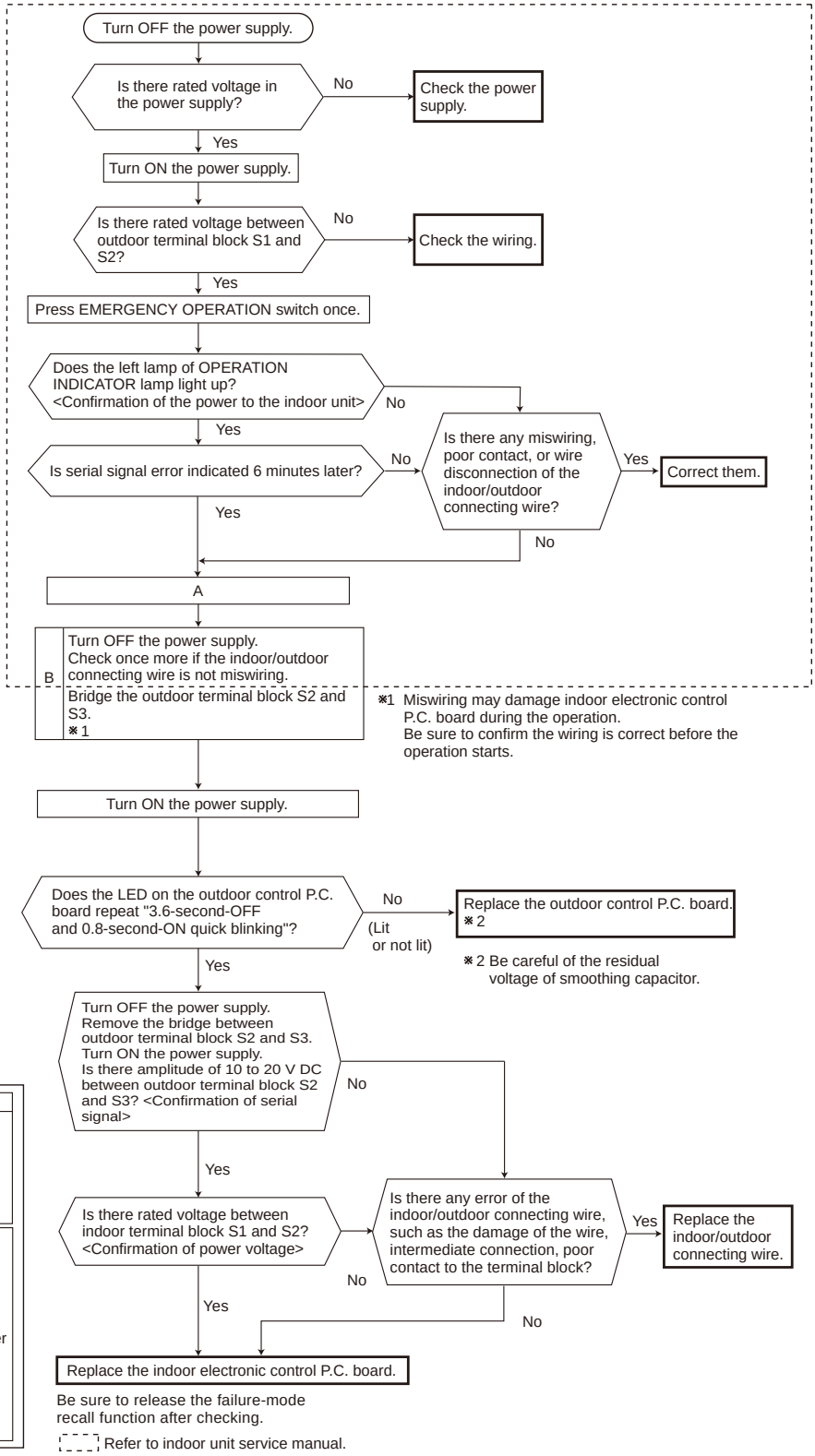
Pattern 1 and 2 is repeatedly displayed alternately. Each pattern is displayed for 15 seconds.

NOTE: "Lit" in the table below does not indicate abnormal communication.

Outdoor control P.C. board



Pattern	LED 1	LED 2	LED 3
1	Unit A status	Unit B status	Lit
2	Unit C status	Unit D status	Not lit
3	Unit E status	———	Blinking

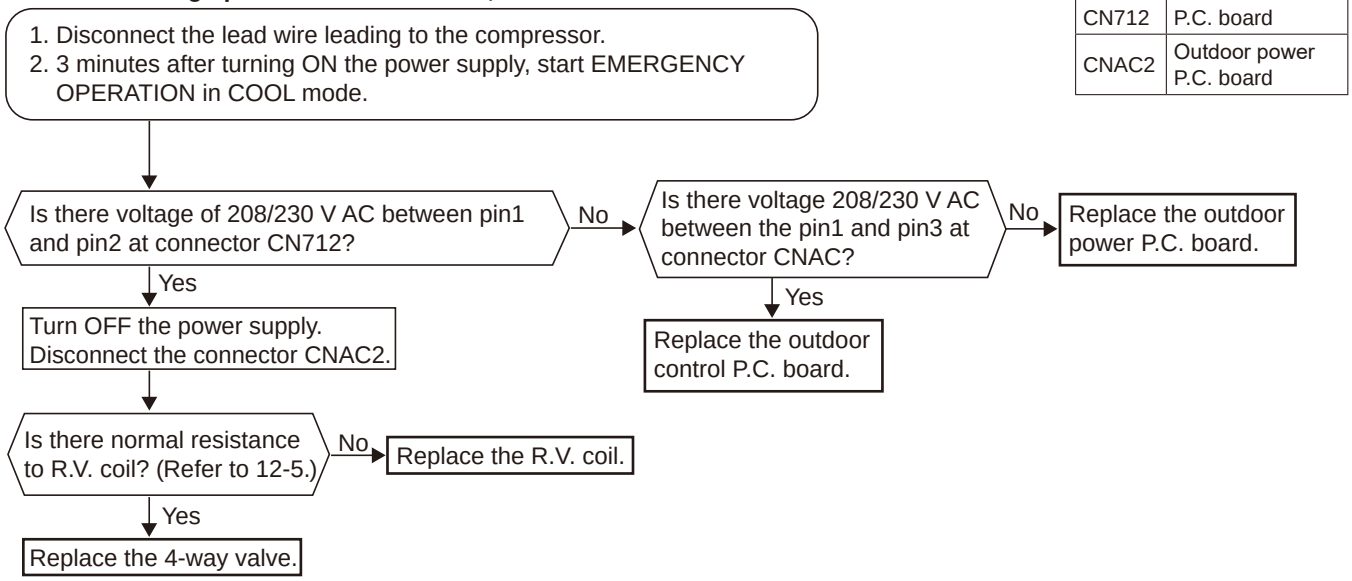


The cooling operation or heating operation does not operate.

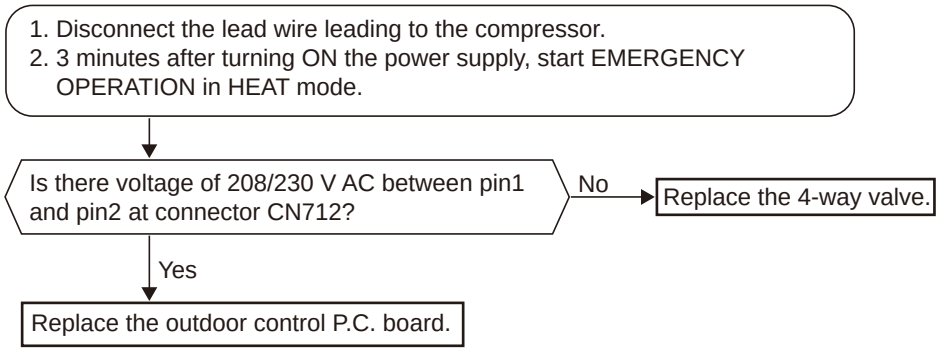
© Check of R.V. coil

CNAC CN712	Outdoor control P.C. board
CNAC2	Outdoor power P.C. board

• When cooling operation does not work,

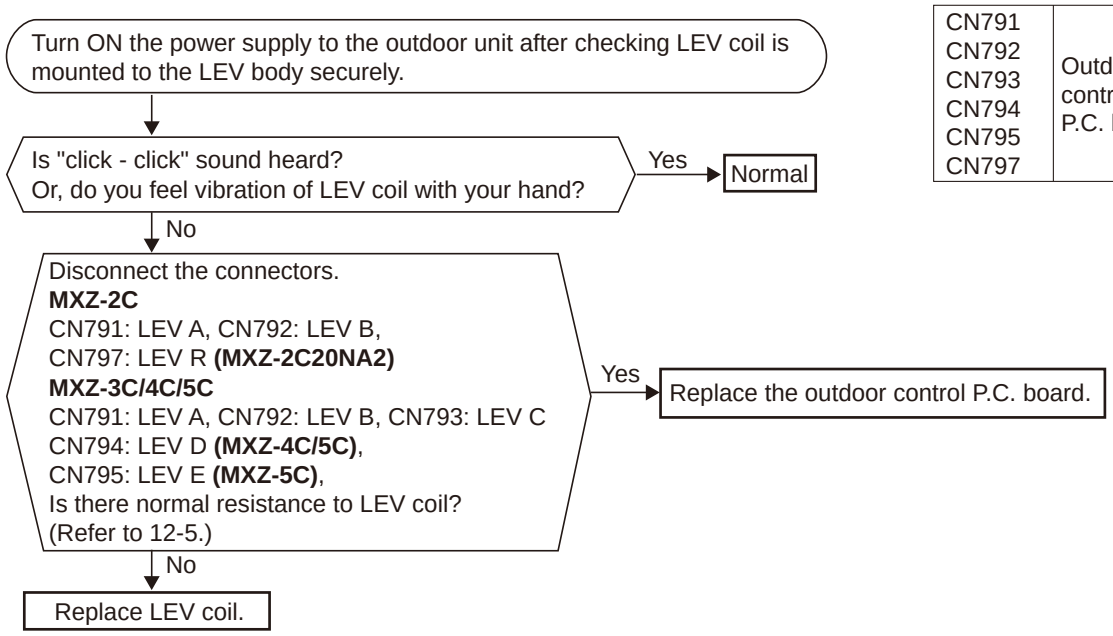


• When heating operation does not work,



• When cooling, heat exchanger of non-operating indoor unit frosts.
• When heating, non-operating indoor unit gets warm.

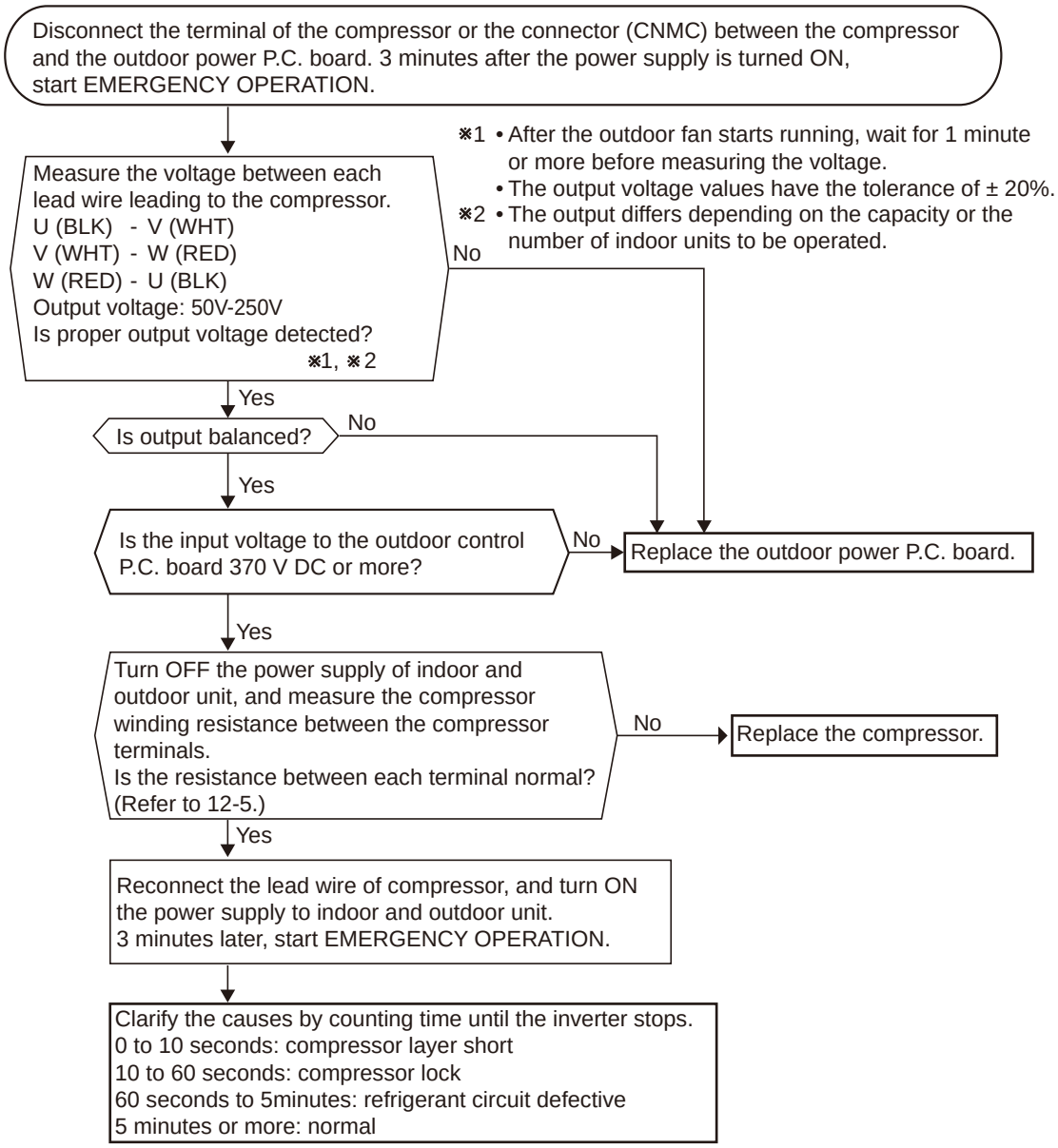
Ⓓ Check of LEV



CN791 CN792 CN793 CN794 CN795 CN797	Outdoor control P.C. board

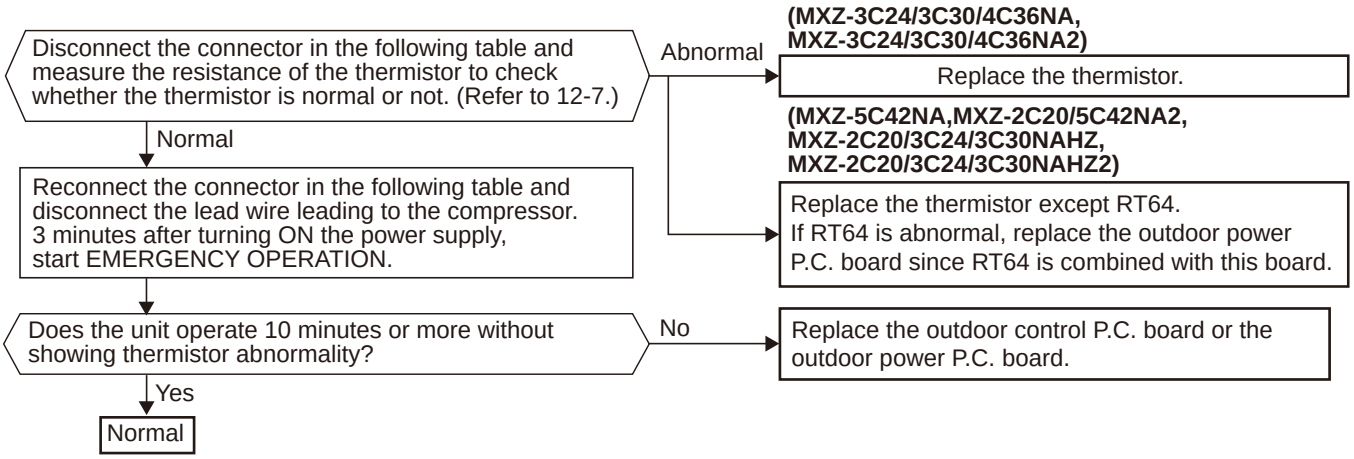
• When heating, room does not get warm.
• When cooling, room does not get cool.

Ⓔ How to check inverter/compressor



• When thermistor is abnormal,

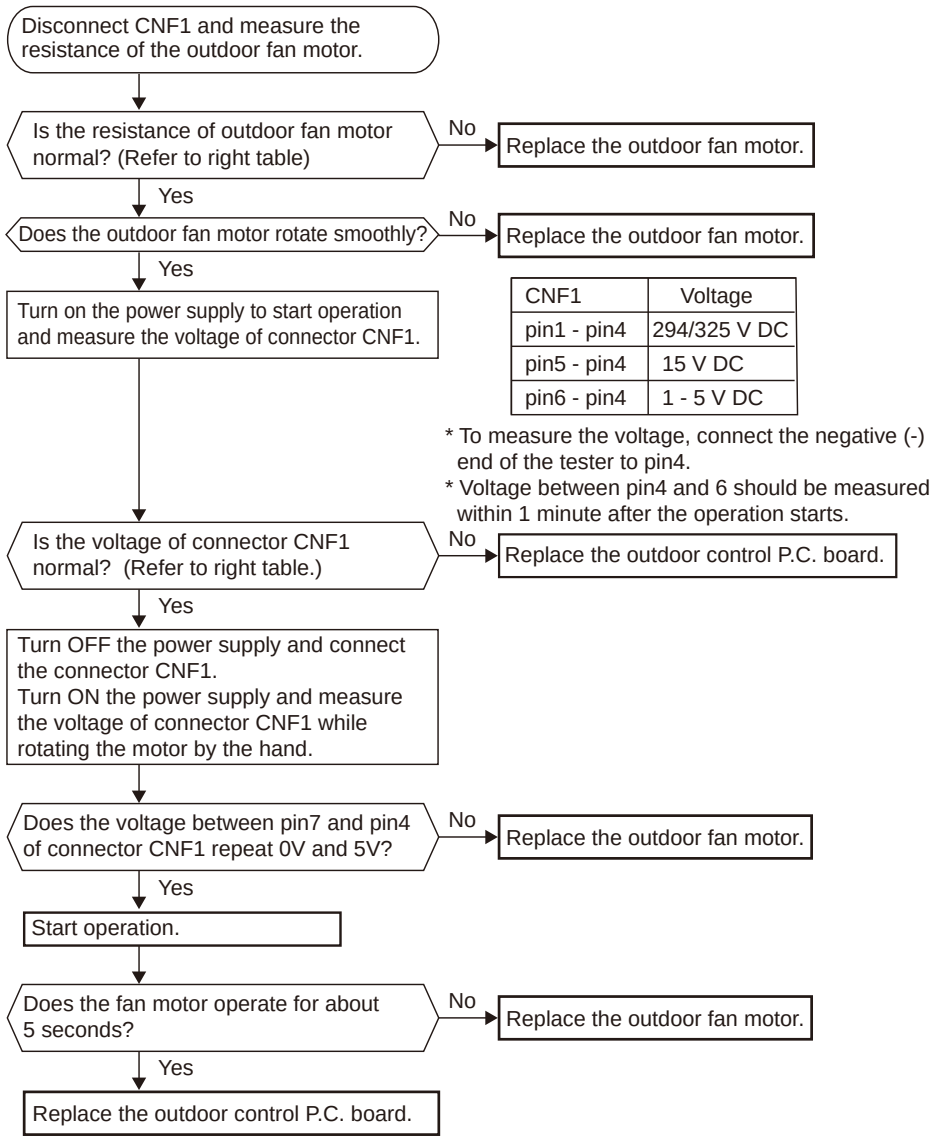
Ⓕ Check of outdoor thermistors



Thermistor	Symbol	Connector, Pin No.	Board
Defrost	RT61	Between CNTH1 pin1 and pin2	Outdoor control P.C. board
Discharge temperature	RT62	Between CNTH1 pin3 and pin4	
Outdoor heat exchanger temperature	RT68	Between CNTH1 pin7 and pin8	
Ambient temperature	RT65	Between CNTH2 pin1 and pin2	
Fin temperature	RT64	Between CN171 pin1 and pin2	Outdoor power P.C. board

• Fan motor does not operate or stops operating shortly after starting the operation.

Ⓖ Check of outdoor fan motor



CNF1	Voltage
pin1 - pin4	294/325 V DC
pin5 - pin4	15 V DC
pin6 - pin4	1 - 5 V DC

* To measure the voltage, connect the negative (-) end of the tester to pin4.
* Voltage between pin4 and 6 should be measured within 1 minute after the operation starts.

CNF1	Outdoor control P.C. board

(MXZ-3C24/3C30/4C36/5C42NA, MXZ-2C20/3C24/3C30NAHZ)

Measuring points	Resistance
pin1 - pin4	∞
pin5 - pin4	60 kΩ
pin6 - pin4	160 kΩ
pin7 - pin4	∞

(MXZ-2C20/3C24/3C30/4C36/5C42NA2, MXZ-2C20/3C24/3C30NAHZ2)

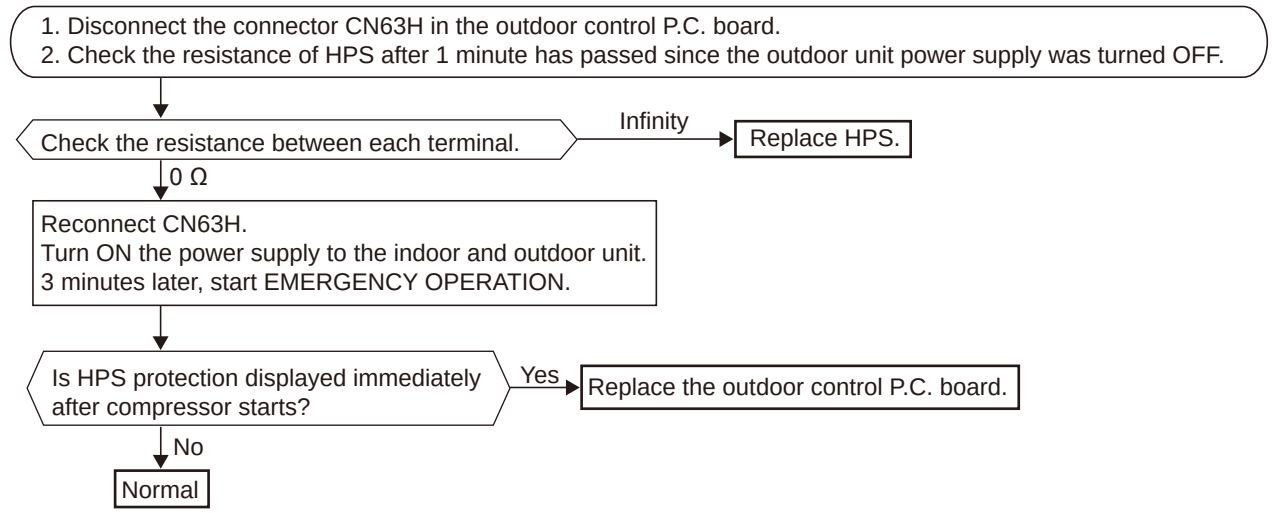
Measuring points	Resistance
pin1 - pin4	1.1 MΩ
pin5 - pin4	40 kΩ
pin6 - pin4	220 kΩ
pin7 - pin4	∞

* To measure the resistance, connect the negative (-) end of the tester to pin4.

• When the operation frequency does not go up from the lowest frequency.

Ⓗ Check of HPS

CN63H	Outdoor control P.C. board

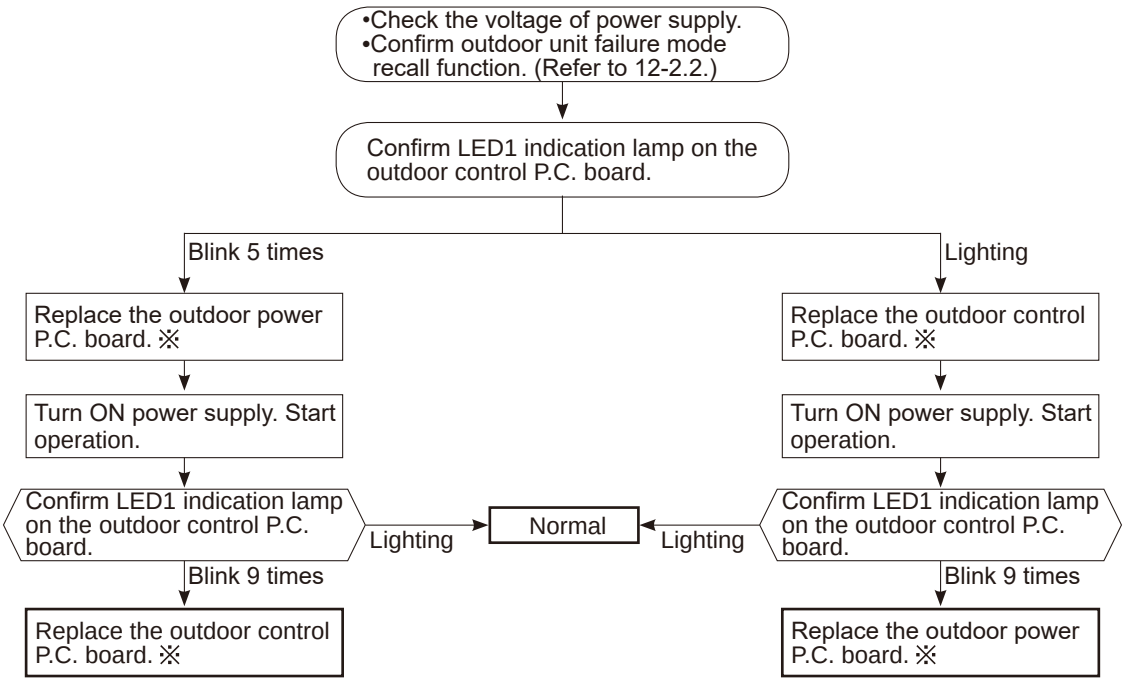


ⓘ The other cases

Indoor unit does not operate. (different operating models in multi system)

- When you try to run 2 indoor units simultaneously, one for cooling and the other for heating, the unit which transmits signal to the outdoor units first decides the operation mode.
- When the above situation occurs, set all the indoor units to the same mode, turn OFF the indoor units, and then turn them back ON.
- Though the top of the indoor unit sometimes gets warm, this does not mean malfunction. The reason is that the refrigerant gas continuously flows into the indoor unit even while it is not operating.

Ⓙ Check of bus-bar voltage



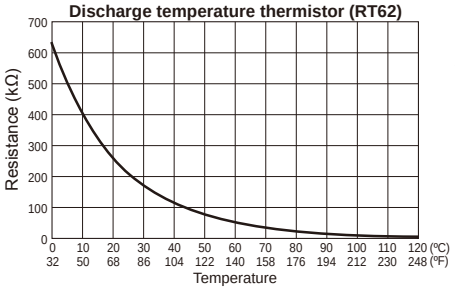
※ Turn OFF power supply before removing P.C. board.

12-7. TEST POINT DIAGRAM AND VOLTAGE

1. Outdoor control P.C. board

MXZ-2C20NA2

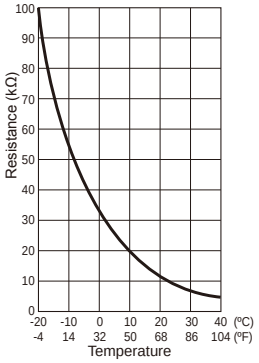
Discharge temperature thermistor (RT62)



Thermistor R100 = 13.36 kΩ ± 2% , B constant = 4014 ± 2%

$Rt = 13.36\exp\{4014(\frac{1}{273+t} - \frac{1}{373})\}$, t: °C = (°F - 32)/1.8

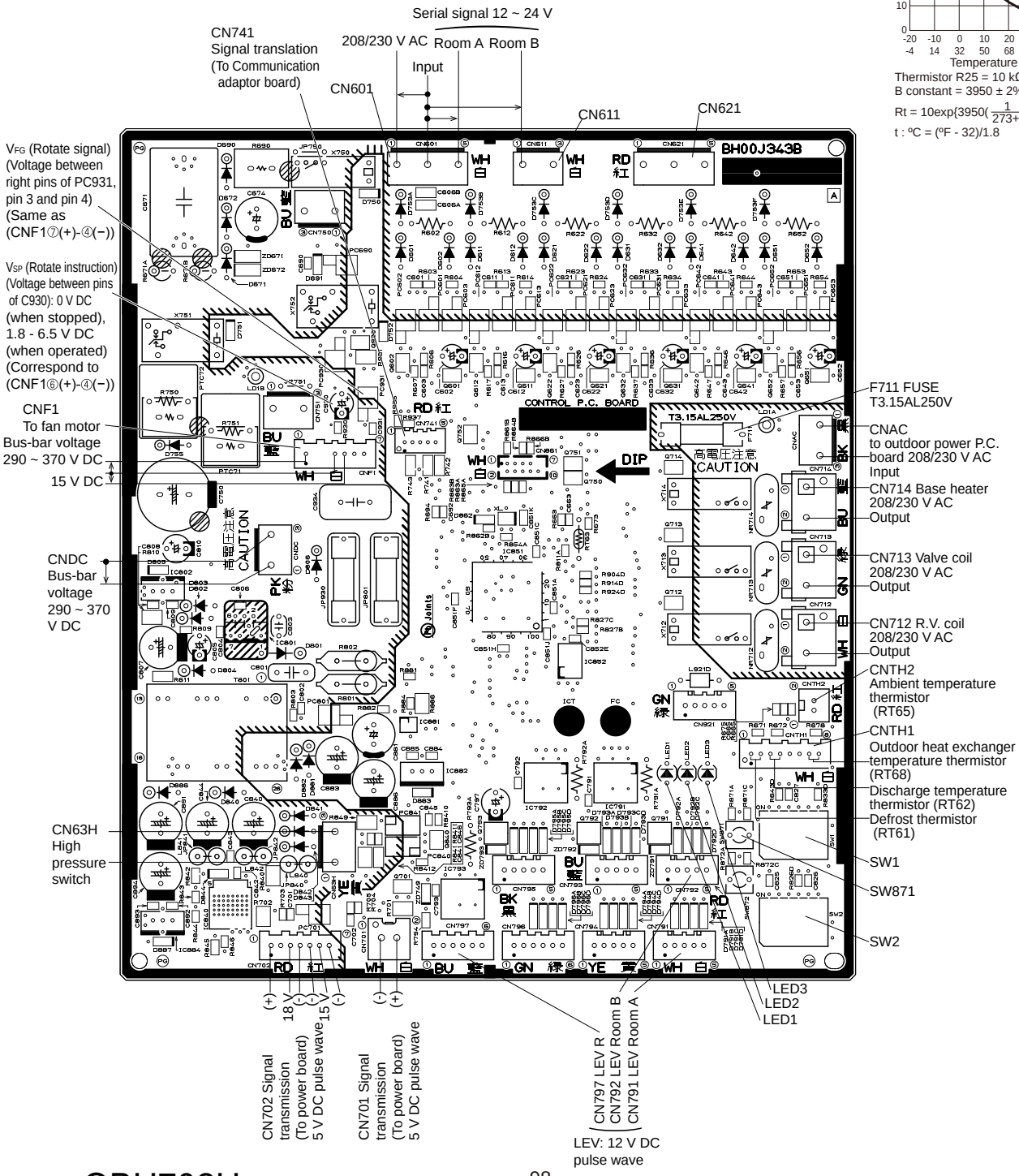
Defrost thermistor (RT61)
Ambient temperature thermistor (RT65)
Outdoor heat exchanger temperature thermistor (RT68)



Thermistor R25 = 10 kΩ ± 2%
B constant = 3950 ± 2%

$Rt = 10\exp\{3950(\frac{1}{273+t} - \frac{1}{298})\}$

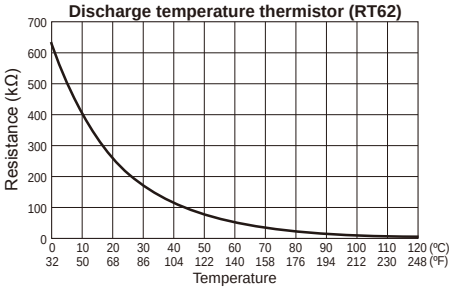
t : °C = (°F - 32)/1.8



1. Outdoor control P.C. board

MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA

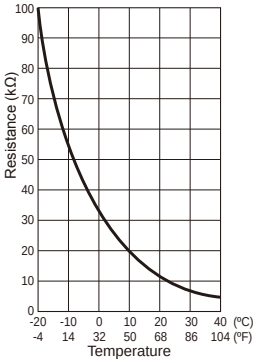
Discharge temperature thermistor (RT62)



Thermistor R100 = 13.36 kΩ ± 2% , B constant = 4014 ± 2%

$Rt = 13.36\exp\{4014(\frac{1}{273+t} - \frac{1}{373})\}$, t: °C = (°F - 32)/1.8

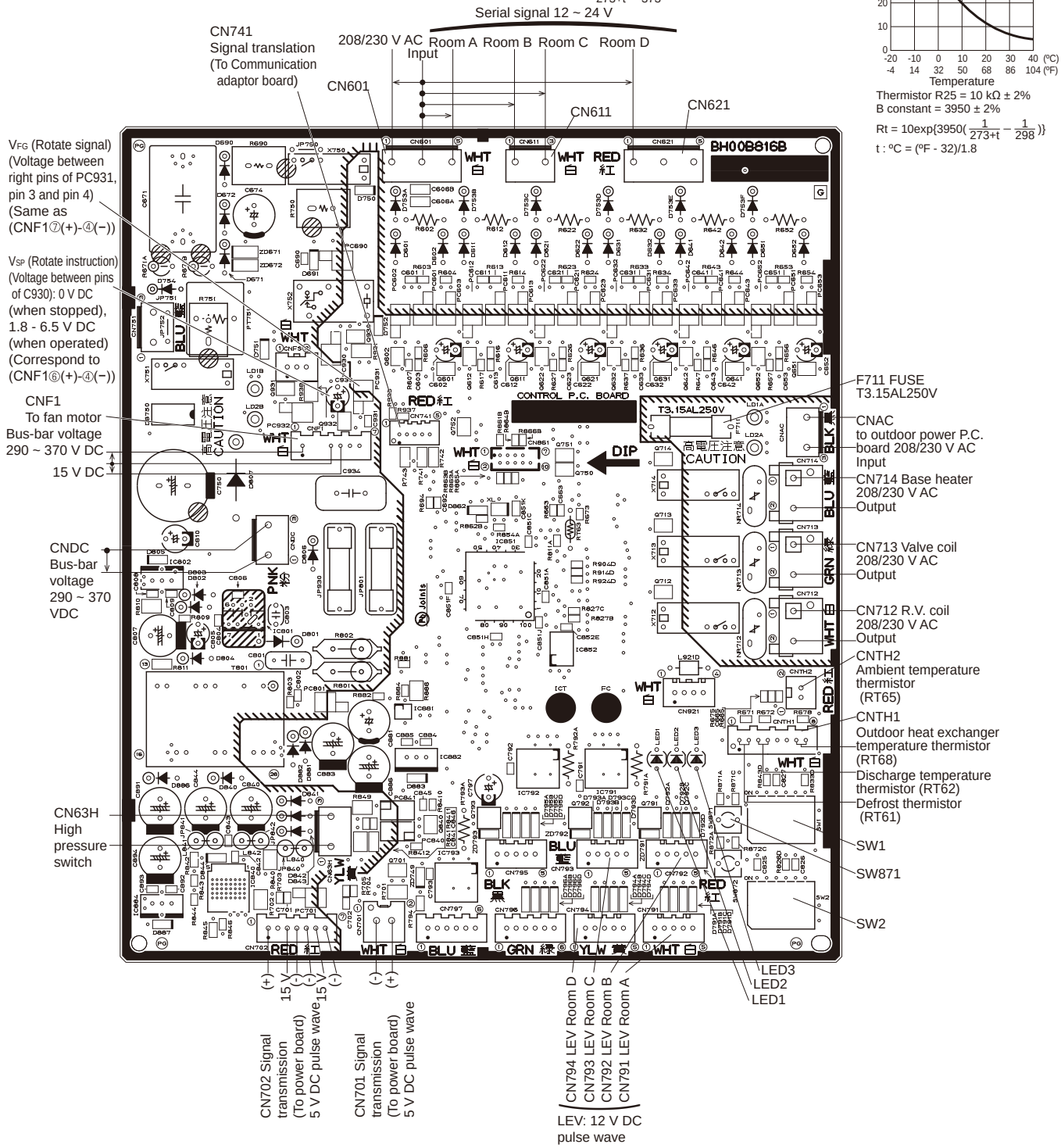
Defrost thermistor (RT61)
Ambient temperature thermistor (RT65)
Outdoor heat exchanger temperature thermistor (RT68)



Thermistor R25 = 10 kΩ ± 2%
B constant = 3950 ± 2%

$Rt = 10\exp\{3950(\frac{1}{273+t} - \frac{1}{298})\}$

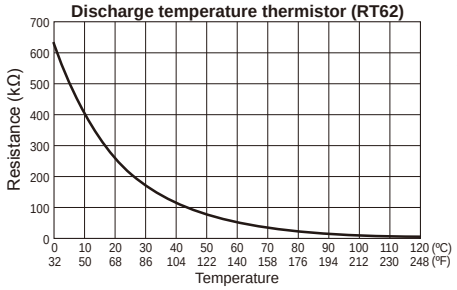
t : °C = (°F - 32)/1.8



1. Outdoor control P.C. board

MXZ-5C42NA
MXZ-2C20NAHZ MXZ-3C24NAHZ
MXZ-3C30NAHZ

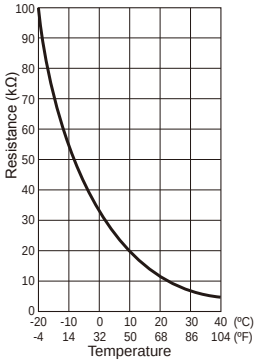
Discharge temperature thermistor (RT62)



Thermistor R100 = 13.36 kΩ ± 2% , B constant = 4014 ± 2%

$Rt = 13.36\exp\{4014(\frac{1}{273+t} - \frac{1}{373})\}$, t: °C = (°F - 32)/1.8

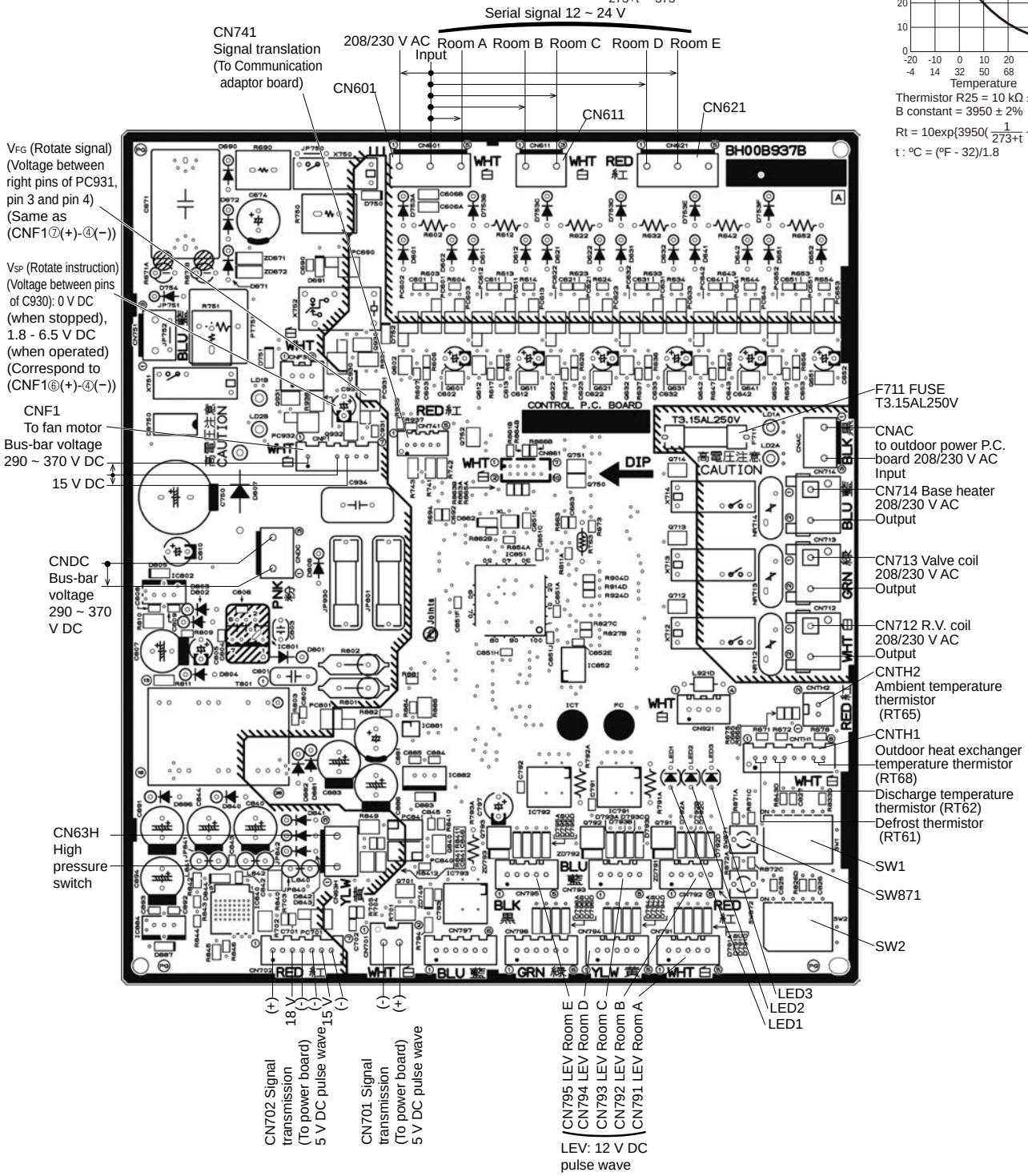
Defrost thermistor (RT61)
Ambient temperature thermistor (RT65)
Outdoor heat exchanger temperature thermistor (RT68)



Thermistor R25 = 10 kΩ ± 2%
B constant = 3950 ± 2%

$Rt = 10\exp\{3950(\frac{1}{273+t} - \frac{1}{298})\}$

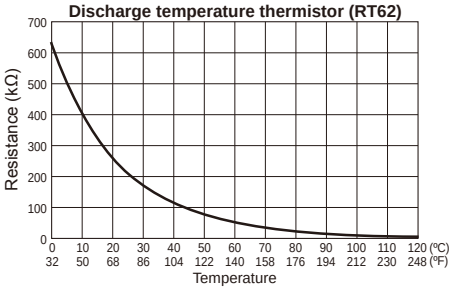
t : °C = (°F - 32)/1.8



1. Outdoor control P.C. board

MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2

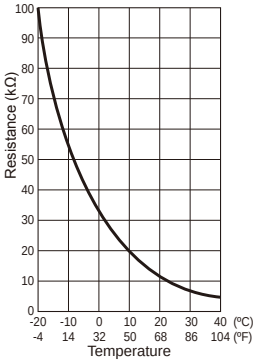
Discharge temperature thermistor (RT62)



Thermistor R100 = 13.36 kΩ ± 2% , B constant = 4014 ± 2%

$Rt = 13.36\exp\{4014(\frac{1}{273+t} - \frac{1}{373})\}$, t: °C = (°F - 32)/1.8

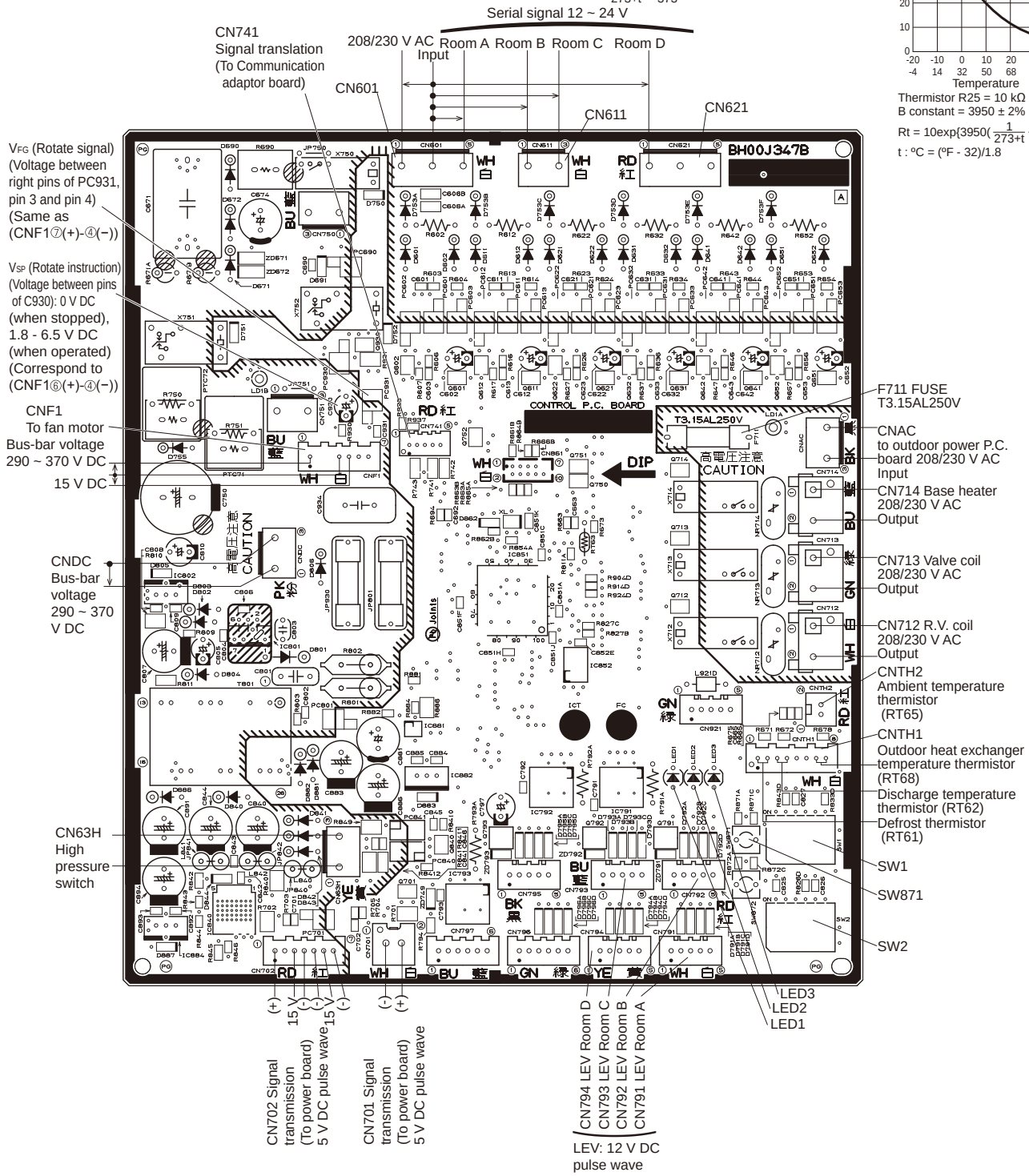
Defrost thermistor (RT61)
Ambient temperature thermistor (RT65)
Outdoor heat exchanger temperature thermistor (RT68)



Thermistor R25 = 10 kΩ ± 2%
B constant = 3950 ± 2%

$Rt = 10\exp\{3950(\frac{1}{273+t} - \frac{1}{298})\}$

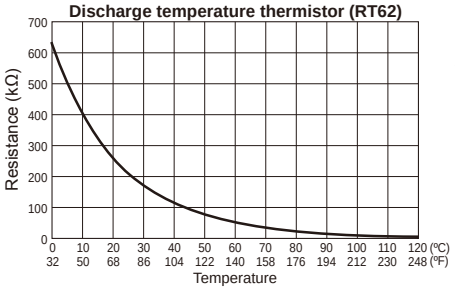
t : °C = (°F - 32)/1.8



1. Outdoor control P.C. board

MXZ-5C42NA2
MXZ-2C20NAHZ2 MXZ-3C24NAHZ2
MXZ-3C30NAHZ2

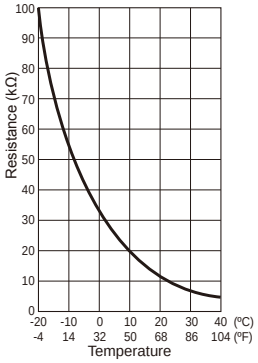
Discharge temperature thermistor (RT62)



Thermistor R100 = 13.36 kΩ ± 2% , B constant = 4014 ± 2%

$Rt = 13.36\exp\{4014(\frac{1}{273+t} - \frac{1}{373})\}$, t: °C = (°F - 32)/1.8

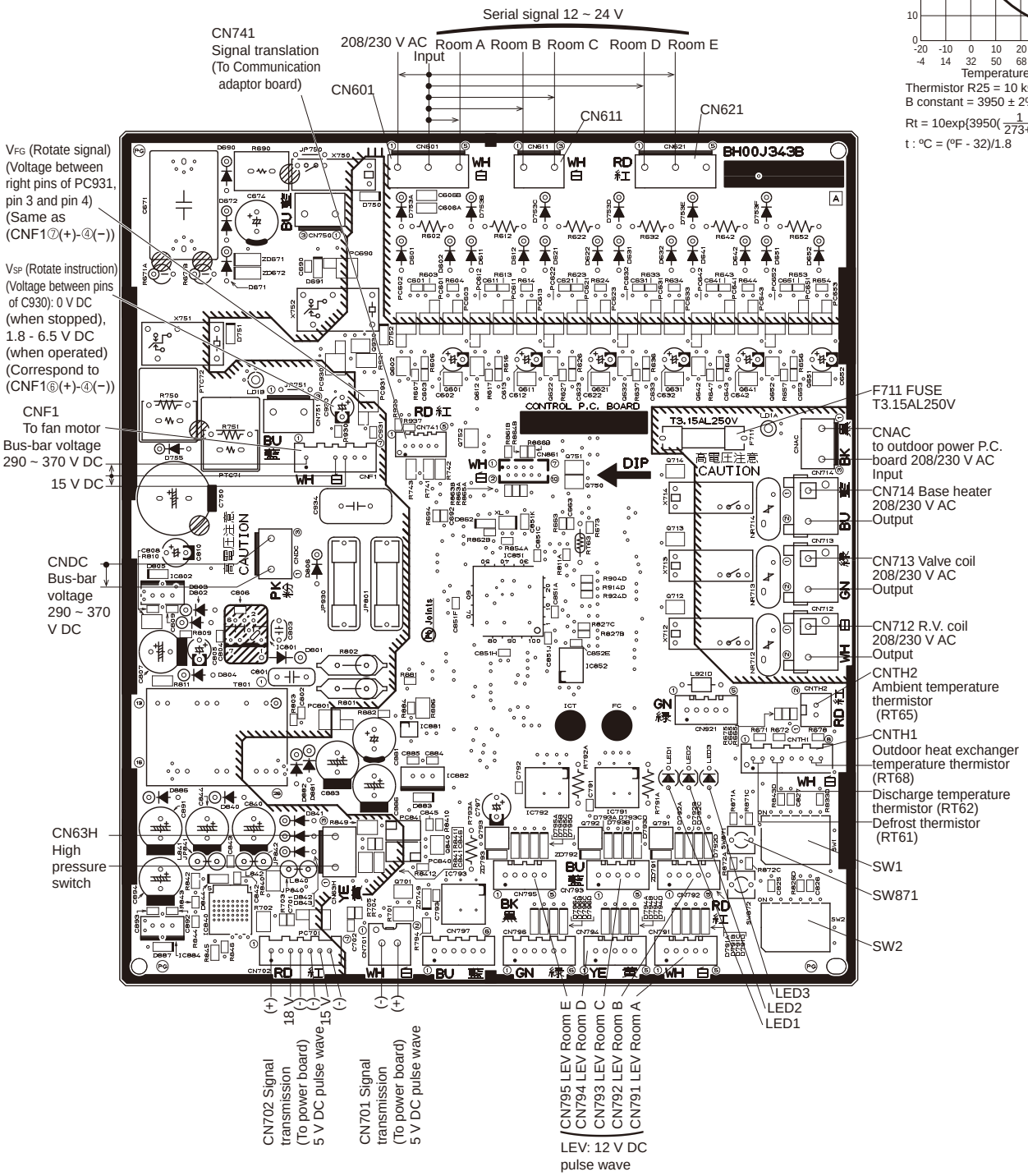
Defrost thermistor (RT61)
Ambient temperature thermistor (RT65)
Outdoor heat exchanger temperature thermistor (RT68)



Thermistor R25 = 10 kΩ ± 2%
B constant = 3950 ± 2%

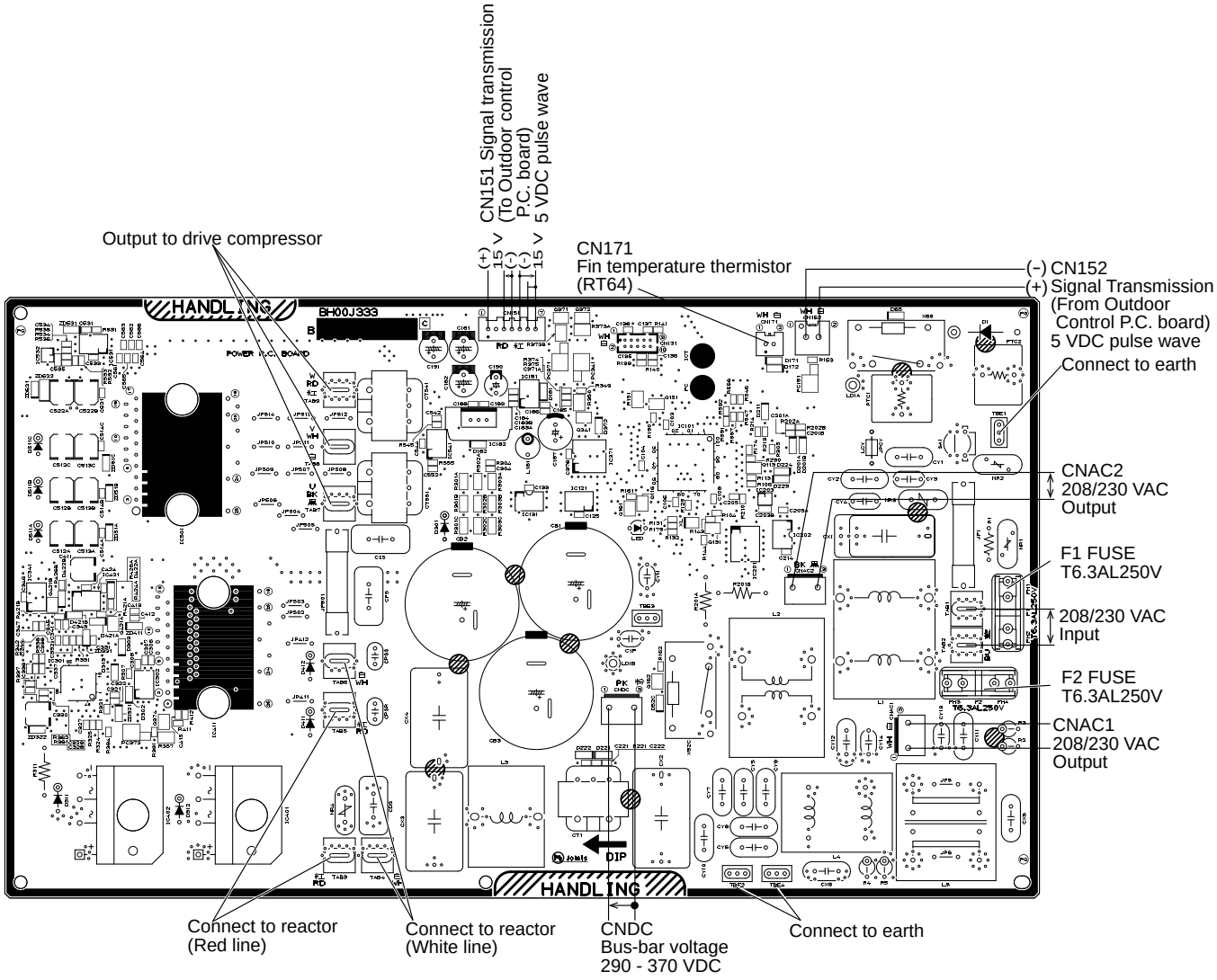
$Rt = 10\exp\{3950(\frac{1}{273+t} - \frac{1}{298})\}$

t : °C = (°F - 32)/1.8

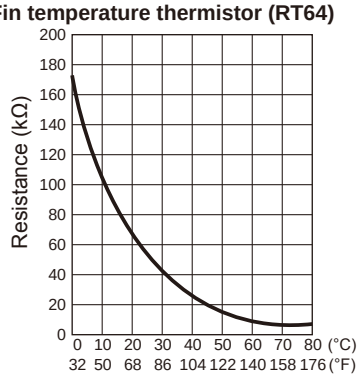


2. Outdoor power P.C. board

MXZ-2C20NA2



Fin temperature thermistor (RT64)



Thermistor R50 = 17 kΩ ± 2%

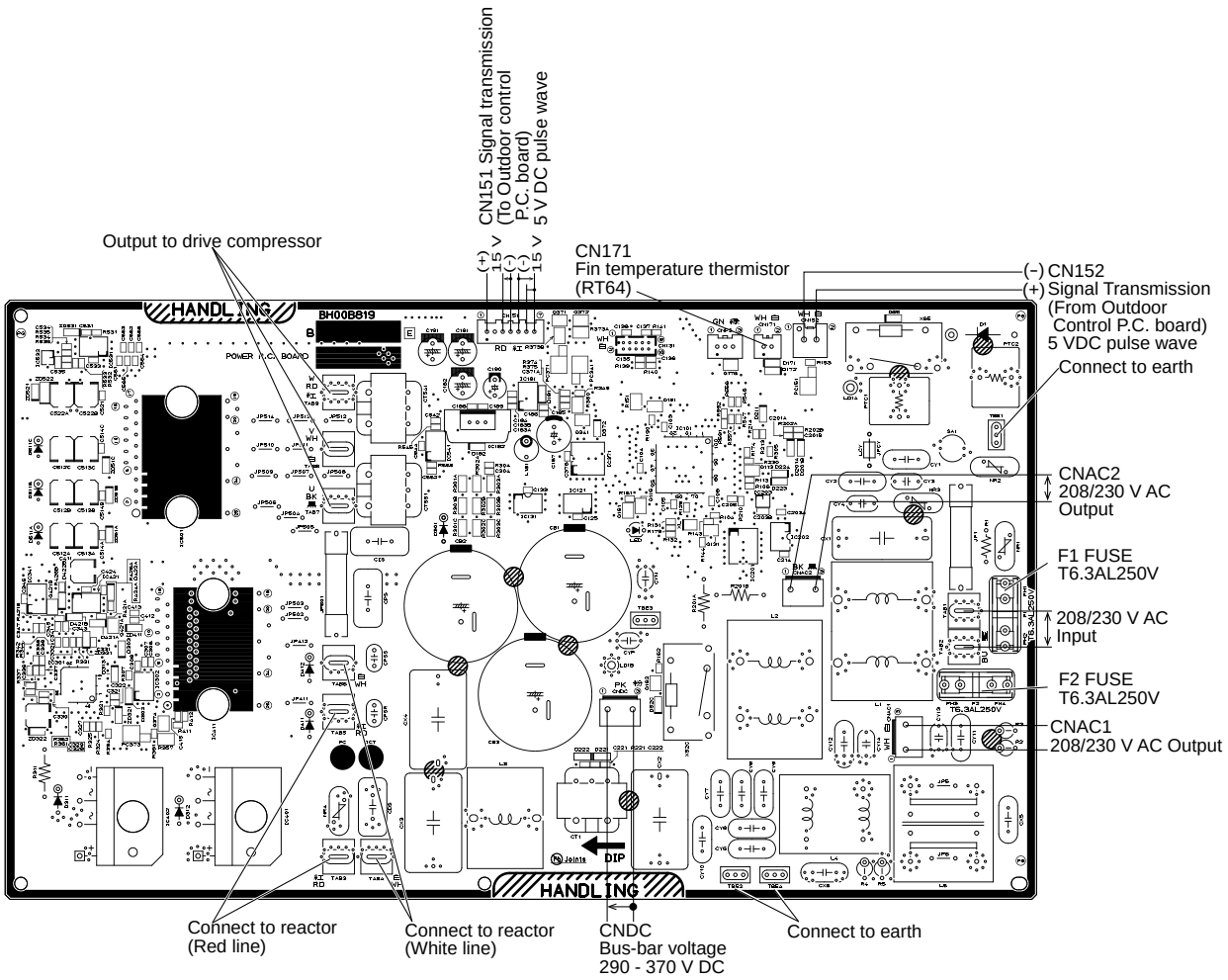
B constant = 4150 ± 3%

$Rt = 17\exp\{4150(\frac{1}{273+t} - \frac{1}{323})\}$

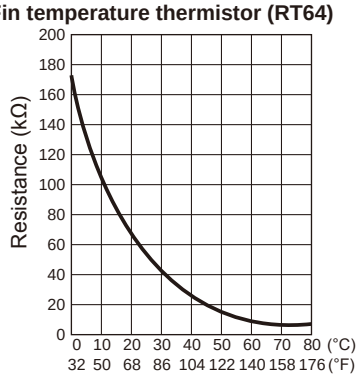
t : ºC = (ºF - 32)/1.8

2. Outdoor power P.C. board

MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2



Fin temperature thermistor (RT64)



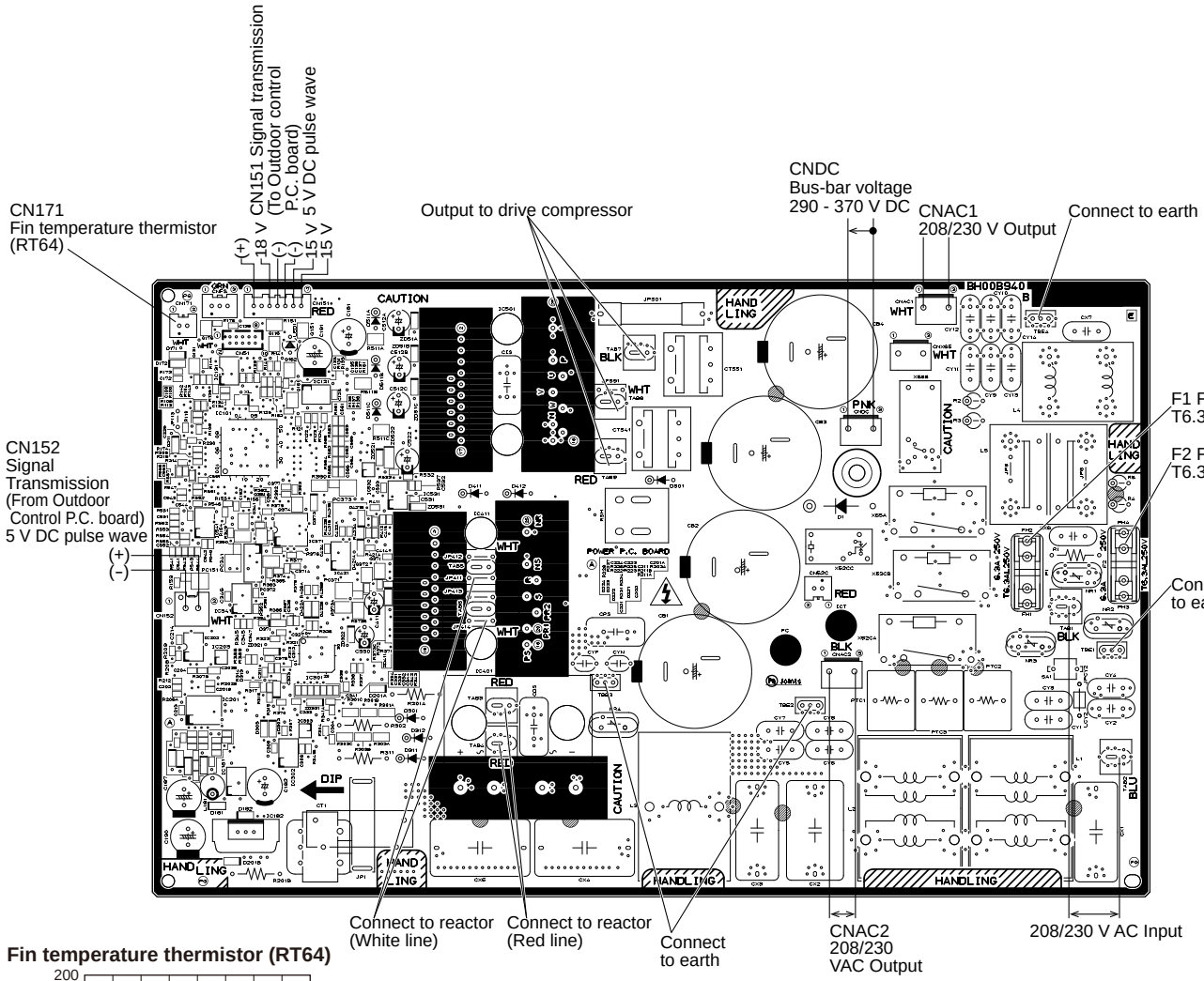
Thermistor R50 = 17 kΩ ± 2%
B constant = 4150 ± 3%

$$Rt = 17\exp\{4150(\frac{1}{273+t} - \frac{1}{323})\}$$

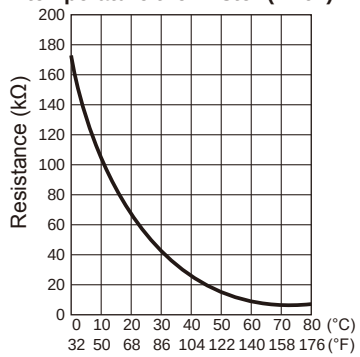
t : °C = (°F - 32)/1.8

2. Outdoor power P.C. board

MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2



Fin temperature thermistor (RT64)



Thermistor R50 = 17 kΩ ± 2%
B constant = 4150 ± 3%

$$Rt = 17\exp\{4150(\frac{1}{273+t} - \frac{1}{323})\}$$

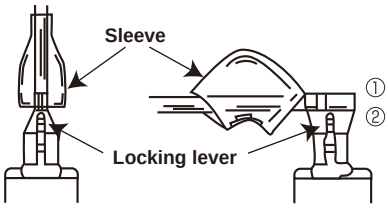
t : °C = (°F - 32)/1.8

13 DISASSEMBLY INSTRUCTIONS

<Detaching method of the terminal with locking mechanism>

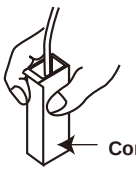
The terminal which has the locking mechanism can be detached as shown below.
There are following 2 types of the terminal with locking mechanism.
The terminal without locking mechanism can be detached by pulling it out.
Check the shape of the terminal before detaching.

(1) Slide the sleeve and check if there is a locking lever or not.



①Slide the sleeve.
②Pull the terminal while pushing the locking lever.

(2) The terminal with the connector shown below has the locking mechanism.

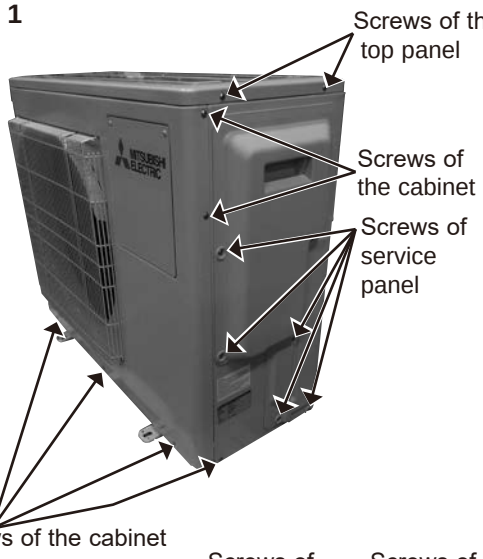
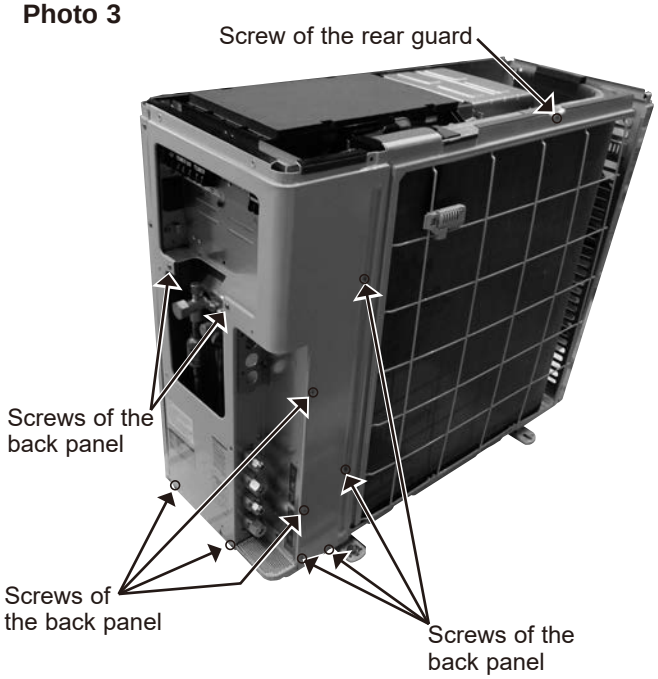
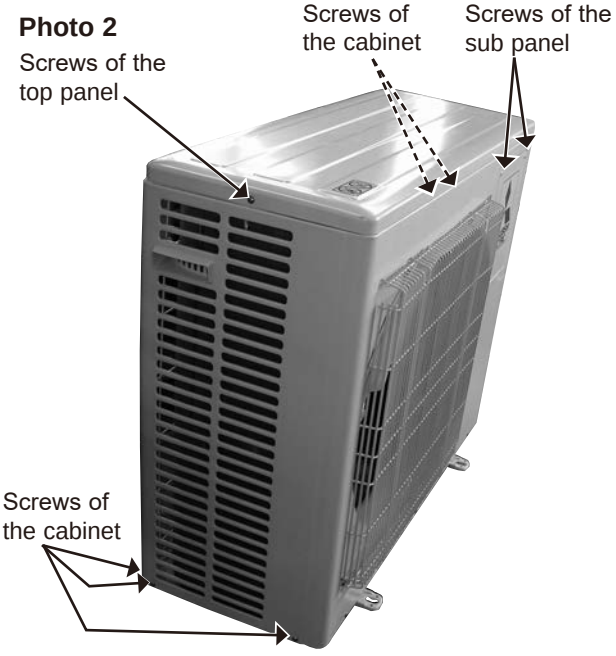


①Hold the sleeve, and pull out the terminal slowly.

13-1. MXZ-2C20NA2

NOTE: Turn OFF the power supply before disassembly.

→: Indicates the visible parts in the photos/figures.
- - - →: Indicates the invisible parts in the photos/figures.

OPERATING PROCEDURE	PHOTOS/FIGURES
1. Removing the cabinet and the panels (1) Remove all the screws of the service panel, and remove the service panel. (2) Disconnect the power supply cord and indoor/outdoor connecting wires. (3) Remove all the screws of the top panel, and remove the top panel. (4) Remove all the screws of the cabinet, and remove the cabinet. (5) Remove all the screws of the back panel, and remove the back panel (Photo 3).	**Photo 1** 
Photo 3  	**Photo 2** 

OPERATING PROCEDURE

2. Removing the outdoor control P.C. board, the outdoor power P.C. board and the reactor

(1) Remove the service panel (Photo 1).
(2) Disconnect the power supply cord and indoor/outdoor connecting wires.
(3) Remove the top panel, the cabinet, and the back panel (Photo 1, 2, 3).
(4) Disconnect all the connectors and the lead wires on the outdoor control P.C. board.
(5) Disengage all the catches of the outdoor control P.C. board, and remove the outdoor control P.C. board.
(6) Remove all the screws of the electrical box assembly, disengage all the catches of the electrical box assembly, and remove the electrical box assembly.
(7) Remove all the screws of outdoor control P.C. board holder, and remove the outdoor control P.C. board holder.
(8) Remove all the screws of the reactor, and remove the reactor.
(9) Remove all the screws of the reactor bed, and remove the reactor bed.
(10) Remove all the screws of the heat sink support, and remove the heat sink support.
(11) Remove all the screws fixing the outdoor power P.C. board.
(12) Disconnect the connectors and the lead wires on the outdoor power P.C. board.

PHOTOS/FIGURES

Photo 4

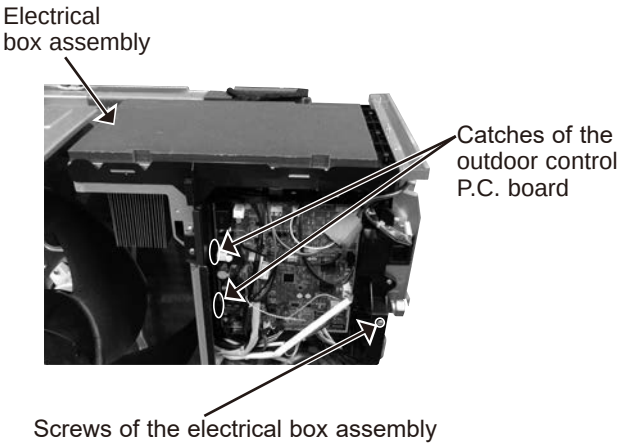


Photo 5

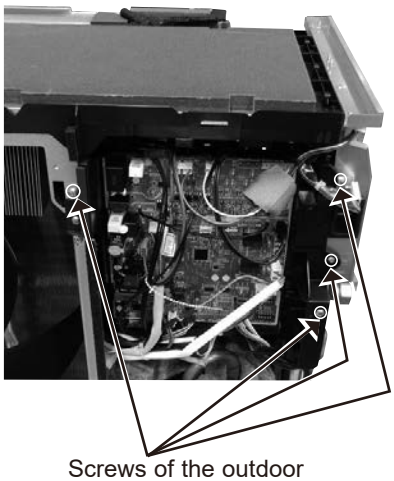


Photo 6

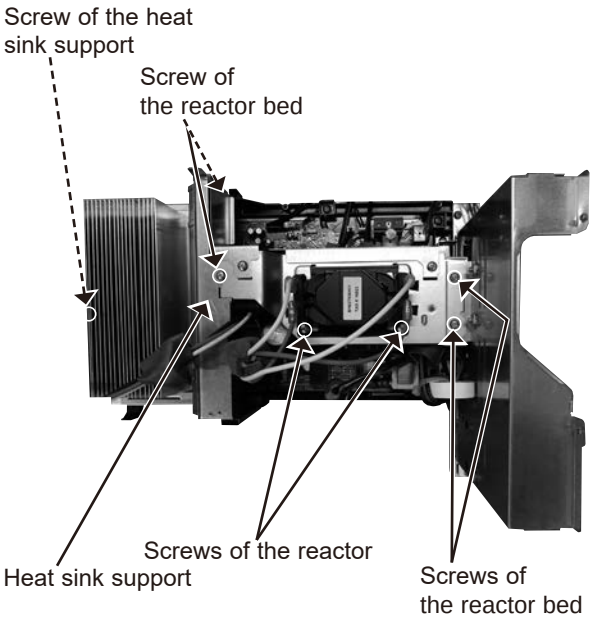
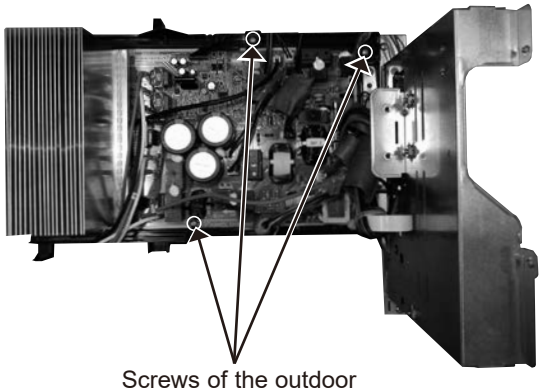
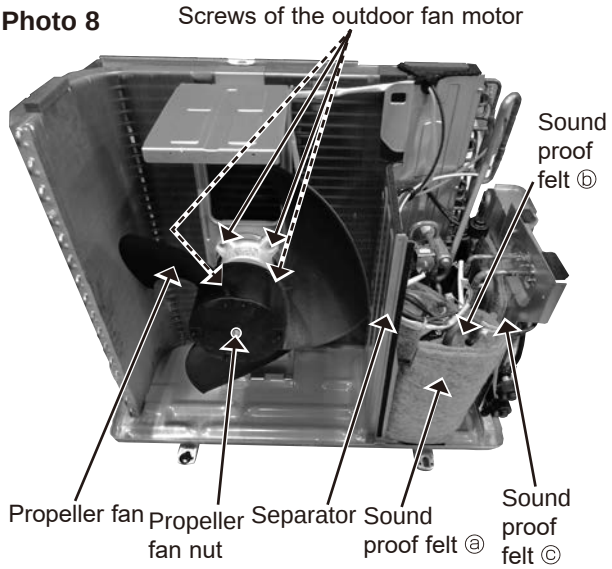
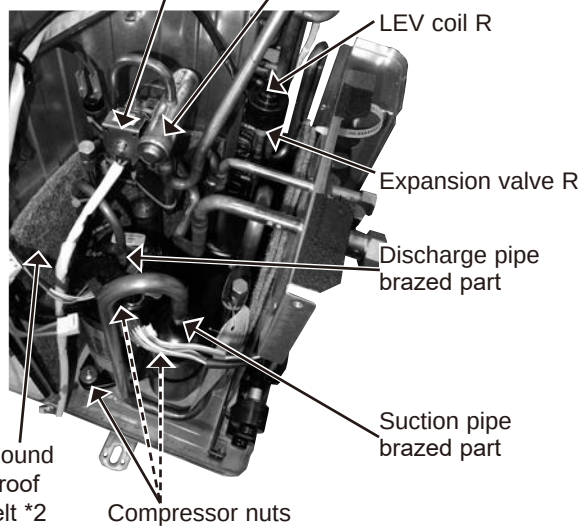
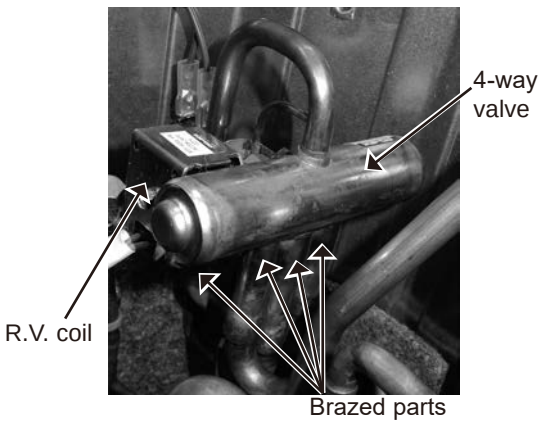
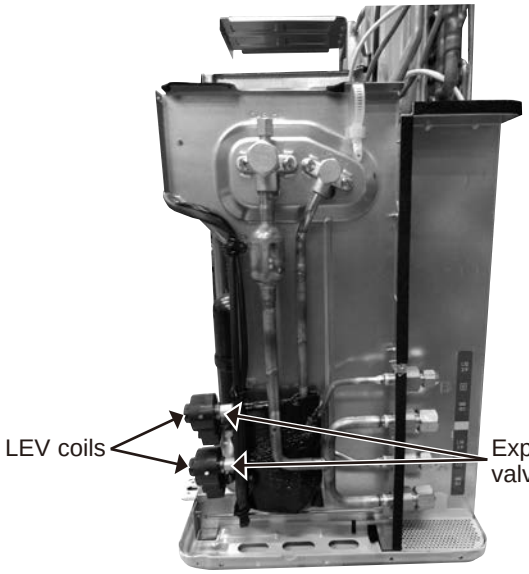
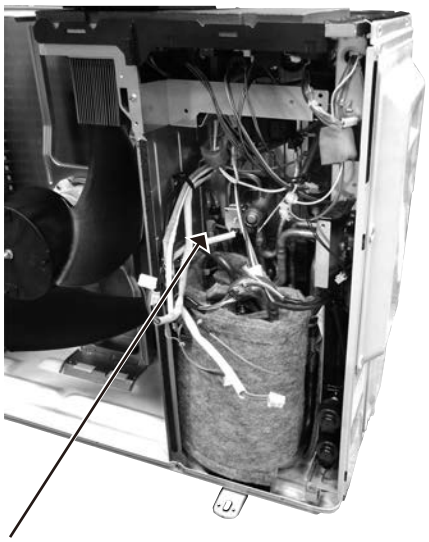


Photo 7



OPERATING PROCEDURE	PHOTOS/FIGURES
3. Removing the fan motor (1) Remove the service panel (Photo 1). (2) Disconnect the power supply cord and indoor/outdoor connecting wires. (3) Remove the top panel, the cabinet, and the back panel (Photo 1, 2, 3). (4) Disconnect the connectors of CN712, CNF1, CNTH1, CNTH2, CN63H, CN791, CN792, CN793, CN794, CN797 on the outdoor control P.C. board and disconnect the relay connector of the compressor lead wire. (5) Remove all the screws of the electrical box assembly, and remove the electrical box assembly (Photo 4). (6) Remove the propeller fan. (7) Remove the fan motor. **NOTE:** The propeller fan nut is a reverse thread.	**Photo 8** 
4. Removing the compressor and the 4-way valve (1) Remove the service panel (Photo 1). (2) Disconnect the power supply cord and indoor/outdoor connecting wires. (3) Remove the top panel, the cabinet, and the back panel (Photo 1, 2, 3). (4) Recover gas from the refrigerant circuit. **NOTE**: Recover gas from the pipes until the pressure gauge shows 0 kg/cm² (0 MPa). (5) Disconnect the outdoor control P.C. board connectors: CNF1, CNTH1, CNTH2, CN63H, CN791,CN792, CN793, CN794, CN797, CN712. (6) Disconnect the compressor lead wire from the terminal of the compressor (U, V, W). (7) Remove all the screws of the electrical box assembly, and remove the electrical box assembly (Photo 4). (8) Remove the propeller fan. (9) Remove the sound proof felt ⓐ, ⓑ and ⓒ. (10) Remove all the screws of the separator, and remove the separator. (11) Detach all the brazed parts of the compressor suction and discharge pipes. (12) Remove all the compressor nuts and remove the compressor. (13) Detach all the brazed parts of the 4-way valve and pipe.	**Photo 9**  **Photo 10** 

OPERATING PROCEDURE	PHOTOS/FIGURES
5. Removing the expansion valve **NOTE:** Gas recovery is not required if the unit is pumped down. (1) Remove the top panel and the service panel (Refer to section 1). (2) Disconnect the power supply cord and indoor/outdoor connecting wires. (3) Remove all the LEV coils. (4) Detach all the brazed parts of the expansion valves and pipes.	**Photo 11** 
6. Before using the service port (High pressure side) (1) Remove the service panel (Photo 1). (2) Disconnect the power supply cord and indoor/outdoor connecting wires. (3) Remove the top panel, the cabinet, and the back panel (Photo 1, 2, 3). (4) Disconnect all the connectors and the lead wires on the outdoor control P.C. board. (5) Remove all the screws of outdoor control P.C. board holder, and remove the outdoor control P.C. board holder (Photo 5). (6) Make sure that the service port is visible.	**Photo 12** 

13-2. MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2

Photos: MXZ-4C36NA
MXZ-4C36NA2

NOTE: Turn OFF the power supply before disassembly.

OPERATING PROCEDURE	PHOTOS/FIGURES
1. Removing the panels (1) Remove all the screws fixing the top panel, and remove the top panel. (2) Remove all the screws fixing the service panel. (3) Pull down on the service panel, and remove the service panel. (4) Disconnect the power supply cord and indoor/outdoor connecting wires. (5) Remove all the screws fixing the front panel, and remove the front panel. (6) Remove all the screws fixing the back panel, and remove the back panel.	**Photo 1** Screws of the top panel Service panel Screws of the service panel

Photo 3

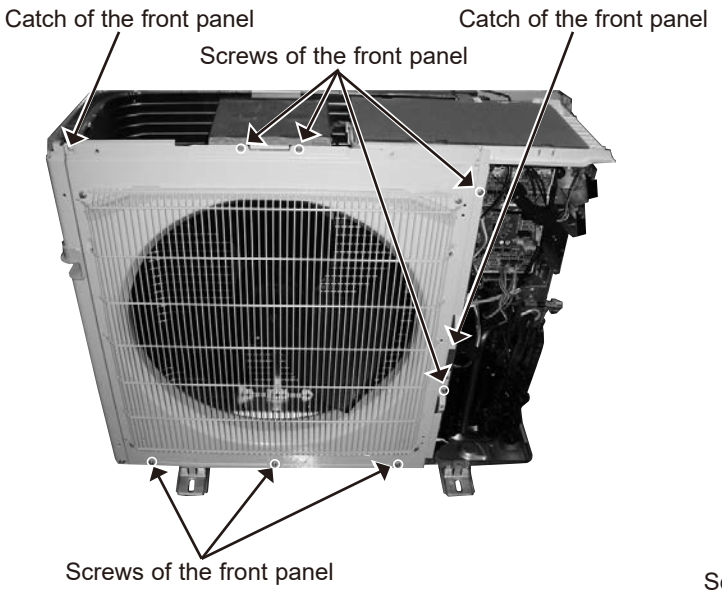
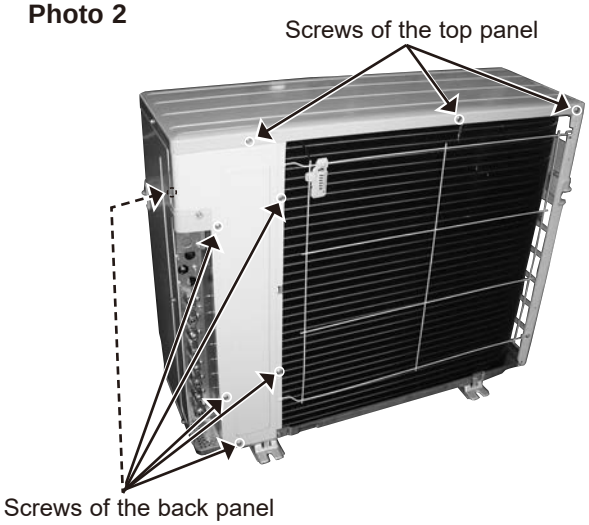


Photo 2



OPERATING PROCEDURE

2. Removing the outdoor control P.C. board, the reactor, the outdoor power P.C. board, and the heatsink

(1) Remove the top panel and the service panel (Refer to section 1).
(2) Disconnect the power supply cord and indoor/outdoor connecting wires.
(3) Disconnect the wire-to-wire connector of the compressor lead wire (Photo 4).
(4) Disconnect all the connectors on the outdoor control P.C. board.
(5) Remove the releasable cable tie securing the lead wires of core, TBE1, CNTH2, and CNAC2 (Photo 4).
(6) Remove all the screws fixing the outdoor control P.C. board holder (Photo 4).
(7) Remove the lead wires of TBE1, CNTH2, and CNAC2 from the right hook on the top of the outdoor control P.C. board holder (Photo 4, ⓐ).
(8) Remove the lead wires of CN151 and CN152 from the left hooks on the top and the bottom of the outdoor control P.C. board holder (Photo 4, ⓑ and 5).
(9) Remove the outdoor control P.C. board holder.
(10) Disengage all the catches of the outdoor control P.C. board holder, and remove the outdoor control P.C. board (Photo 6).
(11) Disconnect all the lead wires from the reactor (Photo 7).
(12) Remove all the screws fixing the reactor, and remove the reactor (Photo 7).
(13) Remove all the lead wires from the clamps on the separator (Photo 8).

PHOTOS/FIGURES

Photo 6

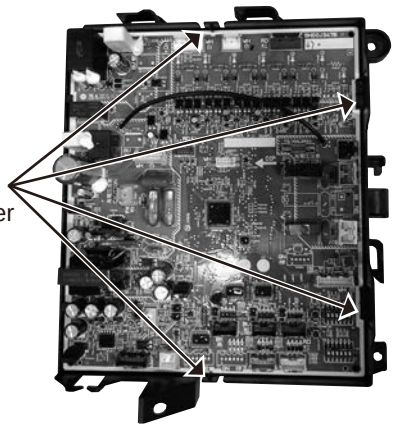


Photo 7

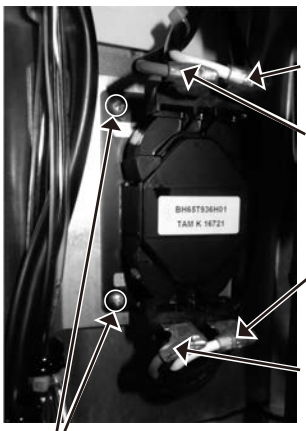


Photo 4

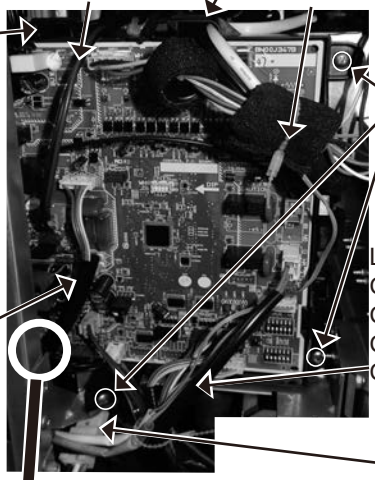


Photo 5

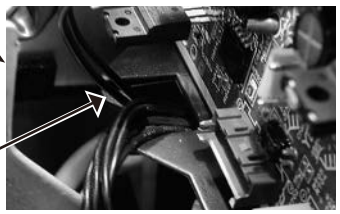
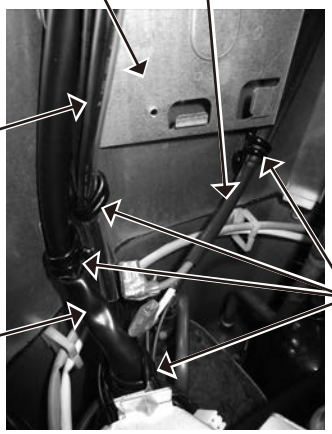


Photo 8

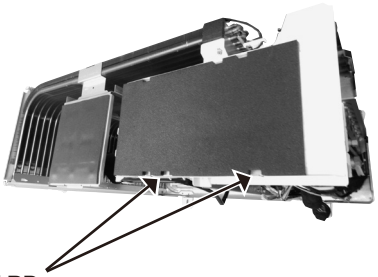


OPERATING PROCEDURE

(13) Disengage all the catches of the PB cover, and remove the PB cover (Photo 9).
(14) Remove the screw fixing the outdoor power P.C. board and all the screws fixing the outdoor power P.C. board and the heatsink. (Photo 10)
(15) Disengage all the catches of the outdoor power P.C. board, and lift the outdoor power P.C. board (Photo 10).
(16) While lifting the outdoor power P.C. board, disconnect the lead wires, the connectors, and the earth wires; then remove the outdoor power P.C. board (Photo 11).
NOTE: When reassembling, pass the lead wire of the CN171 thorough the notch and behind the lead wire of the compressor. (Photo 12)
(17) Remove all the screws of the heatsink fixing parts and remove the heatsink fixing parts (Photo 13).
NOTE: Some units have only 1 heatsink fixing part.
(18) Remove the heatsink.

PHOTOS/FIGURES

Photo 9



Catches of PB cover

Photo 10

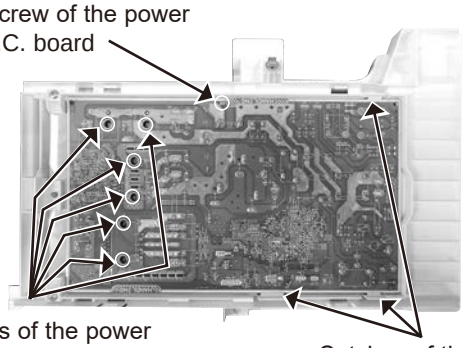


Photo 11

Photo 12

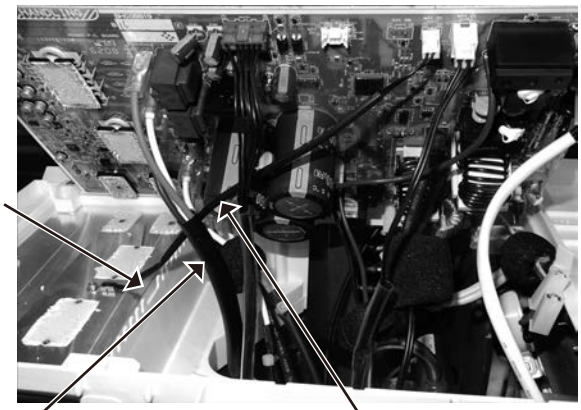
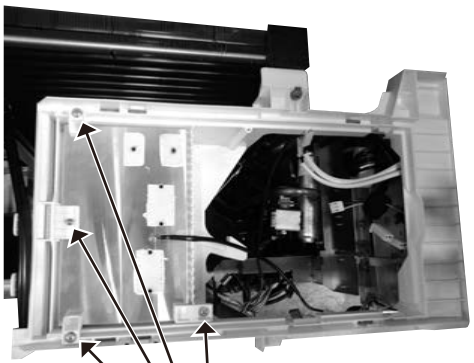
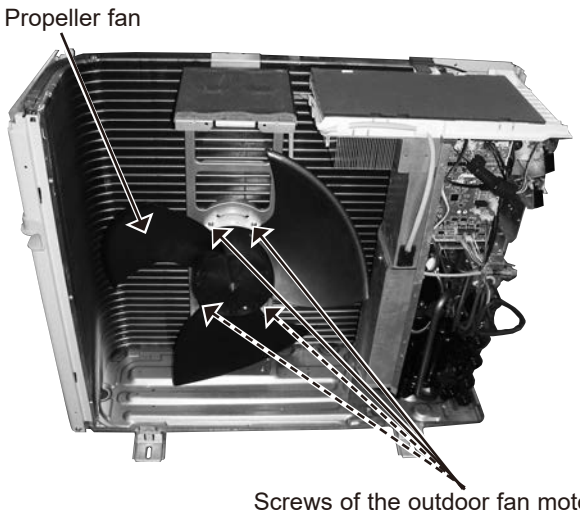
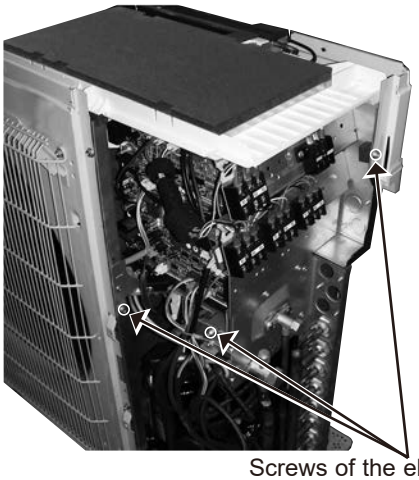
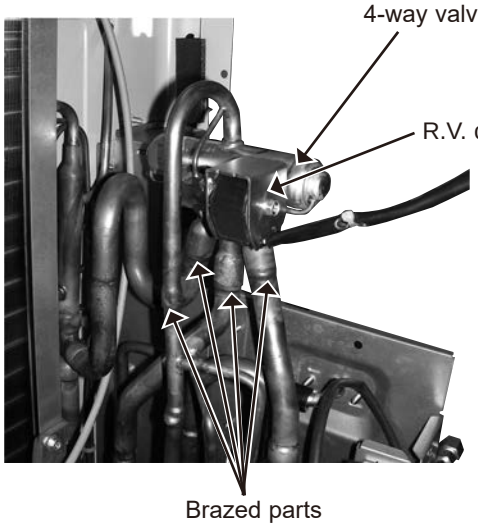
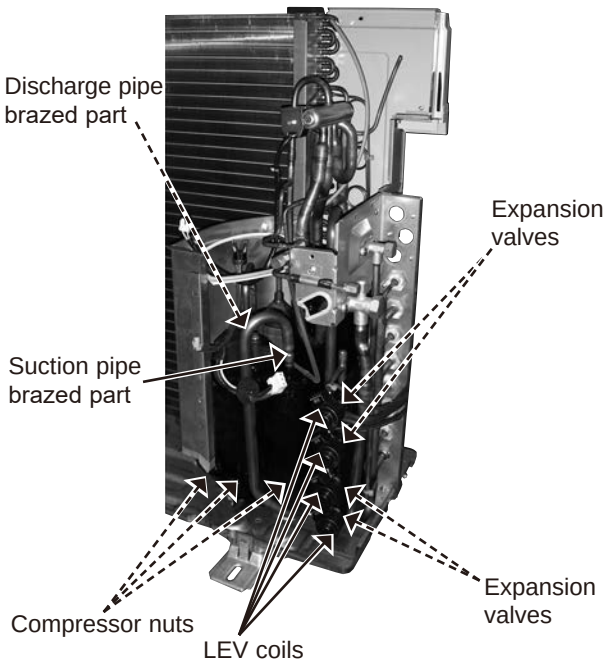


Photo 13



Screws of fixing parts of the heatsink

OPERATING PROCEDURE	PHOTOS/FIGURES
3. Removing the fan motor (1) Remove the top panel, the service panel, and the front panel (Refer to section 1). (2) Disconnect the power supply cord and indoor/outdoor connecting wires. (3) Disconnect the connector of CNF1 on the outdoor control P.C. board. (4) Remove the propeller fan. (5) Remove the fan motor. **NOTE:** The propeller fan nut is a reverse thread.	**Photo 14** 
4. Removing the compressor and 4-way valve (1) Remove the top panel, the service panel, and the front panel (Refer to section 1). (2) Disconnect the power supply cord and indoor/outdoor connecting wires, and remove the back panel. (3) Recover gas from the refrigerant circuit. **NOTE:** Recover gas from the pipes until the pressure gauge shows 0 PSIG. (4) Disconnect the compressor lead wire from the terminal of the compressor (U, V, W). (5) Disconnect the outdoor control P.C. board connectors: CNF1, CNTH1, CNTH2, CN63H, CN712, CN791, CN792, CN793, CN794 (**MXZ-4C**) (6) Remove all the screws fixing the electrical parts, and remove the electrical parts. (7) Remove the propeller fan. (8) Remove all the screws fixing the separator, and remove the separator. (9) Remove the sound proof felt. (10) Detach all the brazed parts of the compressor suction and discharge pipes (Photo 17). (11) Remove all the compressor nuts and remove the compressor (Photo 17). (12) Detach all the brazed parts of 4-way valve and pipes.	**Photo 15**  **Photo 16** 

OPERATING PROCEDURE	PHOTOS/FIGURES
5. Removing the expansion valve **NOTE:** Gas recovery is not required if the unit is pumped down. (1) Remove the top panel and the service panel (Refer to section 1). (2) Disconnect the power supply cord and indoor/outdoor connecting wires. (3) Remove all the LEV coils. **NOTE:** When reassembling, to secure the LEV coils on the pipe, make sure to use the metal clips for proper positioning. (4) Detach all the brazed parts of the expansion valves and pipes.	**Photo 17** 

13-3. MXZ-5C42NA MXZ-2C20NAHZ MXZ-3C24NAHZ MXZ-3C30NAHZ
MXZ-5C42NA2 MXZ-2C20NAHZ2 MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

Photos: MXZ-3C30NAHZ
MXZ-3C30NAHZ2

NOTE: Turn OFF the power supply before disassembly.

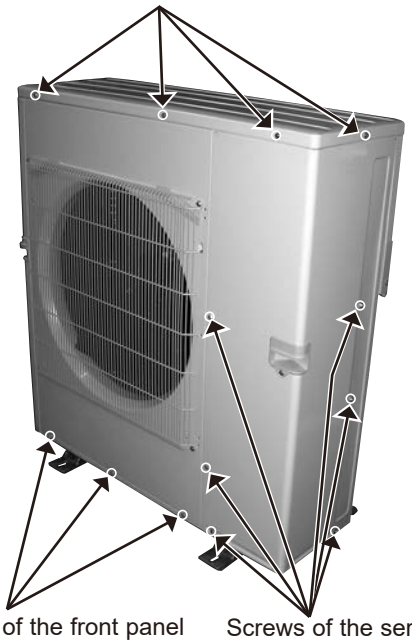
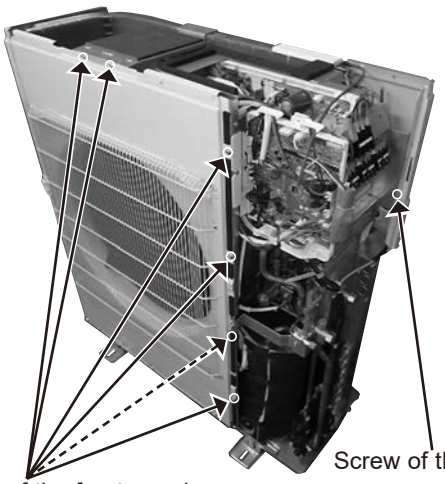
OPERATING PROCEDURE	PHOTOS/FIGURES
1. Removing the panels (1) Remove all the screws fixing the top panel, and remove the top panel. (2) Remove all the screws fixing the service panel. (3) Pull down on the service panel, and remove the service panel. (4) Disconnect the power supply cord and indoor/outdoor connecting wires. (5) Remove all the screws fixing the front panel, and remove the front panel. (6) Remove all the screws fixing the back panel, and remove the back panel.	**Photo 1** Screws of the top panel  Screws of the front panel Screws of the service panel

Photo 3



Screw of the back panel

Screws of the front panel

Photo 2

Screws of the top panel

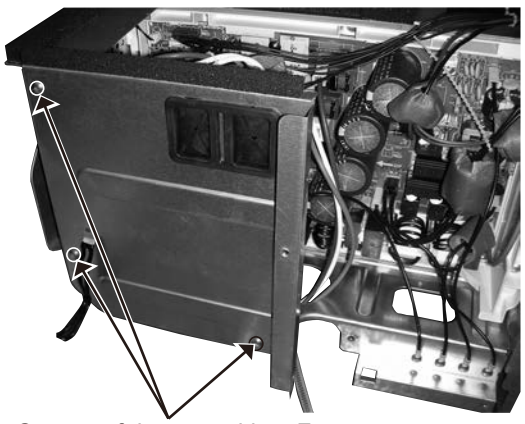
Screws of the back panel

OPERATING PROCEDURE

2. Removing the outdoor control P.C. board, the reactor and the outdoor power P.C. board

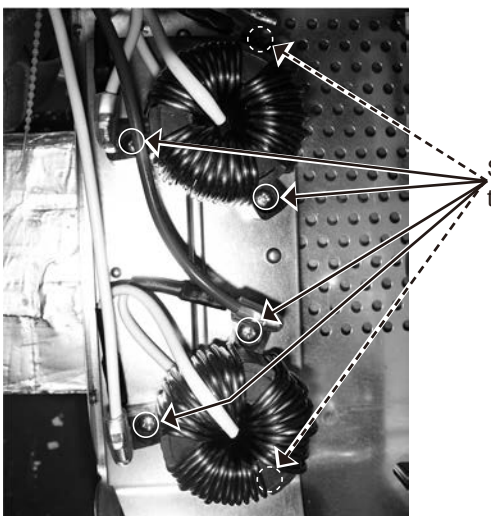
(1) Remove the top panel, the service panel and the front panel (Refer to section 1).
(2) Disconnect the power supply cord and indoor/outdoor connecting wires.
(3) Disconnect all the connectors on the outdoor control P.C. board.
(4) Remove all the screws fixing the outdoor control P.C. board, and remove the outdoor control P.C. board.
(5) Remove all the screws fixing the electrical parts, and remove the electrical parts.
(6) Remove all the screws fixing the TB support, and remove the TB support.
(7) Remove all the screws fixing the control box separator, and remove the control box separator.
(8) Disconnect the lead wire of the outdoor power P.C. board.
(9) Remove all the screws fixing the outdoor power P.C. board, and remove the outdoor power P.C. board with the outdoor P.C. board holder.
(10) Remove all the screws fixing the control box F, and remove the control box F.
(11) Remove all the screws fixing the reactors, and remove the reactors.

Photo 7



Screws of the control box F

Photo 8



PHOTOS/FIGURES

Photo 4

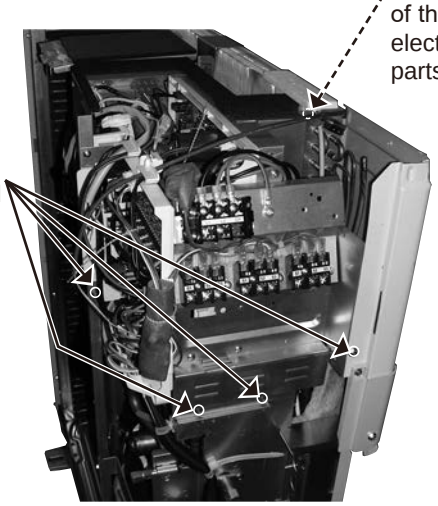
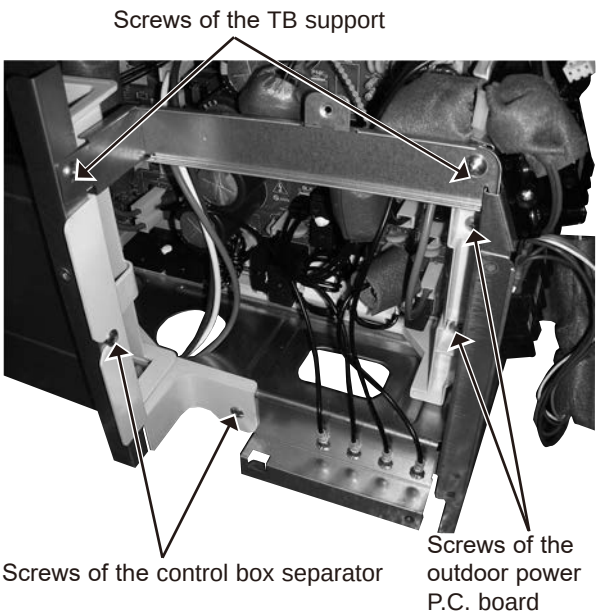


Photo 5

Photo 6



OPERATING PROCEDURE

3. Removing the fan motor

(1) Remove the top panel, the service panel, and the front panel (Refer to section 1).
(2) Disconnect the power supply cord and indoor/outdoor connecting wires.
(3) Disconnect the connector of CNF1 on the outdoor control P.C. board.
(4) Remove the propeller fan.
(5) Remove the fan motor.

NOTE: The propeller fan nut is a reverse thread.

4. Removing the compressor and 4-way valve

(1) Remove the top panel, the service panel and the front panel.
(2) Disconnect the power supply cord and indoor/outdoor connecting wires, and remove the back panel.
(3) Recover gas from the refrigerant circuit.

NOTE: Recover gas from the pipes until the pressure gauge shows 0 PSIG.

(5) Disconnect the compressor lead wire from the terminal of the compressor (U, V, W).
(6) Disconnect the outdoor control P.C. board connectors: CNF1, CNTH1, CNTH2, CN63H, CN712, CN713, CN714 (**MXZ-C·NAHZ, MXZ-C·NAHZ2**), CN791, CN792, CN793 (**MXZ-5C42NA, MXZ-3C24/30NAHZ, , MXZ-5C42NA2 MXZ-3C24/30NAHZ2**), CN794 (**MXZ-5C42NA, MXZ-5C42NA2**), CN795 (**MXZ-5C42NA, MXZ-5C42NA2**)
(7) Remove all the screws fixing the electrical parts, and remove the electrical parts (Photo 4).
(8) Remove the propeller fan.
(9) Remove all the screws fixing the VB fixture, and remove the VB fixture.
(10) Remove all the screws fixing the separator, and remove the separator.

NOTE: When installing the separator, insert the tabs of the heat exchanger into the separator.

(11) Remove all the sound proof felts.
(12) Detach all the brazed parts of the suction and discharge pipes (Photo 11).
(13) Remove all the compressor nuts, and remove the compressor (Photo 11).
(14) Detach all the brazed parts of 4-way valve and pipes.

PHOTOS/FIGURES

Photo 9

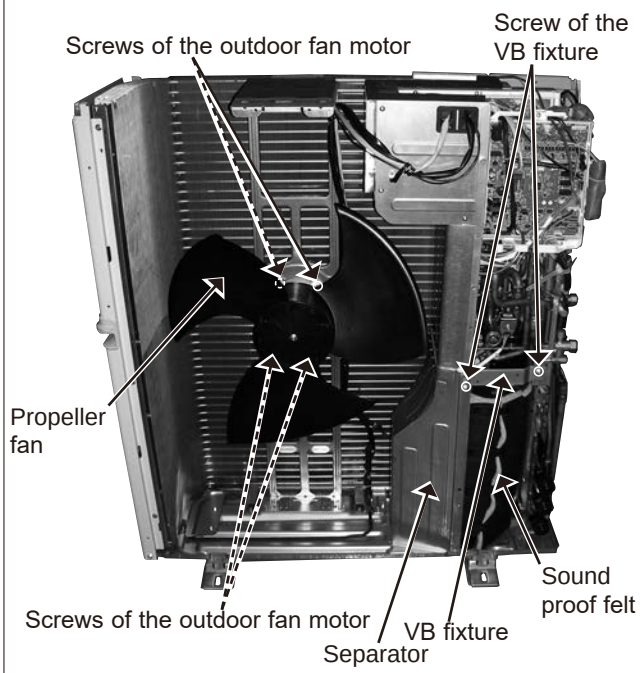
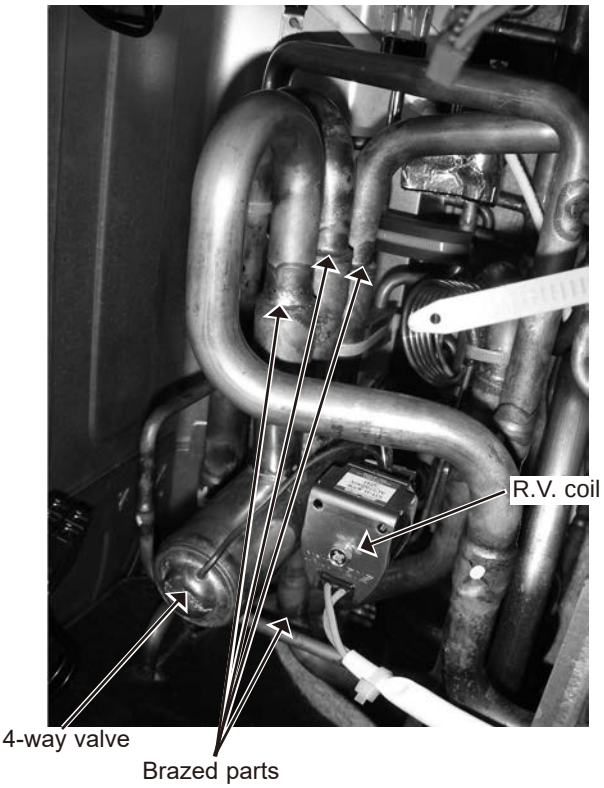
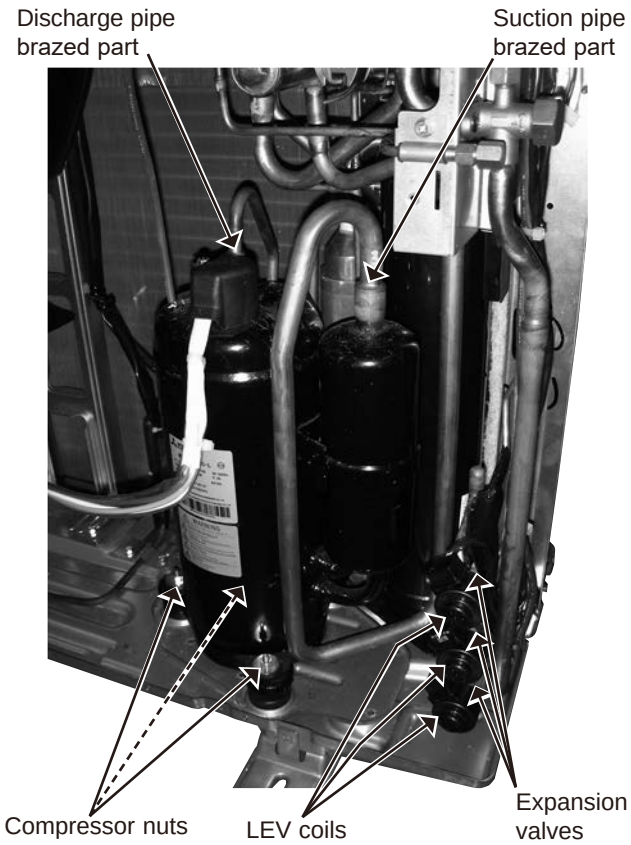


Photo 10



OPERATING PROCEDURE	PHOTOS/FIGURES
5. Removing the expansion valve **NOTE:** Gas recovery is not required if the unit is pumped down. (1) Remove the top panel and the service panel (Refer to section 1). (2) Disconnect the power supply cord and indoor/outdoor connecting wires. (3) Remove all the LEV coils. (4) Detach all the brazed parts of the expansion valves and pipes.	**Photo 11** 

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

Issued: Nov. 2020. No. OBH702 REVISED EDITION-H
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Issued: Apr. 2017. No. OBH702 REVISED EDITION-F
Issued: Dec. 2016. No. OBH702 REVISED EDITION-E
Issued: Jul. 2016. No. OBH702 REVISED EDITION-D
Issued: Mar. 2016. No. OBH702 REVISED EDITION-C
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Published: Sep. 2014. No. OBH702
Made in Japan

MITSUBISHI ELECTRIC

SPLIT-TYPE AIR CONDITIONERS

Revision E:
• Some descriptions have been modified.

OBB702 REVISED EDITION-D is void.

OUTDOOR UNIT

PARTS CATALOG

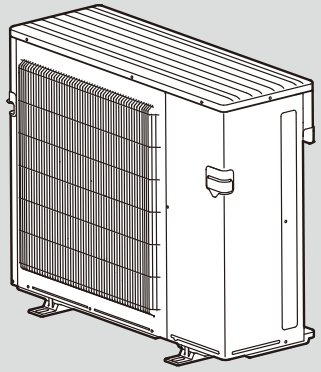
HFC utilized R410A

No. OBB702
REVISED EDITION-E

Models

MXZ-2C20NA2 - U1

MXZ-3C24NA	**MXZ-3C24NA2** - U1
MXZ-3C30NA	**MXZ-3C30NA2** - U1
MXZ-4C36NA	**MXZ-4C36NA2** - U1
MXZ-5C42NA	**MXZ-5C42NA2** - U1
MXZ-2C20NAHZ	**MXZ-2C20NAHZ2** - U1
MXZ-3C24NAHZ	**MXZ-3C24NAHZ2** - U1
MXZ-3C30NAHZ	**MXZ-3C30NAHZ2** - U1



MXZ-3C24NA MXZ-3C24NA2
MXZ-3C30NA MXZ-3C30NA2
MXZ-4C36NA MXZ-4C36NA2

CONTENTS

SERVICE MANUAL (OBH702)

Mr.SLIM™

Revision A:
• **MXZ-3C24NA**, **MXZ-3C30NA** and **MXZ-4C36NA** have been added.

Revision B:
• The part number of the ice guard for **MXZ-5C42NA** has been corrected.

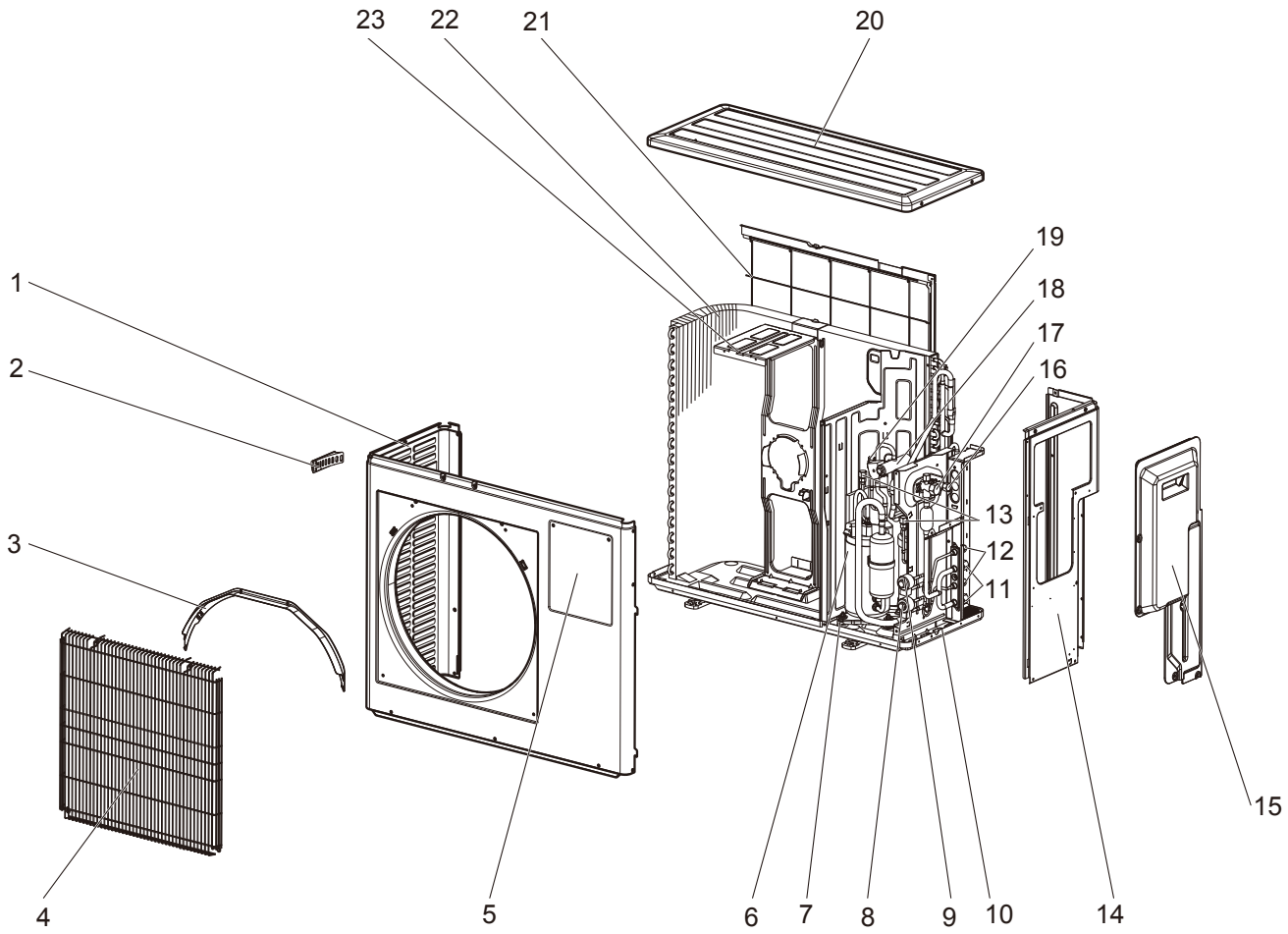
Revision C:
• **MXZ-3C24/3C30/4C36/5C42NA2-U1** and MXZ-2C20/3C24/3C30NAHZ2-U1 have been added.

Revision D:
• **MXZ-2C20NA2-U1** has been added.

Revision E:
• Some descriptions have been modified.

1 SERVICE PARTS LIST

MXZ-2C20NA2
1-1. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS



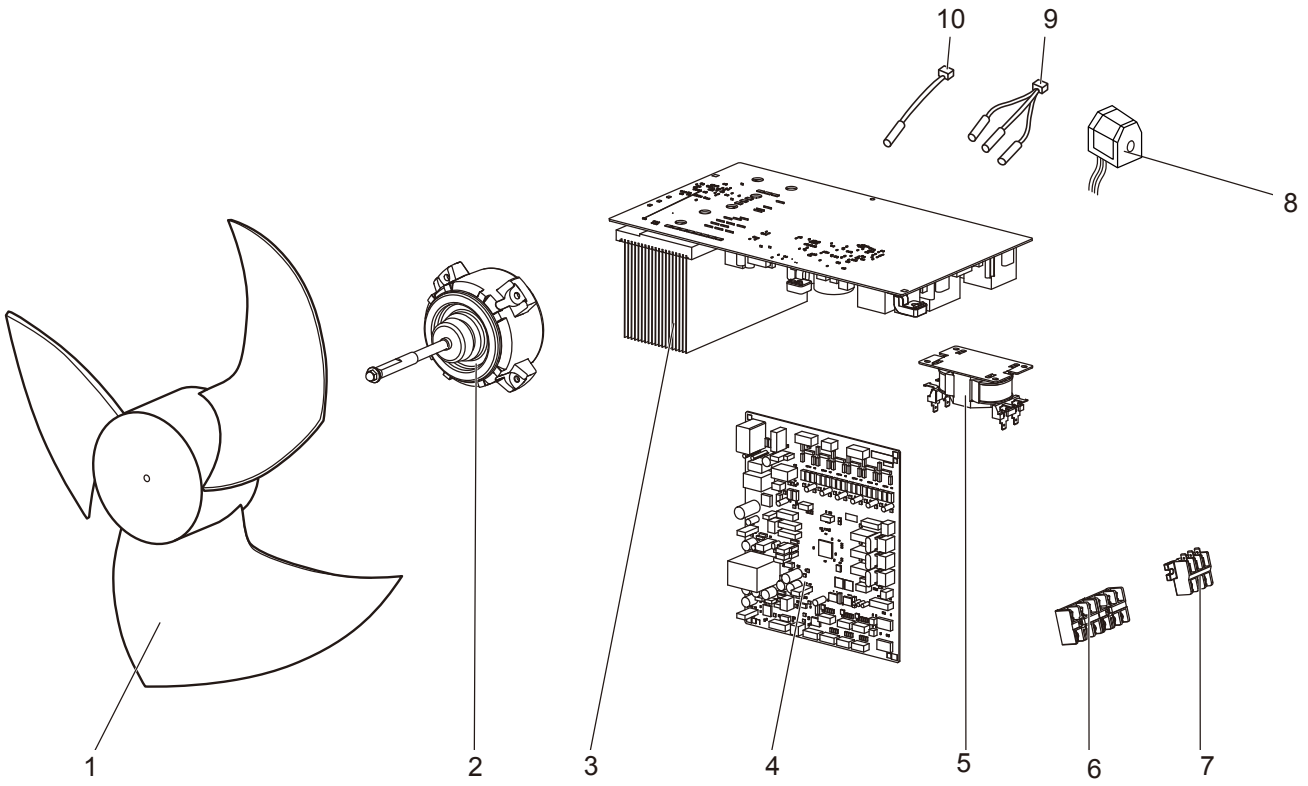
MXZ-2C20NA2
1-1. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Parts No.	Parts Name	MXZ-2C20NA2-U1	Symbol in Wiring Diagram	Remakes
1	E22 T07 232	CABINET	1		
2	E22 817 009	HANDLE	1		
3	E22 J69 531	ICE GUARD	1		
4	E22 J69 521	GRILLE	1		
5	E22 T07 246	SUB PANEL	1		
6	E22 01B 900	COMPRESSOR	1	MC	SNB140FQUH2T
7	E22 C34 506	COMPRESSOR RUBBER SET	3		3 RUBBERS SET
8	E22 851 640	EXPANSION VALVE	1		A room
	E22 R51 493	EXPANSION VALVE COIL	1	LEV A	A room
9	E22 851 640	EXPANSION VALVE	1		B room
	E22 R52 493	EXPANSION VALVE COIL	1	LEV B	B room
10	E22 T07 290	BASE	1		
11	E22 D36 666	UNION(GAS)(ø9.52)	2		ø3/8
12	E22 D36 667	UNION(LIQUID)(ø6.35)	2		ø1/4
13	E22 E79 641	SERVICE PORT	2		
14	E22 R51 233	BACK PANEL	1		
15	E22 R51 245	SERVICE PANEL	1		
16	E22 D36 662	STOP VALVE (LIQUID) (ø9.52)	1		ø3/8
17	E22 C88 661	STOP VALVE (GAS) (ø15.88)	1		ø5/8
18	E22 A56 961	4-WAY VALVE	1		
19	E22 W66 646	HIGH PRESSURE SWITCH	1	HPS	4.41 MPa (45.0 kg/cm^2)
20	E22 819 297	TOP PANEL	1		
21	E22 J69 523	REAR GUARD	1		
22	E22 01B 630	OUTDOOR HEAT EXCHANGER	1		
23	E22 J69 515	MOTOR SUPPORT	1		
㉔	E22 938 937	CAPILLARY TUBE (ø3.6 × ø2.4 × 500)	8		O.D.0.14 x I.D.0.09 x 19.68
㉕	E22 939 936	CAPILLARY TUBE (ø4.0 × ø2.8 × 100)	2		O.D.0.16 x I.D.0.11 x 3.94
㉖	E22 C18 959	POWER RECEIVER	1		
㉗	E22 853 640	EXPANSION VALVE	1		R
	E22 T07 493	EXPANSION VALVE COIL	1	LEV R	

MXZ-2C20NA2

1-2. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



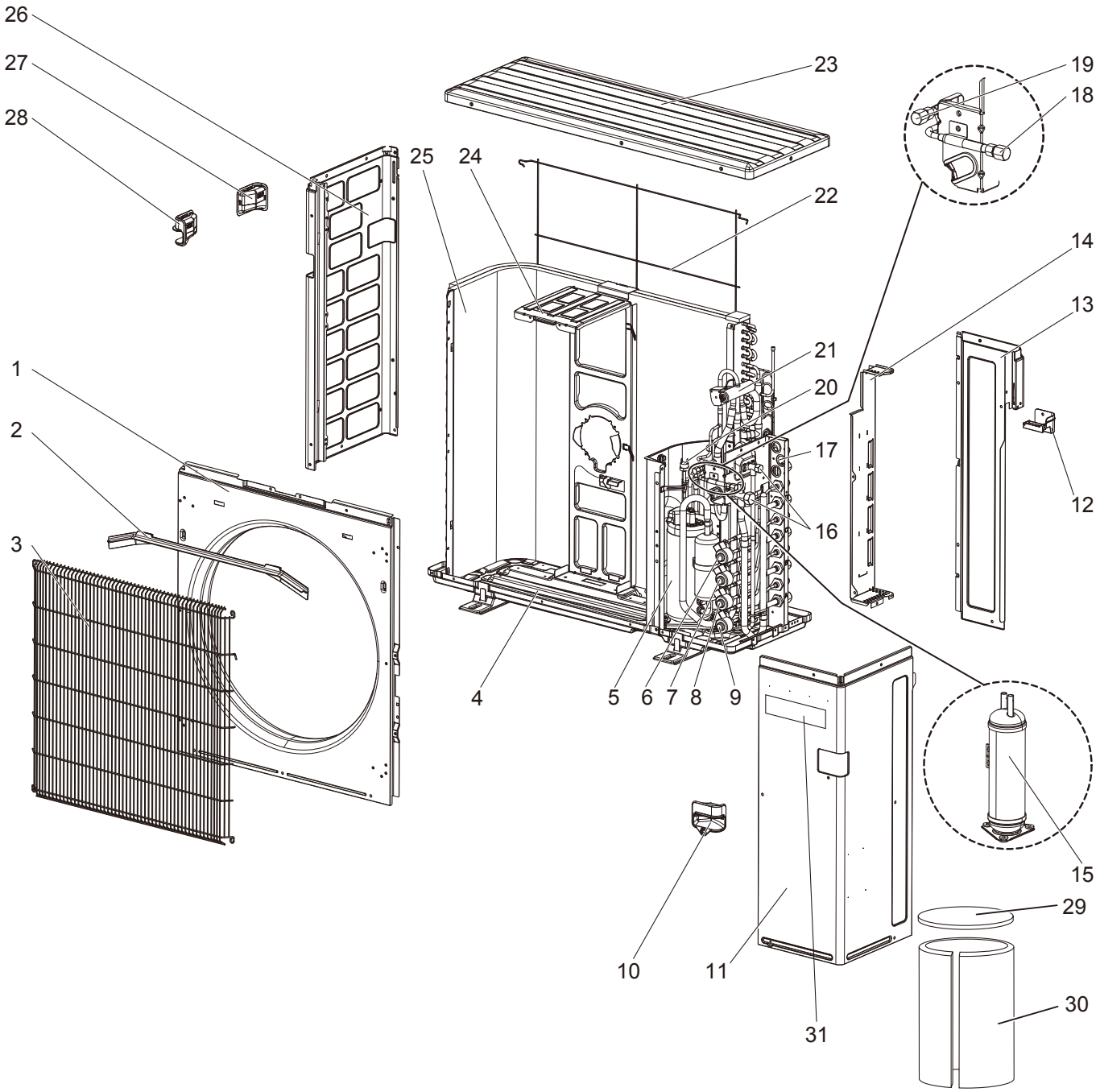
MXZ-2C20NA2
1-2. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

1. The part quantity below indicates the required number of pieces per unit.

No.	Parts No.	Parts Name	MXZ-2C20NA2-U1	Symbol in Wiring Diagram	Remakes
1	E22 851 501	PROPELLER FAN	1		
2	E22 01B 301	OUTDOOR FAN MOTOR	1	MF	RC0J77-□□
3	E22 01B 440	POWER BOARD	1		Includes heat sink and RT64
4	E22 10J 450	OUTDOOR CONTROL P.C. BOARD	1		
5	E22 R51 337	REACTOR	1	L	20 A 600 μH
6	E22 C92 375	TERMINAL BLOCK	2	TB2~3	Indoor unit connecting
7	E22 01B 374	TERMINAL BLOCK	1	TB1	
8	E22 01B 490	R.V. COIL	1	21S4	
9	E22 T07 308	THERMISTOR SET	1	RT61, RT62, RT68	DEFROST, DISCHARGE OUTDOOR HEAT EXCHANGER
10	E22 T07 309	AMBIENT TEMPERATURE THERMISTOR	1	RT65	

MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2

1-3. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS



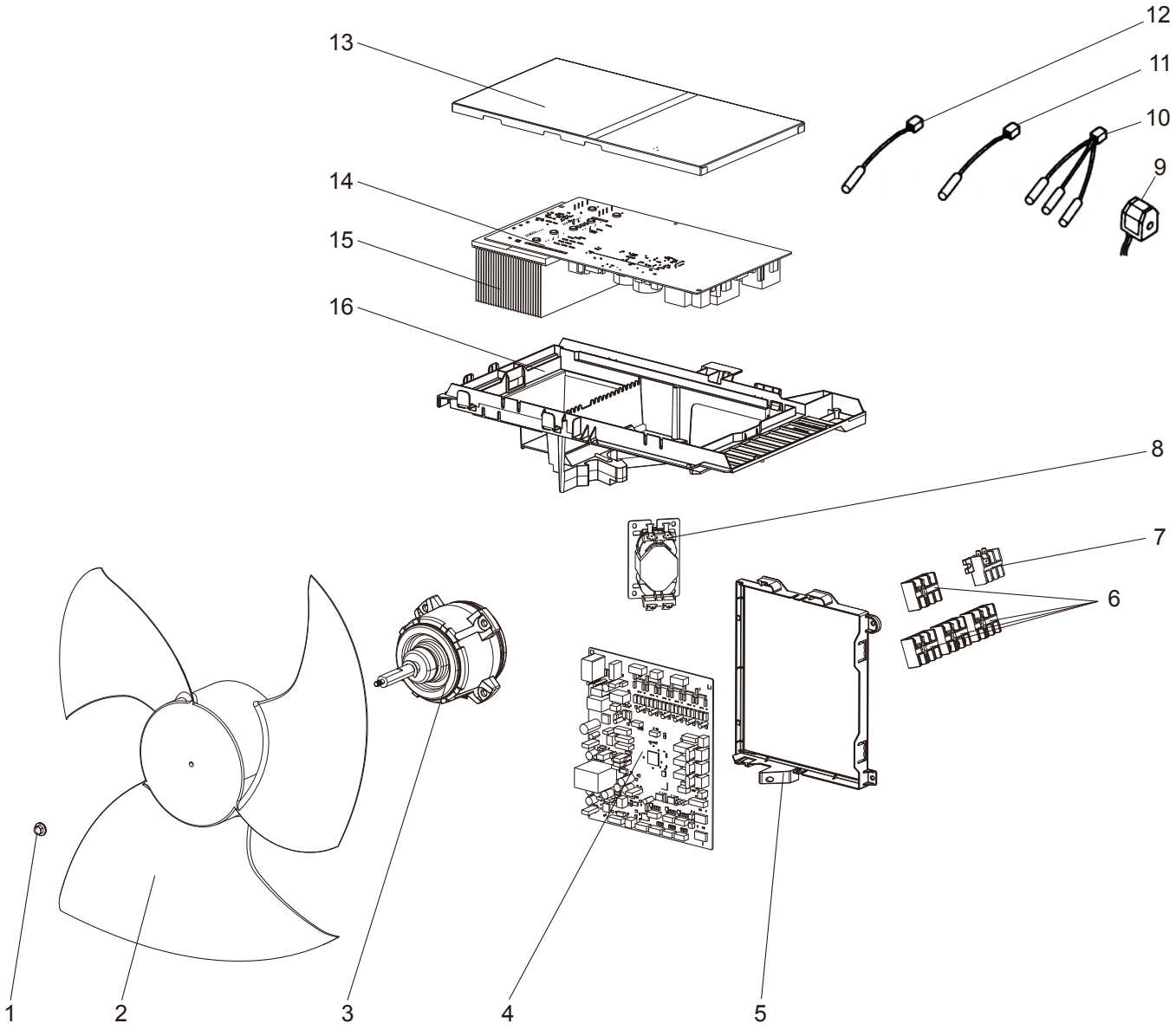
MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2
1-3. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Part No.	Part Name	MXZ-3C24NA	MXZ-3C24NA2-U1	MXZ-3C30NA	MXZ-3C30NA2-U1	MXZ-4C36NA	MXZ-4C36NA2-U1	Symbol in Wiring Diagram	Remarks
1	T7W E21 668	FRONT PANEL	1		1		1			
	T7W E22 668			1		1		1		
2	R01 E02 631	ICE GUARD	1	1	1	1	1	1		
3	R01 E73 691	WIRE GRILLE	1	1	1	1	1	1		
4	T7W E24 686	BASE ASSEMBLY	1		1		1			
	T7W E25 686			1		1		1		
5	T97 419 607	COMPRESSOR	1	1	1	1	1	1	MC	SNB220FQGMC Includes rubber mounts
6	T7W E59 401	EXPANSION VALVE ASSY					1	1		D room, Includes union and capillary tube
	T7W E81 242	LEV COIL					1	1	LEV D	D room, Connector: YELLOW
7	T7W E58 401	EXPANSION VALVE ASSY	1	1	1	1	1	1		C room, Includes union and capillary tube
	T7W E80 242	LEV COIL	1	1	1	1	1	1	LEV C	C room Connector: BLUE
8	T7W E57 401	EXPANSION VALVE ASSY	1	1	1	1	1	1		B room, Includes union and capillary tube
	T7W E79 242	LEV COIL	1	1	1	1	1	1	LEV B	B room, Connector: RED
9	T7W E56 401	EXPANSION VALVE ASSY	1	1	1	1	1	1		A room, Includes union and capillary tube
	T7W E78 242	LEV COIL	1	1	1	1	1	1	LEV A	A room, Connector: WHITE
10	T7W A02 655	HANDLE (R FRONT)	1	1	1	1	1	1		
11	T7W E23 667	SERVICE PANEL	1	1	1	1	1	1		
12	T7W A03 655	HANDLE (R REAR)	1	1	1	1	1	1		
13	T7W E11 682	REAR PANEL	1	1	1	1	1	1		
14	T7W E38 661	BACK PILLAR	1	1	1	1	1	1		
15	T7W E26 440	ACCUMULATOR	1		1		1			
	T7W E27 440			1		1		1		
16	T7W E06 410	STOP VALVE ASSY	1	1	1	1	1	1		Includes both valves
17	T7W E07 617	CONDUIT PLATE SET	1	1	1	1	1	1		
18	R01 E13 413	SERVICE PORT	1	1	1	1	1	1		
19	R01 E12 413	SERVICE PORT	1	1	1	1	1	1		
20	T7W E11 208	HIGH PRESSURE SWITCH	1		1		1		HPS	4.8 MPa (48.9 kg/cm²)
	T7W E13 208			1		1		1		4.41 MPa (45.0 kg/cm²)
21	T7W E06 403	4-WAY VALVE	1	1	1	1	1	1		
22	T7W E06 698	REAR GUARD	1	1	1	1	1	1		
23	T7W E14 641	TOP PANEL	1	1	1	1	1	1		
24	T7W E17 130	MOTOR SUPPORT	1	1	1	1	1	1		
25	T7W E75 408	OUTDOOR HEAT EXCHANGER	1	1	1	1	1	1		Includes capillary tubes and distributor
26	T7W E11 662	SIDE PANEL (L)	1	1	1	1	1	1		
27	T7W A01 655	HANDLE (REAR)	1	1	1	1	1	1		
28	T7W A00 655	HANDLE (FRONT)	1	1	1	1	1	1		
29	T7W A01 602	COMPRESSOR FELT (TOP)	1	1	1	1	1	1		
30	T7W A00 602	COMPRESSOR FELT (BODY)	1	1	1	1	1	1		
31	T7W A01 005	BRAND LABEL	1	1	1	1	1	1		
㉜	T7W A00 508	DAMPER SET	1	1	1	1	1	1		2 PCS SET 95 x 250 T2 (mm)

MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2

1-4. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



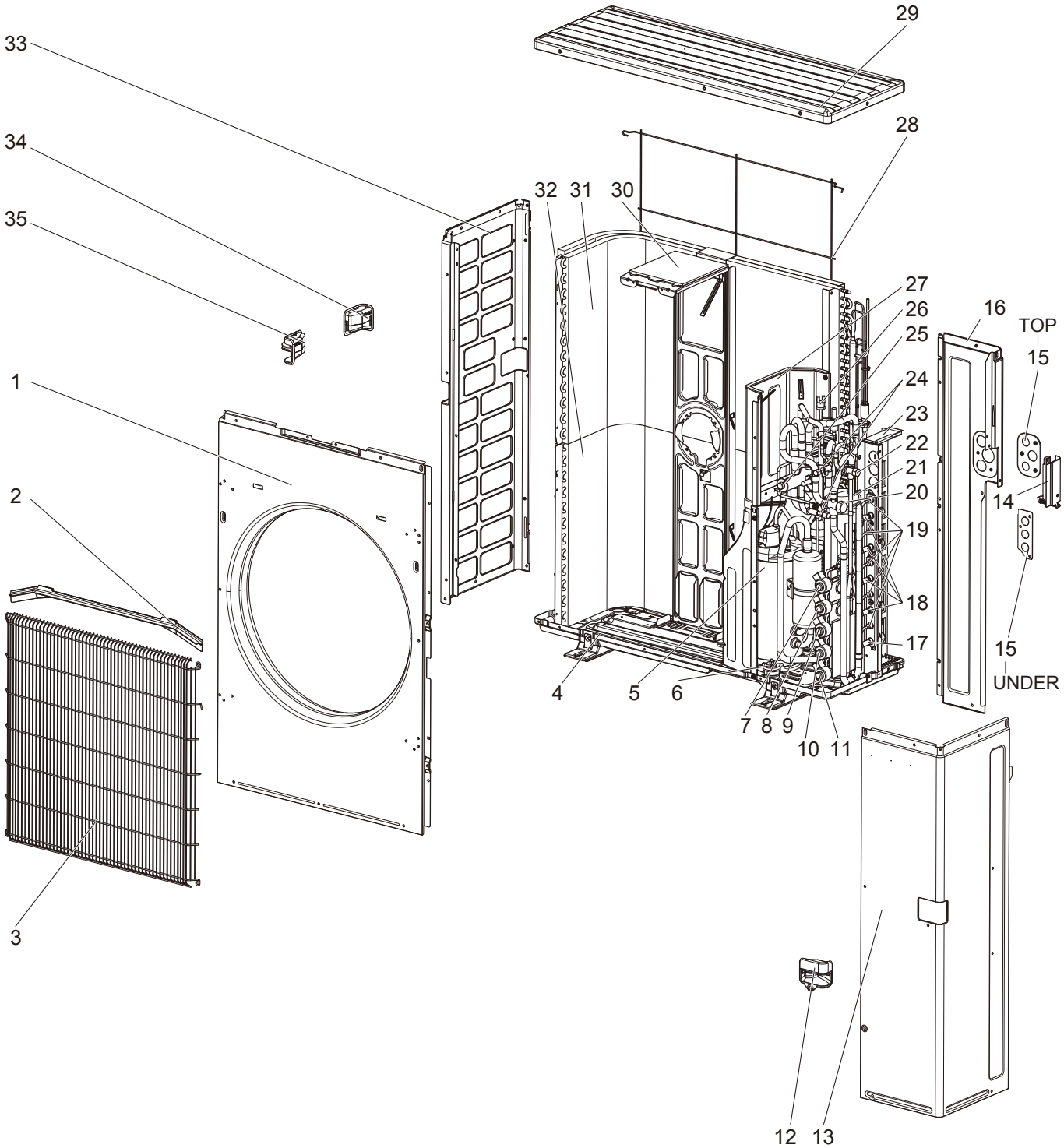
MXZ-3C24NA MXZ-3C30NA MXZ-4C36NA
MXZ-3C24NA2 MXZ-3C30NA2 MXZ-4C36NA2
1-4. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Part No.	Part Name	MXZ-3C24NA	MXZ-3C24NA2-U1	MXZ-3C30NA	MXZ-3C30NA2-U1	MXZ-4C36NA	MXZ-4C36NA2-U1	Symbol in Wiring Diagram	Remarks
1	R01 E09 097	PROPELLER FAN NUT	1	1	1	1	1	1		
2	T7W A00 115	PROPELLER FAN	1	1	1	1	1	1		
3	T7W A13 221	OUTDOOR FAN MOTOR	1	1	1	1	1	1	MF	
4	T7W GB1 315	OUTDOOR CONTROL P.C. BOARD	1							
	T7W GY0 315			1						
	T7W GC0 315				1					
	T7W GZ0 315					1				
	T7W GD1 315						1			
	T7W H00 315							1		
5	T7W A02 327	CB HOLDER	1	1	1	1	1	1		
6	T7W E13 716	TERMINAL BLOCK	3	3	3	3	4	4	TB2,3,4,(5)	Indoor unit connecting 3P (S1,S2,S3)
7	T7W E63 716	TERMINAL BLOCK	1	1	1	1	1	1	TB1	Power supply 3P (L1,L2,GR)
8	T7W E25 259	REACTOR	1	1	1	1	1	1	L	
9	T7W E83 242	R.V. COIL	1	1	1	1	1	1	21S4	
10	T7W E71 202	THERMISTOR	1	1	1	1	1	1	RT61,62,68	DEFROST, DISCHARGE, OUTDOOR HEAT EXCHANGER
11	T7W E72 202	THERMISTOR	1	1	1	1	1	1	RT65	AMBIENT
12	R01 E99 202	THERMISTOR	1	1	1	1	1	1	RT64	FIN (HEAT SINK)
13	T7W A00 325	PB COVER	1	1	1	1	1	1		
14	T7W AE0 323	OUTDOOR POWER P.C. BOARD	1		1		1			
	T7W AW0 323			1		1		1		
15	T7W A03 371	HEAT SINK	1	1	1	1	1	1		
16	T7W A00 327	PB HOLDER	1	1	1	1	1	1		
⑰	T7W A00 510	COMPRESSOR LEAD ASSY SET	1	1	1	1	1	1		

MXZ-5C42NA

1-5. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS



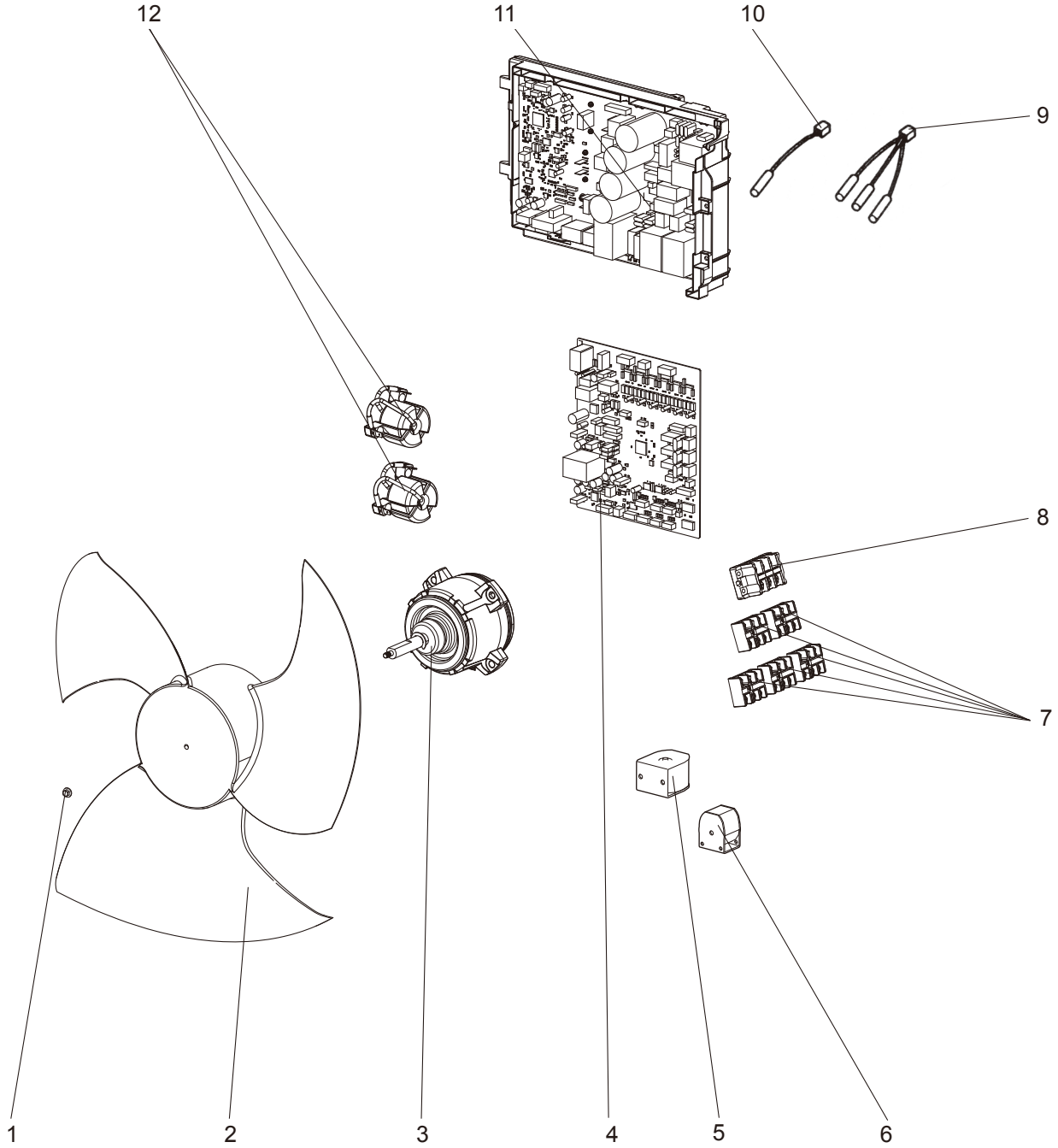
MXZ-5C42NA
1-5. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Part No.	Part Name	MXZ-5C42NA	Symbol In Wiring Diagram	Remarks
1	E22 N99 232	FRONT PANEL	1		
2	E27 A15 531	ICE GUARD	1		
3	E27 942 521	GRILLE	1		
4	E22 N99 290	BASE ASSEMBLY	1		
5	E22 N99 900	COMPRESSOR	1	MC	MNB33FBTMC-L
6	E22 267 506	COMPRESSOR RUBBER SET	3		3 RUBBERS SET
7	E22 N99 640	EXPANSION VALVE	1		E room
	E22 P64 493	LEV COIL	1	LEV E	E room
8	E22 N99 640	EXPANSION VALVE	1		D room
	E22 P63 493	LEV COIL	1	LEV D	D room
9	E22 N99 640	EXPANSION VALVE	1		C room
	E22 P02 493	LEV COIL	1	LEV C	C room
10	E22 N99 640	EXPANSION VALVE	1		B room
	E22 P01 493	LEV COIL	1	LEV B	B room
11	E22 N99 640	EXPANSION VALVE	1		A room
	E22 N99 493	LEV COIL	1	LEV A	A room
12	E22 P01 009	HANDLE	1		
13	E22 N99 245	SERVICE PANEL	1		Without LABEL
14	E22 N99 009	HANDLE (BACK)	1		
15	E22 N99 978	CONDUIT PLATE (TOP)	1		
	E22 P01 978	CONDUIT PLATE (UNDER)	1		
16	E22 N99 233	BACK PANEL	1		
17	E22 D37 666	UNION (GAS) (ø12.7)	1		ø1/2, A room
18	E22 D36 666	UNION (GAS) (ø9.52)	4		ø3/8, B, C, D, E room
19	E22 D36 667	UNION (LIQUID) (ø6.35)	5		ø1/4, A, B, C, D, E room
20	E22 N99 661	STOP VALVE (GAS) (ø15.88)	1		ø5/8
21	E22 N99 932	ACCUMULATOR	1		
22	E22 N99 662	STOP VALVE (LIQUID) (ø9.52)	1		ø3/8
23	E22 P64 814	BACK PILLAR	1		
24	E22 N99 641	SERVICE PORT	2		
25	E22 N99 961	4-WAY VALVE	1		
26	E22 853 646	HIGH PRESSURE SWITCH	1	HPS	4.8 MPa (48.9 kg/cm^2)
27	E22 N99 293	SEPARATOR	1		
28	E22 N99 523	REAR GUARD	1		
29	E22 N99 297	TOP PANEL	1		
30	E22 P64 515	MOTOR SUPPORT	1		
31	E22 N99 630	OUTDOOR HEAT EXCHANGER (TOP)	1		Includes capillary tubes
32	E22 P01 630	OUTDOOR HEAT EXCHANGER (UNDER)	1		Includes capillary tubes
33	E22 N99 086	SIDE PANEL-L	1		
34	E27 943 009	HANDLE (REAR)	1		
35	E27 942 009	HANDLE (FRONT)	1		
㊱	E22 N99 492	2-WAY SOLENOID VALVE	1		
㊲	E22 N99 936	CAPILLARY TUBE (ø4.0 x ø3.0 x 200)	2		O.D. 0.16 x I.D. 0.12 x 7.88
㊳	E22 939 936	CAPILLARY TUBE (ø4.0 x ø2.8 x 100)	5		O.D. 0.16 x I.D. 0.11 x 3.94
㊴	E22 820 936	CAPILLARY TUBE (ø2.5 x ø0.6 x 1000)	1		O.D. 0.10 x I.D. 0.02 x 39.37

MXZ-5C42NA

1-6. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



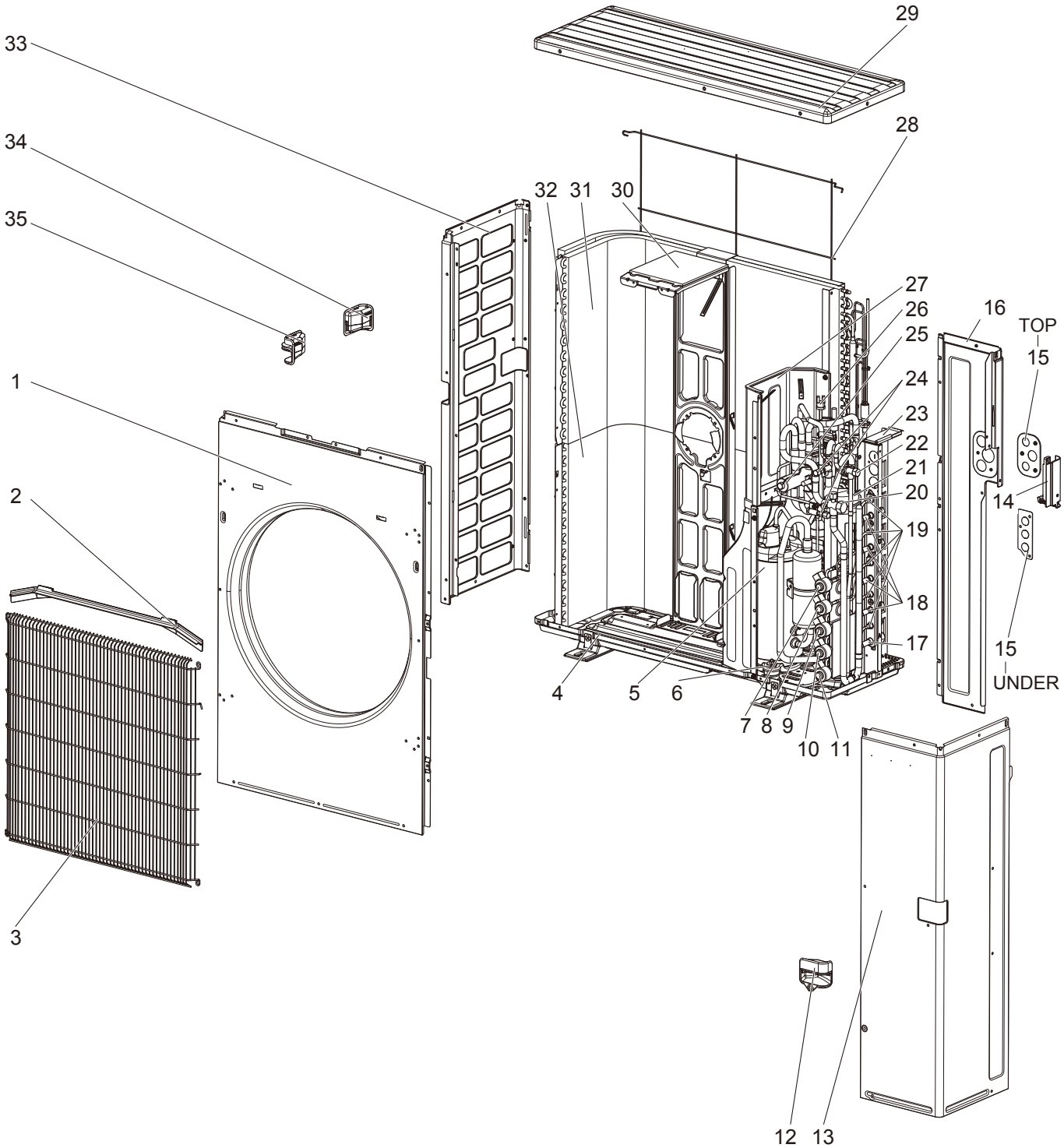
MXZ-5C42NA
1-6. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

1. The part quantity below indicates the required number of pieces per unit.

No.	Part No.	Part Name	MXZ-5C42NA	Symbol In Wiring Diagram	Remarks
1	E27 A15 508	PROPELLER FAN NUT	1		
2	E22 N99 501	PROPELLER FAN	1		
3	E22 R55 301	OUTDOOR FAN MOTOR	1	MF	SIC-81FW-D888-□
4	E22 92H 450	OUTDOOR CONTROL P.C. BOARD	1		
5	E22 P01 490	2-WAY VALVE SOLENOID COIL	1	21S2	
6	E22 N99 490	R.V. COIL	1	21S4	
7	E22 C92 375	TERMINAL BLOCK	5	TB2,3,4,5,6	Indoor unit connecting
8	E22 N99 374	TERMINAL BLOCK	1	TB1	Power supply
9	E22 N99 308	THERMISTOR SET	1	RT61, RT62, RT68	DEFROST, DISCHARGE, OUTDOOR HEAT EXCHANGER
10	E22 N99 309	AMBIENT TEMPERATURE THERMISTOR	1	RT65	
11	E22 N99 440	OUTDOOR POWER P.C. BOARD	1		Includes heat sink and RT64
12	E22 N99 337	REACTOR	2	L1,L2	30A 750μH

MXZ-5C42NA2

1-7. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS



MXZ-5C42NA2

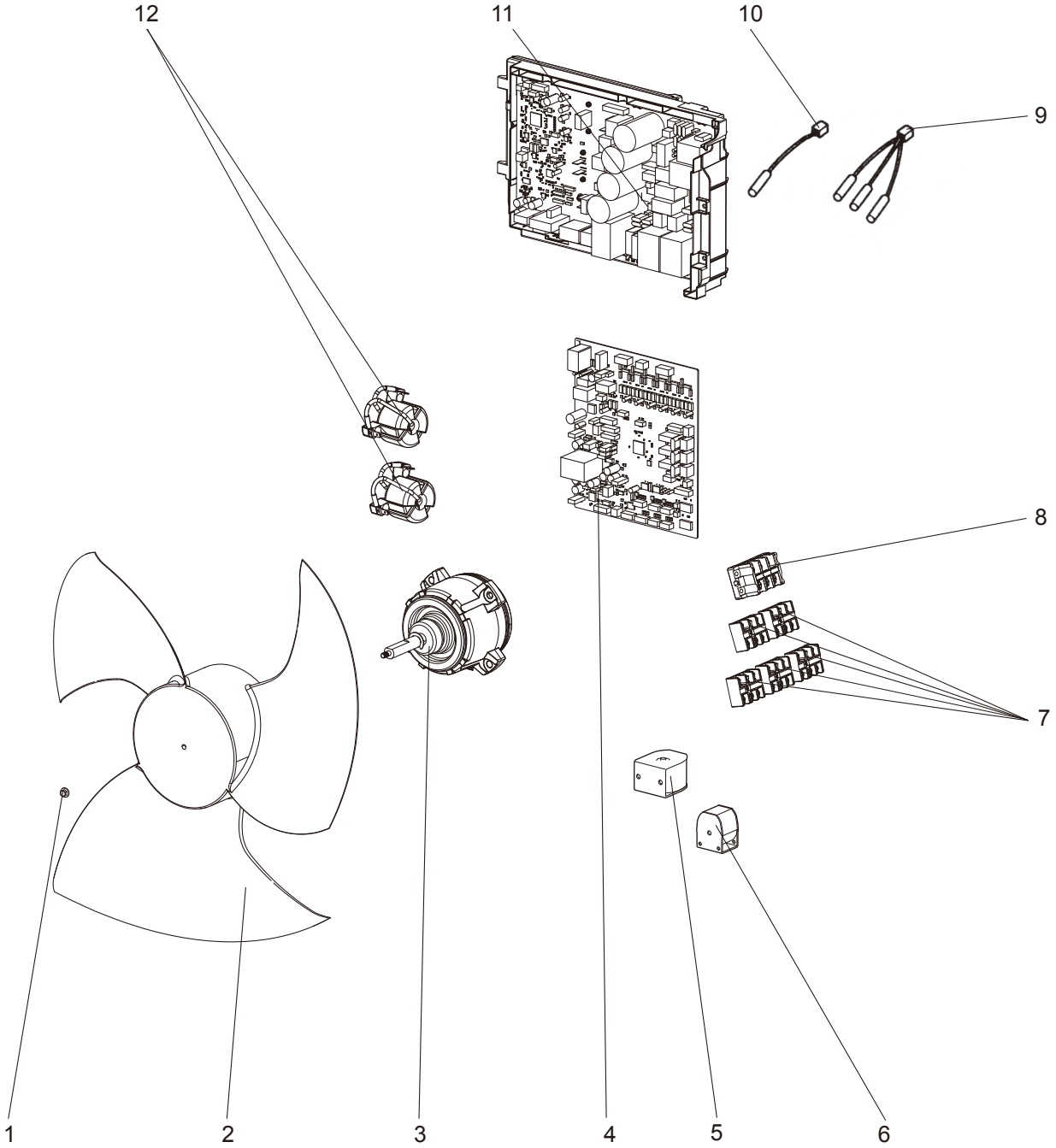
1-7. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Part No.	Part Name	MXZ-5C42NA2-U1	Symbol In Wiring Diagram	Remarks
1	E22 N99 232	FRONT PANEL	1		
2	E27 A15 531	ICE GUARD	1		
3	E27 942 521	GRILLE	1		
4	E22 N99 290	BASE ASSEMBLY	1		
5	E22 N99 900	COMPRESSOR	1	MC	MNB33FBTMC-L
6	E22 267 506	COMPRESSOR RUBBER SET	3		3 RUBBERS SET
7	E22 N99 640	EXPANSION VALVE	1		E room
	E22 P64 493	LEV COIL	1	LEV E	E room
8	E22 N99 640	EXPANSION VALVE	1		D room
	E22 P63 493	LEV COIL	1	LEV D	D room
9	E22 N99 640	EXPANSION VALVE	1		C room
	E22 P02 493	LEV COIL	1	LEV C	C room
10	E22 N99 640	EXPANSION VALVE	1		B room
	E22 P01 493	LEV COIL	1	LEV B	B room
11	E22 N99 640	EXPANSION VALVE	1		A room
	E22 N99 493	LEV COIL	1	LEV A	A room
12	E22 P01 009	HANDLE	1		
13	E22 N99 245	SERVICE PANEL	1		Without LABEL
14	E22 N99 009	HANDLE (BACK)	1		
15	E22 N99 978	CONDUIT PLATE (TOP)	1		
	E22 P01 978	CONDUIT PLATE (UNDER)	1		
16	E22 N99 233	BACK PANEL	1		
17	E22 D37 666	UNION (GAS) (ø12.7)	1		ø1/2, A room
18	E22 D36 666	UNION (GAS) (ø9.52)	4		ø3/8, B, C, D, E room
19	E22 D36 667	UNION (LIQUID) (ø6.35)	5		ø1/4, A, B, C, D, E room
20	E22 N99 661	STOP VALVE (GAS) (ø15.88)	1		ø5/8
21	E22 N99 932	ACCUMULATOR	1		
22	E22 N99 662	STOP VALVE (LIQUID) (ø9.52)	1		ø3/8
23	E22 P64 814	BACK PILLAR	1		
24	E22 N99 641	SERVICE PORT	2		
25	E22 N99 961	4-WAY VALVE	1		
26	E22 W66 646	HIGH PRESSURE SWITCH	1	HPS	4.41 MPa (45.0 kg/cm^2)
27	E22 N99 293	SEPARATOR	1		
28	E22 N99 523	REAR GUARD	1		
29	E22 N99 297	TOP PANEL	1		
30	E22 P64 515	MOTOR SUPPORT	1		
31	E22 N99 630	OUTDOOR HEAT EXCHANGER (TOP)	1		Includes capillary tubes
32	E22 P01 630	OUTDOOR HEAT EXCHANGER (UNDER)	1		Includes capillary tubes
33	E22 N99 086	SIDE PANEL-L	1		
34	E27 943 009	HANDLE (REAR)	1		
35	E27 942 009	HANDLE (FRONT)	1		
㊱	E22 N99 492	2-WAY SOLENOID VALVE	1		
㊲	E22 N99 936	CAPILLARY TUBE (ø4.0 x ø3.0 x 200)	2		O.D. 0.16 x I.D. 0.12 x 7.88
㊳	E22 939 936	CAPILLARY TUBE (ø4.0 x ø2.8 x 100)	5		O.D. 0.16 x I.D. 0.11 x 3.94
㊴	E22 820 936	CAPILLARY TUBE (ø2.5 x ø0.6 x 1000)	1		O.D. 0.10 x I.D. 0.02 x 39.37

MXZ-5C42NA2

1-8. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



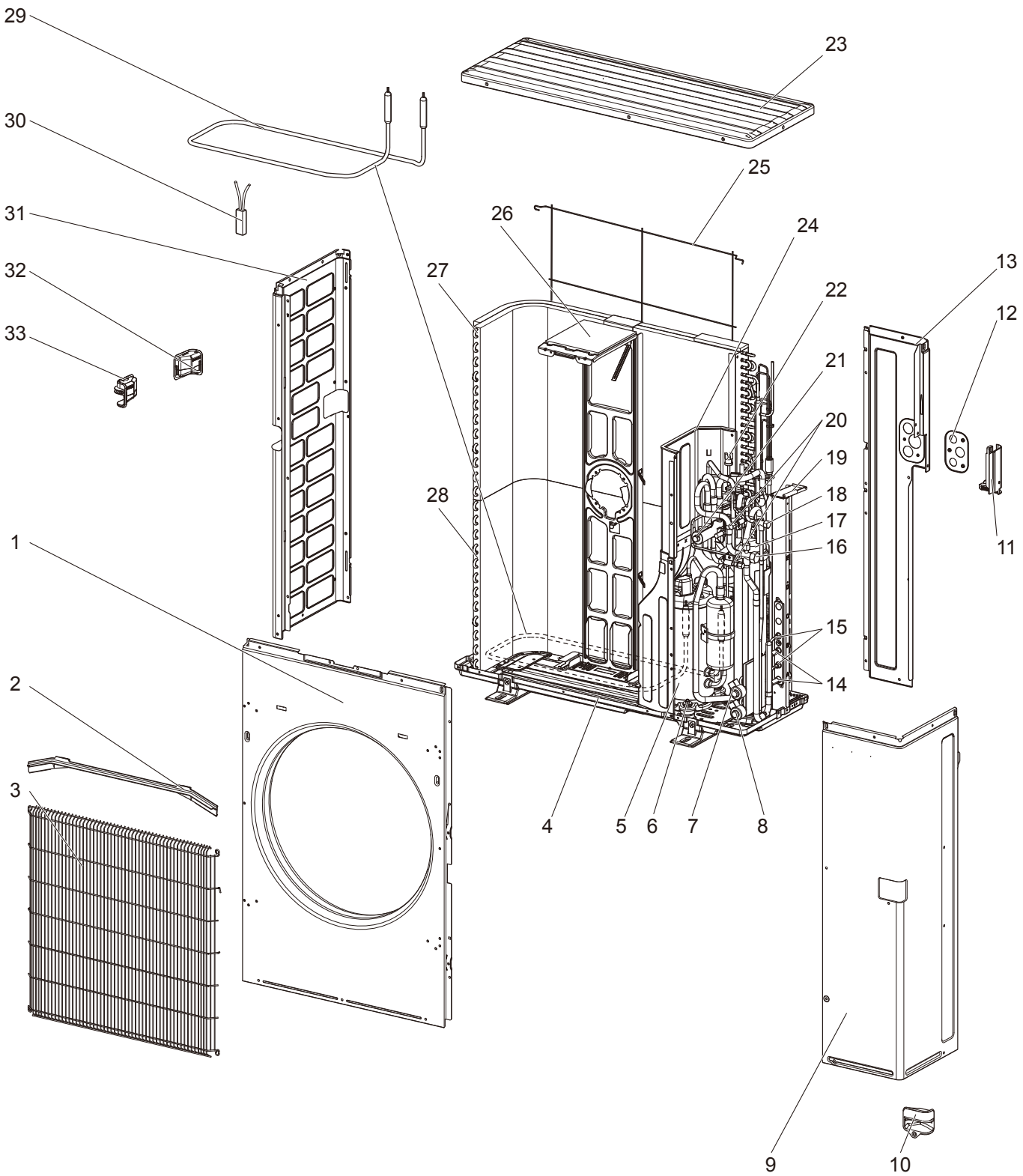
MXZ-5C42NA2
1-8. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

1. The part quantity below indicates the required number of pieces per unit.

No.	Part No.	Part Name	MXZ-5C42NA2-□U1	Symbol In Wiring Diagram	Remarks
1	E27 A15 508	PROPELLER FAN NUT	1		
2	E22 N99 501	PROPELLER FAN	1		
3	E22 W69 301	OUTDOOR FAN MOTOR	1	MF	SIC-88FWJ-D888-□
4	E22 02F 450	OUTDOOR CONTROL P.C. BOARD	1		
5	E22 P01 490	2-WAY VALVE SOLENOID COIL	1	21S2	
6	E22 N99 490	R.V. COIL	1	21S4	
7	E22 C92 375	TERMINAL BLOCK	5	TB2,3,4,5,6	Indoor unit connecting
8	E22 N99 374	TERMINAL BLOCK	1	TB1	Power supply
9	E22 N99 308	THERMISTOR SET	1	RT61, RT62, RT68	DEFROST, DISCHARGE, OUTDOOR HEAT EXCHANGER
10	E22 N99 309	AMBIENT TEMPERATURE THERMISTOR	1	RT65	
11	E22 R55 440	OUTDOOR POWER P.C. BOARD	1		Includes heat sink and RT64
12	E22 N99 337	REACTOR	2	L1,L2	30A 750μH

MXZ-2C20NAHZ

1-9. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS



MXZ-2C20NAHZ

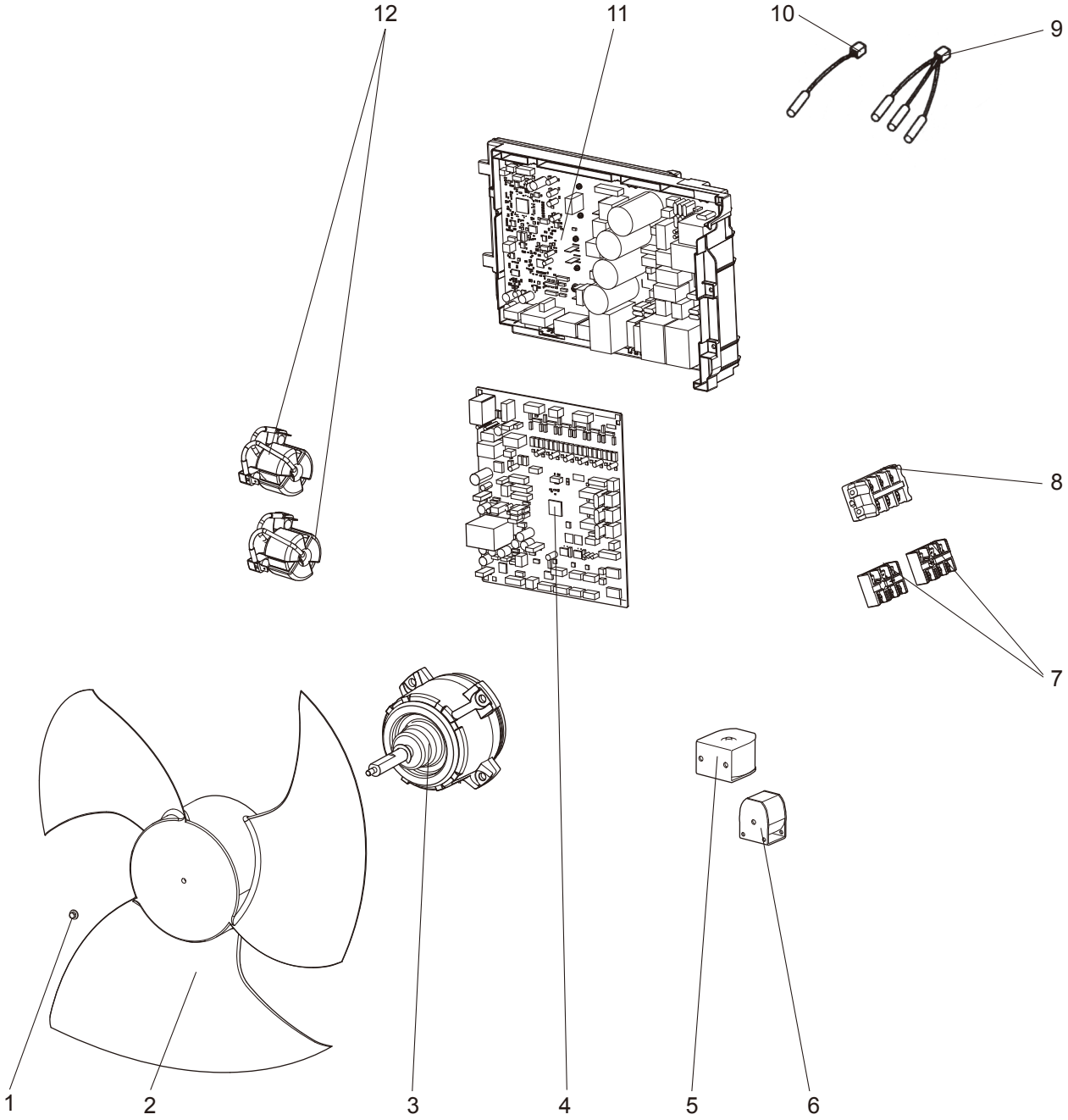
1-9. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Part No.	Part Name	MXZ-2C20NAHZ	Symbol In Wiring Diagram	Remarks
1	E22 N99 232	FRONT PANEL	1		
2	E27 A15 531	ICE GUARD	1		
3	E27 942 521	GRILLE	1		
4	E22 N99 290	BASE ASSEMBLY	1		
5	E22 N99 900	COMPRESSOR	1	MC	MNB33FBTMC-L
6	E22 267 506	COMPRESSOR RUBBER SET	3		3 RUBBERS SET
7	E22 N99 640	EXPANSION VALVE	1		B room
	E22 P01 493	LEV COIL	1	LEV B	B room
8	E22 N99 640	EXPANSION VALVE	1		A room
	E22 N99 493	LEV COIL	1	LEV A	A room
9	E22 N99 245	SERVICE PANEL	1		
10	E22 P01 009	HANDLE	1		
11	E22 N99 009	HANDLE (BACK)	1		
12	E22 N99 978	CONDUIT PLATE	1		
13	E22 N99 233	BACK PANEL	1		
14	E22 D36 666	UNION (GAS) (ø9.52)	2		ø3/8, A, B room
15	E22 D36 667	UNION (LIQUID) (ø6.35)	2		ø1/4, A, B room
16	E22 N99 661	STOP VALVE (GAS) (ø15.88)	1		ø5/8
17	E22 N99 932	ACCUMULATOR	1		
18	E22 N99 662	STOP VALVE (LIQUID) (ø9.52)	1		ø3/8
19	E22 N99 814	BACK PILLAR	1		
20	E22 N99 641	SERVICE PORT	2		
21	E22 N99 961	4-WAY VALVE	1		
22	E22 853 646	HIGH PRESSURE SWITCH	1	HPS	4.8 MPa (48.9 kg/cm^2)
23	E22 N99 297	TOP PANEL	1		
24	E22 N99 293	SEPARATOR	1		
25	E22 N99 523	REAR GUARD	1		
26	E22 N99 515	MOTOR SUPPORT	1		
27	E22 N99 630	OUTDOOR HEAT EXCHANGER (TOP)	1		Includes capillary tubes
28	E22 P01 630	OUTDOOR HEAT EXCHANGER (UNDER)	1		Includes capillary tubes
29	E22 N99 526	DEFROST HEATER	1	H	
30	E22 N99 381	HEATER PROTECTOR	1	26H	
31	E22 N99 086	SIDE PANEL (L)	1		
32	E27 943 009	HANDLE (REAR)	1		
33	E27 942 009	HANDLE (FRONT)	1		
㉞	E22 N99 492	2-WAY SOLENOID VALVE	1		
㉟	E22 939 936	CAPILLARY TUBE (ø4.0 x ø2.8 x 100)	2		O.D. 0.16 x I.D. 0.11 x 3.94
㊱	E22 820 936	CAPILLARY TUBE (ø2.5 x ø0.6 x 1000)	1		O.D. 0.10 x I.D. 0.02 x 39.37

MXZ-2C20NAHZ

1-10. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



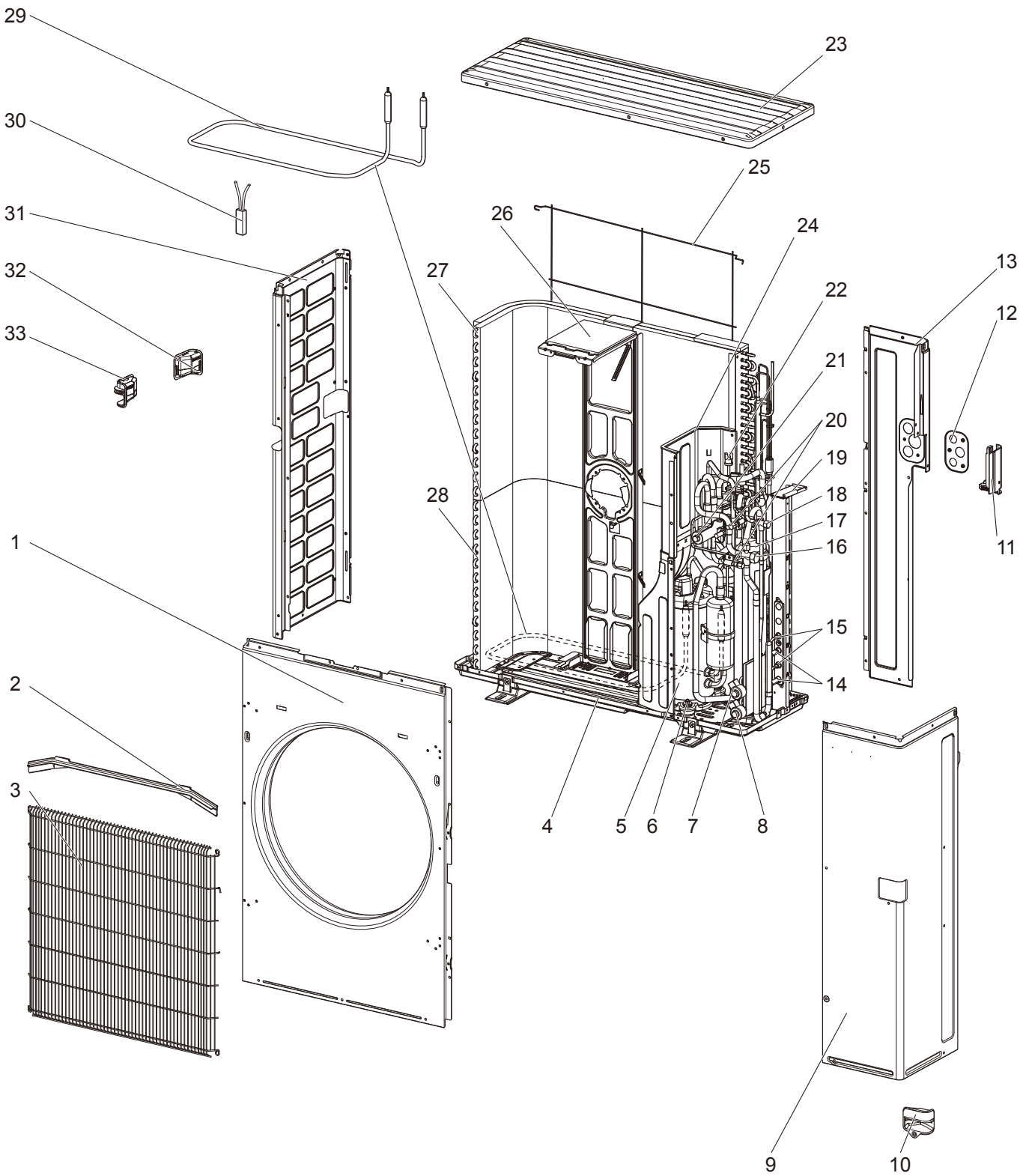
MXZ-2C20NAHZ
1-10. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

1. The part quantity below indicates the required number of pieces per unit.

No.	Part No.	Part Name	MXZ-2C20NAHZ	Symbol In Wiring Diagram	Remarks
1	E27 A15 508	PROPELLER FAN NUT	1		
2	E22 N99 501	PROPELLER FAN	1		
3	E22 R55 301	OUTDOOR FAN MOTOR	1	MF	SIC-81FW-D888-□
4	E22 89H 450	OUTDOOR CONTROL P.C. BOARD	1		
5	E22 P01 490	2-WAY VALVE SOLENOID COIL	1	21S2	
6	E22 N99 490	R.V. COIL	1	21S4	
7	E22 C92 375	TERMINAL BLOCK	2	TB2,3	Indoor unit connecting
8	E22 N99 374	TERMINAL BLOCK	1	TB1	Power supply
9	E22 N99 308	THERMISTOR SET	1	RT61, RT62, RT68	DEFROST, DISCHARGE, OUTDOOR HEAT EXCHANGER
10	E22 N99 309	AMBIENT TEMPERATURE THERMISTOR	1	RT65	
11	E22 N99 440	OUTDOOR POWER P.C. BOARD	1		Includes heat sink and RT64
12	E22 N99 337	REACTOR	2	L1,L2	30A 750μH

MXZ-2C20NAHZ2

1-11. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS



MXZ-2C20NAHZ2

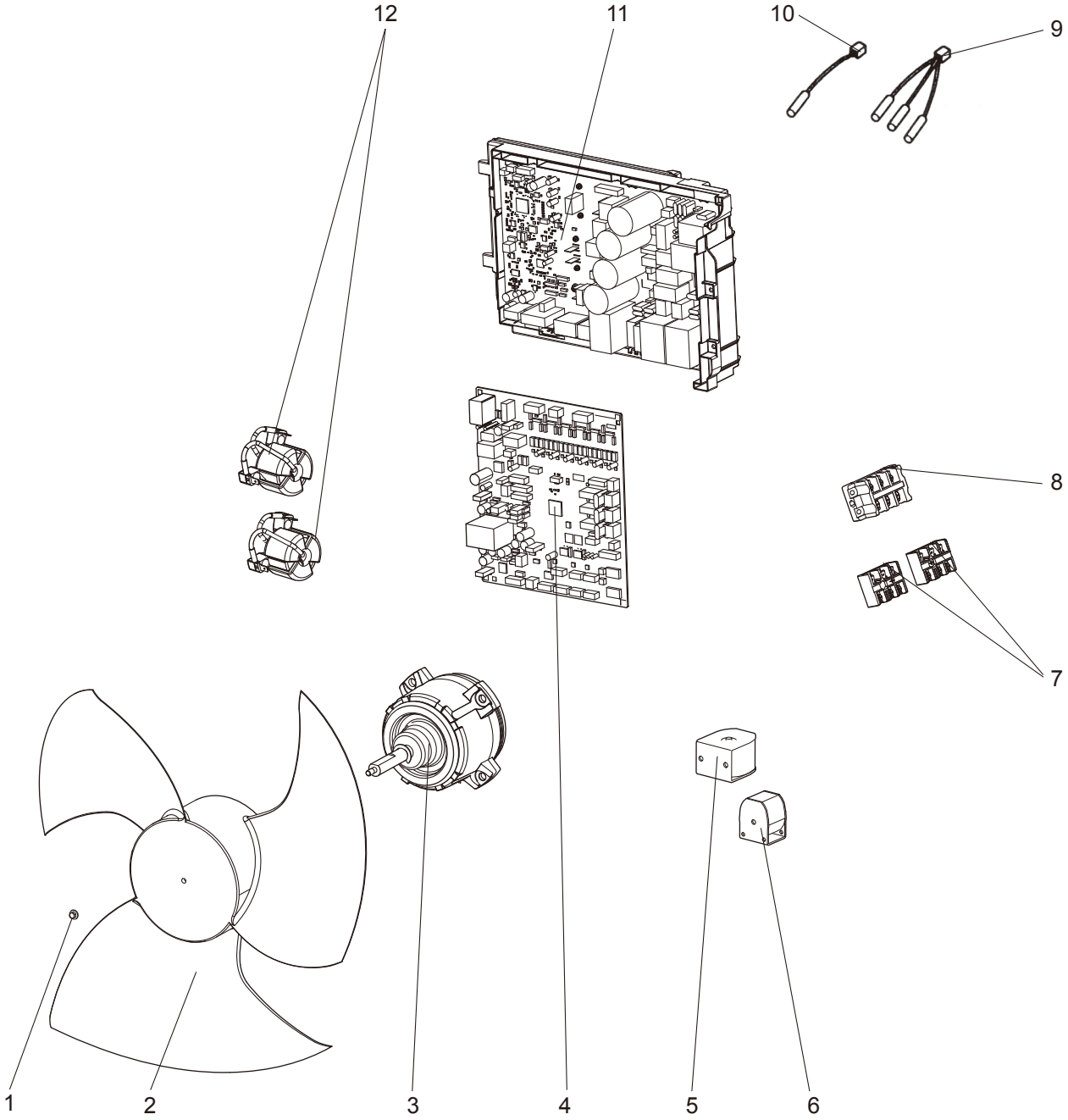
1-11. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Part No.	Part Name	MXZ-2C20NAHZ2-U1	Symbol In Wiring Diagram	Remarks
1	E22 N99 232	FRONT PANEL	1		
2	E27 A15 531	ICE GUARD	1		
3	E27 942 521	GRILLE	1		
4	E22 N99 290	BASE ASSEMBLY	1		
5	E22 N99 900	COMPRESSOR	1	MC	MNB33FBTMC-L
6	E22 267 506	COMPRESSOR RUBBER SET	3		3 RUBBERS SET
7	E22 N99 640	EXPANSION VALVE	1		B room
	E22 P01 493	LEV COIL	1	LEV B	B room
8	E22 N99 640	EXPANSION VALVE	1		A room
	E22 N99 493	LEV COIL	1	LEV A	A room
9	E22 N99 245	SERVICE PANEL	1		
10	E22 P01 009	HANDLE	1		
11	E22 N99 009	HANDLE (BACK)	1		
12	E22 N99 978	CONDUIT PLATE	1		
13	E22 N99 233	BACK PANEL	1		
14	E22 D36 666	UNION (GAS) (ø9.52)	2		ø3/8, A, B room
15	E22 D36 667	UNION (LIQUID) (ø6.35)	2		ø1/4, A, B room
16	E22 N99 661	STOP VALVE (GAS) (ø15.88)	1		ø5/8
17	E22 N99 932	ACCUMULATOR	1		
18	E22 N99 662	STOP VALVE (LIQUID) (ø9.52)	1		ø3/8
19	E22 N99 814	BACK PILLAR	1		
20	E22 N99 641	SERVICE PORT	2		
21	E22 N99 961	4-WAY VALVE	1		
22	E22 W66 646	HIGH PRESSURE SWITCH	1	HPS	4.41 MPa (45.0 kg/cm^2)
23	E22 N99 297	TOP PANEL	1		
24	E22 N99 293	SEPARATOR	1		
25	E22 N99 523	REAR GUARD	1		
26	E22 N99 515	MOTOR SUPPORT	1		
27	E22 N99 630	OUTDOOR HEAT EXCHANGER (TOP)	1		Includes capillary tubes
28	E22 P01 630	OUTDOOR HEAT EXCHANGER (UNDER)	1		Includes capillary tubes
29	E22 N99 526	DEFROST HEATER	1	H	BH70N837H01
30	E22 N99 381	HEATER PROTECTOR	1	26H	
31	E22 N99 086	SIDE PANEL (L)	1		
32	E27 943 009	HANDLE (REAR)	1		
33	E27 942 009	HANDLE (FRONT)	1		
㉞	E22 N99 492	2-WAY SOLENOID VALVE	1		
㉟	E22 939 936	CAPILLARY TUBE (ø4.0 x ø2.8 x 100)	2		O.D. 0.16 x I.D. 0.11 x 3.94
㊱	E22 820 936	CAPILLARY TUBE (ø2.5 x ø0.6 x 1000)	1		O.D. 0.10 x I.D. 0.02 x 39.37

MXZ-2C20NAHZ2

1-12. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



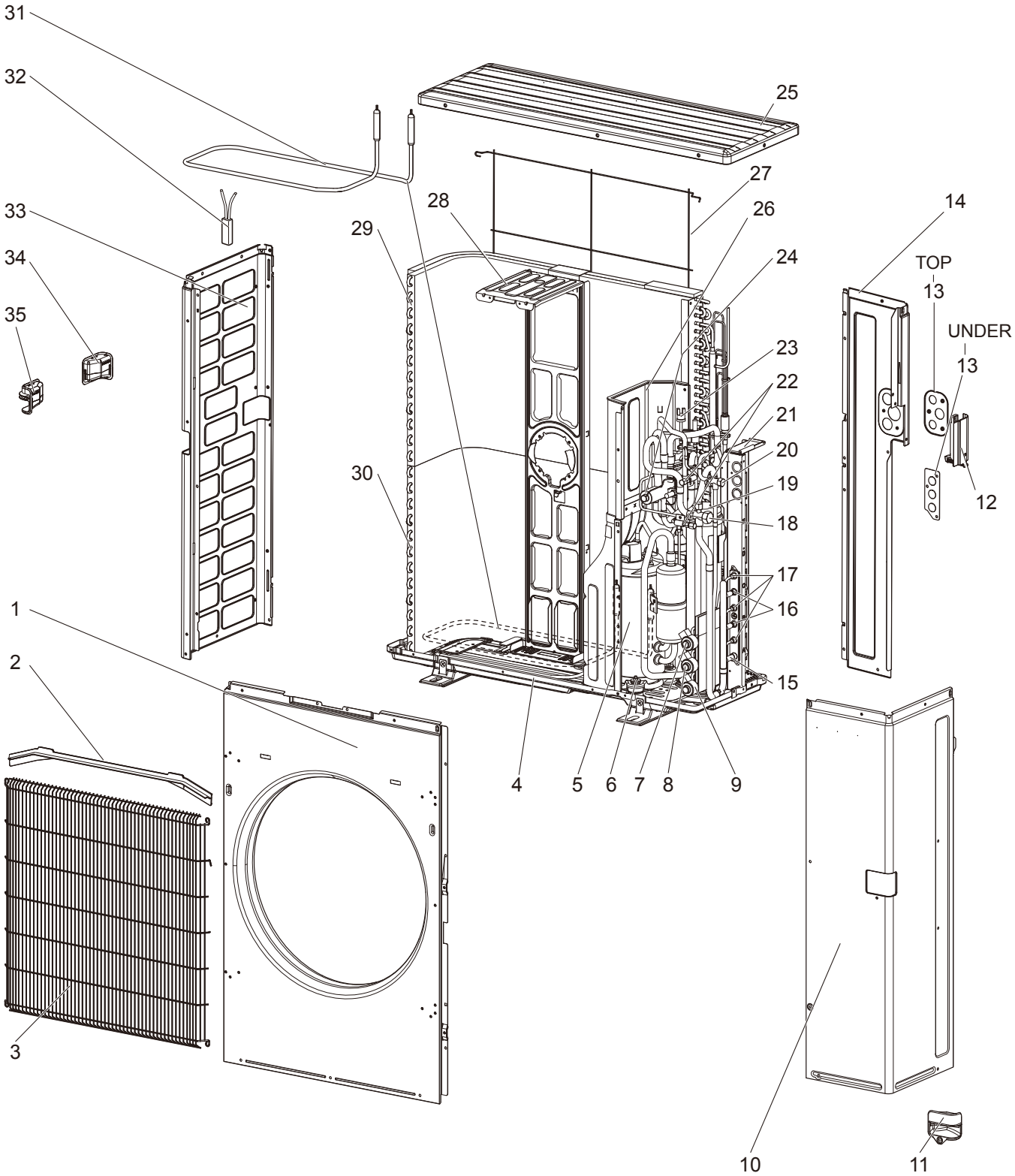
MXZ-2C20NAHZ2
1-12. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

1. The part quantity below indicates the required number of pieces per unit.

No.	Part No.	Part Name	MXZ-2C20NAHZ2-□U1	Symbol In Wiring Diagram	Remarks
1	E27 A15 508	PROPELLER FAN NUT	1		
2	E22 N99 501	PROPELLER FAN	1		
3	E22 W69 301	OUTDOOR FAN MOTOR	1	MF	SIC-88FWJ-D888-□
4	E22 96E 450	OUTDOOR CONTROL P.C. BOARD	1		
5	E22 P01 490	2-WAY VALVE SOLENOID COIL	1	21S2	
6	E22 N99 490	R.V. COIL	1	21S4	
7	E22 C92 375	TERMINAL BLOCK	2	TB2,3	Indoor unit connecting
8	E22 N99 374	TERMINAL BLOCK	1	TB1	Power supply
9	E22 N99 308	THERMISTOR SET	1	RT61, RT62, RT68	DEFROST, DISCHARGE, OUTDOOR HEAT EXCHANGER
10	E22 N99 309	AMBIENT TEMPERATURE THERMISTOR	1	RT65	
11	E22 R55 440	OUTDOOR POWER P.C. BOARD	1		Includes heat sink and RT64
12	E22 N99 337	REACTOR	2	L1,L2	30A 750μH

MXZ-3C24NAHZ MXZ-3C30NAHZ

1-13. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS



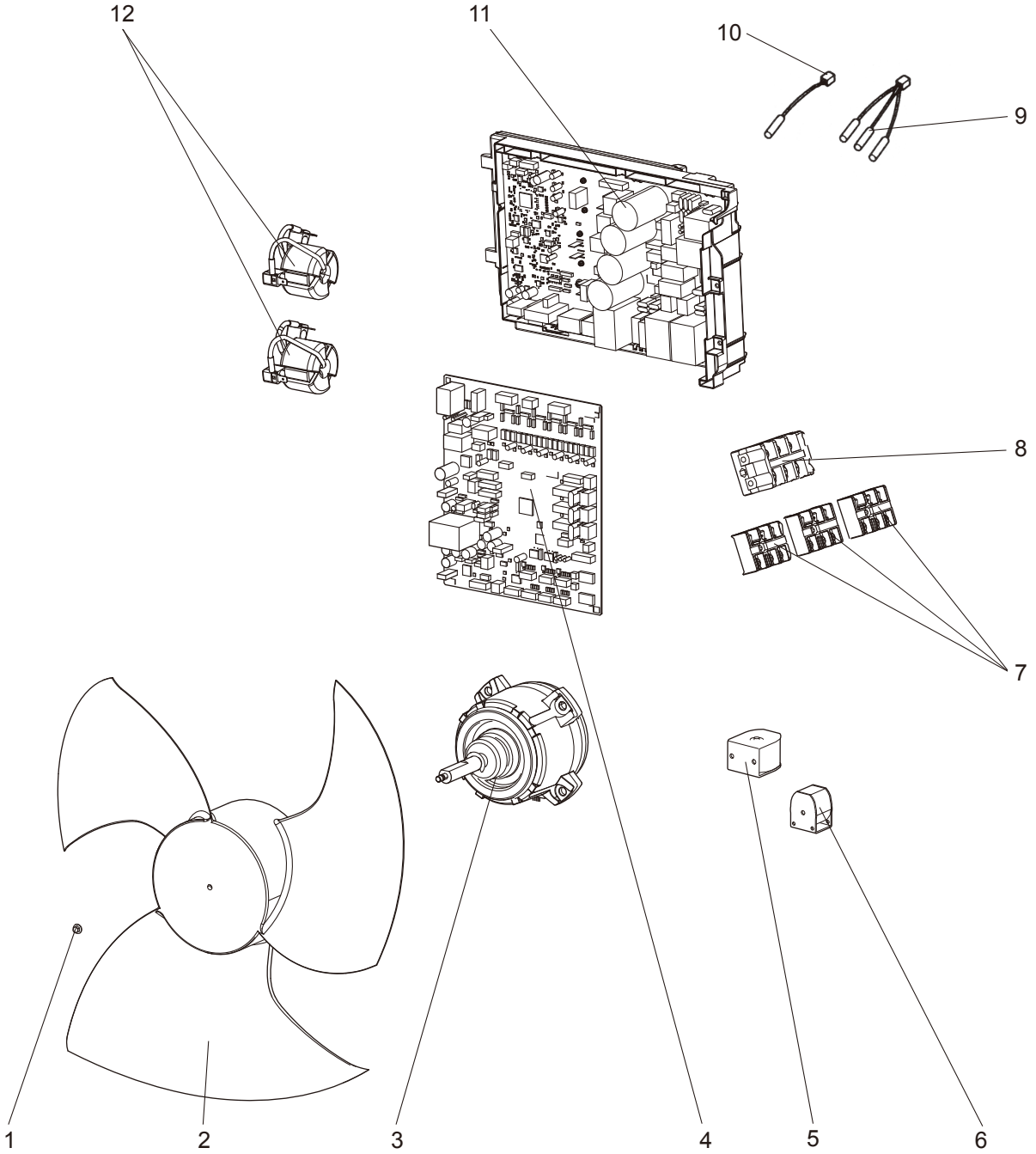
MXZ-3C24NAHZ MXZ-3C30NAHZ
1-13. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Part No.	Part Name	MXZ-3C24NAHZ	MXZ-3C30NAHZ	Symbol In Wiring Diagram	Remarks
1	E22 N99 232	FRONT PANEL	1	1		
2	E27 A15 531	ICE GUARD	1	1		
3	E27 942 521	GRILLE	1	1		
4	E22 N99 290	BASE ASSEMBLY	1	1		
5	E22 N99 900	COMPRESSOR	1	1	MC	MNB33FBTMC-L
6	E22 267 506	COMPRESSOR RUBBER SET	3	3		3 RUBBERS SET
7	E22 N99 640	EXPANSION VALVE	1	1		C room
	E22 P02 493	LEV COIL	1	1	LEV C	C room
8	E22 N99 640	EXPANSION VALVE	1	1		B room
	E22 P01 493	LEV COIL	1	1	LEV B	B room
9	E22 N99 640	EXPANSION VALVE	1	1		A room
	E22 N99 493	LEV COIL	1	1	LEV A	A room
10	E22 N99 245	SERVICE PANEL	1	1		Without LABEL
11	E22 P01 009	HANDLE	1	1		
12	E22 N99 009	HANDLE (BACK)	1	1		
13	E22 N99 978	CONDUIT PLATE (TOP)	1	1		
	E22 P01 978	CONDUIT PLATE (UNDER)	1	1		
14	E22 N99 233	BACK PANEL (OUT)	1	1		
15	E22 D37 666	UNION (GAS) (ø12.7)	1	1		ø1/2, A room
16	E22 D36 666	UNION (GAS) (ø9.52)	2	2		ø3/8, B, C room
17	E22 D36 667	UNION (LIQUID) (ø6.35)	3	3		ø1/4, A, B, C room
18	E22 N99 661	STOP VALVE (GAS) (ø15.88)	1	1		ø5/8
19	E22 N99 932	ACCUMULATOR	1	1		
20	E22 N99 662	STOP VALVE (LIQUID) (ø9.52)	1	1		ø3/8
21	E22 P01 814	BACK PILLAR	1	1		
22	E22 N99 641	SERVICE PORT	2	2		
23	E22 853 646	HIGH PRESSURE SWITCH	1	1	HPS	4.8 MPa (48.9 kg/cm^2)
24	E22 N99 961	4-WAY VALVE	1	1		
25	E22 N99 297	TOP PANEL	1	1		Without LABEL
26	E22 N99 293	SEPARATOR	1	1		
27	E22 N99 523	REAR GUARD	1	1		
28	E22 N99 515	MOTOR SUPPORT	1	1		
29	E22 N99 630	OUTDOOR HEAT EXCHANGER (TOP)	1	1		Includes capillary tubes
30	E22 P01 630	OUTDOOR HEAT EXCHANGER (UNDER)	1	1		Includes capillary tubes
31	E22 N99 526	DEFROST HEATER	1	1	H	
32	E22 N99 381	HEATER PROTECTOR	1	1	26H	
33	E22 N99 086	SIDE PANEL (L)	1	1		
34	E27 943 009	HANDLE (REAR)	1	1		
35	E27 942 009	HANDLE (FRONT)	1	1		
㊱	E22 N99 492	2-WAY SOLENOID VALVE	1	1		
㊲	E22 939 936	CAPILLARY TUBE (ø4.0 x ø2.8 x 100)	3	3		O.D. 0.16 x I.D. 0.11 x 3.94
㊳	E22 820 936	CAPILLARY TUBE (ø2.5 x ø0.6 x 1000)	1	1		O.D. 0.10 x I.D. 0.02 x 39.37

MXZ-3C24NAHZ MXZ-3C30NAHZ

1-14. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



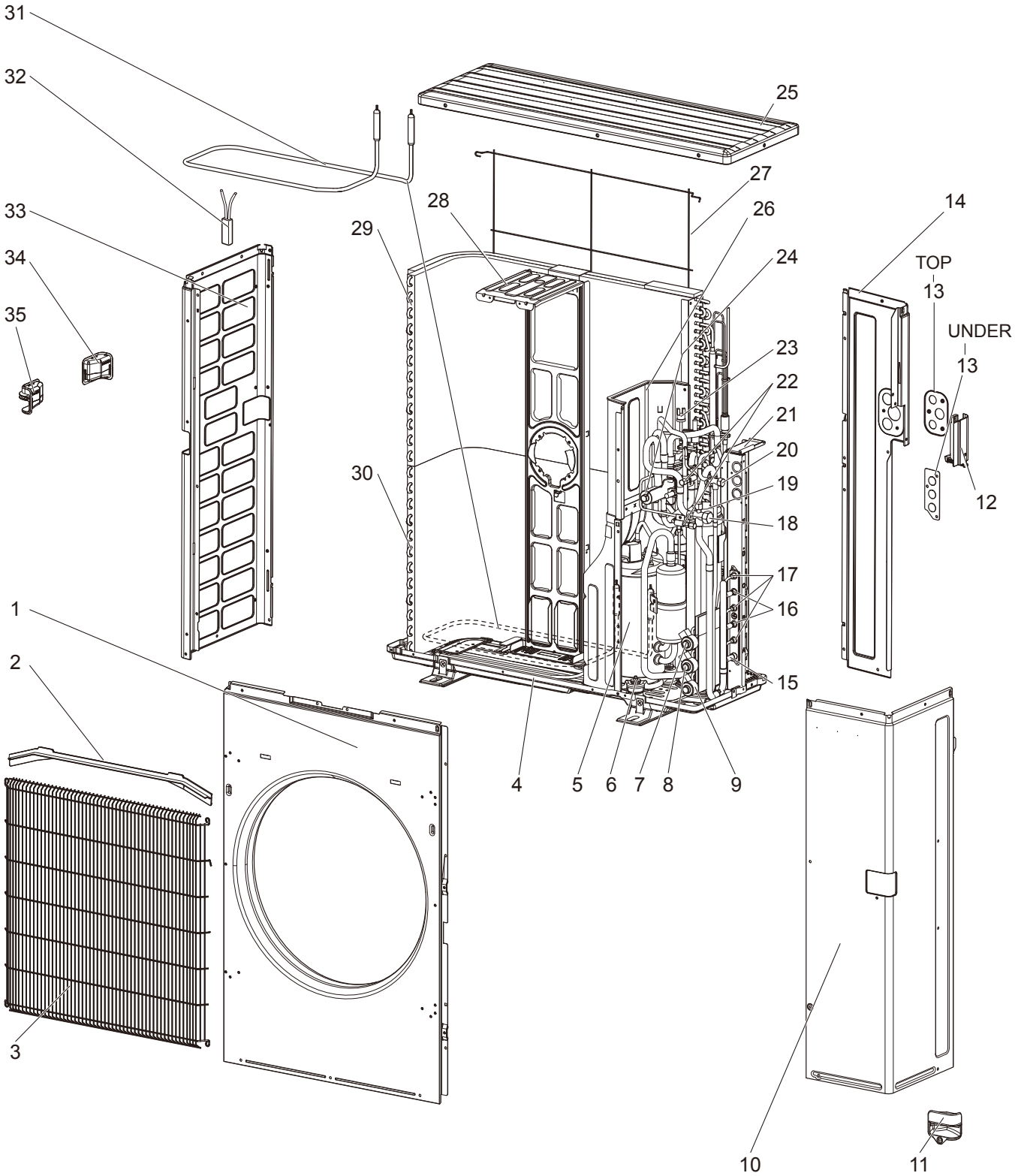
MXZ-3C24NAHZ MXZ-3C30NAHZ
1-14. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

1. The part quantity below indicates the required number of pieces per unit.

No.	Part No.	Part Name	MXZ-3C24NAHZ	MXZ-3C30NAHZ	Symbol In Wiring Diagram	Remarks
1	E27 A15 508	PROPELLER FAN NUT	1	1		
2	E22 N99 501	PROPELLER FAN	1	1		
3	E22 R55 301	OUTDOOR FAN MOTOR	1	1	MF	SIC-81FW-D888-□
4	E22 90H 450	OUTDOOR CONTROL P.C. BOARD	1			
4	E22 91H 450	OUTDOOR CONTROL P.C. BOARD		1		
5	E22 P01 490	2-WAY VALVE SOLENOID COIL	1	1	21S2	
6	E22 N99 490	R.V. COIL	1	1	21S4	
7	E22 C92 375	TERMINAL BLOCK	3	3	TB2,3,4	Indoor unit connecting
8	E22 N99 374	TERMINAL BLOCK	1	1	TB1	Power supply
9	E22 N99 308	THERMISTOR SET	1	1	RT61,62,68	DEFROST, DISCHARGE, OUTDOOR HEAT EXCHANGER
10	E22 N99 309	AMBIENT TEMPERATURE THERMISTOR	1	1	RT65	
11	E22 N99 440	OUTDOOR POWER P.C. BOARD	1	1		Includes heat sink and RT64
12	E22 N99 337	REACTOR	2	2	L1,L2	30A 750μH

MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

1-15. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS



MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

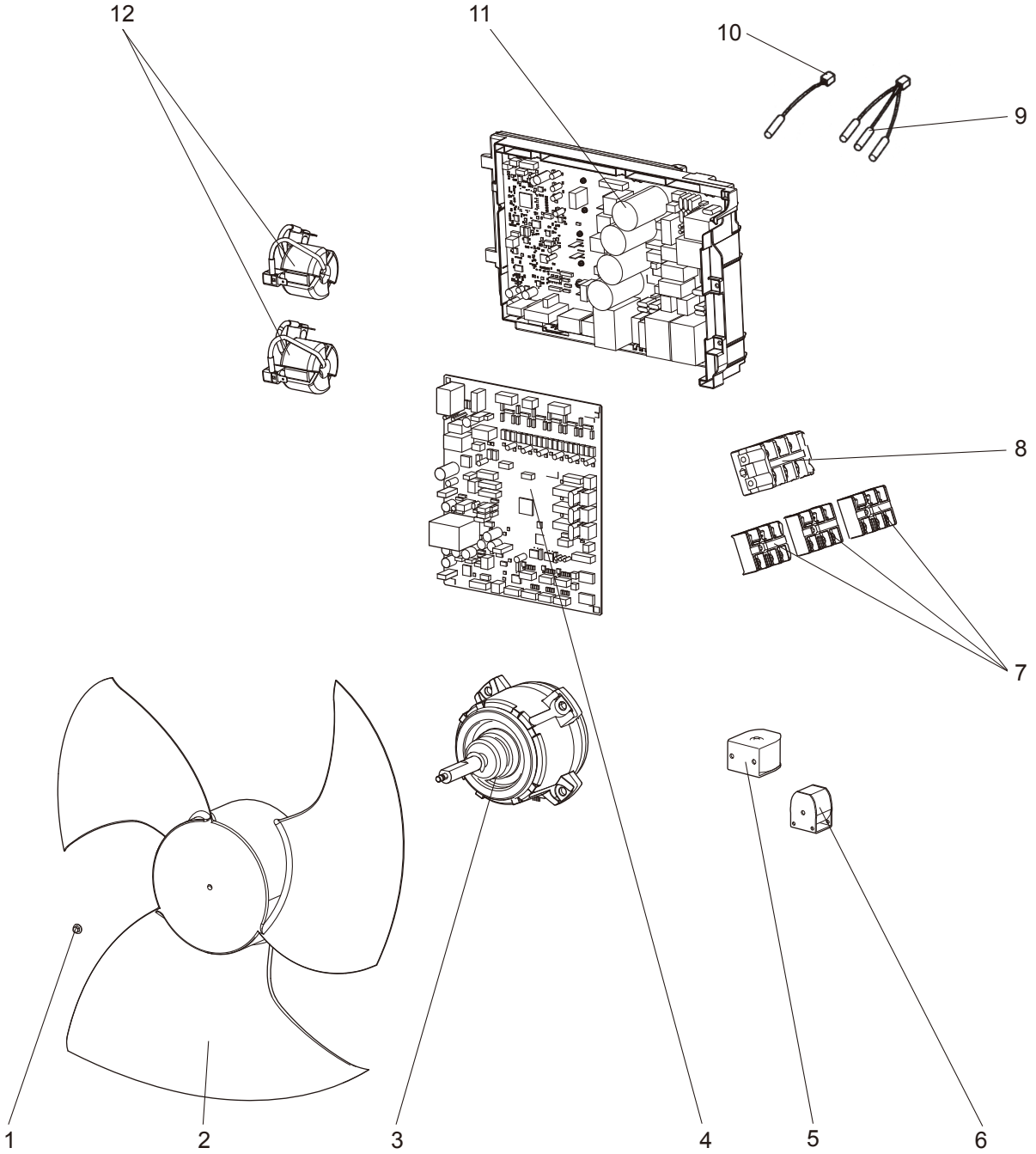
1-15. OUTDOOR UNIT STRUCTURAL PARTS AND FUNCTIONAL PARTS

1. The part quantity below indicates the required number of pieces per unit.
2. The circled No. indicates that the part is not shown in the figure.

No.	Part No.	Part Name	MXZ-3C24NAHZ2-U1	MXZ-3C30NAHZ2-U1	Symbol In Wiring Diagram	Remarks
1	E22 N99 232	FRONT PANEL	1	1		
2	E27 A15 531	ICE GUARD	1	1		
3	E27 942 521	GRILLE	1	1		
4	E22 N99 290	BASE ASSEMBLY	1	1		
5	E22 N99 900	COMPRESSOR	1	1	MC	MNB33FBTMC-L
6	E22 267 506	COMPRESSOR RUBBER SET	3	3		3 RUBBERS SET
7	E22 N99 640	EXPANSION VALVE	1	1		C room
	E22 P02 493	LEV COIL	1	1	LEV C	C room
8	E22 N99 640	EXPANSION VALVE	1	1		B room
	E22 P01 493	LEV COIL	1	1	LEV B	B room
9	E22 N99 640	EXPANSION VALVE	1	1		A room
	E22 N99 493	LEV COIL	1	1	LEV A	A room
10	E22 N99 245	SERVICE PANEL	1	1		Without LABEL
11	E22 P01 009	HANDLE	1	1		
12	E22 N99 009	HANDLE (BACK)	1	1		
13	E22 N99 978	CONDUIT PLATE (TOP)	1	1		
	E22 P01 978	CONDUIT PLATE (UNDER)	1	1		
14	E22 N99 233	BACK PANEL	1	1		
15	E22 D37 666	UNION (GAS) (ø12.7)	1	1		ø1/2, A room
16	E22 D36 666	UNION (GAS) (ø9.52)	2	2		ø3/8, B, C room
17	E22 D36 667	UNION (LIQUID) (ø6.35)	3	3		ø1/4, A, B, C room
18	E22 N99 661	STOP VALVE (GAS) (ø15.88)	1	1		ø5/8
19	E22 N99 932	ACCUMULATOR	1	1		
20	E22 N99 662	STOP VALVE (LIQUID) (ø9.52)	1	1		ø3/8
21	E22 P01 814	BACK PILLAR	1	1		
22	E22 N99 641	SERVICE PORT	2	2		
23	E22 W66 646	HIGH PRESSURE SWITCH	1	1	HPS	4.41 MPa (45.0 kg/cm^2)
24	E22 N99 961	4-WAY VALVE	1	1		
25	E22 N99 297	TOP PANEL	1	1		Without LABEL
26	E22 N99 293	SEPARATOR	1	1		
27	E22 N99 523	REAR GUARD	1	1		
28	E22 N99 515	MOTOR SUPPORT	1	1		
29	E22 N99 630	OUTDOOR HEAT EXCHANGER (TOP)	1	1		Includes capillary tubes
30	E22 P01 630	OUTDOOR HEAT EXCHANGER (UNDER)	1	1		Includes capillary tubes
31	E22 N99 526	DEFROST HEATER	1	1	H	
32	E22 N99 381	HEATER PROTECTOR	1	1	26H	
33	E22 N99 086	SIDE PANEL (L)	1	1		
34	E27 943 009	HANDLE (REAR)	1	1		
35	E27 942 009	HANDLE (FRONT)	1	1		
㊱	E22 N99 492	2-WAY SOLENOID VALVE	1	1		
㊲	E22 939 936	CAPILLARY TUBE (ø4.0 x ø2.8 x 100)	3	3		O.D. 0.16 x I.D. 0.11 x 3.94
㊳	E22 820 936	CAPILLARY TUBE (ø2.5 x ø0.6 x 1000)	1	1		O.D. 0.10 x I.D. 0.02 x 39.37

MXZ-3C24NAHZ2 MXZ-3C30NAHZ2

1-16. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



MXZ-3C24NAHZ2 MXZ-3C30NAHZ2
1-16. OUTDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

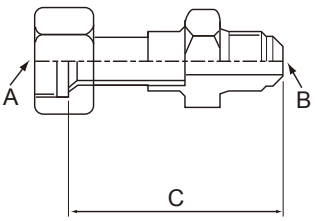
1. The part quantity below indicates the required number of pieces per unit.

No.	Part No.	Part Name	MXZ-3C24NAHZ2-U1	MXZ-3C30NAHZ2-U1	Symbol In Wiring Diagram	Remarks
1	E27 A15 508	PROPELLER FAN NUT	1	1		
2	E22 N99 501	PROPELLER FAN	1	1		
3	E22 W69 301	OUTDOOR FAN MOTOR	1	1	MF	SIC-88FWJ-D888-□
4	E22 97E 450	OUTDOOR CONTROL P.C. BOARD	1			
4	E22 98E 450	OUTDOOR CONTROL P.C. BOARD		1		
5	E22 P01 490	2-WAY VALVE SOLENOID COIL	1	1	21S2	
6	E22 N99 490	R.V. COIL	1	1	21S4	
7	E22 C92 375	TERMINAL BLOCK	3	3	TB2,3,4	Indoor unit connecting
8	E22 N99 374	TERMINAL BLOCK	1	1	TB1	Power supply
9	E22 N99 308	THERMISTOR SET	1	1	RT61,62,68	DEFROST, DISCHARGE, OUTDOOR HEAT EXCHANGER
10	E22 N99 309	AMBIENT TEMPERATURE THERMISTOR	1	1	RT65	
11	E22 R55 440	OUTDOOR POWER P.C. BOARD	1	1		Includes heat sink and RT64
12	E22 N99 337	REACTOR	2	2	L1,L2	30A 750μH

2 OPTIONAL PARTS

2-1. DIFFERENT-DIAMETER PIPE

Unit : inch



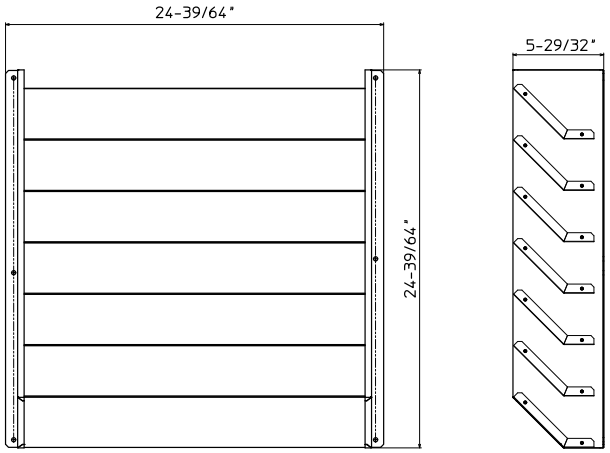
Applied unit	Model name	Connected pipes diameter	Diameter A	Diameter B	Length C
MXZ-3C24NA **MXZ-3C30NA** **MXZ-4C36NA** **MXZ-5C42NA** **MXZ-2C20NAHZ** **MXZ-3C24NAHZ** **MXZ-3C30NAHZ** **MXZ-2C20NA2** **MXZ-3C24NA2** **MXZ-3C30NA2** **MXZ-4C36NA2** **MXZ-5C42NA2** **MXZ-2C20NAHZ2** **MXZ-3C24NAHZ2** **MXZ-3C30NAHZ2**	MAC-A454JP-E	ø3/8 — ø1/2	ø3/8	ø1/2	2.72
	MAC-A455JP-E	ø1/2 — ø3/8	ø1/2	ø3/8	2.56
	MAC-A456JP-E	ø1/2 — ø5/8	ø1/2	ø5/8	2.62
	PAC-493PI	ø1/4 — ø3/8	ø1/4	ø3/8	2.38
	PAC-SG76RJ-E	ø3/8 — ø5/8	ø3/8	ø5/8	4.00

2-2. OUTLET GUIDE

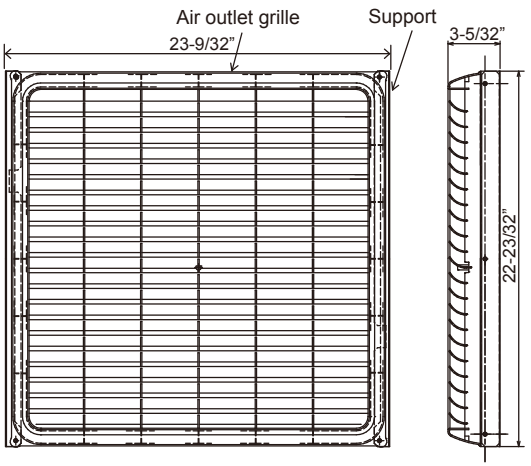
Unit : inch

Changes air discharge direction.

Applied unit	Model name	Model code
MXZ-3C24NA **MXZ-3C30NA** **MXZ-4C36NA** **MXZ-5C42NA** **MXZ-2C20NAHZ** **MXZ-3C24NAHZ** **MXZ-3C30NAHZ** **MXZ-3C24NA2** **MXZ-3C30NA2** **MXZ-4C36NA2** **MXZ-5C42NA2** **MXZ-2C20NAHZ2** **MXZ-3C24NAHZ2** **MXZ-3C30NAHZ2**	PAC-SH96SG-E	7H2N19
MXZ-2C20NA2	MAC-856SG	51H856



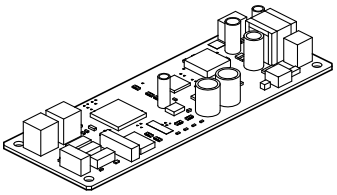
PAC-SH96SG-E



MAC-856SG

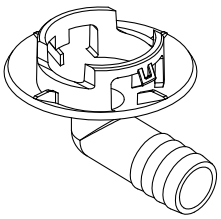
2-3. M-NET ADAPTER

Applied unit	Model name	Model code
MXZ-3C24NA **MXZ-3C30NA** **MXZ-4C36NA** **MXZ-5C42NA** **MXZ-2C20NAHZ** **MXZ-3C24NAHZ** **MXZ-3C30NAHZ** **MXZ-2C20NA2** **MXZ-3C24NA2** **MXZ-3C30NA2** **MXZ-4C36NA2** **MXZ-5C42NA2** **MXZ-2C20NAHZ2** **MXZ-3C24NAHZ2** **MXZ-3C30NAHZ2**	PAC-IF01MNT-E	7H2N34



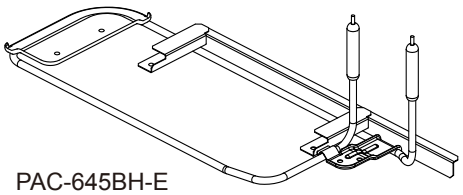
2-4. DRAIN SOCKET

Applied unit	Model name	Model code
MXZ-3C24NA **MXZ-3C30NA** **MXZ-4C36NA** **MXZ-5C42NA** **MXZ-3C24NA2** **MXZ-3C30NA2** **MXZ-4C36NA2** **MXZ-5C42NA2**	PAC-SG60DS-E	7H2N24

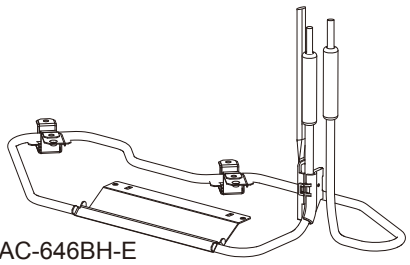


2-5. BASE HEATER

Applied unit	Model name	Model code
MXZ-3C24NA **MXZ-3C30NA** **MXZ-4C36NA** **MXZ-5C42NA** **MXZ-3C24NA2** **MXZ-3C30NA2** **MXZ-4C36NA2** **MXZ-5C42NA2**	PAC-645BH-E	7H2590
MXZ-2C20NA2	PAC-646BH-E	7H2593



PAC-645BH-E



PAC-646BH-E

Components

①	Base heater	1	④	Base heater support (2)	1	⑦	Cable tie	2
②	Heater guard	1	⑤	Clamp	1	⑧	Fastener	2
③	Base heater support (1)	1	⑥	Screw	8	⑨	Spec label	1

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

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Issued: Nov. 2014. No. OBB702 REVISED EDITION-B
Issued: Oct. 2014. No. OBB702 REVISED EDITION-A
Published: Sep. 2014. No. OBB702
Made in Japan

OBB702E

For the residents of USA

U.S. Product Warranty and Registration Information

Congratulations on the purchase of your new Mitsubishi Electric Trane HVAC US Cooling & Heating system and thank you for trusting us with your personal comfort.

Your installing contractor may have registered your products on your behalf. To check the registration status or to complete your product registration, please visit us at http://www.metahvac.com/.
Be sure to have the model and serial number for each of your indoor and outdoor units ready before starting the registration process.

If you need assistance registering your products, call or write to us at:

Mitsubishi Electric Trane HVAC US LLC
ATTN: Customer Care Center
1340 Satellite Boulevard
Suwanee, GA 30024
Phone: 1.800.433.4822
E-mail: CustomerCare@hvac.mea.com

For the residents of Canada

Mitsubishi Electric
HVAC Warranty Registration (Canada)

Congratulations on the purchase of your new Mitsubishi Electric heat pump or air conditioning system.

In order to benefit from our extended warranty, your installing contractor must register your system's products on our website on your behalf within 90 days of installation. The extended warranty covers the system's parts and compressor for an extended period from the date of installation. Product model and serial numbers are required for online registration.

To register, please ask your installing contractor to visit the warranty registration page at www.mitsubishielectricmeq.ca, complete the registration and provide you with confirmation of registration.

If you require assistance, please contact: info@mitsubishielectric.ca

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Mitsubishi Electric
Enregistrement de la garantie HVAC (Canada)

Félicitations pour l'achat de votre nouvelle pompe à chaleur ou système de climatisation Mitsubishi Electric.

Afin de bénéficier de notre garantie prolongée, votre entrepreneur d'installation doit enregistrer les produits de votre système sur notre site Web en votre nom dans les 90 jours suivant l'installation. La garantie prolongée couvre les pièces et le compresseur du système pendant une période prolongée à compter de la date d'installation. Le modèle de produit et les numéros de série sont requis pour l'enregistrement en ligne.

Pour vous inscrire, veuillez demander à votre entrepreneur d'installation de visiter la page d'enregistrement de la garantie à www.mitsubishielectricmeq.ca, de compléter l'inscription et de vous fournir une confirmation d'inscription.

Si vous avez besoin d'aide, veuillez contacter: info@mitsubishielectric.ca

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

JG79A806H05

MITSUBISHI ELECTRIC

Split-type Air-Conditioner

MXZ-2C20NAHZ2
MXZ-3C24NAHZ2
MXZ-3C30NAHZ2
MXZ-5C42NA2

Installation Manual — For INSTALLER — **English**

- This manual only describes the installation of outdoor unit.
  When installing the indoor unit, refer to the installation manual of indoor unit.
  Any structural alterations necessary for installation must comply with local building code requirements.

Notice d'installation — Destinée à l'INSTALLATEUR — **Français**

- Cette notice ne décrit que l'installation de l'appareil extérieur.
  Lors de l'installation de l'appareil intérieur, consultez la notice d'installation de cet appareil.
  Toute altération structurelle requise pour l'installation doit être conforme aux exigences du code du bâtiment local.

Manual de instalación — Para el INSTALADOR — **Español**

- En este manual sólo se describe la instalación de la unidad exterior.
  Para instalar la unidad interior, consulte el manual de instalación de dicha unidad.
  Cualquier modificación estructural necesaria para llevar a cabo la instalación deberá cumplir las normas de edificación locales.

ENGLISH

CONTENTS

Required Tools for Installation

Phillips screwdriver	5/32 in. (4 mm) hexagonal wrench
Level	Flare tool for R410A
Scale	Gauge manifold for R410A
Utility knife or scissors	Vacuum pump for R410A
Torque wrench	Charge hose for R410A
Wrench (or spanner)	Pipe cutter with reamer

1. BEFORE INSTALLATION

1-1. THE FOLLOWING SHOULD ALWAYS BE OBSERVED FOR SAFETY

- Be sure to read "THE FOLLOWING SHOULD ALWAYS BE OBSERVED FOR SAFETY" before installing the air conditioner.
- Be sure to observe the warnings and cautions specified here as they include important items related to safety.
- After reading this manual, be sure to keep it together with the OPERATING INSTRUCTIONS for future reference.

⚠ WARNING (Could lead to death or serious injury, etc.)

- **Do not install the unit by yourself (user).**
  Incomplete installation could cause fire or electric shock, injury due to the unit falling, or leakage of water. Consult the dealer from whom you purchased the unit or a qualified installer.
- **Follow the instructions detailed in the installation manual.**
  Incomplete installation could cause fire or electric shock, injury due to the unit falling, or leakage of water.
- **When installing the unit, use appropriate protective equipment and tools for safety.**
  Failure to do so could cause injury.
- **Install the unit securely in a place that can bear the weight of the unit.**
  If the installation location cannot bear the weight of the unit, the unit could fall causing injury.
- **Perform electrical work according to the installation manual and be sure to use an exclusive circuit. Do not connect other electrical appliances to the circuit.**
  If the capacity of the power circuit is insufficient or there is incomplete electrical work, it could result in a fire or an electric shock.
- **Ground the unit correctly.**
  Do not connect the ground wire to a gas pipe, water pipe, lightning rod or telephone ground. Defective grounding could cause electric shock.
- **Do not damage the wires.**
  Damaged wires could cause fire.
- **Be sure to shut off the main power when setting up the indoor P.C. board or wiring.**
  Failure to do so could cause electric shock.
- **Use the specified wires to securely connect the indoor and outdoor units. Attach the wires firmly to avoid applying stress to the terminal block.**
  Improper connection could cause fire.
- **Do not install the unit in a place where flammable gas may leak.**
  If gas leaks and accumulates around the unit, it could cause an explosion.
- **Do not use intermediate connection of the power cord or the extension cord.Do not connect many devices to one AC outlet.**
  It could cause a fire or an electric shock.
- **Use the parts provided or specified parts for the installation work.**
  The use of defective parts could cause an injury or leakage of water due to a fire, an electric shock, the unit falling, etc.
- **When plugging the power supply plug into the outlet, make sure that there is no dust, blockage, or loose parts both in the outlet and on the plug. Verify that the power supply plug is completely in the outlet.**
  If there is dust, blockage, or loose parts on the power supply plug or the outlet, it could cause electric shock or fire. If loose parts are found on the power supply plug, replace it.
- **Securely attach the electrical cover to the indoor unit and the service panel to the outdoor unit.**
  If the electrical cover of the indoor unit and/or the service panel of the outdoor unit are not attached securely, dust, water, etc. could collect in the unit and could cause a fire or an electric shock.
- **When installing, relocating, or servicing the unit, make sure that no substance other than the specified refrigerant (R410A) enters the refrigerant circuit.**
  Any presence of foreign substance such as air can cause abnormal pressure rise and may result in explosion or injury. The use of any refrigerant other than that specified for the system will cause mechanical failure, system malfunction, or unit breakdown. In the worst case, this could lead to a serious impediment to securing product safety.
- **Do not discharge the refrigerant into the atmosphere. Check that the refrigerant gas does not leak after installation has been completed. If refrigerant leaks during installation, ventilate the room.**
  If refrigerant comes in contact with a fire, harmful gas could be generated.
  If refrigerant gas leaks indoors, and comes into contact with the flame of a fan heater, space heater, stove, etc., harmful gases will be generated.
- **Use appropriate tools and piping materials for installation.**
  The pressure of R410A is 1.6 times higher than R22. Not using the appropriate tools and materials, or improper installation could cause the pipes to burst causing an injury.
- **When pumping down the refrigerant, stop the compressor before disconnecting the refrigerant pipes.**
  If the refrigerant pipes are disconnected while the compressor is running and the stop valve is open, air could be drawn in and the pressure in the refrigeration cycle could become abnormally high, causing the pipes to burst.
- **When installing the unit, securely connect the refrigerant pipes before starting the compressor.**
  If the compressor is started before the refrigerant pipes are connected and the stop valve is open, air could be drawn in and the pressure in the refrigeration cycle could become abnormally high, causing the pipes to burst.
- **Fasten a flare nut with a torque wrench as specified in this manual.**
  If fastened too tight, a flare nut could break and cause refrigerant leakage.
- **Install the unit according to national wiring regulations.**
- **Be sure to install a Ground Fault Interrupt (GFI) circuit breaker.**
  Failure to install a Ground Fault Interrupt (GFI) circuit breaker may result in electric shock or fire.

⚠ CAUTION (Could lead to serious injury when operated incorrectly.)

- **Perform the drainage/piping work securely according to the installation manual.**
  If there is defect in the drainage/piping work, water could drip from the unit, and damage household items.
- **Do not touch the air inlet or the aluminum fins of the outdoor unit.**
  This could cause injury.
- **Do not install the outdoor unit where small animals may live.**
  If small animals enter the unit and damage its electrical parts, it could cause a malfunction, smoke emission, or fire. Keep the area around the unit clean.

1-2. SPECIFICATIONS

Model	Power supply		Pipe length and height difference *1, *2, *3, *4, *5, *6, *8			
	Rated Voltage	Frequency	Max. pipe length per indoor unit / for multi-system	Max. height difference	Max. no. of bends per indoor unit / for multi system	Refrigerant adjustment A *7
MXZ-2C20NAHZ2	208 / 230 V	60 Hz	82 ft. (25 m) / 164 ft. (50 m)	49 ft. (15 m)	25 / 50	1.08 oz each 5 ft. (20 g/m)
MXZ-3C24NAHZ2 MXZ-3C30NAHZ2			82 ft. (25 m) / 230 ft. (70 m)		25 / 70	
MXZ-5C42NA2			82 ft. (25 m) / 262 ft. (80 m)		25 / 80	

*1 Never use pipes with thickness less than specified. The pressure resistance will be insufficient.
*2 Use a copper pipe or a copper-alloy seamless pipe.
*3 Be careful not to crush or bend the pipe during pipe bending.
*4 Refrigerant pipe bending radius must be 4 in. (100 mm) or more.
*5 Insulation material : Heat resisting foam plastic 0.045 specific gravity
*6 Be sure to use the insulation of specified thickness. Excessive thickness may cause incorrect installation of the indoor unit and insufficient thickness may cause dew drippage.
*7 If pipe length exceeds 98 ft. (30 m), additional refrigerant (R410A) charge is required. (No additional charge is required for pipe length less than 98 ft. (30 m).)

$$\text{Additional refrigerant (ft.)} = A \times \frac{(\text{pipe length (ft.)} - 98)}{5}$$

Additional refrigerant (m) = A × (pipe length (m) - 30)

*8 The piping specification table does not provide a minimum line set length. However, indoor units with connected piping length less than 10 ft. (3m) could produce intermittent noise during normal system operation in very quiet environments. Please be aware of this important information when installing and locating the indoor unit within the conditioned space.

1-3. SELECTING OPTIONAL DIFFERENT-DIAMETER JOINTS

If the diameter of connection pipe does not match the port size of outdoor unit, use optional different-diameter joints according to the following table.

(Unit: inch (mm))

Port size of outdoor unit				Optional different-diameter joints (port size of outdoor unit → diameter of connection pipe)
MXZ-2C	MXZ-3C	MXZ-5C	Liquid / Gas	1/4 (6.35) → 3/8 (9.52) : PAC-493PI 3/8 (9.52) → 1/2 (12.7) : MAC-A454JP-E 3/8 (9.52) → 5/8 (15.88) : PAC-SG76RJ-E 1/2 (12.7) → 3/8 (9.52) : MAC-A455JP-E 1/2 (12.7) → 5/8 (15.88) : MAC-A456JP-E Refer to the installation manual of indoor unit for the diameter of connection pipe of indoor unit.
–	A UNIT	A UNIT	1/4 (6.35) / 1/2 (12.7)	
A, B UNIT	B - C UNIT	B - E UNIT	1/4 (6.35) / 3/8 (9.52)	

1-4. SELECTING THE INSTALLATION LOCATION

- Where it is not exposed to strong wind. If the outdoor unit is exposed to a wind during defrosting, the defrosting time will be longer.
- Where airflow is good and dustless.
- Where rain or direct sunshine can be avoided as much as possible.
- Where neighbours are not annoyed by operation sound or hot (or cool) air.
- Where rigid wall or support is available to prevent the increase of operation sound or vibration.
- Where there is no risk of combustible gas leakage.
- When installing the unit, be sure to secure the unit legs.
- Where it is at least 10 ft. (3 m) away from the antenna of TV set or radio. Operation of the air conditioner may interfere with radio or TV reception in areas where reception is weak. An amplifier may be required for the affected device.
- Install the unit horizontally.
- Please install it in an area not affected by snowfall or blowing snow. In areas with heavy snow, please install a canopy, a pedestal and/or some baffle boards.

Note:
It is advisable to make a piping loop near outdoor unit so as to reduce vibration transmitted from there.

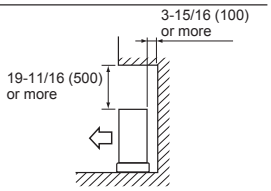
Note:
When operating the air conditioner in low outside temperature, be sure to follow the instructions described below.
- Never install the outdoor unit in a place where its air inlet/outlet side may be exposed directly to wind.
- To prevent exposure to wind, install the outdoor unit with its air inlet side facing the wall.
- To prevent exposure to wind, it is recommended to install a baffle board on the air outlet side of the outdoor unit.

Avoid the following places for installation where air conditioner trouble is liable to occur.
- Where flammable gas could leak.
- Where there is much machine oil.
- Salty places such as the seaside.
- Where sulfide gas is generated such as hot spring, sewage, waste water.
- Where there is high-frequency or wireless equipment.
- Where there is emission of high levels of VOCs, including phthalate compounds, formaldehyde, etc., which may cause chemical cracking.

FREE SPACE REQUIRED AROUND OUTDOOR UNIT

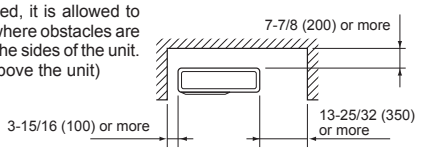
1. Obstacles above

When there is no obstacle in front and on the sides of the unit, it is allowed to install the unit where an obstacle is above the unit only if the space shown in the figure is provided.



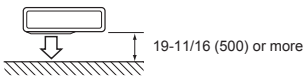
2. Front (blowing) side open

As long as space indicated in the figure is provided, it is allowed to install the unit where obstacles are behind and on the sides of the unit. (No obstacle above the unit)



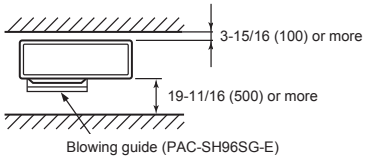
3. Obstacles in front (blowing) only

When there is an obstacle in front of the unit as shown in the figure, open space above, behind, and on the sides of the unit is required.



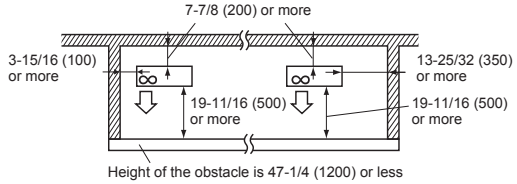
4. Obstacles in front and behind

The unit can be used by attaching an optional outdoor blowing guide (PAC-SH96SG-E) (but both sides and top are open).



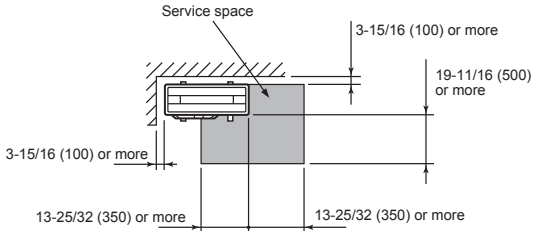
5. Obstacles in front, behind and on side(s)

- When installing the unit in an area that is enclosed with walls such as a verandah, be sure to have enough space as shown below.
  In this case, the air conditioning capacity and power consumption might deteriorate.
- When installing two or more units, do not install the units in front or behind each other.



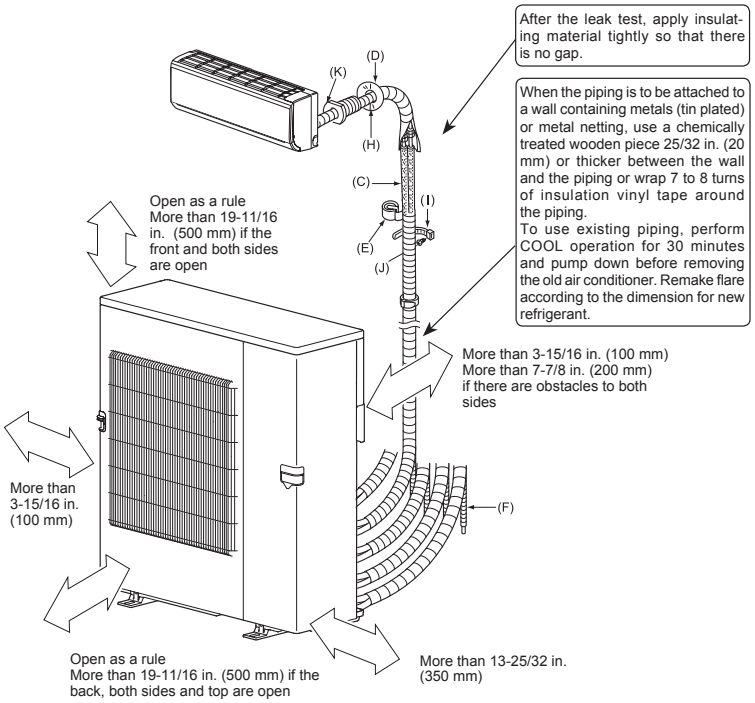
6. Service space

Provide space for service and maintenance as shown in the figure.



(Unit: inch (mm))

1-5. INSTALLATION DIAGRAM



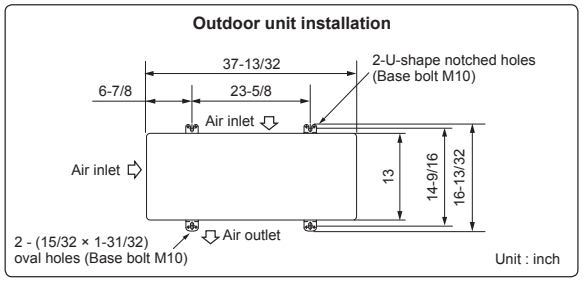
PARTS TO BE PROVIDED AT YOUR SITE

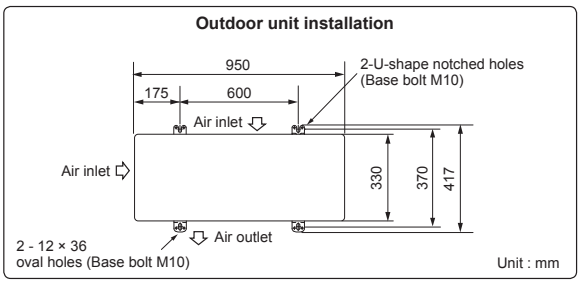
(A)	Power supply cord*	1
(B)	Indoor/outdoor unit connecting wire*	1
(C)	Extension pipe	1
(D)	Wall hole cover	1
(E)	Piping tape	1
(F)	Extension drain hose (or soft PVC hose, 19/32 in. (15 mm) inner diameter or hard PVC pipe VP16)	1
(G)	Refrigeration oil	Little amount
(H)	Putty	1
(I)	Pipe fixing band	2 to 7
(J)	Fixing screw for (I)	2 to 7
(K)	Wall hole sleeve	1

*** Note:**
Place indoor/outdoor unit connecting wire (B) and power supply cord (A) at least 3 ft. (1 m) away from the TV antenna wire.

The "Q'ty" for (B) to (K) in the above table is quantity to be used per indoor unit.

Units should be installed by licensed contractor according to local code requirements.

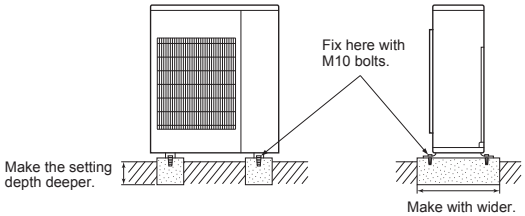


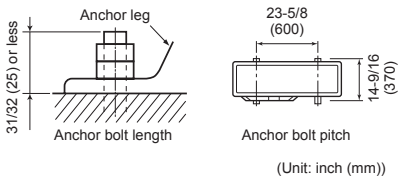


2. OUTDOOR UNIT INSTALLATION

2-1. INSTALLING THE UNIT

- Be sure to fix the unit's legs with bolts when installing it.
- Be sure to install the unit firmly to ensure that it does not fall by an earthquake or a gust.
- Refer to the figure in the right for concrete foundation.
- In case of MXZ-2C20NAHZ2, MXZ-3C24/30NAHZ2, do not use the drain socket and the drain caps.
- In case of MXZ-5C42NA2, do not use the drain socket and the drain caps in the cold region. Drain may freeze and it makes the fan stop.





2-2. CONNECTING WIRES FOR OUTDOOR UNIT

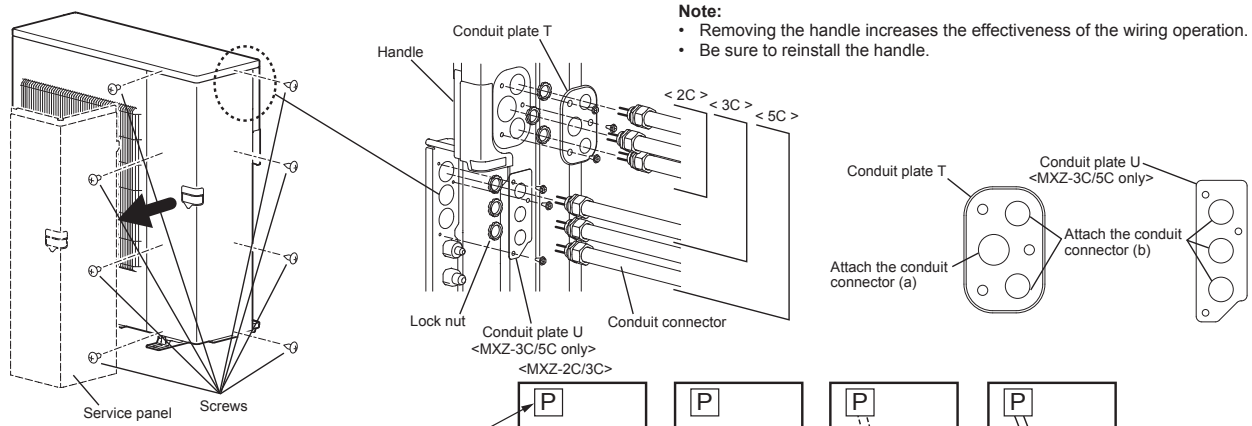
- Be sure to use special circuits for room air conditioner.
- Wiring work should be based on applicable technical standards.
- Wiring connections should be made following the diagram.
- Screws should be tightened so they won't loosen.

1) Remove the service panel.
2) Remove the conduit plate.
3) Attach the conduit connector to conduit plate with lock nut then secure it to the unit with screws. Be sure to attach the conduit connectors in the correct locations according to their sizes.
4) Connect ground wires to the TB bed.
5) Loosen terminal screw, and connect indoor/outdoor unit connecting wire (B) from the indoor unit correctly on the terminal block. Be careful not to make mis-wiring. Fix the wire to the terminal block securely so that no part of its core is appeared, and no external force is conveyed to the connecting section of the terminal block.
6) Firmly tighten the terminal screws to prevent them from loosening. After tightening, pull the wires lightly to confirm that they do not move.
7) Perform 5) and 6) for each indoor unit.
8) Connect power supply cord (A).
9) Close the service panel securely. Make sure that 3-2. PIPE CONNECTION is completed.

ELECTRICAL SPECIFICATIONS					
OUTDOOR UNIT		MXZ-2C20NAHZ2	MXZ-3C24NAHZ2	MXZ-3C30NAHZ2	MXZ-5C42NA2
Power supply (V, PHASE, Hz)		208/230, 1, 60			
Max. Fuse size (time delay) (A)		40			
Min. Circuit Ampacity (A)		28.9	29.9	29.9	31.9
Fan motor (F.L.A)		1.90			
Com-pressor	(R.L.A)	20			
	(L.R.A)	28.8			
Control voltage		Indoor unit-Remote controller : (Wireless) Indoor unit-Outdoor unit : DC 12-24 V			

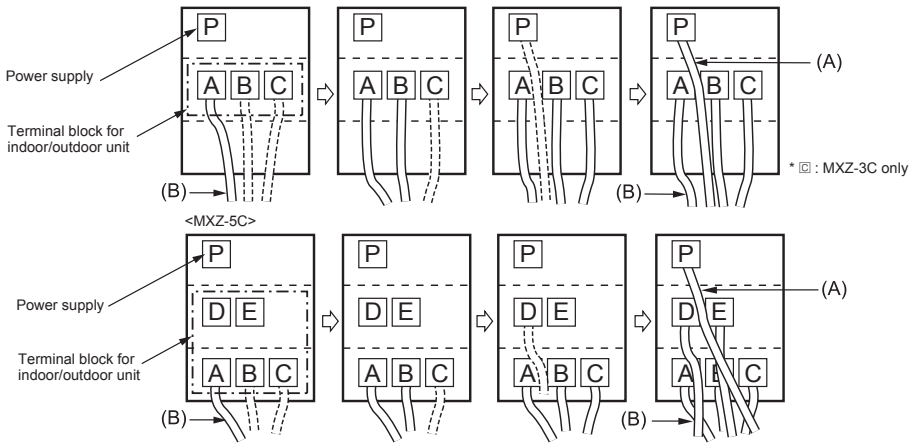
Conduit connector		Trade size of conduit
(a)	Power supply	3/4 in.
(b)	Indoor/outdoor	1/2 in.

Note:
- Removing the handle increases the effectiveness of the wiring operation.
- Be sure to reinstall the handle.

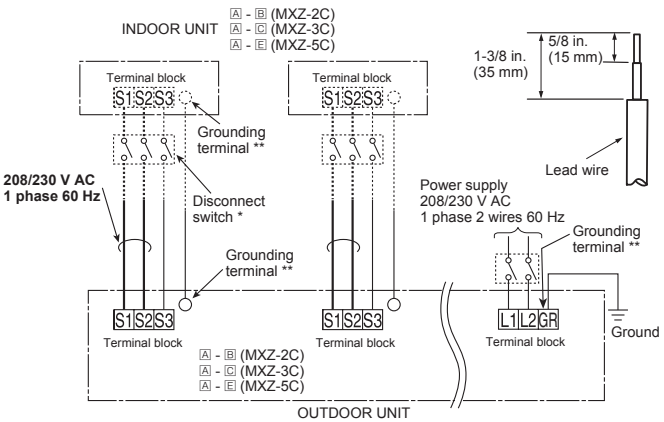


Connecting order
- Connect the terminal block in following order.

MXZ-2C	A→B→P
MXZ-3C	A→B→C→P
MXZ-5C	A→B→C→D→E→P



Remark:
* A disconnect switch should be required. Check the local code.
** Use a ring tongue terminal in order to connect a ground wire to terminal.



- **Connect wires to the matching numbers of terminals.**
- **Be sure to attach each screw to its correspondent terminal when securing the cord and/or the wire to the terminal block.**

CONNECTING WIRES AND CONNECTING GROUND WIRE
- Use solid conductor Min. AWG14 or stranded conductor Min. AWG14.
- Use double insulated copper wire with 600 V insulation.
- Use copper conductors only.
- * **Follow local electrical code.**

POWER SUPPLY CABLE
- Use solid or stranded conductor Min. AWG8.
- Use copper conductors only.
- * **Follow local electrical code.**

GROUND WIRE
- Use solid or stranded conductor Min. AWG8.
- Use copper conductors only.
- * **Follow local electrical code.**

⚠ **WARNING:**
- **Use the indoor/outdoor unit connecting wire that meets the Standards to connect the indoor and outdoor units and fix the wire to the terminal block securely so that no external force is conveyed to the connecting section of the terminal block. An incomplete connection or fixing of the wire could result in a fire.**

For future servicing, give extra length to the connecting wires.

- **Turn on the main power when the ambient temperature is -4°F (-20°C) or higher.**
- **Under conditions of -4°F (-20°C), it needs at least 4hr stand by before the units operate in order to warm the electrical parts.**

3. FLARING WORK AND PIPE CONNECTION

3-1. FLARING WORK

1) Cut the copper pipe correctly with pipe cutter. (Fig. 1, 2)
2) Completely remove all burrs from the cut cross section of pipe. (Fig. 3)
   • Aim the copper pipe downward while removing burrs to prevent burrs from dropping in the pipe.
3) Remove flare nuts attached to indoor and outdoor units, then put them on pipe having completed burr removal. (Not possible to put them on after flaring work.)
4) Flaring work (Fig. 4, 5). Firmly hold copper pipe in the dimension shown in the table. Select A inch (mm) from the table according to the tool selected.
5) Check
   • Compare the flared work with Fig. 6.
   • If flare is noted to be defective, cut off the flared section and do flaring work again.

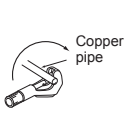


Fig. 1

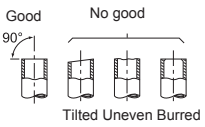


Fig. 2

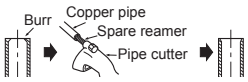


Fig. 3

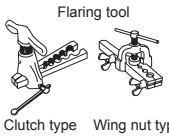


Fig. 4

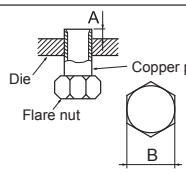


Fig. 5

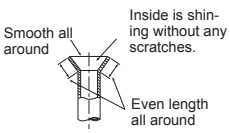


Fig. 6

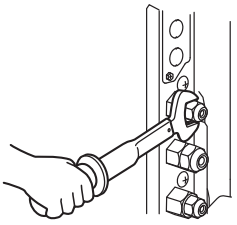
Pipe diameter [inch (mm)]	B [inch (mm)]	A [inch (mm)]			Tightening torque		
		Clutch type tool for R410A	Clutch type tool for R22	Wing nut type tool for R22	ft-lb	N•m	kgf•cm
1/4 (ø6.35)	21/32 (17)	0 to 0.02 (0 to 0.5)	0.04 to 0.06 (1.0 to 1.5)	0.06 to 0.08 (1.5 to 2.0)	10 to 13	13.7 to 17.7	140 to 180
3/8 (ø9.52)	7/8 (22)				25 to 30	34.3 to 41.2	350 to 420
1/2 (ø12.7)	1-1/32 (26)			0.08 to 1.0 (2.0 to 2.5)	36 to 42	49.0 to 56.4	500 to 575
5/8 (ø15.88)	1-5/32 (29)				54 to 58	73.5 to 78.4	750 to 800

3-2. PIPE CONNECTION

1) Apply a thin coat of refrigeration oil (G) to the flared ends of the pipes and the pipe connections of the outdoor unit.
2) Align the center of the pipe with that of the pipe connections of the outdoor unit, then hand tighten the flare nut 3 to 4 turns.
3) Tighten the flare nut with a torque wrench as specified in the table.
   • Over-tightening may cause damage to the flare nut, resulting in refrigerant leakage.
   • Be sure to wrap insulation around the piping. Direct contact with the bare piping may result in burns or frostbite.

⚠ WARNING

When installing the unit, securely connect the refrigerant pipes before starting the compressor.



3-3. INSULATION AND TAPING

1) Cover piping joints with pipe cover.
2) For outdoor unit side, surely insulate every piping including valves.
3) Using piping tape (E), apply taping starting from the entry of outdoor unit.
   • Stop the end of piping tape (E) with tape (with adhesive agent attached).
   • When piping have to be arranged through above ceiling, closet or where the temperature and humidity are high, wind additional commercially sold insulation to prevent condensation.

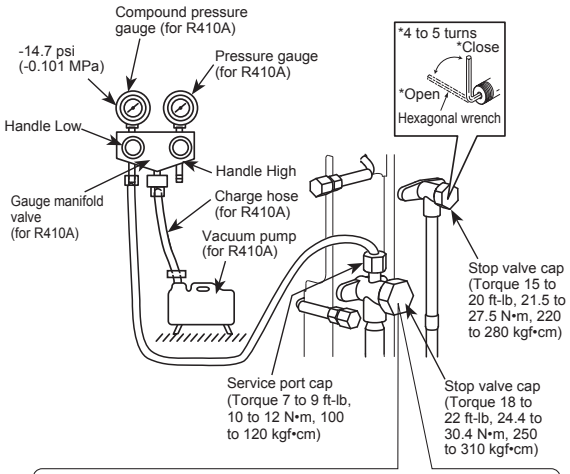
⚠ CAUTION

When there are the ports which are not used, make sure their nuts are tightened securely.

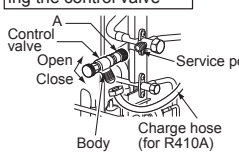
4. PURGING PROCEDURES, LEAK TEST, AND TEST RUN

4-1. PURGING PROCEDURES AND LEAK TEST

1) Remove service port cap of stop valve on the side of the outdoor unit gas pipe. (The stop valves are fully closed and covered in caps in their initial state.)
2) Connect gauge manifold valve and vacuum pump to service port of stop valve on the side of the outdoor unit gas pipe.
3) Run the vacuum pump. (Vacuumize for more than 15 minutes.)
4) Check the vacuum with gauge manifold valve, then close gauge manifold valve, and stop the vacuum pump.
5) Leave as it is for one or two minutes. Make sure the pointer of gauge manifold valve remains in the same position. Confirm that pressure gauge shows -14.7 psi [Gauge] (-0.101 MPa).
6) Remove gauge manifold valve quickly from service port of stop valve.
7) Fully open all stop valves on the gas pipe and the liquid pipe. Operating without fully opening lowers the performance and this causes trouble.
8) Refer to 1-2., and charge the prescribed amount of refrigerant if needed. Be sure to charge slowly with liquid refrigerant. Otherwise, composition of the refrigerant in the system may be changed and affect performance of the air conditioner.
9) Tighten cap of service port to obtain the initial status.
10) Leak test



Precautions when using the control valve



When attaching the control valve to the service port, valve core may deform or loosen if excess pressure is applied. This may cause gas leak.

When attaching the control valve to the service port, make sure that the valve core is in closed position, and then tighten part A. Do not tighten part A or turn the body when valve core is in open position.

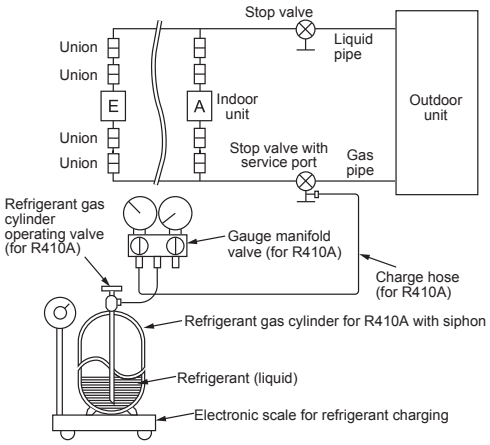
4-2. GAS CHARGE

Perform gas charge to unit.
1) Connect gas cylinder to the service port of stop valve.
2) Perform air purge of the pipe (or hose) coming from refrigerant gas cylinder.
3) Replenish specified amount of the refrigerant, while operating the air conditioner for cooling.

Note:
In case of adding refrigerant, comply with the quantity specified for the refrigerating cycle.

CAUTION:
When charging the refrigerant system with additional refrigerant, be sure to use liquid refrigerant. Adding gas refrigerant may change the composition of the refrigerant in the system and affect normal operation of the air conditioner. Also, charge the liquid refrigerant slowly, otherwise the compressor will be locked.
To maintain the high pressure of the gas cylinder, warm the gas cylinder with warm water (under 104°F (40°C)) during cold season. But never use naked fire or steam.

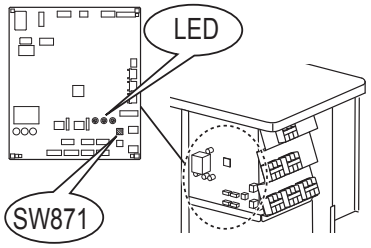
Model	Indoor unit
MXZ-2C	A – B
MXZ-3C	A – C
MXZ-5C	A – E



4-3. TEST RUN

Be sure to also check the following.
The outdoor unit is not faulty. When the outdoor unit fails, LED outdoor unit control panel blinks.
Both the gas and liquid stop valves are completely open.

- Test runs of the indoor units should be performed individually. See the installation manual coming with the indoor unit, and make sure all the units operate properly.
- If the test run with all the units is performed at once, possible erroneous connections of the refrigerant pipes and the indoor/outdoor unit connecting wires cannot be detected. Thus, be sure to perform the test run one by one.



About the restart protective mechanism
Once the compressor stops, the restart preventive device operates so the compressor will not operate for 3 minutes to protect the air conditioner.

Wiring/piping correction function
This unit has a wiring/piping correction function which corrects wiring and piping combination. When there is possibility of incorrect wiring and piping combination, and confirming the combination is difficult, use this function to detect and correct the combination by following the procedures below.

Make sure that the following is done.
- Power is supplied to the unit.
- Stop valves are open.

Note:
During detection, the operation of the indoor unit is controlled by the outdoor unit. During detection, the indoor unit automatically stops operation. This is not a malfunction.

Procedure
Press the piping/wiring correction switch (SW871) 1 minute or more after turning on the power supply.

- Correction completes in 10 to 20 minutes. When the correction is completed, its result is shown by LED indication. Details are described in the following table.
- To cancel this function during its operation, press the piping/wiring correction switch (SW871) again.
- When the correction completed without error, do not press the piping/wiring correction switch (SW871) again.

When the result was “cannot be corrected”, press the piping/wiring correction switch (SW871) again to cancel this function. Then, confirm the wiring and piping combination in a conventional manner by operating the indoor units one by one.

- The operation is done while the power is supplied. Make sure not to contact parts other than the switch, including the P.C. board. This may cause electric shock or burn by hot parts and live parts around the switch. Contacting the live parts may cause P.C. board damage.
- To prevent electronic control P.C. board damage, make sure to perform static elimination before operating this function.

- This function does not operate when the outside temperature is 32°F (0°C) or below.

LED indication during detection:

LED1 (Red)	LED2 (Yellow)	LED3 (Green)
Lighted	Lighted	Once

Result of piping/wiring correction function

LED1 (Red)	LED2 (Yellow)	LED3 (Green)	Result
Lighted	Not lighted	Lighted	Completed (Problem corrected or normal)
Once	Once	Once	Not completed (Detection failed)
Other indications			Refer to “SAFETY PRECAUTIONS WHEN LED BLINKS” located behind the service panel.

4-4. EXPLANATION TO THE USER

- Using the OPERATING INSTRUCTIONS, explain to the user how to use the air conditioner (how to use the remote controller, how to remove the air filters, how to remove or put the remote controller in the remote controller holder, how to clean, precautions for operation, etc.).
- Recommend the user to read the OPERATING INSTRUCTIONS carefully.

5. PUMPING DOWN

When relocating or disposing of the air conditioner, pump down the system following the procedure below so that no refrigerant is released into the atmosphere.

1) Turn off the breaker.
2) Connect the gauge manifold valve to the service port of the stop valve on the gas pipe side of the outdoor unit.
3) Fully close the stop valve on the liquid pipe side of the outdoor unit.
4) Turn on the breaker.
5) Start the emergency COOL operation on all the indoor units.
6) When the pressure gauge shows 0.1 to 0 psi [Gauge] (0.05 to 0 MPa), fully close the stop valve on the gas pipe side of the outdoor unit and stop the operation. (Refer to the indoor unit installation manual about the method for stopping the operation.)
   * If too much refrigerant has been added to the air conditioner system, the pressure may not drop to 0.1 to 0 psi [Gauge] (0.05 to 0 MPa), or the protection function may operate due to the pressure increase in the high-pressure refrigerant circuit. If this occurs, use a refrigerant collecting device to collect all of the refrigerant in the system, and then recharge the system with the correct amount of refrigerant after the indoor and outdoor units have been relocated.
7) Turn off the breaker. Remove the pressure gauge and the refrigerant piping.

⚠ WARNING

When pumping down the refrigerant, stop the compressor before disconnecting the refrigerant pipes. The compressor may burst and cause injury if any foreign substance, such as air, enters the pipes.

ENGLISH

MITSUBISHI ELECTRIC

SPLIT-TYPE AIR CONDITIONERS
INSTALLATION MANUAL

JG79A805H05

MSZ-FH06/09/12/15/18NA
MSZ-FH18NA2

When installing multi units, refer to the installation manual of the multi unit for outdoor unit installation.

Required Tools for Installation

Phillips screwdriver
Level
Scale
Utility knife or scissors
3 in. (75 mm) hole saw
Torque wrench
Wrench (or spanner)
5/32 in. (4 mm) hexagonal wrench
Flare tool for R410A
Gauge manifold for R410A
Vacuum pump for R410A
Charge hose for R410A
Pipe cutter with reamer

1. BEFORE INSTALLATION

1-1. THE FOLLOWING SHOULD ALWAYS BE OBSERVED FOR SAFETY

- Be sure to read these safety precautions and instructions.
- Be sure to observe the warnings and cautions specified here.
- After reading this manual, be sure to store it with the OPERATING INSTRUCTIONS for future reference.
- Please report to your supply authority or obtain their consent before connecting this equipment to the power supply system.

⚠ WARNING (Could lead to death or serious injury.)

- **Do not install the unit by yourself (user).**
  Improper or incomplete installation could cause fire, electric shock, injury due to the unit falling, or water leakage. Consult a qualified installer or the dealer from whom you purchased the unit.
- **Follow the instructions detailed in the installation manual.**
  Incomplete installation could cause fire or electric shock, injury due to the unit falling, or leakage of water.
- **When installing the unit, use appropriate protective equipment and tools for safety.**
  Failure to do so could cause injury.
- **Install the unit securely in a place that can bear the weight of the unit.**
  If the installation location cannot bear the weight of the unit, the unit could fall causing injury.
- **Perform electrical work according to the installation manual and be sure to use an exclusive circuit. Do not connect other electrical appliances to the circuit.**
  If the capacity of the power circuit is insufficient or there is incomplete electrical work, it could result in a fire or an electric shock.
- **Ground the unit correctly.**
  Do not connect the ground wire to a gas pipe, water pipe, lightning rod or telephone ground. Defective grounding could cause electric shock.
- **Do not damage the wires.**
  Damaged wires could cause fire.
- **Be sure to shut off the main power when setting up the indoor P.C. board or wiring.**
  Failure to do so could cause electric shock.
- **Use the specified wires to securely connect the indoor and outdoor units. Attach the wires firmly to avoid applying stress to the terminal block.**
  Improper connection could cause fire.
- **Do not install the unit in a place where flammable gas may leak.**
  If gas leaks and accumulates around the unit, it could cause an explosion.
- **Do not use intermediate connection of the power cord or the extension cord. Do not connect many devices to one AC outlet.**
  It could cause a fire or an electric shock.
- **Use the parts provided or specified parts for the installation work.**
  The use of defective parts could cause an injury or leakage of water due to a fire, an electric shock, the unit falling, etc.
- **When plugging the power supply plug into the outlet, make sure that there is no dust, blockage, or loose parts both in the outlet and on the plug. Verify that the power supply plug is completely in the outlet.**
  If there is dust, blockage, or loose parts on the power supply plug or the outlet, it could cause electric shock or fire. If loose parts are found on the power supply plug, replace it.
- **Securely attach the electrical cover to the indoor unit and the service panel to the outdoor unit.**
  If the electrical cover of the indoor unit and/or the service panel of the outdoor unit are not attached securely, dust, water, etc. could collect in the unit and could cause a fire or an electric shock.
- **When installing, relocating, or servicing the unit, make sure that no substance other than the specified refrigerant (R410A) enters the refrigerant circuit.**
  Any presence of foreign substance such as air can cause abnormal pressure rise and may result in explosion or injury. The use of any refrigerant other than that specified for the system will cause mechanical failure, system malfunction, or unit breakdown. In the worst case, this could lead to a serious impediment to securing product safety.
- **Do not discharge the refrigerant into the atmosphere. Check that the refrigerant gas does not leak after installation has been completed. If refrigerant leaks during installation, ventilate the room.**
  If refrigerant comes in contact with a fire, harmful gas could be generated.
  If refrigerant gas leaks indoors, and comes into contact with the flame of a fan heater, space heater, stove, etc., harmful gases will be generated.
- **Use appropriate tools and piping materials for installation.**
  The pressure of R410A is 1.6 times higher than R22. Not using the appropriate tools and materials, or improper installation could cause the pipes to burst causing an injury.
- **When pumping down the refrigerant, stop the compressor before disconnecting the refrigerant pipes.**
  If the refrigerant pipes are disconnected while the compressor is running and the stop valve is open, air could be drawn in and the pressure in the refrigeration cycle could become abnormally high, causing the pipes to burst.
- **When installing the unit, securely connect the refrigerant pipes before starting the compressor.**
  If the compressor is started before the refrigerant pipes are connected and the stop valve is open, air could be drawn in and the pressure in the refrigeration cycle could become abnormally high, causing the pipes to burst.
- **Fasten a flare nut with a torque wrench as specified in this manual.**
  If fastened too tight, a flare nut could break and cause refrigerant leakage.
- **Install the unit according to national wiring regulations.**

⚠ CAUTION (Could lead to serious injury when operated incorrectly.)

- **Depending on the installation area, install a Ground Fault Interrupt (GFI) circuit breaker.**
  If the Ground Fault Interrupt (GFI) circuit breaker is not installed, an electric shock could occur.
- **Perform the drainage/piping work securely according to the installation manual.**
  If there is defect in the drainage/piping work, water could drip from the unit, and damage household items.
- **Do not touch the air inlet or the aluminum fins of the outdoor unit.**
  This could cause injury.
- **Do not install the outdoor unit where small animals may live.**
  If small animals enter the unit and damage its electrical parts, it could cause a malfunction, smoke emission, or fire. Keep the area around the unit clean.

1-2. SELECTING THE INSTALLATION LOCATION

INDOOR UNIT

- Where airflow is not blocked.
- Where cool air spreads over the entire room.
- On a rigid wall to reduce the possibility of vibration.
- Where it is not exposed to direct sunlight. Do not expose to direct sunlight also during the period following unpacking to before use.
- Where it can be easily drained.
- At a distance 3 ft. (1 m) or more away from a TV and radio. Operation of the air conditioner may interfere with radio or TV reception. An amplifier may be required for the affected device.
- In a place as far away as possible from fluorescent and incandescent lights. In order to make the infrared remote control operate the air conditioner normally. The heat from the lights may cause deformation or the ultraviolet may cause deterioration.
- Where the air filter can be removed and replaced easily.
- Where it is away from the other heat or steam source.

Note:
Install the indoor unit high on the wall where air can distribute over the entire room.

REMOTE CONTROLLER

- Where it is convenient to operate and easily visible.
- Where children cannot easily touch it.
- Select a position about 4 ft. (1.2 m) above the floor. Check that signals from the remote controller from that position are received by the indoor unit ('beep' or 'beep beep' receiving tone sounds). Then, attach remote controller holder to a pillar or wall and install wireless remote controller.

Note:
In rooms where inverter type fluorescent lamps are used, the signal from the wireless remote controller may not be received.

OUTDOOR UNIT

- Where it is not overly exposed to strong winds.
- Where airflow is good and dustless.
- Where neighbours are not annoyed by operation sound or hot air.
- Where rigid wall or support is available to prevent the increase of operation sound or vibration.
- Where there is no risk of combustible gas leakage.
- If installing the unit in a location high above the ground, be sure to secure the unit legs.
- Where it is at least 10 ft. (3 m) away from the antenna of TV set or radio. Operation of the air conditioner may interfere with radio or TV reception in areas where reception is weak. An amplifier may be required for the affected device.
- Install the unit horizontally.
- Please install it in an area not affected by snowfall or blowing snow. In areas with heavy snow, please install a canopy, a pedestal and/or baffle boards.

Note:

- It is advisable to make a piping loop near outdoor unit so as to reduce vibration.
- For increased efficiency, install the outdoor unit in a location where continuous direct sunlight or excessive water can be avoided as much as possible.

Note:
When operating the air conditioner in low outside temperature, be sure to follow the instructions described below.

- Never install the outdoor unit in a place where its air inlet/outlet side may be exposed directly to wind.
- To prevent exposure to wind, install the outdoor unit with its air inlet side facing the wall and a baffle board on the air outlet side.

Avoid the following places for installation where air conditioner trouble is liable to occur.

- Where flammable gas could leak.
- Where there is an excessive amount of machine oil in the air.
- Where oil is splashed or where the area is filled with oily smoke (such as cooking areas and factories, in which the properties of plastic could be changed and damaged).
- Salty places such as the seaside.
- Where sulfide gas is generated such as hot spring, sewage, waste water.
- Where there is high-frequency or wireless equipment.
- Where there is emission of high levels of VOCs, including phthalate compounds, formaldehyde, etc., which may cause chemical cracking.

1-3. SPECIFICATIONS

1-3-1. POWER SUPPLY AND INDOOR/OUTDOOR WIRE CONNECTION

- Power should be taken from an exclusive branched circuit.
- Wiring work should be based on applicable technical standards.
- Wiring connections should be made following the diagram.
- Securely tighten screws.

Connecting wires and the ground wire

- Use solid conductor Min. AWG14 or stranded conductor Min. AWG14.
- Use double insulated copper wire with 600 V insulation.
- Use copper conductors only.

* Follow local electrical codes.

Power supply cable and ground wire

- Use solid or stranded conductor.
  FH06/09/12 Min. AWG14
  FH15/18 Min. AWG12
- Use copper conductors only.

* Follow local electrical codes.

Note:
When the indoor unit is powered from the outdoor unit, depending on local code, a disconnect switch needs to be installed to a power supply circuit.

1-3-2. REFRIGERANT PIPES

- To prevent condensation, insulate the two refrigerant pipes.
- Refrigerant pipe bending radius must be 4 in. (100 mm) or more.

⚠ CAUTION
Be sure to use the insulation of specified thickness (table on the right). Excessive insulation may cause incorrect installation of the indoor unit, and too little insulation may cause condensate to form.

- The unit has flared connections on both indoor and outdoor sides.
- Remove the valve cover from the outdoor unit, then connect the pipe.
- Refrigerant pipes are used to connect the indoor and outdoor units.
- Be careful not to crush or over bend the pipe in pipe bending.

- Refrigerant adjustment... If pipe length exceeds 25 ft. (7.5 m), additional refrigerant (R410A) charge is required.

(The outdoor unit is charged with refrigerant for pipe length up to 25 ft. [7.5 m])

Electrical specifications

MODEL			MSZ-FH06NA MSZ-FH09NA MSZ-FH12NA	MSZ-FH15NA MSZ-FH18NA MSZ-FH18NA2
INDOOR UNIT				
Power supply (V, PHASE, Hz)			208/230, 1, 60	
Min. Circuit Ampacity		(A)	1.0	
Fan motor (F.L.A.)		(A)	0.67	
OUTDOOR UNIT				
Power supply (V, PHASE, Hz)			208/230, 1, 60	
Max. Fuse size (time delay)		(A)	15	20
Min. Circuit Ampacity		(A)	11	16
Fan motor (F.L.A.)		(A)	0.50	0.93
Compressor	(R.L.A)	(A)	8.2	12.0
	(L.R.A)	(A)	10.3	15.0
Control voltage			Indoor unit - Remote controller: (Wireless) Indoor unit - Outdoor unit: DC12-24 V (Polar)	

Pipe	Outside diameter	Minimum wall thickness	Insulation thickness	Insulation material
	inch (mm)			
For liquid	1/4 (6.35)	0.0315 (0.8)	5/16 (8)	Heat resistant foam plastic 0.045 Specific gravity
For gas	3/8 (9.52)	0.0315 (0.8)	5/16 (8)	
	1/2 (12.7)	0.0315 (0.8)	5/16 (8)	

Limits		
Pipe length	MSZ-FH06/09/12NA	65 ft. (20 m) max.
	MSZ-FH15/18NA MSZ-FH18NA2	100 ft. (30 m) max.
Height difference	MSZ-FH06/09/12NA	40 ft. (12 m) max.
	MSZ-FH15/18NA MSZ-FH18NA2	50 ft. (15 m) max.
No. of bends		10 max.

Pipe length	Up to 25 ft. (7.5 m)	No additional charge is required.
	Exceeding 25 ft. (7.5 m)	Additional charge is required. (Refer to the table below.)
Refrigerant to be added	MSZ-FH06/09NA MSZ-FH15/18NA MSZ-FH18NA2	1.08 oz each 5 ft. (20 g/m)
	MSZ-FH12NA	1.62 oz each 5 ft. (30 g/m)

1-4. INSTALLATION DIAGRAM

ACCESSORIES
Check the following parts before installation.
<Indoor unit>

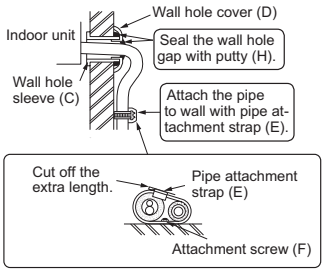
(1)	Installation plate	1
(2)	Attachment screws for the installation plate 4 × 25 mm	5
(3)	Wireless remote controller	1
(4)	Felt tape (For left or left-rear piping)	1
(5)	Remote controller holder	1
(6)	Screws for the remote controller holder 3.5 × 16 mm (Black)	2
(7)	Battery (AAA) for (3)	2
(8)	Air cleaning filter	2

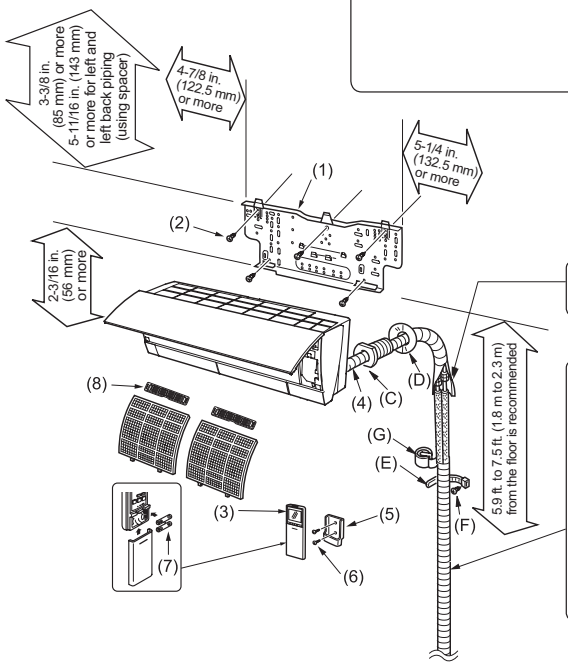
FIELD-SUPPLIED PARTS

(A)	Indoor/outdoor unit connecting wire*1	1
(B)	Extension pipe	1
(C)	Wall hole sleeve	1
(D)	Wall hole cover	1
(E)	Pipe attachment strap	2 to 5
(F)	Screw for (E) 4 × 20 mm	2 to 5
(G)	Piping tape	1
(H)	Putty	1
(I)	Drain hose (or soft PVC hose, 19/32 in. [15 mm] inner diameter or hard PVC pipe VP16)	2 to 5
(J)	Refrigerant oil	1
(K)	Power supply cord*1	1

Note:
*1 Place indoor/outdoor unit connecting wire (A) and power supply cord (K) at least 3 ft. (1 m) away from the TV antenna wire.

Use the wall hole sleeve (C) to prevent indoor/outdoor connecting wire (A) from contacting metal parts in the wall and to protect the wiring from rodents.



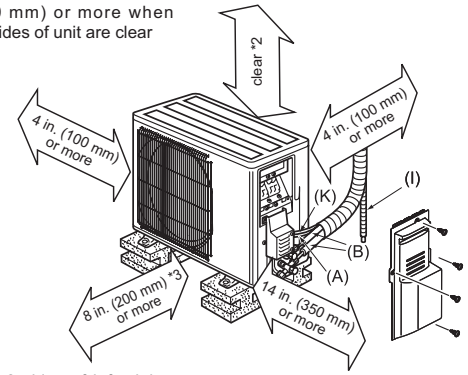


After the leak test, apply insulating material tightly so that there is no gap.

When the piping is to be attached to a wall comprised of tin plate or metal netting, use chemically treated wooden piece 25/32 in. (20 mm) or thicker between the wall and the piping, or wrap insulation vinyl tape 7 to 8 turns around the piping.
To use existing piping, perform COOL operation for 30 minutes and pump down before removing the old air conditioner. Remake flare according to the dimension for new refrigerant.

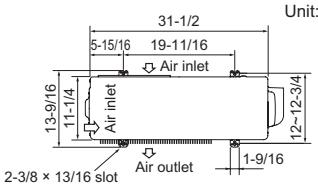
<FH06/09/12>

*2 4 in. (100 mm) or more when front and sides of unit are clear

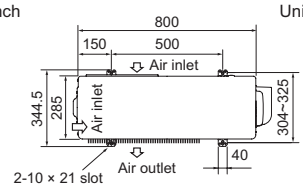


*3 When any 2 sides of left, right and rear of unit are clear

Unit: inch



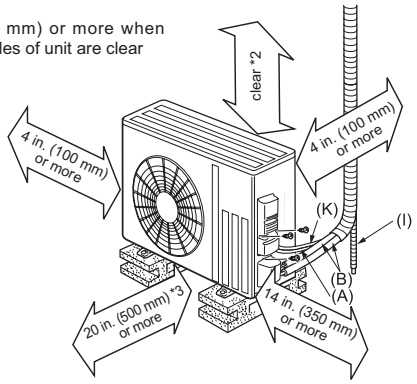
Unit: mm



Units should be installed by licensed contractor according to local code requirements.

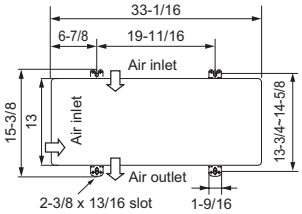
<FH15/18>

*2 20 in. (500 mm) or more when front and sides of unit are clear

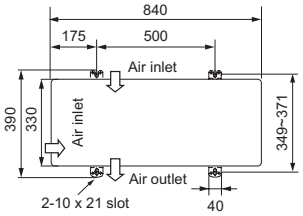


*3 When any 2 sides of left, right and rear of unit are clear

Unit: inch



Unit: mm

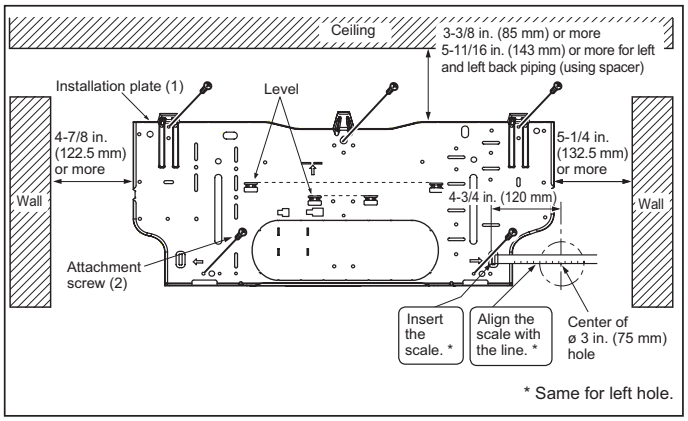


Drain piping for outdoor unit
Install the unit horizontally.
Do not use drain socket in cold regions. Drain may freeze and make the fan stop.
The outdoor unit produces condensate during the heating operation. Select the installation place to ensure to prevent the outdoor unit and/or the grounds from being wet by drain water or damaged by frozen drain water.

2. INDOOR UNIT INSTALLATION

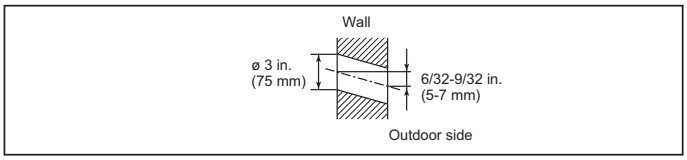
2-1. ATTACHING THE INSTALLATION PLATE

- Find a stud in the wall to attach installation plate (1) horizontally by tightening the fixing screws (2) firmly.
- To prevent installation plate (1) from vibrating, be sure to install the attachment screws in the holes indicated in the illustration. For added support, additional screws may also be installed in other holes.
- When the indoor unit is to be attached to a concrete wall using recessed bolts, secure installation plate (1) using 7/16 in. x 13/16 in. · 7/16 in. x 1 in. (11 mm × 20 mm · 11 mm × 26 mm) oval hole (17-3/4 in. [450 mm] pitch).
- If the recessed bolt is too long, change it for a shorter one (field-supplied).



2-2. DRILLING

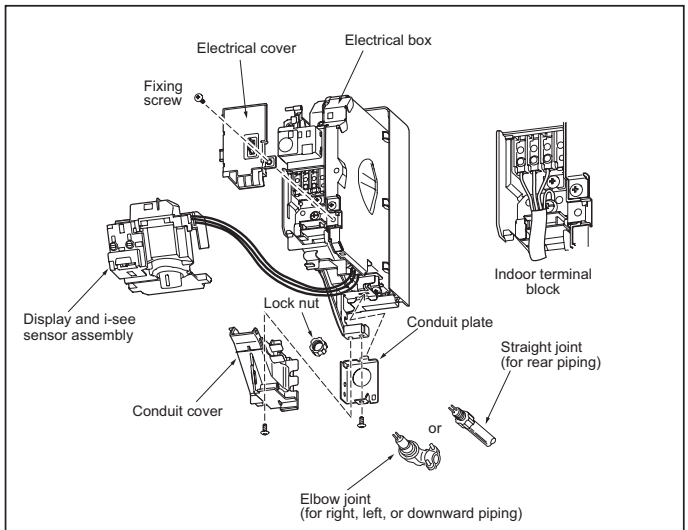
1) Determine where the holes will be located on the wall.
2) Drill a ø 3 in. (75 mm) hole. The outdoor side should be 6/32 to 9/32 in. (5 to 7 mm) lower than the indoor side.
3) Insert wall hole sleeve (C).



2-3. CONNECTING WIRES FOR INDOOR UNIT

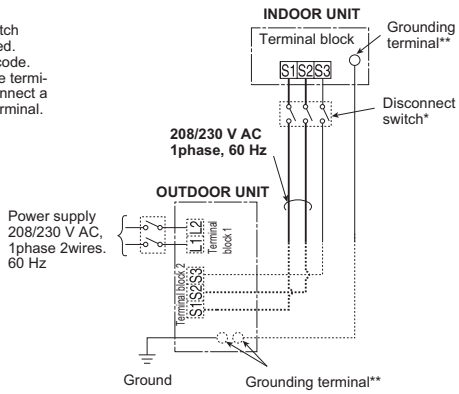
Note:
When the indoor unit is powered from the outdoor unit, depending on local code, a disconnect switch needs to be installed to a power supply circuit.

1) Remove the panel assembly. (Refer to 5-1.)
2) Place the upper part of the indoor unit on the installation plate.
3) Remove corner box and electrical cover.
4) Remove display and i-see sensor assembly, conduit cover and conduit plate.
5) Attach straight joint (for rear piping) / elbow joint (for right, left, or downward piping) to conduit plate with lock nut. The thread of the installed conduit pipe / elbow joint appearing inside should be less than 3/8 in. (10 mm). (Fig. 1) Elbow joint should appear less than 1-3/16 in. (30 mm) outside. (Fig. 2)
6) Process the end of ground wire (Fig. 3). Connect it to the ground terminal of electrical parts box.
7) Process the end of indoor/outdoor unit connecting wire (A) (Fig. 3). Attach it to the terminal block. Be careful not to make mis-wiring. Attach the wire to the terminal block securely so that its core cannot be seen, and no external force affects the connecting section of the terminal block.
8) Firmly tighten the terminal screws. After tightening, verify that the wires are tightly fastened.
9) Reinstall conduit plate, conduit cover and display panel.
10) According to the piping direction, remove the shaded part of the corner box L (Fig. 4) or corner box R (Fig. 5). Reinstall electrical cover, corner box R and front panel.



- Connect wires to the appropriate terminals
- For future servicing, leave some slack in the connecting wires.

Remark:
* A disconnect switch should be required. Check the local code.
** Use a ring tongue terminal in order to connect a ground wire to terminal.



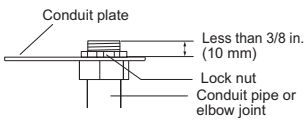


Fig. 1

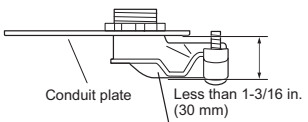
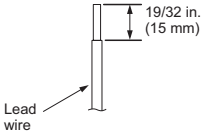


Fig. 2



- Make ground wire a little longer than others. (More than 1-9/16 in. [40 mm])

Fig. 3

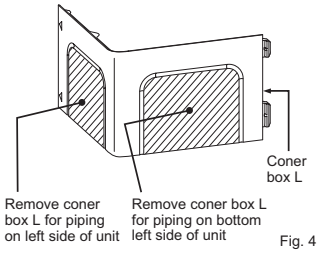


Fig. 4

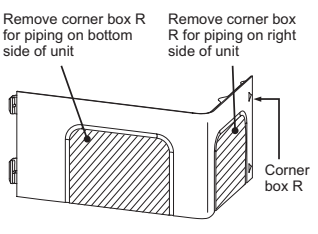


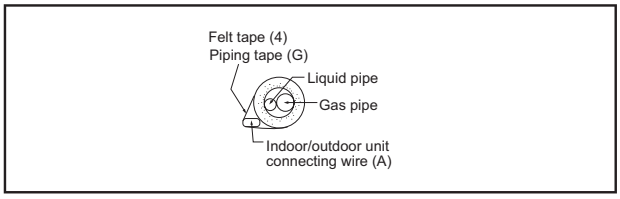
Fig. 5

2-4. PIPE FORMING AND DRAIN PIPING

2-4-1. PIPE FORMING

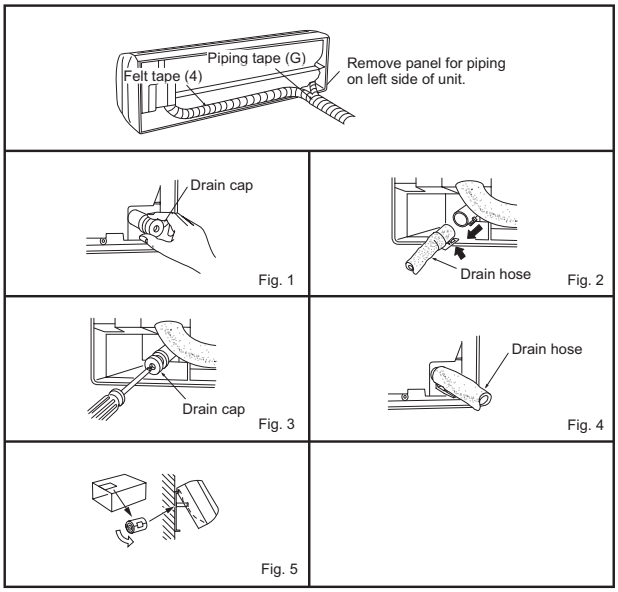
- Place the drain hose below the refrigerant piping.
- Make sure that the drain hose is not crowded or bent.
- Do not pull the hose when applying the tape.
- When the drain hose passes the room, be sure to wrap it with insulation material (field-supplied).

Note:
Make sure not to damage the cover of refrigerant pipe when attaching it back on with screws.

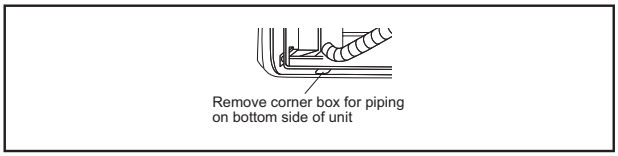


Left or left-rear piping
Note:
Be sure to reattach the drain hose and the drain cap if the piping is being installed on left or bottom left of unit, otherwise, water could drip down from the drain hose.

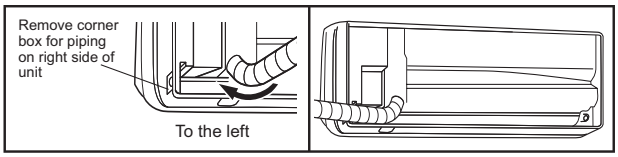
1) Place the refrigerant piping and the drain hose together, then firmly apply felt tape (4) from the end.
   Felt tape (4) overlap width should be 1/3 the tape width. Use a bandage stopper at the end of felt tape (4).
2) Pull out the drain cap at the back right of the indoor unit. (Fig. 1)
   • Hold the convex section at the end and pull the drain cap.
3) Pull out the drain hose at the back left of the indoor unit. (Fig. 2)
   • Hold the claw marked by the arrows and pull out the drain hose forward.
4) Put the drain cap into the section to which the drain hose is to be attached at the rear of the indoor unit. (Fig. 3)
   • Insert a screwdriver into the hole on the cap and insert the cap fully into the drain pan.
5) Insert the drain hose fully into the drain pan at the back right of the indoor unit. (Fig. 4)
   • Check if the hose is hooked securely to the projection of its inserting part at the drain pan.
6) Insert the drain hose into wall hole sleeve (C), and attach the upper part of indoor unit onto the installation plate (1). Then, shift the indoor unit completely to the left to make placing the piping in the back of the unit easier.
7) Cut out a piece of cardboard from the shipping box, roll it up, hook it onto the back rib, and use it as a spacer to lift the indoor unit. (Fig. 5)
8) Connect the refrigerant piping with the extension pipe (B).
9) Attach the lower part of the indoor unit into the installation plate (1).



Rear or bottom piping
1) Place the refrigerant piping and the drain hose together, then firmly apply piping tape (G) from the end.
2) Insert the piping and the drain hose into the wall hole sleeve (C), and attach the upper part of the indoor unit on the installation plate (1).
3) Check if the indoor unit is attached securely on the installation plate (1) by moving the unit to left and right.
4) Attach the lower part of the indoor unit into the installation plate (1).

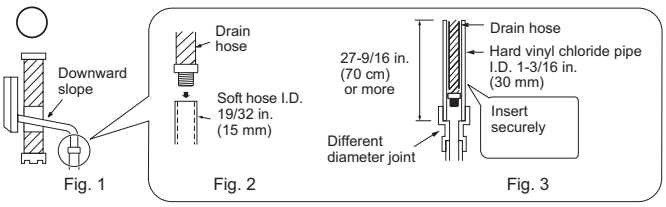


Right piping
Note:
Before performing the following, make sure that wiring is completed, and the conduit cover is installed. (Refer to 2-3.)
1) Place the refrigerant piping and the drain hose together, shift them to left side of the unit, and then firmly apply piping tape (G) from the end.
2) Insert the piping and the drain hose into the wall hole sleeve (C), and attach the upper part of the indoor unit on the installation plate (1).
3) Check if the indoor unit is attached securely on the installation plate (1) by moving the unit to left and right.
4) Attach the lower part of the indoor unit into the installation plate (1).

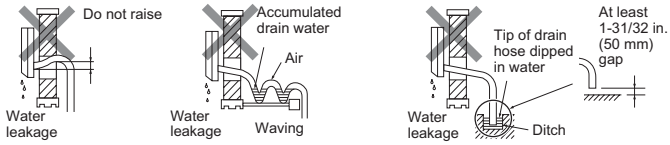


2-4-2. DRAIN PIPING

- If the extension drain hose has to pass through a room, be sure to wrap it with insulation (field-supplied).
- The drain hose should point downward for easy drain. (Fig. 1)
- If the drain hose provided with the indoor unit is too short, connect it with a field-supplied drain hose (I). (Fig. 2)
- When connecting the drain hose to a hard vinyl chloride pipe, be sure to insert it securely into the pipe. (Fig. 3)



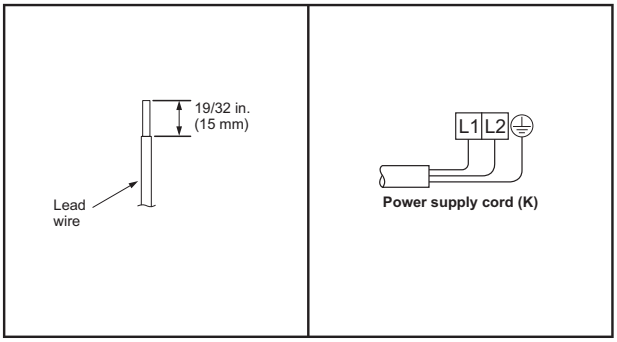
Do not make drain piping as shown below.



3. OUTDOOR UNIT INSTALLATION

3-1. CONNECTING WIRES FOR OUTDOOR UNIT

1) Remove the service panel.
2) Remove the conduit cover.
3) Attach the conduit connectors to the conduit plate with lock nuts then secure it against unit with screws.
4) Connect the ground wires of indoor/outdoor unit connecting wire (A) and power supply cord (K) to the TB support.
5) Loosen the terminal screws, then attach indoor/outdoor unit connecting wire (A) and power supply cord (K) from the indoor unit correctly to the terminal block. Attach the wires to the terminal block securely so that the cores cannot be seen, and no external force affects the connecting section of the terminal block.
6) Firmly tighten the terminal screws. After tightening, verify that the wires are tightly fastened.
7) Install the conduit cover.
8) Install the service panel securely.



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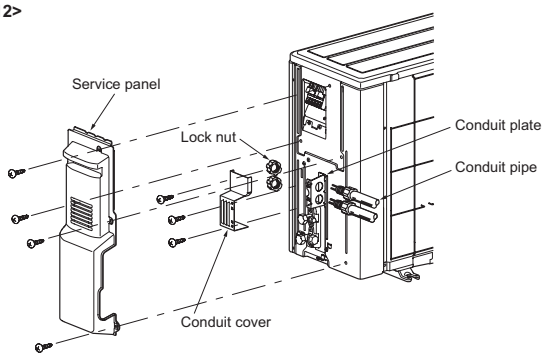
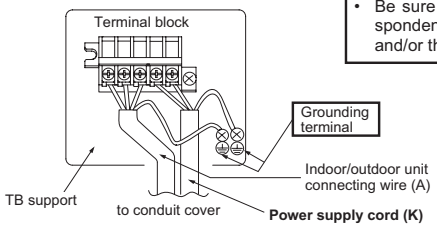
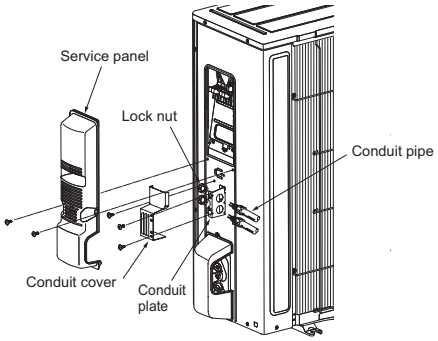
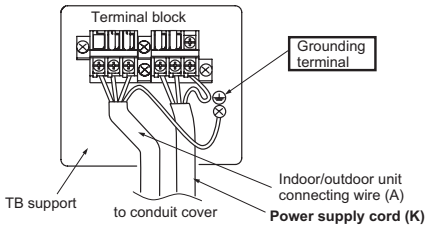




- Make ground wire a little longer than others. (More than 4 in. [100 mm])
- For future servicing, leave some slack in the connecting wires.
- Be sure to attach each screw to its correspondent terminal when securing the cord and/or the wire to the terminal block.

<FH15/18>





3-2. FLARE CONNECTION

1) Cut the copper pipe as straight as possible with a pipe cutter. (Fig. 1, 2)
2) Remove all burrs from the cut section of the pipe, ensuring that precautions are taken to avoid getting metal shavings into the piping. (Fig. 3)
3) Remove flare nuts attached to indoor and outdoor units, then put them on pipe.
4) Flaring work (Fig. 4, 5). Firmly hold copper pipe in the dimension shown in the table. Select A inch (mm) from the table according to the tool you use.
5) Check
   - Compare the flared work with Fig. 6.
   - If flare is defective, cut off the section and repeat procedure.

Pipe diameter inch (mm)	B inch (mm)	A inch (mm)			Tightening torque	
		Clutch type tool for R410A	Clutch type tool for R22	Wing nut type tool for R22	ft-lb (kgf•cm)	N•m
ø 1/4 (6.35)	21/32 (17)	0 to 0.02 (0 to 0.5)	0.04 to 0.06 (1.0 to 1.5)	0.06 to 0.08 (1.5 to 2.0)	10 to 13 (140 to 180)	13.7 to 17.7
ø 3/8 (9.52)	7/8 (22)				25 to 30 (350 to 420)	34.3 to 41.2
ø 1/2 (12.7)	1-1/32 (26)			0.08 to 0.10 (2.0 to 2.5)	36 to 42 (500 to 575)	49.0 to 56.4
ø 5/8 (15.88)	1-5/32 (29)				54 to 58 (750 to 800)	73.5 to 78.4

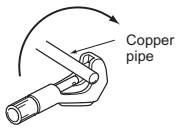


Fig. 1

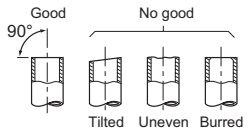


Fig. 2

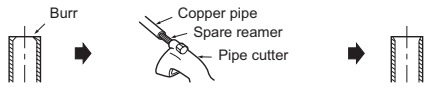


Fig. 3

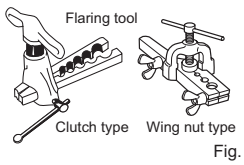


Fig. 4

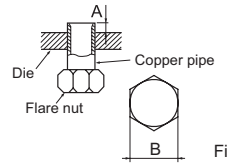


Fig. 5

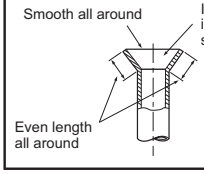


Fig. 6

3-3. PIPE CONNECTION

- Fasten flare nut with a torque wrench as specified in the table (refer to 3-2.).
- When fastened too tight, flare nut may eventually break and cause refrigerant leakage.
- Be sure to wrap insulation around the piping. Direct contact with the bare piping may result in burns or frostbite.

Indoor unit connection

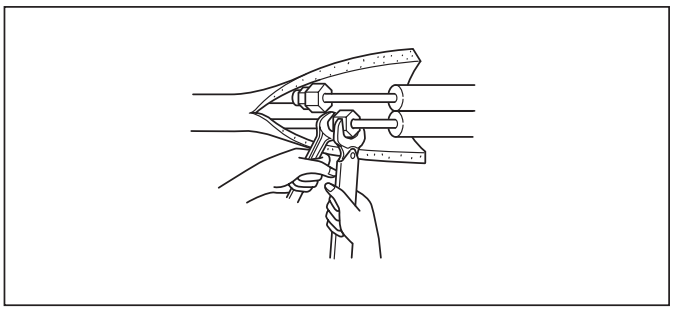
Connect both liquid and gas pipings to indoor unit.

- Apply a thin coat of refrigeration oil (J) on the flared ends of the pipes. Do not apply refrigeration oil on screw threads. Excessive tightening torque will result in damage on the screw.
- To connect, first align the center, then tighten the first 3 to 4 turns of flare nut.
- Use tightening torque table above as a guideline for indoor unit side joints, and tighten using two wrenches. Excessive tightening damages the flare section.

Outdoor unit connection

Connect pipes to stop valve pipe joint of the outdoor unit following the same procedure detailed in Indoor unit connection.

- For tightening, use a torque wrench or spanner.



⚠ WARNING

When installing the unit, securely connect the refrigerant pipes before starting the compressor.

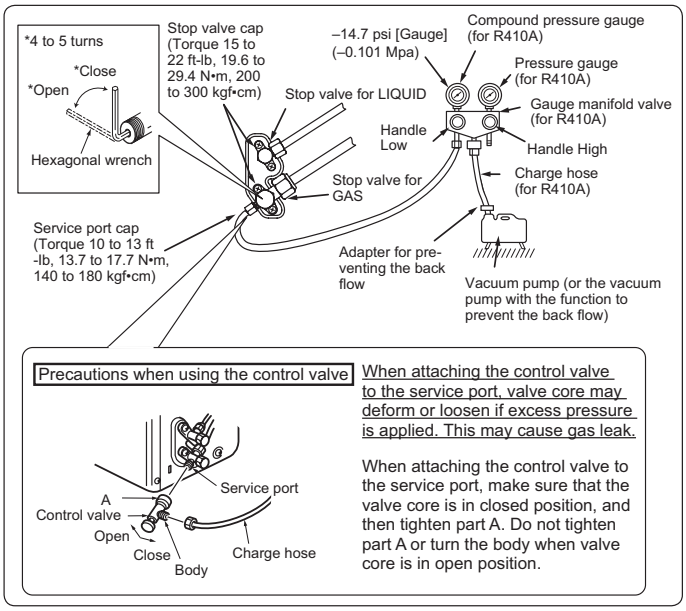
3-4. INSULATION AND TAPING

1) Cover piping joints with pipe cover.
2) For outdoor unit side, insulate the piping, including valves.
3) Apply piping tape (G) starting from the connection on the outdoor unit.
   - When piping has to be installed through a ceiling, closet or where the temperature and humidity are high, use additional field-supplied insulation to prevent condensation.

4. PURGING PROCEDURES, LEAK TEST, AND TEST RUN

4-1. PURGING PROCEDURES AND LEAK TEST

1) Remove service port caps from stop valves on both sides of refrigerant lines. (The stop valves are fully closed when shipped.) Leave closed.
2) Connect gauge manifold to ports of stop valves.



Precautions when using the control valve

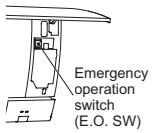
When attaching the control valve to the service port, valve core may deform or loosen if excess pressure is applied. This may cause gas leak.

When attaching the control valve to the service port, make sure that the valve core is in closed position, and then tighten part A. Do not tighten part A or turn the body when valve core is in open position.

3) Evacuate the system to 4000 microns from both service valves. System manifold gauges must not be used to measure vacuum. A micron gauge must be used at all times. Break the vacuum with Nitrogen(N2) into the discharge service valve to 0 PSIG.
4) Evacuate the system to 1500 microns. Break the vacuum with Nitrogen(N2) into the discharge service valve to 0 PSIG.
5) Evacuate the system to 500 microns.
6) Close gauge manifold valves, stop the pump, and conduct a 30 minute rise test.
7) System should hold 500 microns for a minimum of 1 hour.
8) Fully open all stop valves on both sides of gas pipe and liquid pipe. Operating without fully opening lowers the performance and this causes trouble.
9) Refer to 1-3 and charge the prescribed amount of additional refrigerant if needed. Be sure to charge slowly with liquid refrigerant. Otherwise composition of the refrigerant in the system may be changed and affect performance of the air conditioner.
10) Remove gauge manifolds and replace service port caps and tighten.
11) Leak test

4-2. TEST RUN

1) Insert power supply plug into the power outlet and/or turn on the breaker.
2) Press the E.O. SW once for COOL, and twice for HEAT operation. Test run will be performed for 30 minutes. If the left lamp of the operation indicator blinks every 0.5 seconds, inspect the indoor/outdoor unit connecting wire (A) for mis-wiring. After the test run, emergency mode (set temperature 75°F [24°C]) will start.
3) To stop operation, press the E.O. SW several times until all LED lamps turn off. Refer to operating instructions for details.



Checking the remote (infrared) signal reception

Press the ON/OFF button on the remote controller (3) and listen for an audible indicator from the indoor unit. Press the ON/OFF button again to turn the air conditioner off.

- Once the compressor stops, the restart preventive device operates so the compressor will not operate for 3 minutes to protect the air conditioner.

4-3. AUTO RESTART FUNCTION

This product is equipped with an auto restart function. When the power supply is cut off during operation, such as during blackouts, the function automatically starts operation in the previous setting once the power supply is resumed. (Refer to the operating instructions for details.)

Caution:

- After test run or remote signal reception check, turn off the unit with the E.O. SW or the remote controller before turning off the power supply. If this procedure is not performed, the unit will automatically begin operation when power supply is resumed.

To the user

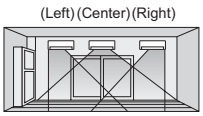
- After installing the unit, explain to the user about auto restart function.
- If auto restart function is unnecessary, it can be deactivated. Consult the service representative to deactivate the function. Refer to the service manual for details.

4-4. SETTING THE INSTALLATION POSITION

Be sure to set the remote controller in accordance with the installed position of the indoor unit.

Installation position:

Left: Distance to objects (wall, cabinet, etc.) is less than 19-11/16 in. (50 cm) to the left
Center: Distance to objects (wall, cabinet, etc.) is more than 19-11/16 in. (50 cm) to the left and right
Right: Distance to objects (wall, cabinet, etc.) is less than 19-11/16 in. (50 cm) to the right



Note:

The installation position can be set only when all the following conditions are met:

- The remote controller is powered off.
- Weekly timer is not set.
- Weekly timer is not being edited.

1) Hold down WIDE VANE on the remote controller for 2 seconds to enter the position setting mode.
2) Select the target installation position by pressing WIDE VANE. (Each press of the WIDE VANE displays the positions in order: center → right → left.)
3) Press SET to complete the position setting.

Installation position	Left	Center	Right
Remote controller display			

4-5. EXPLANATION TO THE USER

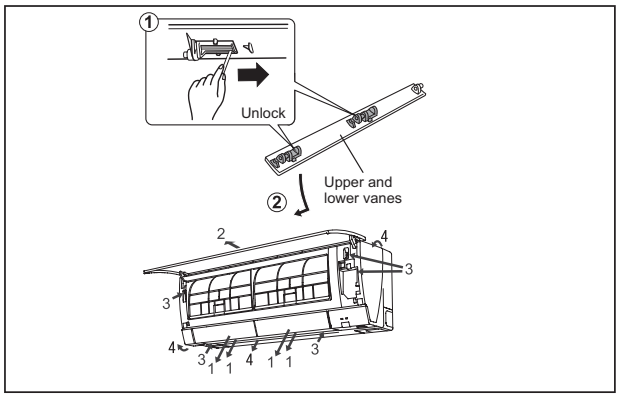
- Using the OPERATING INSTRUCTIONS, explain to the user how to use the air conditioner (the remote controller, removing the air filters, placing or removing the remote controller from the remote controller holder, cleaning methods, precautions for operation, etc.)
- Recommend that the user read the OPERATING INSTRUCTIONS carefully.

5. RELOCATION AND MAINTENANCE

5-1. REMOVING AND INSTALLING THE PANEL ASSEMBLY

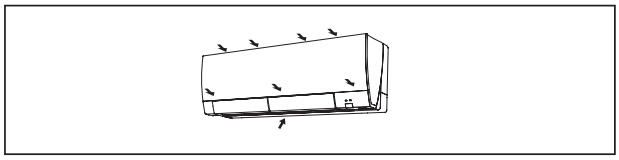
Removal procedure

1) Unlock the upper and lower vanes as shown in ① and ② using a thin instrument. Then, remove the horizontal vanes.
2) Remove the front panel.
3) Remove the 5 screws which fix the panel assembly.
4) The panel assembly consists of 3 components. Remove them in the following order: right, left, and center bottom. To remove the right component, pull out the right top corner. To remove the left component, pull out the left bottom corner. To remove the center bottom component, detach the hook on its upper center part.



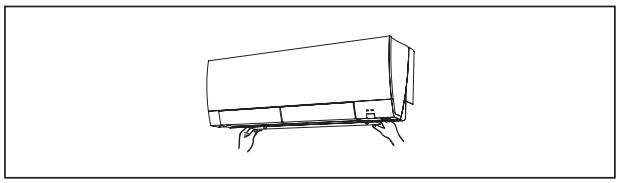
Installation procedure

1) Install the panel assembly following the removal procedure in reverse.
2) Be sure to press the positions as indicated by the arrows in order to attach the assembly completely to the unit.
3) Install the front panel and the horizontal vanes.



5-2. REMOVING THE INDOOR UNIT

Remove the bottom of the indoor unit from the installation plate.
When releasing the corner part, release both left and right bottom corner part of indoor unit and pull it downward and forward as shown in the figure on the right.



5-3. PUMPING DOWN

When relocating or disposing of the air conditioner, pump down the system following the procedure below so that refrigerant is not released into the atmosphere.

1) Connect the gauge manifold valve to the service port of the stop valve on the gas pipe side of the outdoor unit.
2) Fully close the stop valve on the liquid pipe side of the outdoor unit.
3) Close the stop valve on the gas pipe side of the outdoor unit almost completely so that it can be easily closed fully when the pressure gauge shows 0 psi [Gauge] (0 Mpa).
4) Start the emergency COOL operation.
   To start the emergency operation in COOL mode, disconnect the power supply plug and/or turn off the breaker. After 15 seconds, connect the power supply plug and/or turn on the breaker, and then press the E.O. SW once. (The emergency COOL operation can be performed continuously for up to 30 minutes.)
5) Fully close the stop valve on the gas pipe side of the outdoor unit when the pressure gauge shows (0.1 to 0 psi [Gauge] (0.05 to 0 Mpa)).
6) Stop the emergency COOL operation.
   To stop operation, press the E.O. SW several times until all LED lamps turn off. Refer to operating instructions for details.

⚠ WARNING

When pumping down the refrigerant, stop the compressor before disconnecting the refrigerant pipes. The compressor may burst if air etc. get into it.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU,
TOKYO 100-8310, JAPAN

BOILER SERIAL NUMBERS:
65746131
65746134
INSTALL DATE 10/2020

Installation, Operating and Service Instructions for

V8H™

Commercial

- Water & Steam Boiler
- Natural Draft
- Oil-Fired

Models:
- V8H8W
- V8H8S
- V8H9W
- V8H9S

Manual Contents **Page**

ETL LISTED US Intertek 9700609

ETL LISTED C Intertek 9700609

ASME H

TO THE INSTALLER:
Affix these instructions adjacent to boiler.

TO THE CONSUMER:
Retain these instructions for future reference.

AHRI CERTIFIED® www.ahridirectory.org

U.S. Boiler Company

For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

110356-01 - 3/20

IMPORTANT INFORMATION - READ CAREFULLY

All boilers must be installed in accordance with National, State and Local Plumbing, Heating and Electrical Codes and the regulations of the serving utilities. These Codes and Regulations may differ from this instruction manual. Authorities having jurisdiction should be consulted before installations are made.
In all cases, reference should be made to the following Standards:

USA BOILERS

A. Current Edition of American National Standard ANSI/NFPA 31, "Installation of Oil Burning Equipment", for recommended installation practices.
B. Current Edition of American National Standard ANSI/NFPA 211, "Chimneys, Fire places, Vents, and Solid Fuel Burning Appliances", For Venting requirements.
C. Current Edition of American Society of Mechanical Engineers ASME CSD-1, "Controls and Safety Devices for Automatically Fired Boilers", for assembly and operations of controls and safety devices.
D. All wiring on boilers installed in the USA shall be made in accordance with the National Electrical Code and/or Local Regulations.

The following terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning product life.

⚠ DANGER
Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

⚠ CAUTION
Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

⚠ WARNING
Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

NOTICE: Indicates special instructions on installation, operation, or service which are important but not related to personal injury hazards.

NOTICE: This boiler has a limited warranty, a copy of which is included with this boiler. The warranty for this boiler is valid only if the boiler has been installed, maintained and operated in accordance with these instructions.

Surface rust on cast iron sections may be attributed to the manufacturing process as well as condensation during storage. Surface rust is normal and does not affect the performance or longevity of a boiler.

⚠ DANGER

DO NOT store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

⚠ WARNING

- Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Failure to follow all instructions in the proper order can cause personal injury or death. Read and understand all instructions, including all those contained in component manufacturers manuals which are provided with the boiler before installing, starting-up, operating, maintaining or servicing this boiler. Keep this manual and literature in legible condition and posted near boiler for reference by owner and service technician.
- This boiler requires regular maintenance and service to operate safely. Follow the instructions contained in this manual.
- Installation, maintenance, and service must be performed only by an experienced, skilled and knowledgeable installer or service agency.
- All heating systems should be designed by competent contractors and only persons knowledgeable in the layout and installation of hydronic heating systems should attempt installation of any boiler.
- Installation is not complete unless a pressure relief valve is installed into the tapping located on top left corner of front section- See Piping and Trim Sections of this manual for details.
- It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when installation is complete including verifying that the limit sensor is fully installed (seated in bottom of Well).

Failure to properly install Limit Sensor may result in property damage, personal injury or loss of life due to elevated operating temperatures and/or pressures.

- This boiler is suitable for installation on combustible flooring. Do not install boiler on carpeting.
- Do not tamper with or alter the boiler or controls.
- Inspect flueways at least once a year - preferably at the start of the heating season. The inside of the combustion chamber, the vent system and boiler flueways should be cleaned if soot or scale has accumulated.
- When cleaning this boiler, DO NOT damage combustion chamber liner and/or rear target wall. If damaged, combustion chamber insulation must be replaced immediately.
- Oil Burner and Controls must be checked at least once a year or as may be necessitated.
- Do not operate boiler with jumpered or absent controls or safety devices.
- Do not operate boiler if any control, switch, component, or device has been subject to water.
- Boiler materials of construction, products of combustion and the fuel contain alumina, silica, heavy metals, carbon monoxide, nitrogen oxides, aldehydes and/or other toxic or harmful substances which can cause death or serious injury and which are known to the state of California to cause cancer, birth defects and other reproductive harm. Always use proper safety clothing, respirators and equipment when servicing or working nearby the boiler.

⚠ WARNING

- This boiler contains very hot water under high pressure. Do not unscrew any pipe fittings nor attempt to disconnect any components of this boiler without positively assuring the water is cool and has no pressure. Always wear protective clothing and equipment when installing, starting up or servicing this boiler to prevent scald injuries. Do not rely on the pressure and temperature gauges to determine the temperature and pressure of the boiler. This boiler contains components which become very hot when the boiler is operating. Do not touch any components unless they are cool.
- High water temperatures increase the risk of scalding injury. If this boiler is equipped with a tankless heater for domestic water supply, a flow regulator and automatic mixing valve must be installed properly in tankless heater piping. See Piping and Trim Sections of this manual for details.
- This boiler must be properly vented and connected to an approved vent system in good condition. DO NOT operate boiler with the absence of an approved vent system.
- This boiler needs fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air.
- A clean and unobstructed chimney flue is necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.
- This boiler is supplied with controls which may cause the boiler to shut down and not re-start without service. If damage due to frozen pipes is a possibility, the heating system should not be left unattended in cold weather; or appropriate safeguards and alarms should be installed on the heating system to prevent damage if the boiler is inoperative..
- This boiler is designed to burn No. 2 fuel oil only. DO NOT use gasoline, crankcase drainings, or any oil containing gasoline. Never burn garbage or paper in this boiler. DO NOT convert to any solid fuel (i.e. wood, coal). DO NOT convert to any gaseous fuel (i.e. natural gas, LP). All flammable debris, rags, paper, wood scraps, etc., should be kept clear of the boiler at all times. Keep the boiler area clean and free of fire hazards.
- All boilers equipped with burner swing door have a potential hazard which if ignored can cause severe property damage, personal injury or loss of life. Before opening swing door, turn off service switch to boiler to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely when service is completed.

1 Product Description, Specification and Dimensional Data

The V8H Series boiler is a cast iron oil-fired water boiler designed for closed forced circulation heating systems or a low pressure steam boiler designed for use in closed heating steam systems. This boiler must be vented by natural draft into a fireclay tile-lined masonry chimney or chimney constructed from type L vent or a factory built chimney that complies with the type HT requirements of UL103. An adequate supply of air for combustion, ventilation and dilution of flue gases must be available in the boiler room.

Water Boilers

The V8H Series water boiler uses an Intelligent Oil Boiler Control (boiler control). The boiler control replaces the traditional electronic aquastat and circulator relays and adds energy saving thermal purge features. Energy is saved by starting the circulator and delaying the burner start when there is residual heat available in the boiler. A Warm Start Intelligent Oil Boiler Control (Warm Start Boiler Control) is included with a tankless heater option to generate domestic hot water.

Steam Boilers

The V8H Series steam boiler uses a L404F Pressure Limit and Low Water Cut-off. This boiler has indirect domestic water heater connections to generate domestic hot water. Optionally, this boiler may include a L4006 Temperature Limit and a tankless heater to generate domestic hot water.

Table 1A: Dimensional Data (See Figures 1A thru 1C)

Boiler Model	Dimensions See Figures 1A thru 1D			Water Content-Gallons		Heat Transfer Surface Area Sq. Ft.	Approximate Shipping Weight (LB.)
	"A"	"B"	"C"	Steam Boiler	Water Boiler		
V8H8	42-1/8"	21-5/8"	8"	20.9	27.1	51.08	1002
V8H9	47-1/8"	24-1/8"	8"	23.0	30.0	58.12	1094
Note 1 Maximum working pressure: Steam 15 PSI; Water: 30 PSI Shipped From Factory (Std.), 40 PSI Optional, 50 PSI Optional							

Table 1B: Rating Data

Boiler Model	Burner Capacity		Gross Output MBH (2)	AHRI NET Ratings (3)			Thermal Efficiency %	Minimum Chimney Requirements		
	GPH	MBH (1)		Water MBH	Steam MBH	Steam Sq. Ft.		Round In. Dia.	Rectangle In. x In.	Height Ft.
V8H8S	2.35	329	266		200	833	81.4	8	8 x 12	15
V8H8W		329	275	239			82.0			
V8H9S	2.60	364	298		224	933	82.3	9		
V8H9W		364	299	260			82.3			

(1) MBH refers to thousands of BTU per hour.
(2) Based on standard test procedure prescribed by the United States Department of Energy at combustion conditions of 13.0% CO_2.
(3) Net AHRI Ratings are based on piping and pickup allowance of 1.15 for water and 1.333 for steam.

1 Product Description, Specification and Dimensional Data *(continued)*

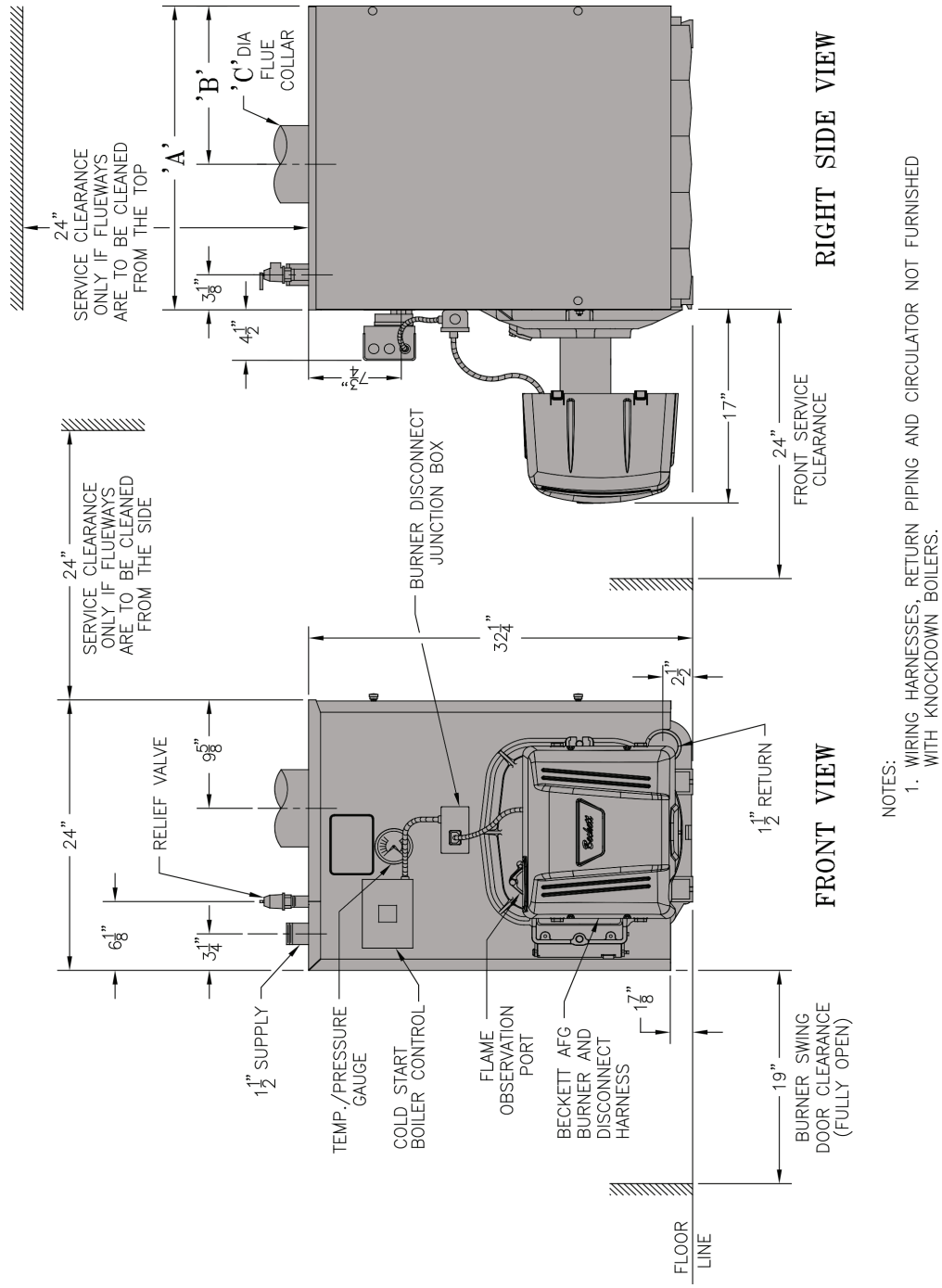
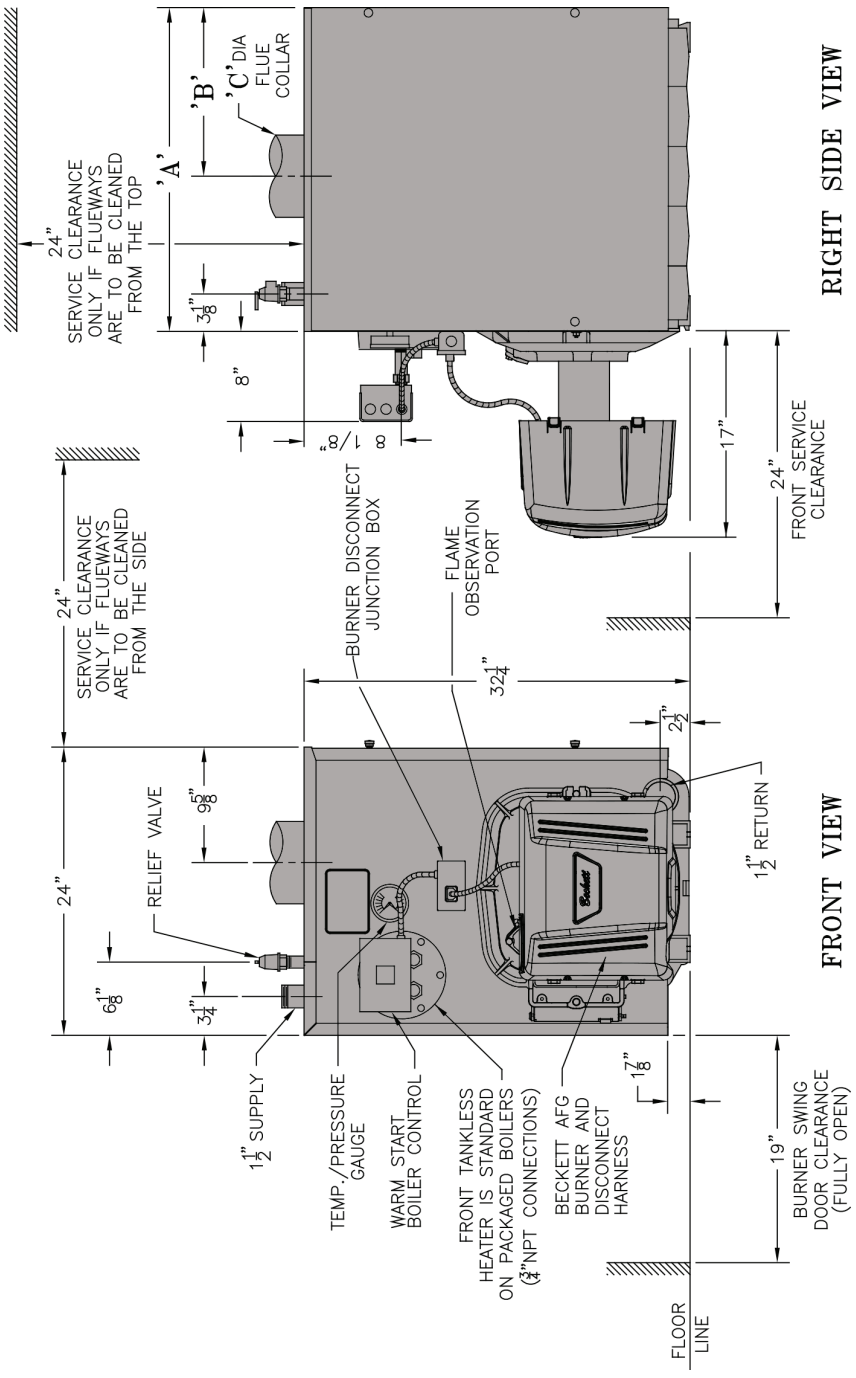


Figure 1A: Water Boiler without Tankless Heater

1 Product Description, Specification and Dimensional Data *(continued)*



NOTES:
1. WIRING HARNESSES, RETURN PIPING AND CIRCULATOR NOT FURNISHED WITH KNOCKDOWN BOILERS.

Figure 1B: Water Boiler with Front Tankless Heater

1 Product Description, Specification and Dimensional Data *(continued)*

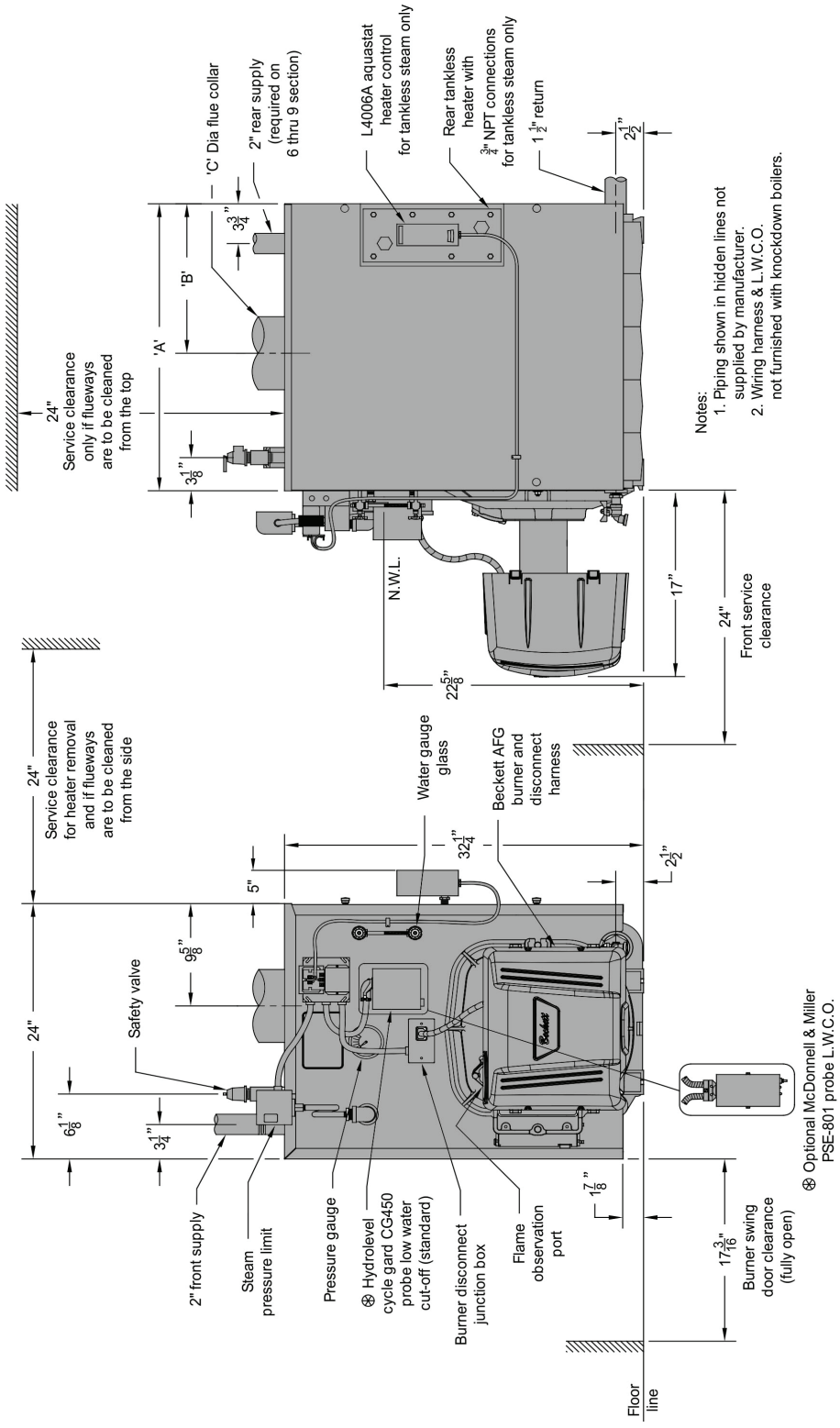


Figure 1C: Steam Boiler with or without Tankless Heater

2 Pre-Installation

A. **INSPECT SHIPMENT** carefully for any signs of damage.

1. All equipment is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of crated boiler to the carrier in good condition.
2. Any claims for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within sixty (60) days after receipt of goods.

B. **LOCATE BOILER** in front of final position before removing crate. See Figures 1A thru 1C.

1. LOCATE so that vent pipe connection to chimney will be short and direct.
2. BOILER IS SUITABLE FOR INSTALLATION ON COMBUSTIBLE FLOOR. Boiler cannot be installed on carpeting.
3. FOR BASEMENT INSTALLATION, provide a solid elevated base, such as concrete, if floor is not level, or if water may be encountered on floor around boiler.
4. PROVIDE SERVICE CLEARANCE of at least 24” clearance from front jacket panel for servicing and removal of front tankless heater. If boiler is equipped with a rear tankless heater, provide at least 24" service clearance on the right side of the boiler. Boiler flueways may be cleaned either from the top or from the right side. Provide at least 24" clearance from either the right side of the boiler or the top of the boiler for cleaning flueways.
5. For minimum clearances to combustible materials. See Figure 2.

C. **PROVIDE COMBUSTION AND VENTILATION AIR.** Local and National Codes may apply and should be referenced.

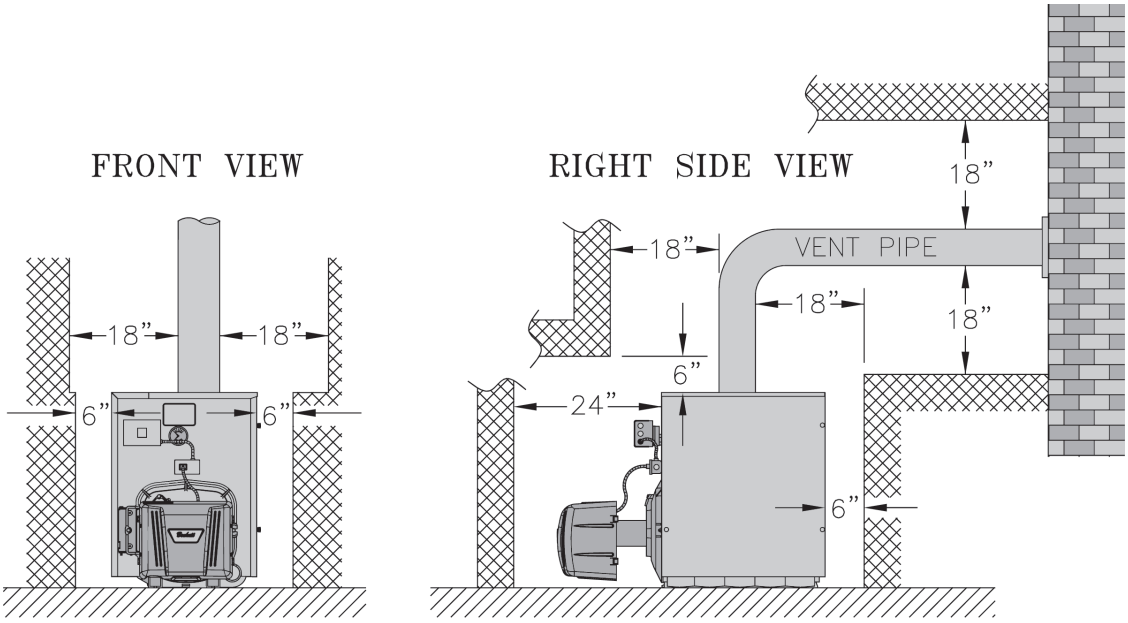


Figure 2: Minimum Installation Clearances To Combustible Materials (Inches)

NOTES:

1. Listed clearances comply with American National Standard ANSI/NFPA 31, Installation of Oil Burning Equipment.
2. V8H Series boilers can be installed in rooms with clearances from combustible material as listed above. Listed clearances cannot be reduced for alcove or closet installations.
3. For reduced clearances to combustible material, protection must be provided as described in the above ANSI/NFPA 31 standard.

2 Pre-Installation *(continued)*

NOTICE: Clearance to venting is for single wall vent pipe. If Type L vent is used, clearance may be reduced to the minimum required by the vent pipe manufacturer.

⚠ WARNING

Adequate combustion and ventilation air must be provided to assure proper combustion and to maintain safe ambient air temperatures.

DO NOT install boiler where gasoline or other flammable vapors or liquids, or sources of hydrocarbons (i.e. bleaches, fabric softeners, etc.) are used or stored.

1. Determine volume of space (boiler room). Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, are considered a part of the space.
   Volume(ft^3) = Length(ft) x Width(ft) x Height(ft)
2. Determine total input of all appliances in the space.
   Add inputs of all appliances in the space and round the result to the nearest 1000 BTU per hour.
3. Determine type of space. Divide Volume by total input of all appliances in space. If the result is greater than or equal to 50 ft^3/1000 BTU per hour, then it is considered an *unconfined space*. If the result is less than 50 ft^3/1000 BTU per hour then the space is considered a *confined space.*
4. For boiler located in an *unconfined space of a conventionally constructed building*, the fresh air infiltration through cracks around windows and doors normally provides adequate air for combustion and ventilation.
5. For boiler located in a confined space or an unconfined space in a building of unusually tight construction, provide outdoor air.
   a. Outdoor air for combustion may be provided with an optional U.S. Boiler Company V8H™ Fresh Air Accessory Kit **(ONLY AVAILABLE ON BECKETT BURNERS WITH PLASTIC COVER APPLICATION, P/N 102119-01)**. Refer to Fresh Air Accessory Kit Instructions for installation and air intake piping details.

   or

   b. Outdoor air may be provided with the use of two permanent openings which communicate directly or by duct with the outdoors or spaces (crawl or attic) freely communicating with the outdoors. Locate one opening within 12 inches of top of space. Locate remaining opening within 12 inches of bottom of space. Minimum dimension of air opening is 3 inches. Size each opening per following:
      i. **Direct communication with outdoors.** Minimum free area of 1 square inch per 4,000 BTU per hour input of all equipment in space.
      ii. **Vertical ducts.** Minimum free area of 1 square inch per 4,000 BTU per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.
      iii. **Horizontal ducts.** Minimum free area of 1 square inch per 2,000 BTU per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.
      Alternate method for boiler located within confined space. Use indoor air if two permanent openings communicate directly with additional space(s) of sufficient volume such that combined volume of all spaces meet criteria for unconfined space. Size each opening for minimum free area of 1 square inch per 1,000 BTU per hour input of all equipment in spaces, but not less than 100 square inches.
6. Louvers and Grilles of Ventilation Ducts
   a. All outside openings should be screened and louvered. Screens used should not be smaller than 1/4 inch mesh. Louvers will prevent the entrance of rain and snow.
   b. Free area requirements need to consider the blocking effect of louvers, grilles, or screens protecting the openings. If the free area of the louver or grille is not known, assume wood louvers have 20-25 percent free area and metal louvers and grilles have 60-75 percent free area.
   c. Louvers and grilles must be fixed in the open position, or interlocked with the equipment to open automatically during equipment operation.

3 KnockDown Boiler Assembly

A. REMOVAL OF BARE BOILER FROM SKID

1. Boiler is secured to skid with 4 bolts, 2 in front and 2 in rear of shipping skid, see Figure 3. Remove all bolts.

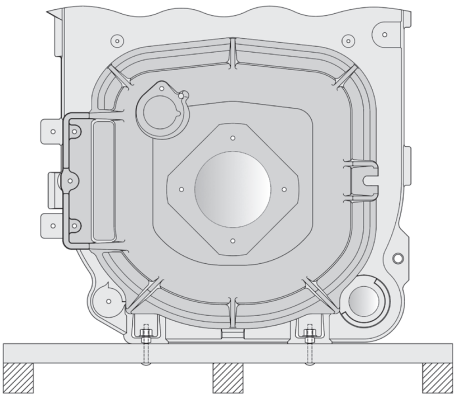


Figure 3: Knockdown Boiler Removal from Skid

2. Tilt boiler to right and to rear. Using right rear leg as pivot, rotate boiler 90° in a clockwise direction, and lower left side of boiler to floor. Tilt boiler and remove skid.

B. MOVE BOILER TO PERMANENT POSITION by sliding or walking.

C. TEST BOILER FOR LEAKS before installing controls, trim, and jacket, and before connecting to heating system.

1. Loosen nuts on tie rods until only finger tight.
2. Install pressure gauge (at least 50 PSI capacity), a hose to the city water and a valve in the supply tapping. Plug remainder of tappings.
3. Fill boiler with water and apply a pressure of at least 10 PSI but no more than 50 PSI gauge pressure.

⚠ WARNING

Assure that there is not air left inside boiler when checking for leaks. DO NOT test for leaks with pressurized air.

4. Examine boiler carefully inside and outside for leaks or damage due to shipment or handling.

D. DRAIN WATER FROM BOILER. Remove gauge, valve and plugs from those tappings to be used. Leave other tappings plugged or bushed according to Figure 5.

E. INSPECT JOINTS BETWEEN SECTIONS. All joints are factory sealed. If there are any spaces due to shipment or handling, seal them with boiler putty.

F. INSPECT FLUE COVER PLATES for tightness. If loose, retighten mounting hardware. If flue plate or sealing rope is damaged, repair or replace as needed.

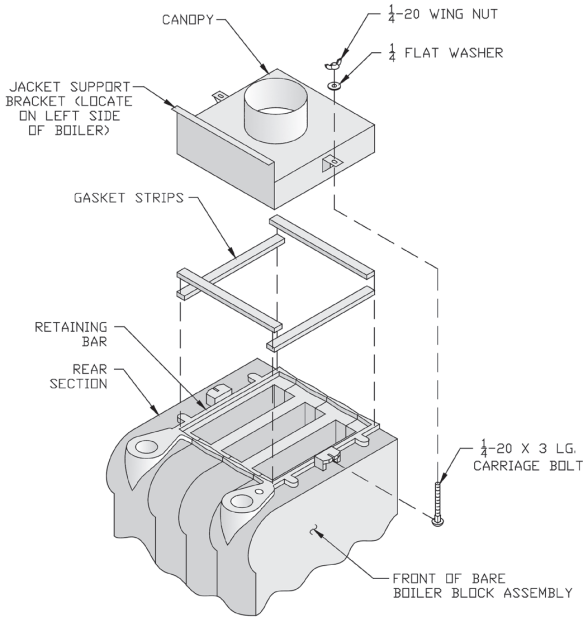


Figure 4: Boiler Canopy Installation

G. INSTALL AND SECURE CANOPY with gasket and hardware provided to ensure gas tight seal — see Figure 4.

1. Cut two (2) strips 13 ¾" long from the roll of gasket insulation. Place one (1) strip across the top of the front section and the other across the rear section as shown in Figure 4.
2. Cut the remainder of the roll into two (2) equal pieces. Place each piece along the sides, allowing the ends to overlap the front and rear pieces.

⚠ CAUTION

DO NOT allow any flueway blockage by gasket.

3. Position canopy body within the retaining bar which borders the flueway openings on top of the bare boiler block assembly.

NOTICE Jacket support bracket must be facing left side of boiler - see Figure 4. Jacket will not fit if bracket is not oriented correctly.

4. Secure canopy to boiler with two (2) 1/4" - 20 x 3" long carriage bolts, 1/4" flat washers and 1/4" - 20 wing nuts provided.

3 KnockDown Boiler Assembly *(continued)*

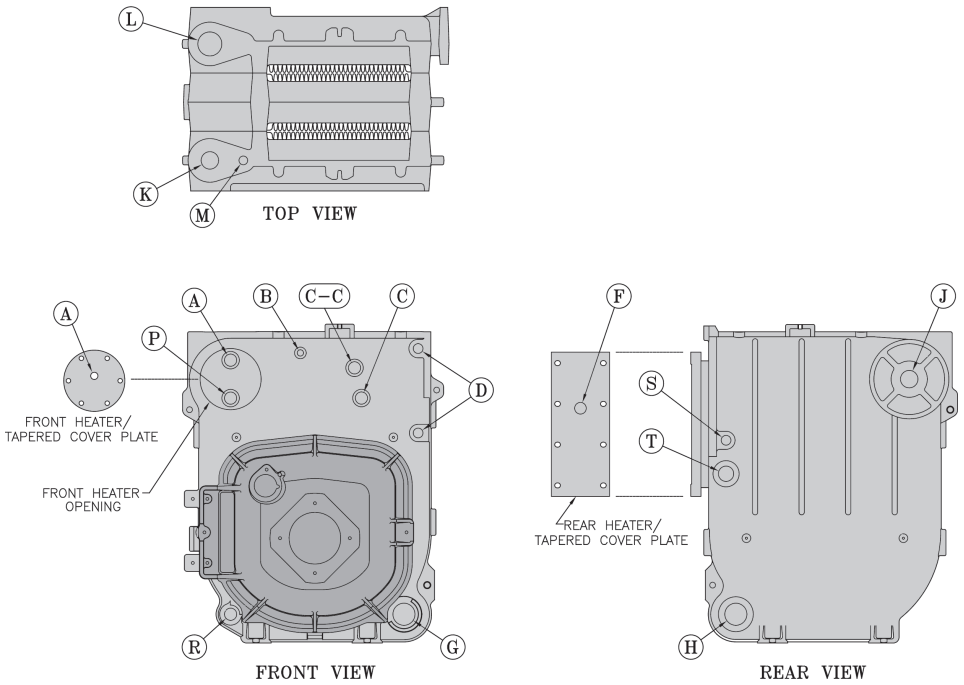


Figure 5: Boiler Tapping Locations and Usage (Knockdown Boilers Only)

PURPOSE OF TAPPINGS					
Tapping Location	Size NPT	Steam Boiler		Water Boiler	
		Non-Heater	Rear Heater	Non-Heater	Front Heater
A	¾"	Pressure Limit (Probe LWCO)		Boiler Control	Boiler Control
B	¼"	Pressure Gauge		Temperature/Pressure Gauge	
C	¾"	Probe LWCO Std.		N/A	
C-C	¾"	Flush Plug	Flush Plug	N/A	
D	½"	Water Gauge Glass (Probe LWCO)		N/A	
F	¾"	N/A	L4006A Operating Control	N/A	N/A
G	1½"	Bushed to ¾" for Drain Valve (Optional Return)		Return	
H	1½"	Return		Plugged	
J	1½"	Surface Blowoff - Plugged		Flush Plug	
K	2"	Front Supply		Front Supply	
L	2"	Required Second Supply		Plugged	
M	¾"	Safety Valve		Relief Valve	
P	¾"	Auxiliary Tapping - Plugged		Aux. Tapping - Plugged	N/A
R	¾"	Aux. Tapping - Plugged (Indirect Return)	Aux. Tapping - Plugged (Indirect Return) *	Auxiliary Tapping - Plugged	
S	½"	Indirect Limit	Indirect Limit *	N/A	
T	1"	Indirect Supply	Indirect Supply *	N/A	

* In lieu of Tankless Heater

3 KnockDown Boiler Assembly *(continued)*

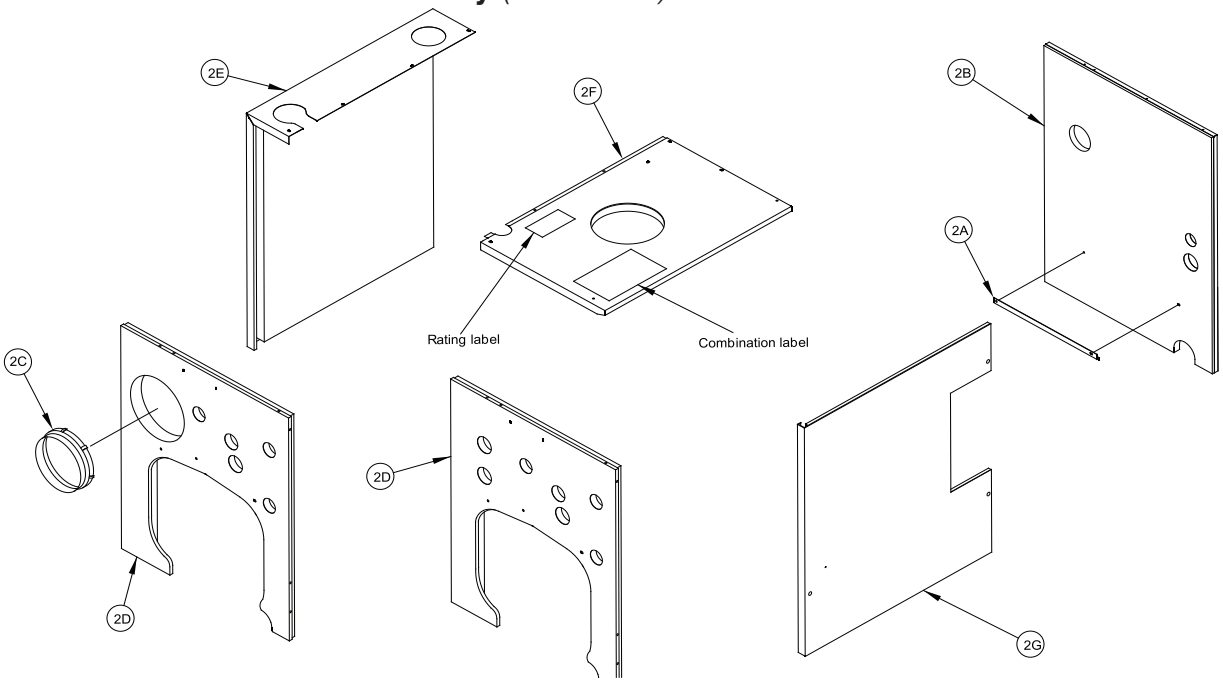


Figure 6: Knockdown Boiler Jacket Assembly

H. INSTALL TRIM. The following steam or water trim will be concealed or inaccessible after boiler jacket is installed, see Figure 5 for boiler tapping locations and usage.

1. STEAM BOILER — Top tappings:
   a. Tapping "M" — Install ¾" NPT coupling and ¾" NPT x 8" long nipple into ¾" NPT tapping located next to front section top supply tapping — all boiler sizes.
2. WATER BOILER — Top tappings:
   a. Tapping "L" — Install 2" NPT plug in rear section top supply tapping — all boiler sizes.
   b. Tapping "M" —Install ¾" NPT x 8" long nipple into ¾" NPT tapping located next to front section top supply tapping — all boiler sizes.

I. INSTALL BOILER JACKET. (See Figure 6).

1. Remove burner swing door and hinge assembly. Remove one (1) 5/16"-18 flange nut and washer from right side latching stud and one (1) 5/16"- 18 x 3½" cap screw on left side used for securing burner swing door to the boiler section. Swing door open and remove 5/16" hairpin cotter from rear hinge pin (see Figure 7). While holding swing door remove hinge pin and set door aside. Remove two (2) 5/16"-18 x ¾" long cap screws securing the hinge bracket to the boiler section.
2. Install jacket rear panel support bracket. (See Figure 6, Item 2A). Align bracket with two (2) 5/16"-18 tapped holes in rear section and secure with two (2) 5/16"-18 x 1/2" long cap screws.
3. Install jacket rear panel. (See Figure 6, Item 2B). Align holes in jacket rear panel and support bracket. Secure with two (2) #8 x 1/2" long sheet metal screws.
4. Jacket Front Panel
   a. Install black plastic collar extension to jacket front panels for 7-13/16" diameter tankless heater opening. (See Figure 6, Items 2C and 2D). Engage two (2) of the collar retaining tabs over raw edge of jacket opening. Provide support behind the panel with one hand while applying pressure on collar to snap each tab over edge of opening until all eight (8) tabs are securing collar.
   b. Install jacket front panel. Locate two (2) 11/32" diameter holes, one round, one obround, on front panel approximately 16" up from the bottom of the panel. Align these holes with the similarly located 5/16"-18 tappings on the front section. Secure with two (2) 5/16"-18 x 1/2" long cap screws.

3 KnockDown Boiler Assembly *(continued)*

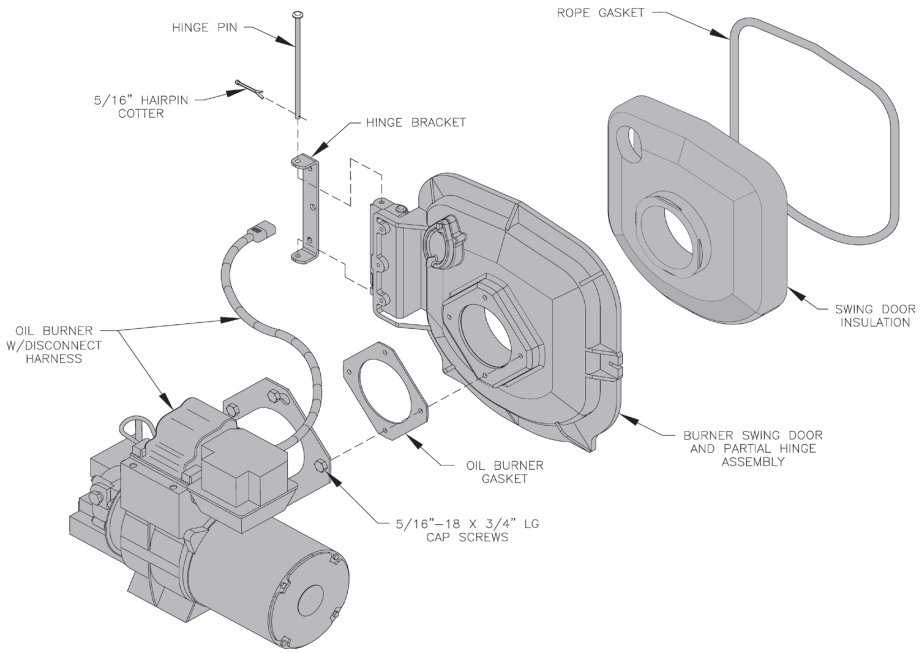


Figure 7: Oil Burner Installation (Beckett Burner Shown)

5. Install jacket left side panel. (See Figure 6, Item 2E). Fold panel at perforation keeping insulation inward. Align left side panel mounting holes with the front and rear panel holes. Secure with #8 x ½" long sheet metal screws.
6. Install jacket top panel. (See Figure 6, Item 2F). Place jacket top panel on boiler and secure to front, rear and left side panels with #8 x ½" long sheet metal screws.
7. Install jacket right side access panel. (See Figure 6, Item 2G). Align right side panel mounting holes with front and rear panel holes. Secure with #8 x ½" long sheet metal screws.
8. Attach the labels shipped in the instruction envelope as follows:
   a. Locate both the Rating Label and Combination Warning Label (P/N 102801-03). Remove paper backing from the labels and apply to the jacket top panel in approximate locations shown in (Figure 6, Item 2F).
   b. <u>On steam boilers only</u>; locate Lowest Permissible Water Level Plate (P/N 81460009 shipped in Steam Trim Carton). Align plate with two 1/8" diameter holes located near the front edge; in line with the lower sight glass tapping, of the jacket right side access panel. Attach plate with two (2) #8 x 1/2" long sheet metal screws. (See Figure 6, Item 2G).

J. <u>INSTALL OIL BURNER.</u>
(See Figure 7).

1. Check target wall and combustion chamber blanket. If any damage or movement occurred during shipment, replace as needed.
2. Locate burner swing door and hinge assembly removed in Paragraph I, No. 1. Check the burner swing door insulation and rope gasket for damage and adhesion. If damaged, replace insulation or gasket. If insulation or gasket is loose, reattach to swing door with RTV 732 or 736 silicone caulk.
3. Install burner swing door in reverse order from Paragraph I, No. 1.
4. Use the following procedure to properly close and secure the burner swing door after it has been removed and re-installed for Field Assembly (Knockdown Boiler) or opened for inspection, cleaning or field service (refer to Figures 11A and 11B):

   Step 1. Lift the door up unto the built-in cast ramp/door rest (protruding from the bottom of the front section casting - see Figure 11A), while rotating the articulated hinge and door to the right and engaging the slot (on right side of door) unto the 5/16" stud protruding from the front section.

3 KnockDown Boiler Assembly *(continued)*

Step 2. Use one hand to help hold door in position by applying pressure directly to the door while re-installing the securing hardware with your opposite hand. **Always install right side latching hardware (5/16" flange nut and flat washer) first, then install left side hinge hardware (5/16" x 3-1/2" lg. hex head flange bolt) second.** Apply additional pressure while hand tightening the hardware as far as possible, then release the pressure.

NOTICE When securing burner swing door make sure door is drawn-in equally on both sides.

Step 3. Use a hand wrench to tighten door hardware and **always start with the right side flange nut first** (see Figure 12B). Use an alternating tightening method from right side flange nut to left side flange bolt to tighten door equally until sealed without applying excessive torque. **Never** tighten left side flange bolt first or tighten either piece of hardware 100% without using the alternating tightening method described above.

Failure to follow the prescribed procedure could cause thread damage to casting or a leak in the door seal. If left side flange bolt is tightened before right side flange nut, right side of door can not be drawn-in to provide an air tight seal, as shown in Figure 12. Applying excessive torque will only cause thread damage.

5. Place oil burner gasket on burner and align holes.

⚠ CAUTION

DO NOT install burner without gasket.

6. Back out (4) 5/16"-18 x 3/4" long cap screws factory installed into burner swing door about 1/4". Insert oil burner into the opening of the burner door, rotate slightly clockwise to align burner mounting flange teardrop cutouts with cap screw hex heads and engage all four cap screws simultaneously. Then, rotate the burner slightly counterclockwise, level it and fully tighten all four cap screws.
7. Inspect electrodes, head setting and factory installed oil nozzle. Refer to the instructions provided with the burner and Table 12.

K. INSTALL TRIM AND CONTROLS - Water Boilers Only (See Figures 1A, 1B, 1C and 5).

1. Thread combination pressure/temperature gauge into ¼" NPT tapping. Tighten with wrench applied to the square shank of the gauge.
2. Lower front section tapping "G" is used for standard return on water boilers, see Figure 5. If circulator (supplied with boiler) is to be mounted in return piping connected directly to 1½" NPT boiler return tapping "G", use the piping arrangements outlined in steps a. thru e. as follows: (see Figures 14A and 14B)
   a. Thread 1½" NPT x 3" long nipple and 1½" NPT x 90° elbow with ¾" NPT side outlet into the return tapping and tighten with a pipe wrench.
   b. Screw drain valve into ¾" NPT side outlet of the 1½" NPT x 90° elbow.
   c. Thread 1½" NPT x 18" long nipple (supplied by others) into the 1½" NPT x 90° elbow and tighten with a pipe wrench.
   d. Thread one of the circulator flange onto the nipple and tighten with a pipe wrench. Position flange so that the bolt slots are parallel to the boiler front.
   e. Place a circular flange gasket in the flange groove on the circulator and mount the circulator on the flange. Note that this is the return piping and the flow arrow on the circulator should point down ↓. Fasten circulator with 7/16" - 14 x 1½" long cap screws and 7/16" - 14 nuts.
   f. Fasten the second circulator flange and gasket to the circulator.
   g. Remove supplied circulator harness from Part Bag. Remove circulator junction box cover and knockout in circulator junction box flange. Insert harness end with two wires having bare-stripped ends through knockout hole and push-in to engage harness connector into flange. Connect harness conductors to circulator junction box wires as follows - White to White and Blue to Yellow (or, Blue) and secure with wire nuts (installer provided).
3. Install relief valve, as shown in Figure 1A, 1B, and 1C, onto ¾" NPT x 8" nipple previously installed in Paragraph H, No. 2, step b.

3 KnockDown Boiler Assembly *(continued)*

⚠ WARNING

Safety valve discharge piping must be piped near floor to eliminate potential of severe burns. DO NOT pipe in any area where freezing could occur. DO NOT install any shut-off valves, plugs or caps.

Tighten with wrench. Pipe discharge as shown in Figures 14A and 14B. Installation of the relief valve must be consistent with ANSI/ASME Boiler and Pressure Vessel Code, Section IV.

4. On boilers without a heater opening, install the well into the 3/4" NPT tapping "A" located on the front of the boiler in the upper left corner. See Figures 1A and 5. Tighten the well and fully insert limit sensor into immersion well such that the tip on the limit sensor touches the bottom of the immersion well. See Figure 8. Secure control to immersion well with setscrew.

⚠ WARNING

Aquastat bulb must be fully inserted into the well.

5. On boilers with a heater opening, install the well in either the 1/2" NPT or 3/4" NPT tapping on the tankless heater plate or cover plate. See Figures 1B, 1C and 5. Tighten the well and fully insert limit sensor into immersion well such that the tip on the limit sensor probe touches the bottom of the immersion well. See Figure 8. Secure control to immersion well with setscrew.
6. After control is installed and secured, remove control cover. Then, remove knockout located directly above factory connected limit harness on right side flange of control. Insert circulator harness end with attached fork terminals thru knockout hole and push-in to engage harness connector into flange. Connect wires to control terminals as follows - Blue to C1 and White to C2 and tighten securely. Re-install control cover.
7. Connect Field Wiring.
   a. Water boilers without tankless heater. Connect the field wiring to the aquastat control. Make the wiring connections as shown on Figure 20A.
   b. Water boilers with front tankless heater. Connect the field wiring to the aquastat control. Make the wiring connections as shown on Figure 20B.
   c. Refer to Paragraph R for details on use of burner disconnect junction box provided with all knockdown boiler builds.

L. INSTALL TRIM AND CONTROLS - Steam Boiler Only (see Figures 1D & 5).

1. Thread the pressure gauge into the ¼" NPT tapping "B", of the front section. Tighten with wrench applied to the square shank of the gauge.

⚠ CAUTION

DO NOT apply pressure to the gauge case - this may result in inaccurate readings.

2. Thread 1½" NPT x ¾" NPT bushing and a ¾" NPT drain valve into the 1½" NPT tapping located in the lower right corner of the front section. Tighten with wrench.

NOTICE Lower rear section Tapping "H" is used for standard condensate return on steam boilers.

3. Thread safety valve, as shown in Figure 1D, into ¾" NPT coupling and ¾" NPT x 8" nipple previously installed in Paragraph H, No. 1, step b. Tighten with wrench. Pipe discharge as shown in Figure 16. Installation of the safety (relief) valve must be consistent with ANSI/ASME Boiler and Pressure Vessel Code, Section IV.
4. Install probe type Low Water Cut-Off (LWCO).

⚠ WARNING

Safety valve discharge piping must be piped near floor to eliminate potential of severe burns. DO NOT pipe in any area where freezing could occur. DO NOT install any shut-off valves, plugs or caps.

a. Thread probe into ¾" NPT tapping "C" located on the front section, down and to the right of the pressure gauge. Slip the low water cut-off (LWCO) control over the probe and clamp in place. Connect the wire(s) between the probe and control per the manufacturer's instructions.

⚠ WARNING

Read the manufacturer's instructions packed with the probe LWCO for proper pipe dope application. DO NOT use Teflon tape on probe threads. Use of teflon can render the probe LWCO inoperational.

3 KnockDown Boiler Assembly *(continued)*

b. Install the gauge glass using the two ½" NPT tappings to the right of the probe LWCO.

5. Install Pressure Limit Control.
   a. Probe LWCO only: Install Limit in Tapping "A" using ¾" NPT x 3" long nipple, ¾" NPT elbow, ¾" NPT x ¼" NPT bushing, and syphon. See Figures 5 and 9.
   b. **DO NOT** tighten the limit by holding the case; apply a wrench to the brass hex below the case.
   c. An L404F pressure limit does not require leveling.
6. Connect the field wiring to the LWCO or the R8239A Control Center/J-box, or burner disconnect J-box.
   a. If equipped with tankless heater, connect field wiring from the aquastat control to the R8239A Control Center transformer terminals or oil burner primary control's "T-T" terminals.
   Make the wiring connections as shown in appropriate wiring diagram, refer to Figure 20A thru 23.
   Note: DO NOT remove "T-T" jumper unless wiring diagram indicates a direct connection from thermostat and/or tankless heater aquastat control to the oil burner primary control's "T-T" terminals.
   Also refer to Section XI, Paragraph I, Item 2, "Verify Oil Primary Control" for more details.
   b. Refer to Paragraph O for details on use of burner disconnect junction box provided with all knockdown boiler builds.

M. BURNERS SUPPLIED BY U.S. BOILER COMPANY utilize a burner disconnect harness that is pre-wired into the burner junction box and primary control. Packed in the canopy carton is the mating burner disconnect junction assembly and mounting hardware for use with these burners.

If you are using a burner with the disconnect harness, complete the following assembly instructions for mounting the mating burner disconnect junction box, see Figure 11.

1. Remove (2) #6 x 1/2" lg. machine screws and J-box cover from junction box.
2. Secure 2" x 4" junction box to jacket front panel with (2) #8 x 3/8" lg. sheet metal screws using pre-punched holes below tridicator or pressure gauge tapping.
3. Complete the field wiring phase of Paragraph Install end of harness from low water cut-off (LWCO), R8239A Control Center or Boiler Control into appropriate knockout of burner disconnect junction box according to source, refer to Figures 1A thru 1D.
4. Connect (3) wires from boiler control LWCO or R8239A Control Center to spade terminals on rear of power outlet receptacle. Make the connections as shown in appropriate wiring diagram based on boiler configuration, refer to Figures 20A thru 23.
5. Secure J-box cover to junction box with (2) #6 x ½" lg. machine screws.
6. Insert mating end of burner disconnect harness (power cord) into power outlet receptacle on J-box.

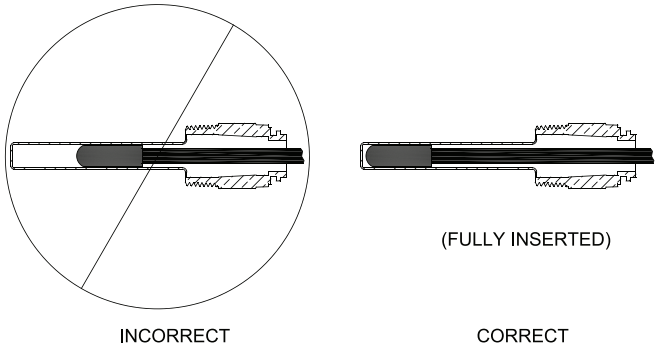


Figure 8: Limit Sensor Insertion

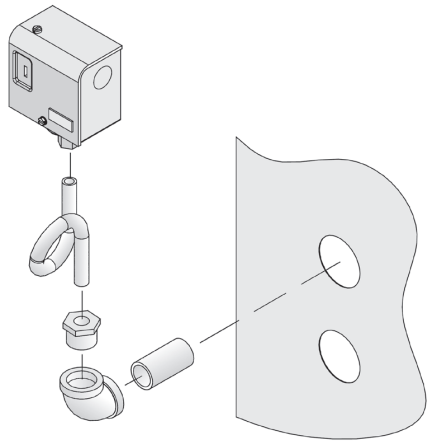


Figure 9: Pressure Limit Installation for Probe LWCO Equipped Boilers

3 KnockDown Boiler Assembly *(continued)*

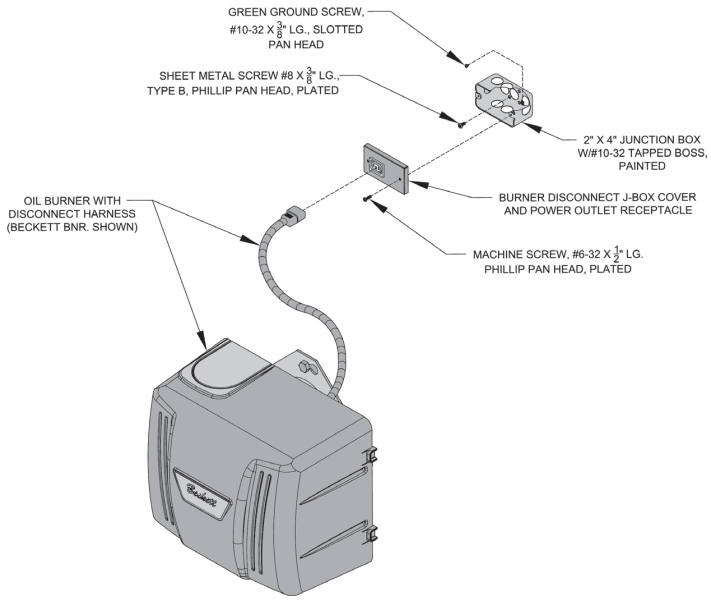


Figure 10: Burner Disconnect Junction Box with Power Outlet Receptacle (Mated to Burners with Disconnect Harness)

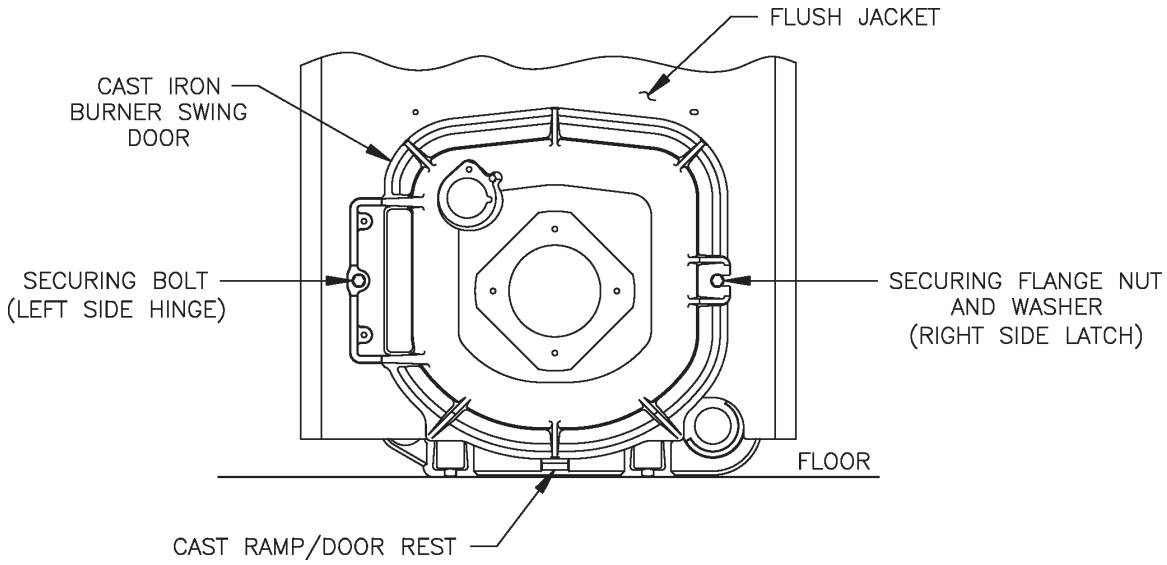


Figure 11A: Partial Front View-Burner Swing Door Mounted to Boiler-Fully Closed and Secured

3 KnockDown Boiler Assembly *(continued)*

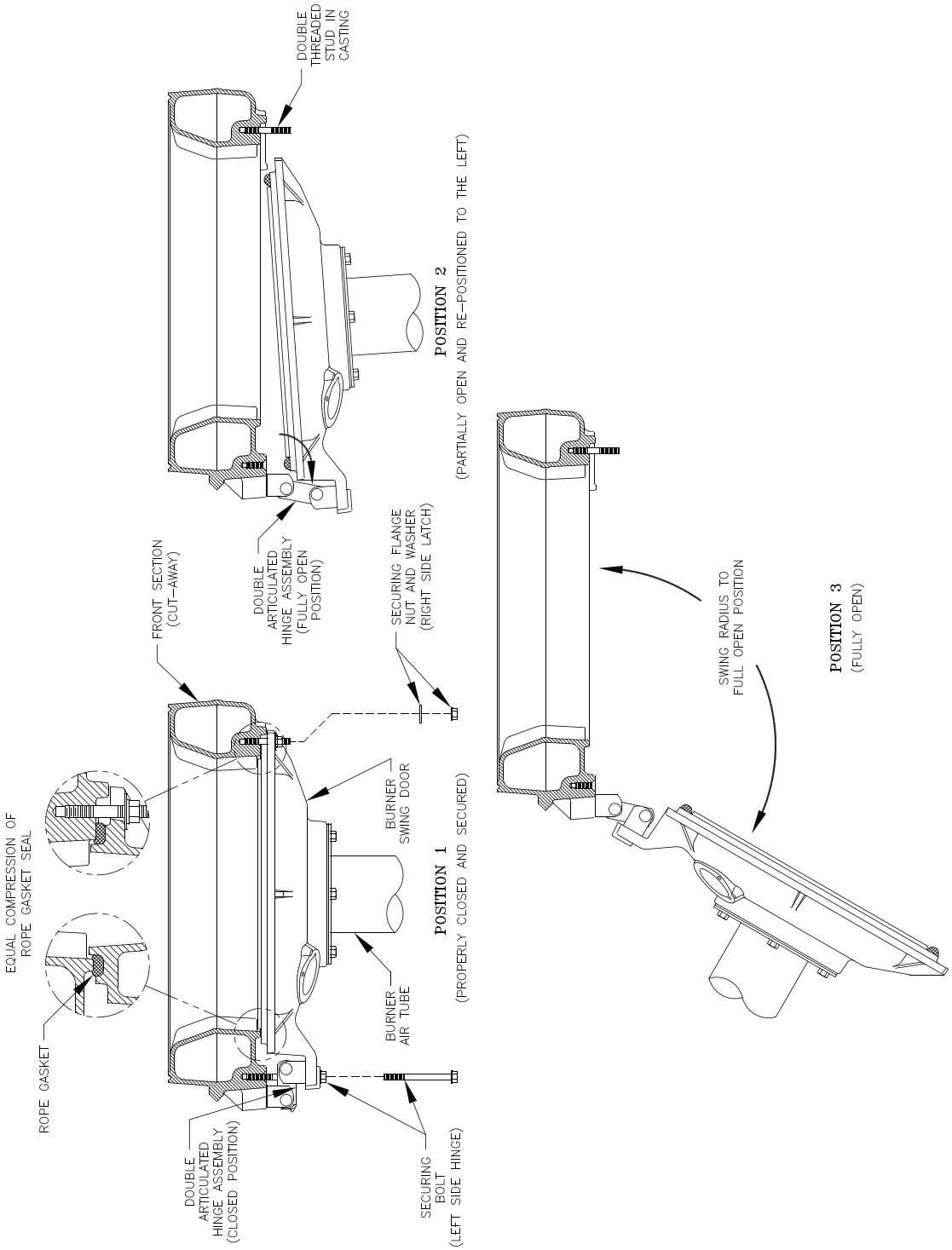


Figure 11B: Top View - Burner Swing Door Mounted to Cast Iron Block Assembly (Jacket Removed for Clarity)

3 KnockDown Boiler Assembly *(continued)*

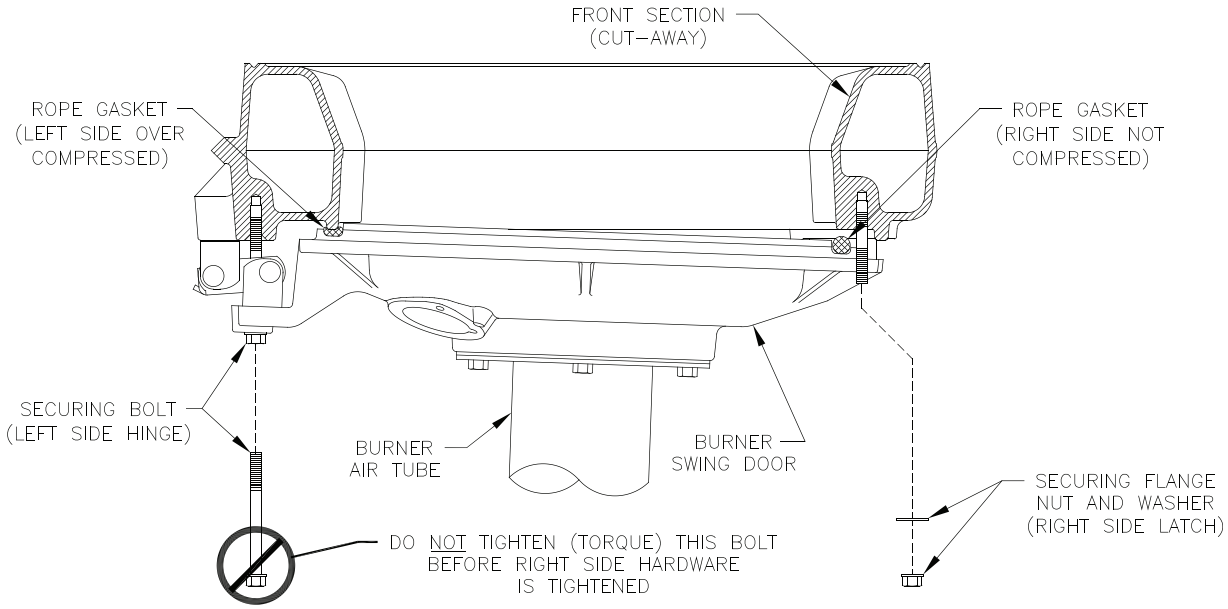


Figure 12: Top View - Burner Swing Door Fully Closed but Not Properly Secured or Sealed

4 Water Boiler Piping and Trim

NOTICE Failure to pipe boiler as specified in this manual may result in excessive system noise, water line fluctuations and water carry over.

A. EVALUATE THE EXISTING WATER SYSTEM.

Design a piping system and install boiler which will prevent oxygen contamination of boiler water and frequent water additions.

1. There are many possible causes of oxygen contamination such as:
   a. Addition of excessive make-up water as a result of system leaks.
   b. Absorption through open tanks and fittings.
   c. Oxygen permeable materials in the distribution system.
2. In order to insure long product life, oxygen sources must be eliminated. This can be accomplished by taking the following measures:
   a. Repairing system leaks to eliminate the need for addition of make-up water.
   b. Eliminating open tanks from the system.
   c. Eliminating and/or repairing fittings which allow oxygen absorption.
   d. Use of non-permeable materials in the distribution system.
   e. Isolating the boiler from the system water by installing a heat exchanger.

⚠ WARNING

System supply and return piping must be connected to correct boiler pipe.

U.S. Boiler Company recommends sizing the system circulator to supply sufficient flow (GPM) to allow a 20°F temperature differential in the system. When sizing the system circulator, the pressure drop of all radiators, baseboard and radiant tubing and all connecting piping must be considered.

⚠ CAUTION

Maintain minimum ½ inch clearance from hot water piping to combustible materials.

B. CONNECT SYSTEM SUPPLY AND RETURN PIPING TO BOILER. See Figures 14A and 14B. Also, consult Residential Hydronic Heating Installation and Design I=B=R Guide.

1. If this boiler is used in connection with refrigeration systems, the boiler must be installed so that the chilled medium is piped in parallel with the heating boiler using appropriate valves to prevent the chilled medium from entering the boiler. See Figure 13. Also, consult Residential Hydronic Heating Installation and Design I=B=R Guide.
2. If this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air, the boiler piping must be equipped with flow control valves to prevent gravity circulation of boiler water during the operation of the cooling system.
3. If boiler is used with an Indirect Domestic Water Heater, install the Indirect Water Heater as a separate heating zone. Refer to the Indirect Water Heater Installation, Operating, and Service Instructions for additional information.
4. Use a boiler bypass if the boiler is to be operated in a system which has a large volume or excessive radiation where low boiler water temperatures may be encountered (i.e. converted gravity circulation system, etc.) The bypass should be the same size as the supply and return lines with valves located in the bypass and return line as illustrated in Figures 14A and 14B in order to regulate water flow for maintenance of higher boiler water temperature.

⚠ WARNING

The use of a low water cut-off device, while not required unless radiation level is below the boiler, is highly recommended.

5. If a Low Water Cut-Off (LWCO) is required, it must be mounted in the system piping above the boiler. The minimum safe water level of a hot water boiler is just above the highest water containing cavity of the boiler; that is, a hot water boiler must be full of water to operate safely. Refer to Appendix A at the rear of this manual.
6. **If it is required to perform a long term pressure test of the hydronic system**, the boiler should first be isolated to avoid a pressure loss due to the escape of air trapped must first be removed from the boiler.

   To perform a long term pressure test including the boiler, ALL trapped air must first be removed from the boiler.

   A loss of pressure during such a test, with no visible water leakage, is an indication that the boiler contained trapped air.

4 Water Boiler Piping and Trim *(continued)*

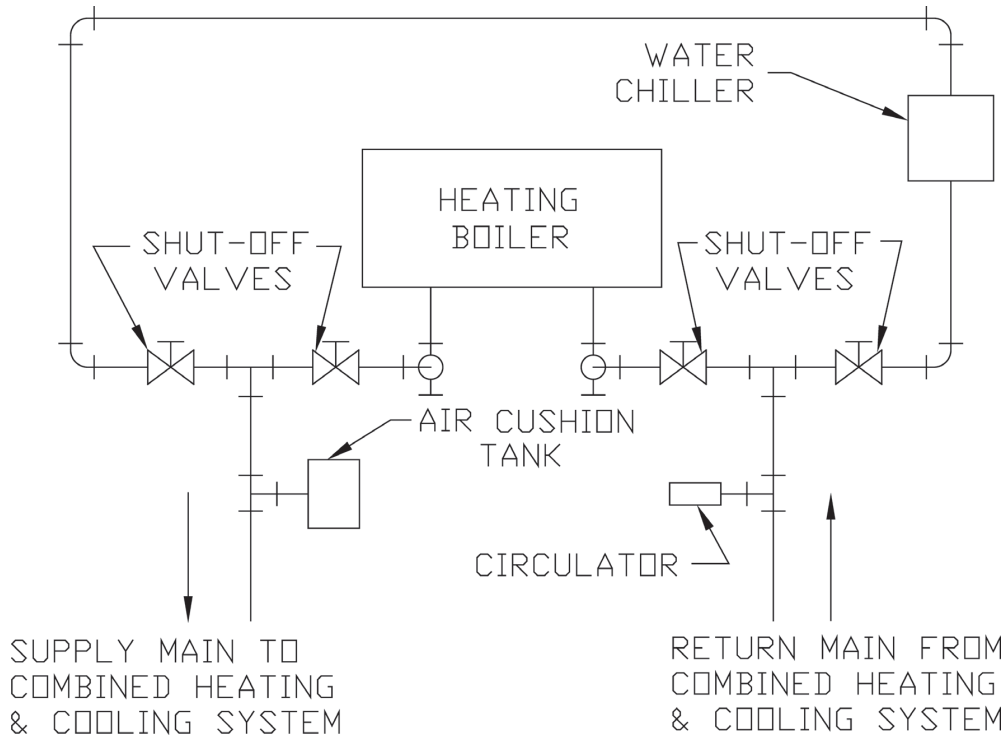


Figure 13: Recommended Piping for Combination Heating and Cooling (Refrigeration) System

4 Water Boiler Piping and Trim *(continued)*

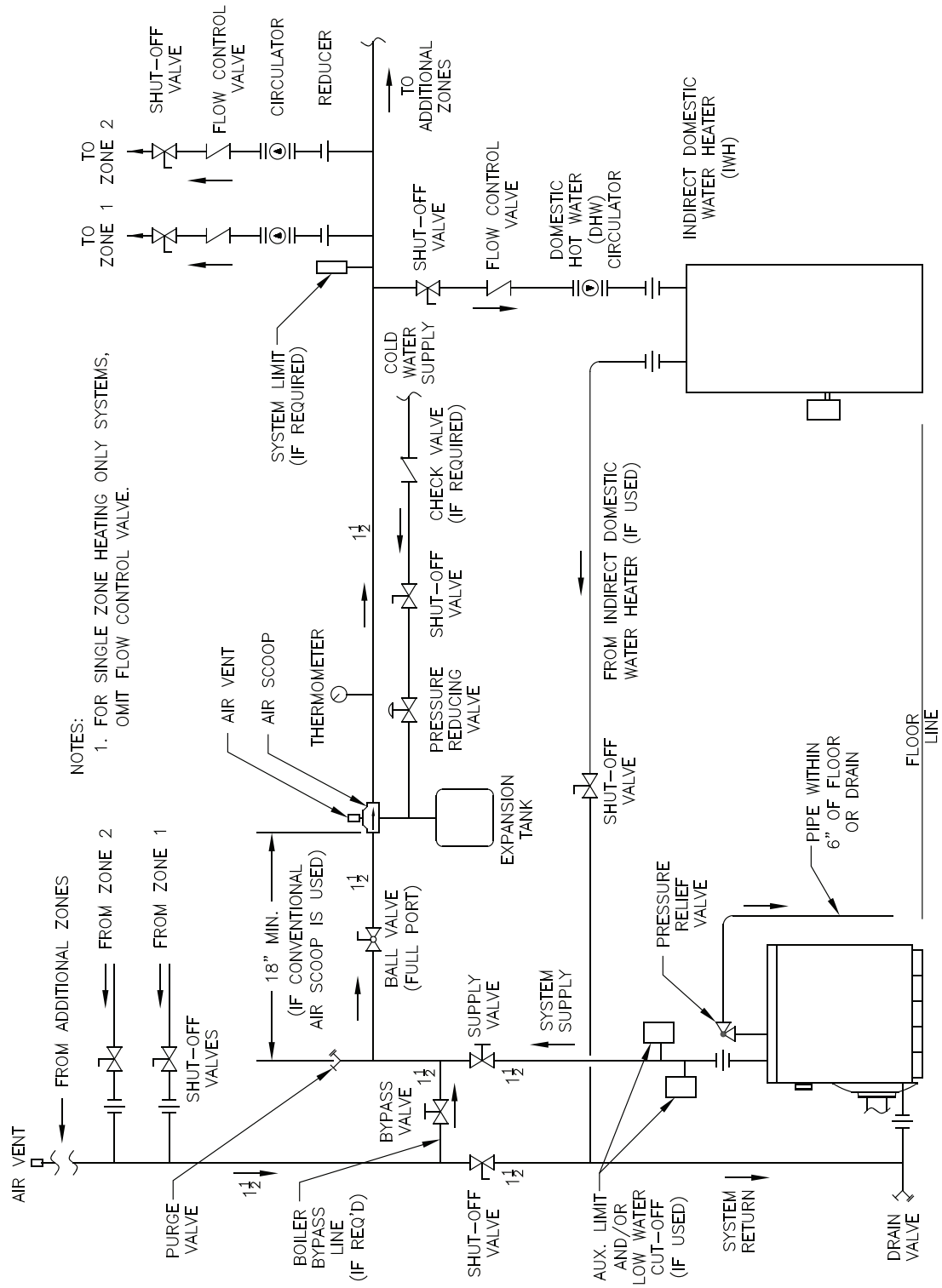


Figure 14A: Recommended Water Piping for Circulator Zoned Heating System - Supply Side Circulators

4 Water Boiler Piping and Trim *(continued)*

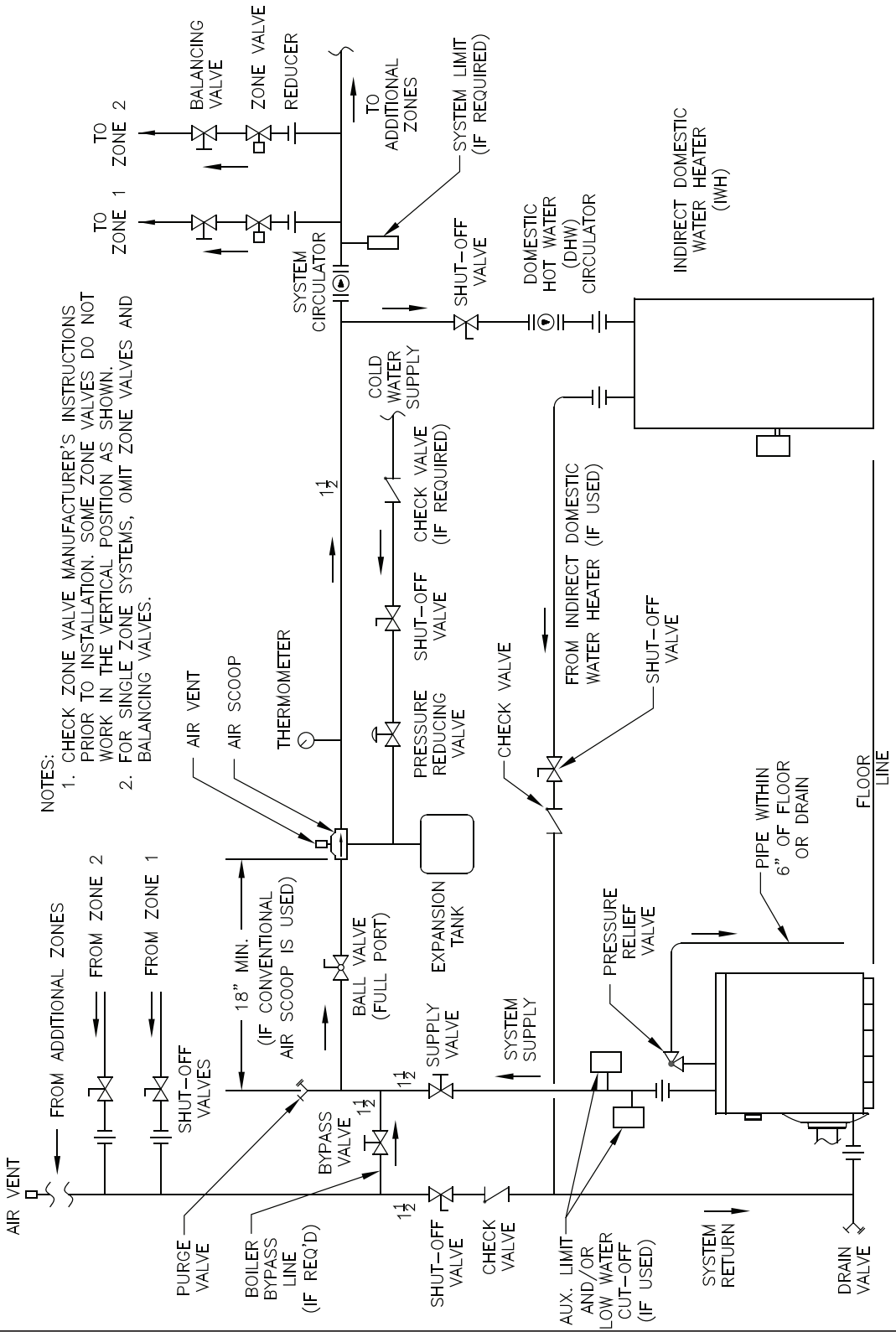


Figure 14B: Recommended Water Piping for Zone Valve Zoned Heating System - Supply Side Circulator

5 Steam Boiler Piping and Trim

⚠ WARNING

- Failure to properly pipe boiler may result in improper operation and damage to boiler or structure.
- DO NOT increase steam boiler input above the ratings.
- DO NOT use softened water in steam boilers. Accelerated boiler corrosion will result. Tie in fresh water supply to the boiler upstream of a water softener.
- Oxygen contamination of boiler water will cause corrosion of iron and steel boiler components, and can lead to boiler failure. U.S. Boiler Company's Standard Warranty does not cover problems caused by oxygen contamination of boiler water or scale (lime) build-up caused by frequent addition of water.

A. EVALUATE THE EXISTING STEAM SYSTEM.

The single most important factor in determining the expected life cycle of a steam boiler, is the amount of fresh water added to the boiler during operation. Fresh water brings minerals and oxygen into the boiler. These contaminants greatly accelerate corrosion of the cast iron boiler sections.

1. Assure that all system radiators, piping and vents are absolutely leak tight.
   a. When a steam boiler is installed in an existing system, ALL air vents should be replaced at the same time. This assures that the new boiler will not be compromised by existing system leaks.
   b. If the system contains hidden supply or return piping (hidden behind walls, buried in concrete, etc.) pressure test this piping to assure there are no leaks.
2. Repair any leaks in the system.
3. Install accurate water meter on the fresh water supply to the boiler.

B. CONNECT SYSTEM SUPPLY AND RETURN PIPING TO BOILER. See Figure 15 for piping details. Also consult Residential Hydronic Heating Installation and Design I=B=R Guide.

⚠ CAUTION

Maintain minimum ½ inch clearance from hot water piping to combustible materials.

NOTICE Before using copper for steam piping, consider the following characteristics of copper piping:

1. high coefficient of thermal expansion can induce mechanical stresses and cause expansion/ contraction noises if not accounted for in the piping system design and installation,
2. high heat transfer rate (heat loss) of uninsulated copper piping must be included in the normal piping and pickup factors used to size the boiler,
3. soldering or brazing pastes and fluxes that end up in the system can cause poor heat transfer, surging, an unsteady water line and wet steam if not thoroughly removed during the boil out procedure and,
4. galvanic corrosion of the adjoining metal may occur due to dissimilar metals in certain water chemistries if dielectric unions are not used.

5 Steam Boiler Piping and Trim *(continued)*

NOTICE Failure to pipe boiler as specified in this manual may result in excessive system noise, water line fluctuations and water carry over.

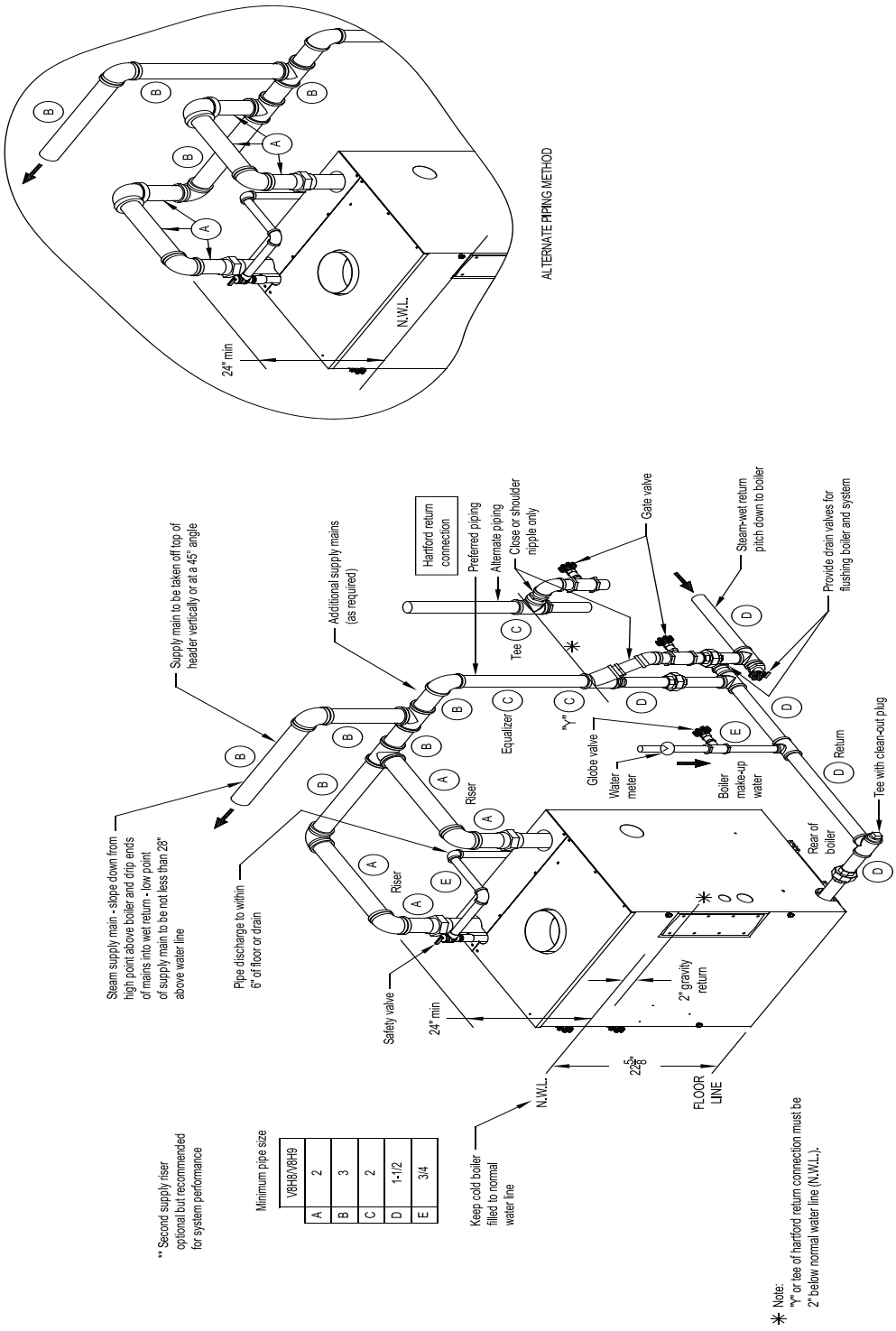


Figure 15: Recommended Boiler Piping for Gravity Return Steam Boiler

6 Tankless and Indirect Water Heater Piping

A. **CONNECT TANKLESS HEATER PIPING** as shown in Figure 16A. See Tables 2A and 2B for Tankless Heater Rating.

⚠ WARNING

Install automatic mixing valve at tankless heater outlet to avoid risk of burns or scalding due to excessively hot water at fixtures. Adjust and maintain the mixing valve in accordance with the manufacturer's instructions. DO NOT operate tankless heater without mixing valve.

THE FOLLOWING GUIDELINES SHOULD BE FOLLOWED WHEN PIPING THE TANKLESS HEATER:

1. FLOW REGULATION — If flow through the heater is greater than its rating, the supply of adequate hot water may not be able to keep up with the demand. For this reason a flow regulator matching the heater rating should be installed in the cold water line to the heater. The flow regulator should preferably be located below the inlet to the heater and a minimum of 3' away from the inlet so that the regulator is not subjected to excess temperatures that may occur during "off" periods when it is possible for heat to be conducted back through the supply line. The flow regulator also limits the flow of supply water regardless of inlet pressure variations in the range of 20 to 125 psi.
2. TEMPERING OF HOT WATER — Installation of an automatic mixing valve will lengthen the delivery of the available hot water by mixing some cold water with the hot. This prevents the possibility of scalding hot water at the fixtures. In addition, savings of hot water will be achieved since the user will not waste as much hot water while seeking a water temperature. Higher temperature hot water required by dishwashers and automatic washers is possible by piping the hot water from the heater prior to entering the mixing valve. The mixing valve should be "trapped" by installing it below the cold water inlet to heater to prevent lime formation in the valve. Refer to Figure 16A.

⚠ CAUTION

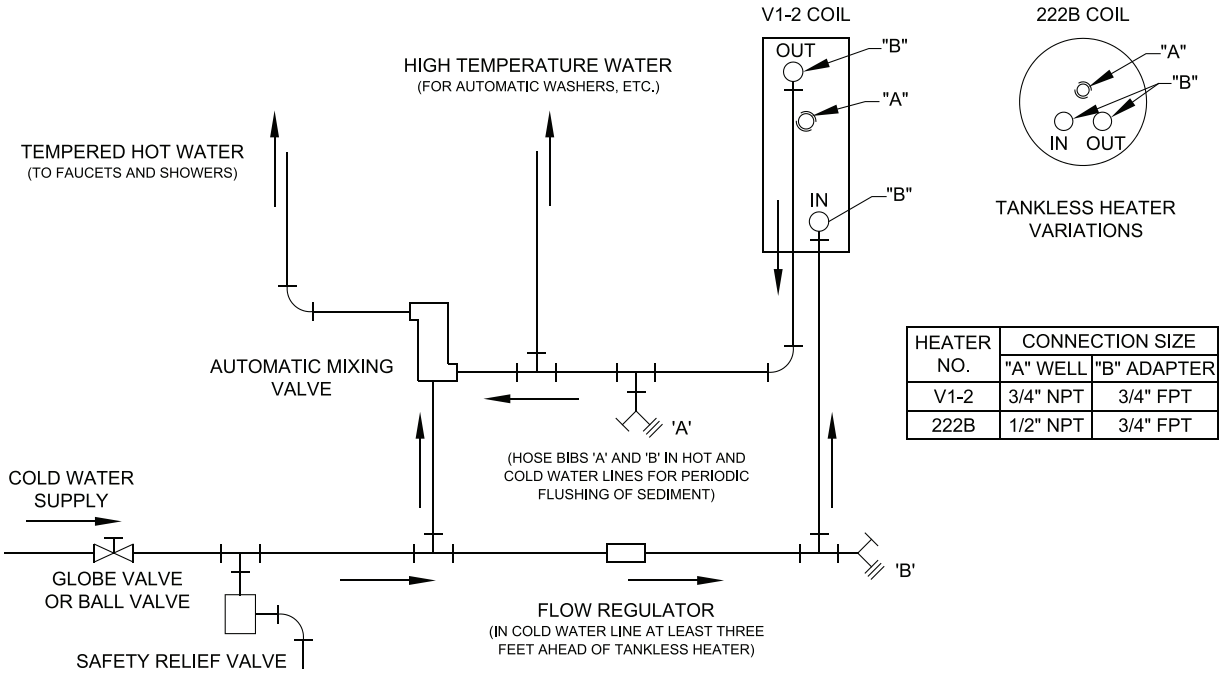
Use of hard water with a tankless coil will, over a short period of time, reduce the output of the coil, reduce flow due to increased pressure drop and reduce the useful life of the coil.

3. FLUSHING OF HEATER — All water contains some sediment which settles on the inside of the coil. Consequently, the heater should be periodically back washed. This is accomplished by installing hose bibs as illustrated and allowing water at city pressure to run into hose bib A, through the heater, and out hose bib B until the discharge is clear. The tees in which the hose bibs are located should be the same size as heater connections to minimize pressure drop.
4. HARD WATER — A water analysis is necessary to determine the hardness of your potable water. This is applicable to some city water and particularly to well water. An appropriate water softener should be installed based on the analysis and dealer's recommendation. This is not only beneficial to the tankless heater but to piping and fixtures plus the many other benefits derived from soft water.

NOTICE During summertime operation, the normal water line on a steam boiler can be raised 1", from 22-5/8" to 23-5/8" (see Figure 1C) for improved tankless heater performance on steam boilers.

Use street elbow fittings in tankless in and out connections to assure adequate clearance of piping.

6 Tankless and Indirect Water Heater Piping *(continued)*



HEATER NO.	CONNECTION SIZE	
	"A" WELL	"B" ADAPTER
V1-2	3/4" NPT	3/4" FPT
222B	1/2" NPT	3/4" FPT

Figure 16A: Schematic Tankless Heater Piping

Table 2A: Tankless Heater Data: Rear Mounted Heater on Steam and Water Boilers

Boiler Series	Heater No.	Heater Rating (GPM)		Pressure Drop thru Heater (PSI)	
		Steam	Water	Steam	Water
V8H8	V1-2	4	4.5	8	9.8
V8H9	V1-2	4	4.5	8	9.8

Table 2B: Tankless Heater Data: Front Mounted Heater on Water Boilers

Boiler Series	Heater No.	Heater Rating (GPM)	Pressure Drop thru Heater (PSI)
V8H8	222B	4.50	46.4
V8H9	222B	5.00	52.0

6 Tankless and Indirect Water Heater Piping *(continued)*

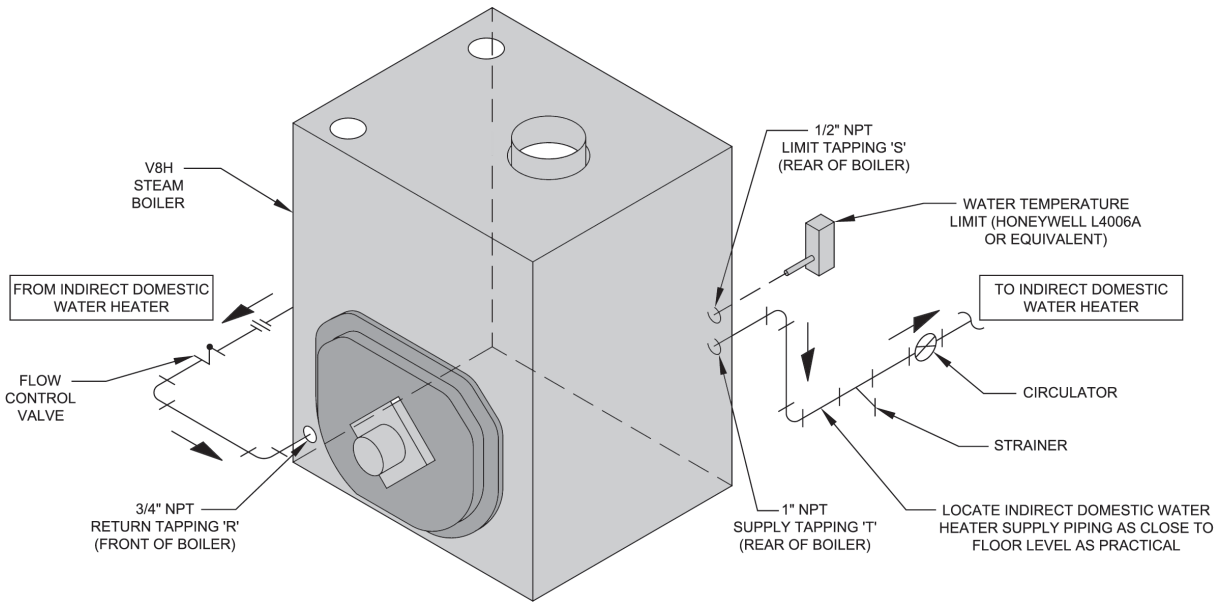


Figure 16B: Indirect Domestic Water Heater Piping with V8H Steam Boiler

B. CONNECT INDIRECT DOMESTIC WATER HEATER PIPING as shown in Figure 16B.

1. Refer to Indirect Water Heater Installation, Operating, and Service Instructions for additional information.

7 Venting and Air Intake Piping

⚠ WARNING

- Vent this boiler according to these instructions. Failure to do so may cause products of combustion to enter the home resulting in severe property damage, personal injury or death.
- Insufficient Combustion Air Supply may result in the production and release of deadly carbon monoxide (CO) into the home which can cause severe personal injury or death.
- Improper venting may result in property damage and the release of flue gases which contain deadly carbon monoxide (CO) into the home, which can cause severe personal injury, death, or substantial property damage.
- Inspect existing chimney and vent connector for obstructions and deterioration before installing boiler. Failure to clean or replace perforated pipe or chimney liner will cause severe injury or death.
- Do not de-rate the appliance. Failure to fire the boiler at it's designed input may cause excessive condensation upon the interior walls of the chimney. In addition, the lower input may not create enough draft to adequately evacuate the by-products of combustion.

A. GENERAL VENTING GUIDELINES

1. Chimney venting is an important part of a safe and efficient oil fired appliance system. Contact your local fire and building officials on specific requirements for restrictions and the installation of fuel oil burning equipment. In addition, consult with a professional knowledgeable on the requirements of NFPA 31 – Standard for the Installation of Oil-Burning Equipment and NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances for installations in the United States.
2. The safe venting of oil fired boilers is dependant on many factors. Some of these factors include:
   a. sufficient draft during the entire heating season to allow for the safe discharge of combustion by-products and;
   b. suitable corrosion protection in the event of condensing flue gases. Only a trained and qualified contractor may install this product.
3. The V8H shall be vented into any of the following:
   a. Masonry or metal chimney. Build and install in accordance with local buildings codes; or local authority having jurisdiction; or "Standards for Chimney, Fireplace, Vents, and Solid Fuel Burning Appliances", ANSI/ NFPA 211 and/or National Building Code of Canada. Masonry chimney must be lined with listed chimney system. Listed clay flue lined masonry chimneys meet venting requirements.
      - External chimneys are more susceptible to flue gas condensation due to colder outside air temperatures. To prevent corrosion due to flue gas condensation, use a listed corrosion-resistant metal liner in chimney.
      - Oversized chimneys are more susceptible to flue gas condensation. To reduce the likelihood of flue gas condensation and ensure proper draft, use a properly sized listed metal liner in oversized chimney.
4. Chimney Inspection – Prior to the installation of any new or replacement fuel burning equipment the chimney shall be inspected by a qualified installer. The chimney shall be inspected for integrity as well as for proper draft and condensate control. Some jurisdictions require the use of a liner when changing fuel types. Some jurisdictions require the use of a liner even when the same fuel is used. At a minimum, the chimney shall be examined by a qualified person in accordance with the requirements of Chapter 11 of NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances.
   a. Loose Mortar – Loose mortar could be an indication of a prior history of condensing flue gases upon the inside walls of the chimney. Colder climates are more susceptible to this condition. Under no circumstances shall a chimney of this condition be used until it meets the requirements of NFPA 211 or CSA B139.
   b. Unlined Chimney – Under no circumstances shall a chimney constructed of brick only be used. Only approved clay liners or listed chimney lining systems shall be used as specified in NFPA 31.
   c. Abandoned Openings – Openings through the chimney wall that are no longer used shall be sealed in accordance to NFPA 211. Often abandoned openings are improperly sealed and usually covered by a gypsum wall covering.

7 Venting and Air Intake Piping *(continued)*

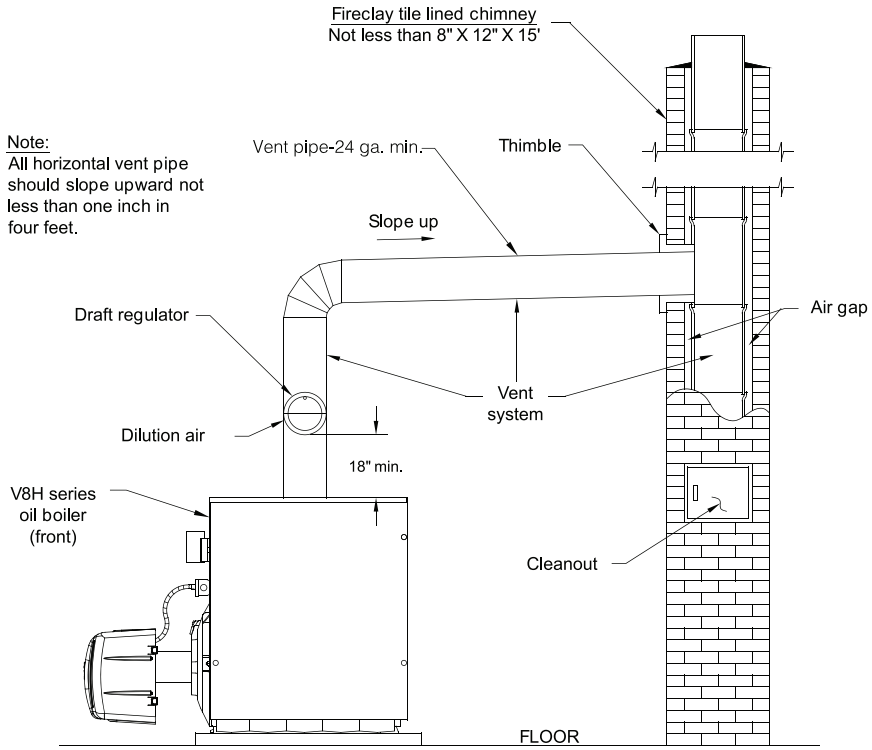


Figure 17: Recommended Vent Pipe Arrangement and Chimney Requirements

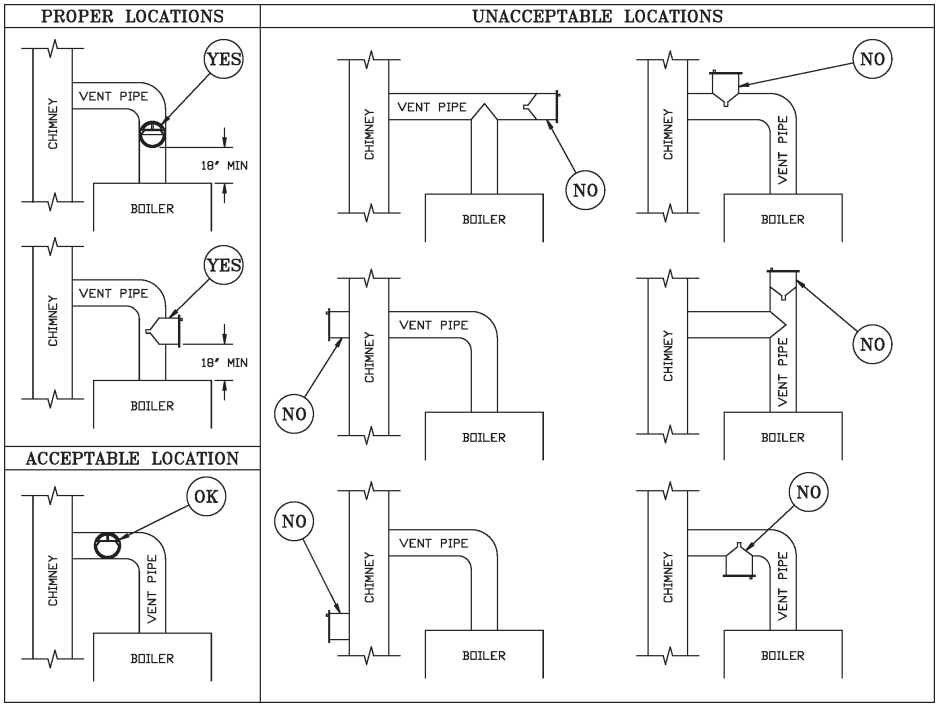


Figure 18: Proper and Improper Locations of Draft Regulator

7 Venting and Air Intake Piping *(continued)*

d. Clean Chimney – Chimney shall be free of all loose debris.

5. Draft Regulator – the draft regulator supplied with the boiler (or equivalent) must be used with this appliance. Refer to Figures 17 and 18.

CHIMNEY CONNECTOR

1. A chimney connector (vent pipe) is used to connect the boiler to the base of the chimney. The chimney connector should be kept as short as possible. The horizontal length of the chimney connector shall not be greater than 10 feet.

⚠ DANGER

The chimney and connector shall be inspected annually for signs of debris and corrosion. Loose mortar at the base of the chimney may be a sign of condensate damage to the chimney. A chimney professional shall be contacted immediately to examine the damage and recommend a solution. Long term operation while in this condition may cause a venting failure and force flue gases into the living space. If the chimney is to be re-lined use the recommendations in NFPA 31, Appendix E.

2. Vent Connector shall be any of the following and of the same size as the outlet of boiler.
   a. Type L or a factory built chimney material that complies with the Type HT requirements of ANSI/UL 103. Install in accordance with listing and manufacturer's instructions.
   b. Steel pipe having resistance to corrosion and heat with a minimum wall thickness of 24 Gauge (0.024").

⚠ DANGER

Any sign of condensate seepage at the base of the chimney shall be inspected immediately. The discoloration may be a sign of chimney damage and must be remedied immediately.

DRAFT

1. The natural draft generated through a chimney is dependent on several factors including, chimney height, temperature of flue gases, cross section area of chimney, chimney wall insulation value, dilution air and total volume of flue gases, to name a few. Make sure that the boiler has been running for at least 5 minutes before measuring the draft.
2. Minimum Draft Overfire – The draft induced by a chimney must create at least a pressure of -0.02 inches water column (" w.c.). The pressure at the canopy **cannot** be positive since this could create a condition that allows flue gas by-products to escape from the draft regulator. A negative pressure reading up to -.03 inches water column is acceptable for proper operation.

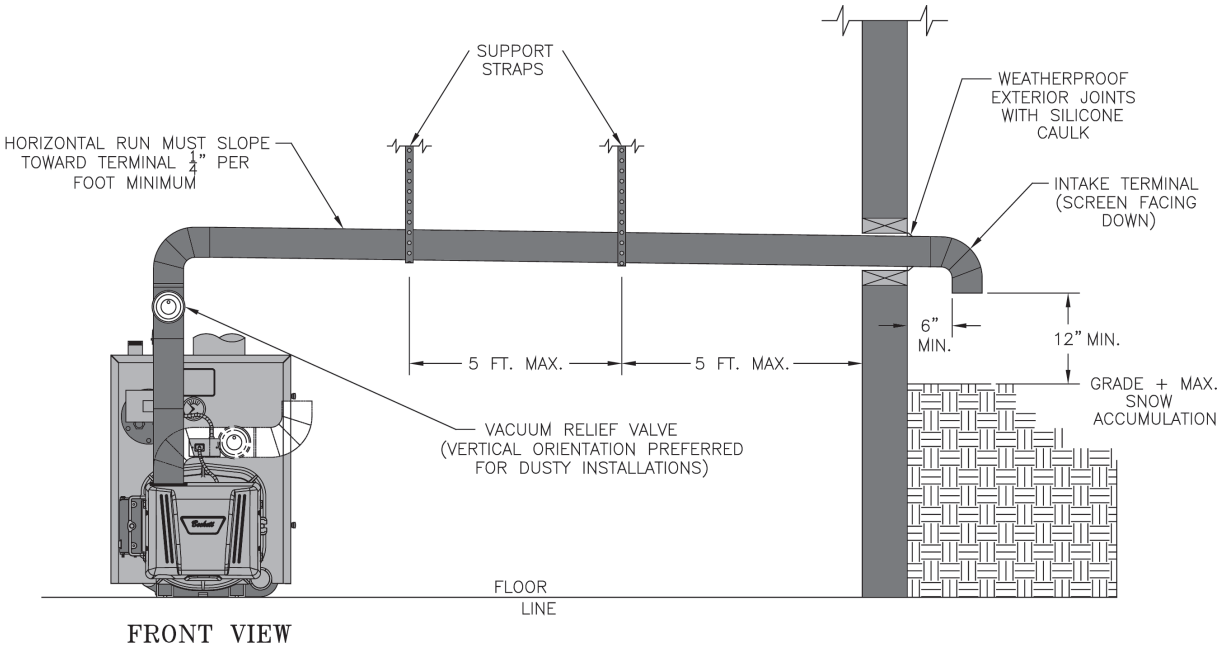


Figure 19: Optional Air Intake Piping Installation - Only Available with Beckett Burner

7 Venting and Air Intake Piping *(continued)*

STACK TEMPERATURE

1. The temperature of the flue gases has a significant effect on the amount of draft created in a vertical chimney as well as the propensity to create condensate. The higher the stack temperature, the greater the amount of draft that can be generated. A lower stack temperature not only reduces the amount of draft that can be created but it also increases the possibility that the flue gases could condense in the chimney connector or stack.
2. NFPA 31 has information to help the installer make an appropriate choice of venting materials. In some cases a chimney may have to be lined to create sufficient draft. In other cases, the chimney may have to be lined to prevent the corrosion of a masonry chimney. Consult with a chimney specialist knowledgeable on the requirements for chimney requirements in your area.

⚠ CAUTION

Any doubt on the condition of a chimney or it's ability to prevent the generation and accumulation of flue gas condensate, must be relined according to NFPA 31 (United States).

Use the chimney venting tables as a guide. It is highly recommended that any borderline application should result in the relining of the chimney with a suitable liner that creates sufficient draft and to protect against corrosion caused by flue gas condensate.

B. OPTIONAL AIR INTAKE PIPING INSTALLATION - Outdoor air for combustion may be provided with an optional U.S. Boiler Company V8H™ Fresh Air Accessory Kit **(ONLY AVAILABLE ON BECKETT BURNERS,** with plastic cover application, P/N 102119-01), refer to Figure 19. Refer to Fresh Air Accessory Kit Instructions for installation and air intake piping details.

⚠ WARNING

DO NOT reduce size of air intake pipe.

Read, understand and follow combustion air instruction restrictions contained in the Pre-Installation Section of this manual.

1. General
   a. Use 4 inch diameter, single wall galvanized metal pipe and fittings available at most heating distributors for air intake piping. Maximum allowable air intake length is 50 equivalent feet. Each elbow is equal to 6 equivalent feet.

⚠ WARNING

DO NOT exceed maximum allowable air intake length.

   b. Start at Burner. Work toward air intake terminal.
   c. Maintain minimum of ¼ inch per foot slope in horizontal run to air intake terminal. Slope down toward air intake terminal.
   d. Seal all joints gas-tight, using silicone caulk or self-adhesive aluminum tape.
2. After determining location, cut a hole in the wall to accept 4 inch air intake pipe. See Figure 19.
3. Remove the metal knockout in right side of burner cover. Install U.S. Boiler Company Inlet Air Accessory Kit, P/N 611280031.
4. Mount the Vacuum Relief Valve Tee Assembly (P/N 8116268 included with Kit) or 90° elbow into the burner inlet ring. See Figure 19.
   a. Secure with at least three (3) sheet metal screws evenly spaced around the burner inlet ring.
   b. Assembly the vacuum relief valve balance weight onto the gate. Refer to the vacuum relief valve manufacturer's instructions.
   c. Mount the vacuum relief valve into the tee and fasten with a screw and nut in collar tabs. To ensure proper operation, the gate must be level across the pivot point and plumb. Refer to vacuum relief valve manufacturer's instructions.
5. Install remainder of air intake, securing each joint with at least three (3) sheet metal screws evenly spaced.
6. Install air intake terminal. See Figure 19.
7. Seal all external joints with weatherproof caulk.

NOTICE Intake terminal must be at least 12 inches above grade plus snow accumulation.

⚠ WARNING

DO NOT locate air intake where petroleum distillates, CFC's, detergents, volatile vapors or any other chemicals are present. Severe boiler corrosion and failure will result.

8 Electrical

⚠ DANGER

Positively assure all electrical connections are unpowered before attempting installation or service of electrical components or connections of the boiler or building. Lock out all electrical boxes with padlock once power is turned off.

⚠ WARNING

- Failure to properly wire electrical connections to the boiler may result in serious physical harm.
- Electrical power may be from more than one source. Make sure all power is off before attempting any electrical work.
- Each boiler must be protected with a properly sized fused disconnect.
- Never jump out or make inoperative any safety or operating controls.
- The primary control may be damaged or may not function properly if 120 volt power supply is NOT wired into control as follows:

The 120V interrupted hot (black) wire must be connected to the primary control black wire, the 120V neutral (white) wire must be connected to the primary control white wire and the 120V constant hot (red) wire must be connected to the primary control red wire.

A. GENERAL

1. Install wiring and electrically ground boiler in accordance with requirements of the authority having jurisdiction, or in absence of such requirements the National Electrical Code, ANSI/NFPA 70.
2. Refer to National Electric Code or Local Electric Codes for proper size and type of wire required. Follow Code.
3. A separate electrical circuit must be run from the mail electrical service with an over-current device/disconnect in the circuit. A service switch is recommended and may be required by some local jurisdictions.
4. Use anti-short bushings on all wiring passing through boiler jacket, junction boxes and/or control boxes.
5. Use armored cable (BX) over all exposed line voltage wiring.
6. If an indirect domestic water heater is used, use priority zoning. **DO NOT** use priority zoning for Hydro-Air Systems.
7. Wiring should conform to Figures 20A through 22.

B. INSTALL A ROOM THERMOSTAT on an inside wall about four feet above floor. Never install thermostat on an outside wall or where it will be influenced by drafts, hot or cold water pipes, lighting fixtures, television, rays of the sun or near a fireplace. Keep large furniture away from thermostat so there will be free movement of room air around this control.

Heat Anticipator in Thermostat should be set to match the requirements of the control to which it is connected. See Figures 20A thru 22 for desired system and heat anticipator setting. If system tends to overheat above the thermostat's temperature setting, reduce heat anticipator settings by .1 or .2 amps. If system tends to short cycle without reaching desired room temperature, increase heat anticipator setting by .1 or .2 amps.

8 Electrical *(continued)*

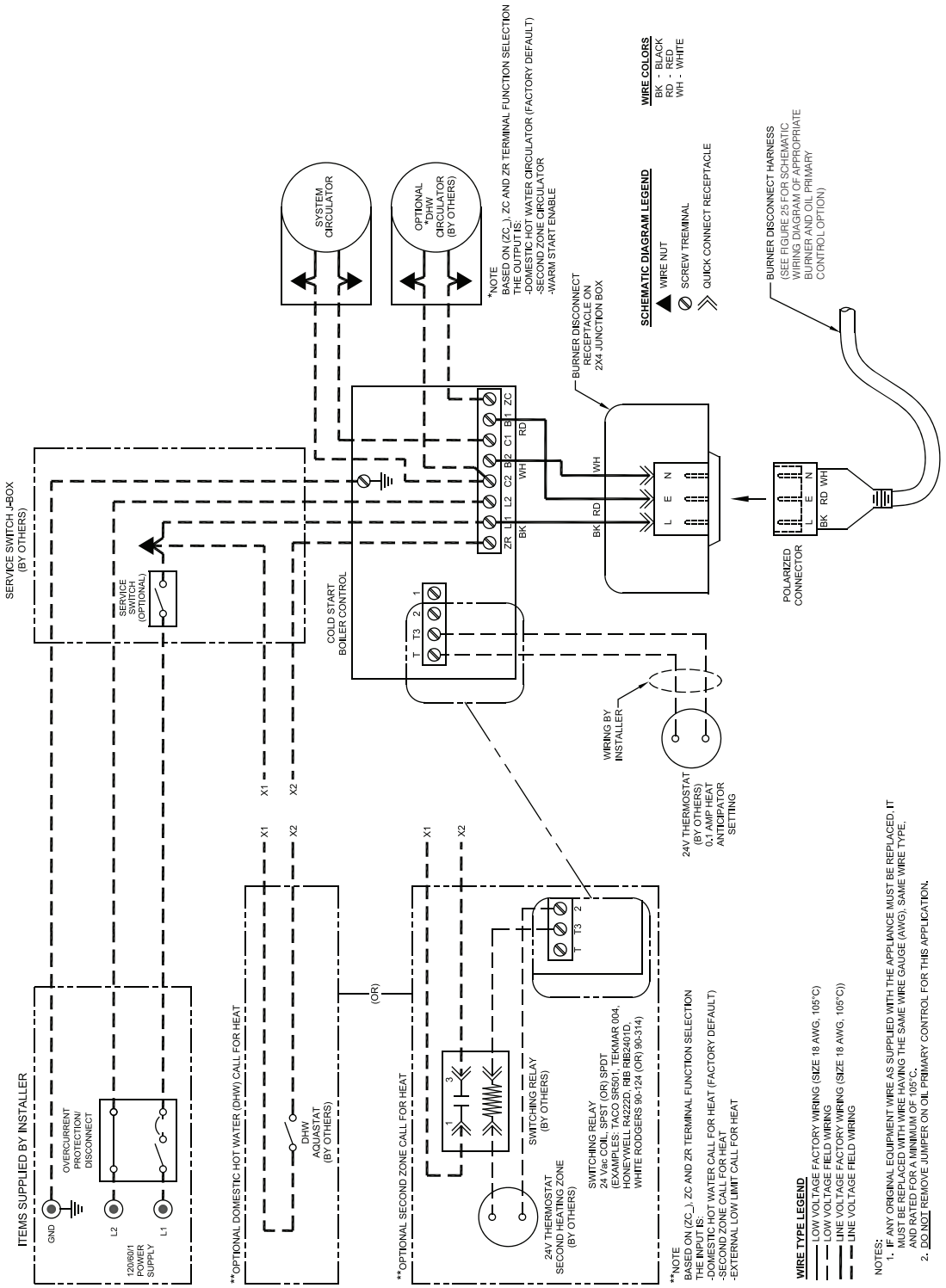


Figure 20A: Schematic Wiring Diagram, Water Boiler without Tankless Heater, Cold Start Control (All Burner Options)

8 Electrical *(continued)*

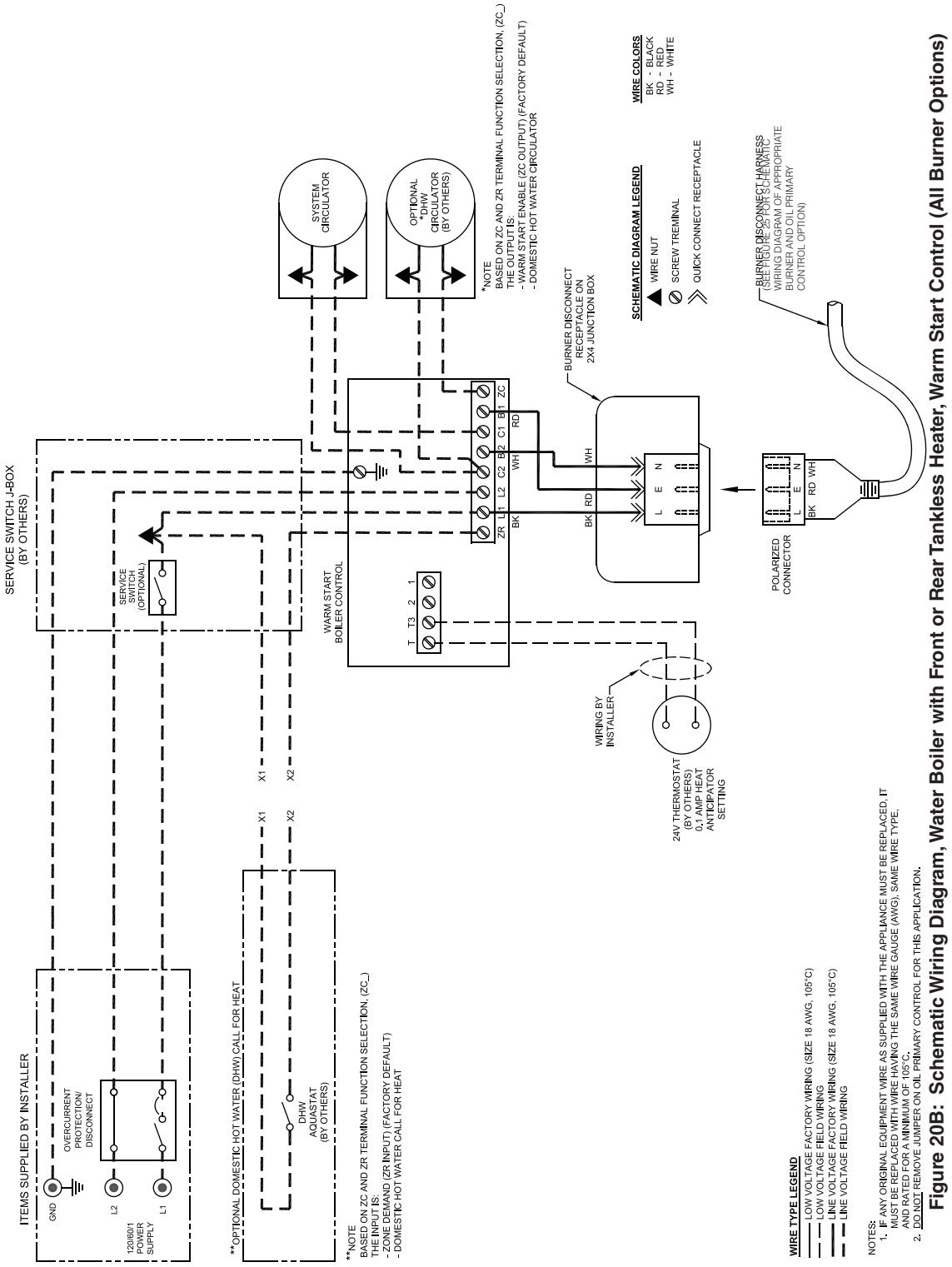


Figure 20B: Schematic Wiring Diagram, Water Boiler with Front or Rear Tankless Heater, Warm Start Control (All Burner Options)

8 Electrical *(continued)*

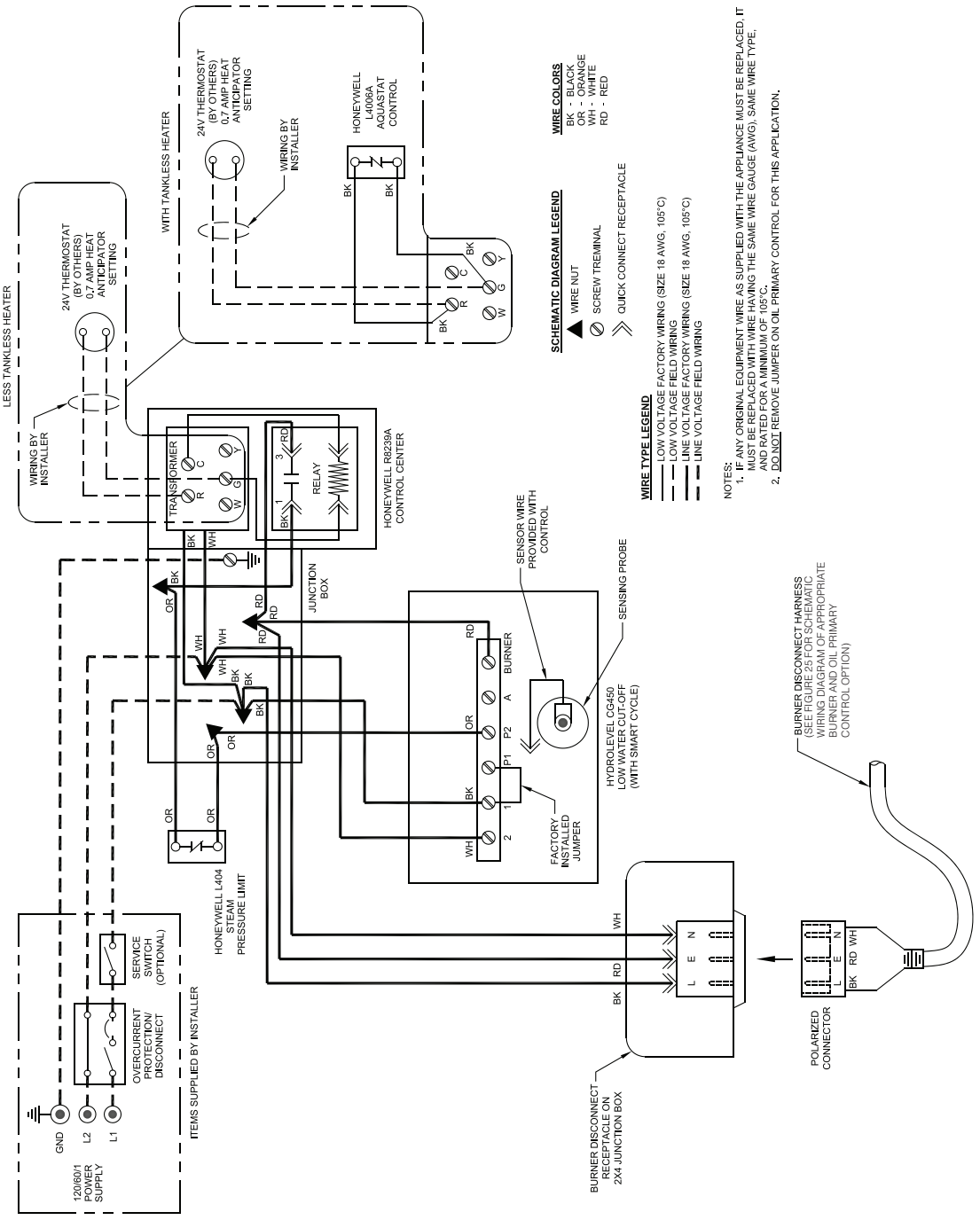
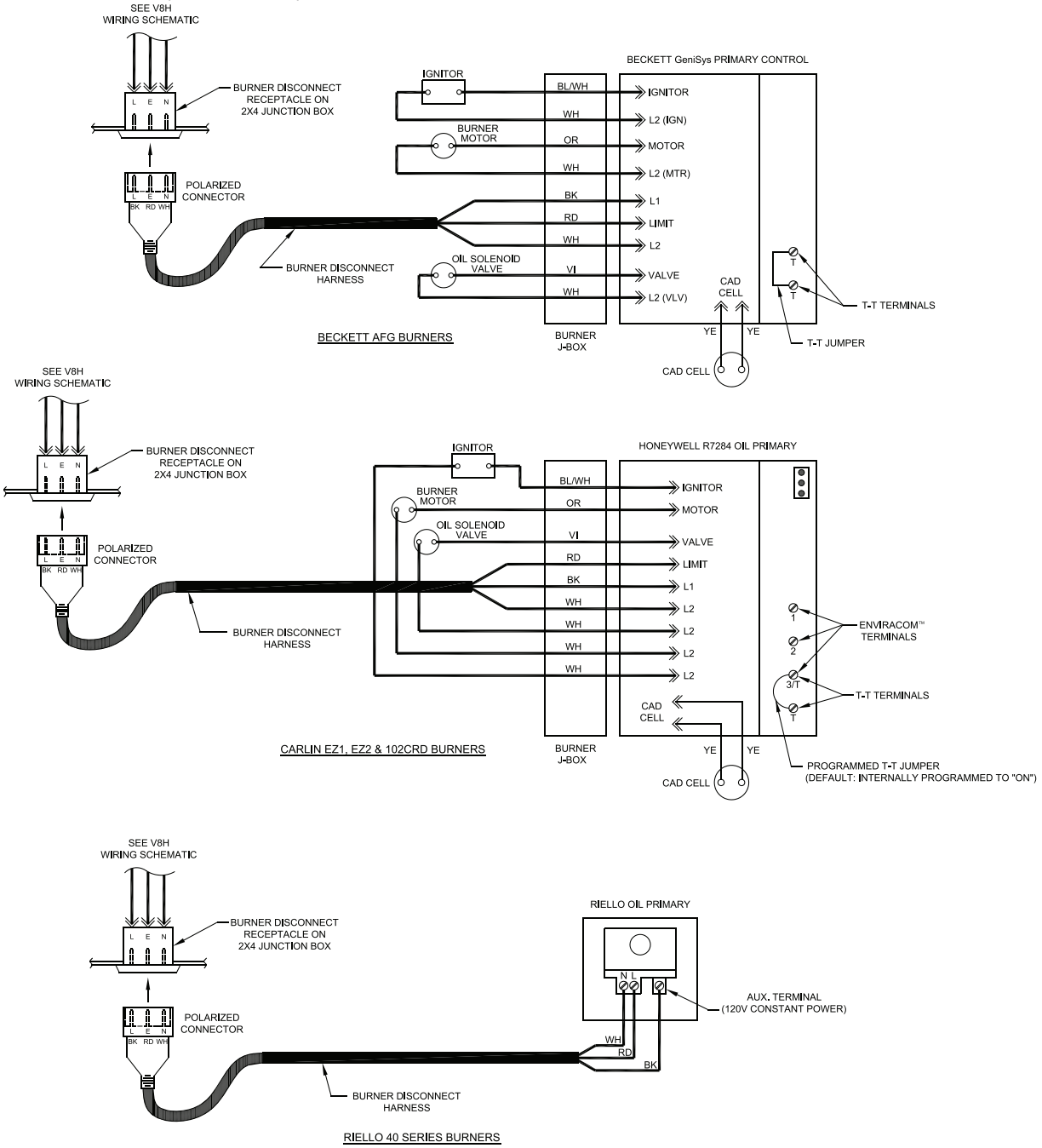


Figure 21: Schematic Wiring Diagram, Steam Boiler, Hydrolevel CG450 Probe LWCO (All Burner Options)

8 Electrical *(continued)*



WIRE TYPE LEGEND

- LOW VOLTAGE FACTORY WIRING (SIZE 18 AWG, 105°C)
- LOW VOLTAGE FIELD WIRING
- LINE VOLTAGE FACTORY WIRING (SIZE 18 AWG, 105°C)
- LINE VOLTAGE FIELD WIRING

SCHEMATIC DIAGRAM LEGEND

- SCREW TREMINAL
- QUICK CONNECT RECEPTACLE

WIRE COLORS

BK - BLACK
BL/WH - BLUE W/ WHITE TRACE
WH - WHITE
RD - RED
VI - VIOLET
YE - YELLOW
OR - ORANGE

NOTES:

1. **IF ANY ORIGINAL EQUIPMENT WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRE HAVING THE SAME WIRE GAUGE (AWG), SAME WIRE TYPE, AND RATED FOR A MINIMUM OF 105°C.**

Figure 22: Schematic Wiring Diagrams For All Burner Options w/Various Oil Primary Controls

9 Oil Piping

A. GENERAL

1. Use flexible oil line(s) so the burner swing door can be opened without disconnecting the oil supply piping.
2. A supply line fuel oil filter is recommended as a minimum for all firing rates but a pleated paper fuel oil filter is recommended for the firing rates below 1.0 GPH to prevent nozzle fouling.
3. Use Flared fittings only. Cast iron fittings cannot be used.

NOTICE DO NOT use compression fittings.

Oil piping must be absolutely airtight or leaks or loss of prime may result. Bleed line and fuel unit completely.

Refer to your local jurisdictions regarding any special considerations for fuel supply requirements. In addition, refer to NFPA 31, Standard for the Installation of Oil-Burning Equipment for Installations in the United States and CSA B139-04 for Installation in Canada.

4. Use of a high efficiency micron filter (Garber or equivalent) in addition to a conventional filter is highly recommended.
5. Piping used to connect the oil burner to the oil supply tank shall not be smaller than 3/8" iron pipe or 3/8" OD copper tubing. Copper tubing shall have a .032" minimum wall thickness.

⚠ WARNING

Under no circumstances can copper with sweat style connectors be used.

NOTICE Some jurisdictions require the use of a fusible shutoff valve at the tank and/or the burner. In addition, some jurisdictions require the use of a fusible electrical interlock with the burner circuit. Check your local Codes for special requirements.

B. SINGLE PIPE OIL LINES

1. Standard burners are provided with single-stage 3450 RPM fuel units with the bypass plug removed for single-pipe installations.
2. The single-stage fuel unit may be installed single-pipe with gravity feed or lift. Maximum allowable lift is 8 feet. See Figure 23.
3. Fuel Oil Line Deaerator – On many occasions a leaky oil delivery line can introduce air into the fuel oil supply system. This often creates a rough starting condition and can create a burner lockout state. In addition to fixing the leak, a fuel line deaerator can be installed to eliminate air. The single line from the fuel tank is connected to the deaerator. The burner pump must be connected to the deaerator as a two pipe system. Follow the oil pump manufacturer's recommendations for conversion to a two pipe system.

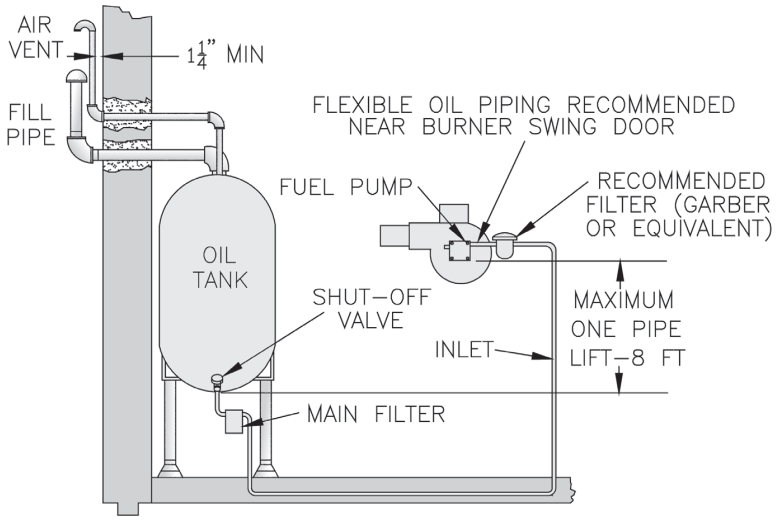


Figure 23: Single Pipe Oil Line

9 Oil Piping *(continued)*

C. TWO PIPE OIL LINES

1. For two piped systems, where more lift is required, the two-stage fuel unit is recommended.
   Table 3 (two-stage) and Table 4 (single-stage) show allowable lift and lengths of 3/8 inch and 1/2 inch OD tubing for both suction and return lines. Refer to Figure 24.

Table 3: Two-Stage Units (3450 RPM) - Two Pipe Systems

Lift "H" (See Fig. 25)	Maximum Length of Tubing "H" + "R" (See Figure 27)	
	3/8" OD Tubing (3 GPH)	1/2" OD Tubing (3 GPH)
0'	93'	100'
2'	85'	100'
4'	77'	100'
6'	69'	100'
8'	60'	100'
10'	52'	100'
12'	44'	100'
14'	36'	100'
16'	27'	100'
18'	---	76'

Table 4: Single-Stage Units (3450 RPM) - Two Pipe Systems

Lift "H" (See Fig. 25)	Maximum Length of Tubing "H" + "R" (See Figure 27)	
	3/8" OD Tubing (3 GPH)	1/2" OD Tubing (3 GPH)
0'	84'	100'
1'	78'	100'
2'	73'	100'
3'	68'	100'
4'	63'	100'
5'	57'	100'
6'	52'	100'
7'	47'	100'
8'	42'	100'
9'	36'	100'
10'	31'	100'
11'	26'	100'
12'	21'	83'
13'	---	62'
14'	---	41'

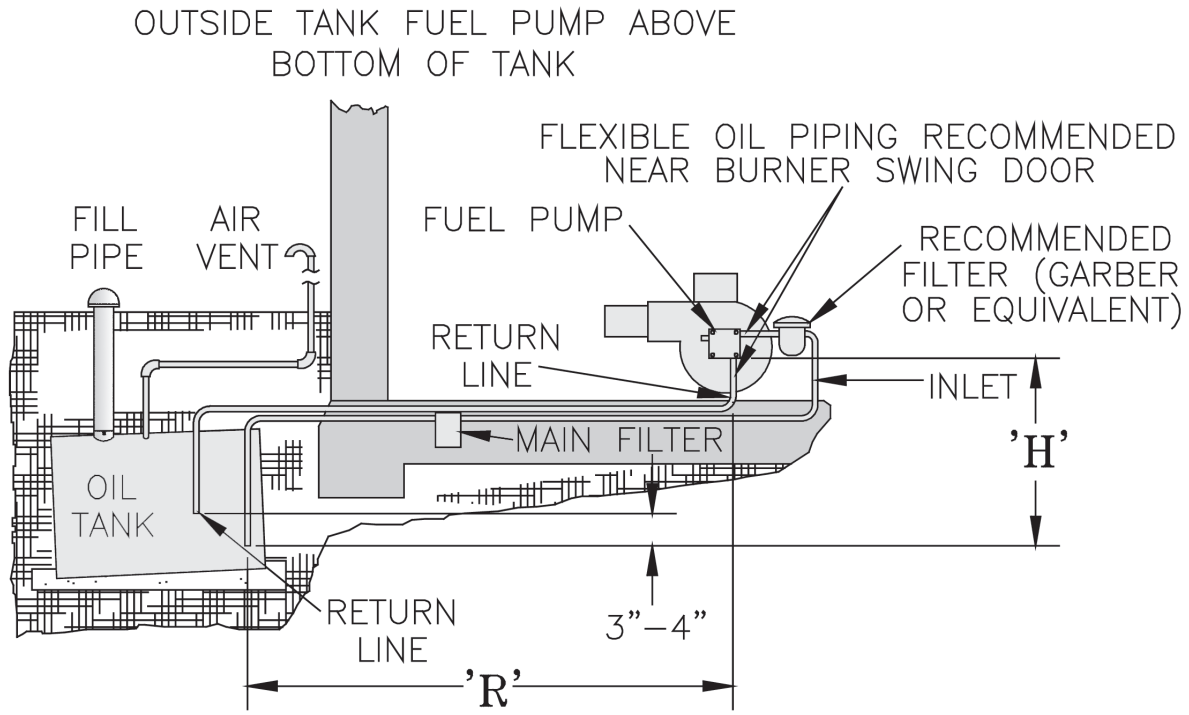


Figure 24: Two Pipe Oil Lines

10 System Start-Up

⚠ WARNING

All boilers equipped with burner swing door have a potential hazard which can cause severe property damage, personal injury or loss of life if ignored. Before opening swing door, turn off service switch to boiler to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely when service is completed.

A. ALWAYS INSPECT INSTALLATION BEFORE STARTING BURNER.

1. Verify that the venting, water piping, oil piping, and electrical system are installed properly. Refer to Installation Instructions contained in this manual.
2. Confirm all electrical, water and oil supplies are turned off at the source and that the vent is clear from obstructions.

⚠ WARNING

Completely read, understand and follow all instructions in this manual before attempting start up.

B. FILL HEATING SYSTEM WITH WATER.

NOTICE It is important, especially in a steam system, to properly remove the oil and dirt from the system. Failure to clean the system can result in erratic water lines and surging.

CLEAN HEATING SYSTEM if boiler water or condensate return water is dirty or if erratic water lines or surging exist after a few days of boiler operation.

Refer to Maintenance and Service Instructions Section of this manual for proper cleaning instructions for steam and water boilers.

1. STEAM BOILERS — Fill boiler to normal water line. Refer to Figure 1D.
2. HOT WATER BOILERS. Fill entire heating system with water and vent air from system. Use the following procedure on a series loop or multi-zoned system installed as per Figures 14A and 14B, to remove air from system when filling:
   a. Close full port ball valve in boiler system piping.
   b. Isolate all zones by closing zone valves or shut-off valves in supply and return of each zone(s).
   c. Attach a hose to vertical purge valve in boiler system piping. (**Note** - Terminate hose in five gallon bucket at a suitable floor drain or outdoor area).
   d. Starting with one zone at a time, open zone valve or shut-off valve in boiler supply and return piping.
   e. Open purge valve.
   f. Open shut-off valve in cold water supply piping located between the air scoop and expansion tank.
   g. Allow water to overflow from bucket until discharge from hose is bubble free for 30 seconds.
   h. When zone is completely purged of air, close zone valve or shut-off valve. Open zone valve to the next zone to be purged. Repeat this step until all zones have been purged. At completion, open all zone valves.
   i. Close purge valve, continue filling the system until the pressure gauge reads 12 psi. Close shut-off valve in cold water supply piping.

⚠ WARNING

The maximum operating pressure of this boiler is posted on the ASME Data Label located on the top of the boiler. Never exceed this pressure. DO NOT plug safety or relief valve.

NOTICE If make-up water line is equipped with pressure reducing valve, system will automatically fill to 12 psi. Follow fill valve manufacturer's instructions.

   j. Open full port ball valve in boiler system piping.
   k. Remove hose from purge valve.
   l. Confirm that the boiler and system have no water leaks.

C. CHECK CONTROLS, WIRING AND BURNER to be sure that all connections are tight and burner is rigid, that all electrical connections have been completed and fuses installed, and that oil tank is filled and oil lines have been tested.

D. ADJUST CONTROL SETTINGS with burner service switch turned “ON”.

1. SET ROOM THERMOSTAT about 10°F below room temperature.
2. PRESS RED RESET BUTTON on front of burner cover (Beckett, Riello burners) or Primary Control (Carlin Burner), hold button for one (1) second and release to reset primary control.

10 System Start-Up *(continued)*

3. STEAM BOILERS:
   With an L404F Pressure Limit - set cut-out pressure (MAIN scale) on the pressure limit for (1) PSI and differential pressure (DIFF.) for .5 PSI. These pressures may be varied to suit individual requirements of the system.
4. STEAM BOILERS WITH TANKLESS DOMESTIC WATER HEATERS, set boiler water temperature dial on L4006 operating control at 190°F (max.). Set differential at 10°.
5. WATER BOILERS WITHOUT TANKLESS HEATERS are equipped with an Intelligent Oil Boiler Control (Boiler Control). The Boiler Control is factory programmed with a High Limit setpoint of 180 F. The High Limit setpoint is adjustable between 140 F and 240 F. This temperature may be varied to suit the installation requirements
6. WATER BOILERS WITH TANKLESS HEATERS are equipped with a Warm Start Intelligent Oil Boiler Control (Warm Start Boiler Control). The Warm Start Boiler Control is factory programmed with a High Limit setpoint of 180 F. The High Limit setpoint is adjustable between 140 F and 240 F. Additionally, the Warm Start Boiler Control is factory programmed with a Low Limit setpoint of 110 F. The Low Limit setpoint is adjustable between 110 F and 220 F. These temperatures may be varied to suit the installation requirements.
7. CHECKOUT
   Put the system into operation and observe at least one complete cycle to make sure that the controller operates properly. See Troubleshooting Section to use LED to assist in determining system operation.

E. ADJUST OIL BURNER BEFORE STARTING.

1. CHECK BURNER SETTINGS and readjust if necessary, see Burner Specifications, Table 12 at the rear of this manual.

F. START OIL BURNER.

1. Open vent fitting on fuel pump.
2. TURN 'ON' BURNER service switch and allow burner to run until oil flows from vent fitting in a SOLID stream without air bubbles for approximately 10 seconds.
3. Close vent fitting and burner flame should start immediately after prepurge is completed. Prepurge prevents burner flame until 10 seconds has elapsed after initial power is applied to burner. During prepurge the motor and igniter will operate but the oil valve will remain closed. Refer to Oil Primary Control Instructions for more details.
4. Adjust oil pressure.
   a. When checking a fuel unit's operating pressure, a reliable pressure gauge may be installed in either the bleeder port or the nozzle port. Refer to Figure 25.
   b. Locate oil pressure adjusting screw and turn screw to obtain proper pump pressure, refer to Table 12 at the rear of this manual.
   c. To check the cutoff pressure, deadhead a reliable pressure gauge onto the copper connector tube attached to the nozzle port. Run the burner for a short period of time. Shut the burner off. The pressure should drop and hold.
   d. Remove the gauge and install bleeder port and/or reconnect the nozzle port line.

G. ADJUST OIL BURNER WHILE OPERATING.
(flame present)

1. SET ROOM THERMOSTAT about 10°F below room temperature.
2. PRESS RED RESET BUTTON on Oil Primary Control and release.
3. READJUST THE HEAD SETTING only if necessary.
4. ADJUST DRAFT REGULATOR for a draft of -0.02" (water gauge) over the fire after chimney has reached operating temperature and while burner is running.

⚠ WARNING

DO NOT loosen or remove any oil line fittings while burner is operating.

5. READJUST THE AIR SETTING on the burner for a light orange colored flame while the draft over the fire is -0.02". Use a smoke tester and adjust air for minimum smoke (not to exceed #1) with a minimum of excess air. Make final check using suitable instrumentation to obtain a CO_2 of 11.5 to 13.0% with draft of -0.02" (water gauge) in fire box. These settings will assure a safe and efficient operating condition. If the flame appears stringy instead of a solid fire, try another nozzle of the same type. Flame should be solid and compact. After all adjustments are made, recheck for a draft of -0.02" over the fire.

10 System Start-Up *(continued)*

6. FLAME FAILURE

   The V8H boiler controls operate the burner automatically. If for unknown reasons the burner ceases to fire and the reset button on the primary control has tripped, the burner has experienced ignition failure. Refer to Oil Primary Control features, Paragraph I, Step 2 of this Section and Section XV, Troubleshooting, Paragraph B. If the failure re-occurs, call your heating contractor immediately before pressing the reset button.

H. CHECK FOR CLEAN CUT OFF OF BURNER.

1. AIR IN THE OIL LINE between fuel unit and nozzle will compress when burner is on and will expand when burner stops, causing oil to squirt from nozzle at low pressure as burner slows down and causing nozzle to drip after burner stops. Usually cycling the burner operation about 5 to 10 times will rid oil line of this air.

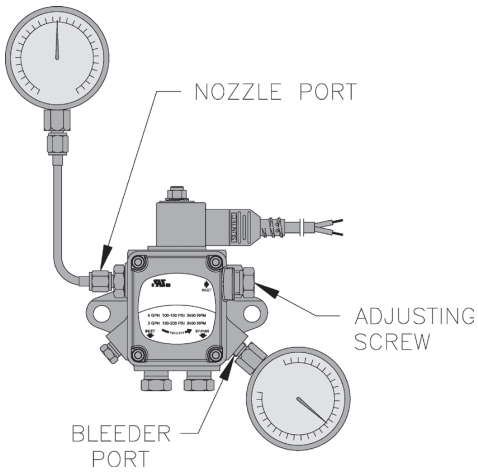


Figure 25: Adjusting Fuel Pump Pressure

2. IF NOZZLE CONTINUES TO DRIP, repeat Paragraph H, No. 1 above. If this does not stop the dripping, remove cut-off valve and seat, and wipe both with a clean cloth until clean, then replace and readjust oil pressure. If dripping or after burn persist replace fuel pump.

I. TEST CONTROLS.

1. Check thermostat operation. Raise and lower thermostat setting as required to start and stop burner.

⚠ WARNING

Before installation of the boiler is considered complete, the operation of all boiler controls must be checked, particularly the primary control and high limit control.

2. **VERIFY OIL PRIMARY CONTROL FEATURES** using procedures outlined in Instructions furnished with control or burner:

⚠ WARNING

Cad Cell Jumper must be removed after this check.

3. CHECK HIGH LIMIT
   a. Adjust system thermostat(s) to highest setting.
   b. Allow burner to run until boiler water temperature exceeds high limit setting. The burner should shut down and circulators continue running.
   c. Allow the temperature to drop below control setting. The burner must restart.
   d. Boiler installation is not considered complete until this check has been made.
   e. Check low water cut-off control with water level at normal water line (see Figure 1D). Raise thermostat setting to allow burner to operate. Open boiler drain to allow water level to drop to bottom of sight glass until burner operation is shut-down by low water cut-off.

      Close boiler drain and refill to normal water line. Burner should automatically restart during fill. Lower thermostat setting.
   f. Check operating control on boiler applications equipped with tankless heater(s). With burner off, draw hot water until burner starts, then turn off hot water and check burner shut-down.

J. IF CONTROLS MEET REQUIREMENT outlined in Paragraph I.

1. Allow boiler to operate for approximately 30 minute, confirm the boiler and system have no leaks.

K. IF CONTROLS DO NOT MEET REQUIREMENTS outlined in Paragraphs I-1 thru I-6, replace control and repeat checkout procedures.

11 Operating

A. WATER BOILERS SEQUENCE OF OPERATION

1. **Water Boilers Without Tankless Heaters** (Cold Start), Sequence Of Operation:
   a. The V8H Boiler is equipped with a Cold Start Intelligent Oil Boiler Control (Cold Start Boiler Control). The Cold Start Boiler Control replaces the traditional electronic aquastat and circulator relays and adds energy saving thermal purge features. Energy is saved by starting the circulator and delaying the burner start when there is residual heat available in the boiler.
   b. The boiler's sequence of operation is shown as Status Codes on Cold Start Boiler Control display. See Table 5 and Figure 31.
   c. When the thermostat calls for heat the boiler control starts the system circulator and the thermal purge (circulator pre-purge time) begins. If the time is completed or boiler temperature is less than the Start Temperature (140 F default) the start sequence continues by energizing the oil primary to operate the following sequence: blower is started and operates for pre-purge time; spark is energized and fuel valve is opened for ignition trial time; burner fires until the thermostat is satisfied.
   d. If the thermostat is not satisfied and the Operating Setpoint (SP) is reached the system circulator will continue to operate and the burner will stop. When the boiler water temperature drops below the setpoint less the differential setting the burner will restart.
   e. After the thermostat is satisfied the burner and circulator are stopped.
   f. When an indirect water heater aquastat call for heat is wired to the "ZR" terminal the Boiler Control starts a domestic hot water circulator connected to the "ZC" terminal and when the boiler temperature is less than Operating Setpoint (SP), the Cold Start Boiler Control energizes the oil primary to turn on the burner without circulator pre-purge delay.
   g. On burner start, if the CAD cell does not see flame within approximately 15 seconds, primary control will shut down the burner and enter into a lockout mode. A lockout is reset by pressing the reset button located on the primary control. If the flame is lost while the burner is firing, the primary control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. If after three (3) trials for ignition, flame is not detected, primary control will enter into restricted mode. Restricted mode is reset by holding down the reset button for 15 seconds.

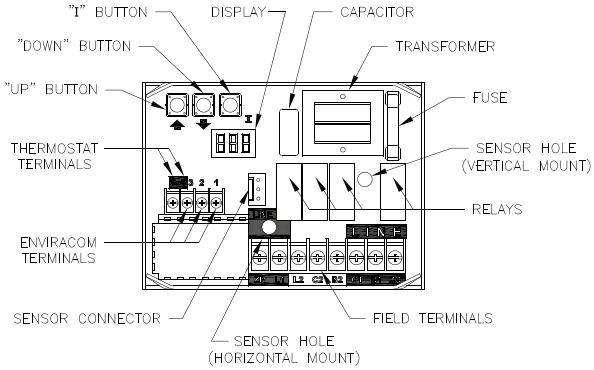


Figure 31: Intelligent Oil Boiler Control

2. **Water Boilers with Tankless Heaters** (Warm Start), Sequence Of Operation:
   a. The V8H Boiler is equipped with a Warm Start Intelligent Oil Boiler Control (Warm Start Boiler Control). The Warm Start Boiler Control replaces the traditional high and low limit aquastat and circulator relays.
   b. The boiler's sequence of operation is shown as Status Codes on Warm Start Boiler Control display. See Table 5 and Figure 31.
   c. When the thermostat calls for heat the Warm Start Boiler Control starts the system circulator and the start sequence continues by energizing the oil primary to operate the following sequence: blower is started and operates for pre-purge time; spark is energized and fuel valve is opened for ignition trial time; burner fires until the

Table 5: Sequence of Operation

Status Codes Displayed in StA Mode		
StA	Status	Description
1	Standby (burner off, pump off)	No call for heat detected
1	Standby (burner off, pump on)	Either condition is true: a. Call for heat detected and boiler temperature higher than operating setpoint. b. Call for heat detected and boiler temperature higher than 140 F and Pump Pre-Purge Time has not expired.
8	Running	The burner runs until the call for heat is satisfied.
17	Self Test	Control internal checking

11 Operating *(continued)*

thermostat is satisfied. Optionally, the thermal purge (circulator pre-purge time) maybe added adjusting the Circulator Pre-purge time parameter. This feature saves energy by starting the circulator and delaying the burner start when there is residual heat available in the boiler.

d. If the thermostat is not satisfied and the Operating Setpoint (SP) is reached the system circulator will continue to operate and the burner will stop. When the boiler water temperature drops below the setpoint less the differential setting the burner will restart.

e. After the thermostat is satisfied the burner and circulator are stopped.

f. The Warm Start Boiler Control also includes a low limit control function. When the boiler water temperature falls below the Low Limit Setpoint less the Low Limit Differential the "ZC" terminal and System Circulator outputs are de-energized and the oil primary is energized to start the burner. As temperature rises above the Low Limit Setpoint the burner is stopped, the "ZC" output is energized and the System Circulator is enabled to run in response to a call for heat.

g. On burner start, if the CAD cell does not see flame within approximately 15 seconds, primary control will shut down the burner and enter into a lockout mode. A lockout is reset by pressing the reset button located on the primary control. If the flame is lost while the burner is firing, the primary control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. If after three (3) trials for ignition, flame is not detected, primary control will enter into restricted mode. Restricted mode is reset by holding down the reset button for 15 seconds.

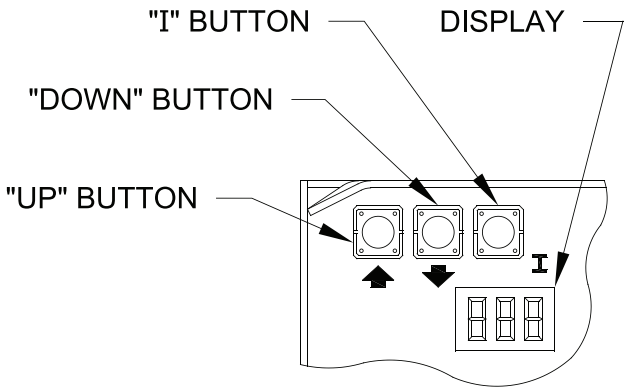


Figure 32: Boiler Control Key Function & Orientation

3. **Using Cold or Warm Start Boiler Control (Boiler Control) Features**

The Boiler Control is located on front of boiler.

The Boiler Control display, along with Up ⇧, Down ⇩, and "𝙸" keys may be used to view boiler operating status (Figure 32).

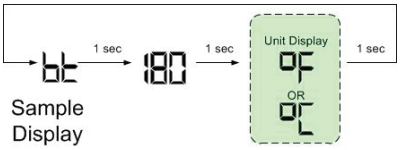
4. **Viewing the Operating Mode Options**

In operating mode the user may view (but not change) boiler operating status, settings and troubleshooting information. To view Boiler Control display information:

Press and release the "𝙸" key on the Boiler Control to change from one parameter to the next. Each setting will alternately flash between the relevant display code and its corresponding value.

Operating Mode Options	
StA	Status Numbers: 1 Standby 8 Running 17 Self Test)
bt	Boiler Temperature
SP	Operating Setpoint (Outdoor Reset)
HL	High Limit Setting
HdF	High Limit Differential
LL	Low Limit Setpoint (warm start only)
LdF	Low Limit Differential (warm start only)
hr	Heat Request Status
dh	DHW Request Status
Err	Boiler Error

For example, when the "𝙸" key is pressed on the Boiler Control until "bt" is displayed, it will then flash a three digit number (such as "180") followed by either "F" (or "C"). This indicates that the boiler water temperature is 180°F. Other operating parameters display the information in a similar fashion.



Please note that in operating mode to hold the display on the value the user can press and hold either the Up ⇧ or Down ⇩ keys and the value will be continuously shown. This may be helpful in watching a value "live".

11 Operating *(continued)*

5. **Changing the Adjustable Parameters**

To adjust parameters such as the High Limit Setpoint and High Limit Differential:

a. Using the Boiler Control display, access the adjustment mode by pressing and holding the Up ⇧, Down ⇩, and "▣" keys simultaneously for three (3) seconds. This procedure is intended to discourage unauthorized changes or accidental changes to limit settings.

b. Press the "▣" key to display available Adjustment Mode options. Select an option.

Cold Start Boiler Control Adjustment Mode Options		
HL_	140-240°F	Adjust High Limit Setting
HdF	10-30°F	Adjust High Limit Differential
2C_	dh, 2r or ELL	ZC and ZR Terminal Function
0r_	0-10 minutes	Pump Overrun Time
PP_	2-20 minutes	Pump Pre-purge Time
St_	140 - 180°F	Start Temperature
Pt_	On or OFF	Priority Time
F-C	F or C	Select degrees F or C Mode
bAc		Back to Operating Mode

Warm Start Boiler Control Adjustment Mode Options		
HL_	140-240°F	Adjust High Limit Setting
LL_	110-220°F	Adjust Low Limit Setting
LdF	10-25°F	Adjust Low Limit Differential Setting
2C_	2r or dh	ZC and ZR Terminal Function
0r_	0-10 minutes	Pump Overrun Time
PP_	0-20 minutes	Pump Pre-purge Time
St_	140 - 180°F	Start Temperature
Pt_	On or OFF	Priority Time
F-C	F or C	Select degrees F or C Mode
bAc		Back to Operating Mode

c. Press the Up ⇧ and Down ⇩ keys to adjust the displayed setpoint to the desired value.

d. To return to the normal operating mode from the Adjustment Mode, when the "bAc" option is displayed, press either the Up ⇧ or Down ⇩ key. If no keys are pressed, after five (5) minutes the Boiler Control will automatically return to the Operating Mode.

6. **More Information about Adjustable Parameters**

a. High Limit (HL_)

The Boiler Control is factory programmed with a High Limit Setpoint of 180°F. The boiler turns "off" when the boiler water temperature (bt) is above this value. The High Limit setpoint is adjustable between 140° and 240°F. The Operating Setpoint (SP) will equal the High Limit Setpoint.

b. High Limit Differential (HdF)

i. The Cold Start Boiler Control is factory programmed with a Differential of 15°F. The Differential is the number of degrees the boiler temperature must decrease below the Operating Setpoint before the boiler can restart. The differential is adjustable between 10° and 30°F.

ii. On Warm Start Boiler Control the High Limit Differential is not adjustable and is fixed at 10°F.

c. Low Limit (LL_)

The Warm Start Boiler Control is factory programmed with a Low Limit Setpoint of 110°F. On falling temperature the boiler turns "on" and the "ZC" terminal and System Circulator outputs are de-energized when the boiler temperature is less than the Low Limit Setpoint less the differential. On a rising temperature when the boiler temperature is above the Low Limit Setpoint the boiler turns "off", the "ZC" terminal output is energized and the System circulator is enabled to respond to a call for heat. The Low Limit Setpoint is adjustable between 110°F and 220°F.

d. Low Limit Differential (LdF)

The Warm Start Boiler Control is factory programmed with a Low Limit Differential Setpoint of 10°F. The Low Limit Differential is the number of degrees the boiler temperature must decrease below the Low Limit Setpoint before the Warm Start Boiler Control takes actions to warm the boiler. These actions include starting the burner and stopping water flow through the boiler. The Low Limit Differential is adjustable between 10°F and 25°F.

e. Circulator Overrun Time (0r_)

Circulator Overrun Time (also called "circulator off delay" or "circulator post purge") continues circulator operation after a call for heat has ended, sending excess heat from the boiler into the priority zone. Ensure system piping and zone panel settings allow water flow to the priority zone after the call for heat ends. The Circulator Overrun Time has a factor setting of 0 minutes and is field adjustable between 0 and 10 minutes.

f. Circulator Pre-Purge Time (PP_)

11 Operating *(continued)*

Table 6: Circulator Pre-Purge Time Example, Parameter PP_= 2 Minutes

Call for Heat	ZC and ZR Terminal Function (2C_)	Boiler Temp.	Boiler Status, (B1 Output)
TT= on	--	< 140	Start with no delay
TT = on	--	>140	Start after 2 minute delay
ZR = on	2C_ = 2r	<140	Start with no delay
ZR = on	2C_ = 2r	>140	Start after 2 minute delay
ZR = on	2C_ = dH	<140	Start with no delay
ZR = on	2C_ = dH	>140	Start with no delay

When the boiler is warm [boiler water temperature higher than 140°F (adjustable using Start Temperature parameter)] and there is a thermostat call for heat, the system circulator is started and boiler firing is delayed pre-purge minutes. If the temperature drops below 140°F or there is a DHW Call for Heat the boiler is started without delay. Additionally, the boiler is started without delay if the thermostat call for heat is initiated when the boiler water temperature is less than 140°F. This feature helps save energy by satisfying home heating needs with residual boiler heat rather than cycling the boiler. The Circulator Pre-purge time has a factory setting of 2 minutes and is field adjustable between 2 and 20 minutes. Refer to Table 6.

The Warm Start Boiler Control Pre-purge Time is factor set to 0 minutes.

g. Start Temperature (St_)

The amount of “Heat available” is calculated by taking the difference between measured boiler water temperature and the Start Temperature setting. Useful “Heat Available” is dependent on the type of heating emitter installed in the home. Heat emitters require a certain minimum temperature to operate effectively. Our default settings reflect cast iron radiators. Fan Coils may require a start temperature setting of 180°F or 160°F before providing heat to the home. The Start Temperature has a factory setting of 140°F and is field adjustable between 140°F and 180°F.

h. Priority Time (Pt_)

When the Priority Time parameter is set to “on” and Domestic Hot Water (DHW) call for heat is “on” the DHW demand will take “Priority” over home heating demand and the system circulator will be forced “off”.

Table 7: Domestic Hot Water Demand, (Parameter 2C_= dH)

Call for Heat			Circulator Status	
T-T Input	**ZR** Input	Priority Time (Pt_)	**System Circulator Output**	**DHW Circulator ZC Output**
on	off	On	on	off
on	on	On	off	on
off	on	On	off	on
on	off	OFF	on	off
on	on	OFF	on	on
off	on	OFF	off	on

Priority Time ends and the system circulator is released to service home heating demand when Domestic Hot Water call for heat is over. When Priority Time parameter is set to “Off” the DHW call for heat does not force “off” the system circulator. The Priority Time has a factory setting of “On” and is field adjustable between “On” and “Off” Refer to Table 7.

i. "ZC" and "ZR" Terminal Function (2C_)

The boiler control allows configuration of the "ZC" output functionality to help the V8H integrate into each installation more effectively. The "ZC" output can be connected to a domestic hot water circulator or a second heating zone circulator or be used to enable pumps in a warm start application. These applications are selected as follows:

i. When 2C_ is set equal to Domestic Hot Water Demand (dh)

When there is an Indirect Water Heater (IWH) the boiler control provides a “ZR” input terminal for the IWH Aquastat and “ZC” output terminal for the DHW Circulator. When there is a DHW call for heat, the System Circulator is “forced off”, the DHW Circulator terminal is energized and the circulator pre-purge time delay control logic is bypassed to allow the boiler to fire without delay. When DHW demand ends the System Circulator “force off” is removed, the circulator can respond normally, and the DHW Circulator is de-energized. The DHW call for heat is detected by a voltage on to the "ZR" terminal. When a Priority Time parameter is set to “off” the System Circulator is not forced off for a DHW call for heat. Refer to Table 7.

11 Operating *(continued)*

Table 8: Zone Request, Parameter 2c_= 2r

Call for Heat		Circulator Status	
T-T Input	**ZR** Input	**C1** Output	**ZC** Output
off	off	off	off
on	off	on	off
on	on	on	on
off	on	off	on

ii. When 2C_ is set equal to Zone Request (2r)

When there is no IWH the Cold Start Boiler Control "ZC" output may be configured to control a second heating zone. This is particularly helpful when the home uses only two heating zones. The Cold Start Boiler Control replaces the need for a two circulator zone panel. When DHW Terminal Function (dh_) is set to 2r the boiler control's two circulator outputs are used to control two independent heating zones. Refer to Table 8. A "TT" input causes a call for heat and energizes the System Circulator output to service heating zone 1. A second zone's thermostat may be wired to the "ZR" input to energize heating zone 2 circulator wired to the "ZC" output. Both outputs function independently, "TT" input controls only the System Circulator output and the "ZR" input controls only the "ZC" output. Both inputs cause a boiler call for heat.

The Warm Start Boiler Control with 2C_ set equal to Zone Request (2r) energizes the "ZC" terminal while the boiler is warm as described earlier in this section (refer to Paragraph A, Step 2, Item f). The "ZR" input is a call for heat that starts the boiler.

iii. External Low Limit, Parameter 2C = ELL

The Cold Start Boiler Control is capable of functioning as a warm start control when external limit control is installed that closes a contact when boiler water temperature falls below a setpoint. When an external limit contact closes (boiler water is cold) the boiler is started and the "ZC" and "C1" output terminals are de-energized. When the "ZR" terminal is de-energized (boiler water temperature is above setpoint) the call for heat is ended and the "C1" terminal is released to operation and the "ZC" terminal is energized. An External Low Limit Request is detected by sensing a voltage on the "ZR" terminal. The Warm Start Boiler Control does not have the External Low Limit Option. Refer to Table 9.

Table 9: External Low Limit, Parameter 2c_= ELL

Call for Heat		Circulator Status	
T-T Input	**ZR** Input	**C1** Output	**ZC** Output
off	off	off	on
on	off	on	on
on	on	off	off
off	on	off	off

B. STEAM BOILERS SEQUENCE OF OPERATION

Upon a thermostat call for heat, when provided, the R8239A Control Center Relay or the Oil Primary Control is energized when the steam pressure is below the L404F Pressure Limit and water level is above the Low Water Cut-Off. When energized the Oil Primary Control starts the burner as follows; blower is started and operates for a pre-purge time; spark is energized and fuel valve is opened for ignition trail time; the fuel valve remains open when flame is proven. The burner fires until the thermostat is satisfied or the Pressure Limit setting is reached. The Oil Primary Control stops the burner by closing the fuel valve and operating the blower for post-purge time. Upon a drop in pressure, steam pressure below the L404F Pressure Limit, the burner will re-start if the thermostat is still calling for heat. When there is a tankless heater included and there is no demand for heat, the L4006A operating control will maintain the boiler water temperature at the selected setting for proper operation of the domestic water heater.

The probe low water cut-off will shut down the burner after a 10-15 second delay, if the water level in the boiler drops below the probe level. The Hydrolevel CG450 low water cut-off will shut down the burner for 60 seconds every 15 minutes of firing time to allow water level to stabilize. If the water level is too low the burner will not be allowed to restart. The low water cut-off will reset and restart the burner with a call for heat a few seconds after the water is returned to its normal level.

On burner start, if the CAD cell does not see flame within approximately 15 seconds, primary control will shut down the burner and enter into a lockout mode. A lockout is reset by pressing the reset button located on the primary control. If the

11 Operating *(continued)*

flame is lost while the burner is firing, the primary control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. If after three (3) trials for ignition, flame is not detected, primary control will enter into restricted mode. Restricted mode is reset by holding down the reset button for 15 seconds.

11 Operating *(continued)*

Important Product Safety Information: Refractory Ceramic Fiber Product

WARNING

Some boiler components use materials that contain refractory ceramic fibers (RCF). RCF has been classified as a possible human carcinogen. When exposed to elevated temperatures, RCF may change into crystalline silica, a known carcinogen. When disturbed as a result of servicing or repair, these substances become airborne and, if inhaled, may be hazardous to your health. Avoid breathing RCF particulates and dust.

Precautionary Measures:

- Do not handle RCF parts or attempt any service or repair work involving RCF without wearing the following protective gear:
    1. A properly fitting National Institute for Occupational Safety and Health (NIOSH)-certified air-purifying respirator with a filter efficiency of at least 95%. Respirator should also include a full facepiece when handling used RCF. Other types of respirators may be required depending on site conditions. Current NIOSH recommendations may be found on the NIOSH website http://www.cdc.gov/niosh/homepage.html. NIOSH-approved manufacturers, respirators and associated user instructions are listed on the NIOSH website.
    2. Long sleeved, loose fitting clothing that is sufficiently tight around potential entry points for RCF dust.
    3. Gloves.
    4. Eye protection, such as goggles, safety glasses with side shields, or full facepiece.
- Take steps to assure adequate ventilation.
- Handle RCF carefully to minimize airborne dust. Use hand tools whenever possible.
- Dampen used RCF with light water spray prior to removal to prevent airborne dust.
- Do not use compressed air or dry sweeping for clean-up. Frequently clean work area with a vacuum or by wet sweeping to minimize debris accumulation.
- Vacuum work clothes before leaving work area. Wash work clothes separately from other laundry and rinse washing machine after use to avoid contaminating other clothes.
- Wash all exposed body areas gently with soap and water after contact.
- Discard used RCF components by sealing in an airtight plastic bag or container. Refer to local, regional, state or provincial regulations to identify applicable disposal requirements.

First Aid Procedures:

- Eye contact: Flush with water for at least 15 minutes. Do not rub eyes. Seek immediate medical attention if irritation persists.
- Skin contact: Wash affected area gently with soap and water. Do not rub or scratch affected skin. Seek immediate medical attention if irritation persists.
- Nose and throat contact: If these become irritated, leave the area and move to a location with clean fresh air. Drink water and blow nose. Seek immediate medical attention if symptoms persist.

12 Maintenance and Service Instructions

A. MAINTENANCE OF LOW WATER CUT-OFF DEVICES

⚠ WARNING

Probe and float type low water cut-off devices require annual inspection and maintenance.

1. PROBE TYPE LOW WATER CUT-OFF
   Although these devices are solid state in their operation, the probe is exposed to possible contamination in the boiler water and subject to fouling.
   It is important to physically remove the probe from the boiler tapping annually and inspect that probe for accumulation of scale or sediment.
   Follow these steps to inspect, clean and/or replace the probe:
   a. Turn off electric service to the boiler.
   b. Drain boiler water to a level below the tapping for the probe.
   c. Disconnect wiring connections between the low water cut-off control and the probe.
   d. Remove the low water cut-off control from the probe.

⚠ DANGER

Assure that the boiler is at zero pressure before removing the LWCO probe. DO NOT rely on the pressure gauge to indicate that the boiler is at zero pressure. Open the safety valve to relieve all internal pressure prior to proceeding. Safety valve discharge piping must be piped such that the potential for burns is eliminated.

   e. Unscrew the probe from the boiler tapping.
   f. Inspect that portion of the probe that is exposed to the boiler water for a scale or sediment buildup.
   g. Light deposits may be removed by wiping the probe with a damp cloth. Wiping the probe with a cloth soaked in vinegar will remove more tenacious lime deposits. The most stubborn deposits may be removed from the probe by using a diluted amount, 3 parts of water to 1 part of phosphoric acid (H_2PO_4).

⚠ CAUTION

Exercise caution when handling phosphoric acid and follow the instruction label on its container.

   h. Clean the pipe threads of the probe to remove old, hardened pipe dope and other foreign matter.
   i. Apply a moderate amount of good quality pipe dope to the pipe threads on the probe, leaving the two end threads bare. **DO NOT** use PTFE (Teflon) tape.
   j. Screw the probe into the boiler tapping.
   k. Mount the low water cut-off control on the probe.
   l. Reconnect the control to probe wiring.
   m. Fill the boiler to its normal waterline.
   n. Add boiler water treatment compound as needed (refer to Paragraph B.).
   o. Restore electric service to the boiler.
   p. Fire burner to bring the water in the boiler to a boil to drive off free oxygen.
   q. WARNING — BEFORE RETURNING BOILER TO SERVICE: Follow the low water cut-off check out procedure in Section X, Paragraph I, No. 4.

B. BOILER AND SYSTEM CLEANING INSTRUCTIONS FOR TROUBLE FREE OPERATION

1. STEAM BOILERS
   a. Oil, greases & sediments which accumulate in a new boiler and piping must be removed in order to prevent an unsteady water line and carry over of the water into the supply main above boiler.
   Operate the boiler with steam in the entire system for a few days allowing the condensate to return to the boiler. If the condensate can temporarily be wasted, operate boiler only for the length of time it takes for condensate to run clear. If the latter cannot be achieved or if the condensate is returned to the boiler, boil out the boiler using the SURFACE BLOW-OFF connection, see Figure 5 (tappings, J).
      i. Drain boiler until 1" of water is visible in gauge glass. Run temporary 1½" NPT pipe line from the surface blow-off connection to an open drain or some other location where hot water may be discharged safely. **DO NOT** install valve in this line.
      ii. Drain about 5 gallons of hot water from boiler into a container and dissolve into it an appropriate amount of recommended boil out compound. Remove safety valve & add solution to boiler water thru exposed tapping using a funnel.

12 Maintenance and Service Instructions *(continued)*

NOTICE Check with local authorities or consult local water treatment services for acceptable chemical cleaning compounds.

iii. Start burner and operate sufficiently to boil the water without producing steam pressure. Boil for about 5 hours. Open boiler feed pipe sufficiently to permit a steady trickle of water from the surface blow-off pipe. Continue this slow boiling and trickle of overflow for several hours until the water coming from the overflow is clear.

iv. Stop burner and drain boiler in a manner and to a location that hot water can be discharged with safety.

v. Refill boiler to normal water line. If water in gauge glass does not appear to be clear, repeat steps (*i.* thru *iii.*) and boil out the boiler for a longer time.

b. Low pressure steam boilers such as the V8H Series should be maintained with appropriate water treatment compounds. Add suitable water treatment compounds as recommended by your qualified water treatment company.

c. Remove temporary surface blow-off piping, plug tapping and reinstall safety valve. Boil or bring water temperature to 180°F promptly in order to drive off the dissolved gases in the fresh water.

d. If unsteady water line, foaming or priming persist, install gate valve in Hartford Loop and drain valves in return main and at boiler as shown in Figure 16 and proceed as follows:

i. Connect hoses from drain valves to floor drain. Close gate valve in Hartford Loop and open drain valve in return main. Fill boiler to normal water level, turn on oil burner and operate boiler at this water level for at least 30 minutes after the condensate begins to run hot, then turn off burner.

Close all radiator valves. Remove all supply main air valves and plug the openings in supply main.

ii. Draw about 5 gallons of hot water from boiler into a container and dissolve into it the appropriate amount of a recommended boilout compound. Remove safety valve from boiler and pour this solution into boiler, then reinstall safety valve.

iii. Turn on oil burner and keep operating while feeding water to boiler slowly. This will raise water level in boiler slowly so that water will be boiling hot and will rise slowly into supply main and back through return main, flowing from drain hose at about 180°F. Continue until water runs clear from drain hose for at least 30 minutes.

iv. Stop feeding water to boiler but continue operating oil burner until excess water in boiler flows out through supply main and water lowers (by steaming) until it reaches normal level in boiler. Turn off oil burner. Drain boiler. Open all radiator valves. Reinstall all supply main air valves. Open gate valve in Hartford Loop.

v. When boiler has cooled down sufficiently (crown sheet of sections are not too hot to touch), close the drain valves at boiler and in return main and feed water slowly up to normal level in boiler. Turn on oil burner and allow boiler to steam for 10 minutes, then turn off burner. Draw off one quart of water from bottom gauge glass fitting and discard. Draw off another quart sample and if this sample is not clear, repeat the cycle of draining the boiler and return main and refilling the boiler until sample is clear.

vi. If the boiler water becomes dirty again at a later date due to additional sediment loosened up in the piping, close gate valve in Hartford Loop, open drain valve in return main, turn on oil burner and allow Condensate to flow to drain until it has run clear for at least 30 minutes while feeding water to boiler so as to maintain normal water level. Turn off oil burner, drain boiler, open gate valve in Hartford Loop, then repeat Step 1 above.

12 Maintenance and Service Instructions *(continued)*

e. Make pH or Alkalinity Test.
After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading in pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or through your local druggist. The pH should be higher than 7, but lower than 11. Add some of the washout chemical (caustic soda), if necessary, to bring the pH within the specified range.

f. Boiler is now ready to be put into service.

2. WATER BOILERS

a. *Filling of Boiler and System — General* —In a hot water heating system, the boiler and entire system (other than the expansion tank) must be full of water for satisfactory operation. Water should be added to the system until the boiler pressure gauge registers 12 psi. To insure that the system is full, water should come out of all air vents when opened.

b. *Boiling Out of Boiler and System.* The oil and grease which accumulate in a new hot water boiler can be washed out in the following manner.

i. Remove relief valve using extreme care to avoid damaging it.
ii. Add an appropriate amount of recommended boil out compound.
iii. Replace relief valve.
iv. Fill the entire system with water.
v. Start firing the boiler.
vi. Circulate the water through the entire system.
vii. Vent the system, including the radiation.
viii. Allow boiler water to reach operating temperature, if possible.
ix. Continue to circulate the water for a few hours.
x. Stop firing the boiler.
xi. Drain the system in a manner and to a location that hot water can be discharged with safety.
xii. Remove plugs from all available returns and wash the water side of the boiler as thoroughly as possible, using a high-pressure water stream.
xiii. Refill the system with fresh water.

c. Add appropriate boiler water treatment compounds as recommended by your qualified water treatment company.

d. *Make pH or Alkalinity Test.*
After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or through your local druggist. The pH should be higher than 7 but lower than 11. Add appropriate water treatment chemicals, if necessary, to bring the pH within the specified range. With this lower level of protection, care must be exercised to eliminate all of the free oxygen in the system.

e. Boiler is now ready to be put into service.

12 Maintenance and Service Instructions *(continued)*

C. EXCESSIVE MAKE-UP WATER

IMPORTANT

IF, DURING NORMAL OPERATION, IT IS NECESSARY TO ADD MORE WATER THAN INDICATED BELOW, CONSULT A QUALIFIED SERVICE TECHNICIAN TO CHECK YOUR SYSTEM FOR LEAKS.

Boiler Series	Gallons Per Month	Gallons Per Year
V8H8	0.7	9
V8H9	0.8	10

A leaky system will increase the volume of make-up water supplied to the boiler which can significantly shorten the life of the boiler. Entrained in make-up water are dissolved minerals, salts and oxygen. When the fresh, cool make-up water is heated in the boiler the minerals fall out as sediment, the salts coat the inside of the boiler, and the oxygen escapes as a gas. The accumulation of sediment eventually isolates the water from contacting the cast iron. When this happens the cast iron in that area gets extremely hot and eventually cracks. The presence of free oxygen or chloride salts in the boiler corrodes the cast iron from the inside. More make-up water and higher concentrations of contaminants damage the boiler sooner. **Our warranty does not cover corrosion and sediment-related damage.** Clearly it is in everyone's best interest to prevent this type of failure. You can do your part by ensuring that your system is leak-free, keeping leakage to less than 2 percent of the boiler water volume each month.

D. ATTENTION TO BOILER WHILE NOT IN OPERATION.

NOTICE If boiler is not used during winter time, it must be fully drained to prevent freeze damage.

1. Spray inside surfaces with light lubricating or crankcase oil using gun with extended stem so as to reach all corners.
2. With steam boilers, at end of season add sufficient water to fill boiler to top of water column and leave it that way until fall when water should be drained again to proper level. If at this time boiler water is dirty, drain water, flush out boiler, and refill with clean water to prescribed water level.
3. Always keep the manual fuel supply valve shut off if the burner is shut down for an extended period of time.
4. To recondition the heating system in the fall season after a prolonged shut down, follow the instructions outlined in Section X, Paragraphs A through K.

⚠ WARNING

This boiler contains controls which may cause the boiler to shut down and not restart without service. If damage due to frozen pipes is a possibility, the heating system should not be left unattended in cold weather; or appropriate safeguards and alarms should be installed on the heating system to prevent damage if the boiler is inoperative.

13 Boiler Cleaning

⚠ WARNING

All boiler cleaning must be completed with burner service switch turned off. Boilers equipped with burner swing door have a potential hazard which can cause severe property damage, personal injury or loss of life if ignored. Before opening swing door, turn off service switch to boiler to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely when service is completed.

A. CLEAN THE FLUEWAYS (See Figure 33).

1. Prior to cleaning boiler, lay a protective cloth or plastic over combustion chamber blanket to collect debris falling from flueways. Several models **DO NOT** utilize a combustion chamber blanket, see Section XIV, Repair Parts, Item 1 Bare Boiler Assembly for details.
2. For access to combustion chamber remove two (2) 5/16" - 18 cap screws, one on the right (1¼" long) and one on the left (3¼" long). If boiler is equipped with flexible fuel line(s), swing door open.
3. For cleaning from the side:
   a. Remove the jacket right side access panel to expose the flue cover plates.
   b. Loosen nuts securing the flue cover plates and remove the plates. The rope gasket should be removed with the plates with care to avoid damage to the rope gasket.
4. For cleaning from the top:
   a. Remove as much vent pipe as necessary to allow removal of the jacket top panel and canopy.
   b. Remove the jacket top panel.
   c. Remove the canopy, being careful not to damage the gasket.
5. Using a 1¼" diameter wire or fibre bristle brush (30" handle) clean the flueways. Brush from the top and/or side using horizontal and diagonal strokes for best results. **DO NOT** allow brush to strike the target wall or liner in the chamber.

B. CLEAN TOP OF BOILER SECTIONS (if cleaning from the top).

Brush and vacuum the tops of the boiler sections.

C. CLEAN THE COMBUSTION CHAMBER.

Using wire or fibre bristle brush, clean crown of boiler and inside of water legs.

⚠ WARNING

DO NOT allow brush to strike target wall or blanket in the combustion chamber.

D. AFTER CLEANING, remove protective cloth or plastic with debris and vacuum as necessary, but be careful not to damage blanket. Inspect target wall, combustion chamber blanket, burner swing door insulation, and rope gasket for signs of damage. If damaged, replace as needed.

E. REASSEMBLE BOILER.

⚠ CAUTION

DO NOT start the burner unless canopy, vent pipe, burner swing door and all flue cover plates are secured in place.

1. Install the canopy taking care to align the gasket without blocking the flueways. If gasket is damaged, replace as needed.
2. Reinstall flue cover plates, making sure rope gasket on each plate is in place and forms a gas tight seal. If damaged replace as needed.
3. Reinstall jacket top panel and/or jacket upper right side access panel with #8 x ½" long sheet metal screws.
4. Reinstall vent pipe on canopy and secure to collar with sheet metal screws.
5. Close burner swing door. Secure door to front section with 5/16" flange nut and washer (right side) and 5/16" x 3½" lg. bolt (left side).

NOTICE When securing burner swing door make sure door is drawn-in equally on both sides.

Tighten swing door hardware to provide adequate seal to rope gasket around perimeter of door.

Use an alternating tightening method from right side flange nut to left side cap screw to pull door tight equally.

13 Boiler Cleaning *(continued)*

NOTES:

1. PRIOR TO CLEANING BOILER, LAY A PROTECTIVE CLOTH OR PLASTIC OVER THE BLANKET TO COLLECT DEBRIS FALLING FROM FLUEWAYS.
2. AFTER CLEANING, INSPECT TARGET WALL, COMBUSTION CHAMBER BLANKET, BURNER SWING DOOR INSULATION AND ROPE GASKET FOR SIGNS OF DAMAGE. IF DAMAGED, REPLACE AS NEEDED.
3. REPLACE CANOPY GASKET STRIPS AS NEEDED IF DAMAGED.

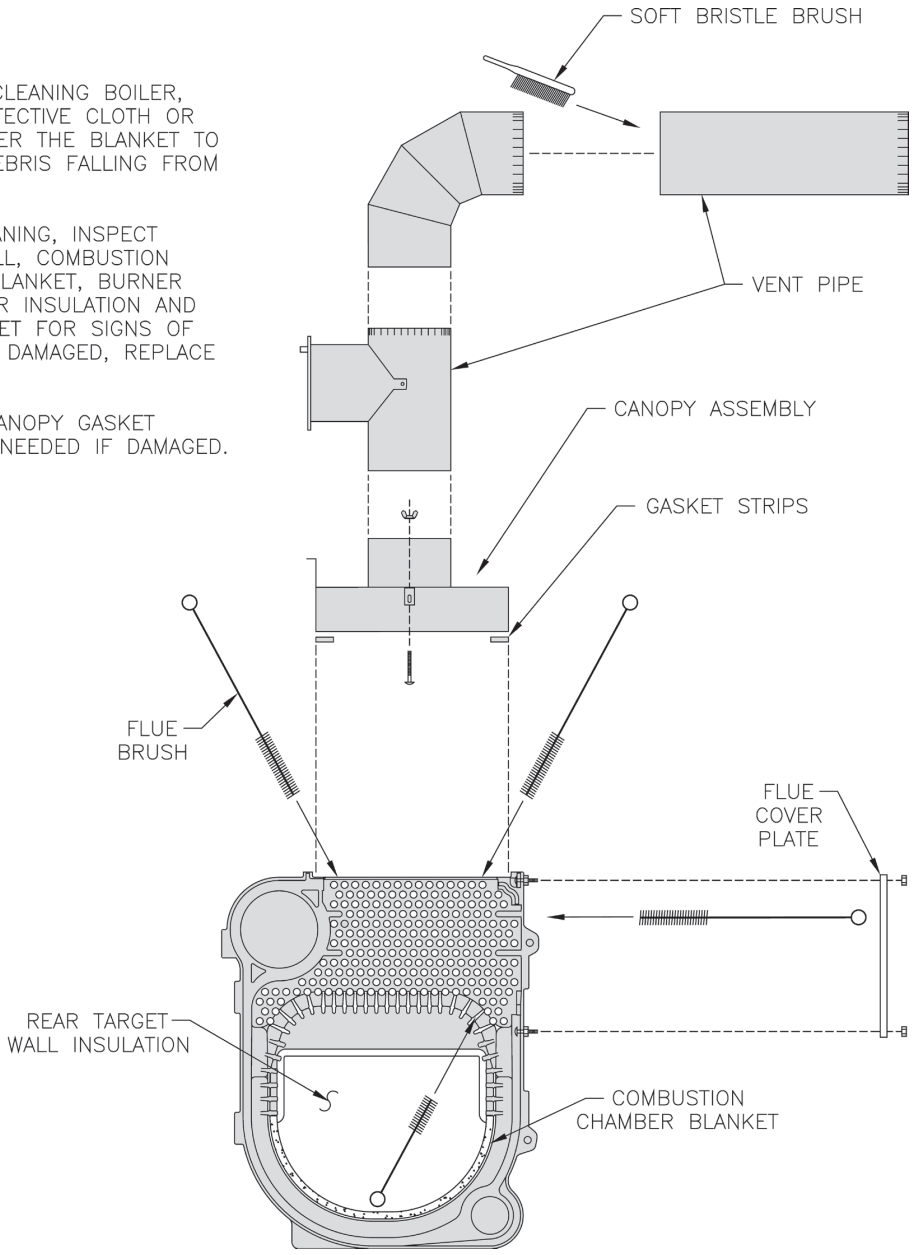


Figure 33: Cleaning of Boiler Flueways

⚠ WARNING

The boiler must be connected to an approved chimney in good condition. Serious property damage could result if the boiler is connected to a dirty or inadequate chimney. The interior of the chimney flue must be inspected and cleaned before the start of the heating season and should be inspected periodically throughout the heating season for any obstructions. A clean and unobstructed chimney flue is necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.

14 Troubleshooting

A. COMBUSTION

1. NOZZLES — Although the nozzle is a relatively inexpensive device, its function is critical to the successful operation of the oil burner. The selection of the nozzle supplied with the V8H boiler is the result of extensive testing to obtain the best flame shape and efficient combustion. Other brands of the same spray angle and spray pattern may be used but may not perform at the expected level of CO_2 and smoke. Nozzles are delicate and should be protected from dirt and abuse. Nozzles are mass-produced and can vary from sample to sample. For all of those reasons a spare nozzle is a desirable item for a serviceman to have.
2. FUEL LEAKS — Any fuel leak between the pump and the nozzle will be detrimental to good combustion results. Look for wet surfaces in the air tube, under the ignitor, and around the air inlet. Any such leaks should be repaired as they may cause erratic burning of the fuel and in the extreme case may become a fire hazard.
3. SUCTION LINE LEAKS — Any such leaks should be repaired, as they may cause erratic burning of the fuel and in extreme cases may become a fire hazard. Whatever it takes, The Oil Must Be Free of Air. This can be a tough problem, but it must be resolved. Try bleeding the pump through a clear tube. There must be no froth visible. There are various test kits available to enable you to look at the oil through clear tubing adapted to the supply line at the pump fitting. Air eliminators are on the market that have potential. Also, electronic sight glasses are being used with good success. At times, new tubing must be run to the tank or new fittings put on. Just make sure you get the air out before you leave.

   Any air leaks in the fuel line will cause an unstable flame and may cause delayed ignition noises. Use only flare fittings in the fuel lines.
4. GASKET LEAKS — If 11.5 to 13.0% CO_2 with a #1 smoke cannot be obtained in the breeching, look for air leaks around the burner mounting gasket, observation door, and canopy gasket. Such air leaks will cause a lower CO_2 reading in the breeching. The smaller the firing rate the greater effect an air leak can have on CO_2 readings.
5. DIRT — A fuel filter is a good investment. Accidental accumulation of dirt in the fuel system can clog the nozzle or nozzle strainer and produce a poor spray pattern from the nozzle. The smaller the firing rate, the smaller the slots become in the nozzle and the more prone to plugging it becomes with the same amount of dirt.
6. WATER — Water in the fuel in large amounts will stall the fuel pump. Water in the fuel in smaller amounts will cause excessive wear on the pump, but more importantly water doesn't burn. It chills the flame and causes smoke and unburned fuel to pass out of the combustion chamber and clog the flueways of the boiler.
7. COLD OIL — If the oil temperature approaching the fuel pump is 40°F or lower, poor combustion or delayed ignition may result. Cold oil is harder to atomize at the nozzle. Thus, the spray droplets get larger and the flame shape gets longer. An outside fuel tank that is above grade or has fuel lines in a shallow bury is a good candidate for cold oil. The best solution is to locate the tank near the boiler in the basement utility room or bury the tank and lines deep enough to keep the oil above 40°F. Check environmental issues with local authorities having jurisdiction.
8. FLAME SHAPE — Looking into the combustion chamber through the observation port, the flame should appear straight with no sparklers rolling up toward the crown of the chamber. If the flame drags to the right or left, sends sparklers upward or makes wet spots on the target wall, the nozzle should be replaced. If the condition persists look for fuel leaks, air leaks, water or dirt in the fuel as described above.
9. HIGH ALTITUDE INSTALLATIONS — Air openings must be increased at higher altitudes. Use instruments and set for 11.5 to 13.0% CO_2.
10. START-UP NOISE — Late ignition is the cause of start-up noises. If it occurs recheck for electrode settings, flame shape, air or water in the fuel lines.
11. SHUT DOWN NOISE — If the flame runs out of air before it runs out of fuel, an after burn with noise may occur. That may be the result of a faulty cut-off valve in the fuel pump, or it may be air trapped in the nozzle line. It may take several firing cycles for that air to be fully vented through the nozzle. Water in the fuel or poor flame shape can also cause shut down noises.

14 Troubleshooting *(continued)*

NOTICE CHECK TEST PROCEDURE. A very good test for isolating fuel side problems is to disconnect the fuel system and with a 24" length of tubing, fire out of an auxiliary five gallon pail of clean, fresh, warm #2 oil from another source. If the burner runs successfully when drawing out of the auxiliary pail then the problem is isolated to the fuel or fuel lines being used on the jobsite.

B. OIL PRIMARY CONTROL (Oil Primary)

1. Burner (Oil Primary) will not come on.
   a. No power to Oil Primary.
   b. Oil Primary is in lockout or restricted mode. Press reset button for one (1) second to exit lockout. If control has recycled three times within the same call for heat, it will enter into restricted mode. To reset from restricted mode, refer to Section XI, Paragraph I, No. 2 for details.
   c. CAD cell seeing light.
   d. CAD assembly defective.
   e. Control motor relay is stuck closed (see note below).
2. Burner (control) will light, then shut down after a short time, then restart after one (1) minute.
   a. CAD cell is defective.
   b. Air leaking into oil line causing flame out.
   c. Defective nozzle causing flame to be erratic.
   d. Excessive airflow or draft causing flame to leave burner head.
   e. Excessive back pressure causing flame to be erratic.
3. Control locks out after Trial For Ignition (TFI).
   a. No oil to burner.
   b. Shorted electrodes.
   c. Nozzle clogged.
   d. Airflow too high.
   e. Ignitor module defective.
   f. CAD cell defective.
   g. Oil valve stuck open or closed.

   Note: The Safety Monitoring Circuit (SMC) is designed to provide lockout in the event of a stuck or welded motor relay.

NOTICE If flame is not established within 15 seconds of oil valve actuation (known as Trial For Ignition [TFI]) lockout will occur. Lockout is indicated by a red LED solid-on located on the oil primary control.
Hard Lockout will occur if the Oil Primary Control locks-out three (3) times during a call for heat. This is indicated by red light reset button solid-on.

C. INTELLIGENT OIL BOILER CONTROL

- **Cold Start Boiler Control** is used on Boilers without Tankless Heaters.
- **Warm Start Boiler Control** is used on Boilers with Tankless Heaters.

1. When a problem occurs with the boiler operation, the Boiler Control easily provides specific, valuable information to help resolve the issue quickly. The display on the Boiler Control should be the first place to check.

Table 10: Troubleshooting Guide

System Condition	Diagnostic Condition	Check	Action
Boiler is cold, house is cold.	Display is OFF.	120 Vac System power.	Turn system power on.
	Display is ON.	24 Vac T-T	No 24 V; replace control.
		24 V present; disconnect thermostat, short T-T.	Boiler starts, check wiring and thermostat.
		120 Vac at B1-B2	• If no, replace control. • If yes, check burner and wiring.
		Refer to **Err** on display.	-----
Boiler is hot, house is cold.	Display is ON.	120 Vac at C1-C2	• 120 Vac at C1-C2, check wiring to pump. • Wiring OK, is pump running? • If not, replace the pump. • If pump is running, check for trapped air or closed zone valves
		Boiler below the Low Limit temperature, wait for boiler to go above Low Limit temperature.	-----
		Boiler above LL? If yes, check for 120 Vac between ZC and L2.	• If no 120 Vac , replace control. • If yes, check zone relays, circulators and wiring.

14 Troubleshooting *(continued)*

a. If an Error Code "Err" **IS NOT** displayed on the Boiler Control: In this circumstance, Table 10 can be used to determine the problem and possible causes.

b. If the Boiler Control detects an error it will flash "Err" (boiler control error) followed by a number. Use this text and number to identify the boiler problem and corrective action in Table 11 below.

Table 11: Boiler Control Error Numbers

Display	Status	Recommended Corrective Actions
Err 1	Temperature Sensor Fault	Temperature sensor failure, wire harness loose or shorted connection or control hardware failure: - Check sensor is securely attached to boiler control - Check that sensor wire is not damaged - If secure and in good condition, replace sensor - If problem persists, replace control
Err 2	Communication Fault	Enviracom terminal is shorted to ground or line voltage. - Check wiring to EnviraCOM terminals 1,2 and 3. Wiring to external EnviraCom device is incorrect.
Err 3	Internal Hardware Fault	Error detected with AC power supply frequency or boiler control failure. Cycle power to the control. Replace control if problem persists.
Err 4	Burner Output (B1) Fault	B1 output sensed powered during safety output relay check sequence or un-powered during running, or powered in idle in combination with water temperature above 264°F limit. Cycle power to the control. Replace control if problem persists.
Err 5	Line Voltage Fault (< 80 Vac)	AC voltage out of specification high or low; check L1, L2, 110 VAC.
Err 6	Fuse missing	Internal fuse is blown or missing. The fuse protects the Aquastat from miswiring the L1 and L2 on Oil Primary. When the Oil Primary is correctly wired the fuse is useless and not detected. If Primary is wired incorrectly the fuse is blown out and Aquastat report error 6. EnviraCOM message is sent when the wiring is fixed and the error disappears to indicate the end of the error state. Check wiring and replace fuse.
Err 7	User settings lost, (reset to factory defaults)	Warning: Generated if user adjustments are lost and the device uses factory default values. Error is cleared by entering and exiting the Adjustment mode. Replace control if problem persists.
Err 8	Manual Reset Lockout (resettable)	Set if Err 4 was invoked four times in a row. Check wiring and clear Lockout by pressing all three user keys for 30 seconds.

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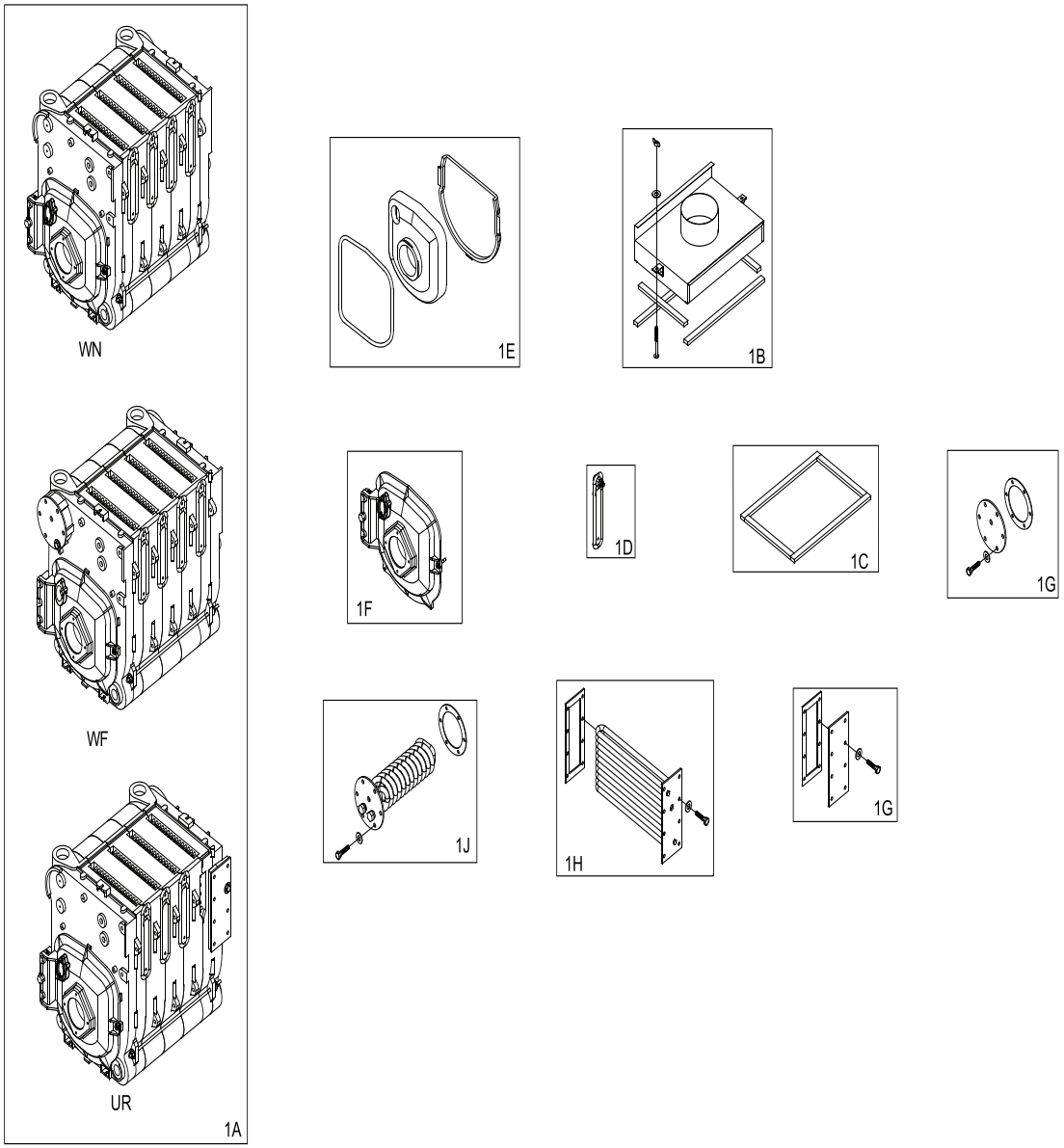
15 Service Parts

All V8H™ Series Boiler Repair Parts may be obtained through your local U.S. Boiler Company Wholesale distributor. Should you require assistance in locating a U.S. Boiler Company Distributor in your area, or have questions regarding the availability of U.S. Boiler Company products or repair parts, please contact U.S. Boiler Company Customer Service at (717) 481-8400 or Fax (717) 481-8408.

15 Service Parts *(continued)*

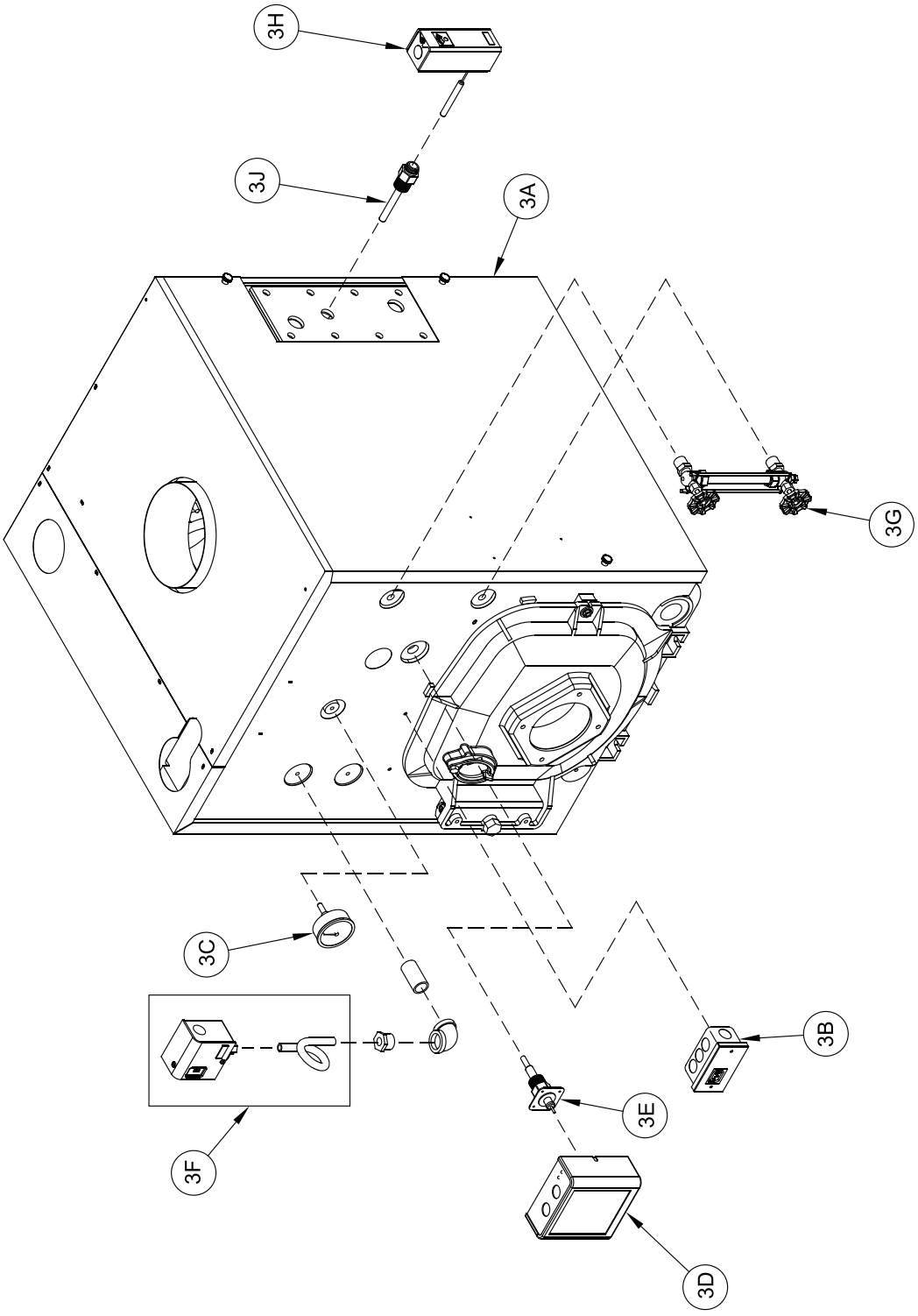


Bare Boiler Assembly

15 Service Parts *(continued)*

Item No.	Description		Part No.	V8H8	V8H9
1. BARE BOILER ASSEMBLY					
Cast Iron Block Assemby: Includes Block Assembly,Burner Swing Door Assembly, Flue Cover Plate, Taget Wall Insulation, Combustion Chamber Blanket (Where Applicable), and Heater Cover Plate/Gasket (Where applicable)					
1A	WF: Block Assembly Carton (Water), Front Heater Opening Includes: Complete Block Assembly, Target Wall Insulation, Flue Cover Plates, Coil Gasket, and Coil Cover Plate/Hardware		610280811	1	
			610280911		1
	WN: Block Assembly (Water), Non-Heater Includes: Complete Block Assembly, Target Wall Insulation, and Flue Cover Plate		610280801	1	
			610280901		1
	UR: Block Assembly for Universal (Steam), Rear Heater Includes: Complete Block Assembly, Target Wall Insulation, and Flue Cover Plates		610280841	1	
			610280941		1
1B	Service Kit, Canopy Includes: Canopy, Canopy Gasket, and Hardware		611280821	1	
			611280921		1
1C	Service Kit, Canopy Gasket		110272-01	1	1
1D	Service Kit, Flue Cover Plate		110273-01	7	8
1E	Service Kit, Combustion Chamber Includes: Target Wall Insulation, Combustion Chamber Blanket, Burner Door Insulation, and Burner Door Rope Gasket		108136-01	1	1
1F	Service Kit, Burner Swing Door Includes: Burner Swing Door, Burner Door Insulation, Burner Door Rope Gasket , Hinge, Observation Port Cover, and Hardware		110282-01	1	1
1G	Service Kit, Heater Cover Plates and Gaskets	Front Heater -Blank	110048-01	1	1
		Front Heater-Trapped		1	1
		Rear Heater-Blank	6036032	1	1
		Rear Heater-Tapped	6036033	1	1
1H	Service Kit, V1-2 Coil		6036031	1	1
1J	Service Kit, 22B Coil		104939-01	1	1

15 Repair Parts *(continued)*

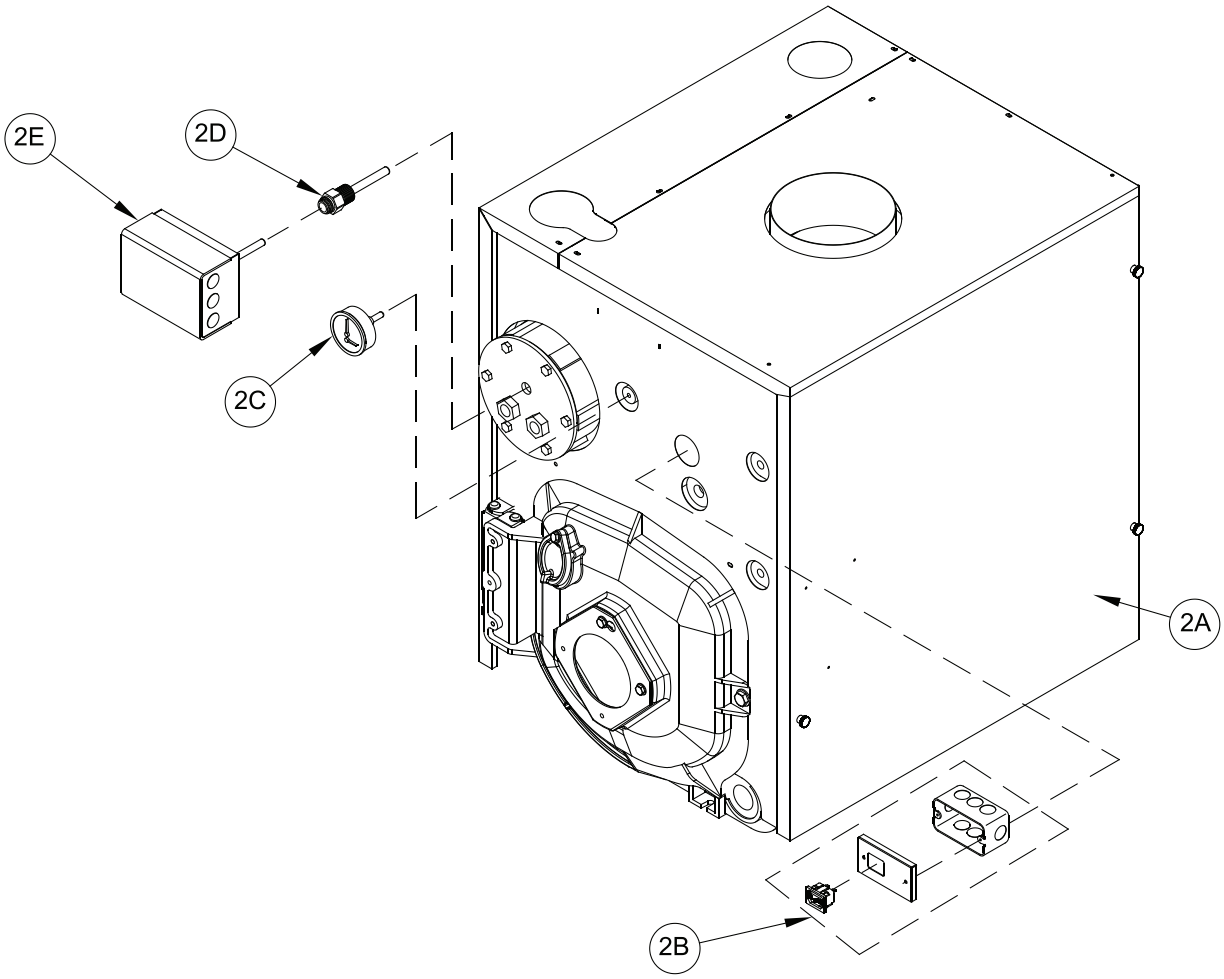


V8H8 and V8H9 Steam Boilers - Trim and Controls

15 Service Parts *(continued)*

Item No.	Description		Part No.	V8H8	V8H9
3. V8H8 and V8H9 STEAM BOILERS - TRIM AND CONTROLS					
3A	UR: Complete Jacket Carton, Rear-Heater		110351-08	1	
			110351-09		1
3B	Service Kit, Burner Disconnect J-Box		110277-01	1	1
3C	Pressure Gauge		110352-01	1	1
3D	Low Water Cut-off, Hydrolevel CG450 (less probe)		110352-01	1	1
3E	Probe, Hydrolevel EL-1214 (for Hydrolevel CG450)		110353-01	1	1
3F	Pressure Limit, Honeywell L404F1369 with Syphon		110354-01	1	1
3G	Gauge Glass Set, 6"		109715-01	1	1
3H	Limit, Honeywell L4006A2015		110355-01	1	1
3J	Well, 3/4" NPT x 3", Honeywell 123871A		109744-01	1	1
Not Shown	Relief Valve, Conbraco, 3/4" FIP	#13-511-B15 15 PSI	Obtain Locally	1	1
	7" Draft Regulator			1	1
	Drain Valve, 3/4" NPT, ConBraCo 35-302-03			1	1

15 Service Parts *(continued)*



V8H8 and V8H9 Water Boilers - Trim and Controls

15 Service Parts *(continued)*

Item No.	Description		Part No.	V8H8	V8H9
2A	WN: Complete Jacket Carton, Water, Non Heater		110271-08	1	
	WF: Complete Jacket Carton Water, Front Heater		110271-09		1
2B	Service Kit, Burner Disconnect J-Box		110277-01	1	1
2C	Temperature & Pressure Gauge, 1/4", NPT x 2-1/2" Dia.		105894-01	1	1
2D	Honeywell #123870A Immersion Well, 3/4" NPT x 1-1/2" Insulation (WN)		109744-01	1	1
	Honeywell #123872A Immersion Well, 1/2" NPT x 3" Insulation (WF)		109711-01	1	1
2E	Honeywell L7248L1080 Hi Limit, Circ. Relay (WN)		110281-01	1	1
	Honeywell L7224C1010 Hi and Lo Limit, Circ. Relay (WF)		110280-01	1	1
Not Shown	Relief Valve, Conbraco, 2/4" FIP x 3/4" FIP	#10-408-15 30 PSI	Obtain Locally	1	1
		#10-303-07 40 PSI			
		#10-303-10 50 PSI			
	7" Draft Regulator			1	1
	Drain Valve, 3/4" NPT, ConBraCo 35-302-03			1	1
	Circulator Flange, 1-1/2" NPT			2	2
	Circulator Gasket	Taco #194-1548		2	2
		Grundfos			
	Circulator	Taco 007e		1	1
		Grundfos Alpha2			

Item No.	Description		Part No.	V8H8	V8H9
	Beckett		102114-08	1	
			102114-09		1
	Carlin		101297-01	1	
			101298-01		1
	Riello		101312-01	1	
			101313-01		1
	Primary Control	Honeywell R7284P1080	103880-01	1	1
		Beckett GeniSys 7505p1515	Obtain Locally	1	1
		Carlin		1	1
		Reillo	Contact Burner Manufacturer	1	1

16 Burner Specifications

Table 12: Burner Specifications

Boiler Model	Firing Rate GPH	Beckett AFG					Carlin				
		Settings			[1] Nozzle	[2] Pump Pressure	Burner Model	Settings		[1] Nozzle	[2] Pump Pressure
		Head (Setting)	Air Shutter	Air Band	GPH x Angle Type			Head Bar	Air Band	GPH x Angle Type	
V8H8S V8H8W	2.35	V1 (4)	10	5	1.75 x 45B HAGO	170	102CRD-3	4	50%	2.00 x 60B	140
V8H9S V8H9W	2.60	V1 (6)	10	7	2.00 x 45B	170	102CRD-3	5	100%	2.25 x 70B	140

[1] All burners utilize Delavan nozzles unless otherwise noted.
[2] Single stage fuel pump is standard, two stage fuel pump is optional. Burner manufacturer has preset single stage fuel pump to settings shown in table above.
Two stage fuel pump is factory set at 140 PSI and must be readjusted to settings shown above during burner start-up.

Boiler Model	Firing Rate GPH	Riello				
		Burner Model	Settings		[1] Nozzle	Pump Pressure
			Air Gate	Turbulator	GPH x Angle Type	
V8H8S V8H8W	2.35	40-F10	4.0	5.0	2.00 x 60B	175
V8H9S V8H9W	2.60	40-F10	7.0	5.0	2.25 x 60P HAGO	145

[1] All burners utilize Delavan nozzles unless otherwise noted.
[2] Single stage fuel pump is standard, two stage fuel pump is optional. Burner manufacturer has preset single stage fuel pump to settings shown in table above.
Two stage fuel pump is factory set at 140 PSI and must be readjusted to settings shown above during burner start-up.

Appendix - Aftermarket Low Water Cut Off (LWCO)

⚠ WARNING

DO NOT ATTEMPT to cut factory wires to install an aftermarket Low Water Cut Off (LWCO). Only use connections specifically identified for Low Water Cut Off.

In all cases, follow the Low Water Cut Off (LWCO) manufacturer's instructions.

When

A low water cutoff is required to protect a hot water boiler when any connected heat distributor (radiation) is installed below the top of the hot water boiler (i.e. baseboard on the same floor level as the boiler). In addition, some jurisdictions require the use of a LWCO with a hot water boiler.

Where

The universal location for a LWCO on oil hot water boilers is above the boiler, in either the supply or return piping. The minimum safe water level of a water boiler is at the uppermost top of the boiler; that is, it must be full of water to operate safely.

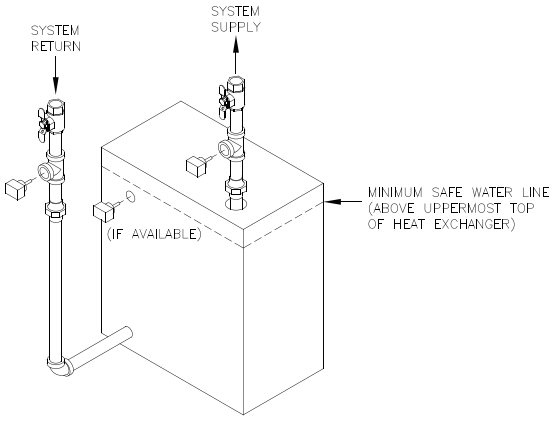
It is recommended that the LWCO control is installed above the boiler to provide the highest level of protection. However, where the LWCO control is approved by the LWCO control manufacturer for installation in a high boiler tapping of a water boiler, the use of the listed LWCO control is permitted when it is installed according to the LWCO manufacturer's instructions.

What Kind

Typically, in residential applications, a probe type LWCO is used instead of a float type, due to their relative costs and the simplicity of piping for a probe LWCO.

How to Pipe

A "tee" is commonly used to connect the probe LWCO in the supply or return piping, as shown below.



LWCO Location

Select the appropriate size tee using the LWCO manufacturer's instructions. Often, the branch connection must have a **minimum** diameter to prevent bridging between the probe and the tee. Also, the run of the tee must have a minimum diameter to prevent the end of the probe from touching or being located too close to the inside wall of the run of the tee.

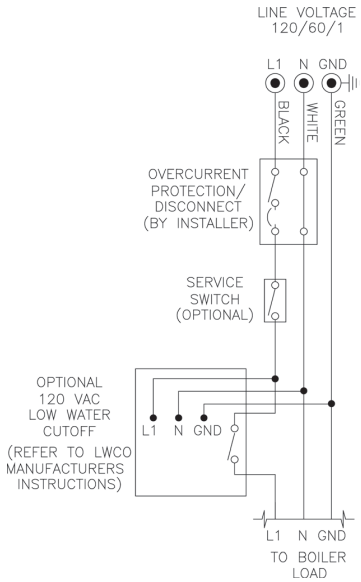
Ideally, manual shutoff valves should be located above the LWCO and the boiler to allow for servicing. This will allow probe removal for inspection without draining the heating system. Many probe LWCO manufacturers recommend an annual inspection of the probe.

How to Wire

LWCO's are available in either 120 VAC or 24 VAC configurations. The 120 VAC configuration must be applied to oil boilers by wiring it in the line voltage service to the boiler (after the service switch, if so equipped).

The presence of water in a properly installed LWCO will cause the normally open contact of the LWCO to close, thus providing continuity of the 120 VAC service to the boiler.

It is recommended to supply power to the probe LWCO with the same line voltage servicing the boiler as shown below.



Wiring of Typical LWCO

Appendix - Aftermarket Low Water Cut Off (LWCO)

A 24 VAC LWCO is used primarily for gas fired boilers where a 24 volt control circuit exists within the boiler. However, a 24 VAC LWCO can only be used if the boiler manufacturer has provided piping and wiring connections and instructions to allow for this application.

How to Test

Shut off fuel supply. Lower water level until water level is BELOW the LWCO. Generate a boiler demand by turning up thermostat. Boiler should not attempt to operate. Increase the water level by filling the system. The boiler should attempt to operate once the water level is above the LWCO.

SERVICE RECORD

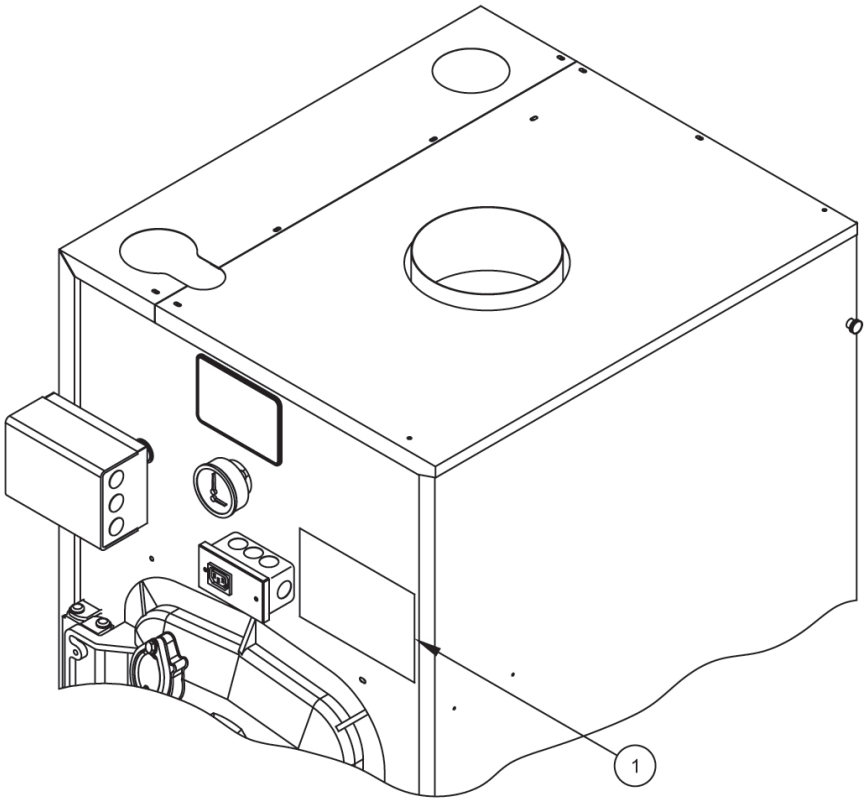
DATE	SERVICE PERFORMED

U.S. Boiler Company, Inc.
P.O. Box 3020
Lancaster, PA 17604
1-888-432-8887
www.usboiler.net

110356-01 - 3/20

Marking Location Diagram V8H Series Oil Boiler (Knockdown Builds)

These instructions contain information related only to the location of the Intelligent Oil Boiler Control Interface Label furnished in the Control Carton on the V8H Series Oil-Fired Knockdown Water boilers. This information is not found in *Installation and Operating Instructions Manual for V8H Series Oil Boiler* furnished with the boiler.



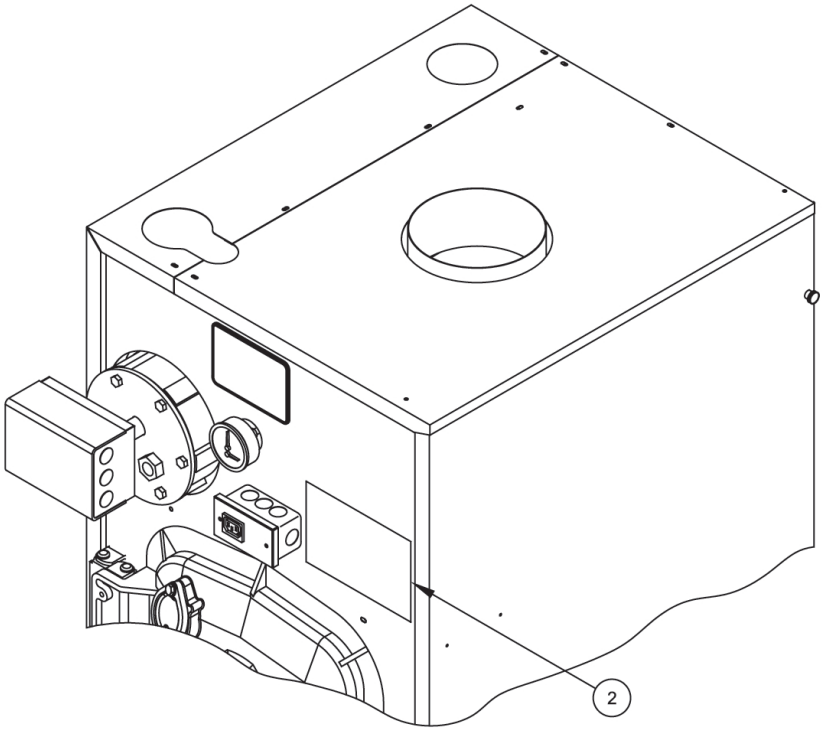
V8H "WC" Water Boiler without Tankless Heater (Partial View)

ITEM	DESCRIPTION	APPLICATION	PART NO.
1	Intelligent Oil Boiler Control Cold Start Interface Label	All water boilers without Tankless Heater	103971-01
2	Intelligent Oil Boiler Control Warm Start Interface Label	All water boilers with Tankless Heater	103972-01

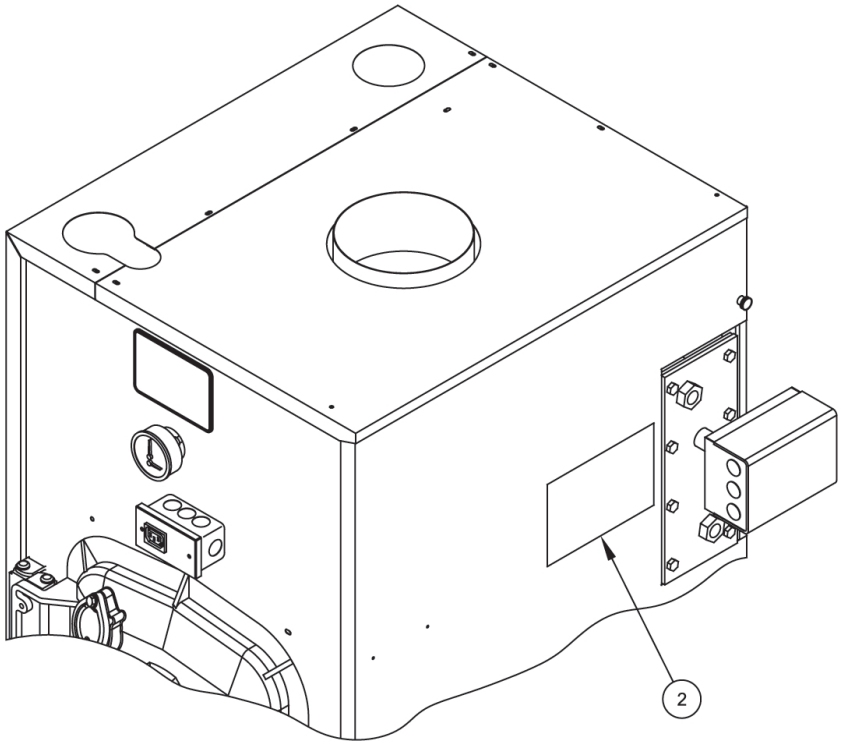
Note:
1. Attach label furnished with control in approximate location as shown.

(See reverse side for additional details)

104180-01 - 6/12



V8H "WF" Water Boiler with Front Tankless Heater
(Partial View)



V8H "WR" Water Boiler with Rear Tankless Heater
(Partial View)

CALEFFI

www.caleffi.com 38505.05

Hydro Separator

548 Series

Function

The hydraulic separator is a device which makes the primary and secondary circuits connected to it independent, and can be used on hot or chilled water systems.
The separator is supplied with an air-vent and check valve assembly to permit automatic discharge of the air in the circuits, and a drain valve for removing any impurities deposited in the bottom of the unit.
These items are designed for use in closed hydronic systems. Do not use in plumbing applications. These items do not meet the low-lead plumbing standards of U.S. and Canada.

Product range

Series 548 Sizes: 1", 1 1/4", 1 1/2", 2" NPT female union connections
1", 1 1/4", 1 1/2", 2" sweat union connections
1", 1 1/4", 1 1/2", 2" press union connections
2"- 4" flanged connections ANSI 150 CLASS

Series NA548 Sizes: 2"-6" flanged connections ANSI 150 CLASS (ASME)
8"-14" flanged connections ANSI 150 CLASS (ASME), with floor supports

SAFETY INSTRUCTION

This safety alert symbol will be used in this manual to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**

WARNING: This product can expose you to chemicals including lead, which is known to the state of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

CAUTION: All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of systems in accordance with all applicable codes and ordinances.

CAUTION: If the hydronic separator is not installed, commissioned and maintained properly, according to the instructions contained in this manual, it may not operate correctly and may endanger the user.

CAUTION: Make sure that all the connecting pipework is water tight.

CAUTION: When making the water connections, make sure that the hydronic separator connecting pipework is not mechanically over-stressed. Over time this could cause breakages, with consequent water losses which, in turn, could cause harm to property and/or people.

CAUTION: Water temperatures higher than 100°F (38°C) can be dangerous. During the installation, commissioning and maintenance of the hydronic separator, take the necessary precautions to ensure that such temperatures do not endanger people.

Technical specifications of hydronic separator

Union connections

Separator:	1", 1 1/4", 1 1/2", 2" NPT Female union 1", 1 1/4", 1 1/2", 2" sweat union 1", 1 1/4", 1 1/2", 2" press union
Drain valve:	3/4" NPT Male
Materials: - Separator body:	Epoxy resin painted steel
- Unions:	Brass
- Air vent body:	Brass
- Air vent hydraulic seal:	peroxide-cured EPDM
- Air vent float:	PP
- Shut-off and drain valve body	Brass
Medium:	Water and non-hazardous glycol solutions up to 50%
Max operating pressure:	150 psi (10 bar)
Temperature range:	32 - 250°F (0÷120°C)
Temperature gauge front connection:	1/2"

Flanged connections

Separator:	2"- 4" ANSI 150 CLASS 2"- 14" ANSI 150 CLASS (ASME)
Air vent relief:	3/8" Female
Drain valve:	1 1/4" NPT Female
Materials: - Separator body:	Epoxy resin painted steel
- Air vent body:	Brass
- Shut-off and drain valve body:	Brass
- Air vent seal:	VITON
- Air vent float:	Stainless steel
Medium:	Water and non-hazardous glycol solutions up to 50%
Max operating pressure:	150 psi (10 bar)
Temperature range:	32 - 250°F (0 - 120°C)

Technical specifications of insulation on union models

Inner part

Material:		Closed-cell expanded PE-X
Thickness:		13/16" (20 mm)
Density: Inner part;		1,9 lb/ft³ (30 kg/m³)
Outer part;		3,1 lb/ft³ (50 kg/m³)
Conductivity (ISO 2581):	- at 32°F (0°C);	.16 BTU/in (0.038 W/(m·K)
	- at 105°F (40°C);	.26 BTU/in (0.045 W/(m·K)

Water vapour resistance coefficient (DIN 52615):
> 1.300

Temperature range:	0 - 210°F (0 - 100°C)
Fire resistance (DIN 4102):	Class B2

Technical specifications of insulation on flanged models (only for 2" to 4" sizes)

Inner part

Material:	rigid closed cell expanded polyurethane foam
Thickness:	2 3/8" (60 mm)
Density:	3 lb/ft³ (45 kg/m³)
Conductivity (ISO 2581):	0.16 BTU/in (0.023 W/(m·K)
Temperature range:	32 - 220°F (0 - 105°C)

Outer part

Material:	Embossed aluminium
Thickness:	7-mil (0.70 mm)
Fire resistance (DIN 4102):	Class 1

Head covers

Heat formed material:	PS

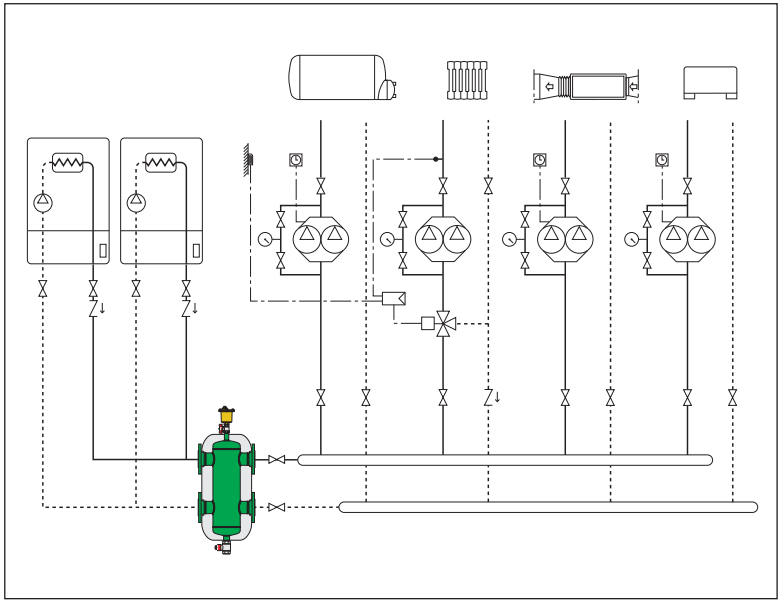
Hydraulic characteristics

The hydraulic separator should be sized according to the maximum flow rate value foreseen at the inlet. The selected value must be either that of the primary circuit or of the secondary, whichever is the greatest.

	UNION				FLANGED									
Size	**1”**	**1 1/4”**	**1 1/2”**	**2”**	**2”**	**2 1/2”**	**3”**	**4”**	**5”**	**6”**	**8”**	**10”**	**12”**	**14”**
gpm	11	18	26	37	60	80	124	247	300	484	792	1330	1850	2500
m³/h	2.5	4	6	8.4	13.6	18	28	56	68	110	180	302	420	568

Installation

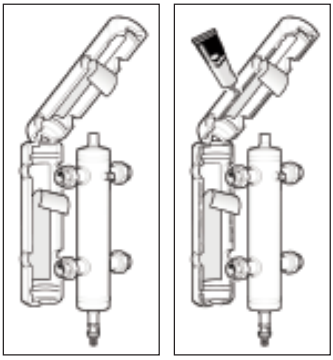
The installation of hydraulic separator should only be done by qualified personnel in accordance with current legislation.
The hydraulic separator is installed between the primary and secondary circuits, always in a vertical position.



Procedure for installation and insulation assembly on union models

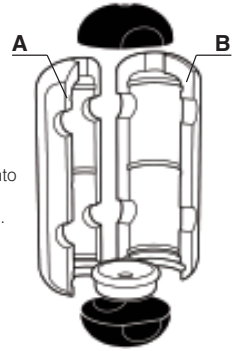
1. Remove the protective strip from the adhesive surface. Re-close the insulation shells.

2. If the hydraulic separator is used with chilled water spread a thin layer of sealant on the edge of the insulation and wait until the solvent evaporates (10 minutes approx) and the close it again.



Procedure for installation and insulation assembly (only for 2" to 4" sizes)

1. Remove the two black head covers at the ends.
2. Open the two side sections and the lower cap.
3. Install the separator in the system.
4. Spread a thin layer of sealant over surfaces A and B. Wait for the solvent to evaporate (approx. 10 minutes).
5. Reassemble the two side sections, fitting the lower cap into one of the two sections and then connecting the other.
6. Finish the assembly with the adhesive tape provided in the box.
7. Complete with the two black head covers.
8. Fit the automatic air vent and the drain valve.



CAUTION: Corrosion or leakage can cause damage or injury. Periodically inspect for signs of corrosion or leakage. If corrosion or leakage is note, the vent must be replaced. Failure to follow these instructions could result in property damage and/or personal injury.

Leave this manual for the user.

Service Instructions

There is no service required for the hydraulic separator.

Scan to view 548, 549 & 5495

Installation Tip

7-19-18

CALEFFI Hydronic Solutions

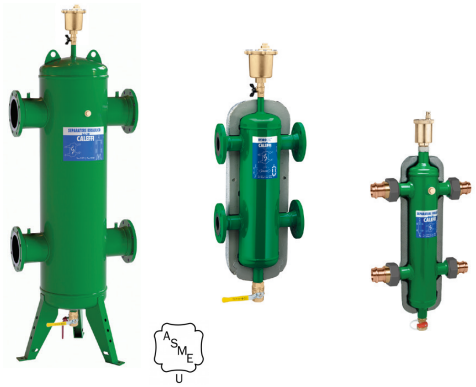
Caleffi North America, Inc.
3883 West Milwaukee Road
Milwaukee, WI 53208
T: 414.238.2360 F: 414.238.2366

Hydro separator

548 series

01076/18 NA
Replaces 01076/16 NA

ISO 9001 FM 21654



Function

The Caleffi 548 and NA548 series hydraulic separator creates a zone with a low pressure loss, which enables connected primary and secondary circuits to be hydraulically independent of each other; **the flow in one circuit does not create or interupt flow in another.** Hydraulically decoupling primary and seconary circuits eliminates pump conflict.

This device includes an automatic high-capacity air vent with service valve to discharge accumulated air within the circuits.

Product range

548 series Hydraulic separator in steel with union connections, drain and insulation.....connections 1" to 2" sweat union
1" to 2" NPT female union
1" to 2" press union

548 series Hydraulic separator in steel with flanged connections, drain and insulation.....connections 2" to 4" ANSI

NA548 series Hydraulic separator in steel with flanged connections, drain and insulation ASME and CRN.....connections 2" to 4" ANSI

NA548 series Hydraulic separator in steel with flanged connections and drain, ASME and CRN.....connections 5" to 14" ANSI

Technical specifications

Threaded, sweat and press union connections

Materials
- body: epoxy resin painted steel
- internal baffle 300 series stainless steel
- air vent body: brass
- shut off and drain valve body: brass
- union nuts: cast iron

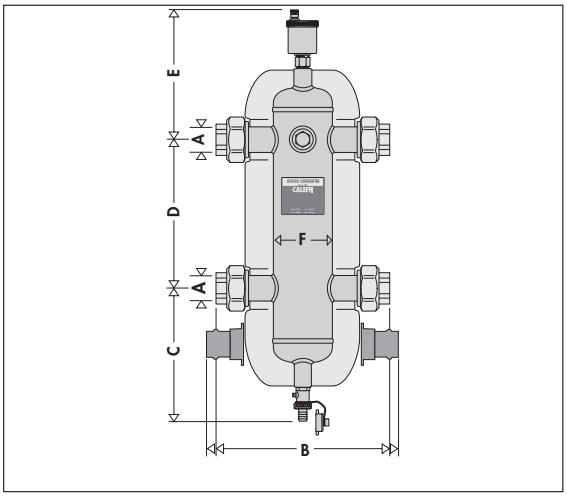
Performance

Suitable fluids: water and non-hazardous glycol solution up to 50%
Max. operating pressure: 150 psi (10 bar)
Working temperature range with insulation: 32–210°F (0–100°C)
Working temperature range without insulation: 32–250°F (0–120°C)

Connections - main: 1",1-¼",1-½", 2" NPT female with unions
1",1-¼",1-½", 2" sweat with unions
1",1-¼",1-½", 2" press with unions
- thermo well tap: ½" straight thread female
- lay length (press connections) size 1 inch : 9"
size 1-¼ inch: 9-¾"
size 1-½ inch: 11-¼"
size 2 inch: 12-¾"
- drain valve: ¾" garden hose thread

Technical specifications of insulation

Materials: double density closed cell expanded PEX
Thickness: ¾" (20 mm)
Density: - internal part: 2 lb/ft³(30 kg/m³)
- external part: 3.1 lb/ft³(50 kg/m³)
Thermal conductivity: 32°F (0°C): 9 BTU·in/hr·ft²·°F (0.038 W/(m·K)
-40°F (-40°C): 11 BTU·in/hr·ft²·°F (0.045 W/(m·K)
Coefficient of resistance to the diffusion of vapor: >1,300
Temperature range: 32–210°F (0–100°C)
Reaction to fire (DIN4102): class B 2



Code*	A	B swt/ press	B npt	C	D	E	F	Wt. (lbs.)	Wt. (kg)
548006A/96A	1"	8¾"	8½"	7"	8⅝"	8½"	3"	13	6.0
548007A/97A	1¼"	9½"	9"	8½"	9½"	8½"	3½"	17	7.7
548008A/98A	1½"	11"	10½"	8½"	10¼"	9¼"	4½"	25	11.3
548009A/99A	2"	12⅜"	11½"	9½"	11⅞"	9¼"	5¾"	27	12.2
548066A	1"	*10¾"*	--	7"	8⅝"	8½"	3"	13	6.0
548067A	1¼"	*11¾"*	--	8½"	9½"	8½"	3½"	17	7.7
548068A	1½"	*14"*	--	8½"	10¼"	9¼"	4½"	25	11.3
548069A	2"	*15¾"*	--	9½"	11⅞"	9¼"	5¾"	27	12.2

***548**00: NPT female union connections; **548**09: sweat union connnections; **548**06: press union connections.

Technical specifications

Flanged connections

Materials
- separator body: epoxy resin painted steel
- air vent body: brass
- shut off and drain valve body: brass
- internal baffle: 304 stainless steel

Performance

Suitable fluids: water and non-hazardous glycol solution up to 50%
Max. operating pressure: 150 psi (10 bar)
Working temperature range with insulation: 32–220°F (0–105°C)
Working temperature range without insulation (vessel): 32–270°F (0–132°C)

Connections
- main: 2"-14"ANSI B16.5 150 CLASS RF
- drain valve: 2 — 6": 1¼" NPT female; 8 — 14": 2" NPT female
- thermo well tap (8 — 14" only):
  - front center: ¾" NPT female
  - inlet/outlet flanges: ½" NPT female

Agency approval

Series NA548 is designed and built in accordance with Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code and tagged and registered with the National Board of Boiler and Pressure Vessel Inspector, and CRN registered, and stamped for 150 psi (10 bar) working pressure, with ASME U stamp. 12" and 14" is CRN pending, contact Caleffi.

Technical specifications of insulation, flflanged versions to 4"

Internal part

Materials: rigid closed cell expanded polyurethane foam
Thickness: 2 3/8" (60 mm)
Density: 2.8 lb/ft³ (45 kg/m³)
Thermal conductivity: 6 BTU·in/hr·ft²·°F (0.023 W/(m·K))
Temperature range: 32–220°F (0–105°C)

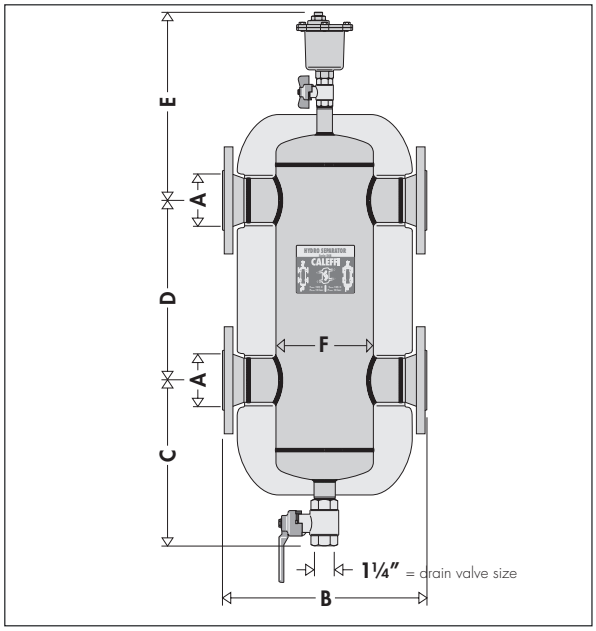
Outer part

Materials: embossed aluminum
Thickness: 7.0-mil (0.7 mm)
Reaction to fire (DIN 4102): class 1

Head covers

Heat formed materials: PS

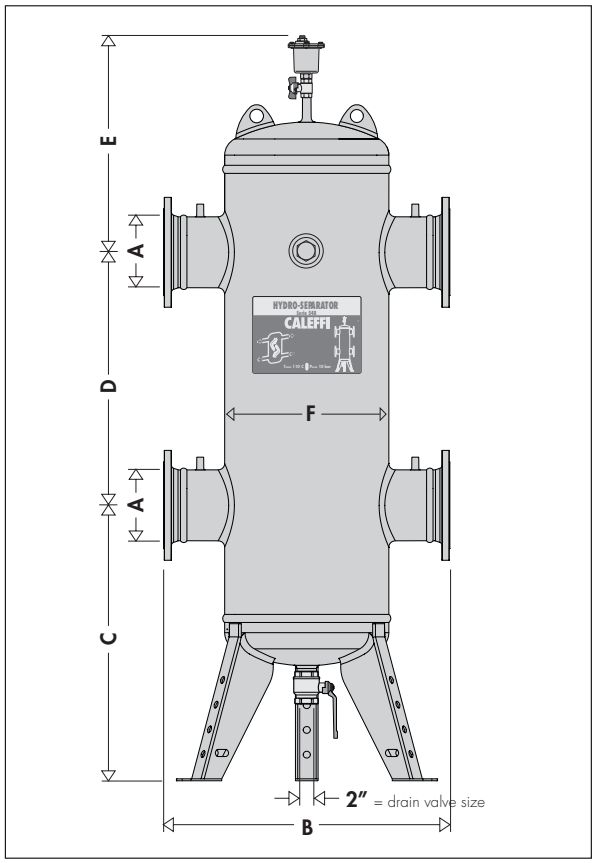
Dimensions



Code	A	B	C	D	E	F	Wt. (lbs.)	Wt. (kg)
***548**052A	2"	13¾"	13"	13"	13½"	6⅝"	75	34
***548**062A	2½"	13¾"	13"	13"	13½"	6⅝"	82	37
***548**082A	3"	18⅜"	15"	17¾"	15¼"	8⅝"	112	51
***548**102A	4"	18½"	15"	17¾"	15½"	8⅝"	117	53
NA548120A**	5"	25"	15"	22"	17½"	12¾"	220	100
NA548150A**	6"	25"	15"	22"	17½"	12¾"	231	105

*Add NA prefix to 2" to 4" flanged connection for ASME approved, CRN registered.
**Without insulation.

NA prefix indicates ASME tagged and registered with the National Board of Boiler and Pressure Vessel Inspectors and CRN registered, with ASME U stamp.



Code	A	B	C	D	E	F	Wt. (lbs.)	Wt. (kg)
NA548200A	8"	35½"	34"	39⅜"	25⅜"	20"	520	236
NA548250A	10"	41¾"	36⁵⁄₁₆"	43⁵⁄₁₆"	27⁵⁄₁₆"	26"	725	330
NA548300A	12"	46½"	37⅞"	47¼"	29⅜"	30"	1,100	500
NA548350A	14"	52"	38⅛"	58⅞"	34½"	36"	1,400	635

NA prefix indicates ASME tagged and registered with the National Board of Boiler and Pressure Vessel Inspectors and CRN registered (except 14" CRN pending, contact Caleffi), with ASME U stamp. Insulation is not included.

Operating principle

When a single system contains a primary production circuit, with its own pump, and a secondary user circuit, with one or more distribution pumps, operating conditions may arise in the system whereby the pumps interact, creating abnormal variations in circuit flow rates and pressures.

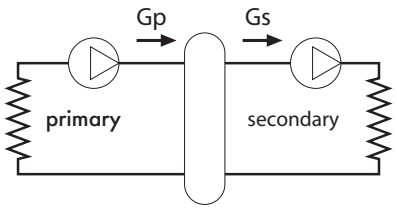
The hydraulic separator creates a zone with a low pressure loss, which enables the primary and secondary circuits connected to it to be hydraulically independent of each other; **the flow in one circuit does not create a flow in the other if the pressure loss in the common section is negligible.**

In this case, the flow rate in the respective circuits depends exclusively on the flow rate characteristics of the pumps, preventing reciprocal influence caused by connection in series.

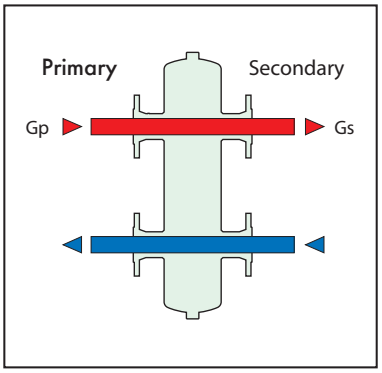
Therefore, using a device with these characteristics means that the flow in the secondary circuit only circulates when the relevant pump is on, permitting the system to meet the specific load requirements at that time.

When the secondary pump is off, there is no circulation in the secondary circuit; the whole flow rate produced by the primary pump is by-passed through the separator.

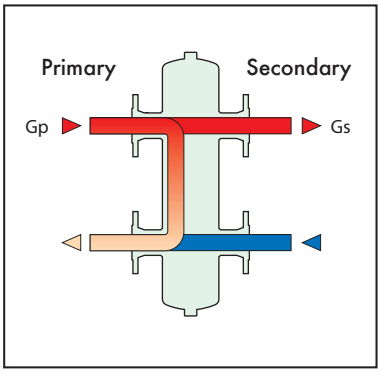
With the hydraulic separator, it is therefore possible to have a primary production circuit with a constant flow rate and a secondary distribution circuit with a variable flow rate; these operating conditions are typical of modern heating and cooling systems.



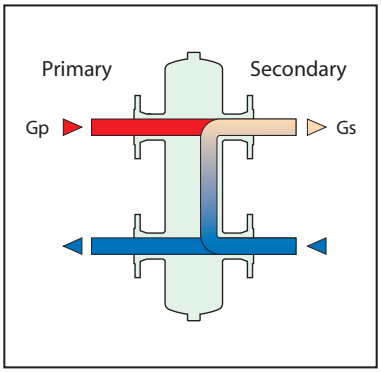
Three possible hydraulic balance situations are shown below.



Gprimary = **G**secondary

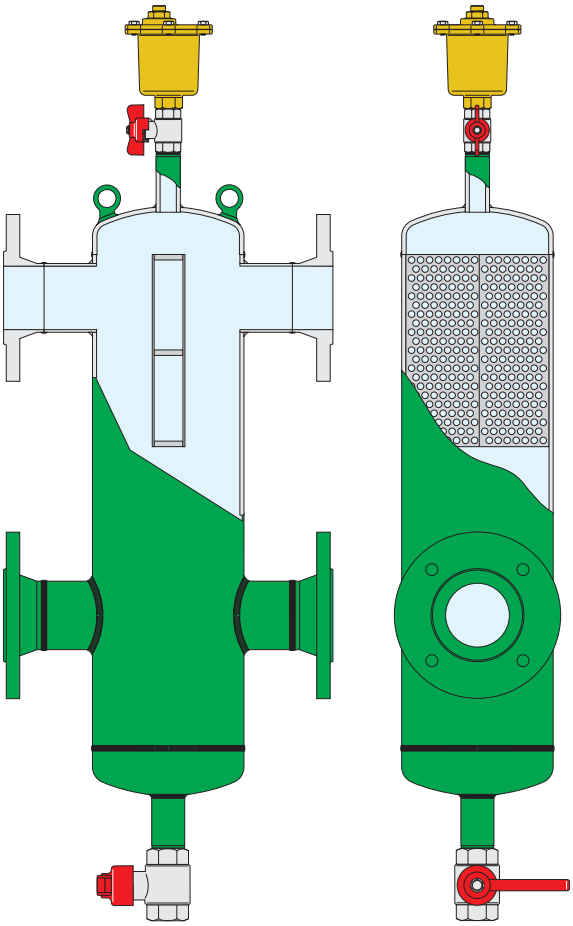


Gprimary > **G**secondary

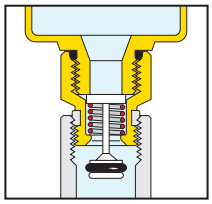


Gprimary < **G**secondary

Construction details

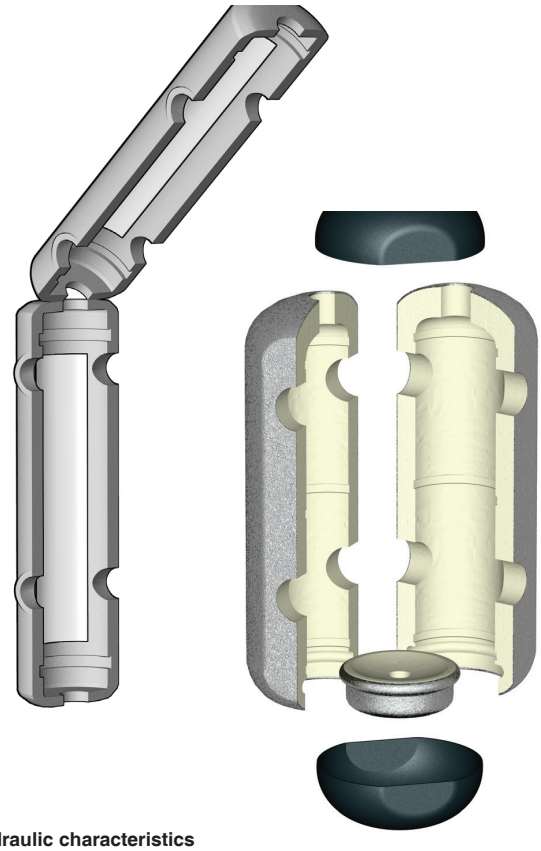


Isolating the air vent valve
In flanged separators, the air vent is isolated manually, using a shut-off ball valve. In union separators, however, the air vent body is automatically isolated by the check valve, which closes when the air vent body is removed.



Insulation

Hydraulic separators are available complete with a hot preformed insulation shell. In the flanged series, up to 4", the insulation is made of a shell in expanded polyurethane foam covered with an aluminium layer. In the union sweat or thread version the insulation is made of a pre-formed shell in double density closed cell expanded PEX. This insulation ensures not only perfect heat insulation but also the tightness required to prevent atmospheric water vapors from entering the unit. For these reasons, this type of insulation can also be used in cooling water circuits, as it prevents the formation of condensate on the surface of the separator body.



Hydraulic characteristics

The hydraulic separator should be sized according to the maximum flow rate value at the inlet.The selected design value must be the greatest required flow rate of either the primary circuit or the secondary circuit.

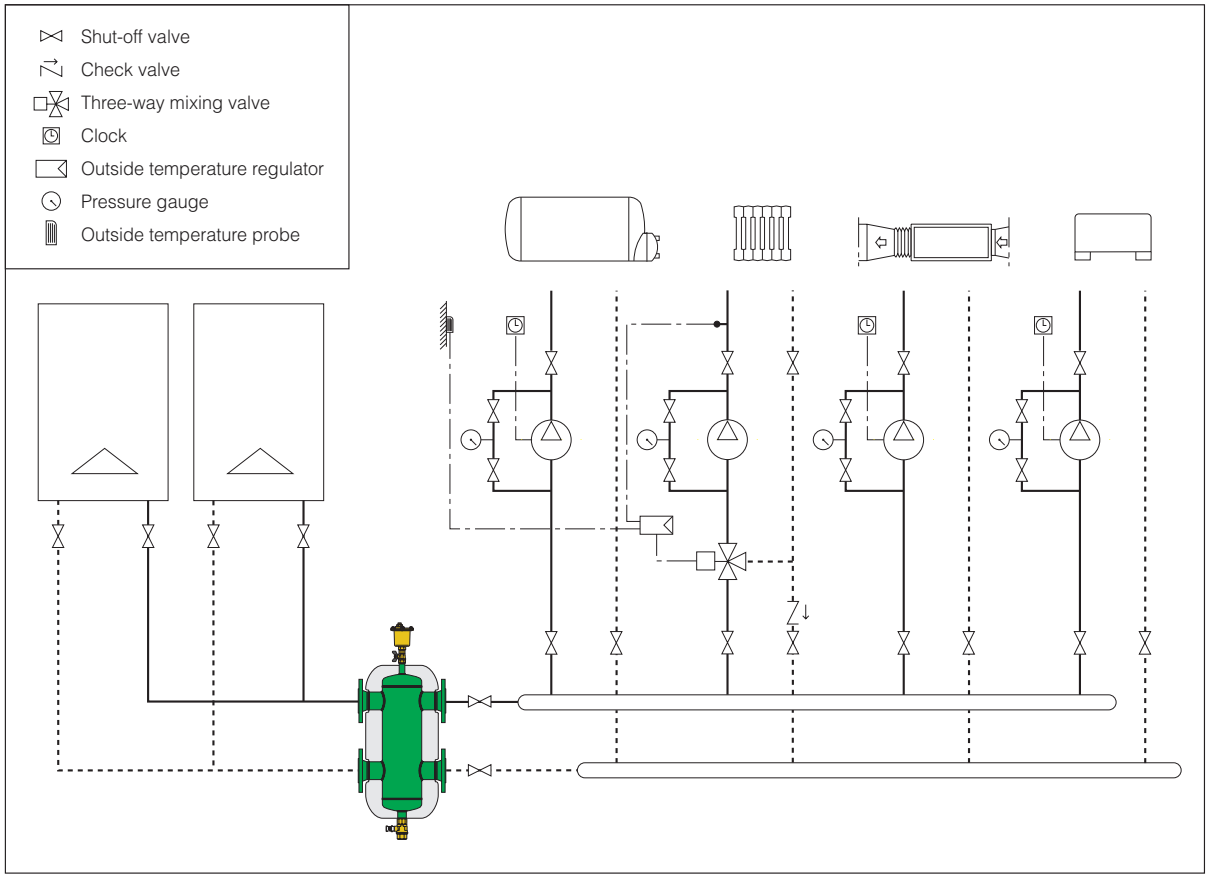
Union connections

Size	1"	1¼"	1½"	2"
gpm	11	18	26	37
l/s	0.7	1.1	1.6	2.3
gallons	0.5	0.7	1.3	3.5
liters	1.9	2.6	4.9	13.2

Flanged connections

Size	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"
gpm	60	80	124	247	300	484	792	1330	1850	2500
l/s	3.8	5.0	7.8	16	19	30	50	84	117	158
gallons	4.0	4.0	8.0	8.0	22.5	23	95	175	255	450
liters	15.1	15.1	30.3	30.3	85.2	87.0	360	662	965	1703

Application diagram



SPECIFICATION SUMMARIES

Hydro Separator 548 series

Hydraulic separator. NPT female, sweat and press union connections 1", 1-1/4", 1-1/2" and 2". Epoxy resin painted steel body. Cast iron union nuts. 300 series stainless steel internal baffle. Working temperature range of 32–210°F (0–100°C) with insulation, 32–250°F (0–120°C) without insulation. Glycol maximum 50%. Max. working pressure 150 psi (10 bar). Supplied with: automatic air vent with automatic service check valve 1/2" NPT female outlet connection and brass body. Drain ball valve brass body with hose connection. Pre-formed double density closed cell expanded PE-X foam shell insulation with external embossed aluminium cover. 1/2 inch femaile straight thread thermometer pocket well front center. Provide temperature pocket well kit, code NA10425.

Hydro Separator 548 series

Hydraulic separator. ANSI B16.5 CLASS 150 RF flanged connections 2", 2-1/2", 3", and 4". Epoxy resin painted steel body. 304 stainless steel internal baffle. Vessel working temperature range of 32–220°F (0–105°C) with insulation, 32–270°F (0–132°C) without insulation. Glycol maximum 50%. Max. working pressure 150 psi (10 bar). Supplied with: automatic air vent with 3/4" NPT female outlet connection and brass body. Brass body 3/4" NPT female shut-off ball valve with T-handle for air vent. Drain ball valve brass body with 1-1/4" NPT female connection. Rigid closed cell expanded polyurethane foam shell insulation with external embossed aluminium cover.

Hydro Separator NA548 series

Hydraulic separator. ANSI B16.5 CLASS 150 RF flanged connections 2", 2-1/2", 3", 4", 6", 8", 10",12" and 14". Epoxy resin painted steel body. 304 stainless steel internal baffle. Vessel working temperature range of 32–220°F (0–105°C) with insulation, 32–270°F (0–132°C) without insulation. Glycol maximum 50%. Max. working pressure 150 psi (10 bar). Supplied with: automatic air vent with 3/4" NPT female outlet connection and brass body. Brass body 3/4" NPT female shut-off ball valve for air vent. Drain ball valve brass body with 1-1/4" NPT female connection for separator sizes 2–6"; 2" NPT female connections for separator size 8–14". For separator size 8–14" only thermometer pocket well on front center 3/4" NPT female; and on inlet/outlet flanges 1/2" NPT female. Rigid closed cell expanded polyurethane foam shell insulation with external embossed aluminium cover for 2, 2-1/2, 3 and 4 inch sizes. The separator is designed and built in accordance Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code and tagged and registered with the National Board of Boiler and Pressure Vessel Inspector, and CRN registered (size 12" and 14" pending, contact Caleffi), and stamped for 150 psi (10 bar) working pressure, with ASME U stamp.

We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice.

CALEFFI Hydronic Solutions

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EXTROL®

EXPANSION TANKS FOR HYDRONIC HEATING & CHILLED WATER SYSTEMS

INSTALLATION & OPERATION INSTRUCTIONS

Models EX-15 through EX-90
Models SX-30V through SX-160V

NOTE: Inspect for shipping damage. Notify freight carrier or store where purchased immediately if damage is present. To avoid risk of personal injury and property damage, if the product appears to be malfunctioning or shows signs of corrosion, call a qualified professional immediately. Current copies of the product manual can be viewed at www.amtrol.com. Use proper safety equipment when installing.

THIS IS THE SAFETY ALERT SYMBOL. IT IS USED TO ALERT YOU TO POTENTIAL PERSONAL INJURY AND OTHER HAZARDS. OBEY ALL SAFETY MESSAGES THAT FOLLOW THIS SYMBOL TO REDUCE THE RISK OF PERSONAL INJURY AS WELL AS PROPERTY DAMAGE.

⚠WARNING **USE ONLY IN RESIDENTIAL CLOSED HYDRONIC SYSTEMS.** Do not install on domestic water systems, or in open heating systems. Corrosion and tank failure may result. Use a Therm-X-Trol® or Therm-X-Span® for domestic water systems. Use a Radiant EXTROL® for radiant heating systems where air elimination equipment or barrier tubing is not used.

⚠WARNING **READ CAREFULLY THE PRODUCT INSTALLATION, OPERATING AND MAINTENANCE MANUAL. FAILURE TO FOLLOW THE INSTRUCTIONS AND WARNINGS IN THE MANUAL MAY RESULT IN SERIOUS OR FATAL INJURY AND/OR PROPERTY DAMAGE, AND WILL VOID THE PRODUCT WARRANTY. THIS PRODUCT MUST BE INSTALLED BY A LICENSED PROFESSIONAL. FOLLOW ALL APPLICABLE LOCAL AND STATE CODES AND REGULATIONS, IN THE ABSENCE OF SUCH CODES, FOLLOW THE CURRENT EDITIONS OF THE NATIONAL PLUMBING CODE AND NATIONAL ELECTRIC CODE, AS APPLICABLE.**

⚠WARNING This Product, like most Products under pressure, may over time corrode, weaken and burst or explode, causing serious or fatal injury, leaking or flooding and/or property damage. To minimize risk, a licensed professional must install and periodically inspect and service the Product. A drip pan connected to an adequate drain must be installed if leaking or flooding could cause property damage. Do not locate in an area where leaking could cause property damage to the area adjacent to the appliance or to lower floors of the structure.

⚠WARNING **RUPTURE OR EXPLOSION HAZARD.** Do not expose product to freezing temperatures or temperatures in excess of 240°F. Do not adjust the pre-charge or re-charge this Product except during installation or regular inspection. Replace the Product and do not adjust the pre-charge if corroded, damaged or with diminished integrity. Adjustments to pre-charge must be done at ambient temperature only. Failure to properly size the Product or follow these instructions may result in excessive strain on the system and may lead to Product failure, serious or fatal personal injury, leakage, and/or property damage.

⚠WARNING A relief valve must be installed to prevent pressure in excess of local code requirement or maximum working pressure designated in the Product Manual, whichever is less. At least once every 3 years or if discharge is present, a licensed professional should inspect the pressure relief valve and replace if corrosion is evident or the valve does not function. **FAILURE TO INSPECT THIS VALVE AS DIRECTED COULD RESULT IN UNSAFE PRESSURE BUILD-UP WHICH CAN RESULT IN PRODUCT FAILURE, SERIOUS INJURY OR DEATH AND/OR SEVERE PROPERTY DAMAGE AND VOID THE PRODUCT WARRANTY.**

⚠WARNING **Chlorine & Aggressive Water:** The water quality can significantly influence the life of this Product. You should test for corrosive elements, acidity, total solids and other relevant contaminants, including chlorine and treat your water appropriately to insure satisfactory performance and prevent premature failure.

⚠WARNING This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY FOR IMPORTANT GENERAL SAFETY INFORMATION AND ADDITIONAL SPECIFIC SAFETY ALERTS. VISIT www.amtrol.com TO VIEW HELPFUL VIDEOS.

Pre-Installation

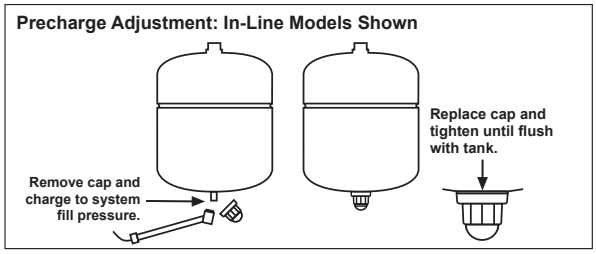
1. Visually inspect for any damage. Ensure expansion tank is sized properly for the application (Figure 1).
2. With tank empty of water, remove plastic cap from air stem (Figure 2).
3. Check precharge pressure and adjust if necessary, charging with air to match boiler fill valve setting.
4. Replace cap and tighten snugly, ensuring the cap is flush against the tank surface.

Figure 1.

Boiler Net Output in 1000'S of BTU/Hr.	Type of Radiation			
	Finned Tube Baseboard or Radiant Panel	Convectors or Unit Heaters	Radiators Cast Iron	Baseboard Cast Iron
25	EX-15	EX-15	EX-15	EX-15
50	EX-15	EX-15	EX-30	EX-30
75	EX-30	EX-30	EX-30	EX-60
100	EX-30	EX-30	EX-60	EX-60
125	EX-30	EX-60	EX-60	EX-90
150	EX-30	EX-60	EX-90	EX-90
175	EX-60	EX-60	EX-90	EX-90
200	EX-60	EX-60	EX-90	EX-90
250	EX-60	EX-90	EX-90	EX-90
300	EX-90	SX-30V	SX-30V	SX-40V
350	SX-30V	SX-30V	SX-40V	SX-60V
400	SX-30V	SX-40V	SX-40V	SX-60V
450	SX-40V	SX-40V	SX-60V	SX-90V
500	SX-40V	SX-40V	SX-60V	SX-90V
550	SX-40V	SX-60V	SX-60V	SX-90V
600	SX-40V	SX-60V	SX-90V	SX-90V
650	SX-60V	SX-60V	SX-90V	SX-90V
700	SX-60V	SX-60V	SX-90V	SX-90V
750	SX-60V	SX-60V	SX-90V	SX-110V
800	SX-60V	SX-90V	SX-90V	SX-110V
850	SX-60V	SX-90V	SX-90V	SX-110V
900	SX-60V	SX-90V	SX-110V	SX-110V
950	SX-90V	SX-90V	SX-110V	SX-110V
1,000	SX-90V	SX-90V	SX-110V	SX-110V
1,100	SX-90V	SX-90V	SX-110V	SX-130V
1,200	SX-90V	SX-90V	SX-110V	SX-130V
1,300	SX-90V	SX-110V	SX-130V	SX-160V
1,400	SX-110V	SX-130V	SX-160V	SX-160V
1,500	SX-110V	SX-130V	SX-160V	(2)SX-110V

Sizing based on: 12 psig Fill; 30 psig Relief Valve; 200°F Average Temperature.

Figure 2.



⚠WARNING **FAILURE TO PROPERLY SEAL CAP WILL RESULT IN LOSS OF PRECHARGE CAUSING PRODUCT TO FAIL.**

⚠WARNING Mount tank vertically in downward position only. Ensure the piping can support the entire weight of the tank when full of water.

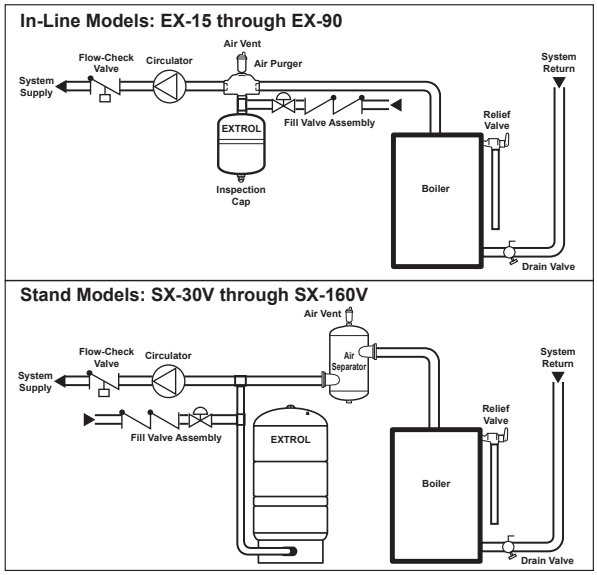
⚠WARNING Models SX-30V through SX-160V are floor standing and may not be hung from the piping.

⚠WARNING Do not install the EXTROL on a dead-end pipe or wherever air can collect. This can cause corrosion and possible leakage.

Installation

1. Drain the boiler system or isolate the area where the EXTROL will be installed.
2. Install the EXTROL on the supply side of the boiler, on the suction-side of the heating circulator(s) (Figure 3).
3. Pressurize the system and check for leaks. Repair as necessary.
4. Restart the boiler system and check for relief valve discharge. If the relief valve drips, the tank may be improperly charged or undersized.

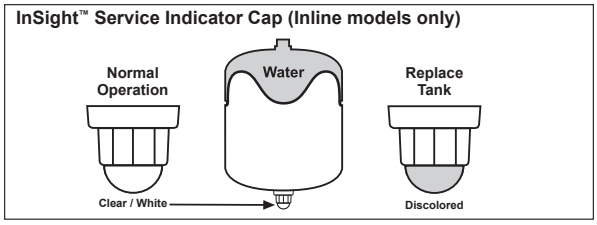
Figure 3.



Maintenance

A professional plumber should check the complete system, including the expansion tank, yearly and more frequently as the system ages. Checking the precharge allows a small quantity of air to escape and can result in an insufficient air charge. Always check the precharge while the tank is isolated and empty of water, and be sure to maintain the proper precharge whenever the tank is inspected. Monitor the tip of the inspection cap for discoloration (Figure 4) in addition to regular product inspection. Contact the installer or a plumbing professional if inspection cap is discolored; tank replacement required. Do not rely on cap as sole indication of tank condition.

Figure 4.



Warranty

EX Models: Seven (7) Year Limited Warranty
SX Models: One (1) Year Limited Warranty
Visit www.amtrol.com for complete warranty details.

WORTHINGTON INDUSTRIES
1400 Division Road, West Warwick, RI USA 02893
T: 800.426.8765 **www.amtrol.com**

Part #: 9015-941 (08/20)

Taco Comfort Solutions
A Taco Group Company

Instruction Sheet

102-135

"00"–IFC Cartridge Circulators with Integral Flow Check

SUPERSEDES: May 1, 2010 EFFECTIVE: July 7, 2015

Plant ID# 001-1021

APPLICATION:

1. Maximum operating pressure is 125 psi (862 kPa).
2. Maximum water temperature not to exceed nameplate rating.
3. Cast iron circulators are to be used for closed loop systems. Bronze or Stainless Steel circulators are to be used for open loop, fresh water, or potable water systems.
4. Taco Cartridge circulator pumps are for indoor use only – employer uniquement a l´interieur.

INSTALLATION:

1. Location – Install the "00"-IFC circulator on the supply side of the boiler "pumping away" from the expansion tank as shown in Figure 1. This is the best pump location for optimum system performance and maintaining positive system pressure.

CAUTION: **Do not use flat rubber gaskets. Only use o-ring gaskets provided or leaks may result. Warranty will be void.**

CAUTION: **If circulator is installed on the return line, purge valve must be placed on the pump discharge to allow proper purging of system air. See Figure 2.**

2. Mounting position – Circulator must be mounted with the motor in a horizontal position. It may be mounted vertically with the motor up, provided that the system cold fill pressure is at least 20 psi (138 kPa).
3. Rotating body – Body has an arrow on the front that indicates direction of flow. To rotate body, remove the four body bolts, rotate body and replace bolts. Make sure that the junction box is NOT located underneath the circulator. (The junction box must NOT be located in the 6 o'clock position, as viewed from the motor end.)
4. Electrical connections – Observe all applicable codes when connecting to power supply. The motor is impedance protected, and does not require overload protection. Either colored wire from the capacitor box can be attached to either colored wire from the power supply. There is no "hot" or "common" wire leading from the capacitor box. Typical installation would be to attach the white wire to the white (common) power supply wire and either the yellow or blue wire to the black (hot) power supply wire. The pump cannot run backwards.
5. Fill system with tap water – The system must be filled before operating the circulator. The bearings are water lubricated and should not be allowed to operate dry. Filling the system will result in immediate lubrication of the bearings. It is always good practice to flush a new system of foreign matter before starting the circulator.
6. Circulator operation – Operate the circulator for 5 minutes immediately after flushing the system to purge remaining air from the bearing chamber. This is especially important when installing the circulator during the off-season.

WARNING: **Do not use in swimming pool or spa areas; pump has not been investigated for this application.**

WARNING: **In the event the retaining screws have been pulled out of the housing, DO NOT replace them. Use of any other screw may short out the stator windings, creating a risk of electrical shock.**

CAUTION: **When installing electrical connections, do not apply mechanical loads to the capacitor box; otherwise, retaining screws may be pulled out of the housing, making circulator unusable.**

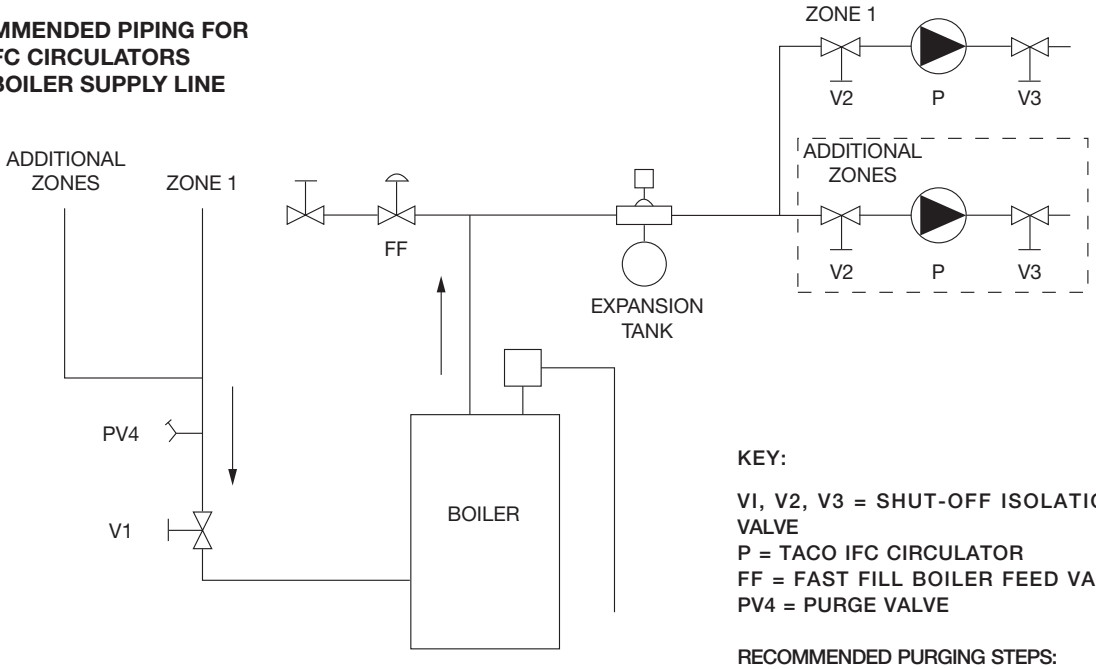
CAUTION: **Installations at higher elevations over 5000 feet must have higher fill pressure of 20 psi minimum to prevent pump cavitation and flashing. Premature failure may result. Adjust expansion tank pressure to equal fill pressure. A larger size expansion tank may be required.**

CAUTION:
1. **The addition of petroleum based fluids or certain chemical additives to systems utilizing TACO equipment voids the warranty.**
2. **Use supply wires suitable for 90°C – ATTENTION: Employer des fils d´alimentation adequats pour 90°C.**

WARNING: **To avoid electrical shock, disconnect the power supply to the circulator and the main electrical unit.**

FIGURE 1 – PREFERRED

RECOMMENDED PIPING FOR IFC CIRCULATORS ON BOILER SUPPLY LINE



KEY:

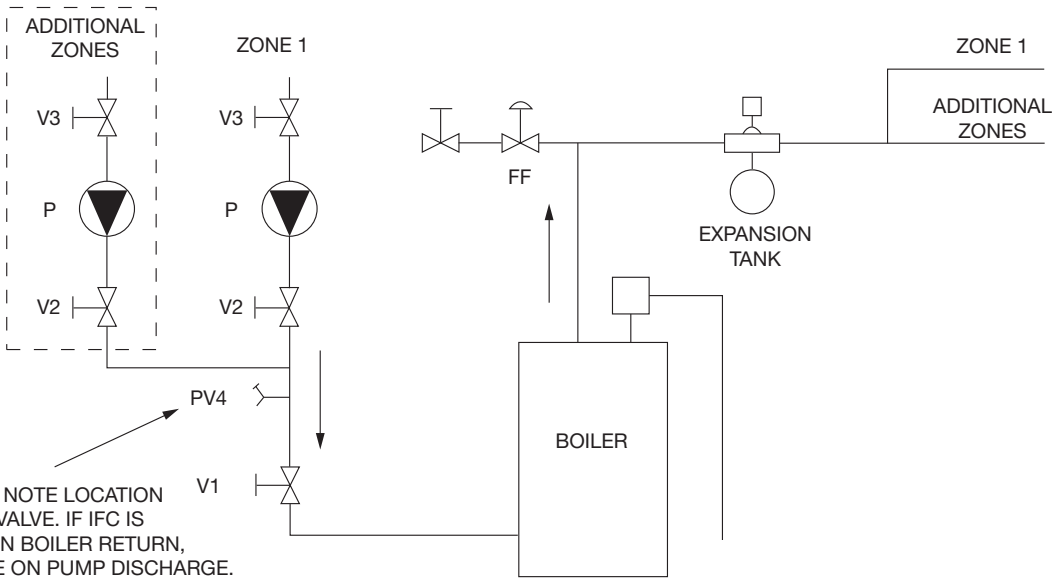
VI, V2, V3 = SHUT-OFF ISOLATION VALVE
P = TACO IFC CIRCULATOR
FF = FAST FILL BOILER FEED VALVE
PV4 = PURGE VALVE

RECOMMENDED PURGING STEPS:

1 . CLOSE V1, PV4, V2
2 . OPEN V3
3 . OPEN FF VALVE
4 . OPEN V2, PV4, TO PURGE ZONE 1
5 . CLOSE FF VALVE
6 . CLOSE V2, PV4
7 . REPEAT STEPS 1 TO 6 FOR EACH ADDITIONAL ZONE
8 . OPEN V1 WHEN ALL ZONES ARE PURGED
9 . ADJUST SYSTEM TO DESIRED OPERATING FILL PRESSURE IF REQUIRED

FIGURE 2 – ALTERNATE

RECOMMENDED PIPING FOR IFC CIRCULATORS ON BOILER RETURN LINE



IMPORTANT: NOTE LOCATION FOR PURGE VALVE. IF IFC IS INSTALLED ON BOILER RETURN, PV4 MUST BE ON PUMP DISCHARGE.

PROPER REMOVAL/REPLACEMENT OF THE INTEGRAL FLOW CHECK (IFC)

Your “00” circulator with an Integral Flow Check (IFC) is designed for easy removal, service and replacement. Please follow these instructions to ensure proper service and operation of the circulator.

REMOVAL:

1. Disconnect power to circulator and related equipment.
2. Shut off water supply. Isolate circulator using service valves or drain system if valves are not available.

3.a For models listed in Figure 3 below, remove motor housing by loosening four cap screws.

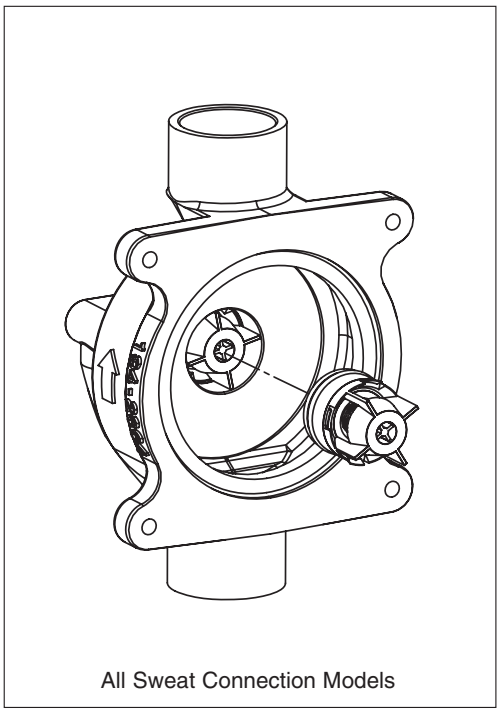
3.b For models listed in Figure 4 below, loosen flange bolts and remove entire circulator from the system to access the IFC.

4. Using needle-nose pliers, carefully grip the IFC’s body and slowly remove the IFC.

REPLACEMENT:

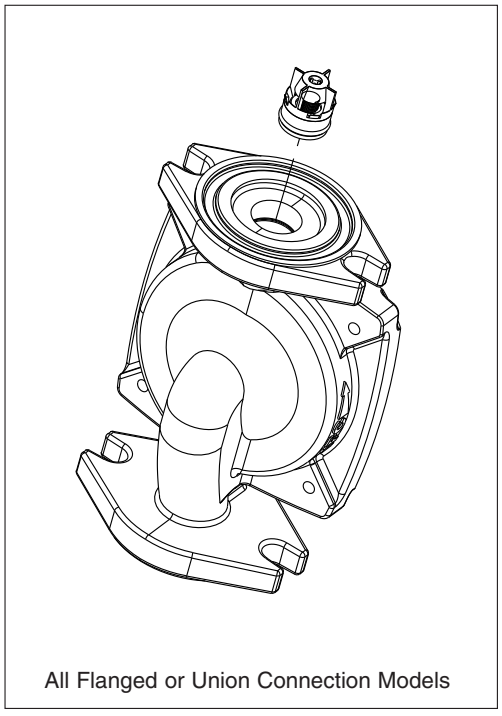
1. Make sure the IFC pocket is clean and free of any debris or particulates.
2. Position IFC into the machined pocket inside the casing as shown in the diagrams below. Firmly press the IFC into the pocket until it snaps into place.
3. Replace O-ring and reattach motor housing; or reinstall entire circulator with new flange gasket.
4. Open water supply and refill system. Check for any leaks.
5. Reconnect power to circulator and check for proper operation of system.

Figure 3: View of IFC on suction side of “00” pump casing, with motor housing removed.



All Sweat Connection Models

Figure 4: View of IFC in discharge flange of “00” pump casing.



All Flanged or Union Connection Models

REPLACING MOTOR ASSEMBLY:

1. Disconnect the electrical supply.
2. Reduce system pressure to 0 psi and allow system to return to room temperature. Isolate the circulator by closing the service valves or draining the system.
3. Remove the body bolts and swing motor assembly away from the body.
4. Install new motor, and reassemble circulator using the new gasket and bolts supplied.
5. Follow the “installation” procedure to start up the circulator

REPLACING CARTRIDGE ASSEMBLY:

1. Disconnect the electrical supply.
2. Reduce system pressure to 0 psi and allow system to return to room temperature. Isolate the circulator by closing the service valves or draining the system.
3. Remove the body bolts and swing motor assembly away from the body.
4. Pull cartridge out of the motor housing.
5. Install replacement cartridge, making sure that the cover plate is between the cartridge flange and motor.
6. Make sure the replacement cartridge corresponds to the full circulator product number. A complete parts list is available from your local plumbing supply wholesaler.
7. Reassemble the circulator using the new gasket and bolts supplied.
8. Follow the “Installation” procedure to start up the circulator.

REPLACING CAPACITOR:

1. Replacement capacitor must have same rating as originally furnished.

LIMITED WARRANTY STATEMENT

Taco, Inc. will repair or replace without charge (at the company’s option) any Taco 00 Series circulator or circulator part which is proven defective under normal use within three (3) years from the date of manufacture.

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local Taco stocking distributor or Taco in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local Taco stocking distributor or Taco. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any Taco product or part not installed or operated in conformity with Taco instructions or which has been subject to misuse, misapplication, the addition of petroleum-based fluids or certain chemical additives to the systems, or other abuse, will not be covered by this warranty.

If in doubt as to whether a particular substance is suitable for use with a Taco product or part, or for any application restrictions, consult the applicable Taco instruction sheets or contact Taco at (401-942-8000).

Taco reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. Taco reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

TACO OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TACO.

TACO WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

Taco Comfort Solutions™ A Taco Group Company
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Taco (Canada), Ltd., 8450 Lawson Road, Suite #3, Milton, Ontario L9T 0J8 | Tel: (905) 564-9422 | FAX: (905) 564-9436
Visit our web site: www.TacoComfort.com | Printed in USA |

Instruction Sheet

102-006

Boiler Feed Valves (Pressure Reducing Valves)
Models 329, 329-T and 335

Dual Controls
Models 334 and 334-T

SUPERSEDES: 102-006 dated January 1, 2003 EFFECTIVE: November 1, 2012

Plant I.D. 001-924

RATINGS:

Boiler Feed Valves (Reducing Valves):	
Maximum Fluid Temperature	212°F (100°C)
Maximum Supply Side Pressure	100 psi (689 kpa)
Setting Range	10-25 psi (69-172 kpa)
Factory Setting of System Side	12 psi (83 kpa)
Dual Controls:	
Maximum Fluid Temperature	212°F (100°C)
Maximum Supply Side Pressure	100 psi (689 kpa)
Relief Valve Set to Release at	30 psi (207 kpa)

Caution: Boiler Feed Valves and Dual Controls should only be installed by qualified heating professionals. Consult local authorities for any code requirements in your area.

DESCRIPTION:

The Boiler Feed Valves are adjustable pressure reducing valves that automatically maintain system pressure. They are equipped with a FAST FILL lever that can be used to override automatic pressure regulation during purging.

329: ½" union connection with a sweat tailpiece at inlet end and a female NPT connection at the outlet end.

329-T: same as 329 except the inlet union connection is threaded.

335: ¾" cast brass body with female NPT connections at body ends.

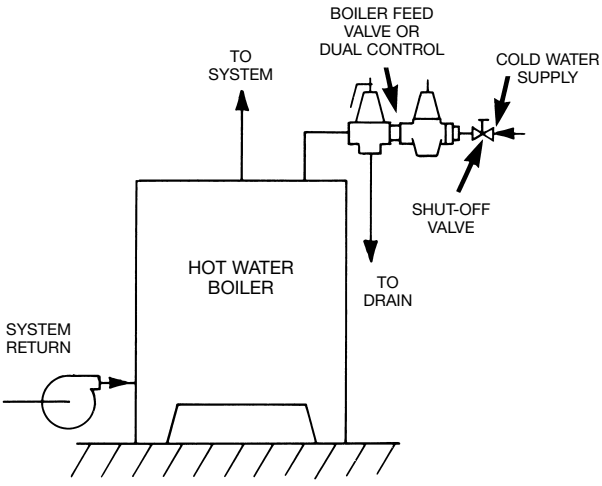
The Dual Control consists of a 329 Boiler Feed Valve with an in-line pressure relief valve connected at its outlet end.

334: ½" union connection at inlet with a sweat tailpiece and a female NPT connection at the outlet end.

334-T: same as the 334 except the union end tailpiece is threaded.

INSTALLATION:

1. Install the Boiler Feed Valve or the Dual Control in a horizontal position in the cold water supply pipe to the boiler.
2. Install a shut-off valve on the upstream side of the Boiler Feed Valve. This valve, provided for isolation purposes during maintenance, must be open at all times during operation so that the Boiler Feed Valve can maintain pressure automatically.
3. Flush out the supply pipe to clear it of chips, scale, dirt, etc. before connecting it to the inlet of the Boiler Feed Valve.
4. Connect a pipe from the bottom “DRAIN” connection of the Relief Valve in the Dual Control. Direct it to some convenient open drain, such as a floor drain or set tubs. Always obey local regulations. DO NOT install a valve of any kind in the drain pipe. The pipe must always pitch down from the valve, with no part of it above the valve, and be no smaller in size than the valve drain connection size.

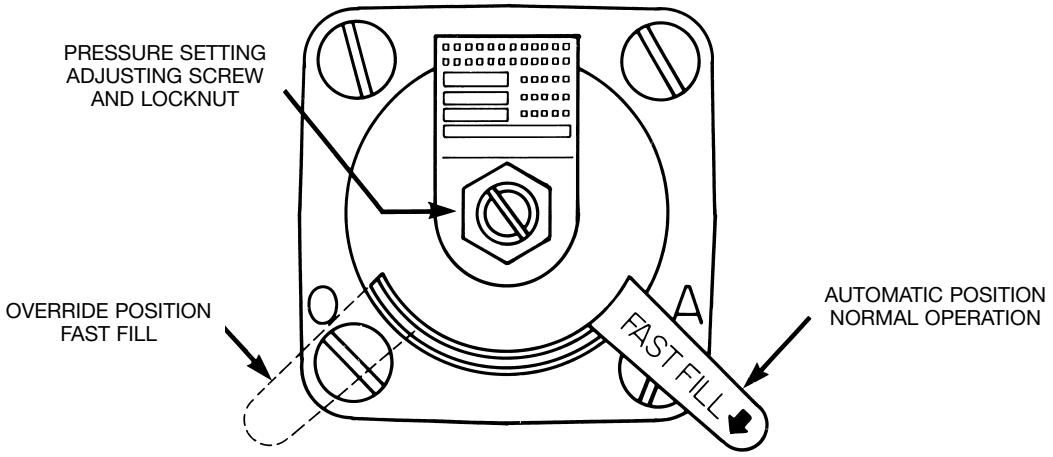


OPERATION:

1. To fill the system, open the shut-off valve upstream of the Boiler Feed Valve. This valve must always be kept open when the system is in operation.
2. The FAST FILL lever must be pushed all the way over to the side of the cover slot, over the “A” on the cover flange for AUTOMATIC operation. The supply water will flow into the system until it is full and under pressure.
3. The Taco Boiler Feed Valves have such a high flow capacity that the FAST FILL feature is not usually needed during filling. It is supplied for use during purging of the system. By moving the lever down and to the side over the “O” on the flange of the cover (OVERRIDE position), the valve will be held open, overcoming the closing action of pressure increases against its diaphragm.
4. After filling and purging, the FAST FILL lever must be placed at the AUTOMATIC (“A” side) position. Under system pressure the lever will move up and be secured in the notch. The lever should not be moved during system operation. This position allows the valve to maintain normal pressure in the system automatically.

Caution: Using the FAST FILL feature with the purge valve closed can cause system over pressurization. This may cause the pressure relief to discharge water, resulting in damage to other system components or water damage to other property. Care must be taken to prevent over pressurizing the system.

5. The Boiler Feed Valve is factory set to deliver water to the boiler at 12 psi. To determine the required pressure if the factory setting is not sufficient to lift the water to the highest radiation, calculate the number of feet from the regulator to the top of the highest radiation. Multiply this by .43 and add 3 psi. This is the pressure needed to raise the water to the highest radiation and keep it under sufficient pressure. To increase the valve setting, loosen the locking nut on the adjusting screw at the top of the valve. Now turn the adjusting screw in (clockwise) slowly until the gauge indicates the pressure calculated. Then lock the adjusting screw with its locking nut.
6. The pressure relief valve of the Dual Control is non-adjustable and is set to relieve at 30 psi.



RP/IS-009

Installation, Maintenance, & Repair Series 009 and LF009

Reduced Pressure Zone Assemblies

Sizes: ¼" – 3" (8 – 80mm)

⚠ WARNING

Read this Manual BEFORE using this equipment.

Failure to read and follow all safety and use information can result in death, serious personal injury, property damage, or damage to the equipment.

Keep this Manual for future reference.

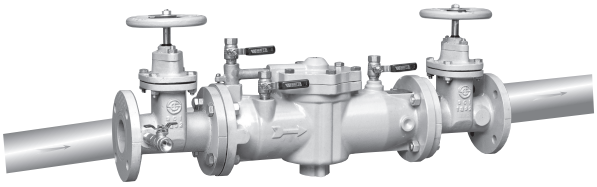
THINK SAFETY FIRST

Local building or plumbing codes may require modifications to the information provided. You are required to consult the local building and plumbing codes prior to installation. If this information is not consistent with local building or plumbing codes, the local codes should be followed.

Need for Periodic Inspection/Maintenance: This product must be tested periodically in compliance with local codes, but at least once per year or more as service conditions warrant.

If installed on a fire suppression system, all mechanical checks, such as alarms and backflow preventers, should be flow tested and inspected in accordance with NFPA 13 and/or NFPA 25.

Corrosive water conditions, and/or unauthorized adjustments or repair could render the product ineffective for the service intended. Regular checking and cleaning of the product's internal components helps assure maximum life and proper product function.



3" (80mm) 009NRS

NOTICE

For Australia and New Zealand, line strainers should be installed between the upstream shutoff valve and the inlet of the backflow preventer.

Testing

For field testing procedure, refer to Watts installation sheets IS-TK-DP/DL, IS-TK-9A, IS-TK-99E and IS-TK-99D found on **watts.com.**

For other repair kits and service parts, refer to our Backflow Prevention Products Repair Kits & Service Parts price list PL-RP-BPD found on **watts.com.**

For technical assistance, contact your local Watts representative.

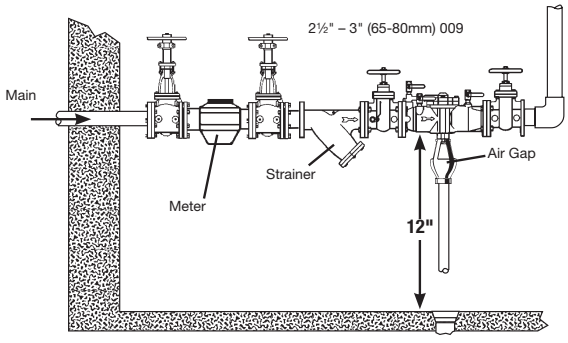
Installation Instructions

Series 009 and LF009

Indoors – Figure 1

For indoor installations, it is important that the assembly be easily accessible to facilitate testing and servicing. If it is located in a line close to a wall, be sure the test cocks are easily accessible. A drain line and air gap (see literature ES-AG/EL/TC) should be piped from the relief valve connection as shown, where evidence of discharge will be clearly visible and so that water damage will not occur. **Therefore, never install in concealed locations.**

Figure 1



NOTICE

In an area where freezing conditions can occur, Series 009 and LF009 should be installed above ground in an insulated enclosure.

Series 009 and LF009 must be installed in an accessible location to facilitate testing and servicing. A discharge line should be piped from the air gap at the relief valve connection making sure that there is adequate drainage. Never pipe the discharge line directly into a drainage ditch, sewer or sump. Series 009 and LF009 should never be installed where any part of the unit could become submerged in standing water.

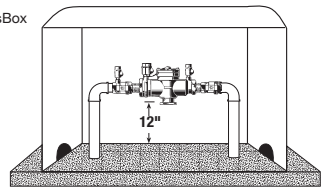
Outside – Figure 2

In an area where freezing conditions do not occur, Series 009 and LF009 can be installed outside. The most satisfactory installation is above ground and should be installed in this manner.

Backflow preventers should not be installed in pits unless approved by local codes. In such cases, a modified pit installation is preferred.

Figure 2

Now available, WattsBox Insulated Enclosures, for more information, send for literature ES-WB.



WATTS®

Installation Instructions
Series 009 and LF009

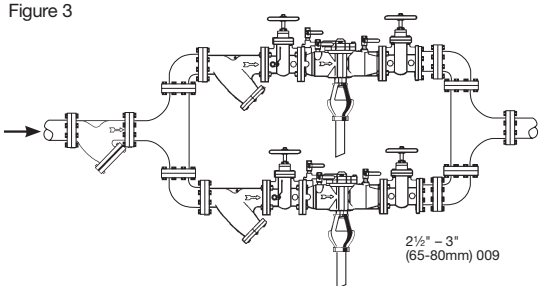
Parallel – Figure 3

Two or more smaller size assemblies can be piped in parallel (when approved) to serve a large supply pipe main. This type of installation is employed where increased capacity is needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

The number of assemblies used in parallel should be determined by the engineer's judgment based on the operating conditions of a specific installation.

For parallel valve installations, the total capacity of the assemblies should equal or exceed that required by the system.

Figure 3



Annual inspection of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.

NOTICE

Shutoff Valves: When shutoff valves are removed and reassembly is necessary, the shutoff valve with the test cock is to be mounted on the inlet side of the backflow preventer.

A. The 009 and LF009 should always be installed in an accessible location to facilitate testing and servicing (See page 2). **Check the state and local codes to ensure that the backflow preventer is installed in compliance, such as the proper height above the ground.**

B. We recommend a strainer be installed ahead of 009 and LF009 series assemblies to protect the internal components from unnecessary fouling.

⚠ CAUTION

Do not install with strainer when backflow preventer is used on seldom-used water lines which are called upon only during emergencies, such as fire sprinkler lines.

Start Up: The downstream shutoff should be closed. Open upstream slowly and fill valve. When valve is filled, open the downstream shutoff slowly and fill the water supply system. This is necessary to avoid water hammer or shock damage.

C. Water discharge from the relief valve should be vented in accordance with code requirements. The relief valve should never be solidly piped into a drainage ditch, sewer or sump. The discharge should be terminated approximately 12" above the ground or through an air gap piped to a floor drain.

NOTICE

Relief Valve Discharge Rates

The installation of an air gap with the drain line terminating above a floor drain will handle any normal discharge or nuisance spitting through the relief valve. However, floor drain size may need to be designed to prevent water damage caused by a catastrophic failure condition. Please refer to Figure No. 4 for maximum relief valve discharge rates, size and capacity of typical floor drains.

Do not reduce the size of the drain line from the air gap fitting. Pipe full line size.

D. After initial installation, a discharge from the relief valve opening may occur due to inadequate initial flushing of pipe lines to eliminate dirt and pipe compounds. If flushing will not clear, remove the first check valve and clean thoroughly.

NOTICE

Periodic relief valve discharge may occur on dead end service applications, such as boiler feed lines or cooling tower makeup lines due to fluctuating supply pressure during a static or no flow condition. To avoid this discharge, install a spring-loaded rubber seated check valve ahead of the backflow assembly to "lock-in" the downstream pressure.

E. Backflow preventers should never be placed in pits unless absolutely necessary and then only when and as approved by local codes. In such cases, provision should be made to always vent above flood level or for a pit drain to ensure an adequate air gap below the relief port.

F. It is important that Series 009 and LF009 backflow preventers be inspected periodically for any discharge from the relief valve which will provide a visual indication of need for cleaning or repair of check valves. Also testing for proper operation of the device should be made periodically in compliance with local codes, but at least once a year or more often, depending upon system conditions.

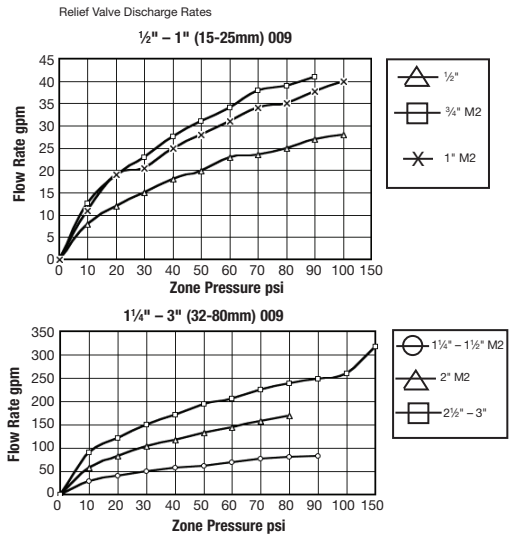
Relief vent will discharge water when, during no-flow periods, (1) the first check valve is fouled or (2) the inlet pressure to the device drops sufficiently due to upstream pressure fluctuations to affect the required operating differential between the inlet pressure and reduced pressure zone. Otherwise, such relief (spitting) can occur when the second check is fouled during emergency backflow or resulting from a water hammer condition. For Troubleshooting Guide send for S-TSG.

NOTICE

Special considerations are necessary when testing assemblies installed on Fire Prevention Systems.

Fire Protection System Installations: The National Fire protection Agency (NFPA) Guidelines require a confirming flow test be conducted whenever a "main line" valve such as the shutoff valves or a backflow assembly have been operated. Certified testers of backflow assemblies must conduct this confirming test.

Figure 4



TYPICAL FLOW RATES AS SIZED BY FLOOR DRAIN MANUFACTURERS:	
2" (50 mm) 55 GPM	5" (125 mm) 350 GPM
3" (80 mm) 112 GPM	6" (150 mm) 450 GPM
4" (100 mm) 170 GPM	8" (200 mm) 760 GPM

Servicing the Relief Valve

Series 009 and LF009

¼" – 3" (8 – 80mm)

1. Remove the four or six relief valve cover bolts while holding the cover down.
2. Lift the cover straight off. The stem and diaphragm assembly will normally remain with the cover as it is removed. The relief valve spring will be free inside the body at this point.
3. The relief valve seat is located at the bottom of the body bore, and can be removed, if necessary, for cleaning. The disc can be cleaned without disassembly of the relief valve module. If it is determined that the relief valve diaphragm and/or disc should be replaced, the relief valve module can be readily disassembled without the use of special tools.

NOTICE

The disc rubber is molded into the disc holder and is supplied as a disc holder assembly.

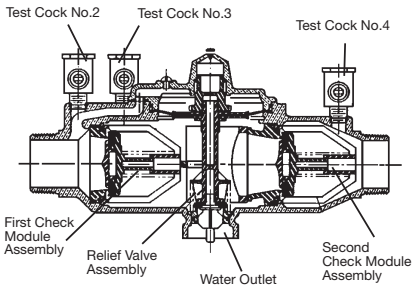
4. To reassemble the relief valve, press the seat firmly into place in the body, center the spring on the seat, and insert the cover and relief valve module as a unit straight into the bore. Press down on the cover to assure proper alignment. Insert and tighten bolts.

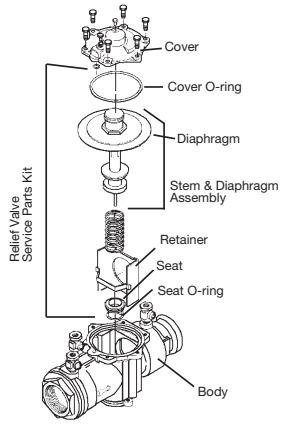
NOTICE

If cover will not press flat against body, stem assembly is crooked and damage can result. Realign stem and cover before bolts are inserted.

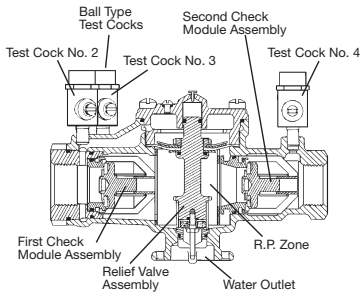
NOTICE

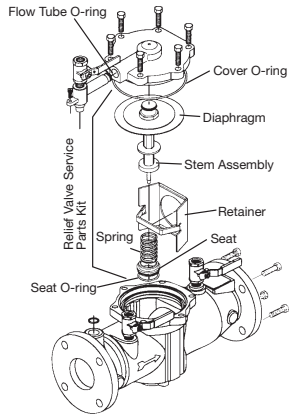
No special tools required to service Series 009 2½" – 3" (65 – 80mm).





For repair kits and parts, refer to our Backflow Prevention Products Repair Kits & Service Parts price list PL-RP-BPD found on **watts.com.**





Servicing First & Second Check Valves

Series 009 and LF009

¼" – 3" (8 – 80mm)

1. Remove the relief valve assembly as outlined on page 3.
2. Remove the retainer from the body bore. The check valve modules can now be removed from the valve by hand or with a screwdriver.

NOTICE

The seats and springs of the first and second check modules are not interchangeable. The heavier spring and smaller diameter seat belong with the first check module.

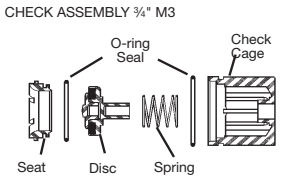
3. The check seats are attached to the cage with a bayonet type locking arrangement. Holding the cage in one hand, push the seat inward and rotate counterclockwise for 2½", 3"; Clockwise for ¼" – 2" against the cage. The seat, spring cage, spring and disc assembly are now individual components.
4. The disc assembly may now be cleaned and reassembled or, depending on its condition, may be discarded and replaced with a new assembly from the repair kit. O-rings should be cleaned or replaced as necessary and lightly greased with the FDA approved silicon grease. For more information refer to repair parts price list PL-RP-BPD.
5. Reassemble the check valve modules. Check modules are installed in the valve body with the seat facing the valve inlet. The modules must be securely in place before the retainer can be replaced. Replace relief valve assembly.

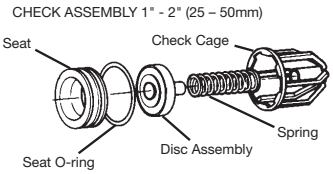
NOTICE

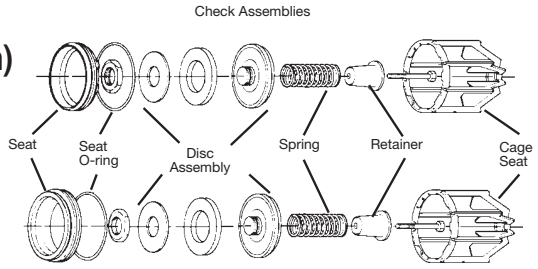
No special tools required to service Series 009 2½" – 3" (65 – 80mm)

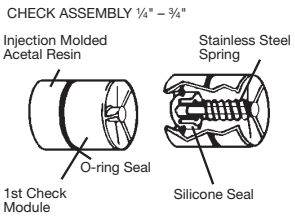
Servicing First & Second Check Valves

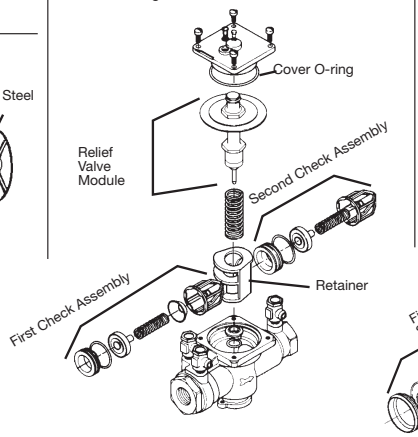
Series 009 and LF009 — ¼" – 3" (8 – 80mm)

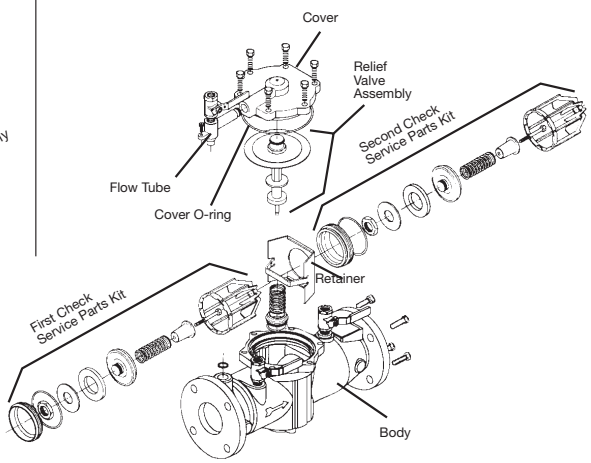












For repair kits and parts, refer to our Backflow Prevention Products Repair Kits & Service Parts price list PL-RP-BPD found on **watts.com.**

Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
For more information: www.watts.com/prop65

Troubleshooting Guide

Symptom	Cause	Solution
1. Check valve fails to hold 1.0 PSID minimum	a. Debris on check disc sealing surface	Disassemble and clean
	b. Leaking isolation valve	Disassemble and clean or repair
	c. Damaged seat disc or seat o-ring	Disassemble and replace
	d. Damaged guide holding check open	Disassemble and clean or replace
	e. Weak or broken spring	Disassemble and replace spring
2. Chatter during flow conditions	a. Worn, damaged or defective guide	Disassemble and repair or replace guide
3. Low flows passing through mainline valve	a. Mainline check fouled	Disassemble and clean
	b. Meter strainer plugged	Disassemble and clean
	c. Damaged mainline seat disc or seat	Disassemble and replace
	d. Broken mainline spring	Disassemble and replace

A Watts Water Technologies Company

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RP/IS-009 1439 EDP# 1911300

tekmar® - Data Brochure

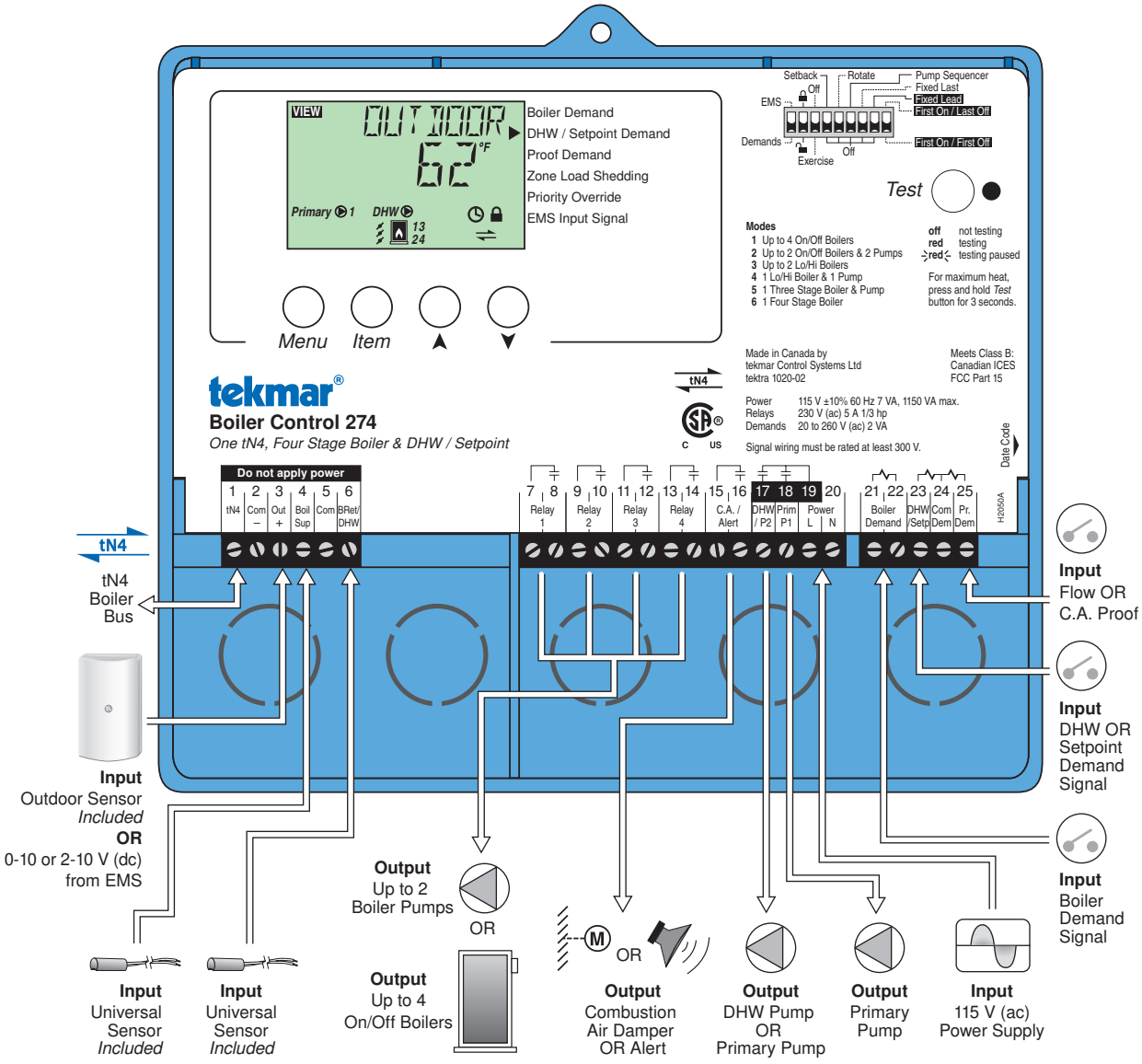
Boiler Control 274

274_D
03/17

The Boiler Control 274 operates up to four on/off boilers to provide outdoor reset operation, domestic hot water and setpoint operation with priority. When operating as a tN4 System Control, the 274 can connect with up to 24 tN4 devices on a single boiler bus. The 274 has primary pump sequencing capabilities along with a flow proof or combustion air damper proof demand.

Additional functions include:

- tN4 Compatible
- 24 Hour, 5-1-1, 7 Day Schedule
- Flow or Combustion Air Proof
- Four On/Off Boilers
- Equal Run Time Rotation
- Primary Pump Sequencing
- DHW Operation
- Optional DHW Sensor
- Setpoint Operation



How to Use the Data Brochure

This brochure is organized into three main sections.

They are: 1) Sequence of Operation,
2) Installation,
3) Control Settings and
4) Testing and Troubleshooting.

The Control Settings section of this brochure describes the various items that are adjusted and displayed by the control. The control functions of each adjustable item are described in the Sequence of Operation.

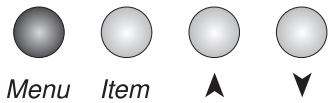
Table of Contents

User Interface

The control uses a Liquid Crystal Display (LCD) as the method of supplying information. You use the LCD in order to setup and monitor the operation of your system. The control has four push buttons (Menu, Item, ▲, ▼) for selecting and adjusting settings. As you program your control, record your settings in the ADJUST menu table, which is found in the second half of this brochure.

Menu

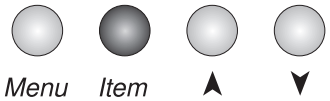
All of the items displayed by the control are organized into five menus (View, Adjust, Time, Schedule, and Misc). These menus are listed on the top left hand side of the display (Menu Field). To select a menu, use the Menu button. By pressing and releasing the Menu button, the display sequences between the five menus. Once a menu is selected, there will be a group of items that can be viewed within the menu.



Item

The abbreviated name of the selected item will be displayed in the item field of the display. To view the next available item, press and release the Item button. Once you have reached the last available item in a menu, pressing and releasing the Item button will return the display to the first item in the selected menu.

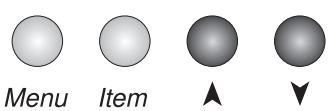
The items can be quickly scrolled through by holding the Item button and then pressing the ▼ button. To rapidly scroll through the items in the reverse order, hold the Item button and press the ▲ button.



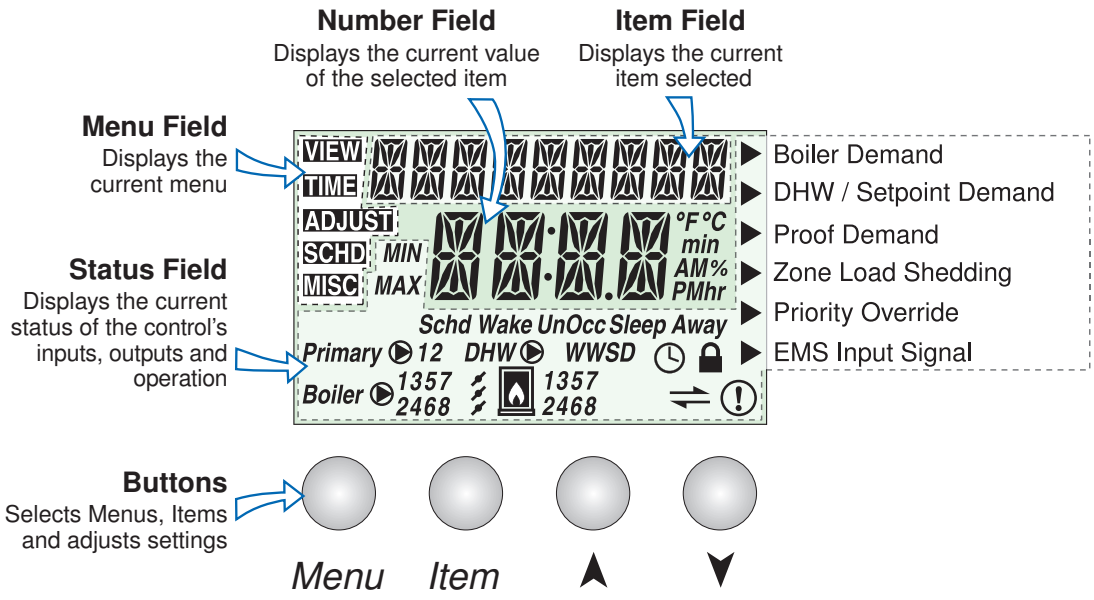
Adjust

To make an adjustment to a setting in the control, begin by selecting the ADJUST, TIME, SCHEDULE or MISC menu using the Menu button. Then select the desired item using the Item button. Finally, use the ▲, and / or ▼ button to make the adjustment.

Additional information can be gained by observing the Status field of the LCD. The status field will indicate which of the control's outputs are currently active. Most symbols in the status field are only visible when the VIEW menu is selected.



Display



Symbol Description

Primary 12	**PRIMARY PUMP** Displays when primary pump 1 or primary pump 2 is in operation	Boiler 13 24	**BOILER PUMP** Displays when the boiler pump 1, 2, 3, or 4 are operating
13 24	**BOILER** Displays which boiler stage is operating		**COMBUSTION AIR DAMPER** Displays when the combustion air damper relay is closed
	LOCK Displays when adjusting Access level if Switch is set to lock.		**SCHEDULE MASTER** Displays when the 274 is a schedule master
	WARNING Displays when an error exists.	WWSD	**WARM WEATHER SHUT DOWN** Displays when the control is in warm weather shut down
	COMMUNICATION BUS Displays when tN4 thermostats are connected.	MIN MAX	**MINIMUM & MAXIMUM** Displays when the boil target or the boil supply is at a minimum or maximum
DHW	**DHW PUMP** Displays when the DHW Pump is operating	Schd Wake UnOcc Sleep Away	**Schd, Wake, UnOcc, Sleep, Away** Displays the current event of a schedule or scene
°F °C min AM% PMhr	**°F, °C, MINUTES, AM, %, PM, HOURS** Units of measurement.	▶	**POINTER** Displays the control operation as indicated by the text

Access Level

The access level restricts the number of Menus, Items, and Adjustments that can be accessed by the user. The Access Level setting is found in the Miscellaneous (MISC) Menu. Select the appropriate access level for the people who work with the control on a regular basis. There are three Access Level Settings:

- User (USER): Select this access level to limit the highest number of settings available to the end user.
- Installer (INST): Select this access level to limit some of the settings available to the installer. This is the factory default access level.
- Advanced (ADV): Select this access level to have complete access to all of the control settings. In the following menu tables, the appropriate access level needed to view each item is shown in the Access column.

Note: the Lock / Unlock switch on the front of the control must be set to unlock to change the access level.

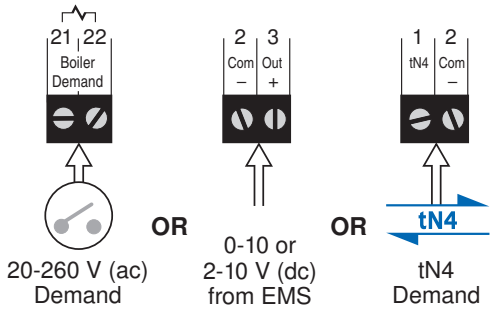
Sequence of Operation

In order for the control to have a target water temperature there must be a demand. There are three different demands the control can have: boiler demand, DHW demand, and setpoint demand.

Boiler Demand *Section A*

Once the control receives a boiler demand it calculates a target water temperature based on the characterized heating curve to provide outdoor reset for space heating. The control can receive a boiler demand three different ways:

1. By applying 20-260 V (ac) to the boiler demand terminals (21 & 22) when the DIP switch is set to Demands.
2. From an Energy Management System (EMS) by applying a 0-10 or 2-10 V (dc) signal to terminals 2 & 3 when the DIP switch is set to EMS.
3. From a tN4 device. This requires a tN4 thermostat to be wired to terminals 1 & 2 so that the call for heat can go over the communication bus.



Outdoor Reset *Section B*

In a heating system, the rate of heat supplied to the building must equal the rate at which heat is lost. If the two rates are not equal, the building will either cool off or over heat.

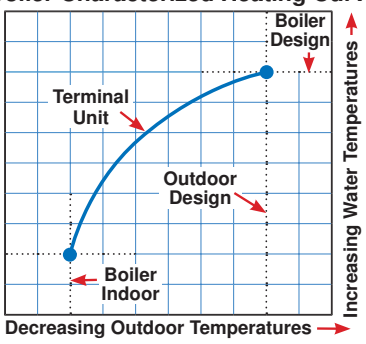
The rate of building heat loss depends mostly on the outdoor temperature. Outdoor Reset allows a hot water heating system to increase the water temperature, adding heat to the building, as the outdoor temperature drops. The rate at which the water temperature is changed as a function of outdoor temperature is defined by the characterized heating curve.

Characterized Heating Curve

A characterized heating curve determines the amount the target water temperature is raised for every 1° drop in outdoor air temperature.

The characterized heating curve takes into account the type of terminal unit that the system is using. Since different types of heating terminal units transfer heat to a space using different proportions of radiation, convection and conduction, the supply water temperature must be controlled differently. The control uses the terminal unit setting to vary the supply water temperature to suit the terminal unit being used. This improves the control of the air temperature in the building.

Boiler Characterized Heating Curve

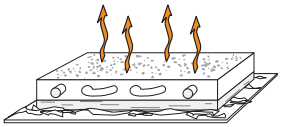


Terminal Unit Setting in Adjust Menu

Select the appropriate terminal unit in the adjust menu. This will change the shape of the characterized heating curve to better match the heat transfer properties of that specific terminal unit.

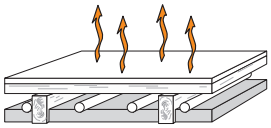
Hydronic Radiant Floor (HRF1)

A heavy or high mass, hydronic radiant floor system. This type of a hydronic radiant floor is embedded in either a thick concrete or gypsum pour. This heating system has a large thermal mass and is slow acting.



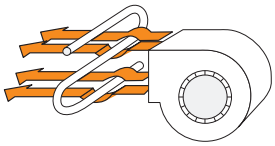
Hydronic Radiant Floor (HRF2)

A light or low mass, hydronic radiant floor system. Most commonly, this type of radiant heating system is attached to the bottom of a wood sub floor, suspended in the joist space, or sandwiched between the subfloor and the surface. This type of radiant system has a relatively low thermal mass and responds faster than a high mass system.



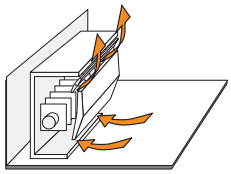
Fancoil (COIL)

A fancoil terminal unit or air handling unit (AHU) consisting of a hydronic heating coil and either a fan or blower. Air is forced across the coil at a constant velocity by the fan or blower and is then delivered into the building space.



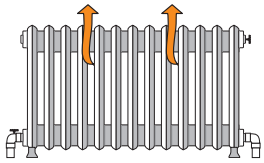
Fin–tube Convector (CONV)

A convector terminal unit is made up of a heating element with fins on it. This type of terminal unit relies on the natural convection of air across the heating element to deliver heated air into the space. The amount of natural convection is dependant on the supply water temperature to the heating element and the room air temperature.



Radiator (RAD)

A radiator terminal unit has a large heated surface that is exposed to the room. A radiator provides heat to the room through radiant heat transfer and natural convection.



Baseboard (BASE)

A baseboard terminal unit is similar to a radiator, but has a low profile and is installed at the base of the wall. The proportion of heat transferred by radiation from a baseboard is greater than that from a fin-tube convector.

Boiler Terminal Unit Defaults

When a terminal unit is selected for boiler zones, the control loads default values for the boiler design, boiler maximum supply, and boiler minimum supply temperatures. The factory defaults can be changed to better match the installed system. Locate the Boiler Terminal Unit setting in the Adjust menu.

Terminal Unit	BOIL DSGN	BOIL MAX	BOIL MIN
High Mass Radiant	120°F (49°C)	140°F (60°C)	OFF
Low Mass Radiant	140°F (60°C)	160°F (71°C)	OFF
Fancoil	190°F (88°C)	210°F (99°C)	140°F (60°C)
Fin-Tube Convector	180°F (82°C)	200°F (93°C)	140°F (60°C)
Radiator	160°F (71°C)	180°F (82°C)	140°F (60°C)
Baseboard	150°F (76°C)	170°F (77°C)	140°F (60°C)

Room Setting in Adjust Menu

The Room setting is the desired room air temperature, but it is not measuring a room temperature sensor. Instead, the Room setting parallel shifts the heating curve up or down to change the target water temperature. Adjust the Room setting to increase or decrease the amount of heat available to the building. Once the heating curve has been set up properly, the Room setting is the only setting that needs to be adjusted. The default Room setting is 70°F (21°C), and it can be adjusted for both the occupied and unoccupied periods.

Outdoor Design Setting in Adjust Menu

The outdoor design temperature is typically the coldest outdoor air temperature of the year. This temperature is used when doing the heat loss calculations for the building and is used to size the heating system equipment. If a cold outdoor design temperature is selected, the supply water temperature rises gradually as the outdoor temperature drops. If a warm outdoor design temperature is selected, the supply water temperature rises rapidly as the outdoor temperature drops.

Boiler Indoor Setting in Adjust Menu

The boiler indoor design temperature is the indoor temperature the heating designer chose while calculating the heat loss for the boiler water heated zones. This temperature is typically 70°F (21.0°C). This setting establishes the beginning of the boiler characterized heating curve.

Boiler Design Setting in Adjust Menu

The boiler design supply temperature is the boiler water temperature required to heat the zones at the outdoor design temperature, or on the typical coldest day of the year.

(Default automatically changes based on terminal unit setting)

Warm Weather Shut Down (WWSD) Setting in Adjust Menu

Warm Weather Shut Down disables the heating system when the outdoor air temperature rises above this programmable setting. When the control enters into WWSD, the LCD will indicate this in the status field. WWSD is only available when the DIP switch = Demands. The boilers will operate when a Domestic Hot Water (DHW) demand or a Setpoint Demand is present.

Boiler Operation — Section C

The 274 is able to operate up to four on/off boilers as a heat source. For proper operation of the boilers, the 274 must be the only control that determines when a boiler is to fire.

***Important note:** The boiler operator, or aquastat, remains in the burner circuit and acts as a secondary upper limit on the boiler temperature. The boiler aquastat temperature setting must be adjusted above the 274's boiler maximum setting in order to prevent short cycling of the burner.

Mode

The 274 control is capable of staging single stage, two stage, three stage and four stage on/off heat sources. As well, in certain modes of operation, the control is capable of controlling the individual boiler pumps. The control has 6 modes of operation based on the type of staging and pump operation that is desired. The following describes the modes of operation.

Mode 1: 4 Single stage boilers and primary pump.

Mode 2: 2 Single stage boilers with individual boiler pumps and primary pump.

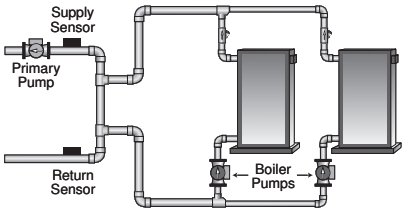
Mode 3: 2 Two stage boilers and a primary pump.

Mode 4: 1 Two stage boiler and individual pump.

Mode 5: 1 Three stage boiler and individual pump.

Mode 6: 1 Four stage boiler and primary pump.

	Relay 1	Relay 2	Relay3	Relay 4
Mode 1	Boiler 1	Boiler 2	Boiler 3	Boiler 4
Mode 2	Boiler 1	Boiler 1 Pump	Boiler 2	Boiler 2 Pump
Mode 3	Boiler 1 Stage 1	Boiler 1 Stage 2	Boiler 2 Stage 1	Boiler 2 Stage 2
Mode 4	Boiler 1 Stage 1	Boiler 1 Stage 2	Boiler 1 Pump	not used
Mode 5	Boiler 1 Stage 1	Boiler 1 Stage 2	Boiler 1 Stage 3	Boiler 1 Pump
Mode 6	Boiler 1 Stage 1	Boiler 1 Stage 2	Boiler 1 Stage 3	Boiler 1 Stage 4

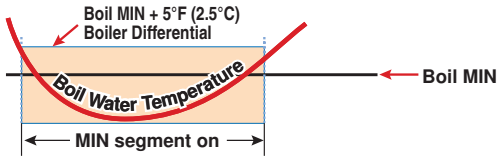


Boiler Target Temperature

The boiler target temperature is determined by connected tN4 devices or by a Boiler, DHW or Setpoint demand received by the control. An Energy Management System (EMS) can also give a boiler target. The tN4 devices determine the highest water temperature required and then request this temperature on the tN4 boiler bus. The temperature request creates a Boiler Demand and this is indicated on the display. A DHW demand and a Setpoint demand have temperature settings to which the boilers are operated to meet and are able to override the tN4 bus temperature if required. The control displays the temperature that it is currently trying to maintain as the boiler supply temperature in the View menu. If the control does not presently have a requirement for heat, it does not show a boiler target temperature. Instead, "– – –" is displayed in the LCD.

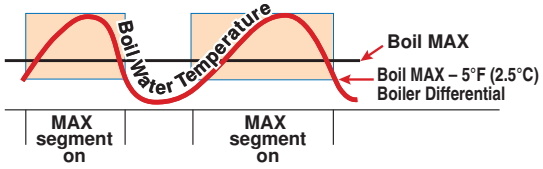
Boiler Minimum Setting in Adjust Menu

The boiler minimum is the lowest temperature that the control is allowed to use as a boiler target temperature. During mild conditions, if the control calculates a boiler target temperature that is below the boiler minimum setting, the boiler target temperature is adjusted to at least the boiler minimum setting. The MIN segment is displayed in the LCD while viewing the boiler supply or target and when the boiler target is boiler minimum and the boiler supply is less than boiler minimum plus 5°F (2.5°C). Set the Boiler Minimum setting to the boiler manufacturer's recommended temperature.



Boiler Maximum Setting in Adjust Menu

The boiler maximum is the highest temperature that the control is allowed to use as a boiler target temperature. The MAX segment is displayed in the LCD while viewing the boiler supply or target and when the boiler target is boiler maximum and the boiler supply is greater than boiler maximum minus 5°F (2.5°C). Set the boiler maximum setting to the boiler manufacturer's recommended temperature. At no time does the control operate the boiler above 248°F (120°C).



Stage Delay Setting in Adjust Menu

The Stage Delay is the minimum time delay between the firing of each stage. After this delay has expired the control can fire the next stage if it is required. This setting can be adjusted manually or set to an automatic setting. When the automatic setting is used, the control determines the best stage delay based on the operation of the system.

Boiler Mass Setting in Adjust Menu (per boiler)

Match the boiler mass setting with the thermal mass characteristics of each boiler. The boiler mass settings also adjusts the inter-stage delay time when operating with an automatic differential.

LO

The LO setting is selected if the boiler that is used has a low thermal mass. This means that the boiler has very small water content and has very little metal in the heat exchanger. A boiler that has a low thermal mass comes up to temperature quite rapidly when fired. This is typical of many copper fin-tube boilers.

The Lo mass setting provides a fast response to the heating system.

MED

The MED setting is selected if the boiler that is used has a medium thermal mass. This means that the boiler either has a large water content and a low metal content or a low water content and a high metal content. This is typical of many modern residential cast iron boilers or steel tube boilers.

The Med mass setting provides a moderate response to the heating system.

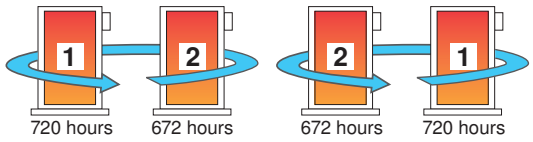
HI

The HI setting is selected if the boiler that is used has a high thermal mass. This means that the boiler has both large water content and a large metal content. A boiler that has a high thermal mass is relatively slow in coming up to temperature. This is typical of many commercial cast iron and steel tube boilers.

The Hi mass setting provides a slow response to the heating system.

Rotation

The Rotate feature changes the firing order of the boilers whenever one boiler accumulates 48 hours more run time than any other boiler. Rotation will be forced if any boiler accumulates 60 hours more run time. After each rotation, the boiler with the least running hours is the first to fire and the boiler with the most running hours is the last to fire. This function ensures that all of the boilers receive equal amounts of use. When the Rotate / Off DIP switch is set to the Off position, the firing sequence always begins with lowest boiler to the highest boiler.



To reset the rotation sequence (without regard to historical running hours), toggle the Rotation DIP Switch Off for 3 seconds and on again. Note that the running hours (see Run Time) in the View menu also need to be reset if you want the rotation sequence and running hours display to be synchronized.

Fixed Last

In some applications, it may be desirable to have the last boiler fire last at all times while the firing sequence of the remaining boilers is changed using Equal Run Time Rotation. This configuration is typical of installations where the boiler plant includes higher efficient boilers and a single less efficient boiler. The lesser efficient boiler is only desired to be operated when all other boilers in the plant are on and the load cannot be satisfied. This rotation option is selected by setting the Fixed Last / Off DIP switch to Fixed Last. With a fixed last rotation, the last boiler is the last to stage on and the first to stage off.

Fixed Lead & First On / First Off

In some applications, it may be desirable to have the first boiler fire first at all times while the firing sequence of the remaining boilers is changed using Equal Run Time Rotation. This rotation option is selected by setting the Fixed Lead / Off DIP switch to the Fixed Lead position.

When using the Fixed Lead rotation option, a selection must be made between First On / Last Off and First On / First Off using the DIP switch.

When First On / First Off is selected, the lead boiler is always staged on first and staged off first. This configuration is typical of installations where the boiler plant includes similar boilers but the first boiler is required to be the first to fire in order to establish sufficient draft for venting.

Fixed Lead & First On / Last Off

When First On / Last Off is selected, the lead boiler is always staged on first and staged off last. This configuration is typical of installations where the boiler plant includes a single higher efficient boiler with lesser efficient boilers. The lead boiler is the high efficiency boiler, therefore it is the last boiler to be sequenced off.

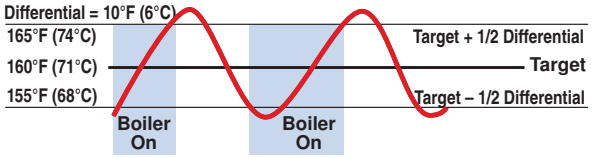
Boiler Run Time in View Menu

The running time of each boiler is logged in the view menu. To reset the running time, select the appropriate Boiler Run Time in the View menu and press and hold the Up and Down buttons simultaneously until CLR is displayed.

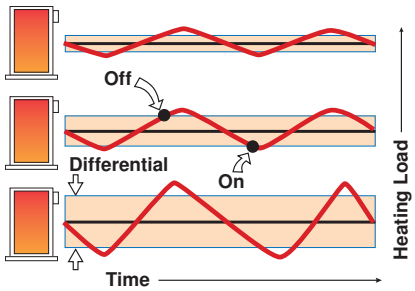
Boiler Differential Setting in Adjust Menu

An On/Off heat source must be operated with a differential in order to prevent short cycling. The boiler differential can be fixed or automatically determined by the control. The Auto Differential setting balances the amount of temperature swing in the boiler supply temperature with boiler on times, off times, and cycle times. This reduces potential short cycling during light load conditions.

Manual Differential



Automatic Differential



Boiler Staging Mode - Lo/Hi or Lo/Lo in Adjust Menu

When using multi-stage boilers, a selection must be made regarding the staging order of the boiler(s). This adjustment is made in the ADJUST menu of the control.

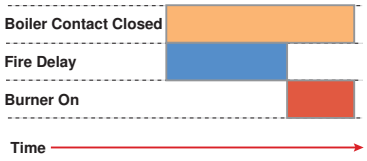
Lo/Hi: If the Lo/Hi staging option is selected the control stages in sequence all of the stages in a single boiler. Once all of the stages are turned on, the control then stages in sequence all of the stages of the next boiler in the rotation sequence.

Lo/Lo: If the Lo/Lo staging option is selected, the control stages all of the Lo stage outputs in all of the boilers first. Once all of the boilers are operating on their Lo stages, the control then operates the second stage in each boiler in the same order.

Boiler Fire Delay Setting in Adjust Menu

(per boiler)

The Boiler Fire Delay sets the time it takes for the boiler to generate flame from the time the boiler turns on.



Combustion Air and Alert Settings — Section D

Relay Setting in Adjust Menu (C.A. Damper / Alert)

The control includes an auxiliary relay that can be used either for a combustion damper/venting device or an Alert. Selection is made through the Relay item in the Adjust menu.

Alert

When the Relay is set to Alert, terminals 15 and 16 close whenever a control or sensor error is detected, or when a warning or limiting condition is detected. When the alert contact closes, refer to the Error Messages section of this brochure to determine the cause of the alert and how to clear the error.

Boiler Alarm

For the Boiler Alarm item to appear in the Adjust menu, the Relay must be set to Alert. If no temperature increase is detected at the boiler supply sensor within this delay period, the Alert relay will close and the control will display the Boiler Alarm error message. All boilers continue to operate if this error is present. To clear the error, press and hold the up and down buttons simultaneously for 5 seconds while viewing the error message in the View menu.

Combustion Air (C.A.) Damper

When the Relay is set to Damper, terminals 15 and 16 operate a combustion air damper / fan motor or power vent motor. The Relay closes once a demand is received and the control has determined that one or more boilers need to be turned on.

Combustion Air Proof Demand Setting in Adjust Menu

The proof demand can be used to prove a combustion air or venting device if set to C.A. Boiler operation cannot occur until the proof demand is present. If the proof demand is lost during operation, the boiler plant is sequenced off.

Combustion Air Proof Demand Delay Setting in Adjust Menu

The control includes a time delay that is associated with the proof demand feature in order to determine if the proof device is functional. Once the C.A. relay closes, the control allows for this delay to receive the proof demand. If the proof demand is not received within the delay time, the control will display an error message.

Combustion Air Damper Delay Setting in Adjust Menu

If the Proof Demand function is set to F P (flow proof) or OFF, boiler sequencing only occurs once a user adjustable time delay elapses.

Combustion Air Post Purge

There is a fixed 15 second post purge of the C.A. relay after the last boiler has turned off, or demand is removed. If there is a heat demand still present once the last boiler has turned off, the control can look at the error and determine if sequencing is to occur in a “short” period of time. If the control does anticipate staging, the C.A. relay will remain on. Otherwise, the C.A. relay will be turned off once the 15 second post purge elapses.

Combustion Air Proof Demand Test

The control includes a C.A. proof demand test in order to determine if the proving device has failed. If the C.A. damper contacts are opened, the flow proof demand should not be present after 4 minutes. If the flow proof demand remains, the control will display an error message.

Domestic Hot Water Operation *Section E*

DHW operation is only available when the Pump Sequencer DIP Switch is set to Off.

DHW Demand

DHW Demands come from one of three sources: an external aquastat, a DHW tank sensor, or a tN4 DHW control.

Once the control detects a DHW Demand, the DHW Demand segment is displayed in the LCD. If an External Powered DHW Demand is applied while the DHW sensor is enabled in the 274, an error message is generated and both demands are ignored.

A DHW demand from a tN4 Setpoint Control can coexist with another DHW demand without generating an error message. The 274 will then use the higher of the two targets.

Powered DHW Demand

The control registers a DHW Demand when a voltage between 20 and 260 V (ac) is applied across the DHW Demand terminals 23 and 24. An aquastat or setpoint control is used to switch the DHW Demand circuit. Program a DHW Exchange temperature for the Occupied and UnOccupied events in the Adjust Menu.

- DHW Sensor must be set to Off.

DHW Sensor

The control can register a DHW Demand when A DHW Sensor is wired to terminals 5 and 6. Once the DHW Sensor drops 1/2 of the DHW Differential setting below the DHW Setpoint, the control registers a DHW Demand. Program a DHW Tank temperature for the Occupied and UnOccupied events in the Adjust Menu.

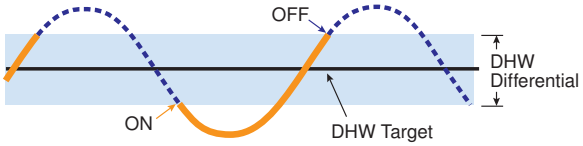
- The DHW Sensor must be set to On. There cannot be an externally powered DHW demand when using a DHW sensor.

tN4 Setpoint Control in DHW Mode

The control can register a DHW Demand when a tN4 Setpoint Control in DHW Mode is wired to terminals 1 and 2. The DHW Demand is sent over the tN4 communication bus when the Setpoint Control calls for heat. Program a DHW tank temperature for the Occupied and UnOccupied events and the desired supply water temperature required on the tN4 bus in the Adjust Menu of the tN4 Setpoint Control.

DHW Differential Setting in Adjust Menu

Due to large differences between the heating load and the DHW load, a separate DHW differential should be used whenever a DHW Demand is present. This will improve staging and boiler cycling. When using a DHW Sensor, a DHW Demand is registered when the DHW sensor drops 1/2 of the DHW Differential setting below the DHW setting. The DHW Demand is satisfied once the DHW Sensor rises 1/2 of the DHW Differential setting above the DHW setting.



Boiler Target Temperature during a DHW Demand

If a Powered DHW Demand is present, the boilers are operated to maintain the DHW Exchange temperature. If a DHW sensor demand is present, the boilers are operated to maintain a temperature 40°F above the DHW tank temperature. If a tN4 demand is present, the primary pump is turned on according to the device's reported requirements and the boilers are operated to maintain the devices requested target on the bus. The DHW Demand overrides the boiler reset target temperature, except when the boiler reset target is higher than the DHW target. Regardless of DHW settings and requested targets, the boilers will maintain a supply temperature no higher than the Boil MAX setting.

DHW During UnOccupied

When using a Powered DHW Demand, the control has a DHW Exchange UnOccupied setting that allows the installer to select On or Off. When set to On, and the control receives a DHW Demand during an UnOccupied or Sleep period, the control continues operation of the DHW system as it would during the Occupied and Wake periods. When set to Off, the control will ignore a DHW Demand for the duration of the UnOccupied and Sleep periods.

When using a DHW Sensor, a second DHW temperature setting is available for the UnOccupied or Sleep period.

DIP Switch must be set to Setback to view UnOccupied items.

During the Away Scene, DHW demands are ignored.

DHW Mode Setting in the Adjust Menu

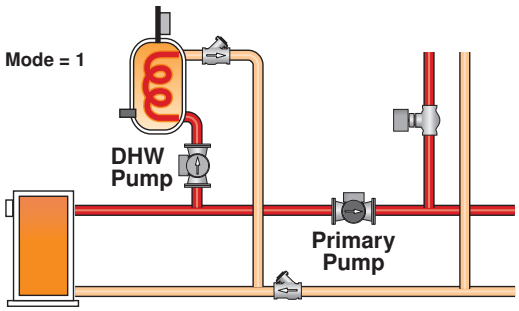
The control has six different DHW Modes that affect pump operation. The required DHW Mode setting will depend on the piping arrangement of the DHW tank and whether or not priority for DHW is necessary. DHW Priority stops or limits the delivery of heat to the building heating system while the DHW tank calls for heat. This allows for quick recovery of the DHW tank.

Mode OFF / No DHW Generation

All DHW demands are ignored. If this mode is selected while DHW generation is underway, all DHW operation stops.

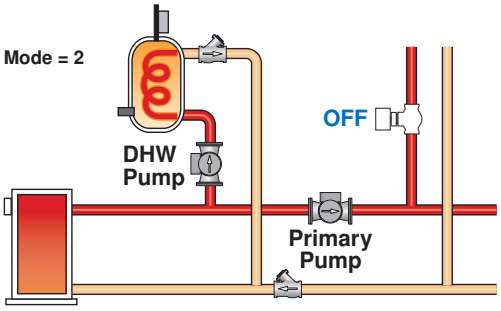
Mode 1 - DHW in Parallel with No Priority

When a valid DHW Demand is present, the DHW relay (terminal 17) turns on. The primary pump can operate when a Boiler Demand is present. It is assumed that the DHW pump will provide adequate flow through the heat exchanger and the boiler. Heating zones are unaffected by DHW operation.



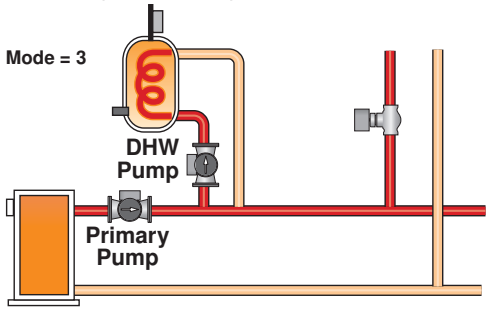
Mode 2 - DHW in Parallel with Priority

When a valid DHW Demand is present, the DHW relay (terminal 17) turns on. The primary pump can operate when a Boiler Demand is present. If the boilers are unable to maintain the boiler target temperature, space heating zones are shut off sequentially using tN4 communication in order to provide priority to the DHW tank. For non-tN4 systems, the primary pump shuts off to provide priority. It is assumed that the DHW pump will provide adequate flow through the heat exchanger and the boiler.



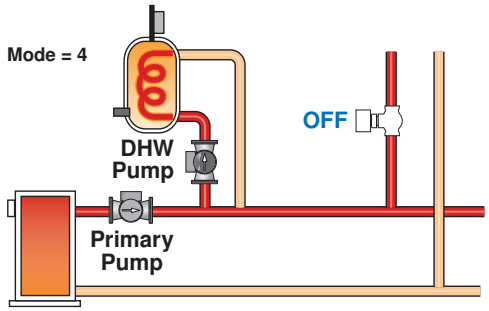
Mode 3 - DHW in Primary/Secondary with No Priority

When a valid DHW Demand is present, the DHW relay (terminal 17) and Primary Pump relay (terminal 18) turn on. Heating zones are unaffected by DHW operation. This mode can be used if the DHW tank is piped in parallel and a DHW valve is installed (need to use an external relay to power the valve with 24 V (ac) since the DHW pump output is a 120 V (ac) powered output).



Mode 4 - DHW in Primary/Secondary with Priority

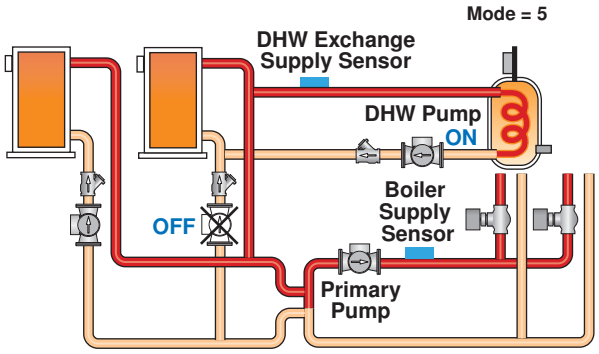
When a valid DHW Demand is present, the DHW relay (terminal 17) and Primary Pump relay (terminal 18) turn on. If the boilers are unable to maintain the boiler target temperature, space heating zones are shut off sequentially using tN4 communication in order to provide priority to the DHW tank.



Mode 5 - DHW in Parallel / Last Boiler with Priority

When a valid DHW Demand is present, the DHW relay (terminal 17) turns on and boiler pump 4 turns off. The control uses the DHW Exchange Supply Sensor in order to measure the boiler supply temperature supplied to the indirect tank. There are two boiler target temperatures, one for the heating system (BOIL TARGET) and one for the indirect DHW system (BOIL DHW TARGET). In this mode, the DHW Demand can only be provided from an External Powered Demand or tN4 Setpoint Control in DHW mode.

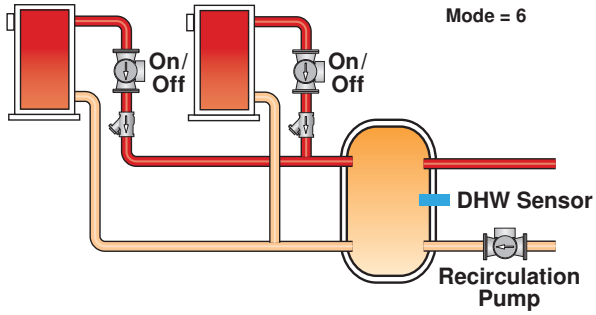
- All boilers are used for space heating requirements
- Boiler 2 is used for DHW when there is a DHW demand
- **The dedicated DHW boiler is always boiler 2 (relay 3), even if there are less than 4 boilers.**
- **If boiler 2 is disabled and mode 5 is selected then the dedicated DHW boiler (boiler 2) will not operate.**
- **This DHW mode is only available when control is in Mode = 2**



Mode 6 – Dedicated DHW

When a valid DHW Demand is present from the DHW Sensor, the primary pump relay turns on. The DHW Relay in this mode is used as the DHW recirculation pump and operates continuously in the Occupied period and cycles with the primary pump in the UnOccupied period. The boiler plant is sequenced based only on the DHW Sensor.

- All boilers are used for DHW requirements
- Requires DHW demand from DHW sensor
- DHW Pump Relay is used for DHW recirculation pump
- Boiler Supply Sensor Not Required



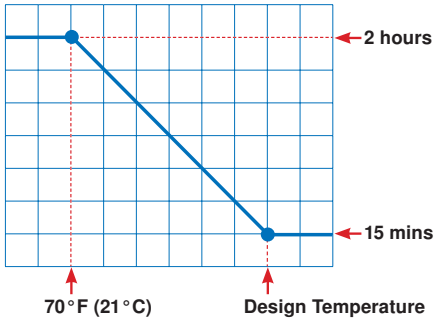
DHW Priority Override Setting in Adjust Menu

DHW Priority Override applies to DHW MODE 2 and 4, as well as Mode 5 if there is a tN4 device with DHW. It prevents the building from cooling off too much or the possibility of a potential freeze up during DHW priority.

When set to auto, the priority time is calculated based on outdoor temperature. At or below the design outdoor temperature, 15 minutes are allowed for DHW priority. At or above 70°F, 2 hours are allowed for DHW priority. The time allowed for DHW priority varies linearly between the above two points. There is a manual setting also available in the adjust menu.

The priority timer does not start timing until priority is selected and both a DHW Demand and a Boiler Demand exist together. Once the allowed time for priority has elapsed, the control overrides the DHW priority and resumes space heating.

Automatic Priority Override



Conditional DHW Priority

If the boiler supply temperature is maintained at or above the required temperature during DHW generation, this indicates that the boilers have enough capacity for DHW and possibly heating as well. As long as the boiler supply temperature is maintained near the target, DHW and heating occurs simultaneously.

DHW Post Purge

After the DHW Demand is removed, the control performs a purge. The control shuts off the boilers and continues to operate the DHW Pump and the primary pump if applicable. This purges the residual heat from the boilers into the DHW tank. The control continues this purge until one of the following occurs:

1. A Boiler Demand is detected
2. The boiler supply drops 20°F (11°C) below the DHW target temperature
3. The DHW tank temperature rises above the DHW setpoint plus 1/2 DHW Differential
4. Two minutes elapse

DHW Mixing Purge

After DHW operation, the boiler is extremely hot. At the same time, the heating zones may have cooled off considerably after being off for a period of time. When restarting the heating system after a DHW demand with priority, the control shuts off the boiler and continues to operate the DHW pump while the primary pump is turned on. This allows some of the DHW return water to mix with the cool return water from the zones and temper the boiler return water.

DHW with Low Temperature Boilers

If DHW heating is to be incorporated into a low temperature system such as a radiant floor heating system, a mixing device is often installed to isolate the high DHW supply temperature from the lower system temperature. If a mixing device is not installed, high temperature water could be supplied to the low temperature system while trying to satisfy the DHW demand. This may result in damage to the low temperature heating system.

The control is capable of providing DHW heating in such a system while minimizing the chance that the temperature in the heating system exceeds the design supply water temperature. In order to do this, the following must be true:

- tN4 Present
- DHW MODE 2 or 4
- Boil MIN OFF

On a call for DHW, the control provides DHW priority by sending a message on the boiler temperature bus to the tN4 thermostats to shut off the heating zones for a period of time. The length of time is based on the outdoor air temperature as described in the DHW Priority Override section. However, if the DHW Demand is not satisfied within the allotted time, the boiler shuts off and the heat of the boiler is purged into the DHW tank. A DHW mixing purge occurs in order to reduce the boiler water temperature and once the boiler supply temperature is sufficiently reduced, the DHW Pump contact shuts off. The heating system zones are allowed to turn on for a period of time to prevent the building from cooling off. After a period of heating, and if the DHW Demand is still present, the control shuts off the heating system and provides heat to the DHW tank once again.

DHW Boilers Setting in Adjust Menu

Select the number of boilers to use for DHW generation.

Setpoint Operation

Section F

Setpoint operation is only available when DHW Mode is set to Off.

The control can operate to satisfy the requirements of a setpoint load in addition to a space heating load. A setpoint load overrides the current outdoor reset temperature in order to provide heat to the setpoint load.

Setpoint Demand

Setpoint Demands come from one of two sources: a Powered Setpoint Demand, or a tN4 Setpoint Control.

Powered Setpoint Demand

The control registers a Setpoint Demand when a voltage between 20 and 260 V (ac) is applied across the Setpoint Demand terminals 23 and 24. An aquastat or setpoint control is used to switch the Setpoint Demand circuit. Program a Setpoint target for the Occupied and UnOccupied events in the Adjust Menu.

• DHW Mode must be set to Off.

tN4 Setpoint Control

The control can register a Setpoint Demand when a tN4 Setpoint Control is wired to terminals 1 and 2. The Setpoint Demand is sent over the tN4 communication bus when the Setpoint Control calls for heat. Program a Setpoint temperature for the Occupied and UnOccupied events and the desired supply water temperature required on the tN4 bus in the Adjust Menu of the tN4 Setpoint Control.

• DHW Mode must be set to Off.

A demand from a tN4 Setpoint Control can coexist with another setpoint demand without generating an error message. The 274 will then use the higher of the two targets.

Boiler Target Temperature during a Setpoint Demand

If a Powered Setpoint Demand is present, the boilers are operated to maintain the Setpoint target. If a tN4 demand is present, the primary pump is turned on according to the device's reported requirements and the boilers are operated to maintain the devices requested target on the bus. The Setpoint Demand overrides the boiler reset target temperature, except when the boiler reset target is higher than the Setpoint target. Regardless of Setpoint settings and requested targets, the boilers will maintain a supply temperature no higher than the Boil MAX setting.

Setpoint During UnOccupied

When using a Powered Setpoint Demand, the control has a Setpoint UnOccupied setting that allows the installer to select On or Off. When set to On, and the control receives a Setpoint Demand during an UnOccupied or Sleep period, the control continues operation of the Setpoint system as it would during the Occupied and Wake periods. When set to Off, the control will ignore a Setpoint Demand for the duration of the UnOccupied and Sleep periods.

DIP Switch must be set to Setback to view UnOccupied items.

During the Away Scene, Setpoint demands are ignored.

Setpoint Mode Setting in the Adjust Menu

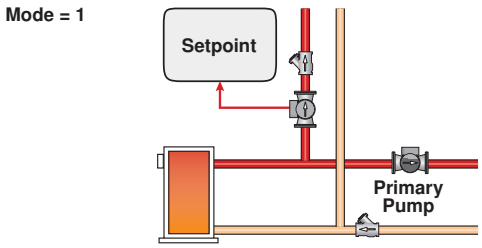
The control has four different Setpoint Modes that affect pump operation. The required Setpoint Mode setting will depend on the piping arrangement and whether or not priority is necessary. Setpoint Priority stops or limits the delivery of heat to the building heating system while the Setpoint load calls for heat. This allows for quick recovery of the Setpoint load.

Mode OFF - No Setpoint Operation

All Setpoint demands are ignored. If this mode is selected while Setpoint operation is underway, all Setpoint operation ceases.

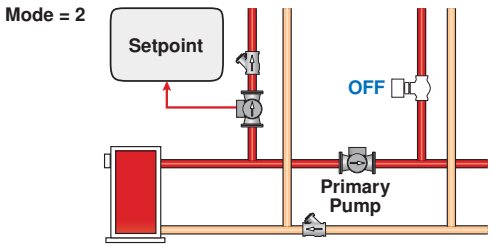
Mode 1 - Setpoint in Parallel with No Priority

Whenever a Setpoint Demand is present, the boilers are operated to maintain the setpoint target. The primary pump does not turn on, but may operate based on a Boiler Demand. It is assumed that the Setpoint pump will provide adequate flow through the heat exchanger and the boiler.



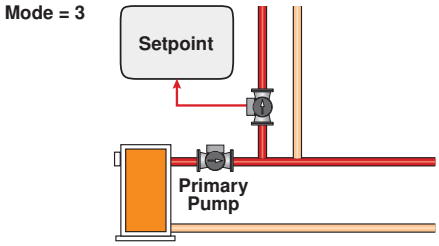
Mode 2 - Setpoint in Parallel with Priority

When a Setpoint Demand is present, the boilers are operated to maintain the setpoint target. The primary pump can operate when a Boiler Demand is present. If the boilers are unable to maintain the boiler target temperature, space heating zones are shut off sequentially using tN4 communication in order to provide priority to the Setpoint Load. For non-tN4 systems, the primary pump shuts off to provide priority. It is assumed that the Setpoint pump will provide adequate flow through the heat exchanger and the boiler.



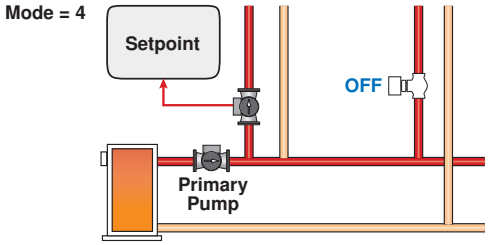
Mode 3 - Setpoint in Primary/Secondary with No Priority

Whenever a Setpoint Demand is present, the primary pump is turned on and the boilers are operated to maintain the setpoint target.



Mode 4 - Setpoint in Primary/Secondary with Priority

Whenever a Setpoint Demand is present, the primary pump is turned on and the boilers are operated to maintain the setpoint target. Space heating zones will be shut off if the boilers are unable to maintain the boiler target temperature.



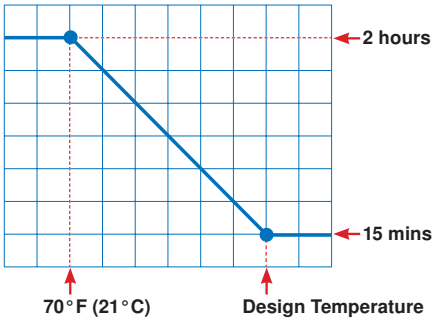
Setpoint Priority Override Setting in Adjust Menu

Setpoint Priority Override applies to SETPOINT MODE 2 and MODE 4. To prevent the building from cooling off too much or the possibility of a potential freeze up during setpoint priority, the control limits the amount of time for setpoint priority.

When set to auto, the priority time is calculated based on outdoor temperature. At or below the design outdoor temperature, 15 minutes are allowed for Setpoint priority. At or above 70°F, 2 hours are allowed for Setpoint priority. The time allowed for Setpoint priority varies linearly between the above two points. There is a manual setting also available in the adjust menu.

The priority timer does not start timing until priority is selected and both a Setpoint Demand and a Boiler Demand exist together. Once the allowed time for priority has elapsed, the control overrides the Setpoint priority and resumes space heating.

Automatic Priority Override



Conditional DHW Priority

If the boiler supply temperature is maintained at or above the required temperature during setpoint generation, this indicates that the boiler has enough capacity for setpoint and possibly heating as well. As long as the boiler target temperature is maintained, setpoint and heating occur at the same time.

Setpoint Post Purge

After a tN4 Setpoint Demand is removed, the control performs a purge. The control shuts off the boilers and continues to operate the Setpoint Pump and the primary pump if applicable. This purges the residual heat from the boilers into the Setpoint load. The control continues this purge until one of the following occurs:

1. A Boiler Demand is detected
2. The boiler supply drops 20°F (11°C) below the Setpoint target temperature
3. Two minutes elapse

Energy Management System (EMS) — Section G

The control can accept an external DC signal from an Energy Management System (EMS) in place of the outdoor sensor. The control converts the DC signal into the appropriate boiler target temperature between 50°F (10°C) and 210°F (99°C) based on the EMS Input Signal and Offset settings. To use the external input signal, the EMS / Demands DIP switch must be set to EMS.

An external signal is generated by applying a voltage between 0 V (dc) and 10 V (dc) across the Out + and Com – terminals (3 and 2). Voltages that exceed 10 V (dc) will still be considered a 10 V (dc) signal.

Once voltage is applied, the EMS Input Signal pointer is displayed in the LCD and the control calculates a boiler target and closes the primary pump contact. The control then activates the boiler(s), if required, to maintain the target supply temperature.

If the EMS signal goes below the minimum voltage, the EMS Input Signal pointer is turned off in the display. The boiler target temperature is displayed as "– – –" to indicate that there is no longer a call for heating. The primary pump and boiler pumps operate as described in section I.

Input Signal

The control can accept either a 0 - 10 V (dc) signal or a 2 - 10 V (dc) signal. The External Input Signal setting must be set to the proper setting based on the signal that is being sent to the control.

0 - 10 V (dc) or 0 - 20 mA

When the 0 - 10 V (dc) signal is selected, an input voltage of 1 V (dc) corresponds to a boiler target temperature of 50°F (10°C). An input voltage of 10 V (dc) corresponds to a boiler target temperature of 210°F (99°C). As the voltage varies between 1 V (dc) and 10 V (dc) the boiler target temperature varies linearly between 50°F (10°C) and 210°F (99°C). If a voltage below 0.5 V (dc) is received the boiler target temperature is displayed as "– – –" indicating that there is no longer a call for heating.

A 0 - 20 mA signal can be converted to a 0 - 10 V (dc) signal by installing a 500 Ω resistor between the Out + and Com – terminals (3 and 2).

2 - 10 V (dc) or 4 - 20 mA

When the 2 - 10 V (dc) signal is selected, an input voltage of 2 V (dc) corresponds to a boiler target temperature of 50°F (10°C). An input voltage of 10 V (dc) corresponds to a boiler target temperature of 210°F (99°C). As the voltage varies between 2 V (dc) and 10 V (dc) the boiler target temperature varies linearly between 50°F (10°C) and 210°F (99°C). If a voltage below 1.5 V (dc) is received the boiler target temperature is displayed as "– – –" indicating that there is no longer a call for heating.

A 4 - 20 mA signal can be converted to a 2 - 10 V (dc) signal by installing a 500 Ω resistor between the Out + and Com – terminals (3 and 2).

CONVERSION TABLE 0 - 10		
0 - 20 mA*	**0 - 10 V (dc)**	**Boiler Target**
0	0	– – – (OFF)
2	1	50°F (10°C)
4	2	68°F (20°C)
6	3	86°F (30°C)
8	4	103°F (39°C)
10	5	121°F (49°C)
12	6	139°F (59°C)
14	7	157°F (69°C)
16	8	174°F (79°C)
18	9	192°F (89°C
20	10	210°F (99°C)

*Requires 500 Ω Resistor in Parallel

CONVERSION TABLE 2 - 10		
4 - 20 mA*	**2 - 10 V (dc)**	**Boiler Target**
0	0	– – – (OFF)
4	2	50°F (10°C)
6	3	70°F (21°C)
8	4	90°F (32°C)
10	5	110°F (43°C)
12	6	130°F (54°C)
14	7	150°F (66°C)
16	8	170°F (77°C)
18	9	190°F (88°C)
20	10	210°F (99°C)

*Requires 500 Ω Resistor in Parallel

Offset Setting in Adjust Menu

For external input operation, the boiler target (determined from the external input signal) may be fine tuned. The Offset setting is used to provide the fine tuning. The Offset setting may be adjusted ±10°F. When set to 0°F, if the temperature determined from the external signal is 140°F, the boiler target will be 140°F. When set to +5°F and with the same external signal represents 140°F, the boiler target will be 145°F.

Example

Range	=	0 - 10 V (dc)	
Input	=	7 V (dc)	157°F (69°C)
Offset	=	+5°F (3°C)	+5°F (3°C)
Boiler Target	=		162°F (72°C)

The minimum and maximum settings also apply for external input operation. For example, if a boiler minimum of 140°F is set and the external signal received represents 80°F, the boiler target will be 140°F. The MIN segment will also be displayed to indicate that a limiting condition is in effect. This also applies for the MAX segment limit.

Whenever an external signal is used, the control can still provide all DHW OR Setpoint functions.

Pump Operation — Section H

Primary Pump Operation

The control includes two primary pump outputs with capability for sequencing. Primary pump sequencing is activated through a DIP switch. Only primary pump 1 is operated when pump sequencing is turned off, while primary pumps 1 and 2 are operated in stand-by mode when pump sequencing is turned on.

The running times of the primary pumps are logged in the view menu. To reset these values back to zero, press and hold the up and down button while viewing this item.

Note: once primary pump sequencing is selected, DHW operation is not available. Setpoint operation, however, is available if primary pump sequencing is selected.

The primary pumps will operate when the control receives an appropriate demand:

- External Boiler Demand
- tN4 Boiler Demand and that zone's thermostat has H1 Pump set to On.
- DHW Demand and the control is set to DHW Mode 3, 4, or 6.
- Setpoint Demand and the control is set to Setpoint Mode 3 or 4.

The primary pumps also operate when the control is completing a DHW Purge.

tN4 thermostats can select whether the primary pump is required to operate or not. tN4 thermostats also include a thermal actuator setting which can delay the primary pump for 3 minutes to allow thermal actuators to open.

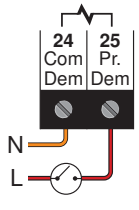
Flow Proof

The control includes a flow proof demand in order to prove flow once a primary pump has turned on. In order for boiler operation to commence, the proof demand must be present. A flow proof signal is required at all times during pump operation. A flow proof is generated by applying a voltage between 20 and 260 V (ac) across the Flow Proof terminals (30 and 31). Once voltage is applied, the Proof Demand indicator is turned on in the LCD.

Once a pump contact is turned on, a flow proof signal must be present before the flow proof delay has expired.

The flow proof demand is selected by setting the Proof Demand item in the Adjust menu to F P (flow proof).

A flow proof demand can come from a flow switch, pressure differential switch, current sensing or power sensing device.



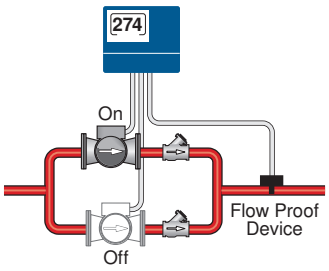
ΔP	Pressure Differential Switch
FS	Flow Switch
KW	Power Sensing Device
Amp	Current Sensing Device

Stand-by Operation

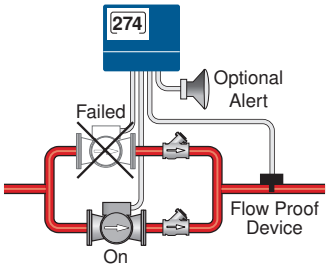
The control only operates one primary pump at a time. A flow proof device can be used to detect when stand-by pump operation is required.

- When a demand is registered, the lead pump is activated, and the control waits for flow to be established within the flow proof delay time.
- If no flow is established, the lead pump is de-activated, the lag pump is activated and the control waits again for the flow to establish within the flow proof delay time.
- If again no flow is established, the lag pump is de-activated and the control stops operation until the error is cleared. Verify that the pumps and flow proof device are working correctly before clearing the error.
- If the lead pump establishes flow, and fails during operation, the lag pump is activated.
- If at any time, one or both pumps fail to prove flow, an error message is displayed.

Normal Operation



Stand-by Pump Operation



Flow Proof Delay Setting in Adjust Menu

The control waits a period of time to receive a flow proof demand from the time the primary pump turns on. If the control does not receive a flow proof demand within that period of time, the primary pump turns off and the stand-by primary pump (if active) turns on. The control then waits that period of time again for the stand-by primary pump to prove flow. If flow is not proven, the stand-by pump turns off. The period of time is set through the Proof Demand 'Pump' DLY item in the Adjust menu and it is adjustable between 10 seconds and 3 minutes.

Flow Proof Demand Test

The control includes a flow proof demand test in order to determine if the flow/pressure device has failed. A flow proof failure is detected if a flow proof is present after the pumps have been shut off for more than four minutes. This can occur if the flow proof device sticks in the on position even when flow has stopped in the system. A proof demand error will latch when this condition exists.

Primary Pump Rotation Setting in Adjust Menu

The control rotates the pumps based on the Rotate item in the Adjust menu. Frequency of Rotation is based on the running time of the pumps. Rotation is done when the lead pump is off. If the lead pump runs continuously, the rotation is delayed for up to 12 hours. If the pump runs continuously and rotation is required, the control shuts off the lead pump and 1 second later the stand-by pump is turned on. This eliminates overloading the pump electrical circuit. Upon turning on the stand-by pump the flow proof input is checked after the flow proof demand delay time.

Primary Pump Purge

After the last valid demand is removed, the primary pump is operated for an additional purging time of at least 20 seconds. If the last demand came from a tN4 zone, the control sends out a purge message to override the zone open for the duration of the boiler purge. At the end of the purge, the zone override is removed so the zone is allowed to close and turn off the primary pump. If the last demand came from a non-tN4 zone, the purge period for the primary pump is adjustable between 10 seconds and 19:55 minutes.

Boiler Pump Operation

The control can operate individual boiler pumps when set to Mode 2, 4 or 5. Refer to the Boiler Operation section for more information about the mode settings.

A pre-purge operates the respective boiler pump for a period of time before the boiler is ignited in order to purge potential residual heat out of the boiler.

The pre-purge time is determined from the boiler mass setting. As the boiler mass setting is increased, the boiler pump pre-purge time is also increased. The pre-purge time is fixed at 4 seconds whenever a DHW / Setpoint demand is provided in order to reduce boiler pick-up times.

The control includes a boiler pump post-purge feature that operates the respective boiler pump for a period of time after the boiler is turned off. This feature will purge heat out of the boiler and aid in reducing "kettling". The amount of time for the boiler pump post purge is adjustable between 10 seconds and 19:55 minutes. See the boiler pump purge setting in the adjust menu.

Exercising — Section I

The control will exercise the Combustion Air Damper, all pumps, and tN4 zones (zone valves and zone pumps) for 10 seconds every three days of inactivity to prevent seizure.

To enable exercising, switch the Exercise / Off DIP to the Exercise position.

Time Clock — Section J

The control has a built-in time clock to allow the control to operate on a schedule. A battery-less backup allows the control to keep time for up to 4 hours without power. The time clock supports automatic adjustment for Daylight Saving Time (DST) once the day, month, and year are entered. Use the Time menu to set the correct time, day, month, and year.

Note: The Setback / Off DIP Switch must be set to Setback before the Time menu can be accessed.

Daylight Savings Time Modes		
Mode	DST Start	DST End
1	1st Sunday in April	Last Sunday in October
2	2nd Sunday in March	1st Sunday in November

Setting the Schedule — Section K

To provide greater energy savings, you can operate the control on a programmable schedule. The schedule is stored in memory and is not affected by loss of power to the control. If a tN4 network is detected the control can become either a schedule member or schedule master.

Control (CTRL) Schedule (tN4 present)

The schedule only applies to the control. The control follows its own schedule and the events are not communicated to tN4 thermostats.

Master Schedule (tN4 present)

If the control is connected to tN4 thermostats, then the control can operate on a master schedule. You can set up a maximum of four master schedules on the tN4 Network. A master schedule is available to all devices on the tN4 network. Master schedules simplify installation since one master schedule may be used by multiple devices.

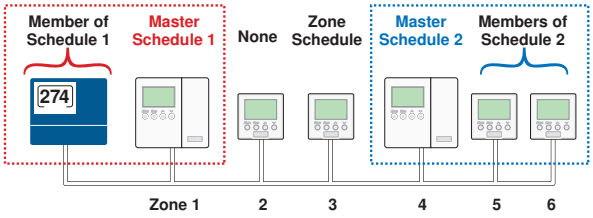
To create a master schedule:

- Assign the control to be a schedule master by setting the Heat Schedule item in the Schedule menu to Master (MST) 1 to 4. After a master schedule is selected, a clock symbol will appear in the View menu display.

Note: The 274 Setback / Off DIP Switch must be set to Setback to access the Schedule Menu.

To follow a master schedule:

- Assign the control to follow a master schedule by setting the Heat Schedule in the Schedule menu to Member (MBR) 1 to 4.



Schedule Types

The schedule type determines when the schedule repeats itself. This control includes three schedule types:

- 24 Hour: Repeats every 24 hours.
- 5-11: Repeats on a weekly basis. However, it breaks the week into Saturday and Sunday followed by the weekdays. This reduces the amount of schedule event settings.
- 7 Day: Repeats on a weekly basis and allows for separate event times for each day.

	Schedule Type		
Day	24 Hour	5-11	7 day
Saturday		•	•
Sunday		•	•
Monday			•
Tuesday	•		•
Wednesday		•	•
Thursday			•
Friday			•

Schedule Mode

The schedule mode can have either 4 or 2 events per day. An event is a time at which the control changes the target temperature. The event time can be set to the nearest 10 minutes. If you wish to have the thermostat skip the event, enter "--:--" as the time. The "--:--" time is found between 11:50 PM and 12:00 AM. See the table, Schedule Mode, for more details regarding types of events.

Schedule Mode	Event	24Hr	Sat	Sun	Mon	Tue	We	Thu	Fri
4 events per day	Wake	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM
	Unoccupied	8:00 AM	8:00 AM	8:00 AM	8:00 AM	8:00 AM	8:00 AM	8:00 AM	8:00 AM
	Occupied	6:00 PM	6:00 PM	6:00 PM	6:00 PM	6:00 PM	6:00 PM	6:00 PM	6:00 PM
	Sleep	10:00 PM	10:00 PM	10:00 PM	10:00 PM	10:00 PM	10:00 PM	10:00 PM	10:00 PM
or									
2 events per day	Occupied	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM
	Unoccupied	10:00 PM	10:00 PM	10:00 PM	10:00 PM	10:00 PM	10:00 PM	10:00 PM	10:00 PM

Boost — Section L

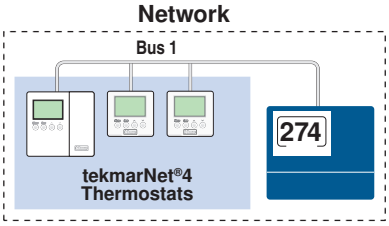
When the control changes from the UnOccupied mode to the Occupied mode, it enters into a boosting mode. In this mode, the supply water temperature to the system is raised above its normal values for a period of time to provide a faster recovery from the setback temperature of the building. The maximum length of the boost is selected using the BOOST setting in the Adjust menu.

Typical settings for the boost function vary between 30 minutes and two hours for buildings that have a fast responding heating system. For buildings that have a slow responding heating system, a setting between four hours and eight hours is typical. After a boost time is selected, the setback timer must be adjusted to come out of setback some time in advance of the desired occupied time. This time in advance is normally the same as the BOOST setting.

If the building is not up to temperature at the correct time, the BOOST setting should be lengthened and the setback timer should be adjusted accordingly. If the building is up to temperature before the required time, the BOOST setting should be shortened and the setback timer should be adjusted accordingly. If the system is operating near its design conditions or if the supply water temperature is being limited by settings made in the control, the time required to bring the building up to temperature may be longer than expected.

tekmarNet®4 Communication — Section M

tekmarNet®4 (tN4) communicates between tN4 devices (thermostats, Reset Module and Expansion Modules). Each tN4 device is connected to a tN4 communication bus using two wires. Each tN4 bus adjusts a single water temperature in the system using indoor temperature feedback. The Boiler Control 274 allows for one tN4 bus. This allows you to control a system with one water temperature. A system that has more than one tN4 bus is referred to as a tN4 network.



Boiler Control 274

The Boiler Control 274 is the system control for a hydronic heating system. The 274 operates up to 4 on/off boilers, a domestic hot water tank, and responds to other heating requirements such as pool heating and snow melting. The 274 also coordinates and optimizes the operation of all the tN4 thermostats.

tN4 Thermostat

The tN4 thermostat operates heating, cooling, and or ventilation equipment for a zone. Several tN4 thermostats may work in a group when operating a cooling system. Up to 24 tN4 devices can connect to a single tN4 bus.

Zone Load Shedding (tN4)

Zone load shedding helps protect non-condensing boilers from sustained flue gas condensation damage. Zone load shedding starts when the boiler supply temperature is below the boiler minimum setting and all boilers are operating at 100% output. Zones are shut off in order of their tN4 address.

Second stage heat zones are the first to shut off starting with thermostat address b:24, continuing downward until the last to shut off is b:01.

Once all second stage heat zones are shut off, first stage zones shut off starting with highest thermostat address b:24 and ending at the lowest b:01.

When the boiler supply temperature reaches the boiler minimum, the first stage heating zones turn back on in order from b:01 to b:24, and then the second stage in order from b:01 to b:24.

Cycle Length Setting in Adjust Menu (tN4)

The control includes an adjustment for the cycle length. The cycle length adjustment allows for synchronization of tN4 zones. An Auto setting allows for the cycle length to be automatically calculated to balance equipment cycling and comfort.

In the tekmarNet®4 system, all of the tekmarNet®4 Thermostats determine the best cycle length for their zone. The thermostats look at trying to maintain the longest possible cycle length while keeping temperature swings to a minimum. The Thermostats do this every cycle and send their ideal cycle length time to the 274.

In order to operate the system as efficiently as possible, all of the zones must operate based on the same cycle. In order to do this, the 274 listens to all of the cycle length requests from all of the tekmarNet®4 Thermostats. The 274 then determines the average cycle length and sends this information to all of the tekmarNet®4 Thermostats, allowing them to operate on the same cycle.

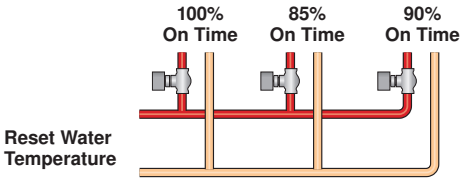
Indoor Temperature Feedback (tN4)

Indoor feedback applies when the 274 is connected to a tN4 Thermostat network operating on a boiler bus. Indoor temperature feedback fine tunes the water temperature of the system based on the requirements of the thermostats. Each thermostat tells the tN4 System Control the water temperature that it requires to heat its zone.

- If the zone is becoming too cool, the thermostat asks for a higher water temperature.
- If the zone is becoming too warm, the thermostat asks for a cooler water temperature.

The 274 provides the highest water temperature required by all of the thermostats.

- The thermostat with the highest water temperature requirement stays on 100% of its cycle.
- The remaining thermostats stay on for a percentage of their cycles.



Device Count (tN4)

The control includes a device count of all the tN4 devices connected to the boiler bus. This item is always found in the Miscellaneous Menu called NUM DEV. Use this to confirm that the correct number of devices are connected to the boiler bus.

Installation

⚠ Caution

Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury or death. It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards. This electronic control is not intended for uses as a primary limit control. Other controls that are intended and certified as safety limits must be placed into the control circuit. Do not attempt to service the control. Refer to qualified personnel for servicing. Opening voids warranty and could result in damage to the equipment and possibly even personal injury or death.

Step One — Getting Ready

Check the contents of this package. If any of the contents listed are missing or damaged, please contact your wholesaler or tekmar sales representative for assistance.

Type 274 includes:

One Boiler Control 274, One Outdoor Sensor 070, Two Universal Sensors 082, One 500 Ohm resistor, Data Brochures D 274, D 070, D 001, Application Brochure A 274.

Note: Carefully read the details of the Sequence of Operation to ensure the proper control was chosen for the application.

Step Two — Mounting the Base

Remove the control from its base by pressing on the release clip in the wiring chamber and sliding the control away from it. The base is then mounted in accordance with the instructions in the Data Brochure D 001.

Step Three — Rough-in Wiring

All electrical wiring terminates in the control base wiring chamber. The base has standard 7/8" (22 mm) knockouts, which accept common wiring hardware and conduit fittings. Before removing the knockouts, check the wiring diagram and select those sections of the chamber with common voltages. Do not allow the wiring to cross between sections as the wires will interfere with safety dividers which should be installed at a later time.

Power must not be applied to any of the wires during the rough-in wiring stage.

- All wires are to be stripped to a length of 3/8" (9 mm) to ensure proper connection to the control.
- Install the Outdoor Sensor 070 according to the installation instructions in the Data Brochure D 070 and run the wiring back to the control.
- Install the Boiler Supply Sensor 082 according to the installation instructions in the Data Brochure D 070 and run the wiring back to the control.
- Install the Boiler Return or DHW Sensor 082 according to the installation instructions in the Data Brochure D 070 and run the wiring back to the control.
- Run wires from any security system, alarm panel, or telephone dialer back to the control.
- Run wires from other system components (boilers, pumps, flow switch, etc.) to the control.
- Run wires from the 115 V (ac) power to the control. Use a clean power source with a 15 A circuit to ensure proper operation. Multi-strand 16 AWG wire is recommended for all 115 V (ac) wiring due to its superior flexibility and ease of installation into the terminals.

Step Four — Electrical Connections to the Control

General

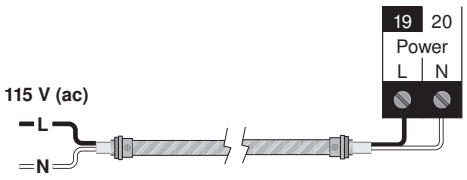
The installer should test to confirm that no voltage is present at any of the wires. Push the control into the base and slide it down until it snaps firmly into place.

⚠ Powered Input Connections

Terminals 19 - 25

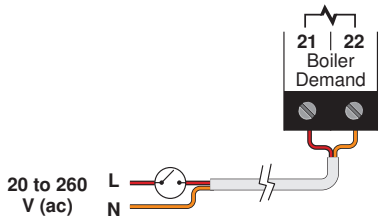
115 V (ac) Power

Connect the 115 V (ac) power supply to the Power L and Power N terminals (19 and 20). This connection provides power to the microprocessor and display of the control.



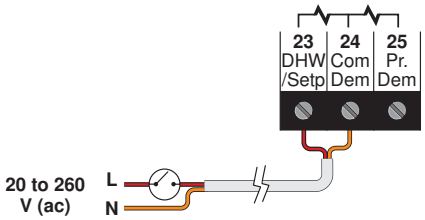
Boiler Demand

To generate a Boiler Demand, a voltage between 20 V (ac) and 260 V (ac) must be applied across the Boiler Demand terminals (21 and 22).



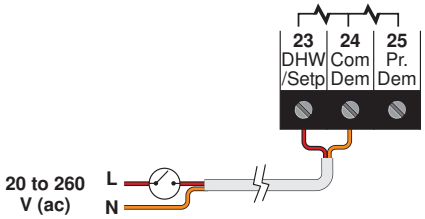
DHW Demand

To generate a DHW Demand, a voltage between 20 V (ac) and 260 V (ac) must be applied across the DHW/Setp and Com Dem terminals (23 and 24). The Pump Sequencer DIP Switch must be set to Off and DHW MODE must be set to 1 through 5.



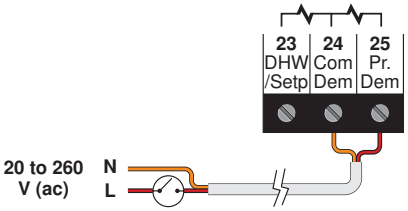
Setpoint Demand

To generate a Setpoint Demand, a voltage between 20 V (ac) and 260 V (ac) must be applied across the DHW/Setp and Com Dem terminals (23 and 24). The DHW MODE must be set to OFF.



Proof Demand

To generate a Proof Demand, a voltage between 20 V (ac) and 260 V (ac) must be applied across the Pr. Dem and Com Dem terminals (25 and 24).



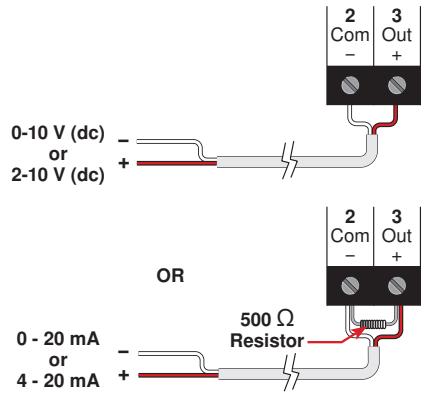
Energy Management System (EMS)

To generate an external input signal from an Energy Management System (EMS), either a 0 to 10 V (dc) or 2 to 10 V (dc) signal must be applied to the Com – and Out + terminals (2 and 3).

A 0 - 20 mA signal can be converted to a 0 - 10 V (dc) signal by installing a 500 Ω resistor in parallel between the Com – and Out + terminals (2 and 3).

A 4 - 20 mA signal can be converted to a 2 - 10 V (dc) signal by installing a 500 Ω resistor in parallel between the Com – and Out + terminals (2 and 3).

Note: DIP Switch must be set to EMS.



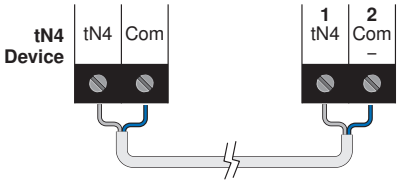
⚠ Non-Powered Input Connections

Terminals 1 - 6

tN4

Terminals 1 and 2 provide a tN4 connection for tN4 devices on the tN4 bus. Connect terminals 1 (tN4) and 2 (Com) to the corresponding terminals on the tN4 devices that are to be connected.

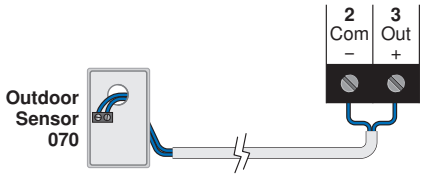
Note: The connection is polarity sensitive. Ensure that terminal 1 (tN4) is connected to the tN4 terminal on the tN4 device and that terminal 2 (C) is connect to the C terminal on the tN4 device.



Outdoor Sensor (tekmar 070)

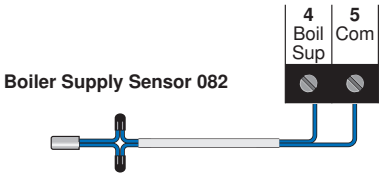
Connect the two wires from the Outdoor Sensor 070 to the Com and Out (2 and 3) terminals. The outdoor sensor is used by the control to measure the outdoor air temperature.

Note: If an Outdoor Sensor 070 is connected to a tekmarNet®4 thermostat in the system, it is not required to be connected to the control.



Boiler Supply Sensor (tekmar 082)

Connect the two wires from the Boiler Supply Sensor 082 to the Com and Boil (5 and 4) terminals. The Boiler Supply Sensor is used by the control to measure the boiler supply water temperature.

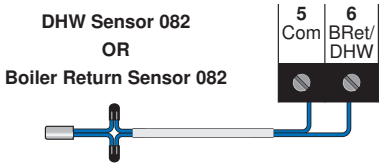


DHW or Boiler Return Sensor (tekmar 082)

Connect the two wires from the DHW Sensor 082 to the Com and BRet / DHW (5 and 6) terminals. The DHW Sensor is used by the control to measure the DHW water temperature or the DHW Exchange Supply Temperature.

OR

Connect the two wires from the Boiler Return Sensor 082 to the Com and BRet / DHW (5 and 6) terminals. The Boiler Return Sensor is used by the control to measure the boiler return temperature.

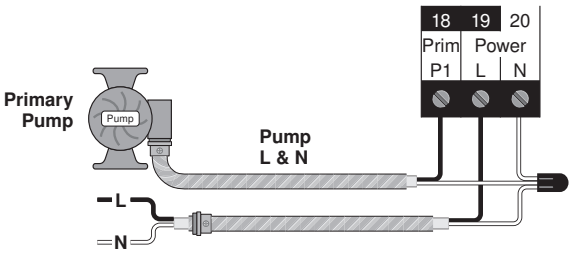


⚠ Powered Output Connections

Terminals 17 - 26

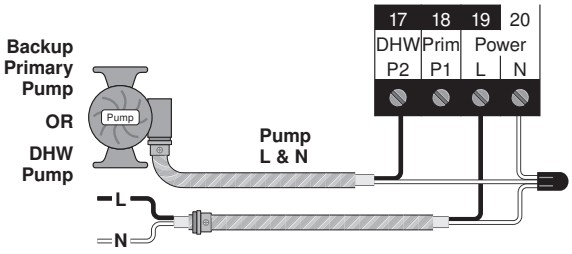
Primary Pump P1

The Prim P1 output on terminal (18) is a powered output. When the relay in the control closes, 115 V (ac) is provided to the Prim P1 terminal (18) from the Power L terminal (19). To operate the primary pump P1, connect one side of the primary pump circuit to terminal (18) and the second side of the pump circuit to the neutral (Power N) side of the 115 V (ac) power supply.



Primary Pump P2

The DHW / P2 output on terminal (17) is a powered output. When the relay in the control closes, 115 V (ac) is provided to the DHW / P2 terminal (17) from the Power L terminal (19). To operate the primary pump P2, connect one side of the primary pump circuit to terminal (17) and the second side of the pump circuit to the neutral (Power N) side of the 115 V (ac) power supply.



Non-Powered Output Connections

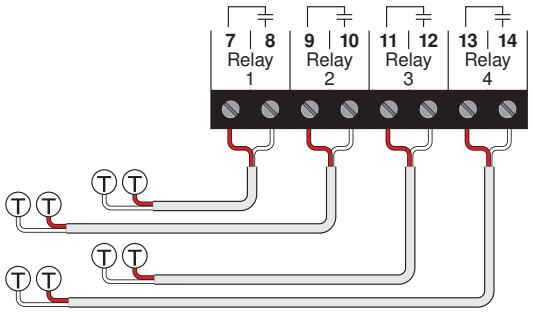
Terminals 7 – 22

Wiring the T-T

(RELAY TYPE = Boiler 13/24)

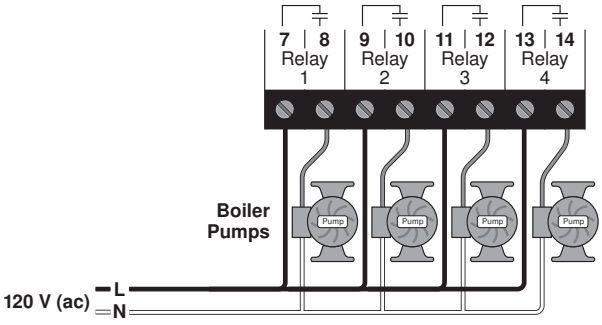
Terminals 7-8, 9-10, 11-12 and 13-14 are dry contacts. No power is available from these terminals. These contacts can be used to either make or break power to a boiler or boiler pump. The boiler must be wired to power as per the manufacturers' directions.

These terminals are typically connected to the boiler's control circuit (commonly labeled as T-T). Connect these terminals directly to the boiler T-T connections.



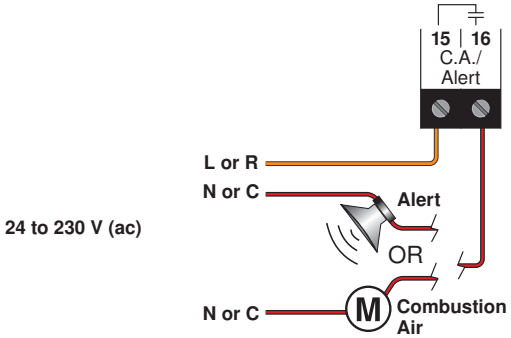
Wiring the Boiler Pumps
(RELAY TYPE = Boiler pump Boiler ▶ 13/24)

Terminals 7-8, 9-10, 11-12 and 13-14 are dry contacts. No power is available from these terminals. These contacts can be used to turn on individual boiler pumps. Wire line voltage to one side of the relay. The other side of the relay goes to one side of the boiler pump and the remaining side of the boiler pump goes to neutral.



Combustion Air / Alert Contact (C.A./Alert)

Terminals 15 and 16 are an isolated output in the control. There is no power available on these terminals from the control. These terminals are to be used as a switch to either make or break power to the combustion air damper or alert device. Since this is an isolated contact, it may switch a voltage between 24 V (ac) and 230 V (ac).

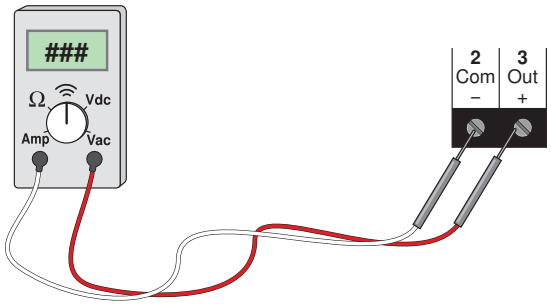


Step Five — Testing the Wiring

General

The following tests are to be performed using standard testing practices and procedures and should only be carried out by properly trained and experienced persons.

A good quality electrical test meter, capable of reading from at least 0-300 V (ac), 0-30 V (dc), 0-2,000,000 Ohms, and testing for continuity is essential to properly test the wiring and sensors.

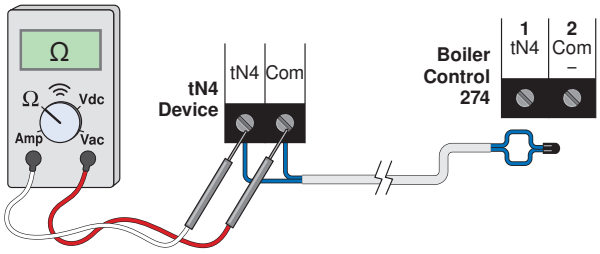


Testing tN4 Network

Terminals 1 – 2

To test the tN4 Network, check the wires for continuity.

1. Disconnect the two wires (tN4 and Com) at one end and connect them together.
2. Go to the other end of the wires and disconnect them.
3. Using an electrical test meter, check for continuity.



Testing the EMS Output

Terminals 2 – 3

If an Energy Management System is used, measure the voltage (dc) between the Com – and the Out + terminals (2 and 3). When the EMS calls for heat, a voltage between 0 – 10 V (dc) or 2 – 10 V (dc) should be measured at the terminals.

Testing tekmar Sensors

Terminals 2 – 6

To test the sensors, the actual temperature at each sensor location must be measured.

- Use a good quality digital thermometer with a surface temperature probe for ease of use and accuracy. Where a digital thermometer is not available, strap a spare sensor alongside the one to be tested and compare the readings.
- Disconnect each sensor from the control.
- Test the sensors resistance according to the instructions in the sensor Data Brochure D 070.

Testing Relay 1 – 4

Terminals 7 – 14

1. Shut off power to the control and the boiler circuit or boiler pump circuit.
2. Remove the bottom cover from the control. Disconnect the wiring from the Relay contacts (terminals 7 – 14).
3. Apply power to the control and press the Test button.
4. Use an electrical test meter and check for continuity between terminals 7-8, 9-10, 11-12 and 13-14.

If the relay is set to boiler ignition:

- When the appropriate boiler symbol is displayed in the LCD, there should be continuity.
- When the appropriate boiler symbol is not displayed in the LCD, there should be no continuity.
- If the relay is set to boiler pump:
- When the appropriate boiler pump symbol is displayed in the LCD, there should be continuity.
- When the appropriate boiler pump symbol is not displayed in the LCD, there should be no continuity.

5. Reconnect the wires to the Relay contacts, install the bottom cover on the control and reapply power to the boiler circuit or boiler pump circuit.

Testing C.A. / Alert Relay

Terminals 15 – 16

1. Shut off power to the control and the boiler circuit or boiler pump circuit.
2. Remove the bottom cover from the control. Disconnect the wiring from the C.A. / Alert contact (terminals 15 – 16).
3. Apply power to the control and press the Test button.
4. Use an electrical test meter and check for continuity between terminals 15 – 16.

If the relay is set to Combustion Air Damper:

- When the Combustion Air Damper symbol is displayed in the LCD, there should be continuity.
- When the Combustion Air Damper symbol is not displayed in the LCD, there should be no continuity.

If the relay is set to Alert:

- When the Alert symbol is displayed in the LCD, there should be continuity.
- When the Alert symbol is not displayed in the LCD, there should be no continuity.

5. Reconnect the wires to the C.A. / Alert contacts, install the bottom cover on the control and reapply power to the Combustion Air Damper or Alert circuit.

Testing DHW and Primary Pumps

Terminals 17 - 18

1. Remove the front and bottom covers from the control.
2. Press the Test Button.
3. When the Primary Pump 1 symbol is displayed in the LCD, use an electrical test meter to measure the (ac) voltage between the Primary Pump 1 terminal and Neutral (18-20). The reading should be 115 V (ac) + / – 10%.

If DHW Mode is enabled:

When the DHW Pump symbol is displayed in the LCD, use an electrical test meter to measure the (ac) voltage between the DHW Pump terminal and Neutral (17-20). The reading should be 115 V (ac) + / – 10%.

If Pump Sequencer is enabled:

When the Primary Pump 2 symbol is displayed in the LCD, use an electrical test meter to measure the (ac) voltage between the Primary Pump 2 terminal and Neutral (17-20). The reading should be 115 V (ac) + / – 10%.

Testing the Input Power

Terminals 19 – 20

1. Remove the front and bottom cover from the control.
2. Use an electrical test meter to measure (ac) voltage between the Input Power L and N terminals (19 and 20). The reading should be 115 V (ac) + / – 10% and the LCD should be lit and show some segments.
3. If power is not present and the LCD is off:

- Check the circuit that supplies power to the Control.
- Make sure exposed wires and bare terminals are not in contact with other wires or grounded surfaces.

1. Remove the front and bottom cover from the control.
2. Use an electrical test meter to measure (ac) voltage between the Boiler Demand terminals (21-22) or the DHW / Setpoint Demand terminals (23-24) or the Proof Demand terminals (24-25).

- When the demand device is on, a voltage between 20 and 260 V (ac) should be measured between the appropriate demand terminals and the LCD should display an indicator arrow pointing to Boiler Demand, DHW / Setpoint Demand, or Proof Demand.
- When the demand device is off, less than 5 V (ac) should be measured between the terminals.

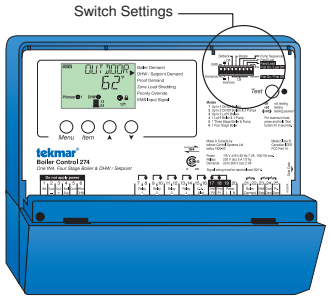
Control Settings

Cleaning the Control

The control's exterior can be cleaned using a damp cloth. Moisten the cloth with water and wring out prior to wiping control. Do not use solvents or cleaning solutions.

DIP Switch Settings

Set the DIP switch settings prior to making adjustments to the control through the user interface. Setting the DIP switches determines which menu items are displayed in the user interface.

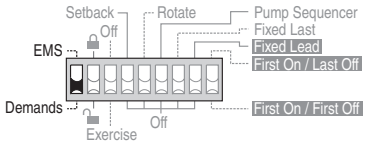


EMS / Demands

The EMS / Demands DIP switch selects whether a tekmar outdoor sensor 070 or an external 0-10 or 2-10 V (dc) input signal is to be connected to the Com - and Out + terminals (2 & 3).

Set the EMS / Demands DIP switch to EMS if an Energy Management System is providing an external analog input signal to the control.

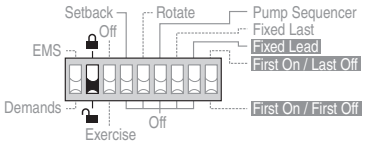
Set the EMS / Demands DIP switch to Demands if the control is accepting a boiler demand and using the outdoor sensor for outdoor reset.



Lock / Unlock

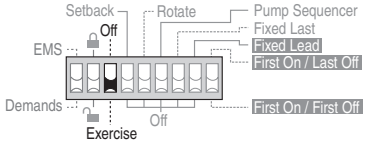
Use this DIP switch to lock and unlock the Access Level of the 274 and all connected tN4 devices, including tN4 thermostats. For details, see "Access Level".

- Once locked, the access level in all devices cannot be viewed or changed.
- When the control is locked, a small segment representing a padlock is shown in the bottom right hand corner of the display (except in View and Time Menu)



Off / Exercise

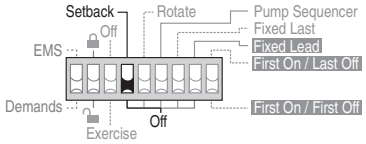
Use the Off / Exercise DIP switch to select whether or not the control is to exercise all pumps, and hydronic zones (zone valves and zone pumps) for 10 seconds every three days of inactivity to prevent seizure.



Setback / Off

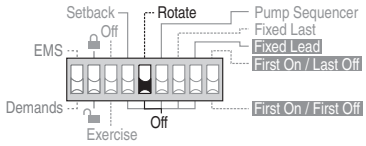
Use the Setback / Off DIP switch to select whether or not the control is to follow a schedule.

- If the 274 is to be a schedule member or schedule master, set the DIP switch to Setback to enable the Time and Schedule menus and the Unocc items in the Adjust menu.
- If the 274 does not follow a schedule, set the DIP switch to Off to disable the Time and Schedule menus and the Unocc items in the Adjust menu.



Rotate / Off

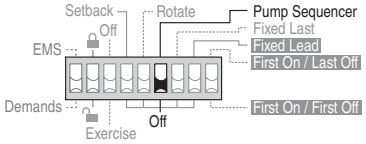
Use the Rotate / Off DIP switch to enable the Equal Run Time Rotation feature. This feature Changes the firing order of the boilers in order to maintain a similar amount of running time on each boiler. If set to Off, the firing sequence if fixed starting with boiler 1 to boiler 4.



Pump Sequencer / Off

Use the Pump Sequencer / Off DIP switch to activate primary pump sequencing. DHW operation is not available when Pump Sequencer is selected.

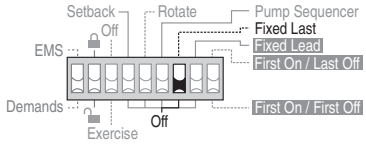
- If set to Pump Sequencer, the control operates primary pumps 1 & 2 in stand-by mode.
- If set to Off, the control operates primary pump 1 and the pump 2 relay is then available for a DHW pump.



Fixed Last / Off

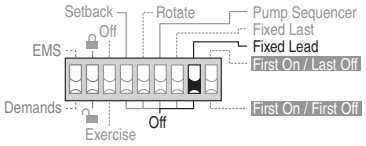
Use the Fixed Last / Off DIP switch to exclude the last boiler in the rotation sequence. This DIP is only active when the Rotate / Off DIP is set to Rotate.

- If set to Fixed Last, the last boiler is always the last to fire.
- Fixed Last will only work for boilers wired to the Relay 4 terminals (13 and 14).



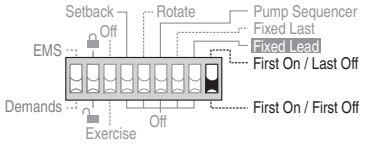
Fixed Lead / Off

- Use the Fixed Lead / Off DIP switch to exclude the first boiler in the rotation sequence. This DIP is only active when the Rotate / Off DIP is set to Rotate.
- If set to Fixed Lead, the first boiler is always the first to fire.
- Fixed Lead will only work for boilers wired to the Relay 1 terminals (7 and 8).



First On / Last Off or First On / First Off.

- The First On / Last Off or First On / First Off DIP switch selects whether the first boiler is the first to fire and the last to shut off or the first to fire and the first to shut off. This DIP switch is only active when the Rotate / Off DIP switch is set to Rotate and the Fixed Lead / Off DIP switch is set to Fixed Lead.



Display Menus

View Menu (1 of 2)

Menu ○ Item ○

The View menu items display the current operating temperatures and status information of the system.

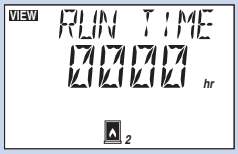
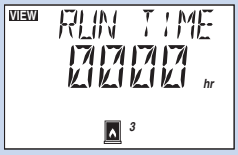
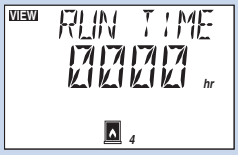
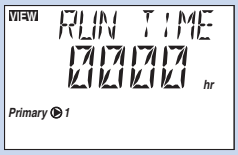
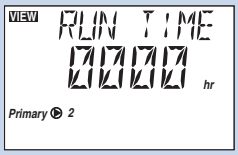
VIEW MENU

Item Field	Range	Access	Description
VIEW OUTDOOR 32 °F	-76 to 149°F (-60.0 to 65.0°C)	USER INST ADV	**OUTDOOR** Current outdoor air temperature as measured by the outdoor sensor. ***Note:*** This item is only available when the EMS/ Demands DIP is set to Demands.
VIEW Bo.1 SUP 180 °F	-22 to 266°F (-30.0 to 130.0°C)	USER INST ADV	**BOILER SUPPLY** Current boiler supply water temperature as measured by the boiler sensor. ***Note:*** This item is not available when DHW Mode is set to 6.
VIEW Bo.1 TARG 180 °F	---, 35 to 230°F (---, 1.5 to 110.0°C)	ADV	**BOILER TARGET** SECTION C The boiler target is the temperature the control is currently trying to maintain at the boiler supply sensor. "---" is displayed when no heat is required. ***Note:*** This item is not available when DHW Mode is set to 6.
VIEW DHW TARG -- -- -- -- Occ	---, 35 to 230°F (---, 1.5 to 110.0°C)	ADV	**DHW EXCHANGE TARGET** SECTION C The DHW exchange target is the temperature the control is currently trying to maintain at the DHW Exchange Supply Sensor. "---" is displayed when no heat is required. ***Note:*** This item is only available when DHW Mode is set to 5 or 6.
VIEW DHW 135 °F	-22 to 266°F (-30.0 to 130.0°C)	USER INST ADV	**DHW** SECTION E Current DHW tank temperature as measured by the DHW sensor. ***Note:*** This item is only available if Pump Sequencing DIP is set to Off AND either DHW Sensor is set to On or DHW Mode is set to 6.
VIEW Bo.1 RET 160 °F	-22 to 266°F (-30.0 to 130.0°C)	ADV	**BOILER RETURN** Current boiler return water temperature as measured by the boiler return sensor. ***Note:*** This item is only available if DHW Sensor is set to Off AND a Boiler Return sensor is present.
VIEW Bo.1 ΔT 20 °F	0 to 252°F (-18.0 to 122.5°C)	ADV	**BOILER ΔT** Current temperature difference between the boiler supply and boiler return sensors. ***Note:*** This item is only available if DHW Sensor is set to Off AND a Boiler Return sensor is present.
VIEW RUN TIME 000000 hr 1	0 to 9999 hours	ADV	**BOILER 1 RUNNING TIME** SECTION C The total running time of Boiler 1 since this item was last cleared. To clear this item, press the Up and Down buttons simultaneously while viewing this item. ***Note:*** This item is only available when Boiler 1 is set to Auto.

Continued on next page.

View Menu (2 of 2)

VIEW MENU

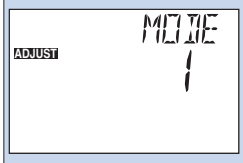
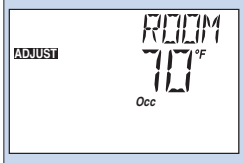
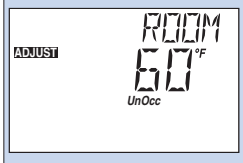
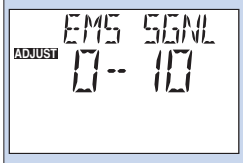
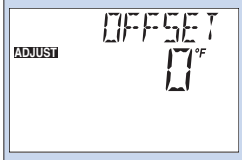
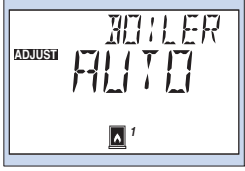
Item Field	Range	Access	Description
	0 to 9999 hours	**ADV**	**BOILER 2 RUNNING TIME** SECTION C The total running time of Boiler 2 since this item was last cleared. To clear this item, press the Up and Down buttons simultaneously while viewing this item. ***Note:*** This item is only available when Boiler 2 is set to Auto.
	0 to 9999 hours	**ADV**	**BOILER 3 RUNNING TIME** SECTION C The total running time of Boiler 3 since this item was last cleared. To clear this item, press the Up and Down buttons simultaneously while viewing this item. ***Note:*** This item is only available when Boiler 3 is set to Auto.
	0 to 9999 hours	**ADV**	**BOILER 4 RUNNING TIME** SECTION C The total running time of Boiler 4 since this item was last cleared. To clear this item, press the Up and Down buttons simultaneously while viewing this item. ***Note:*** This item is only available when Boiler 4 is set to Auto.
	0 to 9999 hours	**ADV**	**PRIMARY PUMP 1 RUNNING TIME** SECTION H The total running time of Pump 1 since this item was last cleared. To clear this item, press the Up and Down buttons simultaneously while viewing this item.
	0 to 9999 hours	**ADV**	**PUMP 2 RUNNING TIME** SECTION H The total running time of Pump 2 since this item was last cleared. To clear this item, press the Up and Down buttons simultaneously while viewing this item. ***Note:*** This item is only available when the DIP Switch is set to Pump Sequencer.

After the last item, the control returns to the first item in the menu.

Adjust Menu (1 of 6)

The Adjust Menu items are the programmable settings used to operate the mechanical equipment.

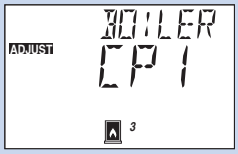
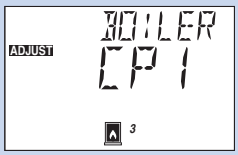
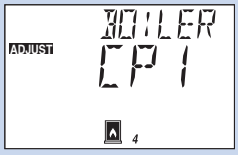
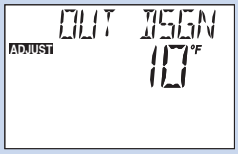
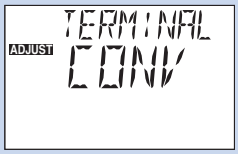
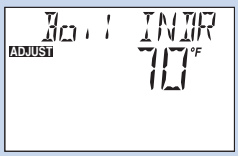
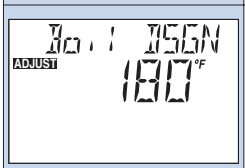
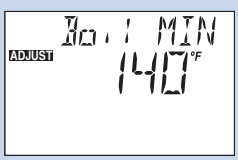
ADJUST MENU

Item Field	Range	Access	Description	Actual Setting
	1 (4 On/Off) 2 (2 On/Off & Pumps) 3 (2 Lo/Hi) 4 (Lo/Hi & Pump) 5 (Three Stage & Pump) 6 (Four Stage)	**ADV**	**MODE** SECTION C Selects the control mode of operation.	
	35 to 100°F (2.0 to 38.0°C) Default = 70°F (21.0°C)	**INST** **ADV**	**ROOM OCCUPIED** SECTION B The desired room air temperature during the occupied period. ***Note:*** This item is only available when DIP is set to Demands AND OUT DSGN is set between -60 to 45°F.	
	35 to 100°F (2.0 to 38.0°C) Default = 70°F (21.0°C)	**INST** **ADV**	**ROOM UNOCCUPIED** SECTION B The desired room air temperature during the unoccupied period. ***Note:*** This item is only available when DIP is set to Demands AND OUT DSGN is set between -60 to 45°F.	
	0-10, 2-10 Default = 0-10	**ADV**	**EMS SIGNAL** SECTION G Selects the range of the Energy Management System input signal. ***Note:*** This item is only available when DIP set to EMS.	
	-10 to 10°F (-5.6 to 5.6°C) Default = 0°F (°C)	**ADV**	**OFFSET** SECTION G Selects the range of the Energy Management System input signal. ***Note:*** This item is only available when DIP set to EMS.	
	OFF, 0:20 to 8:00 hr (5 minute increments) Default = OFF)	**ADV**	**BOOST** SECTION L The maximum amount of morning boost when changing from the unoccupied to the occupied period. ***Note:*** This item is only available when DIP is set to Demands AND DIP is set to Setback.	
	Au (Auto), OFF Default = Au	**INST** **ADV**	**BOILER 1** SECTION C Selects Whether Boiler 1 is operational or not.	

Continued on next page.

Adjust Menu (2 of 6)

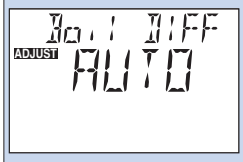
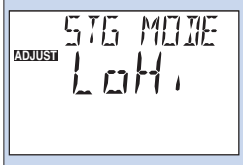
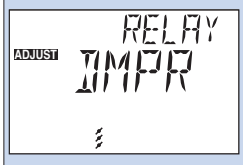
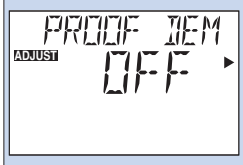
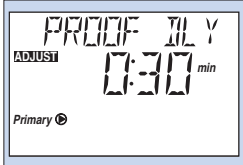
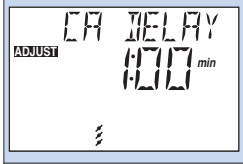
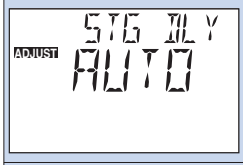
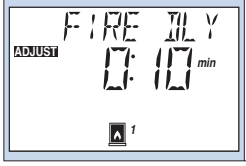
ADJUST MENU

Item Field	Range	Access	Description	Actual Setting
	CP1, Au (Auto), OFF Default = Au	**INST** **ADV**	**BOILER 2** SECTION C Selects Whether Boiler 2 is operational or not. CP1 copies the settings of boiler 1 to boiler 2.	
	CP1, Au (Auto), OFF Default = Au	**INST** **ADV**	**BOILER 3** SECTION C Selects whether Boiler 3 is operational or not. CP1 copies the settings of boiler 1 to boiler 3.	
	CP1, Au (Auto), OFF Default = Au	**INST** **ADV**	**BOILER 4** SECTION C Selects whether Boiler 4 is operational or not.CP1 copies the settings of boiler 1 to boiler 4.	
	OFF, -60 to 45°F (OFF, -51 to 7.0°C) Default = 10°F (-12°C)	**INST** **ADV**	**OUTDOOR DESIGN** SECTION B The design outdoor air temperature used in the heat loss calculations for the heating system. Typically set to the outdoor temperature of the coldest day of the year.	
	HRF1 HRF2 COIL CONV RAD BASE Default = CONV	**INST** **ADV**	**TERMINAL** SECTION B The type of heating terminal units that are being used. ***Note:*** This item is only available when the DIP is set to Demands AND OUT DSGN is set between -60 to 45°F.	
	35 to 100°F (2.0 to 38.0°C) Default = 70°F (21.0°C)	**ADV**	**BOILER INDOOR** SECTION B The design indoor air temperature used in the heat loss calculation for the boiler zones. Typically set to 70°F (21.0°C). ***Note:*** This item is only available when the DIP is set to Demands AND OUT DSGN is set between -60 to 45°F.	
	70 to 220°F (21.0 to 104.5°C) Default = 180°F (82.0°C)	**ADV**	**BOILER DESIGN** SECTION B The supply water temperature required for boiler zones on the typical coldest day of the year. ***Note:*** This item is only available when the DIP is set to Demands AND OUT DSGN is set between -60 to 45°F.	
	OFF, 80 to 180°F (OFF, 26.5 to 82.0°C) Default = 140°F (60.0°C)	**ADV**	**BOIL MINIMUM** SECTION C The minimum allowed boiler target temperature and boiler return protection temperature. Check the boiler manufacturer's manual for recommend supply water temperatures.	
	90 to 225°F, OFF (32.0 to 107.0°C, OFF) Default = 200°F (93.5°C)	**ADV**	**BOILER MAXIMUM** SECTION C The maximum boiler target supply temperature for heat, setpoint and DHW demands. Set below the high limit setting on the boiler.	

Continued on next page.

Adjust Menu (3 of 6)

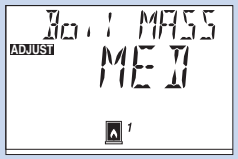
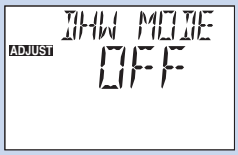
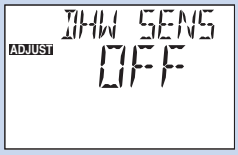
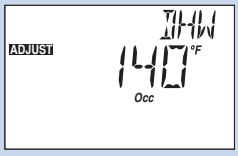
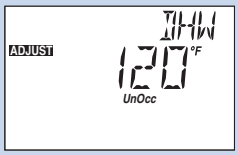
ADJUST MENU

Item Field	Range	Access	Description	Actual Setting
	Au (Auto), 2 to 42°F (Au, 1 to 23.5°C) Default = Au	**ADV**	**BOILER DIFFERENTIAL** SECTION C The temperature differential that the control is to use to cycle the boiler On and Off (half above and half below target).	
	LoHi or LoLo Default = LoHi	**ADV**	**BOILER STAGE MODE** SECTION C Selects the firing sequence of the stages when using multi-stage boilers. ***Note:*** Only available in Mode 3.	
	DMPR 'Damper', ALRT 'Alert' Default = DMPR	**ADV**	**RELAY** SECTION D Selects the operation of the relay to be either combustion air or alert.	
	OFF, Flow Proof (FP), Combustion Air (CA) Default = OFF	**ADV**	**PROOF DEMAND** SECTION D Selects the operation of the Proof Demand to be either off, flow proof, or combustion air damper. ***Note:*** C.A. only available if RELAY is set to DMPR.	
	0:10 to 3:00 minutes Default = 0:30 (pump)	**ADV**	**PUMP PROOF DEMAND DELAY** SECTION D The time allowed for the control to receive a proof demand once the primary pump turns on. ***Note:*** Only available when PROOF DEMAND is set to F P.	
	0:10 to 3:00 minutes Default = 1:00 (damper)	**ADV**	**CA PROOF DEMAND DELAY** SECTION D The time allowed for the control to receive a proof demand once the C.A. contact turns on. ***Note:*** Only available if RELAY is set to DMPR AND Proof Demand is set to C A.	
	0:00 to 3:00 minutes Default = 1:00	**ADV**	**DAMPER DELAY** SECTION D The time delay for the boiler to operate once the combustion air damper relay closes. ***Note:*** Only available if RELAY is set to DMPR AND Proof Demand is set to OFF or FP.	
	Au (Auto), 0:30 to 40:00 minutes Default = Au	**ADV**	**STAGE DELAY** SECTION C The minimum delay between the operation of stages. ***Note:*** This item is only available when at least two boilers are set to Au.	
	0:00 to 3:00 minutes Default = 0:10	**ADV**	**BOILER 1 FIRE DELAY** SECTION C Delay from turn-on of ignition until the burner fires. ***Note:*** This item is only available when Boiler 1 is set to Au.	

Continued on next page.

Adjust Menu (4 of 6)

ADJUST MENU

Item Field	Range	Access	Description	Actual Setting
	Lo, Med, Hi Default = Med	**INST** **ADV**	**BOILER 1 MASS** SECTION C The thermal mass characteristics of the boiler. ***Note:*** This item is only available when Boiler 1 is set to Au.	
	OFF, 0:10 to 19:55 minutes Default = 0:20 min	**ADV**	**BOILER PUMP 1 PURGE** SECTION H The time the boiler pump remains on once the boiler is turned off. ***Note:*** This item is only available when Boiler 1 = Au and Mode = 2, 4 or 5.	
Note: The previous 2 menu items will repeat for up to four boilers that are set to Au.				
	AUTO, 5 to 30 minutes Default = Auto	**ADV**	**CYCLE LENGTH** SECTION M The cycle length to which all tN4 devices will synchronize. ***Note:*** This item is only available when a tN4 device is present.	
	OFF, 1 (parallel, no priority) 2 (parallel, priority) 3 (pri-sec, no priority) 4 (pri-sec, priority) 5 (parallel with last boiler, priority) 6 (dedicated DHW) Default = OFF	**ADV**	**DHW MODE** SECTION E This determines the operation of the primary pump in combination with the DHW pump and whether or not DHW priority is required. ***Note:*** This item is only available when the Pump Sequencing DIP is set to Off. DHW Mode 5 is only available if Mode = 2.	
	OFF, ON Default = OFF	**ADV**	**DHW SENSOR** SECTION E Selects if a DHW sensor is to be used for DHW generation. ***Note:*** This item is only available when the Pump Sequencing DIP is to Off AND DHW Mode is set to either 1, 2, 3 or 4.	
	OFF, 70 to 190°F (OFF, 21.0 to 87.5°C) Default = 140°F (60.0°C)	**INST** **ADV**	**DHW OCCUPIED** SECTION E The temperature of the DHW tank during the Wake and Occupied periods. ***Note:*** This item is only available when the DHW Mode is set to either 1, 2, 3, 4 or 6 AND the DHW Sensor is set to On AND the Pump Sequencing DIP is set to Off.	
	OFF, 70 to 190°F (OFF, 21.0 to 87.5°C) Default = 120°F (49.0°C)	**ADV**	**DHW UNOCCUPIED** SECTION E The temperature of the DHW tank during the Sleep and Unoccupied periods. ***Note:*** This item is only available when the DHW Mode is set to either 1, 2, 3, 4 or 6 AND the DHW Sensor is set to On AND the Pump Sequencing DIP is set to Off, AND the Setback DIP = Setback.	

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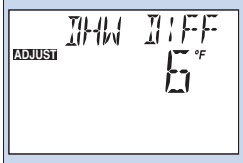
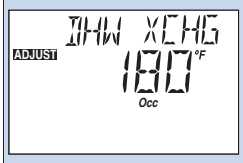
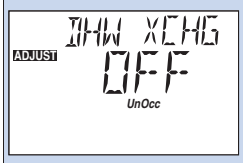
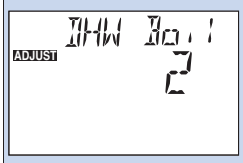
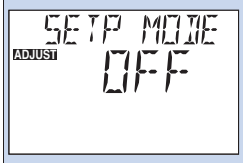
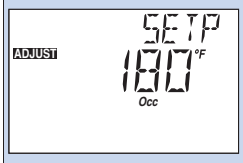
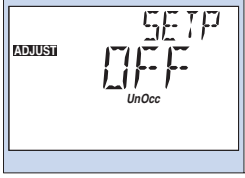
Adjust Menu (5 of 6)

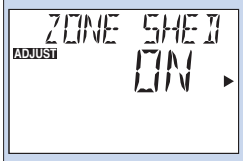
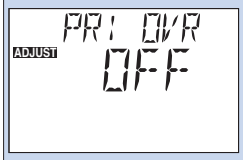
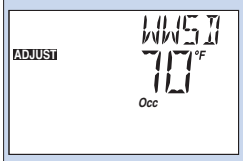
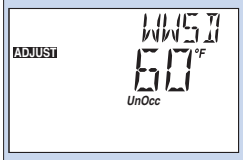
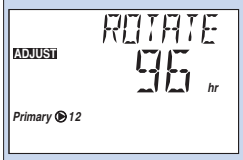
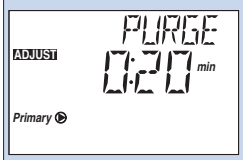
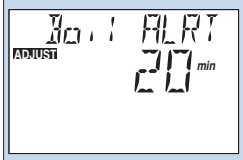
ADJUST MENU

Item Field	Range	Access	Description	Actual Setting
	1 to 42°F (0.5 to 23.5°C) Default = 6°F (3.0°C)	ADV	**DHW DIFFERENTIAL** SECTION E The temperature differential (swing up and down) of the DHW tank from the DHW setting. ***Note:*** This item is only available when DHW Mode is set to either 1, 2, 3, 4 or 6 AND the DHW Sensor is set to On, AND the Pump Sequencing DIP is set to Off.	
	OFF, 100 to 220°F (38.0 to 104.5°C) Default = 180°F (82.0°C)	ADV	**DHW EXCHANGE OCCUPIED** SECTION E The boiler supply temperature to the DHW heat exchanger during the Occupied and Wake periods. ***Note:*** This item is only available when DHW Mode is set to 1,2,3,4 or 5, AND the DHW Sensor is set to OFF, AND the Pump Sequencing DIP is set to OFF.	
	OFF, On Default = OFF	ADV	**DHW EXCHANGE UNOCCUPIED** SECTION E Selects whether the control should respond to DHW Demands during the Sleep and Unoccupied periods. ***Note:*** This item is only available when DHW Mode is set to 1,2,3,4 or 5, AND the DHW Sensor is set to OFF, AND the Pump Sequencing DIP is set to OFF AND the Setback DIP is set to Setback.	
	1, 2, 3, 4 Default = 2	ADV	**DHW BOILER** SECTION E The number of boilers used for indirect DHW generation. ***Note:*** This item is only available when DHW Mode is set to either 1,2,3,or 4 AND the Pump Sequencing DIP is set to Off.	
	OFF, 1 (parallel, no priority) 2 (parallel, priority) 3 (pri-sec, no priority) 4 (pri-sec, priority) Default = 1)	ADV	**SETPOINT MODE** SECTION F Selects the Setpoint mode of operation. This determines the operation of the primary pump and whether or not priority is required. ***Note:*** This item is only available when DHW Mode is set to OFF.	
	OFF, 60 to 220°F (15.5 to 104.5°C) Default = 180°F (82°C)	ADV	**SETPOINT OCCUPIED** SECTION F The minimum boiler target temperature when a Setpoint Demand is present during the Wake and Occupied periods. ***Note:*** This item is only available when DHW Mode is set to OFF.	
	OFF, ON Default = OFF	ADV	**SETPOINT UNOCCUPIED** SECTION F Selects whether the control should respond to Setpoint demands while in unoccupied mode. ***Note:*** This item is only available when DHW Mode is set to OFF, and Setback DIP is set to On.	

Continued on next page.

Adjust Menu (6 of 6)

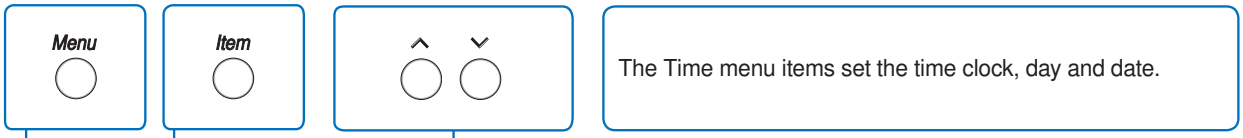
ADJUST MENU

Item Field	Range	Access	Description	Actual Setting
	OFF, On Default = OFF	**ADV**	**ZONE LOAD SHEDDING** SECTION M Selects whether Zone Load Shedding is active or not. ***Note:*** This item is only available when a tN4 device is present and Boil Min is set between 80 to 180°F (26.5 to 82.0°C).	
	OFF, AUTO, 0:20 to 4:00 hours Default = OFF	**ADV**	**PRIORITY OVERRIDE** SECTION E & F The amount of time priority is given for DHW or Setpoint operation before space heating resumes. ***Note:*** This item is only available when DHW Mode is set to either 2,4,or 5, OR Setpoint mode is set to either 2,or 4.	
	35 to 100°F, OFF (2.0 to 38.0°C, OFF) Default = 70°F (21.0°C)	**INST** **ADV**	**WWSD OCCUPIED** SECTION B The system's warm weather shut down temperature during the Wake and Occupied periods. The WWSD applies to the space heating loads only. It does not affect DHW or Setpoint heating loads. ***Note:*** This item is only available when the DIP is set to Demands.	
	35 to 100°F, OFF (2.0 to 38.0°C, OFF) Default = 60°F (15.5°C)	**ADV**	**WWSD UNOCCUPIED** SECTION B The system's warm weather shut down temperature during the Sleep and Unoccupied period. ***Note:*** This item is only available when the DIP is set Demands and the DIP is set to Setback.	
	12 to 180 hours, OFF Default = 96 hours	**ADV**	**ROTATE PRIMARY PUMPS** SECTION H Sets the frequency of rotation of the primary pumps. ***Note:*** This item is only available when the DIP is set to Pump Sequencer.	
	OFF, 0:10 to 19:55 minutes Default = 0:20 min	**ADV**	**PURGE PRIMARY PUMP** SECTION H Time the primary pump remains on once the demand is removed to purge heat from the boiler.	
	OFF, 3 to 40 minutes Default = 20 minutes	**ADV**	**BOILER ALERT** SECTION D Alert signal if boiler supply does not increase in temperature within the selected time. ***Note:*** This item is only available when RELAY is set to ALRT.	

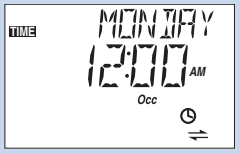
After the last item, the control returns to the first item in the menu.

Time Menu (1 of 2)

Note: The Setback / Off switch setting must be in the Setback position in order to have access to the TIME menu.



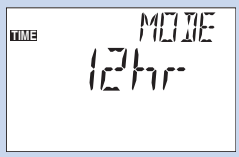
TIME MENU

Item Field	Range	Access	Description
	Default = MONDAY 12:00 AM	USER INST ADV	**CURRENT TIME AND DAY** SECTION J Displays the current time and day of the week. The time and date flash if the time is not set.
	Default = JAN 01 2005	USER INST ADV	**CURRENT DATE** SECTION J Display the current month, day, and year. Use this date to determine daylight savings time. ***Note:*** This item is only available when Daylight Savings Time (DST) is set to On.
	12:00 to :59 Default = 12:00 AM	USER INST ADV	**CLOCK MINUTES** SECTION J Set the minutes.
	12:00 AM to 11:59 PM or 00:00 to 23:59 Default = 12:00 AM	USER INST ADV	**CLOCK HOURS** SECTION J Set the hours.
	SUNDAY ... WEDNESDAY ... SATURDAY Default = SUNDAY	USER INST ADV	**DAY OF THE WEEK** SECTION J Set the day of the week.
	OFF, DST1, DST2 Default = OFF	INST ADV	**DAYLIGHT SAVINGS TIME** SECTION J Selects whether to use Daylight Savings Time. The time is automatically adjusted if set to Mode 1 or 2. ***Note:*** See page 17 for a description of DST Modes.
	JAN, FEB, MAR ... DEC Default = JAN	INST ADV	**MONTH** SECTION J Set the current month of the year. ***Note:*** This item is only available when Daylight Savings Time is set to Mode 1 or 2.
	01 ... 31 (number of days is dependent on month) Default = 01	INST ADV	**DAY OF THE MONTH** SECTION J Set the day of the month. ***Note:*** This item is only available when Daylight Savings Time is set to Mode 1 or 2.

Continued on next page.

Time Menu (2 of 2)

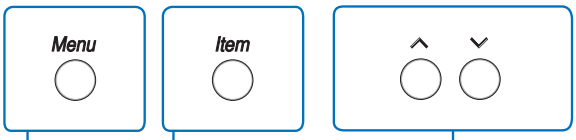
TIME MENU

Item Field	Range	Access	Description
	2000 ... 2255 Default = 2005	INST ADV	**YEAR** SECTION J Set the current year. ***Note:*** This item is only available when Daylight Savings Time is set to Mode 1 or 2.
	12 hr OR 24 hr Default = 12 hr	INST ADV	**MODE** SECTION J Select whether time should be displayed using a 12 or a 24 hour clock.

After the last item, the control returns to the first item in the menu.

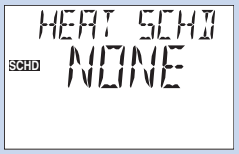
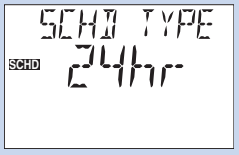
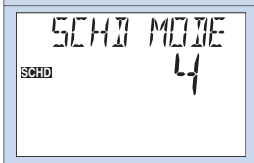
Schedule Menu (1 of 3)

Note: The Setback / Off switch setting must be in the Setback position in order to have access to the SCHEDULE menu.



The Schedule menu items set the schedule type, the number of events per day, and the event times.

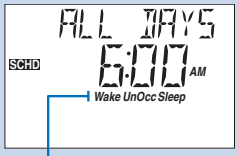
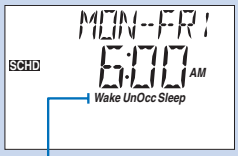
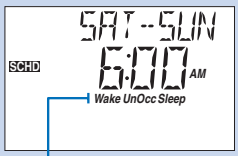
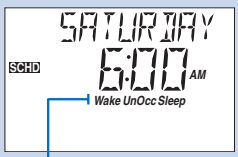
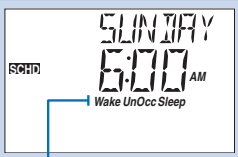
SCHEDULE MENU

Item Field	Range	Access	Description
	NONE, CTRL, MST1, MST2, MST3, MST4, MBR1, MBR2, MBR3, MBR4 Default = NONE	USER INST ADV	**HEAT SCHEDULE** SECTION K If a schedule is not required, select NONE. If the schedule is only used by this control, select CTRL. If the schedule is shared with other tN4 devices, select MST1 to MST4. If the schedule is set on another tN4 device, select MBR1 to MBR4. ***Note:*** This item is only available if the Setback DIP is set to On and a tN4 device is present.
	24 hr, 5-11, 5-2, 7DAY Default = 24 hr	USER INST ADV	**SCHEDULE TYPE** SECTION K Select the type of schedule. ***Note:*** This item is only available when the Heat Schedule is set to MST1 through MST4 AND the Setback DIP is set to On.
	2 (Occ, UnOcc), 4 (Wake, UnOcc, Occ, Sleep) Default = 4	USER INST ADV	**SCHEDULE MODE** SECTION K Select the number of events per day. ***Note:*** This item is only available when the Heat Schedule is set to CTRL, or MST1 through MST4 AND the Setback DIP is set to On.

Continued on next page.

Schedule Menu (2 of 3)

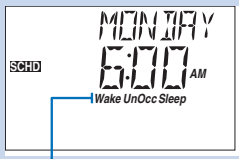
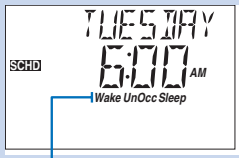
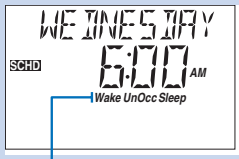
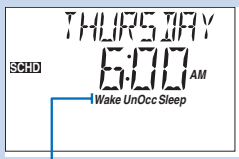
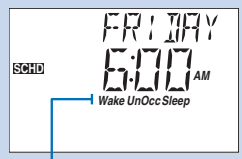
SCHEDULE MENU

Item Field	Range	Access	Description
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**ALL DAYS OF THE WEEK** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set to On AND the Schedule Type is set to 24 hr.
Wake	Default = 6:00 AM		
UnOccupied	Default = 8:00 AM		
Occupied	Default = 6:00 PM		
Sleep	Default = 10:00 PM		
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**MONDAY THROUGH FRIDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set to On AND the Schedule Type is set to 5-2 or 5-11.
Wake	Default = 6:00 AM		
UnOccupied	Default = 8:00 AM		
Occupied	Default = 6:00 PM		
Sleep	Default = 10:00 PM		
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**SATURDAY AND SUNDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set to On AND the Schedule Type is set to 5-2.
Wake	Default = 6:00 AM		
UnOccupied	Default = 8:00 AM		
Occupied	Default = 6:00 PM		
Sleep	Default = 10:00 PM		
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**SATURDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set to On AND the Schedule Type is set to 5-11 or 7 Day.
Wake	Default = 6:00 AM		
UnOccupied	Default = 8:00 AM		
Occupied	Default = 6:00 PM		
Sleep	Default = 10:00 PM		
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**SUNDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set to On AND the Schedule Type is set to 5-11 or 7 Day.
Wake	Default = 6:00 AM		
UnOccupied	Default = 8:00 AM		
Occupied	Default = 6:00 PM		
Sleep	Default = 10:00 PM		

Continued on next page.

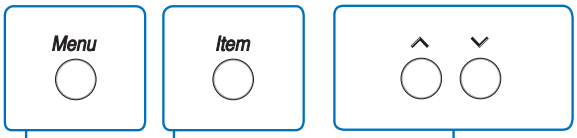
Schedule Menu (3 of 3)

SCHEDULE MENU

Item Field	Range	Access	Description
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**MONDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set On AND the Schedule Type is set to 7 Day.
→ *Wake*	Default = 6:00 AM		
→ *UnOccupied*	Default = 8:00 AM		
→ *Occupied*	Default = 6:00 PM		
→ *Sleep*	Default = 10:00 PM		
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**TUESDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set On AND the Schedule Type is set to 7 Day.
→ *Wake*	Default = 6:00 AM		
→ *UnOccupied*	Default = 8:00 AM		
→ *Occupied*	Default = 6:00 PM		
→ *Sleep*	Default = 10:00 PM		
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**WEDNESDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set On AND the Schedule Type is set to 7 Day.
→ *Wake*	Default = 6:00 AM		
→ *UnOccupied*	Default = 8:00 AM		
→ *Occupied*	Default = 6:00 PM		
→ *Sleep*	Default = 10:00 PM		
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**THURSDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set On AND the Schedule Type is set to 7 Day.
→ *Wake*	Default = 6:00 AM		
→ *UnOccupied*	Default = 8:00 AM		
→ *Occupied*	Default = 6:00 PM		
→ *Sleep*	Default = 10:00 PM		
	– –:– – to 11:50 PM or – –:– – to 23:50	USER INST ADV	**FRIDAY** SECTION K Select the times for the scheduled events. ***Note:*** This item is only available when the Heat Schedule is set to CTRL or MST1 to MST4 AND the Setback DIP is set On AND the Schedule Type is set to 7 Day.
→ *Wake*	Default = 6:00 AM		
→ *UnOccupied*	Default = 8:00 AM		
→ *Occupied*	Default = 6:00 PM		
→ *Sleep*	Default = 10:00 PM		

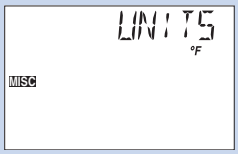
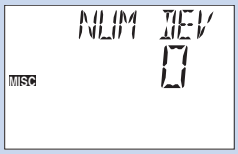
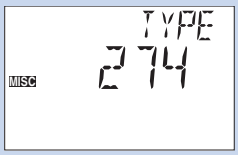
After the last item, the control returns to the first item in the menu.

Misc (Miscellaneous) Menu (1 of 1)



The Miscellaneous menu items set display and control options such as access level and temperature units.

MISC MENU

Item Field	Range	Access	Description
	USER, INST, ADV Default = INST	**USER** **INST** **ADV**	**ACCESS LEVEL** PAGE 4 The access level of the control. The access column shows which items are visible in each access level. ***Note:*** This item is only available when the Lock / Unlock DIP switch on the control is set to Unlock.
	°F, °C Default = °F	**USER** **INST** **ADV**	**UNITS** Select Fahrenheit or Celsius as the temperature units.
	1 to 24	**ADV**	**NUMBER OF DEVICES** SECTION M Number of tN4 devices connected to this tN4 bus.
	OFF, SEL Default = OFF	**ADV**	**DEFAULT** Press and hold the up and down buttons for 1 second to display DEFAULT SEL and load the default settings.
	274, Software Version	**USER** **INST** **ADV**	**TYPE** Product number of this control. Hold the Up button to view the software version.

After the last item, the control returns to the first item in the menu.

Testing the Control

The control has a built-in test routine that tests the main control functions. The control continually monitors the sensors and displays an error message whenever a fault is found. The individual outputs and relays are tested using a test sequence.

Test Sequence

Each step in the test sequence lasts 10 seconds.

- Start the test sequence by pressing the Test button.
- Pause the test sequence by pressing the Test button again. To advance to the next step, press the Test button again.
- If the test sequence is paused for more than five minutes, the control exits the entire test routine.
- To advance to a particular step, repeatedly press and release the Test button to display the appropriate device.

⚠ HAZARD

Access to the Test button requires the removal of the front cover and exposes hazardous voltage while the control is powered. Only trained, qualified and competent personnel should operate the Test button.

Step 1 IF the RELAY item is set to 'Damper' or 'Alert' the C.A. / Alert relay is closed.

IF the RELAY item is set to 'Alert', the C.A. / Alert relay is opened after 10 seconds.

Step 2 The Primary Pump 1 relay is closed.

IF Pump Sequencer DIP = On, the Primary Pump 1 relay is opened after 10 seconds.

IF Pump Sequencer DIP = On

Step 3 The Primary Pump 2 relay is closed.

IF Boiler 1 = Auto

(repeat for each boiler set to Auto or CP1)

Step 4 If mode indicates that a boiler pump is used, the boiler pump is turned on a remains on. Next, the first stage of the boiler is turned on and remains on. If a second stage is present, the second stage is turned on and remains on. If a third stage is present, the third stage is turned on and remains on. If a fourth stage is present, the fourth stage is turned on and remains on. After ten seconds all stages and the boiler pump are turned off.

Step 7 The DHW relay is closed.
The C.A. / Alert relay is opened.
The primary pump is turned off.
The control exits the test sequence.

If a device fails to operate during the test sequence, refer to the installation section of this brochure to check the operation of the control. If the control works properly, refer to any troubleshooting information supplied by the equipment manufacturer.

Max Heat

The control has a function called Max Heat. As long as there is a demand for heat the control operates in this mode for up to 24 hours or until the Test button is pressed. tN4 devices operate to meet their occupied setting +5°F (3°C) and display the MAX segment to indicate the Max Heat mode. Use this mode to run the circulators during system start-up to purge air from the piping.

- When a boiler demand is present the control targets Boiler Maximum. If Boiler Minimum = Off, the control then targets Boiler Design. This allows the Boiler Maximum setting to be set higher for DHW generation.
- When a DHW demand is present the control targets the lower of Boiler Maximum or DHW Exchange.
- The Boil Maximum setting and DHW Exchange setting are always available in the Adjust Menu when in Max Heat. The Boiler Design setting is also available in the Adjust Menu when in Max Heat and the Boiler Minimum is set to Off.
- DHW priority and WWSD are disabled.

To enable Max Heat:

Press and hold the Test button for more than 3 seconds and less than 6 seconds and the test LED will begin to flash rapidly. MAX HEAT and TEST are displayed on screen. No outputs are turned on until there is a demand for heat present.

To Cancel Max Heat:

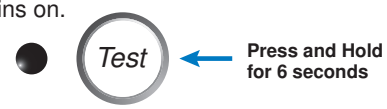
Press the Test button to cancel Max Heat manually or wait 24 hours and the control will automatically leave the Max Heat mode.

Zone Test

In Zone Test mode, each tN4 device can be individually turned on one at a time. The control tests each zone for up to 5 minutes of no button activity. Use this feature to purge air out of each zone and assist in troubleshooting. No items are available in the user interface of the control.

To Enable Zone Test:

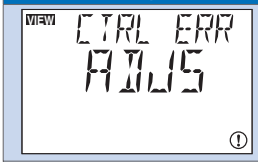
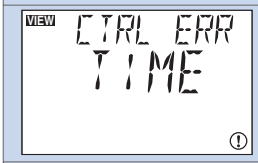
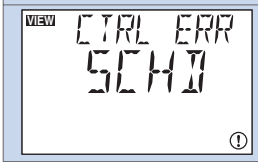
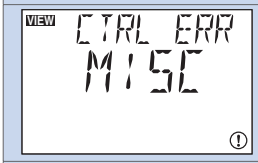
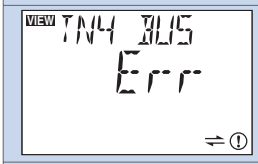
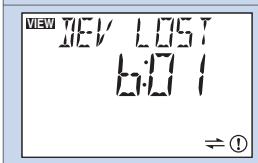
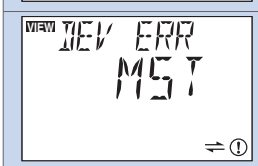
1. Press and hold the Test button for more than 6 seconds. The control displays ZONE TEST OFF and the Test LED remains on.



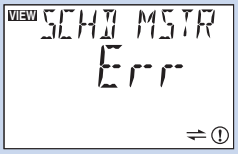
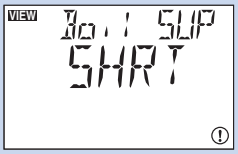
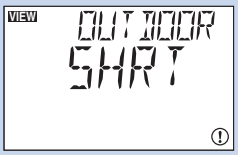
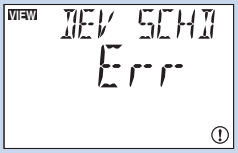
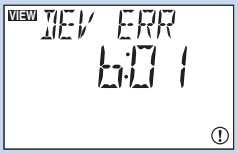
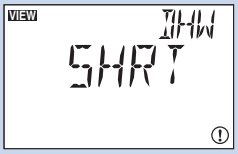
2. Press the Up button to change the display to ZONE TEST ON. After 3 seconds, the boiler and all pumps are shut off.
3. The control operates stage one of the tN4 device with the lowest address number. Device number one (b:01) has the lowest address number and device 24 (b:24) has the highest address number. All other tN4 zones are shut off.
4. Pressing the Up button will turn off stage 1, and turn on stage 2 of the same device (if that device has a second stage) or turn on stage 1 of the device with the next lowest address. The Down button can be pressed to move to a device with a lower address number. The second stage of a two stage zone is indicated with a small 2 in the display.
5. The Up and Down buttons can then be used to move through the devices and the heating stages of each device on the boiler bus.

To cancel the Zone Test press the Test button. Once the Zone Test ends or is cancelled, the control resumes normal operation.

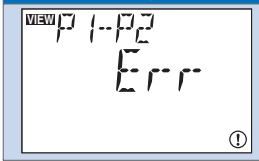
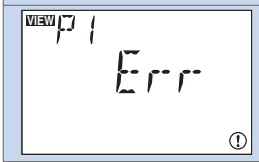
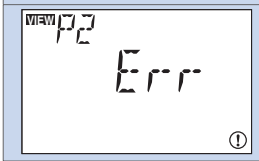
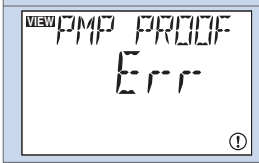
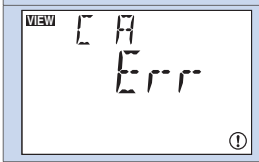
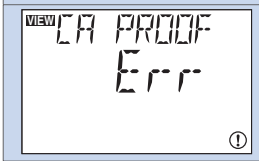
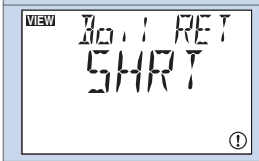
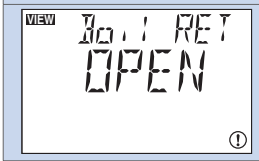
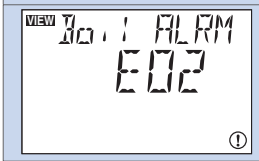
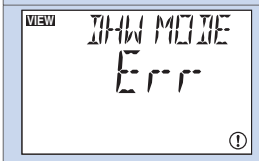
Error Messages (1 of 3)

Error Message	Description
	**CONTROL ERROR ADJUST** The control failed to read the Adjust Menu settings, and reloaded the factory default settings. Operation stops until you check all the Adjust Menu settings. ***Note:*** To clear the error, the access level must be set to Advanced and the settings in the Adjust menu must be checked.
	**CONTROL ERROR TIME** The control failed to read the Time Menu settings, and reloaded the factory default settings. Operation continues normally. ***Note:*** To clear the error, the access level must be set to Advanced and the settings in the Time menu must be checked.
	**CONTROL ERROR SCHEDULE** The control failed to read the Schedule Menu settings, and reloaded the factory default settings. Operation continues normally. ***Note:*** To clear the error, the access level must be set to Advanced and the settings in the Schedule menu must be checked.
	**CONTROL ERROR MISCELLANEOUS** The control failed to read the Miscellaneous Menu settings, and reloaded the factory default settings. Operation continues normally. ***Note:*** To clear the error, the access level must be set to Advanced and the settings in the Miscellaneous menu must be checked.
	**TN4 BUS ERROR** Communication has been lost on the Boiler Bus due to a short or open circuit. Check the tN4, C and R wires for each tN4 device. Check the polarity of the C and R wires. Check for loose or broken wires. Press and hold the up and down arrow buttons together for 5 seconds to manually clear error.
	**DEVICE LOST** Communication is lost to a tN4 device on the Boiler Bus. The number shown is the address of the lost device. The LCD on the lost device displays Bus Boil OPn. Ensure that there is power to the lost device. Trace the wires from the control to the lost device looking for loose or damaged wires. The error message self clears when the error condition is corrected. ***Note:*** If you deliberately remove a tN4 device, hold the Up and Down buttons to clear the error.
	**MASTER DEVICE ERROR** More than one tN4 System control has been detected on the tN4 bus. This generally indicates that two tN4 buses are wired together. Check the tN4 bus wiring. The error message clears once the error condition is corrected.

Error Messages (2 of 3)

Error Message	Description
	**SCHEDULE MASTER ERROR** More than one tN4 device has been assigned the same master number.
	**BOILER SUPPLY SENSOR SHORT CIRCUIT** Due to a short circuit, the control failed to read the boiler supply sensor. When there is a call for heat, the control no longer controls the boiler(s). Instead, the control provides a boiler enable to the boiler's aquastat or boiler control until the sensor is repaired. The control will not operate the boiler contact if the Boil Minimum setting is less than 100°F (38.0°C). Locate and repair the problem as described in the Data Brochure D 070. The error message self clears once the error condition is corrected.
	**BOILER SUPPLY SENSOR OPEN CIRCUIT** Due to an open circuit, the control failed to read the boiler supply sensor. The control no longer controls the boiler. Instead, the control provides a boiler enable to the boiler's aquastat or boiler control until the sensor is repaired. The control will not operate the boiler contact if the Boil Minimum setting is less than 100°F (38.0°C). Locate and repair the problem as described in the Data Brochure D 070. The error message self clears once the error condition is corrected ***Note:*** If you deliberately remove the boiler supply sensor, power down for 10 seconds then restart the control.
	**OUTDOOR SENSOR SHORT CIRCUIT** Due to a short circuit, the control failed to read the outdoor sensor. As a result, the control assumes an outdoor temperature of 32°F (0.0°C) and continues operation. Locate and repair the problem as described in the Data Brochure D 070. The error message self clears once the error condition is corrected.
	**OUTDOOR SENSOR OPEN CIRCUIT** Due to an open circuit, the control failed to read the outdoor sensor. As a result, the control assumes an outdoor temperature of 32°F (0.0°C) and continues operation. Locate and repair the problem as described in the Data Brochure D 070. The error message self clears once the error condition is corrected.
	**DEVICE SCHEDULE ERROR** The selected system schedule is no longer available. Either the system schedule master is no longer connected to the network or the system schedule number has been changed on the schedule master. The error message self clears once the error condition is corrected.
	**DEVICE ERROR AT ADDRESS #:##** #.## is the address of the device with the error. The bus number displays before the colon, and the device number display after. Go to the device with the address displayed. Possible Addresses: **b:01** to **b:24** - Device Error on Boiler Bus
	**DHW SHORT CIRCUIT** Due to a short circuit, the control failed to read the DHW sensor. As a result, the control no longer heats the DHW tank. Locate and repair the problem as described in the Data Brochure D 070. DHW tank heating will resume once the sensor problem is corrected. The error message self clears once the error condition is corrected.
	**DHW OPEN CIRCUIT** Due to an open circuit, the control failed to read the DHW sensor. As a result, the control no longer heats the DHW tank. Locate and repair the problem as described in the Data Brochure D 070. DHW tank heating will resume once the sensor problem is corrected. The error message self clears once the error condition is corrected.

Error Messages (3 of 3)

Error Message	Description
	**PRIMARY PUMP P1 & P2 FAILURE** Both the primary pump P1 and P2 have failed.
	**PRIMARY PUMP P1 FAILURE** The primary pump P1 has failed. The *Prim P1* relay closed, but a flow proof demand was not detected before the proof demand delay time elapsed.
	**PRIMARY PUMP P2 FAILURE** The primary pump P2 has failed. The *Prim P2* relay closed, but a flow proof demand was not detected before the proof demand delay time elapsed.
	**PUMP PROOF DEMAND ERROR** The primary pump has been turned off, but the pump proof demand remains after 4 minutes.
	**COMBUSTION AIR DAMPER FAILURE** The combustion air damper has failed. The C.A. relay closed, but the control did not detect a damper proof demand before the proof demand delay time elapsed.
	**DAMPER PROOF DEMAND ERROR** The combustion air damper has been turned off, but the damper proof demand remains after 4 minutes.
	**BOILER RETURN SENSOR SHORT CIRCUIT** Due to an short circuit, the control failed to read the boiler return sensor. The control will continue to operate normally. Locate and repair the problem as described in the Data Brochure D 070. The error message self clears once the error condition is corrected.
	**BOILER RETURN SENSOR OPEN CIRCUIT** Due to an open circuit, the control failed to read the boiler return sensor. The control will continue to operate normally. Locate and repair the problem as described in the Data Brochure D 070. The error message self clears once the error condition is corrected.
	**BOILER ALARM ERROR** The boiler supply temperature did not increase within the boiler alarm time. To reset the alarm, press and hold the up and down buttons for 5 seconds while viewing this error message.
	**DHW ERROR** A DHW sensor and a DHW demand have been applied at the same time. The DHW tank will not be heated until the DHW Demand signal is removed. The error message self clears once the condition is corrected.

Technical Data

Boiler Control 274 *One tN4, Four Stage Boiler & DHW / Setpoint*

Literature	— 274_D, 274_A, D001, D070
Control	— Microprocessor control; This is **not a safety (limit) control**
	— Enclosure A, blue modified PVC plastic
Dimensions	— 6-5/8” H x 7-9/16” W x 2-13/16” D (170 x 193 x 72 mm)
Approvals	— Certified to CSA C22.2 Nº 24-93
Ambient conditions	— Indoor use only, 32 to 122°F (0 to 50°C), < 90% RH non-condensing
Power supply	— 115 V (ac) ±10% 50/60 Hz 7 VA, 1150 VA max
Relays	— 230 V (ac) 5 A 1/3 hp
Demands	— 20 to 260 V (ac) 2 VA
Sensors	— NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892
included:	— Outdoor Sensor 070 and 2 of Universal Sensor 082

Limited Warranty and Product Return Procedure

Limited Warranty ***The liability of tekmar under this warranty is limited. The Purchaser, by taking receipt of any tekmar product (“Product”), acknowledges the terms of the Limited Warranty in effect at the time of such Product sale and acknowledges that it has read and understands same.***

The tekmar Limited Warranty to the Purchaser on the Products sold hereunder is a manufacturer’s pass-through warranty which the Purchaser is authorized to pass through to its customers. Under the Limited Warranty, each tekmar Product is warranted against defects in workmanship and materials if the Product is installed and used in compliance with tekmar’s instructions, ordinary wear and tear excepted. The pass-through warranty period is for a period of twenty-four (24) months from the production date if the Product is not installed during that period, or twelve (12) months from the documented date of installation if installed within twenty-four (24) months from the production date.

The liability of tekmar under the Limited Warranty shall be limited to, at tekmar’s sole discretion: the cost of parts and labor provided by tekmar to repair defects in materials and/or workmanship of the defective product; or to the exchange of the defective product for a warranty replacement product; or to the granting of credit limited to the original cost of the defective product, and such repair, exchange or credit shall be the sole remedy available from tekmar, and, without limiting the foregoing in any way, tekmar is not responsible, in contract, tort or strict product liability, for any other losses, costs, expenses, inconveniences, or damages, whether direct, indirect, special, secondary, incidental or consequential, arising from ownership or use of the product, or from defects in workmanship or materials, including any liability for fundamental breach of contract.

The pass-through Limited Warranty applies only to those defective Products returned to tekmar during the warranty period. This Limited Warranty does not cover the cost of the parts or labor to remove or transport the defective Product, or to reinstall the repaired or replacement Product, all such costs and expenses being subject to Purchaser’s agreement and warranty with its customers.

Any representations or warranties about the Products made by Purchaser to its customers which are different from or in excess of the tekmar Limited Warranty are the Purchaser’s sole responsibility and obligation. Purchaser shall indemnify and hold tekmar harmless from and against any and all claims, liabilities and damages of any kind or nature which arise out of or are related to any such representations or warranties by Purchaser to its customers.

The pass-through Limited Warranty does not apply if the returned Product has been damaged by negligence by persons other than tekmar, accident, fire, Act of God, abuse or misuse; or has been damaged by modifications, alterations or attachments made subsequent to purchase which have not been authorized by tekmar; or if the Product was not installed in compliance with tekmar’s instructions and/or the local codes and ordinances; or if due to defective installation of the Product; or if the Product was not used in compliance with tekmar’s instructions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH THE GOVERNING LAW ALLOWS PARTIES TO CONTRACTUALLY EXCLUDE, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DURABILITY OR DESCRIPTION OF THE PRODUCT, ITS NON-INFRINGEMENT OF ANY RELEVANT PATENTS OR TRADEMARKS, AND ITS COMPLIANCE WITH OR NON-VIOLATION OF ANY APPLICABLE ENVIRONMENTAL, HEALTH OR SAFETY LEGISLATION; THE TERM OF ANY OTHER WARRANTY NOT HEREBY CONTRACTUALLY EXCLUDED IS LIMITED SUCH THAT IT SHALL NOT EXTEND BEYOND TWENTY-FOUR (24) MONTHS FROM THE PRODUCTION DATE, TO THE EXTENT THAT SUCH LIMITATION IS ALLOWED BY THE GOVERNING LAW.

Product Warranty Return Procedure All Products that are believed to have defects in workmanship or materials must be returned, together with a written description of the defect, to the tekmar Representative assigned to the territory in which such Product is located. If tekmar receives an inquiry from someone other than a tekmar Representative, including an inquiry from Purchaser (if not a tekmar Representative) or Purchaser’s customers, regarding a potential warranty claim, tekmar’s sole obligation shall be to provide the address and other contact information regarding the appropriate Representative.

tekmar® Control Systems

tekmar Control Systems Ltd., *A Watts Water Technologies Company*. Head Office: 5100 Silver Star Road, Vernon, B.C. Canada V1B 3K4, 250-545-7749, Fax. 250-545-0650 Web Site: www.tekmarControls.com

All specifications are subject to change without notice.
Printed in Canada. 274_D - 03/17.

Instruction Sheet

SR506-4 Switching Relay

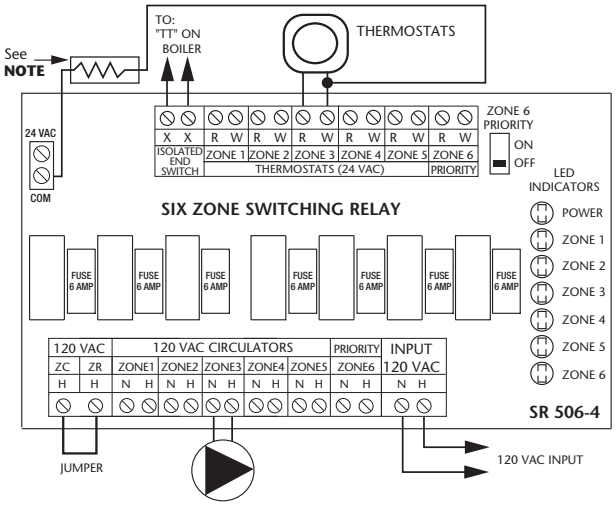
102-383

SUPERSEDES: March 1, 2013

EFFECTIVE: December 20, 2013

Plant ID# 9300-2869

Cold Start Boiler Application:



Operation: When any thermostat calls for heat, the appropriate circulator is energized and the isolated end switch (X and X) will start the boiler.
Priority Operation: When zone 6 is switched to the priority setting and is actuated, all other zones will stop operation until zone 6 is satisfied. When zone 6 is not switched to priority, all zones will operate independently.
Priority Protection Operation: When the priority switch is set to ON, and if the priority zone calls continuously for more than one hour, power is returned to all the other zones, allowing each zone to function independently. Once the priority zone is satisfied, the control's auto-reset is activated and the priority zone is again allowed to have priority for up to one hour starting from when it calls next.
Jumper Placement: The jumper should be placed between terminals ZC and ZR. Connect the isolated end switch to the aquastat control on the boiler.

Power Input: Connect 120 volt ac power input to terminals N and H. Neutral wire to terminal N. Hot wire to terminal H.

NOTE: Resistor (1KΩ, ½ W) may be needed between **W** and **C** terminals.

WARNING: Wiring connections must be made in accordance with all applicable electrical codes. Use copper wire only. 120 VAC wiring must have a minimum temperature rating of 75°C. Failure to follow this instruction can result in personal injury or death and/or property damage. 12-18 gauge wire recommended for 120 VAC connections, 14-22 gauge wire for thermostat connections, and 14-22 gauge wire for 24 VAC source connections.

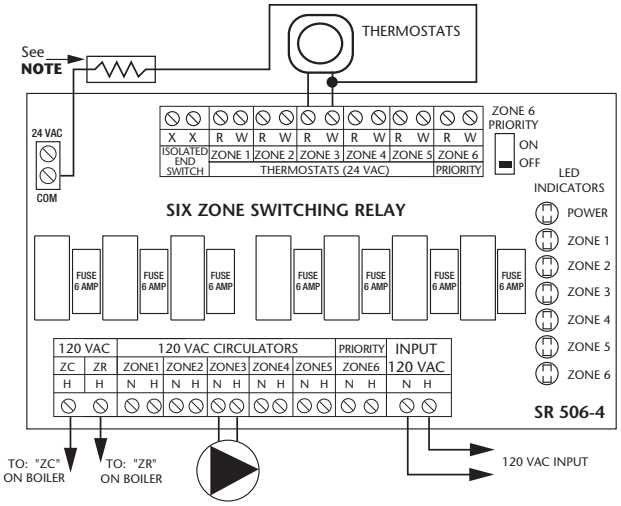
Specifications:

PRODUCT NUMBER	NUMBER OF ZONES	INPUT VOLTAGE	MAXIMUM COMBINED LOAD	TYPE 1 ENCLOSURE WIDTH	HEIGHT	DEPTH
SR506-4	6 with Priority	120/60/1 VAC	20 amps	12 1/4"	8"	3"

All circulator relay connections, including ZC/ZR, are rated 1/3 hp (6 FLA, 36 LRA) at 120 VAC.
End switch connections are rated 24 VAC, 1 amp.
All thermostat connections supply a 24 VAC class 2 output.

For information on Taco's Switching Relays (SR) including catalog sheet, instruction sheets, Visio stencils and our highly praised Zone Controls Wiring Guide, scan the QR code to the left or go to our website: http://www.taco-hvac.com.

Tankless Coil Boiler Application: (Alternative Wiring)



Operation: When any thermostat calls for heat, the boiler is given a signal to start. The appropriate circulator is energized only when the boiler temperature is above the set low limit.
Priority Operation: When zone 6 is switched to the priority setting and is actuated, all other zones will stop operation until zone 6 is satisfied. When zone 6 is not switched to priority, all zones will operate independently.
Priority Protection Operation: When the priority switch is set to ON, and if the priority zone calls continuously for more than one hour, power is returned to all the other zones, allowing each zone to function independently. Once the priority zone is satisfied, the control's auto-reset is activated and the priority zone is again allowed to have priority for up to one hour starting from when it calls next.
Jumper Placement: REMOVE the jumper between terminals ZC and ZR. Connect terminal ZC to ZC on the aquastat control. Connect terminal ZR to ZR on the aquastat control. Confirm polarity is consistent between boiler aquastat and switching relay.
Power Input: Connect 120 volt ac power input to terminals N and H. Neutral wire to terminal N. Hot wire to terminal H.

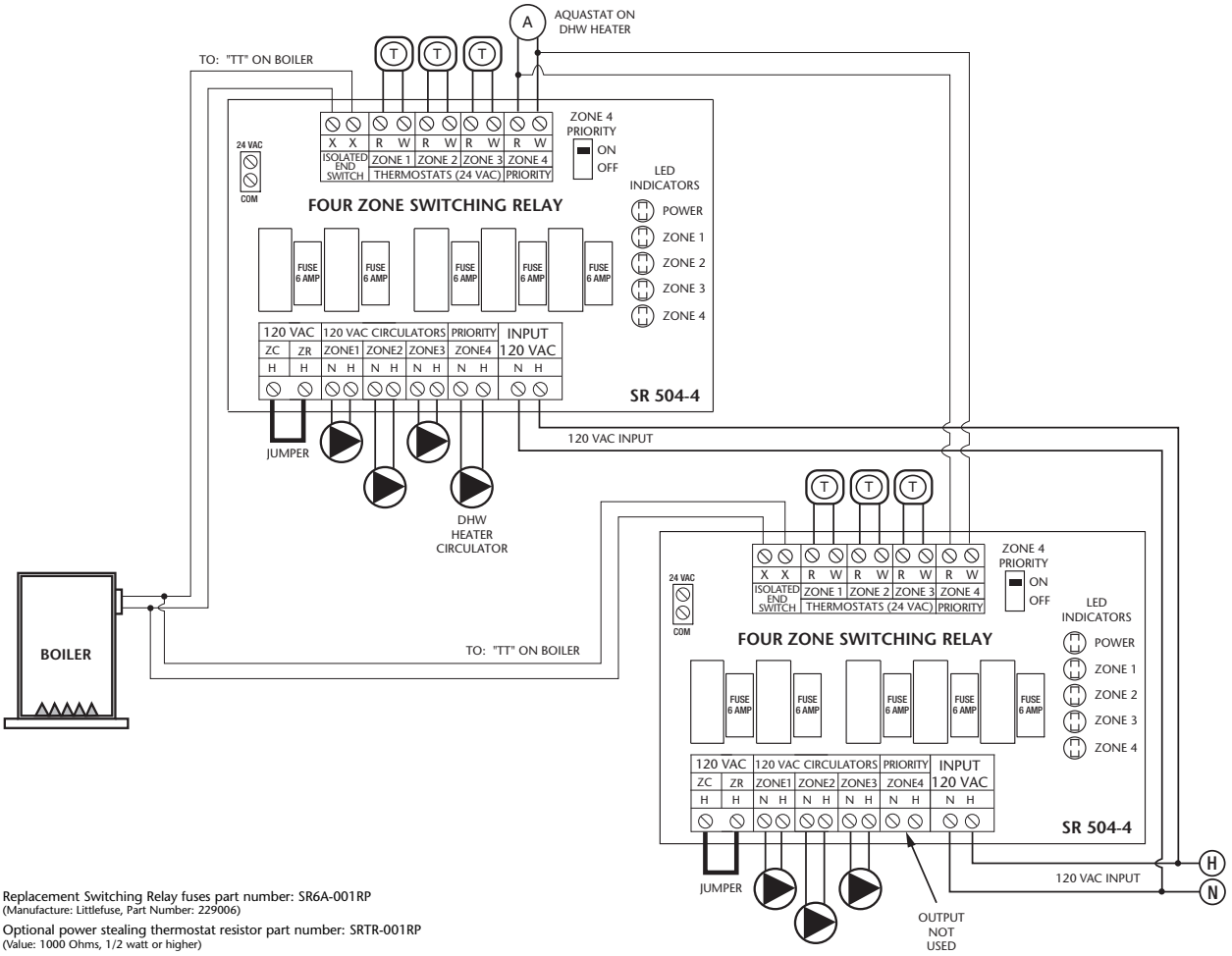
WARNING: When using Alternative Wiring diagram, wiring instructions must be followed so power originates from the boiler aquastat. Failure to follow these wiring instructions may result in a secondary source of power being connected to the boiler that may activate it under certain circumstances, causing injury or death.

Troubleshooting:

- **Problem:** Digital thermostats do not work correctly when connected to a switching relay.
- **Solution:** Some thermostats are a "Power Stealing" type which means they are powered by the switching relay with just 2 wires (**R** & **W**). A resistor may be needed in order to have the thermostat work properly. This resistor should be placed between the **W** & **C** (**common**) terminals of the switching relay. If the thermostat manufacturer does not supply a resistor, a 1000 ohm ½ watt resistor has proven to work with most models and is readily available at electronic supply outlets (e.g. Radio Shack). If the thermostat is battery powered, then check that the batteries are fresh and installed correctly.

- **Problem:** No heat in a zone or room of building.
- **Solution:** LED diagnostic lights will help find a component that is not working properly. The green LED should always be on, indicating that power is connected and the solid-state fuse is good. When there is a call for heat, the red LED will come on indicating power to the zone circulator. This indicates the thermostat is working correctly. If the red LED does not come on, then check the thermostat and thermostat wiring for errors.

Two Standard Switching Relays Connected Together (SR502 – SR506)



Replacement Switching Relay fuses part number: SR6A-001RP
(Manufacture: Littlefuse, Part Number: 229006)

Optional power stealing thermostat resistor part number: SRTR-001RP
(Value: 1000 Ohms, 1/2 watt or higher)

LIMITED WARRANTY STATEMENT

Taco, Inc. will repair or replace without charge (at the company's option) any product or part which is proven defective under normal use within three (3) years from the date of start-up or three (3) years and six (6) months from date of shipment (whichever occurs first).

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local Taco stocking distributor or Taco in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local Taco stocking distributor or Taco. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any Taco product or part not installed or operated in conformity with Taco instructions or which has been subject to misuse, misapplication, the addition of petroleum-based fluids or certain chemical additives to the systems, or other abuse, will not be covered by this warranty.

If in doubt as to whether a particular substance is suitable for use with a Taco product or part, or for any application restrictions, consult the applicable Taco instruction sheets or contact Taco at [401-942-8000].

Taco reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. Taco reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

TACO OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TACO.

TACO WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

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Taco (Canada), Ltd., 8450 Lawson Road, Suite #3, Milton, Ontario L9T 0J8 | Tel: (905) 564-9422 | FAX: (905) 564-9436
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Safgard

Low Water Cut-Offs

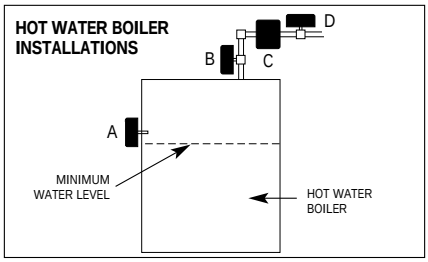
550 / 650 / 750 Series

120 VAC Operating Voltage

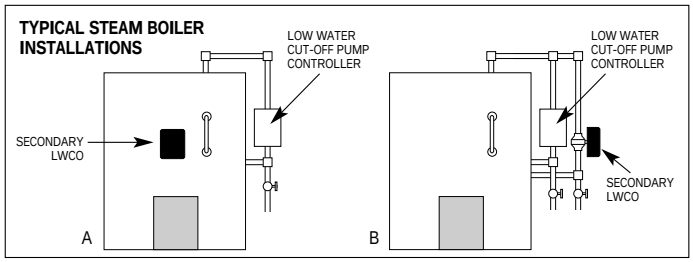
- Automatically shuts off burner in a low water condition to prevent boiler damage.
- Low maintenance. No moving parts to wear stick or hang up, as in float devices.
- Test button (550 & 650 Series) allows the burner circuit and control to be tested without lowering the water level.
- Manual reset feature (550 & 750 Series) will not lock out in power failures.

WARNING: To prevent electrical shock or equipment damage, power must be off during installation or servicing of the control. To prevent serious burns, the boiler should be thoroughly cooled before installing or servicing control. Only qualified personnel may install or service the control in accordance with local codes and ordinances. Read instructions completely before proceeding.

1. Where To Install

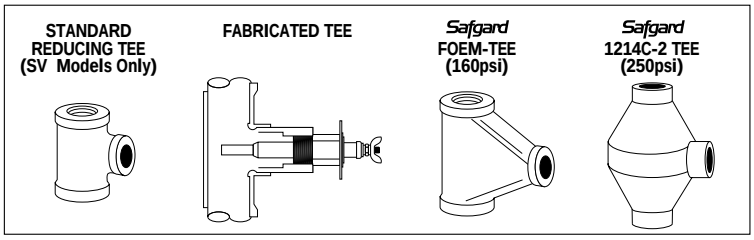


HOT WATER BOILERS: Probe must be installed at or above the minimum safe water level established by the boiler manufacturer. The probe may be installed directly in the boiler (A) if a suitable tapping is available, in the riser (B), in the header horizontally (C), or in the header vertically (D). **IMPORTANT:** To assure proper drainage, pipe diameter should be no less than 1" on installations in vertical piping and no less than 1¼" on installations in horizontal piping.



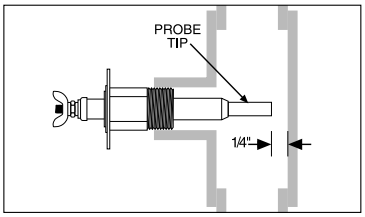
STEAM BOILERS (Secondary) : Control must be installed in a suitable tapping provided in the boiler(A), or in an equalizing line(B). The control should be located below the level of the primary low water cut-off but above the lowest permissable water line as specified by the boiler manufacturer.
Note: For installations in equalizing lines, Hydrolevel recommends the use of Safgard Tees (see step 2).

2. Tee Options



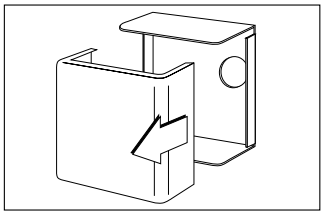
TEE MOUNTING: If a field fabricated tee is used, make sure that the tee drains thoroughly when the water level falls below it, and that it conforms to the spacing requirements described in Step 3. Models equipped with the shorter EL1214-SV probe can be installed in most standard reducing tees. Safgard cast iron tees are also available to accommodate all probe models (See page 4).

3. Probe Installation

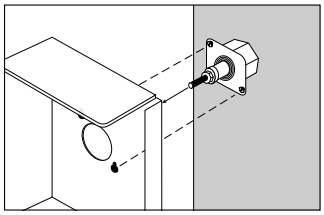


Check to insure 1/4" clearance from probe to *any* surface within the boiler or tee. When installed in a tee, the probe tip should extend fully into the pipe run. Apply pipe sealing compound to threads.
Note: Use of Teflon tape is not recommended.

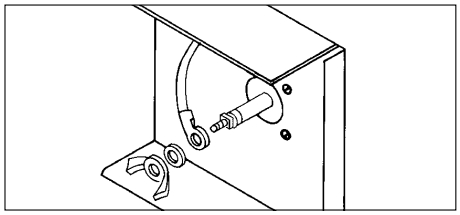
4. Control Mounting



Loosen the two control box cover binding head screws and remove the cover.



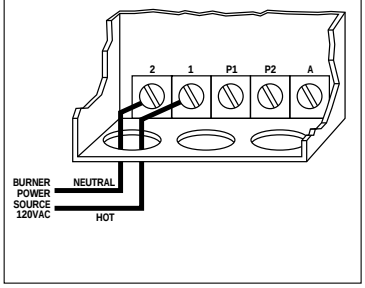
Slide keyhole slots over probe mounting screws and tighten screws (with either a 1/4" hex head driver or flat screwdriver.



Connect the ring terminal wire lead to the probe terminal stud and secure with the lock washer and wing nut provided. *With the power removed,* proceed with installation and wiring according to Method A or B described on next page.

WIRING METHOD A: SAME POWER SOURCE FOR CONTROL AND BURNER CIRCUIT.

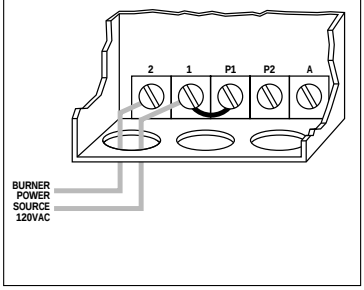
A1



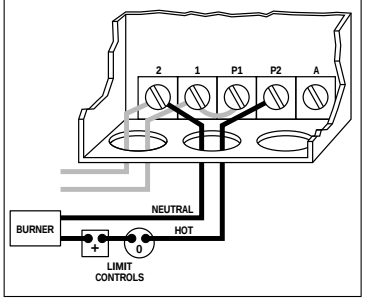
◀A1 Connect the hot lead of the input voltage (120 VAC, 60 HZ) to terminal 1. Connect the neutral lead to terminal 2. 120 VAC, 60 HZ must be supplied to terminals 1 and 2 for internal operation of the control.

Install a jumper between terminal 1 and terminal P1. Power from terminal P1 is supplied to terminal P2 through the control relay when water is at the probe. A2▶

A2



A3

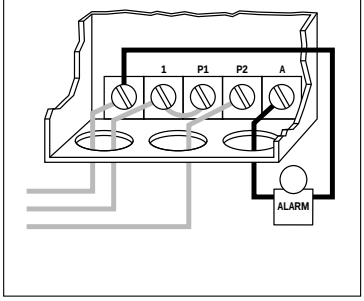


◀A3 Connect terminal 2 to burner circuit neutral. Connect terminal P2 to burner circuit in series with other limit controls. Consult boiler manufacturer instructions for proper terminal connections. Control should be wired in series with and before other circuits.

Optional alarm connection. Connect alarm common to terminal 2. Connect alarm hot to terminal A. A4▶

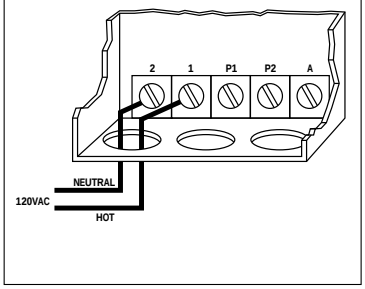
Upon completion of wiring, replace control box cover.

A4



WIRING METHOD B: SEPARATE POWER SOURCE FOR CONTROL AND BURNER CIRCUIT.

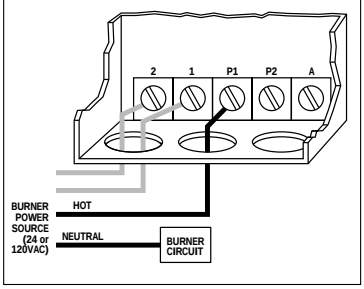
B1



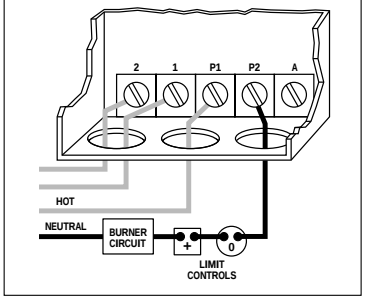
◀B1 Connect the hot lead of the input voltage (120 VAC, 60 HZ) to terminal 1. Connect the neutral lead to terminal 2. 120 VAC, 60 HZ must be supplied to terminals 1 and 2 for internal operation of the control.

Connect hot lead from the 24 VAC or 120 VAC burner power source to terminal P1. This terminal supplies power to terminal P2 in normal operating conditions when water is at the probe. Connect neutral to burner circuit. Note: consult boiler manufacturer instructions for proper terminal connections. B2▶

B2



B3

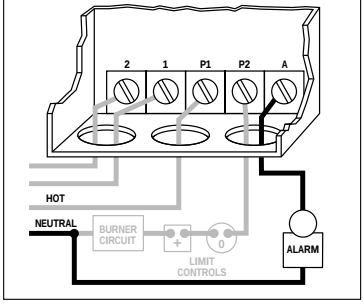


◀B3 Connect terminal P2 to burner circuit in series with and before other limit controls.

Optional alarm connection. Connect alarm hot to terminal A. Connect alarm common to neutral of the burner power source. B4▶

Upon completion of wiring, replace control box cover.

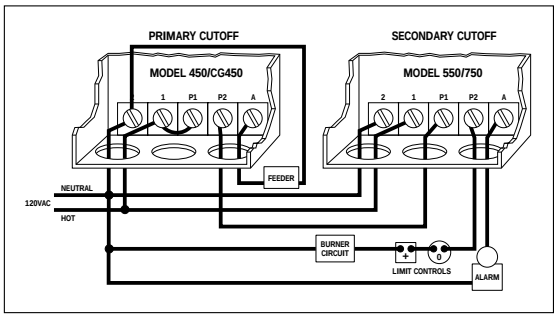
B4



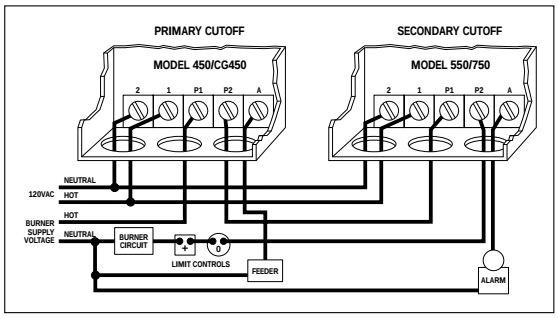
WIRING METHOD C: SECONDARY CUT-OFF

When a Safgard 550/750 is used as a secondary low water cut-off on a steam boiler, the following wiring instructions should be used. The diagram below depicts the 550/750 as a secondary control wired in series with a Safgard Model 450/CG450. Consult boiler manufacturer's instructions for the location of a tapping recommended for a secondary low water cut-off. **CAUTION** – Model 550/750 should not be used as a primary cut-off on a steam boiler.

SAME POWER SOURCE FOR CONTROL AND BURNER CIRCUIT

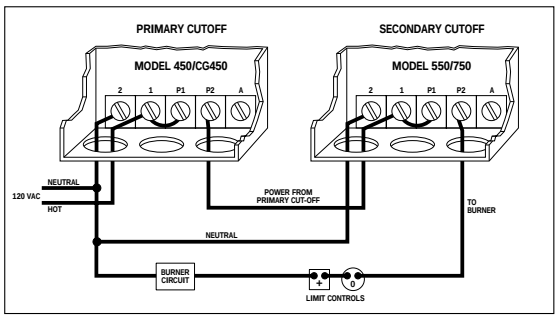


SEPARATE POWER SOURCE FOR CONTROL AND BURNER CIRCUIT



ALTERNATE WIRING: SECONDARY CUT-OFF WITH *CRITICAL DIFFERENTIAL*

On some installations it may be necessary to mount the secondary cut-off at a level in close proximity to the primary cut-off level. In these situations, when the primary low water cut-off shuts down the boiler, the water line can settle below the secondary cut-off causing nuisance lockouts. The wiring diagram at the right is designed to prevent these lockouts. **NOTE:** This wiring method can only be used if the power supply from the primary cut-off is 120 VAC.



OPERATING INSTRUCTIONS

750 Series: *Manual Reset*

1. With the water level above the probe, turn on the power and set the thermostat to call for heat. The burner will fire immediately. The LED lamps should be off.
2. Slowly lower the water level below the probe. The amber light will come on and the burner will shut down within two seconds.
3. **Wait 30 seconds.** The red LED lamp will come on indicating that the control is locked-out.
4. Raise the water above the probe. The red LED lamp will remain lit and the burner will not fire.
5. Push the RESET button to reset the control and restore burner operation.

650 Series: *Automatic Reset & Test Button*

1. With the water level above the probe, turn on the power and set the thermostat to call for heat. The burner will fire immediately. The LED lamp should be off.
2. Push the test button on the top of the control to simulate a low water condition. The LED lamp will light and the burner will shut down within two seconds.

550 Series: *Manual Reset & Test Button*

Follow the operating instructions for the 750 & 650 Series above.
Note: To test the manual reset feature on the 550 Series without lowering the water level:

1. Push and **hold down** the TEST button. The red LED lamp will come on in approximately **30 seconds** indicating that the control is locked-out.
2. Once the red LED is lit, release the TEST button. The burner will not fire.
3. Push the RESET button to reset the control and restore burner operation.

TROUBLE SHOOTING

IF THE BURNER DOES NOT SHUT DOWN
If the burner does not shut down when the water drops below the probe:

1. Remove power immediately and re-check wiring.
2. Remove power and check for adequate clearance from the probe to any surface within the boiler or tee.

IF THE BURNER DOES NOT FIRE

1. Make sure water is at probe and probe lead wire is properly secured to the terminal.
2. Check for proper ground between probe and boiler shell. Excessive use of Teflon tape or sealing compound may insulate the probe from the boiler shell.
3. Re-check wiring and test for correct incoming voltage.

IF THE RED LED LAMP IS ON
The red LED lamp indicates that the control is locked-out. This feature will activate if the boiler experiences a low water condition exceeding 30 seconds in duration.
IMPORTANT: Do not reset control until the cause of the low water condition is corrected. **CAUTION: Do not add water until boiler is cool.**

MAINTENANCE

To ensure optimum performance, inspect probe annually. Clean any scale or build-up from the probe using a scouring pad or steel wool. Re-install the probe and test control in accordance with the Operating Instructions.

FITTINGS

Controls equipped with the EL1214-SV Probe can be mounted in standard reducing tees (supplied by others). Safgard manifolds, listed below, can be used with all probe models.

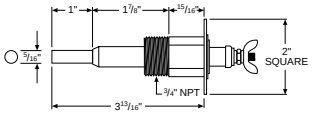
FOEM MANIFOLD

1214C-2 TEE

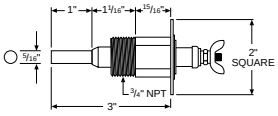
MODEL	PSI	SIZE
FOEM-1	160	1 1/2" x 1 1/2" x 3/4"NPT
FOEM-2	160	1" x 1" x 3/4"NPT
FOEM-3	160	1 1/4" x 1 1/4" x 3/4"NPT
1214C-2 TEE	250	1" x 1" x 3/4"NPT

PROBE DATA

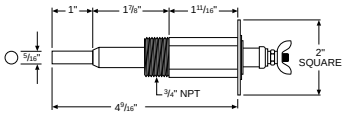
Test Pressure: 1000 PSI, All Models



EL1214 – STANDARD MODEL – 3/4" NPT
For 1/2", order Model EL1220

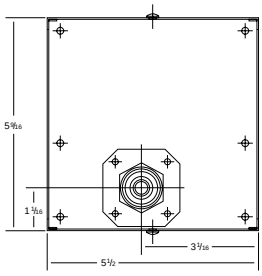


EL1214-SV – 3/4" NPT
For 1/2", order No. EL1220-SV

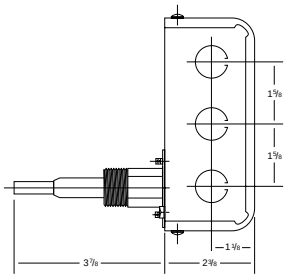


EL1214-P – 3/4" NPT

DIMENSIONS



BACK



BOTTOM

SPECIFICATIONS

MAXIMUM PRESSURE: 250 PSI
INPUT VOLTAGE: 120 VAC, 60 HZ
SWITCH RATINGS: 5.8 FLA, 34.8 LRA
SWITCH CONTACTS: SPDT
ALARM CIRCUIT: 125 VA @ 120 VAC Pilot Duty

LIMITED MANUFACTURER'S WARRANTY

We warrant products manufactured by Hydrolevel Company to be free from defects in material and workmanship for a period of two years from the date of manufacture or one year from the date of installation, whichever occurs first. In the event of any claim under this warranty or otherwise with respect to our products which is made within such period, we will, at our option, repair or replace such products or refund the purchase price paid to us by you for such products. In no event shall Hydrolevel Company be liable for any other loss or damage, whether direct, indirect, incidental or consequential. This warranty is your EXCLUSIVE remedy and shall be IN PLACE OF any other warranty or guarantee, express or implied, including, without limitation, any warranty of MERCHANTABILITY or fitness for a particular purpose. This warranty may not be assigned or transferred and any unauthorized transfer or assignment thereof shall be void and of no force or effect.

HYDROLEVEL COMPANY

P.O. Box 1847
New Haven, CT 06508
Phone: (203) 776-0473
FAX: (203) 773-1019

Honeywell

L4006A,B,E,H
Aquastat® Controllers

INSTALLATION INSTRUCTIONS

APPLICATION

These boiler-mounted, immersion type controllers operate in response to temperature changes in hydronic heating systems.

L4006A breaks the circuit on a temperature rise to the control setting. It is used for high limit or low limit control. When used as a controller or as a low limit, a separate high limit must be used.

L4006B makes the circuit on a temperature rise. It is used as a circulator controller, delaying circulator operation when boiler water temperature is below the control setting.

L4006E,H includes a trip-free manual reset switch. These models are designed to break the control circuit whenever the temperature of the controlled medium reaches the high limit setting. A reset button on the front of the case must be pressed to re-establish the control circuit. L4006H also includes bracket and clamp for surface mounting on pipe or tank.

A plastic bag of heat-conductive compound is included with the L4006A,B,E Aquastat® Controllers for use when the sensing bulb is inserted into a well designed for a large bulb than the one used on the L4006A,B,E. A 124904 Well Adapter, for use on old wells that do not fit the L4006A,B,E immersion well clamp, can be ordered; see form 68-0040, Wells and Fittings for Temperature Controllers. A setting stop is included to prevent setting above a desired temperature on limit.

If a well adapter or other accessories are needed, refer to form 68-0040, Wells and Fittings for Temperature Controllers, for part numbers and ordering information.

INSTALLATION

When Installing This Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

⚠ WARNING

Electrical Shock Hazard.
Can cause serious injury, death or equipment damage.
Disconnect the power supply before beginning installation to prevent electrical shock or equipment damage.

Installing Immersion Well Models (L4006A,B,E)

IMPORTANT

Obtain the best thermal response with a well that snugly fits the sensing bulb. The bulb should be inserted until it rests against the bottom of the well. Use a well of correct length and bend the tubing, if necessary, to provide enough force to hold the bulb against the bottom of the well. Do not make a sharp bend in the tubing. A sharp bend can produce a break in the tubing and cause a loss of fill. This condition will cause the high and low limit controls to be made continuously.

If the well is not a snug fit on the bulb, use the heat-conductive compound as follows. Fold the plastic bag of compound lengthwise and twist gently. Snip the end of the bag and insert into the well. Slowly pull out the bag while squeezing firmly to distribute the compound evenly in the well. Insert the bulb into the well. Bend the tubing, if necessary, to provide force to hold the bulb against the bottom of the well and to hold the out end of the bulb in firm contact with the side of the well. Wipe off any excess compound.

NOTE: Some models have an adjustable capillary tubing length to 3 inches (76 mm). In these models, pull out extra tubing from inside the case, if needed.

Follow the boiler manufacturer instructions, if available; otherwise, proceed as follows.

60-0915-5

1. Remove the old control.
2. Refer to the cover insert of the old control to identify and tag each lead as it is disconnected.
3. Leave the old well in place if it is suitable.

If Well is Otherwise Suitable But Does Not Fit The L4006 Immersion Well Clamp

Use a 124904 Well Adapter (order separately, see form 68-0040) to secure the L4006 to the old well. The adapter has a flange at one end for fastening the L4066 adapter clamp.

1. Loosen, but do not remove, the two adapter clamp screws (see Fig. 1).
2. Slide the adapter onto the capillary and short tube; see Fig. 2 inset.
3. Make sure the flanged end of the adapter fits into the hole in the case. Position the adapter well clamp snugly over the flange on the adapter, then tighten the clamp screws.
4. Insert the bulb into the well, as shown in Fig. 2. If necessary, use the heat-conductive compound as instructed in the IMPORTANT statement on page 1.
5. Tighten the setscrew (if one is present in the old well spud) against the adapter.

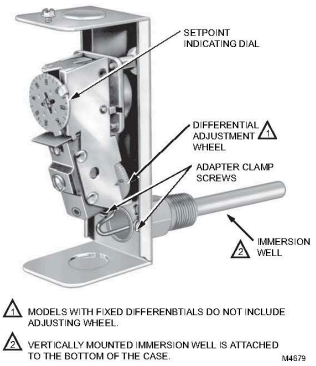


Fig. 1. Internal view of L4006A,B with horizontal well. L4006E is the same with reset button added.

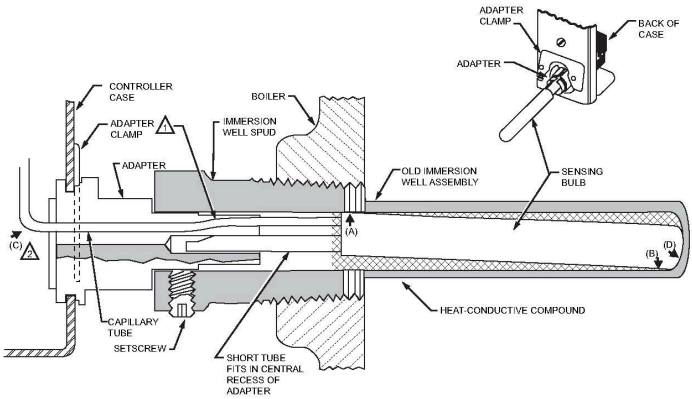


Fig. 2. Bulb in immersion well and use of adapter.

If the Old Well Is Unsuitable.

1. Drain the system and remove the well.
2. Select a new well from form 68-0040 (order well separately).
3. Install the new well, refill the system and check for leaks.
4. Loosen, but do not remove, the two adapter clamp screws (Fig. 1).
5. Insert the sensing bulb into the well until it bottoms as show in Fig. 2. Add heat-conductive compound, if necessary, as instructed in the IMPORTANT statement on page 1.

6. Make sure the end of the well fits into the hole in the case. Position the immersion well clamp snugly over the well flange and tighten the clamp screw securely.

Mounting Surface Mount Model (L4006H)

The L4006H is designed for surface mounting on piping or tank and can be mounted in any position.

When mounting the L4006H on piping, the pipe should be 1 in. (25 mm) diameter or larger for accurate temperature sensing.

1. Remove any insulation from the pipe.
2. Thoroughly scrape off all scale, rust or paint.
3. Mount controller as shown in Fig. 3 using adjustable 12 in. (294 mm) pipe strap furnished.

When mounting the L4006H on a tank, use a pipe strap of appropriate length, approximately 6-10 ft (17.6- 29.4m) for the tank (not provided). Fit the pipe strap through the slot in the mounting bracket. See Fig. 3.

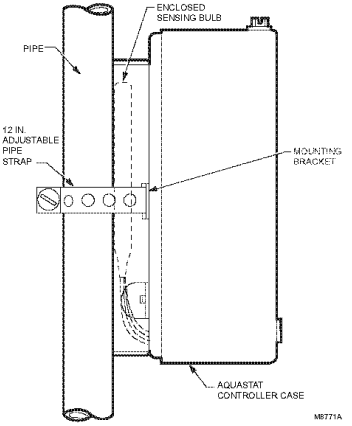


Fig. 3. Mount L4006H directly on surface.

Wiring

⚠ WARNING

Electrical Shock Hazard.
Can cause serious injury, death or equipment damage.
Disconnect power supply before connecting wiring to avoid electrical shock or equipment damage.

All wiring must comply with local codes and ordinances regarding wire size, insulation, enclosure, etc. See Fig. 4 and 5 for typical diagrams of Aquastat® Controllers used in heating systems.

Use these Aquastat Controllers with copper wire only.

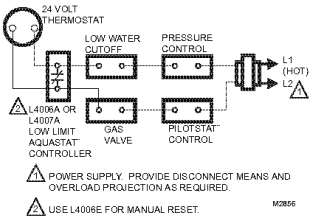


Fig. 4. Typical hookup for gas-fired system with domestic hot water.

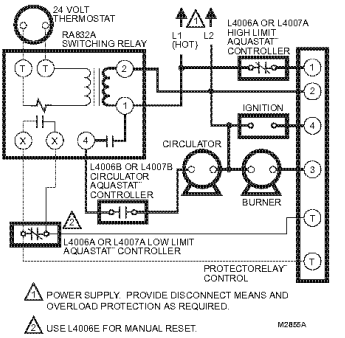


Fig. 5. Hookup for oil-fired, summer-winter, hydronic system with domestic hot water. This is typical where control for domestic hot water is added, or where each Aquastat Controller is mounted in a separate location.

OPERATION

For proper selections of settings, follow boiler manufacturer recommendations:

1. High limit controller: Shuts off burner when water temperature exceeds high limit setting. Burner restarts when temperature drops to high limit setting minus the temperature differential.

NOTE: If L4006E or H, see Manual Reset section.

2. Low limit controller: Maintains minimum boiler temperature for domestic hot water. Turns boiler on at temperature setting, less differential.
3. Circulator controller: Prevents circulation of water that is not hot enough. Breaks circulator circuit at temperature setting minus differential and remakes at setting.

ADJUSTMENT

Set the differential to correspond with the boiler manufacturer recommendations. To adjust models with adjustable differential, rotate the wheel on the back of the snap switch until the desired reading is aligned with the V notch in the frame. The wheel provides an adjustment from 5°F to 30°F (3°C to 17°C). Replace the cover on the Aquastat Controller.

Adjust the control point to correspond with the boiler manufacturer recommendations. To adjust, insert a screwdriver in the slotted screw type head located beneath the window in the cover. Turn the scale to the desired control point.

Manual Reset

When the device includes manual reset (L4006E and H), be sure to press the red reset button on the front of the case to make sure that the controller is not locked out on safety. When checking out the system, adjust the control point low enough so the temperature of the controlled medium reaches the high limit setting, the burner shuts off, and the Aquastat Controller locks out. When the temperature of the controlled medium drops to the high limit setting minus differential, push the manual reset button and the system should be operative again. Reset control to proper high limit setting.

CHECKOUT

Check to make certain that the Aquastat Controller has been installed and adjusted properly. Put the system into operation and observe the action of the device through several cycles to make certain that it provides proper control of the system as described in the Operations section. Further adjustments can be made to meet more exact comfort requirements.

MATERIAL SAFETY DATA SHEET

Section 1. Product And Company Identification

Product Name: Heat Conductive Compound

MSDS ID: DS9021

Synonyms: MS1699

Product Use: Heat conductive material used to enhance contact and heat transfer in temperature sensor applications.

Manufacturer: Honeywell Inc., 1985 Douglas Drive North, Minneapolis, MN 55422.

Date Released: October 8, 1999

Customer Response Center: 800-328-5111

Emergency Telephone Information: 888-809-3787

NFPA Ratings:

Health 0; Flammability 1; Reactivity 0; Personal Protection B

Section 2. Composition, Information on Ingredients

Ingredient	CAS Number	Percent	PEL	TVL
#2 Lithium Complex Grease (70%):				
Mineral Oil	64742-65-0	35-50	5 mg/m^3	5 mg/m^3
Mineral Oil	64742-62-7	20-25	5 mg/m^3	5 mg/m^3
Lithium Hydrostearate/Sebacate Complex	68815-49-6	4-9	—	—
Zinc Alkyldithiophosphate	68649-42-3	0-2	—	—
Aluminum Paste (30%):				
Aluminum, as Al	7429-90-5	20-25	15 mg/m^3	10 mg/m^3
Aliphatic Petroleum Distillates	8052-41-3	10-15	2900 mg/m^3	525 mg/m^3
Stearic Acid	57-11-4	1-2	—	—
Aromatic Petroleum Distillates	64742-95-6	1-2	5 mg/m^3	5 mg/m^3

Additional Information: Part No. 120650 (0.5 oz tube); Part No. 107408 (4 oz can); Part No. 197007 (5 gallon container). May also contain minute amounts of lithium and molybdenum lubricant compounds.

Section 3. Hazard Identification

Acute Health Effects:

Skin: Excessive contact may cause skin irritation and dermatitis.

Eye: Direct contact with eye will cause irritation.

Inhalation: No adverse effects are expected.

Ingestion: Ingestion of product may cause nausea, vomiting and diarrhea.

Chronic Health Effects:

Existing skin rash or dermatitis may be aggravated by repeated contact.

OSHA Hazard Classifications: None.

Carcinogenicity: Not considered to be a carcinogen by either OSHA, NTP, IARC, or ACGIH.

Section 4. First Aid Measures

Eye Contact: Flush eyes with water for 15 minutes. Remove any contact lenses and continue to flush. Obtain medical attention if irritation develops and persists.

Skin Contact: Remove excess with cloth or paper. Wash thoroughly with mild soap and water. Obtain medical attention if irritation develops and persists.

Ingestion: Contact physician or local poison control center *immediately*.

Inhalation: Remove patient to fresh air and obtain medical attention if symptoms develop.

Section 5. Fire Fighting Measures

Material Flash Point: > 383°F (195°C). Will burn if exposed to flame.

Extinguishing Media: Carbon dioxide, dry chemical or foam.

Special Fire Fighting Procedures: None.

Explosion Hazards: None. Aluminum powder can react with water to release flammable hydrogen gas. In the form of this product, this reaction is not expected.

Section 6. Accidental Release Measures

Scrape up and dispose of as solid waste in accordance with state and federal regulations.

Section 7. Handling and Storage

Store in dry place. Keep container closed when not in use.

Section 8. Exposure Controls and Personal Protection.

Ventilation: No special ventilation is required when working with this product.

Respiratory Protection: None required.

Eye Protection: Not normally required. However, use chemical safety goggles or faceshield if potential for eye contact exists, especially if material is heated.

Hand/Clothing Protection: Not normally required. Protective gloves and clothing are recommended, as material is difficult to remove from skin and clothing.

Other Protective Equipment: None required.

Section 9. Physical and Chemical Properties

Appearance/Odor: Aluminum color, semi-solid material, pleasant odor.

Solubility in Water: Negligible.

Specific Gravity: 0.86.

Section 10. Stability and Reactivity

Stability: Stable.

Reactivity: Hazardous polymerization will not occur.

Incompatibilities: Strong oxidizing agents and halogens.

Hazardous Decomposition Products: Carbon dioxide, carbon monoxide.

Section 11. Toxicology Information.

No data available.

Section 12. Ecological Information

Chemical Fate Information: Hydrocarbon components will biodegrade in soil; relatively persistent in water.

Section 13. Disposal Consideration

Dispose of as solid waste in accordance with local, state and federal regulations.

Section 14. Transportation Information

DOT Classification: Not classified as hazardous.

Section 15. Regulatory Information

SARA Title III Supplier Notification: Include in Section 311/312 inventory reports if amounts exceed 10,000 pounds. Aluminum compounds are subject to the reporting requirements under Section 313 of Emergency Planning and Community Right-To-Know Act of 1986 (40 CFR 372). Ingredients listed in TSCA Inventory.

Section 16. Other Information

This information is furnished without warranty, expressed or implied, except that is is accurate to the best of our knowledge.

Prepared by: PROSAR, 1295 Bandana Boulevard, Suite 335, St. Paul, MN 55108 (651-917-6100).

L4006A,B,E,H AQUASTAT® CONTROLLERS

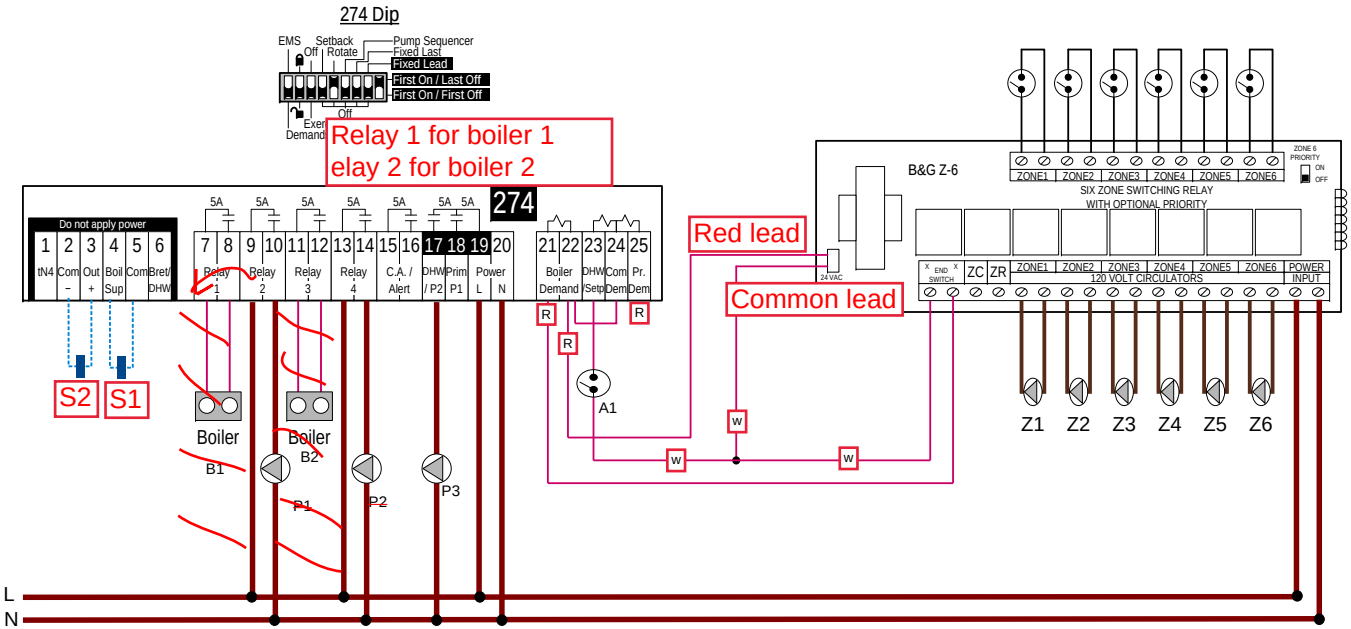
Automation and Control Solutions
Honeywell International Inc.
1985 Douglas Drive North
Golden Valley, MN 55422
customer.honeywell.com

Honeywell Limited-Honeywell Limitée
35 Dynamic Drive
Scarborough, Ontario M1V 4Z9

Honeywell

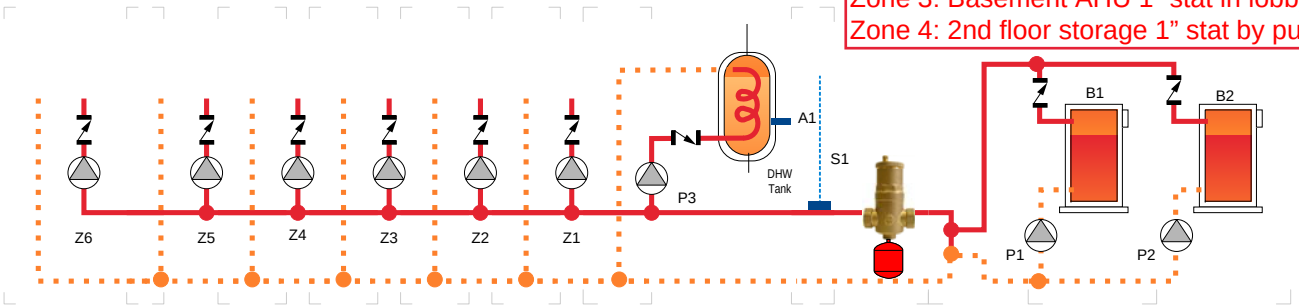
60-0915—5 C.H. Rev. 08-05

Fluid Industrial Associates



S1=BOILER SENSOR 071
S2=OUTDOOR SENSOR
P1=BOILER PUMP 1
P2=BOILER PUMP 2
P3=DHW PUMP
A1=DHW AQUASTAT
Z1-6=ZONE PUMPS
B1&B2= BOILER

Zone 1: Attic AHU 1-1/2" stat by back stage
Zone 2: 2nd floor 1-1/2" stat in auditorium
Zone 3: Basement AHU 1" stat in lobby
Zone 4: 2nd floor storage 1" stat by pull down stairs to attic



Fluid Industrial Associates
7 Sixth Road
Woburn, MA 01801
tel: 1-781-938-8900
fax: 1-781-933-3965

12/09/2020

Eastern Mechanical Services, Inc
3 Starr Street
Danbury, CT 06810
Phone: 203.792.7668 Fax: 203.748.0385 Web: www.emsinc.us

Boiler Start-Up Report

Town of New Canaan – Powerhouse Theatre
Job# 5090

Boiler #1

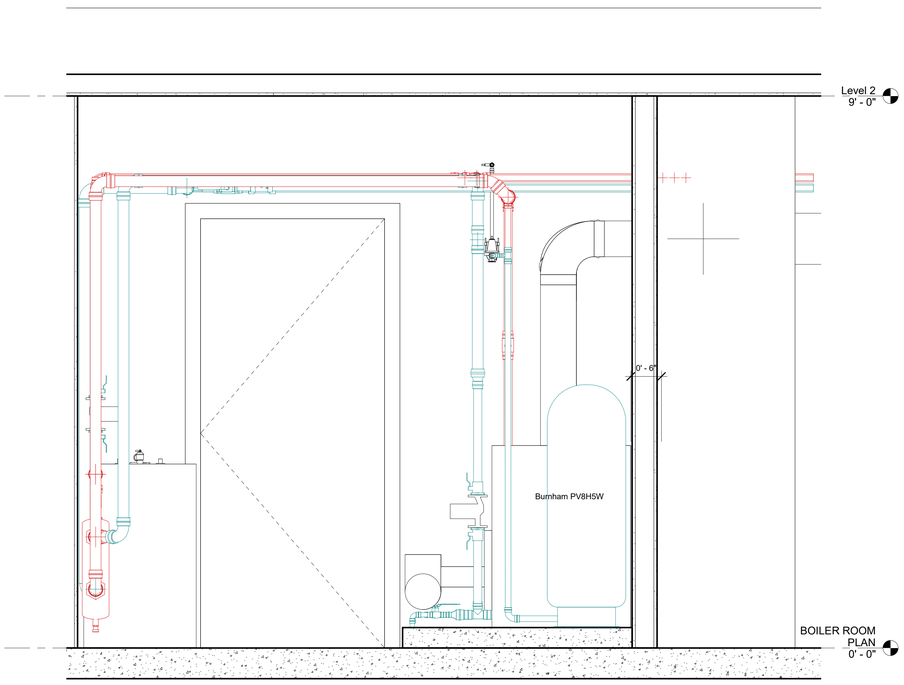
- O_2: 6.4%
- CO: 65 ppm
- Efficiency: 83.2%
- CO_2: 10.8%
- Stack Temperature: 470° F

Boiler #2

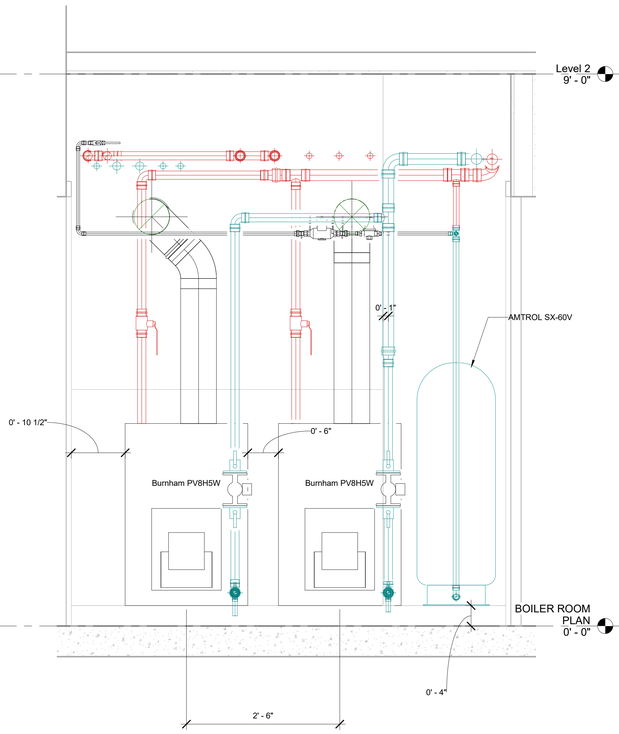
- O_2: 7.6%
- CO: 100 ppm
- Efficiency: 82.8%
- CO_2: 9.9%
- Stack Temperature: 460° F

Performed By: Bob Unger Date: 11/5/2020

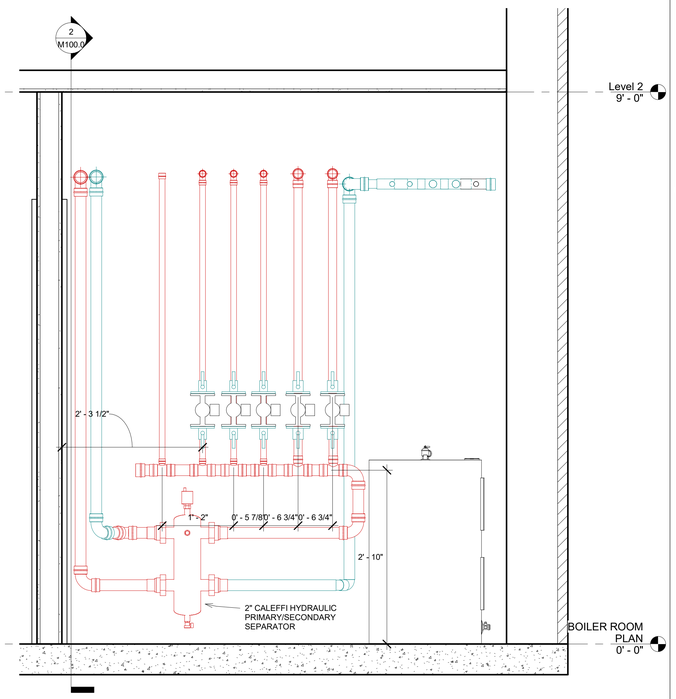
Witnessed By: John Huizinga Date: 11/5/2020



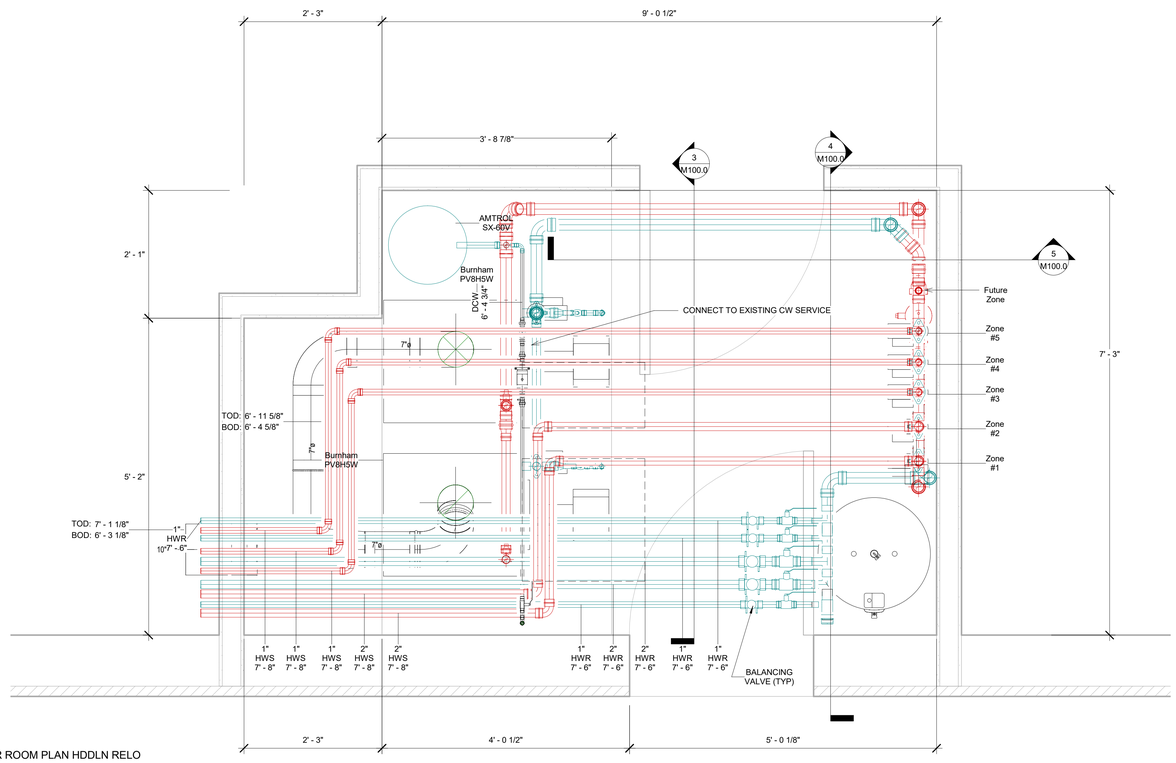
2 Section 1
1" = 1'-0"



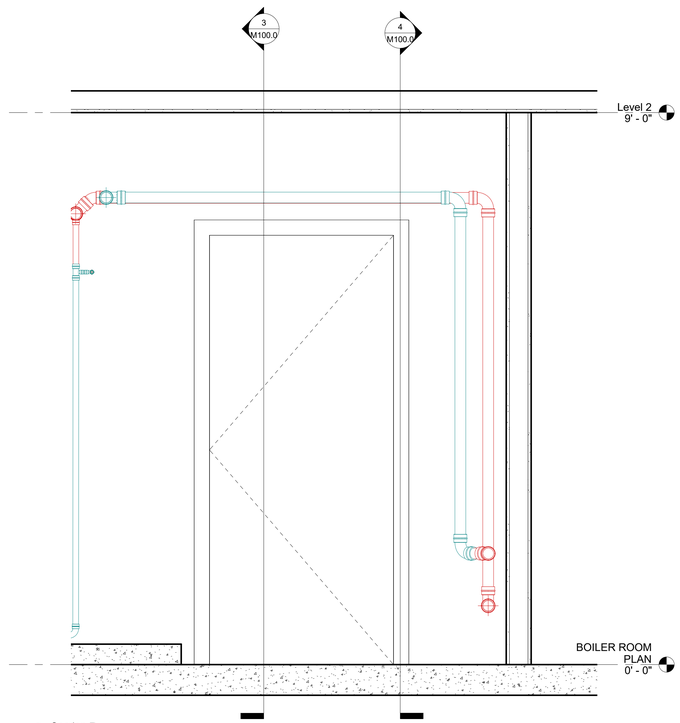
3 Section 2
1" = 1'-0"



4 Section 5
1" = 1'-0"



PHT BOILER ROOM PLAN HDDLN RELO CALEFFI
1 1" = 1'-0"



5 Section 7
1" = 1'-0"

Eastern Mechanical Services, Inc.
3 Starr Street
Danbury, CT 06810
203.792.7668

www.emsinc.us

NOTE:
1) NOT ALL VALVES ARE SHOWN ON THIS DRAWING. EACH PUMP IS FITTED WITH TWO FLOW CHECKS (SUPPLY AND RETURN), ISOLATION BALL VALVES AND DRAIN CONNECTION.

2) PUMPS ARE SIZED TO MATCH THE EXISTING B&G AND ARMSTRONG PUMPS WHICH ARE REPLACED WITH TACO EQUIVALENTS.

3) THE SYSTEM IS PRIMARY / SECONDARY PIPING WITH A 2" CALEFFI HYDRAULIC SEPARATOR WHICH ACTS AS A STRAINER, AIR REMOVAL DEVICE AND HYDRAULIC SEPARATOR.

4) EXISTING DOMESTIC WATER HEATER TO REMAIN.

5) ONE STUB OFF OF SUPPLY HEADER FOR FUTURE CONNECTION.

No.	Description	Date
0	PRELIMINARY PLAN NOT FOR CONSTRUCTION	9/28/2020
1	ADDED CALEFFI PRIMARY/SECONDARY H. SEP.	10/3/2020
2	ADDED FUTURE HWS/HWR PIPING TO PROP. STO.	10/22/2020
3	FINALIZED AS-BUILT	12/2/2020

Town of New Canaan

Boiler Replacements

667 South Ave
New Canaan, CT

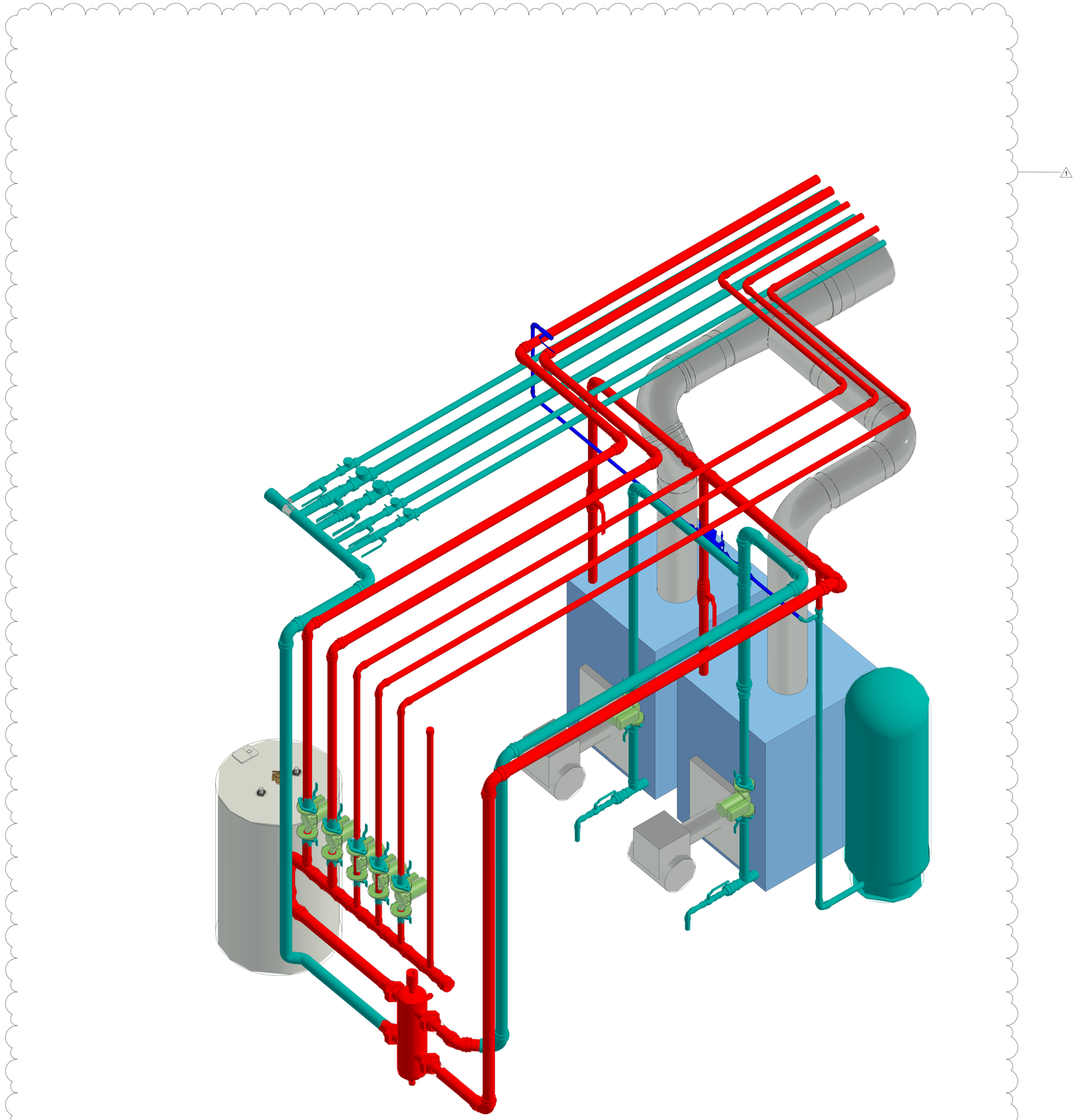
Power House Theater Plan

Project Number	5090
Date	12/2/2020
Drawn By	T.H.
Checked By	J.H.

M100.0

Scale 1" = 1'-0"

4/16/2021 8:22:40 AM



1 Piping Layout Check

Eastern Mechanical Services, Inc.
3 Starr Street
Danbury, CT 06810
203.792.7668

www.emsinc.us

No.	Description	Date
1	As-built Iso	12/2/2020

Town of New Canaan

Boiler Replacements

667 South Ave
New Canaan, CT

Boiler Room Isometric

Project Number	5090
Date	12/2/2020
Drawn By	Th
Checked By	TH

M200.1

Scale

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