Operation and Maintenance Manual

Southwest Community Health Center

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Bridgeport, CT

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Series 8H™

Efficient & Economical
Commercial Gas-fired Hot Water Heating

BURNHAM® COMMERCIAL
AMERICA'S BOILER COMPANY®

Over 83% Efficiency

Heating Capacities
210 to 459 MBH Output

Performance and Long Term Reliability

Series 8H
Burnham Commercial's promise to deliver the best material continues with the new Series 8H. The design features and operating efficiency of the 8H boiler make it ideal for single and multiple boiler applications.

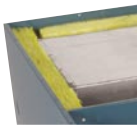
Cast Iron Dependability

- All castings are produced at our state-of-the-art foundry in Zanesville, Ohio.
- Durable high silicone cast iron for long term reliability.
- 
  The Cast Iron Nipple Difference
  Precision cut cast iron nipples that last the life of the boiler expand and contract along with the sections, ensuring the integrity of the section assembly. Additionally, nipples resist boiler flue gases and petroleum based chemicals, including corrosion inhibitors, pump lubricants and antifreeze.

83% Efficiency

- Pinned heating surface and vertical flue design extracts maximum heat while maintaining low draft losses.

- Deluxe jacket with 3 inch insulation reduces jacket and standby losses and is scratch resistant for a long lasting finish.



Two Packaging Options

- Knockdown 8H units are easy to handle and maneuver at the job site. New containerized skid can be stacked providing warehousing and job site convenience. (shown)
- Packaged and wired units provide fast and easy installation. A reinforced shipping container protects against damage.

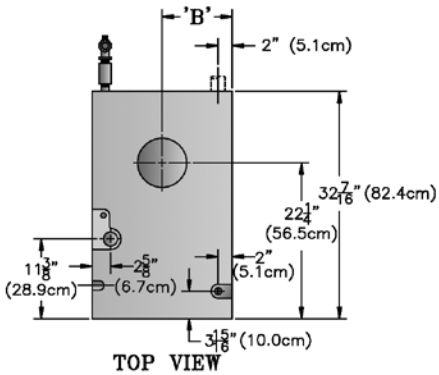
Adaptable to Any Job

- Space heating or combination space heating and domestic hot water
- Compact design
- Easily adapts to existing piping arrangements, boiler room configurations and system heating requirements.

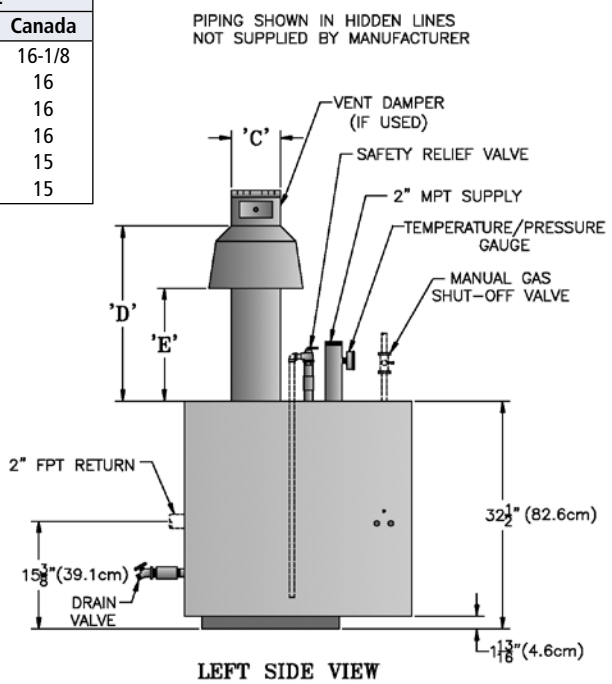
Dimensions (in inches)

Boiler Number	'A'	'B'	'C'	'D'		'E'	
				USA	Canada	USA	Canada
805H	20	10	7	24-3/4	24-3/4	16-1/8	16-1/8
806H	23-3/4	11-7/8	8	27-3/4	25-3/4	18	16
807H	27-1/2	13-3/4	9	28-3/4	25-3/4	18	16
808H	31-1/4	15-5/8	9	30-3/4	26-5/8	20	16
809H	35	17-1/2	10	33-1/2	26-3/8	22	15
810H	38-3/4	19-3/8	10	33-1/2	26-3/8	22	15

FRONT VIEW



TOP VIEW



LEFT SIDE VIEW

* Min . EP and OP electronic control sets are designed to mount on top of the boiler and do not affect side clearances. Please refer to the Modular/Multiple Boiler and Controls literature and Modular manual for detailed installation information.

Over 83% Efficiency

Modular or Multiple Boilers

- One inch minimum side clearances make the Series 8H ideal for modular and multiple boiler installations. *(see note on page 2)

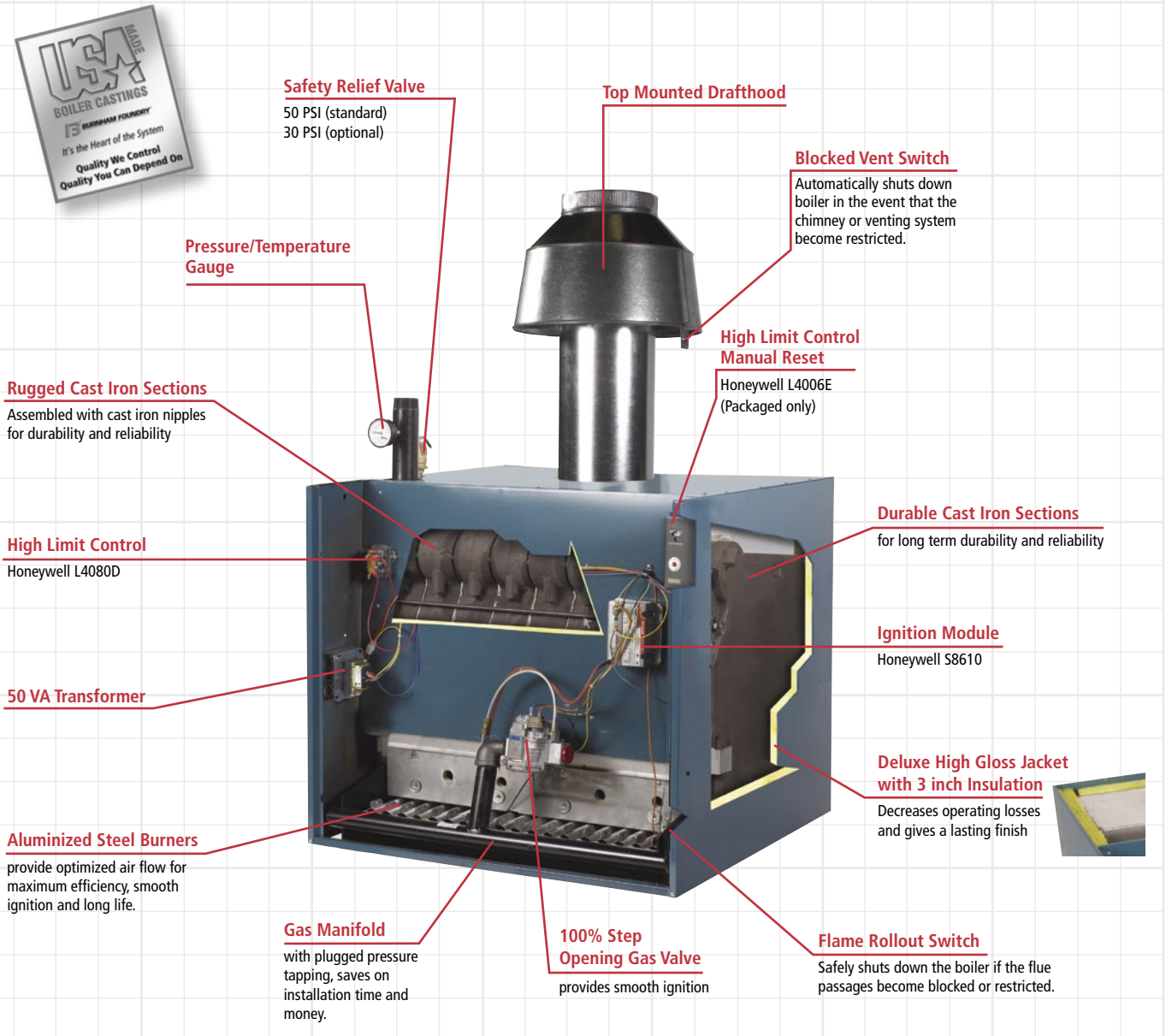
- Sizes 805, 806, and 807 can be installed as modular or multiple boilers as defined by ASME. Sizes 808, 809, and 810 are to be installed as multiple boilers.
*(see note on page 2)

The "Smart" Choice

Specifying a heating system, preparing boiler room layouts and creating sales submittals are all made easy with Burnham Commercial's SmartDesign CD. Engineering and sales tools are all in one place along with AutoCAD drawings that are at a 1" to 1" scale and can be copied and pasted into an existing boiler room layout. Consult your local Burnham Commercial sales representative or visit www.burnham.com for details.

Commitment to Quality

Burnham Commercial, "America's Boiler Company," has earned a reputation for quality and dependability. For single or multiple boiler applications, the Series 8H is right for your next job.



Specifications

SERIES 8H RATINGS* Natural and LP Gas

BOILER MODEL (1)	RATINGS INPUT MBH	RATINGS GROSS OUTPUT MBH	I =B=R NET RATING WATER MBH (2)	EFFICIENCY	MINIMUM NATURAL GAS PRESSURE (inches) 24V	MINIMUM NATURAL GAS PRESSURE (inches) EI	MINIMUM RECOMMENDED CHIMNEY SIZE ROUND DIA. (In.) X HT. (Ft.)(3)	WATER CONTENT (Gal.)	APPROX. SHIPPING WEIGHT (Lbs.)
805H	252	210 (4)	183	83.2 (4)	N/A	4.5	7 X 15	11.9	705
806H	315	262	228	83.1	4.5	4.5	8 X 15	13.9	785
807H	374	311	270	83.2	5.0	4.5	9 X 15	15.9	890
808H	433	360	313	83.3	N/A	4.5	9 X 15	17.9	1000
809H	491	409	356	83.4	N/A	5.0	10 X 15	19.9	1100
810H	550	459	399	83.4	N/A	5.0	10 X 15	21.9	1220

*Ratings shown are for installations at sea level and elevations up to 2,000 feet. For elevations above 2,000 feet, ratings should be reduced at the rate of four percent (4%) for each 1,000 feet above sea level.

1. When ordering use prefix P for packaged and K for knockdown. Use suffix NSP for natural gas, standing pilot; NEI for natural gas, electronic ignition; PSP for LP gas, standing pilot; PEI for LP gas, electronic ignition.
2. Net I=B=R ratings shown are based on normal I=B=R piping and pickup allowance of 1.15. Consult the manufacturer for installations having unusual piping and pickup requirements such as intermittent system of operation, extensive piping systems, etc.
3. 15 foot height is measured from top of drafthood to top of chimney.
4. The 805 is a DOE heating capacity and AFUE efficiency. Furnished with electronic ignition and vent damper.

Maximum allowable working pressure: 50 PSI Water only.
50 PSI Safety Relief Valve - Standard
30 PSI Safety Relief Valve - Optional

1 square inch of free area per 4,000 btu of combined input rating of the fuel burning appliances, thus 550x2+150(water heater)= 1250.
1250/4= 313 square inches free.

Standard Equipment

- Cast Iron Section Assembly
- Deluxe Jacket with 3 inch Insulation
- 100% Shut-off Gas Controls
- Boiler Drain Valve
- 50VA Transformer and Junction Box
- Aluminized Steel Burners
- 1" Gas Connection
- 2" Supply and Return Connections
- 50 PSI Safety Relief Valve
- Stainless Steel Flue Baffles
- Blocked Vent Switch (BVS) - All Sizes
- Flame Roll-Out Switch (FRS) - All Sizes
- L4080D High Limit Control
- 750P-MT-120 Probe LWCO - 808H-810H only
- High Limit Control with Manual Reset - L4006E (in addition to L4080) - Packaged Boilers Only
- Electronic Ignition on 805H, 808H-810H for Natural or LP Gas
- 24V Standing Pilot on 806H, 807H for Natural or LP Gas
- Pressure Temperature Gauge
- New Fully Contained Shipping Skid and Crate (knockdown models only)

Packaged units are shipped packaged and wired in a reinforced cardboard container, for added protection.
Knockdown units are shipped in a stackable container with sections assembled and mounted on the base with manifold and burners installed. Controls, trim, drafthood, and jacket are shipped together in the same container as the boiler.

Optional Equipment

- 30 PSI Safety Relief Valve
- Electronic Ignition on 806H and 807H (standard on 805H, 808H thru 810H)
- Intermittent Circulation (24V)
- Electronic Control Sets to meet CSD-1
- Vent Damper — 806H thru 810H (standard on 805H), available on standing pilot and electronic ignition models only - not available with Electronic Control Sets
- Combustible Floor Shield

NOTE:
NOT FOR DIRECT INSTALLATION ON COMBUSTIBLE FLOORING. A HEAT SHIELD IS REQUIRED AND AVAILABLE FOR COMBUSTIBLE FLOOR INSTALLATION AND CONCRETE INSTALLATION WHICH IS OVER A MATERIAL THAT IS SUBJECT TO MELTING (PVC, PEX RADIANT TUBING ETC.). NOT FOR INSTALLATIONS ON CARPET, EVEN WITH A COMBUSTIBLE FLOOR SHIELD.

Phone: 717-481-8400
www.burnham.com
Form No. PL81401161000-8/05-5Ms
Printed in the U.S.A.

MAXITROL® company

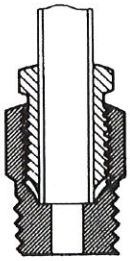
Accessories for Gas Pressure Regulators

All Maxitrol accessories have been designed for universal acceptance among utilities. These accessories can be ordered installed in the regulator, or by bulk quantity. When ordering, indicate part number, name, and size (if any). Include quantity of units desired.

Vent Tube Connector


Nut


Male Connector

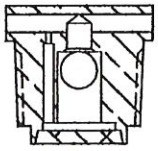


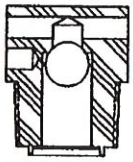
Threaded sleeve - two piece assembly where the nut is tightened inside male connector.
No. 11A03 - connects 1/8" female pipe thread to 1/8" O.D. tubing.
No. 11A04 - connects 1/8" female pipe thread to 1/4" O.D. tubing.

Threaded sleeve nut - for RV20V.
No. 11A08 - 5/16-24 threaded sleeve nut for 1/8" O.D. tube.

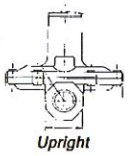
Compression fitting - where nut and sleeve are slipped over tubing and tightened into fitting body.
No. 11A05-42 - connects 1/4" female pipe thread to 1/4" O.D. tubing.
No. 11A05-61 - connects 1/8" female pipe thread to 3/8" O.D. tubing.
No. 11A05-63 - connects 3/8" female pipe thread to 3/8" O.D. tubing.
No. 11A05-64 - connects 1/2" female pipe thread to 3/8" O.D. tubing.

Vent Limiting Means


12A04/12A09


12A34/12A39

Optional automatic vent limiting device - ball check permits free inhalation for fast regulator - diaphragm response on opening cycle, but limits gas escapement to within ANSI standards should a diaphragm rupture. When using the vent limiting device, regulator must be mounted in a horizontal upright position for best performance.


Upright

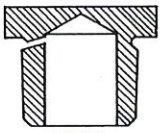
No. 12A04 - CSA certified for 14" w.c., and European approval. Color - brass. 1/8" NPT. Use on RV48, RV52, RV53, RV61 regulators.

No. 12A09 - CSA certified for 2 psi (LP) and 5 psi (natural) with 325-3, 325-3L, and European approval.
Color - green. 1/8" NPT.

No. 12A34 - CSA certified with RV81. Color - brass. 3/8" NPT.
Consult Maxitrol regarding vent limiter use.

No. 12A39 - CSA certified for 2 psi (LP) and 5 psi (natural) with 325-5A, 325-5AL, and European approval.
Color - brass. 3/8" NPT.
Satisfies ANSI Standards for both natural and LP gas.

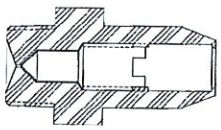
Vent Limiting Orifice


12A06

No. 12A06 - Color - brown. Orifice hole is on side of body, under head. Fixed orifice equally limits inhalation and escapement. Use on RV48, RV52, RV53, and RV61 regulators.

Satisfies ANSI Standards for both natural and LP gas.

Pressure Tap Connector



No. PF10 - Pressure tap connector installed as part of the control. It is a hose fitting incorporating a captured sealing means for testing inlet and outlet pressures. This eliminates the need for a special barb fitting.

Caution: Vent limiters are not recommended for use in models RV91, RV111, RV131, and 210 Series. Consult Maxitrol regarding vent limiter use in model RV81.

CHOOSING A VENT ACCESSORY

Note: If leak limiting device is not used, regulator must be vent piped in accordance with government and local codes and regulations.

RV12L - Built-in vent limiting orifice with dust cap standard.

RV20L - Built-in vent limiting orifice with dust cap standard .

RV20VL - Built-in vent limiting orifice with dust cap standard or use 11A08 threaded sleeve nut and run vent line as per code.

RV47 - Must Order: "L" - Integral vent limiting orifice, includes dust cap; or "D" - Integral ball-check limiting device, includes dust cap.

RV48 - 1/8" NPT vent tap. Optional 12A04 or 12A06 vent limiter. Optional 13A09 dust cap. Optional 10A16-2 or 10A16-3 plastic thread protector.

RV48L - integral vent limiting orifice.

RV52, RV53, RV61 - 1/8" NPT vent tap. Optional 12A04 or 12A06 vent limiter.

RV81 - 3/8" NPT vent tap. Optional 12A34 vent limiter. ***Consult Maxitrol regarding vent limiter use.***

RV91 - 1/4" NPT vent tap. 2-½" pipe size.*

RV91 - 1/2" NPT vent tap. 2" pipe size.*
***Caution:** Vent limiters are not recommended for use in RV91 models.*

RV111, RV131 - 3/4" NPT vent tap.
***Caution:** Vent limiters are not recommended for use in RV111 and RV131 models.*

210 Series - 3/8" NPT vent tap on 210D.*

210 Series - 1/2" NPT vent tap on 210E.*

210 Series - 3/4" NPT vent tap on 210G & 210J.*
***Caution:** Vent limiters are not recommended for use in 210 Series models.*

220 Series - Pilot regulator is equipped with 12A06 vent limiting orifice, separate vent line is not required.

325-3, 325-3L - 1/8" NPT vent tap.
Optional 12A09 vent limiting device.
For outdoor use: optional 13A15 vent protector.

325-5A, 325-5AL - 3/8" NPT vent tap. Optional 12A39 vent limiting device.

325-7, 325-7L - 1/2" NPT vent tap.

R400, R400S, R500, R500S, R600, R600S - 1/8" NPT vent tap. Optional 12A09 vent limiting device.

OPD47 - Integral vent limiting orifice, includes dust cap.

OPD48, OPD600 - 1/8" NPT vent tap. Optional 12A09 vent limiting device.

VENT DAMPENER

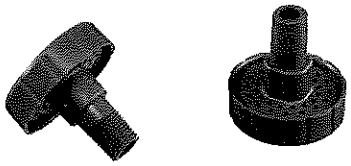
No. KVOP-4 - Used on 325-7.

DUST CAP

Use on vent opening to prevent blockage of breather hole from dust or other foreign particles.

No. 13A09 - for 1/8" NPT vent.
Press-in plastic cap.

VENT PROTECTOR



Designed for outdoor applications. Use on vent opening to protect breather hole from rain, snow, dust or other foreign particles and insects. *Note: Vent protector **MUST** be mounted in an upright position.*

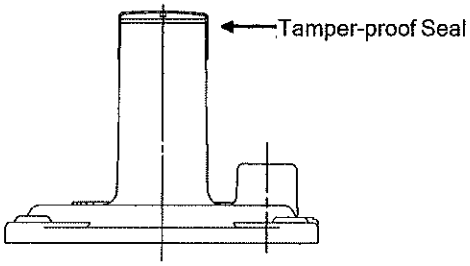
No. 13A15- for 1/8" NPT vent. For outdoor use in 325-3, 325-3L, RV48, RV52, RV53, RV61 RV81, R500S, and R600S. *Not a vent limiting device.*
Consult Maxitrol regarding other configurations.

VENT SCREEN

Brass, 40 mesh screen flame arrestor for insertion in vent outlet. Prevents ignition of gas-air mixture which might be present in upper diaphragm chamber.

No. 13A03-1 - for 1/8" NPT vent
No. 13A03-2 - for 1/4" NPT vent
No. 13A03-3 - for 3/8" NPT vent
No. 13A03-4 - for 1/2" NPT vent
No. 13A03-6 - for 3/4" NPT vent

TAMPER -PROOF SEALS



Permanent pressure sensitive backed paper. Attempted removal of these seals will destroy the face stock, leave adhesive residue on surface beneath, thus tampering can be easily detected. Available for all threaded models. Outlet pressure printed on seal.

No. 101310 - for RV12, RV20L, RV47, RV48, R400, RV52, RV53, RV61, RV500, RV600, 325-3, 325-5A.
No. 101311 - for RV81, RV91, RV111, 210D, 210E, 210G, 325-7.

MAXITROL® company

www.maxitrol.com

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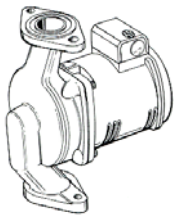
Bell & Gossett

SUBMITTAL

A-135D

JOB:	Southwest Community Health Center	**REPRESENTATIVE:**	
UNIT TAG:	HWCP-1	**SUBMITTED BY:**	**DATE:**
ENGINEER:		**APPROVED BY:**	**DATE:**
CONTRACTOR:	Eastern Mechanical Services		



SERIES PL™

Permanently Lubricated Iron & Bronze Booster Pumps

c UL us LISTED

DESCRIPTION

The Series PL™ close coupled booster pumps are specifically designed for quiet operation in hydronic, radiant and geothermal heating and cooling systems. These inline permanently lubricated pumps are available in cast iron or bronze body construction.

OPERATING DATA

Maximum working Pressure: 150 psi (10 Bar)
Maximum Operating Temperature: 225°F (107°C)

CONSTRUCTION MATERIALS

Booster Body: Cast Iron or Bronze
Face Plate: Stainless Steel
Impeller: 30% Glass Filled Noryl®
(PL-55 & PL-130): Glass Filled PPS
Shaft: Carbon Steel
(PL-55 & PL-130): Stainless Steel
Shaft Sleeve: Stainless Steel
(PL-55 & PL-130): None
Seal: Mechanical, Carbon on Silicon Carbide
Motor Bearings: Sealed Precision Steel Ball Bearing Permanently Lubricated
Motor Type: ODP
Elastomers: EPDM

SCHEDULE

CAST IRON			BRONZE			STANDARD 60 CYCLE SINGLE PHASE MOTOR CHARACTERISTICS				
MODEL NUMBER	PART NUMBER	QTY.	MODEL NUMBER	PART NUMBER	QTY.	HP	VOLTAGE	F.L. AMPS	RPM	TAGGING INFORMATION
PL-30	1BL012		PL-30B	1BL013		1/12	115	1.4	2650	
PL-30	1BL014		PL-30B	1BL015		1/12	230	0.8	2650	
PL-36	1BL001		PL-36B	1BL003		1/6	115	2.1	3300	
PL-36	1BL006		PL-36B	1BL008		1/6	230	1.1	3300	
PL-45	1BL002		PL-45B	1BL004		1/6	115	2.1	3300	
PL-45	1BL007		PL-45B	1BL009		1/6	230	1.1	3300	
PL-50	1BL016		PL-50B	1BL017		1/6	115	1.8	3300	
PL-50	1BL018		PL-50B	1BL019		1/6	230	1.0	3300	
PL-55	1BL032		PL-55B	1BL068		2/5	115	4.7	3250	
PL-55	1BL033		PL-55B	1BL069		2/5	230	2.4	3250	
PL-75	1BL034		PL-75B	1BL035		1/6	115	2.1	3400	
PL-75	1BL036		PL-75B	1BL037		1/6	230	1.1	3400	
PL-130/2"	1BL063		PL-130B/2"	1BL065		2/5	115	4.8	3200	
PL-130/2"	1BL064		PL-130B/2"	1BL066		2/5	230	2.4	3200	
PL-130/3"	1BL070		PL-130B/3"	1BL072		2/5	115	4.8	3200	
PL-130/3"	1BL071		PL-130B/3"	1BL073		2/5	230	2.4	3200	

Note: Where potable water is pumped, use a bronze booster.
PL boosters equipped with a drip-proof motor are recommended for indoor use only.

Bell & Gossett
ITT Industries
Engineered for life

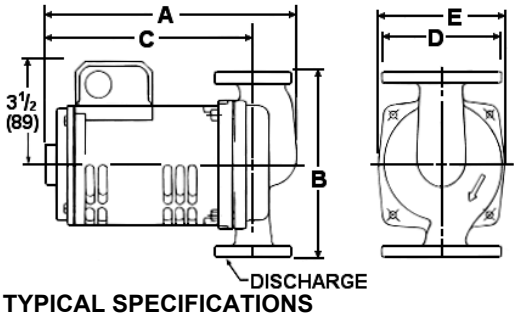
SERIES PL - Permanently Lubricated Booster Pumps

A-135D

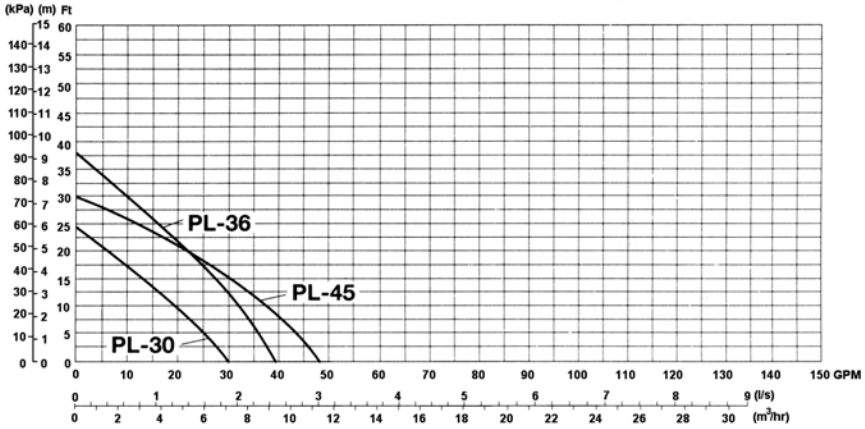
DIMENSIONS AND WEIGHTS

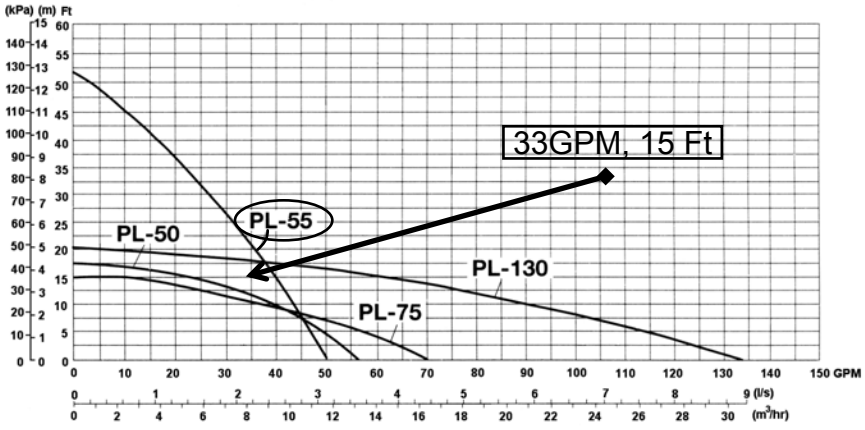
MODEL NO.	FLANGE SIZE INCHES - NPT	MOTOR HP	DIMENSIONS - INCHES (mm)					APPROXIMATE SHIPPING WT. LBS. (KG)
			A	B	C	D	E	
PL-30	3/4, 1, 1-1/4 & 1-1/2	1/12	8 5/8 (219)	6 3/8 (162)	7 1/8 (181)	4 3/16 (106)	4 3/8 (111)	11.6 (5.3)
PL-36	3/4, 1, 1-1/4 & 1-1/2	1/6	8 5/8 (219)	6 3/8 (162)	7 1/8 (181)	4 3/16 (106)	4 3/8 (111)	13.1 (6.0)
PL-45	1, 1-1/4 & 1-1/2	1/6	9 1/8 (232)	8 1/2 (216)	7 1/4 (184)	4 5/8 (117)	4 1/2 (114)	14.5 (6.6)
PL-50	1, 1-1/4 & 1-1/2	1/6	9 1/8 (232)	8 1/2 (216)	7 1/4 (184)	4 5/8 (117)	4 1/2 (114)	14.5 (6.6)
PL-55	3/4, 1, 1-1/4 & 1-1/2	2/5	9 9/16 (243)	6 3/8 (162)	7 15/16 (202)	4 3/16 (106)	4 3/4 (121)	13.1 (6.0)
PL-75	2	1/6	9 15/16 (252)	8 1/2 (216)	7 3/8 (187)	5 3/16 (132)	4 5/8 (117)	18.5 (8.4)
PL-130/2"	2	2/5	10 3/4 (273)	8 1/2 (216)	8 1/4 (210)	5 3/16 (132)	5 1/8 (130)	22 (10)
PL-130/3"	3	2/5	10 3/4 (273)	8 1/2 (216)	8 1/4 (210)	6 (152)	5 1/8 (130)	27 (12.2)

Dimensions are approximate and subject to change. Contact factory for certified dimensions.



PERFORMANCE CHARACTERISTICS CURVES





TYPICAL SPECIFICATIONS

The contractor shall furnish and install inline pumps as illustrated on the plans and in accordance with the following specifications:

1. The pumps shall be of the horizontal, permanently lubricated type, specifically designed and guaranteed for quiet operation.
2. The pumps shall have a steel shaft supported by permanently lubricated, sealed precision ball bearings. The pumps are to be equipped with a water-tight seal to prevent leakage. Mechanical seal faces to be carbon on silicon carbide. The motor shall be non-overloading at any point on the pump performance curve.
3. The motor shall be of the drip-proof, sealed precision ball-bearing, quiet-operating construction. The permanent split-capacitor motor shall be equipped with thermal overload protection.
4. Pumps to be suitable for 225°F (107°C) operating temperature at 150 psig (10 bar) working pressure.

The pumps shall be ITT Bell & Gossett Model No. PL-_____ with a capacity of _____ GPM at _____ feet of head.

ITT Industries

Bell & Gossett

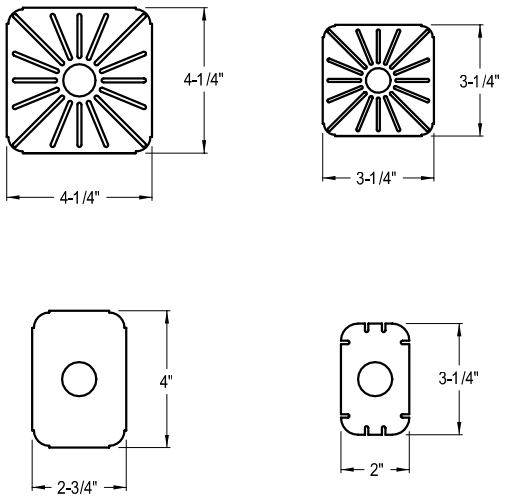
Bell & Gossett
8200 N. Austin Avenue, Morton Grove, IL 60053
Phone (847)966-3700
Facsimile (847)966-9052
www.bellgossett.com

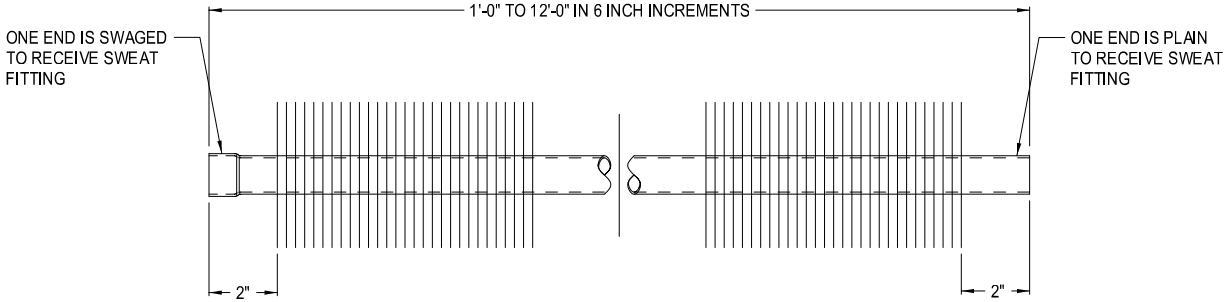
ISO 9001 Certified

MODEL	TUBE SIZE (OD)		TUBE MATERIAL	FIN SIZE	FIN MATERIAL	FINS/FT
	NOMINAL	ACTUAL				
3/4C - 2 X 3-1/4 - 58*	3/4"	7/8" OD	COPPER	2" X 3-1/4"	ALUMINUM	58
3/4C - 2-3/4 X 4 - 32 3/4C - 2-3/4 X 4 - 40 3/4C - 2-3/4 X 4 - 48	3/4"	7/8" OD	COPPER	2-3/4" X 4"	ALUMINUM	32 40 48
3/4C - 3-1/4 - 32 3/4C - 3-1/4 - 40 3/4C - 3-1/4 - 48	3/4"	7/8" OD	COPPER	3-1/4" X 3-1/4"	ALUMINUM	32 40 48
3/4C - 4-1/4 - 32 3/4C - 4-1/4 - 40 3/4C - 4-1/4 - 48	3/4"	7/8" OD	COPPER	4-1/4" X 4-1/4"	ALUMINUM	32 40 48
1C - 2 X 3-1/4 - 58*	1"	1-1/8" OD	COPPER	2" X 3-1/4"	ALUMINUM	58
1C - 2-3/4 X 4 - 32 1C - 2-3/4 X 4 - 40 1C - 2-3/4 X 4 - 48	1"	1-1/8" OD	COPPER	2-3/4" X 4"	ALUMINUM	32 40 48
1C - 3-1/4 - 32 1C - 3-1/4 - 40 1C - 3-1/4 - 48	1"	1-1/8" OD	COPPER	3-1/4" X 3-1/4"	ALUMINUM	32 40 48
1C - 4-1/4 - 32 1C - 4-1/4 - 40 1C - 4-1/4 - 48	1"	1-1/8" OD	COPPER	4-1/4" X 4-1/4"	ALUMINUM	32 40 48
1-1/4C - 2-3/4 X 4 - 32 1-1/4C - 2-3/4 X 4 - 40 1-1/4C - 2-3/4 X 4 - 48	1-1/4"	1-3/8" OD	COPPER	2-3/4" X 4"	ALUMINUM	32 40 48
1-1/4C - 3-1/4 - 32 1-1/4C - 3-1/4 - 40 1-1/4C - 3-1/4 - 48	1-1/4"	1-3/8" OD	COPPER	3-1/4" X 3-1/4"	ALUMINUM	32 40 48
1-1/4C - 4-1/4 - 32 1-1/4C - 4-1/4 - 40 1-1/4C - 4-1/4 - 48	1-1/4"	1-3/8" OD	COPPER	4-1/4" X 4-1/4"	ALUMINUM	32 40 48

NOTES:
1) FIN THICKNESS IS 0.016 INCH EXCEPT AS NOTED,
*0.010" THICK ALUMINUM
2) COPPER MAT'L TYPE C122

ALUMINUM FIN SIZES





CERTIFIED ISO 9001 QUALITY

CONTRACTOR Eastern Mechanical Services ELEMENT 3/4"C - 2-3/4" x 4" - 32

ARCHITECT _____ RATING 790 BTU 180 A.W.T. _____ E.A.T.

ENGINEER _____

REPRESENTATIVE R.A. Novia

LOCATION FTR-A

HYDRO-AIR COMPONENTS,INC.
4950 CAMP ROAD
HAMBURG, NEW YORK 14075

Rittling HEAT-TRANSFER EQUIPMENT

JOB: Southwest Community Health Center

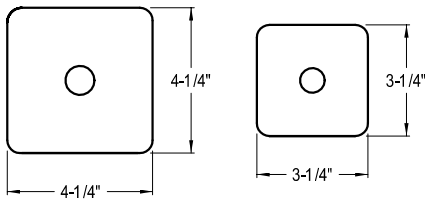
ENCLOSURE MODEL: ALUMINUM ELEMENT

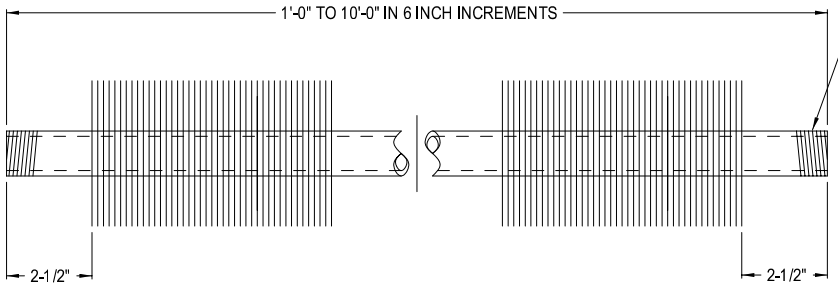
DATE: 08-23-02 DWG. NO. ALUMINUM ELEMENT

MODEL	TUBE SIZE (OD)		TUBE MATERIAL	FIN SIZE	FIN MATERIAL	FINS/FT
	NOMINAL	ACTUAL				
1S - 3-1/4 - 32 1S - 3-1/4 - 40 1S - 3-1/4 - 48	1"	1-5/16" OD	STEEL	3-1/4" X 3-1/4"	STEEL	32 40 48
1S - 4-1/4 - 32 1S - 4-1/4 - 40 1S - 4-1/4 - 48	1"	1-5/16" OD	STEEL	4-1/4" X 4-1/4"	STEEL	32 40 48
1-1/4S - 3-1/4 - 32 1-1/4S - 3-1/4 - 40 1-1/4S - 3-1/4 - 48	1-1/4"	1-11/16" OD	STEEL	3-1/4" X 3-1/4"	STEEL	32 40 48
1-1/4S - 4-1/4 - 32 1-1/4S - 4-1/4 - 40 1-1/4S - 4-1/4 - 48	1-1/4"	1-11/16" OD	STEEL	4-1/4" X 4-1/4"	STEEL	32 40 48
2S - 4-1/4 - 32 2S - 4-1/4 - 40 2S - 4-1/4 - 48	2"	2-3/8" OD	STEEL	4-1/4" X 4-1/4"	STEEL	32 40 48

NOTES:
1) FIN THICKNESS IS 0.030 INCH
2) BLK. PIPE SCHEDULE 40

STEEL FIN SIZES





UNLESS OTHERWISE SPECIFIED, EACH TUBE END HAS AMERICAN STANDARD PIPE THREAD, GAGES FLUSH PLUS OR MINUS ONE THREAD. (PLAIN END OR CHAMFERED FOR WELDING AVAILABLE UPON REQUEST)

CERTIFIED ISO 9001 QUALITY

CONTRACTOR _____ ELEMENT _____

ARCHITECT _____ RATING _____ BTU _____ A.W.T. _____ E.A.T.

ENGINEER _____

REPRESENTATIVE _____

LOCATION _____

HYDRO-AIR COMPONENTS,INC.
4950 CAMP ROAD
HAMBURG, NEW YORK 14075

Rittling HEAT-TRANSFER EQUIPMENT

JOB:

ENCLOSURE MODEL: STEEL ELEMENT

DATE: 08-23-02 DWG. NO. STEEL ELEMENT

Submittal Data

RTU CURB

Project:
Southwest Community Health

Contractor:
Controlled Air

Date:
July 10, 2006

Rev.:
2
For Approval

Submitted By:
Aercon Inc.
345 Highland Ave. Suite 201
Cheshire, CT 06410
Tel. # 203-271-3386
Fax # 203-271-2067

COOK

SUBMITTAL

PROJECT: 968 FAIRFIELD AVE BLDG

LOCATION: Fairfield, CT

ENGINEER: Syska & Hennesey Eng.

CONTRACTOR: Controlled Air
Rob Kinne

SUBMITTED BY: Joe Scott
Air Equipment LLC
43 Thomas St.
East Hartford, CT 06108
PHONE: 860-290-6969 x-102
FAX: 860-290-6977
E-MAIL: jscott@airequipmentllc.com

☐ NO EXCEPTION TAKEN ☐ REVISE – NO RESUBMISSION REQUIRED
☐ REJECTED ☐ REVISE AND RESUBMIT
☐ SUBMIT SPECIFIED ITEM ☐ RETURNED WITHOUT ACTION

Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

SYSKA HENNESSY GROUP
Engineers

Date: 8/9/06 By:

DATE: 07-13-2006

DUCT CONSTRUCTION

Southwest Community Health Center

a) All supply, return, and general exhaust to be galvanized G-90 sheets - CONFORM W/ ASTM A90.

b) 4" W.G. supply ductwork from fan discharge to variable air volume terminal units

c) 2" W.G. supply ductwork from variable air units to diffusers. Also toilet and general exhaust

d) Seal all duct with Class "A" duct seal

e) All ductwork to use TDF or ward frames

f) No ductwork will be aluminum or stainless steel (none shown on drawings) UNINSULATED DUCTS ON ROOF TO BE ALUMINUM.

g) All supply and return ductwork to be insulated with 1" fiberglass blanket

h) Duct liner in transfer ducts only - PROVIDE DATA SHEET FOR INSULATION

PROVIDE INFORMATION ON SEISMIC BRACING AS STATED IN SPECIFICATION SECTION 15005.

SUBMITTAL DATA

RECEIVED

JUL 19 2006

SYSKA HENNESSY GROUP INC
11 W. 42nd STREET
NEW YORK, N.Y. 10036

RTU SUBMITTAL

FOR: APPROVAL

DATE: 07/10/06

PROJECT: SOUTHWEST COMMUNITY HEALTH

PURCHASER: CONTROLLED AIR
ATTN: ROB

SUBMITTED BY:

HEAT INC.
9 FLAGSTONE DRIVE
HUDSON, NH 03051

☒ NO EXCEPTION TAKEN ☐ REVISE - NO RESUBMISSION REQUIRED

☐ REJECTED ☐ REVISE AND RESUBMIT

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Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for communing and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of all other trades, and performing his work in a safe and satisfactory manner.

SYSKA HENNESSY GROUP
Engineers

Date 7/25/06 By:

Southwest Community Health Center

Submittal

TITLE: *Ductwork*
Section 15890-1

ENGINEER: *Gretsky & Assoc.*
49 West 37th St.
New York, NY 10018

SUBMITTED BY: *Controlled Air, Inc*
21 Thompson Rd
Branford, CT 06405
203-481-3531
203-481-3533 (fax)

INSULATION & SEISMIC BRACING DATA REQUIRED

☐ NO EXCEPTION TAKEN ☒ REVISE - NO RESUBMISSION REQUIRED
☐ REJECTED ☐ REVISE AND RESUBMIT
☐ SUBMIT SPECIFIED ITEM ☐ RETURNED WITHOUT ACTION

Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for communing and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

SYSKA HENNESSY GROUP
Engineers

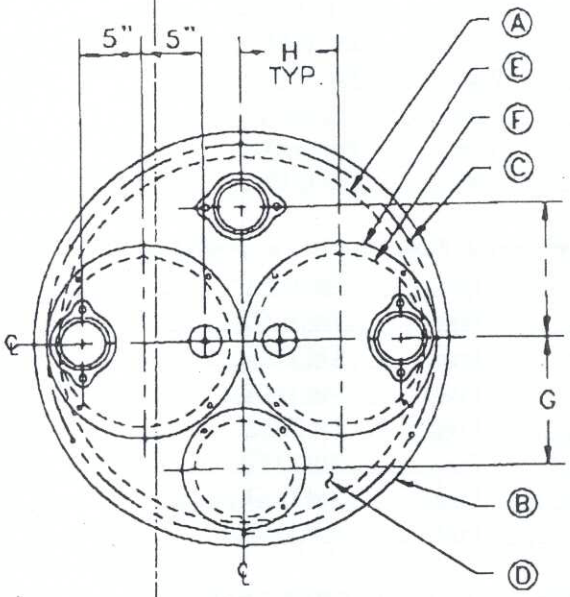
Date 8/9/06 By: DG Henry

July 10, 2006

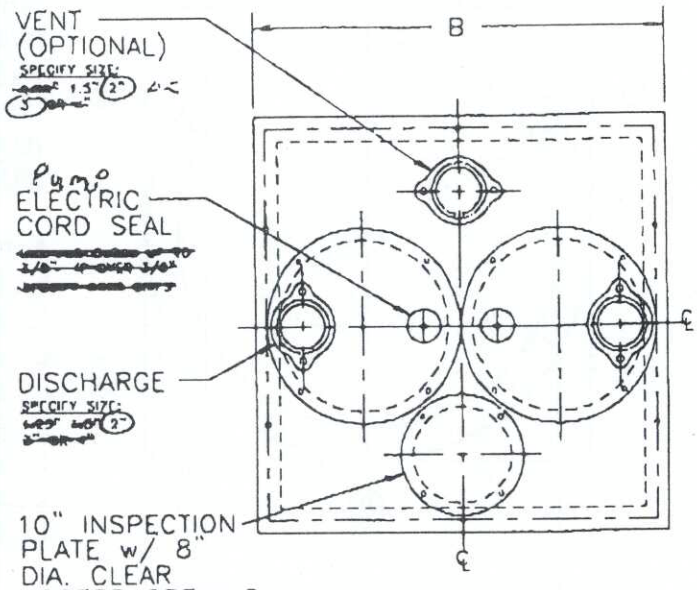
NO. 6-220

DUPLEX STEEL BASIN COVER

STAINLESS STEEL HARDWARE STANDARD
GASKET TAPE PROVIDED



* ROUND COVER



~~SQUARE COVER~~

	PART NO.	STYLE	Ⓐ BASIN INSIDE DIM.	Ⓑ OUTSIDE DIM.	Ⓒ BOLT CIRCLE	Ⓓ THICKNESS	Ⓔ ACCESS PLATE DIM.	Ⓕ CLEAR ACCESS DIM.	Ⓖ DISTANCE	Ⓗ DISTANCE	Ⓘ DISTANCE
	C24DSA	ROUND SQUARE	24 24x24	28 28x28	26.5 26.5x26.5	.25 .25	13x17 13x17	11x15 11x15	9.50 9.50	6.50 6.50	10 10
	C30DSA	ROUND SQUARE	30 30x30	34 34x34	32.5 32.5x32.5	.25 .25	16 16	14 14	10.50 10.50	8.00 8.00	11 11
	C36DSA	ROUND SQUARE	36 36x36	40 40x40	38.5 38.5x38.5	.25 .25	18 18	16 16	13.00 13.00	10.00 10.00	14 14
*	C42DSA	ROUND ~~SQUARE~~	42 ~~42x42~~	46 ~~46x46~~	44.5 ~~44.5x44.5~~	.25 ~~.25~~	22 ~~22~~	20 ~~20~~	14.00 ~~14.00~~	10.00 ~~10.00~~	14 ~~14~~
	C48DSA	ROUND SQUARE	48 48x48	54 54x54	51.0 51.0x51.0	.25 .25	22 22	20 20	18.00 18.00	12.00 12.00	20 20
	C60DSA	ROUND SQUARE	60 60x60	66 66x66	63.0 63.0x63.0	.375 .375	28 28	26 26	15.50 15.50	15.50 15.50	25 25
	C72DSA	ROUND SQUARE	72 72x72	78 78x78	75.0 75.0x75.0	.375 .375	28 28	26 26	15.50 15.50	15.50 15.50	30 30

ALL DIMENSIONS IN INCHES

TOPP INDUSTRIES INCORPORATED

DESCRIPTION: DUPLEX STEEL COVER

REFERENCE: 10082

DRAWN BY:	CHECKED BY:	SUPERSEDES PRINTS PRIOR TO:
K.J.K.		10/17/94

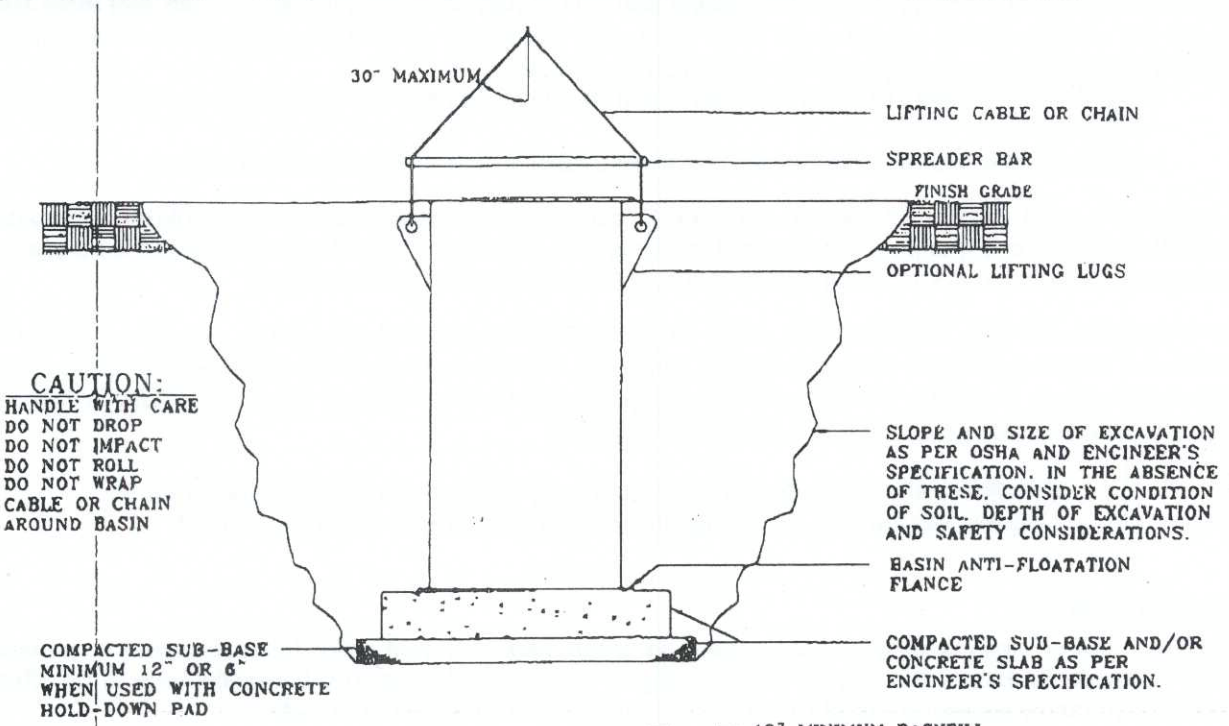
DATE:	REV.:	NO.:
10/17/94	0	6-220

SCALE: NONE DISK:

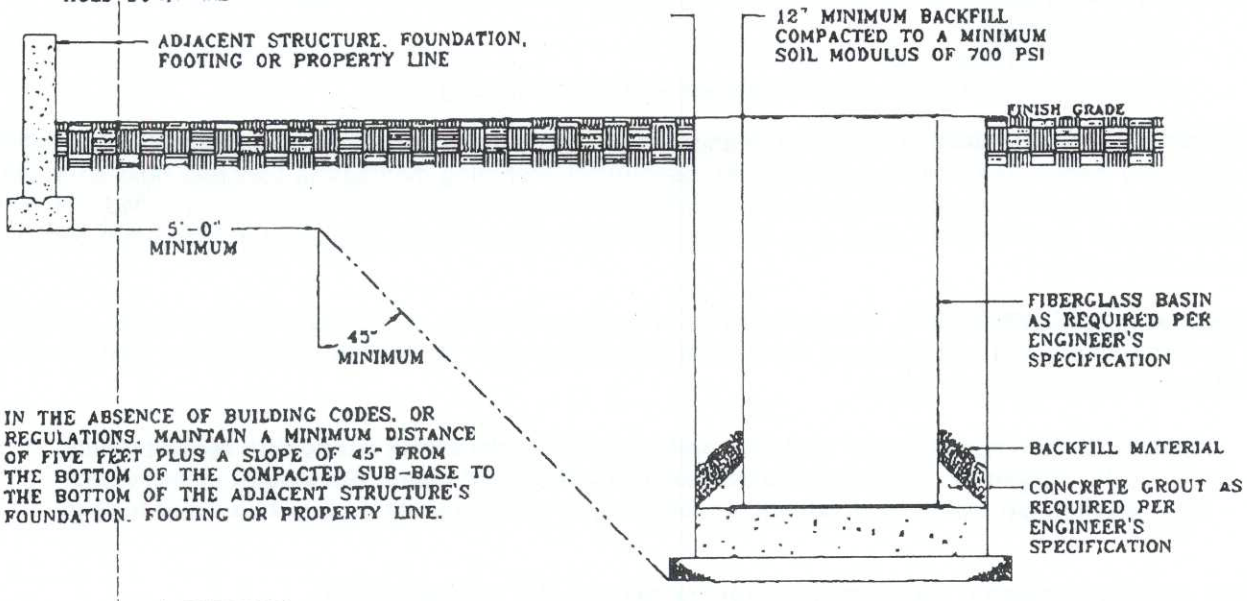
TOPP INDUSTRIES, INC. • P.O. BOX 420 • ROCHESTER, IN 46975 • TOLL FREE 800-354-4534 • FAX 219-223-6106 • WEB SITE www.toppindustries.com • EMAIL toppindustries@toppindustries.com

TOPP INDUSTRIES INCORPORATED

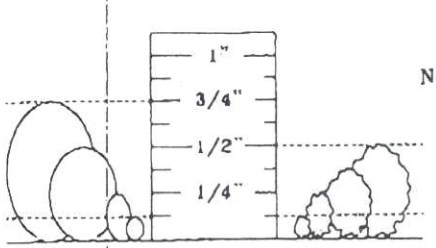
FIBERGLASS BASIN INSTALLATION REFERENCE GUIDE



CAUTION:
HANDLE WITH CARE
DO NOT DROP
DO NOT IMPACT
DO NOT ROLL
DO NOT WRAP CABLE OR CHAIN AROUND BASIN



IN THE ABSENCE OF BUILDING CODES, OR REGULATIONS, MAINTAIN A MINIMUM DISTANCE OF FIVE FEET PLUS A SLOPE OF 45° FROM THE BOTTOM OF THE COMPACTED SUB-BASE TO THE BOTTOM OF THE ADJACENT STRUCTURE'S FOUNDATION, FOOTING OR PROPERTY LINE.



BACKFILL MATERIAL REQUIREMENTS

NOTE:

The intent of these installation instructions and illustrations is to ensure that damage or premature failure to the basin will not occur. These installation instructions and illustrations are NOT intended to preclude normal safety procedures which should be followed to prevent injury to personnel. SAFE INSTALLATION PROCEDURES SHALL BE ENTIRELY THE RESPONSIBILITY OF THE INSTALLER.

7-130

10076 REV 0 090704

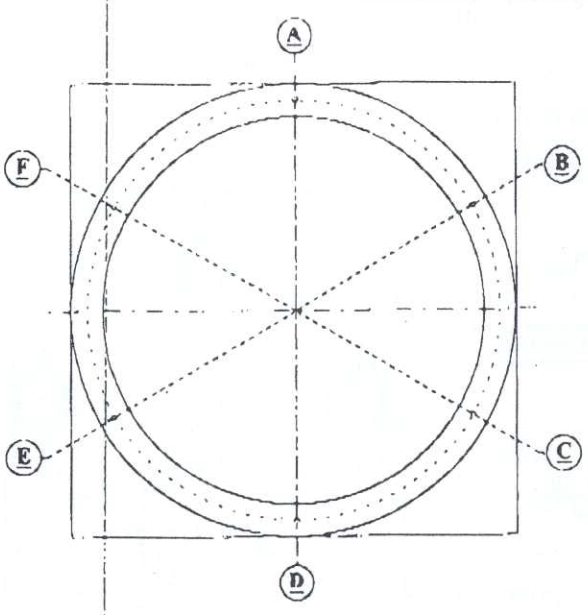
TOPP INDUSTRIES, INC - P.O. BOX 420 - ROCHESTER, IN 46975 - TOLL FREE 800-354-4534 - FAX 219-223-8106 - WEB SITE www.toppindustries.com - EMAIL toppindustries@toppindustries.com

TOPP INDUSTRIES INCORPORATED

FIBERGLASS BASIN SYSTEMS SPEC SHEET

USE FOR FACTORY INSTALLED BASIN ACCESSORIES

01/01/2000



(A) Size:	Type:	Top To CL:
(B) Size:	Type:	Top To CL:
(C) Size:	Type:	Top To CL:
(D) Size:	Type:	Top To CL:
(E) Size:	Type:	Top To CL:
(F) Size:	Type:	Top To CL:

Locations for other adders

( ) Size:	Type:	Top To CL:
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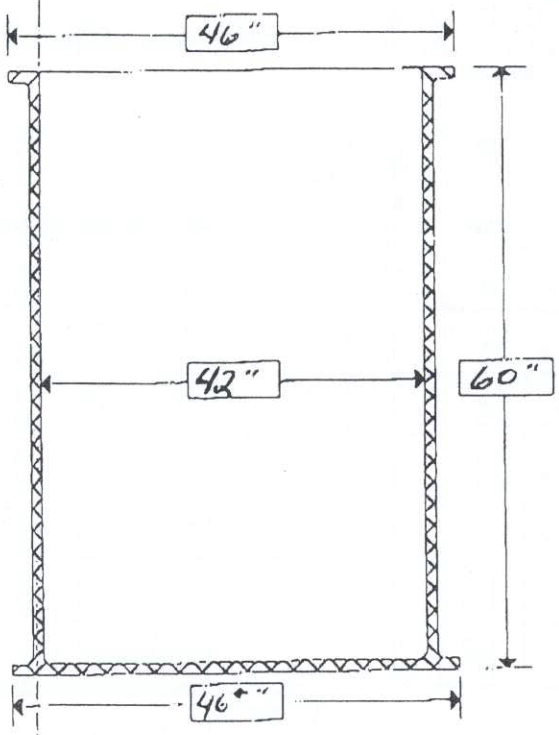


FIBERGLASS BASIN SHORT SPECS

The resins used shall be a commercial grade ployester and shall be evaluated as a laminate by test or determined by previous service to be acceptable for the intended environment.

The reinforceing material shall be a commercial grade of glass fiber (continuous strand, chopped-strand, continuous mat and/or noncontinuous mat) having a coupling agent which will provide a suitable bond between the glass reinforcement material resin.

The FRP laminate wall thickness shall very with the wet well height to provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements The wet well FRP wall laminate must be designed to withstand wall collapse or buckling based on a hydrostatic pressure of 62.4 lbs. per sq. ft.; a saturated soil weight of 120 lbs. per cu. ft., a soil modus of 700 lbs per sq ft.; and, the pipe stiffness values as specified in ASTM D3753. The wet well FRP laminate must be constructed to withstand or exceed two times the assumed loading on any depth of the wet well.

The finished FRP laminate will have a Barcol hardness of at least 80% of the resin manufacturer's specified hardness for the fully cured resin. The Barcol hardness shall be the same for both interior and exterior surfaces.

The wet well top flange shall have an outside diameter at least 4" greater than the inside diameter of the wet well. A four or six hole pattern shall accommodate the mounting of a cover with at least 0.25" in diameter 300 series stainless steel fasteners Noncorroding stainless steel threaded inserts shall be fully encapsulated with noncontinuous mat or chopped-strand glass fiber reinforcement. The inserts shall have an offset tab to prevent stripping or spinning out when removing and reinserting cover fasteners.

Topp Industries, Inc.
P.O. Box 420 - Rochester, IN 46975
(800) 354-4534 Fax (219) 223-6106
www.toppindustries.com

BACKFILLING, *continued*

BACKFILL MATERIAL. Backfill material should be clean, well-granulated, free-flowing, noncorrosive, and inert. It should be free of ice, snow, debris, rock, or organic material, all of which could damage the tank and interfere with the compaction of the backfill material. The largest particles should not be larger than 3/4 inch. Not more than 3 percent (by weight) should pass through a #8 sieve, and the backfill material should conform to ASTM C-33, Paragraph 9.1 requirements. Approved backfill materials include:

- Pea Gravel, naturally-rounded particles with a minimum diameter of 1/8 inch and a maximum diameter of 3/4 inch.
- Crushed Rock, washed and free-flowing angular particles between 1/8 inch and 1/2 inch in size.

PLACEMENT AND COMPACTION OF BACKFILL. compaction of backfill materials should be adequate to ensure the support of the tank, and to prevent movement or settlement. Backfill materials should be place in 12 inch lifts and compacted to a minimum soil modulus of 700 pounds per square inch (psi).

SUPPORTING PIPING, EQUIPMENT AND ACCESSORIES. Support for piping, equipment and other accessories must be provided during backfilling. Using the basin to support piping, equipment, cribbing, bracing or blocking is never permitted. During backfilling, temporary supporting materials must be carefully installed and removed to prevent damage to the basin, piping or equipment.

WARNING! Using the basin to support any loading carried or created by piping, equipment, cribbing, bracing or blocking is never permitted.

ANCHORAGE

GENERAL. When basin installations are located in areas subject to high water tables or flooding, provisions should be made to prevent the basins, either empty or filled, from floating. The buoyancy force to be offset is determined primarily by the volume of the basin. The principle offsetting factors include:

- Backfill materials.
- Concrete hold-down pad.
- Friction between the tank, backfill materials and the surrounding soil.

METHODS OF ANCHORAGE. All methods of anchoring basins use the weight of the backfill materials to offset the buoyancy forces. The use of supplemental mechanical anchoring methods (a concrete hold-down pad) increases the amount of backfill ballast which is mechanically attached to the basin. The recommended method of attachment is to pour concrete grout over the basin's anti-floatation flange and concrete hold-down pad (see attached illustration).

ANCHORAGE REQUIREMENTS. Requirements for anchorage, thickness of concrete hold-down pads, as well as the size of anchors and reinforcement must be calculated for each installation based on the environmental conditions of that specific installation.

WARNING! Use "submerged" material weights when calculating anchorage requirements. Example: weight of concrete (150 pounds per cubic foot) minus the weight of the water 62.4 pounds per cubic foot) equals a "submerged" weight of 87.6 pounds per cubic foot.

FOR ADDITIONAL INFORMATION PLEASE CONTACT:

TOPP INDUSTRIES, INC.
P.O. Box 420 • Highway 25 North • Rochester, Indiana 46975
Toll Free 800-354-4534 • Fax 219-223-6108 • Web site www.toppindustries.com • Email toppindustries@toppindustries.com

FIBERGLASS BASIN INSTALLATION REFERENCE GUIDE

PURPOSE

The purpose of this guide is to provide a brief reference to the recommended methods and procedures for installing Topp Industries' underground sump and sewage basins to ensure that damage or premature failure of the basin do not occur.

Studies conducted by both environmental regulatory agencies and trade organizations demonstrate that the most significant source of leaks and failures in underground storage systems is improper handling and installation. Proper handling and installation requires practical experience combined with strict adherence to proven methods and procedures.

This guide is **not** intended to serve as a basic instructional manual. The installation of our sump and sewage basins is a specialized skill, and it is assumed that the individuals who install our products and refer to this guide will have a basic understanding of such procedures as excavating, backfilling, pipefitting and electrical work. No amount of written instruction by a manufacturer or a regulatory agency will convert an inexperienced, under-supervised laborer into a skilled, experienced mechanic. The ability to recognize and correctly respond to abnormal conditions during a basin installation requires field experience as well as mechanical aptitude.

In addition to proper system engineering and competent manufacturing, the use of basin installers who have both practical experience and integrity to insist that the basin be installed properly constitutes the greatest protection from catastrophic basin failure and liability exposure.

DISCLAIMER

Every reasonable effort has been put forth by Topp Industries, Inc. and its agents to ensure the accuracy and reliability of the information contained in this reference guide. However, neither Topp Industries, Inc., it agents, nor its consultant make any representation, warranty, or guarantee in connection with the publication of these recommended methods and procedures. Topp Industries, Inc. hereby disclaims any liability for loss or damage resulting from their use; for the violation of any federal, state, county or municipal regulations with which these recommended methods and procedures may conflict; or for the infringement of any patent resulting from the use of these recommended methods and procedures.

These handling and installation instructions are **not** intended to preclude normal safety procedures which should be followed to prevent injury to personnel. SAFE INSTALLATION PROCEDURES SHALL BE ENTIRELY THE RESPONSIBILITY OF THE INSTALLER.

MATERIAL HANDLING

GENERAL HANDLING. Although the exterior surfaces of our fiberglass reinforced plastic (FRP) sump and sewage basins are designed to withstand normal handling, they can be damaged during transportation and installation. Basins must not be dropped, dragged or handled with sharp objects and with the exception of the minimal movement involved in a visual inspection, should not be rolled.

If the basin or its shell are damaged, installation should be suspended until a determination of the extent of damage can be made by Topp Industries, Inc. or its agent. Any repairs must be first authorized in writing by Topp Industries, Inc. and then be done in accordance with Topp Industries' instructions.

UNLOADING, LIFTING AND LOWERING. The proper way of moving a basin is by lifting it, using chains or cables with the optional lifting lugs (not more than 30° included angle) or by using a non-marring sling around the basin. Before any attempt is made to move a basin, it should be established that all of the equipment and accessories have sufficient capacity and reach to lift and lower the basins without dragging and/or dropping. Basins should be maneuvered with guide ropes attached to the sides.

WARNING! Under no circumstances is the use of chains or cables around the basin shell permitted.

TOPP INDUSTRIES, INC. • P.O. BOX 420 • ROCHESTER, IN 46975 • TOLL FREE 800-354-4534 • FAX 219-223-6106 • WEB SITE www.toppindustries.com • EMAIL toppindustries@toppindustries.com

MATERIAL HANDLING, *continued*

STORAGE. Basins should be stored in a secure, controlled area where the potential for accidental damage or vandalism will be minimized. The storage area should be free from sharp objects, rocks and any other foreign solutions or materials that could cause damage to the basins. Chock the basins until they are needed for installation and if windy conditions are possible, secure the basins with non-marring restraints of a size and number adequate for securing the basin.

PREINSTALLATION INSPECTION. Basins, valves, equipment and piping materials should be physically and visually inspected prior to installation. Adherence to the project's specifications should also be confirmed before installation. If the basin or any of its internal components are damaged, installation should be suspended until a determination of the extent of damage can be made by Topp Industries, Inc. or its agent. Any repairs must be first authorized in writing by Topp Industries, Inc. and then be done in accordance with Topp Industries' instructions.

EXCAVATING

EXCAVATING. The excavation should provide adequate space for the basin, piping and other buried equipment and for the placement and compaction of backfill materials particularly around the basin walls. The size, shape and wall slope of the excavation should be determined by soil conditions, depth of excavation, shoring requirements, and, if workers are required to enter the excavation, safety considerations and federal, state, county and municipal regulations.

WARNING! Locate all overhead and underground utilities before excavating.

LOCATION OF EXCAVATION. Excavation for an underground basin should be made with due care to avoid undermining foundations of existing structures and contact with underground utilities. In the absence of building codes or regulations, maintain a minimum distance of five feet plus a slope of 45° from the bottom of the compacted sub-base to the bottom of the adjacent structures, foundations, footings and property lines (as shown in the attached illustration). Additional distances may be required to assure that any loading carried or created by the foundations and supports cannot be transferred to the basins.

MAXIMUM BURIAL DEPTH. If burial depth is greater than the basin height, contact Topp Industries, Inc. to determine if additional wall reinforcement is required and secure written authorization.

HANDLING OF EXCAVATED MATERIALS. Excavated materials which cannot be removed from the jobsite should be carefully stored as far from the edge of the basin excavation as possible. Unless approved for use as backfill, excavation materials should be securely stored separate from approved backfill materials.

WORK AREA SAFETY. Safe installation procedures shall be the sole responsibility of the basin installer. Work safety requirements are defined in U.S. Department of Labor 29 CFR part 1926, subpart P, Excavations.

BACKFILLING

GENERAL. Careful selection, placement and compaction of approved backfill material is critical to a successful basin installation. Among the common problems associated with basin leaks and premature failures are:

- Use of an incorrect backfill material.
- Inadequate or improper placement or compaction
- Rocks, clods or debris left in the excavation or basin.
- Voids under or around the perimeter of the basin.
- Failure to prevent the migration of backfill materials.

PLACEMENT OF BASIN. The bottom of the basin excavation should be covered with suitably graded, leveled, and compacted backfill material to a depth of at least 12 inches (compacted sub-base). If a concrete hold-down/anti-flotation pad is required, this bedding can be reduced to a depth of at least 6 inches. The basin should then be carefully lowered into the excavation and centered on the compacted backfill or concrete pad (see attached illustration).

WARNING! Placement of a basin on a concrete pad or compacted sub-base smaller than the total basin bottom area or on intermediate supports (saddles) will cause uneven distribution of loads. This may contribute to structural failure, and is never permitted.

Halsey Taylor
Satisfying Thirsts Since 1912

Southwest Community Health Center EDF-1

Bi-Level Barrier-Free Cooler

MODEL: ☐ **HAC8FSBL-Q CHILD SS**

This water cooler is certified to **NSF/ANSI 61.**

GENERAL
Self-contained, electric refrigerated, bi-level wall-mounted water cooler easily accessible to physically challenged individuals. When properly installed, unit meets state and federal requirements for **both children and adults** as defined by the Americans with Disabilities Act. Unit is certified to NSF/ANSI 61, and meets requirements of the Safe Drinking Water Act. Unit provides 50° F water at 80° F inlet water and 90° F ambient.

CABINET
Stainless steel panels resist wear and corrosion. Durable Satin Finish helps hide water spots and fingerprints.

COOLER TOP
Non-corrosive stainless steel cooler top, no. 300 series with satin finish resists stains and corrosion and is easy to maintain. Anti-splash ridge reduces splatter. Contoured to insure proper drainage.

BUBBLER
Exclusive one-piece, chrome-plated two-stream mound-building bubbler with non-removable anti-squirt feature and integral hood insures a satisfying drink of water.

PUSH BAR ACTUATION MECHANISM
Self-closing, light-touch push bars on front and sides with raised letters for the visually impaired.

AUTOMATIC STREAM HEIGHT REGULATOR
Self-closing assembly is located inside unit to prevent tampering. Unit resists corrosion and liming. A constant stream height is automatically maintained under line pressures that vary from 20 to 105 psi.

INLET STRAINER
Easily cleaned in-line strainer screen traps particles of 140 microns or larger before they enter the waterway.

TEMPERATURE CONTROL
Positive sensing thermostat for controlling temperature of storage tank water. Factory set at 50° F Adjustable ± 5° F.

STORAGE TANK
Non-pressurized stainless steel evaporator/storage tank for long life. Waterways are certified to NSF/ANSI 61, far exceeding the requirements of the Safe Drinking Water Act.

REFRIGERATION SYSTEM
Hermetically sealed, positive start compressor with lifetime lubrication and built-in overload protection, efficient capillary sizing, large capacity dryer-strainer, and fan cooled copper/aluminum condenser with self-lubricated bearing. System uses R134A refrigerant. Protected by Halsey Taylor's Limited 5 Year Warranty.

VENTILATION
Insure proper ventilation by maintaining 6" (152mm) minimum clearance from cabinet louvers to wall.

SUGGESTED SPECIFICATIONS
Shall deliver 8.0 GPH of 50° F water at 90° F ambient and 80° F inlet water. Shall have stainless steel basin with removable drain strainer. Bubbler shall be two-stream, mound building type. Separate valve and automatic stream regulator shall be mounted within cabinet. Refrigeration system shall employ high efficiency, positive start compressor using R134A, non-pressurized tank with totally encapsulated insulation and be controlled by positive sensing thermostat. Shall have front and side push-bar water controls with raised lettering for the visually impaired. Cooler shall comply with ANSI 117:1 and ADA for visual and motion disabilities. The manufacturer shall certify the unit to meet the requirements of NSF/ANSI 61, and the Safe Drinking Water Act. Unit complies with ARI Standard 1010.

NOTE: Continued product improvement makes specifications subject to change without notice. See Halsey Taylor website for most current spec sheet.

Stainless Steel Finish Only

Optional Accessories (extra cost)

- ☐ Glass Filler Kit
- ☐ Water Filter
- ☐ Vandal-Resistant Kit
- ☐ Easy-Flex™ Bubbler
- ☐ Cane Touch Apron

CFC LEAD ADA NSF/ANSI 61

Halsey Taylor Barrier-Free Drinking Fountains and Water Coolers conform to The Americans with Disabilities Act and American National Standards Institute Specifications.

HAC-Q BARRIER-FREE SERIES

Model No.	GPH Capacity Cooled to 50° F* Ambient Air Temp 70°F	80°F	90°F†	100°F	Base Rate Cap.	F.L. Amps	Shipping Weight lb.	Rated Watt Usage
HAC8FSBL-Q CHILD SS	9.6	8.8	8.0	7.2	8.0	3.7	92	325

* With projector service and tap water at 80° F

† UL listed and complies with ARI Standard 1010

Trap and service stop not included

c UL us

www.halseytaylor.com
HALSEY TAYLOR, 2222 CAMDEN COURT, OAK BROOK, ILLINOIS 60523

Bi-Level
Barrier-Free Cooler

(CONTINUED)

MOUNTING INSTRUCTIONS
Locate and secure wall hangers to wall. Note location of waste trap (in right side unit). To insure proper engaging of waste line into trap, centerline of trap must be 5" from wall face. Mount handicap (refrigerated) unit on right wall bracket and secure cabinet to wall using holes in lower back of frame. Mount fountain (non-refrigerated) unit on left wall bracket and against left side of handicap unit. Secure cabinet to wall using holes in lower back of frame. Install connecting waste line to tailpieces on both units. Insulated water line furnished to connect fountain to handicap unit. Connect building water supply line to "water inlet" connection on handicap unit. Complete instructions packed with unit.

Trap and service stop not included.

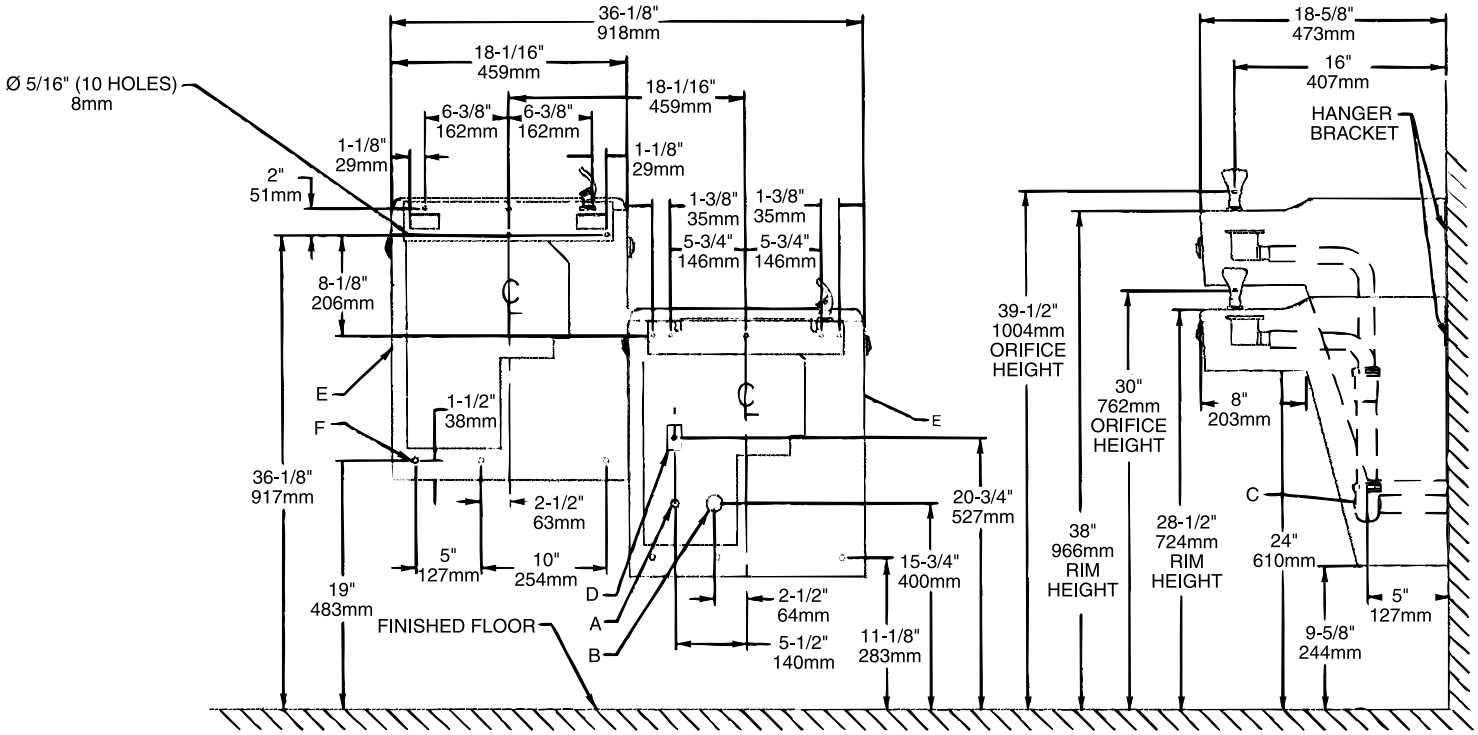
OPERATING PRESSURES:
Supply water - 105 psi maximum

Minimum 40 psi supply line pressure required in special circumstances when both sides of bilevel are in use simultaneously to ensure adequate stream height. Does not apply to non-refrigerated units.

ELECTRICAL
Furnished with plug-in, 3-wire grounding type service cord. Standard 120 volt, 60 Hz, single phase. Install 120-volt receptacle, rated at 15-amp minimum, to receive 3-wire parallel blade grounding type male plug.

FRONT VIEW

SIDE VIEW



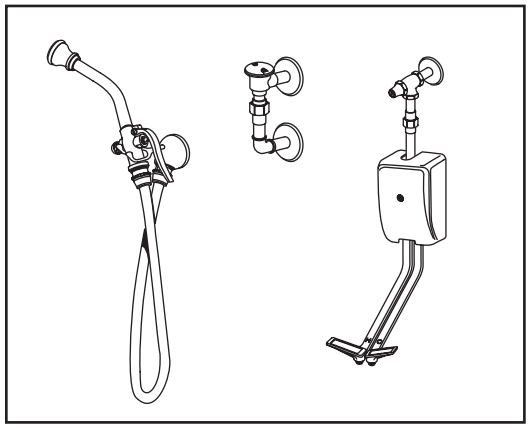
A. RECOMMENDED WATER SUPPLY LOCATION 3/8 O.D. UNPLATED COPPER TUBE CONNECT STUB 1-1/2 IN. (38 mm) OUT FROM WALL SHUT OFF BY OTHERS
B. RECOMMENDED LOCATION FOR WASTE OUTLET 1-1/2" O.D. DRAIN
C. 1-1/2" TRAP NOT FURNISHED**
D. ELECTRICAL SUPPLY (3) WIRE RECESSED BOX
E. INSURE PROPER VENTILATION BY MAINTAINING 6" (152 mm) (MIN.) CLEARANCE FROM CABINET LOUVERS TO WALL
F . 7/16" BOLT HOLES FOR FASTENING UNIT TO WALL

Halsey Taylor®

Printed in the U.S.A.

American Standard

BEDPAN CLEANSER ASSEMBLY

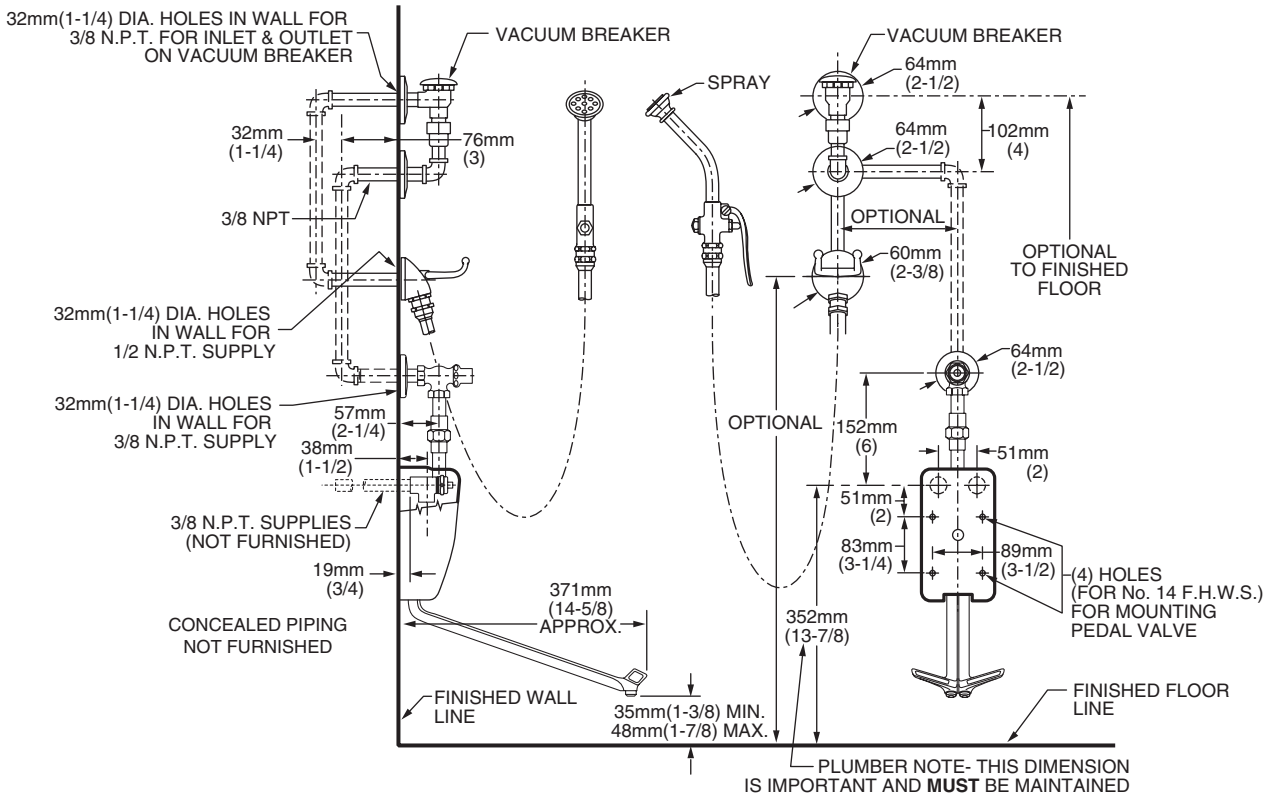


MODEL NUMBER:

❑ **7880.024 Bedpan Cleanser Assembly**

Includes Component parts:

- 7866.015 Wall nozzle with hook
- 7679.012 Double pedal valve
- 7544.018 Loose key wall supply
- 7837.024 Atmospheric vacuum breaker
- Self-closing handle.



GENERAL DESCRIPTION:

Cast brass construction throughout. Single supply nozzle with built-in wall mounted hook for spray end. 4' rubber hose. 10" spray end with self-closing hand valve with renewable seats. Wall-mounted self-closing double pedal valve with renewable seats. Atmospheric vacuum breaker with top outlet to provide back flow protection. Wall-mounted supply with loose key stop.

PRODUCT FEATURES:

Brass Construction: Durable - excellent in high use applications.

Supply Nozzle: Cast brass with built-in hook to hold spray end. Wall mounted.

Vacuum Breaker: Re-buildable back flow preventer.

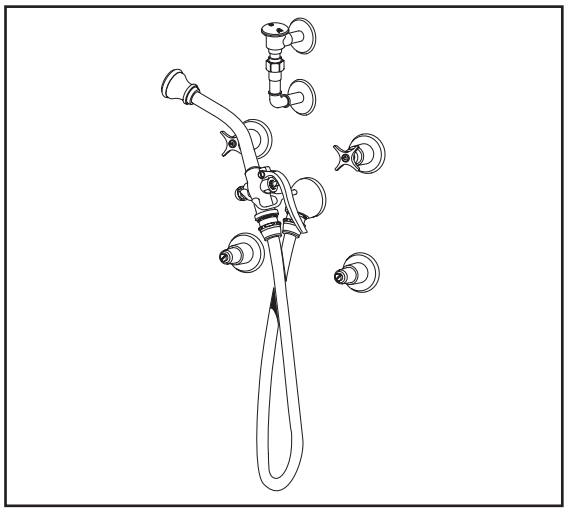
Cast Aluminum Foot Action Mixing: Water supply controlled by self-closing cast aluminum pedals marked "hot"/"cold".

SUGGESTED SPECIFICATION

Bedpan Cleanser Assembly shall feature a wall mounted single inlet supply nozzle with built-in hook. Shall also feature wall mounted double pedal valve, vacuum breaker and wall supply with loose key stop. Cast brass construction throughout. Fitting shall be American Standard Model# 7880.024.002.

American Standard

BEDPAN CLEANSER ASSEMBLY



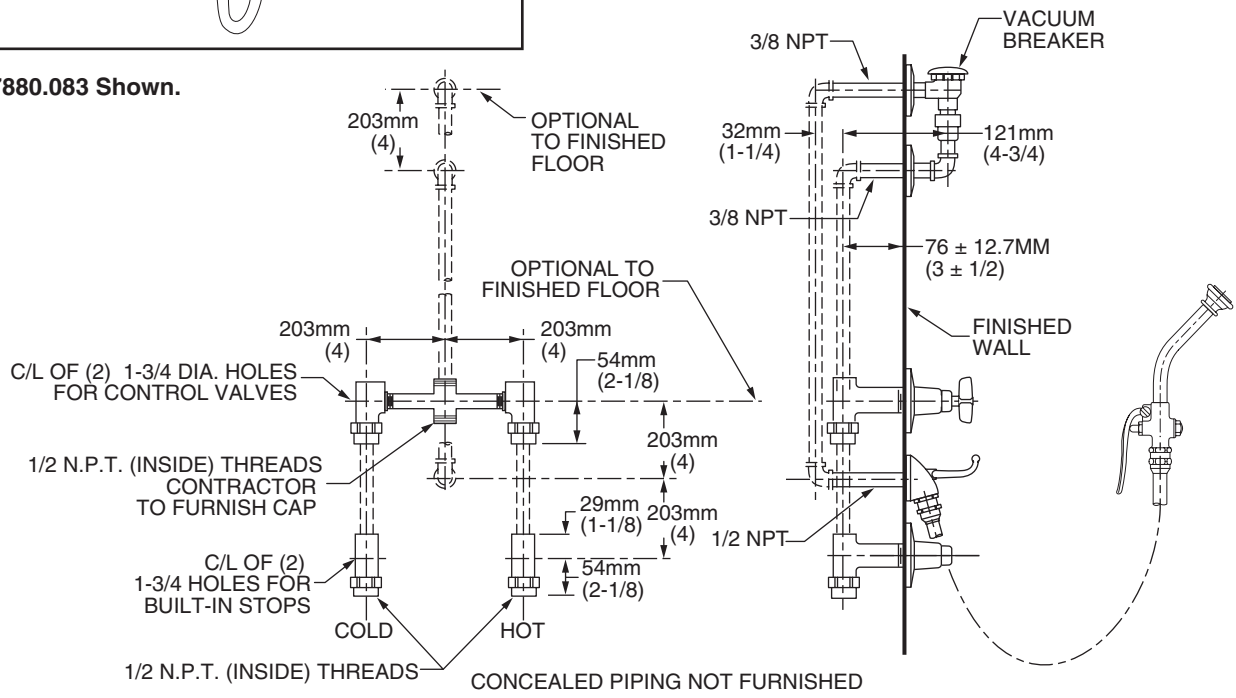
7880.083 Shown.

MODEL NUMBER:

❑ **7880.083 Bedpan Cleanser Assembly**

Includes Component parts:

- 6024.000 By-Pass Valve with Heritage Cross Handles
- 7001.000 In wall supply w/009426 Metal Cross Handle
- 7866.015 Nozzle with hook
- 7837.024 Atmospheric vacuum breaker
- Self-closing handle



GENERAL DESCRIPTION:

Cast brass construction throughout. By-pass valve on 8" centers. Amarilis washerless ceramic disc valve cartridge. Heritage Cross Handles. Screwdriver stops. Single supply nozzle with built-in wall mounted hook for spray end. 4' rubber hose. 10" spray end with self-closing hand valve with renewable seats. Atmospheric vacuum breaker with top outlet to provide back flow protection.

PRODUCT FEATURES:

Brass Construction: Durable - excellent in high use applications.

Ceramic Disc Valving: Assures a lifetime of drip free performance.

Supply Nozzle: Cast brass with built-in hook to hold spray end. Wall mounted.

Vacuum Breaker: Brass housing, ells and nipples with re-buildable back flow preventer.

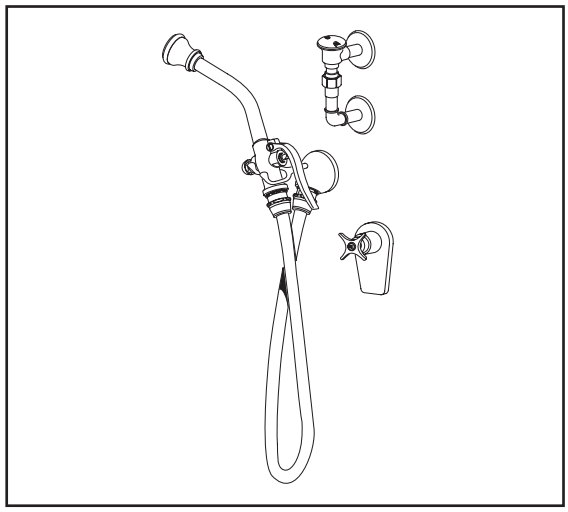
Polished Chrome Finish: Excellent in commercial applications.

SUGGESTED SPECIFICATION

Bedpan Cleanser Assembly shall feature a wall mounted single inlet supply nozzle with built-in hook. Shall feature a by-pass valve on 8" centers and Amarilis washerless ceramic disc valving and screwdriver stops. Back flow protection to be provided by vacuum breaker with top outlet. Cast brass construction throughout. Fitting shall be American Standard Model# 7880.083.002.

American Standard

BEDPAN CLEANSER ASSEMBLY



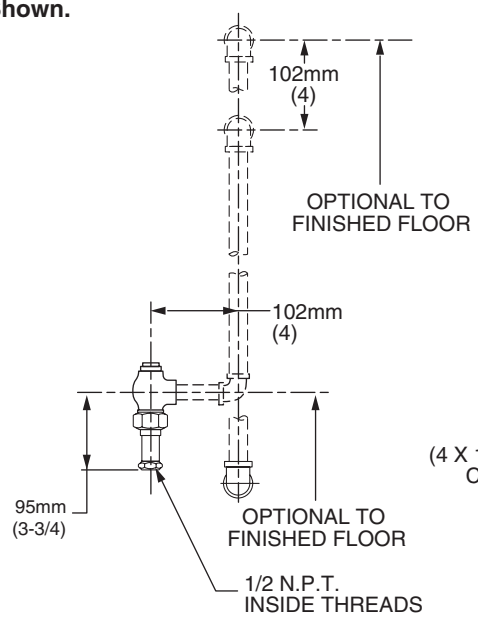
7880.091 Shown.

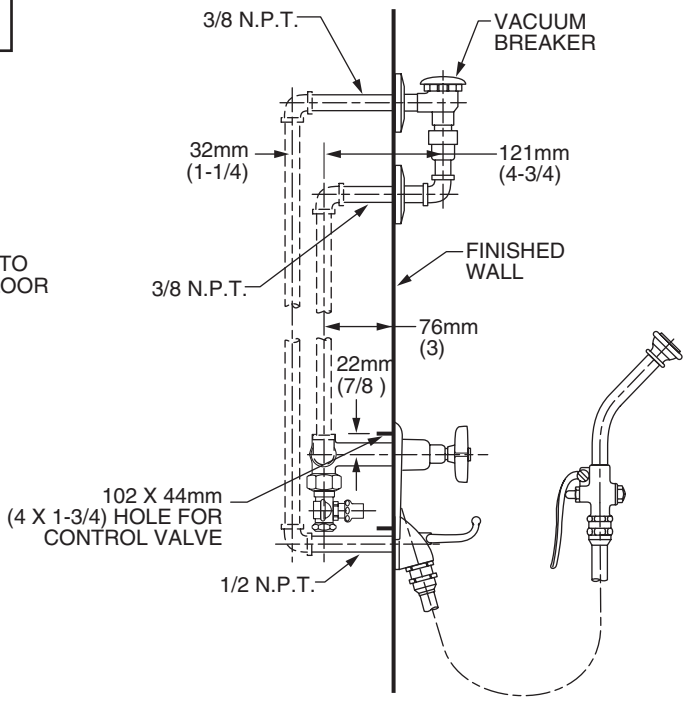
MODEL NUMBER:

❑ **7880.091 Bedpan Cleanser Assembly**

Includes Component parts:

- 7837.024 Atmospheric vacuum breaker
- 7866.015 Nozzle with hook
- 7007.000 By-Pass Valve with Heritage Cross Handle and Screwdriver Stops





GENERAL DESCRIPTION:

Cast brass construction throughout. Single built-in by-pass valve. Amarilis washerless ceramic disc valve cartridge. Heritage Cross Handles. Screwdriver stops. Single supply nozzle with built-in wall mounted hook for spray end. 4' rubber hose. 10" spray end with self-closing hand valve with renewable seats. Atmospheric vacuum breaker with top outlet to provide back flow protection.

PRODUCT FEATURES:

Brass Construction: Durable - excellent in high use applications.

Ceramic Disc Valving: Assures a lifetime of drip free performance.

Supply Nozzle: Cast brass with built-in hook to hold spray end. Wall mounted.

Vacuum Breaker: Brass housing, ells and nipples with re-buildable back flow preventer.

Polished Chrome Finish: Excellent in commercial applications.

SUGGESTED SPECIFICATION

Bedpan Cleanser Assembly shall feature a wall mounted single inlet supply nozzle with built-in hook. Shall feature single built-in by-pass valve with Amarilis washerless ceramic disc valving and screwdriver stops. Back flow protection to be provided by vacuum breaker. Cast brass construction throughout. Fitting shall be American Standard Model# 7880.091.___.

8839SM0001R6/02
June 2002
Raleigh, NC, USA

Submittal Resource Binder

Class 8839
ECONOFLEX™ AC Drives

Retain for future use.

SQUARE D

TABLE OF CONTENTS — SUBMITTAL RESOURCE BINDER FOR CLASS 8839 ECONOFLEX™ AC DRIVES

Preparing Submittals for Class 8839 ECONO-flex™AC Drives

The submittal package should consist of a Drawing Transmittal Cover Sheet and drawing documentation as listed below. The documentation supplied to the customer is based on the horsepower, voltage, power circuit, and option requirements.

1. Drawing Transmittal Cover Sheet, 8839SM0003 (see Tab 2).
2. Controller Catalog Number Identification Sheet, 8839SM0004 (see Tab 3).
3. ECONO-flex Specification Sheets, 8839SM0005 & 8839SM0102 (see Tab 4).
4. Power Circuit Configuration and Modifications Sheet with application check boxes, 8839SM0006 (see Tab 5).
5. Approval Elementary Wiring Diagrams, 8839-450-1 through 8839-450-5 (see Tab 6, Quote to Cash, or www.SquareD.com).

Elementary Wiring Diagram No.	Power Circuit	Control Circuit
8839-450-1	W: Circuit Breaker w/o Bypass	HAND-OFF-AUTO & Speed Pot
8839-450-2	W: Circuit Breaker w/o Bypass	HAND-OFF-AUTO, Start-Stop, & Speed Pot
8839-450-3	W: Circuit Breaker w/o Bypass	Start-Stop & Speed Pot
8839-450-4	Y: Circuit Breaker w/ Bypass	HAND-OFF-AUTO & Speed Pot
8839-450-5	Y: Circuit Breaker w/ Bypass	HAND-OFF-AUTO, Start-Stop, & Speed Pot

6. Approval Enclosure Outline Diagrams, 8839-450-6 through 8839-450-13 (see Tab 7, Quote to Cash, or www.SquareD.com).

Outline & Elevation Drawing No.		**Horsepower Rating and Voltage Class**	
Type 1 & Type 12 Enclosures	Type 3R Enclosure	460 V	208/230 V
8839-450-6	**8839-450-10**	1–7.5 hp VT	1–5 hp VT
8839-450-7	**8839-450-11**	10–25 hp VT	7.5–10 hp VT
8839-450-8	**8839-450-12**	30–50 hp VT	15–25 hp VT
8839-450-9	**8839-450-13**	60–100 hp VT	30–50 hp VT

In some cases, a sales brochure, specifications, or a copy of the instruction bulletin may be required.

7. Sales Brochure for Class 8839 ECONO-flex AC Drives, 8800SM0101A (see Tab 8).
8. SECTION 16420-4.2, Enclosed Adjustable Frequency Drive Variable Torque HVAC Pump and Fan Applications (1 to 100 hp), Specification Number 16420-4.2 (see Tab 9).
9. Instruction Bulletin for Class 8839 ECONO-flex AC Drives, 30072-450-10 (see Tab 10).

Note: The Class 8839 ECONO-flex AC Drive is pre-engineered and marketed specifically for HVAC pump and fan applications. This binder contains all of the documentation for this product. All documents are available electronically. To download the files or order additional binders, use the Online Literature Fulfillment system, accessible from the Business Tools pull-down on the home page of the Square D Intranet.

SQUARE D
Schneider Electric

DRAWING TRANSMITTAL

Submittal Date:

____ Set(s) of drawings with ____ copies for: ☐ Approval ☐ Record

Distributor:
Distributor Order #:
Account #:
Quote to Cash Order #:
Type of Equipment:

Job Name:
Location:
Architect:
Consulting Engineer:
Field Representative:
Field Office:
Factory Contact: Customer Service Department, Seneca, SC
Technical Assistance: Voice: 864-882-2414 x1400
Order Scheduling: Voice: 864-886-1361
Drive APS Specialist:

NOTICE:

- To avoid price escalation, approved drawings must be returned to Square D Company and order must be released for normal shipment within sixty (60) days or by _____.
- This order is on "HOLD STATUS" and will not be scheduled for production until approved drawings are returned to Square D Company. Please call factory for shipping schedule upon release of approved drawings.
- If "APPROVED AS NOTED" drawings require additional equipment that was not included in the original quotation, the cost for additional equipment will be reflected in the total invoice price.

MOTOR CONTROL SCHEDULE

Distributor:

Account #:

Purchase Order #:

Quote to Cash Order #:

Job Name:

Item	Qty	Designation & Description Class, Type & Mod	HP	Volts		Amps		Diagrams
				Line	Control	Input	Output	Wiring/Dimension

Notes:

MOD DESCRIPTIONS

Mod #	Modification Description

SQUARE D
Schneider Electric

DRAWING TRANSMITTAL

Submittal Date: 8/16/00

3 Set(s) of drawings with 1 copies for: [X] Approval [ ] Record

Distributor: ABC
Distributor Order #: 123
Account #: 654321
Quote to Cash Order #: QC0001
Type of Equipment: AC DRIVES

Job Name: STATE TOWERS
Location: SOMEWHERE, USA
Architect:
Consulting Engineer: CDM
Field Representative: JOE SMITH
Field Office: SOMEWHERE, USA 555-123-4567
Factory Contact: Customer Service Department, Seneca, SC
Technical Assistance: Voice: 864-882-2414 x1400
Order Scheduling: Voice: 864-886-1361
Drive APS Specialist:

NOTICE:

- To avoid price escalation, approved drawings must be returned to Square D Company and order must be released for normal shipment within sixty (60) days or by 10/15/00.
- This order is on "HOLD STATUS" and will not be scheduled for production until approved drawings are returned to Square D Company. Please call factory for shipping schedule upon release of approved drawings.
- If "APPROVED AS NOTED" drawings require additional equipment that was not included in the original quotation, the cost for additional equipment will be reflected in the total invoice price.

MOTOR CONTROL SCHEDULE

Distributor: ABC
Account #: 654321
Purchase Order #: 1234
Quote to Cash Order #: QC0001
Job Name: STATE TOWERS

Item	Qty	Designation & Description Class, Type & Mod	HP	Volts		Amps		Diagrams
				Line	Control	Input	Output	Wiring/Dimension
A	3	8839 58EHG4VY A07A08A09G09	10	460	120	15.6	14	8839-450-4

Notes:

MOD DESCRIPTIONS

Mod #	Modification Description
A07	HAND-OFF-AUTO Selector Switch and Speed Pot
A08	Light Cluster – red Power On, green AFC Run, yellow AFC Fault, yellow Auto
A09	Line Reactor
G09	22 KAIC short circuit rating

Catalog Number Identification Sheet for Class 8839 ECONO-flex™ AC Drives

The controller catalog number, located on the nameplate on the inside of the door, is coded to describe the configuration and options present. Use the following grid to translate the catalog number into a description of the drive controller.

Class	Type						Modifications		
							Control	Light	Misc.
8839	58E	•	•	•	V	•	•	•	•
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

① Product

Code	Drive Type
58E	ECONO-FLEX Controller

② Horsepower Code

Code	HP Rating
C	1 hp
D	2 hp
E	3 hp
F	5 hp
G	7.5 hp
H	10 hp
J	15 hp
K	20 hp

Code	HP Rating
L	25
M	30
N	40
P	50
Q	60 (460 V only)
R	75 (460 V only)
S	100 (460 V only)

③ Enclosure Type

Code	Environment Rating
A	Type 12K
G	Type 1
H [5]	Type 3R

④ Voltage Rating

Code	Voltage
2	208 V
3	230 V
4	460 V

⑤ Application Type

Code	Applied Rating
V	Variable Torque

⑥ Device Type

Code	Power Circuit
W [5]	Without Bypass
Y [8]	Bypass

[1] Control option C07 (Start/Stop, Speed Potentiometer) is not compatible with Power Circuit Y (Bypass) or light cluster A08 or B08.

[2] Light cluster A08, B08, and C08 cannot be selected together. Select only one.

[3] Light cluster B08 is not compatible with Power Circuit W (Without Bypass).

[4] Light cluster C08 is not compatible with A07 (Hand/Off/Auto, Speed Potentiometer), or B07 (Hand/Off/Auto, Start/Stop, Speed Potentiometer).

[5] Line contactor B09 is not compatible with this option.

[6] Smoke purge E09 permits the motor to run at full speed.

⑦ Control Option

Code	AFC Controls
A07 [7]	Hand/Off/Auto, Speed Potentiometer
B07 [7]	Hand/Off/Auto, Start/Stop, Speed Potentiometer
C07 [1]	Start/Stop, Speed Potentiometer
N07	None

⑧ Light Option

Code	Light Cluster
A08 [2]	Red Power On
	Green AFC Run
	Yellow AFC Fault
	Yellow Auto
B08 [2], [3]	Red Power On
	Green AFC Run
	Yellow AFC Fault
	Yellow Bypass
C08 [2], [4]	Red Power On
	Green AFC Run
	Yellow AFC Fault

⑨ Misc. Options

Code	Feature
A09 [9]	Line Reactor (included with 30–100 hp @ 460 V and 15–50 hp @ 208/230 V)
B09	Line Contactor
C09 [10]	3-15 PSI Transducer
D09 [13]	Omit Keypad
E09 [6]	Smoke Purge
G09	22 KAIC UL Coordinated Rating
H09 [11]	Analog Card, 0–20 mA, programmable for 4–20 mA output
J09 [12]	0–10 Vdc Auto Speed Reference
K09	cUL Listing
L09 [14]	LONWORKS
M09 [14]	MODBUS
P09 [14]	METASYS N2

[7] Place the Hand-Off-Auto switch in the Off position for AFC fault reset.

[8] Includes AFC/Off/Bypass switch and Test/Normal switch.

[9] Line reactor A09 is an option for 1–25 hp @ 460 V and 1–10 hp @ 208/230 V.

[10] 3–15 PSI Transducer C09 is not compatible with Start/Stop, Speed Potentiometer C07, 0–10 V Auto Speed Reference J09, or Analog Card H09.

[11] Analog Card H09 is not compatible with 3–15 PSI Transducer C09 or serial communication L09, M09 or P09.

[12] 0–10 V Auto Speed Reference J09 is not compatible with C07 Start/Stop Potentiometer or C09 3–15 PSI Transducer.

[13] Omit the keypad D09. User must buy separate device to program the controller.

[14] Serial communication L09, M09 and P09 cannot be selected together. Select only one. Serial communication cannot be selected with H09 analog card.

Specification Sheet for Class 8839 ECONO-flex™ AC Drives with Type 1 or Type 12K Enclosure

Overall Dimensions, inches (mm)

HP	H	W	D
1–7.5 hp @ 460 VAC 1–5 hp @ 208/230 VAC	35 (889)	15 (381)	14 (356)
10–25 hp @ 460 VAC 7.5–10 hp @ 208/230 VAC	41 (1041)	21 (533)	14 (356)
30–50 hp @ 460 VAC 15–25 hp @ 208/230 VAC	49 (1245)	21 (533)	16 (406)
60–100 hp @ 460 VAC 30–50 hp @ 208/230 VAC	63 (1600)	26 (660)	16 (406)

Specifications

Input voltage	460 V ±10%, 230 V ±10%, 208 V ±10%
Displacement power factor	98% through speed range
Input frequency	60 Hz ± 5%
Output voltage	Three-phase output Maximum voltage equal to input voltage
Galvanic isolation	Galvanic isolation between power and control (inputs, outputs, and power supplies)
Frequency range of power converter	0.1 to 500 Hz (factory setting of 60 Hz maximum)
Current	110% of controller rated current for 60 s
Switching frequency	Selectable from 0.5 to 16 kHz [1] Factory setting: 8 kHz
Speed reference	AI1: 0 to +10 V, Z = 30 kΩ Speed potentiometer to AI1 AI2: FACTORY SETTING: 4 to 20 mA Z = 100 Ω (reassignable, X–Y range with keypad display) FACTORY MODIFICATION J09 provides a controller interface 0–10 Vdc reference signal to the AI2 input using a 0–10 V / 4–20 mA converter with Z = 100 kΩ
Frequency resolution in analog reference	0.1 for 100 Hz (10 bits)
Speed regulation	V/f: determined by motor slip, typically 3% SLFV (sensorless flux vector): 1%
Efficiency	97% at full load typical
Reference sample time	5 ms
Acceleration and deceleration ramps	0.1 to 999.9 seconds (definition in 0.1 s increments)
Motor protection	Class 10 electronic overload protection Class 20 electromechanical overload protection with bypass [2]
Keypad display	Self diagnostics with fault messages in three languages; also refer to instruction bulletin VVDED397047US
Temperature	Storage: -13 to +149 °F (-25 to +65 °C) Operation: +14 to +104 °F (-10 to 40 °C)
Humidity	95% with no condensation or dripping water, conforming to IEC 60068-2-3
Altitude	3,300 ft (1000 m) maximum without derating; derating of the current by 1% for each additional 330 ft (100 m)
Enclosure	Type 1 or Type 12K (Type 12 with knockouts)
Pollution degree	Type 1: Pollution degree 2 per NEMA ICS-1 Annex A and IEC 60664-1. Type 12K: Pollution degree 3 per NEMA ICS-1 and IEC 60664-1
Operational test vibration	Conforming to IEC 60721-3-3-3M3 amplitude 1.5 mm peak to peak from 3 to 13 Hz 1 g from 13 to 200 Hz
Transit test to shock	Conforming to National Safe Transit Association and International Safe Transit Association test for packages.
Operational shock	15 g, 11 ms
Codes and standards	UL Listed per UL508C under category NMMS. Conforms to applicable NEMA ICS, NFPA, and IEC Standards. Manufactured under ISO 9001 Standards. Factory modification K09 provides Canadian cUL certification.

[1] Above 8 kHz, select the next largest size drive controller. If the duty cycle does not exceed 60% (36 s maximum for a 60 s cycle), this is not necessary.

[2] Class 10 electromechanical for 1 hp @ 460 V.

Specification Sheet for Class 8839 ECONO-flex™ AC Drives with Type 3R Enclosure

Overall Dimensions, inches (mm)

HP	H	W	D
1–7.5 hp @ 460 VAC 1–5 hp @ 208/230 VAC	35 (889)	24 (621)	14 (356)
10–25 hp @ 460 VAC 7.5–10 hp @ 208/230 VAC	41 (1041)	30 (767)	14 (356)
30–50 hp @ 460 VAC 15–25 hp @ 208/230 VAC	52 (1326)	30 (767)	16 (415)
60–100 hp @ 460 VAC 30–50 hp @ 208/230 VAC	66 (1682)	35 (897)	16 (415)

Specifications

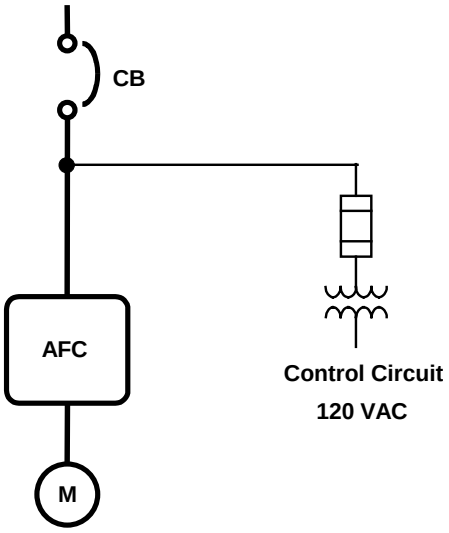
Input voltage	460 V ±10%, 230 V ±10%, 208 V ±10%
Displacement power factor	98% through speed range
Input frequency	60 Hz ± 5%
Output voltage	Three-phase output Maximum voltage equal to input voltage
Galvanic isolation	Galvanic isolation between power and control (inputs, outputs, and power supplies)
Frequency range of power converter	0.1 to 500 Hz (factory setting of 60 Hz maximum)
Current	110% of controller rated current for 60 s
Switching frequency	Selectable from 0.5 to 16 kHz [1] Factory setting: 8 kHz
Speed reference	AI1: 0 to +10 V, Z = 30 kΩ Speed potentiometer to AI1 AI2: FACTORY SETTING: 4 to 20 mA Z = 100 Ω (reassignable, X–Y range with keypad display) FACTORY MODIFICATION J09 provides a controller interface 0–10 Vdc reference signal to the AI2 input using a 0–10 V / 4–20 mA converter with Z = 100 kΩ
Frequency resolution in analog reference	0.1 for 100 Hz (10 bits)
Speed regulation	V/f: determined by motor slip, typically 3% SLFV (sensorless flux vector): 1%
Efficiency	97% at full load typical
Reference sample time	5 ms
Acceleration and deceleration ramps	0.1 to 999.9 seconds (definition in 0.1 s increments)
Motor protection	Class 10 electronic overload protection Class 20 electromechanical overload protection with bypass [2]
Keypad display	Self diagnostics with fault messages in three languages; also refer to instruction bulletin VVDED397047US
Temperature	Storage: -13 to +149 °F (-25 to +65 °C) Operation: +14 to +122 °F (-10 to 50 °C)
Humidity	95% with no condensation or dripping water, conforming to IEC 60068-2-3
Altitude	3,300 ft (1000 m) maximum without derating; derating of the current by 1% for each additional 330 ft (100 m)
Enclosure	Type 3R
Pollution degree	Type 3R: Pollution degree 2 per NEMA ICS-1 Annex A and IEC 60664-1
Operational test vibration	Conforming to IEC 60721-3-3-3M3 amplitude 1.5 mm peak to peak from 3 to 13 Hz 1 g from 13 to 200 Hz
Transit test to shock	Conforming to National Safe Transit Association and International Safe Transit Association test for packages.
Operational shock	15 g, 11 ms
Codes and standards	UL Listed per UL508C under category NMMS. Conforms to applicable NEMA ICS, NFPA, and IEC Standards. Manufactured under ISO 9001 Standards. Factory modification K09 provides Canadian cUL certification.

[1] Above 8 kHz, select the next largest size drive controller. If the duty cycle does not exceed 60% (36 s maximum for a 60 s cycle), this is not necessary.

[2] Class 10 electromechanical for 1 hp @ 460 V.

Description of Power Circuit Configuration for Class 8839 ECONO-flex™AC Drives

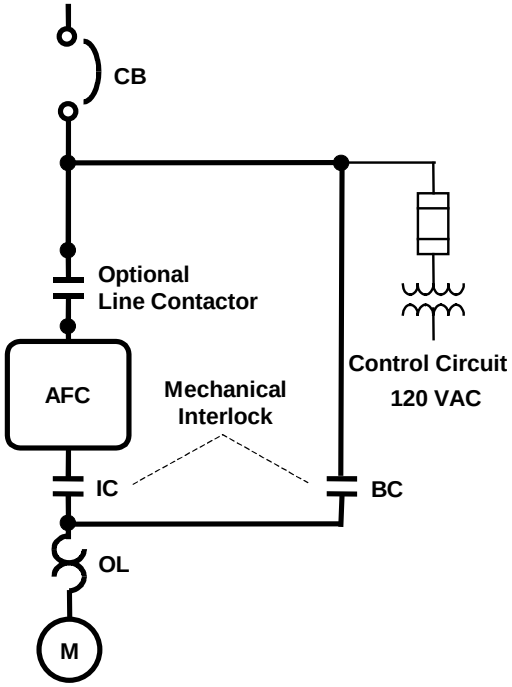
☐ *NON-BYPASS: "Power Circuit W"*



The *"Power Circuit W"* assembly includes:

- 120 V fused control transformer
- Circuit breaker disconnect with means for locking in the open position
- Hand-Off-Auto switch and a manual speed potentiometer are provided as the standard control interface unless other options are selected.

☐ *BYPASS: "Power Circuit Y"*



The *"Power Circuit Y"* assembly includes:

- IEC-rated isolation and bypass contactors with mechanical and electrical interlocking and a Class 20 overload relay.
- 120 V fused control transformer and circuit breaker disconnect with lockout/tag out capability.
- AFC-Off-Bypass switch and Hand-Off-Auto switch with manual speed potentiometer are provided as standard control interface unless other options are selected.
- Test-Normal selector switch provides drive controller testing capability without running the motor and allows drive controller testing if bypass mode is selected. The isolation contactor is sequenced open to provide drive isolation during the test mode.

Description of Enclosure Modifications for Class 8839 ECONO-flex™AC Drives

☐ **Type 12K Enclosure (if used)**

Replaces the standard Type 1 enclosure with a Type 12K enclosure (with conduit knockouts), to provide an additional degree of protection in dusty and dripping-liquid environments.

☐ **Type 3R Enclosure (if used)**

Replaces the standard Type 1 enclosure with a Type 3R enclosure (with bottom-only conduit knockouts), to provide an additional degree of protection in outdoor environments. Ambient controller operating temperature of -10 to 50 ˚C (14 to 122 ˚F).

Description of Modifications (Options) for Class 8839 ECONO-flex™AC Drives

☐ **MOD "A07" Hand-Off-Auto and Speed Potentiometer (factory supplied)**

Provides a two-wire control strategy and allows auto restart capability. Moving the Hand-Off-Auto switch to the Off position resets a drive fault condition.

☐ **MOD "B07" Hand-Off-Auto, Start/Stop, and Speed Potentiometer (if used)**

Provides three-wire control strategy momentary Start and Stop pushbuttons to the factory-supplied Hand-Off-Auto selector switch and manual Speed Potentiometer. In the Hand mode only, this option will not allow auto restart capability. Moving the Hand-Off-Auto switch to the Off position resets a drive fault condition.

☐ **MOD "C07" Start/Stop and Speed Potentiometer only (if used)**

Replaces the factory-supplied Hand-Off-Auto selector switch with momentary Start and Stop pushbuttons. Speed control is accomplished via the door-mounted manual Speed Potentiometer. Automatic (remote) mode selection is not provided.

☐ **MOD "N07" Delete Hand-Off-Auto Switch and Manual Speed Potentiometer (if used)**

Removes the factory-supplied Hand-Off-Auto switch and manual Speed Potentiometer. Under certain conditions, the user may prefer to control the power converter by means of a remote or external source only. **The user provides the control sequence logic.** Refer to Square D instruction bulletin 30072-450-10 for details on the recommended sequence of operation.

☐ **MOD "A08" Pilot Light Cluster (if used)**

Provides visual indication of protective functions and circuit status. The pilot devices are rated 120 V. Included within this configuration are:

- **Power On (Red):** Illuminates whenever mains power is applied to the controller.
- **AFC Run (Green):** Illuminates whenever drive output relay R2 (programmed for running state) is high, to annunciate a drive run condition.
- **Auto Mode (Yellow):** Illuminates whenever the Hand-Off-Auto switch is in the Auto position, controlled by a contact block on the switch.
- **AFC Fault (Yellow):** Illuminates (via relay ADFR) whenever drive output relay R1 (programmed for fault state) is low, to annunciate a fault condition. This light is normally off until a drive protective circuit has caused an abnormal shutdown.

Description of Modifications (Options) for Class 8839 ECONO-flex™AC Drives, cont.

☐ **MOD "B08" Pilot Light Cluster (if used)**

Provides visual indication of protective functions and circuit status. Only available on power circuit Y. The pilot devices are rated 120 V. Included within this configuration are:

- **Power On (Red):** Illuminates whenever mains power is applied to the controller.
- **AFC Run (Green):** Illuminates whenever drive output relay R2 (programmed for running state) is high, to annunciate a drive run condition.
- **Bypass Run (Yellow):** Illuminates whenever the bypass contactor coil is energized.
- **AFC Fault (Yellow):** Illuminates (via relay ADFR) whenever drive output relay R1 (programmed for fault state) is low, to annunciate a fault condition. This light is normally off until a drive protective circuit causes an abnormal shutdown.

☐ **MOD "C08" Pilot Light Cluster (if used)**

Provides visual indication of protective functions and circuit status. The pilot devices are rated 120 V. Included within this configuration are:

- **Power On (Red):** Illuminates whenever mains power is applied to the controller.
- **AFC Run (Green):** Illuminates whenever drive output relay R2 (programmed for running state) is high, to annunciate a drive run condition.
- **AFC Fault (Yellow):** Illuminates (via relay ADFR) whenever drive output relay R1 (programmed for fault state) is low, to annunciate a fault condition. This light is normally off until a drive protective circuit causes an abnormal shutdown.

☐ **MOD "A09" Line Reactor (if used)**

Provides an AC line reactor factory-wired between the circuit breaker and the power converter terminals L1, L2 & L3. Line reactors are included in the drive controller as standard on ratings 25 horsepower and above, 460 V (15 horsepower and above, 208/230 V).

☐ **MOD "B09" Line Isolation Contactor (if used)**

Provides a line isolation contactor factory-wired between the circuit breaker and the power converter terminals L1, L2 & L3. This mod is only available with bypass configurations (power circuit Y).

☐ **MOD "C09" 3–15 PSI Module (if used)**

Provides a pneumatic transducer to allow the controller to follow a user-supplied 3–15 PSI speed reference signal.

☐ **MOD "E09" Smoke Purge Option (if used)**

A smoke purge relay (SPR) permits the motor to operate at full speed. When a bypass is supplied, the controller will operate in the Bypass mode. This circuit requires a user-supplied 120 VAC signal to energize the SPR relay to run the motor at full speed.

☐ **MOD "G09" 22K AIC UL Coordinated Rating (if used)**

Provides a fully coordinated 22K AIC rating marked on the enclosure nameplate. Short-circuit coordination meets UL508C and NEMA ICS 7.1.

Description of Modifications (Options) for Class 8839 ECONO-flex™AC Drives, cont.

☐ **MOD "H09" Analog Output (if used)**

Provides an analog I/O Extension Card, factory-installed on the drive controller to provide a 0 or 4–20 mA selectable analog output. The analog output can be programmed for indication of speed, current or motor torque. Z = 500 ohms.

☐ **MOD "J09" Automatic Speed Reference 0–10 Vdc Input (if used)**

Provides a factory-installed analog 0–10 Vdc speed reference input for automatic mode of operation. The signal transducer input is connected through a signal converter to AI2. Z = 100 Kohms.

☐ **MOD "K09" cUL Listing (if used)**

Provides Canadian cUL certification when required by local code requirements.

☐ **MOD "L09" LONWORKS® Serial Communication (if used)**

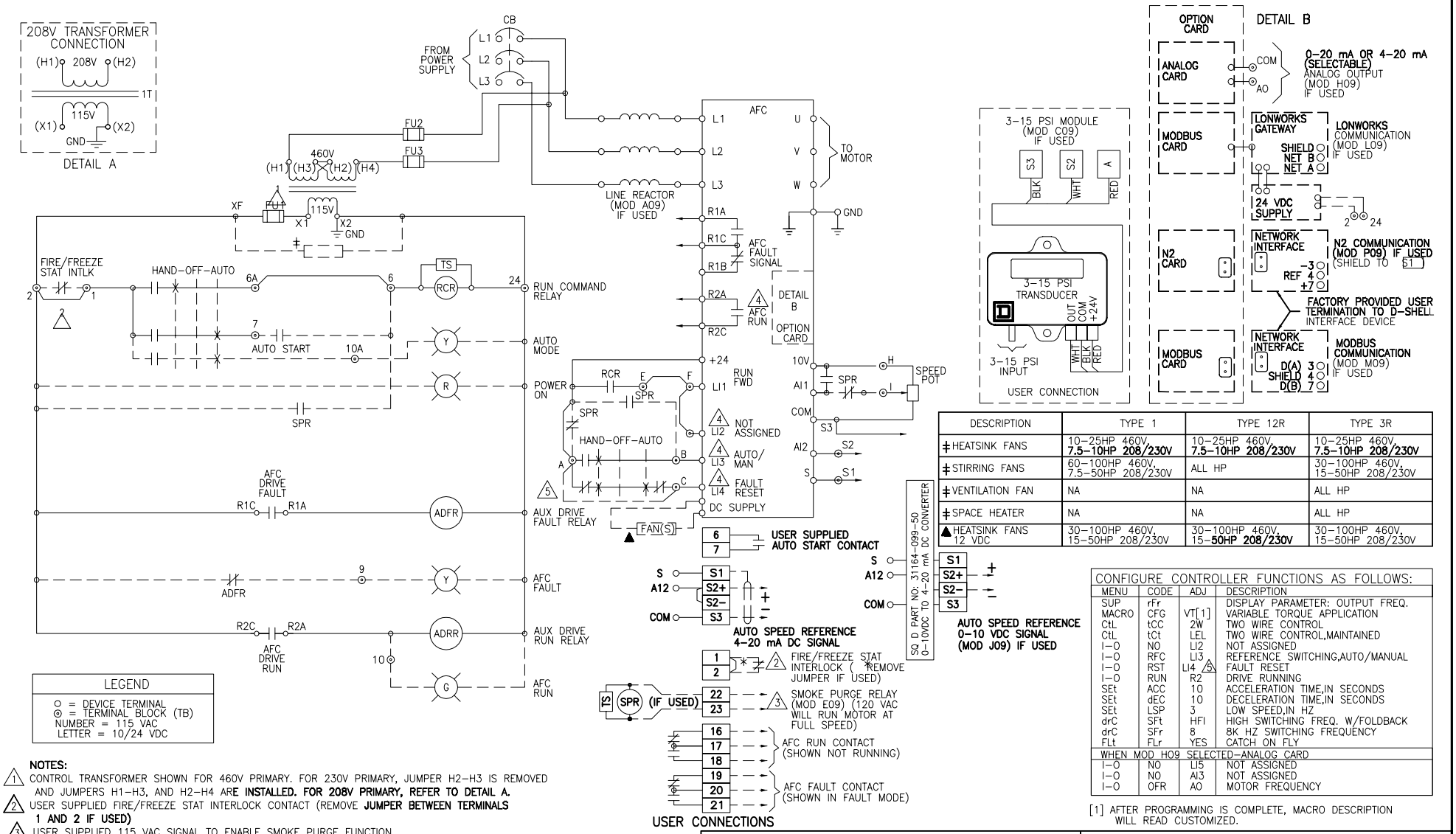
Provides factory-installed LONWORKS to MODBUS® module, 24 Vdc power supply and plug-in MODBUS card. Serial communication is factory-installed for register monitoring.

☐ **MOD "M09" MODBUS® Serial Communication (if used)**

Provides factory-installed plug-in MODBUS card and separate user termination to D-shell interface device. Serial communication is factory-installed for register monitoring.

☐ **MOD "P09" METASYS® N2 Serial Communication (if used)**

Provides factory-installed plug-in METASYS N2 card and separate user termination to D-shell interface device. Serial communication is factory-installed for register monitoring.



DESCRIPTION	TYPE 1	TYPE 12R	TYPE 3R
‡ HEATSINK FANS	10–25HP 460V, **7.5–10HP 208/230V**	10–25HP 460V, **7.5–10HP 208/230V**	10–25HP 460V, **7.5–10HP 208/230V**
‡ STIRRING FANS	60–100HP 460V, 7.5–50HP 208/230V	ALL HP	30–100HP 460V, 15–50HP 208/230V
‡ VENTILATION FAN	NA	NA	ALL HP
‡ SPACE HEATER	NA	NA	ALL HP
▲ HEATSINK FANS 12 VDC	30–100HP 460V, 15–50HP 208/230V	30–100HP 460V, 15–**50HP 208/230V**	30–100HP 460V, 15–50HP 208/230V

CONFIGURE CONTROLLER FUNCTIONS AS FOLLOWS:

MENU	CODE	ADJ	DESCRIPTION
SUP	rFr		DISPLAY PARAMETER: OUTPUT FREQ.
MACRO	CFG	VT[1]	VARIABLE TORQUE APPLICATION
CtL	tCC	2W	TWO WIRE CONTROL
CtL	tCt	LEL	TWO WIRE CONTROL,MAINTAINED
I-O	NO	LI2	NOT ASSIGNED
I-O	RFC	LI3	REFERENCE SWITCHING,AUTO/MANUAL
I-O	RST	LI4 ⚠5	FAULT RESET
I-O	RUN	R2	DRIVE RUNNING
SEt	ACC	10	ACCELERATION TIME,IN SECONDS
SEt	dEC	10	DECELERATION TIME,IN SECONDS
SEt	LSP	3	LOW SPEED,IN HZ
drC	SFt	HFI	HIGH SWITCHING FREQ. W/FOLDBACK
drC	SFr	8	8K HZ SWITCHING FREQUENCY
FLt	FLr	YES	CATCH ON FLY
WHEN MOD H09 SELECTED-ANALOG CARD			
I-O	NO	LI5	NOT ASSIGNED
I-O	NO	AI3	NOT ASSIGNED
I-O	OFR	AO	MOTOR FREQUENCY

[1] AFTER PROGRAMMING IS COMPLETE, MACRO DESCRIPTION WILL READ CUSTOMIZED.

LEGEND

○ = DEVICE TERMINAL
⊙ = TERMINAL BLOCK (TB)
NUMBER = 115 VAC
LETTER = 10/24 VDC

NOTES:

⚠1 CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 230V PRIMARY, JUMPER H2–H3 IS REMOVED AND JUMPERS H1–H3, AND H2–H4 ARE **INSTALLED. FOR 208V PRIMARY, REFER TO DETAIL A.**

⚠2 USER SUPPLIED FIRE/FREEZE STAT INTERLOCK CONTACT (REMOVE **JUMPER BETWEEN TERMINALS 1 AND 2 IF USED)**

⚠3 USER SUPPLIED 115 VAC SIGNAL TO ENABLE SMOKE PURGE FUNCTION.

⚠4 PROGRAMMED I/O SEE CONTROLLER FUNCTION CONFIGURATION TABLE.

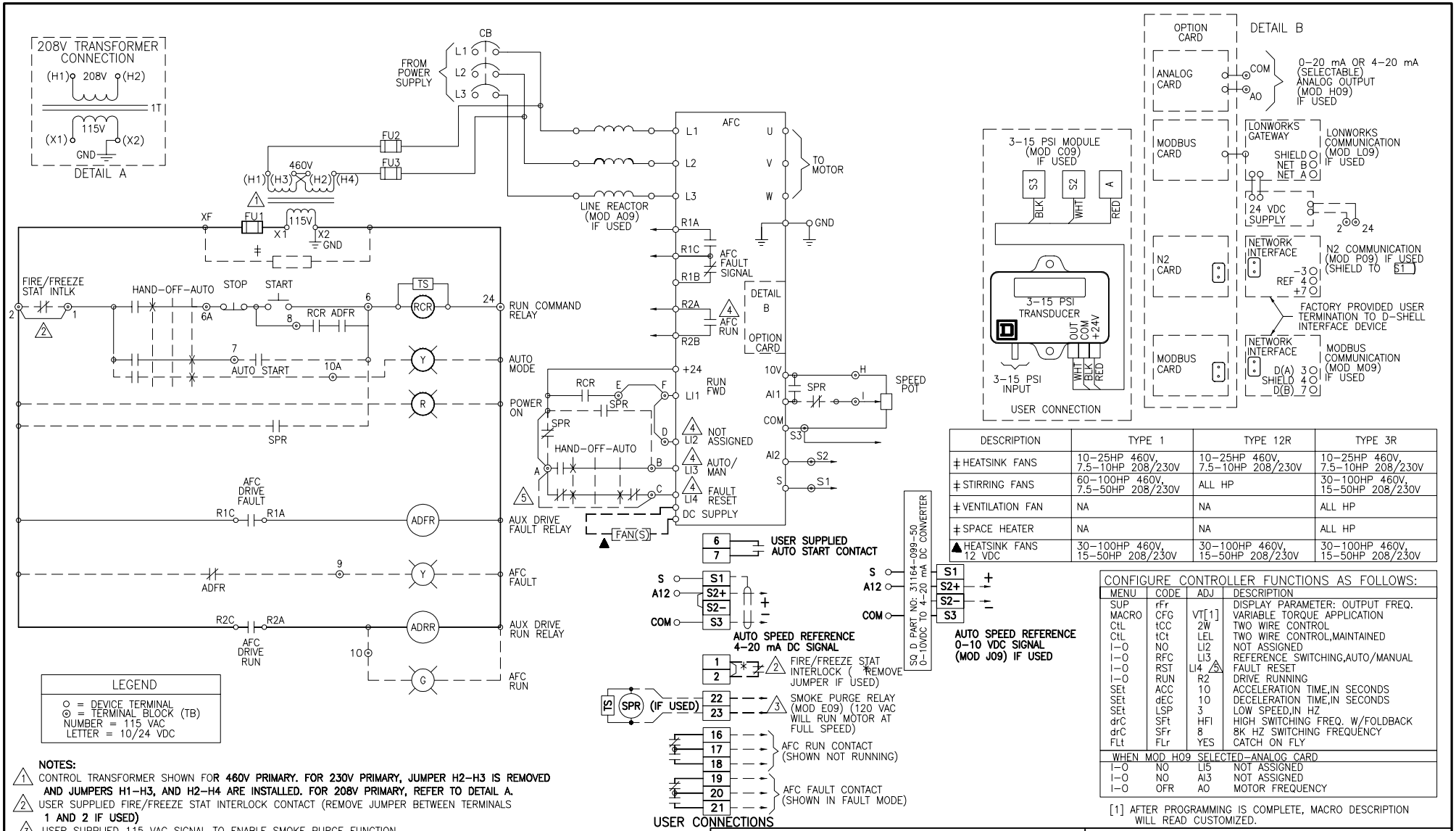
⚠5 FACTORY JUMPER PROVIDED BETWEEN TERMINALS A AND C IF SERIAL COMMUNICATIONS OPTION SELECTED. L14 PROGRAMMED FOR FORCED **LOCAL, CODE FLO.**

CLASS 8839 ECONFLEX
POWER CIRCUIT W
(WITHOUT BYPASS)
HAND–OFF–AUTO AND SPEED POTENTIOMETER

SQUARE D COMPANY

DWG# NO. 8839–450–1

APRIL 2002



DESCRIPTION	TYPE 1	TYPE 12R	TYPE 3R
‡ HEATSINK FANS	10–25HP 460V, 7.5–10HP 208/230V	10–25HP 460V, 7.5–10HP 208/230V	10–25HP 460V, 7.5–10HP 208/230V
‡ STIRRING FANS	60–100HP 460V, 7.5–50HP 208/230V	ALL HP	30–100HP 460V, 15–50HP 208/230V
‡ VENTILATION FAN	NA	NA	ALL HP
‡ SPACE HEATER	NA	NA	ALL HP
▲ HEATSINK FANS 12 VDC	30–100HP 460V, 15–50HP 208/230V	30–100HP 460V, 15–50HP 208/230V	30–100HP 460V, 15–50HP 208/230V

CONFIGURE CONTROLLER FUNCTIONS AS FOLLOWS:

MENU	CODE	ADJ	DESCRIPTION
SUP	rFr		DISPLAY PARAMETER: OUTPUT FREQ.
MACRO	CFG	VT[1]	VARIABLE TORQUE APPLICATION
CtL	tCC	2W	TWO WIRE CONTROL
CtL	tCt	LEL	TWO WIRE CONTROL,MAINTAINED
I–O	NO	LI2	NOT ASSIGNED
I–O	RFC	LI3	REFERENCE SWITCHING,AUTO/MANUAL
I–O	RST	LI4 ⚠5	FAULT RESET
I–O	RUN	R2	DRIVE RUNNING
SEt	ACC	10	ACCELERATION TIME,IN SECONDS
SEt	dEC	10	DECELERATION TIME,IN SECONDS
SEt	LSP	3	LOW SPEED,IN HZ
drC	SFt	HFI	HIGH SWITCHING FREQ. W/FOLDBACK
drC	SFr	8	8K HZ SWITCHING FREQUENCY
FLt	FLr	YES	CATCH ON FLY
WHEN MOD H09 SELECTED–ANALOG CARD			
I–O	NO	LI5	NOT ASSIGNED
I–O	NO	AI3	NOT ASSIGNED
I–O	OFR	AO	MOTOR FREQUENCY

[1] AFTER PROGRAMMING IS COMPLETE, MACRO DESCRIPTION WILL READ CUSTOMIZED.

NOTES:

⚠1 CONTROL TRANSFORMER SHOWN FOR **460V PRIMARY. FOR 230V PRIMARY, JUMPER H2–H3 IS REMOVED AND JUMPERS H1–H3, AND H2–H4 ARE INSTALLED. FOR 208V PRIMARY, REFER TO DETAIL A.**

⚠2 USER SUPPLIED FIRE/FREEZE STAT INTERLOCK CONTACT (REMOVE JUMPER BETWEEN TERMINALS **1 AND 2 IF USED)**

⚠3 USER SUPPLIED 115 VAC SIGNAL TO ENABLE SMOKE PURGE FUNCTION.

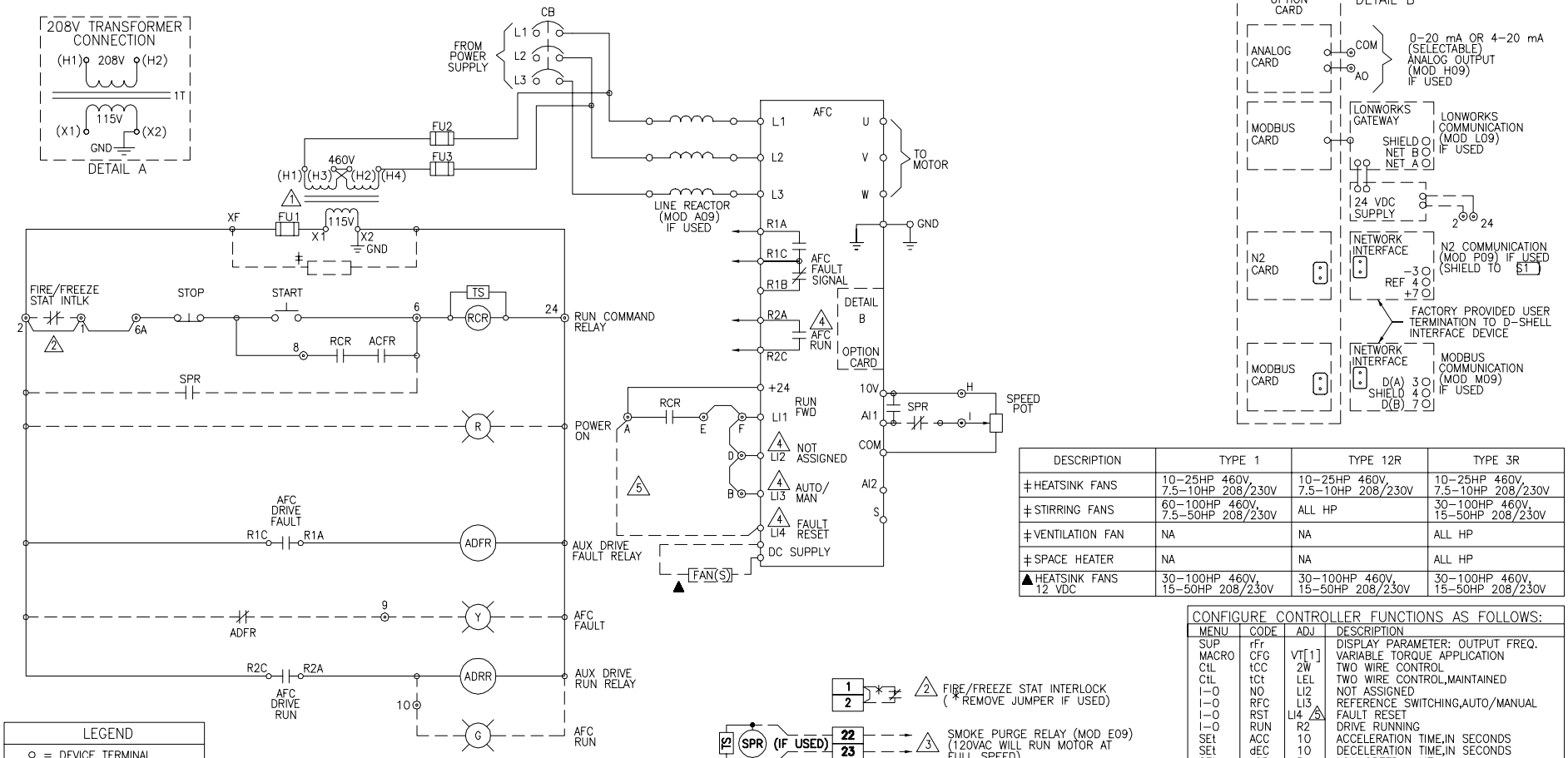
⚠4 PROGRAMMED I/O SEE CONTROLLER FUNCTION CONFIGURATION TABLE.

⚠5 FACTORY JUMPER PROVIDED BETWEEN TERMINALS A AND C IF SERIAL COMMUNICATIONS OPTION SELECTED. L14 PROGRAMMED FOR FORCED **LOCAL, CODE FLO.**

CLASS 8839 ECONFLEX
POWER CIRCUIT W
(WITHOUT BYPASS)
HAND–OFF–AUTO, START–STOP
AND SPEED POTENTIOMETER

SQUARE D COMPANY

DWG# NO. 8839–450–2



DESCRIPTION	TYPE 1	TYPE 12R	TYPE 3R
‡ HEATSINK FANS	10-25HP 460V, 7.5-10HP 208/230V	10-25HP 460V, 7.5-10HP 208/230V	10-25HP 460V, 7.5-10HP 208/230V
‡ STIRRING FANS	60-100HP 460V, 7.5-50HP 208/230V	ALL HP	30-100HP 460V, 15-50HP 208/230V
‡ VENTILATION FAN	NA	NA	ALL HP
‡ SPACE HEATER	NA	NA	ALL HP
▲ HEATSINK FANS 12 VDC	30-100HP 460V, 15-50HP 208/230V	30-100HP 460V, 15-50HP 208/230V	30-100HP 460V, 15-50HP 208/230V

CONFIGURE CONTROLLER FUNCTIONS AS FOLLOWS:

MENU	CODE	ADJ	DESCRIPTION
SUP	rFr		DISPLAY PARAMETER: OUTPUT FREQ.
MACRO	CFG	VT[1]	VARIABLE TORQUE APPLICATION
CtL	tCC	2W	TWO WIRE CONTROL
CtL	tCt	LEL	TWO WIRE CONTROL,MAINTAINED
I-O	NO	LI2	NOT ASSIGNED
I-O	RFC	LI3	REFERENCE SWITCHING,AUTO/MANUAL
I-O	RST	LI4 △5	FAULT RESET
I-O	RUN	R2	DRIVE RUNNING
SEt	ACC	10	ACCELERATION TIME,IN SECONDS
SEt	dEC	10	DECELERATION TIME,IN SECONDS
SEt	LSP	3	LOW SPEED,IN HZ
drC	SFt	HFI	HIGH SWITCHING FREQ. W/FOLDBACK
drC	SFr	8	8K HZ SWITCHING FREQUENCY
FLt	FLr	YES	CATCH ON FLY
WHEN MOD H09 SELECTED-ANALOG CARD			
I-O	NO	LI5	NOT ASSIGNED
I-O	NO	AI3	NOT ASSIGNED
I-O	OFR	AO	MOTOR FREQUENCY

[1] AFTER PROGRAMMING IS COMPLETE, MACRO DESCRIPTION WILL READ CUSTOMIZED.

LEGEND

○ = DEVICE TERMINAL
◎ = TERMINAL BLOCK (TB)
NUMBER = 115 VAC
LETTER = 10/24 VDC

NOTES:

△1 CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 230V PRIMARY, JUMPER H2-H3 IS REMOVED AND JUMPERS H1-H3, AND H2-H4 ARE INSTALLED. FOR 208V PRIMARY, REFER TO DETAIL A.

△2 USER SUPPLIED FIRE/FREEZE STAT INTERLOCK CONTACT (REMOVE JUMPER BETWEEN TERMINALS 1 AND 2 IF USED)

△3 USER SUPPLIED 115 VAC SIGNAL TO ENABLE SMOKE PURGE FUNCTION.

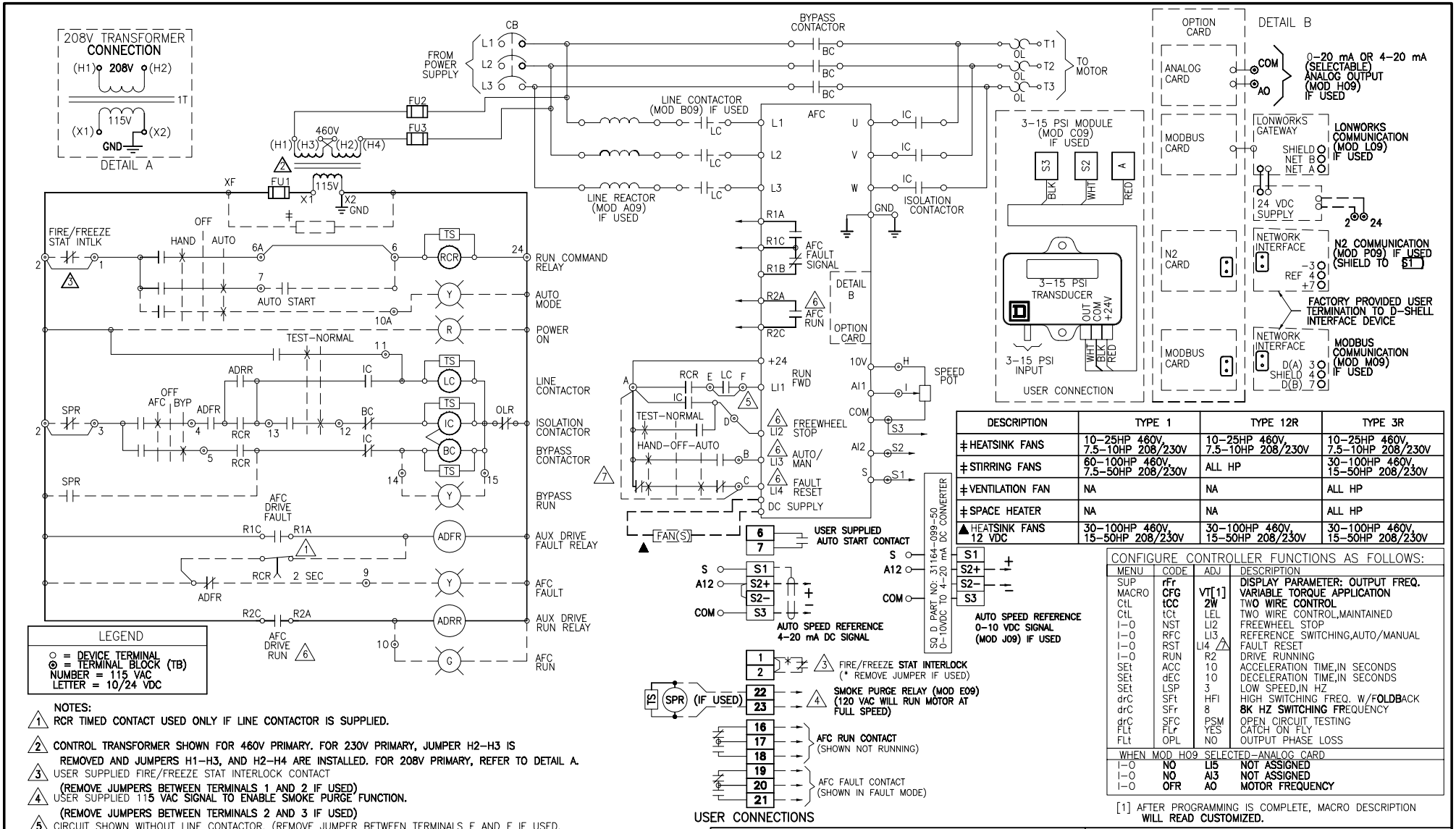
△4 PROGRAMMED I/O SEE CONTROLLER FUNCTION CONFIGURATION TABLE.

△5 FACTORY JUMPER PROVIDED BETWEEN TERMINALS A AND C IF SERIAL COMMUNICATIONS OPTION SELECTED. L14 PROGRAMMED FOR FORCED LOCAL, CODE FLO.

CLASS 8839 ECONFLEX
POWER CIRCUIT W
(WITHOUT BYPASS)
START-STOP AND SPEED POTENTIOMETER

SQUARE D COMPANY

DWG# NO. 8839-450-3



DESCRIPTION	TYPE 1	TYPE 12R	TYPE 3R
‡ HEATSINK FANS	10–25HP 460V, 7.5–10HP 208/230V	10–25HP 460V, 7.5–10HP 208/230V	10–25HP 460V, 7.5–10HP 208/230V
‡ STIRRING FANS	60–100HP 460V, 7.5–50HP 208/230V	ALL HP	30–100HP 460V, 15–50HP 208/230V
‡ VENTILATION FAN	NA	NA	ALL HP
‡ SPACE HEATER	NA	NA	ALL HP
▲ HEATSINK FANS 12 VDC	30–100HP 460V, 15–50HP 208/230V	30–100HP 460V, 15–50HP 208/230V	30–100HP 460V, 15–50HP 208/230V

CONFIGURE CONTROLLER FUNCTIONS AS FOLLOWS:

MENU	CODE	ADJ	DESCRIPTION
SUP	rFr		DISPLAY PARAMETER: OUTPUT FREQ.
MACRO	CFG	VT[1]	VARIABLE TORQUE APPLICATION
CtL	tCC	2W	TWO WIRE CONTROL
CtL	tCt	LEL	TWO WIRE CONTROL,MAINTAINED
I-O	NST	LI2	FREEWHEEL STOP
I-O	RFC	LI3	REFERENCE SWITCHING,AUTO/MANUAL
I-O	RST	LI4 △7	FAULT RESET
I-O	RUN	R2	DRIVE RUNNING
SEt	ACC	10	ACCELERATION TIME,IN SECONDS
SEt	dEC	10	DECELERATION TIME,IN SECONDS
SEt	LSP	3	LOW SPEED,IN HZ
drC	SFt	HFI	HIGH SWITCHING FREQ. W/FOLDBACK
drC	SFr	8	8K HZ SWITCHING FREQUENCY
drC	SFC	PSM	OPEN CIRCUIT TESTING
FLt	FLr	YES	CATCH ON FLY
FLt	OPL	NO	OUTPUT PHASE LOSS
WHEN MOD H09 SELECTED-ANALOG CARD			
I-O	NO	LI5	NOT ASSIGNED
I-O	NO	AI3	NOT ASSIGNED
I-O	OFR	AO	MOTOR FREQUENCY

[1] AFTER PROGRAMMING IS COMPLETE, MACRO DESCRIPTION WILL READ CUSTOMIZED.

LEGEND

○ = DEVICE TERMINAL
⊙ = TERMINAL BLOCK (TB)
NUMBER = 115 VAC
LETTER = 10/24 VDC

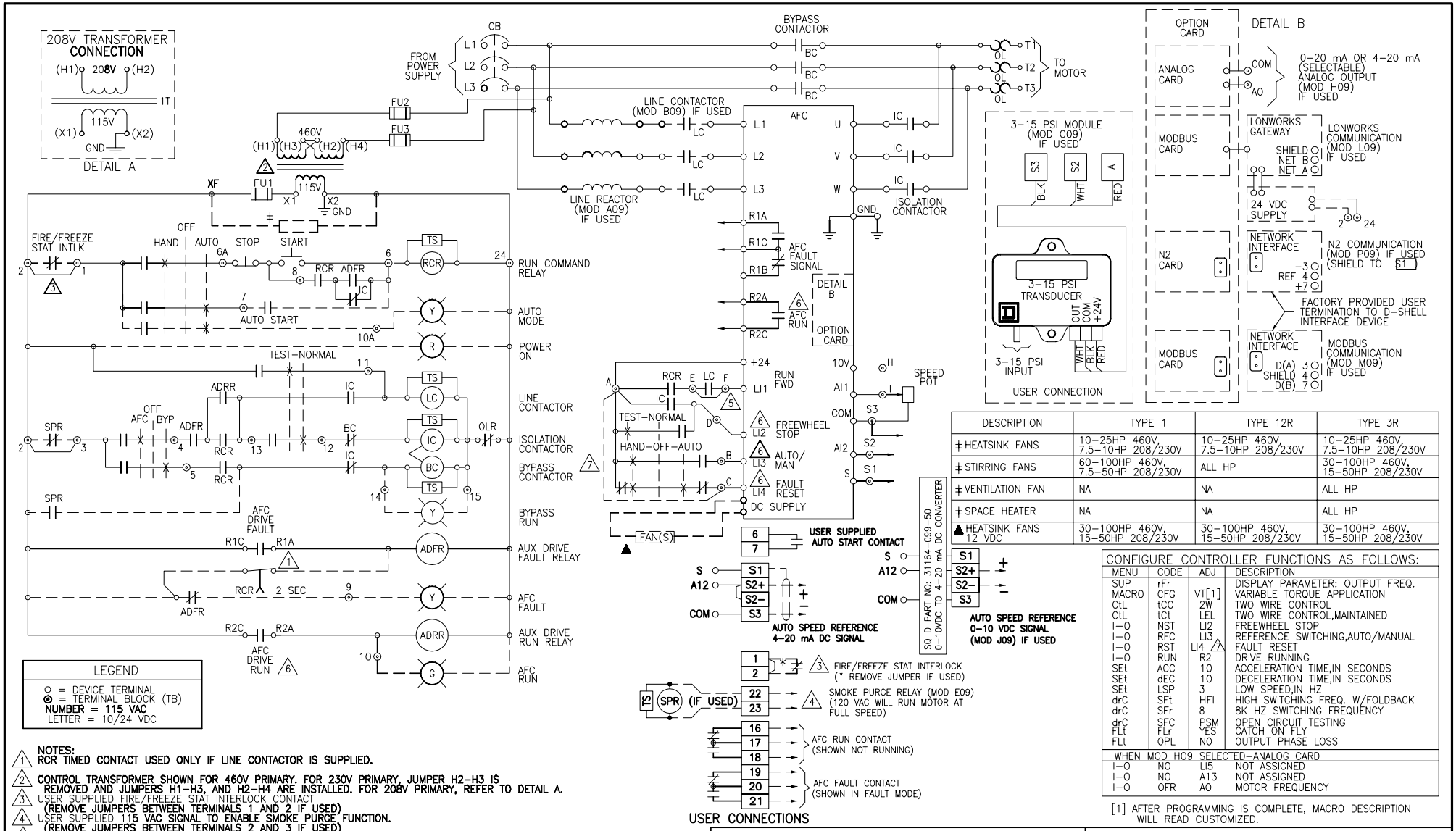
NOTES:

1. RCR TIMED CONTACT USED ONLY IF LINE CONTACTOR IS SUPPLIED.
2. CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 230V PRIMARY, JUMPER H2–H3 IS REMOVED AND JUMPERS H1–H3, AND H2–H4 ARE INSTALLED. FOR 208V PRIMARY, REFER TO DETAIL A.
3. USER SUPPLIED FIRE/FREEZE STAT INTERLOCK CONTACT (REMOVE JUMPERS BETWEEN TERMINALS 1 AND 2 IF USED)
4. USER SUPPLIED 115 VAC SIGNAL TO ENABLE SMOKE PURGE FUNCTION. (REMOVE JUMPERS BETWEEN TERMINALS 2 AND 3 IF USED)
5. CIRCUIT SHOWN WITHOUT LINE CONTACTOR. (REMOVE JUMPER BETWEEN TERMINALS E AND F IF USED, IF LINE CONTACTOR IS SUPPLIED)
6. PROGRAMMED I/O SEE CONTROLLER FUNCTION CONFIGURATION TABLE.
7. FACTORY JUMPER PROVIDED BETWEEN TERMINALS A AND C IF SERIAL COMMUNICATIONS OPTION SELECTED. L14 PROGRAMMED FOR FORCED LOCAL, CODE FLO.

CLASS 8839 ECONFLEX
POWER CIRCUIT Y
(BYPASS)
HAND–OFF–AUTO AND SPEED POTENTIOMETER

SQUARE D COMPANY

DWG# NO. 8839-450-4



DESCRIPTION	TYPE 1	TYPE 12R	TYPE 3R
‡ HEATSINK FANS	10-25HP 460V, 7.5-10HP 208/230V	10-25HP 460V, 7.5-10HP 208/230V	10-25HP 460V, 7.5-10HP 208/230V
‡ STIRRING FANS	60-100HP 460V, 7.5-50HP 208/230V	ALL HP	30-100HP 460V, 15-50HP 208/230V
‡ VENTILATION FAN	NA	NA	ALL HP
‡ SPACE HEATER	NA	NA	ALL HP
▲ HEATSINK FANS 12 VDC	30-100HP 460V, 15-50HP 208/230V	30-100HP 460V, 15-50HP 208/230V	30-100HP 460V, 15-50HP 208/230V

CONFIGURE CONTROLLER FUNCTIONS AS FOLLOWS:

MENU	CODE	ADJ	DESCRIPTION
SUP	rFr		DISPLAY PARAMETER: OUTPUT FREQ.
MACRO	CFG	VT[1]	VARIABLE TORQUE APPLICATION
CtL	tCC	2W	TWO WIRE CONTROL
CtL	tCt	LEL	TWO WIRE CONTROL,MAINTAINED
I-O	NST	LI2	FREEWHEEL STOP
I-O	RFC	LI3	REFERENCE SWITCHING,AUTO/MANUAL
I-O	RST	LI4 ⚠1	FAULT RESET
I-O	RUN	R2	DRIVE RUNNING
SEt	ACC	10	ACCELERATION TIME,IN SECONDS
SEt	dEC	10	DECELERATION TIME,IN SECONDS
SEt	LSP	3	LOW SPEED,IN HZ
drC	SFt	HFI	HIGH SWITCHING FREQ. W/FOLDBACK
drC	SFr	8	8K HZ SWITCHING FREQUENCY
drC	SFC	PSM	OPEN CIRCUIT TESTING
FLt	FLr	YES	CATCH ON FLY
FLt	OPL	NO	OUTPUT PHASE LOSS
WHEN MOD H09 SELECTED-ANALOG CARD			
I-O	NO	LI5	NOT ASSIGNED
I-O	NO	A13	NOT ASSIGNED
I-O	OFR	AO	MOTOR FREQUENCY

[1] AFTER PROGRAMMING IS COMPLETE, MACRO DESCRIPTION WILL READ CUSTOMIZED.

LEGEND

○ = DEVICE TERMINAL
◉ = TERMINAL BLOCK (TB)
NUMBER = 115 VAC
LETTER = 10/24 VDC

NOTES:

⚠1 RCR TIMED CONTACT USED ONLY IF LINE CONTACTOR IS SUPPLIED.

⚠2 CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 230V PRIMARY, JUMPER H2-H3 IS REMOVED AND JUMPERS H1-H3, AND H2-H4 ARE INSTALLED. FOR 208V PRIMARY, REFER TO DETAIL A.

⚠3 USER SUPPLIED FIRE/FREEZE STAT INTERLOCK CONTACT (REMOVE JUMPERS BETWEEN TERMINALS 1 AND 2 IF USED)

⚠4 USER SUPPLIED 115 VAC SIGNAL TO ENABLE SMOKE PURGE FUNCTION. (REMOVE JUMPERS BETWEEN TERMINALS 2 AND 3 IF USED)

⚠5 CIRCUIT SHOWN WITHOUT LINE CONTACTOR. (REMOVE JUMPER BETWEEN TERMINALS E AND F IF USED, IF LINE CONTACTOR IS SUPPLIED)

⚠6 PROGRAMMED I/O SEE CONTROLLER FUNCTION CONFIGURATION TABLE.

⚠7 FACTORY JUMPER PROVIDED BETWEEN TERMINALS A AND C IF SERIAL COMMUNICATIONS OPTION SELECTED. L14 PROGRAMMED FOR FORCED LOCAL, CODE FLO.

CLASS 8839 ECONFLEX
POWER CIRCUIT Y
(BYPASS)
HAND-OFF-AUTO, START-STOP
AND SPEED POTENTIOMETER

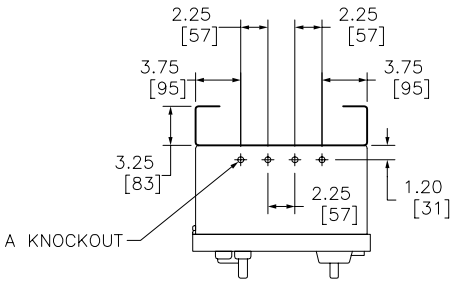
SQUARE D COMPANY

DWG# NO. 8839-450-5

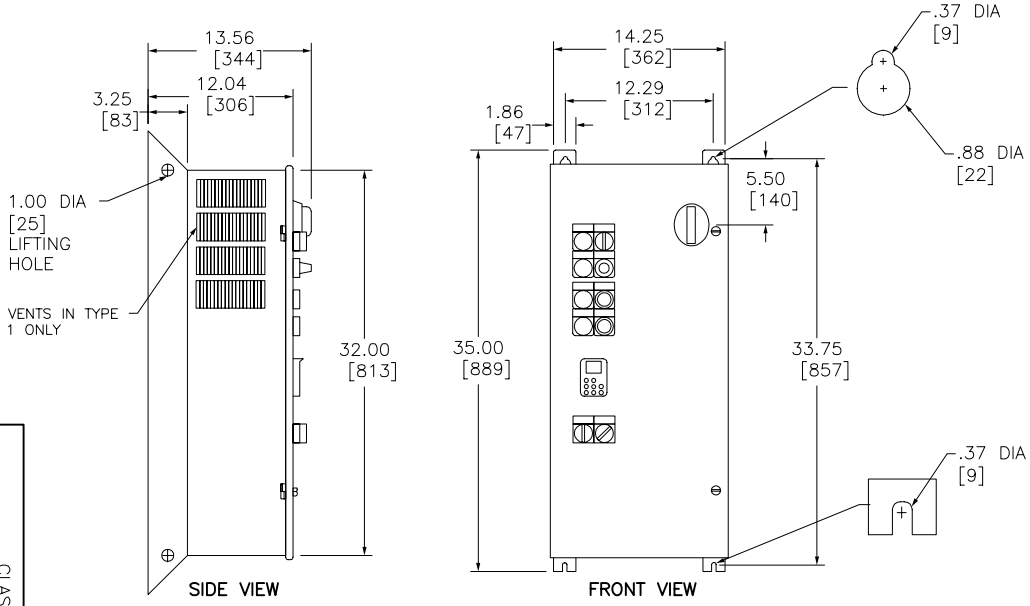
APRIL 2002

CLASS 8839 ECONOFLEX
460V 1–7.5HP
208/230V 1–5**HP**
TYPE 1 AND TYPE 12K (WALL MOUNT)

KNOCKOUTS		
SYMBOL	IN	MM
A	.50	13

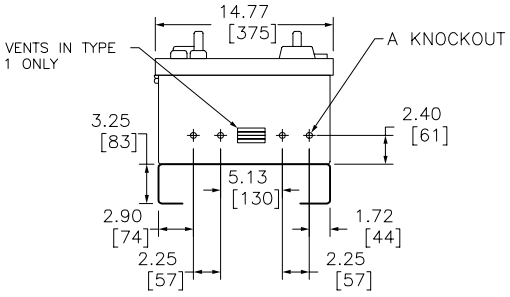


CONDUIT ENTRY – TOP VIEW



SIDE VIEW

FRONT VIEW



CONDUIT ENTRY – BOTTOM VIEW

DUAL DIMENSIONS: INCHES / MILLIMETERS

HP	HP	WEIGHT	
460V	208/230V	LB	KG
1 TO 7.5	1 TO 5	87	39.5

NOTE:
PROVIDE AT LEAST 3.00 [76] OF MOUNTING CLEARANCE ON EACH SIDE OF THE DRIVE CONTROLLER.
PROVIDE AT LEAST 6.00 [152] OF MOUNTING CLEARANCE ON TOP AND BOTTOM OF THE DRIVE CONTROLLER.

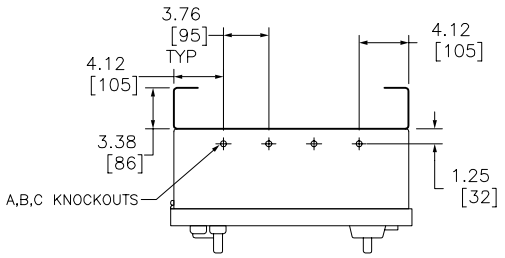
CLASS 8839 ECONOFLEX
460V 1–7.5HP
208/230V 1–5HP
TYPE 1 AND TYPE 12K (WALL MOUNT)

DWG# NO. 8839-450-6

SQUARE D COMPANY

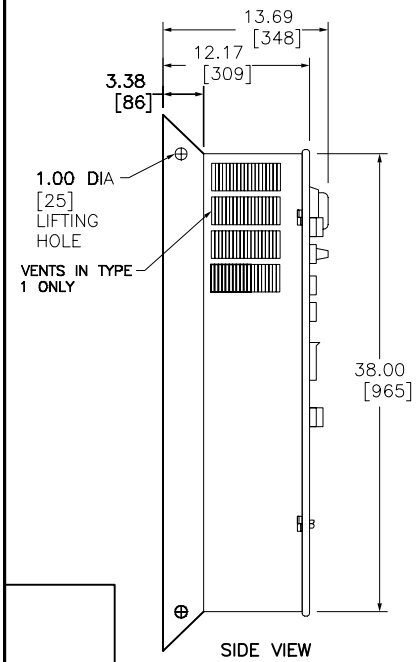
APRIL 2002

CLASS 8839 ECONOFLEX
460V 10–25HP
208/230V 7.5–10HP
TYPE 1 AND TYPE 12K (WALL MOUNT)

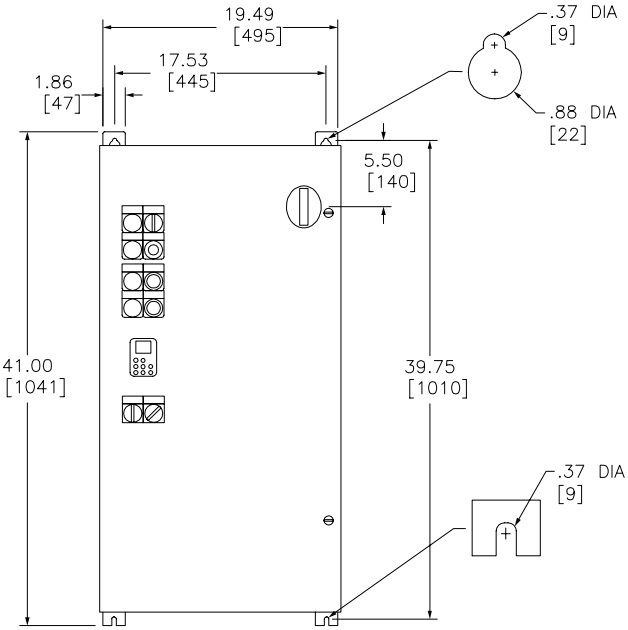


KNOCKOUTS		
SYMBOL	IN	MM
A	.50	13
B	.75	19
C	1.00	25

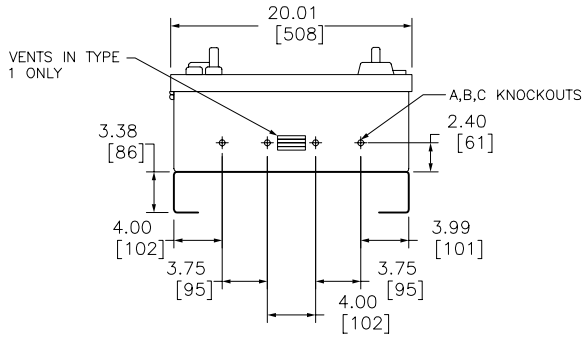
CONDUIT ENTRY – TOP VIEW



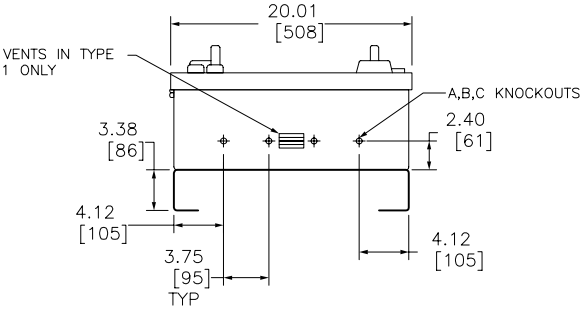
SIDE VIEW



FRONT VIEW



TYPE 1 CONDUIT ENTRY – BOTTOM VIEW



TYPE 12K CONDUIT ENTRY – BOTTOM VIEW

DUAL DIMENSIONS: INCHES
MILLIMETERS

HP	HP	WEIGHT	
460V	208/230V	LB	KG
10 TO 25	7.5 TO 10HP	126	57.2

NOTE:
PROVIDE AT LEAST 3.00 [76] OF MOUNTING CLEARANCE ON EACH SIDE OF THE DRIVE CONTROLLER.
PROVIDE AT LEAST 6.00 [152] OF MOUNTING CLEARANCE ON TOP AND BOTTOM OF THE DRIVE CONTROLLER.

CLASS 8839 ECONOFLEX
460V 10–25HP
208/230V 7.5–10HP
TYPE 1 AND TYPE 12K (WALL MOUNT)

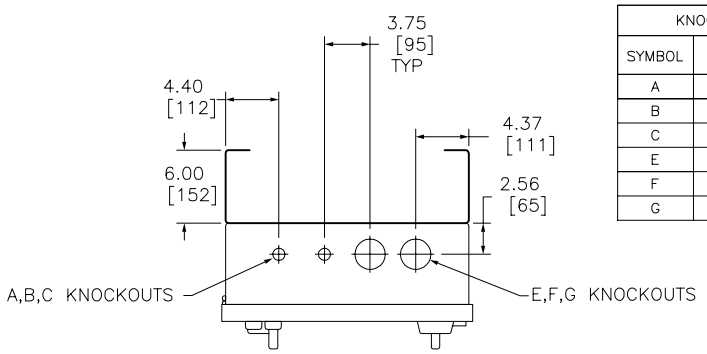
DWG# NO: 8839-450-7

SQUARE D COMPANY

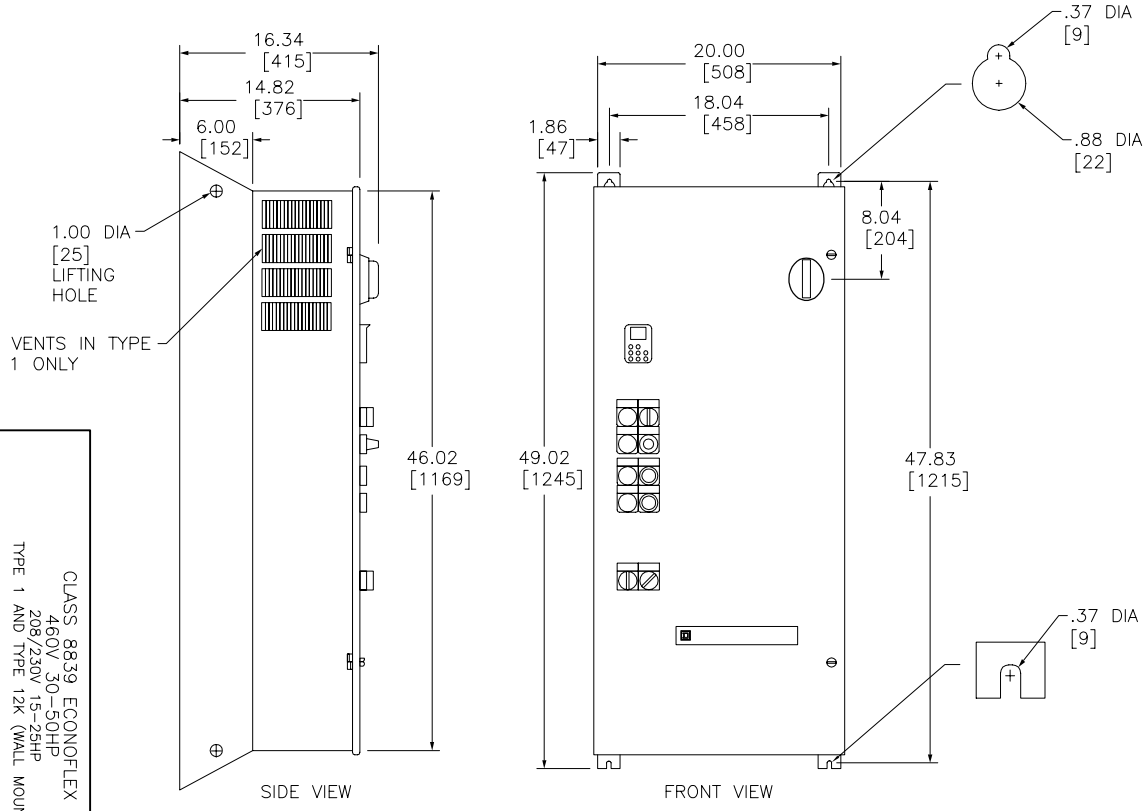
APRIL 2002

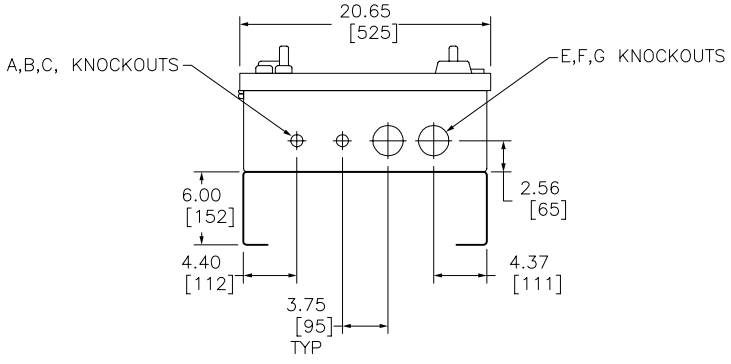
CLASS 8839 ECONOFLEX
460V 30–50HP
208/230V 15–25HP
TYPE 1 AND TYPE 12K (WALL MOUNT)

KNOCKOUTS		
SYMBOL	IN	MM
A	.50	13
B	.75	19
C	1.00	25
E	1.50	38
F	2.00	51
G	2.50	64



CONDUIT ENTRY – TOP VIEW





CONDUIT ENTRY – BOTTOM VIEW

DUAL DIMENSIONS: INCHES
MILLIMETERS

HP	HP	WEIGHT	
460V	208/230V	LB	KG
30 TO 50	15 TO 25	180	81.6

NOTE:
PROVIDE AT LEAST 3.00 [76] OF MOUNTING CLEARANCE ON EACH SIDE OF THE DRIVE CONTROLLER.
PROVIDE AT LEAST 6.00 [152] OF MOUNTING CLEARANCE ON TOP AND BOTTOM OF THE DRIVE CONTROLLER.

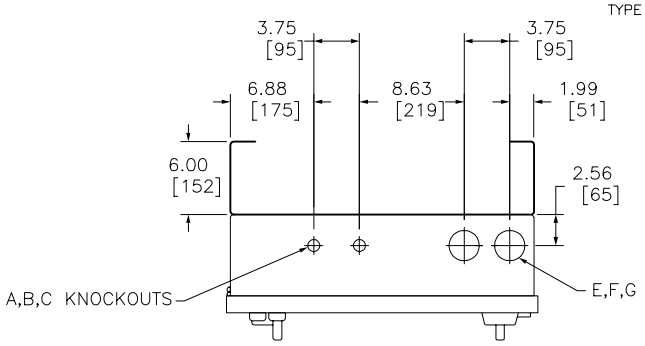
CLASS 8839 ECONOFLEX
460V 30–50HP
208/230V 15–25HP
TYPE 1 AND TYPE 12K (WALL MOUNT)

DWG# NO. 8839-450-8

SQUARE D COMPANY

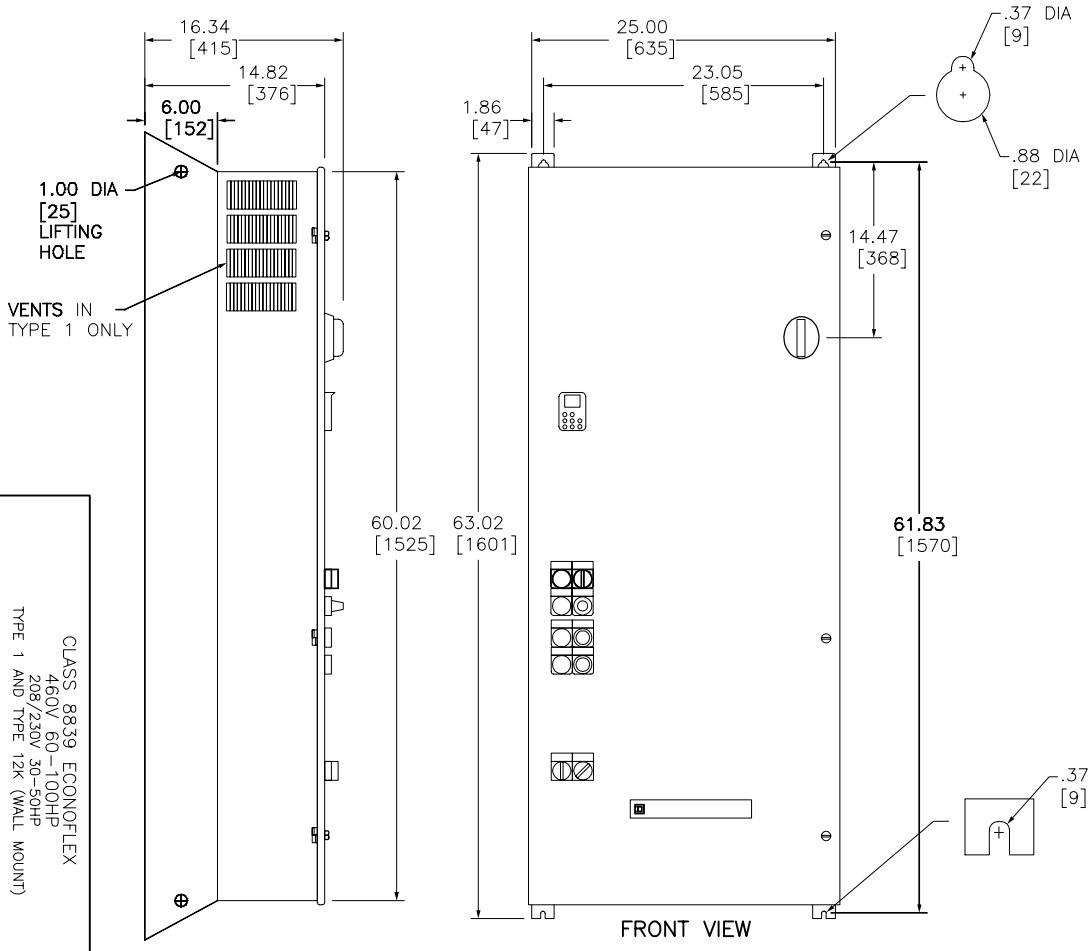
APRIL 2002

CLASS 8839 ECONOFLEX
460V 60–100**HP**
208/230V 30–50HP
TYPE 1 AND TYPE 12K (WALL MOUNT)



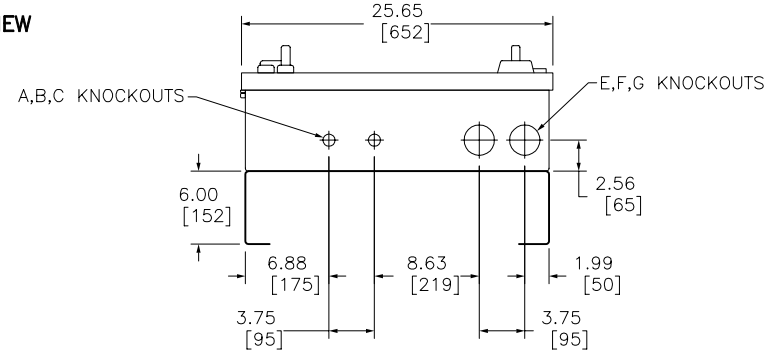
KNOCKOUTS		
SYMBOL	IN	MM
A	.50	13
B	.75	19
C	1.00	25
E	1.50	38
F	2.00	51
G	2.50	64

CONDUIT ENTRY – TOP VIEW



SIDE VIEW

FRONT VIEW



CONDUIT ENTRY – BOTTOM VIEW

DUAL DIMENSIONS: INCHES
MILLIMETERS

HP	HP	WEIGHT	
460V	208/230V	LB	KG
60 TO 100	30 TO 50	225	102.1

NOTE:
PROVIDE AT LEAST 3.00 [76] OF MOUNTING CLEARANCE ON EACH SIDE OF THE DRIVE CONTROLLER.
PROVIDE AT LEAST 6.00 [152] OF MOUNTING CLEARANCE ON TOP AND **BOTTOM** OF THE DRIVE CONTROLLER.

CLASS 8839 ECONOFLEX
460V 60–100HP
208/230V 30–50HP
TYPE 1 AND TYPE 12K (WALL MOUNT)

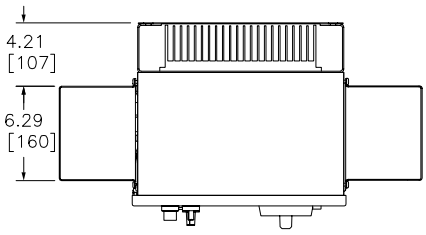
DWG# NO. 8839-450-9

SQUARE D COMPANY

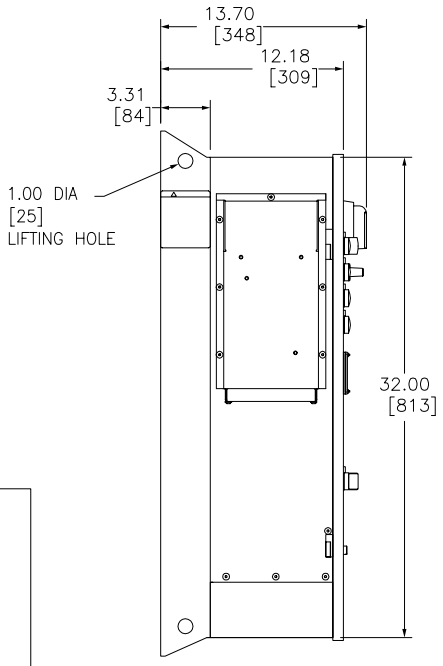
APRIL 2002

CLASS 8839 ECONOFLEX
460V 1–7.5HP
208/230V 1–5HP
TYPE 3R (WALL MOUNT)

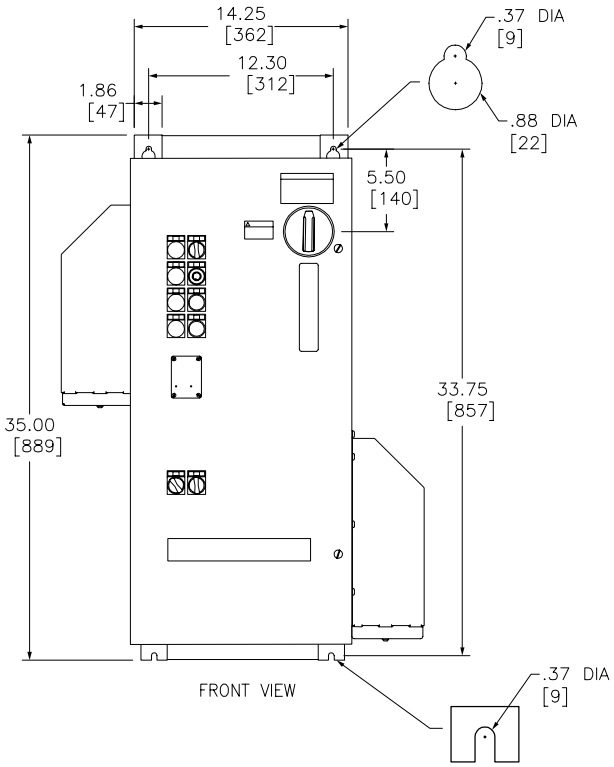
KNOCKOUTS		
SYMBOL	IN	MM
A	.50	13



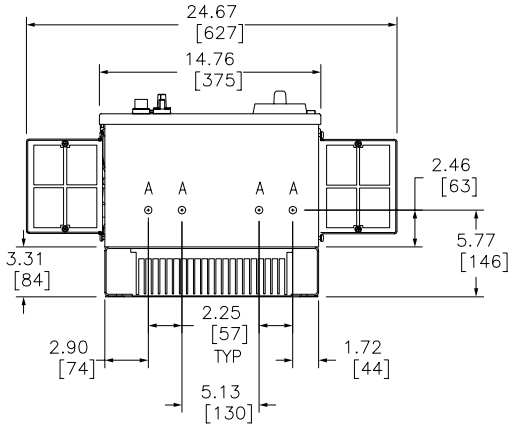
TOP VIEW



SIDE VIEW



FRONT VIEW



CONDUIT ENTRY – BOTTOM VIEW

DUAL DIMENSIONS: INCHES / MILLIMETERS

HP	HP	WEIGHT	
460V	208/230V	LB	KG
1 TO 7.5	1 TO 5	119	54

NOTE:
PROVIDE AT LEAST 2.00 [51] OF MOUNTING CLEARANCE FROM EACH SIDE HOOD.
PROVIDE AT LEAST 6.00 [152] OF MOUNTING CLEARANCE ON TOP OF THE DRIVE CONTROLLER.
PROVIDE AT LEAST 12.00 [305] OF MOUNTING CLEARANCE AT THE BOTTOM OF THE DRIVE CONTROLLER.

CLASS 8839 ECONOFLEX
460V 1–7.5HP
208/230V 1–5HP
TYPE 3R (WALL MOUNT)

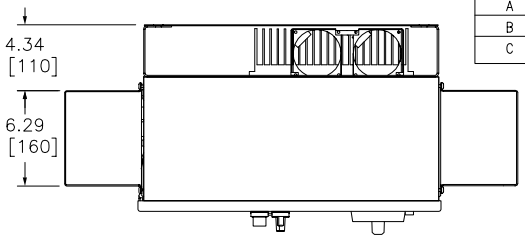
DWG# NO: 8839-450-10

SQUARE D COMPANY

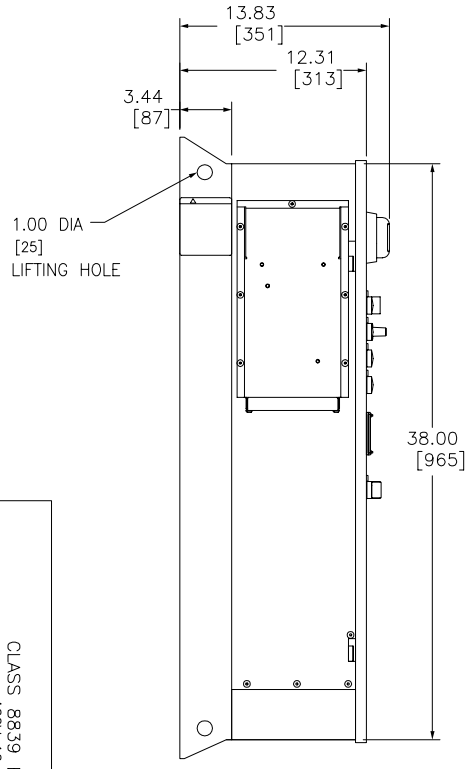
APRIL 2002

CLASS 8839 ECONOFLEX
460V 10–25HP
208/230V 7.5–**10HP**
TYPE 3R (WALL MOUNT)

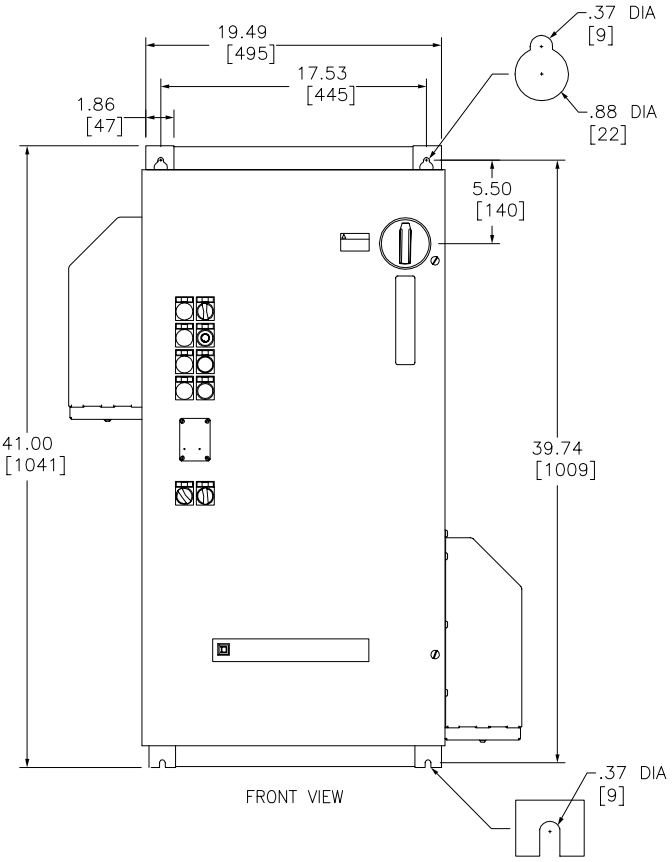
KNOCKOUTS		
SYMBOL	IN	MM
A	.50	13
B	.75	19
C	1.00	25



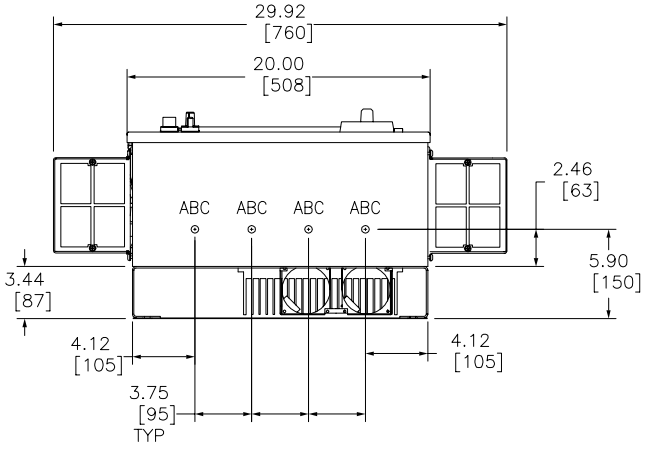
TOP VIEW



SIDE VIEW



FRONT VIEW



CONDUIT ENTRY – BOTTOM VIEW

DUAL DIMENSIONS: INCHES
MILLIMETERS

NOTE:
PROVIDE AT LEAST 2.00 [51] OF MOUNTING CLEARANCE FROM EACH SIDE HOOD.
PROVIDE AT LEAST 6.00 [152] OF MOUNTING CLEARANCE ON TOP OF THE DRIVE CONTROLLER.
PROVIDE AT LEAST 12.00 [305] OF MOUNTING CLEARANCE AT THE BOTTOM OF THE DRIVE CONTROLLER.

HP	HP	WEIGHT	
460V	208/230V	LB	KG
10–25HP	7.5–10HP	163	74

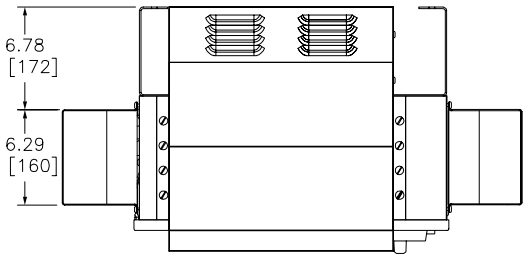
CLASS 8839 ECONOFLEX
460V 10–25HP
208/230V 7.5–10HP
TYPE 3R (WALL MOUNT)

DWG# NO. 8839–450–11

SQUARE D COMPANY

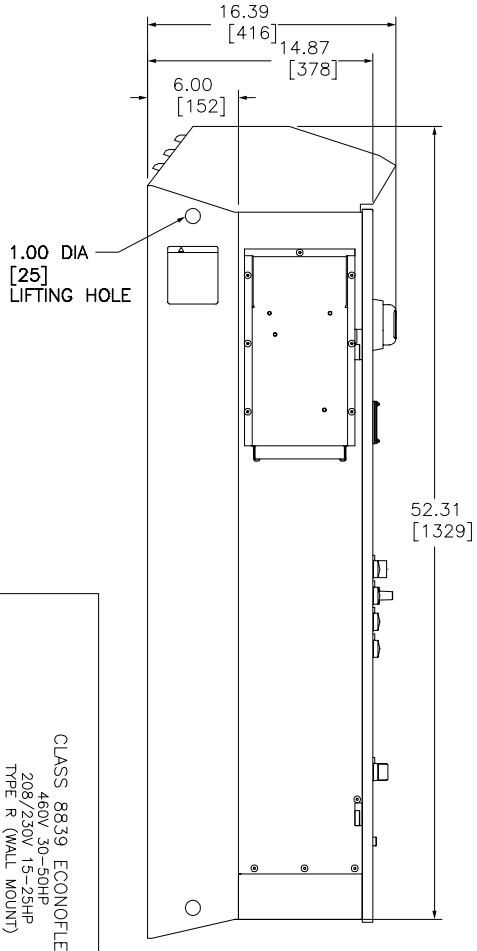
APRIL 2002

CLASS 8839 ECONOFLEX
460V 30-50HP
208/230V 15-25HP
TYPE 3R (WALL MOUNT)

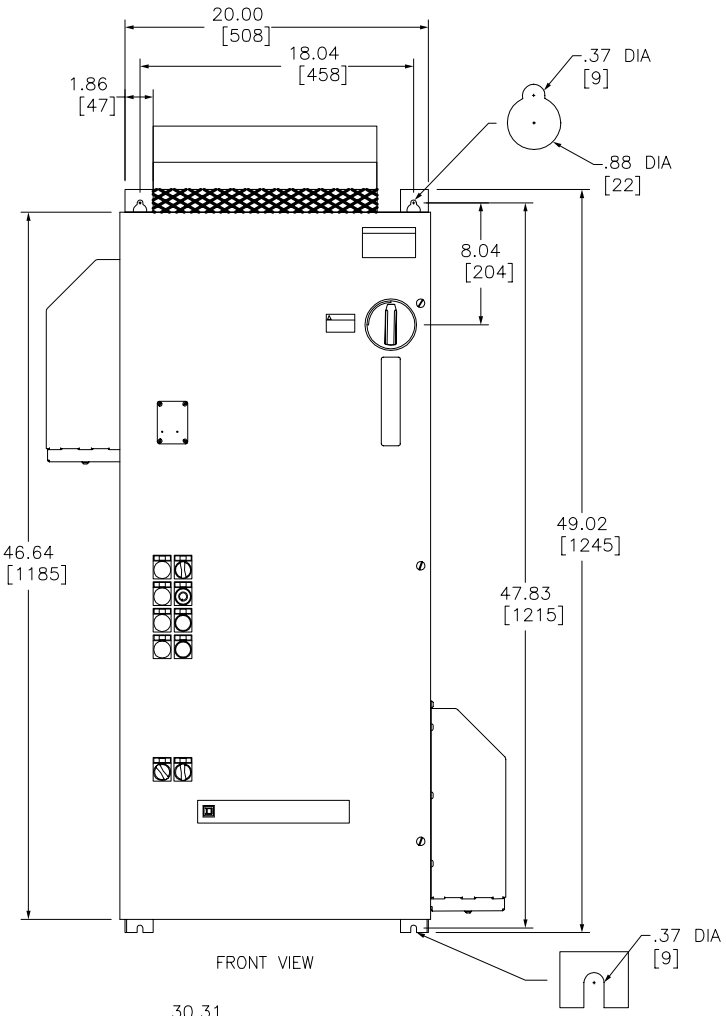


TOP VIEW

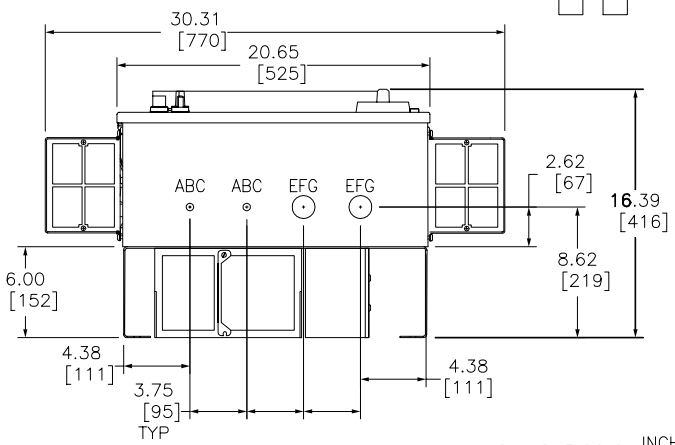
KNOCKOUTS		
SYMBOL	IN	MM
A	.50	13
B	.75	19
C	1.00	25
E	1.50	38
F	2.00	51
G	2.50	64



SIDE VIEW



FRONT VIEW



CONDUIT ENTRY – BOTTOM VIEW

DUAL DIMENSIONS: INCHES
MILLIMETERS

NOTE:
PROVIDE AT LEAST 2.00 [51] OF MOUNTING CLEARANCE FROM EACH SIDE HOOD.
PROVIDE AT LEAST 6.00 [152] OF MOUNTING CLEARANCE ON TOP OF THE DRIVE CONTROLLER.
PROVIDE AT LEAST 12.00 [305] OF MOUNTING CLEARANCE AT THE BOTTOM OF THE DRIVE CONTROLLER.

HP	HP	WEIGHT	
460V	208/230V	LB	KG
30 TO 50	15 TO 25	216	98

CLASS 8839 ECONOFLEX
460V 30-50HP
208/230V 15-25HP
TYPE R (WALL MOUNT)

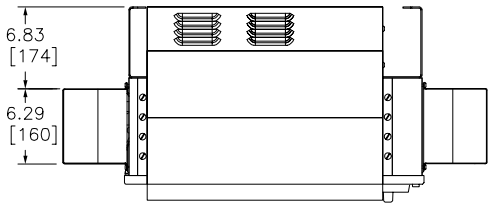
DWG# NO. 8839-450-12

SQUARE D COMPANY

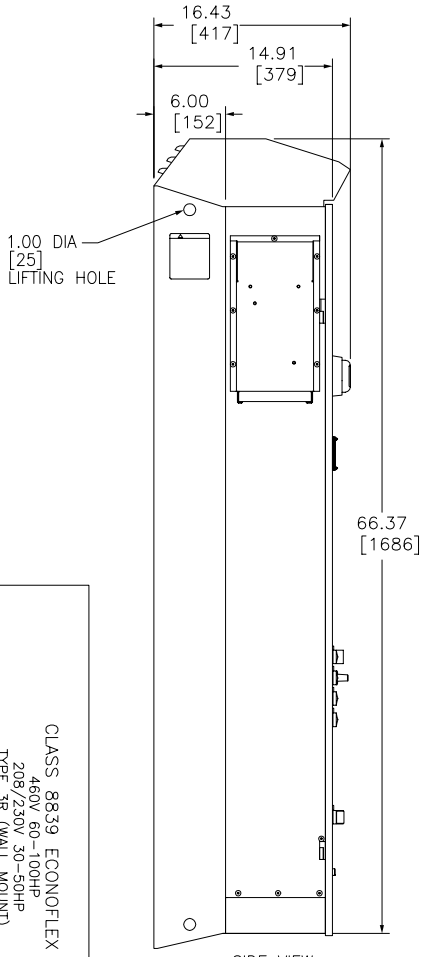
APRIL 2002

CLASS 8839 ECONOFLEX
460V 60–100HP
208/230V 30–50HP
TYPE 3R (WALL MOUNT)

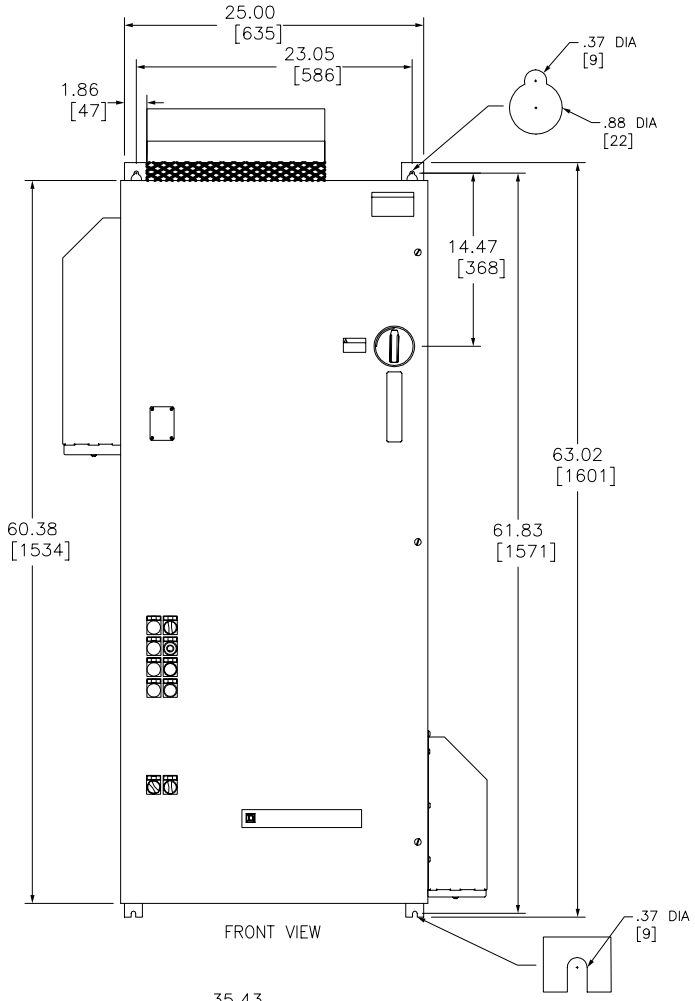
KNOCKOUTS		
SYMBOL	IN	MM
A	.50	13
B	.75	19
C	1.00	25
E	1.50	38
F	2.00	51
G	2.50	64



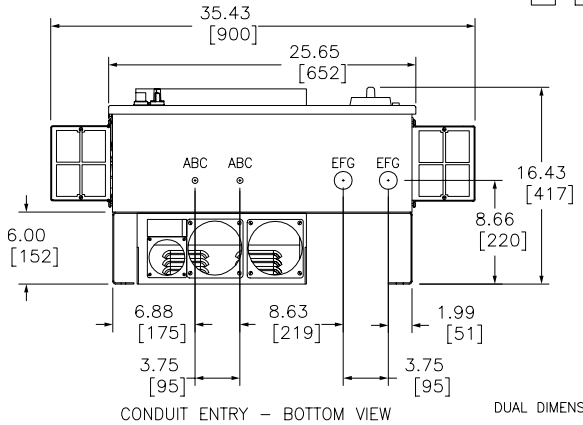
TOP VIEW



SIDE VIEW



FRONT VIEW



CONDUIT ENTRY – BOTTOM VIEW

DUAL DIMENSIONS: INCHES
MILLIMETERS

NOTE:
PROVIDE AT LEAST 2.00 [51] OF MOUNTING CLEARANCE FROM EACH SIDE HOOD.
PROVIDE AT LEAST 6.00 [152] OF MOUNTING CLEARANCE ON TOP OF THE DRIVE CONTROLLER.
PROVIDE AT LEAST 12.00 [305] OF MOUNTING CLEARANCE AT THE BOTTOM OF THE DRIVE CONTROLLER.

HP	HP	WEIGHT	
460V	208/230V	LB	KG
60 TO 100	30 TO 50	261	118

CLASS 8839 ECONOFLEX
460V 60–100HP
208/230V 30–50HP
TYPE 3R (WALL MOUNT)

DWG# NO. 8839–450–13

SQUARE D COMPANY

Class 8839 ECONO-*flex*™ AC Drives

Class 8839 ECONO-*flex*™

The Class 8839 ECONO-*flex family of AC drives provides an efficient and economical adjustable speed solution for commercial and industrial HVAC and pump applications. It combines the sturdy construction of an industrial product with features designed for commercial applications. Plus,* ECONO-*flex drives can increase system energy efficiency by 50% or more.*

Available with Type 1, Type 12K and Type 3R enclosures, ECONO-*flex drives meet both indoor and outdoor application needs. The Type 1 enclosure is designed specifically for indoor, non-dusty environments, while the Type 12K enclosure is designed to protect from dust and dripping liquid. The Type 3R enclosure permits installation on rooftops or other outdoor locations.*

Type 3R Enclosure

Key Benefits

Ease of Use

- Pre-punched conduit knockouts simplify installation and prevent metal filings inside enclosures (common with traditional installations).
- Pre-programmed for HVAC variable torque operation and pre-wired with HVAC controls to permit easy set-up and installation.
- Front-removable heat sink fan assembly eliminates rear access requirements, improving maintenance and minimizing downtime.
- Type 2B wiring simplifies wiring identification and termination to industrial-rated terminals.

Reliability

- Fully-rated motor isolation and bypass contactors with mechanical and electrical interlock prevent accidental voltage backfeeding.
- Circuit breaker protection provides short circuit protection without current-limiting line fuses.
- Adjustable carrier frequency optimized for low noise operation at 8kHz (programmable from 0.5Hz to 16kHz).
- Advanced, ASIC technology platform increases reliability and uptime, lowering component count by up to 50%.
- Soft start effect reduces mechanical stress and routine maintenance.
- Enclosed line reactor option provides transient protection from surge and overvoltage, and minimizes line harmonic currents.

Structural Integrity

- UL 508C listed and coordinated with NEMA ICS 7.1 standards to exceed minimum UL AIC requirements and enhance personnel safety under short circuit conditions for both drive and bypass.
- Industrial-rated control operators and pilot devices accommodate the most demanding industrial environments.

continued

Key Benefits, continued

Functionality

- Type 1, Type 12K and Type 3R enclosures available to meet specific application needs.
- HVAC-specific controls provide smoke purge and fire/freeze stats for full speed/fire safety override and lockout terminations.
- Keypad lockout switch limits configuration access and prevents unauthorized tampering.
- For Type 3R enclosure, thermal management system for –10 to +50°C ambient temperature allows operation in extreme outdoor conditions.

Options

- Type 12K and Type 3R construction
- Handheld PDA commissioning and diagnostic terminal with PC interface
- Microsoft® Windows-based PC configuration software
- 2-wire control for automatic restart requirement or 3-wire control for process operations
- 3–15 PSI input for retrofit applications
- Compatible with ALTIVAR® 58 AC drive communication cards, I/O extension cards and operator interface options
- Motor isolation and bypass contactors for emergency full-speed operation
- Input line contactor for 3-contactor bypass
- Integrated line reactor
- Smoke purge relay interface
- Serial communications: LonWorks®, MODBUS® or METASYS®N2
- cUL certification

Details Make a Difference — Class 8839 ECONO-*flex*™ AC Drives

- **Top and bottom conduit entry with pre-punched conduit knockouts (bottom entry only for Type 3R enclosure)**
- **Output, short circuit and ground fault protection**
- **Fully-rated motor isolation and bypass contactors with mechanical and electrical interlock**
- **ASIC technology platform**
- **Front-removable heat sink fan assembly**
- **HVAC-specific control interface**
- **Compact metal enclosure design to reduce RFI (radio frequency interference)**
- **Test-Normal selector switch to allow drive testing**

Type 12K Enclosure

- **Industrial-rated control operators and pilot devices that indicate drive, bypass and automatic operation, and drive fault conditions**
- **Isolated, speed reference input 120 VAC control interface**
- **Auxiliary form C relay contacts for run and fault indication**
- **Type 2B wiring terminals**
- **Color-coded wire class identification**
- **Coordinated circuit breaker disconnect**
- **Coasting motor restart with bi-directional speed search**
- **Anti-windmilling control**
- **Adjustable Class 20 overload with automatic reset**

Specifications — Class 8839 ECONO-*flex*™ AC Drives

Input voltage	460 V ±10%, 230 V ±10%, 208 V ±10%
Displacement power factor	98% through speed range
Input frequency	60 Hz ± 5%
Output voltage	Three-phase output Maximum voltage equal to input voltage
Galvanic isolation	Galvanic isolation between power and control (inputs, outputs, and power supplies)
Frequency range of power converter	0.1 to 500 Hz (factory setting of 60 Hz maximum)
Current	110% of controller rated current for 60 s
Switching frequency	Selectable from 0.5 to 16 kHz [1] Factory setting: 8 kHz
Speed reference	AI1:0 to +10 V, Z = 30 kΩ Speed potentiometer to AI1 AI2:FACTORY SETTING: 4 to 20 mA Z = 100 Ω (reassignable, XY range with keypad display) FACTORY MODIFICATION J09 provides a controller interface 010 Vdc reference signal to the AI2 input using a 010 V / 420 mA converter with Z = 100 kΩ
Frequency resolution in analog reference	0.1 for 100 Hz (10 bits)
Speed regulation	V/f: determined by motor slip, typically 3% SLFV (sensorless flux vector): 1%
Efficiency	97% at full load typical
Reference sample time	5 ms
Acceleration and deceleration ramps	0.1 to 999.9 seconds (definition in 0.1 s increments)
Motor protection	Class 10 electronic overload protection Class 20 electromechanical overload protection with bypass [2]
Keypad display	Self diagnostics with fault messages in three languages; also refer to instruction bulletin VVDED397047US
Temperature	Type 1 and 12K – Operation: +14 to +104 °F (-10 to 40 °C) Storage: -13 to +149 °F (-25 to +65 °C) Type 3R – Operation: +14 to +122 °F (-10 to 50 °C) Storage: -13 to +149 °F (-25 to +65 °C)
Humidity	95% with no condensation or dripping water, conforming to IEC 60068-2-3
Altitude	3,300 ft (1000 m) maximum without derating, derating of the current by 1% for each additional 330 ft (100 m)
Enclosure	Type 1, Type 12K, Type 3R
Pollution degree	Type 1 and Type 3R: Pollution degree 2 per NEMA ICS-1 Annex A and IEC 60664-1 Type 12K: Pollution degree 3
Operational test vibration	Conforming to IEC 60721-3-3-3M3 amplitude 1.5 mm peak to peak from 3 to 13 Hz 1 g from 13 to 200 Hz
Transit test to shock	Conforming to National Safe Transit Association and International Safe Transit Association test for packages
Operational shock	15 g, 11 ms
Codes and standards	UL Listed per UL508C under category NMMS Conforms to applicable NEMA ICS, NFPA, and IEC Standards Manufactured under ISO 9001 Standards Factory modification K09 provides Canadian cUL certification

[1] Above 8 kHz, select the next largest size drive controller. If the duty cycle does not exceed 60% (36 s maximum for a 60 s cycle), this is not necessary.
[2] Class 10 electromechanical for 1 hp @460 V.

Type 1 or Type 12K Enclosure — Overall Dimensions, inches (mm)

HP	H	W	D
1–7.5 hp @ 460 VAC 1–5 hp @ 208/230 VAC	35 (889)	15 (381)	14 (356)
10–25 hp @ 460 VAC 7.5–10 hp @ 208/230 VAC	41 (1041)	21 (533)	14 (356)
30–50 hp @ 460 VAC 15–25 hp @ 208/230 VAC	49 (1245)	21 (533)	16 (406)
60–100 hp @ 460 VAC 30–50 hp @ 208/230 VAC	63 (1600)	26 (660)	16 (406)

Type 3R Enclosure — Overall Dimensions, inches (mm)

HP	H	W	D
1–7.5 hp @ 460 VAC 1–5 hp @ 208/230 VAC	35 (889)	24 (621)	14 (356)
10–25 hp @ 460 VAC 7.5–10 hp @ 208/230 VAC	41 (1041)	30 (767)	14 (356)
30–50 hp @ 460 VAC 15–25 hp @ 208/230 VAC	52 (1326)	30 (767)	16 (415)
60–100 hp @ 460 VAC 30–50 hp @ 208/230 VAC	66 (1682)	35 (897)	16 (415)

The controller catalog number, located on the nameplate on the inside of the door, is coded to describe the configuration and options present. Use the following grid to translate the catalog number into a description of the drive controller.

Class	Type						Modifications		
							Control	Light	Misc.
8839	58E	•	•	•	V	•	•	•	•
		①	②	③	④	⑤	⑥	⑦	⑧	⑨

① Product

Code	Drive Type
58E	ECONO-FLEX Controller

② Horsepower Code

Code	HP Rating
C	1 hp
D	2 hp
E	3 hp
F	5 hp
G	7.5 hp
H	10 hp
J	15 hp
K	20 hp

Code	HP Rating
L	25
M	30
N	40
P	50
Q	60 (460 V only)
R	75 (460 V only)
S	100 (460 V only)

③ Enclosure Type

Code	Environment Rating
A	Type 12K
G	Type 1
H [5]	Type 3R

④ Voltage Rating

Code	Voltage
2	208 V
3	230 V
4	460 V

⑤ Application Type

Code	Applied Rating
V	Variable Torque

⑥ Device Type

Code	Power Circuit
W [5]	Without Bypass
Y [8]	Bypass

⑦ Control Option

Code	AFC Controls
A07 [7]	Hand/Off/Auto, Speed Potentiometer
B07 [7]	Hand/Off/Auto, Start/Stop, Speed Potentiometer
C07 [1]	Start/Stop, Speed Potentiometer
N07	None

⑧ Light Option

Code	Light Cluster
A08 [2]	Red Power On
	Green AFC Run
	Yellow AFC Fault
	Yellow Auto
B08 [2], [3]	Red Power On
	Green AFC Run
	Yellow AFC Fault
	Yellow Bypass
C08 [2], [4]	Red Power On
	Green AFC Run
	Yellow AFC Fault

⑨ Misc. Options

Code	Feature
A09 [9]	Line Reactor (included with 30–100 hp @ 460 V and 15–50 hp @ 208/230 V)
B09	Line Contactor
C09 [10]	3-15 PSI Transducer
D09 [13]	Omit Keypad
E09 [6]	Smoke Purge
G09	22 KAIC UL Coordinated Rating
H09 [11]	Analog Card, 0–20 mA, programmable for 4–20 mA output
J09 [12]	0–10 Vdc Auto Speed Reference
K09	cUL Listing
L09 [14]	LONWORKS
M09 [14]	MODBUS
P09 [14]	METASYS N2

[1] Control option C07 (Start/Stop, Speed Potentiometer) is not compatible with Power Circuit Y (Bypass) or light cluster A08 or B08.

[2] Light cluster A08, B08, and C08 cannot be selected together. Select only one.

[3] Light cluster B08 is not compatible with Power Circuit W (Without Bypass).

[4] Light cluster C08 is not compatible with A07 (Hand/Off/Auto, Speed Potentiometer), or B07 (Hand/Off/Auto, Start/Stop, Speed Potentiometer).

[5] Line contactor B09 is not compatible with this option.

[6] Smoke purge E09 permits the motor to run at full speed.

[7] Place the Hand-Off-Auto switch in the Off position for AFC fault reset.

[8] Includes AFC/Off/Bypass switch and Test/Normal switch.

[9] Line reactor A09 is an option for 1–25 hp @ 460 V and 1–10 hp @ 208/230 V.

[10] 3–15 PSI Transducer C09 is not compatible with Start/Stop, Speed Potentiometer C07, 0–10 V Auto Speed Reference J09, or Analog Card H09.

[11] Analog Card H09 is not compatible with 3–15 PSI Transducer C09 or serial communication L09, M09 or P09.

[12] 0–10 V Auto Speed Reference J09 is not compatible with C07 Start/Stop Potentiometer or C09 3–15 PSI Transducer.

[13] Omit the keypad D09. User must buy separate device to program the controller.

[14] Serial communication L09, M09 and P09 cannot be selected together. Select only one. Serial communication cannot be selected with H09 analog card.

Visit the SQUARE D Web site at www.SquareD.com

Order Number 8800SM0101A

SQUARE D
Schneider Electric

Specification Number: 16420-4.2

Product Name: Enclosed Adjustable Frequency Drive - Class 8839 ECONOFLEX™ AC Drive for Variable Torque HVAC and Pumping Applications (1-100 hp, 460 V and 1-50 hp, 208/230 V)

SECTION 16420-4.2
Enclosed Adjustable Frequency Drive
Variable Torque HVAC and Pumping Applications

NOTE: These specifications apply to Enclosed Adjustable Frequency Drive Controllers, herein referred to as AC Drives. The Power Converter is a component of the AC Drive. To ensure project compatibility, these specifications follow the Construction Specifications Institute (CSI) format. Copies of this specification are available from the Square D/Schneider Electric website: www.SquareD.com. Application information directly affects the type and rating of AC Drive that will be quoted. Brackets [ ] are provided where such data should be included. Please call your local Square D/Schneider Electric distributor or sales representative for specification assistance regarding a particular application. The AC Drive specification should be included in Division 16, Electrical, for proper coordination with the electrical distribution system.

PART 1: GENERAL

1.01 SCOPE OF WORK

A. This section provides specification requirements for adjustable frequency drives and variable speed drives, herein referred to as AC Drives, for use with [NEMA® B] [NEMA E] design AC motors.

B. The AC Drive manufacturer shall furnish, field test, adjust and certify all installed AC Drives for satisfactory operation.

C. Any exceptions/deviations to this specification shall be indicated in writing and submitted with the quotation.

1.02 REFERENCES

A. ANSI®/NFPA® 70 - National Electrical Code® (NEC®).

B. ANSI C84.1 - Voltage Tolerances for North America.

C. IEC® 60068 Part 2-3 - Basic Environmental Testing Procedures Part 2: Tests - Test Ca: Damp Heat.

D. IEC 60146.1 - Semiconductor Converters - General Requirements and Line Commutated Converters Part 1-1: Specifications of Basic Requirements.

E. IEC 60664-1 - Insulation Coordination for Equipment within Low-Voltage Systems.

F. IEC 60447 - Man-Machine Interface Actuating Principles.

G. IEC 60439-1 - Low Voltage Switchgear and Control Gear Assemblies.

H. IEC 60947-1 - Low Voltage Switchgear and Control Gear Components.

I. IEC 60364-1 - Electrical Installation of Buildings.

J. IEC 60204-1/NFPA 79 - Electrical Equipment of Industrial Machines/Industrial Machinery.

K. IEC 60106 - Guide for Specifying Environmental Conditions for Equipment Performance Rating.

L. IEC 60529 - Degrees of Protection Provided by Enclosure.

M. IEC 61000 - Electromagnetic Compatibility.

N. IEC 60721 - Classification of Environmental Conditions.

O. IEC 60255-8 Overload Relays.

P. IEC 60801-2,-3,-4,-5 - Immunity Tests.

Q. NEMA ICS 6 - Industrial Control and Systems Enclosures.

R. NEMA ICS, Part 4 - Overload Relays.

S. NEMA Publication 250 - Enclosures for Electrical Equipment.

T. NEMA ICS 2-321 - Electrical Interlocks.

U. NEMA ICS7 - Industrial Control and Systems Adjustable Speed Drives.

V. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection Installation and Operation of Adjustable Speed Drives.

W. UL® 50 - UL Standard for Safety Enclosures for Electrical Equipment.

X. UL 98 - UL Standard for Disconnect Switches.

Y. UL 507 - UL Standard for Safety Electric Fans.

Z. UL 508 - UL Standard for Safety Industrial Control Equipment.

AA. UL 508C - UL Standard for Safety Power Conversion Equipment.

BB. UL 991 - UL Standard for Safety Tests for Safety Related Controls Employing Solid-State Devices.

CC. OSHA® 1910.95 - AC Drive Controller Acoustical Noise.

DD. Conforming to National Safe Transit Association and International Safe Transit Association Test for Packages.

1.03 SUBMITTALS

A. [___] submittal packages including drawings shall be furnished for Engineers' approval prior to factory assembly of the AC Drives. These packages shall consist of elementary power and control wiring diagrams on one drawing and enclosure outline drawings. The enclosure drawings shall include front and side views of the enclosures with overall dimensions and weights shown, and conduit entrance locations. Standard catalog specification sheets showing voltage, horsepower and maximum current ratings shall be furnished as part of the submittal package.

1.04 WARRANTY

A. An 18-month parts warranty shall be provided on materials and workmanship from the date of purchase.

1.05 QUALITY ASSURANCE

A. The manufacturer of the AC Drive shall be a certified ISO 9001 facility.

B. The AC Drive and all associated optional equipment shall be UL Listed according to UL 508 C - Power Conversion Equipment. As verification, a UL label shall be attached on the inside of the combination enclosure.

C. The AC Drive shall be designed, constructed and tested in accordance with UL, CSA, NEMA, and NEC standards.

D. Every power converter shall be tested with an AC induction motor while loaded and temperature cycled within an environment chamber at 40 ˚C (104 ˚F).

E. All pilot devices shall be industrial rated and tested to verify proper operation.

PART 2: PRODUCT

2.01 MANUFACTURERS

A. The AC Drive shall be provided by Square D/Schneider Electric, Class 8839 ECONOFLEX, or prior approved equal. Substitutions must be submitted in writing three (3) weeks prior to original bid date with supporting documentation demonstrating that the alternative manufacturer meets all aspects of the specifications herein.

B. Alternate control techniques other than pulse width modulated (PWM) are not acceptable.

2.02 GENERAL DESCRIPTION

A. The AC Drive shall convert the input AC mains power to an adjustable frequency and voltage, as defined in the following sections.

B. The input power section shall utilize a full wave bridge design incorporating diode rectifiers. The diode rectifiers shall convert fixed voltage and frequency, AC line power to fixed DC voltage. This power section shall be insensitive to phase rotation of the AC line.

C. The output power section shall change fixed DC voltage to adjustable frequency AC voltage. This section shall utilize intelligent power modules (IPMs), as required by the current rating of the motor.

2.03 CONSTRUCTION

A. The AC Drive power converter shall be enclosed in a [Type 1, Type 12K, Type 3R] enclosure with a circuit breaker disconnect, industrial rated operator controls, user terminal strip connections and bypass controls [if required]. Type 1 and Type 12K enclosures shall have top and bottom conduit knockouts. Type 3R enclosures shall have conduit knockouts for bottom conduit entry only.

B. The enclosure shall provide dedicated user terminals for power and control device connection.

C. Provisions shall be included for locking the disconnect in the OFF position with a padlock.

D. All enclosure and heatsink fans shall be accessible from the front and shall not require the removal of the AC drive power converter.

2.04 MOTOR DATA

A. The AC Drive shall be sized to operate the following AC motor:

1. Motor horsepower [ ]
2. Motor full load ampere [ ]
3. Motor rpm will be [3600] [1800] [1200] [900] at 60 Hz
4. Motor voltage will be [208] [230] [460]
5. Motor service factor will be [1.15] [1.25]
6. NEMA MG1 [Part 30] [Part 31]

2.05 APPLICATION DATA

A. The AC Drive shall be sized to operate a variable torque load.

B. The speed range shall be from a minimum speed of 1.0 Hz to a maximum speed of 60 Hz.

2.06 ENVIRONMENTAL RATINGS

A. The AC Drive shall meet IEC 60664-1 Annex A and NEMA ICS 1, UL, and CSA standards.

B. The AC Drive shall be designed to operate in an ambient temperature from 0 to 40 ˚C (32 to 104 ˚F) for Type 1 and Type 12K enclosures. AC Drives in Type 3R enclosures shall be designed to operate in an ambient temperature from -10 to 50 ˚C (14 to 122 ˚F).

C. The storage temperature range shall be -25 to 65 ˚C (-13 to 149 ˚F).

D. The maximum relative humidity shall be 95%, non-condensing.

E. The AC Drive shall be rated to operate at altitudes less than or equal to 3300 ft (1000 m). For altitudes above 3300 ft (1000 m), de-rate the AC Drive by 1% for every 330 ft (100 m).

F. The AC Drive shall meet the IEC 60721-3-3-3M3 operational vibration specification.

2.07 RATINGS

A. The AC Drive shall be designed to operate from an input voltage of [460 Vac (±) 10%] [230 Vac (±) 10%] [208 Vac (±) 10%].

B. The AC Drive shall operate from an input frequency range of 60 Hz (±) 5%.

C. The displacement power factor shall not be less than .98 lagging under any speed or load condition.

D. The efficiency of the AC Drive at 100% speed and load shall not be less than 97%.

E. The variable torque rated AC Drive over current capacity shall be not less than 110% for 1 minute.

F. The output carrier frequency of the AC Drive shall be programmable at 0.5, 1, 2, 4 or 8 kHz. In addition, the output carrier frequency shall be randomly modulated about the selected frequency.

2.08 PROTECTION

A. Upon power-up, the AC Drive shall automatically test for valid operation of memory, loss of analog reference input, loss of communication, DC-to-DC power supply, control power and pre-charge circuit.

B. The enclosure shall provide a fully coordinated [5 kAIC 1-50 hp, 10kAIC 60-100 hp] [22 kAIC] rating marked on the enclosure nameplate. Short circuit coordination to UL 508C Power Conversion Equipment and NEMA ICS 7.1.

C. The AC Drive shall be protected against short circuits, between output phases and to ground.

D. The AC Drive shall have a minimum AC undervoltage power loss ride-through of 200 milliseconds (12 cycles).

E. The AC drive shall have a programmable ride-through function, which will allow the logic to maintain control for a minimum of one-second (60 cycles) without faulting.

F. For a fault condition other than a ground fault, short circuit or internal fault, an auto restart function will provide up to 6 programmable restart attempts. The time delay before restart attempts will be 30 seconds.

G. Upon loss of the analog process follower reference signal, the AC Drive shall be programmable to display a fault.

H. The AC Drive shall have a solid-state UL 508 C listed overload protective device and meet IEC 60947.

I. The output frequency shall be software enabled to fold back when the motor is overloaded.

J. There shall be three skip frequency ranges that can be programmed to a bandwidth of ± 2.5 Hz.

2.09 ADJUSTMENTS & CONFIGURATIONS

A. The AC Drive will be factory programmed to operate all specified optional devices.

B. The acceleration and deceleration ramp times shall be adjustable from 0.05 to 999.9 seconds.

C. The memory shall retain and record run status and fault type of the past 8 faults.

D. The software shall have an energy economy function that, when selected, will reduce the voltage to the motor when selected for variable torque loads. A constant volts/Hz ratio will be maintained during acceleration. The output voltage will then automatically adjust to meet the torque requirement of the load.

2.10 KEYPAD DISPLAY INTERFACE

A. The keypad display interface shall offer the modification of AC Drive adjustments via a touch keypad. All electrical values, configuration parameters, I/O assignments, application

and activity function access, faults, local control, and adjustment storage, and diagnostics shall be in plain English. There will be a standard selection of 4 additional languages built-in to the operating software as standard.

B. The display will be a high-resolution, LCD, backlit screen.

C. The AC Drive model number, torque type, software revision number, horsepower, output current, motor frequency and motor voltage shall be listed on the drive identification portion of the LCD display.

D. The keypad display shall have a hardware selector switch that allows the keypad to be locked out from unauthorized personnel.

2.11 OPERATOR CONTROLS

A. The control power for the digital inputs and outputs shall be 24 Vdc.

B. The internal power supply shall incorporate automatic current fold-back that protects the internal power supply if incorrectly connected or shorted. The transistor logic outputs will be current limited and will not be damaged if shorted.

C. Pull-apart terminal strips shall be used on all logic and analog signal connections in the power converter

D. Two voltage-free relay output contacts will be provided. One of the contacts will indicate AC Drive fault status. The other contact shall indicate a drive run status.

E. The combination enclosure shall have the following dedicated operator controls:

1. Hand-Off-Auto switch [Start-Stop push button and Hand-off-Auto switch] [Start-Stop push button]
2. Manual Speed Potentiometer
3. AFC-Off-Bypass switch (when bypass is specified)
4. Test-Normal Selector switch (when bypass is specified)
5. Power On (red) LED indicator
6. Drive Run (green) LED indicator
7. Drive Fault (yellow) LED indicator
8. Auto Mode (yellow) or Bypass Run (yellow) LED indicator

F. The combination enclosure shall include a 120 Vac smoke purge relay option [if required]. A user-supplied 120 Vac signal shall be sequenced in accordance with local fire protection codes and will switch the AC drive to 60 Hz operation for maximum fan motor speed. If drive bypass is supplied, the smoke purge relay will isolate the AC Drive and run the fan motor full speed on bypass.

G. The combination enclosure shall include terminal point connection for fire /freeze state interlock, to prevent drive [or bypass] operation.

2.12 SERIAL COMMUNICATION

A. The AC Drive shall have serial communication options of LONWORKS®, MODBUS®, or METASYS® N2.

2.13 DRIVE ISOLATION AND BYPASS CONTACTORS

A. The AC Drive shall include mechanically and electrically interlocked isolation and bypass contactors complete with Class 20 thermal overload relay, circuit breaker disconnect, control circuit transformer, AFC/OFF/BYPASS switch and TEST/NORMAL selector switch.

B. The operator shall have full control of the bypass starter by operation of the AFC/OFF/BYPASS selector switch.

C. In the AUTOMATIC mode of operation the bypass contactors shall be sequenced by the 120-volt rated auto start contact provided by the user.

D. The isolation contactor for the bypass shall be sequenced to provide motor isolation during a drive ready state of operation.

E. A TEST/NORMAL selector switch shall provide test operation of the power converter while operating the motor in bypass.

2.14 HARMONIC MITIGATION

A. The electrical distribution system has been designed to meet IEEE-519-1992 with the addition of line reactors. These line reactors shall be mounted inside the drive enclosure.

PART 3: INSTALLATION

The Enclosed AC Drive shall be ECONOFLEX by Square D/Schneider Electric, Class 8839.

3.01 INSPECTION

A. Verify that the location is ready to receive work and the dimensions are as indicated.

3.02 PROTECTION

A. Before and during the installation, the AC Drive equipment shall be protected from site contaminants.

3.03 INSTALLATION

A. Installation shall be in compliance with manufacturer's instructions, drawings and recommendations.

B. The AC Drive manufacturer shall provide a factory certified technical representative to inspect the contractor's installation, test and start-up the AC Drive(s) furnished under this specification for a maximum total of [ ] days. The start-up service shall be quoted as a separate line item.

3.04 TRAINING

A. An on-site training course of [ ] training days shall be provided by a representative of the AC Drive manufacturer to plant and/or maintenance personnel.

3.05 DOCUMENTATION

A. The AC Drive manufacturer shall supply a comprehensive 8-1/2 x 11-inch bound instruction/installation manual that includes wiring diagrams, layout diagrams, and outline dimensions. This manual must be 3-hole punched for insertion in a shop manual supplied by the installing contractor.

VersaFlo® UPS

Wet Rotor, In-Line, Single Stage Circulator Pumps

Table of Contents:

SAFETY WARNING

Read This Booklet

This booklet is designed to help a certified installer install, begin operation of and troubleshoot the Grundfos VersaFlo UPS pumps. It should be left with the owner of the pump for future reference and information regarding its operation. Should the owner experience any problems with the pump, a certified professional should be contacted.

Electrical Work

All electrical work should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.

Shock Hazard

A faulty motor or wiring can cause electrical shock that could be fatal, whether touched directly or conducted through standing water. For this reason, proper grounding of the pump to the power supply's grounding terminal is required for safe installation and operation.

In all installations, the above-ground metal plumbing should be connected to the power supply ground as described in Article 250-80 of the National Electrical Code.

Risque de choc électrique

Un moteur ou un câblage défectueux peuvent causer un choc électrique qui pourrait être fatal, soit par contact direct, soit par conduction à travers de l'eau stagnante. Il faut donc mettre la pompe à la terre sur la borne de mise à la terre de la source d'alimentation afin d'assurer une installation et un fonctionnement sécuritaires.

Pour tous les types d'installations, la plomberie en métal de surface devrait être raccordée à la mise à la terre de la source d'alimentation, tel qu'indiqué à l'Article 250-80 du Code national de l'électricité.

PRE-INSTALLATION CHECKLIST

1. Confirm You Have the Correct Pump

- Read the pump nameplate to make sure it is the one you ordered.
- Compare the pump's nameplate data and its performance curve (for head, GPM, etc.) with the application in which you plan to install it.
- Will the pump do what you expect it to do?

2. Check the Condition of the Pump

The shipping carton your pump came in is specially designed around your pump during production to prevent damage. As a precaution, it should remain in the carton until you are ready to install it. At that point, look at the pump and examine it for any damage that may have occurred during shipping. Examine any other parts of the shipment as well for any visible damage.

3. Verify Electrical Requirements

Verification of the electrical supply should be made to be certain the voltage, phase and frequency match that of the pump motor. The proper operating voltage and other electrical information can be found on the motor nameplate. These motors are designed to run on ±10% of the nameplate-rated voltage. Wiring connection diagrams can be found inside the terminal box cover and later in these Installation and Operating Instructions. If voltage variations are larger than ±10%, do not operate the pump.

4. Pumped Liquid Requirements

CAUTION: This pump is intended for use with water only.
Your VersaFlo UPS pump can be used to circulate:

- Potable hot water
- Water for hydronic heating
- Cooling water
- In domestic hot water systems it is advisable to use bronze pumps (VersaFlo UPS model) only for water with a degree of hardness lower than 14 grains per gallon of hardness. For water with a higher degree of hardness, a direct coupled VersaFlo TP pump is recommended.
- If the pump is installed in a heating system, the water should meet the requirements of accepted standards on water quality in heating systems.

The pump is lubricated and cooled by the liquid being pumped. Therefore, the pumped liquid must always be allowed to circulate through the pump. Extended periods without circulation will cause premature wear to the bearings and excessive motor heat. The pumped liquid must also meet the following requirements:

MINIMUM PUMP INLET PRESSURE (During Operation)

UPS Model	At These Liquid Temps 167°F 75°C		194°F 90°C		230°F 110°C	
	[psi]	hf	[psi]	hf	[psi]	hf
32-40/4	0.7	1.6	2.2	5.1	21.0	48.5
32-80/2	0.7	1.6	5.1	11.8	23.9	55.2
32-160/2	11.6	26.8	16.0	37.0	34.1	78.8
40-40/4	0.7	1.6	4.4	10.2	23.2	53.6
40-80/4	0.7	1.6	1.5	3.5	18.1	41.8
40-80/2	6.5	15.0	10.9	25.2	29.0	67.0
40-160/2	5.1	11.8	9.4	21.7	27.6	63.8
40-240/2	11.6	26.8	16.0	37.0	34.1	78.8
50-40/4	0.7	1.6	2.9	6.7	21.8	50.4
50-80/4	0.7	1.6	4.4	10.2	23.2	53.6
50-80/2	4.4	10.2	8.7	20.1	26.8	61.9
50-160/2	11.6	26.8	16.0	37.0	34.1	78.8
50-240/2	10.2	23.6	14.5	33.5	32.6	75.3
80-40/4	11.6	26.8	16.0	37.0	34.1	78.8
80-80/4	14.5	33.5	18.9	43.7	37.0	85.5
80-160/2	21.8	50.4	26.1	60.3	43.5	100.5
100-40/4	27.6	63.8	31.9	73.7	50.0	115.5

LIQUID TEMPERATURE RANGE

Continuously: 14°F (-10°C) up to 230°F (110°C)
Intermittent: < 284°F (140°C) for short periods of time.
Domestic Hot Water: <140°F (60°C)

Installation Procedures

WARNING: Never make any connections in the pump terminal box unless the electrical supply has been switched off.

AVERTISSEMENT: Ne jamais établir de connexions dans la boîte de jonction de la pompe à moins que l'alimentation électrique n'ait été coupée.

1. Electrical Preparation

Terminal Box Position

At the bottom of the stator, closest to the pump housing, there are eight drain holes to allow condensed water to escape. The drain holes must point downwards. As they are opposite the terminal box position, the terminal box must point upwards in one of the positions shown in Fig.1. The following terminal box positions apply whether the piping is mounted vertically or horizontally.

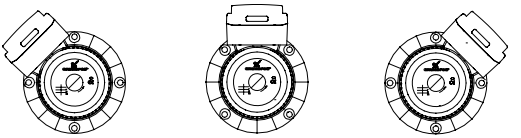


Fig.1

Rotating the Terminal Box

To rotate the terminal box, follow these steps:

WARNING: If the pump is already installed in the system, the system must be drained or the isolating valves on both sides of the pump must be closed before the allen head screws are removed as the pumped liquid may be scalding hot and/or under pressure. Do not start the pump until the system has been filled with liquid and vented.

AVERTISSEMENT: Si la pompe est déjà installée, il faut drainer le système ou fermer les deux robinets d'isolement latéraux de la pompe avant d'enlever les vis à tête hexagonale, car le liquide pompé pourrait être brûlant et/ou sous pression. Ne pas faire fonctionner la pompe jusqu'à ce que le système ait été rempli de liquide et purgé.

1. Remove the four allen screws holding the pump head onto the pump housing
2. Carefully lift the pump head and rotate it so the terminal box is in the desired position. DO NOT locate the terminal box beneath the pump. Make sure the O-ring is properly seated in the pump housing.
3. Replace the pump head onto the pump housing
4. Tighten the allen head screws evenly. Torque to: 8mm ..... 15 ft lbs
   10mm ..... 25 ft lbs
5. Check to make sure the rotor turns freely. Do this by removing the the vent plug in the middle of the pump nameplate. Insert a medium size flat-blade screwdriver into the slot at the exposed end of the shaft. Gently turn the shaft. If it does not turn easily, repeat steps 1-4 above.
6. The position of the nameplate can be changed by easing the outer edge of the plate at the cut out with a screwdriver. Turn the nameplate to the required position and push into place.
7. Refer to page 15 for additional instructions.

2. Piping Considerations

Thoroughly clean and flush all dirt and sediment from the system before attempting to install the pump.

Location in the Piping Line

The pump should never be located at the lowest point of the piping system, where dirt and sediment collect. Nor should it be located at the highest point of the piping sytem, where air accumulates.

Mounting Positions

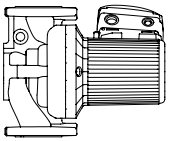


Fig.2

The arrows on the flanges of the pump indicate the direction of water flow. Although the VersaFlo UPS may be installed in either vertical or horizontal piping, the motor shaft must always remain horizontal, as shown in Fig. 1 of the Terminal Box Position instructions and as shown in Fig. 2 to the left.

Also remember: Pumps installed outdoors must be protected by a ventilated, watertight cover to keep out moisture and dirt.

WARNING: The pump must be positioned so that someone cannot accidentally come into contact with the hot surfaces of the pump.

AVERTISSEMENT: La pompe doit être placée de sorte que personne ne puisse accidentellement toucher ses surfaces chaudes.

3. Connect the Pump

Install the pump into the piping system. Grundfos recommends that pressure gauges be installed in the inlet and discharge flanges or pipes to check pump and system performance.

4. Electrical Connection

The electrical connection and protection should be carried out in accordance with the latest edition of the National Electrical Code, local codes and regulations by a qualified electrician.

WARNING: Never make any connections in the pump terminal box unless the electrical supply has been switched off.

- The pump must be grounded.
- The pump must be connected to an external main power switch.

AVERTISSEMENT: Ne jamais établir de connexions dans la boîte de jonction de la pompe à moins que l'alimentation électrique n'ait été coupée.

- La pompe doit être mise à la terre.
- La pompe doit être raccordée à un interrupteur d'alimentation principale externe.

The operating voltage and frequency are marked on the pump nameplate. Make sure that the motor is suitable for the electrical supply it is being installed to.

The pump should be grounded to protect against indirect contact and a ground fault interrupter can be used as extra protection.

Multi-Speed Pump (1 phase)

All single phase pumps are equipped with built-in, automatic resetting, thermal overload protection. The pump is protected at all three speeds.

Multi-Speed Pump (3 phase)

The pump must be connected to the electrical supply via an external contactor. The contactor must be connected to the built in thermal overload switch terminals T1 and T2 (3x208-230V) or P1 and P2 (3x460V & 575V) to protect the pump against overloading at all three speeds.

OR: If the pump is protected by means of a motor starter, the starter must be set to the current consumption of the pump at the selected speed. The motor starter setting must be changed every time the pump speed is changed. The current consumption at the individual speeds is stated on the pump nameplate.

Figures 4, 6, 7, 9, and 10 on the next page show the possible connections:

Installation Procedures

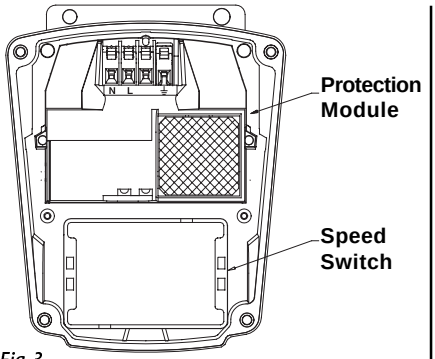


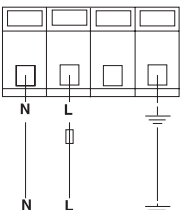
Fig.3

VersFlo UPS 1x115V & 230V Terminal Box:
All VersaFlo UPS single head pumps come with a protection module and a speed switch as shown in Fig.3. All are equipped with built-in, automatic resetting, thermal overload protection. The pump is protected at all three speeds.

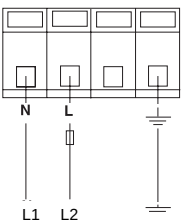
Wiring Diagrams

Fig.4 shows the electrical connections for a single phase pump with protection module.

Fig.4



1~ x115V supply



1~ x230V supply

Notes:
Provide electrical disconnect and current protection as per local electrical codes.
K = External contactor sized to FL & LR pump current.
Auxilary contacts rated for supply voltage (figure 6 & 9 only).

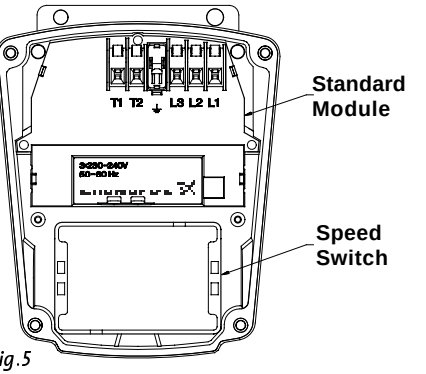


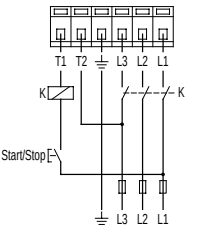
Fig.5

VersFlo UPS 3x208-230V Terminal Box:
All VersaFlo UPS single head pumps come with a standard module and a speed switch as shown in Fig.5. All are equipped with an internal thermal overload switch (terminals T1 & T2, to be connceted to an external contactor) to protect the pump at all three speeds.

Wiring Diagrams

Fig.6 shows the electrical connections when using external impulse contacts (momentary contacts) for start/stop push button station.

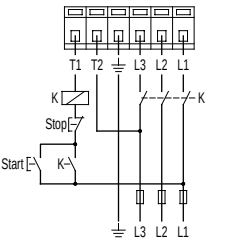
Fig.6



3~ x208-230 volt supply

Fig.7 shows the electrical connections when using an external changeover contact (maintained contacts) for start/stop push button station.

Fig.7



3~ x208-230 volt supply

Installation Procedures

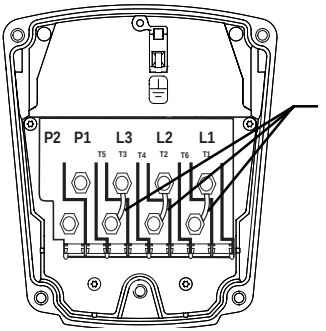


Fig.8

VersaFlo UPS 3x460V & 575V Terminal Box:
All VersaFlo UPS single head pumps with 3 phase x 460V & 575V terminal boxes (Fig.8) come with a special two speed terminal box. The speed is changed by the orientation of the jumpers as shown on page 9. All are equipped with an internal thermal overload switch (terminals P1 & P2) to be connected to external contactor.

Wiring Diagrams

Fig.9 shows the electrical connections when using external **impulse contacts** (momentary contacts) for start/stop push button station.

3~ x 460 & 575 volt supply

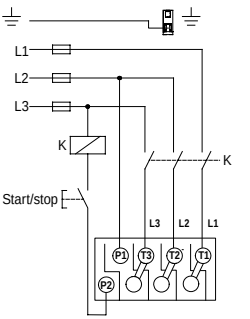


Fig.9

Fig.10 shows the electrical connections when using an external **changeover contact** (maintained contacts) for start/stop push button station.

3~ x 460 & 575 volt supply

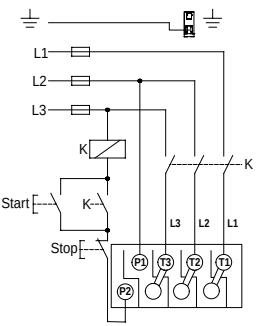


Fig.10

Starting the Pump

1. Vent the Piping System

After the pump has been installed and the electrical connections made, the piping system must be vented. Never operate the pump dry -- the system must first be filled with liquid and vented. Do not vent the piping system through the pump. Instead, follow these steps:

a. Fill and pressurize the system with liquid, and vent all trapped air from the piping by suitable means.

b. If any isolation valves are used, make sure they are OPEN.

WARNING: If the vent screw is to be loosened, care should be taken to ensure that the escaping scalding hot liquid does not cause personal injury or damage to components (see Fig. 12).

AVERTISSEMENT: S'il faut desserrer la vis de purge, prendre les mesures nécessaires pour que le liquide brûlant qui s'échappe ne cause pas de blessures ou de dommages aux composants (voir la figure 12).

2. Check the Direction of Shaft Rotation

APPLIES TO 460V & 575V 2-SPEED MODELS ONLY

(three speed pumps direction of rotation is checked by fault finding chart, page 10)

a. Make sure that the power is OFF.

b. Unscrew and remove the vent plug located at the center of the nameplate.

c. Insert a small, flat-blade screwdriver into the slot in the end of the motor shaft (see Fig.12). Rotate the shaft with the screwdriver to make sure it does so freely.

d. Briefly start and stop the pump and watch to see which direction the shaft rotates. The shaft must rotate in the counterclockwise direction as shown on the nameplate (see Fig.11).

e. If the pump shaft is rotating incorrectly, disconnect the power and interchange any two power leads in the terminal box.

f. Check once again for proper counterclockwise rotation. When it is rotating correctly, replace the vent plug.

Fig.11 Direction of Rotation

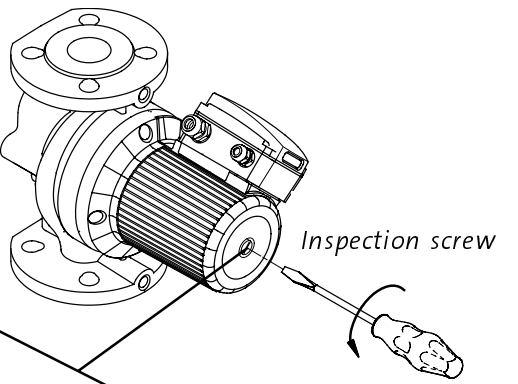


Fig.12 Vent Plug

3a. Speed Selection

(three speed, all models except 3 x 460V & 575V)

The speed switch in the terminal box can be turned to three positions. The speed in the three positions appears in the table below (also see Fig.13).

Switch Position	Speed in % of Maximum Speed	
	Single-Phase Pumps	Three-Phase Pumps
1	approx. 60%	approx. 70%
2	approx. 80%	approx. 85%
3	100%	100%

Changing to lower speeds offers considerable reduction in energy consumption and less noise in the system.

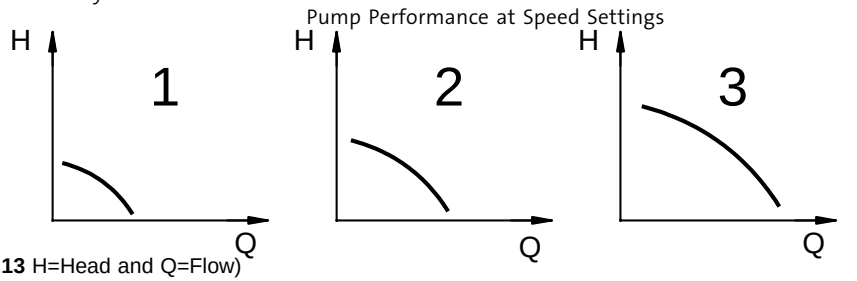


Fig.13 H=Head and Q=Flow)

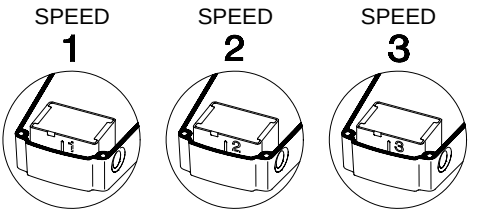
WARNING: Never make any connections in the pump terminal box unless the electricity supply has been switched off.

AVERTISSEMENT: Ne jamais établir de connexions dans la boîte de jonction de la pompe à moins que l'alimentation électrique n'ait été coupée.

Change the pump performance as follows:

1. Switch off the electrical supply to the pump at the main circuit breaker. The green indicator light in the terminal box must be off.
2. Remove the terminal box cover by loosening the four screws in the cover.
3. Pull out the speed switch module and re-insert it so that the desired speed is visible through the window in the terminal box (see Fig.14)

NOTE: When changing to and from speed 1, the cover of the speed switch module must be removed and fitted on the other side of the switch.



Continued on next page Fig.14

Starting the Pump

Change the pump performance as follows: (continued)

4. Fit the terminal box cover back onto the terminal box and tighten the four screws in the cover.

5. Switch on the electrical supply. Check that the green indicator light is permanently on or flashing.
NOTE: The speed switch module must never be used as an on/off switch.

3b. Speed Selection (two speed, 3 x 460V & 575V)

The speed setting in the terminal box (see Fig.13) can be changed to two positions. The speed in the two positions appears in the table below (also see Fig.13 on page 8).

Speed Step	Speed in % of Maximum Speed
1	approx. 75%
2	100%

WARNING: Never make any connections in the pump terminal box unless the electrical supply has been switched off.

AVERTISSEMENT: Ne jamais établir de connexions dans la boîte de jonction de la pompe à moins que l'alimentation électrique n'ait été coupée.

Change the pump performance as follows:

The speed is changed by the position of the bridges in the terminals. The bridges are fitted according to:

- Figure 15 for speed 1 - Low speed
- Figure 16 for speed 2 - High speed

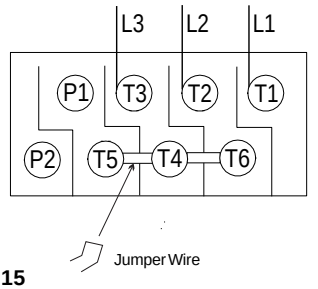


Fig.15

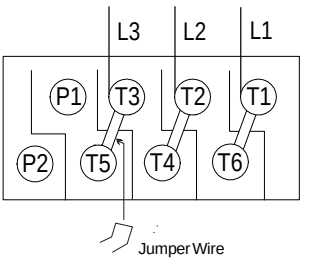


Fig.16

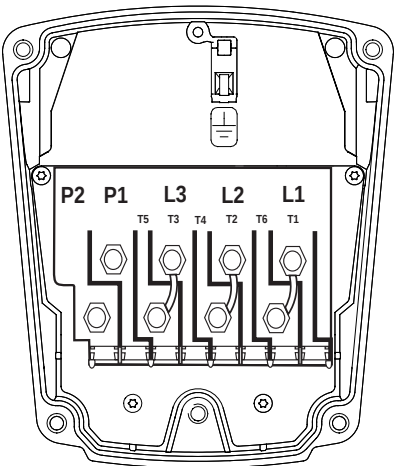


Fig.17

1. Fault Finding Chart

WARNING: Before removing the terminal box cover, make sure that the electrical supply has been switched off and that it cannot be accidentally switched on.

WARNING: The pumped liquid may be scalding hot and under high pressure. Before any removal or dismantling of the pump, the system must be drained or the isolating valves on both sides of the pump must be closed.

AVERTISSEMENT: Avant de retirer le couvercle de la boîte de jonction, s'assurer que l'alimentation électrique a été coupée et ne peut être rétablie accidentellement.

AVERTISSEMENT: Le liquide pompé peut être brûlant et sous haute pression. Avant de retirer ou de démonter la pompe, il faut drainer le système ou fermer les deux robinets d'isolement latéraux de la pompe.

Fault	Cause	Remedy
The pump does not run. None of the indicator lights are on.	One fuse in the installation is blown.	Replace the fuse.
	External circuit breaker is switched off.	Switch the circuit breaker on.
	Current/Voltage operated ground fault interrupter has tripped.	Repair the insulation defects and reset the circuit breaker.
	The pump's internal thermal overload switch has cut out (**Standard module only**).	Check that the liquid temperature falls within the specified range. With **external on/off changeover contact:** The pump will restart automatically when it has cooled to the normal temperature. With **external on/off impulse contacts:** The pump can be restarted when it has cooled to normal temperature.
The pump does not run. The green indicator light is on.	Rotor blocked, but the pump hasn't been cut out by the thermal overload switch.	Switch off the electricity supply and clean/repair the pump.
	The speed switch module has not been fitted.	Switch off the electricity supply at the external circuit breaker and fit the speed switch module into position.
Three-Phase Pumps Only: The pump is running. The red and green indicator lights are on.	The pump is running with the wrong direction of rotation.	Switch off the electricity supply at the external circuit breaker and interchange any two phases (leads) in the pump terminal box.
Noise in the system. The green indicator light is on.	Air in the system. The pump flow is too high. The pressure is too high.	Vent the system. Reduce the pump performance. Reduce the pump performance.
Noise in the pump. The green indicator light is on.	Air in the pump.	Vent the pump.
	The inlet pressure is too low.	Increase the inlet pressure and/or check the air volume in the expansion tank (if installed).
Insufficient heat in some places in the heating system.	The pump performance is too low.	Increase the pump performance, if possible, or replace the pump with a pump with higher flow.
Single phase pumps with protection module (only). The Pump does not run. The red indicator light is on.	The pump has been cut out by the thermal overload switch due to high liquid temperature or blocked rotor.	Check that the liquid temperature falls within the specied range.The pump will restart automatically when it has cooled to normal temperature. **Note:** If the thermal overload switch has cut out the pump three times within a short period, the pump must be restarted manually by switching off the electrical suply.
The green indicator light is off.	The speed switch module has not been fitted.	Switch off the electrical supply by means of the external mains switch and fit the speed switch module.

Preliminary Checks

Supply Voltage

To check the voltage being supplied to the motor, use a voltmeter. Be careful, since power is still being supplied to the pump. Do not touch the voltmeter leads together while they are in contact with the power lines.

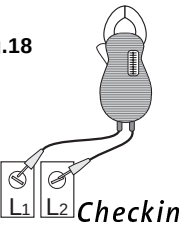
Three Phase Motors

Touch a voltmeter lead to:

- Power leads L1 and L2
- Power leads L2 and L3
- Power leads L3 and L1

} *These tests should give a reading of full line voltage.*

Fig.18



Checking Single Phase Power

Single Phase Motors

Touch one voltmeter lead to each of the lines supplying power to the pump L1 and L2 , (or L1 and N for 115V circuits).

Evaluation

When the motor is under load, the voltage should be within 10% (+ or -) of the nameplate voltage. Any variation larger than this may indicate a poor electrical supply and can cause damage to the motor windings. The motor should not be operated under these conditions. Contact your power supplier to correct the problem or change the motor to one requiring the voltage you are receiving.

Current Measurement

To check the current, use an ammeter. To do so, follow these steps:

1. Make sure the pump is operating
2. Set the ammeter to the proper scale.
3. Place the tongs of the ammeter around the leg to be measured.
4. Compare the results with the amp draw information on the motor nameplate.
5. Repeat for the other legs.

Evaluation

If the current draw exceeds the listed nameplate amps, or if the current imbalance is greater than 5% between each leg on three phase units, then check the following:

- The voltage supplied to the pump maybe too high or too low.
- The contacts on the motor starter may be burned.
- The terminals in the starter or terminal box may be loose.
- There may be a winding defect. Check the winding and insulation resistance
- The motor windings may be shorted or grounded.

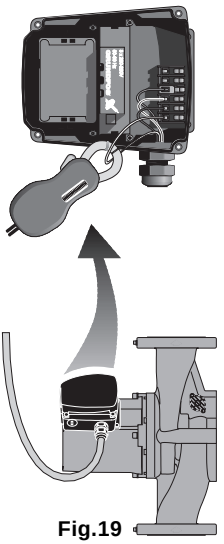


Fig.19

Insulation Resistance (lead-to-ground)

To check the insulation resistance (lead-to-ground) of the motor and leads, a megohmmeter is required.

1. Turn the POWER OFF.
2. Disconnect all electrical leads to the motor.
3. Set the scale selector on the megohmmeter to R x 100K, touch its leads together, and adjust the indicator to zero.
4. Touch the leads of the megohmmeter individually to each of the motor leads and to ground (i.e. L1 to ground; L2 to ground, etc.).

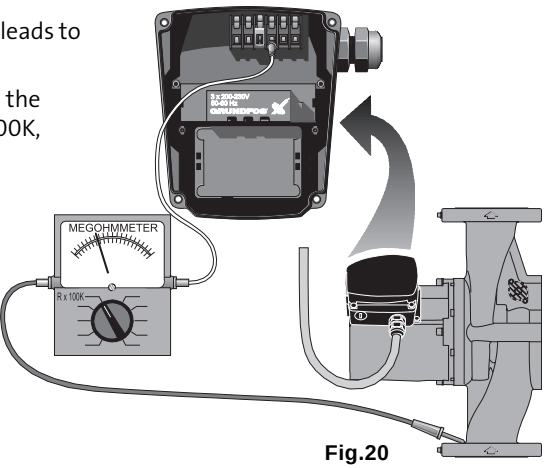


Fig.20

Evaluation: The resistance values for new motors must exceed 1,000,000 ohms. If they do not, replace the motor.

Winding Resistance (line to line)

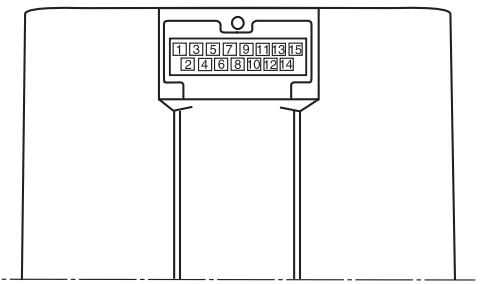
To check the winding resistance of the motor windings, a megohmmeter is required.

1. Turn the power off
2. Disconnect all electrical leads to the motor.
3. Set the scale on the megohmmeter to Rx1, touch its leads together and adjust the indicator to zero.
4. Using the charts below for reference, touch the leads of the megohmmeter to the appropriate pair of connectors. Check all pairs that are present and write down and label (R_A, R_{S1}, R_{S2}, R) all readings.
5. Compare your readings to the matching model, phase and voltage on the chart on page 15.

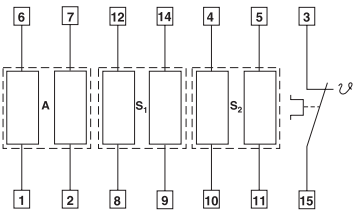
Evaluation : The resistance values must fall within the tolerances listed on the next page. If they do not, replace the motor.

Internal Wiring
UPS

Terminal plug in stator

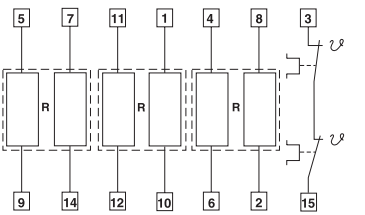


Single Phase



R_A:	6-1	or	6-1, 7-2
R_{S1}:	12-8	or	12-8, 14-9
R_{S2}:	4-10	or	4-10, 5-11

Three Phase 208-230V



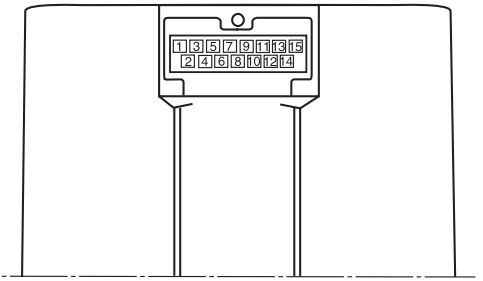
R:	5-9	or	5-9, 7-14
R:	11-12	or	11-12, 1-10
R:	4-6	or	4-6, 8-2

A: Main winding

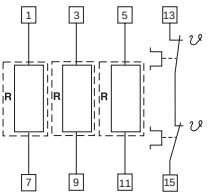
S_2: Auxiliary winding
S_1: Auxiliary winding

Internal Wiring
UPS

Terminal plug in stator



Three Phase 460/575V



Winding Resistance Chart

60 HZ					USA
UPS					
			[Ω] 20°C - 50°C		
Pump Type	Voltage	R	RA	RS1	RS2
	1 x 115 V		17.8 - 23.2	3.95 - 5.20	9.40 - 12.4
	1 x 230 V		70.0 - 91.5	17.0 - 22.2	39.5 - 52.0
UPS 32-40/4	3 x 208 - 230 V	180 - 236			
	3 x 460 V	360 - 470			
	3 x 575 V	575 - 750			
	1 x 115 V		9.55 - 12.6	3.05 - 4.00	6.70 - 8.80
	1 x 230 V		19.4 - 25.5	5.45 - 7.10	12.6 - 16.4
UPS 32-80/2	3 x 208 - 230 V	44.0 - 57.5			
	3 x 460 V	83.5 - 110			
	3 x 575 V	132 - 174			
	1 x 115 V		4.15 - 5.45	1.20 - 1.56	2.65 - 3.50
	1 x 230 V		8.30 - 10.8	2.20 - 2.90	5.05 - 6.65
UPS 32-160/2	3 x 208 - 230 V	26.0 - 34.0			
	3 x 460 V	53.5 - 70.0			
	3 x 575 V	84.5 - 110			
	1 x 115 V		11.4 - 15.0	2.95 - 3.85	5.60 - 7.35
	1 x 230 V		50.5 - 66.5	14.0 - 18.4	25.5 - 34.0
UPS 40-40/4	3 x 208 - 230 V	118 - 154			
	3 x 460 V	234 - 310			
	3 x 575 V	360 - 475			
	1 x 115 V		5.60 - 7.35	1.84 - 2.42	4.50 - 5.90
	1 x 230 V		11.0 - 14.4	3.95 - 5.20	8.55 - 11.2
UPS 40-80/2	3 x 208 - 230 V	32.0 - 42.0			
	3 x 460 V	64.0 - 84.0			
	3 x 575 V	102 - 132			
	1 x 115 V		4.15 - 5.45	1.94 - 2.55	3.30 - 4.35
	1 x 230 V		8.10 - 10.6	3.05 - 4.00	4.60 - 6.05
UPS 40-80/4	3 x 208 - 230 V	46.5 - 61.0			
	3 x 460 V	90.5 - 118			
	3 x 575 V	164 - 216			
	1 x 115 V		2.85 - 3.75	1.10 - 1.44	1.94 - 2.55
	1 x 230 V		5.60 - 7.35	2.02 - 2.66	3.75 - 4.95
UPS 40-160/2	3 x 208 - 230 V	22.8 - 30.0			
	3 x 460 V	45.5 - 59.5			
	3 x 575 V	72.0 - 95.0			
	1 x 230 V		6.80 - 8.95	2.02 - 2.65	3.70 - 4.85
UPS 40-240/2	3 x 208 - 230 V	11.0 - 14.4			
	3 x 460 V	22.0 - 29.0			
	3 x 575 V	35.0 - 45.5			
	1 x 115 V		6.55 - 8.55	2.12 - 2.80	4.30 - 5.65
	1 x 230 V		25.0 - 33.0	8.30 - 10.8	15.0 - 19.8
UPS 50-40/4	3 x 208 - 230 V	57.5 - 75.0			
	3 x 460 V	114 - 148			
	3 x 575 V	184 - 242			
	1 x 115 V		4.15 - 5.45	1.20 - 1.56	2.65 - 3.50
	1 x 230 V		8.30 - 10.80	2.20 - 2.90	5.05 - 6.65
UPS 50-80/2	3 x 208 - 230 V	26.0 - 34.0			
	3 x 460 V	33.5 - 70.0			
	3 x 575 V	84.5 - 110			
	1 x 115 V		2.75 - 3.60	1.74 - 2.30	2.85 - 3.75
	1 x 230 V		5.50 - 7.25	2.65 - 3.50	4.95 - 6.50
UPS 50-80/4	3 x 208 - 230 V	37.0 - 49.0			
	3 x 460 V	79.0 - 104			
	3 x 575 V	120 - 156			
	1 x 230 V		6.80 - 8.95	2.02 - 2.65	3.70 - 4.85
UPS 50-160/2	3 x 208 - 230 V	12.4 - 16.2			
	3 x 460 V	24.2 - 31.5			
	3 x 575 V	37.5 - 49.5			
	3 x 208 - 230 V	7.80 - 10.2			
UPS 50-240/2	3 x 460 V	15.6 - 20.6			
	3 x 575 V	25.0 - 33.0			
	3 x 208 - 230 V	46.5 - 61.0			
UPS 80-40/4	3 x 460 V	90.5 - 118			
	3 x 575 V	164 - 216			
UPS 80-80/4	3 x 208 - 230 V	23.6 - 31.0			
	3 x 208 - 230 V	7.80 - 10.2			
UPS 80 -160/2	3 x 460 V	15.6 - 20.6			
	3 x 575 V	25.0 - 33.0			
	3 x 208 - 230 V	27.5 - 36.0			
UPS 100-40/4	3 x 460 V	54.5 - 71.5			
	3 x 575 V	86.0 - 114			

Replacing the Pump Head Removal

1. Disconnect or TURN OFF the power supply.
2. Close any isolation valves on either side of the pump to avoid draining the system of liquid.
3. Disconnect the electrical leads from the terminal box.
4. Disconnect and remove the conduit from the terminal box.
5. Loosen and remove the four allen screws (8 or 10 mm) which connect the pump head housing to the pump housing.
6. Remove the pump head from the pump housing.
7. Clean the machined surfaces in the pump housing of any foreign material.

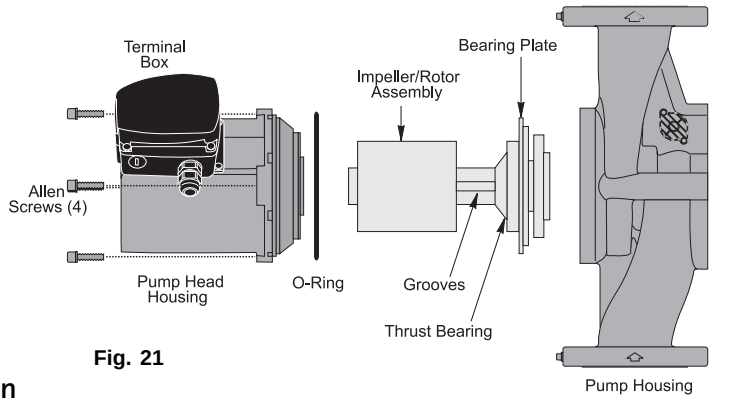


Fig. 21

Installation

1. Carefully remove the new pump head assembly from its packaging. Separate the impeller/rotor assembly from the new pump head.
2. While holding the thrust bearing, carefully place the impeller/rotor assembly into the pump housing. The bearing plate should fit snugly into the lowest machined surface in the pump housing.
3. Make sure that the impeller/rotor assembly can rotate freely.
4. Place the O-Ring over the rotor and locate it into the inner diameter of the pump housing.
5. Carefully place the pumphead housing over the rotor and rotate it so the terminal box is in the position you wish (see page 3 for positioning).
6. Make sure the pump head housing is properly seated on the pump housing. Do not force the two together -- if there is binding, disassemble them and repeat steps 2-6. Tighten the allen screws evenly to secure the pump head. Torque to:
   8mm ..... 15 ft lbs
   10mm ..... 25 ft lbs
7. Check to make sure the motor shaft turns freely, as explained in step 5 on page 3 (under "Rotating the Terminal Box").

Replacing Components

Replacing the Terminal Box or Capacitor

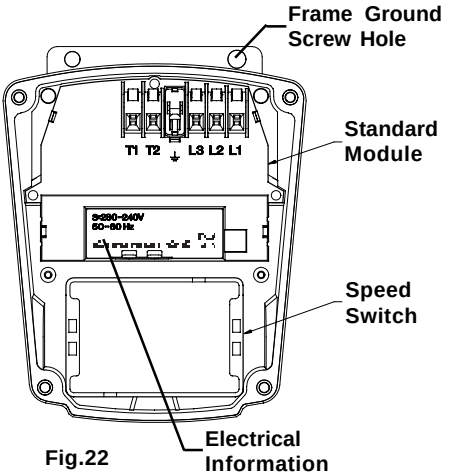


Fig.22

If the terminal box is replaced, make certain the electrical in-formation listed on the new box matches the information listed on the old box, and that it is compatible with the pump and incoming electrical supply.

For all terminal boxes, it is very important to tightly secure the frame ground-ing screw through the terminal box, so that a proper connection between the terminal box and motor is made.

All

1. Before replacing the terminal box or capacitor, make sure the power is OFF.
2. Remove the terminal box cover by completely loosening all four torx/standard screws.
3. Remove the speed switch (noting its position) by pulling firmly and evenly on both sides of it. (Not for 460/575 V)

Capacitor

a.4. (Capacitor replacement, single-phase only) Disconnect the two connector clips from the capacitor and unscrew the complete plastic strain relief nut. Remove capacitor wire and strain relief.

a.5. Screw in new complete strain relief nut and connect new clip connectors. Pull excess sheathed cable out of terminal box, being sure to leave at least $^{1}/_{8}$" of sheath inside of terminal box.

Terminal Box

b.4. (Terminal box replacement, single-phase and three-phase) Disconnect all wiring, remove the three phillips-head screws holding the terminal box in place and remove the terminal box by pulling firmly and evenly on both side.

b.5. Check that the clear rubber gasket is in place around the terminal box connector stem, carefully press the terminal box into the stator socket, replace the three phillips-head terminal box screws and replace wiring.

All

6. Replace the speed switch to its proper position, making sure to push it all the way in. (Not for 460/575V)
7. Replace the terminal box cover and tighten all four torx/standard screws.
8. Switch on electrical power supply. The pump is now ready for operation.

Notes

LIMITED WARRANTY

Products manufactured by (GRUNDFOS) GRUNDFOS PUMPS CORPORATION are warranted to the original user only to be free of defects in material and workmanship for a period of 18 months from date of installation, but not more than 24 months from date of manufacture. GRUNDFOS' liability under this warranty shall be limited to repairing or replacing at GRUNDFOS' option, without charge, F.O.B. GRUNDFOS' factory or authorized service station, any product of GRUNDFOS' manufacture. GRUNDFOS will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by GRUNDFOS are subject to the warranty provided by the manufacturer of said products and not by GRUNDFOS' warranty. GRUNDFOS will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with GRUNDFOS' printed installation and operating instructions.

To obtain service under this warranty, the defective product must be returned to the distributor or dealer of GRUNDFOS' products from which it was purchased together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, the distributor or dealer will contact GRUNDFOS or an authorized service station for instructions. Any defective product to be returned to GRUNDFOS or a service station must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Material Authorization must be included if so instructed.

GRUNDFOS WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE, OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

ISO 9001 CERTIFIED

L-UPS-TL-001	Rev.03/03
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GRUNDFOS

GRUNDFOS®

VersaFlo® UPS50

Wet-Rotor, In-Line, Single Stage Circulator Pumps

Submittal Data

60 Hertz

JOB or CUSTOMER: SOUTHWEST COMMUNITY HEALTH CENTER

ENGINEER:

CONTRACTOR: EASTERN MECHANICAL SERVICES, INC.

SUBMITTED BY: DATE:

APPROVED BY: DATE:

ORDER NO: DATE:

SPECIFICATION REF: BOILER PRIMARY PUMPS

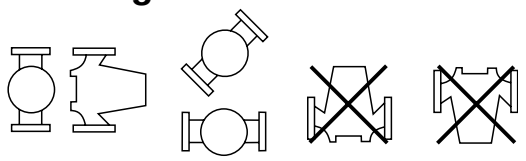
QUANTITY	TAG NO.	MODEL NO.	GPM	FEET	VOLT	PHASE	COMMENTS
2	BOILER PUMP	UPS50-80/2			115		

Technical Data

FLOW RANGE: 20 – 180 U.S. GPM **HEAD RANGE:** 1 – 62 FT.
MAXIMUM WORKING PRESSURE: 145 PSI
FLANGES: 2", 4-Bolt with (4) 9/16" diameter holes (NON-ANSI)
MINIMUM FLUID TEMPERATURE: 14°F (-10°C)
MAXIMUM FLUID TEMPERATURE (Open Systems): 140°F* (60°C)
MAXIMUM FLUID TEMPERATURE (Closed Systems): 230°F (110°C)
AMBIENT AIR TEMPERATURE: 32°F (0°C) to 104°F (40°C)

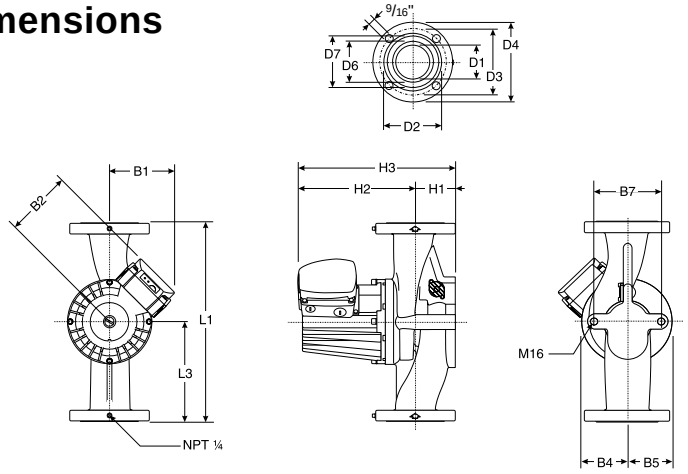
*** MAXIMUM TEMPERATURE: 220°F, 104°C**
NOTE: It is recommended to keep the operating temperature as low as possible (ie., below 140°F, 60°C to avoid precipitation of calcium).

Mounting Positions



Recommended Optional DO NOT Mount Motor Shaft in Vertical Position

Dimensions



Type Designation

UPS 50 - 80 /2 B

- UPS 50 — Circulator Pump; Nominal diameter of ports in mm
- 80 — Maximum head in meters x 10
- /2 — Number of motor poles if 2 and 4 are available
- B — Bronze (optional)

Weights

Pump Type	PH	Net Wt. (Lbs.)	Ship. Wt. (Lbs.)	Ship. Vol. (Cu. Ft.)
UPS50-40/4	1 & 3	49	52.5	1.62
UPS50-80/4	1	64.5	68	1.62
UPS50-80/4	3	60.5	64	1.62
UPS50-80/2	1 & 3	49	52.5	1.62
UPS50-160/2	1 & 3	59.5	62.5	1.62
UPS50-240/2	3	62	65.5	1.62

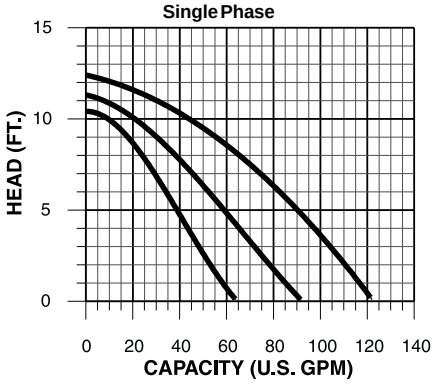
Electrical Data and Dimensions

Pump Type	Nominal HP at Speed 3	PH	Voltage	Suc. Disc. Size	DIMENSIONS IN INCHES														
					L1	L3	B1	B2	B4	B5	B7	H1	H2	H3	D1	D2	D3	D4	D6	D7
UPS50-40/4	1/3 1/3	1 3	115 or 230 208/230, 460*, 575*	2	14	7	5 5/16	5 9/16	3 9/16	3	4 3/4	3 1/4	9 3/4	13	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16
UPS50-80/4	3/4 3/4	1 3	115 or 230 208/230, 460*, 575*	2	11 1/2	5 3/4	5 3/4	6 11/16	4 3/8	4	4 3/4	3 1/4	10 1/2	13 3/4	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16
→ UPS50-80/2	3/4 3/4	1 3	115 or 230 208/230, 460*, 575*	2	11 1/2	5 3/4	5 5/16	5 9/16	3 3/4	3	4 3/4	3	9 1/2	12 1/2	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16
UPS50-160/2	1 1/2	1 3	230 only 208/230, 460*, 575*	2	14	7	5 3/4	6 11/16	4	4	4 3/4	3	10 7/16	13 3/8	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16
UPS50-240/2	2	3	208/230, 460*, 575*	2	14	7	5 3/4	6 11/16	4	4	4 3/4	3	10 3/8	13 5/16	2 1/8	3 7/16	4 1/16	5 1/4	2 1/2	3 1/16

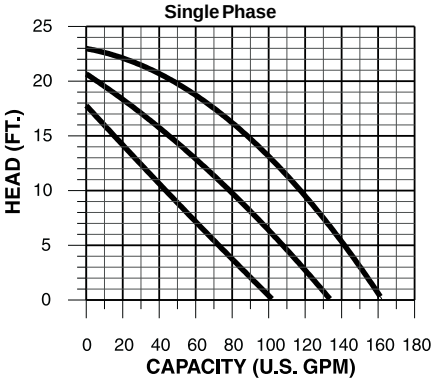
NOTE: *460/575 volt models are two speed only–speeds 2 & 3.

Performance Curves (60 Hz – Single and Three Phase Models)

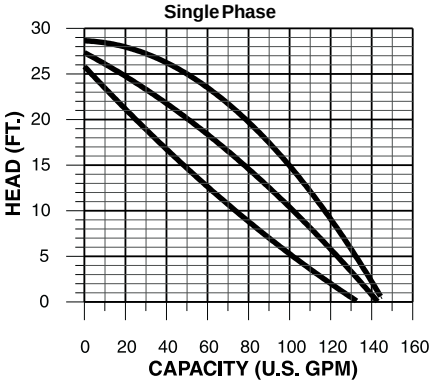
UPS50-40/4
Single Phase



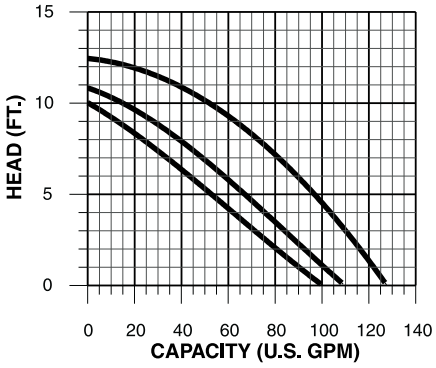
UPS50-80/4
Single Phase



UPS50-80/2
Single Phase



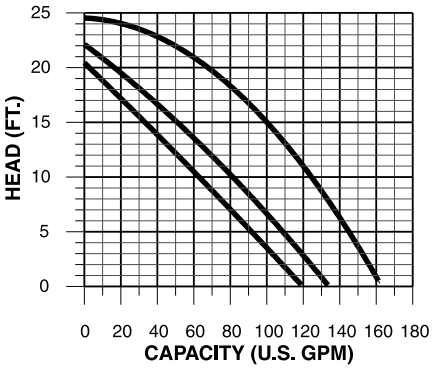
UPS50-40/4
Three Phase



MINIMUM INLET PRESSURE*

Fluid Temperature		
167°F (75°C)	194°F (90°C)	230°F (110°C)
1.6 Ft. 0.7 PSI	6.7 Ft. 2.9 PSI	50.4 Ft. 21.8 PSI

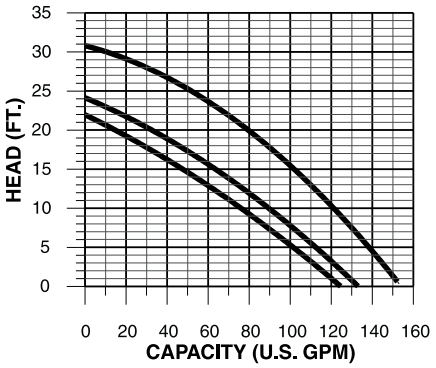
UPS50-80/4
Three Phase



MINIMUM INLET PRESSURE*

Fluid Temperature		
167°F (75°C)	194°F (90°C)	230°F (110°C)
1.6 Ft. 0.7PSI	10.2 Ft. 4.4 PSI	53.6 Ft. 23.2 PSI

UPS50-80/2
Three Phase



MINIMUM INLET PRESSURE*

Fluid Temperature		
167°F (75°C)	194°F (90°C)	230°F (110°C)
10.2 Ft. 4.4 PSI	20.1 Ft. 8.7 PSI	61.9 Ft. 26.8 PSI

Materials of Construction

DESCRIPTION	MATERIAL
Impeller, Bearing Plate, Rotor Cladding, Rotor Can, Bearing Retainers	AISI 304 SS
Impeller Seal Ring	AISI 304 SS/Teflon®
Shaft (cast iron pumps), Inspection Screw Split Cone, Split Cone Nut	AISI 303 SS
Shaft (bronze pumps)	AISI 316 SS
Shaft Bearing Journals	Tungsten Carbide
Pump Housing* *Bronze – Optional	Cast Iron ASTM GG25 35B-40B
Stator Housing	Aluminum AISI 10Cu2
Rotor End Caps	Copper or Brass
Upper and Lower Radial Bearings	Ceramic AI2O3
Thrust Bearing	Carbon MY106
O-Rings	EPDM
Terminal Box, Nameplate	Composite PA66
Plug for Sensor	Composite PPS, GF40

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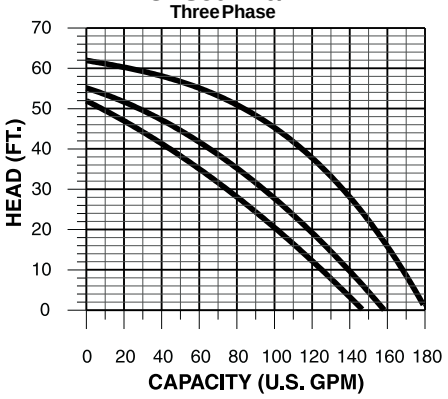
Teflon® is a registered trademark of Dupont.

UPS50-240/2
Three Phase

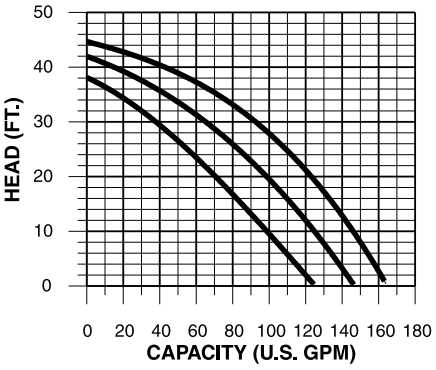


MINIMUM INLET PRESSURE*

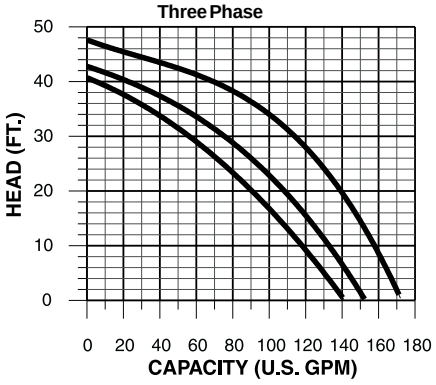
Fluid Temperature		
167°F (75°C)	194°F (90°C)	230°F (110°C)
23.6 Ft. 10.2 PSI	33.5 Ft. 14.5 PSI	75.3 Ft. 32.6 PSI

* Minimum gauge pressure required at the inlet (suction) to ensure effective, trouble-free operation. Varies by fluid temperature.

UPS50-160/2
Single Phase



UPS50-160/2
Three Phase



MINIMUM INLET PRESSURE*

Fluid Temperature		
167°F (75°C)	194°F (90°C)	230°F (110°C)
26.8 Ft. 11.6 PSI	37.0 Ft. 16.0 PSI	78.8 Ft. 34.1 PSI

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L-UPS-TL-050 | Rev. 01/01
PRINTED IN USA

Altivar® 58 *TRX*

Adjustable Speed Drive Controllers
Keypad Display VW3A58101

Instruction Bulletin

Retain for future use.

a brand of Schneider Electric

Telemecanique

See page 17 for the Minimum Start-Up Procedure.

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this bulletin in its entirety before installing or operating Altivar 58 *TRX* drive controllers. Installation, adjustment, repair, and maintenance of the drive controllers must be performed by qualified personnel.
- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Before servicing the drive controller:
  - — Disconnect all power including external control power that may be present before servicing the drive controller.
  - — Place a “DO NOT TURN ON” label on the drive controller disconnect.
  - — Lock the disconnect in open position.
  - — WAIT TEN MINUTES for the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 98 to verify that the DC voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the drive controller.

Electrical shock will result in death or serious injury.

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CHAPTER 1—OVERVIEW

Introduction

The Altivar 58 *TRX* (ATV58 *TRX*) series of adjustable frequency AC drive controllers is a Transparent Ready™ product line providing extended functionality and extended horsepower range for the Altivar 58 AC drive family. The ATV58 *TRX* series includes an analog output, expanded firmware capabilities, and a horsepower range up to 500 hp. As a Transparent Ready™ product equipped with an Ethernet communication card, the ATV58 *TRX* product line can be configured, controlled, monitored, and diagnosed over an Ethernet network using a standard Web browser. No special software or drivers are needed.

The ATV58 *TRX* controllers accept all of the current I/O options, communication card options, and hardware options, such as ventilation fan kits and conduit box kits. See Appendix B for a complete list of options.

Product Range

The ATV58 *TRX* family drive controllers range from:

- 1–75 hp (0.75–55 kW) constant torque, 400/460 V, three-phase input
- 1-500 hp (0.75–315 kW) variable torque 400/460 V, three-phase input
- 0.5–7.5 hp (0.37–5.5 kW) constant torque, 208/230 V, single-phase input
- 0.5–30 hp (0.37–22 kW) variable torque, 208/230 V, single-phase input
- 2–40 hp (1.5–30 kW) constant torque (50 hp variable torque), 208/230 V, three-phase input

Scope of Bulletin and Related Documentation

This bulletin covers the programming, monitoring, diagnostics, and operation of the ATV58 *TRX* drive controllers with the keypad display, part number VW3A58101U. Additional functionality can be obtained by installing the analog I/O option card (part no. VW3A58201U) or the digital I/O card (part no. VW3A58202U). The additional functionality provided by these option cards is documented in this bulletin. Many

communication protocols are supported by communication option cards. Additional documentation is supplied with the option card.

For other specific option cards, additional information is available in the manual provided with the card.

For additional information on parameter applications, refer to the *Altivar® 58* TRX *AC Drives* catalog, 8806CT9901, available on-line at www.SquareD.com.

This keypad display is for use with the drive controllers listed in Table 1. For installation, wiring, start-up, and maintenance, consult the latest revision of the applicable drive controller instruction bulletin.

Table 1: Drive Controller Instruction Bulletins

Drive Controller	Instruction Bulletins
ATV58 *TRX* Type E	VVDED397052US
Econoflex™	30072-450-10
ATV58 *TRX* Type F	VVDED300011US
Flex58 *TRX* Chassis	30072-450-47
ATV58 *TRX* Type H	VVDED397048US
ATV58 *TRX* Type N	30072-450-01
Class 8998 Motor Control Center	80444-035-01

Application Information

The 125–500 hp drive controllers are listed in instruction bulletin VVDED397048US, *Altivar 58 TRX Adjustable Speed Drive Controllers Installation Guide, Type H Controllers*, with ratings typically used for variable torque applications. With proper selection, this range of controllers can also be used in constant torque applications, such as compressors, conveyors, and extruders, where high performance is not required at low speeds. The 125–500 hp product ratings are for applications that require 100% rated torque down to 6 Hz. If the application requires more than 110% transient torque for one minute, select the appropriate horsepower product. For assistance with selecting the proper AC drive controller for constant torque applications, consult your local Square D drives specialist.

Application information is also available in product data bulletin SC100, *Adjustable Frequency Controllers Application Guide* available at www.SquareD.com, or the NEMA Standards Publication: *Application Guide For AC Adjustable Speed Drive Systems*.

Firmware Revision Information

Over time, the functionality of the ATV58 product line has been upgraded to broaden its applications. This document can be used with earlier drive controllers, but not all of the parameters detailed in it will be accessible if a drive controller is not equipped with the most recent firmware. Keypad displays are backward compatible. Older keypad displays used on newer drive controllers will not display the new parameters.

The drive controller firmware revision label is located adjacent to the integrated MODBUS port on the front of the drive controller. The keypad display firmware revision label is located on the back cover of the keypad display. The firmware on the drive controller may be upgraded by installing a new control board, part number VX4A581U, and a new keypad display, part number VW3A58101U.

Table 2 lists the major product upgrades with approximate date of release, drive controller firmware, associated keypad display firmware, and a description of the major function upgrade.

Table 2: Product Upgrade and Revision Level History

Date	Drive Controller Firmware Revision	Associated Keypad Display Firmware Revision	Description of Major Function Upgrade
1Q 1998	V2.1 IE 06	V1.0 IE 04	Initial release of the ATV58 product
2Q 1999	V3.1 IE 14	V2.0 IE 07	Extended the product range to include the 25–75 hp constant torque (100 hp variable torque) drive controllers. The following functions were added: • Display machine speed, *USP*, based on scaling factor coefficient, *USC*. • Display Motor power, *OPr*. • Ability to define DC injection current level, *SdC*. • Ability to invert response to the PI regulator speed reference signal, *PIC*. • Current limit adaptation as function of speed in VT mode, *Fdb*. • Ability to inhibit reverse operation, *rIn*. • Ability to define drive controller response to speed reference signal below low speed setting, *bSP*. • U shaped acceleration and decel ramp type, *rPt*. Motor thermal overload protection (Ith) range increased from 45%–105% to 25%–136%

Table 2: Product Upgrade and Revision Level History *(continued)*

Date	Drive Controller Firmware Revision	Associated Keypad Display Firmware Revision	Description of Major Function Upgrade
3Q 2000	V3.1 IE 16	V3.0 IE 08	Began production of 5–25 hp, 460 Vac variable torque rated drive controllers without the integrated EMC filter for 460 Vac installations where the filter is not required. Removing this filter allowed the product to be rated for additional horsepower at 460 Vac. These drive controllers have the ability to be configured for VT plus as described on page 27.
3Q 2001	V4.1 IE 25	V4.1 IE 13	Relay R2 is no longer factory set for an output contactor. The factory setting is “not assigned.” The following functions were added: • Run time meter function, *rth*, and watt-hour meter function, *APH*. Both meters can be reset with *rpr*. • Two additional jump frequencies are *JF2* and *JF3*. • A second programmable frequency threshold with logic output configuration, *F2d, F2A*. • The ability to provide torque limit via analog input AI3, activated by a logic input, *TLA* and *ATL*. • Minimum adjustment of nominal motor frequency, *FrS*, changed from 40 Hz to 10 Hz. • Ability to configure a freewheel stop below a programmable frequency with *Stt* and *FFT*. • PI regulator has been enhanced to accept programmable setpoints through the keypad display with the use of logic inputs *PR2* and *PR4*. • PI regulator has been enhanced with time-constant filter on feedback, *PSP*. • Parameter, *tbr*, for a baud rate selection on an integrated MODBUS port. • Operation of an extremely undersized motor and the ability to configure an output voltage test mode by configuring *PSM*. • Ability to configure loss of follower fault to run at pre-set speed, *LFF*, and signal loss of follower with logic output, *APL*. Additional assignments possible to an analog output on an option card: • Signed ramp output, ORS • Motor power, OPR • PI setpoint, OPS • PI feedback, OPF • PI error, OPE • PI integral, OPI • Motor thermal state, THR • Drive thermal state, THD Compatible with Ethernet, MODBUS®, TCP/IP communication card, and Forced local function.
4Q 2001	V4.2 IE 28	V4.1 IE 13	PI regulator has been enhanced to work with Auto/Manual (reference switching) *PAU, PIF, PIM*.

Table 2: Product Upgrade and Revision Level History *(continued)*

Date	Drive Controller Firmware Revision	Associated Keypad Display Firmware Revision	Description of Major Function Upgrade
3Q 2002	V5.1 IE 32 V5.2 IE 09 [1]	V5.1 IE 19 V5.2 IE 27 [1]	Launched the ATV58 *TRX* series. Extended the product range to include the 125–500 hp drive controllers for variable torque applications. Added an analog output to the product. The following functions were added: • Ability to run at the last speed on loss of follower, *RLS*. • Increased adjustment range on two PI parameters, *RPG* and *RIG*. • Ability to assign a logic input to an external fault contact, *EDD*. • Ability to assign a logic output to drive temperature alarm and select alarm point, *tAd* and *dtd*.
2Q 2003	V5.3 IE 43	V5.3 IE 32	The following functions were added: • The ability to adjust the motor speed from the customer-defined units display, *LCU*, while in local control mode, using the keypad display's up/down arrow keys. • Enhanced auto restart functionality to allow setting the number of restart attempts, *nAr*, and the time delay between attempts, *tAr*. • The ability to change output phase rotation (motor direction) using parameter *ACb*.

[1] V5.2 IE 09 is the 125–500 hp revision and can use keypad display firmware revision V5.1 or greater.

Keypad Display

The keypad display allows:

- Display of the drive controller part number, electrical values, parameters, and faults
- Adjustment and configuration of the drive controller
- Local command
- Storage of four controller configurations which can be read or downloaded to multiple drive controllers of the same horsepower and firmware revision

Mounting

To mount the keypad display, first remove the protective cover. Insert the keypad display into the SUB–D connector and turn the retaining screw clockwise until finger-tight.

Figure 1: Removal of Protective Cover

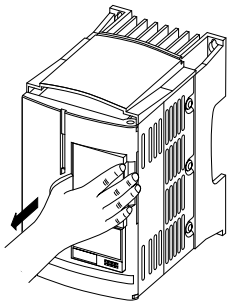
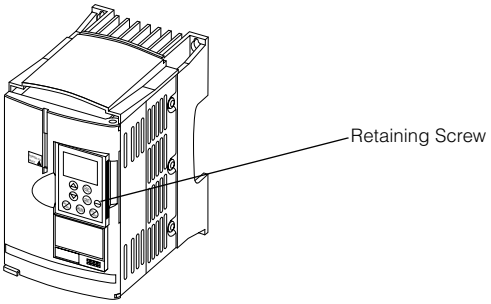


Figure 2: Drive Controller with Keypad Display Mounted



The keypad display can be mounted and removed while there is power to the drive controller. If the keypad display is removed while command of the drive controller from the keypad display is active, the drive controller will trip on the serial link fault. See SLF in Table 27 beginning on page 103.

Remote Mounting

To remotely mount the keypad display, use the keypad display remote mounting kit, part number VW3A58103. This kit has an IP65 rating. It contains a three meter (9.8 ft.) cable with connectors, parts

for mounting the keypad display on the cover of an enclosure, and an instruction sheet.

Setting the 50/60 Hz Switch

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this bulletin in its entirety before installing or operating ATV58 *TRX* drive controllers. Installation, adjustment, repair, and maintenance of these drive controllers must be performed by qualified personnel.
- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Disconnect all power before servicing the drive controller. WAIT TEN MINUTES until the DC bus capacitors discharge. Then follow the DC bus voltage measurement procedure on page 98 to verify that the DC voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.

Electrical shock will result in death or serious injury.

Figure 3 shows the location of the 50/60 Hz switch on the drive controller. **Before powering up the drive controller and using the keypad display, you must set the 50/60 Hz switch to correspond with the frequency of the incoming AC power.**

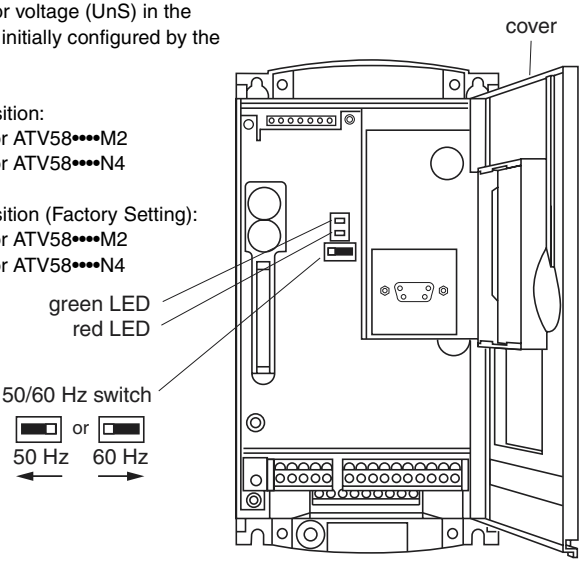
Unlock and open the cover to access the 50/60 Hz switch on the control board. If an option card is present, the switch may not be accessible through the card. Set the switch to the position corresponding to the frequency of the incoming AC power.

Figure 3: Location of 50/60 Hz Switch

The nominal motor voltage (UnS) in the 3—Drive menu is initially configured by the switch position:

For the 50 Hz Position:
-230 V, 50 Hz for ATV58••••M2
-400 V, 50 Hz for ATV58••••N4

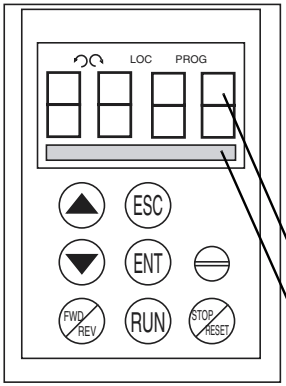
For the 60 Hz Position (Factory Setting):
-230 V, 60 Hz for ATV58••••M2
-460 V, 60 Hz for ATV58••••N4



Function of Keys and Meaning of Displays

Figure 4 shows the front of the keypad display. The keys and displays are explained below.

Figure 4: Front View of Keypad Display



Flashing display: indicates the selected direction of motor rotation.
Fixed display: indicates the actual direction of motor rotation.

LOC — Indicates the keypad display command mode.

PROG — Appears in setup and programming mode. Flashing display indicates that a parameter has been modified but not saved.

Four 7-segment backlit LCD: displays numerical values and codes

16-character backlit LCD display: display of messages in plain language

Press to move within the menus or among the parameters, and to scroll a numeric value up or down.

Press to return to the previous menu, or to abandon an adjustment in progress and return to the original value.

Press to select a menu, or to validate and save a choice.

If command by the keypad display has been selected (parameter LCC in the 4—Control menu, set to YES) the following buttons become active and only function in this mode:

Press to change the direction of motor rotation.

Press to start the motor.

Press to stop the motor or reset a fault. The STOP function can also stop the drive controller in terminal command mode if so configured (see page 57).

Quick Configuration

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

- Parameter changes affect drive controller operation.
- Most parameter changes require pressing ENT. Some parameter changes, such as reference frequency, take effect as soon as you press the up or down arrow keys.
- Read and understand this manual before using the keypad display.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

First prepare your program settings using the forms beginning on page 109.

Programming the Altivar 58 *TRX* controller is facilitated by internal checks. It is recommended that you access the menus and program in the following order. All of the steps are not obligatory in all cases.

1. Set the 50/60 Hz switch, (see page 14).
2. Select the language.
3. Select the macro-configuration.

   NOTE: 125-500 hp drive controllers have only the variable torque macro.
4. Select 2 or 3-wire control in the 4—Control menu.
5. Configure parameters in the 3—Drive Configuration menu.
6. Assign the I/O in the 5—I/O menu.

   NOTE: If the selected Macro-Configuration is Hdg: Material Handling, logic input LI4 must be reassigned or unassigned before you can assign logic input LI3 to a new function.

If the Freewheel Stop / Run Permissive function is assigned to a logic input, the drive controller will not start the motor unless that logic input is connected to +24 V.

7. Configure parameters in the 4—Control menu.
8. Configure the switching frequency type in the 3—Drive Configuration menu.

9. Configure the fault management parameters in the 6—Fault menu.
10. Make Communication or Application configurations (if one of these options is used).
11. Configure the settings in the 2—Adjust menu.

NOTE: You must ensure that the functions which are programmed are compatible with the control scheme used.

Minimum Start-Up

This procedure can be used as a minimum start-up:

- In simple applications where the drive controller factory settings are sufficient
- In installations when it is necessary to turn the motor before fully completing the start-up sequence

Procedure:

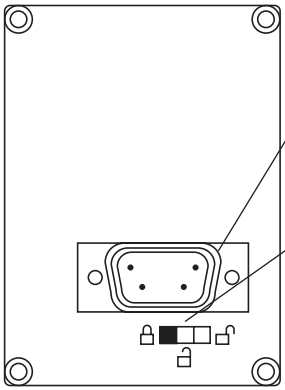
1. Make sure that the 50/60 Hz switch is in the correct position, corresponding to the frequency of the incoming AC power, as shown on page 14.
2. Ensure that the macro-configuration factory setting is suitable for the application. Refer to Table 3 on page 24. If not, change the configuration in the Macro-Configuration menu as shown on page 25.

   NOTE: 125-500 hp drive controllers have only the variable torque macro.
3. Verify that the control scheme is compatible with the macro-configuration, ensuring that the necessary safety precautions have been taken. Refer to the drive controller instruction bulletin, VVDED397048US, for a typical wiring diagram.
4. Verify in the 3—Drive menu that the factory settings are compatible with the motor nameplate values. Refer to Table 11 on page 43. Modify them to match the nameplate values.
5. If necessary, adjust the parameters in the 2—Adjust menu (ramps, motor thermal protection, etc.). See Table 6 on page 30.

If the Freewheel Stop/Run Permissive function is assigned to a logic input, the drive controller will not start the motor unless that logic input is connected to +24 V.

Access Levels

Figure 5: Rear View of Keypad Display



Connector (9-pin SUB-D male):
- for direct connection to the drive controller
- for remote mounting, the keypad display can be connected using a cable provided in kit VW3A58103

Switch for access locking:
- locked position : display mode only, adjustment and configuration parameters not accessible
- partial lock position : display mode and adjustment parameters accessible
- total unlock position : display mode, adjustment and configuration parameters accessible

The position of the access locking switch on the back of the programming keypad display allows three levels of access to the menus. Access to the menus can also be prevented by using an access code (see the 7—File menu on page 90).

Locked Position – Display Mode: use to prevent modifications to the drive controller programming.

- You can select the dialog language in the Language menu.
- You can display the macro-configuration or the pre-programmed values for the selected application in the Macro-Configuration menu.
- You can display the voltage and power rating of your drive controller in the Identification menu.
- You can display the electrical values, the operational status, or fault in the 1—Display menu.

Partial Lock Position – Display and Adjustment Modes: this level is used during startup for access to basic setup parameters.

- You can do everything listed above.
- You can use the 2—Adjust menu to adjust parameters which are accessible when the motor is running.

Total Unlock Position ⊏ **– All modes:** this level is used during startup for access to advanced setup parameters.

NOTE: Many parameters cannot be adjusted while the motor is running.

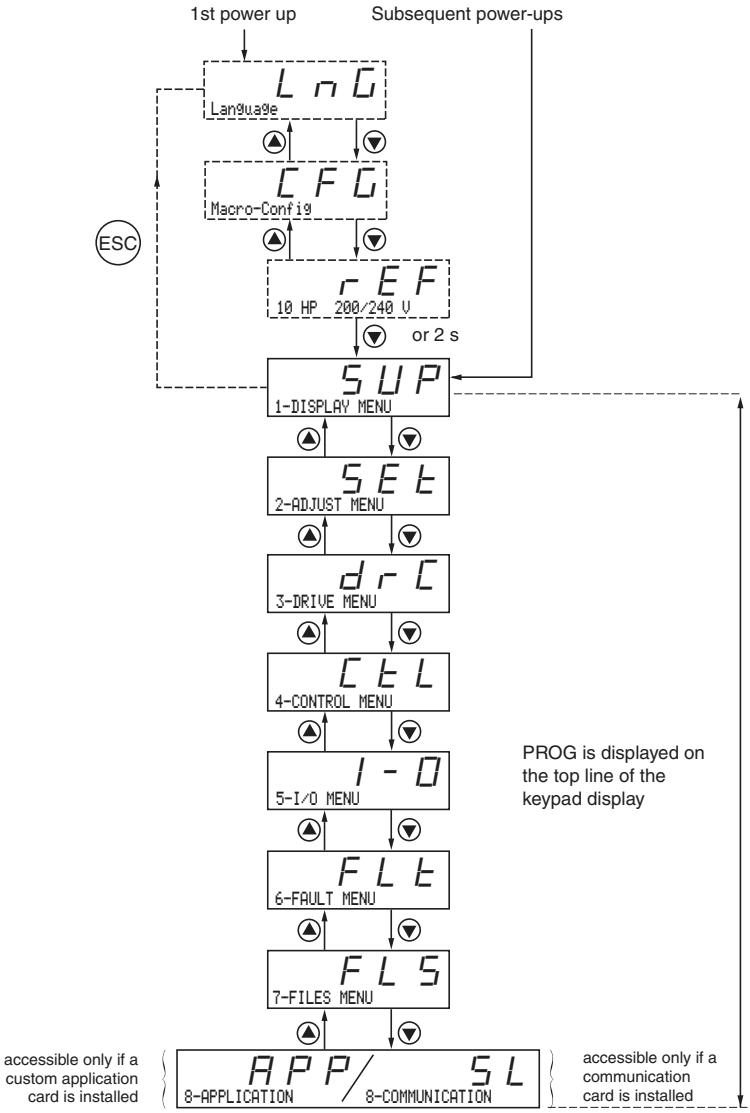
- You can do everything listed in both access levels above.
- You can also select a different macro-configuration in the Macro-Configuration menu.
- You can adjust the performance of the motor-drive controller system, in the 3—Drive menu.
- You can configure the drive controller command to be either from the terminal strip, the keypad display, or the integrated serial link using the 4—Control menu.
- You can change the assignments of the inputs and outputs in the 5—I/O menu.
- You can configure motor protection, drive controller protection, and response after a fault has occurred in the 6—Fault menu.
- You can save the drive controller configurations, recall them from memory, return to factory settings, or protect your configuration in the 7—Files menu.
- You can adjust the parameters pertaining to communication in the 8—Communication menu, if a communication card is installed.
- You can access the 8—Application menu, if a customer application card is installed.

Menu Hierarchy

Figure 6 shows the menus as they appear on the display when the access locking switch is in the total unlock position ⊏.

NOTE: If an access code (password) has already been programmed, certain menus may not be modifiable, or may not be visible. In this case refer to “Access Code” on page 92 for how to enter the access code.

Figure 6: Menus



Principles of Programming

The principle of programming is always the same, regardless of the access locking switch. Figures 7 and 8 show examples of programming steps.

Figure 7: Language Selection Programming Example

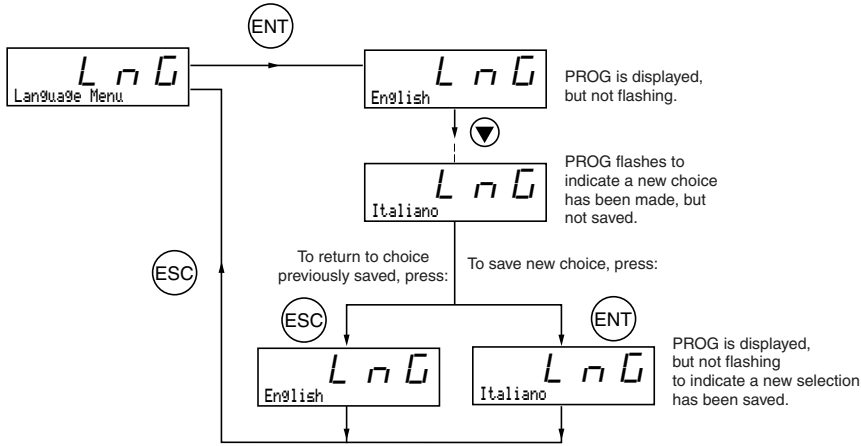
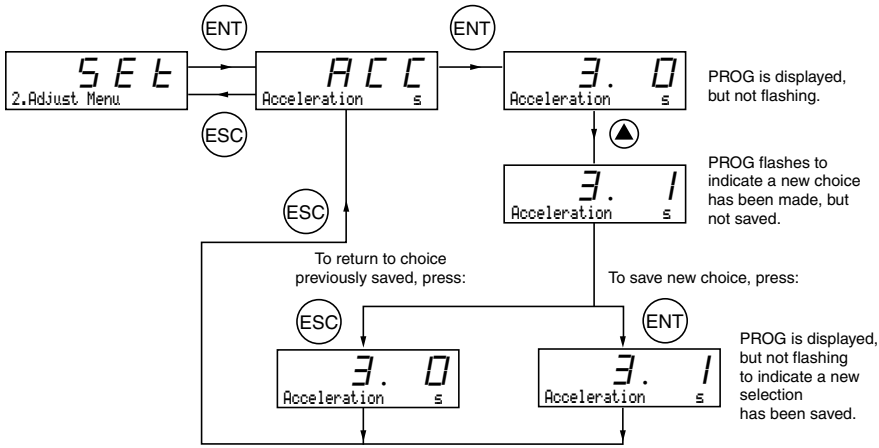


Figure 8: Acceleration Time Programming Example



CHAPTER 2—MENUS

This chapter explains menus and parameter functions.

Language Menu

The Language menu (see Figure 7 on page 21) is accessible in each access level. The available languages are English (factory setting), French, German, Spanish, or Italian. The language can be modified with the motor stopped or running.

Macro-Configuration Menu

Selecting a macro-configuration automatically configures the drive controller for an application. The Macro-Configuration menu can always be displayed, but can only be modified when the access level switch is in the total unlock, , position and when the motor is stopped. Three application types are available for drive controllers up to 100 hp:

- Material handling (Hdg)
- Variable torque for pump and fan applications (VT)
- General use (GEn)

The 125–500 hp drive controllers have only the variable torque macro.

The macro-configuration automatically assigns the inputs and outputs to functions suitable for the application. The parameters related to the I/O functions are then available for adjustment. **The factory-set macro-configuration is Material Handling.** If you customize the I/O to your application, the macro-configuration screen displays CUS:Customize as shown in Figure 10 on page 26. Table 3 shows the drive controller I/O assignments as a function of the macro-configuration selected when the drive controller is set for 2-wire control. For the logic input assignments when the drive controller is set for 3-wire control, refer to Table 12 on page 52.

NOTE: LI1, AI1, and R1 assignments are not visible in the 5—I/O menu. LI1 and R1 cannot be reassigned.

Table 3: Drive Controller I/O Assignments

	Hdg: Material Handling [1]	GEn: General Use	VT: Variable Torque
Logic Input LI1	Forward	Forward	Forward
Logic Input LI2	Reverse	Reverse	Reverse
Logic Input LI3	2 Preset speeds	Jog	Auto/manual [3]
Logic Input LI4	4 Preset speeds	Freewheel stop [2]	DC injection braking [3]
Analog Input AI1	Reference summing	Reference summing	Speed reference 1 [3]
Analog Input AI2	Reference summing	Reference summing	Speed reference 2 [3]
Analog Output AO1	Motor frequency	Motor frequency	Motor frequency
Relay R1	Drive fault relay	Drive fault relay	Drive fault relay
Relay R2	Output contactor control	Motor thermal level attained	Frequency reference attained [3]

[1] Factory default setting for 100 hp products and below.

[2] If the Freewheel Stop/Run Permissive function is configured, the drive controller will not start the motor unless the logic input is connected to +24 V.

[3] For 125–500 hp drive controllers the factory setting are:

LI3 = Fault Reset; LI4 = Not assigned; AI1 = Reference summing; AI2 = Reference summing; R2 = Drive running

NOTE: You must ensure that the functions which are programmed are compatible with the control scheme used.

Table 4: I/O Extension Card Factory Presets

	Hdg: Material Handling [1]	GEn: General Use	VT: Variable Torque
Logic Input LI5	8 preset speeds	Fault reset	Freewheel stop [1]
Logic Input LI6	Fault reset	Torque limit 2 [3]	Ramp switching
Analog Input AI3 [2] or Logic Inputs A, A-, B, B- [3]	Reference summing [2]	Reference summing [2]	Not assigned [2]
	Speed feedback	Speed feedback	Speed feedback
Logic Output LO	Current level attained	Output contactor command	High speed attained
Analog Output AO	Motor current	Motor current	Motor current

[1] If the Freewheel Stop / Run Permissive function is configured, the drive controller will not start the motor unless the logic input is connected to +24 V.

[2] With analog I/O extension card (VW3A58201U).

[3] With digital I/O extension card (VW3A58202U).

Transferring a file created for a drive controller without an I/O extension card to a drive controller with an I/O extension card may result in unexpected I/O assignment. Verify all I/O assignments. Do not assign I/O functions that are not used in the application.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

LI1 has priority:

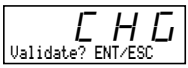
- If LI1 is closed while LI2 is active, the controller will respond to LI1.
- If the LI1 input is lost while LI2 is active, the controller will respond to LI2 and reverse directions.

The logic inputs must be programmed appropriately for the application to prevent the motor from spinning in an unintended direction.

Failure to follow this instruction can result in death or serious injury.

Modification of the macro-configuration requires two confirmations since it automatically changes the function assignments. When a change to the macro-configuration is requested the following screen is displayed:

Figure 9: Macro-Configuration Validation



Press ENT to proceed with change
Press ESC to return to the previous configuration

⚠ WARNING

MACRO-CONFIGURATION OR PROGRAMMING RESET CAN CAUSE AN UNINTENDED EQUIPMENT ACTION

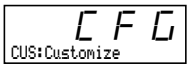
- The factory default settings will be substituted for present settings when the macro-configuration is changed and confirmed.
- The factory default settings may not be compatible with the application. After changing the macro-configuration, verify that the factory settings are compatible with application requirements.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Customizing the Macro-Configuration

The drive controller macro-configuration can be customized by changing the assignment of the inputs and outputs in the 5—I/O menu. The access locking switch must be in the total unlock,  , position to customize the configuration. When an I/O assignment is modified, the macro-configuration screen displays the following:

Figure 10: Customized Macro-Configuration



Drive Controller Identification Screen

This screen can be displayed in each access level. Refer to Figure 11 for the access path. This screen shows the power rating and the voltage indicated on the drive controller nameplate.

Increasing the Power Rating for Variable Torque Applications

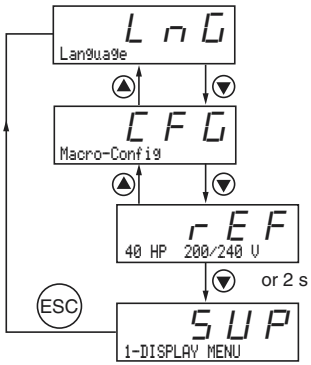
The power rating can be increased for variable torque applications on the drive controller identification screen for the following products:

- 208/230 Vac drive controllers 15 hp and larger (ATV58HD16M2–D46M2)
- 400/460 Vac drive controllers 25 hp and larger (ATV58HD28N4–D79N4)
- 460 Vac drive controllers 5 hp to 25 hp that do not have an integrated EMC filter (ATV58HU54N4X–D23N4X)

To increase the horsepower rating, begin at the rEF screen and follow this procedure:

1. Press ENT. rEF begins flashing.
2. Press ▲. A higher horsepower rating is displayed with a “+” sign indicating that the rating has been increased.
3. Press ENT then ESC. The drive controller is now configured for the higher horsepower rating.

Figure 11: Drive Controller Identification Screen



1—Display Menu

Display parameters can be viewed in any access level. You can scroll through these parameters with the motor running.

Table 5: 1—Display Menu Parameters

Menu 1

Parameter	Code	Function	Units
Drive. state Use this parameter to monitor drive controller status.	rdY rUn ACC dEC CLI dCb nSt Obr	Drive controller status: indicates a fault or the state of the drive controller: rdY = drive controller is ready rUn = motor in steady state ACC = accelerating dEC = decelerating CLI = in current limit dCb = DC injection braking nSt = commanded to freewheel stop Obr = braking with deceleration ramp adaptation	—
Freq. Ref. - Hz	FrH	Reference frequency	Hz
Output Freq. - Hz	rFr	Output frequency applied to the motor	Hz
Motor Speed - RPM	SPd	Motor speed estimated by the drive controller. Based on nominal motor speed (nSP) entry. See Table 11 on page 43.	RPM
Motor Current - A	LCr	Motor current	A
Machine SPd.	USP	Machine speed estimated by the drive controller. USP is proportional to rFr scaled by the coefficient, USC, which is adjustable in the 2—Adjust menu. If USP becomes greater than 9999, the display is divided by 1000.	—
Output Power - %	OPr	Output power estimated by the drive controller. 100% corresponds to nominal power.	%
Mains Voltage V	ULn	Mains voltage	V
Motor Thermal - %	tHr	Thermal state: 100% corresponds to the nominal motor thermal state. Above 118%, the controller trips on OLF (motor overload fault).	%
Drive Thermal - %	tHd	Thermal state of the drive controller: 100% corresponds to the nominal drive controller thermal state. Above 118%, the controller trips on OHF (drive overheating fault). It resets when the thermal state goes below 70%.	%
Last Fault	LFt	Displays the last fault.	—
Consumption	APH	Energy consumed	kWh or MWh

NOTE: If USP is greater than 9999, the display value is USP/1000.

Table 5: 1—Display Menu Parameters *(continued)*

Menu 1	Parameter	Code	Function	Units
	Run time	rtH	Operating time (motor powered up) in hours	hrs
	Freq. Ref	LFr	This adjustment parameter appears in place of the FrH parameter when command of the drive controller by the keypad display has been activated with the LCC parameter in the 4—Control menu (see page 56).	Hz
	LCU	LCU	Local speed control in customer-defined units. Appears when the drive controller command from the keypad display has been activated using the LCC parameter in the 4—Control menu (see page 56). This parameter allows adjustment of the motor speed in customer-defined units. Use parameter USC: Machine Coef. to scale the customer unit value (see page 34). During adjustment, LCUA appears in the lower left-hand corner of the keypad display.	User dependant

2—Adjust Menu

The Adjust menu is accessible when the access locking switch is set to either partial lock, , or total unlock, . Adjustment parameters can be modified with the motor running; however, you must make all adjustments with the motor stopped to avoid unintended equipment action.

⚠ WARNING

PARAMETER CHANGES WHILE THE MOTOR IS RUNNING

Changes made to adjustment parameters while the motor is running may cause unintended equipment action. When changing adjustment parameters, ensure that the motor is stopped.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

There are two types of adjustment parameters: parameters which are always accessible (fixed adjustment parameters), and parameters which may be accessible depending on:

- The macro-configuration selected
- The presence of an I/O extension card
- The input and output reassignments

The fixed set of adjustment parameters, shown in Table 6 beginning on page 30, are accessible in every macro-configuration.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
Freq. Ref. - Hz	LFr	Local speed control in Hz. Appears when the drive controller command from the keypad display has been activated using the LCC parameter in the 4—Control menu (see page 56).	LSP to HSP	
LCU	LCU	Local speed control in customer-defined units. Appears when the drive controller command from the keypad display has been activated using the LCC parameter in the 4—Control menu (see page 56). This parameter allows adjustment of the motor speed in customer-defined units. Use parameter USC: Machine Coef. to scale the customer unit value (see page 34). During adjustment, LCUA appears in the lower left-hand corner of the keypad display.	User dependant	0.00

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Inv. Phases	ACb	Electronic output phase inversion Allows for changing the phase rotation of the voltage at the output of the drive controller, from A-B-C to A-C-B, to change the direction of motor rotation. If this parameter is changed while the motor is running, the motor decelerates on the programmed ramp and then accelerates to the speed reference set point in the opposite rotation direction following the programmed ramp.	No-Yes	No

⚠ CAUTION

UNEXPECTED DIRECTION OF MOTOR ROTATION

- If parameter ACb is set to YES, upon returning to Factory Settings the parameter ACb returns to No (motor rotation will not be in the desired direction).
- Before changing parameter ACb, ensure that reversing the motor rotation direction is acceptable for the application.

Failure to follow these instructions can result in injury or equipment damage.

Acceleration -s Deceleration -s	ACC dEC	Acceleration and deceleration ramp times. Defined as the time between 0 Hz and FRS.	0.05 to 999.9 0.05 to 999.9	3 s 3 s
Low SPeed - Hz	LSP	Low speed	0 to HSP	0 Hz
High SPeed - Hz	HSP	High speed. Ensure that this adjustment is suitable for the motor and the application.	LSP to tFr	50/60 Hz depending on switch setting
Gain - %	FLG	Frequency loop gain. This parameter allows adjustment of the response time of the drive controller to sudden changes in the motor load. Decreasing the gain parameter slows the response time of the drive controller. Increasing the gain parameter makes the drive controller respond more quickly. This parameter should be increased in applications where the undesirable changes in motor speed occur due to changes in motor load. Applications that have fast cycle times or high torque requirements may require an increase in gain.	0 to 100	20

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Stability - %	StA	Frequency loop stability. This parameter allows adjustment of speed overshoot of the drive controller to sudden changes in the motor load. Increasing the stability setting dampens the overshoot. This parameter should be adjusted with the gain setting to tune the drive controller response to meet the desired performance on applications that have fast cycle times or high torque requirements.	0 to 100	20
ThermCurrent - A	ItH	Current setting used for the motor thermal protection. Adjust ItH to the nominal current which appears on the motor nameplate. This provides Class 20 motor overload protection.	0.25 to 1.36 of I_n [1]	Varies according to drive controller size.

⚠ CAUTION

MOTOR OVERHEATING

- This drive controller does not provide direct thermal protection for the motor.
- Use of a thermal sensor in the motor may be required for protection at all speeds or loading conditions.
- Consult the motor manufacturer for the thermal capability of the motor when operated over the desired speed range.

Failure to follow these instructions can result in injury or equipment damage.

DC Inj. Time- s	tdC	DC injection braking time. If tdC = Cont, DC injection is continuous.	0 to 30 s Cont	0.5 s

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
dc I at rest - A	SdC	DC injection braking current level if tdC is set to continuous.	0.1 to 1.36 of I_n [1]	Varies according to drive controller size.

NOTE: DC Inj. Time is only available if automatic DC injection (AdC) is set to Yes.

NOTE: DC Inj. Current Level is only available if tdC is set to continuous.

⚠ WARNING

NO HOLDING TORQUE

- DC injection braking does not provide holding torque at zero speed.
- DC injection braking does not function during loss of power or drive controller fault.
- When required, use a separate brake for holding torque.

EXCESSIVE DC INJECTION BRAKING

Application of DC injection braking for long periods of time can cause motor overheating and damage. Protect the motor from extended periods of DC injection braking.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NST Thresh-Hz	FFt	Freewheel stop trip threshold: when a stop on ramp or fast stop is requested, the type of stop selected is activated until the speed falls below this threshold. Below this threshold, freewheel stop is activated. This parameter can only be accessed if the R2 relay is not assigned to the BLC: Brake Logic function, and if an on ramp or fast type stop has been selected in the 3—Drive menu under type of stop (Stt).	0 to HSP	0 Hz
Jump Freq. - Hz	JPF	Jump frequency with a bandwidth of +/- 2.5 Hz around JPF. This function is used to suppress speeds which cause mechanical resonance.	0 to HSP	0 Hz
Jump Freq.2- Hz	JF2	Second skip frequency: same function as JPF, for a second frequency value.	0 to HSP	0 Hz

NOTE: Additional parameters appear in this menu if certain Macro-Configurations are selected. See Tables 7–9.

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Jump Freq.3- Hz	JF3	Third skip frequency: same function as JPF, for a third frequency value.	0 to HSP	0 Hz
Machine Coef.	USC	Machine speed coefficient. Coefficient applied to rFr permitting the display of machine speed by the parameter USP. USP = rFr x USC	0.01 to 100.0	1.00
LSP Time - s	tLS	Low speed run time. After operation at LSP for the amount of time defined by tLS, the motor is automatically commanded to stop. The motor restarts if the frequency reference is greater than LSP, if a run command continues to be present. “0” means that no time period is set.	0.0 to 999.9 s	0

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Additional Adjustment Parameters for Material Handling

Table 7 lists the additional parameters that are accessible when the macro-configuration is set to Material Handling.

Table 7: 2—Additional Adjustment Parameters with Material Handling Macro-Configuration

Menu 2

NOTE: UFr and SLP are unitless values. The percent value is only to provide a range for adjustment. For example, 50 on a 0 to 150 scale is one third of the maximum.

Parameter	Code	Description	Adjustment Range	Factory Setting
IR Compens. - %	UFr	IR compensation Allows adjustment of the default value of IR Compensation or the value measured during auto-tuning. The adjustment range is extended to 800% if the SPC parameter (special motor) is set to Yes in the 3—Drive menu (see page 50). Special motors include synchronous permanent magnet motors, synchronous wound field motors, and synchronous reluctance motors. This parameter is used to adjust low speed torque for optimal performance. Adjust this parameter to compensate for the resistive voltage drop of the motor stator windings and the conductors connecting the motor and drive controller. This parameter is typically used to boost torque performance at low speed operation. If an autotune is performed, adjustment of this parameter is usually not required.	0 to 150% or 0 to 800%	100%
Slip Comp. - %	SLP	Slip compensation Allows adjustment of the slip compensation around a fixed value set by the nSP parameter (motor nominal speed) in the 3—Drive menu (see page 43). This parameter is used to adjust the slip compensation to improve speed regulation. Induction motors develop torque based on the slip, which is the difference between the speed of the rotating magnetic field in the stator and the speed of the rotor. As the load increases, the slip increases to produce the necessary torque. In applications where the change in speed due to slip is undesirable, the slip compensation should be increased. When this parameter is increased, the drive controller will automatically increase the output frequency. The amount of increase is proportional to the increase of the load, allowing one setting for the entire speed range.	0 to 150%	100%
Preset Sp.2- Hz	SP2	Second preset speed	LSP to HSP	10 Hz
Preset Sp.3- Hz	SP3	Third preset speed	LSP to HSP	15 Hz

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

★ Parameters appear if an I/O extension card is installed.

Menu 2

Table 7: 2—Additional Adjustment Parameters with Material Handling Macro-Configuration

Parameter	Code	Description	Adjustment Range	Factory Setting
Preset SP.4- Hz ★	SP4	Fourth preset speed	LSP to HSP	20 Hz
Preset SP.5- Hz ★	SP5	Fifth preset speed	LSP to HSP	25 Hz
Preset SP.6- Hz ★	SP6	Sixth preset speed	LSP to HSP	30 Hz
Preset SP.7- Hz ★	SP7	Seventh preset speed	LSP to HSP	35 Hz
Curr.Lev.Att: A ★	Ctd	Current threshold above which the logic output or the relay changes to 1	0.25 to 1.36 of I_n [1]	1.36 of I_n [1]

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

★ Parameters appear if an I/O extension card is installed.

Additional Adjustment Parameters for General Use

Table 8 lists the additional parameters that are accessible when the macro-configuration is set to General Use.

Table 8: 2—Additional Adjustment Parameters with General Use Macro-Configuration

Menu 2

NOTE: UFr and SLP are unitless values. The percent value is only to provide a range for adjustment. For example, 50 on a 0 to 150 scale is one third of the maximum.

Parameter	Code	Description	Adjustment Range	Factory Setting
IR Compens. - %	UFr	IR compensation Allows adjustment of the default value of IR Compensation or the value measured during auto-tuning. The adjustment range is extended to 800% if the parameter SPC (special motor) is set to Yes in the 3—Drive menu (see page 50). Special motors include synchronous permanent magnet motors, synchronous wound field motors, and synchronous reluctance motors. This parameter is used to adjust low speed torque for optimal performance. Adjust this parameter to compensate for the resistive voltage drop of the motor stator windings and the conductors connecting the motor and drive controller. This parameter is typically used to boost torque performance at low speed operation. If an autotune is performed, adjustment of this parameter is usually not required.	0 to 150% or 0 to 800%	100%
SlIP Comp. - %	SLP	Slip compensation Allows adjustment of the slip compensation around a fixed value set by the motor nominal speed. This parameter is used to adjust the slip compensation to improve speed regulation. Induction motors develop torque based on the slip, which is the difference between the speed of the rotating magnetic field in the stator and the speed of the rotor. As the load increases the slip increases to produce the necessary torque. In applications where the change in speed due to slip is undesirable, the slip compensation should be increased. When this parameter is increased, the drive controller will automatically increase the output frequency. The amount of increase is proportional to the increase of the load, allowing one setting for the entire speed range.	0 to 150%	100%
Jog Freq. -Hz	JOG	Frequency when operating in Jog	0 to 10 Hz	10 Hz
Jog Delay - s	JGt	Delay between two consecutive jog operations	0 to 2 s	0.5 s

Additional Adjustment Parameters for Variable Torque

Table 9 lists the additional parameters that are accessible when the macro-configuration is set to Variable Torque.

Table 9: 2—Additional Adjustment Parameters with Variable Torque Macro-Configuration [1]

Parameter	Code	Description	Adjustment Range	Factory Setting
DC Inj.Curr.- A	IdC	DC injection braking current level. This parameter is accessible if a logic input is assigned to DC injection braking. After 30 seconds, IdC is automatically set to 0.5 ItH if previously set to a higher value.	0.10 to 1.36 of I_n [2]	Varies according to drive controller size.
U/f Profile - %	PFL	Volts/Hertz adjustment This function is available in variable torque mode and if the Energy Economizer (Energy Savings) function (nld) is disabled. This parameter is useful in applications where the user wishes to define the volts/hertz profile manually instead of having the drive controller perform this function with the Energy Economizer function. The 100% setting provides a linear V/Hz output from 0–FrS (nominal motor frequency).	0 to 100%	20%

[1] On the 125–500 hp drive controllers, Preset Speeds and Jog are also available. See Tables 7 and 8 for descriptions of these functions. IR Compensation appears on 125–500 hp drive controllers if the Special Motor parameter, SPC, is set to Yes in Menu 3.

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Menu 2

NOTE: V/f Profile is available only if the energy savings function (nld) is set to No.

Additional Adjustment Parameters After I/O Reassignment

Menu 2

Table 10 lists the additional parameters that may be accessible after the inputs or outputs have been reassigned.

Table 10: 2—Additional Adjustment Parameters After I/O Reassignment

Parameter	Code	Description	Adjustment Range	Factory Setting
Preset SP.2-Hz	SP2	Second preset speed	LSP to HSP	10 Hz
Preset SP.3-Hz	SP3	Third preset speed	LSP to HSP	15 Hz
Preset SP.4-Hz	SP4	Fourth preset speed	LSP to HSP	20 Hz
Preset SP.5-Hz	SP5	Fifth preset speed	LSP to HSP	25 Hz
Preset SP.6-Hz	SP6	Sixth preset speed	LSP to HSP	30 Hz
Preset SP.7-Hz	SP7	Seventh preset speed	LSP to HSP	35 Hz
Jog Freq. - Hz	JOG	Frequency when operating in jog	0 to 10 Hz	10 Hz
Jog Delay - s	JGt	Delay between two consecutive jog operations.	0 to 2 s	0.5 s
BrReleaseLev-Hz [4]	brL	Brake release frequency	0 to 10 Hz	0 Hz
BrReleaseI -A [4]	Ibr	Brake release current	0 to 1.36 of I_n [3]	0 A

[1] Depending on the position of the 50/60 Hz switch.

[2] 100% corresponds to the nominal torque of a motor with horsepower size equal to that of the drive controller at its constant torque rating.

[3] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[4] This parameter is not available on 125–500 hp drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 2

Table 10: 2—Additional Adjustment Parameters After I/O Reassignment *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
BrReleasTime -s [4]	brt	Brake release time	0 to 5 s	0 s
BrEngageLev- Hz [4]	bEn	Brake engage frequency	0 to LSP	0 Hz
BrEngageTime -s [4]	bEt	Brake engage time	0 to 5 s	0 s
PI Prop. Gain	rPG	Proportional gain for PI regulator	0.01 to 100	1
PI Int. Gain-/s	rIG	Integral gain for PI regulator	0.01 to 100 /s	1 /s
PI Coeff.	FbS	Feedback scaling factor for PI regulator	1.0 to 100.0	1.0
PI Inversion	PIC	Inverts the PI feedback signal No: Normal Yes: Inverted	Yes - No	No
PI Filter -s	PSP	Used to adjust the low-pass filter time constant on the PI feedback signal.	0 to 10 s	0 s
PI Preset 2 - %	PI2	Second preset PI reference. Available after a logic input has been assigned to PR4: PI4 Preset	0-100%	30%
PI Preset 3- %	PI3	Third preset PI reference. Available after a logic input has been assigned to PR4: PI4 Preset	0-100%	60%
ATV th. fault	dtd	Drive thermal fault threshold above which the logic output goes to state 1, after a logic input has been assigned to tAd:ATV th. alarm.	0-118%	105%
Freq. Detect-Hz	Ftd	Motor frequency threshold above which the logic output goes to state 1.	LSP to HSP	50/60 Hz [1]
Freq.Lev.2- Hz	F2d	Same function as Ftd for a second frequency value	LSP to HSP	50/60 Hz [1]

[1] Depending on the position of the 50/60 Hz switch.

[2] 100% corresponds to the nominal torque of a motor with horsepower size equal to that of the drive controller at its constant torque rating.

[3] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[4] This parameter is not available on 125–500 hp drive controllers.

★ These parameters are available only with the I/O extension card installed.

Table 10: 2—Additional Adjustment Parameters After I/O Reassignment *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Curr.Lev.Att- A	CEd	Current threshold above which the logic output or relay goes to state 1.	0.25 to 1.36 of I_n [3]	1.36 of I_n [3]
ThermLevAtt - %	tEd	Motor thermal state threshold above which the logic output or relay goes to state 1 (high).	0 to 118%	100%
Torque lim2 -A [4]	tL2	Second torque limit, activated by a logic input.	0% to 200% [2]	200%
DC Inj. Curr. -A	IdC	DC injection braking current level. Accessible if a logic input is assigned to DC injection braking. After 30 s, IdC is automatically set to 0.5 ItH if previously set to a higher value.	0.10 to 1.36 of I_n [3]	0.7 ItH
Accelerate 2- s Decelerate 2- s	AC2 dE2	Second acceleration and deceleration ramp times. These parameters are accessible if a logic input is assigned to ramp switching or if Frt is not 0.	0.05 to 999.9	5 s
TachFBCoeff ★	dtS	Tachometer scaling factor associated with the tachometer feedback function: $dtS = \frac{9}{\text{tachometer voltage at HSP}}$	1 to 2	1

[1] Depending on the position of the 50/60 Hz switch.

[2] 100% corresponds to the nominal torque of a motor with horsepower size equal to that of the drive controller at its constant torque rating.

[3] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[4] This parameter is not available on 125–500 hp drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 2

3—Drive Menu

This menu is accessible when the access locking switch is in the total unlock,  , position. The parameters can only be modified when the motor is stopped.

Optimal performance is obtained:

- By ensuring that the input frequency selection switch is properly set (see page 14)
- By entering the motor nameplate values into the Drive menu parameters
- By initiating an autotune (on a standard asynchronous motor). See page 45 for more information concerning the autotune function (tUn).

Parallel, Undersized, and Special Motor Applications

The ATV58 *TRX* drive controller can be used in applications with multiple motors wired in parallel, undersized motors, or with special motors. To configure the drive controller for these applications, follow these steps:

1. Select either the “Hdg: Material Handling” or “GEn: General Use” macro-configuration (see page 23).
2. Configure the Special Motor parameter (SPC) in the Drive menu to Yes or PSM (see page 50).
3. Adjust the IR Compensation parameter (UFr) in the 2—Adjust menu to obtain satisfactory performance (see pages 35 and 37).

Parallel motor applications consist of multiple motors wired in parallel to the output of one drive controller. Refer to the Square D Application Guide, *Product Data Bulletin SC100R5/95*, available at www. SquareD.com for information on properly sizing the drive controller for parallel motor applications.

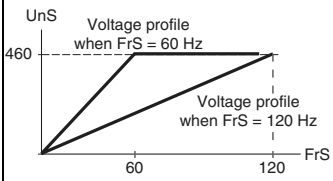
An undersized motor is defined as a motor with a full current rating is less than 25% of the ATV58 *TRX* drive controller rating. Select *PSM* in the Special Motor menu.

Synchronous permanent magnet, synchronous would field, and synchronous reluctance motors are examples of special motors.

Table 11 on page 43 shows the parameters accessed in the Drive menu.

Menu 3

Table 11: 3—Drive Menu Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
Nom.Mot.Volt- V	UnS	Motor nameplate nominal voltage. • ATV58••••M2 • ATV58••••N4	 200 to 240 V 200 to 500 V	 230 V or 400/460 V [1]
Nom.Mot.Freq - Hz	FrS	Motor nameplate nominal frequency. The FrS setting defines the frequency at which nominal motor voltage (UnS) is applied to the motor. FrS cannot be set above the maximum output frequency setting tFr.  	10 to tFr	50/60 Hz [1]
NomMotCurr.- A	nCr	Motor nameplate nominal current.	0.25 to 1.36 of I_n [2]	0.9 of I_n [2]
Nom.Mot.Speed -rPm	nSP	Motor nameplate nominal speed. This should be the value that incorporates slip (i.e. this value should be the rpm of the motor when it is fully loaded).	0 to 9999 rpm	depends on drive controller rating

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Mot.CosPhi	CoS	Motor CosPhi, motor power factor. Set the *CoS* parameter to the motor nameplate power factor. If the power factor is not provided on the nameplate or to optimize the motor torque performance, use the following procedure to optimize the motor power factor setting. Operate the motor with no load at a frequency equal to nominal frequency / 2. Then adjust the *CoS* parameter such that the measured motor voltage equals nominal motor voltage / 2. For example: For a 460 Vac motor operating at 60 Hz, adjust the *CoS* parameter to have 230 V at 30 Hz. If motor voltage is less than 230 V, decrease *CoS* parameter. If motor voltage is more than 230 V, increase the *CoS* parameter.	0.5 to 1	depends on drive controller rating

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Auto Tuning	tUn	Initiates an autotune when the tUn parameter is set to Yes. After the autotune is complete, the display will show "done". No is displayed if the autotune was not successful or completed. No is also displayed if the motor rating is less than 25% of drive controller I_n rating or if multiple motors are connected. The CoS parameter may need to be manually adjusted for optimum performance. This feature will not work if any logic inputs are activated. If freewheel stop or fast stop are assigned to a logic input, they must be in the high state to autotune. When initiated, the drive controller pulses the connected motor, measures, and stores specific motor stator resistance and resistance of the conductors. This allows the drive controller to provide better current regulation for better motor torque performance. This can be initiated from the keypad display or by a logic input assigned to this function.	No - Yes	No
Max.Freq. - Hz	tFr	Maximum output frequency. The maximum value is a function of the switching frequency (SFr, see page 50).	10 to 500 Hz	60/72 Hz [1]

⚠ CAUTION

MACHINERY OVERSPEED

Some motors and/or loads may not be suited for operation above nameplate motor speed and frequency. Consult the motor manufacturer before operating motor above rated speed.

Failure to follow this instruction can result in injury or equipment damage.

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Energy Eco	nLd	Optimizes the motor efficiency by automatically adjusting the Volts/Hz ratio. *NOTE: Energy Eco. is available only in variable torque mode.*	No - Yes	Yes
I Limit adapt.	Fdb	Current limit adaptation. When configured for Yes, the current limit setting will increase as a function of output frequency. *NOTE: I Limit is available only in variable torque mode.*	No - Yes	No
DecRampAdapt	brA	Activation allows the deceleration ramp time to be automatically increased, avoiding an overbraking fault (ObF) if the ramp time was too short. This function may be incompatible with ramp positioning and with dynamic braking. If relay R2 is assigned to Brake Logic, brA can only be set to No.	No - Yes	No [3]
SwitchRamp2- Hz	Frt	Frequency for ramp switching. When the output frequency is greater than Frt, the ramp times will be AC2 and dE2.	0 to HSP	0 Hz

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Type of stop	StE	Type of stop: When a stop is requested, the type of stop defined by this parameter is activated until the FFt threshold (2—Adjust menu) is reached. Below this threshold, freewheel stop is activated. • Stn: On decel ramp • Fst: Fast stop • Nst: Freewheel stop • Dci: DC injection stop *NOTE: Switch Ramp 2 is not available if LI is assigned to ramp switching.* *NOTE: This parameter, Stt, cannot be accessed if the R2 relay or a logic output is assigned to the "BLC: Brake Logic" function.*	STN–FST NST–DCI	STN

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

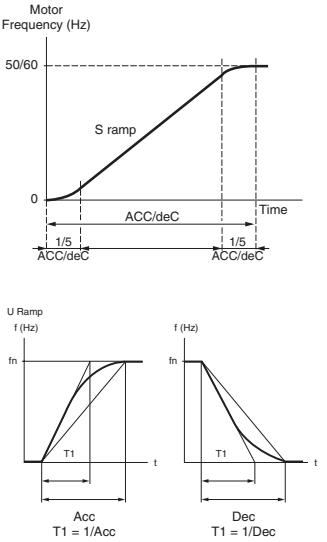
[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Ramp Type	rPt	Defines the type of acceleration and deceleration ramps. LIN: linear S: S ramp U: U ramp 	LIN - S - U	LIN
DecRamp Coeff	dCF	Coefficient for reducing the deceleration ramp time when a logic input has been assigned to the Fast Stop function. For example: If dec=20 s, setting dCF to 2 results in a 10 s dec ramp setting.	1 to 10	4

NOTE: DecRamp Coeff is only available if fast stop is enabled.

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Trq.Limit1 -% [4]	tL1	Torque limit allows limitation of the maximum motor torque.	0 to 200% torque	200%
Int.I Lim -A	CL1	Current limit used to limit the maximum motor heating.	0 to 1.36 of I_n [2]	1.36 of I_n [2]
Auto DC Inj.	AdC	Allows deactivation of automatic DC injection at stop.	No - Yes	Yes
Mot P Coef.	PCC	Defines the ratio between the nominal drive controller power and the motor with the lowest power rating when a logic input is assigned to the motor switching function (see page 71).	0.2 to 1	1
Sw. Freq. Type	SFt	Allows selection of the type of switching frequency.	LF - HF1 - HF2 [5]	LF

NOTE: Mot P Coef. is only available if motor switching is enabled.

NOTE: Modifying SFt causes the following parameters to revert to factory settings: 3—Drive Menu: nCr, CLI, SFr, nrd 2—Adjust Menu: itH, IdC, Ibr, Ctd

- LF allows adjustment between 0.5 and 4 kHz using the SFr parameter.
- HF1 and HF2 allow adjustment between 4 and 16 kHz:

  HF1 is for applications with a low duty cycle, without derating the drive controller. If the drive controller thermal state goes above 95%, the switching frequency automatically goes to 2 or 4 kHz (depending on rating). When the thermal state returns to 70%, the switching frequency returns to the set value.

  HF2 is for machines with a high duty cycle with derating of the drive controller by one power rating. The drive parameters (current limit, thermal current, etc.) are automatically scaled.

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
Sw Freq -kHz	SFr	Selection of switching frequency. The range depends on the SFt parameter. The maximum operational frequency (tFr) is limited depending on the switching frequency: SFr (kHZ) 0.5 1 2 4 8 12 16 tFr (Hz) 62 125 250 500 500 500 500	LF: 0.5-1-2-4 kHz HF1 or HF2: 4-8-12-16 kHz [5]	LF: 4 kHz HF1 or HF2: (depending on controller rating)
Noise Reduct	nrd	This function randomly modulates the switching frequency in order to reduce audible motor noise.	No - Yes	Yes if SFt = LF No if SFt = HF1 or HF2
Special Mot.	SPC	Special motor adaptation This parameter should be set to Yes when using special motors such as synchronous permanent magnet motors, synchronous wound field motors, or synchronous reluctance motors. This parameter should also be enabled if using one drive controller to control multiple motors in parallel. Installation of individual motor thermal protection is required when using the drive controller to control multiple motors in parallel. The PSM setting is intended to be used when the motor connected to the drive controller is less than 25% of the drive controller's nominal current rating. It may be necessary to disable output phase loss protection, OPL. Installation of motor thermal protection is required in this type of application. Also, the PSM setting can be enabled to allow for open circuit output voltage testing. Enabling the SPC parameter increases the IR compensation adjustment range from 0 to 800%.	No - Yes - PSM	No

NOTE: Special Mot. is not available in variable torque mode except in the 125–500 hp drive controllers. After enabling this parameter, the IR compensation parameter appears in Menu 2. For 1/2 –100 hp drive controllers, setting SPC to PSM while in the material handling macro and then selecting the variable torque macro will leave the PSM setting enabled.

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters *(continued)*

Parameter	Code	Description	Adjustment Range	Factory Setting
PG Type ★	PGt	Defines the type of sensor used when an encoder feedback I/O card is installed. INC: incremental encoder (A, A+, B, B+ are wired). DET Detector (only A is wired).	INC-DET	DET
Num. Pulses ★	PLS	Defines the number of pulses for each revolution of the sensor.	1 to 1024	1024

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 14).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] This parameter is not available on 125–500 hp drive controllers.

[5] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

4—Control Menu

The Control Menu is accessible when the access locking switch is in the total unlock, ⊏↑, position. The parameters can only be modified when the motor is stopped.

Table 12: 4—Control Menu: Keypad Display or 2- and 3-Wire Control

Menu 4

Parameter	Code	Description	Adjustment Range	Factory Setting
TermStripCon.	tCC	Configuration of the terminal strip command: 2- or 3-wire control.	2W - 3W	2W

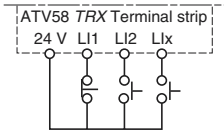
NOTE: Modification of this parameter requires two confirmations since it causes a reassignment of the logic inputs. Shown below are the LI assignments when 3-wire control is selected. See Table 3 on page 24 for the assignments in 2-wire control. In 3-wire control, LI1 and LI2 cannot be reassigned.

I/O	Material Handling	General Use	Variable Torque
LI1	STOP	STOP	STOP
LI2	Run forward	Run forward	Run forward
LI3	Run reverse	Run reverse	Run reverse
LI4	2 Preset speeds	Jog	Reference switching [1]
LI5★	4 Preset speeds	Freewheel stop	Injection braking [1]
LI6★	8 Preset speeds	Clear faults	Freewheel stop [1]

Selecting 3-wire control inhibits the automatic restart function.

3-wire control wiring example:

LI1: Stop
LI2: Forward
LIx: Reverse



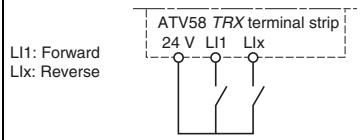
★ These I/O can be accessed if an I/O extension card has been installed.

[1] For 125–500 hp drive controllers the factory setting are:
LI4 = Fault Reset; LI5 = ramp switching; LI6 = Not assigned

Menu 4

NOTE: Type 2 Wire appears only if 2-wire control is selected.

Table 13: 4—Control Menu: 2-Wire Control Type

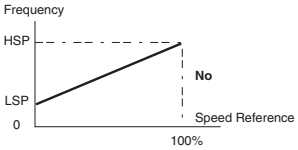
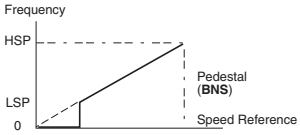
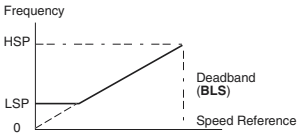
Parameter	Code	Description	Adjustment Range	Factory Setting
Type 2 Wire	tCt	Defines the type of 2-wire control: • LEL: If the forward or reverse input is high when the drive controller is powered up, the drive controller will start the motor. If both inputs are high on power up, the controller will run forward. • TrN: The drive controller must see a transition from low to high of the forward or reverse input before it will start the motor. Therefore, if the forward or reverse input is high when the drive controller is powered up, the input must be cycled before the drive controller will start the motor. • PFW: Forward input has priority over reverse input with this control. If forward is activated while the controller is running in reverse, the controller will run forward. 2-wire control wiring example: 	LEL-TrN-PFW	LEL
RV inhibit	rIn	When configured for Yes, this function inhibits reverse operation even if reverse operation is requested by a summing or PI regulator function. This parameter is not available if a logic input is configured for reverse. A logic input cannot be configured for reverse if this parameter is configured for Yes.	Yes - No	No

★ These I/O can be accessed if an I/O extension card has been installed.

[1] For 125–500 hp drive controllers the factory setting are:
LI4 = Fault Reset; LI5 = ramp switching; LI6 = Not assigned

Menu 4

Table 13: 4—Control Menu: 2-Wire Control Type

Parameter	Code	Description	Adjustment Range	Factory Setting
deadb./Pedst	b S P	This function can be used to manage low speed operation.   	No BLS BnS	No

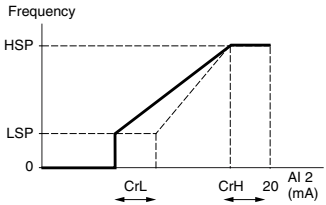
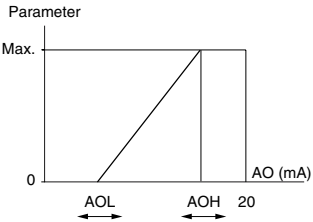
★ These I/O can be accessed if an I/O extension card has been installed.

[1] For 125–500 hp drive controllers the factory setting are:
LI4 = Fault Reset; LI5 = ramp switching; LI6 = Not assigned

Menu 4

NOTE: If CRL is set higher than CRH, reverse sense operation will result (i.e., 20 mA will equal low speed and 4 mA will equal high speed).

Table 14: 4—Control Menu: Other Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
AI2 min Ref.-mA AI2 Max. Ref-mA	CrL CrH	• CrL: Minimum value of the signal on analog input AI2 • CrH: Maximum value of the signal on analog input AI2	CrL: 0–20 mA CrH: 4–20 mA	CrL: 4 mA CrH: 20 mA
		These two parameters allow definition of the signal at AI2. The input can be configured for 0–20 mA, 4–20 mA, 20–4 mA, among other possibilities. 		
AO min Val-mA AO Max. Val-mA	AOL AOH	Min. value of the signal on output AO Max. value of the signal output on AO	0–20 mA 0–20 mA	0 mA 20 mA
		These two parameters are used to define the output signal on AO. For example: 0–20 mA, 4–20 mA, 20–4 mA, etc. 		

★ These parameters are available only with the I/O extension card installed.

Menu 4

Table 14: 4—Control Menu: Other Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
Save Ref	Str	This function allows saving the reference, either when the run command is removed (RAM) or when mains power is removed (EEP). When the motor is next started, the reference speed will be the last saved reference. In order for speed reference to be saved in EEP mode, the run command cannot be present when re-applying power. *NOTE: Save Reference is only available if LIs are assigned to +Speed/-Speed.*	NO-RAM-EEP	NO
KeyPadCom.	LCC	Allows command of the drive controller via the keypad display. The STOP/RESET, RUN, and FWD/REV keys are active. The reference speed is given by the LFr or LCU parameter (see page 30). **Only the freewheel stop, fast stop, and stop by DC injection commands remain active at the terminal strip.** If the link between the drive controller and keypad display is lost, the drive controller will trip on the SLF fault (serial link fault). If this parameter is set to YES prior to the request to return to Factory Settings, it will remain set to YES after returning to Factory Settings.	No - Yes	No

★ These parameters are available only with the I/O extension card installed.

Menu 4

Table 14: 4—Control Menu: Other Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
Stop Priorit.	PSt	This function gives priority to the STOP key on the keypad display no matter what the command source (terminal strip, keypad display, or serial link). To change the PSt parameter to No: 1. Display no. 2. Press ENT. 3. The drive controller displays “See manual”. 4. Press the up arrow key, then the down arrow key, then ENT, then ESC. **When this parameter is set to No, the stop key on the keypad display will be inactive**. To return to Yes, display Yes then press enter.	No - Yes	Yes

⚠ WARNING

DISABLED STOP COMMAND

Disabling the stop key on the keypad display will prevent the drive controller from stopping when the stop key is pressed. An external stop command must be installed to stop the motor.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

DriveAddress	Add	Drive controller address controlled through the RS-485 port by a MODBUS device (i.e., without the programming or operating keypad display). If this parameter is set to any numeral other than 0 prior to the request to return to Factory Settings, it will remain set to that numeral after returning to Factory Settings.	0 to 31	0

★ These parameters are available only with the I/O extension card installed.

Menu 4

Table 14: 4—Control Menu: Other Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
BdRate RS485	tbr	Transmission speed on the RS-485 MODBUS port on the front of the drive controller. • 9600 Bits / second • 19200 Bits / second *NOTE: The keypad display will not operate properly if parameter tbr is set to 9600. On power up, ERR7 may show on the display indicating this error.* *To reset:* 1. Turn off power to the drive controller. 2. Slide the 50/60 Hz switch to the direction opposite its current position. 3. Power up the drive controller for 3 s. 4. Repeat Step 1. 5. Slide the 50/60 Hz switch to its original position. 6. Power up the drive controller and reenter the correct user configuration, because the parameters will have returned to their factory settings.	9600, 19200	19200
Reset counters	rPr	This parameter sets KWh or operating time to 0. No: Ready to accept a reset command. APH: KWh reset to 0 RTH: Operating time reset to 0 Press “ENT” to confirm the reset to 0 command. APH and RTH are active immediately. The parameter then automatically returns to No.	No-APH-RTH	No

★ These parameters are available only with the I/O extension card installed.

5—I/O Menu

This menu allows you to assign functions to the inputs and outputs. It is accessible when the access locking switch is in the total unlock,  , position. The I/O assignments can only be modified if the motor is not running.

The inputs and outputs displayed in the I/O menu vary depending on selections made in the 4—Control menu and whether or not an I/O extension card is installed. On the 125–500 hp drive controllers, the Brake Logic function and I/O associated with torque are not configurable. The default settings depend on the macro-configuration selected (see Table 3 on page 24 for factory settings).

Menu 5

NOTE: When reassigning inputs from +Speed and -Speed, reassign -Speed first.

When reassigning inputs from preset speeds, reassign PS8 first, then PS4, then PS2.

Table 15 shows which functions can be assigned to the analog input and which can be assigned to a logic input. Additional inputs are available and can be assigned when an I/O extension card is installed. *LI1 and R1 cannot be reassigned. AI1, LI1, and R1 are not displayed in the I/O menu.*

Table 15: Possible Assignments for Configurable Inputs

I/O Extension Card			2 Logic Inputs LI5-LI6	Analog Input AI3	Logic Input [1] A, A-, B, B-
Drive Controller without an I/O Extension Card		**Analog Input AI2**	**3 Logic Inputs LI2–LI4**		
Code and Parameter	**Description**				
NO: Not assigned	Not assigned	X	X	X	X
RV: Reverse	Run reverse		X		
RP2: Switch ramP2	Ramp switching		X		
JOG	Jog		X		
+SP: + SPeed	+Speed		X		
-SP: - SPeed	-Speed		X		
PS2: 2 Preset SP	2 preset speeds		X		
PS4: 4 Preset SP	4 preset speeds		X		
PS8: 8 Preset SP	8 preset speeds		X		
NST: Freewhl StoP	Freewheel stop/run permissive		X		
DCI: DC inject	DC injection braking		X		
FST: Fast stoP	Fast stop		X		
CHP: Multi.Motor	Switching between two motors		X		
TL2: Torque Lim2 [2]	Second torque limit		X		
FLO: Forced Local	Force to local		X		
RST: Fault Reset	Fault reset		X		
RFC: Auto/Manu	Reference switching		X		

[1] The menu for assigning encoder input A, A-, B, B- is called “Assign AI3”.

[2] This parameter is not available on 125–500 hp drive controllers.

[3] An AI for PIF (PI regulator) cannot be configured if RFC (Auto/manual) is already assigned to a logic input. For more details refer to page 74.

Menu 5

Table 15: Possible Assignments for Configurable Inputs

I/O Extension Card			2 Logic Inputs LI5-LI6	Analog Input AI3	Logic Input [1] A, A-, B, B-
Drive Controller without an I/O Extension Card		**Analog Input AI2**	**3 Logic Inputs LI2–LI4**		
Code and Parameter	**Description**				
ATN: Autotune	Auto-tuning		X		
PIF: PI regulator	PI regulator feedback	X [3]		X [3]	
PAU:PI Auto/Man	PI Auto/manual if one AI is assigned to PIF		X		
PIM:PI Man.ref.	Manual PI speed reference if one AI is assigned to PIF			X	
PR2:PI 2 Preset	2 preset PI setpoints if one AI is assigned to PIF		X		
PR4:PI 4 Preset	4 preset PI setpoints if one AI is assigned to PIF		X		
EDD:Ext. flt	External fault input		X		
TLA:Torque limit [2]	Torque limitation by AI if one AI is assigned to ATL		X		
FR2: SPeed Ref2	Speed reference 2	X			
SAI: Summed Ref.	Reference summing	X		X	
SFB: Tacho feedbk	Tachogenerator			X	
PTC: Therm. Sensor	PTC probes			X	
ATL: Torque Lim. [2]	Analog Torque limit			X	
RGI: PG feedbk	Encoder or sensor feedback				X

[1] The menu for assigning encoder input A, A-, B, B- is called “Assign AI3”.

[2] This parameter is not available on 125–500 hp drive controllers.

[3] An AI for PIF (PI regulator) cannot be configured if RFC (Auto/manual) is already assigned to a logic input. For more details refer to page 74.

Menu 5

Table 16 shows which functions can be assigned to relay output R2, logic output LO, and analog output AO.

Table 16: Possible Assignments for Configurable Outputs

I/O Extension Card			Analog Output AO	Logic Output LO
Drive Controller without an I/O Extension Card		**Relay R2**	**Analog Output AO1**	
NO: Not assigned	No assigned	X	X	X
RUN: DriveRunning	Drive controller running	X		X
OCC: Output Cont.	Output contactor command	X		X
FTA: Freq Attain.	Frequency threshold attained	X		X
FLA: HSP Attained	High speed attained	X		X
CTA: I Attained	Current level attained	X		X
SRA: FRH Attained	Reference speed attained	X		X
TSA: Mtr Therm Lv1	Motor thermal level attained	X		X
tAd: ATV th. alarm	Drive thermal level attained	X		X
APL:4-20 mA loss	Loss of 4–20 mA signal	X		X
F2A:F2 Attained	Second frequency threshold reached	X		X
BLC: Brk Logic [1]	Brake logic	X		
OCR: Motor current	Motor current		X	
OFR: Motor Frequency	Motor speed		X	
ORP: Output Ramp	Ramp output		X	
TRQ: Motor torque [1]	Motor torque		X	
STQ: Signed Torq. [1]	Signed motor torque		X	
ORS: Signed ramp	Ramp output with +/– sign		X	
OPS:PI ref.	PI setpoint output, if one AI is assigned to PIF		X	
OPF:PI Feedback	PI feedback output, if one AI is assigned to PIF		X	
OPE:PI Error	PI error output, if one AI is assigned to PIF		X	

[1] These parameters are not available on 125–500 hp drive controllers.

Menu 5

Table 16: Possible Assignments for Configurable Outputs

I/O Extension Card			Analog Output AO	Logic Output LO
Drive Controller without an I/O Extension Card		**Relay R2**	**Analog Output AO1**	
OPI:PI Integral	PI integral output, if one AI is assigned to PIF		X	
OPR:Motor Power	Motor power		X	
THR: Motor Thermal	Motor thermal state		X	
THD: Drive Thermal	Drive thermal state		X	

[1] These parameters are not available on 125–500 hp drive controllers.

After the I/O have been assigned, additional parameters related to the functions automatically appear in the menus, and the macro-configuration is CUS: Customized. The additional parameters are listed in Tables 17 and 18.

Menu 2

Table 17: New Parameters in 2—Adjust Menu After I/O Reassignment

I/O	Assignment		New Parameters to Adjust
LI	RP2	Ramp switching	AC2 dE2
LI	JOG	Jog	JOG JGt
LI	PS4	4 preset speeds	SP2 SP3
LI	PS8	8 preset speeds	SP4 SP5 SP6 SP7
LI	DCI	DC injection braking	IdC
LI	TL2	Second torque limit [1]	tL2
LI	PR4	4 preset PI setpoints	P I2 - P I3
AI	PIF	PI regulator	rPG rIG FbS PIC
AI	SFB	Tachogenerator	dtS
R2	BLC	Brake logic [1]	brL Ibr brt bEn bEt
R2, LO	FTA	Frequency threshold attained	Ftd
R2, LO	CTA	Current threshold attained	Ctd
R2, LO	TSA	Motor thermal threshold attained	ttd

[1] These parameters are not available on 125–500 hp drive controllers.

Menu 2

Table 17: New Parameters in 2—Adjust Menu After I/O Reassignment

I/O	Assignment		New Parameters to Adjust
R2, LO	TAD	Drive thermal threshold attained	dtd
R2, LO	F2A	2nd frequency threshold reached	F2d

[1] These parameters are not available on 125–500 hp drive controllers.

Table 18: New Parameters in Menus 3, 4, and 6 After I/O Reassignment

I/O	Assignment		Parameters to Adjust
LI	-SP	- Speed	Str (4—Control menu)
LI	FST	Fast stop	dCF (3—Drive menu)
LI	CHP	Motor switching	PCC (3—Drive menu)
LI	RST	Fault reset	rSt (6—Fault menu)
AI	SFB	Tachogenerator	Sdd (6—Fault menu)
A+, A-, B+, B-	SAI	Summing reference	PGt, PLS (3—Drive menu)
A+, A-, B+, B-	RGI	Encoder feedback	PGt, PLS (3—Drive menu)

Figure 12: Function Compatibility Chart

The compatibility of certain functions can limit the application functions which can be assigned. Figure 12 shows the incompatibilities between functions. The functions not listed in Figure 12 are compatible with all other functions.

	Automatic DC injection braking	Summing inputs	PI Regulator	+Speed/-Speed	Reference switching (Auto/manual)	PI regulator with Auto/manual	Freewheel stop	Fast stop	Jog	Preset Speeds	Reverse operation	Inhibit reverse operation	Speed regulation with tachogenerator or encoder	Torque limitation via AI3	Torque limitation via LI
Automatic DC injection braking							↑								
Summing inputs					●	●									
PI Regulator					●				●	●			●		
+Speed/-Speed					●	●			↑	●					
Reference switching (Auto/manual)		●	●	●		●				●					
PI regulator with Auto/manual		●		●	●										
Freewheel stop	←							←							
Fast stop							↑								
Jog			●	←						←					
Preset Speeds			●	●	●				↑						
Reverse operation												●			
Inhibit reverse operation											●				
Speed regulation with tachogenerator or encoder			●											●	
Torque limitation via AI3													●		
Torque limitation via LI															

● Incompatible functions

Compatible functions

No significance

Function priority (functions which cannot be active at the same time):

← ↑ The arrow points to the function that has priority.

The stop functions have priority over run commands.
The speed references from a logic command have priority over analog references.

Note: An incompatible function must be deselected before the desired function can be programmed. For example, if preset speeds is programmed, it must be cleared before the +/- speed parameter can be selected.

Using the Logic Inputs

Run Forward and Run Reverse

The logic input used for run reverse can be reassigned if the application has only one rotation direction.

2-wire Control

In 2-wire control, run (forward or reverse) and stop are commanded by the same logic input. When the logic input is closed (set to state 1), run is commanded. When it is opened (set to state 0), stop is commanded. See tCt on page 53 for more information.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

LI1 has priority:

- If LI1 is closed while LI2 is active, the controller will respond to LI1.
- If the LI1 input is lost while LI2 is active, the controller will respond to LI2 and reverse directions.

The logic inputs must be programmed appropriately for the application to prevent the motor from spinning in an unintended direction.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

3-wire Control

In 3-wire control, run (forward or reverse) and stop are commanded by two different logic inputs. LI1 is always assigned to stop which is obtained by opening LI1 (setting it to state 0). A pulse on the run input is saved until the stop input is opened.

Whenever the drive controller is powered up or reset, the motor will only run after resetting the Forward, Reverse, and DC injection inputs.

Ramp Switching

This function allows switching between the first and second ramps. The first ramps are ACC and dEC, the second ramps are AC2 and dE2. There are two ways to activate the function:

- Assign a logic input to RP2 and close the assigned input (set it to state 1).
- By detection of a frequency threshold. This must be configured with the Frt parameter.

If a logic input is assigned to the function, ramp switching can only be initiated by the assigned input.

Jog

A logic input can be assigned to the Jog function to define a motor speed from 0 to 10 Hz. A run command (FWD or REV) is also required.

If the Jog contact is closed (set to state 1) and then a run command is given:

- The acceleration ramp is 0.1 s.
- The deceleration ramp will be 0.1 s when the run command is removed.

If a run command is given and then the Jog contact is closed (set to state 1):

- The acceleration ramp (ACC) is 0.1 s if the motor speed is less than the programmed Jog speed.
- The deceleration ramp (dEC) is followed if the motor speed is higher than the programmed Jog speed.

When the Jog contact is opened (set to state 0), the ACC and dEC settings are used to adjust the motor speed.

The following Jog parameters can be modified in the 2—Adjust menu:

- Jog speed (JOG)
- Delay between jog pulses (JGt)

+Speed/-Speed

There are two types of operation for +Speed/-Speed:

1. Use of pushbuttons. Two logic inputs are required in addition to the run direction inputs. The +Speed input increases the speed

and the -Speed input decreases the speed. If logic inputs are assigned to +Speed/-Speed, the Str parameter appears in the 4—Control menu allowing the reference speed to be saved (see page 56).

NOTE: When 3-wire control is selected, -Speed is automatically assigned to the next input after the one assigned to +Speed.

2. Use of selector switches. Only one logic input, assigned to +Speed, is required. When using selector switches, there is one position for each rotation direction.

   NOTE: This type of operation is not compatible with 3-wire control.

   The Save Reference (Str) parameter can be used to save the last speed reference when the run command is removed or when the power is removed.

In both types of operations, the maximum speed is set by the reference speeds at the analog inputs. For example, if 60 Hz is the desired maximum speed, a jumper can be installed from +10 Vdc to AI1.

Figures 13 and 14 illustrate wiring and timing for +Speed/-Speed.

Figure 13: +Speed / -Speed Wiring Diagram

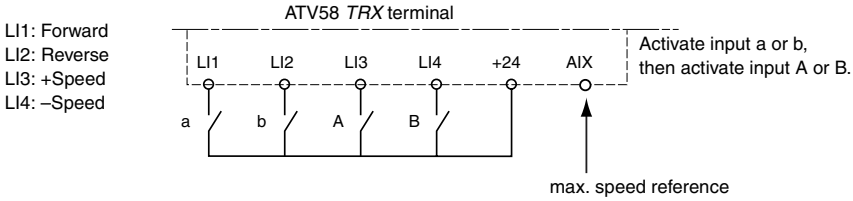
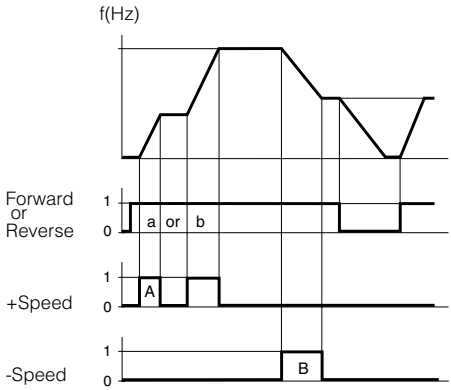


Figure 14: +Speed/-Speed Timing Diagram



NOTE: To reassign the logic inputs to a function other than +Speed/-Speed, -Speed must be cleared first.

Figures 15 and 16 show a wiring example and a timing diagram for +Speed using selector switches. This function requires a maximum speed reference input. For example, if 60 Hz is the desired maximum speed, a jumper can be installed from +10 Vdc to AI1.

Figure 15: Wiring Example for +Speed (Selector Switches)

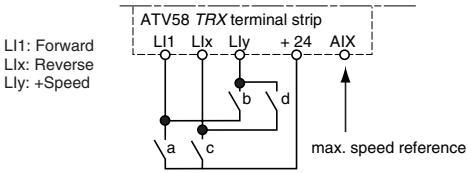
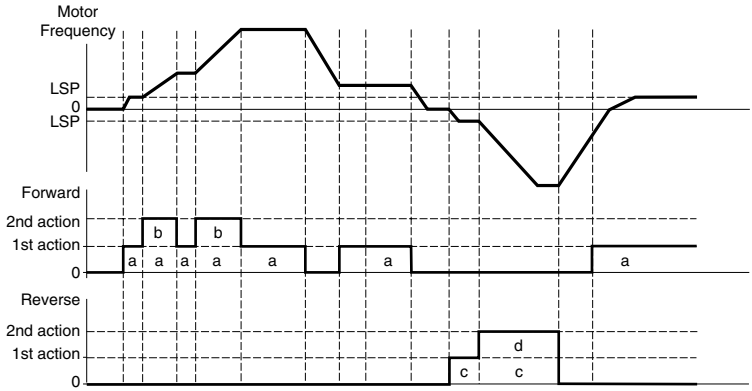


Figure 16: +Speed Timing Diagram (Selector Switches)



Preset Speeds

2, 4, or 8 speeds can be preset, requiring 1, 2, or 3 logic inputs, respectively.

Table 19 shows how the logic inputs are configured for Preset Speeds and the input states that activate them.

Table 19: Preset Speed Logic

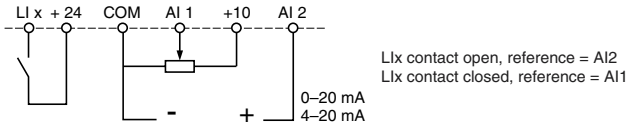
2 Preset Speeds		4 Preset Speeds			8 Preset Speeds			
Assign LIx to PS2.		Assign LIx to PS2, then LIy to PS4.			Assign LIx to PS2, then LIy to PS4, then LIz to PS8.			
LIx	**Speed reference**	**LIy**	**LIx**	**Speed reference**	**LIz**	**LIy**	**LIx**	**Speed reference**
0	LSP + AI reference	0	0	LSP + AI reference	0	0	0	LSP + AI reference
1	HSP	0	1	SP2	0	0	1	SP2
		1	0	SP3	0	1	0	SP3
		1	1	HSP	0	1	1	SP4
					1	0	0	SP5
					1	0	1	SP6
					1	1	0	SP7
					1	1	1	HSP

NOTE: To reassign the logic inputs to a function other than Preset Speeds, PS8 (LIz) must be cleared, then PS4 (LIy), then PS2 (LIx).

Reference Switching (Auto/Manual)

Switching between two references (at AI1 and AI2) by a logic input command. When the logic input is closed (set to state 1), AI1 is enabled. This function automatically assigns AI2 to Speed Reference 2.

Figure 17: Reference Switching Wiring Diagram



Freewheel Stop (Coast to Stop) / Run Permissive

A logic input can be assigned to the Freewheel Stop / Run Permissive (NST) function. *The drive controller will not run until the logic input is closed.* Opening the logic input assigned to the function (setting it to state 0) causes the drive controller to stop applying power to the motor and the motor to coast to a stop. When the logic input is open, NST is displayed in the Drive state screen on the keypad display to indicate that a freewheel stop has been requested. The drive controller will not run until the logic input is closed. This can be used with the Forced Local function for drive controllers on communication networks.

A freewheel stop can be used with a stop command and by setting the FFt parameter. When a stop command is given and the frequency drops below the frequency set with the FFt parameter, the drive controller will freewheel stop.

DC Injection Braking

DC injection braking can be activated at the end of each stop cycle (Adc = Yes) or DC injection braking can be obtained by closing the logic input assigned to the DC Injection Braking function (setting it to state 1).

Fast Stop

⚠ WARNING

EXTENDED STOPPING TIME

- Deceleration time during fast stop may be automatically extended depending on the braking ability of the drive controller.
- A dynamic brake or mechanical stopping/holding brake may be required for consistent stopping times independent of motor load conditions.
- Fast stop does not function during loss of power or drive controller fault.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Fast stop is a braked stop with the deceleration ramp time reduced by a programmable coefficient (see dCF on page 48). Fast stop is obtained by opening the logic input assigned to the function (setting it to state 0), or by configuring fast stop (Fst: Fast Stop) under type of stop (Stt on page 47).

Motor Switching

This function allows a single drive controller to control two motors with different power ratings, one at a time. The ratio between the motor power ratings is set with the PCC parameter in the 3—Drive menu (see page 49).

If the two motors have different power ratings, enclosure types, or speed ratings, then separate motor contactors, thermal protection, and short circuit protection will be required for each motor. **This function automatically inhibits motor thermal protection of the second motor.**

The motor switching command will not be taken into account unless the motor is stopped. If the output contactor opens while the motor is running, the drive controller may trip on overcurrent or overvoltage which may result in damage to the drive controller. The following

parameters are automatically scaled by the command from the logic input:

- DC injection current
- Brake release current
- Nominal motor current

Second Torque Limit

Second Torque Limit reduces the maximum motor torque when the logic input is closed (state set to 1). Use the 2—Adjust menu to configure the percentage of torque.

Fault Reset

Fault reset erases a saved fault and resets the drive controller if the cause of the fault has disappeared. Two types of reset are possible: partial or total. This is set by the rSt parameter in the 6—Fault menu. For a partial reset (rSt = RSP), the following faults are reset and cleared from the display:

- input line overvoltage
- motor overload
- motor overheating
- overbraking
- network communication fault
- loss of RS-485 port communication
- motor phase loss
- loss of 4–20 mA
- drive overheating
- ramp not followed
- external fault
- overspeed

For a Total reset (rSt = RSG), all faults except SCF (Motor Short Circuit) are overridden as long as the logic input assigned to Fault Reset is closed.

CAUTION

MOTOR OVERHEATING

- Repeated reset of the thermal state after a thermal overload can result in thermal stress to the motor.
- When faults occur, promptly inspect the motor and driven equipment for problems (locked shaft, mechanical overload, etc.) before restarting. Also check the power supplied to the motor for abnormal conditions (phase loss, phase imbalance, etc.).

Failure to follow these instructions can result in equipment damage.

External Fault

Assigning a logic input to External Fault allows an external contact closure to stop the drive controller and motor. The stop type is determined by the configuration of the Stt parameter (Type of Stop) in the 3—Drive menu.

Force to Local

Permits going from serial link command to local command using the keypad display or terminal strip, depending on the setting of the LCC parameter in the 4—Control menu. Assigning this parameter selects a local command when the logic input is closed (state 1).

Auto-tuning

When the assigned logic input changes to 1 an auto-tuning operation is triggered, as parameter TUN is described on page 45 in the 3—Drive menu.

Auto tuning is only performed if no command has been activated. If a Freewheel Stop or Fast Stop function is assigned to a logic input, this input must be set to 1 (active at 0).

Encoder Inputs

(Only with an I/O extension card with encoder input, VW3A58202U)

Speed Regulation

The inputs can be used to connect an encoder for improving speed regulation in applications where the load is changing. To program the encoder speed feedback, configure AI3 in the 5—I/O menu for RGI, Encoder Feedback. Then configure the encoder type and number of pulses in the 3—Drive menu.

The A, A-, B, and B- inputs on the I/O option card are for use in forward and reverse directions.

The A input can also be used with an inductive sensor or a photoelectric detector for simplified, but less accurate regulation.

Summing Speed Reference

The setpoint from the encoder input is summed with AI1.

Using the Analog Inputs

The AI1 input is set for speed reference unless the PI Regulator function is enabled. In this case, AI1 is used for the set point reference. The possible assignments of AI2 and AI3 are Speed Reference Summing and PI Regulator.

Speed Reference Summing

The frequency references at AI2 and AI3 can be summed with that at AI1.

PI Regulator

This function is used to regulate a process with a setpoint input and a feedback signal from the process. The function is enabled by assigning an analog input (AI) to PI feedback in the 5—I/O menu after first ensuring that the Auto/Manual (RFC) parameter is not assigned to a logic input. This function is only available in the Variable Torque Macro. The acceleration (ACC) and deceleration (dEC) ramps default to linear ramp type even if the ramps had been configured for S ramp or U ramp with the *rPt* parameter.

When the PI regulator is configured and a logic input is configured for PAU: PI Auto/manual, the PI regulator function is active in Auto mode and AI3 is used for speed input in manual mode. To use the PI Auto/Manual function, you must install an analog option card, VW3A58201U.

Logic inputs can be used with the PI regulator to command the drive controller to run from the analog reference, run at process maximum, or operate with two other definable pre-set setpoints. The configurable setpoints can be used to provide two different setpoints for two different processes, or they can be used instead of using AI1 for setpoint input. For example, providing a setpoint via the logic inputs can eliminate the need for a potentiometer.

Four analog outputs are available to monitor various aspects of the PI regulator function. See pages 83–84 for more information.

PI setpoint	OPS	PI feedback	OPF
PI error	OPE	PI integral error	OPI

Figure 18 shows a diagram of the PI Regulator inputs, calculation points, and outputs.

Table 20 provides a description of the inputs to the PI Regulator.

Figure 18: Diagram of PI Regulator

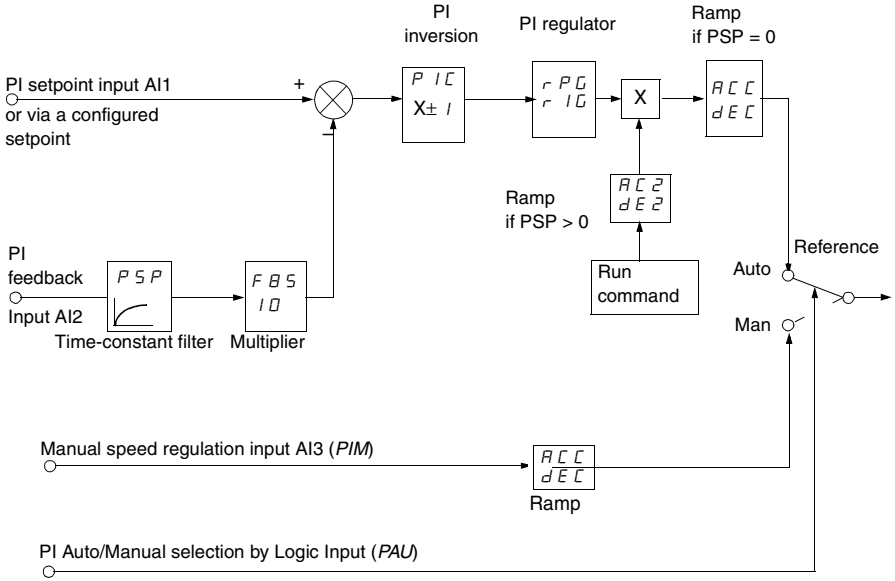


Table 20: Definition of PI Regulator Inputs and Adjustments

Input	Code	Range	Description
PI setpoint	—		The setpoint to the PI regulator can be provided from one of three sources: • via analog input, AI1 (AI2 and AI3 can be set to sum with AI1) • via preset setpoints defined by logic inputs (see Preset setpoints in this table) • over a communication network
PI feedback	—		The feedback to the PI regulator can be provided from AI2 (0–20 mA signal) or AI3 (0–10 Vdc voltage signal).
Auto / Manual with manual speed Input	*PAU, PIM*		When the PI regulator is configured and a logic input is configured for PAU: PI Auto / Manual, AI3 is the speed input in manual mode. The PI regulator function is active in Auto mode. When the logic input is open, (set to state 0), Manual mode is active and the PI regulator is inactive. In manual mode AI3 is enabled and the drive controller responds proportionally to the speed reference at AI3. PI Regulator mode is active when the logic input is closed, (set to state 1).

Table 20: Definition of PI Regulator Inputs and Adjustments *(continued)*

<table>
<tr><th>Input</th><th>Code</th><th>Range</th><th>Description</th></tr>
<tr><td>Preset setpoints</td><td>Pr2, Pr4

PI2, PI3</td><td>0–100% of process maximum (HSP)</td><td>Logic inputs can also be used to provide programmable setpoints. Two or four preset setpoints require the use of one or two logic inputs respectively.
<table>
<tr><th colspan="2">2 preset setpoints</th><th colspan="3">4 preset setpoints</th></tr>
<tr><td colspan="2">Assign: LIx to Pr2</td><td colspan="3">Assign: LIx to Pr2, then LIy to Pr4</td></tr>
<tr><td>LIx</td><td>Reference</td><td>LIy</td><td>LIx</td><td>Reference</td></tr>
<tr><td>0</td><td>Analog reference</td><td>0</td><td>0</td><td>Analog reference</td></tr>
<tr><td>1</td><td>Process max. (HSP)</td><td>0</td><td>1</td><td>PI2 (adjustable)</td></tr>
<tr><td></td><td></td><td>1</td><td>0</td><td>PI3 (adjustable)</td></tr>
<tr><td></td><td></td><td>1</td><td>1</td><td>Process max. (HSP)</td></tr>
</table>
For example, the factory settings of PI2 and PI3 are 30% and 60% respectively and if HSP is 60 Hz, PI2 setpoint will be 18 Hz and PI3 setpoint will be 36 Hz.</td></tr>
<tr><td>PI Inversion</td><td>PIC</td><td>Yes/No</td><td>PI inversion permits an inverted, or reverse-acting, response to the PI setpoint signal. If PIC = No, the motor speed increases when the error is positive. If PIC = Yes, the motor speed decreases when the error is positive.</td></tr>
<tr><td>PI proportional gain</td><td>rPG</td><td>0.01–100</td><td>PI regulator proportional gain adjusts the scaling of the PI setpoint signal.</td></tr>
<tr><td>PI integral gain</td><td>rIG</td><td>0.01–100 s</td><td>PI regulator integral gain adjustment.</td></tr>
<tr><td>Time-constant feedback filter</td><td>PSP</td><td>0–10 s</td><td>PSP can be used to dampen the feedback signal. If PSP is set to zero, the ACC and dEC ramps are active. If PSP is > 0, the AC2/dE2 ramps are active. Adjustment of AC2/dE2 can be used to refine the response of the PI loop. The dEC ramp is always used on stopping.</td></tr>
<tr><td>PI feedback scaling</td><td>FbS</td><td>1.0–100</td><td>PI feedback scaling allows adjustment of the maximum value of the PI feedback signal so that it corresponds to the maximum value of the PI regulator speed reference.</td></tr>
</table>

Assignment of AI2 and AI3

Summing Speed Reference: The frequency setpoints given by AI2 and AI3 can be summed with AI1.

Speed Regulation with Tachogenerator: (Assignment on AI3 only with an I/O extension card, VW3A58201U)

An external divider bridge is required to adapt the voltage of the tachogenerator. The maximum voltage must be between 5 and 9 V. A precise setting is then obtained by setting the dtS parameter available in the 2—Adjust menu.

PTC Probe Processing: (only with an I/O extension card using the analog input). Used for direct thermal protection of the motor by connecting the PTC probes in the motor windings to analog input AI3.

Total resistance of the probe circuit at 20 °C = 750 Ω.

Analog Torque Limit: (Assignment on AI3 only with an I/O extension card VW3A58201U). This function can only be accessed if an analog input has been assigned to the torque limit. If the logic input is at 0, the torque is limited by the setting of TLI or tL2. If the logic input is at 1, the torque is limited by the analog input assigned to this function.

The signal applied at AI3 operates in a linear fashion on the internal torque limit (parameter TLI in the 3—Drive menu):

- If AI3 = 0 V: limit = TLI x 0 = 0
- If AI3 = 10 V: limit = TLI

Using the Controller Relay and Logic Outputs

The relay R2 on the drive controller or the logic output (LO) on an option card can be configured as follows:

Drive Running (RUN)

The logic output is at state 1 if the drive controller is supplying current to the motor or if a run command is generated with a zero speed reference.

Output Contactor Command (OCC)

The Output Contactor Command function allows the drive controller to command a contactor between the controller and the motor. The controller closes the contactor when a run command is given. When there is no longer any current in the motor, the controller opens the contactor. When using an output contactor, set outphase loss (OPL) to No.

NOTE: If the braking by DC injection function is configured, do not exceed contactor rating, because the contactor will not open until the end of braking.

Frequency Threshold Attained (FtA)

The logic output is at state 1 if the motor frequency is greater than or equal to the frequency threshold set by the Ftd parameter in the 2—Adjust menu.

High Speed Attained (FLA)

The logic output is at state 1 if the motor frequency is equal to the high speed value (HSP).

Current Threshold Attained (CtA)

The logic output is at state 1 if the motor current meets or exceeds the current threshold set by the Ctd parameter in the 2—Adjust menu.

Frequency Reference Attained (SrA)

The logic output is at state 1 if the motor frequency is equal to the speed reference value.

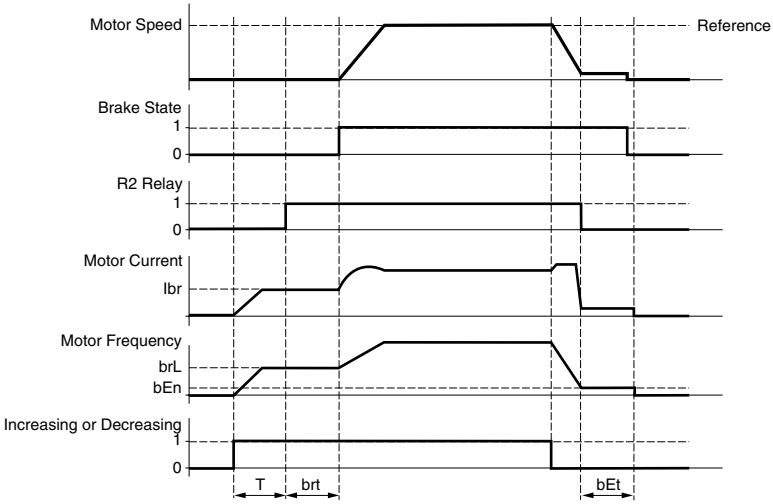
Motor Thermal State Attained (tSA)

The logic output is at state 1 if the motor thermal state meets or exceeds the thermal threshold set by the ttd parameter in the 2—Adjust menu.

Brake Logic Command (bLC) (This parameter is only assignable to R2)

Brake Logic Command allows management of a mechanical brake by the drive controller. Figure 19 shows a timing diagram for Brake Logic.

Figure 19: Brake Logic Timing Diagram



T = non-adjustable delay

Parameters accessible in the 2—Adjust menu when bLC is assigned to R2:

- brake release frequency (brL)
- brake release current (Ibr)
- brake release time (brt)
- brake engage frequency (bEn)
- brake engage time (bEt)

Recommendations for configuring the Brake Logic control parameters:

- Brake release frequency (brL):

  Set the brake release frequency to the value of the nominal motor slip (g) multiplied by the nominal frequency (FS) in Hz.

  brL = g x FS

  g = nominal motor slip

  FS = nominal motor frequency (indicated on the motor nameplate)

  Example Calculation:

  nominal slip (g) = (Ns – Nr) / Ns

  Ns = synchronous speed in rpm

  Nr = nominal motor speed at nominal torque in rpm. Use the speed indicated on the motor nameplate.

  For a 50 Hz supply: Ns = 3000 rpm for a motor with two poles, 1500 rpm for a motor with four poles, 1000 rpm for a motor with six poles, and 750 rpm for a motor with eight poles.

  For a 60 Hz supply: Ns = 3600 rpm for a motor with two poles, 1800 rpm for a motor with four poles, 1200 rpm for a motor with six poles, and 900 rpm for a motor with eight poles.

  Example calculation: for a motor with four poles, a nameplate nominal speed of 1430 rpm, and a 50 Hz supply

  g = (1500 – 1430) / 1500 = 0.0466

  Brake release frequency (brL) = 0.0466 x 50 = 2.4 Hz

- Brake release current (Ibr):

  Adjust the brake release current to the motor nameplate nominal current.

  NOTE: The values indicated (release current and release frequency) correspond to theoretical values. If during testing, the torque is insufficient using these theoretical values, retain the brake release current at the nominal motor current and lower the brake release frequency (up to 2/3 of the nominal slip). If the result is still not satisfactory, return to the theoretical values and then increase the brake release current (the maximum value is imposed by the drive controller) and increase the brake release frequency gradually.

- Acceleration/deceleration time:

  It is advisable to set the acceleration and deceleration ramps to more than 0.5 seconds. Ensure that the drive controller does not exceed the current limit. A braking resistor should be used on overhauling loads.

- Brake release time (brt):

  Adjust according to the time required for the mechanical brake to open.

- Brake engage frequency (bEN):

  Set to twice the nominal slip (in the example above 2 x 0.0466 = 0.0932 Hz). Then adjust according to observed results.

- Brake engage time (bEt):

  Adjust according to the time required for the mechanical brake to close.

Loss of 4–20 mA Signal (APL)

The logic output is at state 1 if the signal on the 4–20 mA speed reference input is less than 2 mA.

Frequency Threshold 2 Attained (F2A)

The logic output is at state 1 if the motor frequency is greater than or equal to the frequency threshold set by the F2d parameter in the 2—Adjust menu.

Drive Thermal Threshold Attained (tAd)

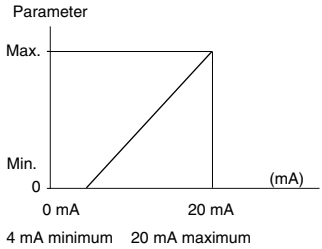
The logic output is at state 1 if the drive thermal state meets or exceeds the thermal threshold set by the dtd parameter in the 2—Adjust menu.

Using the Analog Outputs

The analog outputs on the drive controller and on the Analog I/O and Digital I/O extension cards are current outputs. The minimum and

maximum values (AOL and AOH parameters) are configurable, each with a range of 0–20 mA.

Figure 20: Analog Output Minimums and Maximums



Motor Current

When configured for motor current (OCr), the analog output provides a signal proportional to motor current. The minimum configured value corresponds to zero while the maximum configured value of the analog output corresponds to 200% of the drive controller's constant torque rating.

Output Frequency

When configured for output frequency (OFr), the analog output provides a signal proportional to the motor frequency estimated by the drive controller. The minimum configured value corresponds to zero while the maximum configured value of the analog output corresponds to the maximum frequency setting, not the high speed setting.

Ramp Output

When configured for ramp output (OrP), the analog output provides a signal proportional to the frequency the drive controller is commanding the motor to run. The minimum configured value (AOL) corresponds to zero while the maximum configured value of the analog output (AOH) corresponds to the maximum frequency setting (tFr), not the high speed setting.

Motor Torque

When configured for motor torque (trq), the analog output provides a signal proportional to motor torque as an absolute value. The minimum configured value (AOL) corresponds to zero while the

maximum configured value of the analog output (AOH) corresponds to 200% of the nominal motor torque.

Signed Motor Torque

When configured for signed motor torque (Stq), the analog output provides a signal proportional to motor or braking torque. Zero torque corresponds to:

(AOL + AOH)/2

The minimum configured value (AOL) corresponds to 200% braking torque while the maximum configured value of the analog output (AOH) corresponds to 200% of the nominal torque.

Signed Ramp

When configured for signed ramp output, ORS, the analog output provides a signal proportional to the frequency the drive controller is commanding the motor to run in the reverse or forward direction. Zero frequency corresponds to:

(AOL+AOH) / 2

The minimum configured value, AOL, corresponds to the maximum frequency (tFr) in the reverse direction, while the maximum configured value, AOH, corresponds to the maximum frequency (tFr) in the forward direction.

PI Setpoint

When configured for PI setpoint, OPS, the analog output provides a signal proportional to the PI setpoint being provided to the drive controller. The minimum configured value, AOL, corresponds to the minimum setpoint, while the maximum configured value, AOH, corresponds to the maximum setpoint.

PI Feedback

When configured for PI feedback, OPF, the analog output provides a signal proportional to the PI feedback being provided to the drive controller. The minimum configured value, AOL, corresponds to the minimum feedback, while the maximum configured value, AOH, corresponds to the maximum feedback.

PI Error

When configured for PI error, OPE, the analog output provides a signal proportional to the PI regulator error as a percentage of the sensor range being used for the PI feedback, (maximum feedback minus minimum feedback). The minimum configured value, AOL, corresponds to – 5%, while the maximum configured value, AOH, corresponds to +5%. Zero corresponds to (minimum value + maximum value) / 2, (AOL+AOH) / 2.

PI Integral Error

When configured for PI integral error, OPI, the analog output provides a signal proportional to the PI integral error. The minimum configured value, AOL, corresponds to the low speed setting, LSP, while the maximum configured value, AOH, corresponds to the high-speed setting, HSP.

Motor Power

When configured for motor power, OPR, the analog output provides a signal proportional to power drawn by the motor. The minimum configured value, AOL, corresponds to 0% of the nominal motor power, while the maximum configured value, AOH, corresponds to 200% of the nominal motor power.

Motor Thermal State

When configured for motor thermal state, THR, the analog output provides a signal proportional to the thermal state of the motor calculated by the drive controller. The minimum configured value, AOL, corresponds to 0% of the motor thermal state, while the maximum configured value, AOH, corresponds to 200% of the motor thermal state.

Drive Thermal State

When configured for drive thermal state, THD, the analog output provides a signal proportional to the thermal state of the drive controller. The minimum configured value, AOL, corresponds to 0% of the drive controller thermal state, while the maximum configured value, AOH, corresponds to 200% of the drive controller thermal state.

6—Fault Menu

This menu is only accessible when the access locking switch is in the position. Modifications can only be made when the motor is stopped.

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
Auto Restart	AtR	This function allows an automatic restart of the drive controller if the cause of the fault has disappeared and a run command is maintained. An automatic restart is possible after the following faults: • OSF Input line overvoltage • ObF overbraking • OtF motor overheating (when the thermal sensor resistance is less than 1500 ohms) • LFF loss of 4–20 mA • OLF motor overload (after the thermal state has decreased below 100%) • OPF motor phase loss • OHF drive overheating (when the thermal state has decreased below 70%) • SLF loss of RS-485 port communication • EPF external fault • CnF network communication fault When the Auto restart is active, the fault relay remains energized. If the fault has disappeared, the drive controller will attempt to restart the motor after a delay time set by parameter tAr. If the drive controller remains faulted after attempting the number of restarts set in the parameter nAr, the fault relay de-energizes and the drive controller must be reset by cycling power.	Yes - No	No

⚠ WARNING

AUTOMATIC RESTART

- Automatic restart can only be used for machines or installations that present no danger in the event of automatic restarting, either for personnel or equipment.
- Equipment operation must conform with national and local safety regulations.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

★ This parameter is only available on 125–500 hp drive controllers.

Menu 6

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
Nb max reset	nAr	This parameter is used to set the number of restart attempts.	0-255	5
Reset Pause	tAr	This parameter sets the delay time between Auto restart attempts.	0.1 to 999.9 s	30.0 s
Reset Type	rSt	Faults reset by a partial reset (rSt = RSP) are: • OSF Input line overvoltage • ObF overbraking • OtF motor overheating • LFF loss of 4–20 mA • OLF motor overload • RnF ramp not followed • SOF overspeed • OPF motor phase loss • OHF drive overheating • SLF loss of RS-485 port communication • EPF external fault • CnF network communication fault All faults except motor short circuit are reset by a total reset (rSt = RSG). Total reset overrides all other faults. To configure rSt to RSG: 1. Display RSG 2. Press the ENT key. 3. The drive controller displays “See manual”. 4. Press the up arrow key, then the down arrow key, then ENT twice.	RSP (partial reset) RSG (total reset)	RSP

NOTE: Reset Type is accessible if the Reset Fault function is assigned to a logic input.

CAUTION

MOTOR OVERHEATING

- Repeated reset of the thermal state after a thermal overload can result in thermal stress to the motor.
- When faults occur, promptly inspect the motor and driven equipment for problems such as locked shaft and mechanical overload before restarting. Also check the power supplied to the motor for abnormal conditions such as phase loss and phase imbalance.

Failure to follow these instructions can result in equipment damage.

★ This parameter is only available on 125–500 hp drive controllers.

Menu 6

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
OutPhaseLoss	OPL	Use to enable the output phase loss protection. **Set this parameter set to No if there is a contactor between the drive controller and the motor, or if multiple motors are used on the output of the drive controller.** It may also be necessary to set OPL to No if the motor load is less than 25% of the drive controller current rating (I_n).	Yes - No	Yes
Input Phase Loss	IPL	Allows activation of the Input Phase Loss fault. This fault is not configurable on the following single phase input drive controllers: • ATV58•U09M2 • ATV58•U18M2 Disable IPL when operating the 208/230 Vac drive controllers with single phase input.	Yes - No	Yes
ThermalProTyPe	tHt	This function defines the type of thermal protection. Choices: • No: No motor thermal protection. • ACL: Self-cooled motor. The drive controller takes into account a derating as a function of the rotation frequency. • FCL: Force-cooled motor. The drive controller does not take into account a derating as a function of the rotation frequency.	No - ACL - FCL	ACL

★ This parameter is only available on 125–500 hp drive controllers.

Menu 6

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
LossFollower	LFL	Allows activation of a loss of 4–20 mA follower fault. This fault can only be configured if the minimum and maximum reference parameters for AI2 (CrL and CrH) are greater than 3 mA. If CrL > CrH, LFL is automatically set to Yes. • No: Disabled • Yes: Immediate fault • STT: Stop without fault, restart on return of signal • LSF: Stop followed by fault signal from R1 and LFF display on the keypad • LFF: Run at the preset speed set by the LFF parameter • RLS: Run at last speed on loss of follower without fault. Follow analog input upon return of analog signal. *NOTE: With Loss of Follower configured and Auto-Manual configured, the drive controller will fault when in Manual mode if the Auto signal is not present. Also, with Loss of Follower configured and Keypad command configured, the drive controller will fault when in Keypad mode if the Auto signal is not present.*	No	No
4-20 Flt Spd	LFF	Pre-set speed in the event of the loss of the 4–20 mA signal.	0–HSP	0
Catch On Fly	FLr	Allows a smooth restart after: • Brief loss of input power • Fault reset or automatic restart • Freewheel stop or DC injection braking with a logic input • Momentary interruption of the drive controller output If relay R2 is assigned to the Brake Logic function, FLr will always be set to No.	Yes - No	No

⚠ WARNING

AUTOMATIC RESTART

- Automatic catch on the fly must only be used on machines or installations where automatic restarting will not endanger personnel or equipment.
- Equipment operation must conform with national and local safety regulations.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

★ This parameter is only available on 125–500 hp drive controllers.

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
Cont. StoP	StP	Controlled stop upon loss of input phase. This function is only operational if the IPL parameter (Input Phase Loss) is set to No. If IPL is set to Yes, leave StP set to No. Possible choices: • No: loss of input phase causes drive controller to trip • MMS: Maintenance of DC bus: the DC bus is kept energized by regenerating the kinetic energy from the machine inertia, until the USF (Undervoltage) fault appears. • FRP: Following a ramp: deceleration following the programmed ramp, either dEC or dE2 until the motor stops or the USF (Undervoltage) fault appears. This operation is not available on the ATV58•U09M2, U18M2, U29M2 and U41M2.	No - MMS - FRP	No
RampNotFoll	Sdd	This function can be accessed if feedback via tachogenerator or pulse generator is programmed. When enabled, it is used to lock the drive controller if a speed error is detected (difference between the stator frequency and the measured speed).	Yes - No	No
External fault ★	EPL	This configuration is used to determine the response to an external fault. • Yes: immediate fault • Stt: stop according to Stt setting	Yes - Stt	Yes

★ This parameter is only available on 125–500 hp drive controllers.

Menu 6

7—Files Menu

The Files menu is accessible when the access locking switch is set to the total unlocked,  , position. Changes can only be made when the motor is stopped.

The keypad display can store four drive controller configuration files.

A stored file can be downloaded into other drive controllers that have the same horsepower and voltage rating and the same or earlier version of firmware.

Menu 7

NOTE: The stored program will be substituted for present settings when a file is transferred to the drive controller.

NOTE: Factory default settings will be substituted for present settings when Ini is selected and confirmed by pressing ENT twice when prompted. Parmeters LCC and Add remain at their previous settings.

Table 22: 7—File Menu

Parameter	Code	Description	Factory Setting
File 1 State File 2 State File 3 State File 4 State	F1S F2S F3S F4S	Displays the state of the corresponding file. Possible states: • FRE: File free • EnG: A configuration has already been saved in this file	FRE FRE FRE FRE
Operat. Type	FOt	Selects a file operation. Possible operations: • NO: no operation requested (default setting each time the keypad display is reconnected to the drive controller). • STR: save the configuration in a keypad display file. • REC: transfer a file to the drive controller. • Ini: return the drive controller to the factory settings.	NO

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

- Verify that the factory default or transferred file settings are compatible with the application requirements.
- If a stored file is downloaded with the stop key disabled, this file will be transferred. To stop the motor, an external stop command must be installed.

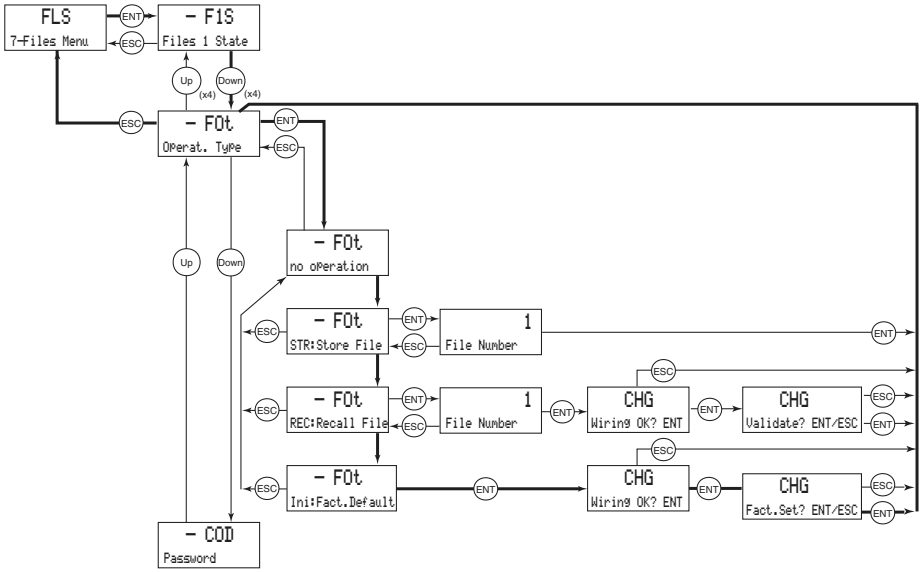
Failure to follow these instructions can result in death, serious injury or equipment damage.

Password	COd	See “Access Code” on page 92.	

Reinitializing the Drive Controller

Figure 21 shows the process of storing and recalling files to reinitialize the drive controller. Follow the path indicated by the bold lines.

Figure 21: Reinitializing the Drive Controller



File Operation

To store or recall a file:

- Set Operation Type (FOt) to STR to store a file, or REC to recall a file.
- Select the FILE number to specify the file.

- If storing a file, the display automatically returns to the FOt (Operation Type) parameter after storing the file.
- If the FOt parameter is set to REC, a second confirmation must be made:

  The display indicates:

  Press ENT to confirm.

  The display then indicates:

  Press ENT to confirm.

  The display automatically returns to the FOt parameter, set to No.

Access Code

The drive controller configuration can be protected by an access code (password).

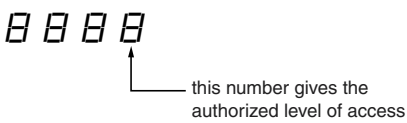
Table 23: Access Code

Parameter	Code	Description	Factory setting
Config. Code	COd	Configuration code used as an access code.	0000

NOTE: Use this parameter with caution. It can prohibit access to parameters. Carefully note and save any modification to this parameter.

The access code is expressed with four digits. The first three are user-assigned and do not affect access to the menus. The fourth digit can range from 0 to 9 and determines which menus can be accessed. See Table 24 for an explanation of the last digit codes.

Figure 22: Access Code



For example, if the access code is “2337”, display of the menus 2, 3, 4, 5, 6, 7, and 8 is allowed, but modification is not allowed.

Table 24: Significance of Access Code Last Digit

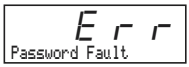
Menus Affected:	*Access is locked* if last digit of code is:	*Display is allowed* if last digit of code is:	*Modification is allowed* if last digit of code is:
2	0 [1] or 9	1	2
2, 3, 4, 5, 6, 7, 8, and Macro-Configuration	0 [1] or 9	3	4
8	0 [1] or 9	5	6
2, 3, 4, 5, 6, 7, 8	0 [1] or 9	7	8

[1] If the factory setting, 0000, is used, access to the menus is completely unlimited.

NOTE: Menu access allowed by the locking switch setting can be limited by the access code.

The access code is set by using the ▲ and ▼ keys. Press ENT twice to validate the code you have chosen. The display reverts to 0 indicating the password has been accepted. The menus are now locked and your access code must be entered to unlock them. If an incorrect code is entered, it is refused, and the following message is displayed:

Figure 23: Incorrect Code Display



After pressing ENT or ESC on the keypad display, the user can try to reenter the correct code.

To access the menus protected by the access code, the correct code must first be entered in the File menu. The File menu is always accessible. Once the correct code has been entered, press ENT and then press ESC twice to get to the menu tree. Display and modifications are now allowed per the code entered.

After completing your changes, cycle power or remove the keypad to re-lock access to the menus.

Menu 8 will only appear on the keypad display if a communication option card or application option card has been installed in the drive controller. Communication option cards contains drivers and connection points for integration into various industrial and building automation networks. Application option cards expand the I/O

functionality of the drive controller. See Appendix B for a list of option cards available from Schneider Electric/Square D Company.

8—Communication Menu

Menu 8

The Communication menu is displayed only if a communication card is installed. It is accessible when the access locking switch is set to the total unlock position. Configuration can only be done while the motor is stopped.

For information on the communication option cards, refer to the manuals supplied with the cards.

8—Application Menu

Menu 8

The Application menu is only displayed if a custom application card is installed. It is accessible when the access locking switch is set to the total unlock position. Configuration can only be done while the motor is stopped.

For more information concerning the custom application card, see the document provided with the card.

Several custom application option cards are available for specific OEM accounts. See Appendix B for a list of option cards available from Schneider Electric.

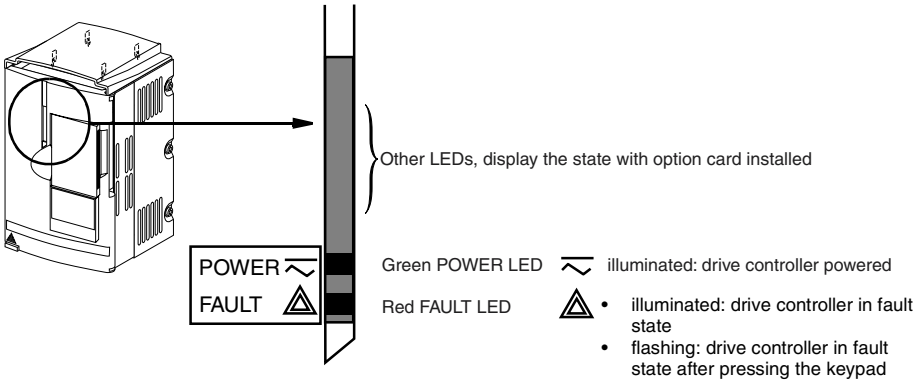
The General Purpose Option Card (catalog no. VW3A58253U) is considered a custom application card. For information on programming the card see instruction bulletin 30072-450-03.

CHAPTER 3—DIAGNOSTICS AND TROUBLESHOOTING

Keypad Display and Indicating LEDs

When a fault condition is detected, a fault code and a plain language message will be displayed as long as power is maintained. See Table 27 on page 103 for fault codes and messages. In addition, the LEDs on the front of the drive controller indicate the states illustrated in Figure 24.

Figure 24: Location and Description of LEDs



Fault Storage

The first fault detected is saved and displayed on the keypad display if power is maintained. The drive controller trips, the red fault LED illuminates, and the fault relay de-energizes. To reset the fault:

1. Remove power from the drive controller.
2. Before restoring power, identify and correct the cause of the fault.
3. Restore power. This will reset the fault if it has been corrected.

In certain cases, if automatic restart has been enabled, the drive controller can be automatically restarted after the cause of the fault has been corrected. See page 85.

Using Fault Codes and Messages to Solve Problems

The fault messages displayed on the keypad display can be used to troubleshoot problems. The fault messages can be divided into three categories:

- Protective faults: These faults are displayed when the drive controller detects conditions that, if left uncorrected, may result in damage to the drive controller and/or motor. The drive controller shuts down to prevent further damage from occurring.
- Drive faults: These faults are displayed when a problem is detected in the drive controller.
- Process faults: These faults are displayed when a process feedback or communication signal used by the drive controller is interrupted.

Table 25: Fault Messages

Protective Faults	Drive Faults	Process Faults
Input phase loss	Precharge fault	Loss of 4–20 mA signal
Undervoltage	EEPROM fault	Loss of RS-485
Overvoltage	Internal fault	External fault
Drive overheating	Internal communication fault	Speed feedback fault
Motor overload	Power rating error	Communication network fault
Overbraking	Option error	
Motor phase loss	Option removed	
Overcurrent	EEPROM checks	
Motor short circuit		
Motor overheating		
Thermal sensor fault		
Overspeed		
Ramp not followed		

Maintenance

Read the safety statements on page 97 before proceeding with any maintenance or troubleshooting procedures.

At regular intervals perform the following steps:

- Check the condition and tightness of the connections.
- Make sure that the ventilation is effective and the temperature around the drive controller remains within specified levels.
- Remove dust and debris from the drive controller, if necessary.

Precautions

Table 27 on page 103 lists faults, associated codes, the probable causes of the faults, and the associated corrective action. When taking corrective action, follow the procedures outlined on pages 98–102.

⚠ DANGER

HAZARDOUS VOLTAGE

Read and understand these procedures before servicing ATV58 *TRX* drive controllers. Installation, adjustment, and maintenance of these drive controllers must be performed by qualified personnel.

Electrical shock will result in death or serious injury.

The following procedures are intended for use by qualified electrical maintenance personnel and should not be viewed as sufficient instruction for those who are not otherwise qualified to operate, service, or maintain the equipment discussed.

Procedure 1: Bus Voltage Measurement

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand the bus voltage measurement procedure before performing the procedure. Measurement of bus capacitor voltage must be performed by qualified personnel.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Electrical shock will result in death or serious injury.

The DC bus voltage level is determined by monitoring the (+) and (–) measurement points. Their location varies by drive controller model number as listed in Table 26 and shown in Figure 25. The drive controller model number is listed on its nameplate.

Table 26: ATV58 TRX Type H (+) and (–) Measurement Points

Drive Controller ATV58H••••••	(+) Measurement Point		(–) Measurement Point	
	Terminal Block or Connector	Terminal Designation	Terminal Block or Connector	Terminal Designation
U09M2• and U18M2•	J2	(+)	J2	(–)
U29M2• to D12M2•	J2	PA	J18	7
U18N4• to D23N4•				
D16M2• to D46M2•	J2	(+)	J2	(–)
D28N4• to D79N4•				
C10N4• to C33N4•		PA (+)		PC (–)

To measure the DC bus capacitor voltage:

1. Disconnect all power from the drive controller including external control power that may be present on the control board and the option board terminals.
2. Wait ten minutes for the DC bus capacitors to discharge.

3. Read the model number of the drive controller from the nameplate and identify the corresponding (+) and (–) measurement points from Table 26 and Figure 25.
4. Open the door or cover of the drive controller.
5. Set the voltmeter to the 1000 Vdc scale. Measure the voltage between the (+) and (–) measurement points identified in step 3. Verify that the DC bus voltage has discharged below 45 V before servicing the drive controller.
6. If the DC bus capacitors will not discharge below 45 V, contact your local Square D representative. **Do not operate the drive controller.**
7. Replace all of the covers after servicing the drive controller.

Figure 25: DC Bus Measurement Terminals

The J18 connector is in the upper left hand corner of the main control board behind the flexible shield. Use a thin probe to access the connector pin.

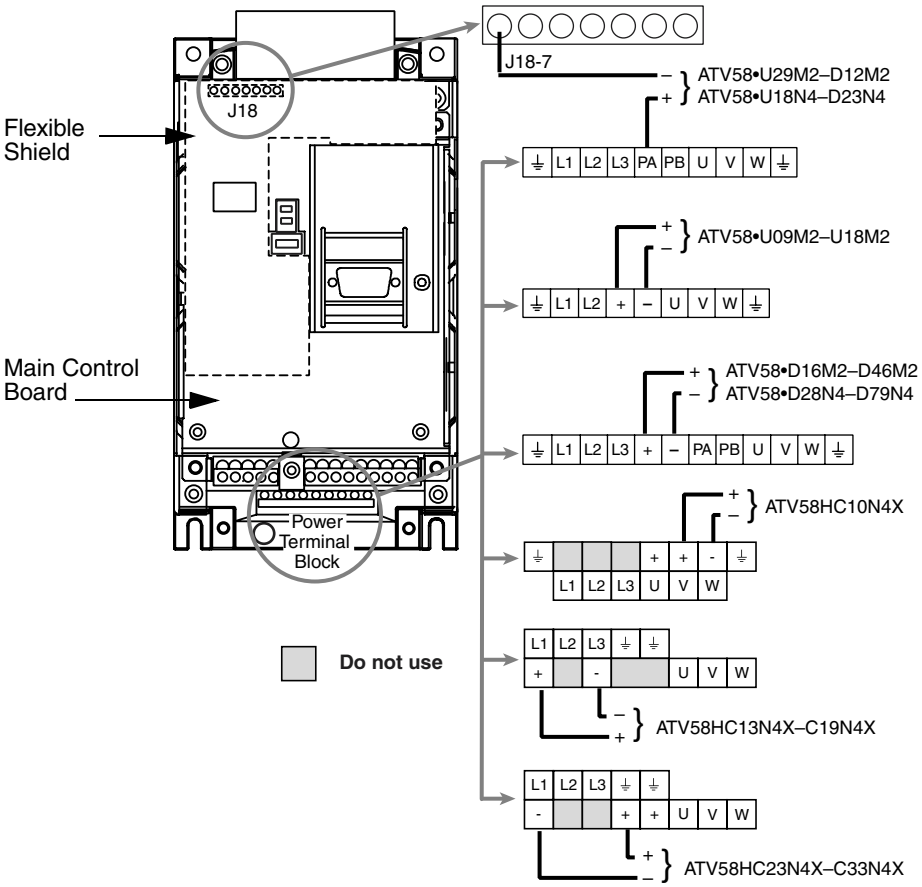
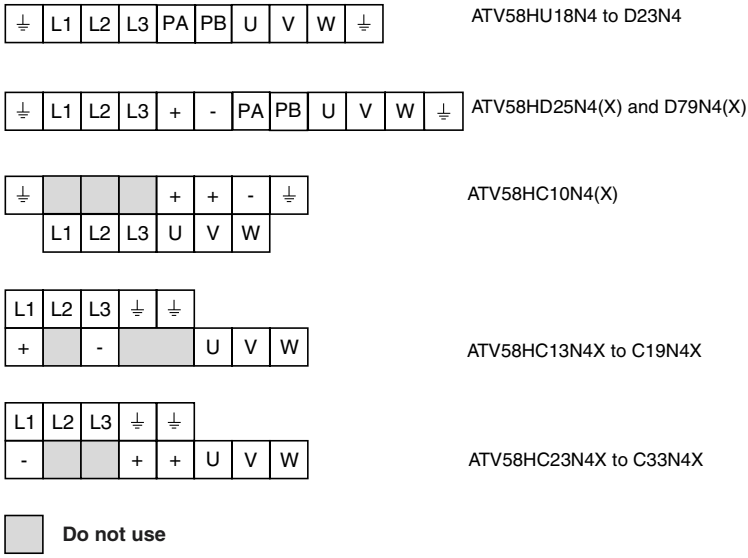


Figure 26: Power Terminal Layout



Procedure 2: Checking Supply Voltage

Measure the input line voltage to determine if the voltage is within the drive controller tolerance.

1. Perform the Bus Voltage Measurement procedure on page 98.
2. Attach meter leads to L1 and L2. Set the voltmeter to the 600 Vac scale.
3. Reapply power and check for the correct line voltage, shown on the drive controller nameplate rating.
4. Remove power and repeat the procedure for L2 and L3, and L1 and L3.
5. When all phases have been measured, remove power. Remove leads and replace all covers.

Procedure 3: Checking the Peripheral Equipment

The following equipment may need to be checked. Follow the manufacturers' procedures when checking this equipment.

1. A protective device, such as a circuit breaker, may have tripped or a fuse may have blown.
2. A switching device, such as a contactor, may not be closing at the correct time.
3. Conductors may require repair or replacement.
4. Connection cables to the motor or high resistance connections to ground may need to be checked. Follow NEMA standard procedure WC-53.
5. Motor insulation may need to be checked. Follow NEMA standard procedure MG-1. *Do not apply high voltage to U, V, or W.* Do not connect the high potential dielectric test equipment or insulation resistance tester to the drive controller since the test voltages used may damage the drive controller. Always disconnect the drive controller from the conductors or motor while performing such tests.

⚠ CAUTION

DIELECTRIC TESTS WHILE CONNECTED
Can Cause Equipment Damage

- Do not perform high potential dielectric tests on circuits while the circuits are connected to the drive controller.
- Any circuit requiring high potential dielectric tests must be disconnected from the drive controller prior to performing the test.

Failure to follow these instructions can result in injury or equipment damage.

Fault Codes and Messages

Table 27: Fault Codes and Messages

Fault/Message	Probable Causes	Corrective Actions
CFF PWR RATE ERR-ENT	Error probably caused by changing a card. Change of the power rating on the power board	Check the configuration of the power board and other boards.
OPTION ERR.-ENT	Change of the type of option card or installation of an option card if one had not been installed before and the macro-configuration was CUS	Reset by cycling power.
OPT. REMOVED-ENT	Option card removed	Save the configuration in a file on the keypad display.
EEP CKS.-ENT	Saved configuration cannot be read. Pressing ENT causes the message “Fact.Setting? ENT/ESC” to appear.	Press ENT to return to factory settings.
CFI CONFIG FAULT	The configuration sent to the drive controller via the serial link cannot be read.	1. Verify the configuration sent. 2. Send a configuration which can be read.
CnF COMM. NETWORK FAULT	Fault on the communication network.	1. Check the connection of the communication network to the drive controller. 2. Check the network time-out setting.
CrF PRECHARGE FAULT	• Precharge relay closure command fault. • Failed precharge resistor.	Perform Bus Voltage Measurement Procedure (Procedure 1 on page 98). Check connections in drive controller.
EEF EEPROM FAULT	Memory error.	Remove power from the drive controller and reset.
EPF EXTERNAL FAULT	Fault caused by an external source such as a PLC or general purpose option (GPO) card. An EPF fault is generated whenever a GPO card is installed.	Verify the external source which caused the fault and reset. If the drive controller has a GPO card installed, see instruction bulletin 30072-450-03 for programming and troubleshooting instructions.
ERR 1	Internal error in the keypad display	Cycle power on the drive controller. If the problem persists, replace the keypad display with part number VW3A58101U.
ERR 2	Serial link error due to incorrect address	• Verify address setting. • Cycle power on drive controller

Table 27: Fault Codes and Messages *(continued)*

Fault/Message	Probable Causes	Corrective Actions
ERR 3	Serial link error due to incorrect value. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on the drive controller. If the keypad display is remotely mounted, verify that the cable is properly shielded. Ensure that the cable is routed away from motor leads. If the problem persists, replace the keypad display with part number VW3A58101U. Reprogram any parameters that are not at factory default settings.
ERR 4	Internal error in the keypad display software. If the keypad display is remotely mounted, electrical noise may be present.	
ERR 5	Serial link error. If the keypad display is remotely mounted, electrical noise may be present.	
ERR 6	Internal error in the keypad display hardware	Cycle power on the drive controller. If the problem persists, replace the keypad display with part number VW3A58101U.
ERR 7	Serial link time out error. The keypad display is not getting a response from the drive controller. If the keypad display is remotely mounted, electrical noise may be present. The port baud rate (tbr) may be set to 9600 bits/s.	Cycle power on the drive controller. If the keypad display is remotely mounted, verify that the cable is properly shielded. Ensure that the cable is routed away from motor leads. See page 58 for instructions for resetting the tbr parameter back to 19200 bits/s. If the problem persists, replace the control board on the drive controller with part number VX4A581U. An Ini fault may be displayed if the problem persists.
ERR 8 ERR 9	Internal error in the keypad display software. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on the drive controller. If the keypad display is remotely mounted, verify that the cable is properly shielded. Ensure that the cable is routed away from motor leads. Re-program any parameters that are not at factory default settings. If the problem persists, replace the keypad display with part number VW3A58101U.
ERR10	Serial link error due to incorrect length of frame. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on the drive controller. If the keypad display is remotely mounted, verify that the cable is properly shielded. Ensure that the cable is routed away from motor leads. If the problem persists, replace the keypad display with part number VW3A58101U. Re-program any parameters that are not at factory default settings.
I L F INTERNAL COMM. FAULT	Communication fault between the control board and the option card.	Perform the Bus Voltage Measurement procedure (Procedure 1 on page 98). Check the connection between the option card and the control board. If the drive controller has a GPO card installed, see instruction bulletin 30072-450-03 for troubleshooting instructions.
I n F INTERNAL FAULT	• Internal fault. • Internal connection fault.	Perform the Bus Voltage Measurement procedure (Procedure 1 on page 98), then check internal connections.

Table 27: Fault Codes and Messages *(continued)*

Fault/Message	Probable Causes	Corrective Actions
In I	Attempting to download an incompatible file from the keypad display to the drive controller. Incompatibility can be caused by transferring to a drive controller with dissimilar part numbers. Also, incompatibility can occur when files are created on a drive controller with new firmware and then attached to a controller with older firmware. The error may appear after ERR7 is displayed.	1. Ensure that the file being downloaded was created for the correct drive controller part. 2. Verify drive controller firmware. Reconfigure the new features used in the newer firmware. Like configurations are transferable independent of firmware revision. Another option is to upgrade the firmware by ordering part number VX4A581U. Cycle power on the drive controller.
LFF LOSS OF 4-20 mA	Loss of 4–20 mA follower signal on AI2 input. See Table 29 on page 107.	1. Verify signal connections. 2. Check signal.
ObF OVERBRAKING	Overvoltage or overcurrent due to excessive braking or an overhauling load. See Table 28 on page 106.	Increase deceleration time. Add a dynamic braking option if necessary, or verify that the dynamic braking option is working properly.
OCF OVERCURRENT	• Ramp too short. • Inertia too high, or load too large • Mechanical blockage.	1. Check the parameter settings. 2. Check the sizing of the drive controller, motor, and load. 3. Remove all power. With the drive controller disconnected, check for mechanical blockage.
OHF DRIVE OVERHEATING	Heatsink temperature too high.	Check the motor load, fan, and the ambient temperature around the drive controller. Wait for the drive controller to cool down before resetting.
OLF MOTOR OVERLOAD	• If the thermal trip setting meets or exceeds 118% of the normal thermal state, thermal trip is due to prolonged overload or output phase failure. • Motor power rating is too low for the application.	• Check the setting of Thermal Current (ItH, see page 32) and compare it with motor I_n (nameplate current rating). Check the load and compare it with operating speed. Check the braking conditions (possibility of single-phase operation). Wait approximately seven minutes before resetting. • Verify that the motor and drive controller selections are correct for application.
OPF MOTOR PHASE LOSS	• Loss of a phase on the output of the drive controller. • Drive controller oversized for motor.	1. Check the wiring to the motor (Procedure 3 on page 102). 2. Disable OPL and provide external overload protection.
OSF OVERVOLTAGE	Supply too high. See Table 28.	1. Check the input line voltage (Procedure 2 on page 101). 2. Reset the drive controller.

Table 27: Fault Codes and Messages *(continued)*

Fault/Message	Probable Causes	Corrective Actions
OtF MOTOR OVERHEATING	Motor temperature too high.	1. Check the motor ventilation, ambient temperature, and motor load. 2. Check the type of thermal sensors used.
PHF INPUT PHASE LOSS	• Input phase loss. • Power fuses blown. • Input line failure (t > 1s).	1. Check the input line voltage (Procedure 2 on page 101). 2. Check the fuses and circuit breaker (Procedure 3 on page 102). 3. Reset.
AnF RAMP NOT FOLLOWED	• Ramp not followed. • Motor rotation speed opposite from speed reference.	1. Check the adjustment and wiring of the speed feedback. 2. Check the adjustments against the load. 3. Check the sizing of the motor/drive controller combination. Dynamic Braking may be necessary.
SCF MOT SHORT CKT	Short circuit or grounding on drive controller output.	1. Remove all power. With the drive controller disconnected, check the connecting cables and motor insulation. 2. Check the drive controller transistors.
SLF LOSS OF RS485	Bad connection between the drive controller and the programming keypad display.	Check the connection between the drive controller and the programming keypad display.
SOF OVERSPEED	• Instability • Overhauling load	1. Check parameter adjustments. 2. Add dynamic braking. 3. Verify the sizing of the motor, drive controller, and load.
SPF SPEED FEEDBACK FAULT	Loss of speed feedback.	Check the wiring of the sensor.
tSF THERMAL SENSOR FAULT	Bad connection between the motor thermal sensors and the drive controller.	1. Check the connection between the thermal sensors and the drive controller. 2. Check the thermal sensors.
USF UNDERVOLTAGE	• Supply is too low. • Temporary voltage drop (t ≥ 200 ms).	Check the input line voltage (Procedure 2 on page 101).

Table 28: Overvoltage/Overbraking Trip and Reset Points

	Overvoltage Trip Point	Overbraking Trip Point	Reset Point
ATV58••••M2	395 Vdc	415 Vdc	385 Vdc
ATV58••••N4	800 Vdc	840 Vdc	785 Vdc

Table 29: Trip and Reset Points when Loss of 4–20 mA

	Trip Point	Reset Point
ATV58••••M2	AI2 < 2 mA	AI2 > 2.5 mA
ATV58••••N4		

APPENDIX A—DRIVE CONTROLLER CONFIGURATION

Use these pages to note the configuration and adjustments of the ATV58 *TRX* drive controller.

Drive catalog number: ATV58.....

Customer identification number: .....

Option card: No Yes Catalog number: .....

Access code: No Yes: .....

Configuration is in file number ..... of the programming terminal.

Macro-configuration: .....

Date of start-up .....

Drive controller serial number .....

For customized configuration (CUS), record assignments of inputs/outputs in Tables 30 to 35.

For a menu overview, see page 113.

The following tables list the factory setting for each parameter. The new customer setting can be noted in the Customer Setting column. If no change has been made to the factory setting, the customer can note “no change” in the Customer Setting column.

Table 30: Menu 2—Adjustment Parameters

Code	Fact. Setting	Cust. Setting	Code	Fact. Setting	Cust. Setting
ACb	no		SP6	30 Hz	Hz
ACC	3 s	s	SP7	35 Hz	Hz
dEc	3 s	s	JOG	10 Hz	Hz
LSP	0 Hz	Hz	JGt	0.5 s	s
HSP	50 / 60 Hz	Hz	brL	0 Hz	Hz
FLG	20%	%	Ibr	0 A	A
StA	20%	%	brt	0 s	s
ItH	0.9 of I_n	A	bEn	0 Hz	Hz
IdC	0.7 ItH	A	bEt	0 s	s
tdC	0.5 s	s	FFt	50/60 Hz	Hz
SdC	Varies	A	rPG	1	
JPF	0 Hz	Hz	r IG	1 / s	/ s
JF2	0 Hz	Hz	PSP	0.0 s	s
JF3	0 Hz	Hz	Fbs	0.1	
AC2	5 s	s	PIC	no	
dE2	5 s	s	PI2	30%	%
tLS	no	no or s	PI3	60%	%
USC	1		dtd	105%	%
UFr	100%	%	dts	1	
SLP	100%	%	Ctd	1.36 of I_n	A
PFL	20%	%	ttd	100%	%
SP2	10 Hz	Hz	tL2	200%	%
SP3	15 Hz	Hz	Ftd	50/60 Hz	Hz
SP4	20 Hz	Hz	F2d	50/60 Hz	Hz
SP5	25 Hz	Hz			

Table 31: Menu 3—Drive Menu Parameters

Code	Fact. Setting	Cust. Setting	Code	Fact. Setting	Cust. Setting
UnS	depends on catalog number	V	Stt	STN	
FrS	50 / 60 Hz	Hz	dCF	4	
nCr	0.9 of I_n	A	tLI	200%	%
nSP	depends on catalog number	rpm	CLI	1.36 of I_n	
COS	depends on catalog number		AdC	yes	
tUn	no		PCC	1	
tFr	60 / 72 Hz	Hz	SFt	LF	
nLd	no		SFr	depends on catalog number	kHz
Fdb	no		nrd	yes	
Frt	0 Hz	Hz	SPC	no	
rPt	LIN		PGt	DET	
brA	no		PLS	1024	

Table 32: Menu 4—Command Menu Parameters

Code	Fact. Setting	Cust. Setting	Code	Fact. Setting	Cust. Setting
tCC	2 W		AOH	20 mA	mA
tCt	LEL		Str	no	
r In	no		LCC	no	
bSP	no		PSt	yes	
CrL	4 mA	mA	Add	0	
CrH	20 mA	mA	tbr	19200	
AOL	0 mA	mA	rPr	no	

Table 33: Menu 5—I/O Assignment

Code	Fact. Setting	Cust. Setting	Code	Fact. Setting	Cust. Setting
AI1	Factory settings depend on the macro-configuration. See page 23.		LI5	Factory settings depend on the macro-configuration. See page 23.	
AI2			LI6		
AI3			r1		Fault
LI1			r2		
LI2			LO		
LI3			AO1		
LI4			AO		

Table 34: Menu 6—Fault Menu Parameters

Code	Fact. Setting	Cust. Setting	Code	Fact. Setting	Cust. Setting
AtrA	no		LFL	no	
nAr	5		LFF	0	
tAr	30.0 s		FLr	no	
rStA	RSP		StP	no	
OPL	yes		Sdd	no	
IPL	yes		EPL	no	
tHt	ACL				

Use the table below to note what drive controller configuration is stored in a file.

Table 35: Menu 7—File Menu

Code	Factory Setting	Customer Notes (e.g. File stored for HVAC Drive #11)
F1S	Free	
F2S	Free	
F3S	Free	
F4S	Free	

Menu Overview

Menu 1 – DISPLAY Menu (page 30)

Parameter	Code
Drive State	rdY
Steady State	rUn
Accelerating	ACC
Decelerating	dEc
I_n Current Limit	CLI
DC Injection Braking	dCb
Freewheel Stop	nSt
Braking with Ramp Mod	Obr
Frequency Reference	LFr
LCU	LCU
Frequency Reference	FrH
Output Frequency	rFr
Motor Speed	SPd
Motor Current	LCr
Machine Speed	USP
Output Power	OPr
Mains Voltage	ULn
Motor Thermal	tHr
Drive Thermal	tHd
Last Fault	LFt
Consumption (wH)	APH
Run Time (Hours)	rtH

Menu 2 – ADJUST Menu (page 32)

Parameter		Code	Factory Setting
Frequency Reference		LFr	
LCU		LCU	0.00
Inv. Phases		ACb	no
Acceleration	-s	ACC	3 s
Deceleration	-s	dEC	3 s
Accelerate 2	-s	AC2	5 s
Decelerate 2	-s	dE2	5 s
Low Speed	-Hz	LSP	0 Hz
High Speed	-Hz	HSP	50 / 60 Hz
Gain	-%	FLG	20%
Stability	-%	StA	20%
Thermal Current	-A	ItH	0.9 In
DC Injection Time	-s	tdC	0.5 s
DC Injection Curr	-A	IdC	0.7 ItH
DC Injection Curr	-A	SdC	Varies
Jump Freq.	-Hz	JPF	0 Hz
Jump Freq. 2	-Hz	JF2	0 Hz
Jump Freq. 3	-Hz	JF3	0 Hz
LSP Time	-s	tLS	no
Machine Speed Coeff.		USC	1
IR Compensation	-%	UFr	100%
Slip Comp.	-%	SLP	100%
Preset Sp.2	-Hz	SP2	10 Hz
Preset Sp.3	-Hz	SP3	15 Hz
Preset Sp.4	-Hz	SP4	20 Hz
Preset Sp.5	-Hz	SP5	25 Hz
Preset Sp.6	-Hz	SP6	30 Hz
Preset Sp.7	-Hz	SP7	35 Hz
Frequency Lev.Att	-Hz	Ftd	50 / 60 Hz
Frequency Lev2.Att	-Hz	F2d	
Torque Limit 2	-%	tL2	200%
Current Level Att.	-A	Ctd	1.36 of I_n
Brake Release Lev	-Hz	brL	0 Hz
Brake Release I	-A	Ibr	0 A
Brake ReleaseTime	-s	brt	0 s

* Requires addition of I/O option card VW3A58201U (analog) or VW3A58202U

Menu 2 – ADJUST Menu (page 32) *(continued)*

Parameter		Code	Factory Setting
Brake Engage Lev	-Hz	bEn	0 Hz
Brake EngageTime	-s	bEt	0 s
Trip Threshold NST	-Hz	FFt	
Tachometer Coeff. *		dtS	1
Jog Freq.	-Hz	JOG	10 Hz
Jog Delay	-s	JGt	0.5 s
V/f Profile	-%	PFL	20%
Thermal Level Att.	-%	ttd	100%
PI Prop. Gain		rPG	1
PI Int. Gain	-/s	rIG	1/s
PI Filter		PSP	0.0
PI Coeff		FbS	0.1
PI Inversion		PIC	no
PI Preset 2	%	PI2	30%
PI Preset 3	%	PI3	60%
ATV th. fault		dtd	105%

Menu 3 – DRIVE Menu (page 43)

Parameter		Code	Factory Setting
Nom. Motor Volt	-V	UnS	depends on cat. #
Nom. Motor Freq.	-Hz	FrS	50 / 60 Hz
Nom. Motor Curr	-A	nCr	0.9 of I_n
Nom. Motor Speed	-rpm	nSP	depends on cat. #
Motor CosPhi (power fact.)		CoS	depends on cat. #
Auto Tuning		tUn	no
Max. Frequency	-Hz	tFr	60 / 72 Hz
Energy Economy		nLd	no
I Limit Adapt.		Fdb	no
Dec Ramp Adapt		brA	no
Switch Ramp 2	-Hz	Frt	0 Hz
Type of Stop		Stt	Stn
Standard Stop		Stn	
Fast Stop		FSt	
Freewheel		nSt	
DC Injection		DCI	
Ramp Type		rPt	LIn
Linear Ramp		LIn	
S Ramp		S	
U Ramp		U	
Dec Ramp Coef.		dCF	4
Torque Limit	-%	tLI	200 %
Int. I Limit	-%	CLI	1.36 of I_n
Auto DC Inj.		AdC	yes
Mot. Power Coef.		PCC	1
Switching Freq. Type		SFT	LF
Range of 0.5 to 4 kHz		LF	depends on cat. #
Range of 4 to 16 kHz		HF1	depends on cat. #
High Duty Cycle w/ derat.		HF2	depends on cat. #
Sw. Freq 0.5 to16	-kHz	SFr	0.5 to 16 kHz
Noise Reduction		nrd	yes
Special Motor		SPC	no
no			
yes			
PSM (small motor)			
PG (feedback sensor)Type *		PGt	dEt
Incremental Encoder		InC	
Detector (pulse or edge)		dEt	
Num. Pulses *		PLS	1

These diagrams include all parameters that may appear in the designated menu. The parameters actually visible on your drive controller depends on its configuration and the options installed.

Menu 4 – CONTROL Menu (page 50)

Parameter		Code	Factory Setting
Terminal Strip Con		tCC	2 W
Two Wire 2W		2 W	
Three Wire 3W		3 W	
Type 2 Wire		tCt	LEL
No Transition		LEL	
Low to High Trans.		TRN	
Forward Input Pri.		PFo	
Inhibit Reverse		rIn	
Low Speed Magmt		bSP	
Linear LSP to HSP		no	no
Pedestal Start		BLS	no
Deadband Start		BNS	
AI2 Min. Ref.	-mA	CrL	4 mA
AI2 Max. Ref.	-mA	CrH	20 mA
Min. Val. AO	-mA	AOL	0 mA
Max. Val. AO	-mA	AOH	20 mA
Reference Memory		Str	no
No memory		no	
Run Com. removed		RAM	
Power removed		EEP	
Keypad Com.		LCC	no
Stop Priority		PSt	yes
Drive Address		Add	0
Bd Rate RS485		tbr	
Reset Counters		rPr	

Menu 5– I/O Menu (page 56)

Parameter	Code	Factory Setting
LI2 Assign	LI2	
LI3 Assign	LI3	
LI4 Assign	LI4	
LI5 Assign *	LI5	
LI6 Assign *	LI6	
Not assigned	no	
RV: Reverse	RV	
Switch Ramp2	RP2	
JOG	JOG	
+SP: +Speed	SP	
-Speed	-SP	
2 preset Sp	PS2	
4 preset SP	PS4	
8 preset Sp	PS8	
Freewheel Stop	NST	
DC inject	DCI	
Fast stop	FSt	
Multi. Motor	CHP	
TorqueLim2	TL2	
Forced Local	FLO	
Fault Reset	rSt	
Auto/manu	RFC	
Auto-tune	Atn	
PI Auto/Man	PAU	
PI 2 Preset	Pr2	
PI 4 Preset	Pr4	
External flt	EDD	
Torque Limit by AI	tLA	

Menu 5– I/O Menu (page 56) *(continued)*

Parameter	Code	Factory Setting
AI2 Assign	AI2	
AI3 Assign *	AI3	
Not assigned	no	
Speed ref 2	Fr2	
Summed ref.	SAI	
PI regulator	PIF	
PI Manual Ref.*	PIM	
Tacho feedback *	SFb	
Therm. Sensor *	PtC	
Torque Limit *	AtL	
Encoder feedback *	RGI	
R2 Assign / LO assign	r2/LO	
Not assigned	no	
Drive running	rUn	
Output contactor	OCC	
Freq reference attain.	FtA	
HSP attained	FLA	
Current level attained	CtA	
Reference Freq. Attain.	SrA	
Motor thermal lvl (Attain)	tSA	
Brake logic	bLC	
4-20mA loss	APL	
F2 attained	F2A	
ATV th. alarm	TAD	
AO1 Assign	AO1	
AO Assign	AO	
Not assigned	no	
Motor current	OCr	
Motor frequency	OFr	
Output ramp	OrP	
Motor torque	trq	
Signed Torque	Stq	
Signed Ramp	OrS	
PI Reference	OPS	
PI Feedback	OPF	
PI Error	OPE	
PI Integral	OPI	
Motor Power	OPr	
Motor Thermal	tHr	
Drive Thermal	tHd	

* Requires addition of I/O option card VW3A58201U (analog) or VW3A58202U (digital)

Menu 6 – FAULT Menu (page 82)

Parameter	Code	Factory Setting
Auto Restart	Atr	no
Nb max reset	nAr	5
Reset pause -s	tAr	30.0 s
Reset Type	rSt	RSP
Partial Reset	rSP	
Total Reset	rSG	
Output Phase Loss	OPL	yes
Input Phase Loss	IPL	yes
Thermal Protection	tHt	ACL
No motor protection	no	
Self Cooled motor	ACL	
Force Cooled motor	FCL	
Loss Follower	LFL	no
Immediate Fault	yes	
Restart on Signal Return	Stt	
Stop and Fault	LSF	
Run at Preset Speed	LFF	
Run at last speed	RLS	
Catch On Fly	FLr	no
Controlled Stop	StP	no
Phase loss drive trip	no	
Maintain DC Bus	MMS	
Follow ramp	FRP	
Ramp not Followed *	Sdd	no
External Fault	EPL	yes

* Requires addition of I/O option card VW3A58201U (analog) or VW3A58202U (digital)

Menu 7 – FILES Menu (page 86)

Parameter	Code	Factory Setting
File 1 State	F1S	FRE
File 2 State	F2S	FRE
File 3 State	F3S	FRE
File 4 State	F4S	FRE
Operation Type	FOt	no
No Operation Req.	no	
Save Configuration	StR	
Transfer File to Drive	REC	
Return to Factory Set	Ini	
Password	Cod	0000

APPENDIX B—OPTIONS AND ACCESSORIES

The following table shows the accessories available for ATV58 *TRX* drive controllers.

Catalog No.	Description
VW3A8104	PowerSuite™ Test & Commissioning Software on CD for use with Microsoft® Windows 95, 98, and NT™ and Windows CE v3.0 for Pocket PCs
VW3A8106	PC Connection Kit for connecting the PC to an ATV58 TRX controller. Kit includes: 1 m cable with RJ45 connectors; RS-232 to RS-485 adapter with RJ45 and DB9 female connectors; RJ45 to DB9 adapter for use with an ATV58 controller; and cable adapter for use with an ATV11 controller.
VW3A8111	Pocket PC Connection Kit for connecting a Jornada® PPC to an ATV58 TRX controller. Kit includes: 1/2 m cable with RJ45 connectors; RS-232 to RS-485 adapter with RJ45 and DB9 male connectors; RJ45 to DB9 adapter, cable adapter for use with an ATV11 controller, cable to connect the serial port on the PPC to the DB9 connector on the RS-232 to RS-485 adapter.
VW3A58101U	Keypad Display
VW3A58103	Remote Mounting Kit for Keypad (IP65 rated)
VW3A58201U	Analog I/O Option Card
VW3A58202U	Digital I/O Option Card
VW3A58210U	Pump Switching Card
VW3A58253U	General Purpose Option Card
VW3A58301U	Fipio® Communication Card
VW3A58302U	Modbus® Plus Communication Card
VW3A58303U	Modbus/Unitelway™ Communication Card
VW3A58304EU	Interbus S Communication Card. Requires external power supply.
VW3A58306U	RS-485 Cable w/ Modbus Mapping Guide
VW3A58307U	Profibus DP Communication Card
VW3A58309U	DeviceNet™ Communication Card
VW3A58310U	Ethernet Modbus TCP/IP Communication Card
VW3A58312PU	LONWORKS® to Modbus DIN Rail Mount Gateway
VW3A58354U	Johnson Controls® N2 Communication Card
VW3A58701	DB Transistor for ATV58HU09M2 and U18M2
VW3A58821	Fan Kit for ATV58HU09M2 and U18M2
VW3A58822	Fan Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58823	Fan Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58824	Fan Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58825	Fan Kit for ATV58HD16M2, D23M2, and D28N4 to D46N4

Catalog No.	Description
VW3A58826	Fan Kit for ATV58HD28M2 to D46M2 and D54N4 to D79N4
VW3A58831	EMC Kit for ATV58HU09M2 and U18M2
VW3A58832	EMC Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58833	EMC Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58834	EMC Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58842	Conduit Box Kit for ATV58HU09M2 and U18M2
VW3A58843	Conduit Box Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58844	Conduit Box Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58845	Conduit Box Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58846	Conduit Box for ATV58HD16M2, D23M2, and D28N4 to D46N4
VW3A58847	Conduit Box for ATV58HD28M2 to D46M2 and D54N4 to D79N4
VW3A66711	DB Resistor Kit for ATV58HU09M2, U18M2, U18N4 to U72N4
VW3A66712	DB Resistor Kit for ATV58HU29M2, U41M2, U90N4, D12N4
VW3A66713	DB Resistor Kit for ATV58HU54M2, U72M2, D16N4, D23N4
VW3A66714	DB Resistor Kit for ATV58HU90M2, D12M2, and D28N4 to D46N4
VW3A66715	DB Resistor Kit for ATV58HD16M2, D23M2, D54N4
VW3A66716	DB Resistor Kit for ATV58HD28M2, D33M2, D46M2, D64N4, and D79N4

Spare Part List for ATV58 TRX Controllers

	Description	For Use on Drives	Catalog Number
	ATV58 *TRX* Control Board Kit	ATV58 Type H, 125–500 hp only	VX4A381U
		ATV58 Type E, F, H and N	VX4A581U
Internal fan kit	Frames 2 and 3 (two fans)	ATV58 ..U29M2, U41M2, U54M2, U72M2, U18N4, U29N4, U41N4, U54N4, U72N4, U90N4	VZ3V58223U
	Frames 4 and 5 (three fans)	ATV58 ..U90M2, D12M2, D12N4, D16N4, D23N4	VZ3V58245U
	Frame 6 (four fans)	ATV58 ..D16M2, D23M2, D28N4, D33N4, D46N4	VZ3V58260U
	Frame 7 (four fans)	ATV58 ..D28M2, D33M2, D46M2 D54N4, D64N4, D79N4	VZ3V58270U
Terminals	Removable ATV58 *TRX* Control Board Terminal Strips (includes relay terminal strip and 9- and 10-position terminal strips)	ATV58 Type E, F, H, and N	VZ3N581U
	Power Terminal Block for Frame 6	ATV58 ..D16M2, D28N4, D33N4	VZ3N58160U
		ATV58 ..D23M2, D46N4	VZ3N58165U
	Power Terminal Block for Frame 7	ATV58 ..D28M2, D33M2, D46M2 D54N4, D64N4, D79N4	VZ3N58170U
Internal EMC Filter Kit	Internal RFI Filter Kit for Frame 6	ATV58HD28N4	VX4A58861U
		ATV58HD33N4	VX4A58862U
		ATV58HD46N4	VX4A58863U
	Internal RFI Filter Kit for Frame 7	ATV58HD54N4	VX4A58871U
		ATV58HD64N4	VX4A58872U
		ATV58HD79N4	VX4A58873U
Power Boards for Frames 6 and 7		ATV58HD16M2	VX5A58D16M2U
		ATV58HD23M2	VX5A58D23M2U
		ATV58HD28M2	VX5A58D28M2U
		ATV58HD33M2	VX5A58D33M2U
		ATV58HD46M2	VX5A58D46M2U
		ATV58HD28N4	VX5A58D28N4U
		ATV58HD33N4	VX5A58D33N4U
		ATV58HD46N4	VX5A58D46N4U
		ATV58HD54N4	VX5A58D54N4U
		ATV58HD64N4	VX5A58D64N4U
		ATV58HD79N4	VX5A58D79N4U

	Description	For Use on Drives	Catalog Number
Power Components	Output Transistor Module	ATV58...D28N4	VZ3IM6075M1258U
		ATV58...D16M2, D33N4	VZ3IM6100M1258U
		ATV58...D23M2, D28M2, D46N4, D54N4	VZ3IM6150M1258U
		ATV58...D33M2, D46M2, D64N4, D79N4	VZ3IM2200M1258U
	Dynamic Braking Transistor	ATV58..D16M2, D23M2, D28N4, D33N4, D46N4	VZ3IM1050M1258U
		ATV58...D28M2, D54N4	VZ3IM1100M1258U
		ATV58...D33M2, D46M2, D64N4, D79N4	VZ3IM1150M1258U
	Input Diode / Transistor Bridge	ATV58...D16M2, D28N4, D33N4	VZ3TD1055M1658U
		ATV58...D23M2, D28M2, D46N4, D54N4	VZ3TD1090M1658U
		ATV58...D33M2, D46M2, D64N4, D79N4	VZ3TD1130M1658U

Factory repaired ATV58 *TRX* drive controllers are available within 24 hours from a factory exchange pool, or your ATV58 *TRX* drive controller can be factory repaired and returned. Contact your local Square D distributor or Square D Customer Service Representative at 919-266-8666 for availability.

INDEX

Symbols

Numerics

A

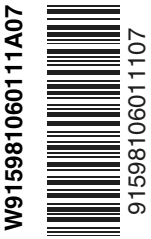
B

C

D

E

F



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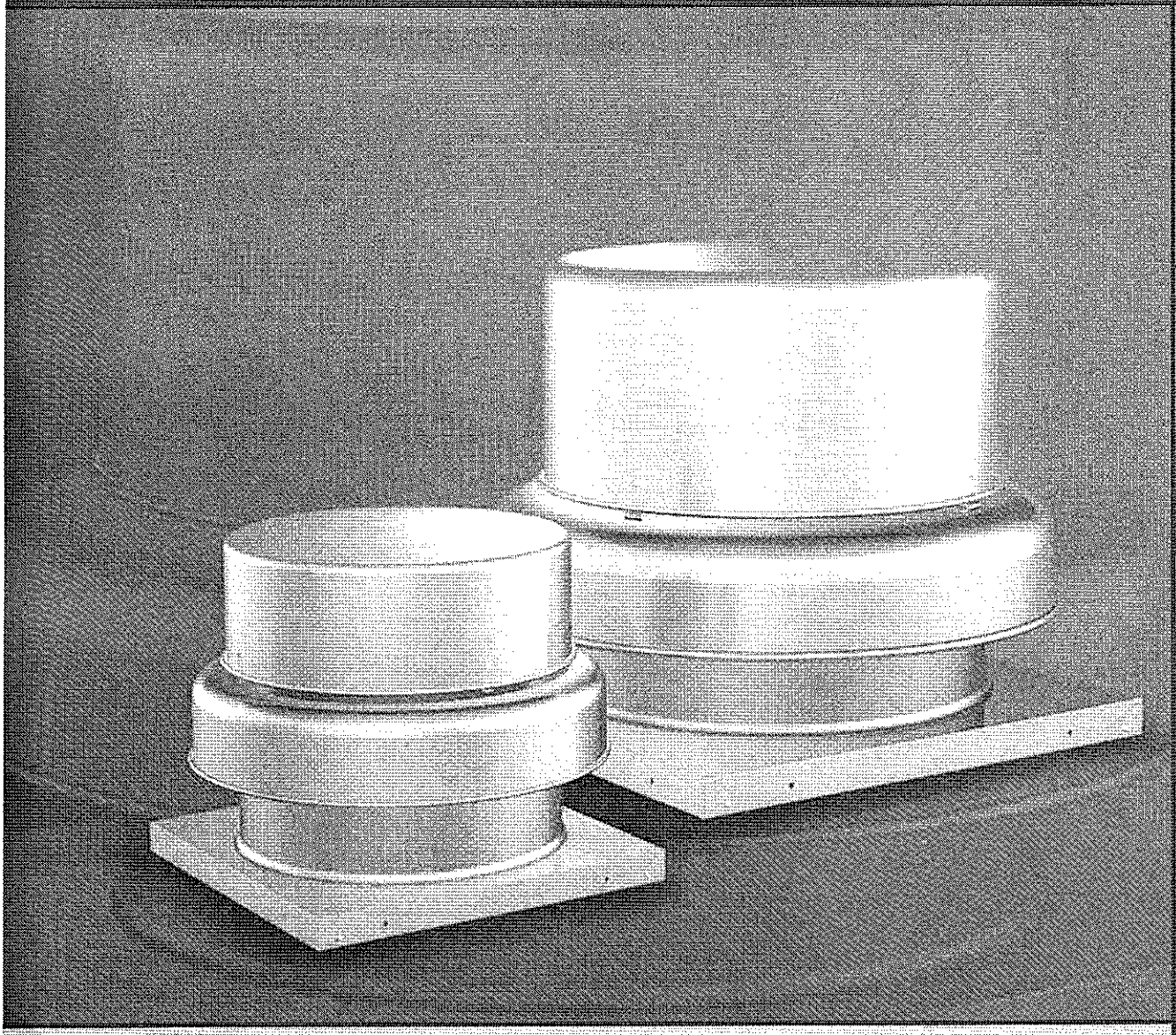
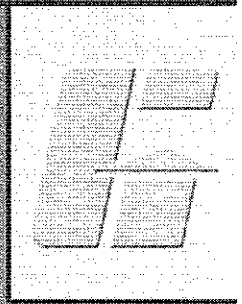
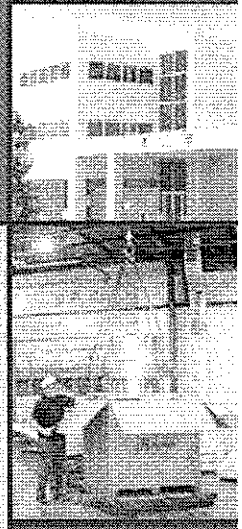
Centrifugal Roof Exhaust Fans

Models G and GB

Direct and Belt Drive







GREENHECK

Building Value in Air.

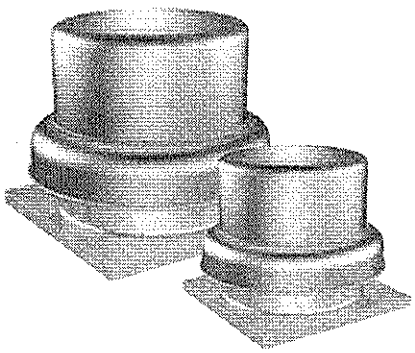
April
2006

Models G & GB

Spun Aluminum - Centrifugal Roof Exhaust Fans

GREENHECK
Building Value in Air.

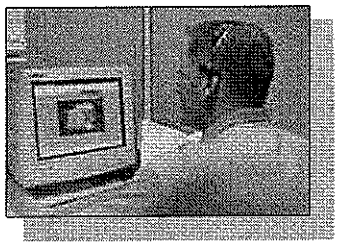
Greenheck's Model G and GB centrifugal roof exhaust fans provide the industry's best performance and durability for general clean air applications.



- Broadest performance in the industry, up to 2.5 in. wg (621 Pa) and 44,700 cfm (75,946 m³/hr).
- Most advanced motor cooling of any fan in its class.
- Performance as cataloged is assured. All fan sizes are tested in our AMCA Accredited Laboratory, and all models are licensed to bear the AMCA sound and air performance seals.
- UL Listed for electrical.*
- Greenheck subjects these products to extensive life testing, assuring you that the fans will provide years of reliable performance.

Outstanding Customer Service

Your local Greenheck representative has a wealth of industry and product knowledge to answer your questions. Our representatives receive the latest product information and can have orders processed directly to our factory. With our direct order processing system, we can ship orders as fast as the next day. With Greenheck's experienced staff, we can answer questions and provide solutions.

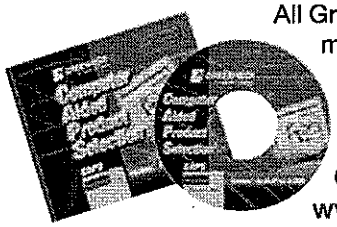


c UL US LISTED

*UL is optional and must be specified. G and GB models are listed for electrical (UL/cUL 705) File no. E40001

Greenheck Fan Corporation certifies that the Models G and GB fans shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. The certified ratings for Models G and GB are shown on pages 7 to 43.

Leading Edge Support

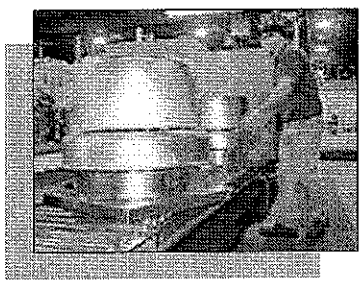


All Greenheck products are supported by the industry's best product literature, electronic media, and computer aided selection program (CAPS). You'll also find extensive product and IOM (Installation and Operating Manual) information on the Internet.

And, of course, you can always count on the personal service and expertise of our national and international representative organization. To locate your nearest Greenheck representative call 715-359-6171 or visit our website at www.greenheck.com

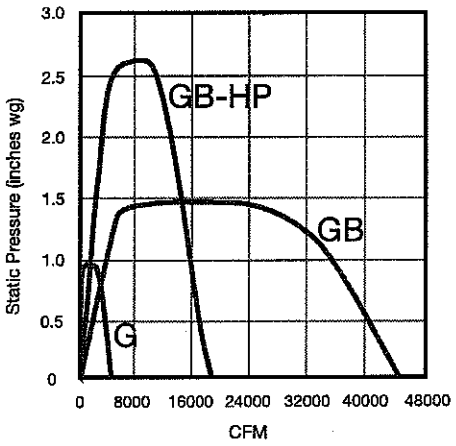
World Class Manufacturing

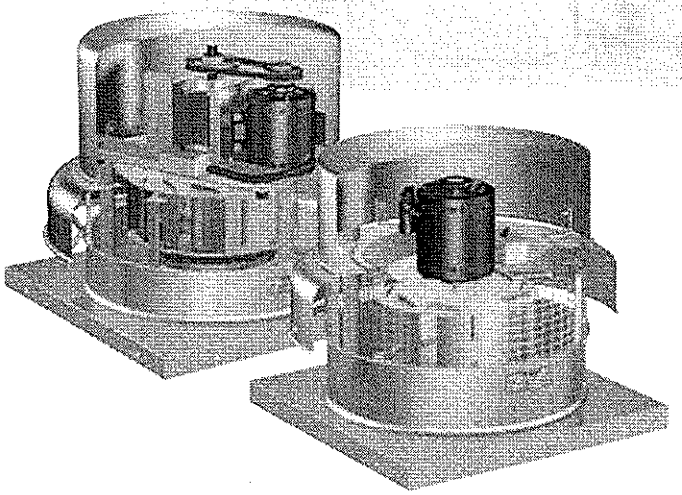
Greenheck's skilled production workers use cost-effective proprietary machines and unique dies designed and built by our own engineers to add innovative features and greater strength to our centrifugal exhaust fans. Our advanced manufacturing processes and quality control procedures always ensure the highest product quality. And just to be sure you get the peace-of-mind you expect when you specify Greenheck, our assembly inspectors test run and monitor every fan before it leaves the factory. Results of these tests are kept in permanent records for future reference.



Model Comparison

GREENHECK
Building Value in Air.





G - Direct Drive
Typically used for short and/or low resistance duct work.

Maximum operating temperature is 130°F (54°C).

GB - Belt Drive
Typically used for average length and/or average resistance duct work.

High volume / Average pressure

Maximum operating temperature is 180°F (82°C).

GB-HP - Belt Drive
Typically used for long and/or high resistance duct work.

Low volume / High pressure

Maximum operating temperature is 180°F (82°C).

Quick Delivery and Quick Build Programs

QUICK DELIVERY

More than 45 G and GB configurations are stocked in our strategically located Greenheck warehouses. Greenheck's Quick Delivery (QD) Program includes stock products that can be shipped in as little as 4 hours. To speed the process even more, order your fans over the Internet using QD Online at **www.greenheck.com/qd**

Our Quick Build (QB) Program ensures rapid response time with your needs dictating manufacturing time. Products can be manufactured in one, three, five or ten days, then shipped to your job site.

Model Number Code

The Model number system is designed to completely identify the fan. The correct code letters must be specified to designate belt or direct drive. The remainder of the model number is determined by the size and performance selected from pages 10 through 39.

GB - 240 HP - 5

Model
G - Direct Drive
GB - Belt Drive

Fan Size
060 through 540

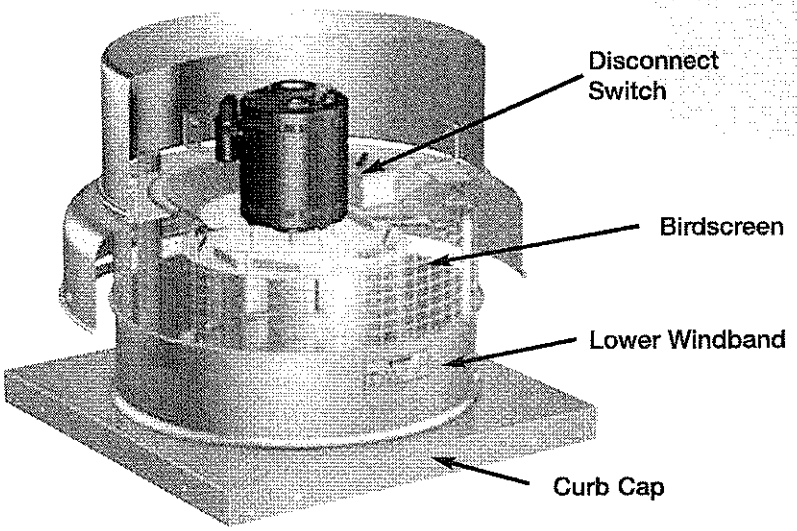
Pressure Level (Belt Drive only)
HP - High Pressure Wheel

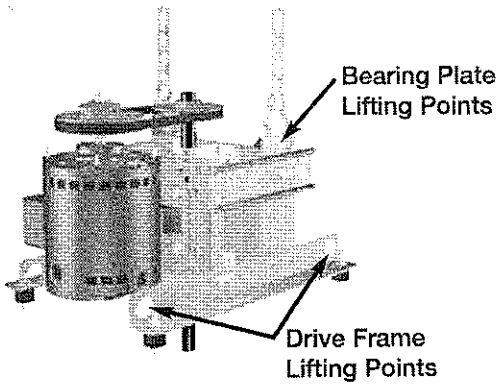
Motor HP (Belt Drive only)

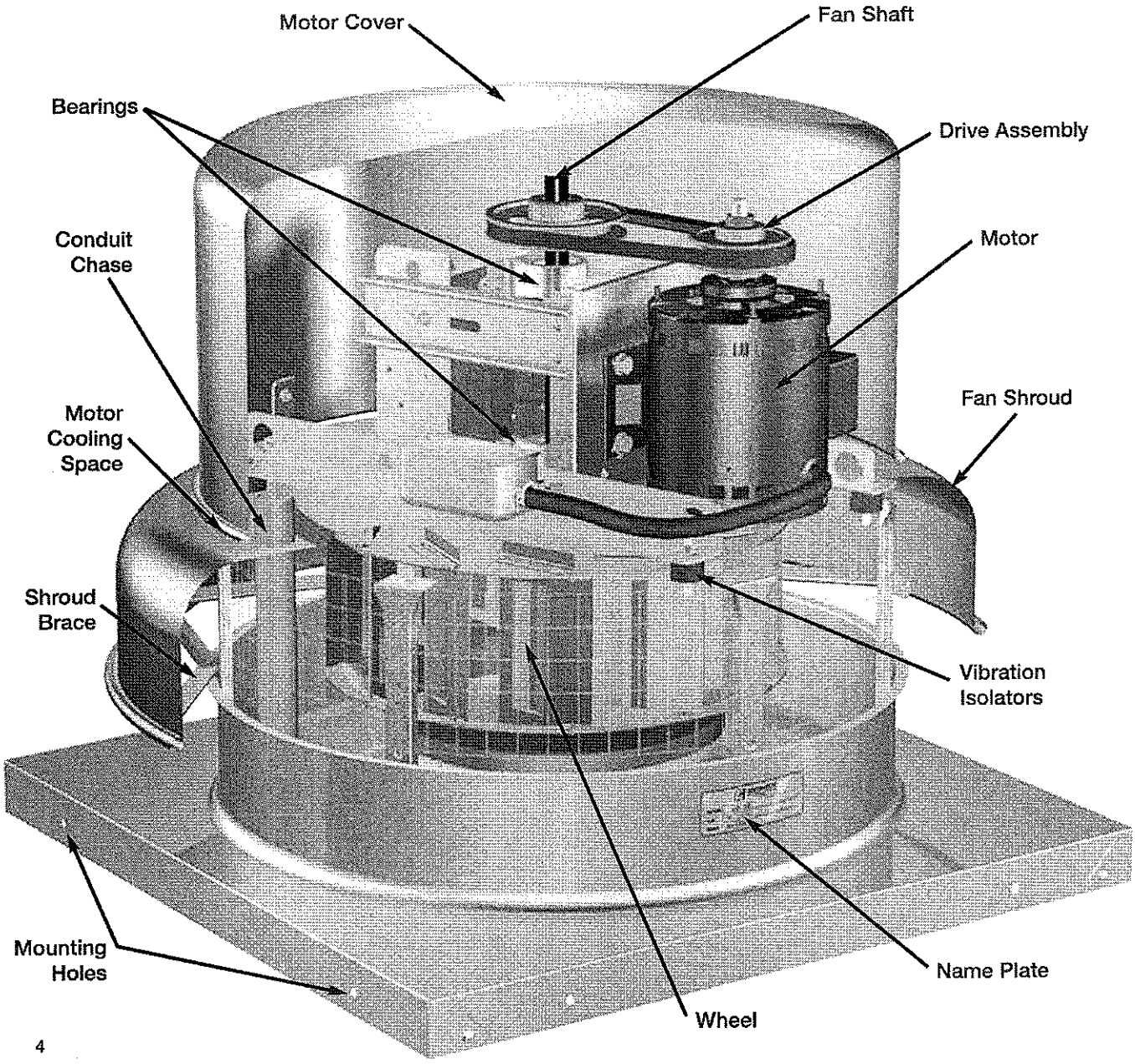
6 = 1/6	10 = 1	50 = 5
4 = 1/4	15 = 1 1/2	75 = 7 1/2
3 = 1/3	20 = 2	100 = 10
5 = 1/2	30 = 3	150 = 15
7 = 3/4		

Motor RPM (Direct Drive only)

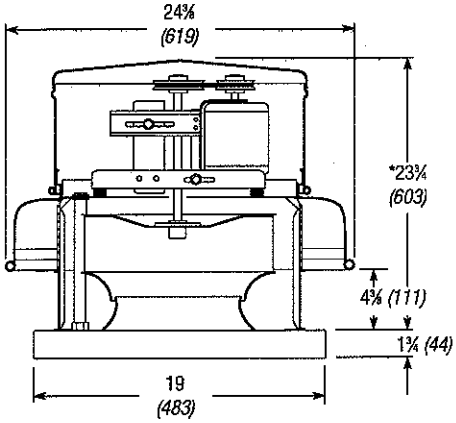
A = 1725	D = 1550
B = 1140	E = 1050
C = 860	G = 1300


Disconnect Switch
Birdscreen
Lower Windband
Curb Cap


Bearing Plate Lifting Points
Drive Frame Lifting Points

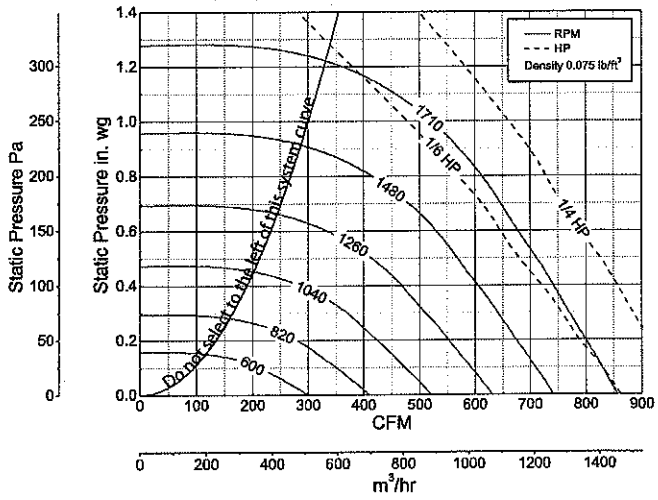

Motor Cover
Fan Shaft
Bearings
Drive Assembly
Conduit Chase
Motor
Motor Cooling Space
Fan Shroud
Shroud Brace
Vibration Isolators
Mounting Holes
Wheel
Name Plate

GB-081 - Belt Drive



Damper Size = 12 x 12 *(305 x 305)*
Roof Opening = 14½ x 14½ in. *(368 x 368)*
Shroud Thickness = 0.051 *(1.3)*
Motor Cover Thickness = 0.040 *(1.0)*
Curb Cap Thickness = 0.064 *(1.6)*
^Approximate Unit Weight = 58 lb. *(26 kg)*

All dimensions in inches *(millimeters)*.
*May be greater depending on motor.
^Weight shown is largest cataloged Open Drip Proof motor.

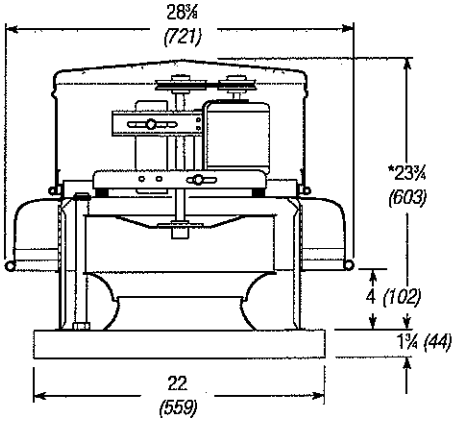


Model Number	HP (Size)	Fan RPM		CFM / Static Pressure in Inches W.G. 0	0.125	0.25	0.375	0.5	0.625	0.75	0.875	1	1.125
GB-081-6	1/6	630	CFM	316	207								
or	or		BHP	0.01	0.01								
GB-081-4	1/4		Sones	2.4	2.1								
		738	CFM	370	283								
			BHP	0.01	0.02								
			Sones	3.1	2.8								
		864	CFM	433	361	265							
			BHP	0.02	0.02	0.02							
			Sones	4.0	3.8	3.5							
		954	CFM	478	413	341							
			BHP	0.03	0.03	0.03							
			Sones	4.8	4.6	4.2							
		1062	CFM	532	474	411	329						
			BHP	0.04	0.04	0.05	0.04						
			Sones	5.9	5.7	5.3	5.0						
		1170	CFM	586	533	478	419	317					
			BHP	0.05	0.06	0.06	0.06	0.06					
			Sones	6.9	6.7	6.4	6.0	5.7					
		1278	CFM	640	592	543	490	428	320				
			BHP	0.07	0.07	0.08	0.08	0.08	0.07				
			Sones	7.9	7.8	7.4	7.0	6.7	6.6				
		1386	CFM	694	650	605	557	507	441	334			
			BHP	0.09	0.09	0.10	0.10	0.10	0.10	0.09			
			Sones	9.1	8.9	8.6	8.2	7.9	7.6	7.6			
		1494	CFM	748	708	666	623	577	528	457	357		
			BHP	0.11	0.12	0.12	0.12	0.12	0.13	0.12	0.11		
			Sones	10.1	10.0	9.8	9.4	8.9	8.7	8.5	8.4		
		1602	CFM	802	765	725	686	644	602	552	480	388	
			BHP	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.15	0.14	
			Sones	11.3	11.1	10.9	10.5	10.1	9.9	9.6	9.5	9.3	
		1710	CFM	856	821	785	748	710	669	630	581	511	424
			BHP	0.17	0.17	0.18	0.18	0.19	0.19	0.19	0.19	0.18	0.17
			Sones	12.5	12.3	12.1	11.9	11.5	11.2	10.9	10.6	10.5	10.3

MAXIMUM BHP AT A GIVEN RPM = (RPM/2985)³
MAXIMUM RPM = 1710
TIP SPEED (ft/min.) = RPM x 2.929
MAXIMUM MOTOR FRAME SIZE = 56

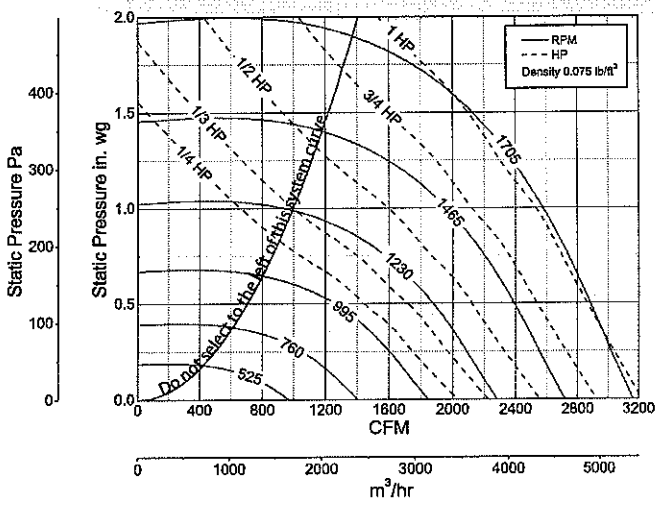
Performance shown is for installation type A: Free inlet, Free outlet. Power rating (BHP) does not include transmission losses. Performance ratings include the effects of a birdscreen in the airstream. The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per AMCA Standard 301. Values shown are for installation type A: Free inlet fan sone levels.

GB-141 - Belt Drive



Damper Size = 16 x 16 *(406 x 406)*
Roof Opening = 18¼ x 18¼ *(470 x 470)*
Shroud Thickness = 0.051 *(1.3)*
Motor Cover Thickness = 0.040 *(1.0)*
Curb Cap Thickness = 0.064 *(1.6)*
^Approximate Unit Weight = 83 lb. *(38 kg)*

All dimensions in inches *(millimeters)*.
*May be greater depending on motor.
^Weight shown is largest cataloged Open Drip Proof motor.



Model Number	HP (Size)	Fan RPM		CFM / Static Pressure in Inches W.G. 0	0.125	0.25	0.375	0.5	0.75	1	1.25	1.5	1.75
GB-141-4	1/4	525	CFM	974	709								
			BHP	0.03	0.03								
			Sones	4.4	4.2								
		663	CFM	1230	1046	732							
			BHP	0.06	0.06	0.06							
			Sones	5.3	5.5	4.4							
		801	CFM	1486	1337	1161	850						
			BHP	0.10	0.11	0.11	0.10						
			Sones	6.5	6.6	6.1	5.3						
		939	CFM	1742	1614	1482	1313	1040					
			BHP	0.16	0.17	0.17	0.18	0.16					
			Sones	7.9	7.8	7.5	7.0	6.4					
		1077	CFM	1998	1886	1775	1651	1495					
			BHP	0.24	0.25	0.26	0.26	0.26					
			Sones	10.0	9.9	9.4	8.9	8.4					
GB-141-3	1/3	1170	CFM	2170	2067	1966	1859	1734	1356				
			BHP	0.31	0.32	0.33	0.33	0.34	0.32				
			Sones	11.4	11.3	10.8	10.3	9.9	8.7				
GB-141-5	1/2	1265	CFM	2347	2250	2158	2062	1955	1677	1048			
			BHP	0.39	0.40	0.41	0.42	0.42	0.42	0.35			
			Sones	12.9	12.7	12.3	11.9	11.4	10.4	8.8			
		1360	CFM	2523	2433	2347	2259	2166	1943	1602			
			BHP	0.48	0.50	0.51	0.52	0.52	0.53	0.51			
			Sones	14.6	14.3	13.9	13.5	13.1	12.2	11.0			
GB-141-7	3/4	1453	CFM	2695	2612	2530	2449	2365	2173	1914	1513		
			BHP	0.59	0.60	0.62	0.63	0.64	0.64	0.64	0.60		
			Sones	16.2	15.9	15.6	15.3	14.8	13.9	13.0	11.8		
		1545	CFM	2866	2787	2710	2634	2556	2384	2177	1890		
			BHP	0.71	0.72	0.74	0.75	0.76	0.77	0.78	0.75		
			Sones	17.6	18.0	17.4	17.1	16.8	14.9	14.7	14.7		
GB-141-10	1	1705	CFM	3163	3091	3020	2952	2883	2739	2574	2370	2120	1731
			BHP	0.95	0.97	0.98	1.00	1.02	1.03	1.03	1.05	1.02	0.96
			Sones	20	20	20	19.6	19.2	18.1	16.9	16.7	16.6	16.4

MAXIMUM BHP AT A GIVEN RPM = (RPM/1676)³
MAXIMUM RPM = 1705
TIP SPEED (ft/min.) = RPM x 3.829
MAXIMUM MOTOR FRAME SIZE = 145T

Performance shown is for installation type A: Free inlet, Free outlet. Power rating (BHP) does not include transmission losses. Performance ratings include the effects of a birdscreen in the airstream. The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per AMCA Standard 301. Values shown are for installation type A: Free inlet fan sone levels.

St. Nicholas Chimney Service LLC
150 Liberty St. Clinton CT. 06413

TO: Mr. Robert Kinne
Controlled air Co.

Chimney inspection at South West Community Health

On feb.20 2007 at approximately 12:00 pm. The chimney servicing the new gas boilers was inspected and found to be free of problems associated with the proper venting of the installed boiler system , all flue tiles were in good sound condition , exterior masonry is in good shape , the upper end ,and termination were in good condition at time of inspection.
Any questions or concerns please feel free to call me at 860 227 1136

Thank You
Craig M Heser
St Nicholas Chimney Service

Contractor's Material and Test Certificate for Underground Piping

Procedure

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative All defects shall be corrected and system left in service before contractor's personnel finally leave the job

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinences.

PROPERTY NAME	DATE
Southwest Community Health Center	1/30/2007

PROPERTY ADDRESS
968 Fairfield Ave, Bridgeport, CT

PLANS

ACCEPTED BY APPROVING AUTHORITY('S) NAMES
City of Bridgeport Building Department

ADDRESS
45 Lyon Terrace Room 220, Bridgeport, CT 06604

INSTALLATION CONFORMS TO ACCEPTED PLANS — ■ YES ☐ NO

EQUIPMENT USED IS APPROVED — ☐ YES ☐ NO

IF NO, EXPLAIN DEVIATIONS

INSTRUCTIONS

HAS PERSON IN CHARGE OF FIRE EQUIPMENT BEEN INSTRUCTED AS TO LOCATION OF CONTROL VALVES AND CARE AND MAINTENANCE OF THIS NEW EQUIPMENT — ☐ YES ■ NO

IF NO EXPLAIN

HAVE COPIES OF APPROPRIATE INSTRUCTIONS AND CARE AND MAINTENANCE BEEN LEFT ON THE PREMISES? IF NO, EXPLAIN. — ☐ YES ■ NO

LOCATION OF SYSTEM

SUPPLIES BLDGS.

Underground pipes and joints

Pipe types and class 4inch cement lined class 52 tyton joint ductile iron fire service

Type joint Tyton push and MJ on fittings

Pipe conforms to Fittings NFPA 24 standard — ■ YES ☐ NO

conforms to NFPA 24 standard — ■ YES ☐ NO

If no, explain

Joint needed anchorage clamped, strapped, or blocked in accordance with NFPA 24 standard — ■ YES ☐ NO

If no, explain

Test description

Flushing Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 390 gpm (1476 L/min) for 4-in. pipe, 880 gpm (3331 L/min) for 6-in. pipe, 1560 gpm (5905 L/min) for 8-in. pipe, 2440 gpm (9235 L/min) for 10-in. pipe, and 3520 gpm (13,323 L/min) for 12-in. pipe. When supply cannot produce stipulated flow rates, obtain maximum available

Hydrostatic Hydrostatic tests shall be made at not less than 200 psi (13.8 bar) for 2 hours or 50 psi (3.4 bar) above static pressure in excess of 150 psi (10.3 bar) for 2 hours

Leakage: New pipe laid with rubber gasketed joints shall, if the workmanship is satisfactory, have little or no leakage at the joints The amount of leakage at the joints shall not exceed 2 quarts per hour (1.89 L/hr) per 100 joints irrespective of pipe diameter. The leakage shall be distributed over all joints If such leakage occurs at a few joints, the installation shall be considered unsatisfactory and necessary repairs made. The amount of allowable leakage specified above can be increased by 1 fluid ounce per inch valve diameter per hr (30 mL/25 mm/hr) for each metal seated valve isolating the test section. If dry barrel hydrants are tested with the main valve open so the hydrants are under pressure, an additional

Flushing tests

New underground piping flushed according to NFPA 24 standard by: — ■ YES ☐ NO

If no, explain

How was flushing flow obtained ■ Public water ☐ Tank or reservoir ☐ Fire pump

Through what type opening ☐ Hydrant butt ■ Open pipe

Lead-ins flushed according to NFPA 24 standard by: — ■ YES ☐ NO

How was flushing flow obtained ■ Public water ☐ Tank or reservoir ☐ Fire pump

Through what type opening ☐ Y connection to flg & spigot ■ Open pipe

Hydrostatic test	All new underground piping hydrostatically tested at 200 psi for 2 hours	Joints covered ■ YES ☐ NO
Leakage test	Total amount of leakage measured 0 gallons 2 hours Allowable leakage _____ gallons _____ hours	
Hydrants	Number installed 0 / Type and make	All operate satisfactorily ☐ YES ☐ NO
Control Valves	Water control valves left wide open If no, state reason Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm	■ YES ☐ NO ■ YES ☐ NO
Remarks	Date left in service 1/30/2007	
Signatures	Name of installing contractor Eastern Mechanical Services, Inc. **Tests witnessed by** For property owner(signed) / Title / Date For installing contractor(signed) Robert Parker / Title Plumbing Forman / Date 1/30/07	
Additional explanations and notes		

CONTRACTOR'S MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING