
CONSTANT PRESSURE PUMP SYSTEMS



up to 3HP (1 phase)

5-7.5HP
(3 phase)



Instruction and Operation Manual





CONSTANT PRESSURE --- Pump Systems

.75 – 3 hp



5 – 7.5 hp



CONSTANT PRESSURE SPECIFICATIONS

Basic System Includes:

- Stainless Steel Pump Components (304L)
- Stainless Steel (316)
- Pressure Transducer (316SS) Variable speed drive-pressure is adjustable as displayed on drive's screen
- Industrial-grade, non-overloading motor
- Discharge Check Valve
- Lockable/Indicating Control Valve (Per NFPA 13D)
- Liquid filled gauge
- Drain
- All piping/valves are bronze/brass
- Stainless-lined Expansion Tank (Pre-charged & re-chargeable to 35 psi, helps maintain pressure at '0' flow)
- 5 - 7.5 HP mounted on separate base

Basic System Specifications:

- Suction Connection: 1.25" / 1.5" / 2" fnpt depending on model
- Discharge Connection: 1¼" fnpt
- System input power 1Ø, 230V (per NFPA 13D) 3 hp & under / 3 Ø, 230v 5 & 7.5 hp
- Lead-free option available

		Input Amps Required at 230V					
HP	¾	1	1-½	2	3	5	7.5
Amps Req'd	8.8	8.8	12	13.3	17.1	18.6	26
¾ - 3 HP (1 phase)						5 – 7.5 HP (3 phase)	

Subject to change without notice.

* Amps may vary depending on motor manufacturer



CONSTANT PRESSURE --- Pump Systems

Installation & Maintenance Instructions

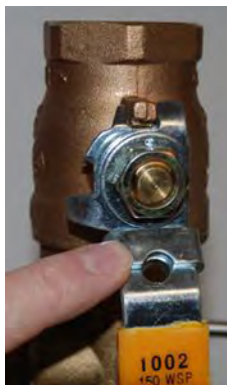
1. Anchor base to floor as per enclosed instructions
2. Pipe to suction & discharge as per enclosed instructions
3. Wire power to VFD as per enclosed instructions
4. It is the contractor's responsibility to field test pump operation per NFPA 13D, test the pressure switch settings and check the pressure gauge to ensure proper operation.



WARNING

Any and all wiring must be performed by a licensed electrician, following all safety standard protocols.

5. Exercise pump once every month. Per NFPA 13D A.4.1.1 - Circuit breaker should not trip!
 - a. If water source is a storage tank, circulating water back to tank is recommended.
 - b. If water source is from a municipal supply, it is recommended that the contractor pipe the test/drain piping to a drain or sunp that is capable of handling the flow of the pump, or outside of dwelling (provided the piping will not be subject to freezing.) A hose may also be connected to the hose valve on the pump riser and run to an area that will not introduce water to the dwelling.
6. When pumps are operating off of tanks, suction inlet should be located at or below tank suction fitting to ensure a continuous flooded suction. Pump should not pull a suction lift.
7. Do not subject the pump to freezing temperatures. Minimum temperature recommended is 40°F.
8. It is of the contractor's responsibility to inform the homeowner of proper pump-testing procedures.
9. It is the homeowner's responsibility to ensure the legend valve remains locked into OPEN position. To lock valve, valve must be in OPEN position, then slide is moved up to reveal opening for pad-lock.
10. Check pump rotation - to reverse rotation, swap any two motor leads - to be done by licensed and qualified electrician



Instructions and Operation



IMPORTANT SAFETY INSTRUCTIONS **Rules for Safe Installation and Operation**

1. Read these rules and instructions carefully. Failure to follow them could cause serious bodily injury and/or property damage.
2. Check your local codes before installing. You must comply with their rules
3. For maximum safety, this product should be connected to a grounded circuit equipped with a ground fault interrupter device.
4. Before installing this product, have the electrical circuit checked by an electrician to make sure it is properly grounded.
5. Before installing or servicing your pump, BE CERTAIN pump power source is disconnected.
6. Make sure the line voltage and frequency of the electrical current supply agrees with the motor wiring. If motor is dual voltage type, BE SURE it is wired correctly for your power supply.
7. Complete pump and piping system MUST be protected against below freezing temperature. Failure to do so could cause severe damage and void the warranty.
8. Avoid system pressures that may exceed one and a half times the operating point selected from the pump performance curve.
9. Do not run your pump dry. If it is, there will be damage to the pump seal.

Do not run your pump dry. If it is, there will be damage to the pump seal, and it will void warranty.

General Description

CONSTANT PRESSURE pumps may be used for the pumping of clean water that is compatible with 304 stainless steel. These pumps are not to be used for handling abrasive water or water with suspended solids, water containing acids, or corrosive liquids, seawater, and flammable or dangerous liquids. Please see pump specifications for fluid temperature ranges. These pumps are not designed to run without water.

CONSTANT PRESSURE pumps are similar in function and construction. The differences between the models include:

- single impeller vs. twin impeller
- flow rate
- heads
- weight
- dimensions
- horsepower
- phase
- baseplate

Instructions and Operation

Rules for Safe Installation and Operation

PACKAGE CONTENTS

1. Be sure all parts have been furnished and that nothing has been damaged in shipment.
2. OPEN PACKAGES AND MAKE THIS CHECK BEFORE GOING TO JOBSITE.

PIPING – Pipes must line up and not be forced into position by unions. Piping should be independently supported near the pump so that no strain will be placed on the pump casing. Where any noise is objectionable, pump should be insulated from the piping with rubber connections. Always keep pipe size as large as possible and use a minimum of fittings to reduce friction losses.

SUCTION PIPING – Suction pipe should be direct and as short as possible. It should be at least one size larger than suction inlet tapping and should have a minimum of elbows and fittings (**5 to 6 pipe diameters of straight pipe before inlet is recommended**). The piping should be laid out so that it slopes upward to pump without dips or high points so that air pockets are eliminated. The highest point in the suction piping should be the pump inlet except where liquid flows to the pump inlet under pressure.

The suction pipe must be tight and free of air leaks or pump will not operate properly.

DISCHARGE PIPING – Discharge piping should never be smaller than pump tapping and should preferably be one size larger.

ELECTRICAL CONNECTIONS – Be sure motor wiring is connected for voltage being used. Unit should be connected to a separate circuit. A fused disconnect switch or circuit breaker must be used in this circuit. Wire of sufficient size should be used to keep voltage drop to a maximum of 5%.

VFD's have built-in overload protection. Flexible metallic conduit should be used to protect the motor leads.

PRIMING – The pump must be primed before starting. The pump casing and suction piping must be filled with water before starting motor. Remove vent plug in top of casing while pouring in priming water. A hand pump or ejector can be used for priming when desired. When water is poured into pump to prime, remove all air before starting motor.

STARTING - Upon startup, pump will automatically speed up / slow down to maintain pressure on VFD dispatch. Use up/down arrows on VFD to adjust pressure settings. When the pump is up to operating speed, open the discharge valve to obtain desired capacity or pressure. **WARNING! DO NOT ALLOW THE PUMP TO RUN WITH THE DISCHARGE VALVE TIGHTLY CLOSED. IF THE PUMP RUNS FOR AN EXTENDED PERIOD OF TIME WITHOUT LIQUID BEING DISCHARGED, THE LIQUID IN THE PUMP CASE CAN GET EXTREMELY HOT CAUSING SEVERE DAMAGE TO THE PUMP AND POSSIBLY CAUSE INJURY TO PEOPLE.**

ROTATION - CHECK PUMP ROTATION

FREEZING – Care should be taken to prevent the pump from freezing during cold weather. It may be necessary, when there is any possibility of this, to drain the pump casing when not in operation. Drain by removing the pipe plug in the bottom of the casing.

ROTARY SEAL – PRO STEEL pumps are fitted only with rotary seal. This seal is recommended for LIQUIDS free from abrasives.

LOCATION OF UNIT – The pump should be installed as near to the liquid source as is practical so that the static suction head (vertical distance from the center line of the pump to water level) is maximized, and so that a short, direct suction pipe may be used. The piping should be as free from turns and bends as possible, as elbows and fittings greatly increase friction loss. Place the unit so that it is readily accessible for service and maintenance and on a solid foundation, which provides a rigid and vibration-free support. Protect the pump against flooding and excess moisture.

CONSTANT PRESSURE --- Pump Systems

Instructions and Operation

Maintenance

Service

Keep ventilation openings clear of extraneous objects which may hinder free flow of air thru motor. Motor bearings are lubricated during manufacture. Additional lubrication is not required during their normal lifetime.



CAUTION

Draining

The pump and piping should always be protected against freezing temperatures. If there is any danger of freezing, the unit should be drained. To drain the pump, remove the drain plug at the bottom of the volute, and remove the priming plug to vent the pump. Drain all piping.

Disassembly Instructions – 13D LEGEND PUMP



WARNING

POWER SUPPLY - Open the power supply switch contacts and remove fuses. Disconnect the electrical wiring from the motor.



WARNING

If not run daily, pump must be exercised every month to assure proper operation per NFPA 13D

IF PUMP IS DAMAGED OR MALFUNCTIONING, CALL (708) 202-0033 FOR SERVICE INSTRUCTIONS.

Instructions and Operation

The Manufacturer warrants to the original purchaser only ("Customer") that the Pump/Product ("Pump") will be free of defects in workmanship and material for a period of twelve (12) months from the date of installation or fifteen (15) months from the date of shipment by the Manufacturer, whichever comes first, provided that notification of any such defect is promptly given in writing to The Manufacturer. Customer may be required to verify that it is the Customer of the Pump and that the Pump was installed and operated in accordance with The Manufacturer's instructions. All motors are subject to the motor manufacturer's warrantee.

The Manufacturer's sole obligation under this warranty will be to provide repair parts or replace with a new or reconditioned Pump, such Pump as has failed or has been found to be defective during the warranty period, or at The Manufacturer's sole option, to refund to the customer an equitable part of the purchase price. In no event shall Manufacturer's cost responsibility exceed the initial purchase price paid by the Sprinkler Contractor for the Pump.

The Manufacturer shall be liable only for the cost of the Pump, or the cost of repair or replacement of any defective Pump. Customer shall be responsible for labor, cost of removal and installation at Customer's premises, transportation and insurance costs and any other incidental costs.

This warranty is void and does not apply if damage is caused by improper installation, improper maintenance, accident, alteration, abuse, misuse or if the Pump has been disassembled prior to warranty evaluation without written authorization from The Manufacturer.

Warranty service and information for return procedures will be provided by The Manufacturer upon receipt of written notice describing the defect or problem to:

RP Equipment
Warranty/Claims
PO Box 69 Maple Park IL
60151
630.272.7268 Phone

THE FOREGOING WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY ON THIS PUMP, AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED AND EXCLUDED FROM THE TERMS OF THIS WARRANTY. THE MANUFACTURER'S SOLE OBLIGATION IN CASE OF ANY DEFECT WILL BE TO PROVIDE THE WARRANTY SERVICE SPECIFIED ABOVE. THE FOREGOING IS CUSTOMER'S SOLE AND EXCLUSIVE REMEDY, WHETHER IN CONTRACT, TORT OR OTHERWISE AND THE MANUFACTURER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND WHATSOEVER.





Installation

3.2 Electrical Installation

3.2.1 Power Connections



DANGER! Hazard of electrical shock!

Circuit potentials up to 600 VAC are possible. Capacitors retain charge after power is removed. Disconnect power and wait at least three minutes before servicing the drive.

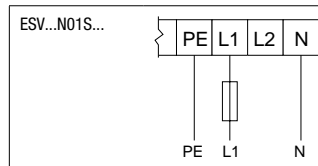


STOP!

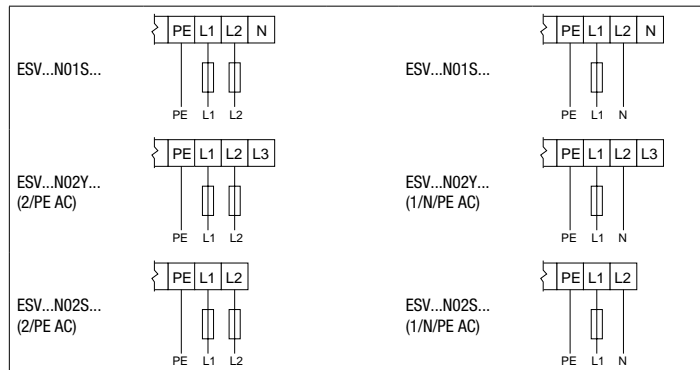
- Verify mains voltage before connecting to drive.
- Do not connect mains power to the output terminals (U,V,W)! Severe damage to the drive will result.
- Do not cycle mains power more than once every two minutes. Damage to the drive will result.

	Mains and Motor Terminations		
	Type	Torque	Strip Length
	<5HP	12 lb-in (1.3 Nm)	0.25 in (6mm)
	ESV552xx2T, ESV752xx2T, ESV113xx4/6, ESV153xx4/6, ESV183xx6, ESV223xx6	16 lb-in (1.8 Nm)	0.25 in (6mm)
	ESV552xx4Txx, ESV752xx4Txx, ESV552xx6Txx, ESV752xx6Txx	12 lb-in (1.3Nm)	0.25 in (6mm)
	ESV113xx2xxx, ESV153xx2xxx, ESV183xx4xxx, ESV223xx4xxx	24 lb-in (2.7 Nm)	0.25 in (6mm)
	Torque: N4X/IP65 Door Screws		
	N4X/IP65	6-7 lb-in (0.67-0.79 Nm)	0.25 in (6mm)

3.2.1.1 Mains Connection to 120VAC Single-Phase Supply

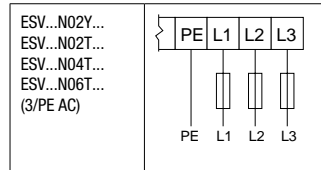


3.2.1.2 Mains Connection to 240VAC Single-Phase Supply

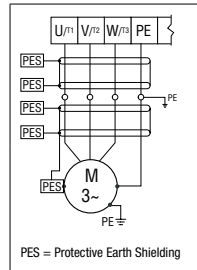




3.2.1.3 Mains Connection to Three-Phase Supply



3.2.1.4 Motor Connection



WARNING!

If the cable connection between the drive and the motor has an in-line contactor or circuit breaker then the drive must be stopped prior to opening/closing the contacts. Failure to do so may result in Overcurrent trips and/or damage to the inverter.



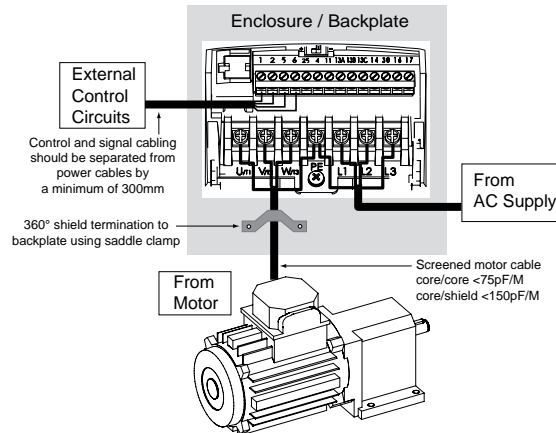
WARNING!

Leakage current may exceed 3.5 mA AC. The minimum size of the protective earth (PE) conductor shall comply with local safety regulations for high leakage current equipment.

3.2.1.5 Installation Recommendations for EMC Compliance

For compliance with EN 61800-3 or other EMC standards, motor cables, line cables and control or communications cables must be shielded with each shield/screen clamped to the drive chassis. This clamp is typically located at the conduit mounting plate.

Motor cable should be low capacitance (core/core <75pF/m, core/shield <150pF/m). Filtered drives can meet the class A limits of EN 55011 and EN 61800-3 Category 2 with this type of motor cable up to 10 meters. **NOTE:** Refer to Appendix A for recommended cable lengths. Any external line filter should have its chassis connected to the drive chassis by mounting hardware or with the shortest possible wire or braid.

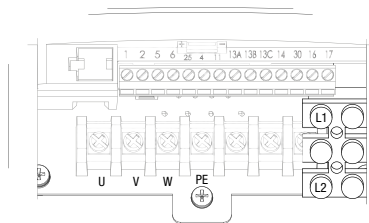




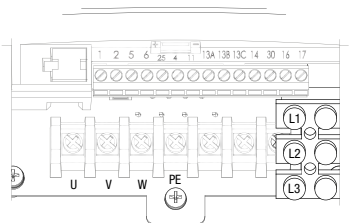
Installation

3.2.1.6 NEMA 4X (IP65) Input Terminal Block

For NEMA 4X (IP65) models with integrated EMC filter and/or integrated line disconnect, the input terminal block is located on the right-hand side of the SMV inverter in the NEMA 4 X (IP65) enclosure. The single and three phase models are illustrated herein. Refer to paragraph 3.2.3 Control Terminals for pin out information.



Single Phase (2/PE)
With Filter and/or integrated line disconnect



Three Phase (3/PE)
With Filter and/or integrated line disconnect

3.2.2 Fuses/Cable Cross-Sections



NOTE

Observe local regulations. Local codes may supersede these recommendations

Type		Recommendations				
		Fuse	Miniature circuit breaker ⁽¹⁾	Fuse ⁽²⁾ or Breaker ⁽²⁾ (N. America)	Input Power Wiring (L1, L2, L3, PE)	
					[mm²]	[AWG]
120V 1~ (1/N/PE)	ESV251N01SXB	M10 A	C10 A	10 A	1.5	14
	ESV371N01SXB, ESV371N01SX*	M16 A	C16 A	15 A	2.5	14
	ESV751N01SXB, ESV751N01SX*	M25 A	C25 A	25 A	4	10
	ESV112N01SXB, ESV112N01SX*	M32 A	C32 A	30A	4	10
240V 1~ (2/PE)	ESV251N01SXB, ESV251N02SXB, ESV371N01SXB, ESV371N02YXB, ESV371N02SF*	M10 A	C10 A	10 A	1.5	14
	ESV751N01SXB, ESV751N02YXB, ESV751N02SF*	M16 A	C16 A	15 A	2.5	14
	ESV112N02YXB, ESV112N02SFC, ESV112N01SXB, ESV112N01SX*	M20 A	C20 A	20 A	2.5	12
	ESV152N02YXB, ESV152N02SF*	M25 A	C25 A	25 A	2.5	12
	ESV222N02YXB, ESV222N02SF*	M32 A	C32A	30 A	4	10
	ESV371N02YXB, ESV751N02YXB, ESV371N02Y_*, ESV751N02Y_*	M10 A	C10 A	10 A	1.5	14
240V 3~ (3/PE)	ESV112N02YXB, ESV152N02YXB, ESV112N02TXB, ESV152N02TXB, ESV112N02Y_*, ESV152N02Y_*	M16 A	C16 A	12 A	1.5	14
	ESV222N02YXB, ESV222N02TXB, ESV222N02YX*	M20 A	C20 A	20 A	2.5	12
	ESV402N02T_*	M32 A	C32 A	30 A	4.0	10
	ESV552N02T_~	M40 A	C40 A	35 A	6.0	8
	ESV752N02T_~	M50 A	C50 A	45 A	10	8
	ESV113N02TXB	M80 A	C80 A	80 A	16	6
	ESV153N02TXB	M100 A	C100 A	90 A	16	4



Type		Recommendations				
		Fuse	Miniature circuit breaker ⁽¹⁾	Fuse ⁽²⁾ or Breaker ⁽³⁾ (N. America)	Input Power Wiring (L1, L2, L3, PE)	
					[mm ²]	[AWG]
400V or 480V 3-(3/PE)	ESV371N04TXB ...ESV222N04TXB ESV371N04T_* ...ESV222N04T_* ESV371N04TF_* ...ESV222N04TF_*	M10 A	C10 A	10 A	1.5	14
	ESV302N04TX*	M16 A	C16 A	15 A	2.5	14
	ESV402N04T_*	M16 A	C16 A	20 A	2.5	14
	ESV552N04T_*	M20 A	C20 A	20 A	2.5	14
	ESV752N04T_~	M25 A	C25 A	25 A	4.0	10
	ESV113N04TXB	M40 A	C40 A	40 A	4	8
400V or 480V 3-(3/PE)	ESV153N04TXB	M50 A	C50 A	50 A	10	8
	ESV183N04TXB	M63 A	C63A	70 A	10	6
	ESV223N04TXB	M80 A	C80 A	80 A	16	6
	ESV751N06TXB ...ESV222N06TXB ESV751N06T_* ...ESV222N06T_*, ESV302N06T_*	M10 A	C10 A	10 A	1.5	14
600V 3-(3/PE)	ESV402N06TXB, ESV402N06T_*	M16 A	C16 A	12 A	1.5	14
	ESV552N06TXB, ESV552N06T_*	M16 A	C16 A	15 A	2.5	14
	ESV752N06TXB, ESV752N06T_~	M20 A	C20 A	20 A	2.5	12
	ESV113N06TXB	M32 A	C32 A	30 A	4	10
	ESV153N06TXB	M40 A	C40 A	40 A	4	8
	ESV183N06TXB	M50 A	C50 A	50 A	6	8
	ESV223N06TXB	M63 A	C63 A	60 A	10	8

- (1) Installations with high fault current due to large supply mains may require a type D circuit breaker.
 (2) UL Class CC or T fast-acting current-limiting type fuses, 200,000 AIC, preferred. Bussman KTK-R, JJJ or JJS or equivalent.
 (3) Thermomagnetic type breakers preferred.

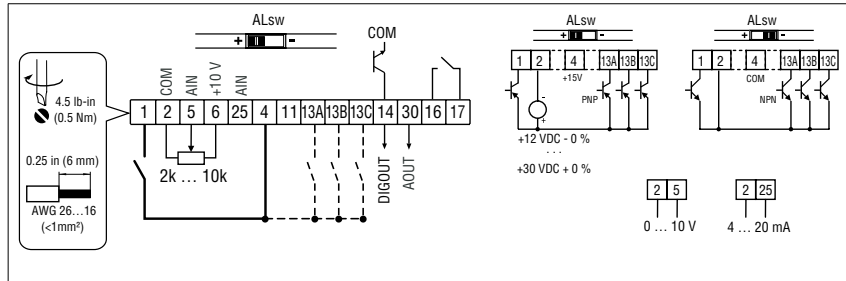
_ 11th digit of part number: F = Integral EMC Filter
 L = Integral EMC Filter and Integrated Line Disconnect (NEMA 4X/IP65 Models only)
 M = Integrated Line Disconnect (NEMA 4X/IP65 Models only)
 X = No EMC Filter/No Line Disconnect
 * = Last digit of part number: C = N4X Indoor only (convection cooled)
 E = N4X Indoor/Outdoor (convection cooled)
 ~ = Last digit of part number: D = N4X Indoor only (fan cooled)
 F = N4X Indoor/Outdoor (fan cooled)

Observe the following when using Ground Fault Circuit Interrupters (GFCIs):

- Installation of GFCI only between supplying mains and controller.
- The GFCI can be activated by:
 - capacitive leakage currents between the cable screens during operation (especially with long, screened motor cables)
 - connecting several controllers to the mains at the same time
 - RFI filters

3.2.3 Control Terminals

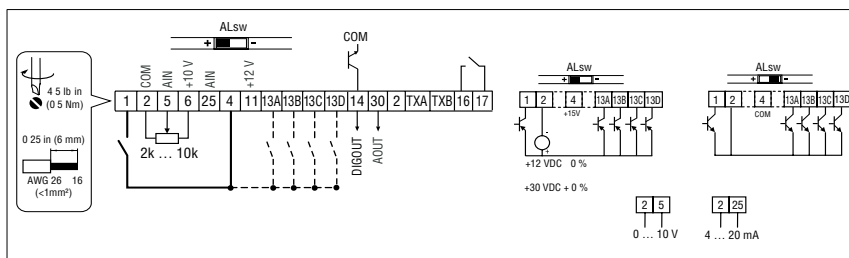
Control Terminal Strip for 0.33 - 10 HP (0.25 - 7.5 kW):





Installation

Control Terminal Strip for 15HP (11 kW) and Greater Drives:



NOTE

Control and communications terminals provide basic insulation when the drive is connected to a power system rated up to 300V between phase to ground (PE) and the applied voltage on terminals 16 and 17 is less than 250 VAC between phase phase and ground (PE).

Terminal	Description	Important
1	Digital Input: Start/Stop	input resistance = 4.3k Ω
2	Analog Common	
5	Analog Input: 0...10 VDC	input resistance: >50 k Ω
6	Internal DC supply for speed pot	+10 VDC, max. 10 mA
25	Analog Input: 4...20 mA	input resistance: 250 Ω
4	Digital Reference/Common	+15 VDC / 0 VDC, depending on assertion level
11	Internal DC supply for external devices	+12 VDC, max. 50 mA
13A	Digital Input: Configurable with P121	input resistance = 4.3k Ω
13B	Digital Input: Configurable with P122	
13C	Digital Input: Configurable with P123	
13D*	Digital Input: Configurable with P124	
14	Digital Output: Configurable with P142, P144	DC 24 V / 50 mA; NPN
30	Analog Output: Configurable with P150...P155	0...10 VDC, max. 20 mA
2*	Analog Common	
TXA*	RS485 TxA	
TXB*	RS485 TxB	
16	Relay output: Configurable with P140, P144	AC 250 V / 3 A
17		DC 24 V / 2 A ... 240 V / 0.22 A, non-inductive

* = Terminal is part of the terminal strip for the 15-30HP (11-22 kW) Models only.

Assertion level of digital inputs

The digital inputs can be configured for active-high or active-low by setting the Assertion Level Switch (ALsw) and P120. If wiring to the drive inputs with dry contacts or with PNP solid state switches, set the switch and P120 to "High" (+). If using NPN devices for inputs, set both to "Low" (-). Active-high (+) is the default setting.

HIGH = +12 ... +30 V

LOW = 0 ... +3 V



NOTE

An **F_{RL}** fault will occur if the Assertion Level switch (ALsw) position does not match the parameter P120 setting and P100 or any of the digital inputs (P121...P124) is set to a value other than 0.

Adjust to desired pressure.

