G&L Pumps

AQUAVAR® AV II

SUBMITTAL

Project: _____

Specification Section : _____ Architect : _____

Submitted By : _____ Contractor : _____

Engineer : _____ Customer : _____

Date : _____

Effective :
Supersedes :

Goulds Pumps

ITT Industries

AQUAVAR AVII **Submittal Schedule**

MOTOR DATA					AQUAVAR DATA		
TAG #	**SERVING**	**HP**	**RATED AMPS**	**VOLTAGE**	**MODEL #**	**RATED AMPS**	**RATED VOLTAGE**

Effective :

Supersedes :

System Design - *Typical Constant Pressure Systems*

Note

Systems MUST be designed by qualified technicians only.

The following diagrams show typical single pump and multi-pump systems using the AQUAVAR controller. Connection can be made directly to a water supply or water can be drawn from a supply tank or well. In the case of supply tanks and wells, level switches, **(item 10)** can be used to shut down the pumps when water is low. In the direct connection, a pressure switch on the suction side **(item 8)** can be used.

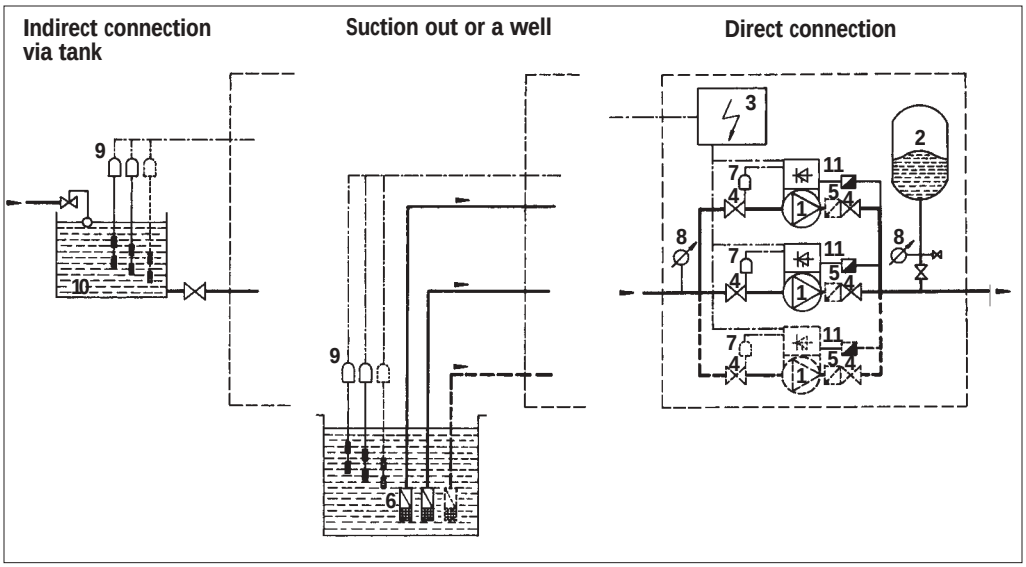


Diagram 1
Multiple Pump Layout

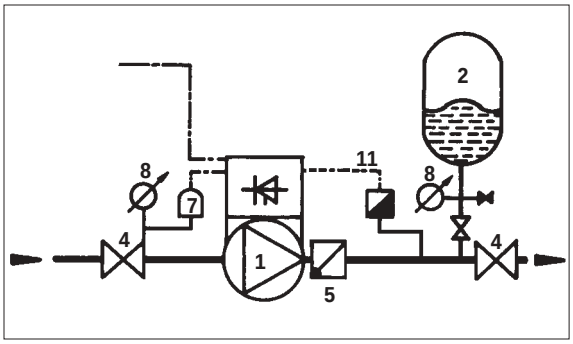


Diagram 2
Single Pump Layout

1 Pump with AQUAVAR controller
2 Diaphragm tank
3 Distribution panel
4 Gate valves
5 Check valves
6 Foot valves
7 Incoming pressure switch
8 Pressure gauges
9 Level switches
10 Supply tank
11 Pressure transmitter
(Included with AQUAVAR) *

A diaphragm pressure tank is used on the discharge side of the pump or pumps to maintain pressure in the line when there is no demand. This will keep the pumps from continuing to run. With the AQUAVAR controller, it is not necessary to have a large tank for supply purposes. In selecting a tank, make sure it can withstand maximum system pressure. The tank should have a capacity of at least 10% of the maximum system flow rate in gpm. Pre-charge the tank to the following:

PSI Set Pressure	15	30	45	60	75	90	105	120	135	150
PSI Tank Pre-charge	12	21	37	52	64	77	95	110	125	138

Note

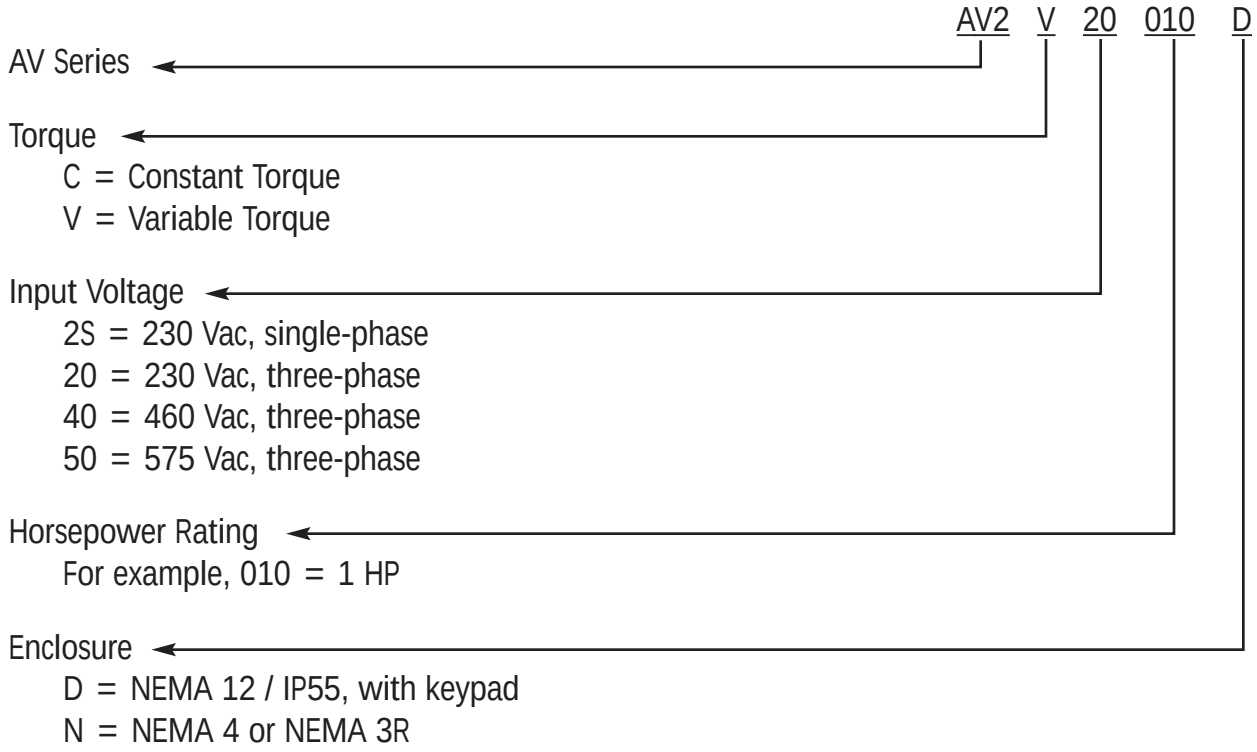
Closed loop circulator systems may not require a pressure tank.

*Check with tank pressure limitations before precharge.

Technical Characteristics

Interpreting Model Numbers

The model number of the AQUAVAR appears on the shipping carton label and on the technical data label affixed to the model. The information provided by the model number is shown below:



Power and Current Ratings

Model Number	Motor Power		Input			Output Voltage (Vac)	Maximum Load Output Current (A)	
	HP	kW	Voltage (Vac)	Maximum Current (A)			200/380 Vac	230/460/ 575 Vac
				200/380 Vac	230/460/ 575 Vac			
AV2V2S010D	1.0	0.7	Single-phase 200 to 230 ±15%	—	8.9	0 to 230	4.8	4.2
AV2V2S020D	2.0	1.5		—	16.2		7.8	6.8
AV2V2S030D	3.0	2.2		—	23.1		11.0	9.6
AV2V2S050D	5.0	3.7		—	32.9		17.5	15.2
AV2V2S075D	7.5	5.5		—	47.5		25.3	22.0
AV2V2S100D	10.0	7.5		—	62.8		32.2	28.0
AV2V20010D	1.0	0.7	Three-phase 200 to 230 ±15%	5.6	4.8	0 to 230	4.8	4.2
AV2V20020D	2.0	1.5		9.0	7.8		7.8	6.8
AV2V20030D	3.0	2.2		12.7	11.0		11.0	9.6
AV2V20050D	5.0	3.7		20.2	17.5		17.5	15.2
AV2V20075D	7.5	5.5		29.2	25.3		25.3	22.0
AV2V20100D	10.0	7.5		37.2	32.2		32.2	28.0

Technical Characteristics

Power and Current Ratings *(continued)*

Specifications

Environmental MAXIMUM HEATSINK TEMP. = 100° C (212° F)

Operating temperature	0ºC to +40ºC (32ºF to 104ºF) *
Storage temperature	-20ºC to +65ºC (-4ºF to 149ºF)
Humidity	0% to 95% non-condensing
Altitude	1000 m (3300 ft) without derating *
Acoustic noise	80 dBA sound power at 1 m (3 ft)

Electrical

Voltage input	AV2C2x models: 200 to 230 Vac, ±15% AV2C4x models: 380 to 460 Vac, ±15% AV2C5x models: 575 Vac, ±15%
Input Line frequency	50 / 60 Hz ±2 Hz
Overvoltage trip	407 Vdc 814 Vdc 1017 Vdc (DC BUS Voltage)
Undervoltage trip	202 Vdc 404 Vdc 505 Vdc (DC BUS Voltage)
Output voltage	0 to 100% of line voltage, 3 Phase
Overload capacity	110% of rated rms for 60 seconds
Rated output frequency	50/60 Hz ±5%
Timed overload	Adjustable time trip set for 110% of rated motor current
Agency listing	UL and CUL Listed, CE marked

Control Features

Protective features and circuits	Overcurrent, overvoltage, phase loss, motor over-temperature, overtemperature, ground fault, under-voltage, short circuit, sensor fault, suction loss.

* For high ambient temperatures, derate HP of drive. Altitudes above 3300 ft. of sea level, derate 2% of HP for every 1000 ft. above 3300 ft. Consult factory for assistance.

Weights and Dimensions

Mounting the AQUAVAR controller:

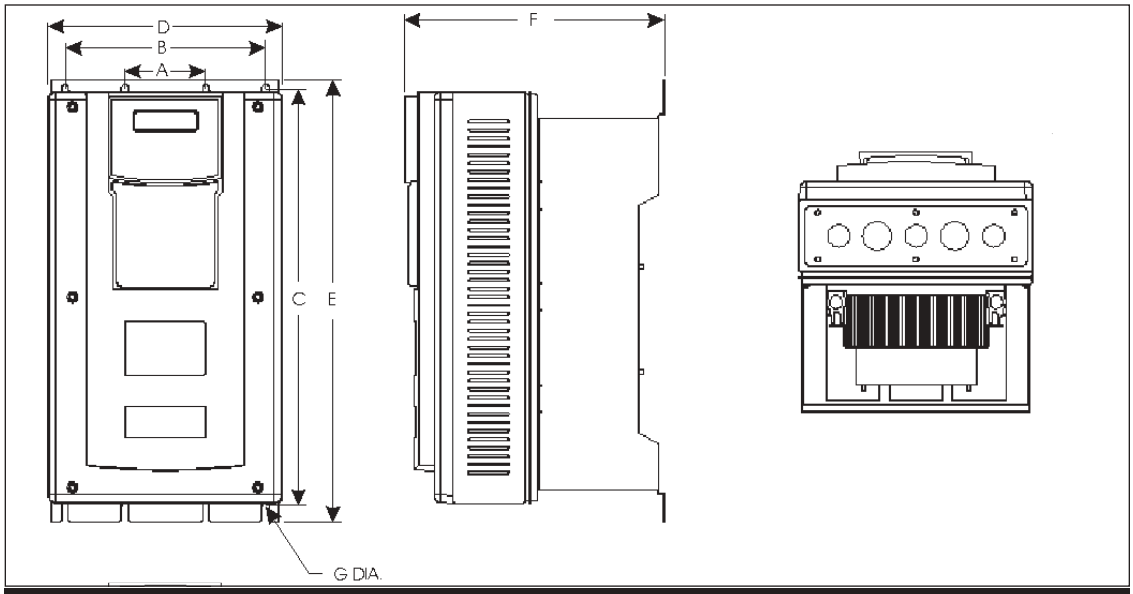


Diagram 3

HP Rating	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E in (mm)	F in (mm)	G in (mm)
1 – 10 (230 – 3) 1 – 5 (230 – 1) 1 – 20 (575)	3.20 (81.28)	7.88 (200.15)	16.50 (419.10)	9.32 (236.70)	17.44 (442.98)	12.08 (306.71)	0.28 (7.11)
15 – 20 (230 – 3) 7½ – 10 (230 – 1) 25 – 40 (460) 25 – 40 (575)	3.20 (81.28)	7.88 (200.15)	19.25 (488.95)	11.44 (290.53)	20.19 (512.83)	13.51 (343.20)	0.28 (7.11)
25 – 75 (460) 25 – 75 (575)	3.20 (81.28)	7.88 (200.15)	28.00 (711.20)	12.68 (322.07)	31.37 (796.80)	14.00 (355.60)	0.42 (10.67)

Note that the E-dimension in the 50-75 HP is maximum overall height to the conduit box rather than the bottom of the foot.

Weights and Dimensions

WEIGHTS OF MODELS - *Table 1: NEMA 12*

Power Rating	Weight	
HP	**Pounds**	**Kilograms**
1	24.0	10.9
2	24.0	10.9
3	24.0	10.9
5	24.0	10.9
7½	24.0	10.9
10	24.0	10.9
15	28.0	12.7
20	28.0	12.7
25	52.0	23.6
30	52.0	23.6
40	60.0	27.2
50	107.0	48.6
60	107.0	48.6
75	107.0	48.6

Control Board Wiring (Transducer)

1. The wires routed from the terminal block U, V, W, and ground screw, should now be connected to the motor leads using the motor nameplate and Diagram 6 for reference. Always refer to motor wiring nameplate.

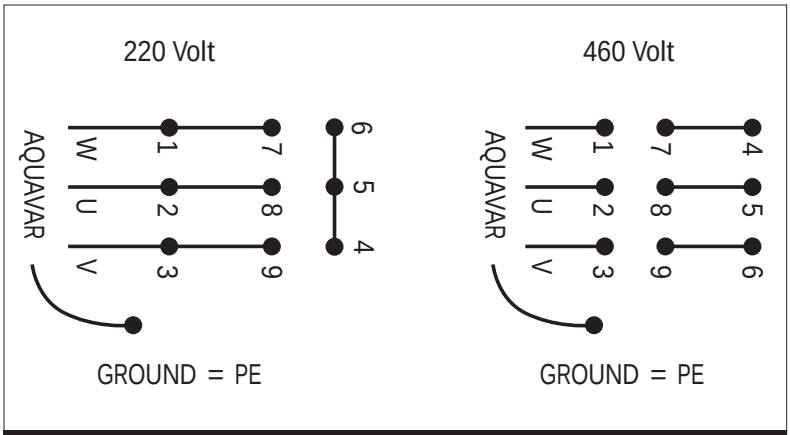


Diagram 4

2. Pressure Transducer Installation and Wiring
It is recommended that the transducer be mounted in the discharge piping. The location should be in a non-turbulent, straight piece of pipe. See layout on page 5. Locate the adapter for the pressure transducer, if needed.

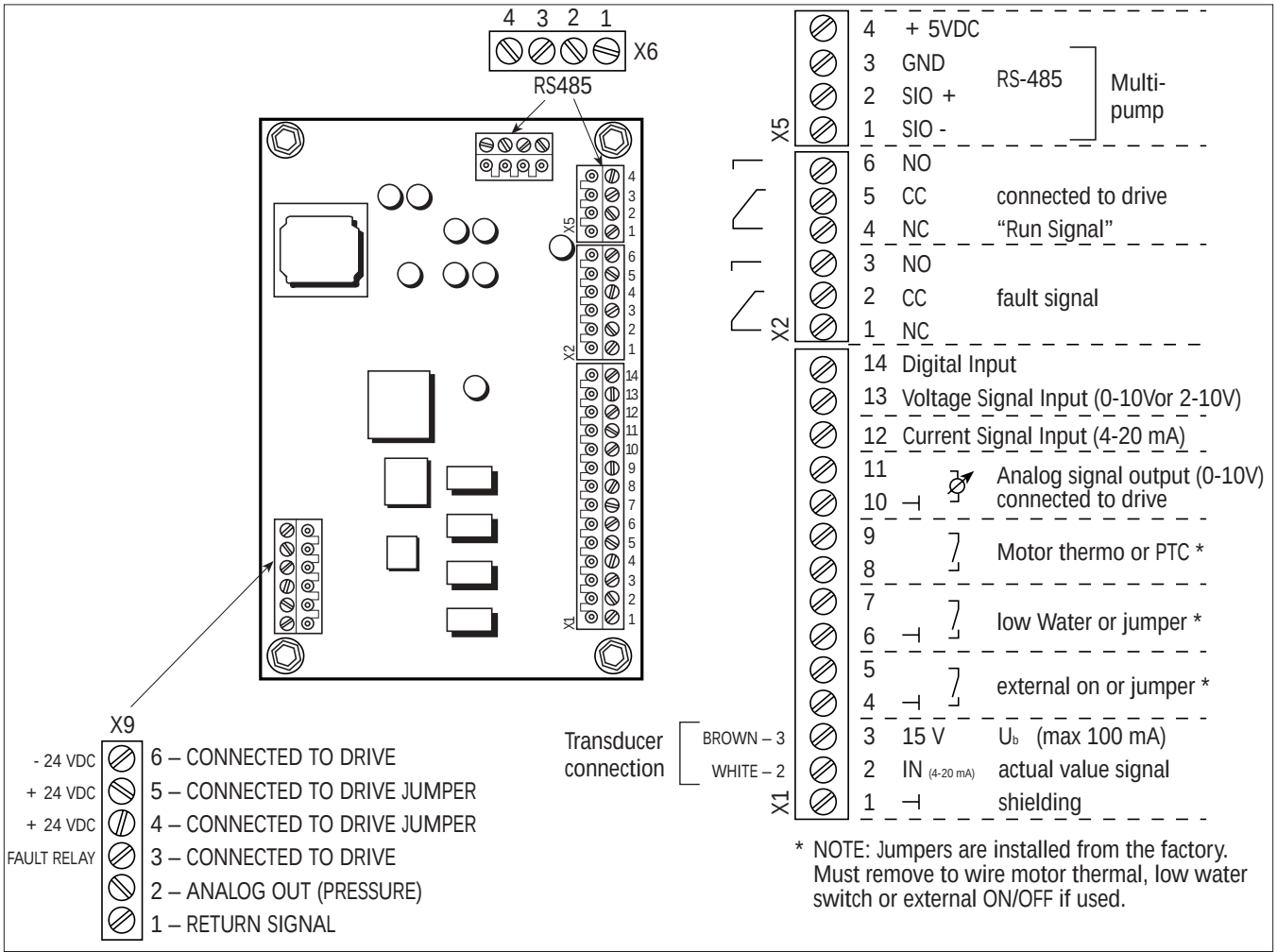


Diagram 5

AQUAVAR Control Board Terminal Information

Terminals For Control Board: There is a terminal strip inside the AQUAVAR controller which will allow the connection of a wide range of external devices for display or control. When using these terminals, shielded wires need to be used. Unshielded wires may produce signal interference which will affect the inverter.

X1	**1**	Ground connection
	2	Actual value input 4- 20 mA, 50 ohm load resistance. Used to connect external pressure transducer, flow meter, etc. Can also be used as input source from another device signalling actual speed when “actuator” is selected in controller mode.
	3	Power source for external transducer 15 V DC, max. 25 mA
	4	Ground connection for external on/off
	5	External on/off connection, 10 kOhm resistance, 5 VDC gold plated contact. Note that the external device must have a switch suitable for < 10 V. If no outside panel or control is used, a jumper wire is installed on contacts 4 and 5.
	6	Ground connection for low water switch.
	7	Low water switch connection, 10 kOhm resistance, 5 VDC. This contact is where an external level switch, float switch or pressure switch from the suction line would be installed. If no suction pressure devices are used, a jumper wire is installed on contacts 6 and 7.
	8	5 V power source for the Klixon thermoswitch mounted in the motor conduit box. 10 kOhm resistance. A jumper wire is installed on contacts 8 and 9.
	9	Thermoswitch return connection.
	10	Ground connection for analog output
	11	Analog output connection 0 - 10 V, maximum 2 mA. Can be used to connect an outside meter or display panel to display actual pump running frequency or pressure as selected on the Analog Out part of the program.
	12	Current signal input 4-20mA
	13	Voltage signal input 0-10V or 2-10V
	14	Digital input
X2	**1**	Fault signal relay connection. This relay turns on the fault light on the control panel if a fault occurs. This relay may also be connected to an outside panel or display through connections 1, 2, and 3. Each is a maximum 250VAC connection with 1 Amp free of inductivity.
	2	Common connection for fault signal relay. 250 VAC with 1 Amp free inductivity.
	3	Commonly open connection for fault signal relay. 250 VAC with 1 Amp free inductivity. Connection 3 is commonly closed.

AQUAVAR Control Board Terminal Information

	4	** Pump operation signal relay connection. This relay turns on the run light on the control panel when the pump is operating. This relay may also be connected to an outside panel or display through connections 4, 5 and 6. Each is a maximum of 250 VAC with 1 Amp of free inductivity. Connection 6 is commonly closed. Four, 5 and 6 are fault relay's connected to internal drive.
	5	** Connected to internal drive. (For run relay, use internal drive connection.)
	6	** Connected to internal drive. (RC2, NC2, NO2, Diagram 8, page 25)
X5/6	**1**	RS-485 interface connection. SIO - (low) for connection of the AQUAVAR controller to other AQUAVAR controller units in a set, or to an outside controller.
	2	RS-485 interface connection. SIO + (high) for connection of the AQUAVAR controller to other AQUAVAR controller units in a set, or to an outside controller.
	3	RS-485 interface connection. Common ground.
	4	RS-485 interface connection. +5 VAC output signal. Maximum 20 mAmp output.

Note

When using the RS-485 connection for multiple pump connection, connections X5 1, 2 and 3, must be connected with three core shielded wire to like connections on each AQUAVAR controller drive head.

X9	**6**	24 VDC supply, connected to drive, control board supply
	5*	Connected to drive, +24 VDC power to control board
	4*	+24 VDC (jumper wire) connected to drive
	3	Connected to drive (fault relay)
	2	Analog out signal, 0-10 VDC (pressure reference)
	1	Return signal for analog out

* Jumper wire installed at factory, do not remove.

** X2, 4, 5 and 6 contacts are connected to the internal drive for a run light relay. (Pump run) For an external run relay, use internal drive connections on TB3, RC2, NC2, NO2, located in Diagram 8, page 25. TB3 terminal block specifications, located on page 26.

Control Wiring (Internal Drive Board)

3. Place the square gasket over the end of the transducer, plug the cable connector on, and tighten the screw.

- The transducer is supplied with ¼" NPT threads for direct mounting in the discharge piping.

Note

Cable connector will fit on one way only! Do not force on or damage may occur.

4. Now select one of the remaining ports in the AQUAVAR controller to route the transducer cable. Route the transducer cable through the strain relief, cut to length and connect to locations X1 #2 and #3 as shown in Diagram 7. (Note: Control board is mounted to the inside front cover of the drive enclosure.) The brown wire is connected to X1 #3 and the white wire to X1 #2. Tighten strain relief.

5. Terminals Found on the AV II Drive Control Board (Internal Drive)

Description of the Control Terminals: Figure 8 shows the control terminals found on the I/O board of the AV II drive. (The actual control board cannot be accessed by the user.) These terminals are prewired by the factory with color coded wires below.

Note that due to labeling constraints, the labels for some terminals start on the left (either on the side or top of the terminal block), are interrupted by the terminal screw, and then finish on the right (either on the side or top of the terminal block). For example, terminal A11 is labeled with A on the left side of the block and 11 to the right of the terminal screw on top of the block. Similarly, terminal NC2 is labeled with N to the left of the terminal screw on top of the block and then C2 on the right side of the block.

As is shown in the figure, the terminals are divided into four terminal blocks, each of which pulls apart for ease of field wiring:

- TB1 - analog input, analog output and digital output terminals.
- TB2 - output relay 1 (R1).
- TB3 - output relay 2 (R2).
- TB4 - digital input terminals.

Table 2 starting on the next page describes the control terminals.

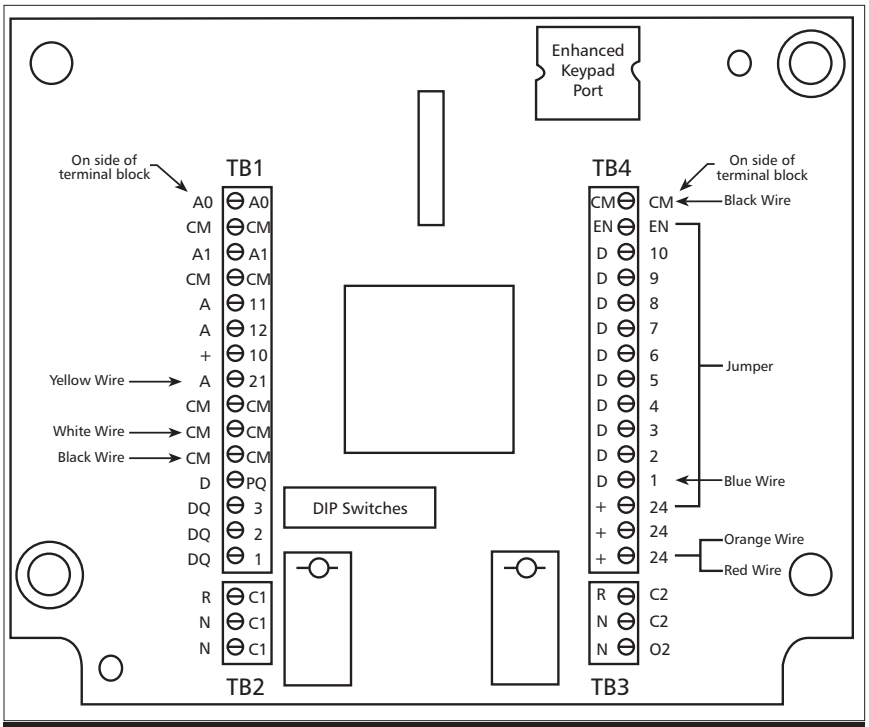


Diagram 6

Control Wiring (Internal Drive Board)

Table 2: Description of AV II Drive Control Terminals (Internal Drive)

Terminal	Description
	TB2 Terminal Block
RC1	Common terminal for the first auxiliary relay. The function of the relay is set by parameter R1 Configure. The default setting is for the relay to activate when a fault is detected (Drv Flted).
NC1	Normally-closed contact for the first auxiliary relay. It will open when the relay is activated.
NO1	Normally-open contact for the first auxiliary relay. It will close when the relay is activated.
	TB3 Terminal Block (Drive Run Contacts)
RC2	Common terminal for the second auxiliary relay. The function of the relay is set by parameter **ROUT R2 Config**. The default setting is for the relay to activate when the drive is running. The contact ratings are 115 VAC at 1 A or 230 VAC at 0.5 A.
NC2	Normally-closed contact for the second auxiliary relay. It will open when the relay is activated.
NO2	Normally-open contact for the second auxiliary relay. It will close when the relay is activated.
	TB4 Terminal Block
EN	Enable terminal. A jumper is placed between this terminal and the +24 terminal at the factory. You may replace this with a contact if desired. The circuit from EN to +24 must be closed for the drive to operate. Note that unlike all other terminals, this terminal cannot be configured for "pull-down logic." That is, a high input to this terminal is always regarded as true – and must be present if the drive is to operate.
D3 to D10	Digital inputs. The function of a digital input is configured by the parameter with the same name as the digital input in the DI Configure parameter group.
D2	Digital input. In 3-wire control, this must be a Stop input. In 2-wire control, it may be configured to another function with parameter **D2 Configure**.
D1	Digital input. This must be a Start or Run input.

Technical Characteristics

Power and Current Ratings ***(continued)***

Model Number	Motor Power		Input			Output Voltage (Vac)	Maximum Load Output Current (A)	
	HP	kW	Voltage (Vac)	Maximum Current (A)				
				200/380 Vac	230/460/ 575 Vac		200/380 Vac	230/460/ 575 Vac
AV2V20150D	15.0	11.0	Three-phase 200 to 230 ±15%	52.1	46.4	0 to 230	48.3	42.0
AV2V20200D	20.0	15.0		53.9	47.4		62.1	54.0
AV2V40010D	1.0	0.7	Three-phase 380 to 460 ±15%	3.4	2.4	0 to 460	2.4	2.1
AV2V40020D	2.0	1.5		5.2	3.9		3.8	3.4
AV2V40030D	3.0	2.2		7.2	5.6		5.7	4.8
AV2V40050D	5.0	3.7		12.0	8.8		8.9	7.6
AV2V40075D	7.5	5.5		15.0	12.8		12.0	11.0
AV2V40100D	10.0	7.5		19.7	16.3		15.6	14.0
AV2V40150D	15.0	11.0		30.9	25.8		23.0	21.0
AV2V40200D	20.0	15.0		40.0	33.3		31.0	27.0
AV2V40250D	25.0	18.6		49.2	40.0		37.0	34.0
AV2V40300D	30.0	22.0		57.5	47.8		43.0	40.0
AV2V40400D	40.0	30.0		62.3	53.3		61.0	52.0
AV2C40500D	50.0	37.0		71.0	65.0		71.0	65.0
AV2C40600D	60.0	45.0		86.0	77.0		86.0	77.0
AV2C40750D	75.0	55.0		105.0	96.0		105.0	96.0
AV2V50010D	1.0	0.7	Three-phase 575 ±15%	—	2.0	0 to 575	—	1.7
AV2V50020D	2.0	1.5		—	3.6		—	2.7
AV2V50030D	3.0	2.2		—	5.0		—	3.9
AV2V50050D	5.0	3.7		—	7.6		—	6.1
AV2V50075D	7.5	5.5		—	10.4		—	9.0
AV2V50100D	10.0	7.5		—	14.1		—	11.0
AV2V50150D	15.0	10.0		—	20.8		—	17.0
AV2V50200D	20.0	15.0		—	27.8		—	22.0
AV2V50250D	25.0	18.6		—	33.4		—	27.0
AV2V50300D	30.0	22.0		—	39.1		—	32.0
AV2V50400D	40.0	30.0		—	52.0		—	41.0
AV2C50500D	50.0	37.0		—	52.0		—	52.0
AV2C50600D	60.0	45.0		—	62.0		—	62.0
AV2C50750D	75.0	55.0		—	77.0		—	77.0

(1) Consult factory.

Pressure Transducer Data

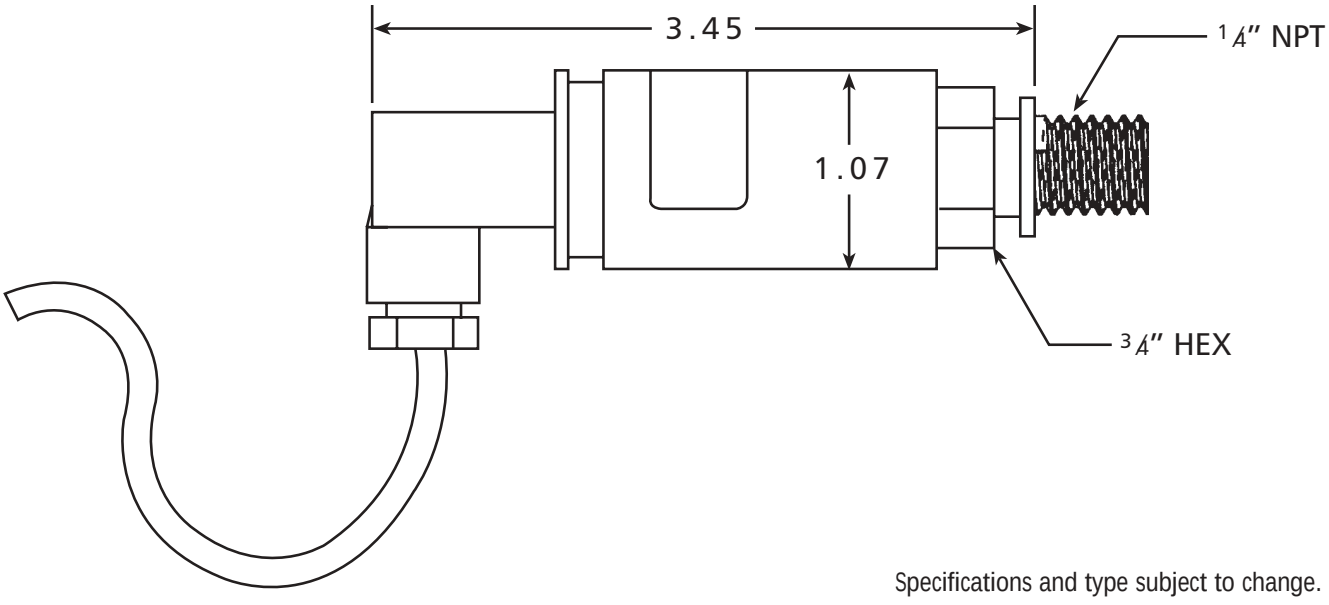
Series 1200

Specifications

Measuring Range (FS):	.52 bar	10 bar	25 bar	(other ranges upon request)
Over-Pressure (PMAX):	2 bar	40 bar	100 bar	

Type	**Sealed gauge:**
Output-Signal:	4-20mA; 2 wire with shield
Supply:	7-35 VDC
Linearity:	0.5% FS
Stability:	0.2% FS max.
Total Error:	2% FS
Operating Temperature:	-22°F to 260° F

Material: Body and diaphragm: 17-4 PH stainless steel



Specifications and type subject to change.

Diagram 7

Notes

G&L Pumps

www.goulds.com

Specifications subject to change without notice.

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