TECHNICAL BROCHURE
BSPDDRIVE

Aquavar SPD (Single Pump Drive)

SIMPLEX VARIABLE SPEED PUMP CONTROLLER
FOR SUBMERSIBLE AND CENTRIFUGAL PUMPS

GOULDS WATER TECHNOLOGY
a xylem brand

Goulds Water Technology "Aquavar SPD" variable speed, constant pressure pump controller is designed for the professional pump installer.

With application specific features and Goulds Water Technology designed software, the SPD was developed specifically for use with submersible and centrifugal pumps.

This variable speed controller goes beyond a "standard" drive, giving the pump professional a rugged design that is built for demanding conditions.

TYPICAL APPLICATIONS

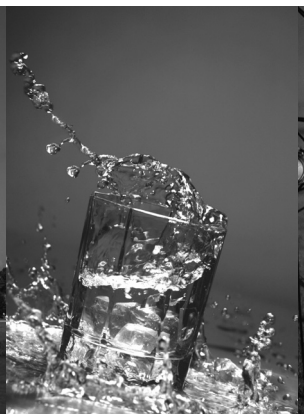
- **Irrigation** → Irrigation applications use both submersible and surface pumps. Choose an SPD for control standard 4" and 6" submersible motors as well as turbine pumps and surface centrifugal pumps up to 30 HP.
- **Rural Water**
- **Pressure Boosting**
- **Agriculture**
- **Retrofit** → Existing constant speed control systems
- **Phase Conversion** → 1 phase to 3 phase power
- **Two Versions for Submersible and Above Ground Installations**

  SPD _ _ _ _ _ F (example: SPD20050F) Models have filters to reduce electrical noise created by drives with long wire runs, typical of submersible installations.

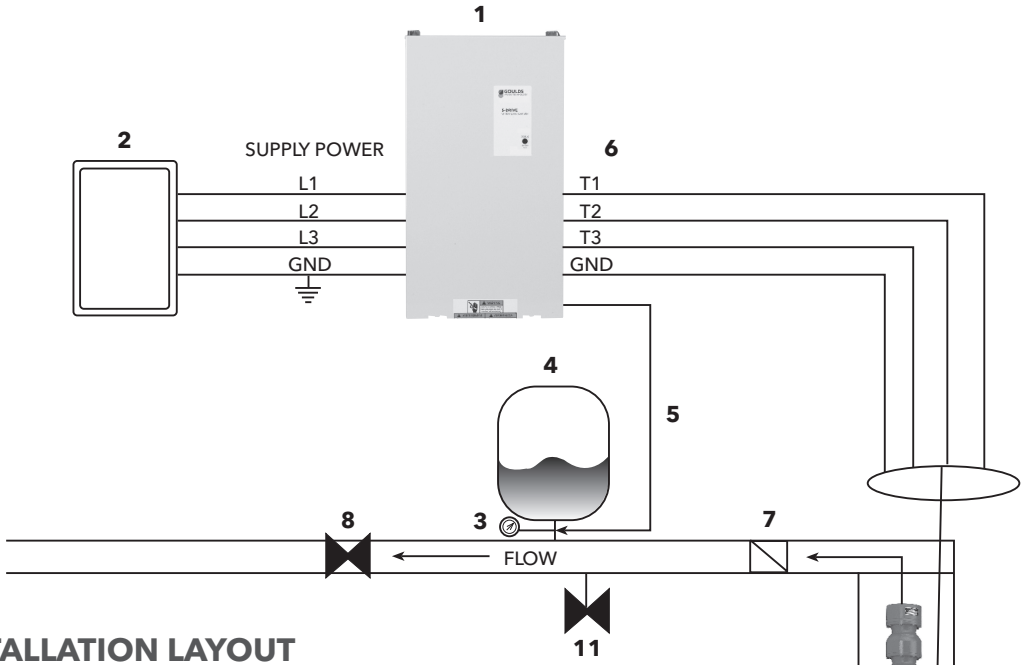
  SPP _ _ _ _ 0 (example: SPP20050) Models are for above ground installation with short wire runs.

KEY FEATURES AND BENEFITS

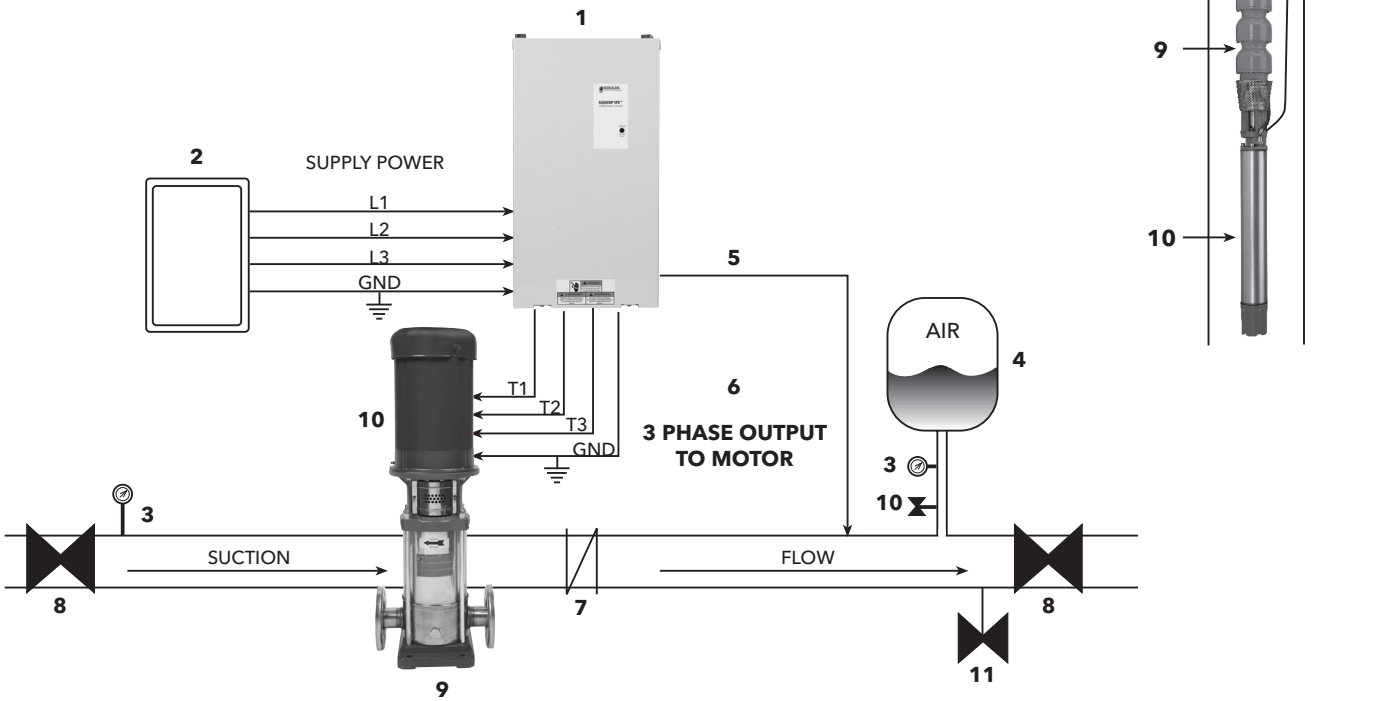
- **Energy Saving** → The SPD is a true variable frequency controller which adjusts motor speed to match the hydraulic needs of the system to maintain pressure. Unlike valve controlled systems, the energy draw is substantially reduced during lower flow while keeping the pump close to its best efficiency. Up to 70% energy savings over fixed speed pumps are common.
- **Easy Set-up** → Install wiring, set DIP switches and go! Total set up time including wiring is less than 30 minutes.
- **NEMA 3R** → Outdoor rated enclosure with operating temperatures from -22° F to 122° F!
- **Dual Phase Input** → UL listed for both **three phase** and **single phase** input (de-rated available).
- **Filter** → Includes output filter rated to 1000 feet of motor lead, standard on models with "F" suffix for submersible installations.
- **True Motor Match** → The SPD is designed for the higher amp requirements typical of submersible pumps on start-up. A 10 HP SPD will run a 10 HP submersible pump!
- **Transducer** → As with all Goulds Water Technology drives, the pressure transducer is included.
- **Full Diagnostics** → Electrical protection and diagnostics, plus a full range of pump protection features such as bound pump or motor shut down, low water or loss of prime shut down.
- **Lockout/Tagout** → Cover can be locked to prevent unauthorized entry.
- **Remote on/off** → Permits external control by timers (irrigation), float or pressure switches (tank draining) or manual control. Dry contact closure required.
- **Hand/Auto Option** → Allows the drive to be run at full speed without a pressure transducer for longer periods of time as in the case of new well development or system start up. Turning the control back to auto resumes the automatic pressure tracking and control.
- **Remote Monitoring** → External monitors may be connected to the drive for monitoring pump running speed (4-20 mA output based on speed), pump on, and system fault. The fault indicator can also be connected to devices like an auto-dialer. This enables control of pumps and drives in un-manned locations. The 4-20 mA output can be utilized for functions such as an external dosing system, or chlorine injection.
- **Pressure Drop** → The drive restart value can be adjusted from 5 PSI drop to 20 PSI. This allows for fewer starts and for small leaks that can be common in irrigation systems.
- **Dual Set Point** → Two pressure set points are available, controlled with an external switch, such as a timer.
- **No Water Restart** → Adjust the time delay after a “dry well” fault, from 10 minutes to 2 hours between each restart. Ideal for low yielding wells.


SUBMERSIBLE WELL SPD WITH FILTER CONSTANT PRESSURE LAYOUT



RECOMMENDED INSTALLATION LAYOUT



1 Aquavar SPD Controller

2 Fusible Disconnect

3 Pressure Gauge

4 Air Diaphragm Tank

5 Pressure Transducer

6 3-Phase Output (Always)

7 Discharge Check Valve

8 Gate Valve (Highly Recommended)

9 Pump End

10 Submersible Motor (3-Phase)

11 Pressure Relief Valve

NOTE: For single phase input, connect L1 and L3 terminals, and adjust motor overload switches to 50% of controller rating or lower.

POWER SUPPLY AND WIRING

Single Phase Power Supply

The SPD can be used with single phase input power for 208 V or 230 V power supplies. The maximum output of the drive and horsepower must be derated to 50% current.

The chart below shows the full load output current ratings of the controller when single phase or 3 phase power is used. If single phase input power is used the Motor Overload switches must be set to 50% or 40%.

Supply Voltage	Frame Size	Model Number	Nominal HP Rating with 3 Phase Input	Nominal HP Rating with 1 Phase Input	Maximum Output Current with 3 Phase Input	Maximum Output Current with 1 Phase Input
208/230	1	SPD20050	5.0	2.0	17.8	8.1
		SPD20050F				
	2	SPD20075	7.5	3.0	26.4	10.9
		SPD20075F				
		SPD20100	10.0	5.0	37.0	17.8
		SPD20100F				
	3	SPD20150	15.0	7.5	47.4	26.4
		SPD20150F				
		SPD20200	20.0	10.0	60.6	33.0
		SPD20200F				
	4	SPD20250	25.0	12.0	76.0	40.2
		SPD20250F				
		SPD20300	30.0	15.0	94.0	47.4
		SPD20300F				
460	1	SPD40050	5.0		8.9	
		SPD40050F				
		SPD40075	7.5		13.2	
		SPD40075F				
	2	SPD40100	10.0		18.5	
		SPD40100F				
		SPD40150	15.0		23.7	
		SPD40150F				
		SPD40200	20.0		30.3	
		SPD40200F				
	3	SPD40250	25.0		37.5	
		SPD40250F				
		SPD40300	30.0		47.0	
		SPD40300F				

STARTING THE SYSTEM

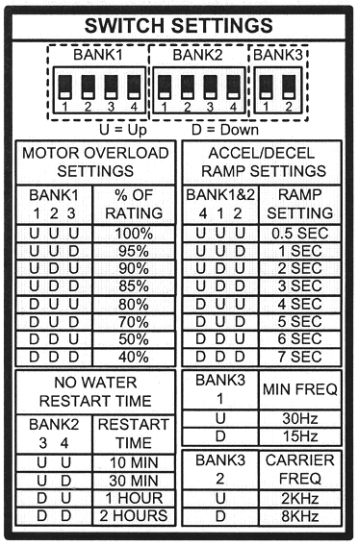
Setting the Motor Overload Switches

The Motor Overload Setting Switches adjust the level of motor overload current protection necessary to protect the motor in case of an over current condition.

Bank 1 switches 1, 2 and 3 allow adjustment of the motor overload setting. These switches adjust the motor overload protection as a percentage of the full load output current rating of the controller. Choose a motor overload setting that meets or is less than the motor's SFA rating. For example, if the full load output current rating of the controller is 37A and the motor SFA rating is 33A, the motor overload setting should be set to 85% (33A/37A = 89%, next lowest setting is 85%).

In applications where the pump and motor are not used to the full capacity the system may not draw current close to the motor's SFA rating. In this case choose a motor overload setting that is close to the actual full load running current.

NOTE: If single phase input power is used the motor overload switches must be set to 50% or lower or nuisance input phase loss errors can result.



The chart below shows the motor overload setting for each model.

			Motor Overload Setting							
Supply Voltage	**Frame Size**	**Model Number**	**100%**	**95%**	**90%**	**85%**	**80%**	**70%**	**50%**	**40%**
208/230	1	SPD20050	17.8	16.9	16.0	15.1	14.2	12.5	8.9	7.1
		SPD20050F								
	2	SPD20075	26.4	25.1	23.8	22.4	21.1	18.5	13.2	10.6
		SPD20075F								
		SPD20100	37.0	35.2	33.3	31.5	29.6	25.9	18.5	14.8
		SPD20100F								
	3	SPD20150	47.4	45.0	42.7	40.3	37.9	33.2	23.7	19.0
		SPD20150F								
		SPD20200	60.6	57.6	54.5	51.5	48.5	42.4	30.3	24.2
		SPD20200F								
	4	SPD20250	76.0	72.2	68.4	64.6	60.8	53.2	38.0	30.4
		SPD20250F								
		SPD20300	94.0	89.3	84.6	79.9	75.2	65.8	47.0	37.6
		SPD20300F								
460	1	SPD40050	8.9	8.5	8.0	7.6	7.1	6.2	4.5	3.6
		SPD40050F								
		SPD40075	13.2	12.5	11.9	11.2	10.6	9.2	6.6	5.3
		SPD40075F								
	2	SPD40100	18.5	17.6	16.7	15.7	14.8	13.0	9.3	7.4
		SPD40100F								
		SPD40150	23.7	22.5	21.3	20.1	19.0	16.6	11.9	9.5
		SPD40150F								
		SPD40200	30.3	28.8	27.3	25.8	24.2	21.2	15.2	12.1
		SPD40200F								
	3	SPD40250	37.5	35.6	33.8	31.9	30.0	26.3	18.8	15.0
		SPD40250F								
		SPD40300	47.0	44.7	42.3	40.0	37.6	32.9	23.5	18.8
		SPD40300F								

INPUT AND OUTPUT FUNCTIONS

CONTROL TERMINALS		
POSITION	FUNCTION	DESCRIPTION
1	COM	SIGNAL COMMON
2	RUN/STOP	CLOSED = RUN OPEN = STOP
3	COM	SIGNAL COMMON
4	HAND/AUTO	CLOSED = HAND OPEN = AUTO
5	COM	SIGNAL COMMON
6	INPUT	TRANSDUCER INPUT
7	+24V	24VDC SUPPLY
8	+5V	5VDC SUPPLY
9	COM	SIGNAL COMMON
10	ANALOG OUTPUT	4-20mA OUTPUT
11	SP2/SP1	CLOSED = SETPOINT2 OPEN = SETPOINT1
12	PRESSURE DROP	CLOSED = 20PSI OPEN = 5PSI
13	RELAY1 - NO	MOTOR RUN STOP: NC = COM RUN: NO = COM
14	RELAY1 - NC	
15	RELAY1 - COM	
16	RELAY2 - NO	SYSTEM FAULT OK: NC = COM FAULT: NO = COM
17	RELAY2 - NC	
18	RELAY2 - COM	

The control terminal strips allow for a variety of input and output functions.

Warning: Turn off all power to the controller before wiring devices to the control terminals.

Warning: Inputs RUN/STOP, HAND/AUTO, SP2/SP1 and PRESSURE DROP are switch inputs. Do not connect power to these inputs or damage to the controller will result. Only connect non-powered switch contacts to these inputs.

RUN/STOP: This input allows the pump/motor to be turned on and off by an external switch. Connect the contacts of a non-powered external switch to terminals 1 (COM) and 2 (RUN/STOP). When the switch is closed the controller is in RUN mode (output to motor is enabled). When the switch is open the controller is in STOP mode (output to motor is disabled).

HAND/AUTO: This input allows the controller to run the motor at full speed without the use of a pressure transducer. This input can be controlled by an external non-powered switch. Connect the contacts of a non-powered external switch to terminals 3 (COM) and 4 (HAND/AUTO). When the switch is closed the controller is in HAND mode. While in HAND mode the RUN/STOP input is used to start and stop the motor and the pressure transducer input is ignored. When the switch is open the controller is in AUTO mode. While in AUTO mode the controller uses the pressure transducer feedback to control the speed of the motor.

INPUT and +24V: These terminals are the transducer feedback and transducer power supply. Connect the white lead from the transducer cable to terminal 6 (INPUT). Connect the brown lead from the transducer cable to terminal 7 (+24V). Connecting the drain (bare) wire to the chassis allows grounding of the case of the pressure transducer. The controller is configured with a 300 PSI 4-20mA output pressure transducer.

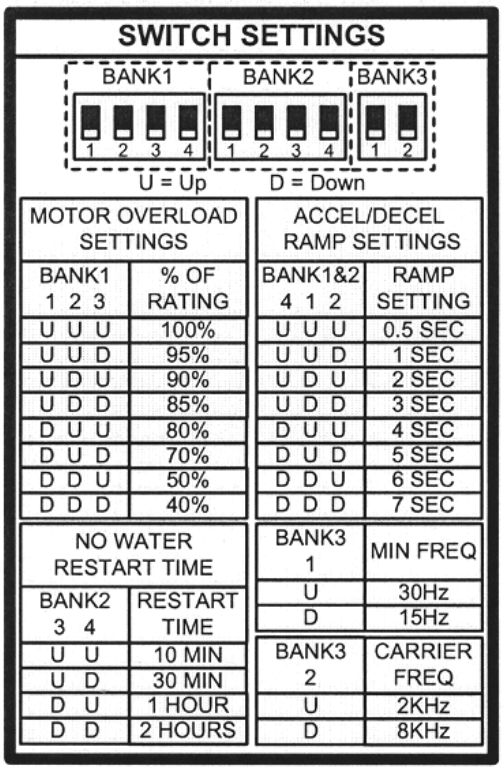
ANALOG OUTPUT: This output is a 4-20mA signal based on motor speed (4mA = 0Hz, 20mA = 60Hz) and can be connected to external monitoring or external control devices. Connect terminal 10 (ANALOG OUTPUT) to the 4-20mA input of the external device. Connect terminal 9 (COM) to the negative side of the current loop on the external device. The external device must have an input resistance (impedance) in the range of 45Ω to 250Ω. The maximum output voltage is 24V.

SP2/SP1: This input allows the system to operate at one of 2 pressure settings. This input can be controlled by an external non-powered switch. Connect the contacts of a non-powered external switch to terminals 5 (COM) and 11 (SP2/SP1). When the switch is closed pressure set point 2 is enabled (preset to 75 PSI when used with a 300 PSI transducer). When the switch is open pressure set point 1 is enabled (preset to 50 PSI when used with a 300 PSI transducer).

PRESSURE DROP: This input allows the user to select the amount of pressure drop in the system before the pump starts. This input can be controlled by an external non-powered switch. Connect the contacts of a non-powered external switch to terminals 5 or 9 (COM) and 12 (PRESSURE DROP). When the switch is closed the system pressure will drop 20 PSI (when used with a 300 PSI transducer) before restarting the pump. When the switch is open the system pressure will drop 5 PSI (when used with a 300 PSI transducer) before restarting the pump.

RUN RELAY: This output indicates when the pump/motor is running. This output can be used to control power to a light, an alarm or other external device. When the pump/motor is off terminal 13 (RELAY1 – NO) will be open and terminal 14 (RELAY 1 – NC) will be connected to terminal 15 (RELAY1 – COM). When the pump/motor is on terminal 13 (RELAY1 – NO) will be connected to terminal 15 (RELAY1 – COM) and terminal 14 (RELAY 1 – NC) will be open. The relay rating is 250Vac, 5 amps maximum.

FAULT RELAY: This output indicates when the system is faulted. This output can be used to control power to a light, an alarm or other external device. When the system is not faulted terminal 16 (RELAY2 – NO) will be open and terminal 17 (RELAY 2 – NC) will be connected to terminal 18 (RELAY2 – COM). When the system is faulted terminal 16 (RELAY2 – NO) will be connected to terminal 18 (RELAY2 – COM) and terminal 17 (RELAY 2 – NC) will be open. The relay rating is 250Vac, 5 amps maximum.



SWITCH SETTINGS

BANK1 (1 2 3 4) BANK2 (1 2 3 4) BANK3 (1 2)

U = Up D = Down

MOTOR OVERLOAD SETTINGS	
BANK1 1 2 3	% OF RATING
U U U	100%
U U D	95%
U D U	90%
U D D	85%
D U U	80%
D U D	70%
D D U	50%
D D D	40%

NO WATER RESTART TIME	
BANK2 3 4	RESTART TIME
U U	10 MIN
U D	30 MIN
D U	1 HOUR
D D	2 HOURS

ACCEL/DECEL RAMP SETTINGS	
BANK1&2 4 1 2	RAMP SETTING
U U U	0.5 SEC
U U D	1 SEC
U D U	2 SEC
U D D	3 SEC
D U U	4 SEC
D U D	5 SEC
D D U	6 SEC
D D D	7 SEC

BANK3 1	MIN FREQ
U	30Hz
D	15Hz

BANK3 2	CARRIER FREQ
U	2KHz
D	8KHz

Motor Overload/Ramp Switches

CONTROL TERMINALS

POSITION	FUNCTION	DESCRIPTION
1	COM	SIGNAL COMMON
2	RUN/STOP	CLOSED = RUN OPEN = STOP
3	COM	SIGNAL COMMON
4	HAND/AUTO	CLOSED = HAND OPEN = AUTO
5	COM	SIGNAL COMMON
6	INPUT	TRANSDUCER INPUT
7	+24V	24VDC SUPPLY
8	+5V	5VDC SUPPLY
9	COM	SIGNAL COMMON
10	ANALOG OUTPUT	4-20mA OUTPUT
11	SP2/SP1	CLOSED = SETPOINT2 OPEN = SETPOINT1
12	PRESSURE DROP	CLOSED = 20PSI OPEN = 5PSI
13	RELAY1 - NO	MOTOR RUN STOP: NC = COM RUN: NO = COM
14	RELAY1 - NC	
15	RELAY1 - COM	
16	RELAY2 - NO	SYSTEM FAULT OK: NC = COM FAULT: NO = COM
17	RELAY2 - NC	
18	RELAY2 - COM	

Digital Input Controls/Relays

Motor Overload Setting:
May be set from 40-100%

Minimum Speed:
15 Hz and 30 Hz minimum frequency settings. (Permanently set to 30 Hz on filtered product.)

Carrier Frequency:
2 KHz to 8 KHz (Permanently set to 2 KHz on filtered product.)

Ramp Setting:
Adjust acceleration and deceleration ramps from .5 to 7 seconds

No Water Restart Time:
Restart delay after ddry well or loss of prime fault adjustable from 10 minutes to 2 hours.

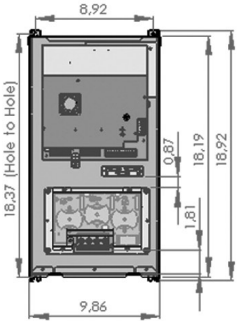
Carrier (IGBT switching) frequency: 2 KHz to 8 KHz

Outputs	**Analog output:** 4-20mA output based on drive frequency. 0-60 Hz. **Pump run status:** Relay to indicate pump run status. **Drive fault status:** Relay to indicate pump, motor or controller fault. May be connected to outside warning device or auto-dialer. LED Lights: **Green** – standby or pump running **Orange** – Under voltage **Red** – Number of blinks determine: replace controller, no water/loss of prime, sensor fault, pump or motor bound, short circuit/ground fault, input phase loss, temperature, over-voltage, or motor overload.
Electrical Efficiency	Over 95% at Full Load
No water restart time	Adjustable restart time for "dry well" function from 10 min. to 2 hours.
Protection Against	Short circuit, under voltage, motor overload, temperature, dead heading, run out, suction loss, sensor fault, bound pump, overvoltage, static discharge, dry well.
Max. Elevation	2000 m (6600 ft.)
Ambient Temp.	-22° F to 122° F
Max. Humidity	95% at 104F non-condensing
Air Pollution	Avoid mounting in areas with excessive dust, acids, corrosives and salts.
Approvals	UL, cUL, CE
Enclosure	Painted Steel enclosure, NEMA 3R, IP43, (rain tight)
Mounting	Wall mount
Cooling	Attached heat sink and fan.
Transducer	4-20 mA rated to 300 PSI with 180-inch, 3 core shielded cable, with internal case ground.
Output Filter (Optional)	Integrated filters protect the motor from voltage spikes even with up to 1,000 feet of wire between controller and motor.

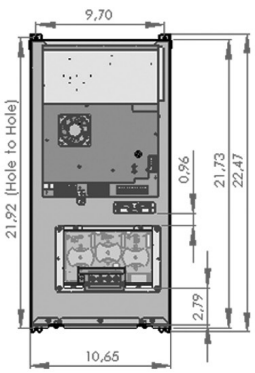
WEIGHTS AND DIMENSIONS

	Filtered Product	Non-Filtered Product
Size 1	21 lbs.	17 lbs.
Size 2	27 lbs.	22 lbs.
Size 3	52 lbs.	41 lbs.
Size 4	110 lbs.	84 lbs.

SIZE 1



SIZE 2



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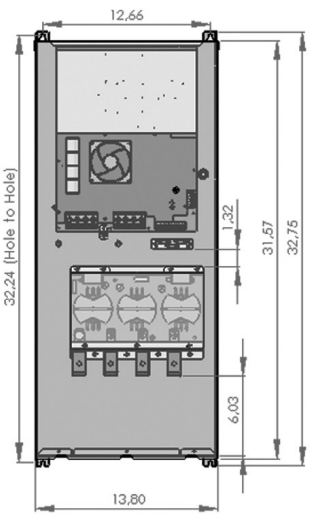

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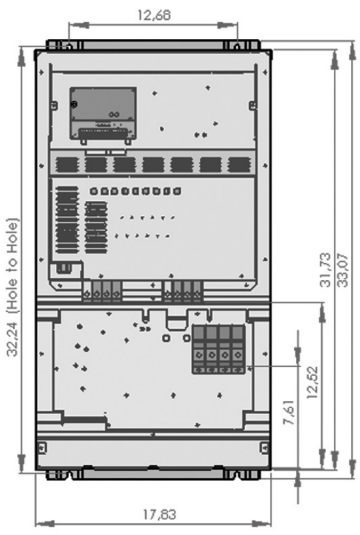
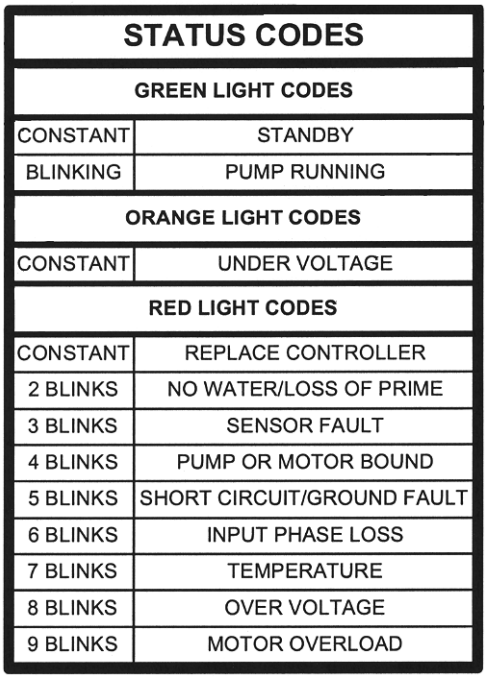


TROUBLESHOOTING

General

The Aquavar SPD drives are self-diagnosing controllers. If a problem occurs, observe the Status Code Indicator Light on the front of the unit. No Status Code Indicator Light means either no or low input voltage (less than 140Vac).

Refer to the status code label on the side of the controller access cover to diagnose system errors. *See the following diagram.*



STATUS CODES	
GREEN LIGHT CODES	
CONSTANT	STANDBY
BLINKING	PUMP RUNNING
ORANGE LIGHT CODES	
CONSTANT	UNDER VOLTAGE
RED LIGHT CODES	
CONSTANT	REPLACE CONTROLLER
2 BLINKS	NO WATER/LOSS OF PRIME
3 BLINKS	SENSOR FAULT
4 BLINKS	PUMP OR MOTOR BOUND
5 BLINKS	SHORT CIRCUIT/GROUND FAULT
6 BLINKS	INPUT PHASE LOSS
7 BLINKS	TEMPERATURE
8 BLINKS	OVER VOLTAGE
9 BLINKS	MOTOR OVERLOAD

Red Flashes	Fault Code	Restart Action
Constant	Replace Controller	Controller will not restart. Power must be reset to clear the fault.
2 Blinks	No Water/Loss of Prime	Controller will restart automatically according to the No Water Restart Time switches (switches 3 & 4 of bank 2).
3 Blinks	Sensor Fault	Controller will restart automatically when the sensor signal is within the valid operating range.
4 Blinks	Pump or Motor Bound	Controller will restart automatically 5 times. After 5 faults the power must be reset to clear the fault.
5 Blinks	Short Circuit/Ground Fault	Controller will not restart. Power must be reset to clear the fault.
6 Blinks	Input Phase Loss	Controller will restart automatically 5 times. After 5 faults the power must be reset to clear the fault.
7 Blinks	Temperature	Controller will restart automatically when temperature is within the operating range of the controller.
8 Blinks	Over Voltage	Controller will restart automatically when the input voltage is within the operating range of the controller.
9 Blinks	Motor Overload	Controller will restart automatically.

VFD INPUT WIRE SIZING CHARTS

	Ratings			Maximum Allowable Conductor Length (40˚C Ambient, 5% Voltage Drop) Conductor Size (75˚C Rated Wire)																				
Controller Input	**Motor HP**	**Motor SFA**	**Input Current**	**14**	**12**	**10**	**8**	**6**	**4**	**3**	**2**	**1**	**1/0**	**2/0**	**3/0**	**4/0**	**250**	**300**	**350**	**400**	**500**	**600**	**750**	**1000**
230V, Single Phase Input	½	2.9	7.2	400	618	1020	1532	2348	3530	4242	5335	6358	7562	8633	10297	11821	13013	14156	15361	16333	17959	19017	20579	22421
	¾	3.8	9.4	301	467	775	1167	1790	2693	3236	4071	4851	5770	6587	7858	9021	9931	10803	11722	12465	13705	14513	15705	17111
	1	4.7	11.6	239	374	623	941	1445	2175	2615	3290	3921	4664	5325	6352	7293	8029	8734	9477	10078	11081	11734	12698	13834
	1½	6.1	15.1	**178**	282	475	721	1110	1673	2012	2533	3019	3592	4102	4894	5618	6186	6729	7302	7764	8537	9041	9784	10659
	2	7.6	18.8		**219**	375	574	887	1340	1612	2030	2421	2882	3291	3927	4509	4964	5400	5860	6232	6852	7256	7852	8555
	3	10.1	25.0			**273**	426	662	1003	1209	1524	1819	2165	2474	2953	3391	3734	4063	4409	4689	5156	5460	5909	6437
	5	17.0	42.1					378	583	708	896	1072	1279	1464	1749	2011	2216	2411	2617	2784	3062	3242	3510	3824
	7½	26.0	64.3						**366**	449	573	690	826	950	1137	1309	1444	1573	1708	1818	2000	2118	2294	2499
	10	33.0	81.7								**441**	534	643	742	890	1027	1135	1236	1343	1430	1574	1668	1806	1968
	15	47.4	117.3										**432**	504	609	706	783	854	930	992	1093	1158	1256	1369
230V, 3 Phase Input	½	2.9	3.4	818	1263	2087	3160	4908	7511	9123	11653	14168	17119	19844	24266	28469	32000	35524	39133	42344	47573	51360	56659	63177
	¾	3.8	4.5	623	962	1591	2410	3745	5731	6962	8893	10812	13064	15144	18519	21727	24421	27111	29865	32315	36306	39196	43240	48214
	1	4.7	5.5	501	776	1285	1948	3027	4633	5628	7189	8741	10562	12244	14972	17566	19744	21919	24146	26127	29354	31690	34960	38981
	1½	6.1	7.2	383	595	988	1499	2331	3568	4335	5538	6734	8137	9433	11536	13534	15213	16888	18604	20131	22617	24417	26936	30035
	2	7.6	8.9	304	474	790	1201	1869	2863	3478	4444	5404	6530	7571	9258	10862	12210	13555	14932	16157	18153	19598	21620	24107
	3	10.1	11.9	224	351	590	900	1403	2152	2615	3342	4065	4912	5696	6966	8173	9187	10199	11235	12158	13659	14747	16268	18140
	5	17.0	20.0		**196**	339	527	826	1272	1548	1981	2410	2915	3381	4136	4853	5456	6058	6674	7222	8114	8760	9665	10777
	7½	26.0	30.6				333	530	823	1005	1288	1570	1900	2206	2700	3170	3565	3959	4362	4720	5304	5727	6319	7045
	10	33.0	38.8				**254**	409	641	785	1009	1231	1492	1734	2124	2495	2806	3117	3435	3718	4178	4511	4978	5550
	15	46.0	54.1					**280**	447	553	713	874	1062	1237	1517	1784	2009	2232	2461	2664	2995	3234	3570	3980
	20	60.0	70.6							**412**	536	660	805	941	1156	1362	1536	1707	1883	2040	2294	2477	2735	3050
	25	76.0	89.4								**410**	509	624	734	905	1069	1207	1343	1482	1607	1808	1953	2158	2406
	30	94.0	110.6										**493**	584	722	856	969	1080	1193	1295	1459	1576	1742	1943
460V, 3 Phase Input	5	8.5	10.0	539	843	1409	2145	3339	5117	6219	7945	9662	11677	13537	16555	19424	21834	24239	26701	28893	32461	35045	38661	43109
	7½	13.0	15.3	**335**	534	906	1391	2174	3337	4059	5189	6312	7630	8847	10821	12697	14274	15846	17457	18890	21224	22913	25278	28186
	10	16.5	19.4		**406**	701	1087	1704	2622	3192	4082	4968	6006	6967	8522	10001	11244	12483	13752	14882	16721	18052	19916	22206
	15	23.0	27.1			**482**	763	1207	1868	2279	2918	3554	4301	4991	6108	7170	8062	8952	9863	10674	11994	12949	14286	15930
	20	30.0	35.3				**568**	909	1418	1734	2225	2715	3288	3819	4676	5491	6176	6859	7558	8180	9193	9925	10951	12211
	25	37.0	43.5					721	1135	1394	1792	2190	2656	3089	3784	4446	5003	5557	6124	6630	7452	8045	8878	9900
	30	47.0	55.3						874	1080	1395	1709	2077	2421	2969	3492	3932	4369	4816	5215	5863	6330	6987	7791
	40	60	70.6							**824**	1072	1320	1610	1882	2313	2725	3071	3414	3766	4079	4588	4954	5470	6100
	50	79	92.9								**785**	**976**	1198	1409	1738	2054	2320	2581	2850	3090	3479	3757	4151	4629
	60	90	105.9									**841**	**1036**	1225	1514	1793	2028	2259	2495	2707	3049	3293	3641	4061
	75	109	128.2											**990**	1230	1464	1660	1852	2049	2226	2511	2712	3001	3348
	100	145	170.6													**1072**	1224	1371	1521	1658	1875	2027	2248	2509
	125	180	211.8															**1083**	1207	1320	1499	1621	1803	2013
	150	220	258.8																	**1063**	1212	1312	1466	1638
	200	270	317.6																			**1052**	1182	1323

Lengths in **BOLD** require 90˚C wire Input connections for models SPD20300 and SPD20300F require 90°C wire

For output cable sizing and maximum length, consult MAID Manual (BMAID).

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2) a leading global water technology company.

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