
AQUAVAR[®] CPC

(Centrifugal Pump Control)

SUBMITTAL

Project: _____

Specification Section : _____ Architect : _____

Submitted By : _____ Contractor : _____

Engineer : _____ Customer : _____

Date : _____

Effective :
Supersedes :

AQUAVAR CPC SUBMITTAL SCHEDULE

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

Effective :

Supersedes :

INTRODUCTION






AQUAVAR CPC Product Numbering

Voltage	Phase	NEMA 1 Base Model	Full Load Amps Normal Duty	Frame Size	Normal Duty Horsepower*
230	1	CPC20071	7.5	R1	1
		CPC20171	8.5	R1	2
		CPC20241	12	R2	3
		CPC20311	15.5	R2	5
		CPC20461	23	R3	7.5
		CPC20591	29.5	R3	10
		CPC20881	44.0	R4	15
		CPC21141	57.0	R4	20
		CPC21431	71.5	R6	25
		CPC21781	89.0	R6	30
		CPC22481	124.0	R6	40
CPC22481	124.0	R6	50		
230	3	CPC20041	4.6	R1	1
		CPC20071	7.5	R1	2
		CPC20121	11.8	R1	3
		CPC20171	16.7	R1	5
		CPC20241	24.2	R2	7.5
		CPC20311	30.8	R2	10
		CPC20461	46.2	R3	15
		CPC20591	59.4	R3	20
		CPC20751	74.8	R4	25
		CPC20881	88.0	R4	30
		CPC21141	114.0	R4	40
		CPC21431	143.0	R6	50
		CPC21781	178.0	R6	60
		CPC22211	221.0	R6	75
CPC22481	248.0	R6	100		
460	3	CPC40061	6.9	R1	3
		CPC40081	8.8	R1	5
		CPC40121	11.9	R1	7.5
		CPC40151	15.4	R2	10
		CPC40231	23	R2	15
		CPC40311	31	R3	20
		CPC40381	38	R3	25
		CPC40441	44	R4	30
		CPC40591	59	R4	40
		CPC40721	72	R4	50
		CPC40771	77	R5	60
		CPC40961	96	R5	75
		CPC41241	124	R6	100
		CPC41571	157	R6	125
		CPC41801	180	R6	150
		CPC42451	245	R7	200
		CPC43161	316	R7	250
		CPC43681	368	R8	300
		CPC44141	414	R8	350
		CPC44861	486	R8	400
CPC45261	526	R8	450		
CPC46021	602	R8	500		
CPC46451	645	R8	550		

* - HP classifications are for reference purposes only, always size the Aquavar according to the output amps and the service factor amps of the motor.

NOTE: Motors required are 3 phase.

CONTROL/TRANSDUCER WIRING (All Frames)

		X1	Control Wiring		
Analog I/O	Transducer Screen/ Shield	1	SCR Terminal for transducer shield. (Connected internally to chassis ground.)		
	Jumper Wire	2	AI1 Analog input channel 1, 2nd transducer. Default ² = frequency reference. Resolution 0.1%, accuracy ±1%. J1:AI1 OFF: 0...10 V (Ri = 312 kΩ)  J1:AI1 ON: 0...20 mA (Ri = 100 Ω) 		
				3	AGND Analog input circuit common. (Connected internally to chassis gnd. through 1 MW. Jumper wire to X1-11.)
				4	+10 V 10 V/10 mA reference voltage output for analog input potentiometer, accuracy ±2%. (Not used.)
	(-) Transducer (4-20mA) Connection (White or Black)	5	AI2 Analog input channel 2. Resolution 0.1%, accuracy ±1%. Transducer input 4-20 mA		
				6	AGND Analog input circuit common. (Connected internally to chassis gnd. through 1 MΩ)
	(+) Transducer Power Supply (Brown or Red)	7	AO1 Analog output, programmable. Default ² = Not used. Current 0...20 mA (load < 500 Ω)		
		8	AO2 Analog output, programmable. Default ² = Not used. 0...20 mA (load < 500 Ω)		
		9	AGND Analog output circuit common (Connected internally to chassis gnd. through 1 MΩ)		
Digital Inputs ¹	10	+24V Auxiliary voltage output 24 VDC / 250 mA (reference to GND). Short circuit protected. Transducer/digital input power supply.			
	Jumper Wire 11 and 12	11	GND Auxiliary voltage output common. (Connected internally as floating.)		
	10 - 15 E-stop or Jumper	12	DCOM Digital input common. To activate a digital input, there must be ≥+10 V (or ≤-10 V) between that input and DCOM. The 24 V may be provided by the AQUAVAR (X1-10) or by an external 12...24 V source of either polarity.		
		13	DI1 Digital input 1, programmable. Default ² = run enable		
		14	DI2 Digital input 2, programmable. Default ² = low water		
		15	DI3 Digital input 3, programmable. Default ² = E-stop or jumper		
		16	DI4 Digital input 4, programmable. Default ² = set point selection		
		17	DI5 Digital input 5, programmable. Default ² = not used		
	Relay Outputs	E-stop/start Jump to +24V for enable (15 to 10 Jumper)	18	DI6 Digital input 6, programmable. Default ² = not used	
19		RO1C	 Relay output 1, programmable. Default ² = run power to drive Maximum: 250 VAC / 30 VDC, 2 A Minimum: 500 mW (12 V, 10 mA)		
		20		RO1A	
		21		RO1B	
22		RO2C	 Relay output 2, programmable. Default ² = ready, pump is running Maximum: 250 VAC / 30 VDC, 2 A Minimum: 500 mW (12 V, 10 mA)		
		23		RO2A	
		24		RO2B	
25		RO3C	 Relay output 3, programmable. Default ² = not used Maximum: 250 VAC / 30 VDC, 2 A Minimum: 500 mW (12 V, 10 mA)		
		26		RO3A	
		27		RO3B	

¹ Digital input impedance 1.5 kΩ. Maximum voltage for digital inputs is 30 V.

² Default values depend on the macro used. Values specified are for the default macro, single/multipump.

NOTE: Jumper Wires between 3 and 11, 10 and 15, 11 and 12.

MULTIPUMP WIRING

Communications

Terminals 28...32 are for RS485 or modbus communications. Use shielded cables. For lengths of cable beyond 100 feet, use screen connections.

Do not directly ground the RS485 network at any point. Ground all devices on the network using their corresponding earthing terminals.

As always, the grounding wires should not form any closed loops, and all the devices should be earthed to a common ground.

Terminate the RS485 network using 120 Ω resistors at both ends of the network. Use the DIP switch to connect or disconnect the termination resistors. See following diagram and table.

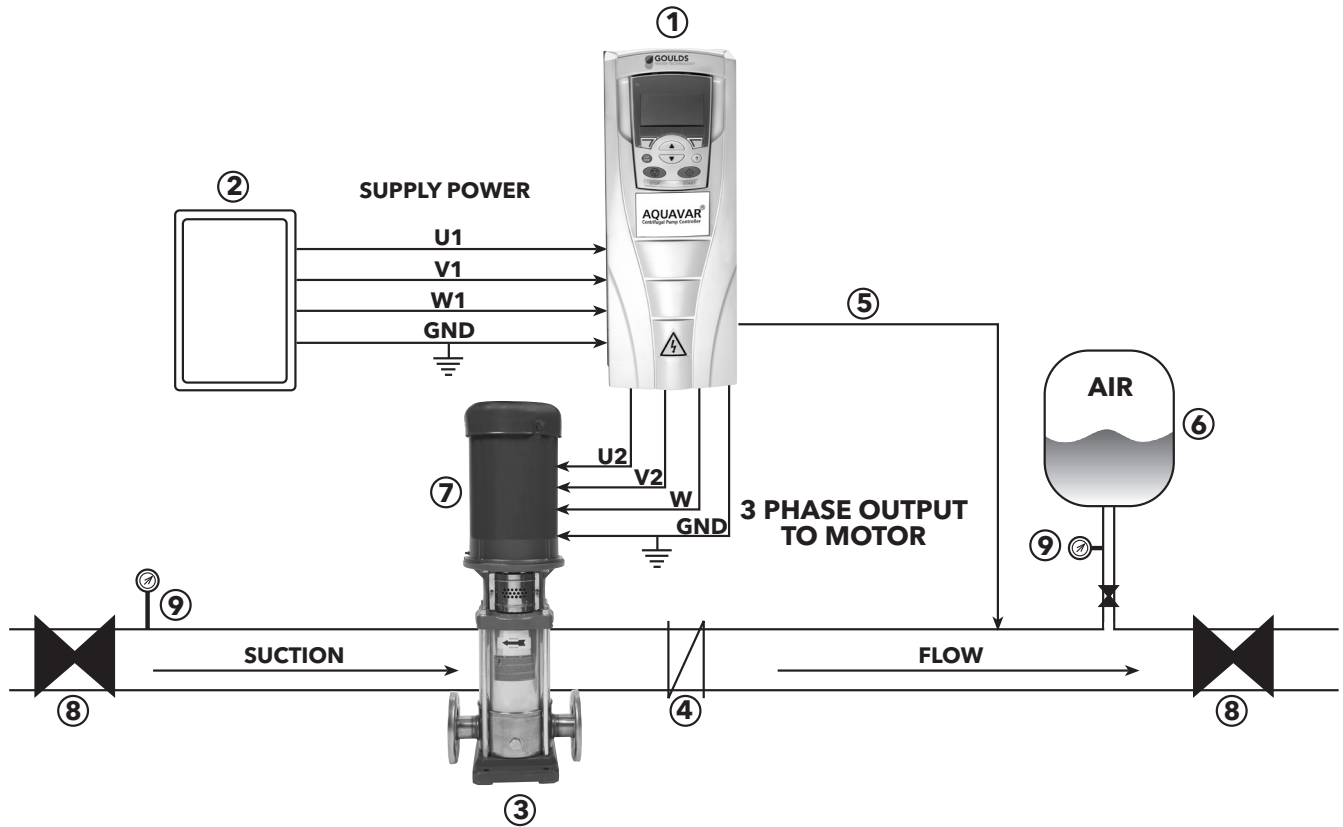


X1	Identification	Hardware Description ¹		
28	Screen	RS485 Multidrop Application Other Modbus Devices 	RS485 Interface 	
29	B			off position
30	A			on position
31	AGND			Bus Termination
32	Screen			

RS485
Multipump
Connections

¹ For functional descriptions, see "Standard Serial Communication" addendum.

RECOMMENDED INSTALLATION LAYOUT



- | | |
|--|---------------------------|
| ① AQUAVAR CPC | ⑥ AIR BLADDER TANK |
| ② FUSIBLE DISCONNECT | ⑦ 3 PHASE MOTOR |
| ③ CENTRIFUGAL PUMP | ⑧ GATE VALVE (BALL VALVE) |
| ④ CHECK VALVE | ⑨ PRESSURE GAUGE |
| ⑤ PRESSURE TRANSDUCER (CABLE ASSEMBLY) | |

- NOTES:**
- Use of load filter (reactor) should be used between the Aquavar and motor, if motor leads exceed 60 wire feet.
 - If single phase power is supplied on 200 - 240 volt three phase units, use U1 and W1 as input terminals from single phase supply, and de-rate unit by 50% of three phase rating.

TECHNICAL DATA

Cable Terminals (Frames R1-R6)

Mains and motor cable maximum sizes (per phase) accepted at the cable terminals and the tightening torques are listed below.

Frame Size	U1, V1, W1 U2, V2, W2				Earthing PE "Ground"				Control Wire			
	Maximum Wire Size		Torque		Maximum Wire Size		Torque		Maximum Wire Size		Torque	
	mm ²	AWG	Nm	lb-ft	mm ²	AWG	Nm	lb-ft	mm ²	AWG	Nm	lb-ft
R1	6	8	1.4	1.0	4	10	1.4	1.0	1.5	16	0.4	0.3
R2	10	6	1.4	1.0	10	8	1.4	1.0				
R3	25	3	1.8	1.3	16	6	1.8	1.3				
R4	50	1/0	2.0	1.5	35	2	2.0	1.5				
R5	70	2/0	15	11.1	70	2/0	15	11.1				
R6	185	350 MCM	40	29.5	95	4/0	8	5.9				

Cable Terminals (Frames R7-R8)

Mains and motor cable maximum sizes (per phase) accepted at the cable terminals and the tightening torques are listed below.

Frame Size	U1, V1, W1, U2, V2, W2					Earthing PE			
	Number of holes per phase	Cable Diameter		Screw	Tightening Torque		Screw	Tightening Torque	
		mm	in		Nm	lb-ft		Nm	lb-ft
R7 ^①	2	58	2.28	M12	50...75	35...55	M8	15...22	10...16
R8 ^①	3	58	2.28	M12	50...75	35...55	M8	15...22	10...16

① **NOTE:** Maximum AWG size for R7 Frame is (2) x 500MCM.
Maximum AWG size for R8 Frame is (3) x 500MCM.

TECHNICAL DATA

Cable Sizing/Ratings

208...240 Volt Drives

The following tables provide current, horsepower, frame size and recommended cable sizes for the Aquavar CPC.

GWT AQUAVAR CPC							
Voltage	Phase	NEMA 1 Base Model	Full Load Amps	NORMAL DUTY HORSEPOWER	Frame Size ²	Output Cable Size Min. AWG ¹	Input Cable Size Min. AWG ¹
230	1	CPC20171	8.5	2	R1	14	10
		CPC20241	12	3	R2	12	8
		CPC20311	15.5	5	R2	12	8
		CPC20461	23	7.5	R3	10	6
		CPC20591	29.5	10	R3	8	4
		CPC20881	44.0	15	R4	6	2
		CPC21141	57.0	20	R4	4	1/0
		CPC21431	71.5	25	R6	3	3/0
		CPC21781	89.0	30	R6	2	4/0
		CPC22211	110.5	40	R6	1/0	300MCM
		CPC22481	124.0	50	R6	2/0	350MCM
230	3	CPC20121	11.8	3	R1	14	14
		CPC20171	16.7	5	R1	10	10
		CPC20241	24.2	7.5	R2	8	8
		CPC20311	30.8	10	R2	8	8
		CPC20461	46.2	15	R3	6	6
		CPC20591	59.4	20	R3	4	4
		CPC20751	74.8	25	R4	3	3
		CPC20881	88.0	30	R4	2	2
		CPC21141	114.0	40	R4	1/0	1/0
		CPC21431	143.0	50	R6	3/0	3/0
		CPC21781	178.0	60	R6	4/0	4/0
		CPC22211	221.0	75	R6	300MCM	300MCM
		CPC22481	248.0	100	R6	350MCM	350MCM

(1) Recommended AWG Size based on NEC table 310.16, 40° C ambient, 90° C, UL type copper wire. For other wire sizes or types, consult local, state or NEC codes.

(2) Frame sizes R7 and R8, the Aquavar CPC will have multiple conductor terminals for each phase. Consult technical section (CABLE TERMINALS).

TECHNICAL DATA

Cable Sizing/Ratings

380...480 Volt Drives

The following table provides Aquavar CPC rating information and recommended wire sizing for the input and output cables.

Voltage	Phase	GWT AQUAVAR CPC			Frame Size ²	Output Cable Size Min. AWG ¹	Input Cable Size Min. AWG ¹
		NEMA 1 Base Model	Full Load Amps	NORMAL DUTY HORSEPOWER			
460	3	CPC40061	6.9	3	R1	14	14
		CPC40081	8.8	5	R1	14	14
		CPC40121	11.9	7.5	R1	14	14
		CPC40151	15.4	10	R2	12	12
		CPC40231	23	15	R2	12	12
		CPC40311	31	20	R3	10	8
		CPC40381	38	25	R3	8	8
		CPC40451	45	30	R3	8	6
		CPC40591	59	40	R4	6	4
		CPC40721	72	50	R4	4	3
		CPC40771	77	60	R4	4	3
		CPC40971	97	75	R4	3	1
		CPC41251	125	100	R5	1	2/0
		CPC41571	157	125	R6	2/0	3/0
		CPC41801	180	150	R6	3/0	4/0
		CPC42451	245	200	R7	350MCM	350MCM
		CPC43161	316	250	R7	2 X 250MCM	2 X 250MCM
		CPC43681	368	300	R8	2 X 300MCM	2 X 300MCM
		CPC44141	414	350	R8	2 X 400MCM	2 X 400MCM
		CPC44861	486	400	R8	2 X 500MCM	2 X 500MCM
CPC45261	526	450	R8	2 X 350MCM	2 X 350MCM		
CPC46021	602	500	R8	2 X 500MCM	2 X 500MCM		
CPC46451	645	550	R8	2 X 500MCM	2 X 500MCM		

(1) Recommended AWG Size based on NEC table 310.16, 40° C ambient, 90° C, UL type copper wire. For other wire sizes or types, consult local, state or NEC codes.

(2) Frame sizes R7 and R8, the Aquavar CPC will have multiple conductor terminals for each phase. Consult technical section (CABLE TERMINALS) for maximum wire diameter and torque values.

TECHNICAL DATA

Fuse Sizing/Ratings

208...240 Volt Drives

Branch circuit protection must be provided by the end user, electrical contractor or distributor, sized per local, state or local National Electrical Codes. Recommendations for fused circuit protection are in the following tables.

GWT AQUAVAR CPC							
Voltage	Phase	NEMA 1 Base Model	Full Load Amps	NORMAL DUTY HORSEPOWER	Frame Size	Input Current Amps	Fuse Type ³ JJN
230	1	CPC20171	8.5	2	R1	17.3	20
		CPC20241	12	3	R2	24.5	30
		CPC20311	15.5	5	R2	31.6	40
		CPC20461	23	7.5	R3	46.9	60
		CPC20591	29.5	10	R3	60.2	70
		CPC20881	44.0	15	R4	89.8	110
		CPC21141	57.0	20	R4	116.3	150
		CPC21431	71.5	25	R6	145.9	175
		CPC21781	89.0	30	R6	181.6	225
		CPC22211	110.5	40	R6	225.4	300
		CPC22481	124.0	50	R6	252.9	300
230	3	CPC20121	11.8	3	R1	12.0	15
		CPC20171	16.7	5	R1	17.0	25
		CPC20241	24.2	7.5	R2	24.7	30
		CPC20311	30.8	10	R2	31.4	40
		CPC20461	46.2	15	R3	47.1	60
		CPC20591	59.4	20	R3	60.6	70
		CPC20751	74.8	25	R4	76.3	90
		CPC20881	88.0	30	R4	89.8	110
		CPC21141	114.0	40	R4	116.3	150
		CPC21431	143.0	50	R6	145.9	175
		CPC21781	178.0	60	R6	181.6	225
		CPC22211	221.0	75	R6	225.4	300
		CPC22481	248.0	100	R6	252.9	300

(3) UL Class T fuses are recommended for short circuit protection. Very fast acting Bussmann* T-tron type JJN and JJS are shown in the Aquavar CPC tables. Other manufacturers are acceptable if they meet fuse requirements.

* Bussmann is a registered trademark of Cooper Industries Inc.

TECHNICAL DATA

Fuse Sizing/Ratings

380...480 Volt Drives

The following table provides Aquavar CPC rating information and recommended fuse sizing for the input short circuit protection. Branch circuit protection must be provided by the end user, contractor or distributor. Sized according to local or applicable NEC codes.

GWT AQUAVAR CPC							
Voltage	Phase	NEMA 1 Base Model	Full Load Amps	NORMAL DUTY HORSEPOWER	Frame Size	Input Current Amps	Fuse Type ³ JJN
460	3	CPC40061	6.9	3	R1	7.0	10
		CPC40081	8.8	5	R1	9.0	15
		CPC40121	11.9	7.5	R1	12.1	15
		CPC40151	15.4	10	R2	15.7	20
		CPC40231	23	15	R2	23.5	30
		CPC40311	31	20	R3	31.6	40
		CPC40381	38	25	R3	38.8	45
		CPC40451	45	30	R3	44.9	60
		CPC40591	59	40	R4	60.2	70
		CPC40721	72	50	R4	73.4	90
		CPC40771	77	60	R4	78.5	90
		CPC40971	97	75	R4	98.0	125
		CPC41251	125	100	R5	126.5	150
		CPC41571	157	125	R6	160.1	200
		CPC41801	180	150	R6	183.6	225
		CPC42451	245	200	R7	250.0	300
		CPC43161	316	250	R7	322.3	400
		CPC43681	368	300	R8	375.4	450
		CPC44141	414	350	R8	422.3	500
		CPC44861	486	400	R8	495.8	600
CPC45261	526	450	R8	536.5	800		
CPC46021	602	500	R8	614.0	800		
CPC46451	645	550	R8	658.0	800		

(3) UL Class T fuses are recommended for short circuit protection. Very fast acting Bussmann* T-tron type JJN and JJS are shown in the Aquavar CPC tables. Other manufacturers are acceptable if they meet fuse requirements.

TECHNICAL DATA

Input Power (Mains) Connection

Input Power (Mains) Connection Specifications	
Voltage (U_1)	208/220/230/240 VAC 3-phase (1-phase) +10%-15% for CPC2XXXX. 400/415/440/460/480 VAC 3-phase +10%-15% for CPC4XXXX.
Prospective Short-Circuit Current (IEC 629)	Maximum allowed prospective short-circuit current in the supply is 65 kA in a second providing that the mains cable of the drive is protected with appropriate fuses. US: 65,000 AIC.
Frequency	48...63 Hz
Imbalance	Max. $\pm 3\%$ of nominal phase to phase input voltage.
Fundamental Power Factor ($\cos \phi_1$)	0.98 (at nominal load)
Cable Temperature Rating	90° C (194° F) rating minimum

Motor Connection

Motor Connection Specifications			
Voltage (U_2)	0... U_1 , 3-phase symmetrical, U_{max} at the field weakening point.		
Frequency	0...500 Hz		
Frequency Resolution	0.01 Hz		
Current	See "Ratings" on pages 131-134		
Power Limit	1.5 x Rated HP		
Field Weakening Point	10...60 Hz		
Switching Frequency	Selectable: 1, 4 or 8 kHz		
Cable Temperature Rating	90° C (194° F) rating minimum		
Maximum Motor Cable Length	Frame Size	Maximum Motor Cable Length	
		$f_{sw} = 1$ or 4 kHz	$f_{sw} = 8$ kHz
	R1	100 m	50 m
	R2 - R4	200 m	100 m
	R5 - R6	300 m	150 m
R7 - R8	300 m	NA	



WARNING! Using a motor cable longer than specified in the chart above may cause permanent damage to the drive or motor.



WARNING! Use of an output load filter or reactor is required when motor leads exceed the above recommendations. Consult motor manufacturer on required use of inverter drives.

TECHNICAL DATA

Control Connection

Control Connection Specifications	
Analog Inputs and Outputs	See table heading "Control Wiring" on page 4.
Digital Inputs	Digital input impedance 1.5 k Ω . Maximum voltage for digital inputs is 30 V.
Relays (Digital Outputs)	<ul style="list-style-type: none"> • Maximum contact voltage: 30 V DC, 250 V AC • Maximum contact current / power: 6 A, 30 V DC; 1500 VA, 250 V AC • Maximum. continuous current: 2 A rms ($\cos \varphi = 1$), 1 A rms ($\cos \varphi = 0.4$) • Minimum load: 500 mW (12 V, 10 mA) • Contact material: Silver-nickel (AgN) • Isolation between relay digital outputs, test voltage: 2.5 kV rms, 1 minute
Cable Specifications	See "Control Cables" on page 14 of the instruction manual.

Efficiency (Frames R1-R8)

Approximately 98% at nominal power level.

Cooling (Frames R1-R6)

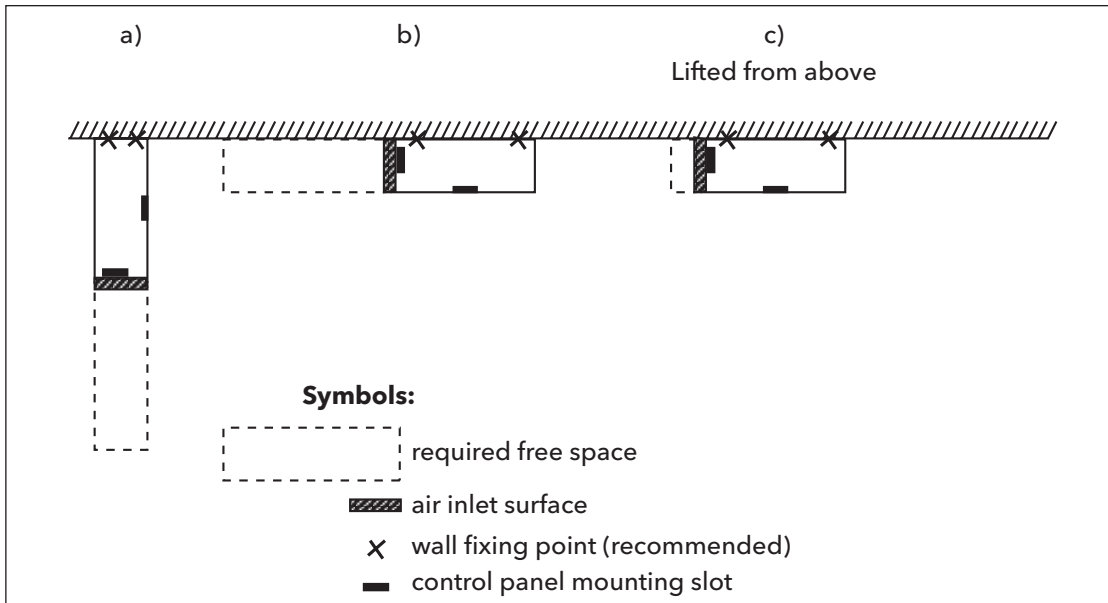
Cooling Specifications	
Method	Internal fan, flow direction from bottom to top.
Requirement	Free space around the unit: <ul style="list-style-type: none"> • 200 mm (8 in) above and below the unit. • 25 mm (1 in) along each side of the unit.

TECHNICAL DATA

Cooling (Frames R7-R8)

Installation Procedure

Choose the mounting orientation (a, b, c or d).



Frame Size	Mounting Orientation	Required Free Space Around the Unit for Mounting, Maintenance, Service and Cooling*					
		Front		Side		Above	
		mm	in	mm	in	mm	in
R7	a,d	500	20	-	-	200	7.9
	b	-	-	500	20	200	7.9
	c	-	-	200**	7.9**	lifting space	lifting space
R8	a,d	600	24	-	-	300	12
	b	-	-	600	24	300	12
	c	-	-	300**	12**	lifting space	lifting space

* Space for the installer not included.

** Space for the fan and capacitor replacement not included.

Mounting orientations a and b

Make holes in the wall (recommended):

1. Lift the unit against the wall into the mounting place.
2. Mark the locations for the two fixing points in the wall.
3. Mark the bottom edges of the unit to the floor.

TECHNICAL DATA

Air Flow, 380...480 Volt Drives

The following table lists heat loss and air flow data for 380...480 Volt drives.

Voltage	Phase	GWT AQUAVAR CPC			Frame Size	Heat Loss		Air Flow CFM
		NEMA 1 Base Model	Full Load Amps	NORMAL DUTY HORSEPOWER		Watts	BTU/HR	
		460	3	CPC40061		6.9	3	
		CPC40081	8.8	5	R1	127	433	26
		CPC40121	11.9	7.5	R1	172	587	26
		CPC40151	15.4	10	R2	232	792	52
		CPC40231	23	15	R2	337	1150	52
		CPC40311	31	20	R3	457	1560	79
		CPC40381	38	25	R3	562	1918	79
		CPC40451	45	30	R3	667	2276	165
		CPC40591	59	40	R4	907	3096	165
		CPC40721	72	50	R4	1120	3820	165
		CPC40771	77	60	R4	1295	4420	168
		CPC40971	97	75	R4	1440	4915	168
		CPC41251	125	100	R5	1940	6621	239
		CPC41571	157	125	R6	2310	7884	239
		CPC41801	180	150	R6	2810	9590	239
		CPC42451	245	200	R7	3850	13144	319
		CPC43161	316	250	R7	6850	23386	319
		CPC43681	368	300	R8	6850	23386	721
		CPC44141	414	350	R8	7850	26800	721
		CPC44861	486	400	R8	7850	26800	721
		CPC45261	526	450	R8	7600	25946	721
		CPC46021	602	500	R8	8100	27653	721
		CPC46451	645	550	R8	9100	31067	721

TECHNICAL DATA

Air Flow, 208...240 Volt Drives

The following table lists heat loss and air flow data for 208...240 Volt drives.

GWT AQUAVAR CPC								
Voltage	Phase	NEMA 1 Base Model	Full Load Amps	NORMAL DUTY HORSEPOWER	Frame Size	Heat Loss		Air Flow CFM
						Watts	BTU/HR	
230	1	CPC20171	8.5	2	R1	161	551	26
		CPC20241	12	3	R2	227	776	52
		CPC20311	15.5	5	R2	285	373	52
		CPC20461	23	7.5	R3	420	1434	79
		CPC20591	29.5	10	R3	536	1829	79
		CPC20881	44.0	15	R4	786	2685	165
		CPC21141	57.0	20	R4	1014	3463	165
		CPC21431	71.5	25	R6	1268	4431	238
		CPC21781	89.0	30	R6	1575	5379	238
		CPC22211	110.5	40	R6	1952	6666	238
		CPC22481	124.0	50	R6	2189	7474	238
230	3	CPC20121	11.8	3	R1	116	404	26
		CPC20171	16.7	5	R1	161	551	26
		CPC20241	24.2	7.5	R2	227	776	52
		CPC20311	30.8	10	R2	285	373	52
		CPC20461	46.2	15	R3	420	1434	79
		CPC20591	59.4	20	R3	536	1829	79
		CPC20751	74.8	25	R4	671	2290	165
		CPC20881	88.0	30	R4	786	2685	165
		CPC21141	114.0	40	R4	1014	3463	165
		CPC21431	143.0	50	R6	1268	4431	238
		CPC21781	178.0	60	R6	1575	5379	238
		CPC22211	221.0	75	R6	1952	6666	238
				CPC22481	248.0	100	R6	2189

TECHNICAL DATA

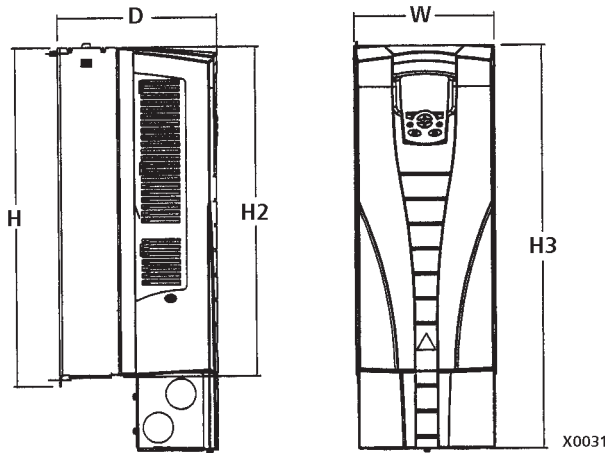
Dimensions and Weights

Frames R1-R6

The dimensions and mass for the AQUAVAR depend on the frame size and enclosure type. If unsure of frame size, first, find the "Type" code on the drive labels. Then look up that model on page 3, to determine the frame size. A complete set of dimensional drawings for AQUAVAR drives is located in the Technical Data section.

Units with UL Type 1 Enclosures

Outside Dimensions



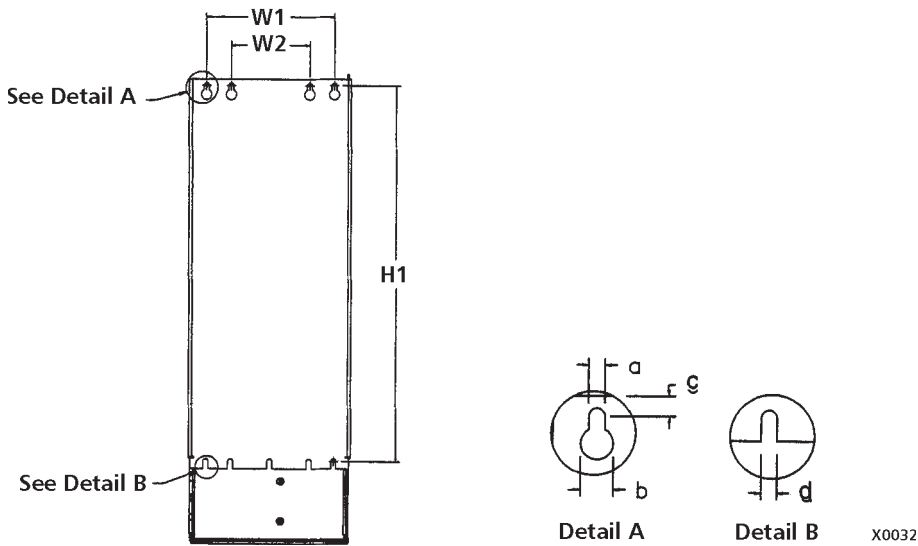
UL Type 1 - Dimensions for each Frame Size												
Ref.	R1		R2		R3		R4		R5		R6	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
W	125	4.9	125	4.9	203	8.0	203	8.0	265	10.4	300	11.8
H	330	13.0	430	16.9	490	19.3	596	23.4	602	23.7	700	27.6
H2	315	12.4	415	16.3	478	18.8	583	23.0	578	22.8	698	27.5
H3	369	14.5	469	18.5	583	23.0	689	27.1	739	29.1	880	34.6
D	212	8.3	222	8.7	231	9.1	262	10.3	286	11.3	400	15.8

NOTE: Enclosures are standard NEMA 1, indoor use only.

TECHNICAL DATA

Frames R1-R6

Mounting Dimensions



UL Type 1 - Dimensions for each Frame Size

Ref.	R1		R2		R3		R4		R5		R6	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
W1*	98.0	3.9	98.0	3.9	160	6.3	160	6.3	238	9.4	263	10.4
W2*	—	—	—	—	98.0	3.9	98.0	3.9	—	—	—	—
H1*	318	12.5	418	16.4	473	18.6	578	22.8	588	23.2	675	26.6
a	5.5	0.2	5.5	0.2	6.5	0.25	6.5	0.25	6.5	0.25	9.0	0.35
b	10.0	0.4	10.0	0.4	13.0	0.5	13.0	0.5	14.0	0.55	14.0	0.55
c	5.5	0.2	5.5	0.2	8.0	0.3	8.0	0.3	8.5	0.3	8.5	0.3
d	5.5	0.2	5.5	0.2	6.5	0.25	6.5	0.25	6.5	0.25	9.0	0.35

* Center to center dimension.

Weight

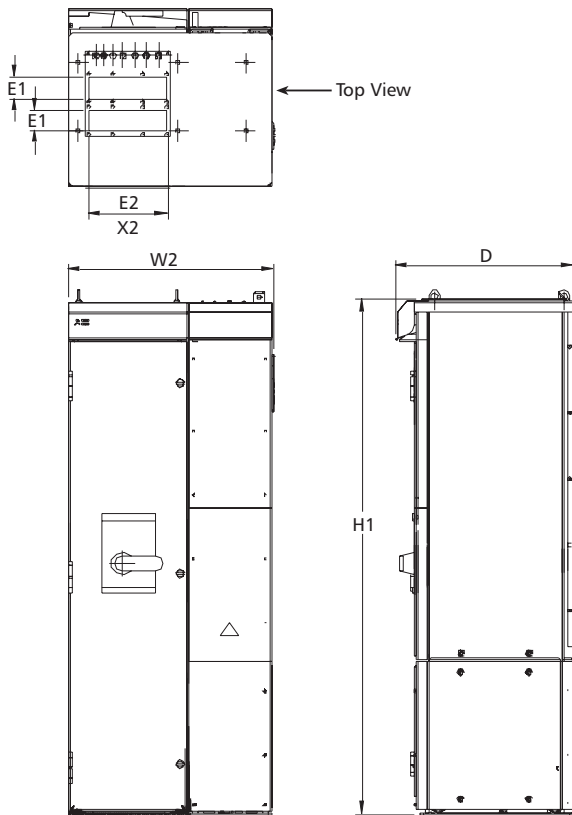
UL Type 1 - Weight for each Frame Size

R1		R2		R3		R4		R5		R6	
kg	lb.	kg	lb.	kg	lb.	kg	lb.	kg	lb.	kg	lb.
6.1	13.4	8.9	19.5	14.7	32.4	22.8	50.2	37	82	78	176

TECHNICAL DATA

Weights and Dimensions

Frames R7-R8



NEMA 1 Enclosure												
Frame	H1		W2		Depth		Weight		E1		E2	
	mm	in	mm	in	mm	in	kg	lb.	mm	in	mm	in
R7	1503	59.17	609	23.98	495	19.49	195	430	92	3.62	250	9.84
R8	2130	83.86	800	31.5	585	23.03	375	827	92	3.62	250	9.84

Drawing is not for engineering purposes.

TECHNICAL DATA

Degrees of Protection

Available enclosures:

- **IP 21 / UL Type 1 Enclosure (Standard).** The site must be free of airborne dust, corrosive gases or liquids, and conductive contaminants such as condensation, carbon dust and metallic particles. Indoor use only.
- **IP 54 / UL Type 12 Enclosure.** This enclosure provides protection from airborne dust and light sprays or splashing water from all directions. Indoor use only.
- **UL Type 3R- Enclosures** are intended for outdoor use to provide a degree of protection from falling rain. Undamaged by the formation of ice on the enclosure. May be cooled by forced air and louvers for vents.
- **IP 56 / UL Type 4 Enclosure.** Constructed for outdoor use or hose down applications. Provides a degree of protection against falling dirt, rain, sleet, snow, windblown dust and splashing water. Not suitable for direct sun. A sun shield or canopy may be required.

Compared to the IP 21 / UL Type 1 Enclosure, the IP 54 / UL Type 12 Enclosure has:

- The same internal plastic shell as the IP 21 Enclosure
- A different outer plastic cover
- An additional internal fan to improve cooling
- Larger dimensions
- The same rating (does not require a derating)

TECHNICAL DATA

Ambient Conditions

The following table lists the AQUAVAR environmental requirements.

Ambient Environment Requirements		
	Installation Site	Storage and Transportation in the protective package
Altitude¹	<ul style="list-style-type: none"> • 0...1000 m (0...3,300 ft) • 1000...2000 m (3,300...6,600 ft) if P_N and I₂ derated 1% every 100 m above 1000 m (300 ft above 3,300 ft). 	
Ambient Temperature²	<ul style="list-style-type: none"> • -15...40° C (5...104° F) • Max. 50° C (122° F) if P_N and I₂ derated to 90%. 	-40...70° C (-40...158° F)
Relative humidity	< 95% (non-condensing)	
Contamination levels (IEC 721-3-3)	<ul style="list-style-type: none"> • No conductive dust allowed. • The ACS550 should be installed in clean air according to enclosure classification. • Cooling air must be clean, free from corrosive materials and free from electrically conductive dust. • Chemical gases: Class 3C2 • Solid particles: Class 3S2 	<p>Storage</p> <ul style="list-style-type: none"> • No conductive dust allowed. • Chemical gases: Class 1C2 • Solid particles: Class 1S2 <p>Transportation</p> <ul style="list-style-type: none"> • No conductive dust allowed. • Chemical gases: Class 2C2 • Solid particles: Class 2S2
Sinusoidal Vibration	<ul style="list-style-type: none"> • Mechanical conditions: Class 3M4 (IEC 60721-3-3) • 2...9 Hz 3.0 mm (0.12 in) • 9...200 Hz 10 m/s² (33 ft/s²) 	In accordance with ISTA-1A and 1B specifications.
Shock (IEC 68-2-29)	Not allowed	Maximum 100 m/s ² (330 ft/s ²), 11ms (36 ft)
Free Fall³	Not allowed	<ul style="list-style-type: none"> • 76 cm (30 in), frame size R1 • 61cm (24 in), frame size R2 • 46 cm (18 in), frame size R3 • 31 cm (12 in), frame size R4 • 25 cm (10 in), frame size R5 • 15 cm (6 in), frame size R6

(1) Consult factory above 6600' altitude.

(2) Derate drive one HP size from motor for higher temperatures (e.g. motor HP = 10 HP; use 15 HP Aquavar in temperature up to 122° F).

(3) R7-R8 not allowed for free fall any distance.

TECHNICAL DATA

Materials

Materials Specifications	
Drive Enclosure	<ul style="list-style-type: none"> • PC/ABS 2.5 mm, color NCS 1502-Y (RAL 90021 / PMS 420 C and 425 C) • Hot-dip zinc coated steel sheet 1.5...2 mm, thickness of coating 100 micrometers. • Cast aluminium AlSi • Extruded aluminium AlSi
Package	Corrugated board (drives and option modules), expanded polystyrene. Plastic covering of the package: PE-LD, bands PP or steel.
Disposal	<p>The drive contains raw materials that should be recycled to preserve energy and natural resources. The package materials are environmentally compatible and recyclable. All metal parts can be recycled. The plastic parts can either be recycled or burned under controlled circumstances, according to local regulations. Most recyclable parts are marked with recycling marks.</p> <p>If recycling is not feasible, all parts excluding electrolytic capacitors and printed circuit boards can be landfilled. The DC capacitors contain electrolyte and the printed circuit boards contain lead, both of which will be classified as hazardous waste within the EU. They must be removed and handled according to local regulations.</p> <p>For further information on environmental aspects and more detailed recycling instructions, please contact your local recycler.</p>

Applicable Standards

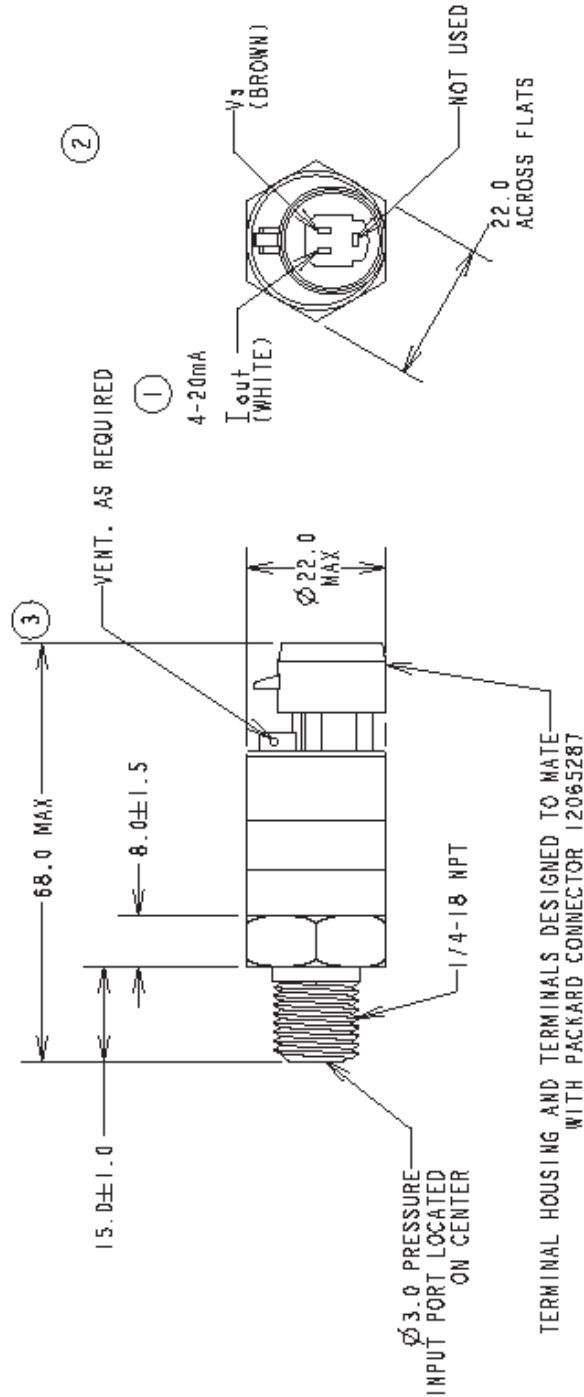
The drive complies with the following standards. The compliance with the European Low Voltage Directive is verified according to standards EN 50178 and EN 60204-1.

Applicable Standards	
EN 50178 (1997)	Electronic equipment for use in power installations.
EN 60204-1 (1997)	Safety of machinery. Electrical equipment of machines. Part 1: General requirements. Provisions for compliance: The final assembler of the machine is responsible for installing: <ul style="list-style-type: none"> • An emergency-stop device • A supply disconnecting device
EN 60529: 1991 (IEC 529), IEC 60664-1 (1992)	Degrees of protection provided by enclosures (IP code).
EN 61800-3 (1996) + Amendment A11 (2000)	EMC product standard including specific test methods.
UL 508C	UL Standard for Safety, Power Conversion Equipment, second edition.

APPENDIX

Transducer Data/Specifications

DRAWING A00439C



REV	ID	DESCRIPTION	UNITS: METRIC	DO NOT SCALE DRAWING																												
1	(1)	ADDED NOTE.	GENERAL TOLERANCES UNLESS NOTED OTHERWISE: INCHES: MILLIMETERS: X.XX ± 0.20 X.X ± .50 X.XXX ± .005 X.XX ± .125 ANGLES: ALL ± .5	THIS DRAWING IS THE PROPERTY OF GOLD'S WATER TECHNOLOGY/VALVING. SPECIFICATIONS BY US AND SHALL NOT, EXCEPT UPON PRIOR WRITTEN PERMISSION, BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. PERMISSION TO REPRODUCE THIS DRAWING FOR OTHER THAN THE MANUFACTURE OF ARTICLES FOR GOLD'S WATER TECHNOLOGY/VALVING MUST BE OBTAINED FROM GOLD'S WATER TECHNOLOGY/VALVING. DRAWING TO BE RETURNED UPON REQUEST.																												
	(2)	ADDED OEM, ENCOM PN.	GEOMETRIC TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 AND APPLICABLE GMAI STANDARDS	<input checked="" type="checkbox"/> PARALLELISM <input checked="" type="checkbox"/> PERPENDICULARITY <input checked="" type="checkbox"/> ANGULARITY <input checked="" type="checkbox"/> TRUE POSITION <input checked="" type="checkbox"/> RUN-OUT <input checked="" type="checkbox"/> TOTAL RUNOUT (TIR) <input checked="" type="checkbox"/> CONCENTRICITY <input checked="" type="checkbox"/> FLATNESS <input checked="" type="checkbox"/> PROFILE																												
	(3)	ADDED NEW PN. BL 02/11/04	THIRD ANGLE PROJECTION	<p>THE DRAWING IS THE PROPERTY OF GOLD'S WATER TECHNOLOGY/VALVING. SPECIFICATIONS BY US AND SHALL NOT, EXCEPT UPON PRIOR WRITTEN PERMISSION, BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. PERMISSION TO REPRODUCE THIS DRAWING FOR OTHER THAN THE MANUFACTURE OF ARTICLES FOR GOLD'S WATER TECHNOLOGY/VALVING MUST BE OBTAINED FROM GOLD'S WATER TECHNOLOGY/VALVING. DRAWING TO BE RETURNED UPON REQUEST.</p>																												
		<table border="1"> <tr> <td colspan="2">PRESSURE TRANSDUCER</td> <td colspan="2">SIZES ALL</td> </tr> <tr> <td>MODEL(S)</td> <td>AQUAVAR</td> <td>DATE</td> <td>7/1/03</td> </tr> <tr> <td>DRAWN</td> <td>TMF</td> <td>APPROVED</td> <td>WDW</td> </tr> <tr> <td>CAD</td> <td>PRO/E</td> <td>DRAWING</td> <td>A00439C</td> </tr> <tr> <td>PATTERN</td> <td>XXX</td> <td>VOLUME</td> <td>N/A</td> </tr> <tr> <td></td> <td></td> <td>SCALE</td> <td>1:1</td> </tr> <tr> <td></td> <td></td> <td>SHEET</td> <td>1 of 1</td> </tr> </table>			PRESSURE TRANSDUCER		SIZES ALL		MODEL(S)	AQUAVAR	DATE	7/1/03	DRAWN	TMF	APPROVED	WDW	CAD	PRO/E	DRAWING	A00439C	PATTERN	XXX	VOLUME	N/A			SCALE	1:1			SHEET	1 of 1
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		SCALE	1:1																													
		SHEET	1 of 1																													

Model: A00439C Model Rev: 1 Release Level RELEASED 01-JUL-03

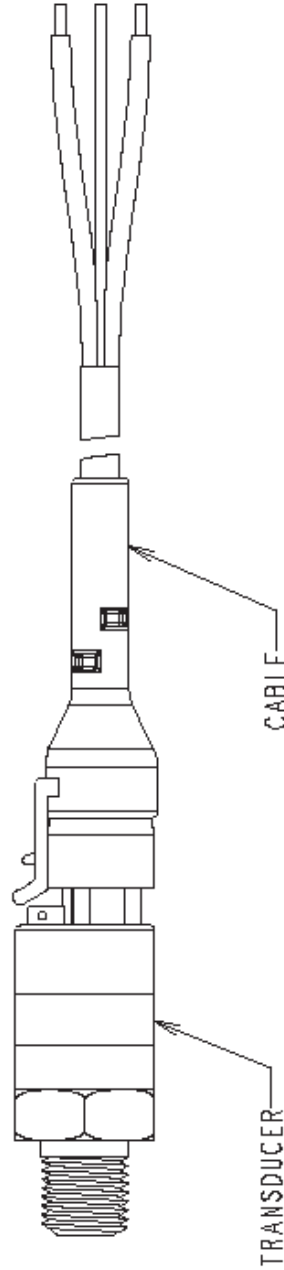
APPENDIX

Transducer Data/Specifications

DRAWING A00462C

PART NO.	K NO.	TRANSDUCER PART NO.	PRESSURE RANGE	CABLE PART NO.
A00462C 1	9K390	A00439C 1	0-150	A00436C 360
A00462C 2	9K391	A00439C 2	0-300	
A00462C 3	9K392	A00439C 3	0-500	
A00462C 4	9K404	A00439C 4	0-1000	

①



REV	ID	DESCRIPTION	UNITS INCHES	DO NOT SCALE DRAWING	MODEL(S)	SIZES
1	①	ADDED P.N.	GENERAL TOLERANCES UNLESS NOTED OTHERWISE: INCHES: MILLIMETERS: X.XX ± 0.20 X.X ± .50 X.XXX ± .005 X.XX ± .125	THIS DRAWING IS THE PROPERTY OF GOLD'S WATER TECHNOLOGY/VALMING. SHEETS FALL IN USE AND SHALL NOT, EXCEPT UPON PRIOR WRITTEN PERMISSION, BE LOANED, REPRODUCED, COPIED, OR USED FOR ANY PURPOSE OTHER THAN THE MANUFACTURE OF ARTICLES FOR GOLD'S WATER TECHNOLOGY/VALMING. PARTS TO BE RETURNED UPON REQUEST.	ALL	ALL
	②	ADDED COLUMN. BL 02/11/04	ANGLES: ALL ± .5	PARALLELISM PERPENDICULARITY ANGULARITY TRUE POSITION RUN-OUT TOTAL RUN-OUT (TIR) CONCENTRICITY FLATNESS PROFILE	MODEL(S)	SIZES
			GEOMETRIC TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 AND APPLICABLE GAIT STANDARDS	THIRD ANGLE PROJECTION	DRAWN TMF	DATE 9/24/03
					APPROVED WDW	DATE 9/24/03
					CAD PRO/E	DRAWING A00462C
					PATTERN N/A	VOLUME N/A
						SCALE 1:1
						SHEET 1 of 1

Model: A00462C Model Rev: 0 Release Level 24-Sep-03

APPENDIX

Transducer Cable Specification

STRIP AND TIN .190

BRN SHLD WHT

2.25 ± .25

6"

NOTE: DO NOT CONNECT SHIELD AT THIS END

BRN WHITE

NO CONNECTION

ITEM	MFG	QTY	P/N	DESCRIPTION
1	PACKARD	1	12078090	FEMALE CONNECTOR 3 POSITION
2	PACKARD	2	12103881-L	FEMALE TERMINAL
3	QUABBIN	CHART "A" DIM	02287	CABLE, 2 CONDUCTOR, 18 AWG, BRN WHT, PVC/PVC, GREY JACKET Aluminized polyester foil shield #20 AWG drain wire, Nominal overall dia. 0.233"
4	EMCOM	1	3147300	OVERMOLDING

REFERENCE

Coil cable
6" Dia. &
Tie-wrap
2 places

A	DRAWING NUMBER	K NO
80	A00436C 80	9K401
300	A00436C 300	9K400
360	A00436C 360	9K399
600	A00346C 600	9K398
1200	A00436C 1200	9K397

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UNITS: INCHES	GENERAL TOLERANCES UNLESS NOTED OTHERWISE: INCHES: MILLIMETERS: X.XX ± .020 X.X ± .50 X.XXX ± .005 X.XX ± .125	PARALLELISM PERPENDICULARITY ANGULARITY TRUE POSITION RUN OUT BOUNDT (TIR) CONCENTRICITY FLATNESS PROFILE	DO NOT SCALE DRAWING
ADDED: - VENDOR AND P/N FOR CABLE - COIL & TIE WRAP NOTE - SHIELD DESCRIPTION TO CABLE - 360" SIZE - ADDED K NUMBERS TO CHART TMF 11/3/03	GEOMETRIC TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 AND APPLICABLE GWT STANDARDS THIRD ANGLE PROJECTION		
REV D	DESCRIPTION	UNITS: INCHES	DO NOT SCALE DRAWING
1			
2			

PRESSURE SENSOR CABLE		SIZES ALL	
MODEL(S)	AQUAVAR	DATE	APPROVED
DRAWN	TMF	6/20/03	MDW
CAD	PRO/E	DRAWING	A00436C
PATTERN	N/A	VOLUME	N/A
SCALE	1:1	DATE	6/20/03
SHEET	1 of 1	ORDER	N/A
		REV	2

Model Rev: 1

Model A00436C.

Release Level PRE-RELEASE

03-Nov-03

TECHNICAL DATA

UL Markings

The AQUAVAR is suitable for use on a circuit capable of delivering not more than 65,000 RMS symmetrical amperes, 480 V maximum. The AQUAVAR has an electronic motor protection feature that complies with the requirements of UL 508C. When this feature is selected and properly adjusted, additional overload protection is not required unless more than one motor is connected to the drive or unless additional protection is required by applicable safety regulations.

The drives are to be used in a controlled environment. See section "Ambient Conditions" for specific limits.

Liability Limits

The manufacturer is not responsible for:

- Any costs resulting from a failure if the installation, commissioning, repair, alteration or ambient conditions of the drive do not fulfill the requirements specified in the documentation delivered with the unit and other relevant documentation.
- Units subjected to misuse, negligence or accident.
- Units comprised of materials provided or designs stipulated by the purchaser.

In no event shall the manufacturer, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties.

If you have any questions concerning your product, please contact the local distributor or Goulds Water Technology. The technical data, information and specifications are valid at the time of printing. The manufacturer reserves the right to modifications without prior notice.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

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