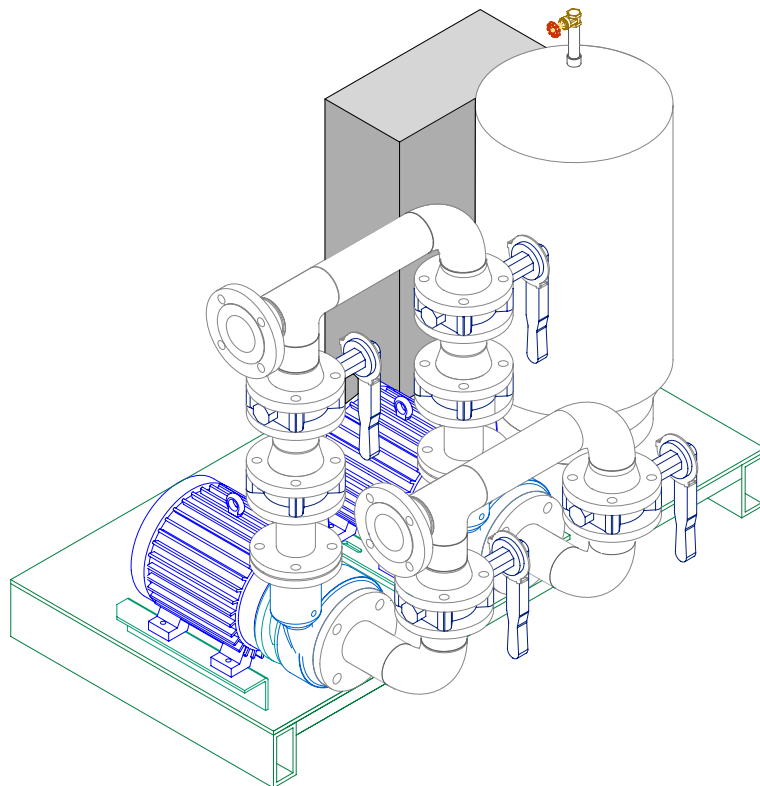


CATALOG

CREOTECH PUMPING PACKAGE
PRIMARY SERIES PSA



30 GPM - 250 GPM
70 - 120 FT.HD.

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<p>Document Number: CATALOG PSA Issued: January 2008</p>

Introduction

Creotech Industries Inc. offers a cost effective, compact and efficient pumping package for single loop applications for chillers, fluid coolers, heat pumps, and process cooling needs.

The **Primary Series PSA** models are available in single pump and two pump arrangements for standby. The base model offers single pump arrangement with on/off starter and pump failure alarm. Dual pump models offer automatic alternating pump operation and automatic standby switchover with alarm. Upgrades can include Suction/Discharge headers and isolation valves, expansion tank, air separator, inlet strainers, suction and discharge vibration isolators, and soft starters.

Efficiency

Pumps are selected to operate at the highest efficiency rating based on the flow and pressure required. High efficiency motors are also available as an option.

Reliability

Pumps are designed with enclosed impellers for high efficiency, quiet operation and long life. Tight tolerances between the impeller eye and the case or wear ring provides maximum efficiency.

The pump seal are constructed with Buna N bellows and seat gasket with a ceramic seat and stainless steel spring and is designed to operate with water/glycol from 0°F to 212°F.

Totally Enclosed Fan Cooled (TEFC) Motors provide continuous operation in dirty environments and in outdoor environments. The motors are selected to ensure non-overloading conditions based on the impeller supplied.

Selection Flexibility

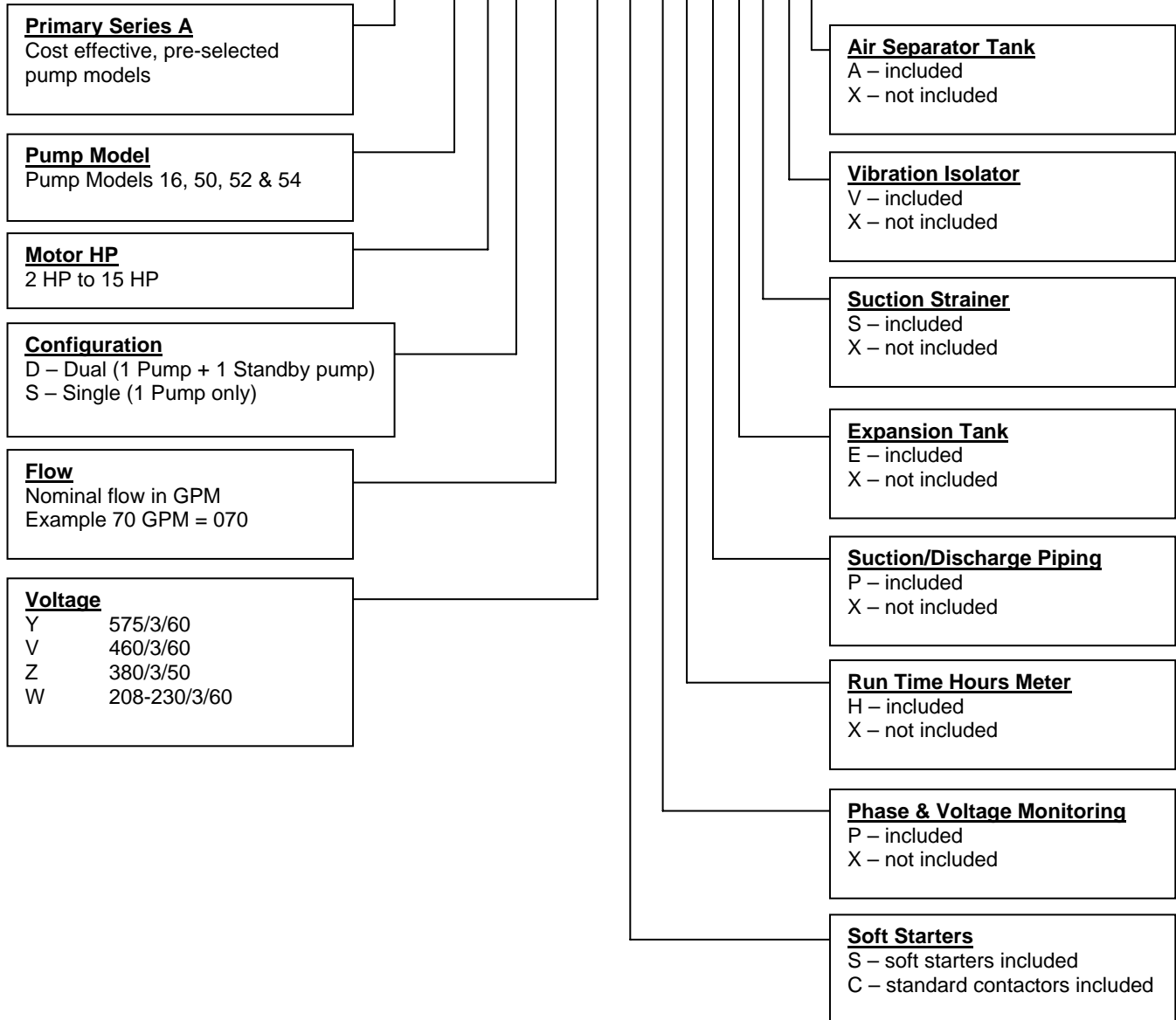
- Flows from 30 gpm to 250 gpm
- Supply pressure from 70 ft.hd to 120 ft.hd.
- Single or dual pump arrangements
- Common suction and discharge headers for dual pump arrangement
- Hydronic specialties available (expansion tank, pipe vibration isolators, air separators)
- Factory assembled

Serviceability

- Easy to access components
- Components selected for availability

PSA Pump Model Number Nomenclature

PSA16/3D180Y-SPHPESVA



Selection Procedure

PSA SERIES PUMPS

Flow and the pressure loss for the flow needed must be determined. The flow required is determined by the load and the temperature range (difference between supply and return temperature) for the application. Corrections for glycol are also required.

Performance Adjustment Factors

Table 2, Altitude Correction Factors

	1000 ft.	2000 ft.	3000 ft.	4000 ft.	5000 ft.	6000 ft.
Capacity	0.997	0.994	0.991	0.988	0.983	0.978
Power	1.0063	1.0126	1.0196	1.0266	1.0336	1.0406

Ethylene and Propylene Glycol Factors

PSA units are designed to operate with a leaving chilled fluid temperature from 0°F (-17.8°C) to 180°F (82.2°C). Leaving fluid temperatures at or below the freezing point of water require a glycol anti-freeze solution. The use of glycol will reduce the performance of the heat transfer properties and would require higher flow to compensate. The reduction in performance depends upon the glycol concentration and temperature. This should be taken into consideration during initial system design.

Creotech Industries encourages a minimum concentration of 25% be provided on all glycol applications. Glycol concentrations below 25% are too diluted for long-term corrosion protection of ferrous metals and corrosion inhibitors need to be recalculated and possibly added to the system. Glycol in the condenser will have a negligible effect on performance because glycol at these higher temperatures will perform with characteristics similar to water.

Adjustment Factors for Ethylene Glycol

Percent E.G	Freeze Point		Cap.	Power	Flow	PD
	°F	°C				
10	26	-3	0.991	0.996	1.013	1.070
20	18	-8	0.982	0.992	1.040	1.129
30	7	-14	0.972	0.986	1.074	1.181
40	-7	-22	0.961	0.976	1.121	1.263
50	-28	-33	0.946	0.966	1.178	1.308

Adjustment Factors for Propylene Glycol

Percent P.G	Freeze Point		Cap.	Power	GPM	PD
	°F	°C				
10	26	-3	0.987	0.992	1.010	1.068
20	19	-7	0.975	0.985	1.028	1.147
30	9	-13	0.962	0.978	1.050	1.248
40	-5	-21	0.946	0.971	1.078	1.366

NOTE: Glycol applications are not included in the ARI certification program.

Selection Procedure

The required cooling load, water temperature range ($\Delta T^{\circ}\text{F}$) and the flow (usgpm) are related in the following formula;

$$\mathbf{Tons = Flow \times \Delta T / 24}$$

You require two out of the three quantities to calculate the third. Use the **Tons** required to select the chiller based on the supply water temperature required. (Adjust for glycol if glycol is used.)

For a chilled water application, the condenser flow required can be derived as follows from the required chiller capacity (tons), the entering condenser water temperature, and either the condenser water temperature range (ΔT_c °F), or the Flow (gpm), they relate in the following formula;

$$\mathbf{Condenser\ Flow = \frac{THR}{500 \times \Delta T_c} = \frac{Nominal\ Tons\ Capacity \times 30}{\Delta T_c}}$$

Application and Recommended Installation

Location and Space Requirements

The PSA Series Pump Packages are designed for indoor and outdoor applications. Provide clearance of 3 ft. (914 mm) on each side and end for piping and to provide space for servicing the unit.

Foundation

The PSA Series Pump Packages are lightweight and can be located almost anywhere.

Vibration Isolation

Vibration mounts are recommended for upper floor installations or where compressor noises are required to be minimized (next to occupied spaces).

Pipe vibration eliminators may be required for water piping connected to the unit to minimize transmission of water or pump noise into occupied spaces.

System Water Volume

The expansion tank option are selected based on a 300 foot total pipe run at the suggested pipe diameter and a 40% estimated adder for volume in the fluid cooler and load application.

Changes in temperatures of the fluid will result in changes in total volume of the system. The expansion tank will absorb changes in system volume based on temperature changes.

Controls

Each pump package includes a differential switch wired to a low pressure alarm. The Dual Pump package also includes an automatic pump run feature that switches the operation of each pump after 100 hours of operation to ensure equal run-time and ensure that each pump is ready to run in case of a failure. The Dual Pump package includes an automatic switch-over to the other pump in case of

failure. An alarm will signal. A dry contact for the alarm allows for a remote signal to be sent in case of failure.

A Remote On/Off dry contact with a switch to operate either remote or local allows the flexibility to operate the pump system from remote.

Electrical Connection

Every PSA Series Pump Package requires field installation of the main supply power

See “Electrical Data” for field electrical hookups. Each unit is provided with its specific wiring diagram in the control panel. All wiring must be done according to local and national codes.

Main Power Supply Disconnect Switch

Every pump package includes the standard single-point power supply.

A factory-installed, non-fused disconnect switch (required to meet NEC Code for disconnects) with a through-the-door handle is included. The disconnect switch is properly sized for the model and voltage supplied.

Application Limitations

1. Maximum allowable water pressure is 125 psig.
2. Maximum allowable water temperature is 180°F (82.2°C).
3. Minimum design leaving water temperature without anti-freeze protection is 35°F (1.7°C).
4. Contact your Creotech representative for operation with water/glycol entering the pump package below 35°F (1.7°C).
5. Consult factory for ambient operation below 0°F (-17.8°C) for outdoor applications.

Recommended Piping Based on Flow Requirement

The recommended pipe sizes follow a rule of maintaining a pressure loss no greater than 10 ft.hd. per 100 feet of pipe and/or a maximum velocity of 10 fps.

The Table shown provides the recommended pipe size based on flow.

Flow (gpm)	Pipe Dia
30	1.5"
40	2"
50	2"
60	2"
70	2.5"
80	2.5"
90	2.5"
100	2.5"
110	3"
120	3"
130	3"
140	3"
150	3"
160	3"
170	3"
180	3"
190	4"
200	4"
210	4"
225	4"
250	4"

Optional Features

Controls

Soft-Start

Soft starters can be supplied instead of standard starters that allow the ramp up and ramp down of pumps when called on. Solid state starting reduces the inrush currents and mechanical shock typical of conventional motor starters, while providing silent and smooth acceleration without arcing, chattering or vibration. Soft starters can prolong the life of the pump motor and reduce or eliminate water hammer in the system.

Electrical

Phase and Voltage Loss Detection

Factory install phase and voltage loss protection can be supplied with fault indication.

Hours of Operation

An hour meter that indicates the number of hours each compressor has run.

Water Side

Suction and Discharge Piping

Isolation valves and check valve can be supplied for a single pump system. Pipe headers would be added for dual pump systems. The pressure differential switches would be installed in systems with suction and discharge piping.

Y-Strainers

40 Mesh strainers are available to protect the application from contamination.

Pipe Rubber Isolators

CFNS rubber isolators can be added to the pump suction and discharge to eliminate vibration and noise transmission.

Expansion Tanks

Pre-selected expansion tanks varying from 8 gallons to 22 gallons are provided based on the flow requirement and 200 feet of total length of piping. The expansion tanks are ASME rated pre-charged diaphragm type pressure vessels designed to absorb the expansion forces of heating/cooling system water while maintaining proper system pressurization. A charging valve and an air vent is included.

Air Separators

Pre-selected air separators from 2" to 4" can be supplied with each system as a ship loose item. The air separators are ASME rated and are designed to remove entrained air allowing the pumps and valves and heat transfer mediums to operate and transfer energy more efficiently.

Enclosures

An 18 gauge steel enclosure with rust-proof outdoor paint can be included. The enclosure includes a hinged access door to allow easy service-ability and proper vent openings to allow ventilation across the unit.

Performance Data

Select your flow and head required. Selection will indicate Model and installed motor HP.

	H(FT)	120	110	100	90	80	70	Pipe Dia	Exp Tank	Air Sep
FLOW (GPM)	30	50/5	16/5	16/3	16/3	16/2	16/2	1.5	ET-1	AS-1
	40	50/5	16/5	16/3	16/3	16/2	16/2	2	ET-1	AS-1
	50	50/5	16/5	16/3	16/3	16/2	16/2	2	ET-1	AS-2
	60	50/5	16/5	16/5	16/3	16/2	16/2	2	ET-1	AS-2
	70	50/5	50/5	16/5	16/3	16/3	16/2	2.5	ET-1	AS-2
	80	50/5	50/5	16/5	16/5	16/3	16/3	2.5	ET-1	AS-2
	90	52/7.5	52/5	52/5	52/5	52/5	52/3	2.5	ET-1	AS-3
	100	52/7.5	52/5	52/5	52/5	52/5	52/3	2.5	ET-1	AS-3
	110	52/7.5	52/7.5	52/5	52/5	52/5	52/5	3	ET-2	AS-3
	120	52/7.5	52/7.5	52/5	52/5	52/5	52/5	3	ET-2	AS-3
	130	52/7.5	52/7.5	52/5	52/5	52/5	52/5	3	ET-2	AS-3
	140	52/7.5	54/7.5	54/7.5	52/5	52/5	52/5	3	ET-2	AS-3
	150	52/7.5	52/7.5	52/7.5	52/5	52/5	52/5	3	ET-2	AS-3
	160	52/10	52/7.5	52/7.5	54/7.5	54/7.5	54/5	3	ET-2	AS-3
	170	54/10	54/10	54/7.5	54/7.5	54/7.5	54/5	3	ET-2	AS-3
	180	54/10	54/10	54/7.5	54/7.5	54/7.5	54/5	3	ET-2	AS-3
	190	54/10	54/10	54/7.5	54/7.5	54/7.5	54/7.5	4	ET-3	AS-4
	200	54/10	54/10	54/10	54/7.5	54/7.5	54/7.5	4	ET-3	AS-4
	210	54/10	54/10	54/10	54/7.5	54/7.5	54/7.5	4	ET-3	AS-4
	225	54/15	54/10	54/10	54/7.5	54/7.5	54/7.5	4	ET-3	AS-4
250	54/15	54/15	54/10	54/10	54/10	54/7.5	4	ET-3	AS-4	

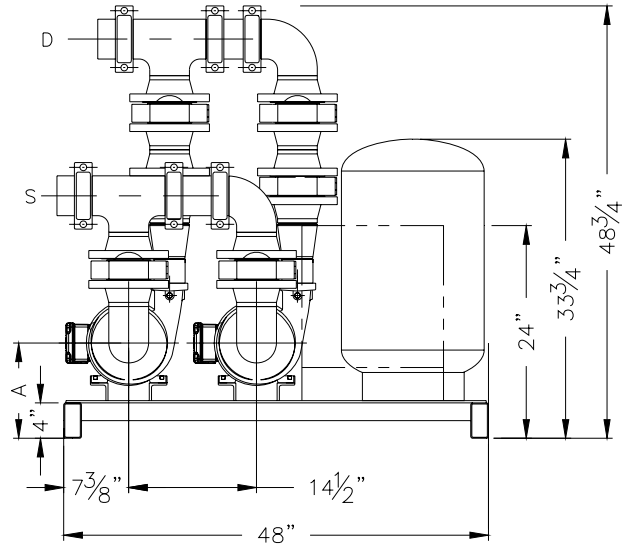
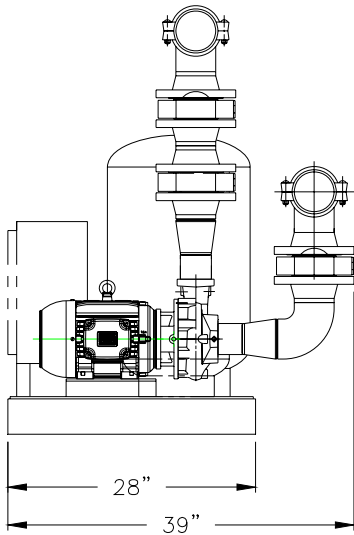
See table at end of manual for more detailed information.

FLA	MOTOR (HP) – single pump					
	2	3	5	7.5	10	15
460/3/60	2.7	4.0	6.5	9.1	11.8	17.7
575/3/60	2.2	3.2	5.2	7.3	9.4	14.2
208-230/3/60	6.0	8.8	14.3	20.2	26.1	39.1

FLA	MOTOR (HP) – Dual pump at transition					
	2	3	5	7.5	10	15
460/3/60	5.4	8	13	18.2	23.6	35.4
575/3/60	4.4	6.4	10.4	14.6	18.8	28.4
208-230/3/60	12	17.6	28.6	40.4	52.2	78.2

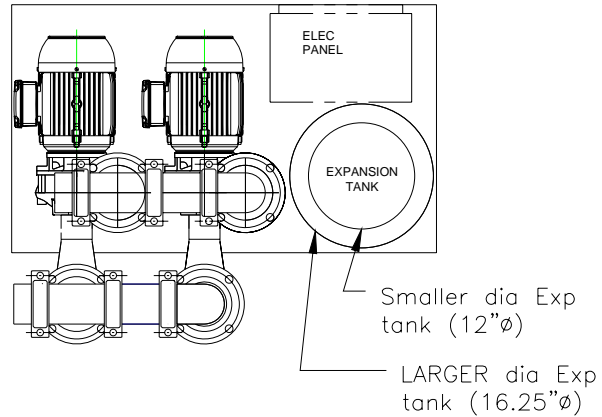
Dimensions and Layout

DWG: PSA2D



- NOTE:
- BASE UNIT COMPLETE WITH SUCTION AND DISCHARGE HEADER AND EXPANSION TANK
 - 2 PUMP ASSEMBLY (1 STANBY)
 - 4"Ø FLANGED HEADER SHOWN.
 - SMALLER HEADERS 2, 2.5 & 3" ARE NPT FITTED

PSA PUMP SKID:
DUAL PUMP
 c/w suction and discharge piping, and expansion tank



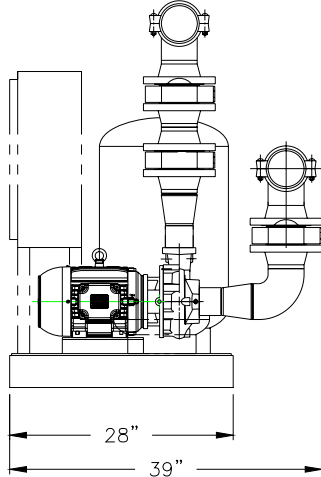
NOTE: Electrical panel location for 460 and 575 volt
 For 208 or 230 volt see PSA2D230

		Pump Model				Dim A
		16	50	52	54	
Motor Size (HP)	2	145JM				7.5
	3	182JM		182JM		8.5
	5	184JM	184JM	184JM	184JM	8.5
	7.5			184JM	184JM	9.25
	10				215JM	10.25
	15				215JM	11
Suction Dia (S)		2	2	2.5	2.5	
Discharge Dia (D)		1.5	1.5	2	2.5	
Connection Type		NPT	NPT	NPT	NPT	

Dimensions and Layout

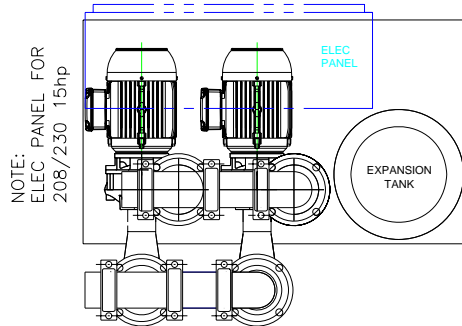
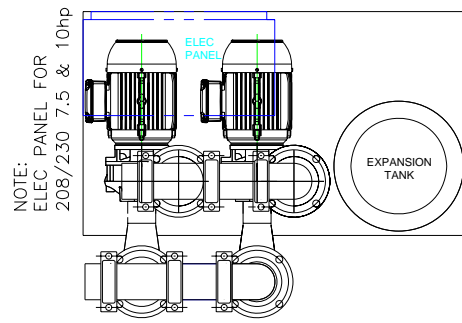
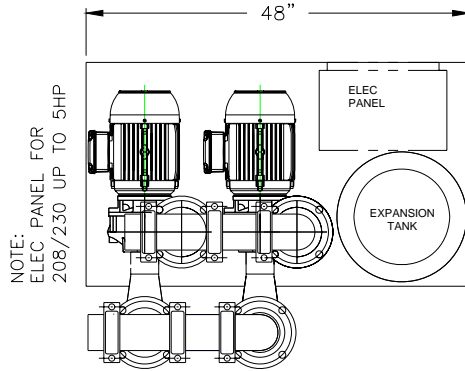
DWG: PSA2D230

208 or 230 volt
Electrical panel location



- NOTE:
- BASE UNIT COMPLETE WITH SUCTION AND DISCHARGE HEADER AND EXPANSION TANK
 - 2 PUMP ASSEMBLY (1 STANBY)
 - 4"Ø FLANGED HEADER SHOWN.
 - SMALLER HEADERS 2, 2.5 & 3" ARE NPT FITTED

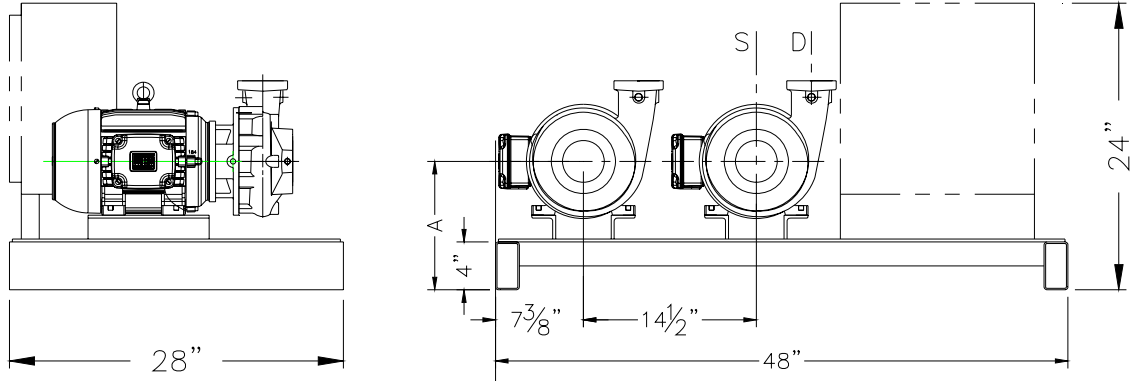
PSA PUMP SKID:
DUAL PUMP
c/w suction and discharge piping, and expansion tank



		Pump Model				Dim A
		16	50	52	54	
Motor Size (HP)	2	145JM				7.5
	3	182JM		182JM		8.5
	5	184JM	184JM	184JM	184JM	8.5
	7.5			184JM	184JM	9.25
	10				215JM	10.25
	15				215JM	11
Suction Dia (S)		2	2	2.5	2.5	
Discharge Dia (D)		1.5	1.5	2	2.5	
Connection Type		NPT	NPT	NPT	NPT	

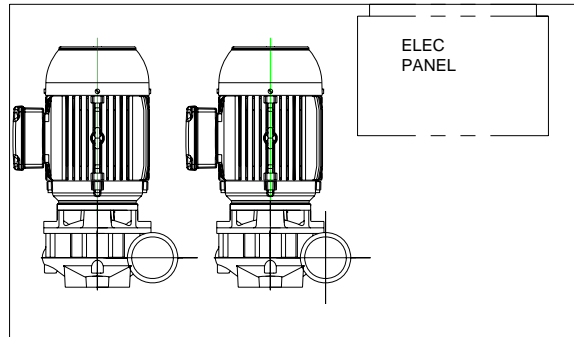
Dimensions and Layout

DWG: PSA2B



NOTE:

- 1 PUMP + 1 STANDBY PUMP
- PUMP CONNECTIONS ARE NPT



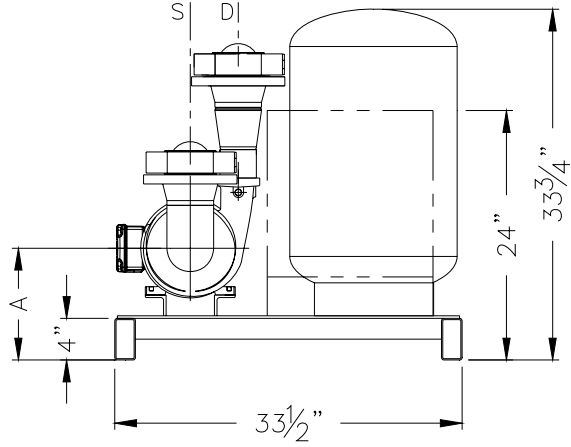
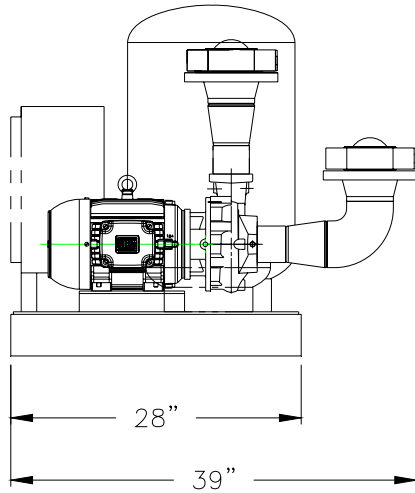
PSA PUMP SKID:
DUAL PUMP

NOTE: Electrical panel location for 460 and 575 volt
For 208 or 230 volt see PSA2D230

		Pump Model				Dim A
		16	50	52	54	
Motor Size (HP)	2	145JM				7.5
	3	182JM		182JM		8.5
	5	184JM	184JM	184JM	184JM	8.5
	7.5			184JM	184JM	9.25
	10				215JM	10.25
	15				215JM	11
Suction Dia (S)		2	2	2.5	2.5	
Discharge Dia (D)		1.5	1.5	2	2.5	
Connection Type		NPT	NPT	NPT	NPT	

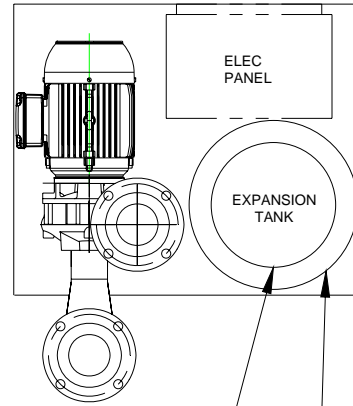
Dimensions and Layout

DWG: PSA1D



NOTE:

- BASE UNIT COMPLETE WITH SUCTION AND DISCHARGE PIPING AND EXPANSION TANK
- 4"Ø FLANGED HEADER SHOWN.
- SMALLER HEADERS 2, 2.5 & 3" ARE NPT FITTED



PSA PUMP SKID: SINGLE PUMP

c/w suction and discharge piping, and expansion tank

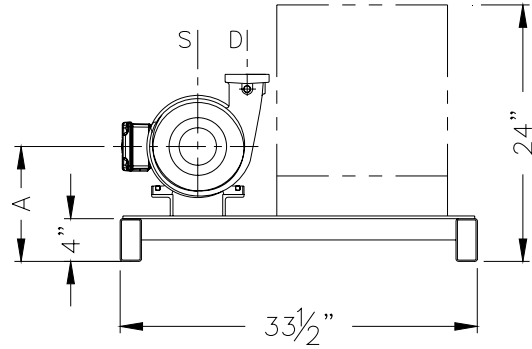
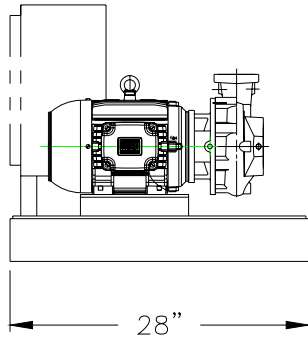
Smaller dia Exp tank (12"Ø)

Larger dia Exp tank (16.25"Ø)

		Pump Model				Dim A
		16	50	52	54	
Motor Size (HP)	2	145JM				7.5
	3	182JM		182JM		8.5
	5	184JM	184JM	184JM	184JM	8.5
	7.5			184JM	184JM	9.25
	10				215JM	10.25
	15				215JM	11
Suction Dia (S)		2	2	2.5	2.5	
Discharge Dia (D)		1.5	1.5	2	2.5	
Connection Type		NPT	NPT	NPT	NPT	

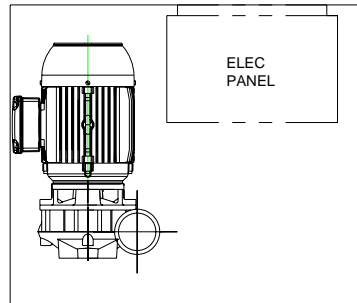
Dimensions and Layout

DWG: PSA1B



NOTE:

- 4"Ø FLANGED CONNECTION.
- SMALLER PIPE SIZES 2, 2.5 & 3" HAVE NPT CONNECTION



PSA PUMP SKID:
SINGLE PUMP

		Pump Model				Dim A
		16	50	52	54	
Motor Size (HP)	2	145JM				7.5
	3	182JM		182JM		8.5
	5	184JM	184JM	184JM	184JM	8.5
	7.5			184JM	184JM	9.25
	10				215JM	10.25
	15				215JM	11
Suction Dia (S)		2	2	2.5	2.5	
Discharge Dia (D)		1.5	1.5	2	2.5	
Connection Type		NPT	NPT	NPT	NPT	

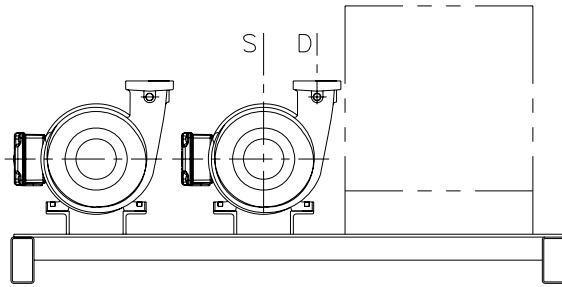
Weights

DUAL UNITS

Weight of the various assemblies and options are as follows. All weights are shown in pounds

Base units includes the weight of the pumps (2x), plus frame and electrical panel.

Other options are then to be added based as chosen to calculate the total unit weight.



DUAL UNIT Pump x 2, Frame, Panel	
Model / Motor HP	Weight (lb)
16 / 2	386
16 / 3	392
16 / 5	432
50 / 5	450
52 / 3	412
52 / 5	452
52 / 7.5	496
52 / 10	598
54 / 5	476
54 / 7.5	520
54 / 10	622
54 / 15	658

Weights (lb) Piping Assemblies and add on components

Weights (lb) Piping Assemblies and add on components			
Diameter	Dual Header	Flex Joints (set of 2)	Suction Strainer Dual
2 "	85	3	5
2.5 "	145	4	7
3 "	185	6	10
4 "	220	8	16

For Expansion Tank and Air Separator please see following page

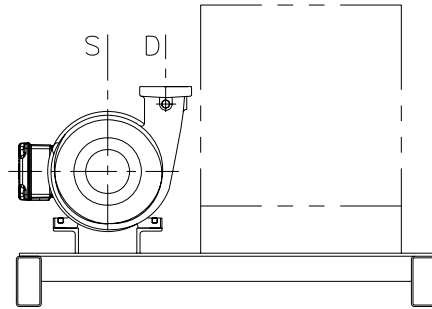
Weights

SINGLE UNITS

Weight of the various assemblies and options are as follows. All weights are shown in pounds

Base units includes the weight of the pump, plus frame and electrical panel.

Other options are then to be added based as chosen to calculate the total unit weight.



SINGLE UNIT Pump, Frame, Panel	
Model / Motor HP	Weight (lb)
16 / 2	261
16 / 3	264
16 / 5	284
50 / 5	293
52 / 3	274
52 / 5	294
52 / 7.5	316
52 / 10	367
54 / 5	306
54 / 7.5	328
54 / 10	379
54 / 15	397

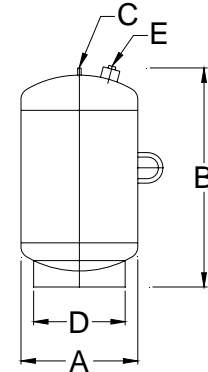
Weights (lb) Piping Assemblies and add on components

Weights (lb)	Piping Assemblies and add on components		
	Single Suction/Discharge only	Flex Joints (set of 2)	Suction Strainer Single
2 "	28	3	2.5
2.5 "	48	4	3.5
3 "	62	6	5
4 "	72	8	8

For Expansion tank and Air separator please see following page

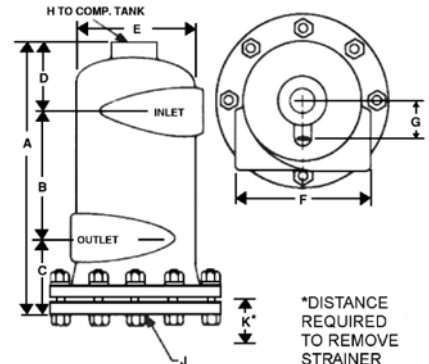
Expansion Tank

Model	DIMENSIONS IN INCHES (MM)						Approx. Shipping WT LBS. (Kg)	Approx. WT 100% FULL LBS. (Kg)
	A	B	System conn. C	Skirt O.D. D	Charge valve E	Skirt Thick.		
ET-1	12 (305)	19-1/2 (495)	1/2 NPTM	10-3/4 (273)	.302-32 NC "	3/16 (5)	43 (20)	110 (50)
ET-2	12 (305)	26-1/2 (673)	1/2 NPTM	10-3/4 (273)	.302-32 NC "	3/16 (5)	45 (21)	136 (62)
ET-3	16-1/4 (413)	29-1/2 (749)	1/2 NPTM	12-3/4 (324)	.302-32 NC "	3/16 (5)	90 (41)	271 (123)

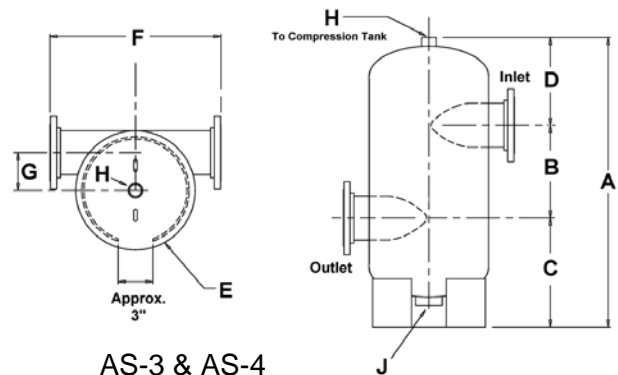


Air Separator

DIMENSIONS in Inches (mm) AND WEIGHTS in Lbs (kg.)				
MODEL	AS-1	AS-2	AS-3	AS-4
A	15-7/8 (403)	17-3/8 (441)	26-7/8 (683)	31-7/16 (799)
B	7 (179)	7-1/2 (191)	8 (203)	10 (254)
C	4 (102)	4-1/2 (114)	10-13/16 (275)	11-15/16 (303)
D	4-7/8 (124)	5-3/8 (137)	8-1/16 (205)	9-1/2 (241)
E	6-5/8 (168)	8-3/8 (213)	10-3/4 (273)	12-3/4 (324)
F	7-3/8 (187)	9-3/4 (248)	22-3/4 (578)	20-1/2 (521)
G	2 (51)	2-5/8 (67)	3-5/8 (92)	4-1/8 (105)
H	1 (25)	1 (25)	1-1/4 (32)	1-1/2 (38)
J	1 (25)	1 (25)	2 (51)	2 (51)
Cv	55	80	215	370
Approx. Volume in Gallons (Ltr.)	2 (7.6)	3 (11.4)	7 (26)	13 (49)
Approx. Shpg. Wt. Lbs. (Kg)	50 (23)	85 (39)	115 (52)	155 (70)
Flood Wt. Lbs. (Kg)	65 (30)	110 (50)	173 (79)	263 (119)



AS-1 & AS-2

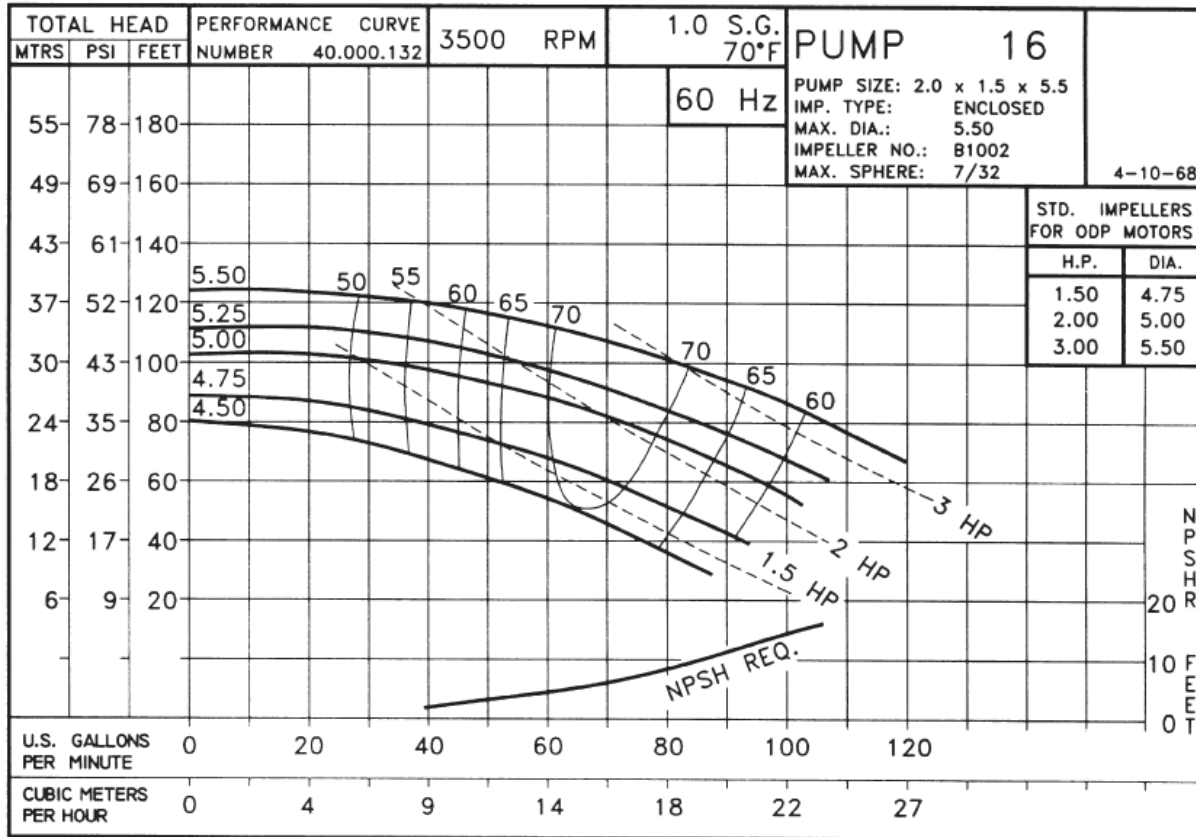


AS-3 & AS-4

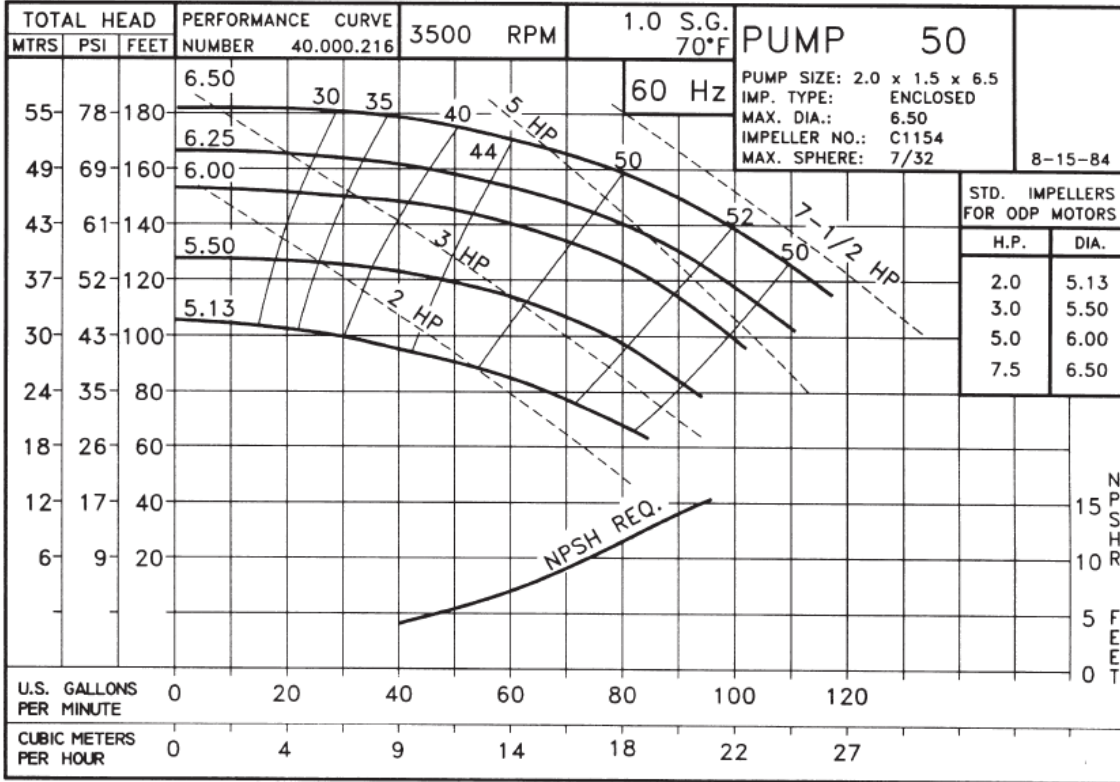
PUMP SELECTION CURVES

Scot Pumps

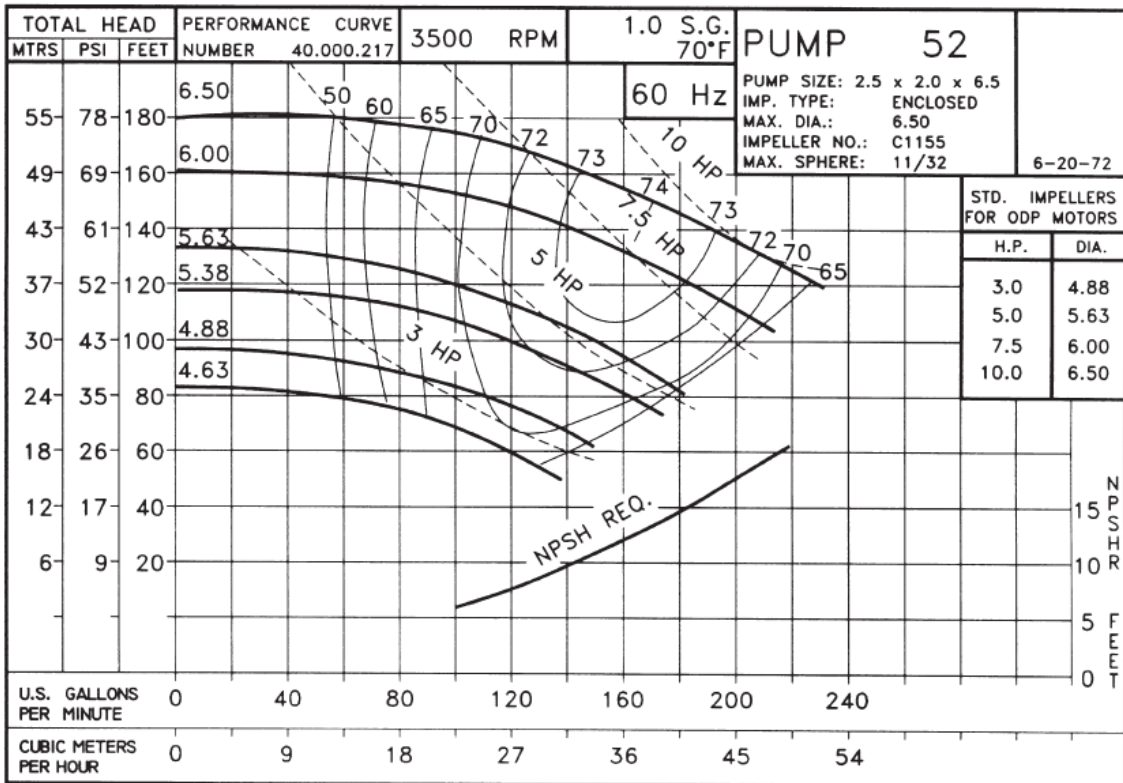
The Scot Pumps used for the Primary Series A (PSA) Pump Packages are the Scot Model 16, Model 50, Model 52 and Model 54. Please refer to the election table for the specific Scot Pump Model used.



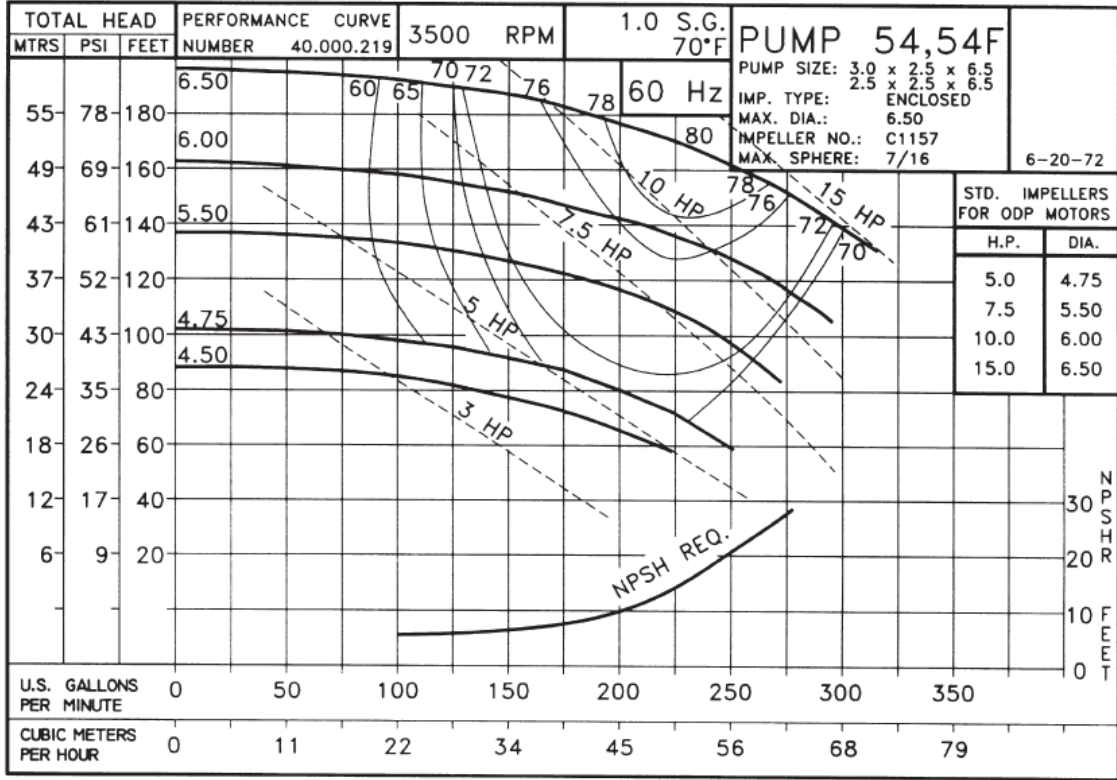
SCOT 16



SCOT 50



SCOT 52



SCOT 54

Detailed Performance Specification

Nomenclature:

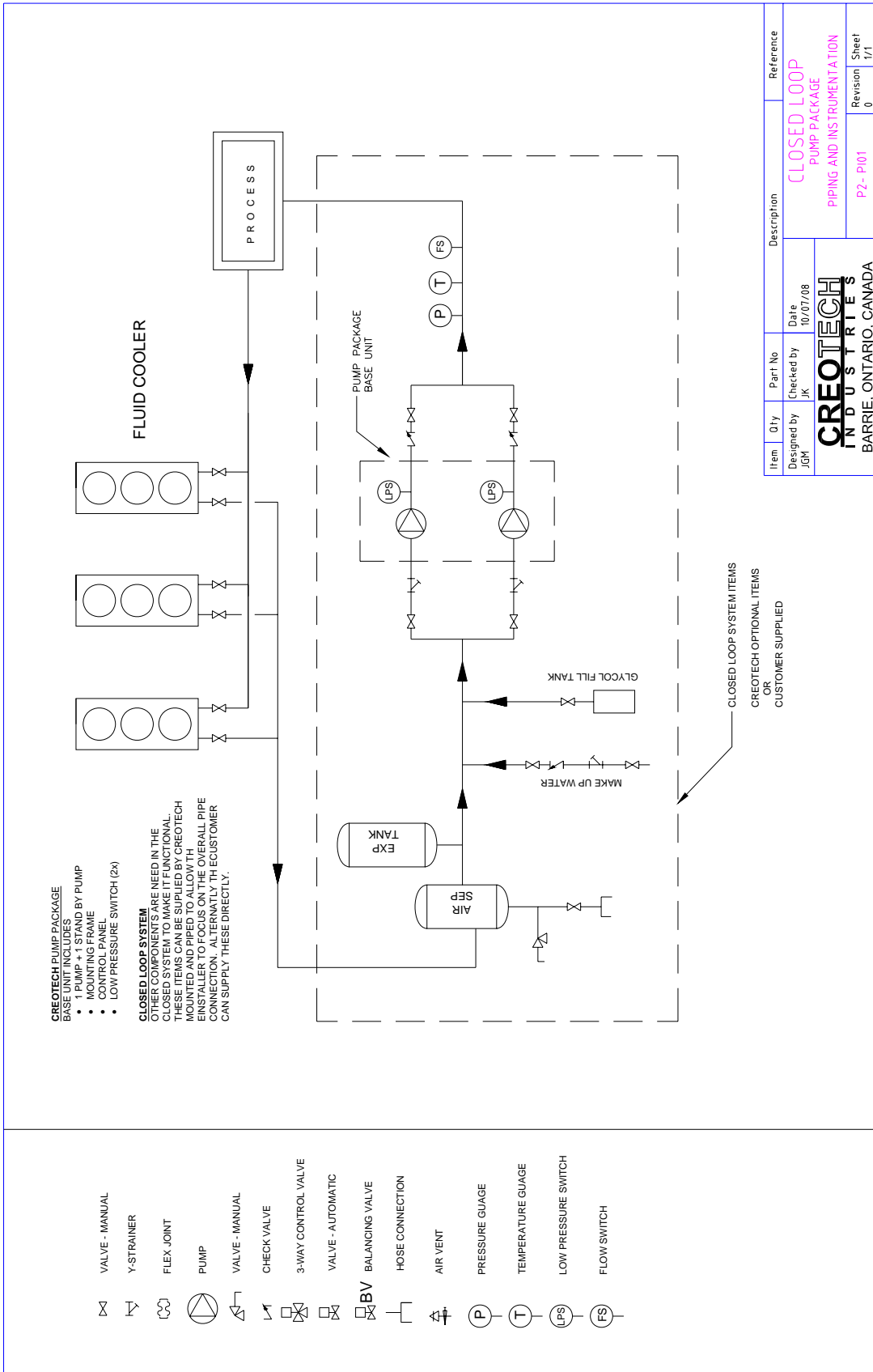
Q	Flow
H	Discharge head
Model #	The designated pump model and skid
Motor HP	Installed hp with pump
BHP	Break horse power. Actual power required for pump model at designated flow and head.
NPSHR	Net positive suction head. Required pressure at suction port of the pump to prevent cavitation.
TEFC	Motor frame size for installed HP. Speed is 3500 rpm.

Q (USGPM)	H (FT)	MODEL#	MOTOR HP	BHP	DIA	NPSHR	TEFC(FRAME)
30	70	16	2	1.3	4.625	1.8	145JM
30	80	16	2	1.4	4.75	1.8	145JM
30	90	16	3	1.7	5	1.8	145JM
30	100	16	3	1.8	5.125	1.8	145JM
30	110	16	5	1.8	5.25	3.8	JM184
30	120	50	5	3.2	5.625	4.6	184JM
40	70	16	2	1.3	4.625	2	145JM
40	80	16	2	1.4	4.75	2	145JM
40	90	16	3	1.7	5	2	145JM
40	100	16	3	1.8	5.125	2	145JM
40	110	16	5	2	5.37	3.8	JM184
40	120	50	5	3.4	5.625	5.3	184JM
50	70	16	2	1.5	4.75	3.8	145JM
50	80	16	2	1.6	4.875	3.8	145JM
50	90	16	3	1.9	5.125	3.8	145JM
50	100	16	3	2.1	5.25	3.8	145JM
50	110	16	5	2.4	5.5	3.8	184JM
50	120	50	5	3.5	5.625	6.1	184JM
60	70	16	2	1.7	4.875	5.7	145JM
60	80	16	2	1.8	5	5.7	145JM
60	90	16	3	2	5.125	5.7	145JM
60	100	16	5	2.3	5.375	5.7	184JM
60	110	16	5	2.5	5.5	5.7	184JM
60	120	50	5	3.9	5.75	7.3	184JM

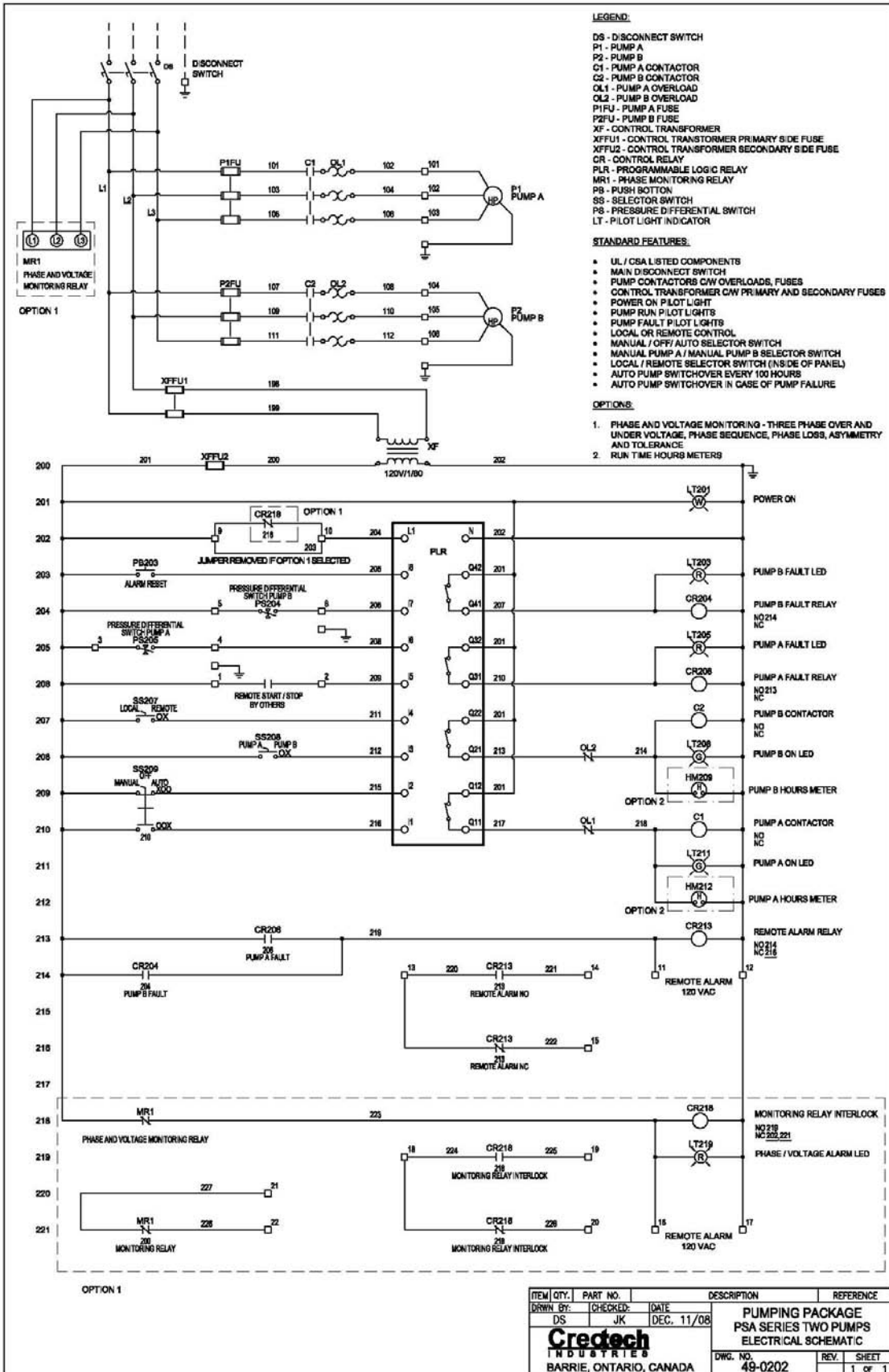
Q (USGPM)	H (FT)	MODEL#	MOTOR HP	BHP	DIA	NPSHR	TEFC(FRAME)
70	70	16	2	1.9	5	8	145JM
70	80	16	3	2.1	5.125	8	145JM
70	90	16	3	2.3	5.25	8	145JM
70	100	16	5	2.5	5.375	8	184JM
70	110	50	5	3.8	5.625	9	184JM
70	120	50	5	4.5	5.875	9	184JM
80	70	16	3	2.3	5.125	10.1	145JM
80	80	16	3	2.5	5.25	10.1	145JM
80	90	16	5	2.7	5.375	10.1	184JM
80	100	16	5	2.9	5.5	10.1	184JM
80	110	50	5	4.6	5.875	11.4	184JM
80	120	50	5	5	6	11.4	184JM
90	70	52	3	3	4.75	6.4	145JM
90	80	52	5	3.6	5	6.4	184JM
90	90	52	5	3.8	5.125	6.4	184JM
90	100	52	5	4.3	5.375	6.4	184JM
90	110	52	5	4.6	5.5	6.4	184JM
90	120	52	7.5	4.9	5.63	6.4	184JM
100	70	52	3	3	4.75	6.8	145JM
100	80	52	5	3.5	5	6.8	184JM
100	90	52	5	3.8	5.125	6.8	184JM
100	100	52	5	4.3	5.375	6.8	184JM
100	110	52	5	4.6	5.5	6.8	184JM
100	120	52	7.5	5.2	5.75	6.8	184JM
110	70	52	5	3.3	4.875	7.2	184JM
110	80	52	5	3.5	5	7.2	184JM
110	90	52	5	4.1	5.25	7.2	184JM
110	100	52	5	4.3	5.375	7.2	184JM
110	110	52	7.5	4.8	5.625	7.2	184JM
110	120	52	7.5	5.3	5.75	7.2	184JM
120	70	52	5	3.2	4.875	7.5	184JM
120	80	52	5	3.8	5.125	7.5	184JM
120	90	52	5	4	5.25	7.5	184JM
120	100	52	5	4.3	5.375	7.5	184JM
120	110	52	7.5	4.8	5.625	7.5	184JM
120	120	52	7.5	5.3	5.75	7.5	184JM
130	70	52	5	3.6	5	8.5	184JM
130	80	52	5	3.9	5.125	8.5	184JM
130	90	52	5	4.4	5.375	8.5	184JM
130	100	52	5	4.7	5.5	8.5	184JM
130	110	52	7.5	5	5.63	8.5	184JM
130	120	52	7.5	5.5	5.75	8.5	184JM
140	70	52	5	4	5.125	9.6	184JM
140	80	52	5	4	5.18	10	JM184
140	90	52	5	4.5	5.38	10	JM184
140	100	52	7.5	5	5.63	10	JM184

Q (USGPM)	H (FT)	MODEL#	MOTOR HP	BHP	DIA	NPSHR	TEFC(FRAME)
140	110	52	7.5	5.5	5.75	10	JM184
140	120	52	7.5	6.2	5.875	9.6	184JM
150	70	52	5	4	5	11	JM184
150	80	52	5	4.3	5.18	11	JM184
150	90	52	5	4.7	5.38	11	JM184
150	100	52	7.5	5.1	5.63	10	JM184
150	110	52	7.5	5.8	5.75	10.8	184JM
150	120	52	7.5	6.5	5.875	10.8	184JM
160	70	54	5	4.6	4.5	8.8	184JM
160	80	54	7.5	5	4.625	8.8	184JM
160	90	54	7.5	5.7	4.875	8.8	184JM
160	100	52	7.5	5.5	5.75	10	JM184
160	110	52	7.5	5.5	5.75	10	JM184
160	120	52	10	7	5.87	10	JM215
170	70	54	5	4.7	4.5	9	184JM
170	80	54	7.5	5.1	4.625	9	184JM
170	90	54	7.5	5.9	4.875	9	184JM
170	100	54	7.5	6.5	5.125	9	184JM
170	110	54	10	6.8	5.25	9	215JM
170	120	54	10	7.6	5.5	9	215JM
180	70	54	5	4.8	4.5	9.2	184JM
180	80	54	7.5	5.6	4.75	9.2	184JM
180	90	54	7.5	5.9	4.875	9.2	184JM
180	100	54	7.5	6.7	5.125	9.2	184JM
180	110	54	10	7.4	5.375	9.2	215JM
180	120	54	10	7.7	5.5	9.2	215JM
190	70	54	7.5	5.2	4.625	9.5	184JM
190	80	54	7.5	5.7	4.75	9.5	184JM
190	90	54	7.5	6.5	5	9.5	184JM
190	100	54	7.5	6.8	5.125	9.5	184JM
190	110	54	10	7.5	5.375	9.5	215JM
190	120	54	10	8.2	5.625	9.5	215JM
200	70	54	7.5	5.2	4.625	10.5	184JM
200	80	54	7.5	5.7	4.75	10.5	184JM
200	90	54	7.5	6.5	5	10.5	184JM
200	100	54	10	7.3	5.25	10.5	215JM
200	110	54	10	7.6	5.375	10.5	215JM
200	120	54	10	8.3	5.625	10.5	215JM
210	70	54	7.5	5.3	4.63	12	JM184
210	80	54	7.5	6.2	4.875	11.9	184JM
210	90	54	7.5	7	5.125	11.9	184JM
210	100	54	10	7.4	5.25	11.9	215JM
210	110	54	10	8.2	5.5	11.9	215JM
210	120	54	10	8.5	5.625	11.9	215JM
225	70	54	7.5	5.5	4.75	14.4	JM184
225	80	54	7.5	6	4.87	14.4	JM184

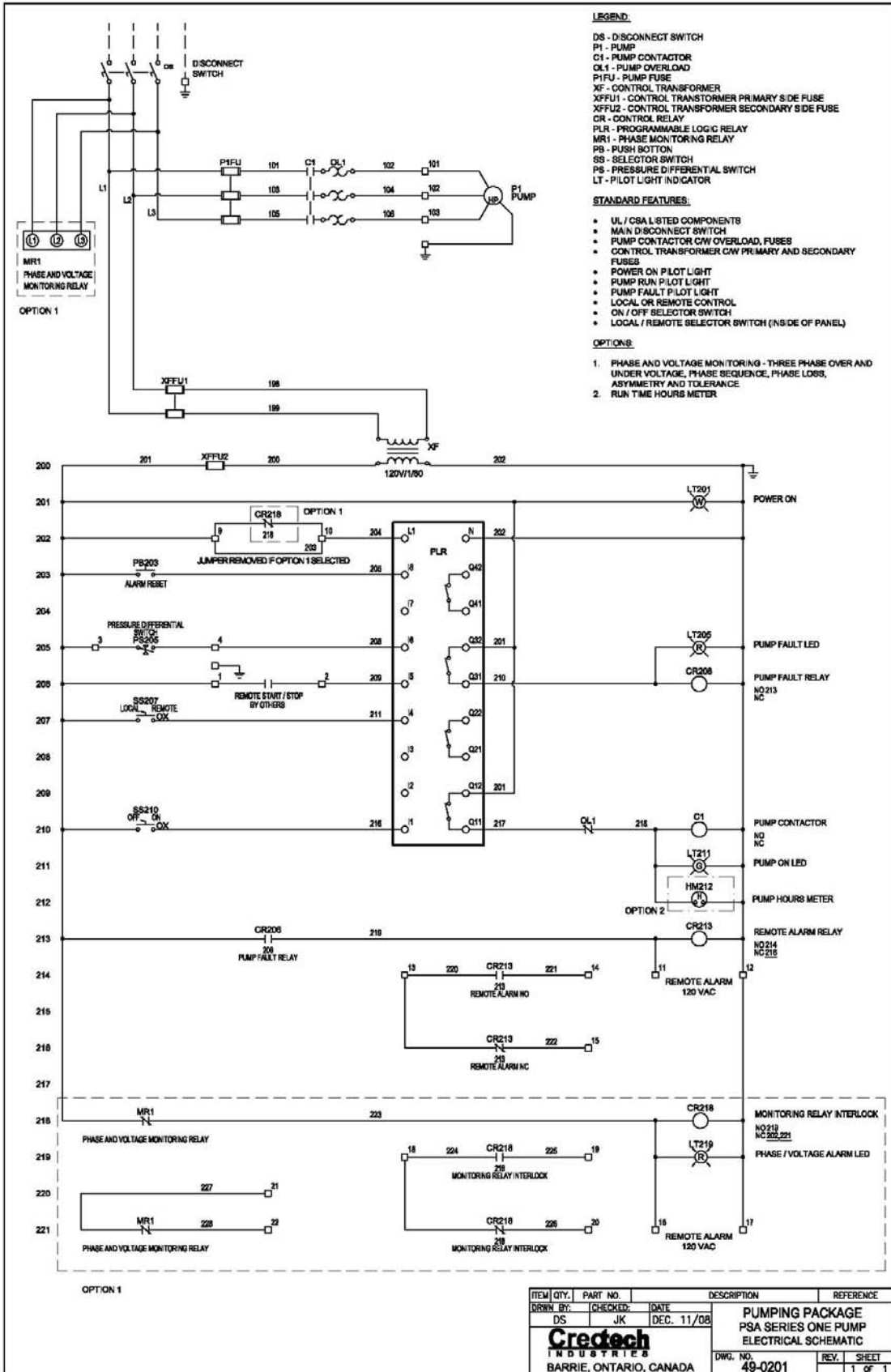
Q (USGPM)	H (FT)	MODEL#	MOTOR HP	BHP	DIA	NPSHR	TEFC(FRAME)
225	90	54	7.5	7.2	5.125	14.4	184JM
225	100	54	10	8	5.375	14.3	215JM
225	110	54	10	8.8	5.625	14.3	215JM
225	120	54	15	9.2	5.75	14.3	215JM
250	70	49	10	6.5	5	19.8	JM215
250	80	50	10	7.2	5.25	19.8	JM215
250	90	51	10	7.5	5.37	19.8	JM215
250	100	52	10	8	5.63	19.8	JM215
250	110	53	15	9	5.75	19.8	JM215
250	120	54	15	10.3	5.875	19.8	215JM



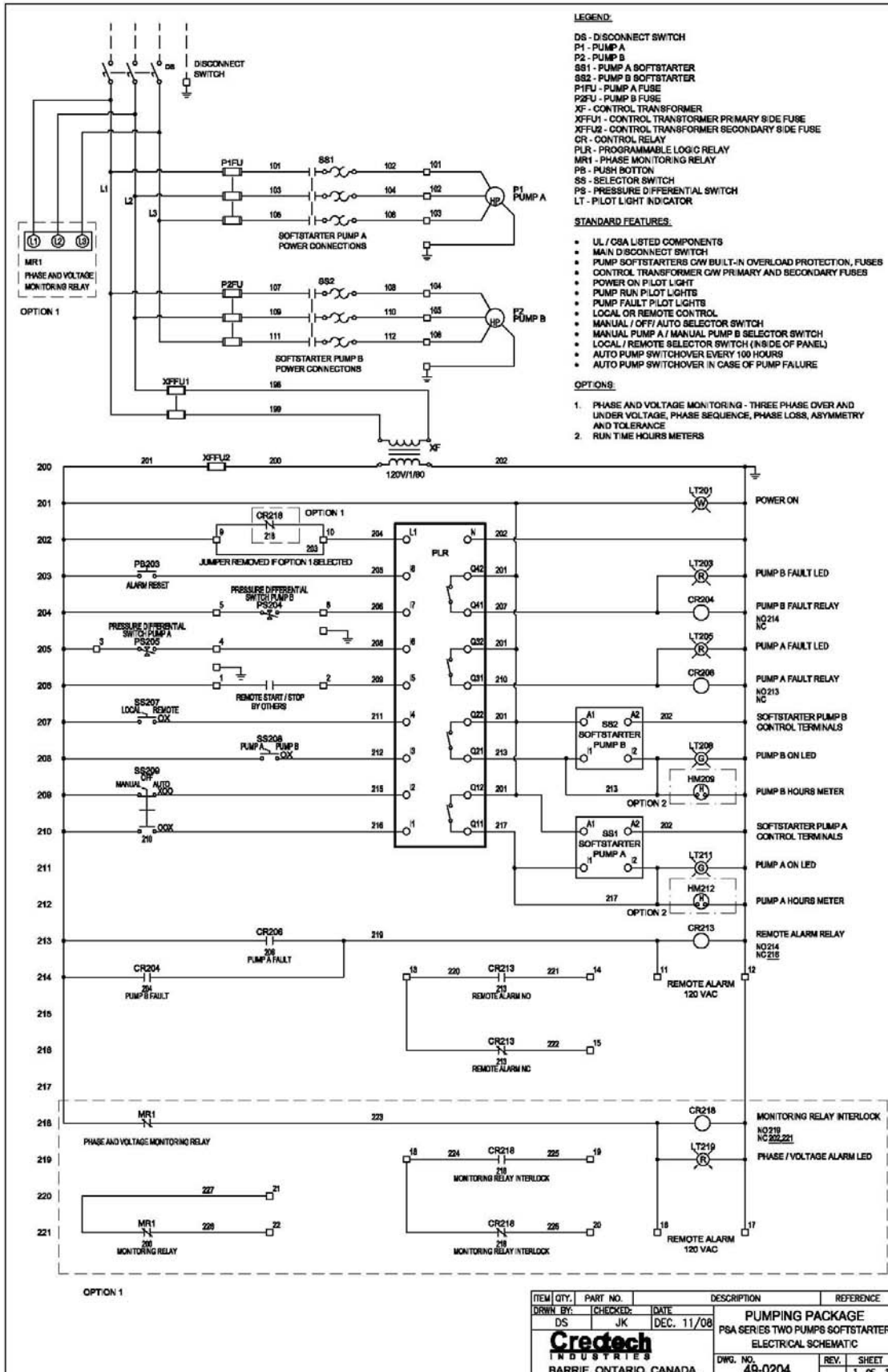
ELECTRICAL SCHEMATIC – PSA DUAL PUMP



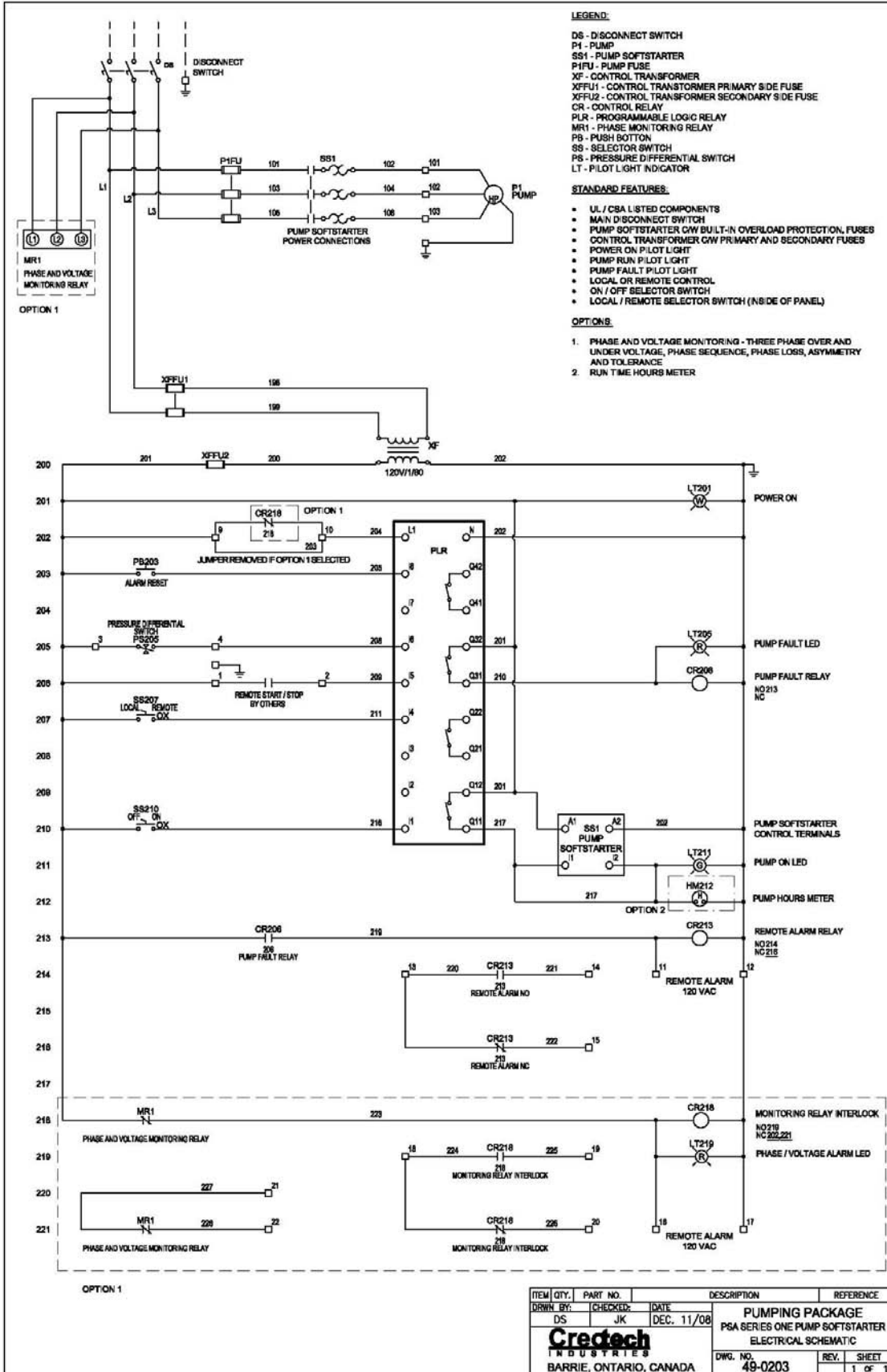
ELECTRICAL SCHEMATIC – PSA SINGLE PUMP



ELECTRICAL SCHEMATIC – PSA DUAL PUMP, SOFT STARTER



ELECTRICAL SCHEMATIC – PSA SINGLE PUMP, SOFT STARTER



ITEM	QTY.	PART NO.	DESCRIPTION	REFERENCE
DRAWN BY: DS CHECKED BY: JK DATE: DEC. 11/08				
PUMPING PACKAGE				
PSA SERIES ONE PUMP SOFTSTARTER				
ELECTRICAL SCHEMATIC				
Dwg. No. 49-0203				REV. SHEET
				1 OF 1

Product Specification

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This Section governs the materials and installation of closed hydronic systems associated with building heating and cooling. The following systems, where applicable, shall be installed as specified herein.
1. Hot Water Heating System
 2. Chilled Water Cooling System
 3. Dual Temperature Water System
 4. Heat Pump Circulating System
 5. Closed Circuit Cooling Tower System
 6. Run-Around Heat Recovery System

1.2 EQUIPMENT SUBSTITUTION

- A. Most items in this DIVISION are eligible for substitution in accordance with the General Conditions and Supplements thereto. Where a proprietary specification is written for a particular item, then only that item may be used. All items eligible for substitution require submission of request for substitution 10 days prior to bid date. This submittal shall include specific models and capacities of equipment and not just manufacturer's literature.

1.3 TESTING & APPROVING AGENCIES

- A. Where items of equipment are required to be provided with compliance to U.L., A.G.A., or other testing and approving agencies, the contractor may submit a written certification from any nationally recognized testing agency, adequately equipped and competent to perform such services, that the item of equipment has been tested and conforms to the same method of test as the listed agency would conduct.

1.4 SUBMITTAL DATA

- A. See Section 01300 for general submittal requirements.
 - B. Provide manufacturer's literature for all products specified in this Section, which will be installed under this project.
 - C. Provide performance curves for all pumps. Plot the specified operating point for each pump on its respective curve.
- Provide complete literature for all components of packaged systems. These include pump performance, heat exchanger calculations, expansion tank capacity, data for all accessories and valves and complete wiring diagrams specific to the exact unit to be supplied. The wiring diagram shall indicate all required field and factory wiring.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Creotech Industries Inc.
- B. (Approved Equal) 2.02

2.1 PUMPS

- A. Close Coupled Pumps.
 - 1. Pumps shall be Scot Model or approved equal. The pumps shall be single stage end suction rear pull out design. The seal shall be serviceable without disturbing the piping connections. The capacities and characteristics shall be as called for in the plans/schedules.
 - 2. Pump casing shall be constructed of ASTM A48 class 30 cast iron. The pump casing/volute shall be rated for 250 psi working pressure for all jobs. The pump flanges shall be matched to suit the working pressure of the piping components on the job, with either ANSI Class 125 flanges. Threaded casings with unions and fittings are provided with that pump to allow servicing.

3. The impeller shall be mild steel and hydraulically balanced. The impeller shall be dynamically balanced and shall be fitted to the shaft with a key.
4. The pump shall be fitted with a single mechanical seal, with Buna N and Carbon/Ceramic faces, rated up to 220°F. This seal must be capable of being flushed externally via a tapping in the pump cover adjacent to the seal cavity. The pump shall be close coupled to a NEMA standard JM frame motor.
5. In order to both simplify and reduce the total cost of ownership, the manufacturer shall standardize on no more than three sizes of mechanical seals through out the entire range of the family of pumps. The manufacturer shall not use multiple part numbers for the same part.

2.2 SUCTION AND DISCHARGE PIPING

A. General

1. All pumps shall be fitted with a discharge and suction valve or other means of providing system balance, isolation, and check feature for reverse flow. The valve shall be straight or angle pattern and shall be field convertible between the two. The valve shall be ductile iron and rated for 125 psi working pressure for all jobs. The valve flanges shall be matched to suit the working pressure of the piping components on the job; with either ANSI class 125 flanges. The valve shall include the following components; non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem. Valve shall be serviceable under full system pressure.
2. All pumps shall be fitted with one 4 1/2" dial pressure gauge piped to the inlet and outlet pump flanges. The gauge is to be isolated from each flange via 1/4" ball valve. This gauge is to be used to take the differential across the pump unless otherwise indicated.
3. Contractor shall install pump in accordance with the manufacturer's instructions. Contractor shall level each pump.

4. Pipe connections to pumps shall be made in such a manner so as not to exert any stress on pump housings. If necessary to meet this requirement, provide additional pipe supports and flex connectors.
5. Pumps shall **NOT** be run dry to check rotation.
6. Change start-up strainers to permanent strainer upon acceptance of the job. Provide a blow-down valve on each strainer and terminate with hose thread or extend blow-down line to nearest floor drain.

2.3 EXPANSION TANKS

Furnish and install as shown on plans a _____ gallon pre-charged vertical expansion tank with integral heavy duty Butyl rubber diaphragm. The tank will have a NPT connection and a 0.302”-32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements.

The tanks must be constructed in accordance with section VIII of the ASME Boiler and Pressure Code and stamped 125 psi (862 kPa) working pressure.