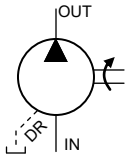
FluidHaus

Axial Piston Pump, 28-140cc/rev

Series: PVAP…4

SAE 0-280 Bar (0-4000 PSI) <252 lpm (<67 gpm)



Features

- Axial Piston Pump Design
- Variable Displacement
- For Open Loop Systems
- Rotation speed up to 3000 rpm
- Continuous Pressure to 280 Bar (4000 psi)
- Wide selection of compensator options to simplify and improc cuit designs

Ordering Details

P	Pump
V	Variable
AP	Axial Piston
28-	CC, Centimeters^3/rev.: 28, 45, 71, 100, 140

PR- Controller: (ref. page 3-4)

Code	Description
F	Fixed max. flow, with pilot port to shift to min. flow
PR	Pressure variable adjustment
PRR	Pressure variable adjustment w/remote pressure port
LS	Load Sense, Flow and Pressure

Code	Description
HP(X)	Horsepower limiting control, Indicate hp setting in parenthesis
PRP12	Pressure is electro-proportional controlled, 12VDC
PRP24	Pressure is electro-proportional controlled, 24VDC

K.8- Shaft: (ref. page 5-9)

Keyed

Code	Shaft Dia., in.	Key Width, in.	CC/rev
K.8	0.875	0.250	28
K1	1.00	0.250	45
K1.2	1.25	0.312	71
K1.5	1.50	0.375	100, 140

Spline

Code	Shaft Dia.	Details	CC/Rev
13T.8	0.875	13T 16/32 DP	28, 45
14T	1.25	14T 12/24 DP	71, 100
15T	1.00	15T 16/32 DP	45
17T	1.5	17T 12/24 DP	100
13T1.7	1.75	13T 8/16 DP	140

2B- Mounting Flange: (ref. page 5-9)

Code	Flange	CC/Rev
2B	SAE B, 2-bolt	28, 45
2C	SAE C, 2-bolt	71, 100
4D	SAE D, 4-bolt	140

F.75 Pressure Port:
F1.25 Suction Port:

4-bolt Flange, Code 61			
Code	Dia., inches	CC/Rev.	
		Pressure	Suction
F.75	0.75	28	
F1	1.00	45, 71	
F1.25	1.25	100, 140	28
F1.5	1.50		45
F2	2.00		71
F2.5	2.50		100, 140

S-	Port Location: S=Side
R-	Rotation: L=Left Hand (CCW), R= Right Hand (CW)

Through Drive Mounting: Blank = None, T = Prepared for through drive according to the following mounting options: (ref. page 10)

Rear pump			Lead Pump
Code	**Flange**	**Shaft**	**CC**
T2A9T.6	SAE A, 2-bolt	Spline 9T 16/32 DP	28, 45, 71, 100, 140
T2B13T.8	SAE B, 2-bolt	Spline13T 16/32 DP	28, 45, 71, 100, 140
T2B15T	SAE B, 2-bolt	Spline 15T 16/32 DP	28, 45, 71, 100, 140

Rear pump			Lead Pump
Code	**Flange**	**Shaft**	**CC**
T2C14T	SAE C, 2-bolt	Spline, 14T 12/24 DP	71, 100, 140
T2C17T	SAE C, 2-bolt	Spline 17T 12/24 DP	100, 140
T2D13T1.7	SAE D, 4 bolt	Spline 13T 8/16 DP	140

add "+" then rear pump part number for a tandem assembled unit

4	Frame: 4

Example Part Number: PVAP28-PR-K.8-2B-F.75F1.25S-R-4

Technical Specifications:

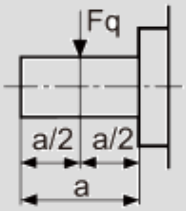
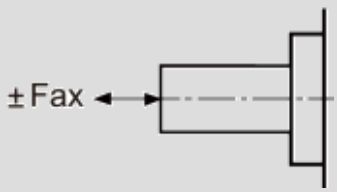
Displacement	cc/rev (in^3/rev	28	45	71	100	140
Flow at 1800 rpm	lpm (gpm)	50.4 (13)	81 (21)	127.8 (33)	180 (47)	252 (66)
Flow at Max. RPM	lpm (gpm)	84(22)	117 (31)	156 (41)	200 (52)	252 (66)

Maximum RPM (continuous)	rpm	3000	2600	2200	2000	1800
Min. Recommended RPM	rpm	500	500	500	500	500
Max. Pressure (continuous)	bar (psi)	280 (4000)	280 (4000)	280 (4000)	280 (4000)	280 (4000)
Max. Pressure (intermittent)*	bar (psi)	350 (5100)	350 (5100)	350 (5100)	350 (5100)	350 (5100)
Power at 1800 rpm and max. pressure (Continuous)	kw (hp)	23 (31)	40 (53)	81 (109)	141 (189)	223 (300)
Power at max. rpm and max. pressure (Continuous)	kw (hp)	39 (52)	54 (72)	72 (97)	93 (124)	117 (156)
Max. Case Pressure above Suction Port Pressure (not to exceed 2 bar (29psi)), Measured at drain port L.	bar (psi)	0.5 (7)	0.5 (7)	0.5 (7)	0.5 (7)	0.5 (7)
Max. Suction Port Pressure	bar (psi)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)
Min. Suction Port Pressure	bar (psi)	0.8 (12)	0.8 (12)	0.8 (12)	0.8 (12)	0.8 (12)
Recommended Oil Viscosity	mm^2/sec (SUS)	16-36 (80-170) {Cold start $\leq$ 1600mm^2/s for $\leq$ 3min}				
Recommended Fluid		Mineral based oil, VG46				
Recommended Fluid Filtration level		20/18/15 to ISO 4406				
Recommended Temp. Range	°C (°F)	-25 to 82 (-13 to 180)				

*Single duration <2ms, Total durations <300hours

Weight	Kg (lbs.)	15 (33)	21 (46)	33 (73)	45 (99)	60 (132)

Permissible Radial and Axial loading on the drive shaft

Radial Force Maximum, Fq at a/2 	N (lbf)	1200 (270)	1500 (337)	1900 (427)	2300 (517)	2800 (630)
Axial Force Maximum, +/-Fax 	N (lbf)	1000 (225)	1500 (337)	2400 (540)	4000 (900)	4800 (1080)

Max. Shaft Through Drive Power**	kw (hp)	45 (61)	57 (77)	100 (133)	157 (210)	223 (300)

**Maximum power of all pumps mounted behind the lead pump. To calculate the power of all pumps mounted to the lead pump add the power of each with the following calculation:

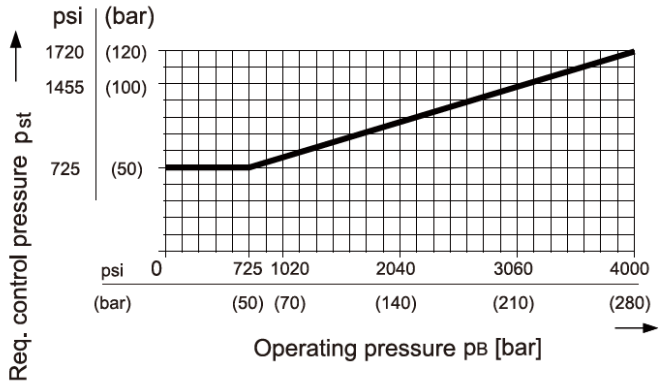
Pump hp = Flow (gpm) x Pressure (psi) /1714 or Pump kw =Flow (lpm) x Pressure (bar)/600

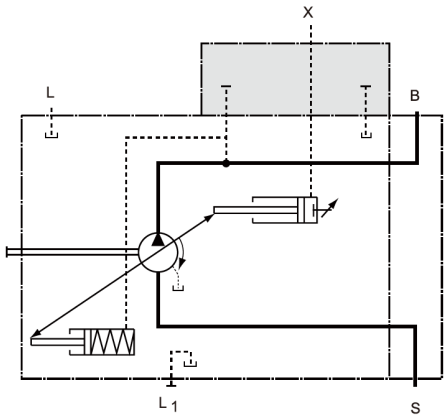
Controller Options:

F-Fixed displacement with minimum displacement pilot

The pump is normally full displacement. The pump can be switched to a minimum displacement by supplying a pilot pressure signal to the X port. Minimum and maximum displacements are not adjustable.

The minimum X port pilot pressure required is 50 bar (725psi). The maximum X port pressure is 120 bar (1740psi). If the system pressure at port B is greater than 50 bar (725psi), the pilot pressure to switch to minimum displacement will need to be increased according to the following graph:





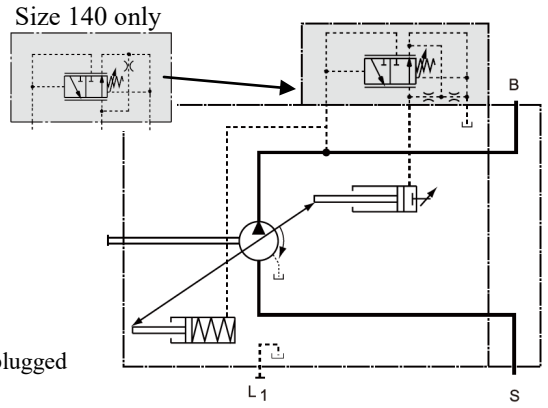
B = Working Pressure Port
S = Suction Port
L = Drain Port
L_1 = Auxiliary Drain Port, plugged
X = Pilot Pressure

PR-Pressure Compensated

Controls the maximum pressure at port B by varying the pump displacement. The pump will provide only the amount of fluid required by the actuators. The maximum pressure is set manually by an allen wrench adjustment on the compensator.

Repetitive accuracy of pressure setting ≤ 3 bar (45psi)

Size 140 only



B = Working Pressure Port
S = Suction Port
L = Drain Port
L_1 = Auxiliary Drain Port, plugged

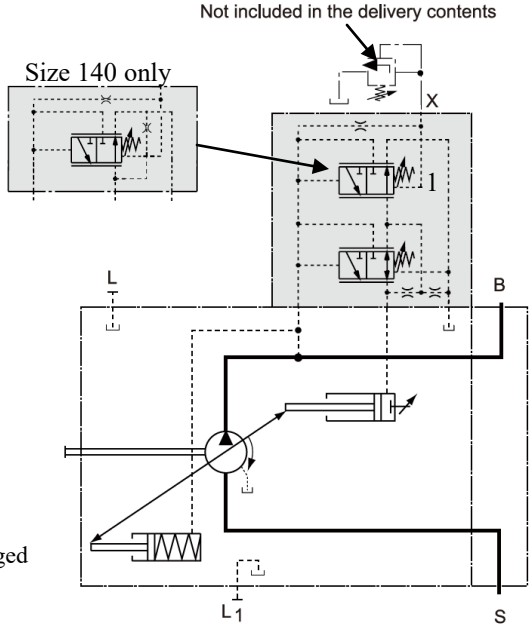
PRR-Pressure Compensated with Remote Pressure Port

Same as the PR control with a X port to remotely set the pressure. Remote pressure valve not included.

The PRR control spool (1) is pre-set at 20 bar (290psi). The remote pressure control will not be able to go below this. The maximum flow for the remote pressure control through the X port is 1.5 lpm (0.4 gpm). The maximum recommended line length to the remote pressure control should be ≤ 2m (6.6 ft.)

Not included in the delivery contents

Size 140 only



B = Working Pressure Port
S = Suction Port
L = Drain Port
L_1 = Auxiliary Drain Port, plugged
X = Pilot Pressure Port

Controller Options:

LS—Load Sense Control (Pressure and Flow)

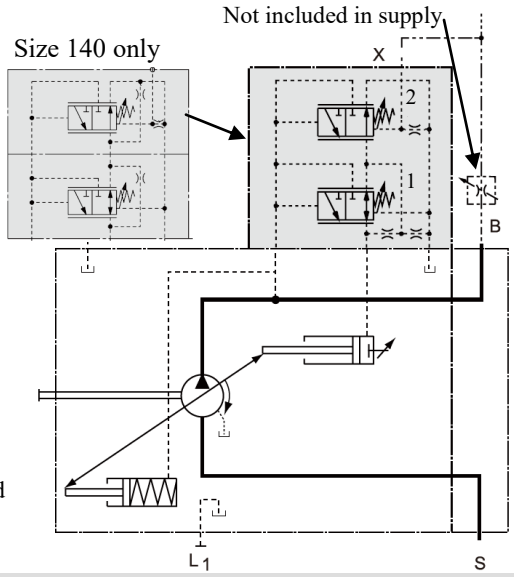
The pump maximum pressure is controlled by the pressure setting (1) on the pump. The flow can also be varied based on the differential pressure across an orifice (valve) in line with each actuator. The pump will limit its flow by means of the spring setting (2) to only what's required for the movement of the actuator based on the orifice (valve) opening. The larger the opening the higher the speed. The pump flow will be consistent regardless of changes in pressure (varying loads on the actuator) or pump rpm The benefit of a LS controls is energy efficiency, reduced heat generation and consistent speed control.

The load sense flow control spring setting (2) is pre-set to 14-22 bar (200-320 psi).

Relieving the X port to tank results a minimum stroke (standby) of 16-20 bar (230-290psi).

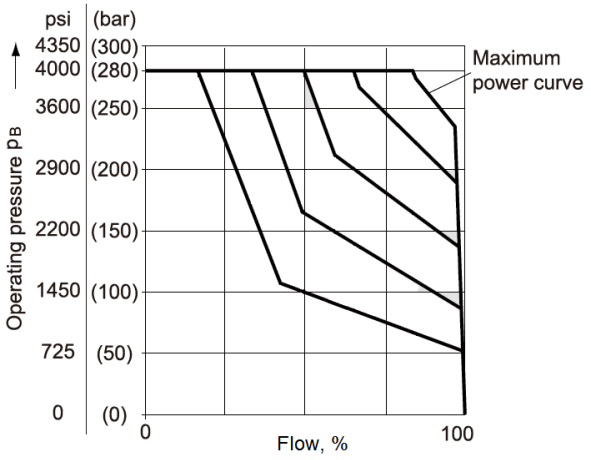
Repetitive accuracy of pressure setting ≤ 3 bar (45psi)

B = Working Pressure Port
S = Suction Port
L = Drain Port
L_1 = Auxiliary Drain Port, plugged
X = Load Sense Pilot Pressure



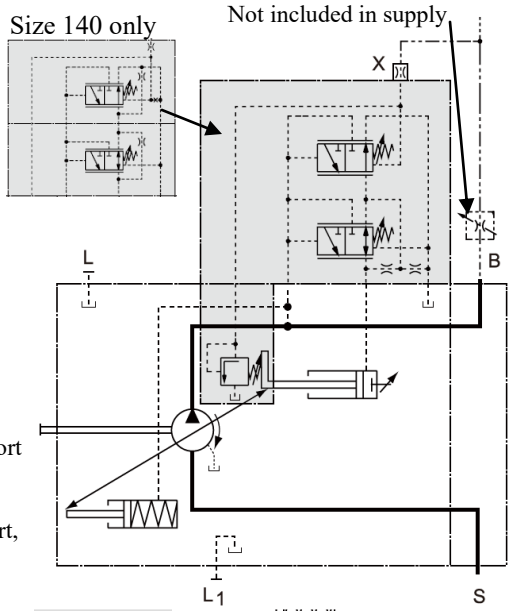
HP-Horsepower Control (Pressure Flow and Power)

The maximum horsepower required to drive the pumps is limited. The output flow of the pump is varied so the pressure times the flow (HP) is held below the limit setting. The flow can be varied before the HP limit is reached. Flow is controlled like the LS controller via an inline orifice (valve).



The power setting is set at the factory. Indicate in the part number the hp setting in parenthesis after the HP controller code.

B = Working Pressure Port
S = Suction Port
L = Drain Port
L_1 = Auxiliary Drain Port, plugged



PRP12 and PRP24-Electrical Proportion Pressure Control

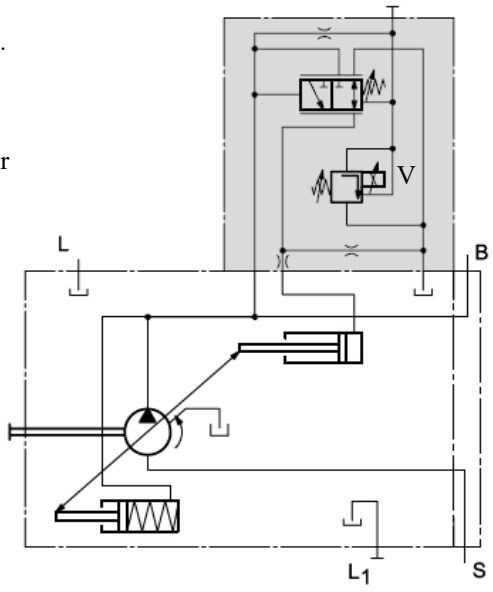
The pump pressure is electrically controlled by varying the current to the proportional valve V. The proportional valve V can be powered by 12VDC (PRP12) or 24VDC (PRP24) options.

If the current drops to 0 amps, the pump goes to the standby pressure of 14 bar (200psi). Increasing the current increases the pressure. Reference the table below for the solenoid details and amplifier options:

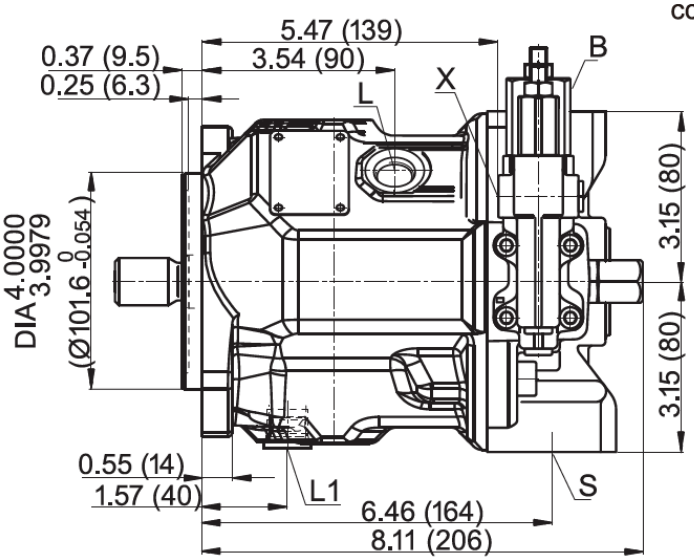
Hysteresis of pressure setting ≤ 4 bar (60psi)

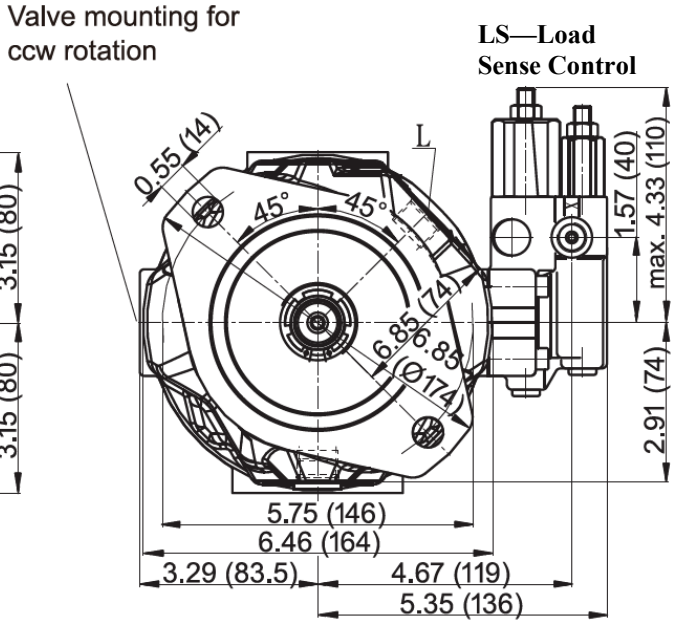
Solenoid Data	PRP12	PRP24
Voltage	12VDC (+/-20%)	24 VDC (+/-20%)
Current at min flow	100 mA	50 mA
Current at max. flow	1200 mA	600mA
Current limit	1.54 A	0.77 A
Nominal Resistance @ 20°C	5.5Ω	22.7Ω
Dither Frequency	100-200 Hz	100-200Hz
Operating Temperature	-20 to 115°C (-4 to 239°F)	
Amplifier Card Part No., Sold Separately (ref. page 11- 12)	AMP PRP12 AMPP PRP12..	AMP PRP24 AMPP PRP24..

B = Working Pressure Port
S = Suction Port
L = Drain Port
L_1 = Auxiliary Drain Port, plugged



Dimensions, 28 cc/rev:

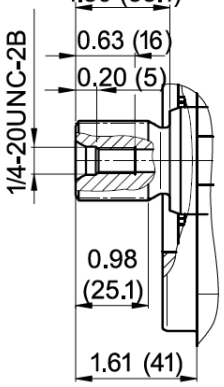




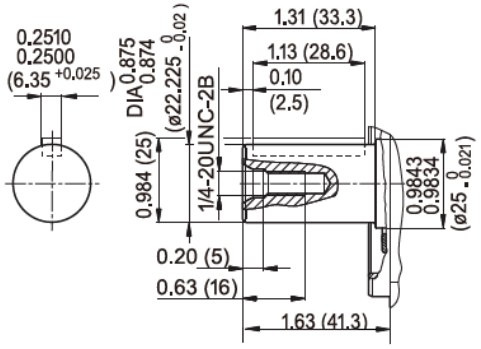
Port	Description	Flange/Thread
B	Pressure Port	3/4 in, SAE J518, Flange
S	Suction Port	1 1/4 in, SAE J518, Flange
L*	Case Drain	SAE –8, 3/4-16 UNF-2B, Thread
L1*	Case Dain, Optional	SAE –8, 3/4-16 UNF-2B, Thread
X	Pilot Pressure	SAE –4, 7/16-20 UNC-2B, Thread

*Fill drain port before operating. Select drain port based on installation direction to keep case full.

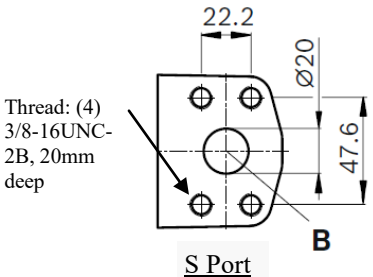
13T.8-Spline Shaft



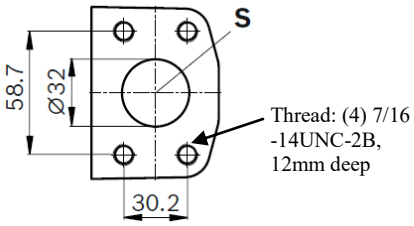
K.8-Keyed Shaft



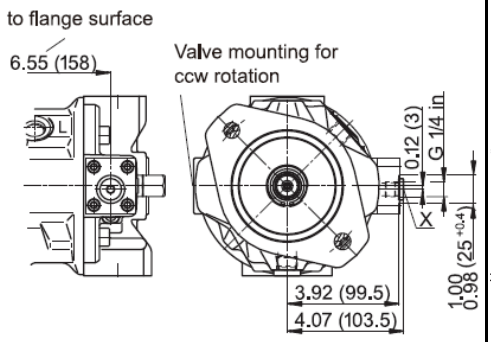
B Port



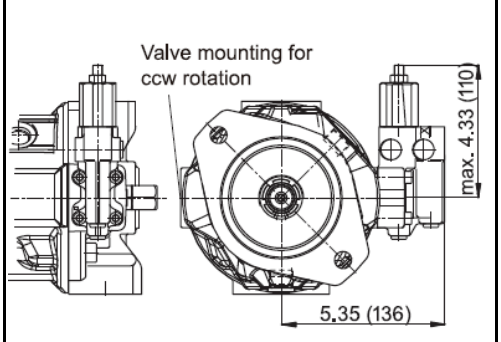
S Port



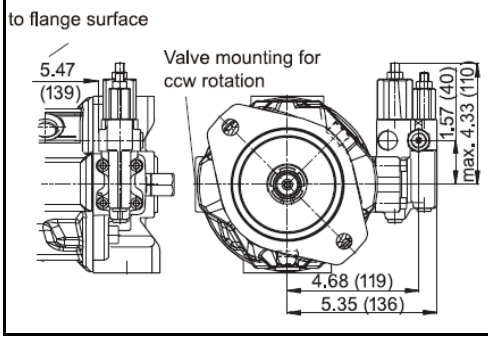
F -2 Position Min/Max Volume Control



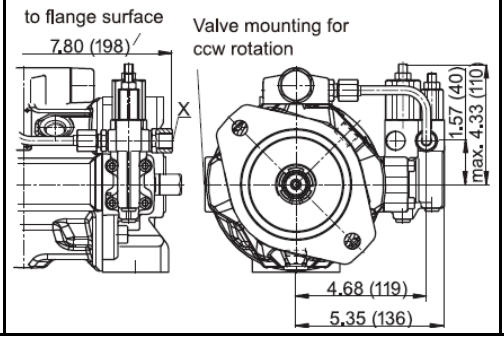
PR-Pressure Control



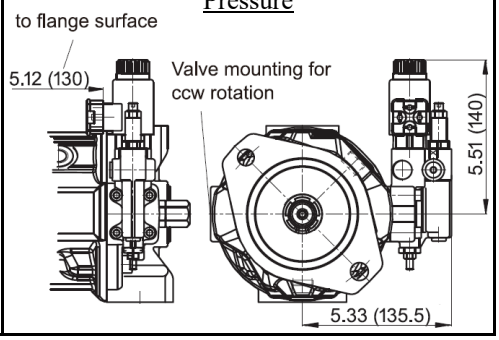
PRR-Pressure control with remote port



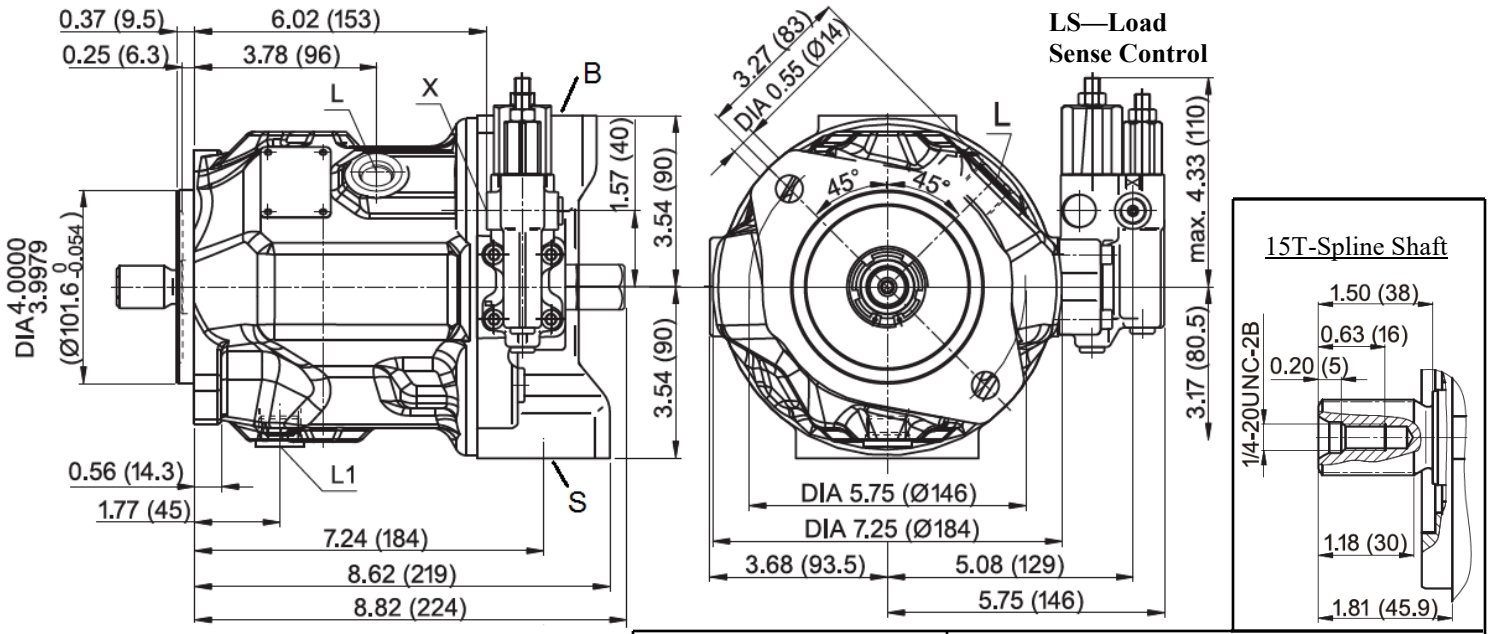
HP-Horsepower Control



PRP12/24-Electro-Proportional Pressure

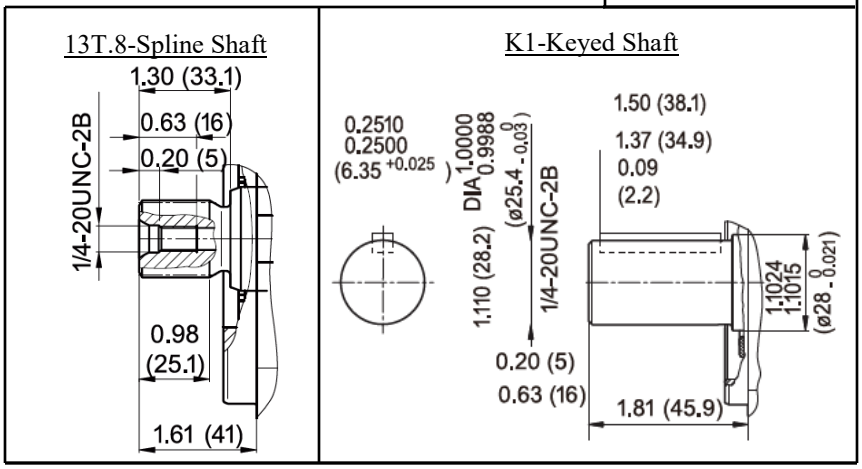


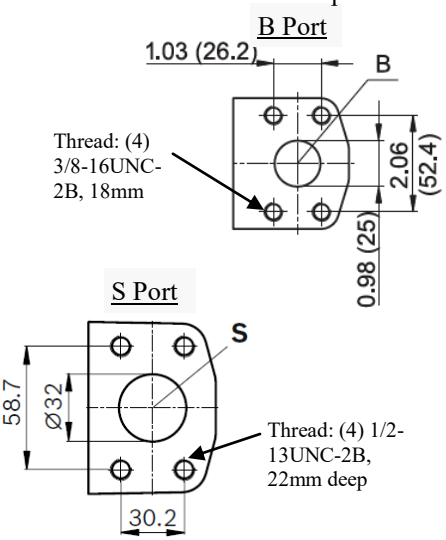
Dimensions, 45 cc/rev:

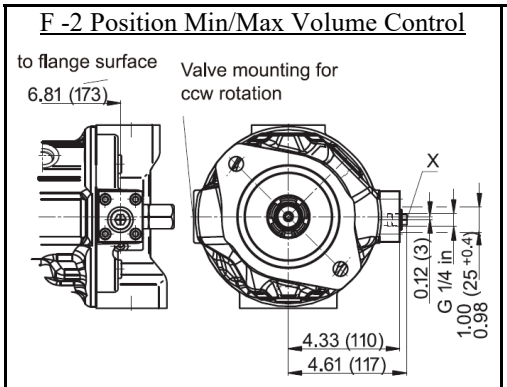


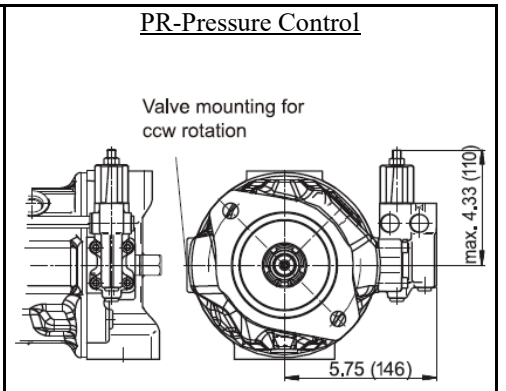
Port	Description	Flange/Thread
B	Pressure Port	1 in, SAE J518, Flange
S	Suction Port	1 1/2 in, SAE J518, Flange
L*	Case Drain	SAE –10, 7/8-14 UNF-2B, Thread
L1*	Case Dain, Optional	SAE –10, 7/8-14 UNF-2B, Thread
X	Pilot Pressure	SAE –4, 7/16-20 UNC-2B, Thread

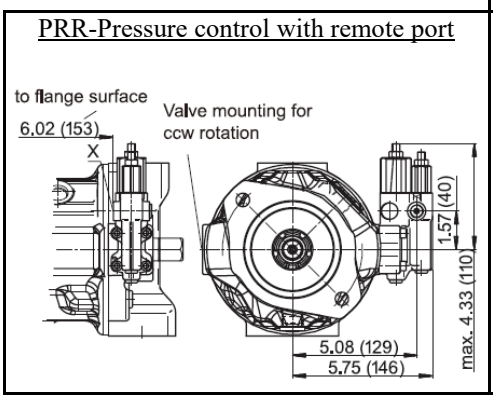
*Fill drain port before operating. Select drain port based on installation direction to keep case full.

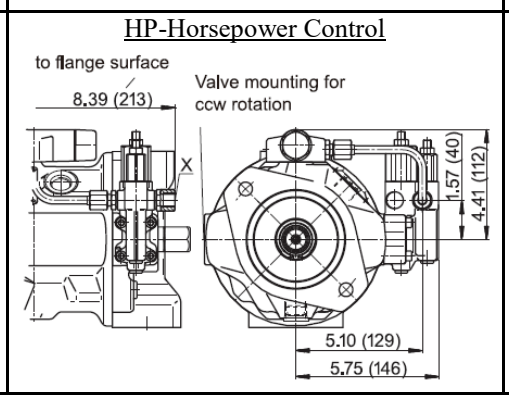


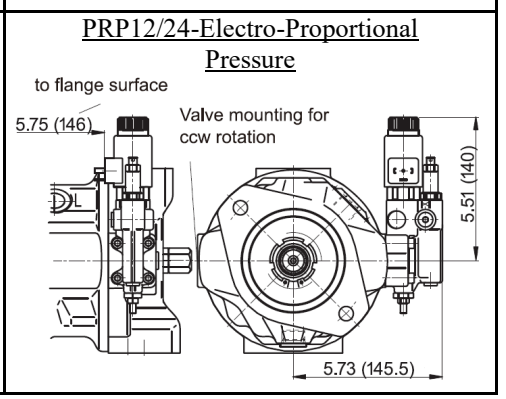




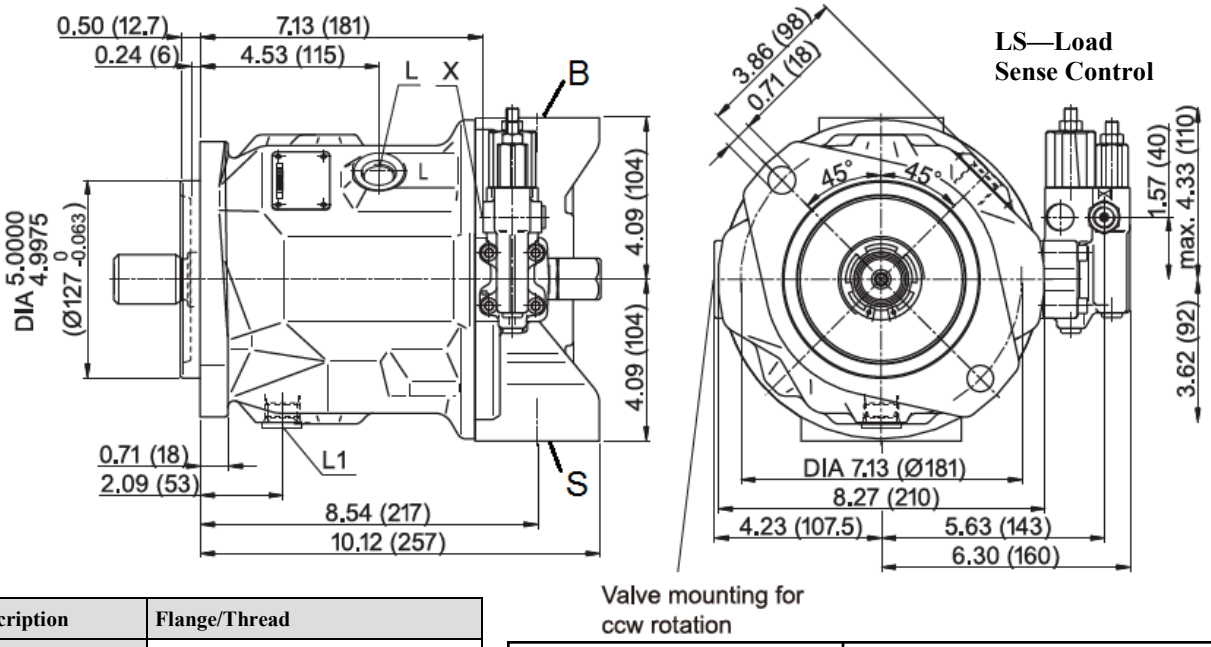








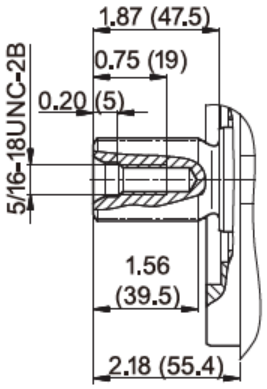
Dimensions, 71 cc/rev:



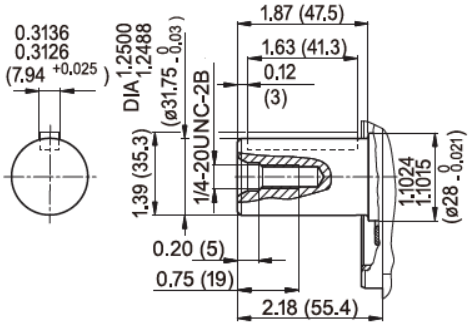
Port	Description	Flange/Thread
B	Pressure Port	1 in, SAE J518, Flange
S	Suction Port	2 in, SAE J518, Flange
L*	Case Drain	SAE –10, 7/8-14 UNF-2B, Thread
L1*	Case Dain, Optional	SAE –10, 7/8-14 UNF-2B, Thread
X	Pilot Pressure	SAE –4, 7/16-20 UNC-2B, Thread

*Fill drain port before operating. Select drain port based on installation direction to keep case full.

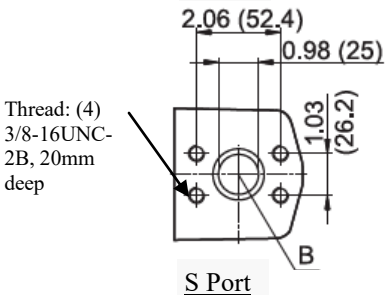
14T-Spline Shaft



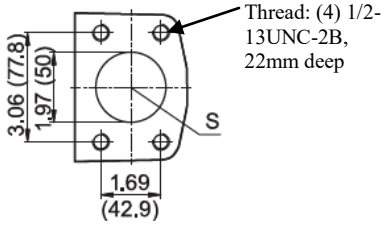
K1.2-Keyed Shaft



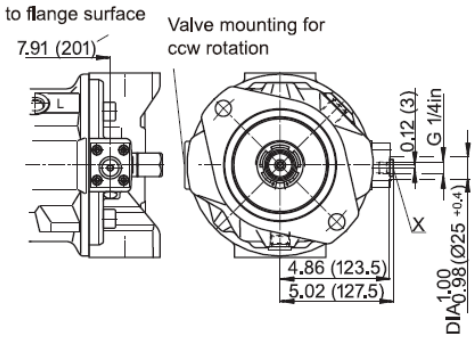
B Port



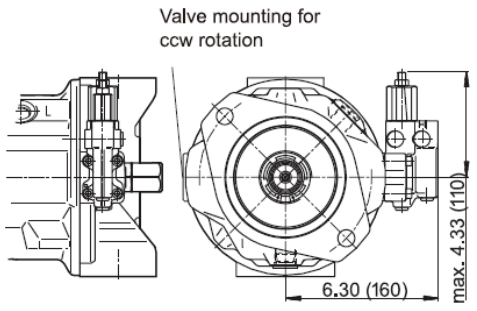
S Port



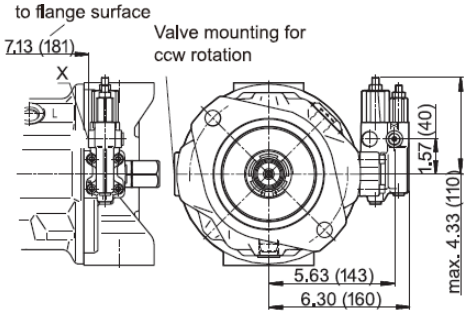
F -2 Position Min/Max Volume Control



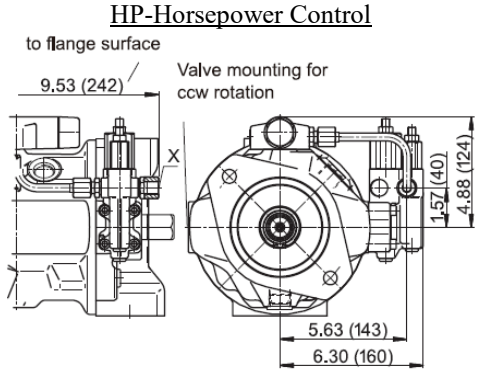
PR-Pressure Control



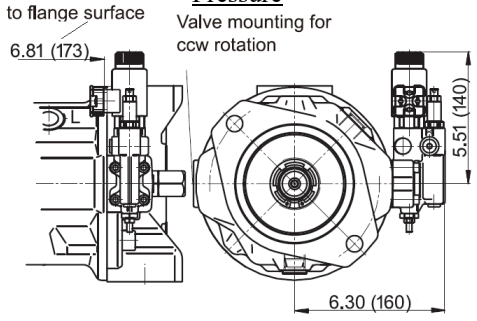
PRR-Pressure control with remote port



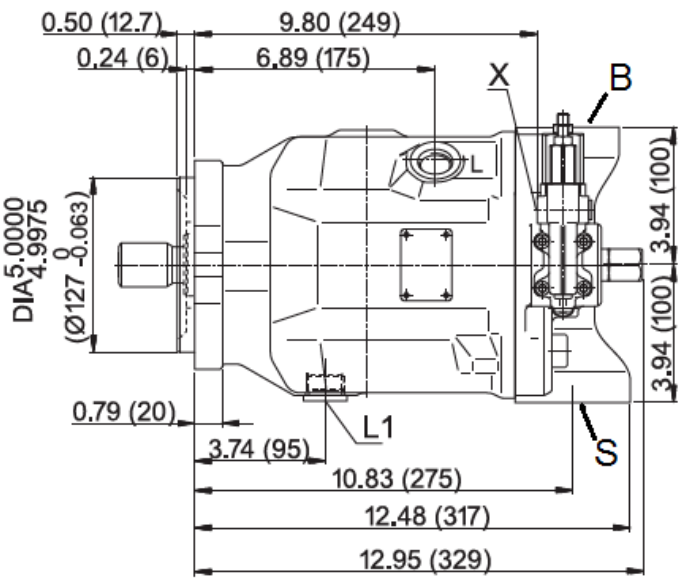
HP-Horsepower Control

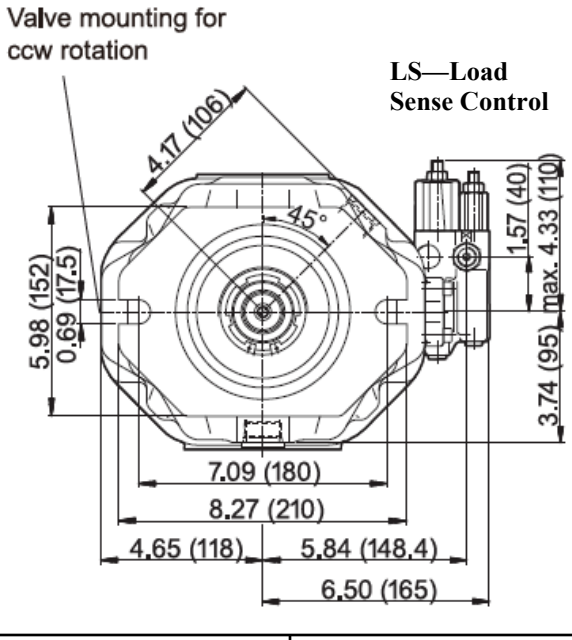


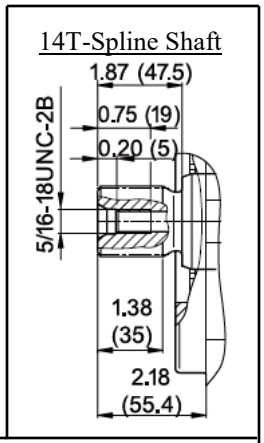
PRP12/24-Electro-Proportional Pressure



Dimensions, 100 cc/rev:

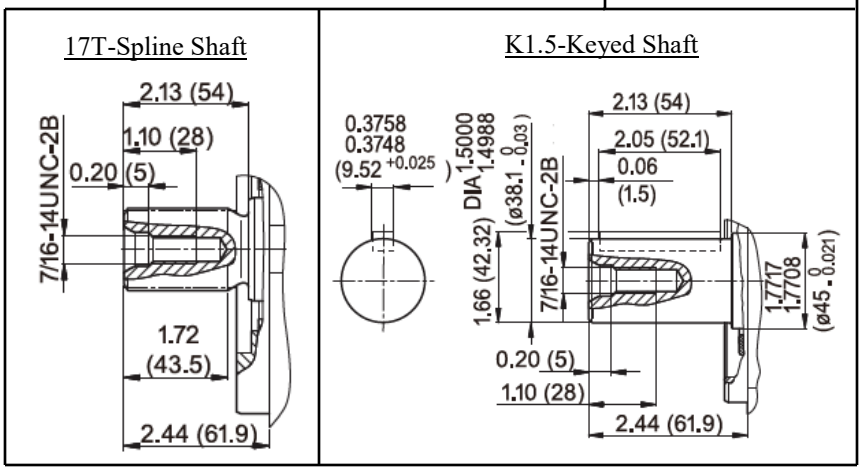


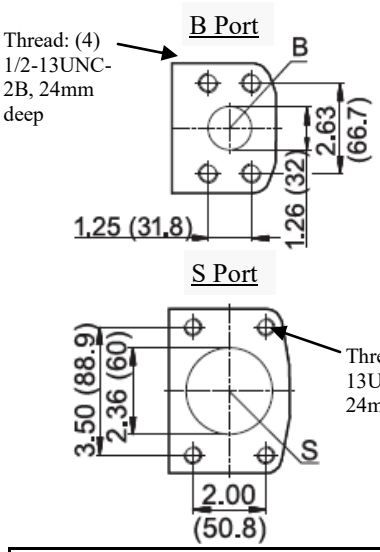


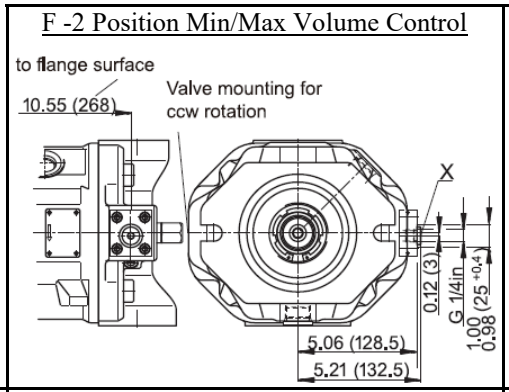


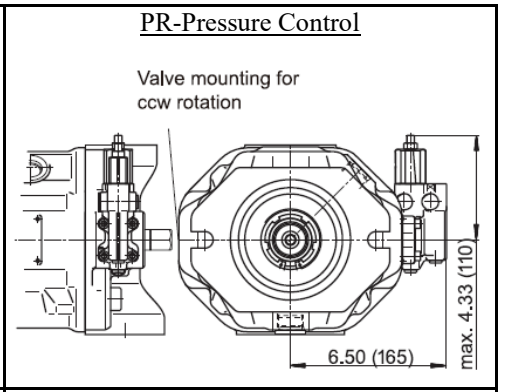
Port	Description	Flange/Thread
B	Pressure Port	1 1/4 in, SAE J518, Flange
S	Suction Port	2 1/2 in, SAE J518, Flange
L*	Case Drain	SAE –12, 1 1/16-12 UNF-2B, Thread
L1*	Case Dain, Optional	SAE –12, 1 1/16-12 UNF-2B, Thread
X	Pilot Pressure	SAE –6, 9/16-18 UNC-2B, Thread

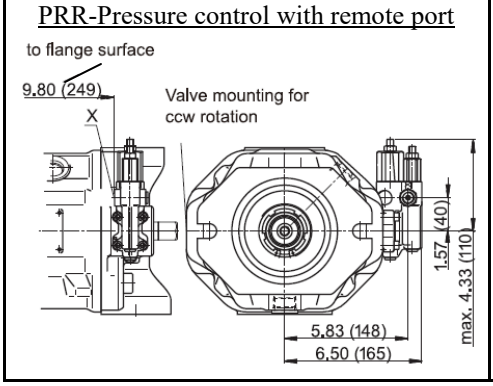
*Fill drain port before operating. Select drain port based on installation direction to keep case full.

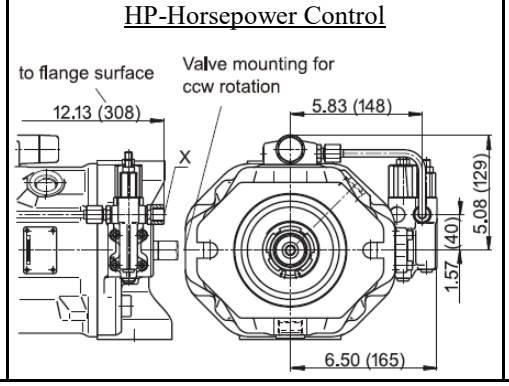


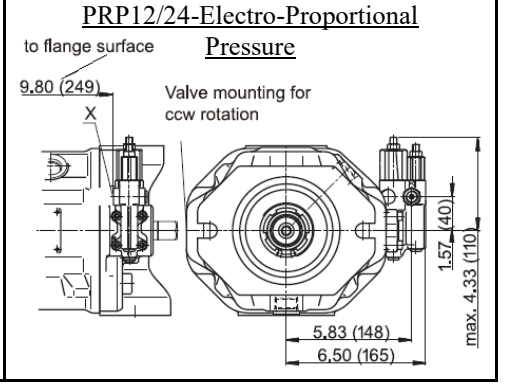




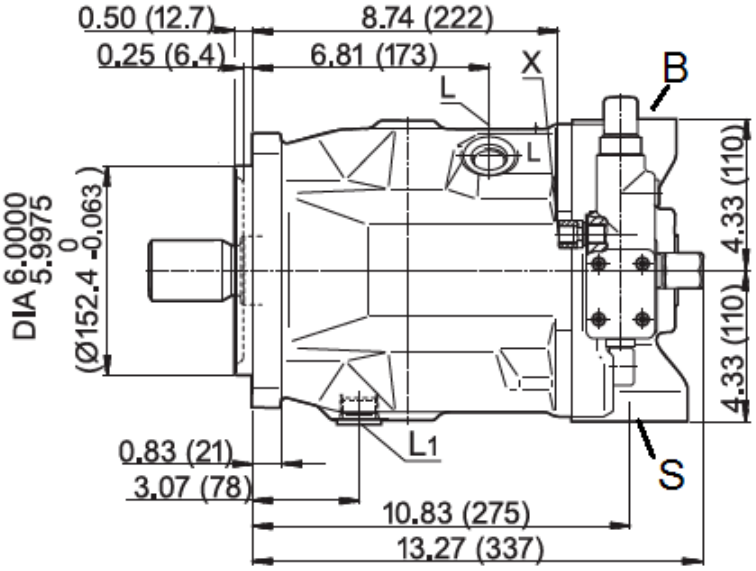




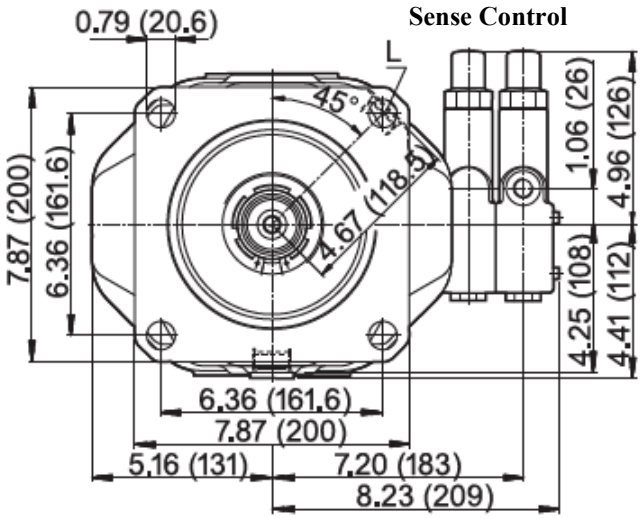




Dimensions, 140 cc/rev:



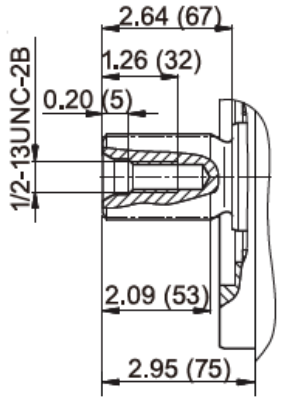
LS—Load Sense Control



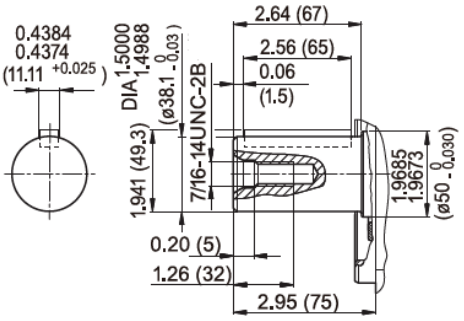
Port	Description	Flange/Thread
B	Pressure Port	1 1/4 in, SAE J518, Flange
S	Suction Port	2 1/2 in, SAE J518, Flange
L*	Case Drain	SAE –12, 1 1/16-12 UNF-2B, Thread
L1*	Case Dain, Optional	SAE –12, 1 1/16-12 UNF-2B, Thread
X	Pilot Pressure	SAE –4, 7/16-20 UNC-2B, Thread

*Fill drain port before operating. Select drain port based on installation direction to keep case full.

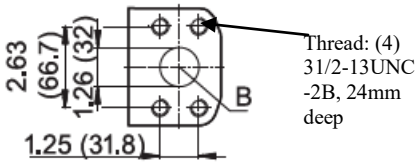
13T1.7-Spline Shaft



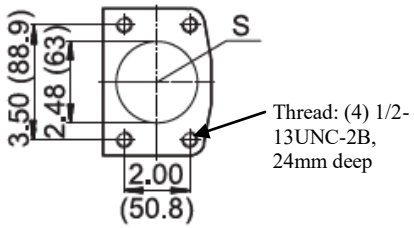
K1.5-Keyed Shaft



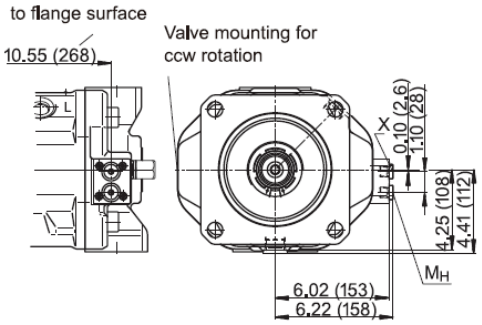
B Port



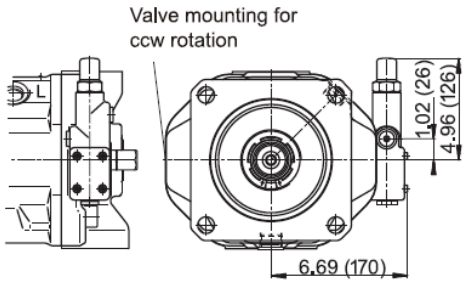
S Port



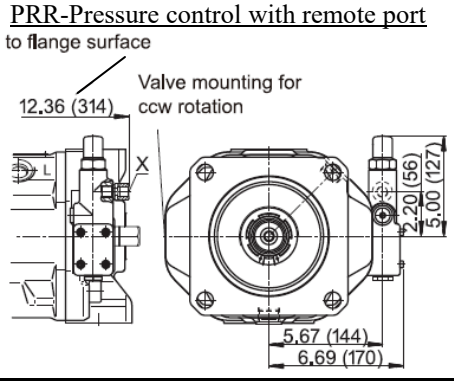
F -2 Position Min/Max Volume Control



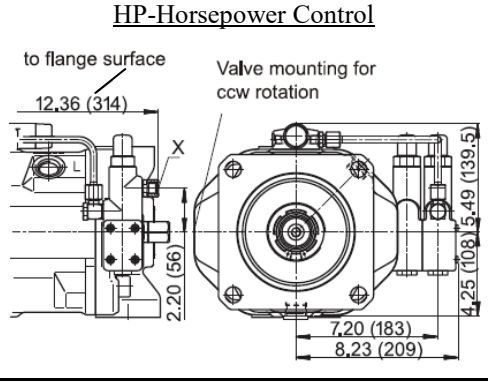
PR-Pressure Control



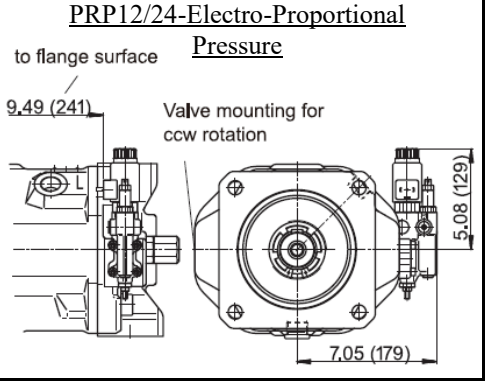
PRR-Pressure control with remote port



HP-Horsepower Control

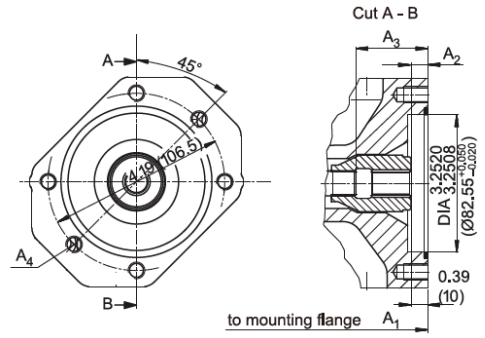


PRP12/24-Electro-Proportional Pressure



Through Drive Adapters:

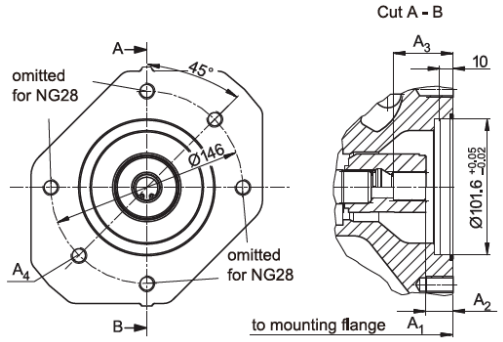
T2A9T-SAE A with 9T 16/32 DP Spline Shaft



CC	A_1	A_2	A_3	A_4
18	7.16 (182)	0.39 (10)	1.70 (43.3)	M10 x 1.5, 0.57 (14.5) deep
28	8.03 (204)	0.39 (10)	1.33 (33.7)	M10 x 1.5, 0.62 (16) deep
45	9.02 (229)	0.42 (10.7)	2.10 (53.4)	M10 x 1.5, 0.62 (16) deep

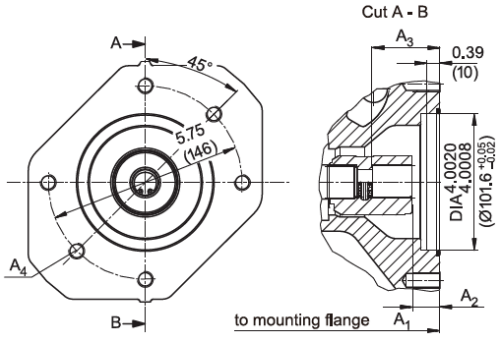
CC	A_1	A_2	A_3	A_4
71	10.51 (267)	0.46 (11.8)	2.41 (61.3)	M10 x 1.5, 0.78 (20) deep
100	13.31 (338)	0.41 (10.5)	2.56 (65)	M10 x 1.5, 0.62 (16) deep
140	13.78 (350)	0.43 (10.8)	3.04 (77.3)	M10 x 1.5, 0.62 (16) deep

T2B13T.8-SAE B with 13T 16/32 DP Spline Shaft



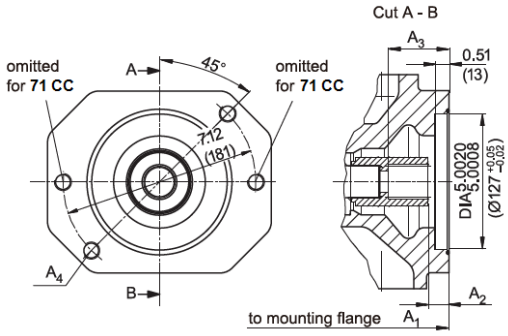
CC	A_1	A_2	A_3	A_4
45	9.02 (229)	0.704 (17.9)	1.64 (41.7)	M12 x 1.75, 0.71 (18) deep
71	10.51 (267)	0.80 (20.3)	1.74 (44.1)	M12 x 1.75, 0.78 (20) deep
100	13.31 (338)	0.71 (18)	1.65 (41.9)	M12 x 1.75, 0.78 (20) deep
140	13.78 (350)	0.70 (17.8)	1.64 (41.6)	M12 x 1.75, 0.78 (20) deep

T2B15T-SAE B with 15T 16/32 DP Spline Shaft



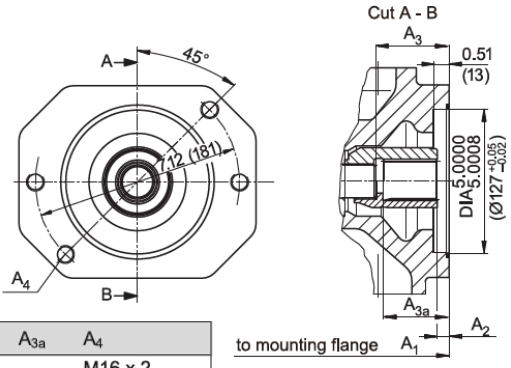
CC	A_1	A_2	A_3	A_4
45	9.02 (229)	0.724 (18.4)	1.84 (46.7)	M12 x 1.75, 0.71 (18) deep
71	10.51 (267)	0.82 (20.8)	1.93 (49.1)	M12 x 1.75, 0.78 (20) deep
100	13.31 (338)	0.716 (18.2)	1.83 (46.6)	M12 x 1.75, 0.78 (20) deep
140	13.78 (350)	0.72 (18.3)	1.81 (45.9)	M12 x 1.75, 0.78 (20) deep

T2C14T-SAE C with 14T 12/24 DP Spline Shaft



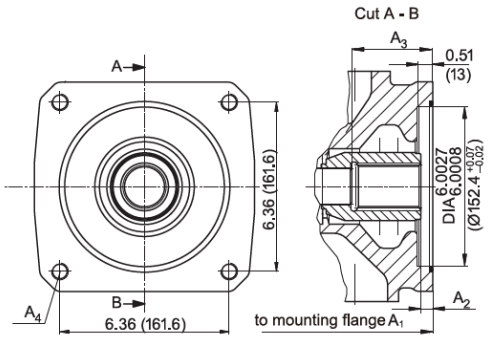
CC	A_1	A_2	A_3	A_4
71	10.51 (267)	0.86 (21.8)	2.31 (58.6)	M16 x 2, continuous
100	13.31 (338)	0.77 (19.5)	2.22 (56.4)	M16 x 2, continuous
140	13.78 (350)	0.76 (19.3)	2.21 (56.1)	M16 x 2, 0.94 (24) deep

T2C17T- SAE C with 17T 12/24 DP Spline Shaft



CC	A_1	A_2	A_3	A_{3a}	A_4
100	13.31 (338)	0.41 (10.5)	2.56 (65)	–	M16 x 2, continuous
140	13.78 (350)	0.42 (10.8)	2.95 (75)	–	M16 x 2, 0.94 (24) deep
	13.78 (350)	0.40 (10.3)	–	2.72 (69.1)	M16 x 2, 0.94 (24) deep

T2D13T1.7-SAE D with 13T 8/16 DP Spline Shaft

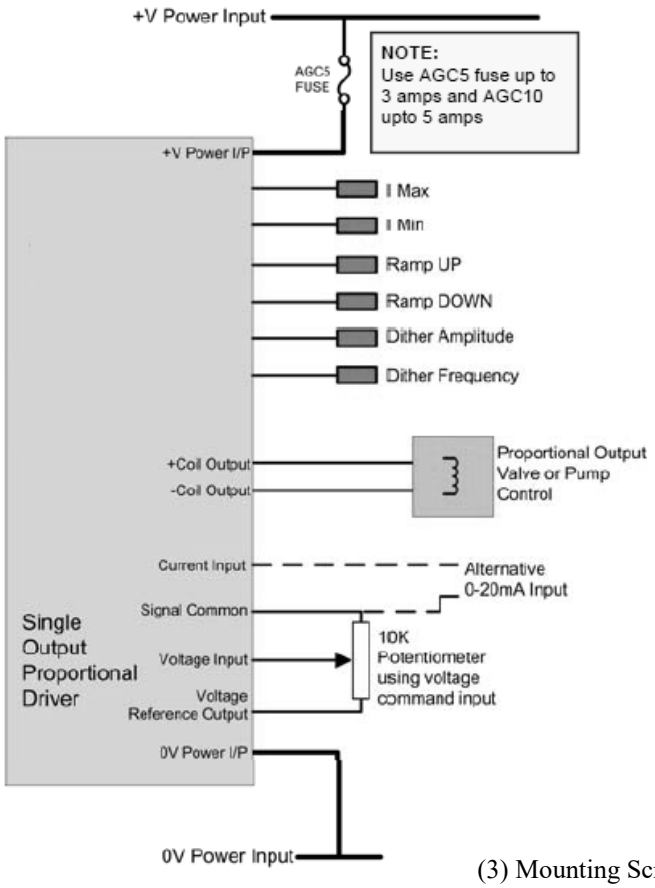


CC	A_1	A_2	A_3	A_4
140	13.78 (350)	0.43 (11)	3.04 (77.3)	M6 x 2, continuous

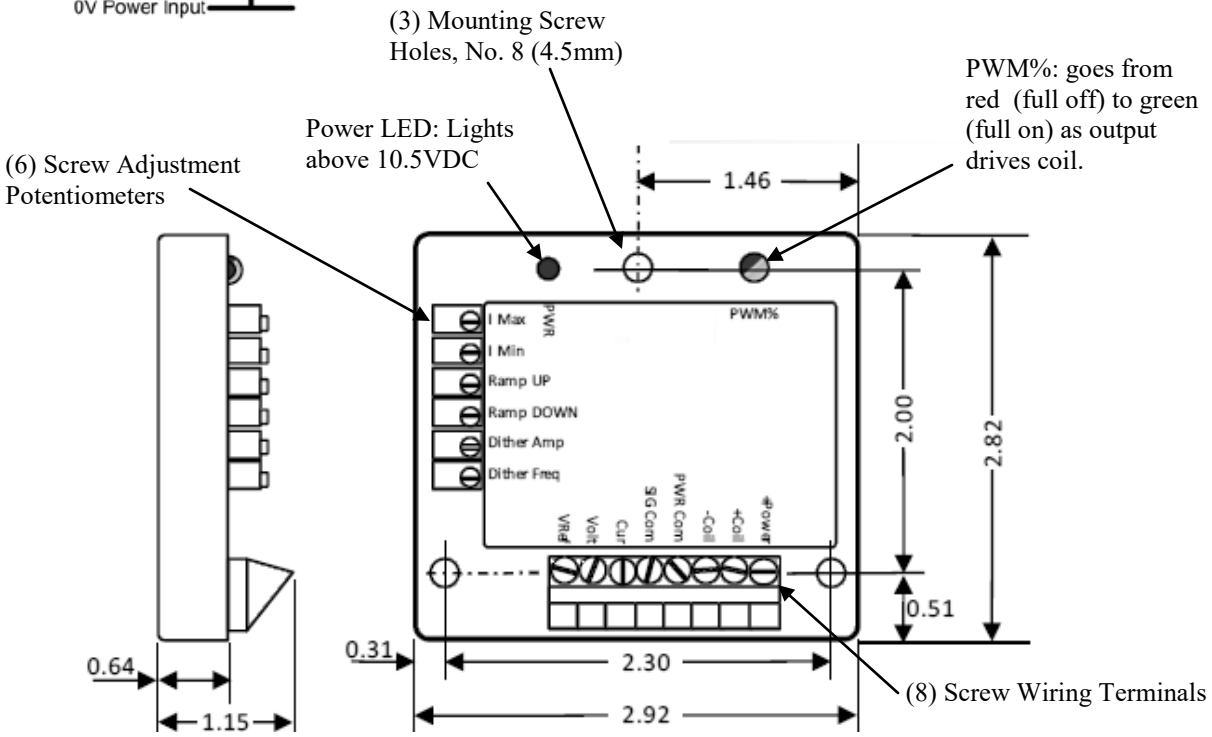
Accessories:

AMP PRP12 and AMP PRP24:

Amplifier card for use with PRP12 and PRP24 controllers.



Specifications	
Input Supply Voltage	11-30VDC
Input Supply Current	200 mA Quiescent (Max)
Command Input Values	0 to +5VDC, 0 to +10VDC or 0 to 20mA
Proportional Output	1x PWM up to 5A max current
Dither Frequency	~30 to 200Hz (adjustable)
Dither Amplitude	~0 to 100% (adjustable)
Housing Material	Block, Polycarbonate
Mounting Screws	3 x No. 8 (4.5mm) screws
Temperature Range	-20 to +60°C (Operating)
NEMA/IP rating	NEMA 6P/68
Weight	350 grams



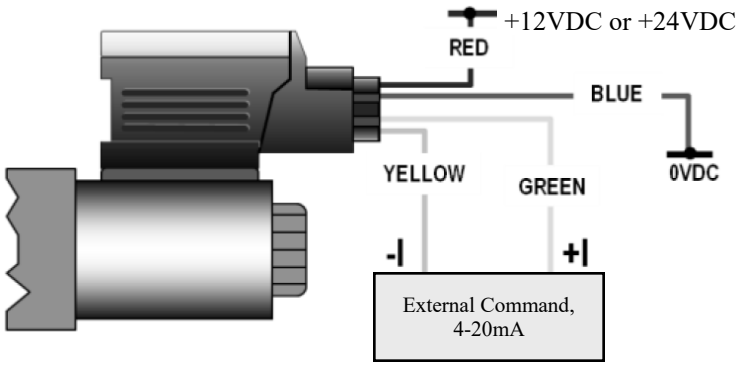
Dimensions in inches

Accessories:

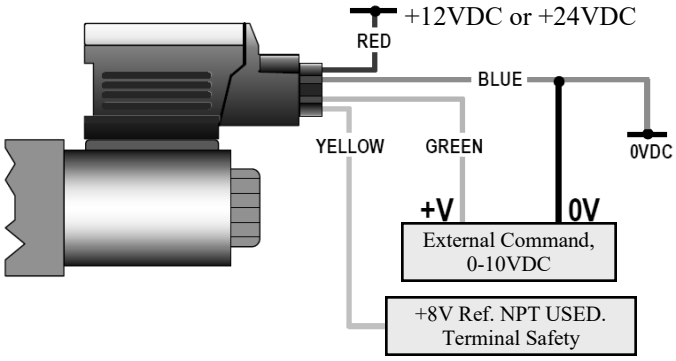
AMPP PRP12 and AMPP PRP24:

Plug In Amplifier card for use with PRP12 and PRP24 controllers. Amplifier comes prewired with 10 feet (3meters) of color coded 16 AWG cable that is selected for harsh environments. Separate plugs are required for mA or VDC set point commands.

Wiring Diagram, mA Command

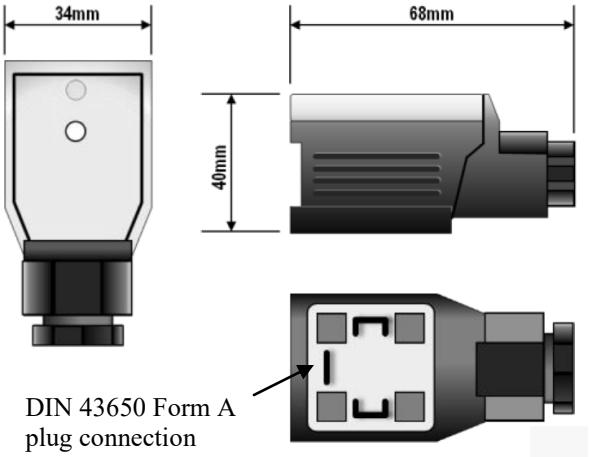


Wiring Diagram, 0-10VDC Command



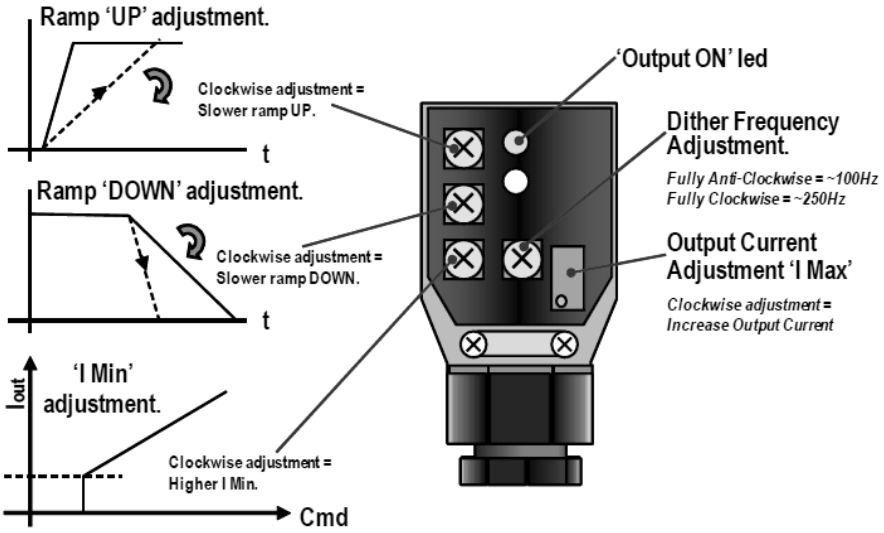
Note: Yellow Wire is internally connected to ground supply.

Dimensions



DIN 43650 Form A plug connection

Adjustments (Cover Off):



Specifications				
Amplifier Part Number	**AMPP PRP12 A**	**AMPP PRP12 V**	**AMPP PRP24 A**	**AMPP PRP24 V**
Input Supply Voltage	12VDC +/-20%	12VDC +/-20%	24VDC +/-20%	24VDC +/-20%
Command Input Value	4-20mA	0-10VDC	4-20mA	0-10VDC
Input Supply Current	200 mA Quiescent (Max)	200 mA Quiescent (Max)	200 mA Quiescent (Max)	200 mA Quiescent (Max)
Output Current	3 Amps (36W)	3 Amps (36W)	1.5 Amps (36W)	1.5 Amps (36W)
Ramp Times	300mS-8Sec.	300mS-8Sec.	300mS-8Sec.	300mS-8Sec.
Dither Frequency	~100 to 250Hz (adjustable)	~100 to 250Hz (adjustable)	~100 to 250Hz (adjustable)	~100 to 250Hz (adjustable)
Housing Material	High Impact resistant ABS	High Impact resistant ABS	High Impact resistant ABS	High Impact resistant ABS
Mounting Screws	3 x No. 8 (4.5mm) screws	3 x No. 8 (4.5mm) screws	3 x No. 8 (4.5mm) screws	3 x No. 8 (4.5mm) screws
Temperature Range	-20 to +70°C (Operating)	-20 to +70°C (Operating)	-20 to +70°C (Operating)	-20 to +70°C (Operating)
NEMA/IP rating	NEMA 6/IP 65	NEMA 6/IP 65	NEMA 6/IP 65	NEMA 6/IP 65