

HYDROSTATIC POWER STEERING UNIT & HYDRAULIC VALVES



Wise Mobile Hydraulic Solution Provider

Steering Units, MCV, Pumps and Valves



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Message from President

To the Top of Hydraulic Technology and Precision Manufacturing

SINJIN PRECISION CO., LTD. established in March 1993 having the key philosophy “Challenge the World with Cooperation and Technology”, is a leading company of hydraulic components for construction equipment, industrial vehicle and agricultural machinery such as forklifts, excavators, loaders, tractors, rice-planting machines and lawn mowers.

Our experience, know-how in developing a new technology and the dedication in endless effort to develop the finest hydraulic components have made us the leading manufacturer of hydrostatic steering units, hydraulic pumps & motors and hydraulic valves in Korea. We are expanding markets to North America, Europe as well as Asian big country including Chinese and Japanese. Our main customers are Doosan Infracore, Hyundai Construction Equipment, Clark, Nippon Oil Pump, Cukurova, Nichiyu, Kubota, Mitsubishi Agricultural Machinery, IHI Shibaura, Maruyama, Daedong, LS Mtron, Dongyang and Kukje.

Our new vision is to become a ‘Global Leader’ in the hydraulic industries. We are aware that we will need to make long strides and pay a remarkable effort to reach the goal. As the key to achieving our new vision, we will steadfastly adhere to our core business philosophy of stable growth, technological innovation and internal harmony and cooperation.

Thank you for your interest in our company and products.

President **Jinsook Choi**

Power Steering System

The advantages of the power steering unit

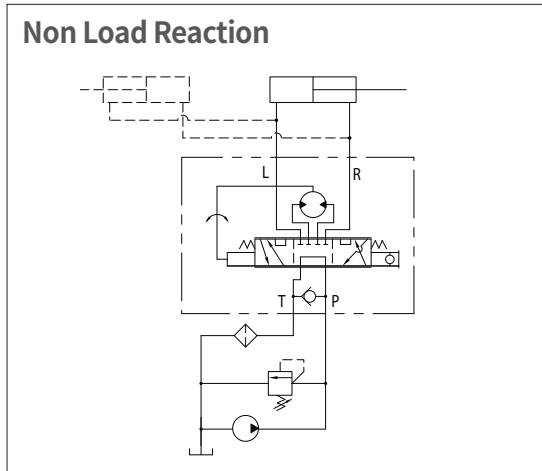
- Minimization of the steering linkage (by replacing the mechanical link with flexible hose)
 - Design flexibility and cost-down
- Preventing the wheels from transferring the load to the steering column
 - Reducing the driver's fatigue
- Low input torque and continuous steering function
 - Oil output directly proportional to the steering speed
- Wide range of choices of gerotor displacement
- Various hydraulic systems available to fit the optimum system design

Open center steering system

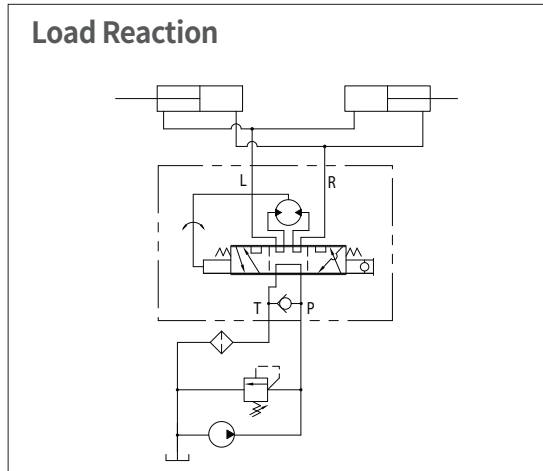
In the open center steering system, the oil from the pump returns to tank in neutral position.

- Quick response to the turning of the steering wheel
- Stable steering even under abrupt change of the steering load and pump oil flow.

Non Load Reaction

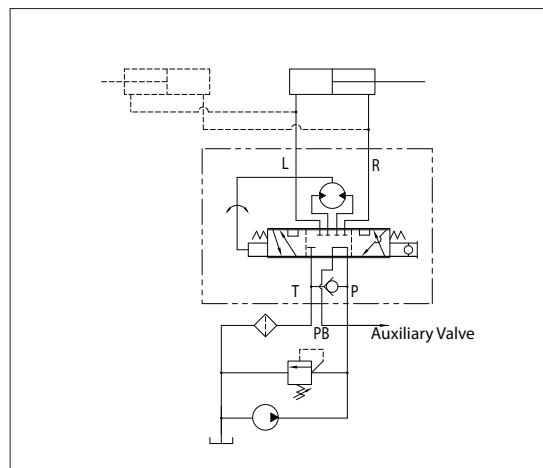


Load Reaction



Power beyond system

With three ports, it provides additional hydraulic component down stream sufficient flow when the prioritized steering function is not used. The additional device is connected to the exiting EF (Excess Flow) port. Flow used for steering cannot be used for auxiliary function of the additional component.



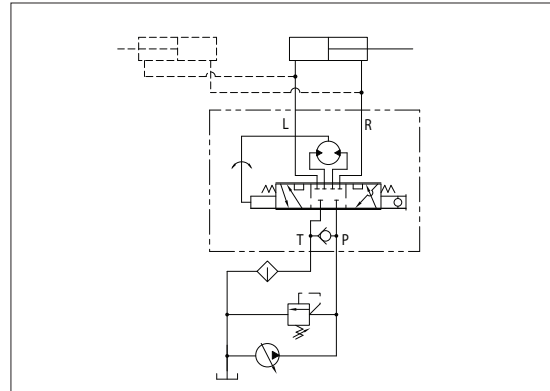


Power Steering System

Closed center steering system

Due to the high pressure resulted from the blocking of the path between P and T in neutral position, a pressure compensation pump is incorporated.

- Quick response to the steering due to high pressure in system



Load sensing steering system

The oil from the pump passes the steering system through the priority valve.

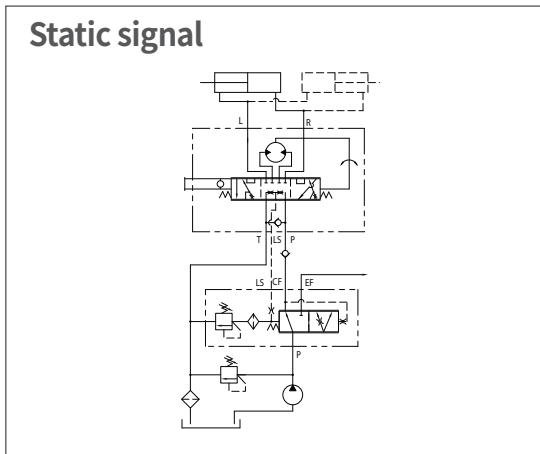
- Additional auxiliary devices as well as the steering unit are usable with one pump.
- When the steering system operated, oil flows primarily to the power steering unit.

Static system

In neutral position, there is no oil supply to the power steering unit: To minimize energy loss.

- Quick response to the steering through dynamic flow: Lower the temperature difference by oil flow within the system.
- Prevent the control set from sticking to the housing at the initial state.

Static signal

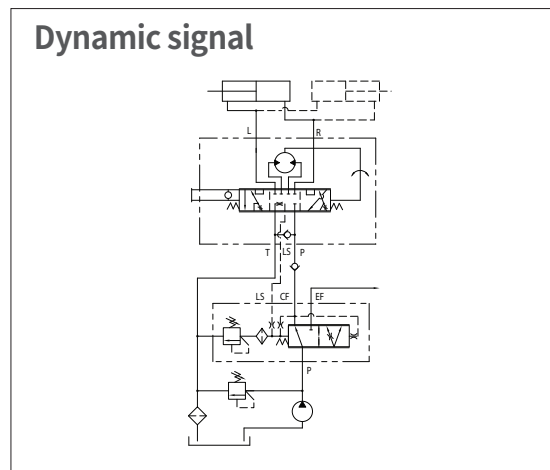


Dynamic system

Dynamic flow in LS line into the power steering unit at neutral position: 0.6~0.9 L/min

- Prevent the kick back phenomena at the steering end.

Dynamic signal



Standard Power Steering Unit

Features

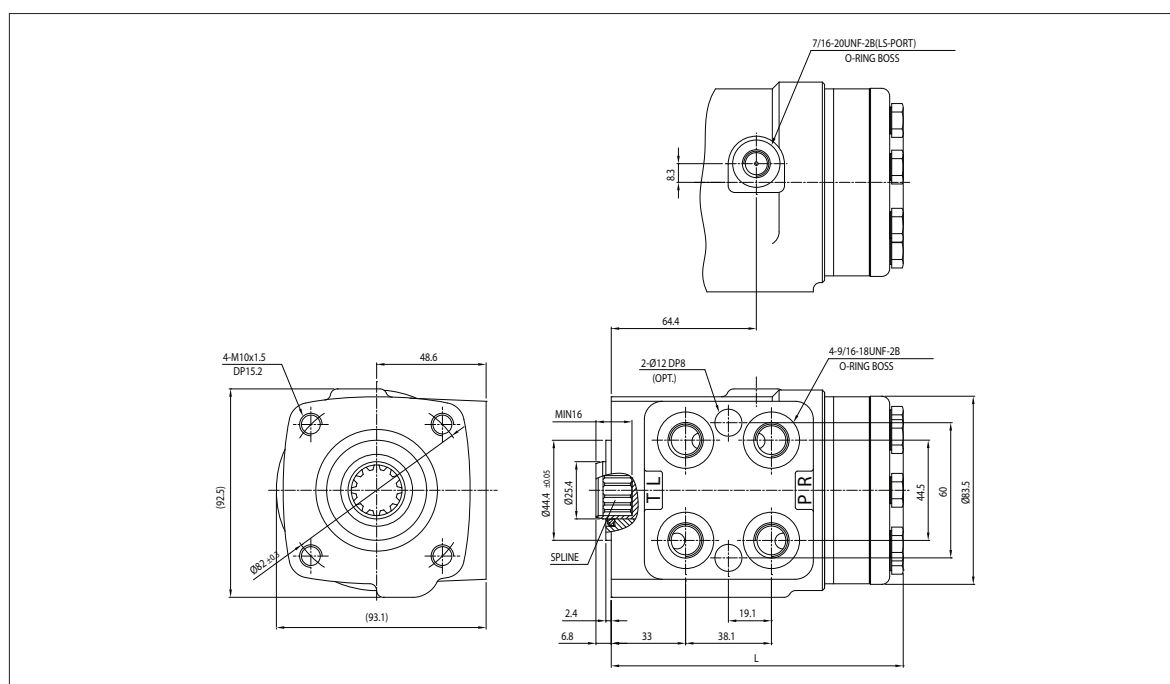
- Typical application : mid sized forklift truck, large farm tractors
- Attachable valve blocks: priority valve, flow divider, flow control valve, etc.
- Special functions according to customer's request are available: high system pressure, high back pressure, low slip gerotor, low input torque, etc.



Specifications

- Max. System Pressure: 175 kgf/cm²(17.2 MPa)
- Rated Flow: 23 L/min, 45 L/min
- Max. Back Pressure: 20 kgf/cm²(2.0 MPa)
- Steering Input Torque: 0.2 kgf.m
- Max. System Operation Temperature: 95 °C
- Recommended Filtration: nominal 10 μm
- System: Open center(non load reaction or load reaction) Load sensing(static or dynamic signal) Closed center

Dimensions



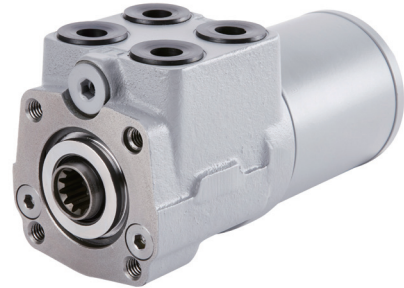
Displacement (cm ³ /rev)	Length L(mm)	Displacement (cm ³ /rev)	Length L(mm)
40	122.3	200	139.8
51	120.7	240	146.3
62	122.3	277	151.9
69	123.2	315	155.6
80	124.7	369	163.7
100	127.5	461	176.0
120	130.1	553	188.4
160	136.2	630	211.3



Standard Integral Power Steering Unit

Features

- Various integral valves are applied within steering system.
(inlet check valve, relief valve, suction valve, shock valve)
- Attachable valve blocks : priority, flow divider, flow control valve, etc.
- Special functions according to customer's request are available:
high system pressure, high back pressure, low slip gerotor,
low input torque, etc.



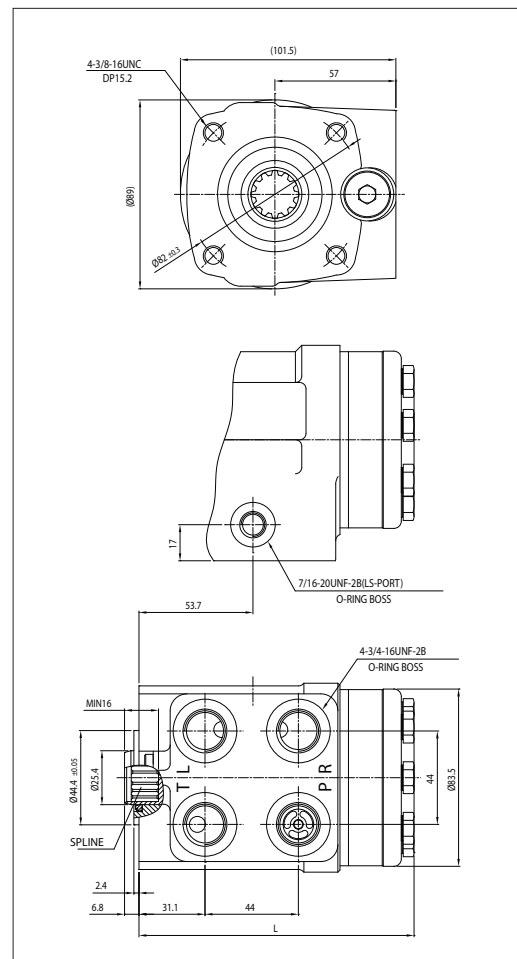
Option Valve

- ① Inlet check valve: prevent kick back phenomenon.
(In case of the pressure of steering cylinder is higher than one of the inlet ports, instant kick back phenomenon occurs by the returned oil.)
- ② Inlet relief valve: set the maximum steering system pressure.
- ③ Suction valve(anti-cavitation valve): prevent the cylinder vacuum phenomena. : prevent the internal cavitation resulted by external forces and the operation of the shock valve.
- ④ Shock valve(overload relief valve): prevent internal overpressure generated by external forces.

Specifications

- Max. System Pressure: 210 kgf/cm²(20.6 MPa)
- Rated Flow: 8~45 L/min
- Relief Pressure Range: 60~175 kgf/cm²(5.9~17.2 MPa)
- Relief Pressure Range of Shock Valve:
140~230 kgf/cm² (13.7~22.6 MPa)
- Max. Back Pressure: 35 kgf/cm²(3.4 MPa)
- Steering Input Torque: 0.1~0.2 kgf.m
- Max. System Operation Temperature: 95°C
- Recommended Filtration: nominal 10 μm
- System: Open center(non load reaction or load reaction) Load sensing(static or dynamic signal) Closed center

Dimensions



Displacement (cm ³ /rev)	Length L(mm)	Displacement (cm ³ /rev)	Length L(mm)
40	122.3	160	136.2
51	120.7	200	139.8
62	122.3	240	146.3
69	123.2	277	151.9
80	124.7	315	155.6
100	127.5	369	163.7
120	130.1	630	211.3

Mini Power Steering Unit

Features

- Smaller and lighter than standard model: Applicable to light vehicles such as garden tractor, municipal vehicles, small tractor.
- Valve block can be attached.
- Special functions according to customer's request are available. (high back pressure, low input torque etc.)



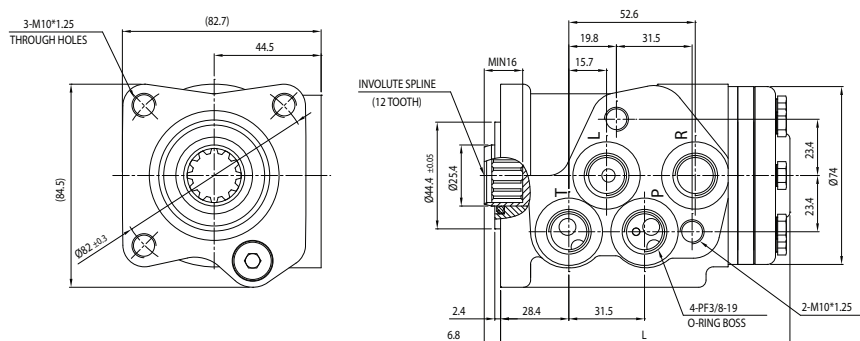
Specifications

- Max. System Pressure: 140 kgf/cm²(13.7 MPa)
- Rated Flow: 8 L/min
- Relief Pressure Range: 60~140 kgf/cm²(5.9~13.7 MPa)
- Max. Back Pressure: 20 kgf/cm²(2.0 MPa)
- Steering Input Torque: 0.1~0.2 kgf.m
- Max. System Operation Temperature: 95 °C
- System: Open center(non load or load reaction)

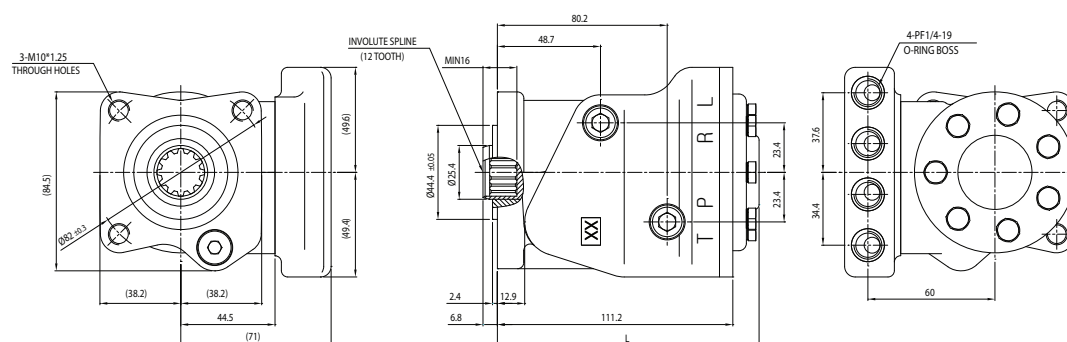
Displacement (cm ³ /rev)	Length L(mm)
31	120.2
40	122.4
51	120.7
62	121.8
69	122.8
74	123.6
80	124.7

Dimensions

Typical mini type



Port block built-in type





Rear Port Power Steering Unit

Features

- Rear end Ports(available with integrated fittings of the ORFS type)
- The unit with integrated steering column
- Easy installation
- Smaller and lighter than standard model:
Applicable to light vehicles such as mini-tractors, mowing machines, forklift trucks, municipal vehicles, garden equipments.
- Special functions according to customer's request are available. (integrated relief valve, check valve in the p-port, low input torque etc.)

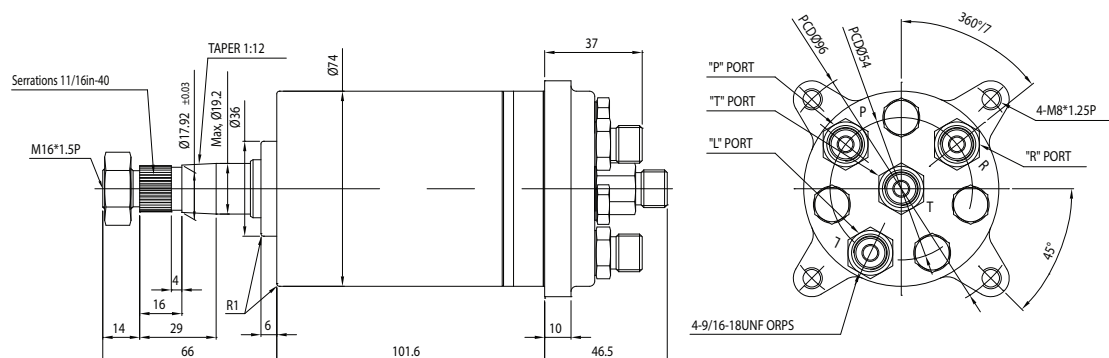


Specifications

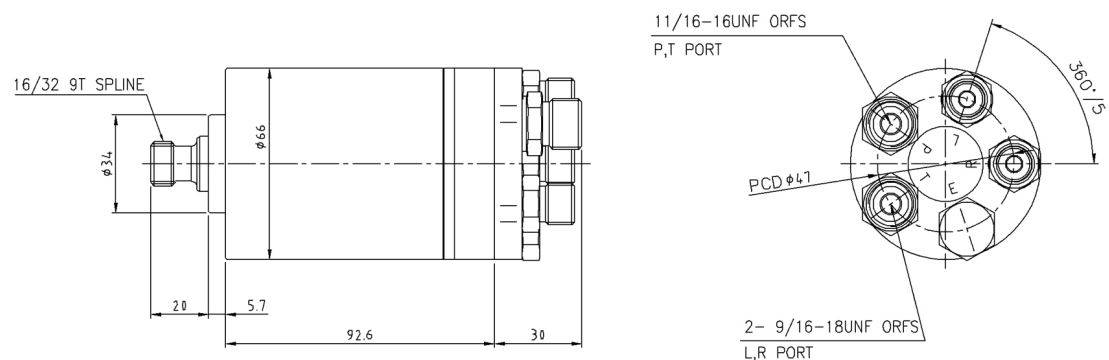
- Max. System Pressure: 140 kgf/cm²(13.7 MPa)
- Rated Flow: 20 L/min
- Relief Pressure Range: 60~140 kgf/cm²(5.9~13.7 MPa)
- Max. Back Pressure: 20 kgf/cm²(2.0 MPa)
- Steering Input Torque: 0.1~0.2 kgf.m

Dimensions

General Size



Mini Size



Power Steering Unit

Power Steering Unit Code and Specifications

S □□□	-	□	-	□	□	□□□	□□	□	□	□	□	-	□
1	-	2	-	3	4	5	6	7	8	9	10	-	11

1. Displacement

050 : 50 cm ³ /rev	140 : 140 cm ³ /rev
060 : 60 cm ³ /rev	160 : 160 cm ³ /rev
070 : 70 cm ³ /rev	200 : 200 cm ³ /rev
080 : 80 cm ³ /rev	230 : 230 cm ³ /rev
100 : 100 cm ³ /rev	320 : 320 cm ³ /rev
120 : 120 cm ³ /rev	630 : 630 cm ³ /rev

2. Steering System

- 1: Non Load Reaction Open Center
- 2: Non Load Reaction Load Sensing Dynamic Signal
- 3: Non Load Reaction Load Sensing Static Signal
- 4: Non Load Reaction Closed Center
- 5: Load Reaction Open Center
- 6: Load Reaction Load Sensing
- 7: Power Beyond Non Load Reaction
- 8: Power Steering Unit for EHPS

3. Housing Type

0: Standard	1: Option Type	4: Rear Type
2: Mini Type	3: Manifold Mount	5: Blocked Hole Type

4. Option Valve

- A: No Option
 B: Inlet Check Valve
 C: Shock & Suction Valve
 D: Inlet Relief Valve
 E: Inlet Relief & Shock & Suction Valve
 F: Inlet Check & Shock & Suction Valve
 G: Inlet Relief & Inlet Check Valve
 H: Inlet Relief & Inlet Check & Shock & Suction Valve
 J: Inlet Relief & Inlet Check & Suction Valve
 K: Inlet Relief & Port Block
 L: Inlet Relief & Inlet Check Valve & Priority V/V
 M: Inlet Check & Suction V/V
 N: Inlet Relief & Inlet Check Valve & Suction & Priority
 P: Inlet Relief & Suction V/V
 R: Inlet Relief & Inlet Check & Shock
 T: Inlet Relief & Inlet Check & Shock & Suction & Priority

5. Pressure Setting of Inlet Relief Valve

70~170 kgf/cm²

6. Flow Rate of Relief Pressure Setting

08: 8 L/min	13: 13 L/min	16: 16 L/min
23: 23 L/min	45: 45 L/min	

7. Shock Pressure Setting

A: 140 kgf/cm ²	C: 150 kgf/cm ²	E: 160 kgf/cm ²
G: 170 kgf/cm ²	J: 180 kgf/cm ²	L: 190 kgf/cm ²
N: 200 kgf/cm ²	Q: 210 kgf/cm ²	S: 220 kgf/cm ²
U: 230 kgf/cm ²	W: 240 kgf/cm ²	Y: 250 kgf/cm ²
X: 260 kgf/cm ²	Z: 270 kgf/cm ²	0: None

8. Port Size

A: 9/16-18 UNF	B: 3/4-16 UNF
C: G3/8-19	D: G1/2-14
E: G1/4-19	G: G1/4-19 [Face Seal Type]
F: G1/2-14(P&EF), G3/8-19(T, L&CF("R"))	
H: M18*1.5P	J: M20*1.5P
K: Plug U Port	M: M22*1.5P
N: G1/2-14(P&EF), G1/4-19(T, L&CF("R"))	
P: G1/4-14(L&R), G3/8-19(T, L&CF(P,T))	
Q: G1/2-14 [Face Seal Type]	
R: G1/2-14(P&EF), G3/8-19(T, L&CF("R")) [Face Seal Type]	
S: M18*1.5P [Face Seal Type]	
T: M18*1.5P [Face Seal Type]	V: M14*1.5P

9. Mounting Screw Size

A: M10×1.5P B: M10×1.25P C: 3/8-16UNC D: M8×1.25P

10. P.C.D Size

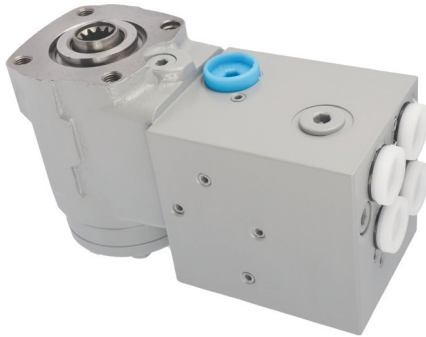
1: Ø82.6(58.4) 2: Ø82(58) 3: Ø96

11. Option

0: No Option



Auto Steering

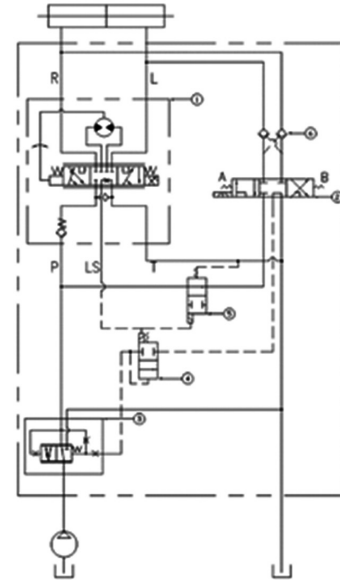


Introduction

- Auto Steering controls the flow rate by electric signals. In addition, it improve convenience through remote control.

Features

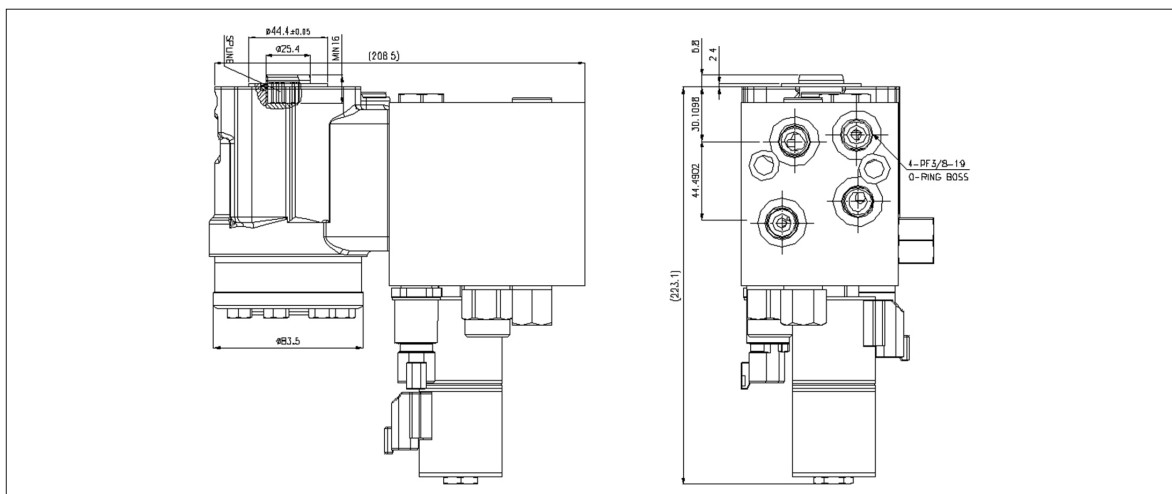
- Manual operation and Proportional control valve integrated (Valve detachable)
- Priority valve integrated (Load sensing type)
- EF Flow available
- Safety shut-off valve integrated



Specifications

Max. pressure	Port LS, Relief setting pressure	210 kgf/cm ²
Gear set	Single, range	50~250 cm ³ /rev
Flow rated	Priority Port P, Flow rated	28 L/min
Input torque	Steering input torque	1.2 N.m
	End steered torque	12 N.m
Max. back pressure	Port T	25 kgf/cm ²
Supply voltage Vdc		12Vdc

Dimensions



Torque Generator (Torque Amplifier)



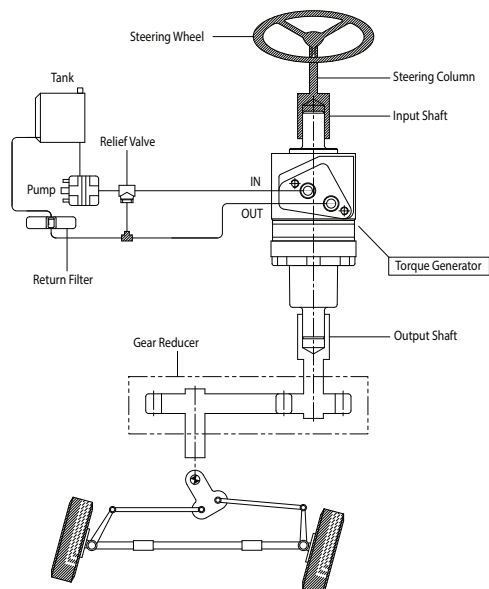
Introduction

The Torque Generator as a rotary device converts hydraulic energy into mechanical energy.

It is usually used to small size vehicles such as golf cart, sweeper, rice-planting machine etc. The typical system consists of torque generator, reduction gear, and mechanical linkage which is connected to steered wheel and power unit (Pump, Relief Valve, Tank).

Relief Valve can also be installed into the torque generator.

Steering System with Torque Generator



Operation Principle

Circuit diagrams below show the status of open center steering system at a neutral and steering position.

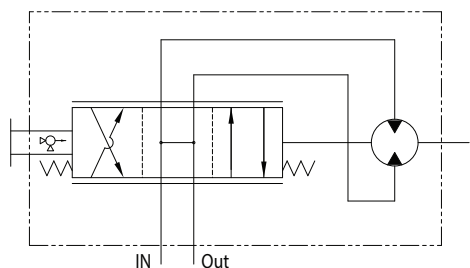
- Neutral Position: Oil from P-port flows to Tank.
- Steering Position: Oil passes the sleeve and spool, gerotor set which generates high/low pressure chamber.

The inner rotor can spin and the generated force is forwarded through the power driver to the power shaft. Once steering is stopped, the sleeve and spool go neutral by the centering springs and the oil goes to the Tank.

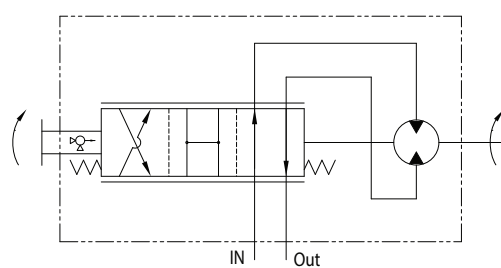
Wheel controls the direction and wheels are turned proportionally as steering wheel turns.

The power steering unit is used normally for industrial vehicles, construction equipments, marine ships, and servo-type systems that are needed to control directions and positions.

Neutral Position



Steering Position





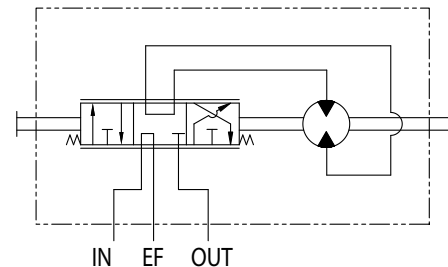
Torque Generator (Torque Amplifier)

Power Beyond Type

With three ports, it provides additional hydraulic component down stream sufficient flow when the prioritized steering function is not used. The additional device is connected to the exiting EF ("Excess Flow") Port.

Flow used for steering cannot be used for auxiliary function of the additional component. To use the auxiliary function all the time, use the case mounting type (Case Drain Type) instead.

Hydraulic Circuit (Power Beyond)

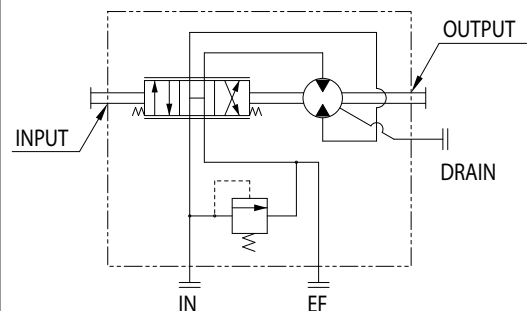


Case Mounting Type

To meet the strict space and cost requirements, a new case mounting type has been developed. This type is used mainly for rice planters.

The internal drain and the optimized spool and sleeve enable you to use "Excess Flow" to power another hydraulic components using only one pump.

Hydraulic Circuit (Case Mounting)



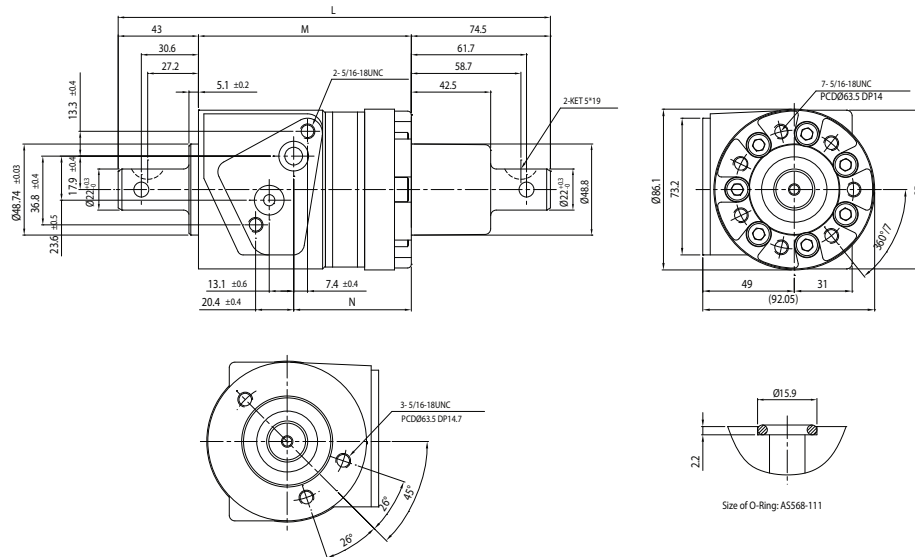
Specifications

- System: Open Center, Load Reaction
- Max. System Pressure: 175 kgf/cm² (17.2 MPa)
- Rated Flow: 9.5 ~ 19.1 l/min
- Displacement: 70, 76, 80, 100 cm³/rev
- Max. Output Torque: 6.0 ~ 8.1 kgf.m (59 ~ 79 Nm)
- Max. Back Pressure: 3.5 kgf/cm² (0.34 MPa)
- Steering Input Torque: 0.25 kgf.m (2.5 Nm)
- Max. Acceptable Input Torque: 12 kgf.m (118 Nm)
- System Operation Temperature: 95°C
- Recommended Filtration: nominal 10 μm

Torque Generator (Torque Amplifier)

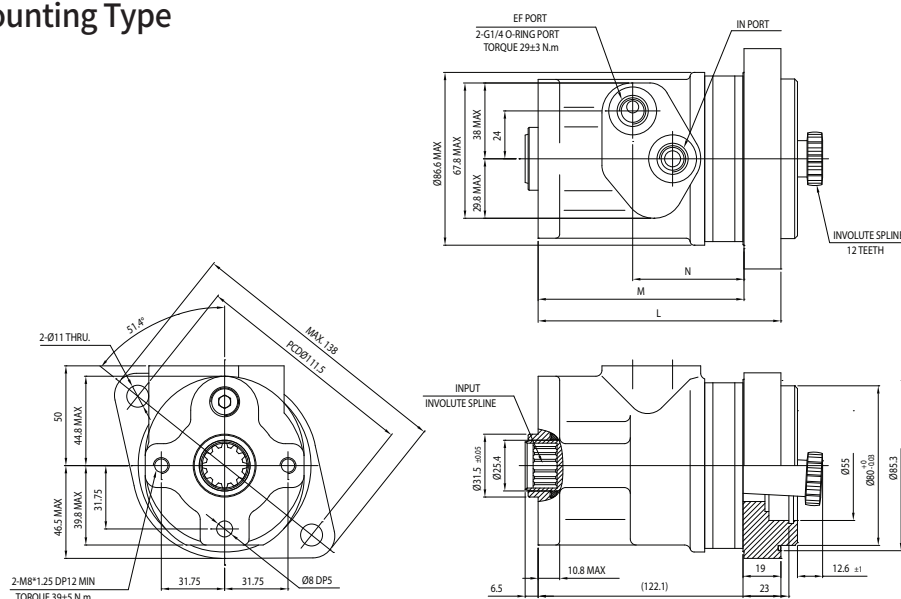
Dimensions

Standard Type



Displacement (cm ³ /rev)	Length L(mm)	Length M(mm)	Length N(mm)
80	239.2	121.7	60.7
100	242.0	124.5	63.5

Case Mounting Type





Torque Generator (Torque Amplifier)

Torque Generator Code and Specifications

GGL0705008AA

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	6	7	8

Product Name	
1	G: Torque Generator

Special Features	
2	G: Torque Generator
	C : Case Mounting(Internal Drain)

System Symbol	
3	L : Open Center, Load Reaction
	B : Power Beyond

System Symbol	
4	070 : 70 cm ³ /rev
	076 : 76 cm ³ /rev
	080 : 80 cm ³ /rev
	100 : 100 cm ³ /rev

Relief Pressure (kgf/cm ²)	
5	Setting Range of 27~80 kgf/cm ²

Flow Rate of Relief Pressure	
6	08 : 8 L/min, 12 : 12 L/min
	14 : 14 L/min
	16 : 16 L/min
	20 : 20 L/min

Mechanical Interface (In/Out)	
7	A : 12T 16/32, 12T 12/24
	B : 12T 16/32, 14T M=1.25
	C : 12T 16/32, 15T M=2
	D : 12T 16/32, 26T M=0.5
	E : 12T 16/32, 30T M=0.467
	F : 12T 16/32, Pin (Ø6)
	G : 12T 16/32, Pin (Ø8)
	H : Pin (Ø6), Pin (Ø6)

Design Symbol	
8	A : PF 3/8 (O-ring), PF 3/8 (O-ring)
	B : PF 3/8 (O-ring), PF 1/4
	C : G 1/4 (O-ring), G 1/4 (O-ring)

Gerotor Motor

Introduction

Gerotor motor series are small volume, economical type, which is designed with shaft distribution flow, which adapt the Gerotor gear set design and provide compact volume, high power and low weight.

Features

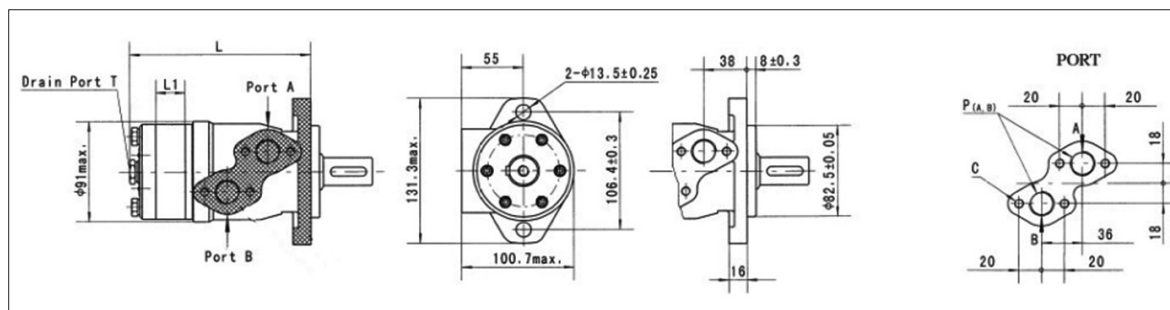
- Advanced manufacturing devices for the Gerotor gear set, which provide small volume, high efficiency and long life.
- Shaft seal can bear high pressure of motor of which can be used in parallel or in series.
- Advanced construction design, high power and low weight.



Specifications

Displacement (cm ³ /rev)		36	51.7	77.7	96.2	120.2	157.2	194.5	240.3	314.5	389.5	486.5
Max. speed (rpm)	Cont.	1500	1150	770	615	490	383	310	250	192	155	120
	Int.	1650	1450	960	770	615	475	385	310	240	190	150
Max. Torque (N.m)	Cont.	55	100	146	182	236	302	360	380	375	360	385
	Int.	76	128	186	227	290	370	440	460	555	525	560
	Peak.	96	148	218	264	360	434	540	550	650	680	680
Max. output (kw)	Cont.	8.0	10.0	10.0	11.0	10.0	10.0	10.0	8.5	7.0	6.0	5.0
	Int.	11.5	12.0	12.0	13.0	12.0	12.0	12.0	10.5	8.5	7.0	6.0
Max. pressure drop (Mpa)	Cont.	12.5	14	14	14	14	14	14	11	9	7	6
	Int.	16.5	17.5	17.5	17.5	17.5	17.5	17.5	14	14	10.5	9
	Peak.	22.5	22.5	22.5	22.5	22.5	22.5	22.5	18	16	14	12
Max. flow (L/min)	Cont.	55	60	60	60	60	60	60	60	60	60	60
	Int.	60	75	75	75	75	75	75	75	75	75	75
Weight (kg)		5.6	5.6	5.7	5.9	6.0	6.2	6.4	6.7	6.9	7.4	8

Dimensions



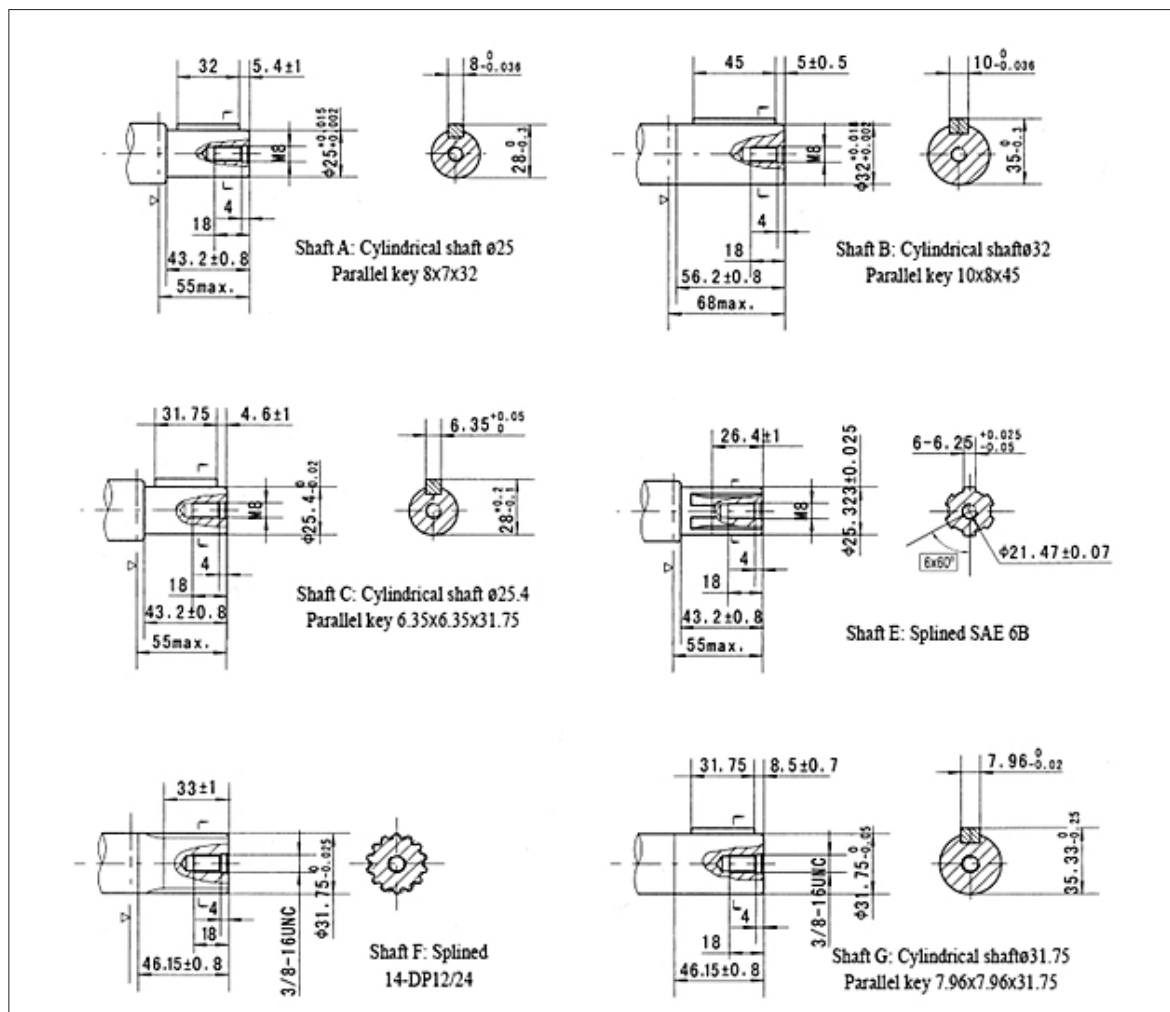
Mounting Code	D(dp)	M(dp)	S(dp)	P(dp)	R(dp)
P(A,B)	G1/2(15)	M22x1.5(15)	7/8-14 O-ring(17)	1/2-14 NPTF(15)	PT(RC)1/2(15)
C	4-M8(13)	4-M8(13)	4-5/16-18 UNC(13)	4-5/16-18 UNC(13)	4-M8(13)
T	G1/4(12)	M14x1.5(12)	7/16-20 UNF(12)	7/16-20 UNF(12)	PT(RC)1/4(9.7)



Gerotor Motor

Model	Displacement(cm^3/rev)	L(mm)	L1(mm)
SRS 36	36	137	7
SRS 50	51.7	137	7
SRS 80	77.7	140.5	10.5
SRS 100	96.2	143	13
SRS 125	120.2	146	16
SRS 160	157.2	151	21
SRS 200	194.5	157	26
SRS 250	240.3	162	32
SRS 315	314.5	172	42
SRS 400	389.5	182	52
SRS 500	486.5	195	65

Shaft Dimensions



Geroler Motor

Introduction

Geroler motor series adapts the advanced Geroler gear set design with shaft distribution flow, which can automatically compensate in operating with high pressure, provide reliable and smooth operation, high efficiency and long life.

Features

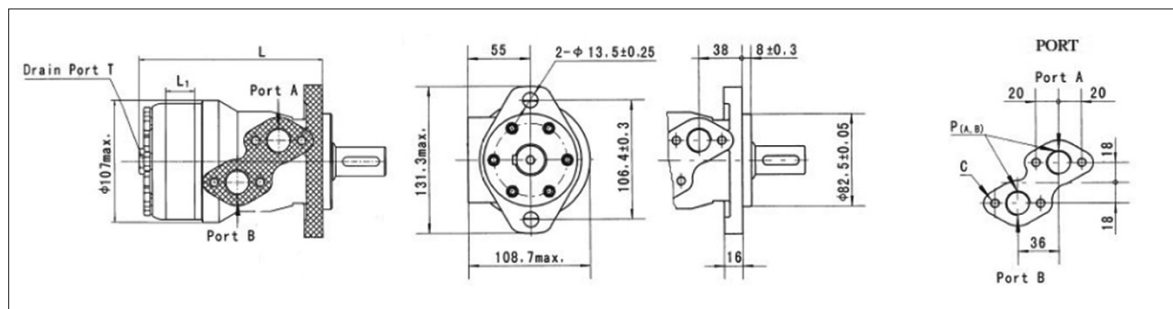
- Advanced manufacturing devices for the Geroler gear set, which use low pressure of start-up, provide smooth, reliable operation and high efficiency.
- Shaft seal can bear high pressure of back and the motor can be used in parallel or in series.
- Special design in the driver-linker and prolong operation life.
- Special design for distribution system can meet the requirement of low noise of unit.



Specifications

Displacement (cm ³ /rev)		36	51.7	81.5	102	127.2	157.2	194.5	253.3	317.5	381.4
Max. speed (rpm)	Cont.	1085	960	750	600	475	378	310	240	190	155
	Int.	1220	1150	940	750	600	475	385	300	240	190
Max. Torque (N.m)	Cont.	72	100	195	240	300	360	360	390	390	365
	Int.	83	126	220	280	340	430	440	490	535	495
	Peak.	105	165	270	320	370	460	560	640	650	680
Max. output (kw)	Cont.	8.5	9.5	12.5	13.0	12.5	12.5	10.0	7.0	6.0	6.5
	Int.	9.8	11.2	15.0	15.0	14.5	14.0	13.0	9.5	9.0	8.0
Max. pressure drop (Mpa)	Cont.	14.0	14	17.5	17.5	17.5	16.5	13	11	9	7
	Int.	16.5	17.5	20	20	20	20	17.5	15	13	10
	Peak.	22.5	22.5	22.5	22.5	22.5	22.5	22.5	20	17.5	15
Max. flow (L/min)	Cont.	40	50	60	60	60	60	60	60	60	60
	Int.	45	60	75	75	75	75	75	75	75	75
Weight (kg)		6.5	6.7	6.9	7.0	7.3	7.6	8.0	8.5	9.0	9.5

Dimensions



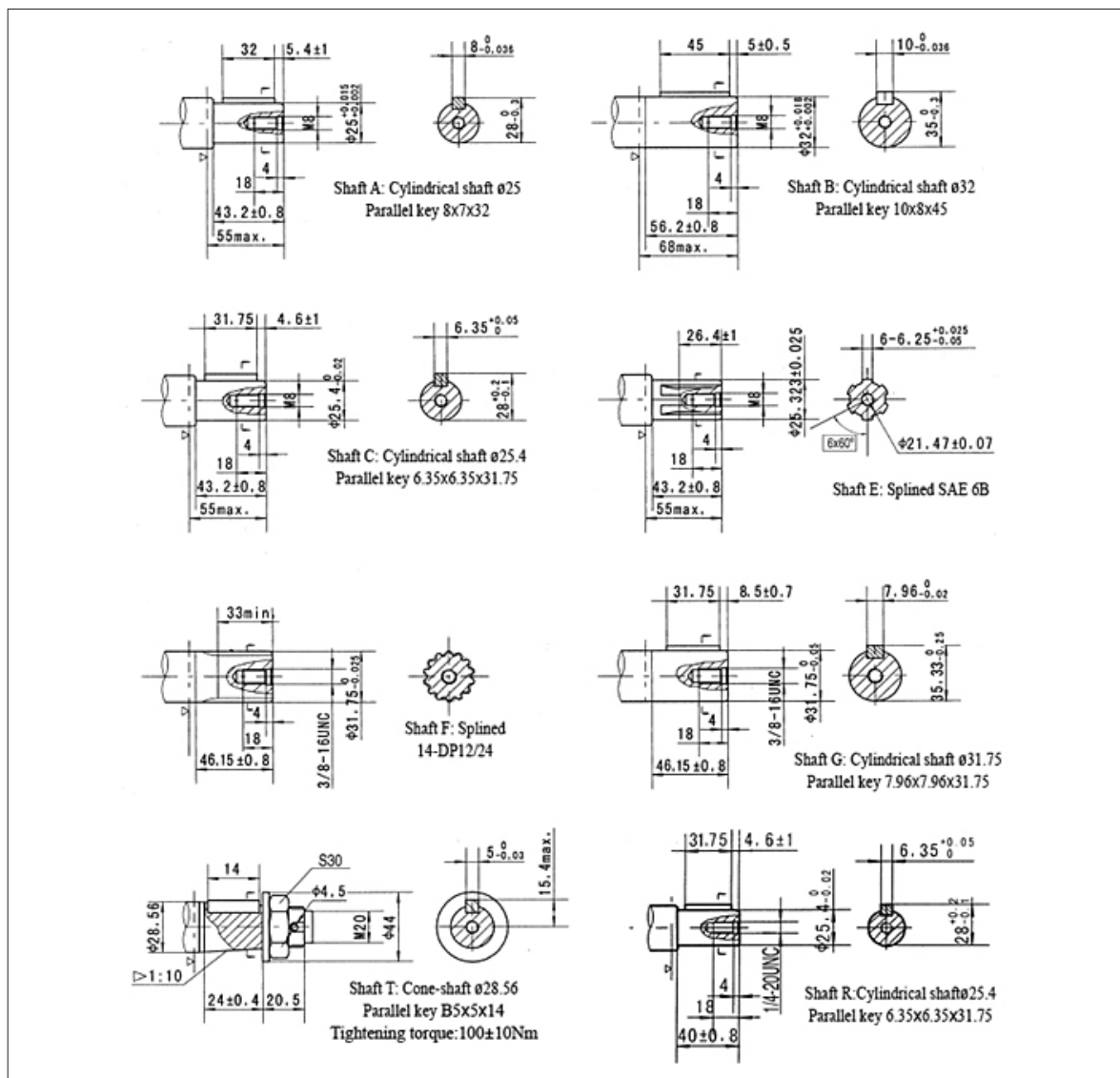
Mounting	Code	D(dp)	M(dp)	S(dp)	P(dp)	R(dp)
P(A,B)		G1/2(15)	M22x1.5(15)	7/8-14 O-ring(17)	1/2-14 NPTF(15)	PT(RC)1/2(15)
C		4-M8(13)	4-M8(13)	4-5/16-18 UNC(13)	4-5/16-18 UNC(13)	4-M8(13)
T		G1/4(12)	M14x1.5(12)	7/16-20 UNF(12)	7/16-20 UNF(12)	PT(RC)1/4(9.7)



Geroler Motor

Model	Displacement(cm^3/rev)	L(mm)	L1(mm)
SGS 36	36	137	7
SGS 50	51.7	140	10
SGS 80	81.5	146	16
SGS 100	102	150	20
SGS 125	127.2	155	25
SGS 160	157.2	160.5	30.5
SGS 200	194.5	168	38.1
SGS 250	253.3	180	50
SGS 315	317.5	192	62
SGS 375	381.4	204	74

Shaft Dimensions



Gerotor/Geroler Motor

Gerotor/Geroler Motor Code and Specifications

SRS	□/□	□/□	□	□ □ □	□
SGS	□/□	□/□	□	□ □ □	□
1	2	3	4	5	6

Series			Mark
1	SRS	Geroler -Type	
	SGS	Gerotor - Type	

Series			Mark
2	2	2-Ø13.5, Ø82.5*8	
	4	4-Ø13.5, Ø82.5*8	
	H4	4-3/8-16, Ø44.4*2.8	
	H5	4-M10, Ø44.4*2.8	

Series			Mark
3	A	Ø25, Parallel key 8*7*32	
	B	Ø32, Parallel key 10*8*45	
	C	Ø25.4, Parallel key 6.35*6.35*31.75, M8	
	E	Ø25.4, Spline SAE 6B	
	R	Ø25.4, Parallel key 6.35*6.35*31.75, 1/4-20UNC	
	F	Ø25.4, Spline 14-DP12/24, 3/8-16UNC	
	FD	Ø25.4, Spline 14-DP12/24, M8	
	G	Ø31.75, Parallel key 7.96*7.96*31.75	
	T	Cone-Shaft Ø28.56, Parallel key B5*5*14	
	T3	Cone-Shaft Ø31.75, Parallel key 7.96*7.96*31.75	SGS only

Port/Drain Port			Mark
4	D	G1/2, 4*M8, G1/4	
	M	M22*1.5, 4*M8, M14*1.5	
	S	7/8-14 O-RING, 4*5/16-18UNC, 7/16-20UNF	
	P	1/2-14NPTF, 4*5/16-18UNC, 7/16-20UNF	
	R	PT(Rc)1/2, 4*M8, PT(Rc)1/4	
	T	PT(Rc)1/2, 4*M8, No Drain Port	

Displacement	Mark
5	036
	050
	080
	100
	125
	160
	200
	250
	315
	375 SRS only
	400 SGS only
	500 SGS only

Direction of Rotation			Mark
6	R	Clockwise	
	L	Counter Clockwise	

Piston Motor

Introduction

Fixed displacement motor A10FE are axial piston motors in swash plate design. These compact motors can be used for hydrostatic transmissions or for fan drive system.

Features

- Axial piston-swash plate design
- Compact size, high power/weight ratio
- Output speed is proportional to input flow
- Plug-in version for installation into machine
- Built in valve: integrated flushing and relief valve, anti-cavitation valve(for fan drives)

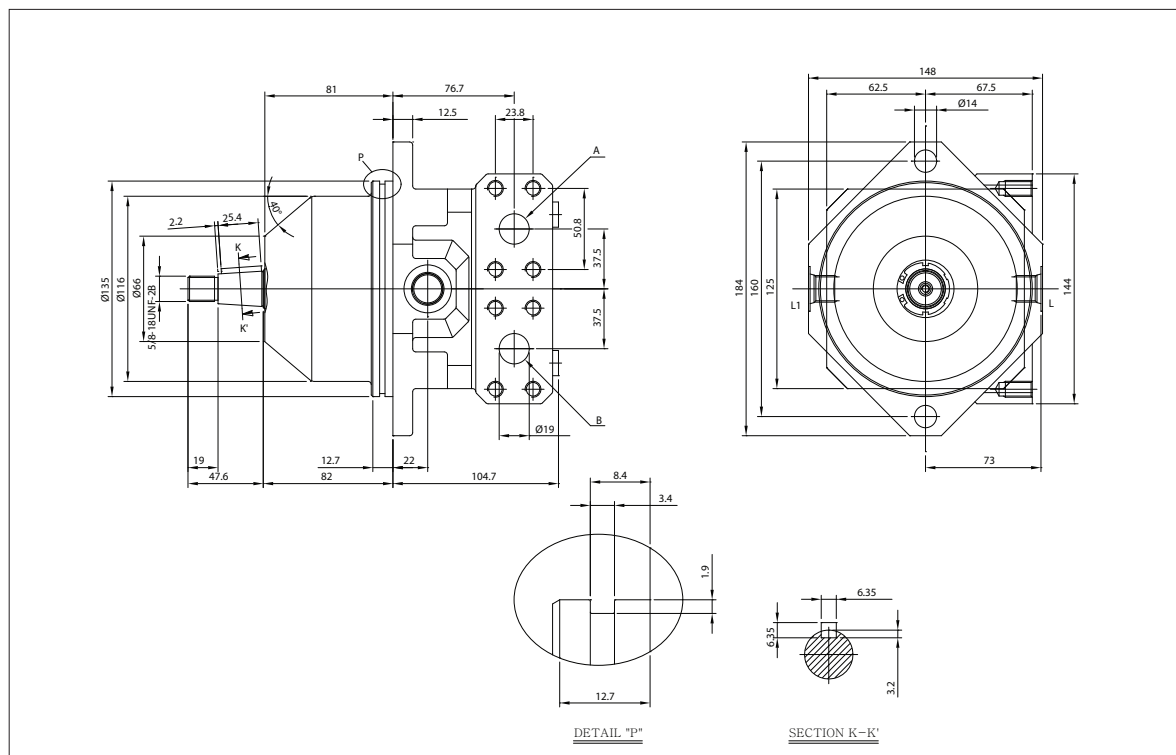
Specifications

- Nominal pressure: 280 kgf/cm²
- Peak pressure: 350 kgf/cm²
- Case drain pressure: 2 kgf/cm²
- Direction of rotation: Flow B to A = Clockwise,
Flow A to B = Counter-clockwise
- Table(theoretical values)



Classification	Units	A10FE 23	A10FE 28
Displacement	cm ³ /rev	23.5	28.5
Speed	rpm	4900	4700
Max. inlet flow	L/min	115	134
Max. torque (Δp=280bar)	N.m	105	127

Dimensions (A10FE23-28)





These compact motors can be used for fan drive system in vehicles and machines.

Features

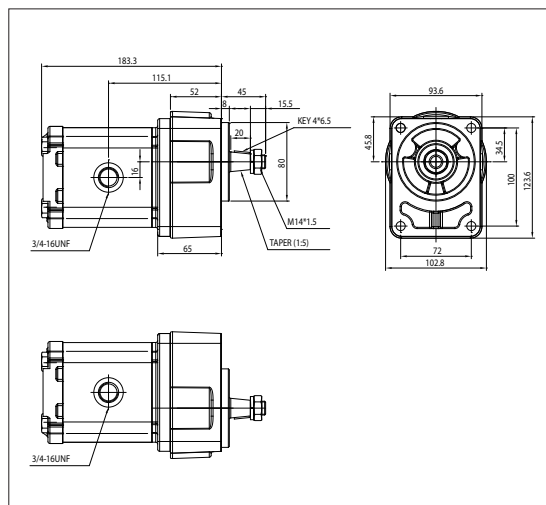
- Integrated outboard bearings for heavy duty applications
- The wide choice of shafts, flanges and ports
- High efficiency
- Built in valve: pressure relief valve, reverse valves, anti-cavitation valve(for fan drives)

Specifications

- Max.peak pressure: 250 kgf/cm²
- Case drain pressure: 2 kgf/cm²
- Table(theoretical values)

Classification	Units	GM 19	GM 31
Displacement	cm ³ /rev	19	31
Max. pressure	kgf/cm ²	210	210
Speed	rpm	3500	3000

Dimensions (GM 19)





Gear Pump

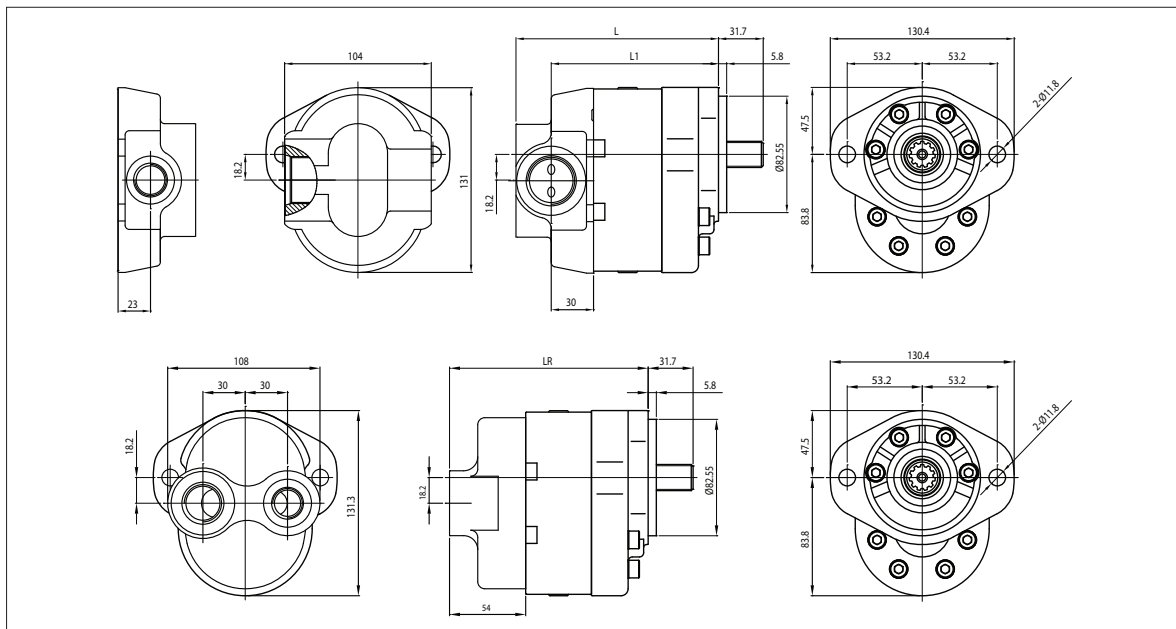


SIP Series

Features

SIP pumps are built with aluminum body and hardened steel gears in order for the excellent performance. A wide variety of options are available to meet specific application requirements worldwide.

Dimensions



Specifications

MODEL	Displacement (D)	MAX. Continuous Pressure (P)	Min. speed	Max. speed	L	L1	LR
	cm ³ /rev	kgf/cm ²	rpm	rpm	mm	mm	mm
SIP-119	11.9	250	600	2700	121.9	96.9	120.9
SIP-143	14.3	250			124.7	99.7	123.7
SIP-168	16.8	250			127.6	102.6	126.6
SIP-190	19	250			130.1	105.1	129.1
SIP-215	21.5	250			133	108	132
SIP-245	24.5	250		2500	136.5	111.5	135.5
SIP-265	26.5	250			138.8	113.8	137.8
SIP-277	27.7	250			140.2	115.2	139.2
SIP-306	30.6	250			143.6	118.6	142.6
SIP-320	32	250		2200	145.2	120.2	144.2

Gear Pump

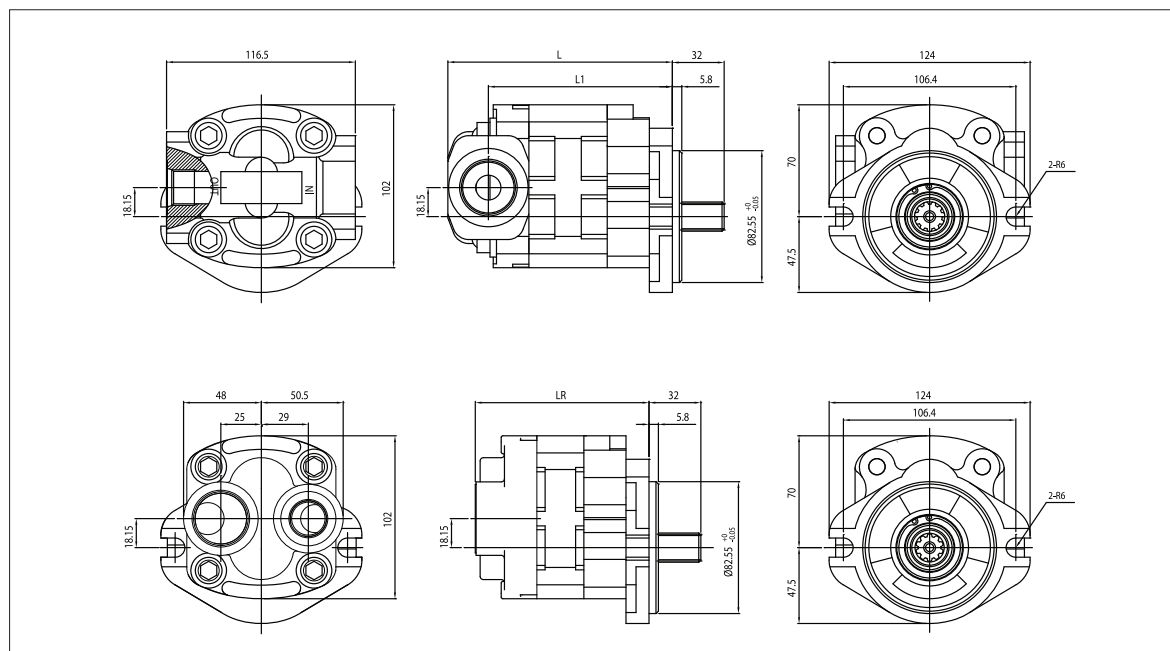


SEP Series

Features

SEP pumps are built with cast iron body and hardened steel gears in order for the excellent high temperature characteristics. They are designed to provide reliable, long life service under rugged conditions with the excellent hydraulic performance, flexibility, high efficiency, low and high speed operation, low noise performance.

Dimensions



Specifications

MODEL	Displacement (D)	MAX. Continuous Pressure (P)	Min. speed	Max. speed	L	L1	LR
	cm ³ /rev	kgf/cm ²	rpm	rpm	mm	mm	mm
SEP-119	11.9	250	600	2700	113.6	88.6	101.6
SEP-143	14.3	250			116.3	91.3	104.3
SEP-168	16.8	250			119.2	94.2	107.2
SEP-190	19	250			121.8	96.8	109.8
SEP-215	21.5	250			124.7	99.7	112.7
SEP-245	24.5	250		2500	128.2	103.2	116.2
SEP-265	26.5	250			130.5	105.5	118.5
SEP-277	27.7	250			131.9	106.9	119.9
SEP-306	30.6	250			135.2	110.2	123.2
SEP-320	32	250		2200	136.8	111.8	124.8



Gear Pump

SIP, SEP Series Code and Specifications

SIP	306	R	U6	U4	–	A1	P3	L	–	1
SEP	306	S	U6	U4	–	A2	P3	R	–	0
1	2	3	4	5	–	6	7	8	–	9

Series		Mark
1	SIP Series	
	SEP Series	

Displacement			Mark
2	CODE	cm ³ /rev	
	119	11.9	
	143	14.3	
	168	16.8	
	190	19	
	215	21.5	
	245	24.5	
	265	26.5	
	277	27.7	
	306	30.6	
	320	32	

Port Position		Mark
3	S : Side Port	
	R : Rear Port	

Inlet/Outlet Port		Mark
4 5	G4 : G1/2	
	G5 : G3/4	
	G6 : G1	
	U4 : 7/8-14UNF	
	U5 : 1-1/16-12UN	
	U6 : 1-5/16-12UN	
	SP : Special Port	

Mounting Flange		Mark
6	SIP	A1 : SAE "A" 2 Bolt
		A2 : SAE "A" 2 Bolt
	SEP	A2 : SAE "A" 2 Bolt

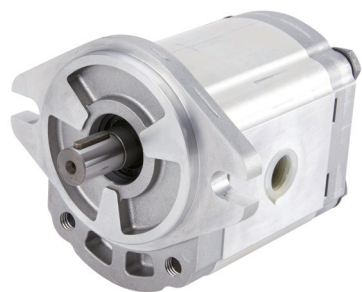
Drive Shaft		Mark
7	P1 : SAE "A" Spline(9T)	
	P2 : SAE Spline(10T)	
	P3 : SAE Spline(11T)	
	P5 : SAE "B" Spline(13T)	

Direction of Rotation		Mark
8	R : Clockwise	
	L : Counter Clockwise	

Special Option		Mark
9	0 : None	
	1 : Relief V/V Attached	*
	2 : Priority V/V Attached	*

Note: * Mark applies only SIP Pump

Gear Pump

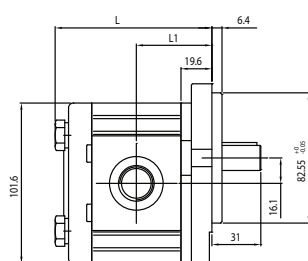


SMP20 Series

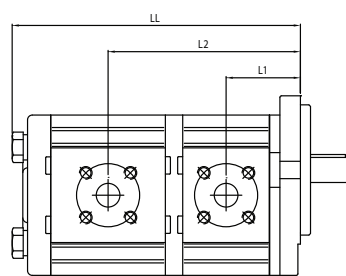
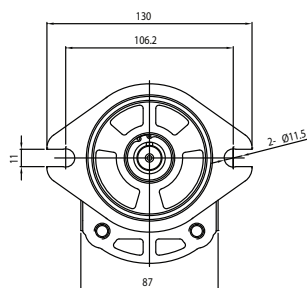
Features

SMP20 pumps consist of a pair of gears supported in bearing bushings and extruded body in high resistance aluminum alloy, aluminum die casting front cover and rear cover. SMP20 pumps are suitable for multiple setup, whereby the drive shaft for the 1st pump is extended to a second and even a 3rd pump.

Dimensions



Single Pump



Multiple Pump

DIMENSION EQUATION

$$L2 = 0.77(2D1 + D2) + 96.8$$

$$LL = 1.54(D1 + D2) + 142.6$$

D1: 1st Pump Displacement

D2: 2nd Pump Displacement

Specifications

MODEL	Displacement (D)	MAX. Continuous Pressure (P)	Min. speed	Max. speed	L	L1	LR	L2
	cm ³ /rev	kgf/cm ²	rpm	rpm	mm	mm	mm	mm
SMP20-048	4.8	250	600	3000	94.6	32.4	SEE "DIMENSION EQUATION"	
SMP20-060	6	250	600	3000	96.5	33.3		
SMP20-083	8.3	250	600	3000	100	35.1		
SMP20-113	11.3	250	600	3000	104.6	37.4		
SMP20-140	14	250	500	3000	108.8	41		
SMP20-160	16	250	500	3000	111.9	41		
SMP20-180	18	200	500	3000	115	42.6		
SMP20-200	20	200	500	3000	118	44.1		
SMP20-215	21.5	200	500	3000	120.3	45.3		
SMP20-252	25.2	170	500	2500	126	48.1		
SMP20-302	30.2	130	500	2000	133.7	52		



Gear Pump

SMP20 Single/Tandem Series Code and Specifications

SMP20	S	113	S	G4	G4	-							A3	P1	R	-	0
SMP20	T	113	S	G4	G4	/	SMP20	113	S	G4	G4	-	A3	P1	R	-	0
1	2	3	4	5	6	/	1	3	4	5	6	-	7	8	9	-	10

Series		Mark
1	SMP 20 Pump	

Type		Mark
2	S : Single	
	T : Tandem	

Displacement			Mark
3	CODE	cm ³ /rev	
	048	4.8	
	060	6	
	083	8.3	
	113	11.3	
	140	14	
	160	16	
	180	18	
	200	20	
	215	21.5	
	252	25.2	
	302	30.2	

Port Position		Mark
4	S : Side Port	

Inlet/Outlet Port		Mark
5 6	00 : None	*
	G3 : G3/8	
	G4 : G1/2	
	G5 : G3/4	
	U4 : 7/8-14UNF	
	U5 : 1-1/16-12UN	
	F1 : SAE Split Port 1/2	
	F2 : SAE Split Port 3/4	
	F3 : SAE Split Port 1	
	E1 : European 4 Bolt Flange	
	E2 : European 4 Bolt Flange	
	M1 : German 4 Bolt Flange	
	M2 : German 4 Bolt Flange	
	SP : Special Port	

Mounting Flange		Mark
7	A3 : SAE "A" 2 bolt	
	B2 : SAE "B" 2 bolt	

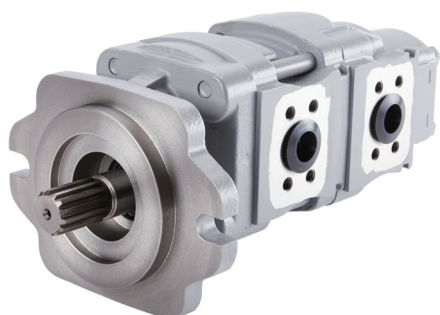
Drive Shaft		Mark
8	P1 : SAE "A" Spline(9T)	
	P2 : SAE Spline(10T)	
	P3 : SAE Spline(11T)	
	P5 : SAE "B" Spline(13T)	
	S1 : SAE "A" Straight(5/8" Dia)	
	S2 : SAE "B" Straight	
	T1 : European Tapered 1:8	*
	T1 : German Tapered 1:5	*

Direction of Rotation		Mark
9	R : Clockwise	
	L : Counter Clockwise	

Special Option		Mark
10	0 : None	

Note: * Mark applies only Tandem Pump

Gear Pump



SHP Series

Features

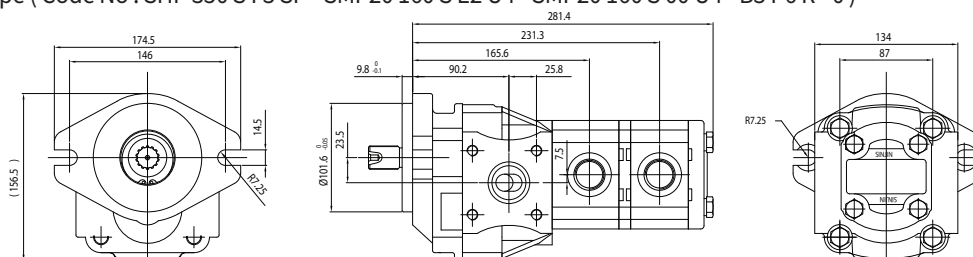
SHP pumps set the standard for superior performance and reliability in heavy-duty hydraulic application. Low-friction bushings provide strength, high efficiency, and long life in severe operation environments. SHP pumps are available in multiple assemblies combined with SMP series pumps.

Application

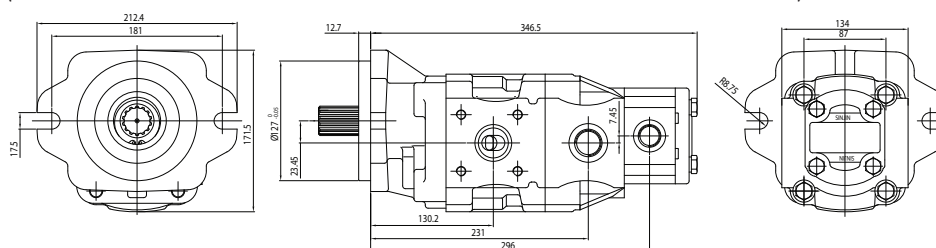
SHP Pumps are designed to be suitable for using in a wide range of integral valves for power steering, power brakes, fan drives and implement of hydraulics. Optimized specification for OEM application is available.

Dimensions

1) B type (Code No : SHP 350 S F3 SP - SMP20 160 S E2 U4 - SMP20 160 S 00 U4 - B3 P6 R - 0)



2) C type (Code No : SHP 350 S F3 SP - SHP 350 S F3 U5 - SMP20 160 S 00 U4 - C1 P6 R - 0)



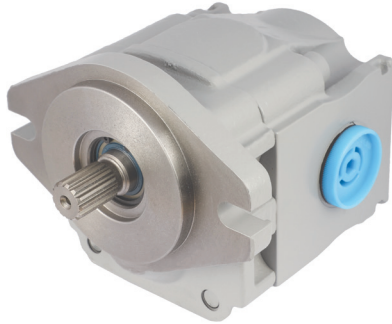
Triple PUMP

Classification	1st Pump	2nd Pump	3rd Pump
Displacements	27~46 cm ³ /rev	4.8~46 cm ³ /rev	4.8~28 cm ³ /rev
Max. Continuous Pressure	260 kgf/cm ²	260 kgf/cm ²	250 kgf/cm ²
Speed	from 500 to 3000 rpm		

Tandem PUMP

Classification	1st Pump	2nd Pump
Displacements	27~46 cm ³ /rev	4.8~28 cm ³ /rev
Max. Continuous Pressure	260 kgf/cm ²	250 kgf/cm ²
Speed	from 500 to 3000 rpm	

Gear Pump

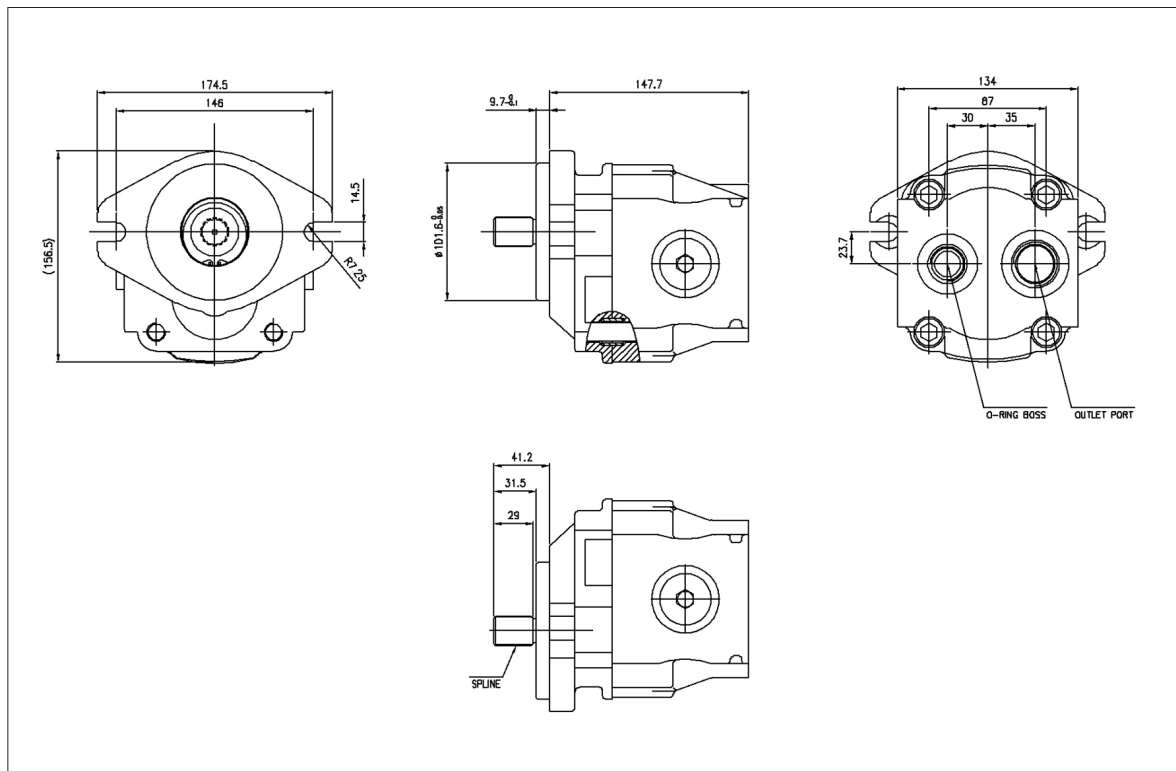


VHP Pump

Features

Classification	Single Pump
Displacements	41~60 cm ³ /rev
Max. Continuous Pressure	250 kgf/cm ²
Speed	from 500 to 3000 rpm

Dimensions



Gear Pump

SHP, VHP Series Code and Specifications

VHP	410	S	G6	G5	-													B3	F5	R	-	0
SHP	350	S	F3	SP	/	SHP	350	S	F3	U6	/	SMP20	160	S	00	04	-	C1	P6	R	-	0
1	2	3	4	5	/	1	2	3	4	5	/	1	2	3	4	5	-	6	7	8	-	9

Series				Mark
1	SHP			
	SMP20			
	VHP			

Displacement				Mark
2	Series	CODE	cm ³ /rev	
	SHF	270	27.0	
		350	35.0	
		390	39.0	
		440	44.0	
	SMP20	048	4.8	
		060	6.0	
		083	8.3	
		113	11.3	
		140	14.0	
		160	16.0	
		180	18.0	
		200	20.0	
		215	21.5	
		252	25.2	
	VHP	410	41.0	
		540	54.0	
		600	60.0	

Port Position			Mark
3	S : Side Port		
	R : Rear Port		*

Inlet/Outlet Port		Mark
4 5	00 : None	
	G3 : G3/8	
	G4 : G1/2	
	G5 : G3/4	
	G6 : G1	
	G7 : G1-1/4	
	U4 : 7/8-14UNF	
	U5 : 1-1/16-12UN	
	U6 : 1-5/16-12UN	
	F1 : SAE Split Port 1/2	
	F2 : SAE Split Port 3/4	
	F3 : SAE Split Port 1	
	F4 : SAE Split Port 1-1/4	
	F5 : SAE Split Port 1-1/2	
	F6 : SAE Split Port 2	
	SP : Special Port	

Mounting Flange		Mark
6	B3 : SAE "B" 2 bolt	*
	C1 : SAE "C" 2 bolt	

Drive Shaft		Mark
7	P5 : SAE "B" Spline(13T)	*
	P6 : SAE "C" Spline(14T)	

Direction of Rotation		Mark
8	R : Clockwise	
	L : Counter Clockwise	

Special Option		Mark
9	0 : None	

Note: * Mark applies only VHF Pump



Gear Pump

Low-Noise Gear Pump LNP20

Features

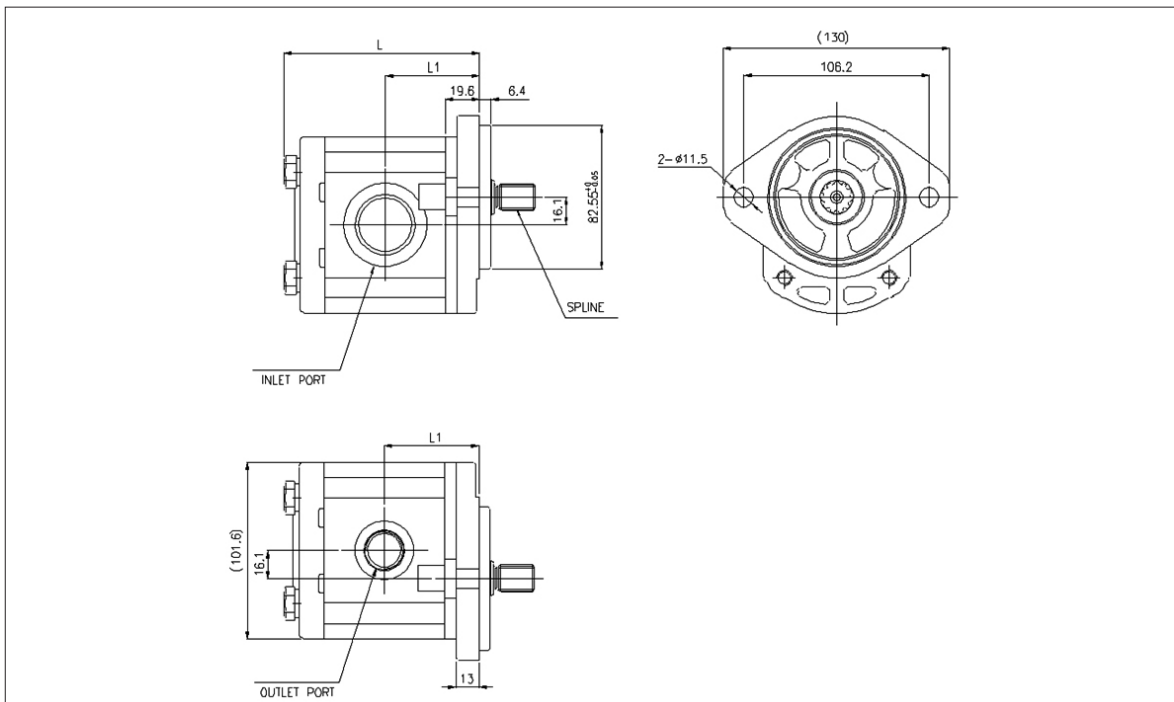
- High reliability by applying a high-strength extruded body.
- Wide range of use by high pressure and efficiency.
- Low noise by reducing gear backlash.



Specifications

- 14, 16.5, 19.6 cm^3/rev Series
- Rated Pressure : 210 kgf/cm^2
- Max Pressure : 230 kgf/cm^2
- Speed : 500 ~ 3000 rpm
- Noise : Under 75dB(A) / rpm at 210 kgf/cm^2

Dimensions



Model	Displacement (D)	Max. Continuous Pressure (P)	Min. Speed	Max. Speed	L	L1
	cm^3/rev	kgf/cm^2	rpm	rpm	mm	mm
SNP20-16.5	165	210	500	3000	112.3	54.1
SNP20-19.6	196	210	500	3000	117	56.5

Gear Pump

Low-Noise Gear Pump LNP30



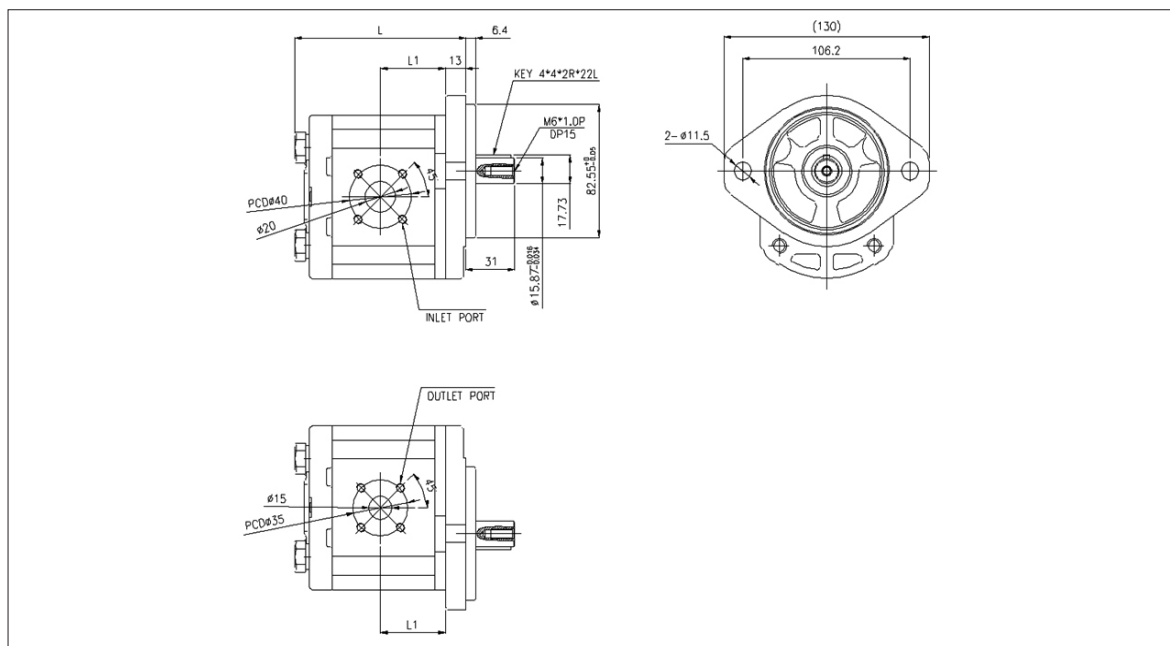
Features

- High reliability by applying a high-strength extruded body.
- Wide range of use by high pressure and efficiency.
- Low noise by reducing gear backlash.

Specifications

- 12.5, 14, 16 cm³/rev Series
- Rated Pressure : 120 kgf/cm²
- Max Pressure : 170 kgf/cm²
- Speed : 500~3000 rpm
- Noise : under 68dB(A) / 1800 rpm at 120 kgf/cm²

Dimensions



Model	Displacement (D)	Max. Continuous Pressure (P)	Min. Speed	Max. Speed	L	L1
	cm ³ /rev	kgf/cm ²	rpm	rpm	mm	mm
LNP30-125	12.5	210	500	3000	104.6	37.4
LNP30-140	140	210	500	3000	108.8	41
LNP30-160	160	210	500	3000	111.9	41



Gear Pump

Low-Noise Gear Pump LNP Series Code and Specifications

LNP20	165	S	U5	U4	–	A3	P1	R	–	0
LNP30	125	S	M2	M1	–	A3	P1	R	–	0
1	2	3	4	5	–	6	7	8	–	9

Series		Mark
1	LNP20 Pump	
	LNP30 Pump	

Displacement			Mark
2	Series	CODE	cm ³ /rev
		165	16.5
		196	19.6
	LNP30	125	12.5
		140	14.0
		160	16.0

Port Position		Mark
3	S : Side Port	

Inlet/Outlet Port		Mark
4 5	U4 : 7/8-14 UNF	
	U5 : 1-1/16-12 UN	
	M1 : German 4Bolt Flange	
	M2 : German 4Bolt Flange	

Mounting Flange		Mark
6	A3 : SAE "A" 2Bolt	

Drive Shaft		Mark
7	P1 : SAE "A" Spline(9T)	

Direction of Rotation		Mark
8	R : Clockwise	

Special Option		Mark
9	0 : None	

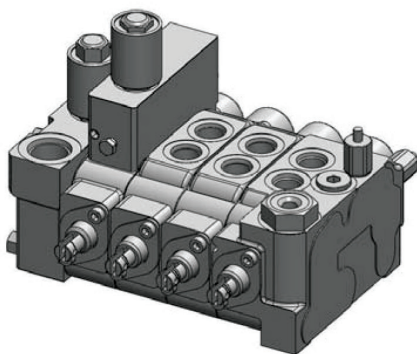
Main Control Valve

Introduction

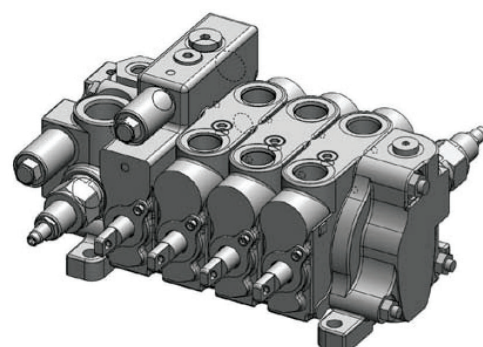
The main control valve for forklift truck is composed of several sections and valves. It controls fork lifting, master tilting, and auxiliary moving functions. The valve mainly functions as a directional control valve, but it also has several pressure and flow control valves, such as relief valve, flow regulator(down control)valve, tilt and lift lock valves. Also, additional safety functioning valves can be attached as in ISO type.

Features

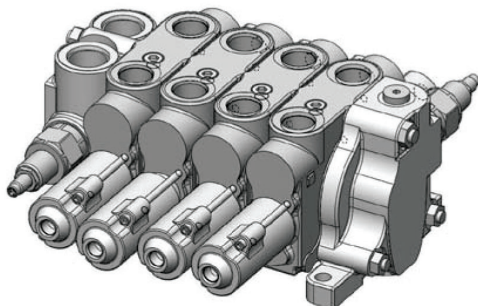
- By incorporating HYDROSTAT function, energy is reduced and heat generation is minimized.
- Tilt lock valve prevents the accidental forward tilting if the lever is operated while engine is switched off.
- Flow Regulator control the work's down speed.
- Lift lock valve increase user's safety by preventing abnormal free fall of the fork.
- In ISO type, when driver gets out of the seat or the engine stops during operation, the valve prevent accident by cutting off the flow to the directional control part.



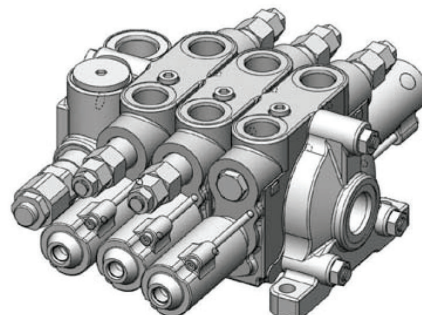
2~3 Ton Class



3.5~4.5 Ton Class



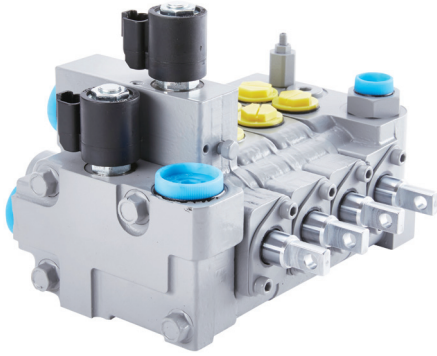
5~8 Ton Class



Wheel Loader Class

Main Control Valve

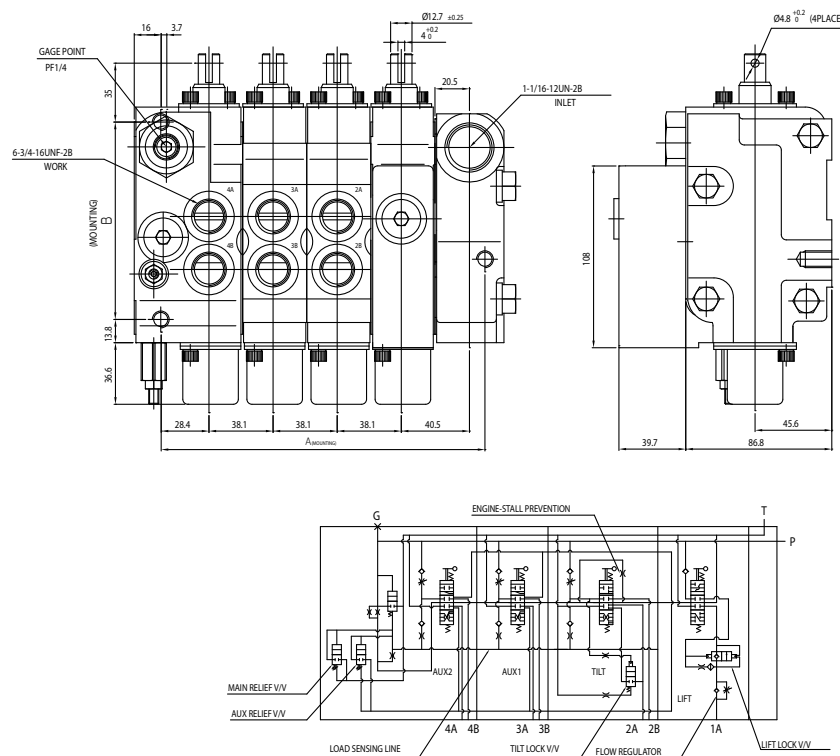
2~3 Ton Class Fork Lift Truck



Specifications

Nominal Flow Rate		95 L/min
Operating Pressure(Max)		250 kgf/cm ²
Relief Valve Setting Pressure	Main	200 kgf/cm ²
	Auxiliary	165 kgf/cm ²
Back Pressure	Peak	15 kgf/cm ²
	Max	10 kgf/cm ²
Fluid		Mineral Oil ISO VG 46
Fluid Temperature		-30°C ~ 100°C

Dimensions

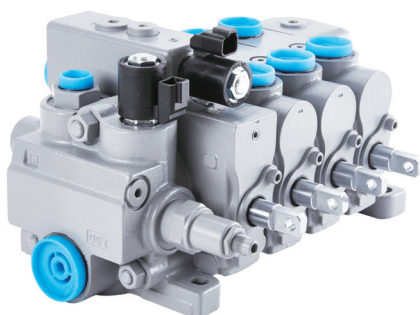


Type	A (mm)	B (mm)	C (mm)
2 sections	143.5	116.2	117.3
3 sections	181.6	154.3	117.3
4 sections	219.7	192.4	117.3

Main Control Valve

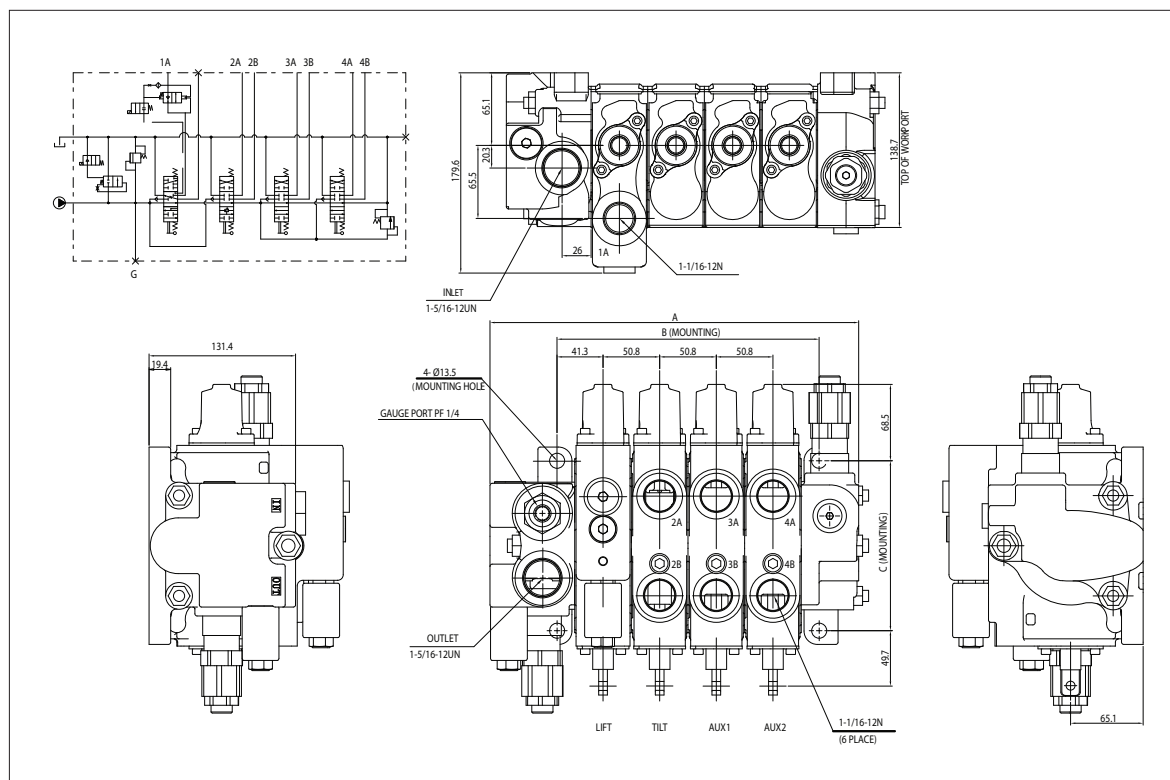
3.5~4.5 Ton Class Fork Lift Truck

Specifications



Max Flow Rate		130 L/min
Operating Pressure(Max)		240 kgf/cm ²
Relief Valve Setting Pressure	Main	210 kgf/cm ²
	Secondary	150 kgf/cm ²
Back Pressure	Peak	15 kgf/cm ²
	Max	10 kgf/cm ²
Fluid		Mineral Oil ISO VG 46
Fluid Temperature		-30°C ~ 100°C

Dimensions



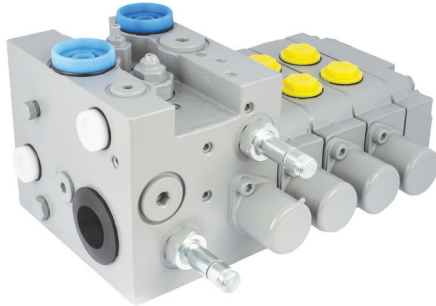
Specifications

Type	A (mm)	B (mm)	C (mm)
2 sections	229.1	133.5	152.4
3 sections	279.9	184.3	152.4
4 sections	330.7	235.1	152.4



Main Control Valve

Main Control Valve with Priority Valve



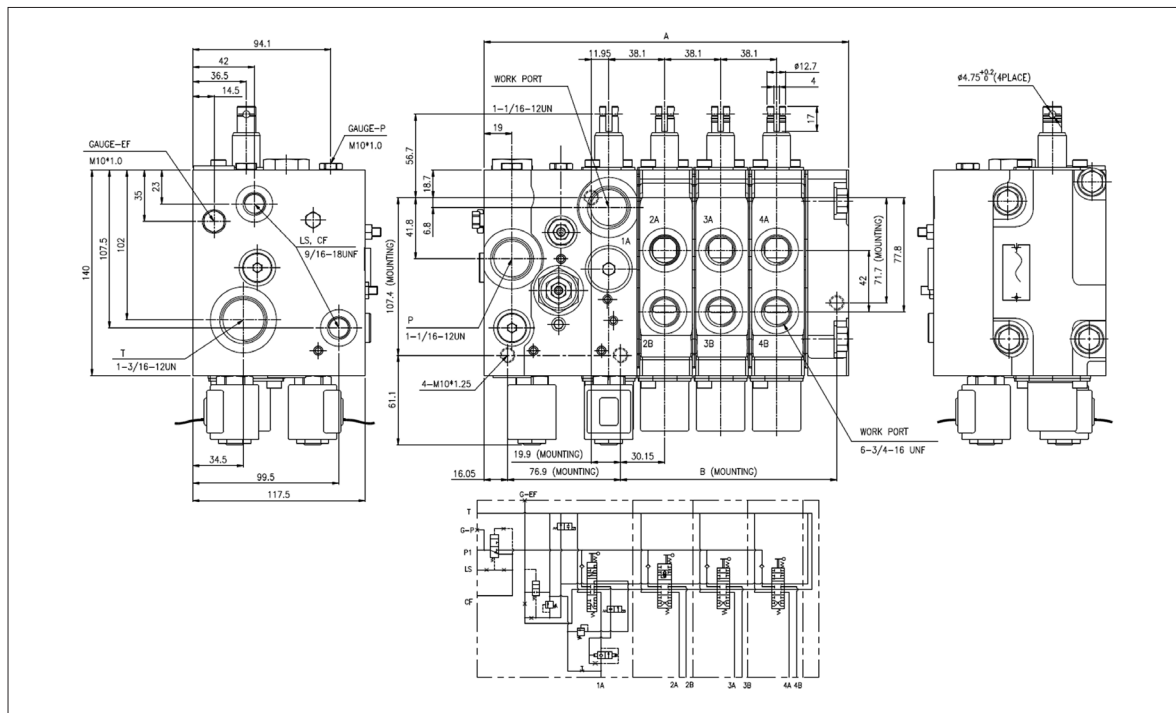
Specifications

Max Flow Rate		110 L/min
Operating Pressure(Max)		250 kgf/cm ²
Relief Valve Setting Pressure	Main	225 kgf/cm ²
	Secondary	163 kgf/cm ²
Priority Valve	Rated Flow	120 L/min
	Control Pressure	9 kgf/cm ²
Back Pressure	Peak	15 kgf/cm ²
	Max	10 kgf/cm ²
Fluid		Mineral Oil ISO 46
Fluid Temperature		-30°C ~ 100°C

Features

- Manual lever operation
- Integral priority valve
- Integral Valve :
Unloading Valve, Tilt/Lift Lock Valve,
Relief Valve, Iso functions, Priority Valve

Dimensions

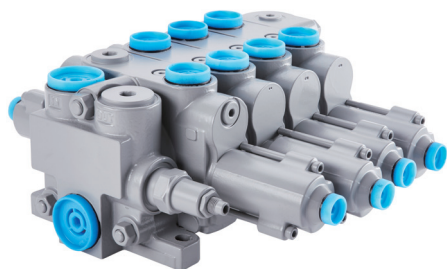


Type	A (mm)	B (mm)
2 sections	172.1	71.2
3 sections	210.2	109.3
4 sections	248.3	147.4

Main Control Valve

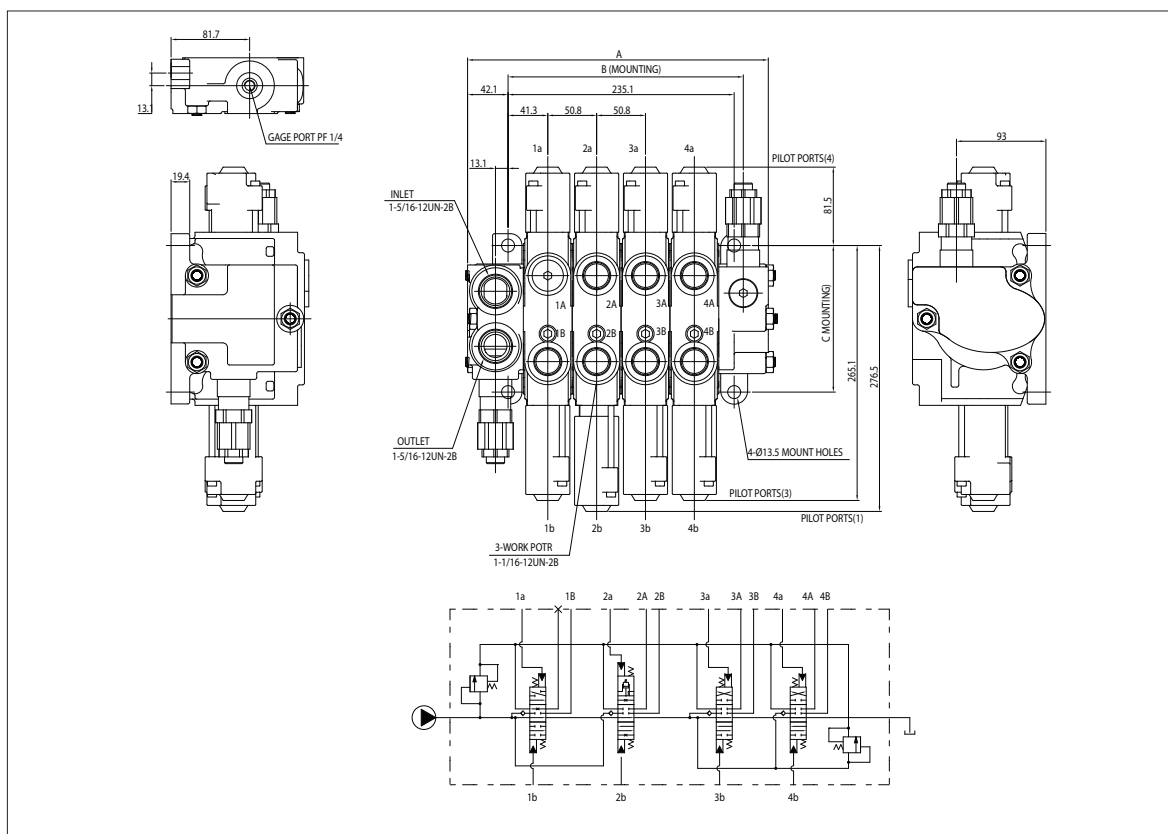
5~8 Ton Class Fork Lift Truck

Specifications



Max Flow Rate		160 L/min
Operating Pressure(Max)		240 kgf/cm ²
Relief Valve Setting Pressure	Main	188 kgf/cm ²
	Secondary	153 kgf/cm ²
Back Pressure	Peak	15 kgf/cm ²
	Max	10 kgf/cm ²
Fluid		Mineral Oil ISO VG 46
Fluid Temperature		-30°C ~ 100°C

Dimensions



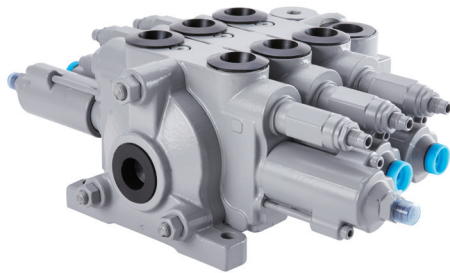
Type	A (mm)	B (mm)	C (mm)
2 sections	211.1	133.5	152.4
3 sections	261.9	184.3	152.4
4 sections	312.7	235.1	152.4



Main Control Valve

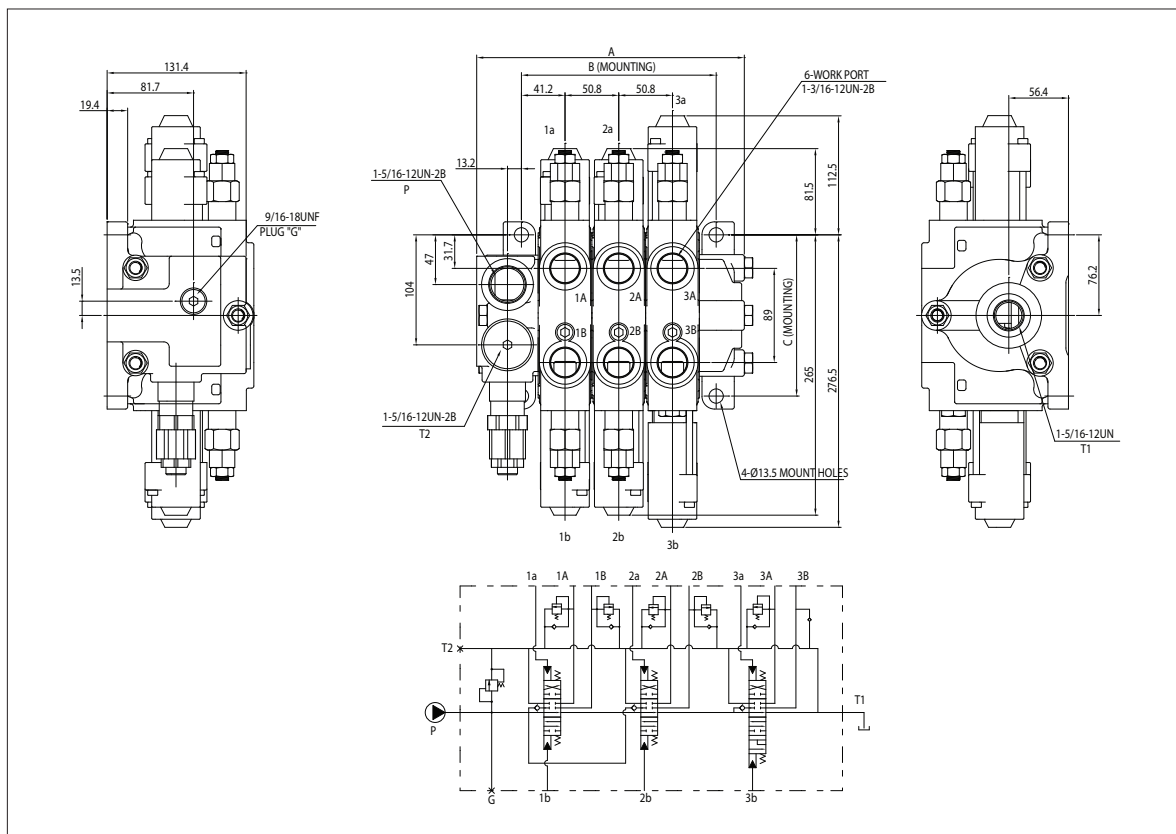
Wheel Loader Class

Specifications



Max Flow Rate		180 L/min
Operating Pressure(Max)		240 kgf/cm ²
Relief Valve Setting Pressure	Main	210 kgf/cm ²
	Lood	240 kgf/cm ²
Back Pressure	Peak	15 kgf/cm ²
	Max	10 kgf/cm ²
Fluid		Mineral Oil ISO VG 46
Fluid Temperature		-30°C ~ 100°C

Dimensions



Type	A (mm)	B (mm)	C (mm)
2 sections	202.2	133.3	152.4
3 sections	253.0	184.1	152.4

Main Control Valve

Proportional Main Control Valve



Features

- Spool control by electric signal
- Fast response and energy saving through load reduction
- Integral relief valve, Shock valve, etc.
- Manual operation by lever
- Integral Valve: Reducing valve, Relief valve Suction & Shock valve, Unloading valve

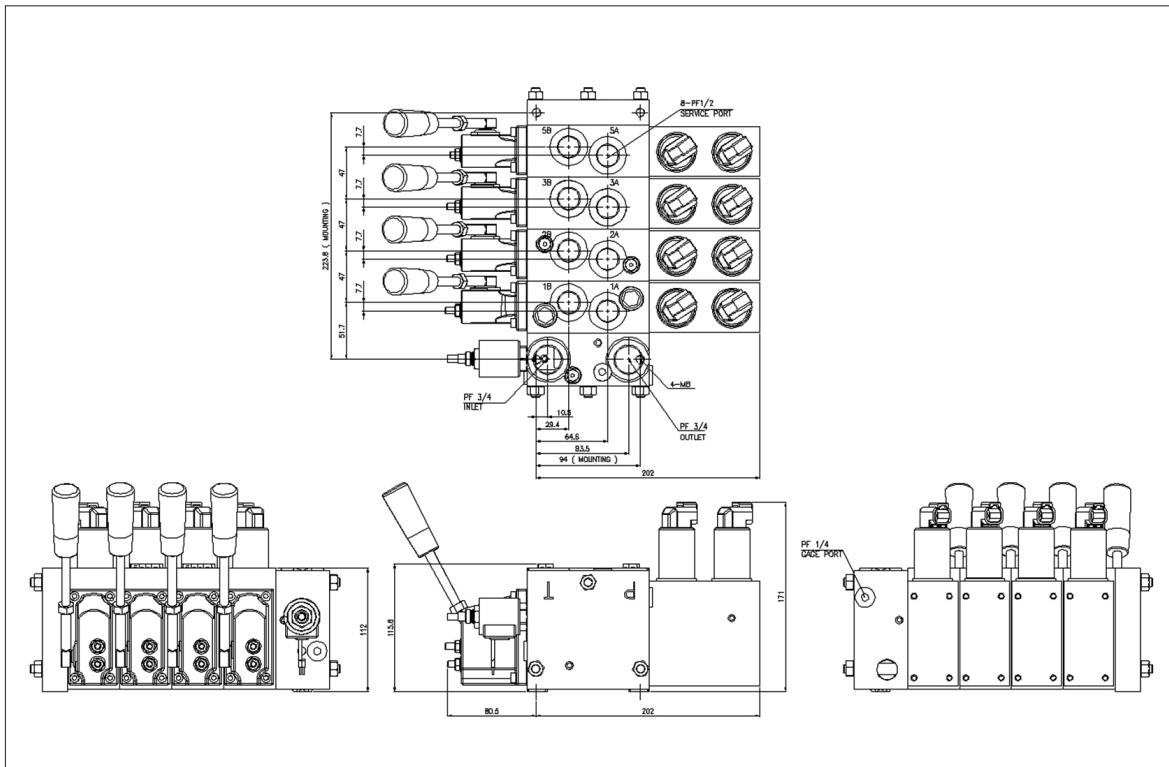
Introduction

Configurable as electrically controlled proportional valve as well as load sensing directional control valve.

Specifications

- MAX. Flow Rate : 150 L/min
- MAX. Pressure : 250 kgf/cm²
- Main Relief Valve : 250 kgf/cm²
- Pressure Drop : 18 kgf/cm²
- Nominal Voltage : DC 12V
- Supply Voltage : DC 11 ~ 32V
- Signal Voltage : DC 0.2xV ~ 0.75xV

Dimensions





Transmission Control Valve

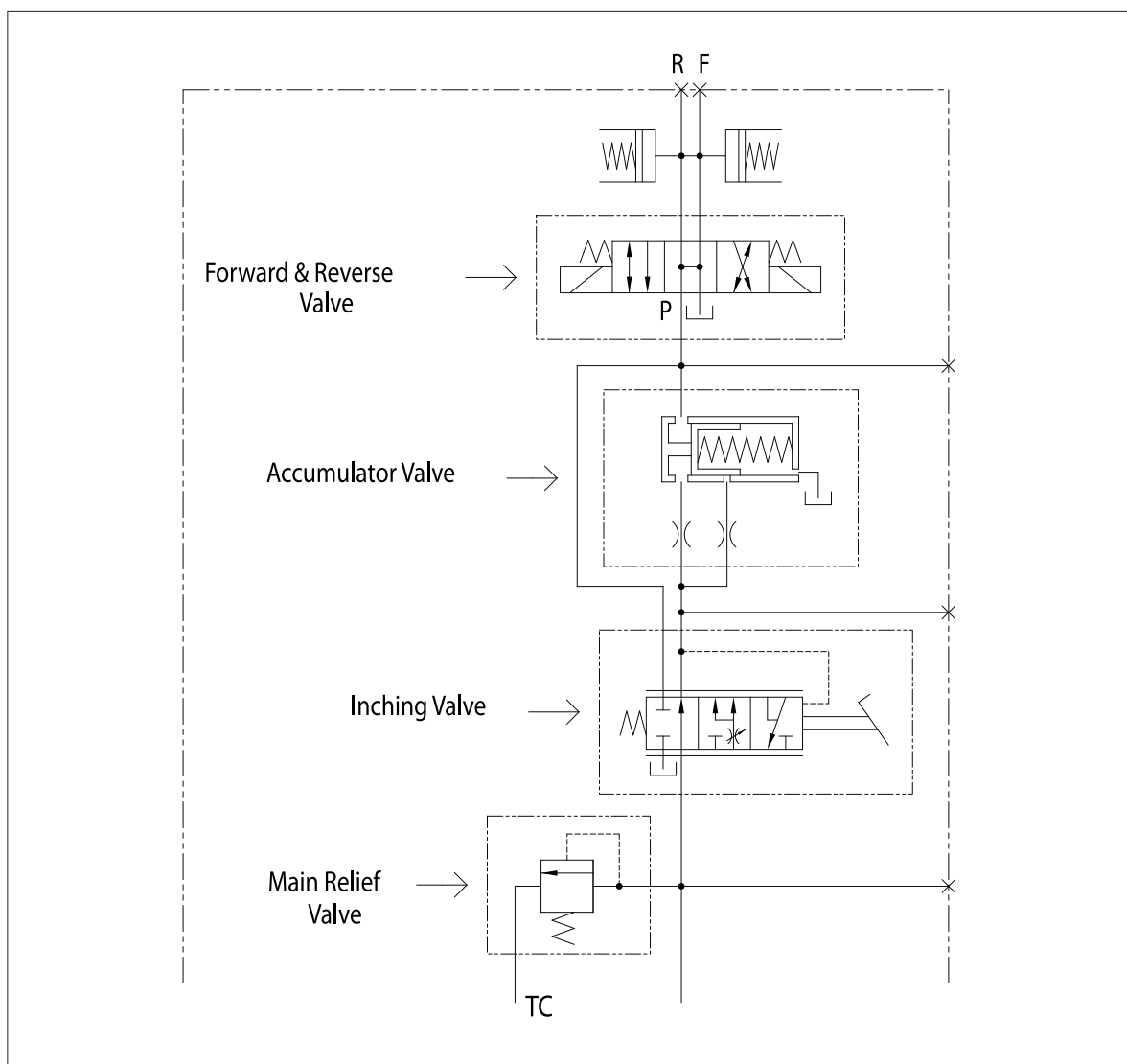
Hydraulic Circuit

1) 2~3 TON



Introduction

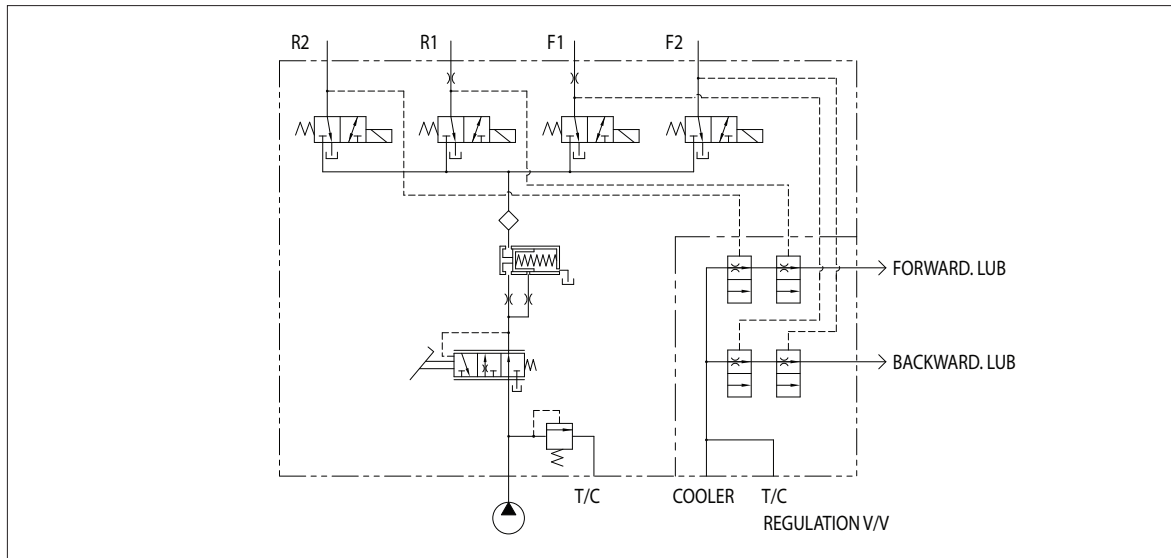
The transmission control valve controls the transmission of forklift trucks. It keeps the set pressure and operates torque converter and clutch. When the clutch is engaged, torque is transferred from torque converter to each actuator, which makes it possible for the vehicle to move forward and backward. In addition, by installing the accumulator inside, it is now possible to avoid shock during forklift is operated.



Transmission Control Valve

Hydraulic Circuit

2) 3.5~5.5TON



Features

• Main Relief Valve

By keeping the pressure stable in the valve, the main relief valve prevents quick pressure fluctuation. When it opens it supplies oil to the torque converter.

• Inching Valve

The inching valve makes the clutch contact smoother by regulating the oil pressure into the clutch.

• Accumulator Valve

The accumulator valve makes it clutch operation smoother by increasing the pressure rising time from the clutch contact.

• Forward & Reverse Valve

The valve determines the direction of vehicle by controlling the oil flow after receiving the electric signals(DC12V, DC24V).

Class	2~3 Ton	3.5 ~ 5.5 Ton
Ass'y		
Pressure	10.8~14.9 kgf/cm ²	9.6~18.5 kgf/cm ²
Electricity	DC 12V	DC 12V, DC 24V
Direction	F, R	F1, R1, F2, R2



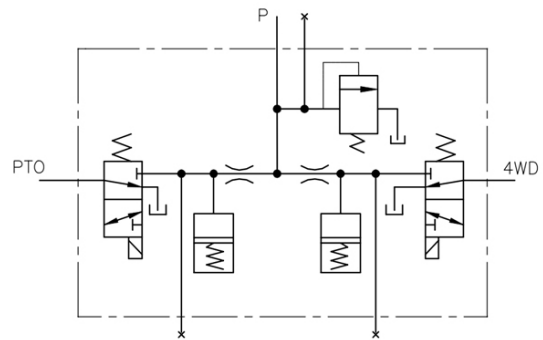
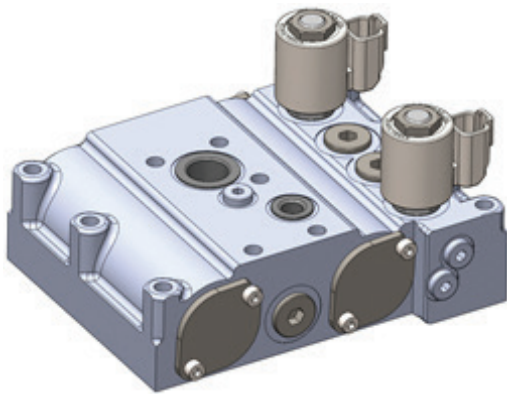
PTO Shuttle Valve

Features

PTO Shuttle Valve improves the usable capacity of agricultural vehicles by converting the powertrain driving power to the work machine.

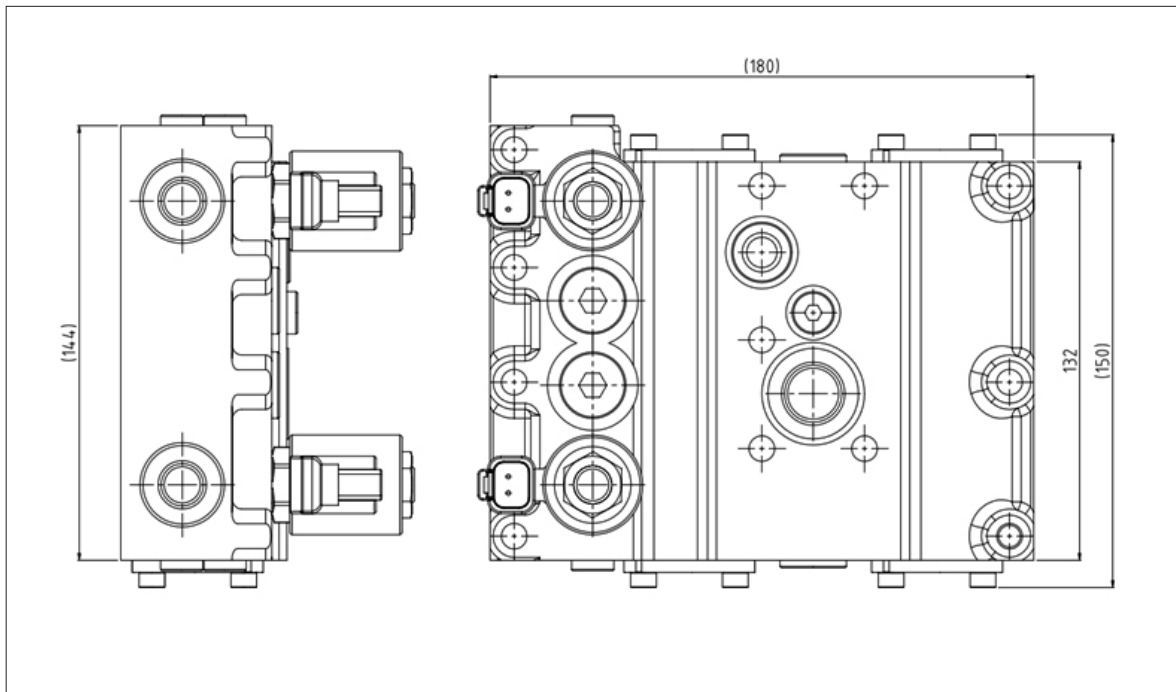
Specifications

- Main Pressure : 10~22 kgf/cm²
- Solenoid Valve : 12~24VDC
- Connector
Leadwire / Duetsch / Etc



Hydraulic Circuit

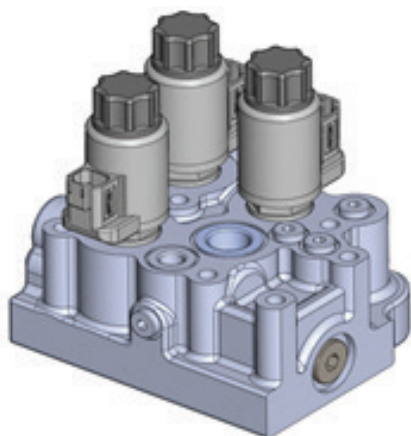
Dimensions



PSV Shuttle Valve

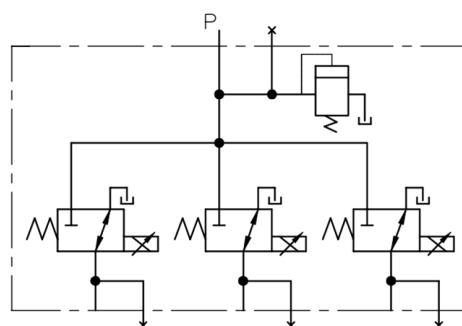
Features

PSV valve controls the transmission of agricultural machinery and forklifts and controls the gear shift by using a proportional control valve.



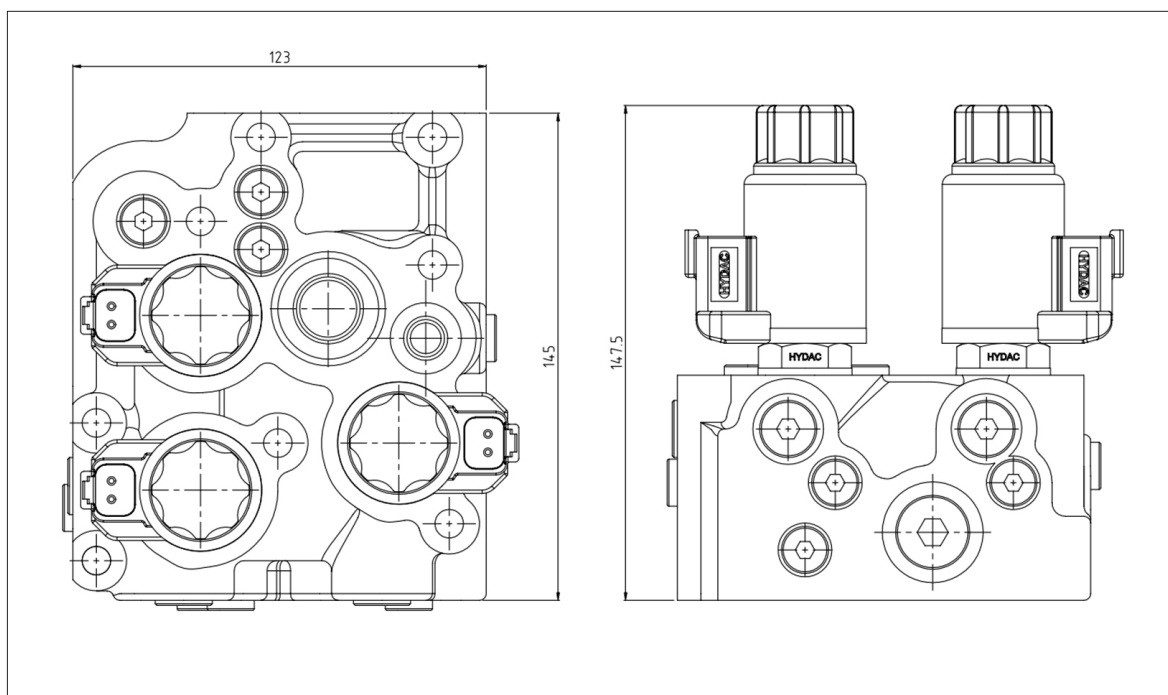
Specifications

- Main Pressure : 10~22 kgf/cm²
- Solenoid Valve : 12~24VDC
- Connector
Leadwire / Duetsch / Etc



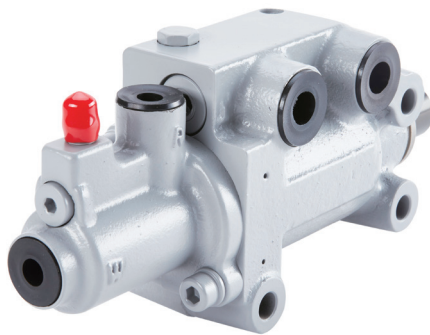
Hydraulic Circuit

Dimensions





Power Master Brake Valve



Introductions

The Boosted Hydraulic Brake Actuator consists of Booster and Master Cylinder. It is applied to Open Center Hydraulic System and constitutes Brake System by being combined with Dual Flow Divider that has a built-in flow control function.

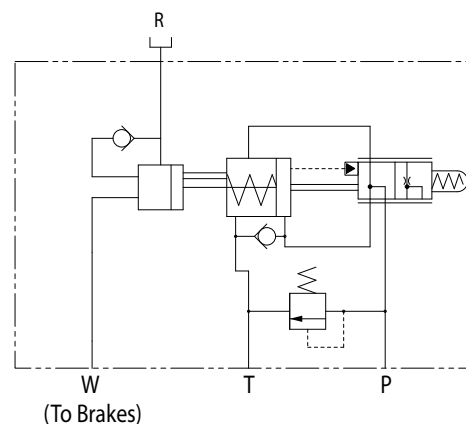
Both Power and Manual mode is possible and pedal works by push method. By changing the area ratio of Booster and Master Cylinder Piston, you can adjust the ratio of Booster input pressure and Brake Line pressure.

Features

- The flow control function(Dual Flow Divider, or Flow Control Valve) is required.
- Due to the application of Booster, it is possible to lower the main system pressure.
- Two different oils can be used for master cylinder and booster.
- Cost effective design by making booster piston and master cylinder piston as one piece
- Abrupt operation is prevented: Controlling the pressure by the built in relief valve.

Specifications

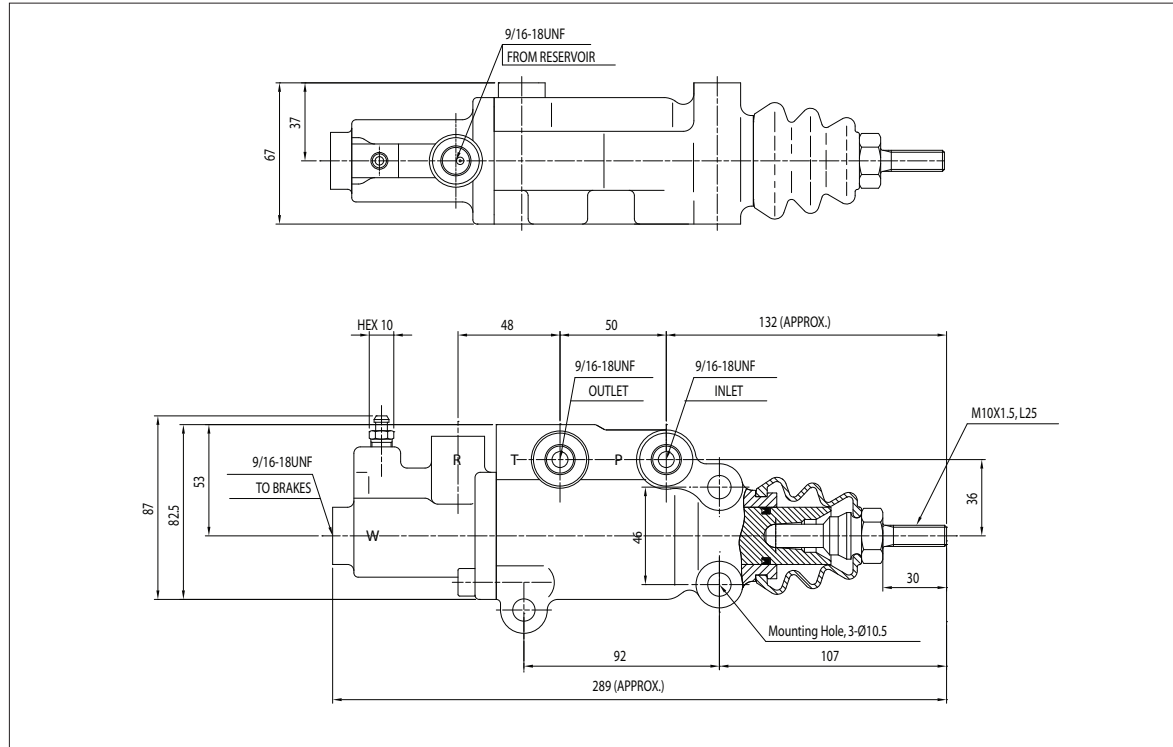
- Brake System Type : Hydraulic Boosted System
- Brake Valve Flow Rate : 3.8 ~ 4.9 L/min
- Brake Line Pressure : 80 kgf/cm²
- Booster Pressure at Max. Brake Pressure : 40~45 kgf/cm²
- Full Stroke : 32.5 mm
- Power Cylinder Fluid Displacement : 18 cm³
- Brake Work Pressure : 83 bar at Spool Stroke 11.3 mm
- Brake Work Force : 145 kgf at Work Pressure 83 kgf/cm²
- Master Cylinder Fluid : Hydraulic Oil ISO VG 32 or Equivalent



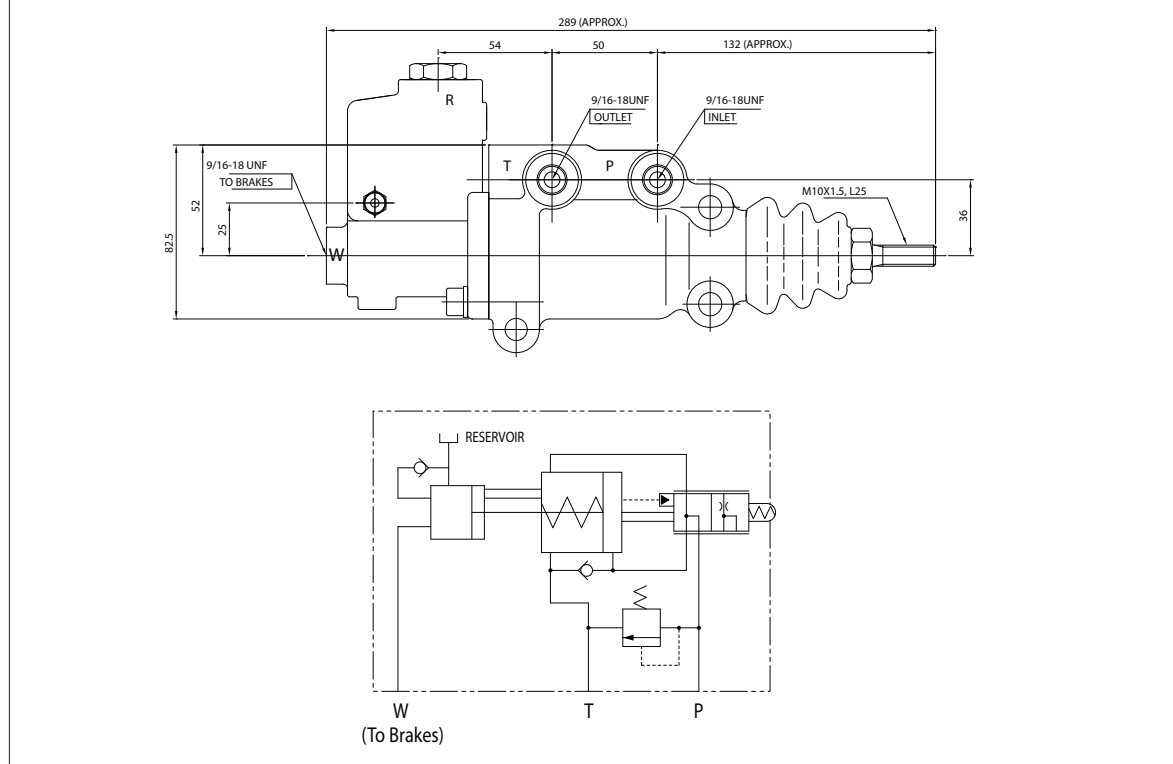
Hydraulic Circuit

Power Master Brake Valve

Dimensions

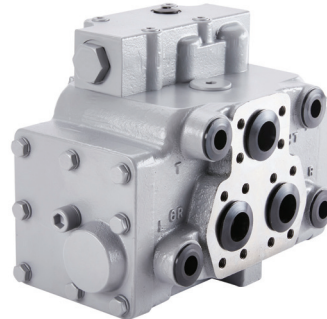


BRAKE VALVE(Attached Reservoir Tank)





Flow Amplifier



Introduction

The FA(M) flow amplifier is used in large vehicle typically very large fork lift trucks, loaders, dumpers. The flow amplifier amplifies the oil flow from the power steering unit cylinder ports L or R by an amplification factor. The amplified oil flow is directed from the flow amplifier ports CL or CR to the steering cylinder. The amplified flow is proportional to the rate of steering wheel rotation

Specifications

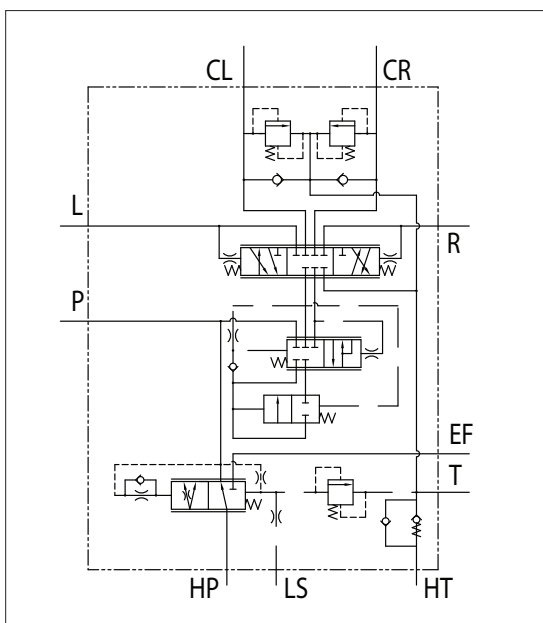
- Max. Steering Pressure : 210 kgf/cm² (20.6Mpa)
- Rated Flow : FAM : 160 L/min
FA : 400 L/min
FAP : 400 L/min
- Amplification factors : 4, 5, 8, 10
- Total displacement of steering system :
FAM : 480~1600 cm³/rev
FA : 1200~4000 cm³/rev
FAP : 1200~4000 cm³/rev

Features

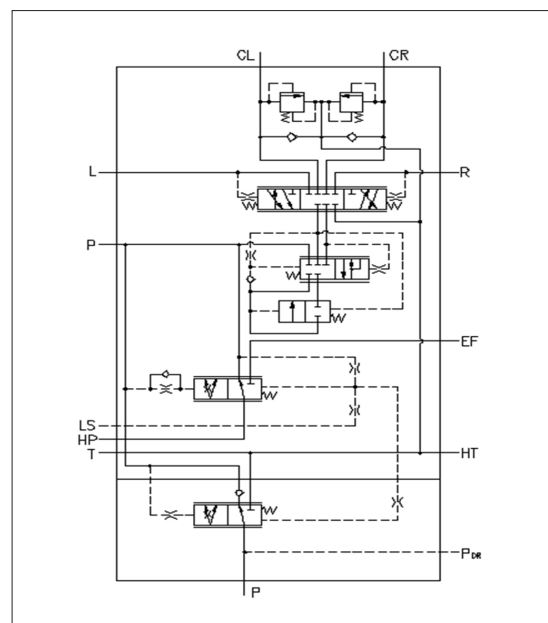
- High Steering Capacity
- Low Pressure Drop at high flow
- Built in valve : a direction valve, an amplification stage, a priority valve, a pilot relief valve, a back pressure valve, shock and suction valve

* Only FAP : Emergency priority valve

FAM / FA



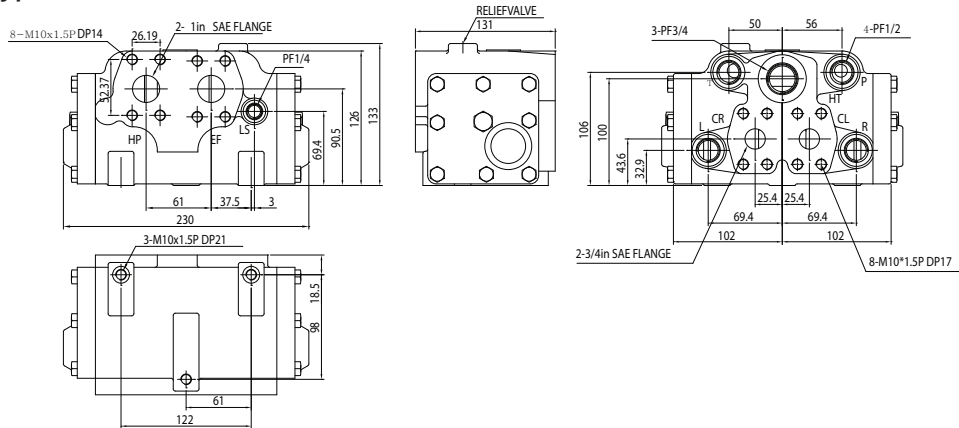
FAP



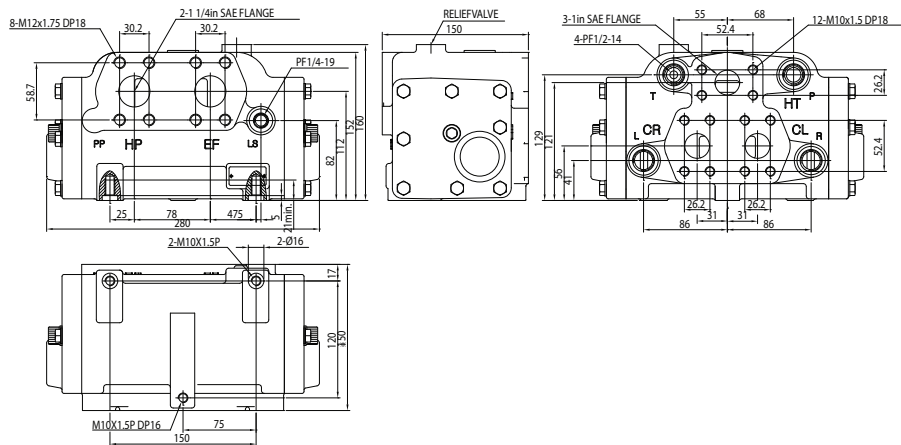
Flow Amplifier

Dimensions

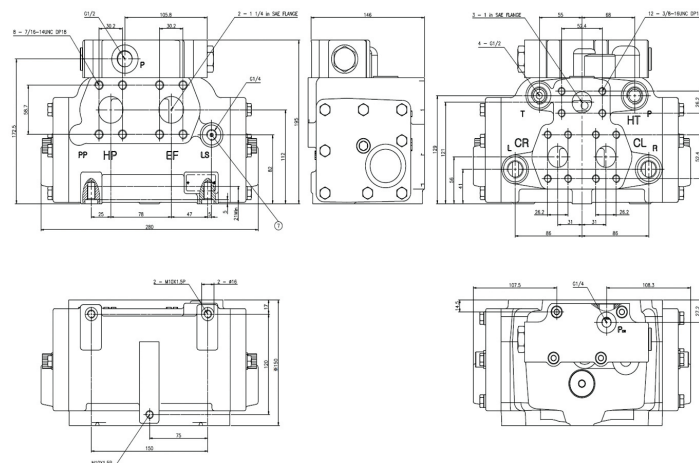
FAM Type



FA Type



FAP Type





Flow Amplifier

Pilot Steering Unit for FA(M)

The FA(M) flow amplifier require special pilot power steering units: FAPS LS, FAPD LS.

There are load sensing steering units whose L and R connections are open to tank in neutral position.

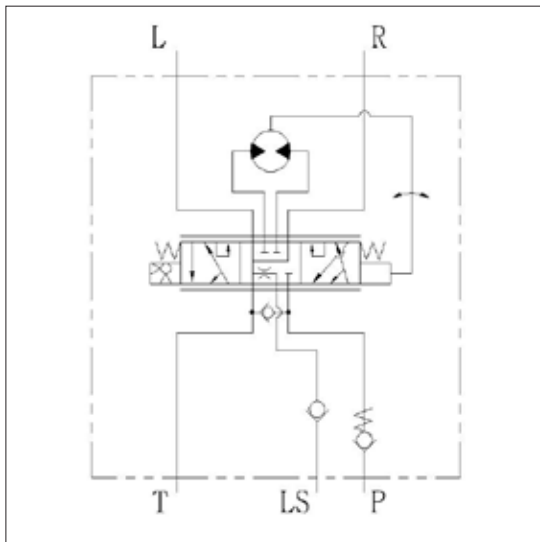
Application

In Large vehicles, a steering system consists of a power steering unit and a flow amplifier

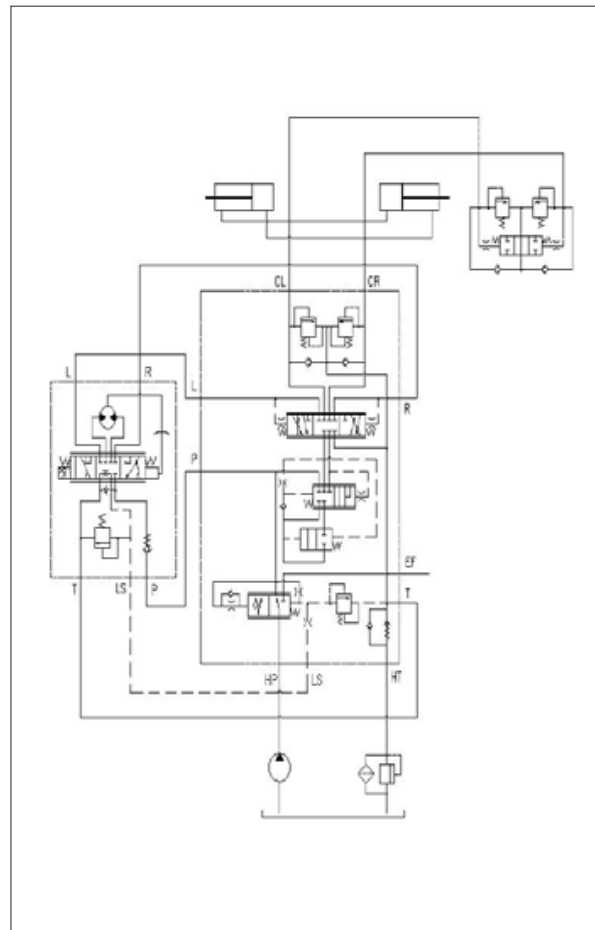
Specifications

- Max. steering pressure: 210 kgf/cm²(20.6MPa)
- Displacement: 80~240 cm³/rev

Hydraulic Circuit



Hydraulic Circuit



Priority Valve



Used in the load sensing system, the Priority Valve controls the oil flow to the power steering unit. The Priority Valve sends the oil to a general functioning part when steering is in neutral. During the steering, it sends the oil to the power steering unit promptly. Hence, it is named “Priority Valve”.

Benefits with Priority Valve

- Using only one pump, both steering and actuating can be operated.
- The oil just as much as the steering system needs to operate is supplied to the PSU and the rest is supplied to the actuators.
- Even in the pressure fluctuation in the line of the steering, the steering is operated smoothly.

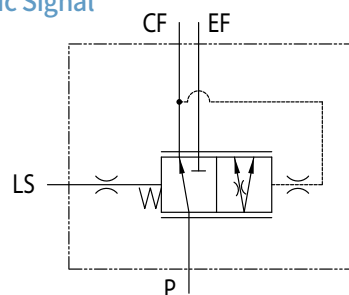
Direct Mounting Priority Valve

- Features
 - Direct Mounting Priority Valve is mounted to the power steering unit directly (Applicable to the Integral power steering unit). This kind of direct mounting priority valve usually has a built-in check valve. Compared with the general priority valves, this has the following advantage.
 - Check valve built in on CF-line or LS-line
 - Reduce the pipe line and noise, wheel kickback due to compact size.
 - Circuit diagram below shows the Static Signal and Dynamic Signal type

Static Signal Type

As a no-oil-flow system at LS port except the relief valve is operated, the structure and design is simpler than the dynamic system. It is applicable where the demand for the response and circuit stability is not high.

Static Signal

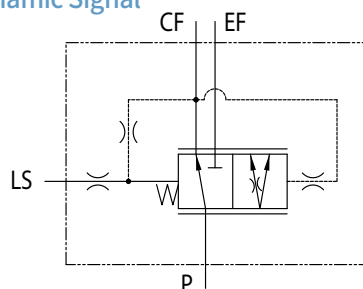


Dynamic Signal Type

It allows a small amount of oil to flow at LS line to the PSU by making a path with orifice at spool. Control pressure can be easily adjusted by modifying the size of the orifice. While it is more complicated than the static system, response and steering capability is much better.

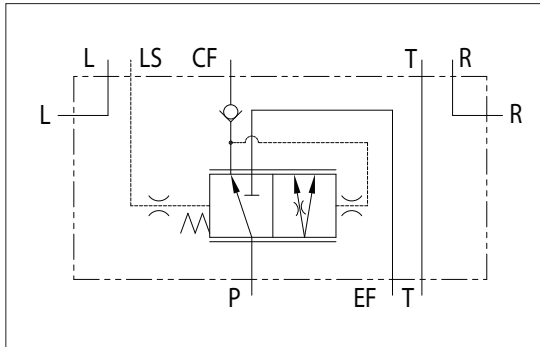
- Features
 - Quick response
 - Easily adjustable control pressure
 - Excellent steering performance due to the pressure compensation.

Dynamic Signal

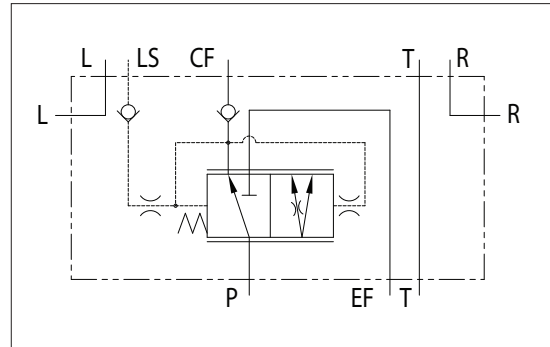


Priority Valve

Static Signal Type

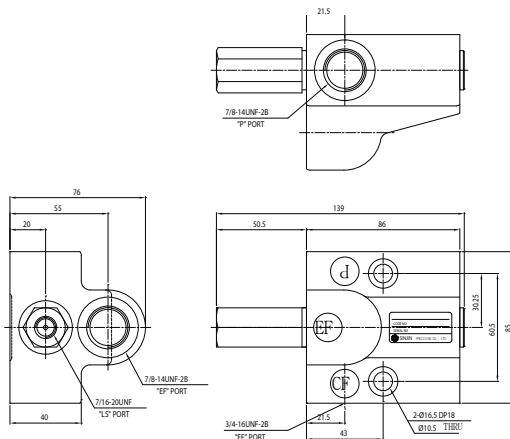


Dynamic Signal Type with Check Valves

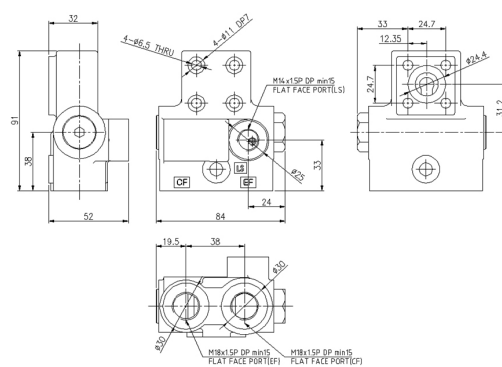


Direct Mounting Priority Valve

PVE 40/80 L/min : Pipe Mounting Type



PVH 40/80 L/min : Pump Mounting Type

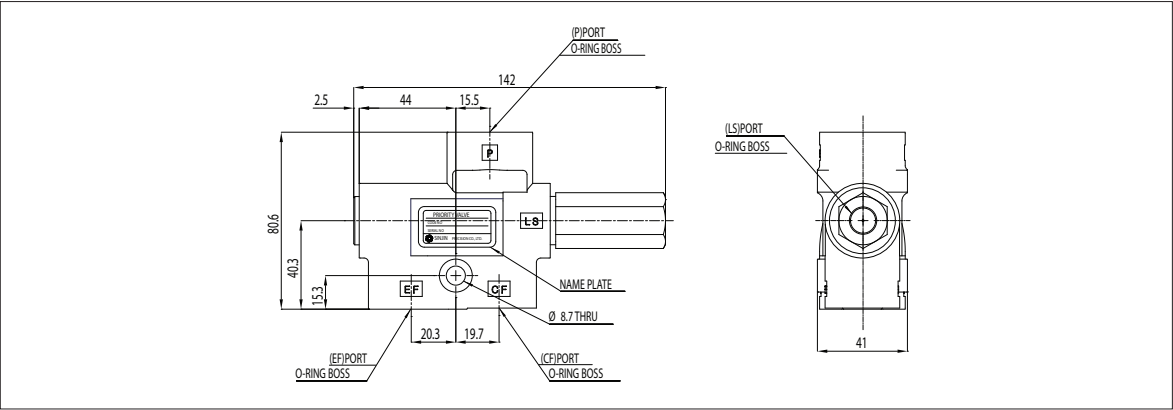


CODE	Port	Size
G	P, EF	G1/2
	CF	G1/2
	LS	G1/4
U	P, EF	7/8-14UNF
	CF	3/4-16UNF
	LS	7/16-20UNF
M	P	Ø15 4Bolt Flange
	CF, EF	M18*1.5P Flat Face
	LS	M14*1.5P Flat Face

Priority Valve

PVA 40 L/min

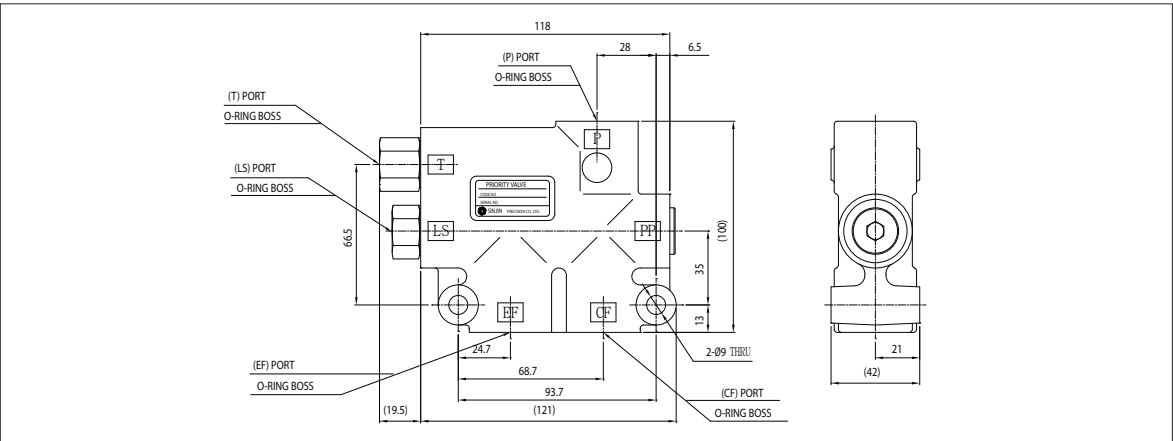
It is a small and simple product of its type and the control pressure can be adjusted easily.



CODE	Port	Size
G	P, EF	G1/2
	CF	G1/2
	LS, T	G1/4
U	P, EF	7/8-14 UNF
	CF	3/4-16 UNF
	LS, T	7/16-20 UNF

PVB 80 L/min

As a most general type of priority valve, the control pressure can be adjusted easily.
In addition, relief valve can be installed by option.



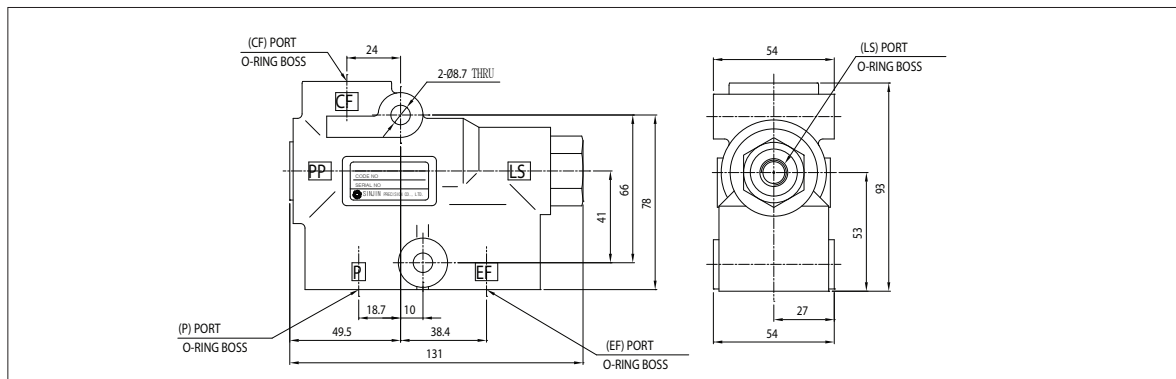
CODE	Port	Size
U	P, EF	7/8-14 UNF
	CF	3/4-16 UNF
	LS, T	7/16-20 UNF



Priority Valve

PVC 120 L/min

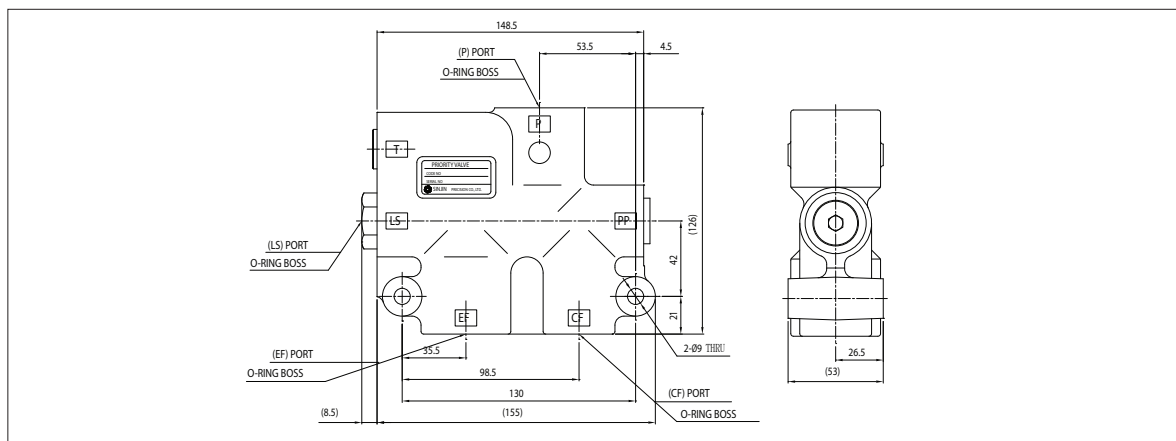
Removing the relief valve, the priority function is enhanced.



CODE	Port	Size
U	P, EF	11/16-12 UN
	CF	3/4-16 UNF
	LS, T	7/16-20 UNF

PVD 160 L/min

As a priority valve used for heavy vehicle, control pressure can be adjusted easily.
In addition, relief valve can be installed by option.

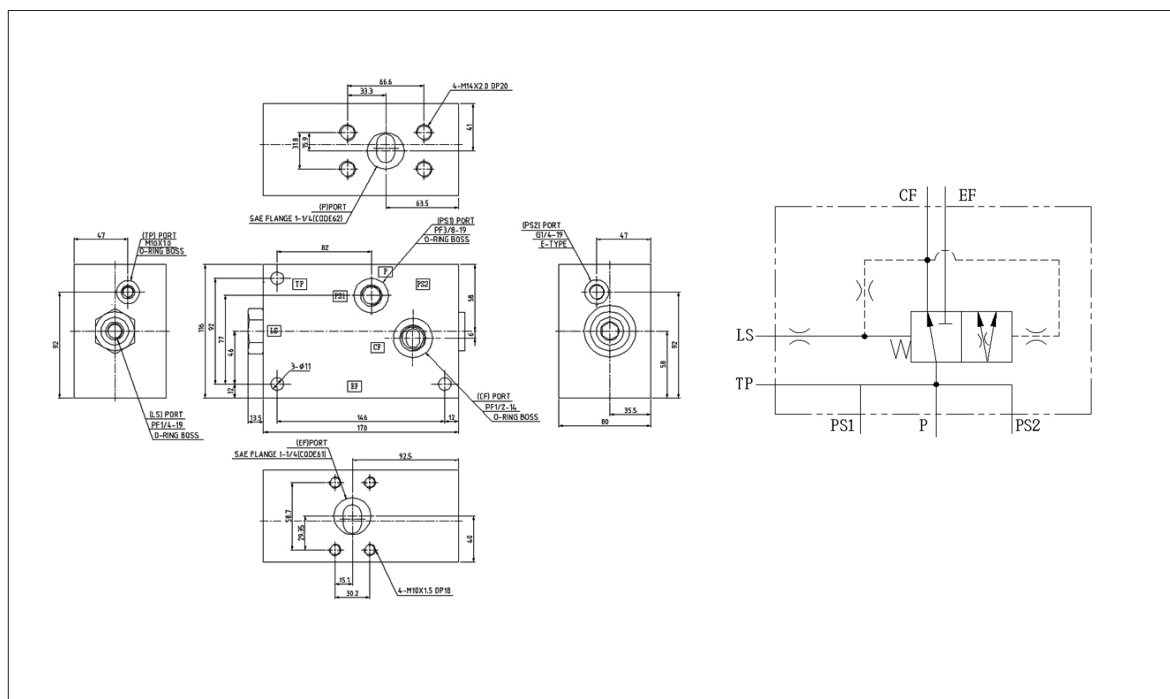


CODE	Port	Size
G	P, EF	G3/4
	CF	G1/2
	LS, T	G1/4
U	P, EF	11/16-12 UN
	CF	3/4-16 UNF
	LS, T	7/16-20 UNF

Priority Valve

PVF 230 L/min

Applied to large industrial vehicles and construction equipment vehicles



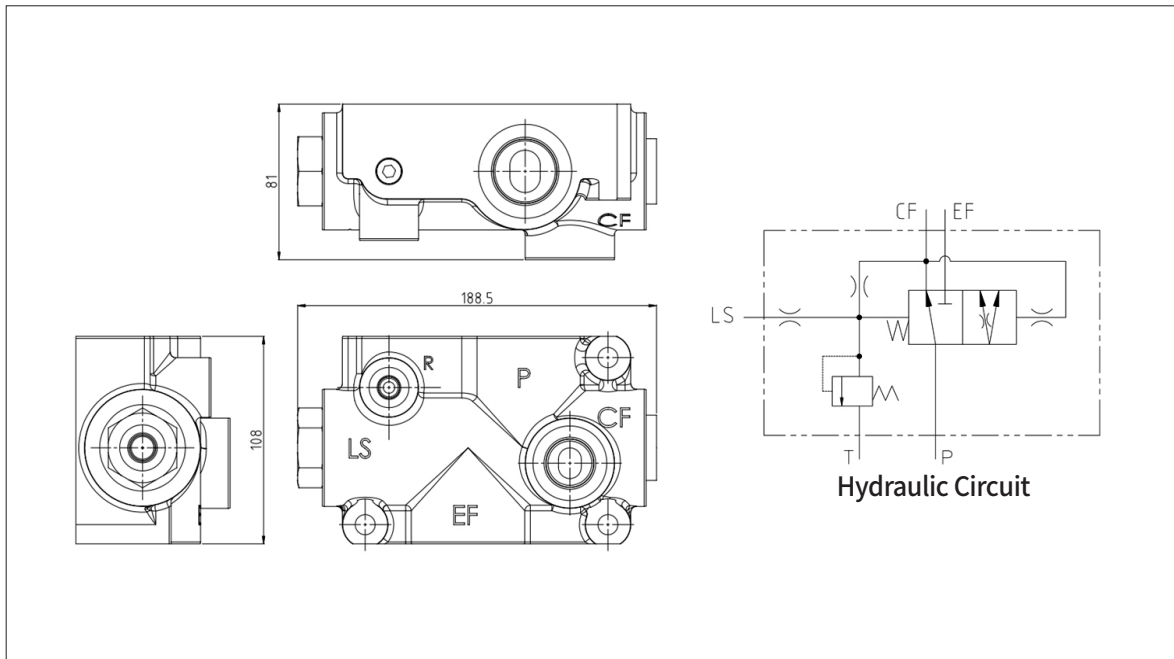
CODE	Port	Size
SP	P	SAE Flange 1-1/4(CODE 62), 4Bolt
	PS1	G3/8
	PS2	G1/4-19 E-TYPE
	TP	M10*1.0P
	CF	G1/2
	EF	SAE Flange 1-1/4 (CODE 61), 4Bolt
	LS	G1/4



Priority Valve

PVG 300 L/min

It is used in large industrial vehicles and construction equipment vehicles and efficiently distributes the flow rate of the pump, and improves efficiency through LS control.



CODE	Port	Size
U	P, EF	1-5/16-12 UN
	CF	1-1/16-12 UN
	LS, T	7-16-20 UNF

Priority Valve

Priority Valve Series Code and Specifications

PVA	S	034	U	00	A
1	2	3	4	5	6

Series		Mark
1	PVA	
	PVB	
	PVC	
	PVD	
	PVE	
	PVF	
	PVG	
	PVH	

System Symbol		Mark
2	S : Static Signal	
	D : Dynamic Signal	

Control Spring Pressure		Mark
3	CODE	kgf/cm ²
	034	3.4
	040	4.0
	048	4.8
	055	5.5
	070	7.0
	080	8.0
	090	9.0
	100	10.0

Port Size		Mark
4	G : G Thread	
	U : UNF Thread	
	M : Metric Thread	
	SP : Special Port	

Relidf Pressure		Mark
5	00 : Without Relief Valve	
	70 : 70 bar	

Design Symbol		Mark
6	A : Initial Design	

Note: * Mark applies only PVE, PVH Type



Cushion Valve



Operation principle

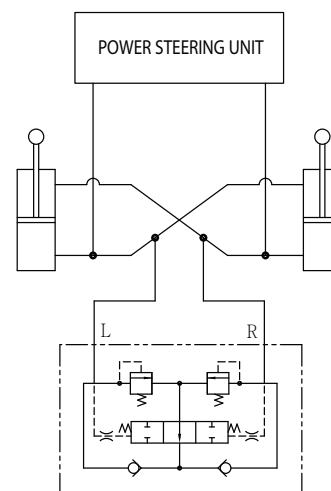
A quick operation or cylinder-stroke-end can cause sudden high pressure in the steering line. If there is a high pressure at L side, the relief valve opens and the flow goes through main spool and check valve of R port. Now, the main spool is shifted by the orifice and the flow stops accordingly. Throughout this process, the temporary high pressure comes down and the system is prevented from the shock. This works to both side, to right and left

Introduction

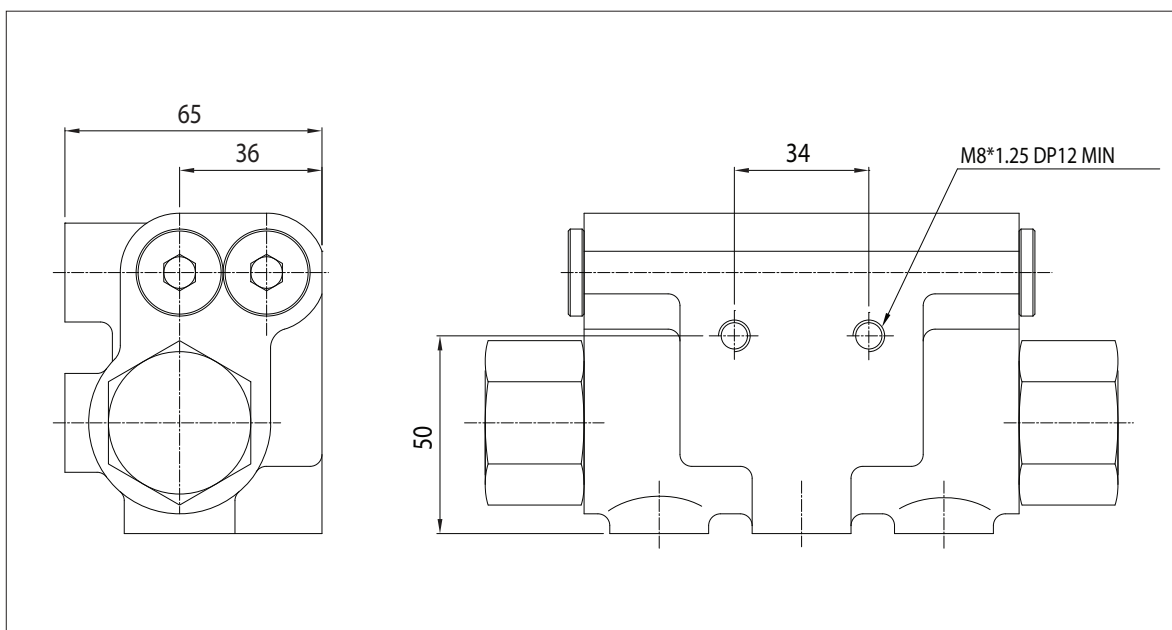
The cushion valve is to minimize the shock and abrupt pressure fluctuation of heavy vehicle such as wheel loader.

Specifications

- Max. System Pressure: 210 kgf/cm² (20.6 MPa)
- Pilot Valve Relief Pressure: kgf/cm²



Dimensions



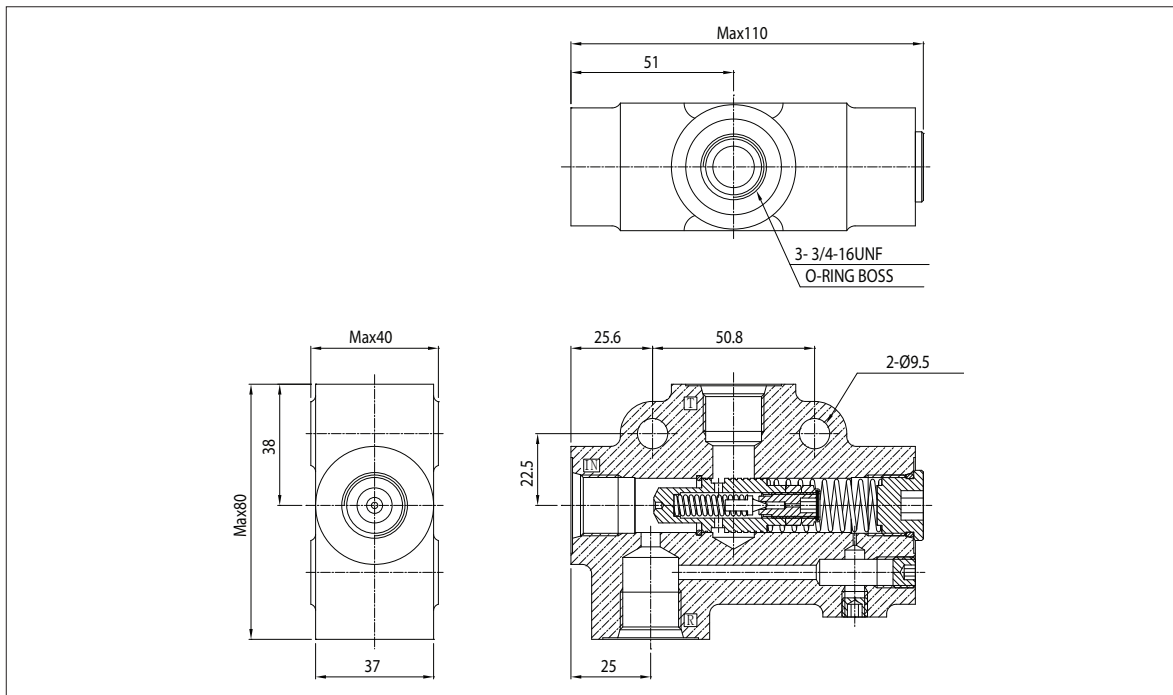
Flow Control Valve



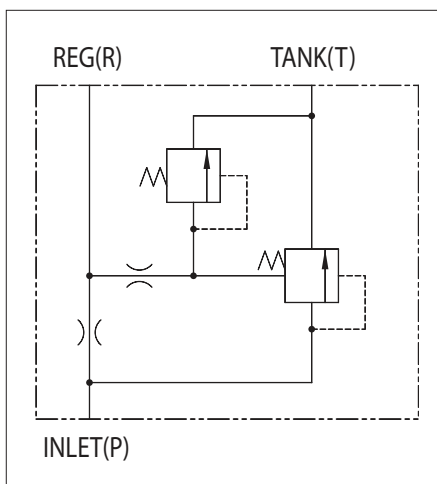
Introduction

The flow control valve is a pressure compensation flow regulating valve. It supplies constant oil flow to a regulated port regardless of the inlet port flow.

Dimensions



Hydraulic Circuit



Specifications

- Max. System Pressure: 210 kgf/cm² (20.6 MPa)
- Max. Flow : 118 L/min
- Controlled Flow : 35 L/min
- Relief Valve Pressure : 70 ~ 175 kgf/cm² (6.9 ~ 17.2 MPa)
- Application : Power Steering System



Dual Flow Divider Valve

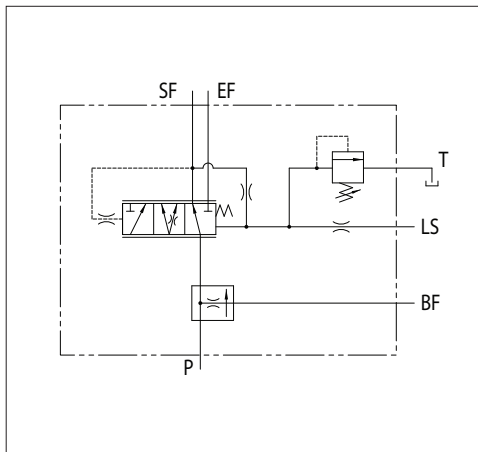


Introduction

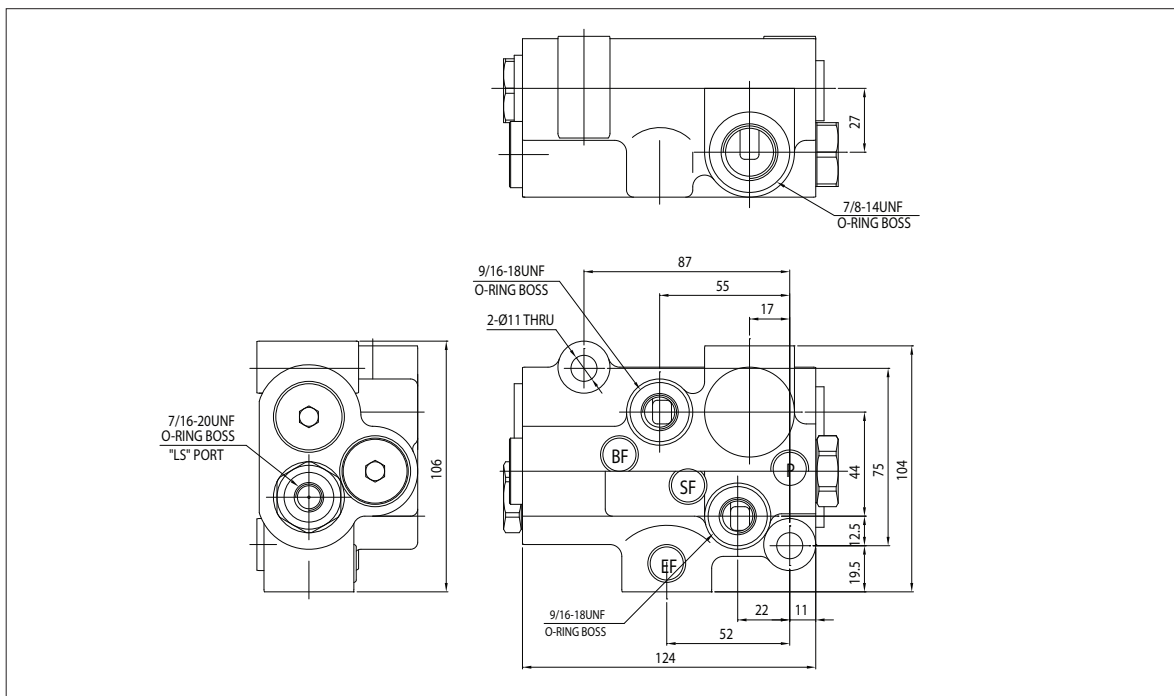
Flow control and priority valve is combined as a one part: The Dual Flow Divider. The flow control part handles the flow for the vehicle braking control. The priority valve part controls the flow and pressure of the Power Steering Unit. It is compact and cost effective solution for small off-road vehicles.

Specifications

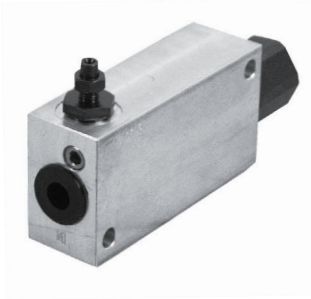
- Max. Flow : 85 L/min
- Control Flow for Brake: 3.0 ~4.5 L/min
- Relief Pressure: 120 bar at 25 L/min
- Control Pressure: 10.5 kgf/cm²
- Steering System: Internal Pilot, Dynamic Signal Type



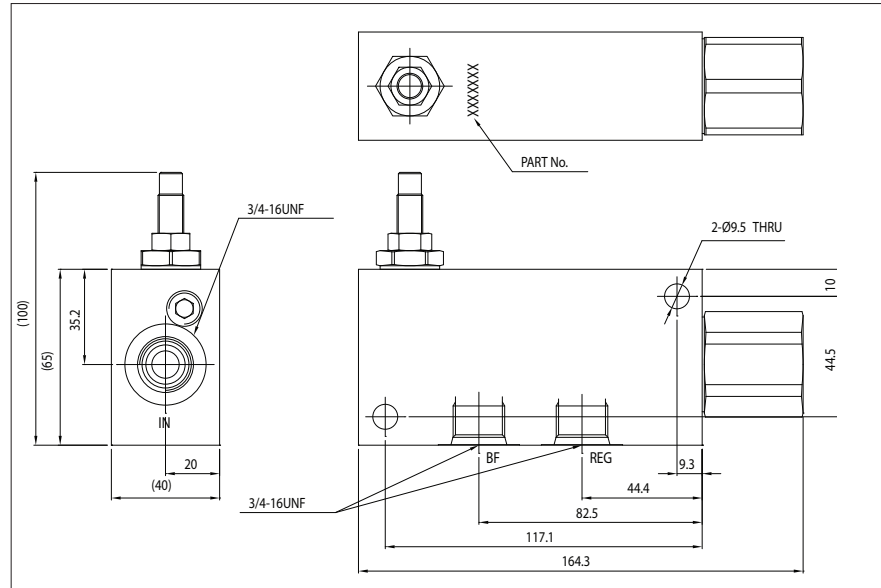
Dimensions



Flow Divider



Dimensions



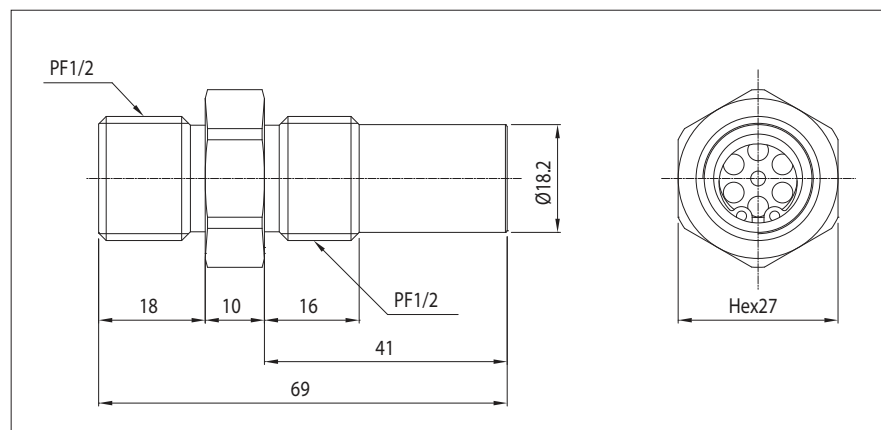
Specifications

Body Material	Port Size	REG.Flow (L/min)	Max.Pressure (kgf/cm ²)
Aluminum	SAE 3/4-16UNF	6 ±0.5	210
		8 ±0.5 210	
		15 ±0.5	

Safety Valve

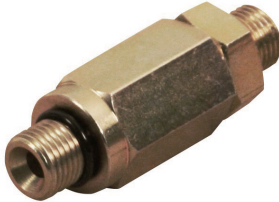
This valve prevents over-flowing of one direction. By a cut-off, keeping constant pressure, it makes only small amount of oil pass.

Dimensions





Flow Regulator Valve



Introduction

As a pressure compensated flow control regulator, it plays a role of an fixed orifice in free flow and a flow regulator in reverse flow.

Features

It has two different functions according to the direct ion of the flow. As a flow regulator, it keeps the flow constant by incorporating the varying the flow area. It is simpler and more effective than electro-hydraulic flow control valve.

Specifications

Controlled Flow

The flow must be preset such as 100 L/min, 150~180 L/min, 250 L/min etc.

Pressure Range

In regulating function, it is usually 6 ~ 210 kgf/cm²

Code and Specifications

Working pressure is 6 ~ 210 kgf/cm²

Inline Type

Features

- As a direct connecting system, it requires small working space.
- It is suitable to a mid flow system and small vehicles.

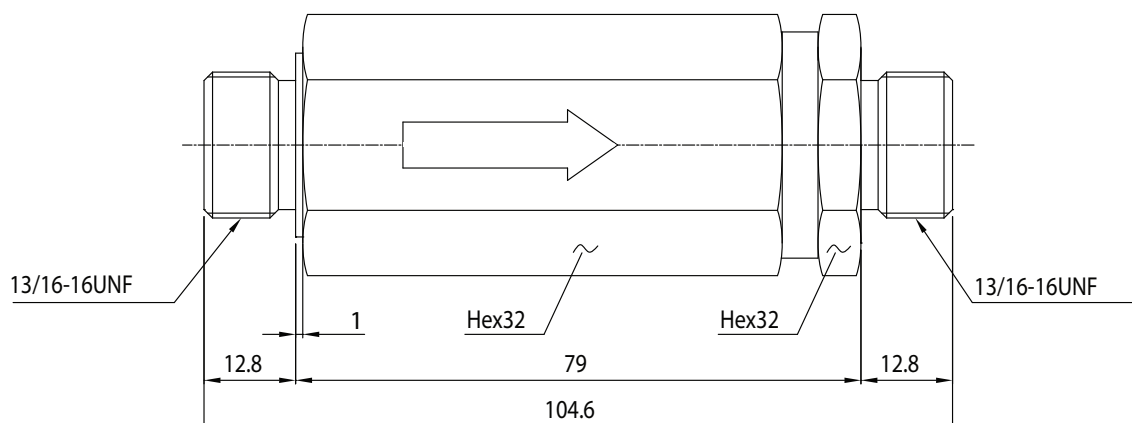
Applications

The most common application is forklift's mast. When the mast is going up, it keeps the inner space maximum and the oil flows freely. When the mast is coming own, it keeps the down speed constant regardless of the load.

Free Flow Loss

When used as an orifice, it has some value of the pressure drop. The pressure loss must be measured on stable flow near the controlled flow.

Dimensions



Flow Regulator Valve

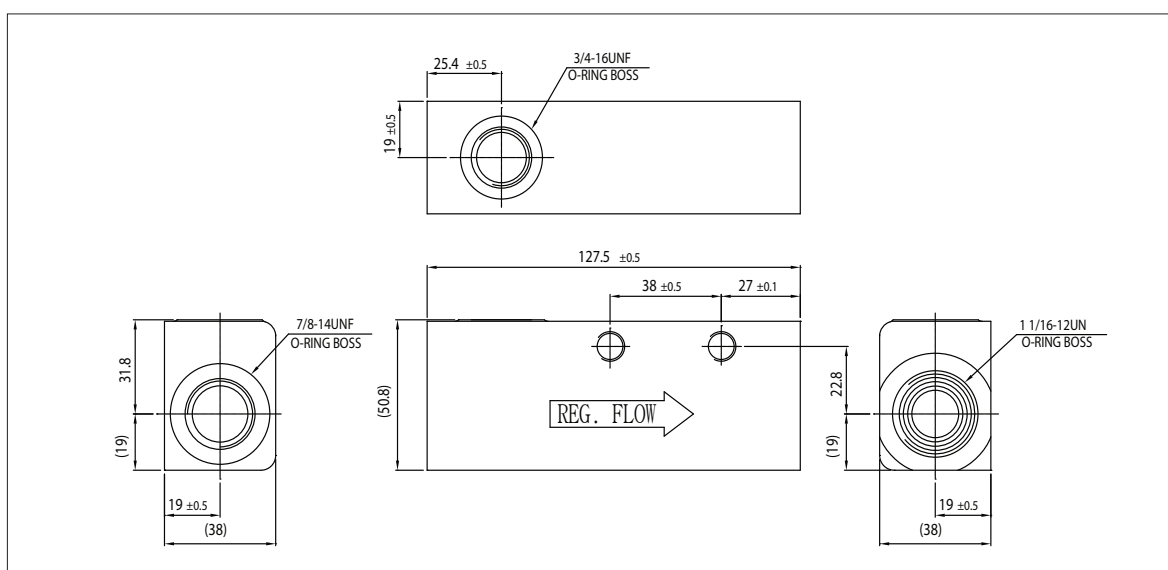


I-block Type

Features

- It is easy to install to the outside of the vehicle because of the cast body.
- Various applications are available by port changing.
- Durable to heavy shock.
- It is suitable for a mid flow system and small equipments.

Dimensions

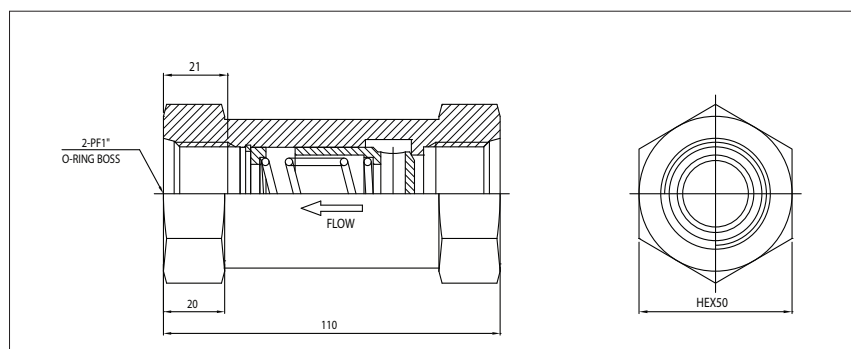


Bypass Valve

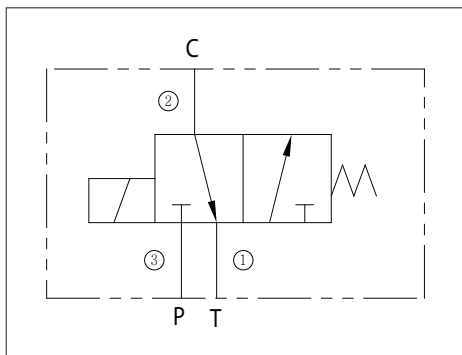
Specifications

Keeping constant pressure within the requested flow limit, the Bypass Valve can protect the hydraulic system against the path blocking. The valve does a similar functioning with the relief valves, but it controls larger flow at lower pressure to re-direct the flow path

Dimensions



Solenoid Valve



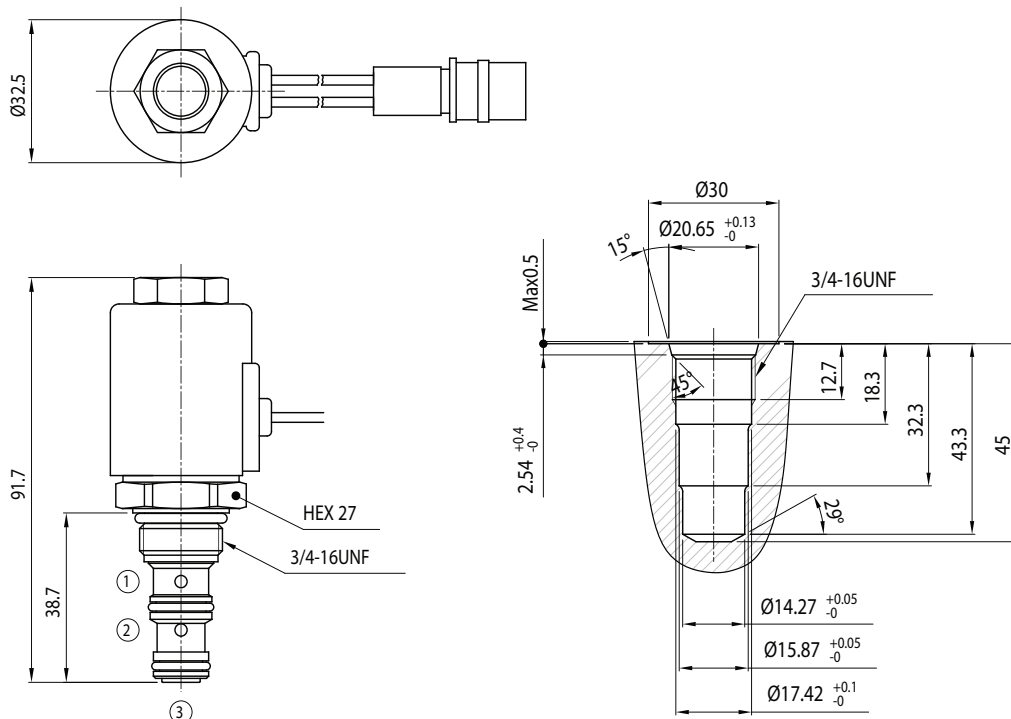
Introduction

Being DC operated, the solenoid valve is a cartridge, manifold inserting type. It is a cost effective solution to the need of on-off switching function.

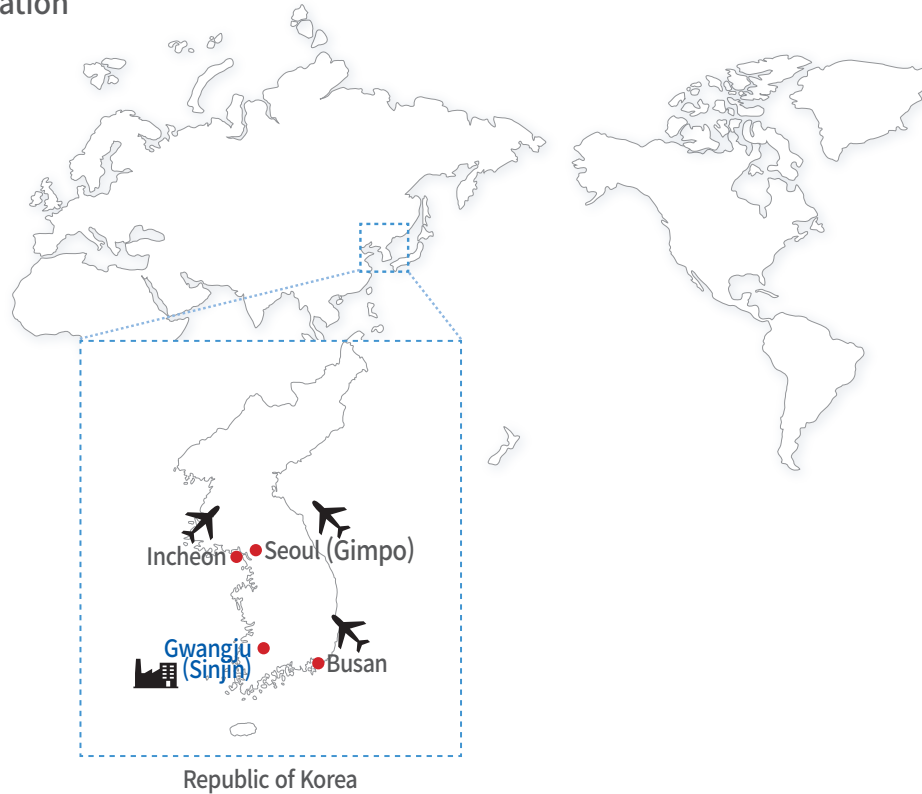
Specifications

- Oil: SAE 10 To 30WT
- Flow: 5 lpm @ 1500 kPa
- Internal Leakage: 10 ml/min @ 2760 kPa
- Operating Temperature: -40 ~ 105 °C
- Coil: 12 VDC, (14.4W)

Dimensions



Location



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