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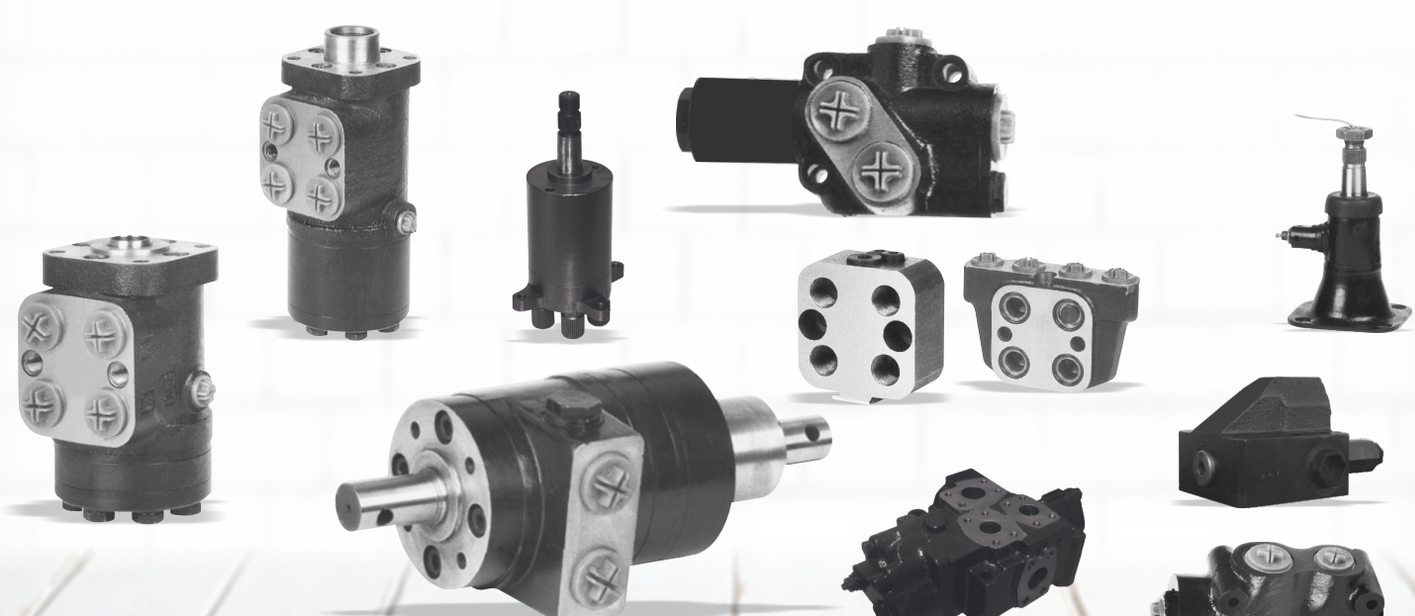
THM HYDRAULICS

HYDRAULIC STEERING UNIT & ACCESSORIES



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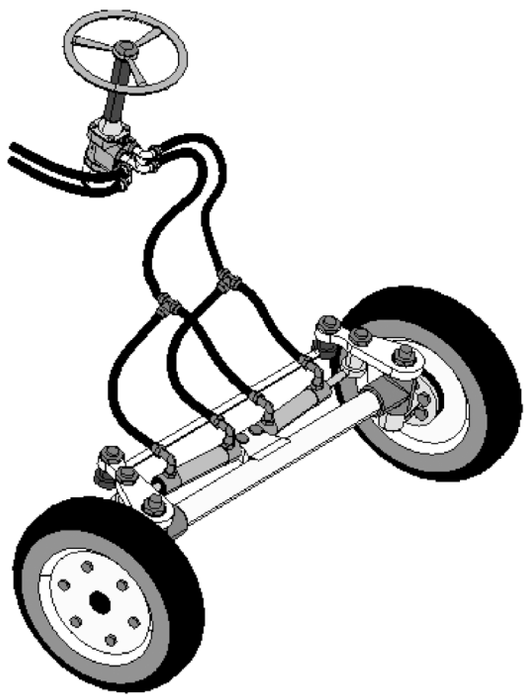
TVV Series Hydraulic Steering Control Units (SCU)



Hydraulic steering control unit(SCU) is widely used both in the system of vehicles and the marine rudder. The operator can obtain bigger steering control force with less steering force, and its function is more safety and reliable, its operation is more smooth and flexible.TVV1,TVV2,TVV3 series SCU offers the advantages as follows:
This kind of SCU series can help you reduce the machinery cost without mechanical linkage device, and can offer reliable light structure.
This kind of SCU series can operate more flexible with light steering torque.
This kind of SCU series can offer emergent manual steering in case of engine failure.
This kind of SCU series can be steering at the continuous speed with less steering torque.
This kind of SCU series can offer various hydraulic system and different mounting choice.
This kind of SCU series can link various steering pump and hydraulic steering system.
In addition to the advantages mentioned above, TVV5 series SCU has the features as follows:
TVV5 series SCU can supply priority relative flow to ensure reliable , sensitive and flexible steering according to the requirement of hydraulic steering system, whether the load pressure is big or small, or the steering wheel rotates quick or slow. In addition to the necessary flow supply to the steering system, the remaining flow out of the pump can be supplied to subsidiary flow system , so that the system can avoid the power loss caused by surplus flow out of the steering flow system, and the system efficiency can be increased.

TVV Series Hydraulic Steering Control Units (SCU)

General Description

TVV Series Function	TVV series hydraulic steering unit is consisted of one pair of rotary valve and one pair of gerotor. Via the steering column, the steering unit links the steering wheel, when the steering wheel rotates, the oil flows out of the supply pump of the steering system , through the rotary valve and the gerotor , to the cylinder's port left or right (depend upon the rotation direction). The gerotor supplies the oil to the steering cylinder in proportion to the angular rotation of the steering wheel. If the oil flow out of the supply pump of the steering system is too small, the steering unit can work as the manual pump.
In Open Center System	Release the steering wheel, the rotary valve stays in the neutral position, the pump and the tank is linked in open circuit. The constant pump is normally used in the open center steering system when the valve stays in the neutral position.
In Closed Center System	Release the steering wheel, the rotary valve stays in the neutral position,the input port is closed.the variable pump is normally used in the close center steering system when the valve stays in the neutral position.
Technical requirement for steering column	The structure of the steering column must ensure not to transfer the axial load to the output shaft of the steering unit. While the steering column is mounted, the steering unit should be able to return to the neutral position after its steering operation.
Steering torque of the steering column	Under the normal steering, the pump of the power unit supply enough oil , the max. torque of the steering wheel is no more than 5 N·m. If the pump fails to supply oil or supply insufficient oil, hydraulic steering unit will automatically change into manual steering.Under manual steering, the steering torque is obviously more than 5 N·m. However the max. torque cant be bigger than 120 N·m. or it will cause some damages inside the parts of steering unit.

TVV Series Hydraulic Steering Control Units (SCU)

Ordering Code

Cycloid Rotary Valve Hydraulic Steering Units = TVV

Function Code
Open center non-reaction = 1
Open center reaction = 2
Closed center non-reaction = 3
Load sensing = 5

Pressure grade 16MPa

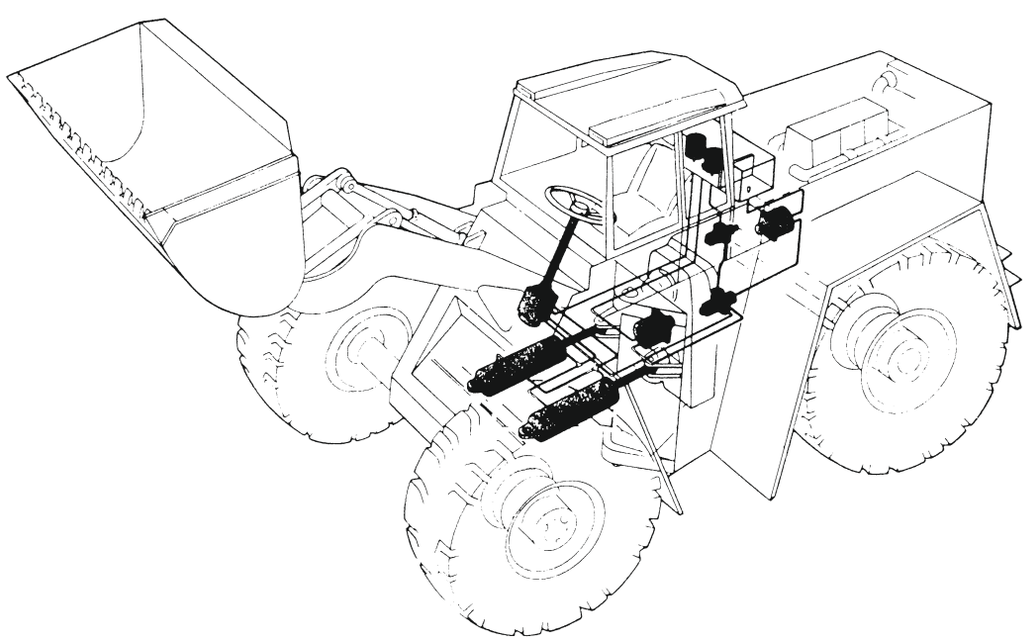
Displacement

Mounting Data
Long spigot, cross-block mounting = A
SAE involute spline mounting = B
Short spigot, cross-block mounting = C

Code for special characteristics (see the table on Page 5)

Ports code (see the table on Page 5 and Page 12)

Code for other requirements(see the table on Page 5;
see the table of LS special port code on page 12)



TVV Series Hydraulic Steering Control Units (SCU)

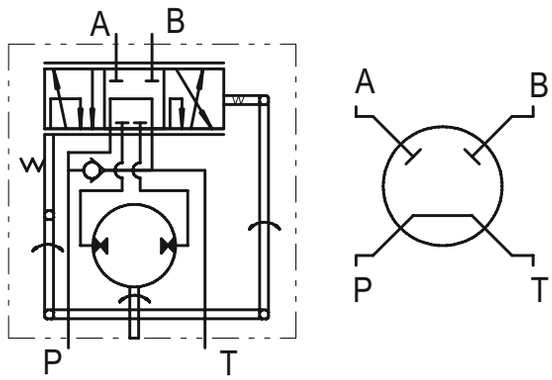
Category	Code	Definition	Remarks
Characteristic Code	(Omit)	Common Type	Fit various steering system, e.g. tractor, loader, and road roller, etc.
	D	Input torque 1.6N·m～2.4 N·m	Fit steering system of vehicles that driving on flat road , such as forklift
	C	Input torque ≤1.6N·m	
	Codes for the requirement of other performance characteristics (should be confirmed in an agreement)		e.g. manual steering, lower terminal steering feeling, noise and back-to-the-neutral-position function etc., or comprehensive requirement.

Ports Code

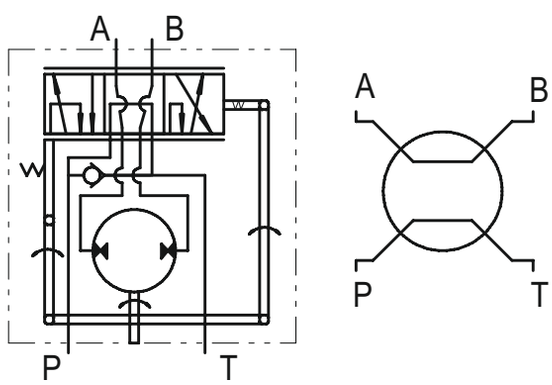
Category	Code	Ports P,T,A,B	Column Mounting C	Valve Mounting V
Ports code	(omit)	M20×1.5	M10	M12
	A	M18×1.5	M10	M12
	B	G1/2	M10	M10×1
	C	3/4-16UNF O-ring	3/8-16UNC	3/8-24UNF
	D	M20×1.5 O-ring	M10	M12
	E	M18×1.5 O-ring	M10	M12
	G	M22×1.5	M10	M12
	Q	M22×1.5 O-ring	M10	M12
	U	G1/2 O-ring	M10	M10×1
	M	3/4-16UNF O-ring	M10	M12
	I	3/4-16UNF O-ring	M10	M10
	N	3/4-16UNF O-ring	M10×1.25	M10
	R	P,T：M22×1.5　A,B：M18×1.5	M10	M12
	S	P,T：M22×1.5 O-ring　A,B：M18×1.5 O-ring	M10	M12
Other Requirements	Mainly refers to the appearance, paint color etc. specified by agreement; the code will be listed in the agreement.			

TVV1, TVV2, TVV3 Series Hydraulic Steering Control Units (SCU)

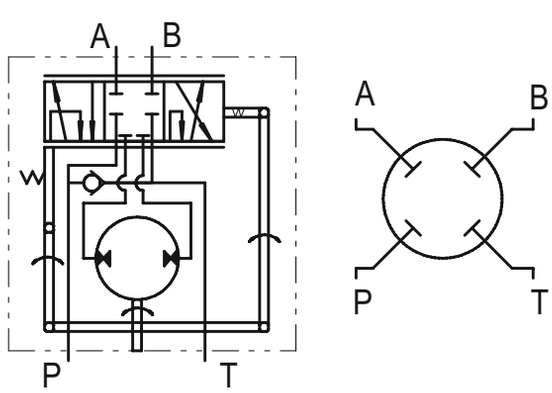
TVV1
Open center non-reaction



TVV2
Open center reaction



TVV3
Closed center non-reaction



TVV1, TVV2, TVV3 Series Hydraulic Steering Control Units (SCU)

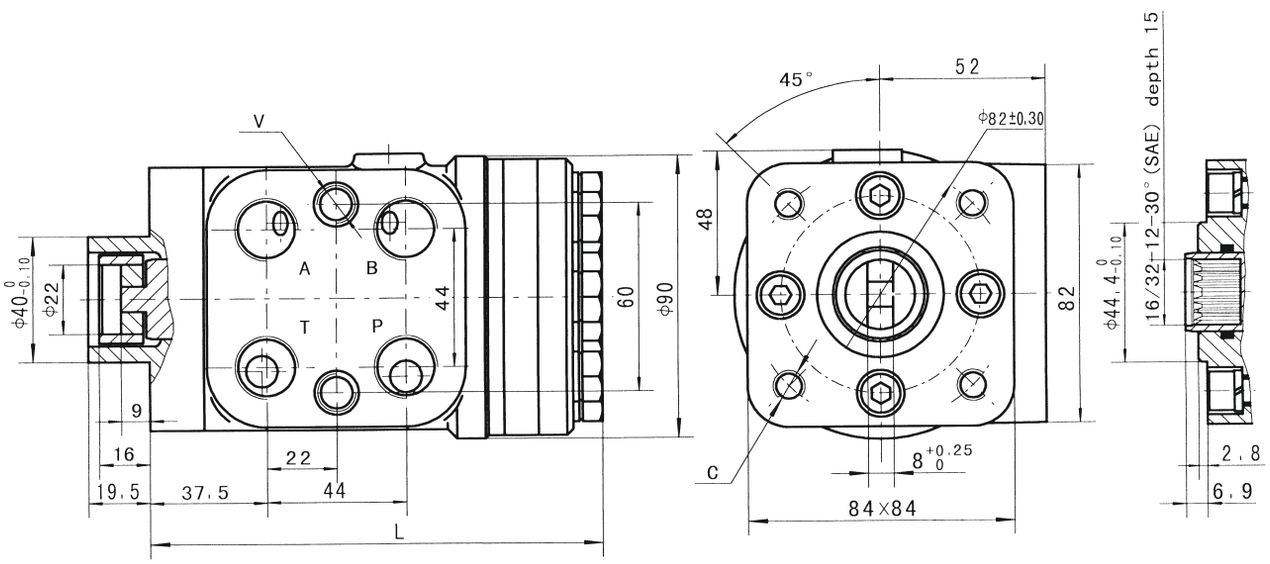
Main Specification

Type	Displacement (mL/r)	Flow (L/min)	Max.input pressure (MPa)	Max. cont. back pressure (Mpa)	Weight (Kg)
TVV□–E50 *	50	4	16	2.5	4.72
TVV□–E63 *	63	5			4.85
TVV□–E80 *	80	6			5.00
TVV□–E100 *	100	7.5			5.27
TVV□–E125 *	125	9.5			5.43
TVV□–E160 *	160	12			5.75
TVV□–E200 *	200	15			6.08
TVV□–E250 *	250	19			6.48
TVV□–E280 *	280	21			6.78
TVV□–E315 *	315	24			7.13
TVV□–E400 *	400	30			7.78
TVV□–E500 *	500	38			8.67
TVV□–E630 *	630	48			9.72
TVV□–E800 *	800	60			11.18
TVV□–E1000 *	1000	75			12.80

Note 1:□represents Function Code, TVV2 can be chosen for SCU with the displacement of 50-200mL/r. TVV1 or TVV3 can be chosen for SCU with the displacement of 50-1000mL/r.
Note 2: “Flow” that we suggest to use is the flow of 1.25 times as much as that at the steering wheel’s rotation speed of 60 r/min. If the design of the system can't meet the requirements, the flow is allowed to be adjusted a little bit.

TVV1, TVV2, TVV3 Series Hydraulic Steering Control Units (SCU)

Unit Dimensions



Short ringed boss Involute spline

Note1: Above is for short ringed boss connection dimension. When dimension is 18, 25, 30.5, instead of 9,16,19.5 long ringed boss connection is available for reference above.
Note 2: please check Page 4 for the port code .
Note3: L is the maximum length dimension of product, this dimension on some products may 2mm or 4mm short.

Type	Length L(mm)
TVV□–E50 *	140
TVV□–E63 *	141
TVV□–E80 *	142.5
TVV□–E100 *	145
TVV□–E125 *	148
TVV□–E160 *	153
TVV□–E200 *	158
TVV□–E250 *	164
TVV□–E280 *	169
TVV□–E315 *	174
TVV□–E400 *	184
TVV□–E500 *	197
TVV□–E630 *	216
TVV□–E800 *	236
TVV□–E1000 *	262

Note : □ represents Function Code,TVV2 can be chosen for SCU with the displacement of 50-200mL/r . TVV1 or TVV3 can be chosen for SCU with the displacement of 50-1000mL/r.

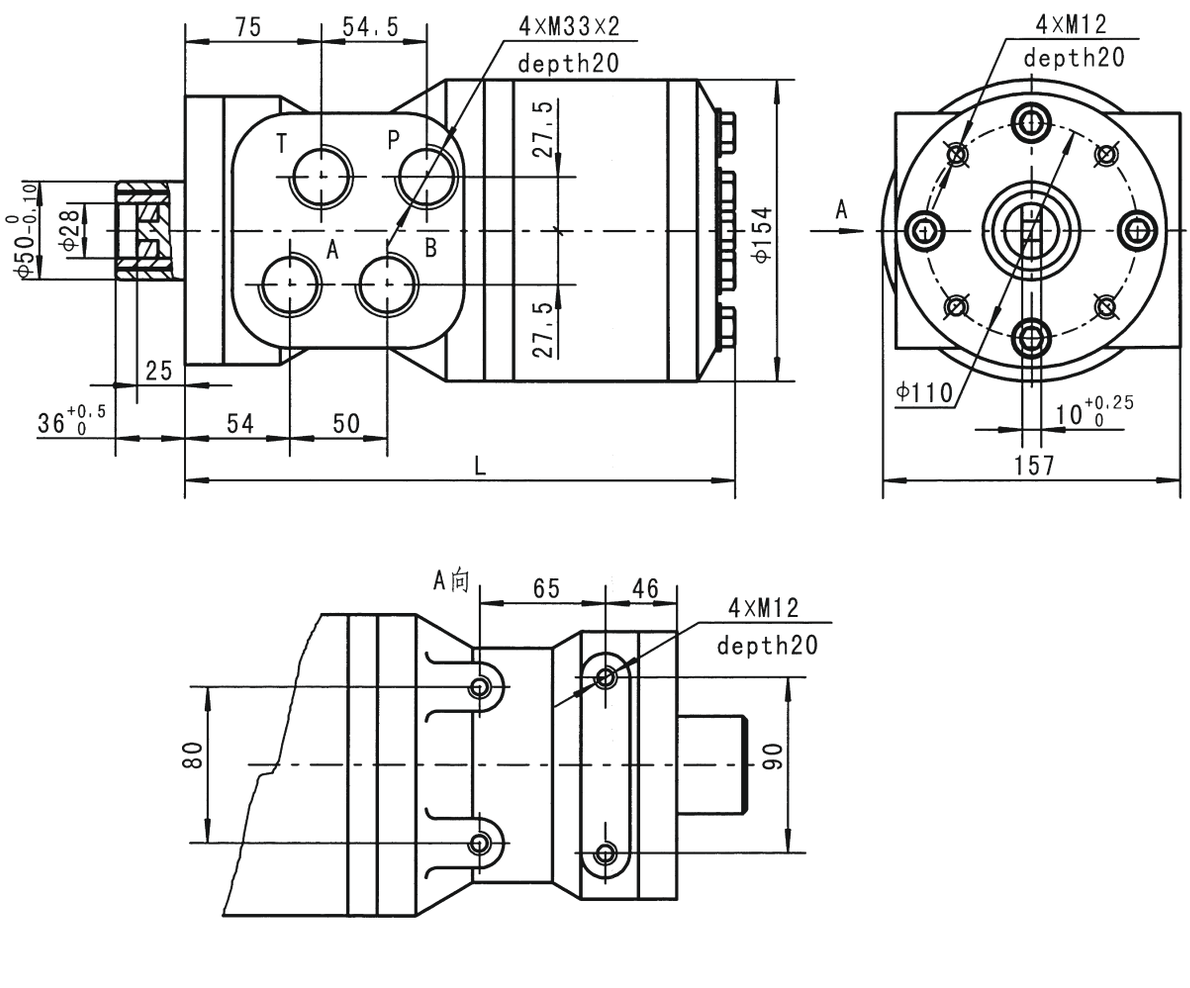
TVV1, TVV3 Series Hydraulic Steering Units (SCU) with Super Displacement

Main Specification

Type	Displacement (mL/r)	Flow (L/min)	Max. input pressure (Mpa)	Max. cont. back pressure (Mpa)	Length L(mm)	Weight (kg)
TVV□–E1000	1000	60	16	2.5	249	24.5
TVV□–E1250	1250	75			261.5	25.5
TVV□–E1600	1600	96			279	27.5
TVV□–E2000	2000	120			299	28.5
TVV□–E2500	2500	150			324	30

Note: represents Function Code, TVV1 & TVV3 can be chosen . please check Page 5 for Function Code explanation.

Unit Dimensions



TVV5 Series Hydraulic Steering Control Units (SCU)

As for load sensing steering system, the steering system and the operational system may use the same pump through the priority valve or the load sensing system can distribute the surplus oil of the steering system into the operational system. Meanwhile, if the pump with load sensing is used , the load sensing will have obviously productive results.
The LS port of the load sensing steering unit has to connect with priority valve or LS port of load sensing pump, so that the signal of the steering load pressure of the steering unit can be transferred to priority valve or load sensing pump through oil hose (we suggest that the length of the hose is ≤2 m), to control the oil volume supplied to steering unit by the control system.

Main Specification

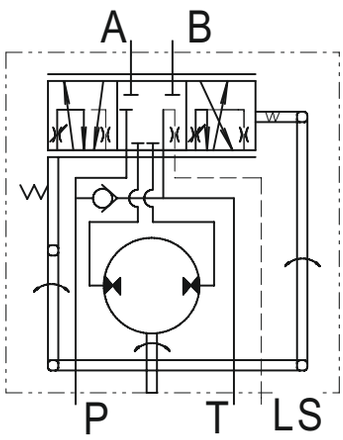
Type	Displacement (mL/r)	Length L(mm)	Max. input speed (rpm)	Max. input pressure (Mpa)	Max. cont. back pressure (Mpa)	Max. power steering torque (Nm)
TVV5 –E50 *	50	140	100	16	1.6	≤5
TVV5 –E63 *	63	141				
TVV5 –E80 *	80	142.5				
TVV5 –E100 *	100	145				
TVV5 –E125 *	125	148				
TVV5 –E160 *	160	153				
TVV5 –E200 *	200	158				
TVV5 –E250 *	250	164				
TVV5 –E280 *	280	169	75			
TVV5 –E315 *	315	174				
TVV5 –E400 *	400	184				
TVV5 –E500 *	500	197	60			
TVV5 –E630 *	630	216				
TVV5 –E800 *	800	236				
TVV5 –E1000 *	1000	262				

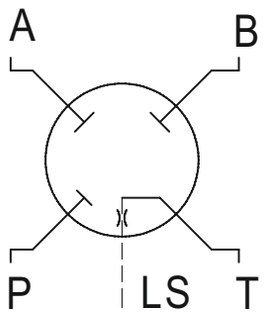
Note1: L is the maximum length dimension of product, this dimension on some products may 2mm or 4mm short.

TVV5 Series Hydraulic Steering Control Units (SCU)

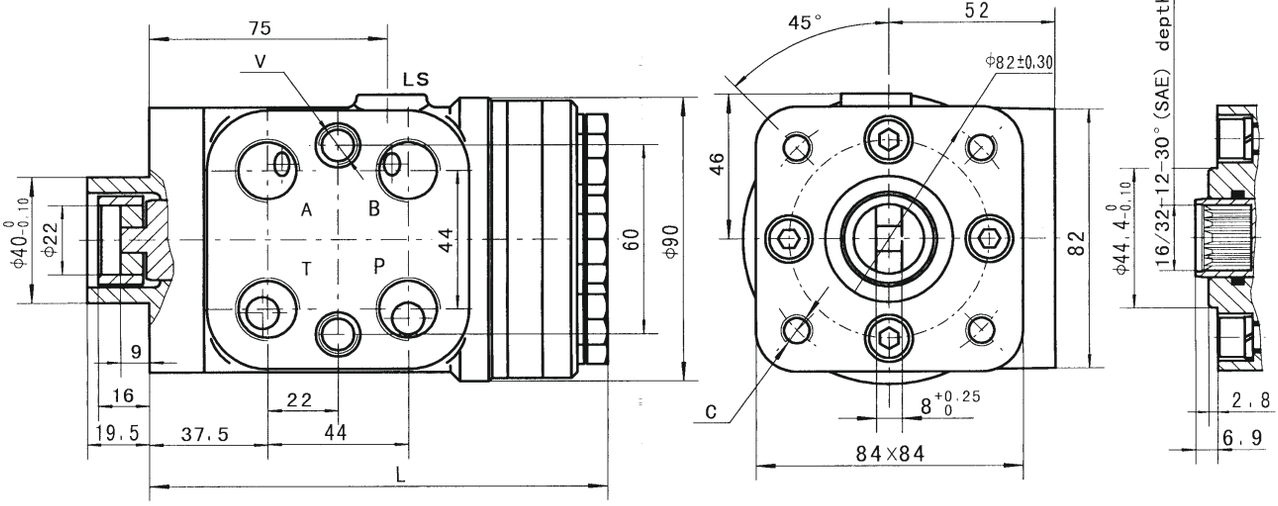
Function code

TVV5
Load sensing





Unit Dimensions



Short ringed boss

Involute spline

TVV5 Series Hydraulic Steering Control Units (SCU)

Ports code

Category	Code	Ports P,T,A,B	Column Mounting C	Valve Mounting V	Port LS
Ports code	(omit)	M20×1.5	M10	M12	M12×1.5
	A	M18×1.5	M10	M12	M12×1.5
	B	G1/2	M10	M10×1	G1/4
	C	3/4-16UNF O-ring	3/8-16UNC	3/8-24UNF	7/16-20UNF O-ring
	D	M20×1.5 O-ring	M10	M12	M12×1.5
	E	M18×1.5 O-ring	M10	M12	M12×1.5
	G	M22×1.5	M10	M12	M12×1.5
	Q	M22×1.5 O-ring	M10	M12	M12×1.5
	U	G1/2 O-ring	M10	M10×1	G1/4 O-ring
	M	3/4-16UNF O-ring	M10	M12	7/16-20UNF O-ring
	I	3/4-16UNF O-ring	M10	M10	7/16-20UNF O-ring
	N	3/4-16UNF O-ring	M10×1.25	M10	7/16-20UNF O-ring
	R	P,T：M22×1.5 A,B：M18×1.5	M10	M12	M12×1.5
	S	P,T：M22×1.5 O-ring A,B：M18×1.5 O-ring	M10	M12	M12×1.5

Note 1: Ports P, T, A, B Depth : 16 mm; Column Mounting C & V Depth: 16 mm;Port LS Depth:12mm.

If the dimension of LS port don't comply with the specifications in the above form, add "—" after the port code and then choose LS code according to the following form.

Ports Code	Port LS
1	M12×1.5 O-ring
3	G1/4
5	7/16-20UNF O-ring
6	G1/4 O-ring
7	M12×1.5

Hydraulic Steering Units T0 Series

Hydraulic Steering Unit T0 series is integral hydraulic steering unit, the valve body of rotary valve is integral structure, then the steering unit can integrate with cartridge valve, such as the pressure control valve of the integral system. Hydraulic Steering Unit T0 series is widely used in the steering control system of different kinds of engineering vehicles, such as the steering system of many kinds of industrial and agricultural mobile machinery forklift, loader, road roller, tractor, combine harvester, and the ship helm etc. The steering unit can control the steering cylinder with bigger resistance force by inputting minor force; It's easier , flexible and reliable; The integral check valve can prevent the system pressure oil from anti-vibration , and prevent from "hit-hand" during the steering operation; Integral pressure control valve can control the operation pressure and the shock pressure of the steering system. The mounting dimensions of Hydraulic Steering Unit T0 series are consistent with the international standard. According to the structure of gerotor set, Hydraulic Steering Unit T0 series can be divided into 2 series: 6/7 teeth structure steering unit and 4/5 teeth structure steering unit.
Hydraulic steering unit with 6/7 teeth structure: according to the size, this series may be divided into T01, T02, T03 series (among these series, the mounting dimension of T02 series is accordance with TVV series). Hydraulic steering unit with 4/5 teeth structure: it's defined as T09 series; according to special requirement of special customers, then we develop T19 and T29 series on the base of T09 series. T0 series SCU integrate inlet check Valve. Each series may be divided into 2 series according to if the steering unit integrating cartridge Valve or not. SCU without valve and SCU with S. SCU without valve doesn't integrate pressure valve,SCU with s integrates pressure valve. As for open center non reaction steering unit,"1" represents the SCU with relief valve and shock valves,"4"represents the SCU with relief valve. Please consult P13 for the introduction of T01 series, T02 and T03 series, while P47 for T09 series.

Ordering code

T0						

Cycloid Rotary Valve Hydraulic Steering Units = T0

Function Code
1st mounting type = 1
2nd mounting type = 2
3nd mounting type = 3
Mini SCU = 9

Code for integral valve
Integral Valve = S
Without Integral valve = omit

Function Code
1:Open center non-reaction = 1
2:Open center reaction = 2
3:Closed center non-reaction = 3
4:Open center non-reaction = 4
5:Load sensing = 5

Displacement

Relief Valve Pressure Settings

Ports Code

T01-1,2,3 Series Hydraulic Steering Control Units (SCU)

Ordering code

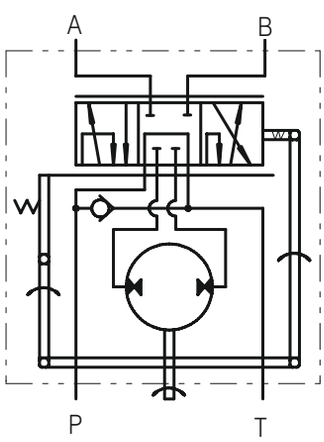
T01 Series Hydraulic Steering Control Units (without integrated valve) = T01

Function Code
Open Center Non-Reaction = 1
Open Center Reaction = 2
Closed Center Non-Reaction = 3

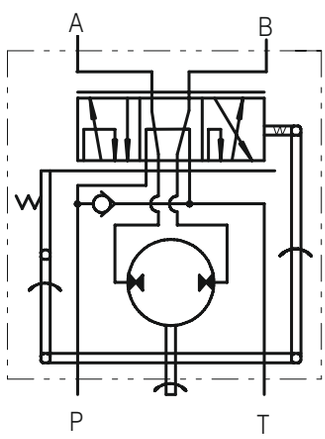
Displacement
50, 63, 80, 100, 125, 160, 200, 250, 280, 315, 400

Ports Code
A, B, C, D, E, U, G, Q, M, F, I, N

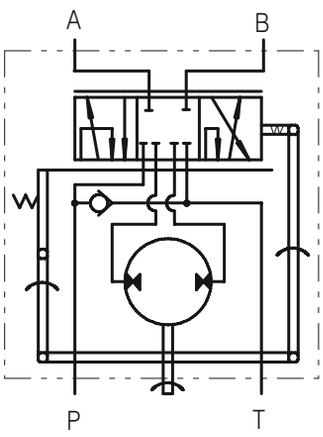
Function Code



T01-1
Open Center Non-Reaction



T01-2
Open Center Reaction



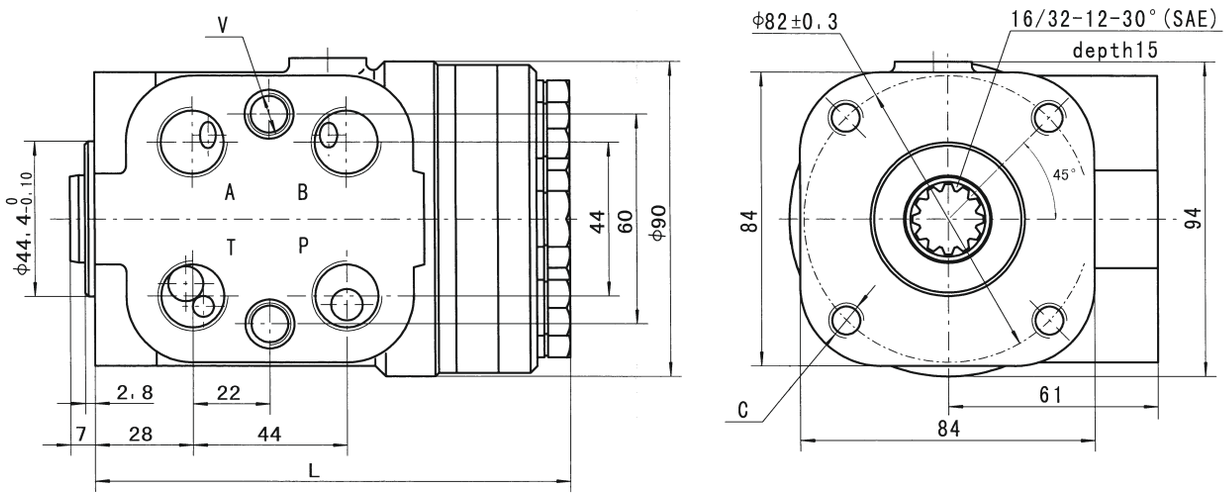
T01-3
Closed Center Non-Reaction

T01-1,2,3 Series Hydraulic Steering Control Units (SCU)

Parameters	Type T01-*-***-*										
Function Code	1,2,3							1, 3			
Displacement(mL/r)	50	63	80	100	125	160	200	250	280	315	400
Rated flow (L/min)	5	6	8	10	12.5	16	20	25	28	31.5	40
Max. input pressure (Mpa)	17.5										
Max. cont. back pressure (Mpa)	2.5										
Weight (kg)	5.70	5.76	5.84	5.91	6.05	6.25	6.45	6.68	6.86	7.06	7.45
Dimension L (mm)	130	132	133	136	139	144	149	155	160	165	175

Note: L is the maximum length dimension of product. This dimension on some products may 2mm or 4mm shorter.

Mounting data



Port Threads

Code	Ports P,T,A,B	Column Mounting C	Valve Mounting V
A	M20×1.5	M10	M12
B	M20×1.5 O-ring		
C	M18×1.5		
D	M18×1.5 O-ring		
E	G1/2		M10x1
U	G1/2 O-ring		
G	M22×1.5		M12
Q	M22×1.5 O-ring		
M	3/4-16UNF O-ring		
F		3/8-16 UNC	3/8-24 UNF
I		M10	M10
N		M10×1.25	

Note 1: Ports P,T,A,B Depth : 15 mm; Column Mounting C & V Depth: 16 mm.
Note 2: The code of other ports dimensions will be listed in an agreement.

T01S-1,2,4 Series Hydraulic Steering Control Units (SCU)

SCU T01S-1,2,4 series inherits the steering function of T01 series both in the structure and in the principle. The feature of T01S series is to have the following valves functions incorporated inside one housing as follows: the relief valve, the shock valves, the suction valves and the check valve according to the different requirement upon the base of the T01 series . This kind of structure is more compact, and it's more convenient in operation.

Ordering code

T01 Series Hydraulic Steering Control Units (with integrated valve) = T01S

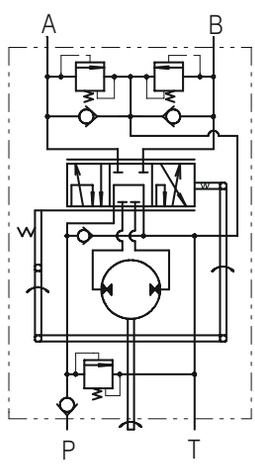
Function Code
Open Center Non-Reaction = 1
Open Center Reaction = 2
Closed Center Non-Reaction = 3

Displacement
50, 63, 80, 100, 125, 160, 200, 250, 280, 315, 400

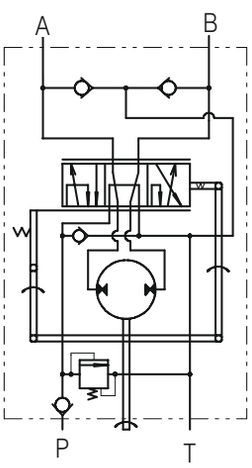
Integrated Valve Parameter
Relief valve pressure settings (MPa):06, 07, 08, 10, 12, 14, 15, 16, 17.5
Shock valves pressure settings is 6 MPa higher than relief valve

Ports Code
A, B, C, D, E, U, G, Q, M, F, I, N

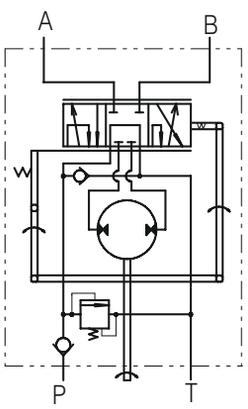
Function Code



T01S-1
Open Center Non-Reaction



T01S-2
Open Center Reaction



T01S-4
Open Center Non-Reaction

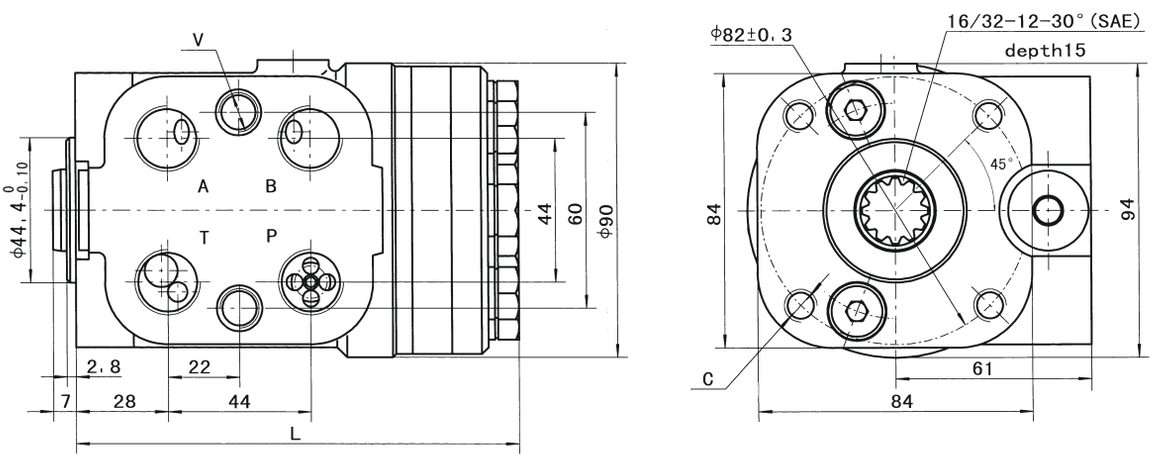
T01S-1,2,4 Series Hydraulic Steering Control Units (SCU)

Main Specifications

Parameters	Type T01S-*-***-*										
Function Code	1,2,4							1, 4			
Displacement(mL/r)	50	63	80	100	125	160	200	250	280	315	400
Rated flow (L/min)	5	6	8	10	12.5	16	20	25	28	31.5	40
Max. input pressure (Mpa)	17.5										
Relief Valve Pressure Settings (Mpa)	06, 07, 08, 10, 12, 14, 15, 16, 17.5										
Shock Valves Pressure Settings (Mpa)	12, 13, 14, 16, 18, 20, 21, 22, 23.5										
Max. cont. back pressure (Mpa)	2.5										
Weight (kg)	5.75	5.81	5.89	5.96	6.1	6.3	6.5	6.73	6.91	7.1	7.5
Dimension L (mm)	130	132	133	136	139	144	149	155	160	165	175

Note: L is the maximum length dimension of product. This dimension on some products may 2mm or 4mm shorter.

Mounting Data



Ports details

Code	Ports P,T,A,B	Column Mounting C	Valve Mounting V
A	M20×1.5	M10	M12
B	M20×1.5 O-ring		
C	M18×1.5		
D	M18×1.5 O-ring		
E	G1/2		M10x1
U	G1/2 O-ring		
M	3/4-16UNF O-ring		M12
F		3/8-16 UNC	3/8-24 UNF
I		M10	M10
N		M10×1.25	

Note 1: Ports P,T,A,B Depth : 15 mm; Column Mounting C & V Depth: 16 mm.
Note 2: The code of other ports dimensions will be listed in an agreement.

T01(S)-5(T)(TE)(L)(E)(TX) Series Hydraulic Steering Control Units(SCU)

SCU T01(S)-5(T)(TE)(L)(E)(TX) series is used in the load sensing steering system.
SCU T01S-5,T01S-5L,T01S-5E series adopt modulary mounting type and can only be used with PVF* type priority valve via modulary mounting.
SCU T01S-5L series guides the pressure signal of port LS out of prot LL, and transfers the pressure signal to the electrical control system.
SCU T01S-5E series guides the pressure signal of port A or B out of port EL, and then supplies the pressure signal to the electrical control system.
SCU T01S-5T,T01S-5TE series adopts Pipe mounting and via pipe mounting can be used with PVL* or DYXL,YXL type priority valve.
SCU T01S-5TE series guides the pressure signal of the port A or B out of port EL.and then supplies the pressure signal to the electrical control system.
SCU T01-5T series adopts the pipe mounting, it can be used only after the pipe mounted with the DYXL,YXL type priority valve, and the relief valve is integrated in the priority valve. When the T01-5TX series SCU is in neutral position, both of its left and right cavity are connected with T port. This kind of SCU are used with LFA,LFB type flow amplifiers.

Ordering Code T01-5T

T01	5T		

T01 Series Hydraulic Steering Control Units (without integrated valve) = T01

Load Sensing, Pipe mounting = 5T

Displacement
50, 63, 80, 100, 125, 160, 200, 250, 280, 315, 400

Ports Code
A, B, C, D, E, U, M, F, I, N

Ordering Code T01-5TX

T01	5T	X		

T01 Series Hydraulic Steering Control Units (without integrated valve) = T01

Load Sensing, Pipe mounting = 5T

When the T01-5TX series SCU is in neutral position, both of its left and right cavity are connected with T port = X

Displacement
50, 63, 80, 100, 125, 160, 200, 250, 280, 315, 400

Ports Code
A, B, C, D, E, U, M, F, I, N

T01(S)-5(T)(TE)(L)(E)(TX) Series Hydraulic Steering Control Units(SCU)

Ordering code

T01S						

T01 Series Hydraulic Steering Control Units (with integrated valve) = T01S

Load Sensing type = 5

Priority valve connection
Modulary mounting = No code
Pipe mounting = T

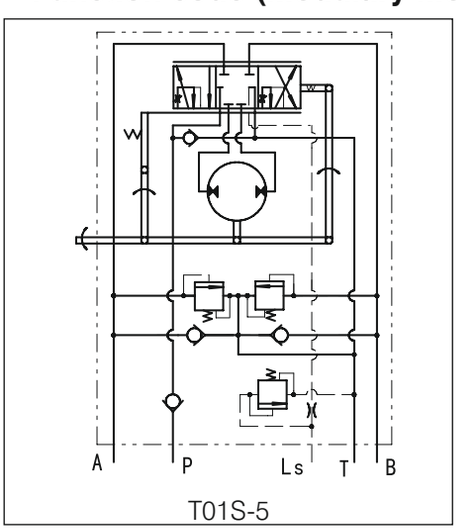
Electrohydraulic control signal connection
No electrohydraulic signal = No code
The pressure signal at LS connection drawn forth from the LL connection = L
The pressure signal at the port A or B drawn forth from EL connection = E

Displacement
50, 63, 80, 100, 125, 160, 200, 250, 280, 315, 400

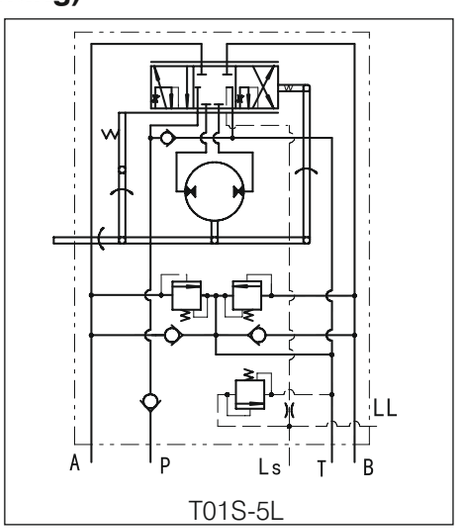
Integrated Valve Parameter
Relief valve pressure settings (MPa):06, 07, 08, 10, 12, 14, 15, 16, 17.5
Shock valves pressure settings is 6 MPa higher than relief valve

Ports Code
A, B, C, D, E, U, M, F, I, N, H

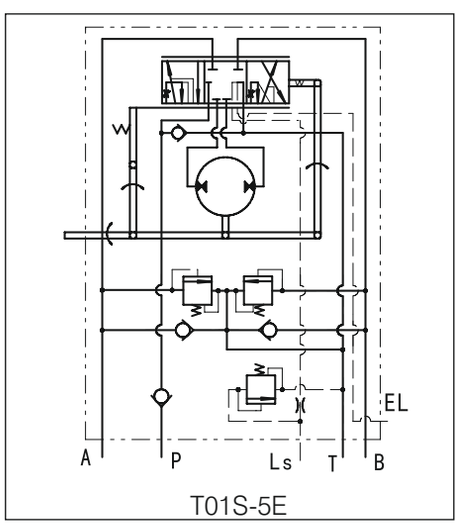
Function code (Modulary Mounting)



T01S-5

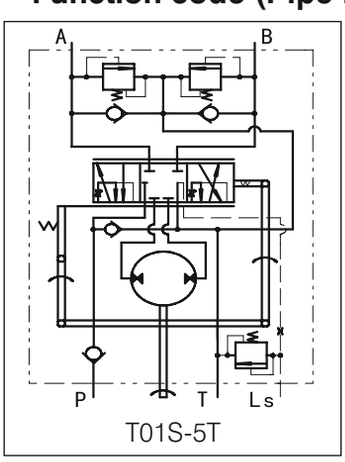


T01S-5L

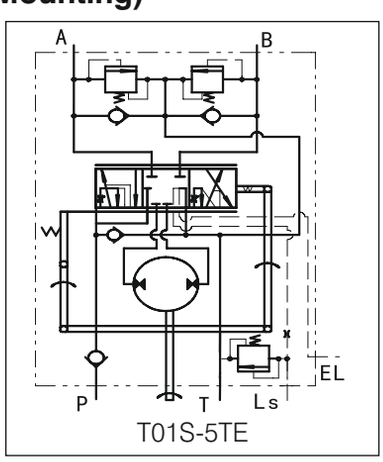


T01S-5E

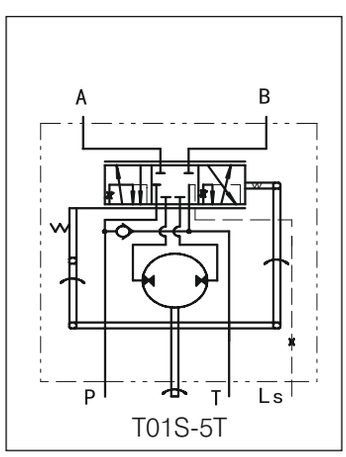
Function code (Pipe Mounting)



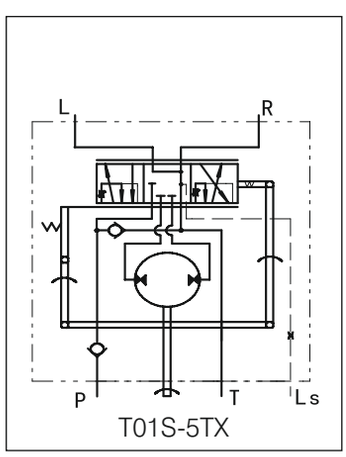
T01S-5T



T01S-5TE



T01S-5T



T01S-5TX

T01(S)-5(T)(TE)(L)(E)(TX) Series Hydraulic Steering Control Units(SCU)

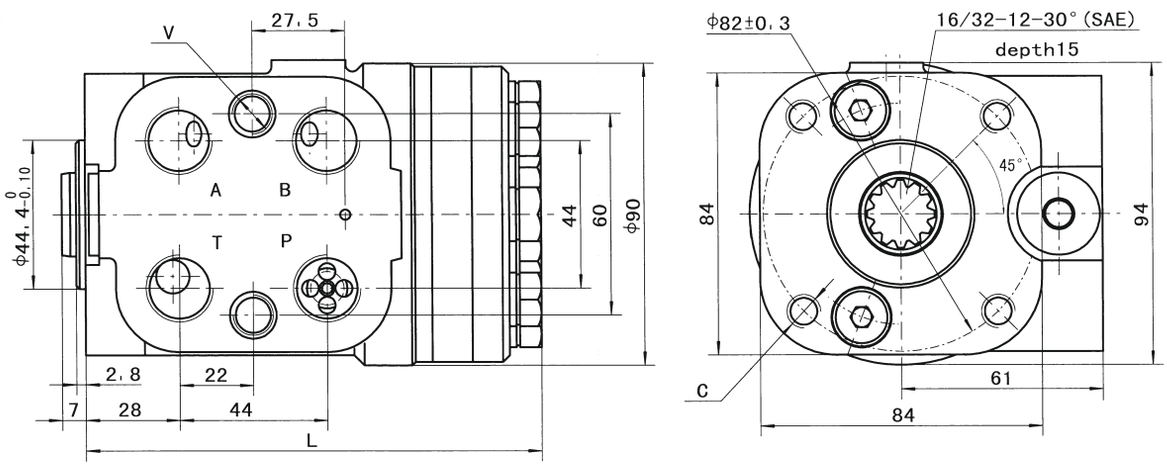
Main Specifications

Parameters	Type T01-5T(TX)-***-*, T01S-5(T)(TE)(L)(E)-***-**-*										
Displacement(mL/r)	50	63	80	100	125	160	200	250	280	315	400
Max. input speed (rpm)	100								75		
Max. input pressure (Mpa)	17.5										
Relief Valve Pressure Settings (Mpa)	06, 07, 08, 10, 12, 14, 15, 16, 17.5										
Shock Valves Pressure Settings (Mpa)	12, 13, 14, 16, 18, 20, 21, 22, 23.5										
Max. cont. back pressure (Mpa)	2.5										
Weight (kg)	5.75	5.81	5.89	5.93	6.1	6.3	6.5	6.73	6.91	7.1	7.5
Dimension L (mm)	130	132	133	136	139	144	149	155	160	165	175

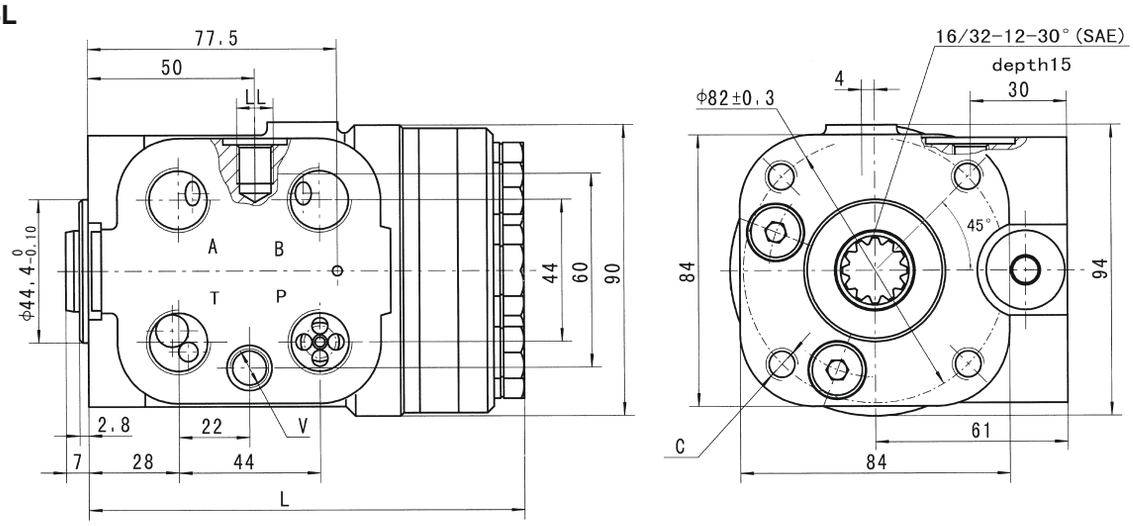
Note: L is the maximum length dimension of product. This dimension on some products may 2mm or 4mm shorter.

Mounting data

T01S-5



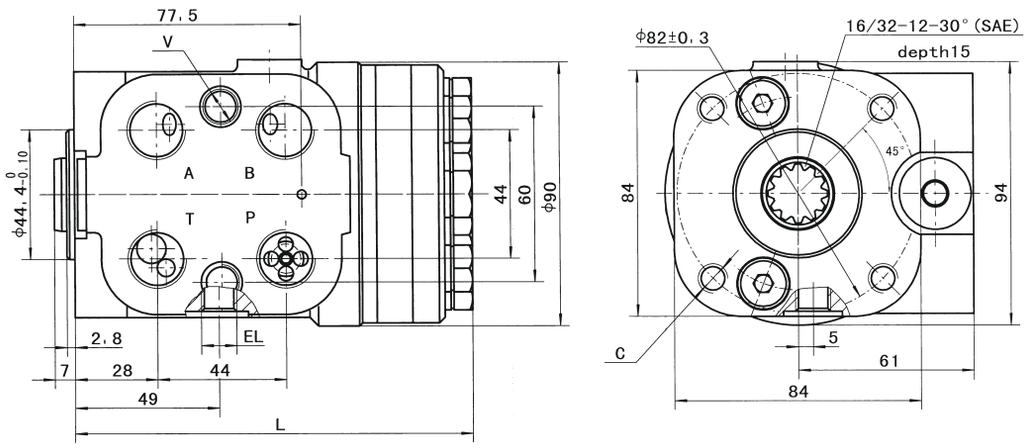
T01S-5L



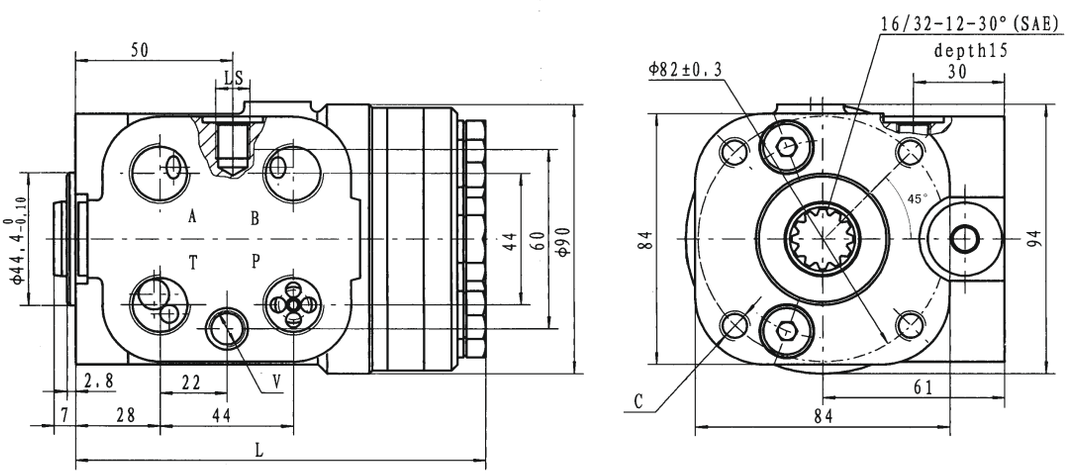
T01(S)-5(T)(TE)(L)(E)(TX) Series Hydraulic Steering Control Units(SCU)

Mounting data

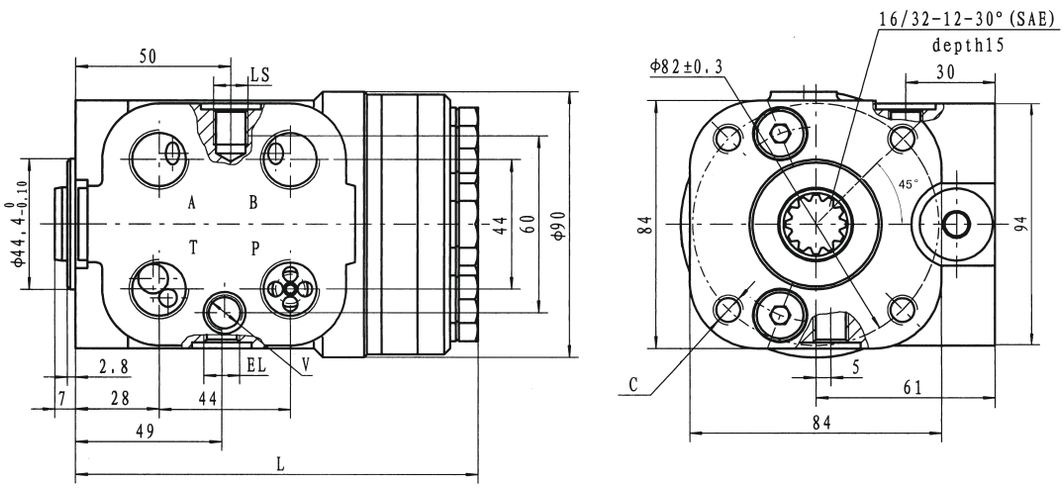
T01S-5E



T01S-5T



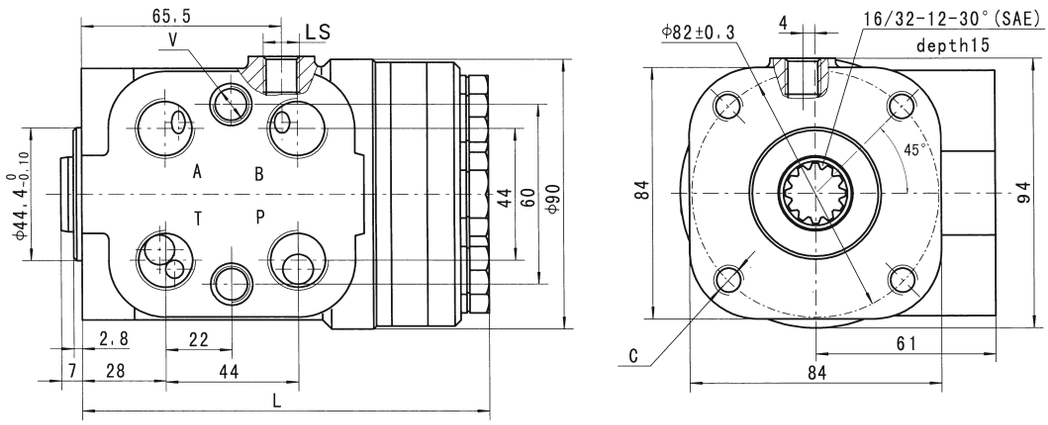
T01S-5TE



T01(S)-5(T)(TE)(L)(E)(TX) Series Hydraulic Steering Control Units(SCU)

Mounting data

T01S-5E



Port Details

Code	Ports P,T,A,B	Column Mounting C	Column Mounting V	Post LS	Post LL, EL
A	M20×1.5	M10	M12	M12×1.5	
B	M20×1.5 O-ring			M12×1.5 O-ring	
C	M18×1.5			M12×1.5	
D	M18×1.5 O-ring			M12×1.5 O-ring	
E	G1/2		M10x1	G1/4	M10×1
U	G1/2 O-ring			G1/4 O-ring	M10×1 O-ring
M	3/4-16UNF O-ring		M12	7/16-20UNF O-ring	
F		3/8-16 UNC	3/8-24 UNF		
I		M10	M10		
N		M10×1.25			
H	Ø18.5	M10	M10	M12×1.5	

Note 1: Ports P,T,A,B Depth : 15 mm; Column Mounting C & V Depth: 16 mm, LS,LL,EL Depth: 12 mm
Note 2: The code of other ports dimensions will be listed in an agreement.

T02-1,2,3 Series Hydraulic Steering Control Units (SCU)

SCU T02-1,2,3 series have the same dimension as TVV series on flange and ports, but different connection compared with T01 series

Ordering code

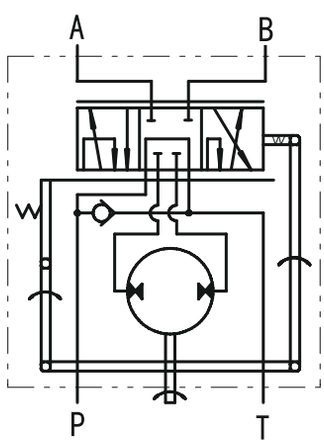
T02 Series Hydraulic Steering Control Units (without integrated valve) = T02

Function Code
Open Center Non-Reaction = 1
Open Center Reaction = 2
Closed Center Non-Reaction = 3

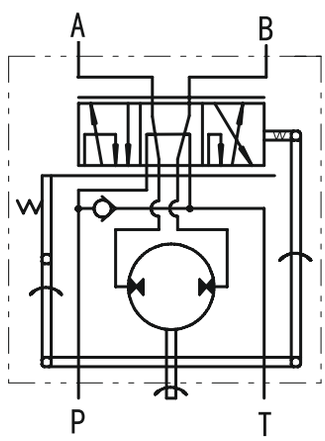
Displacement
50, 63, 80, 100, 125, 160, 200, 250, 280, 315, 400

Ports Code
A, B, C, D, E, F, U, G, Q, M, N, I

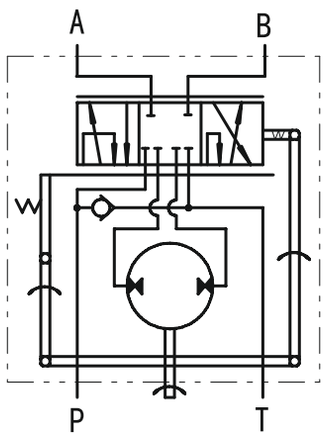
Function code



T02-1
Open center Non-Reaction



T02-2
Open center Reaction



T02-3
Closed center Non-Reaction

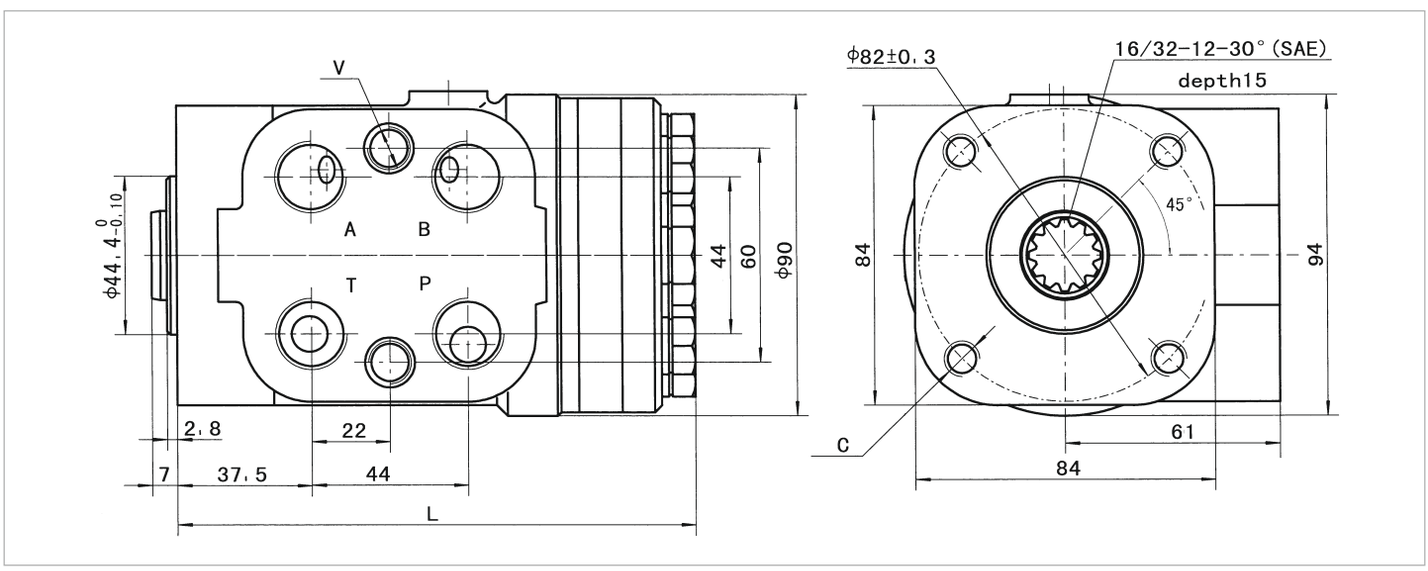
T02-1,2,3 Series Hydraulic Steering Control Units (SCU)

Main Specifications

Parameters	Type T02-*-***-*										
Function Code	1,2,3							1, 3			
Displacement(mL/r)	50	63	80	100	125	160	200	250	280	315	400
Rated flow (L/min)	5	6	8	10	12.5	16	20	25	28	31.5	40
Max. input pressure (Mpa)	17.5										
Max. cont. back pressure (Mpa)	2.5										
Weight (kg)	5.94	6.0	6.08	6.18	6.3	6.5	6.7	6.9	7.1	7.29	7.79
Dimension L (mm)	140	141	143	145	148	153	158	164	169	174	184

Note: L is the maximum length dimension of product. This dimension on some products may 2mm or 4mm shorter.

Mounting Data



Ports Threads

Code	Ports P,T,A,B	Column Mounting C	Valve Mounting V
A	M20×1.5	M10	M12
B	M20×1.5 O-ring		
C	M18×1.5		
D	M18×1.5 O-ring		
E	G1/2		M10x1
U	G1/2 O-ring		
G	M22×1.5		M12
Q	M22×1.5 O-ring		
M	3/4-16UNF O-ring		
F		3/8-16 UNC	3/8-24 UNF
I		M10	M10
N		M10×1.25	

Note 1: Ports P,T,A,B Depth : 15 mm; Column Mounting C & V Depth: 16 mm.
Note 2: The code of other ports dimensions will be listed in an agreement.

T02S-1,2,4 Series Hydraulic Steering Control Units (SCU)

T02S-1,2,4 series hydraulic steering control unit inherit the function of T02 series both in its structure and working principle. On the basis feature of T02 series SCU, T02S series SCU is to incorporate the relief valve,shock valves, suction valves and the inlet check valve inside the housing of SCU according to different requirement. This kind of structure is more compact with easier operation.
The dimension of T02S-1,2,4 series such as port and flang is as the same as TVV series SCU, but different from T01 series SCU in connection dimensions

Ordering code

T01 Series Hydraulic Steering Control Units (with integrated valve) = T02S

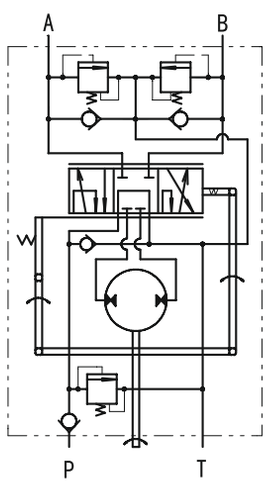
Function Code
Open Center Non-Reaction = 1
Open Center Reaction = 2
Closed Center Non-Reaction = 4

Displacement
50, 63, 80, 100, 125, 160, 200, 250, 280, 315, 400

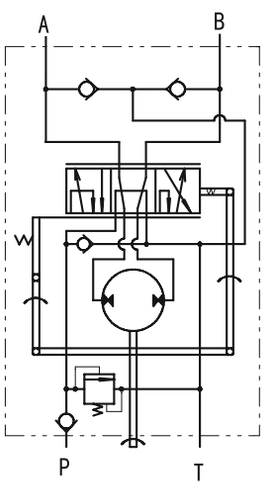
Integrated Valve Parameter
Relief valve pressure settings (MPa):06, 07, 08, 10, 12, 14, 15, 16, 17.5
Shock valves pressure settings is 6 MPa higher than relief valve

Ports Code
A, B, C, D, E, U, M, F, I, N

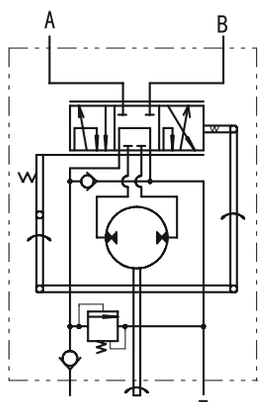
Function code



T02S-1
Open center Non-Reaction



T02S-2
Open center Reaction



T02S-4
Closed center Non-Reaction

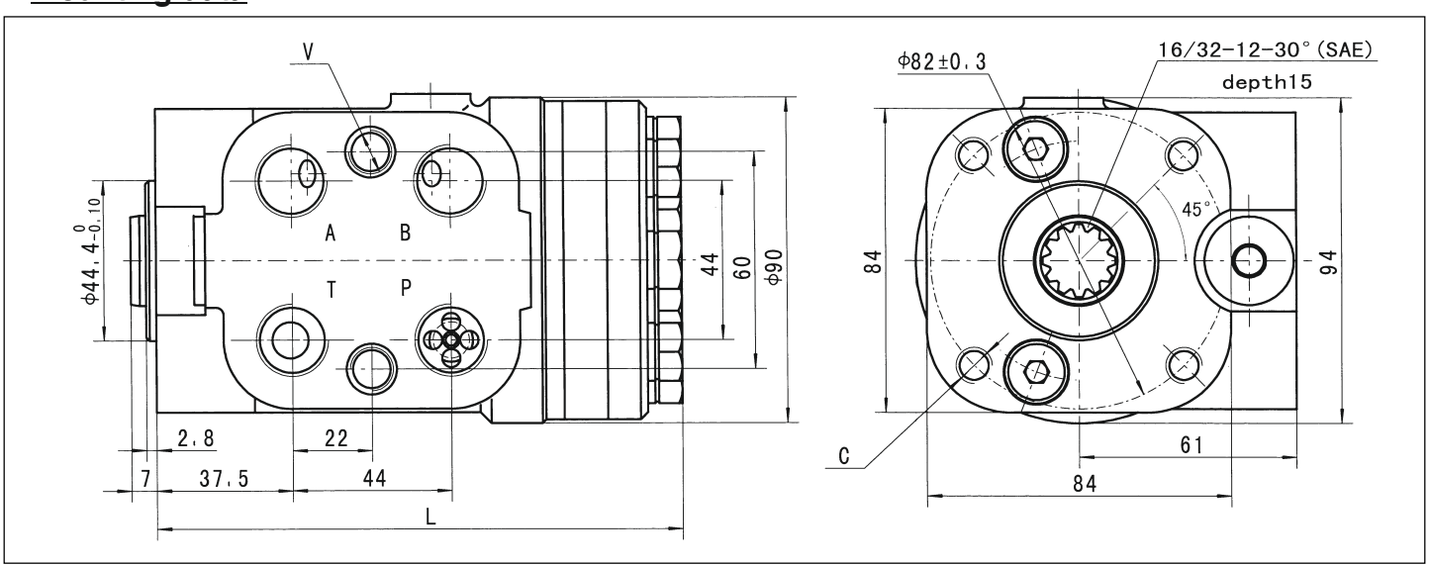
T02S-1,2,4 Series Hydraulic Steering Control Units (SCU)

Main Specifications

Parameters	Type T02S-*-***-*										
Function Code	1,2,4							1, 4			
Displacement(mL/r)	50	63	80	100	125	160	200	250	280	315	400
Rated flow (L/min)	5	6	8	10	12.5	16	20	25	28	31.5	40
Max. input pressure (Mpa)	17.5										
Relief Valve Pressure Settings (Mpa)	06, 07, 08, 10, 12, 14, 15, 16, 17.5										
Shock Valves Pressure Settings (Mpa)	12, 13, 14, 16, 18, 20, 21, 22, 23.5										
Max. cont. back pressure (Mpa)	2.5										
Weight (kg)	6.04	6.09	6.18	6.27	6.4	6.6	6.79	7.02	7.2	7.39	7.89
Dimension L (mm)	140	141	143	145	148	153	158	164	169	174	184

Note: L is the maximum length dimension of product. This dimension on some products may 2mm or 4mm shorter.

Mounting data



Ports details

Code	Ports P,T,A,B	Column Mounting C	Valve Mounting V
A	M20×1.5	M10	M12
B	M20×1.5 O-ring		
C	M18×1.5		
D	M18×1.5 O-ring		
E	G1/2		M10x1
U	G1/2 O-ring		
M	3/4-16UNF O-ring		M12
F		3/8-16 UNC	3/8-24 UNF
I		M10	M10
N		M10×1.25	

Note 1: Ports P,T,A,B Depth : 15 mm; Column Mounting C & V Depth: 16 mm.
Note 2: The code of other ports dimensions will be listed in an agreement.

T02(S)-5(T)(TE)(L)(E) Series Hydraulic Steering Control Units(SCU)

SCU 102(S)-5(T)(TE)(L)(E) series is used in the load sensing steering system.
SCU 102S-5,102S-5L,102S-5E series adopt modulary mounting type and can only be used with PVF* type priority valve via modulary mounting.
SCU 102S-5L series guides the pressure signal of port LS out of prot LL, and transfers the pressure signal to the electrical control system.
SCU 102S-5E series guides the pressure signal of port A or B out of port EL,and then supplies the pressure signal to the electrical control system.
SCU 102S-5T,102S-5TE series adopts the Pipe mounting and via pipe mounting can be used with PVL* or DYXL,YXL type priority valve.
SCU 102S-5TE series guides the pressure signal of the port A or B out of port EL, and then supplies the pressure signal to the electrical control system.
SCU 102-5T series adopts the pipe mounting, it can be used only after the pipe mounted with the DYXL,YXL type priority valve, and the relief valve is integrated in the priority valve.

Ordering Code T01-5T

T02	5T		

T02 Series Hydraulic Steering Control Units (without integrated valve) = T02

Load Sensing, Pipe mounting = 5T

Displacement
50, 63, 80, 100, 125, 160, 200, 250, 280, 315, 400

Ports Code
A, B, C, D, E, U, M, F, I, N

Ordering Code T02(S)-5(T)(TE)(L)(E)

T02S						

T02 Series Hydraulic Steering Control Units (with integrated valve) = T02S

Load Sensing type = 5

Priority valve connection
Modulary mounting = No code
Pipe mounting = T

Electrohydraulic control signal connection
No electrohydraulic signal = No code
The pressure signal at LS connection drawn forth from the LL connection = L
The pressure signal at the port A or B drawn forth from EL connection = E

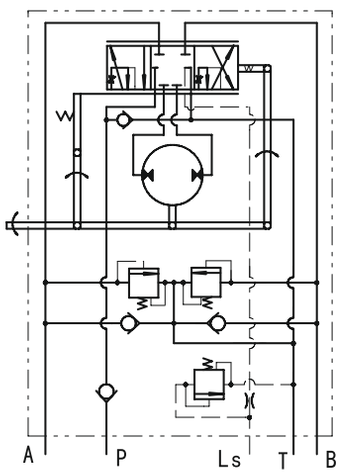
Displacement
50, 63, 80, 100, 125, 160, 200, 50, 280, 315, 400

Integrated Valve Parameter
Relief valve pressure settings (MPa):06, 07, 08, 10, 12, 14, 15, 16, 17.5
Shock valves pressure settings is 6 MPa higher than relief valve

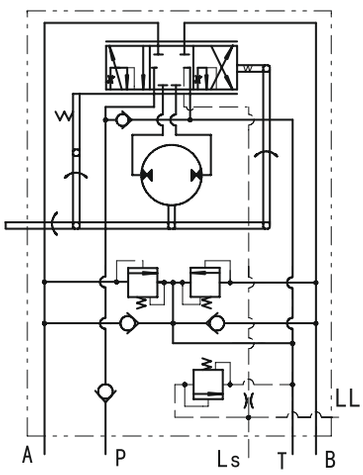
Ports Code
A, B, C, D, E, U, W, M, F, I, N, H

T02(S)-5(T)(TE)(L)(E) Series Hydraulic Steering Control Units(SCU)

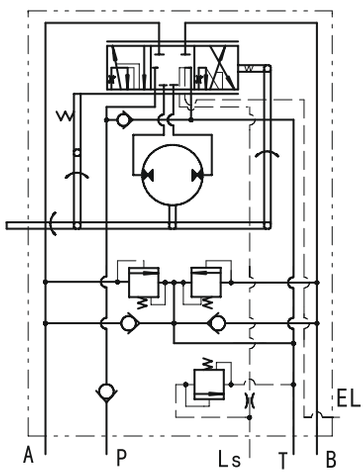
Function Code (Modulary Mounting)



T102S-5

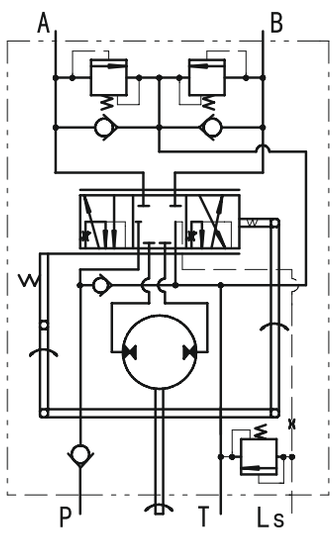


T102S-5L

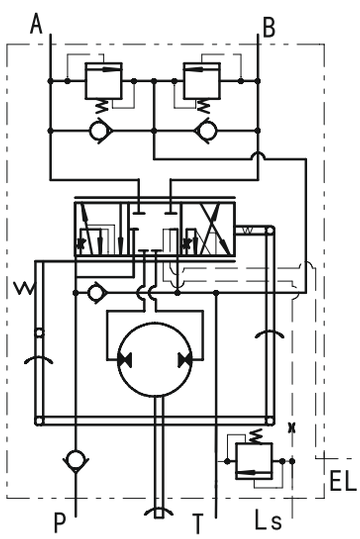


T102S-5E

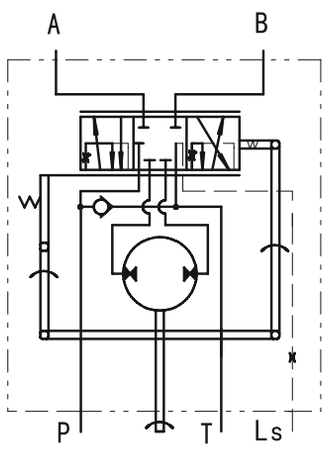
Function Code (Pipe Mounting)



T102S-5T



T102S-5TE



T102-5T

T02(S)-5(T)(TE)(L)(E) Series Hydraulic Steering Control Units(SCU)

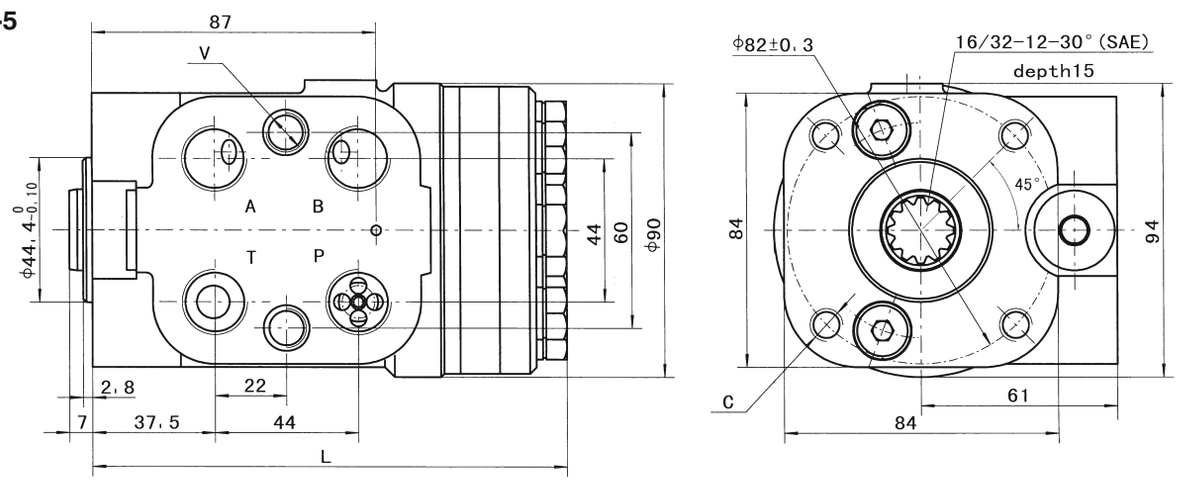
Main Specifications

Parameters	ype 102-5T-***-*, 102S-5(T)(TE)(L)(E)-***-**-*										
Displacement(mL/r)	50	63	80	100	125	160	200	250	280	315	400
Max. input speed (rpm)	100								75		
Max. input pressure (Mpa)	17.5										
Relief Valve Pressure Settings (Mpa)	06, 07, 08, 10, 12, 14, 15, 16, 17.5										
Shock Valves Pressure Settings (Mpa)	12, 13, 14, 16, 18, 20, 21, 22, 23.5										
Max. cont. back pressure (Mpa)	2.5										
Weight (kg)	6.04	6.09	6.18	6.27	6.4	6.6	6.79	7.02	7.2	7.39	7.89
Dimension L (mm)	140	141	143	145	148	153	158	164	169	174	184

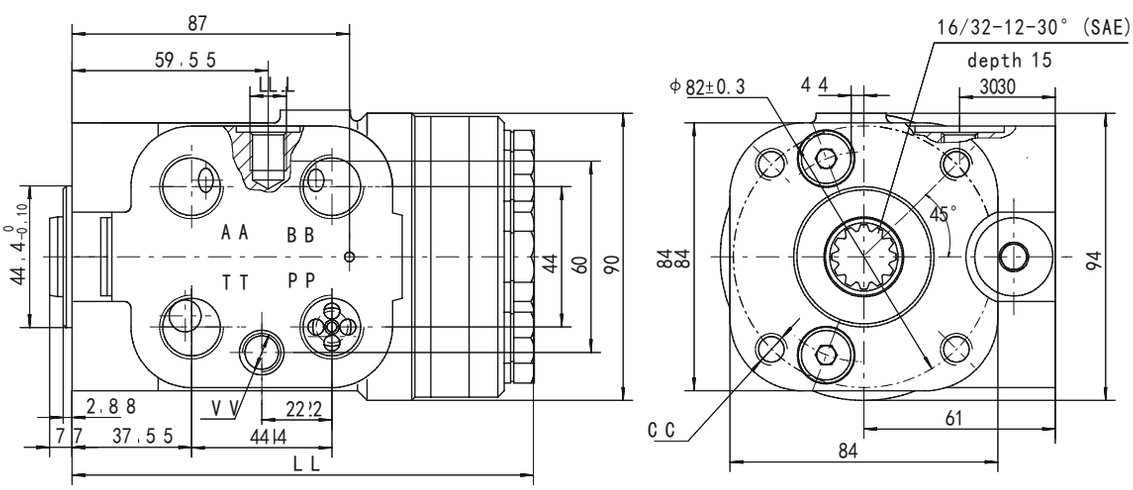
Note: L is the maximum length dimension of product. This dimension on some products may 2mm or 4mm shorter.

Mounting data

T02S-5



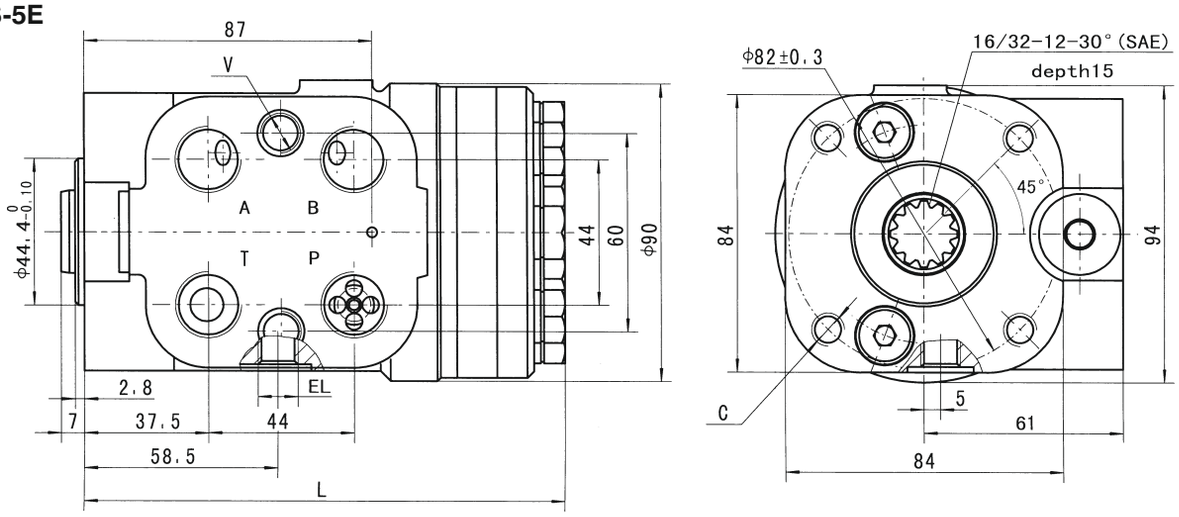
102S-5L



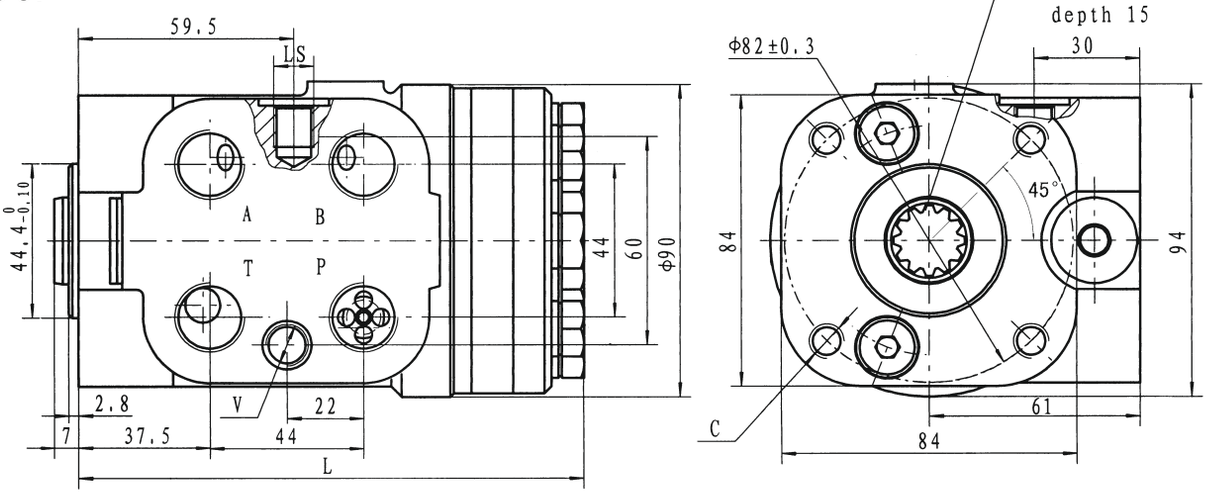
T02(S)-5(T)(TE)(L)(E) Series Hydraulic Steering Control Units(SCU)

Mounting Data

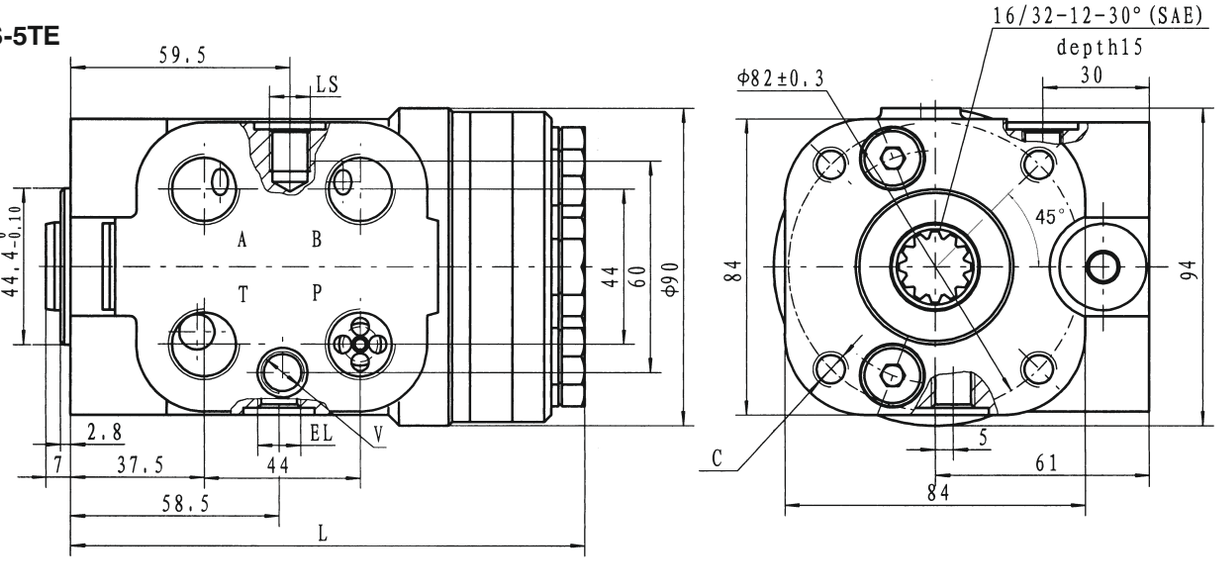
T02S-5E



T02S-5T



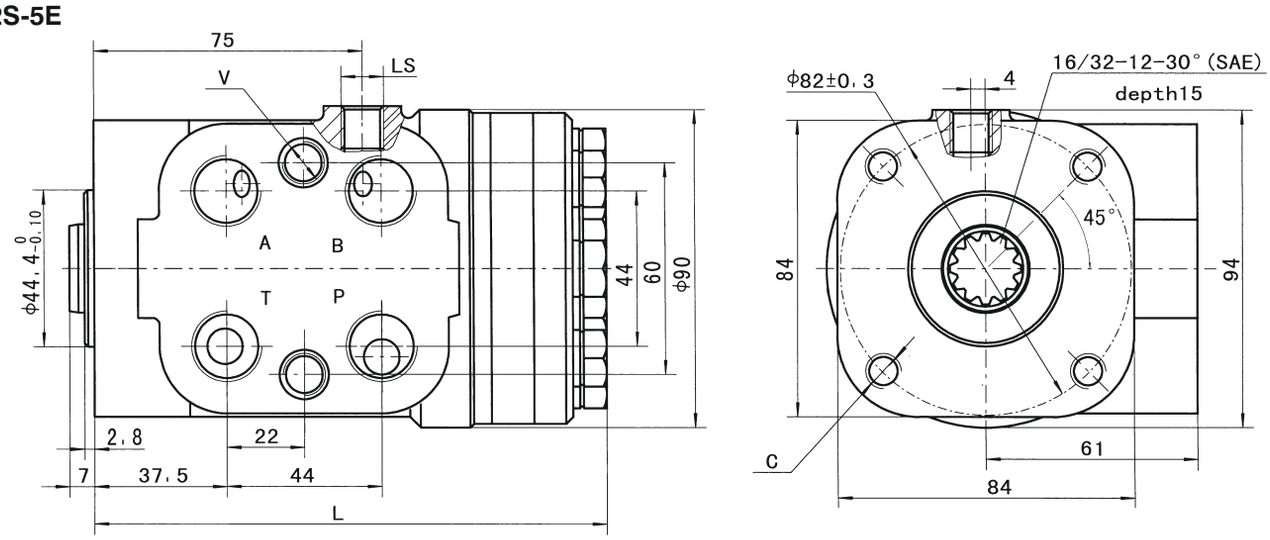
T02S-5TE



T02(S)-5(T)(TE)(L)(E) Series Hydraulic Steering Control Units(SCU)

Mounting Data

T02S-5E



Port Details

Code	Ports P,T,A,B	Column Mounting C	Column Mounting V	Post LS	Post LL, EL
A	M20×1.5	M10	M12	M12×1.5	
B	M20×1.5 O-ring			M12×1.5 O-ring	
C	M18×1.5			M12×1.5	
D	M18×1.5 O-ring			M12×1.5 O-ring	
E	G1/2		M10x1	G1/4	M10×1
U	G1/2 O-ring			G1/4 O-ring	M10×1 O-ring
M	3/4-16UNF O-ring		M12	7/16-20UNF O-ring	
F		3/8-16 UNC	3/8-24 UNF		
I		M10	M10		
N		M10×1.25			
H	Ø18.5	M10	M10	M12×1.5	

Note 1: Ports P, T, A, B Depth : 15 mm; Column Mounting C & V Depth: 16 mm, LS,LL,EL Depth: 12 mm
Note 2: The code of other ports dimensions will be listed in an agreement.

T03-1 Series Hydraulic Steering Control Units(SCU)

The structure of T03-1 series Hydraulic SCU is more compact and its connection dimension conforms to the international standard, while it is different from T01 and T02 series which are suitable for assembly in the narrow space. It's widely used in the low-speed vehicles, steering control system, such as forklift, tractor, combined harvester, engineering or road construction machinery, and the marine rudder, etc. It can obtain more powerful output steering force through the input force and it operates easily, flexibly and reliably.

Ordering code

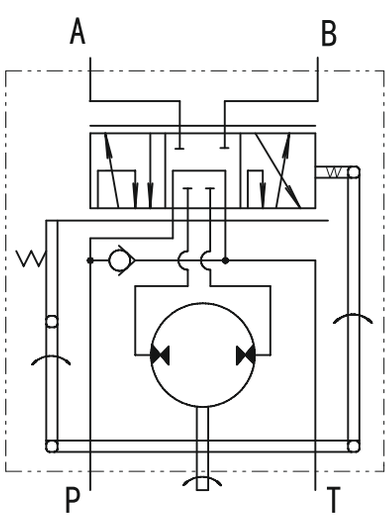
T03-1 Series Hydraulic Steering Control Units = T03

Function Code
Open Center Non-Reaction = 1

Displacement
50, 63, 80, 100, 125, 160, 200, 250

Ports Code
A, B, C, D, F, M, I, N

Function Code



T03-1
Open Center Non-Reaction

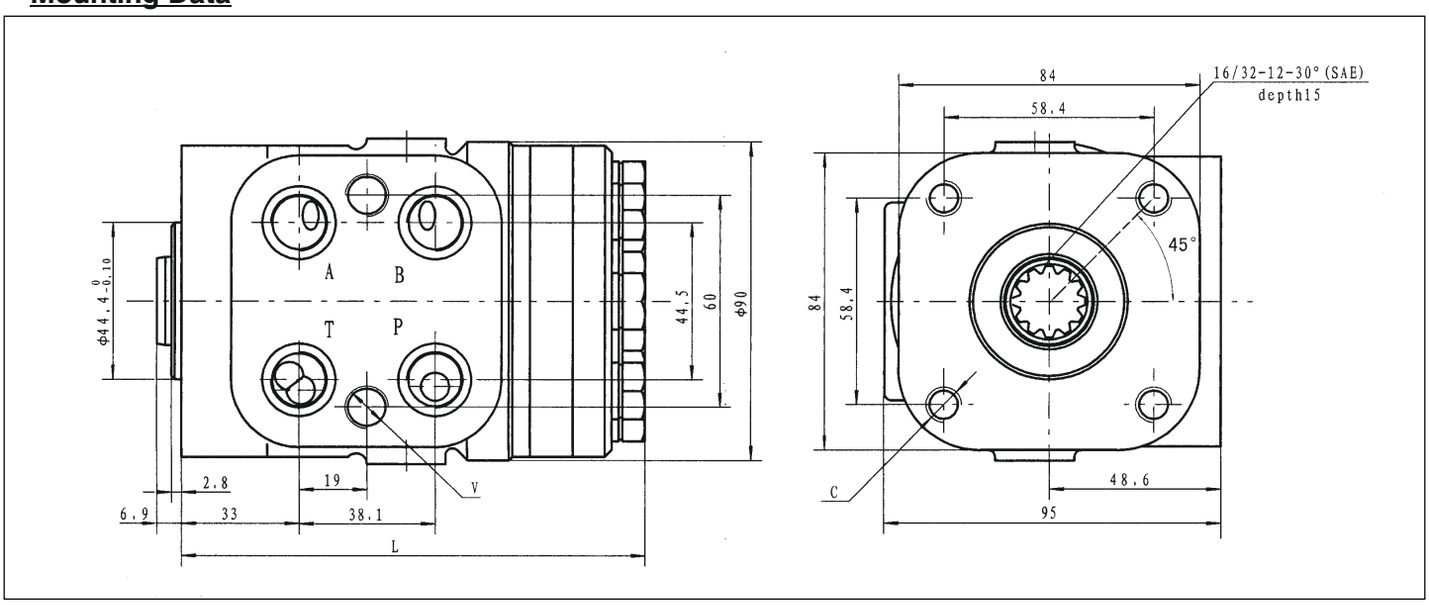
T03-1 Series Hydraulic Steering Control Units(SCU)

Main Specifications

Parameters	Type T03-1-***-*							
Function Code	1	1	1	1	1	1	1	1
Displacement(mL/r)	50	63	80	100	125	160	200	250
Rated flow (L/min)	5	6	8	10	12.5	16	20	25
Max. input pressure (Mpa)	17.5							
Max. cont. back pressure (Mpa)	2.5							
Weight (kg)	3.85	4.0	4.05	4.10	4.25	4.4	4.6	4.8
Dimension L (mm)	125	127	128	131	134	139	144	150

Note: L is the maximum length dimension of product. This dimension on some products may 2mm or 4mm shorter.

Mounting Data



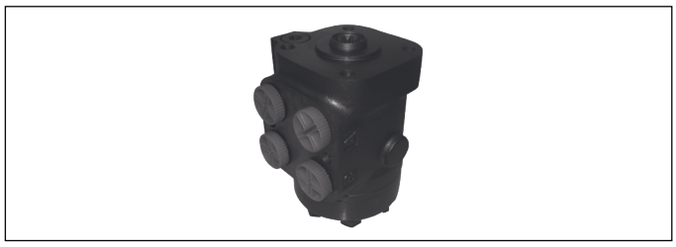
Port Threads

Code	Ports P,T,A,B	Column Mounting C	Valve Mounting V
A	M20×1.5	M10x1.25	M10
B	M20×1.5 O-ring		
C	M18×1.5	M10	M12
D	M18×1.5 O-ring		
M	3/4-16UNF O-ring		
F		3/8-16 UNC	3/8-24 UNF
I		M10	M10
N		M10×1.25	

Note 1: Ports P, T, A, B Depth: 14 mm; Column Mounting C & V Depth: 16 mm.
Note 2: The code of other ports dimensions will be listed in an agreement.

T03S-4 Series Hydraulic Steering Control Units(SCU)

T03S-4 series steering unit contains, in addition to the function of T03-1 series steering unit, also function of relief valve and inlet check valve.



Ordering code

T03S-4 Series Hydraulic Steering Control Units (with integrated valve) = T03S

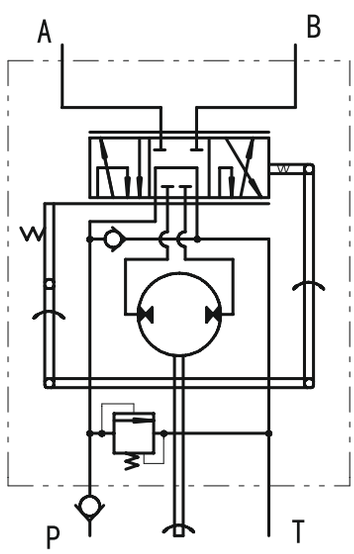
Function Code
Open Center Non-Reaction = 4

Displacement
50, 63, 80, 100, 125, 160, 200, 250

Relief valve pressure settings (Mpa):
06, 07, 08, 10, 12, 14, 15, 16, 17.5

Ports Code
A, B, C, D, M, F, I, N

Function code



T03S-4
Open center Non reaction

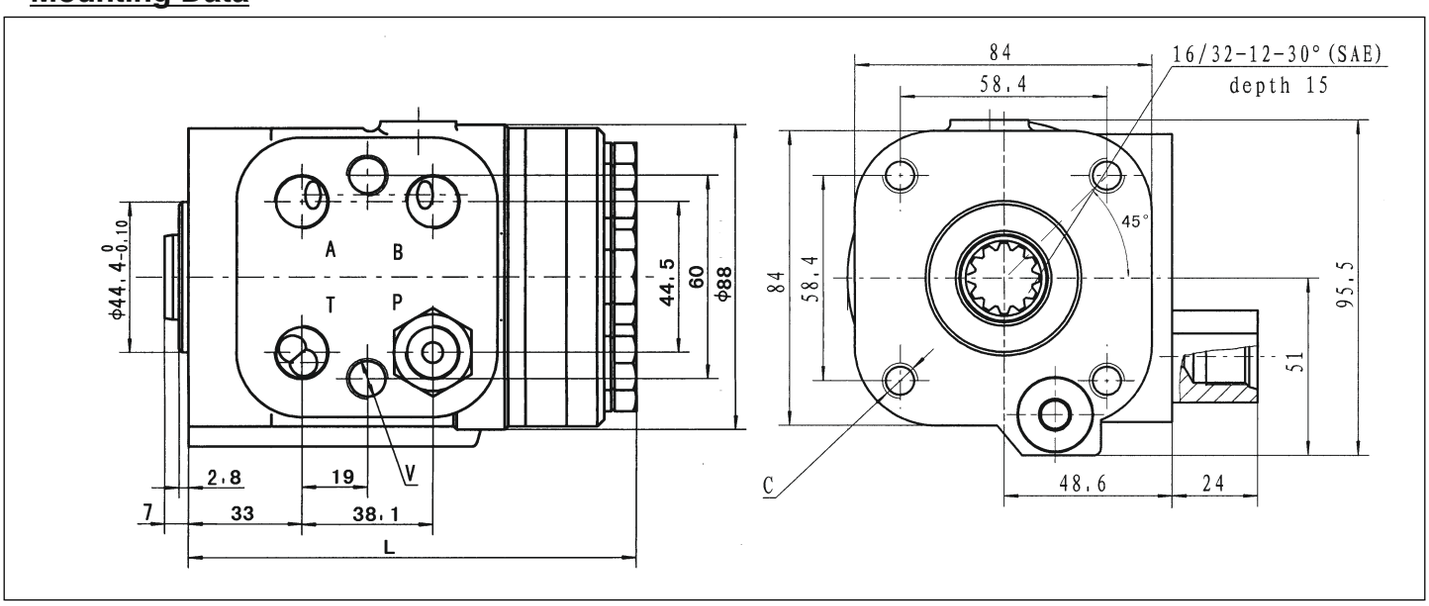
T03S-4 Series Hydraulic Steering Control Units(SCU)

Main Specifications

Parameters	Type T03-1-***-*							
Displacement(mL/r)	50	63	80	100	125	160	200	250
Rated flow (L/min)	5	6	8	10	12.5	16	20	25
Max. input pressure (Mpa)	17.5							
Relief valve pressure settings (Mpa)	06, 07, 08, 10, 12, 14, 15, 16, 17.5							
Max. cont. back pressure (Mpa)	2.5							
Weight (kg)	4.75	4.81	4.89	4.96	5.1	5.3	5.5	5.73
Dimension L (mm)	125	127	128	131	134	139	144	150

Note: L is the maximum length dimension of product. This dimension on some products may 2mm or 4mm shorter.

Mounting Data



Port Threads

Code	Ports P,T,A,B	Column Mounting C	Valve Mounting V
A	G3/8-19 O-ring	M10x1.25	M10
B	9/16-18UNF O-ring		
C	M18×1.5	M10	M12
D	M18×1.5 O-ring		
M	3/4-16UNF O-ring		
F		3/8-16 UNC	3/8-24 UNF
I		M10	M10
N		M10×1.25	

Note 1: Ports P, T, A, B Depth: 14 mm; Column Mounting C & V Depth: 16 mm.
Note 2: The code of other ports dimensions will be listed in an agreement.

T09 Series Hydraulic Steering Control Units (SCU)

T09 series hydraulic steering unit is an integrated orbital steering unit with 4/5 tooth structure. This kind of steering unit has a small and exquisite structure with integrated check valve, relief valve and shock valves and its mounting dimension conforms to international standard. This kind of steering unit is widely used in mini vehicles, such as mini forklift, mini tractor (and other agricultural machinery), mini earthmoving machinery, mini municipal vehicle, etc. It can obtain more steering output torque through input of less power, with features of easy, flexible and reliable operation

Ordering Code

T09					

T09 Series Hydraulic Steering Control Units = T09

Integrated Valve Parameter
Without valve = No code
With Relief Valve,Check Valve,Shock Valves = S
With Relief Valve,Check Valve = V
With Relief Valve = R

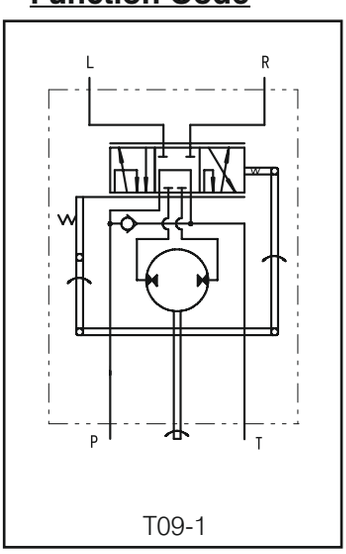
Function Code
Open Center Non-Reaction = 1

Displacement mL/r
20, 32, 40, 50, 63, 80

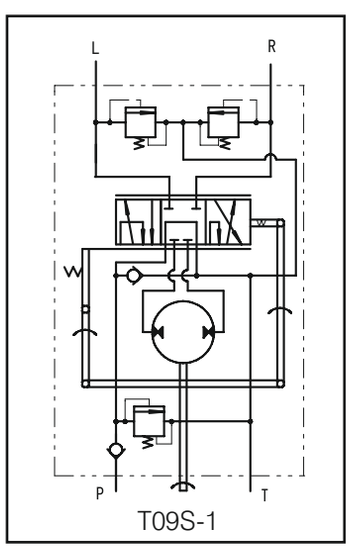
Integrated Valve Parameter
Relief valve pressure settings (MPa):06, 07, 08, 10, 12, 14, 15, 16, 17.5
Shock valves pressure settings is 6 MPa higher than relief valve

Mounting Data

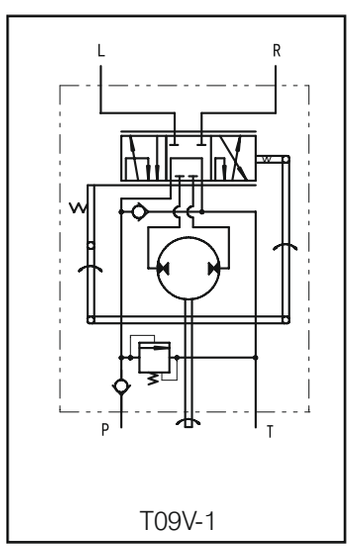
Function Code



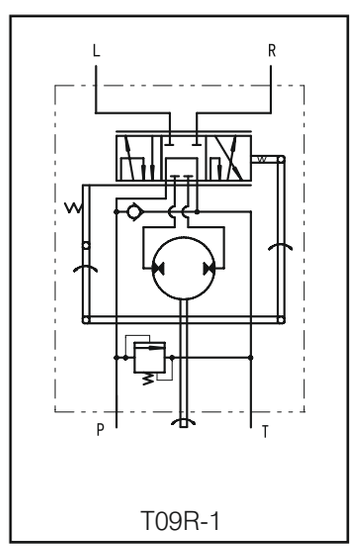
T09-1



T09S-1



T09V-1



T09R-1

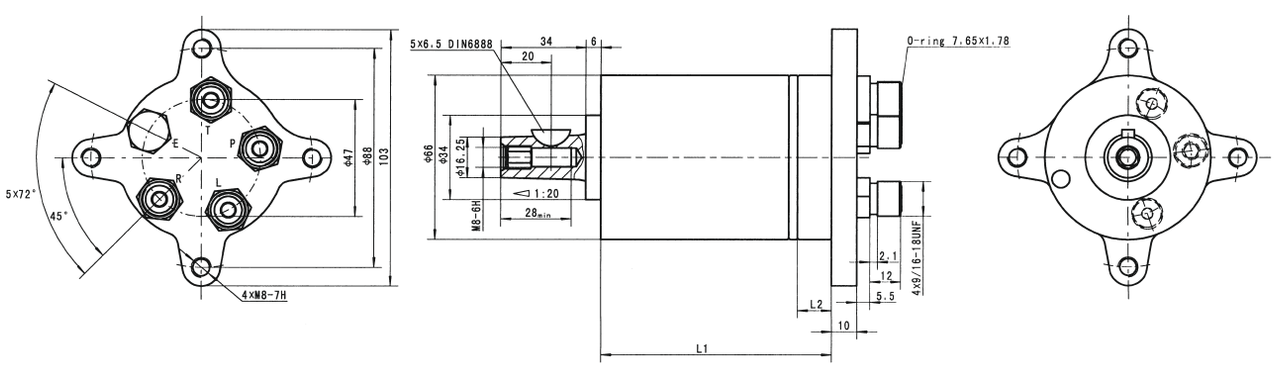
T09 Series Hydraulic Steering Control Units (SCU)

Main Specification

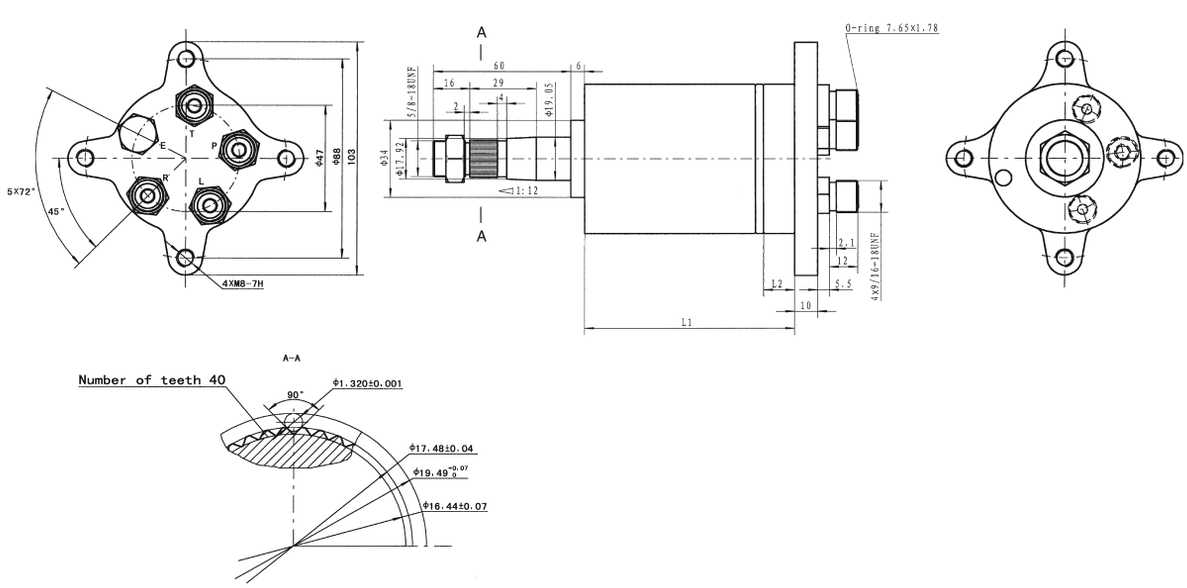
Parameters	Type T09*-1-***-**-*					
Displacement(mL/r)	20	32	40	50	63	80
Rated flow(L/min)	3～20					
Rated Pressure(MPa)	12.5					
Relief Valve Pressure Settings(MPa)	06,07,08,09,10					
Shock Valves Pressure Settings(MPa)	12,13,14,15,16					
Steering Torque(N·m)	≤1.8					
Manual Steering torque(N·m)	max.60					
Max. Cont. Preesure in Line T-P_T(MPa)	1					
Dimension L1(mm)	87	92	96	100	105	113

Mounting data

A

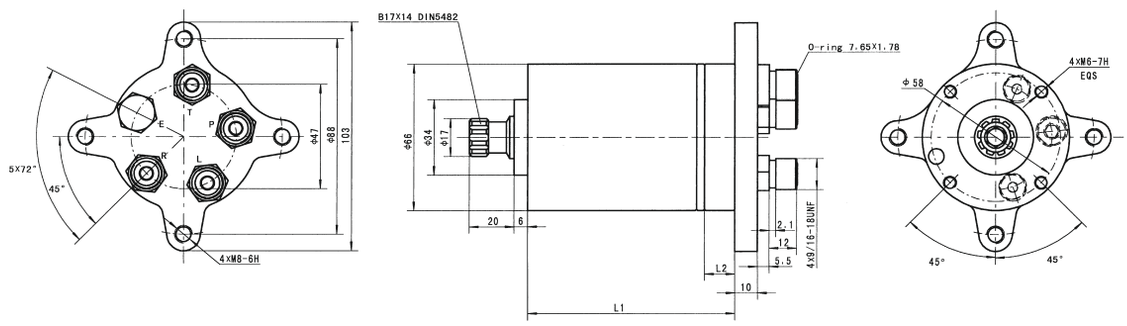


B

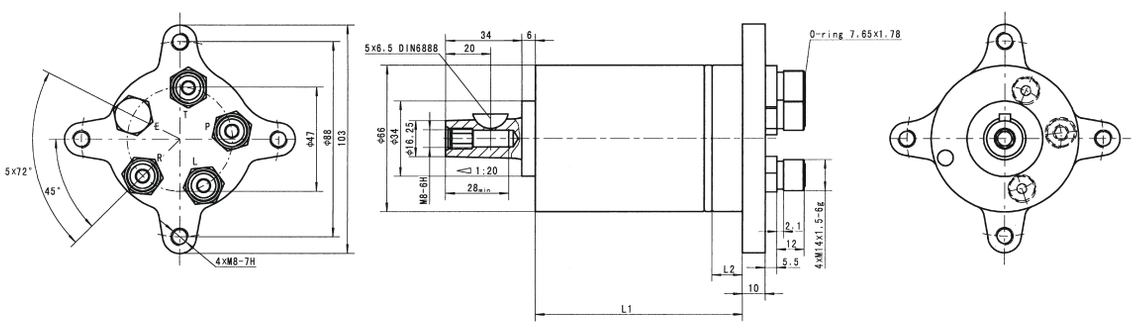


T09 Series Hydraulic Steering Control Units (SCU)

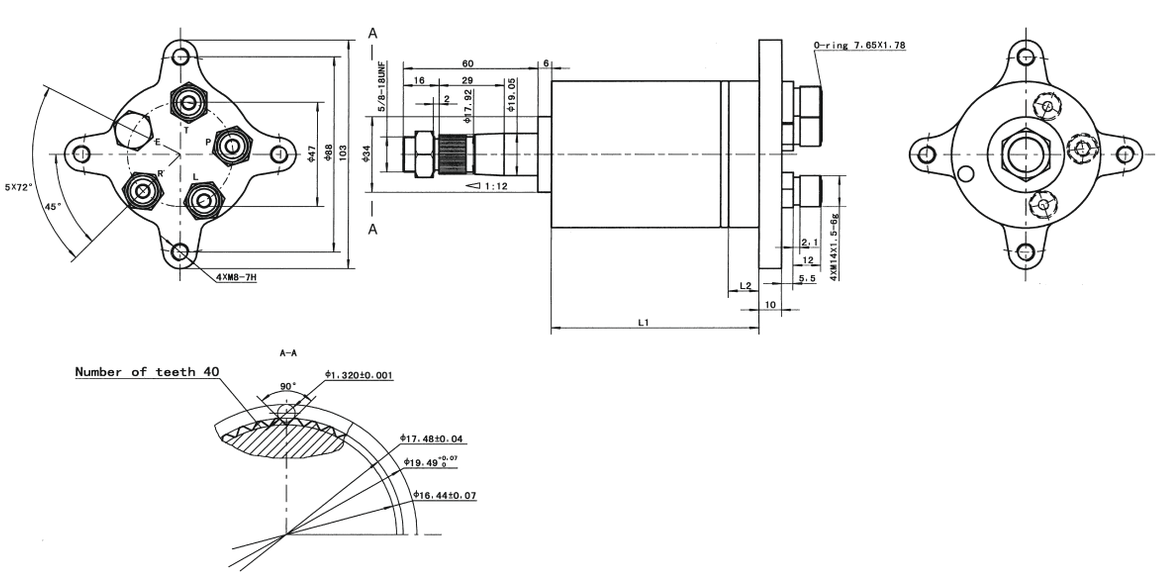
C



D



E



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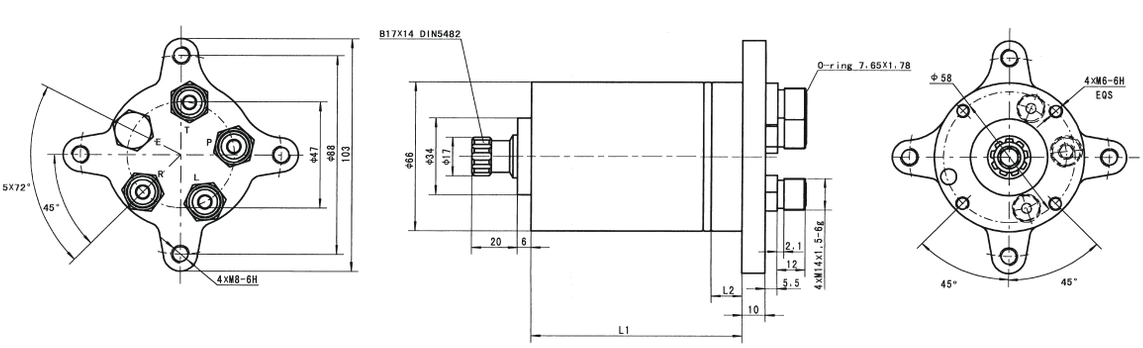
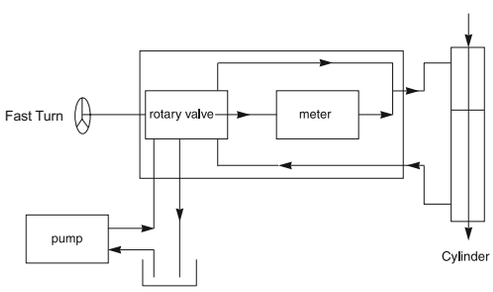


TLF Type Coaxial Flow Amplifying Steering Units

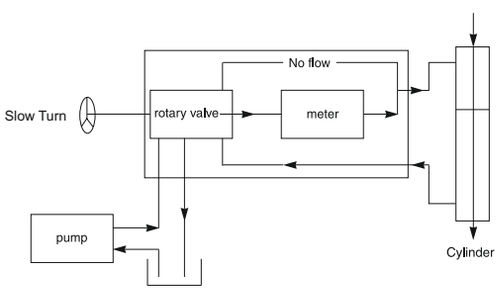
TLF type coaxial flow amplifying steering unit and TVV5 type load sensing steering unit belong to the load sensing steering control unit. In the load sensing steering system, only if the displacement of these two models is the same, and then they can be replaced by each other. But when TLF type coaxial flow amplifying steering unit works as steering control unit, its steering displacement is changeable as the steering wheel's input rotation speed. Under the low speed rotation(rotation speed of the steering wheel less than 10 rpm),the effective displacement of the steering unit is the same as the metering displacement. When the steering wheel's input speed increases (the steering wheel's rotation speed range 10-40rpm), its effective displacement increases as the steering wheel's rotation speed increases. When the steering wheel's rotation speed is more than 40 rpm, the steering unit's effective displacement is basically rated on its constant volume. Such kind of feature has special advantages while it's used in the steering of the industrial vehicles, such as loader, grader, wood trolley, tractor and various mini vehicles.

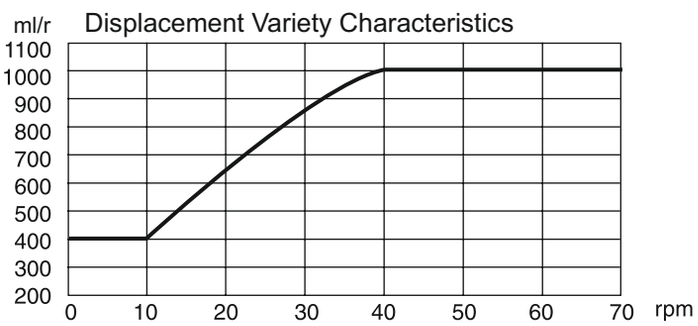
By using TLF type amplifying steering unit ,when the vehicle is driving, it will not cause over-correction of the steering to rotate slowly the steering wheel. When the driving vehicle needs to change the direction quickly, the direction can be changed quickly as well , by increasing the steering wheel's rotation speed and the steering flow.

Steering Function-High Speed



Steering Function-Low Speed





TLF1 Type Coaxial Flow Amplifying Steering Units

TLF1 type coaxial flow amplifying steering unit is a hydrostatic steering unit with flow amplifying ability. It can be supplied by various flow suppliers, and composed various load sensing hydraulic steering systems with priority valves, crossover anti-cavitation relief valves and other elements, which have light operation, sensitive and smooth features and used in large and medium loaders, bulldozers, tractors, architectural machinery, and other off-the-highway vehicles as well as hydraulic rudder of ship. It also provides the following features:
1) Compact volume and light weight
2) Good adjusting characteristic and small pressure ;oss
3) Convenient mounting and reasonable price
Instead of load sensing steering unit in same displacement without changing construction and exchanging other elements Refers to the flow amplifying steering unit which is used in loader steering system with 5 tons or more than 5tons. we recommend static signal priority valve together with static signal steering unit, while dynamic signal priority valve together with dynamic signal steering unit.

Ordering Code

TLF1		E				

Coaxial flow amplifying steering units = TLF1

Static signal = Omit
Dynamic signal = D

Pressure grade = 16 MPa

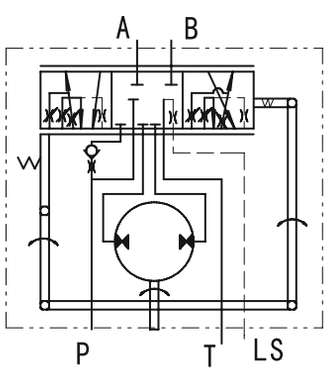
Displacement

Mounting type:
SAE involute spline connection = B
Short ringed boss, cross-block connect = C

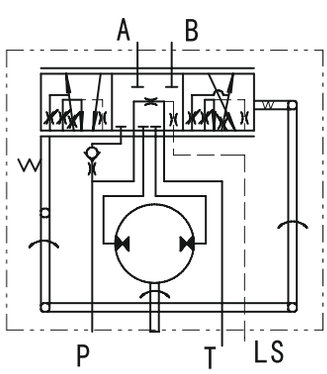
LS Ports code

Code for other requirements

Function Code



dynamic signal TLF1$_d$



static signal TLF1

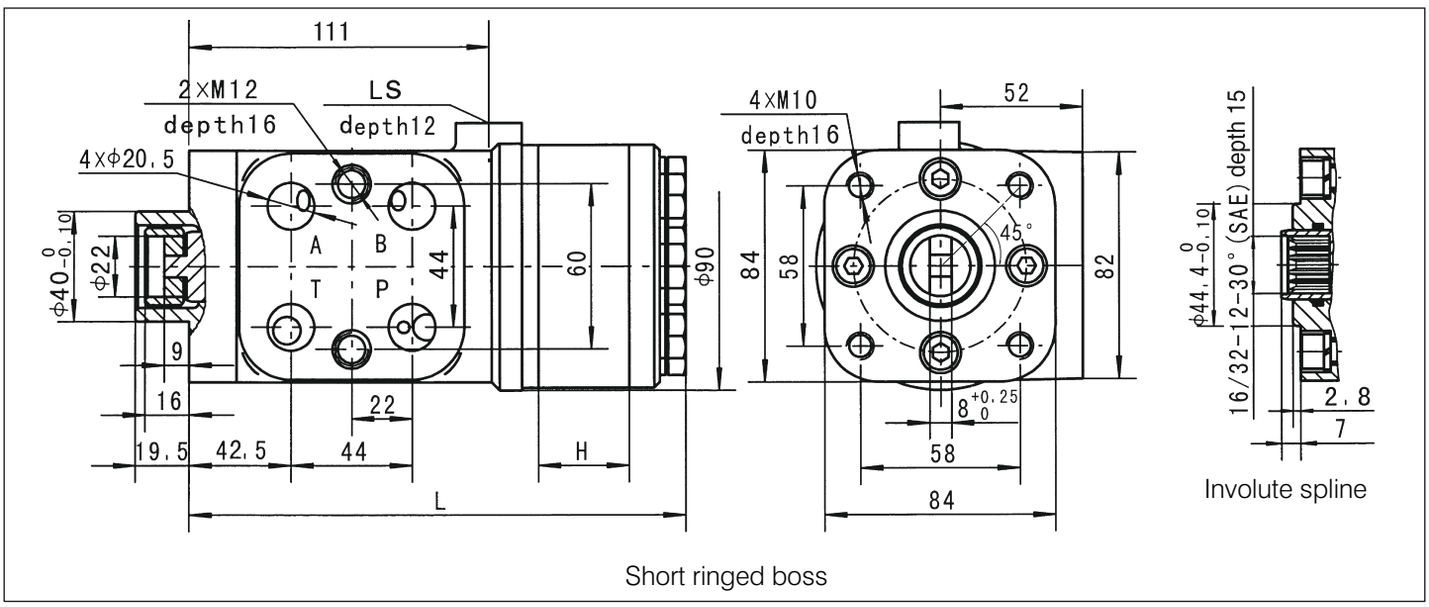
TLF1 Type Coaxial Flow Amplifying Steering Units

Main Specification

Type	Displacement (mL/r)	Max. speed (rpm)	Max. input pressure (MPa)	Max. cont. back pressure	Power steering torque(N·m)	Length
TLF1-E1000	1000	60	16	1.6	≤5	199.5
TLF1$_d$-E1000	1000					
TLF1-E1250	1250					212.5
TLF1$_d$-E1250	1250					

Note : mounting type, only C or B for choice, please see Pg. 40 for reference.

Mounting Data



Short ringed boss

LS Port Code

Ports Code	Ports LS
No code	M12x1.5
1	M12x1.5 O-ring
3	G1/4
5	7/16-20UNF O-ring
6	G1/4 O-ring

TLF2 Type Flow Amplifying Steering Units

TLF2 type amplifying steering unit is also a kind of hydrostatic steering unit with flow amplifying function. It can be used as a replacement of TLF1 type coaxial flow amplifying steering unit. Compared with TLF1, TLF2 provides good features like a better compact design structure and stable steering performance. At the same time, it can be also used as replacement of load sensing type hydrostatic steering unit with same displacement. Refers to the flow amplifying steering unit which is used in loader steering system with 5 tons or more than 5 tons. we recommend static signal priority valve together with static signal steering unit, while dynamic signal priority valve together with dynamic signal steering unit.

Ordering code

TLF2		E				

Flow amplifying steering units

Static signal = No code
Dynamic signal = D

Pressure grade = 16 MPa

Displacement

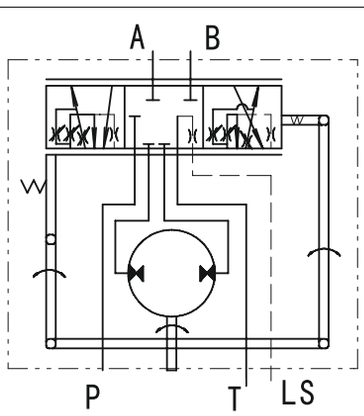
Mounting type:

SAE involute spline connection = B
Short ringed boss, cross-block connect = C

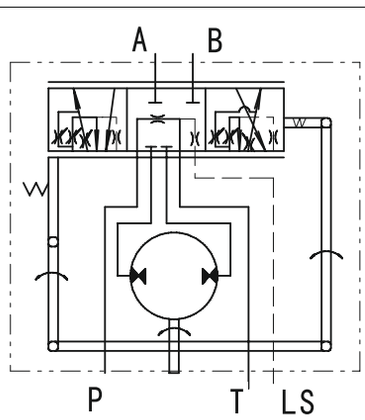
LS Ports code

Code for other requirements

Function Code



dynamic signal $TLF2_d$



Static signal TLF2

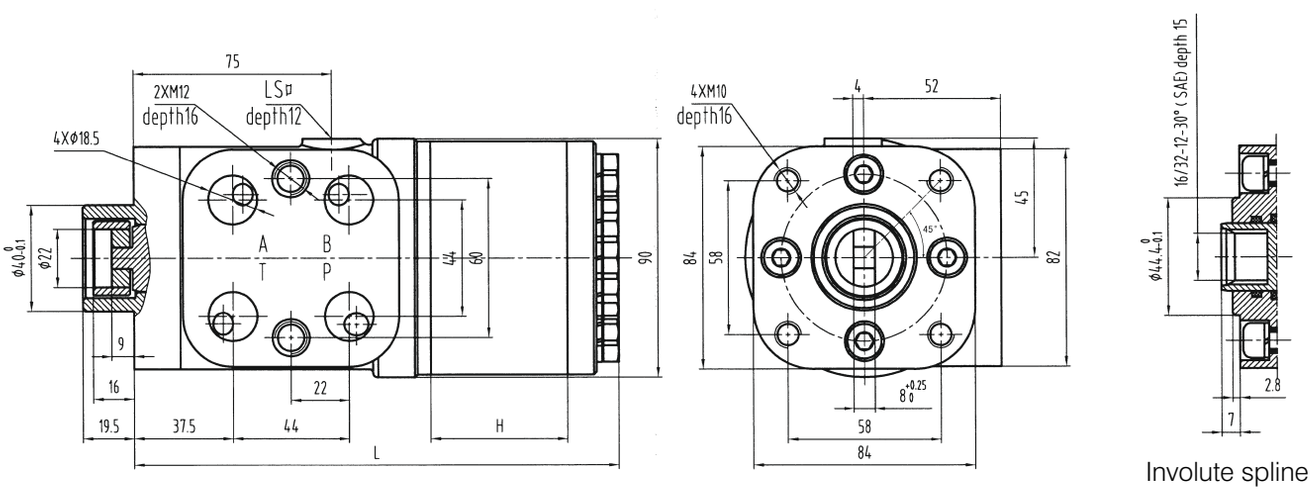
TLF2 Type Flow Amplifying Steering Units

Main Specification

Type	Displacement (mL/r)	Max. speed (rpm)	Max. input pressure (MPa)	Max. cont. back pressure	Power steering torque(N·m)	Length
TLF2-E630	630	60	16	1.6	≤5	184
TLF2$_d$-E630	630					
TLF2-E800	800					
TLF2$_d$-E800	800					
TLF2-E1000	1000					197
TLF2$_d$-E1000	1000					

Note : mounting type, only C or B for choice, please see P54 for reference.

Mounting Data



Involute spline

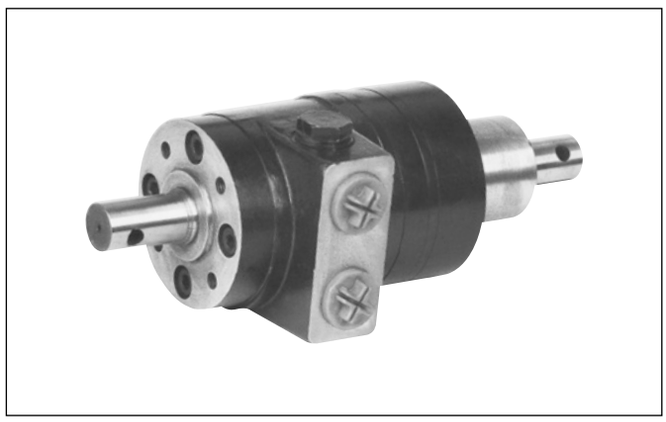
Short ringed boss

LS Port Code

Ports Code	Ports LS
No code	M12x1.5
1	M12x1.5 O-ring
3	G1/4
5	7/16-20UNF O-ring
6	G1/4 O-ring

TNF Type Torque Amplifiers

TNF type torque amplifier unit is one of the hydraulic element, which can get high output torque with low input torque. It contains a distributor valve, cycloid pin pair and a pressure relief valve with the features of comfortable operation, compact volume and easy installation. It can be used in the fields of wheeled vehicle, large manual gate as well as other machineries required high torque. Distributor valve is open center and the power stream fluid circulates through the unit back to the tank at very low pressure when the system is not being steered. When the steering wheel is turned, fluid is led from the steering system pump via the distributor valve to the hydraulic energy (pressure, oil flow) into mechanical energy (torque, speed). The speed is controlled by the rate of rotation of the steering wheel. When the steering wheel been stopped rotating, the distributor valve cuts off the fluid to the cycloid pin pair and torque amplification is stopped.



Ordering code

TNF	E			

Cycloid Rotary Valve Torque amplifiers = TNF

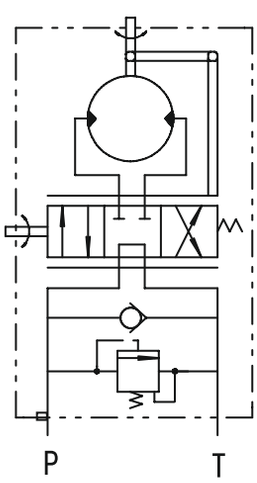
Mounting Data 1: = 1
Mounting Data 2: = 2
Mounting Data 3: = 3

Displacement

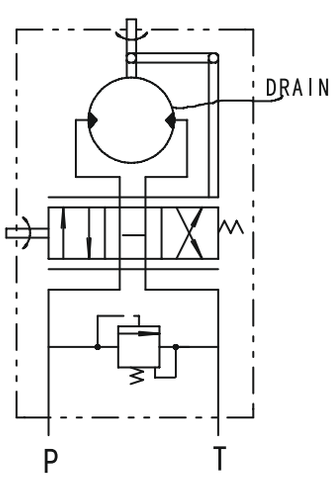
Relief Valve Pressure Settings

Code for other requirements

Function code



TNF1
TNF2



TNF3

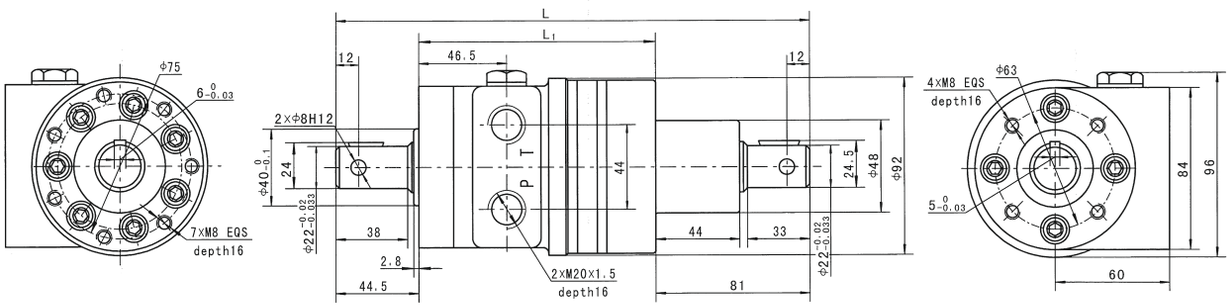
TNF Type Torque Amplifiers

Main Specifications

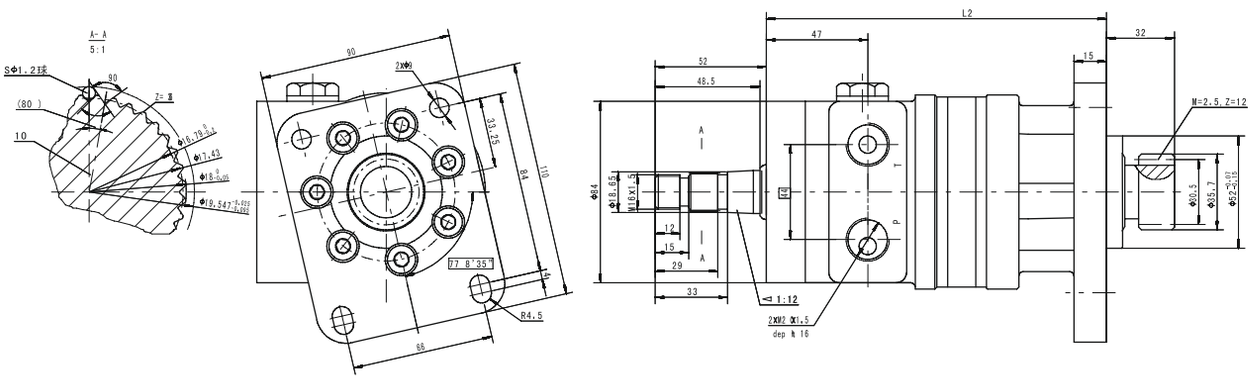
Displace-ment (mL/r)	Input torque (N·m)	Output torque (N·m)	Relief valve pressure settings (MPa)	Rated flow (L/min)	Max. speed (rpm)	Max. output torque (N·m)	Max. back pressure (MPa)	Length			
								L	L1	L2	L3
80	2~5	70	6.3~12.5	10	125	150	2.5	249.5	125	155	121
100		85		10	100			252	127.5	157.5	123.5
125		100		12	100			255	130.5	160.5	126.5
160		120		16	100			260	135.5	165.5	131.5

TNF Type Torque Amplifiers

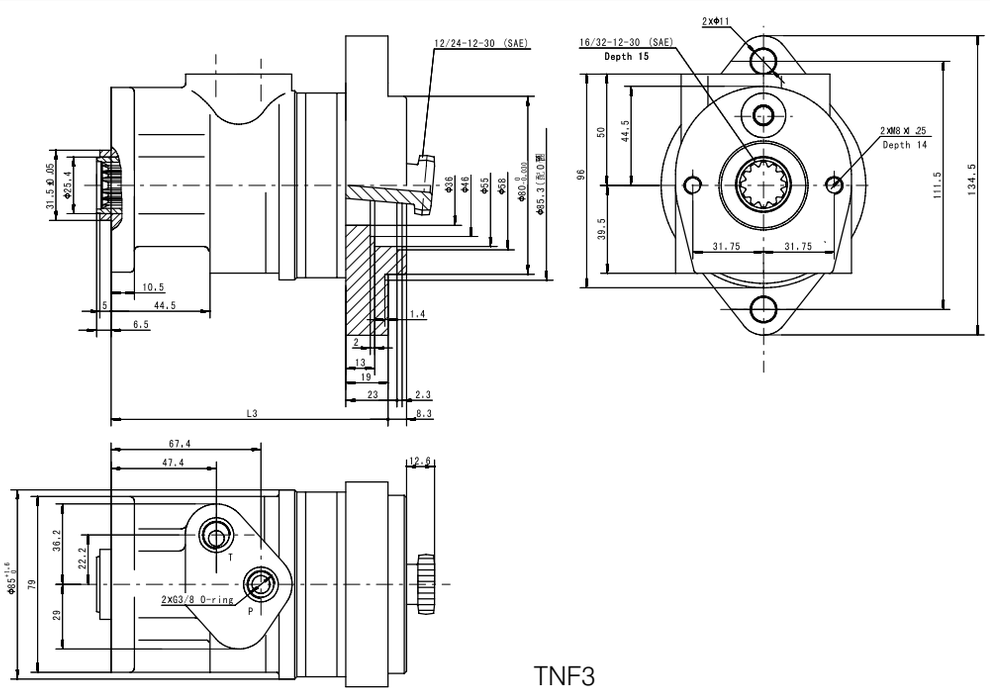
Mounting data



TNF1



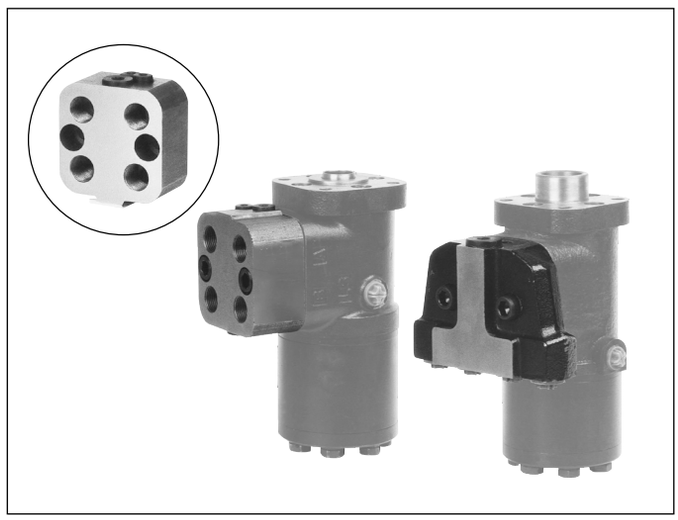
TNF2



TNF3

FK Type Combinatory Valve Blocks

Definition: FKA, FKB, FKC, FKBR type crossover relief valves and FKA2, FKC2 type cushion crossover anticavitation relief valves. Being a combinatory valve, it can bolt directly to the port face of TVV type steering unit to from a complete set, contains duel shock valves to protect the steering unit, hoses and steering cylinder from excessive system pressure due to sudden shock forces at the vehicle wheels and prevent such forces from being transmitted to the steering wheel, it also contains suction valves to help prevent cavitation at the low pressure side of the cylinder, an inlet check valve prevents reversed flow load circuit, a relief valve is the protection of the pump.



Ordering code

FK						

Combinatory valve block

Contains inlet check valve, relief valve, shock valve & suction valve	= AR
Contains inlet check valve, relief valve, and shock valve	= A
Contains inlet check valve, shock valve and suction valve	= BR
Contains inlet check valve and shock valves	= B
Contains inlet check valve and relief valve	= C

Crossover relief valve:	= No code
Cushion crossover anticavitation relief valve:	= 2

Relief Valve Pressure Settings

Flow

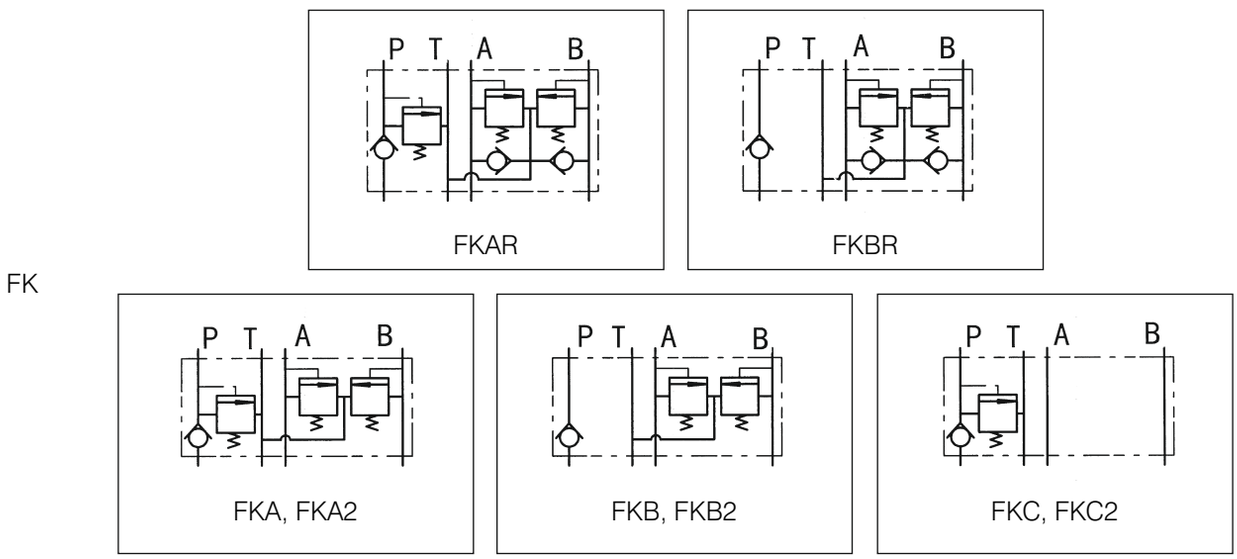
Shock Valves Pressure Settings

Ports codes

FK Type Combinatory Valve Blocks

Function code

FK

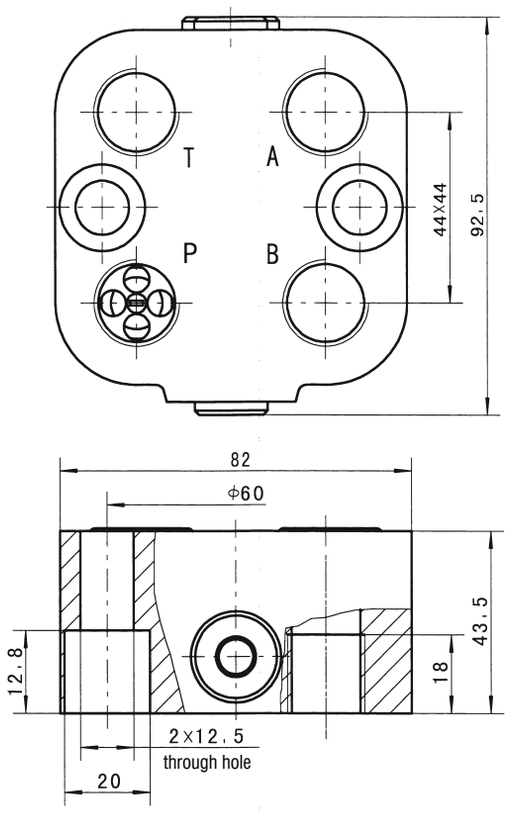


Specification

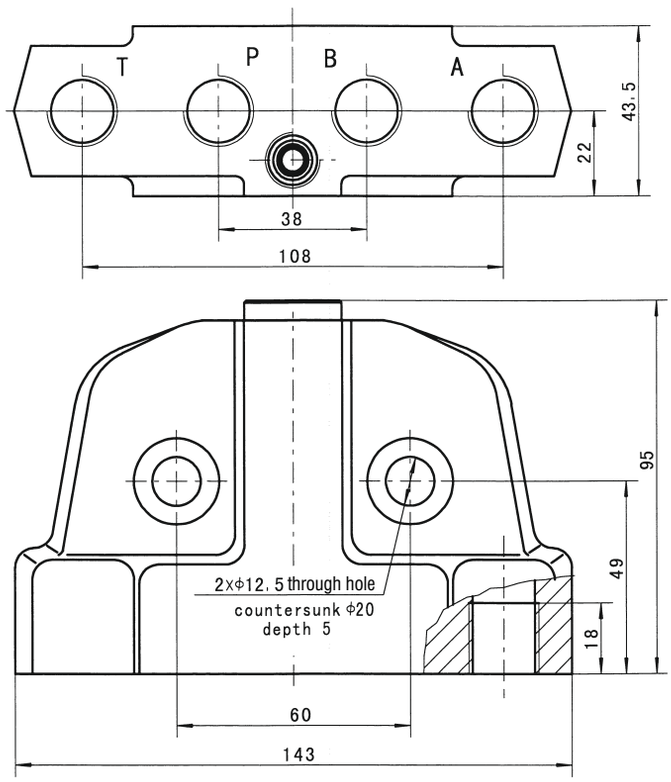
Type	Rated flow (L/min)	Inlet check valve open pressure (Mpa)	Relief valve pressure range (Mpa)	Shock valves pressure range (Mpa)	Suction valves open pressure (Mpa)
FKAR FKA FKA2	30/60	0.1	2.5 ～16	6.3 ～22	0.05 — —
FKBR FKB FKB2	30		—	6.3 ～22	0.05 — —
FKC FKC2	30/60		2.5 ～16	—	—

FK Type Combinatory Valve Blocks

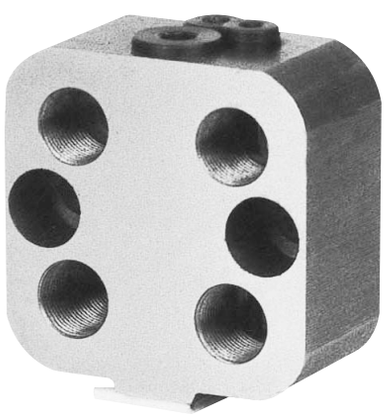
Mounting Data

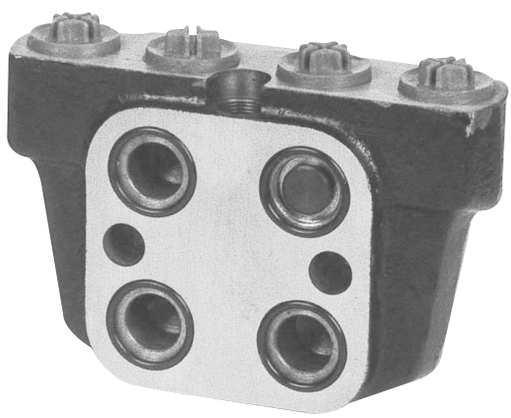


FKA, FKB, FKAR, FKBR FKC



FKA2, FKB2, FKC2





FK Type Combinatory Valve Blocks

Port Threads

Type	Code	Ports P, T, A, B
FK Type Valves	Omit	M20×1.5
	A	M18×1.5
	B	G1/2
	C	3/4-16UNF O-ring
	D	M20×1.5 O-ring
	E	M18×1.5 O-ring
	R	P,T：M20×1.5 A,B：M18×1.5
	S	P,T：M20×1.5 O-ring A,B：M18×1.5 O-ring
	G	M22×1.5
	Q	M22×1.5 O-ring
	U	G1/2 O-ring
FK Type Parallel Port Valves	Omit	M18×1.5
	A	M20×1.5
	B	G1/2
	C	3/4-16UNF O-ring
	D	M20×1.5 O-ring
	E	M18×1.5 O-ring
	U	G1/2 O-ring

Note : The code of other ports dimensions will be listed in an agreement.

FLD Type Flow Divider Valves

Definition: The FLD type flow divider valve is used to form a complete set of TVV1 type steering control units. Under such conditions of variety oil volume or/and different pressure in steering system, FLD type can provide constant flow for the steering unit so as to meet the requirement of hydraulic steering performance of vehicle. FLD type not only can control steering system, but also it helps pump to divide flow so that to reduce cost and simplify system design.

Ordering code

FLD	F				

Flow divider valves = FLD

Max. input pressure: = 20 MPa

Rated flow

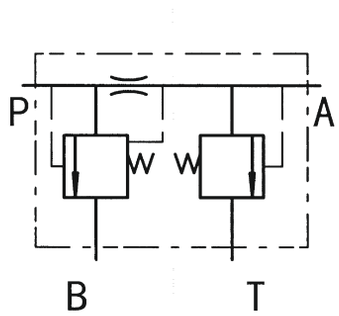
Flow types
Dividing flow: = No code
Constant flow: = H
Nom-relief valve dividing flow: = W

Relief Valves Pressure Settings

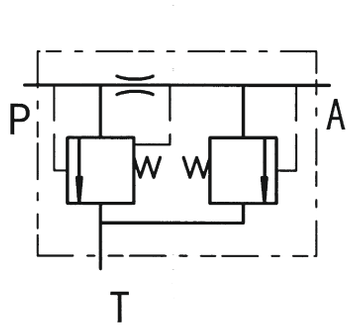
Ports codes

Function code

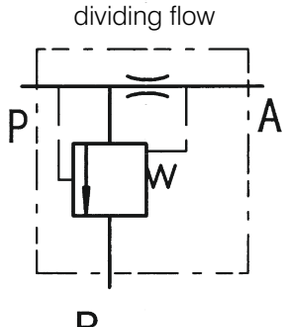
Dividing flow



Constant flow



Non-relief valve dividing flow

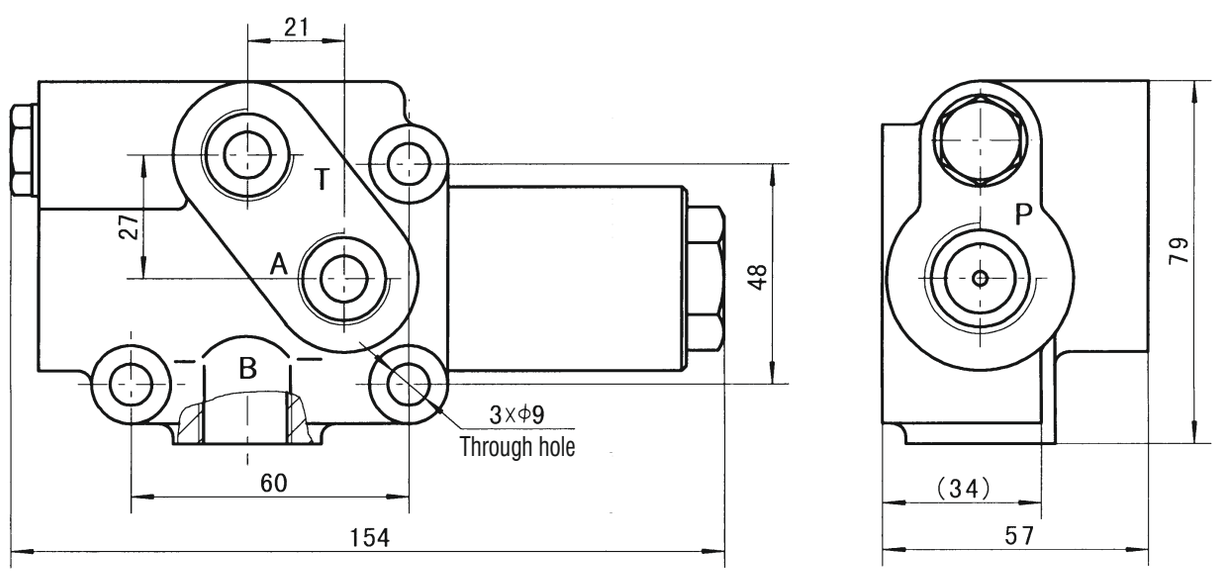


FLD Type Flow Divider Valves

Main Specifications

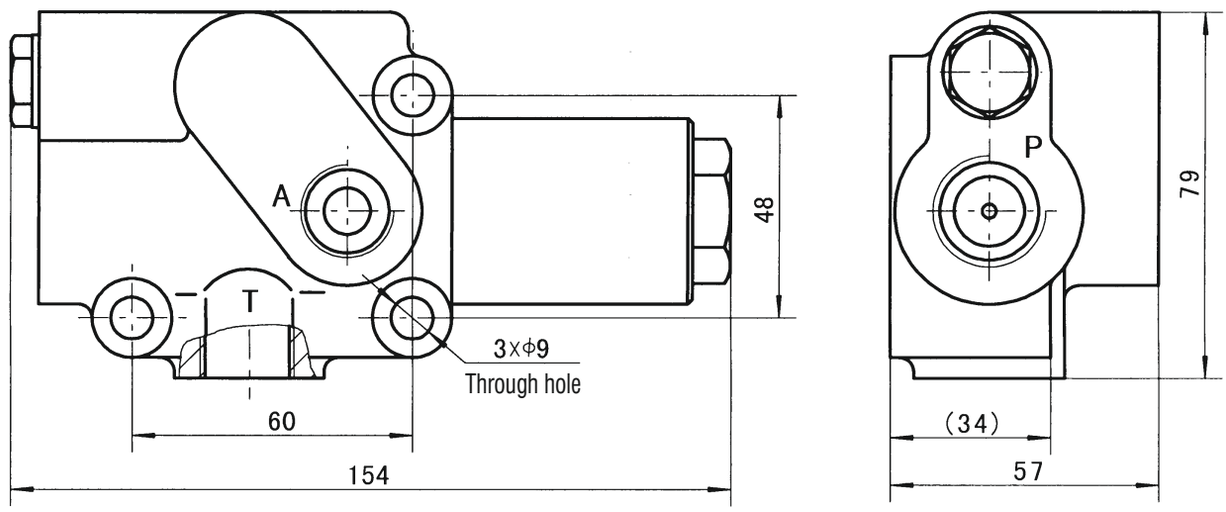
Type	Rated Flow (L/min)	Max. input flow (L/min)	Max. input pressure (Mpa)	Adjusting pressure range (Mpa)	Variation of flow (%)	Fit with steering unit
FLD–F4 *	4	45	20	6.3～16	15	TVV1–E50
FLD–F5 *	5					TVV1–E63
FLD–F6 *	6					TVV1–E80
FLD–F7.5 *	7.5					TVV1–E100
FLD–F9.5 *	9.5					TVV1–E125
FLD–F12 *	12					TVV1–E160
FLD–F15 *	15					TVV1–E200
FLD–F19 *	19	60			20	TVV1–E250
FLD–F21 *	21	75				TVV1–E280
FLD–F24 *	24	75				TVV1–E315
FLD–F30 *	30	90				TVV1–E400
FLD–F38 *	38	120				TVV1–E500
FLD–F48 *	48					TVV1–E630
FLD–F60 *	60	200				TVV1–E800
FLD–F75 *	75					TVV1–E1000

Mounting data

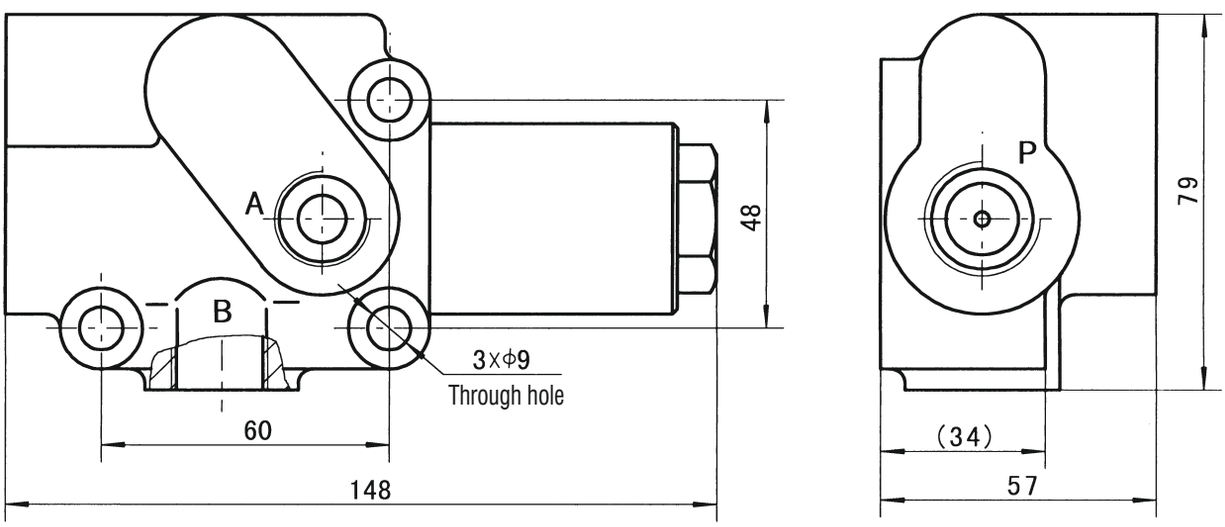


FLD-F4～15

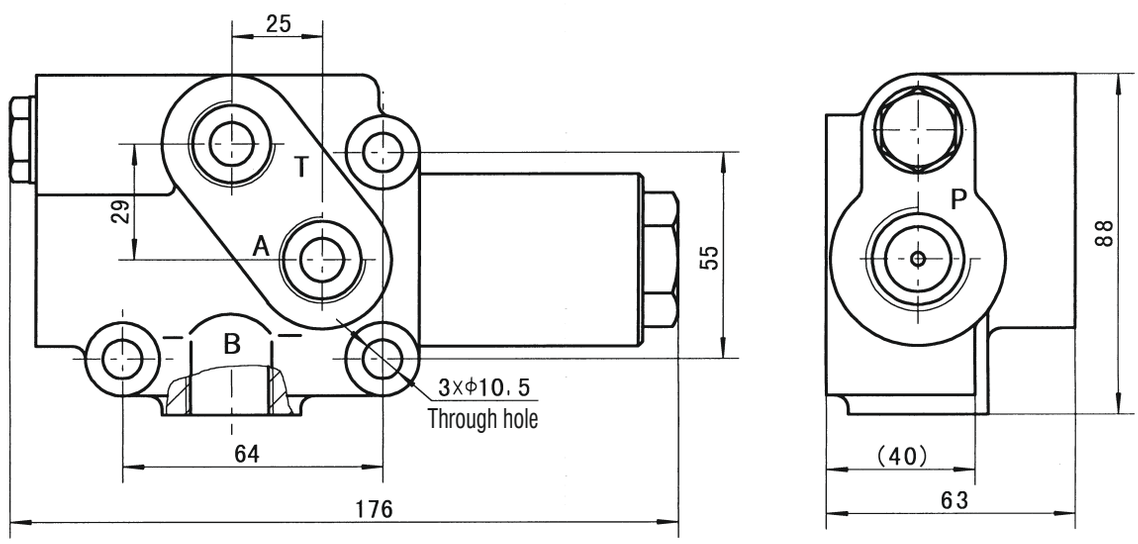
FLD Type Flow Divider Valves



FLD-F4～15H

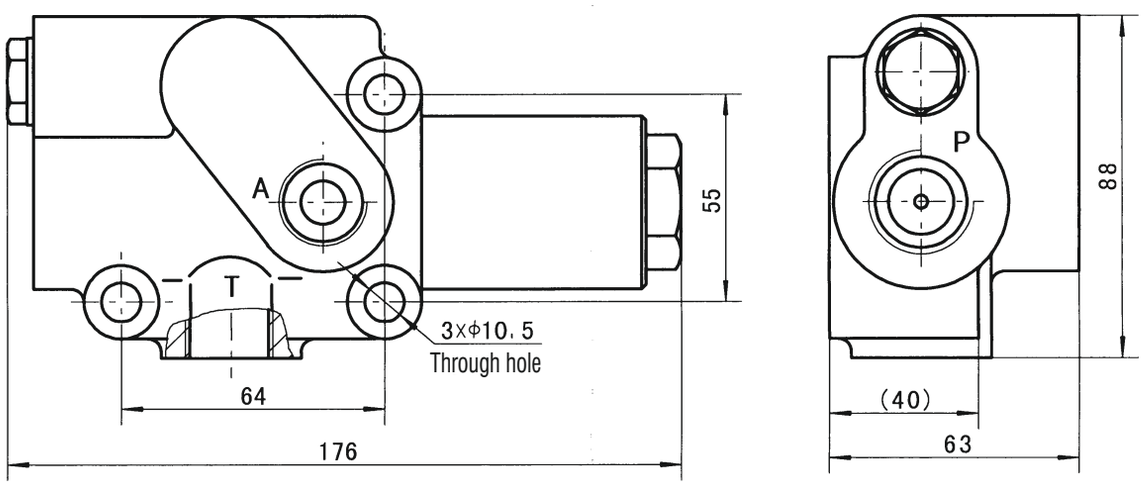


FLD-F4～15W

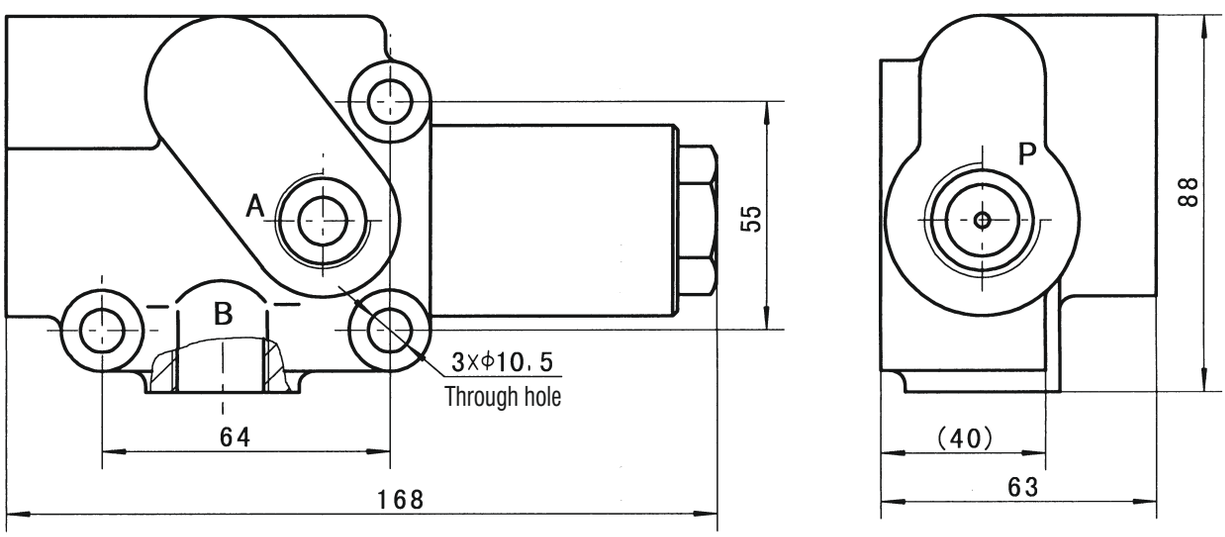


FLD–F19～30

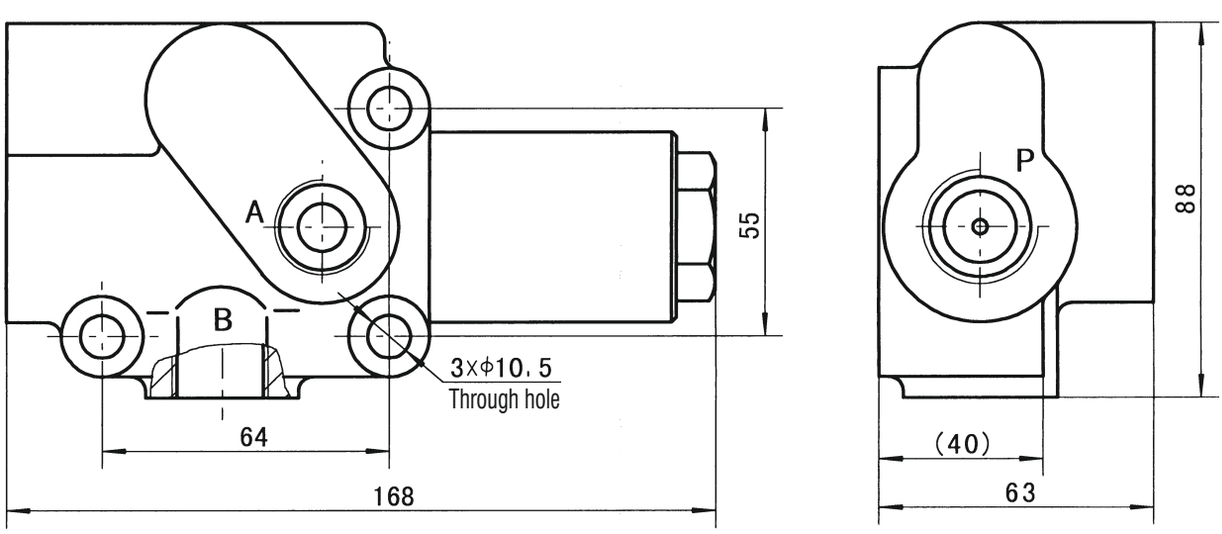
FLD Type Flow Divider Valves



FLD–F19～30H



FLD–F19～30W



FLD–F38～75W

FLD Type Flow Divider Valves

Port Threads

FLD4～15; FLD4～15H; FLD4～15W

Code	Port P	Ports A, B, T
No code	M24×1.5 Depth16	M20×1.5 Depth16
D	M24×1.5 O-ring Depth16	M20×1.5 O-ring Depth16
C	7/8-14UNF O-ring Depth16	3/4-16UNF O-ring Depth16

FLD19～30; FLD19～30H; FLD19～30W

Code	Port P	Ports A, B, T
Omit	M27×1.5 Depth16	M24×1.5 Depth16
D	M27×1.5 O-ring Depth16	M24×1.5 O-ring Depth16
C	1 1/16-16UN O-ring Depth16	7/8-14UNF O-ring Depth1

FLD38～75W

Code	Port P	Ports A, B
Omit	M27×1.5 Depth16	M27×1.5 Depth16
D	M27×1.5 O-ring Depth16	M27×1.5 O-ring Depth16
C	1 1/16-16UN O-ring Depth16	1 1/16-16UN O-ring Depth16

DYXL,YXL Type Priority Valves

Definition: The DYXL,YXL type priority valve is used with TVV5 type load sensing steering control unit or with TLF1 type coaxial flow mplifying steering unit, to form a load sensing power steering system, providing metered priority flow to the SCU.

Ordering code

	YXL	F						

Dynamic signal: = D
Static signal: = Omit

Priority valve

Max. input pressure: = 20 MPa

Max. input flow: 40, 80, 160, 250 L/min

Mounting types
Thread connection: = L
Flange connection: = F

Relief Valves Pressure Settings: 08, 10, 12, 14, 15, 16, 17.5

Control
Internal control: = N
Outer control: = W

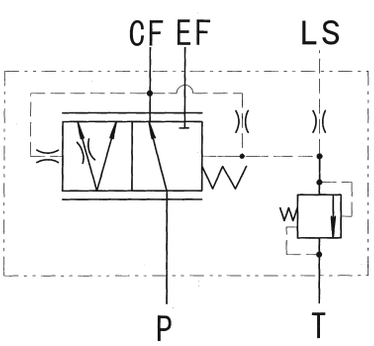
Control Pressure: 4.5, 7, 10.5 Bar

Ports code: A, B, C, D, E

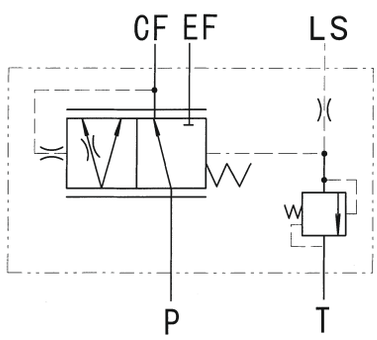
(D)YXL–F40, (D)YXL–F80, (D)YXL–F160

(D)YXL–F250

Function code



Dynamic Signal



Static Signal

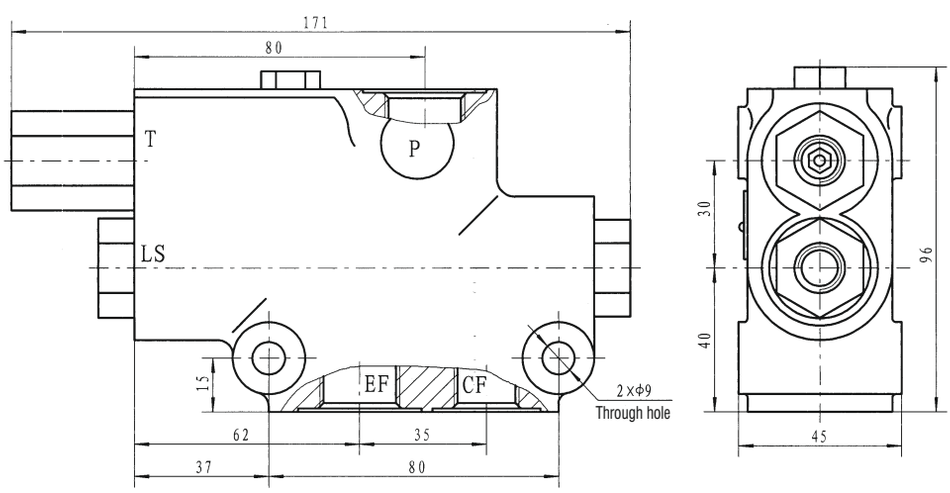
DYXL,YXL Type Priority Valves

Main Specifications:

Type	Control pressure (bar)	Max. input flow (L/min)	Max. input pressure (Mpa)	Relief valve pressure range (Mpa)
YXL–F40L– 4.5-	4.5	40	20	6.3～17.5 adjusted by customer's requirement
YXL–F40L– 7-	7			
YXL–F40L– 10.5-	10.5			
YXL–F80L– 4.5-	4.5	80		
YXL–F80L– 7-	7			
YXL–F80L– 10.5-	10.5			
YXL–F160L– 4.5-	4.5	160		
YXL–F160L– 7-	7			
YXL–F160L– 10.5-	10.5			
YXL–F250 – 7-	7	250		
YXL–F250 – 10.5-	10.5			

: Please see page 56 for reference.

Mounting data



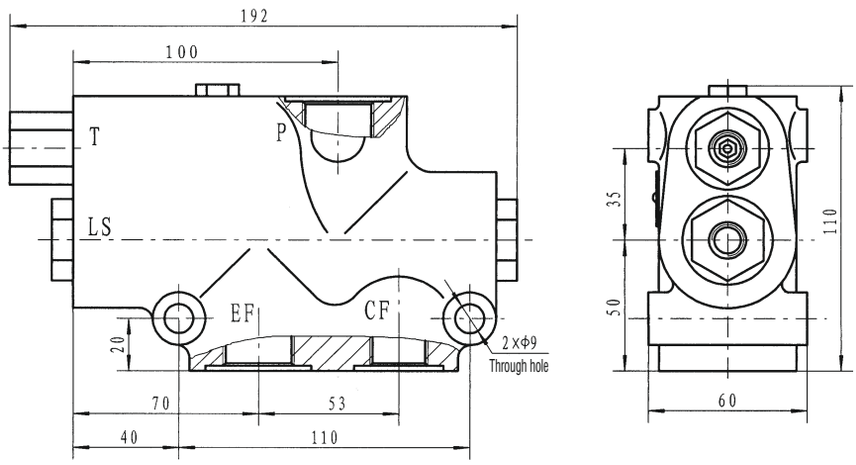
YXL-F40L, DYXL-F40L
YXL-F80L, DYXL-F80L

Code	Ports P, EF		Port CF		Ports LS,T	
	Thread	Depth(mm)	Thread	Depth(mm)	Thread	Depth(mm)
A	M22x1.5	16	M18x1.5	16	M12x1.5	14
B	G1/2		G3/8		G1/4	
C	7/8-14UNF O-ring		3/4-16UNF O-ring		7/16-20UNF O-ring	
D	M22x1.5 O-ring		M18x1.5 O-ring		M12x1.5 O-ring	
E	G1/2 O-ring		G3/8 O-ring		G1/4 O-ring	

DYXL,YXL Type Priority Valves

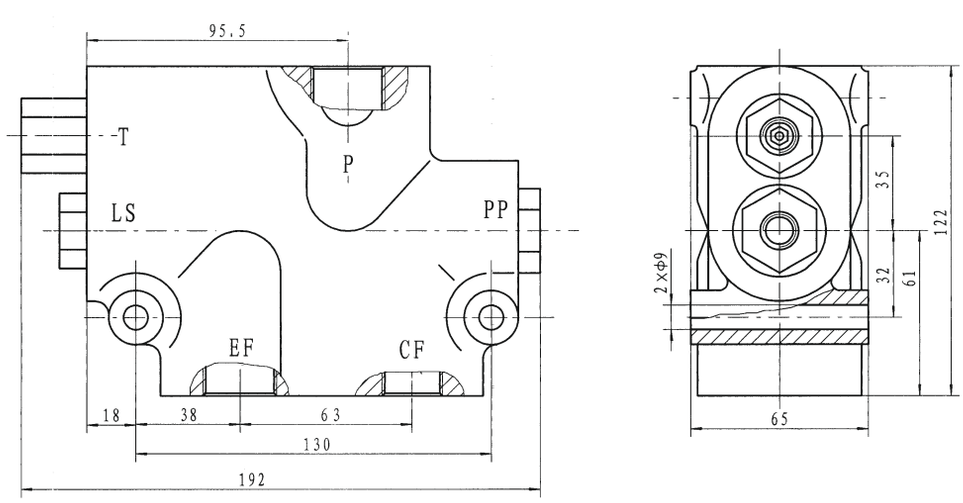
Mounting data

YXL–F160L



Code	Ports P, EF		Port CF		Ports LS,T	
	Thread	Depth(mm)	Thread	Depth(mm)	Thread	Depth(mm)
A	M27x2	18	M22x1.5	16	M12x1.5	14
B	G3/4		G1/2		G1/4	
C	1 1/16-12UN O-ring		3/4-16UNF O-ring		7/16-20UNF O-ring	
D	M27x2 O-ring		M22x1.5 O-ring		M12x1.5 O-ring	
E	G3/4 O-ring		G1/2 O-ring		G1/4 O-ring	

DYXL-F160L

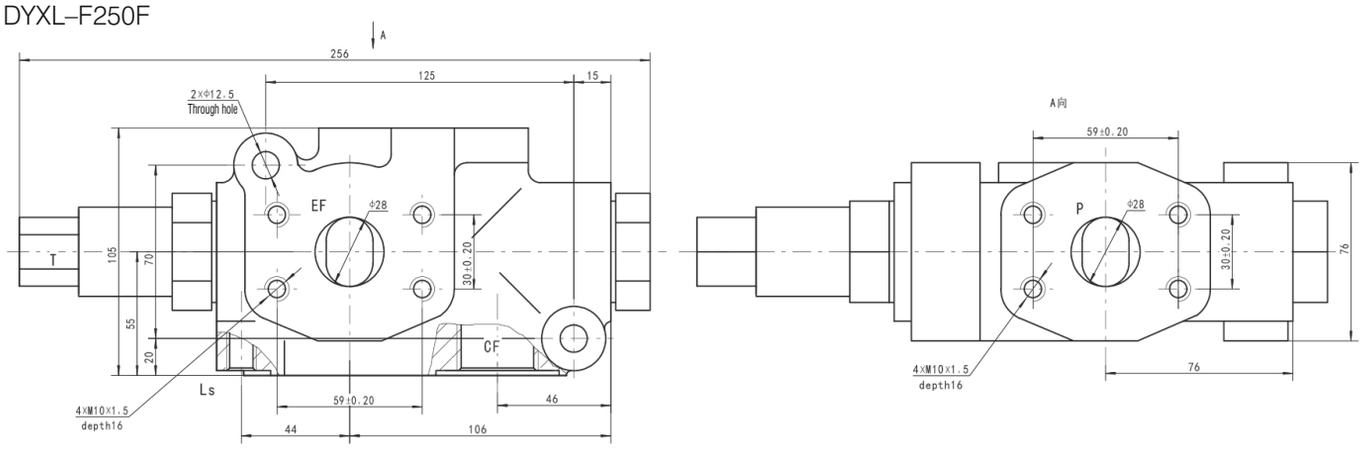


Code	Ports P, EF		Port CF		Ports LS,T	
	Thread	Depth(mm)	Thread	Depth(mm)	Thread	Depth(mm)
A	M27x2	22	M22x1.5	18	M12x1.5	14
B	G3/4		G1/2		G1/4	
C	1 1/16-12UN O-ring		3/4-16UNF O-ring		7/16-20UNF O-ring	
D	M27x2 O-ring		M22x1.5 O-ring		M12x1.5 O-ring	
E	G3/4 O-ring		G1/2 O-ring		G1/4 O-ring	

DYXL,YXL Type Priority Valves

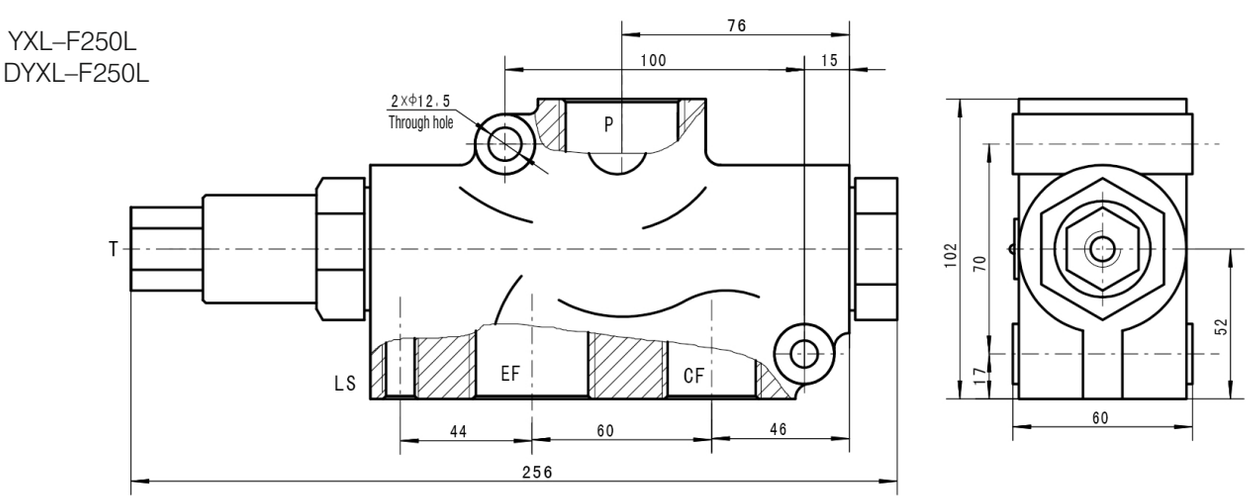
Mounting data

YXL–F250F
DYXL–F250F



Code	Ports P, EF	Port CF		Ports LS,T	
	Aperture Size	Thread	Depth(mm)	Thread	Depth(mm)
A	Ø28	M33×2	22	M12x1.5	14
D	Ø28	M33×2 O-ring	22	M12×1.5 O-ring	14

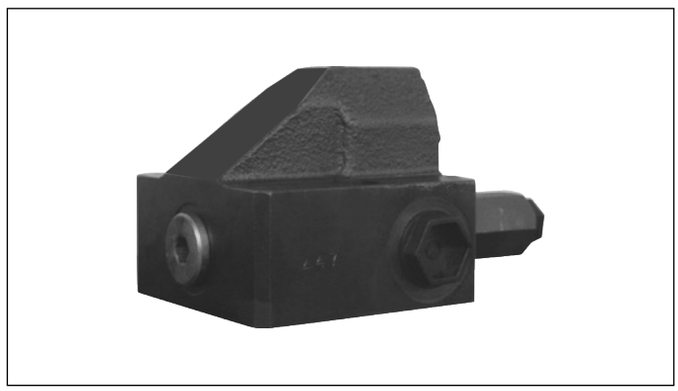
YXL–F250L
DYXL–F250L



Code	Ports P, EF		Port CF		Ports LS,T	
	Thread	Depth(mm)	Thread	Depth(mm)	Thread	Depth(mm)
A	M42×2	22	M33×2	22	M12x1.5	14
D	M42×2 O-ring	22	M33×2 O-ring	22	M12×1.5 O-ring	14

PV Type Priority Valves

PV**- 40, 60, 80 type priority valve is matched with the load sensing unit. When the hydraulic oil flow to the priority valve, and the load or revolution changed;
PVF*- 40, 60, 80 type priority valves is modulary design matched with the T01S-5(L)(E) or 102(S)-5(L)(E)SCU;
PVF*- 40, 60, 80 priority valve has 2 kind signals:
PVFS:- 40, 60, 80 static signal,
PVFD- 40, 60, 80 dynamic signals.
PVL*- 40, 60, 80 type priority valve is pipe design matched with the T01(S)-5T(TE) or 102(S)-5T(TE) SCU.
PVL*- 40, 60, 80 type priority valve has 2 kinds signals:
PVLS- 40, 60, 80 static signal,
PVLD- 40, 60, 80 dynamic signals.
PV**-40, 60, 80 type priority valve is not interchanged with the LS inlet pressure control relief valve, the relief valve integrated in the SCU.



Ordering code

PV					

PV type priority valves

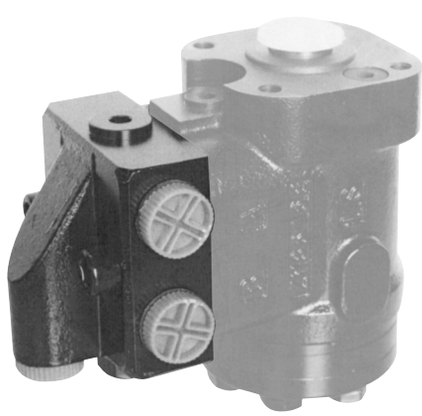
Mounting type:
Modulary mounting = F
Pipe mounting = L

Signal Model:
Static signal = S
Dynamic signal = D

Max. input flow:
40, 60, 80 L/min

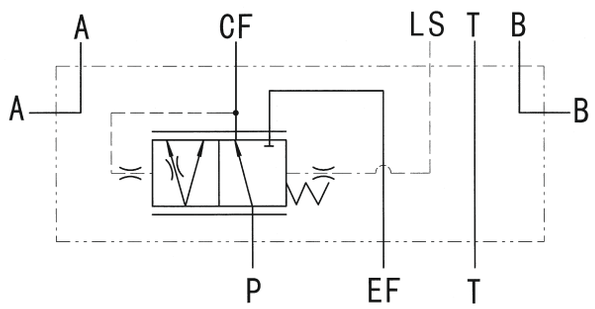
Control pressure:
0.45, 0.7, 1.05 MPa

Ports code:
A, B, C, D

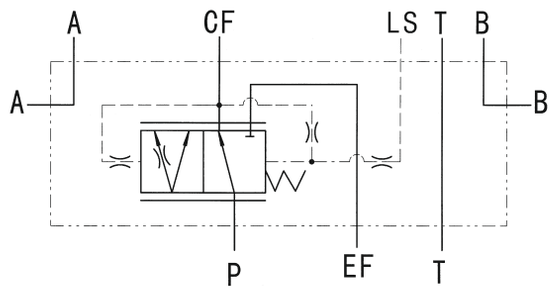


PV Type Priority Valves

Function Code (Modulary Mounting)

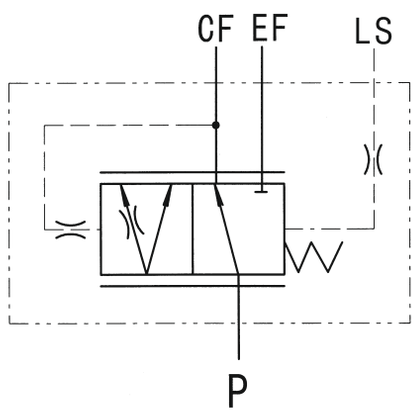


PVFS-40,60,80
Static Signal

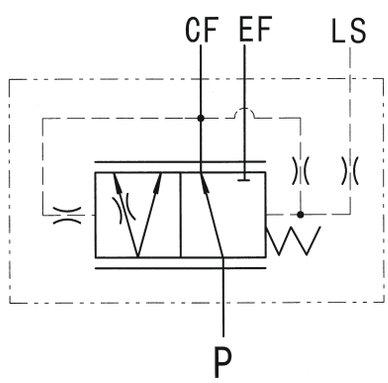


PVFD-40,60,80
Dynamic Signal

Function Code (Pipe Mounting)



PVLS-40,60,80
Static Signal



PVLD-40,60,80
Dynamic Signal

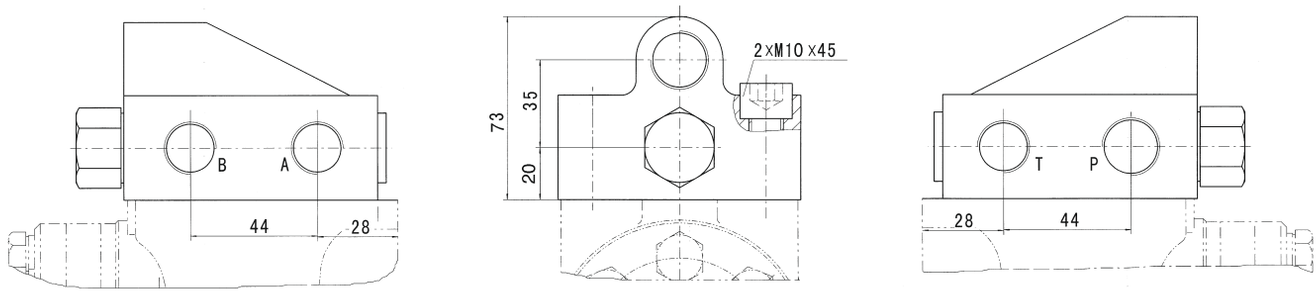
Main Specification

Parameters	Type PVFS(D) , PVLS(D)
Max. Input Flow (L/min)	40,60,80
Control Pressure (MPa)	0.45, 0.7, 1.05
Max. Pressure in Oil: P, EF (MPa)	20
Max. Pressure in Oil: LS, CF (MPa)	17.5

PV Type Priority Valves

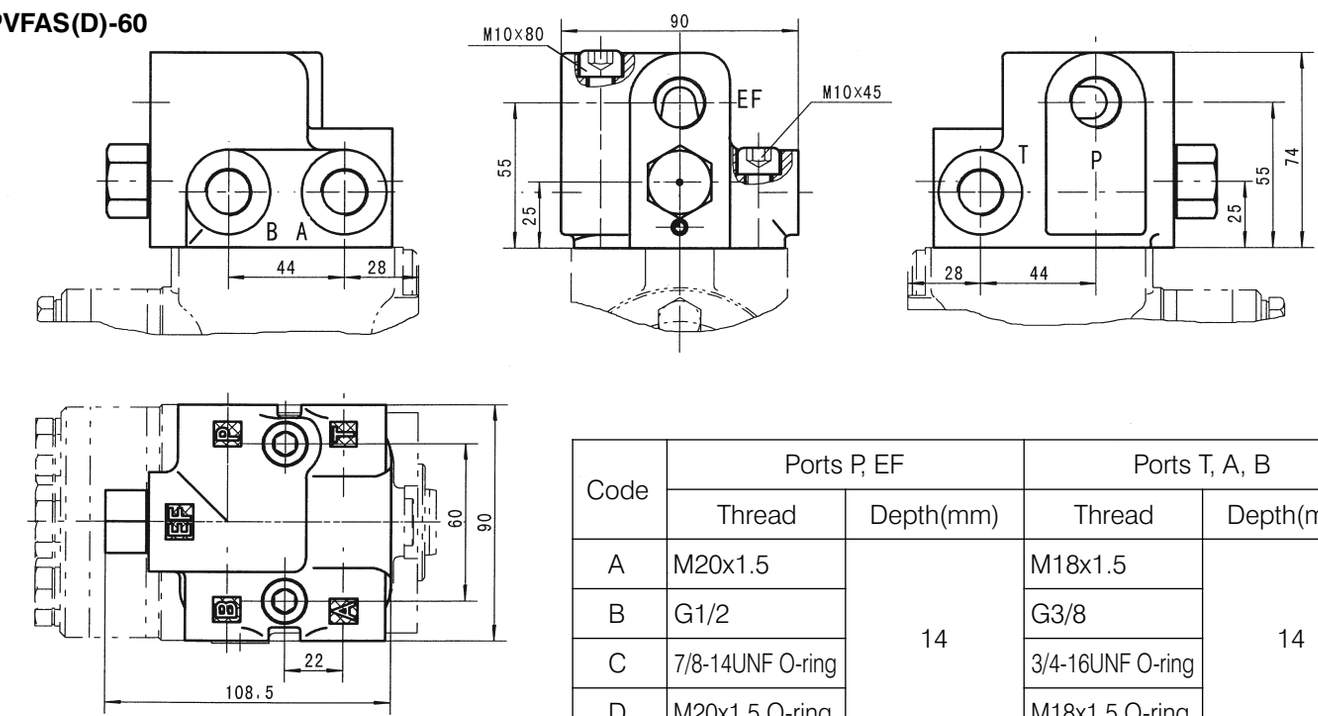
Mounting Data

PVFS(D)-40



Code	Ports P, EF		Ports T, A, B	
	Thread	Depth(mm)	Thread	Depth(mm)
A	M20x1.5	14	M18x1.5	14
B	G1/2		G3/8	
C	7/8-14UNF O-ring		3/4-16UNF O-ring	
D	M20x1.5 O-ring		M18x1.5 O-ring	

PVFAS(D)-60

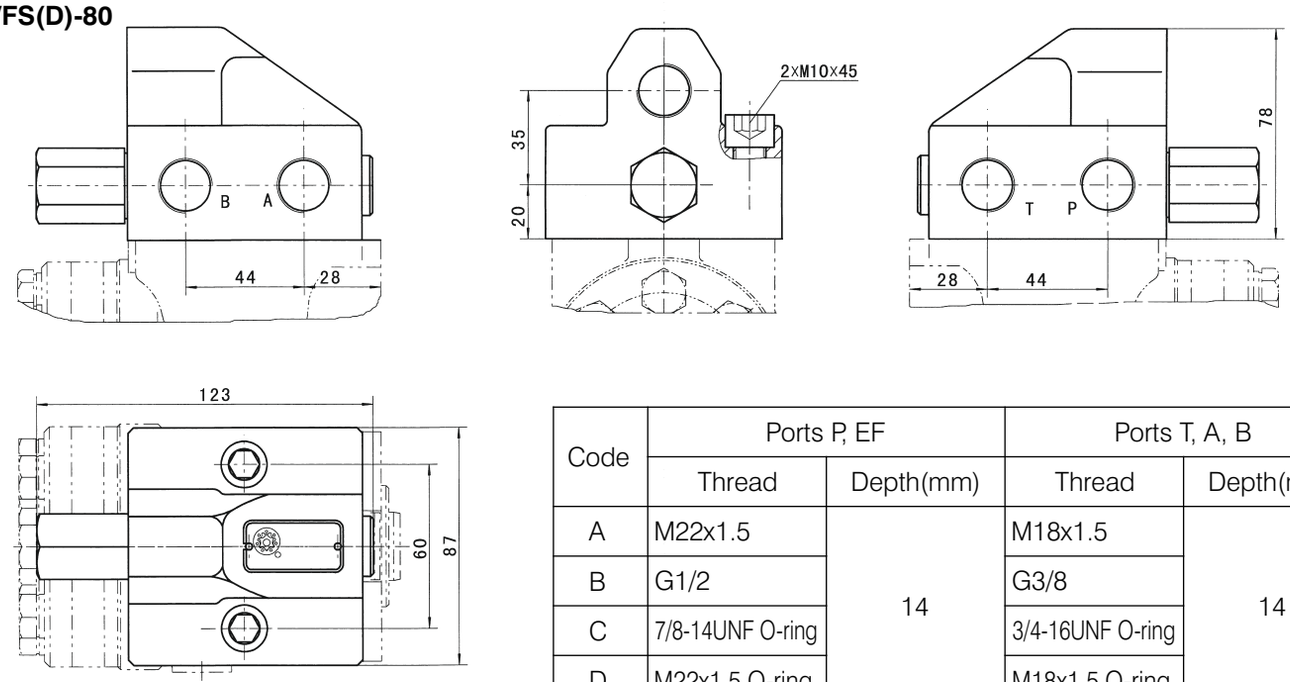


Code	Ports P, EF		Ports T, A, B	
	Thread	Depth(mm)	Thread	Depth(mm)
A	M20x1.5	14	M18x1.5	14
B	G1/2		G3/8	
C	7/8-14UNF O-ring		3/4-16UNF O-ring	
D	M20x1.5 O-ring		M18x1.5 O-ring	

PV Type Priority Valves

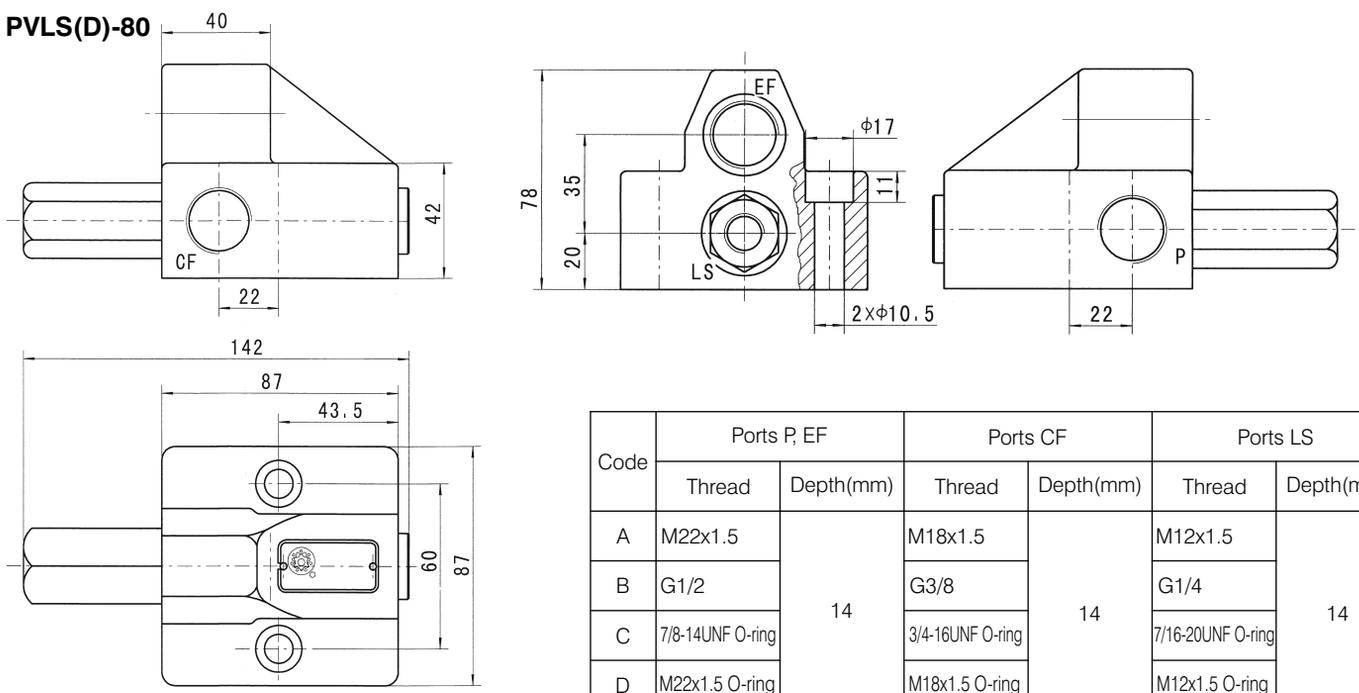
Mounting Data

PVFS(D)-80



Code	Ports P, EF		Ports T, A, B	
	Thread	Depth(mm)	Thread	Depth(mm)
A	M22x1.5	14	M18x1.5	14
B	G1/2		G3/8	
C	7/8-14UNF O-ring		3/4-16UNF O-ring	
D	M22x1.5 O-ring		M18x1.5 O-ring	

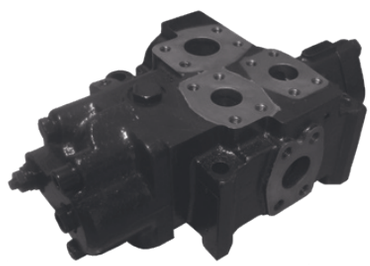
PVLS(D)-80



Code	Ports P, EF		Ports CF		Ports LS	
	Thread	Depth(mm)	Thread	Depth(mm)	Thread	Depth(mm)
A	M22x1.5	14	M18x1.5	14	M12x1.5	14
B	G1/2		G3/8		G1/4	
C	7/8-14UNF O-ring		3/4-16UNF O-ring		7/16-20UNF O-ring	
D	M22x1.5 O-ring		M18x1.5 O-ring		M12x1.5 O-ring	

LFF Type Flow Amplifying Valves

The LFF-25 Flow amplifying valve is a kind of hydraulic directional valve which can use low pressure and small flow to control high pressure and big flow. It can be used with TVV3 type steering unit as hydraulic steering system. Through adopting pressure compensation device, the flow amplifier supplies oil flow for steering cylinder. The oil flow won't vary with the loading as to ensure steering reliability and energy saving. With the features of high steering power and flexible steering, this type Flow amplifying valve is applicable to steering system in large wheeled vehicles and marine rudder.



Ordering code

LFF	25		

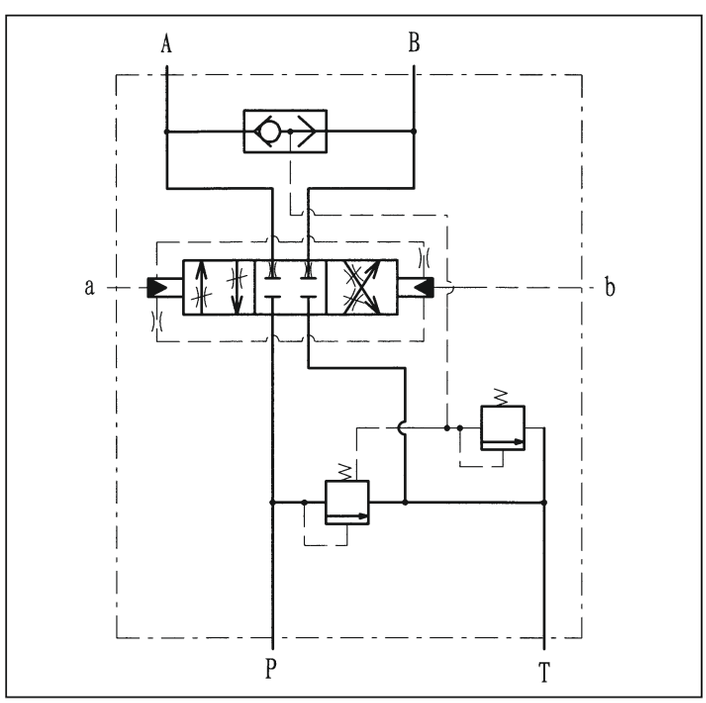
LFF Type Flow Amplifying Valves = LFF

Inside Nominal Diameter: 25mm

Max. output Flow 100L/min = No code
Max. output Flow 110L/min = B
Max. output Flow 150L/min = C

Relief Valve Pressure Settings

Function code

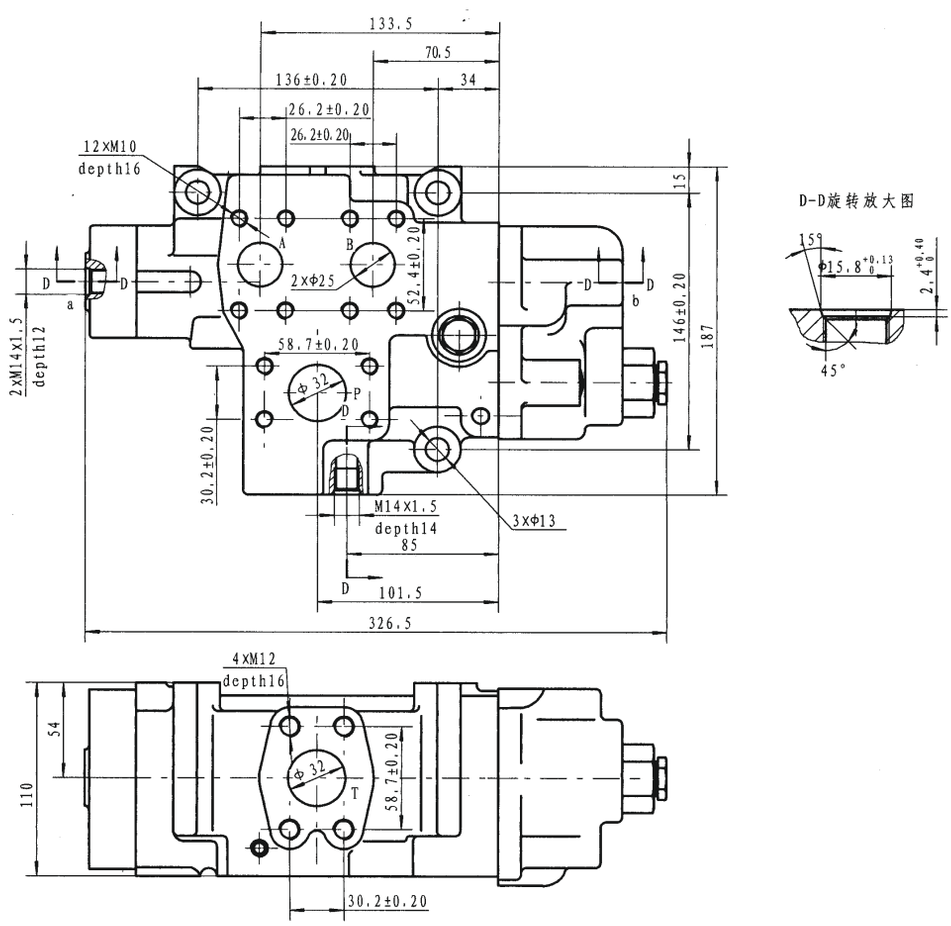


LFF Type Flow Amplifying Valves

Main Specifications

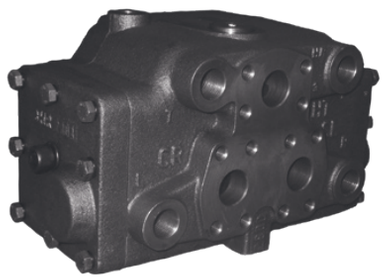
Type	Nominal pressure (Mpa)	Nominal flow (L/min)	Max.output flow (L/min)	Relief valve pressure setting range (MPa)	Unloading Pressure (Mpa)	Max.back pressure (MPa)
LFF-25	20	160	100±5	6.3~16	0.5	2
LFF-25B			110±10			
LFF-25C			150±10			

Mounting Data



LFA, LFB Type Flow Amplifiers

The LFA and LFB flow amplifiers mainly contain a priority valve, a directional valve, an amplification valve, shock valves, suction valves and etc, and they can be used with T01-5TX type steering unit as a loading sensing steering system. Through adopting proportional flow amplification special structure, the flow amplifier amplifies the oil flow from steering unit by a fixed amplification factor to steering cylinder. The amplified flow is proportional to the revolution speed of steering wheel. With the features of high steering power, flexible steering and manual steering in case of engine failure stops, this type steering system are applicable to large wheeled vehicles and marine rudder.



Ordering code

LF				

LF Type Flow Amplifier = LF

Max.input flow 250L/min = A
Max.input flow 400L/min = B

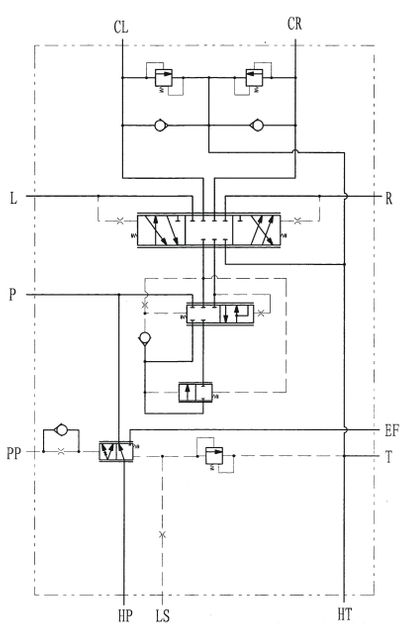
Amplification Factor

Relief Valve Pressure Settings

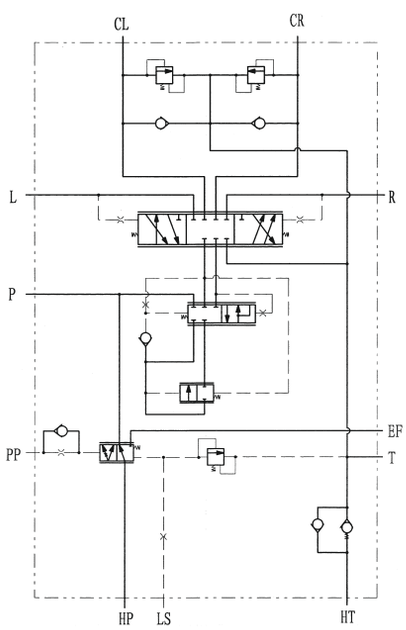
Ports Code

Function Code

LFA



LFB



LFA, LFB Type Flow Amplifiers

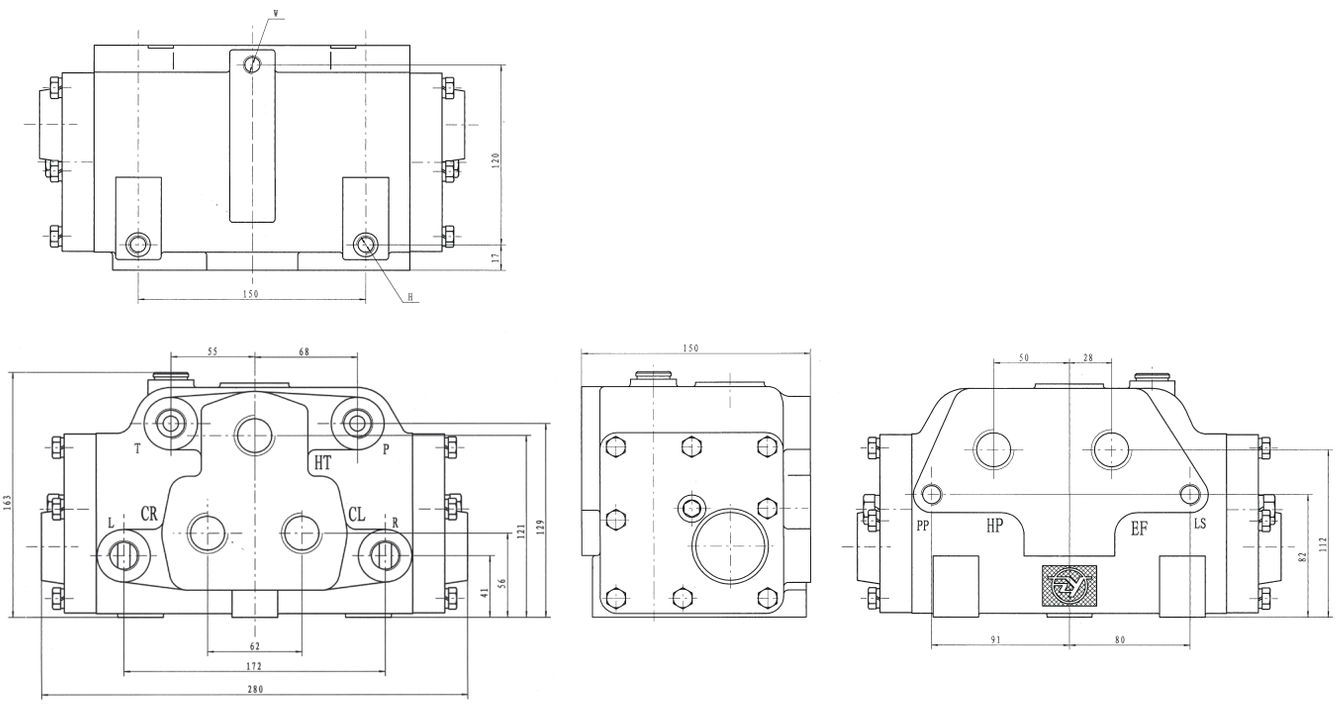
Main Specifications

Flow Amplifiers	Amplification Factor	Displacement of T01-5TX Type				
		160 mL/r	200 mL/r	250 mL/r	315 mL/r	400 mL/r
LFA	5	800	1000	1250	1575	2000
LFA	8	1280	1600	2000	-	-
LFB	5	800	1000	1250	1575	2000
LFB	8	1280	1600	2000	2520	3200

Type	Amplification Factor	Max. input Flow (L/min)	Max. input Pressure (Mpa)	Relief Valve Pressure Range (Mpa)	Shock Valves Pressure Range (Mpa)	Control Spring Pressure (Mpa)	Back Valve Opening Pressure (Mpa)
LFA5	5	250	25	10~17.5	16~25	0.7	-
LFA8	8						
LFB5	5	400	25				0.5
LFB8	8						

Mounting data

LFA (Thread Connection)

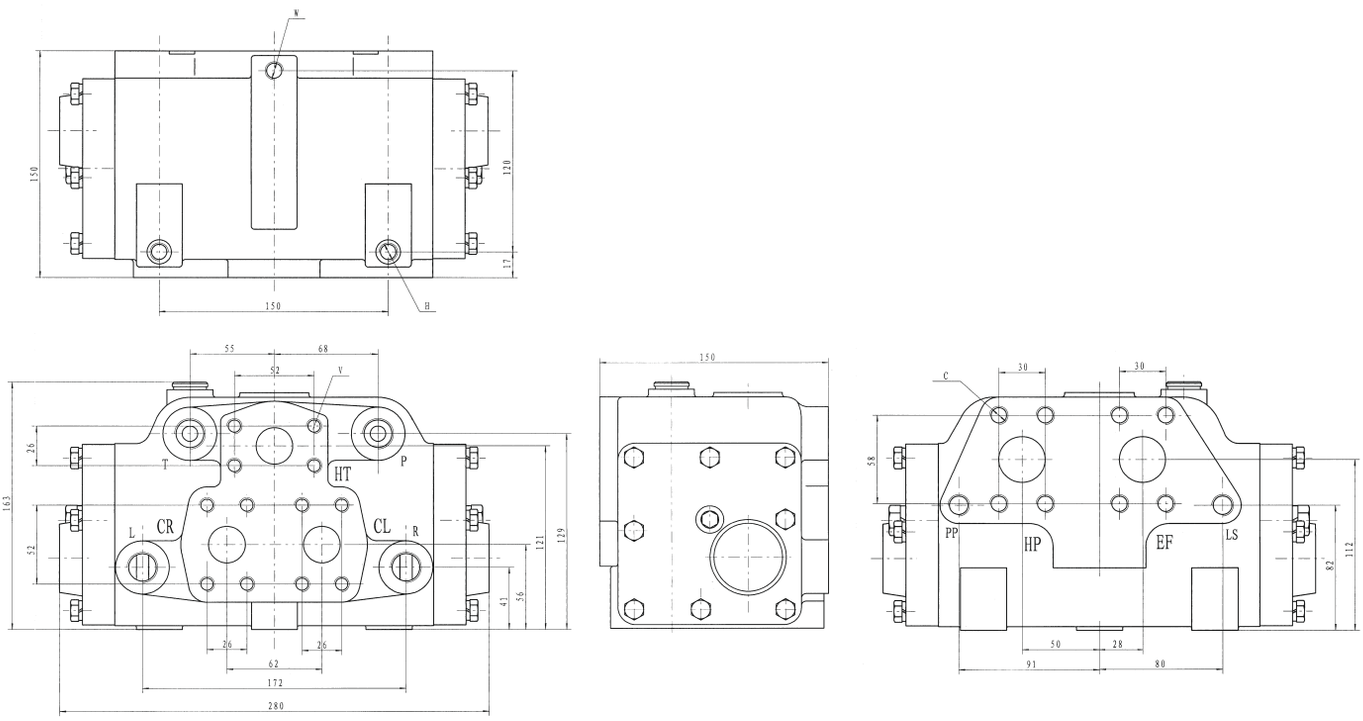


Code	Ports HP, EF	Ports HT, CL, CR	Ports P, T, L, R	Ports PP, LS	Mounting W	Mounting H
A	M27×2 Depth 20	M27×2 Depth 20	M20×1.5 Depth 20	M12×1.5 Depth 14	M10×1.5 Depth 16	M10×1.5 Depth 20
B	G3/4 Depth 20	G3/4 Depth 20	G1/2 Depth 20	G1/4 Depth 14	M10×1.5 Depth 16	M10×1.5 Depth 20
C	1 1/16-12UN Depth 20	1 1/16-12UN Depth 20	3/4-16UNF Depth20	7/16-20UNF Depth 14	7/16-14UNC Depth 16	7/16-14UNC Depth 20

LFA, LFB Type Flow Amplifiers

Mounting data

LFB (Flange Connection)



Code	Ports HP, EF	Ports HT, CL, CR	Ports P, T, L,R	Ports PP, LS	Mounting C	Mounting V	Mounting W	Mounting H
A	Ø30	Ø24	M20×1.5 Depth 20	M12×1.5 Depth 14	M12 Depth 14	M10 Depth 14	M10×1.5 Depth 16	M10×1.5 Depth 20
B	Ø30	Ø24	G1/2 Depth 20	G1/4 Depth 14	7/16-14UNC Depth 14	3/8-16UNC Depth 14	M10×1.5 Depth 16	M10×1.5 Depth 20
C	Ø30	Ø24	3/4-16UNF Depth 20	7/16-20UNF Depth 14	7/16-14UNC Depth 14	3/8-16UNC Depth 14	7/16-14UNC Depth 16	7/16-14UNC Depth 20

FZ Type Steering Columns

FZ Type Steering column suites all type of steering unit. We offer wide range of specifications which are available to customers.

Ordering code

LF					

Steering column = LF

Function
Without horn wire = 1
With horn wire from top = 2
With horn wire from side = 2a

Length of steering column

Steering wheel linkage type
Serration (shaft taper 1:12) = H
Woodruff key (shaft taper 1:12) = D

Output end linkage type
SAE Spline = Ha
Tongue = Ea

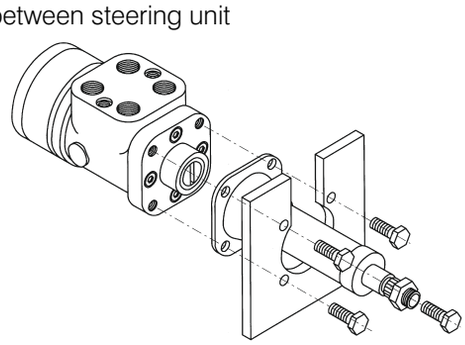
Flange linkage type
Square = F

Main Specifications

Type	Length Series	Max. Permissible load (Nm)	
		Dynamic	Static
FZ1, FZ2, FZ2a	140, 200, 225, 250, 275, 300, 325 350, 375, 400, 425, 450, 475, 500 550, 600, 650, 700, 750, 800, 850 900, 950, 1000, 1100, 1200	80	300

Recommendable mounting example

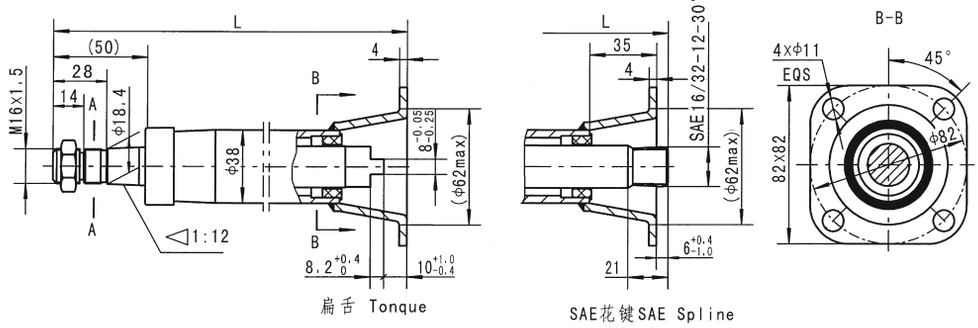
No other parts be mounted between steering unit and steering column



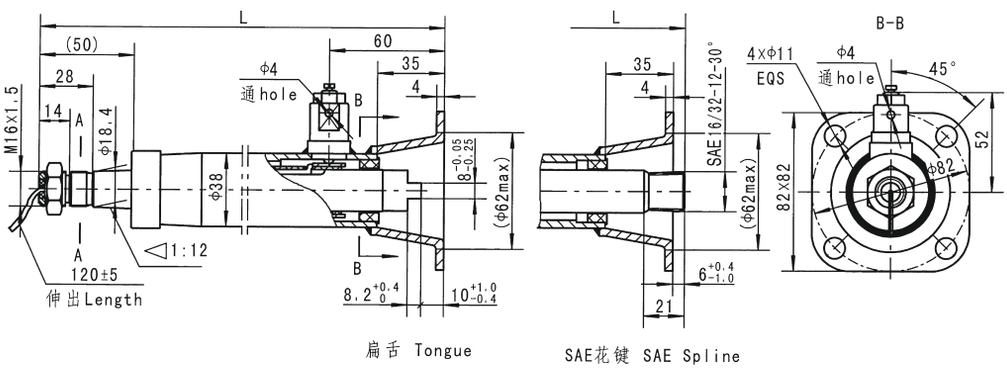
FZ Type Steering Columns

Mounting data

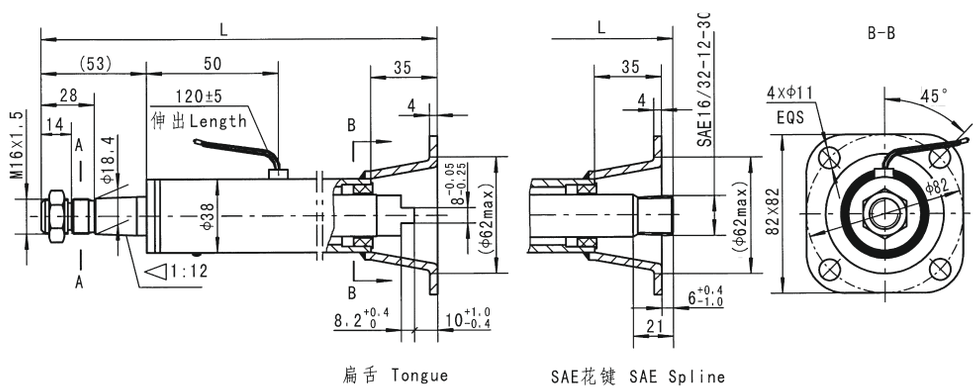
FZ1

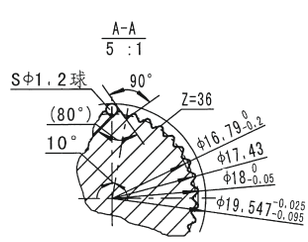


FZ2



FZ2a





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3.Due to improvement of product, Please forgive us if we change at any time without notice.

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