

Technical Information

Mobile Valves

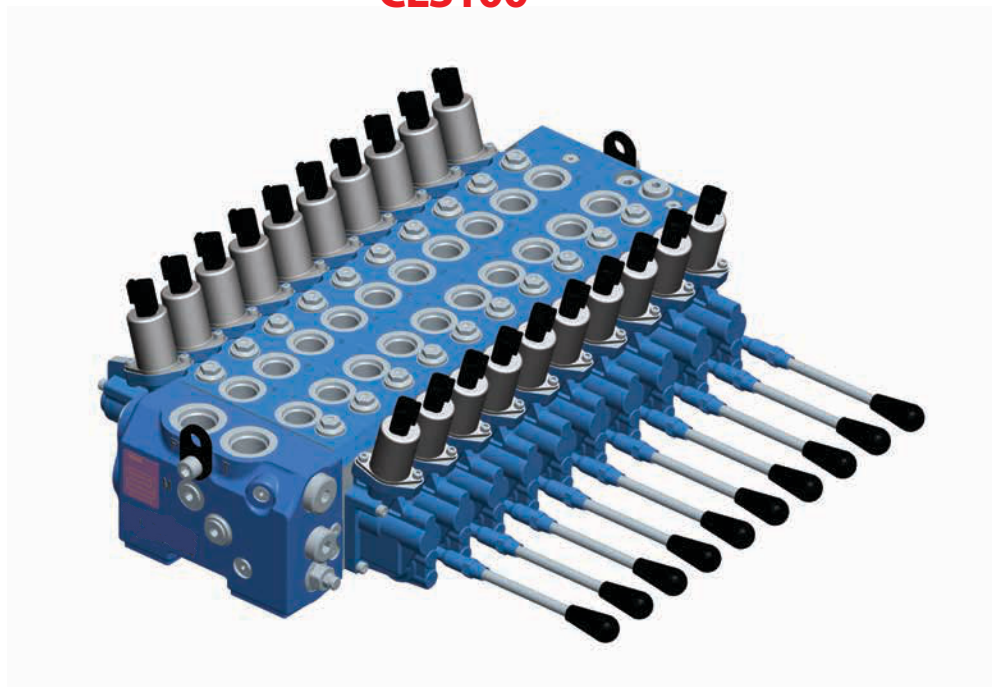
Proportional - Load Sensing

Model CLS100 / CLS180

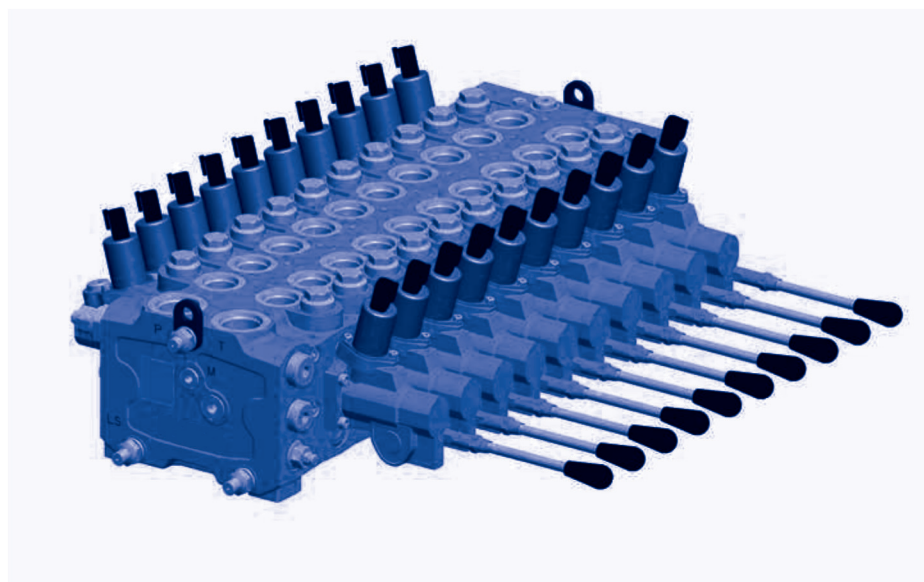
350 bar
100 l/min (CLS100)
180 l/min (CLS180)

Up to 10 sections

CLS100



CLS180



The Danfoss logo, featuring the brand name in a white, stylized script font, set against a solid red rectangular background.

BC440966067604en-000101

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Danfoss CLS

Load Sense Sectional

Mobile Valve

The Danfoss CLS Load Sensing Sectional Mobile Valve is a pre and post compensated mobile valve with a highly versatile design. This modularity is demonstrated through the availability of valve banks with up to 10 sections, a number of spool types and actuation options, mid-inlets, custom inlet manifolds and transition plates. With this flexibility, you can design your valve to meet the requirements of your machine. Add in the ability to install

both pre and post compensated sections in the same valve bank, the CLS allows you to prioritize work functions to accelerate productivity, improve machine efficiency, and enhance the safety characteristics of the machine.

Improve your machine performance with the newest load sensing valve to market, the Danfoss CLS.

Features and benefits

- Load sense circuit design is a parallel circuit with closed center spools. Available with inlet options to support both fixed and variable displacement pumps
- Both pre and post comp sections available in same valve assembly
- Flexible design with up to 10 sections
- Electro-proportional spool control achieved through a PWM proportional pressure reducing solenoid valve controlling pilot pressure to spool ends to maintain spool position
- Optional manual, hydraulic and Electro-hydraulic controls with lever overrides
- Special features available for additional design flexibility:
 - Sectional load sense relief on pre and post compensated sections
 - Adjustable spool stroke limiting device
 - Parallel connection of multiple valve banks
 - Work port relief with anti cavitation
 - Available fourth position float

Typical applications

- Excavator – Multiple sizes
- Forestry
- Refuse trucks
- Forklift
- Agricultural machinery
- Truck mounted cranes
- Marine

Specifications and performance

CLS100 & CLS180 Load Sense Sectional Mobile Valve

		CLS100	CLS180
Rated pressure	Inlet	350 bar (5076 psi)	350 bar (5076 psi)
	Work port	350 bar (5076 psi)	350 bar (5076 psi)
	Tank port	10 bar (145 psi)	10 bar (145 psi)
	Pilot Drain Port (D1/D2)	5 bar (73 psi)	5 bar (73 psi)
Rated inlet flow		150 lpm (39.6 gpm)	220 lpm (58.1 gpm)
Compensation Type		Post Compensation	Post Compensation
		Pre Compensation	NA
Rated workport flow	Post Compensated	100 lpm (26.4gpm)@ 14 bar differential pressure	180 lpm (47.6 gpm)@ 17 bar at differential pressure
	Pre Compensated	80 lpm (21.1gpm)@ 14 bar differential pressure	NA
	Pre Compensated	100 lpm (26.4gpm)@ 17 bar differential pressure	NA
Fluid cleanliness and viscosity		See Hydraulic Fluid Recommendations Bulletin 03-401	See Hydraulic Fluid Recommendations Bulletin 03-401
Ambient operating temperature range		-40°C / 60°C (-40°F / 140°F)	-40°C / 60°C (-40°F / 140°F)
Oil temperature operating range		-25°C / 80°C (-13°F / 176°F)	-25°C / 80°C (-13°F / 176°F)
Construction		Sectional	Sectional
Work sections		1 to 10	1 to 10
Maximum leakage, cylinder workport to tank		11 cc per minute at 100 bar (1450 psi)	12 cc per minute at 100 bar (1450 psi)
Port types	Inlet and Tank	SAE-12 or BSP G 3/4	SAE-16 or BSP G1
	Work Ports A and B	SAE-10 or BSP G 1/2	SAE-12 or BSP G3/4
	Inlet Pr Gauge port "M"	SAE-6 or BSP G 1/4	SAE-6 or BSP G 1/4
	LS port and Drain port	SAE-6 or BSP G 1/4	SAE-6 or BSP G 1/4
	Hydraulic Pilot	SAE-6 or BSP G 1/4	SAE-6 or BSP G 1/4
Work section options	Spools	Double acting (4 way) cylinder	Double acting (4 way) cylinder
		Bi-Directional (4 way) Motor, Full Opento Tank in Neutral	Bi-Directional (4 way) Motor, Full Opento Tank in Neutral
		Double acting (4 way) cylinder with 4th position float	NA
	Actuation	Hydraulic with top ports	Hydraulic with top ports
		Hydraulic with top ports and lever override	Hydraulic with top ports and lever override
		Hydraulic with end ports	Hydraulic with end ports
		Hydraulic with end ports, lever override, and configured for EH pilot valve installation	NA
		Electrohydraulic with lever override	Electrohydraulic with lever override
		Electrohydraulic only	Electrohydraulic only
		Manual with enclosed lever box	Manual with enclosed lever box
		Manual with exposed spool connection	Manual with exposed spool connection
	Coil voltages	12 Volt DC	12 Volt DC
		24 Volt DC	24 Volt DC
Coil connectors		Integral Deutsch DT04-2P	Integral Deutsch DT04-2P
		Amp Jr. Timer connector 106462-1	Amp Jr. Timer connector 106462-1
Electrohydraulic interface		Programmable controllers and application software	

General specifications	CLS100 (Post/pre)	CLS180 (Post)
Max number of working sections	10	10
Sectional nominal thickness (mm)	38	46
Spool stroke (mm)	7/6	7
Rated flow		
Pump flow rate (l/min)	150	220
A/B work port flow rate (l/min)	100/100	180
Working pressure inlet port P (bar)	350	350
Back pressure max		
Max pressure outlet port T (bar) (Under special conditions back pressure can be lower)	10	10
Compensation type		
Pre compensation	•	
Post compensation	•	•
Option chart		
LS Signal pressure relief valve	•	•
Full flow pressure relief valve	•	•
LS signal dump valve (electric 12/24 Vdc)	•	•
Full flow dump valve (electric 12/24 Vdc)	•	•
Spool types		
Double Acting (4 way) Cylinder	•	•
Double Acting (4 way) Cylinder with 4th Position Float	•	
Bi-Directional (4 Way) Motor, Full Open to Tank in Neutral	•	•
Spool actuation		
Hydraulic with top ports	•	•
Hydraulic with end ports	•	•
Hydraulic with stroke limiter	•	•
Hydraulic with lever actuation	•	•
Hydraulic with lever actuation with stroke limiter	•	•
Electrohydraulic with lever override	•	•
Electrohydraulic with lever override and stroke limiter	•	•
Electrohydraulic only	•	•
Electrohydraulic with stroke limiter	•	•
Electrohydraulic with hydraulic ports and lever override	•	
Electrohydraulic with hydraulic ports	•	
Manual with enclosed lever box	•	•
Manual with exposed spool connection	•	•
Port relief valve		
Relief valve		•
Anticavitation valve	•	•
Combined relief and anticavitation valve	•	•
Cavity machined and plugged	•	•
Special features		
Spools position sensor	•	•
Spool stroke limiter	•	•
Section flow limiter	•	
Section load sense pressure limiting relief*	•	•
Section remote load sense pressure limiting relief*	•	

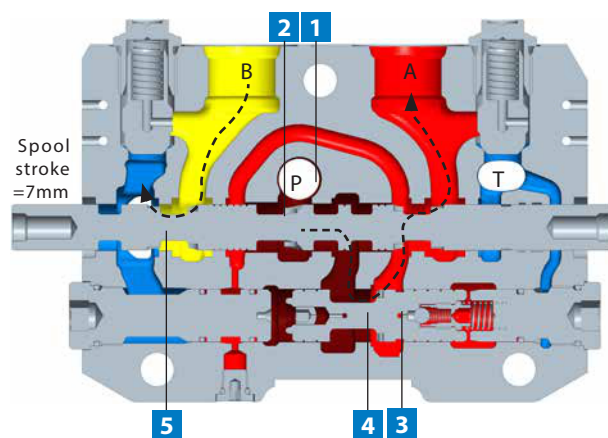
*Applies to local work ports both A and B

CLS Load Sense Sectional Mobile Valve

Product overview

Operating principle (Post Comp)

The CLS valve, completely pressure compensated, guarantees great controllability to all actuations, making workport flow dependent only on metering area (spool position). When flow saturation occurs the system reacts by implementing an equal reduction of pressure margin across all spools, generating a proportional reduction of workport flow.



Legend:

- 1 Inlet line (high pressure)
- 2 Metering notches
- 3 Load sensing line
- 4 Local compensator
- 5 Metering spool

Note: Image shown is of CLS100 for reference only

Single section

Referencing the picture to the left reveals some aspects of system functionality. From the inlet line, the high pressure flow passes across the metering area and down to the local compensator. The metering area, according to the pressure margin, controls the total amount of flow to the work-port selected by the main spool.

The load sensing signal, picked up downstream of the local compensator, feeds the common load-sensing line. When a single section is actuated, the local compensator fully opens to the left side, reaching its complete balanced position. The control of the LS system is achieved by the inlet compensator for fixed displacement pumps or the pump compensator for variable displacement pumps.

Multi-section

When two or more sections are actuated, only the function characterized by the highest pressure (dominant) is involved in the LS signal transmission. The other functions become directly dependent on it (slaves). The common LS line transfers the signal from the dominant local compensator to all dependent compensators. Driven by the LS signal, the unbalanced slave compensators activate the pressure compensation creating an artificial pressure drop able to keep pressure margin nominally the same on all the spools. Work-port flow becomes only a function of metering area making the system totally load independent.

Flow sharing section

Saturation occurs when the total amount of flow required by the valve bank is greater than the maximum pump flow rate. In this condition the system is not able to maintain the nominal pressure margin, reducing the margin according to real flow demand. As a result all the local section compensators experience the same LS signal and the same pressure drop is applied to different metering areas, reducing work-port flows proportionally in order to keep all actuations completely under control.

CLS Load Sense Sectional Mobile Valve

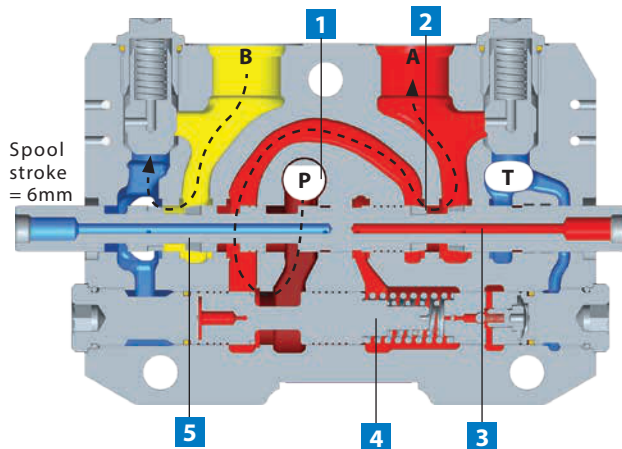
Product Overview

Operating principle (Pre Comp Section) CLS100 only

The unique design of CLS valves allows one or more pre-compensated sections to be designed into a normally configured valve. The advantage of having a pre-compensated section available within a post-compensated system (a rather unique configuration among flow sharing systems) lies in the fact that a priority flow function can be guaranteed.

In a saturation condition, all post compensated sections will proportionally reduce their delivered flows, while the pre-compensated section will keep a constant delivered flow in order to guarantee the priority of the function.

Work section flow path P-A and B-T (pre comp)



Legend:

- 1 Inlet line (high pressure)
- 2 Metering notches
- 3 Load sensing line
- 4 Local compensator
- 5 Metering spool

Single section

Referencing the picture to the left reveals some aspects of system functionality. From the inlet line, the high pressure flow passes across section compensator where the spring provides sectional margin pressure which is addition to the inlet compensator spring pressure. The metering area comes into picture after the sectional compensator as this being pre-compensation. The metering area, according to the pressure margin, controls the total amount of flow to the work-port selected by the main spool.

Pressure differential acting on the compensator spool is picked from either side of the main metering orifice. Compensator spools reference the load sense signal picked up before the load sense shuttle. Pump to load sense pressure differential is controlled by compensator springs

Multi-Section

When flow demand exceeds flow supply the lowest loaded section takes priority over the highest loaded section

Flow Priority

CLS100 offers a precious additional feature: The possibility to mix pre and post compensated technologies in single bank, to improve the control capabilities and manage flows with different priorities.

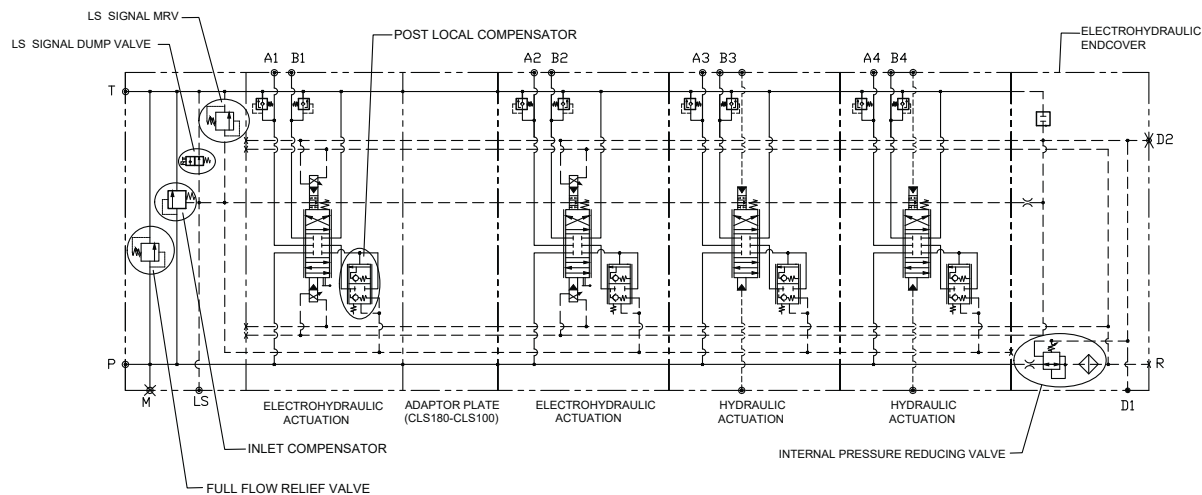
CLS Load Sense Sectional Mobile Valve

Product Overview

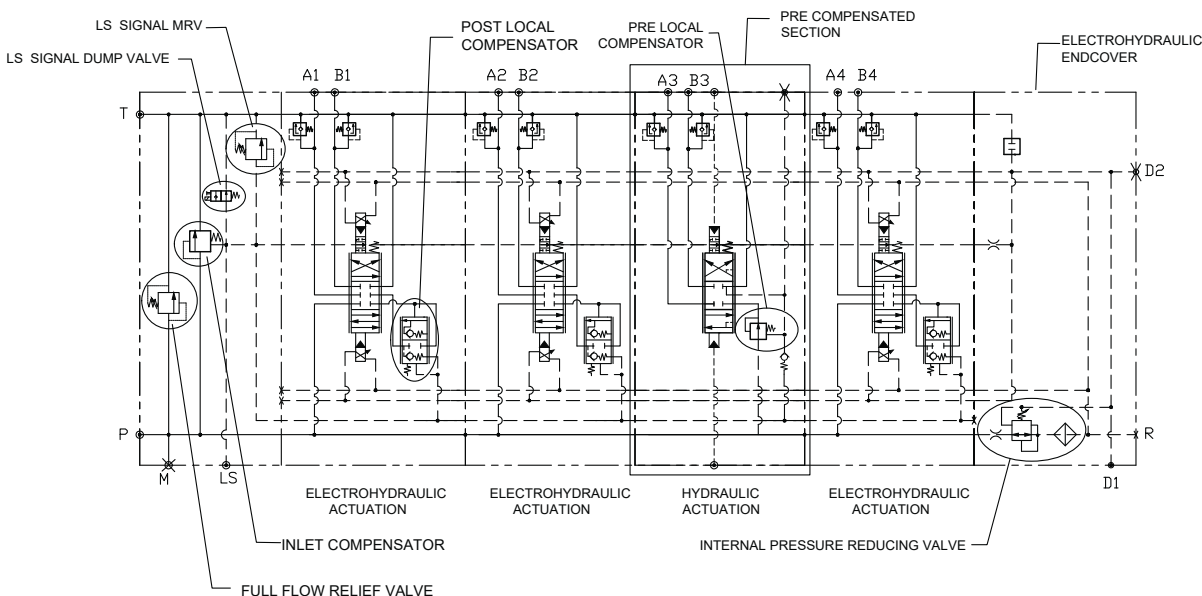
The CLS valve line allows customer the ability to combine pre and post compensated valve sections in the same valve bank. The pre-compensated section acts as a priority flow sharing function by diverting flow to the pre-compensated function first, then to the remaining sections in the bank.

The following schematics show an example of an all post-compensated system, and a system with an integrated pre-compensated section.

Post-compensated system



Pre-compensated system



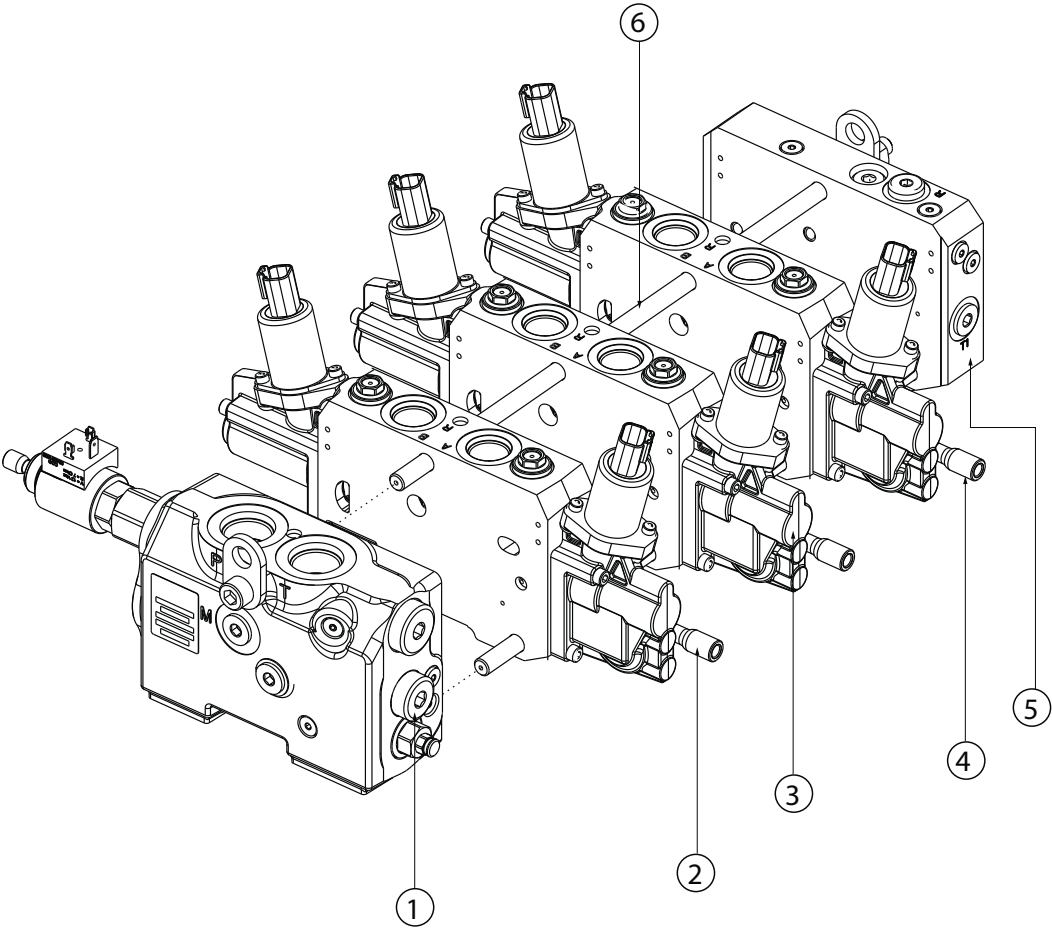
CLS Load Sense Sectional Mobile Valve

Ordering example

Valve bank order example

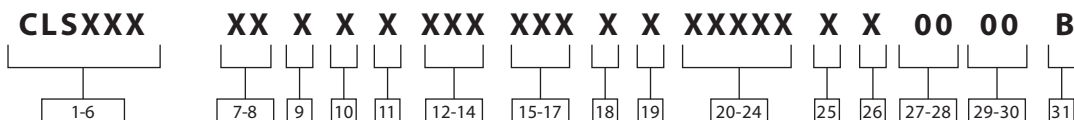
	CLS100	CLS180
1.Inlet	CLS100LSL125000ZZ00B	CLS180LSL210000ZZ00B
2.Section	CLS101PESDA040040CP000P000Z000ZBL00B	CLS181PESHA180180DZ000Z000ZZL00B
3.Section	CLS101PESDA040040CP000P000Z000ZBL00B	CLS181PESHA180180DZ000Z000ZZL00B
4.Section	CLS101PESDA040040CP000P000Z000ZBL00B	CLS181PESHA180180DZ000Z000ZZL00B
5.Endcover	CLS102GS00B	CLS182FS00B
6.CLS/3 Section Tie Rod Kit	6042571-003	6042926-003
7.Paint	Refer page #10 for paint details	

Note: Repeat section model code for additional sections.



Note: Image shown is of CLS100 for reference only

Model code for valve bank



1-6 Product Series

CLS100 – Load Sense Sectional Mobile Valve: Standard Valve Bank Inlet
CLS180 – Load Sense Sectional Mobile Valve: Standard Valve Bank Inlet

7-8 Number of Sections

XX – Replace XX with number of sections (e.g. 01 or 02,... up to 10)
 This number will vary as per requirement of work sections in bank assembly

9 Inlet Type

L – Load Sensing (Variable disp. pumps)
U – Unload for Open Center (fixed disp. pumps)

10 Inlet Ports

B – BSP
 CLS100- (G3/4 P&T, G1/4 LS&M)
 CLS180- (G1 P&T, G1/4 LS&M)
S – SAE
 CLS100- (-12 P&T, -6 LS&M)
 CLS180- (-16 P&T, -6 LS&M)

11 Inlet Reliefs*

D – LS & Full Flow Reliefs
L – LS Relief Only
R – Full flow relief only
Z – No Reliefs

12-14 Load Sense Relief* Setting

XXX – 3 Digit Load Sense Relief Setting in 5 Bar Increments, Code 000 if none

15-17 Full Flow Relief * Setting

XXX – 3 Digit Full Flow Relief Setting in 5 Bar Increments, Code 000 if none

18 Inlet Dump Valve

F – Full Flow Dump Valve
L – LS Dump Valve
Z – No Dump Valve

19 Inlet Coil

A – 12V Coil with DIN Connector
B – 24V Coil with DIN Connector
C – 12V Coil Deutsch Connector
D – 24V Coil Deutsch Connector

E – 12V Coil AmpJr Connector

F – 24V Coil AmpJr Connector

Z – No Coil

20-24 Sections #, @

XXXXX – 5 Digit work section part number (Assigned by Danfoss engineering)
 Repeat these 5 digit work section part number as per build requirement.
 Total number of digits for 10 section bank for referring here are 50 digits.

25 End cover**

F – Electrohydraulic with external end drain
G – Electrohydraulic with external side drain
H – Hydraulic or manual with internal drain
K – Hydraulic or manual with external drain
N – Electrohydraulic with internal drain

26 End cover ports

B – BSP (G1/4 pilot drain)
S – SAE (-6 pilot drain)

27-28 Paint/Coating***

00 – None
0B – Glossy Black
AU – Standard Flat Black
BD – Yellow
OC – Red
CD – Danfoss Blue (Primer)
OK – Green

29-30 Special Features

00 – No special features

31 Design Level

B – Latest design

Notes:

* Refer Inlet modelcode for detail, Page 23

** Refer End cover modelcode for detail, Page 43

*** All paint is finish coat with exception to blue, which is a primer coat.

Position for sections can vary from 20 to 69 digits as per number of sections required in bank assembly. Based on this next features position will change.

® When selecting Actuation sequence for work section for LH build it is required to have A,C,L should be stacked first near inlet section and to be followed by B,D,E & G to avoid interference between section
 When selecting Actuation sequence for work section for RH build it is required to have B,D,E & G should be stacked first near inlet section and to be followed by A,C,L to avoid interference between section

§ Refer power source for offering

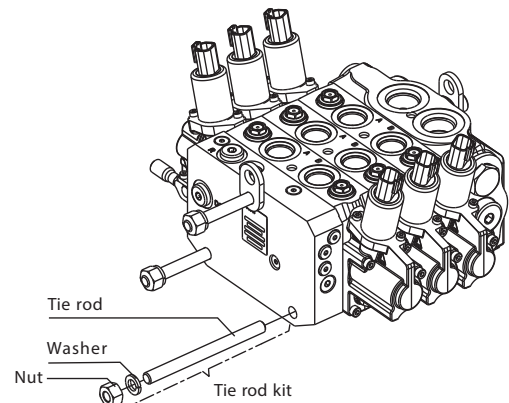
CLS Load Sense Sectional Mobile Valve

Tie Rod Kits

Tie rod kits are required to complete a valve bank assembly. Tie rod length depends on the number of sections in the bank.

Tie rod kits for CLS100 bank assembly

Description	CLS100		CLS180	
	Tie Rod Kit P/N	Length (mm)	Tie Rod Kit P/N	Length (mm)
1 Sect.	6042751-001	102	6042926-001	183
2 Sect.	6042751-002	140	6042926-002	229
3 Sect.	6042751-003	178	6042926-003	275
4 Sect.	6042751-004	217	6042926-004	321
5 Sect.	6042751-005	255	6042926-005	368
6 Sect.	6042751-006	293	6042926-006	414
7 Sect.	6042751-007	331	6042926-007	460
8 Sect.	6042751-008	370	6042926-008	507
9 Sect.	6042751-009	408	6042926-009	553
10 Sect.	6042751-010	445	6042926-010	599



Note: Image shown is of CLS100 for reference only

Note:

CLS100:

1. Tightening torque: 40Nm
2. Each tie rod kit includes 3 tie rods, 3 nuts and 3 washer

CLS180:

1. Tightening torque: 70Nm
2. Each tie rod kit includes 3 tie rods, 6 nuts and 6 washer

Transition plates

Frame size	Type	P/N
CLS180/100	Transition plate	6045191-001

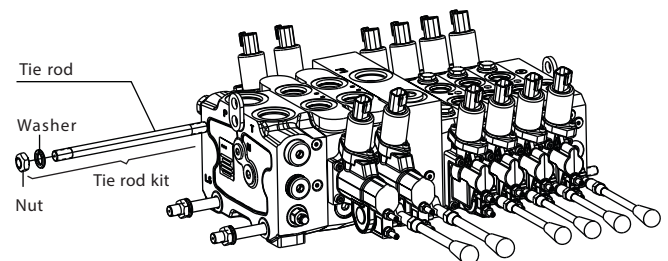
Tie rod kits for CLS180 sections for CLS180 to CLS100 transition plate part #6045191-001

Tie Rod Kit	Desc.	Tie Rod Kit	Length (mm)
CLS180/1	1 Sect.	6044401-001	156
CLS180/2	2 Sect.	6044401-002	202
CLS180/3	3 Sect.	6044401-003	249
CLS180/4	4 Sect.	6044401-004	295
CLS180/5	5 Sect.	6044401-005	341
CLS180/6	6 Sect.	6044401-006	387
CLS180/7	7 Sect.	6044401-007	434
CLS180/8	8 Sect.	6044401-008	480
CLS180/9	9 Sect.	6044401-009	526

Tightening Torque: 70 Nm

Note:

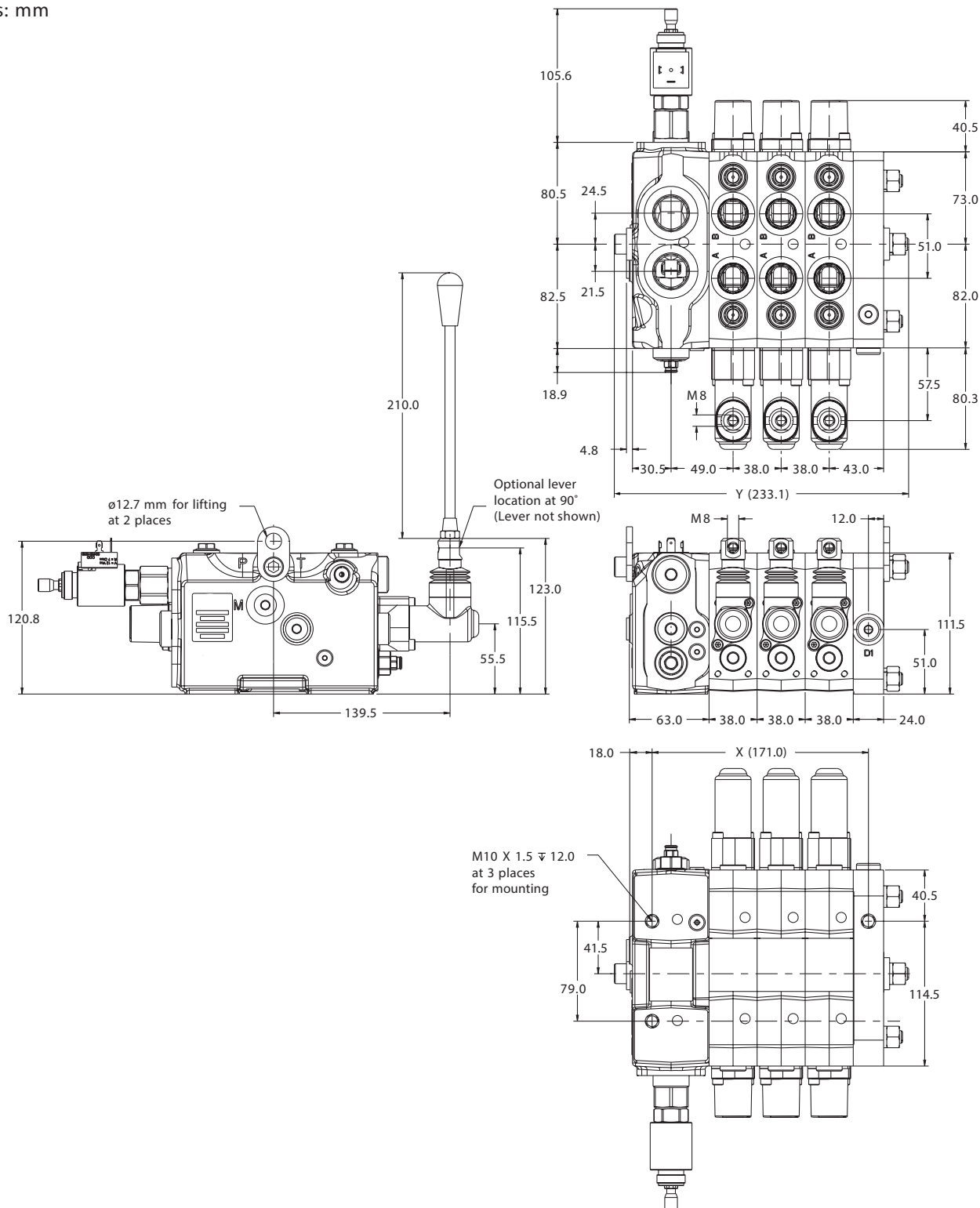
This kit includes 3 tie rods, 3 nuts, 3 washers and used on CLS180 side interface.



CLS Load Sense Sectional Mobile Valve

CLS100 with manual actuation and enclosed lever box

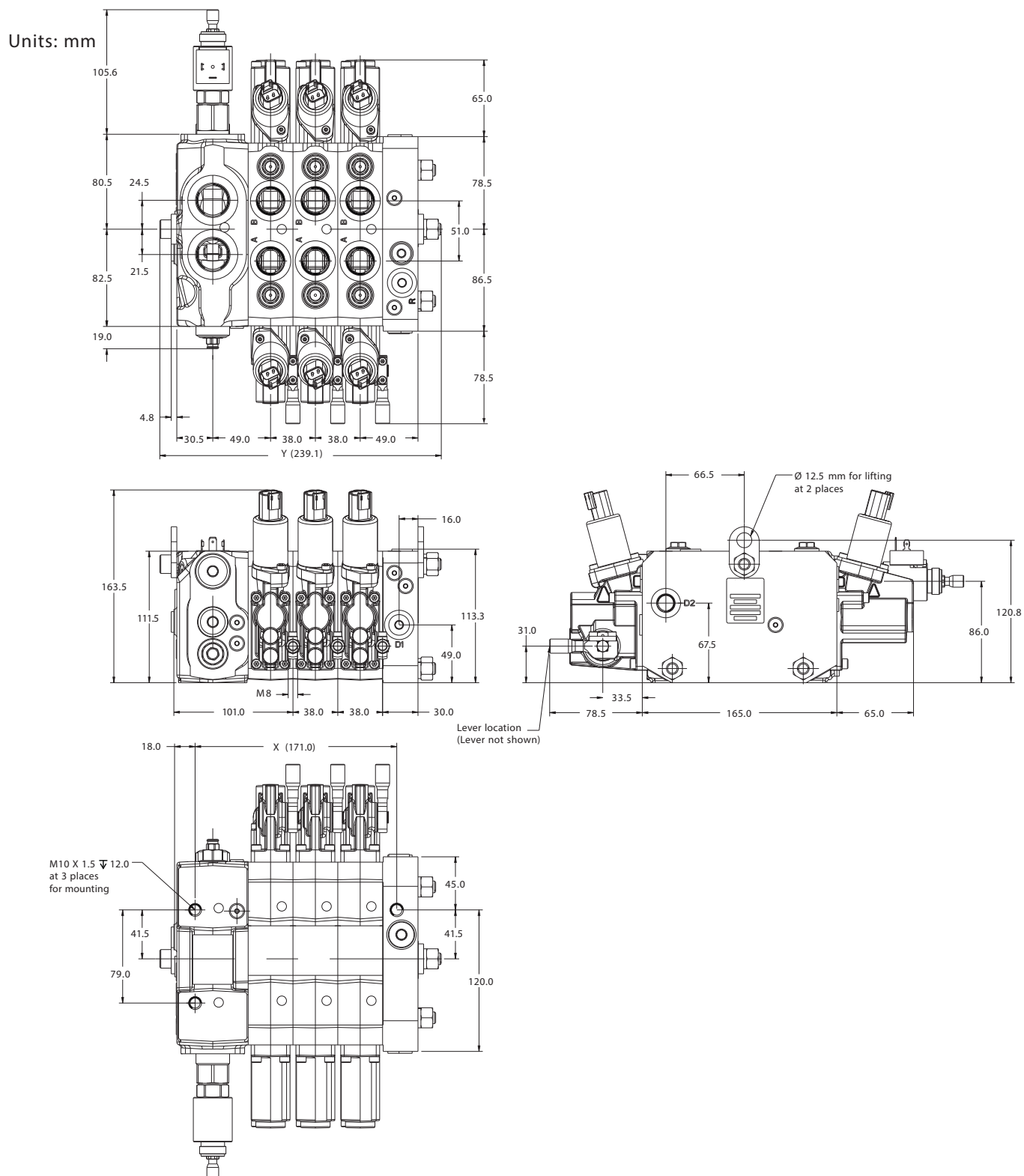
Units: mm



Dimension	Number of sections									
	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
X (mm)	95	133	171	209	247	285	323	361	399	437
Y (mm) Max	157	195	233	272	310	348	386	425	463	500
Weights (kg)	14.5	18.5	22.5	26.5	30.5	34.5	38.5	42.5	46.6	50.5

CLS Load Sense Sectional Mobile Valve

CLS100 with electrohydraulic actuation

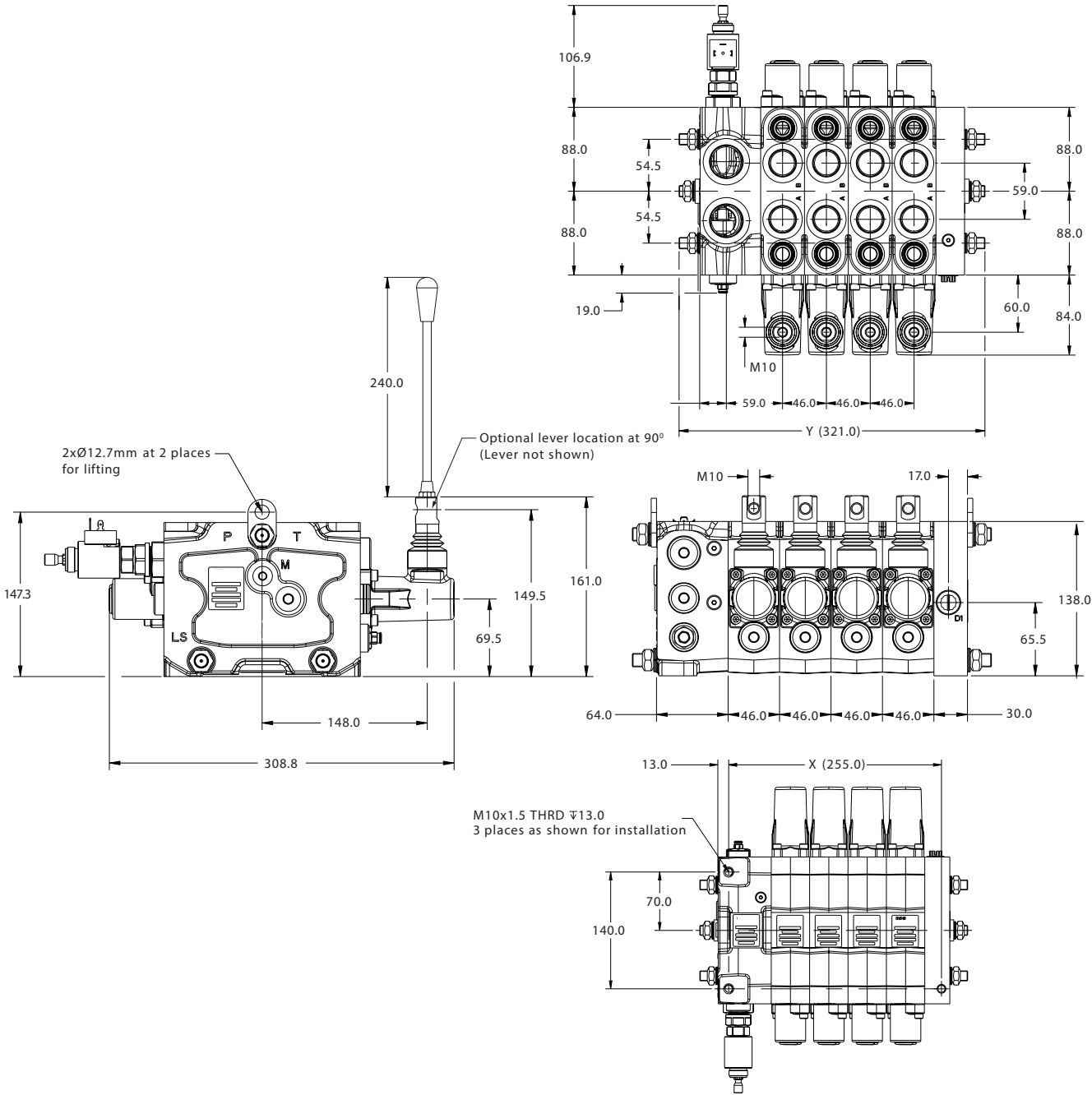


Dimension	Number of sections									
	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
X (mm)	95	133	171	209	247	285	323	361	399	437
Y (mm) Max	163	201	239	278	316	354	392	431	469	506
Weights (kg)	15	19.5	24.0	28.5	33.0	37.5	42.0	46.5	51.0	55.5

CLS180 Load Sense Sectional Mobile Valve

CLS180 with manual actuation and enclosed lever box

Units: mm

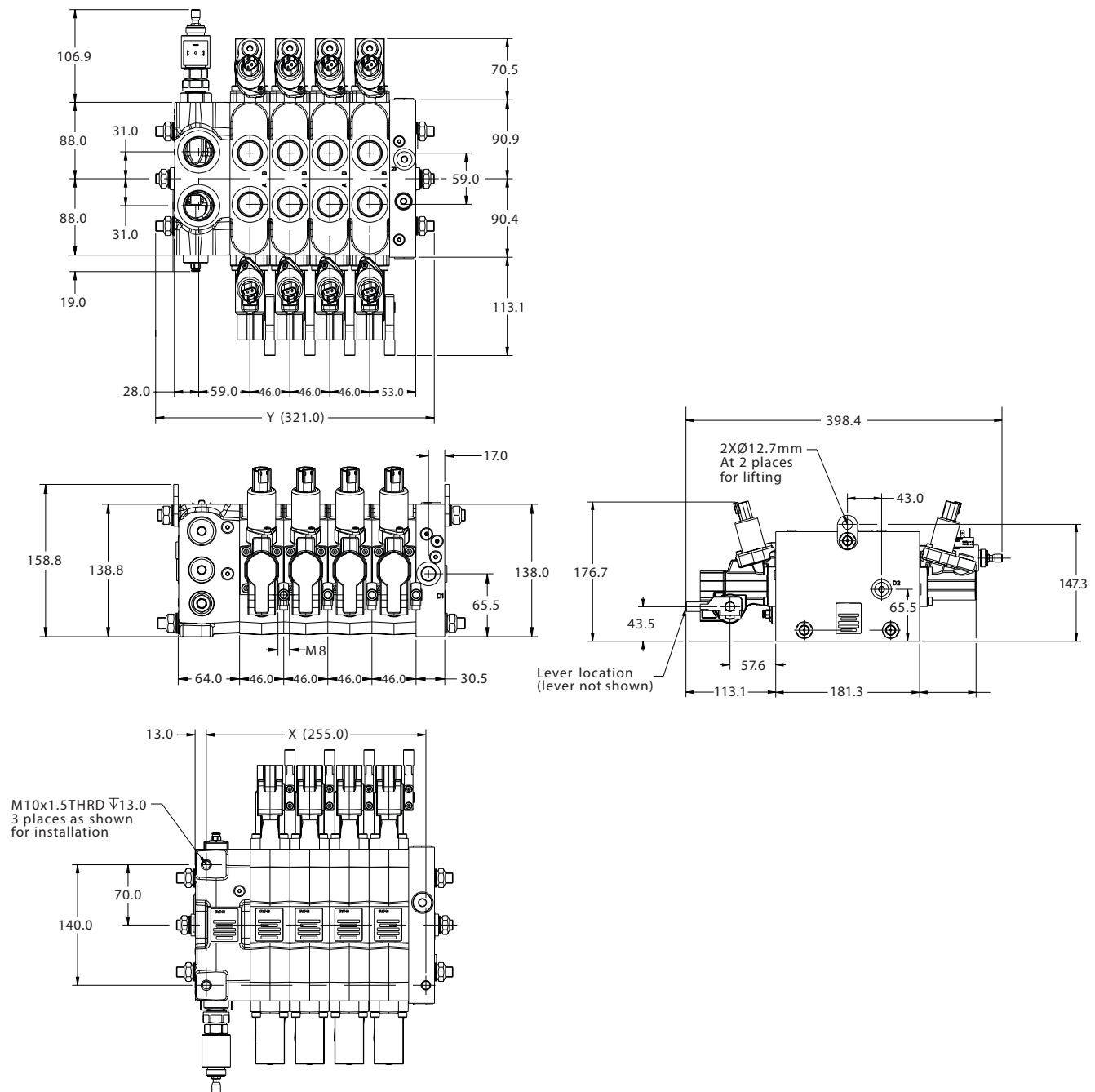


Dimension	Number of sections									
	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
X (mm)	117	163	209	255	301	347	393	439	485	531
Y (mm)	183	229	275	321	368	414	460	507	553	599
Weights (kg)	23.8	30	36.2	42.4	48.6	54.8	61	67.2	74.3	79.6

CLS180 Load Sense Sectional Mobile Valve

CLS180 with electrohydraulic actuation

Units: mm



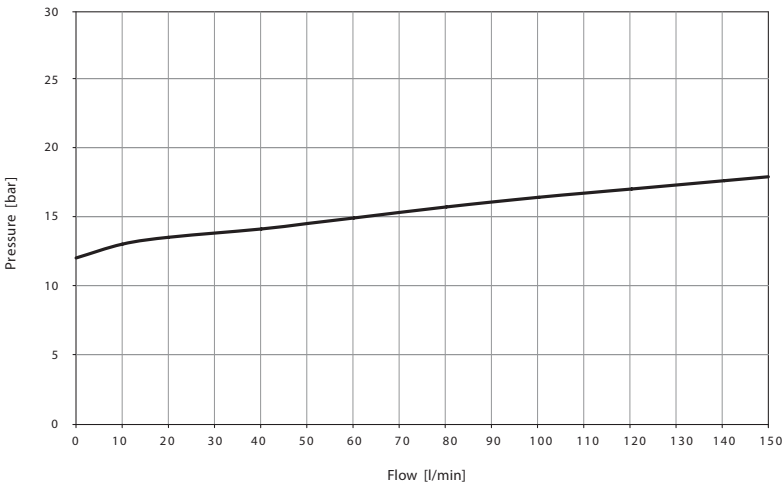
Dimension	Number of sections									
	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
X (mm)	117	163	209	255	301	347	393	439	485	531
Y (mm)	183	229	275	321	368	414	460	507	553	599
Weights (kg)	23.8	30	36.2	42.4	48.6	54.8	61	67.2	74.3	79.6

CLS100 Load Sense Sectional Mobile Valve

Typical curves

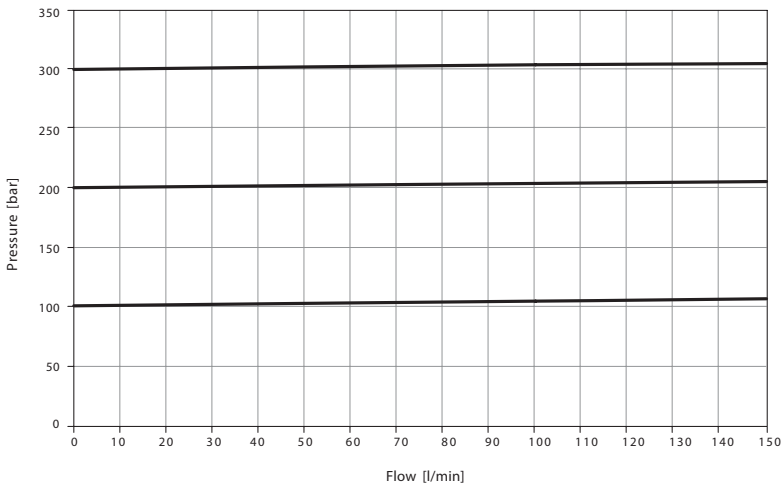
Inlet compensator pressure drop (P-T)

Fixed displacement system: Pressure drop across the inlet compensator as function of pump flow



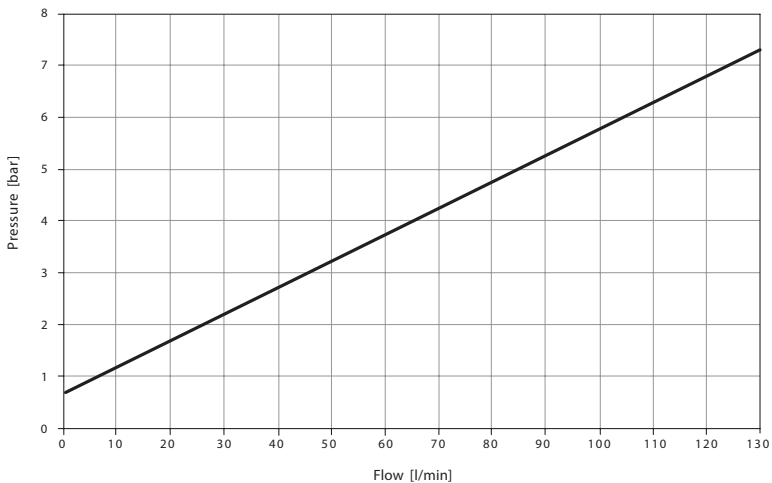
LS signal pressure relief valve

Fixed displacement system: LS Signal pressure relief valve characteristic



Full flow dump valve

Fixed displacement systems: Pressure drop across open electric dump valve as function of pump flow

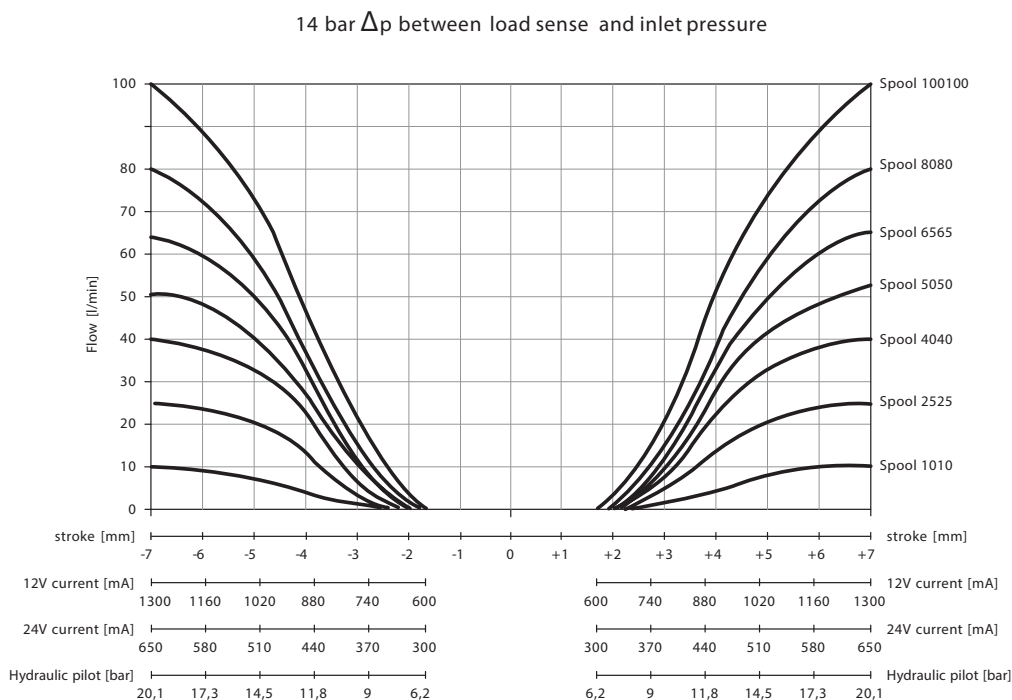


CLS100 Load Sense Sectional Mobile Valve

Typical curves

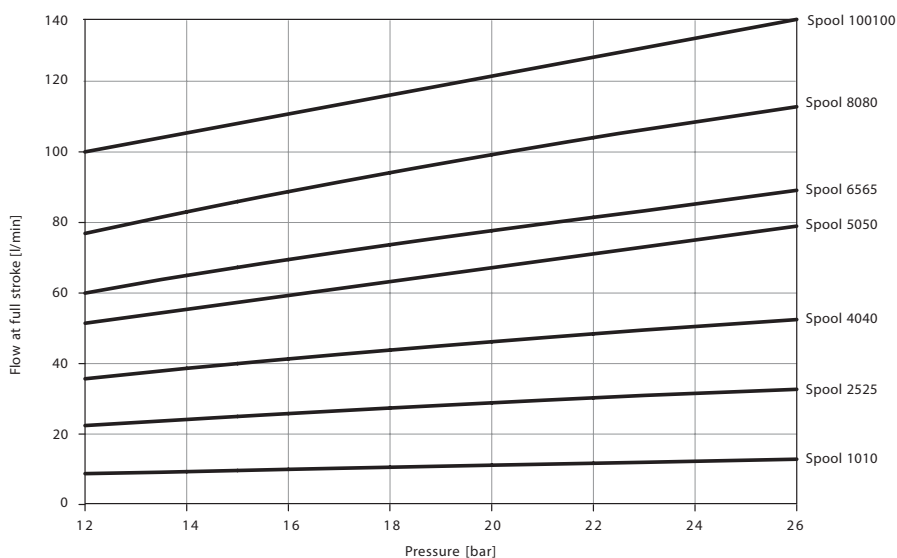
Post-compensated spool flow characteristic

Flow on ports A and B as function of spool stroke, pilot pressure, control current.



Spool flow versus delta pressure

With post comp, maximum flow is a function of the delta P created by the variable displacement pump



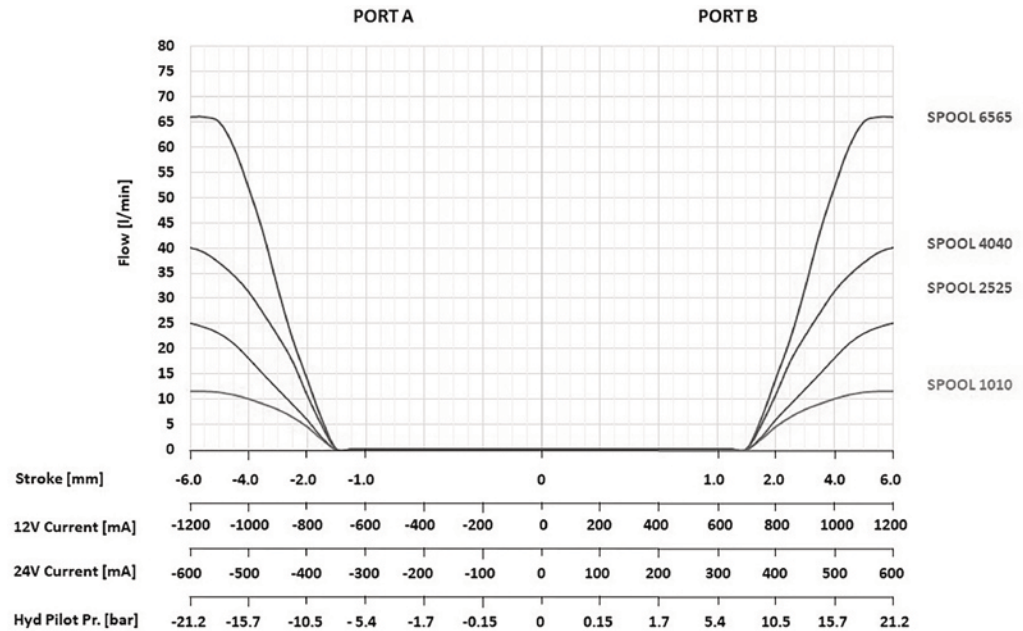
CLS100 Load Sense Sectional Mobile Valve

Typical curves

Pre-compensated spool flow characteristic

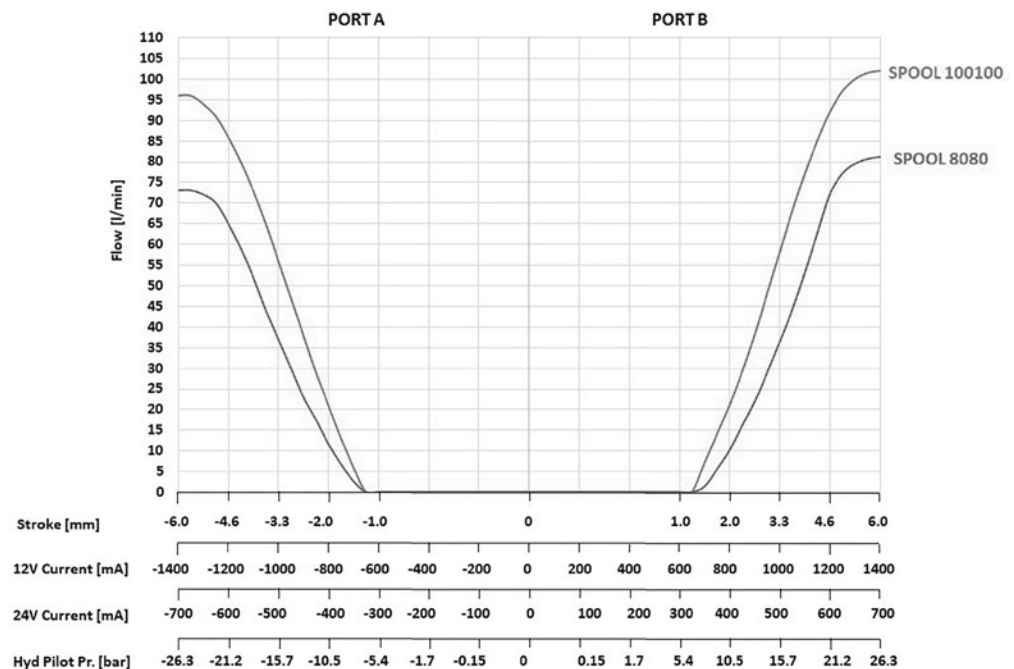
Flow on ports A and B as function of spool stroke, pilot pressure, control current.

14 bar Δp between load sense and inlet pressure



80 lpm Rated flow requires 14 bar ΔP between inlet and load sense & requires special section compensator spring

100 lpm Rated flow requires 17 bar ΔP between inlet and load sense & requires special section compensator spring (need special inlet with 17 bar margin spring when used with open centre inlet)

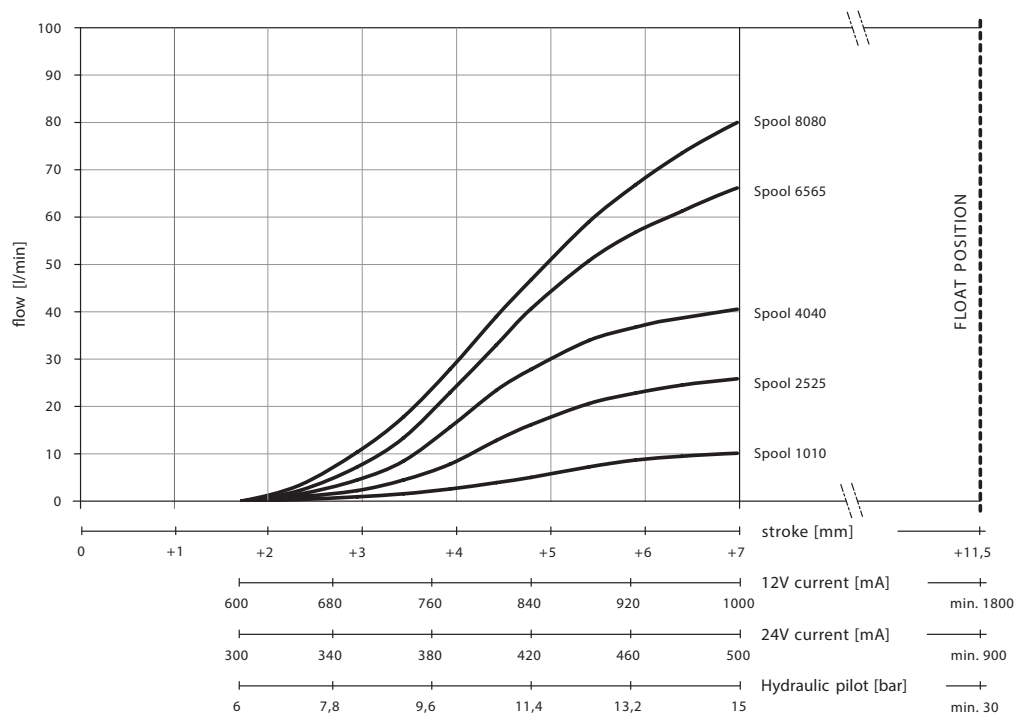


CLS100 Load Sense Sectional Mobile Valve

Typical curves

Post-compensated four position float spool characteristic

Flow and float position as function of spool stroke, pilot pressure, control current

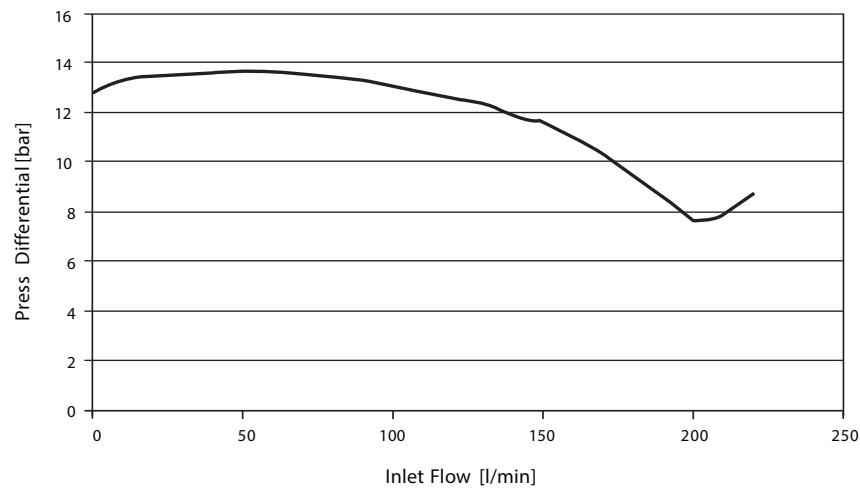


CLS180 Load Sense Sectional Mobile Valve

Typical curves for inlet

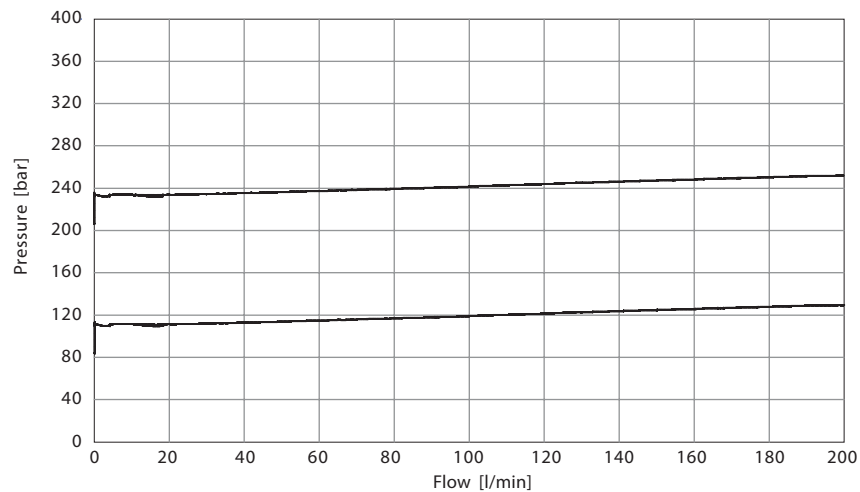
Inlet compensator pressure drop (P-T)

Fixed displacement system: Pressure drop across the inlet compensator as function of pump flow



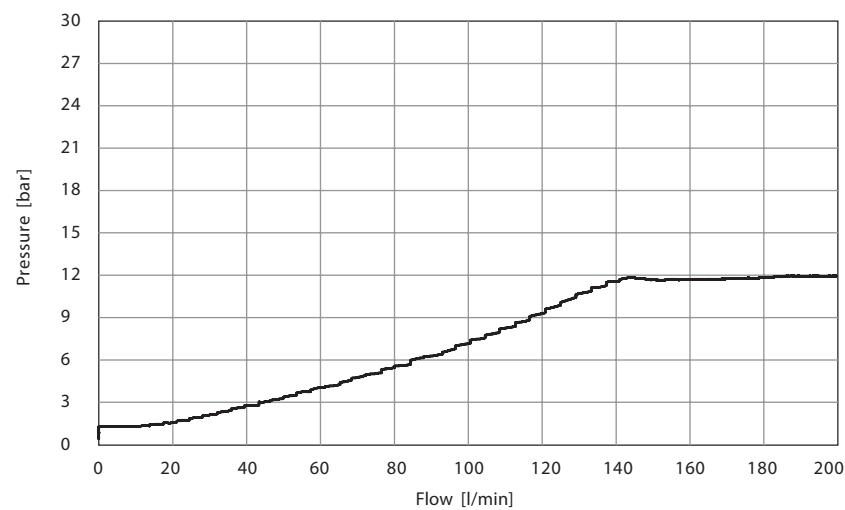
LS Signal pressure relief valve

Fixed displacement system: LS Signal pressure relief valve characteristic



Full flow dump valve

Fixed displacement systems: Pressure drop across open electric dump valve as function of pump flow



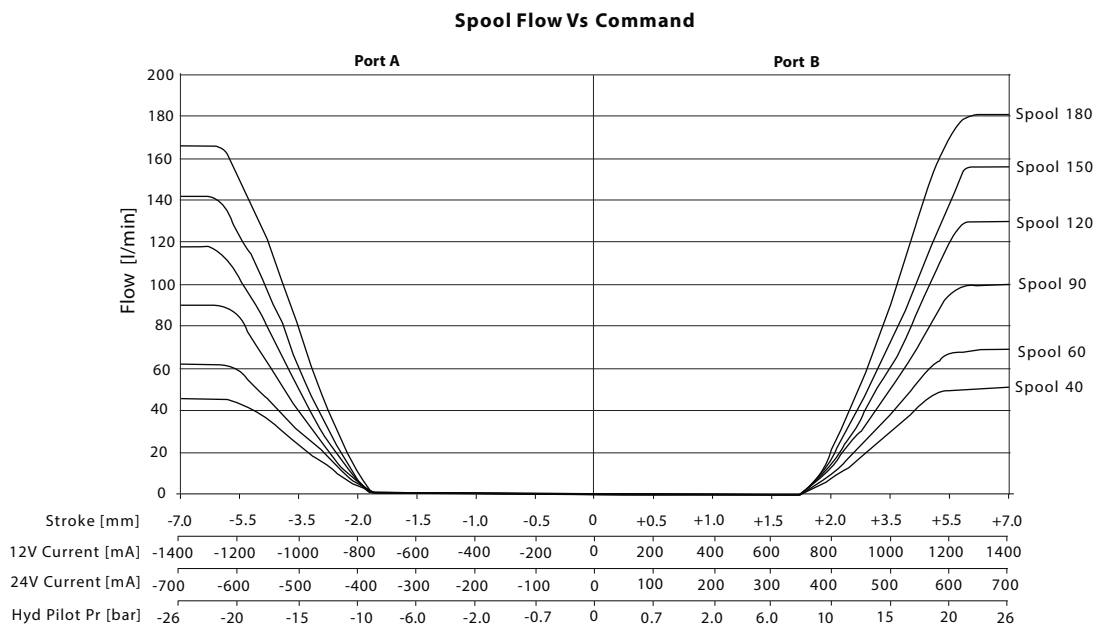
CLS180 Load Sense Sectional Mobile Valve

Typical curves for work section

Post-compensated spool flow characteristic

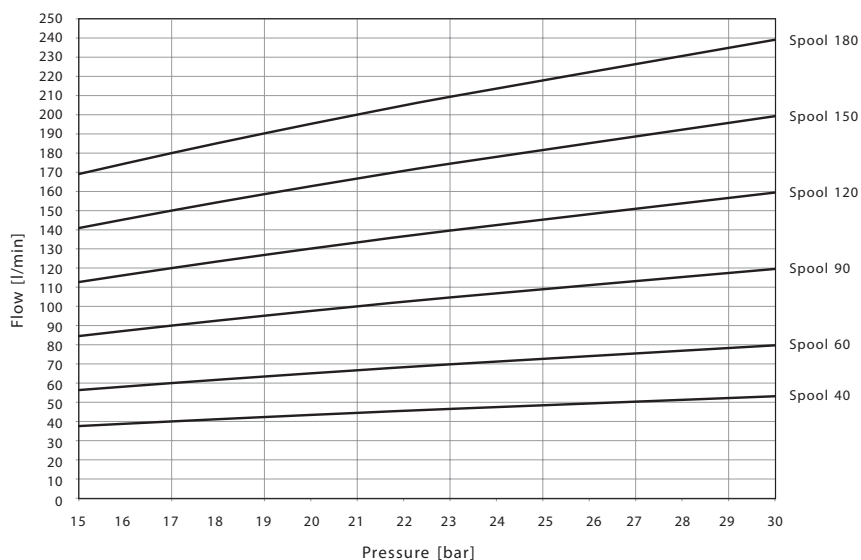
Fixed displacement systems: Flow on ports A and B as function of spool stroke, pilot pressure, control current Inlet flow: 220 l/min

Pump inlet compensator at 17 bar Δp



Post compensated spool flow with variable displacement pumps

Variable displacement systems: Spools maximum delivered flow as function of pump Δp setting



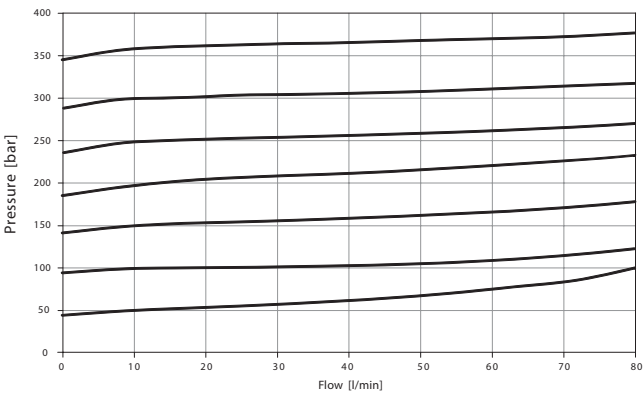
CLS Load Sense Sectional Mobile Valve

Typical work port auxiliary valve curves

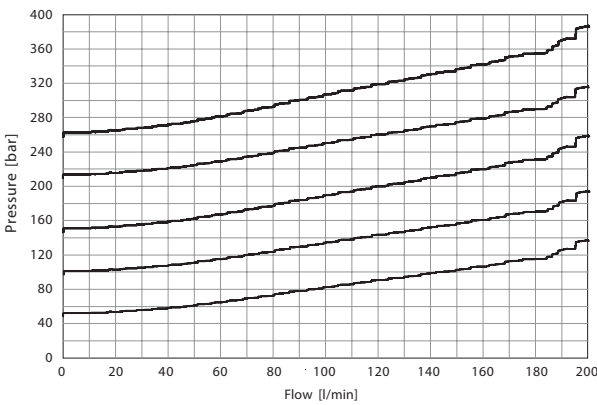
Work Port Relief Valve (relief mode)

Pressure characteristic as function of flow

CLS100



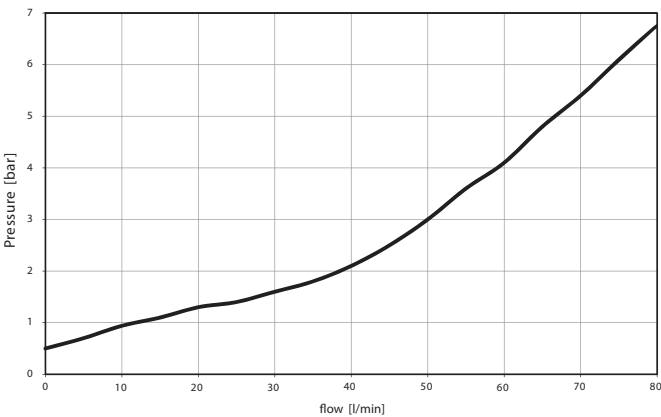
CLS180



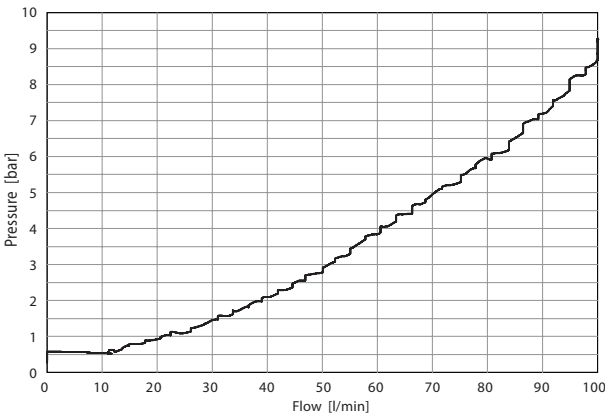
Work Port Relief Valve (anti-cav mode)

Opening and pressure characteristic as function of flow

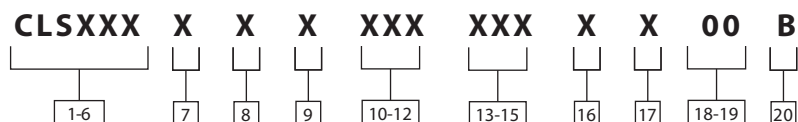
CLS100



CLS180



Model code for valve bank inlet



1-6 Product Series

CLS100 – Load Sense
Sectional Mobile Valve:
Standard Valve Bank Inlet
CLS180 – Load Sense
Sectional Mobile Valve:
Standard Valve Bank Inlet

7 Inlet Type

L – Load Sensing
(Variable disp. pumps)
U – Unload for Open Center
(fixed disp. pumps)

8 Inlet Ports

B – BSP
CLS100- BSP
(G3/4 P&T, G1/4 LS&M)
CLS180- BSP
(G1 P&T, G1/4 LS&M)
S – SAE
CLS100- SAE
(-12 P&T, -6 LS&M)
CLS180- SAE
(-16 P&T, -6 LS&M)

9 Inlet Reliefs

D – LS & Full Flow Reliefs
L – LS Relief Only
R – Full flow relief only*
Z – No Reliefs
Note: * R - Full flow relief only
option is not recommended. Inlet
LS relief is recommended, which
limits system pressure and gives
better efficiency.

10-12 Load Sense Relief Setting

XXX – 3 Digit Load Sense
Relief Setting in 5
Bar Increments,
Code 000 if none
Note: 50-350 bar LS Relief
setting should be minimum
40 Bar lesser than Full flow
relief setting. Anything
above 350 bar is rated for
intermittent operation.
Consult engineering for duty
cycle acceptance above
350 bar

13-15 Full Flow Relief Setting

XXX – 3 Digit Full Flow
Relief Setting in 5
Bar Increments,
Code 000 if none
Note: 90-350 bar
"Settings above 350 bar
should only be used with
approval of duty cycle"

16 Inlet Dump Valve

F – Full Flow Dump Valve
L – LS Dump Valve
Z – No Dump Valve

17 Inlet Coil

A – 12V Coil with DIN
Connector
B – 24V Coil with DIN
Connector
C – 12V Coil Deutsch
Connector
D – 24V Coil Deutsch
Connector

E – 12V Coil AmpJr
Connector

F – 24V Coil AmpJr
Connector

Z – No Coil

18-19 Special Features

00 – No special features

20 Design Level

B – Latest design

Note:

1. Cannot have full flow relief valve and full flow dumpvalve in same inlet.
2. Full flow relief valve and full flow dumpvalve cavities are different, so these are not interchangeable.
Applicable for CLS100 only
3. Transition plates and mid-inlets are available on request.

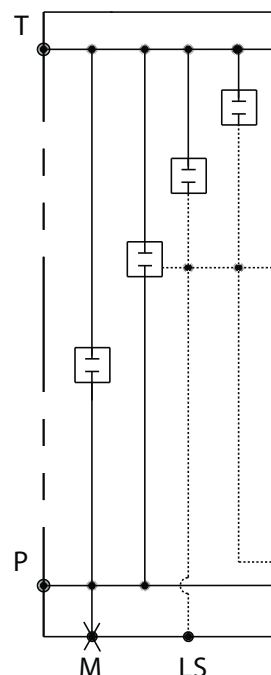
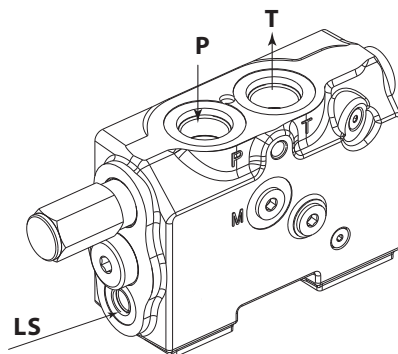
CLS inlet – Configuration for both CLS100 & CLS180

Model code positions 7

L - Load sensing

Closed center inlet section for variable displacement pumps

The inlet section with L configuration enables control valve usage with variable displacement pumps. With this configuration the presence of LS relief valve is suitable to adjust the system maximum pressure. LS electric dump valve can also be added as safety device. An additional full flow relief valve can be added to protect the system from pump regulator failures.

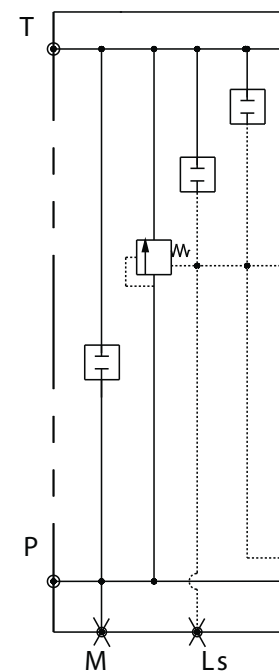
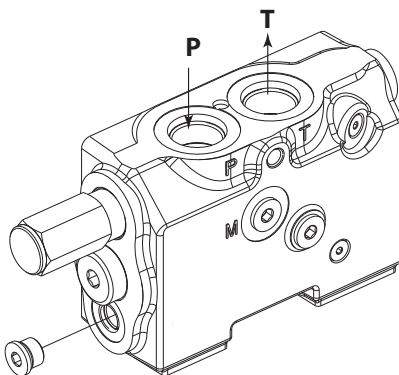


SCHEMATIC FOR LOAD SENSING INLET

U - Unload for open center

Open center inlet section for fixed displacement pumps

The inlet section with U configuration enables control valve usage with fixed displacement pumps. With this configuration the presence of LS relief valve is suitable to adjust the system maximum pressure. Full flow electric dump valve can also be added as safety device.



SCHEMATIC OF UNLOAD FOR OPEN CENTER INLET

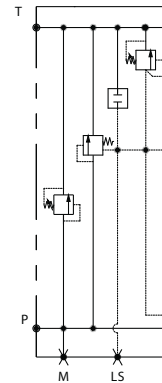
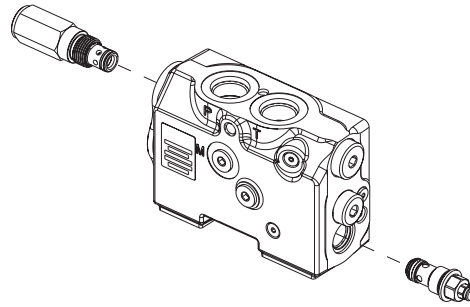
Note: Image shown is of CLS100 for reference only

CLS inlet – Relief valve options for both CLS100 & CLS180

Model code position 9

D - LS & full flow reliefs

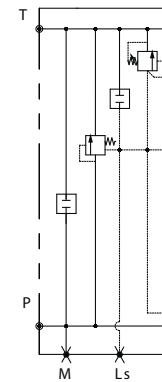
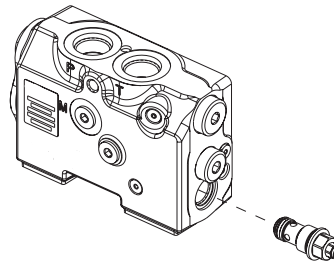
Note: This combination requires that the Full Flow Relief be set at least 40 bar higher than the LS Relief.



SCHEMATIC OF OPEN CENTER D - LS & FULL FLOW RELIEFS

L - LS relief only

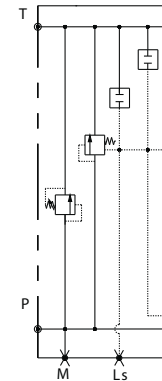
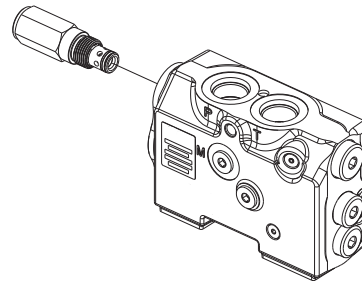
LS relief valve is used to adjust the system maximum pressure



SCHEMATIC OF OPEN CENTER INLET L - LS RELIEF ONLY

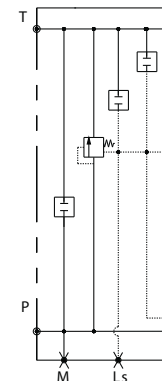
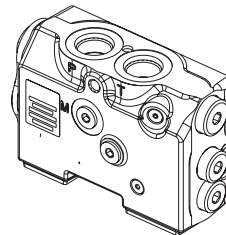
R - Full flow relief only

Full flow relief valve is used as pump pressure compensator malfunction and for system protection



SCHEMATIC OF OPEN CENTER INLET R - FULL FLOW RELIEF ONLY

Z - No reliefs

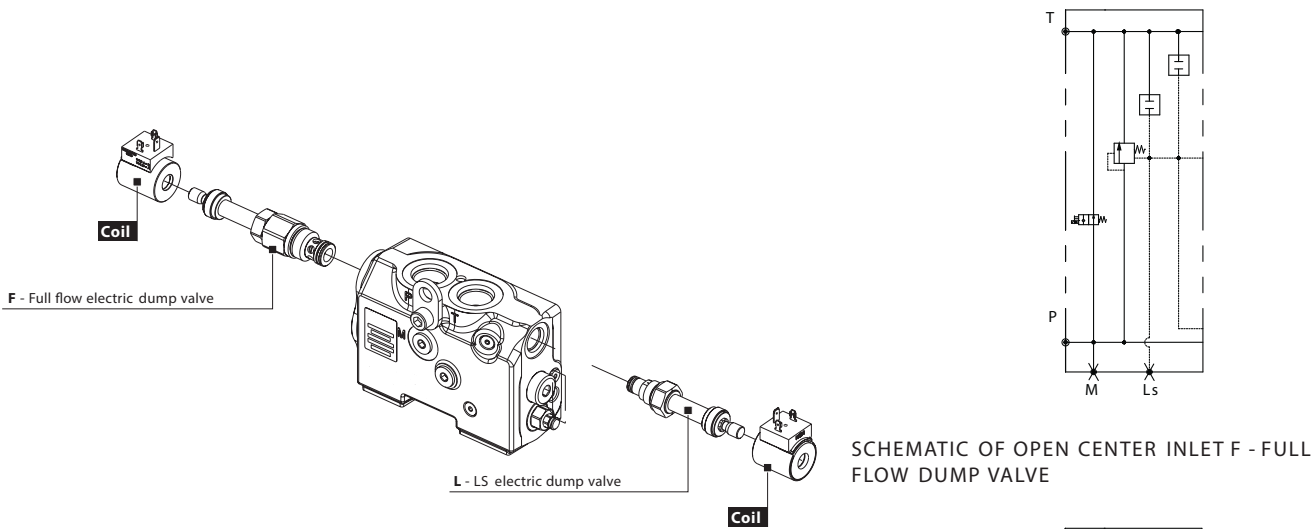


SCHEMATIC OF OPEN CENTER INLET Z - NO RELIEFS

Note: Image shown is of CLS100 for reference only

CLS inlet – Dump valve options for both CLS100 & CLS180

Model code positions 16 & 17



F - Full flow dump valve L - LS Electric dump valve



Full flow and LS dump valve can be added to prevent the system during power failure condition and to unload the pump at low pressure

Coil and Connectors specifications for inlet section

Option	Connector types (Deutsch/Amp Jr)	Ingress Rating	Coil Resistance R20 (Ω)	Connector Material	Coil Body	Duty Cycle	Coil Insulation	Power
A	A - 12V Coil with DIN Connector	IP 65	7	Nylon	Zinc plated steel	ED 100%	Class H coil - IEC 85 Standard	20.5 W
B	B - 24V Coil with DIN Connector	IP 65	28					
C	C - 12V Coil with Deutsch Connector	IP 67	7					
D	D - 24V Coil with Deutsch Connector	IP 67	28					
E	E - 12V Coil with Amp Jr Connector	IP 65	7					
F	F - 24V Coil with Amp Jr Connector	IP 65	28					

Note: Image shown is of CLS100 for reference only

Model code for CLS100 sections

The following 36 digit coding system has been developed to identify preferred feature options for the CLS100 Load Sense Sectional Mobile Valve series. Use this code to

specify a valve with the desired features. All 36-digits of the code must be present to release a new product number for ordering.

CLS101	X	X	X	X	X	XXX	XXX	X	X	XXX	X	XXX	X	XXX	X	XXX	X	X	X	00	B
1-6	7	8	9	10	11	12-14	15-17	18	19	20-22	23	24-26	27	28-30	31	32	33	34-35	36		
1-6 Product Series																					
CLS101 – Load Sense Sectional Mobile Valves																					
7 Compensation																					
P – Post-compensated L – Pre-compensated R – Post-compensated with Local flow Limiter*** N– Non-compensated Section																					
8 Actuation																					
A – Hydraulic with Top Ports B – Hydraulic with Top Ports and Lever Override C – Hydraulic with End Ports D – Hydraulic with End Ports, Lever Override, and configured for EH Pilot Valve Installation E – Electrohydraulic with Lever Override F – Electrohydraulic Only G – Electrohydraulic with Hydraulic Ports and Lever Override H – Electrohydraulic with Hydraulic Ports L – Manual with Enclosed Lever Box M – Manual with Exposed Spool Connection																					
9 Port Type																					
B – G1/2 BSP (G1/4 Pilot if Hyd., S – SAE, -10 (SAE -6 Pilot if Hyd.,																					
10 Spool Type																					
D – Double Acting (4 Way) Cylinder F – Double Acting (4 Way) Cylinder with 4th Position Float # H – Bi-Directional (4 Way) Motor, Full Open to Tank in Neutral																					
11 Spool Action																					
A – Spring Centered to Neutral B – Detent “In” and “Out”* C – Fourth Position Float # E – Fourth Position Float Detent* # F – Friction - Hold in Position*																					
12-14 Port A Spool Flow @																					
005 – 5 l/min 010 – 10 l/min 015 – 15 l/min 025 – 25 l/min 035 – 35 l/min 040 – 40 l/min 050 – 50 l/min 065 – 65 l/min 080 – 80 l/min 100 – 100 l/min																					
15-17 Port B Spool Flow @																					
005 – 5 l/min 010 – 10 l/min 015 – 15 l/min 025 – 25 l/min 035 – 35 l/min 040 – 40 l/min 050 – 50 l/min 065 – 65 l/min 080 – 80 l/min 100 – 100 l/min																					
18 Coil Type																					
C – 12V coil Deutsch connector D – 24V coil Deutsch connector E – 12V coil AmpJr connector F – 24V coil AmpJr connector Z – No coil																					
19 Port A Option Function																					
A – Anti-Cav R – Relief/Anti-Cav P – Plugged - Work port Cavities Machined and Plugged Z – None - Option Port No Machining T – Transducer Port Adaptor For Work Port Pressure Sensing (Plugged option:G1/8BSP or SAE 4)																					
20-22 Port A Option Setting																					
XXX – 040-350 (3 digit, fixed setting in 10 bar increments), relief valve pressure setting, port A																					
23 Port B Option Function																					
A – Anti-Cav R – Relief/Anti-Cav P – Plugged - Work port Cavities Machined and Plugged Z – None - Option Port No Machining T – Transducer Port Adaptor For Work Port Pressure Sensing (Plugged option:G1/8BSP or SAE 4)																					
24-26 Port B Option Setting																					
XXX – 040-350 (3 digit, fixed setting in 10 bar increments), relief valve pressure setting, port B																					
27 LS Relief Option																					
L – Sectional Load Sense Relief (Applies to Both A & B Ports)*** Y – Remote Load Sense Relief (SAE -4 or G1/8) (Applies to Both A & B Ports) ⁵ Z – No LS Relief																					
28-30 LS Relief Setting																					
XXX – 3 Digit Section LS Relief Setting in 5 bar increments from 50-350 bar (000 if not Present or if Using Remote LS Relief)																					
31 Spool Stroke Limiter or Position Indicator																					
A – Electrohydraulic Section w/ Spool Stroke Limiter B – Hydraulic Section w/ Spool Stroke Limiter P – Spool Position Indicator### Z – None																					
32 Lever Kits																					
A – 135mm (5.5”) Lever Kit B – 210mm (8.5”) Lever Kit Z – None																					
33 Build Type																					
R – Right Hand (Std for Pre Comp) L – Left Hand (Std for Post Comp)																					
34-35 Special Features																					
00 – No special features																					
36 Design Level																					
B – Latest Design																					
Note:																					
* Pre/Post compensationspools offer varying flows, please refer page 35 on applicable spool flow * Available with Manual Actuation only ** Post compSectional LS relief comes with LH build Pre compSectional LS relief comes with RH build *** Available with RH build only # Available with RH build and post comp option only ## Sectional LS relief optionnot available for EH float actuation ### Applicable only for Manual and EH actuation ⁵ Available for pre compoption only																					

Model code for CLS180 sections

The following 36 digit coding system has been developed to identify preferred feature options for the CLS180 Load Sense Sectional Mobile Valve series. Use this code to

specify a valve with the desired features. All 36-digits of the code must be present to release a new product number for ordering.

CLS181	X	X	X	X	X	XXX	XXX	X	X	XXX	X	XXX	X	XXX	X	X	00	X	B
1-6	7	8	9	10	11	12-14	15-17	18	19	20-22	23	24-26	27	28-30	31	32	33,34	35	36

1-6 Product series

CLS181 – Load sense sectional mobile valves

7 Compensation

P – Post-compensated

8 Actuation

A – Hydraulic with top ports
B – Hydraulic with top ports and lever override
C – Hydraulic with end ports
E – Electrohydraulic with lever override
F – Electrohydraulic only
L – Manual with enclosed lever box
M – Manual with exposed spool connection

9 Port type

B – G3/4 BSP (G1/4 Pilot if Hyd)
S – SAE, -12 (SAE -6 Pilot if Hyd)

10 Spool type

D – Double acting (4 way) cylinder
H – Bi-directional (4 way) motor, full open to tank in neutral

11 Spool action

A – Spring centered to neutral
B – Detent “in” and “out” * Both ports A and B
C – Detent in port “A” *
D – Detent in port “B” *

12-14 Port A spool flow

040 – 40 l/min
060 – 60 l/min
090 – 90 l/min
120 – 120 l/min
150 – 150 l/min
180 – 180 l/min

15-17 Port B spool flow

040 – 40 l/min
060 – 60 l/min
090 – 90 l/min
120 – 120 l/min
150 – 150 l/min
180 – 180 l/min

18 Coil type

C – 12V coil Deutsch connector
D – 24V coil Deutsch connector
E – 12V coil AmpJr connector
F – 24V coil AmpJr connector
Z – No coil

19 Port A option function

A – Anti-cav
R – Relief/Anti-cav
P – Plugged - work port cavities machined and plugged
N – Port relief without anti-cavitation
Z – None - no work port or LS relief machining
T – Transducer port adapter for work port pressure sensing

20-22 Port A option setting

XXX – 040-350 (3 digit, in 10 bar increments), relief valve pressure setting, port A

23 Port B option function

A – Anti-cav
R – Relief/Anti-cav
P – Plugged - work port cavities machined and plugged
N – Port relief without anti-cavitation
Z – None - no work port or LS relief machining
T – Transducer port adapter for work port pressure sensing

24-26 Port B option setting

XXX – 040-350 (3 digit, in 10 bar increments), relief valve pressure setting, port B

27 LS relief option

L – Section load sense relief (applies to both A and B ports)
Z – No LS relief

28-30 LS relief setting

XXX – 3 digit section LS Relief Setting in 5 bar increments from 50-350 bar (000 if not Present or if Using Remote LS Relief)

31 Spool stroke limiter or position indicator

A – Electrohydraulic section w/ Spool stroke limiter
B – Hydraulic section w/ Spool stroke limiter
P – Spool position indicator®
Z – None

32 Lever kits

A – 135mm (5.3”) lever kit#
B – 210mm (8.2”) lever kit#
C – 140mm (5.5”) lever kit*
D – 240mm (9.4”) lever kit*
Z – None

33 Build type

R – Right hand
L – Left hand

34,35 Special features

00 – No special features

36 Design level

B – Latest design

Note:

* Available with Manual actuation only

* Available for EH with lever over-ride option only

® Applicable only for EH actuation

Features compatibility table CLS100

Compatibility chart for spool action options with compensation type

Combination			Spool Action (Model code position-11)											
			A – Spring Centered to Neutral		B – Detent “In” and “Out”		C – Fourth Position Float				E – Fourth Position Float Detent (Manual)		F – Friction hold in Position	
			RH Build	LH Build	RH Build	LH Build	Hydraulic		Electrohydraulic		RH Build	LH Build	RH Build	LH Build
							RH Build	LH Build	RH Build	LH Build				
Compensation (Model code position-7)	Post comp	With Sectional LS relief	•	•	•	•	•				•		•	
		W/OSectional LS relief	•	•	•	•	•		•		•		•	•
	Post comp with local flow limiter	With Sectional LS relief	•	•	•	•	•				•			
		W/OSectional LS relief	•	•	•	•	•		•		•			•
	Pre comp	With Sectional LS relief	•	•										•
		W/OSectional LS relief	•	•									•	•

Compatibility chart for hydraulic and electrohydraulic actuations having manual override option

Combination			Compensation (Model code position-7)			
			Post-comp		Post-Compwith local flow limiter	
			With Sectional LS Relief	With Sectional LS Relief	W/OSectional LS Relief	Pre-comp
Actuation (Model code position-8)	B – Hydraulic with top ports and lever override	RH Build			•	•
		LH Build	•			
	D – Hydraulic with end ports, lever override and configured for EH pilot valve installation	RH Build			•	•
		LH Build	•			
	E – Electrohydraulic with lever override	RH Build			•	•
		LH Build	•			
	F – Electrohydraulic only	RH Build			•	•
		LH Build	•			
	G – Electrohydraulic with hydraulic ports and lever override	RH Build			•	•
		LH Build	•			
	H – Electrohydraulic with hydraulic ports	RH Build			•	•
		LH Build	•			

Valve section options – Compensation

Model code position 7

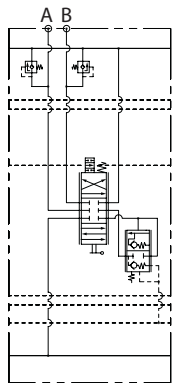
The CLS family offers an unique additional feature: The ability to mix pre and post compensated technologies, to improve the control capabilities

and manage flows with different priorities. The following schematics show an example for the two systems.

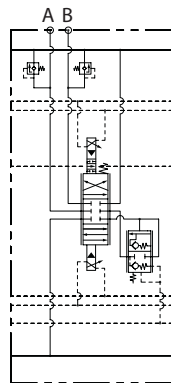
P - Post compensated (flow sharing)

Available with or without auxiliary valve cavities

Note: Shown with auxiliary valves



Mechanical lever actuation

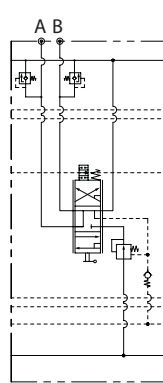


Electrohydraulic actuation

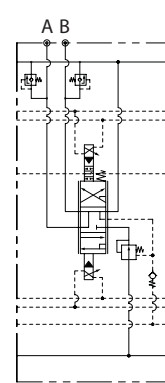
L - Pre compensated *

Available with or without auxiliary valve cavities

Note: Shown with auxiliary valves



Mechanical lever actuation

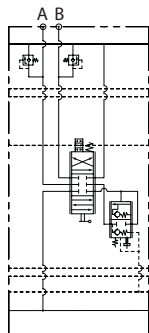


Electrohydraulic actuation

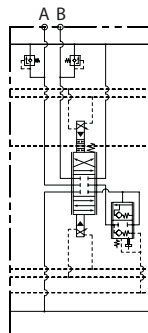
R - Post compensated (flow sharing) * with local flow limiter

Available with or without auxiliary valve cavities

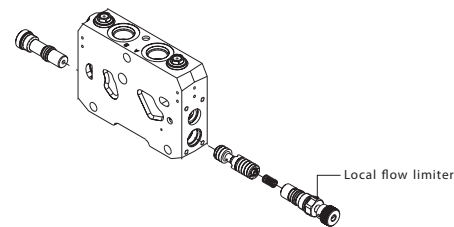
Note: Shown with auxiliary valves
Available with RH build only.



Mechanical lever actuation



Electrohydraulic actuation



Note: * Available for CLS100 only

Valve section options – Actuation for hydraulic control

Dimensions and configurations for model code position 8

Units: mm

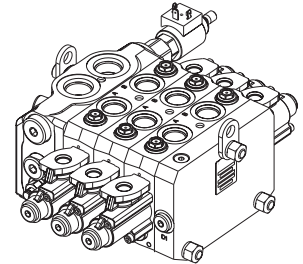
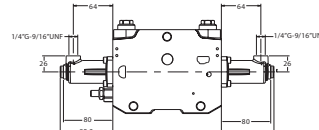
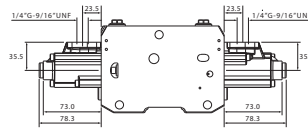
CLS100

CLS180

A - Hydraulic with top ports*

Hydraulic actuation (pilot ports on the top)

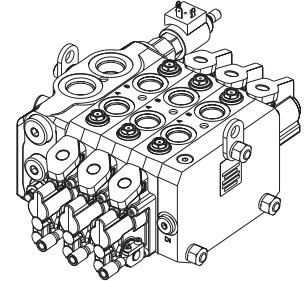
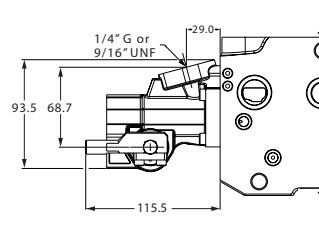
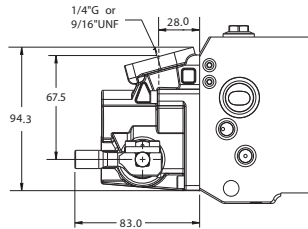
(Only with manual and hydraulic section body)



B - Hydraulic ports and lever override*

Lever actuation and hydraulic actuation

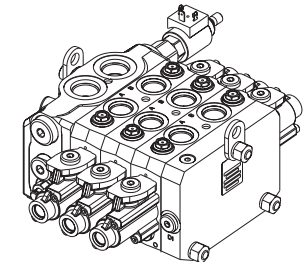
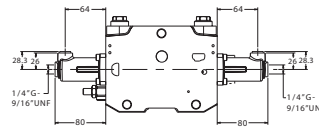
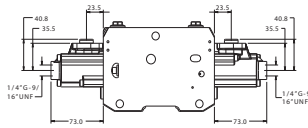
(Only with EH type body)



C - Hydraulic with end ports*

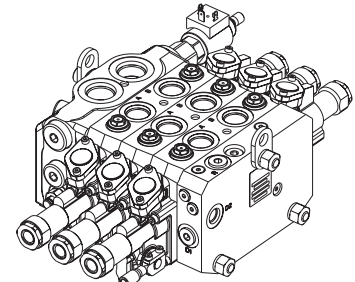
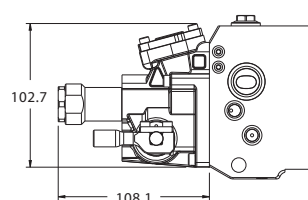
Hydraulic actuation (pilot ports on the sides)

(Only with manual and hydraulic section body)



D - Hydraulic with End ports, lever override, and configured for EH pilot valve installation*

Lever and hydraulic actuation with electrohydraulic arrangement



Note: Images shown of CLS100 for reference only

Valve section options – Actuation for electrohydraulic control

Dimensions and configurations for model code position 8

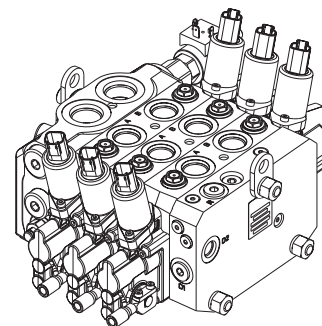
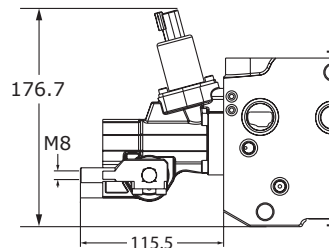
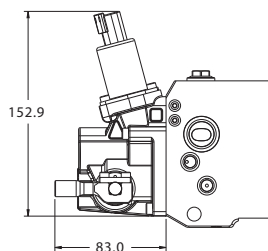
Units: mm

CLS100

CLS180

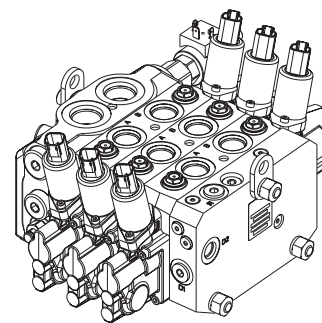
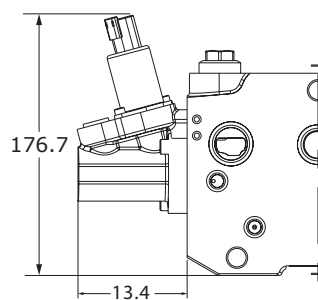
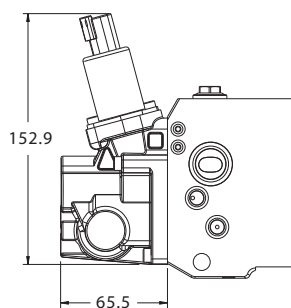
E - Electrohydraulic with lever override

Note: Includes solenoid operated pilot valve



F - Electrohydraulic only Without lever

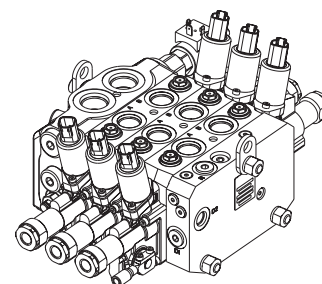
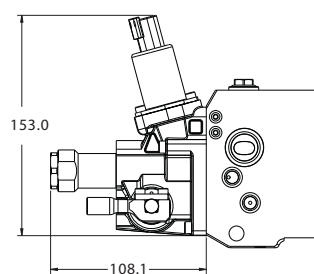
Note: Includes solenoid operated pilot valve



G - Electrohydraulic with hydraulic ports and lever override*

Lever, hydraulic, and
electrohydraulic actuation

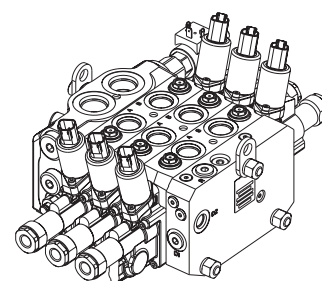
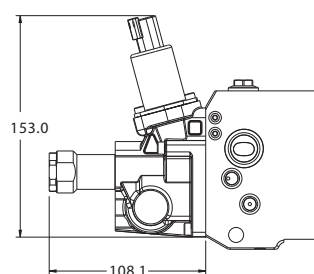
Note: Includes solenoid operated pilot valve



H - Electrohydraulic with hydraulic ports*

Without lever, hydraulic,
and electrohydraulic
actuation

Note: Includes solenoid operated pilot valve



Note: * Plastic shipping plugs fitted on hydraulic ports.
Images shown of CLS100 for reference only

Valve section options – Actuation for manual control

Dimensions and configurations for model code position 8

Units: mm

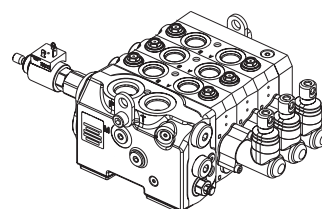
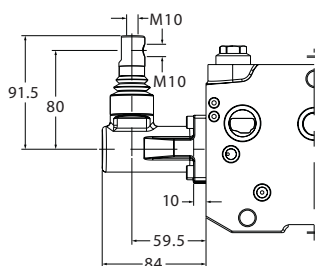
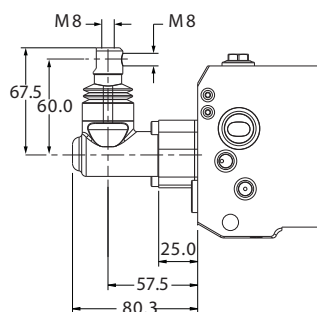
CLS100

CLS180

L - **Manual with enclosed lever box**

Lever actuation

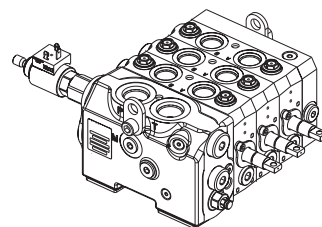
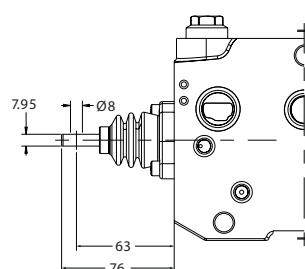
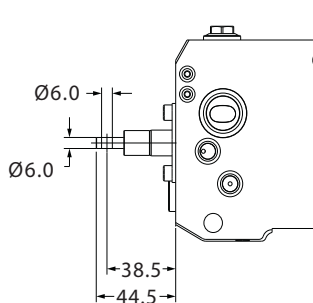
(Only with manual and hydraulic section body)



M - **Manual with exposed spool connection**

Without lever actuation

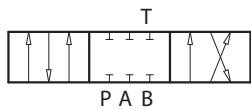
(Only with manual and hydraulic section body)



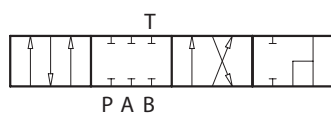
Valve section options – Spool type

Model code position 10

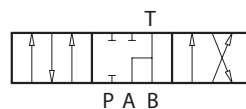
D -
Double acting (4 way)
cylinder #®



F -
Double acting (4 way)
cylinder with 4th position
float*#



H -
Bi-directional (4 way)
motor, full open to tank
in neutral#®



Note:

Spool F requires additional valve body machining and special 4th position detent selection

* Available with RH build and post comp option only

Available with CLS100

® Available with CLS180

Valve Section Options – Port A and Port B spool flows

Model code positions 12-14 (port A) and
Model code positions 15-17 (port B)

Post compensated section CLS100

<i>SpoolType</i>	<i>Flow Rates (l/min)</i>									
	005	010	015	025	035	040	050	065	080	100
D	.	.	.	.	.	.	.	.	.	.
H	.	.	.	.	.	.	.	.	.	.
F		.			.			.	.	

Pre compensated section CLS100

<i>SpoolType</i>	<i>Flow Rates (l/min)</i>						
	010	015	025	040	065	080*	100**
D	.	.	.	.	.	.	.
H	.	.	.	.	.	.	.

Note: Rated flows are defined for 14 bar Δp.

Listed flows are for symmetrical spools; for questions regarding asymmetric spools please contact your sales representative

* Rated flow is defined at 14 bar Δp & requires special section compensatorspring

** Rated flow is defined at 17 bar Δp & requires special section compensatorspring.

(For open center inlet 100 lpm spool needs special inlet compensator with 17 bar margin)

Post-compensated section CLS180

<i>Spool type</i>	<i>Flow rates (l/min)</i>					
	040	060	090	120	150	180
D	.	.	.	.	.	.
H	.	.	.	.	.	.

Note: Rated flows are defined for 17 bar Δp.

Listed flows are for symmetrical spools; for questions regarding asymmetric spools please contact your sales representative.

Valve section options – For both CLS100 & CLS180

Coil Voltage and Connector

Model code position 18

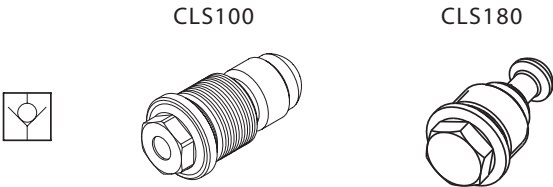
Coil and connector specifications

<i>Option</i>	<i>Supply voltage (VDC)</i>	<i>Connector</i>	<i>Ingress Rating</i>	<i>Coil resistance R₂₀ (Ω)</i>	<i>Feeding Reducing Pressure</i>	<i>Prop. current control (mA)</i>	<i>On-Off current control (mA)</i>	<i>PWM Suggested frequency (Hz)</i>
C	12	Deutsch DT4	IP 67	4.7	40 bar	600-1300	2500	70-90
D	24	Deutsch DT4	IP 67	20.8		300-650	1150	
E	12	Amp Jr	IP 65	4.7		600-1300	2500	
F	24	Amp Jr	IP 65	20.8		300-650	1150	

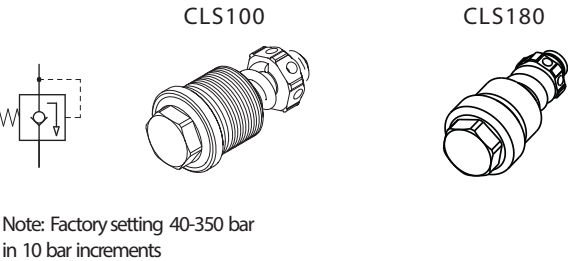
Valve section options – Port A and Port B functions and settings

Model code positions 19-26

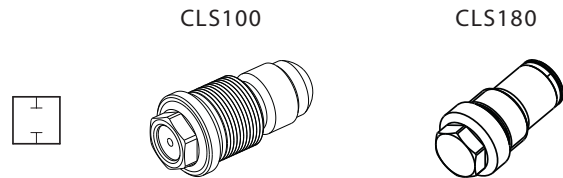
A - anti-cav



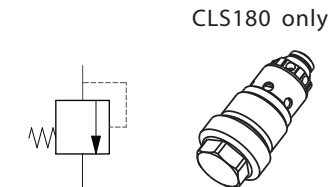
R - relief/anti-cav



P - Plugged - work port valve cavities machined and plugged



N - Port relief without anti-cav



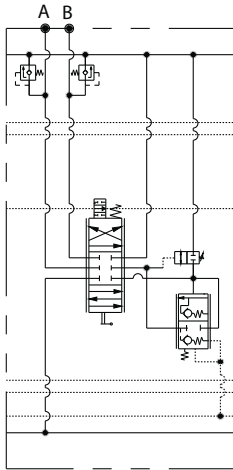
Valve section options – Load sense relief setting

Model code position 27-30

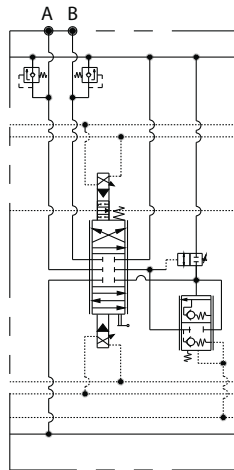
L - Sectional Load Sense Relief Valve (Applies to both A & B ports)

Post compensated - Sectional load sense relief

Schematic for
manual control

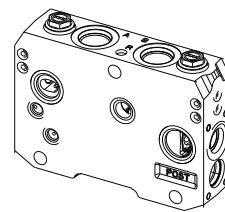


Schematic for
electrohydraulic control

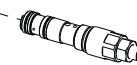


Note: Available with LH build only
No interchangeability of Parts Worksection,
Plug & LSRV due to Design change after January 2021

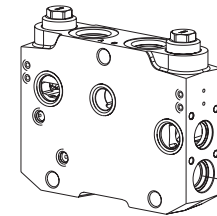
CLS100



Sectional LS relief valve



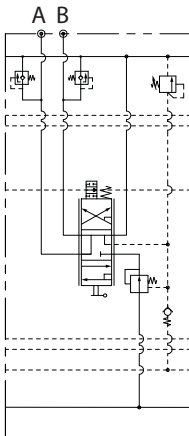
CLS180



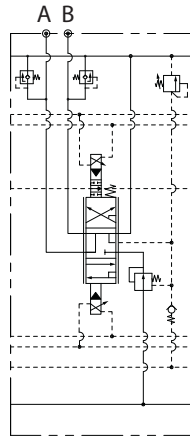
Sectional LS relief valve

Pre compensated - Sectional load sense relief

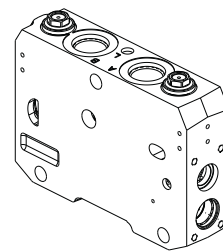
Schematic for
manual control



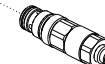
Schematic for
electrohydraulic control



Note: Pre-compload sense relief range is 50-350 bar.
Available with RH build only.
Available for CLS100 only



Sectional LS
relief valve

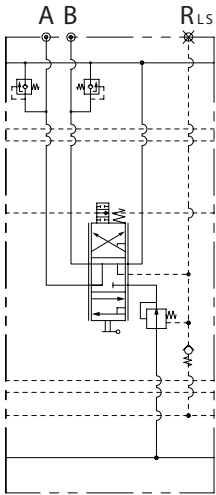


Valve section options – Load sense relief setting

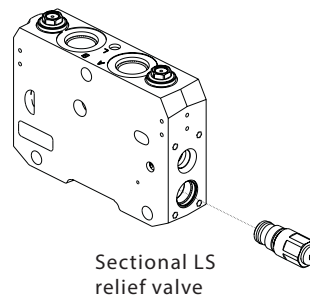
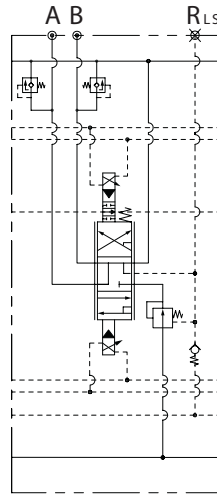
Model code position 27-30

Y - Remote Load Sense Relief Valve (SAE-4 or G1/8 port) (Applies to both A & B port)

Schematic for
manual control



Schematic for
electrohydraulic control



Note: Available with RH build only.
Available for pre-compoption only.
Available for CLS100 only

Valve section options – Spool stroke limiter or position indicator

Dimensions and configurations for model code position 31

Spool position indication is achieved using a Hall effect sensor device used in conjunction with spool position transducer kits available for CLS100 & CLS180. After the final assembly of the valve a computer assisted calibration procedure is performed that compensates for mechanical inaccuracies and uncertainties allowing to attain high accuracy and linearity in spool position detection. Spool position is output as an analog voltage signal in the 0.5 - 4.5V range. The unit works in 12V and 24V environments and is protected against load-dump and other major electrical faults. Fault signaling is carried out through the output signal.

Technical specifications

Electrical

Operating voltage	6 - 30 Vdc
-------------------	------------

Max current consumption	20.5 mA
-------------------------	---------

Output

Output voltage spanning	0.5 - 4.5 Vdc
-------------------------	---------------

Quiescent voltage	2.5 Vdc
-------------------	---------

Output current	-1 - +1 mA
----------------	------------

Minimum outputload resistance	4.5 kOhm
-------------------------------	----------

Overall accuracy	±2.5%
------------------	-------

Resolution	12 bit
------------	--------

Fault signalling levels	4.8V < Vout < 0.2 Vdc
-------------------------	-----------------------

Protections	short circuit protection, reverse, battery protection, thermal shutdown, overvoltage, undervoltage, load-dump
-------------	---

EM Immunity	> 60 Vdc/m
-------------	------------

Mechanical, Environmental

Operating temperature	-40 / +85 °C
-----------------------	--------------

Ingress Protection Rating	IP 65
---------------------------	-------

Dimensions	28 x 18 x 23 mm(L x W x H)
------------	----------------------------

Connections

I/O	DIN 43650-C male
-----	------------------

PIN 1	Vout
-------	------

PIN 2	Vcc
-------	-----

PIN 3	OV
-------	----

PIN 4	Chassis (connected to valve body)
-------	-----------------------------------

Applied standards

Immunityfor industrial environments	EN 61000-6-2
-------------------------------------	--------------

Emission standard for residential commercial and light-industrial environments	EN 61000-6-3
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EMC - Agricultural and forestry machines	EN 14982
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EMC - Earth-moving machinery	ISO 13766
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Valve section options – Spool stroke limiter or position indicator

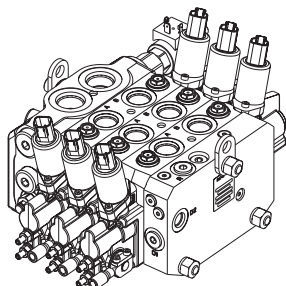
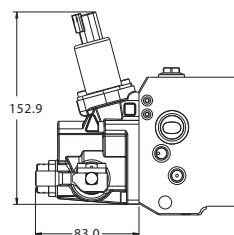
Dimensions and configurations for
model code position 31

Units: mm

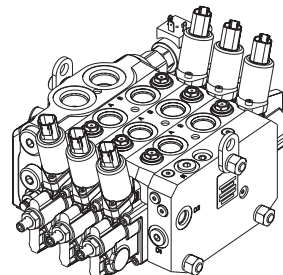
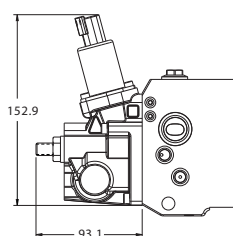
A - Electrohydraulic section with spool stroke limiter

CLS100

With lever override

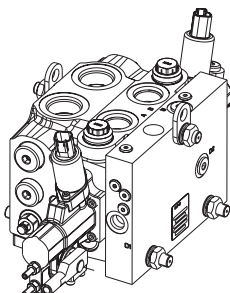
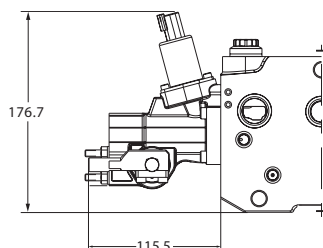


Without lever override

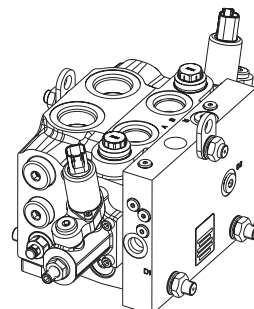
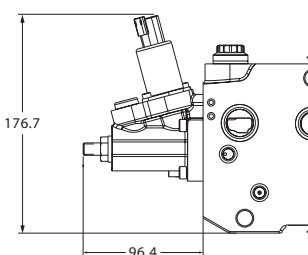


CLS180

With lever override



Without lever override

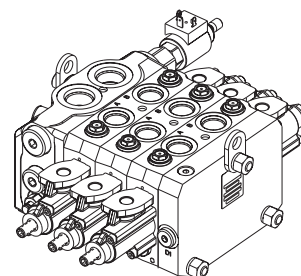
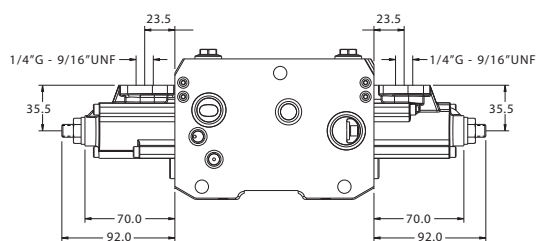


CLS100

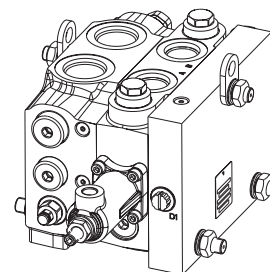
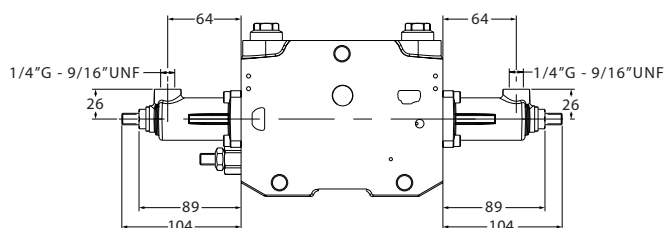
B - Hydraulic section with spool stroke limiter

Hydraulic actuation with
stroke limiter

Note: Not shown in the graphic but also
available with manual override



CLS180



Valve section options – Spool stroke limiter or position indicator

Dimensions and configurations for
model code position 31

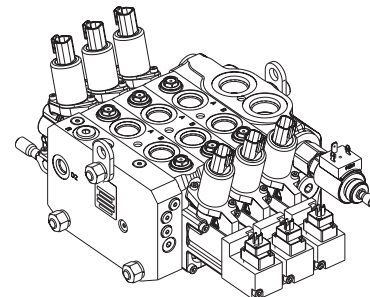
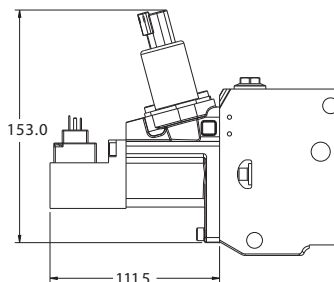
Units: mm

P - Spool position indicator

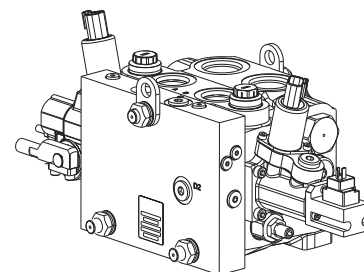
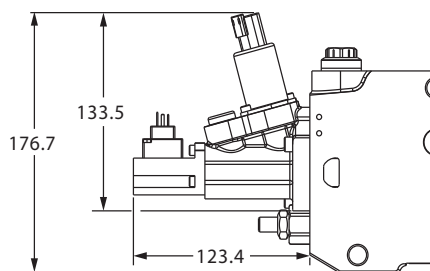
Note:

1. For CLS100, applicable only for Manual and EH actuation.
2. For CLS180, applicable only for EH actuation.

CLS100



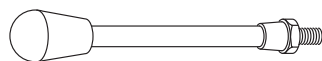
CLS180



Note: Not shown in the graphic but also available with manual override

Valve section options - Lever kits

Model code position 32

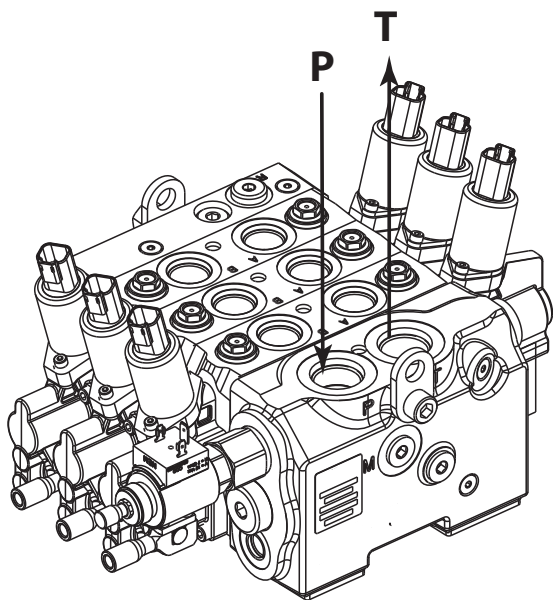


Actuation Type	CLS100 (LEVER KIT OPTIONS)		CLS180 (LEVER KIT OPTIONS)	
EH Actuation	A - 135 Lever Kit Lever with knob - 135mm(5.3")	B - 210 Lever Kit Lever with knob - 210mm(8.2")	A - 135 Lever Kit Lever with knob - 135mm(5.3")	B - 210 Lever Kit Lever with knob - 210mm(8.2")
Manual Actuation	A - 135 Lever Kit Lever with knob - 135mm(5.3")	B - 210 Lever Kit Lever with knob - 210mm(8.2")	C - 140 Lever Kit Lever with knob - 140mm(5.5")	D - 240 Lever Kit Lever with knob - 240mm(9.4")

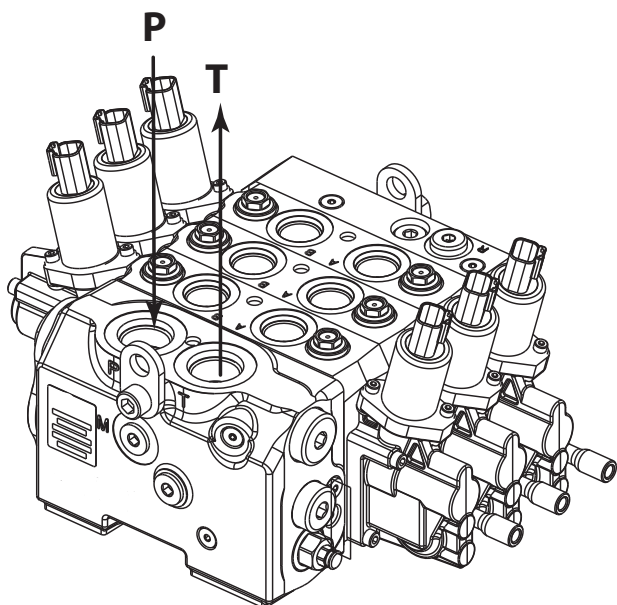
Section Build Type

Model code position 33

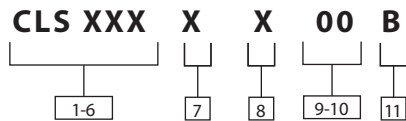
R - Right hand build (Standard build for Pre-comp section) CLS100 only



L - Left hand build (Standard build for Post-comp section)



Model code for valve bank end cover



1-6 Product series

102-CLS100

Load sense sectional mobile valve: Standard Valve Bank Endcover

182-CLS180

Load sense sectional mobile valve: Standard Valve Bank Endcover

7 End cover

- F** Electrohydraulic with external end drain[#]
- G** Electrohydraulic with external side drain[#]
- H** Hydraulic or manual with internal drain
- K** Hydraulic or manual with external drain[#]
- N** Electrohydraulic with internal drain^{*}

8 End cover ports

- B** BSP (G1/4 pilot drain)
- S** SAE (-6 pilot drain)

11 Design level

- B** Latest design

9-10 Special features

- 00** No special features

There are two types of End Covers:

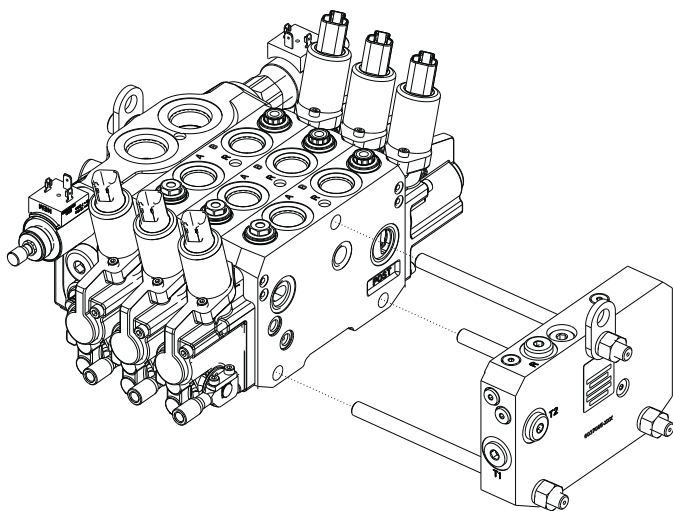
Manual and Hydraulic actuation version

To be used when no electrohydraulic controls are present in the valve bank. This cover is simply collecting the LS signal drain that can be connected to tank internally or externally.

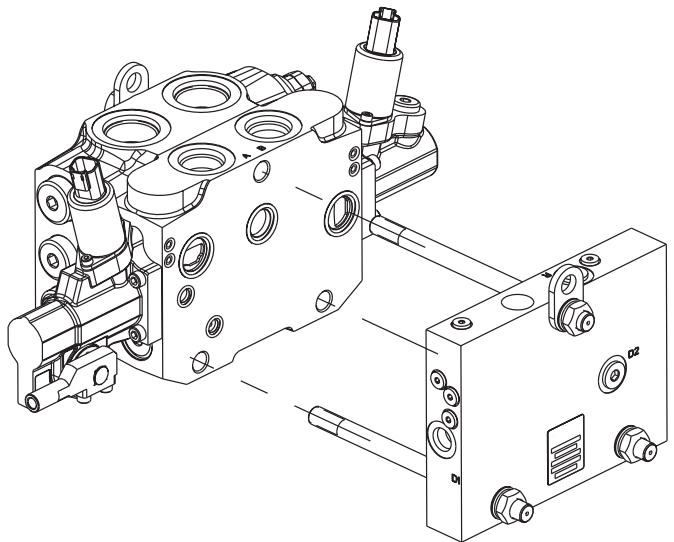
Electrohydraulic version

To be used when at least one section in the valve bank has electrohydraulic actuation. This cover is collecting LS signal and electrohydraulic pilot control drain and is providing electrohydraulic actuation by way of a pressure reducing valve.

CLS100 EndCover (Electrohydraulic type with internal drain)



CLS180 EndCover (Electrohydraulic type with external side drain)



Important:

With electrohydraulic actuation, plumb external drain directly to reservoir, not to tank or tank line. Drain pressure shall remain below 5 bar

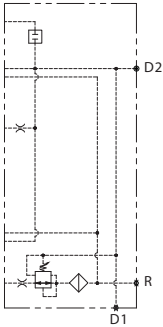
[#] Side port (D1) or End port (D2) should be used as drain port.

^{*} When EH with internal drain option is used, care should be taken to ensure pressure in inlet "T" port should not exceed 5 bar

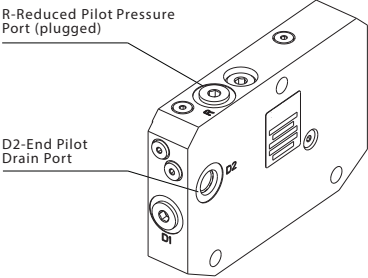
CLS assembly – End covers

Schematics and configurations for model code position 7

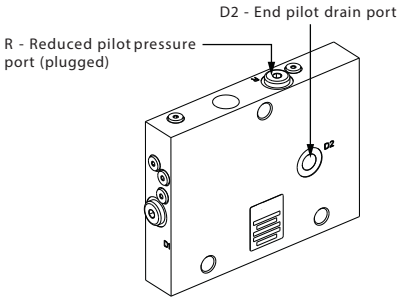
**F -
Electrohydraulic with
external end drain**



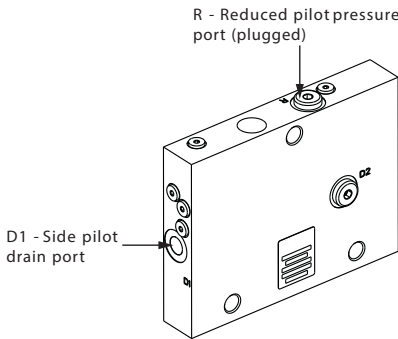
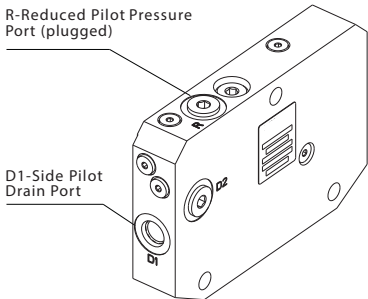
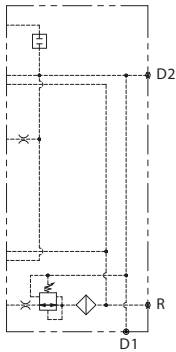
CLS100



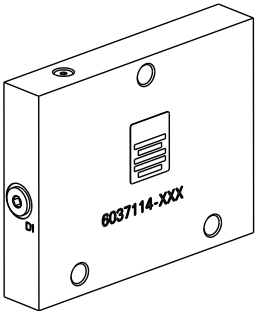
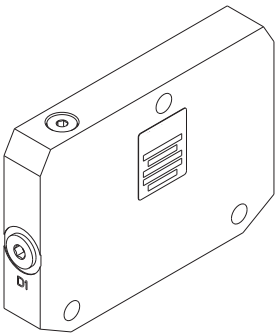
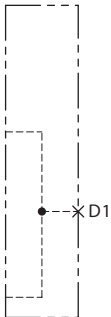
CLS180



**G -
Electrohydraulic with
external side drain**



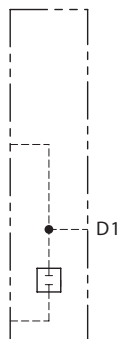
**H -
Hydraulic or manual
with internal drain**



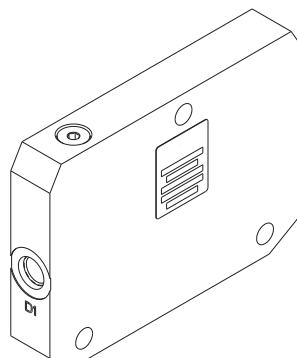
CLS assembly – End covers

Schematics and configurations for
model code position 7

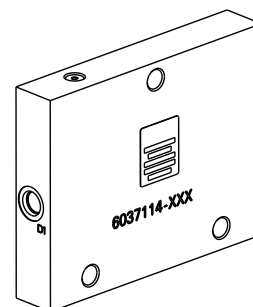
**K -
Hydraulic or manual
with external drain**



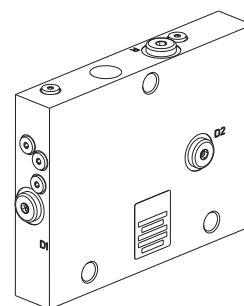
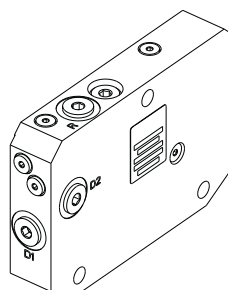
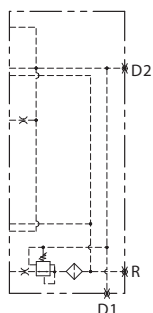
CLS100



CLS180



**N -
Electrohydraulic with
internal drain**



Mid-Inlet and transition plates

The CLS mobile valve family offers standard mid-inlet and transition plates for options of split or combined flow. With the ability to combine CLS models, you can simplify the valve assembly for minimal space utilization and lower cost for machines that require a range of various flows. Danfoss offers the following standard mid-inlet and transition plates for the CLS mobile valve family.

Frame size	Type.	P/N#
CLS180-100	Transition plate assembly	6045191-001
CLS100-CLS100	Mid-inlet body with O-ring grooves	6048082-001

Special End plates

CLS100 End plate with O-ring groove	6048083-001
CLS100 Hyd/Manual internal drain end plate with additional PRV	6048084-001

Hydraulic fluid recommendations

Introduction

Oil in hydraulic systems performs the dual function of lubrication and transmission of power. It is a vital element in a hydraulic system, and careful selection should be made with the assistance of a reputable supplier. Proper selection of oil assures satisfactory life and operation of system components, especially hydraulic pumps and motors.

Generally, oil selected for use with pumps and motors is acceptable for use with valves. Critical servo valves may need special consideration.

When selecting oil for use in an industrial hydraulic system, be sure the oil:

- Contains the necessary additives to ensure excellent anti-wear characteristics
- Has proper viscosity to maintain adequate sealing and lubrication at the expected operating temperature of the hydraulic system
- Includes rust and oxidation inhibitors for satisfactory system operation

Types of hydraulic fluids

Hydraulic fluids are classified by the type of base stock used. Some fluids are further classified by fluid formulation and performance.

Anti-wear hydraulic fluids

For general hydraulic service, Danfoss recommends the use of mineral base anti-wear (AW) hydraulic oils meeting Danfoss specification E-FDGN-TB002-E.

Danfoss requests that fluid suppliers test newly developed lubricants on Danfoss 35VQ25A high pressure vane pump, according to Danfoss ATS-373 test procedure, ASTM D 6973 test method and meet other requirements of the specification E-FDGN-TB002-E. Lubricants meeting the Danfoss specification are considered good quality anti-wear hydraulic fluids that can be used with Danfoss components at maximum allowable operating conditions. They offer superior protection against pump wear and long service life.

Crank case oils

Automotive-type crankcase oils with American Petroleum Institute (API) letter designation SE, SF, SG, SH or higher per SAE J183 classes of oils are recommended for hydraulic service. The "detergent" additive tends to hold water in a tight emulsion and prevents separation of water.

Automotive type crankcase oils generally exhibit less shear stability, which can result in higher loss of viscosity during service life.

Multiple-viscosity, industrial grade hydraulic fluids with better shear stability will provide improved viscosity control. Other mineral oil based lubricants commonly used in hydraulic systems are automatic transmission fluids (ATFs) and universal tractor transmission oils (UTTOs).

Synthetic hydrocarbon

Synthetic hydrocarbon base stocks, such as polyalphaolefins (PAOs), are also used to formulate AW hydraulic fluids, crankcase oils, ATFs and UTTOs.

Environmentally friendly hydraulic fluids

Eco-friendly characteristics is becoming a critical need, and a number of biodegradable hydraulic fluids are being used more and more in environmentally sensitive areas.

Biodegradable hydraulic fluids are generally classified as vegetable oil based (HETG), synthetic ester (HEES), polyalkylene glycol (HEPG) and polyalphaolefin (HEPR). In addition, special water glycol hydraulic fluids are used in applications in which water miscibility is necessary, along with biodegradable properties.

Fire-resistant hydraulic fluids

Fire-resistant fluids are classified as water containing fluids or synthetic anhydrous fluids. Water acts as the fire retarding agent in water containing fluids. The chemical structure of synthetic anhydrous fluids provides fire resistance.

Many applications that are prone to fire hazard, such as steel mills, foundries, die casting, mines, etc., require the use of fire resistant hydraulic fluid for improved fire safety. Fire resistant fluids may not be fireproof, but they have better fire resistance compared to mineral oil.

The alternative fluids are recommended when specific properties, such as fire resistance, biodegradability

etc., are necessary for the application. Keep in mind that alternative fluids may differ from AW petroleum fluids in properties such as pressure viscosity coefficient, specific gravity, lubricity etc. Hence certain pumps / motors may need to be de-rated, some can be operated under full ratings and others are not rated. Be sure to confirm product ratings with the specific fluid in the intended application.

Viscosity

Viscosity is the measure of a selection of hydraulic fluid with a specific viscosity range should be based on the needs of the system, limitations of critical components, or proper performance of specific types of units. At system startup and during operation, Danfoss recommends maintaining the fluid's maximum and minimum viscosity ranges (see chart). Very high viscosities at startup temperatures can cause noise and cavitation damage to pumps.

Continuous operation at moderately high viscosities will tend to hold air in suspension in the fluid, as well as generate higher operating temperatures. This can cause noise, early failure of pumps and motors and erosion of valves. Low viscosities result in decreased system efficiency and impairment of dynamic lubrication, causing wear.

It is important to choose the proper fluid viscosity for your particular system in order to achieve the startup viscosity and running viscosity range (see chart) over the entire temperature range encountered. Confirm with your fluid supplier that

Hydraulic fluid recommendations

the fluid viscosity will not be less than the minimum recommended at the maximum fluid temperature of your application.

A number of anti-wear hydraulic fluids containing polymeric thickeners (Viscosity Index Improvers [VII]) are available for use in low temperature applications. Temporary or permanent viscosity loss of some of these fluids at operating temperature may adversely affect the life and performance of components. Before using polymer containing fluids, check the extent of viscosity loss (shear stability) to avoid hydraulic service below the recommended minimum viscosity. A fluid with good shear stability is recommended for low temperature applications.

Multi-grade engine oils, ATFs, UTTOs etc., also contain VIIs, and viscosity loss will be encountered during use.

Cleanliness

Fluid cleanliness is extremely important in hydraulic systems. More than 70% of all failures are caused by contamination, which can reduce hydraulic system efficiency up to 20% before system malfunction may be recognized. Different hydraulic components require different cleanliness levels. The cleanliness of a hydraulic system is dictated by the cleanliness requirement of the

most stringent component in the system. OEMs and distributors should provide their customers with cleanliness requirements for Danfoss hydraulic components used in their system designs. Refer to Danfoss product catalogs for specific cleanliness requirements of individual components.

Fluid maintenance

The condition of a fluid has a direct bearing on the performance and reliability of the system. Maintaining proper fluid viscosity, cleanliness level, water content, and additive level is essential for excellent hydraulic system performance. In order to maintain a healthy fluid, Danfoss recommends performing periodic checks on the condition of the fluid.

System design considerations

When designing a hydraulic system, the specific gravity of the hydraulic fluid needs to be taken into consideration. If the specific gravity of the fluid is higher than that of mineral oil, be sure the reservoir fluid level is adequately above the pump inlet to meet the recommended inlet operating condition of minimum 1.0 bar absolute pressure at the pump inlet.

Filters

Proper filter type and size, which vary depending on the

type of fluid used in a system, are essential for healthy system function. The primary types of filter materials are paper, cellulose, synthetic fiber, and metal.

Filter media, adhesive, and seals must be compatible with the fluid used in the system. To lengthen fluid change out intervals, special absorbent filter media may be used to remove moisture and acids from phosphate esters.

Seals/elastomers

Select seal/elastomer materials that are suitable for the application, minimum and maximum operating temperature, and compatibility with the type of fluid used in the hydraulic system. The effect of hydraulic fluid on a particular elastomer depends on the constituents of the fluid, temperature range, and level of contaminants.

Replacing hydraulic fluid

Although sometimes valid, arbitrary hydraulic fluid change-outs can result in wasting good fluid and unnecessary machine downtime.

A regularly scheduled oil analysis program is recommended to determine when fluid should be replaced. The program should include inspection of the fluid's color, odor, water content, solid contaminants, wear metals, additive elements,

and oxidation products. Clean the system thoroughly and flush with fresh, new fluid to avoid any contamination with the previous fluid/lubricant. Replace all seals and filters with new, compatible parts. Mixing two different fluids in the same system is not recommended.

Contact your Danfoss representative with questions concerning hydraulic fluid recommendations.

Viscosity and cleanliness requirements

<i>Minimum viscosity</i>	<i>Optimum range viscosity</i>	<i>Maximum allowed -startup viscosity</i>	<i>Cleanliness requirement (ISO 4406:99)</i>
6 cSt (45 SUS)	20-43 cSt (100-200 SUS)	2158 cSt (10,000 SUS)	18/16/14

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