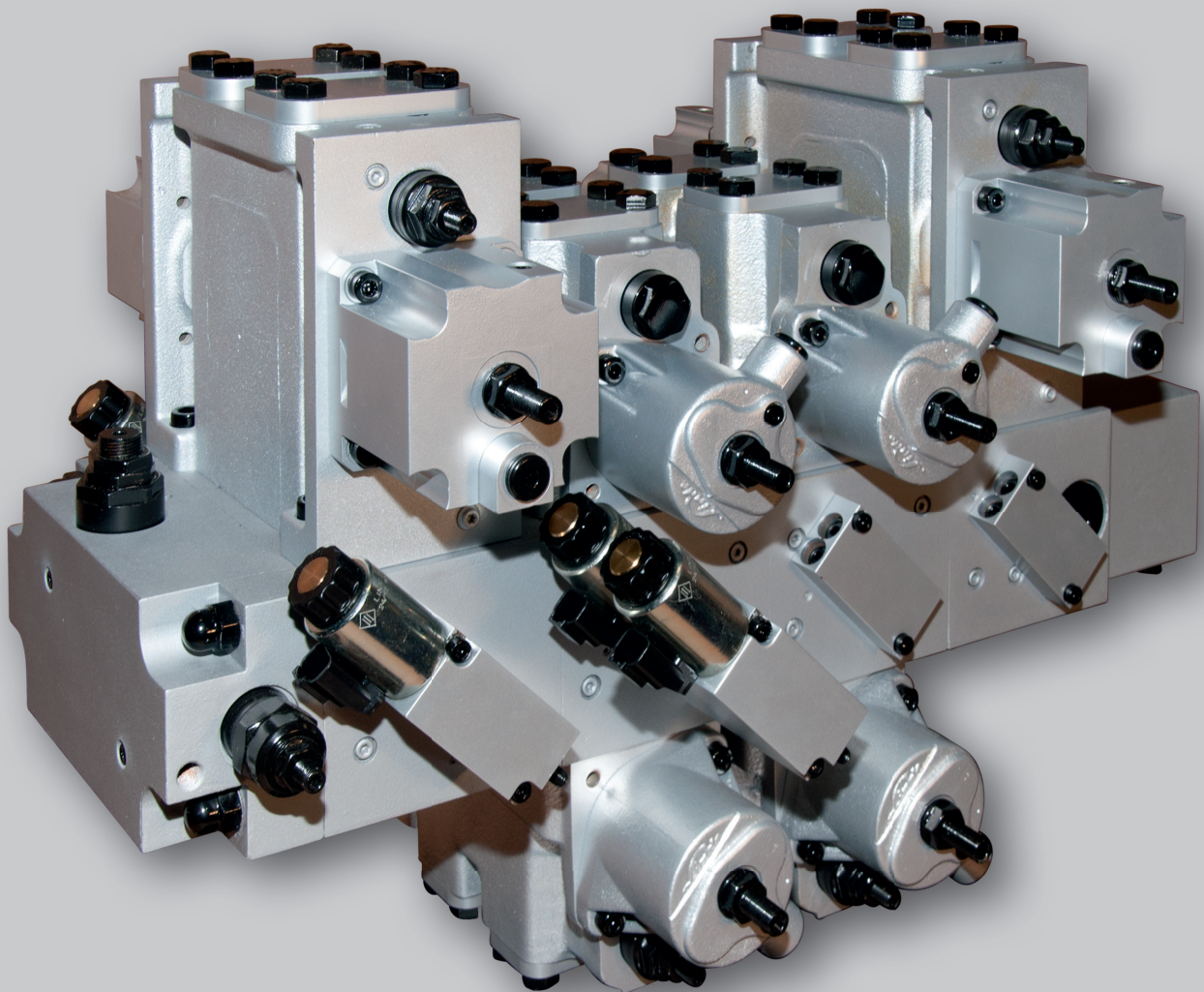
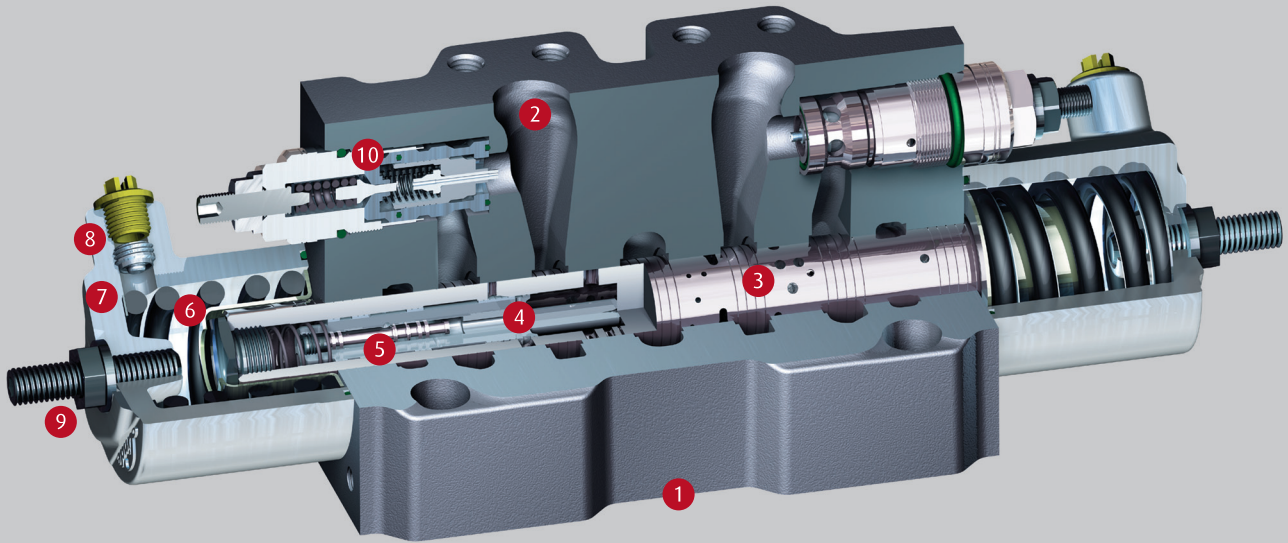


VT modular.
Modular System for
LSC Manifold Valve Plates

Linde Hydraulics

Linde





- | | |
|--|--|
| <p>1 Load Sensing Directional Control Valve
shown as sub plate mounted valve</p> <p>2 Work ports
1" or 1 1/4", based on flow rating</p> <p>3 Valve control spool
with integrated compensators and pressure copiers</p> <p>4 Compensator
downstream, for compensation, one per side</p> <p>5 Pressure copier
integrated in compensator, one per side</p> | <p>6 Centering spring
with 7 - 19 bar nominal control range</p> <p>7 Shim
controls start of function on each side</p> <p>8 Throttle check valve
controls spool dynamics</p> <p>9 Mechanical stroke limiter
independent flow limitation on each side</p> <p>10 Pilot-operated pressure relief valves
with flat flow-pressure characteristic,
make-up function optional</p> |
|--|--|

Design features

- >> directional control valves available in sub plate mounted valve design
- >> designed for the Linde Synchron Control (LSC) – Load Sensing System
- >> nominal sizes 25 and 30
- >> flows up to 600 l /min (size30) per valve section
- >> downstream compensators (Post-Compensated LS system)
- >> proportional flow distribution in case of system saturation
- >> modular design for the configuration of control plates for 1-7 functions
- >> optionally with hydraulic or electric piloting

Product benefits

- >> approved quality since LSC-introduction in 1984
- >> fast machine response & low hysteresis
- >> intuitive machine operation through compensating for load effects – also during multi-functioning
- >> Maintains flow relations, even during system saturation (all functions remain active)
- >> high handling performance
- >> low energy consumption
- >> high system efficiency
- >> easily adaptable to applications
- >> quick availability for quantity 1

Linde Hydraulics Product Range.

Find the right products for your application.

Product	Type	Application	Linde Terminology
Pump	Self-regulating	open circuit	HPR-02
	Variable displacement	closed circuit	HPV-02
Motor	Variable displacement	closed and open circuit	HMV-02
	Self-regulating	closed and open circuit	HMR-02
	Fixed displacement	closed and open circuit	HMF-02
	Fixed displacement	open circuit	HMF-02 P
	Adjustable fixed displacement	closed and open circuit	HMA-02
Valve technology	LSC manifold plate	open circuit	VT modular
	LSC manifold plate	open circuit	Monoblock
Electronics	Control unit	closed and open circuit	LINC
	Peripheral equipment	closed and open circuit	-
	Software	diagnostics and parameterization	LinDiag®

Table of Contents VT modular.

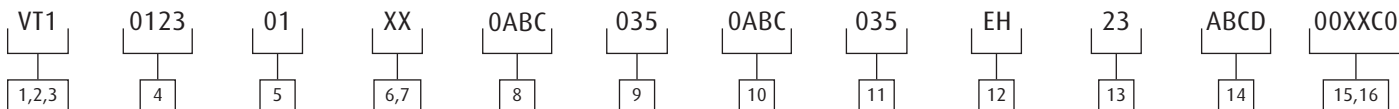
VT modular valve system and classification	2
Model Code Build	4
Model Code Breakdown	6
General technical data and operational parameters	10
Example drawing of the unit shown on the front cover	11

Disclaimer.

The data on which this brochure is based correspond to the current state of development. We reserve the right to make changes in case of technical progress. The dimensions and technical data of the individual installation drawings are prevailing. The features listed in this data sheet may not be available in all combinations and nominal sizes.

Our sales engineers will be happy to provide advice regarding the configuration of your hydraulic system and on product selection.

Model Code Build.



1,2,3 Product

VT1 - LSC Hydraulic Main Control Valve

4 Bank Configuration

0 - Base block with P port only
 1 - Base block with P port plus 1 expansion module
 2 - Base block with P port plus 2 expansion modules
 3 - Base block with P port plus 3 expansion modules

5 Pressure Control Block

0 - No pressure control module
 1 - With pressure control module (standard)

6,7 Pressure Control Setting

XX - Load Sense relief in 10 bar increments (160 to 370 bar) (350 bar standard)

8 Tank Check - Left Tank Port

0 - No tank check
 A - Tank check with port facing down (standard)
 B - Tank check with port facing out
 C - Tank check with port facing up

9 Left Tank Port Check Pressure

0 - No tank check
 3 - 3 bar crack pressure (standard)
 5 - 5 bar crack pressure (standard)

10 Tank Check - Right Tank Port

0 - No tank check
 A - Tank check with port facing down (standard)
 B - Tank check with port facing out
 C - Tank check with port facing up

11 Right Tank Check Pressure

0 - No tank check
 3 - 3 bar crack pressure (standard)
 5 - 5 bar crack pressure (standard)

12 Valve Actuation Type, Position 0

E - 24 volt proportional, Integral Deutsch male connector (standard)
 H - Hydraulically piloted, 6-19 bar (standard)

13 Valve Size, Position 0

2 - 25 size valve
 3 - 30 size valve

14 Valve Type, Position 0

A - Asymmetrical Metering Spool, A and B blocked in neutral
 B - Symmetrical Metering Spool, A and B blocked in neutral
 C - Symmetrical Metering Spool, A and B open to Tank in neutral
 D - Symmetrical Metering Spool with straight tracking feature (25 size only)

15,16 A Port Valve and Setting, Position 0

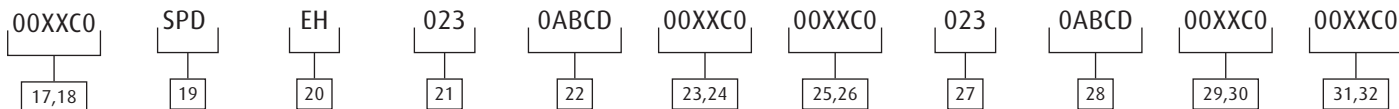
0,0 - No port relief or anti-cav check (plugged cavity)
 X,X - Port relief setting (in ten bar increments) (90 bar to 400 bar) (380 bar standard)
 C,0 - Anti-cav Check (2 bar cracking pressure)

17,18 B Port Valve and Setting, Position 0

0,0 - No port relief or anti-cav check (plugged cavity)
 X,X - Port relief setting (in ten bar increments) (90 bar to 400 bar) (380 bar standard)
 C,0 - Anti-cav Check (2 bar cracking pressure)

Note: If position 4 = 0, omit position codes 19 through 60

Model Code Build.



19 Expansion Block Type, Position 1

S - Single Station, no bottom porting
 P - Single Station, P port on bottom
 D - Double Station, porting for second valve on bottom

Note: If additional expansion blocks are required, repeat positions 19 through 32. A total of three expansion blocks may be used.

20 Valve Actuation Type, Position 1

E - 24 volt proportional, Integral Deutsch male connector (standard)
 H - Hydraulically piloted, 6-19 bar (standard)

21 Valve Size, Position 1, Top

0 - No Valve (Blanking Plate)
 2 - 25 size valve
 3 - 30 size valve

22 Valve Type, Position 1, Top

0 - No Valve (Blanking Plate)
 A - Asymmetrical Metering Spool, A and B blocked in neutral
 B - Symmetrical Metering Spool, A and B blocked in neutral
 C - Symmetrical Metering Spool, A and B open to Tank in neutral
 D - Symmetrical Metering Spool with straight tracking feature (25 size only)

23,24 A Port Valve and Setting, Position 1 Top

0,0 - No port relief or anti-cav check (plugged cavity)
 X,X - Port relief setting (in ten bar increments) (90 bar to 400 bar) (380 bar standard)
 C,0 - Anti-cav Check (2 bar cracking pressure)

25,26 B Port Valve and Setting, Position 1 Top

0,0 - No port relief or anti-cav check (plugged cavity)
 X,X - Port relief setting (in ten bar increments) (90 bar to 400 bar) (380 bar standard)
 C,0 - Anti-cav Check (2 bar cracking pressure)

Note: If position 19 = S or P, omit position codes 27 through 32

27 Valve Size, Position 1, Bottom

0 - No Valve (Blanking Plate)
 2 - 25 size valve
 3 - 30 size valve

28 Valve Type, Position 1, Bottom

0 - No Valve (Blanking Plate)
 A - Asymmetrical Metering Spool, A and B blocked in neutral
 B - Symmetrical Metering Spool, A and B blocked in neutral
 C - Symmetrical Metering Spool, A and B open to Tank in neutral
 D - Symmetrical Metering Spool with straight tracking feature (25 size only)

29,30 A Port Valve and Setting, Position 1 Bottom

0 - No port relief or anti-cav check (plugged cavity)
 X,X - Port relief setting (in ten bar increments) (90 bar to 400 bar) (380 bar standard)
 C,0 - Anti-cav Check (2 bar cracking pressure)

31,32 B Port Valve and Setting, Position 1 Bottom

0,0 - No port relief or anti-cav check (plugged cavity)
 X,X - Port relief setting (in ten bar increments) (90 bar to 400 bar) (380 bar standard)
 C,0 - Anti-cav Check (2 bar cracking pressure)

Note: If position 4 = 1, omit position codes 33 through 60

Model Code Breakdown.

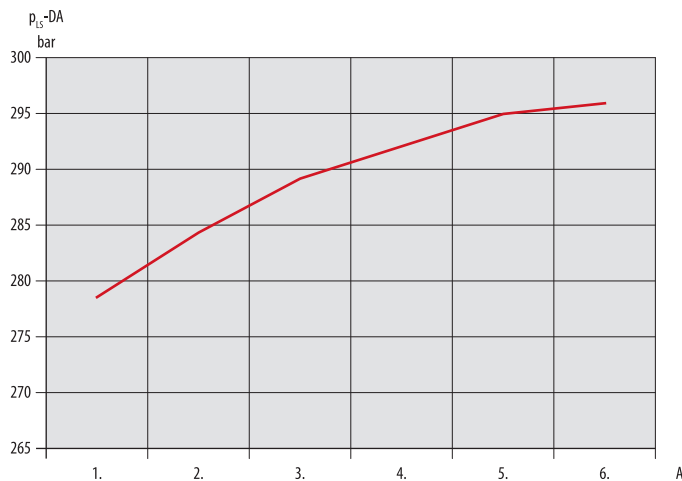
Model Code Character 4 - Bank Configuration

Number of Valves	Character Code
1	0
2	1
3	1 (requires double station module) or 2
4	2 (requires double station module) or 3
5 to 7	3 (requires double station modules)

Application

Base block contains one Pressure port (1-1/2" Code 62 flange) and two Tank ports (1-1/2" Code 61 flange)

Total valve bank flows in excess of 500 lpm must include a second pressure port (on an expansion module) for optimum performance.



The diagram shows the characteristic for 280 bar
A = number of valves with locked actuator

Model code characters 5 through 7 Pressure Control Block

This block contains LS cut off relief, unload relief and LS bleed off valves. The unload relief functions as a system relief that relies on the LS cut off adjustment.

LS Pressure Cut-off (LS-PCO)

The basis level of the LS pressure cut-off can be set to the following values in 10 bar pressure stages:

LS-PCO: 160-370 bar

Application

Maximum load sense signal to the pump(s) is limited by an adjustment in the pressure control block. The range for this adjustment is 160 bar to 370 bar. Factory setting is 350 bar.

The pressure control block contains an unload valve that relieves pump flow to tank when the LS delta pressure exceeds 45 bar.

The pressure control block contains a pressure compensated orifice which drains the LS line when no function is engaged.

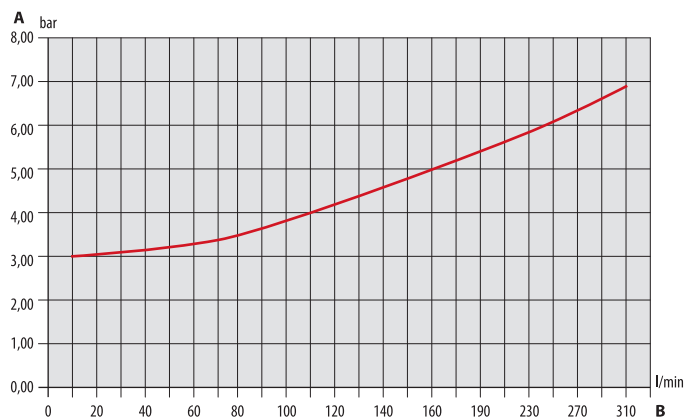
Option "0", no pressure control module, is used only when the system has a second valve bank with a pressure control module.

Model code characters 8 through 11 Tank Check Modules

The base block contains two tank ports. The tank check modules can be added to these flange ports to generate back pressure for make-up oil. Each check module contains a tank port (1-1/2" code 61 flange) oriented 90 degrees to the original tank port. The check module can be rotated to provide three different port orientations. The factory default orientation is "down" or in the direction of the pressure port.

Application

It is typical to have one at lower pressure and one at higher pressure, providing a cooler bypass system.



Typical tank check flow curve

A axis is pressure drop across the check in bar

B axis is flow in liters per minute.

Model Code Breakdown.

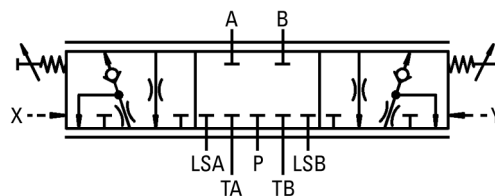
Model code character 12 – Valve Actuation Type

Valve spools can be hydraulically piloted by ports on the valve end caps, or electrically piloted by proportional solenoid valves mounted on the base block or expansion modules. When two electrically piloted valves are mounted on the same module, the pilot valves are “stacked”. The inner pilot valves control the upper main valve, and the outer pilot valves control the lower main valve.

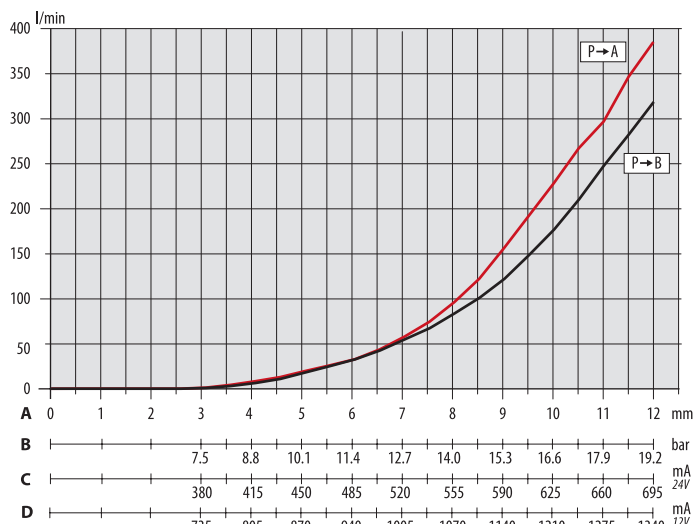
Main valves begin flow at approximately 7.5 bar pilot pressure (3mm for VW25, 2mm for VW30), and achieve full flow at approximately 19 bar pilot pressure (12 mm spool travel).

Application

Automatic pilot line air bleed for hydraulic pilot occurs at approximately 21 bar pilot pressure. Pilot control range of 6 bar to 21 bar is typically recommended.



Schematic for valve type A



Flow curve for 25 size valve type A

Application

Valves can be combined to achieve higher flows to a single actuator. Option “0” provides a blanking plate on any station.

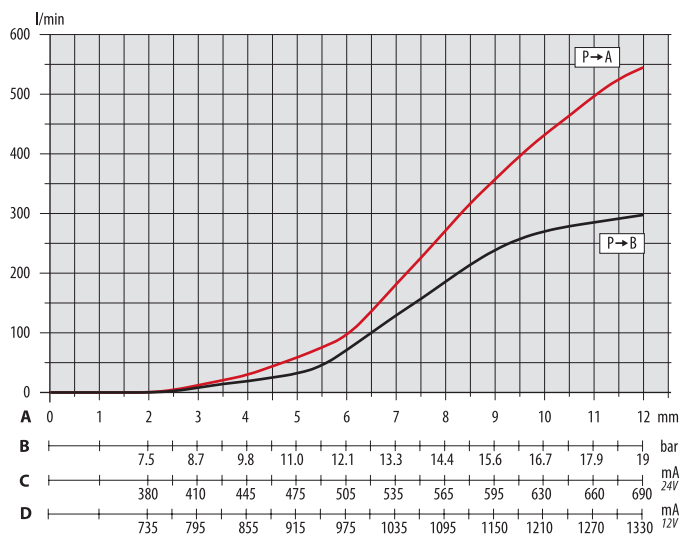
Model code character 14 – Valve Type

Valve Type A

This valve would typically be used for control of cylinders with differential areas.

Valve type A has asymmetrical metering (maximum flow to the A port is higher than to the B port), with all ports blocked in the neutral position, and includes a load drop check feature.

This valve will have a combination relief and anti-cavitation check valves in both work port as standard.



Flow curve for 30 size valve type A

Model Code Breakdown.

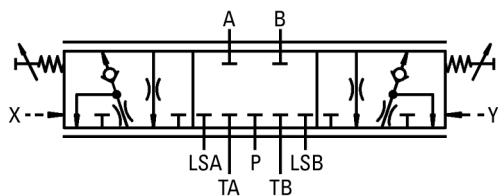
Valve Type B

This valve is a general purpose valve, and would typically be used for rubber tire travel with no counterbalance or closed center swing as examples.

Valve type B has symmetrical metering with all ports blocked in neutral, and includes a load drop check.

The valve type B, 25 size has anti-cavitation valves in both ports as standard.

The valve type B, 30 size has combination relief and anti-cavitation check valves in both working ports as standard.



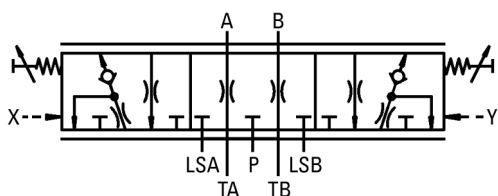
Schematic for valve type B

Valve Type C

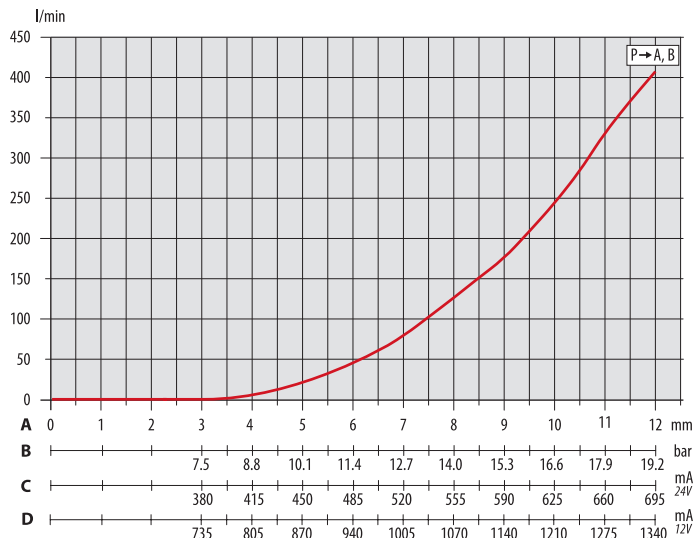
This valve would typically be used with an external counterbalance valve in swing, winch or rubber tired travel applications. It can also be used without counterbalance for float or free-wheel motor control.

Valve type C has symmetrical metering with A and B ports open to tank in the neutral position.

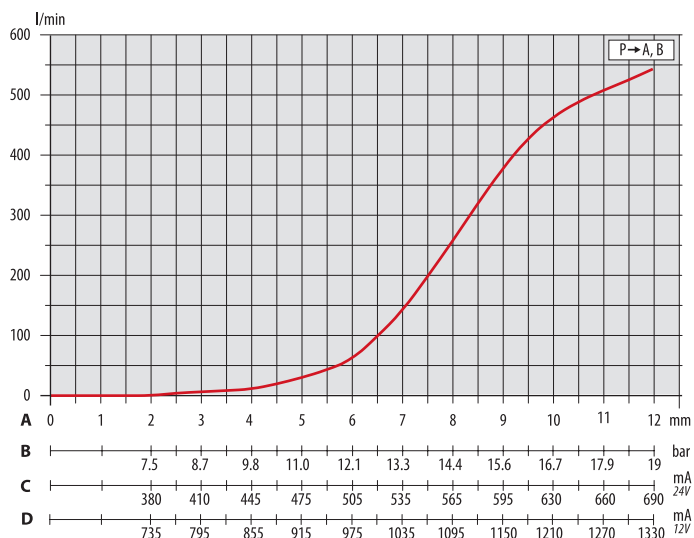
Valve type C has combination relief and anti-cavitation check valves in both working ports as standard.



Schematic for valve type C



Flow curve for 25 size valve type B and C



Flow curve for 30 size valve type B and C

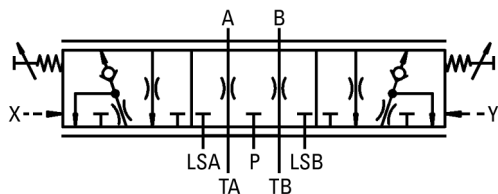
Model Code Breakdown.

Valve Type D

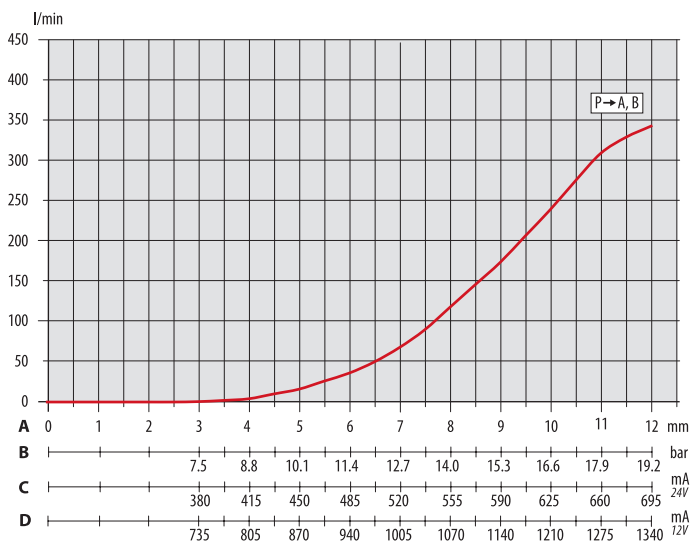
Valve type D has anti-cavitation checks and is designed specifically for open loop track drive systems with external counterbalance valves for braking.

Valve type D has symmetrical metering with A and B ports open to tank in the neutral position. It also has an added feature that provides a powerful "straight tracking" function.

Important: The valve type D is only available in the 25 size valve.



Schematic for valve type D



Flow curve for 25 size valve type D

Model code character 15 through 18 Port Valve Options

All valves have a cavity for a port valve. This valve can be either an anti-cavitation valve, or a combination valve that does both port relief and anti-cavitation functions.

See Valve types for standard configurations.

Application

If no valve is required, specify "00" in the model code for a cavity plug.

For relief valve settings other than standard, insert two digits that represent the relief pressure in tens of bar.

Example 90 bar = 09, 320 bar = 32

Model code character 19 – Expansion Block Type

There are three types of expansion modules that mount to the basic block using tie rods. The first (option S) has a single valve station on top with nothing on the bottom. The second (option P) has a single valve station on top and a 1-1/2" code 62 pressure port on the bottom. The third (option D) has valve stations on both top and bottom. Up to three expansion modules can be added to the basic block.

Application

The secondary P port can be used in systems with multiple pumps, and must be incorporated when the total inlet flow exceeds 500 lpm.

Additional model code characters

Repeat above information as needed for additional positions.

General technical data.

System pressure

>> Nominal pressure* 420 bar

Hydraulic control

Pilot controller pressure range 6 - 21 bar

Nominal flows

>> Pump (P), overall 700 l/min
 >> Pump (P), each 500 l/min
 >> Tank/cooler (T/K) in total 1.000 l/min
 >> Directional control valve (A, B) VW25 400 l/min**
 >> Directional control valve (A, B) VW30 600 l/min**

Electric control

Connector type Deutsch (IP67)
 Max. inductor temperature 170° C
 Insulation voltage 1 kV
 Dither frequency range 100 - 250 Hz
 Rated voltage 12 VDC 24 VDC
 Current 0 - 1650 mA 0 - 850 mA
 On-time with hot inductor 100 % 100 %
 Inductive resistance R20 4.770 18.00
 Inductive resistance R170 7.50 29.20
 Rating of inductor P170 20.2 W 21.1 W
 Limit current 1.64 A 0.85 A

* Nominal pressure: Pressure for the designation or identification of a component. At the effective pressure of 420 bar, LSC-components are rated for max. 5 % of the overall operating hours. (500 h over 10.000 operating hours)

**flows at $\Delta p_{LS} = 20$ bar

Port specifications

Hydraulic ports on system components are in accordance with ISO 6149-1, ISO 6162-1 and ISO 6162-2.

Function	Port name	Port size	Test port	Test port size	Maximum permissible pressure [bar]
Work ports	A, B	1", 1 1/4"	-	-	420
Pump	P	SAE 1 1/2"	xP	M14x1.5	400
Load sensing signal	LS	M14x1.5	xLS	M14x1.5	380
Tank	T	SAE 1 1/2"	xT	M27x2*	30
Cooler	K	SAE 1 1/2"	-	-	30
Neutral Tank	T0	M14x1.5	-	-	2
Pilot pressure	pSt	M14x1.5	-	-	45

*) In addition to its purpose as a test port, the xT port can be used to supply additional make-up oil

Operational parameters.

Permitted pressure fluids

>> Mineral oil HLP in accordance with DIN 51 524-2
 >> Other pressure fluids on request.

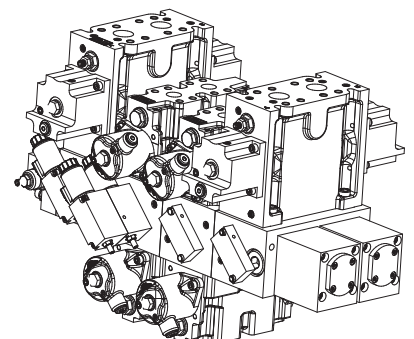
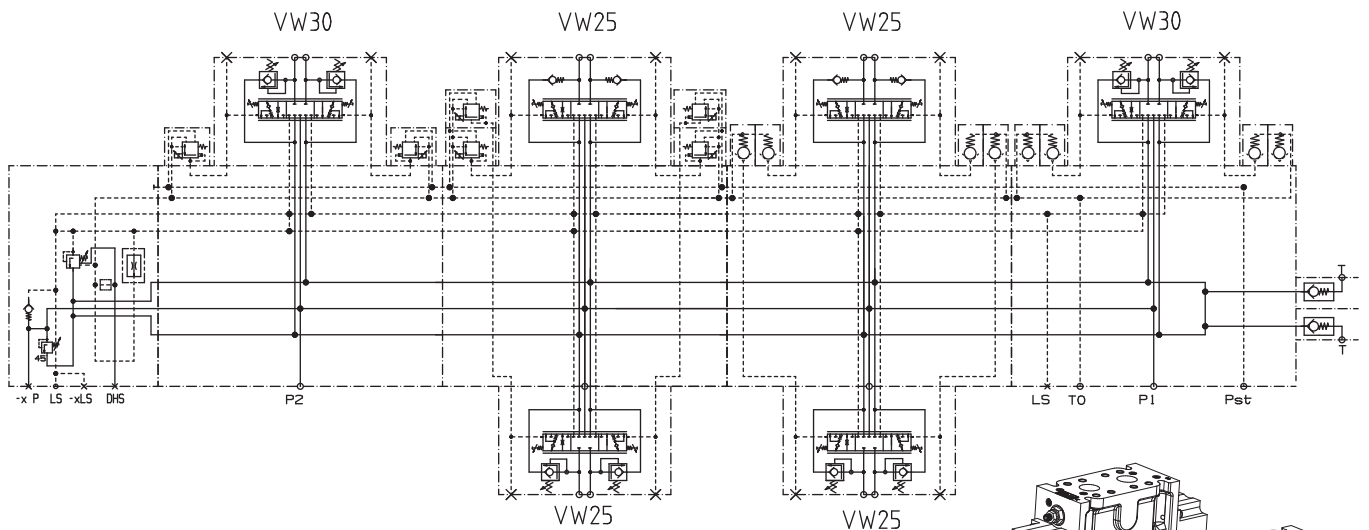
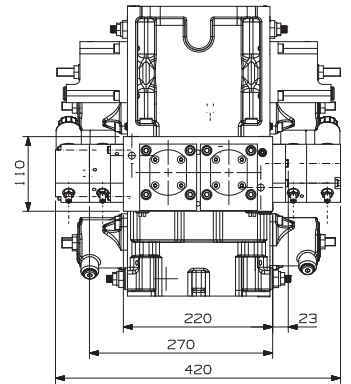
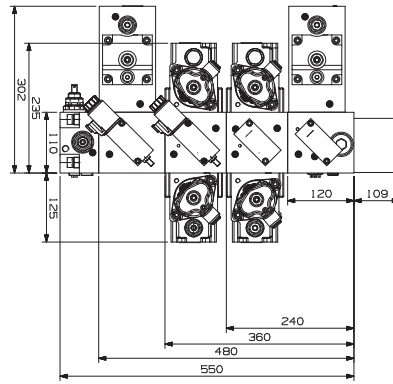
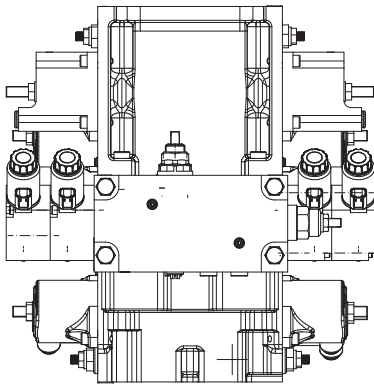
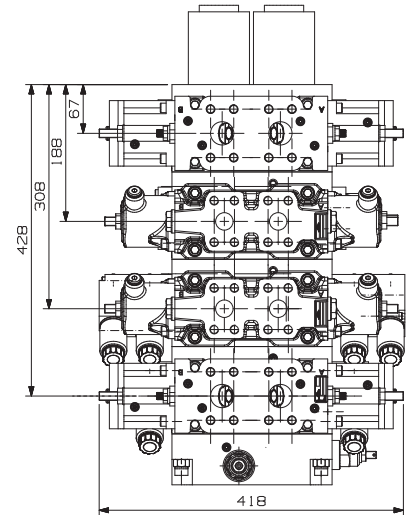
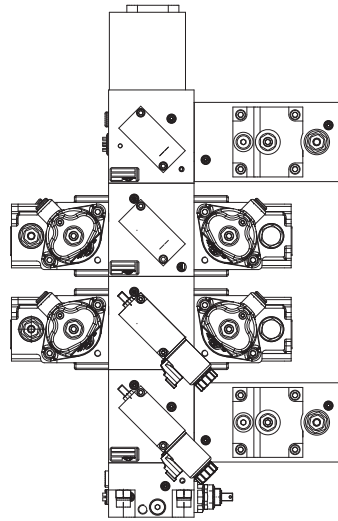
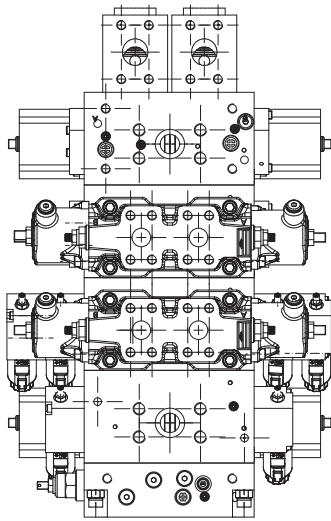
Filtration

>> For reliable proper function and long service live 16 / 14 / 11 in accordance with ISO 4406 or higher
 >> Minimum requirement 18 / 16 / 13 in accordance with ISO 4406
 maximum size of hard contaminating particles: 100 µm

Recommendation for viscosity ranges

Pressure fluid temperature range	[°C]	-20 to +90
Operating viscosity range	[mm ² /s] = [cSt]	10 to 80
Optimum operating viscosity range	[mm ² /s] = [cSt]	15 to 30
Highest viscosity (short time during cold start)	[mm ² /s] = [cSt]	1000

Example drawing of the unit shown on the front cover.



Depicted is the valve assembly from the front cover, showing most of the features of the product. The model code «VT13135A3A5H3B3838DH2BC0C02A3838DE2BC0C02A3838PE3A3838» describes it as a hydraulically piloted VT1 with pressure control module and two tank check modules. Two directional control valves of nominal size 30 and four of size 25 are attached by double sided hydraulically piloted and a double sided electrically piloted expansion module as well as an electrically piloted expansion module with additional P port.

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