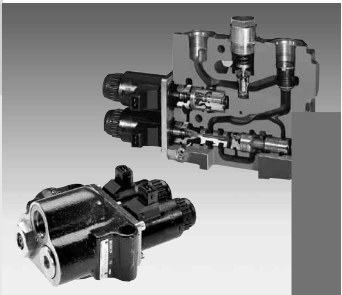
Rexroth
Bosch Group

Hitch control valves

RE 66 125/05.10 1/16
Replaces:
RE 66 125/09.04

EHR5-OC, EHR5-LS, EHR23-EM2



Electronic-hydraulic
hitch control “EHR”

EHR5... Q_{max} = 60 l/min
EHR23... Q_{max} = 100 l/min

3

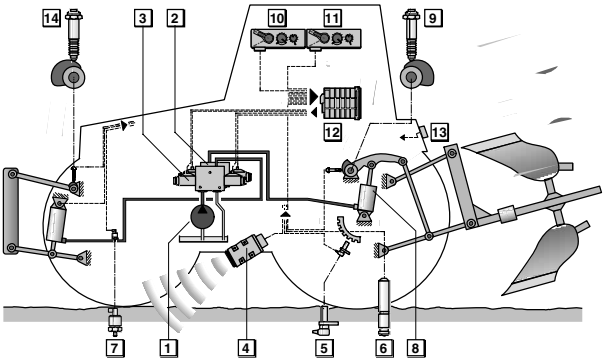
Contents **Page**

Features
- EHR-valves in flange or segmental design
- combinably with directional control valves for working hydraulics
- Applications:
  electronic-hydraulic hitch control for tractors, header control for combines.
  Hitch control valves for:
  position control, draft control, mixed control, pressure- and slip control, as well as active vibration damping (transport mode)

EHR-System

System components

1 Hydraulic pump
2 Hitch control valve, rear-end
3 Hitch control valve, front
4 Radar velocity sensor
5 Speed sensor
6 Draft sensor
7 Pressure sensor
8 Lift cylinder
9 Position sensor
10 Control panel, rear-end
11 Control panel, front
12 Electronic control unit
13 Rear-end actuation
14 Inductive position sensor



Mode of operation

The hydraulic pump 1 supplies oil to the servo solenoid valve 2 which controls the lift cylinder 8. The cylinders operate on the linkage to raise, hold or lower the attached implement. The electronic control unit 12 receives the setpoint value via the control panel 10 and the actual values via the sensors 9 and 6.
The control deviation resulting from the comparison of set-point and actual value is conditioned in the control unit 12 and then fed to the hitch control valve 2. The raising and lowering modules are controlled by 2 proportional solenoids.
The following different operating modes can be implemented:

Position control

In this case, the controlled variable is the position of the hitch. The position sensor 9, which is operated by a cam on the hitch, supplies the feedback signal.

Draft control

In this case, the controlled variable is the force at the trailing linkage. If it can be kept constant, it means that the tractor power is being used optimally, for example when ploughing undulating land and inhomogeneous soil. The feedback signal is supplied by the draft sensors 6. The draft is adjusted by varying the working depth of the attached implement (e.g. plough).

Mixed control

In this case, the actual values of position and draft are mixed in an adjustable ratio at the control panel and then processed as the controlled variable. Mixed control allows the variations in working depth due to fluctuations in soil resistance, which occur with pure draft control, to be reduced.

Vibration damping

In order to reduce fluctuations in front-axle load and thereby increase steering control, sensors 6 and 9 are used to measured the controlled variable. This is evaluated by the electronic control unit 12, which then transwiths the appro-priate electronic signals to the hitch control valve 2.

Slip control

The slip control offers the following advantages:
– Savings in both time and fuel,
– Reduced tyre wear,
– The soil is treated with greater care,
– The driver is under less strain,
– The vehicle does not get stuck.
This function is carried out by the radar sensor 4 and the speed sensor 5.

Pressure control

Pressure control enables optimum packing of the soil. The output signals from the pressure sensor 7 are processed in the control unit 12 and sent to on the hitch control valve 2.

Front-end control

The setpoints for front-end control are present using con-trol panel 11.The feedback signals are transwithted to the electronic control unit 12 by sensors 7 and 14. On the basis of the control deviation resulting from the setpoint/feedback signal comparison, the flow rate of the hitch control valve 3 is proportionally controlled. With front-end control, the position and pressure-control functions can be carried out.

External control

The position sensor fixed to the attached implement supplies electric signals which are evaluated in the control unit 12 and hitch control valve 2, thus enabling the attached implement to be controlled in a defined position.

Rear-end actuation

The hitch can be raised and lowered using rear-end switch 13.

Switch-on interlock

Besides its control and actual value conditioning functions, the electronic control unit also incorporates various supervisory circuits. A switch-on interlock prevents the hitch from making any movement when the system is first switched on. The interlock is released the first time the lift switch is operated.

The lift height is also monitored and its liwith can be preselected by means of a potentiometer.
The cable of the position sensor is monitored for open circuits or short circuits and, in the event of a fault, the control unit is tripped so that the hitch cannot move.

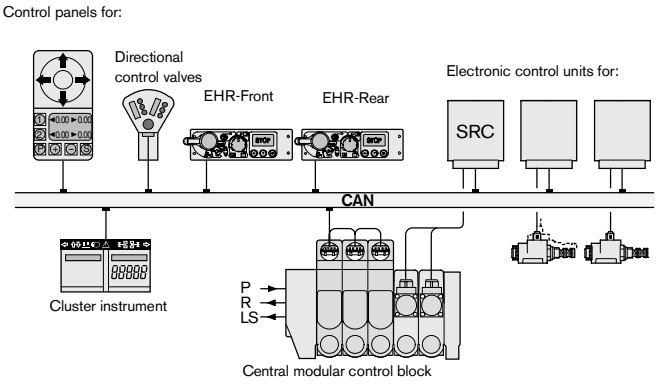
CAN-Bus in the tractor

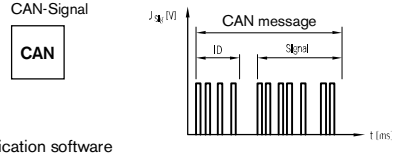
For years, the amount of electronics in the tractor has been growing steadily. This leads to greater complexity of the electronic functions in the control units, which have to exchange or coordinate their information in order to accomplish their tasks. Here, the transfer of data via the conventional wiring harness has often proven to be unsuitable. A solution is the use of a serial data bus, which achieves a reduction in the wiring harness and connectors.

Every future-oriented, high-performance electronic concept makes exacting demands for inter-system exchange of information combined with high transmission reliability. A suitable bus system is found in the Controller Area Network (CAN), since it allows equal-access stations to be linked to one another via a serial data bus. A further advantage of CAN over conventional cabling is the fact that any transmission errors which occasionally occur due to electromagnetic interference are detected and automatically corrected through a repeat transmission.

CAN features:

- Considerably greater functional reliability for all electronic systems.
- High information density and baud rate.
- Link-up enables simultaneous communication between several sensors, control units and display units.
- Internationally recognised standard. ISO 11898 and 11519-2, and SAEJ 1939.
- Less cabling required, which means smaller installation space, lower costs and less susceptibility to interference.
- Interface has greater error tolerance and high interference immunity.
- Optimum diagnostic capabilities thanks to error code output.
- Maximum possible resolution.



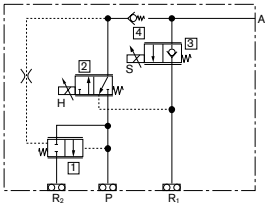


For additional documents, see RE 95337, application software Electrohydraulic hitch control EHR.

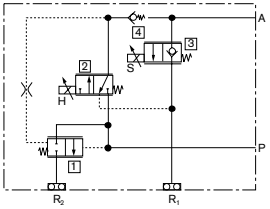
EHR5-OC
Hitch control valves

1 3-way pressure compensator
2 Raising module
3 Lowering module
4 Non-return valve

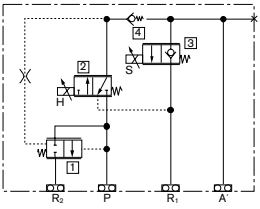
Symbol 1



Symbol 2



Symbol 3



Technical Data

Design	Proportional valve, single-acting, flange-design
Port connections	Internal thread see table below
Installation position	Axis Z – Z, max. 30° deviation from the horizontal
Ambient temperature range	–30...+80 °C
Hydraulic fluid	Hydraulic oils with mineral oil base to DIN/ISO. Other, e.g. environmentally friendly fluids, available on request
Viscosity	10...800 mm^2/s perwithted range 20...100 mm^2/s recommended range ...2000 mm^2/s perwithted for starting
Fluid temperature range	Operating 20...90 °C, short time –30...+100 °C
Filtering	Contamination at least class 19/16 to ISO/DIS 4406 or class 10 to NAS 1638 optained with filter $\beta_{25} = 75$
Max. permissible pressure	P: 220 bar, A: 220 bar, R_1: max. 5 bar, but smaller than load pressure, R_2: max. 10 bar
Rated flow	Q_{SN}, Q_{HN} see table below
Load drop at port A	max. 4 cm^3 per minute at 125 bar, viscosity 35 mm^2/s
Mode of operation	Direct spool operation by means of proportional solenoids 12 V, I_{max} 3.35 A
Electrical connections	Plug connection 2-pin
Degree of protection	IP 64 A

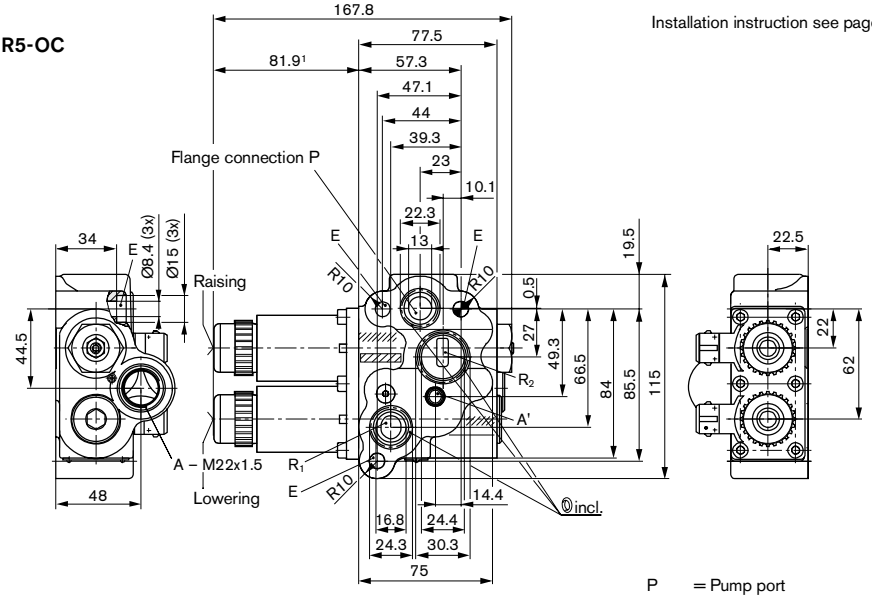
Ordering-No.	Drawing-No.	Port connections: A	A′ in the flange (max. 25 l/min)	P	Thread *)	Lowering Q_{SN} [l/min]	Raising Q_{HN} [l/min]	Emergency manual actuation	Position of solenoid connector	Symb.
0 521 222 002	A 521 023 253	M22x1.5	–	M22x1.5	II	60	40	with	①	2
0 521 222 003	A 521 023 711	7/8 -14 UNF	–	Flange	II	60	60	without	① + ④	1
0 521 222 005	A 521 023 716	M22x1.5	–	M22x1.5	II	60	40	without	① + ④	2
0 521 222 006	A 521 023 717	M22x1.5	–	Flange	I	60	60	with	①	1
0 521 222 008	A 521 023 253	M22x1.5	–	M18x1,5	II	60	40	with	①	2
0 521 222 009	A 521 023 723	M22x1.5	–	M22x1.5	II	60	40	with	②	2
0 521 222 010	A 521 023 253	M22x1.5	–	M22x1.5	II	60	60	with	①	2
0 521 222 012	A 521 023 733	closed	x	Flange	II	60	20	without	① + ④	3
R 917 000 208	R 917 000 208	M22x1.5	–	M22x1.5	II	60	max. 40	without	①	2
R 917 000 878	R 917 000 878	M22x1.5	–	Flange	I	60	60	without	①	1
R 917 005 088	A 521 023 717	M22x1.5	–	Flange	II	60	60	with	①	1
R 917 006 052	A 521 023 246	M22x1.5	–	Flange	II	20	40	with	①	1
R 917 006 650	A 521 023 246	M22x1.5	x	Flange	II	60	40	with	①	3

*) Execution I: DIN 3852, part of 1
Execution II: DIN 3852, part of 3, accordingly ISO 6149 (for O-ring sealing)

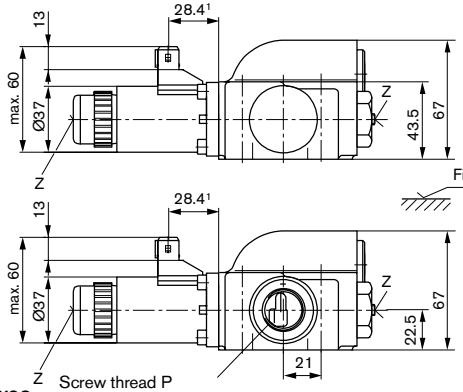
① = As shown, see page 5
② = Raising and lowering solenoids turned 90°
④ = Raising and lowering solenoids with different coding

Installation instruction see page 16

EHR5-OC

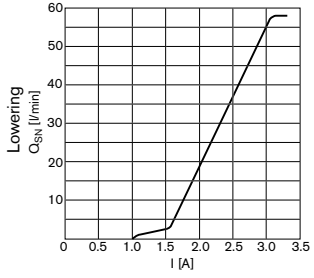


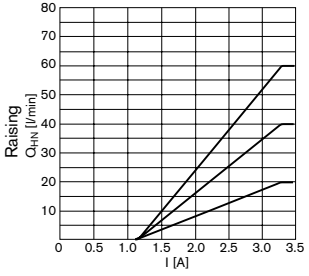
P = Pump port
A, A′ = Cylinder port
R_1 = Cylinder return port
R_2 = Return port
E = Mounting hole
= 25+6 Nm



Characteristic curves

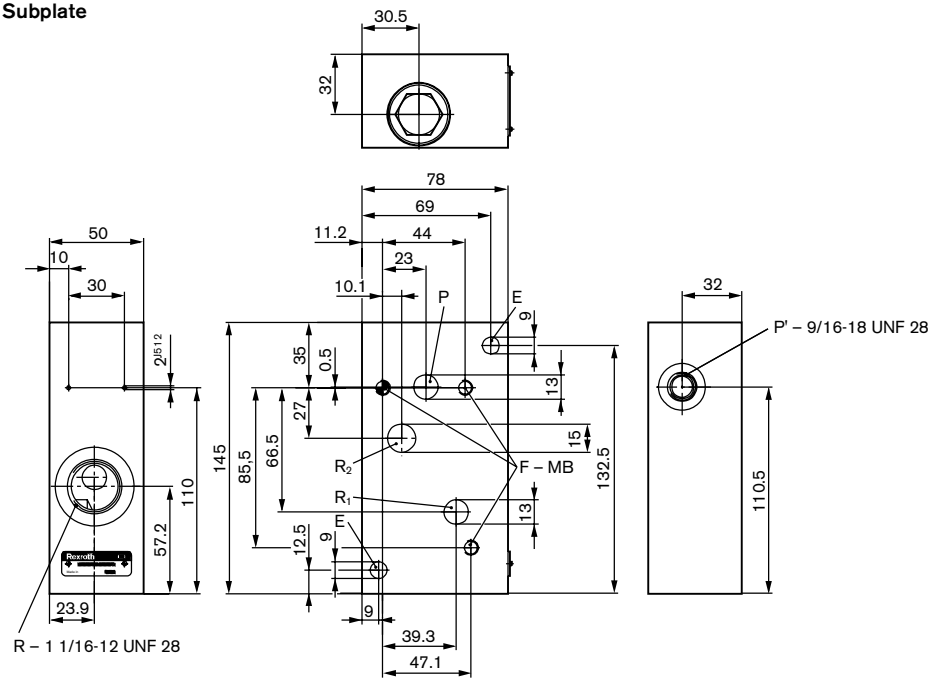
Δp A → R = 15 bar
T = 50°C



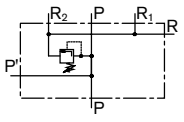


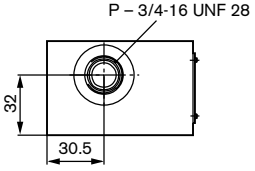
EHR5-OC

Subplate



Circuit diagram



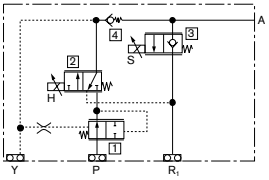


E = Mounting hole
F = Mounting threads

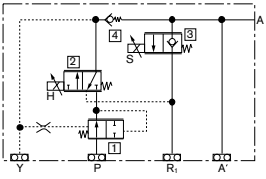
	PRV p [bar]	kg	
Subplate for EHR5-OC	205^{+10}	1,5	**1 525 503 641**

EHR5-LS
Hitch control valves

Symbol 1



Symbol 2



1 3-way pressure compensator
2 Raising module
3 Lowering module
4 Non-return valve

Technical Data

Design	Proportional valve, single-acting, flange-design
Port connections	Internal thread see table below
Installation position	Axis Z – Z, max. 30° deviation from the horizontal
Ambient temperature range	–30...+80°C
Hydraulic fluid	Hydraulic oils with mineral oil base to DIN/ISO. Other, e.g. environmentally friendly fluids, available on request
Viscosity	10...800 mm^2/s perwithted range 20...100 mm^2/s recommended range ...2000 mm^2/s perwithted for starting
Fluid temperature range	Operating 20...90°C, short time –30...+100°C
Filtering	Contamination at least class 19/16 to ISO/DIS 4406 or class 10 to NAS 1638 optained with filter $\beta_{25} = 75$
Max. permissible pressure	P: 220 bar, A: 220 bar, R_1: max. 5 bar, but smaller than load pressure
Rated flow	Q_{SN}, Q_{HN} see table below
Load drop at port A	max. 4 cm^3 per minute at 125 bar, viscosity 35 mm^2/s
Mode of operation	Direct spool operation by means of proportional solenoids 12 V, I_{max} 3.35 A
Electrical connections	Plug connection 2-pin
Degree of protection	IP 64 A

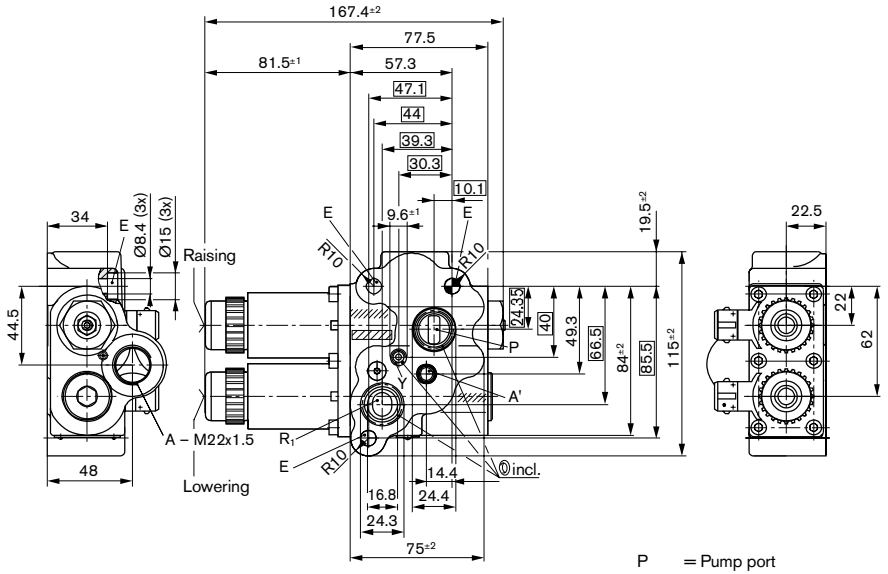
EHR5-LS

Ordering-No.	Drawing-No.	Port connections: A	A′ in the flange (max. 25 l/min)	P	Thread *)	Lowering Q_{SN} [l/min]	Raising Q_{HN} [l/min]	Emergency manual actuation	Position of solenoid connector	Symb.
0 521 222 101	A 521 023 727	M22x1.5	x	Flange	II	60	60	with	①	2
R 917 000 664	A 521 023 735	M22x1.5	–	Flange	I	20	17	with	③	1
R 917 000 198	A 521 023 727	M22x1.5	x	Flange	II	60	60	without	②	2
R 917 004 482	R 917 004 482	M22x1.5	x	Flange	II	60	60	without	①	2
R 917 004 951	R 917 004 951	M22x1.5	x	Flange	II	60	60	without	① + ④	2
R 917 006 510	R 917 006 510	M22x1.5	x	Flange	II	60	60	with	②	2

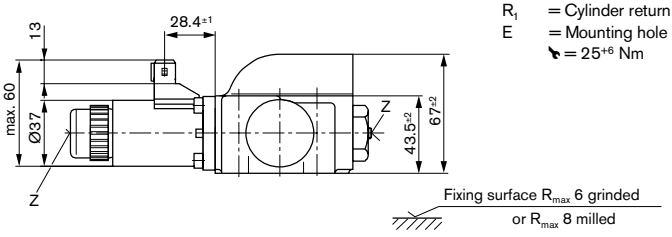
*) Execution I: DIN 3852, part of 1
Execution II: DIN 3852, part of 3, accordingly ISO 6149 (for O-ring sealing)
① = As shown, see page 8
② = Raising and lowering solenoids turned 90°
③ = Raising and lowering solenoids turned 60°
④ = Raising and lowering solenoid connectors with different coding

EHR5-LS

Installation instruction see page 16

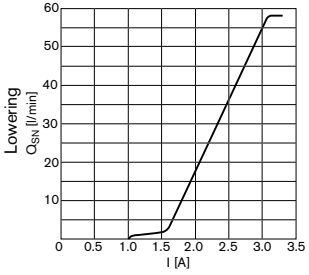


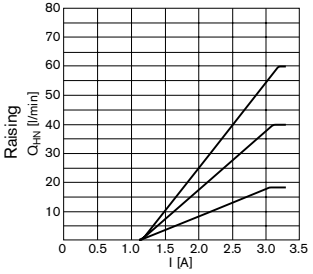
P = Pump port
A, A′ = Cylinder port
R_1 = Cylinder return port
E = Mounting hole
= 25^{+6} Nm



Characteristic curves

Δp A → R = 15 bar
T = 50°C

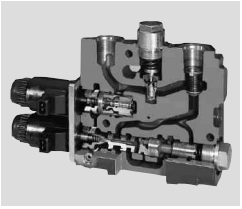




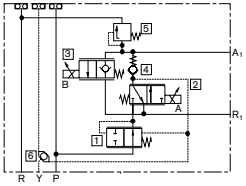
EHR23-EM2, -ERV

Hitch control valves

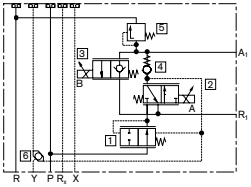
EM2: direct electromagnetic actuation, proportional
ERV: limit control valve
- **with flange surface on the O-ring side (symbol 6)**
- **with flange surface opposite the O-ring (symbol 7)**



Symbol 1

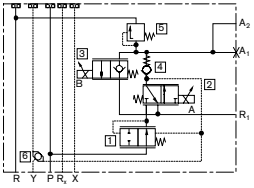


Symbol 2

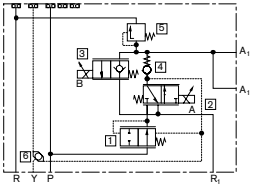


1 2-way pressure compensator
2 Raising module
3 Lowering module
4 No-return valve
5 Secondary pressure-relief valve
6 Shuttle valve

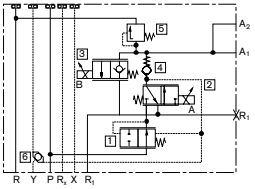
Symbol 3



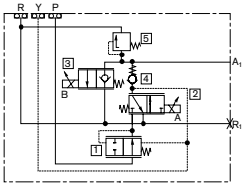
Symbol 4



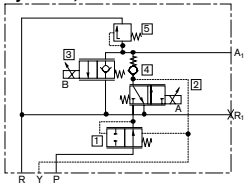
Symbol 5



Symbol 6, ERV



Symbol 7, ERV

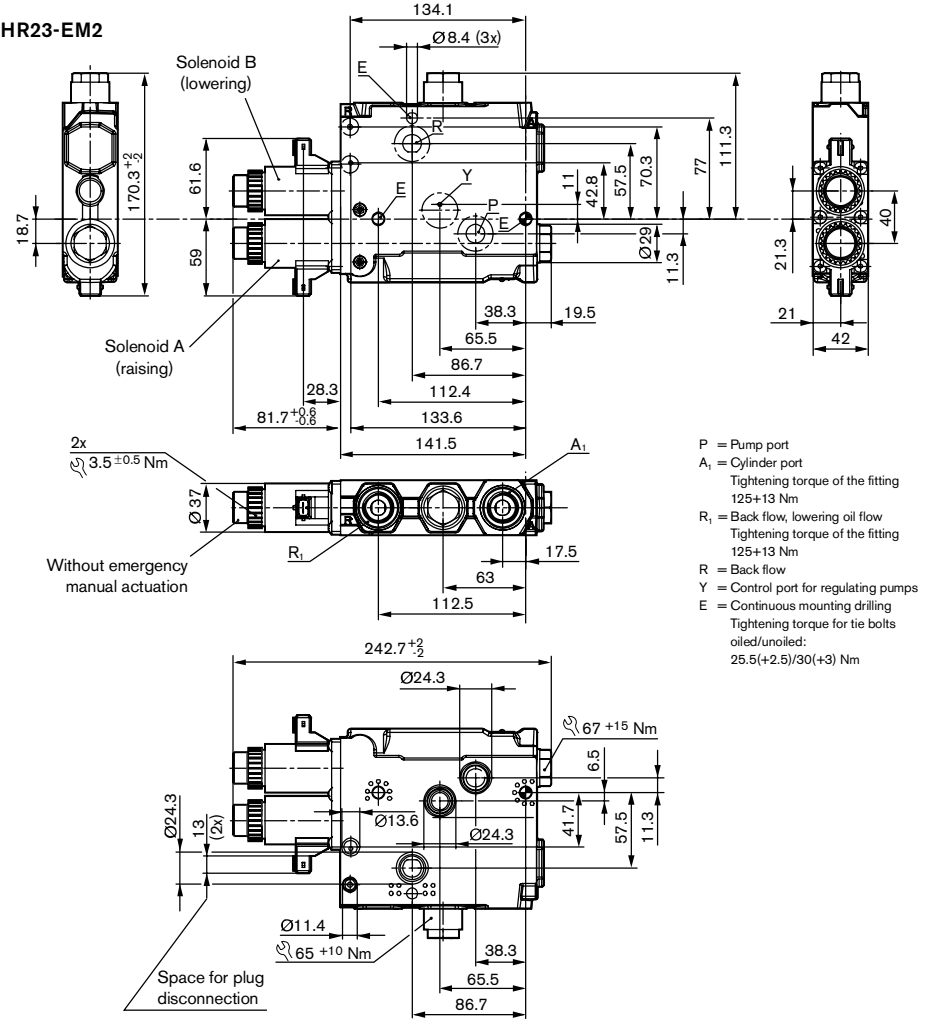


Notice to symbol 6 and 7:
Not to be used as an end valve in the control block.

Technical Data

Design	Proportional valve, single-acting, segmental design
Port connections	Screw-in thread, see pages 10–15
Installation position	Axis Z – Z, max. 30° deviation from the horizontal
Ambient temperature range	–30...+80 °C
Hydraulic fluid	Hydraulic oils with mineral oil base to DIN/ISO. Other, e.g. environmentally friendly fluids, available on request
Viscosity	10...800 mm²/s perwithted range 20...100 mm²/s recommended range ...2000 mm²/s perwithted for starting
Fluid temperature range	Operating 20...90 °C, short time –30...+100 °C
Filtering	Contamination at least class 19/16 to ISO/DIS 4406 or class 10 to NAS 1638 obtained with filter $\beta_{25} = 75$
Max. permissible pressure	P, Y: 250 bar, R_1: 5 bar, but smaller than load pressure, R: 30 bar
Rated flow	Q_{SN}, Q_{HN} see pages 10–15
Load drop at port A	max. 4 cm³ per minute at 125 bar, viscosity 35 mm²/s
Mode of operation	Direct spool operation by means of proportional solenoids 12 V, I_{max} 3.35 A
Electrical connections	Plug connection 2-pin, except for OBE
Degree of protection	IP 64 A

EHR23-EM2



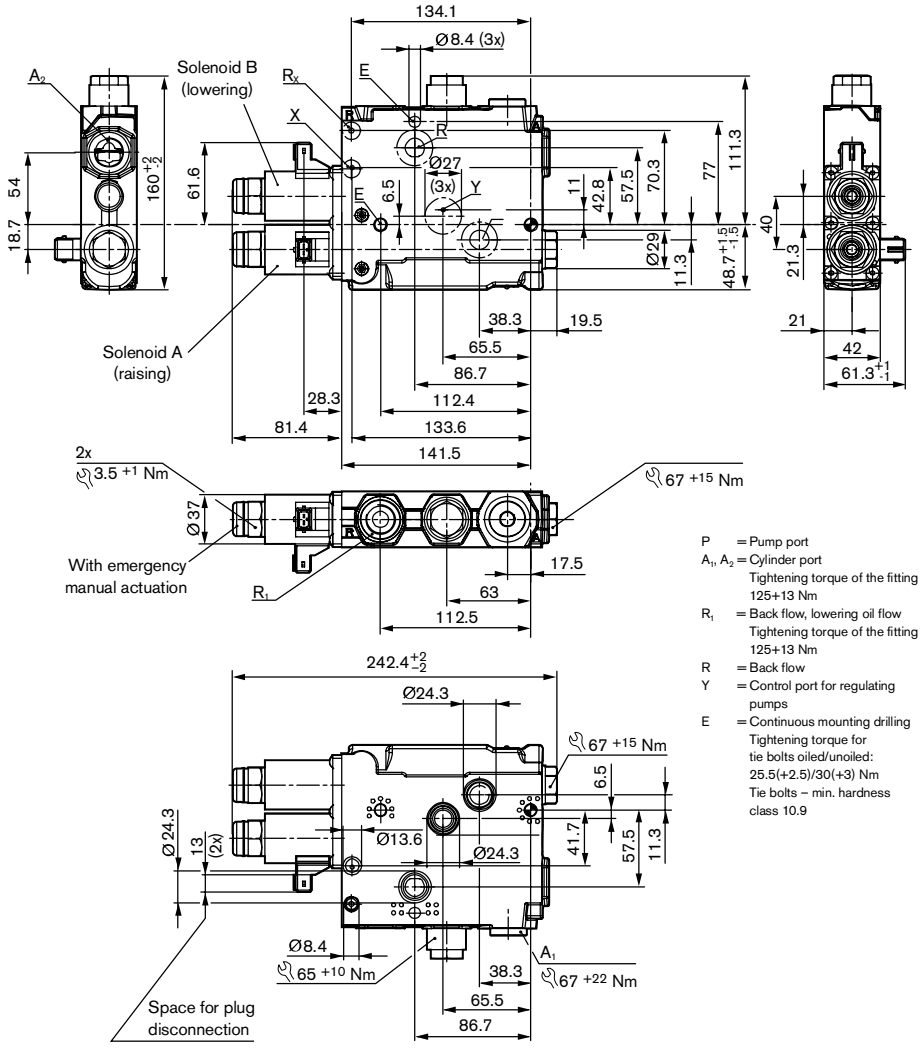
P = Pump port
A_1 = Cylinder port
Tightening torque of the fitting
125+13 Nm
R_1 = Back flow, lowering oil flow
Tightening torque of the fitting
125+13 Nm
R = Back flow
Y = Control port for regulating pumps
E = Continuous mounting drilling
Tightening torque for tie bolts
oiled/unoiled:
25.5(+2.5)/30(+3) Nm

Ordering-No. Drawing-No.	Port connections: A_1	 R_1	 Thread*)	Lowering Q_{SN} [l/min]	Raising Q_{HN} [l/min]	PRV p_{LSV} [bar]	Emergency manual actuation	Position of solenoid connector	EHS borehole (X_1, R_X)	Symbol, see page 9
R 917 006 918	M22x1.5	M22x1.5	I	65	80	220+20	with	①	without	1
R 917 005 455	M22x1.5	M22x1.5	I	65	80	220+20	with	①+②	without	1
R 917 006 003	M22x1.5	M22x1.5	I	65	50	220+20	with	②+③	without	1
R 917 006 449	M22x1.5	M22x1.5	III	65	80	220+20	without	①	with	2
R 917 005 001	M22x1.5	M22x1.5	III	65	100	203+18	with	①	with	2

*) Execution I: DIN 3852-1
Execution III: EN ISO 6149-1

① = As shown
② = Raising solenoid connector, towards O-ring side
③ = Lowering solenoid connector, towards O-ring side

EHR23-EM2

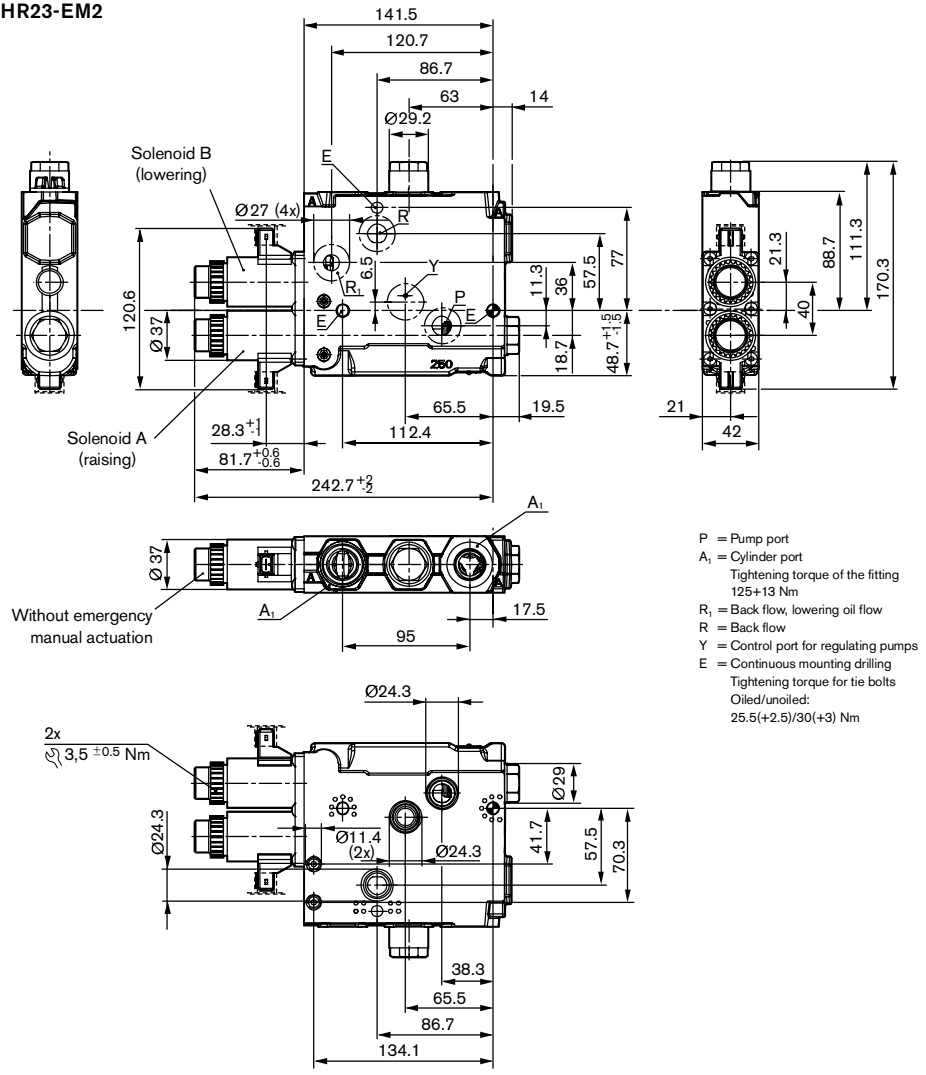


P = Pump port
A_1, A_2 = Cylinder port
Tightening torque of the fitting 125+13 Nm
R_1 = Back flow, lowering oil flow
Tightening torque of the fitting 125+13 Nm
R = Back flow
Y = Control port for regulating pumps
E = Continuous mounting drilling
Tightening torque for tie bolts oiled/unoiled: 25.5(+2.5)/30(+3) Nm
Tie bolts – min. hardness class 10.9

Ordering-No. Drawing-No.	Port connections: A_2	R_1	Thread*)	Lowering Q_{SN} [l/min]	Raising Q_{HN} [l/min]	PRV p_{LSV} [bar]	Symbol, see page 9
R 917 005 125	M22x1.5	M22x1.5	III	65	80	220^{+20}	3

*) Execution III: EN ISO 6149-1

EHR23-EM2

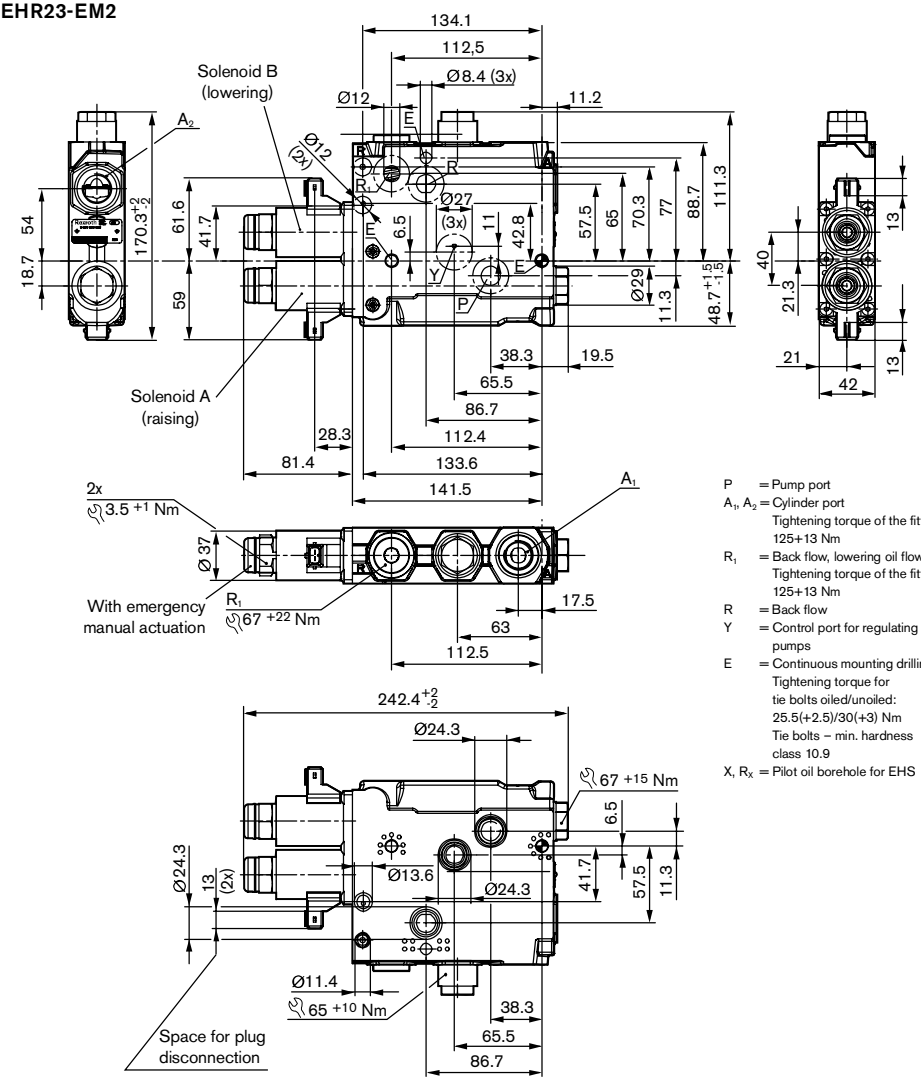


P = Pump port
A_1 = Cylinder port
Tightening torque of the fitting
125+13 Nm
R_1 = Back flow, lowering oil flow
R = Back flow
Y = Control port for regulating pumps
E = Continuous mounting drilling
Tightening torque for tie bolts
Oiled/unoiled:
25.5(+2.5)/30(+3) Nm

Ordering-No. Drawing-No.	Port connections: A_2	R_1	Thread*)	Lowering Q_{SN} [l/min]	Raising Q_{HN} [l/min]	PRV p_{LSV} [bar]	Symbol, see page 9
R 917 005 120	M22x1.5	Flange	III	65	90	218^{+22}	4

*) Execution III: EN ISO 6149-1

EHR23-EM2

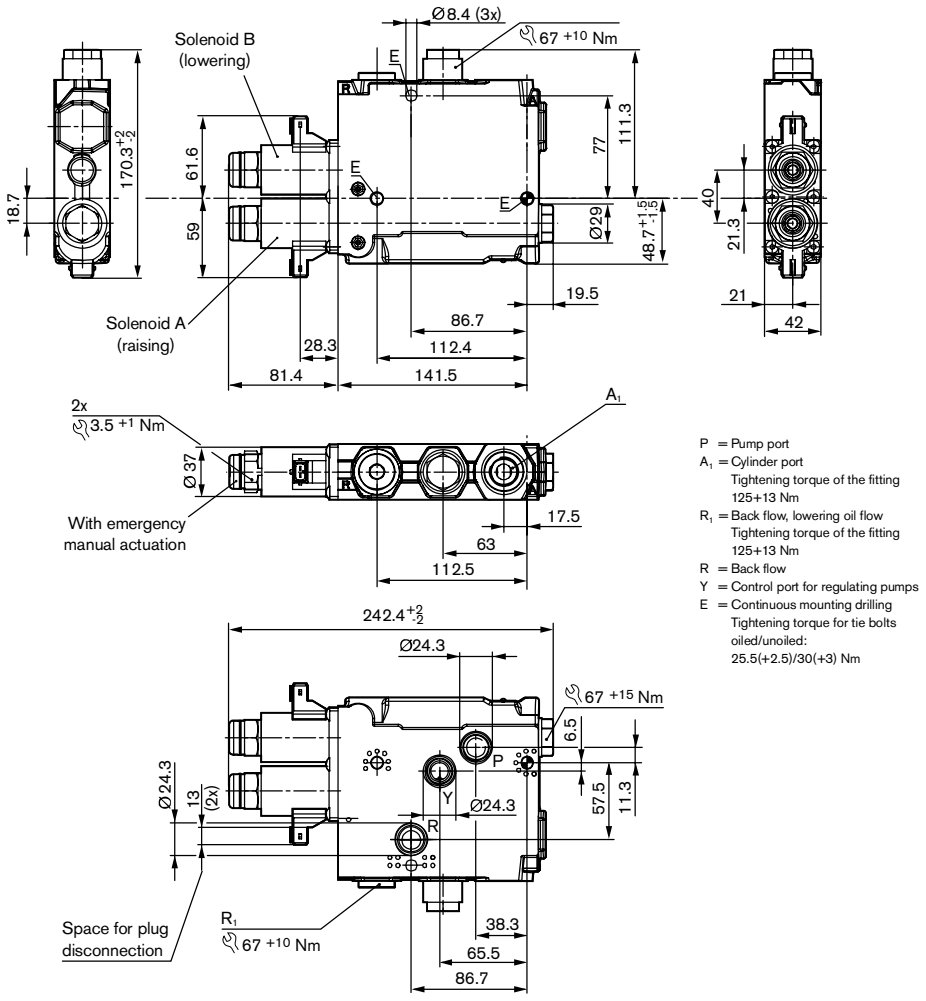


P = Pump port
A_1, A_2 = Cylinder port
Tightening torque of the fitting 125+13 Nm
R_1 = Back flow, lowering oil flow
Tightening torque of the fitting 125+13 Nm
R = Back flow
Y = Control port for regulating pumps
E = Continuous mounting drilling
Tightening torque for tie bolts oiled/unoiled: 25.5(+2.5)/30(+3) Nm
Tie bolts – min. hardness class 10.9
X, R_X = Pilot oil borehole for EHS

Ordering-No. Drawing-No.	Port connections: A_1 A_2	R_1	Thread*)	Lowering Q_{SN} [l/min]	Raising Q_{HN} [l/min]	PRV p_{LSV} [bar]	Symbol, see page 9
R 917 005 129	M22x1.5	Flange	III	65	80	220^{+20}	5

*) Execution III: EN ISO 6149-1 (for O-ring sealing)

EHR23-EM2-ERV, Limit control valve with flange surface on the O-ring side

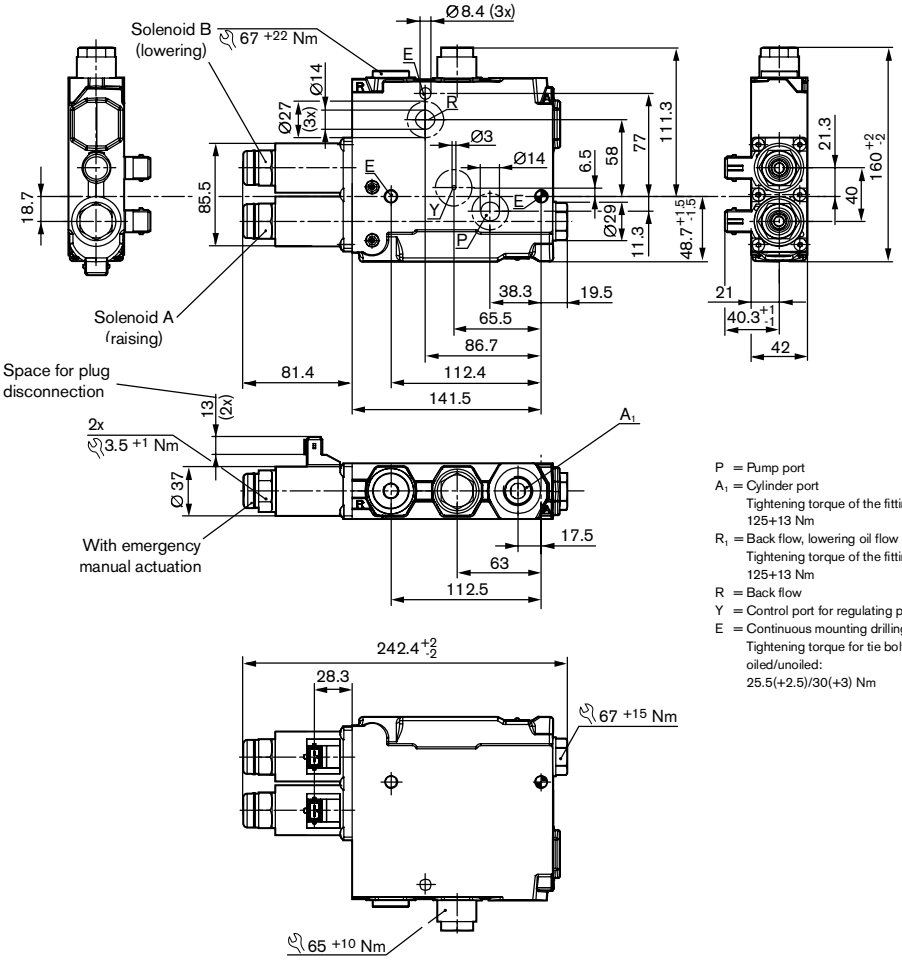


P = Pump port
A_1 = Cylinder port
Tightening torque of the fitting 125+13 Nm
R_1 = Back flow, lowering oil flow
Tightening torque of the fitting 125+13 Nm
R = Back flow
Y = Control port for regulating pumps
E = Continuous mounting drilling
Tightening torque for tie bolts oiled/unoiled: 25.5(+2.5)/30(+3) Nm

Ordering-No. Drawing-No.	Port connections: A_1	R_1	Thread*)	Lowering Q_{SN} [l/min]	Raising Q_{HN} [l/min]	PRV p_{LSV} [bar]	Position of solenoid connector	Symbol, see page 9
R 917 004 244	M22x1.5	Flange	II	65	80	220^{+20}	②	6
R 917 005 640	M22x1.5	Flange	II	65	100	220^{+20}	①	6

*) Execution II: EN ISO 6149-1 (for O-ring sealing)
① = As shown
② = Direction of the raising and lowering solenoid connectors opposite the flange surface

EHR23-EM2-ERV, Limit control valve with flange surface opposite the O-ring



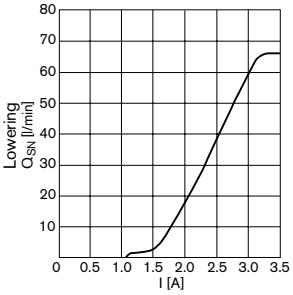
Ordering-No. Drawing-No.	Port connections: A_2	R_1	Thread*)	Lowering Q_{SN} [l/min]	Raising Q_{HN} [l/min]	PRV p_{LSV} [bar]	Position of solenoid connector	Symbol, see Ppage 9
R 917 006 959	M22x1.5	Flange	I	65	80	220+20	①	7
R 917 001 441	M22x1.5	Flange	III	65	100	220+20	②	7

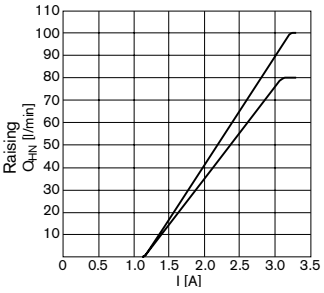
*) Execution I: DIN 3852-1
Execution III: EN ISO 6149-1 (for O-ring sealing)
① = As shown
② = Lowering solenoid connector towards line port A_1

EHR23-EM2

Characteristic curves

Δp A → R = 15 bar
T = 50°C





Installation instruction for hitch control valves EHR5 and EHR23

The valves must be completely filled with hydraulic fluid upon comissioning into service and during operation.
During service, the proportion of dispersed air in the oil must be low, as this may lead to malfunctions and to the hydraulic components.
According to the latest information, proportions of undissolved air in oil within the range of 0.2...0.5 % by vol. under normal pressure are deemed to be risk-free.
If greater proportions by volume are present, a field test under worst-case conditions must be performed and documented.

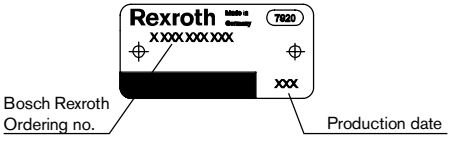
Instruction for plug connections

To ensure the reliable function of the plug system, use only Bosch GmbH specified mating plugs.
Customer specified plug system.
The customer is responsible for the function and reliability. Failty plug systems are not guaranteed by Bosch GmbH.

Further information on the correct handling of hydraulic products from Bosch Rexroth can be found in our publication:
Product-specific instructions RE 66 125-B2.

For further information on the properties of the flange mating surface and recommendations for the solenoid mating connector, see notes in the quotation drawings.

Information on the name plate



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Rexroth
Bosch Group

Traction module RTM (flow divider)

RE 64592/05.2012 1/26
Replaces: 06.2006

Data sheet

Size 16; 25
Component series 1X
Nominal pressure 500 bar
Max. flow:
– 160 l/min (size 16)
– 440 l/min (size 25)


HAD 7373/05

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Table of contents

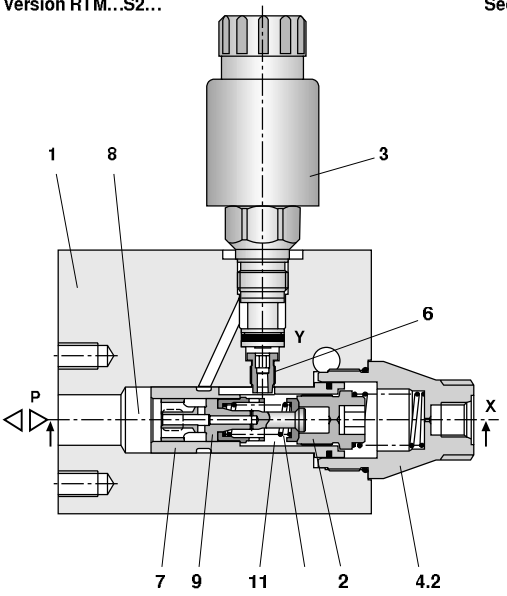
Features

- Protection against overrevving of hydraulic motors in control mode
- Synchronous operation of a maximum of 4 actuators connected in parallel within a wide flow range
- Adjustable dividing accuracy, can be preselected or re-adjusted by means of proportional orifice
- Double acting (dividing or summating) flow divider
- Constant division ratio in the case of summating flow division
- Suitable for open and closed circuits
- 2-, 3- and 4-fold flow division
- Optionally with or without free-wheel operation
- Can be switched in all functions
- Integrated pressure relief/anti-cavitation valves for protecting hoses and preventing cavitation
- Electro-proportional regulation of the metering land

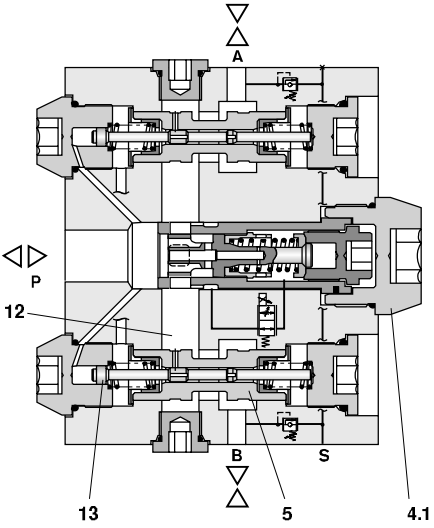
Function, section

1 Housing
2 Meter-in orifice
3 Proportional valve
4.1 Plug screw (without free-wheel "1")
4.2 Reducing piece (for free-wheel "2")
5 Pressure compensator
6 Set screw
7 Sleeve
8 Chamber
9 Control spool
10 Compression spring
11 Spring chamber
12 Bore
13 2/2 directional valve

Version RTM...S2...



Section A-A (without free-wheel circuit)



Traction module RTM

RTM traction modules are flow dividers for controlling the synchronism and free-wheel of hydraulic motors. They can be used for 2-, 3- and 4-wheel drives and can be operated in the open or closed circuit.

Design

The basic components are housing (**1**), meter-in orifice (**2**), proportional valve (**3**), reducing piece (**4.2**) or plug screw (**4.1**) and pressure compensator (**5**).

In housing (**1**) sleeve (**2**) is radially fixed by set screw (**6**), but can also move axially. According to the selected division/summation ratio, metering orifices are integrated in the sleeve, which are used for dividing and directing the outflowing flows into channels A, B, C and D. Pressure compensators (**5**) are integrated in the various actuator ports to compensate for differences in load pressures.

The main flow flows from P into chamber (**8**) and shifts control spool (**9**) against pre-loaded spring (**10**). This causes the cross-section of the metering orifice to change depending on the amount of flow, and the hydraulic fluid is fed through bores (**12**) to the spool of pressure compensator (**5**) and on to channels A, B, C, and D. If the dividing accuracy is to be increased, the pressure in spring chamber (**11**) must be increased by energizing proportional valve (**3**) so that the pressure compensator spool (**5**) starts to move earlier, and the traction accuracy of the vehicle is increased.

For the automatic change-over from the dividing to the summation function, the 2/2 directional valve (**13**) moves from the right-hand to the left-hand limit stop.

The differential lock can be switched on or off by controlling port "X" by means of an external 3/2 directional valve.

NOTE!

The necessary operating pressure in port **X** is the present high pressure in the hydraulic circuit of the RTM. The change-over is performed by means of an external directional valve (separate order).

- **X** pressureless → free-wheel, divider deactivated
- **X** pressurized → synchronism, divider activated
- A flushing valve must be provided between the pump and the RTM.
  External directional valve: see RE 18136-21
  Flushing valve: see RE 18133-02

Technical data (for applications outside these parameters, please consult us!)

General									
Size				16			25		
Weight				Summation flow division			Summation flow division		
				S2	S3	S4	S2	S3	S4
	• Without free-wheel function		kg	14.0	18.2	18.2	29.9	37.4	37.4
	• With free-wheel function		kg	14.1	18.3	18.3	30.0	37.5	7.5
Installation orientation				Horizontal					
Type of connection				SAE flange connection					
Type of mounting				Contact face mounting					
Base coat (standard)				RAL 5010					

Hydraulic					
Max. operating pressure in port	• P, A, B, C, D	p	bar	500	
	• L	p	bar	At zero pressure to tank	
	• P_P, S	p	bar	40	
Pressure differential		Δp	bar	approx. 2	
Max. flow in port	• P	$q_{V,\,max}$	l/min	80 or 160	220 or 440
Hydraulic fluid				Mineral oil (HL, HLP) to DIN 51524 Phosphate ester (HFD-R)	
Hydraulic fluid temperature range		ϑ	°C	– 20 to +80	
Viscosity range		v	mm²/s	10 to 380	
Max. permissible degree of contamination of the hydraulic fluid Cleanliness class to ISO 4406 (c)				Class 20/18/15 For this, we recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.	

Technical data (for applications outside these parameters, please consult us!)

Electrical, proportional solenoid					
Type of voltage			*U*	DC voltage	
Supply voltage			V	**12 DC**	**24 DC**
Solenoid coil resistance	• cold value at 20 °C		Ω	2.3	4.8
	• max. hot value		Ω	3.5	7.2
Max. coil temperature [1]			°C	150	
Duty cycle			%	100	100
Type of protection to VDE 0470-1, DIN 40050-9				IP69K (with plug-in connector mounted and locked)	
Max. control current (nominal current)		*I*	A	1.76	1.2
Clock frequency		*f*	Hz	225	

Electrical, switching solenoid					
Type of voltage			*U*	DC voltage	
Supply voltage			V	12 DC	24 DC
Voltage tolerance vs. ambient temperature				See diagram	
Power consumption			W	22	
Duty cycle				See diagram	
Switching time to ISO6403 (solenoid horizontal)	• ON		ms	≤ 80	
	• OFF		ms	≤ 50	
Max. switching frequency			s/h	15000	
Max. coil temperature [1]			°C	150	
Type of protection to VDE 0470-1, DIN 40050-9		Version "K40"		IP69K (with plug-in connector mounted and locked)	

Electrical, control electronics	
Control electronics	Modular amplifier VT-MSPA1-100 Plug-in amplifier VT-SSPA1-1.., see RE 30116

CAUTION!

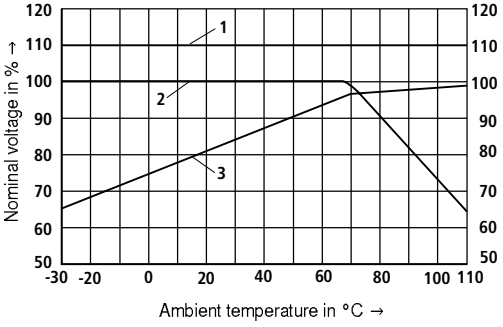
When establishing the electrical connection of "K40", properly connect the protective earth conductor (PE ⏚).

NOTE!

Further information about the proper handling of hydraulic products of Bosch Rexroth can be found in our brochure "Hydraulic valves for mobile applications - general information", RE 64020-B1.

[1] Due to the surface temperature occurring on the solenoid coil, observe the European standards EN 563 and EN 982!

Voltage tolerance vs. ambient temperature; duty cycle / proportional solenoid



1 Maximum voltage
2 Duty cycle
3 Minimum operate voltage

Ordering code

RTM		S				1X/							K40	V	11	*

Size 16 = 16
Size 25 = 25

Travel drive
Summation flow division = S

Number of actuator
= 2
= 3
= 4

Division ratio in % [1]

3-fold		4-fold		2-fold	
A : B : C		A : B : C : D		A : B	
33 : 33 : 33	= A	25 : 25 : 25 : 25	= A	50 : 50	= A
34 : 32 : 34	= F	33 : 17 : 33 : 17	= H	60 : 40	= B
25 : 50 : 25	= M	27 : 23 : 27 : 23	= K	75 : 25	= C
30 : 40 : 30	= T	30 : 20 : 30 : 20	= V		

Free-wheel spool
Standard = –
Special spool = Y

Component series 10 to 19 = 1X
(10 to 19: unchanged installation and connection dimensions)

Nominal flow
Max. pump flow - size 16 (l/min) = 080
= 160
Max. pump flow - size 25 (l/min) = 220
= 440

Δp control
Electro-proportional orifice or orifice with electrical change-over orifice (adjustable orifice) = P
Fixed orifice (without proportional valve) = F

Free-wheel circuit
Without free-wheel function = 1
With free-wheel function = 2

Secondary valves
Standard: Pressure valve with anti-cavitation feature, pressure setting in bar = H...
Plug screw (only for open circuit) = Q

Pressure setting of secondary valve in bar (other values on inquiry)
420 bar = 420
460 bar = 460
CAUTION!
Match pressure setting with travel drive!
Add boost pressure to the pressure setting!

Orifice diameter of fixed orifice, e.g. F12 = Ø1,2 mm = F . .
Operation with adjustable orifice, electro-hydraulic proportional [2] = W9
Operation with adjustable orifice, electro-hydraulic switchable [2] = W7

Supply voltage U = 24 V [2] = 1
U = 12 V [2] = 3

Electrical connection
Connecting plug 02-pin K40 0T04-2PA, make: Deutsch (standard) [2] [3] = K40

Seal material: FKM seals = V

Line connections: Flange acc. to DIN ISO 6162-2 [4] = 11

Special configuration

[1] Other division ratios on request.
[2] Indication required only in conjunction with electro-proportional orifice (version "P").
[3] Mating plugs are **not** included in the scope of supply and must be ordered separately.
[4] See pages 20 to 25.

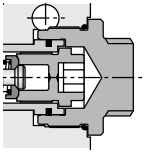
= Preferred program

3

Supplementary explanations regarding the ordering code with summation flow division RTM...S...

Free-wheel circuit

- Without free-wheel circuit ...**1**...



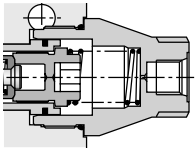
Free-wheel circuit

- With free-wheel circuit ...**2**...

Operation by means of external directional valve:

X pressureless → free-wheel, divider deactivated

X pressurized → synchronism, divider activated
(see note on page 2)



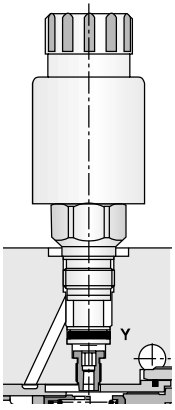
Δp control

- Electro-proportional orifice ...**P**
  Electro-hydraulic proportional operation ...**W9**
  Supply voltage 24 V ...**1**
  Supply voltage 12 V ...**3**

  Ordering code: ... **P ... W91** or ... **P ... W93**

- Electrical change-over orifice ...**P**
  Electro-hydraulic proportional operation ...**W7**
  Supply voltage 24 V ...**1**
  Supply voltage 12 V ...**3**

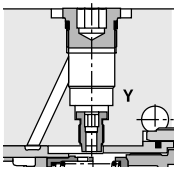
  Ordering code: ... **P ... W71** or ... **P ... W73**



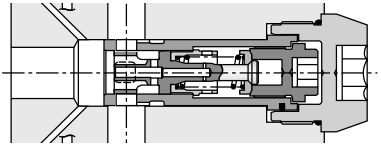
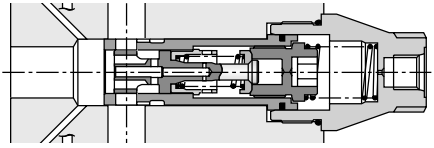
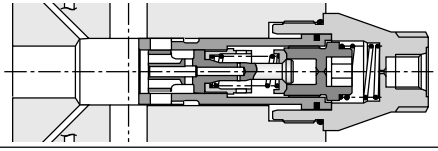
Δp control

- Fixed orifice ...**F**
  with orifice diameter of, e.g. 1.2 mm ...**F12**

  Ordering code: ... **F ... F12**



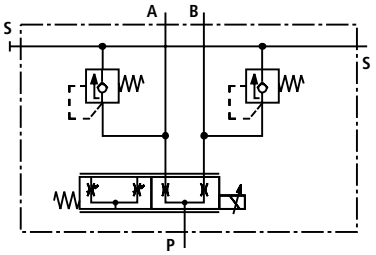
Supplementary explanations regarding the ordering code with summation flow division RTM...S...

Free-wheel circuit		Electro-proportional orifice	Electrical change-over orifice	Fixed orifice
Without	RTM active 	Proportional solenoid de-energized ($I = 0$) ↓ Proportional increase in dividing accuracy Proportional solenoid energized ($I = I_{max}$)	Switching solenoid de-energized ↓ Low dividing accuracy Switching solenoid energized High dividing accuracy	Dividing accuracy defined by fixed orifice
With	X pressurised RTM active 	Proportional solenoid de-energized ($I = 0$) ↓ Proportional increase in dividing accuracy Proportional solenoid energized ($I = I_{max}$)	Switching solenoid de-energized ↓ Low dividing accuracy Switching solenoid energized High dividing accuracy	Dividing accuracy defined by fixed orifice
With	X pressureless RTM inactive 	RTM in free-wheel mode, electro-proportional orifice ineffective	RTM in free-wheel mode, electrical change-over orifice ineffective	RTM in free-wheel mode, fixed orifice ineffective

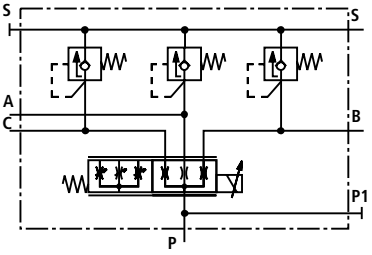
Dividing accuracy: see diagrams on pages 12, 13.

Symbols with summation flow division, without free-wheel circuit – simplified circuit

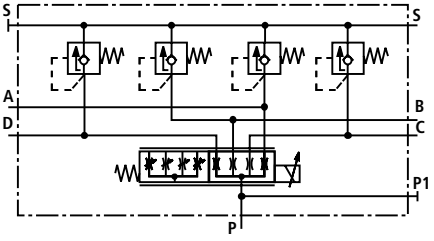
RTM...S2/P1 2-fold



RTM...S3/P1 3-fold

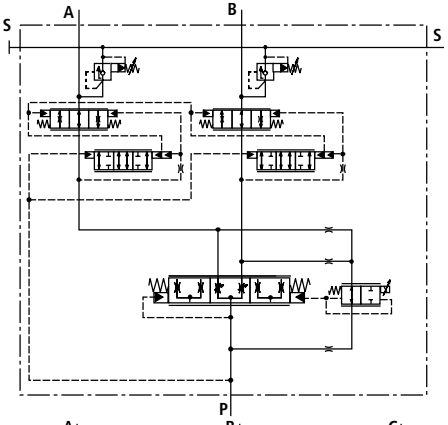


RTM...S4/P1 4-fold

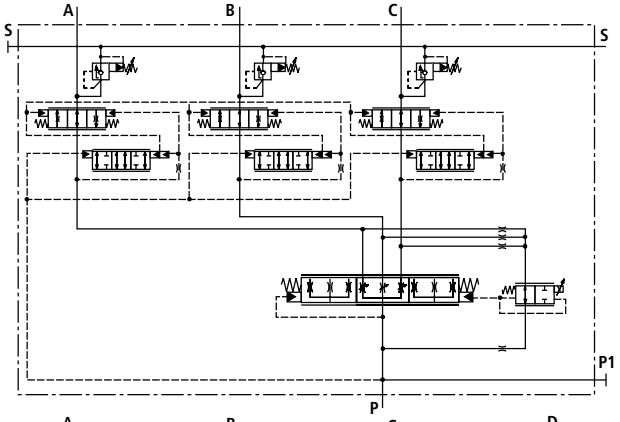


Symbols with summation flow division, without free-wheel circuit – detailed circuit

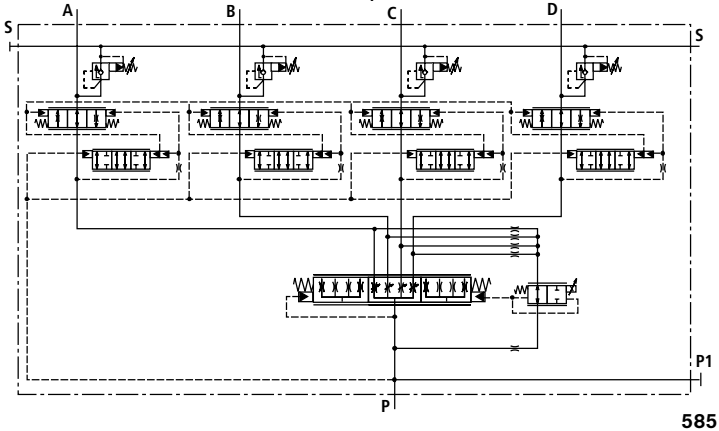
RTM...S2/P1 2-fold



RTM...S3/P1 3-fold

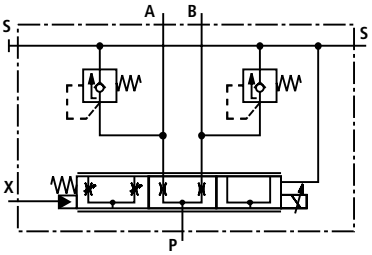


RTM...S4/P1 4-fold

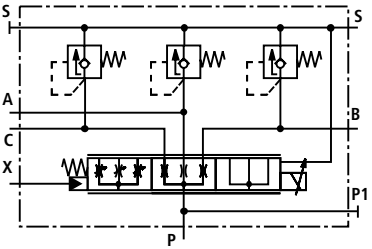


Symbols with summation flow division, with free-wheel circuit – simplified circuit

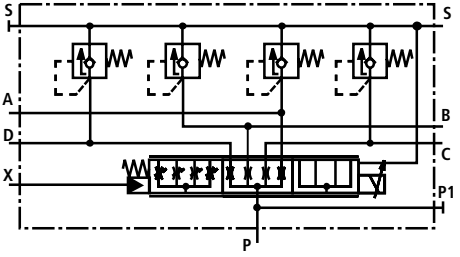
RTM...S2/P2 2-fold



RTM...S3/P2 3-fold

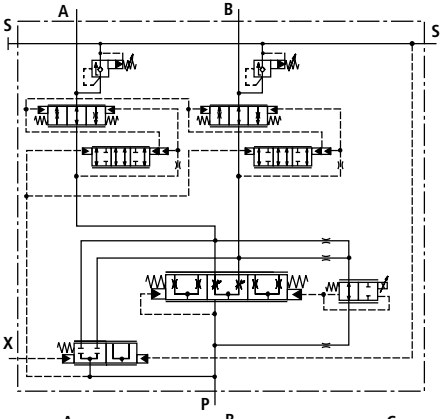


RTM...S4/P2 4-fold

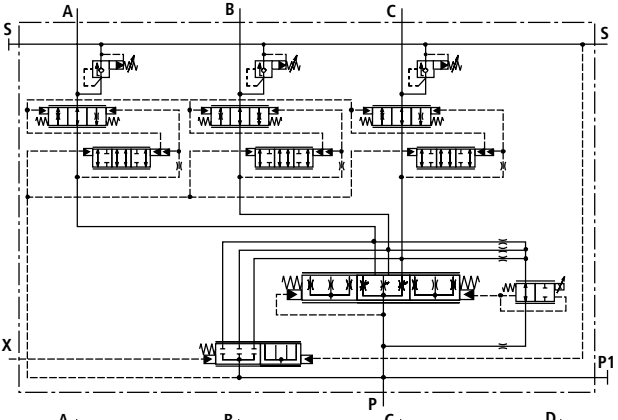


Symbols with summation flow division, with free-wheel circuit – detailed circuit

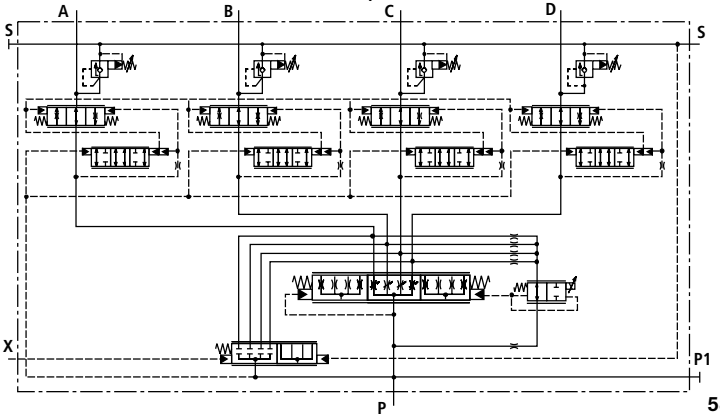
RTM...S2/P2 2-fold



RTM...S3/P2 3-fold



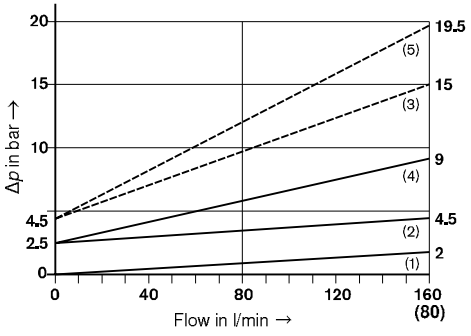
RTM...S4/P2 4-fold



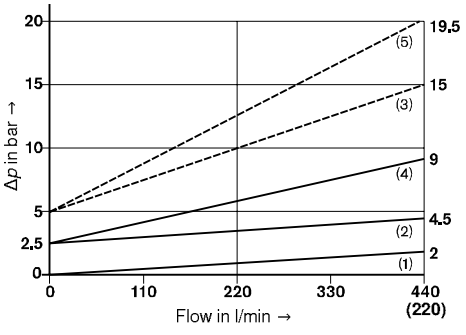
Characteristic curves (measured with HLP46, ϑ_{oil} = 40°C ±5°C; division ratio A = 50:50)

Δp-q_V characteristic curves (Standard configuration)

RTM 16 S



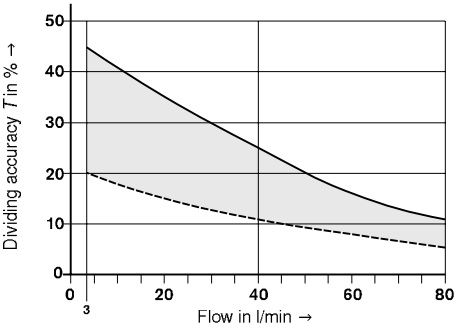
RTM 25 S



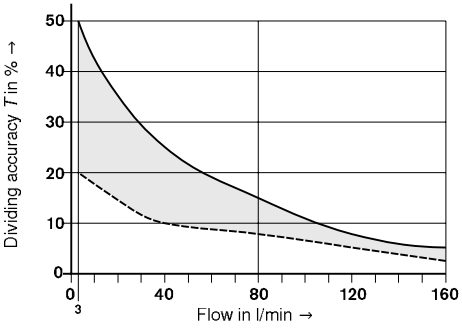
Curve	Direction of flow	Proportional valve	Current intensity
(1)	Free-wheel		
(2)	P → A, B, C, D	de-energized	I = 0 A
(3)	P → A, B, C, D	energized	I = 1.8 A at 12 V / 1.2 A at 24 V
(4)	A, B, C, D → P	de-energized	I = 0 A
(5)	A, B, C, D → P	energized	I = 1.8 A at 12 V / 1.2 A at 24 V

Dividing accuracy T at 150 bar pressure difference (Standard configuration)

RTM 16 S ($q_{V\,nom}$ = 80 l/min)



RTM 16 S ($q_{V\,nom}$ = 160 l/min)



– – – – Proportional valve energized to max. value (I = 1.8 A at 12 V / 1.2 A at 24 V) (with fixed orifice Ø1.2 mm)

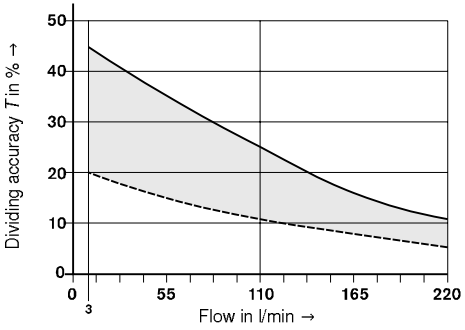
——— Proportional valve de-energized (I = 0.0 A)

• T = Deviation of an actuator from the theoretical characteristic curve, with a pressure difference of 150 bar between the actuators, in dependence upon inlet flow $q_{V,p}$

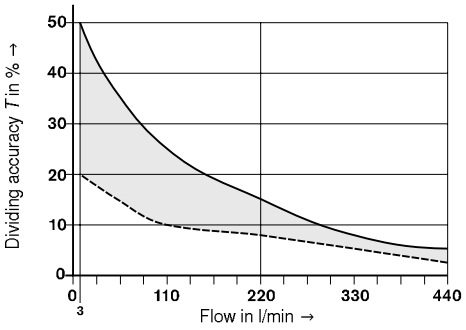
Characteristic curves (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C; division ratio A = 50:50)

Dividing accuracy T at 150 bar pressure difference (Standard configuration)

RTM-25 S ($q_{V\ nom}$ = 220 l/min)



RTM-25 S ($q_{V\ nom}$ = 440 l/min)



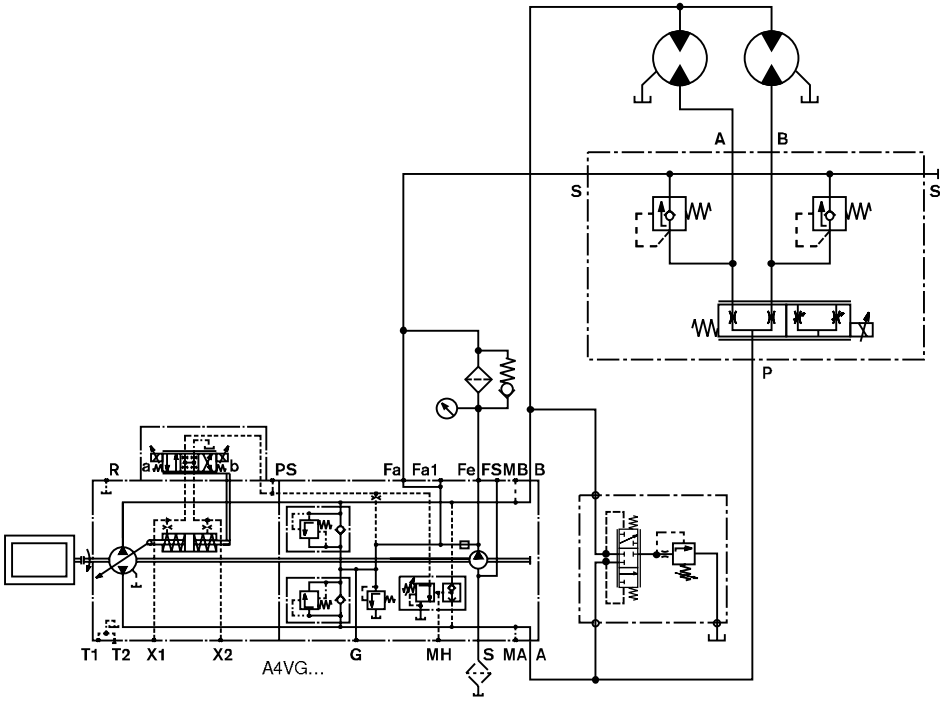
– – – – Proportional valve energized to max. value (I = 1.8 A at 12 V / 1.2 A at 24 V) (with fixed orifice Ø1.2 mm)

——— Proportional valve de-energized (I = 0.0 A)

T = Deviation of an actuator from the theoretical characteristic curve, with a pressure difference of 150 bar between the actuators, in dependence upon inlet flow $q_{V,\,p}$

3

Application example: Type RTM..S2



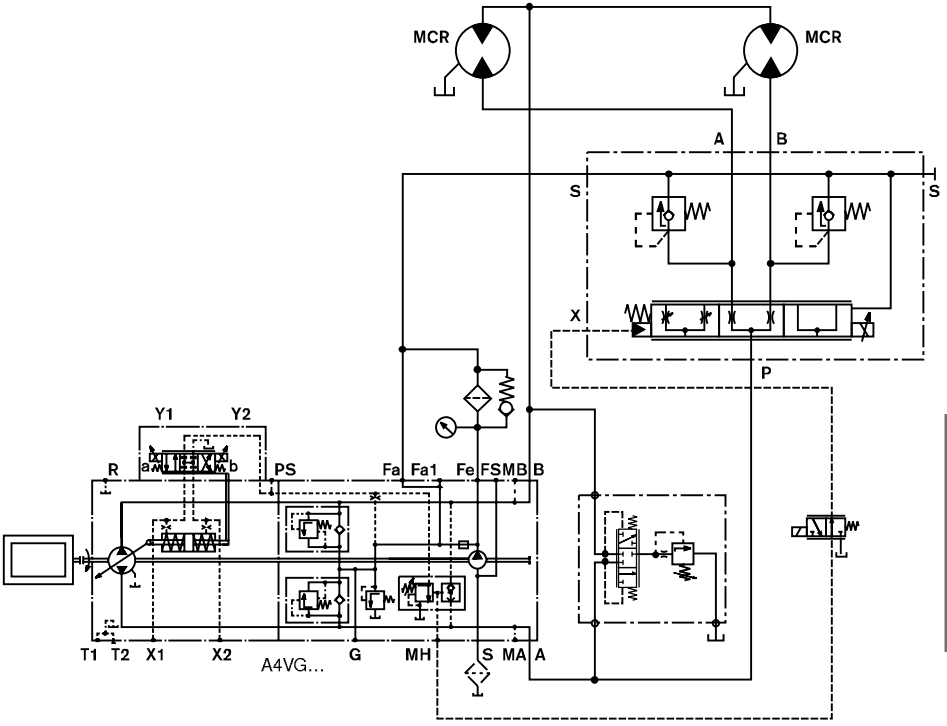
Operational states of the vehicle:

- Stepless, proportional regulation of dividing accuracy
- Without current, extended manoeuvrability
- Max. current, high dividing accuracy

Ordering code:

RTM..S2.1X/...P1H... W9.K40V11

Application example: Type RTM..S2 with free-wheel circuit



Operational states of the vehicle:

Operating position 1

- Stepless, proportional regulation of dividing accuracy
- Without current, extended manoeuvrability
- Max. current, high dividing accuracy

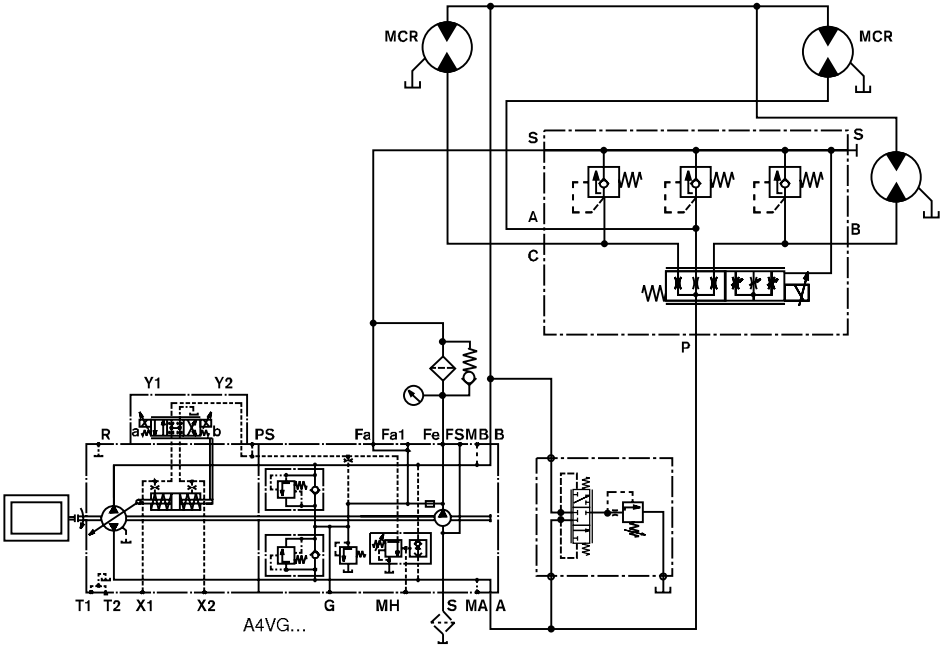
Operating position 2

- Free-wheel, lines to motors free
- No flow division

Ordering code:

RTM..S2.1X/...P2H... W9.K40V11

Application example: Type RTM..S3



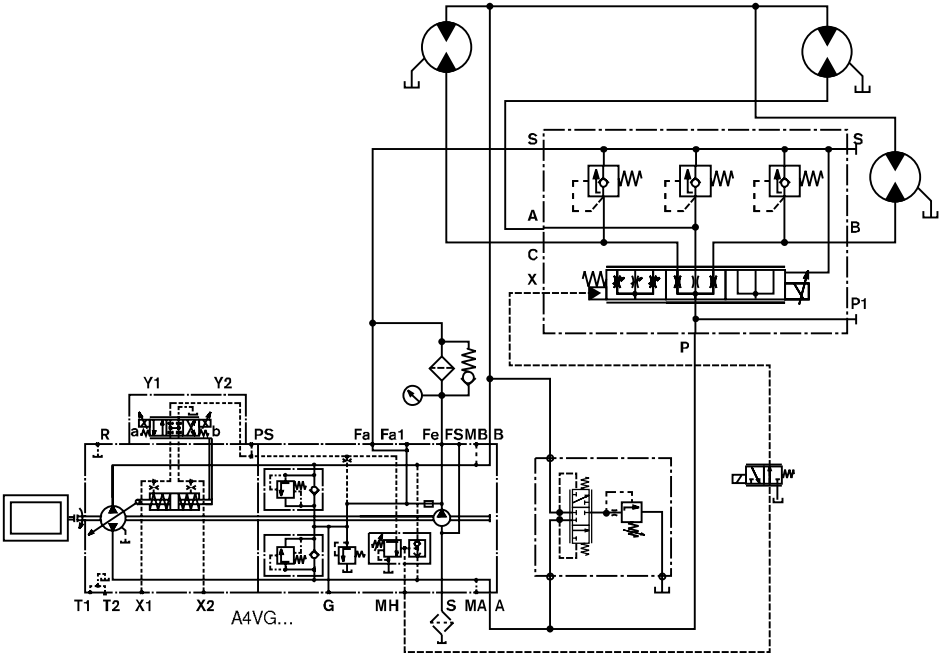
Operational states of the vehicle:

- Stepless, proportional regulation of the dividing accuracy
- Without current, extended manoeuvrability
- Max. current, high dividing accuracy

Ordering code:

RTM..S3.1X/...P1H... W9.K40V11

Application example: Type RTM..S3 with free-wheel circuit



Operational states of the vehicle:

Operating position 1

- Stepless, proportional regulation of the dividing accuracy
- Without current, extended manoeuvrability
- Max. current, high dividing accuracy

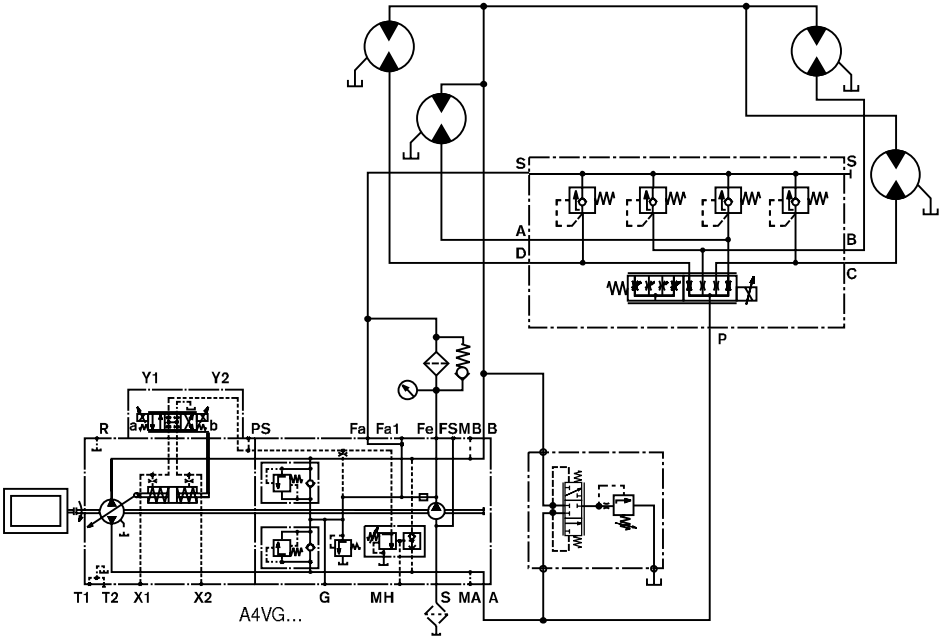
Operating position 2

- Free-wheel, lines to motors free
- No flow division

Ordering code:

RTM..S3.1X/...P2H... W9.K40V11

Application example: Type RTM..S4



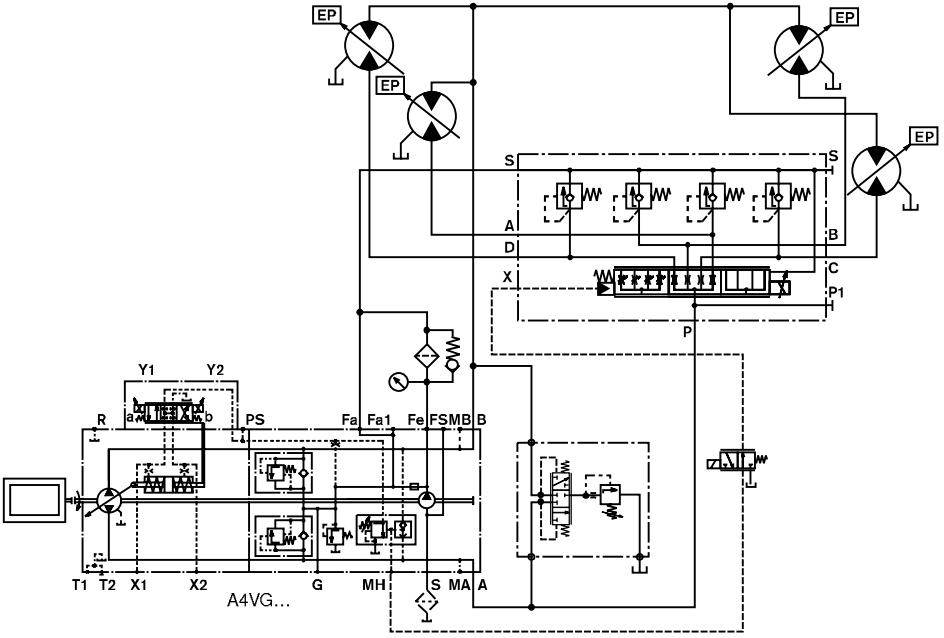
Operational states of the vehicle:

- Stepless, proportional regulation of the dividing accuracy
- Without current, extended manoeuvrability
- Max. current, high dividing accuracy

Ordering code:

RTM..S4.1X/...P1H... W9.K40V11

Application example: Type RTM..S4 with free-wheel circuit



3

Operational states of the vehicle:

Operating position 1

- Stepless, proportional regulation of the dividing accuracy
- Without current, extended manoeuvrability
- Max. current, high dividing accuracy

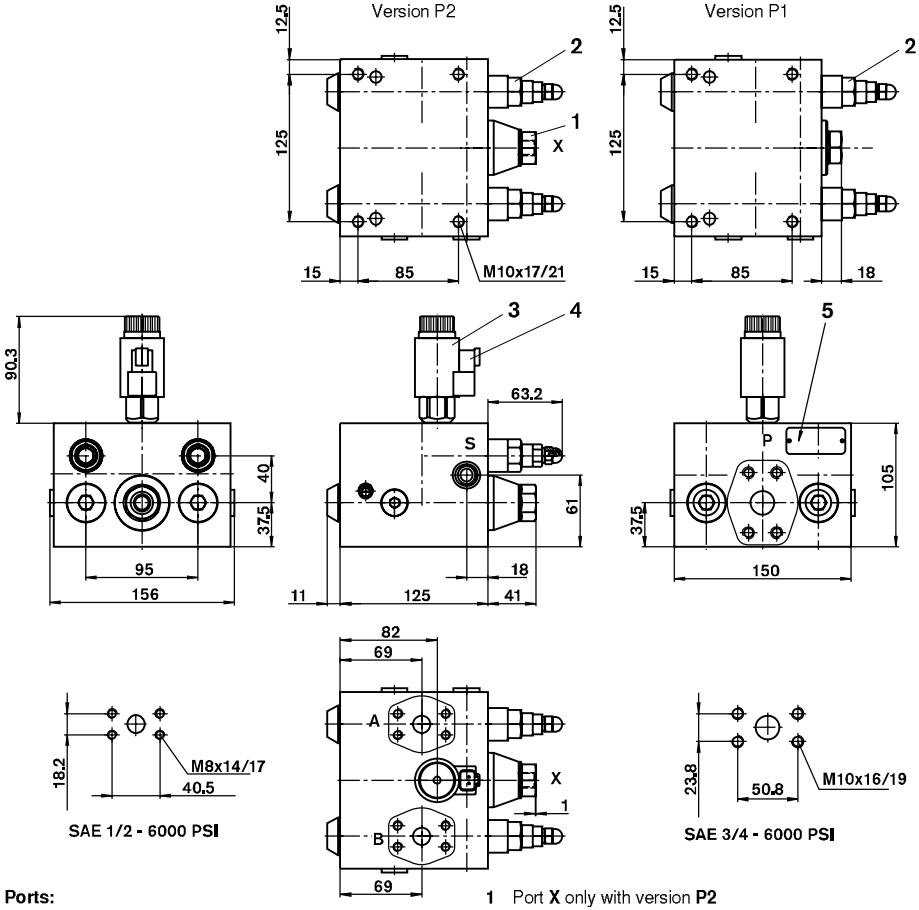
Operating position 2

- Free-wheel, lines to motors free
- No flow division

Ordering code:

RTM..S4.1X/...P2H... W9.K40V11

Unit dimensions: RTM 16 S2 (nominal dimensions in mm)



Ports:

P	= SAE 3/4	J518 (6000 PSI)
A, B	= SAE 1/2	J518 (6000 PSI)
S	= M18X1.5	RN 115.48
X	= M14X1.5	ISO 6149

1 Port **X** only with version **P2**
(electro-proportional orifice with free-wheel)

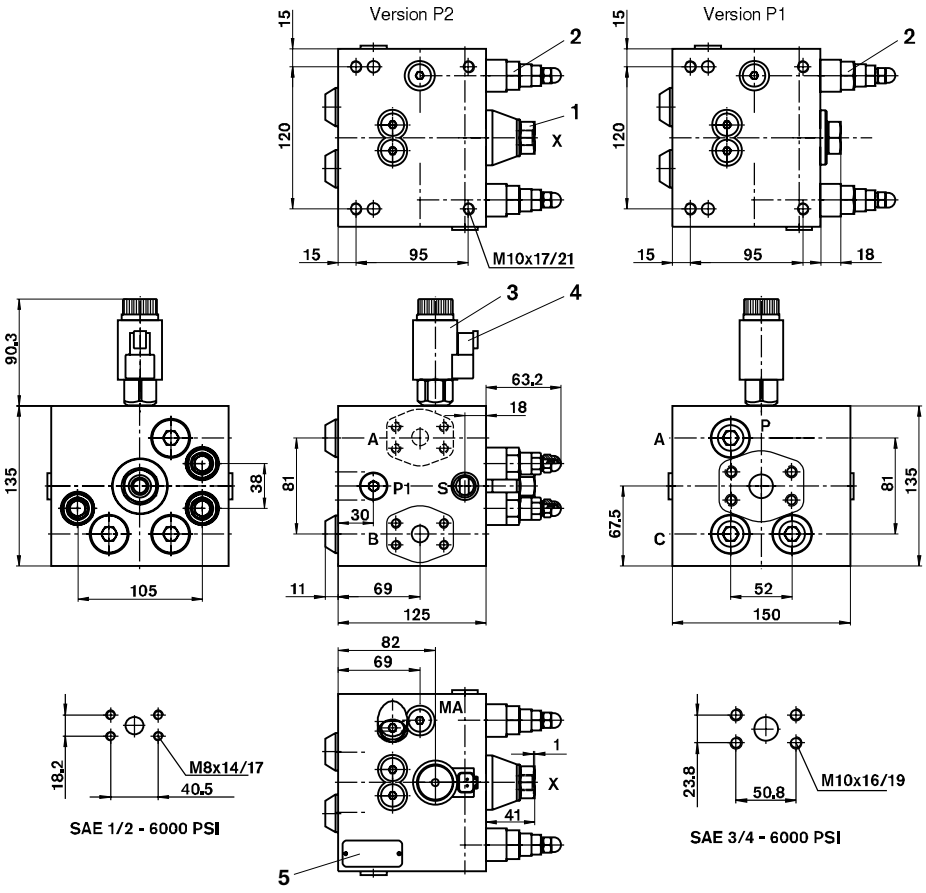
2 Pressure relief/anti-cavitation valve:
Material no.: R901069096
Width across flats: A/F = 24 mm
Tightening torque: M_T = 90 + 9 Nm

3 Valve
Width across flats: A/F = 27 mm;
Tightening torque: M_T = 45 + 5 Nm

4 Mating plug 02-pin Deutsch DT06-25WR
(not included in the scope of supply; must be ordered separately; Mat. no. R901017846)

5 Nameplate

Unit dimensions: RTM 16 S3 (nominal dimensions in mm)



Ports:

P	= SAE 3/4	J518 (6000 PSI)
A, B, C	= SAE 1/2	J518 (6000 PSI)
S, P1	= M18X1.5	
MA	= M14X1.5	RN 115.48
X	= M14X1.5	ISO 6149

1 Port **X** only with version **P2**
(electro-proportional orifice with free-wheel)

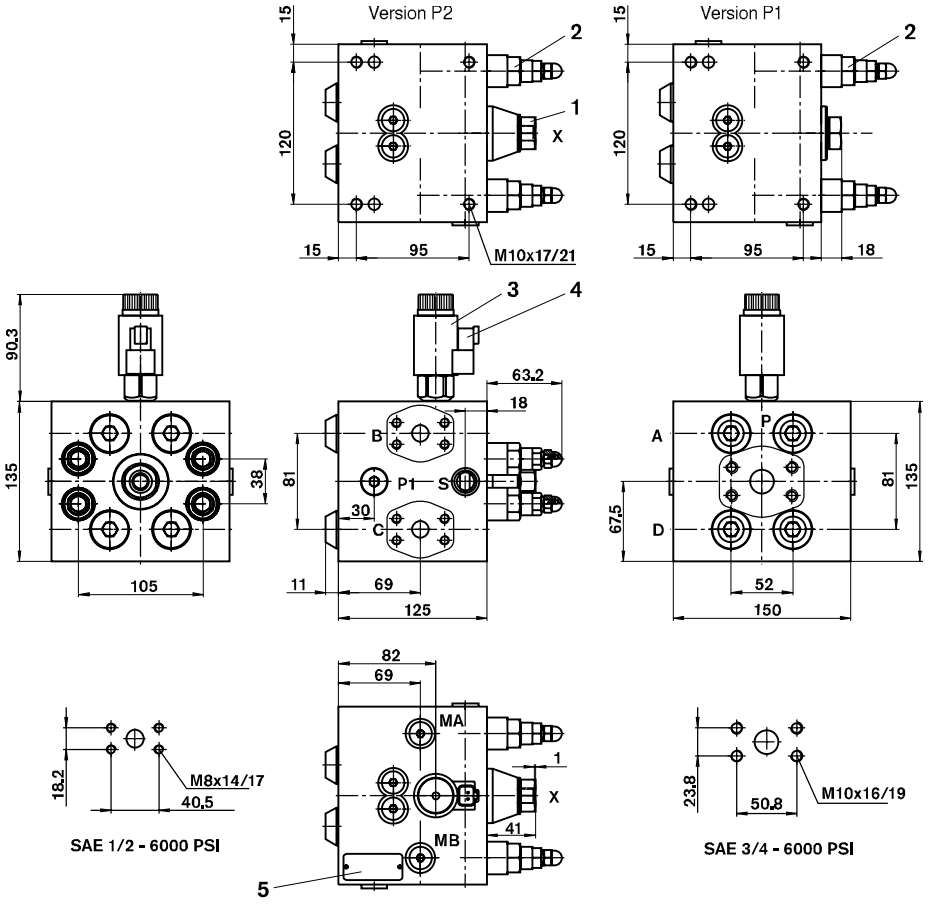
2 Pressure relief/anti-cavitation valve:
Material no.: R901069096
Width across flats: A/F = 24 mm
Tightening torque: M_T = 90 + 9 Nm

3 Valve
Width across flats: A/F = 27 mm;
Tightening torque: M_T = 45 + 5 Nm

4 Mating plug 02-pin Deutsch DT06-25WR
(not included in the scope of supply; must be ordered separately; Mat. no. R901017846)

5 Nameplate

Unit dimensions: RTM 16 S4 (nominal dimensions in mm)



Ports:

P	= SAE 3/4	J518 (6000 PSI)
A, B, C	= SAE 1/2	J518 (6000 PSI)
S, P1	= M18X1.5	
MA	= M14X1.5	RN 115.48
X	= M14X1.5	ISO 6149

1 Port **X** only with version **P2**
(electro-proportional orifice with free-wheel)

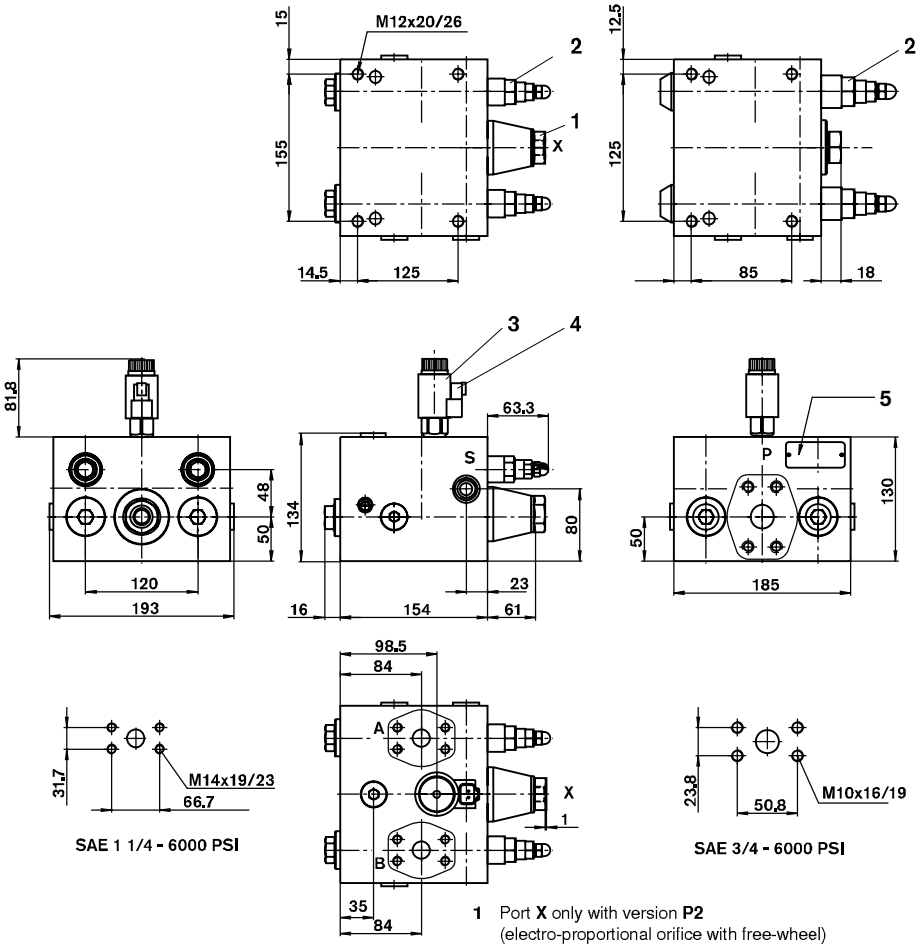
2 Pressure relief/anti-cavitation valve:
Material no.: R901069096
Width across flats: A/F = 24 mm
Tightening torque: M_T = 90 + 9 Nm

3 Valve
Width across flats: A/F = 27 mm;
Tightening torque: M_T = 45 + 5 Nm

4 Mating plug 02-pin Deutsch DT06-25WR
(not included in the scope of supply; must be ordered separately; Mat. no. R901017846)

5 Nameplate

Unit dimensions: RTM 25 S2 (nominal dimensions in mm)



Ports:

P	= SAE 1 1/4	J518 (6000 PSI)
A, B	= SAE 3/4	J518 (6000 PSI)
P1	= M22X1.5	RN 115.48
S	= M22X1.5	RN 115.48
X	= M14X1.5	ISO 6149

1 Port **X** only with version **P2**
(electro-proportional orifice with free-wheel)

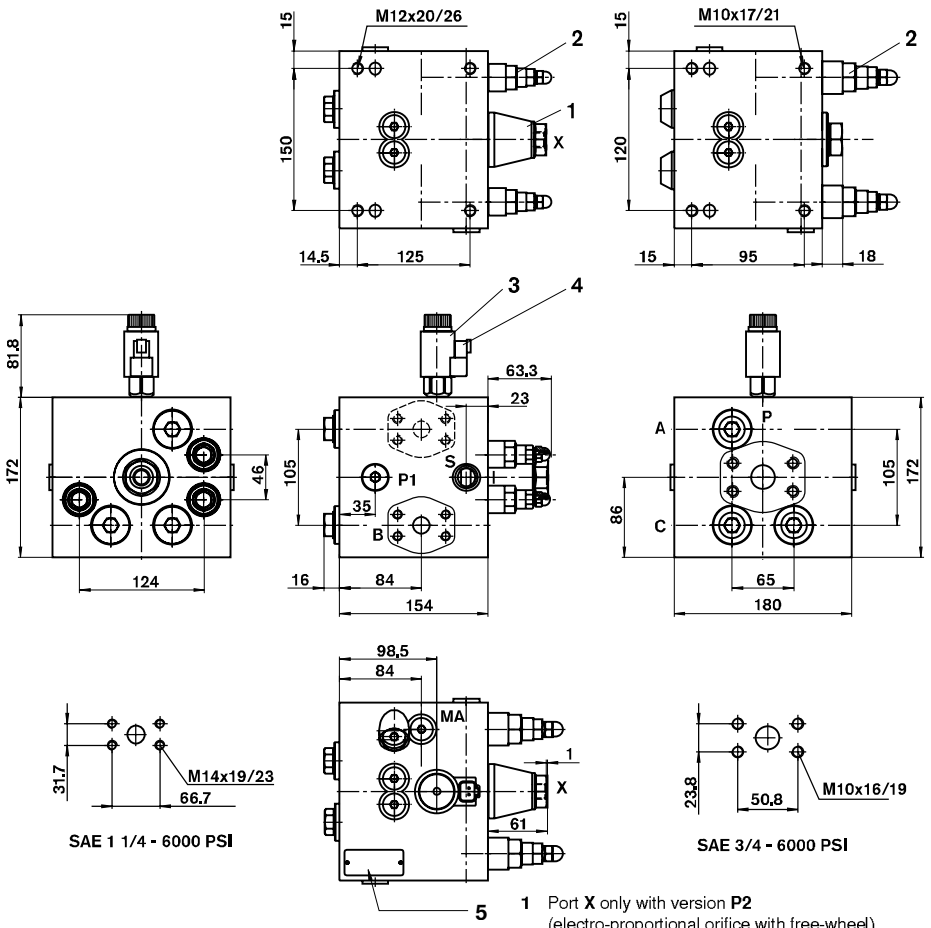
2 Pressure relief/anti-cavitation valve:
Material no.: R901079744
Width across flats: A/F = 30 mm
Tightening torque: M_T = 100 + 10 Nm

3 Valve
Width across flats: A/F = 27 mm;
Tightening torque: M_T = 45 + 5 Nm

4 Mating plug 02-pin Deutsch DT06-25WR
(not included in the scope of supply; must be ordered separately; Mat. no. R901017846)

5 Nameplate

Unit dimensions: RTM 25 S3 (nominal dimensions in mm)



Ports:

P	= SAE 1 1/4	J518 (6000 PSI)
A, B, C	= SAE 3/4	J518 (6000 PSI)
S, P1	= G 1/2	RN 115.48
MA	= M22X1,5	ISO 6149
X	= M14X1,5	ISO 6149

1 Port **X** only with version **P2**
(electro-proportional orifice with free-wheel)

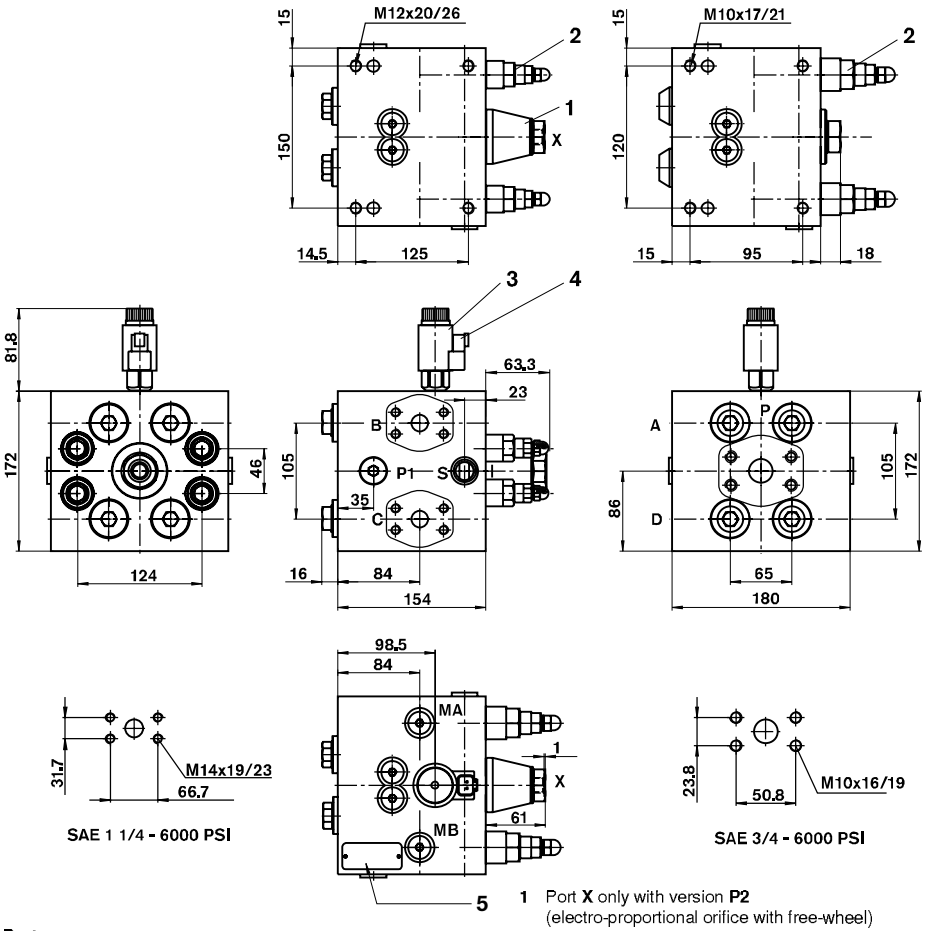
2 Pressure relief/anti-cavitation valve:
Material no.: R901079744
Width across flats: A/F = 30 mm
Tightening torque: M_T = 100 + 10 Nm

3 Valve
Width across flats: A/F = 27mm;
Tightening torque: M_T = 45 + 5 Nm

4 Mating plug 02-pin Deutsch DT06-25WR
(not included in the scope of supply; must be ordered separately; Mat. no. R901017846)

5 Nameplate

Unit dimensions: RTM 25 S4 (nominal dimensions in mm)



Ports:

P	= SAE 1 1/4	J518 (6000 PSI)
A, B, C, D	= SAE 3/4	J518 (6000 PSI)
S, P1	= G 1/2	RN 115.48
MA, MB	= M22X1.5	ISO 6149
X	= M14X1.5	ISO 6149

1 Port **X** only with version **P2**
(electro-proportional orifice with free-wheel)

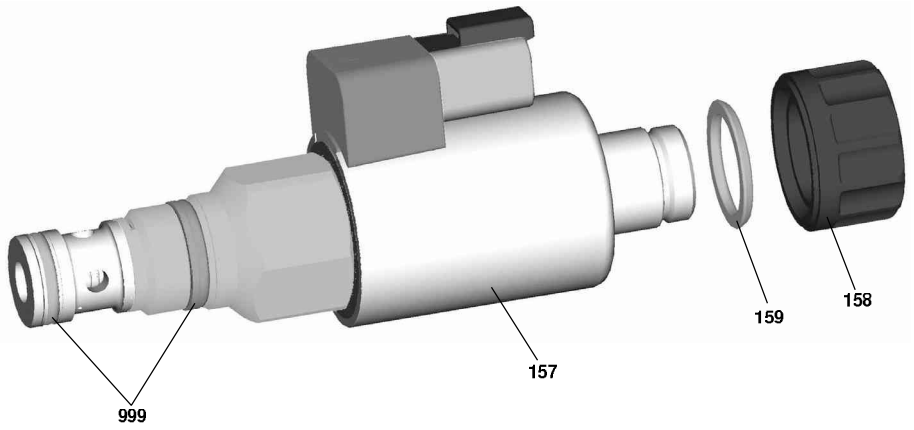
2 Pressure relief/anti-cavitation valve:
Material no.: R901079744
Width across flats: A/F = 30 mm
Tightening torque: M_T = 100 + 10 Nm

3 Valve
Width across flats: A/F = 27 mm;
Tightening torque: M_T = 45 + 5 Nm

4 Mating plug 02-pin Deutsch DT06-25WR
(not included in the scope of supply; must be ordered separately; Mat. no. R901017846)

5 Nameplate

Available individual components



Item	Designation		DC voltage	Material no.
157	Coil for individual connection			
	Proportional solenoid	K40	12 V 24 V	R901003055 R901003053
	Switching solenoid	K40	12 V 24 V	R900729189 R900729190
158	Nut			R900991453
159	O-ring for pressure tube			R900004280
999	Valve seal kit			R900733593

See also data sheet RE 18136-21.

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www.boschrexroth.de

Rexroth
Bosch Group

Slew drive module

RE 64593/06.2010 1/12

Type MSC


HAD 7371/05

Size 16
Component series 1X
Maximum operating pressure 350 bar
Rated flow 160 l/min

Table of contents

Features

System

- Independent, separate control of the supply and discharge flow (meter-in (MI) and meter-out (MO))
- Circulation pressure compensator for load-independent flow control LUDS
- Operation of a holding brake

Control concepts

- Open vario = Controlled supply
- Closed vario = Controlled supply and discharge
- Speed vario = Controlled discharge
- Free swing = Open discharges

Fields of application

Control of slew drives in the open circuit:

- Cranes
- Excavators
- Drilling machinery
- Machinery for forestry

Function

The MSC16 slew drive module contains in a compact form the functions required for actuating slew drives in mobile machines.

Supply and discharge spools are actuated independently. The pressure compensator is located downstream the supply spool. This allows for the realization of different control concepts. Fluctuating or negative loads (e.g. during braking) can be kept under control by means of these control options.

The pressure drops at the metering orifices depend on the pressures occurring during accelerations or decelerations of the rotary movement. Due to the resolution of the control edges, energetically optimized acceleration and cavitation-free deceleration (by hydraulically claiming the motor) of the rotary movement are possible.

By opening the discharge spools, a floating position can be realized without having to renounce the fine control at the main spool.

Actuation of the supply spool (1) is effected via the pressure reducing valves (2), control of the discharge via the discharge spools (3) and pressure reducing valves (4) with load-independent flow control (7).

Any unwanted rotation of the upper structure against the pump is prevented by the load-holding valve (9).

Apart from that, a primary (5) and a secondary pressure limitation (6) is integrated in the slew drive module.

Optionally, valves for loosening the holding brake (10) ca be extended by a valve (13) for actuating a dynamic brake.

The discharge spools can be designed in the position "normally open" or "normally closed".

Optionally with pilot oil switch-off (12).

Basic actuations:

- Open vario
- Closed vario
- Speed vario
- Free swing
- Special actuations

Thanks to the option of independent supply and discharge spool actuation, the user can program the perfect control concept for the rotary movement, individually for their application.

Control concept during rotation

Control concept	Direction of rotation	Supply spool (MI)	Discharge spool A (left) (MO)	Discharge spool B (right) (MO)
Open vario	Clockwise	Proportional right	Closed	Open
	Counterclockwise	Proportional left	Oopen	Closed
Closed vario	Clockwise	Proportional right	Closed	Proportional
	Counterclockwise	Proportional left	Proportional	Closed
Speed vario	Clockwise	Open right	Closed	Proportional
	Ccounterclockwise	Open left	Proportional	Closed
Free swing	-	Closed	Open	Open
Special actuation		Free selection of the supply and discharge spool actuation. Combination of open, closed and speed vario.		

MI = Meter in = Supply control
MO = Meter out = Discharge control

Technical data (For applications outside these parameters, please consult us!)

general

Size			16
Weight		kg	Approx. 22
Installation position			Horizontal (see page 9)
Environmental/storage temperature range, at zero pressure		°C	–40 to +80
Type of connection			See unit dimensions page 8
Mounting type			See unit dimensions page 8
Paintwork			Standard priming RAL 5010

hydraulic

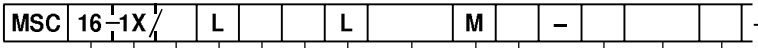
Maximum operating pressure		bar	350
Maximum operating pressure at the port	– P, MP	bar	350
	– A, B, X, MX	bar	350
	– PV, BR, M1...M4	bar	50
	– T	bar	20
	– L	bar	Depressurized to the tank
Maximum flow at port P	q	l/min	160
Flow resistance, uncontrolled neutral circulation P → A → B → T	Δp	bar	8 (with q = 160 l/min; viscosity 32 mm²/s)
Hydraulic fluid			Mineral oil (HL, HLP) according to DIN 51524; HFD-R (phosphoric acid ester); fast bio-degradable hydraulic fluids according to VDMA 24568 (see also RE 90221); HETG (rape seed oil); other hydraulic fluids upon request
Hydraulic fluid temperature range		°C	–20 to +80
Viscosity range		mm²/s	10 to 380
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)			Class 20/18/15 [1]

electrical

Voltage type			Direct voltage (DC)	
On/off valves:				
Supply voltage		V	**12**	**24**
Solenoid coil resistance with 20 °C		Ω	10	40
Power consumption at 20 °C		W	14.4	14.4
Duty cycle		%	100	100
Proportional valves:				
Supply voltage		V	**12**	**24**
Solenoid coil resistance with 20 °C		Ω	2.4	12
Duty cycle		%	100	100
Max. control current		A	1.8	0.8
Recommended chopper frequency		Hz	150	150
Protection class according to VDE 0470-1 (DIN EN 60529), DIN 40050-9	– Version "C4"		IP 66 (with mating connector mounted and locked)	
			IP 69K (with Rexroth mating connector, Material no. R901022127)	
	– Version "K40"		IP 69K (with mating connector mounted and locked)	
Plug-in connector type			C4 Junior-Timer K40 Deutsch plug	
Control electronics			e.g. BODAS control unit RC	

[1] The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the service life of the components.

Ordering code



Size 16 = **16**

Component series 10 to 19 = **1X**
(10 to 19: unchanged installation and connection dimensions)

Supply spool
80 l/min = **080**
160 l/min = **160**
Linear = **L**

Discharge spool
60 l/min = **060**
90 l/min = **090**
120 l/min = **120**
160 l/min = **160**
200 l/min = **200**
Normally open = **O**
Normally closed = **C**
Linear = **L**

Pressure adjustment in bar, 3-digit
Primary – secondary A – secondary B, e.g. 140–170–170 = **… – … – …**

Measuring ports
With = **M**

Pilot oil shut-off valve (optional)
With = **S**
Without = **Z**

Shuttle valve external X (optional)
With = **W**
Without = **Z**

Damping valve (optional)
Supply/discharge orifice, specification in mm (2-digit), 0.4 mm – 2.0 mm = **04 – 20**

Proportional valve dynamic brake (only upon request)
With = **B**
Without = **Z**

= Standard types

Standard types and standard units are contained in the EPS (standard price list).

Ordering code

–			V	01	*

Further details in the plain text

Line connections

01 = Pipe thread according to DIN ISO 228/1

Seal material

V = FKM seals

⚠ Attention!
Observe compatibility of seals with the hydraulic fluids used!

Electrical connection

K40 = DT04-2P (Deutsch)

C4 = Junior-Timer 2-pin (AMP) [1)]

Supply voltage

G12 = 12 V

G24 = 24 V

1) ☞ **Note!**
Mating connectors are not included in the scope of delivery and must be ordered separately, see also page 6.

Short type

Complete slew drive modules are defined according to the type code. The order text serves the specify the technical features and requirements. From the order text, the Rexroth distribution organization derives a short type as well as a material number.

Example of an MSC16 short type:

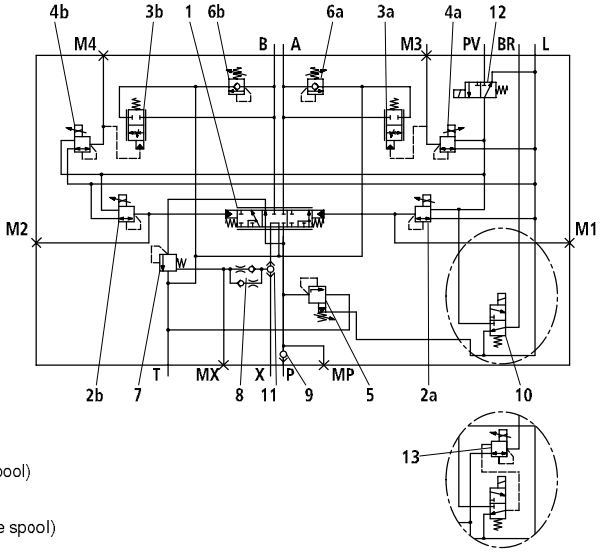
MSC – 1006 – 1 0 / 1 MSC16 LUDS G24 -007

- Serial number of the slew drive module
- Component series (1X)
- Revision status of the series
- Number of axes
- Load-independent flow control
- Direct voltage 24 V
- Special number, if applicable

Standard types	Material number	Ordering code
MSC–1100–10/1MSC16LUDSG24	R901267589	MSC16–1X/080L090CL180-210-210MZZ04-20Z–G24C4V01
MSC-1101–10/1MSC16LUDSG24	R901267592	MSC16–1X/160L200CL180-210-210MZZ04-20Z–G24C4V01

Symbol

Ports	
P	Pump
A, B	Actuator
T	Tank
X	External load indication
L	Leakage oil
PV	Pilot oil
BR	Braking port
MX	Measuring port Load indication
MP	Measuring port Pump
M1…M4	Measuring port



1	Supply spool
2a, b	Proportional valve (actuation supply spool)
3a, b	Discharge spool
4a, b	Proportional valve (actuation discharge spool)
5	Primary pressure valve supply
6a, b	Secondary valve
7	Pressure compensator
8	Damping valve (optional)
9	Load holding valve
10	Holding brake valve
11	Optional: Shuttle valve external X port
12	Optional: Pilot oil switch-off
13	Optional: Proportional valve dynamic brake

Mating connector

Recommended mating connector for plug-in connector type Junior Timer 2-pin (AMP)

Mating connector for FTDRE… and FTWE… protection class IP 69K

Material number: R900313533

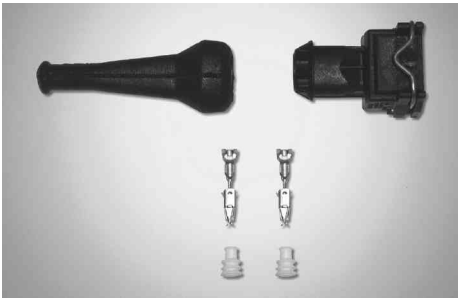
For litz wire cross-sections from 0.5 to 1 mm² and for an insulation diameter of the individual seals from 1.2 to 2.1 mm

Material number: R901022127

For litz wire cross-sections from 0.5 to 1 mm² and for an insulation diameter of the individual seals from 2.2 to 3 mm

Note!

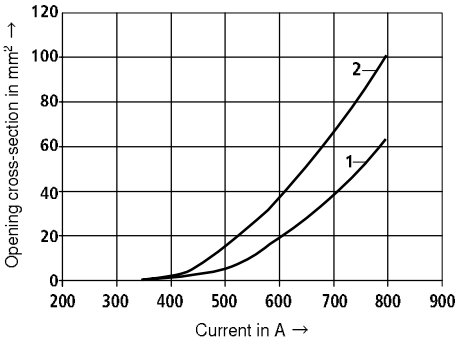
Mating connectors are not included in the scope of delivery and must be ordered separately.



Recommended mating connector for Junior Timer 2-pin (AMP)

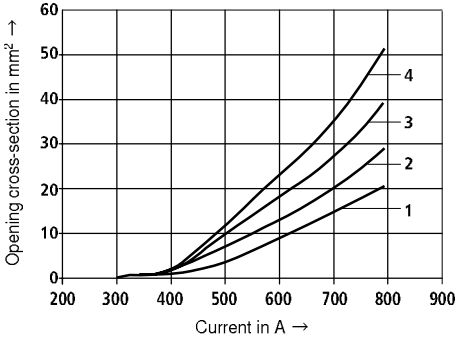
Theoretic design characteristic curves

Supply spool



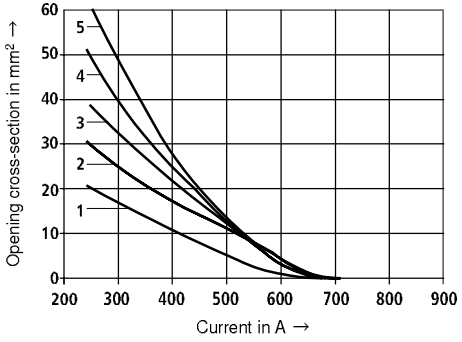
Spool:
1 80 l/min linear
2 160 l/min linear

Discharge spool linear, normally closed (standard)



Spool:
1 60 l/min
2 90 l/min
3 120 l/min
4 200 l/min

Discharge spool linear, normally open



Spool:
1 60 l/min
2 90 l/min
3 120 l/min
4 160 l/min
5 200 l/min

3

Unit dimensions: Line connections

P	G1
T	G1
A, B	G3/4
X	G1/4
MX	G1/4
MP	G1/4
M1, M2	G1/4
M3, M4	G1/4
BR	G1/4
PV	G1/4
L	G1/2

P = Pump
A, B = Actuator
T = Tank
X = External load indication
L = Leakage oil
PV = Pilot oil
BR = Braking port
MX = Measuring port Load indication
MP = Measuring port Pump
M1...M4 = Optional: Measuring port override (without override function, the ports are closed)

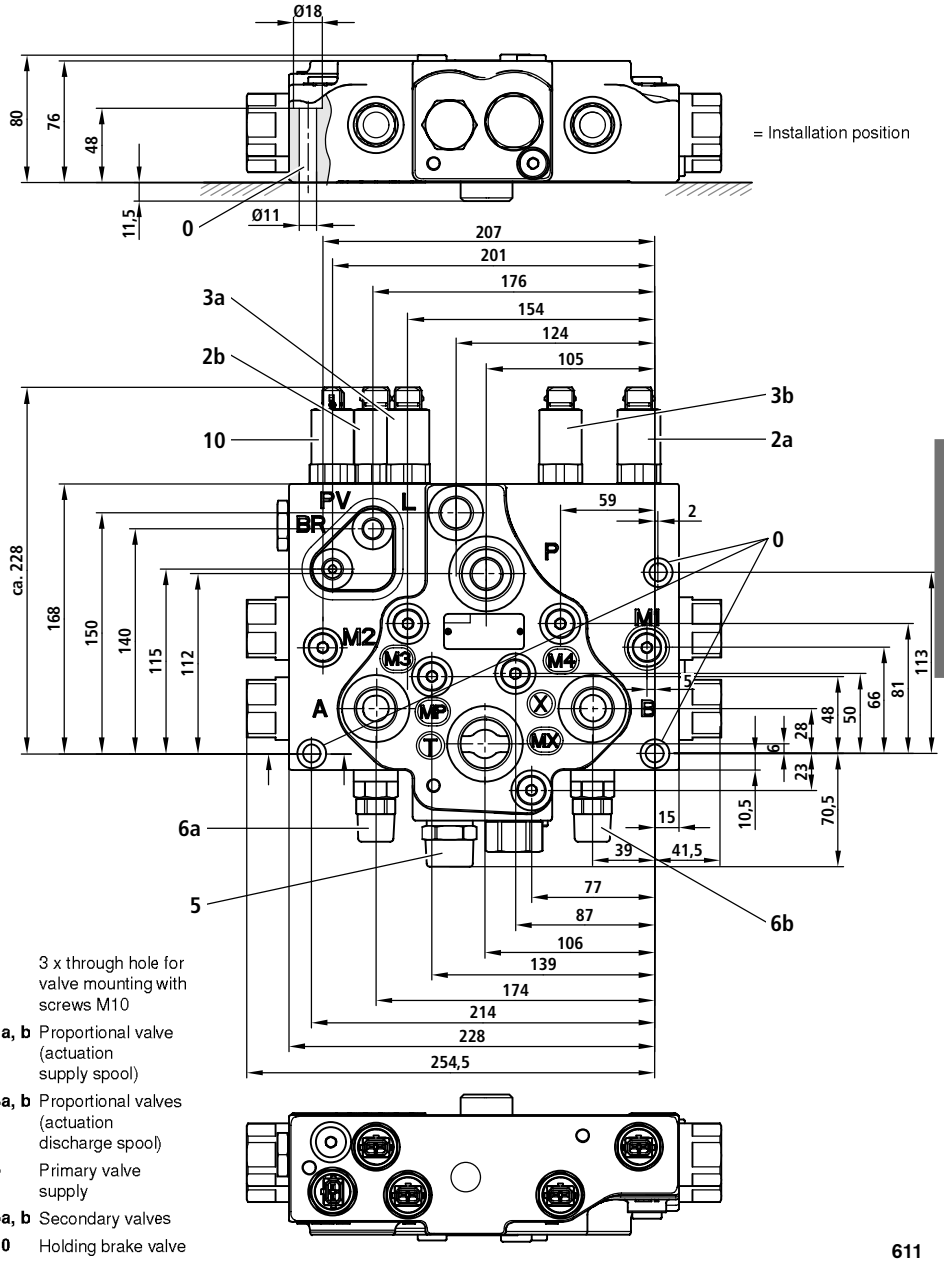
Mounting cavities for pipe fittings with thread according to DIN ISO 228 / DIN 13.

Note!

The subsequent unit dimension serve to describe the product. Technical modifications reserved.

Observe the valid, relevant type-specific installation drawing.

Unit dimensions: Without pilot oil switch-off (dimensions in mm)



0 3 x through hole for valve mounting with screws M10

2a, b Proportional valve (actuation supply spool)

3a, b Proportional valves (actuation discharge spool)

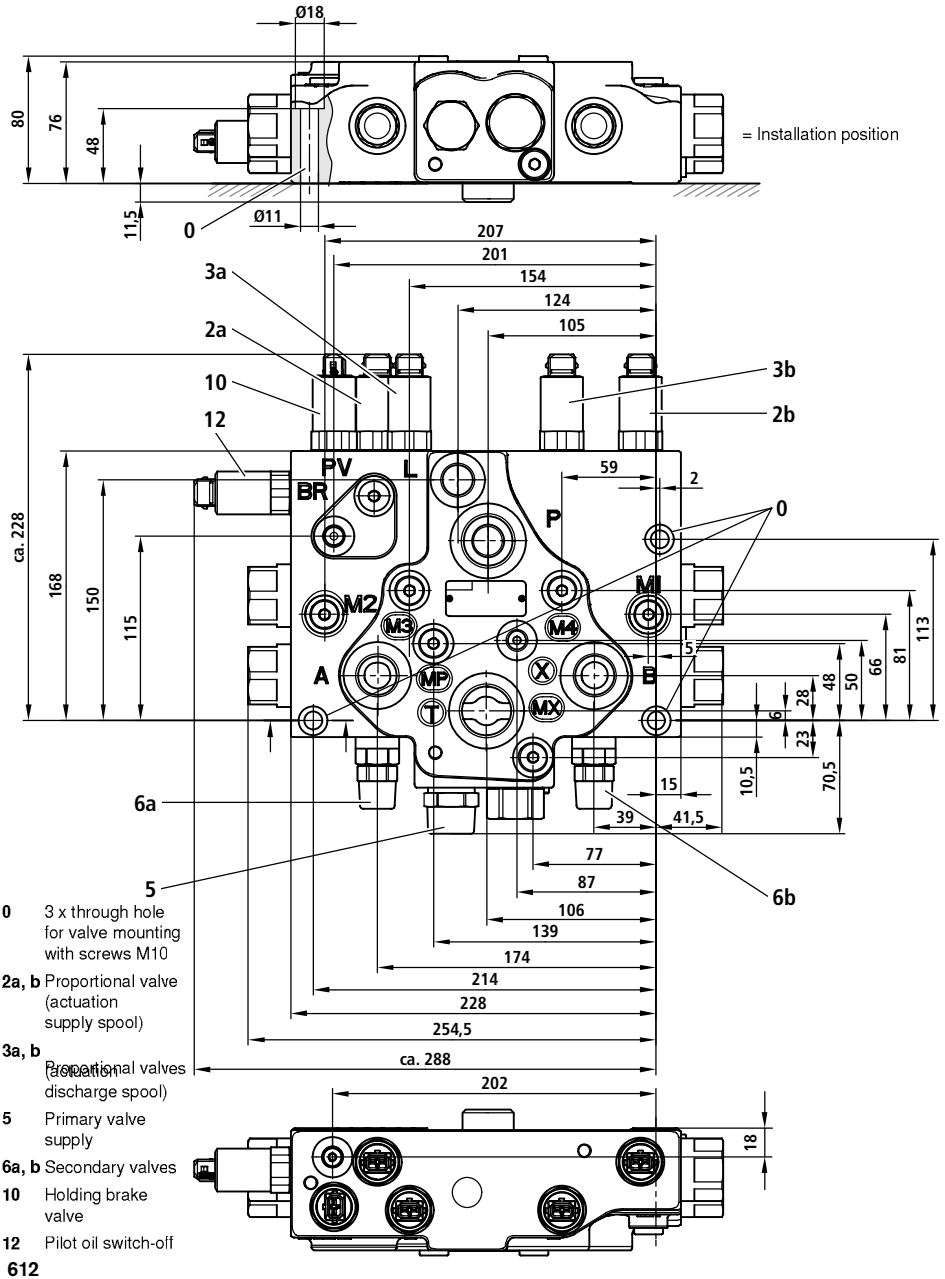
5 Primary valve supply

6a, b Secondary valves

10 Holding brake valve

3

Unit dimensions: With pilot oil switch-off (dimensions in mm)



0 3 x through hole for valve mounting with screws M10

2a, b Proportional valve (actuation supply spool)

3a, b Proportional valves (actuation discharge spool)

5 Primary valve supply

6a, b Secondary valves

10 Holding brake valve

12 Pilot oil switch-off

Notes

Notes

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Fax +49 (0) 93 52 / 18-23 58
info.brm-mc@boschrexroth.de
www.boschrexroth.de

Rexroth
Bosch Group

Check-Q-meter

RE 27 551/06.03 1/10
Replaces: 09.97

Type FD

K2791/2

Nominal size 12...32
Series 2X
Max. Operating pressure 350 bar
Max. Flow 560 L/min

3

Overview of contents

Features

- For installation in manifolds (cartridge valve),
- With SAE flanged ports,
- For subplate mounting,
  porting pattern to DIN 24 340, form D,
  ISO 5781 and CETOP–RP 121 H,
  subplates to catalogue sheet RE 45 062
  (separate order),
- Use subplate version when valve panel mounting.

Functions

- Pilot operated check valve, leak-free,
- The check-Q-meter controls the returning flow q_{V2} in relation to the flow being directed into the opposite side of the actuater q_{V1}. With cylinders the area tratio ($q_{V2} = q_{V1} \bullet \varphi$) has to be taken into account,
- By-pass valve, free-flow in opposite direction,
- Optional built-on secondary pressure relief valve (only for valve with flange connections).

Ordering details

FD			2X/		V	*

Nominal size 12 = **12**
Nominal size 16 = **16**
Nominal size 25 = **25**
Nominal size 32 = **32**

For manifold mounting (cartridge valve) = **KA**
For sub-plate mounting **without** secondary DBV = **PA**
For SAE flange connections **without** secondary DBV = **FA**
For SAE flange connections **with** secondary DBV = **FB**

Series 20 to 29 = **2X**
(20 to 29: unchanged installation and connection dimensions)

Further details in clear text

V = FKM seals, suitable for mineral oil to DIN 51 524 (HL, HLP) and phosphate ester (HFD-R)

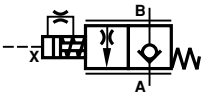
B00 = **Without** orifice
B03 = Orifice Ø 0.30 mm (sizes 12 and 16)
B04 = Orifice Ø 0.40 mm (size 25)
B06 = Orifice Ø 0.60 mm (size 32)
(other orifice diameters on request)

Pressure range of the secondary pressure relief valve
Valve with SAE flange connections
(**only** for version "FB")

200 = Pressure setting up to 200 bar
300 = Pressure setting up to 300 bar
400 = Pressure setting up to 400 bar

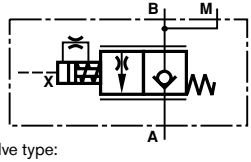
Symbols

Without secondary pressure relief valve



Valve type:

FD 12 KA 2X/B03..
FD 16 KA 2X/B03..
FD 25 KA 2X/B04..
FD 32 KA 2X/B06..

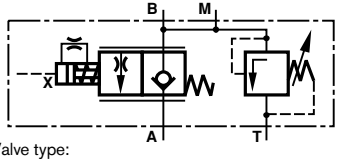


Valve type:

FD 12 PA 2X/B03..
FD 16 PA 2X/B03..
FD 25 PA 2X/B04..
FD 32 PA 2X/B06..

FD 12 FA 2X/B03..
FD 16 FA 2X/B03..
FD 25 FA 2X/B04..
FD 32 FA 2X/B06..

With secondary pressure relief valve



Valve type:

FD 12 FB 2X/.B03..
FD 16 FB 2X/.B03..
FD 25 FB 2X/.B04..
FD 32 FB 2X/.B06..

Functional description, section

Check-Q-meters are used in hydraulic systems to influence the speeds of hydraulic motors and cylinders independent of the load (prevents running away). In addition there is an isolator function for pipe burst safety.

The check-Q-meter comprises basically of the housing (1), main poppet (2), pilot part (3), pilot spool (4), damping spool (5) and pilot damping (6).

Lifting the load

With free-flow from A to B the main spool (2) is opened. If the load pressure fails (e.g. pipe break between the directional valve and port A) then the main spool (2) immediately closes. This function is achieved by the connection of the load side (7) with chamber (8).

Lowering the load (circuit examples)

The direction of flow is from B to A. Port A is connected to tank via the directional valve. The piston rod side of the cylinder has a flow applied which corresponds to the working conditions. The relationship between the control pressure at port X and the load pressure at port B = 1 : 20.

When the control pressure is reached the pre-opening of the main spool takes place. Via the control spool (4) the pilot stage (3) is lifted off its seat and chamber (8) is de-compressed via this drilling and port A to tank. At the same time the load pressure in port B is no longer applied to chamber (8), this is due to the longitudinal movement of the pilot stage (3) within the main spool. The main poppet (2) is thereby unloaded. The reverse side of the control spool (4) at the main poppet (2), lies against the collar of the damping spool (5).

The pressure required at port X to open B to A is now only influenced by the spring in chamber (9). The pressure required to begin opening the connection B to A is 20 bar; to fully open the connection 50 bar is required.

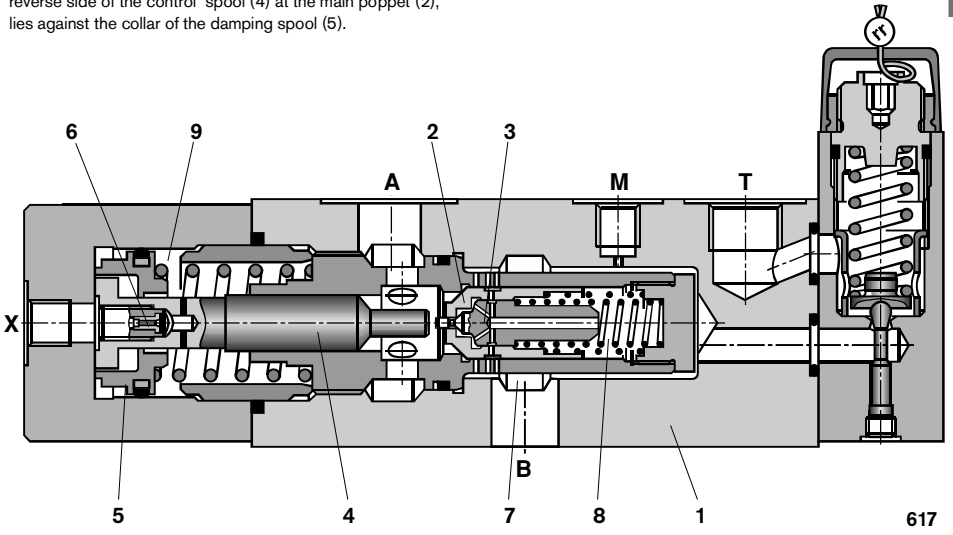
The opening cross-section for flow control increases progressively. It is created by the successive opeining of radial drillings in the bush and the main poppet (2) land.

The relationship between the control pressure, cracking pressure and differential pressure determines the flow to the actuator via the connection of B to A. Thus uncontrolled running away of the actuator is prevented.

The controlled lowering procedure is not affected even if there is a pipe burst between the directional valve and port A.

Guidelines for influencing the opening and closing times of the check-Q-meter.

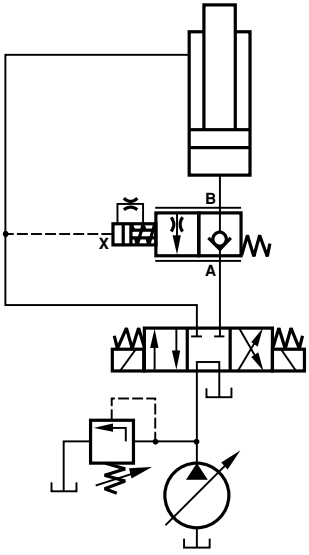
- Throttling of the opening sequence is via orifice (6) in the control spool (4) and both sides of the damping spool (5). The orifice (6) is protected by sieves.
- The closing movement of the check-Q-meter is virtually un-throttled.
- When being used in conjunction with cylinders the control line to port X can be fitted with a throttle check valve (meter-out control) to influence the closing sequence.
- When being used in conjunction with motors a throttle check valve should not be fitted in the control line to port X. In this case it is recommended that the control times of the directional valve are influenced.



Circuit examples

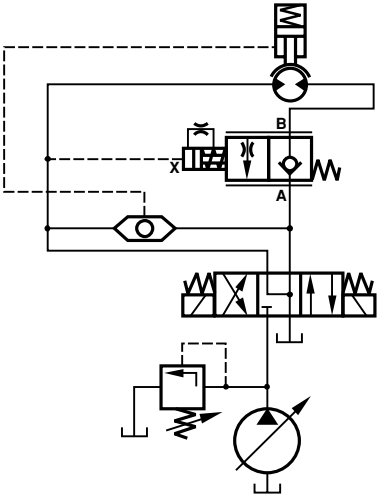
Differential cylinder

On safety grounds, a closed centre directional valve should always be used!



Hydraulic motor

So that the holding brake can operate both of the direction all valve ports have to be connected to port T in the de-energised position. If the brake is externally unloaded then it is possible to use a closed centre directional valve in the de-energised condition.

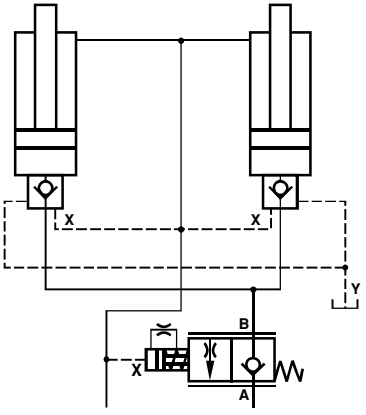


Note:

Two check-Q-meters cannot be used to control two cylinders which are forced mechanically to move together, as synchronisation and the same pressure cannot be guaranteed in each cylinder.

Therefore, the cylinders have to be equipped with two pilot operated check valves, type SL. The check-Q-meter is fitted in a common line.

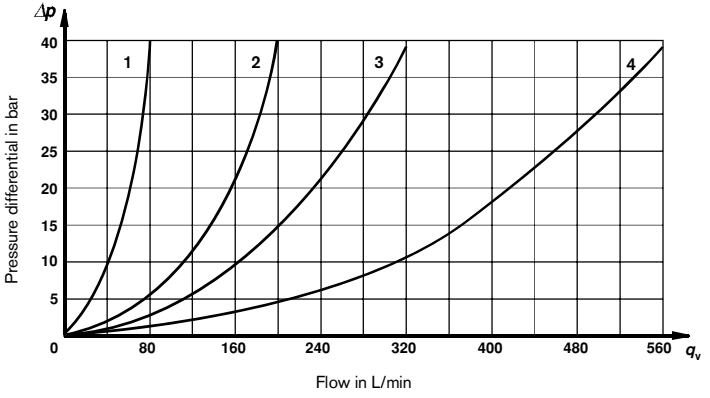
In this case, the load pressure must not exceed 200 bar!



Technical Data (For application outside these parameters, please consult us!)

Operating pressure, ports A, X	bar	up to 350
port B	bar	up to 420
Pilot pressure, port X (flow control range)	bar	min. 20 to 50, max. 350
Cracking pressure, A to B	bar	2
Setting pressure for secondary pressure relief valve	bar	up to 400
Flow	L/min	80 (size 12), 200 (size 16), 320 (size 25), 560 (size 32)
Area ratio of the pre-opening		$\frac{\text{poppet seat area}}{\text{area of pilot spool}} = \frac{1}{20}$
Pressure fluid		mineral oil to DIN 51524 (HL,HLP); phosphate ester (HFD-R)
Pressure fluid temperature range	°C	– 20 to + 80
Viscosity range	mm²/s	10 to 800
Degree of contamination (maximum permissible		ISO 4406 (C) class 20/18/15

Characteristic curves (measured at $\nu = 41$ mm² and $\vartheta = 50$ °C)

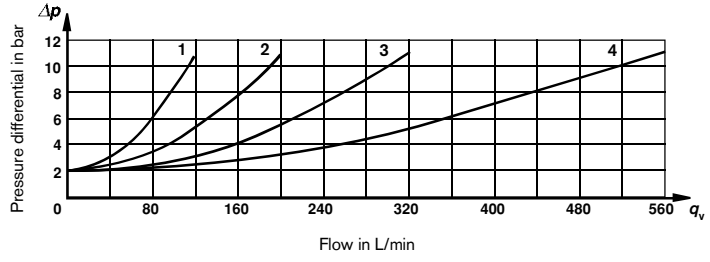


Pressure differential Δp in relation to flow q_v, measured at throttle position:

Throttle fully open ($p_x = 50$ bar)

B to A

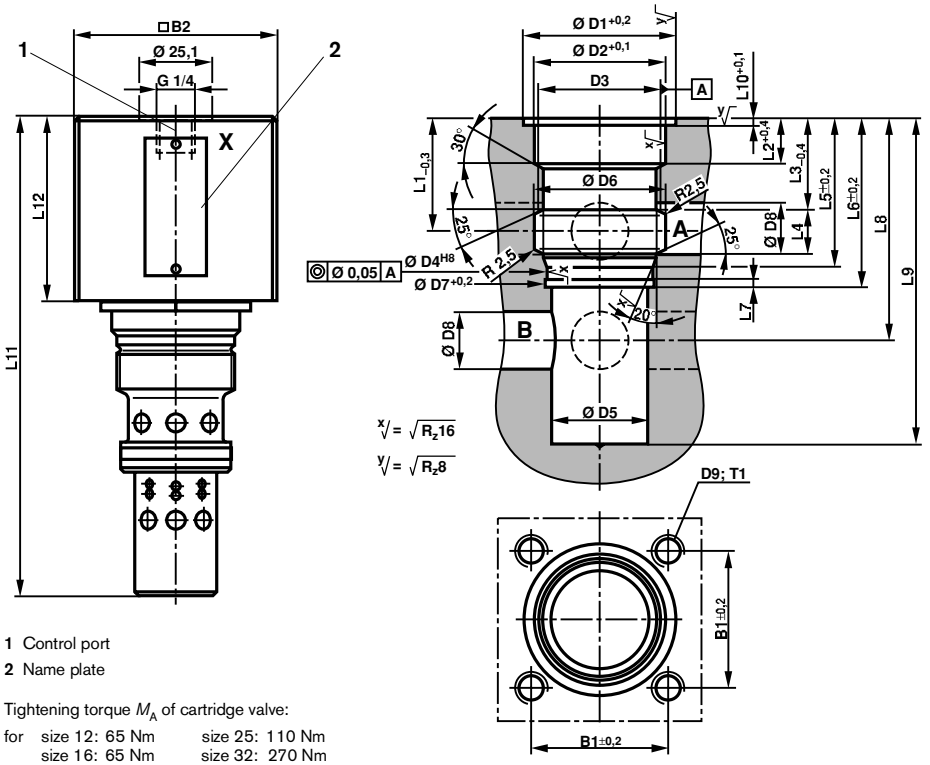
1 = size 12
2 = size 16
3 = size 25
4 = size 32



Pressure differential Δp in in relation to flow q_v, measured over the check valve

A to B

Unit dimensions: valve for assembly into manifolds (cartridge valve) (Dimensions in mm)



1 Control port

2 Name plate

Tightening torque M_A of cartridge valve:

for size 12: 65 Nm size 25: 110 Nm
size 16: 65 Nm size 32: 270 Nm

Ports A and B can be optionally arranged about the circumference.

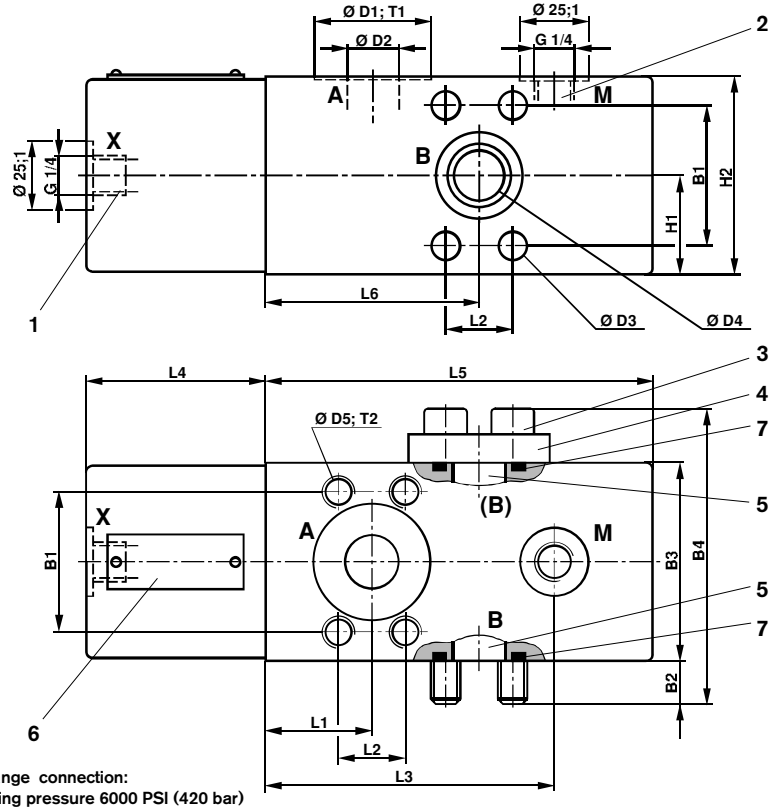
Attention!
The valve fixing holes must not be damaged.

Pipe threads "G" to ISO 228/1

Type	B1	B2	D1	D2	D3	D4	D5	D6	D7	D8	D9	T1	L1	L2	L3	L4	L5	L6
FD 12 KA 2X/...	48	70	54	46	M42x2	38	34	46	38,6	16	M10	16	39	16	32	15,5	50,5	60
FD 16 KA 2X/...	48	70	54	46	M42x2	38	34	46	38,6	16	M10	16	39	16	32	15,5	50,6	60
FD 25 KA 2X/...	56	80	60	54	M52x2	48	40	60	48,6	25	M12	19	50	19	39	22	65	80
FD 32 KA 2X/...	66	95	72	65	M64x2	58	52	74	58,6	30	M16	23	52	19	40	25	71	85

Type	L7	L8	L9	L10	L11	L12	Valve fixing screws/tightening torque	M_A in Nm	Weight
FD 12 KA 2X/...	3	78	128	2,3	191	65	4 off M10 x 70 DIN 912-10.9	69	2,8 kg
FD 16 KA 2X/...	3	78	128	2,3	191	65	4 off M10 x 70 DIN 912-10.9	69	2,8 kg
FD 25 KA 2X/...	4	105	182	2,3	253	75	4 off M12 x 80 DIN 912-10.9	120	5,6 kg
FD 32 KA 2X/...	4	105	198	2,3	289	94	4 off M16 x 100 DIN 912-10.9	295	7,5 kg

Unit dimensions: for SAE flange connections, without secondary pressure relief valve (Dimensions in mm)



SAE flange connection:
Operating pressure 6000 PSI (420 bar)

Flange mounting screws and blanking flange are included within the scope of supply.

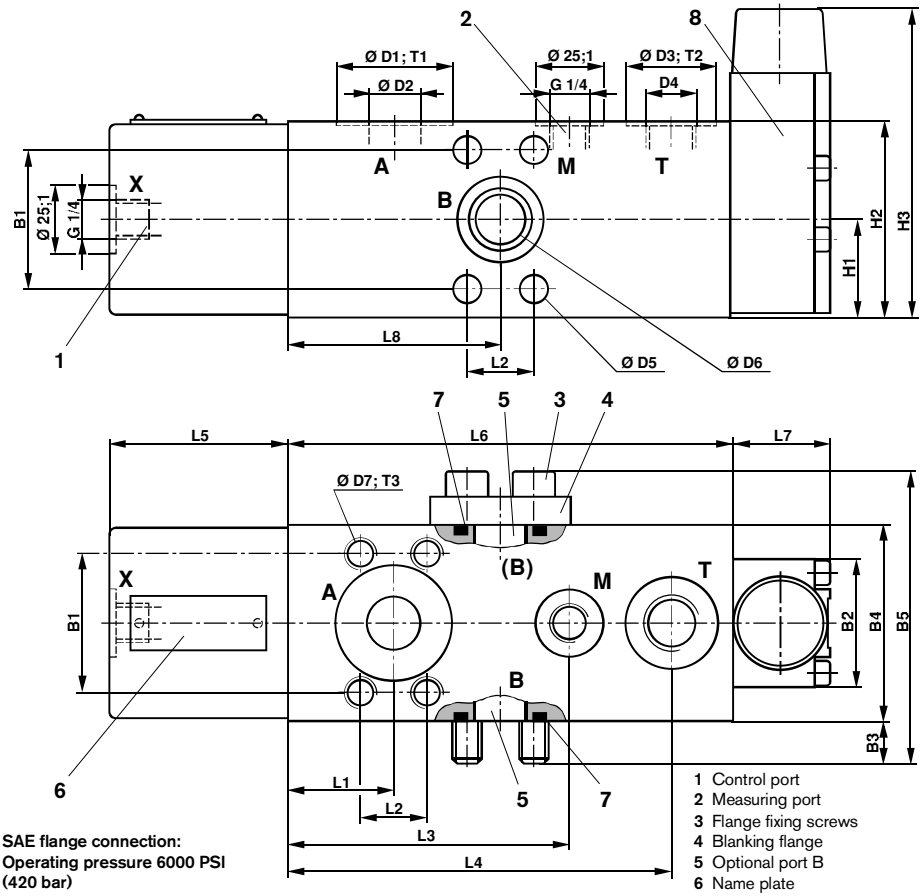
1 Control port
2 Measuring port
3 Flange fixing screws
4 Blanking flange
5 Optional port B
6 Name plate
7 O-ring

Pipe thread "G" to ISO 228/1

Type	B1	B2	B3	B4	D1	D2	D3	D4	D5	H1	H2
FD 12 FA 2X/...	50,8	16,5	72	110	43	18	10,5	18	M10	36	72
FD 16 FA 2X/...	50,8	16,5	72	110	43	18	10,5	18	M10	36	72
FD 25 FA 2X/...	57,2	14,5	90	132	50	25	13,5	25	M12	45	90
FD 32 FA 2X/...	66,7	20	105	154	56	30	15	30	M14	50	105

Type	L1	L2	L3	L4	L5	L6	T1	T2	Weight	O-ring (7)
FD 12 FA 2X/...	39	23,8	105	65	140	78	0,1	15	7 kg	25 x 3,5
FD 16 FA 2X/...	39	23,8	105	65	140	78	0,1	15	7 kg	25 x 3,5
FD 25 FA 2X/...	50	27,8	148	75	200	105	0,1	18	16 kg	32,92 x 3,53
FD 32 FA 2X/...	52	31,6	155	94	215	115	0,1	21	21 kg	37,7 x 3,53

Unit dimensions: for SAE flange connections, with secondary pressure relief valve (Dimensions in mm)



SAE flange connection:
Operating pressure 6000 PSI (420 bar)

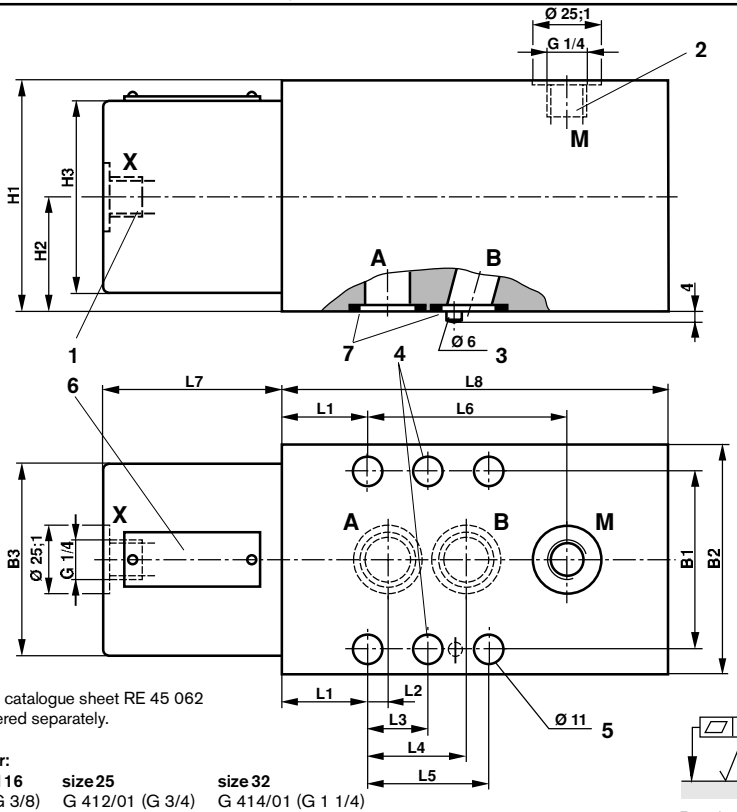
Flange mounting screws and blanking flange are included within the scope of supply.

1 Control port
2 Measuring port
3 Flange fixing screws
4 Blanking flange
5 Optional port B
6 Name plate
7 O-ring
8 Secondary pressure relief valve
Pipe threads "G" to ISO 228/1

Type	B1	B2	B3	B4	B5	D1	D2	D3	D4	D5	D6	D7	H1	H2
FD 12 FB 2X/...	50,8	47	16,5	72	110	43	18	34	G 1/2	10,5	18	M10	36	72
FD 16 FB 2X/...	50,8	47	16,5	72	110	43	18	34	G 1/2	10,5	18	M10	36	72
FD 25 FB 2X/...	57,2	80	14,5	90	132	50	25	42	G 3/4	13,5	25	M12	45	90
FD 32 FB 2X/...	66,7	80	20	105	154	56	30	42	G 3/4	15	30	M14	50	105

Type	H3	L1	L2	L3	L4	L5	L6	L7	L8	T1	T2	T3	Weight	O-ring (7)
FD 12 FB 2X/...	118	39	23,8	105	141,5	65	162	38	78	0,1	1	15	9 kg	25 x 3,5
FD 16 FB 2X/...	118	39	23,8	105	141,5	65	162	38	78	0,1	1	15	9 kg	25 x 3,5
FD 25 FB 2X/...	145	50	27,8	148	198	75	225	50	105	0,1	1	18	18 kg	32,92 x 3,53
FD 32 FB 2X/...	145	52	31,6	155	215	94	240	50	115	0,1	1	21	24 kg	37,7 x 3,53

Unit dimensions: for subplate mounting (Dimensions in mm)

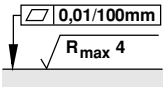


Subplates to catalogue sheet RE 45 062 must be ordered separately.

Subplates for:

sizes 12 and 16	**size 25**	**size 32**
G 460/01 (G 3/8)	G 412/01 (G 3/4)	G 414/01 (G 1 1/4)
G 461/01 (G 1/2)	G 413/01 (G 1)	G 415/01 (G 1 1/2)

Note!
Only use a sub-plate mounting valve for panel mounting!



Required surface finish of mating piece

1 Control port
2 Measuring port
3 Locating pin

4 Not for sizes 12,16 and 25
5 4 valve fixing holes for sizes 12, 16 and 25.
6 valve fixing holes for size 32
6 Name plate

Pipe threads "G" to ISO 228/1

Type	B1	B2	B3	H1	H2	H3	L1	L2	L3	L4	L5	L6
FD 12 PA 2X/...	66,7	85	70	85	42,5	70	31,8	7,2	–	35,8	42,9	73,2
FD 16 PA 2X/...	66,7	85	70	85	42,5	70	31,8	7,2	–	35,8	42,9	73,2
FD 25 PA 2X/...	79,4	100	80	100	50	80	38,9	11,1	–	49,2	60,3	109,1
FD 32 PA 2X/...	96,8	120	95	120	60	95	35,3	16,7	42,1	67,5	84,2	119,7

Type	L7	L8	Valve fixing screws/tightening torque	M_A in Nm	Weight	O-ring (7)
FD 12 PA 2X/...	65	140	4 off M10 x 100 DIN 912-10.9	75	9 kg	21,3 x 2,4
FD 16 PA 2X/...	65	140	4 off M10 x 100 DIN 912-10.9	75	9 kg	21,3 x 2,4
FD 25 PA 2X/...	75	200	4 off M10 x 120 DIN 912-10.9	75	18 kg	29,82 x 2,62
FD 32 PA 2X/...	94	215	6 off M10 x 140 DIN 912-10.9	75	24 kg	38 x 3

Notes

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Rexroth
Bosch Group

Stabilising module

RE 64614/07.04 1/6

Type RSM2

Nominal size 10
Component series 2X
Maximum operating pressure:
• Actuator connections A, B 420 bar
• Accumulator connection X 350 bar
Nominal flow 80 L/min


HAD 7290/04

3

Overview of contents

Features

The RSM2 stabilising module reduces pitching movements on wheeled vehicles that effect the vehicle and driver. For this the lifting line is connected to a hydro-pneumatic accumulator, via a switching valve, that absorbs the loads caused by the pitching movements.

Applications:

– Wheeled loaders
– Telescopic handlers

The following advantages apply when the RSM2 system is fitted:

– Higher transport speeds
– Higher handling rates
– Stable steering characteristics
– Shorter braking distances
– Higher comfort for the driver
– Lower mechanical loading of the entire machine
– Fewer repairs or down times with identical handling rates

Ordering details

RSM2	–	10	B	2X	/				V	01	*

Stabilising module

Nominal size 10 = 10

Design
Block design = B

Component series 20 to 29 = 2X
(20 to 29: unchanged installation and connection dimensions)

Accumulator pressure limitation
Without accumulator pressure limitation = A000
Accumulator pressure limitation **with** EC design test, pressure in bar = A . . .
Accumulator pressure limitation **without** EC design test, pressure in bar = B . . .

Accumulator loading orifice (defined when optimising the machine)
Orifice cross-section → Loading side = 12..
Orifice cross-section → Unloading side = ..04

Further details in clear text

Connections
01 = Pipe thread to ISO 228/1

V = FKM seals

Electrical connections
C4 = Plug, 2-pin, Junior Timer
K41L = Plug, 2-pin, Junior Timer, and diode P6KE30CA (12 V)
K42L = Plug, 2-pin, Junior Timer, and diode P6KE47CA (24 V)

Supply voltage
G12 = 12 V DC
G24 = 24 V DC

Function, circuit

Design

The stabilising module (1) basically comprises of a housing into which are built:

- Valve spool (2)
- 3/2-way directional valve, solenoid operated (3)
- Pressure relief valve (4)
- Emergency drain screw (5)
- Accumulator loading valve (6)

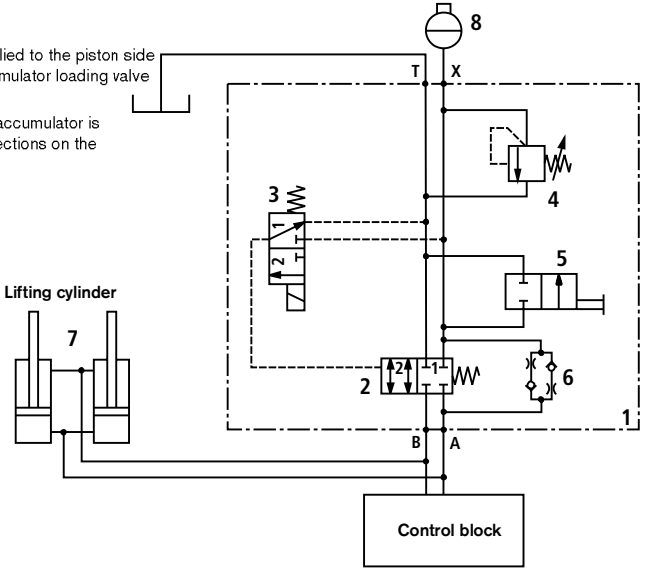
The damping valve can be automatically activated via the travel speed. The 3/2-way directional valve (3) is switched into the switched position 2. The valve spool (2) is switched to the switched position 2 and connects the piston side of the lifting cylinder (7) with the accumulator (8) as well as the rod side of the lifting cylinder (7) to tank.

The pressure relief valve (4) prevents unpermissible high pressures in the accumulator.
(Set pressure < permissible accumulator pressure).

Function

If the lifting cylinder (7) has pressure applied to the piston side then pressure is also applied to the accumulator loading valve (6) as well as the accumulator (8).

The loading and unloading speed of the accumulator is defined via the selectable orifice cross-sections on the accumulator loading valve (6).



Parking the vehicle, maintenance and service work

Via the emergency drain screw (5) (shown in the circuit as a mechanically operated 2/2-way directional valve) it is possible to unload the accumulator so that the above mentioned work can be carried out.

The accumulator loading orifice components are subject to a degree of wear. They should be checked and if necessary replaced after approx. 200.000 load cycles.

⚠ **Attention:**
The safety technical requirements of the vehicle have to be taken into account! The lifting system must firstly be secured against lowering.

Regularity requirements and safety guidelines

Accumulators are required for the RSM2 stabilisation system. If, due to the operation situation of the machine, the danger exsists that the accumulator's permissible pressure limit can be exceeded, then a pressure relief valve has to be fitted. For this system regularity requirements and those from the authorities may have to be complied with.

For this purpose the RSM2 is fitted with a pressure relief valve. This can also be a design tested valve which complies with the pressure component directive 97/23/EC (see ordering details).

If a RSM2 is ordered **without** a pressure relief valve (example: RSM2-10 B2X/A000...), Rexroth assumes that the appropriate pressure safety function has been foreseen by the vehicle manufacturer or that accumulator pressure overloads are prevented in a different manner within the vehicle's design.

In addition for the vehicle other national and international regulations may apply.

The entire responsibility lies with the vehicle manufacturer.

Installation guidelines

- The number of accumulators is dependent on the lifting cylinder size. Accumulators have to be ordered separately.
- The pressure relief setting (safety valve for the pressure vessel) **must** be lower than the permissible accumulator pressure.

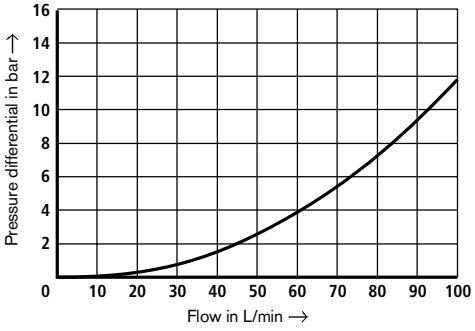
⚠ **Attention:**
- Before carrying out any maintenance work the accumulators must be unloaded (zero pressure).
- For this, unscrew the plug then rotate the valve spindle, loacated under the plug (3A/F), 2 turns anti-clockwise. The lifting system must firstly be secured against lowering.

Technical data (for applications outside these parameters, please consult us!)

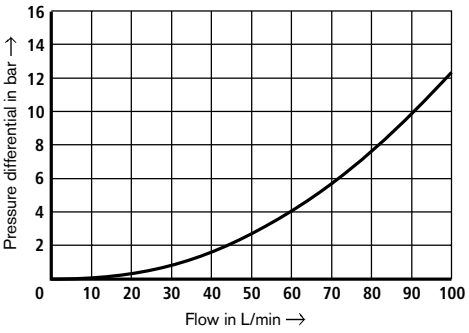
General			
Installation			Optional
Ambient temperature range		°C	– 20 … + 80
Weight		kg	4.7
Hydraulic			
Operating pressure	Ports A, B	bar	420
	Port X	bar	350
	Port T	bar	30
Max. nominal flow	Ports A, X	L/min	80
Pressure fluid			Mineral oil (HL, HLP) to DIN 51524; Other pressure fluids on request!
Pressure fluid temperature range		°C	– 20 … + 80
Viscosity range		mm^2/s	10 … 380
Max. permissible degree of pressure fluid contamination Cleanliness class to ISO 4406 (c)			Class 20/18/15
Electrical			
Control voltage		V	12; 24
Power consumption (solenoid)		W	14.4

Characteristic curves (measured with HLP68, $\vartheta_{oil} = 40\ °C \pm 5\ °C$)

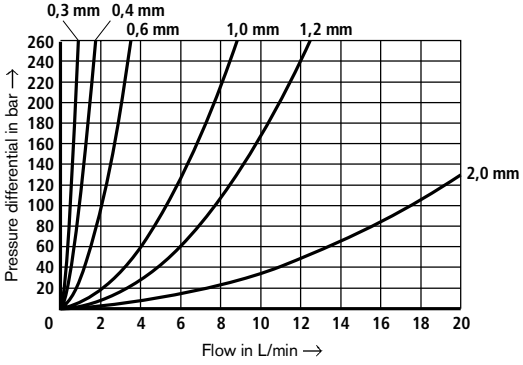
Direction of flow A → X



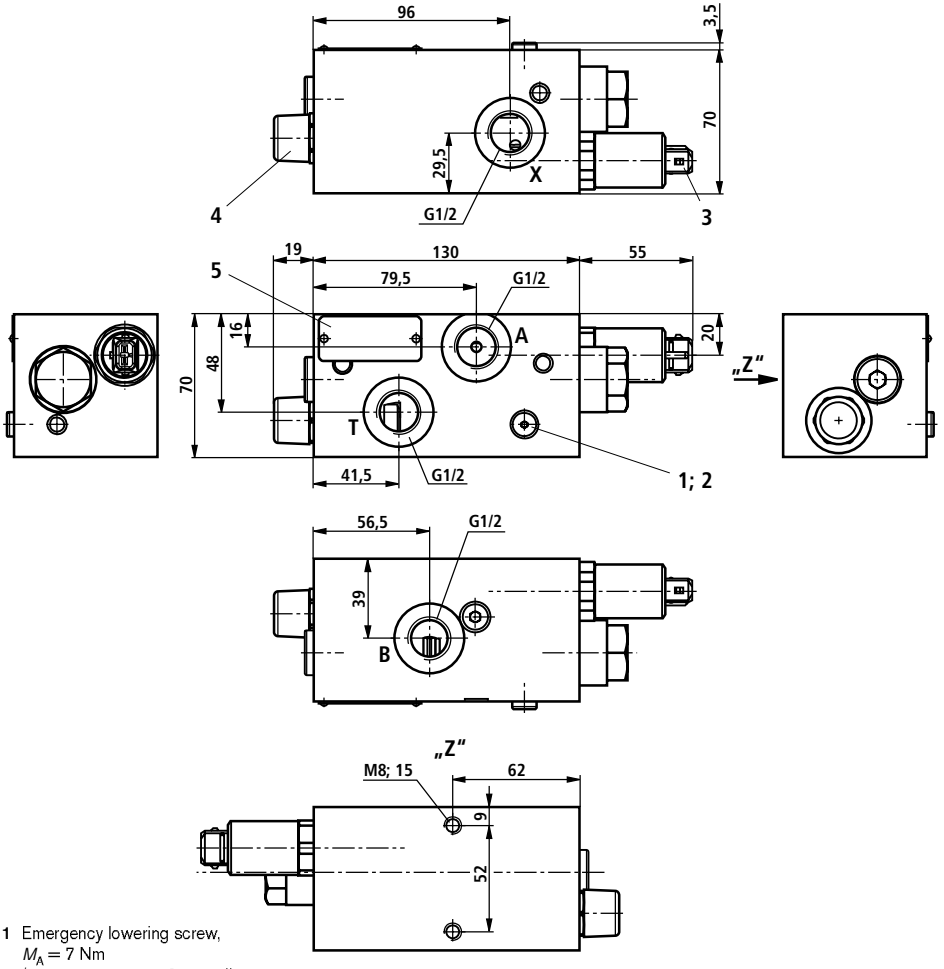
Direction of flow B → T



Δp-q_V-characteristic curves for selecting the accumulator loading orifice



Unit dimensions (in mm)



1 Emergency lowering screw, $M_A = 7$ Nm
(see notes on page 3 regarding installation)

2 Valve spindle located under Pos.1 3A/F, $M_A = 3.5$ Nm

3 Electrical connection
Plug, 2-pin
Type Junior Timer (AMP)

4 Pressure relief valve

5 Name plate

Port sizes
A, B, T, X = G 1/2

Notes

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Rexroth
Bosch Group

Stabilising module

RE 64617/05.04 1/4
Replaces: 07.03

Type RSM2

Nominal size 16
Component series 2X
Maximum operating pressure:
• Actuator connections A, B 420 bar
• Accumulator connection X2 350 bar
Nominal flow 150 L/min


HAD 7081/03

3

Overview of contents

Features

The RSM2 stabilising module reduces pitching movements on wheeled vehicles that effect the vehicle and driver. For this the lifting line is connected to a hydro-pneumatic accumulator, via a switching valve, that absorbs the loads caused by the pitching movements.

Applications:

– Wheeled loaders
– Telescopic handlers

The following advantages apply when the RSM2 system is fitted:

– Higher transport speeds
– Higher handling rates
– Stable steering characteristics
– Shorter braking distances
– Higher comfort for the driver
– Lower mechanical loading of the entire machine
– Fewer repairs or down times with identical handling rates

Ordering details

RSM2	–	16	B	2X	/				V	01	*

Stabilising module
Nominal size 16 = 16

Design
Block design = B

Component series 20 to 29 = 2X
(20 to 29: unchanged installation and connection dimensions)

Accumulator pressure limitation
Without accumulator pressure limitation = A000
With accumulator pressure limitation, pressure details in bar = A...

Pressure limitation
Pressure limitation 90 bar = B090
Pressure limitation 120 bar = B120
Pressure limitation 160 bar = B160

Further details in clear text

Connections
01 = Pipe thread to ISO 228/1

V = FKM seals

Electrical connections
C4 = Plug, 2-pin, Junior Timer
K41L = Plug, 2-pin, Junior Timer, and diode P6KE30CA (12 V)
K42L = Plug, 2-pin, Junior Timer, and diode P6KE47CA (24 V)

Supply voltage
G12 = 12 V DC
G24 = 24 V DC

Function, circuit

Design

The stabilising module basically comprises of a housing into which are built:

- Valve spool (2)
- 3/2-way directional valve, solenoid operated (3)
- Pressure relief valve (EC design tested) (4)
- Emergency drain screw (5)

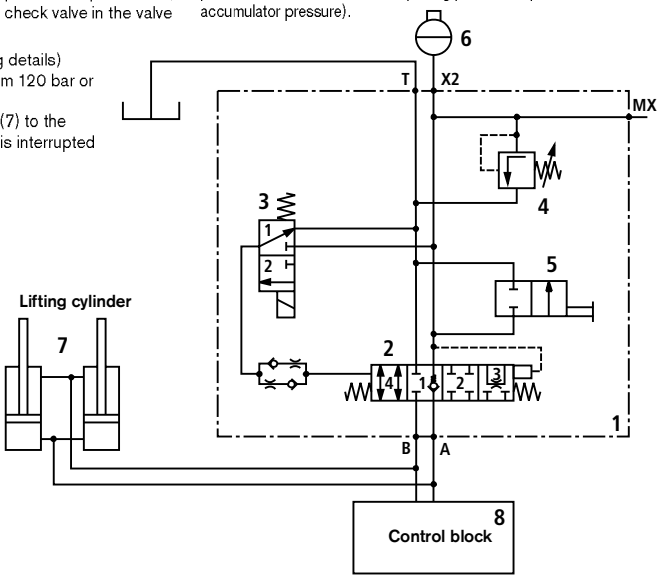
Function

If the lifting cylinder (7) has pressure applied to the piston side, then the pressure is also applied to the check valve in the valve spool (2) and the accumulator (6).

Dependent on the design (see ordering details)
...**B090** –> from 90 bar, ...**B120** –> from 120 bar or
...**B160** –> from 160 bar
the connection from the lifting cylinder (7) to the accumulator (6) via the valve spool (2) is interrupted (switched position 2).

A pressure reducing function for the accumulator (6) is integrated in the valve spool (2) (switched position 3). The opening pressure lies approx. 30 bar higher than the switch off pressure (switched position 2).

The damping valve can be automatically activated via the travel speed. The 3/2-way directional valve (3) is switched into the switched position 2. The valve spool (2) is switched to the switched position 4 and connects the piston side of the lifting cylinder (7) with the accumulator (6) as well as the rod side of the lifting cylinder (7) with the reservoir. The pressure relief valve (4) prevents unpermissible high pressures in the accumulator (opening pressure < permissible accumulator pressure).



Parking the vehicle, maintenance and service work

Via the emergency drain screw (5) (shown in the circuit as a mechanically operated 2/2-way directional valve) it is possible to unload the accumulator so that the above mentioned work can be carried out.

⚠ **Attention:**
The safety technical requirements of the vehicle have to be taken into account!

The lifting system must firstly be secured against lowering.

Regularity requirements and safety guidelines

Accumulators are required for the RSM2 stabilisation system. If, due to the operation situation of the machine, the danger exsists that the accumulator's permissible pressure limit can be exceeded, then a pressure relief valve has to be fitted. For this system regularity requirements and those from the authorities have to be complied with.

The RSM2 is fitted with a design tested pressure relief valve which complies with the pressure component directive 97/23/EC.

If a RSM2 is ordered without a pressure relief valve (example: RSM2-16 B2X/A000...), Rexroth assumes that the appropriate pressure safety function has been foreseen by the vehicle manufacturer or that accumulator pressure overloads are prevented in a different manner within the vehicle's design.

In addition for the vehicle other national and international regulations may apply.

The entire responsibility lies with the vehicle manufacturer.

Installation guidelines

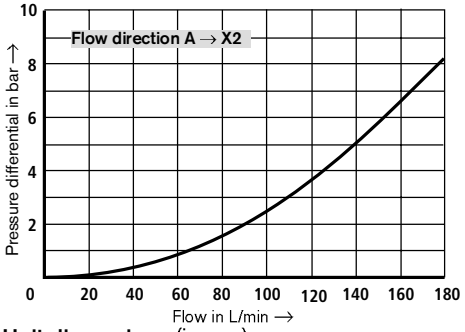
- The number of accumulators is dependent on the lifting cylinder size. Accumulators have to be ordered separately.
- The pressure relief setting (safety valve for the pressure vessel) **must** be lower than the permissible accumulator pressure.

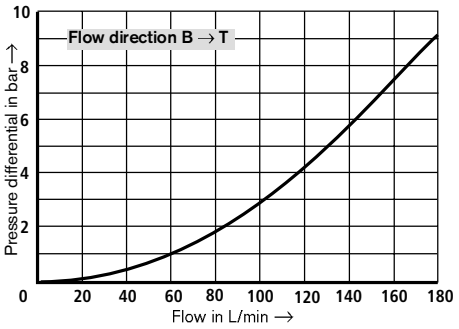
⚠ **Attention:**
- Before carrying out any maintenance work the accumulators must be unloaded (zero pressure).
- For this, unscrew the plug then rotate the valve spindle, located under the plug (3A/F), 2 turns anti-clockwise.
- The lifting system must firstly be secured against lowering.

Technical data (for applications outside these parameters, please consult us!)

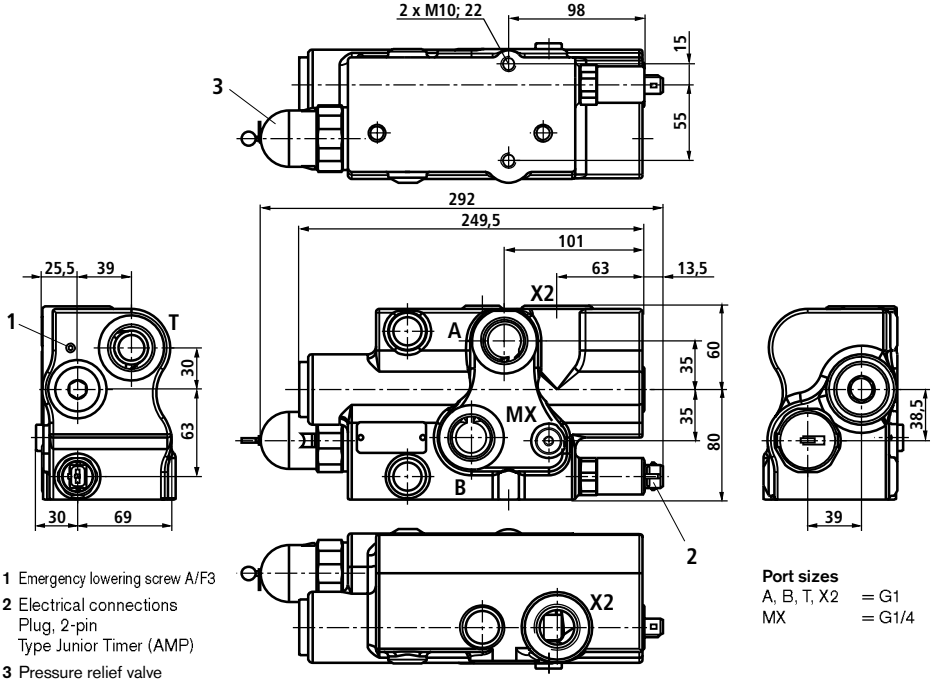
General			
Installation			Optional
Ambient temperature range		°C	– 20 … + 80
Weight		kg	15
Hydraulic			
Operating pressure	Ports A, B	bar	420
	Port X2	bar	350
	Port T	bar	30
Max. nominal flow	Ports A, X2	L/min	150
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524; Other pressure fluids on request!
Pressure fluid temperature range		°C	– 20 … + 80
Viscosity range		mm^2/s	10 … 380
Degree of contamination (max. permissible)			ISO 4406 (c) class 20/18/15
Electrical			
Control voltage		V	12; 24
Power consumption (solenoid)		W	14.4

Characteristic curves (measured with HLP68, $\vartheta_{oil} = 40\ °C \pm 5\ °C$)





Unit dimensions (in mm)



1 Emergency lowering screw A/F3

2 Electrical connections
Plug, 2-pin
Type Junior Timer (AMP)

3 Pressure relief valve

Port sizes

A, B, T, X2	= G1
MX	= G1/4

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Rexroth
Bosch Group

Stabilising module

RE 64618/05.04 1/4

Type RSM2

Nominal size 25
Component series 2X
Maximum operating pressure:
• Actuator connections A, B 420 bar
• Accumulator connections X1, X2 350 bar
Nominal flow 300 L/min


HAD 7202/04

3

Overview of contents

Features

The RSM2 stabilising module reduces pitching movements on wheeled vehicles that effect the vehicle and driver. For this the lifting line is connected to the hydro-pneumatic accumulator, via a switching valve, that absorbs the loads caused by the pitching movements.

Applications:

– Wheeled loaders
– Telescopic handlers

The following advantages apply when the RSM2 system is fitted:

– Higher transport speeds
– Higher handling rates
– Stable steering characteristics
– Shorter braking distances
– Higher comfort for the driver
– Lower mechanical loading of the entire machine
– Fewer repairs or down times with identical handling times

Ordering details

RSM2 – 25 | B | 2X/ | | G24 | | V | 11 | *

Stabilising module

Nominal size 25 = 25

Design

Block design = B

Component series 20 to 29 = 2X
(20 to 29: unchanged installation and connection dimensions)

Accumulator pressure limitation

Without accumulator pressure limitation = A000

With accumulator pressure limitation, pressure details in bar = A...

Pressure limitation

Pressure limitation 90 bar = B090

Pressure limitation 120 bar = B120

Pressure limitation 160 bar = B160

Further details in clear text

Connections

11 = SAE flange

V = FKM seals

Electrical connection

C4 = Plug, 2-pin, Junior Timer

K42L = Plug, 2-pin, Junior Timer, and diode P6KE47CA (24 V)

Supply voltage

G24 = 24 V DC

Function, circuit

Design

The stabilising module basically comprises of a housing into which are built:

- Valve spool (2)
- 3/2-way directional valve, solenoid operated (3)
- Pressure relief valve (EC design tested) (4)
- Emergency drain screw (5)

Function

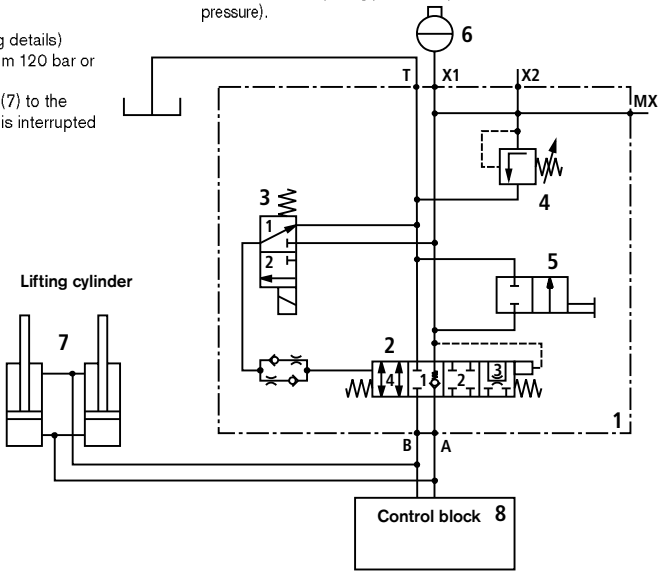
If the lifting cylinder (7) has pressure applied to the piston side, then the pressure is also applied to the check valve in the valve spool (2) and the accumulator (6).

Dependent on the design (see ordering details)
...**B090** –> from 90 bar, ...**B120** –> from 120 bar or
...**B160** –> from 160 bar
the connection from the lifting cylinder (7) to the accumulator (6) via the valve spool (2) is interrupted (switched position 2).

A pressure reducing function for the accumulator (6) is integrated in the valve spool (2) (switched position 3). The opening pressure lies approx. 30 bar higher than the switch off pressure (switched position 2).

The damping valve can be automatically activated via the travel speed. The 3/2-way directional valve (3) is switched into the switched position 2. The valve spool (2) is switched to the switched position 4 and connects the piston side of the lifting cylinder (7) with the accumulator (6) as well as the rod side of the lifting cylinder (7) with the reservoir.

The pressure relief valve (4) prevents unpermissible high pressures in the accumulator (opening pressure < permissible accumulator pressure).



Parking the vehicle, maintenance and service work

Via the emergency drain screw (5) (shown in the circuit as a mechanically operated 2/2-way directional valve) it is possible to unload the accumulator so that the above mentioned work can be carried out.

⚠ **Attention:**
The safety technical requirements of the vehicle have to be taken into account!

The lifting system must firstly be secured against lowering.

Regularity requirements and safety guidelines

Accumulators are required for the RSM2 stabilisation system. If, due to the operation situation of the machine, the danger exsists that the accumulator's permissible pressure limit can be exceeded, then a pressure relief valve has to be fitted. For this system regularity requirements and those from the authorities have to be complied with.

The RSM2 is fitted with a design tested pressure relief valve which complies with the pressure component directive 97/23/EC.

If a RSM2 is ordered without a pressure relief valve (example: RSM2-25 B2X/A000...), Rexroth assumes that the appropriate pressure safety function has been foreseen by the vehicle manufacturer or that accumulator pressure overloads are prevented in a different manner within the vehicle's design.

In addition for the vehicle other national and international regulations may apply.

The entire responsibility lies with the vehicle manufacturer.

Installation guidelines

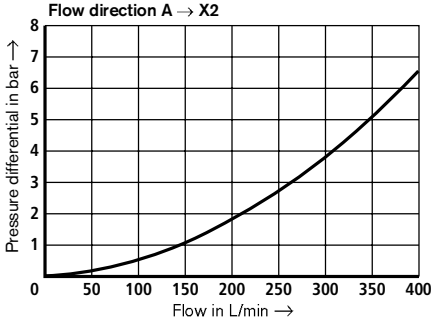
- The number of accumulators is dependent on the lifting cylinder size. Accumulators have to be ordered separately.
- The pressure relief setting (safety valve for the pressure vessel) **must** be lower than the permissible accumulator.

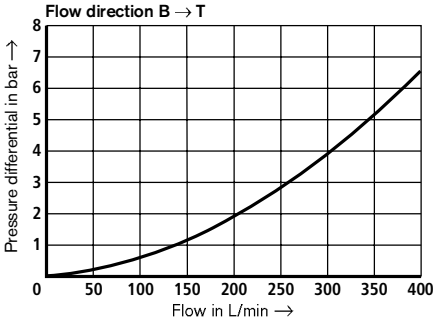
⚠ **Attention:**
- Before carrying out any maintenance work the accumulators must be unloaded (zero pressure).
- For this, unscrew the plug then rotate the valve spindle, located under the plug (3A/F), 2 turns anti-clockwise.
- The lifting system must firstly be secured against lowering.

Technical data (for application outside these parameters, please consult us!)

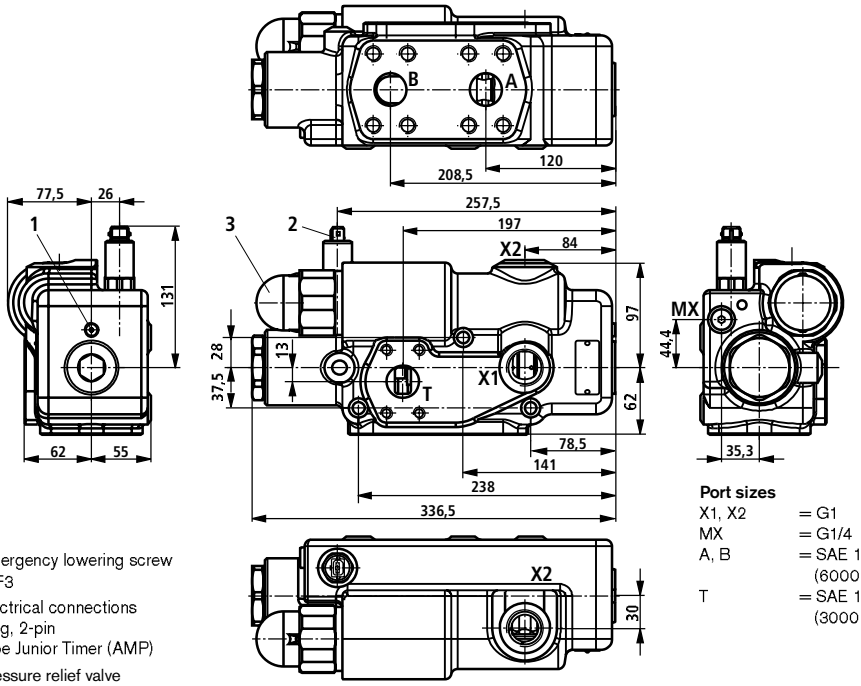
General			
Installation			Optional
Ambient temperature range		°C	– 20 … + 80
Weight		kg	27.5
Hydraulic			
Operating pressure	Ports A, B	bar	420
	Port X	bar	350
	Port T	bar	30
Max. nominal flow	Ports A, X	L/min	300
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524; Other pressure fluids on request!
Pressure fluid temperature range		°C	– 20 … + 80
Viscosity range		mm^2/s	10 … 380
Degree of contamination (max. permissible)			ISO 4406 (c) class 20/18/15
Electrical			
Control voltage		V	24
Power consumption (solenoid)		W	14.4

Characteristic curves (measured with HLP68, $\vartheta_{oil} = 40\ °C \pm 5\ °C$)





Unit dimensions (in mm)



1 Emergency lowering screw A/F3

2 Electrical connections
Plug, 2-pin
Type Junior Timer (AMP)

3 Pressure relief valve

Port sizes

X1, X2	= G1
MX	= G1/4
A, B	= SAE 1 1/4 (6000 PSI)
T	= SAE 1 1/4 (3000 PSI)

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Rexroth
Bosch Group

Multi-way directional valves (hydraulic switches) MH.W...AG

RE 64638/02.07 1/8
replaces: 01.06

Data sheet

Sizes 6, 20 and 30
Component series 2X
Operating pressure max. 350 bar

3

Content analysis

Caracteristics

- Direct or pilot operated
- 2 types of actuator (hydraulic and electrical)
- With spring return

Function

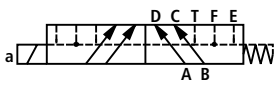
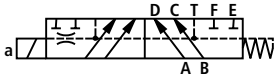
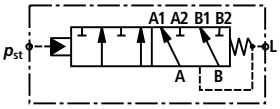
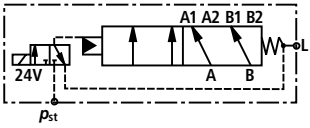
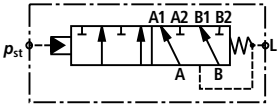
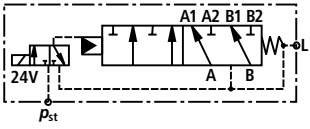
The 6/2-way valves are hydraulically or electrically actuated directional spool valves.

They control the starting, stopping and direction of a flow.

In general, these valves are used as an extension to a mobile control block instead of fitting an extra section. The following overview table shows the models available.

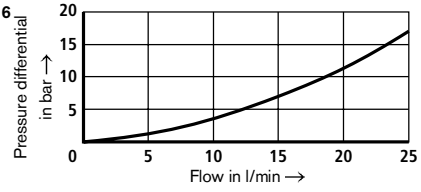
Deviating variants on request.

Overview table of available models

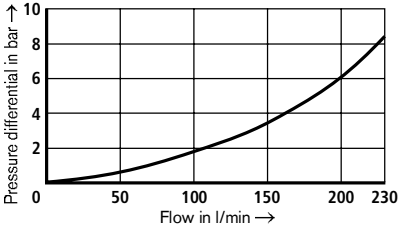
Size	Material No.	Type	Symbol	Actuation/voltage switching pressure $p_{pilot\ min}$ pilot pressure $p_{pilot\ max}$
6	R901058030	MH7WE 06 AG2X/EG24N9M01		direct actuated, electrical 24 V =
	R901058029	MH7WE 06 AG2X/EG12N9M01		direct actuated, electrical 12 V =
	R901058035	MH6WE 06 AG2X/LEG24N9M01		direct actuated, electrical 24 V =
	R901058036	MH6WE 06 AG2X/LEG12N9M01		direct actuated, electrical 12 V =
20	R901094340	MH6WH 22 AG2X/003V01		hydraulic, with spring return $p_{pilot\ min}$ = 4.5 bar $p_{pilot\ max}$ = 30 bar
	R901094341	MH6WW 22 AG2X/030L2G24C4V11		pilot operated, electrical 24 V = $p_{pilot\ min}$ = 3.5 bar $p_{pilot\ max}$ = 30 bar
	R901094342	MH6WW 22 AG2X/030L2G24C4V01		
	R901094343	MH6WW 22 AG2X/030L2G12C4V11		
	R901094344	MH6WW 22 AG2X/030L2G12C4V01		
30	R901061669	MH6WH 32 AG2X/003M11		hydraulic, with spring return $p_{pilot\ min}$ = 4.5 bar $p_{pilot\ max}$ = 30 bar
	R901061670	MH6WW 32 AG2X/L4AG24C4M11		pilot operated, electrical 24 V = $p_{pilot\ min}$ = 3.5 bar $p_{pilot\ max}$ = 30 bar

Δp-q_V-curves (measured at $\nu = 41$ mm²/s and $\vartheta = 50$ °C)

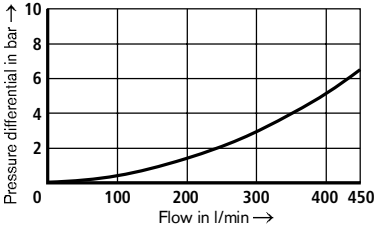
Size 6



Size 20



Size 30



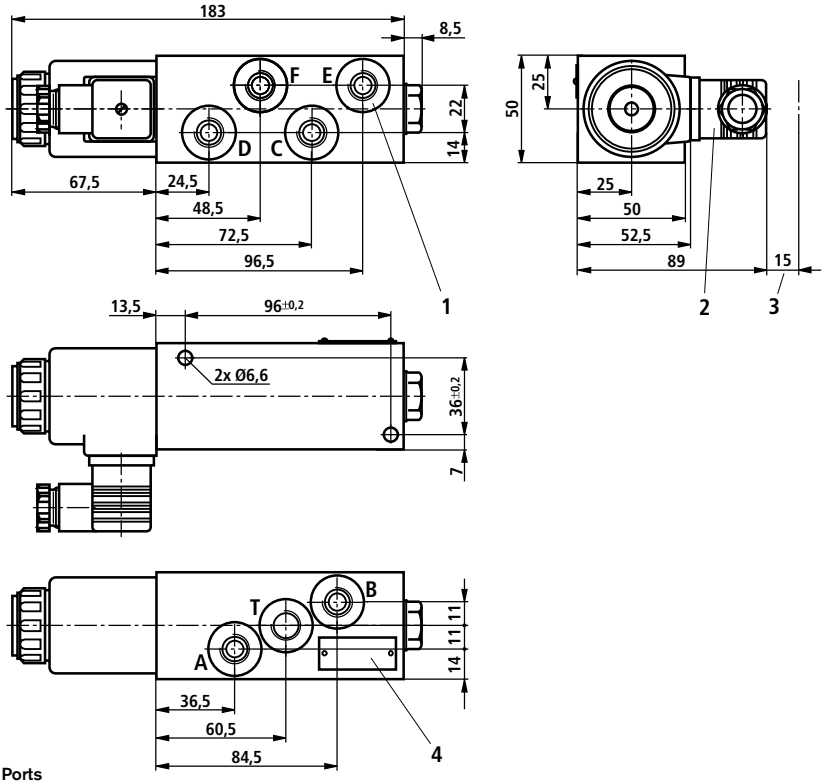
Unit dimensions: size 6 (Dimensions in mm)

Type MH7WE 06 AG2X/EG..N9M01

Material-No. **R901058030** (24 V =)
R901058029 (12 V =)

Type MH6WE 06 AG2X/LEG..N9M01

Material-No. **R901058035** (24 V =)
R901058036 (12 V =)



1 **Ports**
A, B, C, D, E, F and T
= G 1/4 to ISO 228/1

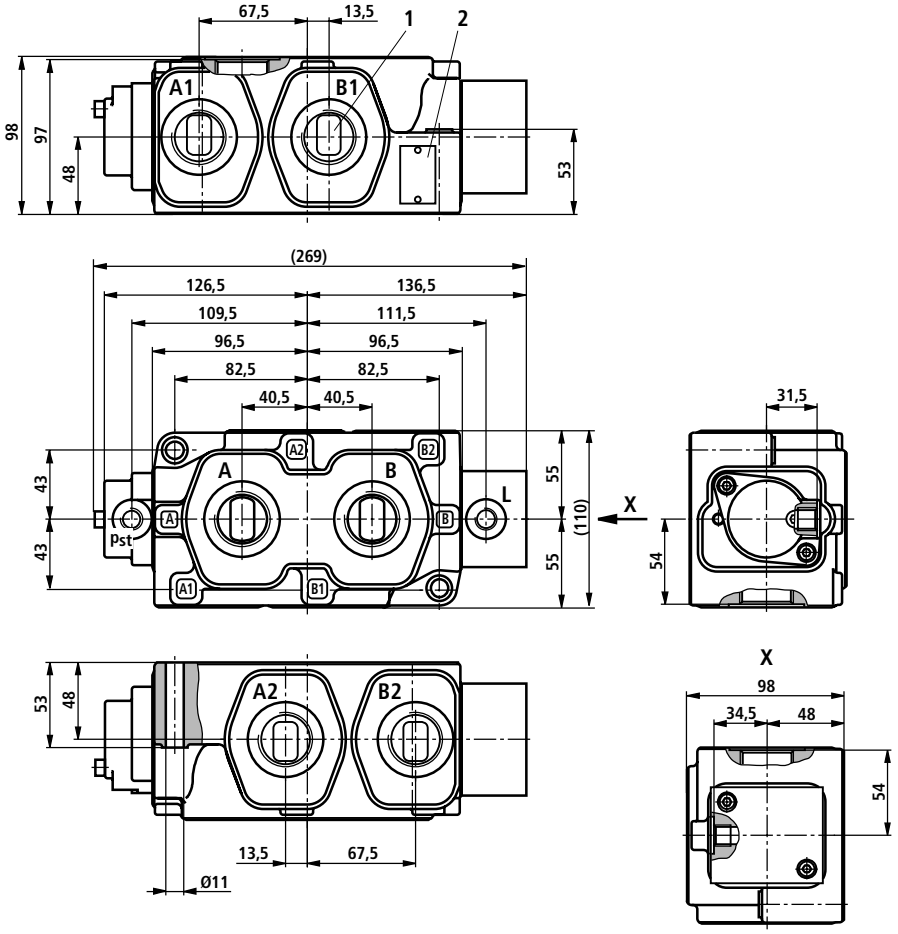
2 Plug-in connector

3 Space required to remove plug-in connector

4 Nameplate

Unit dimensions: size 20 (Dimensions in mm)

Type MH6WH 22 AG2X/003V01
Material-No. **R901094340**



1 **Ports**
A, A1, A2, B, B1 and B2
= G 1 to ISO 228/1
p_{pilot} and L = G 1/4 to ISO 228/1

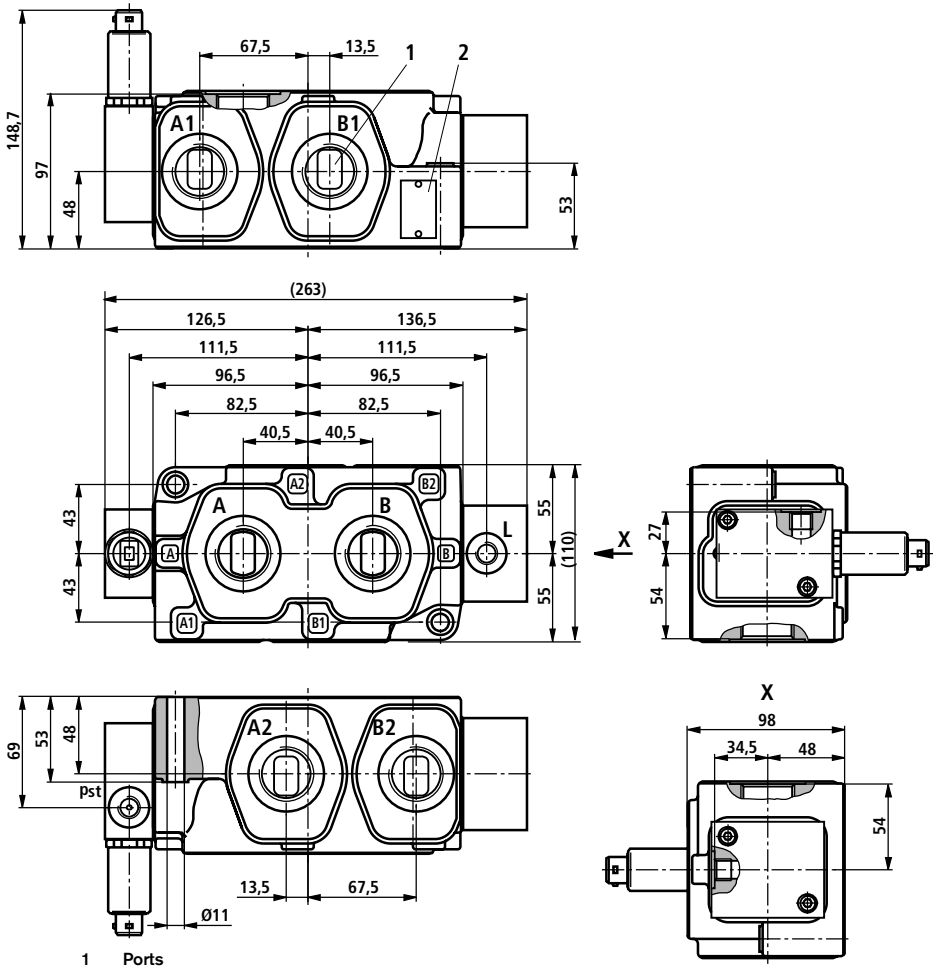
2 Nameplate

Unit dimensions: size 20 (Dimensions in mm)

Type MH6WW 22 AG2X/030L2G $\frac{12}{24}$ C4V01

Material-No. **R901094342** (24V =)

Material-No. **R901094344** (12V =)



1 **Ports**
A, A1, A2, B, B1 and B2
= G 1 to ISO 228/1
p_{pilot} and L = G 1/4 to ISO 228/1

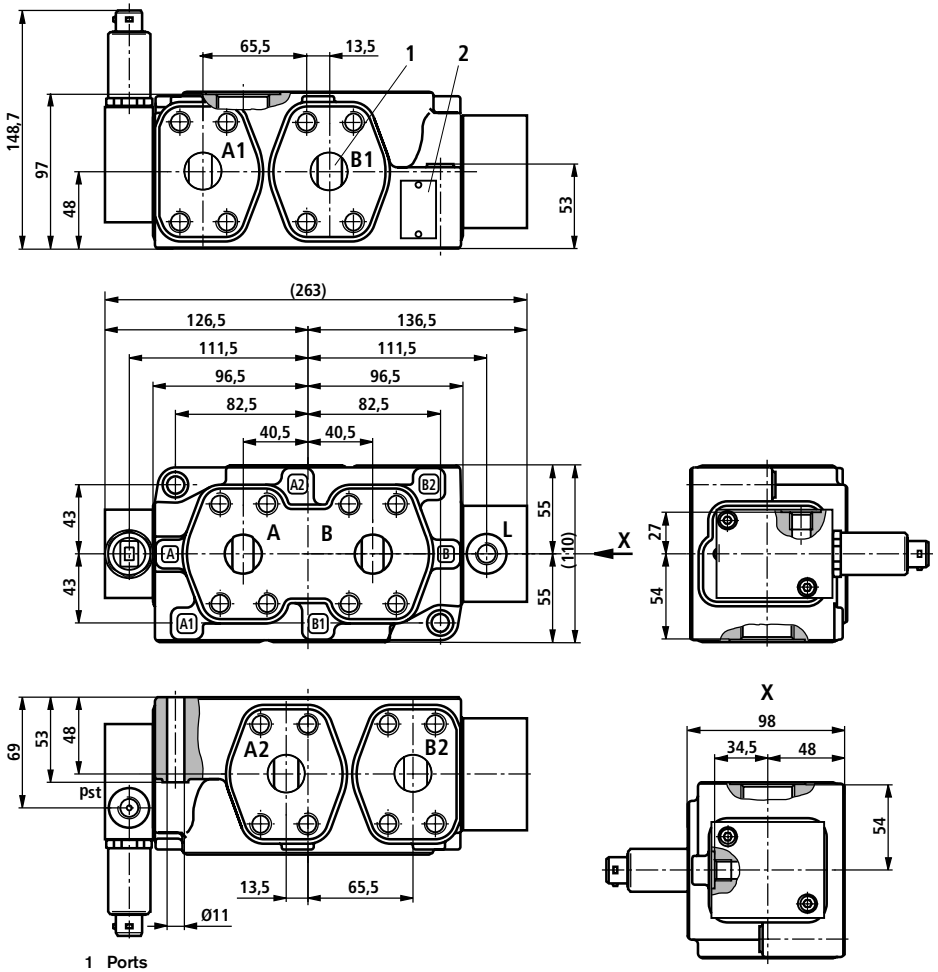
2 Nameplate

Unit dimensions: size 20 (Dimensions in mm)

Typ MH6WW 22 AG2X/030L2G$\frac{12}{24}$C4V11

Material-Nr. **R901094341** (24V =)

Material-Nr. **R901094343** (12V =)



1 Ports

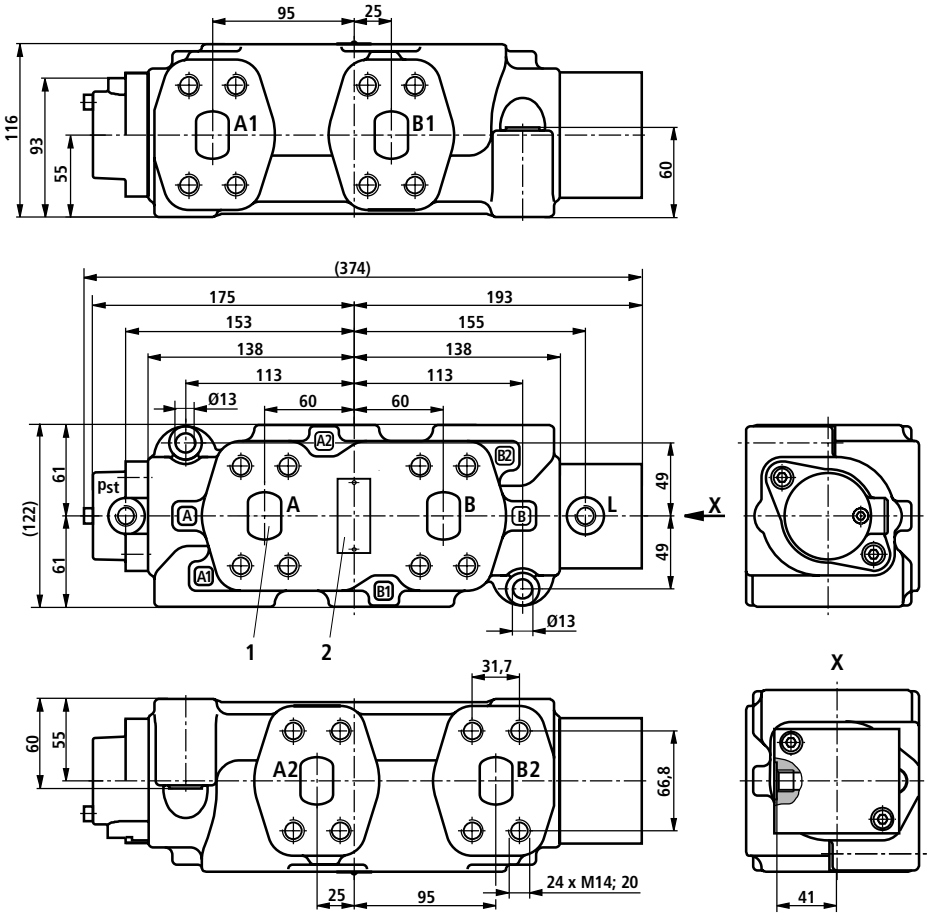
A, A1, A2, B, B1 und B2
= SAE 1 to J518 (6000 PSI)

p_{St} and L = G 1/4 to ISO 228/1

2 Nameplate

Unit dimensions: size 30 (Dimensions in mm)

Type MH6WH 32 AG2X/003M11
Material-No. **R901061669**



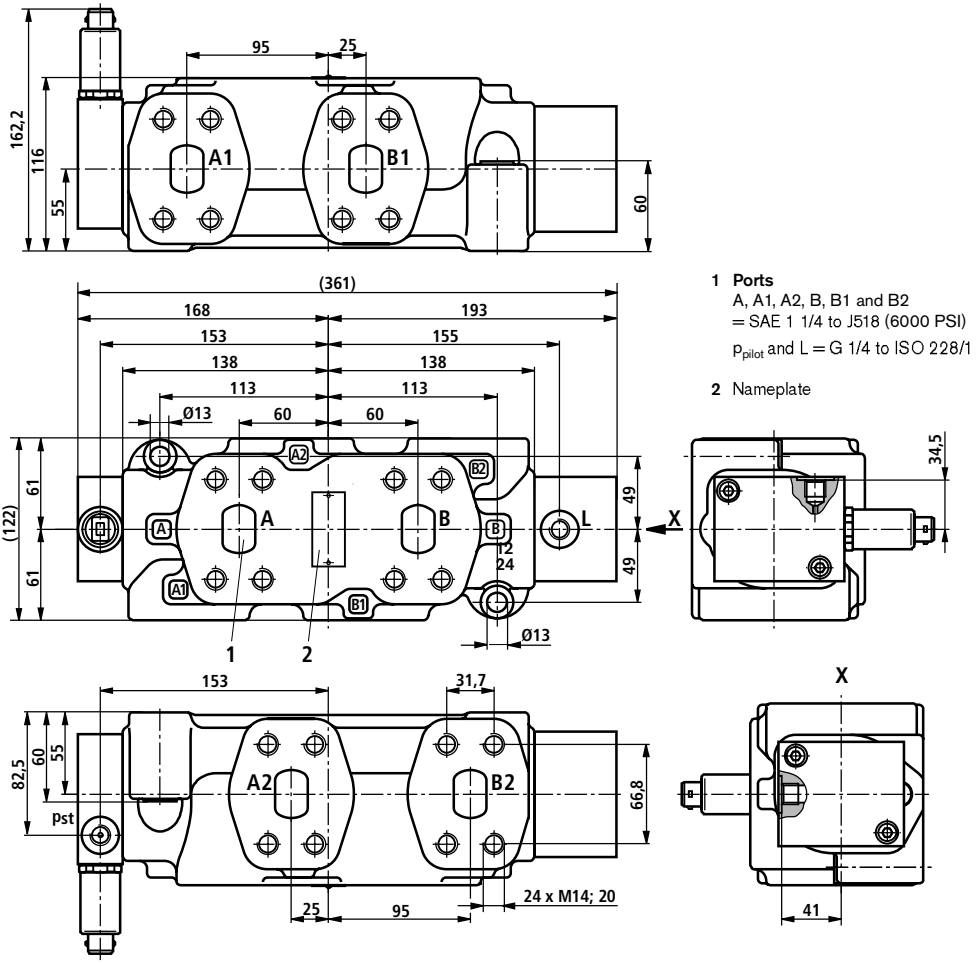
1 **Ports**
A, A1, A2, B, B1 and B2
= SAE 1 1/4 to J518 (6000 PSI)
p_{pilot} and L = G 1/4 to ISO 228/1

2 Nameplate

Unit dimensions: size 30 (Dimensions in mm)

Type MH6WW 32 AG2X/L4AG24C4M11

Material-No. **R901061670**



1 **Ports**
A, A1, A2, B, B1 and B2
= SAE 1 1/4 to J518 (6000 PSI)
p_{pilot} and L = G 1/4 to ISO 228/1

2 Nameplate

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Rexroth
Bosch Group

Pressure relief valves

RE 25 860/11.11 1/12
Replaces:
RE 25 860/10.10
Pressure relief valves

0 532 ...
R 917 ...

Valves for line connections

Valves for block installation

p_{max} = 350 bar
Q_{max} = 120 l/min

3

Contents

Features

- Type of connection for pipeline installation and block installation
- Adjustment methods such as hand wheel, lead-seal capable, fixed, hand wheel with scale (with and without lock)

Application

In conveying and handling equipment, agricultural engineering, in municipal-vehicles and in general mechanical engineering.

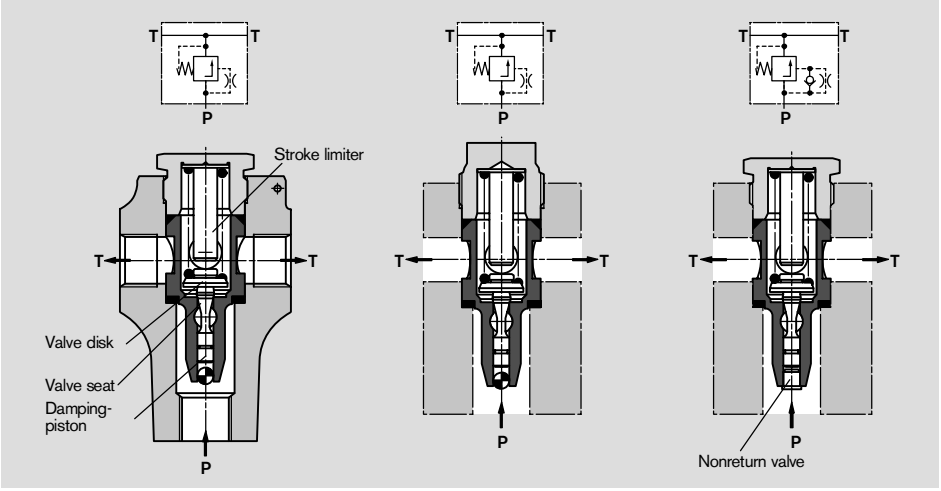
Note

The versions “Safety valves TÜV German Technical Inspection Agency model approved” in accordance with the Pressure Equipment Directive 97/23/EG are used to safeguard hydraulic accumulators, see technical data sheet RDEF 50 153.

Function

This model series is based on a valve in seat design with damping piston. The punched valve seat serves to ensure high density, the damping piston prevents any valve vibration. It produces a flat control characteristic, i.e., even at an increasing flow rate the set opening pressure is for the most part maintained. This is achieved by the effect of the flow forces on the valve disk, whereby the valve continues to open as the flow rate increases.

Versatile version variants are available:
- Housing for pipeline installation with and without measuring connection.
- Valve cartridges for block installation.
- Various adjustment methods such as hand wheel, lead-seal capable, fixed, hand wheel with scale (with and without lock).
- Check valve before damping piston for fast response times.

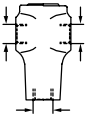


Technical data

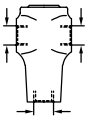
Design	Seat valve with damping
Line connections	for pipeline installation and block installation
Installation position	Optional
Ambient temperature	–30...+80 °C
Pressure medium	Hydraulic oils based on mineral oil acc. to DIN/ISO, other, e.g. environmentally-compatible fluids available on request
Viscosity	10...800 mm^2/s permissible range 20...100 mm^2/s recommended range ...2000 mm^2/s for start permissible range
Pressure medium temperature	–30 °C...+80 °C with NBR sealings, NBR = Perbunan® –15 °C...+120 °C with FKM sealings, FKM = Viton®
Filtration	Oil contamination Class 19/16 in accordance with ISO/DIS 4406, or Class 10 in accordance with NAS 1638 to be achieved using filter $\beta_{25} = 75$
Direction of flow rate	shown by symbol or marking
Operating pressure For line installation	P: max. permissible 350 bar, depending on number of load changes and temperature. Counter values on request. T: max. permissible 210 bar (NBR) or 80 bar (FKM), depending on number of load changes and temperature. Counter values on request.
For block installation	P: In accordance with set pressure. T: NBR max. 210 bar, FM max. 80 bar
MTTFd:	max. 150 years, PRV with set value > 210 bar: B10 value on request
Cracking pressure (tolerance p_{nom} +5 %)	Set at flow 0.1 l/min
Leakage oil flow	Max. 1 cm^3/min
Flow	Max. 120 l/min, depending on set pressure and line Ø, see chapter “Characteristics”

Pressure relief valves for line installation



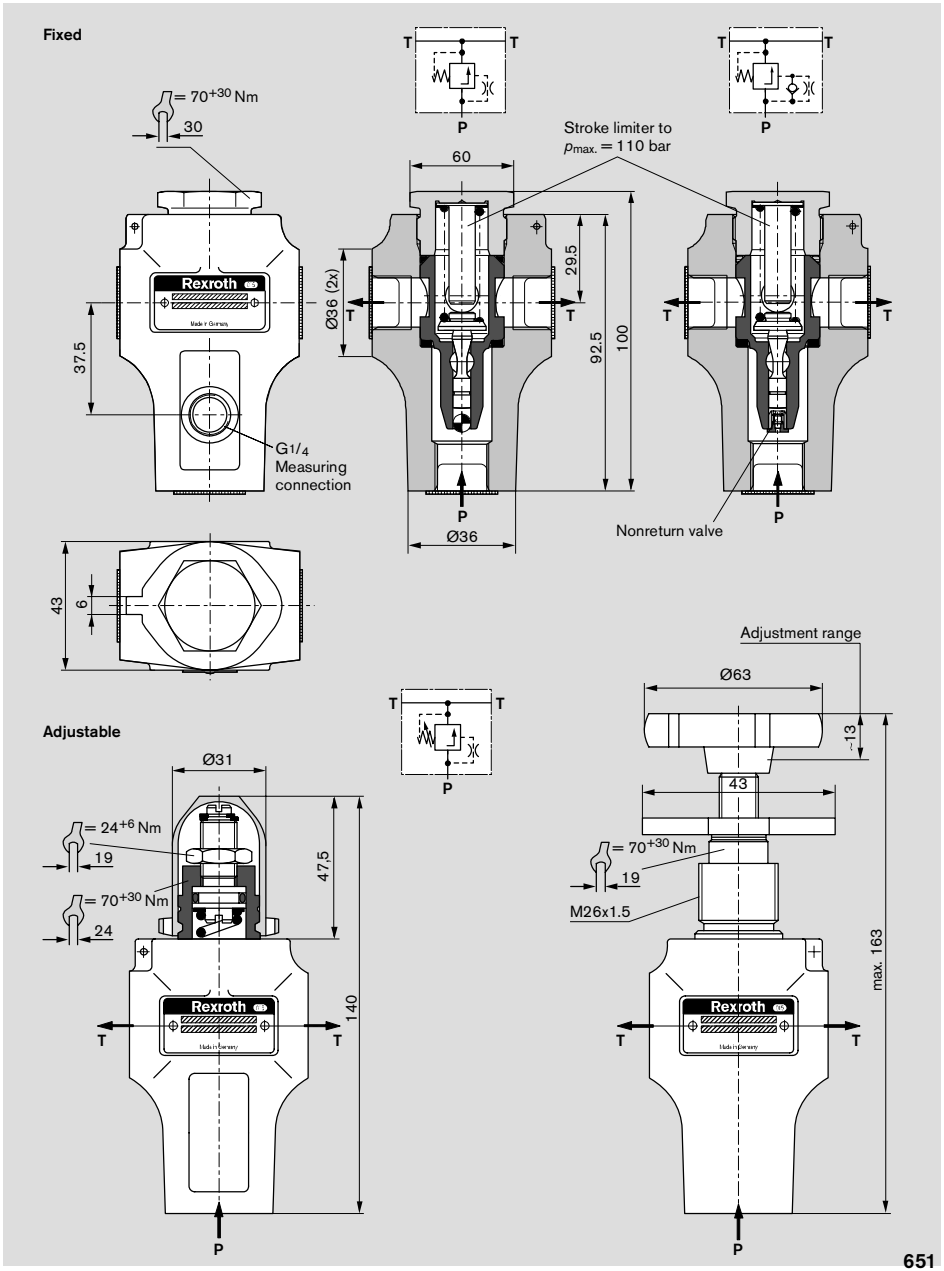

Threaded port	Version		Seals	Set pressure* [bar]	Weight [kg]	Material No.
M 18 x 1,5 	Fixed		NBR	10	0.9	0 532 001 031
			FKM	10		0 532 001 115
			NBR	12		0 532 001 156
				15		0 532 001 004
				20		0 532 001 012
				25		0 532 001 011
				30		0 532 001 014
				40		0 532 001 027
				50		0 532 001 020
				60		0 532 001 018
				70		0 532 001 005
				80		0 532 001 006
				90		0 532 001 026
				100		0 532 001 007
				110		0 532 001 024
				140		0 532 001 008
				140		R 917 002 956**
				150		R 917 002 975**
				150		0 532 001 009
				170		0 532 001 028
				180		0 532 001 022
				190		0 532 001 021
				200		0 532 001 023
				210		0 532 001 013
				210		0 532 001 154
	Fixed, with nonreturn valve			210		R 917 002 960**
	Fixed			230		0 532 001 019
				250		0 532 001 016
				300		0 532 001 030

NBR = Perbunan®, FKM = Viton®
* p_{nom} +5 % at Q = 0.1 l/min, with back flow unloaded
** Pressure relief valve zinc-plated and transparent-passivated, special options upon request

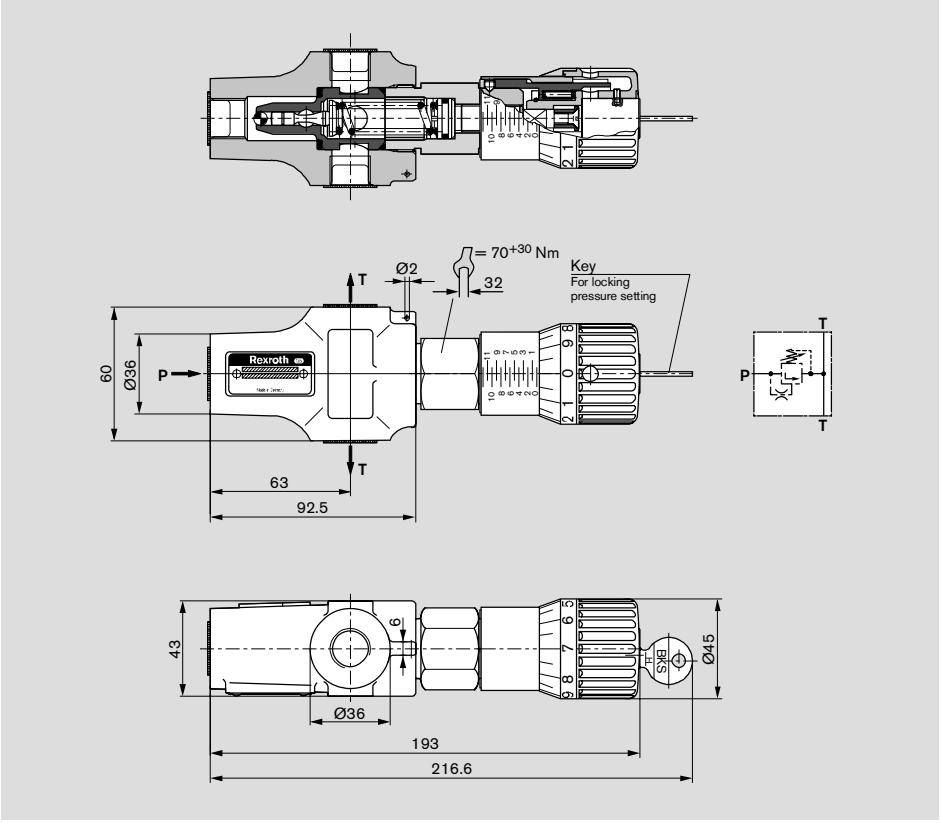
Threaded port	Version		Seals	Set pressure* [bar]	Weight [kg]	Material No.
$G^1/_2$ ISO 228	Fixed, with nonreturn valve		NBR	320	0.9	0 532 001 131
M 18 x 1.5 	Adjustable		NBR	10...15	1.0	0 532 002 010
				15...50		R 917 002 939**
				15...50		0 532 002 005
				7...67		0 532 002 052
				40...100		R 917 002 936**
				40...100		0 532 002 003
				50...300		R 917 002 938**
				50...300		0 532 002 007
			FKM	50...300		0 532 002 020
			NBR	50...350		0 532 002 064
				70...180		R 917 002 937**
				70...180		0 532 002 001
				100...250		0 532 002 004
$G^1/_2$ ISO 228			NBR	100...250		R 917 002 932**
				50...300		0 532 002 044
$G^1/_2$ ISO 228	Fixed, with nonreturn valve			50...350		0 532 002 059
M 18 x 1.5	Adjustable, long adjusting shaft		NBR	1...10	1.2	0 532 003 014
	Adjustable			1...35		0 532 003 035
				15...80		0 532 003 016
				15...150		0 532 003 001
				30...200		0 532 003 003
				30...200		R 917 005 060**
				50...250		0 532 003 002
				50...300		0 532 003 009
$G^1/_2$ ISO 228				50...300		0 532 003 034
M 18 x 1.5	Adjustable			0...250	1.2	0 532 008 002

NBR = Perbunan®, FKM = Viton®
* p_{nom} +5 % at Q = 0.1 l/min, with back flow unloaded
** Pressure relief valve zinc-plated and transparent-passivated, special options upon request

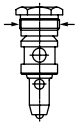
Device dimensions



Device dimensions (Continued)

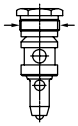
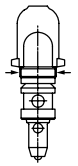
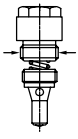


Pressure relief valves for block installation

Threaded port	Version		Seals	Set pressure* [bar]	Weight [kg]	Material No.
M 30 x 1.5	Fixed		FKM	5	0.2	0 532 001 148
	Fixed, with nonreturn valve		NBR	6		0 532 001 171
	Fixed			12		0 532 001 060
				15		0 532 001 055
				25		0 532 001 039
				30		0 532 001 113
				50		0 532 001 059
				60		0 532 001 142
				70		0 532 001 127
				80		0 532 001 032
				90		0 532 001 036
				120		0 532 001 048
				130		0 532 001 057
				150		0 532 001 041
				160		0 532 001 029
				170		0 532 001 147
				170		0 532 001 040
				180		0 532 001 050
				190		0 532 001 037
				200		0 532 001 052
			FKM	210		0 532 001 176
			NBR	220		0 532 001 058
	Fixed, with nonreturn valve		HNBR	230		R 917 006 555
	Fixed		NBR	250		0 532 001 051
				260		0 532 001 167
				280		0 532 001 061
			FKM	280		0 532 001 172
			NBR	300		0 532 001 043
	Fixed, with nonreturn valve			320		0 532 001 145
				330		0 532 001 173

NBR = Perbunan®, FKM = Viton®, HNBR = Therban®

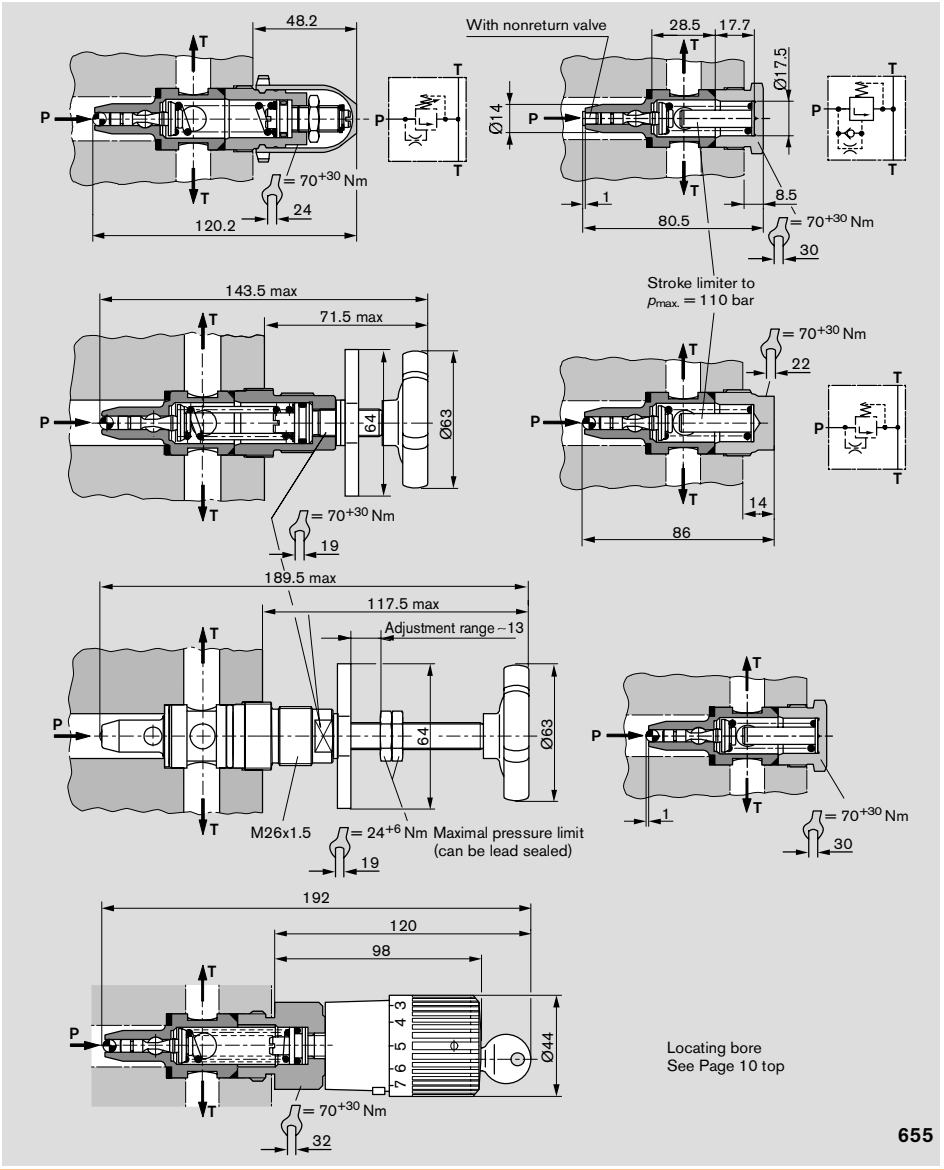
* p_{nom} +5 % at Q = 0.1 l/min, with back flow unloaded

Threaded port	Version		Seals	Set pressure* [bar]	Weight [kg]	Material No.
M 30 x 1.5 	Fixed		NBR	185	0.2	0 532 001 170
				350		0 532 001 139
M 30 x 1.5 	Adjustable		NBR	1 ...10	0.3	0 532 002 068
	Adj., return loadable up to 330 bar			1 ...15		0 532 002 048
	Adjustable, preset to 35^{+2} bar		FKM	5...35		0 532 002 065
	Adjustable		NBR	5...35		0 532 002 062
				7...67		0 532 002 042
				10...15		0 532 002 011
				15...50		0 532 002 012
				40...100		0 532 002 015
	Adjustable, with nonreturn valve			40...200		0 532 002 051
	Adjustable			50...300		0 532 002 014
	Adjustable, with nonreturn valve			50...350		0 532 002 050
	Adjustable		FKM	50...350		0 532 002 046
	Adjustable, with nonreturn valve		NBR	50...380		0 532 002 058
	Adjustable			70...180		0 532 002 002
			FKM	70...180		0 532 002 016
	Adjustable, preset to 190^{+10} bar		NBR	100...250		0 532 002 013
	Adjustable		FKM	100...250		0 532 002 019
				100...320		0 532 002 041
M 30 x 1.5	Adjustable, long adjusting shaft		NBR	1 ...10	0.4	0 532 003 012
	Adjustable			1 ...35		0 532 003 037
				15...150		0 532 003 011
				40...280		0 532 003 033
M 30 x 1.5	Adjustable		NBR	50...315	0.5	0 532 008 001
M 26 x 1.5 	Fixed, Valve carrier for screwing-in M 24 x 1.5 See device dimensions Page 10 bottom		NBR	30	0.2	0 532 001 813
				40		0 532 001 806
				110		0 532 001 812
				175		0 532 001 805
				200		0 532 001 804

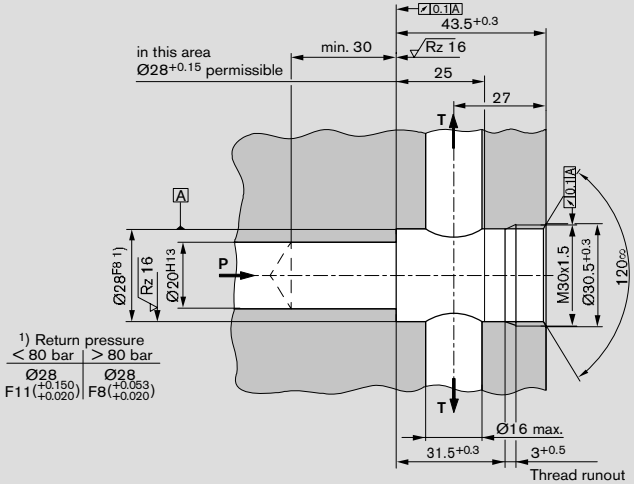
NBR = Perbunan®, FKM = Viton®
* p_{nom} +5 % at Q = 0.1 l/min, with back flow unloaded

Device dimensions

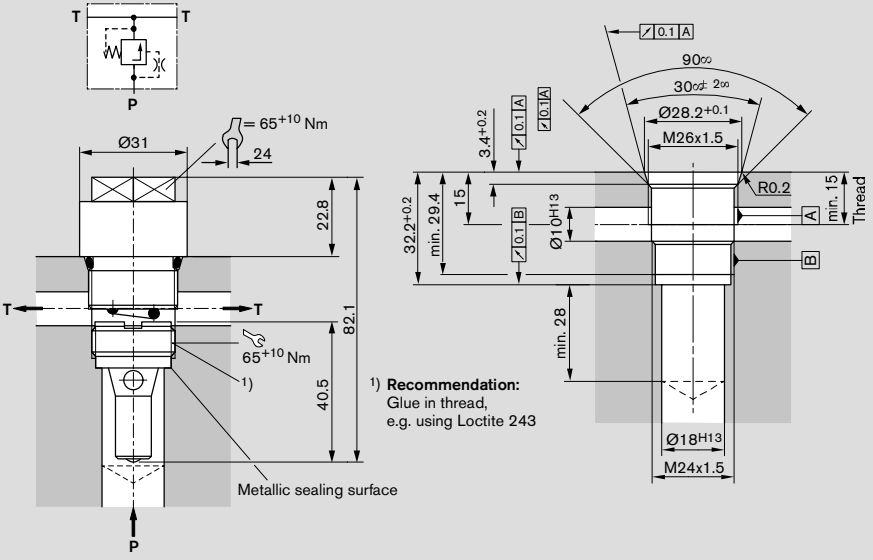
All sealing rings included loose



Device dimensions



Valve carrier for screwing-in

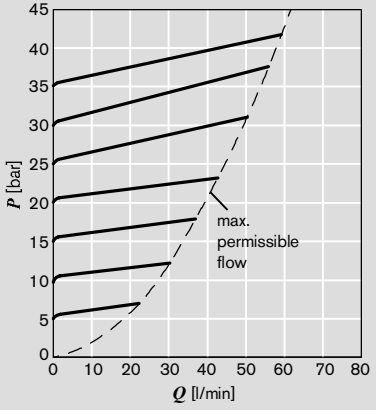


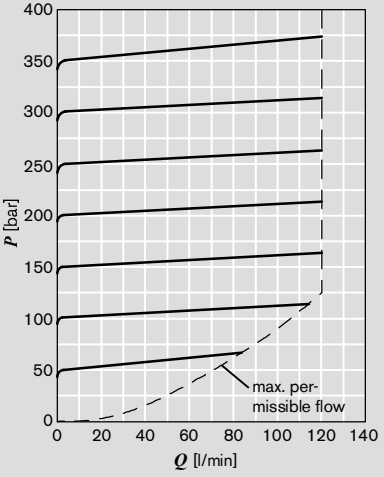
This pressure relief valve for block installation with M26 x 1.5 internal thread is designed for particularly small installation areas. The hydraulic parameters are identical with those for M30 x 1.5 internal thread. The exact pressure setting must ultimately be made by the customer.

Curves

ν 35 mm²/s, $T = 50$ °C
Exceeding the boundaries of application will cause a disproportionate increase in pressure, and even to the functional limit of the PRV.

For lower setting limits





3

Further notes

Special models for line installation with fatigue strength up to 350 bar on request.

For proper use, please observe the following additional data sheets:
– Hydraulic valves for mobile applications: general information RE 64 020-B1
– Pressure relief valves: product-specific instructions RE 25 860-B2
– Pressure relief valves: repair instructions RDE 25 860-R

Information regarding the correct handling of Bosch Rexroth hydraulic products is available in our publication:
“General Product Information for Hydraulic Products” RE 07 008.

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Flow control valves

RE 27 574/04.05 1/8
Replaces:
1 987 760 704/10.97
Flow control valves

0 533 10. . . .
VT1, VH1, VH4, VHR4

Flow divider, dual acting

3-way flow control valves, fixed

3-way flow control valves, adjustable

3

Contents

Features

– Type of connection for pipeline installation
– Adjustment methods such as fixed and adjustable

Application

In conveying and handling equipment, agricultural engineering, municipal-vehicles and in general mechanical engineering.

Flow divider valve, dual acting

Function

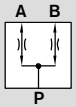
The flow divider valve is dual acting, i.e., the oil flow can be split up; however 2 oil flows can also be joined together. When dividing the flow an oil flow P is always divided into equal oil flows A and B, irrespective of pressure differences in A and B.

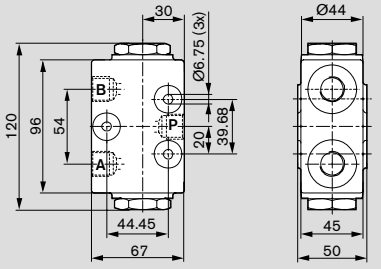
If the direction of flow is inverted, the oil flows A and B are always joined together in an equal ratio to form an oil flow P, irrespective of pressure differences in A and B.
A typical application for the flow divider valve is the synchronization of 2 cylinders with differing cylinder loads.

Technical data

Design	dual acting
Line connections	for pipeline installation
Installation position	Horizontal
Ambient temperature	–30...+60 °C
Pressure medium	Mineral-based hydraulic oils in accordance with DIN/ISO, other, e.g. environmentally-compatible fluids available on request
Viscosity	10...800 mm^2/s permissible range 20...100 mm^2/s recommended range 20...2000 mm^2/s for start permissible range
Pressure medium temperature	–20...+80 °C
Filtration	Oil contamination Class 19/16 in accordance with ISO/DIS 4406, or Class 10 in accordance with NAS 1638 to be achieved using filter $\beta_{25} = 75$
Direction of flow rate	shown by symbol or marking
Operating pressure	Max. 310 bar
Flow rate max.	See table below
Dividing ratio	1:1

Device dimensions





Type	Q_P [l/min.] min.	max.	p_{max} [bar]	P	A	B	Material number
VT1/10	6	10	310	M18x1.5	M18x1.5	M18x1.5	0 533 108 003
VT1/20	8	20	310	M18x1.5	M18x1.5	M18x1.5	0 533 108 005
VT1/30	16	30	310	M22x1.5	M18x1.5	M18x1.5	0 533 108 006
VT1/40	25	40	310	M22x1.5	M18x1.5	M18x1.5	0 533 108 007
VT1/50	35	50	310	M27x1.5	M22x1.5	M22x1.5	0 533 108 008
VT1/60	45	60	310	M27x2	M22x1.5	M22x1.5	0 533 108 004
VT1/70	55	70	310	M27x2	M22x1.5	M22x1.5	0 533 108 009

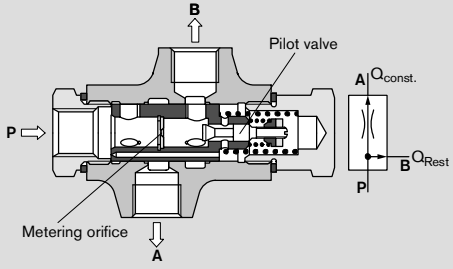
3-way flow control valve, fixed

Function

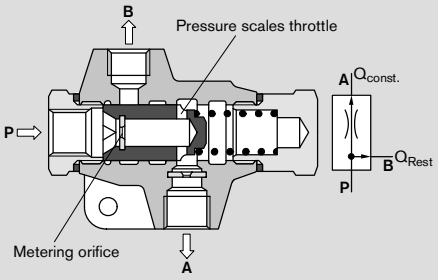
3-way flow control valves split up a delivered oil flow P into a regulated constant flow A and a residual flow B. The regulated oil flow A remains practically constant irrespective of any pressure changes in A or B. The residual flow can then be sent to the tank or drive a secondary system. For applications in vehicles the constant flow is used, e.g. for steering.

Directly actuated valves have a faster response for the pressure scale. The oil flow A is less constant as load pressure increases (see curve).
Pilot operated valves respond less sensitively to changes in load pressure.
Their response characteristic is dampened.

Valve, pilot controlled, VH1

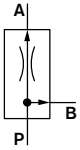
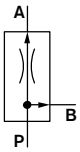


Valve, directly actuated, VH4



Technical data

Design	3-way flow control valves, fixed	
Line connections	for pipeline installation	
Installation position	Optional	
Ambient temperature	–25...+50 °C	
Pressure medium	Mineral-based hydraulic oils in accordance with DIN/ISO, other, e.g. environmentally-compatible fluids available on request	
Viscosity	10...800 mm^2/s permissible range 20...100 mm^2/s recommended range 20...2000 mm^2/s for start permissible range	
Pressure medium temperature	–25...+80 °C	
Filtration	Oil contamination Class 19/16 in accordance with ISO/DIS 4406, or Class 10 in accordance with NAS 1638 to be achieved using filter $\beta_{25} = 75$	
Direction of flow rate	shown by symbol or marking	
Operating pressure	Max. 210 bar	
Max. flow, type Q_P l/min directly actuated Q_A l/min pilot controlle Q_A l/min	VH1 55 – 30	VH4 55 30 –
Max. pressure difference	Δp (A → B) = 150 bar	
Minimimu pressure drop	Directly actuated: 6 bar, pilot controlled: 12 bar	

Type		$Q_{const.}$ [l/min]	Pilot controlled	Direct	Ø mm * M	Ø mm * D	kg	Material number
VH 1/2/1		2	•		1.2	–	0.9	0 533 103 028
VH 1/3/4		3	•		1.5	–		0 533 103 007
VH 1/6/1		6	•		2	–		0 533 103 001
VH 1/9/1		9	•		3	–		0 533 103 046
VH 1/12/2		12	•		3	–		0 533 103 002
VH 1/19/3		19	•		3.5	–		0 533 103 051
VH 4/0.75/1		0.75		•	1.0	–	0.9	0 533 103 023
VH 4/1 .5/1		1.5		•	1.2	–		0 533 103 033
VH 4/2/1		2		•	1.5	1.0		0 533 103 034
VH 4/3/1		3		•	2	1.5		0 533 103 024
VH 4/4.5/1		4.5		•	2.5	2.5		0 533 103 039
VH 4/6/...		6		•	2.5	2.5		0 533 103 048
VH 4/6/1		6		•	3	2.5		0 533 103 015
VH 4/7.5/A1		7.5			3.3	2.8		0 533 103 056
VH 4/7.5/1		7.5		•	3.3	2.8		0 533 103 029
VH 4/9/1		9		•	3.5	3.0		0 533 103 019
VH 4/11/18		11		•	4	3.5		0 533 103 054
VH 4/12/1		12		•	4	3.5		0 533 103 021
VH 4/15/1		15		•	4.5	3.5		0 533 103 018
VH 4/17/1		17		•	5	4.5		0 533 103 026
VH 4/20/1		20		•	6	5.5		0 533 103 030
VH 4/23/2		23		•	5.3	–		0 533 103 031
VH 4/1 .5/1		1.5		•	1.3	1.5		0 533 103 057

Valve, pilot controlled
Pressure scale response dampened. Flow more constant for rising load pressure.
Valve, directly actuated
Fast pressure scale response. Flow less constant for rising load pressure.

* M: Ø mm metering bore
D: Ø mm damping bore

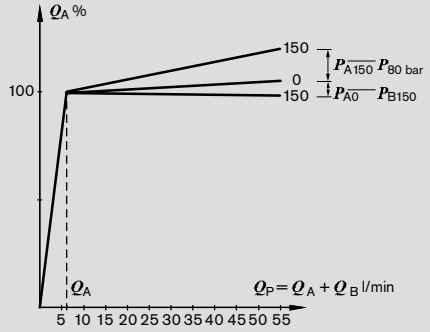
Curves

υ 35 mm²/s

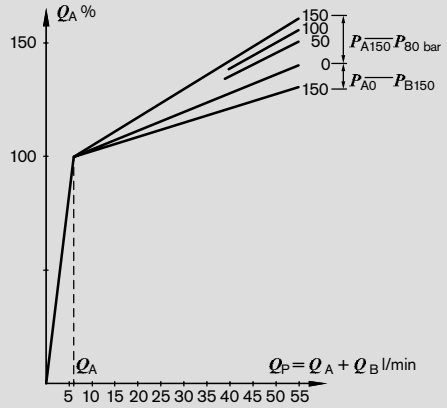
The diagrams display the typical changes in the constant flow Q_A depending on the pressure difference in A and B as well as depending on the total flow Q_P.
The transfer for other constant flow variables is done as follows:

Ascertain the co-ordinate point from Q_P = desired constant flow Q_A and ordinate Q_A = 100 % and draw straight lines from it to the end points of the appropriate diagram above Q_P = 55 or 110 l/min.

VH 1 pilot controlled

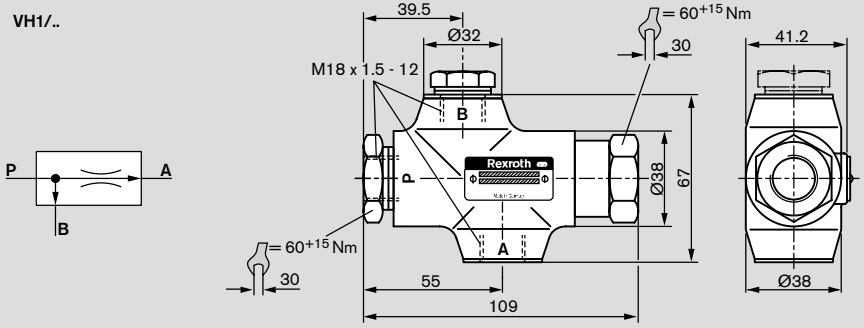


VH 4 directly actuated

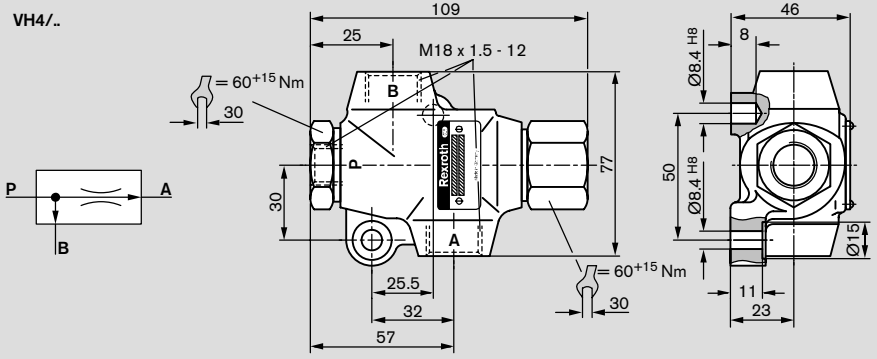


Device dimensions

VH1/..



VH4/..

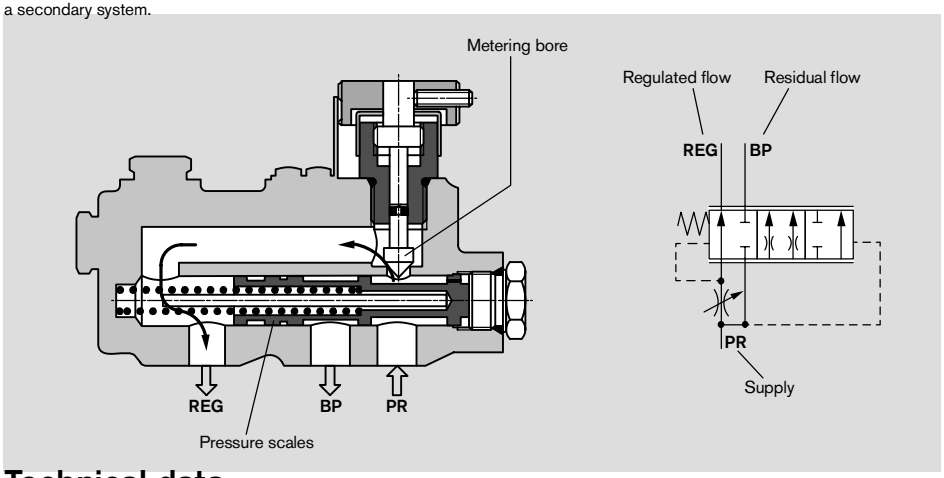


3

3-way flow control valve, adjustable

Function

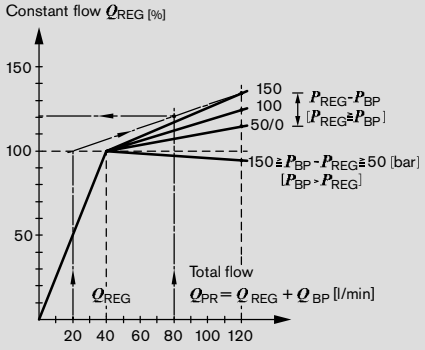
3-way flow control valves in this model series split up a delivered oil flow Q_{PR} into a regulated constant flow Q_{REG} and a residual flow Q_{BP}.
The regulated oil flow Q_{REG} remains for the most part constant irrespective of any changes in pressure in REG or BP.
The residual flow can then be sent to the tank or drive a secondary system.

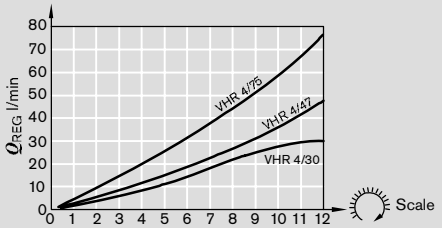


Technical data

Design	3-way flow control valves, adjustable
Line connections	for pipeline installation
Installation position	Optional
Ambient temperature	–25...+50 °C
Pressure medium	Mineral-based hydraulic oils in accordance with DIN/ISO, other, e.g. environmentally-compatible fluids available on request
Viscosity	10...800 mm^2/s permissible range 20...100 mm^2/s recommended range 20...2000 mm^2/s for start permissible range
Pressure medium temperature	–25...+80 °C
Filtration	Oil contamination Class 19/16 in accordance with ISO/DIS 4406, or Class 10 in accordance with NAS 1638 to be achieved using filter $\beta_{25} = 75$
Direction of flow rate	shown by symbol or marking
Operating pressure	Max. 250 bar
Flow, regulated	1...30, 1...47, 1...75 l/min
Minimum pressure drop	3...6 bar
Max. flow	Total flow $Q_{PR} = 114$ l/min Constant flow Q_{REG} see curve

Curves



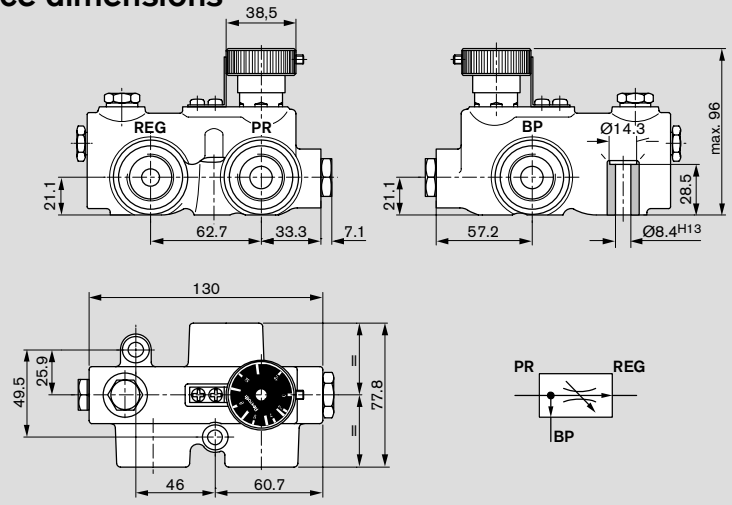


The diagram shows the typical change in constant flow, irrespective of any pressure difference between P_{REG} and P_{BP} as well as the total flow Q_{PR}.
The diagram is adapted to other constant flow variables as follows:
Select the desired constant flow on the abscissa, and go vertically up until the 100% line is reached.
From this coordinate, draw straight lines to the end points for $Q_{PR} = 120$ l/min.

Example:
Constant flow.....$Q_{REG} = 20$ l/min
Total flow.....$Q_{PR} = 80$ l/min

Pressure difference between constant and residual flow $P_{REG} - P_{BP} = 150$ bar.
According to the diagram, the constant flow deviation deviates by 21 % from the set value.
This diagram was recorded for an oil viscosity of $\upsilon = 32$ mm²/s.

Device dimensions



Type		Q_{PR} [l/min]	Q_{REG} [l/min]		kg	Material number
VHR 4	PR REG BP	114	0.5...30	M22x1.5	2.1	0533103502
			0.5...47	M22x1.5		0533103500
			0.5...75	M27x2		0533103501

Information regarding the correct handling of Bosch Rexroth hydraulic products is available in our publication:
„General Product Information for Hydraulic Products“ RD 07008.

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Thermal pressure valve MHDBDT 06

RE 64309/06.06 1/4
Replaces: 06.02

Data sheet

Nominal size 6
Component series 2X
Maximum operating pressure 280 bar
Maximum flow 3 l/min


H/A4624/95

3

Overview of contents

Features

- Pressure adjustment, proportional to the temperature via a thermostat
- Low hysteresis
- Very good repeatability accuracy
- Choice of several temperature ranges
- Optional installation orientation
- Low weight
- Saves energy

Ordering details

MHDB	DT	06	G	0	–2X/		M		*

Pressure relief valve

Direkt operated via thermostat = **DT**

Nominal size 6 = **06**

Valve version
Housing = **G**

Adjustment
Not adjustable = **0**

Component series 20 to 29 = **2X**
(20 to 29: unchanged installation and connection dimensions)

Maximum DB pressure
210 bar = **210**
280 bar (for AA10VO control pump) = **280**

Further details in clear text

Port threads P and T
06 = Metric
19 = UNF

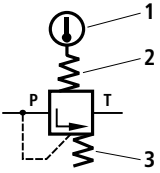
Seal material
M = NBR seals, suitable for mineral oil (HL, HLP) to DIN 51524

Nominal temperature at which control starts
T050 = 50 °C (control range 8 °C)
T060 = 60 °C (control range 8 °C)
T075 = 75 °C (control range 10 °C)
T082 = 82 °C (control range 10 °C)
T087 = 87 °C (control range 10 °C)

Function, symbol

The thermal pressure valve is a direct operated pressure relief valve of poppet seat design, where the nominal pressure is proportional to temperature within given limits.

The valve basically comprises of a housing, thermoelement (1), valve seat and valve cone. The maximum pressure is dependent on the selected version. The thermal element expands in relation to the temperature and thereby compresses the springs (2) and (3) via a spring plate. If the temperature at the thermoelement (1) is lower than the control range, then the spring decompresses (2) and the re-set spring (3) unloads the pressure chamber P to tank.



Technical data (for applications outside these parameters, please consult us!)

General

Weight	kg	0,8
Installation		Optional

Hydraulic

Max. operating pressure at port P	bar	315
Control pressure at port P	bar	210 or 280 (for AA10VO control pump)
Pressure at port T	bar	Zero pressure, separate line to tank
Max. flow	l/min	3
Pressure fluid		Mineral oil (HL, HLP) to DIN 51524; fast bio-degradable pressure fluids to VDMA 24568 (also see RE 90221); HETG (rape seed oil); HEPG (polyglycols); HEES (synthetic ester); Other pressure fluids on request
Pressure fluid temperature range	°C	–20 to +80
Viscosity range	mm^2/s	2,8 to 300
Degree of contamination		class 20/18/15. We therefore recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.
Max. hysteresis	°C	4
Repeatability accuracy	%	$< \pm 2$ % of p_{nom}

Installation notes:

MHDBDT 06 thermal pressure valves are **only** suitable for fluid circuits. The fluid to be measured should continually flow through the device once it is installed.

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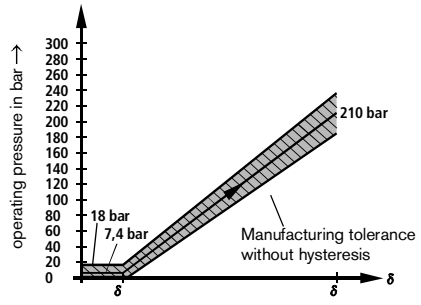
Characteristic curves (measured at $q_V = 2$ l/min and $\Delta\delta = 1$ °C/min)

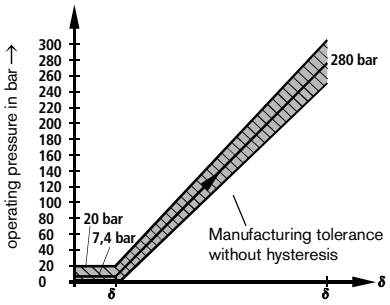
Pressure/temperature characteristic curves

$p_{nom} = 210$ bar

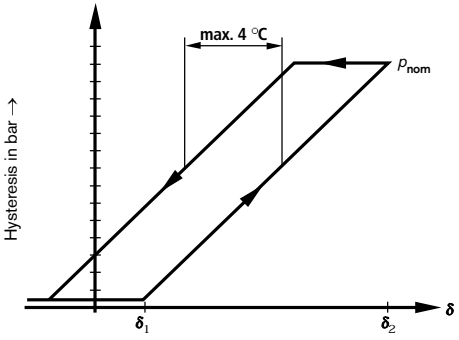


δ_1, δ_2 see table →

$p_{nom} = 280$ bar



δ_1, δ_2 see table →

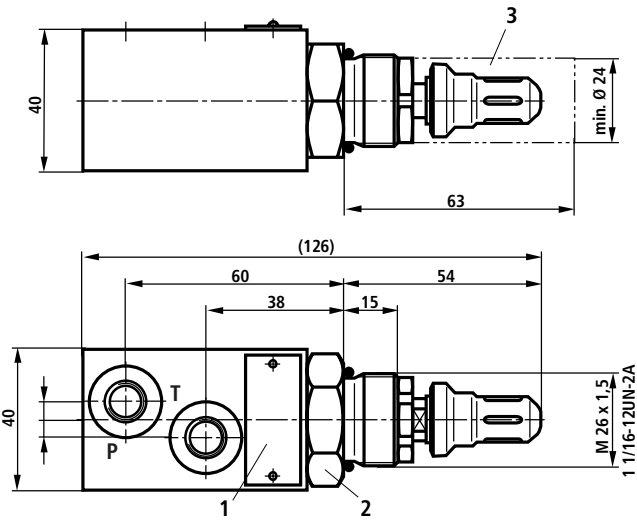


δ_1, δ_2 see table →

Temperature range thermostat:

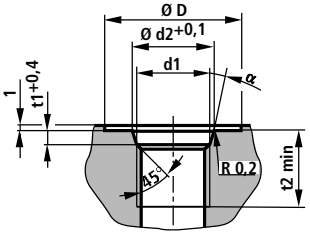
δ_1		δ_2
50 °C	–	58 °C
60 °C	–	68 °C
75 °C	–	85 °C
82 °C	–	92 °C
87 °C	–	97 °C

Unit dimensions (dimensions in mm)

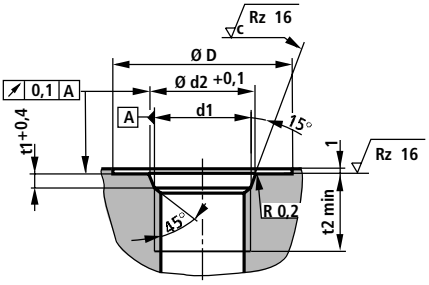


1 Name plate
2 Width across flats 32A/F (tightening torque 50 Nm)
3 Installation in the cooling circuit

Ports P and T



Installation cavity



Ports P and T						
Port thread	d1	Ød2	ØD	t1	t2	a
06	M12 x 1,5	13,8	22	2,4	11,5	15°
19	7/16-20 UNF-2B	12,4	21	2,4	11,5	12°

Installation cavity for valve					
Port thread	d1	Ød2	ØD	t1	t2
06	M26 x 1,5	29,05	40	3,1	15
19	1 1/16-12 UNF-2B	29,2	41	3,3	15

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Rexroth
Bosch Group

Throttle check valve and Check valve with SAE flanged ports MHFS; MHSV

RE 64548/06.03 1/6
Replaces: 03.94

Data sheet


K 3680/1

Type MHFS ...-1X/...


K 3683/12

Type MHSV...-1X/...

Size 20, 25, 32
Series 1X
Operating pressure max. 420 bar

3

Overview of contents

Features

- Operation dependent on pressure and viscosity
- Compact design
- For direct mounting on cylinder or distributor block
- Reduction of possible leakage points
- Additional gauge port

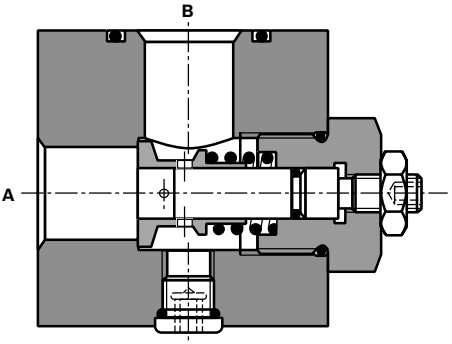
Throttle/Check Valve, Type MHFS

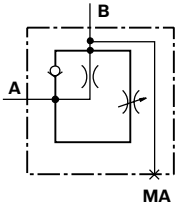
Sizes available:

- Size 20 = 3/4" SA
  Type MHFS 20 E2B1-1X/PBF45B08V11
  Ordering code R900417906
- Size 25 = 1" SAE
  Type MHFS 25 E2B1-1X/PBF10B04V11
  Ordering code R900334465
- Size 32 = 1 1/4" SAE
  Type MHFS 32 E2B1-1X/PBF10B03V11
  Ordering code R900411106

Function, Section, Symbol

The valves are primarily used for limiting cylinder speeds, in order to reduce shocks when stopping heavy loads.
They consist basically of housing (1), spindle (2), valve poppet (3) and compression spring (4).
Limiting the cylinder speed (flow from B to A) is achieved by means of spindle (2). Depending on the spindle setting, radial holes (5) in valve poppet (3) are plugged to produce the required throttling to flow.
Fixed opening (6) between A and B prevents the throttle opening from being reduced to 0. This opening is 7.6 mm² for size 20, 13.2 mm² for size 25, and 26.4 mm² for size 32.
For the lifting operation (flow from A to B), valve poppet (3), which is guided by spindle (2), is pressed against compression spring (4) to allow the valve to fully open.



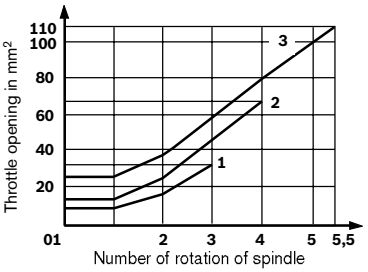


Technical data (For operation outside these parameters, please consult us!)

Max. operating pressure		bar	420
Cracking pressure		bar	0,5
Fluid			Mineral oil to DIN 51 524 (HL, HLP), phosphate ester (HFD-R)
Fluid temperature range		°C	–20 to +80
Viscosity range		mm2/s	2,6 to 380
Fluid cleanliness (maximum permissible)			ISO 4406 (C) Class 20/18/15
Weight	Size 20	kg	2,1
	Size 25	kg	3,5
	Size 32	kg	5,1

Throttle/Check Valve, Type MHFS ...

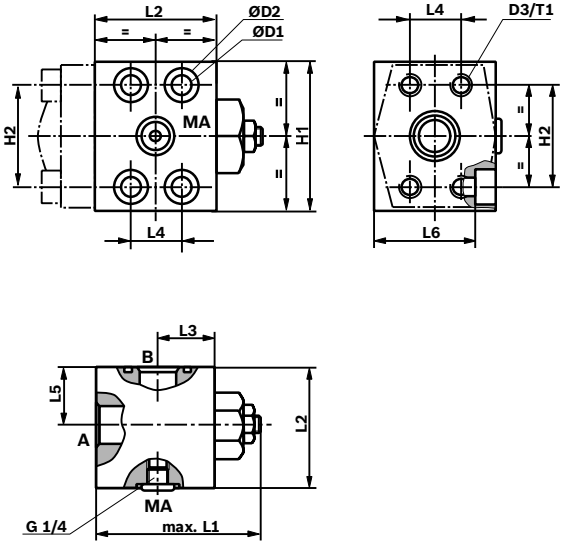
Operating Curves (measured at $\nu = 42$ mm²/s and $\vartheta = 50$ °C)



Throttle opening dependent on spindle movement

1 Size 20
2 Size 25
3 Size 32

Unit dimensions (Dimensions in mm)



Size	Port A, B [1]	L1 max.	L2	L3	L4	L5	L6	H1	H2	ØD1	ØD2	D3	T1
20	SAE 3/4"	85	60	30	23,9	30	49	75	50,8	11	18	M10	14
25	SAE 1"	100	75	37	27,8	40	60	80	57,2	13,5	20	M12	16
32	SAE 1 1/4"	116	85	42,5	31,7	42,5	70	90	66,7	15	24	M14 x 1,5	18

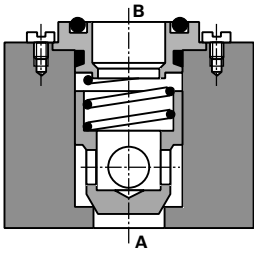
[1] 6000 PSI (420 bar)

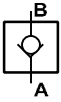
Check Valve, Type MHSV

Sizes available:

- Size 20 = 3/4“ SAE
  Type MHSV 22 ZB1-1X/M11-099
  Ordering code R900493236
- Size 25 = 1“ SAE
  Type MHSV 25 FB1-1X/M11
  Ordering code R900358470
- Size 32 = 1 1/4“ SAE
  Type MHSV 30 FB1-1X/M11
  Ordering code R900307483

Section, Symbol

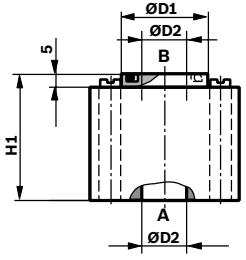


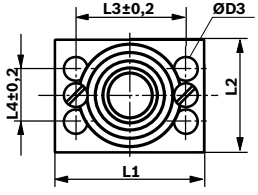


Technical data (For operation outside these parameters, please consult us!)

Max. operating presssure		bar	420
Cracking pressure:	Size 20	bar	0,6
	Size 25	bar	0,5
	Size 32	bar	1,5
Fluid			Mineral oil to DIN 51 524 (HL, HLP) Phosphate ester (HFD-R)
Fluid temperature range		°C	–20 to +80
Viscosity range		mm²/s	2,6 to 380
Fluid cleanliness (maximum permissible)			ISO 4406 (C) Class 20/18/15
Weight		kg	Approx. 1

Unit dimensions (Dimensions in mm)





Size	Port A, B [1]	L1	L2	L3±0,2	L4±0,2	H1	ØD1	ØD2	ØD3	Seal kit ordering code
20	SAE 3/4“	70	50	50,8	23,9	57	40	20	11,5	R900312289
25	SAE 1“	80	60	57,2	27,8	70	46	25	13,5	R900312593
32	SAE 1 1/4“	90	72	66,7	31,7	78	52	30	16	R900004330 [2] R900007920 [2]

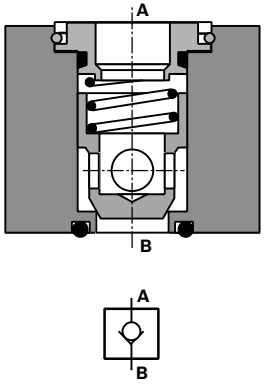
[1] 6000 PSI (420 bar)
[2] If necessary, state both ordering codes

Check Valve, Type MHSV 22 PB2

Size available:

- Size 20 = 3/4" SAE
  Type MHSV 22 PB2-1X/M
  Ordering code R900459081

Section, Symbol



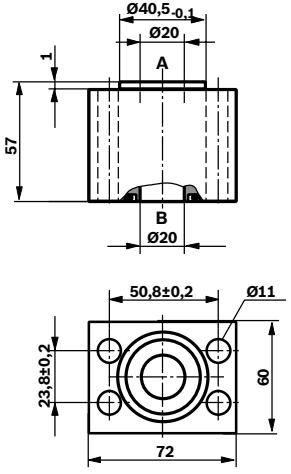
Technical data (For operation outside these parameters, please consult us!)

Max. operating presssure	bar	420
Cracking pressure	bar	0,6
Fluid		Mineral oil to DIN 51 524 (HL, HLP) Phosphate ester (HFD-R)
Fluid temperature range	°C	–20 to +80
Viscosity range	mm²/s	2,6 to 380
Fluid cleanliness (maximum permissible)		ISO 4406 (C) Class 20/18/15
Weight	kg	Approx. 1

Unit dimensions (Dimensions in mm)

3/4" SAE ports (A, B) 6000 PSI (420 bar)

Seal kit ordering code R900312289



Notes

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