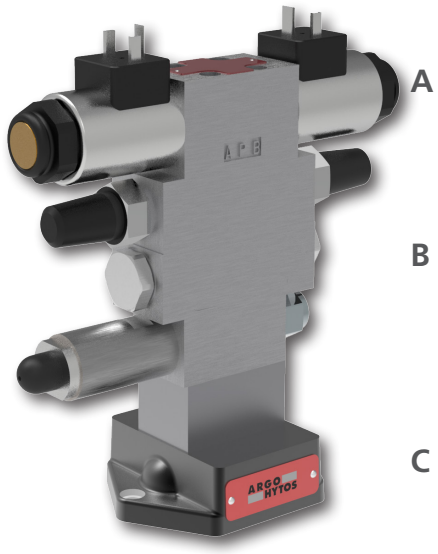
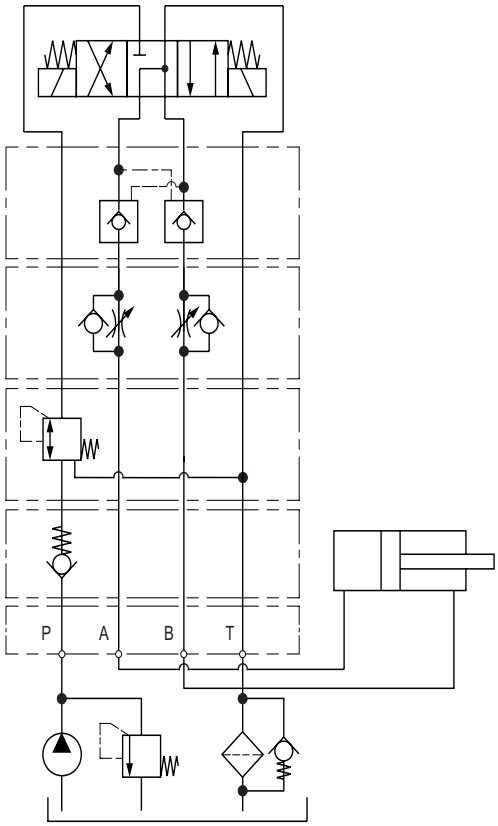
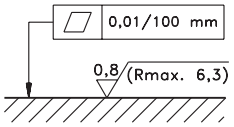
Modular Blocks Size 04 (CETOP 02) with Built-in Valves

Vertically integrated valves according to diagram



Example of a vertically integrated valves size 04





Required surface quality of the counterpart

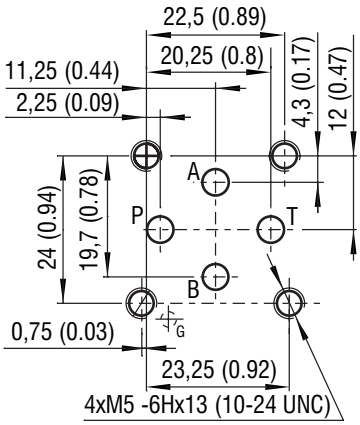
Technical Features

- Simple creation of complicated hydraulic circuits
- Flexible connection solution
- Wide range of valves available
- Circuit creation without the use of pipes and hoses
- Saves build-in space

Functional Description

Vertically integrated modular blocks with built-in valves are assembled into a single unit using four M5 or 10-24 UNC threaded bolts and mounted to a base, e.g. to a subplate, a parallel circuit manifold with side ports or another block. The connection plate diagram conforms with ISO 4401. The surface of upper block is usually closed with connected directional control valve with body or with a blanking plate.

Connection diagram size 04 according to ISO 4401

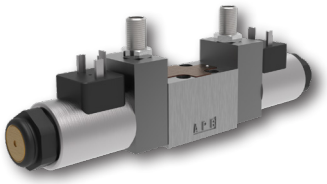


Content

Directional Control Valves with Body

The valves control the movement direction of the actuator and usually close the upper surface of vertically integrated modular valves. The most commonly used are solenoid operated with one solenoid (4/2) or two solenoids (4/3, 4/2 with detent assembly of spool). However, they can also be operated manually.

RPE3-043

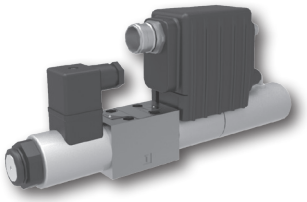


Product name	Datasheet no.	Max. pressure [bar (PSI)] P,A,B / T	Max. flow [l/min (GPM)]	Description
RPE3-04	HA 4014	320 / 210 (4640 / 3050)	30 (7.9)	Solenoid operated directional control valve
RPR3-04	HA 4018	320 / 100 (4640 / 1450)	30 (7.9)	Manually operated directional control valve (with locked spool position or proportional control)

Proportional Directional Control Valves with Body

The valves can be used instead of standard valves. In addition to controlling the fluid flow direction, they enable smooth control of volumetric flow, and thus the moving speed of piston rod or hydraulic motor. To ensure the repeatability of regulation, it is necessary to stabilize the pressure drop on the control edges of spool using a two-way or a three-way pressure compensator. An electronic control unit is necessary for the valve control. It can be integrated on the top surface of the valve (on-board ECU) or located on an external standardised plate. Proportional valves allow comfortable, continuous remote control via electric command signal. The built-in spool position sensor as a feedback reduces the valve hysteresis to 0.5 %.

PRM7-04

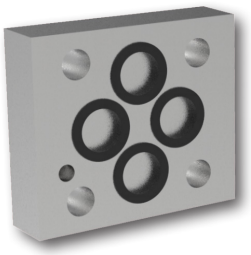


Product name	Datasheet no.	Max. pressure [bar (PSI)] P,A,B / T	Max. flow [l/min (GPM)]	Description
PRM2-04	HA 5105	320 / 210 (4640 / 3050)	20 (5.3)	Proportional directional control valve without feedback
PRM7-04	HA 5120	320 / 210 (4640 / 3050)	20 (5.3)	Proportional direcional control valve with spool position & system feedback

Blanking Plates

They can be used for closing the channels on the top surface of vertical integrated modular valves instead of a top valve with body. The plates enable various channels connection.

DK1-04



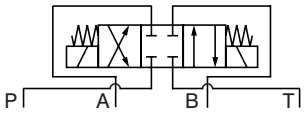
Product name	Datasheet no.	Material / max. pressure [bar (PSI)]	Description
DK1-04	HA 0003	Grey cast Iron / 320 (4640)	Blanking plate

Caution:
Modular blocks made of gray cast iron may be used up to pressure of 350 bar (5080 PSI).
For higher system pressure up to 420 bar (6090 PSI), it is necessary to use modular blocks made of steel.

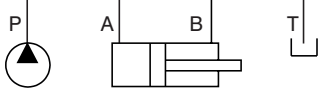
Caution:
The valve pressure drop (Δp_V), given for specific flow volume in the valve datasheet, is increased by the pressure loss of the modular block (Δp_B) after assembly. The amount depends of the way of internal connection.
$\Delta p = \Delta p_V + \Delta p_B$

Directional Control Valves, Spool Type

2/2 directional control valves, built in modular block, are often used as stop valves, connecting or unloading valves.



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no. * Block height mm(in)
Stop valve in P channel		SD2E-A2/H2I11 HA 4040 SD2E-A2/L2I11 HA 4040	30 (7.9) 20 (5.3)	SB-04A2-1P2-GV-B HA 0028 SB-04A2-1P2-GV-B HA 0028	31850600 40 (1.57) 31850600 40 (1.57)
Stop valve in A channel		SD2E-A2/H2I11 HA 4040 SD2E-A2/L2I11 HA 4040	30 (7.9) 20 (5.3)	SB-04A2-1A2-GV-B HA 0028 SB-04A2-1A2-GV-B HA 0028	32360000 40 (1.57) 32360000 40 (1.57)
Stop valve in B channel		SD2E-A2/H2I11 HA 4040 SD2E-A2/L2H11 HA 4040	30 (7.9) 20 (5.3)	SB-04A2-1B1-GV-B HA 0028 SB-04A2-1B1-GV-B HA 0028	31113000 40 (1.57) 31113000 40 (1.57)
Stop valve in A and B channels		SD2E-A2/H2I11 HA 4040 SD2E-A2/L2I11 HA 4040	30 (7.9) 20 (5.3)	SB-04A2-2C2-GV-B HA 0028 SB-04A2-2C2-GV-B HA 0028	30727200 40 (1.57) 30727200 40 (1.57)
Connecting valve A → B		SD2E-A2/H2I12 HA 4040 SD2E-A2/L2I12 HA 4040	30 (7.9) 20 (5.3)	SB-04A2-1AB2-GV-B HA 0028 SB-04A2-1AB2-GV-B HA 0028	31509300 40 (1.57) 31509300 40 (1.57)
Unloading valve P → T		SD2E-A2/H2I12 HA 4040 SD2E-A2/L2I12 HA 4040	30 (7.9) 20 (5.3)	SB-04A2-1PT2-GV-B HA 0028 SB-04A2-1PT2-GV-B HA 0028	31509800 40 (1.57) 31509800 40 (1.57)
Unloading valve A → T		SD2E-A2/H2I12 HA 4040 SD2E-A2/L2H12 HA 4040	30 (7.9) 20 (5.3)	SB-04A2-1AT2-GV-B HA 0028 SB-04A2-1AT2-GV-B HA 0028	30150000 40 (1.57) 30150000 40 (1.57)
Unloading valve B → T		SD2E-A2/H2I12 HA 4040 SD2E-A2/L2I12 HA 4040	30 (7.9) 20 (5.3)	SB-04A2-1BT2-GV-B HA 0028 SB-04A2-1BT2-GV-B HA 0028	31509500 40 (1.57) 31509500 40 (1.57)
Unloading valves A → T, B → T		SD2E-A2/H2I12 HA 4040 SD2E-A2/L HA 4040	30 (7.9) 20 (5.3)	SB-04A2-2D2-GV-B HA 0028 SB-04A2-2D2-GV-B HA 0028	28229200 40 (1.57) 28229200 40 (1.57)



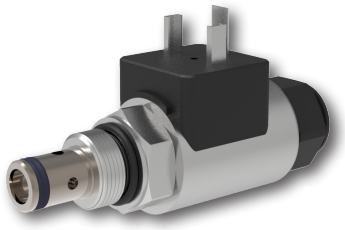
* block only

Ventile:

Product name	Datasheet no.	Max. pressure [bar PSI)]	Max. flow [l/min (GPM)]	Description
SD2E-A2/H	HA 4040	350 (5080)	30 (7.9)	Screw-in cartridge 2/2 directional control valve, spool type (C-8-2)
SD2E-A2/L	HA 4040	250 (3630)	20 (5.3)	Screw-in cartridge 2/2 directional control valve, spool type, lightline design (with reduced performance) (C-8-2)

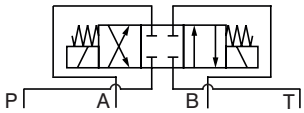
SD2E-A2/H

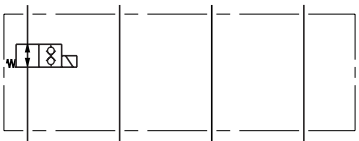
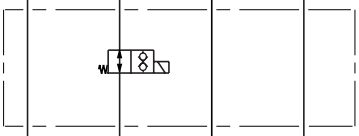
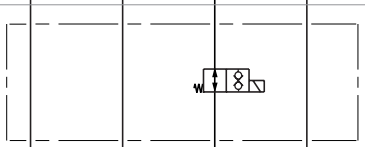
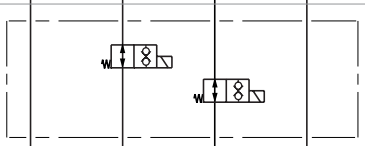
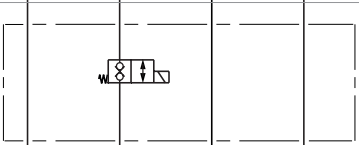
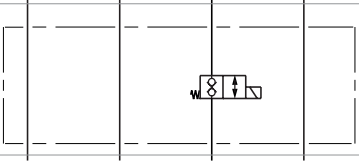
SD2E-A2/L



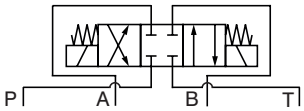
Poppet Valves, Direct Acting

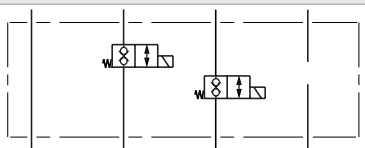
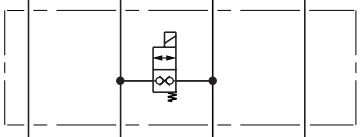
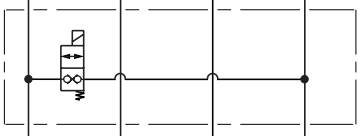
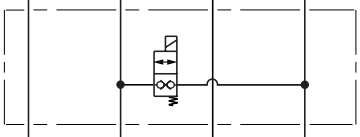
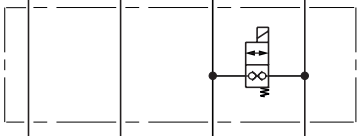
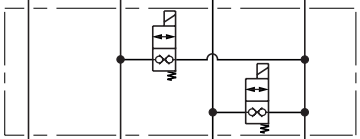
Poppet valves, built in modular block, are leak proof and are commonly used as stop valves, safety, connecting or unloading valves.
The direct acting valves are bidirectional valves and can be used in both flow directions.

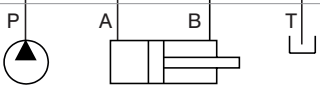


Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Stop valve in P channel		SD1E-A2/H2S6 HA 4070	30 (7.9)	SB-04A2-1P2-GV-B HA 0028	31850600 40 (1.57)
Stop valve in A channel		ROE3-042S6MA04 HA 4073 SD1E-A2/H2S6 HA 4070	25 (6.6) 30 (7.9)	 SB-04A2-1A2-GV-B HA 0028	 40 (1.57) 32360000 40 (1.57)
Stop valve in B channel		ROE3-042S6MB04 HA 4073 SD1E-A2/H2S6 HA 4070	25 (6.6) 30 (7.9)	 SB-04A2-1B1-GV-B HA 0028	 40 (1.57) 31113000 40 (1.57)
Stop valve in A and B channels		ROE3-042S6MC04 HA 4073 SD1E-A2/H2S6 HA 4070	25 (6.6) 30 (7.9)	 SB-04A2-2C2-GV-B HA 0028	 40 (1.57) 30727200 40 (1.57)
Safety (stop) valve in P channel		SD1E-A2/H2S5 HA 4070	30 (7.9)	SB-04A2-1P2-GV-B HA 0028	31850600 40 (1.57)
Safety (stop) valve in A channel		ROE3-042S5MA04 HA 4073 SD1E-A2/H2S5 HA 4070	25 (6.6) 30 (7.9)	 SB-04A2-1A2-GV-B HA 0028	 40 (1.57) 32360000 40 (1.57)
Safety (stop) valve in B channel		ROE3-042S5MB04 HA 4073 SD1E-A2/H2S5 HA 4070	25 (6.6) 30 (7.9)	 SB-04A2-1B1-GV-B HA 0028	 40 (1.57) 31113000 40 (1.57)

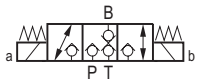
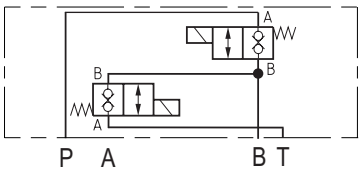
* block only



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Safety (stop) valves in A and B channels		ROE3-042S5MC04 HA 4073 SD1E-A2/H2S5 HA 4070	25 (6.6) 30 (7.9)	SB-04A2-2C2-GV-B HA 0028	40 (1.57) 30727200 40 (1.57)
Connecting valve A → B		ROE3-042S5MX04 HA 4073 SD1E-A2/H2S5 HA 4070	25 (6.6) 30 (7.9)	SB-04A2-1AB2-GV-B HA 0028	40 (1.57) 31509300 40 (1.57)
Unloading valve P → T		ROE3-042S5MG04 HA 4073 SD1E-A2/H2S5 HA 4070	25 (6.6) 30 (7.9)	SB-04A2-1PT2-GV-B HA 0028	40 (1.57) 31509800 40 (1.57)
Unloading valve A → T		ROE3-042S5MD04 HA 4073 SD1E-A2/H2S5 HA 4070	25 (6.6) 30 (7.9)	SB-04A2-1AT2-GV-B HA 0028	40 (1.57) 30150000 40 (1.57)
Unloading valve B → T		ROE3-042S5ME04 HA 4073 SD1E-A2/H2S5 HA 4070	25 (6.6) 30 (7.9)	SB-04A2-1BT2-GV-B HA 0028	40 (1.57) 31509500 40 (1.57)
Unloading valves A → T, B → T		ROE3-042S5MF04 HA 4073 SD1E-A2/H2S5 HA 4070	25 (6.6) 30 (7.9)	SB-04A2-2D2-GV-B HA 0028	40 (1.57) 28229200 40 (1.57)



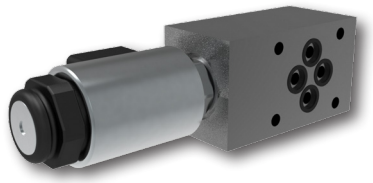
* block only

Top blanking plate for B-port control P → B or B → T 		ROE3-042S5MJ04 HA 4073	25 (6.6)		40 (1.58)

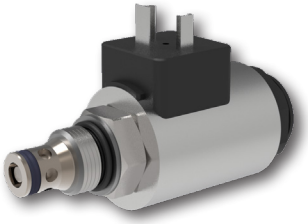
Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
ROE3-042xxxx04	HA 4073	250 (3630)	25 (6.6)	2/2 poppet valve, direct acting, built-into modular block
SD1E-A2	HA 4070	350 (5080)	30 (7.9)	Screw-in cartridge 2/2 poppet valve, direct acting (C-8-2)

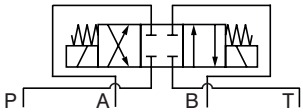
ROE3-04

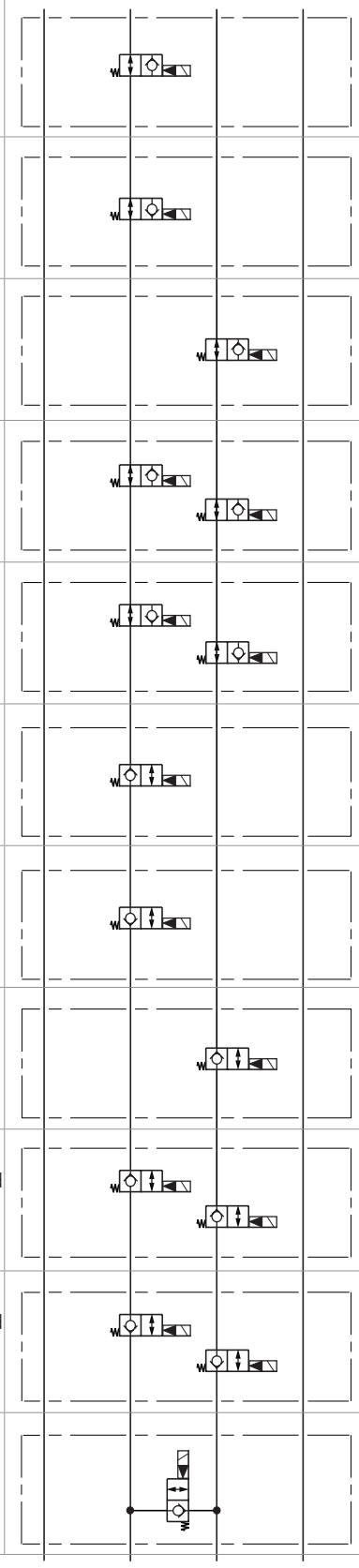


SD1E-A2

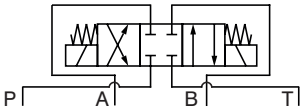


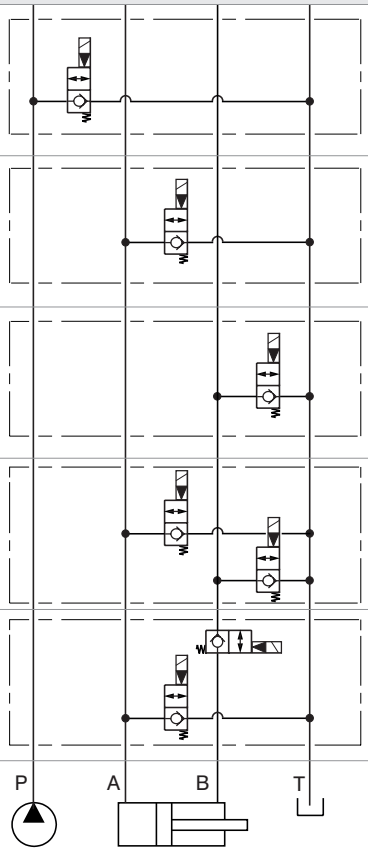
Pilot operated poppet valves close leak free only in one direction, according to the valve symbol. In the opposite direction the valve is open.



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Stop valve in A channel, flow direction from the actuator		SD3E-A2/H2O2 HA 4043 SD3E-A2/L2O2 HA 4043	30 (7.9) 30 (7.9)	SB-04A2-1A1-GV-B HA 0028 SB-04A2-1A1-GV-B HA 0028	30978800 40 (1.57) 30978800 40 (1.57)
Stop valve in A channel, flow direction to the actuator		SD3E-A2/H2O2 HA 4043 SD3E-A2/L2O2 HA 4043	30 (7.9) 30 (7.9)	SB-04A2-1A2-GV-B HA 0028 SB-04A2-1A2-GV-B HA 0028	32360000 40 (1.57) 32360000 40 (1.57)
Stop valve in B channel, flow direction from the actuator		SD3E-A2/H2O2 HA 4043 SD3E-A2/L2O2 HA 4043	30 (7.9) 30 (7.9)	SB-04A2-1B1-GV-B HA 0028 SB-04A2-1B1-GV-B HA 0028	31113000 40 (1.57) 31113000 40 (1.57)
Stop valves in A and B channels, flow direction from the actuator		SD3E-A2/H2O2 HA 4043 SD3E-A2/L2O2 HA 4043	30 (7.9) 30 (7.9)	SB-04A2-2C1-GV-B HA 0028 SB-04A2-2C1-GV-B HA 0028	28063300 40 (1.57) 28063300 40 (1.57)
Stop valves A and B channels, flow direction to the actuator		SD3E-A2/H2O2 HA 4043 SD3E-A2/L2O2 HA 4043	30 (7.9) 30 (7.9)	SB-04A2-2C2-GV-B HA 0028 SB-04A2-2C2-GV-B HA 0028	30727200 40 (1.57) 30727200 40 (1.57)
Safety (stop) valve in A channel, flow direction from the actuator		ROE3-062S2MA04 HA 4072 SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	25 (6.6) 30 (7.9) 30 (7.9)	 SB-04A2-1A1-GV-B HA 0028 SB-04A2-1A1-GV-B HA 0028	 40 (1.57) 30978800 40 (1.57) 30978800 40 (1.57)
Safety (stop) valve in A channel, flow direction to the actuator		SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	30 (7.9) 30 (7.9)	SB-04A2-1A2-GV-B HA 0028 SB-04A2-1A2-GV-B HA 0028	32360000 40 (1.57) 32360000 40 (1.57)
Safety (stop) valve in B channel, flow direction from the actuator		ROE3-062S2MB04 HA 4072 SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	25 (6.6) 30 (7.9) 30 (7.9)	 SB-04A2-1B1-GV-B HA 0028 SB-04A2-1B1-GV-B HA 0028	 40 (1.57) 31113000 40 (1.57) 31113000 40 (1.57)
Safety (stop) valves in A and B channels, flow direction from the actuator		ROE3-062S2MC04 HA 4072 SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	25 (6.6) 30 (7.9) 30 (7.9)	 SB-04A2-2C1-GV-B HA 0028 SB-04A2-2C1-GV-B HA 0028	 40 (1.57) 28063300 40 (1.57) 28063300 40 (1.57)
Safety (stop) valves in A and B channels, flow direction to the actuator		SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	30 (7.9) 30 (7.9)	SB-04A2-2C2-GV-B HA 0028 SB-04A2-2C2-GV-B HA 0028	30727200 40 (1.57) 30727200 40 (1.57)
Connecting valve A → B		ROE3-062S2MX04 HA 4072 SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	25 (6.6) 30 (7.9) 30 (7.9)	 SB-04A2-1AB2-GV-B HA 0028 SB-04A2-1AB2-GV-B HA 0028	 40 (1.57) 31509300 40 (1.57) 31509300 40 (1.57)

* block only



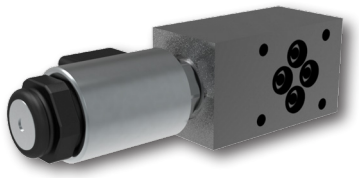
Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Unloading valve P → T		ROE3-062S2MG04 HA 4072 SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	25 (6.6) 30 (7.9) 30 (7.9)	 SB-04A2-1PT2-GV-B HA 0028 SB-04A2-1PT2-GV-B HA 0028	 40 (1.57) 31509800 40 (1.57) 31509800 40 (1.57)
Unloading valve A → T		ROE3-062S2MD04 HA 4072 SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	25 (6.6) 30 (7.9) 30 (7.9)	 SB-04A2-1AT2-GV-B HA 0028 SB-04A2-1AT2-GV-B HA 0028	 40 (1.57) 30150000 40 (1.57) 30150000 40 (1.57)
Unloading valve B → T		ROE3-062S2ME04 HA 4072 SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	25 (6.6) 30 (7.9) 30 (7.9)	 SB-04A2-1BT2-GV-B HA 0028 SB-04A2-1BT2-GV-B HA 0028	 40 (1.57) 31509500 40 (1.57) 31509500 40 (1.57)
Unloading valves A → T, B → T		ROE3-062S2MF04 HA 4072 SD3E-A2/H2L2 HA 4043 SD3E-A2/L2L2 HA 4043	25 (6.6) 30 (7.9) 30 (7.9)	 SB-04A2-2D2-GV-B HA 0028 SB-04A2-2D2-GV-B HA 0028	 40 (1.57) 28229200 40 (1.57) 28229200 40 (1.57)
Special design: Unloading valve A → T and safety (stop) valve in B channel		ROE3-062S2MI04 HA 4072	25 (6.6)		

* block only

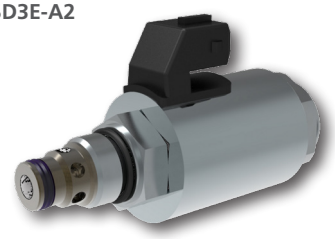
Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
ROE3-062S2xx04	HA 4072	250 (3630	25 (6.6)	2/2 poppet valve, pilot operated, built-into modular block
SD3E-A2/H	HA 4043	420 (6090)	30 (7.9)	Screw-in cartridge 2/2 poppet valve, pilot operated (C-8-2)
SD3E-A2/L	HA 4043	250 (3630)	30 (7.9)	Screw-in cartridge 2/2 poppet valve, pilot operated, lightline design (with reduced performance) (C-8-2)

ROE3-062S2M

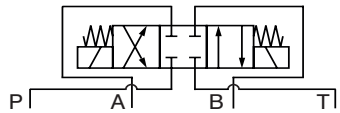


SD3E-A2

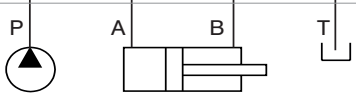


Check Valves

Check valves enable the fluid flow only in one direction. They are often connected to the pump pressure pipeline to prevent a backflow caused by excessive load on the actuator. The modular block can be provided with one or two built-in check valves. The free flow direction can be chosen.



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Check valve in P channel, flow direction to the actuator		VJO1-04/MP HA 5012 SC1F-A2 HA 5010	30 (7.9) 40 (11)	 SB-04A2-1P2-GV-B HA 0028	30 (1.18) 31850600 40 (1.57)
Check valve in A channel, flow direction from the actuator		VJO1-04/MA HA 5012 SC1F-A2 HA 5010	30 (7.9) 40 (11)	 SB-04A2-1A2-GV-B HA 0028	30 (1.18) 32360000 40 (1.57)
Check valve in B channel, flow direction from the actuator		VJO1-04/MB HA 5012	30 (7.9)		30 (1.18)
Check valve in T channel, flow direction from the actuator		VJO1-04/MT HA 5012	30 (7.9)		30 (1.18)
Check valve in A channel, flow direction to the actuator		VJO1-04/MC HA 5012 SC1F-A2 HA 5010	30 (7.9) 40 (11)	 SB-04A2-1A1-GV-B HA 0028	30 (1.18) 30978800 40 (1.57)
Check valve in B channel, flow direction to the actuator		VJO1-04/MD HA 5012 SC1F-A2 HA 5010	30 (7.9) 40 (11)	 SB-04A2-1B1-GV-B HA 0028	30 (1.18) 31113000 40 (1.57)
Check valves A and B channels, flow direction to the actuator		VJO1-04/MAB HA 5012 SC1F-A2 HA 5010	30 (7.9) 40 (11)	 SB-04A2-2C1-GV-B HA 0028	30 (1.18) 28063300 40 (1.57)
Check valves P and T channels, flow direction P to the actuator and T from the actuator		VJO1-04/MPT HA 5012	30 (7.9)		30 (1.18)



* block only

Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
VJO1-04/M	HA 5012	320 (4640)	30 (7.9)	Check valve built-into modular block
SC1F-A2*	HA 5010	420 (6090)	40 (11)	Screw-in cartridge check valve (C-8-2)

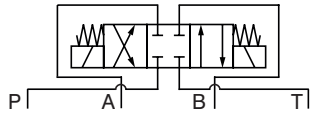
* Optionally it is possible to use the valve SC1F-A3 with integrated gauge port M (Datasheet HA 5016)

VJ01-04

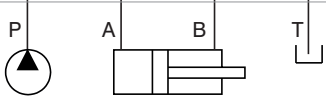
SC1F-A2

Check Valves, Pilot to Open

Pilot operated check valves are used for load holding when the pump is switched off.
The valve can be built in A, B or both channels of modular block according to acting direction of the load.



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Pilot operated valve in A channel, control pressure from B		VJR1-04/MA HA 5023	20 (5.3)		30 (1.18)
Pilot operated valve in B channel, control pressure from A		VJR1-04/MB HA 5023	20 (5.3)		30 (1.18)
Pilot operated valves in A and B channels		VJR1-04/MC HA 5023	20 (5.3)		30 (1.18)



* block only

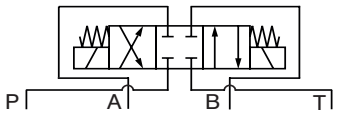
Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
VJR1-04/M	HA 5023	320 (4640)	20 (5.3)	Pilot operated check valve built into modular block

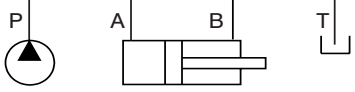
VJR1-04

Pressure Relief Valves, Direct Acting

Pressure relief valves limit the maximum system pressure and protect the system against overloading.
They are connected parallel to the pump or actuator.



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Pressure relief valve in P channel (P → T)		VPP2-04/MP04 HA 5094 SR1A-A2 HA 5063	40 (11) 30 (7.9)	 SB-04A2-1PT1-GV-B HA 0028	 35 (1.38) 30979100 40 (1.57)
Pressure relief valve in A channel (A → T)		VPP2-04/MA04 HA 5094 SR1A-A2 HA 5063	40 (11) 30 (7.9)	 SB-04A2-1AT1-GV-B HA 0028	 35 (1.38) 30138300 40 (1.57)
Pressure relief valve in B channel (B → T)		VPP2-04/MB04 HA 5094 SR1A-A2 HA 5063	40 (11) 30 (7.9)	 SB-04A2-1BT1-GV-B HA 0028	 35 (1.38) 29230100 40 (1.57)
Pressure relief valve in A channel (A → B)		VPP2-04/ME04 HA 5094 SR1A-A2 HA 5063	40 (11) 30 (7.9)	 SB-04A2-1AB1-GV-B HA 0028	 35 (1.38) 32016600 40 (1.57)
Pressure relief valve in B channel (B → A)		SR1A-A2 HA 5063	30 (7.9)	SB-04A2-1AB2-GV-B HA 0028	31509300 40 (1.57)
Crossport pressure relief valves (A ↔ B)		VPP2-04/MC04 HA 5094 SR1A-A2 HA 5063	40 (11) 30 (7.9)	 SB-04A2-2C3-GV-B HA 0028	 35 (1.38) 30353600 40 (1.57)
Two independent pressure relief valves (A → T and B → T)		VPP2-04/MD04 HA 5094 SR1A-A2 HA 5063	40 (11) 30 (7.9)	 SB-04A2-2D1-GV-B HA 0028	 35 (1.38) 29992200 40 (1.57)

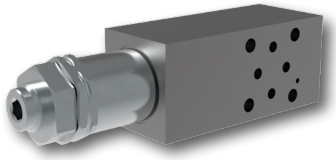


* block only

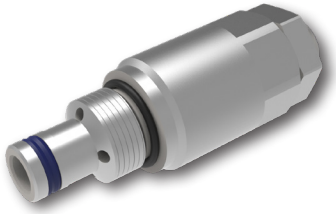
Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
VPP2-04/xx04	HA 5094	320 (4640)	40 (11)	Pressure relief valve, direct acting, built into modular block
SR1A-A2	HA 5063	350 / 160 (5080 / 2320)	30 (7.9)	Screw-in cartridge pressure relief valve, direct acting (C-8-2)

VPP2-04/xx04

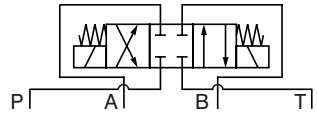


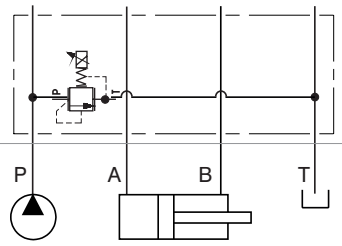
SR1A-A2



Proportional Pressure Relief Valves

The valves enable continuous adjustment of the maximum system pressure depending on the command control signal. The valves with a negative characteristic create the maximum pressure at zero control signal (opposite function)



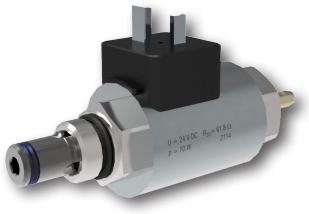
Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Continuous adjustment of maximum pressure in P channel (P → T)		SR1P2-A2 HA 5122	1.5 (0.4)	SB-04A2-1PT1-GV-B HA 0028	30979100 40 (1.57)
		SRN1P1-A2 HA 5137	1.5 (0.4)	SB-04A2-1PT1-GV-B HA 0028	30979100 40 (1.57)

* block only

Ventile:

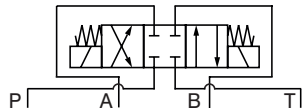
Product name	Datasheet no.	Max. pressure [bar (PSI)] P / T	Max. flow [l/min (GPM)]	Description
SR1P2-A2	HA 5122	350 / 100 (5080 / 1450)	1.5 (0.4)	Screw-in cartridge proportional pressure relief valve, direct acting (C-8-2)
SRN1P1-A2	HA 5137	350 / 100 (5080 / 1450)	1.5 (0.4)	Screw-in cartridge proportional pressure relief valve with negative characteristic, direct acting (C-8-2)

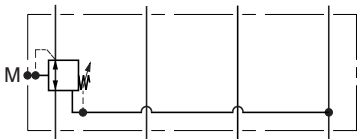
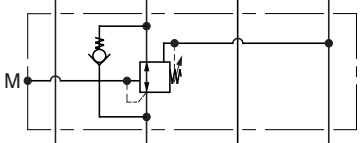
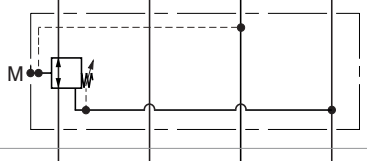
SR1P2-A2



Pressure Reducing Valves, Direct Acting

Reducing valves maintain a constant set pressure. They are often used for adjusting the pressure on an actuator, it means the force acting on the piston rod or the torque on the shaft of hydraulic motor. Three-way valves protect the pipeline leading to the actuator against pressure overloading as a relief valves and allow the back flow from the actuator to the tank.



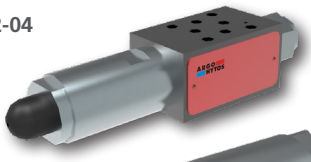
Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Reduced pressure setting in P channel, additionally gauge port M		VRP2-04-P HA 5142	20 (5.3)		30 (1.18)
		SP2A-A3 HA 5143	20 (5.3)	SB-04A3-1P2-GV-B HA 0028	31665200 50 (1.97)
Reduced pressure setting in A channel, bypass check valve for back flow, additionally gauge port M		VRP2-04-A HA 5142	20 (5.3)		30 (1.18)
Reduced pressure setting in P channel, the valve controlled by pressure in B channel, additionally gauge port M		VRP2-04-B HA 5142	20 (5.3)		30 (1.18)

* block only

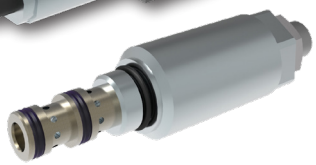
Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)] P / T	Max. flow [l/min (GPM)]	Description
VRP2-04	HA 5142	320 / 210 (4640 / 3050)	20 (5.3)	Pressure reducing-relieving valve, direct acting, built into modular block
SP2A-A3	HA 5143	350 / 200 (5080 / 2900)	20 (5.3)	Screw-in cartridge reducing-relieving valve, direct acting (C-8-3)

VRP2-04

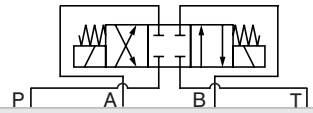


SP2A-A3



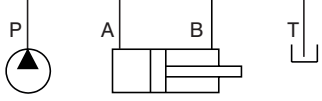
Overcenter Valves

Overcenter valves ensure the load position when the pump is off and enable continuous, safe movement control of the load acting in the movement (negative) direction of the actuator, which is accelerated by load. Non-balanced, partly balanced and fully balanced valves with ventilation of spring space are available.



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Non-balanced overcenter valve in A channel, controlled by pressure from B channel		SO5A-Q3/I HA 5200	30 (7.9)	SB-04Q3-1A1-GV-B HA 0028	32475000 50 (1.97)
Non-balanced overcenter valve in B channel, controlled by pressure from A channel		SO5A-Q3/I HA 5200	30 (7.9)	SB-04Q3-1B1-GV-B HA 0028	32043900 50 (1.97)
Non-balanced overcenter valves in A and B channels, crossport controlled		SO5A-Q3/I HA 5200	30 (7.9)	SB-04Q3-2C2-GV-B HA 0028	30846300 48.5 (1.91)
Partly balanced overcenter valve in A channel, controlled by pressure from B channel		SOP5A-Q3/I HA 5201	30 (7.9)	SB-04Q3-1A1-GV-B HA 0028	32475000 50 (1.97)
Partly balanced overcenter valve in B channel, controlled by pressure from A channel		SOP5A-Q3/I HA 5201	30 (7.9)	SB-04Q3-1B1-GV-B HA 0028	32043900 50 (1.97)
Partly balanced overcenter valves in A and B channels, crossport controlled		SOP5A-Q3/I HA 5201	30 (7.9)	SB-04Q3-2C2-GV-B HA 0028	30846300 48.5 (1.91)
Fully balanced overcenter valve in A channel, controlled by pressure from B channel		SOB5A-Q3/I HA 5202	30 (7.9)	SB-04Q3-1A1-GV-B HA 0028	32475000 50 (1.97)
Fully balanced overcenter valve in B channel, controlled by pressure from A channel		SOB5A-Q3/I HA 5202	30 (7.9)	SB-04Q3-1B1-GV-B HA 0028	32043900 50 (1.97)
Fully balanced overcenter valves in A and B channels, crossport controlled		SOB5A-Q3/I HA 5202	30 (7.9)	SB-04Q3-2C2-GV-B HA 0028	30846300 48.5 (1.91)

* block only



Ventile:

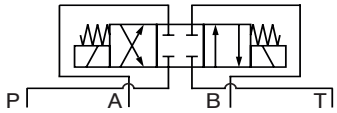
Product name	Datasheet no.	Max. pressure induced by load [bar (PSI)]	Max. flow [l/min (GPM)]	Description
SO5A-Q3/I	HA 5200	350 / 270 (5080 / 3920)	30 (7.9)	Screw-in cartridge overcenter valve, non-balanced
SOP5A-Q3/I	HA 5201	350 / 270 (5080 / 3920)	30 (7.9)	Screw-in cartridge overcenter valve, partly balanced
SOB5A-Q3/I	HA 5202	350 / 270 (5080 / 3920)	30 (7.9)	Screw-in cartridge overcenter valve, fully balanced with atmospheric ventilation

SO5A-Q3/I

SOB5A-Q3/I

Throttle Valves with Bypass Check Valves

Throttle valves are used as flow restrictors for flow regulation and thus velocity regulation of actuator. The flow can be regulated upstream or downstream the actuator depending on bypass check valve orientation.

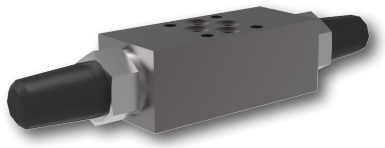


Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Throttle valve in A channel, flow regulation upstream the actuator		VSO1-04/MA HA 5053	25 (6.6)		30 (1.18)
Throttle valve in B channel, flow regulation upstream the actuator		VSO1-04/MB HA 5053	25 (6.6)		30 (1.18)
Throttle valve in A and B channels, flow regulation upstream the actuator		VSO1-04/MC HA 5053	25 (6.6)		30 (1.18)
Throttle valve in A channel, flow regulation downstream the actuator		VSO1-04/ME HA 5053	25 (6.6)		30 (1.18)
Throttle valve in B channel, flow regulation downstream the actuator		VSO1-04/MF HA 5053	25 (6.6)		30 (1.18)
Throttle valve in A and B channels, flow regulation downstream the actuator		VSO1-04/MD HA 5053	25 (6.6)		30 (1.18)

* block only

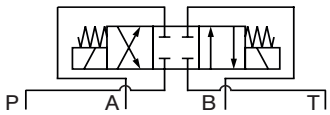
Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
VSO1-04/M	HA 5053	320 (4640)	25 (6.6)	Double throttle valve with bypass check valves in the form of modular block

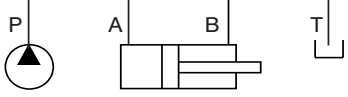


Throttle Valves

Throttle valves are used as a flow restrictor for flow regulation and thus velocity regulation of actuator.



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Throttle valve in P channel		ST21A-A2 HA 5133	20 (5.3)	SB-04A2-1P2-GV-B HA 0028	31850600 40 (1.57)
Throttle valve in A channel		ST21A-A2 HA 5133	20 (5.3)	SB-04A2-1A2-GV-B HA 0028	32360000 40 (1.57)
Throttle valve in A channel, flow regulation upstream the actuator		ST2C1A-A2 HA 5133	20 (5.3)	SB-04A2-1A2-GV-B HA 0028	32360000 40 (1.57)
Throttle valve in B channel		ST21A-A2 HA 5133	20 (5.3)	SB-04A2-1B1-GV-B HA 0028	31113000 40 (1.57)
Throttle valve in B channel, flow regulation downstream the actuator		ST2C1A-A2 HA 5133	20 (5.3)	SB-04A2-1B1-GV-B HA 0028	31113000 40 (1.57)
Throttle valves in A and B channels		ST21A-A2 HA 5133	20 (5.3)	SB-04A2-2C2-GV-B HA 0028	30727200 40 (1.57)
Throttle valve in A and B channels, flow regulation upstream the actuator		ST2C1A-A2 HA 5133	20 (5.3)	SB-04A2-2C2-GV-B HA 0028	30727200 40 (1.57)
Throttle valve in A and B channels, flow regulation downstream the actuator		ST2C1A-A2 HA 5133	20 (5.3)	SB-04A2-2C1-GV-B HA 0028	28063300 40 (1.57)

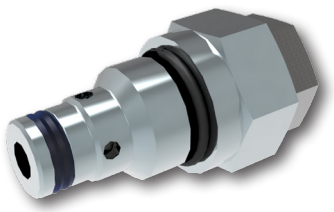


* block only

Ventile:

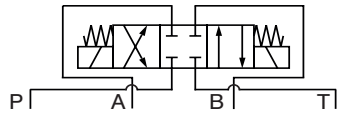
Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
ST21A-A2	HA 5133	320 (4600)	20 (5.3)	Screw-in cartridge throttle valve (C-8-2)
ST2C1A-A2	HA 5133	320 (4600)	20 (5.3)	Screw-in cartridge throttle valve with bypass check valve (C-8-2)

ST21A-A2
ST2C1A-A2

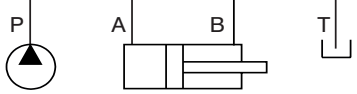


Flow Control Valves with Two-way Pressure Compensator

Flow control valves with two-way pressure compensator maintain a set flow rate independent of the pressure induced by load and supply pressure fluctuation. Constant pressure drop on the valve and thus the constant flow rate is maintained by throttling.



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Flow control valve with 2-way pressure compensator in P channel		SF22A-A2 HA 5060	21 (5.5)	SB-04A2-1P2-GV-B HA 0028	31850600 40 (1.57)
Flow control valve with 2-way pressure compensator in A channel, flow regulation upstream the actuator		SF22A-A2 HA 5060	21 (5.5)	SB-04A2-1A1-GV-B HA 0028	30978800 40 (1.57)
Flow control valve with 2-way pressure compensator in A channel, flow regulation downstream the actuator		SF22A-A2 HA 5060	21 (5.5)	SB-04A2-1A2-GV-B HA 0028	32360000 40 (1.57)
Flow control valve with 2-way pressure compensator in B channel, flow regulation upstream the actuator		SF22A-A2 HA 5060	21 (5.5)	SB-04A2-1B1-GV-B HA 0028	31113000 40 (1.57)



* block only

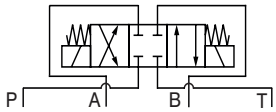
Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
SF22A-A2	HA 5060	350 (5080)	21 (5.5)	Screw-in cartridge flow control valve with 2-way pressure compensator (C-8-2)

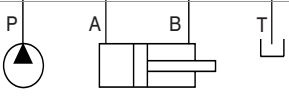
SF22A-A2

Pressure Compensators

Pressure compensators are used for stabilisation of pressure drop on valves. When used with proportional directional control valves they assure repeatability of flow regulation at the load or supply fluctuation. Two-way pressure compensator regulates the pressure drop by throttling of the flow, three-way pressure compensator by flow dividing. The two-way pressure compensator has two possible connections. Meter-in connection is used for positively acting load, meter-out connection is used for negatively acing load (in the moving direction of actuator).



Functional description	Functional symbol	Valve	Max. flow [l/min (GPM)]	Modular blocks	Ordering no.* Block height mm(in)
Two-way pressure compensator in P channel, meter-in connection, controlled by pressure from A channel		TV2-042/MA HA 5167	16 (4.2)		35 (1.38)
Two-way pressure compensator in P channel, meter-in connection, controlled by pressure from B channel		TV2-042/MB HA 5167	16 (4.2)		35 (1.38)
Two-way pressure compensator in P channel, meter-in connection, controlled by pressure from A or B channel via load shuttle valve		TV2-042/MC HA 5167	16 (4.2)		35 (1.38)
Two-way pressure compensator with bypass check valve in A and B channels, meter-out connection		TV2-042/MD HA 5167	16 (4.2)		50 (1.97)
Two-way pressure compensator with bypass check valve in A channel, meter-out connection		TV2-042/ME HA 5167	16 (4.2)		50 (1.97)
Two-way pressure compensator with bypass check valve in B channel, meter-out connection		TV2-042/MF HA 5167	16 (4.2)		50 (1.97)
Three-way pressure compensator controlled by pressure from A channel		TV2-043/MA HA 5188	20 (5.3)		45 (1.77)
Three-way pressure compensator controlled by pressure from B channel		TV2-043/MB HA 5188	20 (5.3)		45 (1.77)
Three-way pressure compensator controlled by pressure from A and B channels via load shuttle valve		TV2-043/MC HA 5188	20 (5.3)		45 (1.77)



* block only

Ventile:

Product name	Datasheet no.	Max. pressure [bar (PSI)]	Max. flow [l/min (GPM)]	Description
TV2-042/M	HA 5167	320 (4640)	16 (4.2)	Two-way pressure compensator built into modular block
TV2-043/M	HA 5188	320 (4640)	20 (5.3)	Three-way pressure compensator built into modular block

TV2-042/M

TV2-043/M

C. Subplates and Manifolds

Integrated modular blocks create a flexible control assembly, which is connected to the hydraulic circuit with the help of subplate or base block provided threaded side ports.

Subplates DP

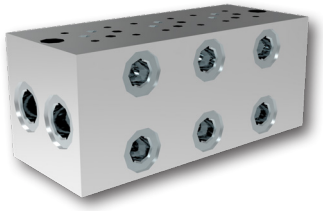
Subplates DP-04 are used for connection of one (CETOP) valve with body or integrated modular assembly. The under side is provided with threaded ports for fittings and pipeline connection.

Product name	Datasheet no.	Material / Max. pressure [bar (PSI)]	Description
DP-04	HA 0002	Gray cast iron / 320 (4640)	Subplate

Parallel Circuit Manifolds with Side Ports DR1-04

Parallel circuit manifolds DR1-04 enable multiple vertical integration by extending the number of connecting patterns (from 1 to 8). Plates are produced from mechanically hardened aluminium alloy ENAW 7575, specified for working pressure up to 320 bar. The front section can be fitted optionally with a built-in pressure relief valve and unloading valve (P-T). Each section is designed to control one actuator.

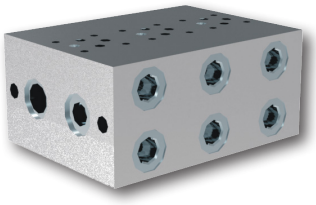
Product name	Datasheet no.	Material / Max. pressure [bar (PSI)]	Description
DR1-04	HA 0017	Aluminium alloy / 320 (4640)	Parallel circuit manifolds with common P and T channels

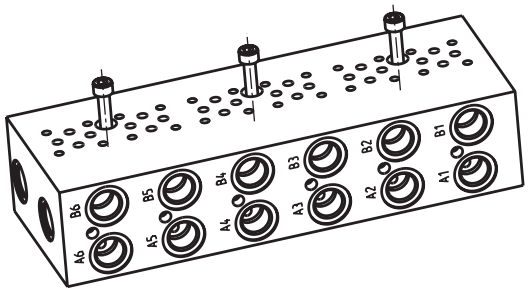


Parallel circuit manifolds PD04 enable multiple vertical integration by extending the number of connecting patterns (from 1 to 8). They are designed for connection to central manifold of small power pack type SMA 05. In this way it is possible to create a control circuit of power pack. However, they can be used separately too.

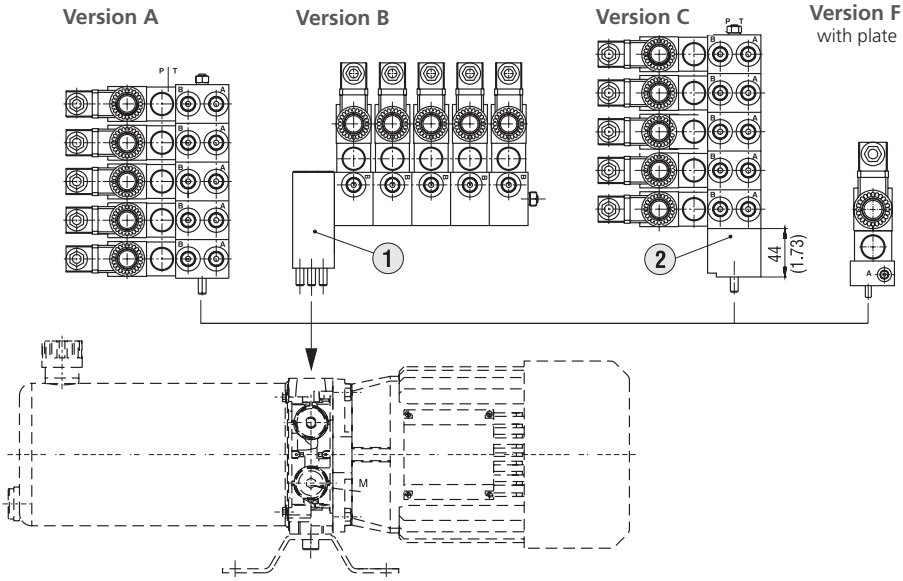
Product name	Datasheet no.	Material / Max. pressure [bar (PSI)]	Description
PD04	HA 0005	Aluminium alloy / 250 (3630)	Parallel circuit manifold with common P and T channels

PD04

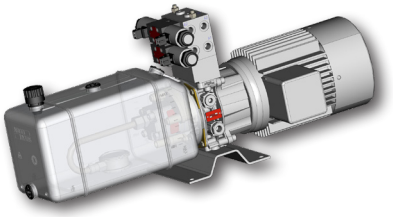




Separately used manifold PD04

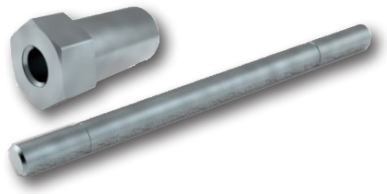


		SAP no.
1	Connecting plate **B**	16094500
2	Connecting plate **C**	16094700



Four possible ways how to connect the parallel circuit manifold PD04 to the central block of power pack SMA 05.

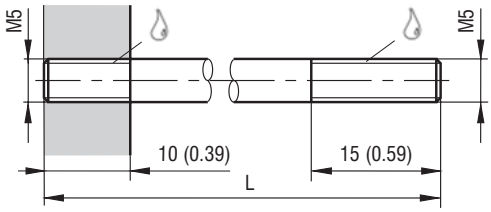
D. Fastening Material



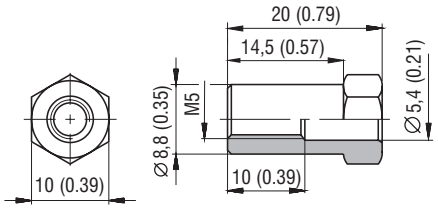
Fastening material for vertical integration of modular valves and the calculation of the length of studs and screws can be found in Datasheet no. HA 0020.

Metric Threads dimensions in millimeters (in)

Studrod M5xL (lenght L see the table)
Strenght class - GR.8 ISO 10.9



Studnut M5



Calculating of Stud Length

Calculation formula: **L = LP + ∑HM + LB + LN**

L - total length of the studrod
LP - thread length projection into subplate / block = 10 mm (0.39 in)
∑HM - SUM of all heights of all installed sandwich valves
LB - length of directional valve projection = 27 mm (1.06 in)
LN - length of thread in the nut (LN_{min} - LN_{max}) = 6 mm (0.24 in) - 14 mm (0.55 in)

Studrods - order numbers of separate elements or kits

M5		Torque to 8.9 Nm (6.6 lbf.ft)			
Item	**Length L**	**Weight**	**Item number**		**Max. pressure**
	[mm]	kg / 100 pcs	1pc	Kit*	[bar]
Studrod	70	1.0	20197400	16103500	350
Studrod	77	1.1	15609500	16105100	350
Studrod	82	1.2	20197600	16103600	350
Studrod	88	1.2	16679400	16105200	350
Studrod	93	1.3	24233200	33884500	350
Studrod	98	1.4	20197800	16103700	350
Studrod	102	1.4	20197900	16103800	350
Studrod	110	1.6	15609700	16103900	350
Studrod	115	1.6	20198100	16108200	350
Studrod	120	1.8	20198200	23678300	350
Studrod	125	1.8	24233300	33884800	350
Studrod	130	1.8	15609600	16104000	350
Studrod	136	1.9	15609800	16104100	350
Studrod	144	2.0	20198500	16104200	350
Studrod	150	2.1	20198600	33885000	350
Studrod	158	2.2	20198700	33885200	320
Studrod	166	2.3	20198800	23686800	320
Studrod	170	2.4	16679500	16104300	320
Studrod	177	2.5	20199000	16108300	320
Studrod	180	2.5	20199100	16104500	320
Studrod	185	2.6	20199200	16104600	320
Studrod	190	2.7	20199300	23679200	320
Studrod	202	3.0	20199400	16105300	320
Studrod	210	3.1	20199500	16104700	250
Studrod	215	3.2	20199600	16104800	250
Studrod	222	3.3	20199700	16104900	250
Studrod	230	3.4	20199800	33885600	250
Studrod	242	3.4	23698400	23685200	250
Studrod	250	3.5	20199900	16105500	200
Studrod	255	3.6	20200000	16105000	200
Studrod	262	3.7	20200100	16105400	200
Nut	M5	0.7	15630800		

Caution!
*Kits include 4 studrods + 4 nuts

Remarks:

This document is intented to aid circuit creation by means of vertical integration and identification of modular blocks in relation to their individual valves. If the required modular valve was not found in the above selection, we recommend you the following procedure:

- Select the required valve from the constantly updated product catalogue at www.argo-hytos.com
- Available blocks for specific valve are listed in the table "Technical Data" of datasheet.
- Select the appropriate modular block for screw-in cartridge valves according to type and function of the valve in datasheet no. HA 0028.
- In the same way, you can choose in-line body for screw-in cartridge valves from datasheet SB 0018.
- If you need to make the cavity for screw-in cartridge valve in your own block, cavity drawings and the associated tools are found in datasheet SMT 0029.
- It is possible to realize different hydraulic function using the unified type of block. E.g. the same block type 1PT1 can be used for pressure relief valve and appropriate type of unloading valve.
- Generally, there is a recommendation to not connect pressure line (P) to the electric operated valves in such way that the solenoid core tube is loaded by undesired pressure peaks. These valves should be connected to the pump in radial direction.
- Connection symbols of pilot operated poppet valves (one-way valves) and pressure valves show their connection which is necessary for their proper function. For better understanding see data sheets of the valves.
- If the required modular blocks is not listed, please contact our sales department.