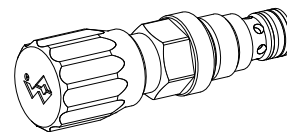


Pressure relief valve
Screw-in cartridge

- Pilot operated
- $Q_{max} = 25 \text{ l/min}$
- $p_{max} = 400 \text{ bar}$
- $p_{N max} = 350 \text{ bar}$

M18x1,5
ISO 7789


DESCRIPTION

Pilot operated pressure relief valve as screw-in cartridge with a thread M18x1,5 and cavity according to ISO draft 7789. The valve is available in 2 different setting versions: Key setting "S" and turning knob setting "D". Key adjustment "S" is also available with cover, see data sheet 2.0-50. Three standard pressure levels are available: 63, 160 and 350 bar. The cartridge body made of steel is galvanized and therefore rust-protected.

FUNCTION

When the set operating pressure is reached, the main spool opens and connects the protected line with the return line to the tank. These pressure relief valves consist of a main-and a pilot operation system integrated into the cartridge. The pilot operation is a direct operated pressure relief valve which acts on the main system. The helical spring of the pilot operation can be easily set to the desired operating pressure. Pilot operated pressure relief valves can be very sensitively adjusted and are suitable for large oil flows and high pressure. The very limited play of the hardened spool results in a limited oil leakage.

APPLICATION

For limiting the operating pressure in hydraulic systems by releasing the oil from the protected oil line P (1) to the outlet/tank return line T (2). The screw-in cartridge is very suitable for mounting in control blocks and is built into the Wandfluh miniature hydraulics NG3 as a functional element in sandwich style plates (vertical combination) and flange-mounted valves (please refer to the separate data sheets in register 2.1). Stepped tools are available for making the receptacle bores in steel and aluminium (Hire or purchase). Please refer to the data sheets in register 2.13.

Attention: Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

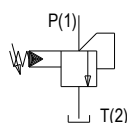
Pressure relief valve		B	V	☐	PM18	-	☐	#	☐
Pilot operated									
Type of adjustment	Key	☐	S						
	Control knob	☐	D						
	Cover	☐	A	(see data sheet 2.0-50)					
Screw-in cartridge M18x1,5									
Pressure range p_N	63 bar	☐	63						
	160 bar	☐	160						
	350 bar	☐	350						
Design-Index (Subject to change)									

GENERAL CHARACTERISTICS

Description	Pilot operated pressure relief valve
Construction	Screw-cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M18x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening	$M_D = 30 \text{ Nm}$
Weight	$m = 0,10 \text{ kg}$ (key) $m = 0,11 \text{ kg}$ (control knob)

HYDRAULIC CHARACTERISTICS

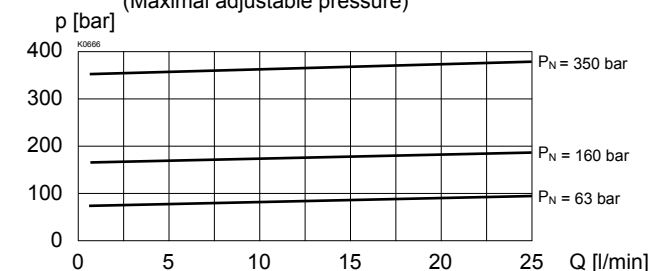
Hydraulic fluid	Mineral oils, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20 ...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 80 \text{ bar}$
Nominal pressure range	$p_N = 63 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Minimum pressure	see characteristics
Volume flow	$Q = 0,1...25 \text{ l/min}$
Leakage volume flow	see characteristics

SYMBOL

MECHANICAL ACTUATION

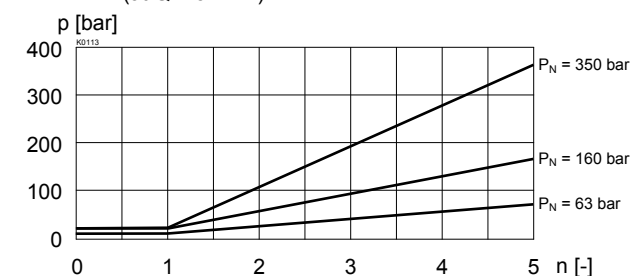
Mechanical types of operation in 2 different versions:	
S	= Screw adjustment with fork wrench and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

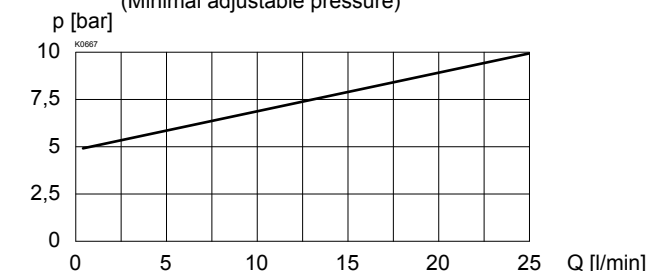
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



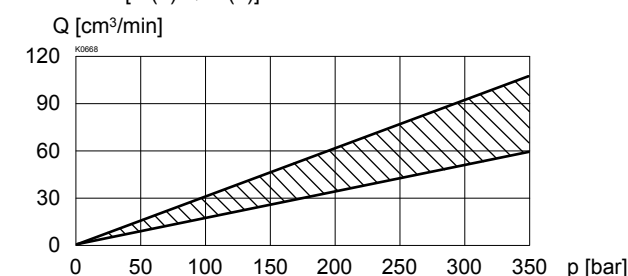
$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)



$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



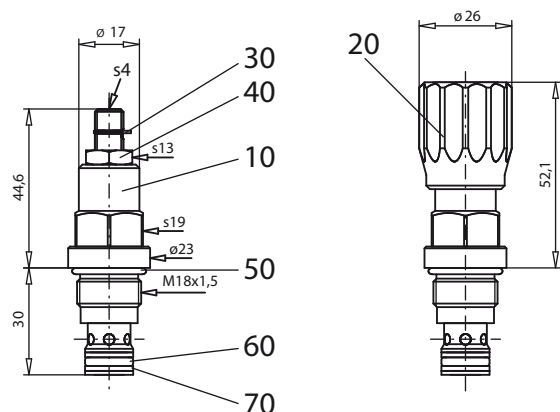
$Q_L = f(p)$ Leakage volume flow characteristics
[P (1) → T (2)]



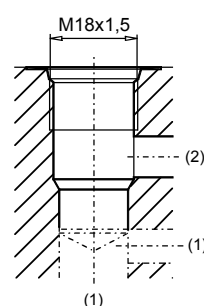
DIMENSIONS

Screw adjustment "S"

Knob adjustment "D"



Cavity drawing to
ISO 7789-18-02-0-98



Detailed cavity drawing and cavity
tools see data sheet 2.13-1001.

PARTS LIST

Position	Article	Discription
10	592.1100 592.1101 592.1102	BV.PM18- 63 pre-mounted BV.PM18-160 pre-mounted BV.PM18-350 pre-mounted
20	114.2224	Knob
30	193.1061	Safety plate RD6 DIN 6799
40	153.1402	Hexagonal nut 0,5D M8x1
50	160.2156	O-ring ID 15,6x1,78
60	160.2093	O-ring ID 9,25x1,78
70	49.3137	Back-up ring RD 10,6x13,5x1,4

ACCESSORIES

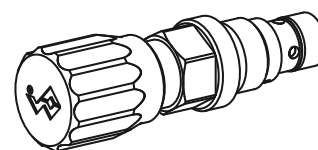
Pressure relief valve:	
Flange-/sandwich plate NG3-Mini	Data sheet 2.1-600
Back pressure valve:	
Sandwich plate NG3-Mini	Data sheet 2.1-700
Line mount body	Data sheet 2.9-200

Technical explanation see data sheet 1.0-100E

Pressure relief valve
Screw-in cartridge

- Direct operated
- $Q_{\max} = 5 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 315 \text{ bar}$

M18x1,5
ISO 7789


DESCRIPTION

Direct operated pressure relief valve as screw-in cartridge with a thread M18x1,5 and cavity according to ISO draft 7789. The valve is available in two different setting versions: Key setting "S" and turning knob setting "D". Key adjustment "S" is also available with cover, see data sheet 2.0-50. Three standard pressure levels are available: 63, 160 and 315 bar. The cartridge body made of steel is galvanized and therefore rust-protected.

FUNCTION

When the set operating pressure is reached, the poppet spool opens and connects the protected line with the return line to the tank. By means of the adjusting mechanism the poppet spool is pressed onto a hardened seat which is pressed into the lower cartridge opening by a helical spring. Thanks to the poppet/spool principle and the direct operation, these pressure relief valves are rapid acting and free of leakage oil. Therefore they are suitable wherever no leakage must occur in the system and where short opening times are demanded.

APPLICATION

For limiting the operating pressure in hydraulic systems by releasing the oil from the protected oil line P (1) to the outlet/tank return line T (2). The screw-in cartridge is very suitable for mounting in control blocks and is built into the Wandfluh miniature hydraulics NG3 as a functional element in sandwich style plates (vertical combination) and flange-mounted valves (please refer to the separate data sheets in register 2.1). Stepped tools are available for making the receptacle bores in steel and aluminium (Hire or purchase). Please refer to the data sheets in register 2.13.

Attention: Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

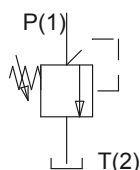
		B	S	☐	PM18 -	☐	#	☐
Pressure relief valve								
Direct operated, poppet spool								
Type of adjustment	Key	☐	S					
	Control knob	☐	D					
	Cover	☐	A	(see data sheet 2.0-50)				
Screw-in cartridge M18x1,5								
Pressure range p_N	63 bar	☐	63					
	160 bar	☐	160					
	315 bar	☐	315					
Design-Index (Subject to change)								

GENERAL CHARACTERISTICS

Description	Direct operated pressure relief valve
Construction	Screw-cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M18x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening	$M_D = 30 \text{ Nm}$
Weight	$m = 0,11 \text{ kg}$ (key) $m = 0,12 \text{ kg}$ (control knob)

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 80 \text{ bar}$
Nominal pressure range	$p_N = 63 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 315 \text{ bar}$
Minimum pressure	see characteristics
Volume flow	$Q = 0,1...5 \text{ l/min}$
Leakage volume flow	Maximum 4 drops/min (up to 80 % of the adjusted pressure)

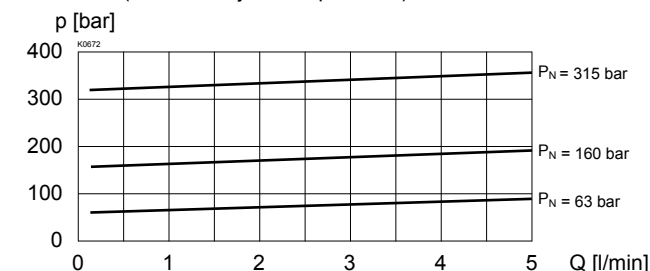
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 3 different versions:

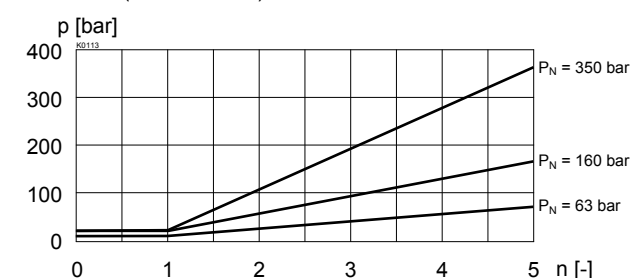
S	= Key adjustment by means of Span key and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

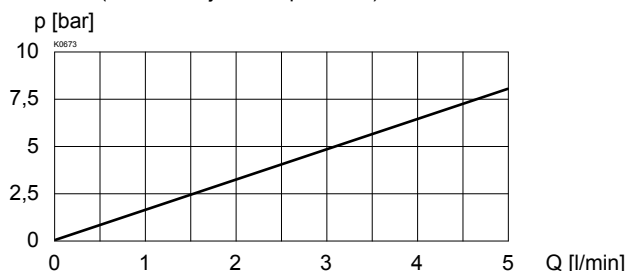
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 1 \text{ l/min}$)



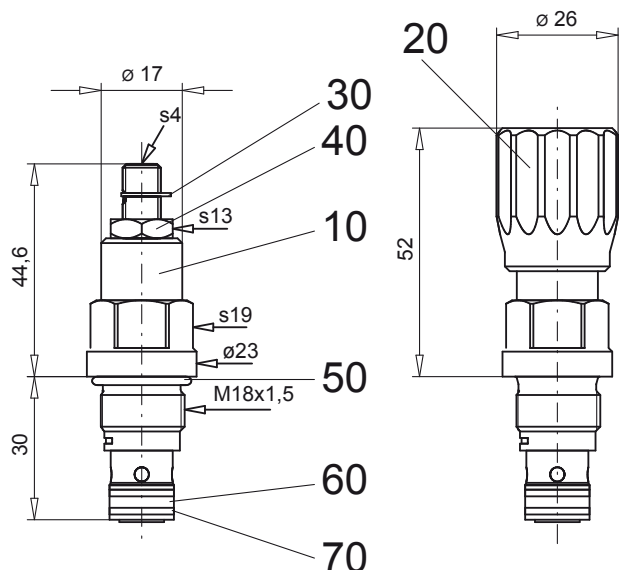
$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



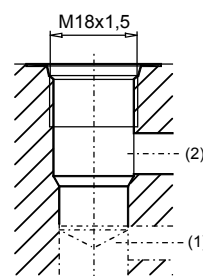
DIMENSIONS

Screw adjustment "S"

Knob adjustment "D"



Cavity drawing to
ISO 7789-18-02-0-98



Detailed cavity drawing and cavity
tools see data sheet 2.13-1001.

PARTS LIST

Position	Article	Discription
10	592.1103 592.1104 592.1105	BS.PM18- 63 pre-mounted BS.PM18-160 pre-mounted BS.PM18-350 pre-mounted
20	114.2224	Knob
30	193.1061	Safety plate RD6 DIN 6799
40	153.1402	Hexagonal nut 0,5D M8x1
50	160.2156	O-ring ID 15,6x1,78
60	160.2093	O-ring ID 9,25x1,78
70	49.3137	Back-up ring RD 10,6x13,5x1,4

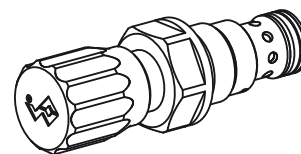
ACCESSORIES

Pressure relief valve:	
Flange-/sandwich plate NG3-Mini	Data sheet 2.1-600
Back pressure valve:	
Sandwich plate NG3-Mini	Data sheet 2.1-700
Line mount body	Data sheet 2.9-200

Technical explanation see data sheet 1.0-100

Pressure relief valve
Screw-in cartridge

- Pilot operated
- $Q_{max} = 100 \text{ l/min}$
- $p_{max} = 400 \text{ bar}$
- $p_{Nmax} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Pilot operated pressure relief valve as screw-in cartridge with a thread M22x1,5 and cavity according to ISO draft 7789. The valve is available in two different setting versions: Key setting "S" and turning knob setting "D". Key adjustment "S" is also available with cover, see data sheet 2.0-50. Three standard pressure levels are available: 63, 160 and 350 bar. The cartridge body made of steel is galvanized and therefore rust-protected.

FUNCTION

When the set operating pressure is reached, the main spool opens and connects the protected line with the return line to the tank. These pressure relief valves consist of a main-and a pilot operation system integrated into the cartridge. The pilot operation is a direct operated pressure relief valve which acts on the main system. The helical spring of the pilot operation can be easily set to the desired operating pressure. Pilot operated pressure relief valves can be very sensitively adjusted and are suitable for large oil flows and high pressure. The very limited play of the hardened spool results in a limited oil leakage.

APPLICATION

For limiting the operating pressure in hydraulic systems by releasing the oil from the protected oil line P (1) to the outlet/tank return line T (2). The screw-in cartridge is very suitable for mounting in control blocks and is built into the Wandfluh hydraulics NG4, NG6 and NG10 as a functional element in sandwich style plates (vertical combination) and flange-mounted valves (please refer to the separate data sheets in register 2.1). Stepped tools are available for making the receptacle bores in steel and aluminium (Hire or purchase). Please refer to the data sheets in register 2.13.

Attention: Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

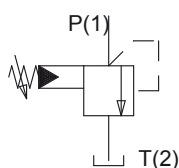
Pressure relief valve		B	V	☐	PM22	-	☐	#	☐
Pilot operated									
Type of adjustment	Key	☐	S						
	Control knob	☐	D						
	Cover	☐	A	(see data sheet 2.0-50)					
Screw-in cartridge M22x1,5									
Pressure range p_N	63 bar	☐	63						
	160 bar	☐	160						
	350 bar	☐	350						
Design-Index (Subject to change)									

GENERAL CHARACTERISTICS

Description	Pilot operated pressure relief valve
Construction	Screw-cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M22x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening	$M_D = 50 \text{ Nm}$
Weight	$m = 0,15 \text{ kg}$ (key) $m = 0,16 \text{ kg}$ (control knob)

HYDRAULIC CHARACTERISTICS

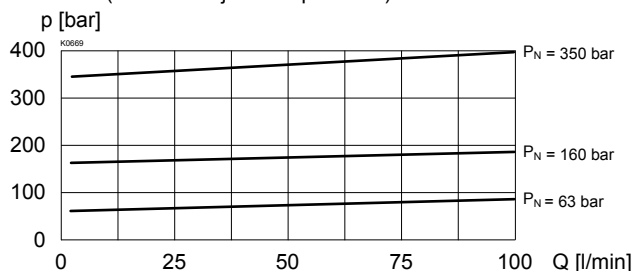
Hydraulic fluid	Mineral oils, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$
Nominal pressure range	$p_N = 63 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Minimum pressure	see characteristics
Volume flow	$Q = 0,2...100 \text{ l/min}$
Leakage volume flow	see characteristics

SYMBOL

MECHANICAL ACTUATION

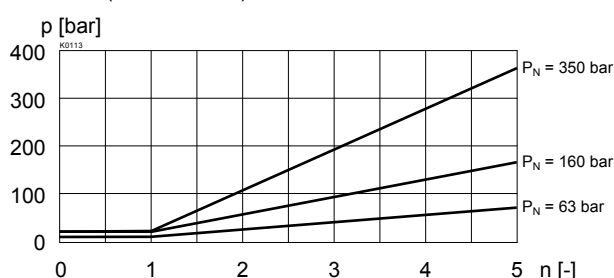
Mechanical types of operation in 3 different versions:	
S	= Key adjustment by means of Span key and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

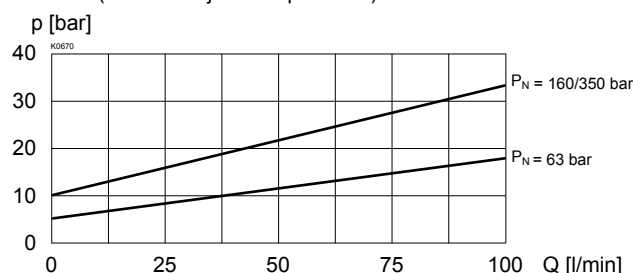
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



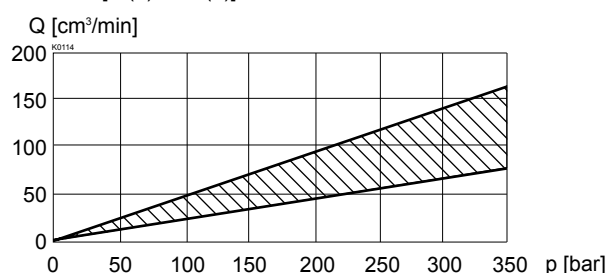
$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)



$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



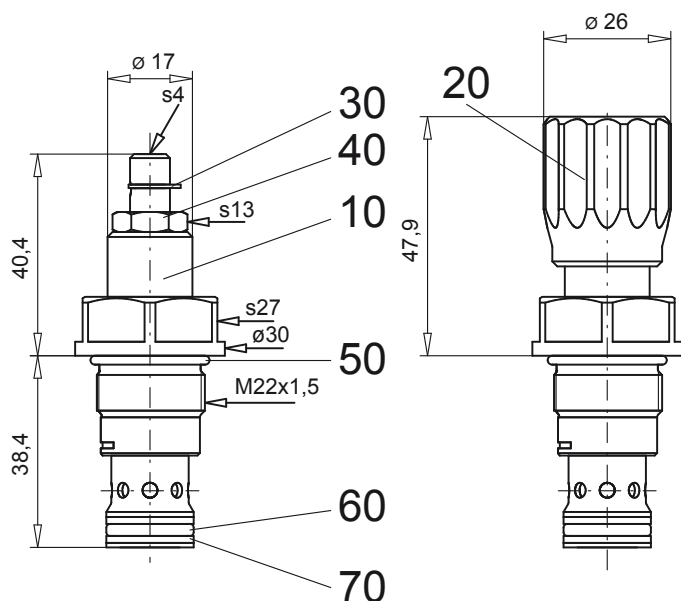
$Q_L = f(p)$ Leakage volume flow characteristics
[P (1) → T (2)]



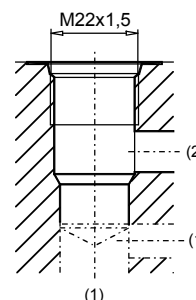
DIMENSIONS

Screw adjustment "S"

Knob adjustment "D"



Cavity drawing to
ISO 7789-22-02-0-98



Detailed cavity drawing and cavity
tools see data sheet 2.13-1003.

PARTS LIST

Position	Article	Description
10	592.4300	BV.PM22- 63 pre-mounted
	592.4301	BV.PM22-160 pre-mounted
	592.4302	BV.PM22-350 pre-mounted
20	114.2224	Knob
30	193.1061	Safety plate RD6 DIN 6799
40	153.1402	Hexagonal nut 0,5D M8x1
50	160.2188	O-ring ID 18,77x1,78
60	160.2140	O-ring ID 14,00x1,78
70	049.3177	Back-up ring RD 14,6x17,5x1,4

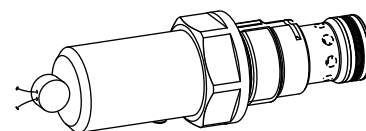
ACCESSORIES

Pressure relief valve:	
Flange-/sandwich plate NG4-Mini	Data sheet 2.1-620
Flange-/sandwich plate NG6	Data sheet 2.1-640
Flange-/sandwich plate NG10	Data sheet 2.1-660
Back pressure valve:	
Sandwich plate NG4-Mini	Data sheet 2.1-720
Sandwich plate NG6	Data sheet 2.1-740
Sandwich plate NG10	Data sheet 2.1-760
Line mount body	Data sheet 2.9-200

Technical explanation see data sheet 1.0-100

Safety valve
EC - type tested
Pressure Equipment Directive 97/23/EC

- **Pilot operated**
- $Q_{max} = 30 \text{ l/min}$
- $p_{N max} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Pilot operated pressure relief valve as screw-in cartridge with thread M22x1,5 for cavity according to ISO 7789. The valve is designed according to AD-2000 and EC-type tested in accordance with the Pressure Equipment Directive 97/23/EC. As standard versions, the following preferential response pressures are available: 100, 140, 250, 330 and 350 bar. Apart from this, within the range of 50 – 350 bar response pressures can be freely selected. The cartridge body made of steel is zinc coated and therefore protected against rust, the colourlessly anodized covering hood and the blue locking seal made of plastic provide this quality product with a clean design.

FUNCTION

When reaching the set and locked seal response pressure, the main spool opens and connects the protected line with the return line to the tank. These pressure relief valves consist of a main and a pilot operation system integrated into the cartridge. The pilot operation is a direct operated pressure relief valve which acts on the main system. These safety valves are suitable for the protection of hydraulic systems with pressure accumulators, resp. pressure reservoirs. The very limited play of the hardened spool results in a limited oil leakage.

APPLICATION

For the protection of the maximum permissible operating pressure in hydraulic systems with pressure accumulators, resp. pressure reservoirs by the flowing out of the oil from the protected oil line P (1) to the tank line T (2). The screw-in cartridge is very suitable for mounting in control blocks and is built into the Wandfluh hydraulics NG6 and NG10 as a functional element in sandwich style plates (vertical combination) and flange-mounted valves (please refer to the separate data sheets in register 2.1). Stepped tools are available for making the receptacle bores in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13. **Attention:** The banking-up pressure in the tank line for Q_{max} must amount to a maximum of 3 bar.

CONTENT

GENERAL SPECIFICATIONS	1
HYDRAULIC SPECIFICATIONS	1
SYMBOL	1
CARACTERISTICS	2
DIMENSIONS	2
PARTS LIST	2
ACCESSORIES	2

TYPE CODE

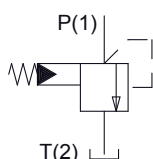
	B	V	T	PM22	-	-	-	#	
Pressure relief valve									
Pilot operated									
EC - Type tested in accordance with PED 97/23/EC									
Screw-in cartridge M22x1,5									
Response pressure range									
50...< 160 bar									A
160...< 260 bar									B
260... 350 bar									C
Response pressure p_A in bar									
Design-Index (Subject to change)									

GENERAL SPECIFICATIONS

Description	EC - type tested safety valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M22x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening	$M_D = 50 \text{ Nm}$
Weight	$m = 0,20 \text{ kg}$
Basic material	The basic material of the hydraulic block has to be selected by the user in accordance with the Pressurised Devices Directives and general safety considerations. For pressures above 160 bar, the manufacturer recommends steel with a minimum tensile strength of 330N/mm ² .

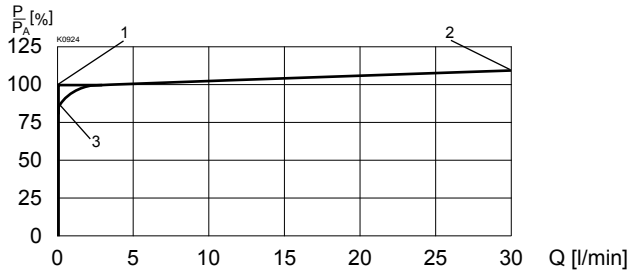
HYDRAULIC SPECIFICATIONS

Hydraulic fluid	Mineral oils, other media on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Ad. volume flow	$Q_{max} = 30 \text{ l/min}$
Leakage volume flow	See curve
Preferential response pressure p_A	100 bar * 140 bar * 250 bar * 330 bar * 350 bar *
Individual response pressure	on request 50... 350 bar
	* $\pm 3\%$

SYMBOL


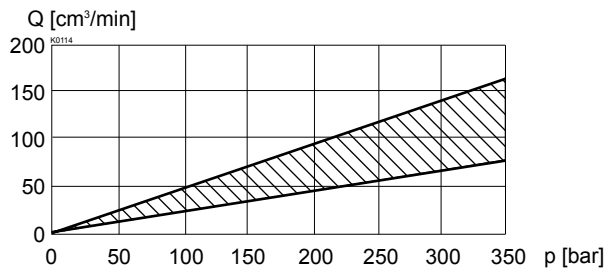
CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p = f(Q)$ Pressure volume flow characteristics

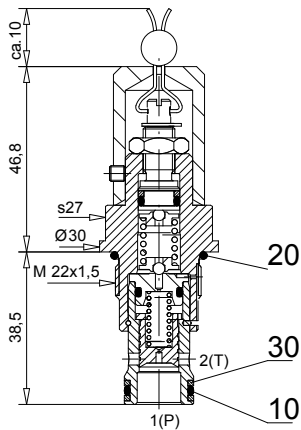


- 1 Response pressure: Response pressure in accordance with type code.
- 2 Blow-off pressure: The blow-off pressure is situated a maximum of 10 % above the response pressure.
- 3 Closing pressure: The closing pressure is situated a maximum of 15 % below the response pressure.

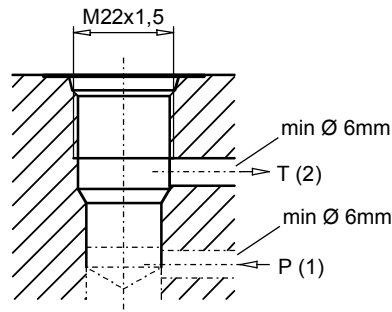
$Q_L = f(p)$ Leakage volume flow characteristics
[P (1) → T (2)]



DIMENSIONS



Cavity drawing to
ISO 7789-22-02-0-98



Detailed cavity drawing and cavity tools
see data sheet 2.13-1003.

PARTS LIST

Position	Article	Description
10	160.2140	O-ring ID 14,00x1,78
20	160.2188	O-ring ID 18,77x1,78
30	049.3177	Back-up ring RD 14,6x17,5x1,4

ACCESSORIES

Cartridge built into flange- or sandwich body:

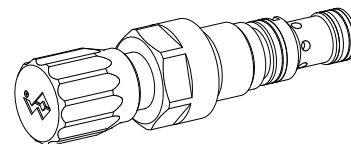
Flange valve register 2.1
Sandwich valve register 2.1

– The operating instructions incl. the EC declaration of conformity is supplied in German, English and French (download under www.wandfluh.com)

Technical explanation see data sheet 1.0-100E

Vented relief valve
Screw-in cartridge

- Pilot operated
- $Q_{max} = 80 \text{ l/min}$
- $p_{max} = 400 \text{ bar}$
- $p_{N max} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Spool type pilot operated relief valve, vented. Thread M22x1,5 and cavity in accordance with ISO 7789. The valve is available in 2 different setting versions: Key setting «S» and turning knob setting «D». Key adjustment «S» is also available with cover, see data sheet 2.0-50. Three standard pressure levels are available: 63, 160 and 350 bar. The steel cartridge body and adjustment spindle are galvanised to protect them from corrosion. The quality of this product is reflected in the good performance data and the relevant design.

FUNCTION

If the operating pressure exceeds a set value, the pilot part opens. A control fluid then starts to flow and relieves the back of the spool in the direction of the tank. The pressure difference generated displaces the spool towards the spring and the valve opens the closed pipe to the tank. When the excess pressure has been reduced, the pilot control interrupts the flow of control fluid and the pressures at the spool are equilibrated. The spring displaces the spool and the valve closes. If the control pipe x is switched to unpressurised by an external valve, the pressure shut off valve switches to an unpressurised circuit.

APPLICATION

To limit the operating pressure in hydraulic systems. The valve function can be remote controlled via connection x. When relieving/opening control pipe x (3), the circuit is more or less unpressurised. The screw in cartridge is very suitable for installing in control blocks. Cavity tools are available for hire or sale for machining aluminium and steel. Please refer to data sheet 2.13. **Attention:** Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

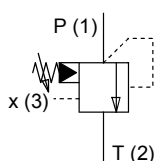
		B	V	☐	PM22 -		- Z9	#	
Pressure relief valve									
Pilot operated									
Type of adjustment	Key	☐		☐					
	Control knob	☐		☐					
	Cover	☐		(see data sheet 2.0-50)					
Screw-in cartridge M22x1,5									
Pressure range p_N	63 bar	☐		☐					
	160 bar	☐		☐					
	350 bar	☐		☐					
Additional description									
Design-Index (Subject to change)									

GENERAL SPECIFICATIONS

Description	Pilot operated relief valve, vented
Construction	Screw-in cartridge to ISO 7789
Mounting	Screw-in thread M22x1,5 to ISO 7789
Ambient temperature	-20...+50 °C
Mounting position	any
Fastening torque	$M_D = 50 \text{ Nm}$
Weight	$m = 0,21 \text{ kg}$ $m = 0,22 \text{ kg}$ (control knob)

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$
Fluid temperature	-20...+70 °C
Nominal pressure	$p_N = 63 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Volume flow	$Q = 0,5...80 \text{ l/min}$
Minimal pressure	see curve
Leakage volume flow	see data sheet 2.1-530

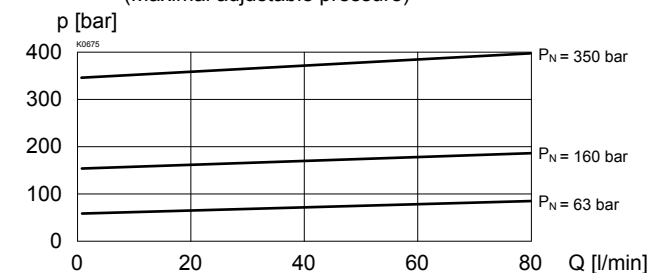
SYMBOL

CONTROL MECHANICAL

Mechanical types of operation in 2 different versions:

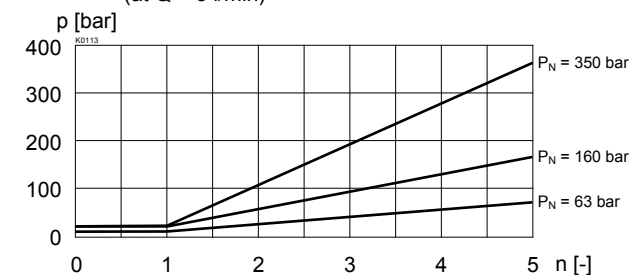
S	= Screw adjustment with fork wrench and Allen key
D	= Control knob adjustment, fixed
Stroke S_b	= 5 mm
Angle α_b	= 180° (5 Turns)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

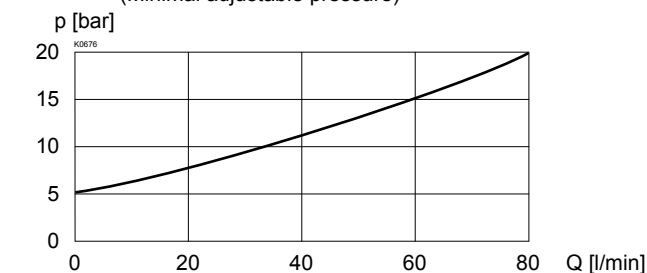
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



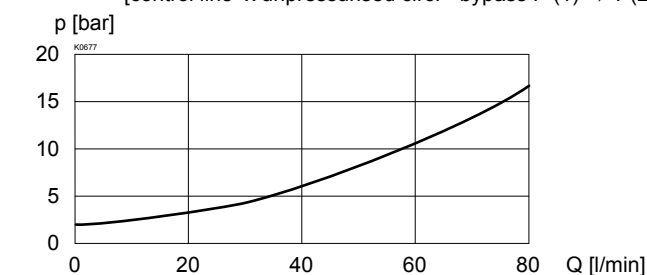
$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)



$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



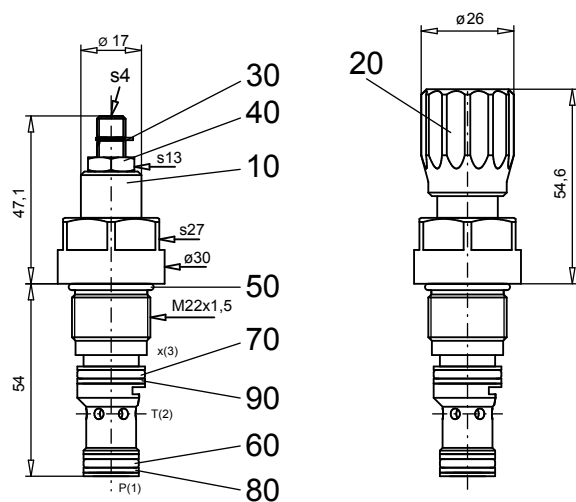
$\Delta p = f(Q)$ Pressure volume flow characteristics
[control line x unpressurised circ. - bypass P (1) → T (2)]



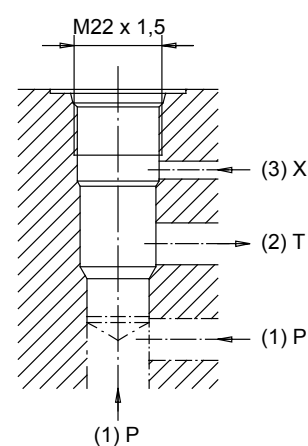
DIMENSIONS

Screw adjustment «S»

Knob adjustment «D»



Cavity drawing to
ISO 7789-22-07-0-98



For detailed cavity drawing and cavity
tools see data sheet 2.13-1007.

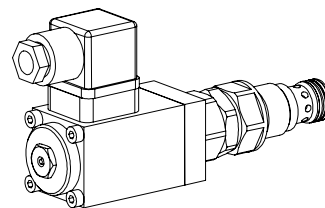
PARTS LIST

Position	Article	Discription
20	114.2224	Knob
30	193.1061	Safty plate RD6 DIN 6799
40	153.1402	Hexagon nut 0,5D M8x1
50	160.2188	O-ring ID 18,77x1,78
60	160.2120	O-ring ID 12,42x1,78
70	160.2156	O-ring ID 15,60x1,78
80	049.3157	Back-up ring RD 12,6x15,5x1,4
90	049.3196	Back-up ring RD 16,1x19x1,4

Technical explanation see data sheet 1.0-100E

Pressure relief valve solenoid operated
Screw-in cartridge

- **Pilot operated**
- $Q_{max} = 100 \text{ l/min}$
- $p_{max} = 400 \text{ bar}$
- $p_{Nmax} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Pilot operated pressure relief valve, solenoid activated with mechanical pressure adjustment. With activated solenoid the valve will shift to maximum adjusted pressure. Screw-in cartridge with M22x1,5 thread, in accordance with ISO 7789. Standard pressure ranges: 63, 160, 350 bar. The solenoid is used to either activate or deactivate the valve, and may be rotated through 360°. Solenoid power = 18 W. External parts are zinc coated or phosphated. Caution: Standard solenoids with 22Watt power consumption may not be used on this valve.

FUNCTION

The valve consists of a main stage and integrated pilot stage. When working pressure setting is reached main spool opens and connects pressure port with tank port. The spring in the pilot stage can easily be adjusted by means of a hexagon nut. With de-energised solenoid the valve is in unloading mode. This pilot operated pressure relief valve can be adjusted very sensitively and is suitable for large oil flows and high pressures. This device is concerning hydraulic performance equal to the pilot operated pressure relief valve BV.PM22.

APPLICATION

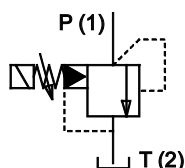
For limiting the operating pressure in hydraulic systems. Oil will be relieved from protected line P to return line T. The solenoid for loading and unloading allows remote control of the system pressure. The Screw-in cartridge is ideally suited for installation in HIC blocks and is also utilised in Wandfluhs range of NG4, NG6 and NG10 sandwich and flange mounted valves. See data sheet register No 2.1 Cavity tools are available for hire or sale for machining aluminium or steel. See data sheet register No 2.13. **Attention:** Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

Pressure relief valve	B	V	E	PM22	-		-		#	
Pilot operated										
Electric operated										
Screw-in cartridge M22x1,5										
Nominal pressure range p_N	63 bar	63								
	160 bar	160								
	350 bar	350								
Nominal voltage U_N / nominal power P_N										
12VDC/18W	G12	110VAC/18W				R110				
24VDC/18W	G24	115VAC/18W				R115				
		230VAC/18W				R230				
Design-Index (Subject to change)										

GENERAL SPECIFICATIONS

Denomination	Pilot operated pressure relief valve solenoid operated
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Mounting	Screw-in thread M22x1,5
Mounting position	any
Ambient temperature	-20...+50°C
Weight	m = 0.76 kg
Fastening torque	$M_D = 50 \text{ Nm}$ for cartridge $M_D = 2,8 \text{ Nm}$ (Qual. 8.8) for fastening screws of solenoid

SYMBOL

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$
Nominal pressure	$p_N = 63 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$ Note: Max. adjustable pressure may exceed nominal pressure by up to 30% depending on production tolerances
Minimal pressure	see characteristics
Volume flow	$Q = 0,2...100 \text{ l/min}$
Leakage volume flow	see characteristics

ELECTRICAL SPECIFICATIONS

Design	Solenoid, wet pin push type, pressure tight
Nominal voltage	U _N = 12 VDC, 24 VDC U _N = 110 VAC*, 115 VAC*, 230 VAC* AC = 50 to 60 Hz * Connector plug with integrated rectifier
Voltage tolerance	±10 % of nominal voltage.
Protection class	IP 65 according to EN 60 529
Relative duty factor	100% ED (See data sheet 1.1-430)
Switching cycles	15'000/h
Operating life (number of switching cycles)	10 ⁷
Connection/Power supply	Over device plug connection to ISO 4400/DIN 43650, (2P+E), other connections on request
Solenoid type:	- Medium SIN35V (data sheet 1.1-105)

OPERATING PRESSURE

The desired operating pressure is set by means of a knob and is only reached with the solenoid activated. By-pass circulation is obtained when the solenoid is switched to no current.

Pressure adjustment:

Actuation stroke

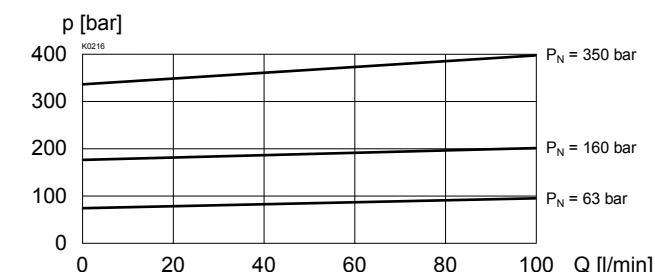
$$S_s = 2,5 \text{ mm}$$

Actuation angle

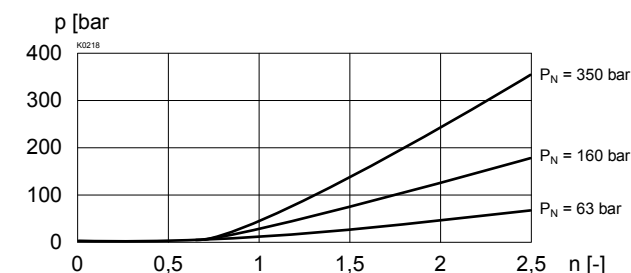
 $\alpha_b = 1080^\circ$ (3 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)

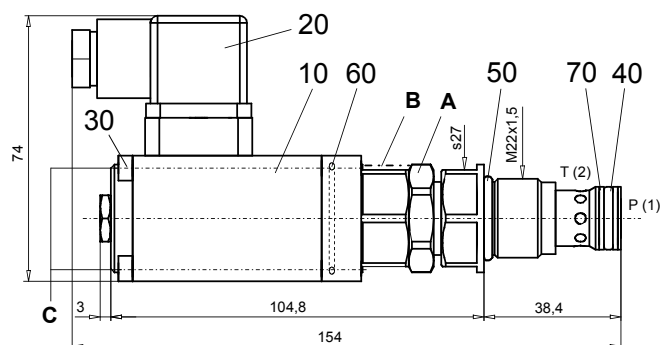


SECTIONAL DRAWING/PRESSURE ADJUSTMENT

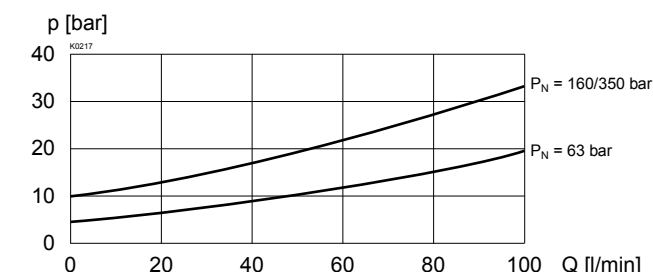
For detailed cavity drawing ISO 7789-22-02-0-98 and cavity tools
see data sheet 2.13-1003

Pressure is only adjustable with activated solenoid.

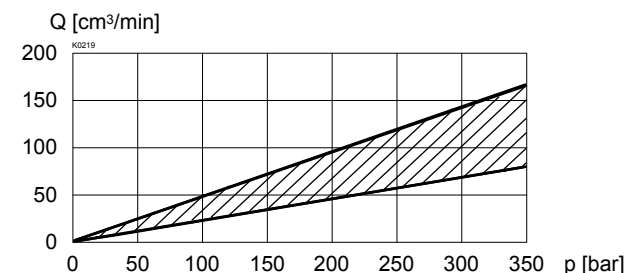
- 1) Loose lock nut **A**
- 2) Turn knob **B** and solenoid until required system pressure is adjusted
- 3) Fix turning knob **B** with lock nut **A**
- 4) Loose screws **C** slightly, turn solenoid into required position.
(Attention: Solenoid stays under tank pressure.)
- 5) Thighten screws **C** with torque (M_n 2,8 Nm)



$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



$Q_L = f(p)$ Leakage volume flow characteristics
P (1) → T (2)



PARTS LIST

Position	Article	Description
10	260.4...	Solenoid SIN35V-... -L18
20	219.2002	Plug (black)
30	249.1007	Socket head cap screw M4x63
40	160.2140	O-ring ID 14,0x1,78
50	160.2188	O-ring ID 18,77x1,78
60	160.2283	O-ring ID 28,3x1,78
70	049.3177	Back-up ring RD 14,5x17,5x1,4

ACCESSORIES

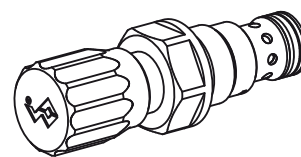
Flange-/sandwich plate NG4-Mini	Data sheet 2.1-620
Flange-/sandwich plate NG6	Data sheet 2.1-640
Flange-/sandwich plate NG10	Data sheet 2.1-660
Line mount body	Data sheet 2.9-200

Technical explanation see data sheet 1.0-100

Leakage-free pressure relief valve
Screw-in cartridge

- **Pilot operated**
- $Q_{max} = 100 \text{ l/min}$
- $p_{max} = 450 \text{ bar}$
- $p_{N max} = 420 \text{ bar}$

M22x1,5
ISO 7789


DESCRIPTION

Pilot operated pressure relief valve, leakage-free as screw-in cartridge with a thread M22x1,5 and cavity according to ISO draft 7789. The valve is available in two different setting versions: Key setting "S" and turning knob setting "D". Key adjustment "S" is also available with cover, see data sheet 2.0-50. Four standard pressure levels are available: 63, 160, 350 and 420 bar. The cartridge body made of steel is galvanized and therefore rust-protected.

FUNCTION

When the set operating pressure is reached, the main spool opens and connects the protected line with the return line to the tank. These pressure relief valves consist of a main-and a pilot operation system integrated into the cartridge. The pilot operation is a direct operated pressure relief valve which acts on the main system. The helical spring of the pilot operation can be easily set to the desired operating pressure. Pilot operated pressure relief valves can be very sensitively adjusted and are suitable for large oil flows and high pressure. The hardened tight seating spool results in a valve free of leakage oil.

APPLICATION

For limiting the operating pressure in hydraulic systems by releasing the oil from the protected oil line P (1) to the outlet/tank return line T (2). The screw-in cartridge is very suitable for mounting in control blocks and is built into the Wandfluh hydraulics NG4, NG6 and NG10 as a functional element in sandwich style plates (vertical combination) and flange-mounted valves (please refer to the separate data sheets in register 2.1). Stepped tools are available for making the receptacle bores in steel and aluminium (Hire or purchase). Please refer to the data sheets in register 2.13.

Attention: Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

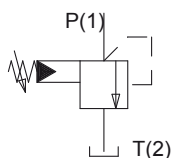
		B	C	☐	PM22	-		#	
Pressure relief valve									
Pilot operated, leakage-free									
Type of adjustment	Key	☐	S						
	Control knob	☐	D						
	Cover	☐	A	(see data sheet 2.0-50)					
Screw-in cartridge M22x1,5									
Pressure range p_N	63 bar	☐	63						
	160 bar	☐	160						
	350 bar	☐	350						
	420 bar	☐	420						
Design-Index (Subject to change)									

GENERAL CHARACTERISTICS

Description	Pilot operated pressure relief valve
Construction	Screw-cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M22x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening	$M_D = 50 \text{ Nm}$
Weight	$m = 0,15 \text{ kg}$ (key) $m = 0,16 \text{ kg}$ (control knob)

HYDRAULIC CHARACTERISTICS

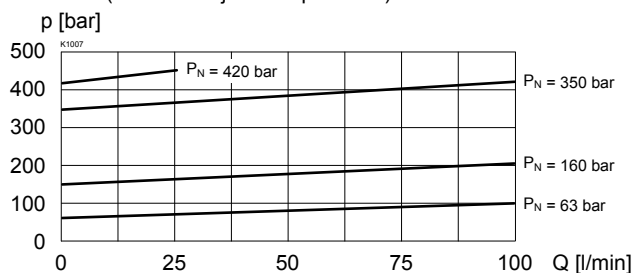
Hydraulic fluid	Mineral oils, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{max} = 450 \text{ bar}$ $p_{Tmax} = 450 \text{ bar}$
Nominal pressure range	$p_N = 63 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$, $p_N = 420 \text{ bar}$ see characteristics
Minimum pressure	see characteristics
Volume flow	$Q = 0,2...100 \text{ l/min}$

SYMBOL

MECHANICAL ACTUATION

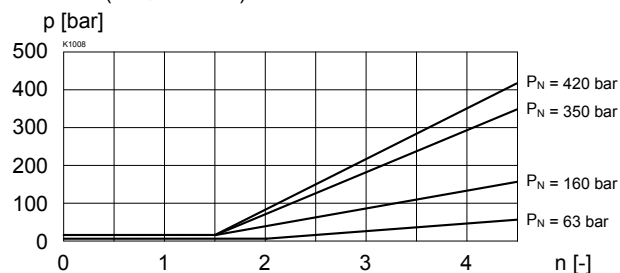
Mechanical types of operation in 3 different versions:	
S	= Key adjustment by means of Span key and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (4,5 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

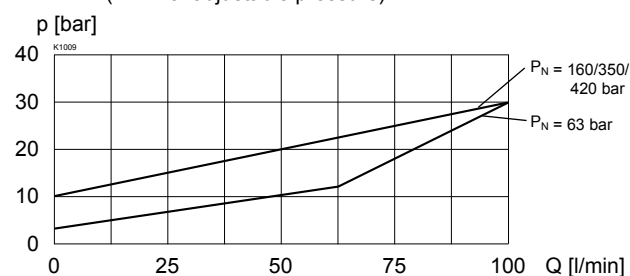
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)



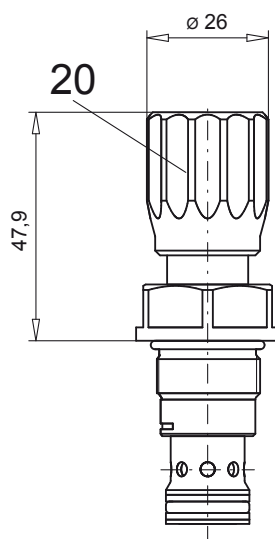
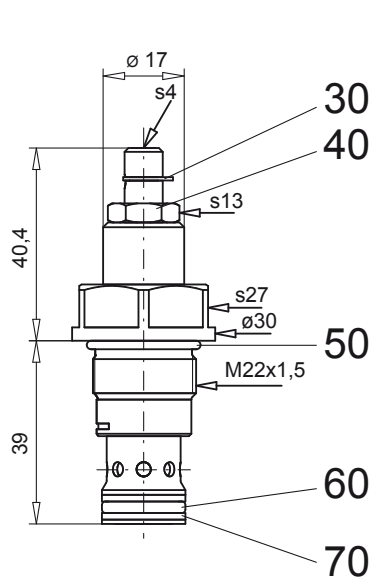
$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



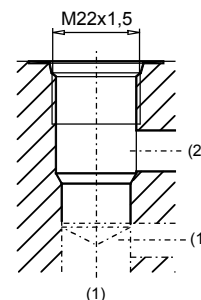
DIMENSIONS

Screw adjustment "S"

Knob adjustment "D"



Cavity drawing to
ISO 7789-22-02-0-98



Detailed cavity drawing and cavity
tools see data sheet 2.13-1003.

PARTS LIST

Position	Article	Discription
20	114.2224	Knob
30	193.1060	Safety plate RD6,5
40	153.1402	Hexagonal nut 0,5D M8x1
50	160.2188	O-ring ID 18,77x1,78
60	160.2140	O-ring ID 14,00x1,78
70	049.3177	Back-up ring RD 14,6x17,5x1,4

ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.1-620
Flange-/sandwich plate NG6	Data sheet 2.1-640
Flange-/sandwich plate NG10	Data sheet 2.1-660
Line mount body	Data sheet 2.9-200

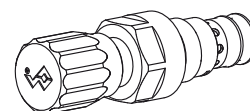
Technical explanation see data sheet 1.0-100

Pressure relief valve

Screw-in cartridge

- Direct operated
- $Q_{\max} = 25 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 315 \text{ bar}$

M22x1,5
ISO 7789



DESCRIPTION

Direct operated pressure relief valve as screw-in cartridge with a thread M22x1,5 and cavity according to ISO draft 7789. The valve is available in two different setting versions: Key setting "S" and turning knob setting "D". Key adjustment "S" is also available with cover, see data sheet 2.0-50. Three standard pressure levels are available: 63, 210 and 315 bar. The cartridge body made of steel is galvanized and therefore rust-protected.

FUNCTION

When the set operating pressure is reached, the poppet spool opens and connects the protected line with the return line to the tank. By means of the adjusting mechanism, the poppet spool is pressed onto a seat which is screwed into the lower cartridge opening by a helical spring. The poppet spool is opened and closed hydraulically damped. This makes the operation of this cartridge very stable. Thanks to the poppet/spool principle and the direct operation, these pressure relief valves are rapid acting and free of leakage oil. The reduced diameter of the seat produces a higher pressure drop and a lower flow throughput performance than pilot operated valves of the same size.

APPLICATION

For limiting the operating pressure in hydraulic systems by releasing the oil from the protected oil line P (1) to the outlet/tank return line T (2). The screw-in cartridge is very suitable for mounting in control blocks and is built into the Wandfluh miniature hydraulics NG4, NG6 and NG10 as a functional element in sandwich style plates (vertical combination) and flange-mounted valves (please refer to the separate data sheets in register 2.1). Stepped tools are available for making the receptacle bores in steel and aluminium (Hire or purchase). Please refer to the data sheets in register 2.13.

Attention: Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

Pressure relief valve		B	A	☐	PM22 -	☐	#	☐
Direct operated, poppet spool								
Type of adjustment	Key	☐	S					
	Control knob	☐	D					
	Cover	☐	A	(see data sheet 2.0-50)				
Screw-in cartridge M22x1,5								
Pressure range p_N	63 bar	☐	63					
	210 bar	☐	210					
	315 bar	☐	315					
Design-Index (Subject to change)								

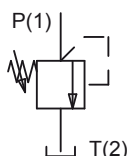
GENERAL CHARACTERISTICS

Description	Direct operated pressure relief valve
Construction	Screw-cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M22x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening	$M_D = 50 \text{ Nm}$
Weight	$m = 0,19 \text{ kg}$ (key) $m = 0,20 \text{ kg}$ (control knob)

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 20 \text{ bar}$
Nominal pressure range	$p_N = 63 \text{ bar}$, $p_N = 210 \text{ bar}$, $p_N = 315 \text{ bar}$
Minimum pressure	see characteristics
Volume flow	$Q = 0,1...25 \text{ l/min}$
Leakage volume flow	Maximum 4 drops/min (up to 80 % of the adjusted pressure)

SYMBOL



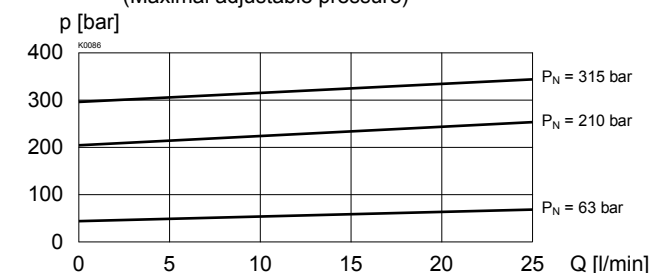
MECHANICAL ACTUATION

Mechanical types of operation in 3 different versions:

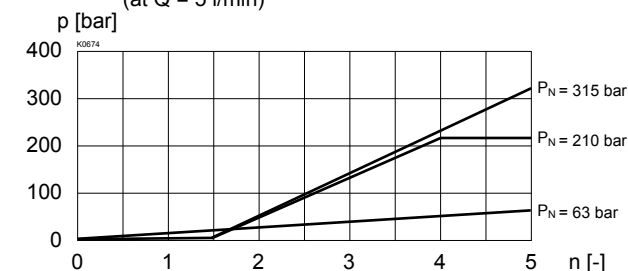
S	= Key adjustment by means of Span key and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 1800° (5 revolutions) at $p_N = 210 \text{ bar}$ 1400° (4 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

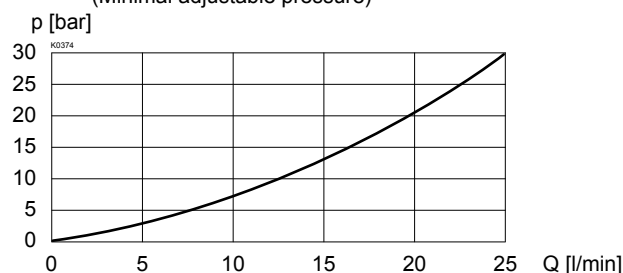
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)



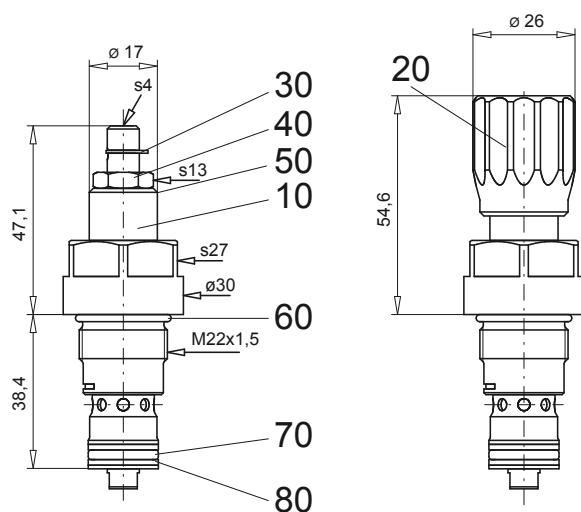
$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



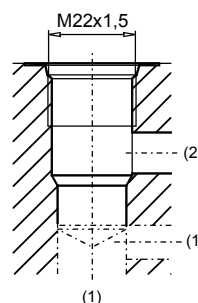
DIMENSIONS

Screw adjustment "S"

Knob adjustment "D"



Cavity drawing to
ISO 7789-22-02-0-98



Detailed cavity drawing and cavity
tools see data sheet 2.13-1003.

PARTS LIST

Position	Article	Description
10	592.4303	BA.PM22-63 pre-mounted
	592.4304	BA.PM22-210/350 pre-mounted
20	114.2224	Knob
30	193.1061	Safety plate RD6 DIN 6799
40	153.1402	Hexagonal nut 0,5D M8x1
50	212.1486	Plate (only for $p_N = 210 \text{ bar}$)
60	160.2188	O-ring ID 18,77x1,78
70	160.2140	O-ring ID 14,00x1,78
80	049.3177	Back-up ring RD 14,6x17,5x1,4

ACCESSORIES

Pressure relief valve:

Flange-/sandwich plate NG4-Mini

Data sheet 2.1-620

Flange-/sandwich plate NG6

Data sheet 2.1-640

Flange-/sandwich plate NG10

Data sheet 2.1-660

Back pressure valve:

Sandwich plate NG4-Mini

Data sheet 2.1-720

Sandwich plate NG6

Data sheet 2.1-740

Sandwich plate NG10

Data sheet 2.1-760

Line mount body

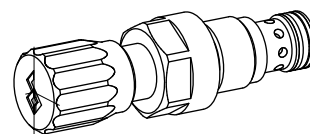
Data sheet 2.9-200

Technical explanation see data sheet 1.0-100

Pressure relief valve
Screw-in cartridge

- **Direct operated**
- $Q_{\max} = 100 \text{ l/min}$
- $p_{\max} = 100 \text{ bar}$
- $p_{N\max} = 32 \text{ bar}$

M22x1,5
ISO 7789


DESCRIPTION

Directly operated pressure relief valve in screw-in cartridge construction with M22x1,5 thread for cavity acc. to ISO 7789. The valve is available with two different types of adjustment: key adjustment «S» and control knob adjustment «D». Key adjustment «S» is also available with cover, see data sheet 2.0-50. One pressure stage, 32 bar, is available as standard. The cartridge body made of steel is galvanized and therefore rust-protected.

FUNCTION

The adjustment mechanism keeps the control spool in its end position by means of a coil spring. When the set operating pressure has been reached, the main spool opens and connects the protected line with the return to the tank. This means that the pressure occurring in P is relieved to T until the spring force returns the valve spool to its end position.

APPLICATION

For hydraulic systems with low operating pressures and high volume flows to limit the operating pressure by diverting the flow of the oil from the protected line P (1) to the outlet/tank line T (2). The screw cartridges are very well suited for installation in control blocks and are installed as a functioning part in Wandfluh hydraulics NG4, NG6 and NG10 sandwich plates (vertical stacking) and flange valves (please see separate data sheets in register 2.1). Cavity tools are available (for hire or purchase) for the manufacture of cartridge cavities in steel or aluminium blocks. See data sheets in register 2.13.

Attention: Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

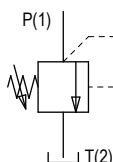
		B	K	☐	PM22	-	32	#	☐
Pressure relief valve									
Direct operated, control spool									
Type of adjustment	Key ☐ S								
	Control knob ☐ D								
	Cover ☐ A (see data sheet 2.0-50)								
Screw cartridge M22x1,5									
Pressure range p_N 32 bar									
Design-Index (Subject to change)									

GENERAL CHARACTERISTICS

Description	Directly operated pressure relief valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Type of fixture	M22x1.5 screw thread
Ambient temperature	-20...+50 °C
Installation position	any
Tightening torque	$M_D = 50 \text{ Nm}$
Weight	$m = 0,18 \text{ kg}$ (key) $m = 0,19 \text{ kg}$ (control knob)

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other fluids on request
Max permissible contamination level	ISO 4406:1999, class 18/16/13 (recommended filter gauge $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Hydraulic fluid temp.	-20...+70 °C
Peak pressure	$p_{\max} = 100 \text{ bar}$ $p_{T\max} = p_p + 20 \text{ bar}$ $p_N = 32 \text{ bar}$
Rated pressure stage	see curve
Minimum pressure	see curve
Volume flow	$Q = 0,2...100 \text{ l/min}$
Leak volume flow	see curve

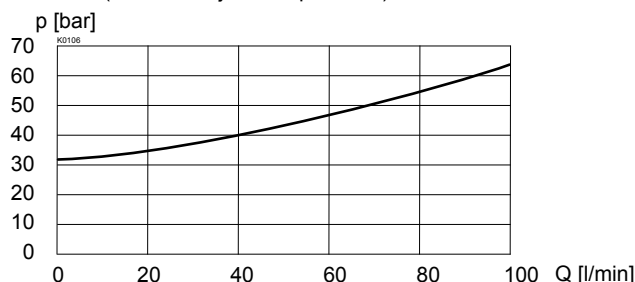
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 2 different versions:

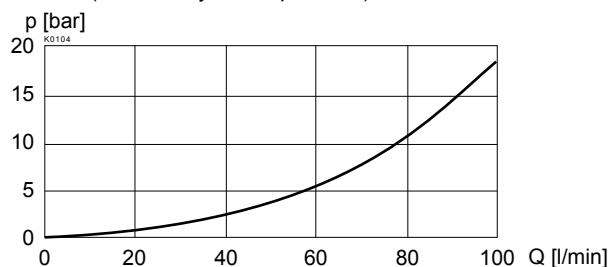
S	= Screw adjustment with fork wrench and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 7 mm
Actuation angle α_b	= 2520° (7 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

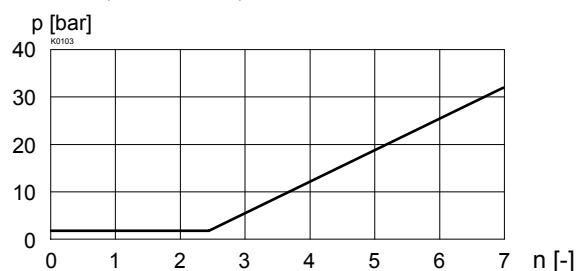
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



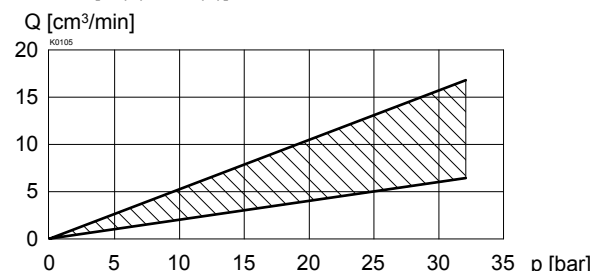
$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)



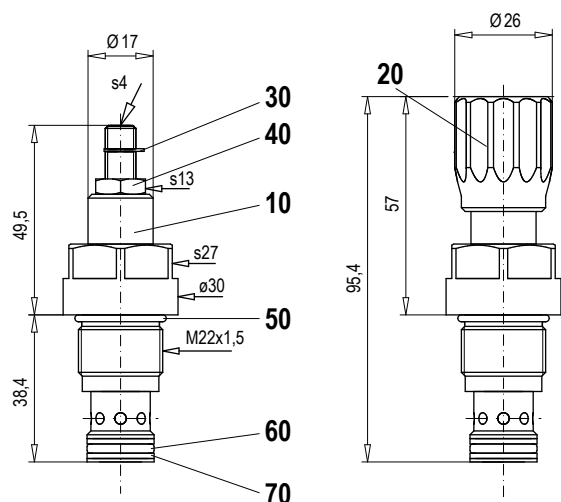
$Q_L = f(p)$ Leakage volume flow characteristics
[P (1) → T (2)]



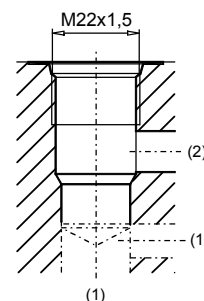
DIMENSIONS

Screw adjustment «S»

Knob adjustment «D»



Cavity drawing to
ISO 7789-22-02-0-98



Detailed cavity drawing and cavity
tools see data sheet 2.13-1003.

PARTS LIST

Position	Article	Discription
10	592.4305	BK.PM22-32 pre mounted
20	114.2224	Knob
30	193.1061	Safety plate RD6 DIN 6799
40	153.1402	Hexagonal nut 0,5D M8x1
50	160.2188	O-ring ID 18,77x1,78
60	160.2140	O-ring ID 14,00x1,78
70	049.3177	Back-up ring RD 14,5x17,5x1,4

ACCESSORIES

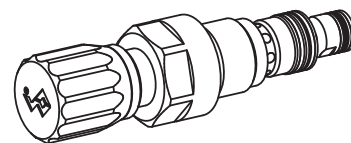
Pressure relief valve:		
Flange-/sandwich plate NG4-Mini		Data sheet 2.1-620
Flange-/sandwich plate NG6		Data sheet 2.1-640
Flange-/sandwich plate NG10		Data sheet 2.1-660
Back pressure valve:		
Sandwich plate NG4-Mini		Data sheet 2.1-720
Sandwich plate NG6		Data sheet 2.1-740
Sandwich plate NG10		Data sheet 2.1-760
Line mount body		Data sheet 2.9-200

Technical explanation see data sheet 1.0-100

Pressure relief valve
Screw-in cartridge

- Direct operated
- $Q_{\max} = 25 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M22x1,5
Wandfluh standard


DESCRIPTION

Direct operated pressure relief valve as a screw-in cartridge with a thread M22x1,5 and cavity according to Wandfluh-Norm. The valve is available in 2 different setting versions: Key setting „S“ and turning knob setting „D“. Key adjustment „S“ is also available with cover see data sheet 2.0-50.2 standard pressure levels are available: 100 bar and 315 bar. The cartridge body made of steel is galvanized and therefore rust-protected.

FUNCTION

BX: If pressure in pilot line x reaches the set pressure poppet spool will be pushed against the spring. Oil passage from P to T line will be opened-up irrespective of pressure in P line, this due to a drain connection separating x and P line. Poppet spool and pilot piston are physically linked.

BY: If pressure in pilot line x reaches the set pressure poppet spool will be pushed against the spring. Oil passage from P to T line will be opened-up. Poppet spool and pilot piston are separate items. Due to the area ratio of the pilot the required pilot pressure in x line is lower than pressure in P line by the percentage of the differential pressure.

APPLICATION
BX:

Used to pilot e.g.a logic elements with must relief independent of system pressure.

BY:

Used to pilot e.g.a logic element with loading/unloading and relief function in an accumulator or dual pump system.

For machining the cavity in steel or aluminium tools are available for rent or sale. See also data sheet in register 2.13

TYPE CODE

Pressure relief valve		B	☐	PM22	-	☐	#	☐
Relief valve remote controlled			☒					
Relief and unloading valve			☒					
Type of adjustment	Key	☒	S					
	Control knob	☐	D					
	Cover	☐	A			(see data sheet 2.0-50)		
Screw cartridge M22x1,5								
Nominal pressure p_N	100 bar	☐	100					
	315 bar	☐	315					
	350 bar	☐	350					
Design-Index (Subject to change)								

GENERAL CHARACTERISTICS

Description	BX: Direct operated relief valve, remote controlled BY: Direct operated relief valve, with additional unloading function
Construction	Screw-in cartridge for cavity acc. to Wandfluh-standard
Mounting	M22x1.5 screw thread
Ambient temperature	-20...+50°C
Installation position	any
Tightening torque	$M_D = 50 \text{ Nm}$
Weight:	$m = 0,20 \text{ kg}$ (key) $m = 0,21 \text{ kg}$ (control knob)

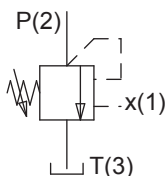
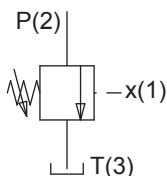
HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other fluids on request
Max permissible contamination level	ISO 4406:1999, class 18/16/13 (recommended filter gauge $\beta_{10...25} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Hydraulic fluid temp.	-20...+70°C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 20 \text{ bar}$
Nominal pressure	$p_N = 100 \text{ bar}, p_N = 315 \text{ bar}, p_N = 350 \text{ bar}$
Min. pressure	see characteristic
Differential pressure (only for BY.PM22)	11% for $p_N = 100 \text{ bar}$ 7,5% for $p_N = 315 \text{ bar}$ and $p_N = 350 \text{ bar}$
Volume flow	$Q = 0,1...25 \text{ l/min}$
Leak volume flow	see characteristic (BX.PM22) tight seating (BY.PM22)

SYMBOLS

BX.PM22

BY.PM22

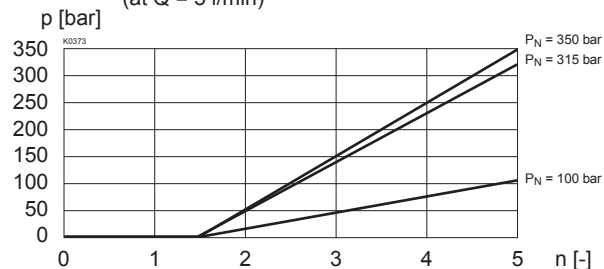

MECHANICAL ACTUATION

2 types of adjustments:

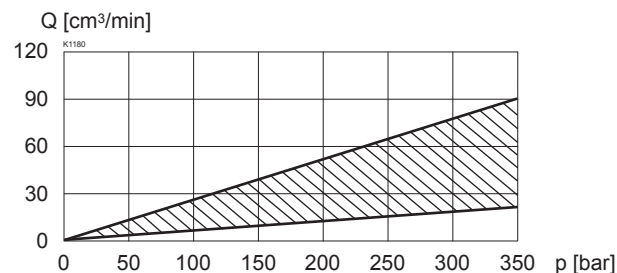
S	= Screw adjustment with fork wrench and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

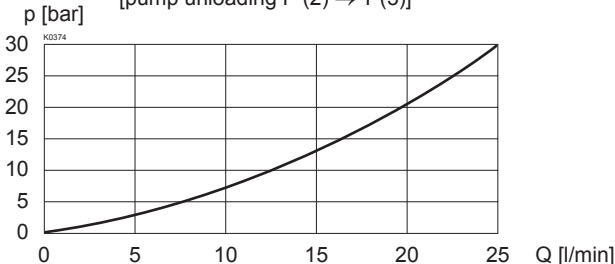
$p = f(n)$ Pressure adjustable characteristics
(at $Q = 5 \text{ l/min}$)



$Q_L = f(p)$ Leakage volume flow characteristics
BX.PM22
[P (2) + x(1) → T (3)]



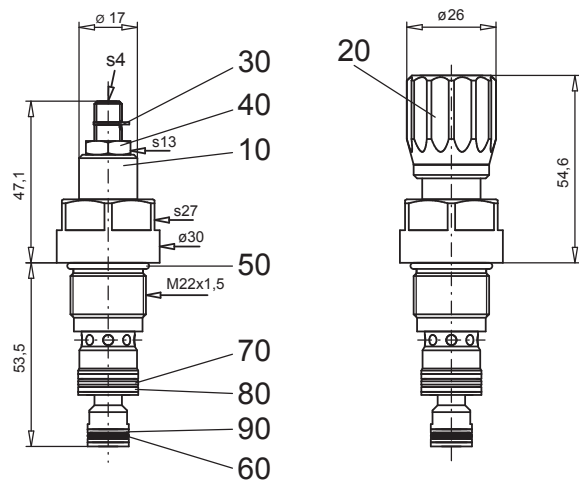
$p = f(Q)$ Pressure volume flow characteristics
[pump unloading P (2) → T (3)]



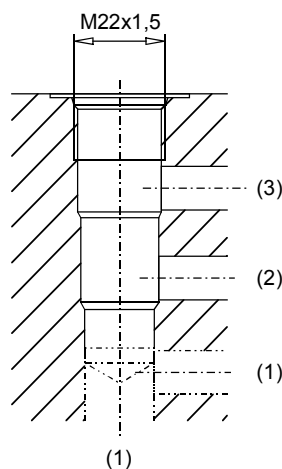
DIMENSIONS

Screw adjustment „S“

Knob adjustment „D“



Cavity drawing acc. to
Wandfluh-Norm



For detailed cavity drawing
and cavity tools see data sheet
2.13-1037.

PARTS LIST

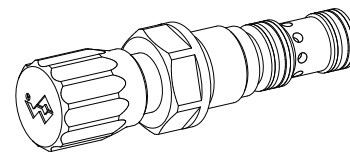
Position	Article	Description
10	592.4308	BX.PM22-100 pre-mounted
	592.4309	BX.PM22-315 pre-mounted
	592.4306	BY.PM22-100 pre-mounted
	592.4307	BY.PM22-315 pre-mounted
20	114.2224	Knob
30	193.1061	Safety plate RD6 DIN 6799
40	153.1402	Hexagonal nut 0,5D M8x1
50	160.2188	O-ring ID 18,77x1,78
60	160.2140	O-ring ID 14,00x1,78
70	160.2087	O-ring ID 8,73x1,78
80	049.3177	Back up ring RD 14,6x17,5x1,4
90	049.3126	Back up ring RD 9,1x12x1,4

Technical explanation see data sheet 1.0-100

Pressure sequence valve
Screw-in cartridge

- Pilot operated
- $Q_{\max} = 100 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M22x1,5
ISO 7789


DESCRIPTION

Pilot operated pressure sequence valve in screw cartridge construction with M22x1,5 thread for cavity acc. to ISO 7789. The valve is available with 2 different types of adjustment: key adjustment „S“ and control knob adjustment „D“ both of which are fixed, and a lockable version „K“. Key adjustment „S“ is also available with cover see data sheet 2.0-50. Three pressure ranges are available as standard: 63, 160 and 350 bar. The steel cartridge body is zinc coated and thus protected against rust.

FUNCTION

The pressure sequence valve connects consumers in hydraulic circuits. Its separate leakage line means that the valve can be used as a pressure relief valve that is not sensitive to ram pressure. When the set pressure has been reached, the pilot operation opens to the tank, thereby opening the main spool to the next consumer. Pilot operated pressure sequence valves can be very finely adjusted and are suitable for high volume flows and pressures. There is very little play in the hardened spool, thus leakage is kept to a minimum.

APPLICATION

For sequence control of operating sequences, whereby a consumer is switched on when a specific pressure is reached. Operates as a pressure relief valve for controls where ram pressure in the secondary line may not affect the pressure setting. The screw cartridges are very well suited for use in control blocks and are installed as functional parts in the Wandfluh-Hydraulik NG4, NG6 and NG10 sandwich plates (vertical stacking). Please see separate data sheets in register 2.1). Step tools are available (for hire or purchase) for the manufacture of the cartridge cavities in steel or aluminium blocks. See data sheets in register 2.13

TYPE CODE

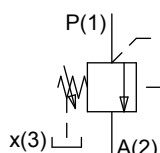
		F	V	☐	PM22	-		#	
Pressure sequence valve									
Pilot operated									
Type of adjustment	Key	☐	S						
	Control knob	☐	D						
	Cover	☐	A	(see data sheet 2.0-50)					
Screw cartridge M22x1,5									
Pressure range p_N	63 bar	☐	63						
	160 bar	☐	160						
	350 bar	☐	350						
Design-Index (Subject to change)									

GENERAL CHARACTERISTICS

Description	Pilot operated pressure sequence valve
Construction	Screw cartridge for cavity acc. to ISO 7789
Type of fixture	M22x1,5 screw thread
Ambient temperature	-20...+50°C
Installation position	any
Tightening torque	$M_D = 50 \text{ Nm}$
Weight	$m = 0,17 \text{ kg}$ (key) $m = 0,18 \text{ kg}$ (control knob)

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oil, other media on request
Max. permissible contamination level	ISO 4406:1999, class 18/16/13 (recommended filter gauge $\beta_{6...10} \geq 75$) see also data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Hydraulic fluid temp.	-20...+70°C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 20 \text{ bar}$
Rated pressure ranges	$p_N = 63 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Minimum pressure	see curve
Volume flow	$Q = 0,2...100 \text{ l/min}$
Leak volume flow	see curve
Control volume flow	$Q_{St} = 0,1...0,4 \text{ l/min}$ (dep. on pressure)

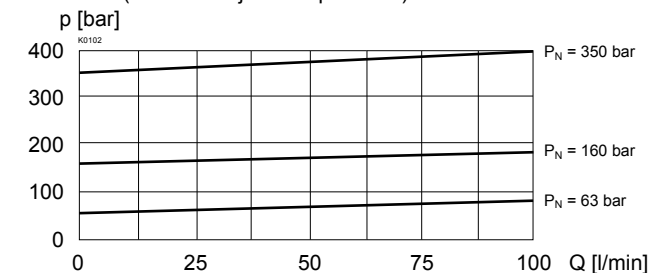
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 2 different versions:

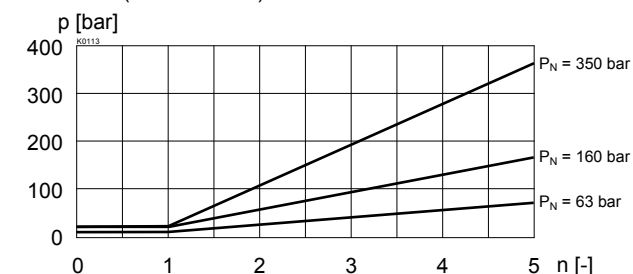
S	= Screw adjustment with fork wrench and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 turns)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

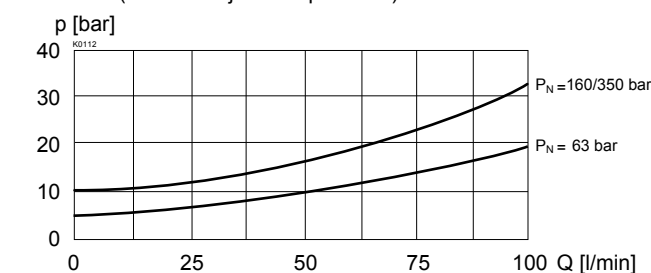
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



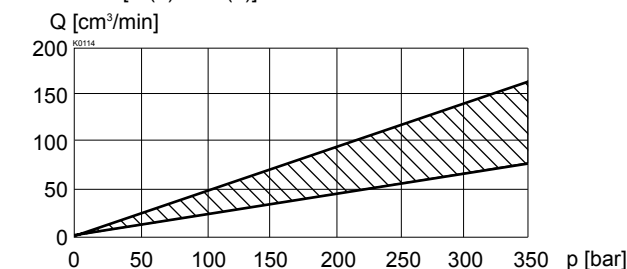
$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)



$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)

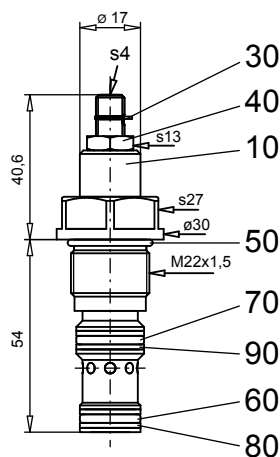


$Q_L = f(p)$ Leakage volume flow characteristics
[P (1) → T (2)]

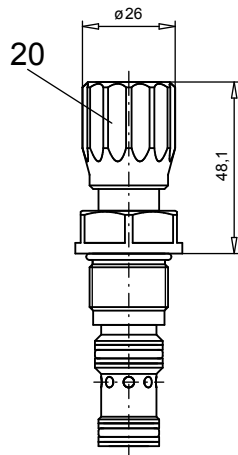


DIMENSIONS

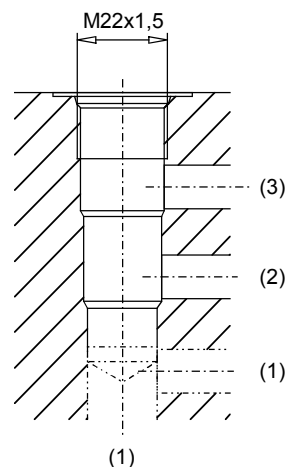
Screw adjustment „S“



Knob adjustment „D“



Cavity drawing acc. to
ISO 7789-22-06-0-98



For detailed cavity drawing and cavity tools see data sheet 2.13-1006.

PARTS LIST

Position	Article	Description
10	592.4320	FV.PM22-63 pre mounted
	592.4321	FV.PM22-160 pre mounted
	592.4322	FV.PM22-350 pre mounted
20	114.2224	Knob
30	193.1061	Safety plate RD6 DIN 6799
40	153.1402	Hexagonal nut 0,5D M8x1
50	160.2188	O-ring ID 18,77x1,78
60	160.2140	O-ring ID 14,00x1,78
70	160.2156	O-ring ID 15,60x1,78
80	049.3176	Back-up ring RD 14,1x17x1,4
90	049.3196	Back-up ring RD 16,1x19x1,4

ACCESSORIES

Sandwich plate NG4-Mini
Sandwich plate NG6
Sandwich plate NG10

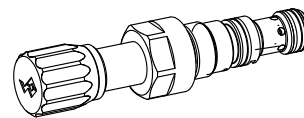
Data sheet 2.1-820
Data sheet 2.1-840
Data sheet 2.1-860

Technical explanation see data sheet 1.0-100

Accumulator unloading valve
Screw-in cartridge

- 1-point adjustment
- Pilot operated
- $Q_{\max} = 30 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M22x1,5
ISO 7789


DESCRIPTION

Spool type pilot operated accumulator unloading valve. Thread M22x1,5 and cavity in accordance with ISO 7789. The valve is available with two types of setting. There are three pressure stages to choose from. The valve has an adjustable unloading point and a defined re-switching difference. The steel bodies of the sandwich valve are phosphate coated. Steel cartridge body and adjustment spindle galvanised to protect them against corrosion. The quality of this product is reflected in the good performance data and design.

FUNCTION

If the system pressure exceeds the adjustable unloading point, the pilot spool is opening the pilot valve. A control flow starts to flow and the back end of the main spool is depressurised. The resultant pressure difference displaces the main spool towards the spring and the valve switches to unloading circulation. Because of the difference in section in the pilot area, the pilot flow is interrupted as soon as the pressure in the accumulator drops by 15% or 25% of the upper switching point. The pressures at the main spool are equilibrated and the spring displaces the main spool to the closed position. The pump can now build up the system pressure again as far as the unloading point and the cycle starts again.

APPLICATION

Accumulator loading valves are used in hydraulic systems with accumulators. They allow a low cost, energy saving system design in cases where the cylinder flow demand varies considerably or for retaining pressures over a period of time, e.g. for clamping processes. Installation of the proportional pressure reducing valves in control blocks, as well as Wandfluh vertical stack combination valves NG4-Mini, NG6 and NG10. (Please refer to separate data sheets in register 2.1). Cavity tools are available for hire or sale for machining aluminium or steel. See register 2.13. **Note:** An additional relief valve for system protection must be installed. Please refer to the set-up and connection example on page 2.

TYPE CODE

		U S	☐	PM22 -	☐	#	☐
Accumulator loading valve, pilot operated							
Type of adjustment	Key	☐	S				
	Control knob	☐	D				
	Cover	☐	A	(see data sheet 2.0-50)			
Screw-in cartridge M22x1,5							
Pressure ranges p_N	100 bar	☐	100				
:	$p_N = 160 \text{ bar}$	☐	160				
	$p_N = 350 \text{ bar}$	☐	350				
Design-Index (Subject to change)							

GENERAL SPECIFICATIONS

Description	Pilot operated accumulator unloading valve
Construction	Screw-in cartridge acc. to ISO 7789
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20...+50 °C
Mounting position	any
Fastening torque	$M_D = 50 \text{ Nm}$
Weight:	$m = 0,23 \text{ kg}$ (key) $m = 0,24 \text{ kg}$ (control knob)

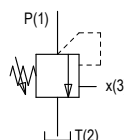
MECHANICAL ACTUATION

Mechanical types of operation in 2 different versions:
S = Screw adjustment with fork wrench and Allen key
D = Control knob adjustment, fixed

Nominal pressure	$p_N = 100/160 \text{ bar}$	$p_N = 350 \text{ bar}$
Stroke S_b	3,8 mm	7,5 mm
Angle a_b	1368°	2700°
(Turns)	3,8	7,5

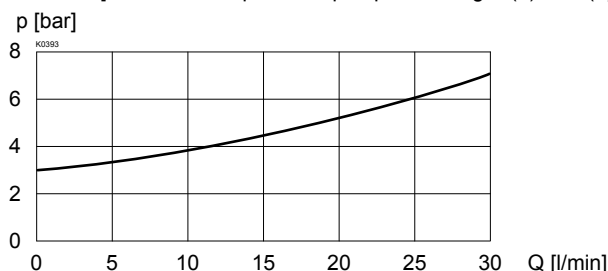
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) (refer to data sheet 1.0-50/2)
Viscosity range	12 mm ² /s ... 320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure	$p_N = 100 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Minimal pressure	$p_{\min} = 50 \text{ bar}$ for $p_N 160/350 \text{ bar}$ $p_{\min} = 25 \text{ bar}$ for $p_N 100 \text{ bar}$
Diff. unloading/loading	$15 \pm 3\%$ for $p_N = 160/350 \text{ bar}$ $25 \pm 3\%$ for $p_N = 100 \text{ bar}$
Volume flow range	$Q = 1...30 \text{ l/min}$ (over 30 l/min on request)
Leakage volume flow	Maximum 4 drops/min in accumulator operation P - T

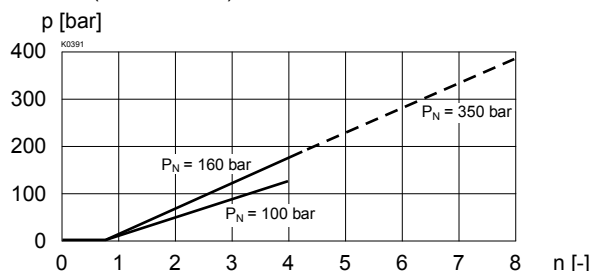
SYMBOL


CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$\Delta p = f(Q)$ Pressure-flow characteristics curve
[Accumulator operation- pump unloading P (1) $\rightarrow$ T (2)]

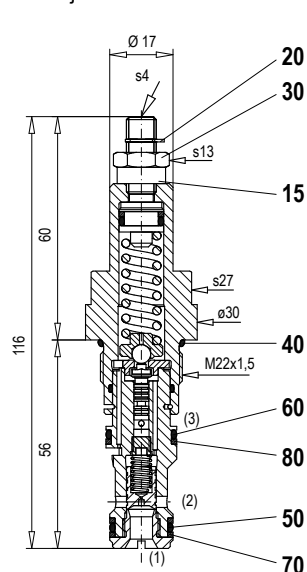


$p = f(n)$ Pressure adjustable characteristics
(at $Q = 2 \text{ l/min}$)

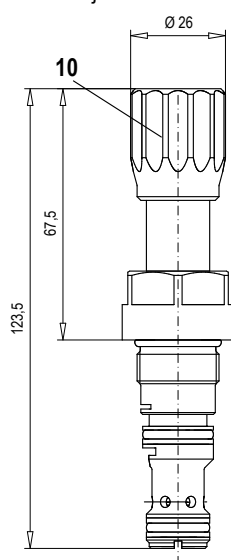


DIMENSIONS / SECTIONAL DRAWINGS

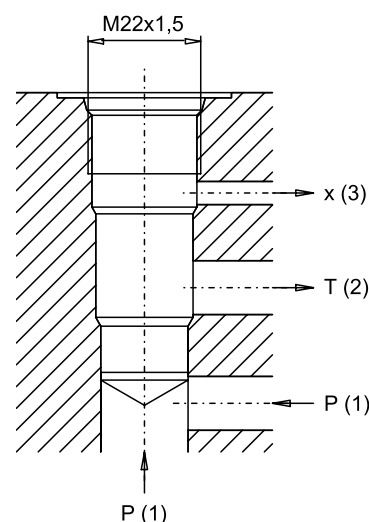
Screw adjustment «S»



Knob adjustment «D»



Cavity drawing according to ISO 7789-22-06-0-98



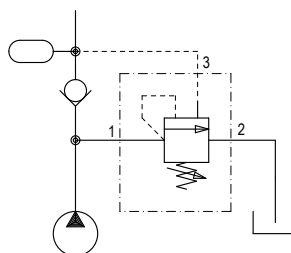
Detailed cavity drawing and cavity tools see data sheet no. 2.13-1006

PARTS LIST

Position	Article	Description
10	114.2224	Knob
15	212.1488	Disc (only at P_N 100 bar and 160 bar)
20	193.1061	Safety plate RD6 DIN 6799
30	153.1402	Hexagonal nut 0,5 d M8x1
40	160.2188	O-ring ID 18,77x1,78
50	160.2140	O-ring ID 14,00x1,78
60	160.2156	O-ring ID 15,60x1,78
70	049.3176	Back-up ring RD 14,1x17x1,4
80	049.3196	Back-up ring RD 16x19x1,4

SET-UP AND CONNECTION EXAMPLES

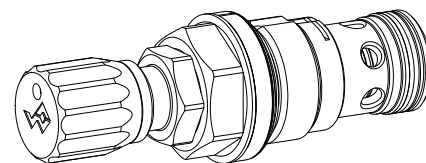
Unloading point adjusted at 100 bar (OS)
Differential value 15%
Loading point: OS -15% = 85 bar
Gas side of accumulator loaded upto max. 90% of US = 76 bar



Technical explanation see data sheet 1.0-100

Pressure relief valve
Screw-in cartridge

- Pilot operated
- $Q_{\max} = 230 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M33x2
ISO 7789

DESCRIPTION

Pilot operated pressure relief valve as screw-in cartridge with a thread M33x2 and cavity according to ISO draft 7789. The valve is available in two different setting versions: Key setting "S" and turning knob setting "D". Key adjustment "S" is also available with cover, see data sheet 2.0-50. 2 standard pressure levels are available: 160 and 350 bar. The cartridge body made of steel is galvanized and therefore rust-protected.

FUNCTION

When the set operating pressure is reached, the main spool opens and connects the protected line with the return line to the tank. These pressure relief valves consist of a main-and a pilot operation system integrated into the cartridge. The pilot operation is a direct operated pressure relief valve which acts on the main system. The helical spring of the pilot operation can be easily set to the desired operating pressure. Pilot operated pressure relief valves can be very sensitively adjusted and are suitable for large oil flows and high pressure. The very limited play of the hardened spool results in a limited oil leakage.

APPLICATION

For limiting the operating pressure in hydraulic systems by releasing the oil from the protected oil line P (1) to the outlet/tank return line T (2). The screw-in cartridge is very suitable for mounting in control blocks. Cavity tools are available for hire or sale for machining aluminium or steel. See register 2.13.

Attention: Should therefore not be utilized anymore in applications with periodically changing direction of flow.

TYPE CODE

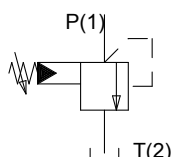
Pressure relief valve		B	V	☐	PM33	-		#	
Pilot operated									
Type of adjustment	Key	☐	S						
	Control knob	☐	D						
	Cover	☐	A	(see data sheet 2.0-50)					
Screw-in cartridge M33x2									
Pressure range p_N	160 bar	☐	160						
	350 bar	☐	350						
Design-Index (Subject to change)									

GENERAL CHARACTERISTICS

Description	Pilot operated pressure relief valve
Construction	Screw-cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M33x2
Ambient temperature	-25...+50°C
Mounting position	any
Fastening	$M_D = 80 \text{ Nm}$
Weight	$m = 0,32 \text{ kg}$
MTTFd	150 years

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-25...+70°C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 20 \text{ bar}$
Nominal pressure range	$p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Minimum pressure	see characteristics
Volume flow	$Q = 0,2...230 \text{ l/min}$
Leakage volume flow	see characteristics

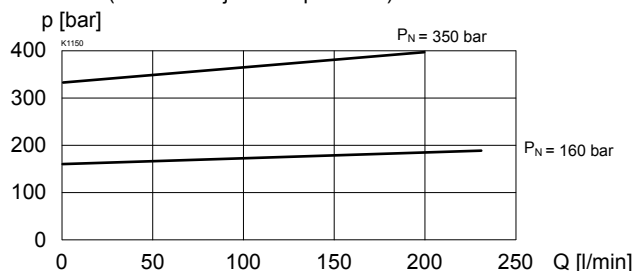
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 3 different versions:

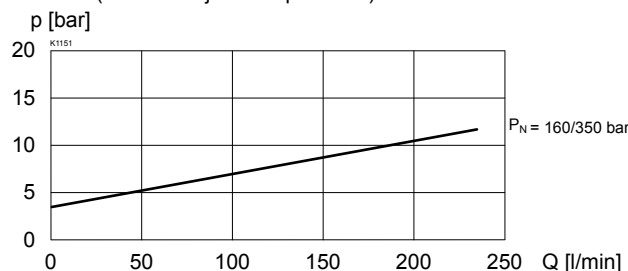
- | | |
|----------------------------|---|
| S | = Key adjustment by means of Span key and Allen key |
| D | = Control knob adjustment, fixed |
| Actuation stroke S_b | = 5 mm |
| Actuation angle α_b | = 1800° (5 revolutions) |

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

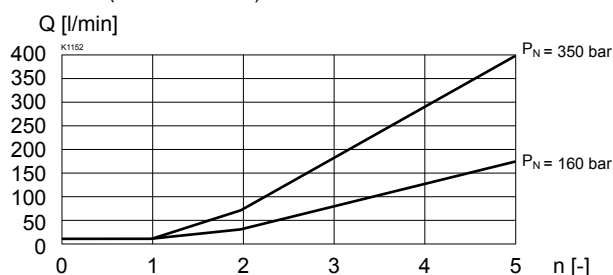
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



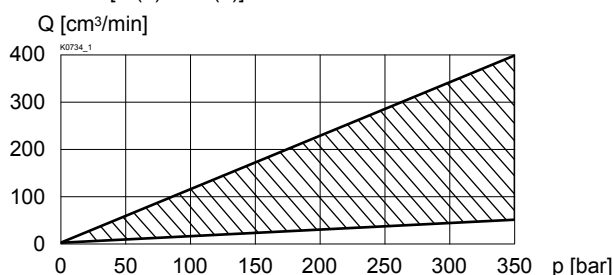
$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 30 \text{ l/min}$)

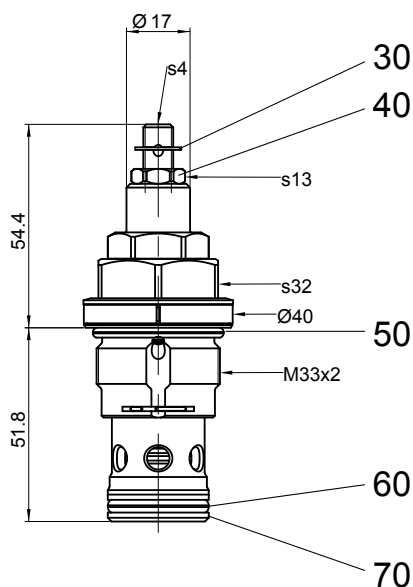


$Q_L = f(p)$ Leakage volume flow characteristics
[P (1) → T (2)]

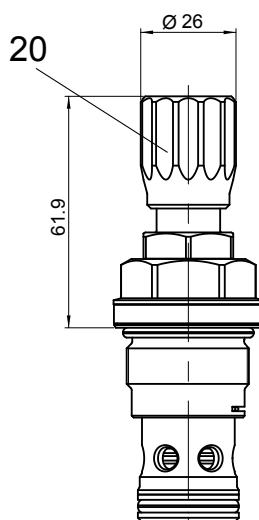


DIMENSIONS

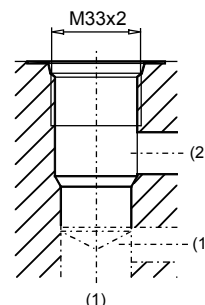
Screw adjustment "S"



Knob adjustment "D"



Cavity drawing to
ISO 7789-33-02-0



Detailed cavity drawing and cavity
tools see data sheet 2.13-1041.

PARTS LIST

Position	Article	Discription
20	114.2224	Knob
30	193.1061	Safety plate RD6 DIN 6799
40	153.1402	Hexagonal nut 0,5D M8x1
50	160.2298 160.6296	O-ring ID 29,82x2,62 (NBR) O-ring ID 29,82x2,62 (FKM)
60	160.2219 160.6216	O-ring ID 21,89x2,62 (NBR) O-ring ID 21,89x2,62 (FKM)
70	049.3277	Back-up ring RD 22,5x27x1,4

ACCESSORIES

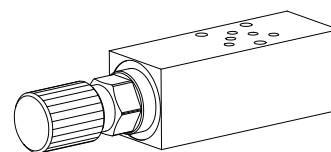
Line mount body

Data sheet 2.9-200

Technical explanation see data sheet 1.0-100

Pressure relief valve
Flange and sandwich construction

- **Pilot operated:** $Q_{\max} = 8 \text{ l/min}$
 $p_{N \max} = 350 \text{ bar}$ $p_{\max} = 400 \text{ bar}$
- **Direct operated:** $Q_{\max} = 5 \text{ l/min}$
 $p_{N \max} = 315 \text{ bar}$ $p_{\max} = 400 \text{ bar}$

NG3-Mini®

DESCRIPTION

Pilot and direct operated pressure reducing valves NG3-Mini. Flange and sandwich construction according to Wandfluh standard with 4 ports. Incorporated are proportional pressure reducing cartridges size M18x1,5 according to Wandfluh standard. The flange body and sandwich plates are made of aluminium.

FUNCTION

When the inlet pressure exceeds the control spring setting the main poppet opens allowing fluid to by-pass to tank „T“. Both flange and sandwich bodies with the pressure relief cartridge in the „P“ line have a G1/4" tapping for a pressure gauge or similar device.

APPLICATION

For limiting the operating pressure in hydraulic systems by by-passing fluid from the protected „P“, „A“ and „B“ lines to tank „T“. Flange and sandwich vertical stacking valves are suitable for machine tools, also for mobile equipment of all kinds. The mini-3 pressure relief valves are recommended whenever hydraulic systems specify small valves at a low weight and size.

TYPE CODE

Pressure relief valve		B		☐	☐	☐	A 03 -	☐	-	☐	#	☐	
Direct operated		☐	S										
Pilot operated		☐	V										
Setting versions	Key	☐	S										
	Control knob	☐	D										
	Cover	☐	A										
Flange design		☐	F										
Sandwich design		☐	S										
Mounting interface acc. to Wandfluh standard, NG3-Mini													
Type list / function	Flange design in P	☐	P	Sandwich design in P	☐	P							
				in A	☐	A							
				in B	☐	B							
				in A and B	☐	AB							
Pressure range p_N	Pilot operated	63 bar	☐	63	direct operated	63 bar	☐	63					
		160 bar	☐	160		160 bar	☐	160					
		350 bar	☐	350		315 bar	☐	315					
Design-Index (Subject to change)													

GENERAL CHARACTERISTICS

Denomination	Pilot or direct operated pressure relief valve
Nominal size	NG3-Mini acc. to Wandfluh standard
Construction	Flange or sandwich construction
Type of mounting	3 fixing holes for socket head cap screws M4 or stud M4
Fastening torque	$M_D = 2,8 \text{ Nm}$ (quality 8.8) for fixing screws $M_D = 30 \text{ Nm}$ for screw-in cartridge
Type of connections	Thread-connection plates rows of flange plates and horizontal stacking system
Installation position	any
Ambient temperature	-20...+50°C
Weight	• Flange design $m = 0,13 \text{ kg}$
(without screw-in-cartridges)	• Sandwich design P, A, B $m = 0,15 \text{ kg}$ • Sandwich design AB $m = 0,19 \text{ kg}$

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other media on request
Max. permissible contamination level	ISO 4406:1999, classe 18/16/13 (Rec. filter gauge $\beta 6...10 \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s ... 320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure:	$p_{\max} = 400 \text{ bar}$
Maximum volume flow	
pilot, direct op. conical spool	$Q_{\max} = 8 \text{ l/min}$
direct operated control spool	$Q_{\max} = 5 \text{ l/min}$



REMARK!

Detailed performance data and additional hydraulic specifications may be drawn from the data sheets of the corresponding installed pressure relief cartridge.

CAUTION!



The performance data especially the „**pressure-flow-characteristic**“, on the data sheets of the screw-in cartridges refer to the screw-in cartridges only. The additional pressure drop of the flange body respectively sandwich body must be taken into consideration.

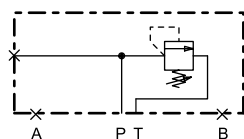
SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

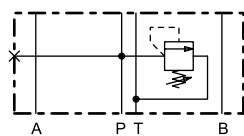
Type	Designation	Data sheet no.
BV.PM18	Pressure relief valve • pilot operated	2.1-510
BS.PM18	Pressure relief valve • direct operated	2.1-520

TYPES / DIMENSIONS

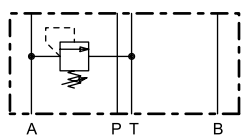
Flange construction
B..FA03-P



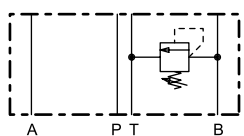
Sandwich construction
B..SA03-P



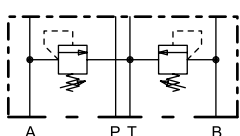
B..SA03-A



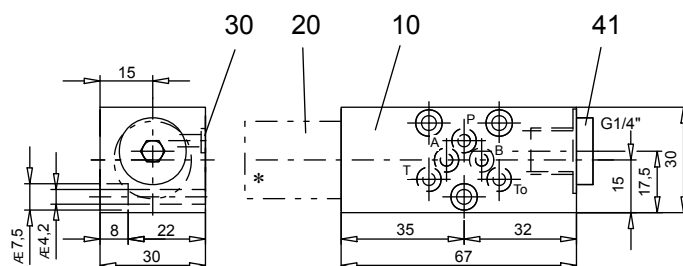
B..SA03-B



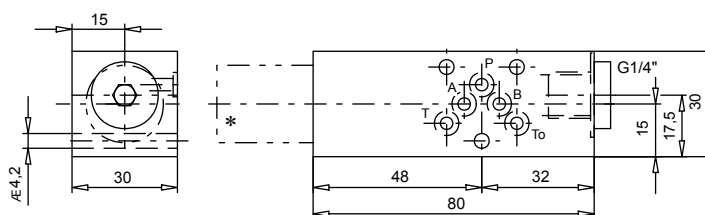
B..SA03-AB



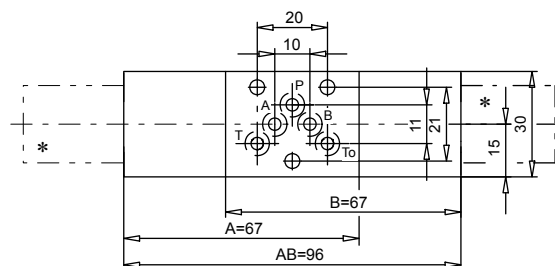
Flange construction



Sandwich construction in P



Sandwich construction in A, B or AB



PARTS LIST

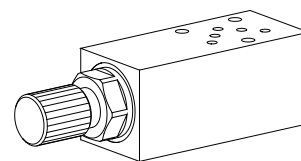
Position	Article	Description
10	128.3200 128.3607 128.3606 128.3610 128.3611	Flange body Sandwich plate P Sandwich plate AB Sandwich plate A Sandwich plate B
20	593....	Pressure relief cartridge M18x1,5 to data sheet 2.1-510 and 2.1-520
30	160.2045	O-ring ID 4,50x1,50
41	238.2406	Plug VSTI G1/4"-ED (only for flange and sandwich plate P)

* The exterior dimensions of the cartridges can be obtained from the corresponding data sheets

Technical explanation see data sheet 1.0-100

Pressure relief valve
Flange and sandwich construction

- **Pilot operated:** $Q_{\max} = 30 \text{ l/min}$
 $p_{N \max} = 350 \text{ bar}$ $p_{\max} = 400 \text{ bar}$
- **Direct operated:** $Q_{\max} = 30 / 25 \text{ l/min}$
 $p_{N \max} = 32 / 315 \text{ bar}$ $p_{\max} = 100 / 400 \text{ bar}$

NG4-Mini®

DESCRIPTION

Pilot and direct operated pressure reducing valves NG4-Mini. Flange and sandwich construction according to Wandfluh standard with 4 ports. Incorporated are proportional pressure relief cartridges size M22x1,5 according to ISO 7789. The steel bodies for flange constructions and the bodies for sandwich constructions are phosphatized.

FUNCTION

When the set operating pressure has been reached, the spool opens and joins the protected line with the return to the tank. T.G 1/4" connection thread is provided (sealed) as standard for flange and sandwich designs with pressure relief in P. This enables connection to a pressure gauge.

APPLICATION

For relieving the operating pressure of a hydraulic system by diverting the flow of oil from the protected oil lines P, A or B to the return/tank line T. Flange and sandwich valves (vertical stacking) are particularly suitable for: machine tools and all types of handling systems. NG4 size valves are also generally used in stacking systems on power units. Mini 4 pressure regulating valves are used everywhere where lightweight, small hydraulic control systems are required.

TYPE CODE

Pressure relief valve		B		☐	☐	☐	A 04 -	☐	-	☐	#	☐
Direct operation, conical spool		☐	A									
Direct operation, conical spool		☐	K									
Pilot operated		☐	V									
Type of adjustment	Key	☐	S									
	Control knob	☐	D									
	Cover	☐	A									
Flange design		☐	F									
Sandwich design		☐	S									
Mounting interface acc. to Wandfluh standard, NG4-Mini												
Type list / function	Flange design in P	☐	P	Sandwich design in P	☐	P	in A	☐	A	in B	☐	B
				in A and B	☐	AB						
Pressure range p_N	Pilot operated	63 bar	☐	63	conical spool, direct operated	63 bar	☐	63	control spool, direct operated	32 bar	☐	32
		160 bar	☐	160		210 bar	☐	210				
		350 bar	☐	350		315 bar	☐	315				
Design-Index (Subject to change)												

GENERAL CHARACTERISTICS

Nomination	Pilot or direct operated pressure relief valve
Nominal size	NG4-Mini acc. to Wandfluh standard
Construction	Flange or sandwich construction
Type of mounting	3 fixing holes for socket head cap screws M5 or stud M5
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8) for fixing screws $M_D = 50 \text{ Nm}$ for screw-in cartridge
Type of connections	Thread- connection plates rows of flange plates and horizontal stacking system
Installation position	any
Ambient temperature	-20...+50°C
Weight	• Flange design $m = 1,15 \text{ kg}$ • Sandwich design P, A, B $m = 0,96 \text{ kg}$ • Sandwich design AB $m = 1,24 \text{ kg}$

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other media on request
Max. permissible contamination level	ISO 4406:1999, classe 18/16/13 (Rec. filter gauge $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s ... 320 mm ² /s
Peak pressure:	$p_{\max} = 400 \text{ bar}$ $p_{\max} = 100 \text{ bar}$ (direct operated control spool)
Maximum volume flow	
pilot, direct op. conical spool	$Q_{\max} = 30 \text{ l/min}$
direct operated control spool	$Q_{\max} = 25 \text{ l/min}$



REMARK!

Detailed performance data and additional hydraulic specifications may be drawn from the data sheets of the corresponding installed pressure relief cartridge.

CAUTION!



The performance data especially the „**pressure-flow-characteristic**„ on the data sheets of the screw-in cartridges refer to the screw-in cartridges only. The additional pressure drop of the flange body respectively sandwich body must be taken into consideration.

SCREW-IN CARTRIDGES INSTALLED

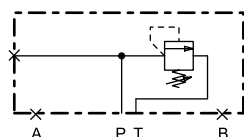
The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	Designation	Data sheet no.
BV.PM22	Pressure relief valve • pilot operated	2.1-530
BA.PM22	Pressure relief valve • pilot operated	2.1-540
BK.PM22	Pressure relief valve • direct operated	2.1-542

TYPES / DIMENSIONS

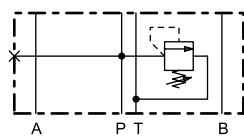
Flange construction

B..FA04-P

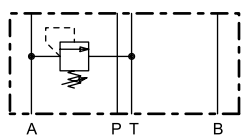


Sandwich construction

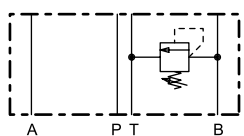
B..SA04-P



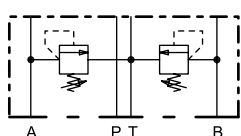
B..SA04-A



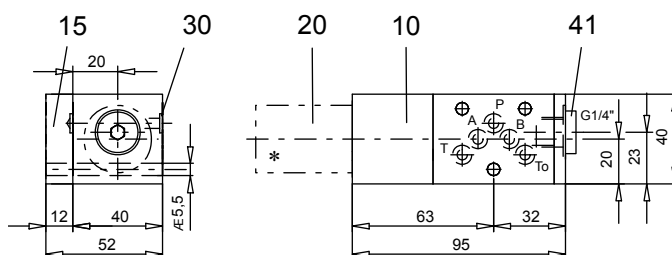
B..SA04-B



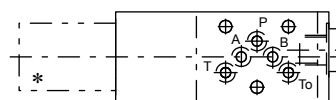
B..SA04-AB



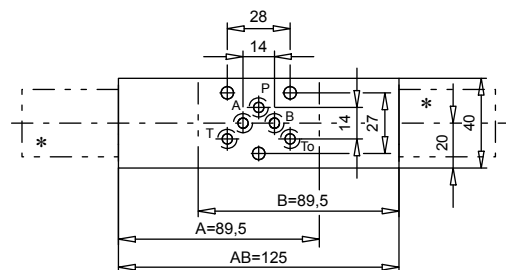
Flange construction



Sandwich construction in P



Sandwich construction in A, B or AB



PARTS LIST

Position	Article	Description
10	130.3626 130.3625 130.3632 130.3633	Sandwich plate P Sandwich plate AB Sandwich plate A Sandwich plate B
15	173.1150	Blindplate BBP4 (only for flansch)
20	593....	Pressure relief cartridge M22x1,5 to data sheet 2.1-530, 2.1-540, 2.1-542
30	160.2052	O-ring ID 5,28x1,78
41	238.2406	Plug VSTI G1/4"-ED (only for flange and sandwich plate P)

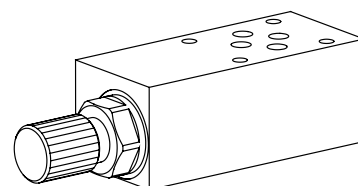
* The exterior dimensions of the cartridges can be obtained from the corresponding data sheets

Technical explanation see data sheet 1.0-100D

Pressure relief valve
Flange and sandwich construction

- **Pilot operated:** $Q_{max} = 80 \text{ l/min}$
 $p_{N \text{ max}} = 350 \text{ bar}$ $p_{max} = 400 \text{ bar}$
- **Direct operated:** $Q_{max} = 80 / 25 \text{ l/min}$
 $p_{N \text{ max}} = 32 / 315 \text{ bar}$ $p_{max} = 100 / 400 \text{ bar}$

NG6
ISO 4401-03


DESCRIPTION

Pilot operated pressure reducing valves NG6. Flange and sandwich construction according to ISO 4401-03 with 4 ports. Incorporated are proportional pressure reducing cartridges size M22x1,5 according to ISO 7789. The steel bodies for flange constructions and the bodies for sandwich constructions are phosphatized.

FUNCTION

When the set operating pressure has been reached, the spool opens and joins the protected line with the return to the tank T. G1/4" connection thread is provided (sealed) as standard for flange and sandwich designs with pressure relief in P. This enables connection to a pressure gauge.

APPLICATION

For relieving the operating pressure of a hydraulic system by diverting the flow of oil from the protected oil lines P, A or B to the return/tank line T. Flange and sandwich valves (vertical stacking) are particularly suitable for: machine tools and all types of handling systems. NG6 size valves are also generally used in stacking systems on power units.

TYPE CODE

Pressure relief valve		B		☐	☐	☐	A 06 -	☐	-	☐	#	☐
Direct operation, conical spool		☐ A										
Direct operation, conical spool		☐ K										
Pilot operated		☐ V										
Type of adjustment	Key	☐ S										
	Control knob	☐ D										
	Cover	☐ A										
Flange design		☐ F										
Sandwich design		☐ S										
International standard interface ISO, NG6												
Type list / function	Flange design in P	☐ P	Sandwich design in P	☐ P								
			in A	☐ A								
			in B	☐ B								
			in A and B	☐ AB								
Pressure range p_N	Pilot operated		conical spool, direct operated				control spool, direct operated					
	63 bar	☐ 63	63 bar	☐ 63			32 bar	☐ 32				
	160 bar	☐ 160	210 bar	☐ 210								
	350 bar	☐ 350	315 bar	☐ 315								
Design-Index (Subject to change)												

GENERAL CHARACTERISTICS

Denomination	Pilot or direct operated pressure relief valve
Nominal size	NG6 acc. to ISO 4401-03
Construction	Flange or sandwich construction
Type of mounting	4 fixing holes for socket head cap screws M5 or stud M5
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8) for fixing screws $M_D = 50 \text{ Nm}$ for screw-in cartridge
Type of connections	Thread- connection plates rows of flange plates and horizontal stacking system
Installation position	any
Ambient temperature	-20...+50°C
Weight	• Flange design $m = 1,43 \text{ kg}$ • Sandwich design P, A, B $m = 1,18 \text{ kg}$ • Sandwich design AB $m = 1,58 \text{ kg}$
(without screw-in-cartridges)	

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other media on request
Max. permissible contamination level	ISO 4406:1999, classe 18/16/13 (Rec. filter gauge $\beta 6...10 \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s ... 320 m
Peak pressure:	$p_{max} = 400 \text{ bar}$ $p_{max} = 100 \text{ bar}$ (direct operated control spool)
Maximum volume flow	
pilot, direct op. conical spool	$Q_{max} = 80 \text{ l/min}$
direct operated control spool	$Q_{max} = 25 \text{ l/min}$



REMARK!

Detailed performance data and additional hydraulic specifications may be drawn from the data sheets of the corresponding installed pressure relief cartridge.

CAUTION!



The performance data especially the „**pressure-flow-characteristic**„, on the data sheets of the screw-in cartridges refer to the screw-in cartridges only. The additional pressure drop of the flange body respectively sandwich body must be taken into consideration.

SCREW-IN CARTRIDGES INSTALLED

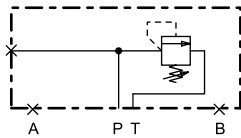
The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	Designation	Data sheet no.
BV.PM22	Pressure relief valve • pilot operated	2.1-530
BA.PM22	Pressure relief valve • direct operated	2.1-540
BK.PM22	Pressure relief valve • direct operated	2.1-542

TYPES / DIMENSIONS

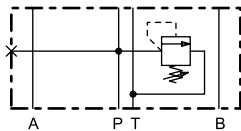
Flange construction

B..FA06-P

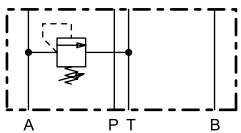


Sandwich construction

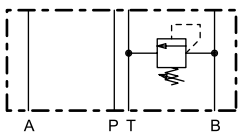
B..SA06-P



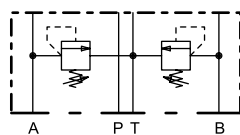
B..SA06-A



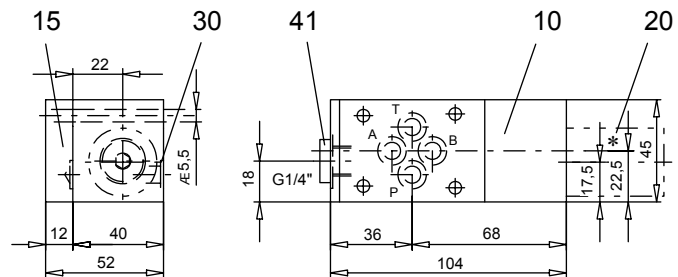
B..SA06-B



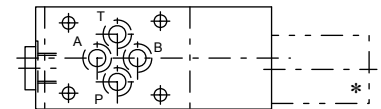
B..SA06-AB



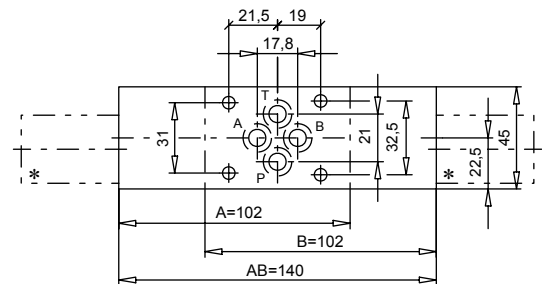
Flange construction



Sandwich construction in P



Sandwich construction in A, B or AB



PARTS LIST

Position	Article	Description
10	134.3626 134.3627 134.3634 134.3633	Sandwich plate P Sandwich plate AB Sandwich plate A Sandwich plate B
15	173.3150	Blindplate ABP6 (only for flansch)
20	593....	Pressure relief cartridge M22x1,5 to data sheet 2.1-530, 2.1-540, 2.1-542
30	160.2093	O-ring ID 9,25x1,78
41	238.2406	Plug VSTI G1/4"-ED (only for flange and sandwich plate P)

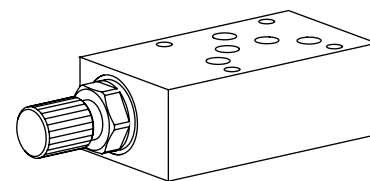
* The exterior dimensions or the cartridges can be obtained from the corresponding data sheets

Technical explanation see data sheet 1.0-100D

Pressure relief valve
Flange and sandwich construction

- **Pilot operated:** $Q_{\max} = 100 \text{ l/min}$
 $p_N \max = 350 \text{ bar}$ $p_{\max} = 400 \text{ bar}$
- **Direct operated:** $Q_{\max} = 100 / 25 \text{ l/min}$
 $p_N \max = 32 / 315 \text{ bar}$ $p_{\max} = 100 / 400 \text{ bar}$

NG10
ISO 4401-05


DESCRIPTION

Pilot operated pressure reducing valves NG10. Flange and sandwich construction according to ISO 4401-05 with 4 ports. Incorporated are proportional pressure reducing cartridges size M22x1,5 according to ISO 7789. The steel bodies for flange constructions and the bodies for sandwich constructions are phosphatized.

FUNCTION

When the set operating pressure has been reached, the spool opens and joins the protected line with the return to the tank T. G1/4" connection thread is provided (sealed) as standard for flange and sandwich designs with pressure relief in P. This enables connection to a pressure gauge.

APPLICATION

For relieving the operating pressure of a hydraulic system by diverting the flow of oil from the protected oil lines P, A or B to the return/tank line T. Flange and sandwich valves (vertical stacking) are particularly suitable for: machine tools and all types of handling systems. NG10 size valves are also generally used in stacking systems on power units.

TYPE CODE

Pressure relief valve		B		☐	☐	☐	A 10 -	☐	-	☐	#	☐
Direct operation, conical spool		☐	A									
Direct operation, conical spool		☐	K									
Pilot operated		☐	V									
Type of adjustment	Key	☐	S									
	Control knob	☐	D									
	Cover	☐	A									
Flange design		☐	F									
Sandwich design		☐	S									
International standard interface ISO, NG10												
Type list / function	Flange design in P	☐	P	Sandwich design in P	☐	P	in A	☐	A	in B	☐	B
				in A and B	☐	AB						
Pressure range p_N	Pilot operated	63 bar	☐	63	conical spool, direct operated	63 bar	☐	63	control spool, direct operated	32 bar	☐	32
		160 bar	☐	160		210 bar	☐	210				
		350 bar	☐	350		315 bar	☐	315				
Design-Index (Subject to change)												

GENERAL CHARACTERISTICS

Denomination	Pilot or direct operated pressure relief valve
Nominal size	NG10 acc. to ISO 4401-05
Construction	Flange or sandwich construction
Type of mounting	4 fixing holes for socket head cap screws M6 or stud M6
Fastening torque	$M_D = 9,5 \text{ Nm}$ (quality 8.8) for fixing screws $M_D = 50 \text{ Nm}$ for screw-in cartridge
Type of connections	Thread-connection plates rows of flange plates and horizontal stacking system
Installation position	any
Ambient temperature	-20...+50 °C
Weight	• Flange design $m = 2,34 \text{ kg}$ • Sandwich design P, A, B $m = 1,70 \text{ kg}$ • Sandwich design AB $m = 1,94 \text{ kg}$
(without screw-in-cartridges)	

HYDRAULIC CHARACTERISTICS

Hydraulic fluid	Mineral oils, other media on request
Max. permissible contamination level	ISO 4406:1999, classe 18/16/13 (Rec. filter gauge $\beta_{0.5} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s ... 320 m
Peak pressure:	$p_{\max} = 400 \text{ bar}$ $p_{\max} = 100 \text{ bar}$ (direct operated control spool)
Maximum volume flow	
pilot, direct op. conical spool	$Q_{\max} = 100 \text{ l/min}$
direct op. control spool	$Q_{\max} = 25 \text{ l/min}$



REMARK!

Detailed performance data and additional hydraulic specifications may be drawn from the data sheets of the corresponding installed pressure relief cartridge.



CAUTION!

The performance data especially the «**pressure-flow-characteristic**» on the data sheets of the screw-in cartridges refer to the screw-in cartridges only. The additional pressure drop of the flange body respectively sandwich body must be taken into consideration.

SCREW-IN CARTRIDGES INSTALLED

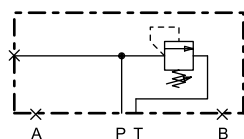
The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	Designation	Data sheet no.
BV.PM22	Pressure relief valve • pilot operated	2.1-530
BA.PM22	Pressure relief valve • pilot operated	2.1-540
BK.PM22	Pressure relief valve • direct operated	2.1-542

TYPES / DIMENSIONS

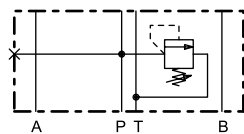
Flange construction

B..FA10-P

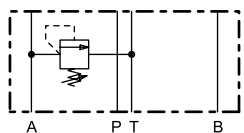


Sandwich construction

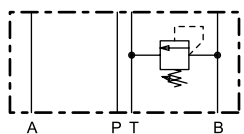
B..SA10-P



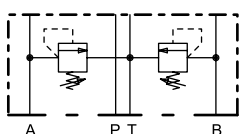
B..SA10-A



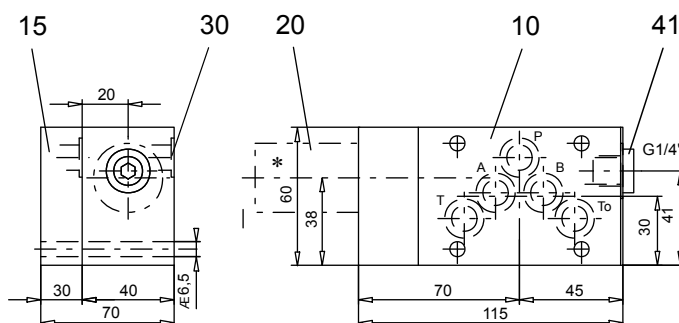
B..SA10-B



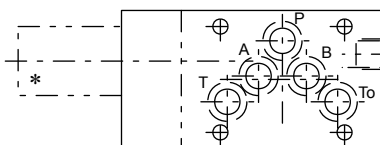
B..SA10-AB



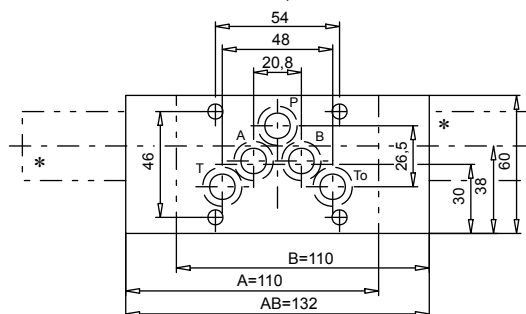
Flange construction



Sandwich construction in P



Sandwich construction in A, B or AB



PARTS LIST

Position	Article	Description
10	136.3621 136.3622 136.3629 136.3630	Sandwich plate P Sandwich plate AB Sandwich plate A Sandwich plate B
15	173.4150	Blindplate ABP10 (only for flansch)
20	593....	Pressure relief cartridge M22x1,5 to data sheet 2.1-530, 2.1-540, 2.1-542
30	160.2140	O-ring ID 14,0x1,78
41	238.2406	Plug VSTI G1/4"-ED (only for flange and sandwich plate P)

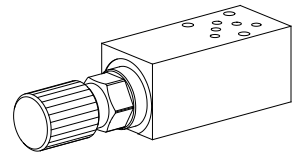
* The exterior dimensions of the cartridges can be obtained from the corresponding data sheets

Technical explanation see data sheet 1.0-100

Back pressure valve Sandwich construction

- **Pilot operated:** $Q_{\max} = 8 \text{ l/min}$
 $p_{N \max} = 350 \text{ bar}$ $p_{\max} = 400 \text{ bar}$
- **Direct operated:** $Q_{\max} = 5 \text{ l/min}$
 $p_{N \max} = 315 \text{ bar}$ $p_{\max} = 400 \text{ bar}$

NG3-Mini®



DESCRIPTION

Back pressure valves in direct or pilot operated versions for sandwich mounting. The valves are available in two types of adjustment and can be fixed. A cover is also available for key adjustment, see data sheet 2.0-50. Three pressure ranges are available. The sandwich bodies are in anodised aluminium.

FUNCTION

When pressure reaches the setting of the back pressure valve main spool will open up the oil passage.

APPLICATION

Back pressure valves are applied where a back pressure in the outlet part of a cylinder or motor is necessary to prevent uncontrolled movement. The fields of applications are in machine building, handling system and hydraulic power packs.

TYPE CODE

Back pressure valve		G		☐	☐	S	A03	-		-		#	☐	
Direct operated	☐	S												
Pilot operated	☐	V												
Type of adjustment	Key	☐	S											
	Control knob	☐	D											
	Cover	☐	A											
Sandwich construction														
Mounting interface acc. to Wandfluh standard, NG3-Mini														
Type list / function	in T	☐	T	in A	☐	A								
	in A and B	☐	AB	in B	☐	B								
Pressure range P_N	Pilot operated			Direct operated										
	63 bar	☐	63	63 bar	☐	63								
	160 bar	☐	160	160 bar	☐	160								
	350 bar	☐	350	315 bar	☐	315								

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Nominal size	NG3-Mini according to Wandfluh standard
Denomination	Pilot- and direct operated back pressure valve
Construction	Sandwich construction
Mounting	3 holes for socket cap screws M4 or studs screws M4
Fastening torque	$M_f = 2,8 \text{ Nm}$ (qual. 8.8) for fixing screws $M_D = 30 \text{ Nm}$ for screw in cartridge
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Mounting position	any
Ambient temperature	-20...+50 °C
Weight	Depending on the type of valves 0,30...0,85 kg

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure	
pilot operated:	$p_N = 63 \text{ bar}, 160 \text{ bar}, 350 \text{ bar}$
direct operated:	$p_N = 63 \text{ bar}, 160 \text{ bar}, 315 \text{ bar}$ see characteristics
Minimal Pressure	
Opening pressure over non-return valve	$p_o = 0,3 \text{ bar}$
Max. Volume flow	
pilot operated:	$Q_{\max} = 8 \text{ l/min}$
direct operated:	$Q_{\max} = 5 \text{ l/min}$

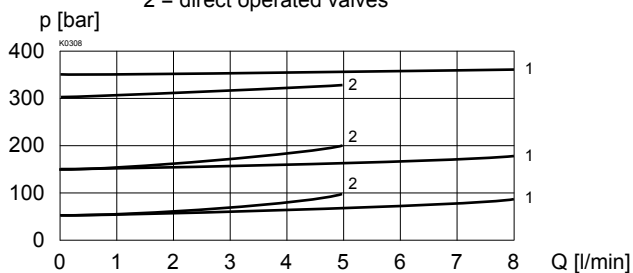
For further hydraulic specifications refer to data sheets:

2.1-510 for cartridge M18x1,5 pilot operated

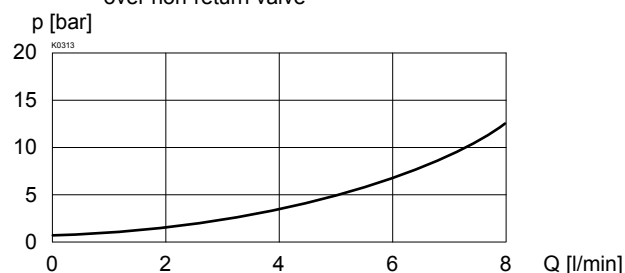
2.1-520 for cartridge M18x1,5 direct operated

CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

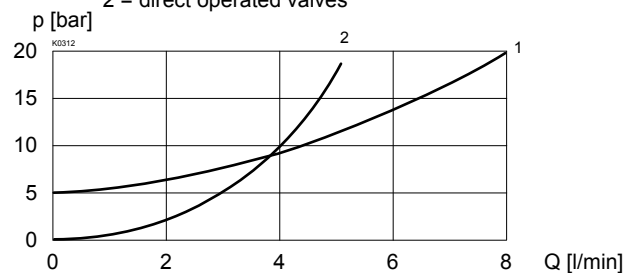
$p = f(Q)$ Pressure-flow characteristic curve
1 = pilot operated valves
2 = direct operated valves



$\Delta p = f(Q)$ Pressure drop-volume flow curve over non-return valve

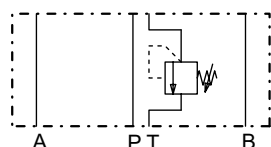


$p_{\min} = f(Q)$ Minimum adjustable pressure
1 = pilot operated valves
2 = direct operated valves

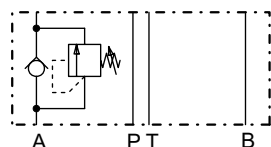


TYPE LIST / DIMENSIONS

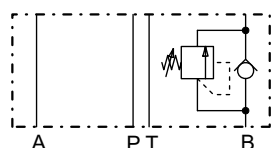
Sandwich construction
G..SA03-T



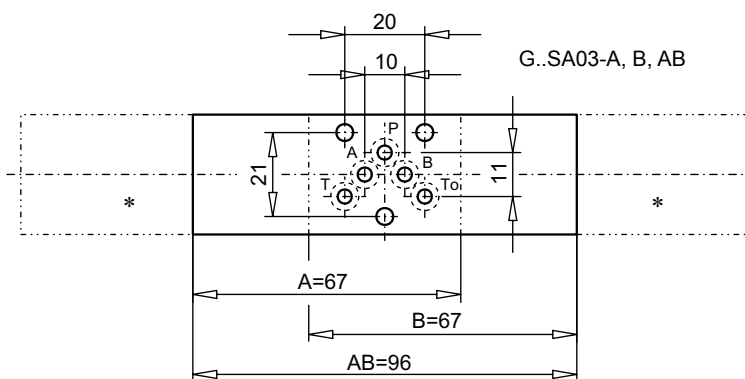
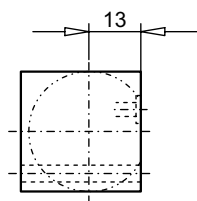
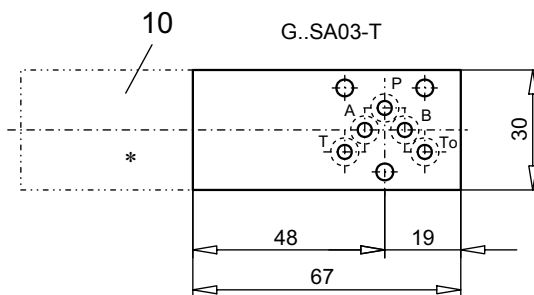
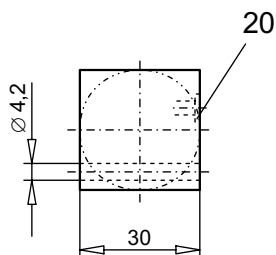
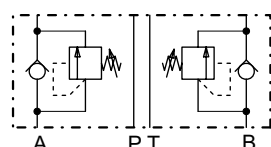
G..SA03-A



G..SA03-B



G..SA03-AB

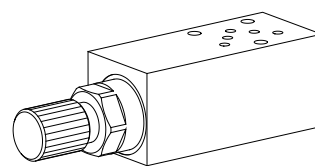


* The exterior dimensions of the cartridges can be obtained from the corresponding data sheets 2.1-510 and 2.1-520.

PARTS LIST

Position	Article	Description
10	593. ...	Pressure relief cartridge M18x1,5 to data sheets 2.1-510 and 2.1-520
20	160.2045	O-ring ID 4,5x1,5

Technical explanation see data sheet 1.0-100

**Back pressure valve
Sandwich construction**
Pilot operated:
 $p_{N \max} = 350 \text{ bar}$
 $Q_{\max} = 30 \text{ l/min}$
 $p_{\max} = 400 \text{ bar}$
NG4-Mini®
Direct operated:
 $p_{N \max} = 32 / 315 \text{ bar}$
 $Q_{\max} = 30 / 25 \text{ l/min}$
 $p_{\max} = 100 / 400 \text{ bar}$

DESCRIPTION

Back pressure valves in direct or pilot operated versions for sandwich mounting. Mounting interface acc. to Wandfluh standard. The valves are available in three types of adjustment, one of them being lockable, the others being fixed. A cover is also available for key adjustment, see data sheet 2.0-50. Three pressure ranges are available for the pilot operated valves, four are available for the directly operated ones. The steel bodies are phosphate coated.

FUNCTION

When pressure reaches the setting of the back pressure valve main spool will open up the oil passage.

APPLICATION

Back pressure valves are applied where a back pressure in the outlet part of a cylinder or motor is necessary to prevent uncontrolled movement. The fields of applications are in machine building, handling system and hydraulic power packs.

TYPE CODE

Back pressure valve				G ☐ ☐ S A04 - - #			
Direct operated, conical spool	A						
Direct operated, control spool	K						
Pilot operated	V						
Type of adjustment	Key	S					
	Control knob	D					
	Cover	A					
Sandwich construction							
Mounting interface acc. to Wandfluh standard, NG4-Mini							
Type list / function	in T	T	in A	A			
	in A and B	AB	in B	B			
Pressure range P_N	Pilot operated		Conical spool, direct operated		Control spool, direct operated		
	63 bar	63	63 bar	63	32 bar	32	
	160 bar	160	210 bar	210			
	350 bar	350	315 bar	315			

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Nominal size	NG4-Mini acc. to Wandfluh standard
Denomination	Pilot- and direct operated pressure valve
Bauart	Sandwich construction
Mounting	3 holes for socket cap screws M5 or studs screws M5
Fastening torque	$M_D = 5,5 \text{ Nm}$ (qual. 8.8) for fixing screws $M_S = 50 \text{ Nm}$ for screw in cartridge
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Mounting position	any
Ambient temperature	-20...+50 °C
Weight	Depending on the type of valves 1,140...2,230 kg

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{\max} = 100 \text{ bar}$ (Dir. op., control spool)
Nominal pressure	
pilot operated:	$p_N = 63 \text{ bar}, 160 \text{ bar}, 350 \text{ bar}$
direct operated:	
conical spool	$p_N = 63 \text{ bar}, 210 \text{ bar}, 315 \text{ bar}$
control spool	$p_N = 32 \text{ bar}$
Minimal Pressure	see characteristics
Opening pressure over non-return valve	$p_o = 2,2 \text{ bar}$
Max. Volume flow	
pilot- direct op. control spool	$Q_{\max} = 30 \text{ l/min}$
direct operated conical spool	$Q_{\max} = 25 \text{ l/min}$

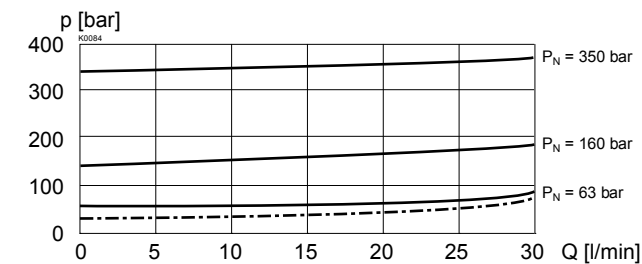
For further hydraulic specifications refer to data sheets:

- 2.1-530 for cartridge M22x1,5 pilot operated
- 2.1-540 for cartridge M22x1,5 direct operated conical spool
- 2.1-542 for cartridge M22x1,5 direct operated control spool

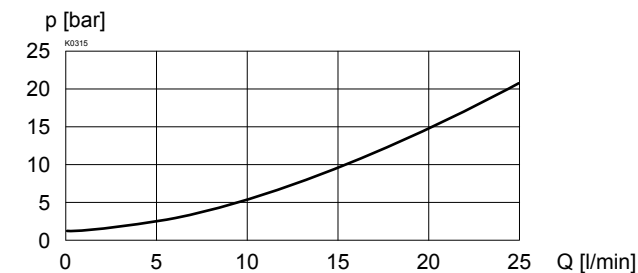
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

Pressure volume flow curve

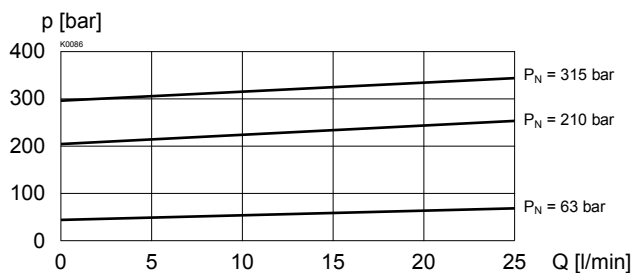
— pilot operate
- - - direct operated, control spool



$\Delta p = f(Q)$ Pressure drop-volume flow curve over non-return valve

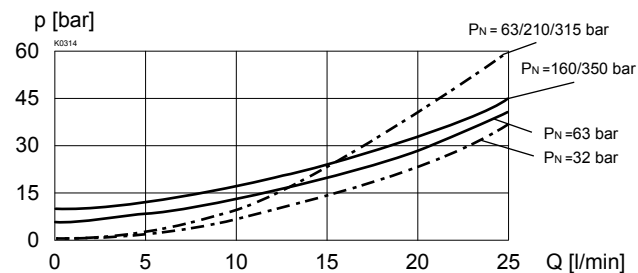


$p = f(Q)$ Pressure volume flow curve
direct operated, conical spool



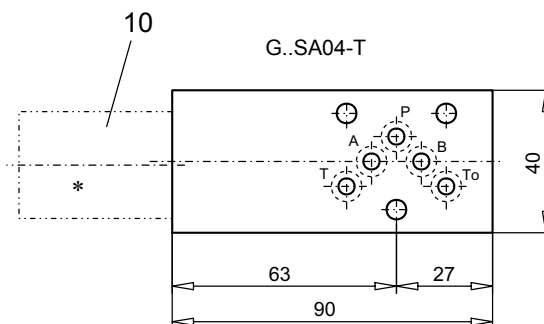
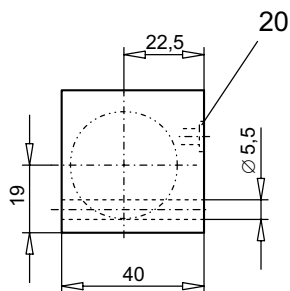
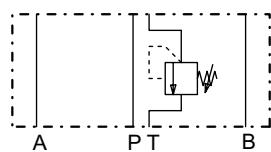
$p_{\min} = f(Q)$ Minimum adjustable pressure

— pilot operated
- - - direct operated

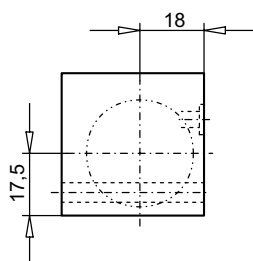
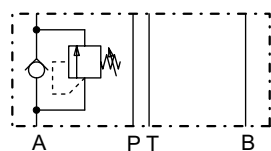


TYPE LIST / DIMENSIONS

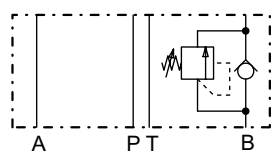
Sandwich construction
G..SA04-T



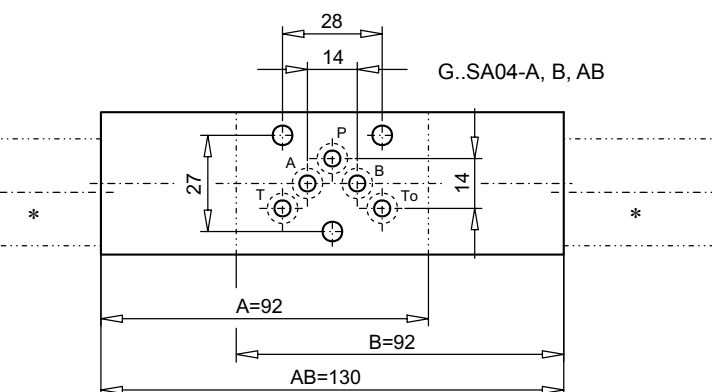
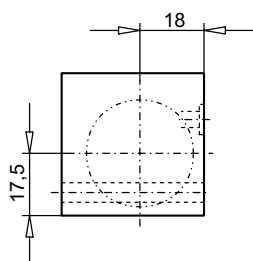
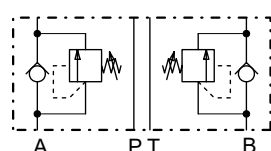
G..SA04-A



G..SA04-B



G..SA04-AB



* The exterior dimensions of the cartridges can be obtained from the corresponding data sheets 2.1-530, 2.1-540 and 2.1-542.

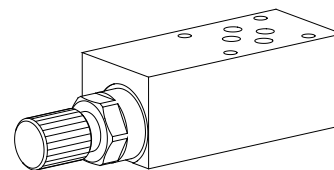
PARTS LIST

Position	Article	Description
10	593. ...	Pressure relief cartridge M22x1,5 to data sheets 2.1-530, 2.1-540 and 2.1-542
20	160.2052	O-ring ID 5,28x1,78

Technical explanation see data sheet 1.0-100

**Back pressure valve
Sandwich construction**

- **Pilot operated:**
 $p_{N \max} = 350 \text{ bar}$
 $Q_{\max} = 80 \text{ l/min}$
 $p_{\max} = 400 \text{ bar}$
- **Direct operated:**
 $Q_{\max} = 80 / 25 \text{ l/min}$
 $p_{N \max} = 32/315 \text{ bar}$ $p_{\max} = 100/400 \text{ bar}$

NG6
ISO 4401-03

DESCRIPTION

Back pressure valves in direct or pilot operated versions for sandwich mounting. Mounting interface acc. to ISO 4401-03. The valves are available in two types of adjustment and can be fixed. A cover is also available for key adjustment, see data sheet 2.0-50. Three pressure ranges are available for the pilot operated valves, four are available for the directly operated ones. The steel bodies are phosphate coated.

FUNCTION

When pressure reaches the setting of the back pressure valve main spool will open up the oil passage.

APPLICATION

Back pressure valves are applied where a back pressure in the outlet part of a cylinder or motor is necessary to prevent uncontrolled movement. The fields of applications are in machine building, handling system and hydraulic power packs.

TYPE CODE

Back pressure valve		G		☐	☐	S	A06	-		-		#	
Direct operated, conical spool	☐	A											
Direct operated, control spool	☐	K											
Pilot operated	☐	V											
Type of adjustment	Key	☐	S										
	Control knob	☐	D										
	Cover	☐	A										
Sandwich construction													
International standard interface ISO, NG6													
Type list / function	in T	☐	T	in A	☐	A	in B	☐	B				
	in A and B	☐	AB										
Pressure range P_N	Pilot operated	63 bar	☐	63	Conical spool, direct operated	63 bar	☐	63	Control spool, direct operated	32 bar	☐	32	
		160 bar	☐	160		210 bar	☐	210					
		350 bar	☐	350		315 bar	☐	315					

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Nominal size	NG6 acc. to ISO 4401-03
Denomination	Pilot- and direct operated pressure valve
Bauart	Sandwich construction
Mounting	4 holes for socket cap screws M5 or studs screws M5
Fastening torque	$M_0 = 5,5 \text{ Nm}$ (qual. 8.8) for fixing screws $M_1 = 50 \text{ Nm}$ for screw in cartridge
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Mounting position	any
Ambient temperature	-20...+50 °C
Weight	Depending on the type of valves 1,3...2,6 kg

HYDRAULIC SPECIFICATIONS

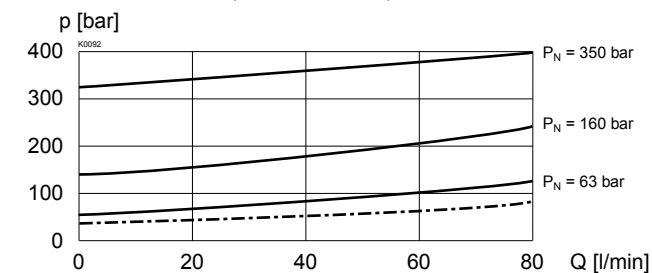
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{\max} = 100 \text{ bar}$ (Dir. op., control spool)
Nominal pressure	
pilot operated:	$p_N = 63 \text{ bar}, 160 \text{ bar}, 350 \text{ bar}$
direct operated:	
conical spool	$p_N = 63 \text{ bar}, 210 \text{ bar}, 315 \text{ bar}$
control spool	$p_N = 32 \text{ bar}$
Minimal Pressure	see characteristics
Opening pressure over non-return valve	$p_0 = 2 \text{ bar}$
Max. Volume flow	
pilot- direct op. control spool	$Q_{\max} = 80 \text{ l/min}$
direct operated conical spool	$Q_{\max} = 25 \text{ l/min}$

For further hydraulic specifications refer to data sheets:
2.1-530 for cartridge M22x1,5 pilot operated
2.1-540 for cartridge M22x1,5 direct operated conical spool
2.1-542 for cartridge M22x1,5 direct operated control spool

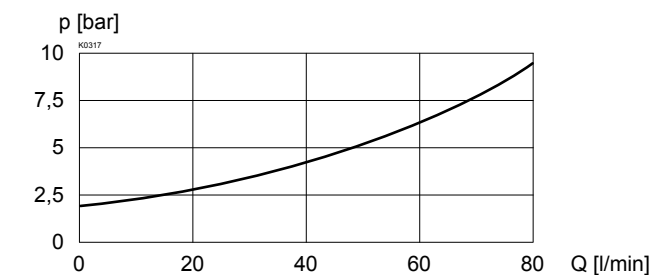
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

Pressure volume flow curve

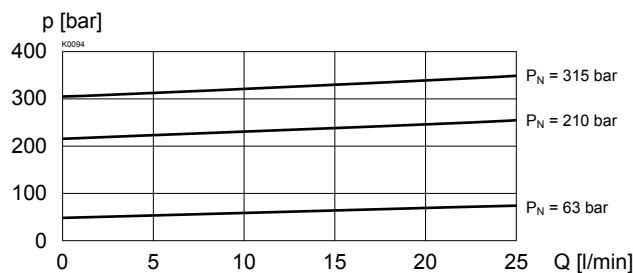
— pilot operate
- - - direct operated, control spool



$\Delta p = f(Q)$ Pressure drop-volume flow curve over non-return valve

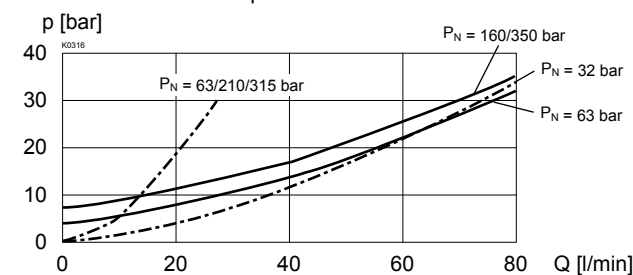


$p = f(Q)$ Pressure volume flow curve
direct operated, conical spool



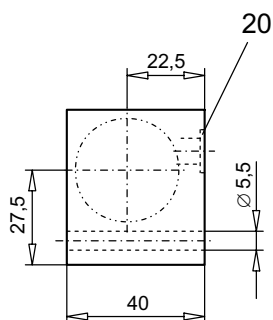
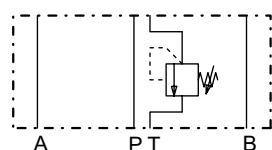
$p_{\min} = f(Q)$ Minimum adjustable pressure

— pilot operated
- - - direct operated

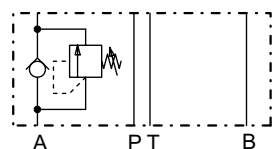


TYPE LIST / DIMENSIONS

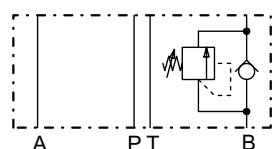
Sandwich construction
G..SA06-T



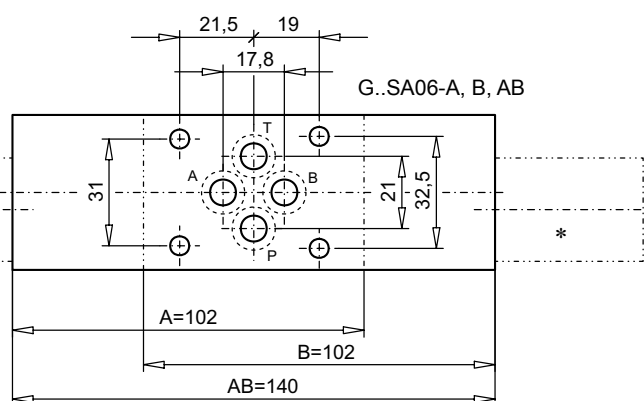
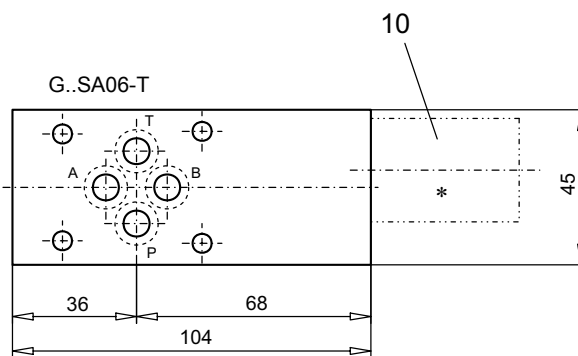
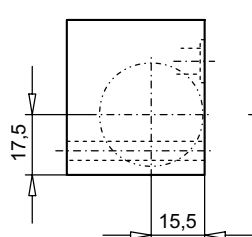
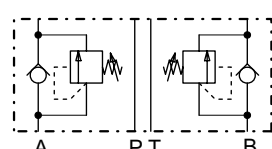
G..SA06-A



G..SA06-B



G..SA06-AB



* The exterior dimensions of the cartridges can be obtained from the corresponding data sheets 2.1-530, 2.1-540 and 2.1-542.

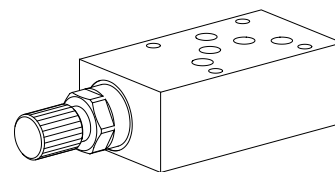
PARTS LIST

Position	Article	Description
10	593. ...	Pressure relief cartridge M22x1,5 to data sheets 2.1-530, 2.1-540 and 2.1-542
20	160.2093	O-Ring ID 9,25x1,78

Technical explanation see data sheet 1.0-100

**Back pressure valve
Sandwich construction**
• Pilot operated:
 $p_{N \max} = 350 \text{ bar}$
 $Q_{\max} = 100 \text{ l/min}$
 $p_{\max} = 400 \text{ bar}$
NG10

ISO 4401-05


• Direct operated:
 $p_{N \max} = 32 / 315 \text{ bar}$
 $Q_{\max} = 100 / 25 \text{ l/min}$
 $p_{\max} = 100 / 400 \text{ bar}$
DESCRIPTION

Back pressure valves in direct or pilot operated versions for sandwich mounting. Mounting interface according to ISO 4401-05. The valves are available in two types of adjustment, the others being fixed. A cover is also available for key adjustment, see data sheet 2.0-50. Three pressure ranges are available for the pilot operated valves, four are available for the directly operated ones. The steel bodies are phosphate coated.

FUNCTION

When pressure reaches the setting of the back pressure valve main spool will open up the oil passage.

APPLICATION

Back pressure valves are applied where a back pressure in the outlet part of a cylinder or motor is necessary to prevent uncontrolled movement. The fields of applications are in machine building, handling system and hydraulic power packs.

TYPE CODE

Back pressure valve		G		☐	☐	S	A10	-	☐	-	☐	#	☐
Direct operated, conical spool	☐	A											
Direct operated, control spool	☐	K											
Pilot operated	☐	V											
Type of adjustment	Key	☐	S										
	Control knob	☐	D										
	Cover	☐	A										
Sandwich construction													
International standard interface ISO, NG10													
Type list / function	in T	☐	T	in A	☐	A	in B	☐	B				
	in A and B	☐	AB										
Pressure range P_N	Pilot operated	63 bar	☐	63	Conical spool, direct operated	63 bar	☐	63	Control spool, direct operated	32 bar	☐	32	
		160 bar	☐	160		210 bar	☐	210					
		350 bar	☐	350		315 bar	☐	315					

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Nominal size	NG10 nach ISO 4401-05
Denomination	Pilot- and direct operated pressure valve
Bauart	Sandwich construction
Mounting	4 holes for socket cap screws M6 or studs screws M6
Fastening torque	$M_D = 9,5 \text{ Nm}$ (qual. 8.8) for fixing screws $M_D = 50 \text{ Nm}$ for screw in cartridge
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Mounting position	any
Ambient temperature	-20...+50 °C
Weight	Depending on the type of valves 1,9...2,9 kg

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{\max} = 100 \text{ bar}$ (Dir. op., control spool)
Nominal pressure	
pilot operated:	$p_N = 63 \text{ bar}, 160 \text{ bar}, 350 \text{ bar}$
direct operated:	
conical spool	$p_N = 63 \text{ bar}, 210 \text{ bar}, 315 \text{ bar}$
control spool	$p_N = 32 \text{ bar}$
Minimal Pressure	see characteristics
Opening pressure over non-return valve	$p_o = 0,8 \text{ bar}$
Max. Volume flow	
pilot- direct op. control spool	$Q_{\max} = 100 \text{ l/min}$
direct operated conical spool	$Q_{\max} = 25 \text{ l/min}$

For further hydraulic specifications refer to data sheets:

2.1-530 for cartridge M22x1,5 pilot operated

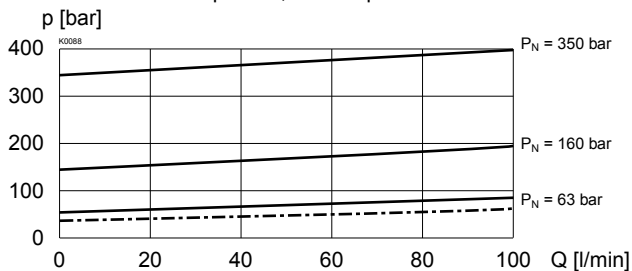
2.1-540 for cartridge M22x1,5 direct operated conical spool

2.1-542 for cartridge M22x1,5 direct operated control spool

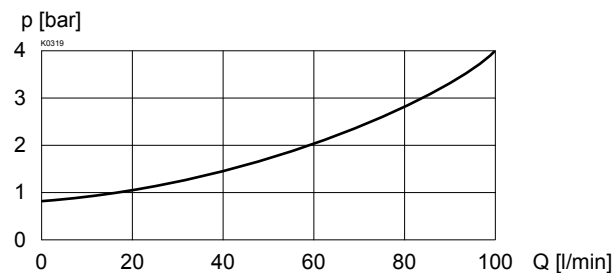
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

Pressure volume flow curve

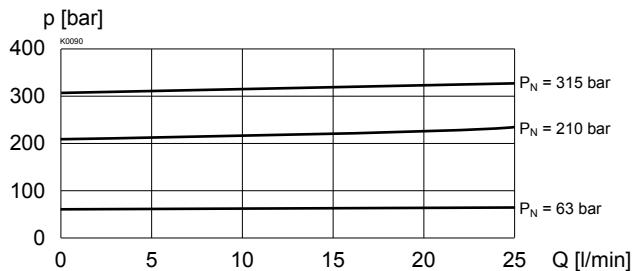
— pilot operate
- - - direct operated, control spool



$\Delta p = f(Q)$ Pressure drop-volume flow curve over non-return valve

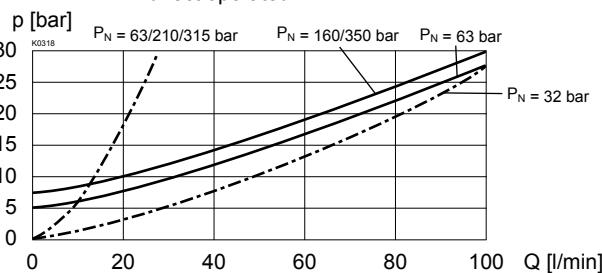


$p = f(Q)$ Pressure volume flow curve direct operated, conical spool



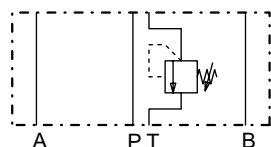
$p_{\min} = f(Q)$ Minimum adjustable pressure

— pilot operated
- - - direct operated

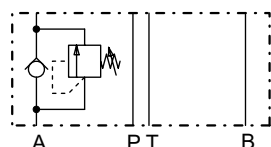


TYPE LIST / DIMENSIONS

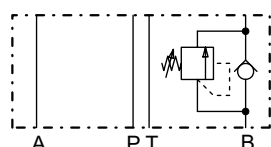
Sandwich construction
G..SA10-T



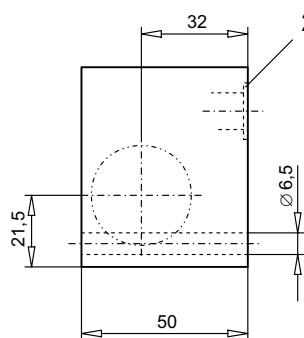
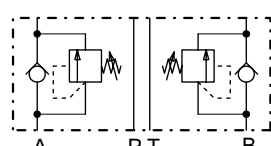
G..SA10-A



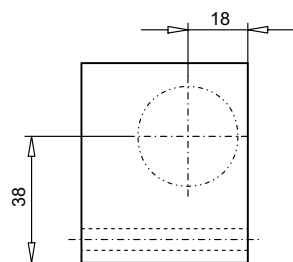
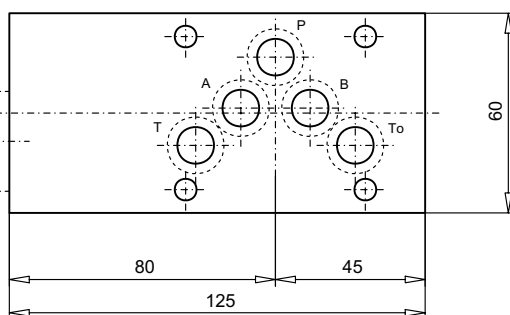
G..SA10-B



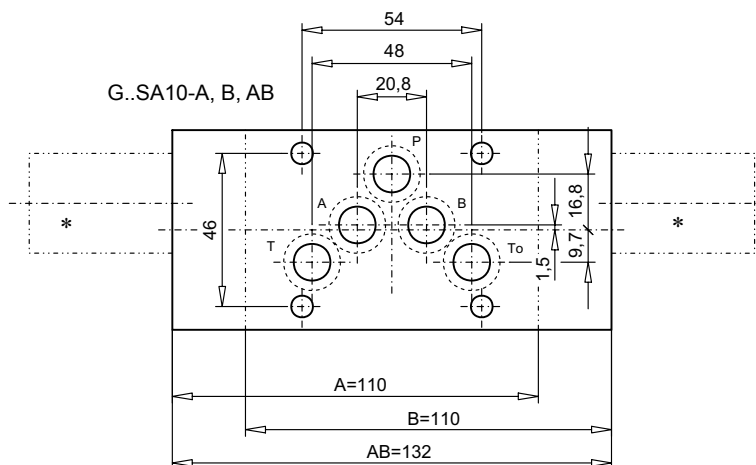
G..SA10-AB



G..SA10-T



G..SA10-A, B, AB



PARTS LIST

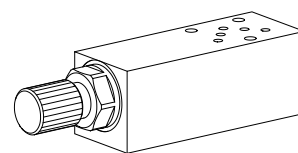
Position	Article	Description
10	593. ...	Pressure relief cartridge M22x1,5 to data sheets 2.1-530, 2.1-540 and 2.1-542
20	160.2140	O-Ring ID 14,00x1,78

* The exterior dimensions of the cartridges can be obtained from the corresponding data sheets 2.1-530, 2.1-540 and 2.1-542.

Technical explanation see data sheet 1.0-100

**Pressure sequence valve
Sandwich construction**

- Pilot operated
- $Q_{max} = 20 \text{ l/min}$
- $p_{max} = 400 \text{ bar}$
- $p_{N max} = 350 \text{ bar}$

NG4-Mini[®]

DESCRIPTION

Pressure sequence valve in sandwich construction. Connection diagram in accordance with Wandfluh standard. The valves are available in two types of adjustment, the others being fixed. A cover is also available for key adjustment, see data sheet 2.0-50. Three pressures stages are available as standard. The steel bodies of the sandwich are phosphate coated.

FUNCTION

The pressure sequence valve connects consumers in hydraulic circuits. When the set pressure has been reached, the pilot operation opens to the tank, thereby opening the main spool to the next consumer. The pilot oil flows via an internal drain line to T port. With sandwiches in A and B, return flow passes through a by-pass check valve.

APPLICATION

For sequence control of operating sequences, whereby a consumer is switched on when a specific pressure is reached. Sandwich vertical stacking valves are suitable for machine tools, also for mobile equipment of all kinds. Mini-4 pressure sequence valves are recommended whenever hydraulic systems specify small valves at a low weight and size.

TYPE CODE

		F	V	☐	S	A04	☐	-	☐	#	☐
Pressure sequence valve											
Pilot operated											
Type of adjustment	Key ☐ S Control knob ☐ D Cover ☐ A										
Sandwich construction											
Mounting interface acc. to Wandfluh standard, NG4-Mini											
Type list / function	in P ☐ P in A ☐ A in B ☐ B										
Pressure range p_N	63 bar ☐ 63 160 bar ☐ 160 350 bar ☐ 350										
Design-Index (Subject to change)											

GENERAL SPECIFICATIONS

Normal Size	NG4-Mini acc. to Wandfluh standard
Designation	Pressure sequence valve pilot operated
Construction	Sandwich construction
Type of fixture	3 mounting holes for M5 socket head screws or M5 locking screws.
Tightening torques	$M_D = 5,5 \text{ Nm}$ (qual. 8.8) for fixing screws $M_D = 50 \text{ Nm}$ for screw cartridges
Type of connections	Thread-connection plates Rows of flange plates and horizontal stacking system.
Installation position	any
Ambient temperature	$-20...+50^\circ\text{C}$
Weight	$m = 1,2 \text{ kg}$

HYDRAULIC SPECIFICATIONS

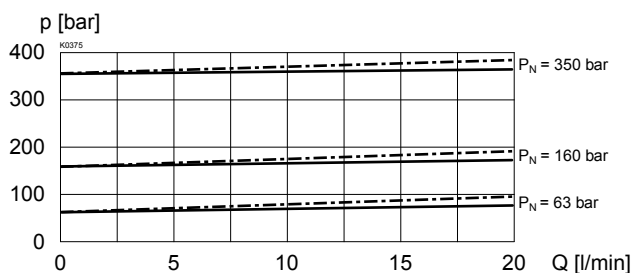
Hydraulic fluid	Mineral oils, other media on request
Max. permissible contamination level	ISO 4406:1999, class 18/16/13 (Recommended filter gauge $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	$12 \text{ mm}^2/\text{s}...320 \text{ mm}^2/\text{s}$
Hydraulic fluid temp.	$-20...+70^\circ\text{C}$
Peak pressure	$p_{max} = 400 \text{ bar}$
Rated pressure ranges	$p_N = 63 \text{ bar}, 160 \text{ bar}, 350 \text{ bar}$
Minimum pressure	see curve
Opening pressure over non-return valve	$p_o = 2,2 \text{ bar}$
Maximum volume flow	$Q_{max} = 20 \text{ l/min}$

Other hydraulic characteristics can be obtained from the data sheets 2.1-546 for cartridge M22x1,5.

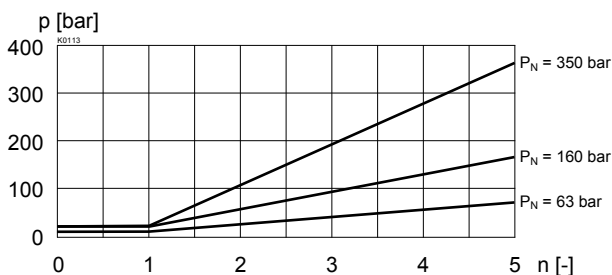
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p = f(Q)$ Pressure volume flow charac. (max.adjustable pressure)

— Sandwich in A or B
- - - Sandwich in P

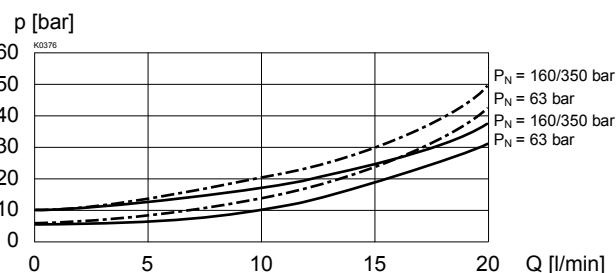


$p = f(n)$ Pressure adjustment characteristic
(at $Q = 5 \text{ l/min}$)

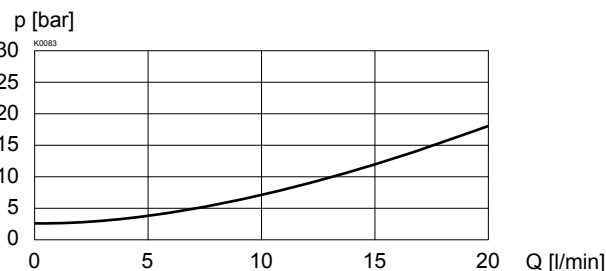


$p = f(Q)$ Pressure volume flow charac. (min.adjustable pressure)

— Sandwich in A or B
- - - Sandwich in P

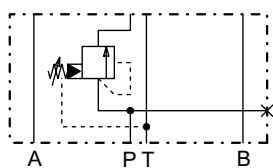


$\Delta p = f(Q)$ Pressure-drop flow characteristics curve
over non-return valve

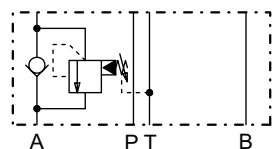


TYPE LIST / DIMENSIONS

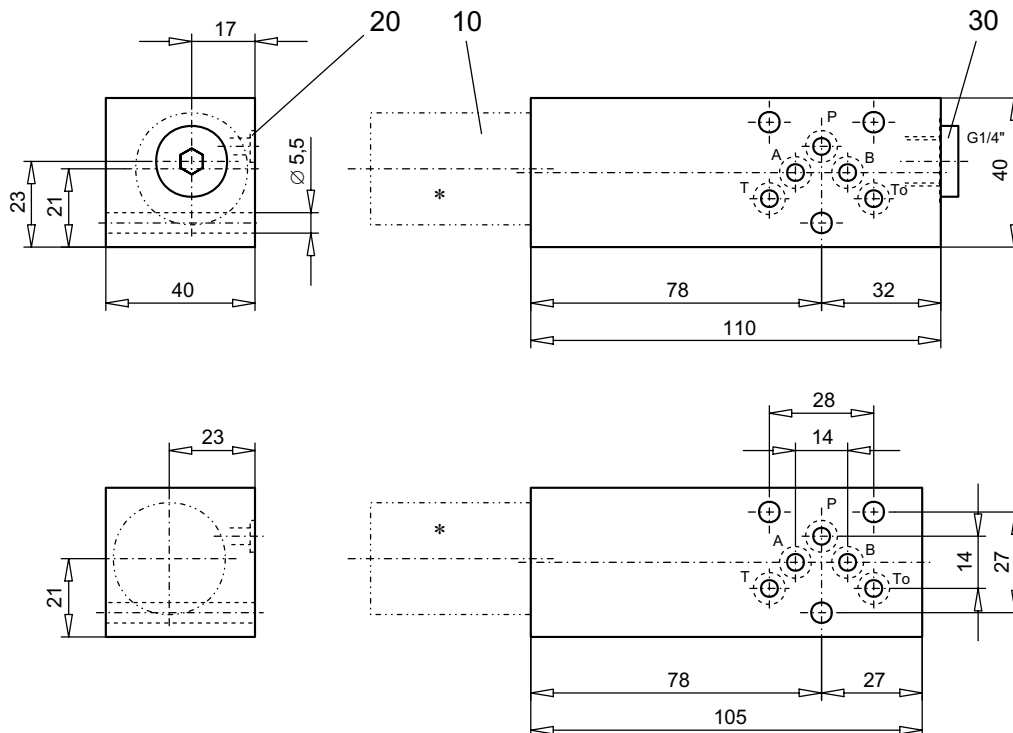
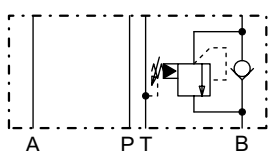
FV.SA04-P



FV.SA04-A



FV.SA04-B



PARTS LIST

Position	Article	Description
10	593.	Pressure sequence cartridge M22x1,5 to data sheet 2.1-546
20	160.2052	O-ring ID 5,28x1,78
30	238.2406	Plug VSTI G1/4"-ED

On sandwich typ B cartridge is located on B-Side.

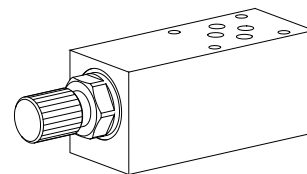
* The exterior dimensions or the cartridges can be obtained
from the data sheet 2.1-546.

Technical explanation see data sheet 1.0-100

**Pressure sequence valve
Sandwich construction**

- **Pilot operated**
- $Q_{\max} = 60 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

NG6
ISO 4401-03


DESCRIPTION

Pressure sequence valve in sandwich construction. Connection diagram in accordance with ISO 4401-03. The valves are available in three types of adjustment, one of them being lockable, the others being fixed. A cover is also available for key adjustment, see data sheet 2.0-50. Three pressure stages are available as standard. The steel bodies of the sandwich are phosphate coated.

FUNCTION

The pressure sequence valve connects consumers in hydraulic circuits. When the set pressure has been reached, the pilot operation opens to the tank, thereby opening the main spool to the next consumer. The pilot oil flows via an internal drain line to T port. With sandwiches in A and B, return flow passes through a by-pass check valve.

APPLICATION

For sequence control of operating sequences, whereby a consumer is switched on when a specific pressure is reached. Sandwich vertical stacking valves are suitable for machine tools, also for mobile equipment of all kinds.

TYPE CODE

		F	V	☐	S	A06	☐	-	☐	#	☐
Pressure sequence valve											
Pilot operated											
Type of adjustment	Key ☐ S Control knob ☐ D Cover ☐ A										
Sandwich construction											
International standard interface ISO, NG6											
Type list / function	in P ☐ P in A ☐ A in B ☐ B										
Nominal pressure, p_N	63 bar ☐ 63 160 bar ☐ 160 350 bar ☐ 350										
Design-Index (Subject to change)											

GENERAL SPECIFICATIONS

Normal Size	NG6 according to ISO 4401-03
Designation	Pressure sequence valve pilot operated
Construction	Sandwich construction
Type of fixture	4 mounting holes for M5 socket head screws or M5 locking screws.
Tightening torques	$M_D = 5,5 \text{ Nm}$ (qual. 8.8) for fixing screws $M_D = 50 \text{ Nm}$ for screw cartridges
Type of connections	Thread-connection plates Rows of flange plates and horizontal stacking system.
Installation position	any
Ambient temperature	$-20 \dots +50^\circ \text{C}$
Weight	$m = 1,4 \text{ kg}$

HYDRAULIC SPECIFICATIONS

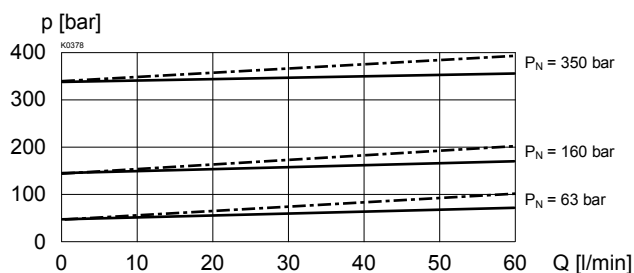
Hydraulic fluid	Mineral oils, other media on request
Max. permissible contamination level	ISO 4406:1999, class 18/16/13 (Recommended filter gauge $\beta_{6 \dots 10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	$12 \text{ mm}^2/\text{s} \dots 320 \text{ mm}^2/\text{s}$
Hydraulic fluid temp.	$-20 \dots +70^\circ \text{C}$
Peak pressure	$p_{\max} = 400 \text{ bar}$
Rated pressure ranges	$p_N = 63 \text{ bar}, 160 \text{ bar}, 350 \text{ bar}$
Minimum pressure	see curve
Opening pressure over non-return valve	$p_o = 2,0 \text{ bar}$
Maximum volume flow	$Q_{\max} = 60 \text{ l/min}$

Other hydraulic characteristics can be obtained from the data sheets 2.1-546 for cartridge M22x1,5.

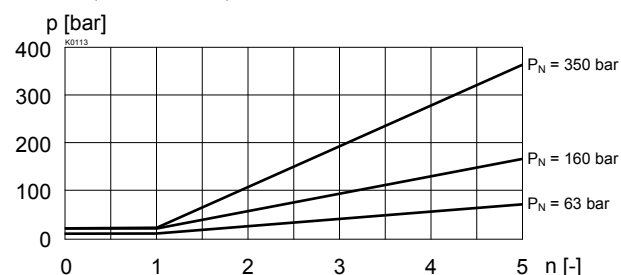
CHARACTERISTICS oil viscosity $\nu = 30\text{mm}^2/\text{s}$

$p = f(Q)$ Pressure volume flow charac. (max.adjustable pressure)

— Sandwich in A or B
- - - Sandwich in P

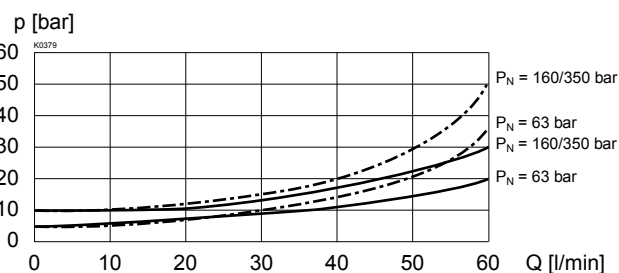


$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5\text{ l/min}$)

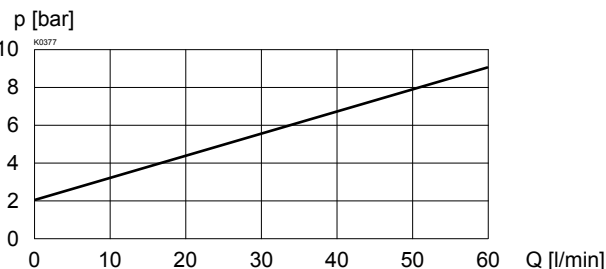


$p = f(Q)$ Pressure volume flow charac. (min.adjustable pressure)

— Sandwich in A or B
- - - Sandwich in P

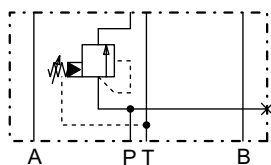


$\Delta p = f(Q)$ Pressure-drop flow characteristics curve
over non-return valve

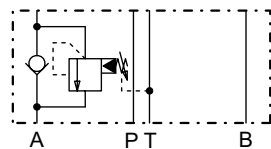


TYPE LIST / DIMENSIONS

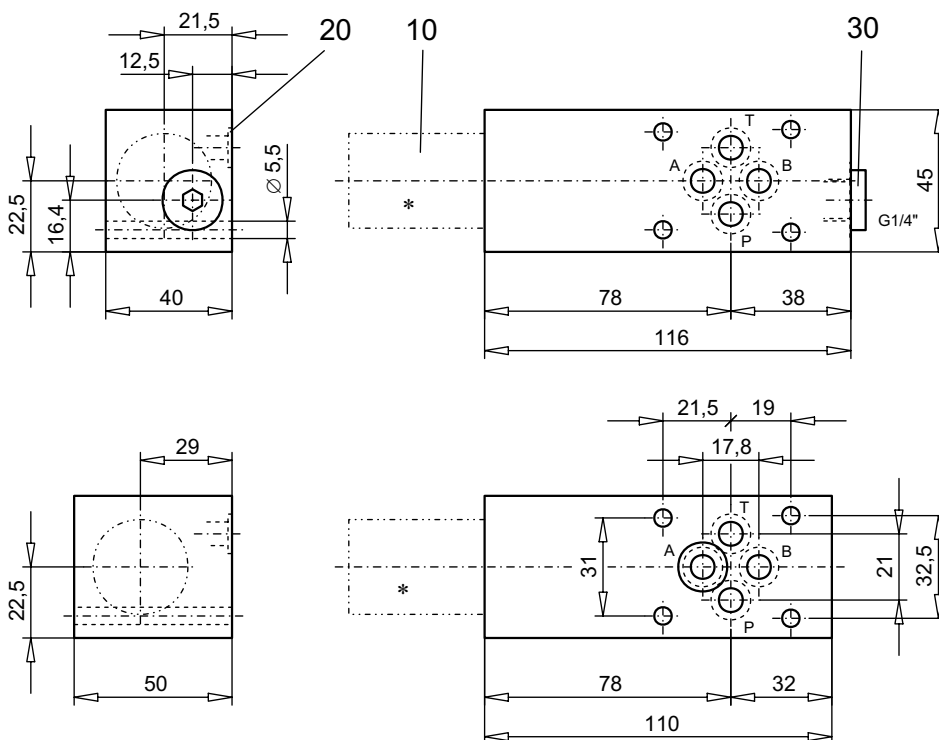
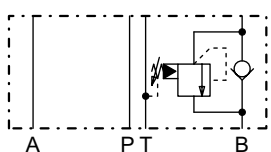
FV.SA06-P



FV.SA06-A



FV.SA06-B



PARTS LIST

Position	Article	Description
10	593.	Pressure sequence cartridge M22x1,5 to data sheet 2.1-546
20	160.2093	O-ring ID 9,25x1,78
30	238.2406	Plug VSTI G1/4"-ED

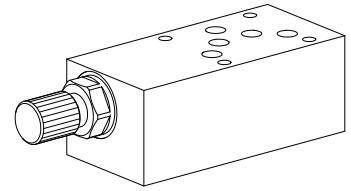
On sandwich type B cartridge is located on B-Side.

* The exterior dimensions of the cartridges can be obtained from the data sheet 2.1-546.

Technical explanation see data sheet 1.0-100

**Pressure sequence valve
Sandwich construction**
•Pilot operated

- $Q_{\max} = 100 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

NG10
ISO 4401-05

DESCRIPTION

Pressure sequence valve in sandwich construction. Connection diagram in accordance with ISO 4401-05. The valves are available in two types of adjustment, the others being fixed. A cover is also available for key adjustment, see data sheet 2.0-50. Three pressures stages are available as standard. The steel bodies of the sandwich are phosphate coated.

FUNCTION

The pressure sequence valve connects consumers in hydraulic circuits. When the set pressure has been reached, the pilot operation opens to the tank, thereby opening the main spool to the next consumer. The pilot oil flows via an internal drain line to T port. With sandwiches in A and B, return flow passes through a by-pass check valve.

APPLICATION

For sequence control of operating sequences, whereby a consumer is switched on when a specific pressure is reached. Sandwich vertical stacking valves are suitable for machine tools, also for mobile equipment of all kinds.

TYPE CODE

		F	V	☐	S	A10	☐	-		#	☐	
Pressure sequence valve												
Pilot operated												
Type of adjustment	Key	☐	S									
	Control knob	☐	D									
	Cover	☐	A									
Sandwich construction												
International standard interface ISO, NG10												
Type list / function	in P	☐	P									
	in A	☐	A									
	in B	☐	B									
Nominal pressure, p_N	63 bar	☐	63									
	160 bar	☐	160									
	350 bar	☐	350									
Design-Index (Subject to change)												

GENERAL SPECIFICATIONS

Normal Size	NG10 acc. to ISO 4401-05
Designation	Pressure sequence valve pilot operated
Construction	Sandwich construction
Type of fixture	4 mounting holes for M6 socket head screws or M6 locking screws
Tightening torques	$M_D = 9,5 \text{ Nm}$ (Qual. 8.8) for fixing screws $M_D = 50 \text{ Nm}$ for screw cartridge
Type of connection	Thread- connection plates Rows of flange plates and horizontal stacking system.
Installation position	any
Ambient temperature	$-20...+50^\circ\text{C}$
Weight	$m = 1,9 \text{ kg}$

HYDRAULIC SPECIFICATIONS

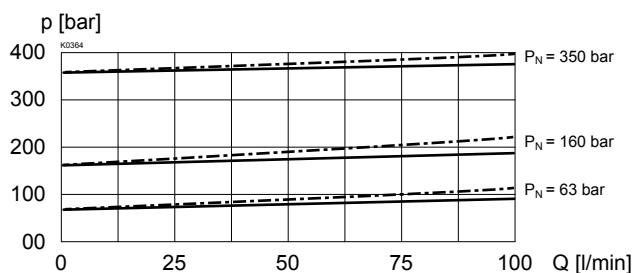
Hydraulic fluid	Mineral oils, other media on request
Max. permissible contamination level	ISO 4406:1999, class 18/16/13 (Recommended filter gauge $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	$12 \text{ mm}^2/\text{s}...320 \text{ mm}^2/\text{s}$
Hydraulic fluid temp.	$-20...+70^\circ\text{C}$
Peak pressure	$p_{\max} = 400 \text{ bar}$
Rated pressure ranges	$p_N = 63 \text{ bar}, 160 \text{ bar}, 350 \text{ bar}$
Minimum pressure	see curve
Opening pressure over non-return valve	$p_o = 0,8 \text{ bar}$
Maximum volume flow	$Q_{\max} = 100 \text{ l/min}$

Other hydraulic characteristics can be obtained from the data sheets 2.1-546 for cartridge M22x1,5.

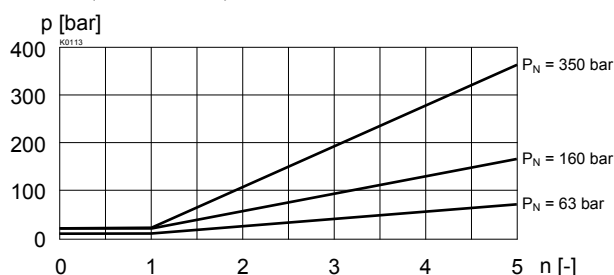
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p = f(Q)$ Pressure volume flow charac. (max.adjustable pressure)

— Sandwich in A or B
- - - Sandwich in P

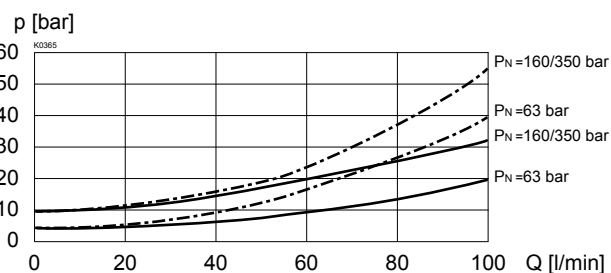


$p = f(n)$ Pressure adjustment characteristics
(at $Q = 5 \text{ l/min}$)

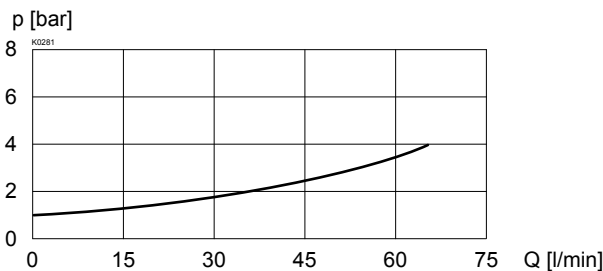


$p = f(Q)$ Pressure volume flow charac. (min.adjustable pressure)

— Sandwich in A or B
- - - Sandwich in P

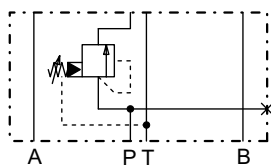


$\Delta p = f(Q)$ Pressure-drop flow characteristics curve
over non-return valve

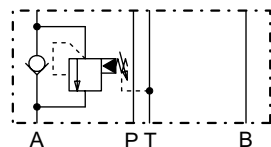


TYPE LIST / DIMENSIONS

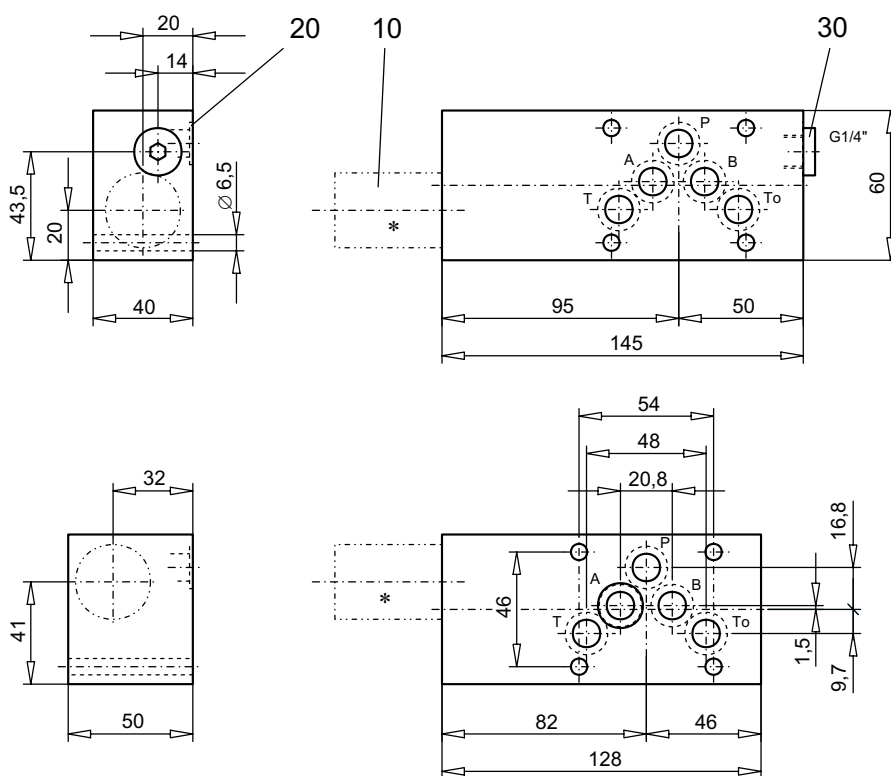
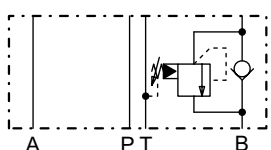
FV.SA10-P



FV.SA10-A



FV.SA10-B



PARTS LIST

Position	Article	Description
10	593.	Pressure sequence cartridge M22x1,5 to data sheet 2.1-546
20	160.2140	O-ring ID 14,00x1,78
30	238.2406	Plug VSTI G1/4"-ED

On sandwich type B cartridge is located on B-Side.

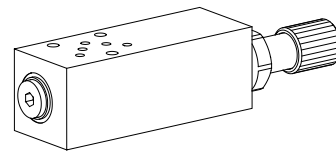
* The exterior dimensions of the cartridges can be obtained from the data sheet 2.1-546.

Technical explanation see data sheet 1.0-100

Accumulator unloading valve Sandwich construction

- 1-point adjustment
- Pilot operated
- $Q_{\max} = 8 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

NG4-Mini®



DESCRIPTION

Sandwich type pilot operated accumulator unloading valve. Mounting interface according to Wandfluh standard. The valve is available with two types of setting, both interlockable. There are three pressure stages to choose from. The valve has an adjustable unloading point and a defined re-switching difference. The steel bodies of the sandwich valve are phosphate coated. Steel cartridge body and adjustment spindle galvanised to protect them against corrosion. The aluminium knob has a natural anodised finish. The quality of this product is reflected in the good performance data and design.

FUNCTION

If the P pressure exceeds the adjustable unloading point, the pilot spool is opening the pilot valve. A control flow starts to flow and the back end of the main spool is depressurised. The resultant pressure difference displaces the main spool towards the spring and the valve switches to unloading circulation. Because of the difference in section in the pilot area, the pilot flow is interrupted as soon as the pressure in the accumulator drops by 15 % or 25 % of the upper switching point. The pressures at the main spool are equilibrated and the spring displaces the main spool to the closed position. The pump can now build up the system pressure again as far as the unloading point and the cycle starts again.

APPLICATION

Accumulator loading valves are used in hydraulic systems with accumulators. They allow a low cost, energy saving system design in cases where the cylinder flow demand varies considerably or for retaining pressures over a period of time, e.g. for clamping processes. Mini-4 accumulator unloading valves are used everywhere where lightweight, small hydraulic control systems are required. **Note:** An additional relief valve for system protection must be installed. Please refer to the set-up and connection example on page 2.

TYPE CODE

		US	☐	S	A04	-	P	☐	#	☐
Accumulator unloading valve, pilot operated										
Type of adjustment	Key	☐		☒						
	Control knob	☐		☒						
Sandwich construction										
Mounting interface acc. to Wandfluh standard, NG4-Mini										
Type list / function	in P									
Pressure range p_N	100 bar	☐		☒						
	160 bar	☐		☒						
	350 bar	☐		☒						
Design-Index (Subject to change)										

GENERAL SPECIFICATIONS

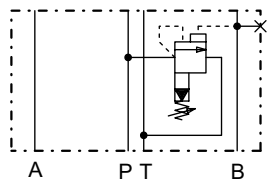
Description	Pilot operated accumulator unloading valve
Nominal size	NG4-Mini acc. to Wandfluh standard
Construction	Sandwich construction
Mounting	3 holes for socket cap screw M5 or studs M5
Connections	Connection plates Multi-station flange subplate Longitudinal stacking system
Mounting position	any
Ambient temperature	-20...+50 °C
Fastening torque	$M_D = 5,5 \text{ Nm}$ (qual 8.8) for fixing screw $M_D = 50 \text{ Nm}$ for screw cartridge
Weight	$m = 1,4 \text{ kg}$

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Normal pressure	$p_N = 100 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Minimum pressure	$p_{\min} = 50 \text{ bar}$ for $p_N = 160 / 350 \text{ bar}$ $p_{\min} = 25 \text{ bar}$ for $p_N = 100 \text{ bar}$
Diff. unloading/loading	$15 \pm 3 \%$ for $p_N = 160 / 350 \text{ bar}$ $25 \pm 3 \%$ for $p_N = 100 \text{ bar}$
Volume flow	$Q_{\min} = 1...8 \text{ l/min}$ (over 8 l/min on request)
Leakage volume flow	Maximum 4 drops/min in accumulator operation P - T

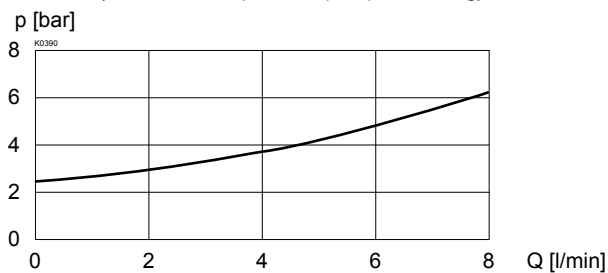
For further hydraulic characteristics refer to data sheet: 2.1-548

SYMBOL

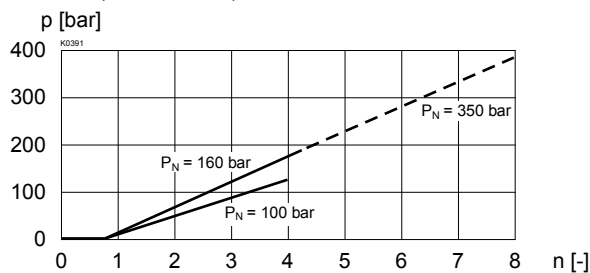


CHARACTERISTICS oilviscosity $\nu = 30\text{mm}^2/\text{s}$

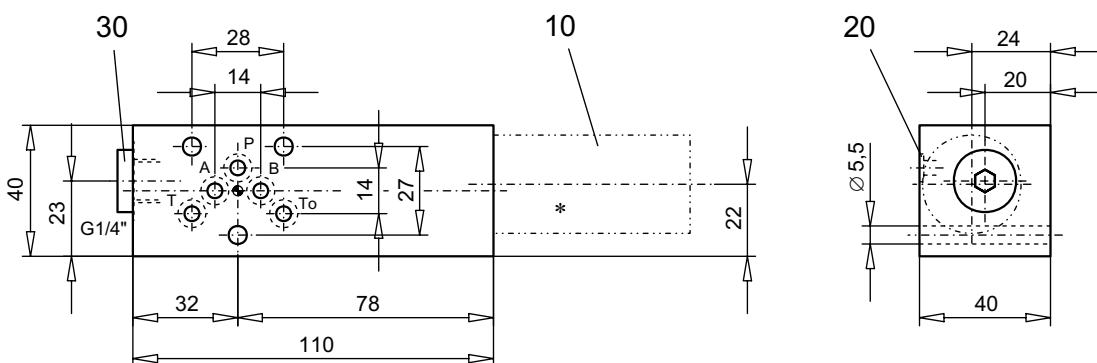
$\Delta p = f(Q)$ Pressure-flow characteristics curve
(Accumulator operation-pump unloading)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 2 \text{ l/min}$)



DIMENSIONS



* The exterior dimensions of the cartridge can be obtained from the corresponding data sheet 2.1-548

PARTS LIST

Position	Article	Description
10	597.	Accumulator loading cartridge M22x1,5 acc. to data sheet 2.1-548
20	160.2052	O-ring ID 5,28x1,78
30	238.2406	Plug VSTI G1/4"-ED

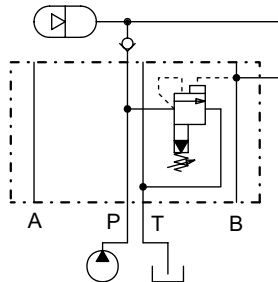
SET-UP AND CONNECTION EXAMPLES

Unloading point adjusted at 100 bar (OS)

Differential value 15%

Loading point: (US) = OS minus 15% = 85 bar

Gas side of accumulator loaded upto max. 90% of US = 76 bar

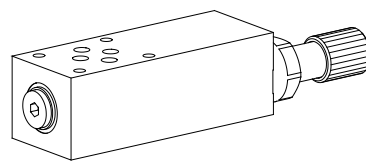


Technical explanation see data sheet 1.0-100

**Accumulator unloading valve
Sandwich construction**

- 1-point adjustment
- Pilot operated
- $Q_{\max} = 24 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

NG6
ISO 4401-03


DESCRIPTION

Sandwich type pilot operated accumulator unloading valve. Mounting interface acc. to ISO 4401-03. The valve is available with two types of setting, both interlockable. There are three pressure stages to choose from. The valve has an adjustable unloading point and a defined re-switching difference. The steel bodies of the sandwich valve are phosphate coated. Steel cartridge body and adjustment spindle galvanised to protect them against corrosion. The aluminium knob has a natural anodised finish. The quality of this product is reflected in the good performance data and design.

FUNCTION

If the P pressure exceeds the adjustable unloading point, the pilot spool is opening the pilot valve. A control flow starts to flow and the back end of the main spool is depressurised. The resultant pressure difference displaces the main spool towards the spring and the valve switches to unloading circulation. Because of the difference in section in the pilot area, the pilot flow is interrupted as soon as the pressure in the accumulator drops by 15 % or 25 % of the upper switching point. The pressures at the main spool are equilibrated and the spring displaces the main spool to the closed position. The pump can now build up the system pressure again as far as the unloading point and the cycle starts again.

APPLICATION

Accumulator loading valves are used in hydraulic systems with accumulators. They allow a low cost, energy saving system design in cases where the cylinder flow demand varies considerably or for retaining pressures over a period of time, e.g. for clamping processes. **Note:** An additional relief valve for system protection must be installed. Please refer to the set-up and connection example on page 2.

TYPE CODE

		US	☐	S	A06	-	P	☐	#	☐
Accumulator unloading valve, pilot operated										
Type of adjustment	screw knob	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sandwich construction										
International standard interface ISO, NG6										
Type list / function	in P									
Pressure range p_N	100 bar	☐	☐	☐	☐	☐	☐	☐	☐	☐
	160 bar	☐	☐	☐	☐	☐	☐	☐	☐	☐
	350 bar	☐	☐	☐	☐	☐	☐	☐	☐	☐
Design-Index (Subject to change)										

GENERAL SPECIFICATIONS

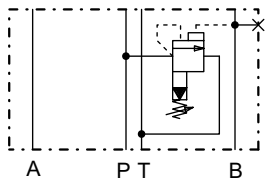
Description	Pilot operated accumulator unloading valve
Normal size	NG6 according to ISO 4401-03
Construction	Sandwich construction
Mounting	4 holes for socket cap screw M5 or studs M5
Connections	Connection plates Multi-station flange subplate Longitudinal stacking system
Mounting position	any
Ambient temperature	-20...+50 °C
Fastening torque	$M_D = 5,5 \text{ Nm}$ (Qual 8.8) for fixing screw $M_D = 50 \text{ Nm}$ for screw cartridge
Weight	$m = 1,7 \text{ kg}$

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Normal pressure	$p_N = 100 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Minimum pressure	$p_{\min} = 50 \text{ bar}$ for $p_N 160 / 350 \text{ bar}$ $p_{\min} = 25 \text{ bar}$ for $p_N 100 \text{ bar}$
Diff. unloading/loading	15 ± 3 % for $p_N = 160 / 350 \text{ bar}$ 25 ± 3 % for $p_N = 100 \text{ bar}$
Volume flow	$Q_{\min} = 1...24 \text{ l/min}$ (over 24 l/min on request)
Leakage volume flow	Maximum 4 drops/min in accumulator operation P - T

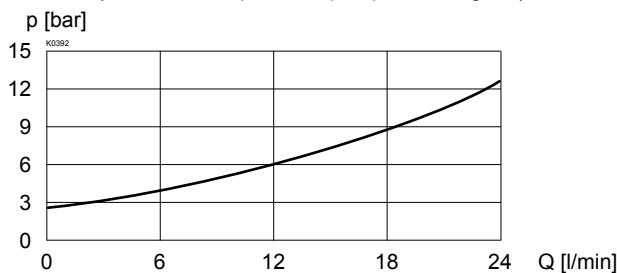
For further hydraulic characteristics refer to data sheet: 2.1-548

SYMBOL

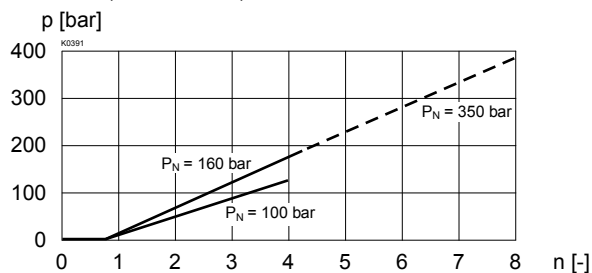


CHARACTERISTICS oilviscosity $\nu = 30\text{mm}^2/\text{s}$

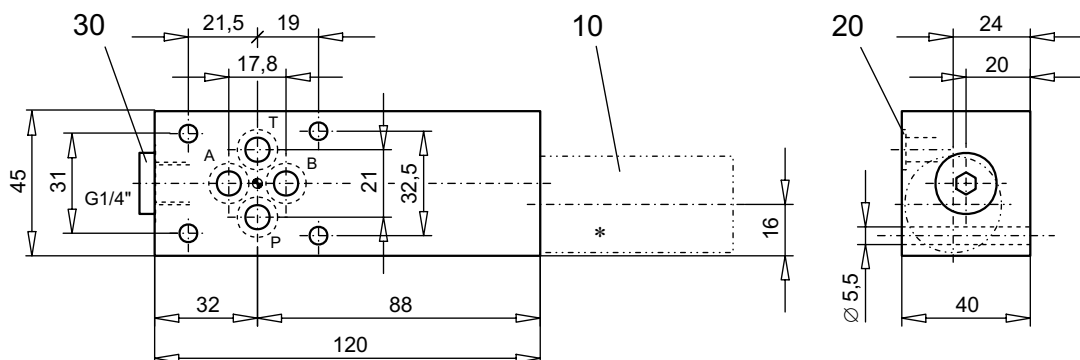
$\Delta p = f(Q)$ Pressure drop-volume flow curve
(Accumulator operation - pump unloading P-T)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 2 \text{ l/min}$)



DIMENSIONS



* The exterior dimensions of the cartridge can be obtained from the corresponding data sheet 2.1-548

PARTS LIST

Position	Article	Description
10	597.	Accumulator loading cartridge M22x1,5 acc. to data sheet 2.1-548
20	160.2093	O-ring ID 9,25x1,78
30	238.2406	Plug VSTI G1/4"-ED

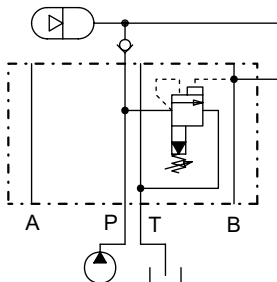
SET-UP AND CONNECTION EXAMPLES

Unloading point adjusted at 100 bar (OS)

Differential value 15 %

Loading point: (US) = OS minus 15 % = 85 bar

Gas side of accumulator loaded upto max. 90 % of US = 76 bar



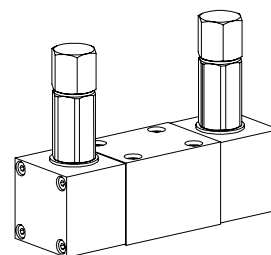
Technical explanation see data sheet 1.0-100

Accumulator loading valve

Flange construction

- 2-point-adjustment
- $Q_{\max} = 30 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

NG6
ISO 4401-03

**DESCRIPTION**

Flange type pilot operated accumulator loading valve. Mounting interface acc. to ISO 4401-03. 3 pressure ranges are available. The upper and lower shifting pressure are adjustable independently from each other. A minimum pressure difference must be observed. Spools are of hardened steel, body is of high grade hydraulic cast iron for long service life.

FUNCTION

The accumulator loading valve diverts pump flow back to tank at low Δp after upper working pressure of the accumulator has been reached and to load the accumulator when pressure of the stored fluid drops to the lower working pressure. Hydraulic circuits with short time peak consumption of fluids may be built by combining a pump with relatively low delivery and an accumulator. Energy input will be reduced.

Important:

For loading an accumulator a check valve for free flow from P to B line is necessary (Sandwich plate NG6: ARV6/P-B must be ordered separately).

APPLICATION

Accumulator loading valves are used in hydraulic systems with accumulator. Systems with low energy consumption and reduced installation costs may be built where oil demand of a cylinder varies or for load holding functions eg. clamping functions.

Important:

- An additional relief valve for system protection has to be installed. The relief valve setting must be above the upper shifting pressure of the accumulator loading valve.
- Drain port A needs a separate tank line as back pressure influences the pressure settings.
- Gas charge of the accumulator may not exceed 90 % of lower shifting pressure.

TYPE CODE

A SPLV 6 2 / ☐ # ☐

International mounting interface ISO

Accumulator loading valve

Nominal size 6

2 adjustable shifting pressures

Pressure range p_N

63 bar	☐ p1
160 bar	☐ p2
350 bar	☐ p3

Design-Index (Subject to change)

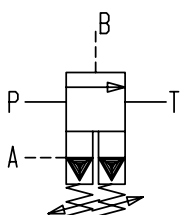
GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS	
Description	Pilot operated accumulator loading valve
Normalinal size	NG6 acc. to ISO 4401-03
Construction	Flange construction
Mounting	Flange
	4 fixing holes for head cap screws M5x45 (with in addition ARV6/P-B: socket head cap screws M5x88)
Connections	Connection plates Multi-station flange subplate Longitudinal stacking system
Ambient temperature	-20...+50°C
Mounting position	any
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8)
Weight	$m = 2,7 \text{ kg}$

HYDRAULIC SPECIFICATIONS

HYDRASER SPECIFICATIONS	
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13...21/19/15 (Required filtration grade $\beta_6...25 \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	p _{max} = 400 bar
Normal pressure p _N	p1 = 63 bar, p2 = 160 bar, p3 = 350 bar
Minimum pressure p _{min}	p1: 20 bar, p2/p3: 25 bar
Min. shifting pressure diff.	p1: 15 bar, p2: 25 bar, p3: 30 bar
Pressure adjustment	p1: 12 bar/turn, p2: 20 bar/turn p3: 40 bar/turn
Volume flow	Q = 1...30 l/min
Leakage volume flow	see characteristics

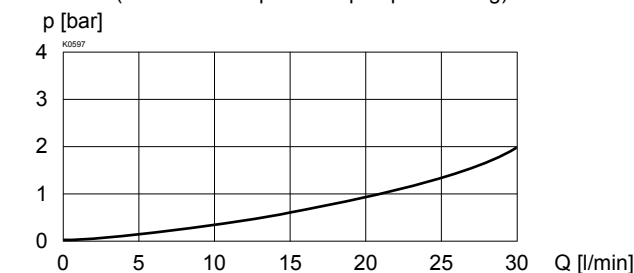
SYMBOL



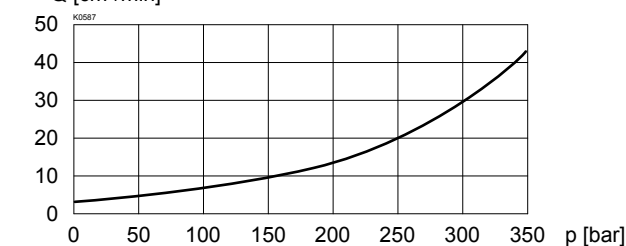
P: Pressure port
T: Tank port
A: Drain port
B: Pilot port

CHARACTERISTICS oilviscosity $\nu = 30 \text{ mm}^2/\text{s}$

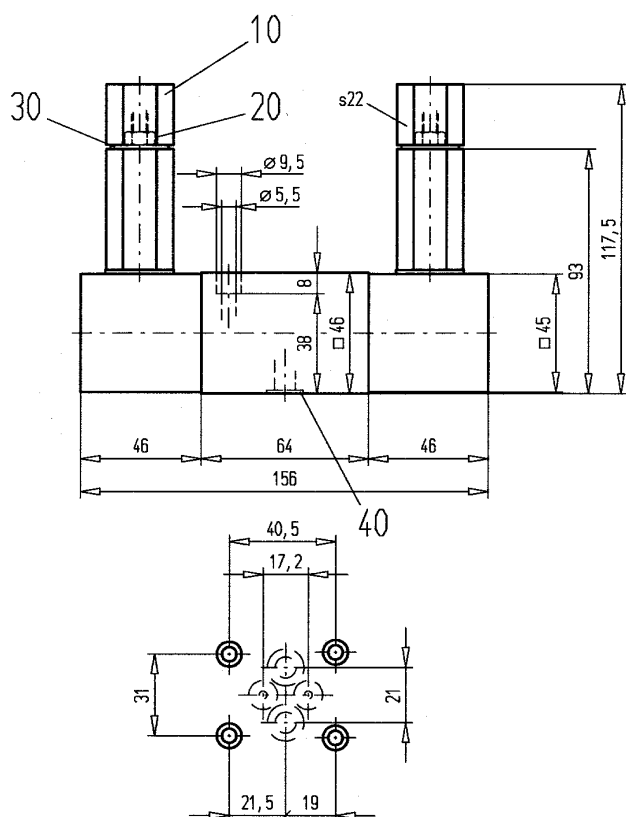
$\Delta p = f(Q)$ Pressure-flow characteristics curve
(Accumulator operation- pump unloading)



$Q_L = f(p)$ Leakage volume flow-characteristics
Q [cm³/min]



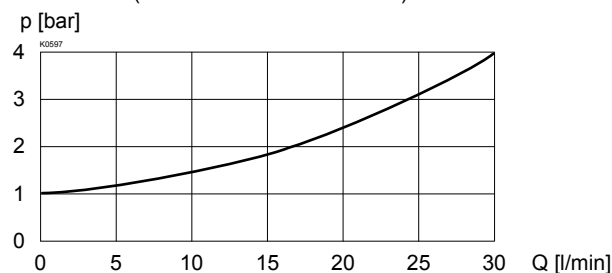
DIMENSIONS



PARTS LIST

Position	Article	Designation
10	154.7200	Cap nut M6x23
20	153.1301	Hexagonal nut 0,8 D M6
30	049.1180	Cop. seal ring NG 18x22x1,5 DIN 7603
40	160.2076 160.2108	O-ring ID 12,42x1,78 (A and B) O-ring ID 15,60x1,78 (P and T)

$\Delta p = f(Q)$ Pressure-drop flow characteristics curve
(over check valve ARV6/P-B)

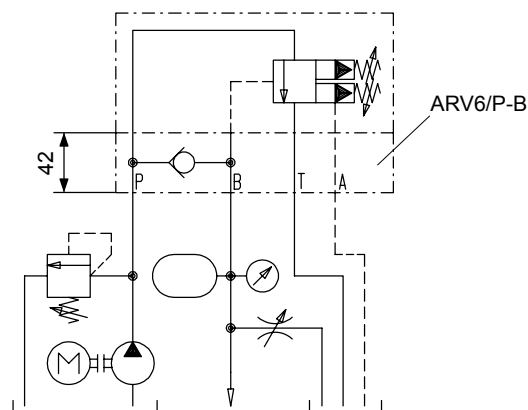


Setting procedure

Adjusting the shifting pressures

To adjust the acc. / . v. a drain code (B to tank) is required.

The accumulator loading valve has 2 adjusting screws, and lock nuts, to ensure that the set pressures are maintained. The „OS“ adjusting screw is used to set the upper shifting point, and the „US“ adjusting screw to set the lower shifting point.



Procedure

1. Open drain cock to by-pass flow to tank when pump gets started.
2. Adjustment screw „US“: turn anti clockwise to relief spring completely.
3. Adjustment screw „OS“: turn clockwise to the stop, then 2 turns back.
4. Start pump. Close drain cock. Check relief valve setting (min 10 bar higher than desired upper shifting pressure of accumulator for loading valve).
5. Close drain cock partially and let pressure rise to the desired upper working pressure.
6. Turn adjustment „OS“ anti clockwise to the point where the valve shifts into unloading function.
7. Open drain cock slowly and let pressure drop until valve shifts into loading function.
8. Turn adjustment „US“ clockwise to the specified lower shifting pressure.
9. Lock adjustments with lock nuts. Check set pressures by simulating varying oil demands with drain cock.
10. Mount caps and close drain cock.

ACCESSORIES

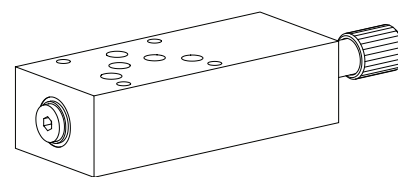
Connection plates, multi-station flange subplate and longitudinal stacking system Register 2.9
Check sandwich valve NG6 ARV6/P-B Article no. 662.3010

Technical explanation see data sheet 1.0-100

Accumulator unloading valve Sandwich construction

- 1-point adjustment
- Pilot operated
- $Q_{\max} = 30 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

NG10
ISO 4401-05



DESCRIPTION

Sandwich type pilot operated accumulator unloading valve. Mounting interface acc. to ISO 4401-05. The valve is available with two types of setting, both interlockable. There are three pressure stages to choose from. The valve has an adjustable unloading point and a defined re-switching difference. The steel bodies of the sandwich valve are phosphate coated. Steel cartridge body and adjustment spindle galvanised to protect them against corrosion. The aluminium knob has a natural anodised finish. The quality of this product is reflected in the good performance data and design.

FUNCTION

If the P pressure exceeds the adjustable unloading point, the pilot spool is opening the pilot valve. A control flow starts to flow and the back end of the main spool is depressurised. The resultant pressure difference displaces the main spool towards the spring and the valve switches to unloading circulation. Because of the difference in section in the pilot aerea, the pilot flow is interrupted as soon as the pressure in the accumulator drops by 15% or 25% of the upper switching point. The pressures at the main spool are equilibrated and the spring displaces the main spool to the closed position. The pump can now build up the system pressure again as far as the unloading point and the cycle starts again.

APPLICATION

Accumulator loading valves are used in hydraulic systems with accumulators. They allow a low cost, energy saving system design in cases where the cylinder flow demand varies considerably or for retaining pressures over a period of time, e.g. for clamping processes. **Note:** An additional relief valve for system protection must be installed. Please refer to the set-up and connection example on page 2.

TYPE CODE

		US	☐	S	A10	-	P	☐	#	☐
Accumulator unloading valve										
Settings versions:	screw ☐ knob ☐									
Sandwich construction										
International standard interface ISO, NG10										
Accumulator loading in P										
Standard nominal pressure ranges:	$p_N = 100 \text{ bar}$ ☐ $p_N = 160 \text{ bar}$ ☐ $p_N = 350 \text{ bar}$ ☐									
Design-Index (Subject to change)										

GENERAL SPECIFICATIONS

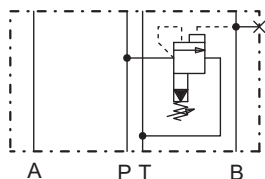
Description	Pilot operated accumulator unloading valve
Normalinal size	NG10 according to ISO 4401-05
Construction	Sandwich construction
Mounting	4 holes for socket cap screw M6 or studs M6
Connections	Connection plates Multi-station flange subplate Longitudinal stacking system
Mounting position	any
Ambient temperature	-20...+50 °C
Fastening torque	$M_D = 9,5 \text{ Nm}$ (Qual 8.8) for fixing screw $M_D = 50 \text{ Nm}$ for screw cartridge
Weight	$m = 2,7 \text{ kg}$

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure	$p_N = 100 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$
Minimum pressure	$p_{\min} = 50 \text{ bar}$ for $p_N 160 / 350 \text{ bar}$ $p_{\min} = 25 \text{ bar}$ for $p_N 100 \text{ bar}$
Diff. unloading/loading	$15 \pm 3\%$ for $p_N = 160 / 350 \text{ bar}$ $25 \pm 3\%$ for $p_N = 100 \text{ bar}$
Volume flow	$Q_{\min} = 1...30 \text{ l/min}$ (over 30 l/min on request)
Leakage volume flow	Maximum 4 drops/min in accumulator operation P - T

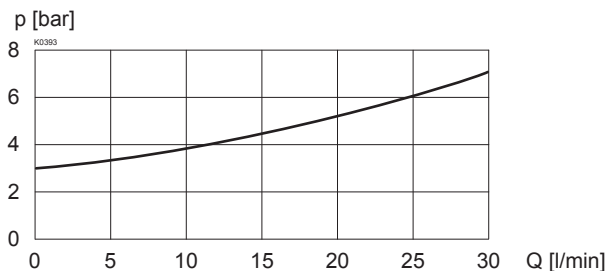
For further hydraulic characteristics refer to data sheet: 2.1-548

SYMBOL

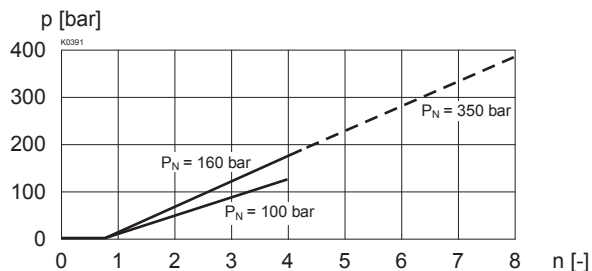


CHARACTERISTICS oilviscosity $\nu = 30\text{mm}^2/\text{s}$

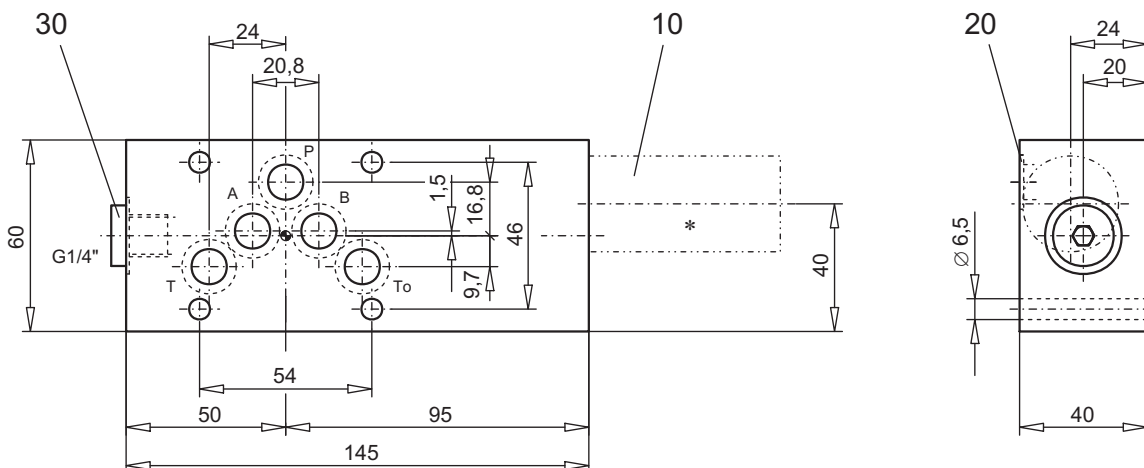
$\Delta p = f(Q)$ Pressure drop-volume flow curve
(Accumulator operation - pump unloading P-T)



$p = f(n)$ Pressure adjustment characteristics
(at $Q = 2\text{ l/min}$)



DIMENSIONS



* The exterior dimensions of the cartridge can be obtained from the corresponding data sheet 2.1-548

PARTS LIST

Position	Article	Description
10	597.	Accumulator loading cartridge M22x1,5 acc. to data sheet 2.1-548
20	160.2140	O-ring ID 14,00x1,78
30	238.2406	Plug VSTI G1/4"-ED

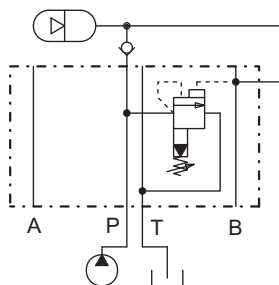
SET-UP AND CONNECTION EXAMPLES

Unloading point adjusted at 100 bar (OS)

Differential value 15 %

Loading point: (US) = OS minus 15 % = 85 bar

Gas side of accumulator loaded upto max. 90 % of US = 76 bar



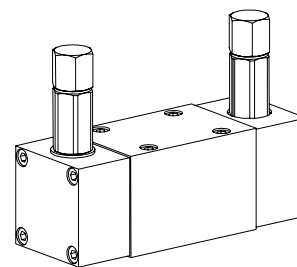
Technical explanation see data sheet 1.0-100

Accumulator loading valve

Flange construction

- 2-point-adjustment
- $Q_{\max} = 80 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

NG10
ISO 4401-05

**DESCRIPTION**

Flange type pilot operated accumulator loading valve. Mounting interface acc. to ISO 4401-05. 3 pressure ranges are available. The upper and lower shifting pressure are adjustable in dependently from each other. A minimum pressure difference must be observed. Spools are of hardened steel, body is of high grade hydraulic cast iron for long service life.

FUNCTION

The accumulator loading valve diverts pump flow back to tank at low Δp after upper working pressure of the accumulator has been reached and to load the accumulator when pressure of the stored fluid drops to the lower working pressure. Hydraulic circuits with short time peak consumption of fluids may be built by combining a pump with relatively low delivery and an accumulator. Energy input will be reduced.

Important:

For loading an accumulator a check valve for free flow from P to B line is necessary (Sandwich plate NG10: ARV6/P-B must be ordered separately).

APPLICATION

Accumulator loading valves are used in hydraulic systems with accumulator. Systems with low energy consumption and reduced installation costs may be built where oil demand of a cylinder varies or for load holding functions e.g. clamping functions.

Important:

- An additional relief valve for system protection has to be installed. The relief valve setting must be above the upper shifting pressure of the accumulator loading valve.
- Drain port A needs a separate tank line as back pressure influences the pressure settings.
- Gas charge of the accumulator may not exceed 90 % of lower shifting pressure.

TYPE CODE

	A	SPLV	10	2	/		#	
International mounting interface ISO								
Accumulator loading valve								
Nominal size 10								
2 adjustable shifting pressures								
Pressure range p_N								
63 bar								p1
160 bar								p2
350 bar								p3
Design-Index (Subject to change)								

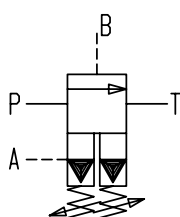
GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS	
Description	Pilot operated accumulator loading valve
Nominal size	NG10 acc. to ISO 4401-05
Construction	Flange construction
Mounting	Flange
	4 fixing holes for head cap screws M6x65 (with in addition ARV10/P-B: studs M6x141 plus step nuts M6)
Connections	Connection plates Multi-station flange subplate Longitudinal stacking system
Ambient temperature	-20...+50°C
Mounting position	any
Fastening torque	$M_D = 9,5 \text{ Nm}$ (quality 8.8)
Weight	$m = 4,5 \text{ kg}$

HYDRAULIC SPECIFICATIONS

HYDRACON SPECIFICATIONS	
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13...21/19/15 (Required filtration grade $\beta_6...25 \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{\max} = 400$ bar
Nominal pressure p_N	$p_1 = 63$ bar, $p_2 = 160$ bar, $p_3 = 350$ bar
Minimum pressure $p_{\min}$	$p_1: 20$ bar, $p_2/p_3: 25$ bar
Min. shifting pressure diff.	$p_1: 15$ bar, $p_2: 25$ bar, $p_3: 30$ bar
Pressure adjustment	$p_1: 12$ bar/turn, $p_2: 20$ bar/turn $p_3: 40$ bar/turn
Volume flow	$Q = 1...80$ l/min
Leakage volume flow	see characteristics

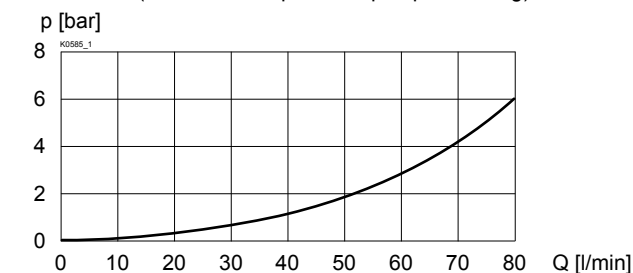
SYMBOL



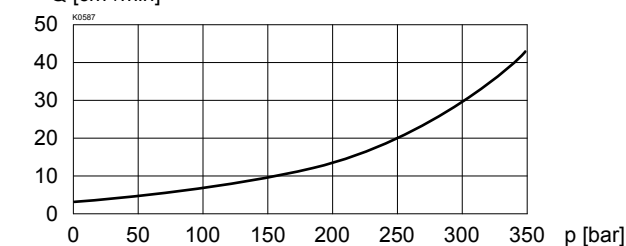
P: Pressure port
T: Tank port
A: Drain port
B: Pilot port

CHARACTERISTICS oilviscosity $\nu = 30 \text{ mm}^2/\text{s}$

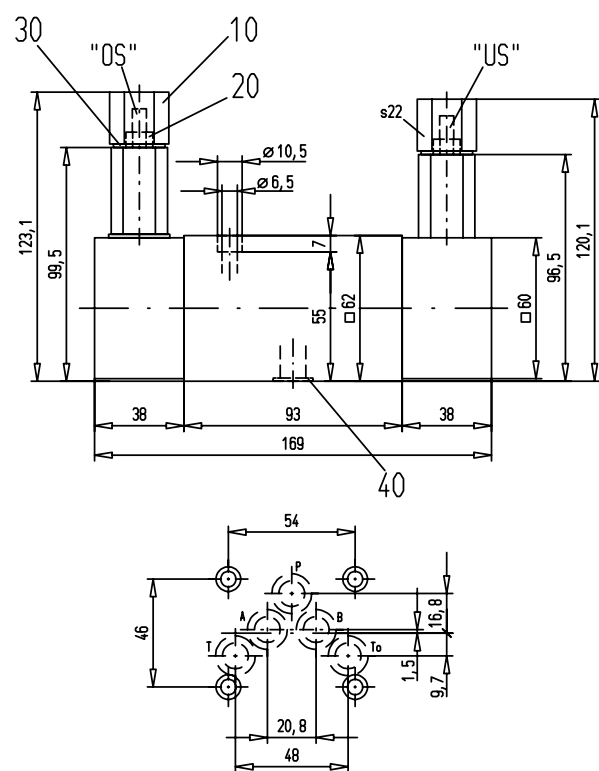
$\Delta p = f(Q)$ Pressure-flow characteristics curve
(Accumulator operation- pump unloading)



$Q_L = f(p)$ Leakage volume flow-characteristics
Q [cm³/min]



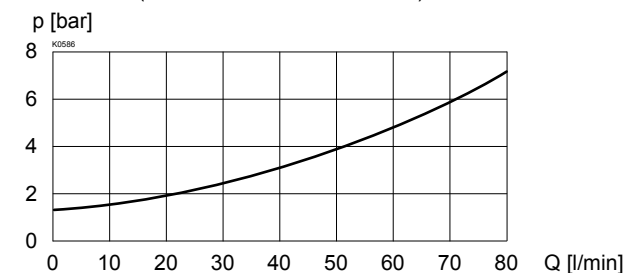
DIMENSIONS



PARTS LIST

Position	Article	Designation
10	154.7200	Cap nut M6x23
20	153.1301	Hexagonal nut 0,8 D M6
30	049.1180	Cop. seal ring NG 18x22x1,5 DIN 7603
40	160.2120 160.2156	O-ring ID 12,42x1,78 (A and B) O-ring ID 15,60x1,78 (P, T and To)

$\Delta p = f(Q)$ Pressure-drop flow characteristics curve
(over check valve ARV10/P-B)

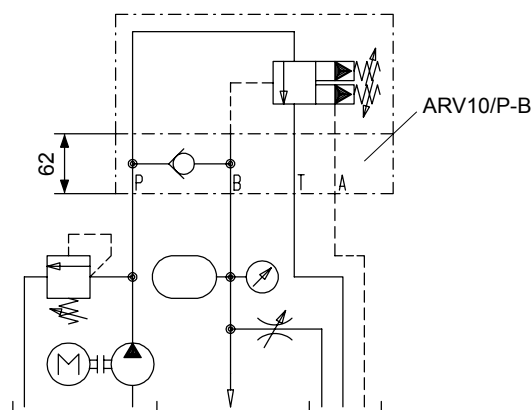


Setting procedure

Adjusting the shifting pressures

To adjust the acc ./. v. a drain cock (B to tank) is required.

The accumulator loading valve has 2 adjusting screws, and lock nuts, to ensure that the set pressures are maintained. The „OS“ adjusting screw is used to set the upper shifting point, and the „US“ adjusting screw to set the lower shifting point.



Procedure

1. Open drain cock to by-pass flow to tank when pump gets started.
2. Adjustment screw „US“: turn anti clockwise to relief spring completely.
3. Adjustment screw „OS“: turn clockwise to the stop, then 2 turns back.
4. Start pump. Close drain cock. Check relief valve setting (min 10 bar higher than desired upper shifting pressure of accumulator for loading valve).
5. Close drain cock partially and let pressure rise to the desired upper working pressure.
6. Turn adjustment „OS“ anti clockwise to the point where the valve shifts into unloading function.
7. Open drain cock slowly and let pressure drop until valve shifts into loading function.
8. Turn adjustment „US“ clockwise to the specified lower shifting pressure.
9. Lock adjustments with lock nuts. Check set pressures by simulating varying oil demands with drain cock.
10. Mount caps and close drain cock.

ACCESSORIES

Connection plates, multi-station flange subplate and longitudinal stacking system

Register 2.9

Check sandwich valve NG10 ARV6/P-B

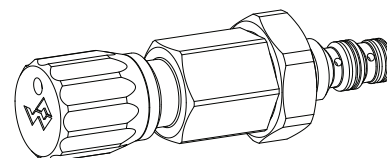
Article no. 662.4013

Technical explanation see data sheet 1.0-100

Proportional pressure reducing valve
Screw-in cartridge

- **Direct operated**
- $Q_{\max} = 6 \text{ l/min}$
- $p_{\max} = 210 \text{ bar (350 bar)}$
- $p_{N \text{ red max}} = 50 \text{ bar}$

M16x1,5
Wandfluh-Norm


DESCRIPTION

Direct operated pressure reducing valve as a screw-in cartridge with a thread M16x1,5. This valve reduces the inlet pressure to a adjustable outlet pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. The valve is available with 2 types adjustments. A cover is also available for key adjustment, see data sheet 2.0-50. The special surface coating protects the external parts against corrosion and reduces friction of the control spool. The solenoid coil is zinc-/nickel-coated. The housing is made of stainless steel.

FUNCTION

The pressure regulating valve controls the pressure in port A (1). By increasing the spring tension, the pressure in A (1) increases. The valve functions practically independently of pressure in port P (2). A pressure rise in Port A (1) above the set pressure, e.g. due to an active oil consumer, will be prevented by relieving excess volume flow to tank via port T (3).

APPLICATION

Pressure reducing valves are used to keep the pressure constant in the consumer, irrespective of pressure fluctuations on the supply side. If there are several consumers, the pressure of the individual consumers can be set individually using the pressure reducing valve. The integrated pressure relief facility means that no additional pressure relief valve is needed in the actuator line. Installation of the screw-in cartridge in control blocks.

TYPE CODE

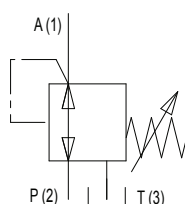
Pressure reducing valve		M D ☐ PM16 - ☐ - ☐ # ☐	
Direct operated			
Type of adjustment	Key ☐ S Control knob ☐ D Cover ☐ A (see data sheet 2.0-50)		
Screw-in thread M16x1,5			
Nominal pressure range $p_{N \text{ red}}$	18 bar ☐ 18 32 bar ☐ 32 50 bar ☐ 50		
Sealing material	NBR ☐ FKM (Viton) ☐ D1		
System pressure max. 210 bar ☐ System pressure max. 350 bar ☐ Z406			
Design-Index (Subject to change)			

GENERAL SPECIFICATIONS

Description	Direct operated pressure reducing valve
Construction	Screw-in cartridge for cavity according to Wandfluh standard
Mounting	Screw-in thread M18x1,5
Ambient temperature	-25...+70°C
Mounting position	any
Fastening torque	$M_D = 30 \text{ Nm}$
Weight:	$m = 0,11 \text{ kg}$ (Key) $m = 0,12 \text{ kg}$ (Control knob)

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-25...+70°C
Peak pressure	$p_{\max} = 210 \text{ bar}$
Minimum adjustable pressure	< 0,5 bar
Nominal pressure range	$p_{N \text{ red}} = 18 \text{ bar, } 32 \text{ bar, } 50 \text{ bar}$
Volume flow range	$Q = 0...6 \text{ l/min}$
Leakage volume flow	18/32 bar version $p_{\text{red}} = 0 \text{ bar: } < 10 \text{ ml/min.}$ $p_{\text{red}} = 25 \text{ bar: } < 50 \text{ ml/min.}$ 50 bar version $p_{\text{red}} = 0 \text{ bar: } < 10 \text{ ml/min.}$ $p_{\text{red}} = 40 \text{ bar: } < 40 \text{ ml/min.}$

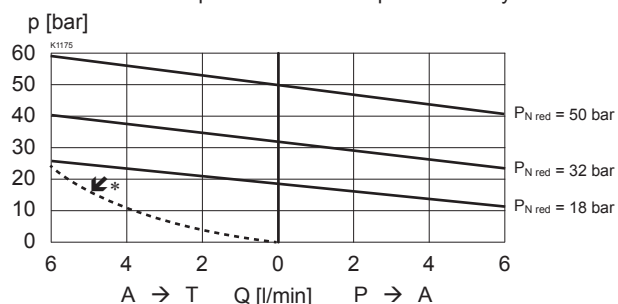
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 2 different versions:
S = Screw adjustment with fork wrench and Allen key
D = Control knob adjustment, fixed
Control stroke $S_b = 5,25 \text{ mm}$
Control angle $\alpha_b = 1890^\circ$ (5,25 revolutions)

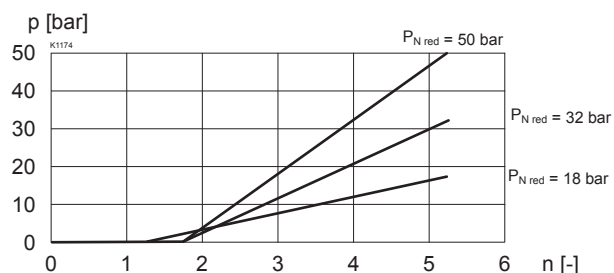
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)

* Consumption resistance dependent on system

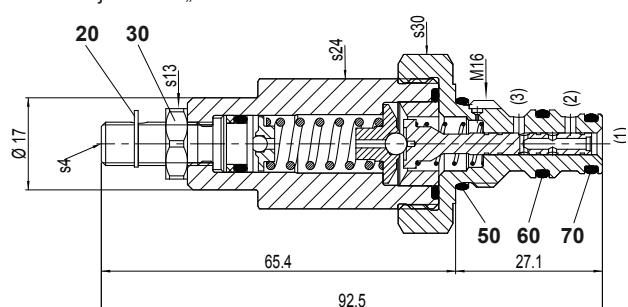


$p_{\text{red}} = f(n)$ Pressure adjustment characteristics
[at $Q = 0 \text{ l/min}$ (static)]

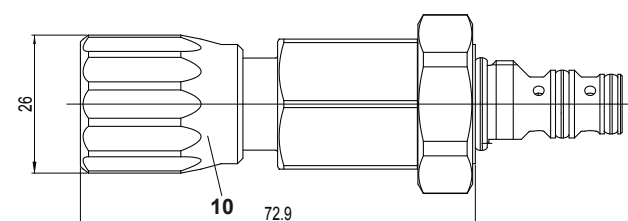


DIMENSIONS/SECTIONAL DRAWINGS

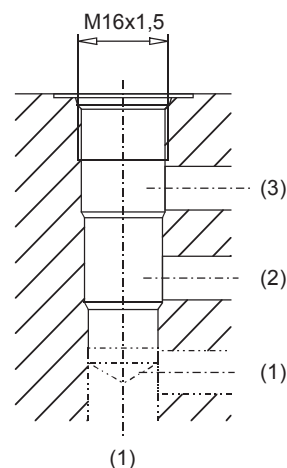
Screw adjustment „S“



Knob adjustment „D“



Cavity drawing acc. to
Wandfluh standard



For detailed cavity drawing
see data sheet 2.13-1020

PARTS LIST

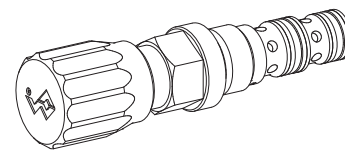
Position	Article	Description
10	114.2224	Knob
20	193.1061	Safety plate RD6 DIN 6799
30	153.1402	Hexagonal nut 0,5D M8x1
50	160.2140 160.8140	O-ring ID 14,00 x 1,78 (NBR) O-ring ID 14,00 x 1,78 (FKM)
60	160.2093 160.8092	O-ring ID 9,25 x 1,78 (NBR) O-ring ID 9,25 x 1,78 (FKM)
70	160.2076 160.8076	O-ring ID 7,65 x 1,78 (NBR) O-ring ID 7,65 x 1,78 (FKM)

Technical explanation see data sheet 1.0-100E

Pressure reducing valve
Screw-in cartridge

- Pilot operated
- $Q_{\max} = 25 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

M18x1,5
Wandfluh standard


DESCRIPTION

Pilot operated 3-way pressure reducing valve of the screw-in cartridge type with thread M18x1,5 for cavity in according to Wandfluh standard. This valve reduces the inlet pressure to a ad-justable outlet pressure. The integrated pres-sure relief function prevents the reduced pressure from being exceeded as a result of external forces. The valve is available with 2 types adjustments. A cover is also available for key adjustment, see data sheet 2.0-50. There are 3 pressure stages to choose from. The steel cartridge body and adjustment spindle are galvanised and the aluminium knob has a natural anodised finish. The quality of this product is reflected in the good performance data and design.

FUNCTION

The spool, located in the pilot operated main section of the valve, is held in the reset position by a spring. The connection to the consumer is fully open. With the pilot stage which is designed as relief valve, reduced pressure is adjustable. It opens when the set value is reached. As a result, a pilot volume flows through the nozzle in the spool. The resultant pressure difference displaces the spool towards the spring. The volume flow is throttled in the valve inlet and the reduced pressure is controlled. If forces acting on the actuator allow the reduced pressure to exceed the set value, the spool is displaced until the valve inlet closes and the reduced pressure port is being connected to tank. The pressure increase is then limited.

APPLICATION

Pressure reducing valves are used to keep the pressure constant in the consumer, irre-spective of pressure fluctuations on the supply side. If there are several consumers, the pressure of the individual consumers can be set individually using the pressure reducing valve. The integrated pressure relief facility means that no additional pressure relief valve is needed in the actuator line. Installation of the screw-in cartridge in control blocks as well as in the Wandfluh sandwich plates (vertical stacked systems) and flange valves of the NG3-Mini types. (Please note the separate data sheets in register 2.2). Cavity tools are available for machining the cavities in steel and aluminium (hire or pur-chase). Please refer to the data sheets in register 2.13.

TYPE CODE

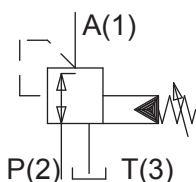
		M	V	☐	PM18	-	☐	#	☐
Pressure reducing valve									
Pilot operated									
Types of adjustment:	Key ☐ S Control knob ☐ D Cover ☐ A (see data sheet 2.0-50)								
Screw-in cartridge M18x1,5									
Standard nominal pressure range:	$p_{N \text{ red}} = 63 \text{ bar}$ ☐ 63 $p_{N \text{ red}} = 160 \text{ bar}$ ☐ 160 $p_{N \text{ red}} = 350 \text{ bar}$ ☐ 350								
Design-Index (Subject to change)									

GENERAL SPECIFICATIONS

Description	Pilot operated pressure reducing valve
Construction	Screw-in cartridge for cavity according to Wandfluh standard
Mounting	Screw-in thread M18x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening torque	$M_D = 30 \text{ Nm}$
Weight:	$m = 0,11 \text{ kg}$ (Key) $m = 0,12 \text{ kg}$ (Control knob)

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure ranges	$p_{N \text{ red}} = 63 \text{ bar}, 160 \text{ bar and } 350 \text{ bar}$
Volume flow	$Q = 0...25 \text{ l/min}$
Pilot- and leakage volume flow	see characteristics

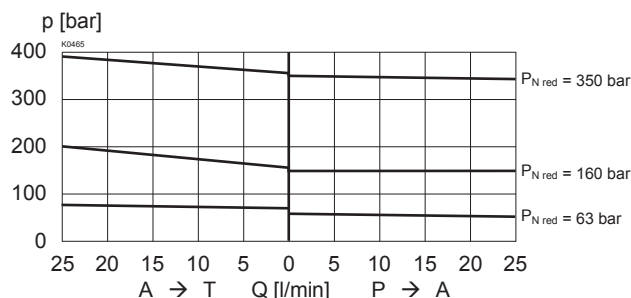
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 2 different versions:
S = Screw adjustment with fork wrench and Allen key

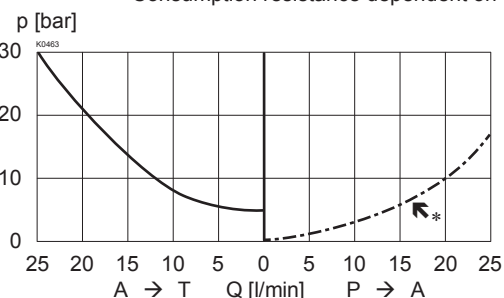
D = Control knob adjustment, fixed
Control stroke $S_b = 5 \text{ mm}$
Control angle $\alpha_b = 1800^\circ$ (5 revolutions)

CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

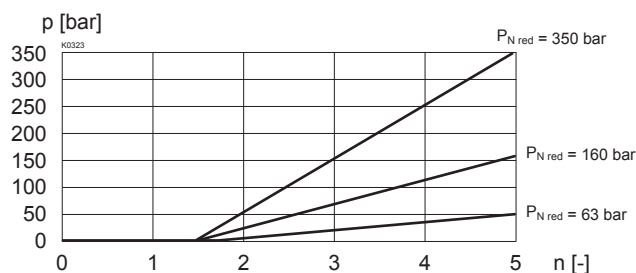
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



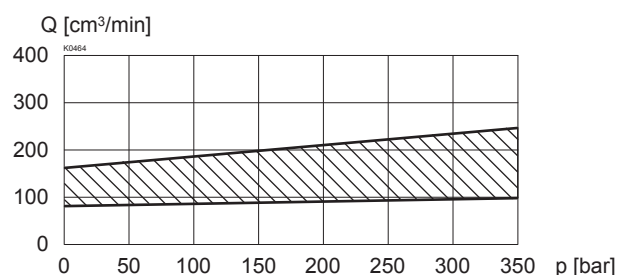
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)
* Consumption resistance dependent on system



$p_{\text{red}} = f(n)$ Pressure adjustment characteristics
[at $Q = 0 \text{ l/min}$ (static)]

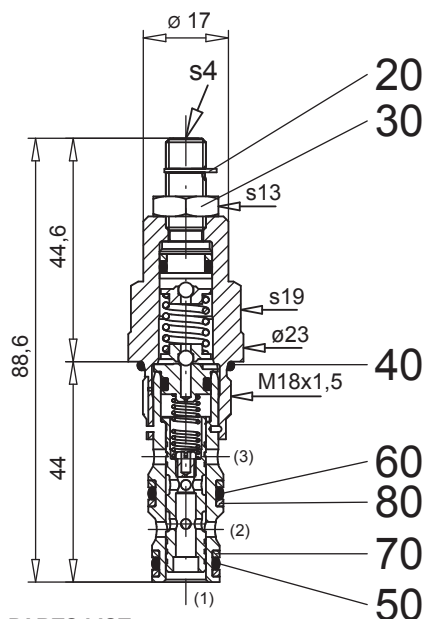


$Q_{\text{st+L}} = f(p)$ Pilot- and leakage volume flow characteristic
[A (1) → T (3)]

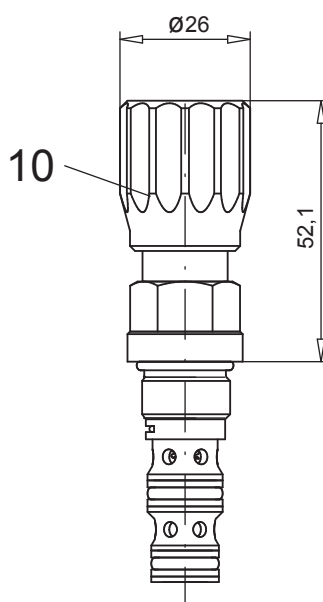


DIMENSIONS/SECTIONAL DRAWINGS

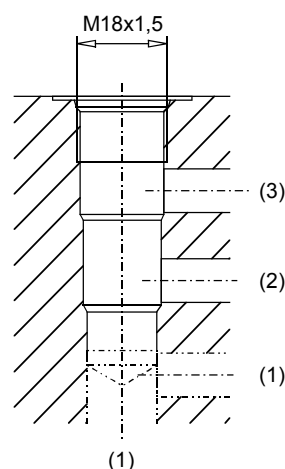
Screw adjustment „S“



Knob adjustment „D“



Cavity drawing acc. to
Wandfluh standard



For detailed cavity drawing
and cavity tools see data
sheet 2.13-1020

PARTS LIST

Position	Article	Description
10	114.2224	Knob
20	193.1061	Safety plate RD6 DIN 6799
30	153.1402	Hexagonal nut 0,5D M8x1
40	160.2156	O-ring ID 15,60x1,78
50	160.2093	O-ring ID 9,25x1,78
60	160.2111	O-ring ID 11,11x1,78
70	049.3137	Back-up ring RD 10,6x13,5x1,4
80	049.3156	Back-up ring RD 12,1x15x1,4

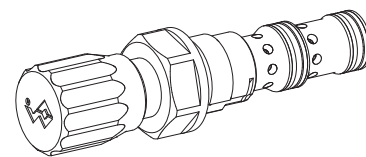
ACCESSORIES

Flange-/sandwich plate NG3-Mini	Data sheet 2.2-600
Line mount body	Data sheet 2.9-210

Technical explanation see data sheet 1.0-100E

Pressure reducing valve
Screw-in cartridge

- **Pilot operated**
- $Q_{\max} = 80 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Pilot operated 3-way pressure reducing valve of the screw-in cartridge type with thread M22x1,5 for cavity in according to ISO 7789. This valve reduces the inlet pressure to a adjustable outlet pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. The valve is available with 2 types adjustments. A cover is also available for key adjustment, see data sheet 2.0-50. There are 3 pressure stages to choose from. The steel cartridge body and adjustment spindle are galvanised. The quality of this product is reflected in the good performance data and design.

FUNCTION

The spool, located in the pilot operated main section of the valve, is held in the reset position by a spring. The connection to the consumer is fully open. With the pilot stage which is designed as relief valve, reduced pressure is adjustable. It opens when the set value is reached. As a result, a pilot volume flows through the nozzle in the spool. The resultant pressure difference displaces the spool towards the spring. The volume flow is throttled in the valve inlet and the reduced pressure is controlled. If forces acting on the actuator allow the reduced pressure to exceed the set value, the spool is displaced until the valve inlet closes and the reduced pressure port is being connected to tank. The pressure increase is then limited.

APPLICATION

Pressure reducing valves are used to keep the pressure constant in the consumer, irrespective of pressure fluctuations on the supply side. If there are several consumers, the pressure of the individual consumers can be set individually using the pressure reducing valve. The integrated pressure relief facility means that no additional pressure relief valve is needed in the actuator line. Installation of the screw-in cartridge in control blocks as well as in the Wandfluh sandwich plates (vertical stacked systems) and flange valves of the NG4-Mini, NG6 and NG10 types. (Please note the separate data sheets in register 2.2). Cavity tools are available for machining the cavities in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

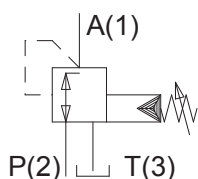
		M	V	☐	PM22	-	☐	#	☐
Pressure reducing valve									
Pilot operated									
Types of adjustment:	Key ☐ S Control knob ☐ D Cover ☐ A (see data sheet 2.0-50)								
Screw-in cartridge M22x1,5									
Standard nominal pressure range:	$p_{N \text{ red}} = 63 \text{ bar}$ ☐ 63 $p_{N \text{ red}} = 160 \text{ bar}$ ☐ 160 $p_{N \text{ red}} = 350 \text{ bar}$ ☐ 350								
Design-Index (Subject to change)									

GENERAL SPECIFICATIONS

Description	Pilot operated pressure reducing valve
Construction	Screw-in cartridge for cavity according to ISO 7789
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening torque	$M_D = 50 \text{ Nm}$
Weight:	$m = 0,17 \text{ kg}$ (Key) $m = 0,18 \text{ kg}$ (Control knob)

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure ranges	$p_{N \text{ red}} = 63 \text{ bar}$, 160 bar and 350 bar
Volume flow	$Q = 0...80 \text{ l/min}$
Pilot- and leakage volume flow	see characteristics

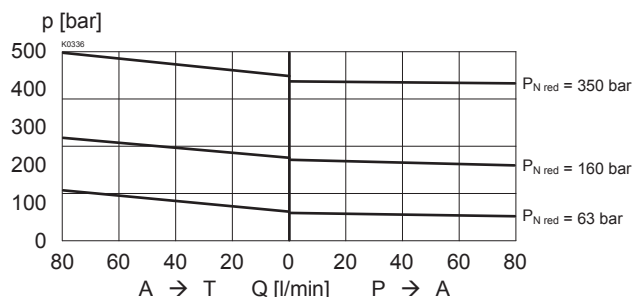
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 2 different versions:
S = Screw adjustment with fork wrench and Allen key

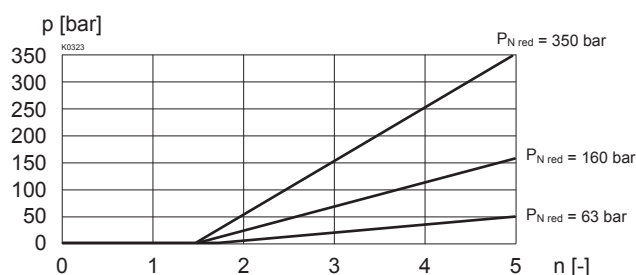
D = Control knob adjustment, fixed
Control stroke $S_b = 5 \text{ mm}$
Control angle $\alpha_b = 1800^\circ$ (5 revolutions)

CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

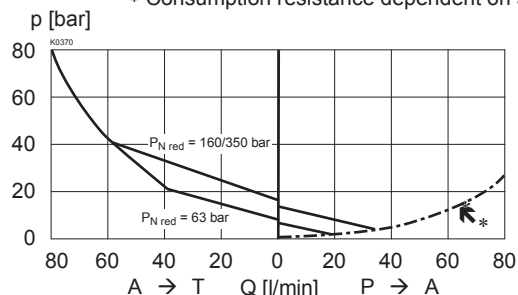
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



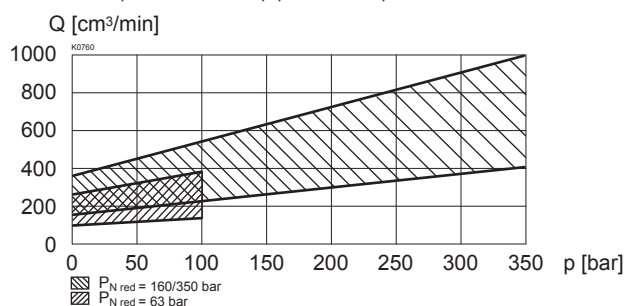
$p_{\text{red}} = f(n)$ Pressure adjustment characteristics
[at $Q = 0 \text{ l/min}$ (static)]



$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)
* Consumption resistance dependent on system



$Q_{\text{st}+L} = f(p)$ Pilot- and leakage volume flow characteristic
[A (1) → T (3)]
(Pressure in P (2) = 350 bar)

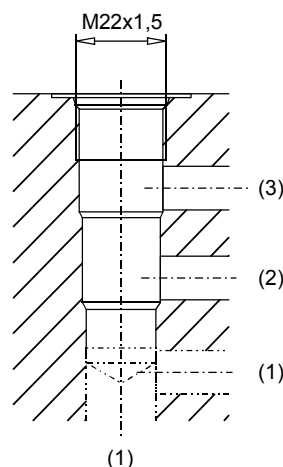
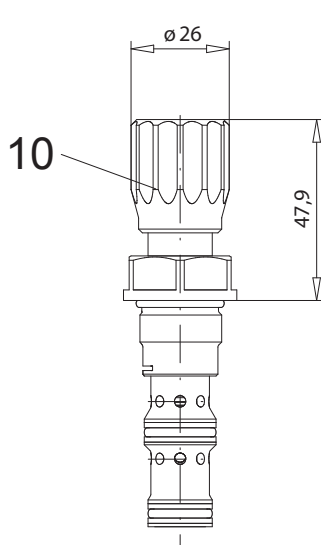
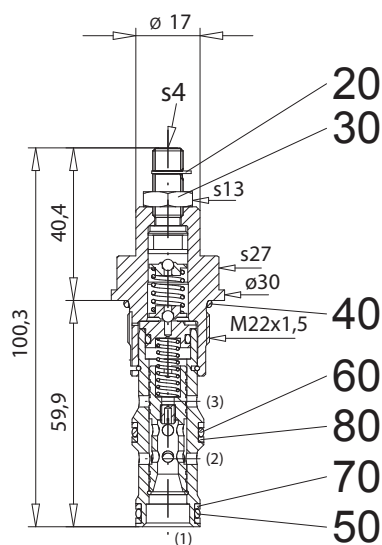


DIMENSIONS/SECTIONAL DRAWINGS

Screw adjustment „S“

Knob adjustment „D“

Cavity drawing acc. to
ISO 7789-22-04-0-98



For detailed cavity drawing
and cavity tools see data
sheet 2.13-1004

PARTS LIST

Position	Article	Description
10	114.2224	Knob
20	193.1061	Safety plate RD6 DIN 6799
30	153.1402	Hexagonal nut 0,5D M8x1
40	160.2188	O-ring ID 18,77x1,78
50	160.2140	O-ring ID 14,00x1,78
60	160.2156	O-ring ID 15,60x1,78
70	049.3176	Back-up ring RD 14,1x17x1,4
80	049.3196	Back-up ring RD 16,1x19x1,4

ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.2-620
Flange-/sandwich plate NG6	Data sheet 2.2-640
Flange-/sandwich plate NG10	Data sheet 2.2-660
Line mount body	Data sheet 2.9-210

Technical explanation see data sheet 1.0-100

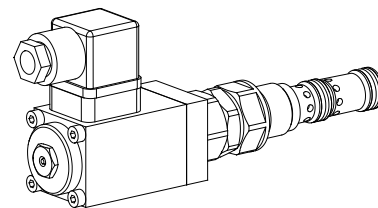
Pressure reducing valve, electric operation

Screw-in cartridge

- Pilot operated
- $Q_{\max} = 80 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

M22x1,5

ISO 7789



DESCRIPTION

Pilot-operated 3-way pressure reducing valve with mechanical pressure adjustment and electrical pressure changeover. In Version E with the solenoid switched on, the reduced pressure set is produced. Screw-in cartridge with M22x1.5 thread and cavity in accordance with ISO 7789. As standard version, three nominal pressure ranges are available: 63, 16 and 350 bar. The solenoid for the pressure changeover with a reduced electric power (18 W) corresponds to the VDE-standard 0580. It can be steplessly rotated around its longitudinal axis and correspondingly fixed. The cartridge body is zinc-coated and as a result rust protected.

Attention: Standard normal solenoids with 22 W power must not be utilised.

FUNCTION

The spool in the pilot-operated main part is kept in the basic position by a spring. The connection to the consumer is completely open. The reduced pressure can be adjusted at the pilot control, which is designed as a pressure relief. It opens, when the set value has been reached. As a result, a control volume flow passes through the nozzle in the spool. The resulting pressure difference moves the spool against the spring, the volume flow at the valve inlet is throttled by this, and the reduced pressure is controlled. If forces on the consumer make the reduced pressure rise to above the set value, the spool is displaced to such an extent, that the valve inlet closes and the reduced pressure opens to the tank. The pressure increase is therefore limited. With respect to the hydraulic characteristic values, the device is identical with the pilot operated pressure reducing valve MV.PM22 (2.2-530).

APPLICATION

Pressure control valves are utilised for keeping the pressure in a consumer constant independent of the pressure fluctuations on the supply side. In the case of several consumers, with the pressure reducing valve, the pressure of the individual consumers can be individually adjusted. The integrated pressure relief renders an additional relief valve in the consumer line superfluous. Installation of the screw-in cartridge in control blocks as well as in the Wanfluh sandwich plates (vertical stacked systems) and flange valves of the NG4-Mini, NG6 and NG10 types. (Please note the separate data sheets in register 2.2). Cavity tools are available for machining the cavities in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

	M	V	E	PM22	-		-		#	
Pressure reducing valve										
Pilot operated										
Electric operation: energised solenoid corresponds to set pressure										
Screw-in cartridge M22 x1,5										
Nominal pressure	$p_N = 63 \text{ bar}$	63								
ranges:	$p_N = 160 \text{ bar}$	160								
	$p_N = 350 \text{ bar}$	350								
Nominal voltage										
12VDC/18W	G12	110VAC/18W	R110							
24VDC/18W	G24	115VAC/18W	R115							
		230VAC/18W	R230							
Design-Index (Subject to change)										

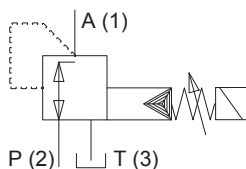
GENERAL SPECIFICATIONS

Denomination	Pilot operated pressure relief valve solenoid operated
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Mounting	Screw-in thread M22x1,5
Mounting position	any
Ambient temperature	-20...+50 °C
Weight	m = 0,78 kg
Fastening torque	M _D = 50 Nm for cartridge M _D = 2,6 Nm (Qual. 8.8) for fastening screws of solenoid

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{0.5} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	p _{max} = 400 bar
Nominal pressure ranges	p _{N red} = 63 bar, 160 bar und 350 bar
Volume flow	Q = 0...80 l/min
Pilot- and leakage volume flow	see characteristics

SYMBOL



ELECTRICAL OPERATIONS

Design	Solenoid, wet pin push type, pressure tight
Nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}$ $U_N = 110 \text{ VAC}^*, 115 \text{ VAC}^*, 230 \text{ VAC}^*$ $AC = 50 \text{ to } 60 \text{ Hz}$ *Connector plug with integrated rectifier
Voltage tolerance	$\pm 10\%$ of nominal voltage
Protection class	IP 65 according to EN 60 529
Relative duty factor	100% ED (see data sheet 1.1-430)
Switching cycles	15'000/h
Operating life (number of switching cycles)	10^7

Connection/Power supply Over device plug connection
EN 175301-803 (DIN 43650)
ISO 4400 (2 P + E), construction type A,
other connections on request
Solenoid type: – Medium SIN35V (data sheet 1.1-105)

OPERATING PRESSURE

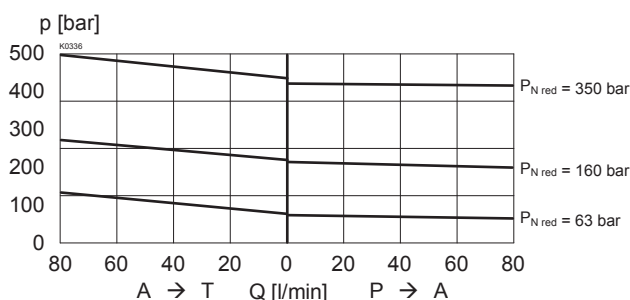
The desired operating pressure is set by means of a knob and is only reached with the solenoid activated.

Pressure adjustment:

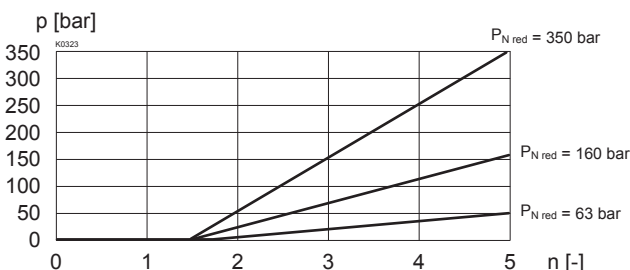
Actuation stroke $S_b = 2,5 \text{ mm}$
Actuation angle $\alpha_b = 1080^\circ$ (3 revolutions)

CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



$p_{\text{red}} = f(n)$ Pressure adjustment characteristics
[at $Q = 0 \text{ l/min}$ (static)]

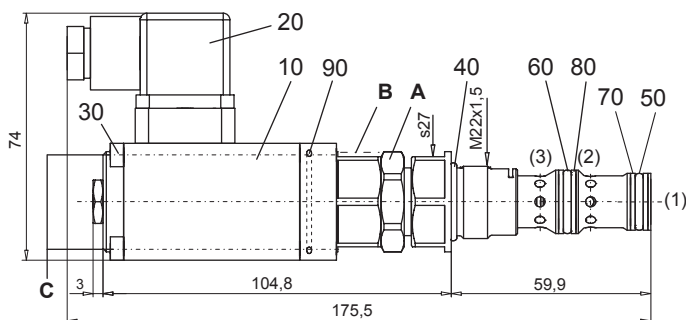


SECTIONAL DRAWING/PRESSURE ADJUSTMENT

For detailed cavity drawing ISO 7789-22-04-0-98 and cavity tools see data sheet 2.13-1004

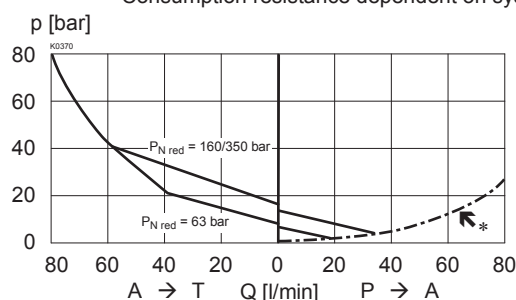
The reduced pressure can only be adjusted with the solenoid activated.

- 1) Loose lock nut **A**
- 2) Turn knob **B** and solenoid until required system pressure is adjusted
- 3) Fix turning knob **B** with lock nut **A**
- 4) Loose screws **C** slightly, turn solenoid into required position.
(Attention: Solenoid stays under tank pressure.)
- 5) Tighten screws **C** with torque ($M_D, 2,8 \text{ Nm}$)

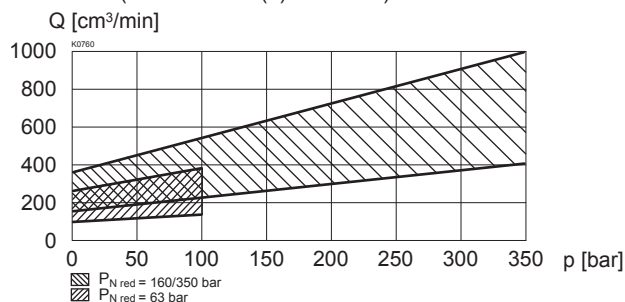


$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)

* Consumption resistance dependent on system



$Q_{\text{st}+L} = f(p)$ Pilot- and leakage volume flow characteristics
[A (1) $\rightarrow$ T (3)]
(Pressure in P (2) = 350 bar)



PARTS LIST

Position	Article	Description
10	260.4...	Solenoid SIN35V-...-L18
20	219.2002	Plug (black)
30	249.1007	Socket head cap screw M4x63
40	160.2188	O-ring ID 18,77x1,78
50	160.2140	O-ring ID 14,00x1,78
60	160.2156	O-ring ID 15,60x1,78
70	049.3176	Back-up ring RD 14,1x17x1,4
80	049.3196	Back-up ring RD 16,1x19x1,4
90	160.2283	O-ring ID 28,3x1,78

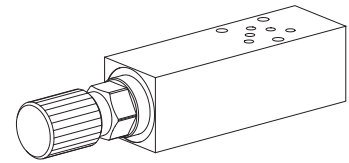
ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.2-620
Flange-/sandwich plate NG6	Data sheet 2.2-640
Flange-/sandwich plate NG10	Data sheet 2.2-660
Line mount body	Data sheet 2.9-210

Technical explanation see data sheet 1.0-100

Pressure reducing valve
Flange- and sandwich construction
• Pilot operated

- $Q_{\max} = 8 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

NG3-Mini®

DESCRIPTION

Flange or sandwich type pilot operated 3-way pressure reducing valve NG3-Mini in accordance with Wandfluh standard. Screw-in cartridge M18x1,5 in according with Wandfluh-Norm. The valve reduces the inlet pressure to a preset output pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. Two types of setting and three pressure stages are available. A pressure gauge connection is provided in the reduced connection. A bypass non-return valve plate for the flange valve for free flow from A to P can be ordered separately. The flange body and the sandwich plates are in anodised aluminium.

FUNCTION

The spool, located in the pilot operated main section of the valve, is held in the reset position by a spring. The connection to the consumer is fully open. With the pilot stage which is designed as relief valve, reduced pressure is adjustable. It opens when the set value is reached. As a result, a pilot volume flows through the nozzle in the spool. The resultant pressure difference displaces the spool towards the spring. The volume flow is throttled in the valve inlet and the reduced pressure is controlled. If forces acting on the actuator allow the reduced pressure to exceed the set value, the spool is displaced until the valve inlet closes and the reduced pressure port is being connected to tank. The pressure increase is then limited.

APPLICATION

Pressure reducing valves are used for keeping the pressure constant in a consumer, irrespective of pressure fluctuations on the supply side. If several consumers are used, the reduced pressure can be set individually with the aid of one pressure control valve for each consumer. Generally speaking, pressure control valves are used for reducing a hydraulic pressure to a lower level. The integrated pressure relief function obviates the need for any additional pressure relief valve in the reduced pipe. Directly operated pressure reducing valves also keep the reduced pressure stable, even under very difficult operating conditions. Mini-3 valves are used where both, reduced dimensions and weight are important.

TYPE CODE

		M	V	☐	☐	A03	-	☐	-	☐	#	☐
Pressure reducing valve												
Pilot operated												
Setting versions: Schlüssel	☐ S											
Knob	☐ D											
Flange construction	☐ F											
Sandwich construction	☐ S											
Interface NG3-Mini												
Sandwich construction	P	☐ P										
Pressure control in:	A	☐ A										
	B	☐ B										
Flange construction												
Pressure control in:	P → A	☐ P/A										
Standard nominal pressure range: $p_{N \text{ red}} = 63 \text{ bar}$		☐ 63										
$p_{N \text{ red}} = 160 \text{ bar}$		☐ 160										
$p_{N \text{ red}} = 350 \text{ bar}$		☐ 350										
Design-Index (Subject to change)												

GENERAL SPECIFICATIONS

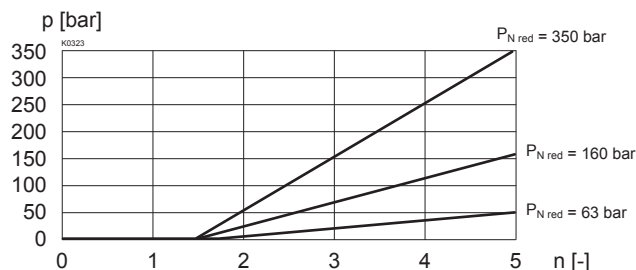
Description	Pilot operated pressure control valve
Nominal size	NG3-Mini according to Wandfluh standard
Construction	Flange- or sandwich
Mounting	3 mounting holes for cyl. screws
Connection	M4 or double ended screws M4
	Threaded connection plates
	Multi-flange subplates
	Longitudinal stacking system
Ambient temperature	-20...+50°C
Mounting position	any
Fastening torque	$M_D = 2,8 \text{ Nm}$ (Qual. 8.8) for fastening screws
	$M_D = 30 \text{ Nm}$ for screw-in cartridge
Weight	Depending on the type 0,26...0,50 kg

HYDRAULIC SPECIFICATIONS

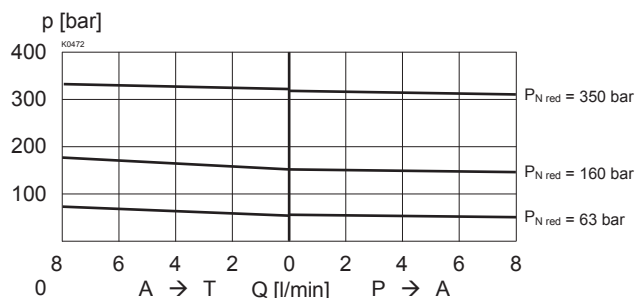
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (required filtration grade $\beta_{6..10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s...320 mm²/s
Fluid temperature	-20...+70°C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure ranges	$p_{N \text{ red}} = 63 \text{ bar}$, $p_{N \text{ red}} = 160 \text{ bar}$ $p_{N \text{ red}} = 350 \text{ bar}$
Opening pressure to non-return valve	$p_0 = 0,8 \text{ bar}$
Volume flow	$Q = 0...8 \text{ l/min}$
For further hydraulic specifications see data sheet 2.2-510	

CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{red} = f(n)$ Pressure adjustment characteristics
 $Q = 0$ l/min (static)

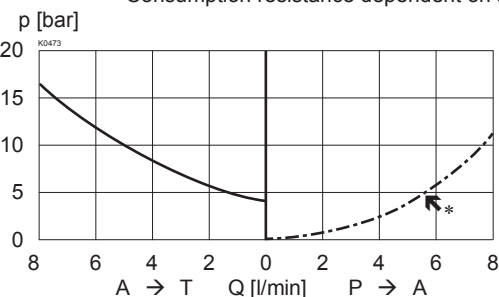


$p_{red} = f(Q)$ Pressure volume flow characteristics

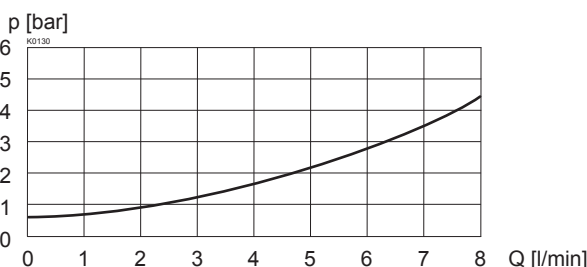


$p_{\min} = f(Q)$ Minimal pressure loss/flow characteristics

* Consumption resistance dependent on system

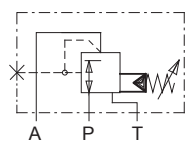


$\Delta p = f(Q)$ Pressure loss/flow characteristics over non-return valve

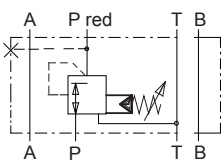


TYPES/DIMENSIONS

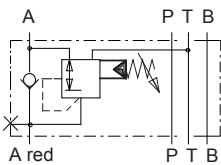
Flange construction
MV.FA03-P/A



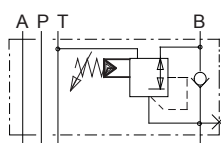
Sandwich construction
MV.SA03-P



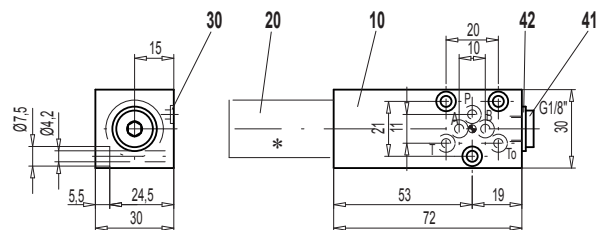
MV.SA03-A



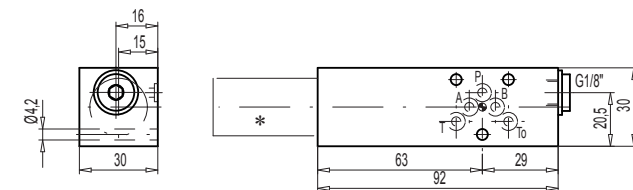
MV.SA03-B



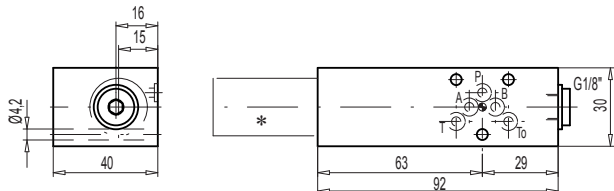
Flange construction MV.FA03-P/A



Sandwich construction MV.SA03-P



Sandwich construction MV.SA03-A



PARTS LIST

Position	Article	Description
10	128.4203 128.4600 128.4601 128.4602	Flange body Sandwich plate P Sandwich plate A Sandwich plate B
20	603.1. . .	Pressure reducing cartridge M18x1,5 with data sheet 2.2-510
30	160.2045	O-ring ID 4,50x1,5
41	238.1202	Plug DIN 908 G1/8"
42	49.2102	Seal ring ID 10,7x17x1,5

Technical explanation see data sheet 1.0-100E

For sandwich red.pressure in B cartridge is located on B-side

* The total lengths depends on the cartridge type,
see data sheet 2.2-510

ACCESSORIES

Threaded connection plate and multi-flange subplates
Bypass non-return valve RNSA03-A/P

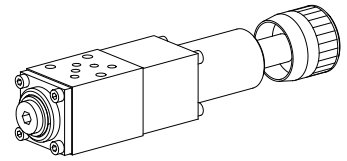
Req. 2.9

Pressure reducing valve

Flange- and sandwich construction

- $Q_{\max} = 8 \text{ l/min}$
- $p_{\max} = 315 \text{ bar}$
- $p_{N \text{ red max}} = 200 \text{ bar}$

NG3-Mini®



DESCRIPTION

Flange or sandwich type directly operated 3-way pressure reducing valve NG3-Mini in accordance with Wandfluh standard. The valve reduces the inlet pressure to a preset output pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. Two types of setting and four pressure stages are available. A pressure gauge connection is provided in the reduced connection. A bypass non-return valve plate for the flange valve – for free flow from A to P – can be ordered separately. The flange valve body is painted, the other parts are phosphatised.

FUNCTION

The spool is held in the home position by the spring. The connection to the consumer is fully open. The reduced pressure can be adjusted at the adjustment spindle, irrespective of the inlet pressure. If the reduced pressure increases, it displaces the valve towards the spring. The volume flow at the valve inlet is then throttled, controlling the reduced pressure. If forces acting on the consumer allow the reduced pressure to be increased above the set value, the spool is displaced until the valve inlet closes and the tank port opens. The pressure increase is then limited to a low value, controlled by the spring.

APPLICATION

Pressure reducing valves are used for keeping the pressure constant in a consumer, irrespective of pressure fluctuations on the supply side. If several consumers are used, the reduced pressure can be set individually with the aid of one pressure control valve for each consumer. Generally speaking, pressure control valves are used for reducing a hydraulic pressure to a lower level. The integrated pressure relief function obviates the need for any additional pressure relief valve in the reduced pipe. Directly operated pressure reducing valves also keep the reduced pressure stable, even under very difficult operating conditions. Mini-3 valves are used where both, reduced dimensions and weight are important.

TYPE CODE

	M	D	☐	☐	A03 -		-		#	
Pressure reducing valve										
Direct operated										
Setting versions:	screw adjustment	☐	S							
	knob adjustment	☐	D							
Flange construction	☐	F								
Sandwich construction	☐	S								
Interface NG3-Mini										
Sandwich construction										
Pressure control in:	P	☐	P							
	A	☐	A							
	B	☐	B							
Flange construction										
Pressure control from:	P to A	☐	P/A							
Standard nominal pressure range:	p _{N red} = 32 bar	☐	32							
	p _{N red} = 80 bar	☐	80							
	p _{N red} = 200 bar	☐	200							

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Direct operated pressure reducing valve
Nominal size	NG3-Mini according to Wandfluh standard
Constructions	Flange- or sandwich
Mounting	3 mounting holes for zyl. screws M4 or double ended screws M4
Connections	Threaded connection plates Multi-flange plates Longitudinal stacking system
Ambient temperature	-20...+50 °C
Mounting position	any
Fastening torque	$M_0 = 2,8 \text{ Nm}$ (quality 8.8)
Weight	$m = 0,54 \text{ kg}$ (Flange, Sandwich P) $m = 0,67 \text{ kg}$ (Sandwich A/B)

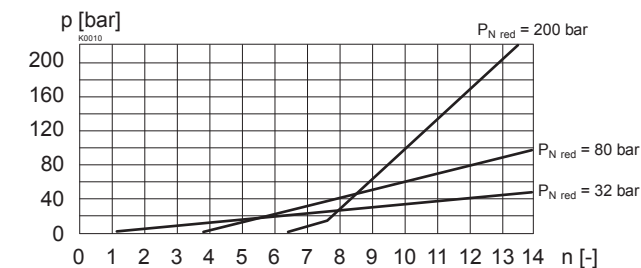
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 1816/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	p _{max} = 315 bar
Tank load in connection T	p _{T max} = 50 bar
Nominal pressure	p _{N red} = 32 bar, 80 bar and 200 bar
Volume flow	Q = 0...8 l/min

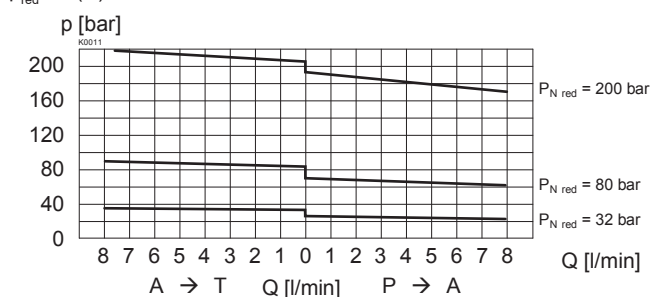
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{\text{red}} = f(n)$ Pressure adjustment characteristics

$Q = 0 \text{ l/min}$ (static)



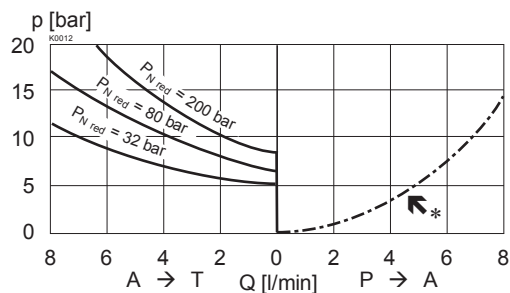
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics



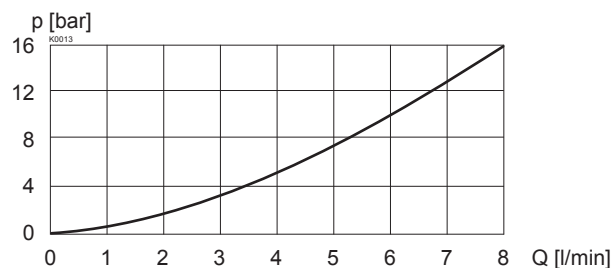
$p_{\text{min}} = f(Q)$

Minimal pressure loss/flow characteristics

* Consumption resistance dependent on system



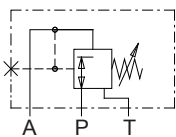
$\Delta p = f(Q)$ Pressure loss/flow characteristics over non-return valve



TYPES / DIMENSIONS

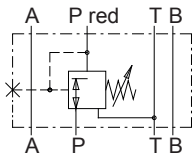
Flange construction

red. pressure in A
MD.FA03-P/A

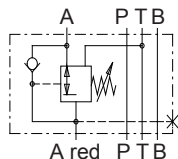


Sandwich construction

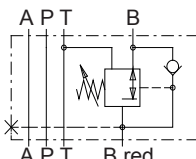
red. pressure in P
MD.SA03-P



red. pressure in A
MD.SA03-A

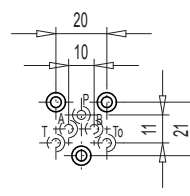
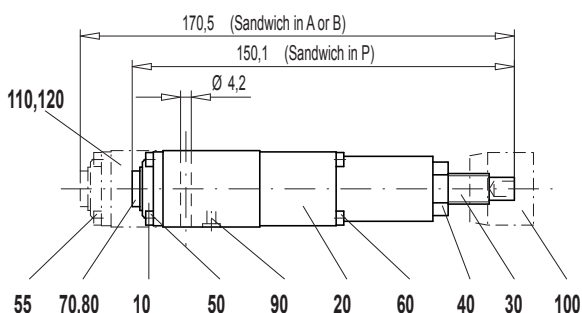
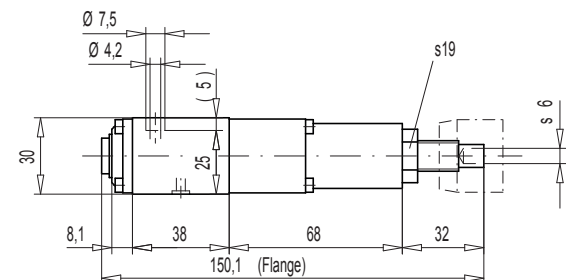


red. pressure in B
MD.SA03-B



PARTS LIST

Position	Article	Description
10	56.4700	Lid
20	84.4800	Case
30	80.3127	Adjustment screw
40	153.1605	Hexagonal nut 0,5 D M12x1
50	246.0108	Cylinder screw M3x8-DIN912
55	246.0130	Cylinder screw M3x30-DIN912
60	246.0135	Cylinder screw M3x35-DIN912
70	238.1202	Plug screw G1/8" DIN908
80	49.2102	Seal ring ID10,7x17x1,5
90	160.2045	O-Ring ID 4,5x1,5
100	114.1226	Turning knob
110	56.4300	Lid
120	94.7065	Non-return valve



Spindle not secured against unscrewing

For model red. pressure in B the adjusting parts are on A end

ACCESSORIES

Threaded connection plates and multi flange plates

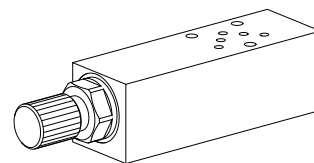
Register 2.9

By-Pass non-return plates RNNSA03-A/P

Technical explanation see data sheet 1.0-100

**Pressure reducing valve
Flange- and sandwich construction**
• Pilot operated

- $Q_{\max} = 20 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

NG4-Mini®

DESCRIPTION

Flange or sandwich type pilot operated 3-way pressure reducing valve NG4-Mini in accordance with Wandfluh standard. Screw-in cartridge M22x1,5 in according with ISO 7789. The valve reduces the inlet pressure to a preset output pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. Two types of setting and three pressure stages are available. A pressure gauge connection is provided in the reduced connection. A bypass non-return valve plate for the flange valve – for free flow from A to P – can be ordered separately. The flange valve body is painted, the other parts are phosphatised.

FUNCTION

The spool, located in the pilot operated main section of the valve, is held in the reset position by a spring. The connection to the consumer is fully open. With the pilot stage which is designed as relief valve, reduced pressure is adjustable. It opens when the set value is reached. As a result, a pilot volume flows through the nozzle in the spool. The resultant pressure difference displaces the spool towards the spring. The volume flow is throttled in the valve inlet and the reduced pressure is controlled. If forces acting on the actuator allow the reduced pressure to exceed the set value, the spool is displaced until the valve inlet closes and the reduced pressure port is being connected to tank. The pressure increase is then limited.

APPLICATION

Pressure reducing valves are used for keeping the pressure constant in a consumer, irrespective of pressure fluctuations on the supply side. If several consumers are used, the reduced pressure can be set individually with the aid of one pressure control valve for each consumer. Generally speaking, pressure control valves are used for reducing a hydraulic pressure to a lower level. The integrated pressure relief function obviates the need for any additional pressure relief valve in the reduced pipe. Directly operated pressure reducing valves also keep the reduced pressure stable, even under very difficult operating conditions. Mini-4 valves are used where both, reduced dimensions and weight are important.

TYPE CODE

		M	V			A04	-		-		#	
Pressure reducing valve												
Pilot operated												
Setting versions: Screw	☐ S											
Knob	☐ D											
Flange construction	☐ F											
Sandwich construction	☐ S											
Interface NG4-Mini												
Sandwich construction	P					☐ P						
Pressure control in:	A					☐ A						
	B					☐ B						
Flange construction												
Pressure control in:	P → A					☐ P/A						
Standard nominal pressure range:	$p_{N \text{ red}} = 63 \text{ bar}$					☐ 63						
	$p_{N \text{ red}} = 160 \text{ bar}$					☐ 160						
	$p_{N \text{ red}} = 350 \text{ bar}$					☐ 350						
Design-Index (Subject to change)												

GENERAL SPECIFICATIONS

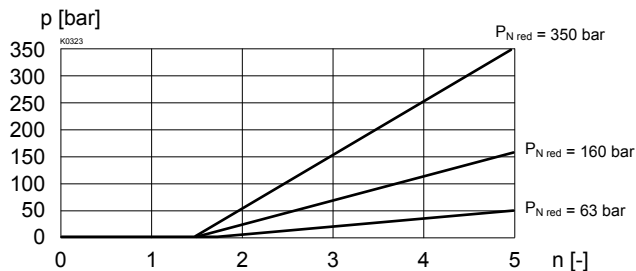
Description	Pilot operated pressure control valve
Nominal size	NG4-Mini according to Wandfluh standard
Construction	Flange- or sandwich
Mounting	3 mounting holes for zyl. screws M5 or double ended screws M5
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50 °C
Mounting position	any
Fastening torque	$M_D = 5,5 \text{ Nm}$ (qual. 8.8) for fastening screws $M_D = 50 \text{ Nm}$ for screw-in cartridge
Weight	Depending on the type 1,4...1,53 kg

HYDRAULIC SPECIFICATIONS

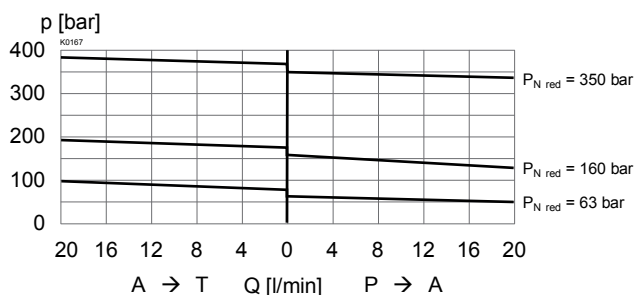
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 Required filtration grade $\beta_{6...10 \geq 75}$ refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure ranges	$p_{N \text{ red}} = 63 \text{ bar}$, $p_{N \text{ red}} = 160 \text{ bar}$ $p_{N \text{ red}} = 350 \text{ bar}$
Opening pressure to non-return valve	$p_D = 2,2 \text{ bar}$
Volume flow	$Q = 0...20 \text{ l/min}$
For further hydraulic specifications see data sheet 2.2-530	

CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{\text{red}} = f(n)$ Pressure adjustment characteristics
 $Q = 0 \text{ l/min}$ (static)

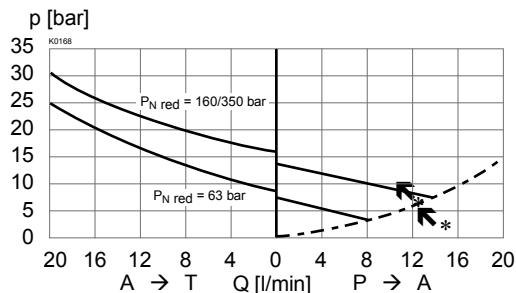


$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics

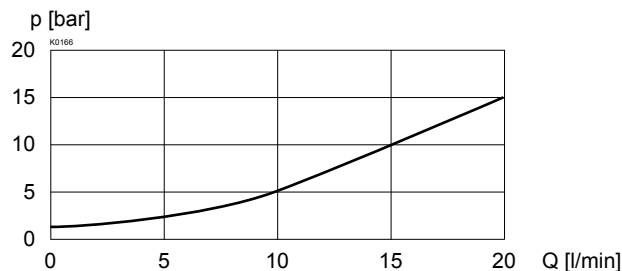


$p_{\text{min}} = f(Q)$ Minimal pressure loss/flow characteristics

* Consumption resistance dependent on system

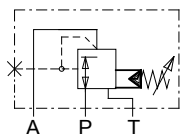


$\Delta p = f(Q)$ Pressure loss/flow characteristics over non-return valve

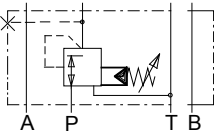


TYPES / DIMENSIONS

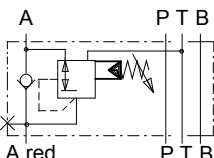
Flange
MV.FA04-P/A



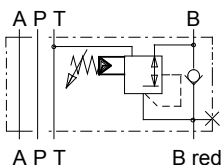
Sandwich
MV.SA04-P



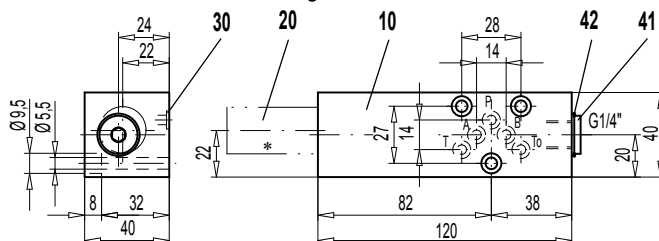
MV.SA04-A



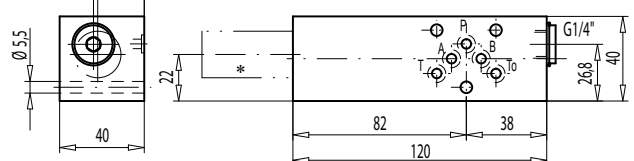
MV.SA04-B



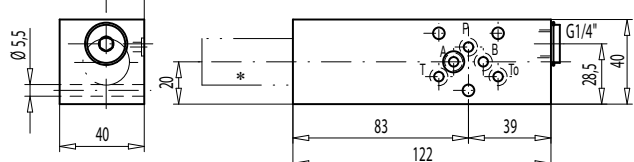
Flange MV.FA04-P/A



Sandwich MV.SA04-P



Sandwich MV.SA04-A



PARTS LIST

Position	Article	Description
10	130.4209	Flange body
	130.4605	Sandwich plate P
	130.4606	Sandwich plate A
	130.4607	Sandwich plate B
20	603.3 . . .	Pressure reducing cartridge M22x1,5 data sheet 2.2-530
30	160.2052	O-ring ID 5,28x1,78
41	238.2204	Plug DIN 908 G1/4"
42	49.2132	Seal ring ID 13,7x20x1,5

Technical explanation see data sheet 1.0-100

For sandwich red.pressure in B cartridge is located on B-side

* The total lengths depends on the cartridge type, see data sheet 2.2-530.

ACCESSORIES

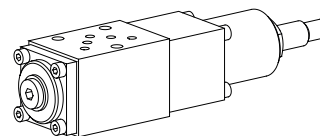
Threaded connection plate and multi-flange subplates
Bypass non-return valve BDRVP4

Reg. 2.9

Pressure reducing valve Flange- and sandwich construction

- $Q_{\max} = 20 \text{ l/min}$
- $p_{\max} = 315 \text{ bar}$
- $p_{N \text{ red max}} = 200 \text{ bar}$

NG4-Mini®



DESCRIPTION

Flange or sandwich type directly operated 3-way pressure reducing valve NG4-Mini in accordance with Wandfluh standard. The valve reduces the inlet pressure to a preset output pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. Two types of setting and four pressure stages are available. A pressure gauge connection is provided in the reduced connection. A bypass non-return valve plate for the flange valve – for free flow from A to P – can be ordered separately. The flange valve body is painted, the other parts are phosphatised.

FUNCTION

The spool is held in the home position by the spring. The connection to the consumer is fully open. The reduced pressure can be adjusted at the adjustment spindle, irrespective of the inlet pressure. If the reduced pressure increases, it displaces the valve towards the spring. The volume flow at the valve inlet is then throttled, controlling the reduced pressure. If forces acting on the consumer allow the reduced pressure to be increased above the set value, the spool is displaced until the valve inlet closes and the tank port opens. The pressure increase is then limited to a low value, controlled by the spring.

APPLICATION

Pressure reducing valves are used for keeping the pressure constant in a consumer, irrespective of pressure fluctuations on the supply side. If several consumers are used, the reduced pressure can be set individually with the aid of one pressure control valve for each consumer. Generally speaking, pressure control valves are used for reducing a hydraulic pressure to a lower level. The integrated pressure relief function obviates the need for any additional pressure relief valve in the reduced pipe. Directly operated pressure reducing valves also keep the reduced pressure stable, even under very difficult operating conditions. Mini-4 valves are used where both, reduced dimensions and weight are important.

TYPE CODE

		B	DRV	d	☐	4	☐	/	☐	#	☐
Mounting interface											
Pressure reducing valve											
Direct operated											
Flange	☐ N										
Sandwich pressure red in P	no remark										
Sandwich pressure red in A	☐ A										
Sandwich pressure red in B	☐ B										
Interface NG4-Mini											
Setting versions:	Key	no remark									
	Knob	☐ D									
	Cover	☐ H									
Standard nominal	$p_{N \text{ red}} = 40 \text{ bar}$	☐ 40									
pressure range:	$p_{N \text{ red}} = 80 \text{ bar}$	☐ 80									
	$p_{N \text{ red}} = 160 \text{ bar}$	☐ 160									
	$p_{N \text{ red}} = 200 \text{ bar}$	☐ 200									
Design-Index (Subject to change)											

GENERAL SPECIFICATIONS

Description	Direct operated pressure control valve
Nominal size	NG4-Mini acc. to Wandfluh standard
Construction	Flange- or sandwich
Mounting	3 mounting holes for zyl. screws M5 or double ended screws M5
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50 °C
Mounting position	any
Fastening torque	$M_0 = 5,5 \text{ Nm}$ (quality 8.8)
Weight	$m = 1,0 \text{ kg}$

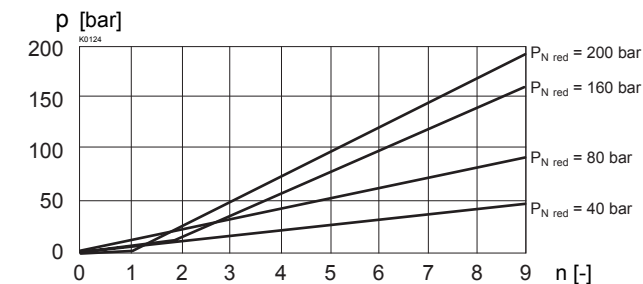
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 315 \text{ bar}$
Tank load in connection T	$p_{T \text{ max}} = 50 \text{ bar}$
Nominal pressure ranges	$p_{N \text{ red}} = 40 \text{ bar}$, $p_{N \text{ red}} = 160 \text{ bar}$ $p_{N \text{ red}} = 80 \text{ bar}$, $p_{N \text{ red}} = 200 \text{ bar}$ $p_0 = 2,2 \text{ bar}$
Opening pressure to non-return valve	
Volume flow	$Q = 0...20 \text{ l/min}$

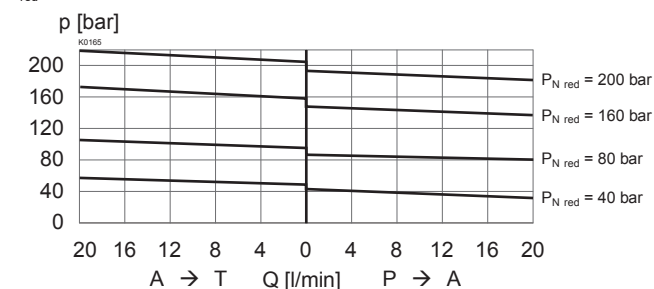
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{\text{red}} = f(n)$ Pressure adjustment characteristics

$Q = 0 \text{ l/min}$ (static)



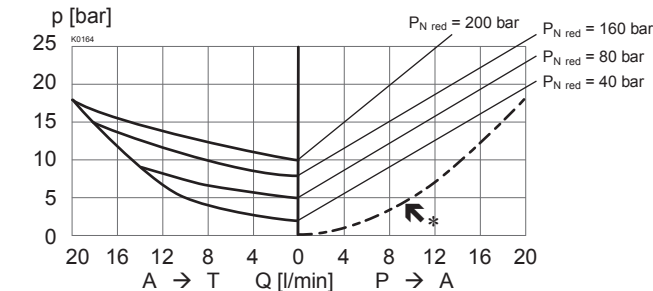
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics



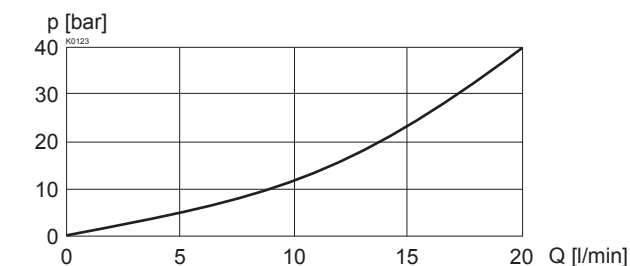
$p_{\text{min}} = f(Q)$

Minimal pressure loss/flow characteristics

* Consumption resistance dependent on system

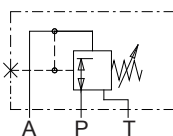


$\Delta p = f(Q)$ Pressure loss/flow characteristics over non-return valve

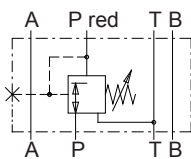


TYPES / DIMENSIONS

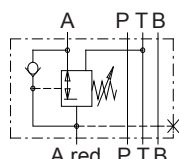
Flange
red. pressure in A
BDRVdN4



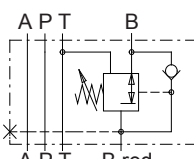
Sandwich
red. pressure in P
BDRVd4



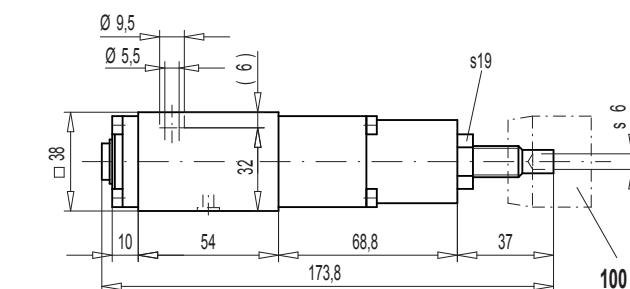
red. pressure in A
BDRVdA4



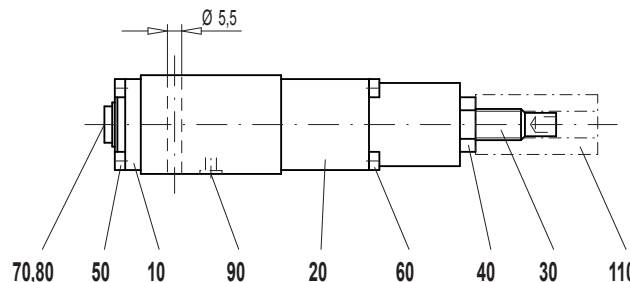
red. pressure in B
BDRVdB4



Flange



Sandwich



PARTS LIST

Position	Article	Description
10	57.4701	Lid
20	85.4800	Housing
30	80.3118	Plug
40	153.1601	Hexagonal nut 0,5D M12x1
50	246.1112	Zyl. screw M4x12-DIN912
60	246.1140	Zyl. screw M4x40-DIN912
70	238.1202	Plug G1/8" DIN908
80	49.2102	Seal ring ID 10,7x17x1,5
90	160.2052	O-Ring ID 5,28x1,78
100	114.1202	Knob
110	154.7100	Cap nut

ACCESSORIES

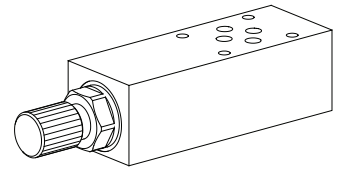
Threaded connection plates and Multi-flange subplates Register 2.9
Bypass non-return valve BDRVP4

Technical explanation see data sheet 1.0-100

Pressure reducing valve
Flange- and sandwich construction

- **Pilot operated**
- $Q_{\max} = 80 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

NG6
ISO 4401-03


DESCRIPTION

Flange or sandwich type pilot operated 3-way pressure reducing valve. Screw-in cartridge M22x1,5 in according with ISO 7789. The valve reduces the inlet pressure to a preset output pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. Two types of setting and three pressure stages are available. A pressure gauge connection is provided in the reduced connection. A bypass non-return valve plate for the flange valve – for free flow from A to P – can be ordered separately. The flange valve body is painted, the sandwich plates are phosphatised.

FUNCTION

The spool, located in the pilot operated main section of the valve, is held in the reset position by a spring. The connection to the consumer is fully open. With the pilot stage which is designed as relief valve, reduced pressure is adjustable. It opens when the set value is reached. As a result, a pilot volume flows through the nozzle in the spool. The resultant pressure difference displaces the spool towards the spring. The volume flow is throttled in the valve inlet and the reduced pressure is controlled. If forces acting on the actuator allow the reduced pressure to exceed the set value, the spool is displaced until the valve inlet closes and the reduced pressure port is being connected to tank. The pressure increase is then limited.

APPLICATION

Pressure reducing valves are used for keeping the pressure constant in a consumer, irrespective of pressure fluctuations on the supply side. If several consumers are used, the reduced pressure can be set individually with the aid of one pressure control valve for each consumer. Generally speaking, pressure control valves are used for reducing a hydraulic pressure to a lower level. The integrated pressure relief function obviates the need for any additional pressure relief valve in the reduced pipe. Pilot operated pressure reducing valves also keep the reduced pressure stable, even under very difficult operating conditions.

TYPE CODE

	M	V	☐	☐	A06	-		-		#	
Pressure reducing valve											
Pilot operated											
Setting versions: Screw											
Knob											
Flange construction											
Sandwich construction											
Interface NG6											
Sandwich construction	P				P						
Pressure control in:	A				A						
	B				B						
Flange construction											
Pressure control in:	P → A				P/A						
Standard nominal pressure range: $p_{N \text{ red}}$	= 63 bar				63						
	$p_{N \text{ red}} = 160 \text{ bar}$				160						
	$p_{N \text{ red}} = 350 \text{ bar}$				350						
Design-Index (Subject to change)											

GENERAL SPECIFICATIONS

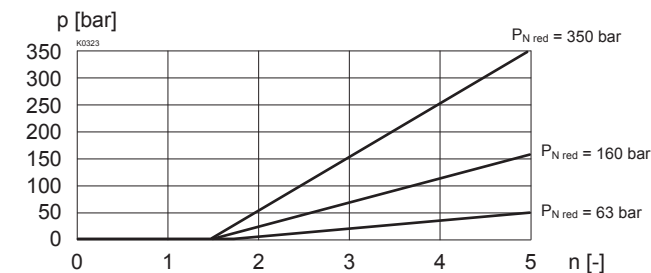
Description	Pilot operated pressure control valve
Nominal size	NG6 according to ISO 4401-03
Construction	Flange or sandwich
Mounting	4 mounting holes for zyl. screws M5 or double ended screws M5
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50 °C
Mounting position	any
Fastening torque	$M_D = 5,5 \text{ Nm}$ (qual.8.8) for fastening screws $M_D = 50 \text{ Nm}$ for screw-in cartridge
Weight	Depending on the type 1,57...1,92 kg

HYDRAULIC SPECIFICATIONS

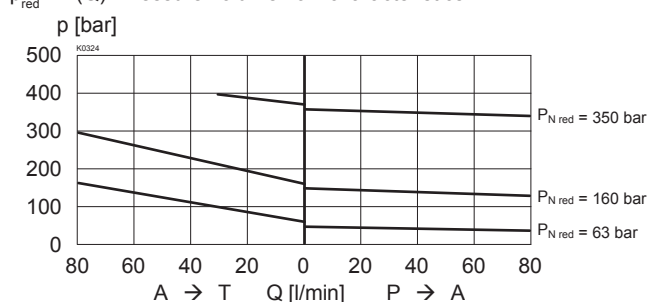
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Red. nominal pressure	$p_{N \text{ red}} = 63 \text{ bar}$, $p_{N \text{ red}} = 160 \text{ bar}$ $p_{N \text{ red}} = 350 \text{ bar}$
Opening pressure to non-return valve	$p_0 = 2 \text{ bar}$
Volume flow	$Q = 0...80 \text{ l/min}$
For further hydraulic specifications see data sheet 2.2-530.	

CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{red} = f(n)$ Pressure adjustment characteristics
 $Q = 0$ l/min (static)

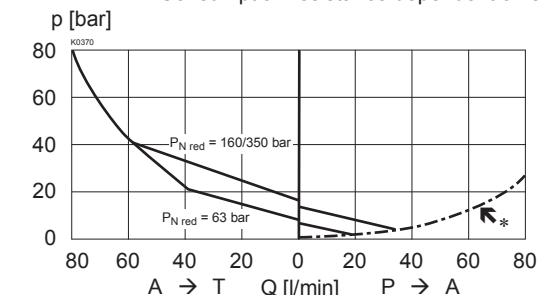


$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics

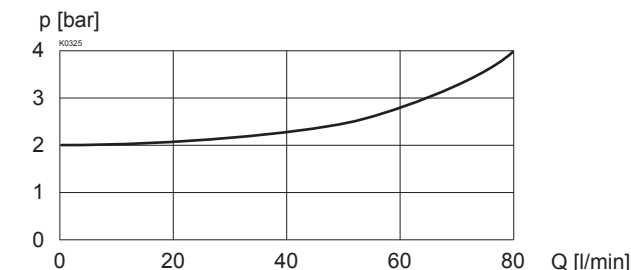


$p_{\min} = f(Q)$ Minimal pressure loss/flow characteristics

* Consumption resistance dependent on system

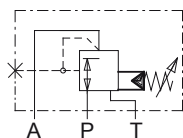


$\Delta p = f(Q)$ Pressure loss/flow characteristics over RV

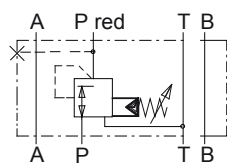


TYPES / DIMENSIONS

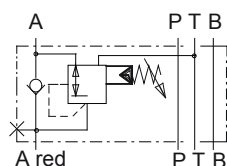
Flange
MV.FA06-P/A



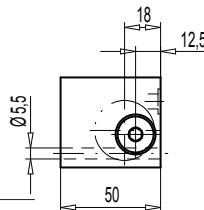
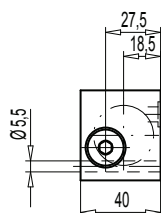
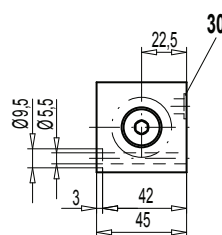
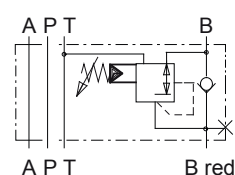
Sandwich
MV.SA06-P



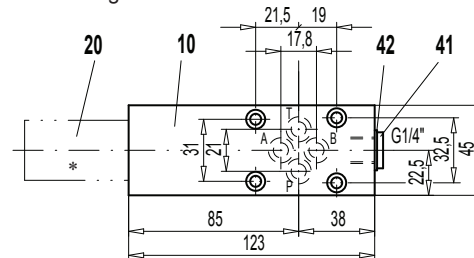
MV.SA06-A



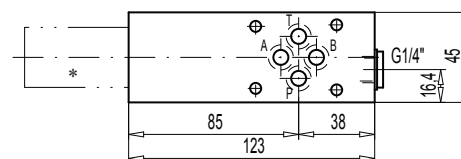
MV.SA06-B



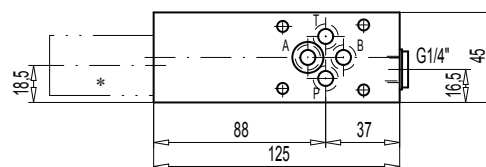
Flange MV.FA06-P/A



Sandwich MV.SA06-P



Sandwich MV.SA06-A



PARTS LIST

Position	Article	Description
10	134.4211 134.4605 134.4607 134.4606	Flange body Sandwich plate P Sandwich plate A Sandwich plate B
20	603.3 . . .	Pressure reducing cartrige M22x1,5 Data sheet 2.2-530
30	160.2093	O-Ring ID 9,25x1,78
41	238.2204	Plug DIN 908 G1/4"
42	49.2132	Seal ring ID 13.7x20x1,5

For sandwich red.pressure in B cartridge is located on B-side.

* The total lengths depends on the cartridge type, see data sheet 2.2-530.

ACCESSORIES

Threaded connection plate and multi-flange subplates
Bypass non-return valve ADRVP6

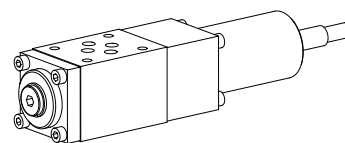
Req. 2.9

Technical explanation see data sheet 1.0-100

Pressure reducing valve Flange- and sandwich construction

- $Q_{\max} = 30 \text{ l/min}$
- $p_{\max} = 315 \text{ bar}$
- $p_{N \text{ red max}} = 200 \text{ bar}$

NG6
ISO 4401-03



DESCRIPTION

Flange or sandwich type directly operated 3-way pressure reducing valve. The valve reduces the inlet pressure to a preset output pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. Two types of setting and five pressure stages are available. A pressure gauge connection is provided in the reduced connection. A by-pass non-return valve plate for the flange valve for free flow from A to P (B port not drilled) can be ordered separately. In the sandwiches with control in A or B line by-pass check valves are integrated. The flange valve body is painted, the other parts are phosphated.

FUNCTION

The spool is held in the home position by the spring. The connection to the consumer is fully open. The reduced pressure can be adjusted at the adjustment spindle, irrespective of the inlet pressure. If the reduced pressure increases, it displaces the valve towards the spring. The volume flow at the valve inlet is then throttled, controlling the reduced pressure. If forces acting on the consumer allow the reduced pressure to be increased above the set value, the spool is displaced until the valve inlet closes and the tank port opens. The pressure increase is then limited to a low value, controlled by the spring.

APPLICATION

Pressure reducing valves are used for keeping the pressure constant in a consumer, irrespective of pressure fluctuations on the supply side. If several consumers are used, the reduced pressure can be set individually with the aid of one pressure control valve for each consumer. Generally speaking, pressure control valves are used for reducing a hydraulic pressure to a lower level. The integrated pressure relief function obviates the need for any additional pressure relief valve in the reduced pipe. Directly operated pressure reducing valves also keep the reduced pressure stable, even under very difficult operating conditions.

TYPE CODE

A		DRV	d	☐	6	☐	/	☐	#	☐
International mounting interface ISO										
Pressure reducing valve										
Direct operated										
Flange ☐ N										
Sandwich pressure red in P no remark										
Sandwich pressure red in A ☐ A										
Sandwich pressure red in B ☐ B										
Nominal size 6										
Setting versions:		Key	no remark							
		Knob	☐ D							
		Cover	☐ H							
Standard nominal pressure ranges:		$p_{N \text{ red}} = 31,5 \text{ bar}$	☐ 31,5							
		$p_{N \text{ red}} = 63 \text{ bar}$	☐ 63							
		$p_{N \text{ red}} = 125 \text{ bar}$	☐ 125							
		$p_{N \text{ red}} = 160 \text{ bar}$	☐ 160							
		$p_{N \text{ red}} = 200 \text{ bar}$	☐ 200							
Design-Index (Subject to change)										

GENERAL SPECIFICATIONS

Description	Direct operated pressure control valve
Nominal size	NG6 acc. to ISO 4401-03
Construction	Flange- or sandwich
Mounting	4 mounting holes for zyl. screws M5 or double ended screws M5
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20 ... +50 °C
Mounting position	any
Fastening torque	$M_D = 5,5 \text{ Nm}$ (Quality 8.8)
Weight	$m = 2,0 \text{ kg}$

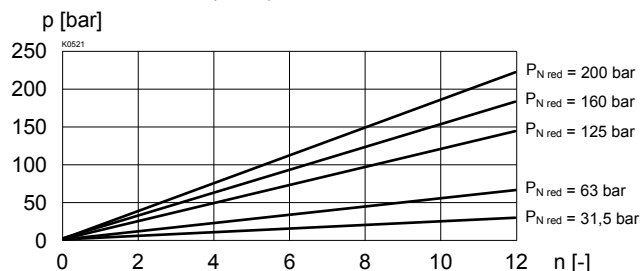
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 315 \text{ bar}$
Tank load in connection T	$p_{T \text{ max}} = 50 \text{ bar}$
Nominal pressure	$p_{N \text{ red}} = 31,5 \text{ bar}, p_{N \text{ red}} = 63 \text{ bar}$ $p_{N \text{ red}} = 125 \text{ bar}, p_{N \text{ red}} = 160 \text{ bar}$ $p_{N \text{ red}} = 200 \text{ bar}$
Opening pressure to non-return valve	$p_{N \text{ red}} = 200 \text{ bar}$
Volume flow	$p_o = 0,2 \text{ bar}$ $Q = 0...30 \text{ l/min}$

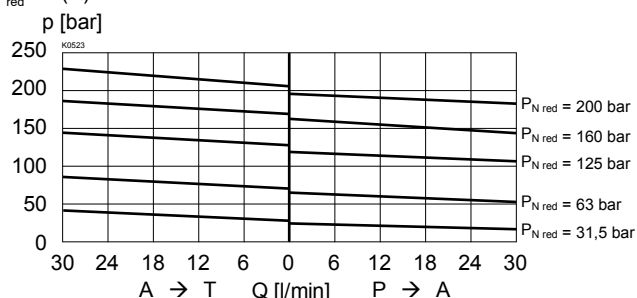
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{\text{red}} = f(n)$ Pressure adjustment characteristics

$Q = 0 \text{ l/min}$ (static)



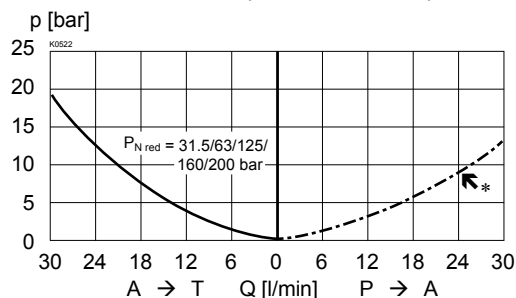
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics



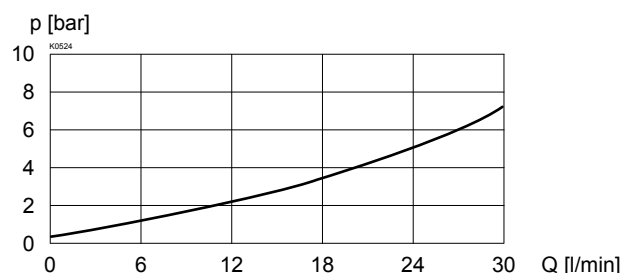
$p_{\text{min}} = f(Q)$

Minimal pressure loss/flow characteristics

* Consumption resistance dependent on system

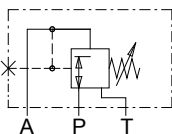


$\Delta p = f(Q)$ Pressure loss/flow characteristics over non-return valve

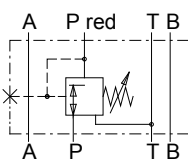


TYPES / DIMENSIONS

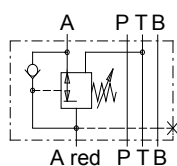
Flange construction
ADRVdN6



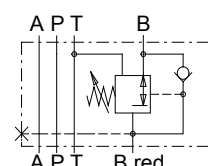
Sandwich construction
ADRVd6



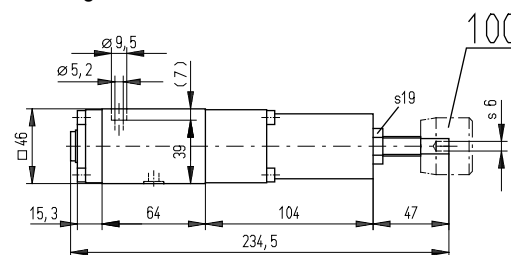
ADRVdA6



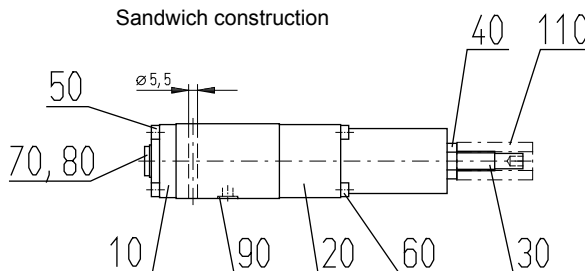
ADRVdB6



Flange construction



Sandwich construction



PARTS LIST

Position	Article	Description
10	58.4701	Lid
20	86.2800	Housing
30	80.3119	Adjustment screw
40	153.1601	Hexagonal nut 0,5D M12
50	246.2116	Cylinder screw M5x16 DIN912
60	246.2145	Cylinder screw M5x45 DIN912
70	238.2204	Plug G1/4" DIN908
80	49.2132	Seal ring ID 13,7x20x1,5
90	160.2093	O-ring ID 9,25x1,78
100	114.1202	Knob
110	154.7100	Cap nut

Technical explanation see data sheet 1.0-100

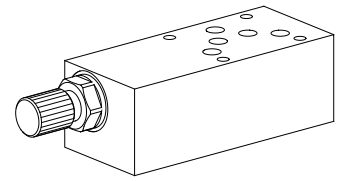
ACCESSORIES

Threaded connection plate and multi-flange subplates
Bypass non-return valve ADRVp6

Reg. 2.9

Pressure reducing valve
Flange- and sandwich construction

- Pilot operated
- $Q_{\max} = 80 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

NG10
ISO 4401-05

DESCRIPTION

Flange or sandwich type pilot operated 3-way pressure reducing valve. Screw-in cartridge M22x1,5 in according with ISO 7789. The valve reduces the inlet pressure to a preset output pressure. The integrated pressure relief function prevents the reduced pressure from being exceeded as a result of external forces. Two types of setting and three pressure stages are available. A pressure gauge connection is provided in the reduced connection. A bypass non-return valve plate for the flange valve – for free flow from A to P – can be ordered separately. The flange valve body is painted, the sandwich plates are phosphatised.

FUNCTION

The spool, located in the pilot operated main section of the valve, is held in the reset position by a spring. The connection to the consumer is fully open. With the pilot stage which is designed as relief valve, reduced pressure is adjustable. It opens when the set value is reached. As a result, a pilot volume flows through the nozzle in the spool. The resultant pressure difference displaces the spool towards the spring. The volume flow is throttled in the valve inlet and the reduced pressure is controlled. If forces acting on the actuator allow the reduced pressure to exceed the set value, the spool is displaced until the valve inlet closes and the reduced pressure port is being connected to tank. The pressure increase is then limited.

APPLICATION

Pressure reducing valves are used for keeping the pressure constant in a consumer, irrespective of pressure fluctuations on the supply side. If several consumers are used, the reduced pressure can be set individually with the aid of one pressure control valve for each consumer. Generally speaking, pressure control valves are used for reducing a hydraulic pressure to a lower level. The integrated pressure relief function obviates the need for any additional pressure relief valve in the reduced pipe. Directly operated pressure reducing valves also keep the reduced pressure stable, even under very difficult operating conditions.

TYPE CODE

		M	V			A10	-		-		#	
Pressure reducing valve												
Pilot operated												
Setting versions:	Screw											
	Knob											
Flange construction												
Sandwich construction												
Interface NG10												
Sandwich construction	P											
Pressure control in:	A											
	B											
Flange construction												
Pressure control in:	P → A											
Standard nominal pressure range:												
	$p_{N \text{ red}} = 63 \text{ bar}$											
	$p_{N \text{ red}} = 160 \text{ bar}$											
	$p_{N \text{ red}} = 350 \text{ bar}$											
Design-Index (Subject to change)												

GENERAL SPECIFICATIONS

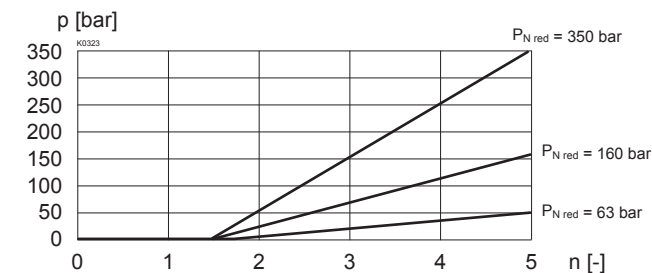
Description	Pilot operated pressure control valve
Nominal size	NG10 according to ISO 4401-05
Construction	Flange or Sandwich
Mounting	4 mounting holes for cyl. screws M6 or double ended screws M6
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50 °C
Mounting position	any
Fastening torque	$M_D = 9,5 \text{ Nm}$ (qual. 8.8) for fastening screws $M_D = 50 \text{ Nm}$ for screw-in cartridge
Weight	Depending on the type 2,89...3,09 kg

HYDRAULIC SPECIFICATIONS

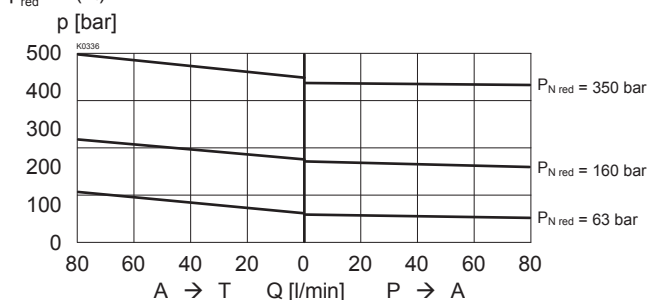
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Red. nominal pressure	$p_{N \text{ red}} = 63 \text{ bar}$, $p_{N \text{ red}} = 160 \text{ bar}$ $p_{N \text{ red}} = 350 \text{ bar}$ $p_o = 0,8 \text{ bar}$
Opening pressure to non-return valve	
Volume flow	$Q = 0...80 \text{ l/min}$
For further hydraulic specifications see data sheet 2.2-530.	

CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

$p_{\text{red}} = f(n)$ Pressure adjustment characteristics
 $Q = 0 \text{ l/min}$ (static)

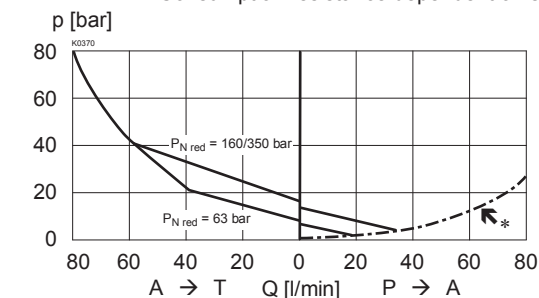


$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics

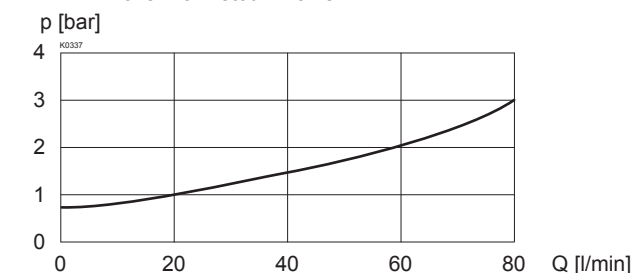


$p_{\text{min}} = f(Q)$ Minimal pressure loss/flow characteristics

* Consumption resistance dependent on system

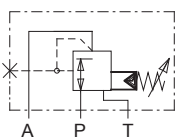


$\Delta p = f(Q)$ Pressure loss/flow characteristics over non-return valve

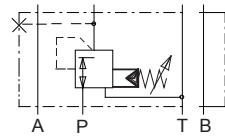


TYPES / DIMENSIONS

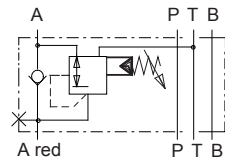
Flange
MV.FA10-P/A



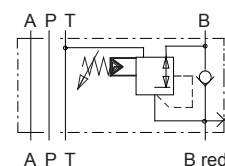
Sandwich
MV.SA10-P



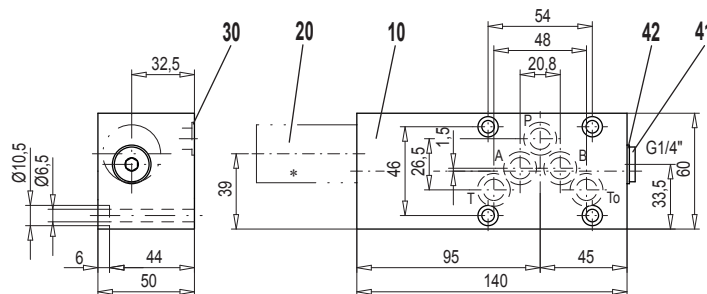
MV.SA10-A



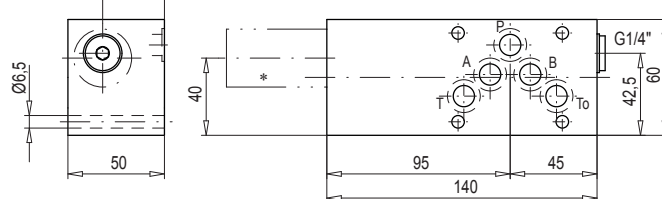
MV.SA10-B



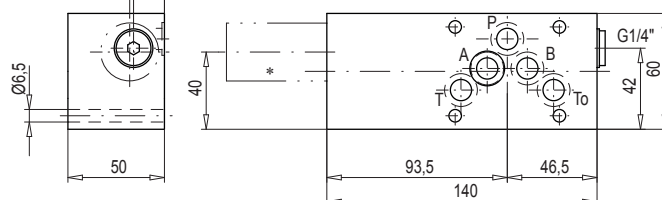
Flange MV.FA10-P/A



Sandwich MV.SA10-P



Sandwich MV.SA10-A



PARTS LIST

Position	Article	Description
10	136.4208 136.4607 136.4609 136.4610	Flange body Sandwich plate P Sandwich plate A Sandwich plate B
20	603.3 ...	Pressure reducing cartridge M22x1,5 Data sheet 2.2-530
30	160.2140	O-ring ID 14,00x1,78
41	238.2204	Plug DIN 908 G1/4"
42	049.2132	Seal ring ID 13,7x20x1,5

For sandwich red.pressure in B cartridge is located on B-side.

* The total lengths depends on the cartridge type,
see data sheet 2.2-530.

ACCESSORIES

Threaded connection plate and multi-flange subplates
Bypass non-return valve BDRVP4

Reg. 2.9

Technical explanation see data sheet 1.0-100