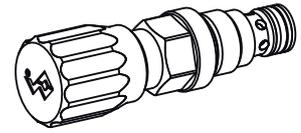


Pressure relief valve
Screw-in cartridge

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

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 and NG4 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.

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TYPE CODE

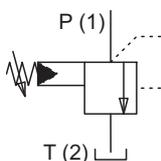
	B V <input type="checkbox"/> PM18 - <input type="checkbox"/> # <input type="checkbox"/>
Pressure relief valve	
Pilot operated	
Types of adjustment: Key <input type="checkbox"/> S	(see data sheet 2.0-50)
Control knob <input type="checkbox"/> D	
Cover <input type="checkbox"/> A	
Screw-in cartridge M18x1,5	
Pressure range: $p_N = 63 \text{ bar}$ <input type="checkbox"/> 63	
$p_N = 160 \text{ bar}$ <input type="checkbox"/> 160	
$p_N = 350 \text{ bar}$ <input type="checkbox"/> 350	
Design-Index (Subject to change)	

GENERAL CHARACTERISTICS

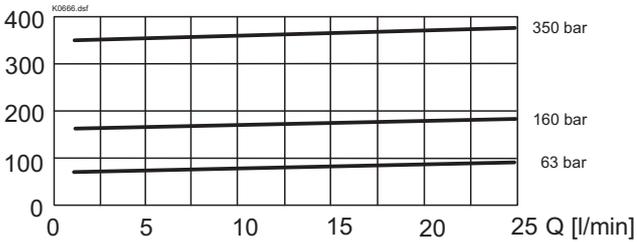
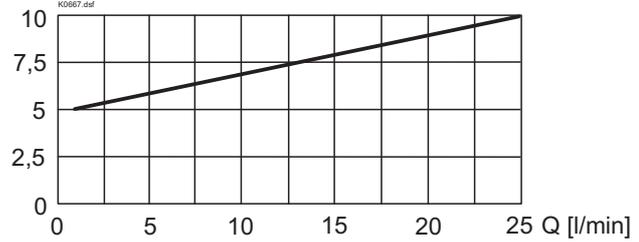
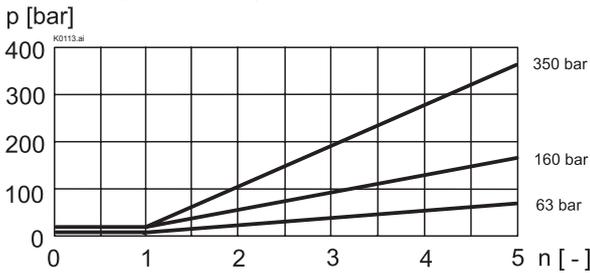
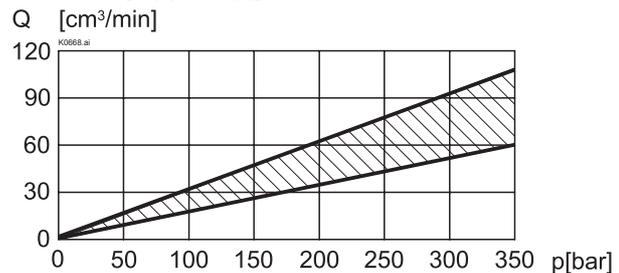
Description	Pilot operated pressure relief valve
Construction	Screw-cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M18x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening	$M_D = 30 \text{ Nm}$
Weight	$m = 0,10 \text{ kg}$ (key) $m = 0,11 \text{ kg}$ (control knob)

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

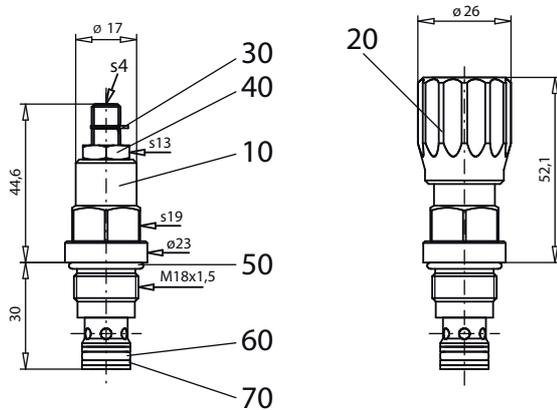
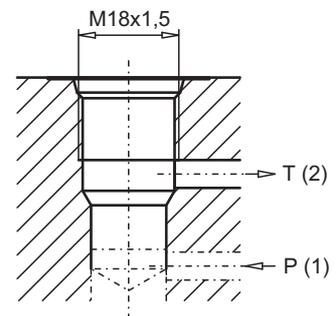
SYMBOL

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	= 1800° (5 revolutions)

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$
 $p = f(Q)$ Pressure volume flow characteristics
 p [bar] (Maximal adjustable pressure)

 $p = f(Q)$ Pressure volume flow characteristics
 p [bar] (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 7789-18-02-0-98

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

PARTS LIST

Position	Article	Description
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

Cartridge built into flange- or sandwichbody:

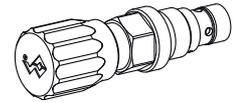
 Flange valve
 Sandwich valve

 register 2.1
 register 2.1

Technical explanation see data sheet 1.0-100E

**Pressure relief valve
Screw-in cartridge**

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

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.

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TYPE CODE

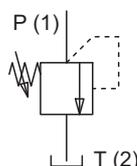
Pressure relief valve	B	S	<input type="checkbox"/>	PM18 -	<input type="checkbox"/>	#	<input type="checkbox"/>
Direct operated, poppet spool							
Types of adjustment: Key		<input type="checkbox"/>	S				
Control knob		<input type="checkbox"/>	D				
Cover		<input type="checkbox"/>	A	(see data sheet 2.0-50)			
Screw-in cartridge M18x1,5							
Pressure range:	$p_N = 63 \text{ bar}$	<input type="checkbox"/>	63				
	$p_N = 160 \text{ bar}$	<input type="checkbox"/>	160				
	$p_N = 315 \text{ bar}$	<input type="checkbox"/>	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

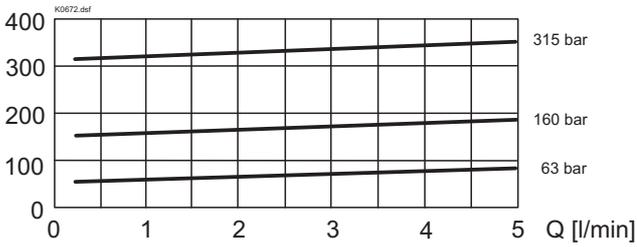
Hydraulic fluid	Mineral oils, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 80 \text{ bar}$ $p_N = 63 \text{ bar}, p_N = 160 \text{ bar}, p_N = 315 \text{ bar}$
Nominal pressure range	see characteristics
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

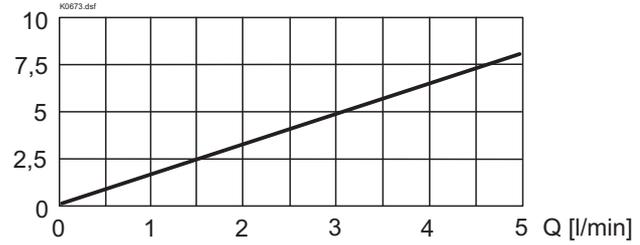
Mechanical types of operation in 3 different versions:	
S	= Key adjustment by means of Span key and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 revolutions)

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

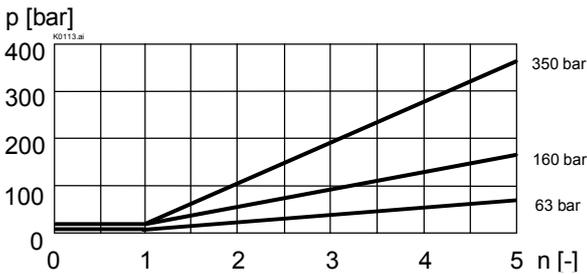
$p = f(Q)$ Pressure volume flow characteristics
 p [bar] (Maximal adjustable pressure)



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

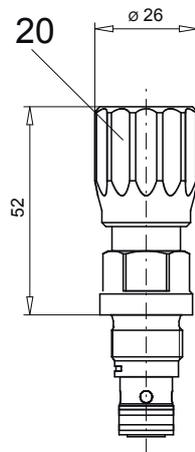
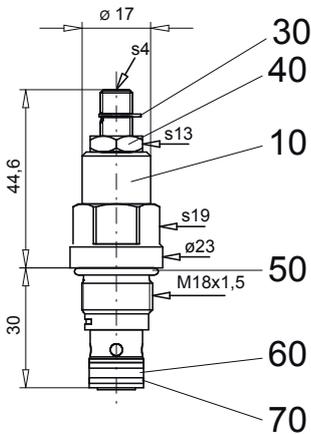
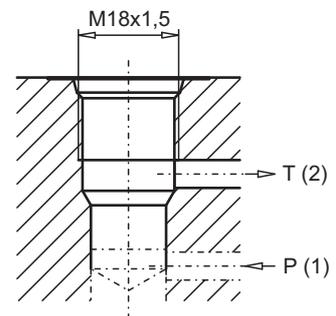


$p = f(n)$ Pressure adjustment characteristics
 (at $Q = 1 \text{ l/min}$)


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

Cartridge built into flange- or sandwichbody:

Flange valve

register 2.1

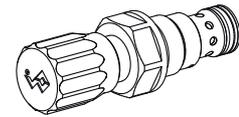
Sandwich valve

register 2.1

Technical explanation see data sheet 1.0-100E

**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.

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CHARACTERISTICS.....	2
DIMENSIONS.....	2
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ACCESSORIES.....	2

TYPE CODE

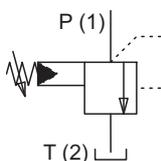
	B	V	<input type="checkbox"/>	PM22 -	<input type="text"/>	#	<input type="text"/>
Pressure relief valve							
Pilot operated							
Types of adjustment: Key	<input type="checkbox"/>	S					
Control knob	<input type="checkbox"/>	D					
Cover	<input type="checkbox"/>	A	(see data sheet 2.0-50)				
Screw-in cartridge M22x1,5							
Pressure range:	$p_N = 63 \text{ bar}$	<input type="checkbox"/>	63				
	$p_N = 160 \text{ bar}$	<input type="checkbox"/>	160				
	$p_N = 350 \text{ bar}$	<input type="checkbox"/>	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

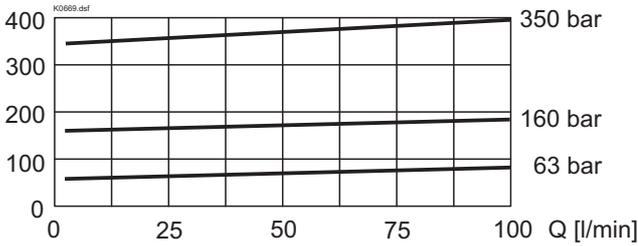
Hydraulic fluid	Mineral oils, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$
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

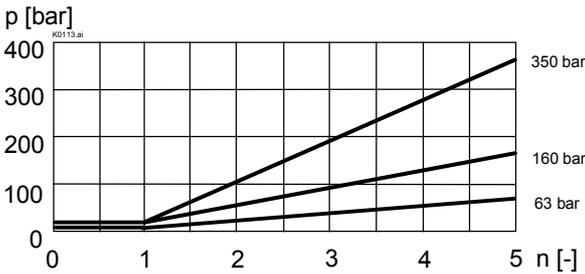
Mechanical types of operation in 3 different versions:	
S	= Key adjustment by means of Span key and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 revolutions)

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

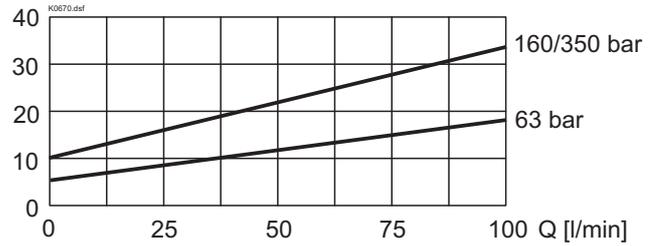
$p = f(Q)$ Pressure volume flow characteristics
 p [bar] (Maximal adjustable pressure)



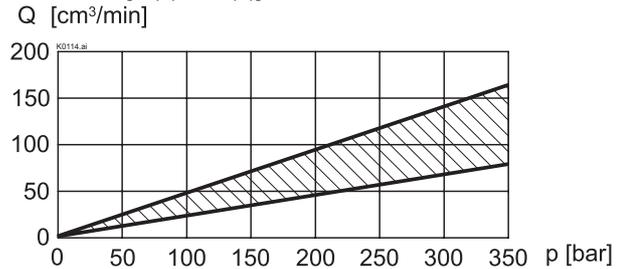
$p = f(n)$ Pressure adjustment characteristics
 (at $Q = 5 \text{ l/min}$)



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

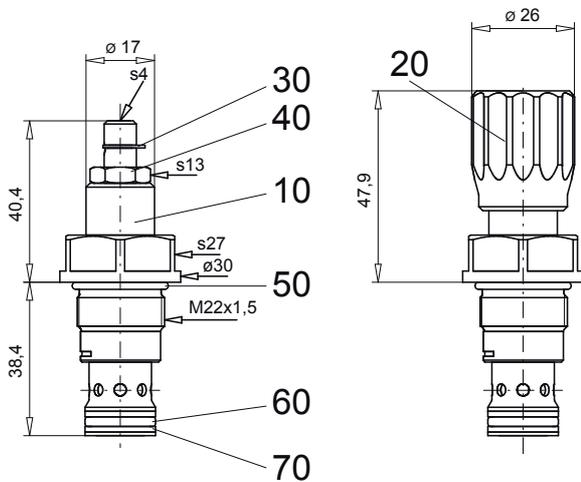
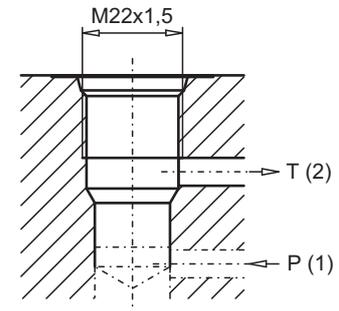


$Q_L = f(p)$ Leakage volume flow characteristics
 [P (1) \rightarrow T (2)]


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

Cartridge built into flange- or sandwichbody:

Flange valve

register 2.1

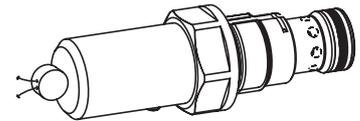
Sandwich valve

register 2.1

Technical explanation see data sheet 1.0-100E

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.

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DIMENSIONS.....	2
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TYPE CODE

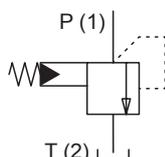
Pressure relief valve	B	V	T	PM22	-	-	-	#	#
Pilot operated									
EC - Type tested in accordance with PED 97/23/EC									
Screw-in cartridge M22x1,5									
Response pressure range									
50...< 160 bar									A
160...< 260 bar									B
260... 350 bar									C
Response pressure p_A in bar		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

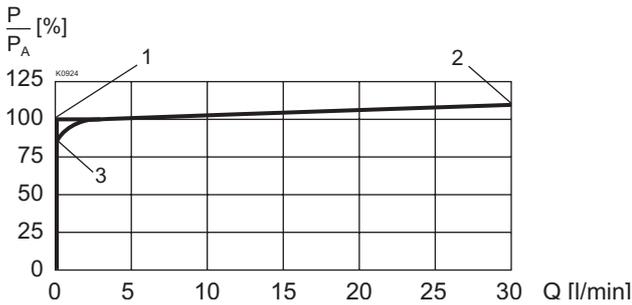
GENERAL SPECIFICATIONS

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
	*± 3%

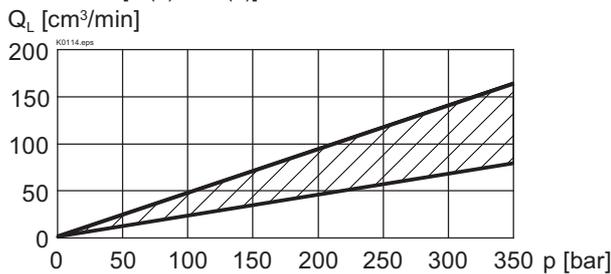
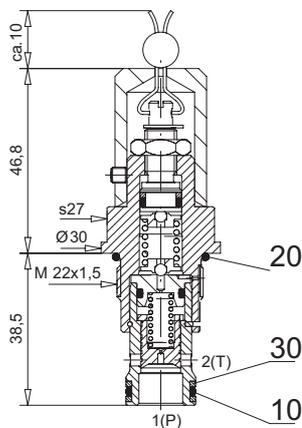
SYMBOL


CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$
 $p = f(Q)$ Pressure volume flow characteristics


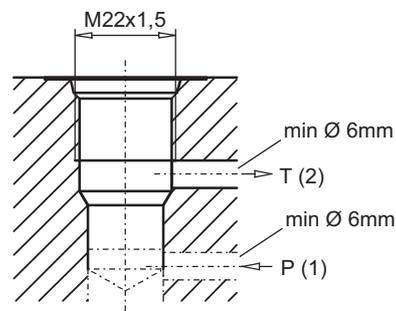
- 1 Response pressure: Response pressure in accordance with type code.
- 2 Blow-off pressure: The blow-off pressure is situated a maximum of 10 % above the response pressure.
- 3 Closing pressure: The closing pressure is situated a maximum of 15 % below the response pressure.

 $Q_L = f(p)$ 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:

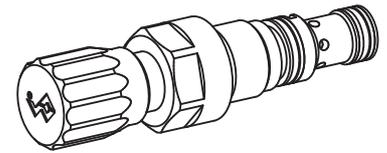
 Flange valve register 2.1
 Sandwich valve register 2.1

 – 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
- $Q_{max} = 80 \text{ l/min}$
- $p_{max} = 400 \text{ bar}$
- $p_{Nmax} = 350 \text{ bar}$

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.

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SYMBOL.....	1
MECHANICAL ACTUATION.....	1
CHARACTERISTICS.....	2
DIMENSIONS.....	2
PARTS LIST.....	2

TYPE CODE

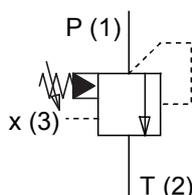
	B V <input type="checkbox"/> PM22 - <input type="checkbox"/> - Z9 # <input type="checkbox"/>
Pressure relief valve	
Pilot operated	
Setting versions: Key	S
Control knob	D
Cover	A (see data sheet 2.0-50)
Screw-in cartridge M22x1,5	
Pressure range: $p_N = 63 \text{ bar}$	63
$p_N = 160 \text{ bar}$	160
$p_N = 350 \text{ bar}$	350
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

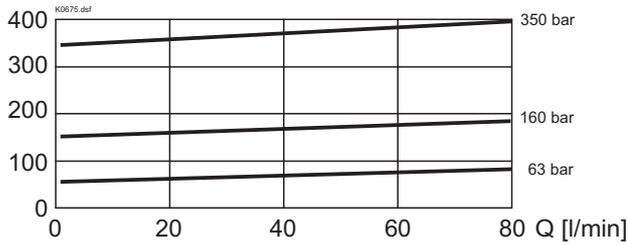
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$ -20...+70 °C
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

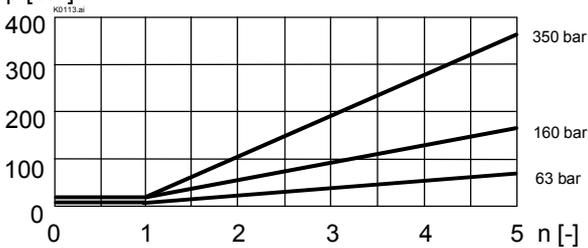
Mechanical types of operation in 2 different versions:	
S	= Screw adjustment with fork wrench and Allen key
D	= Control knob adjustment, fixed
Stroke S_b	= 5 mm
Angle α_b	= 180° (5 Turns)

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

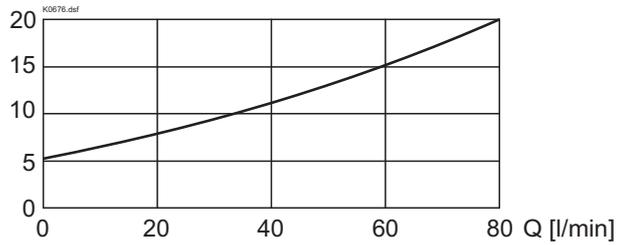
$p = f(Q)$ Pressure volume flow characteristics
 p [bar] (Maximal adjustable pressure)



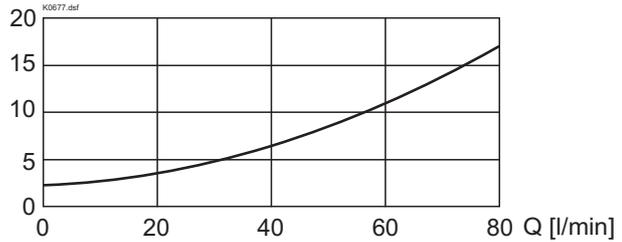
$p = f(n)$ Pressure adjustment characteristics
 (at $Q = 5 \text{ l/min}$)



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

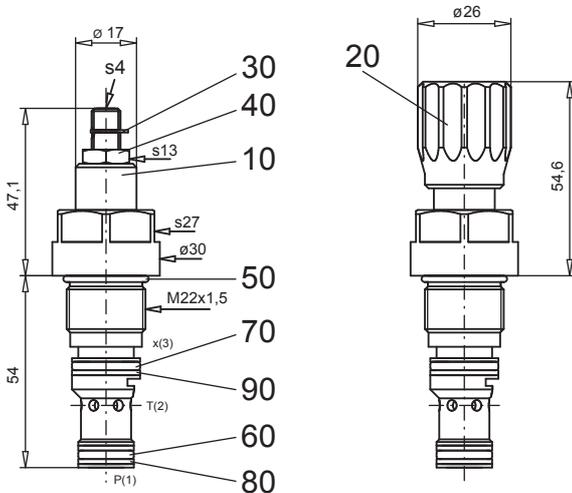
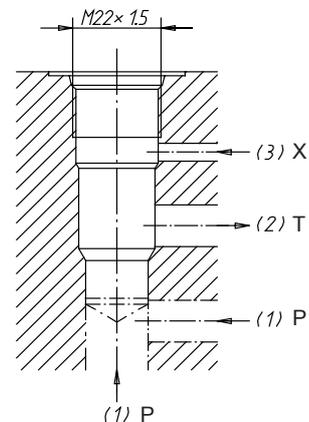


$\Delta p = f(Q)$ Pressure volume flow characteristics
 Δp [bar] [control line x unpressurised circ. - bypass P (1) → T (2)]


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.

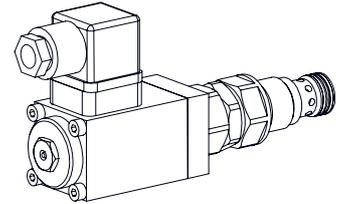
PARTS LIST

Position	Article	Description
20	114.2224	Knob
30	193.1061	Safety 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
- $Q_{max} = 100$ l/min
- $p_{max} = 400$ bar
- $p_{Nmax} = 350$ 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 utilised anymore in applications with periodically changing direction of flow.

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TYPE CODE

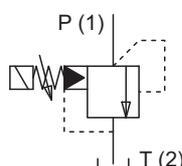
	B	V	E	PM22 -	-	#	□
Pressure relief valve							
Pilot operated							
Electric operation: energised solenoid corresponds to max. set pressure							
Screw-in cartridge M22x1,5							
Nominal pressure $p_N = 63$ bar				63			
ranges: $p_N = 160$ bar				160			
$p_N = 350$ bar				350			
Nominal voltage, current type, frequency							
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	$M_D = 50$ Nm for cartridge $M_D = 2,8$ 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 $\beta_{6...10} \geq 75$) 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	$p_{max} = 400$ bar $p_{Tmax} = p_p + 20$ bar
Nominal pressure	$p_N = 63$ bar, $p_N = 160$ bar, $p_N = 350$ 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 l/min
Leakage volume flow	see characteristics

SYMBOL


ELECTRICAL SPECIFICATIONS

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 to ISO 4400/DIN 43650, (2P+E), other connections on request
Solenoid type:	- Medium SIN35V (data sheet 1.1-105)

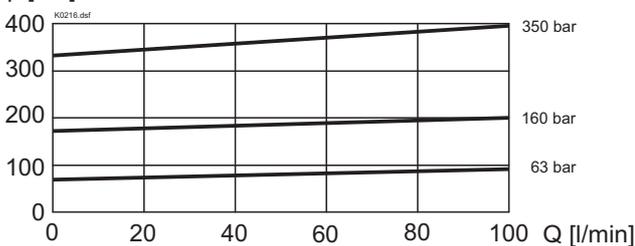
OPERATING PRESSURE

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.

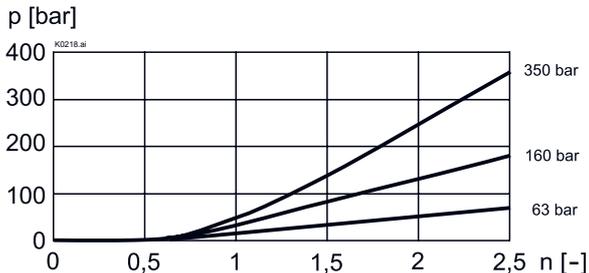
Pressure adjustment:	
Actuation stroke	$S_b = 2,5 \text{ mm}$
Actuation angle	$\alpha_b = 1080^\circ$ (3 revolutions)

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

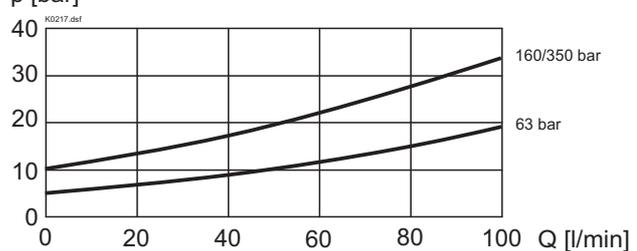
$p = f(Q)$ Pressure volume flow characteristics
 (Maximal adjustable pressure)



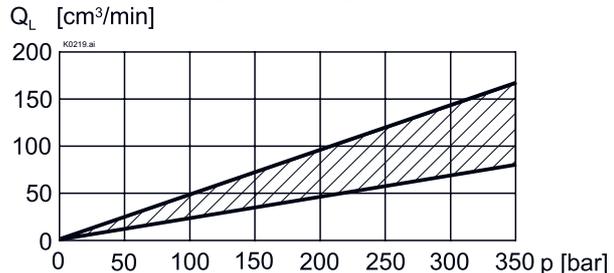
$p = f(n)$ Pressure adjustment characteristics
 (at $Q = 5 \text{ l/min}$)



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



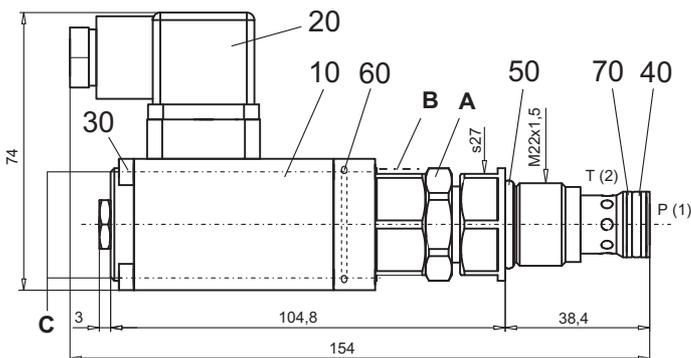
$Q_L = f(p)$ Leakage volume flow characteristics
 [P (1) → T (2)]


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) Tighten screws **C** with torque ($M_D, 2,8 \text{ Nm}$)


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

Cartridge built into flange- or sandwichbody

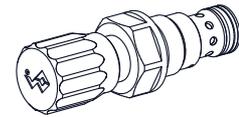
Flange valve
 Sandwich valve

Register 2.1
 Register 2.1

Technical explanation see data sheet 1.0-100E

**Leakage-free pressure relief valve
Screw-in cartridge**

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

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.

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TYPE CODE

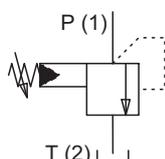
Pressure relief valve	B	C	<input type="checkbox"/>	PM22 -	<input type="checkbox"/>	#	<input type="checkbox"/>
Pilot operated, leakage-free							
Types of adjustment: Key				<input type="checkbox"/>	S		
Control knob				<input type="checkbox"/>	D		
Cover				<input type="checkbox"/>	A	(see data sheet 2.0-50)	
Screw-in cartridge M22x1,5							
Pressure range:	$p_N = 63 \text{ bar}$	<input type="checkbox"/>	63				
	$p_N = 160 \text{ bar}$	<input type="checkbox"/>	160				
	$p_N = 350 \text{ bar}$	<input type="checkbox"/>	350				
	$p_N = 420 \text{ bar}$	<input type="checkbox"/>	420				
Design-Index (Subject to change)							

GENERAL CHARACTERISTICS

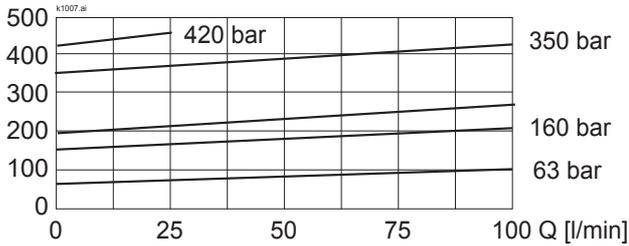
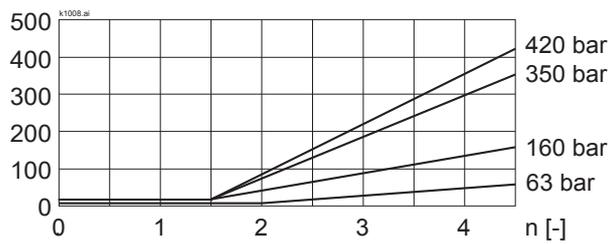
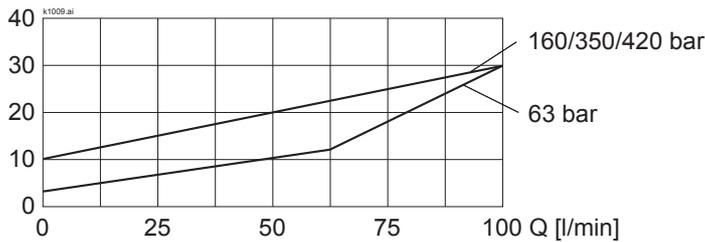
Description	Pilot operated pressure relief valve
Construction	Screw-cartridge for cavity acc. to ISO 7789
Mounting	Screw thread M22x1,5
Ambient temperature	-20...+50°C
Mounting position	any
Fastening	$M_D = 50 \text{ Nm}$
Weight	$m = 0,15 \text{ kg}$ (key) $m = 0,16 \text{ kg}$ (control knob)

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	$p_N = 63 \text{ bar}$, $p_N = 160 \text{ bar}$, $p_N = 350 \text{ bar}$, $p_N = 420 \text{ bar}$
Minimum pressure	see characteristics
Volume flow	$Q = 0,2...100 \text{ l/min}$

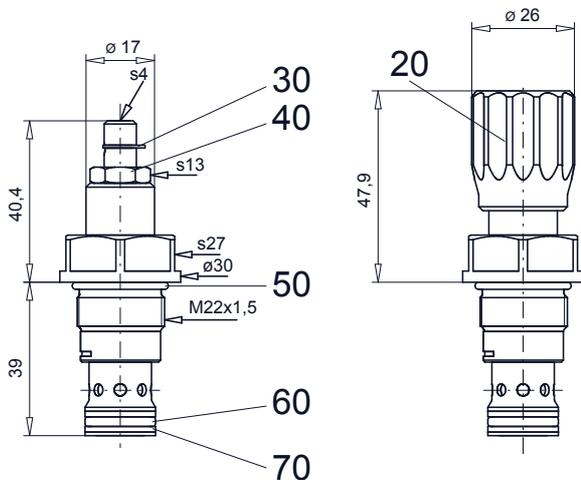
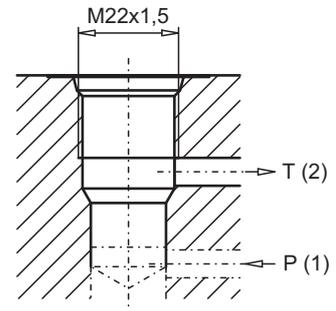
SYMBOL

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	Description
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

Cartridge built into flange- or sandwichbody:

Flange valve

register 2.1

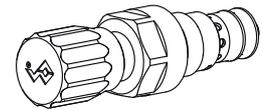
Sandwich valve

register 2.1

Technical explanation see data sheet 1.0-100

**Pressure relief valve
Screw-in cartridge**

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

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.

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TYPE CODE

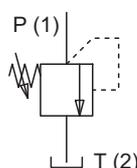
Pressure relief valve	B	A	<input type="checkbox"/>	PM22 -	<input type="checkbox"/>	#	<input type="checkbox"/>
Direct operated, poppet spool							
Types of adjustment: Key	S						
Control knob	D						
Cover	A (see data sheet 2.0-50)						
Screw-in cartridge M22x1,5							
Pressure range:	$p_N = 63 \text{ bar}$	<input type="checkbox"/>	63				
	$p_N = 210 \text{ bar}$	<input type="checkbox"/>	210				
	$p_N = 315 \text{ bar}$	<input type="checkbox"/>	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	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$
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)

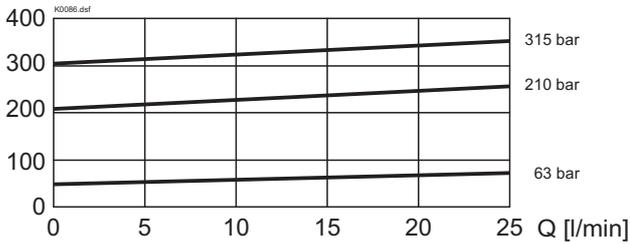
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 3 different versions:

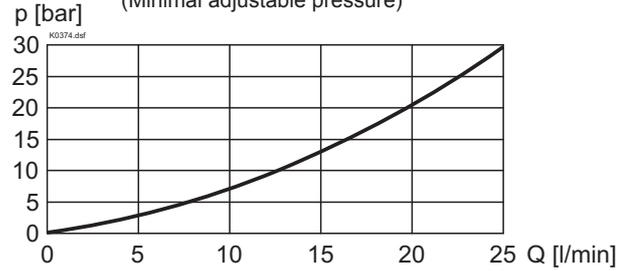
S	= Key adjustment by means of Span key and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 revolutions) at $p_N = 210 \text{ bar}$ 1400° (4 revolutions)

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

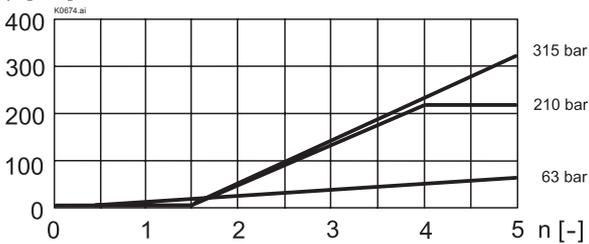
$p = f(Q)$ Pressure volume flow characteristics
 (Maximal adjustable pressure)



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

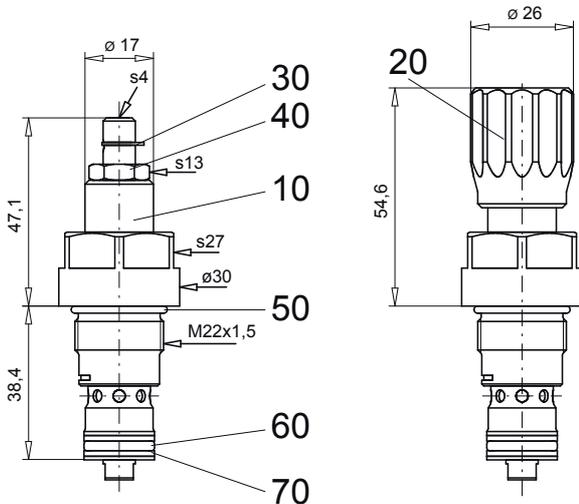
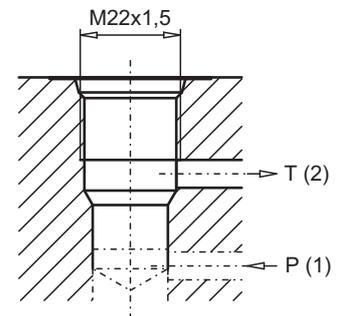


$p = f(n)$ Pressure adjustment characteristics
 (at $Q = 5 \text{ l/min}$)


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

Cartridge built into flange- or sandwichbody:

Flange valve

register 2.1

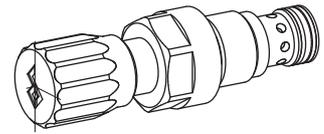
Sandwich valve

register 2.1

Technical explanation see data sheet 1.0-100E

**Pressure relief valve
Screw-in cartridge**

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

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.

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TYPE CODE

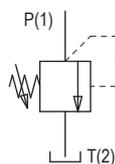
Pressure relief valve	B	K	<input type="checkbox"/>	PM22 -	<input type="checkbox"/>	#	<input type="checkbox"/>
Direct operated control spool							
Types of adjustment:	Key	<input type="checkbox"/>	S				
	Control knob	<input type="checkbox"/>	D				
	Cover	<input type="checkbox"/>	A	(see data sheet 2.0-50)			
Screw cartridge M22x1,5							
Rated pressure stage: $p_N = 32 \text{ bar}$	<input type="checkbox"/>	32					
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	$p_{max} = 100 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$
Rated pressure stage	$p_N = 32 \text{ bar}$
Minimum pressure	see curve
Volume flow	$Q = 0,2...100 \text{ l/min}$
Leak volume flow	see curve

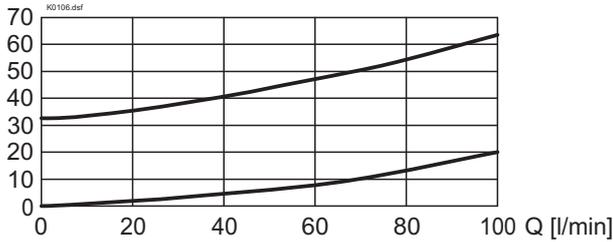
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 2 different versions:

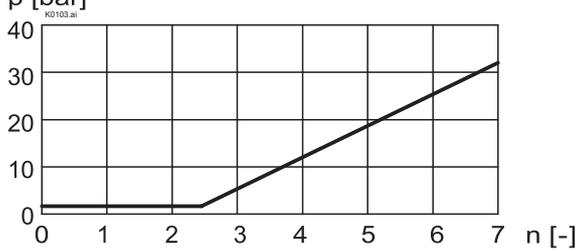
- | | |
|----------------------------|---|
| S | = Screw adjustment with fork wrench and Allen key |
| D | = Control knob adjustment, fixed |
| Actuation stroke S_b | = 7 mm |
| Actuation angle α_b | = 2520° (7 revolutions) |

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

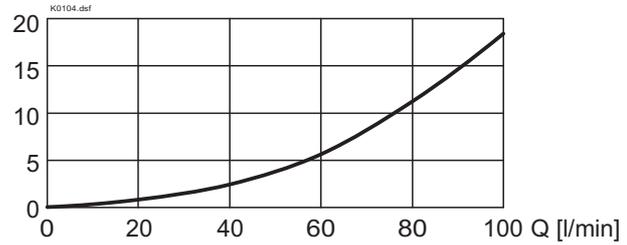
$p = f(Q)$ Pressure volume flow characteristics
 p [bar] (Maximal adjustable pressure)



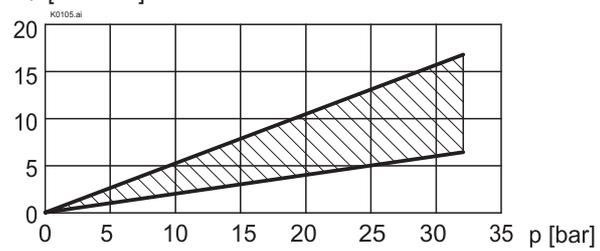
$p = f(n)$ Pressure adjustment characteristics
 (at $Q = 5 \text{ l/min}$)



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

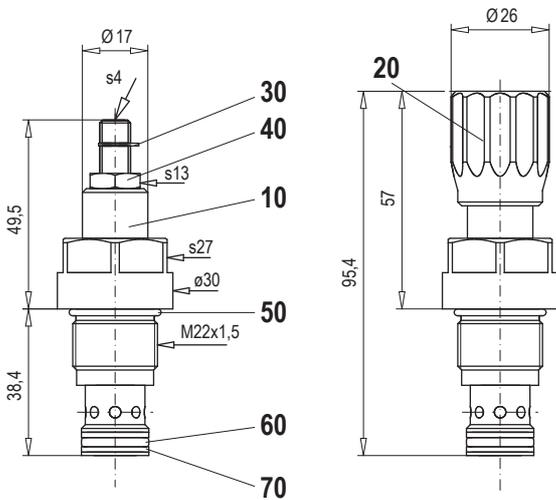
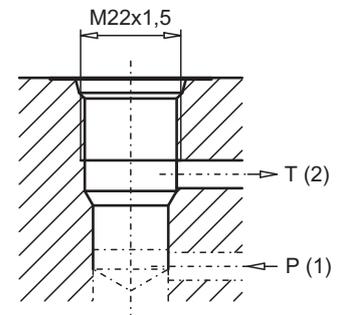


$Q_L = f(p)$ Leakage volume flow characteristics
 Q [cm³/min] [P (1) → T (2)]


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

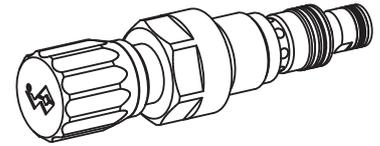
Cartridge built into flange- or sandwich body:

Flange valve	register 2.1
Sandwich valve	register 2.1

Technical explanation see data sheet 1.0-100

**Pressure relief valve
Screw-in cartridge**

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

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 wich 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

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TYPE CODE

Pressure relief valve	B	<input type="checkbox"/>	<input type="checkbox"/>	PM22 -	<input type="text"/>	#	<input type="text"/>
Relief valve remote controlled							
Relief and unloading valve							
Types of adjustment:	Key	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(see data sheet 2.0-50)		
	Control knob	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
	Cover	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Screw cartridge M22x1,5							
Nominal pressure: $p_N = 100 \text{ bar}$		<input type="checkbox"/>					
$p_N = 315 \text{ bar}$		<input type="checkbox"/>					
Design-Index (Subject to change)							

GENERAL CHARACTERISTICS

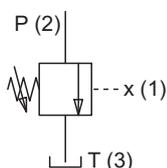
Description	BX: Direct operated relief valve, remote controlled BY: Direct operated relief valve, with additional unloading function
Construction	Screw-in cartridge for cavity acc. to Wandfluh-standard
Mounting	M22x1.5 screw thread
Ambient temperature	-20...+50°C
Installation position	any
Tightening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

HYDRAULIC CHARACTERISTICS

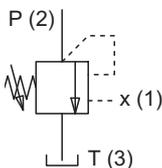
Hydraulic fluid	Mineral oils, other fluids on request
Max permissible contamination level	ISO 4406:1999, class 18/16/13 (recommended filter gauge $\beta_{10...25} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Hydraulic fluid temp.	-20...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$
Nominal pressure	$p_N = 100 \text{ bar}, p_N = 315 \text{ bar}$
Min. pressure	see characteristic
Differential pressure (only for BY.PM22)	11% for $p_N = 100 \text{ bar}$ 7,5% for $p_N = 315 \text{ bar}$
Volume flow	$Q = 0,1...25 \text{ l/min}$
Leak volume flow	max. 4 drops/min (up to 80% of the adjusted pressure)

SYMBOLS

BX.PM22



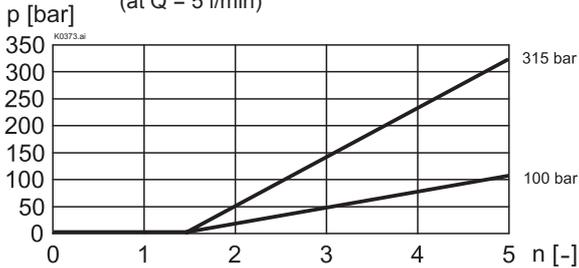
BY.PM22


MECHANICAL ACTUATION

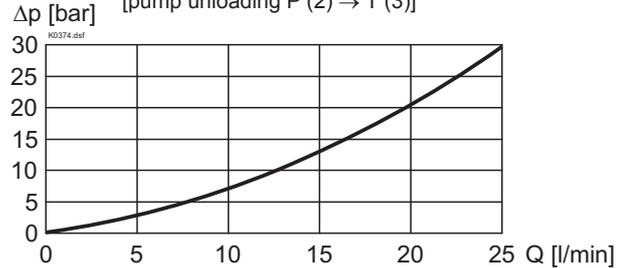
2 types of adjustments:	
S	= Screw adjustment with fork wrench and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 revolutions)

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

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



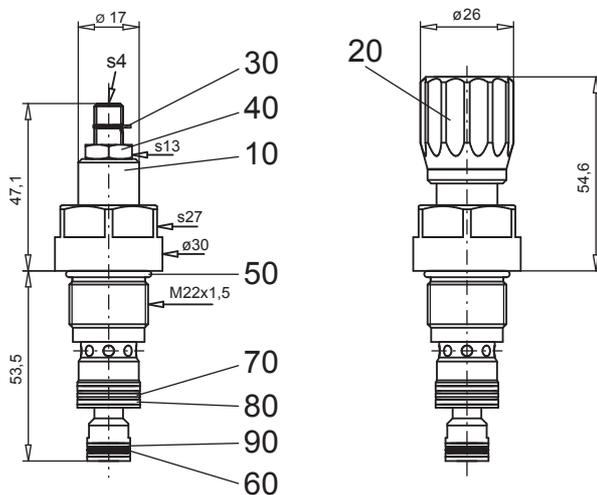
$p = f(Q)$ Pressure volume flow characteristics
[pump unloading P (2) → T (3)]



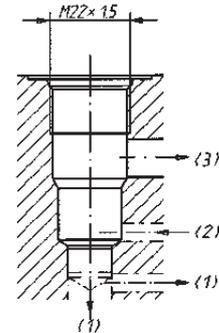
DIMENSIONS

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.

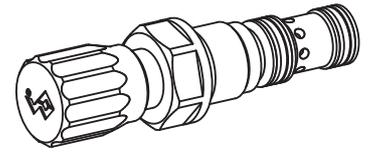
PARTS LIST

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 1.0-100E

Pressure sequence 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 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

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TYPE CODE

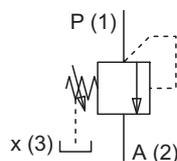
	F	V	<input type="checkbox"/>	PM22 -	<input type="text"/>	#	<input type="text"/>
Pressure sequence valve							
Pilot operated							
Types of adjustment:	Key	<input type="checkbox"/>	S				
	Control knob	<input type="checkbox"/>	D				
	Cover	<input type="checkbox"/>	A	(see data sheet 2.0-50)			
Screw cartridge M22x1,5							
Rated pressure ranges:	$p_N = 63 \text{ bar}$	<input type="checkbox"/>	63				
	$p_N = 160 \text{ bar}$	<input type="checkbox"/>	160				
	$p_N = 350 \text{ bar}$	<input type="checkbox"/>	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	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$
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)

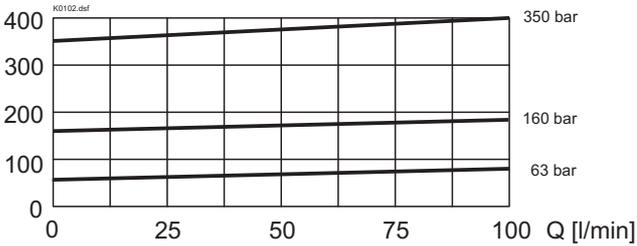
SYMBOL

MECHANICAL ACTUATION

Mechanical types of operation in 2 different versions:

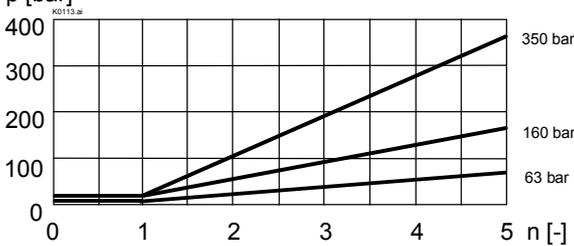
S	= Screw adjustment with fork wrench and Allen key
D	= Control knob adjustment, fixed
Actuation stroke S_b	= 5 mm
Actuation angle α_b	= 180° (5 turns)

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

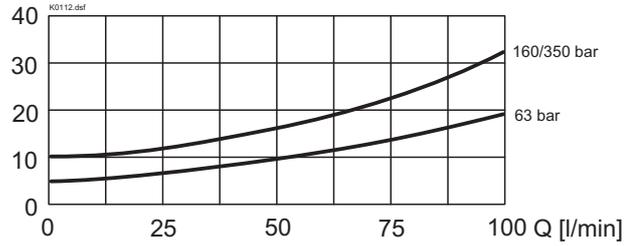
$p = f(Q)$ Pressure volume flow characteristics
 p [bar] (Maximal adjustable pressure)



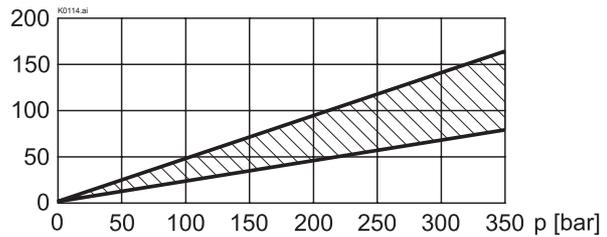
$p = f(n)$ Pressure adjustment characteristics
 (at $Q = 5 \text{ l/min}$)



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

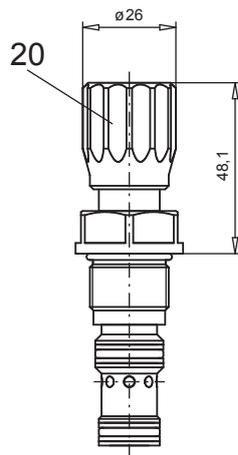
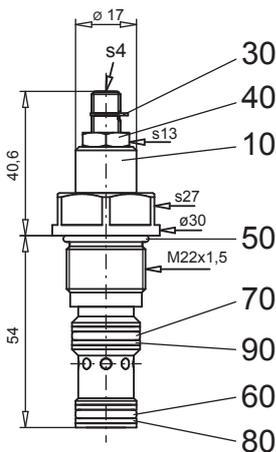
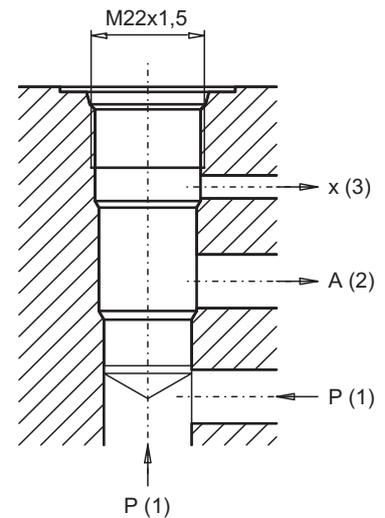


$Q_L = f(p)$ Leakage volume flow characteristics
 Q [cm^3/min] [P (1) \rightarrow T (2)]


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

Cartridge built into sandwich plate:

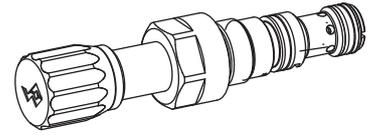
Sandwich valve

Register 2.1

Technical explanation see data sheet 1.0-100E

Accumulator unloading valve
Screw-in cartridge

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

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.

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TYPE CODE

	U S	<input type="checkbox"/>	PM22 -	<input type="checkbox"/>	#	<input type="checkbox"/>
Pilot operated accumulator loading valve						
Types of adjustment: Key <input type="checkbox"/> S						
Control knob <input type="checkbox"/> D						
Cover <input type="checkbox"/> A (see data sheet 2.0-50)						
Screw-in cartridge M22x1,5						
Standard nominal	$p_N = 100 \text{ bar}$	<input type="checkbox"/> 100				
pressure ranges:	$p_N = 160 \text{ bar}$	<input type="checkbox"/> 160				
	$p_N = 350 \text{ bar}$	<input type="checkbox"/> 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)

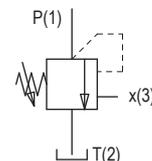
HYDRAULIC SPECIFICATIONS

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

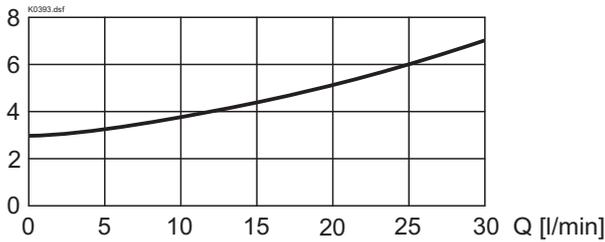
MECHANICAL ACTUATION

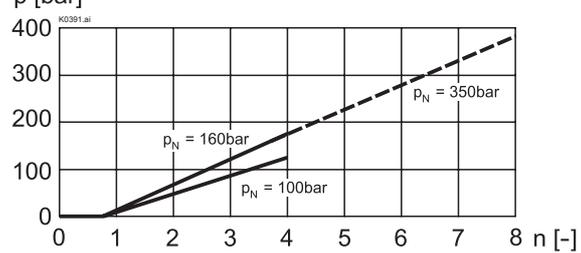
Mechanical types of operation in 2 different versions:
 S = Screw adjustment with fork wrench and Allen key
 D = Control knob adjustment, fixed

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

SYMBOL


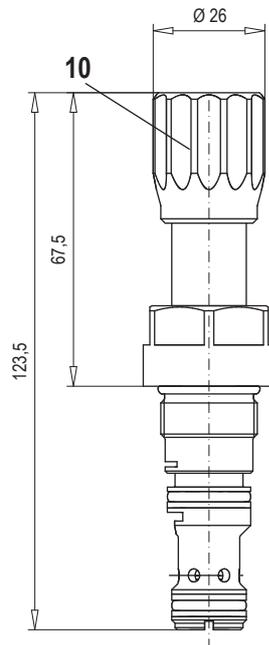
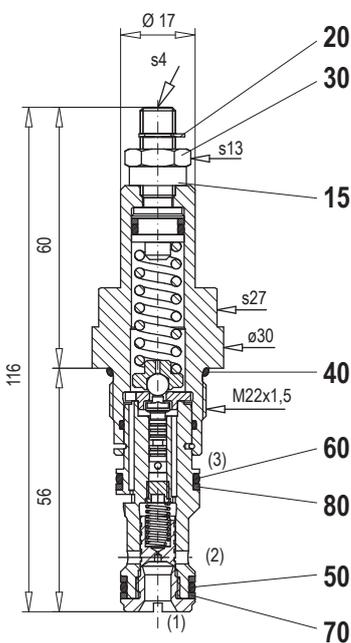
CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$
 $\Delta p = f(Q)$ Pressure-flow characteristics curve

 Δp [bar] [Accumulator operation- pump unloading P (1) \rightarrow T (2)]

 $p = f(n)$ Pressure adjustable characteristics

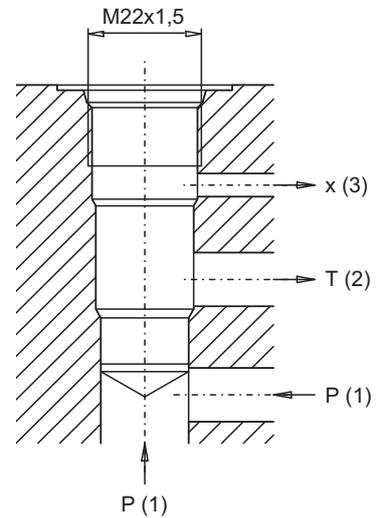
 p [bar] (at $Q = 2 \text{ l/min}$)

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 16x1x19x1,4

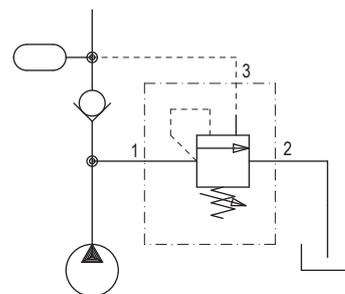
SET-UP AND CONNECTION EXAMPLES

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