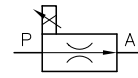


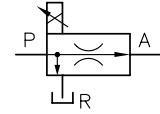
Proportional, solenoid actuated flow control valves type SE and SEH

Operating pressure p_{\max} = 315 bar
Flow Q_{\max} = 120 lpm

2-way
flow control valve



3-way
flow control valve



1. General information

The proportional flow control valves type SE 2 and SEH 2 (2-way version) as well as SE 3 and SEH 3 (3-way version) are used for pressure independent, stepless remote control of the operating speed of the connected hydraulic consumers.

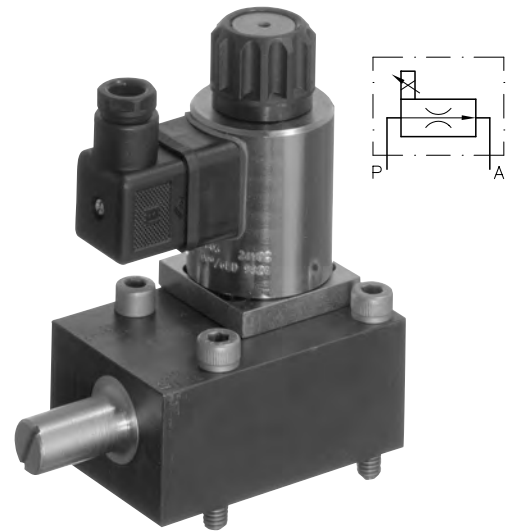
They enable the effective consumer flow to be proportional to the electrical signal (control current), according to any desired profile within the adjustment range, ranging from simple, time-adjustable acceleration and deceleration, by manual remote adjustment of the operating speed to e.g., pre-selectable speeds of automatic work cycles.

The control of these valves is via proportional amplifiers maintaining a constant current level e.g. type EV1M2 acc. to D 7831/1 or type EV1G1 acc. to D 7837.

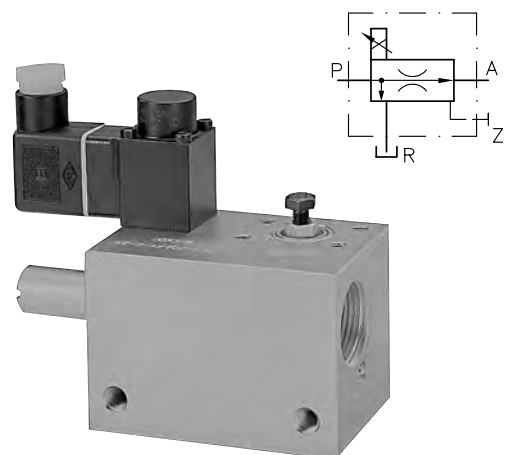
For the most simple applications (e.g. ON/OFF pump operation) control may be via a potentiometer connected in series to the proportional solenoid.

The essential components of these pressure compensated flow control valves are the proportional solenoid, the metering orifice, and the flow controller. The metering orifice, whose flow cross section is adjusted by the actuated proportional solenoid, generates a specific, low pressure drop which is required for the function of the flow controller.

Version with directly actuated metering orifice
e.g. type SE 2 - 3/50 P - G24



Version with piloted metering orifice
e.g. type SEHF 3 - 4/70 F - G24



The following basic types are distinguished:

- Type SE with a directly actuated metering orifice most advantageous for application mainly operated at Q_{\min} near 0, its high, oscillated mass limits the response time.
- Type SEH with a piloted metering orifice advantageous for application where quick response is a must; a min. inlet flow is required as there is always a design related leakage loss (see table 1 and 4).
- Both types are available as 2- or 3-way flow control valves
- The individual valves are available either as manifold mounting design or for direct pipe connection
- Additional function (3-way valve): Pressure limiting valve to the limitation of the pressure on the consumer side, arbitrary idle circulation, etc.
- Additional function (2-way valve): Bypass check valve, rectifier circuit via check valves enabling arbitrary flow direction.
- Type PB proportional throttle used for not completely load compensated speed controls (e.g. accelerating and decelerating tasks) and limited flow.

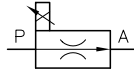
Two metering orifice versions are available:

- Metering orifice completely open when deenergized (idle position), i.e. full consumer flow at port A which is gradually reduced down to the min. rating in accordance to the rising voltage applied at the proportional solenoid.
- Metering orifice closed when deenergized (idle position), i.e. min. consumer flow at port A which is gradually increased up to the max. rating in accordance to the rising voltage applied at the proportional solenoid.

2. Available versions, main data

2.1 2-way flow control valve

Order examples: **SE 2 - 3/15 B - G24**
SEH 2 - 2/30 F P - G24



Design, connection mode and size, as well as optional functions, see table 2

Table 3: Solenoid voltage (proportional solenoid)

Coding	Type SE			Type SEH(F)	
	G 12	G 24	G 80	G 12	G 24
Nom. voltage U_N (V DC)	12	24	80	12	24
Power, cold P_{20} (W) ²⁾	37	37	37	24	24
Min. power P_G (W) ³⁾	24.7	24.7	24.7	9.5	9.5

For additional electrical data, see sect. 3.2

Table 1: Basic type, size and flow rating

Basic type and size	Version	Pressure p_{max} (bar) with version for		Flow (nom. flow rating of the metering orifice)													
				Closed when deenergized (standard)													
				3F	6F	10F	15F	22F	30F	36F	50F	70F	90F	3/7F	3/26F	4/18F	
				Open when deenergized ¹⁾													
		Pipe connection	Manifold mounting	Flow control range $Q_{A min} \dots Q_{A max}$ (lpm)													
0.1 to 3	0.1 to 6			0.1 to 10	0.2 to 15	0.2 to 22	0.2 to 30	0.3 to 36	0.3 to 50	0.6 to 70	0.6 to 90	0.1 to 7 ⁴⁾	0.1 to 26 ⁴⁾	0.1 to 18 ⁴⁾			
SE 2 - 3/	with directly actuated metering orifice	315	200	● ⁶⁾	●		●	●	●								
SE 2 - 4/										● ⁶⁾	● ⁶⁾						
SEH 2 - 2/	with piloted metering orifice	315	315	●	●	●	●	●	●			●	●	●			
SEH 2 - 3/ SEHF 2 - 3/ ⁵⁾		---	315		● ⁷⁾	● ⁷⁾		● ⁷⁾	● ⁷⁾	● ⁷⁾							

Table 2: Design, connection mode and size

Con- nection mode	Basic type	Conne- ction size (BSP)	Coding		Rectifier circuit via check valves, controlled flow in both directions			
			Basic version	With options				
Pipe connec- tion	SEH 2-2	G 3/8	Without coding (stan- dard)	---	P - 3/8 B	SEH 2-2/.. ..P - 3/8 B	SE 2-3/.. B-..	
	SE 2-3	G 1/2		R				
	SE 2-4	G 3/4						
Manifold mount- ing	SEH 2-2	See di- mensional drawings in sect. 4.2	P	---	PR			
	SEH 2-3							
	SEHF 2-3							
	SE 2-3 SE 2-4							

Additional order examples:

SEH 2-2/15 FP-3/8 B-G12
 SEH 2-2/30-G24
 SE 2-3/50 B-G80

1) 2-way flow control valves type SEH 2-.. (free flow when deenergized):
 A min. flow (pump delivery) of 2/3 of the nom. flow rating must be apparent at port P (inlet side) to achieve the necessary internal pressure drop which is required to drive the piston (metering orifice) in its control position. This version must not be used if the $Q_{pu min}$ figures (see table below) are not available.

Metering orifice	3	6	10	15	22	30	36	50
$Q_{pu min}$ (lpm)	2	4	6	10	15	20	24	33

2) Power when cold (ambient temperature 20°C)

3) Power when hot

4) Version with fine control range (see curves in sect. 3.1)

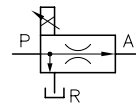
5) Type SEHF with min. flow limitation, adjustment via set screw

6) Deenergized open version available only

7) Deenergized blocked version available only

2.2 3-way flow control valve

SE 3 - 3/50 S - WN 1 F - G24/WG230 - 120
 SE 3 - 4/70 P - B0,6 - G24
 SEH 3 - 2/6F P - G12



Pressure specification 4) ($p_{max} = 315$ bar)

Differing voltage of idle circulation valve (On/Off solenoid)
 For available voltages see pamphlet D 7470 A/1

Solenoid voltage (prop. solenoid), see table 3 in sect. 2.1

Design, connection mode and size, as well as optional equipment (see table 5)

Table 4: Basic type, size and flow

Basic type and size	Version	Pressure p_{max} (bar) with version for		Flow (nom. flow of the metering orifice)														
				Deenergized closed (standard)														
				3F	6F	10F	15F	22F	30F	36F	50F	70F	90F	120F	3/7F	3/26F	4/18F	
				Deenergized open (only type SE 3-... and SEH 3-2!)														
				With locked closed position of the metering orifice while deenergized (only SEH 3-2-1)														
				3F0	6F0	10F0	15F0	22F0	30F0	36F0	---	---	---	---	---	---	---	
				Flow control range $Q_{A min} \dots Q_{A max}$ (lpm)														
		Pipe connection	Manifold mounting	0.1 to 3	0.1 to 6	0.1 to 10	0.2 to 15	0.2 to 22	0.2 to 30	0.3 to 36	0.3 to 50	0.6 to 70	0.6 to 90	1 to 120	0.1 to 7 7)	0.1 to 26 7)	0.1 to 18 7)	
SE 3 - 3/	with directly actuated metering orifice	315	200	● ¹⁰⁾	●		●		●	●	●							
SE 3 - 4/													● ¹⁰⁾	● ¹⁰⁾				
SEH 3 - 2/	with piloted metering orifice 8)	315	315	●	●	●	●	●	●	● ¹¹⁾					●	●	●	
SEH 3 - 3/		315	315		● ¹²⁾		● ¹²⁾		● ¹²⁾	● ¹²⁾	● ¹²⁾							
SEHF 3 - 3/																		
SEHD 3 - 3/																		
SEH 3 - 4/	SEHF 3 - 4/	15	315									● ¹²⁾	● ¹²⁾					
SEHF 3 - 4/				SEHD 3 - 4/														
SEH 3 - 5/	SEHF 3 - 5/	SEHD 3 - 5/	315	---										● ¹²⁾				

Table 5: Design, connection mode and size, as well as optional equipment

Connection mode	Basic type	Connection size (BSP)	Coding							
			Basic version	Pressure limiting valve	By-pass orifice $\varnothing 0.6$					
Direct pipe connection	SEH 3-2	G 3/8	Without coding (standard)	S, ST 9)	..S	S-WN 1 F(D)	---			
	SE 3-3	G 1/2								
	SEH 3-3	G 3/4								
	SEHF(D) 3-3 8)									
	SE 3-4									
SEH 3-4	G 3/4	G 1								
SEHF(D) 3-4 8)										
SEH 3-5	G 1	SEHF(D) 3-5 8)								
Manifold mounting	SEH 3-2	See dimensional drawings in sect. 4.2		---						
	SE 3-3									
	SEH 3-3							PS		
	SEHF(D) 3-3 8)							PS		
SE 3-4										
SEH 3-4										
SEHF(D) 3-4 8)										

1) For description, see sect. 5.1
 2) Power when cold (ambient temperature 20°C)
 3) Power when hot
 4) Only in connection with additional element coding S and ST (table 5)
 5) Idle circulation valve acc. to D 7470 A/1 ($p_{min} 6 \dots 10$ bar)
 6) Control port Z (For dimensions, see sect. 4 ++)
 7) Version with fine control range (For curves, see sect. 3.1)
 8) Type SEHF with min. flow limitation, adjustment via set screw (hexagon head).
 Type SEHD with min. flow limitation, adjustment via set screw (turn knob).
 9) Type ST.; for symbols and brief description, see sect. 5.3
 Only available for type SEH... size 4 and 5
 10) Deenergized open version available only
 11) only available as version /36F and /36F0
 12) Deenergized blocked version available only

3. Additional parameters

3.1 General and hydraulic data

Installed position Any

Flow direction Only in indicated arrow direction P→A(R), reverse flow A→P only via by-pass check valve.
Flow control valve versions with rectifier circuit via check valves: A→B or B→A

Surface protection Valve body nitrous hardened, solenoid body zinc galvanized, olive passivation

Ports and operating pressure
 P = Inlet port (pump) $p_{P\ max} = 315\ bar$ Z = Control port; $p_{Z\ max} = 315\ bar$
 R = Return port $p_{R\ max} = 310\ bar$ (only with type SEH..3-..S and ST)
 20 bar (only type SE(H) 3../..S..) T = Return port $p_{T\ max} = 20\ bar$
 (only with type SEH..3-..ST)
 A = Outlet port (consumer) $p_{A\ max} = 315\ bar$

$p_{min} = 8\ bar$, opening pressure of the metering orifice approx. 8 bar.
 3-way flow control valves: The back pressure at return port R must be always lower than the one apparent at port A (consumer); min pressure difference 8 bar

Consumer flow $Q_{max} = 120\ lpm$ (3-way flow control valve) The flow codings and the guide line figures differ due to coil dependant tolerances of the utilized proportional solenoids.
 90 lpm (2-way flow control valve)

Static overload capacity approx. $2 \times p_{max}$

Mass (weight) approx. kg

Size	SE 2-..(R), SE 3-..(S)	SE 2-..B	SE 2-..P(PR)	SE 3-..S-WN 1 F(D)
3	2.2	2.4	2.4	2.4
4	2.8	---	3.1	3.1

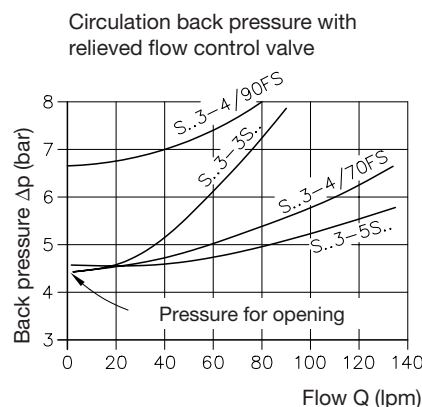
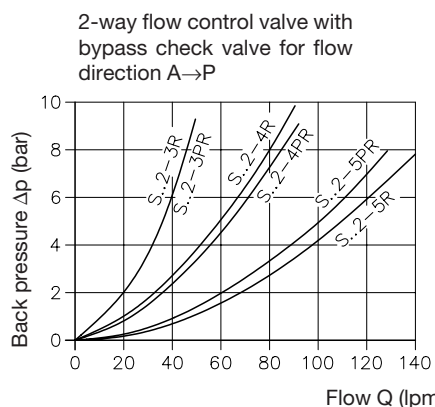
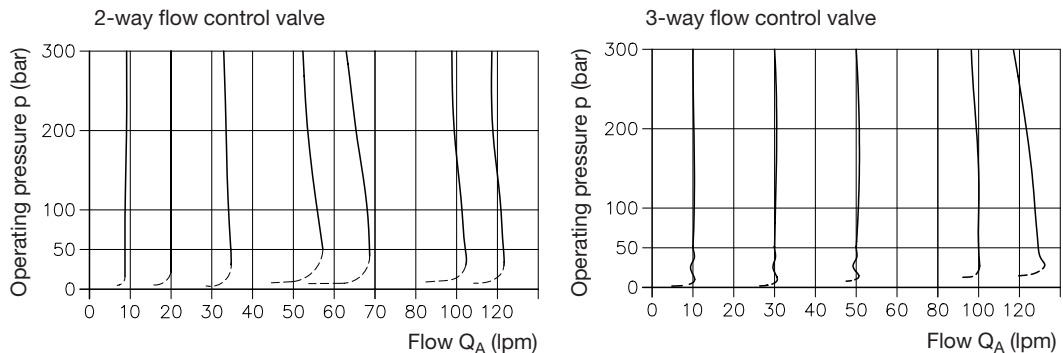
Size	SEH 2	SEH 2-2/..-P SEHF 2-2/..P	SEH 2-2/..-P- -3/8 B	SEH 3-..S(T) SEHF(D) 3-..S(T)	SEH 3-..S-WN 1.. SEHF(D) 3-..S-WN 1..	SEH 3-..P SEHF(D) 3-..P
2	1.0	1.1	1.8	1.0	---	1.1
3	---	---	---	1.6	2.0	1.9
4	---	---	---	2.2	2.6	2.5
5	---	---	---	3.3	3.7	---

Hydraulic fluid: Hydraulic oil acc. to DIN 51524 table 1 and 3; ISO VG 10 to 68 acc. to DIN 51519
 Viscosity range: min. approx. 4; max. approx. 1500 mm²/s
 Optimal operation range: approx. 10...500 mm²/s Also suitable are biologically degradable pressure fluids type HEPG (Polyalkylenglykol) and HEES (synth. Ester) at operation temperatures up to approx. +70°C.

Temperature: Ambient: approx. -40...+80°C; Fluid: -25...+80°C, pay attention to the viscosity range!
 Start temperature down to -40°C are allowable (Pay attention to the viscosity range during start!), as long as the operation temperature during subsequent running is at least 20K higher. Biological degradable pressure fluids: Pay attention to manufacturer's information. With regard to the compatibility with sealing materials do not exceed +70°C.

Attention: Observe the restrictions regarding the perm. operation cycles for the prop. solenoids, see sect. 3.2!

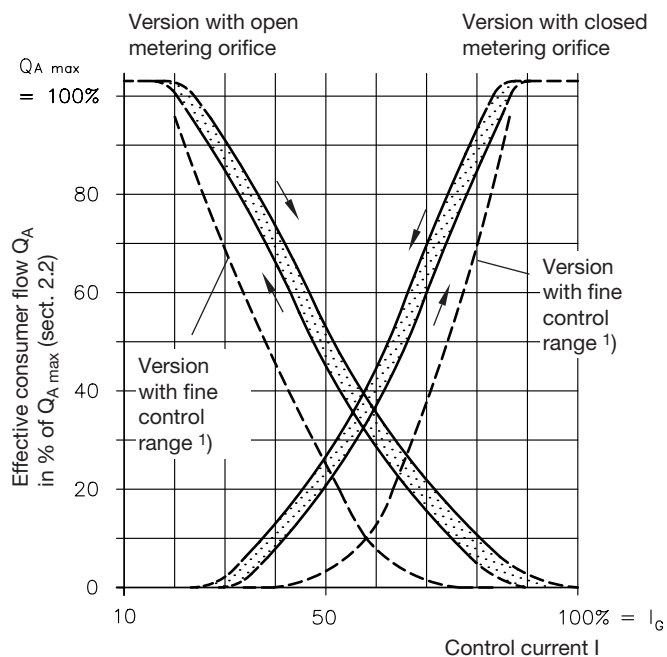
p-Q curves (guideline)



Oil viscosity during measuring approx. 35 mm²/s

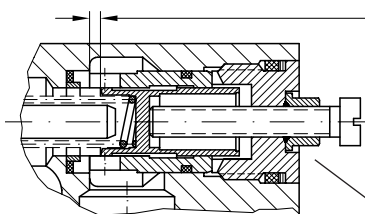
Q-I curves (guideline), oil viscosity during measuring approx. 50 mm²/s

2- and 3-way flow control valve



1) Qualitative representation.
The fine control range ends at approx. 0.5 I_{contr.}; the flow achieved at that point is part of the respective metering orifice coding (e.g. 4/18, fine control range up to approx. 4 lpm, Q_{max} approx. 18 lpm).

Note for 2-way flow control valve:



The initial idle stroke may be reduced via the set screw in cases where Q_{pump} ≤ Q_{A max}. This will also reduce the response time. The initial idle stroke is set at HAWE according to Q_{max} represented by the nom. flow coding (sect. 2.1).

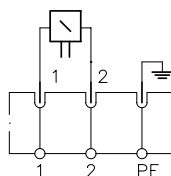
The Seal-Lock nut must be loosened for min. 1 turn, prior to adjustment of the set screw to prevent any damage of the vulcanized thread seal.

3.2 Electrical data (proportional solenoid)

Solenoid conforming VDE 0580

Proportional amplifier type EV1M2 acc. to D 7831/1 and type EV1G1 acc. to D 7837 for DC-versions G 12 and G 24 (a prop. amplifier is not available for G80V).

Type		SE 2.. and SE 3..			SEH(F, D) 2.. and SEH(F, D) 3..	
Nom. voltage U _N	(V DC)	12	24	80	12	24
Coil resistance R _{20 ±5%}	(Ω)	4.1	17.6	200	6	24
Current, cold I ₂₀	(A)	2.8	1.4	0.45	2	1
Current, hot I _G	(A)	1.9	0.95	0.29	1.26	0.63
Power, cold P ₂₀	(W) ²⁾	37	37	37	24	24
Power, hot P _G	(W)	24.7	24.7	24.7	9.5	9.5
Relative duty cycle		100% ED (reference temperature θ ₁₁ = 50°C)				
Electrical connection		DIN EN 175 301-803		Industrial standard (like DIN EN 175 301-803)		
Protection class		IP 65 (IEC 60529) (with properly installed plug)				
Insulation material class		F				
Necessary dither frequency		60 ... 150 Hz				
Dither amplitude		20 ... 40% of I ₂₀				
Cable gland						



2) Power when cold (ambient temperature 20°C). Power when cold will differ accordingly at differing start temperatures P_k = P₂₀ · R₂₀/R_k. This must be observed when a customer furnished electronic control without current limitation is used, as it might be over loaded otherwise.

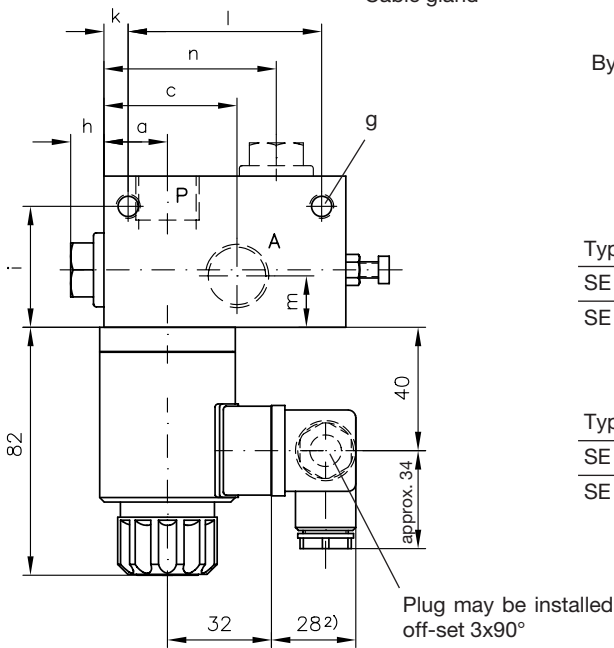
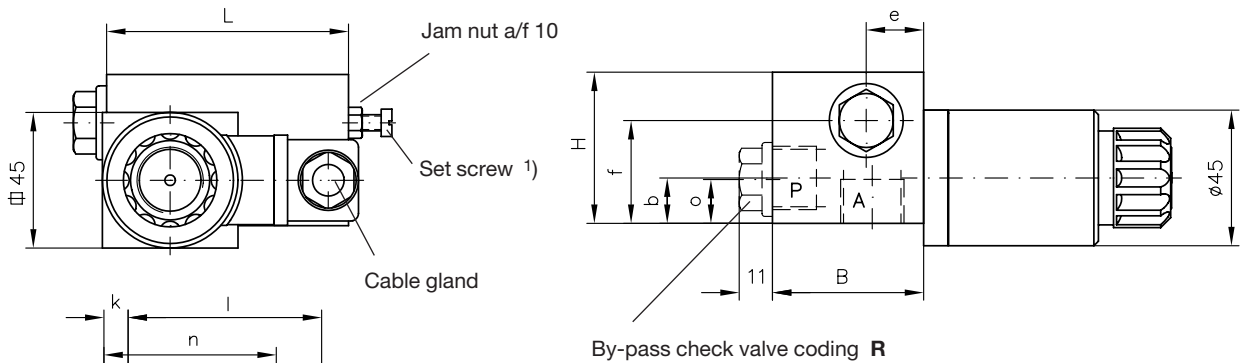
4. Unit dimensions

All dimensions in mm, subject to change without notice !

The proportional solenoid may be rotated and fixed at any angle but may be also installed upside down (cable gland will face in the other direction).

4.1 2- and 3-way flow control valve for direct pipe connection

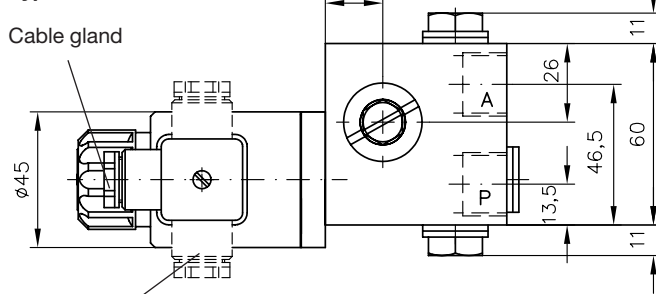
Type SE 2-3/.., SE 2-3/..R, SE 2-4/.. and SE 2-4/..R



Type	L	B	H	a	b	c	e	f	g
SE 2-3 (R)	80	50	50	21	15	44	19	34	M8, 8 deep
SE 2-4 (R)	85	60	60	25	19	53	21	41	M8, 10 deep

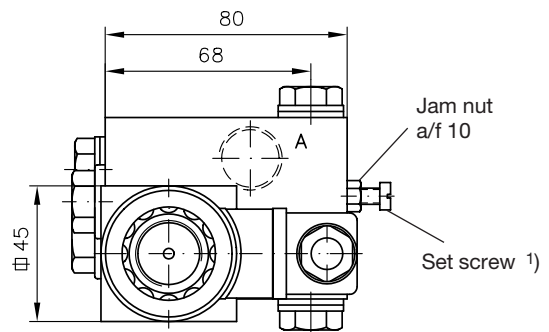
Type	h	i	k	l	m	n	o	Ports ISO 228/1 (BSPP) P and A
SE 2-3 (R)	12	40	8	64	17	57	14.5	G 1/2
SE 2-4 (R)	14	48	10	65	21	68	18	G 3/4

Type SE 2-3/..B

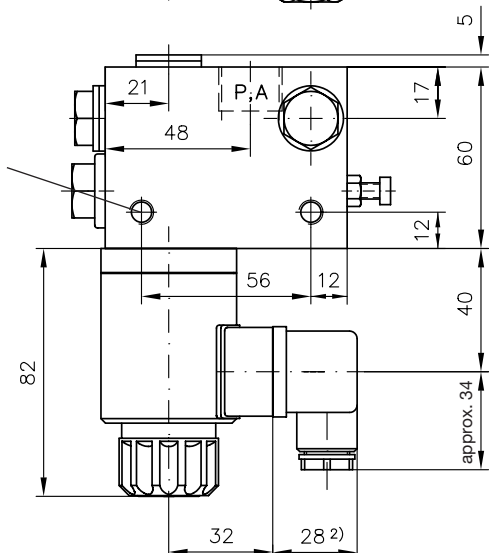


Plug may be installed off-set 3x90°

Ports ISO 228/1 (BSPP):
P and A = G 1/2



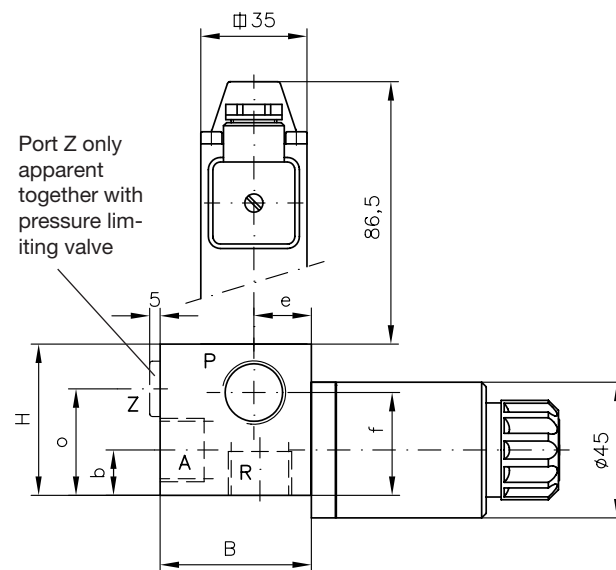
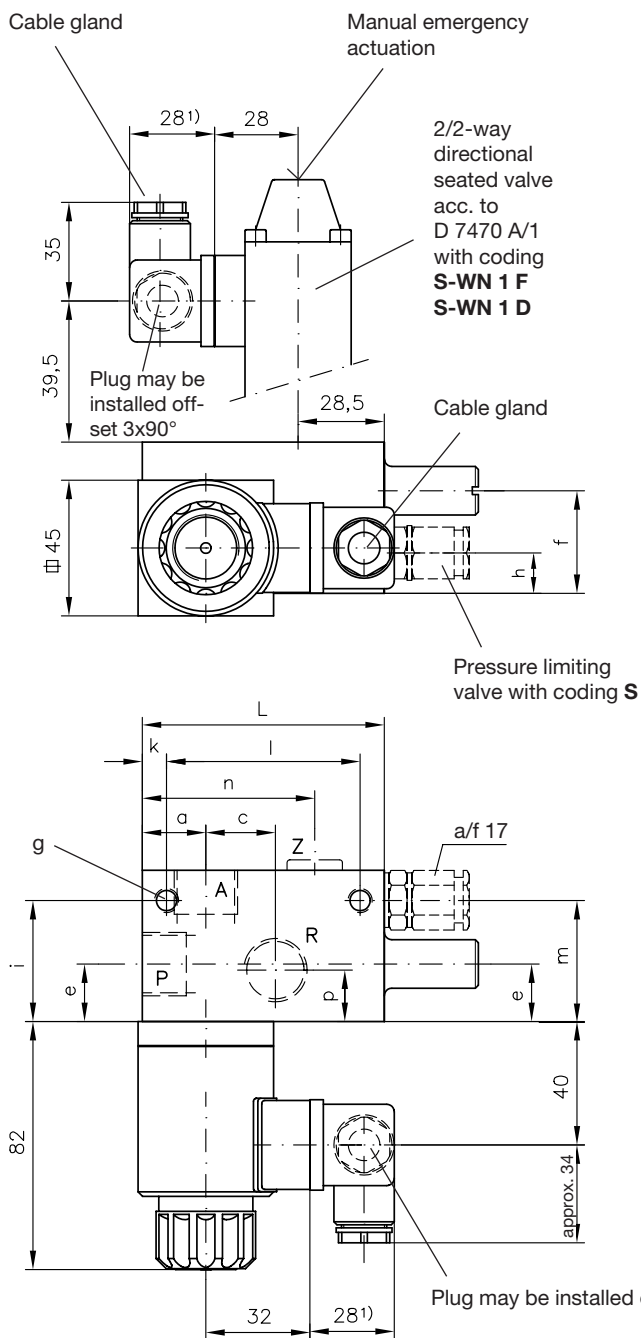
M8, 8 deep



1) The Seal-Lock nut must be loosened for min. 1 turn, prior to adjustment of the set screw to prevent any damage of the vulcanized thread seal. See also note on page 5 !

2) **Attention:** This dimension is depending on the manufacturer and may be up to max. 40 mm (acc. to DIN EN 175 301-803)!

Type SE 3-3/.., SE 3-3/..S., SE 3-4/.. and SE 3-4/..S..



Type	L	B	H	a	b	c	e	f	g
SE 3-3(S)	80	50	50	21	15	23	19	34	M8, 8 deep
SE 3-4(S)	85	60	60	25	19	28	21	41	M8,10 deep

Type	h	i	k	l	m	n	o	p
SE 3-3(S)	13.5	40	8	64	40	60	35	17
SE 3-4(S)	19	48	10	65	46	55	41	21

Ports ISO 228/1 (BSPP):

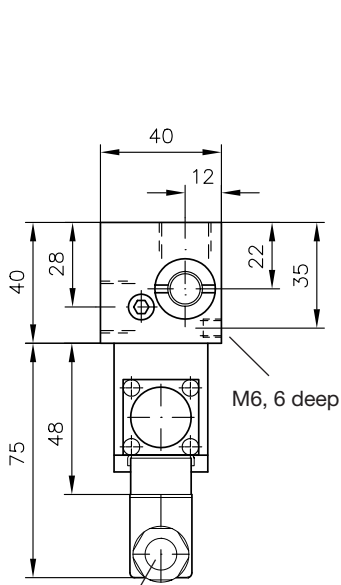
Type	P, R, A	Z
SE 3-3(S)	G 1/2	G 1/4
SE 3-4(S)	G 3/4	G 1/4

Pressure adjustment

Coding (table 5) / acc. to pressure specification	Travel f_{max} (mm)	Δp (bar) per turn
S(ST) / (0) ... 200 bar	4	90
S(ST) / 200 ... 315 bar	4	150

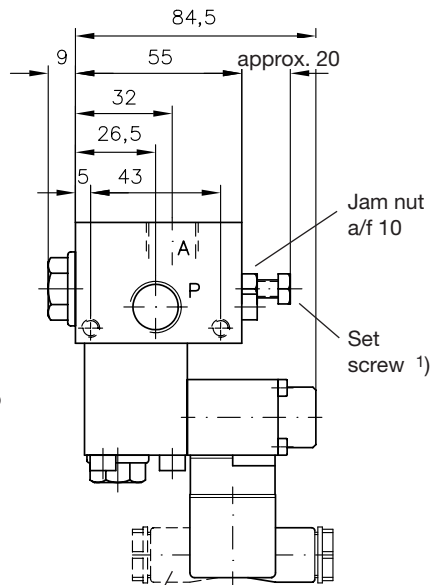
1) **Attention:** This dimension is depending on the manufacturer and may be up to max. 40 mm (acc. to DIN EN 175 301-803) !

Type SEH 2-2/..

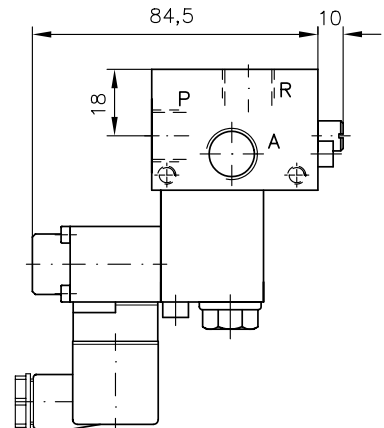
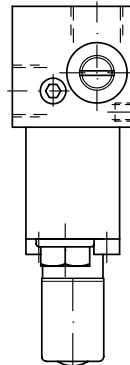


Cable gland

Type SEH 3-2/..

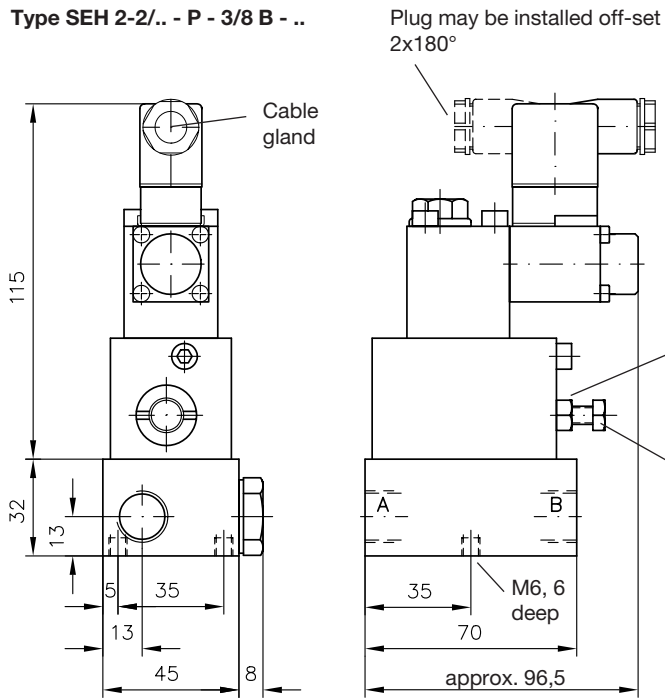


Plug may be installed off-set 2x180°



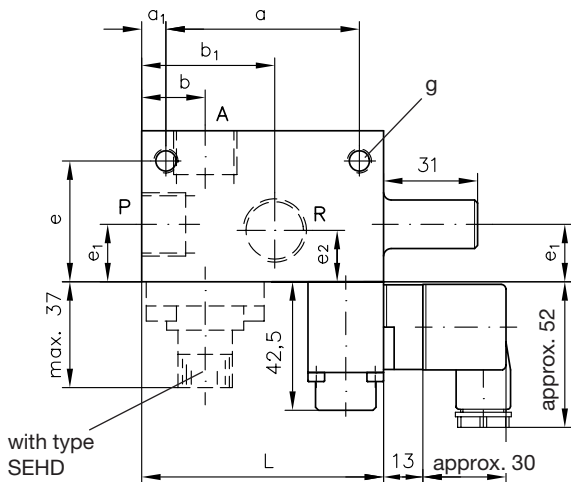
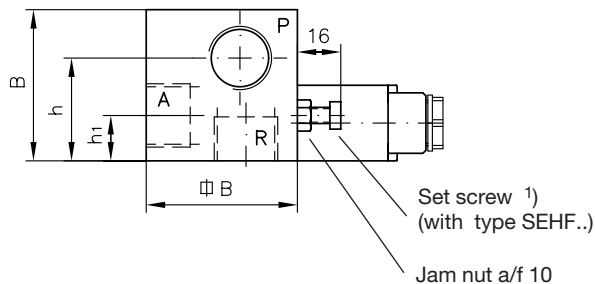
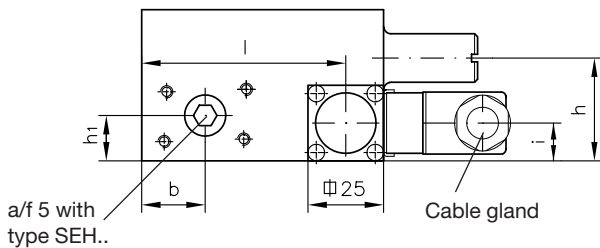
For missing data, see below!

Type SEH 2-2/.. - P - 3/8 B - ..



1) The Seal-Lock nut must be loosened for min. 1 turn, prior to adjustment of the set screw to prevent any damage of the vulcanized thread seal. See also note on page 5 !

Type SEH 3-3/.., SEH 3-4/.. and SEH 3-5/..
SEHF(D) 3-3/.., SEHF(D) 3-4/.. and SEHF(D) 3-5/..

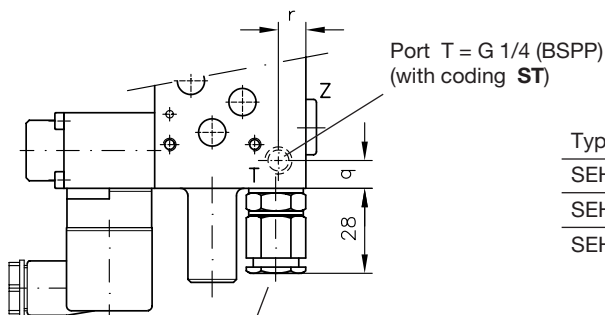
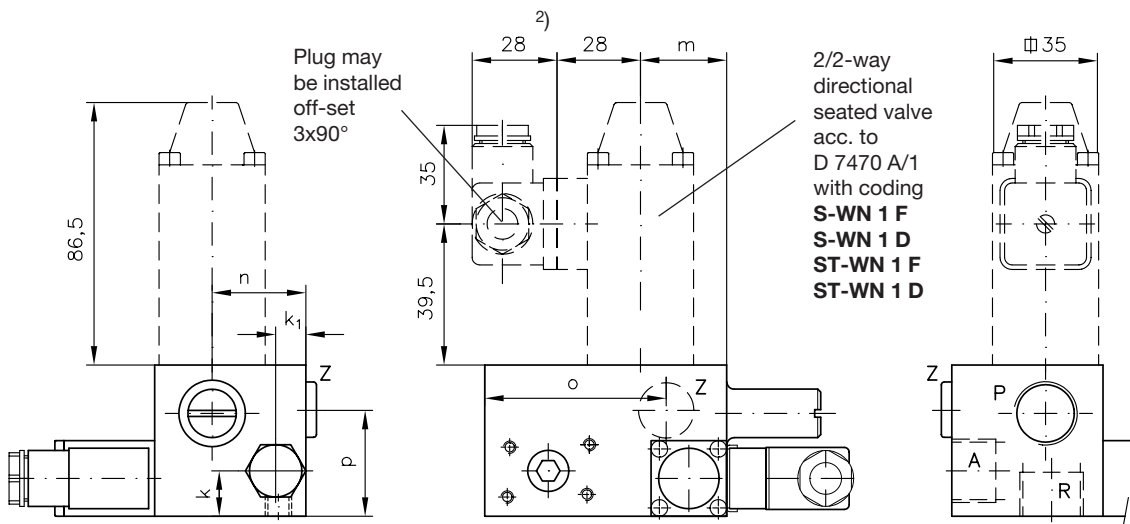


1) The Seal-Lock nut must be loosened for min. 1 turn, prior to adjustment of the set screw to prevent any damage of the vulcanized thread seal. See also note on page 5 !

Ports A, P, R conf. ISO 228/1 (BSPP):
SEH..3-3/.. = G 1/2
SEH..3-4/.. = G 3/4
SEH..3-5/.. = G 1

Type	B	L	a	a1	b	b1	e	e1	e2	g	h	h1	i	l
SEH..3-3/..	50	80	64	8	21	44	40	19	17	M8, 8 deep	34	15	12.5	67.5
SEH..3-4/..	60	85	65	10	25	53	48	21	21	M8, 10 deep	41	19	12.5	72.5
SEH..3-5/..	70	100	60	20	27	60	52	23	23	M10, 12 deep	47	22	17.5	87.5

Valve with additional pressure limitation function



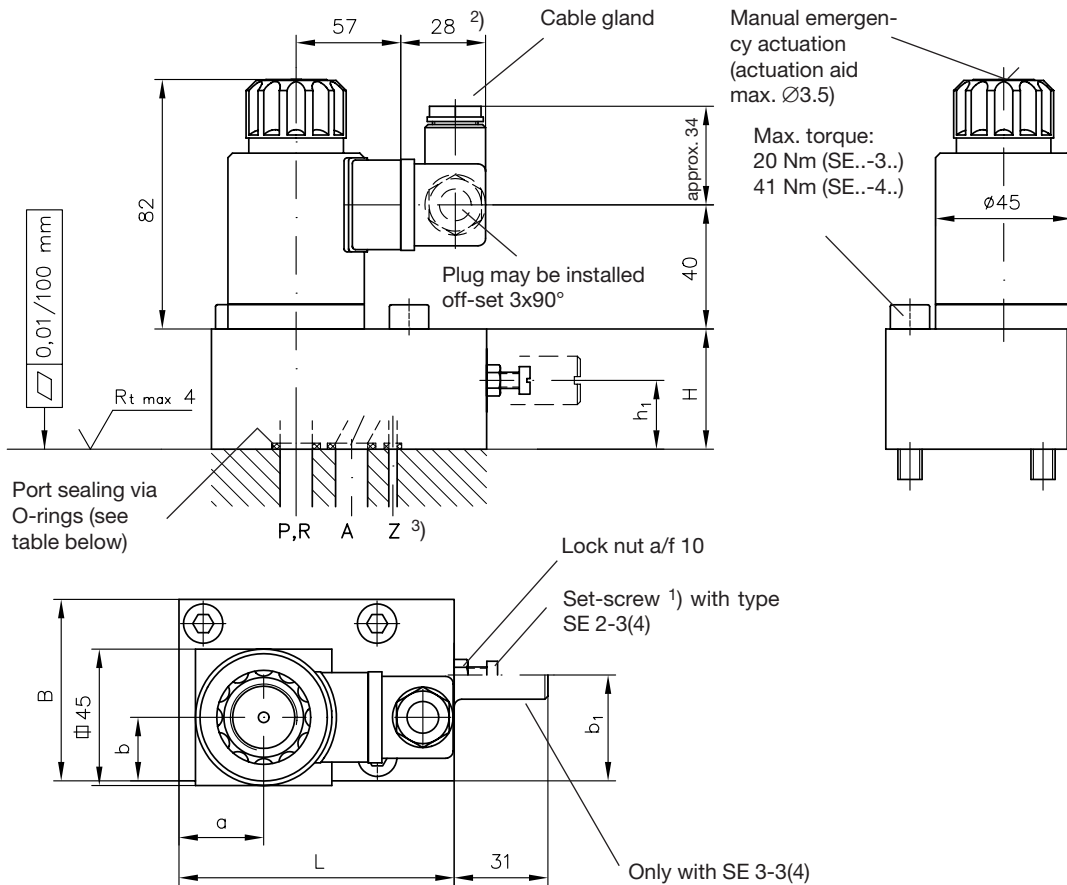
Pressure limiting valve with coding **S** and **ST**
(See note for the pressure adjustment in page 7)

2) **Attention:** This dimension is depending on the manufacturer and may be up to max. 40 mm (acc. to DIN EN 175 301-803) !

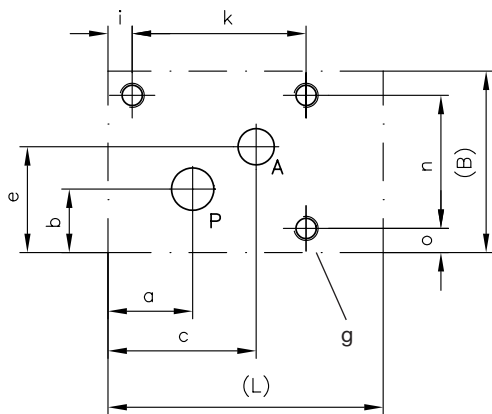
Type	k	k1	m	n	o	p	q	r
SEH..3-3/..S.. (S..-WN 1..)	15	10	28.5	31	60	35	13	11
SEH..3-4/..S.. (S..-WN 1..)	19	14	28.5	39	55	41	11	15
SEH..3-5/..S.. (S..-WN 1..)	22	15	29.5	47	70	47	--	--

4.2 2- and 3-way flow control valve for manifold mounting

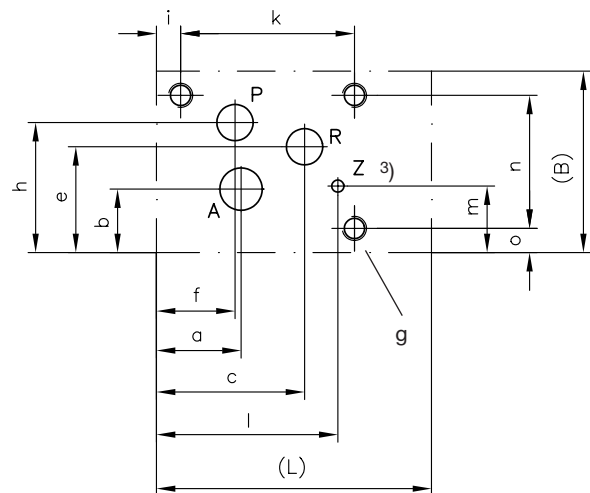
Type SE 2-3/..P(PR), SE 2-4/..P(PR), SE 3-3/..P and SE 3-4/..P



Hole pattern of the manifold for 2-way flow control valve Type SE 2-3/.. and SE 2-4/..



Hole pattern of the manifold for 3-way flow control valve Type SE 3-3/.. and SE 3-4/..



Type	L	B	H	a	b	b ₁	c	e	f
SE...-3 P(R)	91	60	40	28	21	35	49	35	26
SE...-4 P(R)	100	70	50	35	26	42	57	42	33.5

Type	g	h	h ₁	i	k	l	m	n	o
SE...-3 P(R)	M8, 12 deep	43	23	8	57.5	60	22	44	8
SE...-4 P(R)	M10, 12 deep	53	29	16	57	55	21	52	9

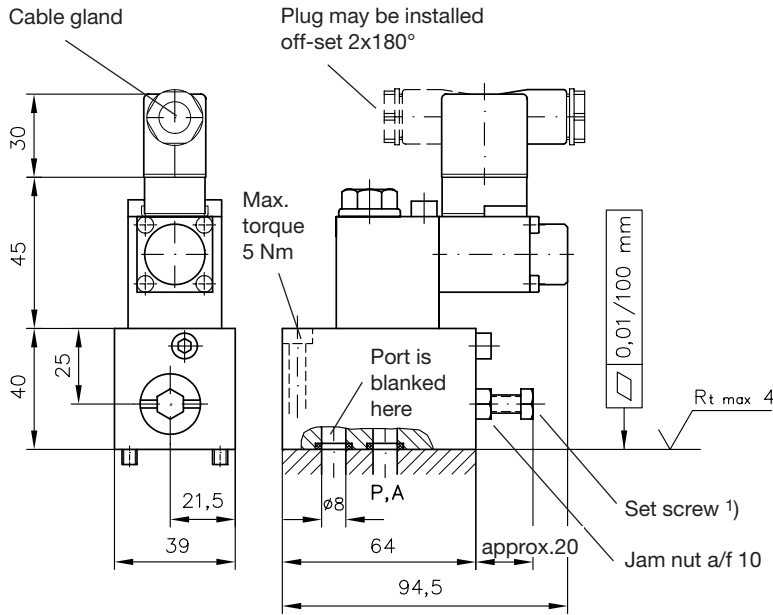
Type	Port Ø				Sealing (O-ring 90 Sh)	
	P	R	A	Z	P, R and A	Z
SE 2-3 P(R)	14	---	12	---	15x2.5	---
SE 2-4 P(R)	17	---	17	---	18.5x2.62	---
SE 3-3 P	12	12	14	4	15x2.5	6x2
SE 3-4 P	17	17	17	4	18.75x2.62	6x2

1) The Seal-Lock nut must be loosened for min. 1 turn, prior to adjustment of the set screw to prevent any damage of the vulcanized thread seal. See also note on page 5!

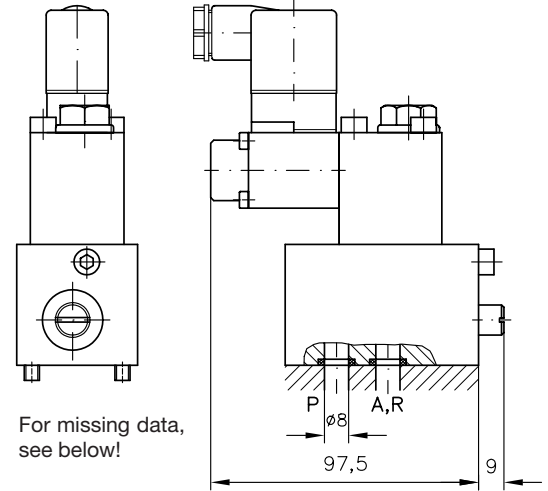
2) **Attention:** This dimension is depending on the manufacturer and may be up to max. 40 mm (acc. to DIN EN 175 301-803)!

3) Port Z only apparent with idle circulation circuit (see sect. 2.2 foot note ⁵⁾ and ⁶⁾)

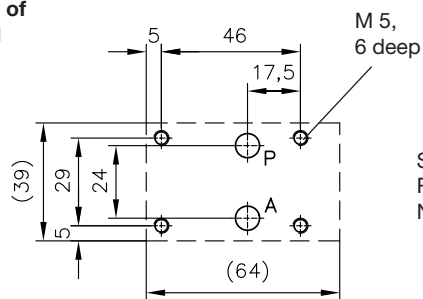
Type SEH 2-2/.. P



Type SEH 3-2/.. P

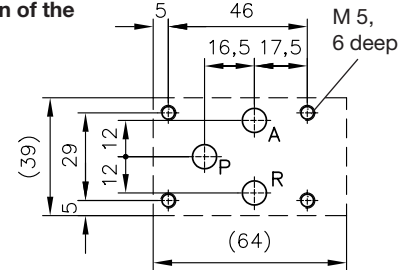


Hole pattern of the manifold (top view)

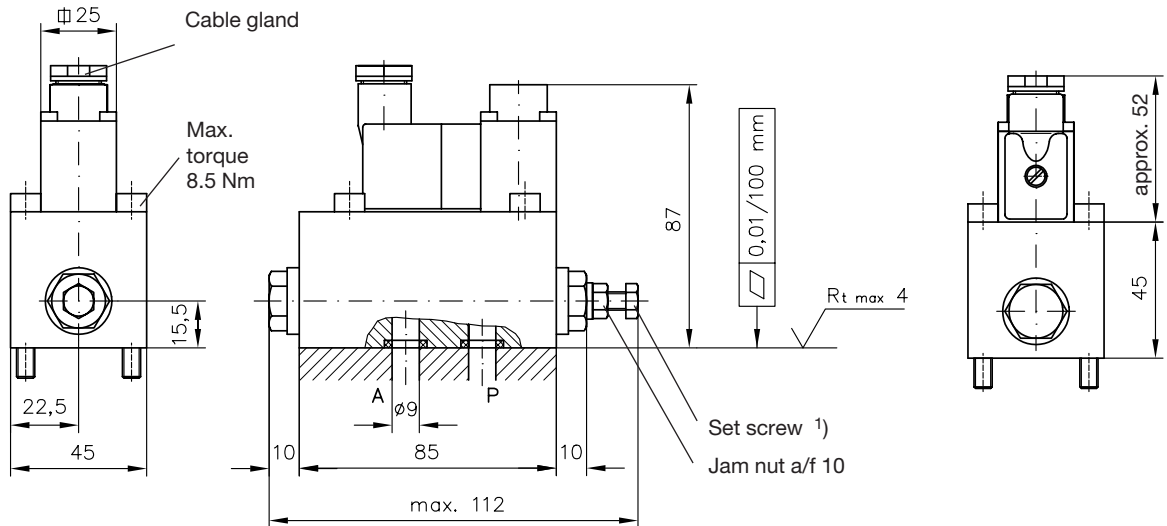


Sealing of ports A, P and R via O-rings 9.25x1.78 NBR 90 Sh

Hole pattern of the manifold (top view)

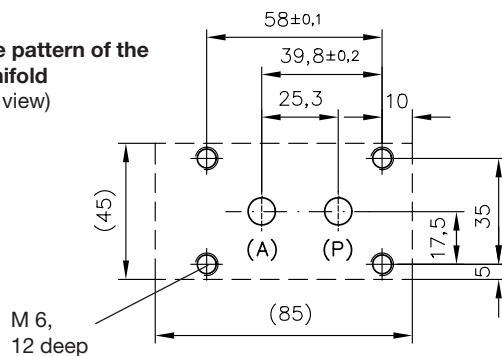


Type SEH 2-3/..-P and SEHF 2-3/..-P



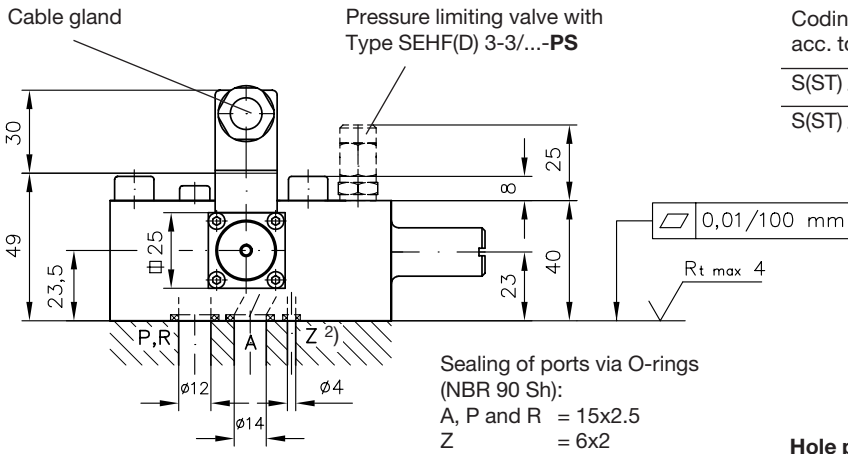
Sealing of ports A and P via O-rings 10.82x1.78 NBR 90 Sh

Hole pattern of the manifold (top view)



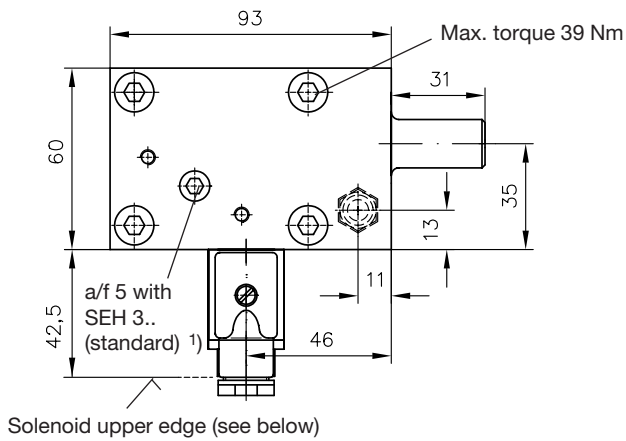
1) The Seal-Lock nut must be loosened for min. 1 turn, prior to adjustment of the set screw to prevent any damage of the vulcanized thread seal. See also note on page 5 !

Type SEH(F, D) 3-3/.. - P and SEH(F, D) 3-3/.. - PS

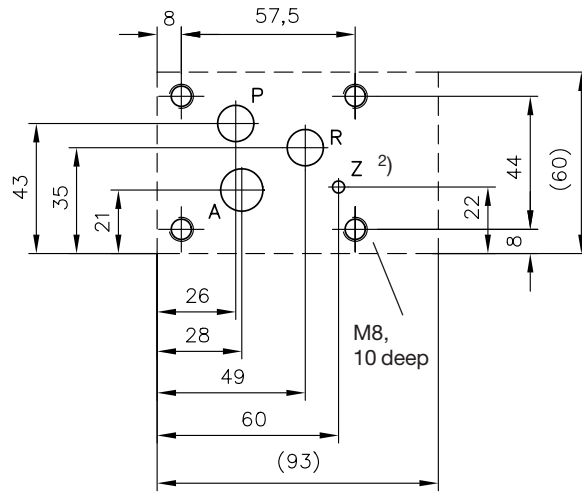


Pressure adjustment

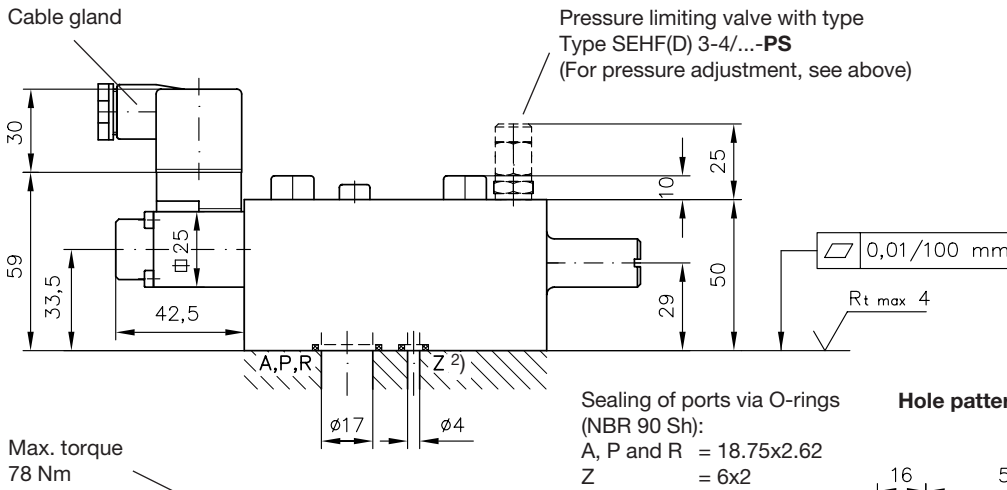
Coding (table 5) / acc. to pressure specification	Travel f_{max} (mm)	Δp (bar) per turn
S(ST) / (0) ... 200 bar	6.3	40
S(ST) / 200 ... 315 bar	4.5	95



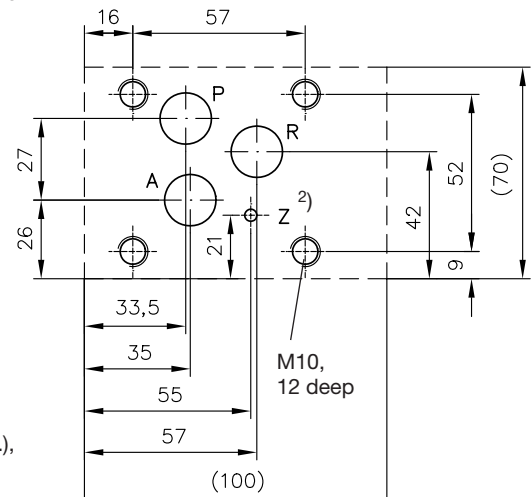
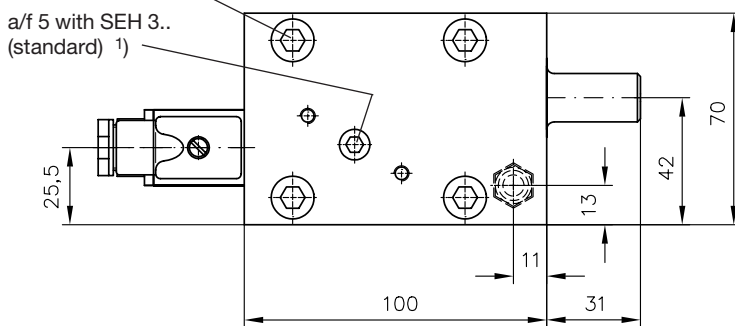
Hole pattern of the manifold (top view)



Type SEHF 3-4/.. - P



Hole pattern of the manifold (top view)



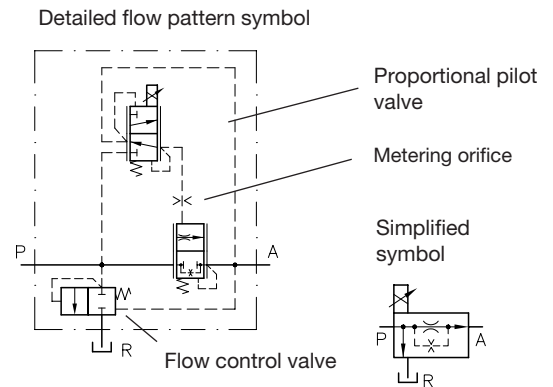
1) For illustration of the locked screw (type SEHF 3..) or the turn knob (type SEHD 3..), see page 9
 2) Port Z only apparent with idle circulation circuit (see sect. 2.2 foot note 5) and 6))

5. Appendix

5.1 Notes to the metering orifice codings ...F0

(acc. to table 4, sect. 2.2)

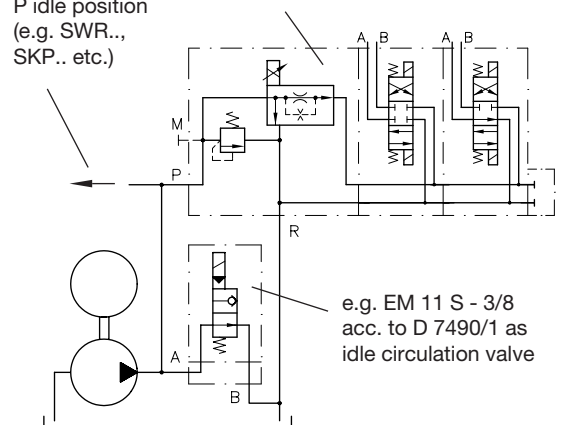
- Available versions:
3-way flow control valve type SEH 3-2 as well as the flow control valves integrated in the connection block of directional spool valve banks type SWR 1(2) SE.. and SWS 2 SE.. acc. to D 7450, D 7451, and D 7951.
- Use:
Enables controlled supply of pressurized fluid in hydraulic circuits connected in parallel, where usually 2-way flow control valves are utilized.
Example: Variable supply of pressurized fluid to an auxiliary circuit which is diverted from a main circuit and fed via a constant delivery pump. The forced blocked position of the flow control valve (when not actuated) i.e. all consumers of the auxiliary circuit are in blocked idle position enables actuation of all consumers fed by the constant flow (main) circuit without influence due to uncontrolled movement of the flow control valve with accompanied loss via port R.
- Advantage:
The auxiliary circuit shows only the loss of a 3-way control. The excess flow will be only returned to the tank against the set pressure for the consumer side. The common procedure with a 2-way flow control valve shows higher losses as the excess flow is returned to the tank via the main pressure limiting valve (max. pressure setting).
- Restriction:
This system must not be used while one of the consumers of the main circuit is actuated. This version shows a slightly higher minimum consumer flow $Q_{A \text{ min}}$ to be achieved when compared with the standard version as the metering orifice is always slightly opened.
Attention: The metering orifice is slightly open in "0"-position !
- Description:
This version (other than standard) features a stop for the F flow control valve (deenergized closed) in idle position via a washer (may be retrofitted). This residual passage enables a connection between P- and A-side and therewith to therear side of the flow control valve (spring cavity). This enables a permanent compensation of the losses from the spring cavity to R, maintaining a pressure balance between the front and rear side of the flow control valve while the directional seated or spool valves are not actuated i.e. in blocked idle position. The spring enforced flow control valve blocks the passage to R or returns promptly from its working position to blocked position thereby minimizing influence of the main circuit.



Example circuit

To the main circuit via e.g. directional valve banks with blocked to P idle position (e.g. SWR..., SKP.. etc.)

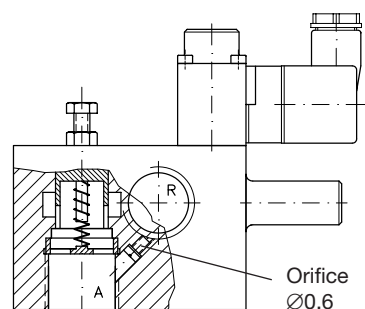
Auxiliary circuit utilizing e.g. SWR 2 SE 10F0-GG-G 24-150. The pressure limiting valve safeguards both circuits in this example.



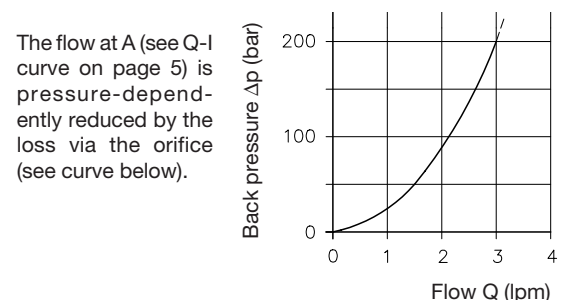
5.2 Notes to type SEH 3 -4(5)/.. B0,6 version with by-pass orifice

(acc. to table 5, sect. 2.2)

- Available versions:
3-way flow control valve type SEH 3-4/.. and SEH 3-5/.. (version for pipe connection) may be retrofitted (see illustration below).
- Use:
Automatic switch-over even with blocked consumer at A. This makes an otherwise required 2/2-way solenoid valve superfluous, e.g. type SEH 3-4/.. S-WN1D-G24.
- Description:
A prompt depressurization of A (consumer) and therewith the rear side (spring cavity) of the flow control valve is ensured while closed (deenergized prop. solenoid) via a by-pass orifice $\varnothing 0.6$ mm installed between A and R enabling return of the flow control valve to its idle circulation position (back pressure 6 bar).
Attention: There is a permanent, pressure dependant loss of the effective consumer flow at A/R via the orifice during operation. This slightly harms the load independence of the device (see Δp -Q curves in sect. 3.1).
- Restriction:
This control must not be used for systems with load induced pressure (loaded single acting cylinders) at A. It is possible to block this pressure via an external check valve (e.g. RC1-E at A).



The orifice $\varnothing 0.6$ is accessibly via port A after removal of the tapped plug (with O-ring 4x1 NBR 90 Sh). Therefore it may be retrofitted any time (carburetor jet M4x $\varnothing 0.6$).

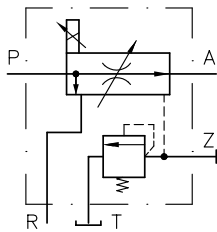


5.3 Notes to type SEH 3 -4(5)/.. ST.. version with pressure limiting valve

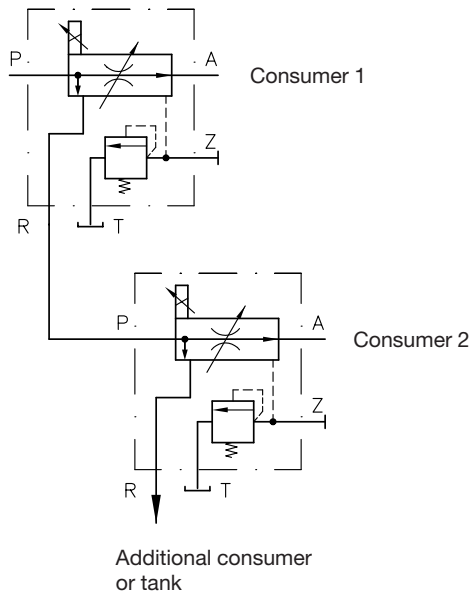
(acc. to table 5, sect. 2.2)

- Available versions:
3-way flow control valve type SEH 3-4/.. and SEH 3-5/.. (version for pipe connection).
- Use:
3-way flow control valve connected in series featuring individual pressure limitation for consumer port A or circuits with pressurized port R, where a pressure limitation for port A is required even though (standard version type SEH 3-../.. S.. $p_R \leq 20$ bar).
- Description:
The return flow of the pressure limiting valve is to be routed back individually via port T. This prevents any influence of the apparent pressure at R on the pressure setting.

Type SEH 3-4(5)/.. ST-..



Example circuit



5.4 Proportional throttle type PB

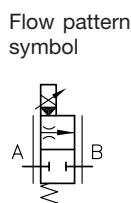
The metering orifice utilized at flow control valves type SEH size 2 may be used also individually as a proportional throttle valve.

Attention: The flow and with that the consumer velocity is herewith not load independent.

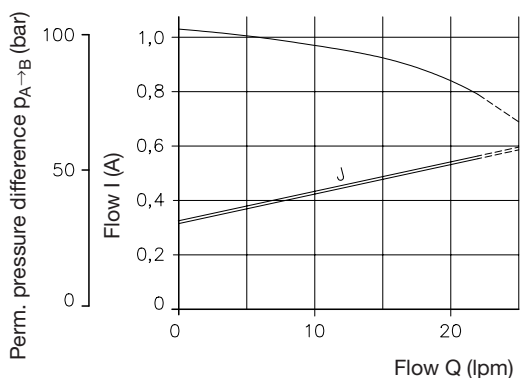
Main parameter is the control current applied to the proportional solenoid but also the current pressure conditions at ports A and B.

Order example: **PB 2 - 15 F**

Basic type
Flow **3 F**
5 F
10 F
15 F

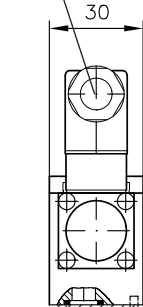


Perm. pressure difference A→B 315 bar
Flow direction A→B (mandatory)



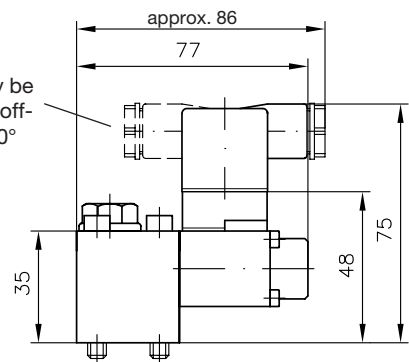
Cable gland

30

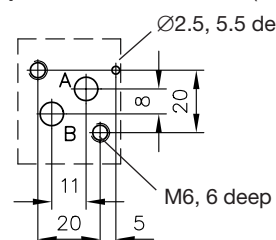


Sealing of ports A and B via O-rings 9.25x1.78 NBR 90 Sh

Plug may be installed off-set 2x180°



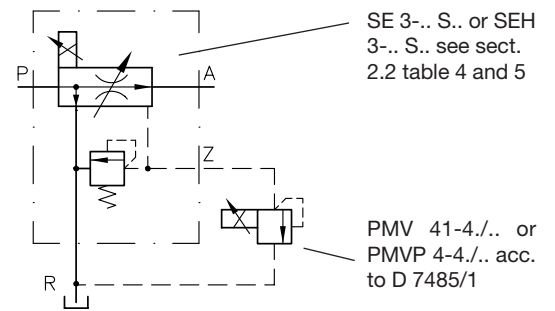
Hole pattern of the manifold (top view)



5.5 Combination with a proportional pressure limiting valve

The connection of a proportional pressure limiting valve type PMV 41-4./.. or PMVP 4-4./.. at control port Z of the 3-way flow control valve (featuring an integrated pressure limiting valve with fixed setting) enables proportional control of the flow and the operating pressure as well as an idle circulation pressure (P→R) of roughly 8 ... 10 bar when deenergized (applies to both flow controller versions, deenergized open or closed).

The already apparent piloting pressure limiting valve in the controller can be used as a main pressure limitation for the circuit but has to be set always higher than the intended pressure conditions for the proportional pressure limiting valve (PMV 41-4./.. or PMVP 4-4./..).



6. Type coding key

Order examples: **SE 2-3/15 B - G12**
SE 3-3 S - WN 1 F - G24 - 120
SEHF 3-4/70 P - B0,6 - G24

Pressure specification (bar)
for the pressure limiting valve

Nom. voltage of the solenoids (see sect. 2.1 and 2.2, table 3)

G12, G24, G80 Type SE..

G12, G24 Type SEH..

Design, connection mode and size

of the 2-way flow control valve (see sect. 2.1, table 2):

(without) Standard (pipe connection)

P Manifold mounting

R By-pass check valve

P-3/8B Rectifier circuit (only type SEH 2-2)

B Rectifier circuit (only type SE 2-3)

3-way flow control valve (see sect. 2.2, table 5):

(without) Standard (pipe connection)

P Manifold mounting

PS Manifold mounting with pressure limiting valve

S, ST Pressure limiting valve

S-WN 1 F Pressure limiting valve plus idle circulation valve

WN 1 F acc. to D 7470 A/1

S-WN 1 D Pressure limiting valve plus idle circulation valve

WN 1 D acc. to D 7470 A/1

B0,6 By-pass orifice Ø0.6

Flow (nom. flow P→A) see sect. 2.1 and 2.2, table 1 and 4

Deenergized closed (standard):

3F, 6F, 10F, 15F, 22F, 30F Size 2

6F, 10F, 15F, 22F, 30F, 36F, 50F, Size 3

3/7F, 3/26F, 4/18F ¹⁾

70F and 90F Size 4

120F Size 5

Deenergized open:

3, 6, 10, 15, 22, 30 Size 2

3, 6, 10, 15, 22, 30, 36, 50, Size 3

3/7, 3/26, 4/18 ¹⁾

70 and 90 Size 4

120 Size 5

With forced blocked position of the flow control valve when not actuated:

3F0, 10F0, 15F0, 22F0, 30F0 only SEH 3-2!

Size

2

3

4

5

Basic type

2-way flow control valve (see sect. 2.1, table 1):

SE 2 with directly actuated metering orifice

SEH 2 with piloted metering orifice

SEHF 2 with stop for minimum consumer flow

3-way flow control valve (see sect. 2.2, table 4)

SE 3 with directly actuated metering orific

SEH 3 with piloted metering orifice

SEHF 3 with stop for minimum consumer flow (adjustment via set-screw)

SEHD 3 with stop for minimum consumer flow (adjustment via turn knob)

PB Proportional throttle see sect. 5.4

¹⁾ only SEH(F) 2-3/.. and SEH(F) 3-3/..