

2/2-, 3/2-, and 4/3-way seated valves type NBVP 16 with industrial standard connection pattern conforming DIN 24 340-A6

for any flow direction, zero leakage, all ports pressure resistant

Pressure $p_{max} = 400$ bar
 Flow $Q_{max} = 20$ lpm

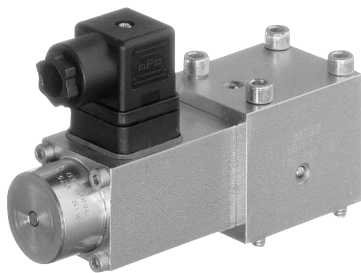
Additional valves with same function

Type BVG 1 and BVP 1 see D 7765 ($Q_{max} = 20$ lpm, $p_{max} = 400$ bar)
 Type BVG 3 and BVP 3 see D 7400 ($Q_{max} = 60$ lpm, $p_{max} = 315$ bar)
 Type BVE see D 7921 ($Q_{max} = 70$ lpm, $p_{max} = 400$ bar, Cartridge valve)

1. General, brief description

The 2/2-, 3/2- and 4/3-way directional seated valves type NBVP 16 are cone seated valves and available with solenoid, hydraulic, pneumatic, or manual actuation. All ports are equally pressure resistant due to their internal pressure compensation. Valves featuring a spring return will return automatically into their idle position when not activated. Versions with detent will achieve their idle or working position whenever the opposing solenoid is briefly actuated.

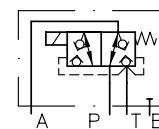
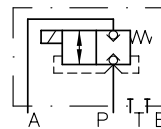
● Basic version



Example:

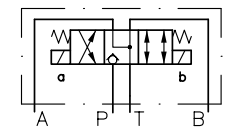
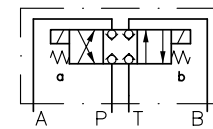
Type NBVP 16 - R - G 24

Type NBVP 16 - Y - WG 230

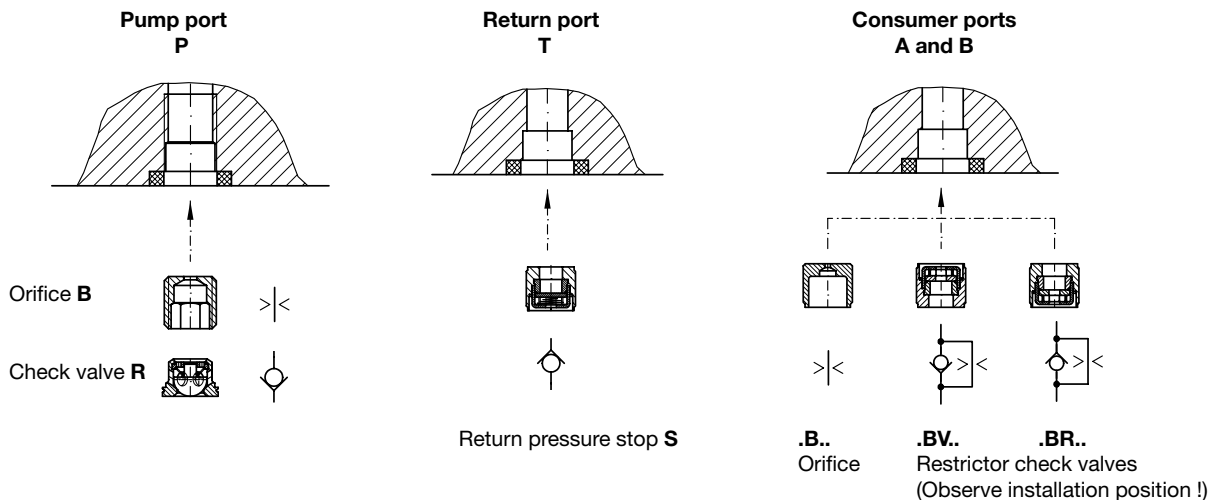


Type NBVP 16 - G - GM 24

Type NBVP 16 - D - WGM 230



● Additional elements for pump-, consumer- and return port



2.2

2. Available versions

2.1. Type coding, main data

Order examples:

NBVP 16 - S/B 0.8 /2 - WG 110

NBVP 16 - G/B 0.8 R/ABR2.0 BBR1.5 /A3 B9/400/S - GM 24

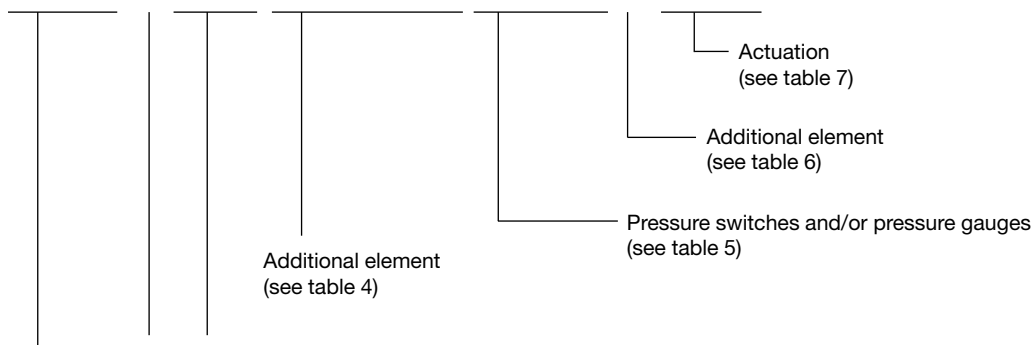


Table 1: Basic type

Coding, description	Flow Q _{max} (lpm)	Pressure p _{max} (bar)
NBVP 16 With industrial standard hole pattern DIN 24 340-A6	20	400/ 250 ¹⁾

Table 2: Flow pattern symbols

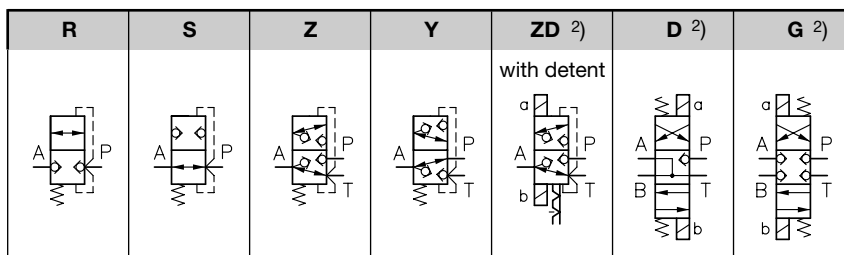


Table 3: Additional elements in port P

Additional element (also in combination)	Coding ⁴⁾	∅ (mm)
Orifice	B 0.8	0.8
	B 1.0	1.0
	B 1.2	1.2
	B 1.5	1.5
	B 2.0	2.0
	B 0 ³⁾	0
Check valve	R	---

Table 4: Additional elements in consumer ports A and/or B

Additional element	Coding ⁴⁾		∅ (mm)
	all flow pattern symbols	only flow pattern symbols G, D	
Orifice in A and/or B	AB 0.7	BB 0.7	0.7
	AB 1.0	BB 1.0	1.0
	AB 1.5	BB 1.5	1.5
	AB 2.0	BB 2.0	2.0
	AB 2.5	BB 2.5	2.5
Restrictor check valve at A and/or B throttling the flow to the consumer	ABV 0.7	BBV 0.7	0.7
	ABV 1.0	BBV 1.0	1.0
	ABV 1.5	BBV 1.5	1.5
	ABV 2.0	BBV 2.0	2.0
Restrictor check valve at A and/or B throttling the flow from the consumer	ABR 0.7	BBR 0.7	0.7
	ABR 1.0	BBR 1.0	1.0
	ABR 1.5	BBR 1.5	1.5
	ABR 2.0	BBR 2.0	2.0

1) 250 bar with solenoid actuation coding GM..., WGM.. acc. to table 7 with flow pattern R, S, Y, and Z (ZD)

2) Only with solenoid actuation

3) Without hole, enabling customized orifices acc. to the Δp-Q curve

4) Part No. for spare parts order etc. see section 5.1 "Appendix"


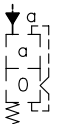




Table 5: Pressure switches and/or pressure gauges at ports A and/or B

Pressure switch acc. to D 5440 (adjustable range (bar))	Coding dep. on flow pattern symbols		
	R, S, Z, Y, ZD	G, D Connection A Connection B	
without DG (prepared for retrofiting)	2	---	---
DG33 (200...700)	3	A3	B3
DG34 (100...400)	4	A4	B4
DG35 (20...250)	5	A5	B5
DG36 (4...12)	6	A6	B6
DG365 (12...170)	7	A7	B7
Pressure gauge acc. to D 7077 ³⁾ with scale up to (bar)			
100	--- ⁴⁾	A9/100	B9/100
160	--- ⁴⁾	A9/160	B9/160
250	--- ⁴⁾	A9/250	B9/250
400	--- ⁴⁾	A9/400	B9/400
600	--- ⁴⁾	A9/600	B9/600

Table 6: Additional elements at port T

Additional element	Coding
without	---
Return pressure stop (Check valve)	S

Table 7: Actuation modes

Actuation	Pressure P _{max} (bar)	For flow pattern symbols	Coding			Main data, also see section 3.2		
			With plug	Plug with LED	Without plug			
Solenoid	400	R, S, Z, Y, ZD	G 12	L12	X12	U _N = 12V DC U _N = 24V DC U _N = 110V AC, 50/60 Hz (98V DC) U _N = 230V AC, 50/60 Hz (205V DC)		
			G 24	L24	X24			
	WG 110 ²⁾	---	X98					
	WG 230 ²⁾	---	X205					
	400	G, D	GM 12	LM24	XM12	U _N = 12V DC U _N = 24V DC U _N = 110V AC, 50/60 Hz (98V DC) U _N = 230V AC, 50/60 Hz (205V DC)		
			GM 24	LM24	XM24			
	250	R, S, Z, Y, ZD ⁵⁾	WGM 110 ²⁾	---	XM98			
			WGM 230 ²⁾	---	XM205			
	220	all	G 24ex ¹⁾	---	---	U _N = 24V DC		
Hydraulic	400	R, S, Z, Y (without G, D, ZD)	H 1/4	External control port G 1/4		Control pressure: p _{contr. min} = 24 bar p _{contr. max} = 400 bar		
Pneumatic	400		P	External control port G 1/4		Control pressure: p _{contr. min} = 3 bar p _{contr. max} = 15 bar		
Manual	400		A			Actuation moment: approx. 1.5 ... 3 Nm		
Mechanical	400		T	Pin		Actuation force: F = approx. 80 ... 190 N		
			K	Roller		Actuation force: F = approx. 22 ... 35 N		
Symbols			Solenoid	Hydraulic H 1/4	Pneumatic P	Manual A	Mechanical pin T	roller K
								

- 1) Explosion-proof version
- 2) DC-solenoid (98V DC, 205V DC) with bridge rectifier in the plug
- 3) Not available, when pressure switch at the same port
- 4) With ports for pressure gauge G 1/8
- 5) Versions GM, WGM, LM, XM are priced lower than version G, WG etc.; Observe their reduced pressure rating!

3. Further characteristic data

3.1. General and hydraulic data

Installed position Any

Overlap with 3/2-way directional valves Negative (overlap only apparent during transition from one to the other end position). All ports are interconnected during the switching process.

Operating pressure See table 7 in sect. 2.1

Static overload capacity Ports A, B and P approx. $2 \times p_{max}$, $T = 50$ bar

Housing material and surface coating Steel, gas nitrided (basic valve)

Complete with actuation		NBVP16-R NBVP16-S	NBVP16-Z NBVP16-Y	NBVP16-ZD	NBVP16-G NBVP16-D
Solenoid	G., G 24ex, L., X., WG..	1.5	1.7	2.2	---
	GM., LM., XM., WGM..	1.4	1.6	2.0	2.1
Hydraulic	H 1/4	1.1	1.3	---	---
Pneumatic	P	1.0	1.2	---	---
Manual	A	1.4	1.6	---	---
Mechanical	T	1.1	1.3	---	---
	K	1.4	1.6	---	---

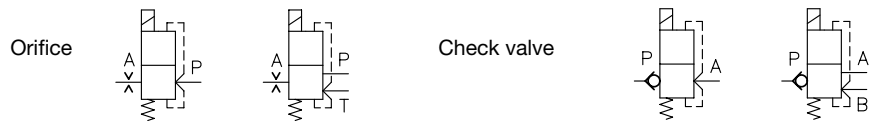
Per pressure switch + 0.3

Pressure fluid Hydraulic oil conforming DIN 51524 part 1 to 3: ISO VG 10 to 68 conforming DIN 51519. Viscosity limits: min. approx. 4, max. approx. 1500 mm²/s; opt. operation approx. 10... 500 mm²/s. Also suitable are biologically degradable pressure fluids types HEPG (Polyalkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70 °C.

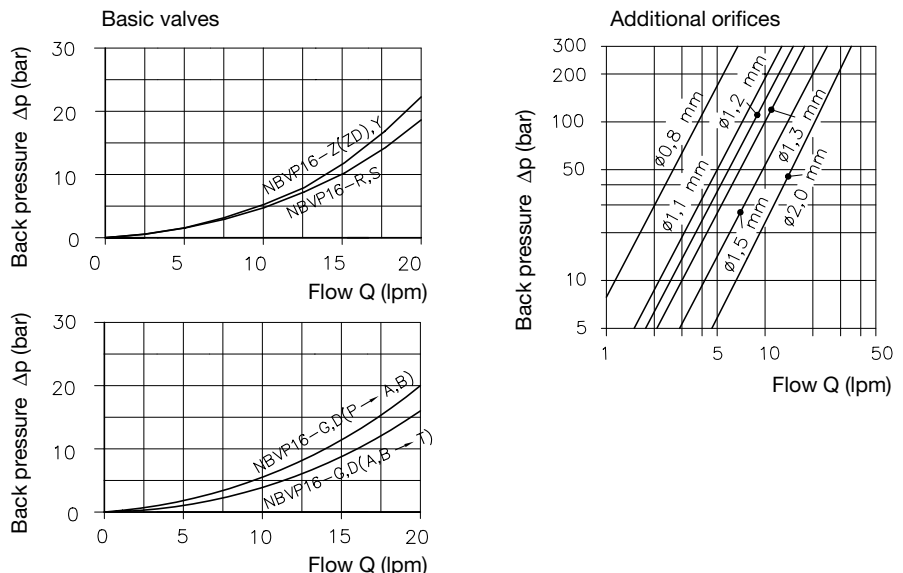
Temperature Ambient: approx. -40 ... +80 °C; Fluid: -25 ... +80°C, Note the viscosity range ! Permissible temperature during start: -40°C (observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation. Biologically degradable pressure fluids: Observe manufacturer's specifications. By consideration of the compatibility with seal material not over +70 °C. **Attention:** Observe the restrictions regarding the perm. operation time of the solenoids, see sect. 3.2 !

Flow $Q_{max} = 20$ lpm

Flow limitation It is necessary to limit the flow down to the permissible range depending on the system pressure via orifices (see sect. 2.1). This applies to all circuits fed by an accumulator or when connected to high pressure circuits fed by high delivery pumps. The orifice must be located on the accumulator side always. For more detailed information, see table 3 and 4, section 2.1. The check valves (see table 3 and 6 in sect. 2.1) prevent an undesired reversal of the flow direction.



Δp -Q curve



Viscosity during measurements approx. 60 mm²/s

3.2. Actuators

Solenoid

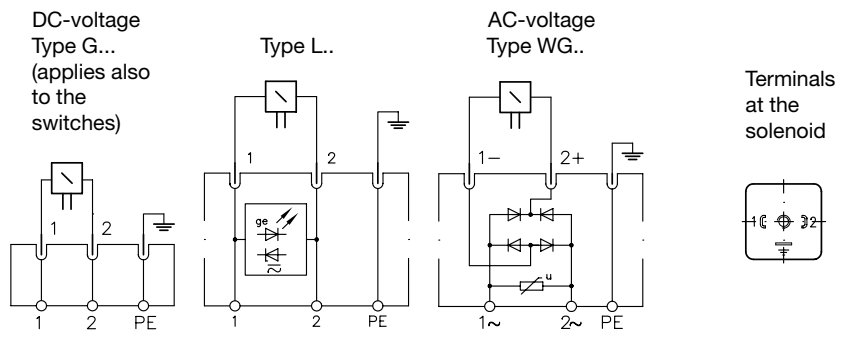
		All solenoids are built and tested acc. to DIN VDE 0580								
Coding		G 12 L 12 X 12	GM 12 LM 12 XM 12	G 24 L 24 X 24	GM 24 LM 24 XM 24	G 24ex --- ---	WG 110 --- ---	WGM 110 --- ---	WG 230 --- ---	WGM 230 --- ---
Nom. voltage	U_N (V)	12	12	24	24	24	110	110	230	230
		DC-voltage				AC-voltage, 50 and 60 Hz				
Nom. power	P_N (W)	29.4	26.2	27.6	26.5	23.4	28.6	24.8	30.2	28

G 24ex:
Explosion protection
class E Ex m II T4
PTB Nr. Ex-93.c.4074

Plug
DIN EN 175301-803
(circuitry and symbols)

All plugs Pg 9

For additional plugs, see
D 7163



Switching time (reference value)	On or Off: approx. 50...60 ms, 2-3 longer with WG...	<p>Relative duty cycle during operation (100% ED stamping on the solenoid)</p>
Switching/hour	approx. 2000, approximately evenly distributed	
Min. pulse duration	approx. 300 msec with flow pattern ZD	
Protection class	IP 65 acc. to DIN VDE 0470 / En 60529 / IEC 529 (plug properly mounted)	
Insulation material class	F	
Contact temperature	approx. 98°C, with ambient temperature 20°C	
Switch-off energy	$WA \leq 0.4$ Ws	
Surface coating (solenoid)	DIN 50961-Fe/Zn 12 bk cC	

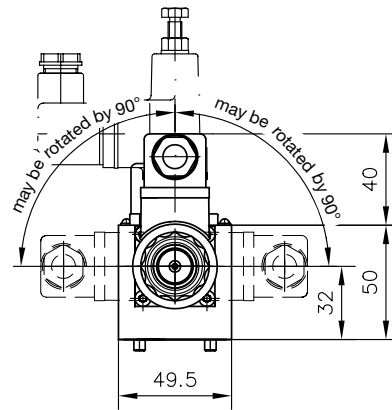
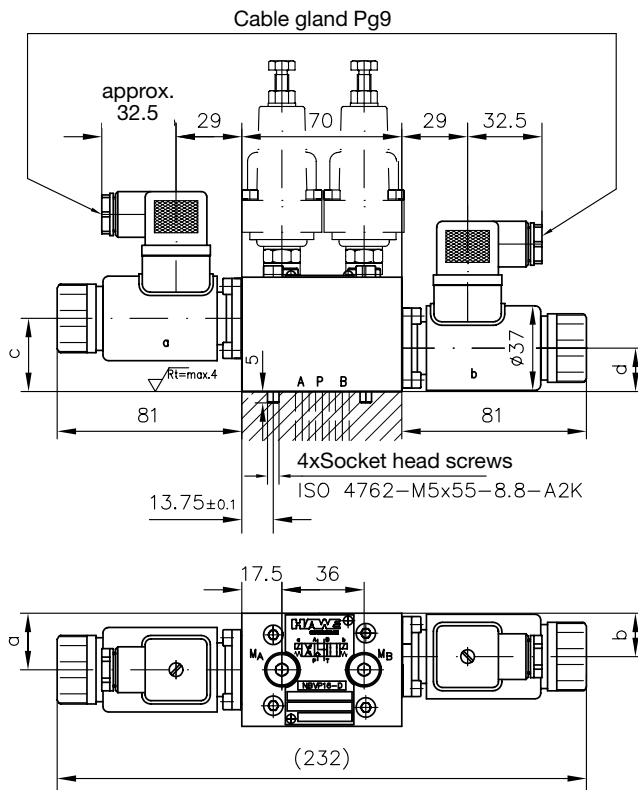
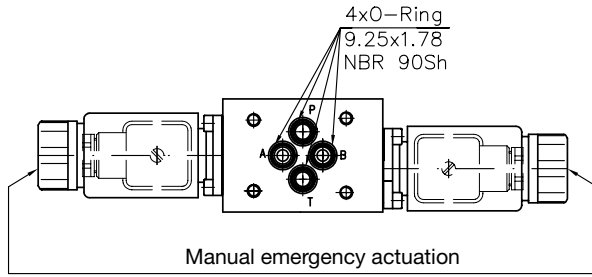
		Hydraulic (coding H 1/4)	Pneumatic (coding P)	Manual (coding A)	Mechanical (coding T) (coding K)	
Control pressure	$p_{contr. min}$	24 bar	3 bar	---	---	---
	$p_{contr. max}$	400 bar	15 bar	---	---	---
Permissible residual pressure in the control line for save return into the idle position		< 2 bar	---	---	---	---
Z overload capacity		appr. 1.5 $p_{contr. max}$ bar	appr. 1.5 $p_{contr. max}$ bar	---	---	---
Control displacement (geometric)		1.4 cm ³	9.3 cm ³	---	---	---
Housing material and surface coating		Steel (control housing) zinc galvanized	Light alloy (control housing) black anodized	Steel (lever housing) gas nitrided	Steel (control housing) gas nitrided	
Actuation moment		---	---	appr. 1.5...3 Nm	---	---
Actuation force		---	---	---	appr. 80...190 N	appr. 22...35 N

4. Unit dimensions

All dimension in mm and subject to change without notice!

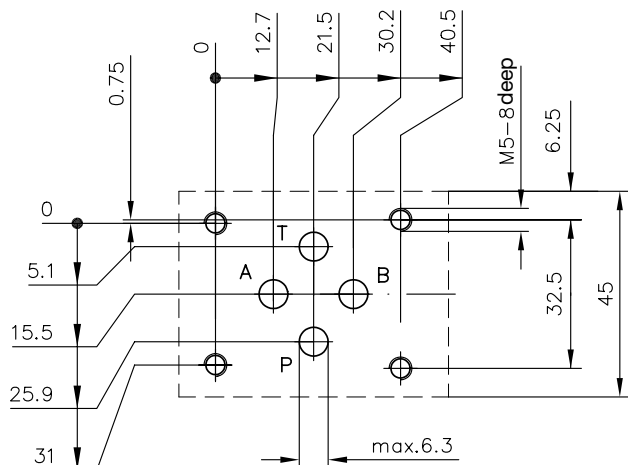
4.1. Valve section

Type NBVP16 - G, D

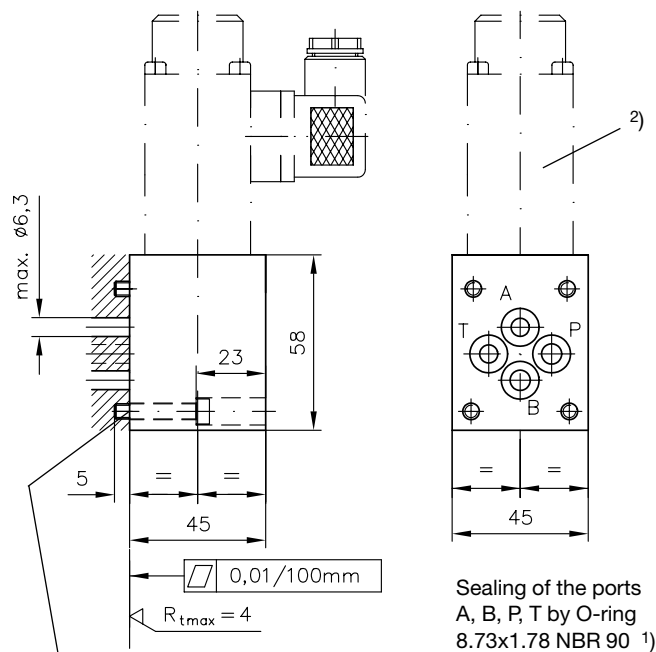


Dimension (mm)	a	b	c	d
Flow pattern symbols G	24,75	24,75	25	25
Flow pattern symbols D	24,75	19	32	19

Hole pattern at the manifold (top view)



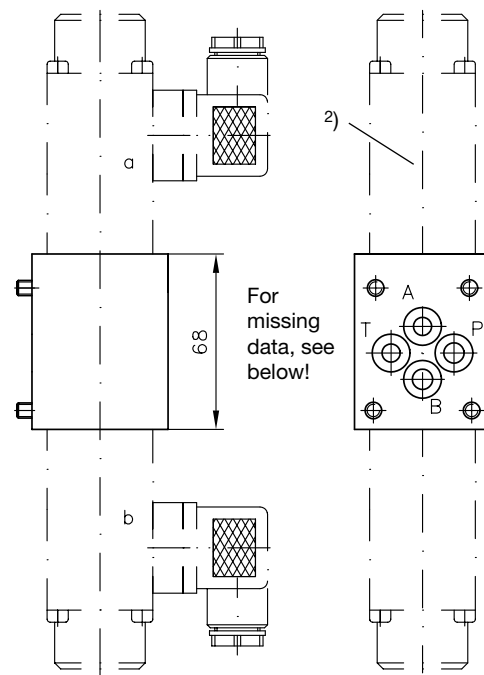
Type NBVP 16 - R, S, Z, Y



4x Socket head screws
ISO 4762-M5x30-8.8-A2K

- 1) Part of seal kit DS 7765-2 (including O-rings for actuation, H 1/4)
- 2) For dimension of the differing actuations, see section 4.2!

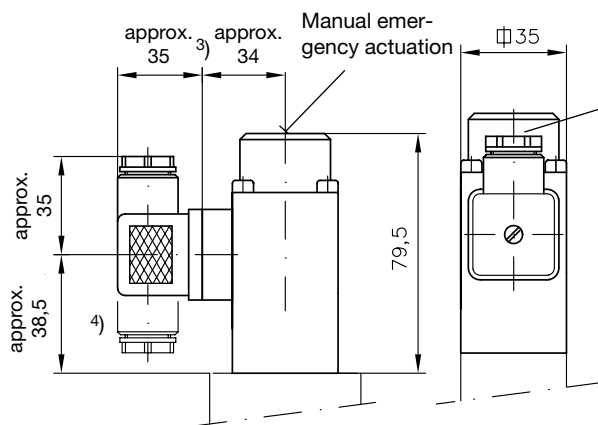
Type NBVP 16 - ZD



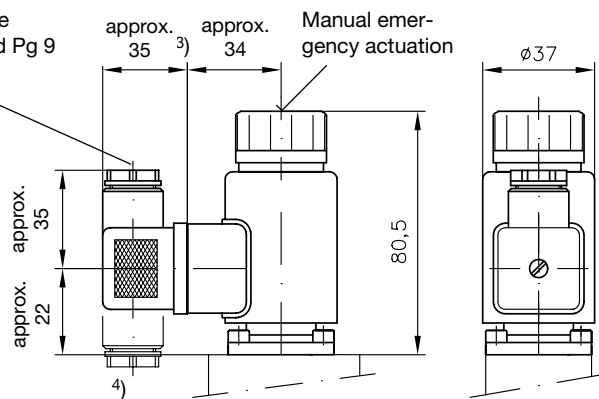
4.2. Control elements

Electrical actuation

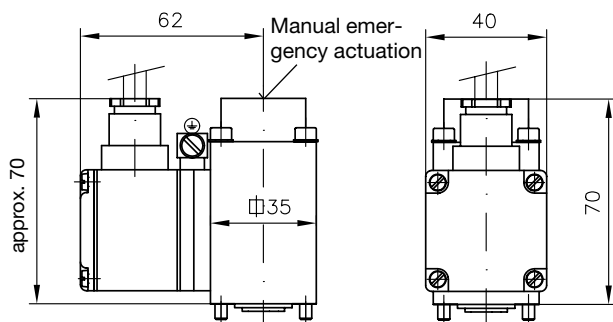
Coding G... and WG...



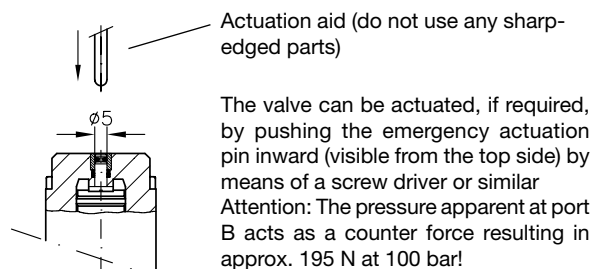
Coding GM... and WGM...



Coding G 24ex

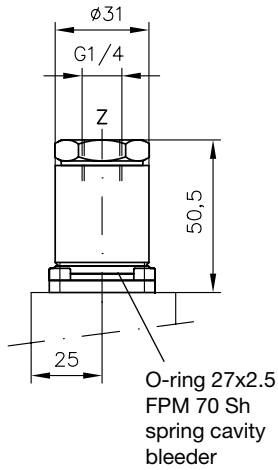


Manual emergency operation

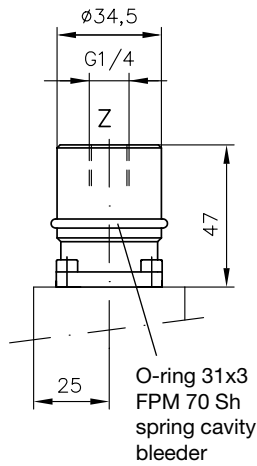


- 3) Attention: This dimension depends on the manufacturer and may be max. 40 mm acc. to DIN 43650!
- 4) Solenoid may be installed off-set by 4x90°. Plug may be installed off-set by 2x180°.

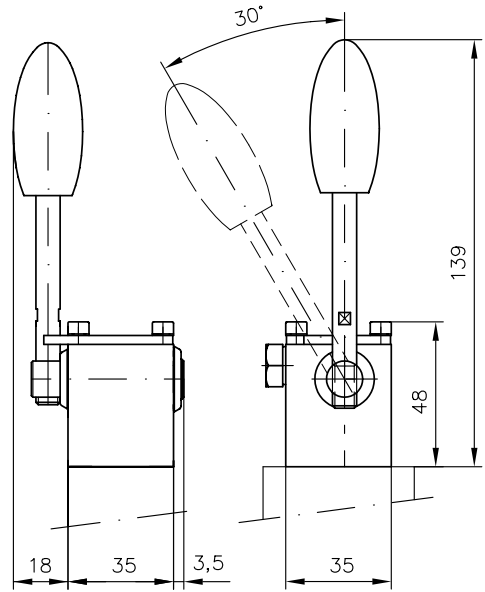
**Hydraulic
Coding H 1/4**



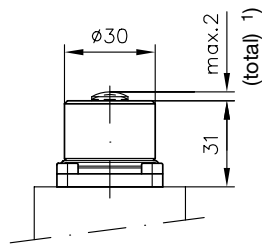
**Pneumatic
Coding P**



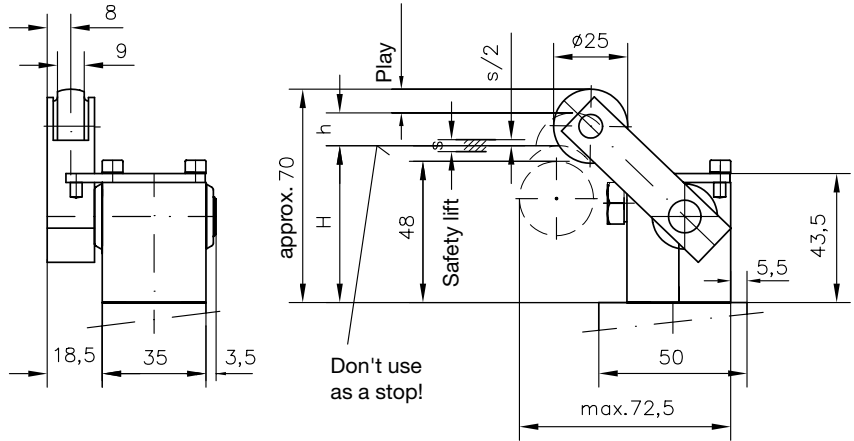
**Manual
Coding A**



**Mechanical
Coding T**



Coding K



Actuation force F at 100 ... 400 bar:
 Type NBVP 16-R-T = 80 ... 140 N
 NBVP 16-Z-T = 140 ... 190 N
 NBVP 16-S-T = 140 ... 190 N

1) Distribution: Play 0.5 mm
 Working stroke 1 mm
 Safety lift 0.5 mm

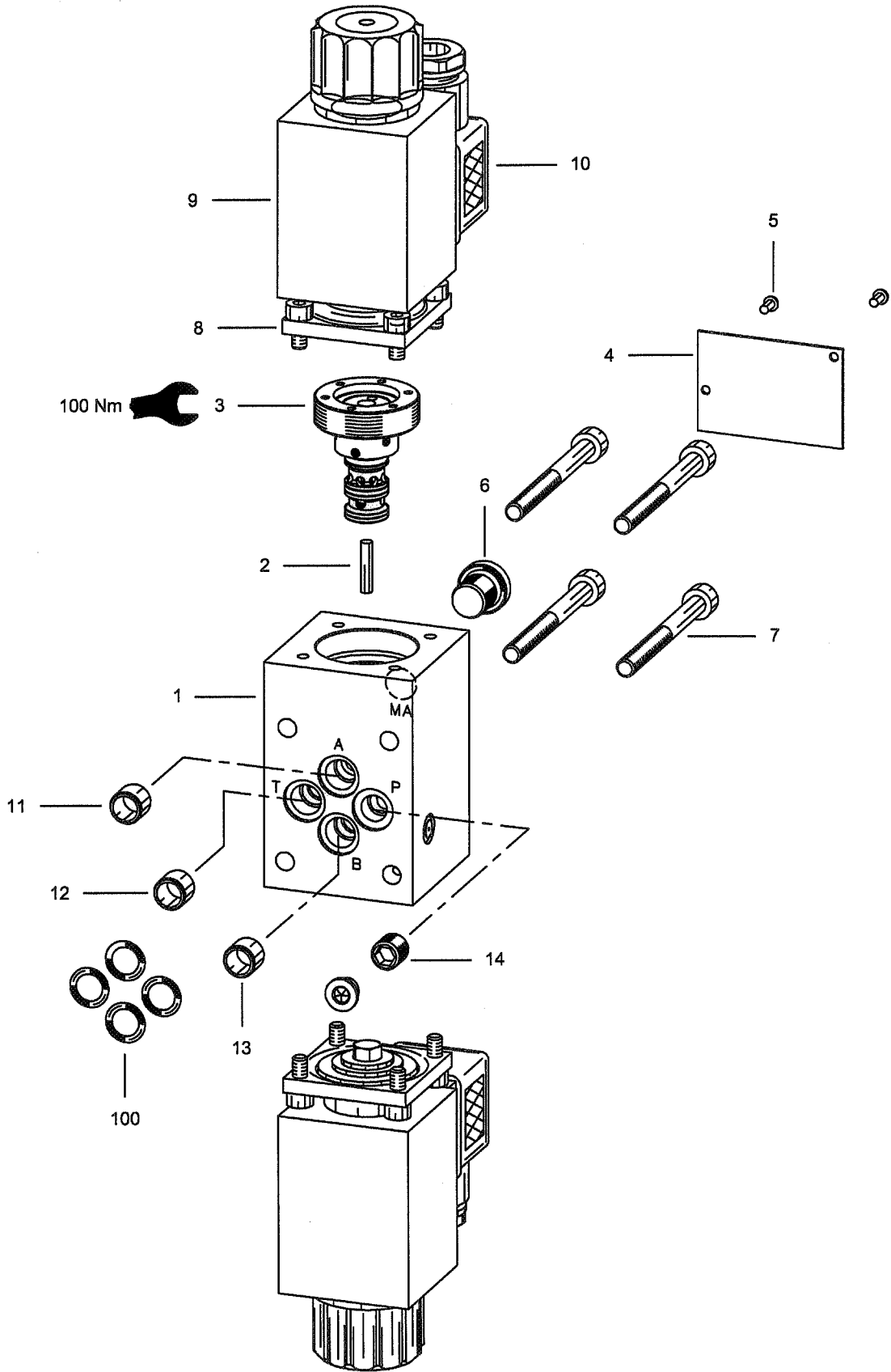
Working stroke (mm) with		NBVP 16-R-K	NBVP 16-S-K	NBVP 16-Z-K
Start of function	(H+h)	66	66	66
Functional travel	h	14	10	14
Switching position range s		---	±1	±1
Actuation force	N	approx. 26	approx. 22	approx. 35

5. Appendix

5.1. Parts No. of the orifices, when ordering spare parts

Coding	Parts No.
B ...	EUMA-jet DIN 913 M8x8-B 0 M8x8-B 0.8 (Ø 0.8) M8x8-B 1.0 (Ø 1.0) M8x8-B 1.2 (Ø 1.2) M8x8-B 1.5 (Ø 1.5) M8x8-B 2.0 (Ø 2.0)
R	ER 13

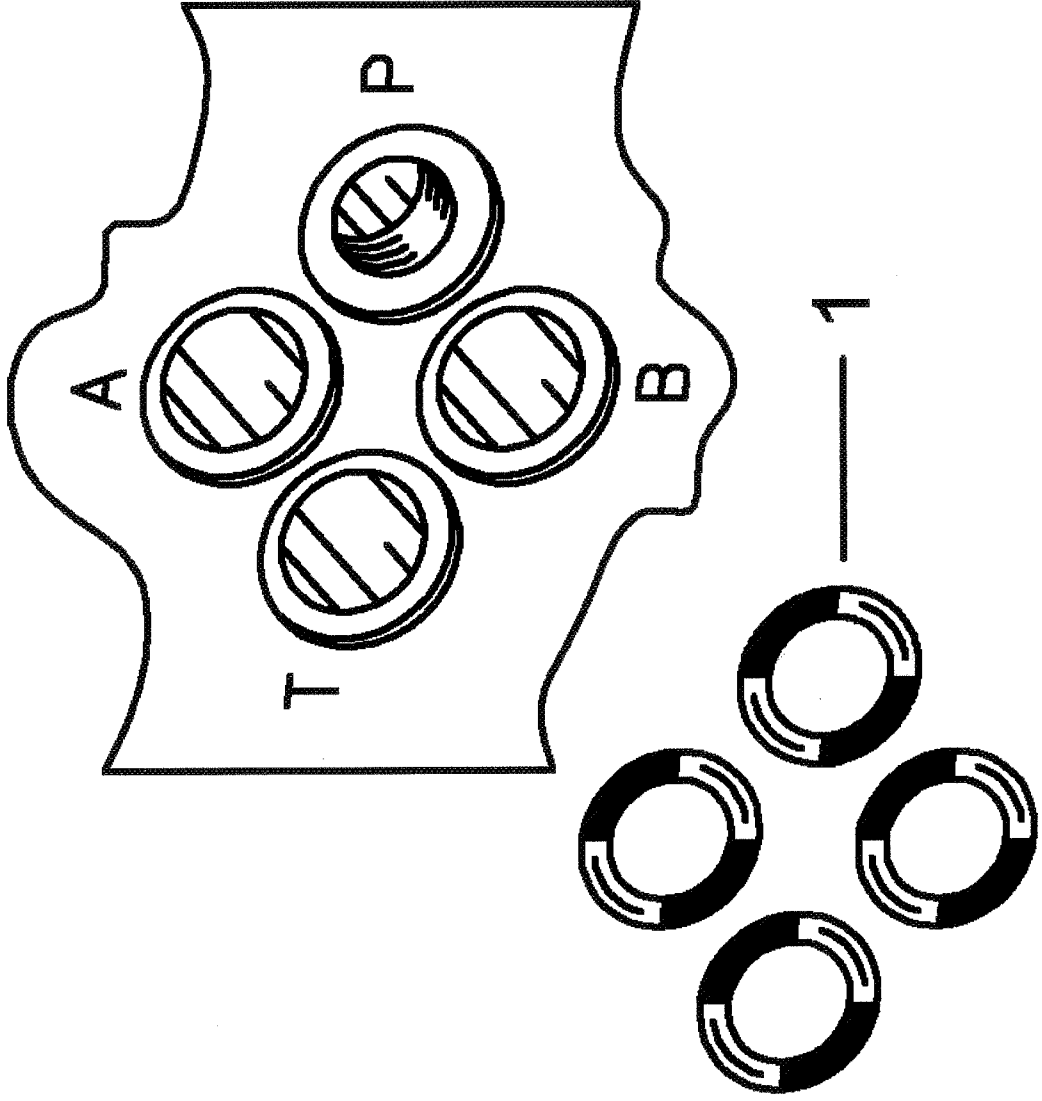
Coding	Parts No.
S	ER 14
ABV ...	EBR 14-B 0.7 (Ø 0.7)
BBV ...	EBR 14-B 1.0 (Ø 1.0)
ABR ...	EBR 14-B 1.5 (Ø 1.5)
BBR ...	EBR 14-B 2.0 (Ø 2.0)
AB ...	7966 003 a (Ø 0.7)
BB ...	7966 003 b (Ø 1.0) 7966 003 c (Ø 1.5) 7966 003 d (Ø 2.0) 7966 003 e (Ø 2.5)



NBVP 16 ZD - ...

Part No.	Qty.	Item	Nomenclature	Drawing No.	Add. Information
3406 833500	1	1	BLOCK	7930 005/1	A repair is only possible at HAWE!
3028 416800	1	2	SPRING GUIDE	7930 006	A repair is only possible at HAWE!
6800 877201	1	3	VALVE INSERT 1 -ZD	7765 590	A repair is only possible at HAWE, max. torque 100Nm!
4708 436800	1	4	TYPE PLATE	7930 023	
6140 310600	2	5	GROOVED DRIVE STUD ISO 8746 2X6 LIGHT ALLOY		
Meß-Befehlsgeräte G1/8	1	6	Monitoring devices G1/8		
6005 048500	4	7	ISO 4762-M5x30-12.9 GEOMET 500 SKT.-HEAD SCREW		
6800 997900	2	8		7329 730	A repair is only possible at HAWE!
ERREGERSYSTEM X, G, WG	2	9	Coil depending on voltage X(G,WG,L,L5K,AMP)		with coding X; G; WG; L; L5K; AMP, a repair is only possible at HAWE!
ERREGERSYSTEM XM, GM, WGM	2	9	Coil depending on Voltage GM(XM,WGM,LM,L5KM,AMPM)		with coding XM; GM; WGM; LM; L5KM; AMPM; a repair is only possible at HAWE!
6801 041900	2	9	Actuation G.. EX	7329 731	A repair is only possible at HAWE! Please follow the operation manual B ATEX, B 03/2004!
Gerätestecker-1	1	10	Plugs - DIN 43650 (ISO440) - Single solenoids G.(WG.,L.,L5K.)		
6800 954601	1	11	Options at port A	7927 420	
6800 954801	1	12	Options at port T	7927 440	
6800 954701	1	13	Options at port B	7927 430	
6800 954501	1	14	Options at port P	7927 410	
6800 954000	4	100	SEAL KIT	7927 419	

SEAL KIT



SEAL KIT

Part No.	Qty.	Item	Nomenclature	Drawing No.	Add. Information
6096 927600	1	1	O-RING 9,25X1,78 NBR 90 SH		