Directional seated valve banks type of BVZP1

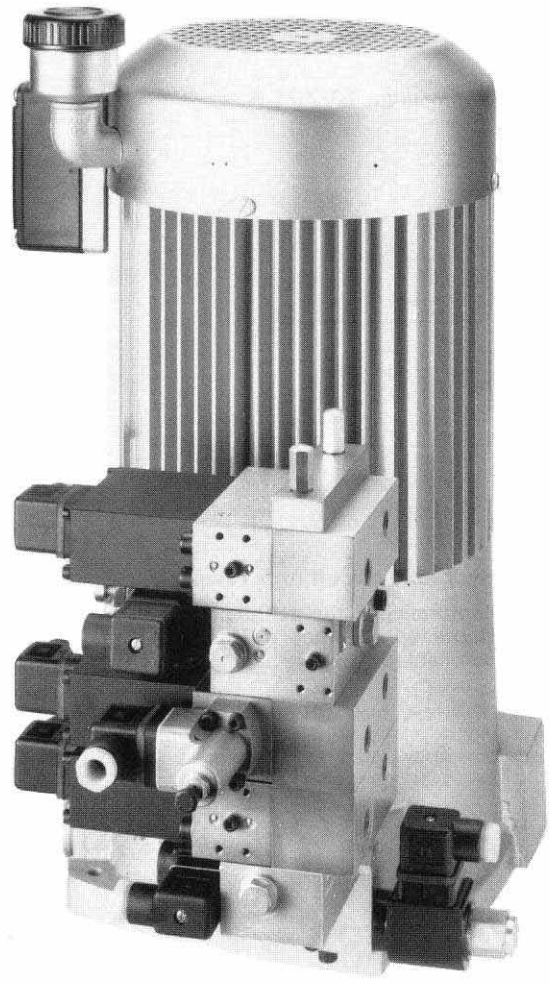
with directional seated valves acc. to D 7785A

Permissible pressure p_{max} = 450 bar
Permissible flow Q_{max} = 15 l/min
For individual valves type VZP1 see D 7785A

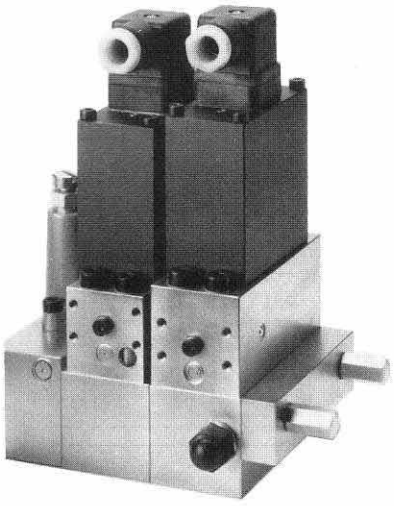
1. General information

The directional valves acc. to D 7785A are mounted on sub-plates, laterally arranged and hydraulically connected between a connection block and an end plate, all held together via two strong tie rods. The connection block with inlet for pressurized oil and outlet for the reflux is available in various versions: suitable for pipe connection with/without pressure limiting valve or as an adapter to mount the valve bank onto hydraulic power units. The ducts for pressurized oil and reflux run through all sub-plates and connect the mounted valves in parallel.
The valves are counted starting from the connection block. The codings for flow patterns and accessories eventually integrated are identical with the corresponding codings in D 7785A. They are completed by the codings for the accompanying sub-plates and accessories eventually integrated there.
At the end of the valve bank further directional valve banks, type BWN (H) 1... acc. to D 7470B or BWH2 ... acc. to D 7545B, may be added by means of adapter plates instead of the end plate.

Example: The directional valve bank added to a compact hydraulic power unit. See order code example 2, page 2 and hydraulic circuit page 3



Example: The directional valve bank for pipe connection like in order code example 1 page 2



2.2

2. Available versions

In the following only the composition of the type coding is explained. All general, hydraulic and electric data are to be taken from pamphlet D 7785A. If other, additional valves are used for the functional expansion only the main specifications, required for a proper selection, are listed here. Their complete technical data may be found in the indicated pamphlets.

2.1. Type coding

The following two examples show a valve bank for pipe connection consisting of cone seated valves and another with ball seated valves suited for mounting onto hydraulic power units (here type HK 44 acc. to D 7600). Cone and ball seated valve sections may be combined at any position within the valve bank, see further example in sect. 2.4. The third example (see sect. 2.5) shows possible combinations with other valve types.

Example 1: **BVZP1 A-1/200** **- G22/0**
- D42/20 - 1 - 1 - G 24

Example 2: **BVZP1 FEH 10F V15/G12** **- G22/0**
- R5M2/0
- CZ5/80/5R
- H12H12/0 - 1 - 1 - G 24

G 24 = Nom. solenoid voltage (24V DC, 12V DC and 230V AC acc. to D 7785A sect. 2.1)

1 = tapped ports G 1/4 (connection size) for all ports

table 1, 2 or 3 page 4 and 5	tab. 7 or 10 page 9 or 17	tab. 4 or 5 page 6 or 7	tab. 8 page 10	identical

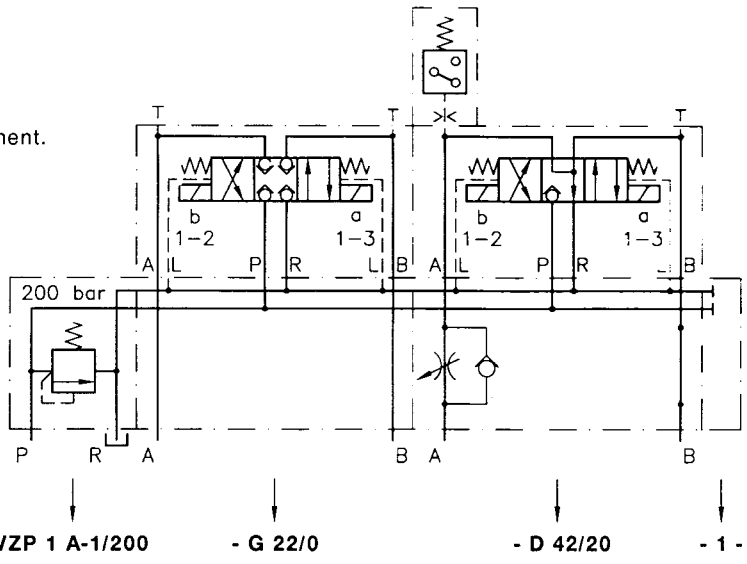
Example 3: **BVZP1 F** **- G52/22** **- BWN1 P - HH - 1 - 1 - G 24**

Valve bank coding acc. to D 7470B or D 7545B

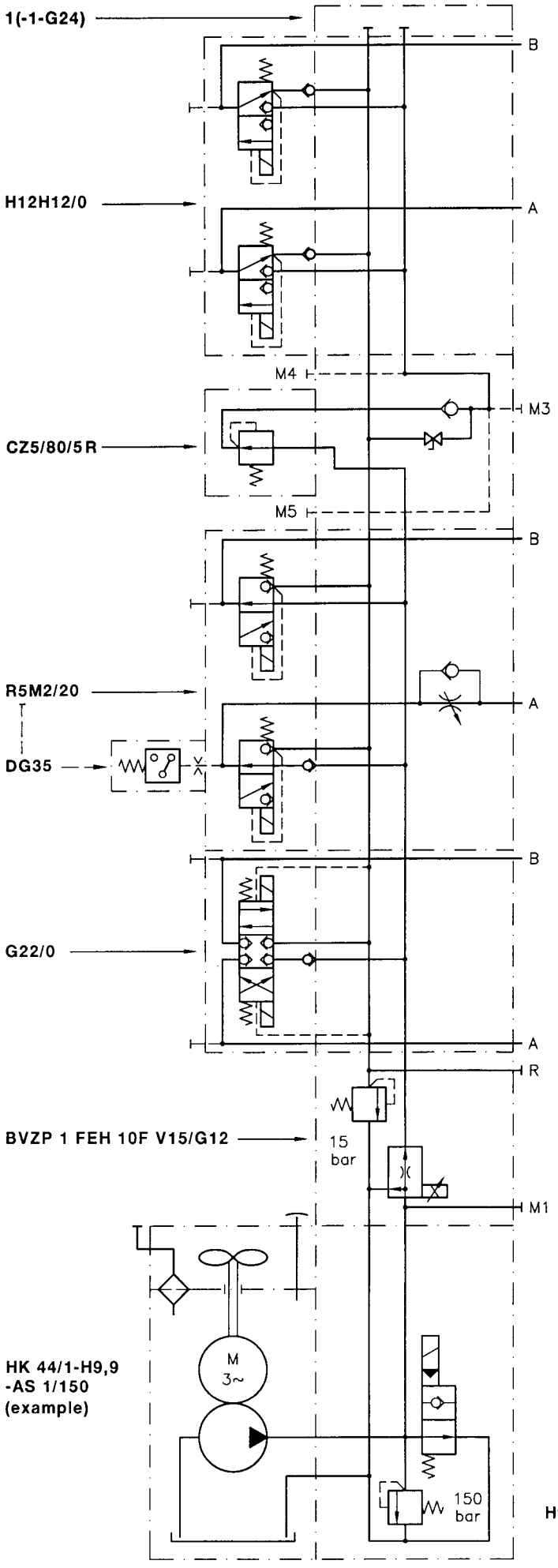
Table 9 page 10 (replaces tab. 8 page 10) with subsequent valve bank coding acc. to D 7470B or D 7545B

Hydraulic circuit for example 1

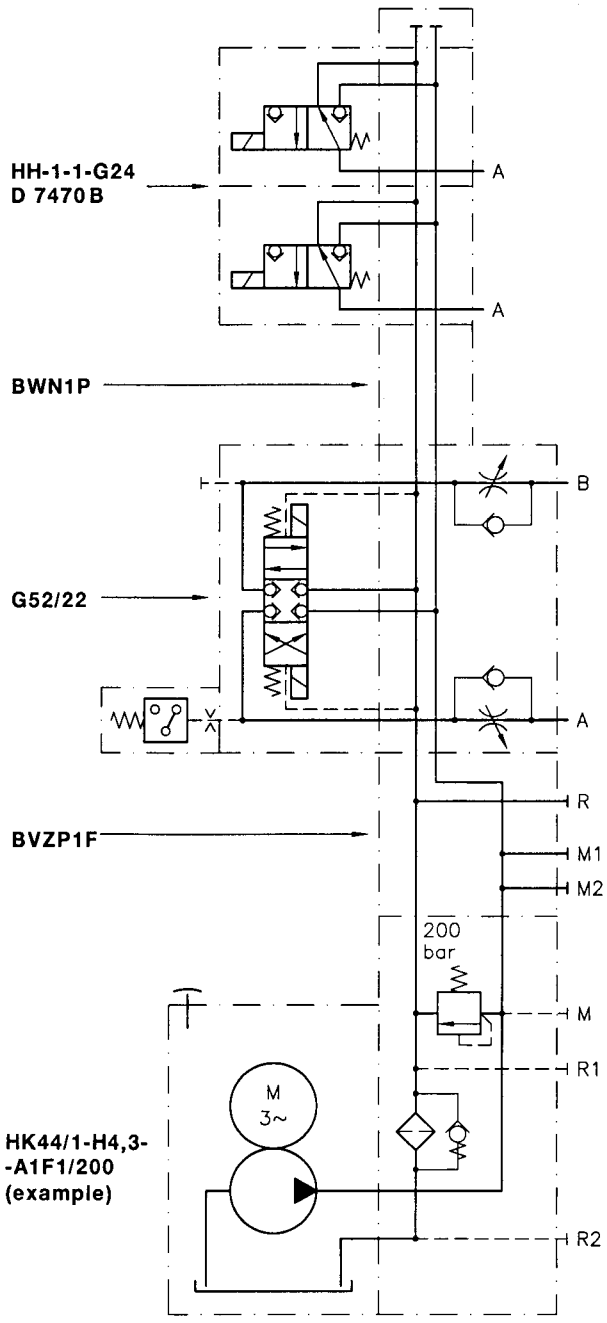
conforming to the actual arrangement.
Representation acc. to DIN 24347
see sect. 5.



BVZP 1 A-1/200 **- G 22/0** **- D 42/20** **- 1 -**



Hydraulic circuit for example 2



Hydraulic circuit for example 3

Circuit examples 2 and 3 represent the actual arrangement, where the valve bank type BVZP1F.. is oriented vertically, when mounted onto hydraulic power units type HK or HC.

2.2. Connection blocks

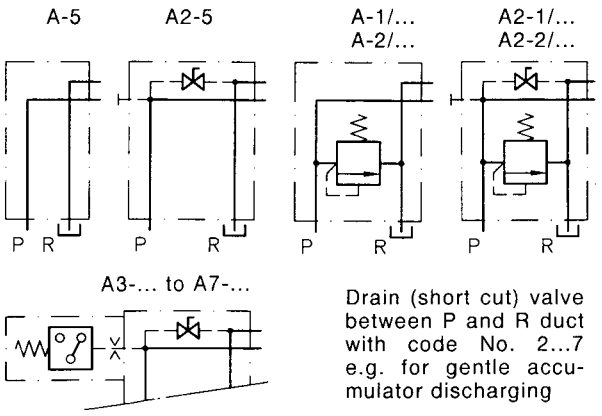
They represent the start of the valve bank and enable a connection via the pressurized oil inlet and the reflow outlet to the hydraulic power unit (pump). They may be either designed for separate location from the pump (table 1) or for direct mounting onto the hydraulic power unit via an adapter plate with integrated pressurized oil and reflow ducts (table 2 a. 3). Additional functional elements are integrated depending on type.
Versions and variations available as standard are stated in table 1, 2 a. 3.

Order example: **BVZP1A2-2/250** - N2F2/0 - ... - 1 - 1 - G12 (Examples for individual order, see page 5 below)

Table 1 Version for direct pipe connection for mounting at any position within a hydraulic circuit.
Protection against occasional, coarse particle contamination see sect. 4.2

Order coding optional with pressure switch type DG3.. acc. to D 5440, code No. 2...7 with drain valve			Coding for pressure limiting valve (desired pressure setting (bar))	
BVZP1A	(without)	without DG3.., can't be retrofitted[1]	-1/...	tool adjustable
	2	without DG3.., may be retrofitted		
	3	DG33 200...450 bar [2]	-2/...	manually adjustable
	4	DG34 100...350 bar		
	5	DG35 20...210 bar	-5	without pressure limiting valve
	6	DG36 4...12 bar		
	7	DG365 12...130 bar		

Symbols



Drain (short cut) valve between P and R duct with code No. 2...7 e.g. for gentle accumulator discharging

[1] can't be retrofitted
[2] observe the permissible pressure rating of the directional valves if required (D 7785A sect. 2.1)

Order code example: **BVZP1F72** -D22/0 -... - 1 - 1 - G24 (For individual order examples see page 5 bottom)

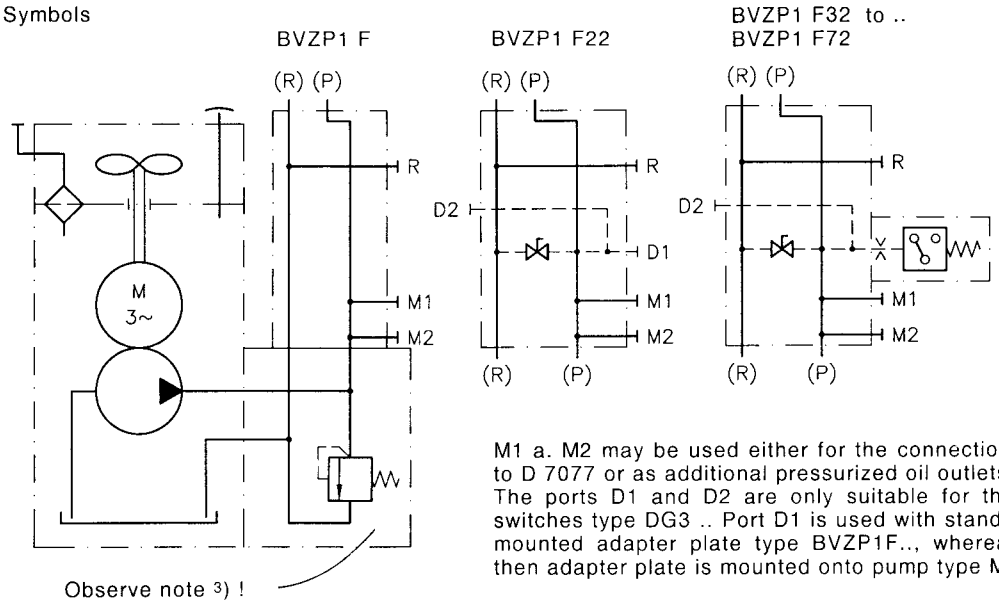
Table 2 Adapter version (conversion plate) for mounting onto compact hydraulic power units type HK acc. to D 7600, -24, -34; type MP acc. to D 7200 and type HC acc. to D 7900

Coding alternatively without/with pressure switch type DG3.. acc. to D 5440			
Coding		equipped with DG3..	
BVZP1F	(without)	without DG3, can't be retrofitted	
	22	without DG3, may be retrofitted	
	32	DG33	200...450 bar [3]
	42	DG34	100...350 bar [3]
	52	DG35	20...210 bar
	62	DG36	4...12 bar
	72	DG365	12...130 bar

Note:
The compact hydraulic power units mentioned above must be equipped with one of the connection blocks in the margin to enable the mounting of the adapter plate BVZP1F..:

Connection block	Pamphlet
A1/... to A4/... AS(V)1/.. to AS(V)4/.. AL11.. and AL12..	D 6905A, sect. 2.1
A1F.. to A4F.. AL21F AS1F to AS4F A1F..-P.. and A3F..-P.. AK(M)1F.. u. AK(M)3F.. AL21D..	D 6905 AF/1, sect. 2 and following
AP1 and AP3	D 7585 AP
AX14 and AX3	D 6905 TÜV
AN..F..D	Sk 7881

Symbols



[3] Observe the max. permissible pressure of the utilized directional valves acc. to sect. 2.3, see also D 7785A.

M1 a. M2 may be used either for the connection of fittings type X84 acc. to D 7077 or as additional pressurized oil outlets.
The ports D1 and D2 are only suitable for the connection of pressure switches type DG3 .. Port D1 is used with standard assembly mode of the mounted adapter plate type BVZP1F.., whereas D2 is only used when then adapter plate is mounted onto pump type MP acc. to D 7200.

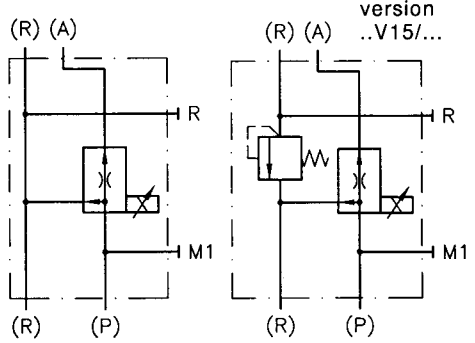
Attention the following limitations are to be observed for:
The consumer port sides B, which cannot be equipped with pressure switches and throttles, either on the valve side or on the sub-plate side. This also applies to consumer side A with assembly mode L acc. to Sk 7785L. Remedy when required with spacer plate type U, see D 6905U.

Order example: **BVZP1FEH 15F V15/G24** - G22/0 - 1 - 1 - G24

Table 3 Adapter version (conversion plate) with integrated 3-way proportional flow control valve [1] for mounting onto hydraulic power unit type HK acc. D 7600, -24, -34; type MP acc. to D 7200 and type HC acc. to D 7900. For suitable electronic amplifier see pamphlets D 7819 and D 7831/1.

Basic type [1]	Permissible flow Rating Throttle deenergized open	closed	throttle range ca. l/min from ... to	Pre-load on reflow 15 bar [2] without	with	Nominal voltage of the proportional solenoid	
BVZP1FEH	15F	15	0,2 ... 15	(without coding)	V15	/G12	12V DC
	10F	10	0,2 ... 10			/G24	24V DC
	6F	6	0,1 ... 6				
	3F	3	0,1 ... 3				

Symbols



hydraulical data

Operating pressure

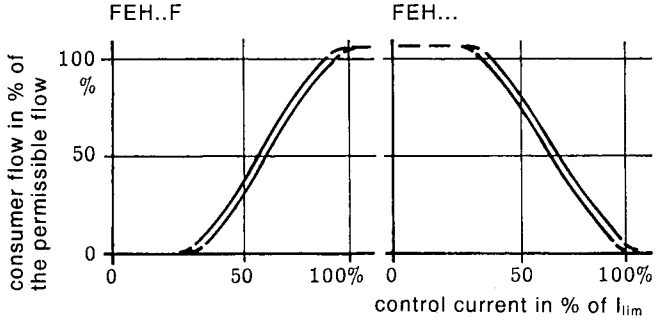
p_{max} = 315 bar
p_{min} = 8 bar

Temperature:

Oil -25 ... +80°C
Ambient -40 ... +60°C

(for further notes see D 7785A sect. 3.2)

Q-I-curves for consumer flow (guideline)



electrical data

Nom. voltage U_N		V	24V DC	12V DC
Coil resistance R_{20}		Ω	24,0	6,0
Current when cold I_{20}		A	1,0	2,0
Max. current [3]	I_{lim} (≈ 70% of I_{20})	A	0,63	1,3
Power when cold	$P_{20} = R_{20} \times I^2_{20}$	W	24	24
Max. power	$P_{lim} = U_N \times I_{lim}$	W	15,1	15,6
Rel. duty cycle % ED with (reference temp. ϑ_{11} = 50°C)			100	
Electrical connection			industrial standard; slim shape, contact gap 11 mm	
Protection class (plug mounted) acc. to DIN 40050			IP 65	
Insulation material class acc. to DIN VDE 0580			F	
Dither frequency f		Hz	50 ... 150	
Dither amplitude A of I_{lim}		%	20 ... 40	
Suitable control electronics			EV1SJ-... acc. to D 7819 EV1M-... acc. to D 7831/1	

[1] The functional elements of the proportional flow control valve are similar to those of type SEH 3-2/... acc. to D 7557. General notes can be taken from this pamphlet.

[2] Optional for slightly pre-loading hydraulic consumers. Factory setting max. 15 bar, this setting may be lowered if required (see also dimensional drawing, sect. 3.1)

[3] The max. current rating represents the load, the device can withstand permanently without over heating (acc. to DIN VDE 0580) at a reference temperature of ϑ_{11} = 50°C. This figures has various coding: I_{lim}; I_G (I_{limit})

Individual order (e.g. for replacement, expansion, own storage etc.)

Order examples:

acc. to table 1	connection block	BVZP1A4 - 1/250
acc. to table 2	adapter plate	BVZP1F52
acc. to table 3	adapter plate	BVZP1FEHV15/G24

Figures for pressure or coding for additional elements, acc. to the tables, have to be inserted in the order coding.

2.3. Directional seated valves and sub-plates

The directional valves acc. to sect. 2.2 are connected in parallel together with the accompanying sub-plates, by means of two of tie rods either with the connection blocks or adapter plates. Max. 10 valves can be arranged side by side. Both the directional valves and the sub-plates may be equipped with additional elements.
The standard assembly of the valve sections by means of the adapter plates type BVZP1F ... (acc. to table 2 and 3 in sect 2.2 and order example 2 in sect. 2 1) is displayed in the photo on the cover page. The actuation solenoids are located on the left side (viewed from front) of the erected valve bank and the consumer ports are accessible from the right. A vice versa orientation is also possible. For a detailed description of order coding and symbolic drawings see Sk 7785L (pls. inquire if neccessary).

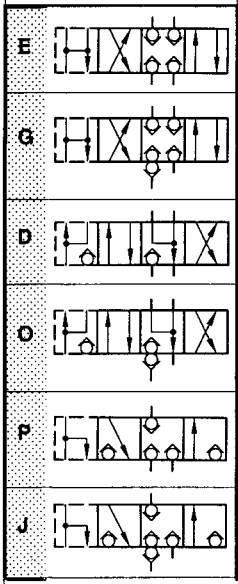
Order example: BVZP1F **-G32/0**
-H12 B1,2 M3/00 - 1 - 1 - G24

Table 4 Directional seated valves
For order coding of the directional seated valves as individual units (replacement, own storekeeping) see D 7785A, if required as single slice including sub-plate, see page 7 below.

Seated cone valves D 7785A sect. 2.1

max. pressure 400 bar

Code letter and flow pattern [1]

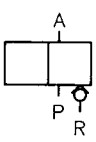


Seated ball valves D 7785A sect. 2.2 for both solenoid sides **a** (1-3) a. **b** (1-2)

max. pressure up to 450 bar

Code letter and flow pattern

Standard	with return pressure stop (optional)
H	H1
N	N1
M	M1
R	R1
F	Only on solenoid side a (1-3), port B
C	Not available with return pressure stop!



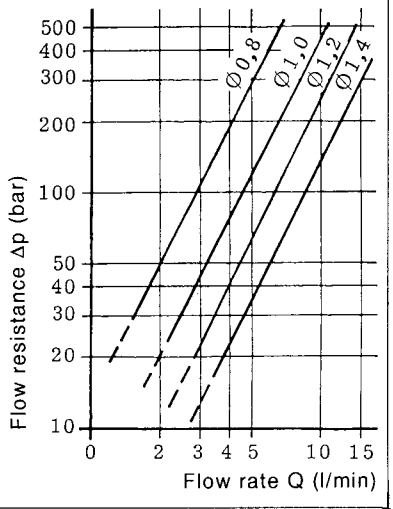
Pressure switch type DG3 .. at the consumer port A (first number) and/or B (second number). Both code numbers are immediately added to the flow pattern E to O.
With flow pattern H(H1) to R(R1) the selected code No. is added to each code letter

Port [2] A	Port [2] B	Pressure switch type DG3 .. acc. to D 5440
2	2	without DG3.., prepared for retrofitting to A or B side
3	either as first and / or second code No.	DG33 200 ... 450 bar
4		DG34 100 ... 350 bar
5		DG35 20 ... 210 bar
6		DG36 4 ... 12 bar
7		DG365 12 ... 130 bar

Orifice (optional) for low pattern E, D, P, H(H1) and M(M1) (for individual order see page 7 bottom)

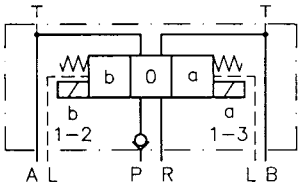
orifice diameter mm

0,8	1,0	1,2	1,4
B0,8	**B1,0**	**B1,2**	**B1,4**

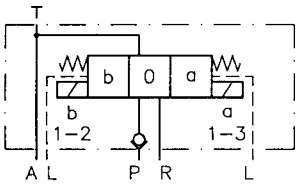


Complete flow pattern of the indiv. valves

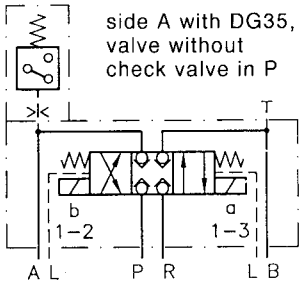
Example: code letter G22-... or O22-..



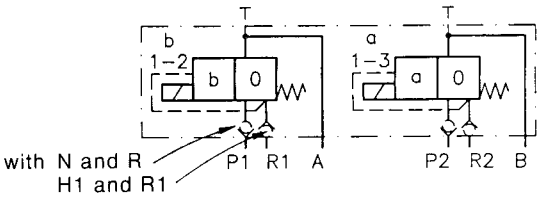
Example: code letter J2-...



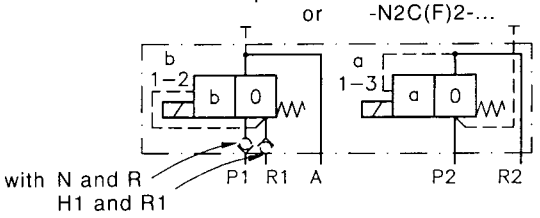
Example: code letter E52-...



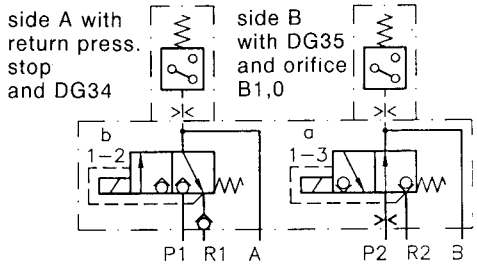
Example: VZP1 -H2H2-... or -H2M2-... or -N2H12-.. etc.



Example: VZP1 -H2F(C)2-... or -N2C(F)2-...



Example: VZP1 -H14M5B1,0-...



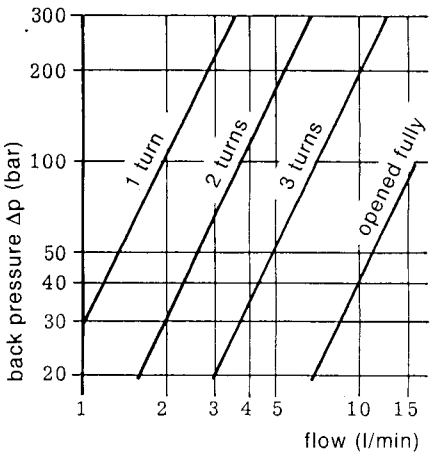
[1] The 4th switching position shown in the flow pattern is achieved by simultaneously energizing both solenoids **a** and **b**.

[2] The following applies to type BVZP1**F**: The consumer port sides B, which cannot be equipped with pressure switches and throttles, either on the valve side or on the sub-plate side. This also applies to consumer side A with assembly mode L acc. to Sk 7785L. Remedy when required with spacer plate type U, see D 6905U.

Order example: BVZP1A-1/300 -G42 **/22**
-N15 N15 **/01**
-D22 **/0** - 1 - 1 - G24

Table 5 Standard sub-plates
For protection against occasional, coarse particle contamination (see sect. 4.2)

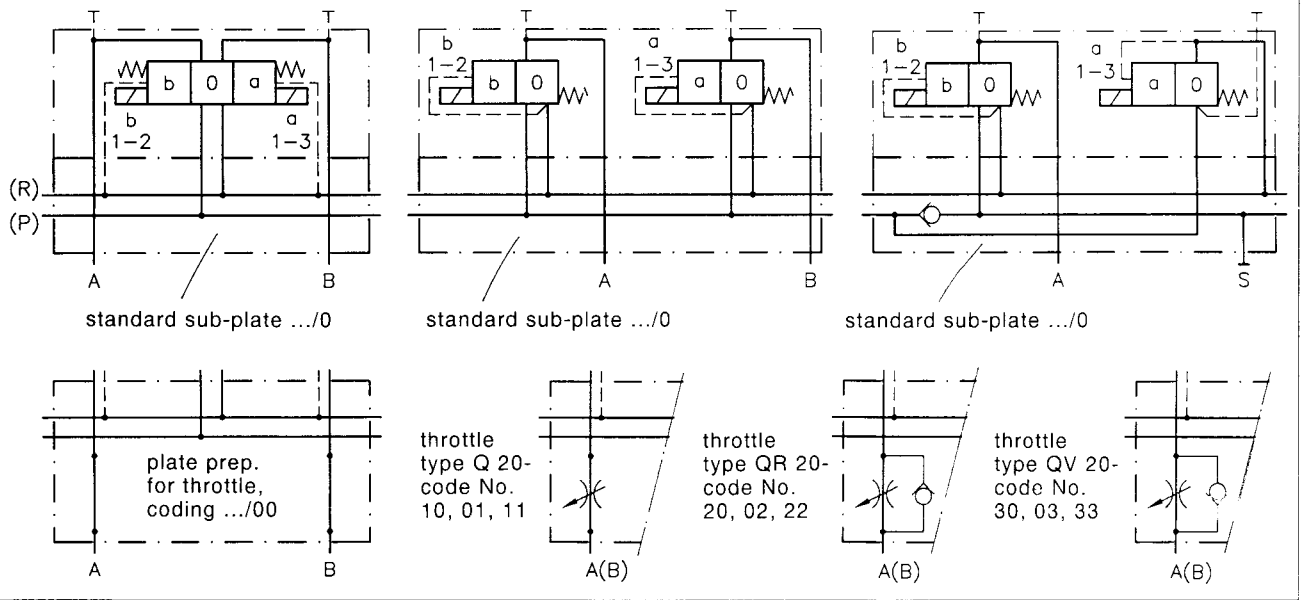
Code No.	For cone and ball seated valves E to J a. H to R. Slot type throttle acc. to D 7730		For seated ball valve code letter F or C on solenoid side a (1-3)
	Outlet A	Outlet B	
0	without throttle, can't be retrofitted		
00	without throttle, may be retrofitted [1]		
10	Q 20	without [1]	Q 20
20	QR 20	without [1]	QR 20
30	QV 20	without [1]	QV 20
01	without [1]	Q 20	
02	without [1]	QR 20	
03	without [1]	QV 20	
11 [2]	Q 20	Q 20	
22 [2]	QR 20	QR 20	
33 [2]	QV 20	QV 20	



A back pressure of approx. 10 bar will occur when a flow of 20 l/min passes check valve type QR (V).

Note:
The max. adjustment travel of the slot type throttle is signaled by a red marked groove.
Do not over ride this mark.
Notice the detailed representation in section 4.1!

Symbols



[1] Mounting hole for the throttle is plugged by a tapped plug.

[2] Combinations of differing throttles are available, e.g. with individually actuated 3/2-way directional valves, code letters H, N, M, R.
Example .../21; .../13 etc.

Individual order (e.g. for replacement, expansion, own storekeeping etc.)

Order examples: Valve section VZP1 - G22/20 - G24

Valve section VZP1 - N4 N7/0 - WG230

The code numbers for pressure switches, throttles and solenoid voltage are to be inserted if required, as described in tables 4 a. 5.

Order numbers for orifice (complete with filter section)

Orifice	B 0,8	7785 021
	B 1,0	7785 022
	B 1,2	7785 023
	B 1,4	7785 024

Individual valves, type WN1, WH1 or WH2 with sub-plates

The individual valves type WN(H) 1 (acc. to D 7470A(B)) and WH2 (acc. to D 7545E) may be integrated with the listed flow pattern at any place within the valve bank.

Order example: BVZP1A - 1/300 - G22/0
- D22/44
- **WH2 H /30 /2** - 1 - 1 - G24

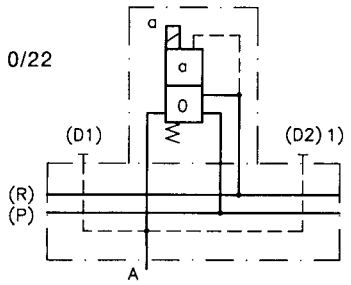
For individual order (example) (e.g. for replacement, expansion, own storekeeping etc.) VZP1 - WH1 Q /0 /23 - G24

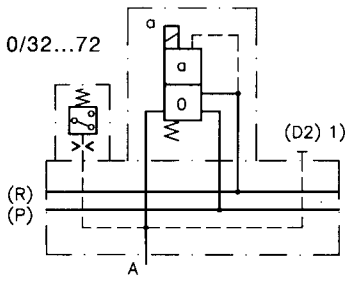
Table 6a	Basic type coding		
	Q_{max} (l/min)	p_{max} (bar)	see pamphlet
WN1	5	320	D 7470A(B)
WH1	8	450	D 7470A(B)
WH2	15	350	D 7545E

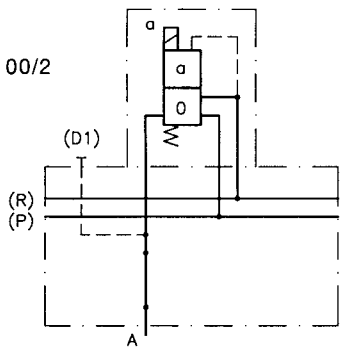
Table 6d	Pressure switch			
with sub-plate (see table 6c)				mounted pressure switch type DG3. acc. to D 5440
/0 1)	/22	/00 ... /30	/2	without, retrofitting possible
	/32, 23		/3	200... 450 bar
	/42, 24		/4	100... 350 bar
	/52, 25		/5	20... 210 bar
	/62, 26		/6	4... 12 bar
	/72, 27		/7	12... 130 bar
DG at D1 DG at D2				

Table 6c	Sub-plates	
Slot type throttle type Q.. acc. to D 7730) Integrated for outlet port A		
/0	without throttle (cannot be retrofitted)	
/00	without throttle (may be retrofitted, mounting hole is plugged with tapped plug)	
/10	Q 20	Attention: Taking into account the red marking for max. adjustment travel of the slot type throttle. See drawing in sect. 4.1
/20	QR 20	
/30	QV 20	

Symbols
(only shown for 3/2-way directional valves)







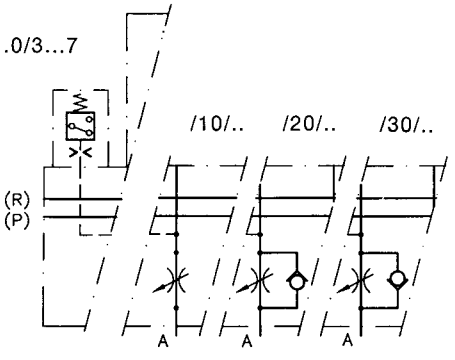
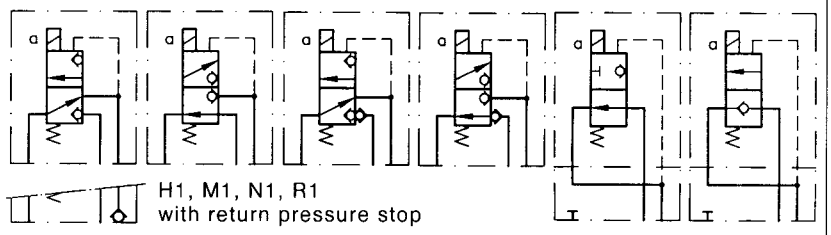
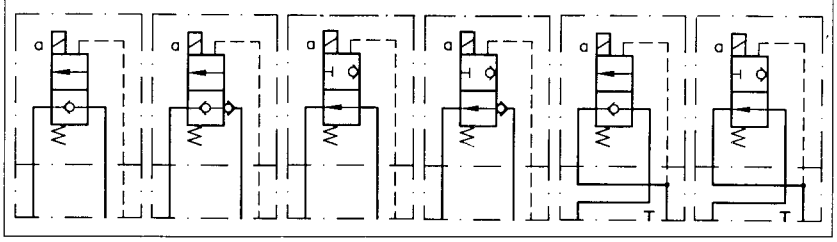


Table 6b	Flow patterns of the directional valves (Symbol for WH1 (2), leakage port doesn't exist with WN1)					
H (H1)	**M (M1)**	**N (N1)**	**R (R1)**	**F** 2)	**D** 2)
					
H1, M1, N1, R1 with return pressure stop					
B	**Q**	**C**	**E**	**P**	**Q**
only available with WN1 and WH1 (see also D 7470B)					
					

1) The mounting of a pressure switch is only possible at port D2 with the leftsided mounting mode (acc. to Sk 7785L) or via adapter plate type U (acc. to D 6905U) or with the intermediate block (acc. to D 6905A, sect. 2.3) if it is intended to mount the complete valve bank onto hydraulic power units. In the leftsided mounting mode it is not possible to connect the pressure switch at D1.

2) In this case utilized as idle circulation valve (port A plugged, no pressure switch and no throttle available, code No. /0/2). There is no intermediate plate required with type WN1F(D).

2.4. 2-way pressure reducing valve, connected either in parallel or in series

For version with 3-way pressure reducing valve (only avail. parallely connected), see sect. 4.3.

Max. permissible inlet pressure 400 bar (P side).
Pressure reducing valves type CDK 3 (acc. to D 7745) are utilized for this application.
The pressure reducing valve rules the system pressure (system pressure regulation) for all subsequent directional valves including their consumers according to the set pressure, when it is connected in series.
The set pressure applies only to the directional valve mounted on the joined sub-plate, when the pressure reducing valve is connected in parallel (individual pressure regulation). All other directional valves within the valve bank are applied with pump sided (primary sided) pressure (higher).

Order example when connected in series (system pressure regulation)

Type coding acc. to sect. 2.1

BVZP1..-1/250 - G22/0
- **CZ2/180/5R**
- D22/0
- H2H2/0 - 1 - 1 - G 24

CZ2/180/5R

Order example when connected in parallel (individual pressure regulation)

Type coding acc. to sect. 2.1

BVZP1..-1/250 - G22/0
- D22/**CZ2/150/4R/2**
- H2H2/0 - 1 - 1 - G24

D22-Ventil Tabelle 4 Pos. 2.3

CZ2/150/4R/2

Table 7 2-way pressure reducing valve for serial connection (system pressure regulation) or parallel connection (individual pressure regulation)

Used pressure reducing valve acc. to D 7745	Coding	Pressure range from ... to bar	Adjustability 1)
CDK 3-1	CZ 1/...	30 ... 300	tool adjustable
CDK 3-2	CZ 2/...	20 ... 200	
CDK 3-5	CZ 5/...	15 ... 130	

→ set pressure in bar

Sub-plate for serially connected pressure regulation. Pressure regulation for all subsequent valve sections

Coding	Check valve 2)
/5	no
/5R	yes

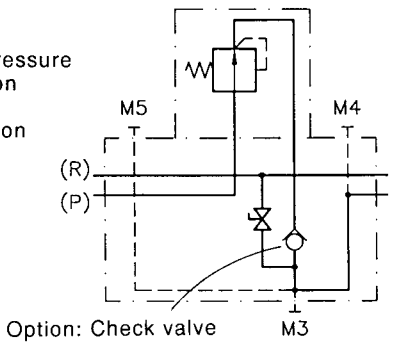
Sub-plate for individual pressure regulation
Pressure regulation only for one valve section 4)

Coding	Thread type throttle	Check valve 2)
/0 /.	no	no
/0R /.	no	yes
/4 /.	yes	no
/4R /.	yes	yes

2	without, may be retrofitted	
3	DG33	200 ... 450 bar
4	DG34	100 ... 350 bar
5	DG35	20 ... 210 bar
6	DG36	4 ... 12 bar
7	DG365	12 ... 130 bar

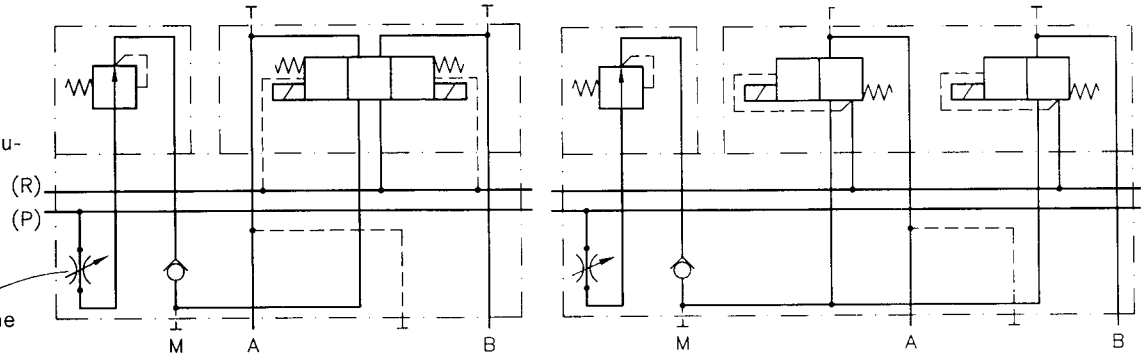
Symbols

Serial pressure regulation Serial connection



M, M3, M4, M5 = Port size G 1/4 for fittings type X84 acc. to D 7077.
M4 is utilized in standard assembly mode, M5 with assembly mode acc. to Sk 7785L

Parallel connection individual (valve) pressure regulation



1) Can be adjusted by means of a screw driver after slackening the lock nut a/f 17 (monitor with pressure gauge!).
2) The check valve prevents a pressure drop on the secondary side, if the pressure on the primary side drops below the set pressure of the pressure reducing valve, due to e.g. switching operations of primary sided consumers.
3) Slot type throttles are not available for the outlet ports A and B integrated in the sub-plate (like in table 5 of sect. 2.3) due to design reasons if connected in parallel. A possible cure are throttles type Q(R,V)20H6(8) (acc. to D 7730) mounted in ports A and/or B.
4) Not available for valve combinations code letter F and C (acc. to table 4) as well as combinations with valves type WN(H)1 and WH2 (acc. to table 6).

Individual order (e.g. for replacement, expansion, own storekeeping etc.)

Order examples: Serial connection VZP1 - CZ2/120/5R

Parallel connection VZP1 - G22/CZ5/130/0R/7 - WG230

The corresponding code numbers as well as the solenoid voltage are to be inserted as described in table 7.

Valve code letter acc. to table 4 E...J or H...R(1)

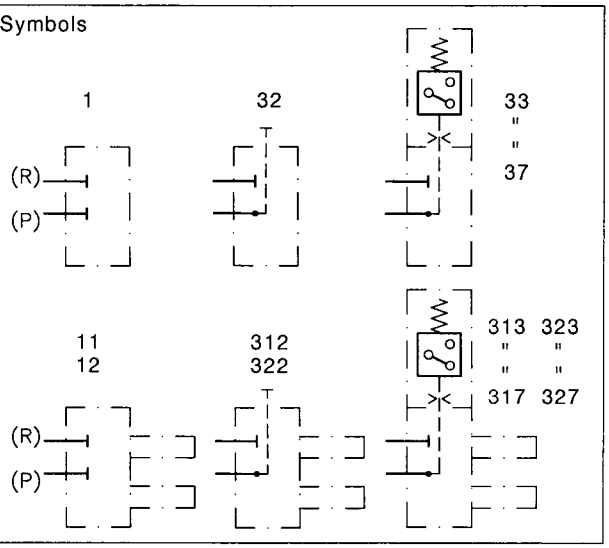
2.5. End plates and adapter plates

End plates are closing the valve bank with its pressurized oil and reflow ducts to the outside. They may be optionally equipped with spacers to enable the retrofitting of one or two more valve sections, see table 4, 6 or 7.
By means of adapter plates, it is possible to mount other directional valve types. In this case coding for the adapter plate replaces the one for an endplate, see table 8.

Order example: BVZP1F72 - G32/0 - **315** - 1 - G24

Table 8	End plates	Basic type	With pressure switch
Standard end plate		**1**	**3** .
With extension for one valve section, table 4 and 5 [1]		**11**	**31** .
With extension for two valve section, table 4 and 5 [1]		**12**	**32** .
Pressure switch type DG3 .. acc. to D 5440 for end plate 3..	prepared for retrofitting		**2**
	DG33 200 ... 450 bar [2]		**3**
	DG34 100 ... 350 bar [2]		**4**
	DG35 20 ... 210 bar		**5**
	DG36 4 ... 12 bar		**6**
	DG365 12 ... 130 bar		**7**

Symbols



Order example: BVZP1A - 1/250 - G22/0 - **BWH2P** - HH - 1 - 1 - G 24

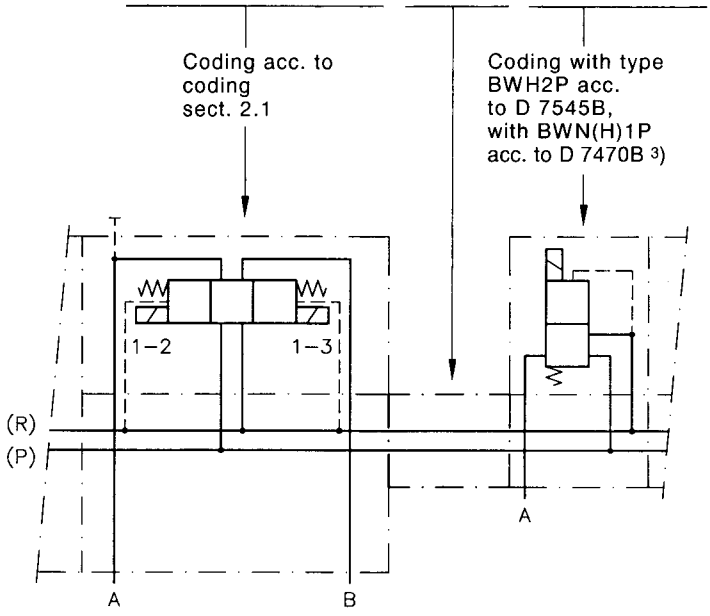


Table 9	Adapter (conversion) plate
Adapter plate	for the mounting of valve banks type [3]
BWN1P- **BWH1P-**	BWN(H)1 acc. to D 7470B
BWH2P-	BWH2 acc. to D 7545B

[1] If clearances for more than two valve sections are required, please inquire.

[2] The adjustment range of pressure switches type DG33 or DG34 is eventually not fully used. Observe the max. pressure of the directional valves utilized in the valve bank (section 2.3 and D 7785A)

[3] The coding for port threads and solenoid voltage (in the example ... -1-G24) apply at this uniformly to all valve sections in the valve bank.

Individual order (e.g. for replacement, expansion, own storekeeping etc.)

Order example: End plate VZP1 - 1
VZP1 - 33

Adapter plate BWN1P

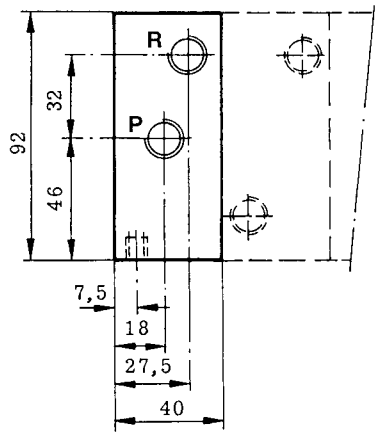
Tie rods: The tie rod length may be calculated by
$L = n \cdot 40 + 30$
n = Number of the valve sections (including a serially connected pressure reducing valve and extensions eventually required)
Order code: 2 x tie rod DIN 940-M6 Fo x L - 8.8-A2K

3. Unit dimensions

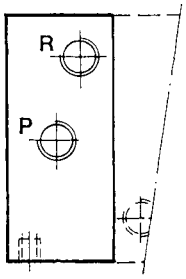
All dimensions are in mm and are subject to change without notice!

3.1. Connection blocks acc. to section 2.2

BVZP1 A-5
A2-5
"
"
A7-5

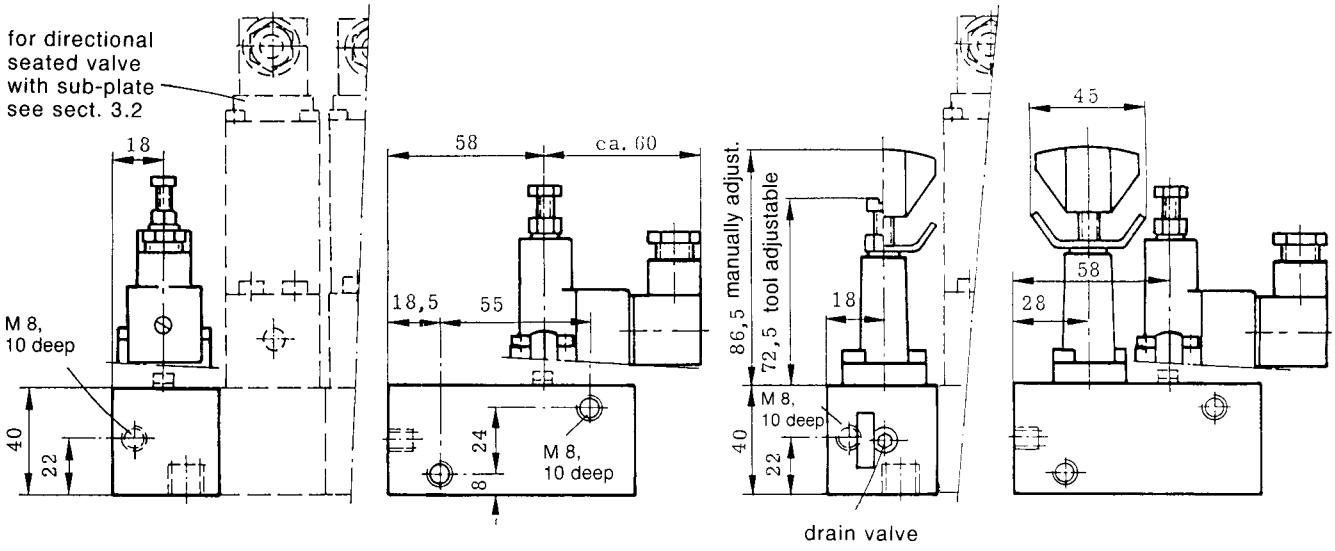


BVZP1 A-1/...
A-2/...
A2-1(2)/..
"
"
A7-1(2)/...

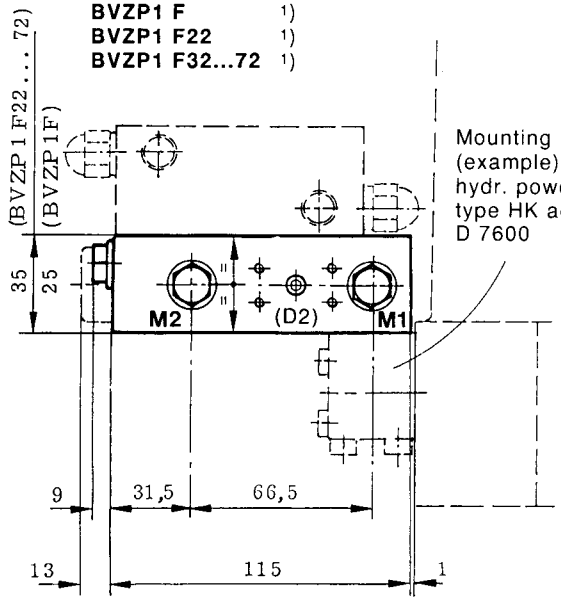


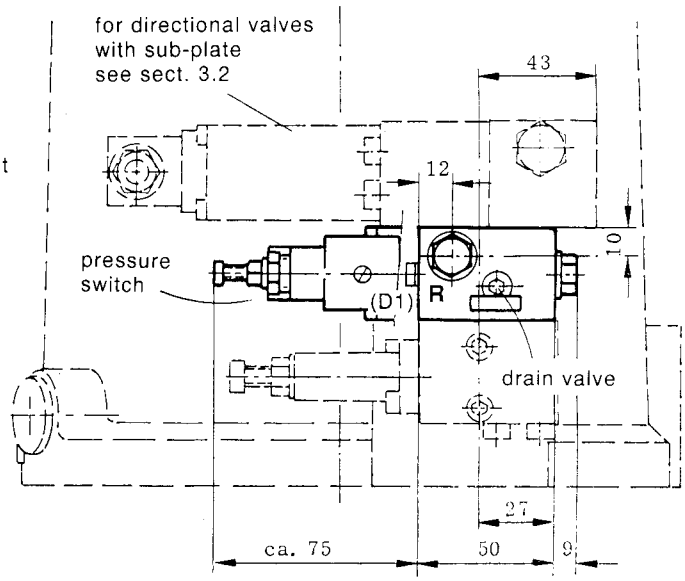
for missing data see below !

ports conforming DIN ISO 228/1: P and R = G 1/4



BVZP1 F 1)
BVZP1 F22 1)
BVZP1 F32...72 1)

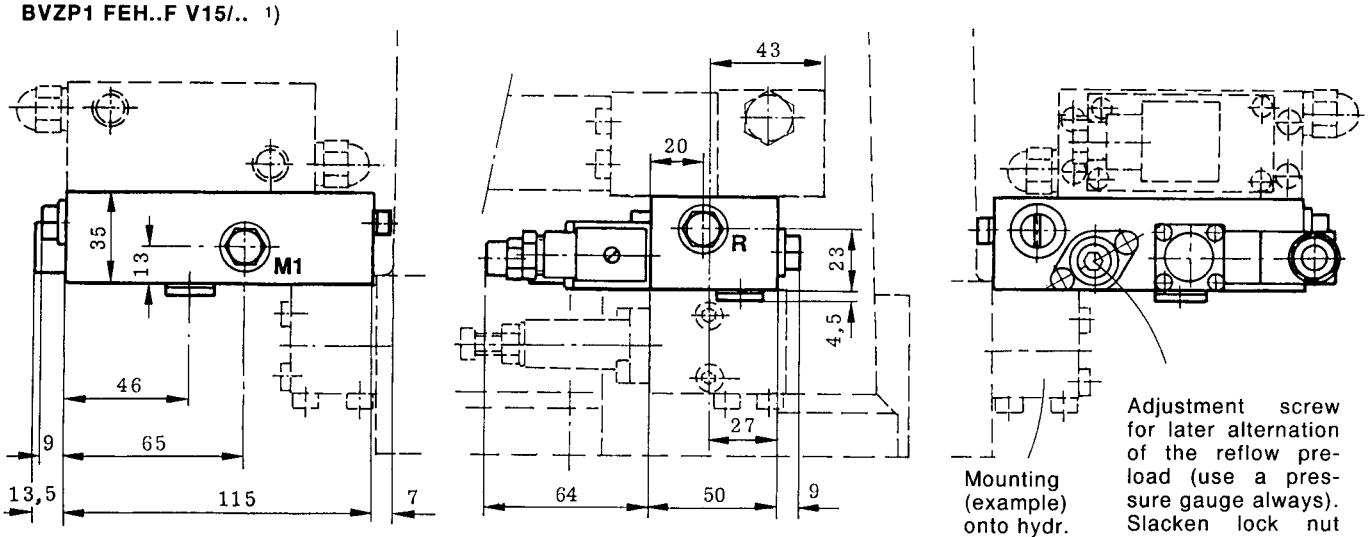




Ports conforming to DIN ISO 228/1: M1, M2 and R = G 1/4

1) Arrangement of the directional valves attached in mounting mode L (see Sk 7785L)

BVZP1 FEH..F V15/.. 1)



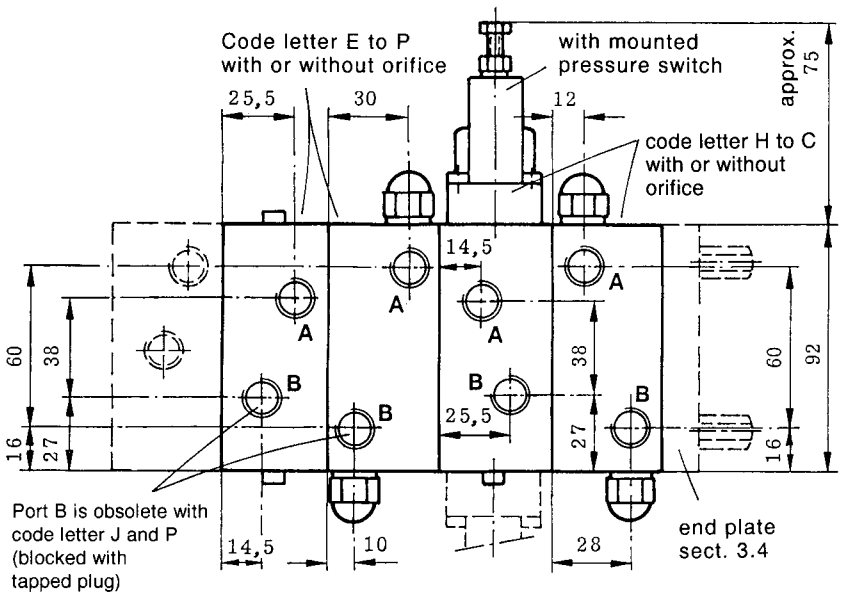
Ports conforming DIN ISO 228/1: M1 and R = G 1/4

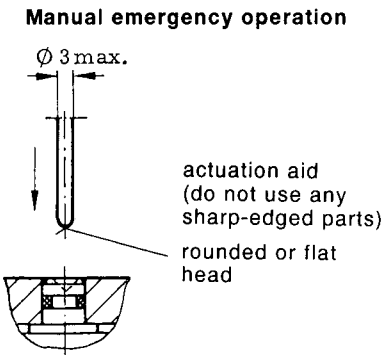
1) Arrangement of the attached directional valves in mounting mode L (see Sk 7785L)

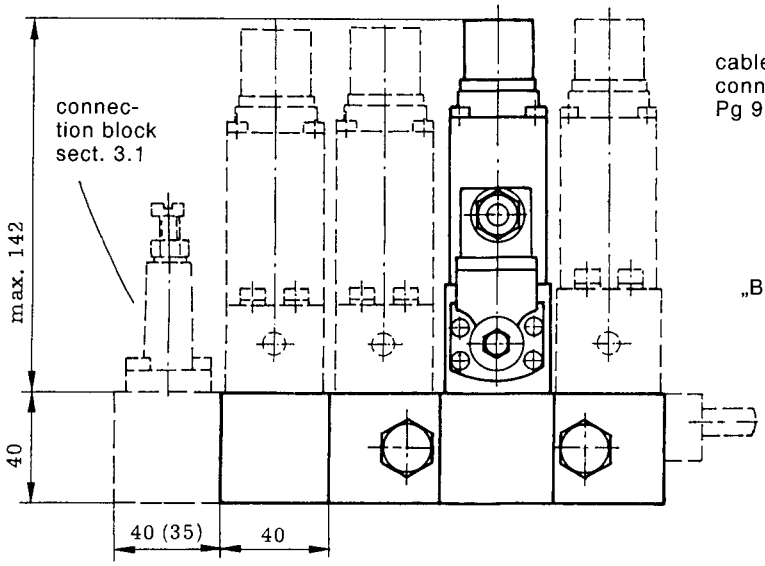
3.2. Directional seated valves and sub-plates

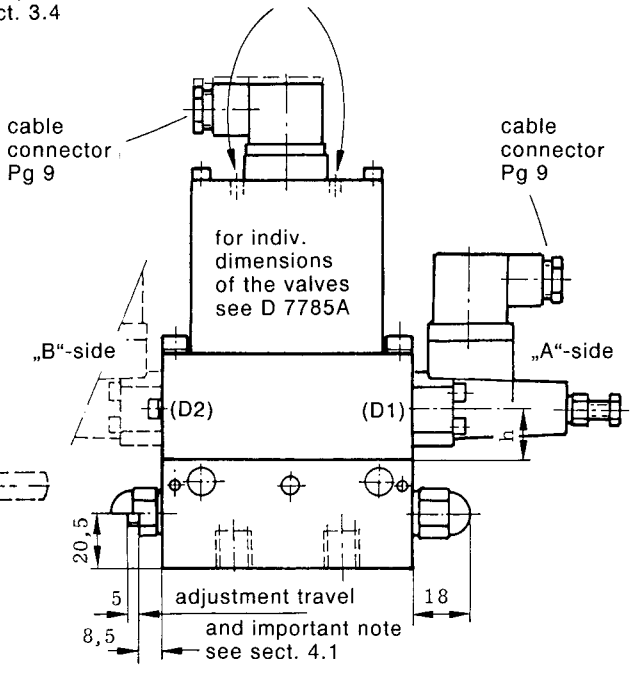
Also see notes in sect. 4.5

3.2.1. Standard sub-plates with mounted directional seated valves acc. to table 4 and 5 in section 2.3





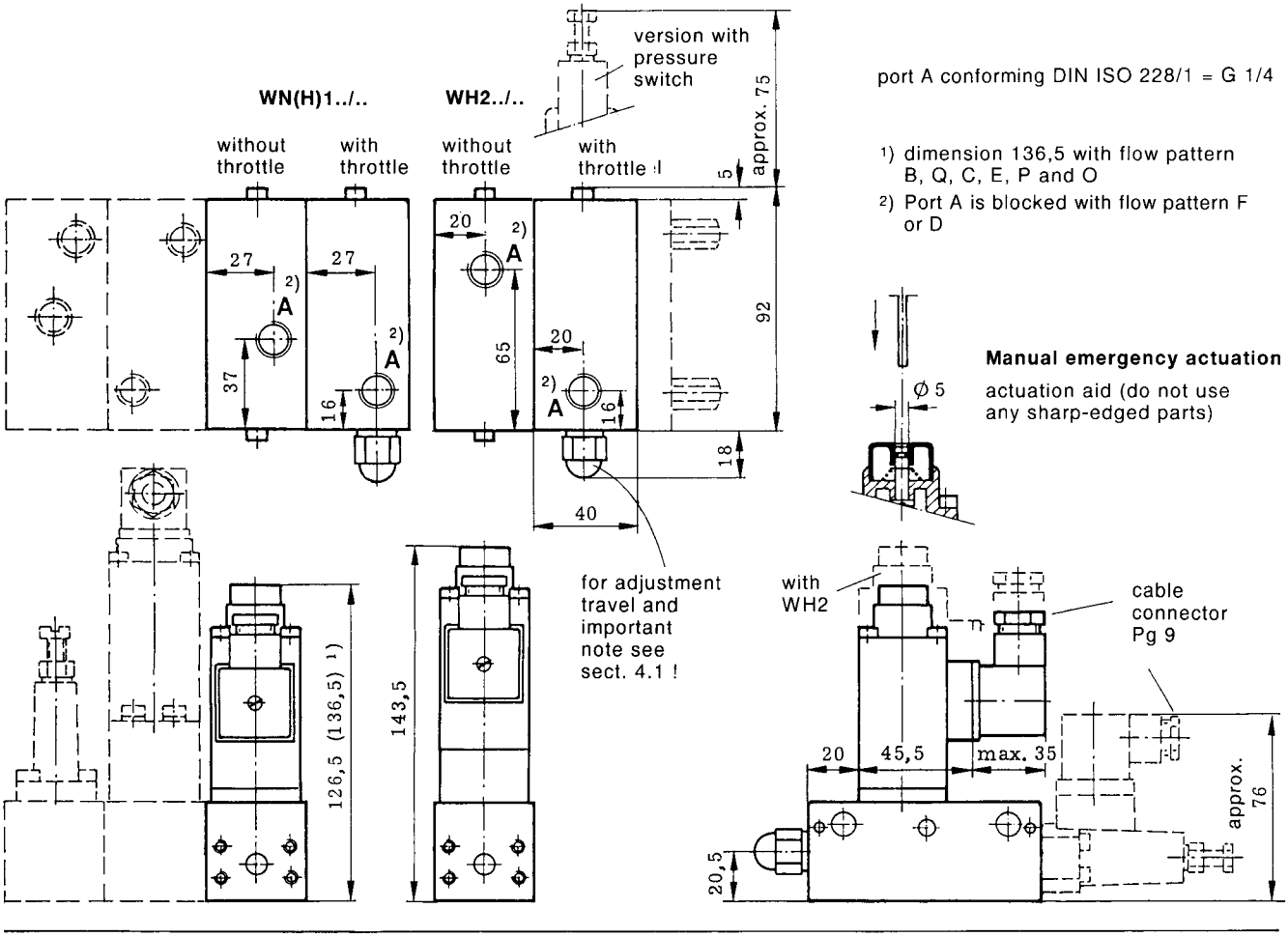




ports conforming to DIN ISO 228/1: A and B = G 1/4

h = 21,5 (code letter E,G,P and J)
18,5 (code letter D and O)
19 (code letter H to C)

3.2.2. Sub-plates with mounted directional seated valves WN(H)1 and WH2 acc. to table 6



port A conforming DIN ISO 228/1 = G 1/4

1) dimension 136,5 with flow pattern B, Q, C, E, P and O

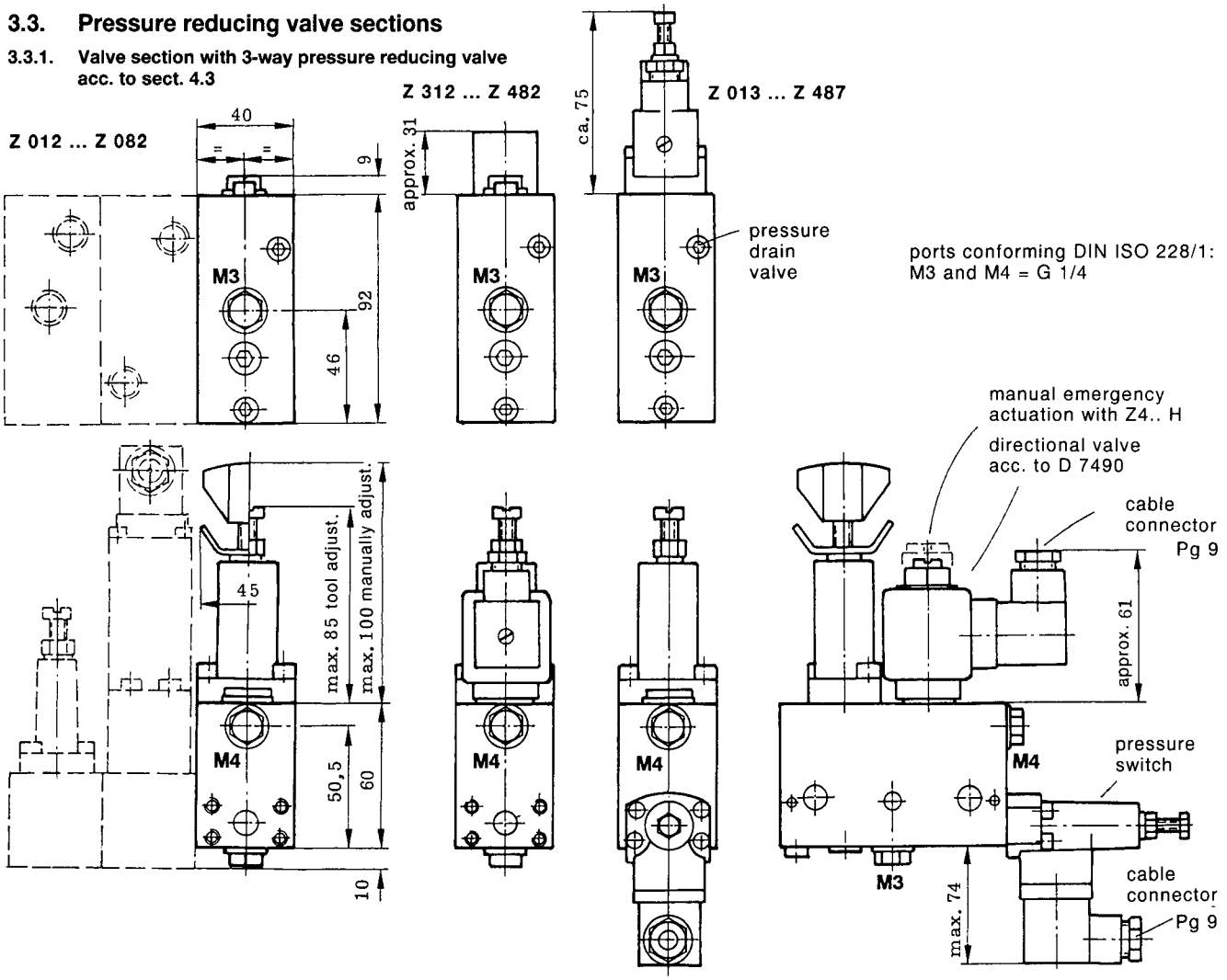
2) Port A is blocked with flow pattern F or D

Manual emergency actuation

actuation aid (do not use any sharp-edged parts)

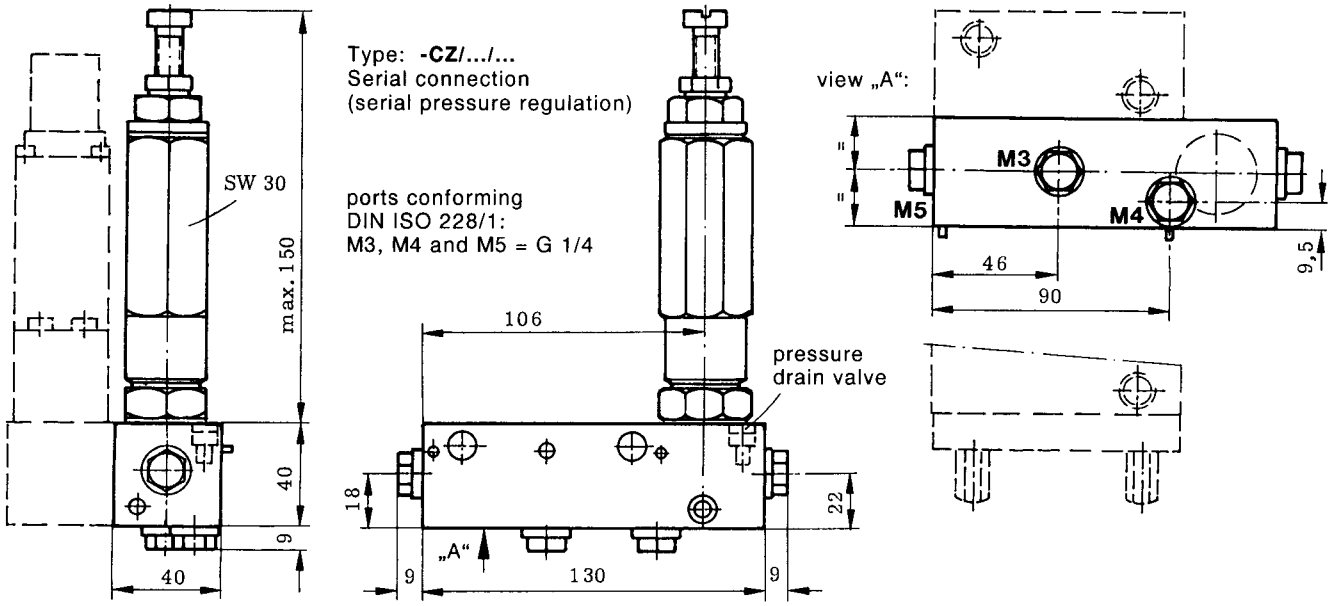
3.3. Pressure reducing valve sections

3.3.1. Valve section with 3-way pressure reducing valve acc. to sect. 4.3

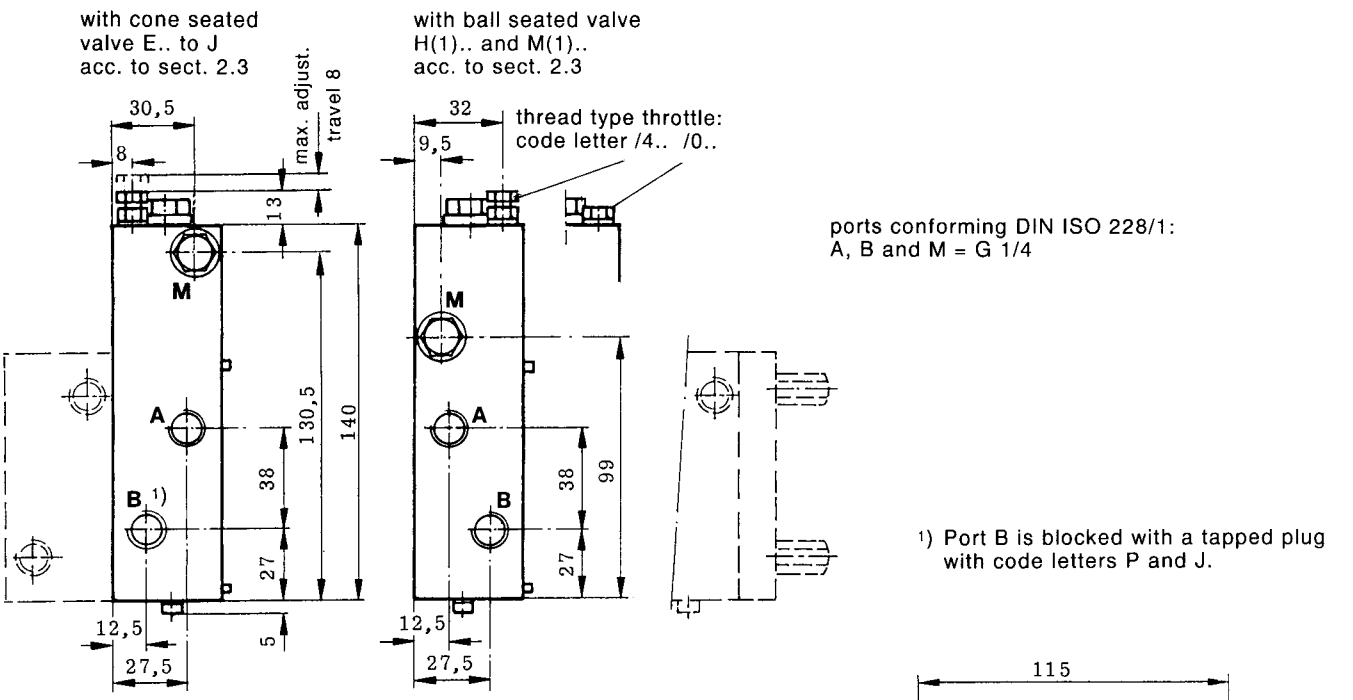


ports conforming DIN ISO 228/1: M3 and M4 = G 1/4

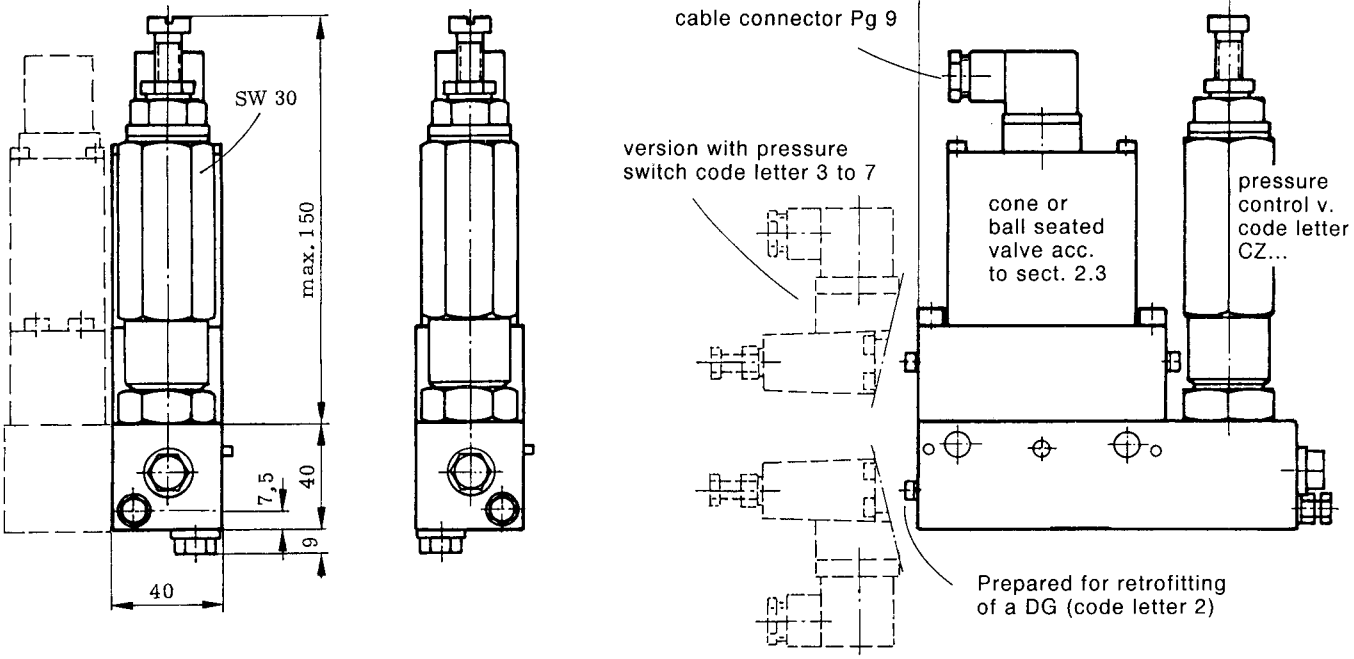
3.3.2. Valve section with 2-way pressure reducing valve acc. to section 2.4



Type: -.../CZ/.../... Parallel connection (indiv. pressure control)

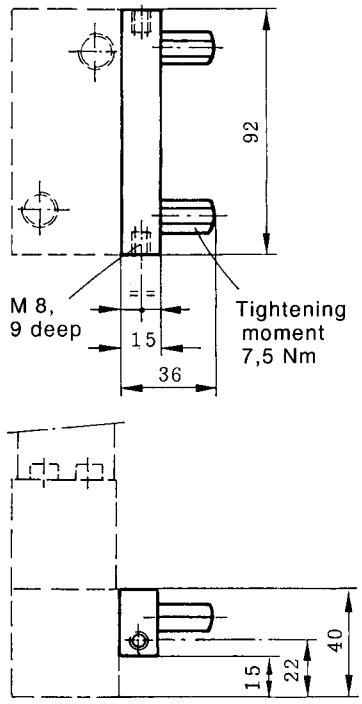


1) Port B is blocked with a tapped plug with code letters P and J.

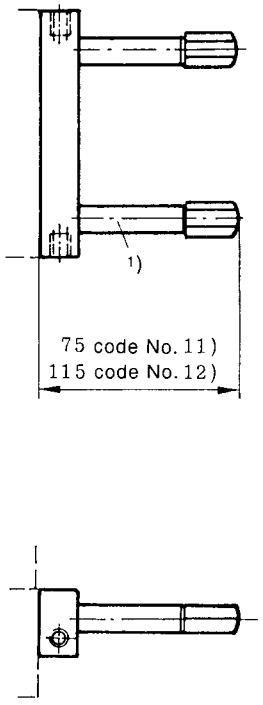


3.4. End plates

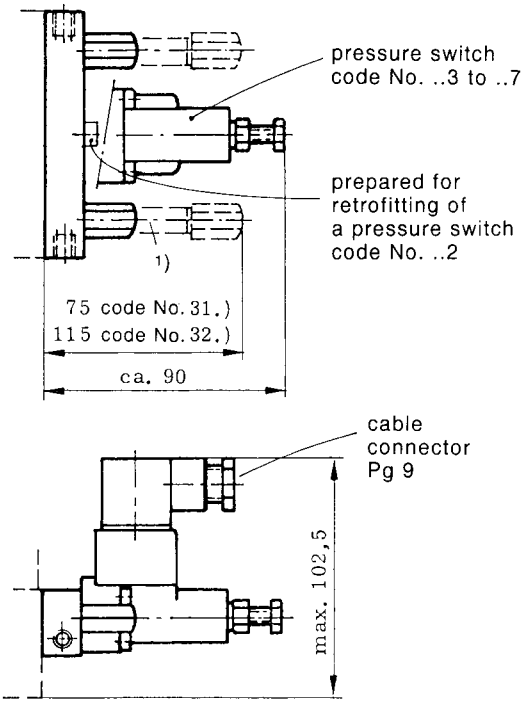
Code No. 1



Code No. 11 and 12

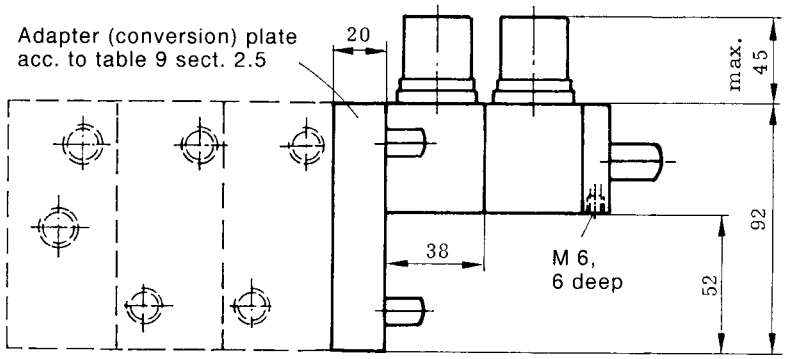


Code No. 3., 31. and 32.

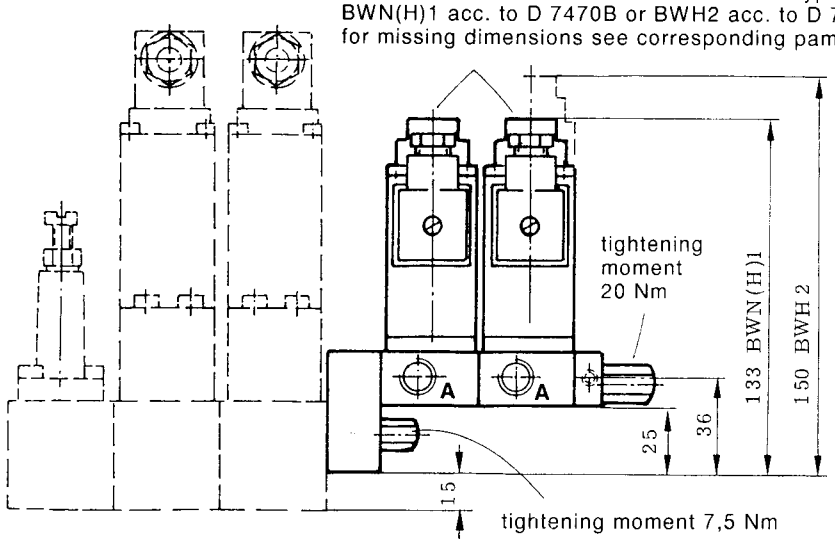


1) Inquire, if more than two clearances are required.

3.5. Adapter plate for the attachment to valve banks type BWN(H)1 or BWH2



The attached directional valve bank are of type
BWN(H)1 acc. to D 7470B or BWH2 acc. to D 7545B,
for missing dimensions see corresponding pamphlets.



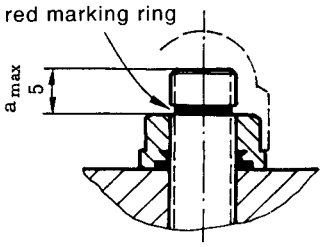
4. Appendix

4.1. Important note for slot and thread type throttles

This applies to sub-plates acc. to table 5 and 6 in sect. 2.3 (slot type throttles) and acc. to table 8 in sect. 2.4 (thread type throttles for individual pressure regulation).
Note: To protect the sealing lip of the SEAL-Lock collar nut, it has to be slackened before readjusting the throttle.

4.1.1. Slot type throttle (type Q, QR or QV20 acc. to pamphlet D 7730)

Maximum adjustment travel

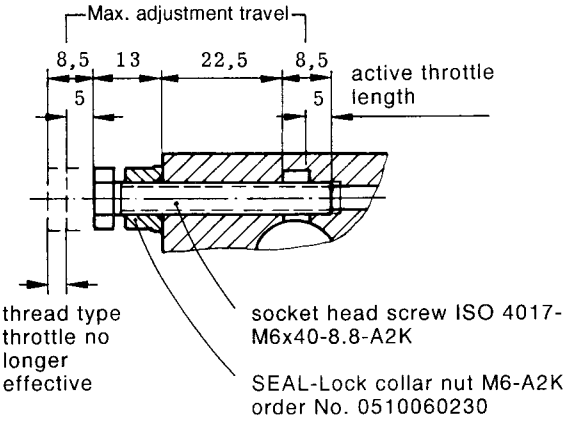


A red ring marking becomes visible as soon as the max adjustment travel (guiding dimension a_{max} = 5 mm) is achieved. Further undoing will not achieve any further change (reduction) of the cross-section area, which influences the Δp-value.
It is not possible to provide an internal stop, preventing further or even complete unscrewing, due to design reasons. Therefore the red ring marking also represents the end of the permissible adjustment travel. The number of load-bearing pitches would be reduced and there is the risk that the throttle screw might be torn out at high pressures when unscrewed too far. This point should be entered in the operating manual or the operating instructions for the system, if required.

Attention: Do not unscrew the throttle screw beyond the red marking ring!

4.1.2. Thread type throttle

Maximum adjustment travel



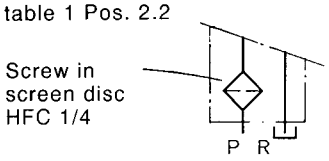
The thread type throttle has an overlong screw-in depth due to design reasons, therefore special marking rings aren't provided.
It is necessary to point out in the operating manual or the operating instructions for the system, that this indicated max. adjustment travel (8,5 mm) must not be exceeded.

4.2. Fitted screen filters as standard

To prevent sudden disturbance caused by coarse particle contamination that may occasionally be carried along in the oil (such as torn off particles of tubing, packing, scale swarf) the directional seated valves are fitted with screen filter elements (acc. to D 7325) as well as the connection and sub-plates with screen filter elements acc. to D 7235. For the sake of simplicity, the filter elements are not explicitly shown in the diagrams.

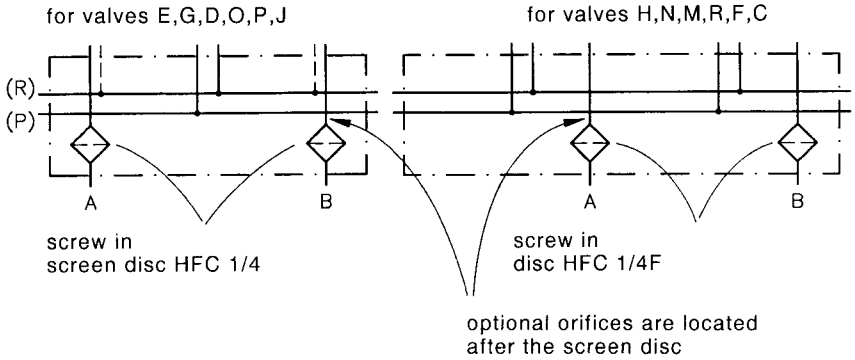
Connection block

BVZP1A.. acc. to table 1 Pos. 2.2



Sub-plates

acc. to table 5 sect. 2.3



4.3. 3-way pressure reducing valve, connected in series

Max. permissible inlet pressure 315 bar (P side), for pressure reducing valves suitable up to 400 bar, see sect. 2.4

The pressure reducing valve section can be placed arbitrarily within the subsequently mounted sub-plates of the valve bank (serial connection). It limits the pressure for all directional valves mounted downstream (secondary side) and the consumers connected to them, independent from simultaneous withdrawal of pressurised oil with a higher pressure level via directional valves located upstream (primary side).
The primary side can only be kept leakage-free (if necessary) by versions Z31. to Z48. with a pre-located 2/2-way seated valve. This is due to the functionally determined, permanent internal leakage even if there is no consumption of pressurised oil on the secondary side. The 2/2-way seated valve has to be actuated whenever pressurised oil is withdrawn. The secondary side is protected against leakage by a check valve located down stream of the pressure reducing valve. However, this means that the pressure reducing valve cannot be used as an secondary pressure limitter here, if the secondary pressure is exceeded due to external, rising forces acting on the consumer. If necessary the consumer line would have to be safeguarded by its own pressure limiting valve and made flexible.

correct order code acc. to type coding in sect. 2.1

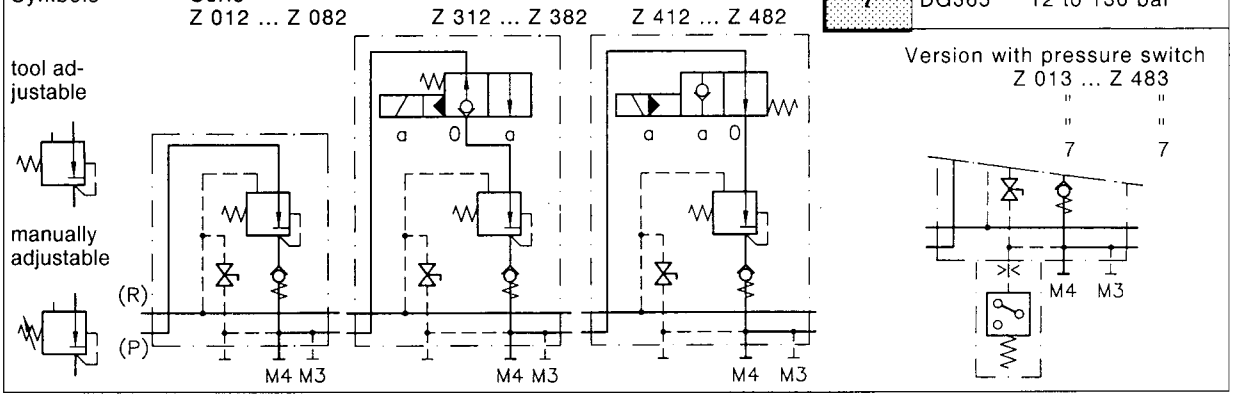
Bestellbeispiel: BVZP1 A4-1/300-G22/22 - **Z 377** - H12 B1,0H2/0 - 1 - 1 - WG 230

Table 10 3 way pressure reducing valve for serial connection

Secondary pressure adjustable in the range of (bar)	Standard version tool adjustable	Standard version manually adjustable	With pre-located 2/2-way directional valve acc. to D 7490 EM1V tool adjustable	EM1V manually adjust.	EM1S tool adjustable	EM1S manually adjust.
160 to 250	**Z 01.**	**Z 05.**	**Z 31.**	**Z 35.**	**Z 41.**	**Z 45.**
60 to 160	**Z 02.**	**Z 06.**	**Z 32.**	**Z 36.**	**Z 42.**	**Z 46.**
30 to 120	**Z 03.**	**Z 07.**	**Z 33.**	**Z 37.**	**Z 43.**	**Z 47.**
10 to 30	**Z 04.**	**Z 08.**	**Z 34.**	**Z 38.**	**Z 44.**	**Z 48.**
Version with EM1SH (manual emergency stop)					Z 4.. **H**	

Pressure switch on the secondary side DG3.. acc. to D 5440 Code No.	Type and range for switching operation	
2	without DG3.., may be retrofitted	
3	DG33	200 to 315 bar [1]
4	DG34	100 to 315 bar [1]
5	DG35	20 to 210 bar
6	DG36	4 to 12 bar
7	DG365	12 to 130 bar

Symbols



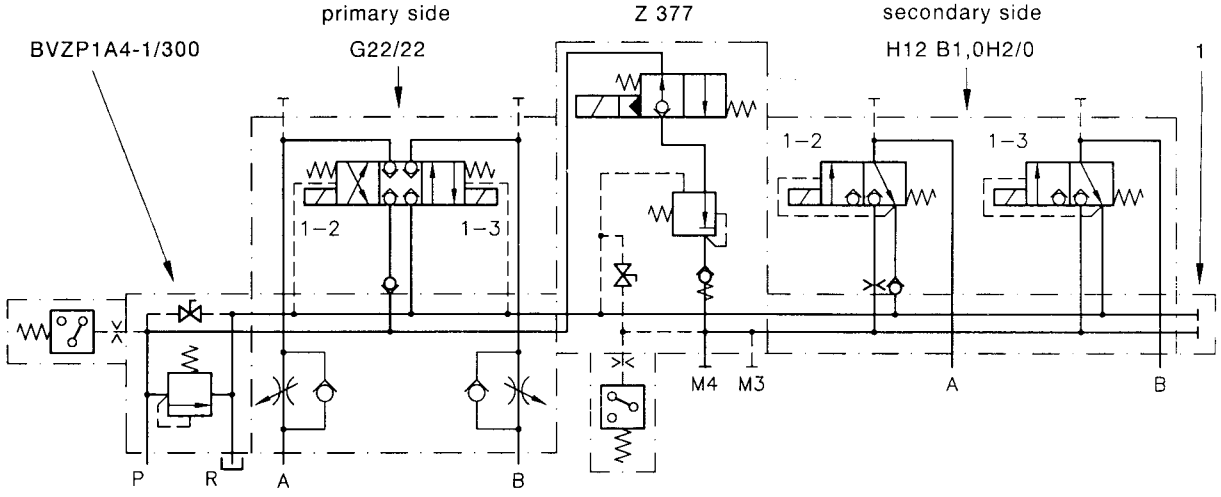
[1] The full operation range of the pressure switch type DG 3.. cannot be used due to the pressure reducing valve.

for dimensional drawings see sect. 3.3.1

Individual order (e.g. for replacement, expansion, own storekeeping etc.)

Order example: VZP1 - Z423 - G24

Symbol scheme to the order example above, representation shows actual arrangement



4.4. Valve section with 4/2-way function (directional spool type version) acc. to D 7785A sect. 5.1

Switchable pressure p_{max} = 300 bar; Permissible flow Q_{max} = 16 l/min

The spools are pressure resistant up to 450 in idle position or switched through state. If this is not permissible, a 2-way pressure reducing section may be mounted in series ahead of the directional spool valve section (sect. 2.4).

Attention: Directional spool type valves always show some leakage, this means that consumers connected to them cannot be maintained under pressure as soon as the pump is switched off or in idle circulation mode. Directional seated valve versions should be selected, if this situation is unacceptable.
For further notes see D 7785A sect. 5.1.

4.4.1. Type coding

Order example: BVZP1 A4/250 - H2H2/22 -
- G22/0 -
- D42/20
- WX4 W2B0,8/0 - 1 - 1 - G24

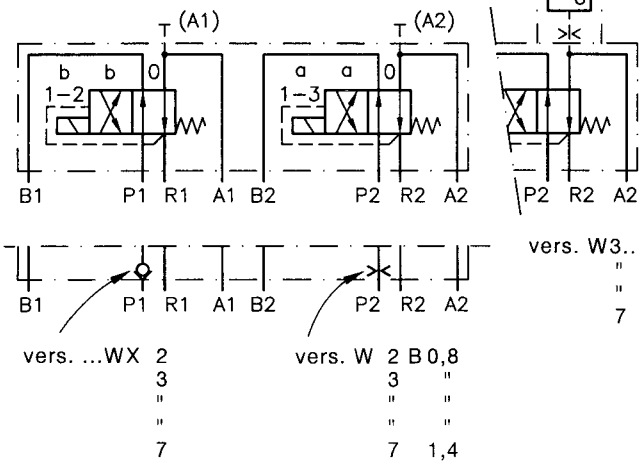
Individual order (e.g. replacement, own storekeeping etc.)

VZP1 - **WX4 W2B0,8/0** - G24

should be inserted as described in the tables

Symbols

Example 1: VZP1W2W2 - ...



Example 2: VZP1R4WX2 - ...

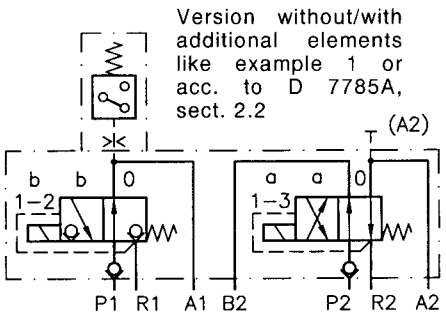


Table 11: 4/2-way directional spool valve

W	A version with return pressure stop (like at sect. 2.2, for 3/2-way directional valves) is not available due to design reasons
WX	
H, H1 N, N1 M, M1 R, R1	The 3/2-way directional seated valves acc. to sect. 2.2 have to be located on solenoid side **b** (1-2) always, when combined with spool valves type W..

Table 12: Pressure switch type DG3 .. acc. to D 5440, optionally for valve port A1 or A2

2 3 ... 7	For selection and description see table 4 in section 2.3.

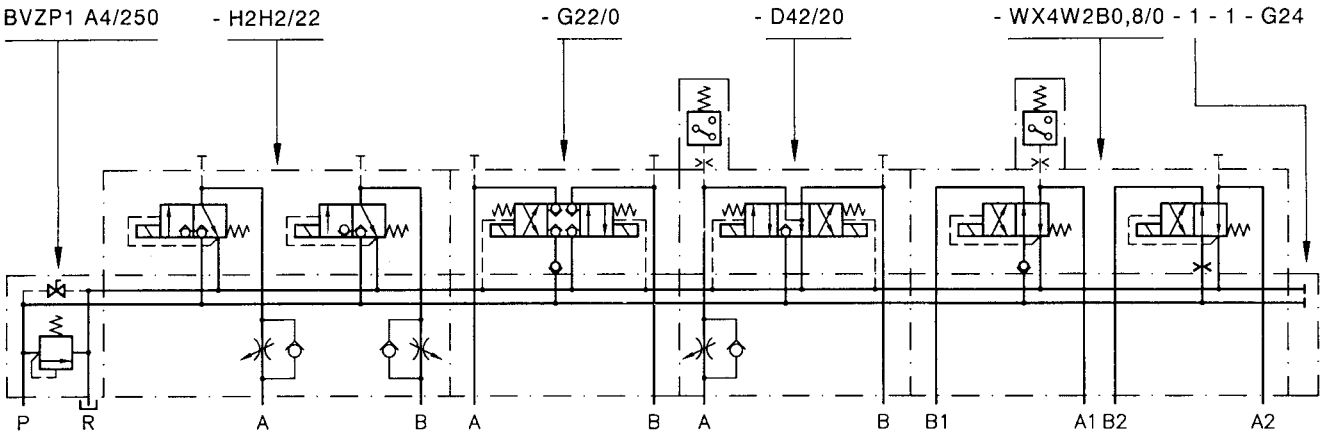
Table 13: Orfice as an additional element to limit the flow

Orifice plugged into port P1 or P2.
Note: This only applies to spools code letter W or seated valves code letter H(1) or M(1).
For selection and description see table 4 in section 2.3.

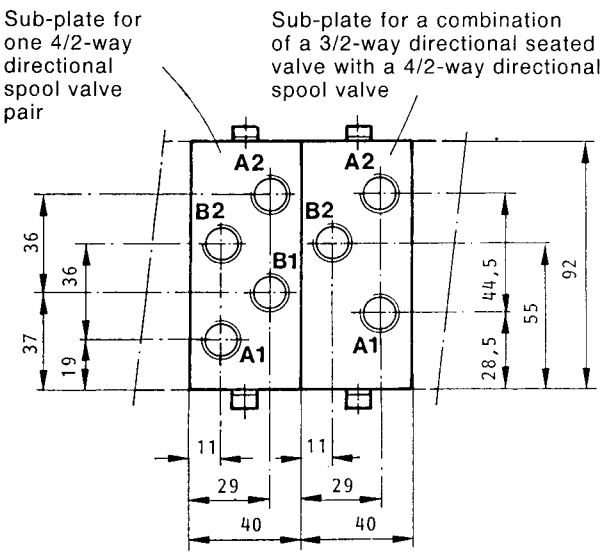
Table 14: Sub-plate

0	basic version without additional elements

Hydraulic circuit acc. to the order example (also see sect. 2.1)



4.4.2. Unit dimensions



ports conforming DIN ISO 228/1:
A1, A2 = G 1/4
B1, B2 = G 1/4

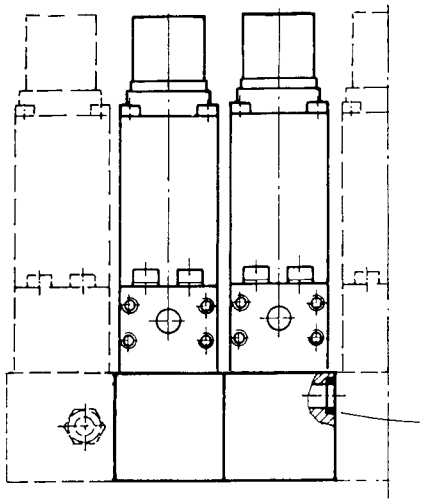
For missing dimensions see sect. 3.2.1 as well as D 7785A sect. 5.1

All dimensions are in mm
and are subject to change without notice!

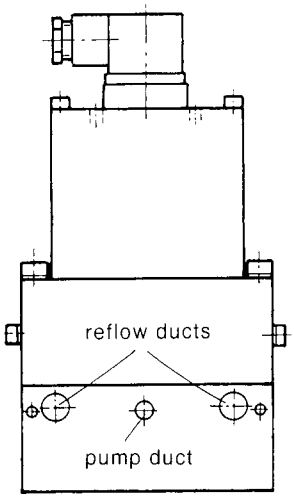
4.5. Other individual component parts and notes

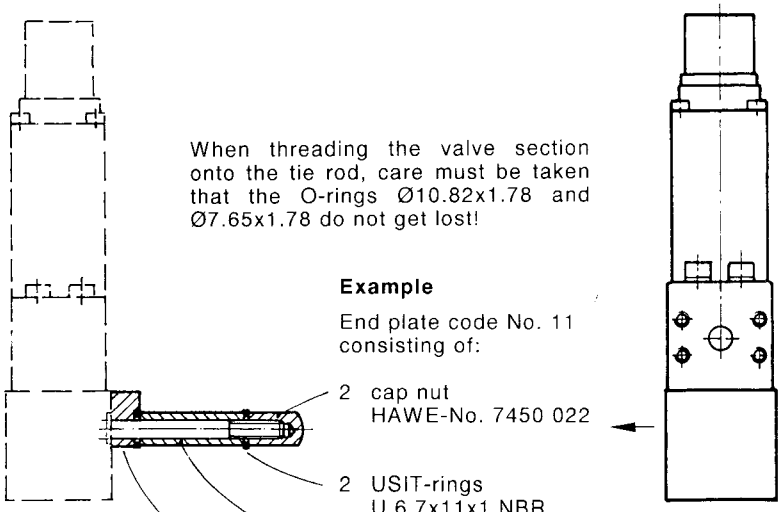
Sealing by O-rings between the sub-plates

(For dimensions of O-rings utilized between valve and sub-plate see D 7785A, sect. 4 and 5.1.2)



	O-ring NBR 90 Sh
Pump duct	7,65x1,78
Reflow ducts	10,82x1,78





When threading the valve section onto the tie rod, care must be taken that the O-rings Ø10.82x1.78 and Ø7.65x1.78 do not get lost!

Example

End plate code No. 11 consisting of:

2 cap nut
HAWE-No. 7450 022

2 USIT-rings
U 6.7x11x1 NBR

2 tubular spacers 1)
HAWE-No. 7795 062

1 end plate with
2 USIT-rings
U 6.7x11x1 NBR

Valve section to be installed by the customer

Installation directions:

1. Remove cap nut with seals and end plate from the tension rod
2. Thread on valve section
3. Push on end plate with USIT-ring and tighten cap nut with **10 Nm**. Two USIT-rings and the tubular spacers will no longer be needed.

1) Four tubular spacers 7795 062 together with USIT-rings U 6,7x11x1 in between are required for end plate code number 12 (22, 332 etc.).

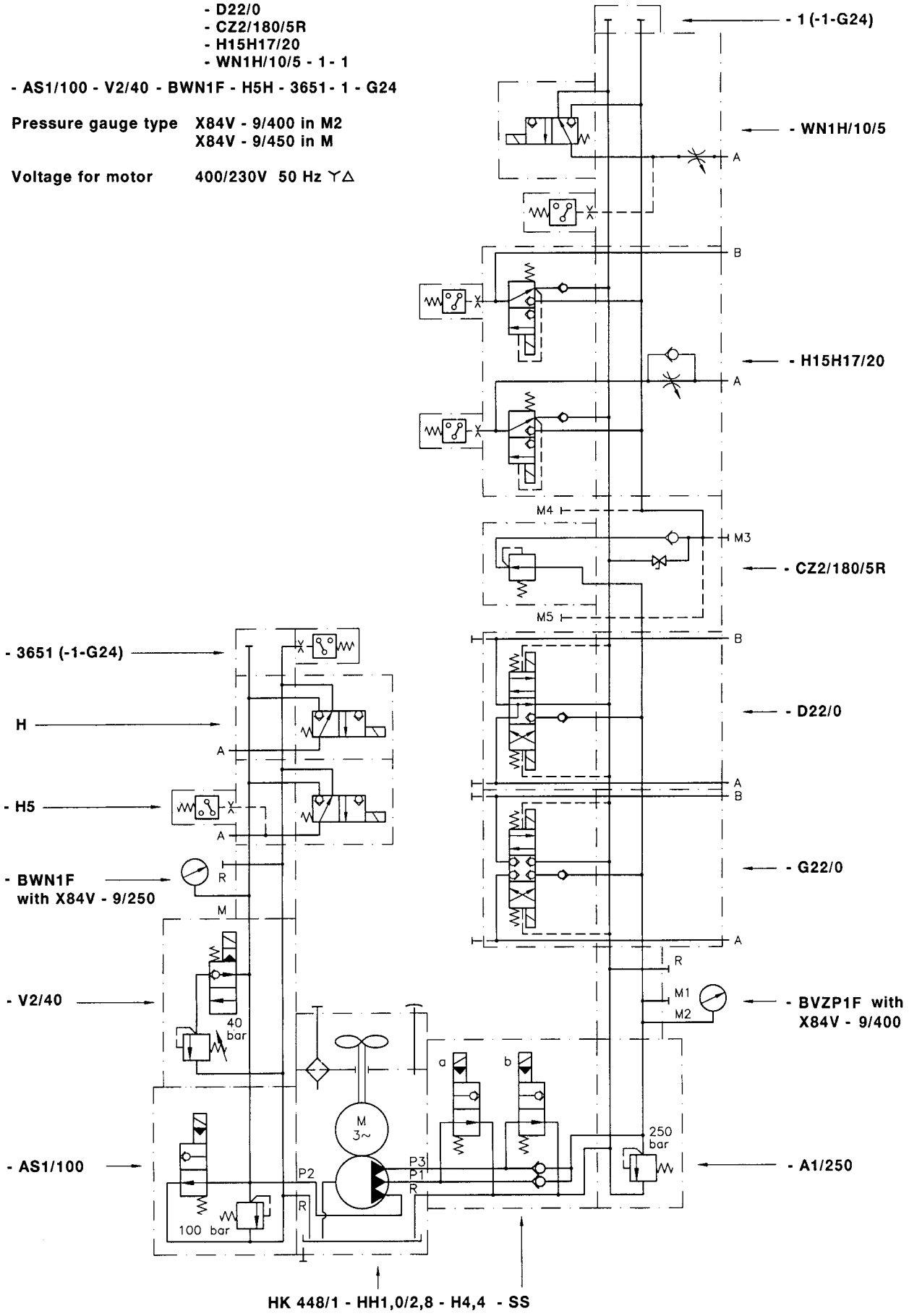
4.6. Example

Order coding:

HK 448/1 - HH1,0/2,8 - H4,4
- SS - A1/250 - BVZP1F - G22/0
- D22/0
- CZ2/180/5R
- H15H17/20
- WN1H/10/5 - 1 - 1
- AS1/100 - V2/40 - BWN1F - H5H - 3651 - 1 - G24

Pressure gauge type **X84V - 9/400 in M2**
X84V - 9/450 in M

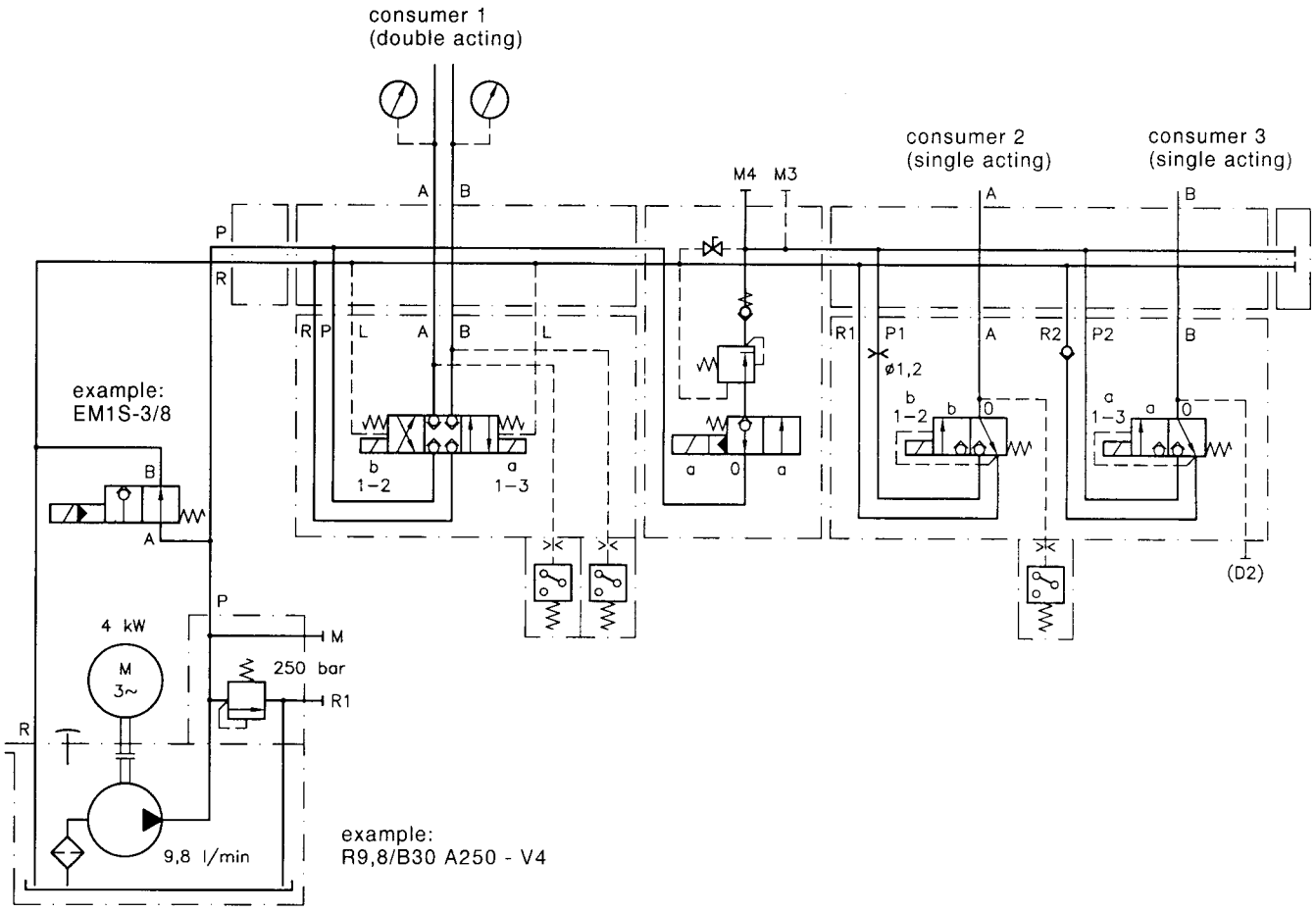
Voltage for motor **400/230V 50 Hz ⅄△**



5. Hydraulic circuit drawings conforming DIN 24347

The control is represented according to the direction of pump flow to the consumers, from the left side to the right and from the bottom upwards starting from the pressurized oil supply (pump). The position of the graphical symbols doesn't have to correspond to the actual spatial position of the individual devices and pipes.
The suggested construction as illustrated e.g. in table 4 of sect. 2.3. is only a graphic representation and not mandatory.

Example: BVZP1A - 5 - G55/0 - Z372 - H7B1,2H12/0 - 1 - 1 - G 24



6. Mass (weight)

Connection blocks (sect. 2.2)

Coding	approx. kg
BVZP1 A2-1(2)/..	1.2
BVZP1 A2-5	1.0
BVZP1 A3..7-1(2)/..	1.5
BVZP1 A3..7-5	1.3
BVZP1F	1.0
BVZP1F22	1.0
BVZP1F32..37	1.2
BVZP1FEH..V15/..	1.9

Directional seated valves and sub-plates (section 2.3)

Standard plate acc. to table 4

Coding	approx. kg	
E. G. J. P D and O	2.9 3.2	+ 0.3 for each DG3.. mounted
H(1). N(1). M(1). R(1). F and C	3.2	
W. WX	2.9	

WN(H)1 or WH2 mounted onto sub-plates acc. to table 6

Coding	approx. kg	
WN(H)1../.. WH2../..	1.5 1.7	+ 0.3 for each DG3.. mounted

Pressure reducing valve section (section 2.4 u. 4.3)

Coding		approx. kg	
Serial connection - CZ...		2.0	+ 0.3 for each DG3.. mounted
Parallely connected	..CZ../..-E to J	3.9	
	..CZ../..-H(1)	4.2	
	..CZ../..-M(1)	4.2	
Serially connected	-Z 012 ... 082	1.7	
	-Z 312 ... 482	2.0	

End plates (section 2.5)

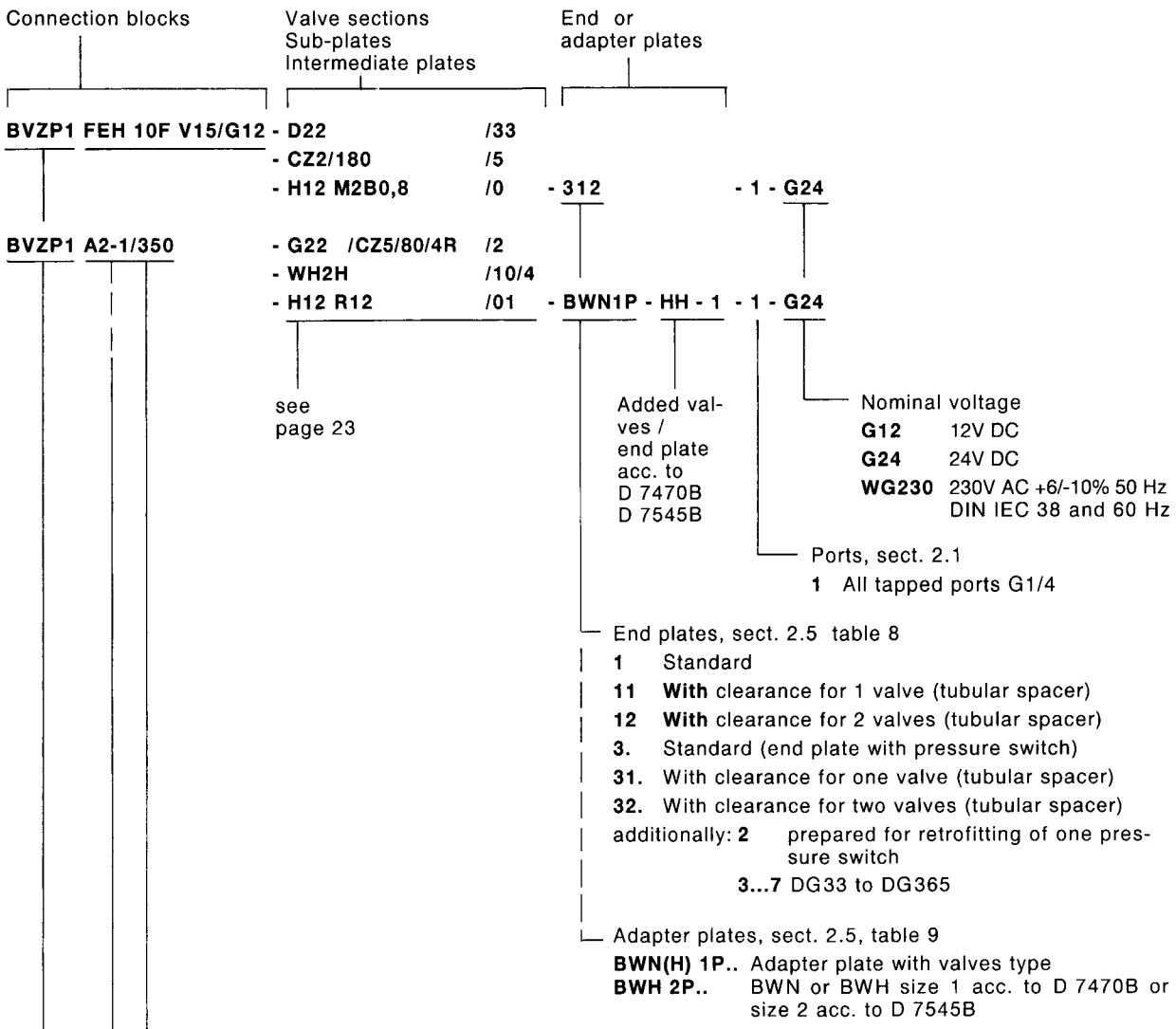
Code No.	approx. kg	Code No.	approx. kg	Code No.	approx. kg
1	0.25	32	0.55	33...7	0.85
11	0.3	312	0.6	313...7	0.9
12	0.35	322	0.65	323...7	0.95

Adapter plates (section 2.5)

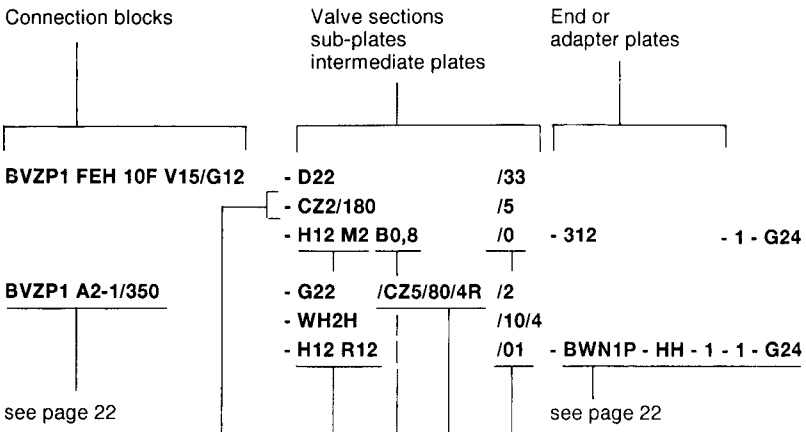
Coding	approx. kg
BWN(H)1P	0.6
BWH2P	0.6

7. Type overview

Order examples:



Order examples (continuing from page 22):



Sub-plates for valve sections, acc to sect. 2.3, table 5 and 6

/0	Standard sub-plate
/00	For retrofitting of one or two throttle valves Type Q(R,V)20 acc. to D 7730 in the consumer ducts
/10, /20, /30	Throttle valve type Q(R,V)20 mounted in port A
/01, /02, /03	Throttle valve typeQ(R,V)20 mounted in port B
/11, /22, /33	Throttle valve type Q(R,V)20 mounted in port A and B (combinations are possible, e.g. **/12, /31** etc.)
	Pressure switch (DG3. acc. to D 5440) mounted in port A for directional valves type WN(H) acc. to table 6 or pressure reducing valve (parallel connection) coding /CZ... acc. to table 7 (coding /22, /32 ... /27 only for type WN(H) with sub-plate coding /0)
/2, /22	Prepared for retrofitting
/3, /4, /5, /6, /7	Pressure switch DG3. in port A
/32.../72, /23.../27	Pressure switch DG3. in port A (at D1 or D2)

Pressure reducing valve (connected in parallel), sect. 2.4, table 7

/CZ1/..., /CZ2/..., /CZ5/...		Pressure reducing valve for on valve section with pressure setting
plus:	**/0**	Without additional elements
	/0R	With additional check valve between pressure reducing and directional valve
	/4	With thread type throttle upstream of the pressure reducing valve
	/4R	With thread type throttle and additional check valve

Additional elements for valve sections, sect. 2.3, table 4

2	Prepared for retrofitting of one pressure switch type DG3. (with code letter F, C, H, N, M, R, P, J, W)
3, 4, 5, 6, 7	Pressure switch (DG3.) in consumer port A or B
22	Prepared for retrofitting of two pressure switches type DG3. (code letter E, G, D, O)
33..77	Two pressure switches type DG3.) in A and B (code letter E, G, D, O)
23..27, 32..72	One pressure switch type DG3.) in A or B, prepared for retrofitting of a second pressure switch (code letter E, G, D, O)
B0,8, B1,0, B1,2, B1,4	Orifice insert Ø 0,8, 1,0, 1,2, 1,4 mm for code letter E, D, P, H(1), M(1)

Valve sections, see table 4 and 6 in sect. 2.3 and table 7 in sect. 2.4,

F, C	2/2-way function (seated valve only available on side B, together with another 3/2-way directional valve)
H, N, M, R	3/2-way function (seated valve together with another 2/2- 3/2- or 4/2-way directional valve)
H1, N1, M1, R1	3/2-way function with return pressure stop (seated valve together with another 2/2- 3/2- or 4/2-way directional valve)
P, J	3/3-way function (seated valve)
E, G, D, O	4/3-way function (seated valve)
W, WX	4/2-way function (spool valve together with another 3/2- or 4/2-way directional valve), see sect. 4.4
WN1., WH1., WH2.	Individual directional function with directional seated valves type WN(H)1 Acc. to D 7470A or WH2 acc. to D 7545E, plus flow pattern coding H(1), N(1), M(1), R(1), F and D (see table 6) (for type WN(H)1 only: B, Q, C, E, P, O)

CZ1/..., CZ2/..., CZ5/...		2-way pressure reducing valve incl. pressure setting connected in series, table 7 in sect. 2.4,
plus:	**/5**	Without additional elements
	/5R	With additional check valve between pressure reducing valve and directional valves located down-stream

Z01...Z48 **Z312...Z482**	3-way pressure reducing valve connected in series, table 10 insect. 4.3, Additionally prepared for retrofitting of a pressure switch type DG3. for the secondary circuit (table 10)
Z313(4..7)...Z483(4..7)	With additional pressure switch type DG3. in the secondary circuit (table 10)