

Proportional pressure reducing valves type PM and PMZ

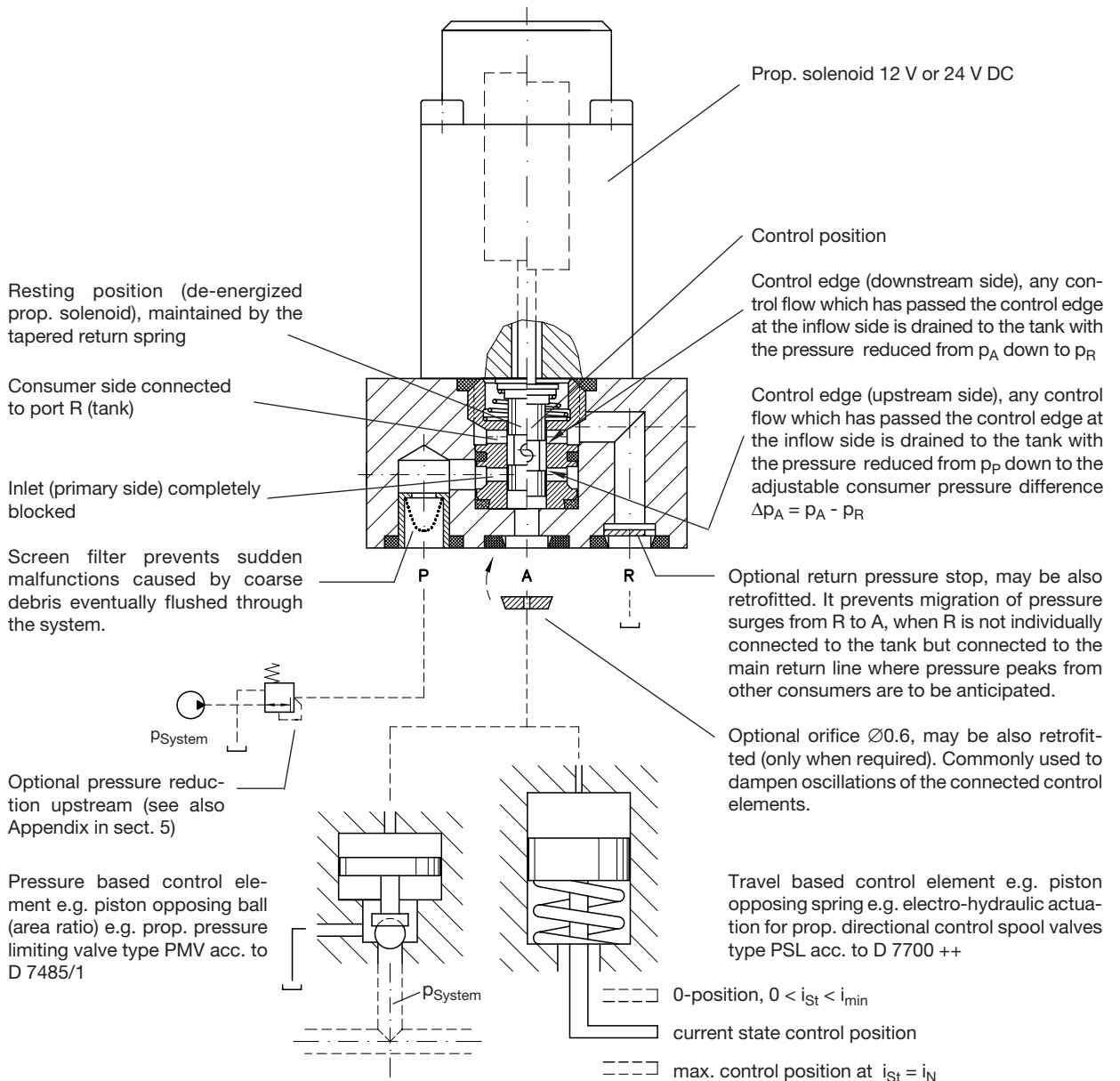
preferably as pilot valve up to approx. 30 bar

Pressure difference $\Delta p_{\max} = 30 \text{ bar}$
 Flow $Q_{\max} = 2 \text{ lpm}$

1. General

The pressure reducing valves type PM and PMZ are directly actuated valves in all-steel design. They consist of valve body, controller spool and -sleeve, and prop. actuation solenoid. The higher, eventually varying system pressure p_p apparent at port P is reduced down to a lower constant pressure level at port A. This pressure level corresponds to the current fed to the prop. solenoid with a limit $\Delta p_A = p_A - p_R$. The pressure p_A apparent at port A is used for hydraulic actuators or for stepless switching operations at variable displacement pumps, proportional valves etc. The power consumption of the prop. solenoid is low, enabling use of prop. amplifiers type EV acc. to D 7817/1, D 7831/1, D 7831 D or D 7835 as well as the programmable logic valve control type PLVC acc. to D 7845 ++.

The max. inlet (system) pressure at port P is rated at 40 bar to prevent any controller inaccuracies or stepwise operation after steady-state periods. When the system pressure is higher than 40 bar it is recommended to use a pressure reducing valve e.g. type ADC 1-25 or AM 1-25 acc. to D 7458, see also examples in sect. 5.



2. Available versions, main data

2.1 Individual valves

Order example:

PM 11 - 7 - B 0,6 - G 24 /1
PMZ 1 - 30 - 30 - G 24 - 1/4

Table 1: Basic type

Coding	Version
PM 1	Single valve
PMZ 1	Assembly kit
PMZ 01	
PM 11	Manifold mounting
PM 12	

Individual connection block, port G 1/4 (BSPP) (for type PMZ 1 only)

Solenoid orientation
 Assembly kits PM 1 and PMZ 1
 Without coding = Individual parts
 Single and double valves PM 11 and PM 12
/1 (2, 3) = Solenoid orientation (see sect. 4.2)

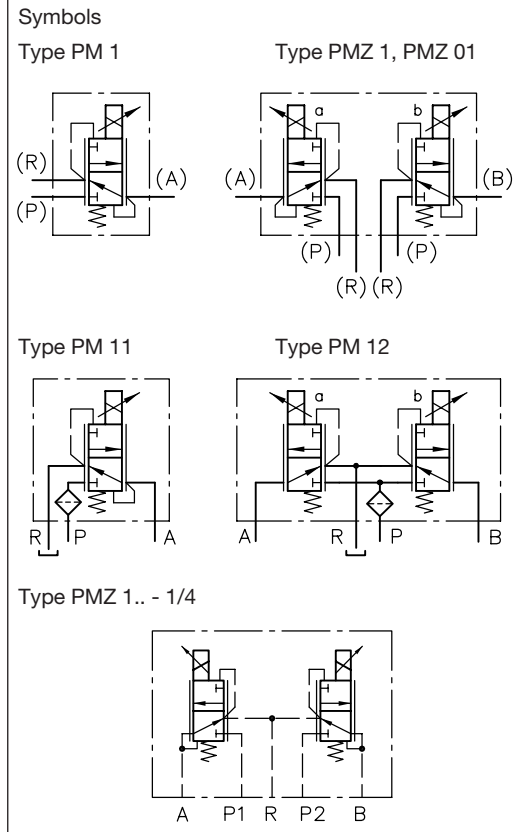


Table 3: Additional elements

Coding	Description
(ohne)	Standard
R	Return pressure stop at R only PM 11 and PM 12
B 0,6	Throttle Ø0.6 at A and B

Table 2: Proportionally adjustable nominal pressure difference

Coding	$\Delta p_A = p_A - p_R$ (bar)
30	30
19	19
14	14
11	11.5
9	9
7	7.5
5,5	5.5
4	4.5

Table 4: Nom. solenoid voltage

Coding	Nominal voltage	Description	PM	PMZ 1	PMZ 01
G 12, X 12, G 12 T(H) 2), X 12 T(H) 2)	12 V DC	Standard, version with connection conf. EN 175 301-803 with (G ..) or without (X ..) plug	•	•	•
G 24, X 24, G 24 T(H) 2), X 24 T(H) 2)	24 V DC	G(X)..T with manual emergency actuation, G(X)..TH with additional push button	•	•	•
G 24 H 4, X 24 H 4	24 V DC	Like G 24 (X 24), but solenoid for electrical actuation 4-pin		•	
G 24 C 4, X 24 C 4	24 V DC	Version with connection conf. EN 175 301-803, 4-pin, with (G ..) or without (X ..) plug		•	
AMP 24 H 4	24 V DC	Version with connection via AMP Junior Timer, 4-pin at electrical actuation		•	•
DT 12, DT 24	12 V DC 24 V DC	Connection via plug Co. DEUTSCH DT 04-4P, suited for socket DT 06-4S		•	•
S 12, S 12 T 2), S 24, S 24 T 2)	12 V DC 24 V DC	Version with quarter turn type plug (Bayonet PA 6, Co. Schlemmer D-85586 Poing, suited for taper with bayonet 10 SL), version S..T with additional manual emergency actuation. Plug is not scope of delivery.	•	•	•
G 24 EX 1), G 24 EX-10 m 1)	24 V DC	For use in areas with explosion hazardous atmosphere. Suited for category 2 and 3, zone 1, 21, 2, 22. Protection class EEx m II 120° (T4), with cable length 3 m (no coding) or 10 m		•	
G 24 MSHA 1), G 24 MSHA-10 m 1)	24 V DC	For use in mines and its on-surface systems, where a MSHA (USA) or MA (China) approval is mandatory. Protection class I M2 Ex d I (flame proof, intrinsic safe), with cable length 5 m (no coding) or 10 m		•	

1) Not available as valve bank

2) Options ...T and ...TH only available with type PMZ 1 and PMZ 01

2.2 Valve bank

It is possible to arrange the individual valves type as valve banks via sub-plates. A maximum of 10 valves can be combined.

Attention: Not available are valves with ex-proof solenoids!

Order example:

PMZ 1 A51 - 11/1 - 11/1 - 1 - G 24

Basic type and connection block with pressure reducing valve on the inlet side

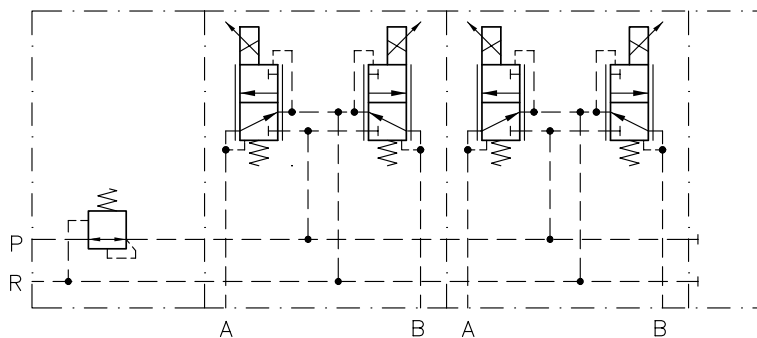
Solenoid voltage (table 4)

End plate

Pressure reducing valve acc. to table 2

Sub-plate

Symbol



Ports:
P, R, A and B = G 1/4 (BSPP)

3. Additional parameters

3.1 General and hydraulic

Nomenclature, design	Proportional pressure reducing valve; directly actuated spool type valve with additional safety valve function (conf. DIN ISO 1219-1)
Material	All-steel design; controller sleeve nitrous hardened and honed. Controller spool hardened and ground. Both components polish-deburred. Optimum wear resistance against erosion and cavitation caused by the passing fluid.
Surface treatment	Valve body: gal Zn 5-8bk Proportional solenoid: gal Zn 12mtcD
Port coding	P = Inlet (primary side) A = Consumer outlet (secondary side) R = Return (to the tank)
Pipe connection	PM 1, PMZ 1: Corresponding ports are to be located in the customer furnished manifold. Attention: Provide a contamination screen at the P-side, e.g. type HFC 1/4 F acc. to D 7235 PM 11, PM 12, PMZ 1...-1/4: For dimensions, see sect. 4.3
Installed position	Any
Flow direction	P → A (→ R) (Controller position at fluid removal mode) A → R (Controller position at safety valve function mode)
Operating pressure	Inlet P (P1, P2): $p_{P\max} = 40$ bar, when the system pressure is higher a pressure reducing valve should be provided e.g. type ADC 1 or AM 1 acc. to D 7458, see also examples in sect. 5. Outlet A (B): $p_A = \Delta p_A + p_R$ proportionally adjustable pressure difference $\Delta p_A = (0) \dots 4$ to $(0) \dots 30$ bar dep. on type, see also curves at page 4 Outlet R: best depressurized to the tank, $p_R \leq 20$ bar with PM 1, PM 11, PM 12 $p_R < 5$ bar with PMZ 1 permissible static load capacity (idle mode) PM 1, PM 11, PM 12 = 315 bar (all ports) PMZ 1: P (P1, P2) = 40 bar; A (B) = 20 bar; R = 5 bar
Flow	Q_{\max} approx. 2 lpm
Mass (weight)	PM 1 = 200 g; PM 11 = 300 g; PM 12 = 600 g; PMZ 1 = 500 g; PMZ 1...-1/4 = 600 g
Pressure fluid	Hydraulic oil acc. to DIN 51524 table 1 to 3; ISO VG 10 to 68 conf. DIN 51 519 Viscosity range: min. approx. 4; max. approx. 600 mm ² /sec Optimum: 10 to 500 mm ² /sec Also suitable are biologically degradable pressure fluids type 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. Restriction regarding ex-proof solenoid max. ambient temperature -35 ... +40°C, Fluid: max. 70°C
Notes regarding use of ex-proof solenoids:	Observe the operation manual B 01/2002! The assembly kit type PMZ 1 can only be used when a manifold with minimum dimension of 96 x 80 x 49.5 mm is provided. It is therefore not possible to use ex-proof versions in valve banks type PMZ 1 A51-... acc. to sect. 2.2. Both coils of the twin solenoid must not be energized simultaneously!

3.2 Electrical data

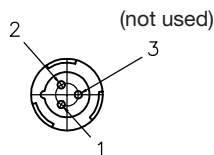
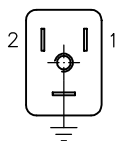
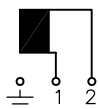
Solenoid		Manufactured and tested acc. to VDE 0580 The armature cavity of the wet armature solenoid is sealed to the outside and internally connected to R. This way the armature is maintenance free lubed by the hydraulic fluid and protected against corrosion.				
Valve type		PM		PMZ 1 / PMZ 01		
Nom. voltage U_N	(V DC)	12	24	12	24	24 (ex-proof) ripple 15%
Coil resistance $R_{20} \pm 5\%$	(Ω)	5.9	24	6.7 / 6.7	27.2 / 28	27.0 / --
Current, cold I_{20}	(A)	2.0	1.0	1.8 / 1.8	0.88 / 0.86	0.88 / --
Max. current I_G	(A)	1.26	0.63	1.26 / 1.16	0.63 / 0.58	0.63 / --
Power, cold $P_{20} = U_N \times I_{20}$	(W)	24	24	22 / 22	21 / 21	21.5 / --
Max. power $P_G = U_N \times I_G$	(W)	9.5	9.5	10.6 / 13.9	10.8 / 13.9	10.8 / --
Switch-off energy W_A	(Ws)	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3
Relative duty cycle		100%		100% ED (only one coil)		
Protection class	X.., G..	IP 65 with properly mounted plug			IP 67 (IEC 60529)	
IEC 70 (Co) 13	S..:	IP 67 (IEC 60529)				
Required dither frequency		50 ... 150 Hz				
Dither amplitude		$20\% \leq A_D \leq 40\%$				
$A_D (\%) = \frac{I_{peak - peak}}{I_G} \cdot 100$						

Electr. connection

Type PM

Circuitry for coding -G 12, -G 24
-X 12, -X 24
Industrial standard (like EN 175 301-803)

Circuitry for coding -S 12
-S 24
Quarter-turn PA 6, Co. Schlemmer



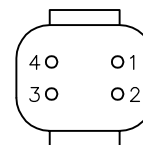
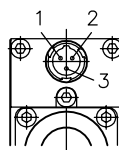
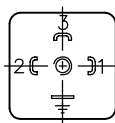
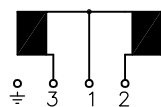
Type PMZ

Circuitry for coding -G 12, -G 24
-X 12, -X 24
EN 175 301-803 A
3-pin
IP 65 (IEC 60529)

Circuitry for coding -S 12
-S 24
3-pin
IP 67 (IEC 60529)

Circuitry for coding -DT 12
-DT 24
4-pin
IP 67 (IEC 60529)

3-pin
Coil a (1) Coil b (2)



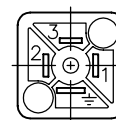
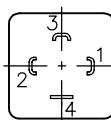
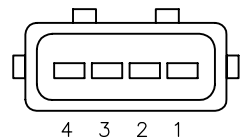
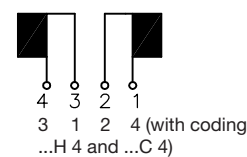
Type PMZ

Circuitry for coding -AMP 12 K 4
-AMP 24 K 4
AMP Junior Timer,
4-pin
IP 65 (IEC 60529)

Circuitry for coding -G 12 H 4
-G 24 H 4
4-pin
IP 65 (IEC 60529)

Circuitry for coding -G 24 C 4
EN 175 301-803 C
4-pin
IP 65 (IEC 60529)

4-pin
Coil a (1) Coil b (2)



The IP-specification only applies when the plug is mounted as specified.

Additional notes regarding versions with ex-proof solenoid (see also restrictions at page 3!)

Letter of conformity

TÜV - A02 ATEX 0007 X

Coding

⊕ II 2 GD T120°C IP67 EEx m II 120°C(T4)

Attention: Additionally observe operating manuals B 01/2002 and B ATEX.

Required electrical fusing (acc. to IEC 127)

$I_F < 1.8$ A medium

Installation

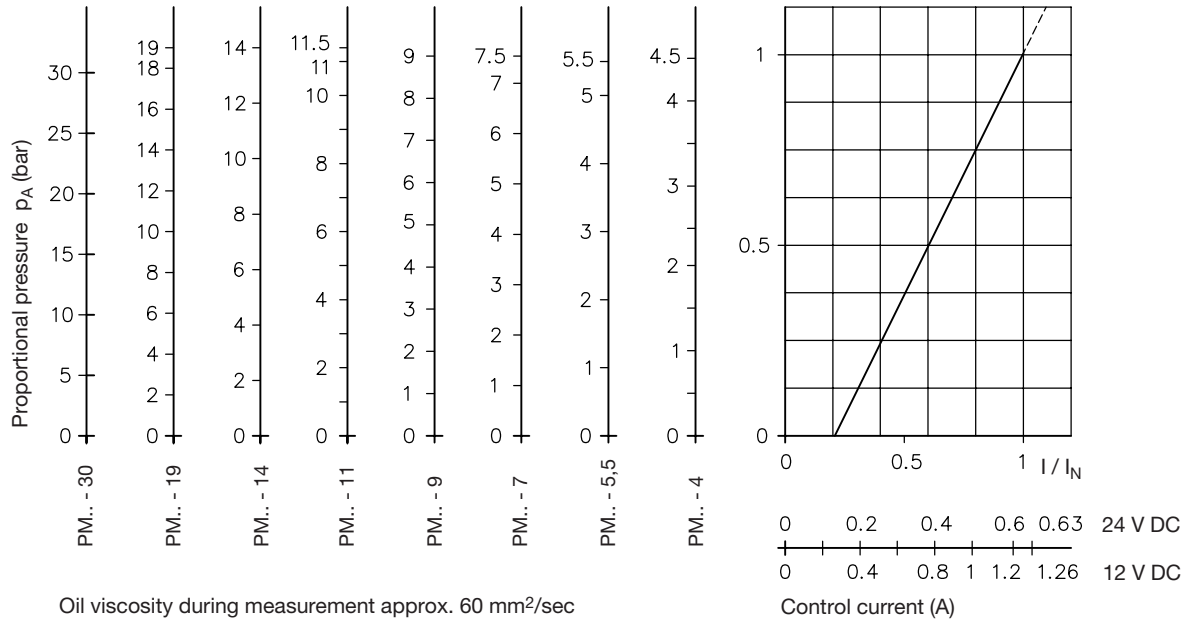
Protect against direct sun light

(see also restrictions at „Temperature“)

Electrical layout and testing

conforming EN 50014, DIN VDE 0170/0171 T1 and T9

Δp_A -I-curves

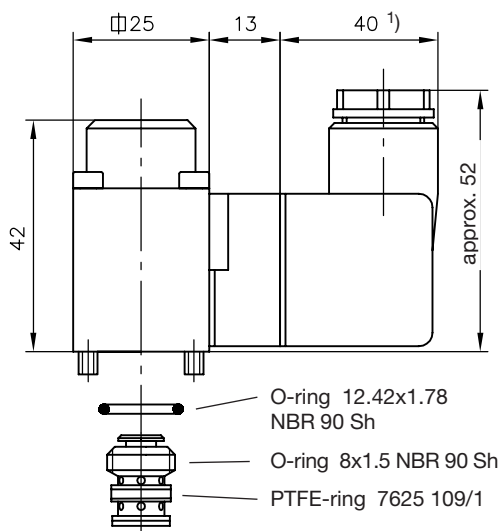


4. Unit dimensions All dimensions in mm, subject to change without notice!

4.1 Assembly kits

Individual valve type PM 1

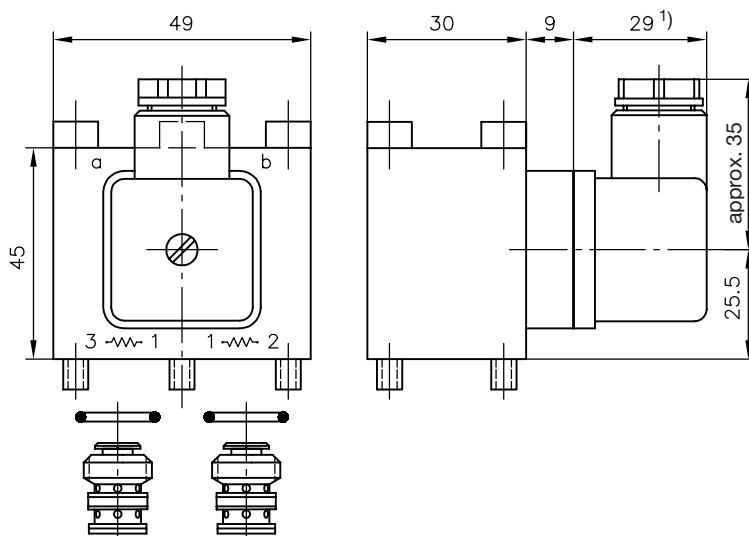
Solenoid coding **G..**



Prop. pressure reducing valve insert

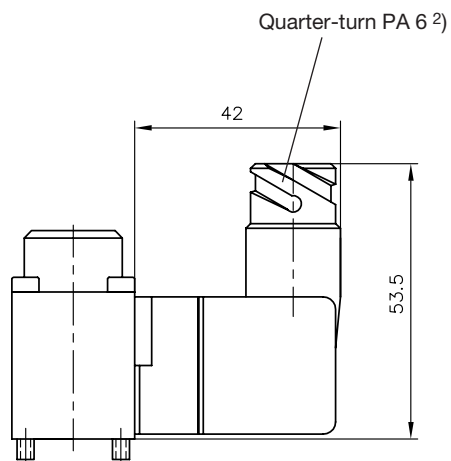
Twin valve PMZ 1

Solenoid coding **G..**



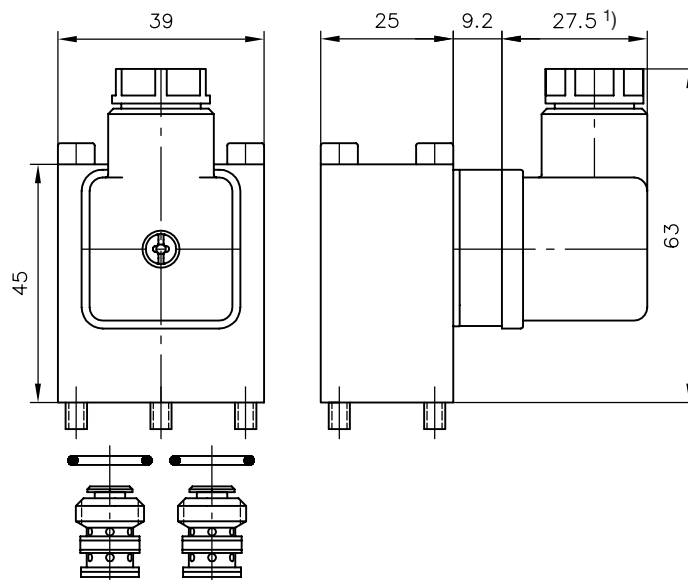
Type PM

Solenoid coding **S**



Twin valve type PMZ 01

Solenoid coding **G..**

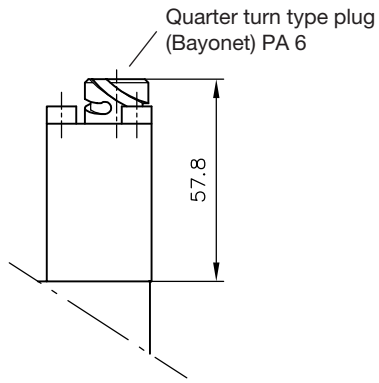


1) This dimension depends on the manufacturer and may be max. 40 mm acc. to EN 175 301-803.

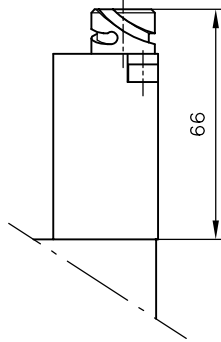
2) Accessories (to be ordered individually):
 SCHLEMMER-plug, 90° 10SL part No. 6217 8071-00
 SCHLEMMER-plug, straight 10SL part No. 6217 8070-00

Type PMZ 1

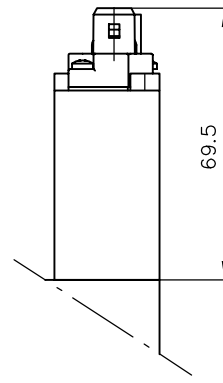
Solenoid coding **S**



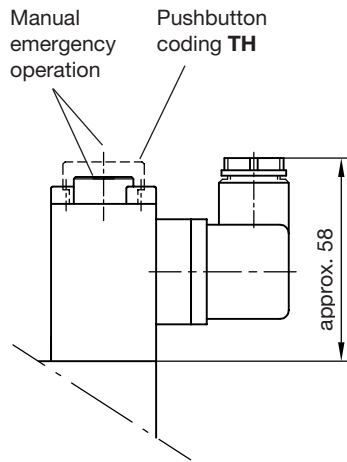
Solenoid coding **S..T**



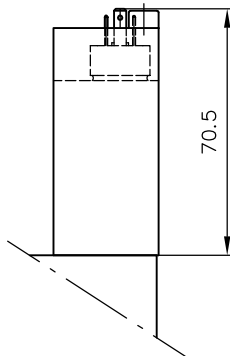
Solenoid coding **AMP 24 H 4**



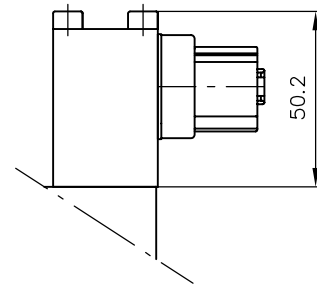
Solenoid coding **G.. T**
X.. TH



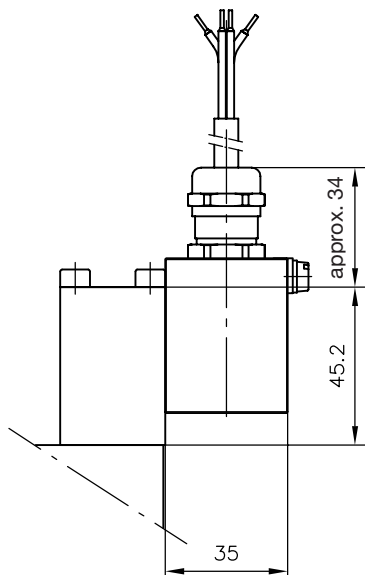
Solenoid coding **G.. C 4**
X.. C 4



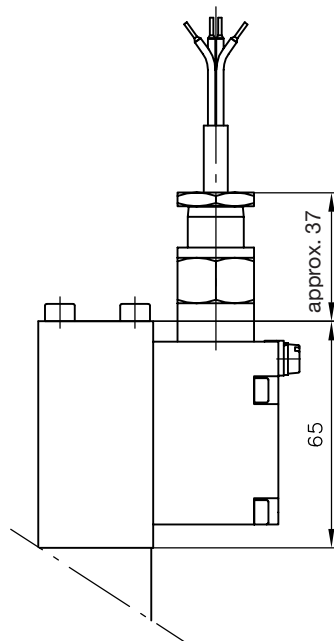
Solenoid coding **DT 12**
DT 24



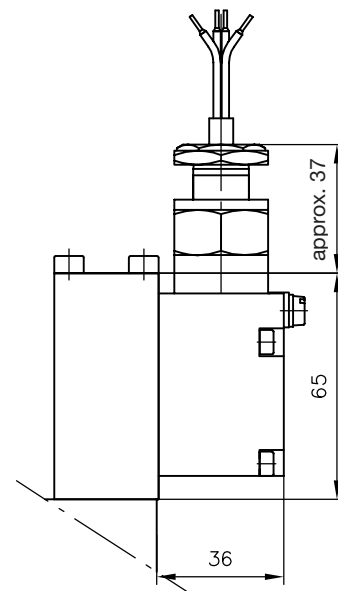
Solenoid coding **G.. EX**



Solenoid coding **G.. T EX**



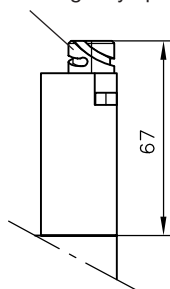
Solenoid coding **G 24 MSHA**



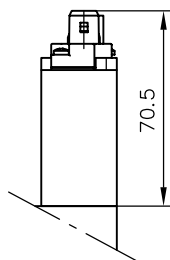
Type PMZ 01

Solenoid coding **S 12**
S 24

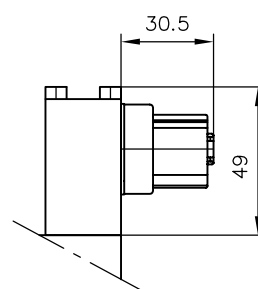
Manual emergency operation



Solenoid coding **AMP 12 K 4**
AMP 24 K 4



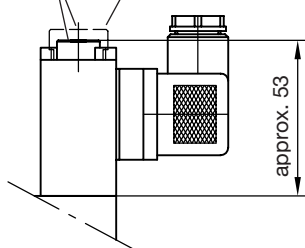
Solenoid coding **DT 12**
DT 24



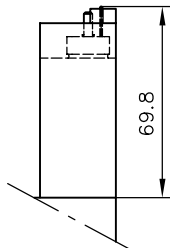
Solenoid coding **G(X) 12 T**
G(X) 24 T

Manual emergency operation

Pushbutton coding **TH**

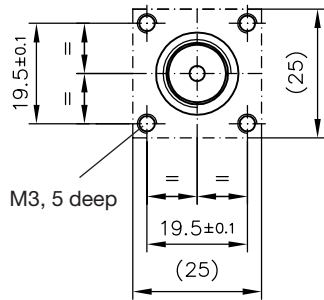
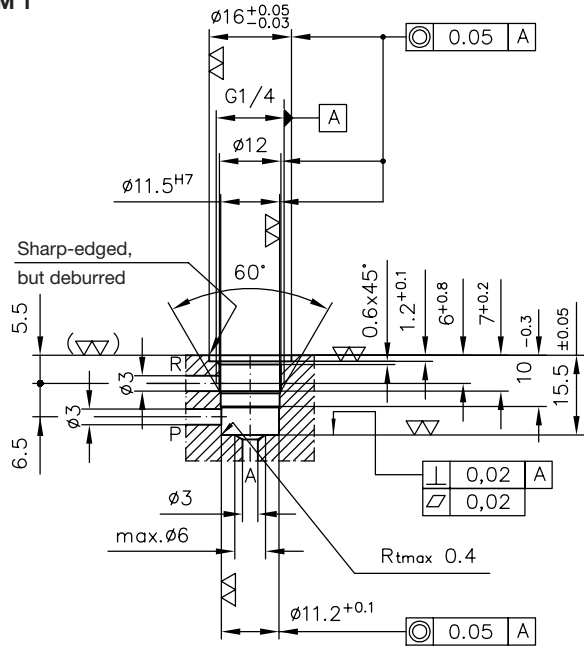


Solenoid coding **G(X) 24 C 4**



Mounting hole

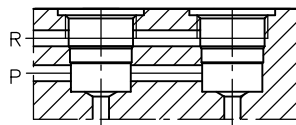
PM 1



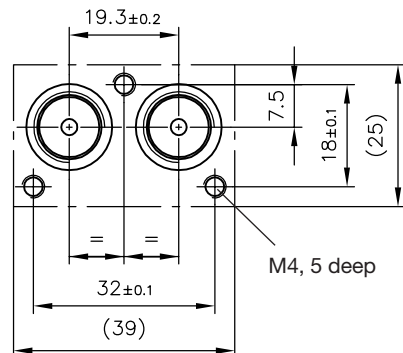
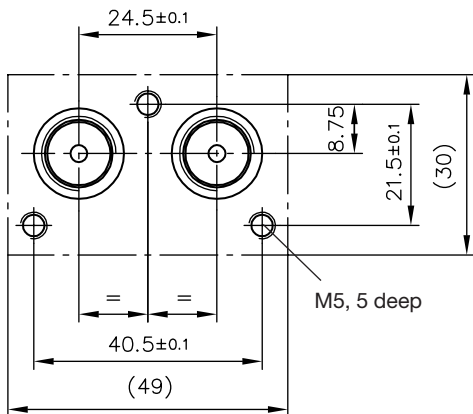
Mounting hole

PMZ 1

PMZ 01

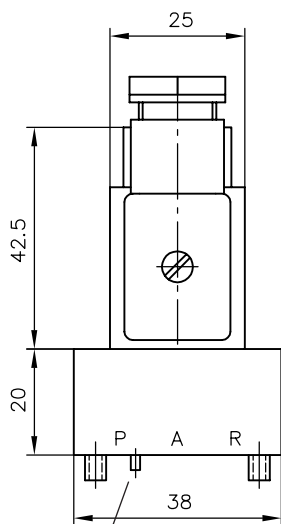


For missing dimension, see type PM 1



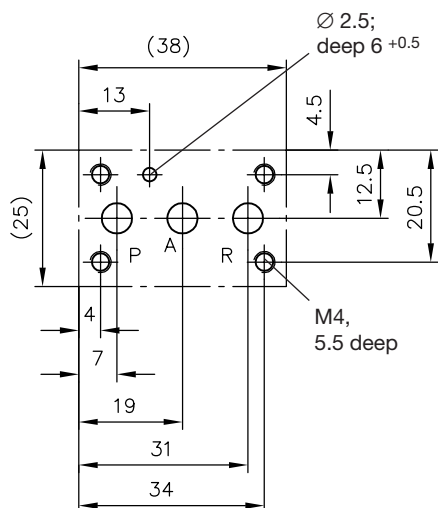
4.2 Version for sub-plate mounting

Individual valve type PM 11



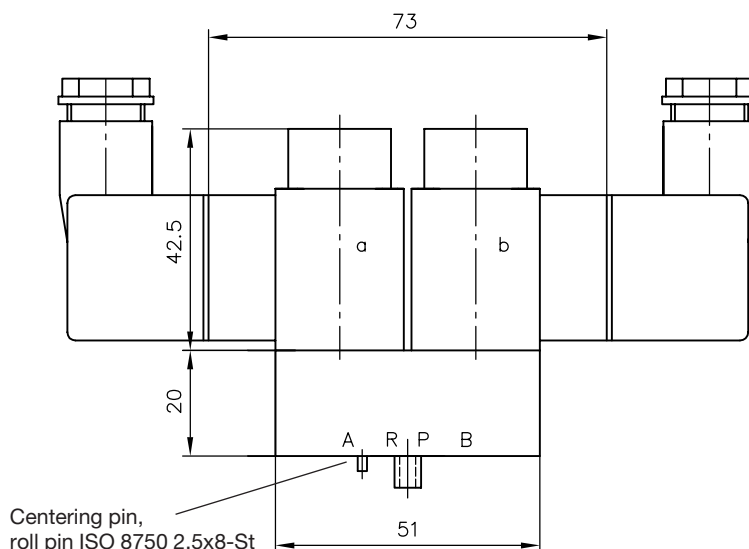
Centering pin,
roll pin ISO 8750 2.5x8-St

Hole pattern of the manifold (viewed from top)



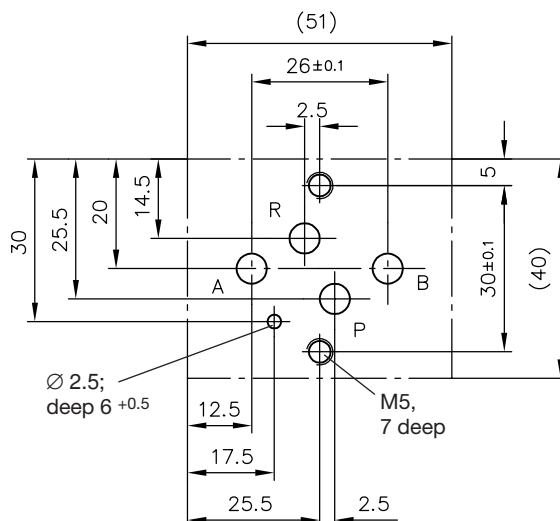
Sealing of ports A, B, P and R
via O-rings 6.07x1.78 NBR 90 Sh

Double valve type PM 12

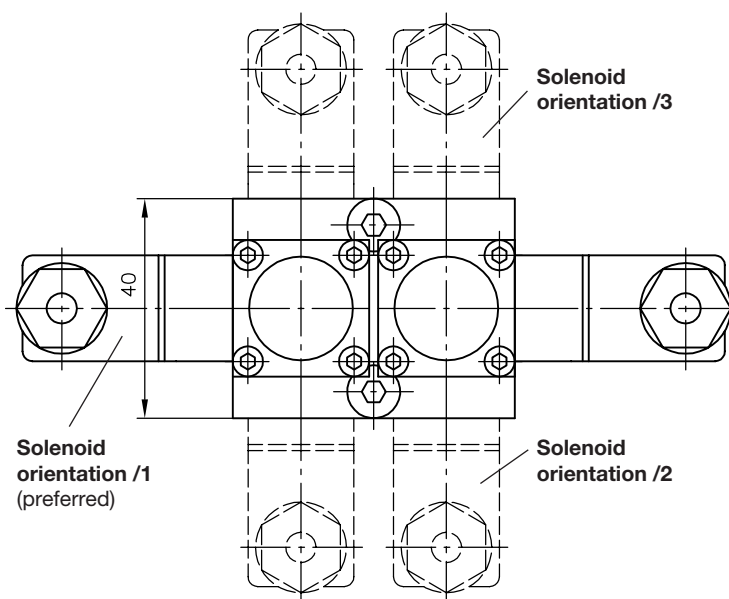
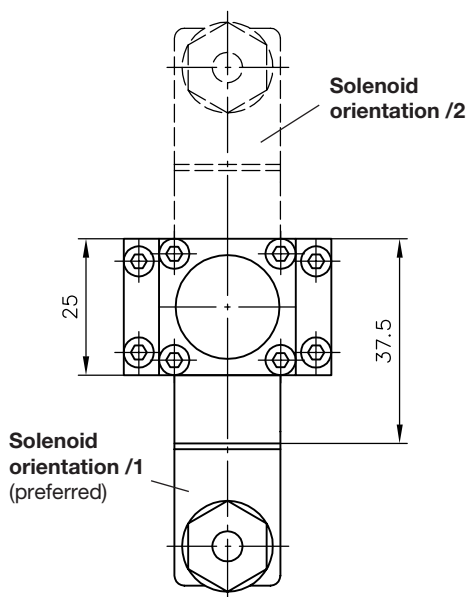


Centering pin,
roll pin ISO 8750 2.5x8-St

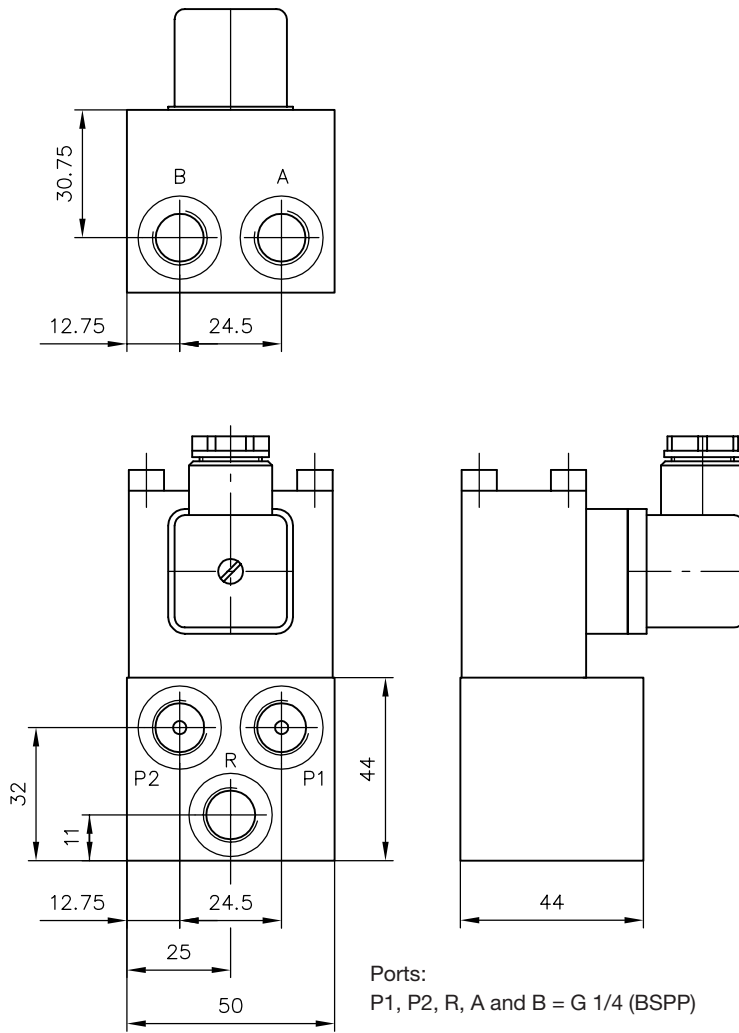
Hole pattern of the manifold (viewed from top)



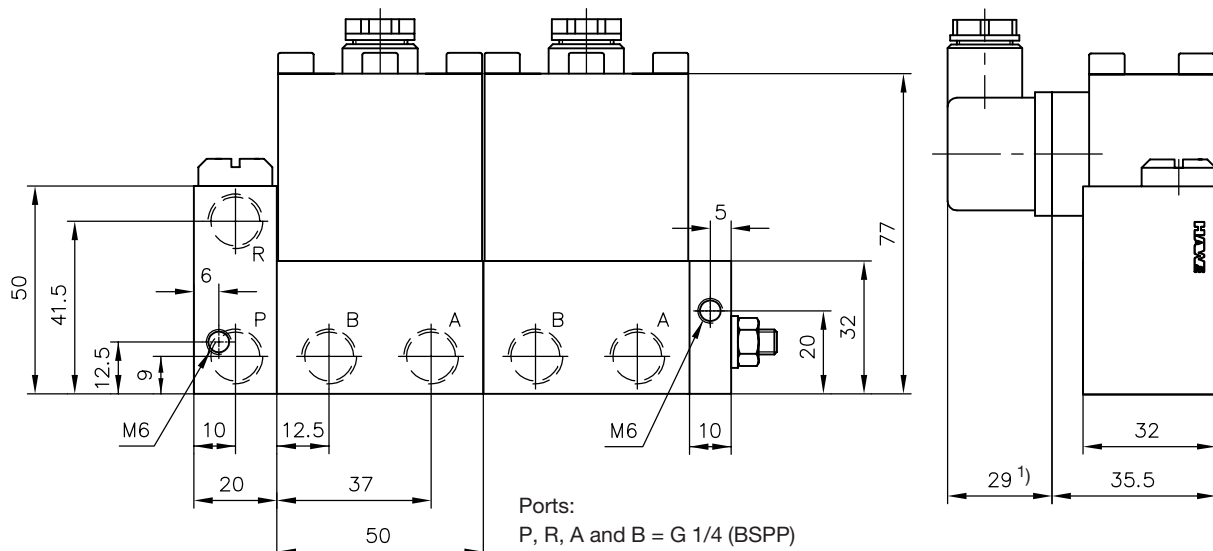
Sealing of ports A, B, P and R
via O-rings 6.07x1.78 NBR 90 Sh



4.3 Versions for direct pipe connection



4.4 Valve bank version type PMZ



1) This dimension depends on the manufacturer and may be max. 40 mm acc. to EN 175 301-803.

5. Appendix

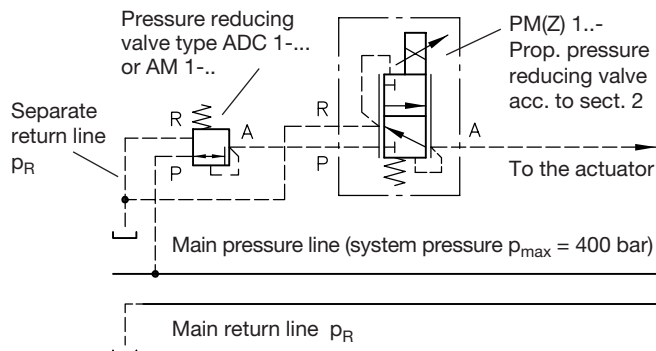
Notes for lay-out

A pressure reducing valve type ADC 1-... or AM 1-... acc. to D 7458 should be provided upstream of the prop. pressure reducing valve to limit the pressure entering down to approx. 40, when the system pressure is between 40 and $p_{max} = 400$ bar.

Case 1:

Joined, depressurized return for control and return oil from the piloting and prop. pressure reducing valve via separate line.

This way the influence of p_R in the return line can be neglected and will show no influence on the characteristic of the valve i.e. pressure p_A .



Case 2:

All control and return oil from the piloting and prop. pressure reducing valve is fed into the system return line. Drawback is that the varying system return pressure p_R shows a significant influence on the characteristic of the valve i.e. pressure p_A . This negative influence can be prevented by compensation via a connection between system return line and the rear cavity of the actuator.

