



**4 MODEL CODE OF SPOOL TYPE ON-OFF DIRECTIONAL SOLENOID VALVES**

**DHA**      / \* - 0 63 1/2 / PA - GK / 7 24DC      \*\*      / \*

**DHA** = spool type - direct  
**DPHA** = spool type - piloted

Optional certifications (omit for Group II ATEX)  
**M** = Group I, ATEX (mining)  
**RU** = Group II, Rostechnadzor (Russian)

Valve size (ISO 4401)  
for DHA **0** = 06  
for DPHA **1** = 10      **2** = 16      **3** = 25

Valve configuration, DHA see section 5 and DPHA see section 6

Spool type, DHA see section 5 and DPHA see section 6

Optional cable gland:  
**PA** = with threaded cable gland, see section 27

(1) Not for group I, ATEX (mining)

Synthetic fluids:  
**WG** = water-glycol  
**PE** = phosphate ester  
Low temperature execution:  
**BT** = low temperature -40°C (1)

Series number

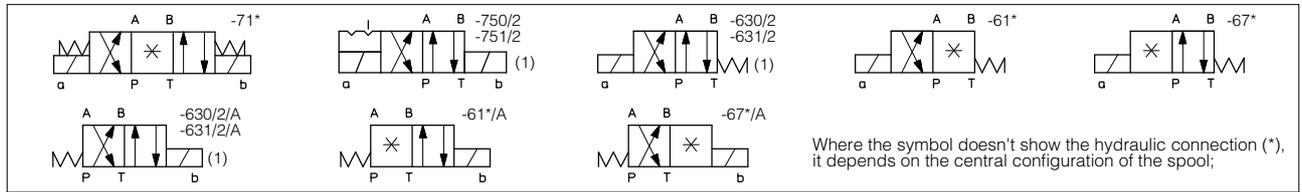
Voltage code - see section 11

Options:  
**7** = for ambient temperature up to 70°C  
**A** = solenoid at side of port B (for single solenoid valves)  
**MV** = horizontal hand lever (only for DHA)  
**O** = horizontal cable entrance (1)  
**WP** = prolonged manual override protected by metallic cap

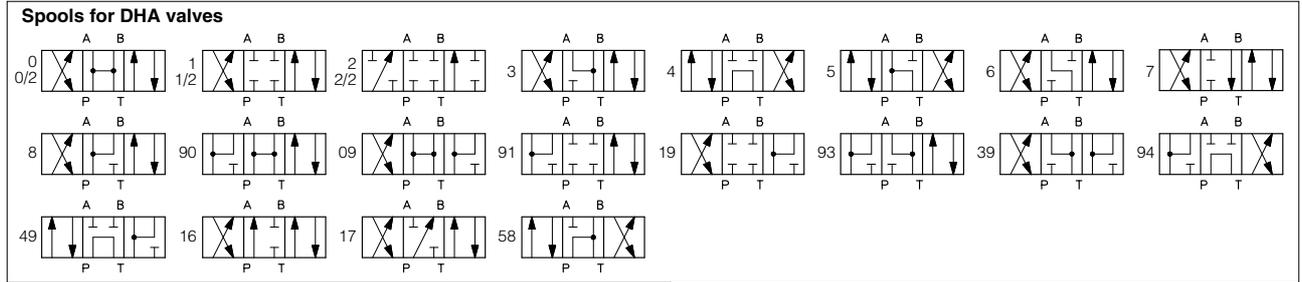
Only for DPHA:  
**/D** = Internal drain.  
**/E** = External pilot pressure.  
**/H** = Adjustable chokes (meter-out to the pilot chambers of the main valve).  
**/H9** = Adjustable chokes (meter-in to the pilot chambers of the main valve).  
**/S** = Main spool stroke adjustment (only for DPHA-2, -3).

Solenoid threaded connection:  
**GK** = GK-1/2" ISO/UNI-6125 (tapered)  
**NPT** = 1/2" NPT ANSI B2.1 (tapered)  
**M** = M20x1,5 UNI-4535 (6H/6g)

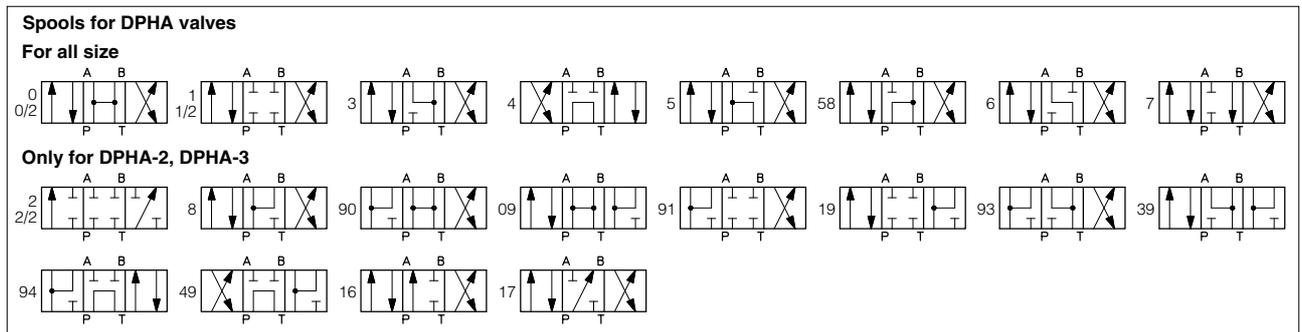
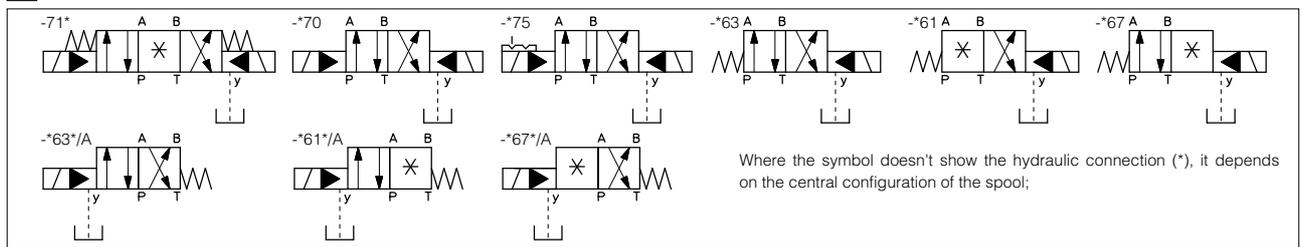
**5 CONFIGURATION OF DHA VALVES**



(1) Configurations 63 and 75 are available only for spool type 0/2, 1/2 and 2/2



**6 CONFIGURATION OF DPHA VALVES**



**7 MODEL CODE OF POPPET TYPE LEAK FREE DIRECTIONAL SOLENOID VALVES**

**DLO                      H - 2                      A / PA - GK - AO / 7                      24DC                      \*\*                      /\***

Directional control valve poppet type, size 06

**H** = max flow 12 l/min  
**K** = max flow 30 l/min

**2** = two way (only for DLOH)  
**3** = three way

Valve configuration, see section 8  
**A** = open in rest position  
**C** = closed in rest position

Optional cable gland:  
**PA** = with threaded cable gland, see section 27

Solenoid threaded connection:  
**GK** = GK-1/2" ISO/UNI-6125 (tapered)  
**NPT** = 1/2" NPT ANSI B2.1 (tapered)  
**M** = M20x1,5 UNI-4535 (6H/6g)

Synthetic fluids (1):  
**WG**= water-glycol  
**PE** =phosphate ester

Series number

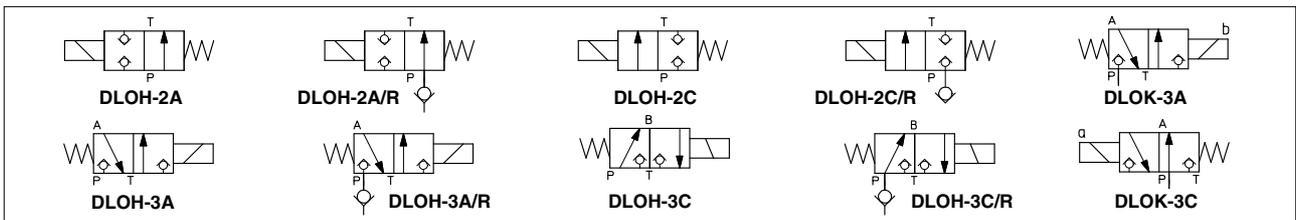
Voltage code - see section 11

Options:  
**7** = for ambient temperature up to 70°C  
**O** = horizontal cable entrance (not for group I ATEX)  
**R** = with check valve on port P  
**WP** = prolonged manual override protected by metallic cap

Certification type  
**AO** = Group II, ATEX  
**AO/M** = Group I, ATEX (mining)  
**AO/RU** = Group II, Rostechndzor (Russian)

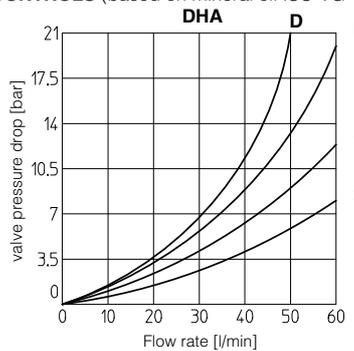
(1) Option **/BT** = low temperature -40°C also available on request (not for group I ATEX -mining-)

**8 CONFIGURATION OF DLOH/AO/\* AND DLOK/AO/\***



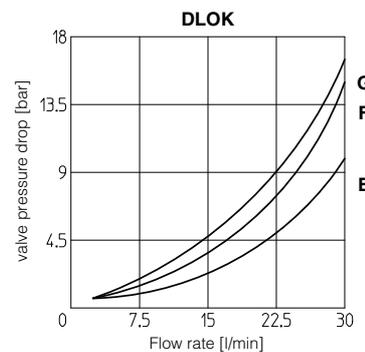
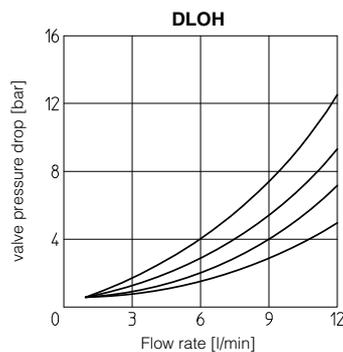
**9 Q/Δp DIAGRAMS OF ON/OFF DIRECTIONAL CONTROLS (based on mineral oil ISO VG 46 at 50°C)**

Flow direction \ Spool type	Flow direction				
	P→A	P→B	A→T	B→T	P→T
<b>0</b>	C	C	C	C	
<b>0/2, 1, 1/2</b>	A	A	A	A	
<b>3</b>	A	A	C	C	
<b>4, 5</b>	D	D	D	D	A
<b>6</b>	A	A	C	A	
<b>7</b>	A	A	A	C	
<b>8</b>	C	C	B	B	



**INTERNAL LEAKAGE** of DLOH and DLOK less than 5 drops/min (0,36 cm<sup>3</sup>/min) at max pressure.

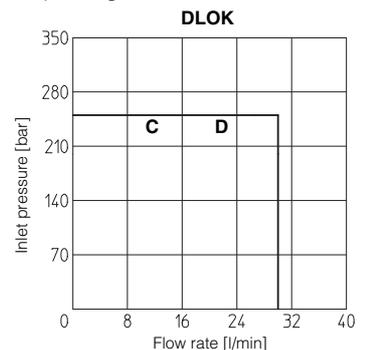
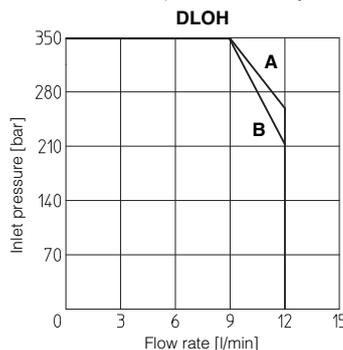
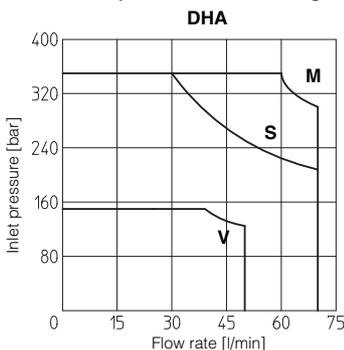
Flow direction \ Valve type	Flow direction	
	P → A (1) (P → B)	A → T (B → T)
<b>DLOH-2A</b>	B	-
<b>DLOH-2C</b>	C	-
<b>DLOH-3A</b>	D	C
<b>DLOH-3C</b>	C	A
<b>DLOK-3A</b>	G	F
<b>DLOK-3C</b>	F	E



(1) For two-way valves pressure drop refers to P→T

**10 OPERATING LIMITS OF ON/OFF DIRECTIONAL CONTROLS (based on mineral oil ISO VG 46 at 50°C)**

The diagram has been obtained with warm solenoids and power supply at lowest value (V<sub>nom</sub>-10%). For DHA valves the curves refer to application with symmetrical flow through the valve (i.e. P → A and B → T). In case of asymmetric flow the operating limits must be reduced.



**M** = Spools 0, 1, 8; **V** = Spools 4, 5.  
**S** = Spools 0/2, 1/2, 3, 6, 7;

**A** = DLOH-3A;  
**B** = DLOH-2A, DLOH-3C.

**C** = DLOK-3A;  
**D** = DLOK-3C.

**10.1 Pressure limits:** P, A, B = 350 bar; T = 210 bar

**11 MODEL CODE OF PRESSURE RELIEF VALVES**

**AGAM - 20 / 2 0 /210/100/100 / PA - NPT - AO / O 24 DC \*\* /\***

**AGAM** = pressure relief valve: subplate mounting, see tab. C066  
**ARAM** = pressure relief valve: threaded connections, see tab. C045

Valve size for AGAM: **10** (ISO 6264) **20** = G 3/4" **32** (ISO 6264)  
 for ARAM: **20** = G 3/4" **32** = G 1 1/4"

Number of the different setting pressure values:  
**1** = one setting pressure  
**2** = two setting pressure  
**3** = three setting pressure

Valve configuration  
**0** = venting with de-energized solenoid  
**1** = venting with energized solenoid  
**2** = without venting

Max regulated pressure of first (second / third) setting see section 12

Optional cable gland:

**PA** = with threaded cable clamp, see section 27

Synthetic fluids (1):  
**WG** = water-glycol  
**PE** = phosphate ester

Series number

Voltage Code, see section 11

Options:

- 7** = for ambient temperature up to 70°C
- E** = external pilot
- O** = horizontal cable entrance (not for group I Atex)
- V** = regulating handwheel
- WP** = prolonged manual override protected by metallic cap
- Y** = external drain

Certification type:

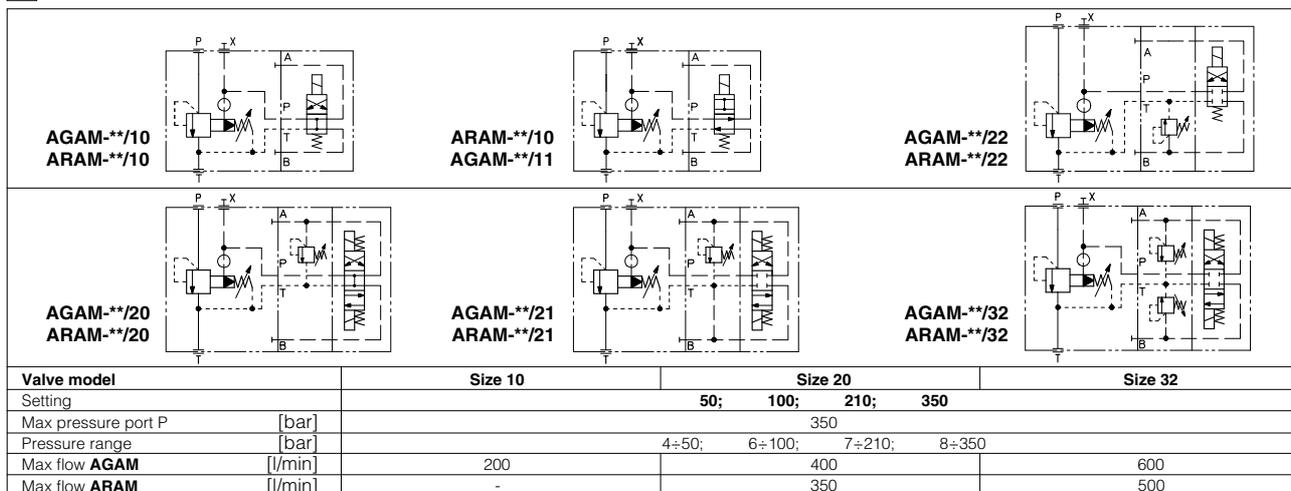
- AO** = Group II, ATEX
- AO/M** = Group I, ATEX (mining)
- AO/RU** = Group II, Rostechnadzor (Russian)

Solenoid threaded connection:

- GK** = GK-1/2" ISO/UNI-6125 (tapered)
- NPT** = 1/2" NPT ANSI B2.1 (tapered)
- M** = M20x1,5 UNI-4535 (6H/6g)

(1) Option **/BT** = low temperature -40°C also available on request (not for group I Atex -mining-)

**12 HYDRAULIC CHARACTERISTICS**



**13 MODEL CODE OF COVERS FOR CARTRIDGE VALVES**

**LIDEW - 1 / PA - GK - AO - O 24DC \*\* /\***

Cover type:  
**LIDBH\*** = with solenoid valve and shuttle valve for pilot selection  
**LIDEW\*** = with solenoid valve for pilot selection  
 \* = valve configuration (see H030 section 2)

Size (ISO 7368)  
**1** = 16; **4** = 40; **8** = 80 (only for LIDEW);  
**2** = 25; **5** = 50;  
**3** = 32; **6** = 63;

Optional cable gland:

**PA** = with threaded cable gland, see section 27

Solenoid threaded connection:

- GK** = GK-1/2" ISO/UNI-6125 (tapered)
- NPT** = 1/2" NPT ANSI B2.1 (tapered)
- M** = M20x1,5 UNI-4535 (6H/6g)

Certification type

- AO** = Group II, ATEX
- AO/M** = Group I, ATEX (mining)
- AO/RU** = Group II, Rostechnadzor (Russian)

Optional different provision or setting of the calibrated plugs in the pilot channels see table H030 sect. 6

Synthetic fluids (1):  
**WG** = water-glycol  
**PE** = phosphate ester

Series number

Voltage code - see section 11

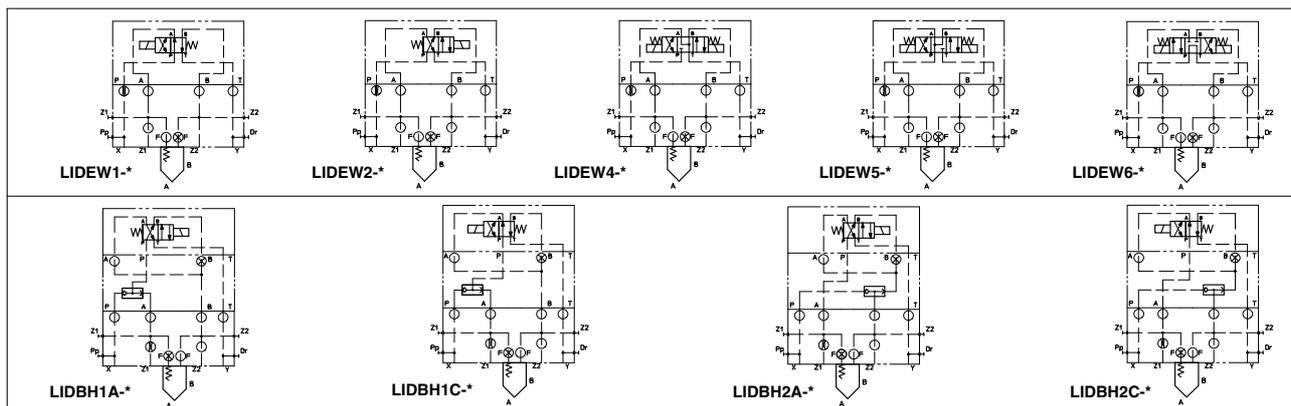
Options:

- 7** = for ambient temperature up to 70°C
- B** = cartridge piloted via port "B" of solenoid pilot valve
- E** = external attachments X (1/4" GAS) and underneath port X supplied plugged (only for sizes 40..80)
- O** = horizontal cable entrance (not for group I Atex)
- WP** = prolonged manual override protected by metallic cap

Note: for the code of the ISO cartridge to use with the above covers see tab. H003, section 2 and tab. H030, section 3.

(1) Option **/BT** = low temperature -40°C also available on request (not for group I Atex -mining-)

**14 HYDRAULIC SYMBOLS**





**18 MODEL CODE OF SERVOPROPORTIONAL VALVES**

**DLHZA / \* - T - 0 4 0 - L 7 3 / PA - GK / 7 \*\* / \***

**DLHZA** = size 06  
**DLKZA** = size 10

Optional certifications (omit for Group II ATEX)  
**M** = Group I, ATEX (mining)  
**RU** = Group II, Rostechnadzor (Russian)

**T** = with integral position transducer

Valve size (ISO 4401)  
**0** = size 06 (DLHZA)  
**1** = size 10 (DLKZA)

Configuration, see section 19  
**4** = external plus central position, spring centered  
**6** = 3 position, spring centered

Spool overlapping in central position, see section 19  
**0** = P, A, B, T positive overlapping

Spool type  
**L** = linear; **T** = not linear;

Synthetic fluids (1):  
**WG** = water-glycol  
**PE** = phosphate ester

Series number

Options:  
**7** = for ambient temperature up to 70°C  
**B** = solenoid at side of port A  
**C** = position transducer with current feedback 4-20 mA  
**Y** = external drain

Solenoid threaded connection:  
**GK** = GK-1/2" ISO/UNI-6125 (tapered)  
**NPT** = 1/2" NPT ANSI B2.1 (tapered)  
**M** = M20x1,5 UNI-4535 (6H/6g)

Optional cable gland:  
**PA** = with threaded cable gland, see section 27

Fail safe configuration:  
**1** = A, B, P, T with positive overlapping **3** = P positive overlapping; A, B, T negative

Spool size: see section 19

(1) Option **/BT** = low temperature -40°C also available on request (not for group I ATEX -mining-)

**19 HYDRAULIC CHARACTERISTICS** (based on mineral oil ISO VG 46 at 50 °C)

Valve model	<b>DLHZA-T*</b>						<b>DLKZA-T*</b>		
Pressure limits [bar]	ports P, A, B = 350; T = 160 (250 with external drain /Y)						ports P, A, B = 315; T = 160 (250 with external drain /Y)		
Spool	<b>L1</b>	<b>L3</b>	<b>L5</b>	<b>T5</b>	<b>L7</b>	<b>T7</b>	<b>L3</b>	<b>L7</b>	<b>T7</b>
Δp max P-T [bar]	70		70		70		60		
Max flow at Δp = 30 bar [l/min]	4,5		9		18		40		
Max flow at Δp max bar [l/min]	7		14		28		55		
Leakage [cm³/min] at P = 100 bar (1)	< 200		< 300		< 500		< 900		< 200
Response time (2) [ms]	≤ 10						≤ 15		
Hysteresis [%]	≤ 0,1%						≤ 0,1%		
Thermal drift	zero point displacement < 1% at ΔT = 40°C								

(1) Referred to spool in center position and 50°C oil temperature.  
(2) Response times at step signal (0%→100%) are measured from 10% to 90% of step value and are strictly referred to valve regulation.

**20 MODEL CODE OF PRESSURE COMPENSATED PROPORTIONAL FLOW CONTROL VALVES**

**QVHZA / \* - T - 06 / 12 / PA - GK / \* / \* \*\* / \***

**QVHZA** = size 06  
**QVKZA** = size 10

Optional certifications (omit for Group II ATEX)  
**M** = Group I, ATEX (mining)  
**RU** = Group II, Rostechnadzor (Russian)

**A** = without position transducer  
**T** = with integral position transducer

Valve size (ISO 4401)  
QVHZA: **06**      QVKZA: **10**

Max regulated flow:  
QVHZA      QVKZA  
**3** = 3,5 l/min;    **36** = 36 l/min;    **65** = 65 l/min  
**12** = 12 l/min;    **45** = 45 l/min;    **90** = 90 l/min  
**18** = 18 l/min;

Optional cable gland:  
**PA** = with threaded cable clamp, see section 27

Synthetic fluids (1):  
**WG** = water-glycol  
**PE** = phosphate ester

Series number

Omit for standard coil 12 V<sub>DC</sub>:  
**24** = with 24 V<sub>DC</sub> coils (only A version)

Options:  
**7** = for ambient temperature up to 70°C  
**C** = current feedback signal 4-20 mA (only for -T versions)  
**D** = quick venting (only for -A versions)  
**O** = horizontal cable entrance (only for -A versions, not for group I ATEX)  
**WP** = prolonged manual override protected by metallic cap (only for -A versions)

Solenoid threaded connection:  
**GK** = GK-1/2" ISO/UNI-6125 (tapered)  
**NPT** = 1/2" NPT ANSI B2.1 (tapered)  
**M** = M20x1,5 UNI-4535 (6H/6g)

(1) Also available on request (not for group I ATEX -mining-) option **/BT** = low temperature -40°C

**21 HYDRAULIC CHARACTERISTICS** (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols														
	<b>QVHZA-A</b>						<b>QVHZA-T</b>							
<b>Note:</b> In three-way versions port P is open. In two-way versions port P must be plugged. Port T must always be plugged.														
Valve model	<b>QVHZA-A</b>						<b>QVHZA-T</b>							
Valve size	<b>06</b>						<b>06</b>							
Max pressure ports P, A, B [bar]	210													
Max regulated flow [l/min]	3,5	12	18	36	45	3,5	12	18	35	45	65	90	65	90
Min regulated flow (1) [cm³/min]	15	20	30	50	60	15	20	30	50	60	85	100	85	100
Regulating Δp [bar]	4 - 6		10 - 12		15	4 - 6		10 - 12		15	6 - 8		10 - 12	
Max flow on port A [l/min]	40		35		50	50		50		60		70		100

Above performance data refer to valves coupled with Atos electronic drivers.  
(1) Values are referred to 3-way configuration. In the 2-way configuration, the values of min regulated flow are higher.

**22 MODEL CODE OF PROPORTIONAL PRESSURE RELIEF AND COMPENSATOR VALVES**

**RZMA / \* - A - 010 / 250 / PA - GK / \* / \* \*\* / \***

Pressure relief:  
**RZMA** = subplate size 06  
**HZMA** = modular size 06  
**AGMZA** = subplate size 10, 20, 32  
**LIMZA** = cartridge (1)  
 Pressure compensator:  
**LICZA** = cartridge (1)

Optional certifications (omit for Group II ATEX)  
**M** = Group I, ATEX (mining)  
**RU** = Group II, Rostechnadzor (Russian)

**A** = without integral pressure transducer

Valve size:  
 see section 23 for size code

Max regulated pressure:  
 see section 23

Optional cable gland  
**PA** = with threaded cable clamp, see section 27

Synthetic fluids (1):  
**WG** = water-glycol  
**PE** = phosphate ester

Series number

Omit for standard coil 12 VDC:  
**24** = with 24 VDC coils

Options:  
**7** = for ambient temperature up to 70° C  
**E** = external pilot (only for AGMZA)  
**O** = horizontal cable entrance (not for group I ATEX)  
**P** = with integral mechanical pressure limiter (only for LI\*ZA)  
**Y** = external drain (only for AGMZA)

Solenoid threaded connection:  
**GK** = GK-1/2" ISO/UNI-6125 (tapered)  
**NPT** = 1/2" NPT ANSI B2.1 (tapered)  
**M** = M20x1,5 UNI-4535 (6H/6g)

(1) For the code of the ISO cartridge to use with LIMZA and LICZA, see tab. F300 section 2.  
 (2) Option **/BT** = low temperature -40°C also available on request (not for group I ATEX -mining-)

**23 HYDRAULIC CHARACTERISTICS**

Valve model	RZMA			HZMA			AGMZA			LIMZA						LICZA				
Size code	010	030	030	10	20	32	1	2	3	4	5	6	1	2	3	4	5			
Valve size	06			10	20	32	16	25	32	40	50	63	16	25	32	40	50			
Max regulated pressure [bar]				80;			180;		250											
Max pressure at port P, A, B, X [bar]							315													
Max pressure at port T, Y [bar]							210													
Max flow [l/min]	4	40	40	200	400	600	200	400	750	1000	2000	3000	200	400	750	1000	2000			

**24 MODEL CODE OF PROPORTIONAL PRESSURE REDUCING VALVES**

**RZGA / \* - A - 010 / 250 / PA - GK / \* / \* \*\* / \***

Pressure reducing:  
**RZGA** = subplate size 06  
**HZGA** = modular size 06  
**KZGA** = modular size 10  
**AGRCZA** = subplate size 10, 20  
**LIRZA** = cartridge

Optional certifications (omit for Group II ATEX)  
**M** = Group I, ATEX (mining)  
**RU** = Group II, Rostechnadzor (Russian)

**A** = without integral transducer

Valve size:  
 see section 23 for size code

Max regulated pressure:  
 see section 23

Optional cable gland  
**PA** = with threaded cable clamp, see section 27

Synthetic fluids (1):  
**WG** = water-glycol  
**PE** = phosphate ester

Series number

Omit for standard coil 12 VDC:  
**24** = with 24 VDC coils

Options:  
**7** = for ambient temperature up to 70° C  
**E** = external pilot (only for AGRCZA)  
**O** = horizontal cable entrance (not for group I ATEX)  
**P** = with integral mechanical pressure limiter (only for AGRCZA and LIRZA)  
**R** = with check valve (only for AGRCZA)

Solenoid threaded connection:  
**GK** = GK-1/2" ISO/UNI-6125 (tapered)  
**NPT** = 1/2" NPT ANSI B2.1 (tapered)  
**M** = M20x1,5 UNI-4535 (6H/6g)

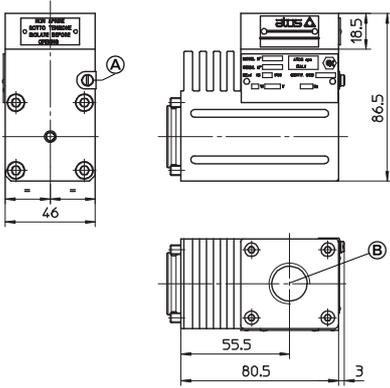
Note: for the code of the ISO cartridge to use with LIRZA, see tab. F300 section 2.  
 (1) Option **/BT** = low temperature -40°C also available on request (not for group I ATEX -mining-)

**25 HYDRAULIC CHARACTERISTICS**

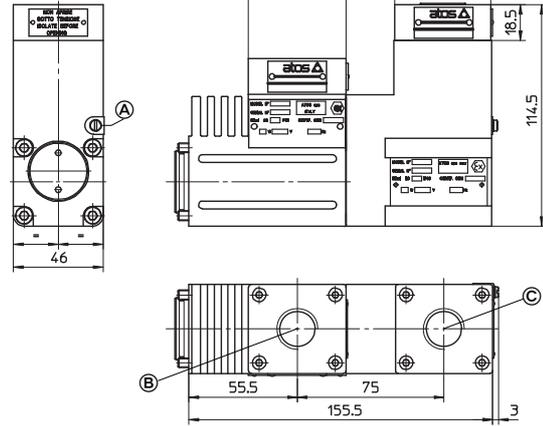
Valve model	RZGA		HZGA	KZGA	AGRCZA		LIRZA		
Size code	010	033	031	031	10	20	1	2	3
Valve size	06		10		10	20	16	25	32
Max regulated pressure [bar]	32; 100; 210		80;		180;		250		
Min regulated pressure [bar]	0,8		1		1		7		
Max pressure at port P [bar]					315				
Max pressure at port T [bar]					210				
Max flow [l/min]	12	40	40	100	160	300	160	320	600

OA  
OZA-A

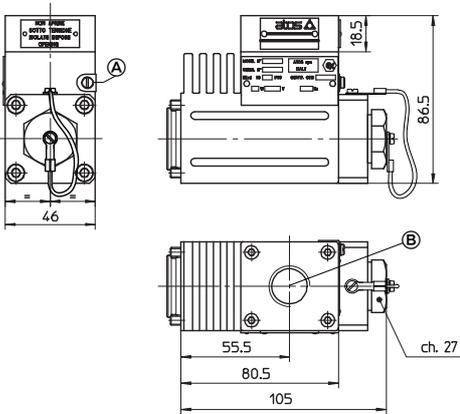
OA/M  
OZA/M-A



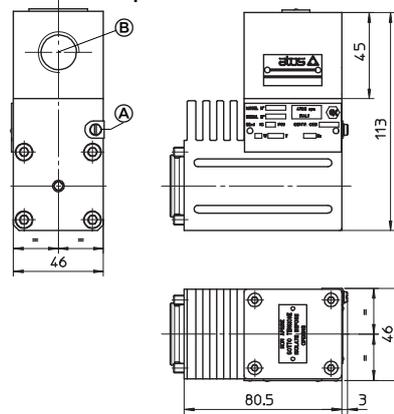
OZA-T OZA/M-T



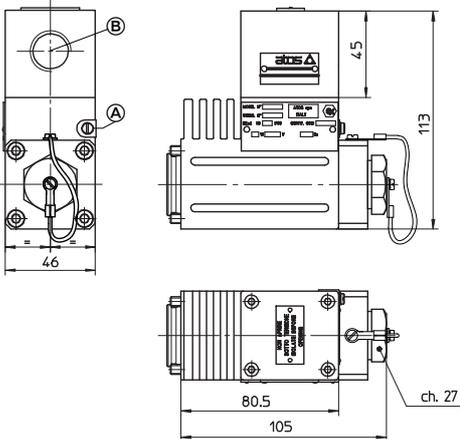
Option /WP



Option /O

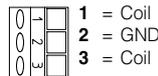


Option /OWP

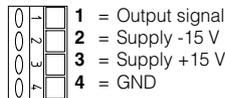


Ⓐ = screw terminal for additional equipotential grounding

Ⓑ = Solenoid wiring

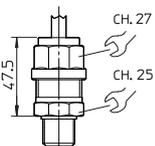


Ⓒ = Position transducer wiring



27 CABLE GLAND

**CABLE GLAND SP-PA19\***  
**CABLE GLAND SP-PAM19\* - for valves with mining certification**  
**(PG9 - IP67)**



The cable glands are available on request certified ATEX according to EN 60079-0 and EN 60079-1.  
 PA19 cable size 7÷9,5 mm  
 PA112 cable size 9÷12 mm

Following codes have to be specified for spare cable glands:  
**SP-PA(M)19/GK** = with threaded connection GK-1/2" ISO/UNI-6125 (tapered)  
**SP-PA(M)19/NPT** = with threaded connection 1/2" NPT ANSI B2.1 (tapered)  
**SP-PA(M)19/M** = with threaded connection M20x1,5 UNI-4535 (6H/6g).  
 This cable gland must be blocked with loctite or similar or with a lock nut.

Note: special cable clamps PA112 (PG12) available on request only as spare parts.

The valves must be connected to the power supply using the terminal board inside the solenoid.

**The cable must be suitable for the working temperature as specified in the "safety instructions" delivered with the first supply of the products.**

Additional equipotential grounding can be also performed by the user on the external facility provided on the solenoid case. Minimum section of external ground wire = 4 mm².

Minimum section of internal ground wire = the same of supply wire. In order to reach the terminal board inside the solenoid, the top plate of the solenoid must be removed.

Solenoids are provided with threaded connection for cable entrance: GK-1/2" GAS (ISO/UNI 6125) or M20x1,5 (UNI-4535) or 1/2"NPT (ANSI B2.1)