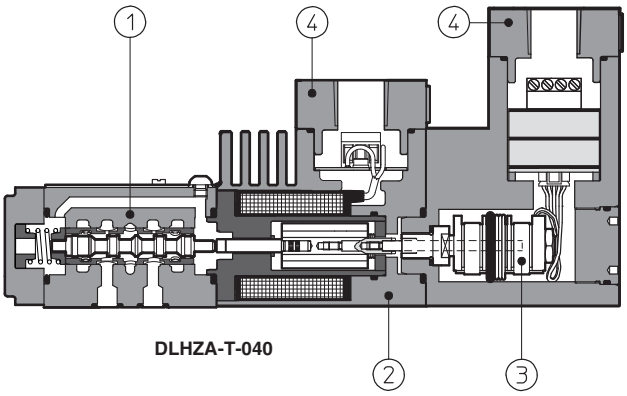
Explosion-proof solenoid valves

on/off and proportional controls - ATEX, IECEx or Rostechnadzor Russian certification



DLHZA-T-040

① valve body
② ex-proof solenoid
③ ex-proof transducer (only for proportional -T valves)
④ threaded connections for cable clamp or conduit pipe

Note:
For ex-proof proportional valves with integral digital drivers, see table **F600**

On/off and proportional valves equipped with explosion-proof solenoids available with following certifications and protection modes:

Solenoids group II for surface plants with gas, vapours and dust environment
- ATEX 94/9/EC
  Ex II 2 GD Ex d IIC T6/T4/T3,
  Ex tD A21 IP67 - category 2, zone 1, 2, 21 & 22
- IECEx worldwide recognized safety certification, Ex d IIC T6/T4/T3, Ex tD A21 IP67
- Rostechnadzor Russian Certification
  Ex d IIC T6/T4/T3

Solenoids group I for surface, tunnels or mining plants
- ATEX 94/9/EC, Ex I M2 Ex d I
- IECEx, EX d I Mb

The solenoid case is designed to contain the possible explosion which could be caused by the presence of the gas mixture inside the housing, thus avoiding dangerous propagation in the external environment. They are also designed to limit the external temperature according to the certified class to avoid the self ignition of the explosive mixture present in the environment. DHA and DLOH valves conform to **SIL 3** safety level (TÜV approved). These solenoids are applied to hydraulic valves for application in explosion-hazardous environments.

1 EXPLOSION PROOF SOLENOIDS: MAIN DATA

SOLENOID TYPE		PROPORTIONAL without transducer	PROPORTIONAL with transducer	ON-OFF
Solenoid code	Group II, ATEX	OZA-A	OZA-T	OA
	Group II, IECEx	OZAI-A	OZAI-T	OAI
	Group I, ATEX (mining)	OZAM-A	OZAM-T	OAM
	Group II, Rostechnadzor	OZA/RU-A	OZA/RU-T	OA/RU
Voltage code	VDC ±10%	**12 DC, 24 DC**	**12 DC**	**12DC, 24DC, 28DC, 48DC, 110DC, 125DC, 220DC**
	VAC 50/60 Hz ±10%	–		**12AC, 24AC, 110AC, 230AC (1)**
Power consumption		35W		8W
Coil insulation		Class H		
Protection degree		IP 67 According to IEC 144 when correctly coupled with the relevant cable gland SP-PA*, see section 26		
Duty factor		100%		
Mechanical construction		Flame proof housing classified Ex d, according to EN 60079-0: 2006, EN 60079-1: 2007		
Cable entrance and electrical wiring		Internal terminal board for cable connection Threaded connection for cable entrance, vertical (standard) or Horizontal (option /O). See section 26 for cable gland		

(1) For alternating current supply a rectifier bridge is provided built-in the solenoid

2 EXPLOSION PROOF SOLENOIDS: TEMPERATURE DATA

SOLENOID TYPE		PROPORTIONAL (with and without transducer)		ON/OFF	
Method of protection		Ex d			
Temperature class (only for Group II)		**T4**	**T3** (option /7)	**T6**	**T4** (option /7)
Surface temperature	Group II, ATEX and IECEx	≤135 °C	≤ 200 °C	≤ 85 °C	≤135 °C
	Group I, ATEX (mining)	150 °C			
	Rostechnadzor	≤135 °C	≤ 200 °C	≤ 85 °C	≤135 °C
Ambient temperature	Group II, ATEX and IECEx	-40 ÷ +40 °C (2)	-40 ÷ +70 °C (2)	-40 ÷ +45 °C (2)	-40 ÷ +70 °C (2)
	Group I, ATEX (mining)	-20 ÷ +60		-20 ÷ +70	
	Rostechnadzor	-40 ÷ +40 °C	-40 ÷ +70 °C	-40 ÷ +45 °C	-40 ÷ +70 °C

(2) The Group II solenoids are certified according to ATEX and IECEx for minimum ambient temperature -40°C. In case the complete valve must withstand with minimum ambient temperature of -40°C, select /BT in the model code

3 CERTIFICATIONS

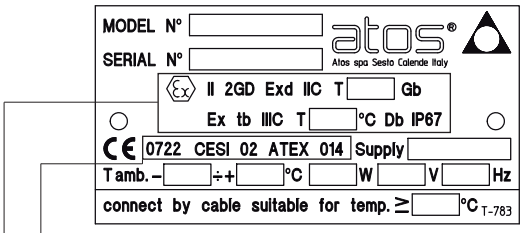
In the following are resumed the valves marking according to ATEX Group I, ATEX and IECEx Group II, Rostechnadzor certifications.

3.1 GROUP II, ATEX

= ATEX identification for explosive atmospheres equipments
II = Group II for surfaces plants
2 = High protection (equipment category)
GD = For gas, vapours and dust
Ex d = Flame proof housing
IIC = Gas group
T6/T4/T3 = Temperature class of solenoid surface
Gb = Equipment protection level, high level protection for explosive Gas atmospheres
Ex tb = Equipment protection by enclosure "tb"
IIIC = Suitable for conductive dust (applicable also IIIB and/or IIIA)
Db = Equipment protection level, high level protection for explosive Dust atmospheres
IP67 = Protection degree

Zone 1 (gas) and 21 (dust) = Possibility of explosive atmosphere during normal functioning
Zone 2 (gas) and 22 (dust) = Low probability of explosive atmosphere

EXAMPLE OF NAMEPLATE MARKING



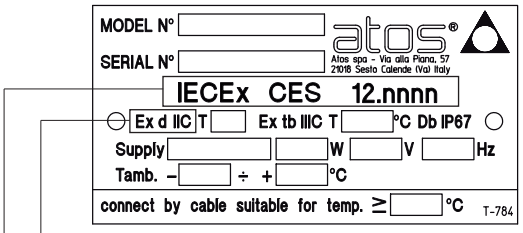
Notified body and certificate number

Marking according to Atex Directive

3.2 GROUP II, IECEx

Ex d = Equipment for explosive atmospheres, flame proof housing
IIC = Gas group
T6/T4/T3 = Temperature class of solenoid surface
tb = Dust ignition protection
IIIC = Suitable for conductive dust (applicable also IIIB and/or IIIA)
Db = Equipment protection level, high level protection for explosive Dust atmospheres
IP67= Protection degree

EXAMPLE OF NAMEPLATE MARKING



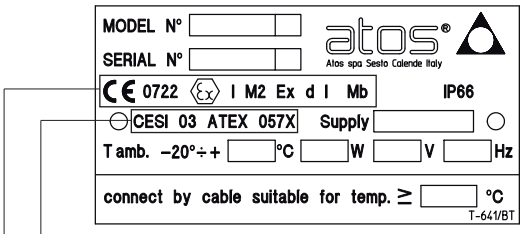
Marking according to IECEx

Notified body and certificate number

3.3 GROUP I, ATEX (mining)

= ATEX identification for explosive atmospheres equipments
I = Group I for mines and surface plants
M2 = High protection (equipment category)
d = Flame proof housing
I = Gas group (Methane)
Mb = Equipment protection level, high level protection for explosive atmospheres

EXAMPLE OF NAMEPLATE MARKING



Notified body and certificate number

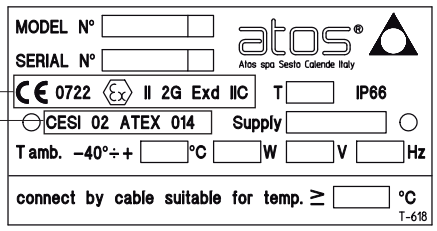
Marking according to ATEX Directive

3.4 ROSTECHNADZOR

Rostechnadzor certification acknowledges the whole ATEX Directive 94/9/EC.
For this reason the solenoids report the ATEX nameplate in addition to the Rostechnadzor one.
This certification is available only for gas environment (not for dust).

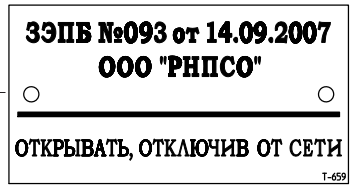
= ATEX identification for explosive atmospheres equipments
d = Flame proof housing
IIC = Gas group
T6/T4/T3 = Temperature class of solenoid surface

EXAMPLE OF NAMEPLATE MARKING



Marking according to ATEX Directive

Notified body and certificate number



Rostechnadzor certification

Note:
According to EN60079-0 the valves with Atex certification can be coated with a non-metallic material (for ex. paintened), observing the maximum thickness:
Group IIC = 0,2 mm max

WARNING: service work provided on the valve by the end users or not qualified personnel invalidates the certification

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

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

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

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

Valve size (ISO 4401)
for DHA **0** = 06
for DPHA **1** = 10 **2** = 16 **4** = 25 **6** = 32

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 threated cable gland, see section 26

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)

Seals material:
omit for NBR (mineral oil & water glycol)
PE = FPM
Low temperature execution:
BT = low temperature -40°C (1)

Series number

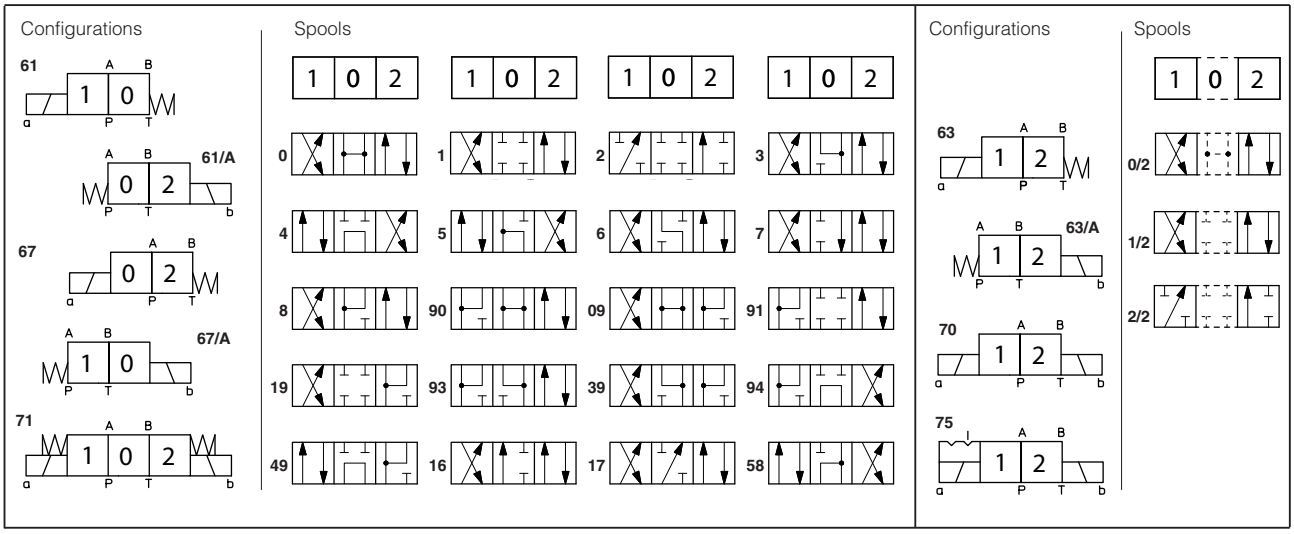
Voltage code - see section 1

Options:
7 = for ambient temperature up to 70°C (not for Group I)
A = solenoid at side of port B (for single solenoid valves)
MV = vertical hand lever (only for DHA) (2)
O = horizontal cable entrance (1)
WP = prolongued manual override protected by metallic cap

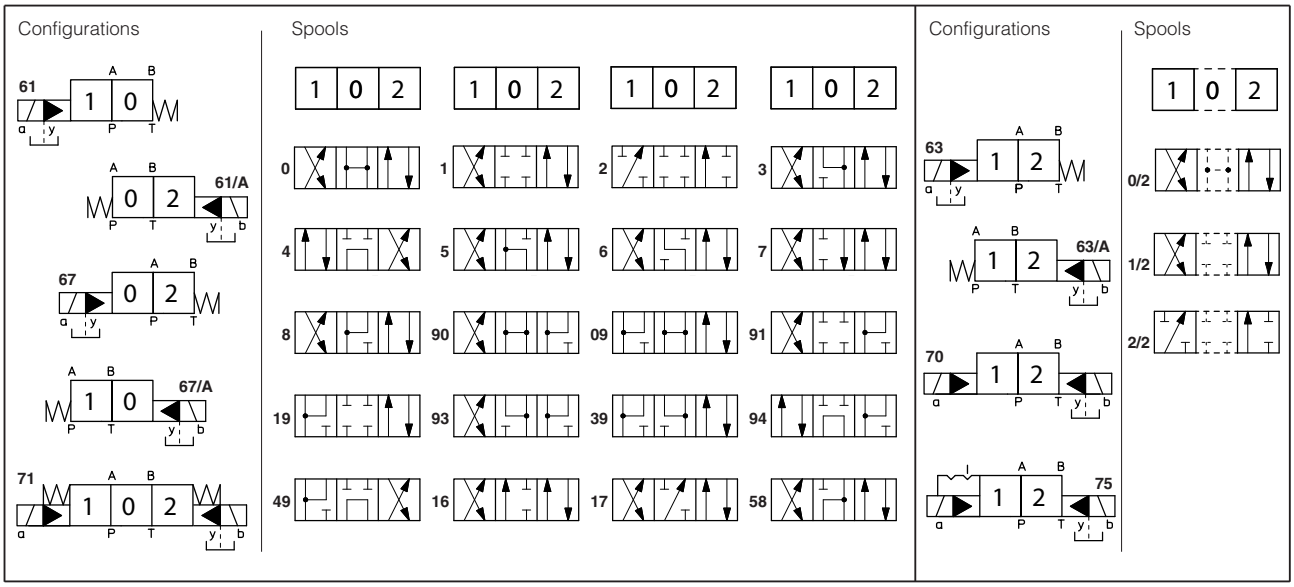
Only for DPHA:
/D = Internal drain.
/E = External pilot pressure.
/H = Adjustable chokes (meter-out to the pilot chambers of the main valve).
/H9 = Adjustable chokes (meter-in to the pilot chambers of the main valve).
/R = Pilot pressure generator (4 bar on port P)
/S = Main spool stroke adjustment (not for DPHA-1).

(1) Not for group I, Atex (mining)
(2) Available only for DHA, configuration 61, 63, 71 and spool type 0, 0/2, 1, 1P, 1/2, 1/2P, 3, 3P, 4, 7

5 CONFIGURATIONS and SPOOLS for DHA valves



6 CONFIGURATIONS and SPOOLS for DPHA valves



NOTES:
- For **DP*-1** are available only spools: **0, 0/2, 1, 1/2, 3, 4, 5, 58, 6, 7**
- For **DP*-6** are available only spools: **0, 1, 2, 3, 4, 5, 58, 6, 7, 8, 19, 91**

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 threated cable gland, see section 26

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)

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

Certification type
AO = ATEX, Group II
AO/IE = IECEx, Group II
AO/IEM = IECEx, Group I (mining)
AO/M = ATEX, Group I (mining)
AO/RU = Rostechnadzor (Russian), Group II

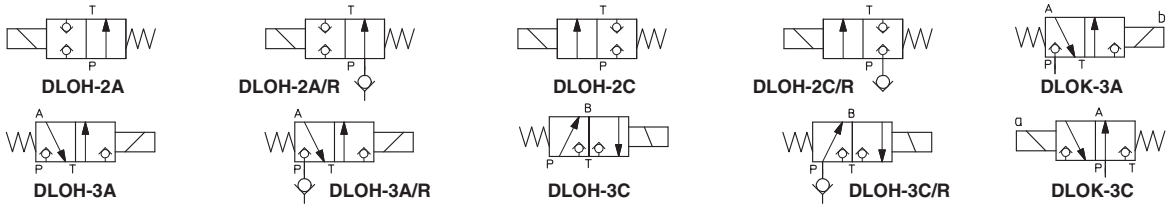
Seals material (1):
omit for NBR (mineral oil & water glycol)
PE = FPM

Series number

Voltage code - see section 1

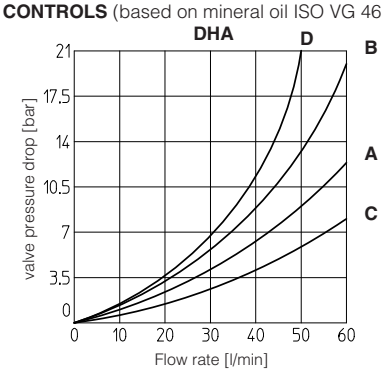
(1) Option **/BT** = low temperature -40°C also available on request (not for group I Atex -mining-)

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)

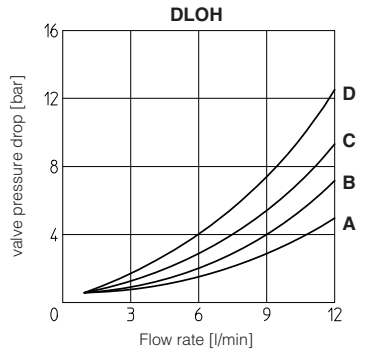
Spool type \ Flow direction	P→A	P→B	A→T	B→T	P→T
0	C	C	C	C	
0/2, 1, 1/2	A	A	A	A	
3	A	A	C	C	
4, 5	D	D	D	D	A
6	A	A	C	A	
7	A	A	A	C	
8	C	C	B	B	

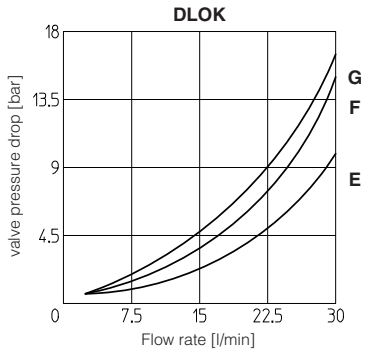


INTERNAL LEAKAGE of DLOH and DLOK less than 5 drops/min (0,36 cm³/min) at max pressure.

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

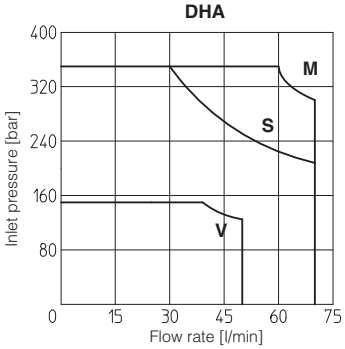
(1) For two-way valves pressure drop refers to P→T



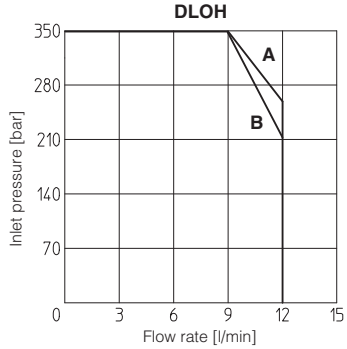


10 OPERATING LIMITS OF ON/OFF DIRECTIONAL CONTROLS (based on mineral oil ISO VG 46 at 50°C)

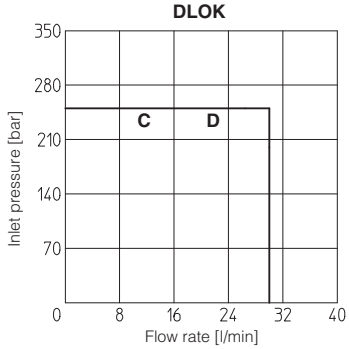
The diagram have been obtained with warm solenoids and power supply at lowest value (V_{nom}-10%). For DHA valves the curves refer to application with symmetrical flow through the valve (i.e. P → A and B → T). In case of asymmetric flow the operating limits must be reduced.



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** (ISO 6264), **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 26

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 = ATEX, Group II
AO/IE = IECEx, Group II
AO/IEM = IECEx, Group I (mining)
AO/M = ATEX, Group I (mining)
AO/RU = Rostechnadzor (Russian), Group II

Options:
7 = for ambient temperature up to 70°C (not for Group I)
E = external pilot
O = horizontal cable entrance (not for group I Atex)
V = regulating handweel
WP = prolongued manual override protected by metallic cap
Y = external drain

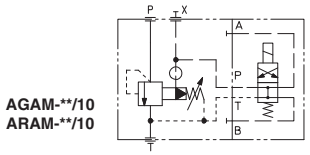
Voltage Code, see section 1

Series number

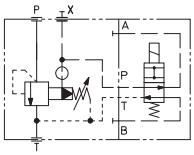
Seals material (1):
omit for NBR (mineral oil & water glycol)
PE = FPM

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

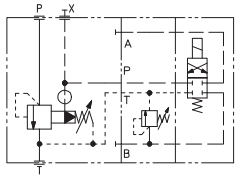
12 HYDRAULIC CHARACTERISTICS



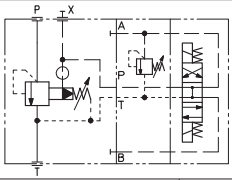
AGAM-/10**
ARAM-/10**



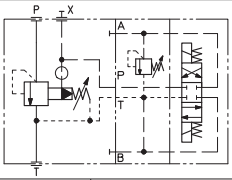
ARAM-/10**
AGAM-/11**



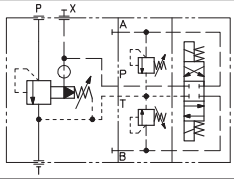
AGAM-/22**
ARAM-/22**



AGAM-/20**
ARAM-/20**



AGAM-/21**
ARAM-/21**



AGAM-/32**
ARAM-/32**

Valve model		Size 10	Size 20	Size 32
Setting			**50; 100; 210; 350**	
Max pressure port P	[bar]		350	
Pressure range	[bar]		4÷50; 6÷100; 7÷210; 8÷350	
Max flow **AGAM**	[l/min]	200	400	600
Max flow **ARAM**	[l/min]	-	350	500

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

Optional cable gland:
PA = with threaded cable gland, see section 26

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/IE = Group II, IECEx
AO/M = Group I, ATEX (mining)
AO/RU = Group II, Rostechnadzor (Russian)

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 forsizes 40...80)
O = horizontal cable entrance (not for group I Atex)
WP = prolongued manual override protected by metallic cap

Voltage code - see section 1

Series number

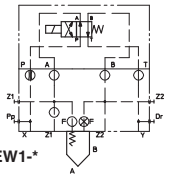
Seals material (1):
omit for NBR (mineral oil & water glycol)
PE = FPM

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

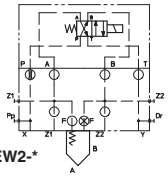
Note: for the code of the ISO cartridge to use with the above covers see tab. H003, section 2 and tab. H030, section 3.

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

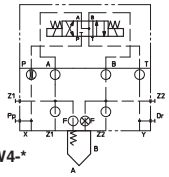
14 HYDRAULIC SYMBOLS



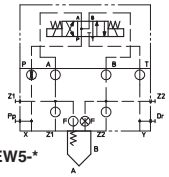
LIDEW1-*



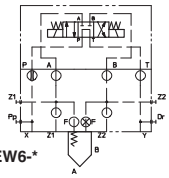
LIDEW2-*



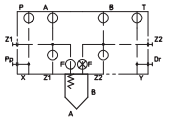
LIDEW4-*



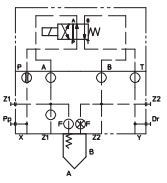
LIDEW5-*



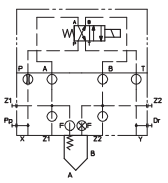
LIDEW6-*



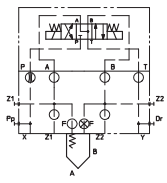
LIDBH1A-*



LIDBH1C-*



LIDBH2A-*



LIDBH2C-*

15 MODEL CODE OF PROPORTIONAL DIRECTIONAL VALVES

**DHZA - /IE - T - 0 7 1 - L 5 / PA - GK / 7 /* ** / *

DHZA = size 06
DKZA = size 10
DPZA = size 10
= size 16
= size 25

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

A = without integral position transducer
T = with integral position transducer (not for DPZA)

Valve size (ISO 4401)

DHZA	DKZA	DPZA
0= size 06	**1**= size 10	**1**= size 10 **2**= size 16 **4**= size 25 **6**= size 32

Configuration, DHZA and DKZA see section 16, DPZA see section 17
5 = external plus central position, spring centered
7 = 3 position, spring centered

Spool overlapping in central position, DHZA and DKZA see section 16, DPZA see section 17
1 = P, A, B, T positive overlapping
3 = P positive overlapping; A, B, T, negative

Spool type
L = linear; **S** = progressive; **D** = as **S**, but with P-A = Q, P-B = Q/2

Spool size: DHZA and DKZA see section 16, DPZA see section 17

Optional cable gland:
PA = with threated cable gland, see section 26

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)

Options:
7 = for ambient temperature up to 70°C (not for Group I)
B = solenoid at side of port A (and position transducer for -T version)
C = position transducer with current feedback 4÷20 mA (only for -T)
D = internal drain (only for DPZA)
E = external pilot (only for DPZA)
G = pressure reducing valve for piloting (only for DPZA)
MV = vertical hand lever (only for DHZA) (2)
O = horizontal cable entrance (only for -A, not for group I Atex)
WP = prolongued manual override protected by metallic cap (only for -A)
Y = external drain (only for DHZA and DKZA)

Omit for standard coil 12 V_{DC}:
24 = with 24 VDC coils (only A version)

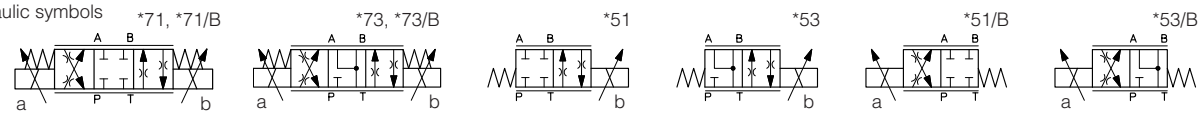
Series number

Seals material (1):
omit for NBR (mineral oil & water glycol)
PE = FPM

(1) Option **/BT** = low temperature -40°C also available on request only for valves -A without integral position transducer (not for group I Atex -mining-)
(2) Option **/MV** available only for DHZA configuration 51, 53, 71, spool type S3, S5, D3, D5, L3, L5

16 HYDRAULIC CHARACTERISTICS of DHZA and DKZA (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols

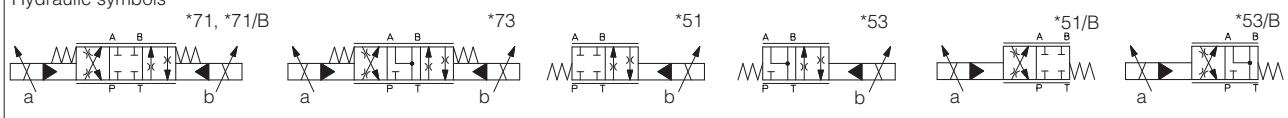


Valve model	DHZA-A DHZA-T					DKZA-A	DKZA-T
Spool overlapping	**1, 3**	**1, 3**	**1, 3**	**1, 3**	**1, 3**	**1, 3**	**1, 3**
Spool type and size (1)	**L14**	**L1**	**S2**	**S3, L3, D3**	**S5, L5, D5**	**S3, L3, D3**	**S5, L5, D5**
Pressure limits [bar]	ports P, A, B = 350; T = 160 (250 with external drain /Y)						
Δp max P-T [bar]	70			50		40	
Max flow [l/min]							
at Δp = 10 bar (P-T)	1	4,5	8	17	28	45	60
at Δp = 30 bar (P-T)	2	8	14	30	50	80	105
max permissible flow	3	12	21	45	60	90	120
Response time (2) [ms]	< 30 (A) < 15 (T)					< 40 (A)	< 20 (T)
Hysteresis [%]	≤ 5% (A) ≤ 0,2% (T)					≤ 5% (A)	≤ 0,2% (T)
Repeatability	± 1% (A) ± 0,1% (T)					± 1% (A)	± 0,1% (T)

(1) Additional spools and configurations for -T execution, see table F172.
(2) Response times at step signal (0%→100%) are measured from 10% to 90% of step value and are strictly referred to the valve regulation.

17 HYDRAULIC CHARACTERISTICS OF DPZA (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols



Valve model	DPZA-1			DPZA-2					DPZA-4			DPZA-6		
Spool type and size (1)	L5	S5	D5	S3	D3	L5	S5	D5	L5	S5	D5	L5	S5	D5
Pressure limits [bar]	Ports P, A, B, X = 350; T = 250; Y = 0													
Max flow [l/min]														
at Δp = 10 bar	100	100	100 : 60	130	130 : 80	200	180	180 : 130	390	360	360 : 220	600	600	600:370
at Δp = 30 bar	160	160	160 : 100	225	225 : 135	340	310	310 : 225	680	620	620 : 380	1030	1030	1030:640
max permissible flow	180	180	180 : 110	550	550 : 300	760	640	640 : (460)	1450	1350	1350 : 820	1600	1600	1600:100
Response time (2) [ms]	< 80			< 100					< 120					
Hysteresis [%]	≤ 5%			≤ 5%					≤ 5%					
Repeatability	± 1%			± 1%					± 1%					

(1) Additional spools and configurations for -T execution, see table F172.
(2) Response times at step signal (0%→100%) are measured from 10% to 90% of step value and are strictly referred to the valve regulation.

ELECTRONIC DRIVERS TO BE USED WITH EX-PROOF PROPORTIONAL VALVES
- Atos driver for proportional valves type **-A** (without transducer): **E-ME-AC**, see tab. G035
- Atos driver for proportional valves type **-T** (with transducer): **E-ME-T**, see tab. G140

18 MODEL CODE OF SERVOPROPORTIONAL VALVES

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

DLHZA = size 06
DLKZA = size 10

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

T = with integral position transducer

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

Configuration, see section 19
4 = spring offset with fail safe
6 = spring offset

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

Spool type
L = linear; **T** = not linear (1); **D** = different-linear (1);
V = progressive; **DT** = as D but with non-linear regulation (1);

Spool size: see section 19

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

Optional cable gland:
PA = with threated cable gland, see section 26

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)

Options:
7 = for ambient temperature up to 70°C (not for Group I)
B = solenoid at side of port A
C = position transducer with current feedback 4÷20 mA
Y = external drain

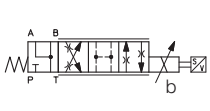
Series number

Seals material:
omit for NBR (mineral oil & water glycol)
PE = FPM

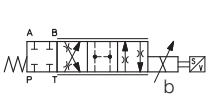
(1) Spool type D, DT and T are available only for valve with fail safe position DLHZA-*-040 and DLKZA-*-040

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

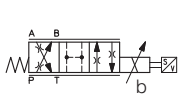
Hydraulic symbols



*40-L*3
*40-D*3
*40-DT*3
*40-T*3
*40-V*3



*40-L*1
*40-D*1
*40-DT*1
*40-T*1
*40-V*1

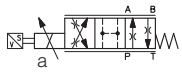


*60-L*1
*60-V*1

*40-L*3/B
*40-D*3/B
*40-DT*3/B
*40-T*3/B
*40-V*3/B

*40-L*1/B
*40-D*1/B
*40-DT*1/B
*40-T*1/B
*40-V*1/B

*60-L*1/B
*60-V*1/B



Valve model		DLHZA-T*											DLKZA-T*					
Pressure limits [bar]		ports P, A, B = 350; T = 210 (250 with external drain /Y)											ports P, A, B = 315; T = 210 (250 with external drain /Y)					
Spool		L0	L1	V1	L3	V3	L5	T5	L7	T7	V7	D7	DT7	L3	L7	T7	V7	D7	DT7
Max flow (1) [l/min]		2,5	4,5	5	9	13	18		26			26÷13		40	60			60÷33	
at Δp = 30 bar		4	7	8	14	20	28		40			40÷20		60	100			100÷50	
at Δp = 70 bar		10	18	18	32	40	50		70			70÷40		90	160			160÷80	
max permissible flow																			
Leakage [cm³/min] at P = 100 bar (2)		<100	<200	<100	<300	<150	<500	<200	<900	<200	<200	<700	<200	<1000	<1500	<400	<400	<1200	<400
Fail safe connections		P → A				P → B						A → T		B → T					
Leakage [cm³/min] at P = 100 bar (3)	Fail safe 1	50				70						70		50					
	Fail safe 3	50				70						70		50					
Flow [l/min] (4) DLHZA	Fail safe 3	-				-						15÷30		10÷20					
Flow [l/min] (4) DLKZA	Fail safe 3	-				-						40÷60		25÷40					
Response time [ms]		≤ 10												≤ 15					
Hysteresis [%]		≤ 0,1%												≤ 0,1%					
Thermal drift		zero point displacement < 1% at ΔT = 40°C																	

Notes:
- Above performance data refer to valves coupled with Atos electronic drivers, see table G140.
- The flow regulated by the directional proportional valves is not pressure compensated, thus it is affected by the load variations.To keep costant the regulated flow under different load conditions, modular pressure compensators are available (see tab. D150).

(1) For different Δp, the max flow is in accordance to the diagrams in section 13.2
(2) Referred to spool in neutral position and 50°C oil temperature.
(3) Referred to spool in fail safe position and 50°C oil temperature.
(4) Referred to spool in fail safe position at Δp = 35 bar per edge and 50°C oil temperature.

20 MODEL CODE OF PRESSURE COMPENSATED PROPORTIONAL FLOW CONTROL VALVES

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

QVHZA = size 06
QVKZA = size 10

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

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 threated cable clamp, see section 26

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

Omit for standard coil 12 V_{DC}:
24 = with 24 VDC coils (only A version)

Series number

Seals material (1):
omit for NBR (mineral oil & water glycol)
PE = FPM

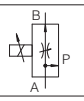
Solenoid threaded connection:
GK = GK-1/2" ISO/UNI-6125 (tapered)
NPT = 1/2" NPT ANSI B2.1 (tapered)
M = M20x1,5 UNI-4535 (6H/6g)

(1) Option **/BT** = low temperature -40°C also available on request only for valves -A without integral position transducer (not for group I Atex -mining-)

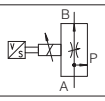
21 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols

Note: In three-way versions port P is open. In two-way versions port P must be plugged. Port T must always be plugged.



QVHZA-A
QVKZA-A



QVHZA-T
QVKZA-T

Valve model		QVHZA-A					QVHZA-T					QVKZA-A		QVKZA-T	
Valve size		06					06					10		10	
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	6 - 8	10 - 12
Max flow on port A	[l/min]	40		35	50	55	50				60	70	100	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 / IE – 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)
IE = IECEx, Group II
IEM = IECEx, Group I (mining)
M = ATEX, Group I (mining)
RU = Rostechnadzor (Russian), Group II

A = without integral pressure transducer

Valve size: see section 23 for size code

Max regulated pressure: see section 23

Optional cable gland
PA = with threated cable clamp, see section 26

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

Omit for standard coil 12 V_{DC}:
24 = with 24 VDC coils

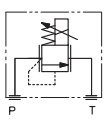
Series number

Seals material (1):
omit for NBR (mineral oil & water glycol)
PE = FPM

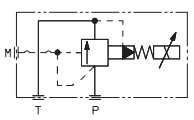
Solenoid threated connection:
GK = GK-1/2" ISO/UNI-6125 (tapered)
NPT = 1/2" NPT ANSI B2.1 (tapered)
M = M20x1,5 UNI-4535 (6H/6g)

(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-)

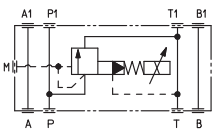
23 HYDRAULIC CHARACTERISTICS



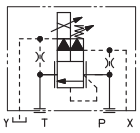
RZMA-010



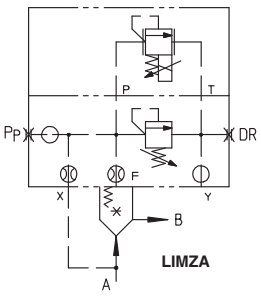
RZMA-030



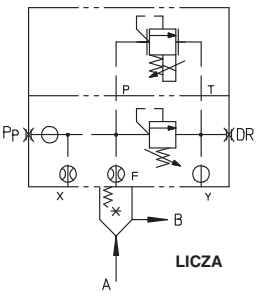
HZMA



AGMZA



LIMZA



LICZA

Valve model		RZMA		HZMA	AGMZA			LIMZA							LICZA				
Size code		010	030	030	10	20	32	1	2	3	4	5	6	8	1	2	3	4	5
Valve size		06			10	20	32	16	25	32	40	50	63	80	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	4500	200	400	750	1000	2000

24 MODEL CODE OF PROPORTIONAL PRESSURE REDUCING VALVES

RZGA / * – A – 010 / 210 / 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)
IE = IECEx, Group II
IEM = IECEx, Group I (mining)
M = ATEX, Group I (mining)
RU = Rostechnadzor (Russian), Group II

A = without integral transducer

Valve size:
see section 25 for size code

Max regulated pressure:
see section 25

Optional cable gland
PA = with threated cable clamp, see section 26

Seals material (1):
omit for NBR (mineral oil & water glycol)
PE = FPM

Series number

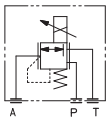
Omit for standard coil 12 VDC:
24 = with 24 VDC coils

Options:
7 = for ambient temperature up to 70° C (not for Group I)
O = horizontal cable entrace (not for group I Atex)
P = with integral mechanical pressure limiter (only for AGRCZA and LIRZA)
R = with check valve (only for AGRCZA)

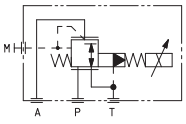
Solenoid threaded connection:
GK = GK-1/2" ISO/UNI-6125 (tapered)
NPT = 1/2" NPT ANSI B2.1 (tapered)
M = M20x1,5 UNI-4535 (6H/6g)

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-)

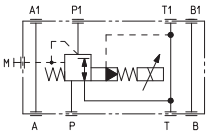
25 HYDRAULIC CHARACTERISTICS



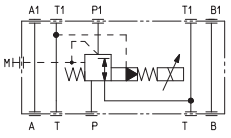
RZGA-A-010



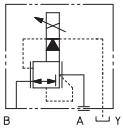
RZGA-A-033



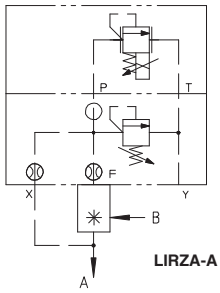
HZGA-A-031



KZGA-A-031



AGRCZA-A

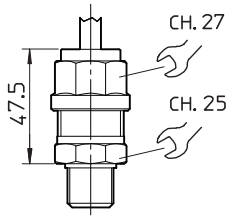


LIRZA-A

Valve model		RZGA		HZGA	KZGA	AGRCZA		LIRZA			
Size code		010	033	031	031	10	20	1	2	3	4
Valve size		06			10	10	20	16	25	32	40
Max regulated pressure	[bar]	32; 100; 210			80;		180;	250			
Min regulated pressure	[bar]	0,8	1	1	1	1	1	7	7	7	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	300	550	800

26 CABLE GLAND

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



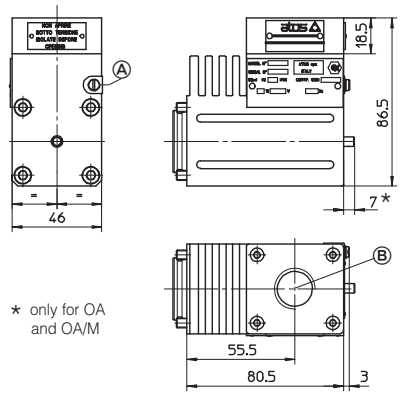
The cable glands are available on request certified ATEX according to EN 60079-0 and EN 60079-1.
PA19 cable size 7÷9,5 mm
PA112 cable size 9÷12 mm

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

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

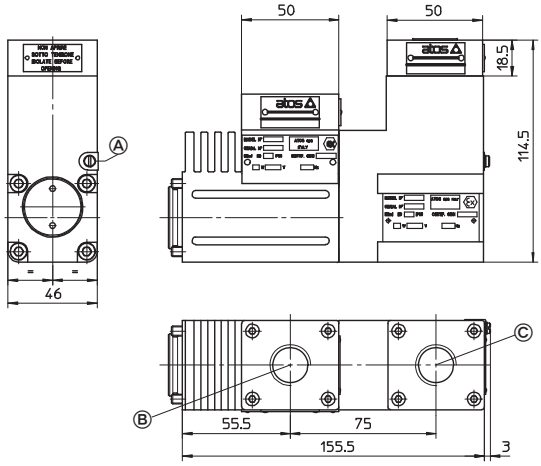
The valves must be connected to the power supply using the terminal board inside the solenoid.
The cable must be suitable for the working temperature as specified in the "safety instructions" delivered with the first supply of the products.
Additional equipotential grounding can be also performed by the user on the external facility provided on the solenoid case.
Minimum section of external ground wire = 4 mm^2.
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 threated connection for cable entrance:
GK-1/2" GAS (ISO/UNI 6125) or M20x1,5 (UNI-4535) or 1/2"NPT (ANSI B2.1)

OA OAI OA/M
OZA-A OZAI-A OZA/M-A

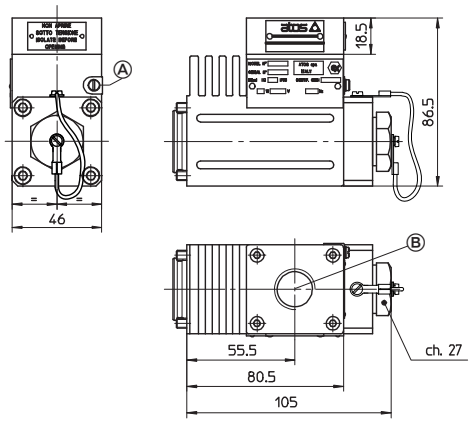


* only for OA and OA/M

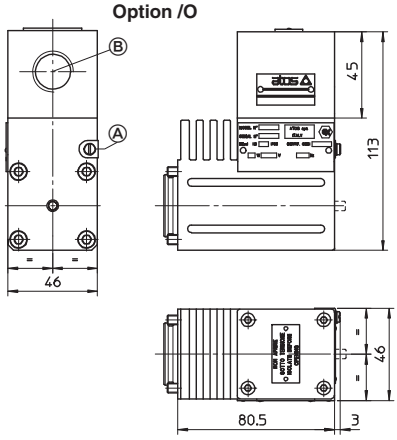
OZA-T OZAI-T OZA/M-T



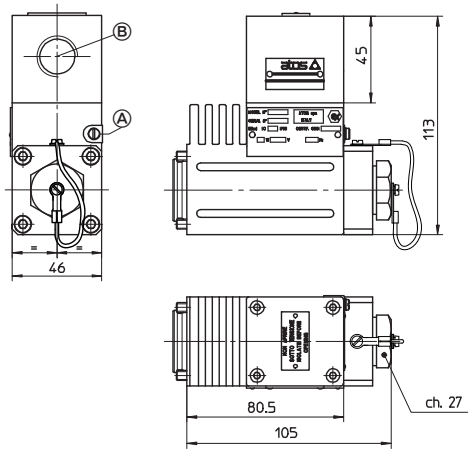
Option /WP



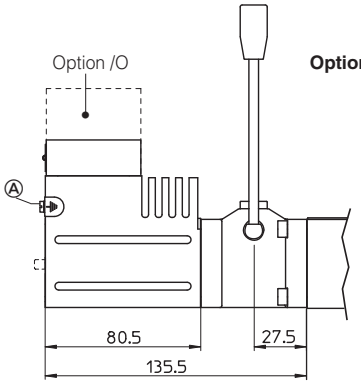
Option /O



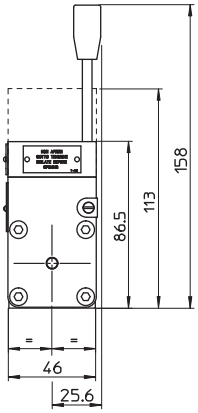
Option /OWP



Option /O



Option /MV



Ⓐ = **screw terminal for additional equipotential grounding**

Ⓑ = **Solenoid wiring**

1 = Coil
2 = GND
3 = Coil

Ⓒ = **Position transducer wiring**

1 = Output signal
2 = Supply -15 V
3 = Supply +15 V
4 = GND