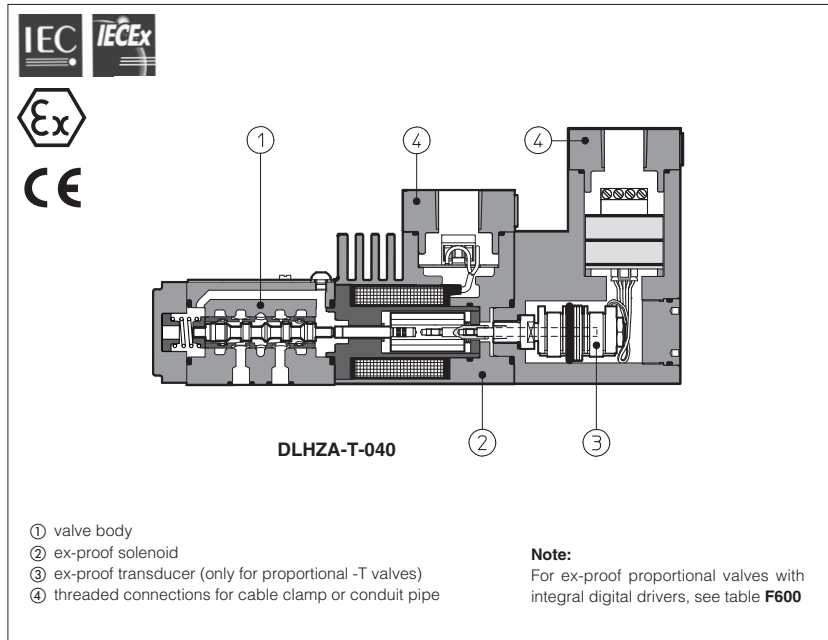


Rozdzielacze do stref zagrożonych wybuchem Ex *Explosion-proof solenoid valves*



Explosion-proof solenoid valves

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



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		ON-OFF
	without transducer	with transducer	
Solenoid code	Group II, ATEX OZA-A	Group II, IECEx OZAI-T	OA
	Group I, ATEX (mining) OZAM-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		ON/OFF	
	(with and without transducer)		Ex d	
Method of protection	Ex d			
Temperature class (only for Group II)	T4	T3 (option /7)	T6	T4 (option /7)
Surface temperature	≤135 °C	≤200 °C	≤85 °C	≤135 °C
	150 °C			
	≤135 °C	≤200 °C	≤85 °C	≤135 °C
Ambient temperature	-40 ÷ +40 °C (2)	-40 ÷ +70 °C (2)	-40 ÷ +45 °C (2)	-40 ÷ +70 °C (2)
	-20 ÷ +60		-20 ÷ +70	
	-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

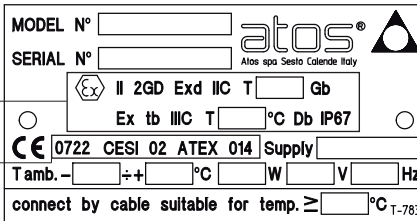
3 CERTIFICATIONS

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



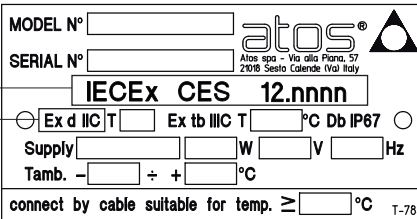
Notified body and certificate number

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



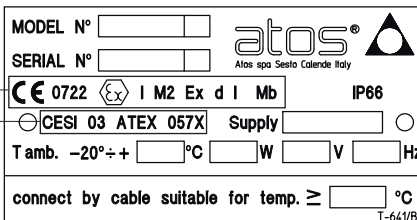
Notified body and certificate number

Marking according to IECEx

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

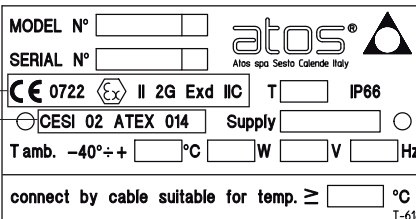
Marking according to ATEX Directive

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

ЗЭП №093 от 14.09.2007
ООО "РНПСО"

ОТКРЫВАТЬ, ОТКЛЮЧИВ ОТ СЕТИ

T-618

Note:

According to EN60079-0 the valves with ATEX certification can be coated with a non-metallic material (for ex. painted), 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 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)

(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

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 11

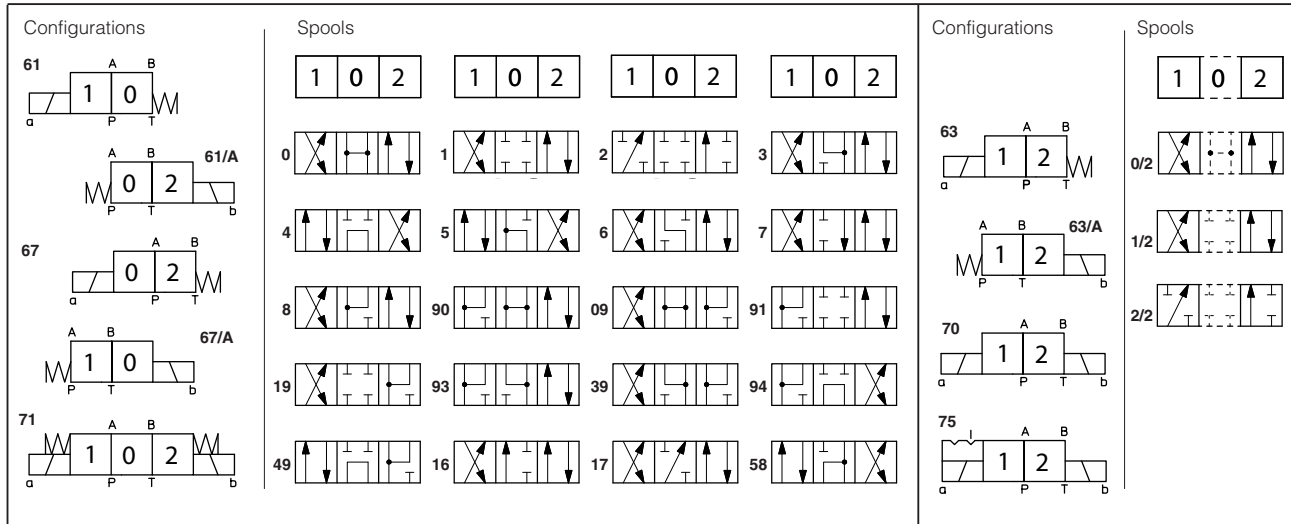
Options:

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 = prolonged manual override protected by metallic cap

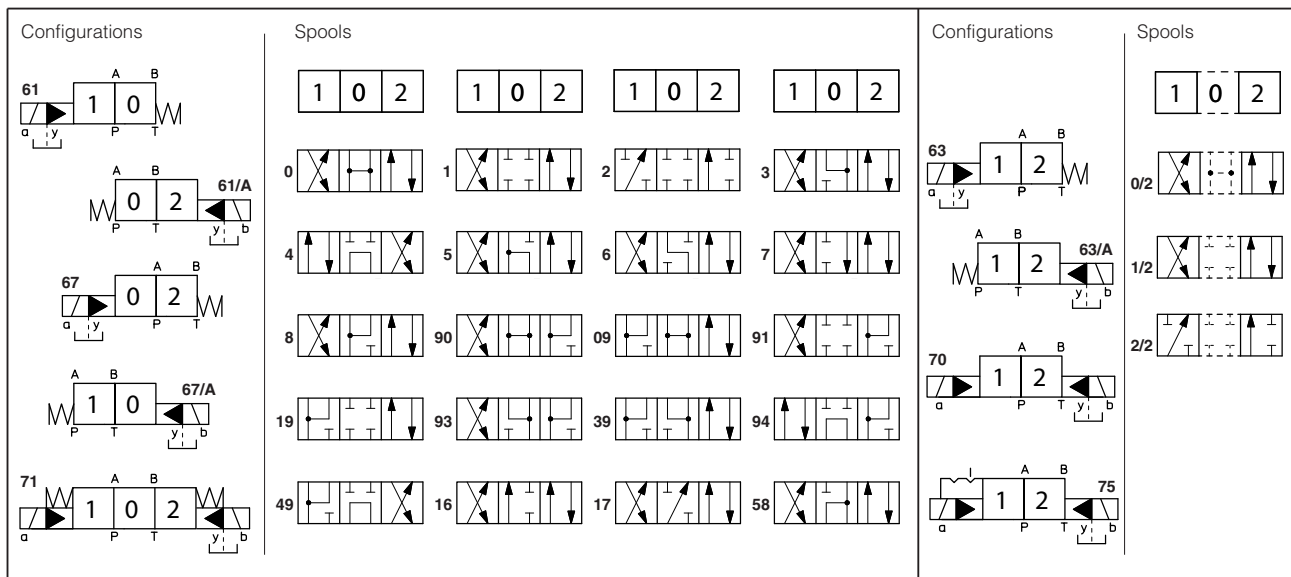
Only for DPHA:

/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).
/R = Pilot pressure generator (4 bar on port P)
/S = Main spool stroke adjustment (not for DPHA-1).

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 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)

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

Series number

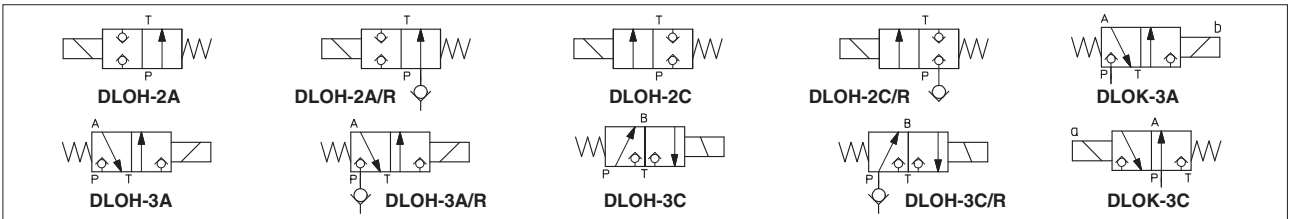
Voltage code - see section 11

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 = prolonged manual override protected by metallic cap

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

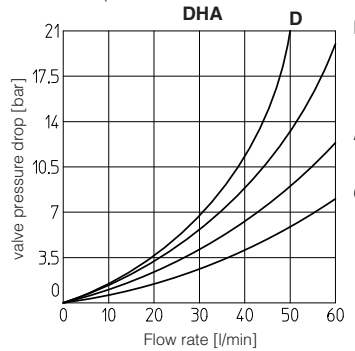
(1) Option **/BT** = low temperature -40°C also available on request (not for group I Atex -mining-)

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



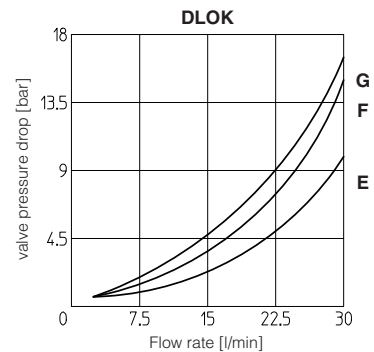
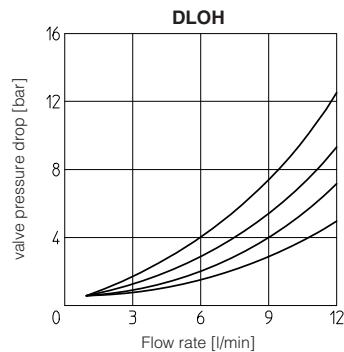
9 Q/Δp DIAGRAMS OF ON/OFF DIRECTIONAL CONTROLS (based on mineral oil ISO VG 46 at 50°C)

Flow direction	Flow direction					
	P→A	P→B	A→T	B→T	P→T	
Spool type						
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.

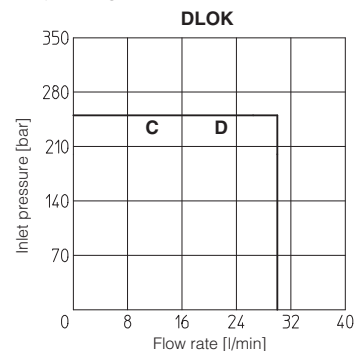
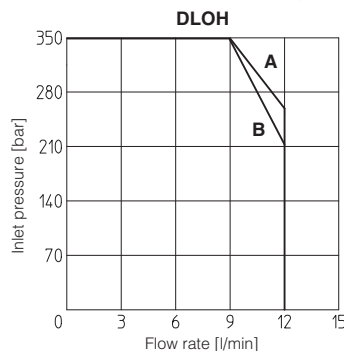
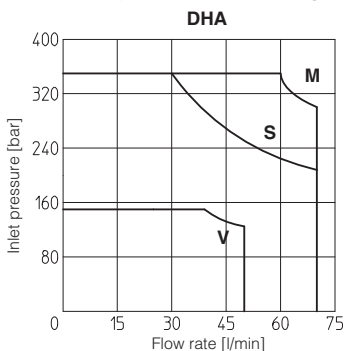
Valve type	Flow direction	
	P → A (1) (P → B)	A → T (B → T)
DLOH-2A	B	-
DLOH-2C	C	-
DLOH-3A	D	C
DLOH-3C	C	A
DLOK-3A	G	F
DLOK-3C	F	E



(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

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

Series number

Voltage Code, see section 11

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 handwheel
- WP** = prolonged manual override protected by metallic cap
- Y** = external drain

Certification type

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

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

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

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-)

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

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

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

14 HYDRAULIC SYMBOLS

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
 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

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

Series number

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

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 = prolonged manual override protected by metallic cap (only for -A)
Y = external drain (only for DHZA and DKZA)

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 16

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

(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	*71, *71/B		*73, *73/B		*51		*53		*51/B		*53/B	
Valve model	DHZA-A		DHZA-T		DKZA-A		DKZA-T					
Spool overlapping	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	
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]			70				50				40	
at Δp = 10 bar (P-T)	1		4,5		8		17		28		45	
at Δp = 30 bar (P-T)	2		8		14		30		50		80	
max permissible flow	3		12		21		45		60		90	
Response time (2) [ms]			< 30 (A)		< 15 (T)						< 40 (A)	
Hysteresis [%]			≤ 5% (A)		≤ 0,2% (T)						≤ 5% (A)	
Repeatability			± 1% (A)		± 0,1% (T)						± 1% (A)	

(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	*71, *71/B			*73			*51			*53			*51/B			*53/B		
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);

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

Series number

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

Solenoid threaded connection:
GK = GK-1/2" ISO/JUNI-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 26

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) 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

Valve model	DLHZA-T*											DLKZA-T*							
	ports P, A, B = 350; T = 210 (250 with external drain Y)																		
Pressure limits [bar]	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			-				-				15÷30				10÷20			
	DLKZA			-				-				40÷60				25÷40			
Response time [ms]	≤ 10																		
Hysteresis [%]	≤ 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 constant 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 threaded cable clamp, see section 26

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

Series number

Omit for standard coil 12 V_{DC}:

24 = with 24 VDC coils (only A version)

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 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) 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	50		60		70		100		70	

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 threaded cable clamp, see section 26

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

Series number

Omit for standard coil 12 V_{DC}:

24 = with 24 VDC coils

Options:

7 = for ambient temperature up to 70° C (not for Group I)
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)

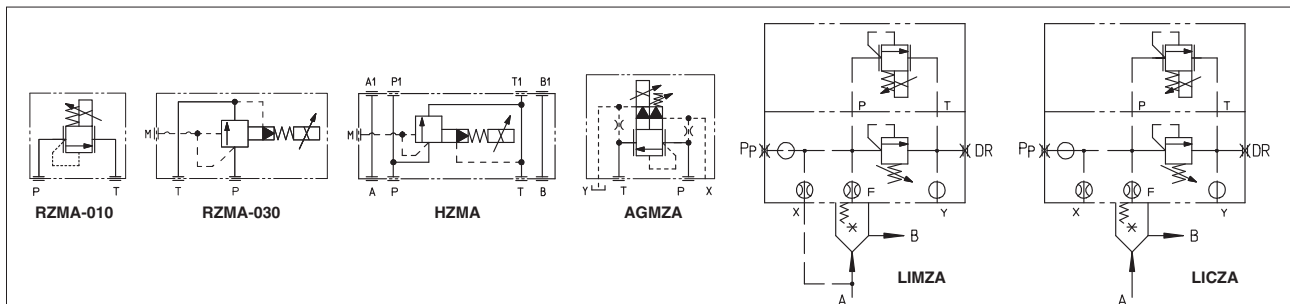
Solenoid threaded connection:

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	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						210											
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 threaded 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 entrance (not for group I ATEX)
P = with integral mechanical pressure limiter (only for AGRCZA and LIRZA)
R = with check valve (only for AGRCZA)

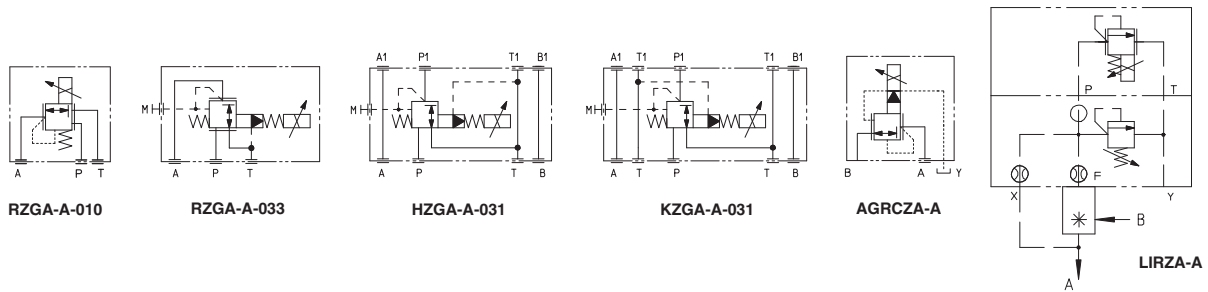
Solenoid threaded connection:

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-)

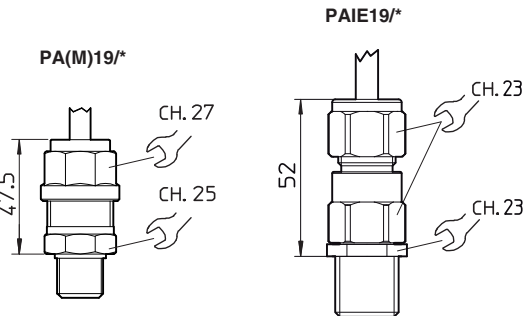
25 HYDRAULIC CHARACTERISTICS



Valve model	RZGA		HZGA	KZGA	AGRCZA		LIRZA			
Size code	010	033	031	031	10	20	1	2	3	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 PA19/* (PG9 - IP67)
CABLE GLAND PAM19/* - for valves with mining certification (PG9 - IP67)
CABLE GLAND PAIE19/* - for valves with IECEx certification (PG9 - IP66)



The cable glands PA and PAM, are available on request certified ATEX according to EN 60079-0 and EN 60079-1.

The cable gland PAIE, is certified IECEx according to the following standards: IEC 60079-0, IEC 60079-1, IEC 60079-7, IEC 61241-0, IEC 61241-1

PA19 cable size 7÷9,5 mm
 PA112 cable size 9÷12 mm

Following codes have to be specified for spare cable glands:

- PA(M)19/GK** = with threaded connection GK-1/2" ISO/UNI-6125 (tapered)
- PA(M)19/NPT** = with threaded connection 1/2" NPT ANSI B2.1 (tapered)
- PA(M)19/M** = with threaded connection M20x1,5 UNI-4535 (6H/6g).
- PAIE19/GK** = with threaded connection GK-1/2" ISO/UNI-6125 (tapered)
- PAIE19/NPT** = with threaded connection 1/2" NPT ANSI B2.1 (tapered)
- PAIE19/M** = with threaded connection M20x1,5 UNI-4535 (6H/6g).

The cable gland PA*/M must be blocked with loctite or similar or with a locking nut.

Note: special cable clamps PG12, PA(M)112/* are available on request and they have to be ordered separately

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.

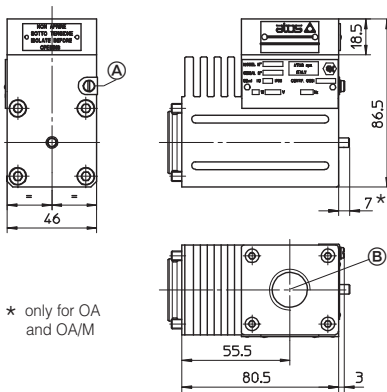
Solenoids are provided with threaded connection for cable entrance:

GK-1/2" GAS (ISO/UNI 6125) or M20x1,5 (UNI-4535) or 1/2"NPT (ANSI B2.1)

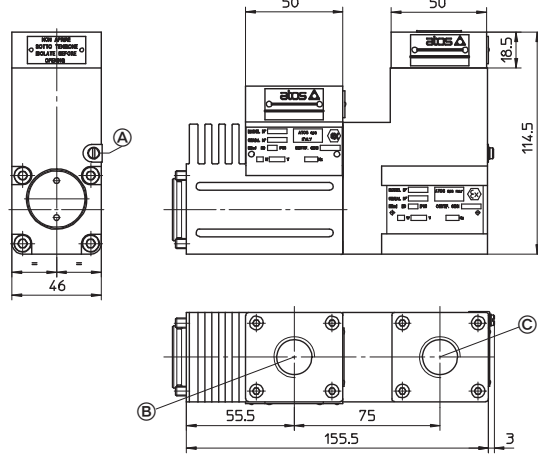
OA
OZA-A

OAI
OZAI-A

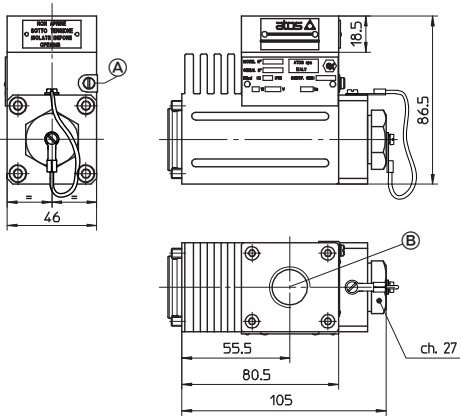
OA/M
OZA/M-A



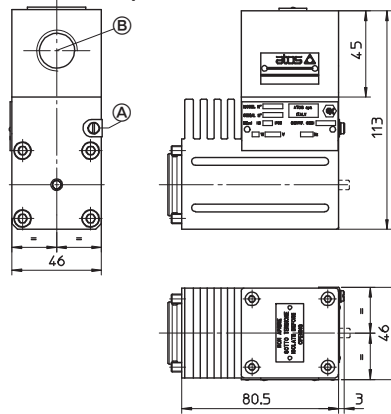
OZA-T OZAI-T OZA/M-T



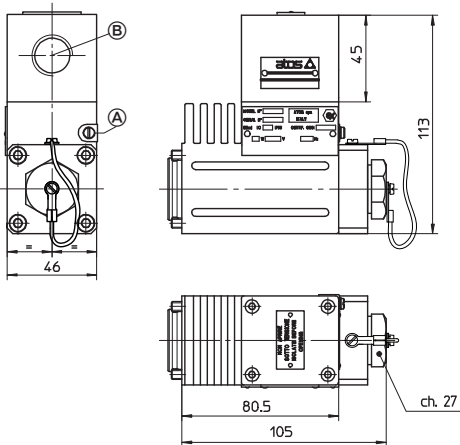
Option /WP



Option /O

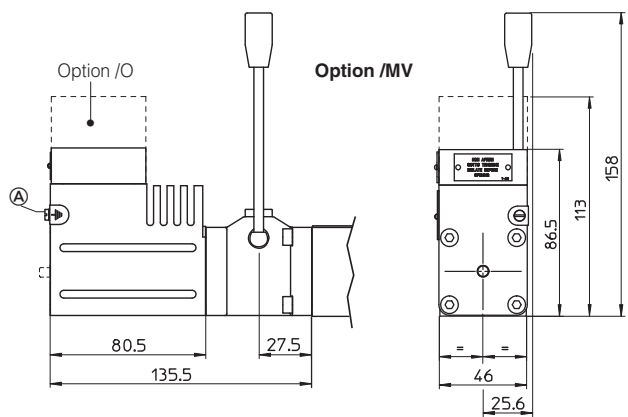


Option /OWP



Option /O

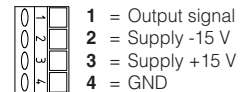
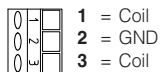
Option /MV



Ⓐ = screw terminal for additional equipotential grounding

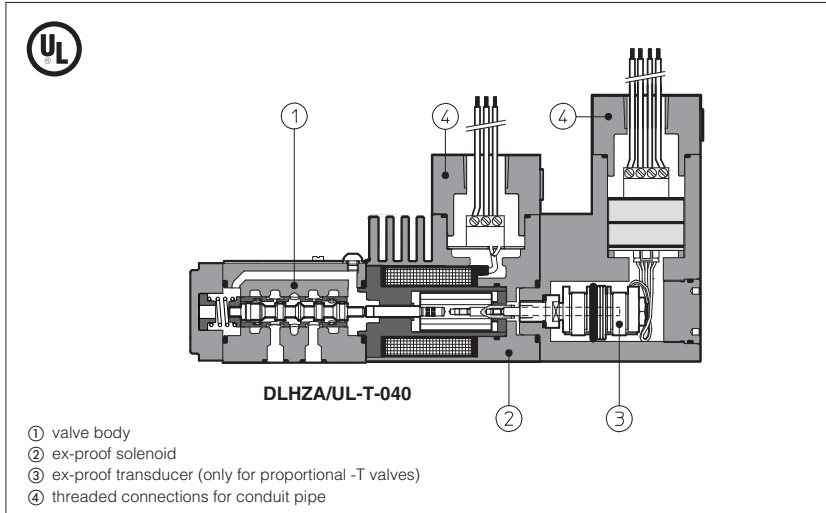
Ⓑ = Solenoid wiring

Ⓒ = Position transducer wiring



Explosion-proof solenoid valves

on/off and proportional controls - C UL US certification



Explosion-proof on/off and proportional solenoids certified C UL US according to UL 1002 and CSA 22.2 n°139-1982 Standard, Class I, Groups C&D (Groups IIA & IIB to NEC 505-7).

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.

DHA and DLOH valves are conform to **SIL 3** safety level (TÜV approved).

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.

These solenoids are applied to hydraulic valves for application in explosion-hazardous environments.

1 EXPLOSION PROOF SOLENOIDS: MAIN DATA

SOLENOID TYPE	PROPORTIONAL		ON-OFF
	without transducer	with transducer	
Solenoid code	OZAUL-A	OZAUL-T	OAUL
Voltage code	V _{dc} ±10% 12 DC, 24 DC	12 DC	12DC, 24DC, 110DC, 125DC, 220DC 12AC, 24AC, 110AC, 230AC (1)
Power consumption	35W		12W
Coil insulation	Class H		
Protection degree	IP 67 According to IEC 144 when correctly coupled with the relevant conduit pipe		
Duty factor	100%		
Mechanical construction	Flame proof housing classified, according to UL 1002 and CSA 22.2 n°139-1982, class I, groups C&D (Groups IIA & IIB to NEC 505-7)		
Cable entrance and electrical wiring	Connection 1/2" NPT (ANSI B2.1) for conduit pipe The valves are supplied with 1,07 m (42 inches) cable length factory wired - cable size AWG 16		

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

2 EXPLOSION PROOF SOLENOIDS: TEMPERATURE DATA

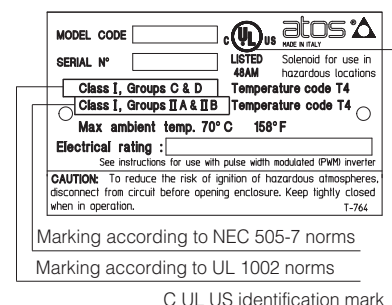
SOLENOID TYPE	PROPORTIONAL	ON/OFF
Method of protection	Ex d	
Temperature class with +70°C ambient temp.	T4	Not applicable
Surface temperature	≤135 °C	≤ 85 °C
Ambient temperature	-40 ÷ +70 °C	

3 CERTIFICATIONS

In the following is resumed the valves marking according to UL 1002 and CSA 22.2 n° 139-1982 certification

- Class I** = Equipment for famable gas and vapours
- Division 1** = Possibility of explosive atmosphere during normal functioning
- Groups C&D** = Gas group (according to UL 1002)
- Groups IIA&IIB** = Gas group (according to NEC 505-7)
- T4** = Temperature class of solenoid surface referred to +70°C ambient temperature

3.1 EXAMPLE OF NAMEPLATE MARKING



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

<p>DHA = spool type - direct DPHA = spool type - piloted</p> <p>UL = C UL US certification</p> <p>Valve size (ISO 4401) for DHA 0 = 06 for DPHA 1 = 10 2 = 16 4 = 25 6 = 32</p> <p>Valve configuration, DHA see section 5 and DPHA see section 6</p> <p>Spool type, DHA see section 5 and DPHA see section 6</p> <p>Solenoid threaded connection: NPT = 1/2" NPT ANSI B2.1 (tapered)</p>	<p>/ UL - 0 63 1/2 / NPT / *</p>	<p>24DC</p>	<p>**</p>	<p style="text-align: right;">/*</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> Seals material: omit for NBR (mineral oil & water glycol) PE = FPM Low temperature execution: BT = low temperature -40°C </div> <p>Series number</p> <p>Voltage code - see section 1</p>
---	---	--------------------	------------------	---

Options:
A = solenoid at side of port B (for single solenoid valves)
O = horizontal cable entrance
MV = vertical hand lever (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)
/L9 = (only for DPHA-2 and DPHA-4) plug with calibrated restrictor on port P of pilot valve
/S = Main spool stroke adjustment (only for DPHA-2, -3)

(1) Option **/MV** 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

<p>Configurations</p>	<p>Spoils</p>	<p>Configurations</p>	<p>Spoils</p>
-----------------------	---------------	-----------------------	---------------

6 CONFIGURATIONS and SPOOLS

<p>Configurations</p>	<p>Spoils</p>	<p>Configurations</p>	<p>Spoils</p>
-----------------------	---------------	-----------------------	---------------

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 / NPT - AO/UL / * 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

Solenoid threaded connection:
NPT = 1/2" NPT ANSI B2.1 (tapered)

(1) Option **/BT** = low temperature -40°C also available on request

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

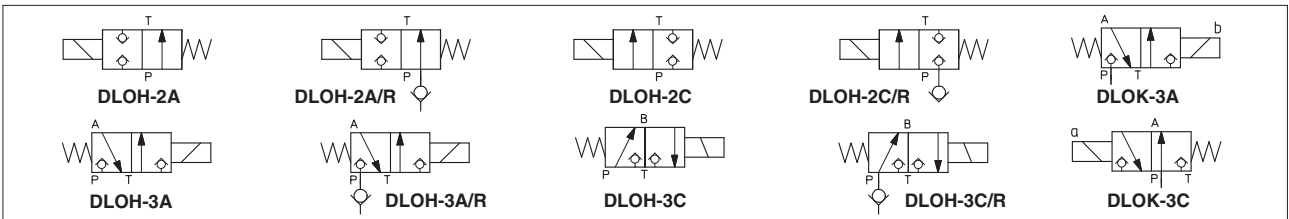
Series number

Voltage code - see section 11

Options:
O = horizontal cable entrance
R = with check valve on port P (only for DLOH)
WP = prolonged manual override protected by metallic cap

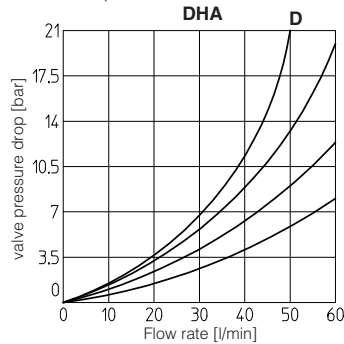
AO/UL = C UL US certification

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



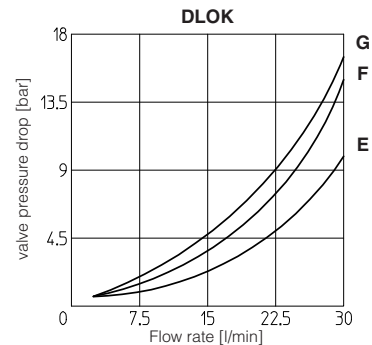
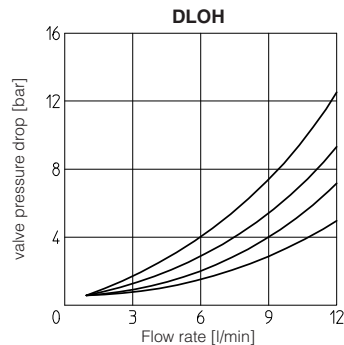
9 Q/Δp DIAGRAMS OF ON/OFF DIRECTIONAL CONTROLS (based on mineral oil ISO VG 46 at 50°C)

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

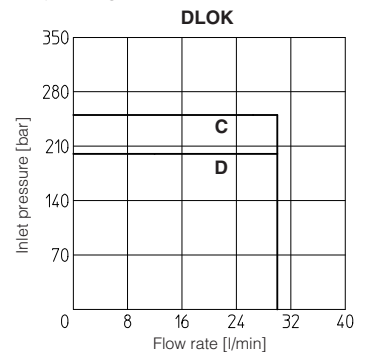
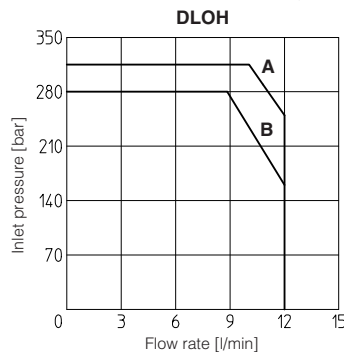
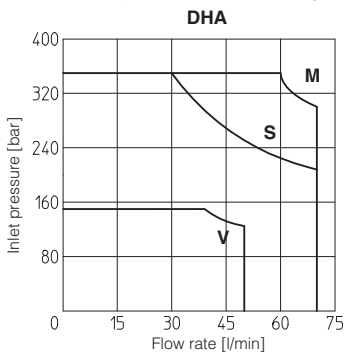
Flow direction \ Valve type	P → A (1) (P → B)	A → T (B → T)
DLOH-2A	B	-
DLOH-2C	C	-
DLOH-3A	D	C
DLOH-3C	C	A
DLOK-3A	G	F
DLOK-3C	F	E



(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 Max pressure in port T = 210 bar

11 MODEL CODE OF PRESSURE RELIEF VALVES

AGAM - 20 / 2 0 / 210/100/100 / NPT - AO/UL / * 24 DC ** /*

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

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

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

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

Series number

Voltage Code, see section 11

Options:
E = external pilot
O = horizontal cable entrance
V = regulating handwheel
WP = prolonged manual override protected by metallic cap
Y = external drain

AO/UL = C UL US certification

Solenoid threaded connection:
NPT = 1/2" NPT ANSI B2.1 (tapered)

(1) Option **/BT** = low temperature -40°C also available on request

12 HYDRAULIC CHARACTERISTICS

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 / NPT - AO/UL - * 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;

Solenoid threaded connection:
NPT = 1/2" NPT ANSI B2.1 (tapered)

Certification type
AO/UL = C UL US certification

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

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

Series number

Voltage code - see section 11

Options:
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
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

14 HYDRAULIC SYMBOLS

LIDEW1-*, LIDEW2-*, LIDEW4-*, LIDEW5-*, LIDEW6-*, LIDBH1A-*, LIDBH1C-*, LIDBH2A-*, LIDBH2C-*

15 MODEL CODE OF PROPORTIONAL DIRECTIONAL VALVES

DHZA /UL - T - 0 7 1 - L 5 / NPT / * / * / ** / *

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

UL = C UL US certification

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

(1) Option **/BT** = low temperature -40°C also available on request
 (2) Option **/MV** Available only for DHZA configuration 51, 53, 71, spool type S3, S5, D3, D5, L3, L5

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 (only A version)

Options:
B = solenoid at side of port A (only for single solenoid valves)
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 (2)
O = horizontal cable entrance (only for -A)
WP = prolonged manual override protected by metallic cap (only for -A)
Y = external drain (only for DHZA and DKZA)

Solenoid threaded connection:
NPT = 1/2" NPT ANSI B2.1 (tapered)

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

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

Hydraulic symbols *71, *71/B *73, *73/B *51 *53 *51/B *53/B

Valve model	DHZA-A DHZA-T				DKZA-A DKZA-T			
Spool overlapping	1, 3		1, 3		1, 3		1, 3	
Spool type and size	L14		L1		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			
Max flow [l/min]	70		40		50		40	
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 (1) [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) 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 *71, *71/B *73 *51 *53 *51/B *53/B

Valve model	DPZA-1			DPZA-2			DPZA-3			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]	Ports P, A, B, X = 350; T = 250; Y = 0														
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			< 120			< 120		
Hysteresis [%]	≤ 5%			≤ 5%			≤ 5%			≤ 5%			≤ 5%		
Repeatability	± 1%			± 1%			± 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 /UL - T - 0 4 0 - L 7 3 / NPT / * ** /*

DLHZA = size 06
DLKZA = size 10

UL = C UL US certification

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 zero overlapping

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

(1) Option **/BT** = low temperature -40°C also available on request

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

Series number

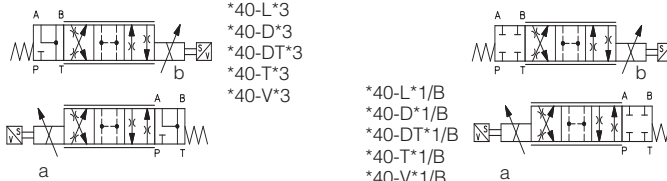
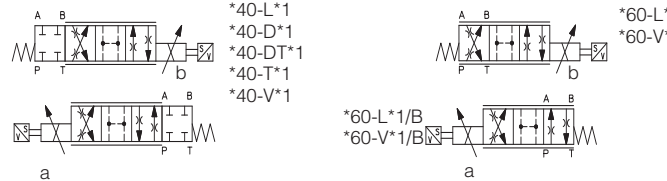
Options:
B = solenoid at side of port A
C = position transducer with current feedback 4÷20 mA
Y = external drain

Solenoid threaded connection:
NPT = 1/2" NPT ANSI B2.1 (tapered)

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

Spool size: see section 19

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

Hydraulic symbols																		
Valve model	DLHZA-T*										DLKZA-T*							
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)							
Δp max P-T	70										60							
Spool	L0	L1	V1	L3	V3	L5	T5	L7	T7	V7	D7	DT7	L3	L7	T7	V7	D7	DT7
Max flow at Δp = 30 bar	2,5	4,5	5	9	13	18		26		26÷13			40		65		65÷33	
max permissible flow	4	7	8	14	20	28		40		40÷20			55		80		80÷40	
Leakage [cm³/min] at P = 100 bar (1)	<100	<200	<100	<300	<150	<500	<200	<900	<200	<200	<700	<200	<1000	<1500	<400	<400	<1200	<400
Response time [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.

20 MODEL CODE OF PRESSURE COMPENSATED PROPORTIONAL FLOW CONTROL VALVES

QVHZA / UL - T - 06 / 12 / NPT / * / * ** / *

QVHZA = size 06
QVKZA = size 10

UL = C UL US certification

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;

(1) Option **/BT** = low temperature -40°C also available on request

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 (only A version)

Options:
C = current feedback signal 4÷20 mA (only for -T versions)
D = quick venting
O = horizontal cable entrance (only for -A versions)
WP = prolonged manual override protected by metallic cap (only for valves without transducer)

Solenoid threaded connection:
NPT = 1/2" NPT ANSI B2.1 (tapered)

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

Hydraulic symbols	 <p>QVHZA-A QVKZA-A</p>	 <p>QVHZA-T QVKZA-T</p>																						
Note: 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	QVHZA-A					QVHZA-T					QVKZA-A		QVKZA-T											
Valve size	06					06					10		10											
Max pressure ports P, A, B	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 / UL - A - 010 / 250 / NPT / * / * ** / *

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

UL = C UL US certification

A = without integral pressure transducer

Valve size:
 see section 23 for size code

Max regulated pressure:
 see section 23

(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

Seals material (2):
 omit for NBR (mineral oil & water glycol)
PE = FPM

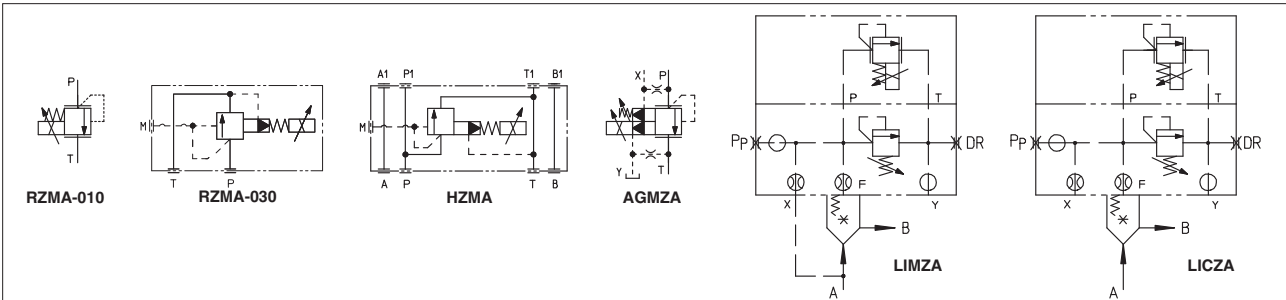
Series number

Omit for standard coil 12 Vdc:
24 = with 24 VDC coils (only A version)

Options:
E = external pilot (only for AGMZA)
O = horizontal cable entrance
P = with integral mechanical pressure limiter (only for L1*ZA)
Y = external drain (only for AGMZA)

Solenoid threaded connection:
NPT = 1/2" NPT ANSI B2.1 (tapered)

23 HYDRAULIC CHARACTERISTICS



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 / UL - A - 010 / 250 / NPT / * / * ** / *

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

UL = C UL US certification

A = without integral transducer

Valve size:
 see section 23 for size code

Max regulated pressure:
 see section 23

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

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

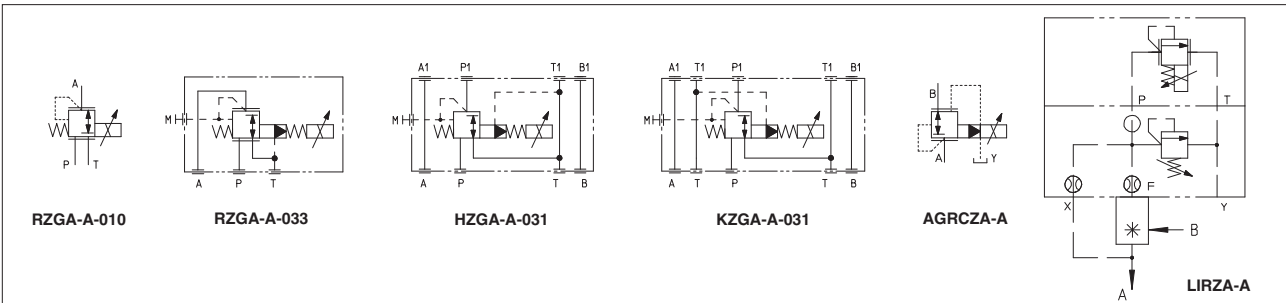
Series number

Omit for standard coil 12 Vdc:
24 = with 24 Vdc coils (only A version)

Options:
O = horizontal cable entrance (1)
P = with integral mechanical pressure limiter (only for AGRCZA and LIRZA)
R = with check valve (only for AGRCZA)

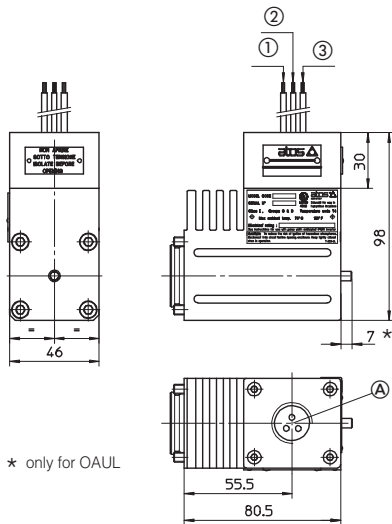
Solenoid threaded connection:
NPT = 1/2" NPT ANSI B2.1 (tapered)

25 HYDRAULIC CHARACTERISTICS



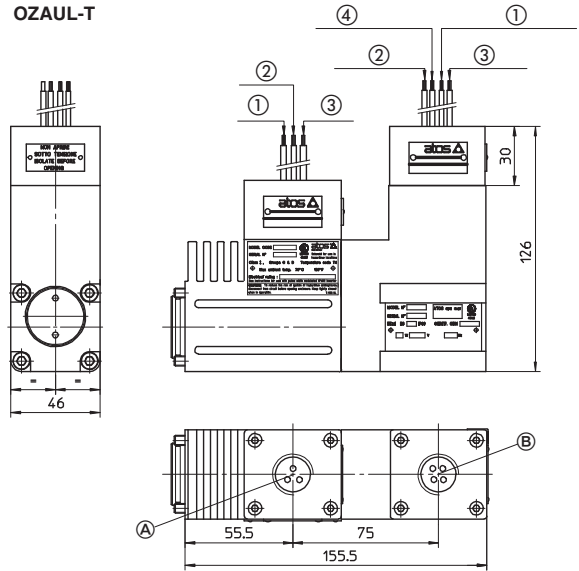
Valve model	RZGA		HZGA	KZGA	AGRCZA		LIRZA			
Size code	010	033	031	031	10	20	1	2	3	4
Valve size	06			10	10	20	16	25	32	40
Max regulated pressure [bar]	32; 100; 210				80;		180;		250	
Min regulated pressure [bar]	0.8	1	1	1	1	1	7	7	7	7
Max pressure at port P [bar]	315									
Max pressure at port T [bar]	210									
Max flow [l/min]	12	40	40	100	160	300	160	300	550	800

**OAUL
OZAUL-A**

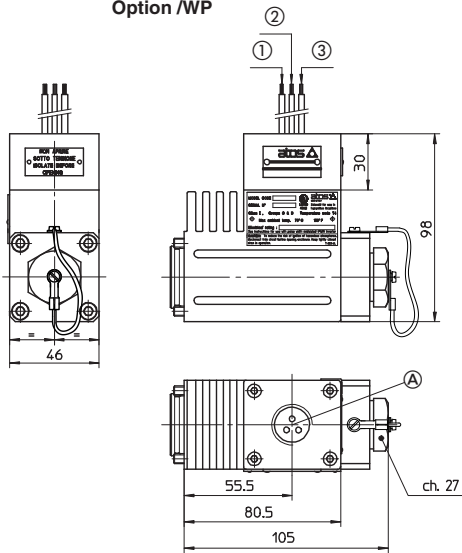


* only for OAUL

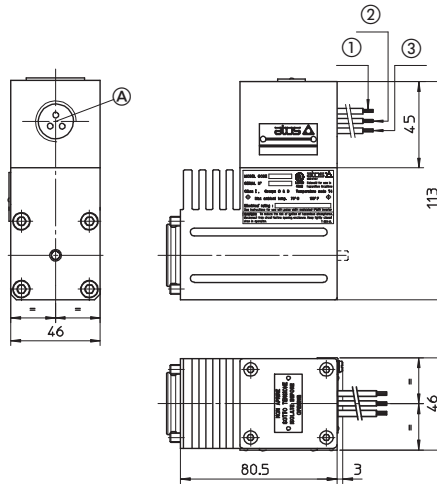
OZAUL-T



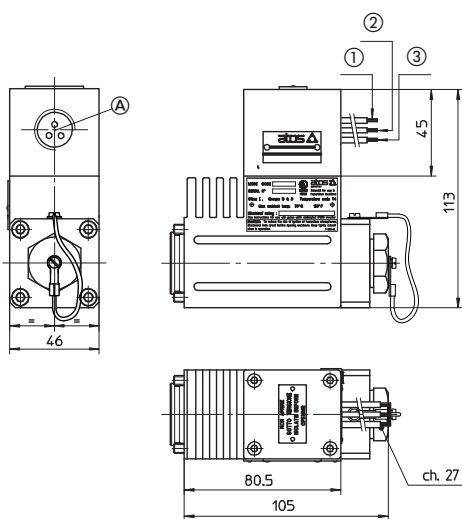
Option /WP



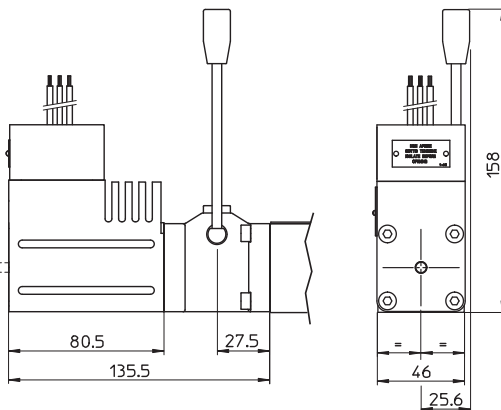
Option /O



Option /OWP



Option /MV



A Solenoid wiring (connection 1/2"NPT)

OAUL-AC

- ① white = Coil (neutral)
- ② green = GND
- ③ black = Coil

OAUL-DC

- ① red = +
- ② green = GND
- ③ black = -

OZAUL

- ① red = Coil
- ② green = GND
- ③ black = Coil

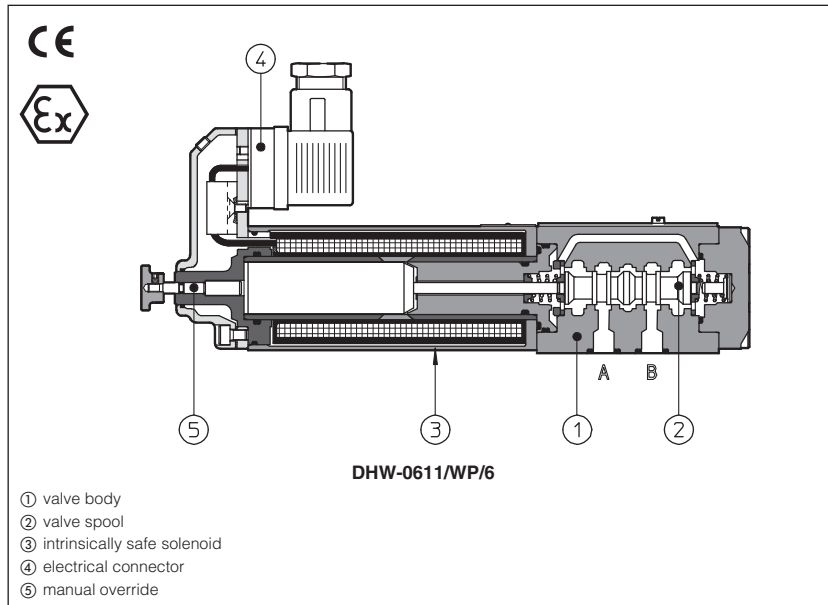
B Position transducer wiring (connection 1/2"NPT)

- ① white = Output signal
- ② black = Supply -15 V
- ③ red = Supply +15 V
- ④ yellow = GND

The valves are supplied with 1 m (42 inches) cable length, factory wired - cable size AWG 16

Intrinsically safe solenoid valves

on/off controls - ATEX certification



On/off valves equipped with intrinsically safe solenoids certified according to ATEX 94/9/CE, protection mode:

- Ex II 1 G, Ex ia IIC T6, IIB T6 or IIA T5 (surface plants with gas or vapours environment, category 1, zone 0, 1 and 2).
- Ex I M2 Ex ia I (solenoids group I for surface, tunnels or mining plants).

"Intrinsically safe" protection is based on the principle of limiting the energy of electric circuits in environments with presence of hazardous atmospheres. For this reason the valves must be supplied through specific "safety barriers" which limitate the max current to the solenoid. Atos provides galvanically insulated barriers for single and double solenoid valves, see section 18 to 21. The "intrinsically safe" circuit is virtually unable to produce electrical surges or thermic effects able to cause explosion in hazardous environments also in presence of specific break-down situations.

1 INTRINSICALLY SAFE SOLENOIDS: MAIN DATA

Solenoid code	Group II	OW-18/6	OW-18/H
	Group I (mining)	OWM-18/6	OWM-18/H
Nominal resistance at 20°C	150 Ω		
Coil insulation	Class H		
Protection degree	IP65		IP67
Duty factor	100%		
Electrical connector	DIN 43650 2 pin+GND		MIL-C-26482 3 pin

2 INTRINSICALLY SAFE SOLENOIDS: ELECTRICAL AND TEMPERATURE DATA

Method of protection	Ex ia / Ex ib according to EN60079-0: 2006, EN60079-11:2007						
Gas group	I and IIC		I and IIB	I and IIA	I		
Temperature class	T6		T6	T5	-		
Electrical characteristic	V max	27 V	19,5 V	19,11 V	28 V	28 V	12,2 V
	I max	130 mA	360 mA	360 mA	250 mA	396 mA	2200 mA
	P max	0,9 W	1,64 W	1,72 W	1,8 W	2,8 W	6,82 W
Minimum supply current	≥ 65mA, for I.S. barriers see section 18 to 21						
Surface temperature (ambient temp. +60°C)	≤ 85°C			≤ 100°C		150 °C	
Ambient temperature	-40 ÷ +60°C (1)					-20 ÷ +60°C	

(1) The Group II solenoids are Atex certified for minimum temperature -40°C. Select /BT in the valve code for the application with minimum temperature -40°C

3 CERTIFICATIONS

In the following is resumed the valves marking according to the Atex Group I and Group II certification

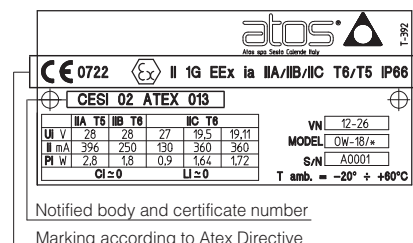
3.1 GROUP II, Atex

- Ex** = Equipment for explosive atmospheres
- II** = Group II for surface plants
- I** = Very high protection (equipment category)
- G** = For gas and vapours
- ia** = Intrinsically safe execution
- IIC** = Gas group - application in surface plants
- T6 / T5** = Temperature class of the solenoid surface referred to +60°C ambient temperature
- Zone 0** (1 and 2) = Explosive atmosphere continuously present

3.2 GROUP I (mining), Atex

- Ex** = Equipment for explosive atmospheres
- I** = Group I for mines and surface plants
- M2** = High protection (equipment category)
- d** = Flame proof housing
- I** = Gas group (Methane)

3.3 EXAMPLE OF NAMEPLATE MARKING



4 MAIN CHARACTERISTICS OF INTRINSICALLY SAFE VALVES

Assembly position	the installation of DHW valves with the axis in vertical position is not recommended. If this type of installation is absolutely necessary, please consult our technical office
Subplate surface finishing	Roughness index $\sqrt{0.4}$ flatness ratio 0,01/100 (ISO 1101)
Ambient temperature	from -20°C to +60°C (standard, /WG and /PE seals) -40°C to +60°C for /BT option
Fluid	Hydraulic oil as per DIN 51524 535; for other fluids see section 5
Recommended viscosity	15 ÷ 100 mm ² /s at 40°C (ISO VG 15 ÷ 100) max viscosity 400 mm ² /s
Fluid contamination class	ISO 18/15, achieved with in line filters at 10 µm value to $\beta_{10} \geq 75$ (recommended)
Fluid temperature	-20°C +60°C (standard, /WG and /PE seals) -40°C to +60°C for /BT option

4.1 Corrosion protection characteristics

Valve screws: all screws made in stainless steel class A2

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

<p>DH = spool type - direct DPH = spool type - piloted</p> <p>W = intrinsically safe solenoid, Atex certified</p> <p>omit for Group II M = Group I (mining)</p> <p>Valve size (ISO 4401): for DHW : 0 = size 06; for DPHW : 1 = size 10 2 = size 16; 3 = size 25</p> <p>Valve configuration, DHW see section 6 and DPHW see section 7</p> <p>Spool type, DHW see section 6 and DPHW see section 7 3H = spool type 3H for marine applications (1) Only for DHW-071</p>	<p>0 71 3H / A / 6 ** /*</p> <p>Synthetic fluids (2): WG = water-glycol PE = phosphate ester</p> <p>Series number</p> <p>Connector type - see section 17 /6 = DIN 43650 (standard) /H = MIL-C-26482</p> <p>Options: /A = solenoid at side of port B /WP = prolonged manual override</p>
---	--

(1) Spool type 3H provides larger passages A-B to T in central position than spool type 3, see section 11.3

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

6 HYDRAULIC CONFIGURATIONS OF DHW VALVES

Configuration for DHW

Where the symbol doesn't show the hydraulic connection (*), it depends by the central configuration of the spool

Spools for DHW

7 CONFIGURATION OF DPHW VALVES

Where the symbol doesn't show the hydraulic connection (*), it depends on the central configuration of the spool;

Spools for DPHW valves

For all size

Only for DPHW-2, DPHW-3

8 MODEL CODE OF POPPET TYPE LEAK FREE ON-OFF DIRECTIONAL SOLENOID VALVES

DLOH /^{*} - **2** **A** / **R** - **WO** / **6** ** /^{*}

directional control valve, poppet type size 06

omit for Group II
M = Group I (mining)

2 = 2 way
3 = 3 way

A = open in rest position
C = closed in rest position

Options:
/**R** = with check valve on port P
/**WP** = prolonged manual override

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

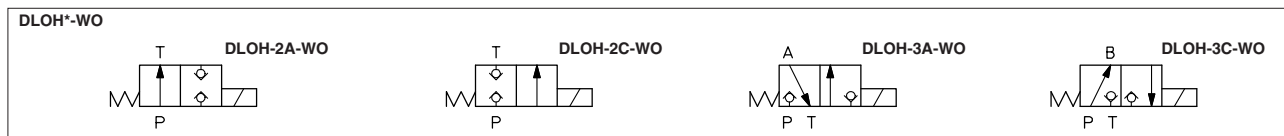
Series number

Connector type - see section 17
/**6** = DIN 43650 (standard)
/**H** = MIL-C-26482

/WO = intrinsically safe solenoid, Atex certified

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

9 HYDRAULIC CONFIGURATIONS OF DLOH VALVES



10 Q/Δp DIAGRAMS based on mineral oil ISO VG 46 at 50°C

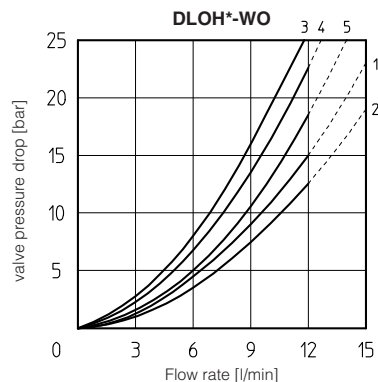
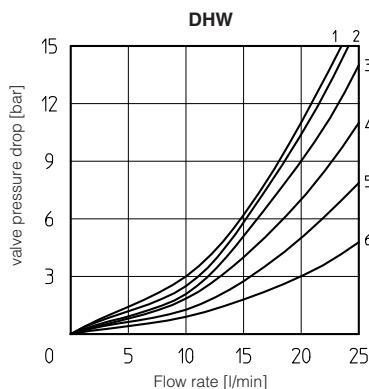
DHW

spool type	0	0/2	1/2	1	3	3H
Flow direction						
P→A / P→B	4	5	5	3	3	3
A→T / B→T	6	2	1	2	4	5

DLOH*-WO

configuration	2A	2C	3A	3C
Flow direction				
P→A / P→B (1)	1	2	4	3
A→T / B→T	-	-	5	4

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

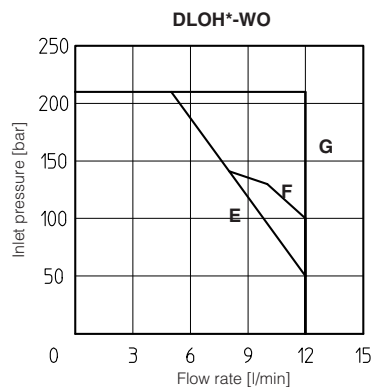
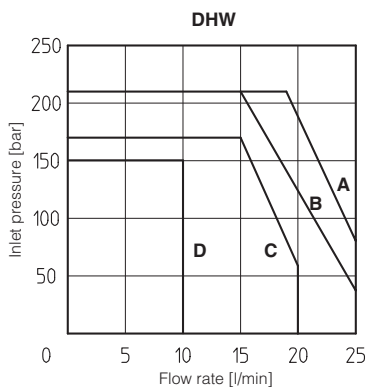


11 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams refer to warm solenoids and power supply provided by the Atos barrier type **Y-BXNE-412**. For DHW 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.

DHW type	0	0/2	1/2	1	3	3H
Diagram	B	B	C	C	A	D

DLOH type	2A	2C	3A	3C
Diagram	G	G	F	E



11.1 Operating pressure:

Ports P, A, B = 350 bar Port T = 160 bar

11.2 Operating limits (only for DHW-0713H)

Max flow = 10 l/1' - Max pressure = 150 bar

11.3 Flow capability in central position A-B → T (only for DHW-0713H)

Max flow = 25 l/1' with Δp 10,5 bar

12 INTERNAL LEAKAGES

12.1 DHW internal leakages

18 cm³/min with P=100 bar - fluid viscosity = 43 cSt at 40 °C
30 cm³/min with P=140 bar - fluid viscosity = 22 cSt at 45 °C

12.2 DLOH*-WO internal leakages based on mineral oil ISO VG 46 at 50°C

less than 5 drops/min (0,36 cm³/min) at max pressure.

13 MODEL CODE OF PRESSURE CONTROLS

AGAM

/* - **20** / **2** **0** / **210** - **WO** / **WP** / **6** ****** **/***

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

Omit for Group II
M = Group I (mining)

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

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

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

Series number

Connector type - see section 17

/6 = DIN 43650 (standard)
/H = MIL-C-26482

Option:

/WIP = prolonged manual override

WO = Intrinsically safe solenoid, Atex certified

Pressure range of first/second/third setting:
50 = 4 - 50 bar **210** = 7 - 210 bar
100 = 6 - 100 bar **350** = 8 - 350 bar

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

14 HYDRAULIC CHARACTERISTICS

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

15 MODEL CODE OF COVERS FOR CARTRIDGE VALVES

LIDEW **/*** **1** - **1** / ***** - **WO** / **6** ****** **/***

Cover type:
LIDBH = with solenoid valve and shuttle valve for pilot selection
LIDEW = with solenoid valve for pilot selection

Omit for Group II
M = Group I (mining)

Valve configuration, see section 16

Valve size (ISO 7368)
 for LIDBH*: **1** = 16, **2** = 16, **3** = 16, **4** = 16, **5** = 50
 for LIDEW* **1** = 16, **2** = 16, **3** = 16, **4** = 16, **5** = 50, **6** = 63, **8** = 80

Options:
/B = cartridge piloted via port "B" of solenoid pilot valve
/E = external attachments X (G 1/4") and underneath port X supplied plugged (only for sizes 40 to 80)

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

Series number

Connector type - see section 17
/6 = DIN 43650 (standard)
/H = MIL-C-26482

WO = Intrinsically safe solenoid, Atex certified

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-)

16 HYDRAULIC SYMBOLS

17 SOLENOID DIMENSIONS AND WIRING

Dimension [mm]

OW-18/6 (standard)

Option /H

Option /WP

Connector wiring		
/6	/H	Connections
1	A	Coil
2	C	Coil
3	B	GND

DIN 43650

MIL-C-26482

cover shape for mining version

note: the connectors are supplied with the valves

18 INTRINSICALLY SAFE BARRIERS

The electric supply to these solenoids must be done through electronic devices situated out of potentially flammable environment (i.e. in safe zone), which limit the electric current to the intrinsically safe solenoid. These electronic devices are normally called "intrinsically safe barriers" approved and certified according to the Ex ia protection mode. To select the proper intrinsically safe barriers following data must be considered:

- 1) V_{max} and I_{max} of the solenoid as specified in section 2 must not be exceeded also in fault conditions;
- 2) the resistance of the solenoid is 150Ω and the current supplied by the barrier, in normal operation condition, must be over the min. limit (65 mA) to ensure the valve correct operation (over 70 mA for max performances).

The barriers type Y-BXNE 412 are galvanically isolated electronic devices, developed according to the European Norms EN60079-0/06, EN60079-11/07 and certified ATEX 94/9/CE, protection mode Ex ia IIC.

These barriers ensure the optimized functioning of the Atos valves up to the max operating limits specified in section 11.

The barriers Y-BXNE-412 are double channel type, suitable to operate valves with double or single solenoid.

Two single solenoid valves can be connected to the barrier (one to each channel) but they cannot be contemporary operated.

19 MODEL CODE OF I.S. BARRIER

**19.1 I.S. barrier for double solenoid valves
Y-BXNE 412 00 ***

Supply voltage
E = 110/230 VAC
2 = 24÷48 VDC

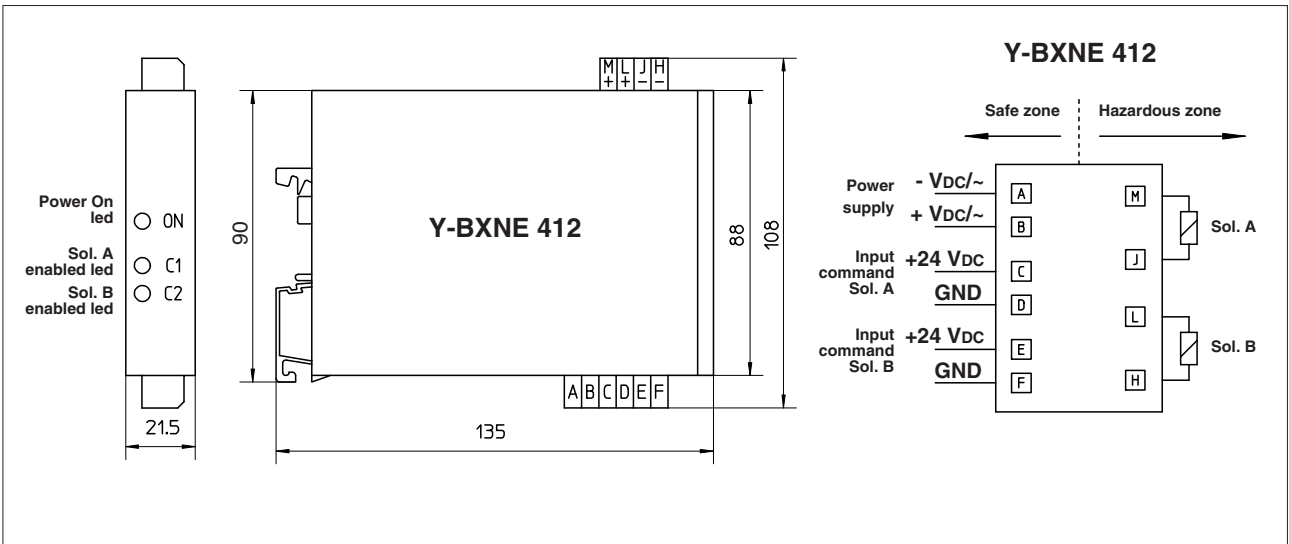
The above barrier can be used both for double or for single solenoid valves.

With one barrier, two single solenoid valves can be operated but not contemporary, see section 18.

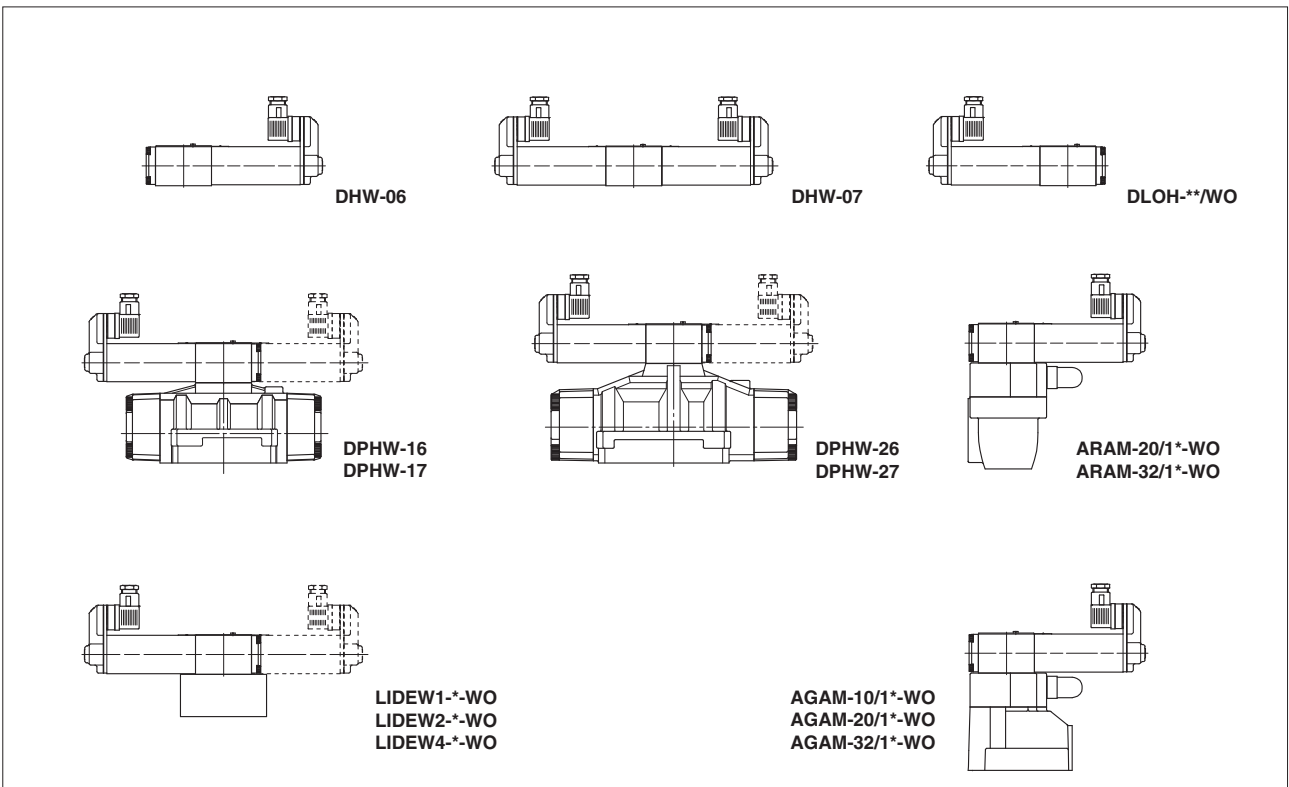
20 TECHNICAL CHARACTERISTICS OF I.S. BARRIER

	Y-BXNE 412
N° output channels	2
Power supply voltage	110÷230 VAC ±10% (50/60 HZ) 21,6 ÷ 53 VDC
Power consumption	< 3W
Output voltage U_o	19,5 V
Output current I_o	341 mA
Output power P_o	1,64 W
Galvanic insulation supply/output	2500 VAC / 50 Hz
Storage temperature	-25 °C ÷ +70 °C
Working temperature	-10 °C ÷ +60 °C
Housing material	ABS case
Mounting	on rail EN 50022
Electrical connections	screw terminals
Method of protection	Ex ia IIC
ATEX classification	Ex II 1 G/D

21 INSTALLATION DIMENSIONS OF I.S. BARRIER [mm]

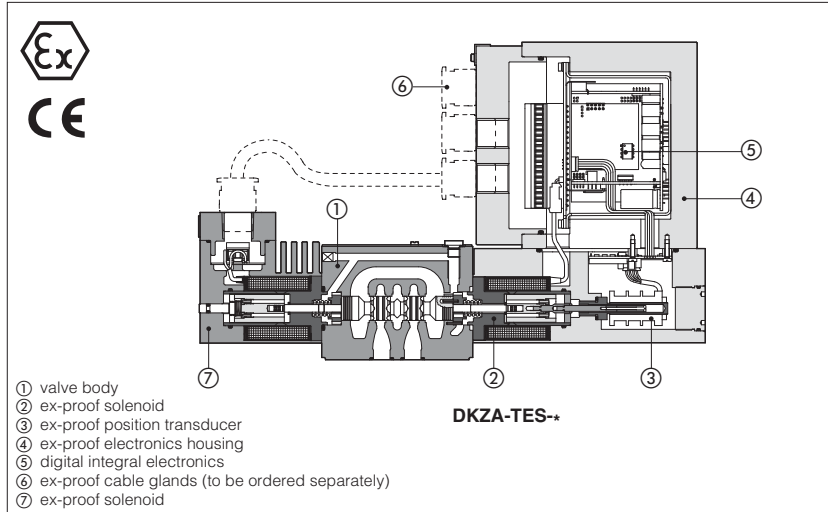


22 EXTERNAL PROFILE OF INTRINSICALLY SAFE VALVES [mm]



Ex-proof proportional valves with integral digital drivers

with or without integral position or pressure transducer - ATEX or IECEx certification



Ex-proof ZA valves are proportional valves equipped with specific solenoids and integral digital electronic drivers available with following certifications and protection mode:

- ATEX 94/9/CE
 Ex II 2 G Ex d IIC T6/T5/T4/T3 (group II for surface plants with gas or vapours environment, category 2, zone 1 and 2)
- IECEx worldwide recognized safety certification, Ex d IIC T6/T5/T4/T3 Gb IP66

The solenoid and the electronics housing are 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.

The integral digital drivers in explosion proof construction provides consistent advantages respect to the separated analog drivers for ex-proof valves:

- compact execution
- simplified valve wiring
- reduced risk of electromagnetic disturbances on the valve's transducer feedback signal
- possibility to exploit in hazardous environment all the advantages provided by the standard digital electronics: software setting of the main functional parameters as bias, ramps, scale, linearization of the hydraulic regulation characteristic
- complete diagnostics of the driver status, and fault condition.

Following communication interfaces are available:

- PS, Serial communication interface for configuration, monitoring and firmware updating through Atos PC software.
- BC, CANopen interface
- BP, PROFIBUS DP interface

The valves with -BC and -BP interfaces can be integrated into a fieldbus communication network and thus digitally operated by the machine control unit.

The ex-proof digital integral electronics is available for the full range of proportional valves, as shown in the following pages.

1 EXPLOSION PROOF CERTIFICATION MAIN DATA

ATEX certification	Ex II 2G Ex d IIC T6/T5/T4/T3			
IECEx certification	Ex d IIC T6/T5/T4/T3 Gb IP66			
VALVE TYPE	DOUBLE SOLENOID VALVES (with or without transducer)		SINGLE SOLENOID VALVES (with or without transducer)	
Temperature class (only for Group II)	T4	T3 (option /7)	T6	T5 (option /7)
Surface temperature	≤ 135 °C	≤ 200 °C	≤ 85 °C	≤ 100 °C
Ambient temperature	-20 ÷ +40 °C	-20 ÷ +60 °C	-20 ÷ +45 °C	-20 ÷ +60 °C
Protection degree	IP66 According to IEC 144 when correctly coupled with the relevant cable gland see section 20			
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 connections M20x1.5 threaded connection for cable entrance			

Note: This technical table contains information about ex-proof certification data, model codes, dimensions and wiring of the ex-proof proportional valves with integral digital electronics. For detailed information about:

- valve's functional characteristics and mounting surface dimensions
 - digital drivers technical data and functional parameters setting
- see the relevant technical tables of the standard proportional valves and digital drivers.

2 MAIN CHARACTERISTICS OF EX-PROOF PROPORTIONAL VALVES

Assembly position	Any position
Subplate surface finishing	Roughness index, $\sqrt{0.4}$ flatness ratio 0,01/100 (ISO 1101)
Ambient temperature	See section 11
Fluid	Hydraulic oil as per DIN 51524 ... 535 for other fluids see model code sections
Recommended viscosity	15 ÷ 100 mm ² /s at 40°C (ISO VG 15÷100)
Fluid contamination class	ISO 18/15 achieved with in line filters of 10 µm and $\beta_{10} \geq 75$ (recommended)
Fluid temperature	-20°C +60°C (standard and /WG seals) -20°C +80°C (/PE seals)

3 CERTIFICATION

In the following are resumed the valves marking according to ATEX 94/9/CE and IECEx

3.1 GROUP II, ATEX

 = ATEX identification for explosive atmospheres

II = Group II for surfaces plants

2 = High protection (equipment category)

G = For gas and vapours

d = Flame proof housing

IIC = Gas group

T6/T5/T4/T3 = Temperature class of solenoid surface referred to the max ambient temperature

Zone 1 = Possibility of explosive atmosphere during normal functioning

Zone 2 = Low probability of explosive atmosphere

3.2 GROUP II, IECEx

Ex = Equipment for explosive atmospheres

d = Flame proof housing

IIC = Gas group

T6/T5/T4/T3 = Temperature class of solenoid surface

Gb = Equipment protection level, high level protection for explosive Gas atmospheres

IP66 = Protection degree



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

4 MODEL CODE OF EX-PROOF PROPORTIONAL DIRECTIONAL VALVES DIRECT OPERATED

DHZA / IE - TES - PS - 0 7 1 - L 5 / M / 7 ** / *

DHZA = size 06
DKZA = size 10

Certification (omit for Atex)
IE = IECEx

AES = without integral position transducer
TES = with integral position transducer

Communication interfaces
PS = Serial (1)
BC = CANopen
BP = PROFIBUS DP

Valve size (ISO 4401)
DHZA DKZA
0 = size 06 **1** = size 10

Configuration: DHZA and DKZA see section 5
5 = external plus central position, spring centered
7 = 3 positions, spring centered

Spool overlapping in central position, DHZA and DKZA see section 5
0 = zero overlapping (only for -TES)
1 = P, A, B, T positive overlapping
2 = only for DKZA-TES-172-S5 (2)
3 = P positive overlapping; A, B, T, negative

Synthetic fluids:
WG = water-glycol
PE = phosphate ester

Series number

Options:

- 7** = for ambient temperature up to 60°C
- B** = solenoid with integral digital electronics at side of port A
- I** = current reference 4 ÷ 20mA (only for TES) (3)
- Y** = external drain
- W** = power limitation function (only AES)

Cable entrance threaded connection:
M = M20x1,5 (6H/6g)

Spool size: see section 5

Spool type

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

(1) Serial interface always present for AES-BC and AES-BP.

(2) The configuration type 2 provides the same characteristic of type 1, but avoiding the pressurization of A and B ports with spool in rest position.

(3) Software selectable for AES.

Note: For the valves functional characteristics see:

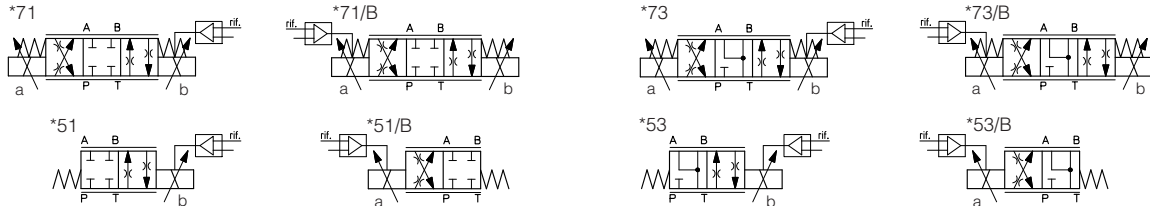
table **F160** (DHZA-AES, DKZA-AES); table **F165** (DHZA-TES, DKZA-TES)

For mounting surface dimensions see table **P005**

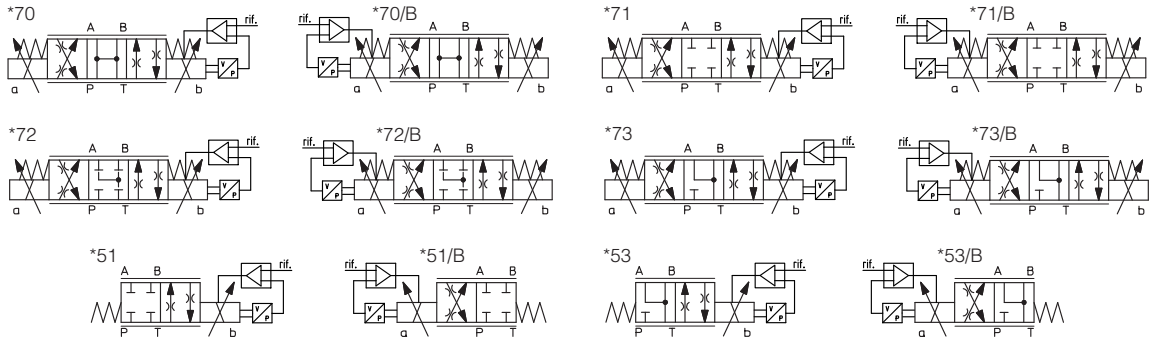
For the digital drivers technical data and functional parameters setting, see:
table **G115** (-AES); **G210** (-TES)

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

Hydraulic symbols of **-AES** version



Hydraulic symbols of **-TES** version



Valve model	DHZA-AES				DHZA-TES				DKZA-AES				DKZA-TES							
Spool overlapping	1, 3		1, 3		1, 3		0		1, 3		1, 3		0		0		2		1, 3	
Spool type and size (1)	L14		L1		S2		S3, L3, D3		L5, D5		S5, L5, D5		S3, L3, D3		L3		L5, D5		S5, L5, D5	
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)									
Δp max P-T [bar]	70		70		50		50		50		40		40		40		40		40	
Max flow [l/min]	1		4,5		8		17		28		45		60		80		105		120	
at Δp = 10 bar (P-T)	2		8		14		30		50		80		105		120		120		120	
at Δp = 30 bar (P-T)	3		12		21		45		60		90		120		120		120		120	
at Δp max (P-T)	3		12		21		45		60		90		120		120		120		120	
Response time (2) [ms]	< 30 (-AES) < 15 (-TES)										< 40 (-AES) < 20 (-TES)									
Hysteresis [%]	≤ 5% (-AES) ≤ 0,2% (-TES)										≤ 5% (-AES) ≤ 0,2% (-TES)									
Repeatability	± 1% (-AES) ± 0,1% (-TES)										± 1% (-AES) ± 0,1% (-TES)									
Thermal drift (only -TES)	zero point displacement < 1% at ΔT = 40°C																			

(1) Spool type S2 only for -AES version; spool type 0L5, 0D5, 0L3 only for -TES version

(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.

6 MODEL CODE OF EX-PROOF PROPORTIONAL DIRECTIONAL VALVES PILOT OPERATED

DPZA / IE - LES - PS - 2 7 1 - L 5 / M / 7 ** / *

DPZA = size 10
= size 16
= size 25

Certification (omit for Atex)
IE = IECEx

AES = without integral position transducer
LES = with double integral position transducer

Communication interfaces
PS = Serial (1)
BC = CANopen
BP = PROFIBUS DP

Valve size (ISO 4401)
1 = size 10
2 = size 16
3 = size 25

Configuration: see section 7
5 = external plus central position, spring centered
7 = 3 positions, spring centered

Spool overlapping in central position, see section 7
0 = zero overlapping (only for -LES with spool type L)
1 = P, A, B, T positive overlapping
3 = P positive overlapping; A, B, T, negative

Synthetic fluids:
WG = water-glycol
PE = phosphate ester

Series number

Options:
7 = for ambient temperature up to 60°C
B = solenoid with integral digital electronics at side of port A of main stage for -AES version and at side of port B for -LES version
D = internal drain
E = external pilot
G = pressure reducing valve for piloting (2) standard for DPZA-LES-1
I = current reference 4÷20mA (only for -LES) (3)
W = power limitation function (only AES)

Cable entrance threaded connection:
M = M20x1,5 (6H/6g)

Spool size: see section 7

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

- (1) Serial interface always present for AES-BC and AES-BP.
- (2) Pressure reducing valve with fixed setting (40 bar for DPZA-1 and -2; 100 bar for DPZA-3) installed between pilot valve and main body. It is advisable for valves with internal pilot in case of system pressure higher than 200 bar. This option is standard for DPZA-LES-1
- (3) Software selectable for AES

Note: For the valves functional characteristics see: table **F170** (DPZA-AES); table **F175** (DPZA-LES)
For mounting surface dimensions see table **P005**
For the digital drivers technical data and functional parameters setting, see: table **G115** (-AES); **G210** (-LES)

7 HYDRAULIC CHARACTERISTICS OF DPZA-AES AND DPZA-LES (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols of **-AES** version

Hydraulic symbols of **-LES** version

Valve model	DPZA-1				DPZA-2				DPZA-3						
Spool overlapping	0, 1, 3	1, 3	0, 1, 3	0, 1, 3	1, 3	0, 1, 3	1, 3	0, 1, 3	0, 1, 3	0, 1, 3	1, 3	0, 1, 3			
Spool type and size (1)	L5 (2)	S5	D5	DL5(3)	L3 (3)	S3	D3	L5 (2)	S5	D5	DL5 (3)	L5 (2)	S5	D5	DL5 (3)
Max flow: [l/min]	at Δp = 10 bar														
	100	100:60	130	130:80	200	180	180:130	200:145	390	360	360:220	390:240			
	at Δp = 30 bar														
	160	160:100	225	225:130	340	310	310:225	340:250	680	620	620:380	680:410			
	max permissible flow														
	180	180:110	550	550:300	760	640	640:460	680:500	1450	1350	1350:820	1450:880			
Pressure limits [bar]	ports P, A, B, X = 350; T = 250 (5 for option /D); Y = 5														
Response spool overlapping 0	<80 (AES); <50 (LES)				<100 (AES) <70 (LES)				<120 (AES) <75 (LES)						
time [ms] spool overlapping 1-3	<80 (AES); <50 (LES)				<100 (AES) <70 (LES)				<120 (AES) <75 (LES)						
Hysteresis [%]	≤ 5% (AES) ≤ 0,1% (LES)														
Repeatability	±1% (AES) ±0,1% (LES)														
Thermal drift	zero point displacement < 1% at ΔT = 40°C														

(1) Additional spool for -LES, see table F175
 (2) For zero overlapping spool **0L5**, the valve offset position (with switch-off power supply) is 1 ÷ 6% P-B/A-T
 (3) Only for LES version
 (4) Response times at step signal (0%→100%) are measured from 10% to 90% of step value and are strictly referred to the valve regulation.

8 MODEL CODE OF EX-PROOF SERVOPROPORTIONAL VALVES

DLHZA / IE - TES - PS - 0 6 0 - L 5 3 / M / 7 ** / *

DLHZA = size 06
DLKZA = size 10

Certification (omit for Atex)
IE = IECEx

TES = with integral position transducer

Communication interfaces
PS = Serial
BC = CANopen
BP = PROFIBUS DP

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

Configuration, see section 9
4 = external plus central position, spring centered
6 = 3 position, spring centered

0 = zero overlapping

Synthetic fluids:
WG = water-glycol
PE = phosphate ester

Series number

Options:
7 = for ambient temperature up to 60°C
B = solenoid at side of port A
I = current reference 4 + 20mA
Y = external drain

Cable entrance threaded connection:
M = M20x1,5 (6H/6g)

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

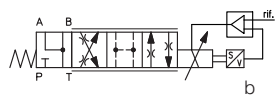
Spool size **1, 3, 5, 7** see section 9

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

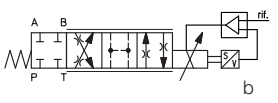
Note: For the valves functional characteristics see: table **F180** (DLHZA, DLKZA)
For mounting surface dimensions see table **P005**
For the digital drivers technical data and functional parameters setting, see: table **G210** (-TES)

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

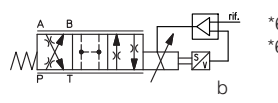
Hydraulic symbols



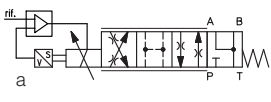
*40-L*3
*40-D*3
*40-DT*3
*40-T*3
*40-V*3



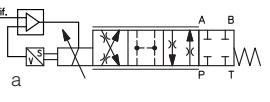
*40-L*1
*40-D*1
*40-DT*1
*40-T*1
*40-V*1



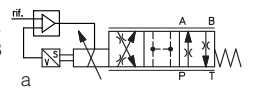
*60-L*1
*60-V*1



*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 [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	8	14	16	30	40	50		70			70÷40		90		160		160÷80	
max permissible flow																		
Leakage [cm³/min] at P = 100 bar (1)	<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 (2)	Fail safe 1			Fail safe 1				Fail safe 1			Fail safe 1							
	Fail safe 3			Fail safe 3				Fail safe 3			Fail safe 3							
Flow [l/min] (3)	DLHZA			DLHZA				DLHZA			DLKZA							
	Fail safe 3			Fail safe 3				Fail safe 3			Fail safe 3							
Response time [ms]	≤ 10										≤ 15							
Hysteresis [%]	≤ 0,1%										≤ 0,1%							
Thermal drift	zero point displacement < 1% at ΔT = 40°C																	

Notes:
(1) Referred to spool in neutral position and 50°C oil temperature.
(2) Referred to spool in fail safe position and 50°C oil temperature.
(3) Referred to spool in fail safe position at Δp = 35 bar per edge and 50°C oil temperature.

10 MODEL CODE OF EX-PROOF PROPORTIONAL PRESSURE RELIEF AND COMPENSATOR VALVES

RZMA / IE - TERS - PS - 010 / 250 / M / * ** / *

Pressure relief:
RZMA = subplate size 06
AGMZA = subplate size 10, 20, 32
LIMZA = cartridge type see section 12

Pressure compensator:
LICZA = cartridge type see section 12

Certification (omit for ATEX)
IE = IECEx

AES = without integral pressure transducer (1)
TERS = with integral pressure transducer
AERS = as TERS but with remote pressure transducer (to be ordered separately), see tab. G466

Communication interfaces
PS = Serial
BC = CANopen
BP = PROFIBUS DP

Valve size:
 see section 11 for size code

Synthetic fluids:
WG = water-glycol
PE = phosphate ester

Series number

Options:
7 = for ambient temperature up to 60° C
E = external pilot (only for AGMZA)
I = current reference 4 ÷ 20mA (only TERS, AERS) (2)
P = with integral mechanical pressure limiter (only for LI*ZA)
Y = external drain (only for AGMZA)

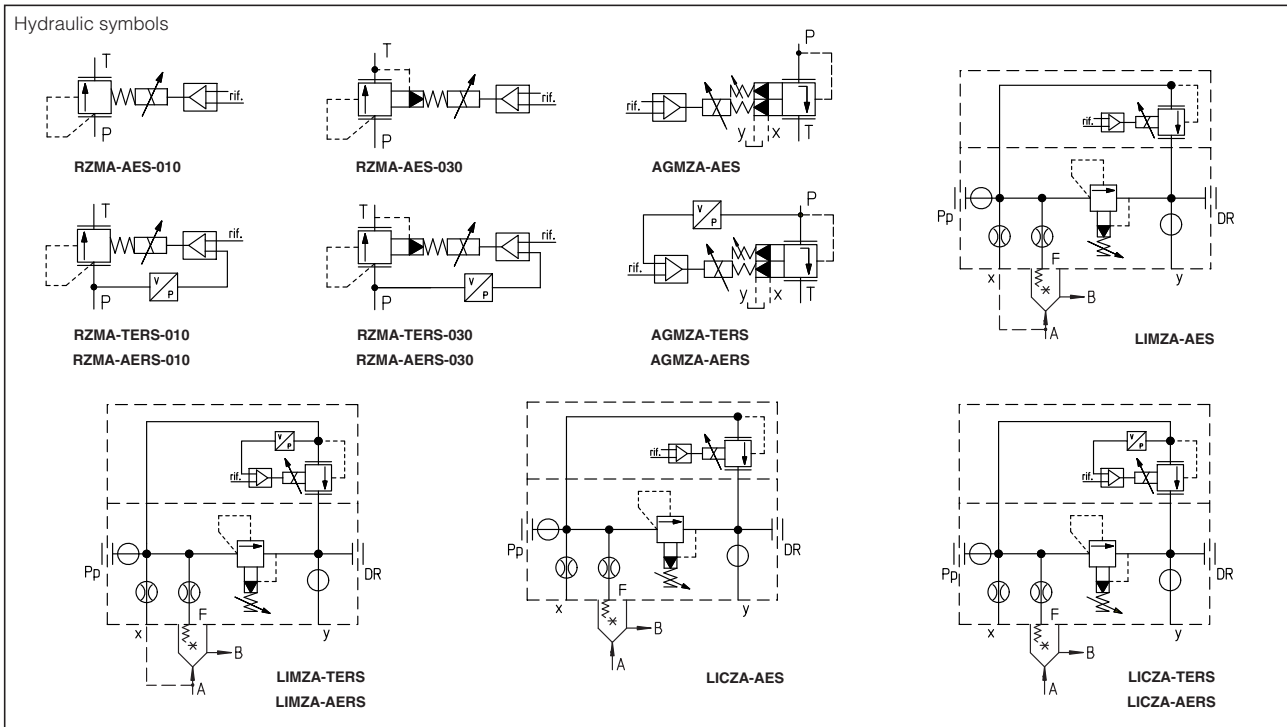
Cable entrance threaded connection:
M = M20x1,5 (6H/6g)

Max regulated pressure:
 see section 11

- (1) Serial interface always present for AES-BC and AES-BP.
- (2) Software selectable for AES.

Note: For the valves functional characteristics see:
 table **F007, F010** (RZMA-*010); table **F065, F067** (RZMA-*030); table **F035, F040** (AGMZA); table **F300, F305** (LIMZA, LICZA)
 For mounting surface dimensions see table **P005**
 For the digital drivers technical data and functional parameters setting, see:
 table **G115** (-AES); table **G205** (-AERS, TERS)

11 HYDRAULIC CHARACTERISTICS



Valve model	RZMA		AGMZA			LIMZA					LICZA									
Size code	010	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	200	400	600	200	400	750	1000	2000	3000	4500	200	400	750	1000	2000			

12 MODEL CODE OF CARTRIDGES (for LIMZA and LICZA)

SC LI - 32 31 2 ** / *

Cartridge according to ISO 7368

Size:
16; 25; 32;
40; 50; 63 and 80 (only for LIMZA)

Type of cartridge
31 = for LIMZA and LICZA **36** = for LICZA

Synthetic fluids:
WG = water-glycol
PE = phosphate ester

Series number

Spring cracking pressure:
2 = 1,5 bar for poppet 31
3 = 3 bar
4 = 4 bar
6 = 6 bar for poppet 31 and 36

TYPICAL FUNCTIONS OF CARTRIDGES

Type	Functional sketch (hydraulic symbol)	Typical section	Area ratio (1)
31			1:1
36			1:1

(1) It is the ratio of the area A to the area on which the pilot pressure is applied.

13 MODEL CODE OF EX-PROOF PROPORTIONAL PRESSURE REDUCING VALVES

RZGA / **IE** - **TERS** - **PS** - **033** / **250** / **M** / * ** / *

Pressure reducing:
RZGA = subplate size 06
AGRCZA = subplate size 10, 20
LIRZA = cartridge type see sect. 13

Certification (omit for ATEX)
IE = IECEx

AES = without integral pressure transducer
TERS = with integral pressure transducer
AERS = as TERS but with remote pressure transducer (to be ordered separately), see tab. G466

Communication interfaces
PS = Serial (1)
BC = CANopen
BP = PROFIBUS DP

Valve size:
 see section 14 for size code

Synthetic fluids:
WG = water-glycol
PE = phosphate ester

Series number

Options:
7 = for ambient temperature up to 60° C
E = external pilot (only for AGRCZA)
I = current reference 4 ± 20mA (only TERS, AERS) (2)
P = with integral mechanical pressure limiter (only for AGRCZA and LIRZA)
R = with check valve (only for AGRCZA)

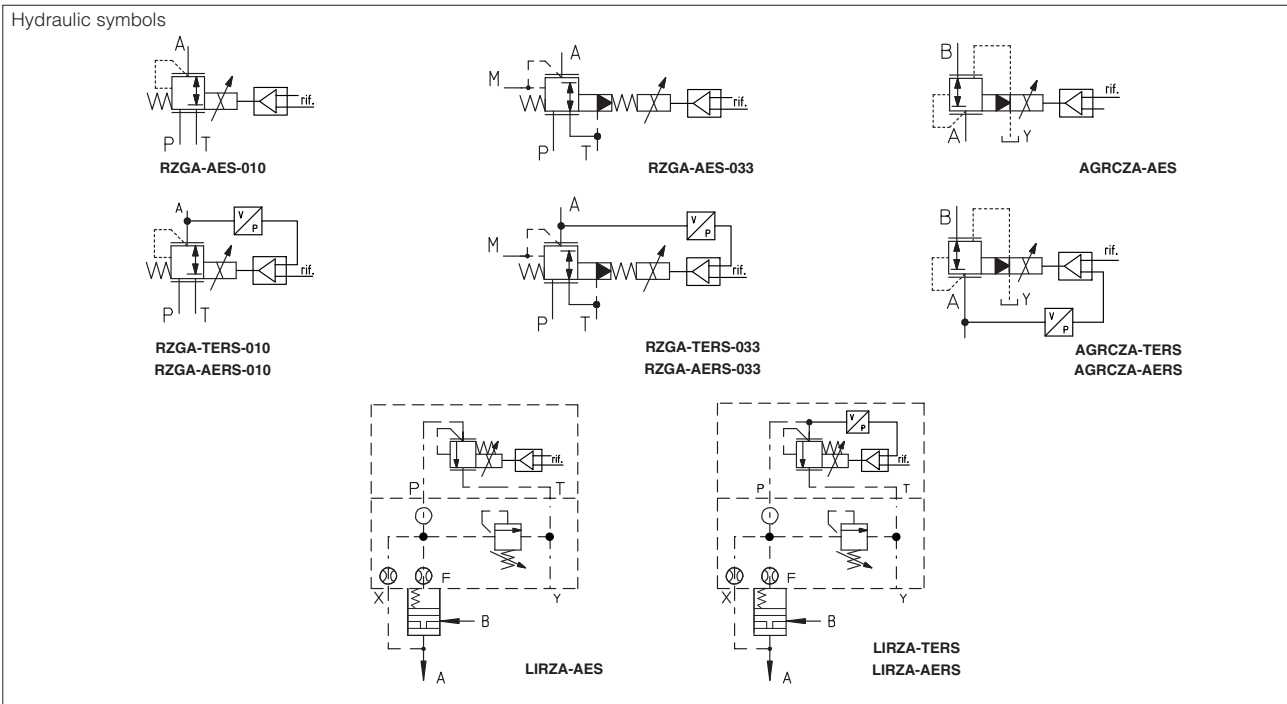
Cable entrance threaded connection:
M = M20x1,5 (6H/6g)

Max regulated pressure:
 see section 14

- (1) Serial interface always present for AES-BC and AES-BP.
 (2) Software selectable for AES.

Note: For the valves functional characteristics see:
 table **F015, F020** (RZGA-*010); table **F070, F075** (RZGA-*033); table **F050, F055** (AGRCZA); table **F300, F305** (LIRZA)
 For mounting surface dimensions see table **P005**
 For the digital drivers technical data and functional parameters setting, see:
 table **G115** (-AES); table **G205** (-AERS, TERS)

14 HYDRAULIC CHARACTERISTICS



Valve model	RZGA		AGRCZA		LIRZA			
Size code	010	033	10	20	1	2	3	4
Valve size	06		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	7	7	7	7
Max pressure at port P, A, B, X [bar]	315							
Max pressure at port T, Y [bar]	210							
Max flow [l/min]	12	40	160	300	160	300	550	800

15 MODEL CODE OF CARTRIDGES (for LIRZA)

SC LI - **25** **37** **4** ** / *

Cartridge according to ISO 7368

Size:
16; **25;** **32;** **40;**

Type of cartridge
37 = for LIRZA

Synthetic fluids
WG = water-glycol
PE = phosphate ester

Series number

Spring cracking pressure:
4 = 4 bar; **7** = 7 bar

TYPICAL FUNCTIONS OF CARTRIDGES

Type	Functional sketch (hydraulic symbol)	Typical section	Area ratio (1)
37			1:1

(1) It is the ratio of the area A to the area on which the pilot pressure is applied.

Note: For mounting surface dimensions see table **P006**

16 MODEL CODE OF EX-PROOF PRESSURE COMPENSATED PROPORTIONAL FLOW CONTROL VALVES

QVHZA / IE - TES - PS - 06 / 12 / M / * ** / *

QVHZA = size 06
QVKZA = size 10

Certification (omit for Atex)
IE = IECEx

AES = without integral position transducer
TES = with integral position transducer

Communication interfaces
PS = Serial (1)
BC = CANopen
BP = PROFIBUS DP

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

Synthetic fluids:
WG = water-glycol
PE = phosphate ester

Series number

Options:
7 = for ambient temperature up to 60° C
D = quick venting (only for -AES versions)
I = current reference 4 ÷ 20mA (only TES) (2)
W = power limitation function (only AES)

Cable entrance threaded connection:
M = M20x1,5 (6H/6g)

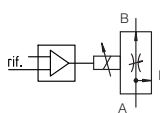
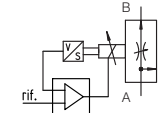
Max regulated flow:

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;		

- (1) Serial interface always present for AES-BC and AES-BP.
- (2) Software selectable for AES.

Note: For the valves functional characteristics see: table **F410, F412** (QVHZA-*, QVKZA-*)
For mounting surface dimensions see table **P005**
For the digital drivers technical data and functional parameters setting, see: table **G115** (-AES); table **G210** (-TES)

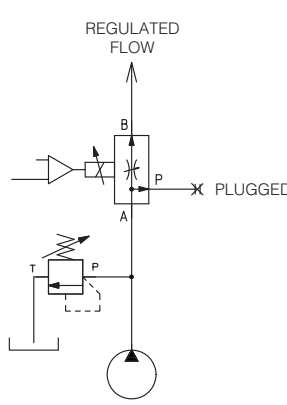
17 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

<p>Hydraulic symbols</p> <p>Note: In three-way connection port P is open. In two-way connection port P must be plugged. Port T must always be plugged.</p>	 <p>QVHZA-AES QVKZA-AES</p>	 <p>QVHZA-TES QVKZA-TES</p>												
Valve model	QVHZA-AES	QVHZA-TES	QVKZA-AES	QVKZA-TES										
Valve size	06		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	

(1) Values are referred to 3-way configuration. In the 2-way configuration, the values of min regulated flow are higher.

17.1 TYPICAL APPLICATIONS

2 WAY CONNECTION

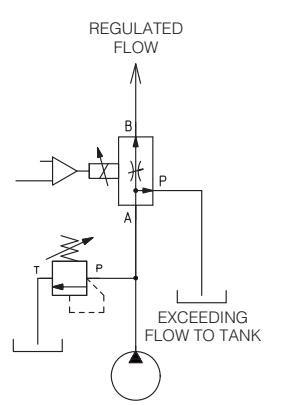


REGULATED FLOW

PLUGGED

In the 2 way connection the pump is always working at the pressure set on the relief valve

3 WAY CONNECTION

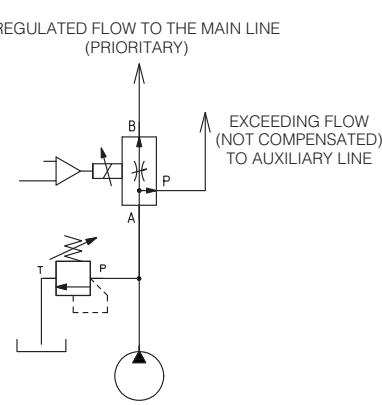


REGULATED FLOW

EXCEEDING FLOW TO TANK

In the 3 way connection the pump is working at the pressure required by the user load

3 WAY CONNECTION AS PRIORITY VALVE



REGULATED FLOW TO THE MAIN LINE (PRIORITY)

EXCEEDING FLOW (NOT COMPENSATED) TO AUXILIARY LINE

The regulated flow (pressure compensated) is sent to the main line the exceeding flow for the auxiliary line

18 ELECTRONICS WIRING

18.1 MAIN CONNECTIONS FOR ALL MODELS

PIN	CABLE ENTRANCE	DESCRIPTION	TECHNICAL SPECIFICATION
1	3	ENABLE	Enabling input, normal working = 24 Vdc
2	3	VL0	Power supply (logic stage) Stabilized +24 Vdc
3	3	VL+	Filtered and rectified: Vrms 21-33 (ripple max 2Vpp)
4	3	FAULT	Alarm = 0 Vdc Correct functioning = +24Vdc
5	4	COIL S2	Coil connection only for double solenoid valves
6	4	COIL S2	
7	3	INPUT-	Reference signal ± 10 Vdc or 0 \div 10 Vdc (2) (3)
8	3	MONITOR	± 10 Vdc or 0 \div 10 Vdc (1) (3) ± 5 Vdc (only for -AES)
9	3	INPUT+	Reference signal ± 10 Vdc or 0 \div 10 Vdc (2) (3)
10	3	V0	Power supply (power stage) Stabilized +24 Vdc
11	3	V+	Filtered and rectified: Vrms 21-33 (ripple max 2Vpp)
PE	3	EARTH	Earth connection

- (1) referred to pin 2 (VL0)
 (2) differential mode input
 (3) current reference and monitor (4 \div 20mA) **for option I** (not for -AES)

18.2 TRANSDUCER CONNECTIONS FOR -TERS, -LES (factory wired), -AERS, -AES/W (to be wired)

PIN	CABLE ENTRANCE	VERSION	DESCRIPTION	TECHNICAL SPECIFICATION
12	4	-AES/W	Monitor 2	2 nd Monitor ± 5 Vdc
		-TERS -AERS	NC	Not connected
		-LES	AGND	Power supply and signal = 0 Vdc
13	4	-AES/W	AGND	Power supply and signal = 0 Vdc
		-TERS -AERS	VT+	Transd. supply +24 Vdc
		-LES	VT+	Transd. supply +15 Vdc
14	4	-AES/W	TR	Pressure transducer signal
		-TERS -AERS	NC	Not connected
		-LES	VT-	Transd. supply -15 Vdc
15	4	-AES/W	VT+	Transd. supply +24 Vdc
		-TERS -AERS	TR	Pressure transd. signal
		-LES	TR	Position transd. signal

N.B. For -AES and -TES versions the pins 12-13-14-15 are not connected

18.3 -PS COMMUNICATION INTERFACE (M8 connector)

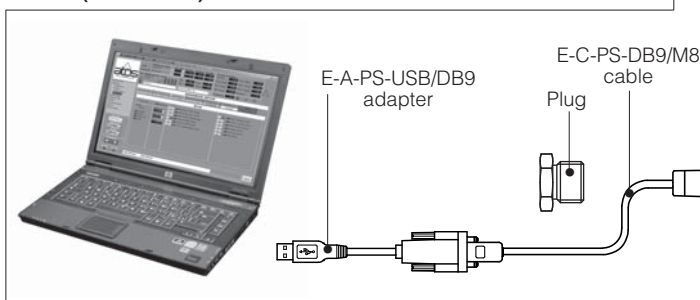
PIN	CABLE ENTRANCE (4)	SIGNAL	WIRE COLOUR	CONNECTOR INTERFACE
1	1	RS_RX	brown	
3		RS_TX	blue	
4		RS_GND	black	

- (4) For -BC and -BP versions, the Serial communication interface is always available for eventual valve's parameter setting through the E-SW programming software.
 In -BC and -BP versions, the Serial communication interface is available with M8 connector inside the electronic box, see Fig.2

18.4 -BC and -BP COMMUNICATION INTERFACE CONNECTIONS

PIN	CABLE ENTRANCE	DESCRIPTION	
		-BC	-BP
16	1 / 2	NC do not connect	+5V BUS
17	1 / 2	SHIELD	SHIELD
18	1 / 2	CAN_H	B_LINE
19	1 / 2	CAN_L	A_LINE
20	1 / 2	BUS GND	BUS GND

Fig. 2 PC connection to the valve's serial communication interface (version -PS)



18.5 CABLE ENTRANCE (see Fig.1)

- ① Cable entrance for -PS, -BC, -BP communication interfaces:

The Ex-proof integral digital electronics is provided with serial (-PS) or CANopen (-BC) or PROFIBUS DP (-BP) communication interface, depending to the selected model code

For -PS version the communication connector is used for the software setting of the functional parameters. It is installed in the cable entrance pos. ① (factory plugged). For the electronics parameter setting, remove the threaded metal plug and connect the PC communication cable to the connector -see Fig.2



WARNING:

The above operation must be performed in a safety area.

After having completed the parameter setting, disconnect the communication cable and close the cable entrance with the proper threaded plug.

For -BC and -BP versions the valve is directly driven through the fieldbus interface, which connections are available on the terminal board internal to the electronics housing.

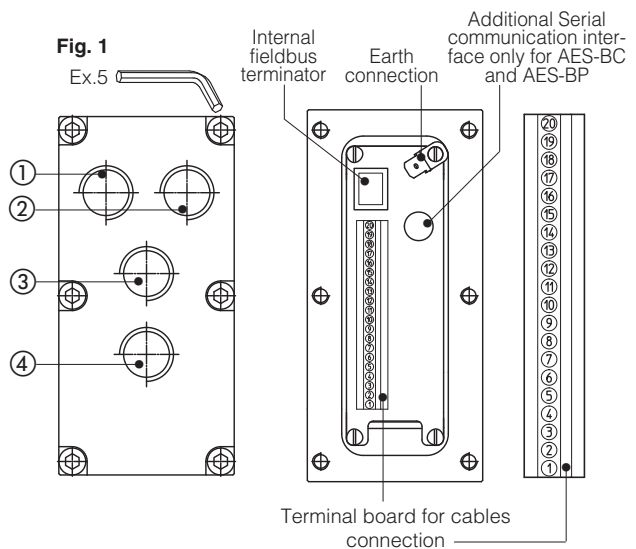
Depending to the type of connection to the fieldbus network, one or two cable entrances can be used (see section 20 TAB.I)

- "Via stub" connection, cable entrance ① to be used
 - "Daisy chain" connection, cable entrance ① and ② to be used

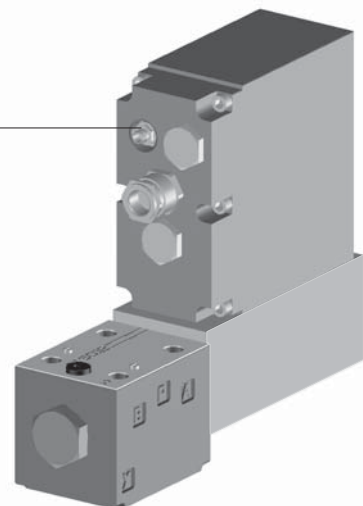
- ② Additional cable entrance for -BC, -BP communication interfaces
 ③ Cable entrances for power supply and main connections
 ④ Cable entrances for remote pressure transducer connections (for -AERS or -AES/W)

The cable entrance ④ is factory wired for:

- TERS (pressure transducer)
- LES (position transducer)
- AES and TES double solenoid version



M8 Serial communication connector



19 SOFTWARE TOOLS

The driver configuration and parameters can be easily set with the Atos E-SW programming software.

The programming software is available in three different versions according to the driver's communication interfacing:

E-SW-PS (Serial), **E-SW-BC** (CANopen) and **E-SW-BP** (PROFIBUS DP).

A proper connection is required between the PC and the electronic driver communication port (-PS, -BC or -BP).

For a more detailed description of software interface, PC requirements and adapter/cable/terminator characteristics please refer to technical table **G500**.

Programming software, must be ordered separately :

E-SW-* (mandatory - first supply) = Dvd including E-SW-* software installer, operator manuals, registration form for Atos digital service

E-SW-*-N (optional - next supplies) = as above but not including the registration form for Atos digital service

USB Adapters, Cables and Terminators, can be ordered separately

E-A-PS-USB/DB9 and **E-C-PS-DB9/M8** = USB adapter and cable for -PS drivers

E-A-PS-USB/DB9 adapter is required only if a RS232 serial port is not available on the PC

E-A-BC-USB/DB9, E-C-BC-DB9/RA and **E-TRM-BC-DB9/DB9** = USB adapter, cable and terminator for -BC drivers

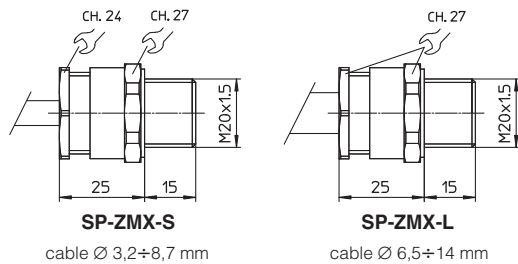
E-A-BP-USB/DB9, E-C-BP-DB9/RA and **E-TRM-BP-DB9/DB9** = USB adapter, cable and terminator for -BP drivers

E-TRM-BC-DB9/DB9 (CANopen) and E-TRM-BP-DB9/DB9 (PROFIBUS DP) fieldbus terminators are required when the adapter is directly connected to the digital driver or to one end of the fieldbus network.

20 MODEL CODE OF CABLE GLANDS AND THREADED PLUGS

Atos can supply 2 different kind of cable glands, depending to the cable's diameter used by the customer.

The cable glands and the threaded plugs (to be ordered separately) are ATEX certified according to EN 60079-0 and EN 60079-1



Atos codes for cable glands and threaded plugs:

SP-ZMX-S =brass cable gland, protection degree IP 66 threaded connection M20x1,5 (6H/6g). Cable size 3,2 ÷ 8,7 mm

SP-ZMX-L =brass cable gland, protection degree IP 66 threaded connection M20x1,5 (6H/6g). Cable size 6,5 ÷ 14 mm

P-ZMX-T =brass threaded plug, protection degree IP 66 threaded connection M20x1,5 (6H/6g).

Depending to the model code, the valves are supplied with:

- Atex certified cable gland code SP-ZMX-S, for factory wired connections
- Atex certified threaded plugs code SP-ZMX-T, for connections not to be used
- for connections available for the customers, the cable glands and the treaded metal plug have to be ordered separately. The quantity and the mounting position of the cable glands and threaded plugs is depending to the selected connection of the of communication interface, as shown in the following **TAB. I**

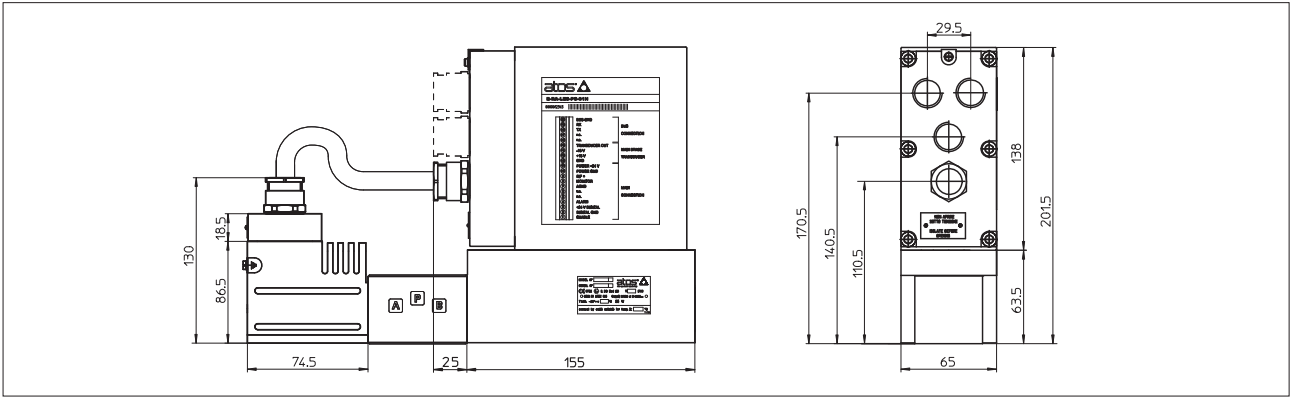
TAB. I

Valve's communication interfaces	To be ordered separately				Scheme	Notes
	Cable gland quantity	Cable gland position	Threaded plug quantity	Threaded plug position		
-PS	1	3	none	none		Cable entrance 1 and 2 are factory plugged Cable entrance 3 is open for costumers Cable entrance 4 is factory plugged or wired depending to the valve model
-BC, -BP "via stub" connection	2	1, 3	1	2		Cable entrance 2 is factory plugged Cable entrance 3 is open for costumers Cable entrance 4 is factory plugged or wired depending to the valve model
-BC, -BP "daisy chain" connection	3	1, 2, 3	none	none		Cable entrance 3 is open for costumers Cable entrance 4 is factory plugged or wired depending to the valve model

21 MASS

VALVE TYPE	MASS (Kg)	VALVE TYPE	MASS (Kg)	VALVE TYPE	MASS (Kg)	VALVE TYPE	MASS (Kg)	VALVE TYPE	MASS (Kg)	VALVE TYPE	MASS (Kg)
DHZA-*-05	8,2	DPZA-*-27	18,7	AGMZA-*-10	12,2	LIMZA-*-5	19,2	RZGA-*-010	9	QVHZA	8,6
DHZA-*-07	9	DPZA-*-35	22	AGMZA-*-20	16	LIMZA-*-6	28	RZGA-*-033	9,6	QVKZA	9,5
DKZA-*-05	9	DPZA-*-37	23	AGMZA-*-32	18,5	LICZA-*-1	13,6	AGRCZA-*-10	13,6		
DKZA-*-07	9,6	DLHZA	8,5	LIMZA-*-1	10,3	LICZA-*-2	14,6	AGRCZA-*-20	14,6		
DPZA-*-15	13,6	DLKZA	10,2	LIMZA-*-2	10,8	LICZA-*-3	17,7	LIRZA-*-1	17,7		
DPZA-*-17	14,6	RZMA-*-010	9	LIMZA-*-3	12	LICZA-*-4	8,2	LIRZA-*-2	8,2		
DPZA-*-25	17,7	RZMA-*-030	9,3	LIMZA-*-4	15,7	LICZA-*-5	9	LIRZA-*-3	9		

22 DIMENSIONS OF EXPLOSION PROOF SOLENOIDS WITH INTEGRAL DIGITAL ELECTRONICS [mm]



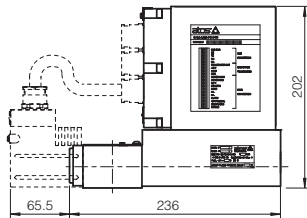
23 DIMENSIONS OF EXPLOSION PROOF VALVES WITH INTEGRAL DIGITAL ELECTRONICS [mm]

DIRECTIONAL VALVES
dotted line = double solenoid version

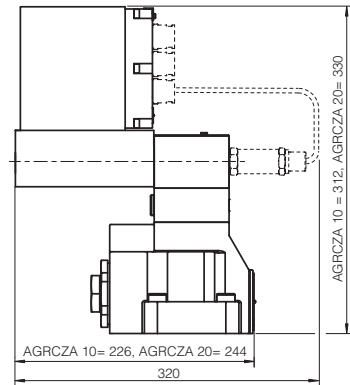
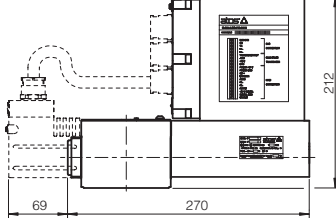
PRESSURE CONTROL VALVES
dotted line = -TERS version

AGRCZA

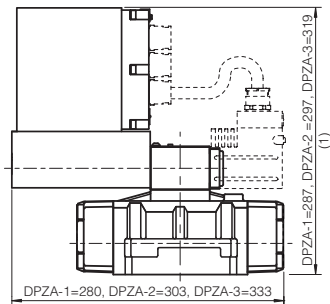
**DHZA
DLHZA**



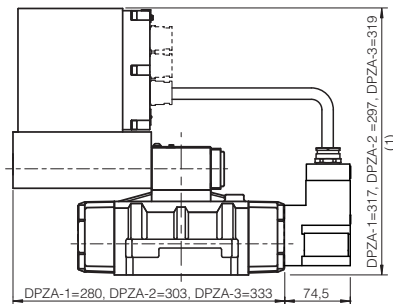
**DKZA
DLKZA**



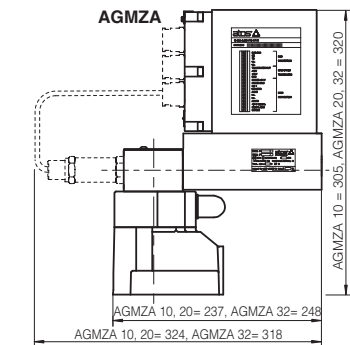
DPZA -AES



DPZA -LES

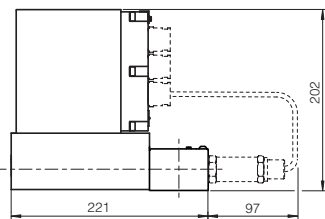


AGMZA

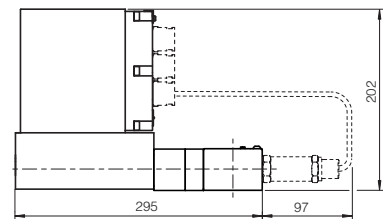


(1) For DPZA-LES-1 the height in the drawing includes the pressure reducing valve (option /G standard)
For DPZA-AES-1, DPZA-*2 and -3, in case of option /G the height in the drawings must be increased of 30 mm

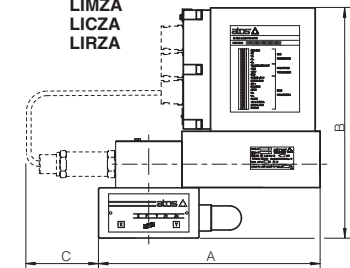
**RZMA-010
RZGA-010**



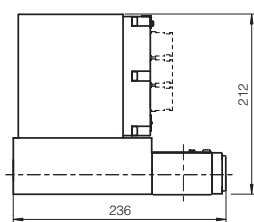
**RZMA-030
RZGA-033**



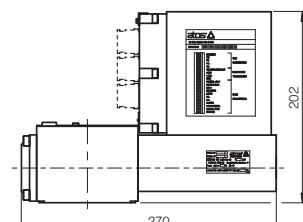
**LIMZA
LICZA
LIRZA**



QVHZA



QVKZA



		LIMZA, LICZA, LIRZA						
dimension	size	16	25	32	40	50	63	80
	A		228	230	238	253	261	281
B *		243	243	252	261,5	271,5	281,5	311,5
C		90	88	80	68	60	37	-

* for option /H add 40mm to the dimension

Dział Handlowy i Produkcja
Bielsko-Biała, ul. Strażacka 60

Sekretariat Spółki

Marketing:

• produkcja zasilaczy, układów hydraulicznych

• **elektrozawory, chłodnice, zawory nabożowe, bloki zaworowe**

• produkcja cylindrów

• elementy cylindrów: rury, tłoczyska, dławnice, tłoki, końcówki

Dział Konstrukcyjny

Sprzedaż:

• komponenty (elektrozawory, chłodnice, zawory nabożowe, bloki zaworowe, dławnice, tłoki)

• cylindry, zasilacze, agregaty filtracyjne

• rury i tłoczyska *

*ul. Strażacka 41

hydro@hydro.com.pl

tel. +48 33 829 56 60

fax. +48 33 829 56 69

tel. +48 33 829 56 74

tel. +48 33 829 56 63

tel. +48 33 829 56 79

tel. +48 33 829 56 65

tel. +48 33 829 56 62

tel. +48 33 829 56 72

tel. +48 33 829 56 65

tel. +48 33 829 56 78

tel. +48 33 829 56 68

tel. +48 33 829 56 67

tel. +48 33 829 56 97

Oddział Handlowy

Bielsko-Biała, ul. Strażacka 41

Sekretariat Oddziału

Marketing:

• dostawy do klientów OEM

• produkcja przewodów hydr., węże i końcówki

• filtracja, pompy zębate, rozdzielacze, elementy zasilaczy

• pompy zębate, rozdzielacze, zawory, dzielniki strumienia*

• urządzenia do produkcji przewodów hydr.

• uszczelnienia do cylindrów*

• eksport

Sprzedaż:

• filtry, elementy zasilaczy*

• elementy łączne, złącza pomiarowe, zawory*

• uszczelnienia, manometry*

• szybkozłącza, przewody hydr*

• eksport*

Spedycja Oddziału Handlowego*

*ul. Świt 37

Punkt Handlowy

Czeladź, ul. Wojkowicka 14a

biuro@hydro.com.pl

tel. +48 33 829 56 87

fax. +48 33 815 88 68

tel. +48 33 829 56 80,

tel. +48 33 829 56 95

tel. +48 33 829 56 84

tel. +48 33 829 87 36

tel. +48 33 829 56 85

tel. +48 33 829 87 30

tel. +48 33 829 56 98

tel. +48 33 829 56 99

export@hydro.com.pl

tel. +48 33 829 87 38

tel. +48 33 829 87 33

tel. +48 33 829 87 40

tel. +48 33 829 56 94

tel. +48 33 829 87 32

tel. +48 33 829 56 93

czeladz@hydro.com.pl

tel. +48 32 763 72 17

fax. +48 32 360 01 61

tel. +48 32 763 72 19

www.hydro.com.pl