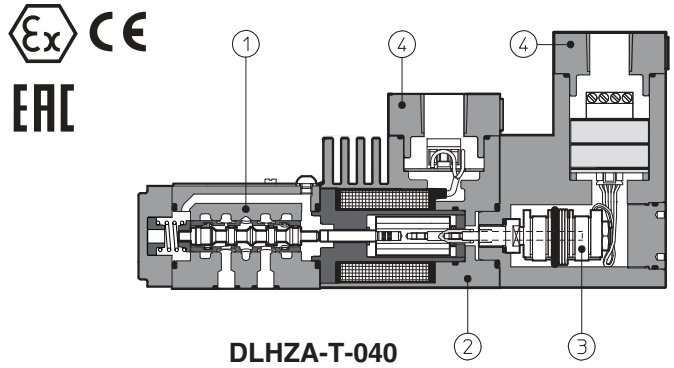
Ex-proof proportional valves

multicertification ATEX, IECEx, EAC



DLHZA-T-040

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

Note:
For ex-proof ON-OFF valves without integral digital drivers, see table **E120**

Proportional valves equipped with explosion-proof solenoids available with following multicertifications:

Multicertifications for **solenoids group II** for surface plants with gas, vapours and dust environment

- ATEX 94/9/EC
  Ex II 2G Ex d IIC T4/T3 Gb
  Ex II 2D Ex tb IIIC T135°C/T200°C Db
- IECEx worldwide recognized certification
  Ex d IIC T4/T3 Gb
  Ex tb IIIC T135°C/T200°C Db
- EAC EurAsian Certification
  Ex II 2G Exd IIC T4/T3

Multicertifications for **solenoids group I** for surface, tunnels or mining plants

- ATEX 94/9/EC: Ex I M2 Ex d I Mb
- IECEx: I M2 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.

1 EXPLOSION PROOF SOLENOIDS: MAIN DATA

SOLENOID TYPE		PROPORTIONAL	
		without transducer	with transducer
Solenoid code	Multicertification for Group II	OZA-A	OZA-T
	Multicertification for Group I (mining)	OZAM-A	OZAM-T
Voltage code	VDC ±10%	**12 DC, 24 DC**	**12 DC**
	VAC 50/60 Hz ±10%	**-**	
Power consumption		35W	
Coil insulation		Class H	
Protection degree		IP 66/67 According to IEC 144 when correctly coupled with the relevant cable gland 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	
Method of protection		Ex d	
Temperature class (only for Group II)		**T4** (with and without transducer)	**T3** (with and without transducer)
Surface temperature	Multicertification for Group II	≤ 135 °C	≤200 °C
	Multicertification for Group I (mining)	150 °C	
Ambient temperature	Multicertification for Group II	-40 ÷ +40 °C **(1)**	-40 ÷ +70 °C **(1)**
	Multicertification for Group I (mining)	-20 ÷ +60	

(1) 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

2 MAIN CHARACTERISTICS, SEALS AND HYDRAULIC FLUID - for other fluids not included in above table, consult our technical office

Assembly position / location	Any position for all valves		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option)= -20°C ÷ +80°C HNBR seals (/BT option)= -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	15÷100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s		
Fluid contamination class	ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 μm (β10 ≥75 recommended)		
Hydraulic fluid	**Suitable seals type**	**Classification**	**Ref. Standard**
Mineral oils	NBR, FKM, HNBR	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

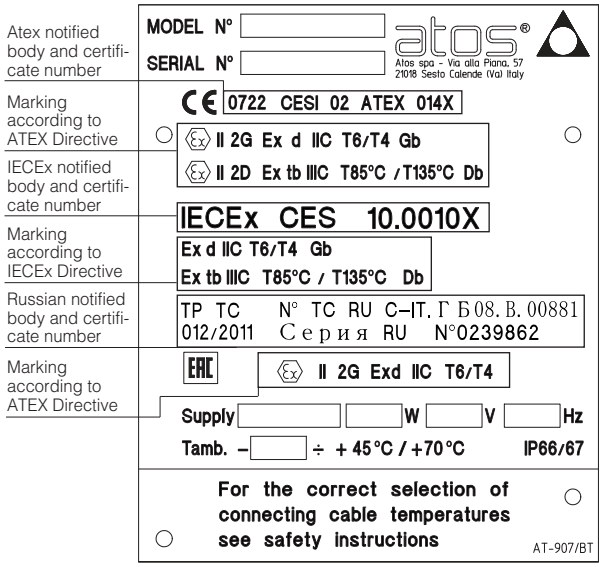
3 CERTIFICATIONS

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

3.1 GROUP II, ATEX marking

II 2 G = Solenoid for surface plants with gas and vapors environment, category 2, suitable for zone 1 and zone 2
Ex d = Explosion-proof equipment
II C = Equipment of group IIC suitable for substances (gas) of group IIC
T4/T3 = Solenoid temperature class (maximum surface temperature)
Gb = Equipment protection level, high level protection for explosive Gas atmospheres
CE = Mark of conformity to the applicable European directives
II 2 D = Solenoid for surface plants with dust environment, category 2, suitable for zone 21 and zone 22
Ex d = Explosion-proof equipment
III C = Suitable for conductive dust (applicable also IIIB and/or IIIA)
IP66/67 = Protection degree
T135°C/T200°C = Maximum surface temperature (Dust)
Db = Equipment protection level, high level protection for explosive Dust atmospheres
Ex = Mark of conformity to the 94/9/CE directive and to the technical norms

EXAMPLE OF NAMEPLATE MARKING



3.2 GROUP II, IECEx marking

Ex d = Explosion-proof equipment
IIC = Equipment of group IIC suitable for substances (gas) of group IIC
T4/T3 = Solenoid temperature classes (Gas)
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)
T135°C/T200°C = Maximum surface temperature (Dust)
Db = Equipment protection level, high level protection for explosive Dust atmospheres
IP66/67 = Protection degree

3.3 EAC marking

EAC (EurAsian Certification) acknowledges the whole ATEX Directive 94/9/EC.
This certification is available only for gas environment (not for dust).

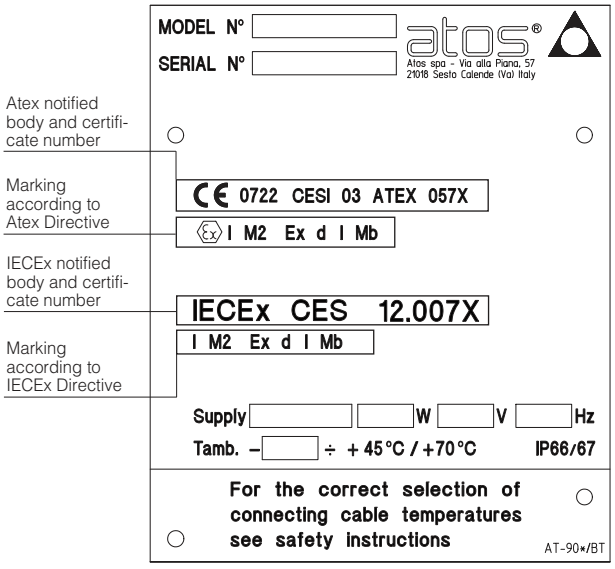
II 2 G = Solenoid for surface plants with gas and vapors environment, category 2, suitable for zone 1 and zone 2
Ex d = Explosion-proof equipment
II C = Equipment of group IIC suitable for substances (gas) of group IIC
T4/T3 = Solenoid temperature class (maximum surface temperature)
Ex = Mark of conformity to the 94/9/CE directive and to the technical norms

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

3.4 GROUP I, ATEX (mining)

Ex = ATEX identification for explosive atmospheres equipments
I = Group I for mines and surface plants
M2 = High protection (equipment category)
Ex d = Explosion-proof equipment
I = Gas group (Methane)
Mb = Equipment protection level, high level protection for explosive atmospheres
IP66/67 = Protection degree

EXAMPLE OF NAMEPLATE MARKING



3.5 GROUP I, IECEx (mining)

I = Group I for mines and surface plants
M2 = High protection (equipment category)
Ex d = Explosion-proof equipment
I = Gas group (Methane)
Mb = Equipment protection level, high level protection for explosive atmospheres
IP66/67 = Protection degree

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

4 MODEL CODE OF PROPORTIONAL DIRECTIONAL VALVES

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

DHZA = size 06
DKZA = size 10

Optional multicertifications
- = omit for Group II
M = Group I (mining)

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

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

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

Spool overlapping in central position, see section 5
1 = P, A, B, T positive overlapping
3 = P positive overlapping; A, B, T, negative

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

Spool size: see section 5

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

Options:
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 version)
MV = vertical hand lever (only for DHZA) **(1)**
O = horizontal cable entrance (only for -A, not for group I)
WP = prolongued manual override protected by metallic cap (only for -A)
Y = external drain (only for DHZA - DKZA)

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

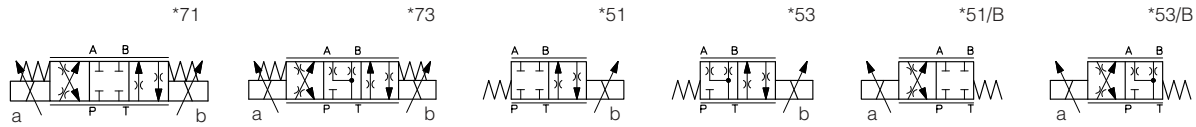
Series number

Seals material, see section 2:
- = NBR
PE = FKM
BT = HNBR

(1) Option **/MV** available only for DHZA configuration 51, 53, 71, spool type S3, S5, D3, D5, L3, L5

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

Hydraulic symbols



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

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

6 MODEL CODE OF PROPORTIONAL DIRECTIONAL VALVES

DPZA / * - **T** - **2** **7** **1** - **L** **5** - **GK** / * / * ** / *

DPZA = spool type - piloted

Optional multicertifications
- = omit for Group II
M = Group I (mining)

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

Valve size (ISO 4401)
1= size 10
2= size 16
4= size 25
6= size 32

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

Spool overlapping in central position, see section 7
1 = P, A, B, T positive overlapping
3 = P positive overlapping; A, B, T, negative

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

Spool size: see section 7

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

Options:
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 version)
D = internal drain
E = external pilot
G = pressure reducing valve for piloting
O = horizontal cable entrance (only for -A, not for group I)
WP = prolongued manual override protected by metallic cap (only for -A)

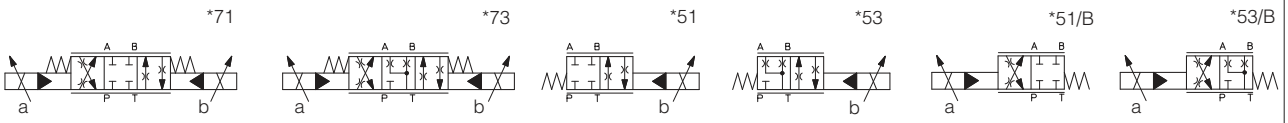
Omit for standard coil 12 VDC:
24 = with 24 VDC coils (only A version)

Series number

Seals material, see section 2:
- = NBR
PE = FKM
BT = HNBR

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

Hydraulic symbols



Valve model		DPZA-1			DPZA-2					DPZA-4			DPZA-6		
Spool type and size		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	160	160 : 98	250	225	225 : 160	360	360	360 : 220	500	500	500:300
at Δp = 30 bar		160	160	160 : 100	270	270 : 160	430	390	390 : 280	620	620	620 : 380	860	860	860:530
max permissible flow		180	180	180 : 110	400	400 : 245	550	550	550 : 390	770	770	770 : 470	1300	1300	1300:800
Response time (1)	[ms]	< 80			< 100					< 120					
Hysteresis	[%]	≤ 5%			≤ 5%					≤ 5%					
Repeatability		± 1%			± 1%					± 1%					

(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.

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

8 MODEL CODE OF SERVOPROPORTIONAL VALVES

DLHZA	/	*	-	T	-	0	40	-	L	7	3	-	GK	/	*	**	/	*

DLHZA = size 06
DLKZA = size 10

Optional multicertifications
- = omit for Group II
M = Group I (mining)

T = with integral position transducer

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

Configuration, see section 9
40 = zero overlap spring offset with fail safe
60 = zero overlap spring offset

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

Spool size: see section 9

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

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

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

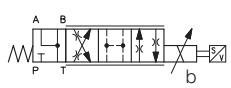
Series number

Seals material, see section 2:
- = NBR
PE = FKM
BT = HNBR

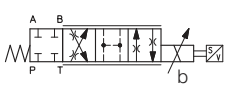
(1) Spool type D, DT and T are available only for valve with fail safe position DLHZA-*-040 and DLKZA-*-140

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

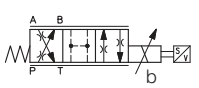
Hydraulic symbols



*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

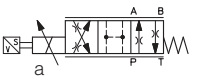


*60-L*1
*60-V*1

*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 (1) [l/min]		2,5	4,5	5	9	13	18		26			26÷13		40	60			60÷33	
at Δp = 30 bar		4	7	8	14	20	28		40			40÷20		60	100			100÷50	
at Δp = 70 bar		10	18	18	32	40	50		70			70÷40		90	160			160÷80	
max permissible flow																			
Leakage [cm³/min] at P = 100 bar (2)		<100	<200	<100	<300	<150	<500	<200	<900	<200	<200	<700	<200	<1000	<1500	<400	<400	<1200	<400
Fail safe connections		P → A				P → B						A → T		B → T					
Leakage [cm³/min] at P = 100 bar (3)	Fail safe 1	50				70						70		50					
	Fail safe 3	50				70						70		50					
Flow [l/min] (4) DLHZA	Fail safe 3	-				-						15÷30		10÷20					
Flow [l/min] (4) DLKZA	Fail safe 3	-				-						40÷60		25÷40					
Response time [ms]		≤ 10												≤ 15					
Hysteresis [%]		≤ 0,1%												≤ 0,1%					
Thermal drift		zero point displacement < 1% at ΔT = 40°C																	

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

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

10 MODEL CODE OF PRESSURE COMPENSATED PROPORTIONAL FLOW CONTROL VALVES

QVHZA / * - **T** - **06** / **12** - **GK** / * / * | ** / *

QVHZA = size 06
QVKZA = size 10

Optional multicertifications
- = omit for Group II
M = Group I (mining)

A = without position transducer
T = with integral position transducer

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

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

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

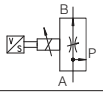
Series number

Seals material, see section 2:
- = NBR
PE = FKM
BT = HNBR

Options:
C = current feedback signal 4÷20 mA (only for -T version)
D = quick venting (only for -A version)
O = horizontal cable entrace (only for -A version, not for group I)
WP = prolongued manual override protected by metallic cap (only for -A version)

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

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

Hydraulic symbols **Note: In 3-way versions port P is open** **In 2-way versions port P must be plugged** **Port T must always be plugged**		 **QVHZA-A** **QVKZA-A**					 **QVHZA-T** **QVKZA-T**								
Valve model		**QVHZA-A**					**QVHZA-T**					**QVKZA-A**		**QVKZA-T**	
Valve size		**06**					**06**					**10**		**10**	
Max pressure ports P, A, B	[bar]	210													
Max regulated flow	[l/min]	3,5	12	18	36	45	3,5	12	18	35	45	65	90	65	90
Min regulated flow (1)	[cm³/min]	15	20	30	50	60	15	20	30	50	60	85	100	85	100
Regulating Δp	[bar]	4 - 6		10 - 12		15	4 - 6		10 - 12		15	6 - 8	10 - 12	6 - 8	10 - 12
Max flow on port A	[l/min]	40		35	50	55	50				60	70	100	70	100

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

12 MODEL CODE OF PROPORTIONAL PRESSURE RELIEF AND COMPENSATOR VALVES

RZMA / * - **A** - **010** / **250** - **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 multicertifications
- = omit for Group II
M = Group I (mining)

A = without integral pressure transducer

Valve size: see section 13 for size code

Max regulated pressure: see section 13

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

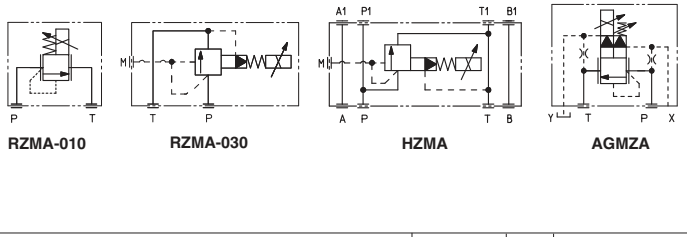
Series number

Seals material, see section 2:
- = NBR
PE = FKM
BT = HNBR

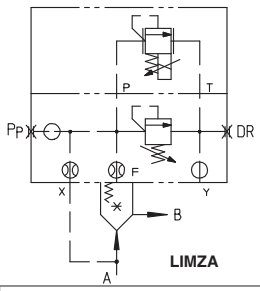
Options:
E = external pilot (only for AGMZA)
O = horizontal cable entrace (not for group I)
P = with integral mechanical pressure limiter (only for LI*ZA, standard for size 1, 2, 3)
Y = external drain (only for AGMZA)

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

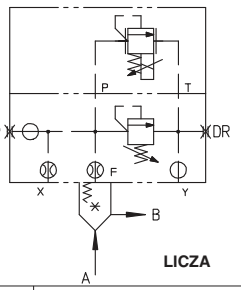
13 HYDRAULIC CHARACTERISTICS



RZMA-010 **RZMA-030** **HZMA** **AGMZA**



LIMZA



LICZA

Valve model		**RZMA**		**HZMA**	**AGMZA**			**LIMZA**							**LICZA**				
Size code		**010**	**030**	**030**	**10**	**20**	**32**	**1**	**2**	**3**	**4**	**5**	**6**	**8**	**1**	**2**	**3**	**4**	**5**
Valve size		06			10	20	32	16	25	32	40	50	63	80	16	25	32	40	50
Max regulated pressure	[bar]	80; 180; 250																	
Max pressure at port P, A, B, X	[bar]	315																	
Max pressure at port T, Y	[bar]	210																	
Max flow	[l/min]	4	40	40	200	400	600	200	400	750	1000	2000	3000	4500	200	400	750	1000	2000

14 MODEL CODE OF PROPORTIONAL PRESSURE REDUCING VALVES

RZGA / * - **A** - **010** / **210** - **GK** / * / * ****** / *

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

Optional multicertifications
- = omit for Group II
M = Group I (mining)

A = without integral transducer

Valve size:
see section 15 for size code

Max regulated pressure:
see section 15

Seals material, see section 2:
- = NBR
PE = FKM
BT = HNBR

Series number

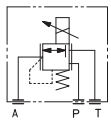
Omit for standard coil 12 VDC:
24 = with 24 VDC coils (only A version)

Options:
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)

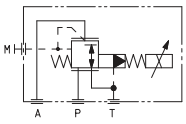
Solenoid threaded connection for cable gland:
GK = GK-1/2" ISO/UNI-6125 (tapered)
NPT = 1/2" NPT ANSI B2.1 (tapered)
M = M20x1,5 UNI-4535 (6H/6g)

Note: for the code of the ISO cartridge to use with LIRZA, see tab. F300 section 2

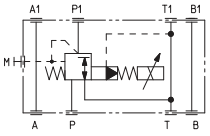
15 HYDRAULIC CHARACTERISTICS



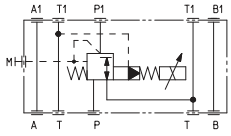
RZGA-A-010



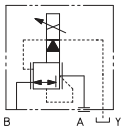
RZGA-A-033



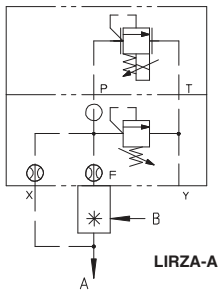
HZGA-A-031



KZGA-A-031



AGRCZA-A



LIRZA-A

Valve model		RZGA		HZGA	KZGA	AGRCZA		LIRZA			
Size code		**010**	**033**	**031**	**031**	**10**	**20**	**1**	**2**	**3**	**4**
Valve size		06			10	10	20	16	25	32	40
Max regulated pressure	[bar]	32; 100; 210				80;	180;	250			
Min regulated pressure	[bar]	0,8	1	1	1	1	1	7	7	7	7
Max pressure at port P	[bar]	315									
Max pressure at port T	[bar]	210									
Max flow	[l/min]	12	40	40	100	160	300	160	300	550	800

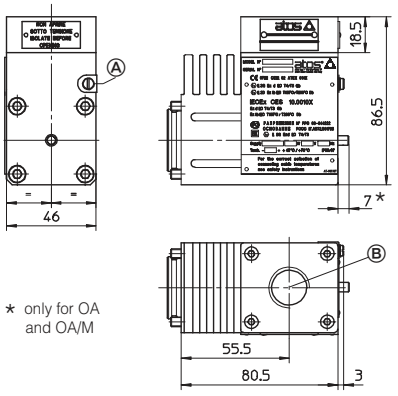
16 CABLE GLANDS - only for Group II - to be ordered separately - see technical table **K600**

Wiring specifications

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.

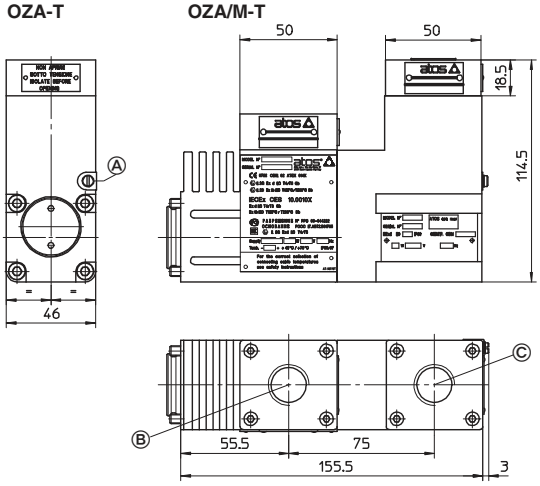
17 SOLENOIDS DIMENSIONS AND WIRING

OZA-A **OZA/M-A**

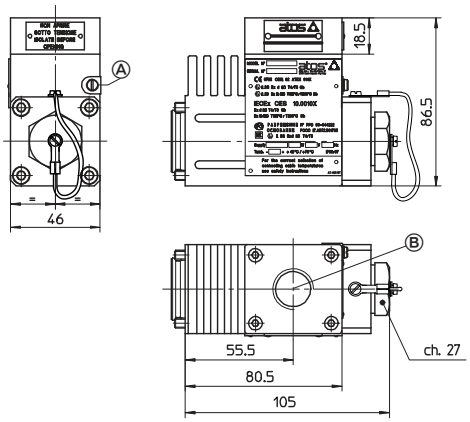


* only for OA and OA/M

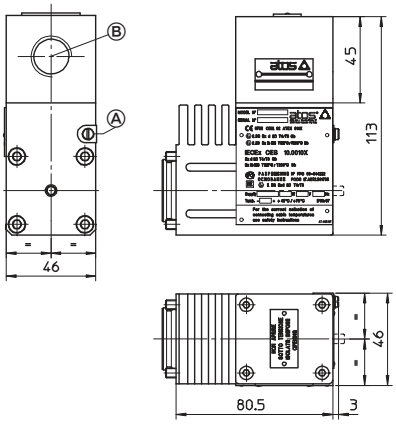
OZA-T **OZA/M-T**



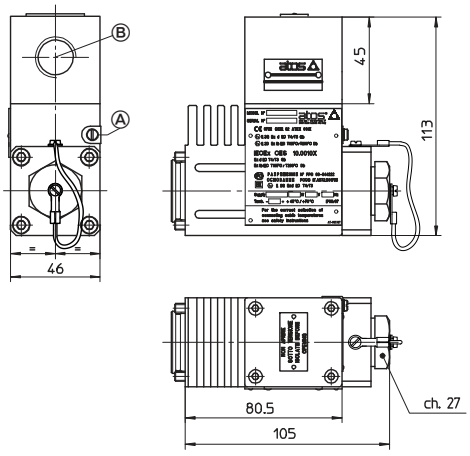
Option /WP



Option /O

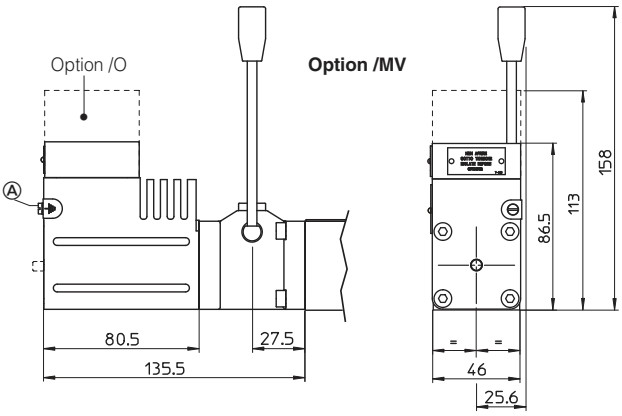


Option /OWP



Option /O

Option /MV



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

Ⓑ = **Solenoid wiring**

1 = Coil
2 = GND
3 = Coil

Ⓒ = **Position transducer wiring**

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