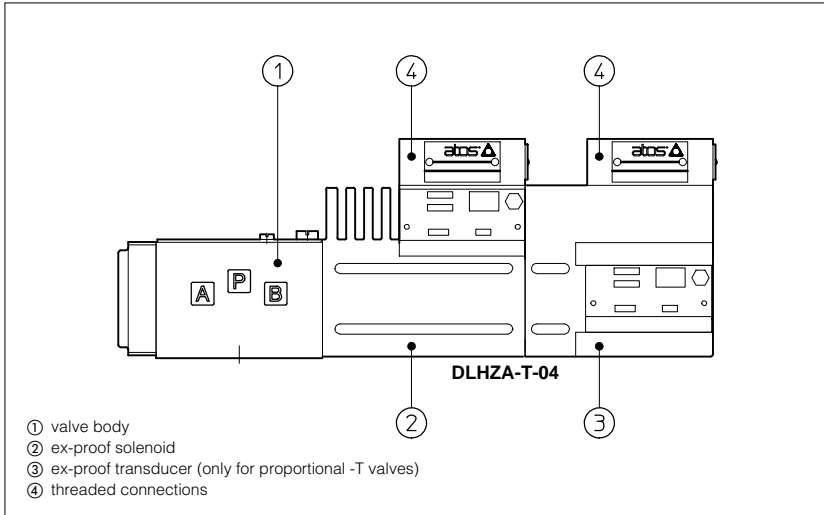


Explosion-proof solenoids and valves

on/off and proportional controls - ATEX standard



On/off solenoids type OA and proportional solenoids type OZA are built in a safety case which is explosion-proof.

This case is designed to limit the explosion inside of it, thus eliminating dangerous phenomena of compression and blasting. They are also designed to limit the external temperature at pre-fixed values.

Explosion-proof solenoids are type-tested according to ATEX 94/4/CE, protection mode:
 - Ex II 2 G EEx d IIC T6/T4/T3 (for surface plants with gas or vapours environment, category 2, zone 1 and 2);
 - Ex I M2 EEx d I (for surface, tunnels or mining plants)

These solenoids are applied to hydraulic valves to suit them for use in explosion-hazardous environments.

On request and according to the environment or to the installation requirements, the explosion-proof valves can be supplied with a suitable surface protection degree. Valves are designed to operate in oil hydraulic systems.

1 MAIN DATA OF EX-PROOF SOLENOIDS

	PROPORTIONAL	ON/OFF	NOTES
Solenoid code	OZA(M)-A for -A models OZA(M)-T for -T models	OA OAM	
Supply voltage (1)	12 DC 24 DC (available on request for versions OZA(M)-A only)	12 DC, 24 DC, 98DC, 198DC, 12/50 AC, 12/60 AC, 24/50 AC, 24/60 AC (2), 110/50 = 120/50 AC, 110/60 = 120/60 AC (2), 220/50 = 240/50 AC, 220/60 = 240/60 AC (2)	(1) Tolerance on the supply voltage: -10% + 10% (2) For alternating current supply a rectifier bridge is provided built-in the solenoid.
Power consumption (3)	35W	8 W	(3) With solenoid stabilized temperature
Temperature class (4)	T4 (< 135° C on the surface)	T6 (<85° C on the surface)	(4) At ambient temperature of 40° C
Coil insulation	Class H		
Protection degree	IP 66 according to IEC 144		
Duty factor	100%		
Mechanical construction	Explosion-proof safety case classified EEx-dIIC according to: EN 50.014 and EN 50.018;		
Electrical wirings (5)	Valves, supplied without cable, must be connected to the power supply using the terminal board inside the solenoid. The grounding can be also performed by the user on the external grounding points provided for that. Minimum section of external ground wire = 4 mm² Minimum section of internal ground wire = the same of supply wires		(5) In order to reach the terminal board inside the solenoid, the top of the solenoid must be removed. Solenoids are provided with threaded connection: GK-1/2" GAS (ISO/UNI 6125) or M20x1,5 (UNI-4535) or 1/2"NPT (ANSI B2.1) To this connection must be applied the cable glands, available on request certified according to EN 50.014 and EN50.018, see tab. K500 (not available for Group I -mining- solenoids).

2 PROPORTIONAL EX-PROOF VALVES

	SIZE	CODE	MAX FLOW [l/min]	MAX Δp [bar]	MAX PRESS. [bar]	
DIRECTIONAL CONTROL	ISO/Cetop 03	DHZA-A, T	60	50	350	
		DLHZA-T	40	70		
	ISO/Cetop 05	DKZA-A,T	110	40	315	
		DLKZA-T	80	60		
ISO/Cetop 07	DPZA-A-2	350	40	350		
	ISO/Cetop 08	DPZA-A-3	600		40	
PRESSURE COMPENSATOR	NG 16, 25, 32 40, 50	LICZA-A	200,400,750 1000, 2000	= =	250	
PRESSURE RELIEF	ISO/Cetop 03	RZMA-A-010	4	= =	250	
		RZMA/HZMA-030	40	= =		
	ISO/Cetop 06R	AGMZA-A-10	200	= =		
	ISO/Cetop 08R	AGMZA-A-20	400	= =		
	ISO/Cetop 10R	AGMZA-A-32	600	= =		
NG16, 25, 32 40, 50, 63	LIMZA-A	200, 400, 750 1000,2000,3000	= =			
PRESSURE REDUCING	ISO/Cetop 03	RZGA-A-010	12	= =	32-210	
		RZGA/HZGA-03*	40	= =		
	ISO/Cetop 06	AGRZA-A-10	160	= =	250	
	ISO/Cetop 08P	AGRZA-A-20	300	= =		
	NG 16, 25, 32	LIRZA-A	160, 320, 600	= =		
FLOW CONTROL	ISO/Cetop 03	QVHZA-A, T	45	= =	210	
	ISO/Cetop 05	QVKZA-A, T	90	= =		
	ISO/Cetop 06-2	QVZA-A-10/2	60	= =	250	
		QVZA-A-10/3	70	= =		
		ISO/Cetop 07-2	QVZA-A-20/2	135		= =
		ISO/Cetop 07-3	QVZA-A-20/3	150		= =

Note: for valves classified Group I (mining) add the option /M to the identification code.
 Example: DHZA/M-A

3 ON/OFF EX-PROOF VALVES

	SIZE	CODE	MAX FLOW [l/min]	MAX PRESS. [bar]
DIRECTIONAL CONTROL	ISO/Cetop 03	DHA	see section [1]	350
		DLOH-*.**.-AO DLOK-*.**.-AO	see section [1]	
	ISO/Cetop 05 ISO/Cetop 07 ISO/Cetop 08	DPHA-1	140	350
		DPHA-2	300	
		DPHA-3	650	
		LIDBH**.**.AO	180,400,600 1200, 2000	
NG16, 25, 32, 40, 50	LIDEW*.**.AO	180,400,600 1200, 2000 3000, 5000		
	ISO/Cetop 06R	AGAM-10/.*.-AO	200	
PRESSURE RELIEF	ISO/Cetop 08R	AGAM-20/.*.-AO	400	100-350
	NG20	ARAM-20/.*.-AO	350	
	ISO/Cetop 10R	AGAM-32/.*.-AO	600	
	NG 32	ARAM-32/.*.-AO	500	

Note: for valves classified Group I (mining) add the option /M to the identification code. Example: DLOH-*.**.-AO/M
 DHA/M

4 CODES OF EX-PROOF PROPORTIONAL DIRECTIONAL CONTROLS

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

DHZA = ISO/Cetop 03 without sleeve, see tab. F160
DLHZA = ISO/Cetop 03 with sleeve, see tab. F180
DKZA = ISO/Cetop 05 without sleeve, see tab. F160
DLKZA = ISO/Cetop 05 with sleeve, see tab. F180
DPZA = ISO/Cetop 07 and 08, see tab. F170

option for valves classified Group I (mining)
 (omit if not required)

A = for open loop application (not available for DL*ZA)
T = with integral transducer (not available for DPZA)

Valve size:
0 = ISO/Cetop 03; **1** = ISO/Cetop 05; **2** = ISO/Cetop 07; **3** = ISO/Cetop 08

Valve configuration, see section 5

Regulation characteristic:
L = linear
S = progressive (not available for DL*ZA)
D = as S, but A and B flow path have ratio 1:2 (not available for DL*ZA)

Spool size, see technical tables: **3, 5** (for all models); **1, 7** (only for DL*ZA)

Fail safe configuration for DL*ZA: **1** = A, B, P, T blocked **3** = P blocked; A, B, T conncted

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

Design number

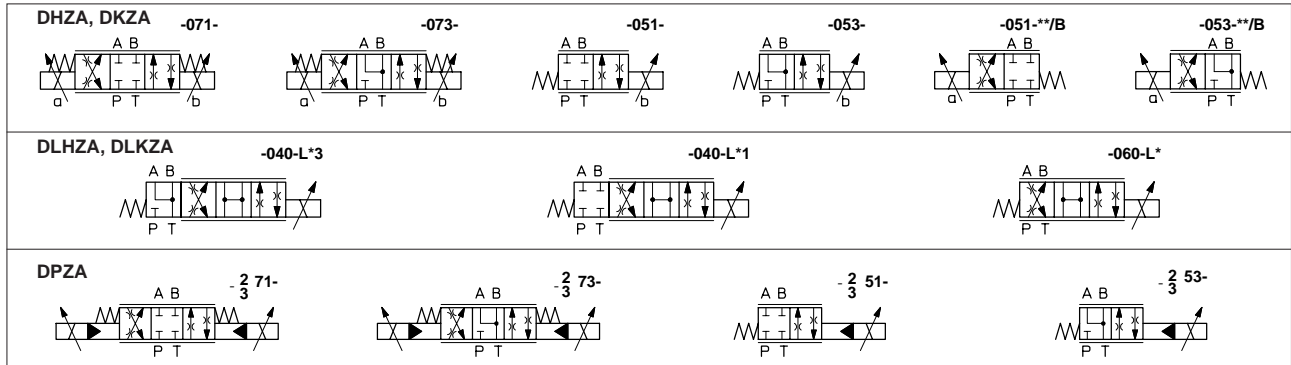
Options:
/W/P = prolonged manual override protected by metallic cap (only for valves without transducer)
/- = for ambient temperature ≤ 40° C
/7 = for ambient temperature ≤ 70° C
/B = solenoid at side of port A
/C = current feedback signal 4÷20 mA (only for -T version)

Only for DPZA:
/G = pressure reducing valve for piloting
/E = external pilot (through port X)
/D = internal drain

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

Option
PA- = with threaded cable clamp PG19, see section 14

5 HYDRAULIC CONFIGURATIONS OF DIRECTIONAL PROPORTIONAL CONTROLS



6 CODES OF EX-PROOF PROPORTIONAL PRESSURE CONTROLS

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

Pressure relief:
RZMA = ISO/Cetop 03, see tab. F007
HZMA = ISO/Cetop 03, see tab. F060
AGMZA = ISO/Cetop 06R, 08R, 10R, see tab. F035
LIMZA = NG16, 25, 32, 40, 50, 63, see tab. F300

Pressure compensator:
LICZA = NG16, 25, 32, 40, 50, see tab. F300

Pressure reducing:
RZGA = ISO/Cetop 03, see tab. F015
HZGA = ISO/Cetop 03, see tab. F060
AGRZA = ISO/Cetop 06P, 08P, see tab. F040
LIRZA = NG16, 25, 32, see tab. F300

option for valves classified Group I (mining)
 (omit if not required)

A = for open loop application

For RZMA e RZGA: **010** = ISO/Cetop 03 For RZMA/HZMA: **030** = ISO/Cetop 03
 For RZGA: **033** = ISO/Cetop 03 For HZGA: **031** = ISO/Cetop 03
 For AGMZA: **10** = ISO/Cetop 06R, **20** = ISO/Cetop 08R, **32** = ISO/Cetop 10R
 For AGRZA: **10** = ISO/Cetop 06P, **20** = ISO/Cetop 08P
 For LIMZA, LICZA, LIRZA: **16** = NG16, **25** = NG25, **32** = NG32 (all models)
40 = NG40; **50** = NG50 (only LIMZA and LICZA)
63 = NG63 (only LIMZA)

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

Design number

Options:
/- = for ambient temperature ≤ 40° C
/7 = for ambient temperature ≤ 70° C
/E = external pilot (only for AGMZA)
/P = with integral mechanical pressure limiter (only for AGRZA and LI*ZA)
/R = with check valve (only for AGRZA)

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)

Option
PA- = with threaded cable clamp PG19, see section 14

Max pressure:
32 = 32 bar (only for RZGA-A-010)
80 = 80 bar
210 = 210 bar (only for RZGA-A-010)
180 = 180 bar
250 = 250 bar

7 CODES OF EX-PROOF PROPORTIONAL FLOW CONTROLS

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

Pressure compensated:
QVHZA = ISO/Cetop 03, see tab. F410
QVKZA = ISO/Cetop 05, see tab. F410
QVZA = ISO/Cetop 06, 07, see tab. F430

option for valves classified Group I (mining)
 (omit if not required)

A = for open or closed loop application
T (only for QVHZA) = with integral spool position transducer

For QVHZA:
06 = ISO/Cetop 03

For QVZA:
10 = ISO/Cetop 06, **20** = ISO/Cetop 08

Only for QVZA:
/2 = 2-way
/3 = 3 way

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

Design number

Options:
/W/P = prolonged manual override protected by metallic cap (only for valves without transducer)
/- = for ambient temperature ≤ 40° C
/7 = for ambient temperature ≤ 70° C
/C = current feedback signal 4÷20 mA (only for -T versions)
/E = external pilot (for QVZA)
/V = without check valve (only for 2-way version of QVZA)

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)

Option
PA- = with threaded cable clamp PG19, see section 14

Max regulated flow: (only for QVKZA)
/3 = 3,5 l/min; **/12** = 12 l/min
/18 = 18 l/min; **/36** = 36 l/min

Regulation characteristic (only for QVZA and LIQZA):
-L4 = linear **-S4** = progressive

8 CODES OF EX-PROOF ON/OFF DIRECTIONAL CONTROLS

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

DHA = ISO/Cetop 03 spool type see tab. E010
DHAM = valve classified Group I - mining
DLOH - DLOK = ISO/Cetop 03 poppet type, see tab. E041
DPHA = ISO/Cetop 05, 07 and 08, see tab. E080

Cartridge type:
LIDBH** = NG16, 25, 32, 40, 50, see tab. H030
LIDEW* = NG16, 25, 32, 40, 50, 63, 80, see tab. H030

Valve size for all models excluded DLOH and DLOK
 for DHA: **0** = ISO/Cetop 03;
 for DPHA: **1** = ISO/Cetop 05; **2** = ISO/Cetop 07; **3** = ISO/Cetop 08;
 for LIDBH**: **16** = NG16, **50** = NG50
 for LIDEW* **16** = NG16...**80** = NG80

Valve configuration, (only for DHA, DLOH, DLOK, DPHA) see section 9

Spool type (only for DHA and DPHA), see section 9

Options:
/WP = prolonged manual override protected by metallic cap
/- = for ambient temperature ≤ 40°C
/7 = for ambient temperature ≤ 70°C [14]
/PA- = with threaded cable clamp, see section [14]
/A = solenoid at side of port B

Only for DLOH:
/R = with check valve on port P

Only for LID*:
/E = external attachments X (1/4" GAS) and underneath port X supplied plugged
/** = restrictors different from standard ones, see tab. H030

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

Design number

Supply voltage:
12DC = 12V_{DC} Direct Current supply
24DC = 24V_{DC} Direct Current supply
12AC = 12V_{AC} Alternating Current supply
24AC = 24V_{AC} Alternating Current supply
110 = 98V_{DC} Direct Current supply
 110 → 120V_{AC} Alternating current supply-50 as well as 60 Hz
220 = 198 V_{DC} Direct Current supply
 220 → 240V_{AC} Alternating current supply-50 as well as 60 Hz

Only for DLOH, DLOK, LIDBH** and LIDEW*;
-AO = Explosion proof solenoid
-AO/M = explosion proof solenoid classified Group I (mining)

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)

9 HYDRAULIC CONFIGURATIONS OF DIRECTIONAL ON/OFF CONTROLS

For the valve hydraulic configuration and the spool type, see:

DHA Table E010, sections 2 and 3;

DLOH*-AO / DLOK*-AO Table E041, section 2;

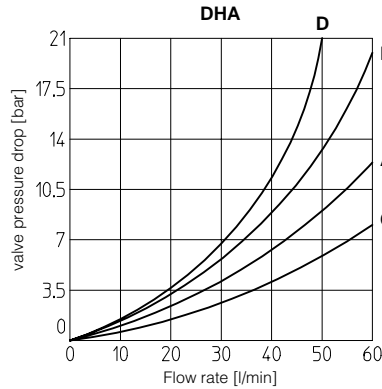
DPHA Table E080, sections 2 and 3;

LIDBH*-AO / LIDEW*-AO Table H030, section 2.

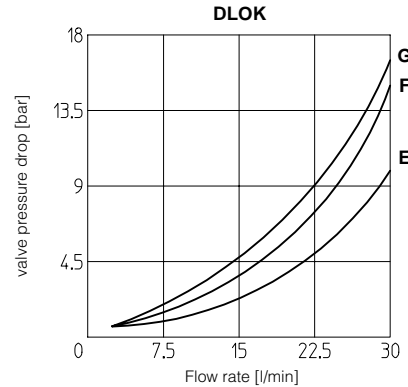
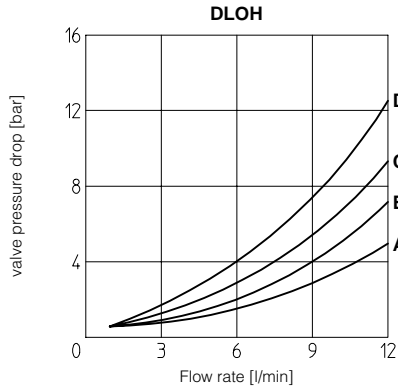
10 Q/Δp DIAGRAMS

based on fluid viscosity of 43 mm²/s at 40°C

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



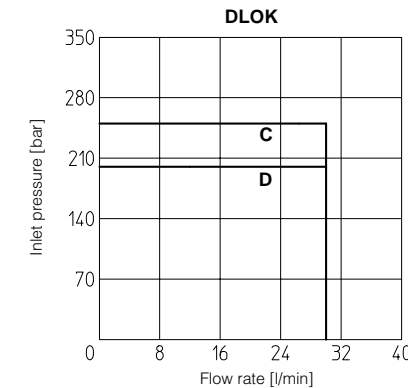
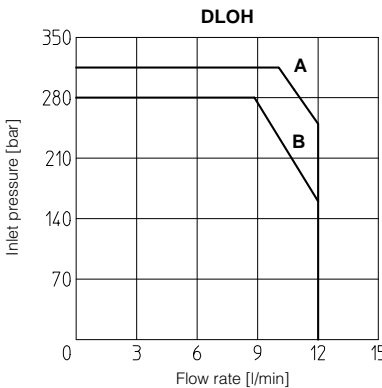
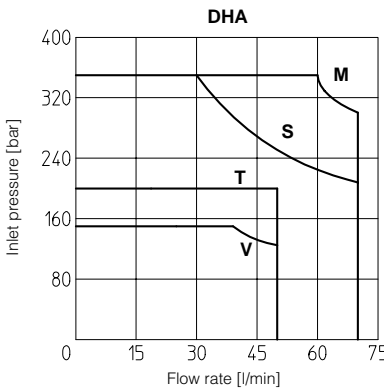
Flow direction Valve type	P → A (1) (P → B)		A → T (B → T)	
	P→A	P→B	A→T	B→T
DLOH-2A	B	-	-	-
DLOH-2C	C	-	-	-
DLOH-3A	D	-	C	-
DLOH-3C	C	-	A	-
DLOK-3A	G	-	F	-
DLOK-3C	F	-	E	-



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

11 OPERATING LIMITS

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;
S = Spools 3, 6, 7;
T = Spools 0/2, 1/2;
V = Spools 4, 5;

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

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

12 CODES OF EX-PROOF MECHANICAL PRESSURE CONTROLS

AGAM

- 20 / 2 0 / 210 /PA- GK -AO 24 DC ** /*

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

Valve size for AGAM: for ARAM:
 10 = ISO/Cetop 06R; 20 = 3/4" GAS;
 20 = ISO/Cetop 08R; 32 = 1 1/4" GAS;
 32 = ISO/Cetop 10R;

Number of the different setting pressure values (1, 2, 3)

Valve configuration, see section 13
 0 = venting with de-energized solenoid 1 = venting with energized solenoid
 2 = without venting

Pressure range of first/second/third setting:
 100 = 10 - 100 bar
 210 = 10 - 210 bar
 350 = 10 - 350 bar

Options:
 /- = for ambient temperature ≤ 40°C
 /7 = for ambient temperature ≤ 70°C
 /PA- = with threaded cable clamp, see section 14

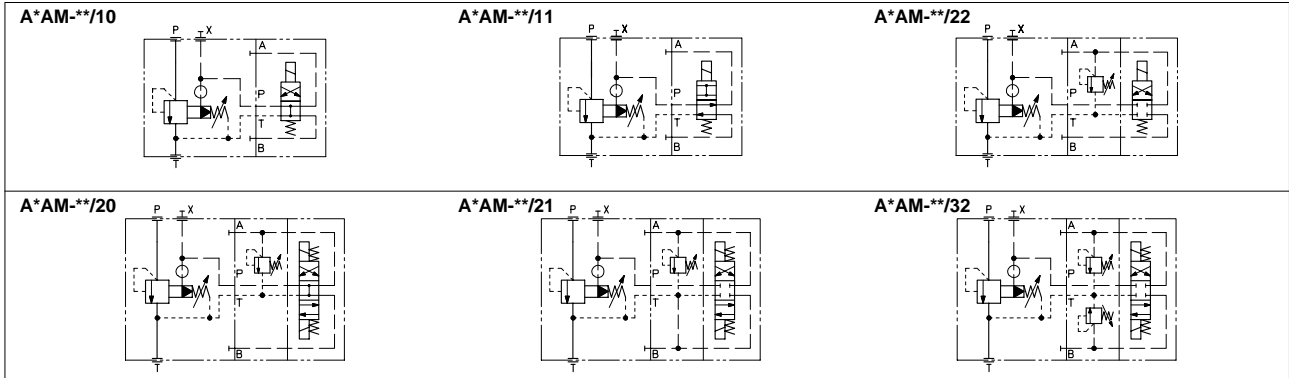
Design number Synthetic fluids:
 /WG: water-glycol
 /PE: phosphate ester

Supply voltage:
 12DC = 12V_{DC} Direct Current supply
 24DC = 24V_{DC} Direct Current supply
 12AC = 12V_{AC} Alternating Current supply
 24AC = 24V_{AC} Alternating Current supply
 110 = 98 V_{AC} (Direct Current supply)
 110 = 120V_{AC} (Alternating current supply-50 as well as 60 Hz)
 220 = 198 V_{AC} (Direct Current supply)
 220 = 240V_{AC} (Alternating current supply-50 as well as 60 Hz)

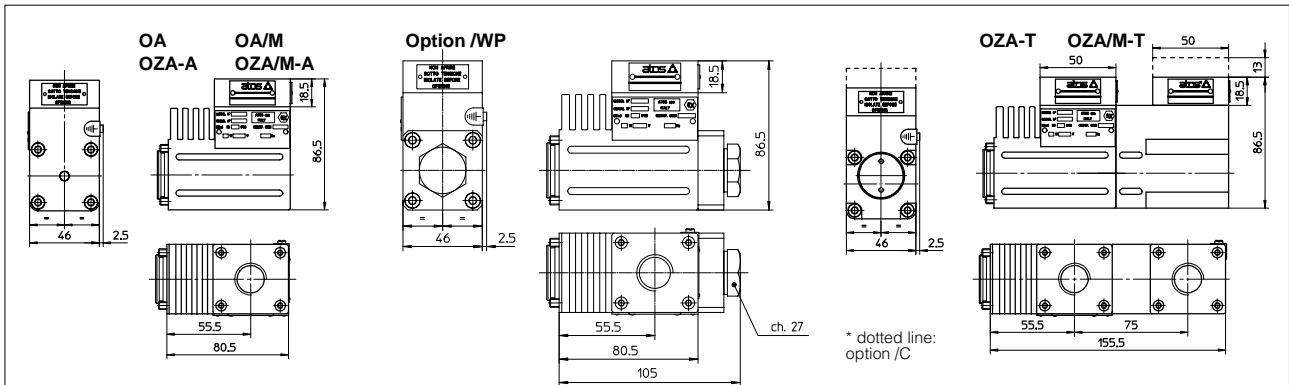
- AO = explosion proof solenoid
 -AO/M = explosion proof solenoid classified Group I (mining)

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)

13 HYDRAULIC CONFIGURATIONS OF MECHANICAL PRESSURE CONTROLS

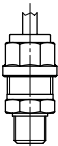


14 EX-PROOF SOLENOID DIMENSIONS [mm]



CABLE CLAMP TYPE PA*

(not available for solenoids classified Group I -mining)



Codes of cable glands certified according to ATEX EN-50014 and EN-50018:

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

This cable gland must be blocked with loctite or similar or with a lock nut.

Note: code of standard cable clamps is PA19. Special cable clamps PA112 (PG12) available on request only as spare parts.

15 EXTERNAL PROFILE OF EX-PROOF VALVES

