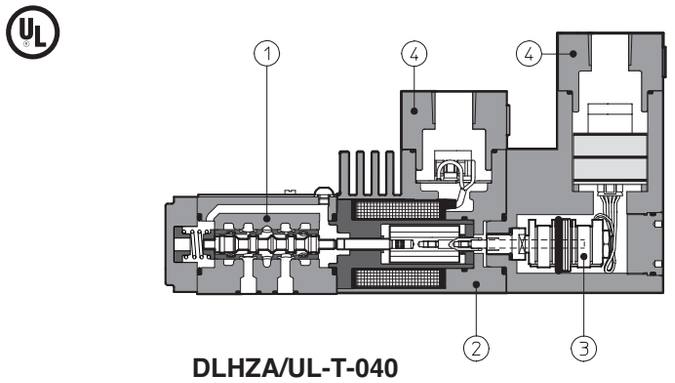
# Explosion-proof solenoid valves

on/off and proportional controls - cULus certification




**DLHZA/UL-T-040**

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

Explosion-proof on/off and proportional solenoids certified **cULus** according to UL 1203 and UL429, CSA 22.2 n°30-1986 and CSA 22.2 n°139-13.

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

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 DLAH valves are **SIL** compliance with IEC 61508 (TÜV certified) - see section 3.2

## 1 EXPLOSION PROOF SOLENOIDS: MAIN DATA

| **SOLENOID TYPE** | | | PROPORTIONAL without transducer | PROPORTIONAL with transducer | ON-OFF |
|---|---|---|---|---|---|
| Solenoid code | | | OZAUL-A | OZAUL-T | OAUL |
| **Voltage code** | VDC | ±10% | **12 DC, 24 DC** | **12 DC** | **12DC, 24DC, 110DC, 125DC, 220DC** |
| | VAC 50/60 Hz | ±10% | – | | **12AC, 24AC, 110-120AC, 230-240AC (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 1203 and UL429, CSA 22.2 n°30-1986 and CSA 22.2 n°139-13 | | |
| Cable entrance and electrical wiring | | | Connection 1/2" NPT (ANSI/ASME B46.1) for cable gland internal terminal board for cable connection | | |

(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 | T4 (≤ 135°C) | T3 (≤ 200°C) | T6 (≤ 85°C) | T5 (≤ 100°C) |
| Ambient temperature | -40 ÷ +55 | -40 ÷ +70 | -40 ÷ +55 | -40 ÷ +70 |
| Surface temperature | ≤135 °C | | ≤ 85 °C | |

## 3 CERTIFICATIONS

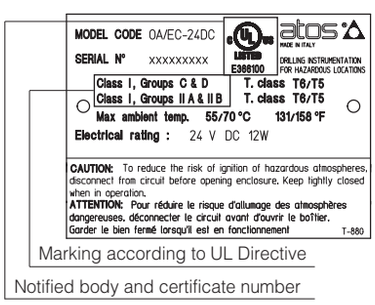
In the following is resumed the valves marking according to UL certification

**Class I** = Equipment for famable gas and vapours
**Division 1** = Possibility of explosive atmosphere during normal functioning
**Groups C&D** = Atmosphere containing flamable gas
**Groups IIA&IIB** = Gas group
**T6/T5** = Temperature class of solenoid surface referred to +55°C / +70°C ambient temperature

### 3.2 SIL compliance with IEC 61508: 2010

DHA/UL and DLAH/UL meets the requirements of:
- **SC3** (systematic capability)
- max **SIL 2** (HFT = 0 if the hydraulic system does not provide the redundancy for the specific safety function where the component is applied)
- max **SIL 3** (HFT = 1 if the hydraulic system provides the redundancy for the specific safety function where the component is applied)

### 3.1 EXAMPLE OF NAMEPLATE MARKING



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

**DHA / UL – 0 63 1/2 / NPT / * 24DC ** /***

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

**UL** = C UL US certification

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

Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

Voltage code - see section 1

Series number

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

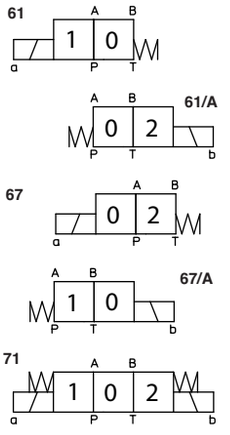
Options:
**A** = solenoid at side of port B (for single solenoid valves)
**O** = horizontal cable entrance
**MV** = vertical hand lever (1)
**WP** = prolongued manual override protected by metallic cap

Only for DPHA:
**/D** = Internal drain
**/E** = External pilot pressure
**/H** = Adjustable chokes (meter-out to the pilot chambers of the main valve).
**/H9** = Adjustable chokes (meter-in to the pilot chambers of the main valve)
**/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, -4)

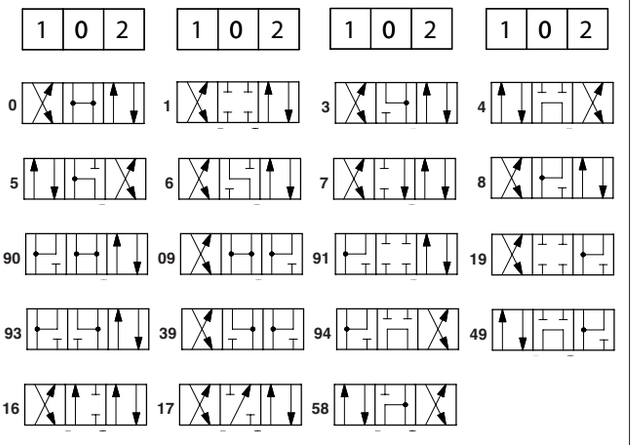
(1) Option **/MV** available only for DHA, configuration 61, 63, 71 and spool type 0, 0/2, 1, 1P, 1/2, 1/2P, 3, 3P, 4, 7

## 5 CONFIGURATIONS and SPOOLS for DHA valves

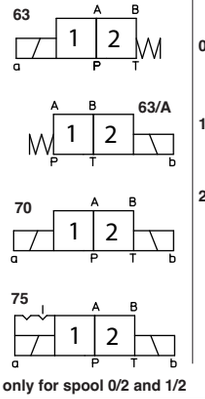
Configurations




Spools

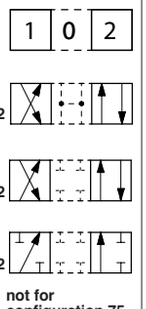



Configurations




only for spool 0/2 and 1/2

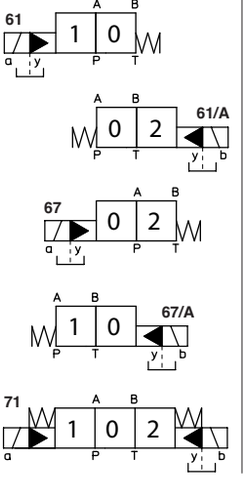
Spools



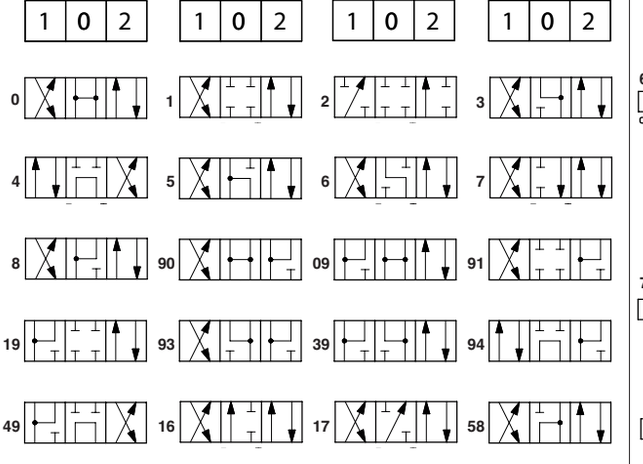

not for configuration 75

## 6 CONFIGURATIONS and SPOOLS for DPHA valves

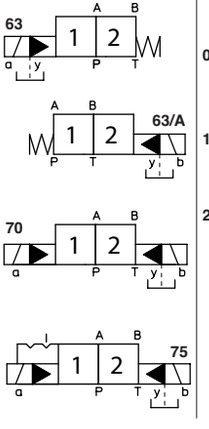
Configurations



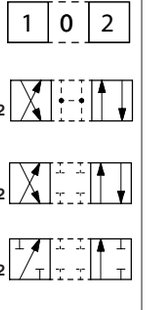

Spools




Configurations




Spools




**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

**DLAH /UL – 2 A / NPT / * 24DC ** /***

Directional control valve poppet type, size 06
**DLAH** = max flow 12 l/min
**DLAHM** = max flow 30 l/min

**UL** = C UL US certification

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

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

Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

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

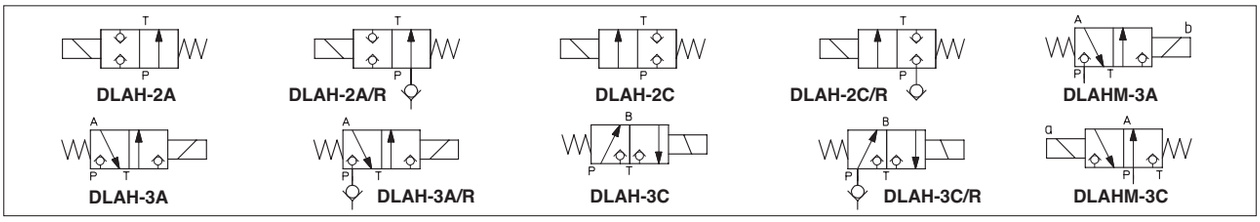
Voltage code - see section 1

Series number

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

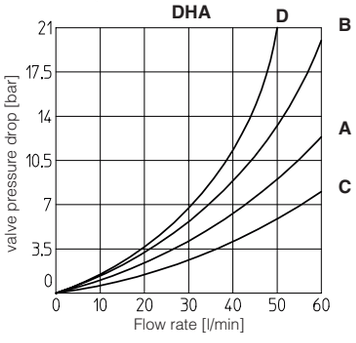
(1) Option **/BT** = low temperature -40°C also available on request

## 8 CONFIGURATION OF DLAH AND DLAHM




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

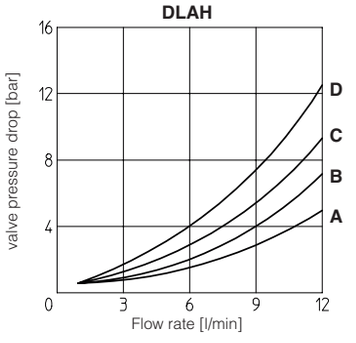
| Flow direction / Spool type | P→A | P→B | A→T | B→T | P→T |
|---|---|---|---|---|---|
| **0** | C | C | C | C | |
| **0/2, 1, 1/2** | A | A | A | A | |
| **3** | A | A | C | C | |
| **4, 5** | D | D | D | D | A |
| **6** | A | A | C | A | |
| **7** | A | A | A | C | |
| **8** | C | C | B | B | |

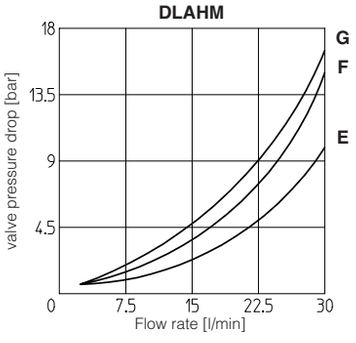



**INTERNAL LEAKAGE** of DLAH and DLAHM less than 5 drops/min (0,36 cm³/min) at max pressure.

| Flow direction / Valve type | P → A (1) (P → B) | A → T (B → T) |
|---|---|---|
| **DLAH-2A** | B | – |
| **DLAH-2C** | C | – |
| **DLAH-3A** | D | C |
| **DLAH-3C** | C | A |
| **DLAHM-3A** | G | F |
| **DLAHM-3C** | F | E |

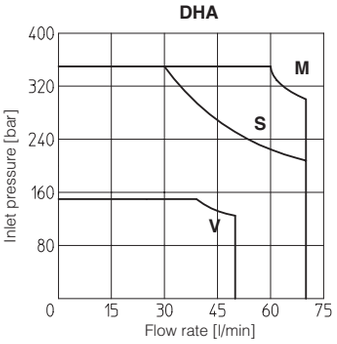
(1) For two-way valves pressure drop refers to P→T



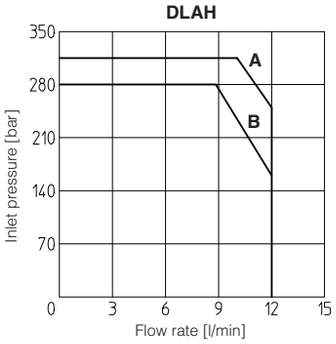




## 10 OPERATING LIMITS OF ON/OFF DIRECTIONAL CONTROLS (based on mineral oil ISO VG 46 at 50°C)

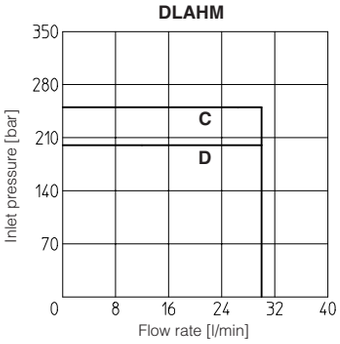
The diagram have been obtained with warm solenoids and power supply at lowest value ($V_{nom}$-10%). For DHA valves the curves refer to application with symmetrical flow through the valve (i.e. P → A and B → T). In case of asymmetric flow the operating limits must be reduced.




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




**A** = DLAH-3A;
**B** = DLAH-2A, DLAH-3C




**C** = DLOK-3A;
**D** = DLAHM-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: threated 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

Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

**AO/UL** = C UL US certification

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

Voltage Code, see section 1

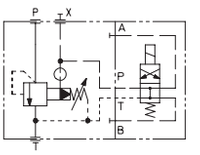
Series number

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

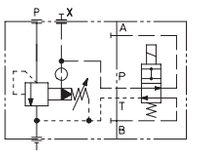
(1) Option **/BT** = low temperature -40°C also available on request

## 12 HYDRAULIC CHARACTERISTICS

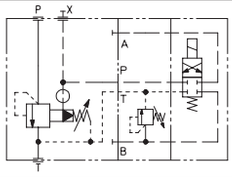
**AGAM-**/10**
**ARAM-**/10**



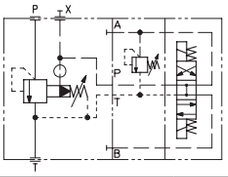
**ARAM-**/10**
**AGAM-**/11**



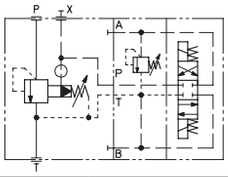
**AGAM-**/22**
**ARAM-**/22**



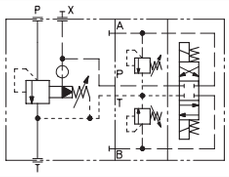
**AGAM-**/20**
**ARAM-**/20**



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



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



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

## 13 MODEL CODE OF COVERS FOR CARTRIDGE VALVES

**LIDEW - 1 / 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; **2** = 25; **3** = 32; **4** = 40; **5** = 50; **6** = 63; **8** = 80 (only for LIDEW);

Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

Certification type
**AO/UL** = C UL US certification

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 forsizes 40...80)
**O** = horizontal cable entrance
**WP** = prolongued manual override protected by metallic cap

Voltage code - see section 1

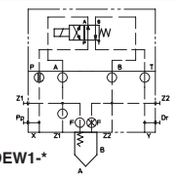
Series number

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

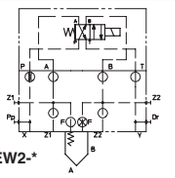
Optional different provision or setting of the calibrated plugs in the pilot channels see table H030 sect. 6

Note: for the code of the ISO cartridge to use with the above covers see tab. H003, section 2 and tab. H030, section 3.
(1) Option **/BT** = low temperature -40°C also available on request

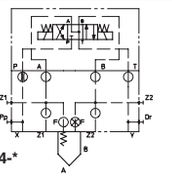
## 14 HYDRAULIC SYMBOLS



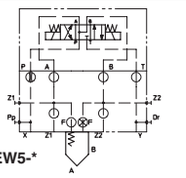
**LIDEW1-***



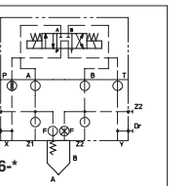
**LIDEW2-***



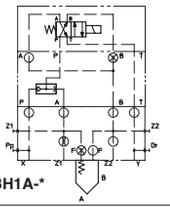
**LIDEW4-***



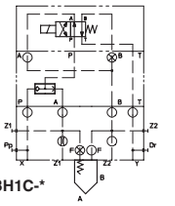
**LIDEW5-***



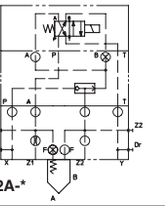
**LIDEW6-***



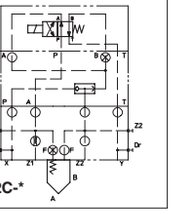
**LIDBH1A-***



**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

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

Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

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

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

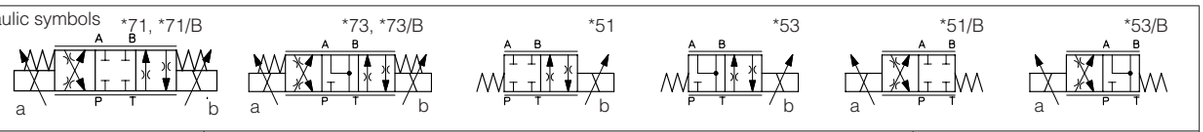
Series number

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

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

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

Hydraulic symbols

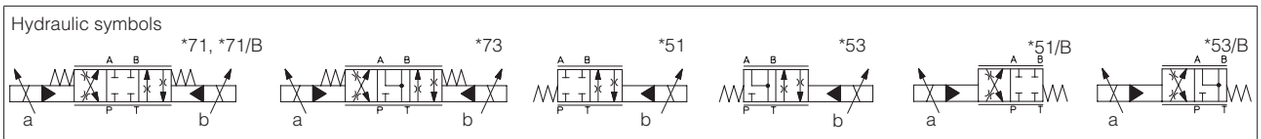



| Valve model | | DHZA-A DHZA-T | | | | | DKZA-A | DKZA-T |
|---|---|---|---|---|---|---|---|---|
| Spool overlapping | | 1, 3 | 1, 3 | 1, 3 | 1, 3 | 1, 3 | 1, 3 | 1, 3 |
| Spool type and size | | L14 | L1 | S2 | S3, L3, D3 | S5, L5, D5 | S3, L3, D3 | S5, L5, D5 |
| Pressure limits | [bar] | ports P, 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 (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




| 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 | 160 | 160:98 | 250 | 225 | 225 : 160 | 420 | 400 | 400 : 245 | 600 | 600 | 600:370 |
| at Δp = 30 bar | | 160 | 160 | 160 : 100 | 270 | 270:160 | 430 | 390 | 390 : 280 | 720 | 690 | 690 : 420 | 1000 | 1000 | 1000:620 |
| max permissible flow | | 180 | 180 | 180 : 110 | 400 | 400:245 | 550 | 550 | 550 : 390 | 900 | 900 | 900 : 550 | 1600 | 1600 | 1600:990 |
| 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 /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

Spool size: see section 19

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

Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

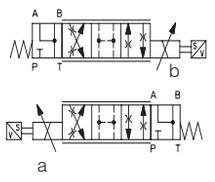
Options:
**B** = solenoid at side of port A
**C** = position transducer with current feedback 4÷20 mA
**Y** = external drain

Series number

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

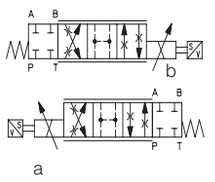
## 19 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols



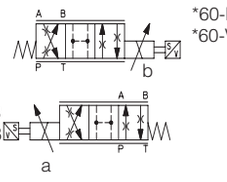

*40-L*3
*40-D*3
*40-DT*3
*40-T*3
*40-V*3

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




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

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




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

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

| 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 | [l/min] | | | | | | | | | | | | | | | | | | |
| 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

Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

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

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

Series number

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

## 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 | [l/min] | 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

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

Series number

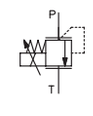
Omit for standard coil 12 $V_{DC}$:
**24** = with 24 VDC coils (only A version)

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

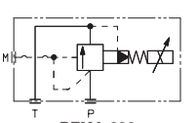
Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

(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

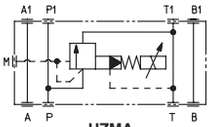
## 23 HYDRAULIC CHARACTERISTICS



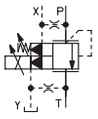
RZMA-010



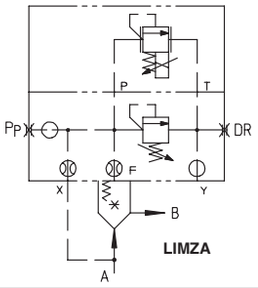
RZMA-030



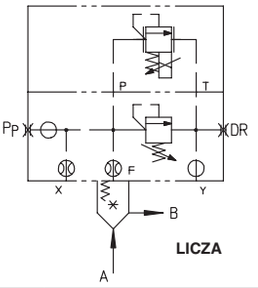
HZMA



AGMZA



LIMZA



LICZA

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

## 24 MODEL CODE OF PROPORTIONAL PRESSURE REDUCING VALVES

**RZGA / 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 25 for size code

Max regulated pressure:
see section 25

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

Series number

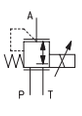
Omit for standard coil 12 $V_{DC}$:
**24** = with 24 VDC coils (only A version)

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

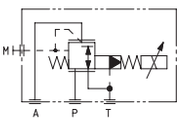
Solenoid threated connection:
**NPT** = 1/2" NPT ANSI/ASME B46.1 (tapered)

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

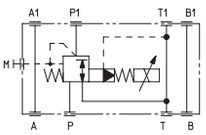
## 25 HYDRAULIC CHARACTERISTICS



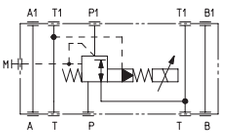
RZGA-A-010



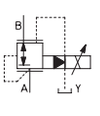
RZGA-A-033



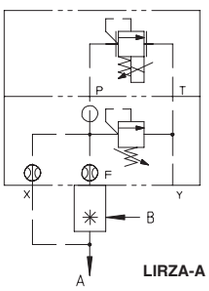
HZGA-A-031



KZGA-A-031



AGRCZA-A

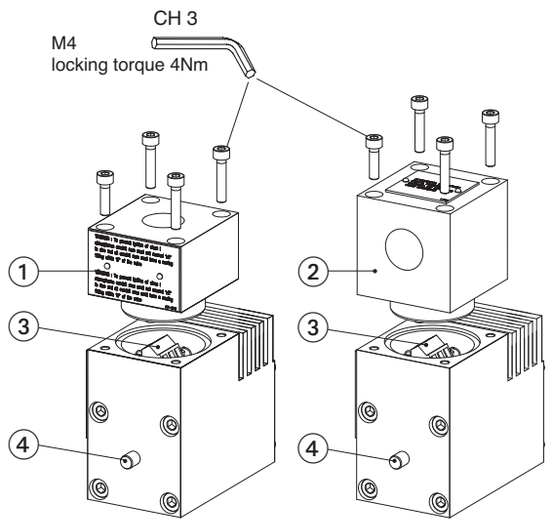


LIRZA-A

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

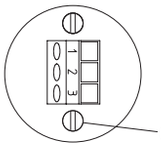
## 26 EX PROOF SOLENOIDS WIRING

**ON-OFF and proportional valves -A**




**Standard version** **Option /O**

① cover with threaded connection for vertical cable gland fitting
② cover with threaded connection for horizontal cable gland fitting
③ terminal board for cables wiring
④ standard manual override

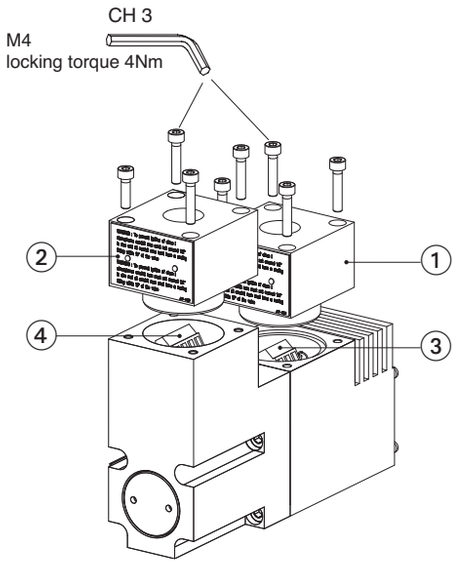


**1** = Coil **+**
**2** = GND
**3** = Coil **-**

PCB 3 poles terminal board suitable for wires cross sections up to 2,5 mm² (max AWG14)

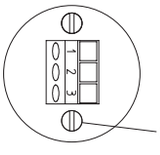
**(2)** = alternative GND screw terminal connected to solenoid housing

**Proportional valves -T**




① solenoid cover with threaded connection for cable gland fitting
② transducer cover with threaded connection for cable gland fitting
③ solenoid terminal board for cables wiring
④ transducer terminal board for cables wiring

**Solenoid wiring**



**1** = Coil **+**
**2** = GND
**3** = Coil **-**

PCB 3 poles terminal board suitable for wires cross sections up to 2,5 mm² (max AWG14)

**(2)** = alternative GND screw terminal connected to solenoid housing

**Position transducer wiring**

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

PCB 4 poles terminal board suitable for wires cross sections up to 2,5 mm² (max AWG14)

**Cable Specification**:
Power supply and transducer cables have to comply with following characteristics

- Suitable for use in Class I Division 1, Gas Groups C
- Armored Marine Shipboard Cable which meets UL 1309
- Tinned Stranded Copper Conductors
- Bronze braided armor
- Overall impervious sheath over the armor

Any Listed (UBVZ/ UBVZ7) Marine Shipboard Cable rated 300 V min, 15A min. 3C 2,5 mm² (14 AWG) having a suitable service temperature range of at least -25°C to +110°C ("/BT" Models require a temperature range from -40°C to +110°C)

For Class I wiring the 3C 1,5 mm² AWG 16 cable size is admitted only if a fuse lower than 10 A is connected to the load side of the solenoid wiring.

**Note**: a Loctite sealant type 545, should be used on the cable gland entry threads

### 26.1 Cable temperature

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

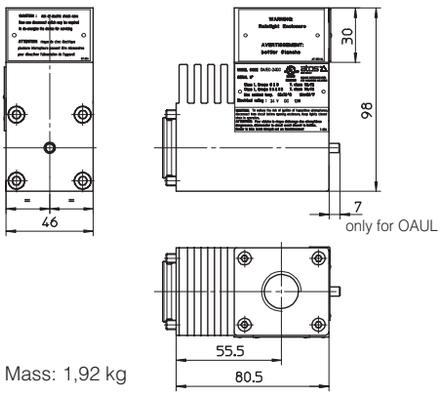
**ON-OFF**

| Max ambient temperature [°C] | Temperature class | Surface temperature [°C] | Cable temperature |
|---|---|---|---|
| 55 °C | T6 | <85 °C | 100 °C |
| 70 °C | T5 | <100 °C | 100 °C |

**PROPORTIONAL**

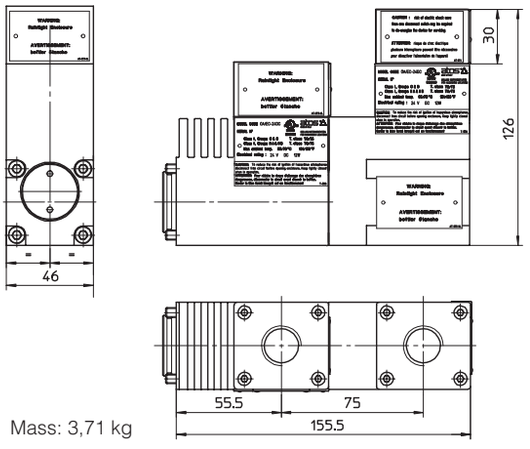
| Max ambient temperature [°C] | Temperature class | Surface temperature [°C] | Cable temperature |
|---|---|---|---|
| 55 °C | T4 | <135 °C | 100 °C |
| 70 °C | T3 | <200 °C | 100 °C |

**OAUL**
**OZAUL-A**



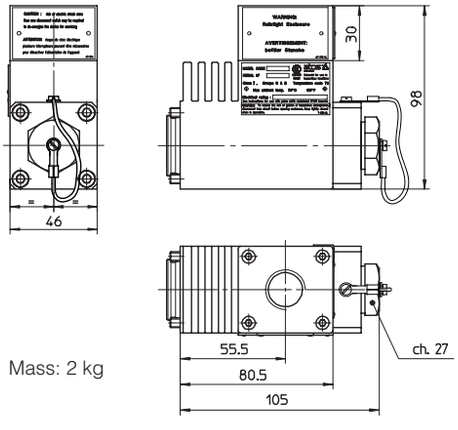

Mass: 1,92 kg

**OZAUL-T**



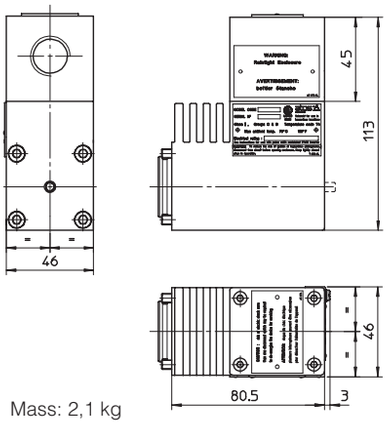

Mass: 3,71 kg

**Option /WP**



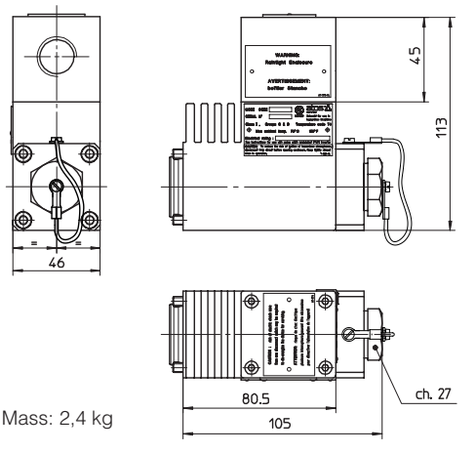

Mass: 2 kg

**Option /O**




Mass: 2,1 kg

**Option /OWP**




Mass: 2,4 kg

**Option /MV**