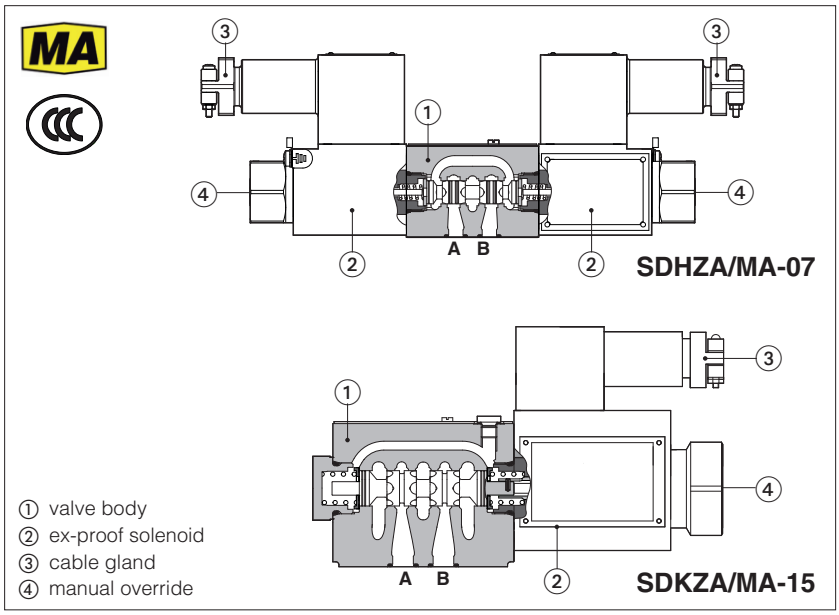
# Ex-proof proportional directional valves

direct, without transducer and with positive spool overlap - **MA** and **CCC certification**




① valve body
② ex-proof solenoid
③ cable gland
④ manual override

**SDHZA/MA-A, SDKZA/MA-A**

Ex-proof proportional directional valves equipped with explosion-proof solenoids certified according to **CCC** and **MA** Chinese mining certification, protection mode:

**Ex db I Mb** for surface, tunnel or mine plants

They operate is association with electronic drivers, see section 2, which supply the proportional solenoids with proper current to align the pressure regulation to the reference signal.

The solenoid case classified **Ex db** 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.

**SDHZA/MA**:
Size: **06** - ISO 4401
Max flow: **45 l/min**
Max pressure: **350 bar**

**SDKZA/MA**:
Size: **10** - ISO 4401
Max flow: **105 l/min**
Max pressure: **315 bar**

## 1 MODEL CODE

| SDHZA | / | MA | - | A | - | 0 | 71 | - | S | 5 | / | * | / | * | ** | / | * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

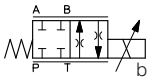
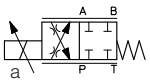
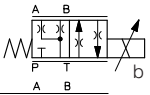
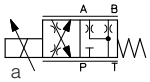
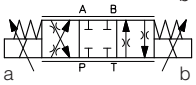
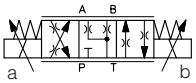
**SDHZA** = size 06
**SDKZA** = size 10

**MA** = Ex-proof Ma chinese certification

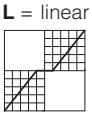
**A** = off-board drivers, see sect. 2

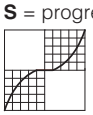
**Valve size** - ISO 4401
**0** = size 06 (SDHZA)
**1** = size 10 (SDKZA)

**Configuration:**

| | Standard | Option **/B** |
|---|---|---|
| **51** = |  |  |
| **53** = |  |  |
| **71** = |  | |
| **73** = |  | |

**Spool type** - regulating characteristics:

**L** = linear 

**S** = progressive 

**D** = differential-progressive 
P-A = Q, B-T = Q/2
P-B = Q/2, A-T = Q

Seals material, see section 5:
**-** = NBR
**PE** = FKM

Series number

**Voltage code (2):**
see section 6:
**-** = standard coil for 24VDC Atos drivers
**24** = optional coil for 24VDC low current drivers **(3)**

**Hydraulic options**
**B** = solenoid side of port A (only for valve configuration 51, 53)

**Hand lever options (1)**
**MV** = vertical hand lever

| **Spool size**: | **14** (L) | **1** (L) | **3** (L,S,D) | **5** (L,S,D) |
|---|---|---|---|---|
| SDHZA = | 1 | 4,5 | 17 | 28 |
| SDKZA = | - | - | 45 | 60 |

Nominal flow (l/min) at Δp 10 bar P-T

**(1)** Only for **SDHZA** with spool type S3, S5, D3, D5, L3, L5
**(2)** Available on request coil voltage **/6** for Atos driver with power supply 12 VDC
**(3)** Select coil voltage **/24** in case of electronic drivers not supplied by Atos, with power supply 24 VDC

## 2 ELECTRONIC DRIVERS

Electronic drivers are factory set with max current limitation for ex-proof valves.
Please include in the driver order also the complete code of the connected ex-proof proportional valve.

| Drivers model | E-BM-AS-* /A | E-BM-AES-* /A |
|---|---|---|
| Type | digital | digital |
| Format | DIN-rail panel | |
| Data sheet | G030 | GS050 |

## 3 GENERAL CHARACTERISTICS

| | |
|---|---|
| Assembly position / location | Any position |
| Subplate surface finishing to ISO 4401 | Acceptable roughness index, Ra ≤0,8 recommended Ra 0,4 - flatness ratio 0,01/100 |
| MTTFd values according to EN ISO 13849 | 150 years, for further details see technical table P007 |
| Ambient temperature | **Standard** = -20°C ÷ +40°C **/PE** option = -20°C ÷ +40°C |
| Storage temperature range | **Standard** = -20°C ÷ +80°C **/PE** option = -20°C ÷ +80° |
| Compliance | Explosion proof protection, see section 6<br>-Flame proof enclosure Ex-db |

## 4 HYDRAULIC CHARACTERISTICS

| Valve model | **SDHZA** | | | | **SDKZA** | |
|---|---|---|---|---|---|---|
| Pressure limits [bar] | ports **P, A, B** = 350; **T** = 210 | | | | ports **P, A, B** = 315; **T** = 210 | |
| Spool type and size | **L14** | **L1** | **S3, L3, D3** | **S5, L5, D5** | **S3, L3, D3** | **S5, L5, D5** |
| Nominal flow **(1)** [l/min] at Δp = 10 bar (P-T) | 1 | 4,5 | 18 | 28 | 45 | 60 |
| at Δp = 30 bar (P-T) | 1,5 | 7,5 | 27 | 45 | 80 | 105 |
| Max permessible flow | see operating limits, section 8.2 and 9.2 | | | | | |
| Response time **(2)** [ms] | < 65 | | | | < 80 | |
| Hysteresis [%] | ≤ 5 [% of max regulation] | | | | | |
| Repeatability [%] | ± 1 [% of max regulation] | | | | | |

**Notes:** above performance data refer to valves coupled with Atos electronic drivers, see section 2.
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, Atos modular pressure compensators are available at www.atos.com (see KT table D150).

**(1)** For different Δp, the max flow is in accordance to the diagrams in sections 8.2 and 9.2

**(2)** 0-100% step signal

## 5 SEALS AND HYDRAULIC FLUID

| | | | | |
|---|---|---|---|---|
| Seals, recommended fluid temperature | | NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C<br>FKM seals (/PE option) = -20°C ÷ +80°C | | |
| Recommended viscosity | | 20 ÷ 100 mm²/s - max allowed range 15 ÷ 300 mm²/s | | |
| Max fluid contamination level | normal operation | ISO4406 class 18/16/13 NAS1638 class 7 | see also filter section at www.atos.com or KTF catalog | |
| | longer life | ISO4406 class 16/14/11 NAS1638 class 5 | | |
| **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 **(1)** | | NBR, HNBR | HFC | |

⚠ The ignition temperature of the hydraulic fluid must be 50°C higher than the max solenoid surface temperature

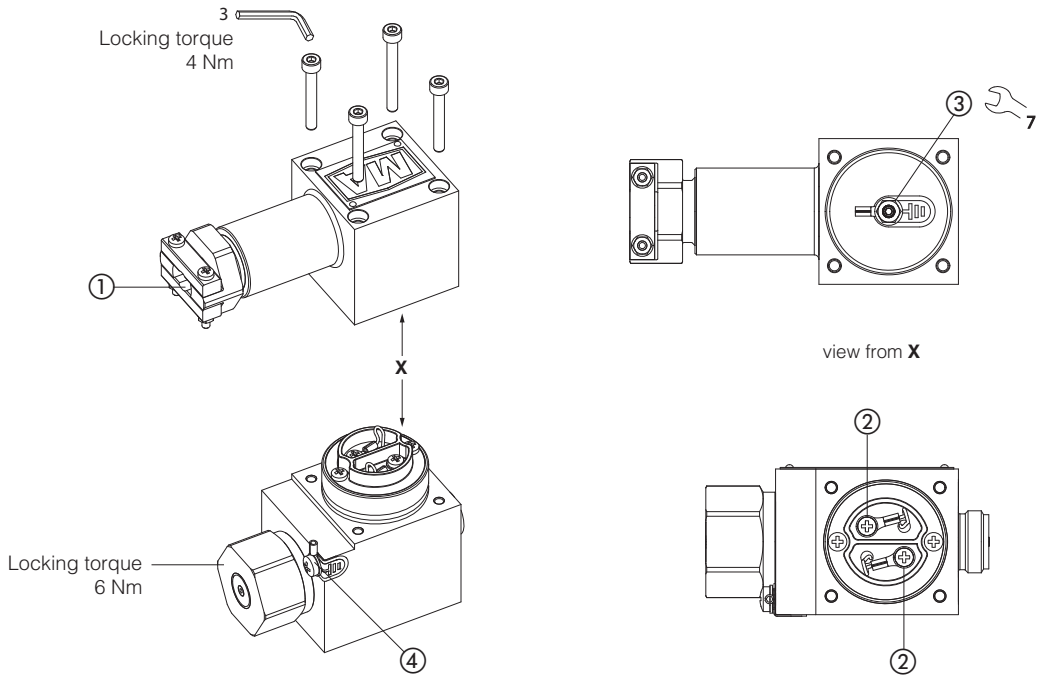
**(1) Performance limitations in case of flame resistant fluids with water:**
-max operating pressure = 210 bar
-max fluid temperature = 50°C

## 6 CERTIFICATION DATA

| Valve type | SDHZA/**MA** | | SDKZA/**MA** | |
|---|---|---|---|---|
| Voltage code | **-** (standard) | **24** | **-** (standard) | **24** |
| Max solenoid current | 2,5 A | 1,2 A | 2,5 A | 1,5 A |
| Certification | **MA** mining, **CCC** | | | |
| Solenoid certified code | **DTBBL10-37/12FYC** | **DTBBL10-37/24FYC** | **DTBBL10-90/12FYC** | **DTBBL10-90/24FYC** |
| Type examination certificate | MA: MEE231120 | MA: MEE231118 | MA: MEE231117 | MA: MEE231119 |
| | CNEx 22.5286X<br>CCC: 2024312307000486 | | CNEx 22.5287X<br>CCC: 2024312307000487 | |
| Method of protection | Ex db I Mb | | | |
| Surface temperature | ≤150 °C | | | |
| Ambient temperature | -20 ÷ +40 °C | | | |
| Cable entrance | cable entrance Ø =10.5mm | | | |
| Protection degree to DIN EN60529 | IP 65 | | | |

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

## 7 EX-PROOF SOLENOID WIRING

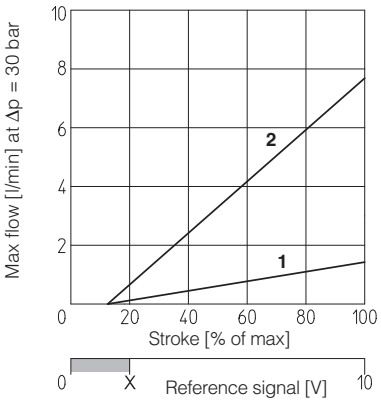


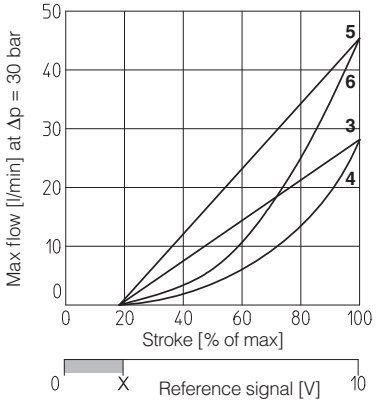

① cable entrance = ø 10,5 mm
② screw termianl for power supply coil connection
③ screw terminal for ground connection
④ screw terminal for additional equipotential grounding

## 8 DIAGRAMS FOR SDHZA (based on mineral oil ISO VG 46 at 50 °C)

### 8.1 Regulation diagrams

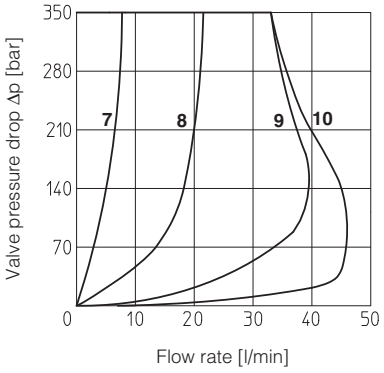
**1** = linear spool L14
**2** = linear spool L1
**3** = linear spool L3
**4** = progressive spool S3, D3
**5** = linear spool L5
**6** = progressive spool S5, D5




### 8.2 Operating limits

**7** = spool L14
**8** = spool L1
**9** = spool L3, S3, D3
**10** = spool L5, S5, D5




**X** = Threshold for bias activation depending to the valve type and amplifier type

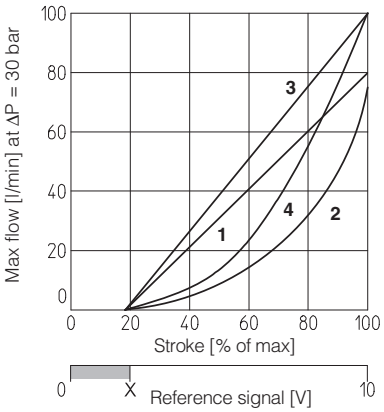
## 9 DIAGRAMS FOR SDKZA (based on mineral oil ISO VG 46 at 50 °C)

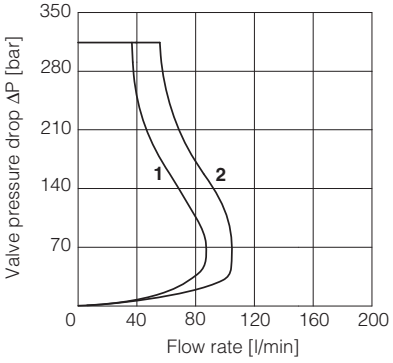
### 9.1 Regulation diagrams

**1** = linear spool L3
**2** = progressive spool S3, D3
**3** = linear spool L5
**4** = progressive spool S5, D5

### 9.2 Operating limits

**1** = spool L3, S3, D3
**2** = spool L5, S5, D5




**X** = Threshold for bias activation depending to the valve type and amplifier type

## 10 OPTIONS

**B** = Solenoid at side of port A of the main stage

**MV** = Auxiliary vertical hand levers (only for SDHZA)

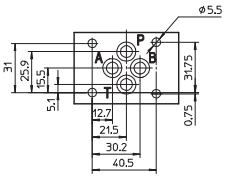
This option allows to operate the valves in absence of electrical power supply, i.e. during commissioning, maintenance or in case of emergency.
When the valve is electrically operated the hand lever remains stopped in its rest position
The hand lever execution does not affect the performances of the original valves

| | | | | | |
|---|---|---|---|---|---|
| Total angle stroke | [°deg] | ± 28° | Lever actuating force | [N] | 1 ÷ 8 |
| Working angle stroke | [°deg] | ± 15° | Lever device weight | [g] | 880 |

**10.1 Possible combined options:** all combination are available

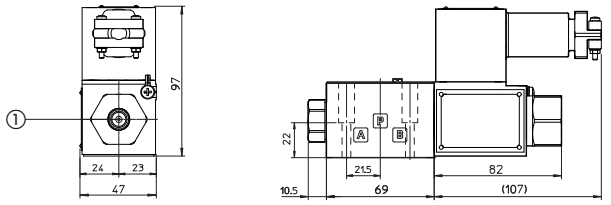
## SDHZA/MA

**ISO 4401: 2005**
**Mounting surface: 4401-03-02-0-05**
Fastening bolts: 4 socket head screws:
M5x30 class 12.9
Tightening torque = 8 Nm
Seals: 4 OR 108
Ports P,A,B,T: Ø = 7.5 mm (max)

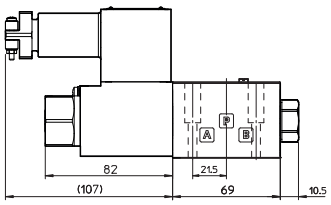



**P** = PRESSURE PORT
**A, B** = USE PORT
**T** = TANK PORT

**SDHZA/MA-05**

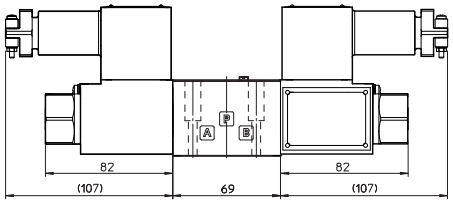



**SDHZA/MA-05*/B**




① manual override

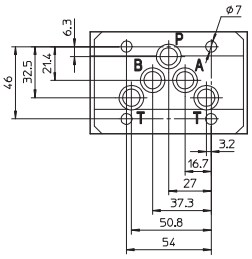
**SDHZA/MA-07**




| **Mass** (Kg) | |
|---|---|
| SDHZA/MA-05 | 4.6 |
| SDHZA/MA-07 | 7.7 |

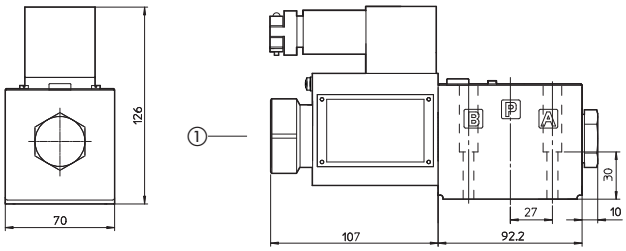
## SDKZA/MA

**ISO 4401: 2005**
**Mounting surface according to 4401-05-04-0-05**
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Seals: 5 OR 2050 and 1 OR 108
Ports P,A,B,T: Ø = 11.5 mm (max)

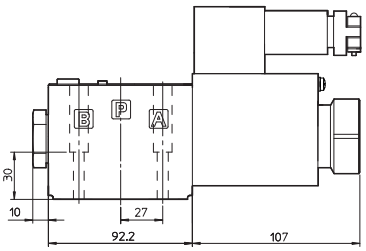



**P** = PRESSURE PORT
**A, B** = USE PORT
**T** = TANK PORT

**SDKZA/MA-15**

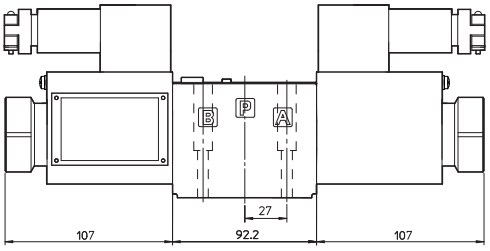



**SDKZA/MA-15*/B**




① manual override

**SDKZA/MA-17**




| **Mass** (Kg) | |
|---|---|
| SDKZA/MA-15 | 7.1 |
| SDKZA/MA-17 | 11.5 |