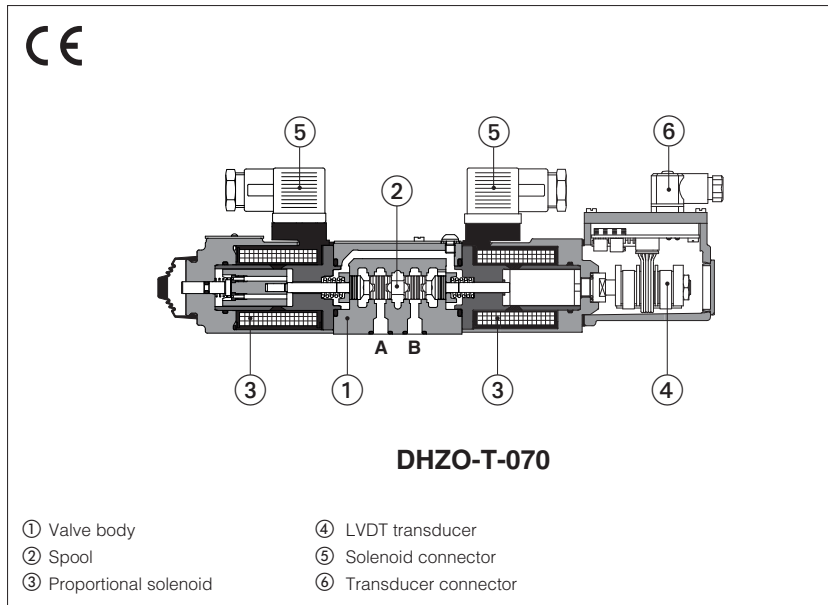


Servoproportional directional valves

direct, with LVDT transducer and zero spool overlap



DHZO-T, DKZOR-T

Servoproportional directional valves, direct, with LVDT position transducer and zero spool overlap for best performances in any position closed loop.

The valves operate in association with digital off-board divers or axis card, see section [2]. The LVDT transducer grants very high regulation accuracy and response sensitivity. With de-energized proportional solenoids, mechanical central position of the spool is performed by centering springs.

Spools regulation characteristics:

L = linear

D = differential-progressive, for control of actuators with area ratio 1:2

DHZO:

Size: **06** - ISO 4401

Max flow: **80 l/min**

Max pressure: **350 bar**

DKZOR:

Size: **10** - ISO 4401

Max flow: **180 l/min**

Max pressure: **315 bar**

1 MODEL CODE

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-----------|---|-----------|---|-----------|---|----------|---|----------|---|----------|---|---|---|--|--|--|--|-------------|---|-----------|--|-----------|--------------|---|-----------|--|-----------|
| DHZO | - | T | - | 0 | - | 70 | - | L | / | 5 | / | * | / | * | / | * | | | | | | | | | | | | | |
| <p>DHZO = size 06 DKZOR = size 10</p> <p>T = with LVDT transducer</p> <p>Valve size ISO 4401: 0 = 06 1 = 10</p> <p>Configuration:</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Standard</p> </div> <div style="text-align: center;"> <p>Option /B</p> </div> </div> <p>Spool type, regulating characteristics:</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>L = linear</p> </div> <div style="text-align: center;"> <p>D = differential-progressive</p> </div> </div> <p style="font-size: small;">P-A = Q, B-T = Q/2 P-B = Q/2, A-T = Q</p> | | | | | | | | | | | | | | <p>Seals material, see section [6]:</p> <ul style="list-style-type: none"> - = NBR PE = FKM BT = HNBR <p>Series number</p> | | <p>Hydraulic options (1):</p> <p>B = solenoid and LVDT transducer at side of port A Y = external drain</p> | | <p>Spool size:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">DHZO</td> <td style="width: 25%; text-align: center;">=</td> <td style="width: 10%; text-align: center;">17</td> <td style="width: 10%;"></td> <td style="width: 10%; text-align: center;">28</td> </tr> <tr> <td>DKZOR</td> <td style="text-align: center;">=</td> <td style="text-align: center;">45</td> <td></td> <td style="text-align: center;">75</td> </tr> </table> <p>Nominal flow (l/min) at Δp 10bar P-T</p> | | DHZO | = | 17 | | 28 | DKZOR | = | 45 | | 75 |
| DHZO | = | 17 | | 28 | | | | | | | | | | | | | | | | | | | | | | | | | |
| DKZOR | = | 45 | | 75 | | | | | | | | | | | | | | | | | | | | | | | | | |

(1) Possible combined options: /BY

2 OFF-BOARD ELECTRONIC DRIVERS

Please include in the driver order also the complete code of the connected proportional valve.

| | | | |
|---------------|----------------|----------------|----------------|
| Drivers model | E-BM-TEB | E-BM-TES | Z-BM-TEZ |
| Type | Digital | Digital | Digital |
| Format | DIN-rail panel | DIN-rail panel | DIN-rail panel |
| Tech table | GS230 | GS240 | GS330 |

3 GENERAL CHARACTERISTICS

| | |
|--|---|
| Assembly position | Any position |
| Subplate surface finishing to ISO 4401 | Acceptable roughness index: Ra ≤ 0,8, recommended Ra 0,4 – Flatness ratio 0,01/100 |
| MTTFd valves according to EN ISO 13849 | 150 years, see technical table P007 |
| Ambient temperature range | Standard = -20°C ÷ +60°C /PE option = -20°C ÷ +60°C /BT option = -40°C ÷ +60°C |
| Storage temperature range | Standard = -20°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C |
| Surface protection | Zinc coating with black passivation |
| Corrosion resistance | Salt spray test (EN ISO 9227) > 200 h |
| Compliance | CE according to EMC directive 2014/30/EU (Immunity: EN 61000-6-2; Emission: EN 61000-6-3) RoHS Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006 |

4 HYDRAULIC CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C

| Valve model | DHZO | | | DKZOR | | |
|---|--|-----------|-----------|--|-----------|-----------|
| Pressure limits [bar] | ports P, A, B = 350; T = 210 (250 with external drain /Y) Y = 10 | | | ports P, A, B = 315; T = 210 (250 with external drain /Y) Y = 10 | | |
| Spool type | L3 | L5 | D5 | L3 | L5 | D5 |
| Nominal flow Δp P-T [l/min] (1) | | | | | | |
| Δp= 10 bar | 18 | 28 | 28 | 45 | 75 | 75 |
| Δp= 30 bar | 30 | 50 | 50 | 80 | 130 | 130 |
| Δp= 70 bar | 45 | 75 | 75 | 120 | 170 | 170 |
| Max permissible flow (2) | 50 | 80 | 80 | 130 | 180 | 180 |
| Leakage [cm³/min] | <500 (at p = 100 bar); <1500 (at p = 350 bar) | | | <800 (at p = 100 bar); <2500 (at p = 315 bar) | | |
| Response time (3) [ms] | ≤ 15 | | | ≤ 20 | | |
| Hysteresis | ≤ 0,2 [% of max regulation] | | | | | |
| Repeatability | ± 0,1 [% of max regulation] | | | | | |
| Thermal drift | zero point displacement < 1% at ΔT = 40°C | | | | | |

(1) For different Δp, the max flow is in accordance to the diagrams in section 7.2

(2) See detailed diagrams in section 7.3

(3) 0-100% step signal

5 ELECTRICAL CHARACTERISTICS

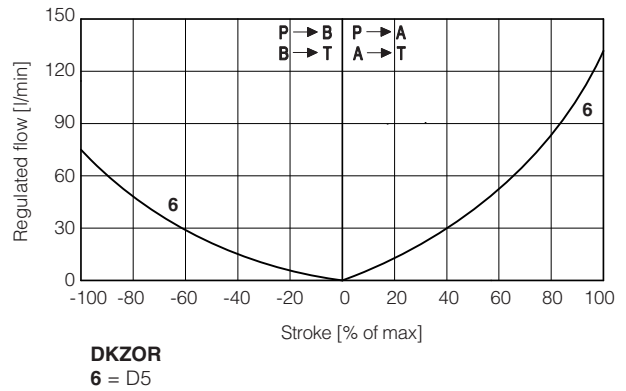
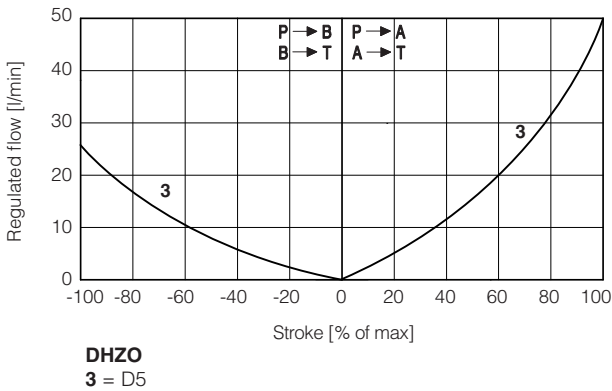
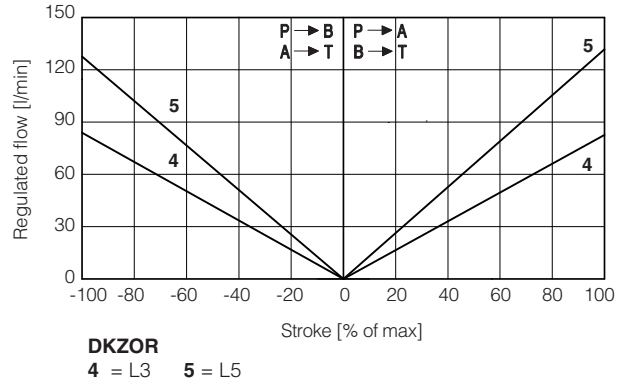
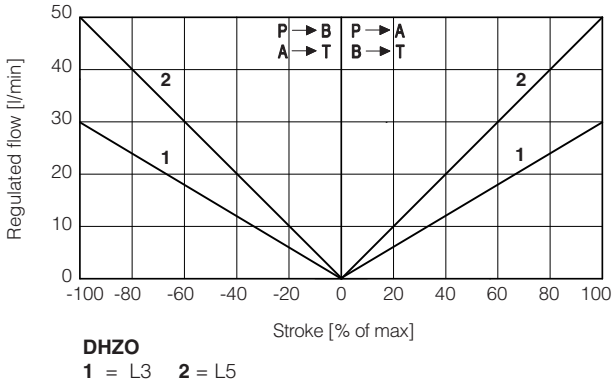
| | |
|----------------------------------|---|
| Max power consumption | 30 W |
| Max. solenoid current | DLHZO = 2,6 A DLKZOR = 3 A |
| Coil resistance R at 20°C | DLHZO = 3 ÷ 3,3 Ω DLKZOR = 3,8 ÷ 4,1 Ω |
| Insulation class | H (180°) Due to the occurring surface temperatures of the solenoid coils, the European standards ISO 13732-1 and EN982 must be taken into account |
| Protection degree to DIN EN60529 | IP65 with mating connectors |
| Duty factor | Continuous rating (ED=100%) |

6 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

| | | | |
|--------------------------------------|---|---|---|
| Seals, recommended fluid temperature | NBR seals (standard) = -20°C ÷ +80°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 | 20÷100 mm²/s - max allowed range 15 ÷ 380 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 | NBR, HNBR | HFC | |

7 DIAGRAMS - based on mineral oil ISO VG 46 at 50 °C

7.1 Regulation diagrams (values measure at Δp 30 bar P-T)



Note:

Hydraulic configuration vs. reference signal for configurations 70 (standard and option /B)

Reference signal $\left. \begin{matrix} 0 \div +10 \text{ V} \\ 12 \div 20 \text{ mA} \end{matrix} \right\} P \rightarrow A / B \rightarrow T$ Reference signal $\left. \begin{matrix} 0 \div -10 \text{ V} \\ 12 \div 4 \text{ mA} \end{matrix} \right\} P \rightarrow B / A \rightarrow T$

7.2 Flow / Δp diagrams

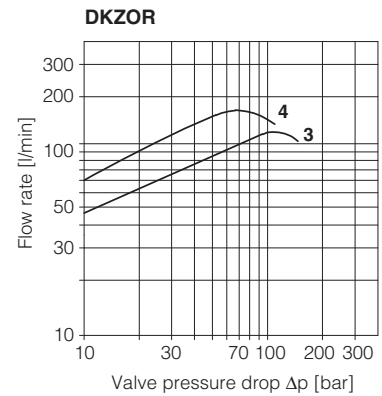
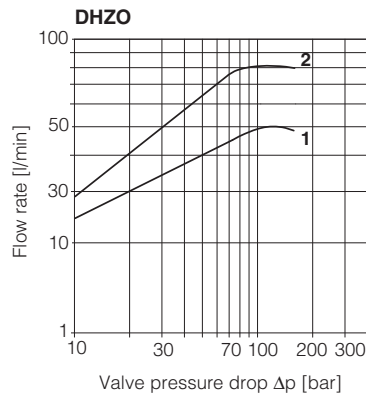
stated at 100% of valve stroke

DHZO

1 = spool L3,
2 = spool L5, D5

DKZOR

3 = spool L3
4 = spool L5, D5



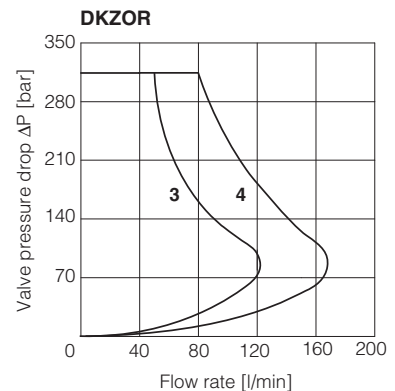
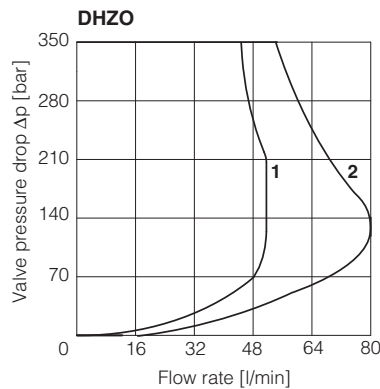
7.3 Operating limits

DHZO

1 = spool L3
2 = spool L5, D5

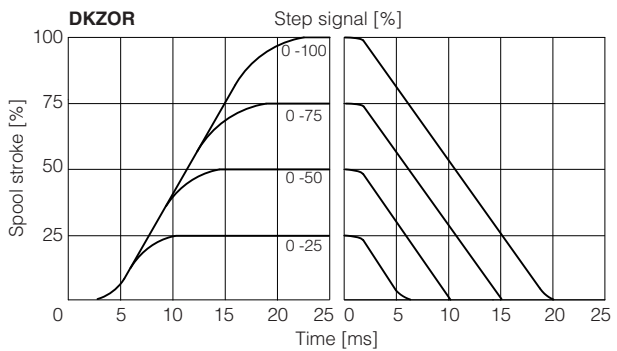
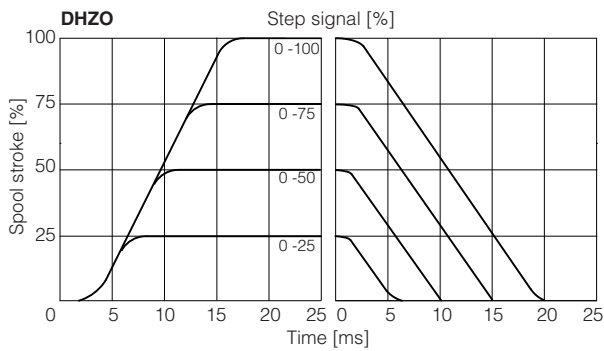
DKZOR

3 = spool L3
4 = spool L5, D5



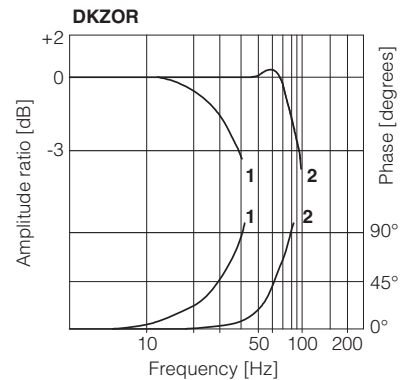
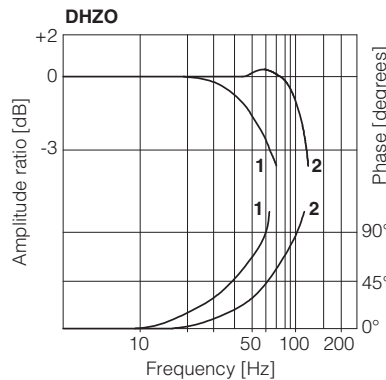
7.4 Response time

The response times in below diagrams are measured at different steps of the reference input signal. They have to be considered as average values. For the valves with digital electronics the dynamics performances can be optimized by setting the internal software parameters.



7.5 Bode diagrams

- 1 = 10% ↔ 90% nominal stroke
- 2 = 50% ± 5% nominal stroke



8 HYDRAULIC OPTIONS

B = Solenoid and position transducer at side of port A of the main stage. For hydraulic configuration vs reference signal, see 7.1

Y = This option is mandatory if the pressure in port T exceeds 210 bar.

9 ELECTRICAL CONNECTION

9.1 Solenoid connector - supplied with the valve

| PIN | SIGNAL | TECHNICAL SPECIFICATION | Connector code 666 |
|-----|--------|-------------------------|--------------------|
| 1 | COIL | Power supply | |
| 2 | COIL | Power supply | |
| 3 | GND | Ground | |

9.2 LVDT transducer connector - supplied with the valve

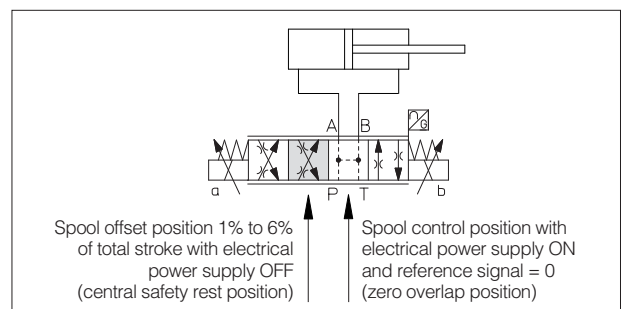
| PIN | SIGNAL | TECHNICAL SPECIFICATION | Connector code 345 |
|-----|--------|-------------------------|--------------------|
| 1 | TR | Output signal | |
| 2 | VT- | Power supply -15Vdc | |
| 3 | VT+ | Power supply +15Vdc | |
| 4 | GND | Ground | |

10 SAFETY REST POSITION - configuration 70

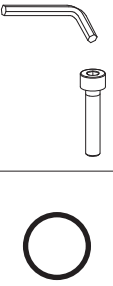
In absence of power supply to the solenoids, the valve spool is moved by the springs force to the **safety rest position** characterized by a small offset of about 1% to 6% of the total stroke in P-B / A-T configuration.

This is specifically designed to avoid that in case of accidental interruption of power supply to the valve solenoids, the actuator moves towards an undefined direction (due to the tolerances of the zero overlap spool), with potential risk of damages or personnel injury.

Thanks to the **safety rest position** the actuator movement is suddenly stopped and it is recovered at very low speed towards the direction corresponding to the P-B/ A-T connection.



11 FASTENING BOLTS AND SEALS

| | | |
|---|--|---|
|  | DHZO Fastening bolts: 4 socket head screws M5x50 class 12.9 Tightening torque = 8 Nm | DKZOR Fastening bolts: 4 socket head screws M6x40 class 12.9 Tightening torque = 15 Nm |
| | Seals: 4 OR 108; Diameter of ports A, B, P, T: \varnothing 7,5 mm (max) 1 OR 2025 Diameter of port Y: \varnothing = 3,2 mm (only for /Y option) | Seals: 5 OR 2050; Diameter of ports A, B, P, T: \varnothing 11,2 mm (max) 1 OR 108 Diameter of port Y: \varnothing = 5 mm (only for /Y option) |

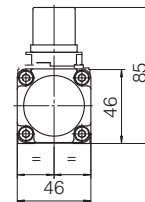
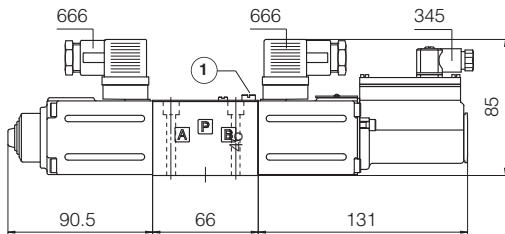
12 INSTALLATION DIMENSIONS [mm]

DHZO-T

ISO 4401: 2005

Mounting surface: 4401-03-02-0-05 (see table P005)
 (for /Y surface 4401-03-03-0-05 without X port)

| Mass [kg] | |
|-----------|-----|
| DHZO-T-07 | 2,6 |



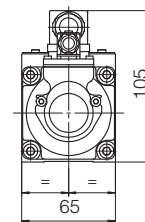
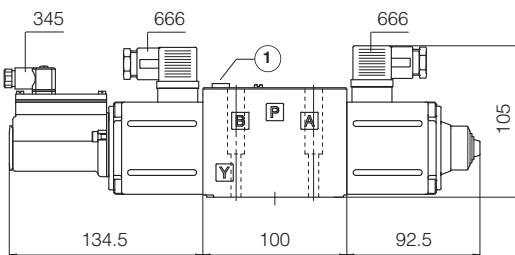
① = Air bleeding 

DKZOR-T

ISO 4401: 2005

Mounting surface: 4401-05-04-0-05 (see table P005)
 (for /Y surface 4401-05-05-0-05 without X port)

| Mass [kg] | |
|------------|-----|
| DKZOR-T-17 | 4,5 |



① = Air bleeding  

Note: for option /B the solenoid and the LVDT transducer are at side of port A

13 RELATED DOCUMENTATION

| | | | |
|--------------|---|--------------|---|
| FS001 | Basics for digital electrohydraulics | GS500 | Programming tools |
| FS900 | Operating and maintenance information for proportional valves | GS510 | Fieldbus |
| GS230 | E-BM-TEB digital driver | K800 | Electric and electronic connectors |
| GS240 | E-BM-TES digital driver | P005 | Mounting surfaces for electrohydraulic valves |
| GS330 | Z-BM-TEZ digital axis card | | |