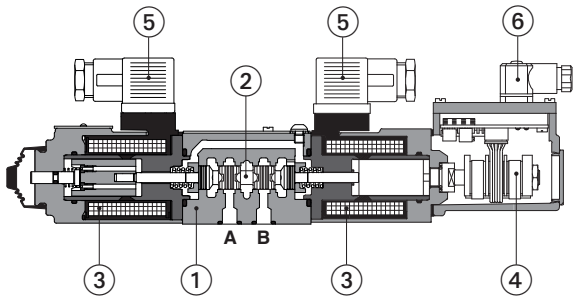
Servoproportional directional valves

direct, with LVDT transducer and zero spool overlap



DHZO-T-070

① Valve body
② Spool
③ Proportional solenoid
④ LVDT transducer
⑤ Solenoid connector
⑥ Transducer connector

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:	**DKZOR**:
Size: **06** - ISO 4401	Size: **10** - ISO 4401
Max flow: **80 l/min**	Max flow: **180 l/min**
Max pressure: **350 bar**	Max pressure: **315 bar**

1 MODEL CODE

DHZO	-	T	-	0	70	-	L	5	/	*	*	/	*

DHZO = size 06
DKZOR = size 10

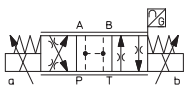
T = with LVDT transducer

Valve size ISO 4401:
0 = 06 **1** = 10

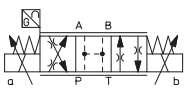
Configuration:

70 =

Standard



Option **/B**



Spool type, regulating characteristics:

L = linear

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

Spool size:

		3 (L)	**5** (L,D)
DHZO	=	17	28
DKZOR	=	45	75

Nominal flow (l/min) at Δp 10bar P-T

Hydraulic options (1):
B = solenoid and LVDT transducer at side of port A
Y = external drain

Series number

Seals material,
see section 6 :
- = NBR
PE = FKM
BT = HNBR

(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]					
Repeatibility		± 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

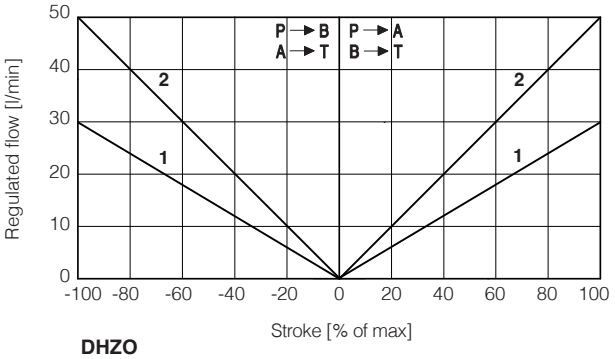
Max power consumption	30 W
Max. solenoid current	**DHZO** = 2,6 A **DKZOR** = 3 A
Coil resistance R at 20°C	**DHZO** = 3 ÷ 3,3 Ω **DKZOR** = 3,8 ÷ 4,1 Ω
Insulation class	H (180°) Due to the occuring surface temperatures of the solenoid coils, the European standards ISO 13732-1 and EN982 must be taken 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

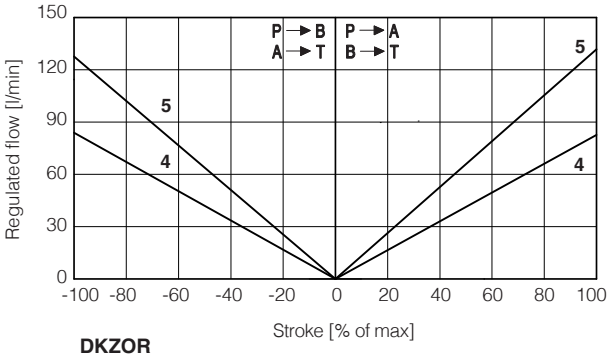
Seals, recommended fluid temperature		NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity		20÷100 mm²/s - max allowed range 15 ÷ 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

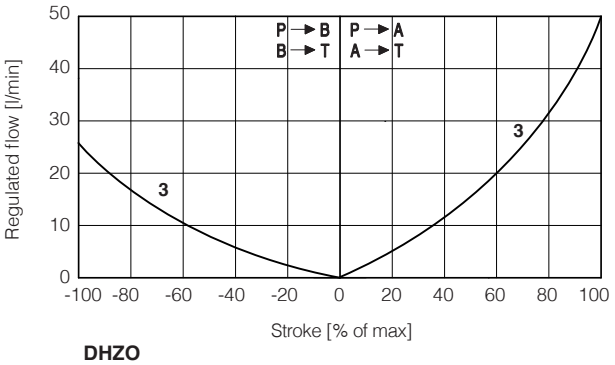
7.1 Regulation diagrams (values measure at Δp 30 bar P-T)



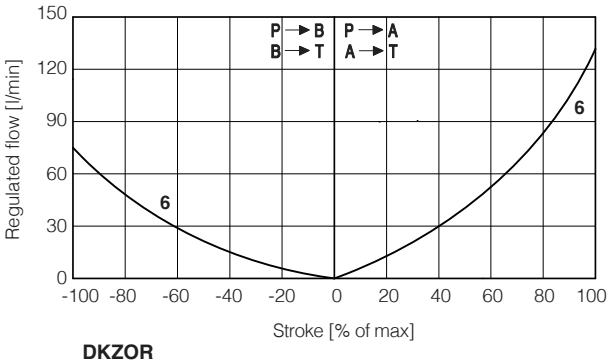
DHZO
1 = L3 **2** = L5



DKZOR
4 = L3 **5** = L5



DHZO
3 = D5



DKZOR
6 = D5

Note:

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

Reference signal { 0 ÷ +10 V / 12 ÷ 20 mA } P → A / B → T Reference signal { 0 ÷ -10 V / 12 ÷ 4 mA } P → B / A → T

7.2 Flow /Δp diagrams

stated at 100% of valve stroke

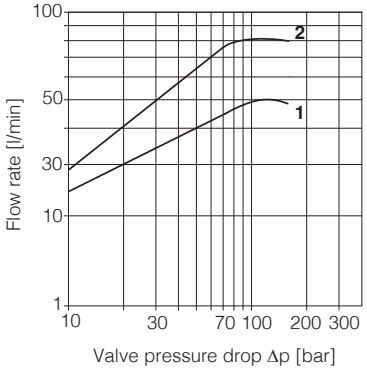
DHZO

1 = spool L3,
2 = spool L5, D5

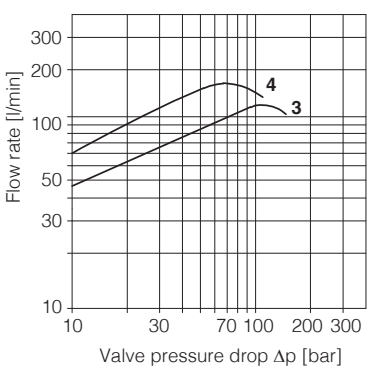
DKZOR

3 = spool L3
4 = spool L5, D5

DHZO



DKZOR



7.3 Operating limits

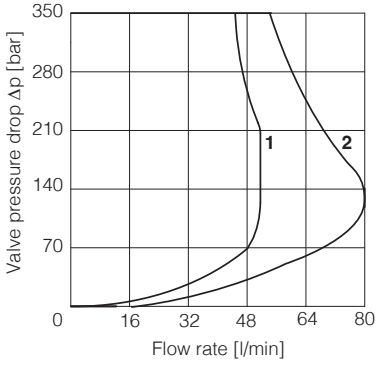
DHZO

1 = spool L3
2 = spool L5, D5

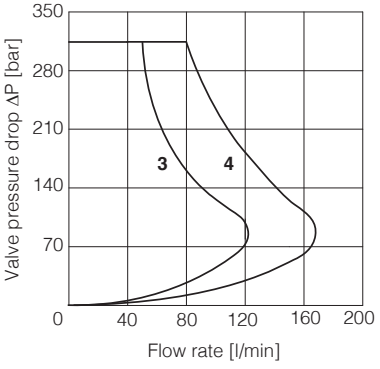
DKZOR

3 = spool L3
4 = spool L5, D5

DHZO

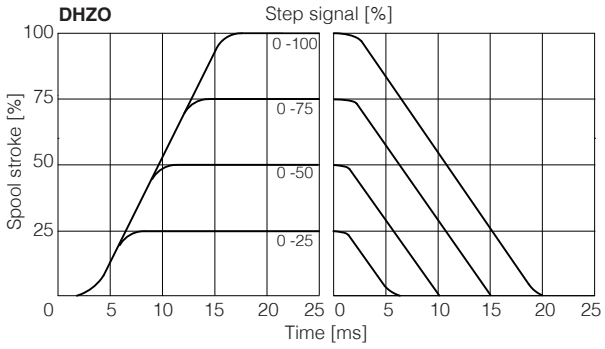


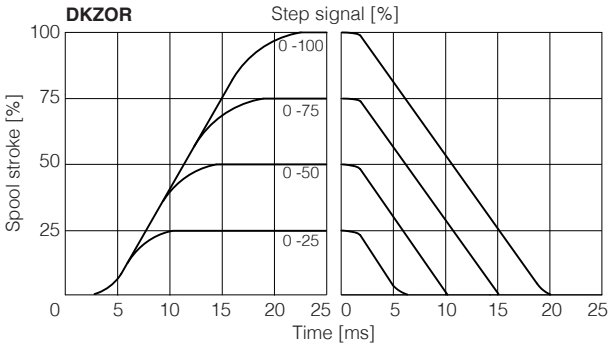
DKZOR



7.4 Response time

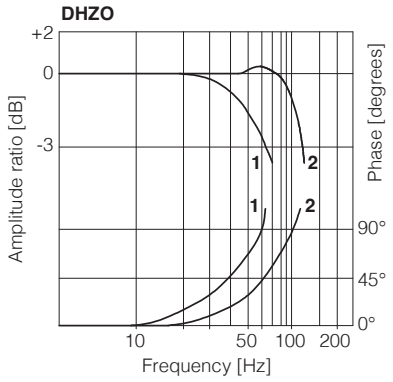
The response times in below diagrams are measured at different steps of the reference input signal. They have to be considered as average values. For the valves with digital electronics the dynamics performances can be optimized by setting the internal software parameters.

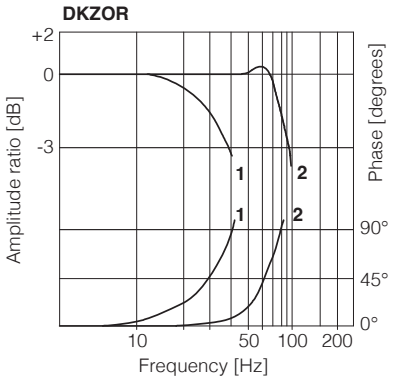




7.5 Bode diagrams

1 = 10% ⟷ 90% nominal stroke
2 = 50% ± 5% nominal stroke





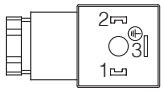
8 HYDRAULIC OPTIONS

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

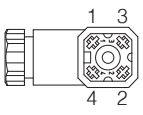
Y = This option is mandatory if the pressure in port T exceeds 210 bar.

9 ELECTRICAL CONNECTION

9.1 Solenoid connector - supplied with the valve

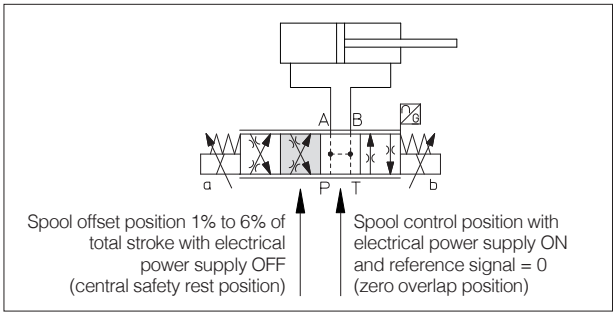
PIN	SIGNAL	TECHNICAL SPECIFICATION	Connector code 666
1	**COIL**	Power supply	
2	**COIL**	Power supply	
3	**GND**	Ground	

9.2 LVDT transducer connector - supplied with the valve

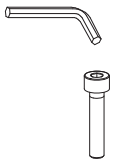
PIN	SIGNAL	TECHNICAL SPECIFICATION	Connector code 345
1	**TR**	Output signal	
2	**VT-**	Power supply -15VDC	
3	**VT+**	Power supply +15VDC	
4	**GND**	Ground	

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

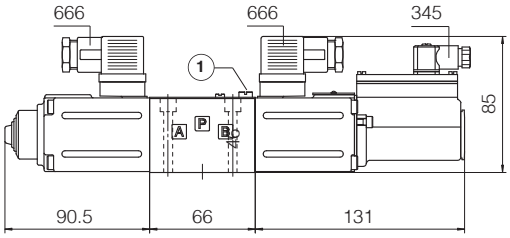
	DHZO	DKZOR
	**Fastening bolts:** 4 socket head screws M5x50 class 12.9 Tightening torque = 8 Nm	**Fastening bolts:** 4 socket head screws M6x40 class 12.9 Tightening torque = 15 Nm
	**Seals:** 4 OR 108; Diameter of ports A, B, P, T: Ø 7,5 mm (max) 1 OR 2025 Diameter of port Y: Ø = 3,2 mm (only for /Y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

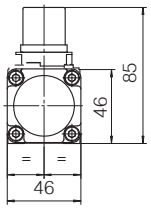
12 INSTALLATION DIMENSIONS [mm]

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



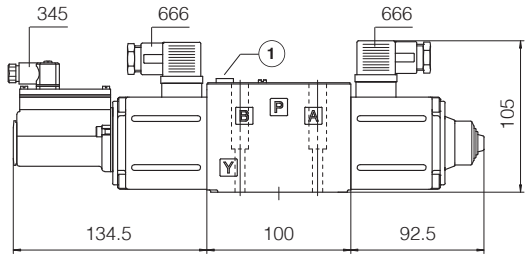


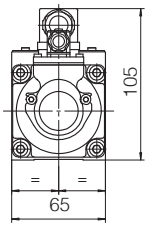
1 = Air bleeding 

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		