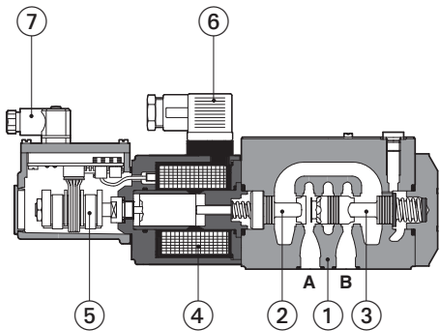
Proportional flow valves

direct, pressure compensated, with LVDT transducer



① Valve body
② Throttle
③ Compensator
④ Proportional solenoid
⑤ LVDT transducer
⑥ Solenoid connector
⑦ Transducer connector

QVKZOR-T-10/*

QVHZO-T, QVKZOR-T

Proportional flow control valves, direct, pressure compensated, equipped with LVDT position transducer for best accuracy in flow regulations.

The valves operate in association with digital off-board divers, see section 2.

The mechanical pressure compensator keeps a constant Δp across the proportional throttle, thus the regulated flow is independent to the load conditions.

The valves can be connected in 2-way or in 3-way, in this last the exceeding flow, not regulated from A to B ports, returns to tank trough the P port (3rd way).

QVHZO:	**QVKZOR**:
Size: **06** - ISO 4401	Size: **10** - ISO 4401
Max flow: **45 l/min**	Max flow: **90 l/min**
Max pressure: **210 bar**	Max pressure: **210 bar**

1 MODEL CODE

QVKZOR	-	T	-	10	/	65	/	*	/	*

Proportional flow control valves, direct, pressure compensated
QVHZO = size 06
QVKZOR = size 10

T = with LVDT transducer

Valve size ISO 4401:
06 = size 06
10 = size 10

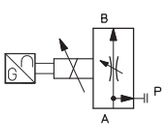
Max regulated flow:

QVHZO:		**QVKZOR**:
3 = 3,5 l/min	**36** = 35 l/min	**65** = 65 l/min
12 = 12 l/min	**45** = 45 l/min	**90** = 90 l/min
18 = 18 l/min		

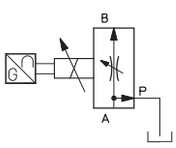
Series number

Seals material,
see section 7 :
- = NBR
PE = FKM
BT = HNBR

2 HYDRAULIC SYMBOLS



2 way connection



3 way connection

The valves can be used in 2 or 3 way connection, depending to the application requirements.

In **2 way** the P port must not be connected (blocked)
In **3 way** the P port has to be connected to tank or to other user lines
The port T must be always not connected (blocked)

For application examples of 2 and 3 way connections, see section 9

3 OFF-BOARD ELECTRONIC DRIVERS

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

Drivers model	E-BM-TID	E-BM-TEB	E-BM-TES
Type	digital	digital	digital
Format	DIN-rail panel	DIN-rail panel	DIN-rail panel
Tech table	GS235	GS230	GS240

4 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 2015/65/EU REACH Regulation (EC) n°1907/2006

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

Valve model		**QVHZO**					**QVKZOR**	
Max regulated flow	[l/min]	3,5	12	18	35	45	65	90
Min regulated flow	[cm³/min]	15	20	30	50	60	85	100
Regulating Δp	[bar]	4 - 6		10 - 12		15	6 - 8	10 - 12
Max flow on port A	[l/min]	50				60	70	100
Max pressure	[bar]	210					210	
Response time 0÷100% step signal	[ms]	25					35	
Hysteresis	[% of the regulated max flow]	0,5					0,5	
Linearity	[% of the regulated max flow]	0,5					0,5	
Repeatability	[% of the regulated max flow]	0,1					0,1	
Thermal drift		zero point displacement < 1% at ΔT = 40°C						

6 ELECTRICAL CHARACTERISTICS

Max power consumption	30 W
Max. solenoid current	**QVHZO** = 2,6 A **QVKZOR** = 3 A
Coil resistance R at 20°C	**QVHZO** = 3 ÷ 3,3 Ω **QVKZOR** = 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%)

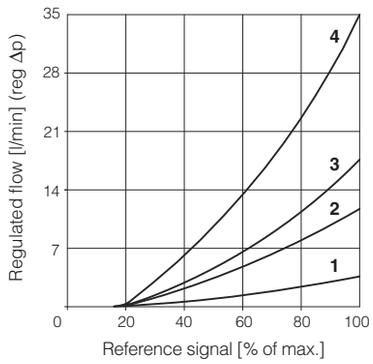
7 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

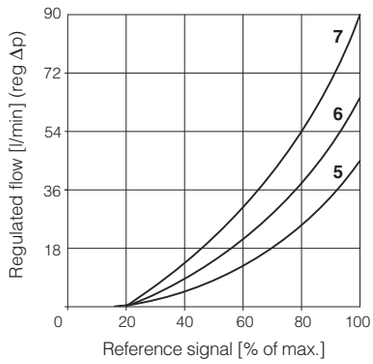
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	20÷100 mm²/s - max allowed range 15 ÷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

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

8.1 Regulation diagrams

1 = QVHZO-T-06**/3**
2 = QVHZO-T-06**/12**
3 = QVHZO-T-06**/18**
4 = QVHZO-T-06**/36**
5 = QVHZO-T-06**/45**
6 = QVKZOR-T-10**/65**
7 = QVKZOR-T-10**/90**



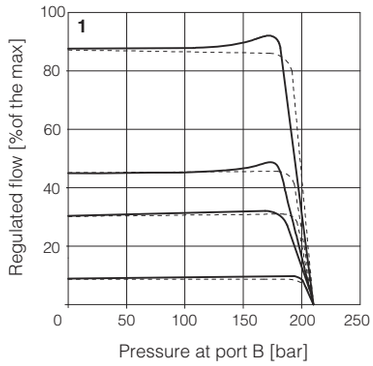


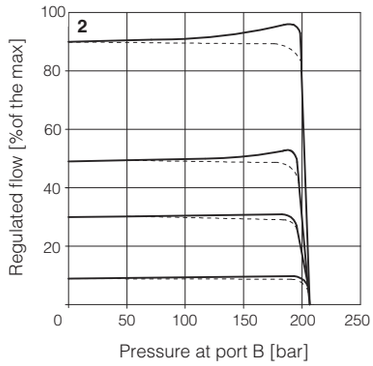
8.2 Regulated flow/outlet pressure diagrams

with inlet pressure = 210 bar

1 = QVHZO
2 = QVKZOR

Dotted line for 3-way versions

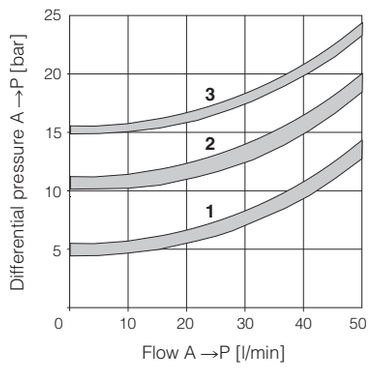


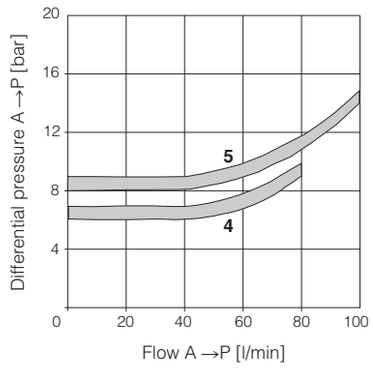


8.3 Flow A →P/Δp diagrams

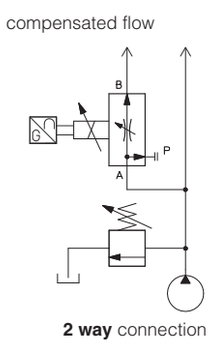
3-way configuration

1 = QVHZO-T-06**/3**
QVHZO-T-06**/12**
2 = QVHZO-T-06**/18**
QVHZO-T-06**/36**
3 = QVHZO-T-06**/45**
4 = QVKZOR-T-10**/65**
5 = QVKZOR-T-10**/90**

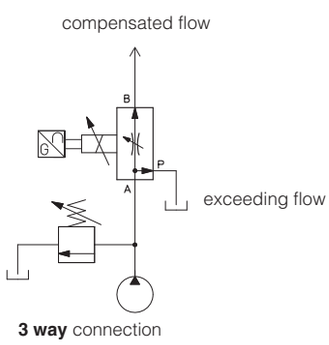




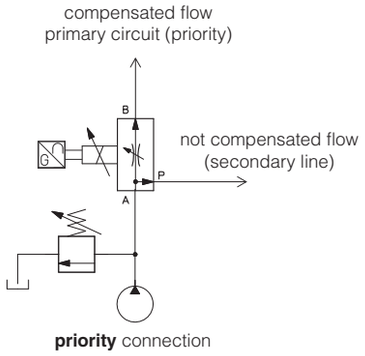
9 APPLICATIONS AND CONNECTIONS



2 way connection



3 way connection



priority connection

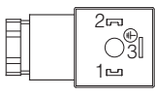
2 way connection
The 2 way connection is normally used to control the flow in one part of the hydraulic circuit or to regulate the speed of a specific actuator.
The metered flow in the controlled line is kept constant, independently to the load variations
If the valve is directly installed on the pump main line, the exceeding flow is returned to tank though the pressure relief valve.

3 way connection
The 3 way connection is normally used when the valve directly controls the pump flow (main line)
The metered flow in the controlled line is kept constant, independently to the load variations
The exceeding flow (not metered by the valve) it is returned to tank trough the valve P port = T line (3rd way)

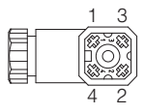
Priority connection
The priority connection guarantees the pressure compensated flow supply to the primary circuit.
The exceeding flow (not required by the primary circuit) is bypassed through the valve P port, to secondary circuit operating at lower pressure and not requiring compensated flow regulations.

10 ELECTRICAL CONNECTION

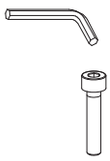
10.1 Solenoid connector - supplied with the valve

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

10.2 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	

11 FASTENING BOLTS AND SEALS

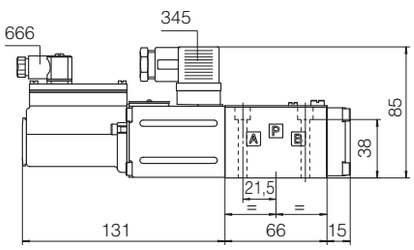
	QVHZO	QVKZOR
	**Fastening bolts:** 4 socket head screws M5x50 class 12.9 Tightening torque = 8 Nm	**Fastening bolts:** 4 socket head screws M6x40 class 12.9 Tightening torque = 15 Nm
	**Seals:** 4 OR 108; Diameter of ports A, B, P, T: Ø 7,5 mm (max)	**Seals:** 5 OR 2050; Diameter of ports A, B, P, T: Ø 11,2 mm (max)

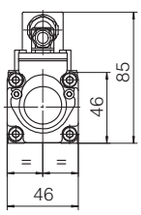
12 INSTALLATION DIMENSIONS [mm]

QVHZO-T

ISO 4401: 2005
Mounting surface: 4401-03-02-0-05 (see tab. P005)

Mass [kg]	
QVHZO-T	2,3

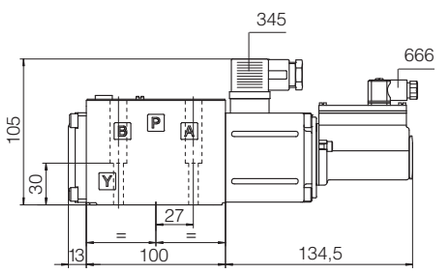


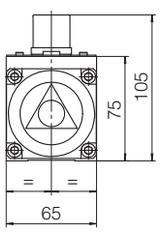


QVKZOR-T

ISO 4401: 2005
Mounting surface: 4401-05-04-0-05 (see tab. P005)

Mass [kg]	
QVKZOR-T	3,9





13 RELATED DOCUMENTATION

FS900	Operating and maintenance information for proportional valves	**GS500**	Programming tools
GS230	E-BM-TEB digital driver	**GS510**	Fieldbus
GS235	E-BM-TID digital driver	**K800**	Electric and electronic connectors
GS240	E-BM-TES digital driver	**P005**	Mounting surfaces for electrohydraulic valves

01/20