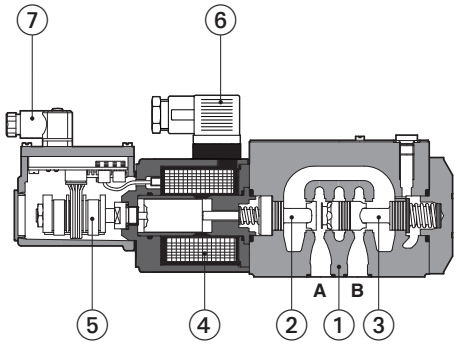
# Proportional flow valves

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 | / | * | / | * |
|---|---|---|---|---|---|---|---|---|---|---|

**QVKZOR**

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**:

**3** = 3,5 l/min
**12** = 12 l/min
**18** = 18 l/min
**36** = 35 l/min
**45** = 45 l/min

**QVKZOR**:

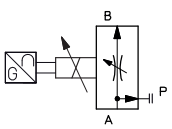
**65** = 65 l/min
**90** = 90 l/min

Series number

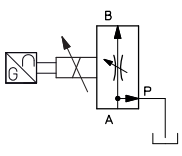
**Seals material,** see section [7]:

**-** = 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-TEB | E-BM-TES |
|---|---|---|
| Type | digital | digital |
| Format | DIN-rail panel | DIN-rail panel |
| Tech table | 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)<br>RoHS Directive 2011/65/EU as last update by 2015/863/EU<br>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,<br>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%) |

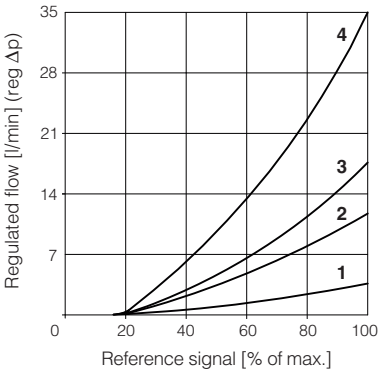
## 7 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

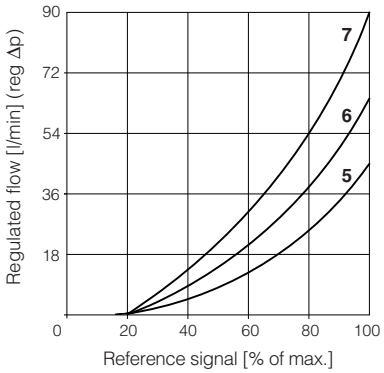
| | | | | |
|---|---|---|---|---|
| Seals, recommended fluid temperature | | NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C<br>FKM seals (/PE option) = -20°C ÷ +80°C<br>HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C | | |
| Recommended 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 | |

## 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**



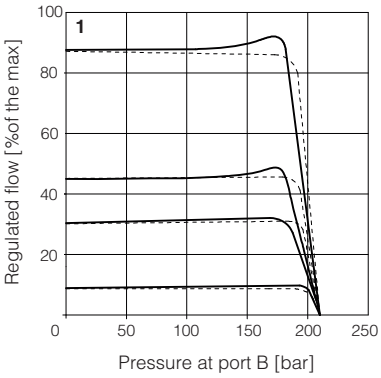



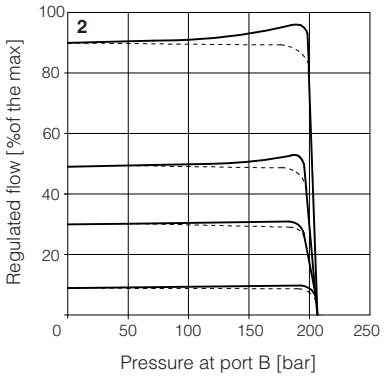

### 8.2 Regulated flow/outlet pressure diagrams

with inlet pressure = 210 bar

**1** = QVHZO
**2** = QVKZOR

Dotted line for 3-way versions

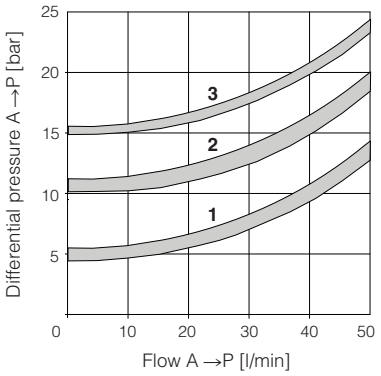


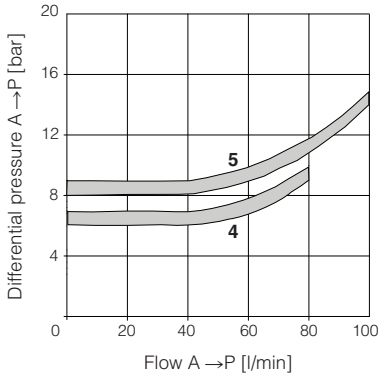




### 8.3 Flow A →P/Δp diagrams

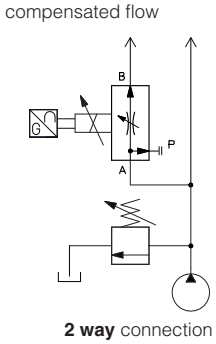
3-way configuration

**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**

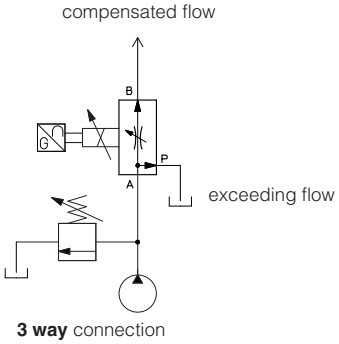


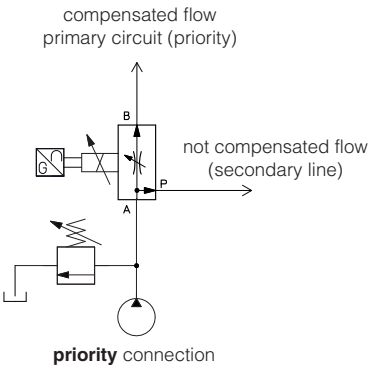

## 9 APPLICATIONS AND CONNECTIONS




**2 way** connection




**3 way** connection




**priority** connection

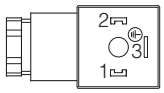
**2 way connection**
The 2 way connection is normally used to control the flow in one part of the hydraulic circuit or to regulate the speed of a specific actuator.
The metered flow in the controlled line is kept constant, independently to the load variations
If the valve is directly installed on the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

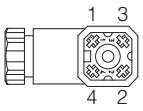
## 10 ELECTRICAL CONNECTION

**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 | |

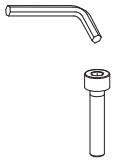


**10.2 LVDT transducer connector -** supplied with the valve

| 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

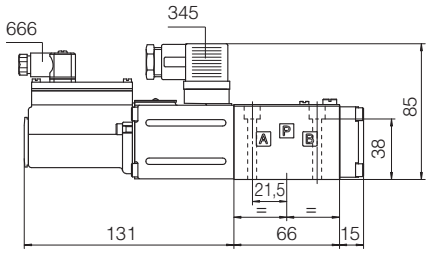
| | QVHZO | QVKZOR |
|---|---|---|
|  | **Fastening bolts:**<br>4 socket head screws M5x50 class 12.9<br>Tightening torque = 8 Nm | **Fastening bolts:**<br>4 socket head screws M6x40 class 12.9<br>Tightening torque = 15 Nm |
|  | **Seals:**<br>4 OR 108;<br>Diameter of ports A, B, P, T: Ø 7,5 mm (max)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

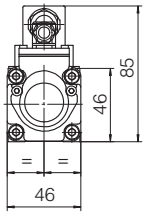
## 12 INSTALLATION DIMENSIONS [mm]

# QVHZO-T

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

| Mass [kg] | |
|---|---|
| QVHZO-T | 2,3 |

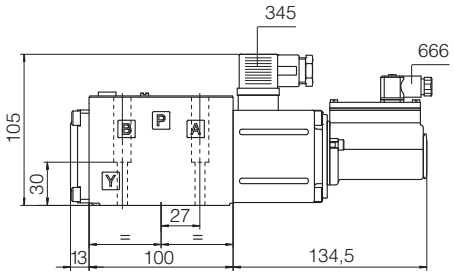


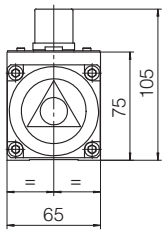




# QVKZOR-T

**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 | **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 |
| **GS500** | Programming tools | | |