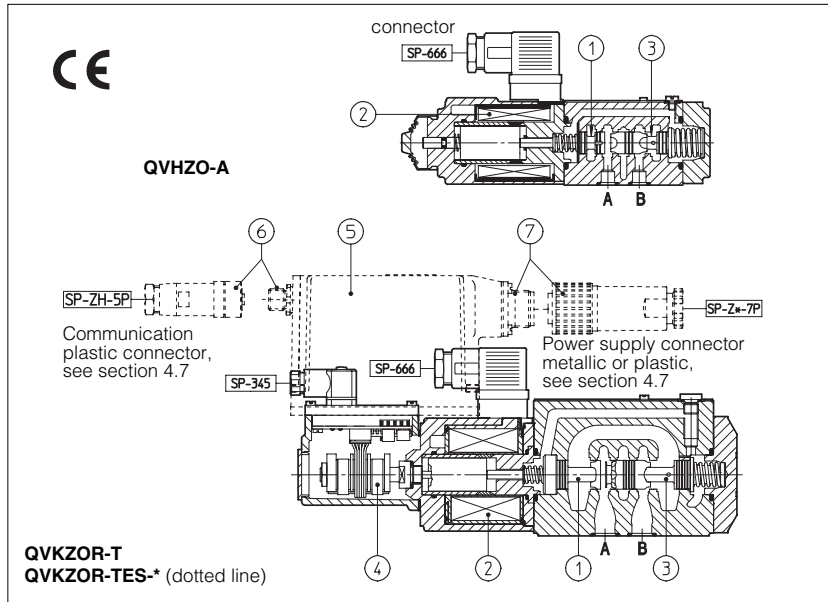


Proportional flow valves type QVHZO, QVKZOR

pressure compensated, direct operated, two or three way, ISO 4401 size 06 and 10



QVHZO and QVKZOR are proportional valves, direct operated, which provide compensated flow control according to the electronic reference signal.

They operate in association with electronic drivers, see section 8 which supply the proportional valves with correct current signal to align valve regulation to the reference signal supplied to the electronic driver.

They are available in different executions:

- -A, without position transducer;
- -AE, -AES, as -A plus analogue (AE) or digital (AES) integral electronics;
- -T, with position transducer ④;
- -TE, -TES as -T plus analogue (TE) or digital (TES) integral electronics.

The flow is controlled by a throttle ①, directly operated by the proportional solenoid ②. The mechanical pressure compensator ③ keeps a constant Δp across the throttle ①, thus the regulated flow is independent to the load conditions.

The integral electronics ⑤ ensures factory presetting, fine functionality plus valve-to-valve interchangeability and simplified wiring and installation.

Following communication interfaces ⑥ are available for the digital -AES and -TES executions:

- -PS, RS232 serial communication interface. The valve reference signal is provided with analogue commands via the 7 (or 12) pins connector ⑦.
 - -BC, CANbus interface
 - -BP, PROFIBUS-DP interface
- In the -BC and -BP options the valve reference signal is provided via fieldbus; during start up or maintenance, the valves can be operated with analogue signals via the 7 (or 12) pins connector ⑦.

The coils are fully plastic encapsulated (insulation class H) and valves have anti-vibration, antishock and weather-proof features.

Surface mounting: ISO 4401, size 06 and 10. Max flow respectively up to 45 l/min and 90 l/min.

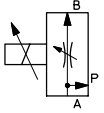
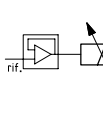
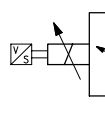
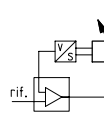
Max pressure = 210 bar.

1 MODEL CODE

QVKZOR - TES - PS - 10 / 65 / * ** / *

Pressure compensated flow control valves QVHZO = size 06 QVKZOR = size 10	Synthetic fluids WG = water-glycol PE = phosphate ester
A = without position transducer AE = as A plus integral electronics AES = as A plus integral digital electronics T = with position transducer TE = as T plus integral electronics TES = as T plus integral digital electronics	Design number
Communication interfaces (only for AES and TES) PS = RS232 serial BC = CANbus BP = PROFIBUS-DP	Options, see section 4: for -A execution: 6 = with 6 V _{DC} coil instead of standard 12 V _{DC} coil 18 = with 18 V _{DC} coil instead of standard 12 V _{DC} coil D = quick venting N = manual micrometric adjustment NV = as N plus handwheel and graduated scale for -AE and -TE executions: D = quick venting I = current reference (4÷20 mA) F = fault signal (only for -TE) Q = enable signal Z = enable, fault and monitor signals (only for -TE) for -AES and -TES executions: Z = double power supply, enable and fault (12 poles connector)
Valve size, see section 2 06 = ISO 4401, size 06 10 = ISO 4401, size 10	
Max regulated flow: for QVHZO : 3 = 3.5 l/min 36 = 35 l/min 12 = 12 l/min 45 = 45 l/min 18 = 18 l/min	for QVKZOR : 65 = 65 l/min 90 = 90 l/min

2 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols																
	QVHZO-A QVKZOR-A				QVHZO-AE QVKZOR-AE				QVHZO-T QVKZOR-T				QVHZO-TE, QVHZO-TES QVKZOR-TE, QVKZOR-TES			
Valve model	QVHZO-A*-06					QVHZO-T*-06					QVKZOR-A*-10		QVKZOR-T*-10			
Max regulated flow [l/min]	3,5	12	18	35	45	3,5	12	18	35	45	65	90	65	90		
Min regulated flow (1) [cm ³ /min]	15	20	30	50	60	15	20	30	50	60	85	100	85	100		
Regulating Δp [bar]	4 - 6		10 - 12			4 - 6		10 - 12			15	6 - 8	10 - 12	6 - 8	10 - 12	
Max flow on port A [l/min]	40		35	50	55	50		60			70	100	70	100		
Max pressure [bar]	210															
Response time 0÷100% step signal (2) [ms]	30					25					45		35			
Hysteresis [% of the regulated max flow]	≤ 5					≤ 0,5					≤ 5		≤ 0,5			
Linearity [% of the regulated max flow]	≤ 3					≤ 0,5					≤ 3		≤ 0,5			
Repeatability [% of the regulated max flow]	≤ 1					≤ 0,1					≤ 1		≤ 0,1			

Above performance data refer to valves coupled with Atos electronic drivers, see sections 8.

(1) Values are referred to 3-way configuration. In the 2-way configuration, the values of min regulated flow are higher.

(2) Reponse times at step signal (0%→100%) are measured from 10% to 90% of step value and are strictly referred to the valve regulation.

3 MAIN CHARACTERISTICS OF PROPORTIONAL FLOW VALVES TYPE QVHZO-* AND QVKZOR-*

Assembly position	Any position
Subplate surface finishing	Roughness index, $\sqrt{0.4}$ flatness ratio 0,01/100 (ISO 1101)
Ambient temperature	-20°C ÷ +70°C for -A and -T executions; -20°C ÷ +60°C for -AE, -AES, -TE, -TES
Fluid	Hydraulic oil as per DIN 51524 ... 535 for other fluids see section I
Recommended viscosity	15 ÷ 100 mm ² /s at 40°C (ISO VG 15÷100)
Fluid contamination class	ISO 18/15 achieved with in line filters of 10 µm and $\beta_{10} \geq 75$ (recommended)
Fluid temperature	-20°C +60°C (standard and /WG seals) -20°C +80°C (/PE seals)

3.1 Coils characteristics

Valve model	QVHZO-A*			QVHZO-T*	QVKZOR-A*			QVKZOR-T*
	with 12 V _{DC} coil	with 6 V _{DC} coil	with 18 V _{DC} coil		with 12 V _{DC} coil	with 6 V _{DC} coil	with 18 V _{DC} coil	
Coil resistance R at 20°C	3 ÷ 3,3 Ω	2 ÷ 2,2 Ω	13 ÷ 13,4 Ω	3 ÷ 3,3 Ω	3,8 ÷ 4,1 Ω	2,2 ÷ 2,4 Ω	12 ÷ 12,5 Ω	3,8 ÷ 4,1 Ω
Max. solenoid current	2,2 A	2,75 A	1,2 A	2,6 A	2,6 A	3,25 A	1,2 A	2 A
Max. power	30 Watt				35 Watt			
Protection degree (CEI EN-60529)	IP65 for -A and -T executions; IP65-67 for -AE, -AES, -TE and -TES, depending to the connector type (see sect. 4.7)							
Duty factor	Continuous rating (ED=100%)							

4 INTEGRAL ELECTRONICS OPTIONS AND WIRING

- 4.1 Option /I** It provides the 4÷20 mA current reference signal and the current feedback signals instead of the standard 0÷10V. It is normally used in case of long distance between the machine control unit and the valve or where the reference signal can be affected by electrical noise. In case of breakage of the reference signal cable, the valve functioning is disabled.
- 4.2 Option /F** Safety option providing an output signal which switches to zero in case of interruption of the transducer feedback cable. In this condition the valve functioning is disabled.
- 4.3 Option /Q** Safety option providing the possibility to enable or disable the valve functioning without cutting the power supply.
- 4.4 Option /D** This option provides a quick venting of the user line when the valve is closed or de-energized.
- 4.5 Option /Z** For **-TE** execution: option providing the same characteristics of **/F** and **/Q** plus the monitor signal of the spool position. For **-TES** execution: safety option, specifically introduced for -BC and -BP communication interfaces, provides two separated power supplies for the digital electronic circuits and for the solenoid power supply stage. The Enable and Fault signals are also available. The option **/Z** allows to interrupt the valve functioning by cutting the solenoid power supply (e.g. for emergency, as provided by the European Norms EN954-1 for components with safety class 2), but keeping energized the digital electronic circuits, thus avoiding fault conditions of the machine fieldbus controller. For the electrical wiring of -TE and -TES electronics with option **/Z** (12 poles connector), see tab. G200 and G210.

4.6 Integral electronics wiring

For the electric wiring shielded cables must be provided: the shield must be connected to the power supply zero **on the generator side**, see tab. **F003**

POWER SUPPLY CONNECTOR					
PIN	SIGNAL DESCRIPTION	-AE, -AES; -TE, -TES	-AE, -AE/I; -TE/I	-TE/F	-AE/Q; -TE/Q
A	Power supply 24 V _{DC}	Stabilized: +24V _{DC}			
B	Power supply zero	Filtered and rectified: V _{RMS} = 21 ÷ 33 (ripple max 2V _{PP})			
C	Signal zero	Reference 0 V _{DC}	Reference 0 V _{DC}	Reference 0 V _{DC}	Enabling input normal working 9 ÷ 24 V _{DC}
D	Input signal +	0 ÷ 10 V _{DC}	4 ÷ 20 V _{DC}	0 ÷ 10 V _{DC}	0 ÷ 10 V _{DC}
E	Input signal -				
F	Monitor Driving current (-AE, -AES) Spool position (-TE, -TES)	0 ÷ 10 V referred to pin C (signal 0 V _{DC}) 1 V = 1 A 1 V = 10% of spool position	5 ÷ 5V (-AE/I) 4 ÷ 20 mA (-TE/I) 1 V = 1 A 4 ÷ 20 mA = 0÷100% of spool position	Fault signal alarm = 0 V _{DC} Normal working = +24 V _{DC}	0 ÷ 10 V referred to pin B (signal 0 V) 1 V = 1 A 1 V = 10% of spool position
G	Earth	Connect only when the power supply is not conform to VDE 0551 (CEI 14/6)			

COMMUNICATION CONNECTORS (for -AES and -TES)				
Communication options	-PS (RS232) male connector	-BC (CAN Bus) male connector	-BP (PROFIBUS-DP) female connector (reverse key)	
Pin number Signal description	1	NC	CAN_SHLD	+5V
		Not Connected	Shield	Termination voltage
	2	NC	NC	LINE -A
		Not Connected	Not Connected	Bus line (high)
	3	RS_GND	CAN_GND	DGND
	Signal zero data line	Signal zero data line		
4	RS_RX	CAN_H	LINE-B	
	Valves receiving data line	Bus line (high)	Bus line (low)	
5	RS_TX	CAN_L	SHIELD	
	Valves transmitting data line	Bus line (low)	Shield	

POSITION TRANSDUCER CONNECTOR (-T)	
PIN	Signal description
1	OUTPUT SIGNAL
2	SUPPLY -15 V _{DC}
3	SUPPLY +15 V _{DC}
4	GND

Note:

- electrical signals (e.g. actual - feedback signals) acquired via valve electronics must not be used to switch off the machine safety functions. This is in accordance with the European standards (Safety requirements of fluid technology systems and components - hydraulics, EN-892).
- installation notes with basic information for commissioning and start-up, are always supplied with relevant components, together with the specific technical tables.

4.7 Model codes of power supply and communication connectors

VALVE VERSION	-A, -T		-AE, -AES, -TE, -TES		-AES/Z -TE/Z -TES/Z	-RS232 (-PS) OR CANBUS (-BC)	PROFIBUS (-BP)
	Power supply	Transducer					
CONNECTOR CODE	SP-666	SP-345	SP-ZH-7P (1)	SP-ZM-7P (1)	SP-ZH-12P (1)	SP-ZH-5P (1)	SP-ZH-5P/BP (1)
CONNECTOR CODE	IP65	IP65	IP67	IP66	IP65	IP67	IP67

(1) to be ordered separately

5 PROGRAMMING DEVICES

The functional parameters of the digital valves, as the bias, scale, ramp and linearization of the regulation characteristic, can be easily set and optimized with graphic interface by using the following software programming devices suitable for standard PC:

KIT-E-SW-PS for electronics with RS232 interface (option **-PS**)

KIT-E-SW-BC for electronics with CANbus interface (option **-BC**)

KIT-E-SW-BP for electronics with PROFIBUS-DP interface (option **-BP**)

see tab. G500 for complete information about the programming device kits and for the PC minimum requirements.

Only for the -BC and -BP communication options, the functional parameters can be alternatively set via fieldbus through the machine control unit, using the standard communication protocol implemented by Atos.

The protocol operating instructions to be implemented in the standard protocols (DS301V4.02, DSP408 for CANbus and DPVO for PROFIBUS-DP) are described in the user manuals MAN-S-BC (for -BC option) and MAN-S-BP (for -BP option) supplied with the relevant programming device kits.

The above programming devices have to be ordered separately.

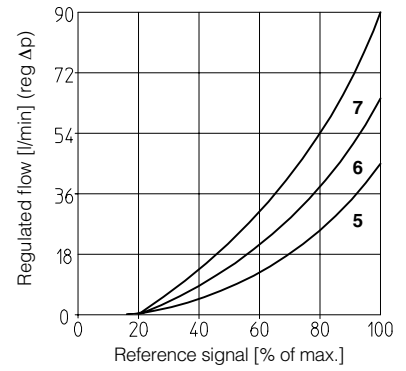
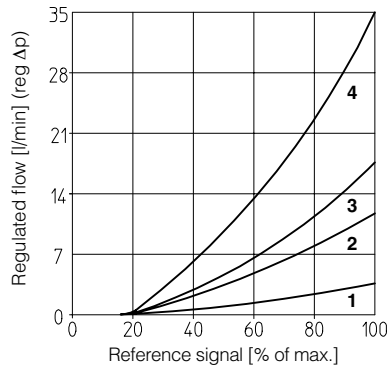
6 DIAGRAMS (based on mineral oil ISO VG 46 at 50 °C)

6.1 Regulation diagrams

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

Note:

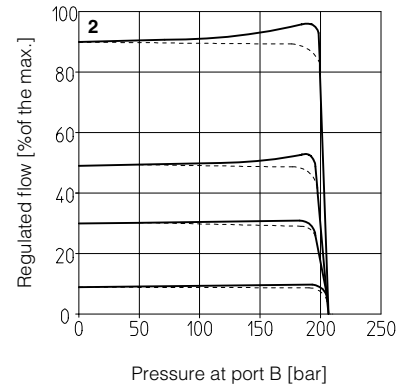
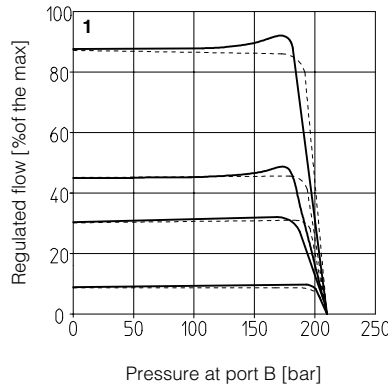
1) For the valves with digital electronics, the regulation characteristic can be modified by setting the internal software parameters, see tab. G500.



6.2 Regulated flow/outlet pressure diagrams
with inlet pressure = 210 bar

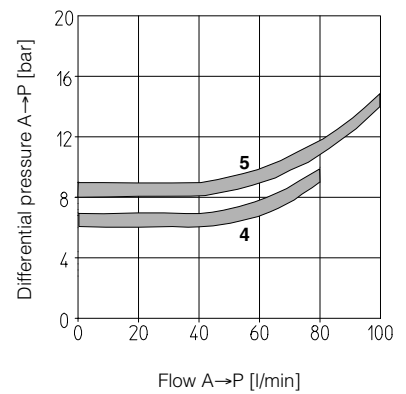
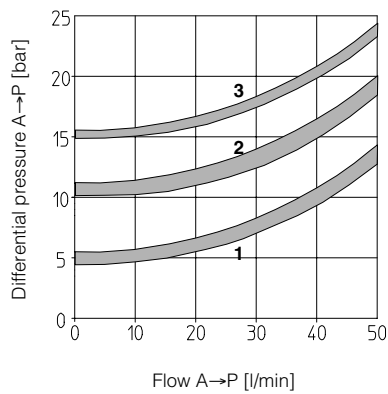
- 1 = QVHZO-*
- 2 = QVKZOR-*

Dotted line for 3-way versions



6.3 Flow A→P/Δp diagrams
3-way configuration

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



6.4 Dynamic response

The response times in section 2 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 INSTALLATION DIMENSIONS [mm]

QVHZO

Mounting surface
ISO 4401-AB-03-4 size 06
 Fastening bolts: 4 socket head screws M5 x 50
 Seals: 4 OR 108;
 Diameter of ports A, B, P, T:
 Ø 7,5 mm (max)

QVHZO-A
 Mass: 2,3 kg

QVHZO-T
 Mass: 2,5 kg

QVHZO-AE QVHZO-AES (dotted line)
 Mass: 2,9 kg

QVHZO-TE QVHZO-TES (dotted line)
 Mass: 3,1 kg

A = INLET PORT
B = OUTLET PORT
P = DISCHARGE PORT
 (only for 3-way versions;
 not used for 2-way versions)
T = NOT USED
 (it must be plugged)

QVKZOR

Mounting surface
ISO 4401-AC-05-4 size 10
 Fastening bolts: 4 socket head screws M6 x 40
 Seals: 5 OR 2050; 1 OR 108
 Diameter of ports A, B, P, T: Ø 11,2 mm (max)

QVKZOR-A
 Mass: 3,8 kg

QVKZOR-T
 Mass: 4 kg

QVKZOR-AE QVKZOR-AES (dotted line)
 Mass: 4,4 kg

QVKZOR-TE QVKZOR-TES (dotted line)
 Mass: 4,6 kg

A = INLET PORT
B = OUTLET PORT
P = DISCHARGE PORT
 (only for 3-way versions;
 not used for 2-way versions)
T = NOT USED
 (it must be plugged)

8 ELECTRONIC DRIVERS FOR QVHMZO AND QVKMZOR

Valve model	-A				-AE	-AES
Drivers model	E-MI-AC-01F	E-BM-AC-01F	E-ME-AC-01F	E-PP-AC-01F	E-RI-AE	E-RI-AES
Data sheet	G010	G025	G035	G100	G110	G115

Valve model	-T		-TE	-TES
Drivers model	E-ME-T		E-RI-TE	E-RI-TES
Data sheet	G140		G200	G210

For complete information about the drivers characteristics and relevant options, see the technical data sheet specified in the table.

9 MOUNTING PLATES

Size	Model	Ports location	Gas ports A, B, P, T	Ø Counterbore A, B, P, T	Mass [kg]
06	BA-202	Ports A, B, P, T underneath;	3/8"	-	1,2
	BA-204	Ports P, T underneath; ports A, B on lateral side	3/8"	25,5	1,8
	BA-302	Ports A, B, P, T (X, Y) underneath;	1/2" (1/8")	30 (16,5)	1,8
10	BA-308	Ports A, B, P, T underneath;	1/2"	30	2,5
	BA-428	Ports A, B, P, T underneath;	3/4"	36,5	5,5
	BA-434 (Y)	Ports P, T (X, Y) underneath; A, B on lateral side	3/4" (1/4")	36,5 (21,5)	8,5