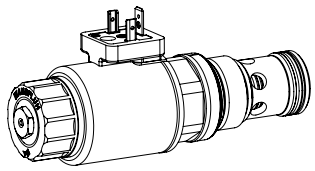
Proportional 2-way flow control cartridge

- direct operated, pressure compensated
- Q_{max} = 80 l/min
- $Q_{N\,max}$ = 80 l/min
- p_{max} = 350 bar

M33 x 2
ISO 7789



DESCRIPTION

Direct operated, pressure compensated proportional flow control valve as screw-in cartridge for cavity according to ISO 7789. With the solenoid deenergised, the control spool is held in the closed position (QN) or open position (QO) by a spring. The change of the electric current is followed by a proportional volume flow change. From the input (1), the fluid flows over the control and throttling spool to the controlled output (2). For the control, Wandfluh proportional amplifiers are available (see register 1.13).

APPLICATION

Proportional flow control valves are suitable for precise speed control, where the load current has to be maintained constant independent of the input and output pressure. The screw-in cartridge is perfectly suitable for installation in control blocks and is installed in sandwich- (vertical stacked systems) and in flange plates (corresponding data sheets in this register). For machining the cartridge cavity in steel and aluminum blocks, cavity tools are available (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

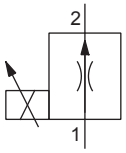
Q ☐ P PM33 - ☐ - ☐ / ☐ ☐ - ☐ HB4,5 # ☐

Flow control valve				
Normally closed		N		
Normally open		O		
Proportional				
Screw-in cartridge M33 x 2				
Nominal volume flow rate Q_N	normally closed		normally open	
	32 l/min	32	32 l/min	32
	63 l/min	63	63 l/min	63
	80 l/min	80		
Nominal voltage U_N	12 VDC	G12		
	24 VDC	G24		
	without coil	X5		
Slip-on coil	Metal housing round			W
	Metal housing square			M
Connection execution	Connector socket EN 175301-803 / ISO 4400			D
	Connector socket AMP Junior-Timer			J
	Connector Deutsch DT04-2P			G
Sealing material	NBR			
	FKM (Viton)	D1		
Manual override				
Design index (subject to change)				

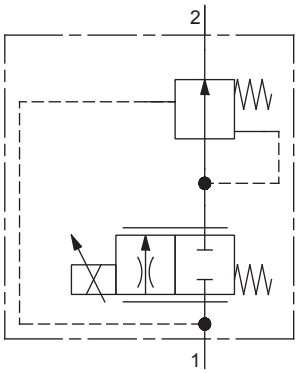
2.6-651

SYMBOL

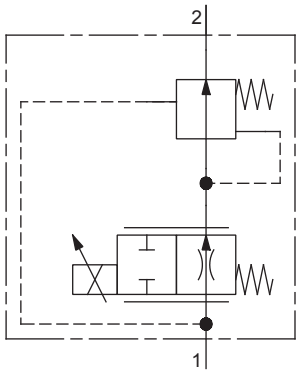
Simplified



Detailed QN…



Detailed QO…



GENERAL SPECIFICATIONS

Designation	Proportional 2-way flow control valve
Construction	Direct operated
Mounting	Screw-in cartridge construction
Nominal size	M33 x 2 according to ISO 7789
Actuation	Proportional solenoid
Ambient temperature	-25…+70 °C
Weight	0,95 kg
MTTFd	150 years

MANUAL OVERRIDE

HB4,5
Optionally: Screw plug (HB0), no actuation possible

HYDRAULIC SPECIFICATIONS

Working pressure	p_{max} = 350 bar
Maximum volume flow	Q_{max} = 80 l/min
Volume flow direction	1 → 2
Leakage oil	See characteristics
Nominal volume flow range	Q_N = 32 l/min, 63 l/min, 80 l/min (QN) Q_N = 32 l/min, 63 l/min (QO)
Hysteresis	≤ 6 % (QN); 10 % (QO) at optimal dither signal
Repeatability	≤ 2 % at optimal dither signal
Fluid	Mineral oil, other fluid on request
Viscosity range	12 mm²/s…320 mm²/s
Temperature range fluid	-25…+70 °C (NBR) -20…+70 °C (FKM)
Contamination efficiency	Class 18 / 16 / 13
Filtration	Required filtration grade ß 6…10 ≥ 75, see data sheet 1.0-50

ACTUATION

Actuation	Proportional solenoid, wet pin push type, pressure tight
Execution	W.S45 / 23 x 50 (Data sheet 1.1-180) M.S45 / 23 x 50 (Data sheet 1.1-181)
Connection	Connector socket EN 175301 – 803 Connector socket AMP Junior-Timer Connector Deutsch DT04 – 2P

ELECTRICAL SPECIFICATIONS

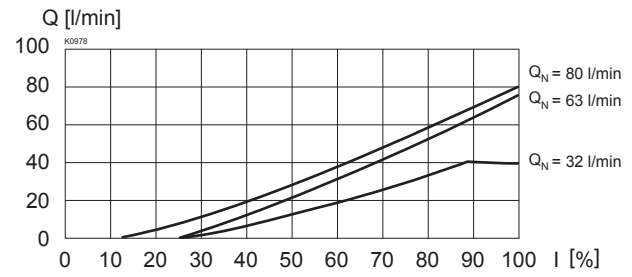
Protection class	Connection execution D: IP65 Connection execution J: IP66 Connection execution G: IP67 and IP69K
Relative duty factor	100 % DF
Standard nominal voltage	12 VDC, 24 VDC
Limiting current at 50 °C	I_G = 1560 mA (U_N = 12VDC) I_G = 780 mA (U_N = 24VDC)

Note! Other electrical specifications see data sheet 1.1-180 (slip-on coil W) and 1.1-181 (slip-on coil M)

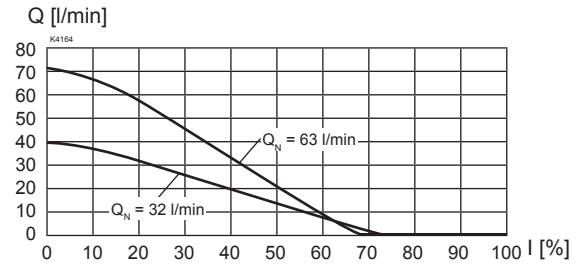
PERFORMANCE SPECIFICATIONS

Oil viscosity υ = 30 mm²/s

Q = f (I) — Volume flow signal characteristics QN

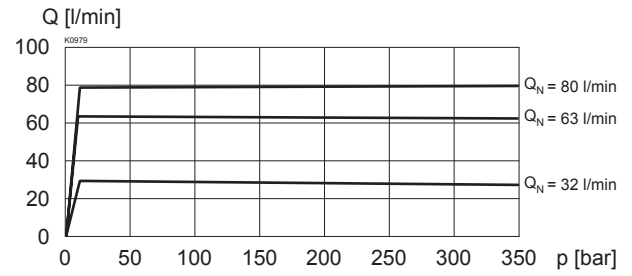


Q = f (I) — Volume flow signal characteristics QO

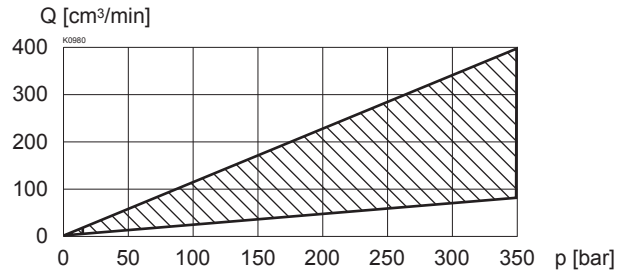


Q = f (p) — Volume flow pressure characteristics QN + QO

$I = I_G$



Q_L = f (p) — Leakage volume flow characteristics QN + QO



ACCESSORIES

Flange body / sandwich plate	Data sheet 2.6-680
Threaded body	Data sheet 2.9-205
Proportional amplifier	Register 1.13
Mating connector black (B)	Article no. 219.2002
Technical explanations	Data sheet 1.0-100
Filtration	Data sheet 1.0-50
Relative duty factor	Data sheet 1.1-430

SURFACE TREATMENT

- The cartridge body is gas-nitro-carburised
- The armature tube and the slip-on coil are zinc- / nickel-coated

SEALING MATERIAL

NBR or FKM (Viton) as standard, choice in the type code

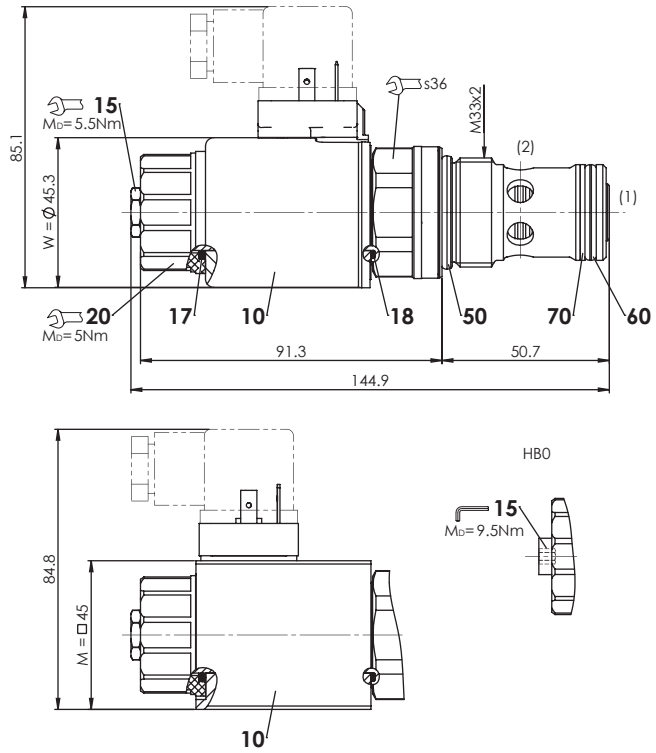
INSTALLATION NOTES

Mounting type	Screw-in cartridge M33 x 2
Mounting position	Any, preferably horizontal
Tightening torque	M_D = 80 Nm Screw-in cartridge M_D = 5 Nm knurled nut

STANDARDS

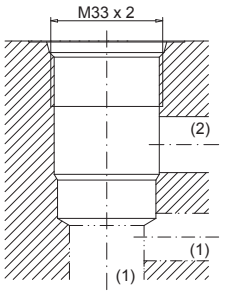
Cartridge cavity	ISO 7789
Solenoids	DIN VDE 0580
Connection execution D	EN 175301 – 803
Protection class	EN 60 529
Contamination efficiency	ISO 4406

DIMENSIONS



HYDRAULIC CONNECTION

Cavity drawing according to ISO 7789–33–01–0–98



Note! For detailed cavity drawing and cavity tools see data sheet 2.13-1005

PARTS LIST

Position	Article	Description
10	206.12..	W.S45 / 23 x 50
	206.7...	M.S45 / 23 x 50
15	253.8000	HB4,5 manual override
	239.2033	HB0 Screw plug
17	160.2222	O-ring ID 22,22 x 2,62 (NBR)
18	160.2220	O-ring ID 21,95 x 1,78 (NBR)
20	154.2701	Knurled nut M23 x 1,5 x 19,7
50	160.2298	O-ring ID 29,82 x 2,62 (NBR)
	160.6296	O-ring ID 29,82 x 2,62 (FMK)
60	160.2238	O-ring ID 23,81 x 2,62 (NBR)
	160.6238	O-ring ID 23,81 x 2,62 (FMK)
70	049.8297	Backup ring PTSM rd 22,1 x 26,6 x 1,4