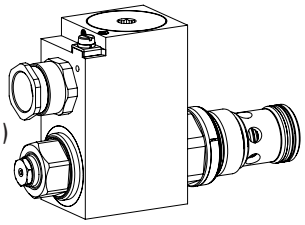
Proportional 2-way flow control cartridge

- direct operated, pressure compensated
- Q_{max} = 70 l/min
- $Q_{N\,max}$ = 55 l/min
- p_{max} = 350 bar

M33 x 2

ISO 7789



Ex db IIC T6, T4 Gb (Zone 1)
Ex tb III C T80 °C, T130 °C Db (Zone 21)
Ex db I Mb
Ⓔx II 2 G Ex db IIC T6, T4
Ⓔx II 2 D Ex tb III C T80 °C, T130 °C
Ⓔx I M2 Ex db I Mb
Class I, Division 1, Group A, B, C, D T4
Class II & III, Division I, Group E, F, G T4

DESCRIPTION

Direct operated, pressure compensated proportional flow control valve as screw-in cartridge for cavity according to ISO 7789. When the solenoid is deenergised, the control spool closes practically leakage-free. 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). The pressure tight encapsulated Ex-protection solenoid coil prevents an explosion on the inside penetrating to the outside as well as an ignitable surface temperature.

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. These valves are suitable for applications in explosion-hazard areas, open cast and also in mines. 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.

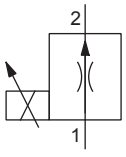
CERTIFICATES

	Surface	Mining	Standard -25 °C to…	M248 Electronic
ATEX / UKEX	x	x	x	x
IECEx	x	x	x	x
CCC	x	x	x	x
EAC	x	x	x	x
Australia	x	x	x	
MA		x	x	x
USA / Canada	x		x	x
PESO	x		x	x

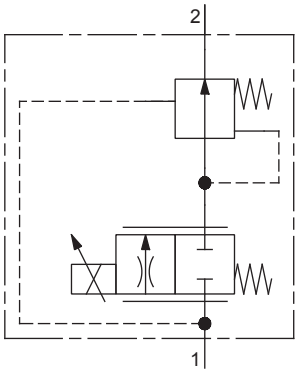
The certificates can be found on www.wandfluh.com

SYMBOL

Simplified



Detailed QN…



TYPE CODE

Q N B PM33 - [ ] - [ ] / [ ] / [ ] - [ ] [ ] # [ ]

Flow control valve					
Normally closed					
Proportional, explosion proof					
Screw-in cartridge M33 x 2					
Nominal volume flow rate Q_N	55 l/min	55			
Nominal voltage U_N	12 VDC	G12			
	24 VDC	G24			
			Ambient temperature up to:		
Nominal power P_N	15 W	L15	70 °C		
Certification	ATEX, UKEX, IECEx, EAC, CCC			USA / Canada	UC-M187
	Australia	AU		India	PE
	MA	MA			
Sealing material	NBR				
	FKM (Viton)	D1			
Options	without				
	amplifier	M248			
Design index (subject to change)					

2.6-655

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	**Operation as T4** -25…+70 °C (L15)
Weight	2,3 kg
MTTFd	150 years

ELECTRICAL SPECIFICATIONS

Protection class	IP65 / 66 / 67
Relative duty factor	100 % DF
Voltage tolerance	± 10 % with regard to nominal voltage
Standard nominal voltage	12 VDC, 24 VDC
Limiting current at… °C	**L15, 50 °C** I_G = 950 mA (12 VDC) I_G = 450 mA (24 VDC) **L15, 70 °C** I_G = 910 mA (12 VDC) I_G = 420 mA (24 VDC)
Standard nominal power	15 W
Temperature class	Nominal power 15 W: T1…T4

Note! Other electrical specifications see data sheet 1.1-183

ACTUATION

Actuation	Proportional solenoid, wet pin push type, pressure tight
Execution	MKY45 / 18x60 (Data sheet 1.1-183)
Connection	Cable gland for cable Ø 6,5…14 mm

Attention! The UC execution is always supplied without cable gland

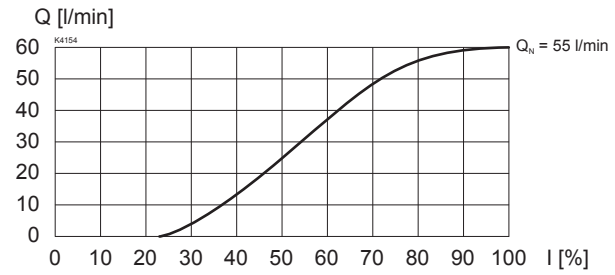
HYDRAULIC SPECIFICATIONS

Working pressure	p_{max} = 350 bar
Maximum volume flow	Q_{max} = 70 l/min
Volume flow direction	1 → 2
Leakage oil	See characteristics
Nominal volume flow range	Q_N = 55 l/min
Hysteresis	≤ 8 % at optimal dither signal
Repeatability	≤ 3 % at optimal dither signal
Fluid	Mineral oil, other fluid on request
Viscosity range	12 mm²/s…320 mm²/s
Temperature range fluid	**Operation as T4** NBR -25…+70 °C (L15) FKM -20…+70 °C (L15)
Contamination efficiency	Class 18 / 16 / 13
Filtration	Required filtration grade ß 6…10 ≥ 75, see data sheet 1.0-50

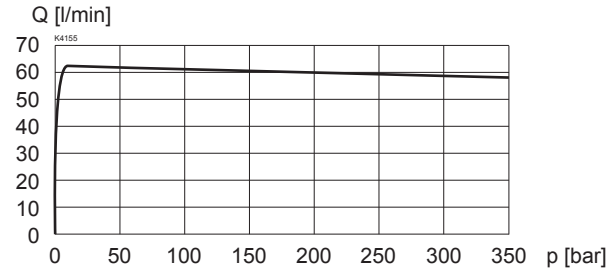
PERFORMANCE SPECIFICATIONS

Oil viscosity υ = 30 mm²/s

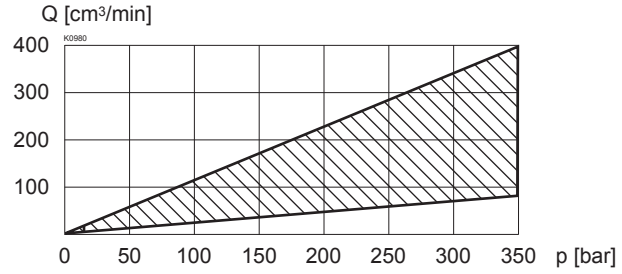
Q = f (I) **Volume flow signal characteristics**



Q = f (p) **Volume flow pressure characteristics**

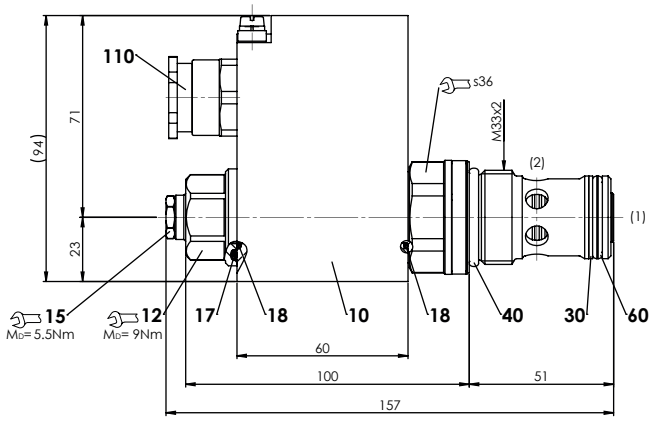


Q_L = f (p) **Leakage volume flow characteristics**



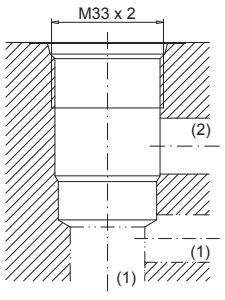
Note! With the L15 execution for ambient temperatures up to 70 °C, the performance specifications have been evaluated with an ambient temperature of 50 °C

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	263.6...	Solenoid coil MK.45 / 18 x 60
12	154.2603	Knurled nut Ex M18 x 1,5 x 18
15	253.8000	Manual override HB4,5
110	111.1080	Cable gland M20 x 1,5

Seal kit consisting of

17	O-ring	ID 25,07 x 2,62
18	O-ring	ID 17,17 x 1,78
30	Back. ring	rd 24,5 x 29 x 1,4
40	O-ring	ID 29,82 x 2,62
60	O-ring	ID 23,81 x 2,62

STANDARDS

Cartridge cavity	ISO 7789
Explosion protection	Directive 2014 / 34 / EU (ATEX)
Flameproof enclosure	EN / IEC / UL 60079-1, 31
Cable entry	EN 60079-0, 1, 7, 15, 31
Protection class	EN 60 529
Contamination efficiency	ISO 4406

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 = 9 Nm knurled nut M_D = 9,5 Nm HB0 M_D = 5,5 Nm HB4,5

SURFACE TREATMENT

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

ACCESSORIES

Threaded body	Data sheet 2.9-205
Technical explanations	Data sheet 1.0-100
Filtration	Data sheet 1.0-50
Relative duty factor	Data sheet 1.1-430

MANUAL OVERRIDE

HB4,5 as standard
Optionally: HN (K)
→ see data sheet 1.1-311

SEALING MATERIAL

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

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