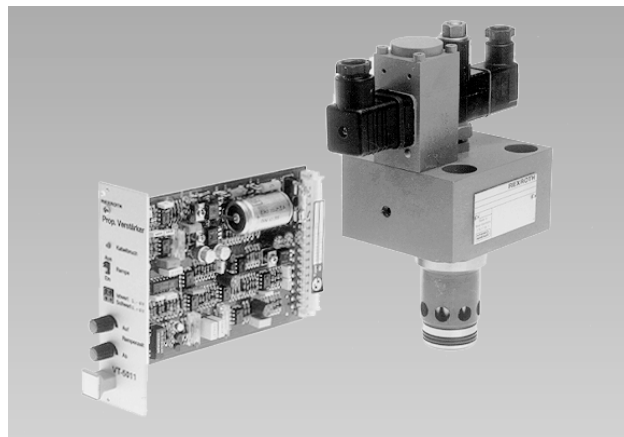


MANNESMANN REXROTH	2-Way Proportional Logic Cartridge Valve Model FE.. (Series 1X and 2X)			RA 29 204/06.98 Replaces: 05.94
	Size 16 ... 63	... 4600 PSI (315 bar)	... 475 GPM (1800 L/min)	

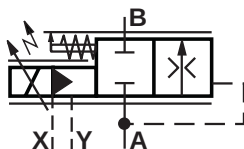
Characteristics:

- Single land throttle valve (main stage) with electrical setting
- Cartridge bore and mounting pattern to DIN 24 342.
- Stroke of orifice piston is proportional to the electrical input signal (signal value voltage)
- Position control circuit to compensate for disturbance variables
- High equipment dynamics and therefore low switching times
- May be used in association with a pressure compensator as a metering orifice for flow control independent of load pressure
- Automatic closure in the event of power failure or cable breakage
- Optional internal or external pilot oil supply
- Single source valve and control electronics
- For the control:
electrical amplifier type VT 5011 to 5016
(separate order), see pages 3 and 10

F 86021



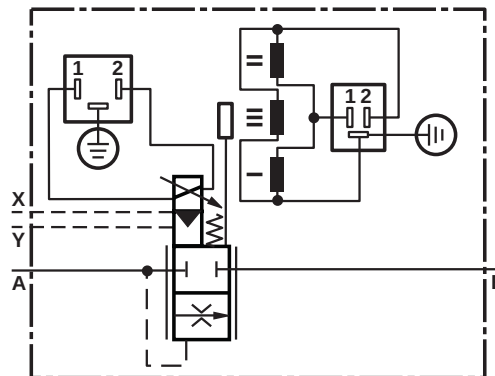
Model FE 25 C 2X/...
with associated electronics (ordered separately)

Symbols

- A** Service inlet port
B Service outlet port
X Pilot fluid supply
Y Pilot fluid drain
 Direction of flow A → B

with electrical
connection

Note:
Connect pilot fluid supply
port X with A or connect
externally



Functional description

The Model FE..C 2-way electronic proportional cartridge valve is an adjustable orifice, the opening stroke of which is preset by means of an electronic input signal to the proportional solenoid.

The valve is supplied as a unit ready to install, in a standard logic cavity. In the cover (3) is the sleeve (4) with the main spool (5), the positional transducer (2), the pilot control (8) and the proportional solenoid (9).

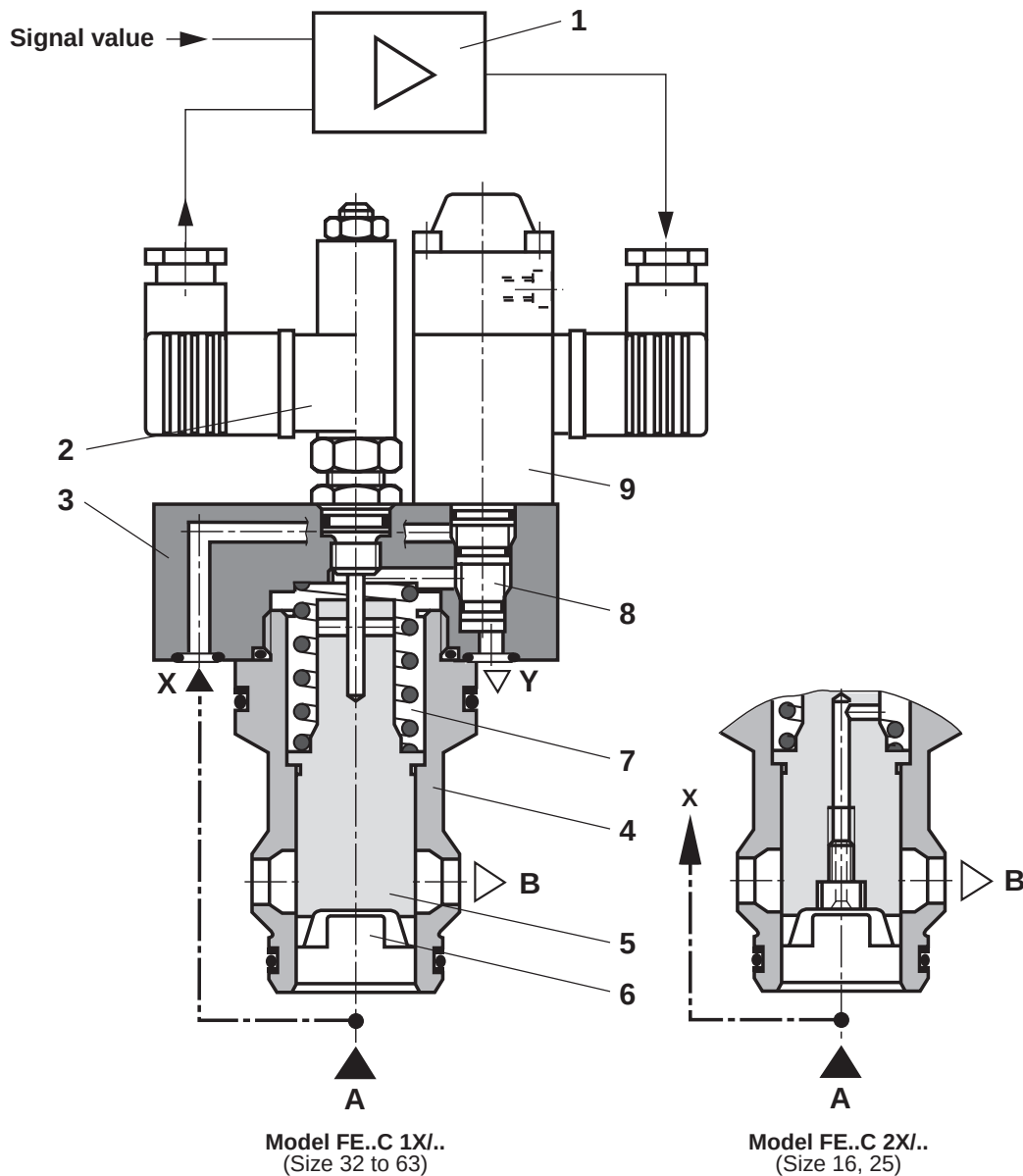
The direction of flow is from A to B. The pilot fluid connection X is connected to port A. The pilot fluid drain Y should be led back to tank at minimum pressure. A comparison between the external input signal and the actual value signal (feedback from the positional transducer) is made within the amplifier (1). The current to the proportional solenoid (9) is then altered to correspond to the differential value. The proportional solenoid (9) converts the electrical positional signal into movement of the pilot control (8). The pressure in the spring chamber (7) is then adjusted so that the spring-loaded main spool (5) moves into a position corresponding to the input signal value.

Should the solenoid current or the feedback signal fail, the orifice closes automatically (safety control).

The internal circuitry of the positional control are arranged so that the input value and the stroke of the spool (5) are directly proportional to each other. For a given pressure drop across the orifice, the volumetric flow from A to B is only dependent on the spool position and the window geometry (6).

Direct proportionality is achieved between in-put value and output flow, with linear window geometry (FE..C10/L..). Model FE..C10/Q.. has an orifice design which provides a progressive relationship between input value and flow.

Electronic amplifier card Model VT 5011 ... VT 5016 (dependent on valve size) must be ordered separately, see RA 29 956.



Ordering code

FE		C	/	K4		*
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Further details to be written in clear text

Size16 = 16
 Size 25 = 25
 Size 32 = 32
 Size 40 = 40
 Size 50 = 50
 Size 63 = 63

Cartridge assembly = C
 Series 10 to 19 (for sizes 32 to 63) = 1X
 (10 to 19, externally interchangeable)
 Series 20 to 29 (for sizes 16 and 25) = 2X
 (20 to 29, externally interchangeable)

M = NBR seals, suitable for petroleum oils (HM, HL, HLP) and water glycol
 V = FPM seals, suitable for phosphate ester fluids (HFD-R)

Electrical connection at proportional solenoid
 with component plug to DIN 43 650-AM2
without plug-in connector – separate order
 (Z4) **RR00 074 684**
 (Z45) **RR00 011 039**
Inductive positional transducer
 Plug connection to DIN 43 650 Form B,
 plug-in connector included

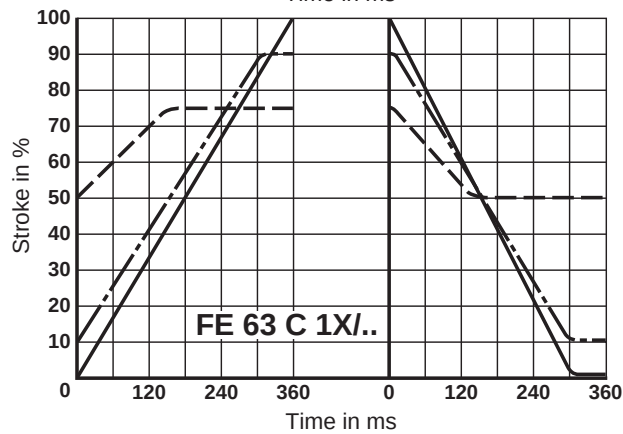
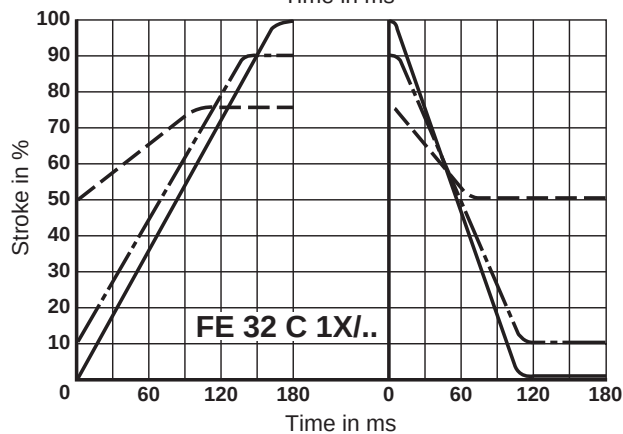
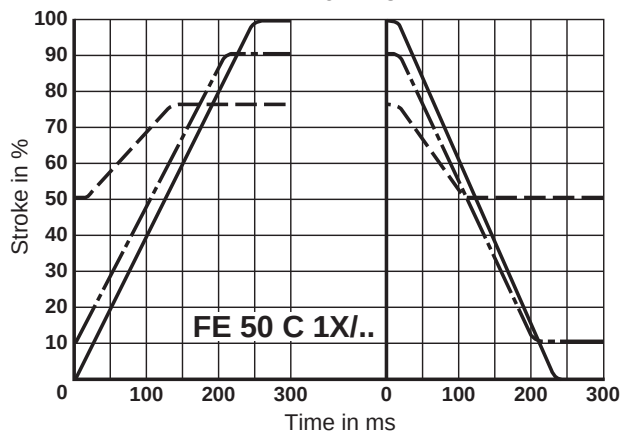
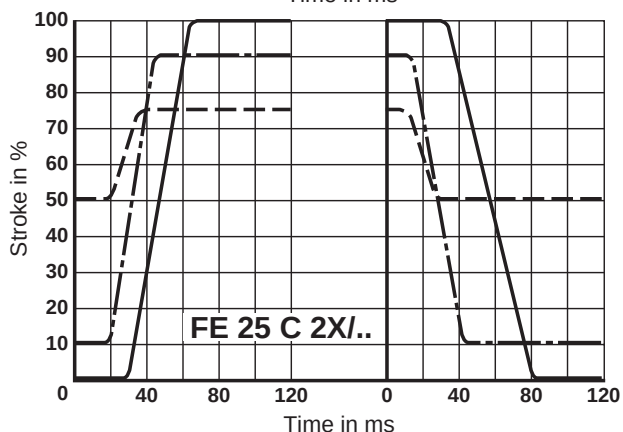
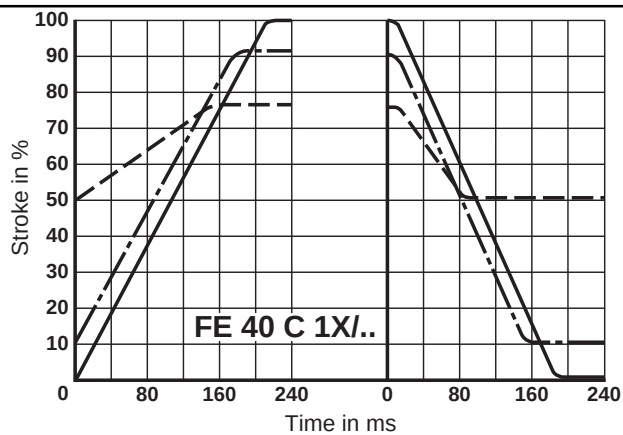
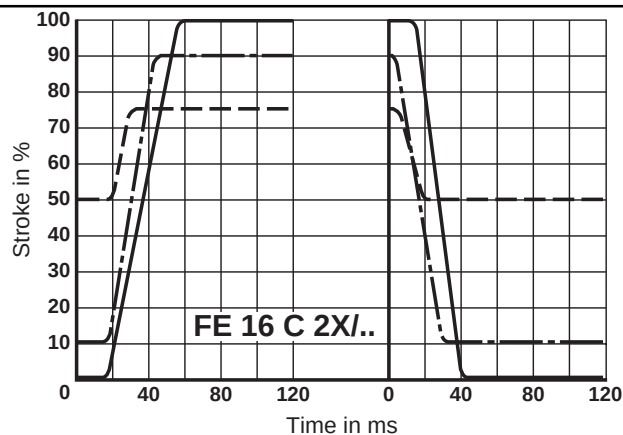
Max. flow in L/min at Δp 10 bar

Size	Flow characteristic		Size	Flow characteristic	
	linear GPM (L/min)	progressive GPM (L/min)		linear GPM (L/min)	progressive GPM (L/min)
16	6.6 (25) = 25L	6.6 (25) = 25Q	32	-	73.9 (280) = 280Q
	13.2 (50) = 50L	13.2 (50) = 50Q		118.8 (450) = 450L	-
	21.1 (80) = 80L	-	40	-	85.8 (325) = 335Q
	26.4 (100) = 100L	-		176.9 (670) = 670L	-
	36.9 (140) = 140L	35.4 (134) = 140Q	50	317.1 (1200) = 1180L	-
	50.2 (190) = 190L	-	63	475.5 (1800) = 1800L	-
25	-	52.3 (198) = 200Q			
	85.8 (325) = 315L	-			

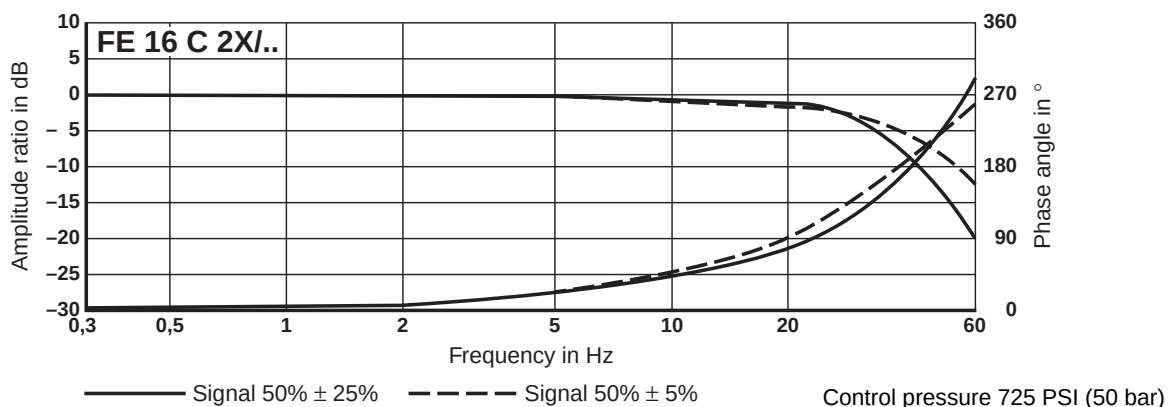


Technical data (For applications outside these parameters please consult us)										
General										
Installation position			Optional (however, the end cap on the solenoid must be rotated so that bleed screw is always at highest point in order to bleed the air on the 1st start-up)							
Ambient temperature range			°F (°C)		– 4 ... 122 (– 20 ... 50)					
Weight			Size		16	25	32	40	50	63
			lbs (kg)		6.9 (2.7)	8.4 (3.8)	8.8 (4.0)	13.0 (5.9)	26.5 (12.0)	44.1 (20.0)
Hydraulic										
Operating pressure		Port A, B	PSI (bar)	... 4600 (315)						
Feedback pressure		Port Y	PSI (bar)	max. 435 (30)						
Max. flow Q_v for main valve at Δp 145 PSI (10 bar)		Size		16	25	32	40	50	63	
		Model “L”	GPM (L/min)	50 (190)	86 (325)	119 (450)	177 (670)	317 (1200)	476 (1800)	
		Model “Q”	GPM (L/min)	45 (134)	52 (198)	77 (280)	86 (325)	–	–	
Pilot oil volume for reversal process 0 → 100 %			in ³ (cm ³)	0.055 (0.9)	0.116 (1.9)	0.214 (3.5)	0.348 (5.7)	1.214 (19.9)	2.154 (35.9)	
Pilot oil with stepped input signal			GPM (L/min)	0.66 (2.5)	0.66 (2.5)	0.66 (2.5)	0.66 (2.5)	1.72 (6.5)	1.72 (6.5)	
Max. drain flow in port . (closed state - signal voltage 0V)			GPM (L/min)	0.52 (2)	0.79 (3)	1.32 (5)	1.84 (7)	3.17 (12)	4.75 (18)	
Hydraulic fluid				Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R), water-glycols						
Fluid cleanliness				Maximum degree of contamination of the fluid to NASS 1638 class 7 to 9. We therefore recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$ %.						
Hydraulic fluid temperature range			°F (°C)	– 4 ... 160 (– 20 ... 70)						
Viscosity range			SUS (mm ² /s)	75 ... 1760 (15 ... 380)						
Hysteresis			%	< 1						
Repeatability			%	< 1						
Electrical										
Insulation (DIN 40 050)				Exceeds NEMA class B (IP 65)						
Voltage type				DC						
Current rating			Size	16	25	32	40	50	63	
			mA	1000	1000	800	800	800	800	
Coil resistance	Value when cold at 68 °F (20 °C)		Ω	12	12	24.6	24.6	19.5	19.5	
	Max. value when hot		Ω	18.24	18.24	37	37	28.8	28.8	
Duty cycle				continuous operation						
Coil temperature				up to (150 °C)						
Electrical connection				3 prong plug and socket connection to ISO 4400, ANSI B 93.94 M						
Electrical main stage (inductive positional transducer)										
Insulation (DIN 40 050)				IP 65						
Coil resistance at 20 °C (see Symbol)	Total resistance			1 and 2		2 and $\frac{1}{2}$		1 and $\frac{1}{2}$		
			Ω	31.5		45.4		31.5		
Inductivity			mH	6 to 8						
Oscillator frequency			kHz	2.5						
Electrical connection				3 prong plug and socket connection						
Control electronics										
Corresponding amplifier in Eurocard format to data sheet RA 29 956 (separate order)			Size	16	25	32	40	50	63	
				VT 5011	VT 5012	VT 5013	VT 5014	VT 5015	VT 5016	

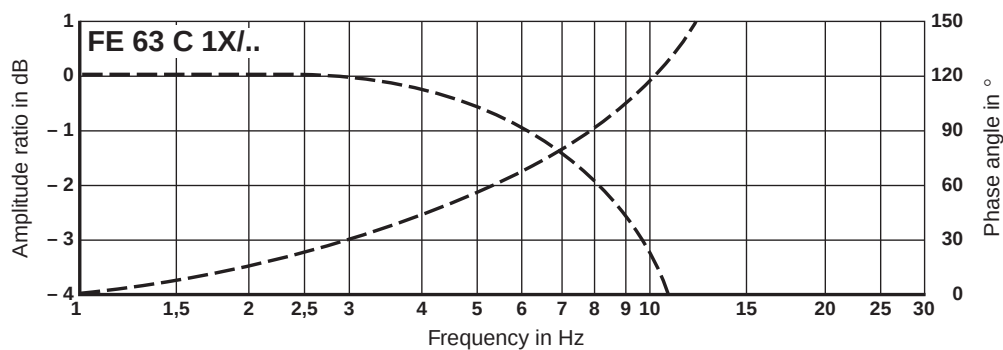
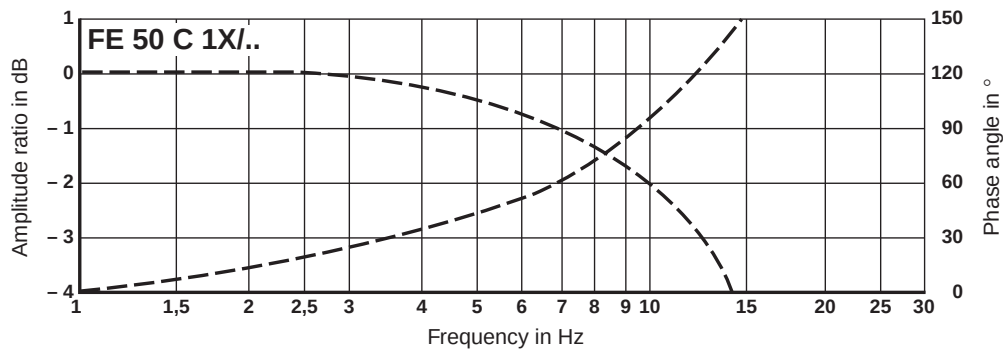
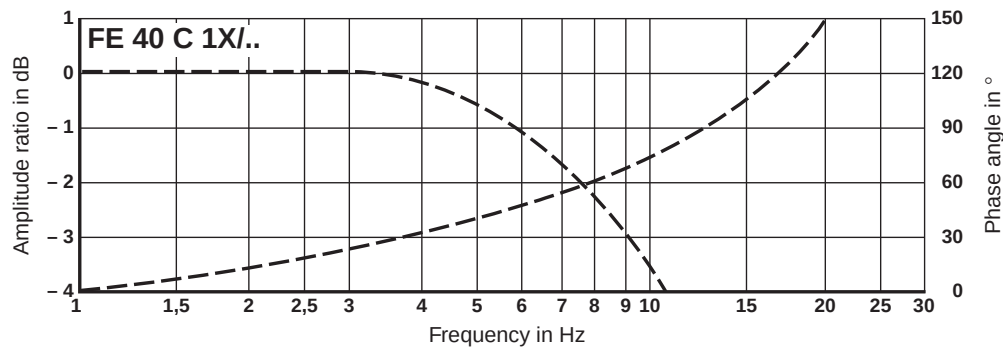
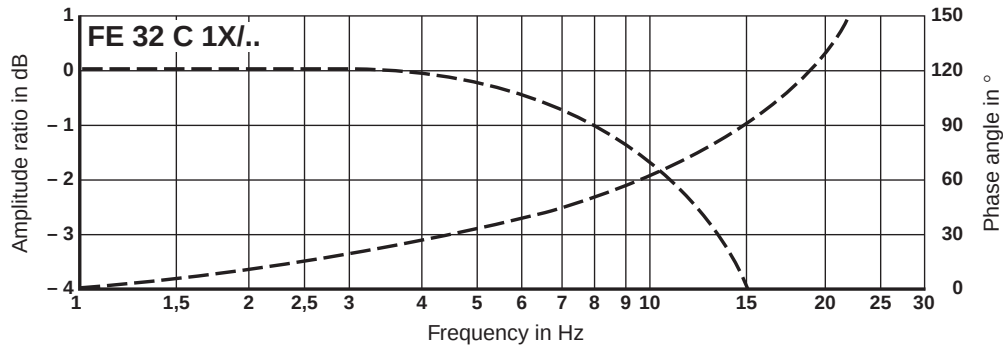
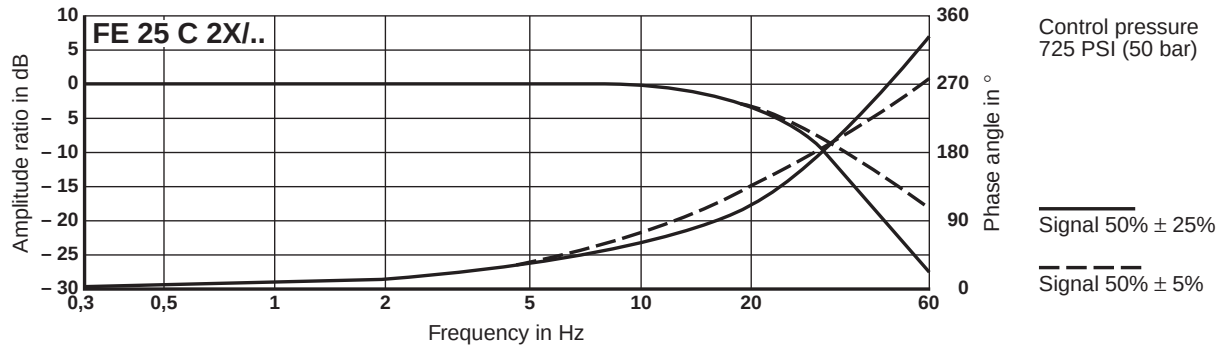
Transition function with stepped signal value alteration



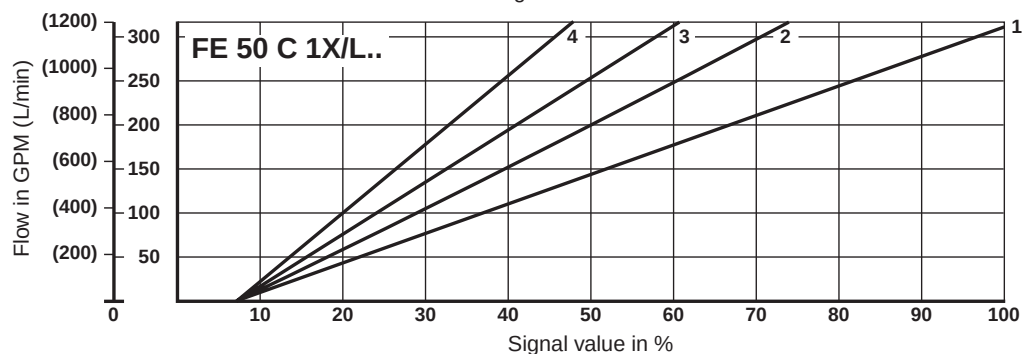
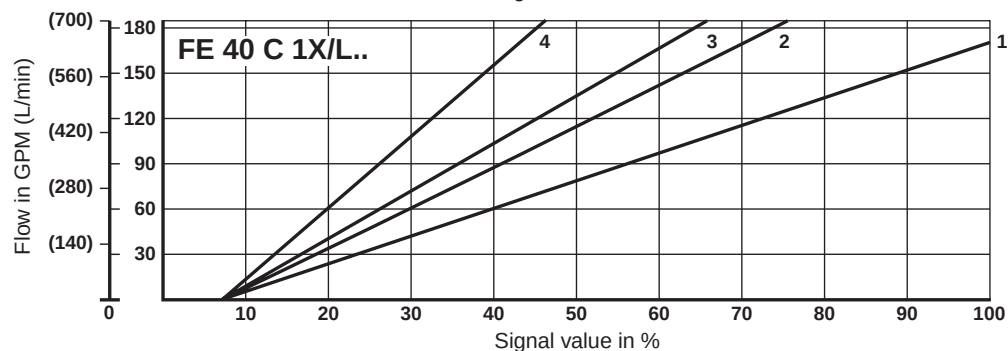
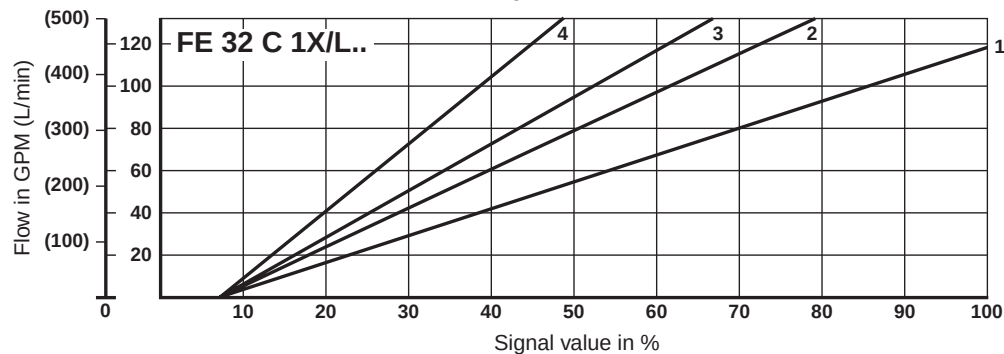
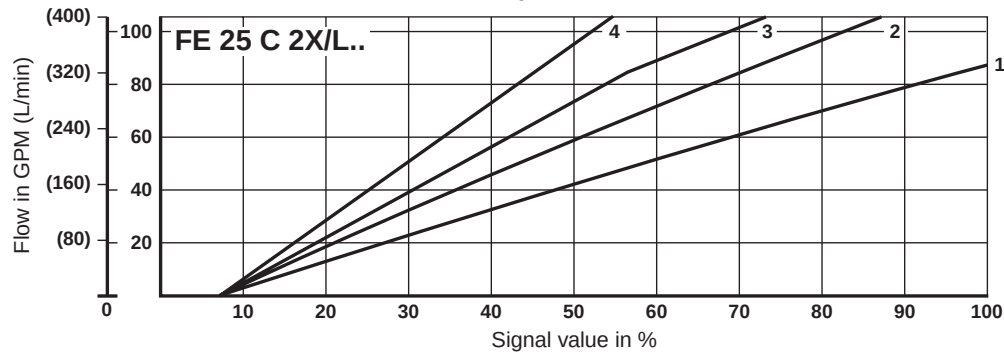
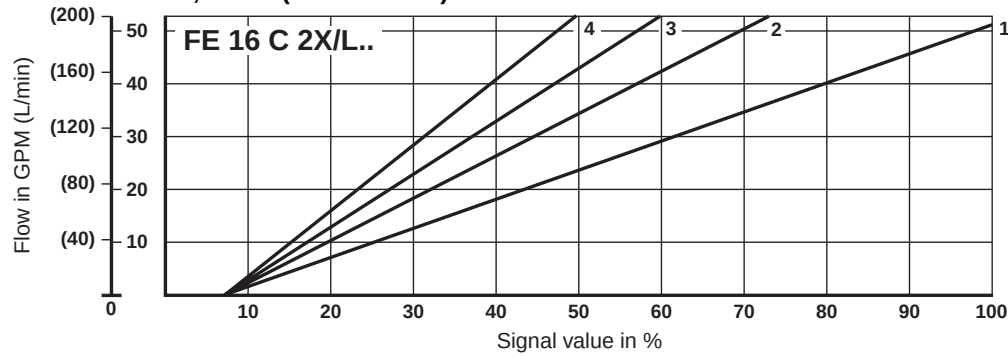
Frequency characteristics: measured at $p_A = 725$ PSI (50 bar); $v = 190$ SUS (41 mm²/s) and $t = 122$ °F (50 °C)

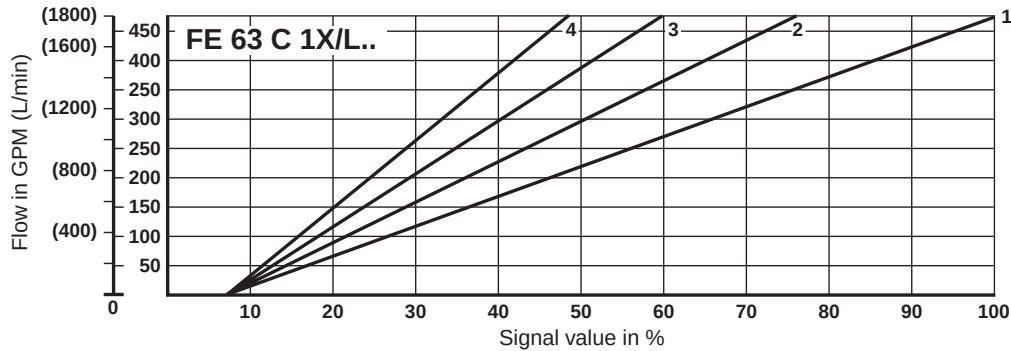
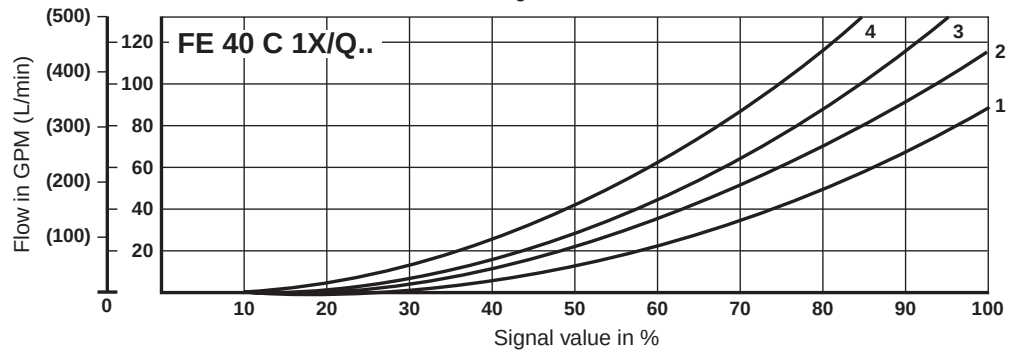
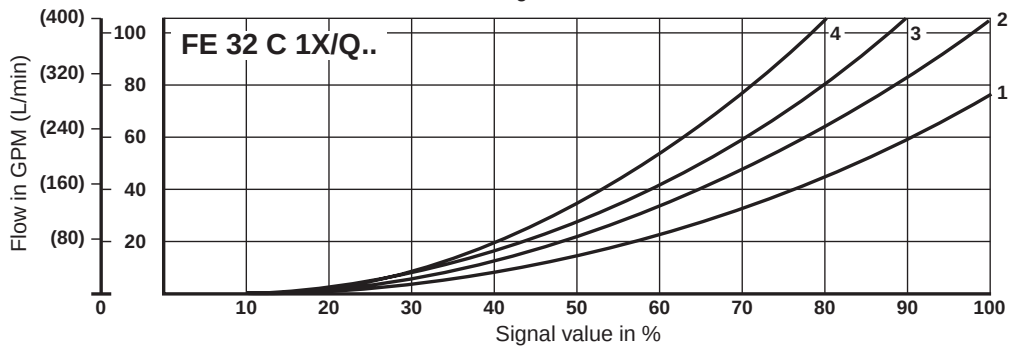
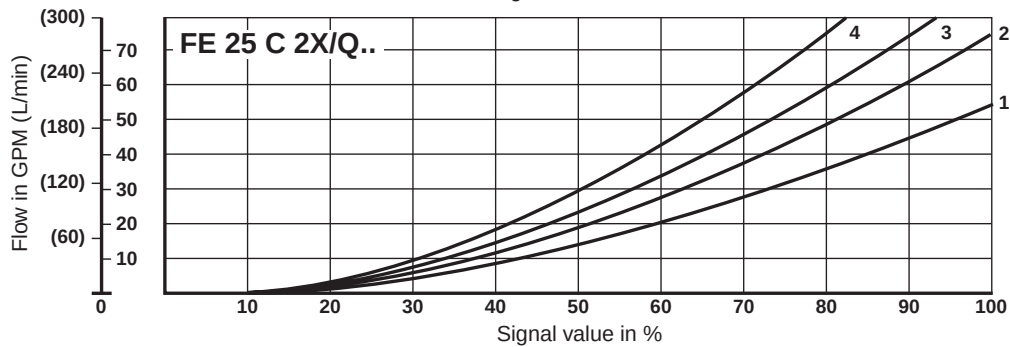
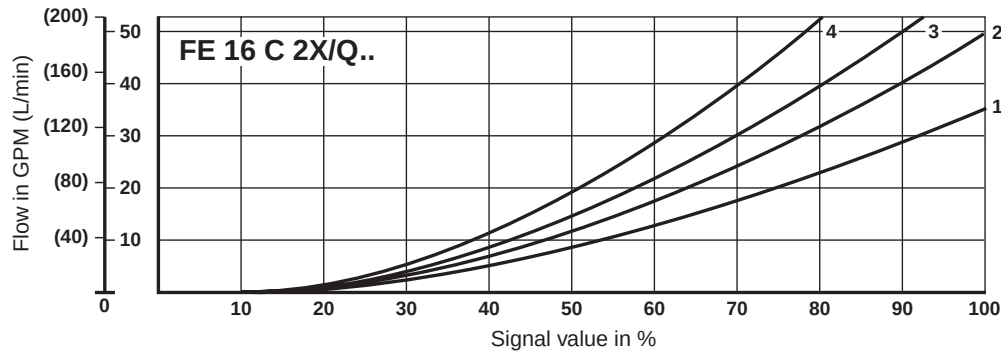


Frequency characteristics: measured at $p_A = 725 \text{ PSI (50 bar)}$; $v = 190 \text{ SUS (41 mm}^2\text{/s)}$
and $t = 122 \text{ }^\circ\text{F (50 }^\circ\text{C)}$



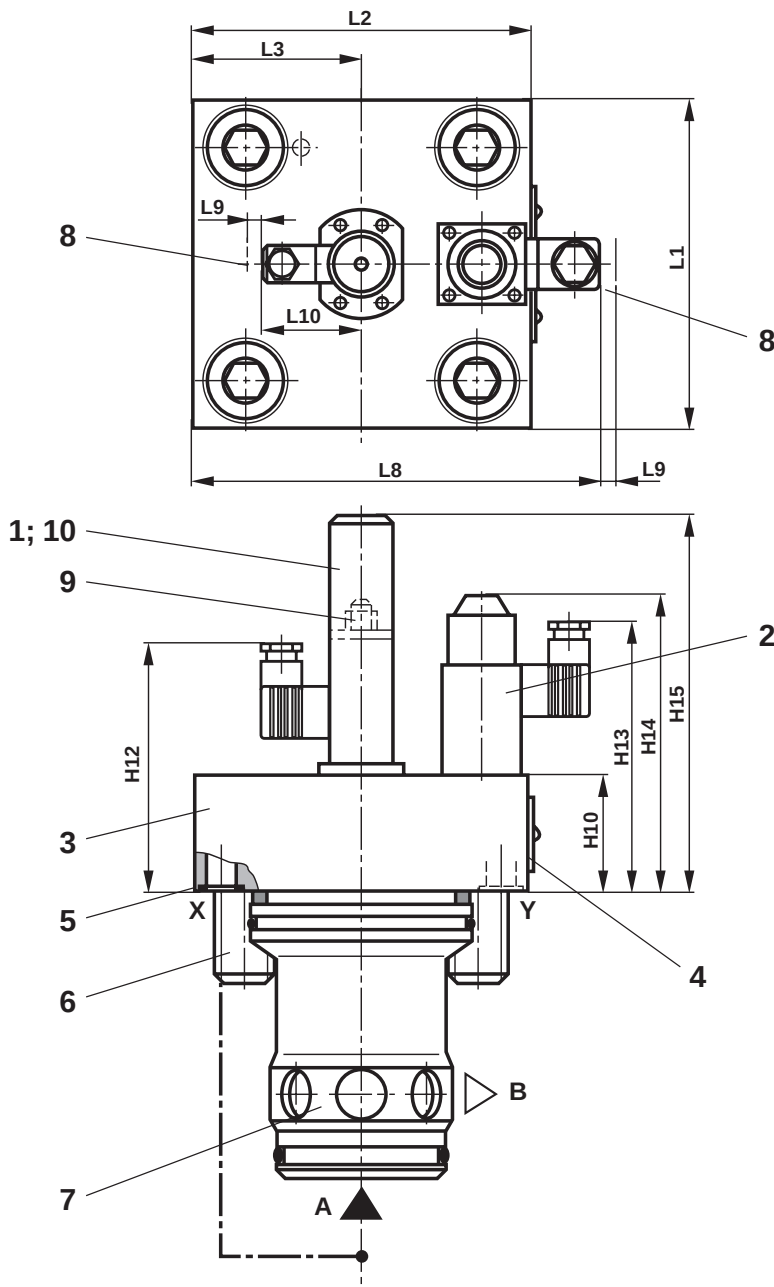
Operating Curves: measured at $v = 190 \text{ SUS}$ ($41 \text{ mm}^2/\text{s}$) and $t = 122^\circ\text{F}$ (50°C)

Flow characteristic, linear (size 16 ... 63)


Operating Curves: measured at $v = 190 \text{ SUS}$ ($41 \text{ mm}^2/\text{s}$) and $t = 122^\circ\text{F}$ (50°C)**Flow characteristic, progressive (sizes 16 ... 40)**

Unit dimensions: dimensions in inches (millimeters)

Size	16	25	32	40	50	63
H10	1.97 (50)	2.01 (51)	1.61 (41)	1.61 (41)	2.56 (65)	2.56 (65)
H12	4.57 (116)	4.61 (117)	4.21 (107)	4.21 (107)	5.16 (131)	5.16 (131)
H13	4.53 (115)	4.57 (116)	4.17 (106)	4.17 (106)	5.51 (140)	5.51 (140)
H14	4.72 (120)	4.76 (121)	4.37 (111)	4.37 (111)	—	—
H15	—	—	—	—	7.64 (194)	7.64 (194)
L1	2.56 (65)	3.34 (85)	3.93 (100)	4.92 (125)	5.51 (140)	7.08 (180)
L2	3.26 (83)	3.68 (93.5)	3.93 (100)	4.92 (125)	5.51 (140)	7.08 (180)
L3	1.28 (32.5)	1.67 (42.5)	1.97 (50)	2.46 (62.5)	2.75 (70)	3.54 (90)
L8	4.76 (121)	5.15 (131)	5.47 (139)	6.26 (159)	6.81 (173)	8.34 (212)
L9	0.6 (15)	0.6 (15)	0.6 (15)	0.6 (15)	0.6 (15)	0.6 (15)
L10	2.1 (53)	2.1 (53)	2.1 (53)	2.1 (53)	2.1 (53)	2.1 (53)



1 Inductive positional transducer

2 Proportional solenoid

3 Cover

4 Name plate

5 R ring (port X, Y)

Size 16 R ring 9.81 mm x 1.5 mm x 1.78 mm

Size 25 R ring 9.81 mm x 1.5 mm x 1.78 mm

Size 32 R ring 11.18 mm x 1.6 mm x 1.78 mm

Size 40 R ring 12.81 mm x 2.4 mm x 2.62 mm

Size 50 R ring 12.81 mm x 2.4 mm x 2.62 mm

Size 63 R ring 17.56 mm x 2.4 mm x 2.62 mm

6 Socket head valve mounting bolts Tightening torque

16 M8 x 35 (5/16" x 1-1/4") 18.5 lb-ft (25 Nm)

25 M12 x 60 (1/2" x 2") 55 lb-ft (75 Nm)

32 M16 x 55 (5/8" x 2") 125 lb-ft (170 Nm)

40 M20 x 60 (3/4" x 2-1/4") 258 lb-ft (350 Nm)

50 M20 x 80 (7/8" x 3-1/4") 280 lb-ft (380 Nm)

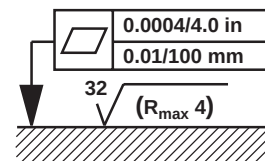
63 M30 x 90 (1-1/4" x 3-1/2") 885 lb-ft (1200 Nm)

7 Sleeve

8 Space required to remove plug

9 Sizes 16 ... 40

10 Sizes 50, 63

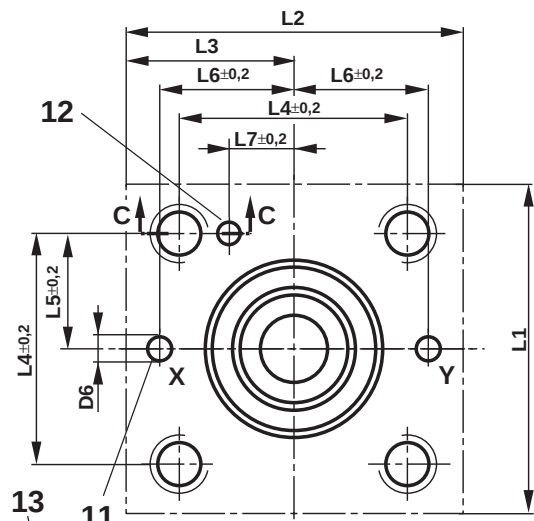


Required surface finish of interface when mounting the valve without our subplate

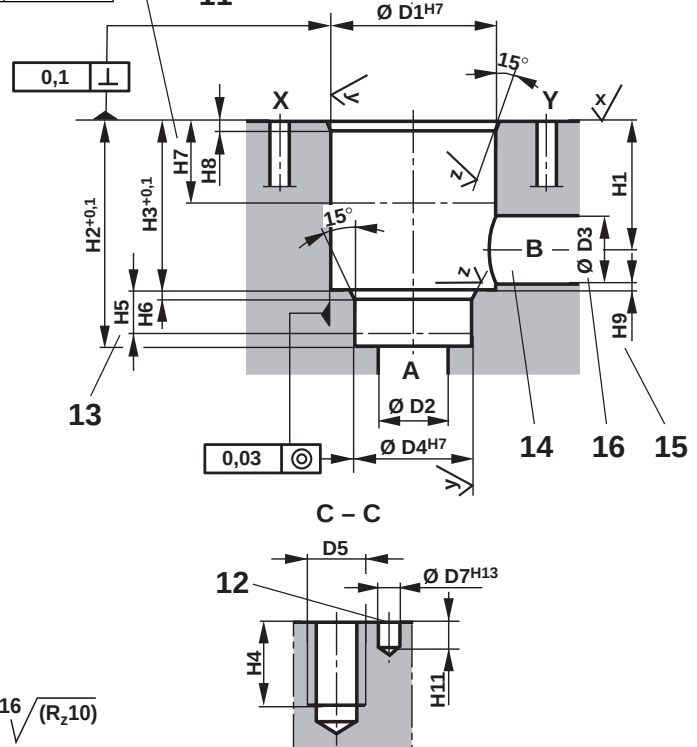
Installation bore and mounting pattern to DIN 24 342: dimensions in inches (millimeters)

Size	16	25	32	40	50	63
Ø D1	1.2598 ^{+0.0009} ₋₀ (32) ^{H7}	1.7716 ^{+0.0009} ₋₀ (45) ^{H7}	2.3622 ^{+0.0009} ₋₀ (60) ^{H7}	2.9527 ^{+0.0009} ₋₀ (75) ^{H7}	3.5433 ^{+0.0009} ₋₀ (90) ^{H7}	4.7244 ^{+0.0013} ₋₀ (120) ^{H7}
Ø D2	0.63 (16)	0.98 (25)	1.26 (32)	1.57 (40)	1.97 (50)	2.48 (63)
Ø D3	0.63 (16)	0.98 (25)	1.26 (32)	1.57 (40)	1.97 (50)	2.48 (63)
Ø D3 _{max}	0.98 (25)	1.26 (32)	1.57 (40)	1.97 (50)	2.48 (63)	3.15 (80)
Ø D4	0.9842 ^{+0.0008} ₋₀ (25) ^{H7}	1.3385 ^{+0.0009} ₋₀ (34) ^{H7}	1.7716 ^{+0.0009} ₋₀ (45) ^{H7}	0.9842 ^{+0.0011} ₋₀ (55) ^{H7}	0.9842 ^{+0.0011} ₋₀ (68) ^{H7}	0.9842 ^{+0.0013} ₋₀ (90) ^{H7}
D5	5/16" U.N.C. (M8)	1/2" U.N.C. (M12)	5/8" U.N.C. (M16)	3/4" U.N.C. (M20)	7/8" U.N.C. (M20)	1 1/4" U.N.C. (M30)
Ø D6 _{max}	0.15 (4)	0.23 (6)	0.31 (8)	0.39 (10)	0.39 (10)	0.48 (12)
Ø D7	0.157 ^{+0.0071} ₋₀ (4) ^{H13}	0.236 ^{+0.0071} ₋₀ (6) ^{H13}	0.236 ^{+0.0071} ₋₀ (6) ^{H13}	0.236 ^{+0.0071} ₋₀ (6) ^{H13}	0.314 ^{+0.0087} ₋₀ (8) ^{H13}	0.314 ^{+0.0087} ₋₀ (8) ^{H13}
H1	1.34 (34)	1.73 (44)	2.04 (52)	2.52 (64)	2.83 (72)	3.74 (95)
H1(*)	1.16 (29.5)	1.59 (40.5)	1.89 (48)	2.32 (59)	2.58 (65.5)	3.40 (86.5)
H2 ^{+0.004} _{-0.000} (+0.1)	2.204 (56)	2.834 (72)	3.346 (85)	4.134 (105)	4.803 (122)	6.102 (155)
H3 ^{+0.004} _{-0.000} (+0.1)	1.693 (43)	2.283 (58)	2.756 (70)	3.425 (87)	3.937 (100)	5.118 (130)
H4	0.78 (20)	0.98 (25)	1.38 (35)	1.77 (45)	1.77 (45)	2.56 (65)
H5	0.43 (11)	0.47 (12)	0.51 (13)	0.59 (15)	0.67 (17)	0.78 (20)
H6	0.08 (2)	0.09 (2.5)	0.09 (2.5)	0.12 (3)	0.12 (3)	0.15 (4)
H7	0.78 (20)	1.18 (30)	1.18 (30)	1.18 (30)	1.37 (35)	1.57 (40)
H8	0.08 (2)	0.09 (2.5)	0.09 (2.5)	0.12 (3)	0.15 (4)	0.15 (4)
H9 _{min}	0.02 (0.5)	0.04 (1)	0.06 (1.5)	0.09 (2.5)	0.09 (2.5)	0.11 (3)
H11 _{min}	0.39 (10)	0.39 (10)	0.39 (10)	0.39 (10)	0.39 (10)	0.39 (10)
L1	2.56 (65)	3.34 (85)	3.93 (100)	4.92 (125)	5.51 (140)	7.08 (180)
L2	3.26 (83)	3.68 (93)	3.93 (100)	4.92 (125)	5.51 (140)	7.08 (180)
L3	1.28 (32.5)	1.67 (42.5)	1.97 (50)	2.46 (62.5)	2.75 (70)	3.54 (90)
L4±0.008(±0.2)	1.811 (46)	2.283 (58)	2.756 (70)	3.346 (85)	3.937 (100)	4.921 (125)
L5±0.008(±0.2)	0.905 (23)	1.141 (29)	1.378 (35)	1.673 (42.5)	1.968 (50)	2.460 (62.5)
L6±0.008(±0.2)	0.983 (25)	1.299 (33)	1.614 (41)	19.68 (50)	2.283 (58)	2.952 (75)
L7±0.008(±0.2)	0.413 (10.5)	0.629 (16)	0.669 (17)	0.905 (23)	1.181 (30)	1.496 (38)

*) at max. Ø D3



- 11 Connect port X with port A
- 12 Hole for fixing pin
- 13 Mounting depth
- 14 Port B may be placed at any point around the central axis of port A, but clearance must always be allowed for the mounting bolt holes
- 15 Dependent on diameter D3 this minimum dimensions (H9) must be maintained
- 16 For other diameters of port B as given in the dimensions table, the distance of the hole must be calculated from the cover mounting surface



$$x/\sqrt{32} = \sqrt{R_{\max}4}$$

$$y/\sqrt{63} = \sqrt{R_{\max}8}$$

$$z/\sqrt{16} = \sqrt{R_z10}$$

Notes