Proportional cartridge throttle valve, with on-board electronics (OBE) and inductive position transducer, pilot operated

Type FESXE

RE 29216/12.07
Replaces: 09.05

Nominal size (NG) 16, 25, 32, 40, 50
Unit series 1X
Maximum working pressure A, B, X 315 bar, Y 100 bar
Nominal flow rate Q_{nom} 980 l/min

List of contents

Features

- Pilot operated throttle valves with on-board electronics (OBE) and inductive position transducer
- Design: cartridge type DIN 24342, ISO/DIS 7368
  Control oil external X and Y
- Adjustable via the position-controlled main stage by means of the position transducer and on-board electronics
- Hysteresis < 0.2 %, positioning accuracy > 0.5 %, see Technical data
- Plug-in connector to DIN 43563-AM6 for the electrical connection, see catalog page RE 08008 (order separately)
- Data for the on-board trigger electronics
  - Complies with CE, EMC directives EN 61000-6-2: 2002-08 and EN 61000-6-3: 2002-08
  - U_B = 24 V_{nom} DC
  - Electrical connection 6P+PE
  - Signal actuation
    – Standard 0...+10 V (A1)
  - Valve curve calibrated at the factory

Ordering data

FESX	E		C	A	–1X/		L	K0	B1	M	*

Proportional throttle valve with inductive position transducer (pilot operated)

With on-board electronics **= E**

Nominal size **= 16**
Mounting hole configuration **= 25**
DIN 24342, ISO/DIS 7368 **= 32**
= 40
= 50

Connection type **= C**
(cartridge)

Direction of flow A → B **= A**
(customer may implement B → A)

Unit series 10 to 19 **= 1X**
(10 to 19: installation and connection dimensions unchanged)

125 =
210 =
320 =
500 =
980 =
Nominal flow rate
Q_{nom} in l/min
Δp = 5 bar

L = **Flow characteristic**
Linear

K0 = **Electrical connection**
without plug-in connector,
with unit plug to DIN 43563-AM6
Order plug-in connector separately

B1 = **Interface for trigger electronics**
Setpoint input 0.5...+10 V

M = NBR seals, suitable for mineral oils (HL, HLP) to DIN 51524

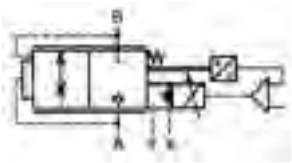
Further information in plain text

Preferred types

Material Number	Type
0 811 402 454	FESXE16CA–1X/125LK0B1M
0 811 402 517	FESXE25CA–1X/210LK0B1M
0 811 402 616	FESXE32CA–1X/320LK0B1M
0 811 402 622	FESXE40CA–1X/500LK0B1M
0 811 402 642	FESXE50CA–1X/980LK0B1M

Symbol

For on-board trigger electronics



Function, sectional diagram

General

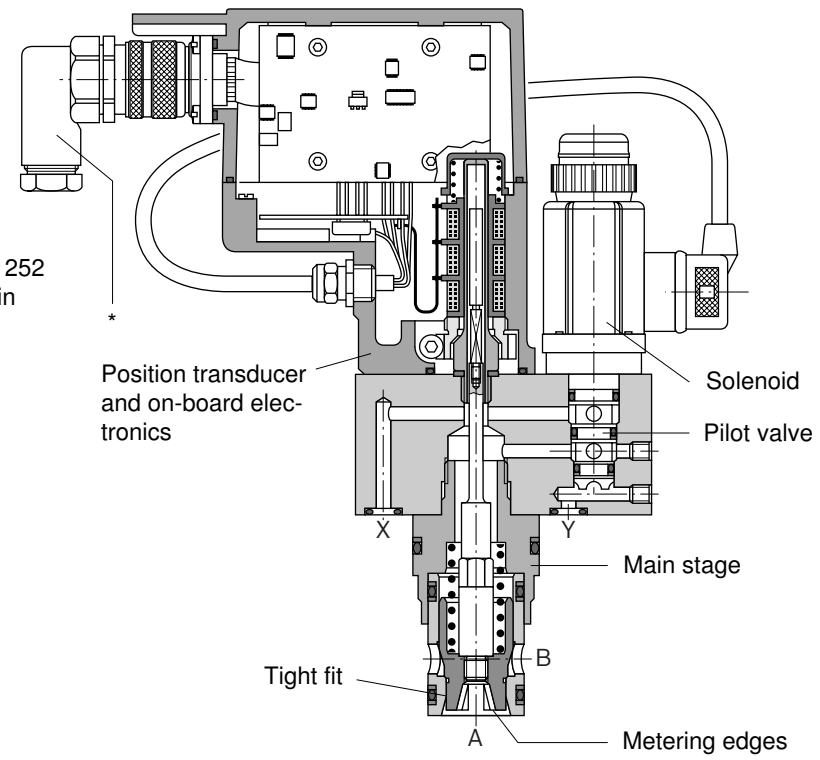
Type FESXE proportional throttle valves are pilot operated and in “cartridge” design. This results in their compact form despite high flow rates.
The position of the main spool is closed-loop controlled by the on-board electronics (OBE). Hysteresis is < 0.2 %, and a position accuracy of > 0.5 % is achieved.
For external valve shutdown (bypassing the valve electronics), the ISA adapter is available as an accessory. This adapter protects the solenoid and the switch contacts during shutdown.

Basic principle

Pilot operated 2/2-way cartridge type valves.
There is a free choice of directions of flow, A → B or B → A, but please note:
- Always route “Y” externally
- Pressure at “X” must always be equal to or greater than at “A” and not below 12 bar when A → B.
- Pressure at “X” must always be equal to or greater than at “B” and not below 20 bar when B → A.

If the valve is shut down electrically and is supplied externally with sufficient pressure at “X”, the main stage A → B may be employed as a poppet valve.

CE EN 61000-6-2: 2002-08
EN 61000-6-3: 2002-08



* Use of 90° plug 1 834 484 252 is preferable, not included in scope of delivery.

Accessories

Type			Material Number
(4 x) ISO 4762	Cheese-head bolts included in scope of delivery		
* 	Plug-in connectors 2P+PE, see also RE 08008	KS	**1 834 482 022**
		KS	**1 834 482 026**
		MS	**1 834 482 023**
		MS	**1 834 482 024**
		KS 90°	**1 834 484 252**
	ISA adapter for external solenoid shutdown, see page 8		**1 834 484 245**

Testing and service equipment

Test box type VT-PE-TB3, see RE 30065
Measuring adapter 6P+PE type VT-PA-2, see RE 30068

Technical data

General						
Construction			Cartridge type throttle valve, spool valve with closed-loop position control via OBE			
Actuation			Pilot operated, proportional 3/2-way directional control valve in valve cover, without position control			
Main stage			Position control via OBE and position transducer LVDT DC/DC			
Connection type			Cartridge type, mounting hole configuration to DIN 24342, ISO/DIS 7368			
Mounting position			Horizontal if possible, or position transducer at the bottom			
Ambient temperature range		°C	–20...+50			
Vibration resistance, test condition			Max. 25 g, shaken in 3 dimensions (24 h)			

Hydraulic (measured with HLP 46, ϑ_{oil} = 40 °C ±5 °C)						
Pressure fluid			Hydraulic oil to DIN 51524...535, other fluids after prior consultation			
Viscosity range	recommended	mm^2/s	20...100			
	max. permitted	mm^2/s	10...800			
Pressure fluid temperature range		°C	–20...+70			
Maximum permitted degree of contamination of pressure fluid Purity class to ISO 4406 (c)			Class 18/16/13 [1]			
Direction of flow			A → B or B → A (when X supplied “internally”, or “externally” when pressure higher)			
Nominal flow rate at Δp = 5 bar per edge [2]		l/min	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**
			125	210	320	500	980
Weight		kg	3.5	4.6	5.8	7.9	10.5
Max. working pressure in A, B, X		bar	315	315	315	315	315
Max. working pressure in Y		bar	100	100	100	100	100
Q_{max}		l/min	350	600	1,000	1,500	3,000
Q_N pilot valve (supply) Δp = 5 bar		l/min	5	15	15	28	28
Leakage X → Y Pilot valve at 100 bar		cm^3/min	< 150	< 200	< 200	< 400	< 400
Min. flow rate at U_E = 0 V adjustable Valve active (Δp = 5 bar)		cm^3/min	2,000	2,000	3,000	3,000	4,000
Leakage in main stage at Δp =100 bar (valve shut down electrically)			A → B = tight (poppet valve) B → A = tight (poppet valve) **Note**: min. leakage X → B possible when X = external				
Minimum supply pressure A → B		bar	12	12	12	12	12
Minimum supply pressure B → A		bar	20	20	20	20	20

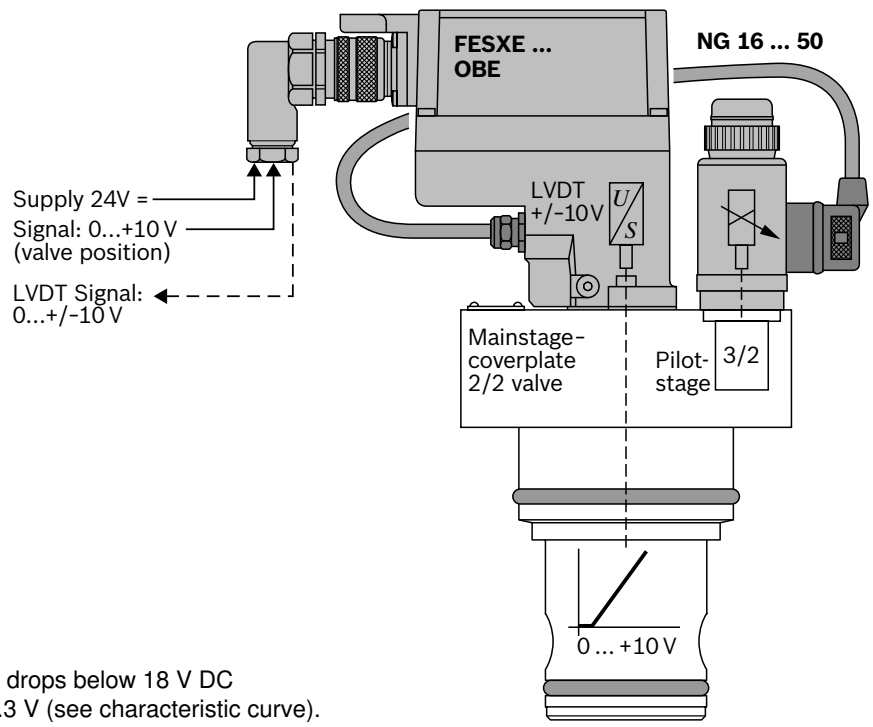
Static/Dynamic						
Spool stroke/characteristic curve		+ mm	4	5	7	10	12.5
Overlap on shutdown		– mm	3	3	3	3	3
Control oil volume of main stage 100 %		cm^3	1.02	2.66	6.36	12.57	24.54
Required control oil 0...100 %, x = 100 bar		l/min	3	5	7	9	9
Hysteresis		%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Positioning accuracy		%	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Manufacturing tolerance (Q_{max})		%	≤ ±5				
Response time (x = 100 bar)		ms					
Signal change	0...100 %	“open”	< 70	< 70	< 90	< 90	< 110
Signal change	100... 0 %	“close”	< 70	< 70	< 90	< 130	< 300
Signal change	0... 10 %	“open”	< 50	< 50	< 70	< 70	< 80
Signal change	10... 0 %	“close”	< 40	< 40	< 50	< 70	< 100
Switch-off behavior U_B = OFF or $U_{D–E}$ ≦ 0.3 V			After electrical shutdown (pilot valve opens “X” to the main stage), main stage moves to closed end position				
Thermal drift			< 1 % at ΔT = 40 °C				
Calibration			At the factory ±1 %, when $U_{D–E}$ = 0.5 V, see characteristic curves				

Technical data

Electrical, trigger electronics integrated in valve		
Cyclic duration factor	%	100
Degree of protection		IP 65 to DIN 40050 and IEC 14434/5
Connection		Plug-in connector 6P+PE, DIN 43563
Supply voltage Terminal A: Terminal B: 0 V		24 V DC_{nom} Min. 21 V DC/max. 40 V DC Ripple max. 2 V DC
Power consumption		40 VA max.
External fuse		2.5 A_F
Input, “standard” version Terminal D: U_{D-E} Terminal E:		Differential amplifier, R_i = 100 kΩ 0...0.5...+10 V (see curve) 0 V
Max. voltage to differential inputs over 0 V		D → B E → B } max. 18 V DC
Test signal, “standard” version Terminal F: U_{Test} Terminal C:	A1	LVDT 0...+10 V Reference 0 V
Safety earth conductor and shield		See pin assignment (installation in conformity with CE)
Recommended cable		See pin assignment up to 20 m 7 x 0.75 mm^2 up to 40 m 7 x 1 mm^2
Calibration		Calibrated at the factory, see valve curve
Conformity		CE EN 61000-6-2: 2002-08 EN 61000-6-3: 2002-08

[1] The purity classes stated for the components must be complied with in hydraulic systems.
Effective filtration prevents problems and also extends the service life of components.
For a selection of filters, see catalog sheets RE 50070, RE 50076 and RE 50081.

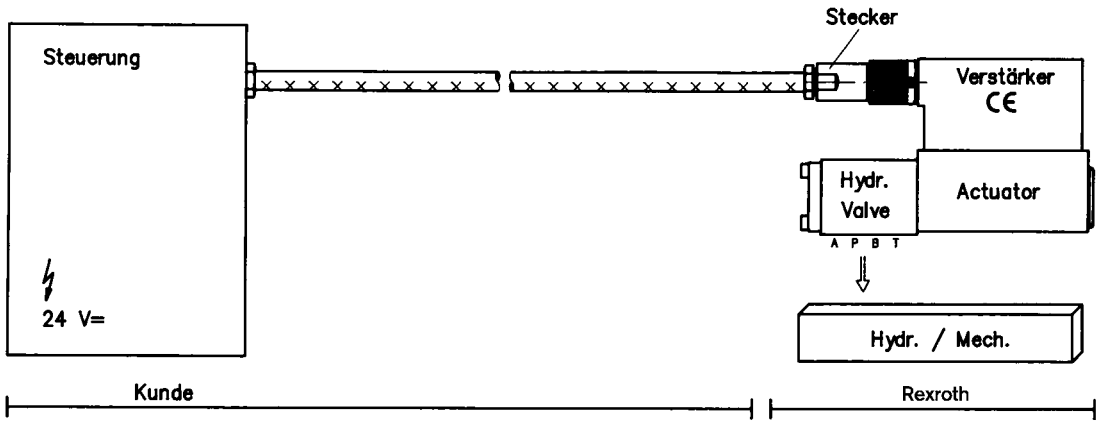
[2] Flow for other values of Δp $Q_X = Q_{nom} \cdot \sqrt{\frac{\Delta p_X}{5}}$



Note
Rapid shutdown takes place if:
– The supply voltage 24 V_{nom} (U_{A-B}) drops below 18 V DC
– The signal setpoint drops below 0.3 V (see characteristic curve).

Connection

For electrical data, see page 7 and
Operating Instructions **1 819 929 083**



Technical notes for the cable

Design:
- Multi-wire cable
- Extra-finely stranded wire to VDE 0295, Class 6
- Safety earth conductor, green/yellow
- Cu braided shield

Type:
- e.g. Ölflex-FD 855 CP (from Lappkabel company)

No. of wires:
- Determined by type of valve, plug type and signal assignment

Cable Ø:
- 0.75 mm^2 up to 20 m long
- 1.0 mm^2 up to 40 m long

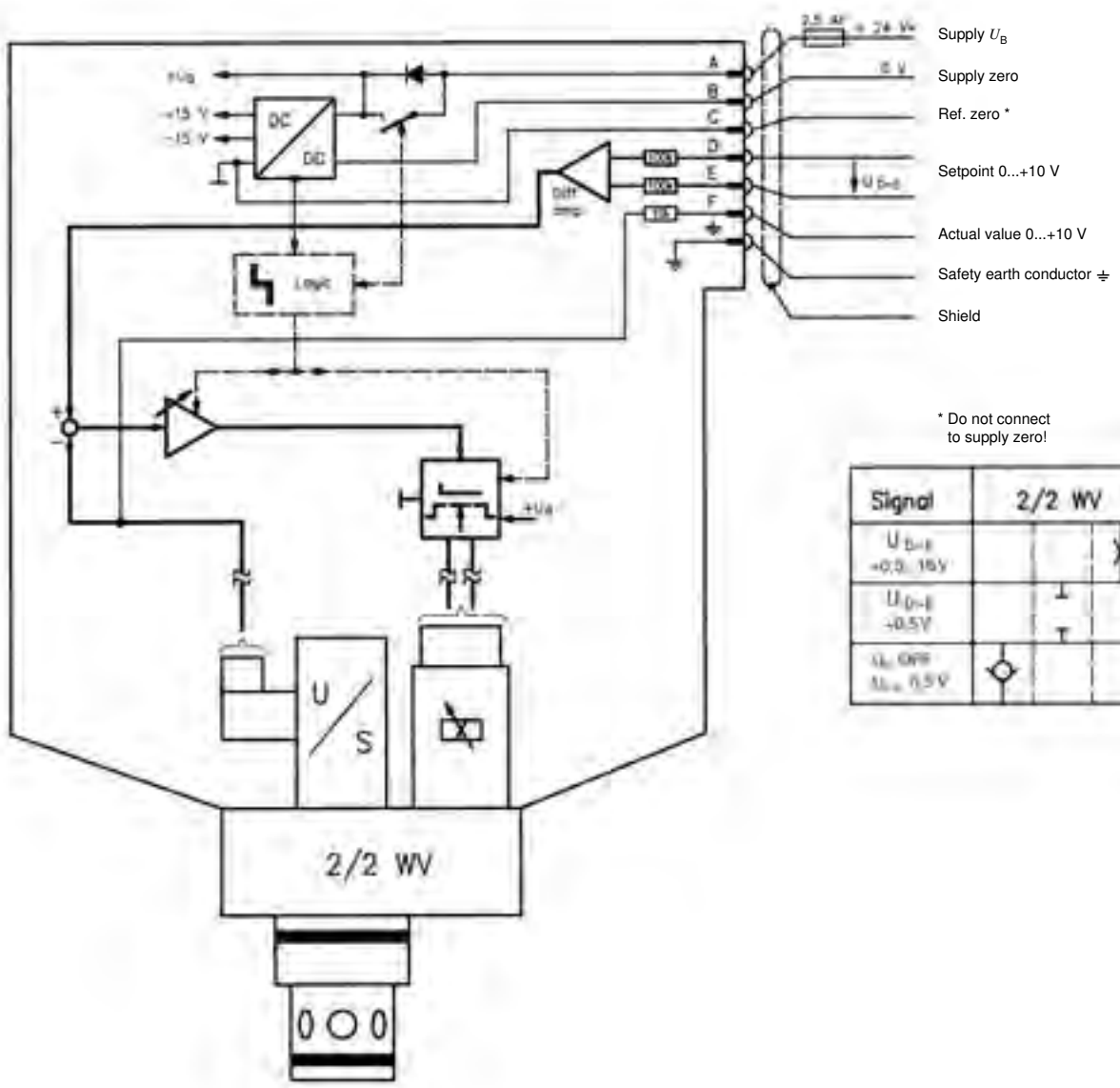
Outside Ø:
- 9.4...11.8 mm – Pg11
- 12.7...13.5 mm – Pg16

Important

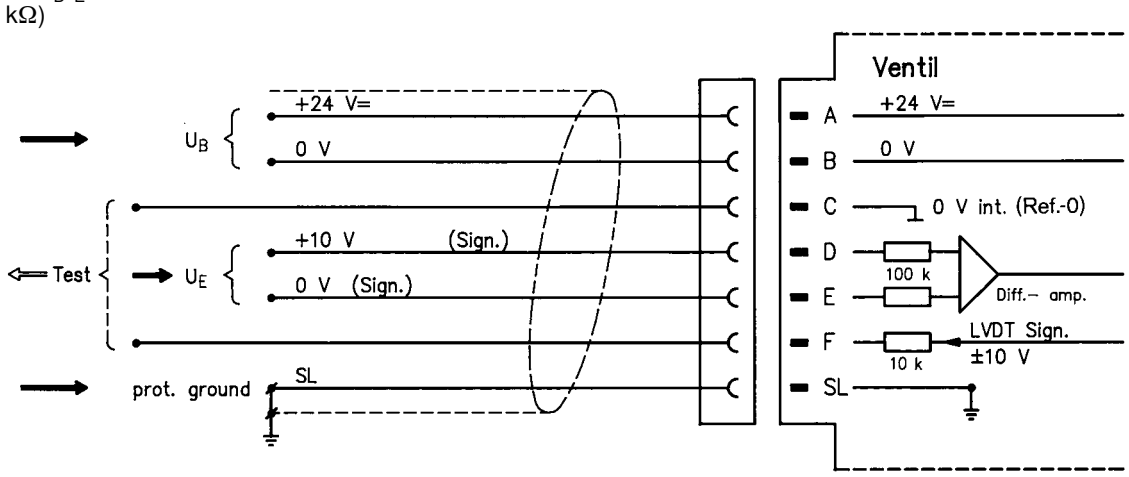
Power supply 24 V DC nom.,
if voltage drops below 18 V DC, rapid shutdown resembling "Enable OFF" takes place internally.
In addition, with the "mA signal" version:
$I_{D-E} \geqq 3$ mA – valve is active
$I_{D-E} \leqq 2$ mA – valve is deactivated.
Electrical signals (e.g. actual values) emitted via the trigger electronics must not be used to shut down safety-relevant machine functions!
(Also see European Standard, "Technical Safety Requirements for Fluid-Powered Systems and Components – Hydraulics", EN 982.)

On-board trigger electronics

Circuit diagram/pin assignment
Version B1: U_{D-E} 0...0.5...+10 V



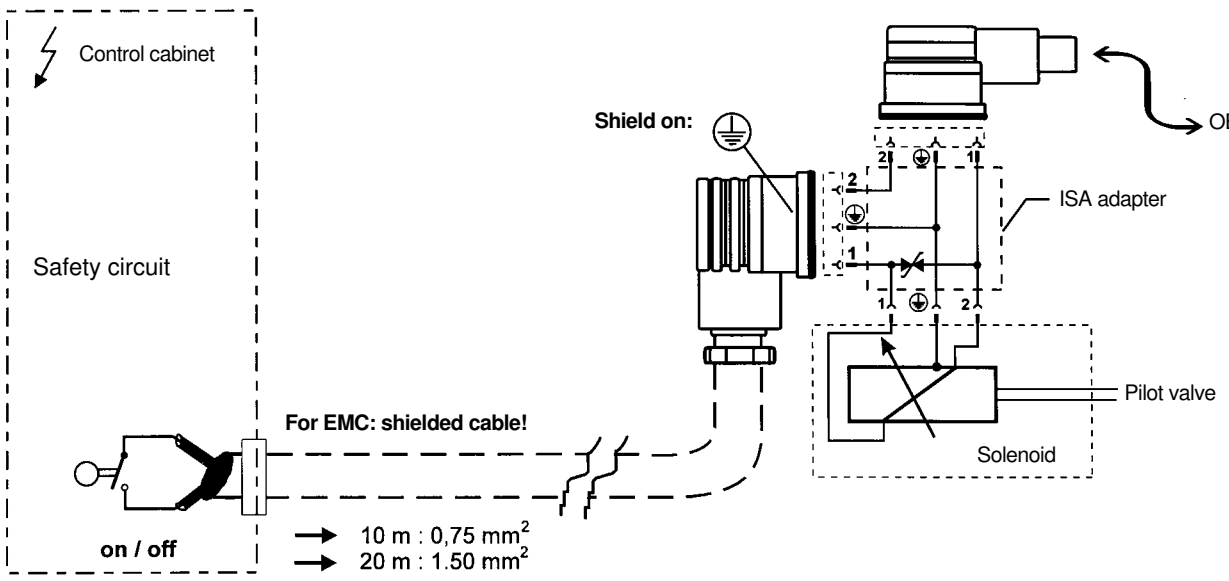
Pin assignment
Version B1: U_{D-E} 0...0.5...+10 V
(R_i = 100 kΩ)



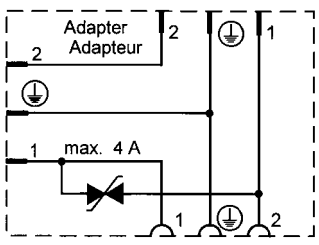
Accessory for external shutdown (ISA adapter)

Function
Interrupt **S**afety **A**dapter, protective circuit and plug connection for external solenoid shutdown (emergency stop circuit).

Circuit with ISA adapter



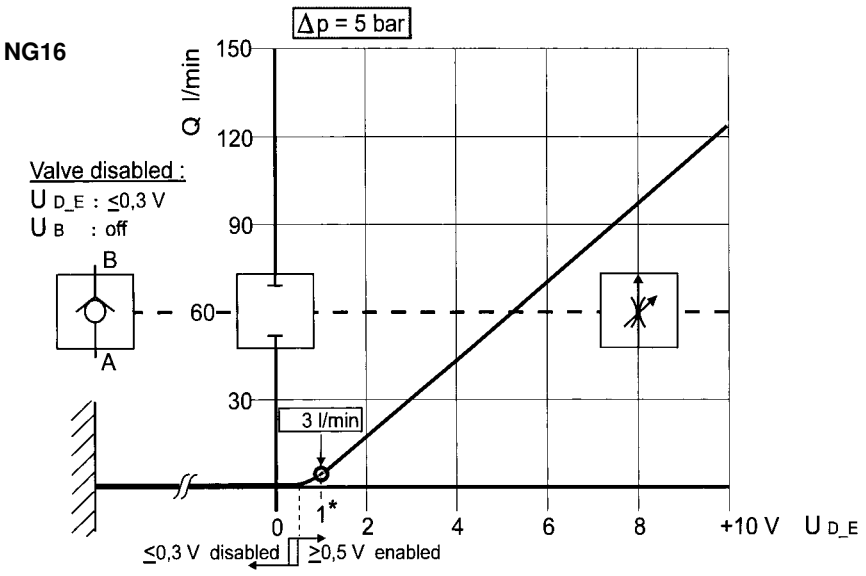
Note
The manufacturer of the complete system is responsible for installation in accordance with EMC guidelines.

Symbol	Application	kg	**Material Number**
	ISA adapter for Rexroth control solenoids up to 50 VA	0.07	**1 834 484 245**

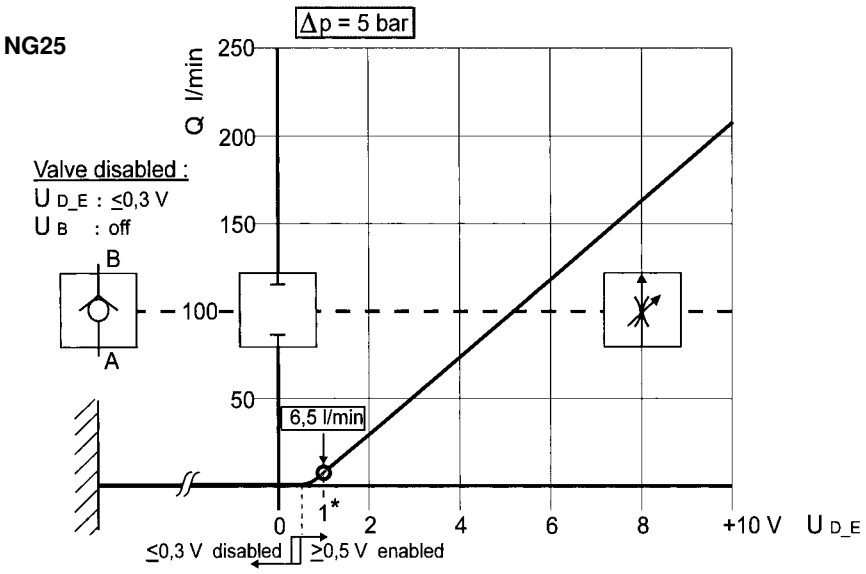
Characteristic curves (measured with HLP 46, ϑ_{oil} = 40 °C ±5 °C)

Δp = 5 bar
ν = 36 mm²/s

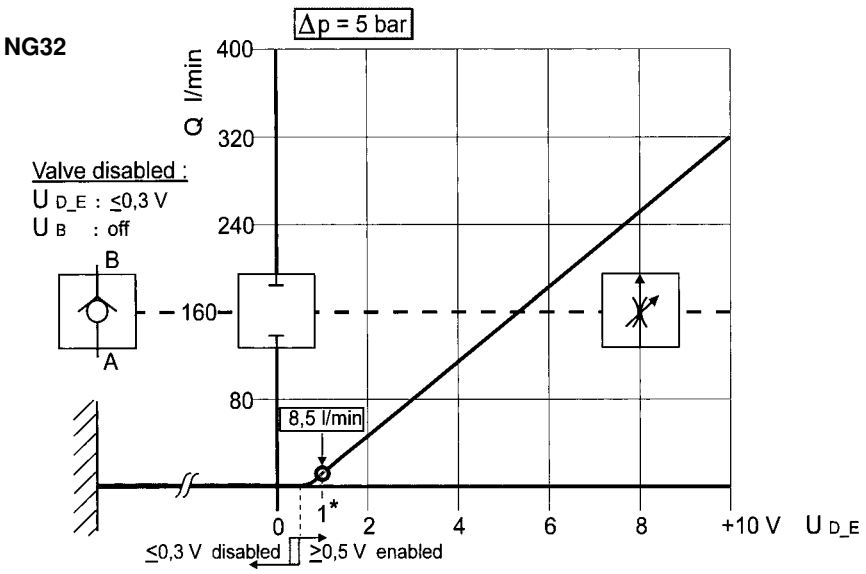
NG16



NG25



NG32

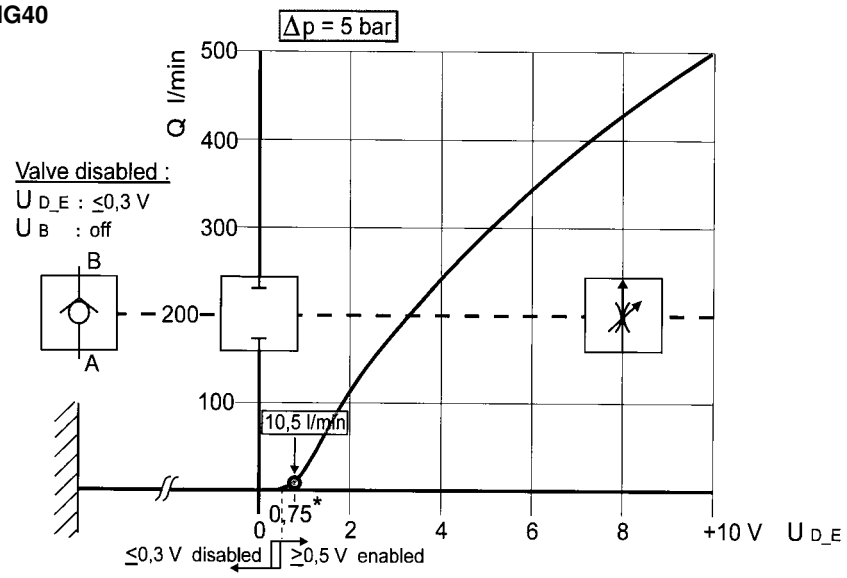


* Factory setting

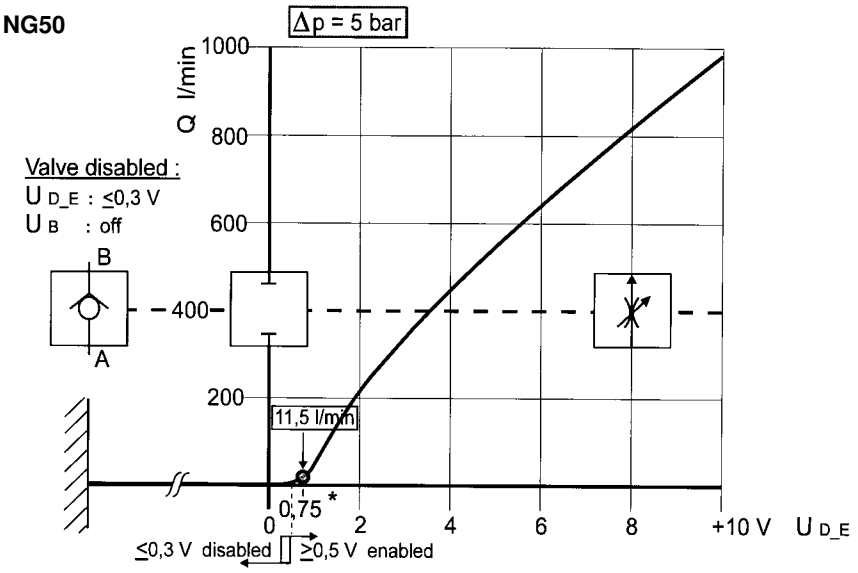
Characteristic curves (measured with HLP 46, ϑ_{oil} = 40 °C ±5 °C)

Δp = 5 bar
ν = 36 mm²/s

NG40



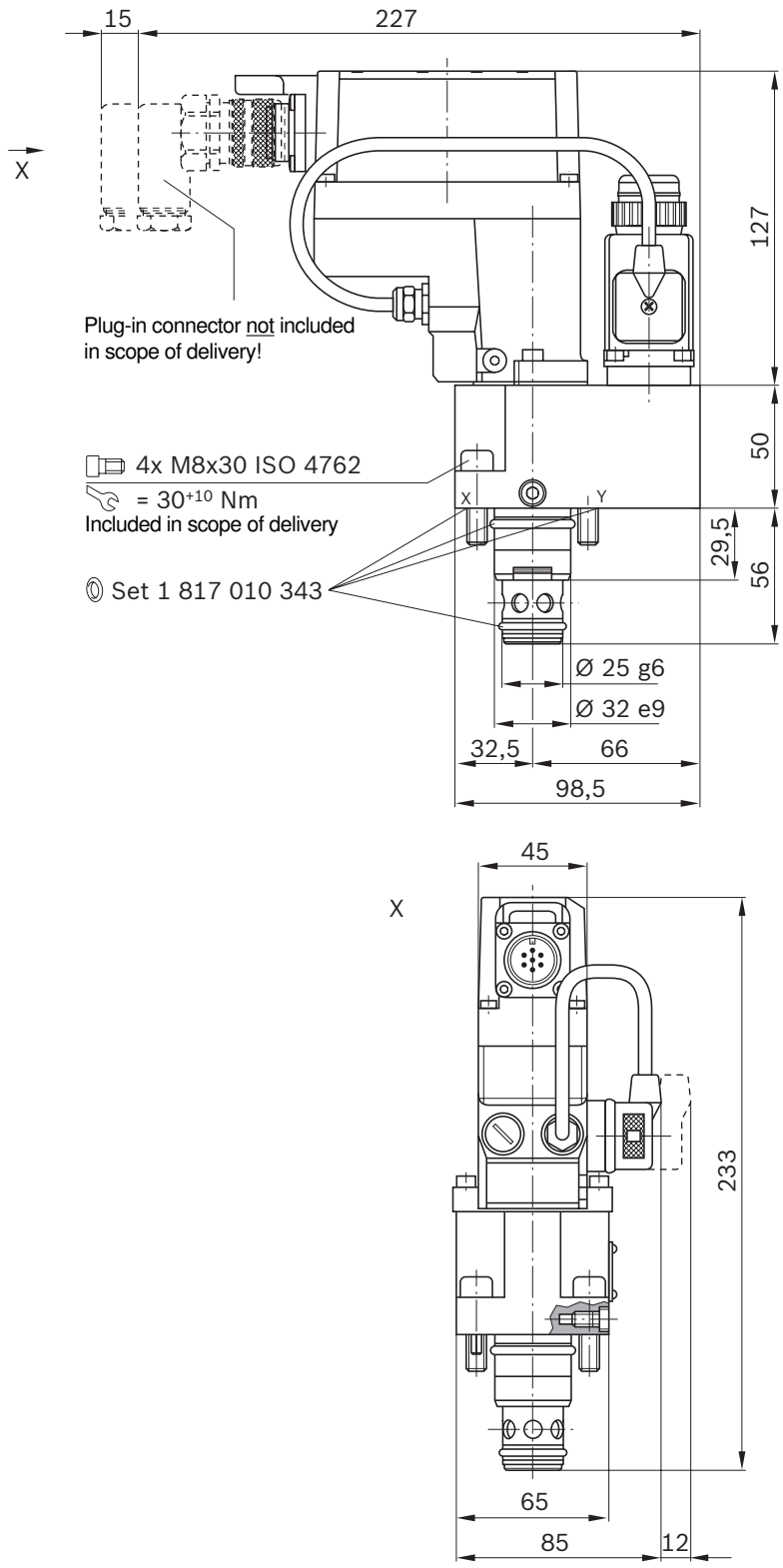
NG50



* Factory setting

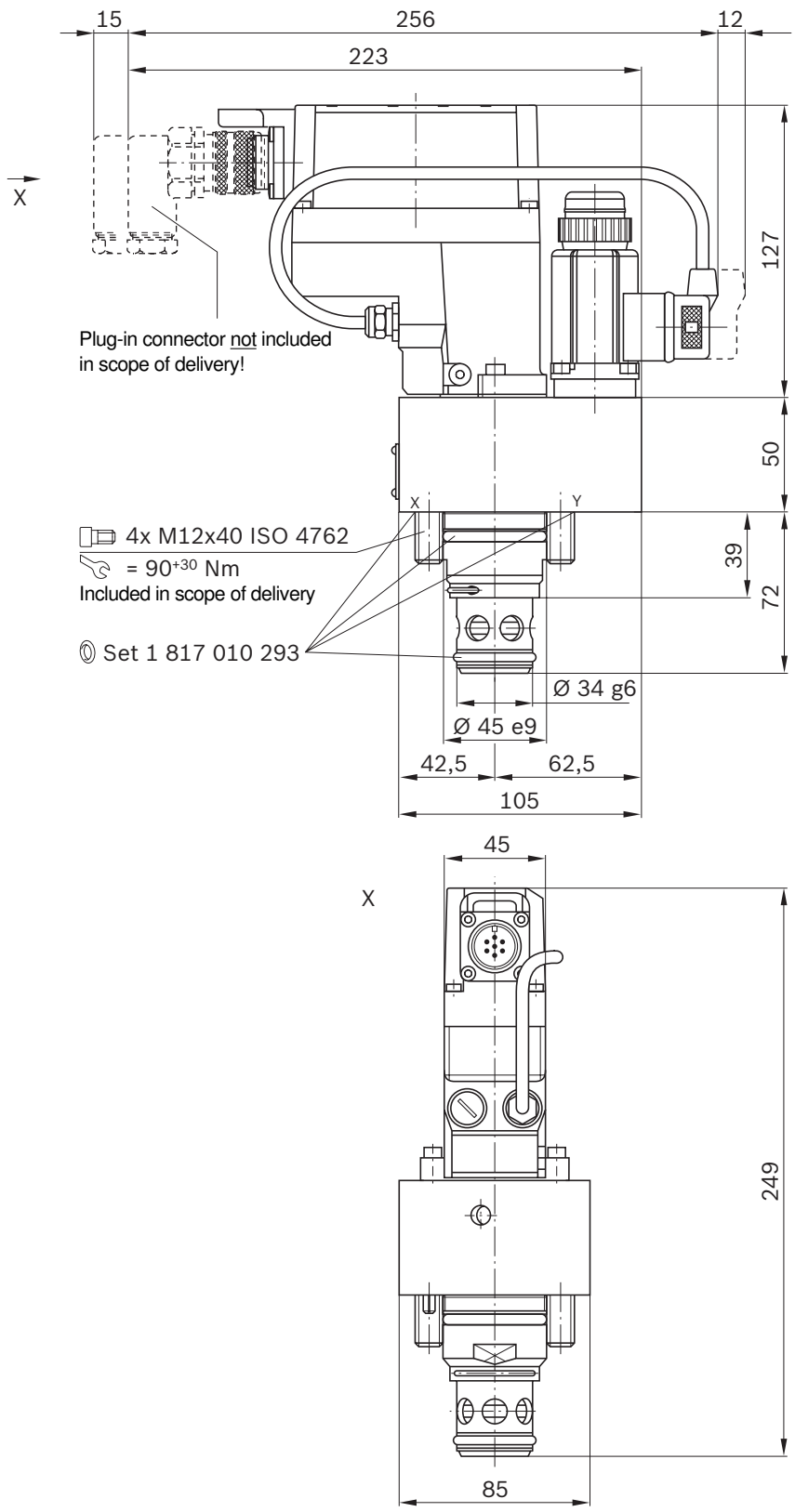
Note
The output stage is shut down at $U_{D-E} \leqq 0.3$ V. The valve goes into poppet position.
The output stage with position control is switched on at $U_{D-E} \geqq 0.5$ V. The spool position is determined by the setpoint.

Unit dimensions NG16 (in mm)



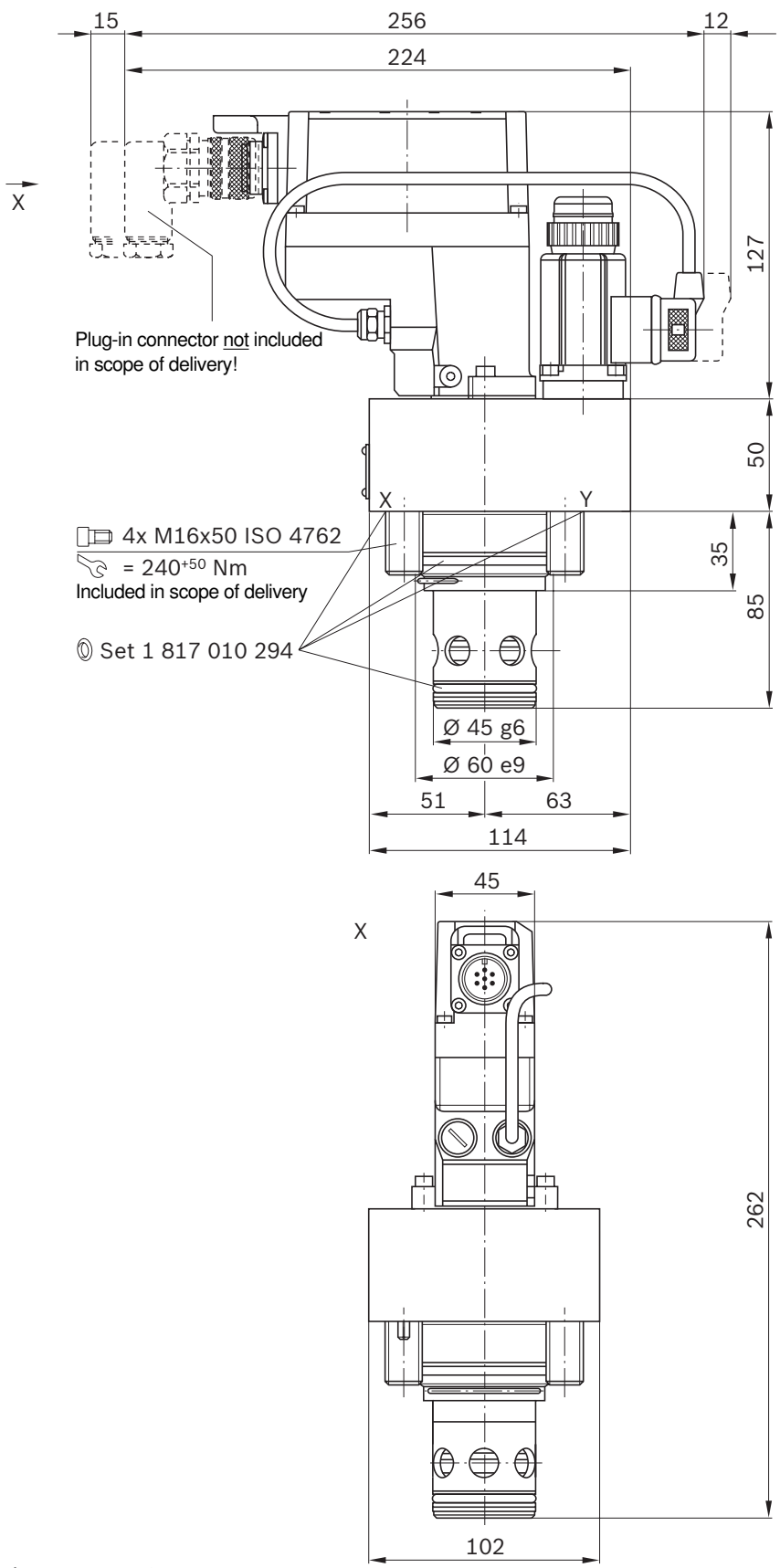
See installation dimensions on page 16

Unit dimensions NG25 (in mm)



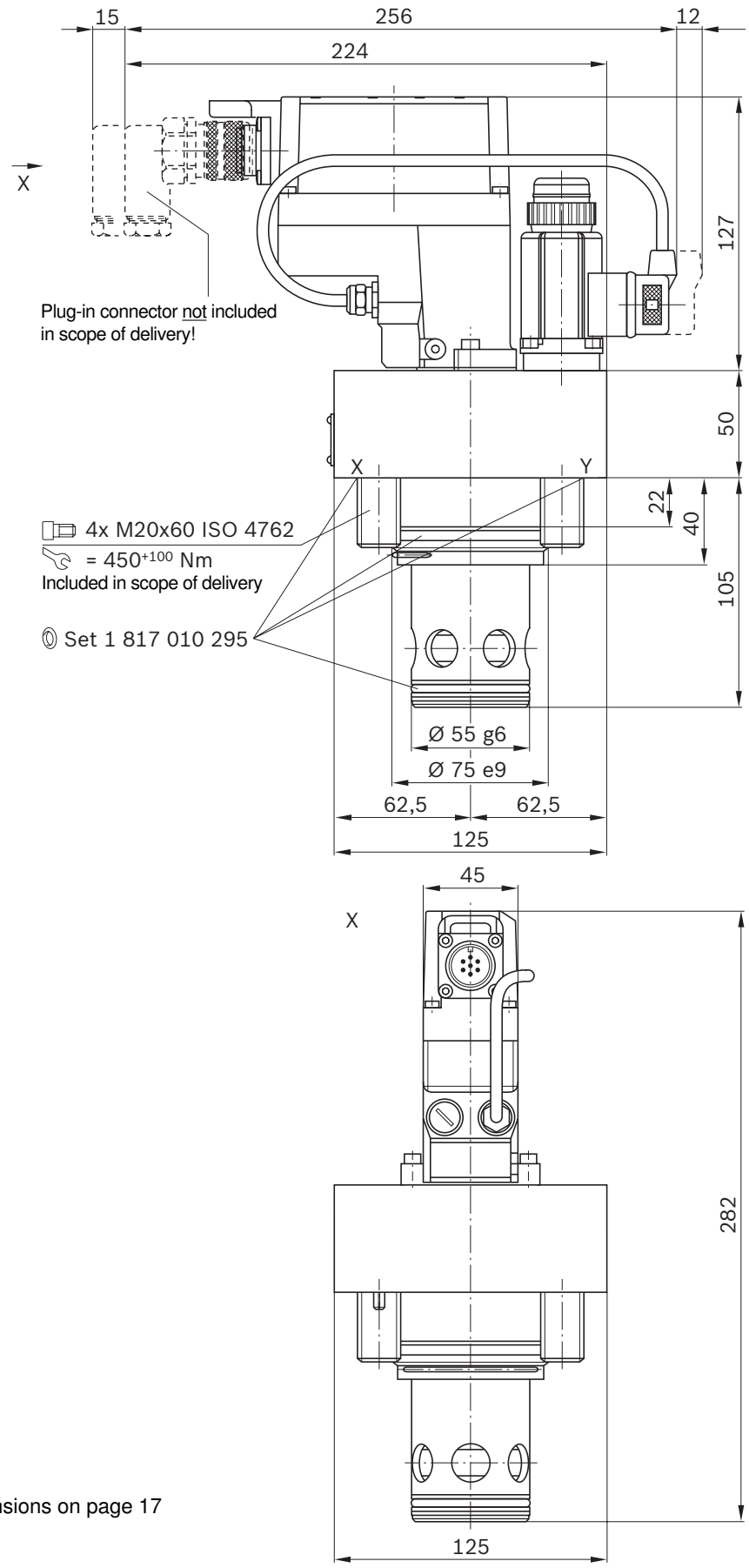
See installation dimensions on page 16

Unit dimensions NG32 (in mm)



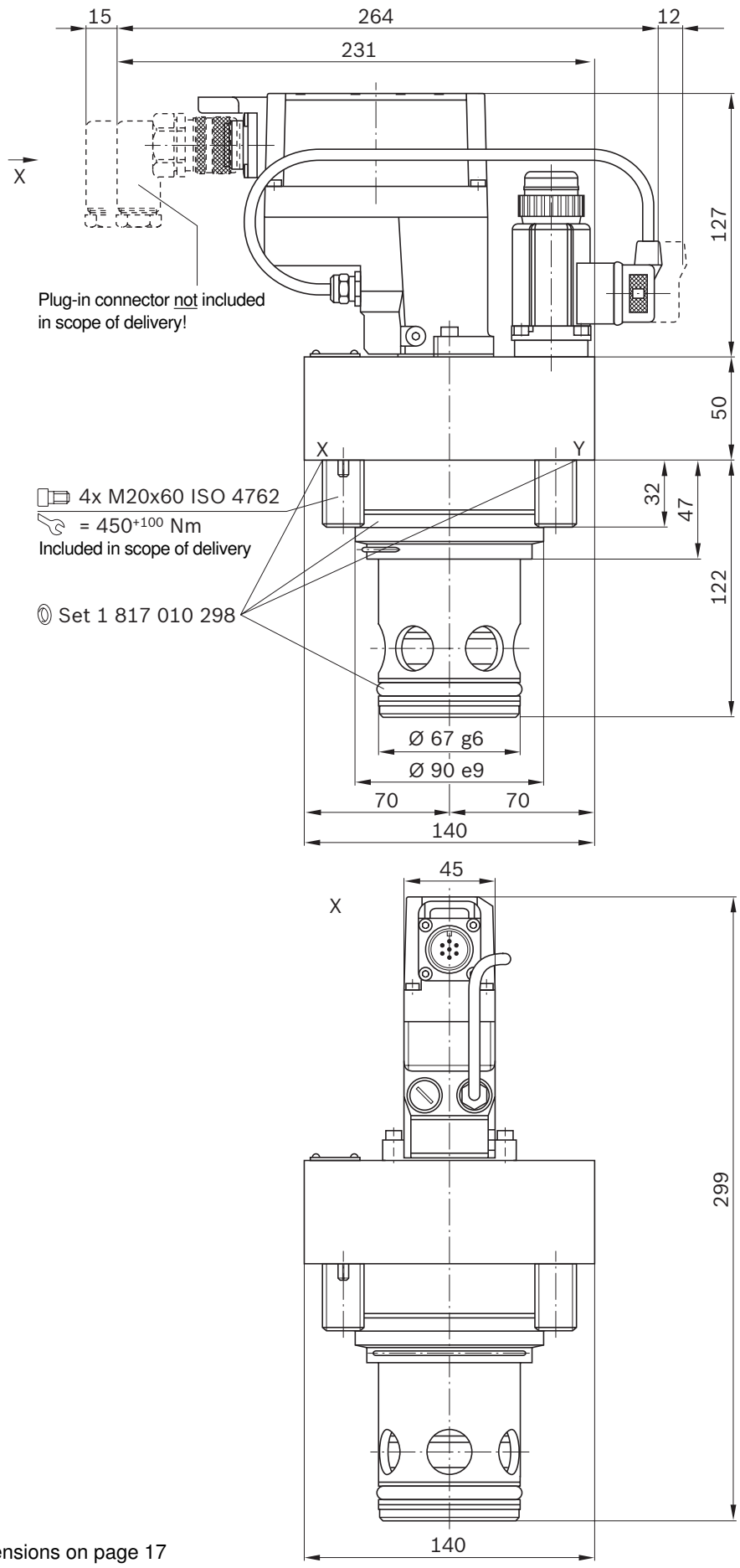
See installation dimensions on page 16

Unit dimensions NG40 (in mm)



See installation dimensions on page 17

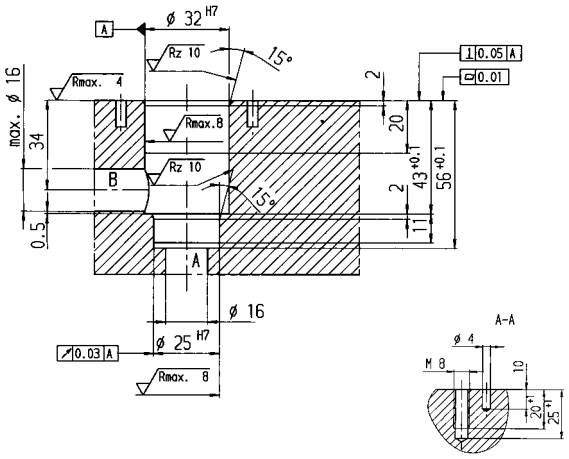
Unit dimensions NG50 (in mm)

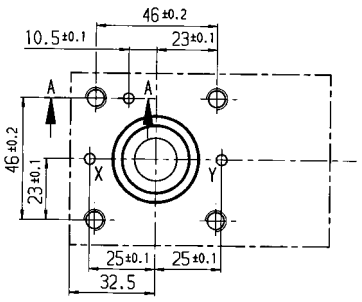


See installation dimensions on page 17

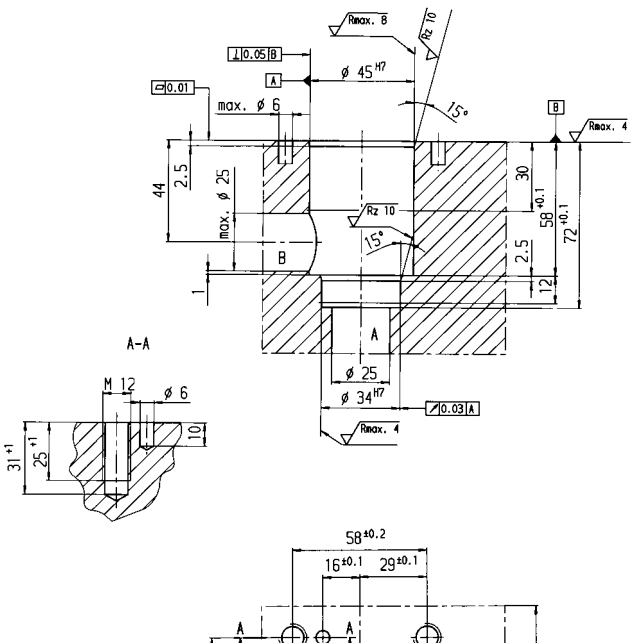
Installation dimensions DIN 24342, ISO/DIS 7368 (in mm)

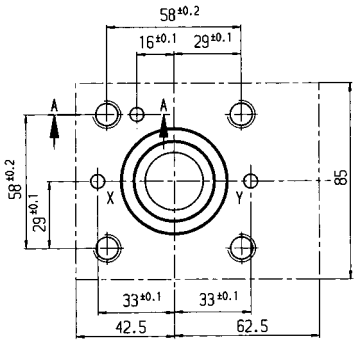
NG16



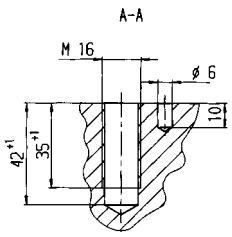


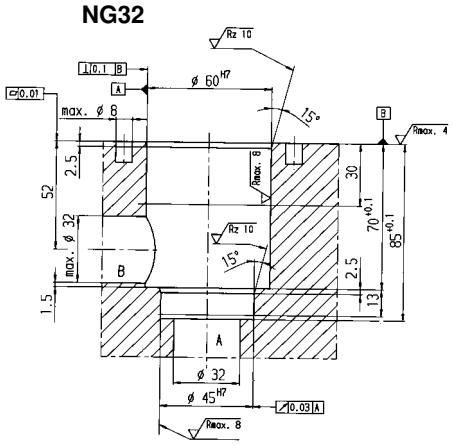
NG25

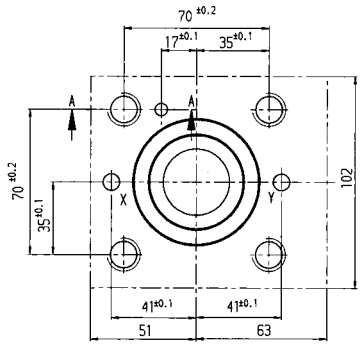




NG32

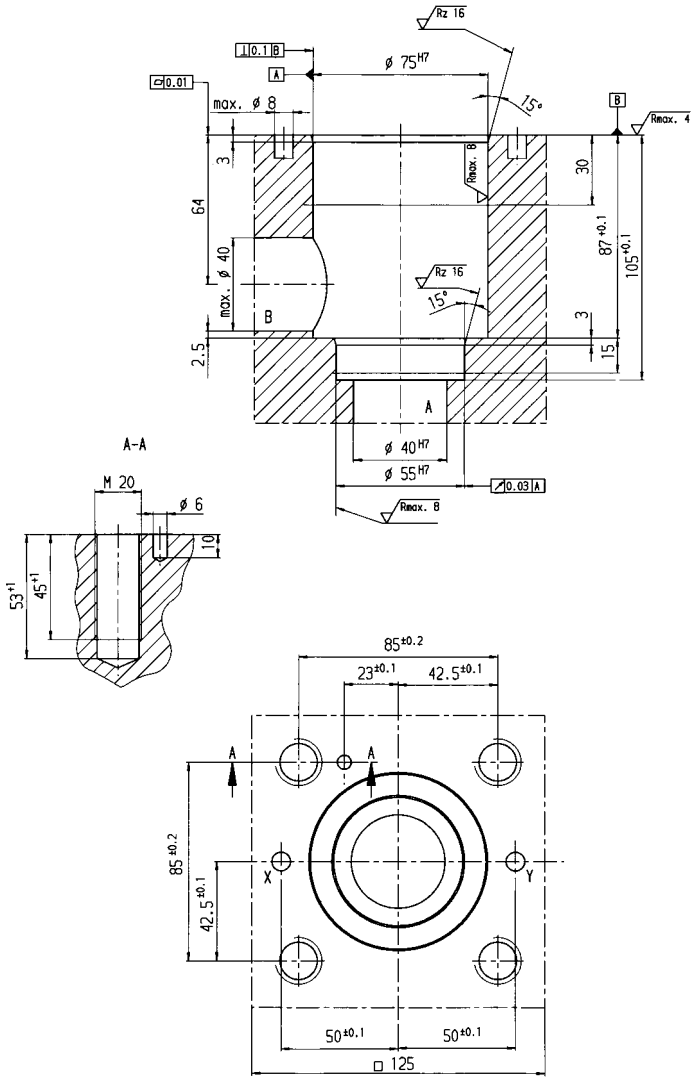




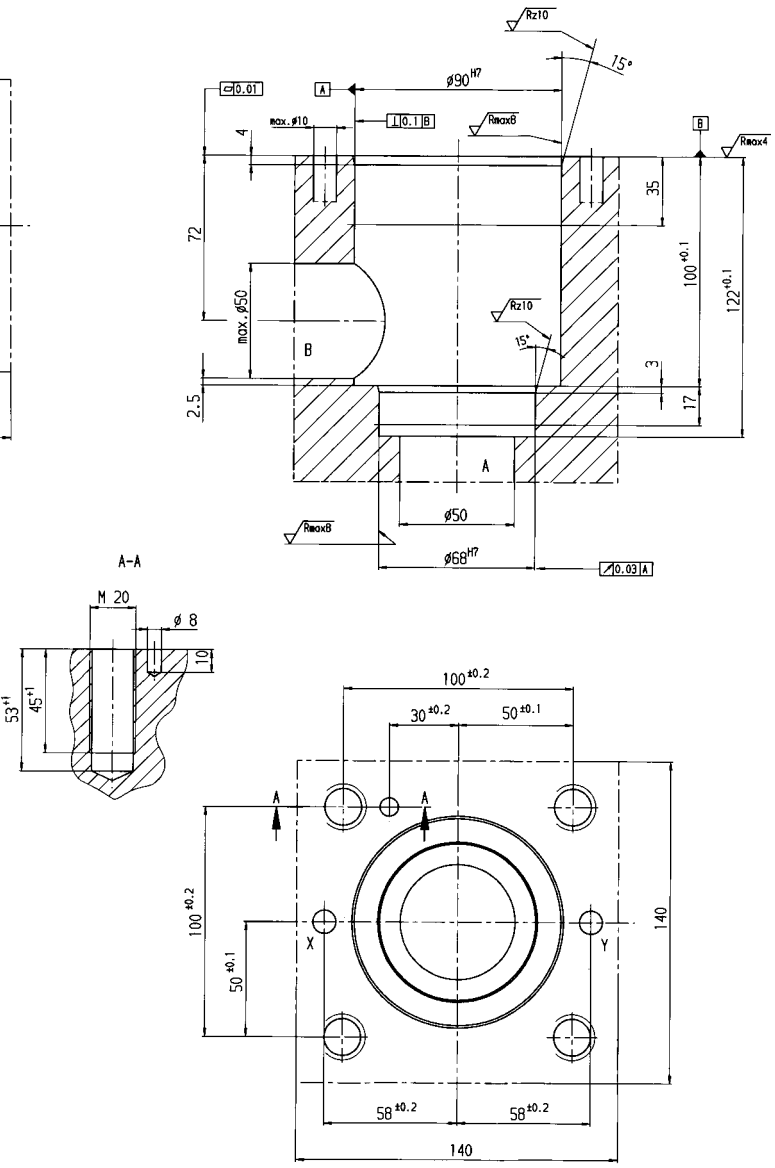


Installation dimensions DIN 24342, ISO/DIS 7368 (in mm)

NG40



NG50



Notes

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Notes

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