

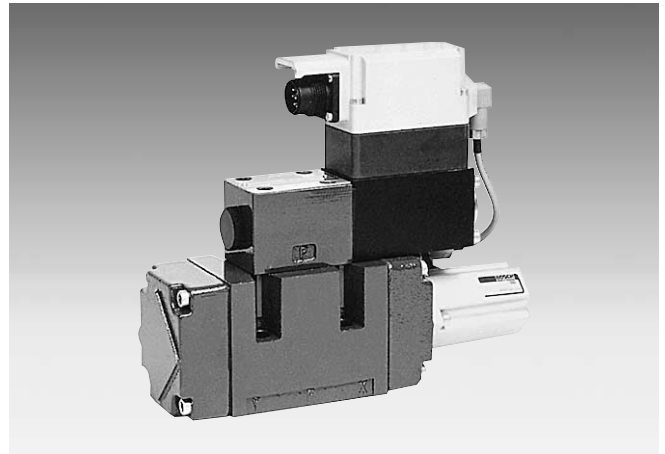
RE 29 077/01.03

## Servo solenoid valves with on-board electronics (OBE) Type 4WRVE 10 ... 25

Size 10, 16, 25

Series 2X

Maximum working pressure 350 bar

Maximum flow rate 430 l/min ( $\Delta p$  10 bar)

Type 4WRVE . . . -2X/G24...

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### Features

- Pilot operated High Response servo solenoid valves NG 10 to NG 25, with control piston and sleeve in servo quality
- On-board electronics (OBE) with position controller for the pilot and main stages, calibrated at the factory
- Main stage in servo quality with position feedback
- Flow characteristic
  - M = Progressive with fine metering notch
  - P = Non-linear curve
  - L = Linear (only available on request)
- Electrical connection 11P+PE  
Signal input difference amplifier with interface  $B5 \pm 10 V$
- Suitable for electrohydraulic controllers in production and testing systems
- For subplate attachment, mounting hole configuration to DIN 24 340 Form A, ISO 4401 and CETOP-RP 121 H
- Subplates as per catalogue section, NG 10 RE 45 055, NG 16 RE 45 057 and NG 25 RE 45 059
- Line sockets to DIN 43 563-AM6, see catalogue section RE 08 008 (order separately)

### Variants on request

- For standard applications
- Special symbols for plastic injection-moulding machines and for extending the module.



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We must reserve the right to make changes on the grounds of continual product development. No liability can be accepted for incomplete or inaccurate information.

## Ordering data

4WRV	E					-2X	/G24		K0/B5	M	*
With <b>on-board</b> trigger electronics = E											Further information in plain text
Size 10	= 10										
Size 16	= 16										
Size 25 <sup>1)</sup>	= 25										
<b>Symbols</b>											
<b>4/3-way version</b>											
	= V, V <sub>1</sub>										
<b>With symbol V1:</b>											
P → A: $q_v$	B → T: $q_v/2$										
P → B: $q_v/2$	A → T: $q_v$										
<sup>1)</sup> "H": Highflow version											
– NG 25 standard version has 25 mm hole in "P A B T"											
P A B: $p_{max} = 350$ bar.											
– In the highflow version, the holes are enlarged to 32 mm											
P A B: $p_{max} = 280$ bar.											
<sup>2)</sup> $q_N$ : Flow characteristic "P"											
<b>M =</b>	NBR seals, suitable for mineral oils (HL, HLP) to DIN 51 524										
<b>B5 =</b>	Interface for trigger electronics Setpoint input $\pm 10$ V										
<b>K0 =</b>	without line socket, with plug to DIN 43 563-AM6 Order line socket separately										
<b>G24 =</b>	Voltage supply of trigger electronics +24 V DC										
<b>H =<sup>1)</sup></b>	Highflow version (on request)										
<b>2X =</b>	Series 20 to 29 (installation and connection dimensions unchanged)										
<b>P =</b>	Flow characteristic Progressive with linear fine metering Non-linear curve, linear (kink at 40 %)										
<b>Nominal flow rate at 70 bar valve pressure difference</b>											
<b>Size</b>											
<b>10</b>	= 40 <sup>2)</sup> , 55, 70 <sup>2)</sup> or 85 l/min										
<b>16</b>	= 90 <sup>2)</sup> , 120, 150 <sup>2)</sup> or 200 l/min										
<b>25</b>	= 370 or 430 <sup>1)</sup> l/min										

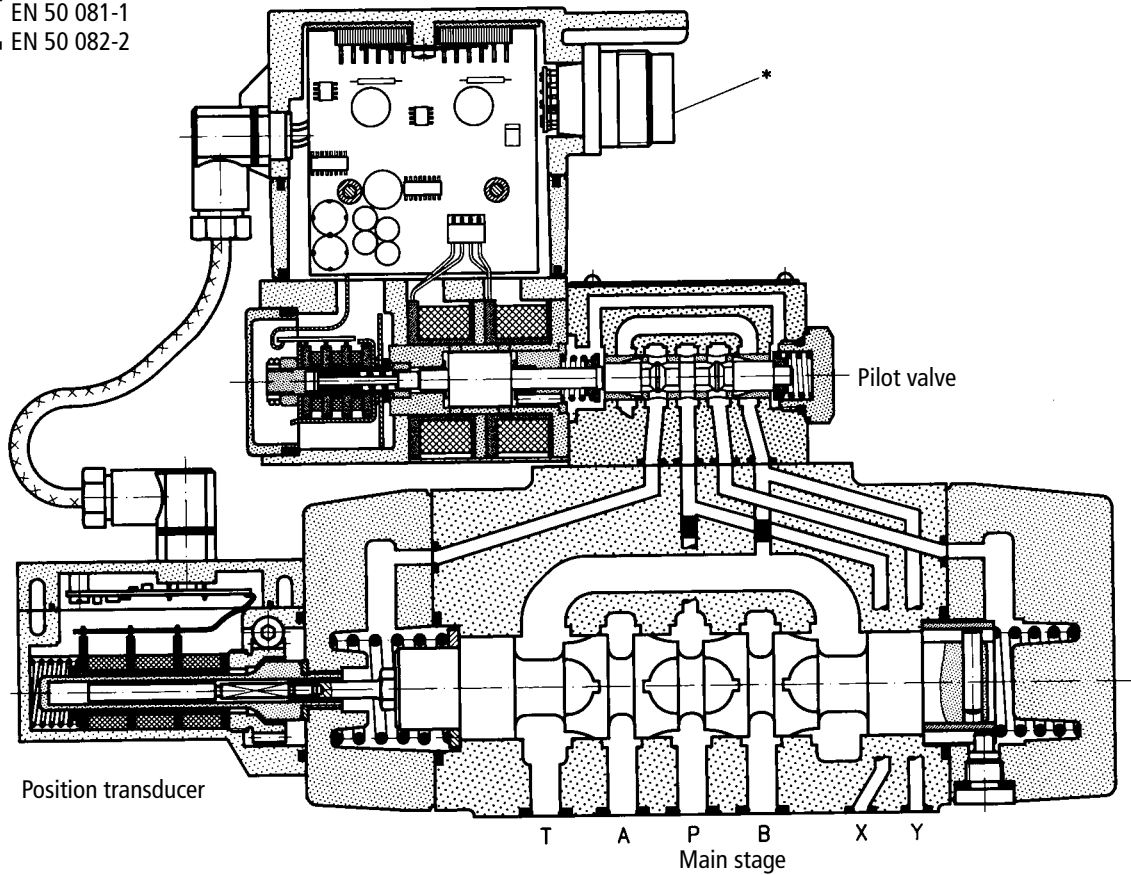
## Preferred types (available at short notice)

Material no.	Type 4WRVE	Material no.	Type 4WRVE
<b>NG 10</b>	<b>V/V1</b>	<b>NG 16</b>	<b>V/V1</b>
0 811 404 690	4WRVE 10 V – 55M 2X/G24 K0 / B5M	0 811 404 290	4WRVE 16 V – 120M 2X/G24 K0 / B5M
0 811 404 699	4WRVE 10 V1 – 55M 2X/G24 K0 / B5M	0 811 404 294	4WRVE 16 V1 – 120M 2X/G24 K0 / B5M
0 811 404 691	4WRVE 10 V – 85M 2X/G24 K0 / B5M	0 811 404 291	4WRVE 16 V – 200M 2X/G24 K0 / B5M
0 811 404 697	4WRVE 10 V1 – 85M 2X/G24 K0 / B5M	0 811 404 295	4WRVE 16 V1 – 200M 2X/G24 K0 / B5M
0 811 404 693	4WRVE 10 V – 40P 2X/G24 K0 / B5M	0 811 404 296	4WRVE 16 V – 90P 2X/G24 K0 / B5M
0 811 404 695	4WRVE 10 V1 – 40P 2X/G24 K0 / B5M	0 811 404 298	4WRVE 16 V1 – 90P 2X/G24 K0 / B5M
0 811 404 694	4WRVE 10 V – 70P 2X/G24 K0 / B5M	0 811 404 297	4WRVE 16 V – 150P 2X/G24 K0 / B5M
0 811 404 696	4WRVE 10 V1 – 70P 2X/G24 K0 / B5M	0 811 404 299	4WRVE 16 V1 – 150P 2X/G24 K0 / B5M
		<b>NG 25</b>	<b>V/V1</b>
		0 811 404 445	4WRVE 25 V – 370M 2X/G24 K0 / B5M
		0 811 404 447	4WRVE 25 V1 – 370M 2X/G24 K0 / B5M

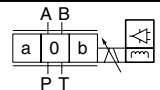
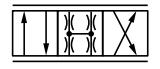
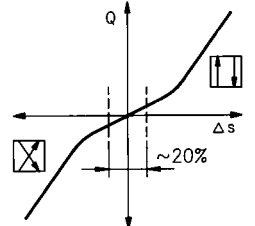
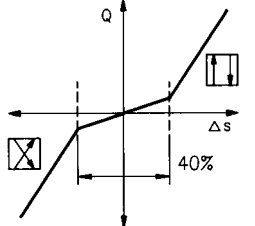
## Function, sectional diagram

### Servo solenoid valve 4WRVE 10 ... 25



 EN 50 081-1  
 EN 50 082-2



### Symbols

	M: Progressive with fine metering	P: Non-linear, linear (40 %)
		

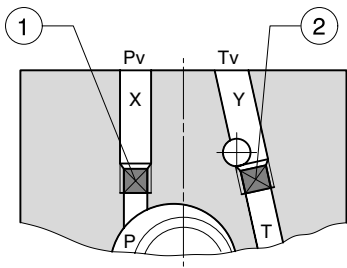
### Accessories, not included in scope of delivery

Fastening screws 	<table border="1"> <tr> <td>NG 10</td> <td>4 x M 6 x 40, DIN 912-10.9</td> <td>2 910 151 209</td> </tr> <tr> <td rowspan="2">NG 16</td> <td>2 x M 6 x 45, DIN 912-10.9</td> <td>2 910 151 211</td> </tr> <tr> <td>4 x M 10 x 50, DIN 912-10.9</td> <td>2 910 151 301</td> </tr> <tr> <td>NG 25</td> <td>6 x M 12 x 60, DIN 912-10.9</td> <td>2 910 151 354</td> </tr> </table>	NG 10	4 x M 6 x 40, DIN 912-10.9	2 910 151 209	NG 16	2 x M 6 x 45, DIN 912-10.9	2 910 151 211	4 x M 10 x 50, DIN 912-10.9	2 910 151 301	NG 25	6 x M 12 x 60, DIN 912-10.9	2 910 151 354	
NG 10	4 x M 6 x 40, DIN 912-10.9	2 910 151 209											
NG 16	2 x M 6 x 45, DIN 912-10.9	2 910 151 211											
	4 x M 10 x 50, DIN 912-10.9	2 910 151 301											
NG 25	6 x M 12 x 60, DIN 912-10.9	2 910 151 354											
*  Pg 16	Line socket 11P+PE	KS 1 834 484 142											

### Testing and service equipment

- Test box type VT-PE-TB3, see RE 30 065
- Test adapter 11P+PE type VT-PA-1, see RE 30 067

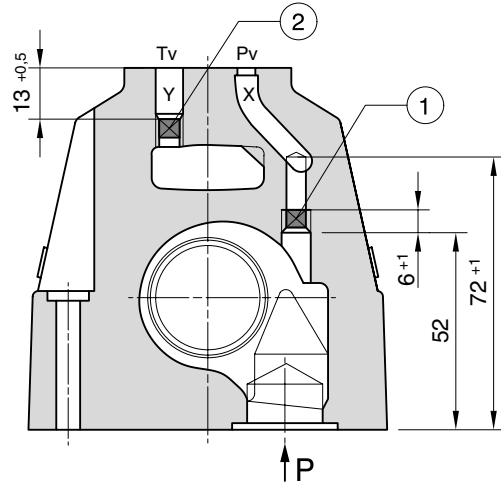
NG 10, 25



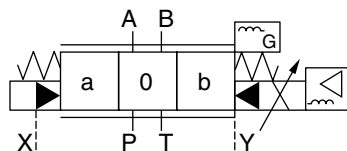
Plug

① ②  
1 813 464 007 SW 3

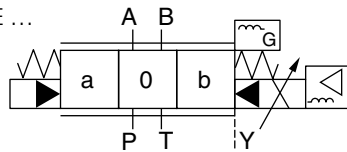
NG 16



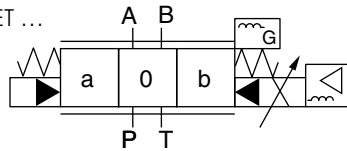
Type ...-3X ...



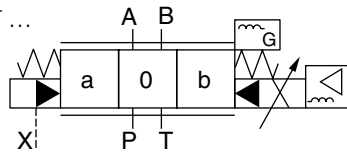
Type ...-3X ... E ...



Type ...-3X ... ET ...



Type ...-3X ... T ...



No designation =

"x" = external, "y" = external

E =

"x" = internal, "y" = external

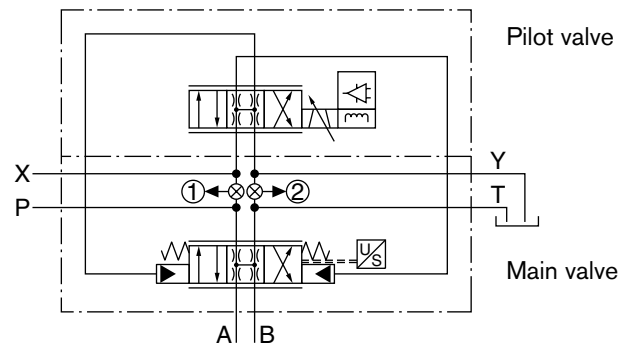
ET =

"x" = internal, "y" = internal

T =

"x" = external, "y" = internal

Symbol in detail



## Conversion

The pilot valve can be supplied with oil both via ports X and Y (external) and from the main flow ducts P and T. In the basic version, the valve is equipped with the plugs ① and ②, i.e. X and Y are external. For valve versions with X and/or Y as internal, see ordering overview or carry out the conversion (see diagram above). When the control oil supply or discharge is changed, the part number must also be changed.

## Important




Servo solenoid valves (pilot operated) do not have a closed middle position when switched off! They only perform their function in an active, closed control loop, even when the pilot valve features a relief (fail-safe) 4th symbol. For details on "switch-off behaviour", see Technical data.

## Technical data (For device applications beyond the stated values, please consult us!)


### General

Construction	Spool type valve, pilot operated		
Actuation	4WREH servo solenoid valve NG 6 – OBE, with position controller for pilot valve and main stage		
Type of mounting	Subplate, mounting hole configuration NG 10 ... 25 (ISO 4401 and CETOP-RP 121 H)		
Installation position	Optional		
Ambient temperature range	-20 ... +50 °C		
Weight	<b>NG 10</b> 8.0 kg	<b>NG 16</b> 10.4 kg	<b>NG 25</b> 18.2 kg
Vibration resistance, test condition	Max. 25 g, shaken in 3 dimensions (24 h)		

### Hydraulic (measured with HLP 46, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ )

Pressure fluid	Hydraulic oil to DIN 51 524 ... 535, other fluids after prior consultation		
Viscosity range, recommended max. permitted	20 ... 100 mm <sup>2</sup> /s 10 ... 800 mm <sup>2</sup> /s		
Pressure fluid temperature range	-20 ... +65 °C		
Purity class to ISO code	Maximum permitted degree of contamination of pressure fluid to ISO 4406 (C) Class 18/16/13 1)		
Flow direction	See symbol		
Nominal flow [l/min] at $\Delta p = 5\text{ bar per notch}^*$	<b>NG 10</b>		<b>NG 16</b>
	40	55	70
	85	90	120
	150	200	<b>NG 25</b>
			370
Max. working pressure	Port P, A, B: 350 bar		
Max. pressure	Port T, X, Y: 250 bar		
$q_{max}$ [l/min]	170	450	900
$q_N$ pilot valve [l/min]	8	24	40
Leakage [cm <sup>3</sup> /min] of pilot valve at 100 bar 	<180		<300
Leakage [cm <sup>3</sup> /min] of main stage at 100 bar  	<400	<600	<1,000
Control oil pressure "pilot stage"	min. 10 bar		
	max. 250 bar		

### Static/Dynamic

Hysteresis	< 0.1 %, scarcely measurable		
Manufacturing tolerance for $q_{max}$	$\leq 10\%$		
Response time for signal change (at X = 100 bar)	0 ... 100 % 0 ... 10 %	12 6	15 7
Response time for signal change (at X = 10 bar)	0 ... 100 % 0 ... 10 %	40 20	50 20
Switch-off behaviour	After electrical switch-off: pilot valve undefined in P-B/A-T or P-A/B-T Main stage can be controlled 100 % (PB/AT or PA/BT)		
Thermal drift	Zero point displacement < 1 % at $\Delta T = 40\text{ °C}$		
Zero adjustment	Factory-set $\pm 1\%$		
Conformity	 EN 50 081-1 EN 50 082-2		

- 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 catalogue sections RE 50 070, RE 50 076 and RE 50 081.

\* Flow rate at a different  $\Delta p$

$$q_x = q_{nom.} \cdot \sqrt{\frac{\Delta p_x}{5}}$$

### Important

Pilot operated 4WRLE servo solenoid valves only perform their function in an active closed control loop and do not have a safe basic position when switched off. For this reason, many applications require the use of "additional check valves", which must be taken into account during the On/Off switching sequence.

## Technical data (For device applications beyond the stated values, please consult us!)

### Electrical, trigger electronics integrated in the valve

Cyclic duration factor	100 %, max. current input 30 VA (24 V DC)					
Degree of protection	IP 65 to DIN 40 050 and IEC 14 434/5					
Connection	Plug, 11P+PE	Data				
Power supply 24 V DC <sub>nom.</sub>	1)	<table border="1"> <tr> <td>1</td> <td>+24 V DC<sub>nom.</sub>, fuse 2.5 A<sub>F</sub> (output stages)</td> </tr> <tr> <td>2</td> <td>0 V power ground</td> </tr> </table>	1	+24 V DC <sub>nom.</sub> , fuse 2.5 A <sub>F</sub> (output stages)	2	0 V power ground
	1	+24 V DC <sub>nom.</sub> , fuse 2.5 A <sub>F</sub> (output stages)				
2	0 V power ground					
2)	<table border="1"> <tr> <td>9</td> <td>+24 V DC<sub>nom.</sub> signal part</td> </tr> <tr> <td>10</td> <td>0 V signal ground</td> </tr> </table>	9	+24 V DC <sub>nom.</sub> signal part	10	0 V signal ground	
9	+24 V DC <sub>nom.</sub> signal part					
10	0 V signal ground					
Input signal ±10 V	3)	<table border="1"> <tr> <td>4</td> <td rowspan="2">} Difference amplifier, R<sub>i</sub> = 100 kΩ</td> </tr> <tr> <td>5</td> </tr> </table>	4	} Difference amplifier, R <sub>i</sub> = 100 kΩ	5	
		4	} Difference amplifier, R <sub>i</sub> = 100 kΩ			
5						
Feedback signal (LVDT)		<table border="1"> <tr> <td>6</td> <td>±10 V DC, R<sub>a</sub> = 1 kΩ</td> </tr> <tr> <td>7</td> <td>0 V, reference point</td> </tr> </table>	6	±10 V DC, R <sub>a</sub> = 1 kΩ	7	0 V, reference point
		6	±10 V DC, R <sub>a</sub> = 1 kΩ			
7	0 V, reference point					
Enabling input		> 8.5 V to 24 V DC <sub>nom.</sub> (max. 40 V DC) R <sub>i</sub> = 10 kΩ				
Signals	4)	<table border="1"> <tr> <td>8</td> <td>Enabling acknowledgement +24 V DC</td> </tr> <tr> <td>11</td> <td>Fault signal: no fault +24 V DC</td> </tr> </table>	8	Enabling acknowledgement +24 V DC	11	Fault signal: no fault +24 V DC
		8	Enabling acknowledgement +24 V DC			
11	Fault signal: no fault +24 V DC					
Protective conductor		Only connect when transformer of 24 V DC system does not conform to standard VDE 0551				
Connecting cable	Recommended Ø 12 ... 14 mm: screened					
		max. 20 m 0.75 mm <sup>2</sup>				
		max. 40 m 1.0 mm <sup>2</sup>				

24 V DC<sub>nom.</sub> – min. 21 V DC  
– max. 40 V DC

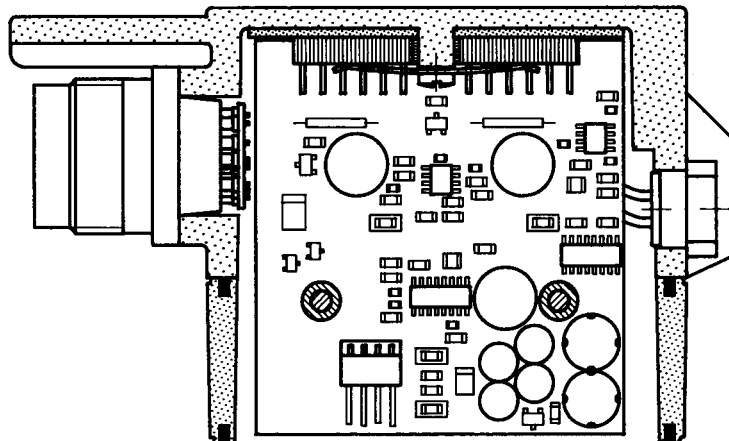
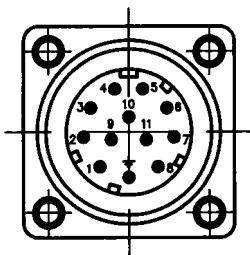
1) U<sub>B</sub> (Pin 1) = output stage supply  
– Valve "OFF" < 13.4 V DC  
– Valve "ON" > 16.8 V DC  
No fault signal (Pin 11)

2) U<sub>S</sub> (Pin 9) = signal electronics supply  
– Valve "OFF" < 16.8 V DC  
Fault signal (Pin 11)  
– Valve "ON" > 19.5 V DC  
No fault signal (Pin 11)

3) Inputs: dielectric strength to withstand up to max. 50 V.

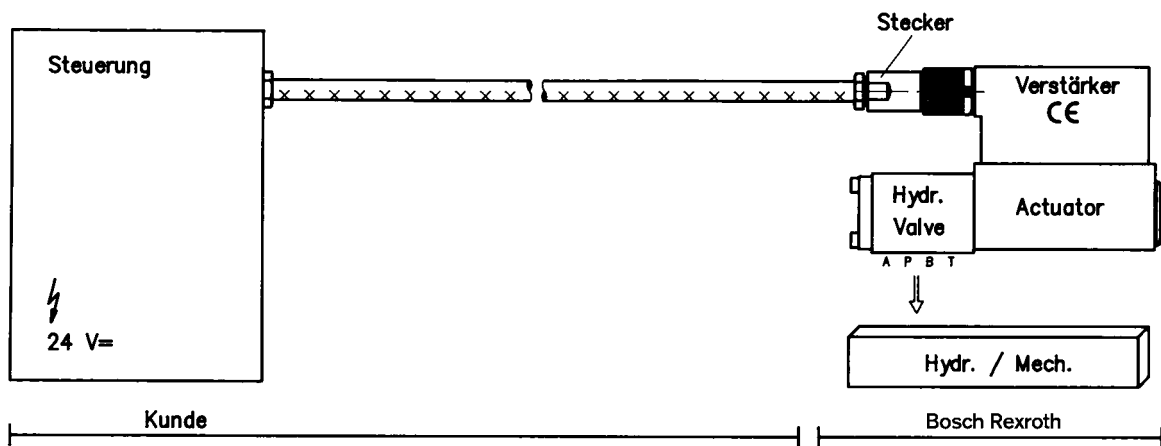
4) Signals can bear a load of max. 20 mA and are resistant to shorts to ground.

11P+PE



## Connection

For electrical data, see page 6 and  
Operating Instructions 1 819 929 083



### Technical notes on the cable

- Version:**
- Multi-wire cable
  - Extra-finely stranded wire to VDE 0295, Class 6
  - Protective conductor, green/yellow
  - Cu braided screen
- Types:**
- e.g. Ölflex-FD 855 CP (from Lappkabel company)
- No. of wires:**
- Determined by type of valve, plug types and signal assignment
- Cable Ø:**
- 0.75 mm<sup>2</sup> up to 20 m length
  - 1.0 mm<sup>2</sup> up to 40 m length
- Outside Ø:**
- 9.4 ... 11.8 mm – Pg 11
  - 12.7 ... 13.5 mm – Pg 16

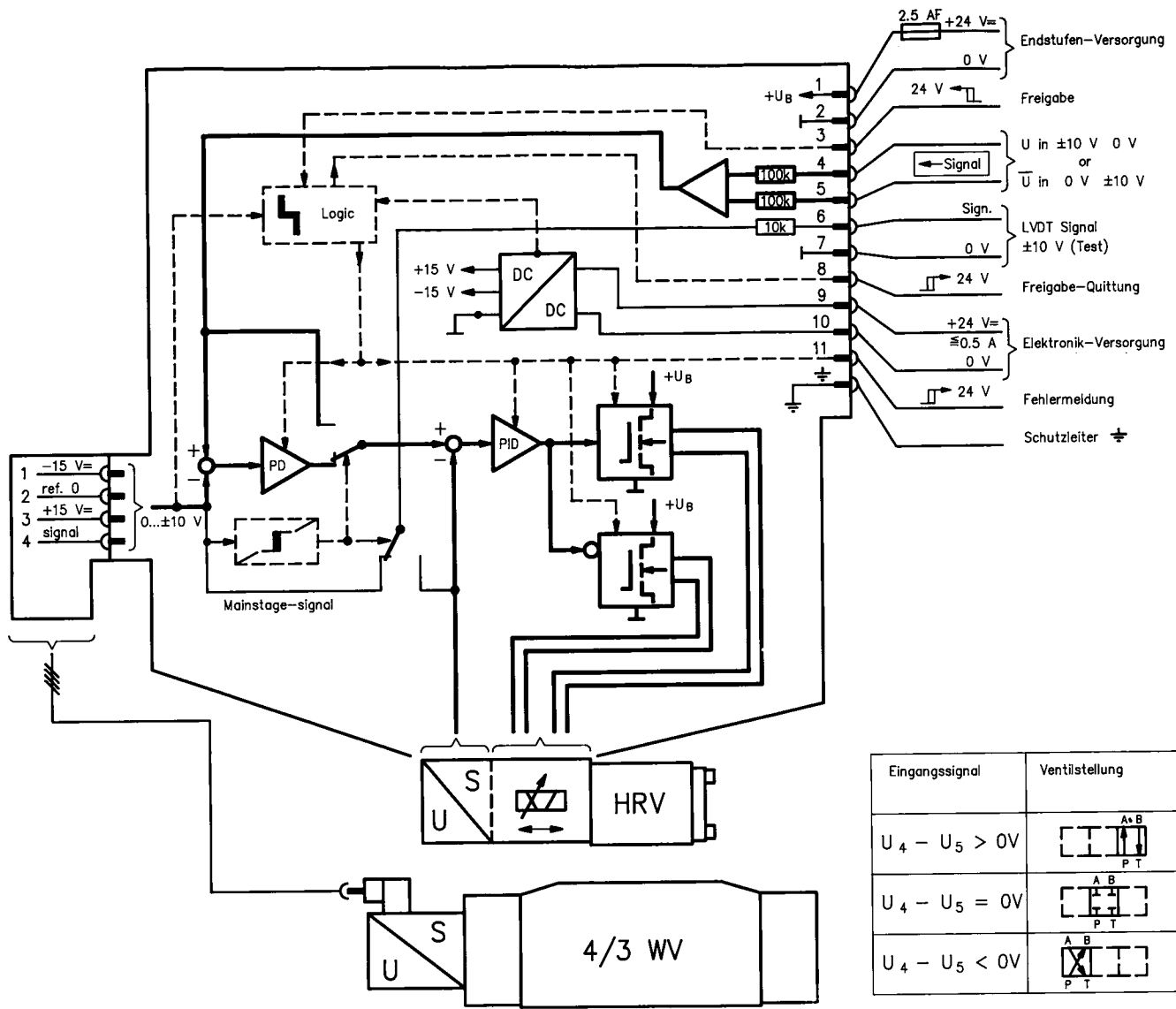
### Important

Electrical signals emitted via the trigger electronics (e.g. actual values) must not be used to shut down safety-relevant machine functions! (See European Standard, "Technical Safety Requirements for Fluid-Powered Systems and Components – Hydraulics", EN 982.)

# On-board trigger electronics

## Block diagram / pin assignment

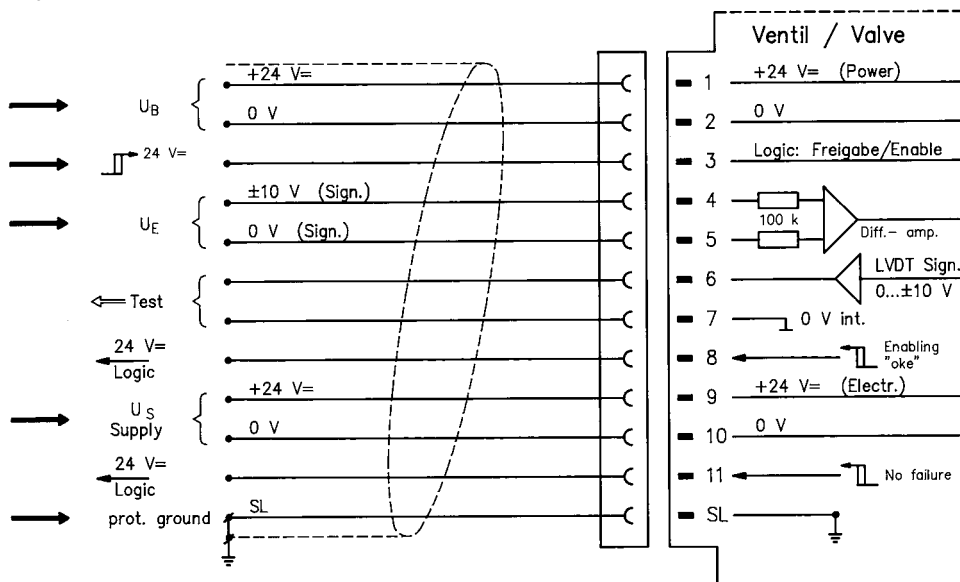
Version B5:  $U_E \pm 10\text{ V}$



## Pin assignment 11P + PE

Version B5:  $U_E \pm 10\text{ V}$

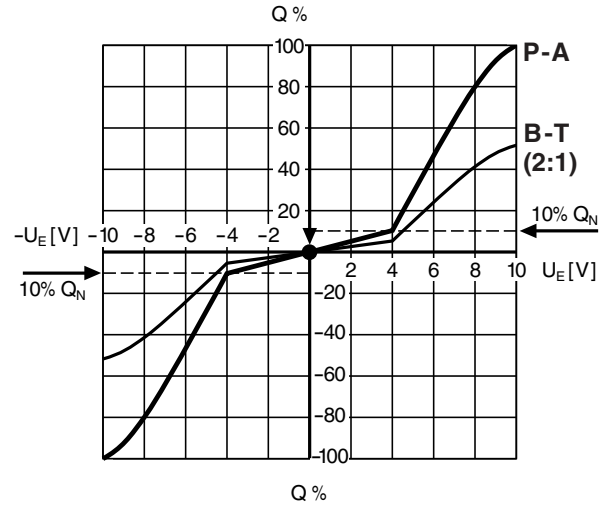
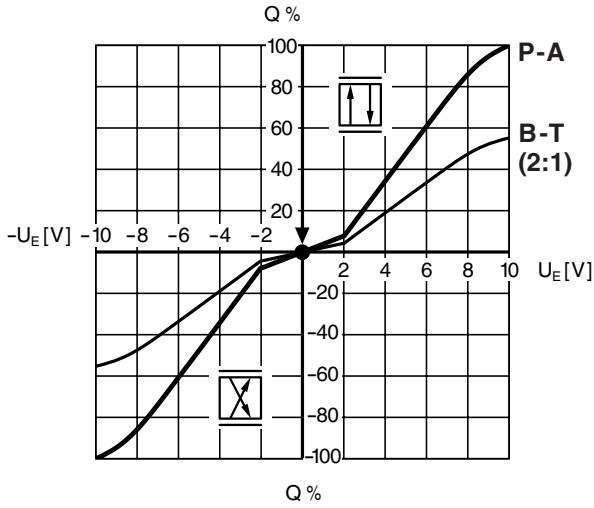
( $R_i = 100\text{ k}\Omega$ )



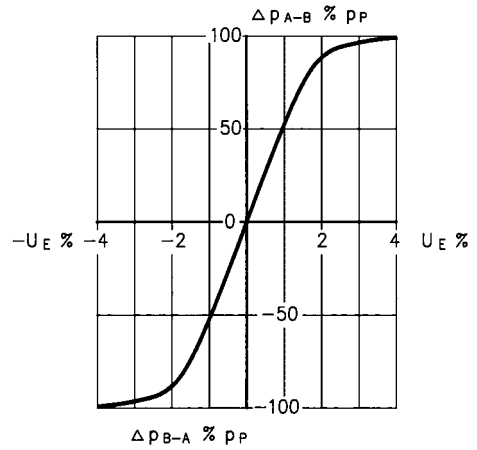
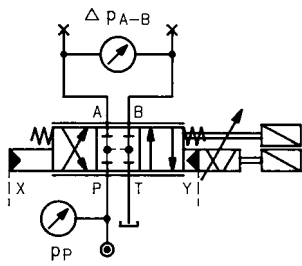


Flow rate/Signal function

$Q = f(U_E)$

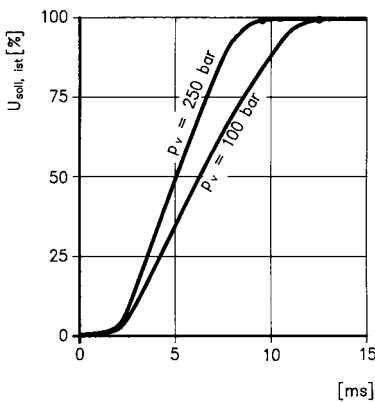


Pressure gain  $\Delta = f(U_E)$

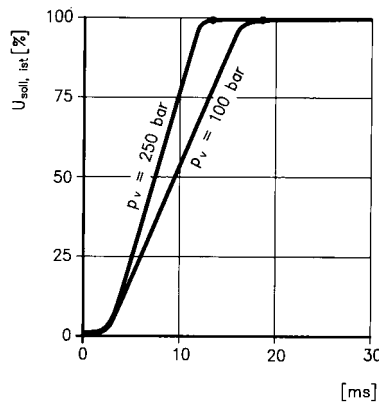


Response time 0 → 100%

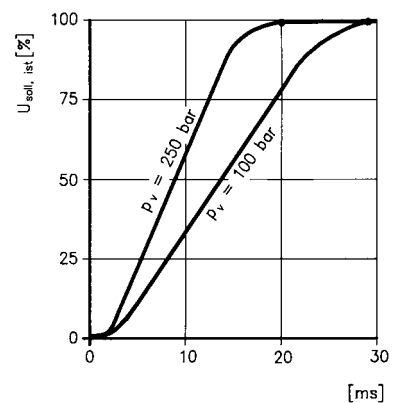
NG 10



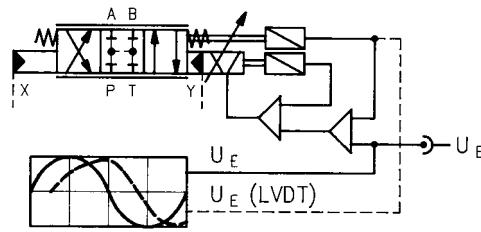
NG 16



NG 25

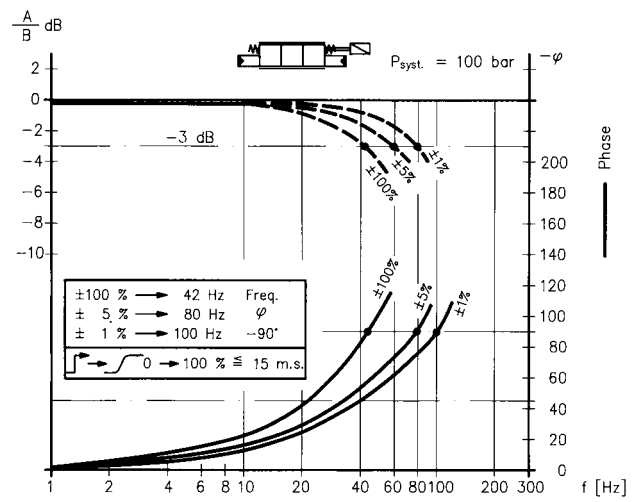
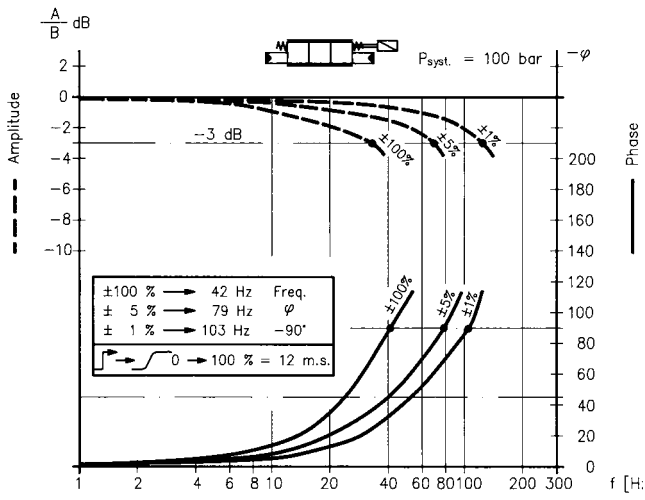


Bode diagrams

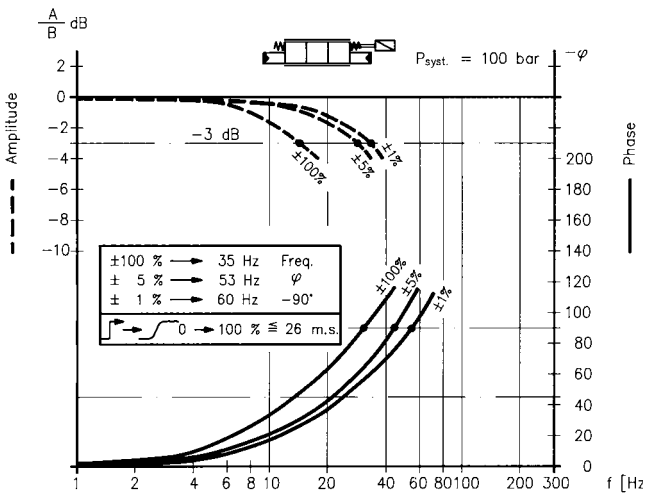


NG 10

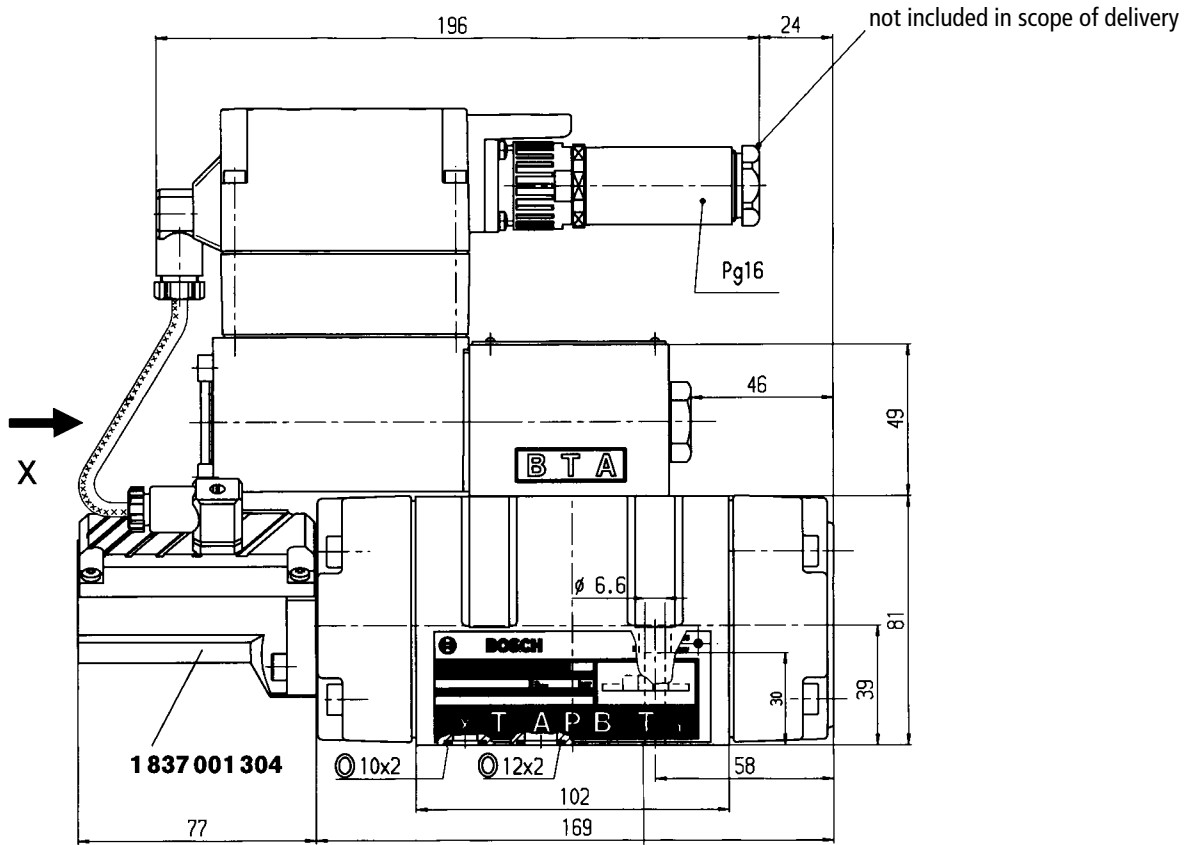
NG 16




NG 25

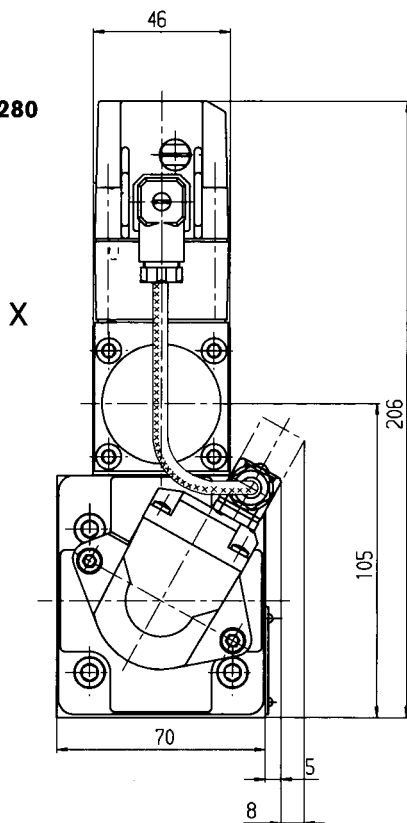


Device dimensions NG 10 (in mm)



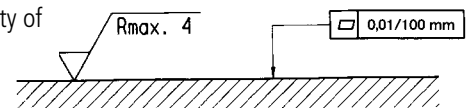
4 x  M6x40 DIN 912-10.9  
 = 11<sup>+3</sup> Nm **2910 151 209**

 Set **1817 010 280**

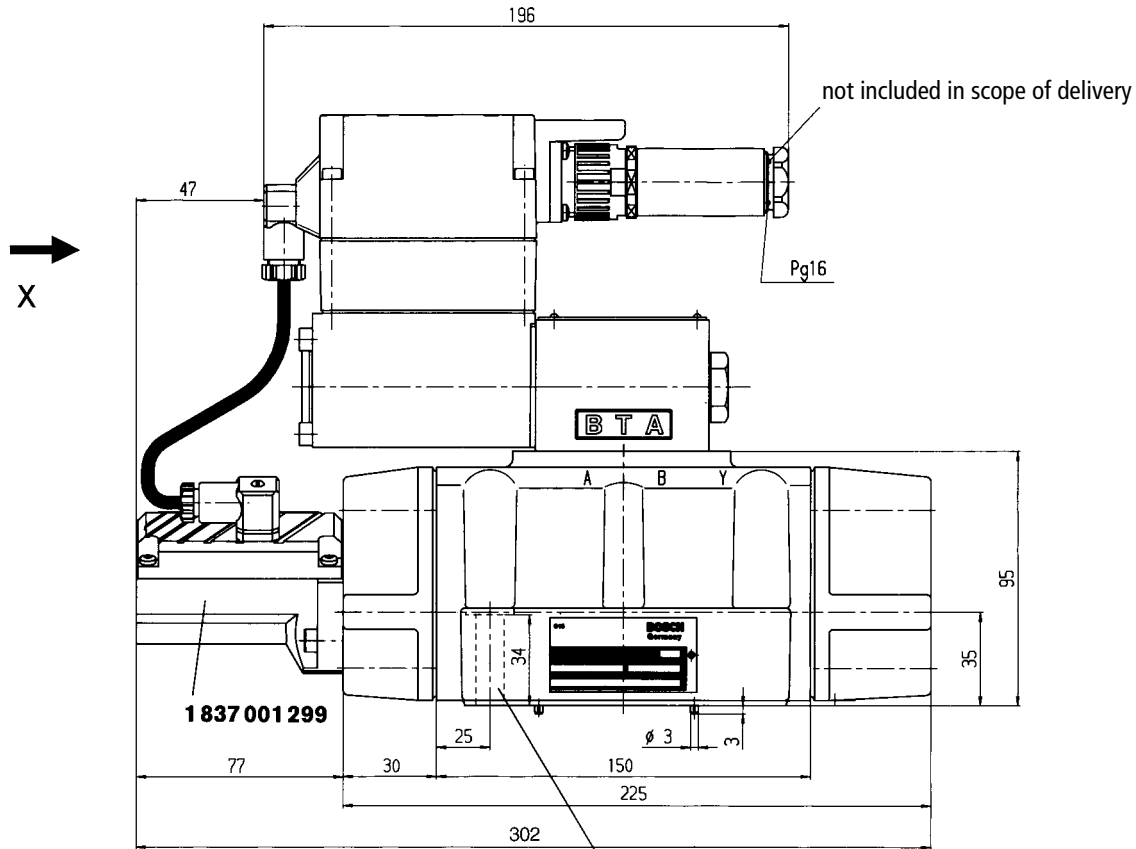


**Mounting hole configuration: NG 10** (DIN 24 340 Form A, ISO 4401 and CETOP-RP 121 H), see page 14  
 For subplates, see catalogue section RE 45 055

Required surface quality of mating component

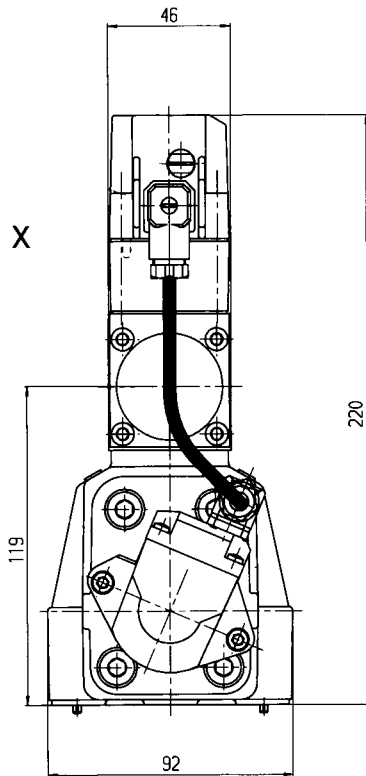


Device dimensions NG 16 (in mm)



2x M6x45, DIN 912-10.9  $11^{+3}$  Nm  
 4x M10x50, DIN 912-10.9  $50^{+10}$  Nm

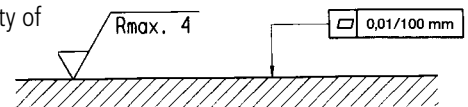
- ⊙ X, Y  $\varnothing 9 \times 2$
- ⊙ P, A, B, T  $\varnothing 23 \times 2,5$
- ⊙ Set **1817010275**



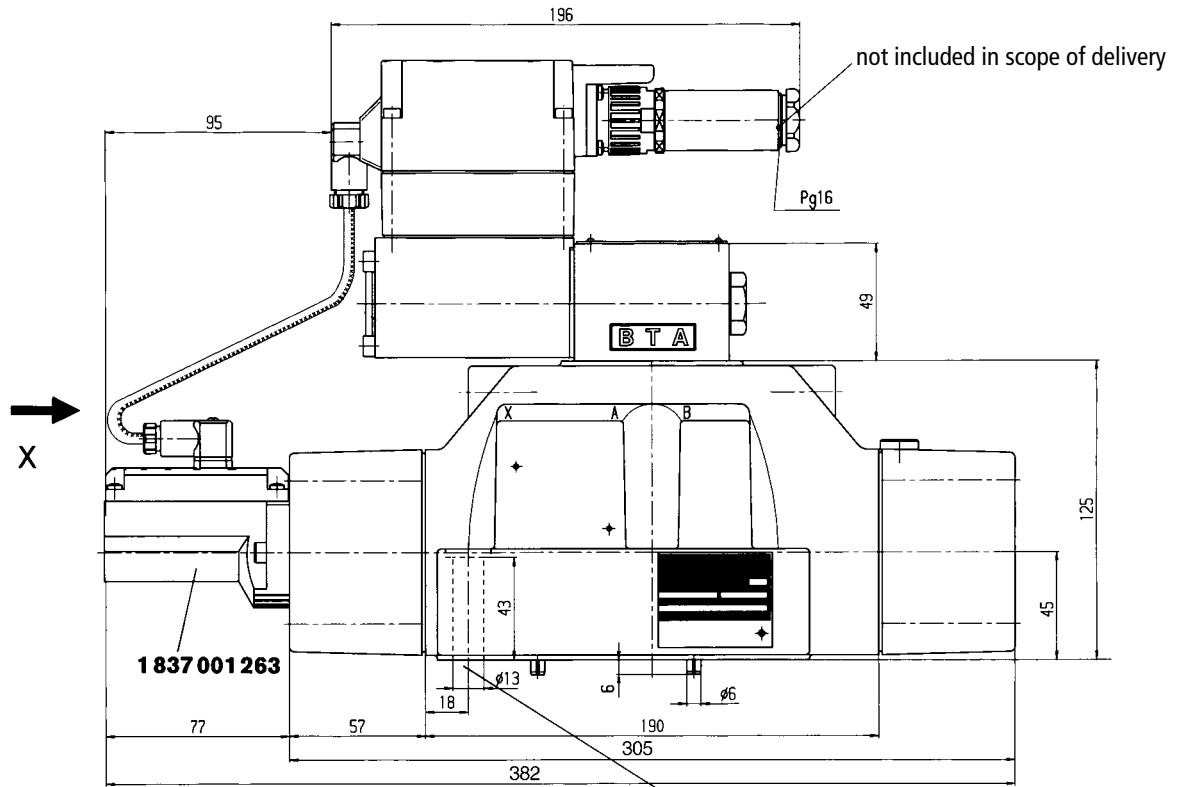
M6x45 **2910151211**  
 M10x50 **2910151301**


**Mounting hole configuration: NG 16** (DIN 24 340 Form A, ISO 4401 and CETOP-RP 121 H), see page 14  
 For subplates, see catalogue section RE 45 057




Required surface quality of mating component

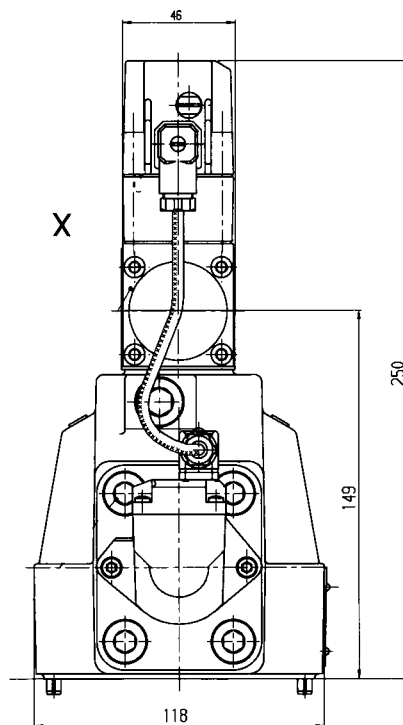


Device dimensions NG 25 (in mm)



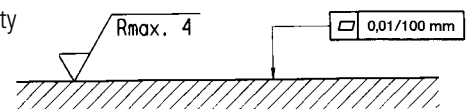
6 x  M12x60 DIN 912-10.9  
 = 90<sup>+30</sup> Nm  
**2910 151 354**

-  X, Y  $\varnothing$  15x2,5
-  P, A, B, T  $\varnothing$  28x3
-  Set **1817 010 273**



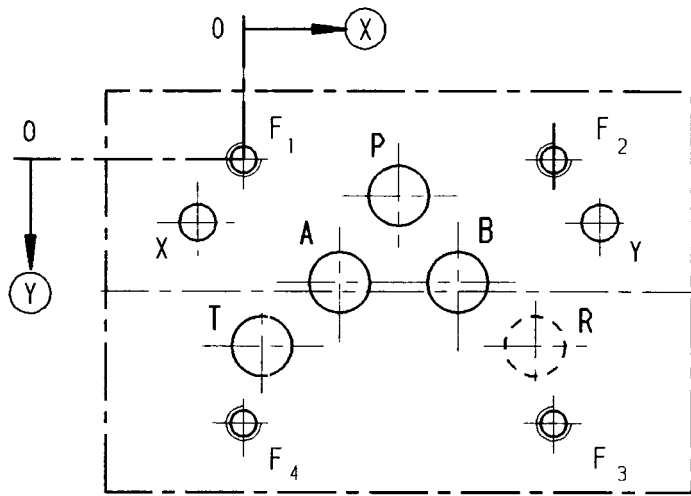
**Mounting hole configuration: NG 25** (DIN 24 340 Form A, ISO 4401 and CETOP-RP 121 H), see page 15  
 For subplates, see catalogue section RE 45 059

Required surface quality of mating component



## Mounting hole configurations (dimensions in mm)

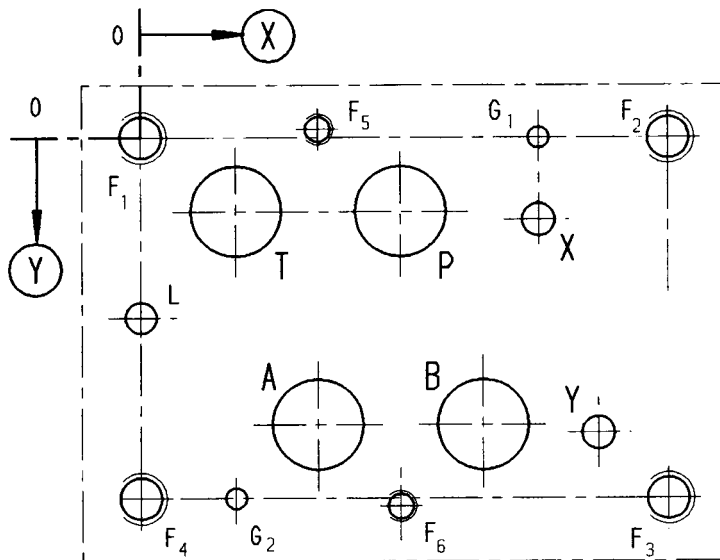
### NG 10 – ISO 4401



- 1) Deviates from standard  
 2) Thread depth: Ferrous metal  $1.5 \times \varnothing^*$   
 Non-ferrous  $2 \times \varnothing$   
 \* (NG 10 min. 10.5 mm)

	P	A	T	B	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	X	Y	R
⊗	27	16.7	3.2	37.3	0	54	54	0	-8	62	50.8
⊙	6.3	21.4	32.5	21.4	0	0	46	46	11	11	32.5
∅	10.5 <sup>1)</sup>	10.5 <sup>1)</sup>	10.5 <sup>1)</sup>	10.5 <sup>1)</sup>	M 6 <sup>2)</sup>	M 6 <sup>2)</sup>	M 6 <sup>2)</sup>	M 6 <sup>2)</sup>	6.3	6.3	10.5 <sup>1)</sup>

### NG 16 – ISO 4401

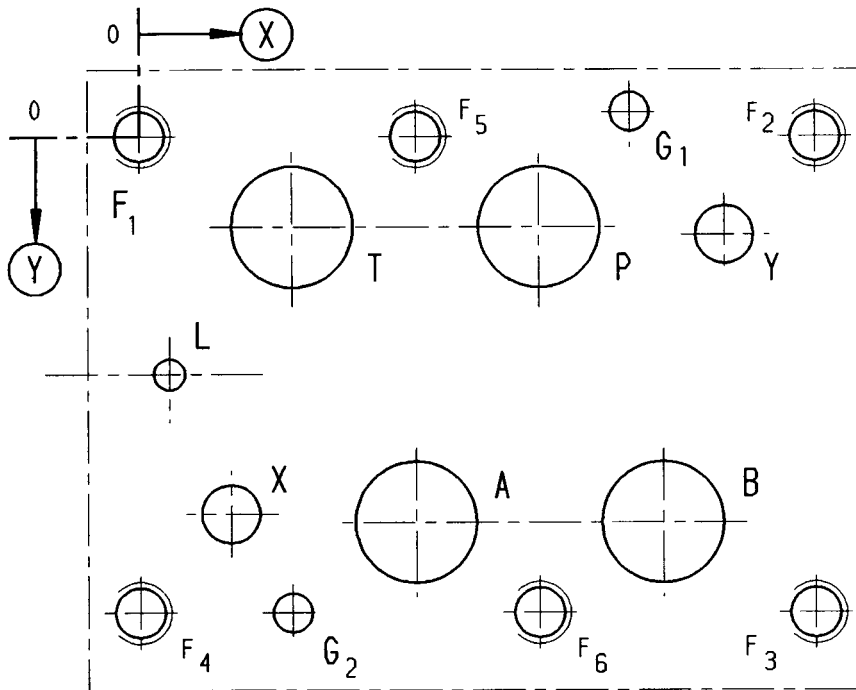


- 1) Deviates from standard  
 2) Thread depth: Ferrous metal  $1.5 \times \varnothing^*$   
 Non-ferrous  $2 \times \varnothing$   
 \* (NG 10 min. 10.5 mm)

	P	A	T	B	L	X	Y	G <sub>1</sub>	G <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>5</sub>	F <sub>6</sub>
⊗	50	34.1	18.3	65.9	0	76.6	88.1	76.6	18.3	0	101.6	101.6	0	34.1	50
⊙	14.3	55.6	14.3	55.6	34.9	15.9	57.2	0	69.9	0	0	69.9	69.9	-1.6	71.5
∅	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>1)</sup>	6.3	6.3	6.3	4	4	M10 <sup>2)</sup>	M10 <sup>2)</sup>	M10 <sup>2)</sup>	M10 <sup>2)</sup>	M6 <sup>2)</sup>	M6 <sup>2)</sup>

# Mounting hole configurations (dimensions in mm)

## NG 25 – ISO 4401



- 1) Deviates from standard  
 2) Thread depth: Ferrous metal  $1.5 \times \varnothing^*$   
 Non-ferrous  $2 \times \varnothing$   
 \* (NG 10 min. 10.5 mm)

	P	A	T	B	L	X	Y	G <sub>1</sub>	G <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>5</sub>	F <sub>6</sub>
⊗	77	53.2	29.4	100.8	5.6	17.5	112.7	94.5	29.4	0	130.2	130.2	0	53.2	77
⊙	17.5	74.6	17.5	74.6	46	73	19	-4.8	92.1	0	0	92.1	92.1	0	92.1
∅	25 <sup>1)</sup>	25 <sup>1)</sup>	25 <sup>1)</sup>	25 <sup>1)</sup>	11.2	11.2	11.2	7.5	7.5	M12 <sup>2)</sup>	M12 <sup>2)</sup>	M12 <sup>2)</sup>	M12 <sup>2)</sup>	M12 <sup>2)</sup>	M12 <sup>2)</sup>

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