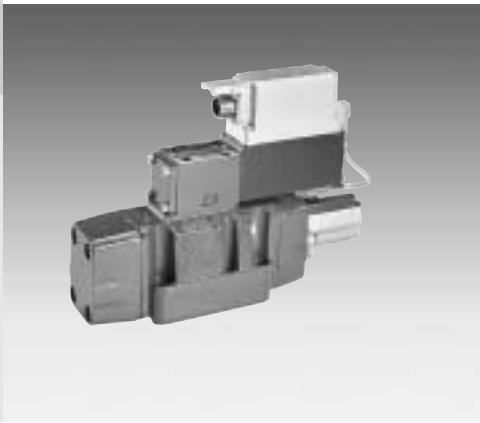
Rexroth
Bosch Group

Servo solenoid valves with positive overlap and on-board electronics

RE 29089/01.05 1/22
Replaces: 05.04

Type 4WRLE 10...35, symbols E./W.



Nominal size 10, 16, 25, 35
Unit series 3X
Maximum working pressure P, A, B 350 bar, T 250 bar
Nominal flow rate 50...1,100 l/min (Δp 10 bar)

Overview of contents

Variants on request

- For standard applications
- Special symbols and characteristic curves with/without intermediate plates

Features

- Pilot operated servo solenoid valves NG10 to NG35 with positive overlap, see symbols E./W. and characteristic curves
- Pilot valve NG6, with control piston and sleeve in servo quality
- Actuated on one side, 4/4 fail-safe position when switched off
- Control solenoid with integral position feedback and on-board valve electronics (OBE), calibrated at the factory
- Main stage with approx. 20% overlap and position feedback
- Electronically compensated, calibrated overlap, see characteristic curve range ±0.5 V
- Spool with linear travel, with anti-rotation element
- Flow characteristic
  - S = Progressive
  - NG16 and 25 with load tap C1/C2
- Suitable for electrohydraulic controllers in production systems with more demanding requirements
- For subplate attachment, mounting hole configuration NG10 to ISO 4401-05-05-0-94, NG16 to ISO 4401-07-06-0-94, NG25 to ISO 4401-08-07-0-94 and NG32 to ISO 4401-10-08-0-94
- Subplates as per catalog section, NG10 RE 45055, NG16 RE 45057, NG25 RE 45059 and NG32 RE 45060 (order separately)
- Plug-in connectors to DIN 43563-AM6, see catalog section RE 08008 (order separately)

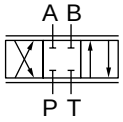
Ordering data and scope of delivery

4WRL	E			Z		S	J	−3X	H	/	G24		K0	/A1	M	*

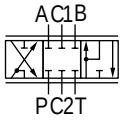
With **on-board** trigger electronics **= E**

Nominal size 10 **= 10**
Nominal size 16 **= 16**
Nominal size 25 **= 25**
Nominal size 35 [1] **= 35**

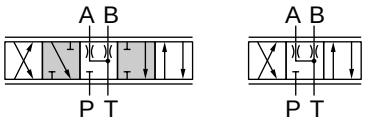
Symbols **= E, E1**



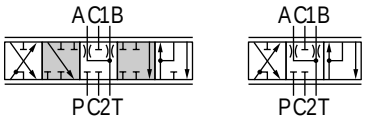
= E (Z), E1 (Z)



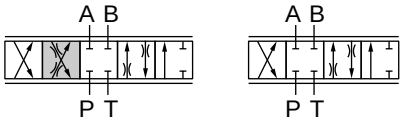
= W, W1



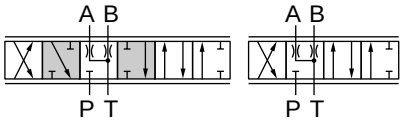
= W (Z), W1 (Z)



= E4



= W4



Transitional symbols

With symbol E1, E1(Z), E4, W1(Z), W4:
P → A: q_v B → T: $q_v/2$
P → B: $q_v/2$ A → T: q_v

[1] NG35 is a high flow version of the NG32, ports P, A, B and T have Ø 50 mm in the main stage.
Contrary to the standard, ports P, A, B and T may be drilled to max. Ø 48 mm in the control block.
These valves therefore provide higher flow rates $Q_A : Q_B$.

Further information in plain text

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

Interface for trigger electronics
A1 = Setpoint input ±10 V

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

Control oil supply "x", control oil outlet "y"
No code= "x" = external, "y" = external
E = "x" = internal, "y" = external
ET = "x" = internal, "y" = internal
T = "x" = external, "y" = internal

Voltage supply of trigger electronics
G24 = +24 V DC

H = Highflow version (on request)

3X = Unit series 30 to 39 (installation and connection dimensions unchanged)

J = **Overlap compensation signal**
See characteristic curve range: ±0.5 V

Flow characteristic
S = Progressive

Nominal flow rate at 10 bar valve pressure difference

Nominal size
10 = 50 or 85 l/min
16 = 180 l/min
25 = 350 or 430 l/min
35 = 1,100 l/min

Z = **With load tap C1/C2**

Preferred types (available at short notice)

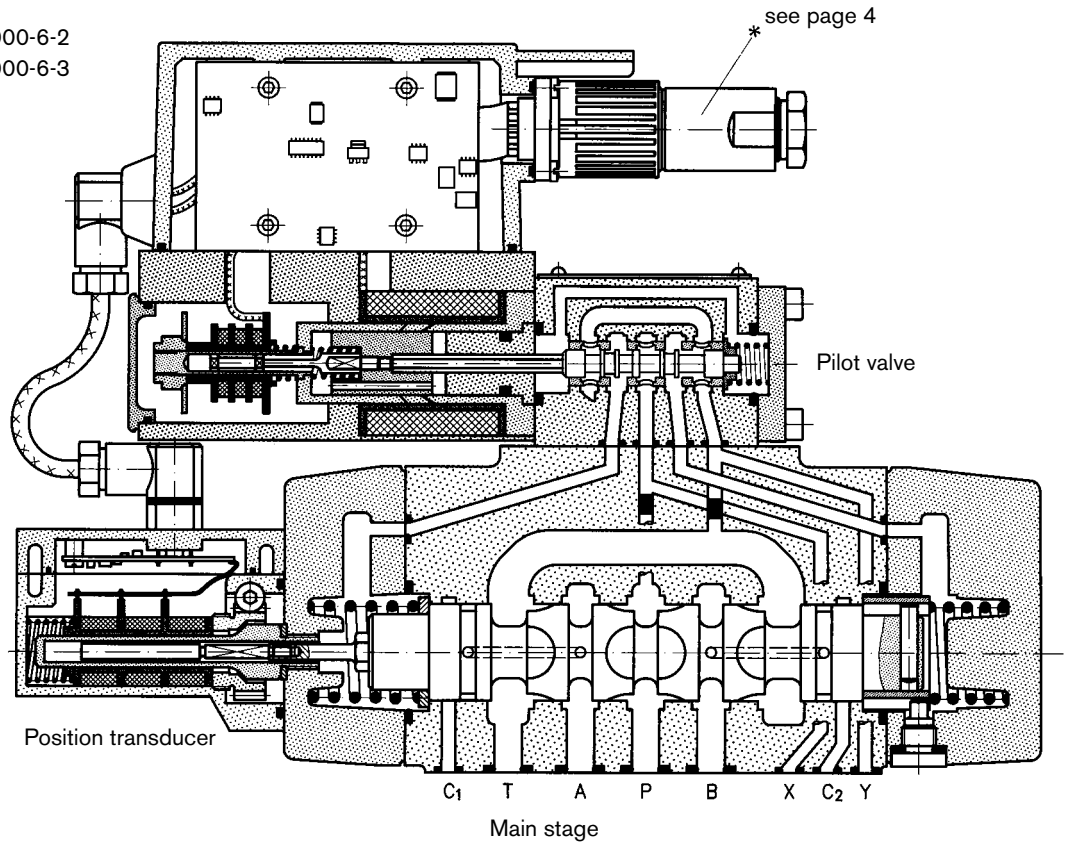
Type 4WRLE	Material No.
E, E1, E4, W, W1, W4	**NG10**
4WRLE10E–80SJ–3X/G24KO/A1M	**0 811 404 700**
4WRLE10E–80SJ–3X/G24ETKO/A1M	**0 811 404 713**
4WRLE10E1–80SJ–3X/G24KO/A1M	**0 811 404 701**
4WRLE10E1–80SJ–3X/G24ETKO/A1M	**0 811 404 715**
4WRLE10E4–80SJ–3X/G24KO/A1M	**0 811 404 714**
4WRLE10W–50SJ–3X/G24ETKO/A1M	**0 811 404 704**
4WRLE10W–80SJ–3X/G24KO/A1M	**0 811 404 702**
4WRLE10W–80SJ–3X/G24ETKO/A1M	**0 811 404 707**
4WRLE10W1–80SJ–3X/G24KO/A1M	**0 811 404 703**
4WRLE10W4–80SJ–3X/G24KO/A1M	**0 811 404 711**
E (Z), E1 (Z), W (Z), W1 (Z), W4	**NG16**
4WRLE16EZ–180SJ–3X/G24ETKO/A1M	**0 811 404 319**
4WRLE16EZ–180SJ–3X/G24TKO/A1M	**0 811 404 318**
4WRLE16EZ–180SJ–3X/G24KO/A1M	**0 811 404 305**
4WRLE16E1Z–180SJ–3X/G24KO/A1M	**0 811 404 306**
4WRLE16WZ–180SJ–3X/G24KO/A1M	**0 811 404 307**
4WRLE16W1Z–180SJ–3X/G24ETKO/A1M	**0 811 404 327**
4WRLE16W1Z–180SJ–3X/G24KO/A1M	**0 811 404 308**
4WRLE16W4–180SJ–3X/G24ETKO/A1M	**0 811 404 328**
4WRLE16W4–180SJ–3X/G24KO/A1M	**0 811 404 333**

Type 4WRLE	Material No.
E (Z), E1 (Z), E4, W (Z), W1 (Z), W4	**NG25**
4WRLE25EZ–350SJ–3X/G24KO/A1M	**0 811 404 454**
4WRLE25EZ–350SJ–3X/G24TKO/A1M	**0 811 404 466**
4WRLE25EZ–350SJ–3X/G24ETKO/A1M	**0 811 404 481**
4WRLE25E1Z–350SJ–3X/G24KO/A1M	**0 811 404 455**
4WRLE25E4–350SJ–3X/G24KO/A1M	**0 811 404 459**
4WRLE25WZ–350SJ–3X/G24KO/A1M	**0 811 404 456**
4WRLE25W1Z–350SJ–3X/G24EKO/A1M	**0 811 404 476**
4WRLE25W1Z–350SJ–3X/G24KO/A1M	**0 811 404 457**
4WRLE25W4–350SJ–3X/G24ETKO/A1M	**0 811 404 471**
4WRLE25W4–350SJ–3X/G24KO/A1M	**0 811 404 472**
W	**NG35**
4WRLE35W–1100SJ–3X/G24KO/A1M	**0 811 404 504**

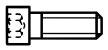
Function, sectional diagram

Servo solenoid valve 4WRLE 10...35

CE EN 61000-6-2
EN 61000-6-3



Accessories, not included in scope of delivery

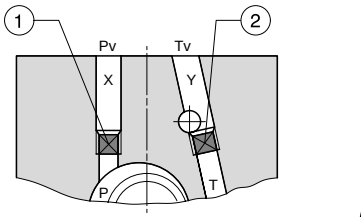
Fastening screws 	NG10	4 x M6 x 40, DIN 912-10.9	**2910151209**
	NG16	2 x M6 x 45, DIN 912-10.9	**2910151211**
		4 x M10 x 50, DIN 912-10.9	**2910151301**
	NG25	6 x M12 x 60, DIN 912-10.9	**2910151354**
	NG35	6 x M20 x 90, DIN 912-10.9	**2910151532**
* 	Plug-in connectors 6P+PE, see also RE 08008	KS	**1834482022**
		KS	**1834482026**
		MS	**1834482023**
		MS	**1834482024**
		KS 90°	**1834484252**

Testing and service equipment

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

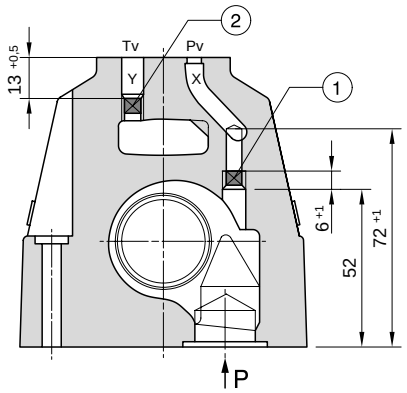
Control oil supply

NG10, 25, 35

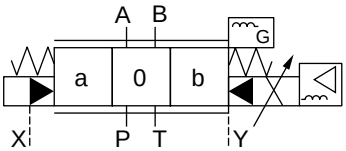


Plug ① ②
NG10...25 **1 813 464 007** SW 3
NG35 **1 813 464 001** SW 4

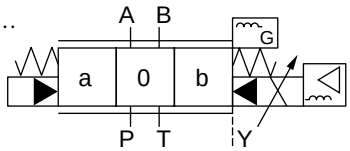
NG16



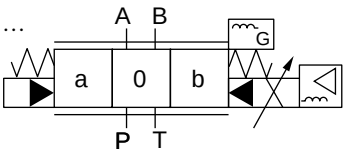
Type … –3X …



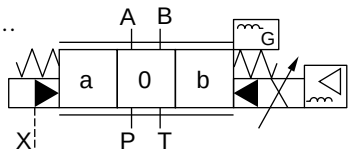
Type … –3X … E …



Type … –3X … ET …

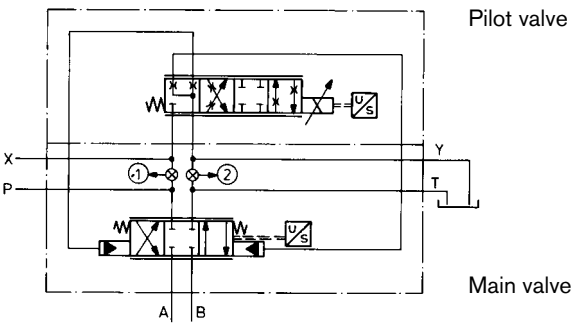


Type … –3X … T …



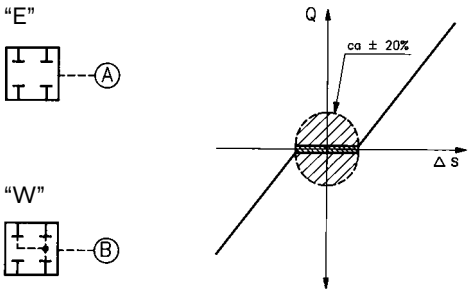
No code = "x" = external, "y" = external
E = "x" = internal, "y" = external
ET = "x" = internal, "y" = internal
T = "x" = external, "y" = internal

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 outlet is changed, the part number must also be changed.

Symbols in mid position “E”.. or “W”..



Spool valves with overlap

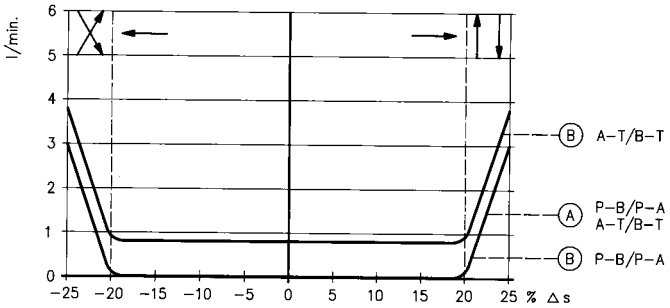
With symbol “E”, leakage oil in the two work chambers A and B of the control piston results in a build-up of pressure in A or B, which then causes a connecting cylinder to drift out of position.
In many cases, the “W” symbol is a better solution. With a setpoint of “0”, the control piston moves into the overlapped mid position.
In this mid position, pressure is then relieved from ports A and B with small openings to T.
This also supports the function of external check valves.

Flow in mid position “leakage pressure relief”

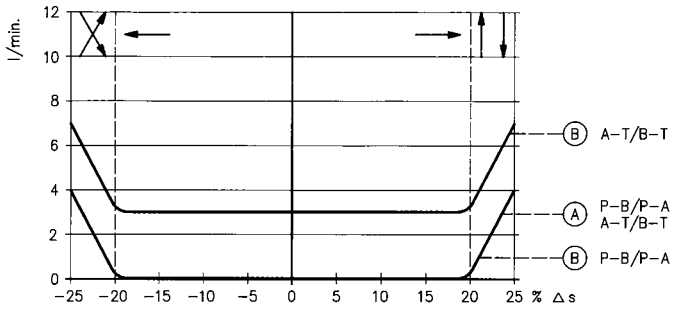
$Q = f(\Delta s)$
$0 \ldots \pm 25\,\%$

$$Q_x = Q_{nom} \cdot \sqrt{\frac{\Delta p_x}{5\ \text{bar}}}$$

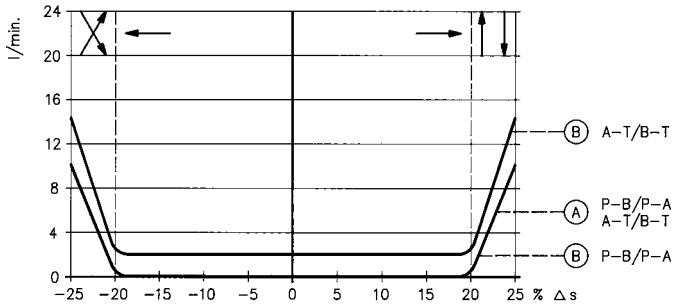
NG10



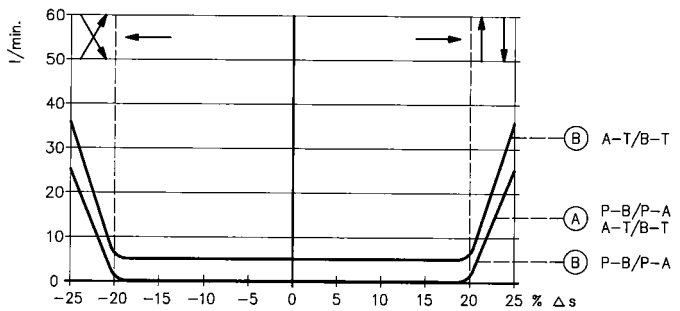
NG16



NG25



NG35

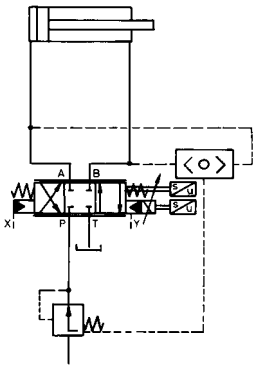


Load tap C1/C2

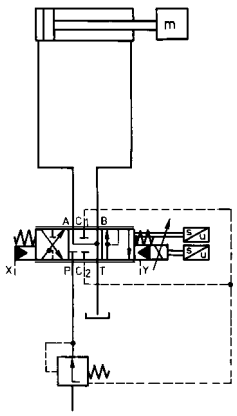
To compensate for fluctuations in the load or supply pressure, proportional valves are combined with pressure compensators. The load is tapped through a shuttle valve for the NG10 and 35, and through two additional ports C1 and C2 for NG16 and 25 ("4WRL" and "4WRLE" only).

The pressure compensator therefore always receives the correct pressure signal even in the event of negative load.
When using pressure compensators, external control oil supply should always be selected.

NG10, 35



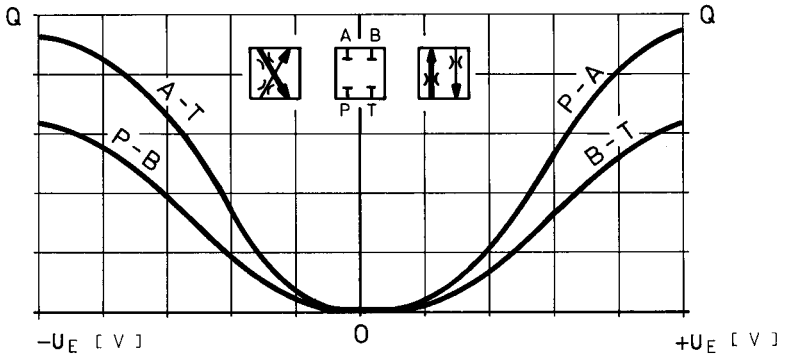
NG16, 25

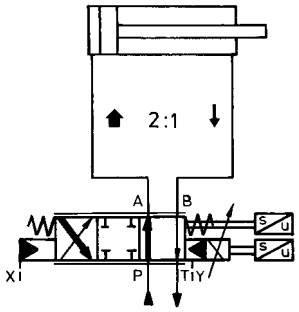


Asymmetrical valve spool $Q_A : Q_B = 2:1$

The two throttle cross-sections of proportional directional control valves are usually symmetrical.

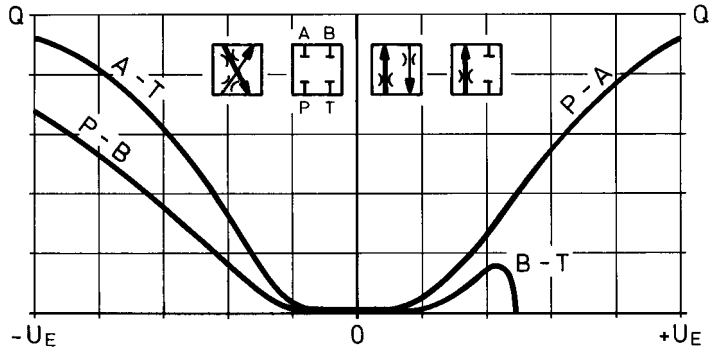
In order to adapt to differential cylinders with different with asymmetrical metering notches are available.
A comparison of the flow rates can be found in the product range overview "Preferred types, characteristic curves".

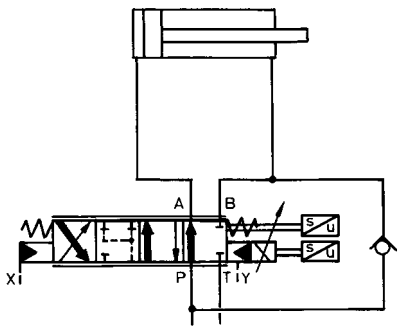




Valve spools in a differential circuit

In order to produce differential circuits, valve spools with an additional "4th position" are available (see diagram).
It is sufficient to install a check valve in the consumer lines.
In addition, a symbol (spool) with internal B-P connection is employed for certain "branch-oriented solutions". However, we recommend that you consult the BRH Application Center with regard to these special symbols.
As a rule, a simulation or knowledge of this type of system is required.





Technical data

General

Construction		Spool type valve, pilot operated			
Actuation		Servo solenoid valve NG6, with position controller for pilot valve and main stage			
Type of mounting		Subplate, mounting hole configuration NG10...35 (ISO 4401-...)			
Installation position		Optional			
Ambient temperature range	°C	−20 … +50			
Weight	kg	**NG10** 8.7	**NG16** 10.6	**NG25** 18.4	**NG35** 81
Vibration resistance, test condition		max. 25 g, shaken in 3 dimensions (24 h)			

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

Pressure fluid		Hydraulic oil to DIN 51524 … 535, other fluids after prior consultation			
Viscosity range	recommended mm²/s	20 … 100			
	max. permitted mm²/s	10 … 800			
Pressure fluid temperature range	°C	−20 … +70			
Maximum permissible degree of contamination of pressure fluid Purity class to ISO 4406 (c)		Class 18/16/13 [1]			
Direction of flow		See symbol			
Nominal flow at $\Delta p = 5$ bar per notch [2]	l/min	**NG10** 50, 80	**NG16** 180	**NG25** 350	**NG35** 1,100
Max. working pressure in P, A, B	bar	350	350	350	350
Max. pressure in X (ext.)	bar	280			
Max. pressure in P (X = int.)	bar	280			
Max. pressure in T (Y = ext.)	bar	250			
Max. pressure in T (Y = int.)	bar	250			
Max. pressure in Y (ext.)	bar	250			
Min. control oil pressure of “pilot stage”		8			
Q_{max}	l/min	170	450	900	3,500
Q_N pilot valve (supply pressure) $\Delta p = 35$ bar	l/min	2	4	12	40
Leakage of pilot valve at 100 bar	cm³/min	<150	<180	<350	<1,100
Leakage of main stage Sb “E” at 100 bar Q_N: Sb “W”, see graph on page 5	l/min	<0.25	<0.4	<0.6	<1.1

Static/Dynamic

Overlap in mid position		≈18 ... 22 % of spool stroke, electrically adjustable for U_{D-E} ±0.5 V			
Spool stroke, main stage	± mm	4	7	10	12.5
Control oil volume of main stage 100 %	cm³	1.1	4.3	11.3	41.5
Control oil requirement 0 ... 100 %, x = 100 bar	l/min	2.2	4.7	11.7	15.6
Hysteresis	%	< 0.1, scarcely measurable			
Manufacturing tolerance	%	<±5 (Q_{max})			
Response time for 0 ... 100 %, x = 100 bar	ms	<40	<80	<80	<130
Response time for 0 ... 100 %, x = 10 bar	ms	<150	<250	<250	<500
Switch-off behavior		After electrical shut-off (pilot valve in “fail-safe”) Main stage moves to spring-centered mid position (Sb “E../W..”)			
Thermal drift		<1 % at $\Delta T = 40$ °C			
Calibration		At factory ±1 %, see flow curve			
Conformity		CE EN 61000-6-2 EN 61000-6-3			

[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 sections RE 50070, RE 50076 and RE 50081.

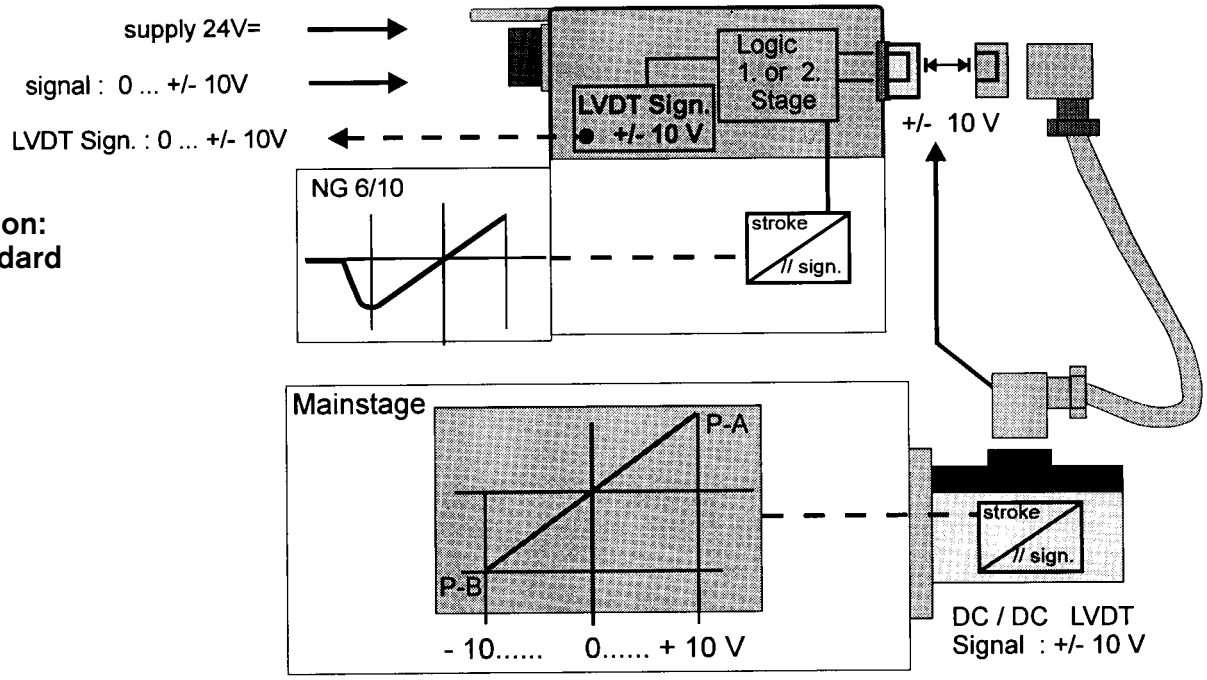
[2] Flow rate at a different Δp $q_x = q_{nom} \cdot \sqrt{\frac{\Delta p_x}{5}}$

Technical data

Electric pilot valve NG6, valve with on-board electronics

Cyclic duration factor %	100
Degree of protection	IP 65 to DIN 40050 and IEC 14434/5
Connection	Plug-in connector 6P+PE, DIN 43563
Power supply 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	Solenoid ☑ 45 mm = 40 VA max.
External fuse	2.5 A_F
Input, "Standard" version Terminal D: U_E Terminal E:	Difference amplifier, $R_i = 100\ k\Omega$ 0...±10 V 0 V
Max. differential input voltage at 0 V	D → B E → B } max. 18 V DC
Test signal, "Standard" version Terminal F: U_{Test} Terminal C:	LVDT 0...±10 V Reference 0 V
Protective conductor and screen	See pin assignment (installation conforms to CE)
Recommended cable	See pin assignment up to 20 m 7x0.75 mm^2 up to 40 m 7x1 mm^2
Calibration	Overlap and P–A at +8 V, calibrated at the factory, see valve characteristic curve

Version:
Standard

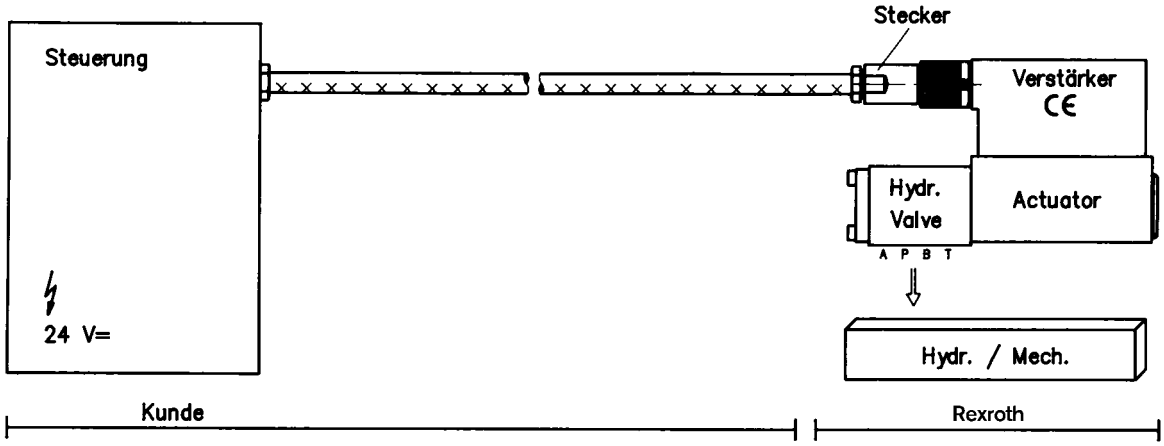


Important

Pilot operated servo solenoid valves with positive overlap perform their function in open or closed-loop-controlled axes and have approx. 20 % overlap when switched off. This condition does not constitute an active, safe basic position. For this reason, many applications require the use of "external check valves" or certain sandwich-mounted valves, which must be taken into account during the On/Off switching sequence.

Connection

For electrical data, see page 8 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 mm² to 20 m length
- 1.0 mm² to 40 m length

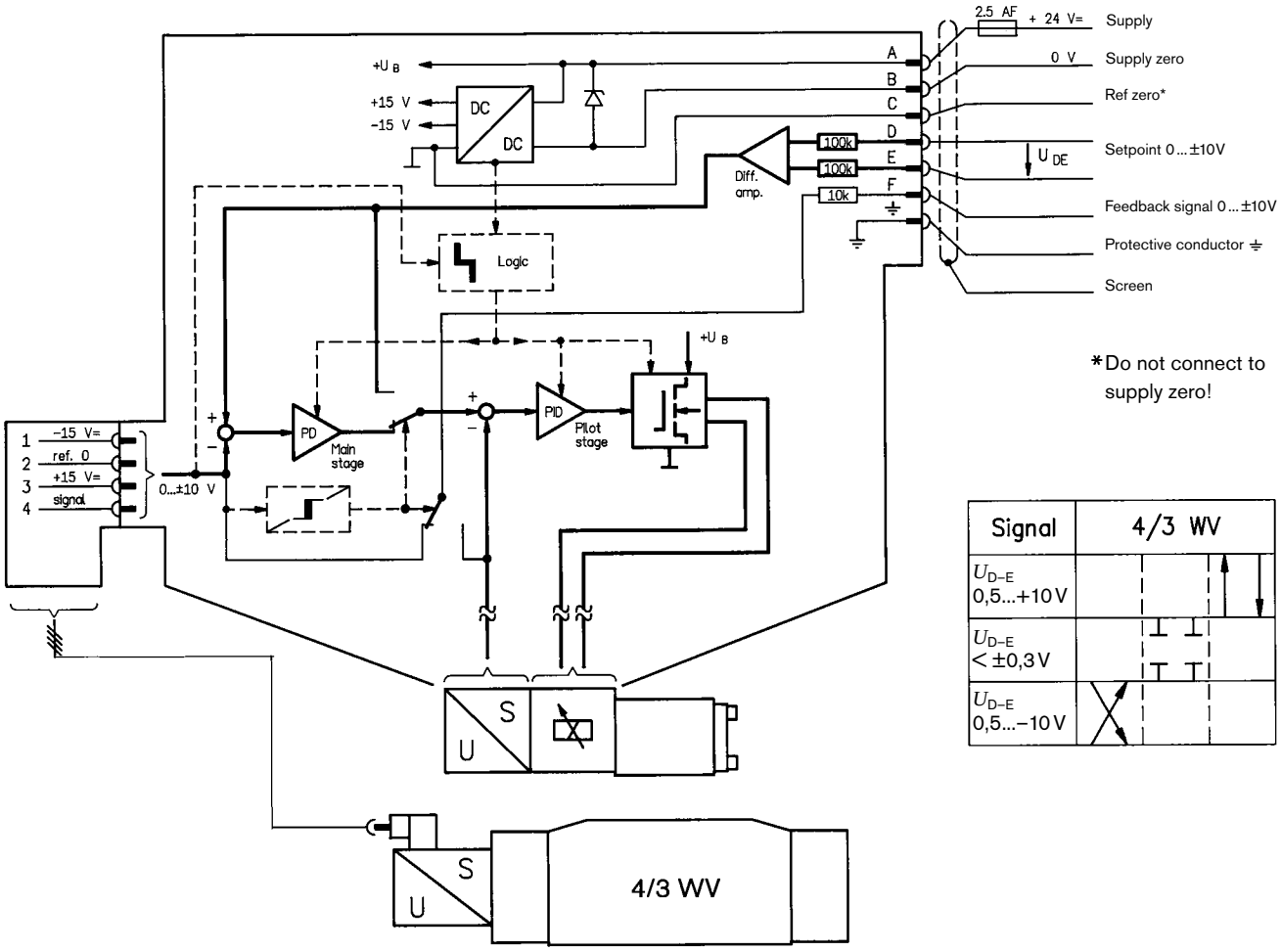
Outside Ø:
- 9.4 ... 11.8 mm – Pg11
- 12.7 ... 13.5 mm – Pg16

Important

Voltage supply 24 V DC nom.,
if voltage drops below 18 V DC, rapid shutdown resembling "Enable OFF" takes place internally.
Electrical signals emitted via the trigger electronics (e.g. feedback signal) 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.)

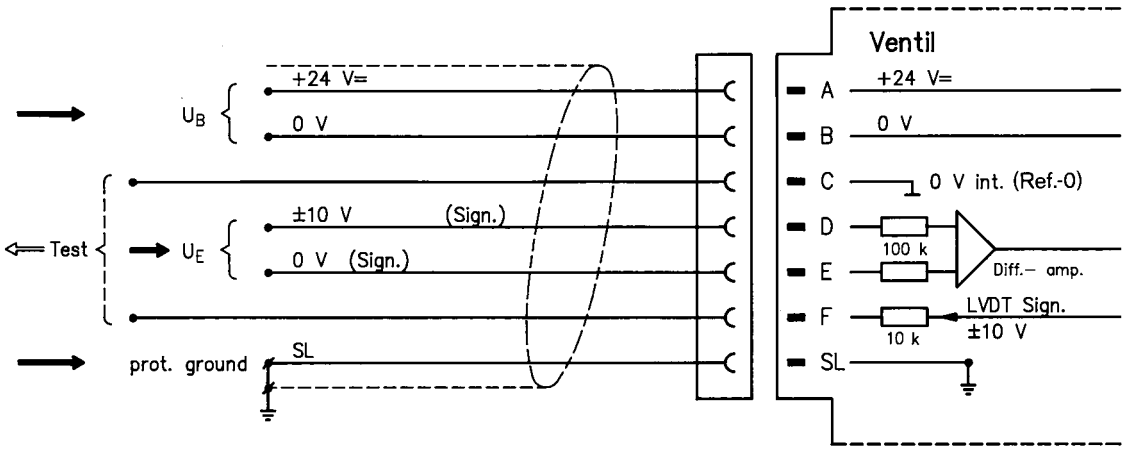
On-board trigger electronics

Block diagram/pin assignment
Version A1: U_{D-E} ±10 V



Signal	4/3 WV
U_{D-E} 0,5...+10 V	
U_{D-E} < ±0,3 V	
U_{D-E} 0,5...−10 V	

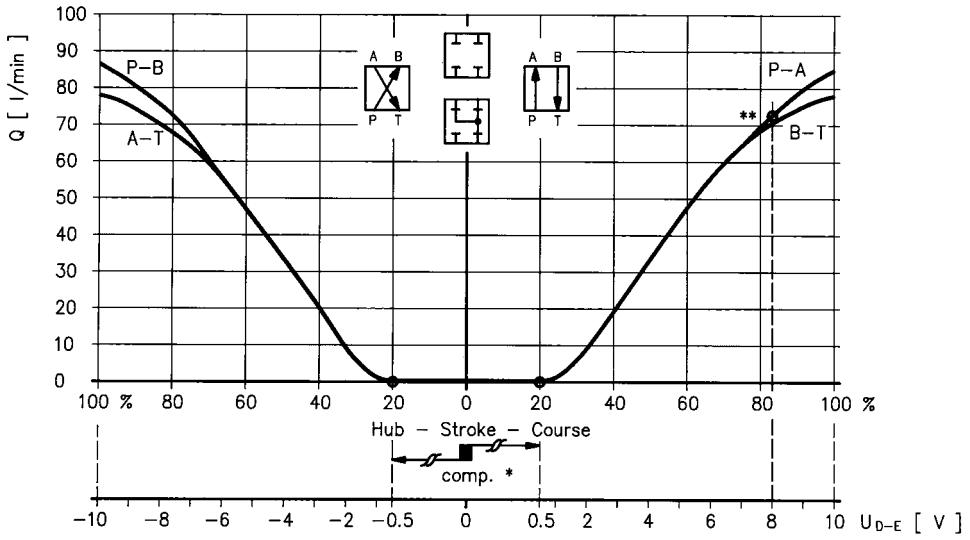
Pin assignment 6P+PE
Version A1: U_{D-E} ±10 V
(R_i = 100 kΩ)



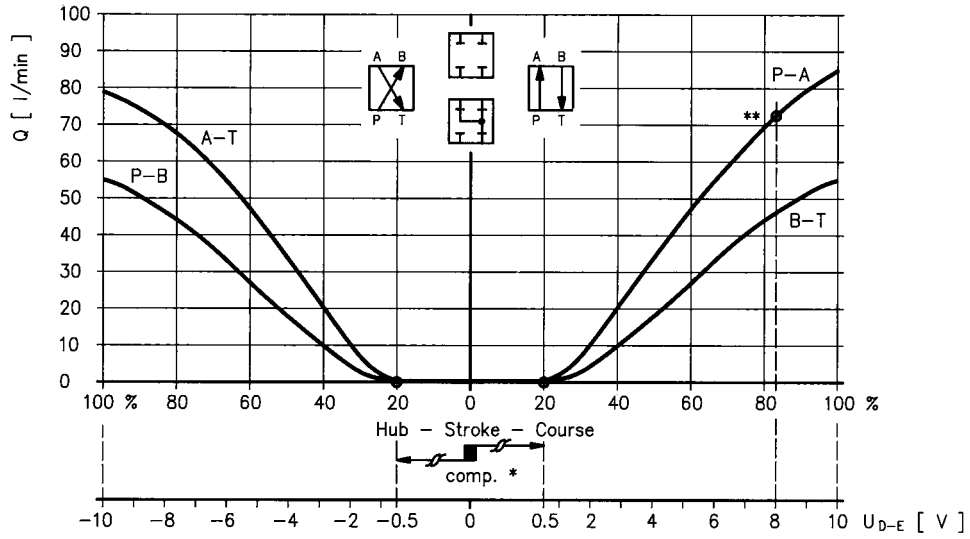
Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\,°C \pm 5\,°C$)

NG10

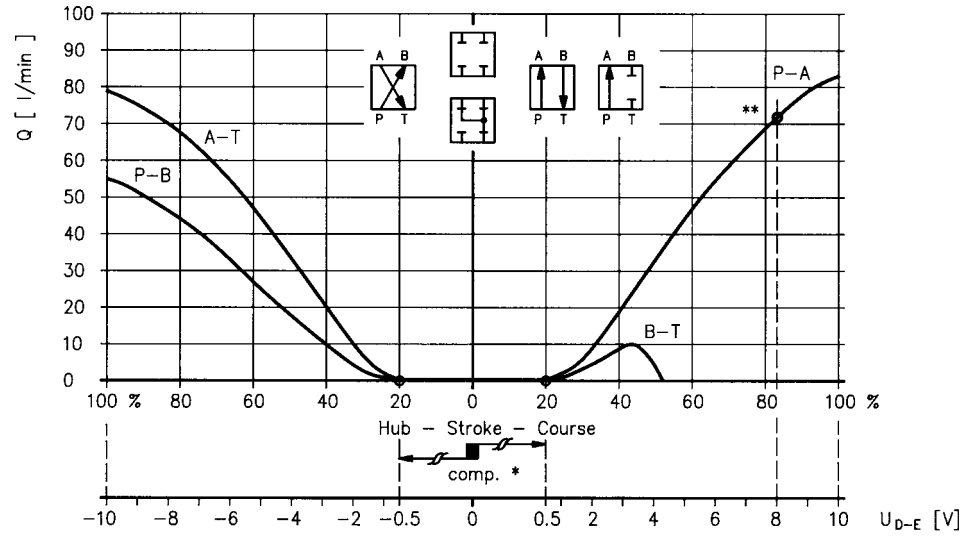
$Q_A : Q_B$ = 80:80 l/min.



$Q_A : Q_B$ = 80:50 l/min.



$Q_A : Q_B$ = 80:50 l/min.



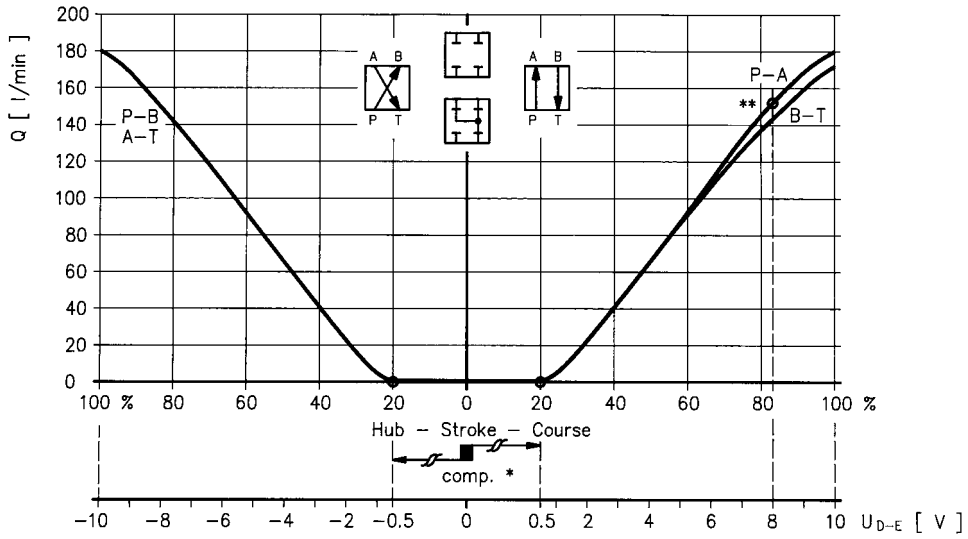
* Comp. U_{D-E} ±0.5 V factory setting ±1 %

** Q_{P-A} at +8 V [U_{D-E}] manufacturing tolerance $Q_{max} \leqq \pm 5\,\%$

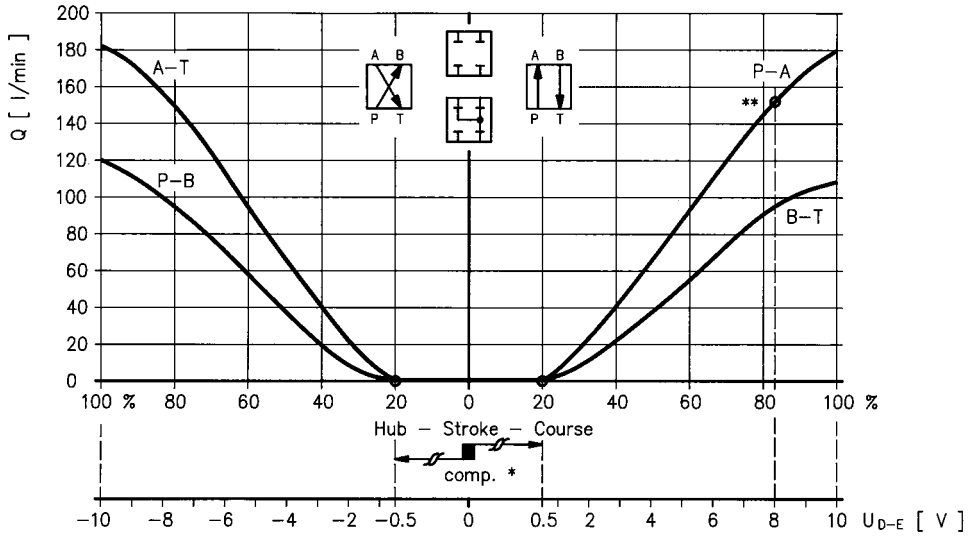
Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\,°C \pm 5\,°C$)

NG16

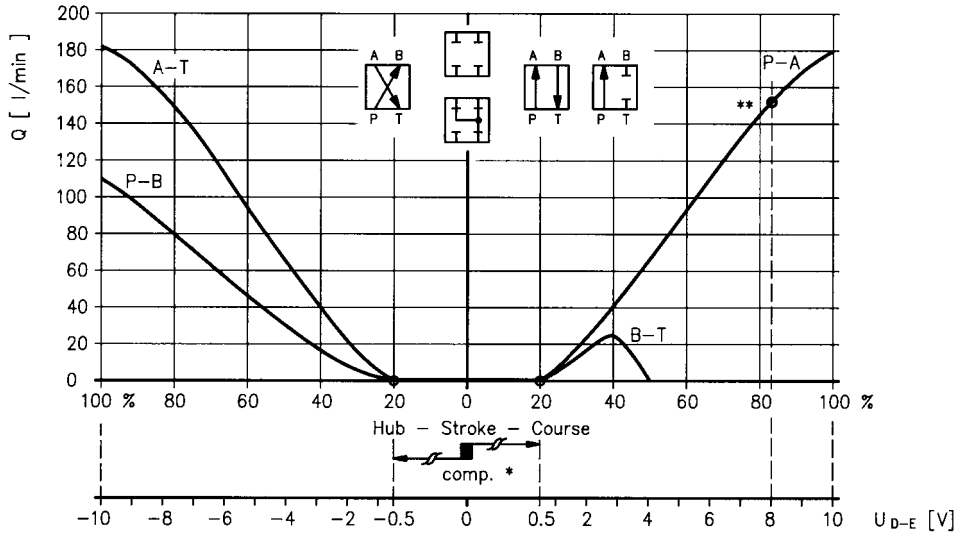
$Q_A : Q_B$ = 180:180 l/min.



$Q_A : Q_B$ = 180:110 l/min.



$Q_A : Q_B$ = 180:110 l/min.



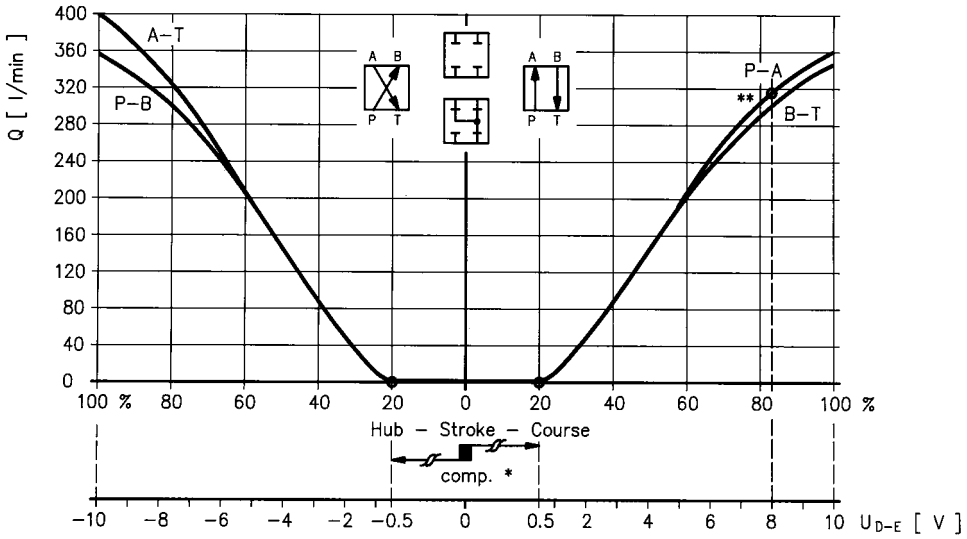
* Comp. U_{D-E} ±0.5 V factory setting ±1 %

** Q_{P-A} at +8 V [U_{D-E}] manufacturing tolerance $Q_{max} \leqq \pm 5\,\%$

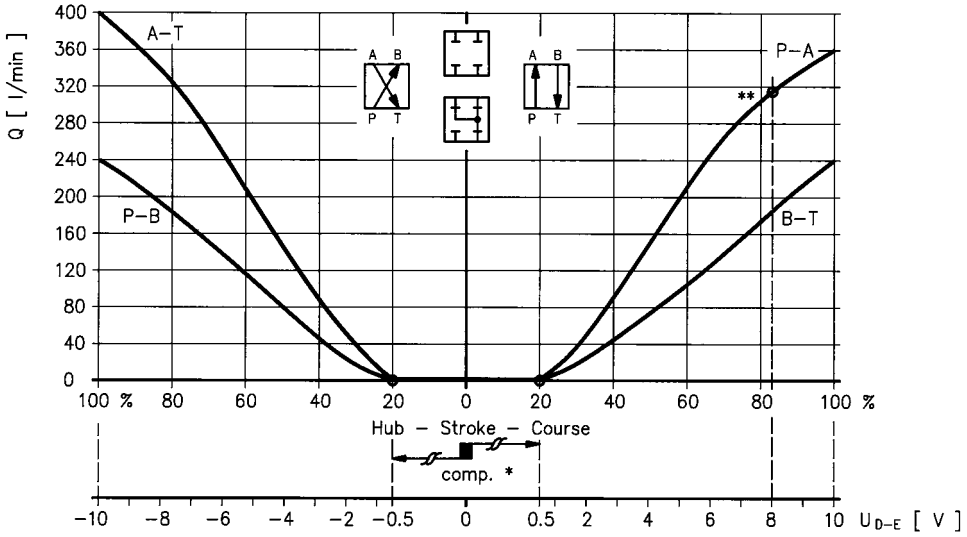
Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\,°C \pm 5\,°C$)

NG25

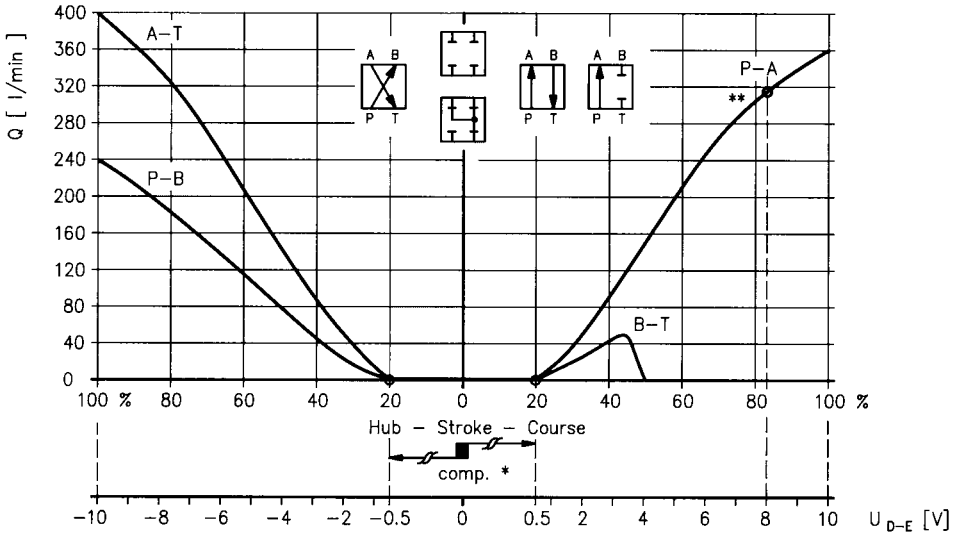
$Q_A : Q_B$ = 350: 350 l/min.



$Q_A : Q_B$ = 350: 230 l/min.



$Q_A : Q_B$ = 350: 230 l/min.

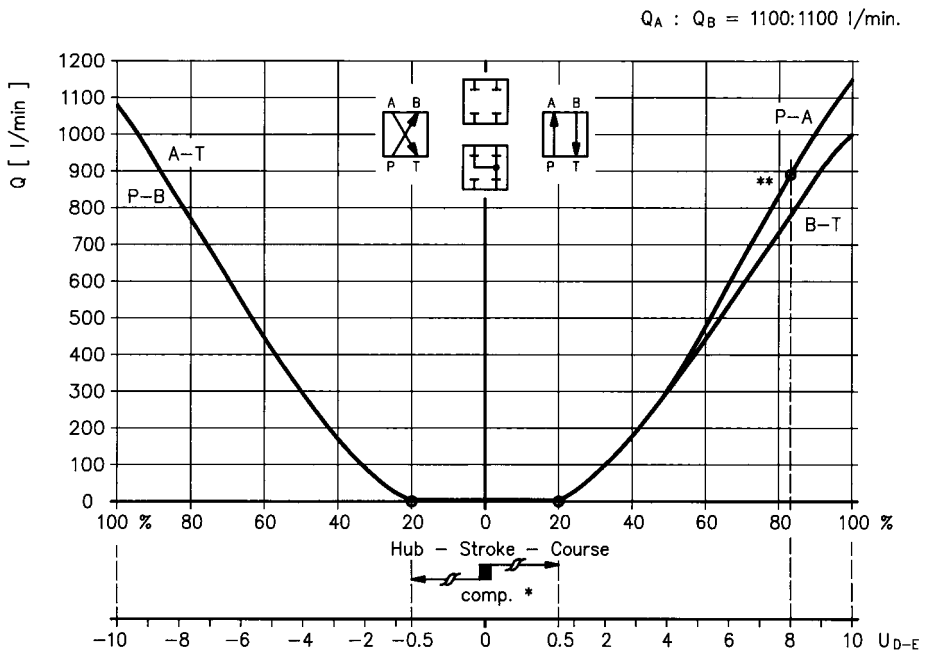


* Comp. U_{D-E} ±0.5 V factory setting ±1 %

** Q_{P-A} at +8 V [U_{D-E}] manufacturing tolerance $Q_{max} \leqq \pm 5\,\%$

Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\,°C \pm 5\,°C$)

NG35



* Comp. U_{D-E} ±0.5 V factory setting ±1 %

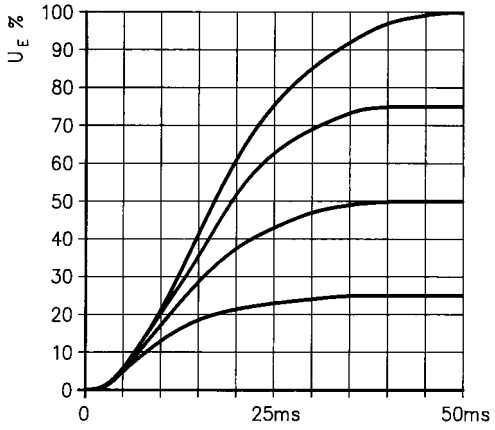
** Q_{P-A} at +8 V [U_{D-E}] manufacturing tolerance $Q_{max} \leqq \pm 5\,\%$

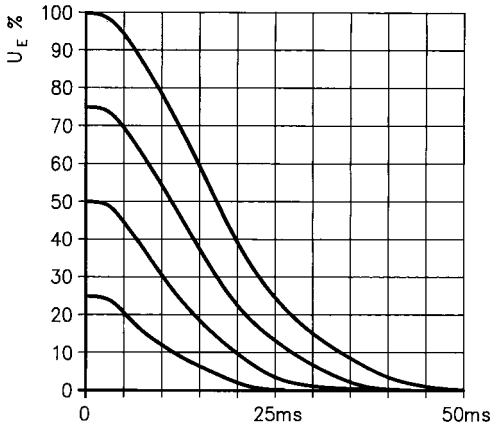
Characteristic curves (measured with HLP 46, $\vartheta_{oil} = 40\,°C \pm 5\,°C$)

Response time x = 100 bar

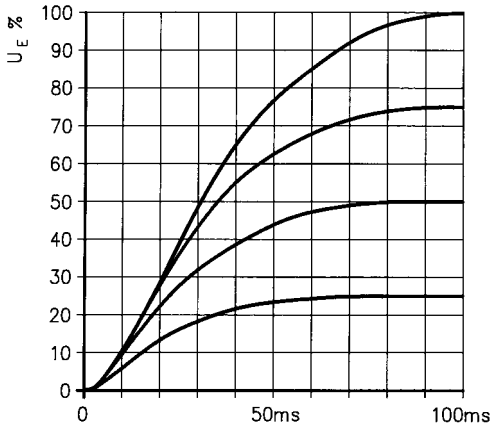
Open **Close**

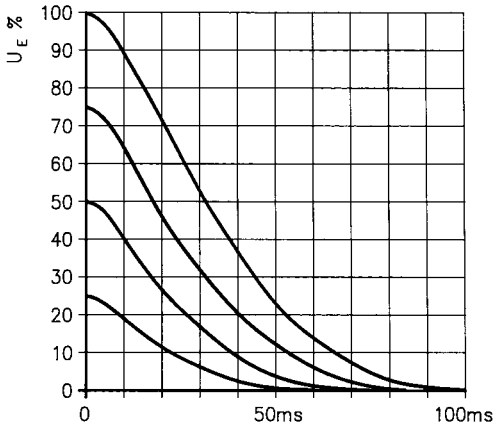
NG10



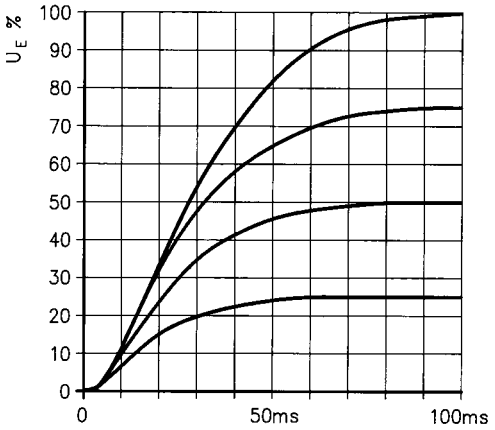


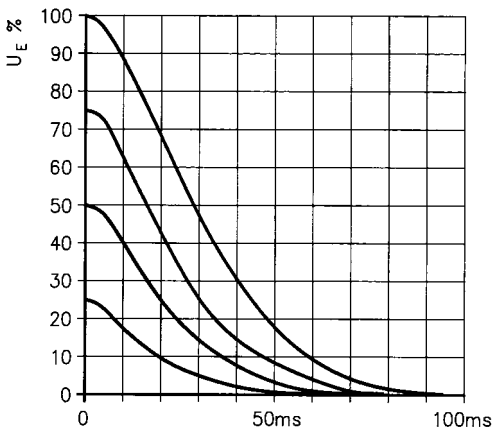
NG16



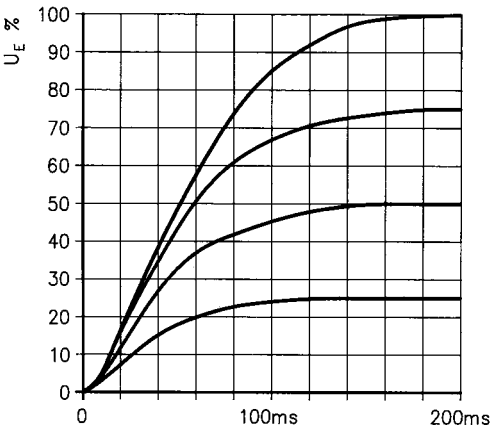


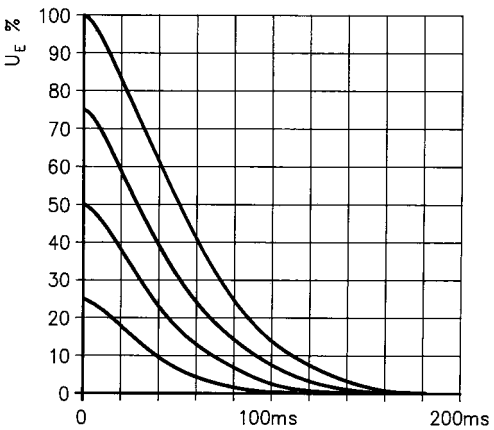
NG25



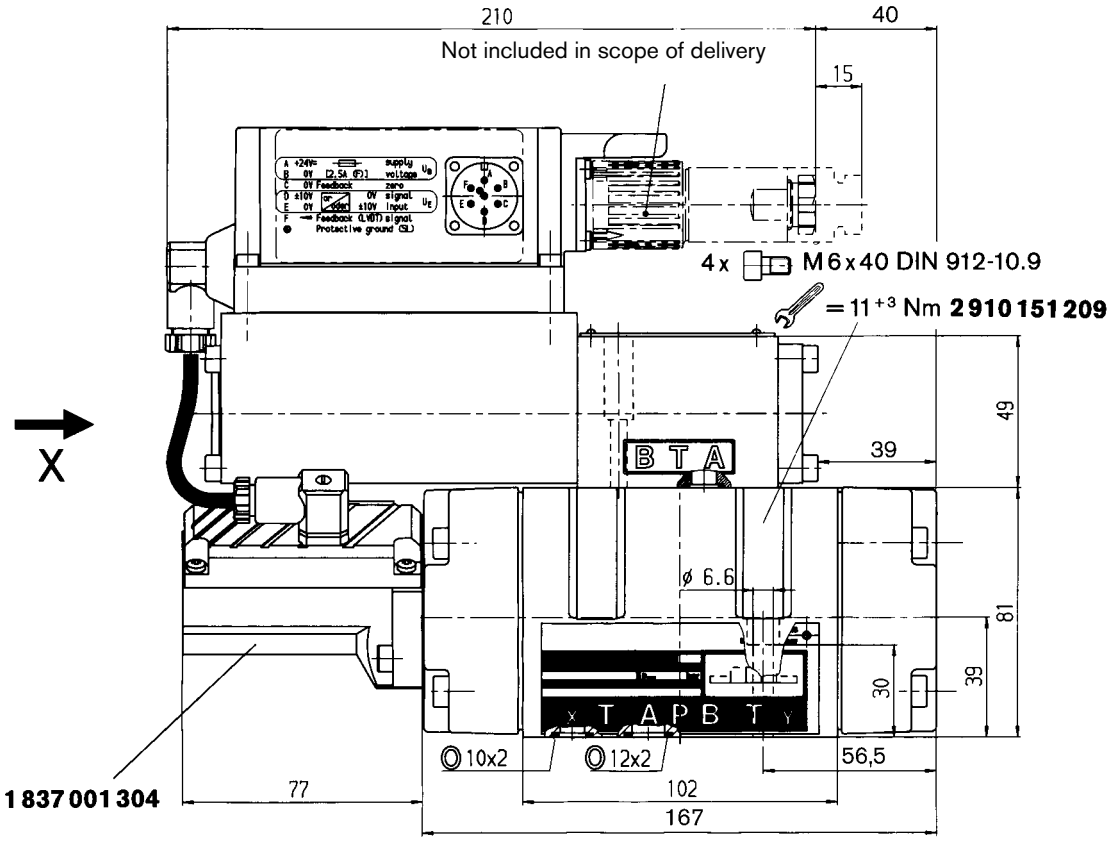


NG35

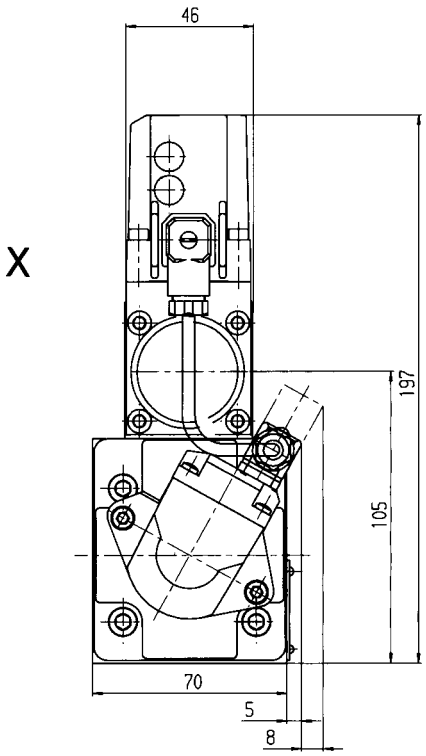




Unit dimensions NG10 (nominal dimensions in mm)

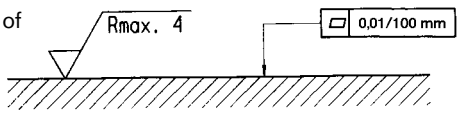


Set **1817010280**

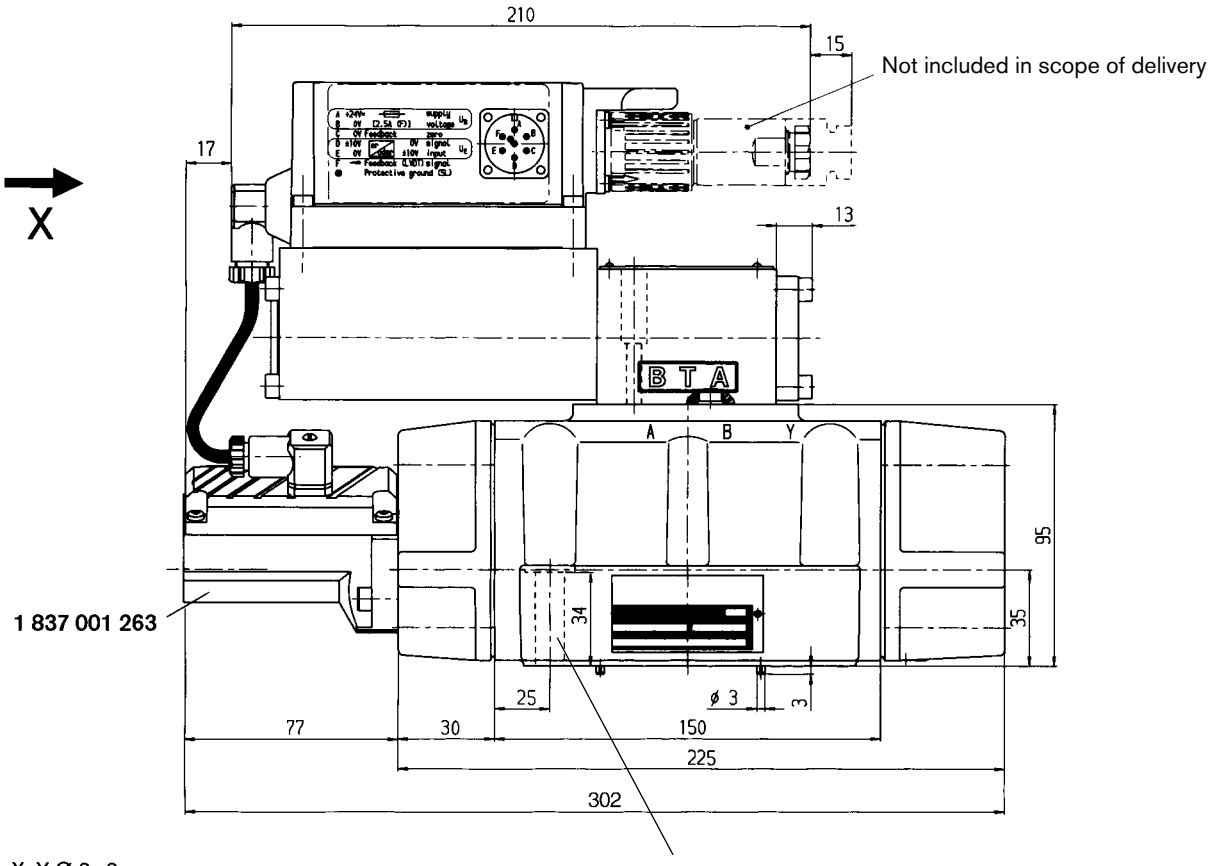


Mounting hole configuration: NG10
(ISO 4401-05-05-0-94), see page 20
For subplates, see catalog section RE 45055

Required surface quality of mating component

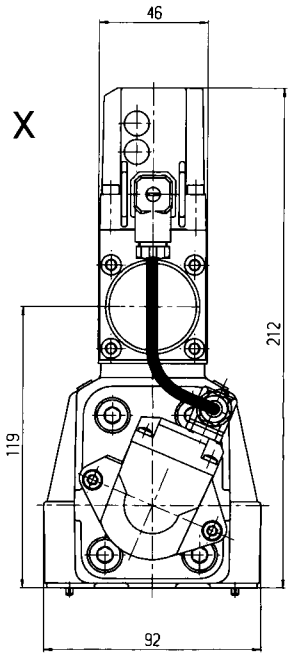


Unit dimensions NG16 (nominal dimensions in mm)



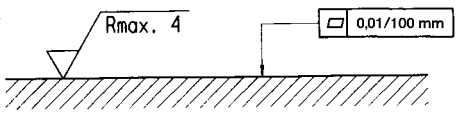
- X, Y Ø 9x2
- P, A, B, T Ø 23x2,5
- Set **1817010275**

M 6x45 **2910151211**
M 10x50 **2910151301**

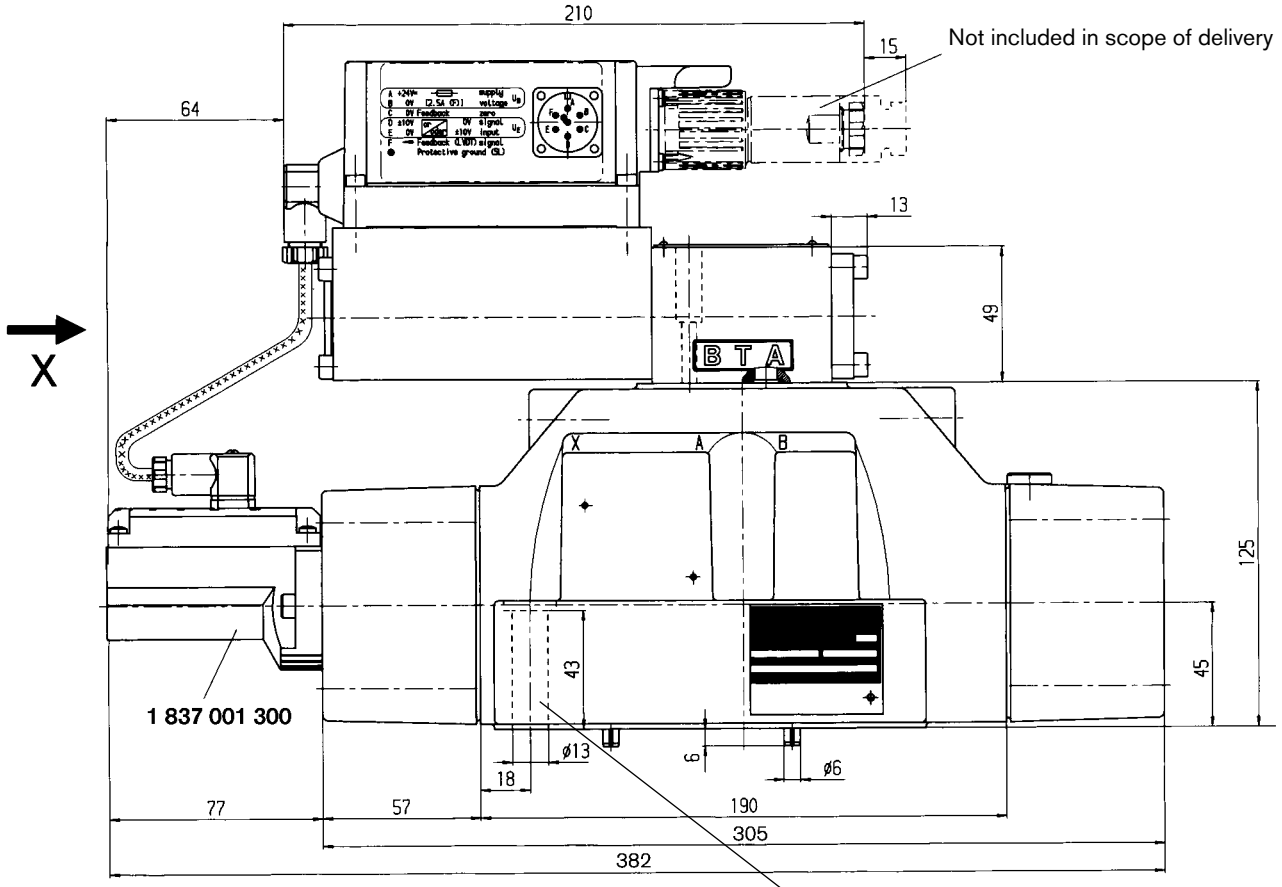


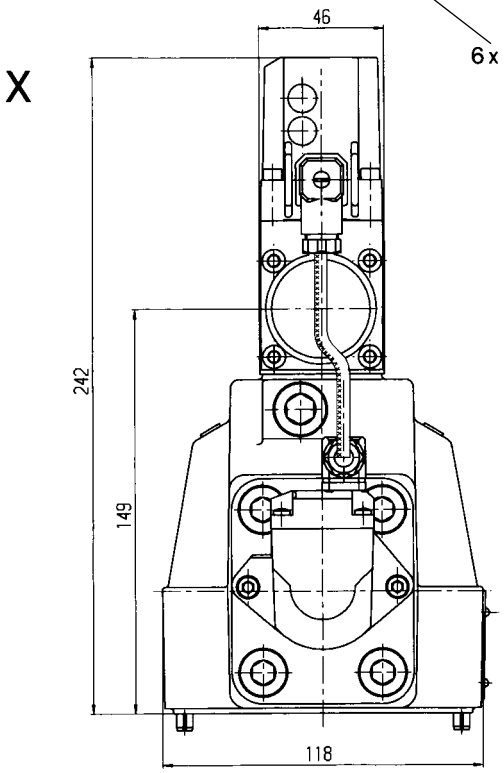
Mounting hole configuration: NG16
(ISO 4401-07-06-0-94), see page 20
For subplates, see catalog section RE 45057

Required surface quality of mating component



Unit dimensions NG25 (nominal dimensions in mm)





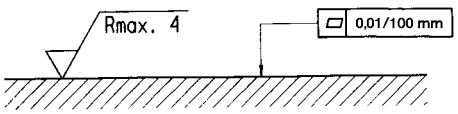
X

6x M 12x60 DIN 912-10.9
= 90 +30 Nm
2910151354

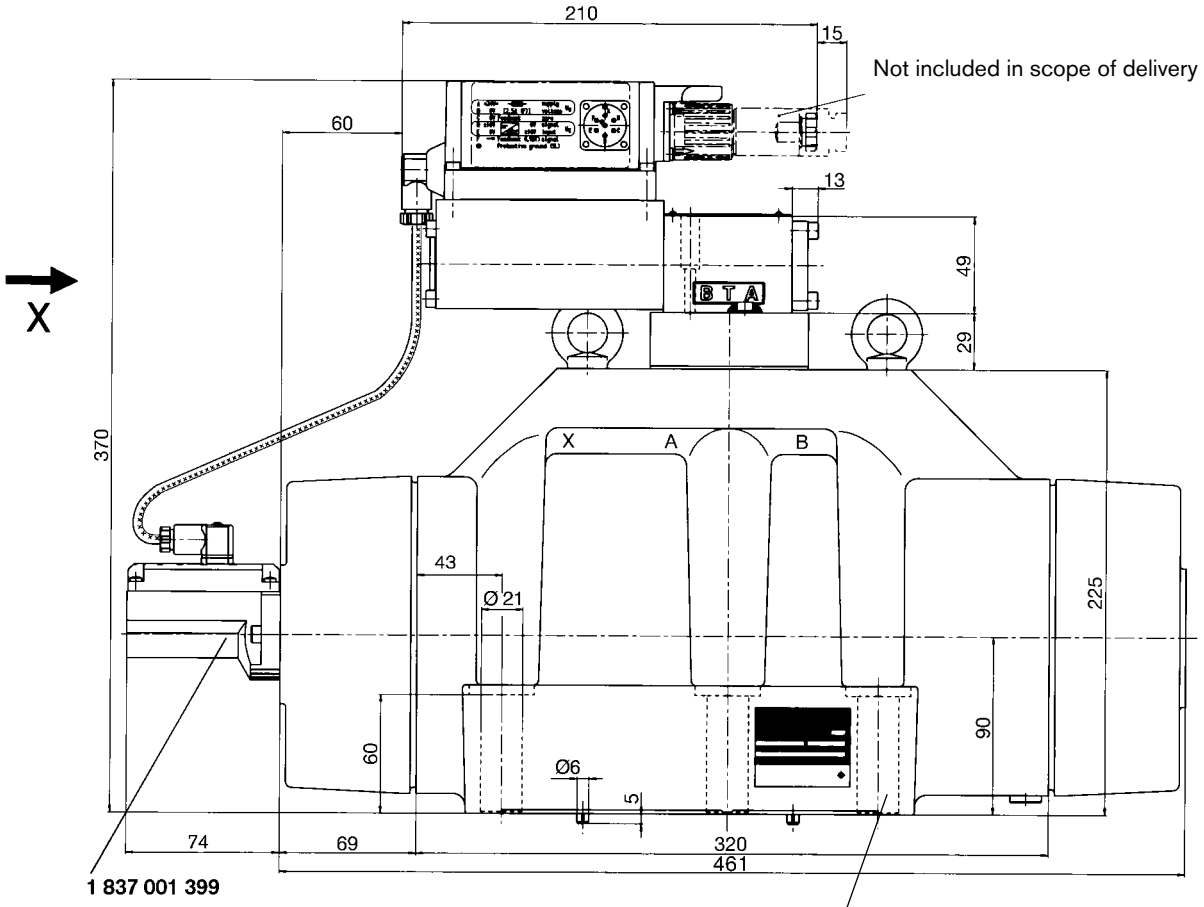
- X, Y Ø 15x2,5
- P, A, B, T Ø 28x3
- Set **1817010273**

Mounting hole configuration: NG25
(ISO 4401-08-07-0-94), see page 21
For subplates, see catalog section RE 45059

Required surface quality
of mating component



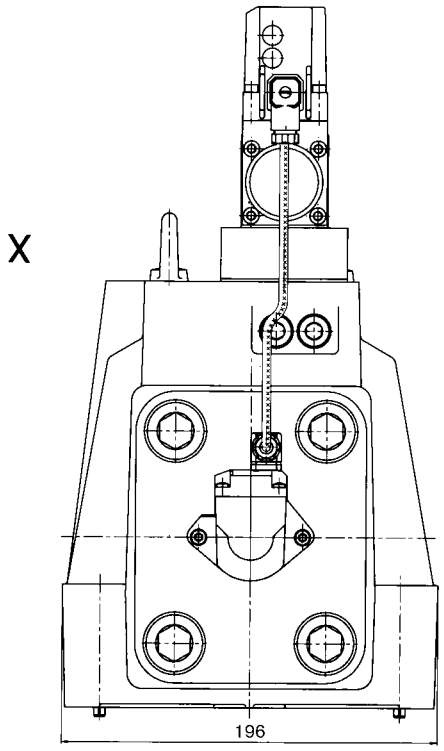
Unit dimensions NG35 (nominal dimensions in mm)



6x M 20x90 DIN 912-10.9
= 450 +110 Nm

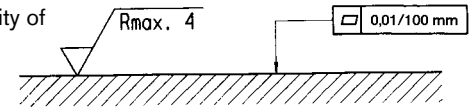
2910151532

- L_1, L_2, X, Y Ø 15x2,5
- P, A, B, T Ø 53,57x3,53
- Set **1817010297**



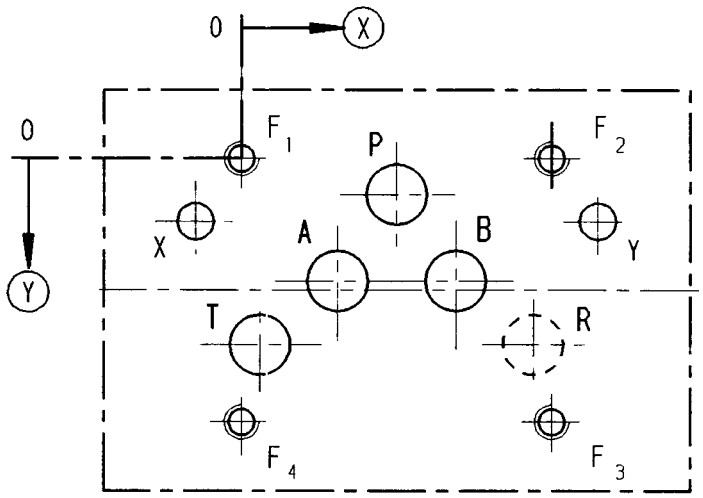
Mounting hole configuration: NG32
(ISO 4401-10-08-0-94), see page 21
For subplates, see catalog section RE 45060

Required surface quality of mating component



Mounting hole configurations (nominal dimensions in mm)

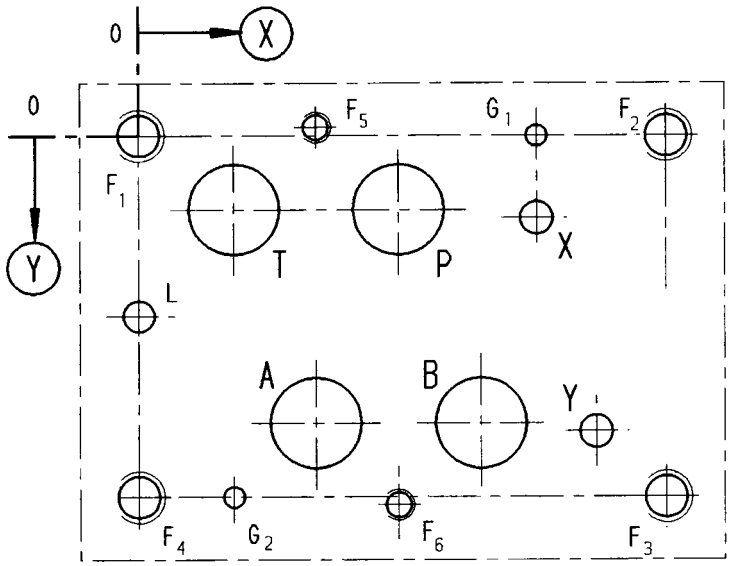
NG10 – ISO 4401-05-05-0-94



[1] Deviates from standard
[2] Thread depth:
Ferrous metal 1.5 x Ø*
Non-ferrous 2 x Ø
* (NG10 min. 10.5 mm)

	P	A	T	B	F_1	F_2	F_3	F_4	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 [1]	10.5 [1]	10.5 [1]	10.5 [1]	M6 [2]	M6 [2]	M6 [2]	M6 [2]	6.3	6.3	10.5 [1]

NG16 – ISO 4401-07-06-0-94

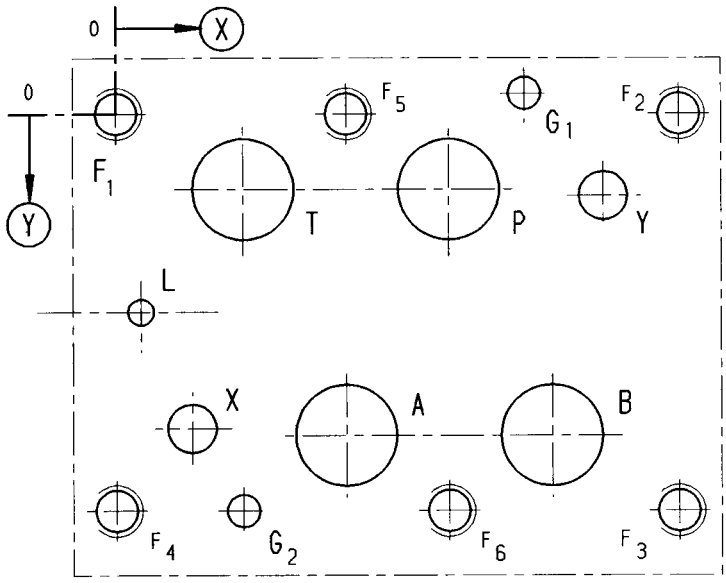


[1] Deviates from standard
[2] Thread depth:
Ferrous metal 1.5 x Ø
Non-ferrous 2 x Ø

	P	A	T	B	L	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
⊗	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 [1]	20 [1]	20 [1]	20 [1]	6.3	6.3	6.3	4	4	M10 [2]	M10 [2]	M10 [2]	M10 [2]	M6 [2]	M6 [2]

Mounting hole configurations (nominal dimensions in mm)

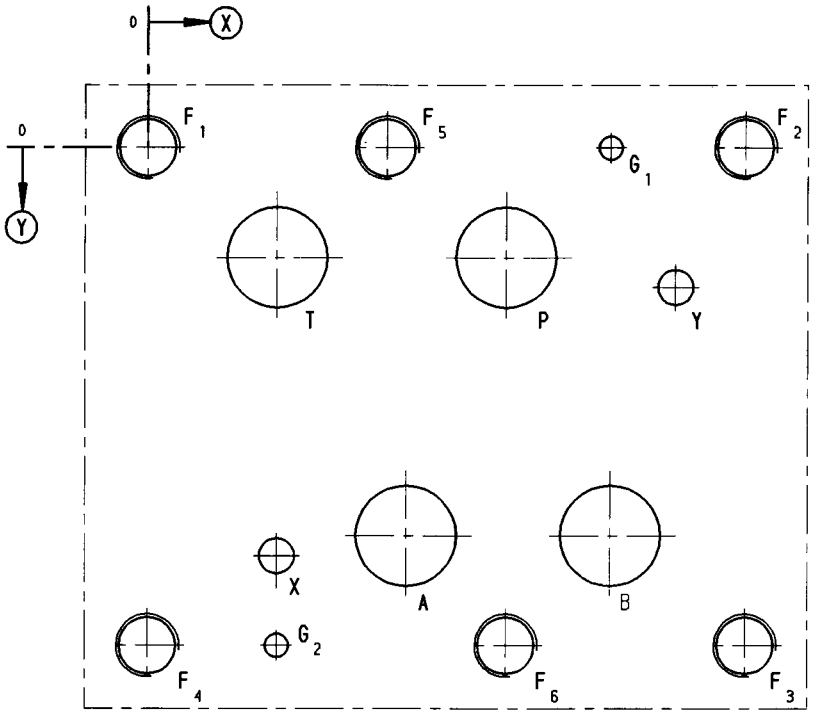
NG25 – ISO 4401-08-07-0-94



[1] Deviates from standard
[2] Thread depth:
Ferrous metal 1.5 x Ø
Non-ferrous 2 x Ø

	P	A	T	B	L	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
⊗	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 [1]	25 [1]	25 [1]	25 [1]	11.2	11.2	11.2	7.5	7.5	M12 [2]	M12 [2]	M12 [2]	M12 [2]	M12 [2]	M12 [2]

NG32 – ISO 4401-10-08-0-94



[1] Deviates from standard (NG 35)
[2] Thread depth:
Ferrous metal 1.5 x Ø
Non-ferrous 2 x Ø

	P	A	T	B	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
⊗	114.3	82.5	41.3	147.6	41.3	168.3	147.6	41.3	0	190.5	190.5	0	76.2	114.3
Ⓨ	35	123.8	35	123.8	130.2	44.5	0	158.8	0	0	158.8	158.8	0	158.8
∅	48 [1]	48 [1]	48 [1]	48 [1]	11.2	11.2	7.5	7.5	M20 [2]	M20 [2]	M20 [2]	M20 [2]	M20 [2]	M20 [2]

Notes

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Notes

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Notes

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