4/2 proportional directional control valve, without position control

RE 29047/09.05 1/16

Type 4WRBA..EA..

Nominal size 6, 10
Unit series 2X
Maximum working pressure P, A, B 315 bar, T 250 bar
Nominal flow rate Q_{nom} 14...28 l/min (NG6), 32...63 l/min (NG10)

Overview of Contents

Features

- Directly controlled NG6 and NG10 valves with positive overlap and external valve electronics
- Actuated on one side, standard symbol EA, normally closed version NC (normally open NO also available, with manual adjustment as optional extra)
- Adjustable by means of the solenoid current, see Characteristic Curve, Technical Data and the selected valve electronics
- Solenoid version $I_{max} = 2.5$ A
- For subplate attachment, mounting hole configuration NG6 to ISO 4401-03-02-0-94, NG10 to ISO 4401-05-04-0-94
- Subplates as per catalog sheet, RE 45053 for NG6, RE 45055 for NG10 (order separately)
- Plug-in connector to DIN 43650-AM2 included in scope of delivery
- External trigger electronics with ramps and valve calibration in the following versions/designs (order separately)
  - Plug, setpoint 0...+10 V or 4...20 mA, RE 30264
  - Module, setpoint 0...+10 V, RE 30222
  - Europe card format, setpoint 0...+10 V, RE 30109

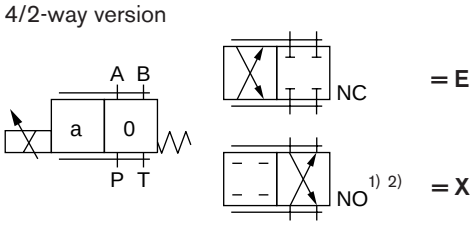
Ordering data

4WRBA			A	–2X/G24		Z4/M	*

4/2 proportional directional control valve, without position control

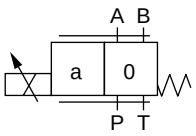
NG6 = 6
NG10 = 10

Symbols
4/2-way version



= E
= X

Actuating side



= A

Nominal flow rate (Δp = 5 bar per metering notch)

NG6
15 = 14 l/min
30 = 28 l/min
NG10
32 = 32 l/min
64 = 63 l/min

2X = **Unit series**
(installation and connection dimensions unchanged)

G24 = **Voltage supply of trigger electronics**
+24 V DC

N = **Manual adjustment**
N9 = **Manual auxiliary override**
(covered)

Z4 = **Electrical connection**
With unit plug to DIN 43650-AM2
with plug-in connector,
included in scope of delivery

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

Further information
in plain text
–892 = see symbol 1)
–893 = see symbol 2)

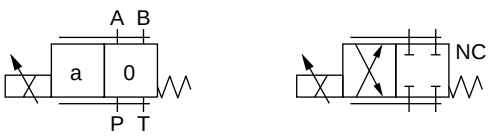
Preferred types

NG6 Solenoid 2.5 A		NG10 Solenoid 2.5 A	
Type	**Material Number**	**Type**	**Material Number**
4WRBA6EA15–2X/G24N9Z4/M	0 811 403 105	4WRBA10EA32–2X/G24N9Z4/M	0 811 403 020
4WRBA6EA30–2X/G24N9Z4/M	0 811 403 104	4WRBA10EA64–2X/G24N9Z4/M	0 811 403 021
4WRBA6XA30–2X/G24N9Z4/M–892	0 811 403 108		
4WRBA6XA30–2X/G24NZ4/M–893	0 811 403 109		

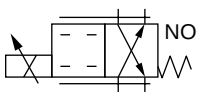
Symbols

Actuation: A-side

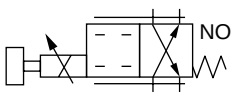
..E..



..= X.. 1)



..= X.. 2)



Function, sectional diagram

General

Type 4WRBA 4/2 proportional directional control valves without position control are also known as “throttle valves”. These directly controlled valves are available in nominal sizes 6 and 10.

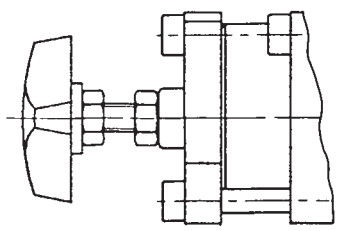
Hysteresis is < 4 % for the NG6 and < 5 % for the NG10. The valve amplifier electronics are available in various designs for 2.5 A solenoids. The operating limits are largely determined by the available magnetic force, see characteristic curves for single or double flow.

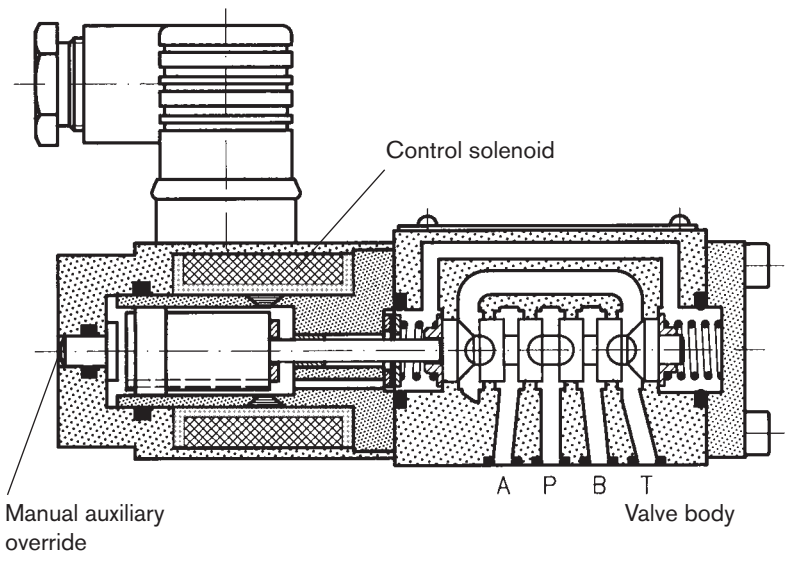
Basic principle

To adjust the oil flow rate, a setpoint is set in the trigger electronics. Based on this setpoint, the electronics control the solenoid coil with regulated PWM (pulse-width-modulated) current.
The current is modulated with a dither, ensuring low hysteresis. The proportional solenoid converts the current to a mechanical force, with which an armature plunger acts on a spool to push against the spring. If the magnetic force and the spring force are the same, this produces a spool position in conformity with the spring characteristic curve. If the drop in pressure is minimal (< 30 bar) the throttling function takes effect, if the pressure drop is greater, the operating limits (see characteristic curves) must be observed.
The pressure drop at the valve is reliably limited by the use of an external pressure compensator or regulating pump.

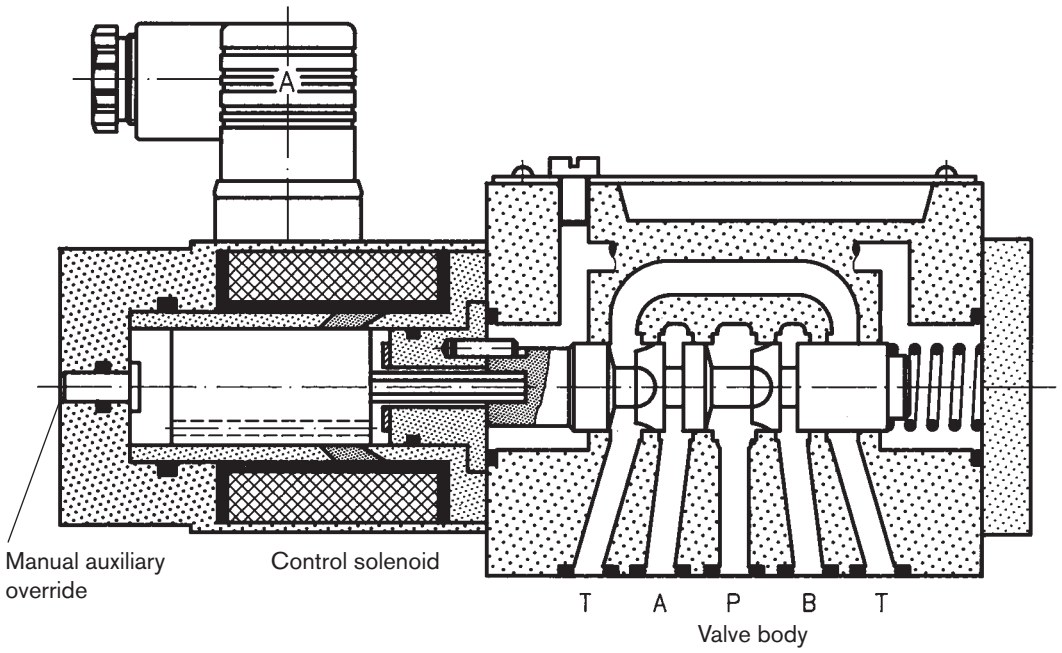
NG6

Manual adjustment
4WRBA..EA..N..

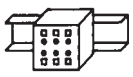
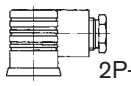




NG10



Accessories

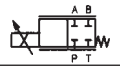
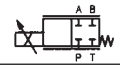
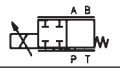
Type				Material Number
(4x) ISO 4762-M5x30-10.9	Cheese-head bolts NG6			2 910 151 166
(4x) ISO 4762-M6x35-10.9	Cheese-head bolts NG10			2 910 151 207
Plug 	VT-SSPA1-525-20/V0	(2.5 A)	RE 30264	0 811 405 143
	VT-SSPA1-525-20/V0/I	(2.5 A)		0 811 405 145
Module 	VT-MSPA1-525-10/V0	(2.5 A)	RE 30222	0 811 405 127
Europe card 	VT-VSPA1-525-10/V0/RTP	(2.5 A)	RE 30109	0 811 405 079
Plug-in connector 	Plug-in connector 2P+PE (M16x1.5) included in scope of delivery, see also RE 08008			

Testing and service equipment

Test box type VT-PE-TB1, see RE 30063
Test adapter type VT-PA-3, see RE 30070
Current measuring adapter type VT-PA-5, see RE 30073

Technical data

General			
Construction			Spool-type valve
Actuation			Proportional solenoid without position control, external amplifier
Connection type			Subplate, mounting hole configuration NG6 (ISO 4401-03-02-0-94), NG10 (ISO 4401-05-04-0-94)
Mounting position			Optional
Ambient temperature range		°C	–20...+50
Weight	NG6	kg	2.0 (2.2 with manual adjustment)
	NG10	kg	6.9
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	mm^2/s	20...100			
	max. permitted	mm^2/s	10...800			
Pressure fluid temperature range		°C	–20...+80			
Maximum permitted degree of contamination of pressure fluid Purity class to ISO 4406 (c)			Class 18/16/13 [1]			
Direction of flow, see symbol			**NG6**		**NG10**	
Nominal flow rate (at $\Delta p = 5$ bar)*		l/min	14	28 (per channel)	32	63 (per channel)
Leakage per metering edge ($\Delta p = 100$ bar)	$I_m = 0$	cm^3/min	 ≦ 80		 ≦ 80	
	I_m = max.	cm^3/min	 ≦ 150			
Max. working pressure		bar	Port P, A, B: 315 Port T: 250			

[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.

* **Nominal flow**
This is always based on a pressure differential of $\Delta p = 5$ bar at the throttling point.
Where other pressure differentials are involved, the flow is calculated according to the following formula:

$$Q_x = Q_{nom} \cdot \sqrt{\frac{\Delta p_X}{5}}$$

However, the **operating limits** must be borne in mind. If they are exceeded, the ensuing flow forces lead to uncontrollable spool movements. **Pressure compensators** are used to reliably limit Δp.

Technical data

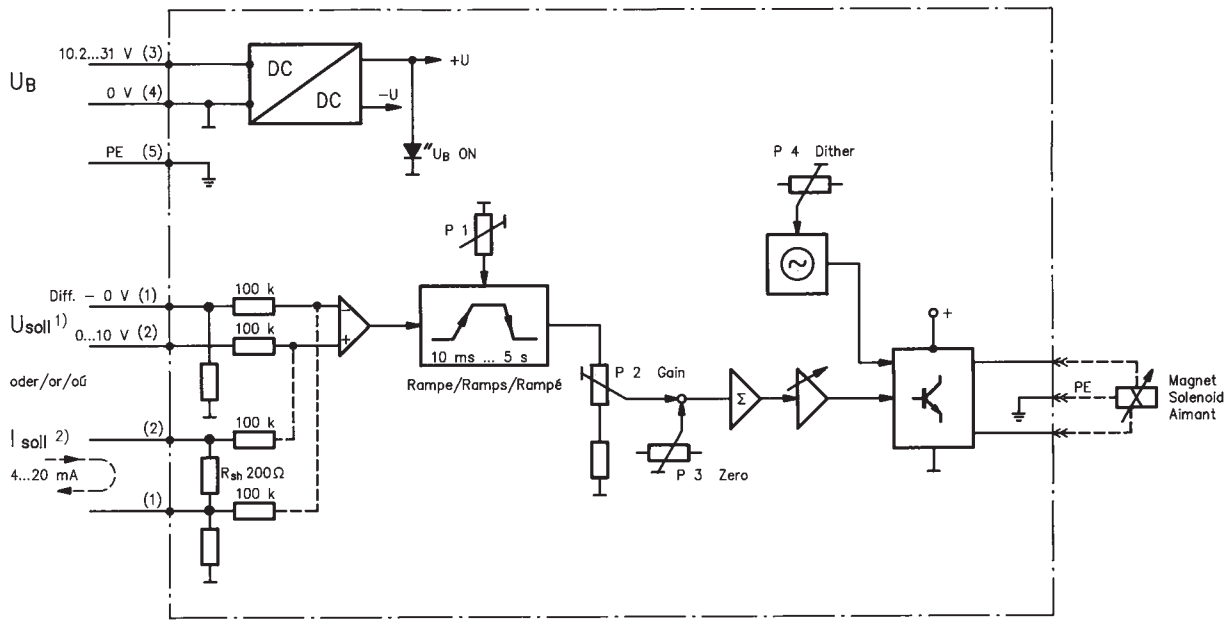
Electrical			
Cyclic duration factor	%	100	
Degree of protection		IP 65 to DIN 40050 and IEC 14434/5	
Solenoid connection		Unit plug DIN 43650/ISO 4400, M16x1.5 (2P+PE)	
Valve with solenoid type		**NG6**	**NG10**
Max. solenoid current I_{max}	A	2.5	2.5
Coil resistance R_{20}	Ω	3	5.8
Max. power consumption at 100 % load and operating temperature	VA	30	55

Static/Dynamic [1]			
Hysteresis	%	≤ 4	≤ 5
Range of inversion	%	≤ 3	≤ 3
Manufacturing tolerance	%	≈ 10	≈ 10
Response time 100 % signal change	ms	On < 70 Off < 70	100

[1] All characteristic values ascertained using amplifier 0 811 405 079 for the 2.5 A solenoid.

Valve with external trigger electronics (plug, RE 30264)

Circuit diagram/pin assignment

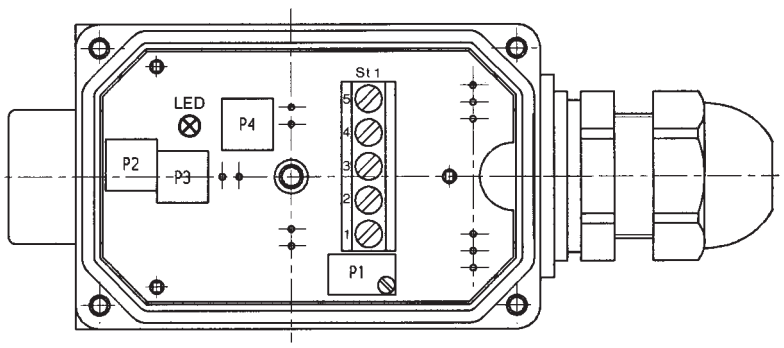


1) Version with 0...+10 V signal

2) Version with 4...20 mA signal

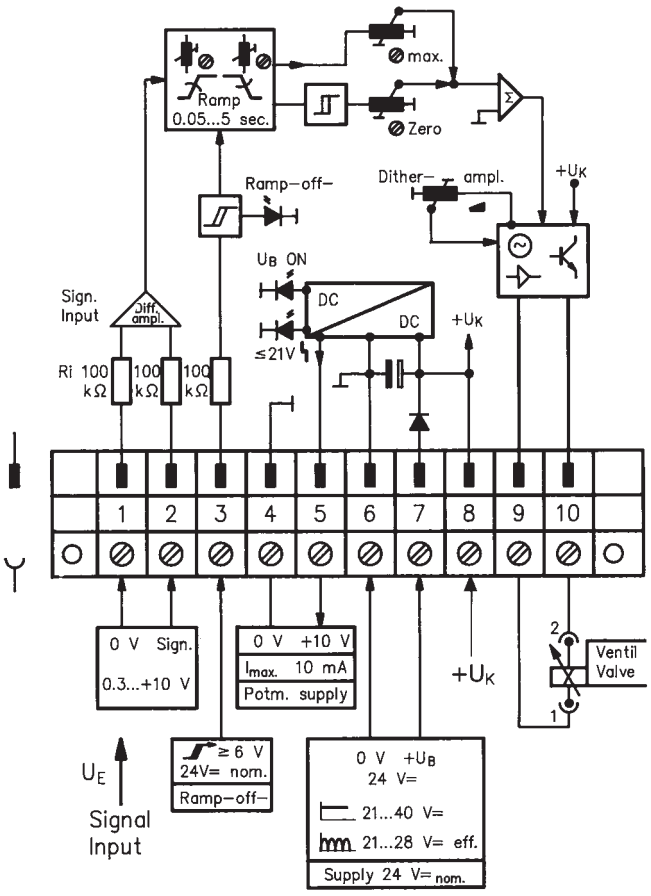
Connection/adjustment

P1 – Ramp time
P2 – Sensitivity
P3 – Zero
P4 – Dither frequency
St1 – Terminal
LED – U_B display

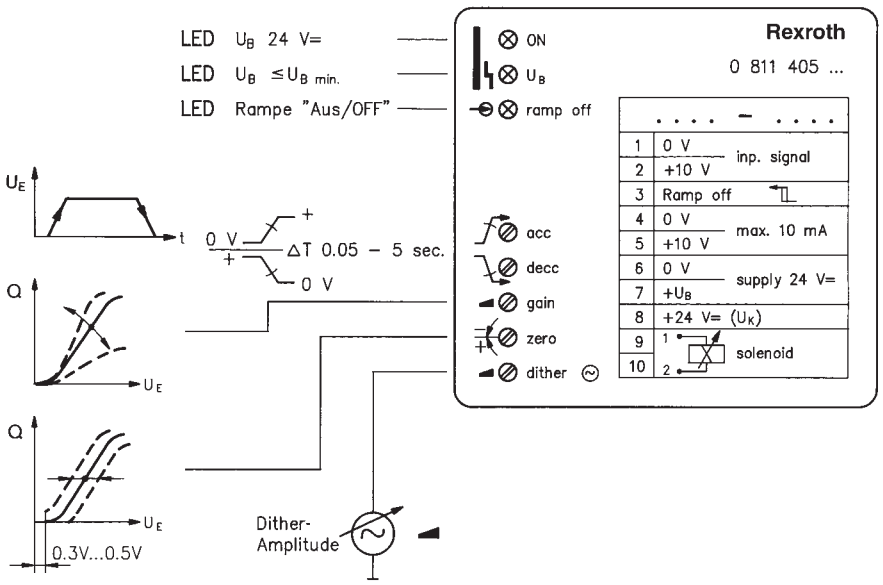


Valve with external trigger electronics (module, RE 30222)

Circuit diagram/pin assignment

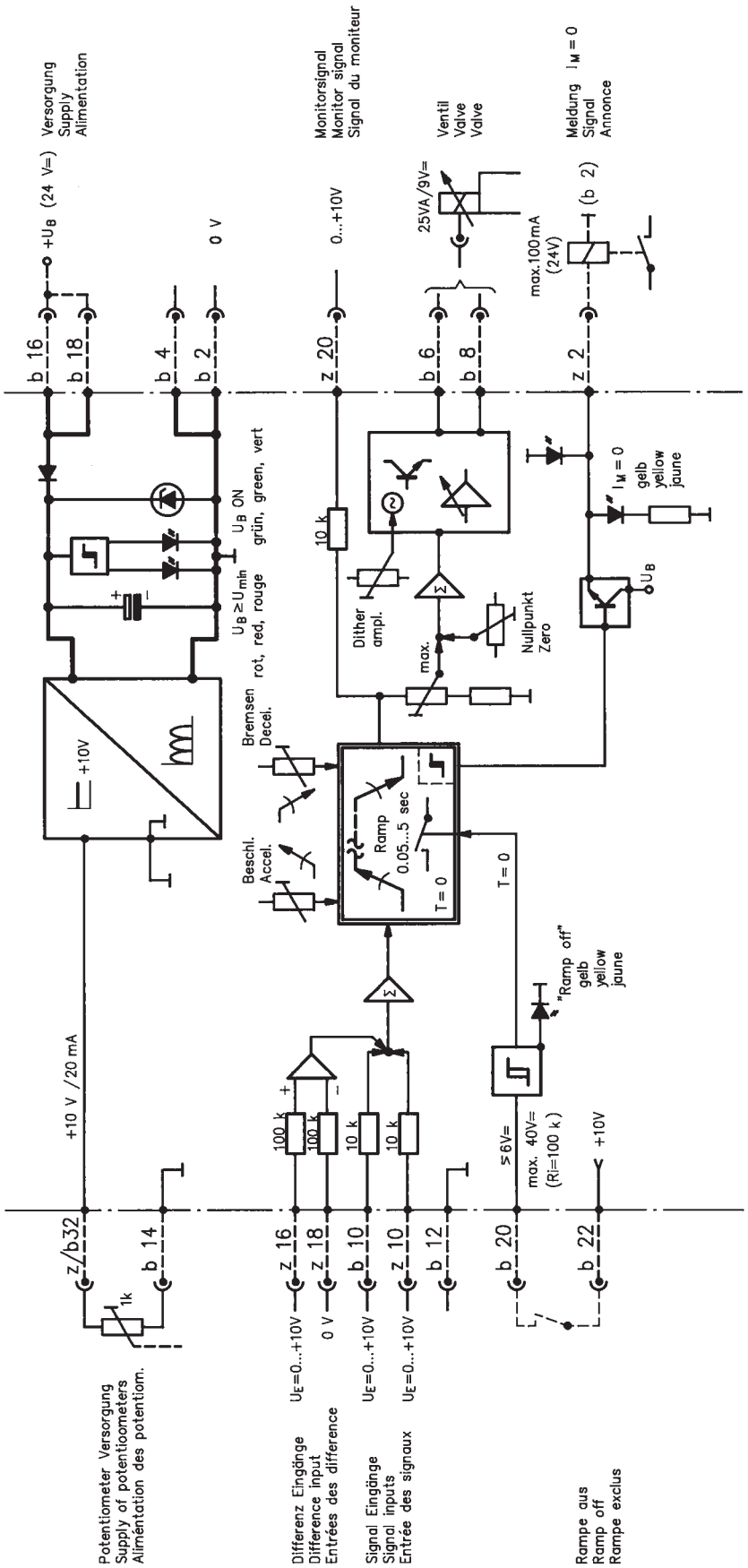


Front view/adjustment



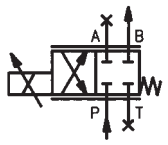
Valve with external trigger electronics (europe card, RE 30109)

Circuit diagram/pin assignment

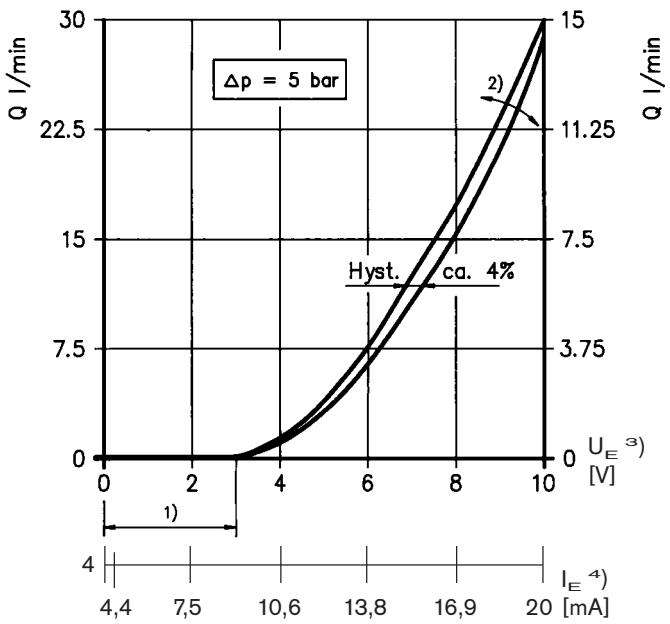


Characteristic curves NG6 (measured with HLP 46, ϑ_{oil} = 40 °C±5 °C)

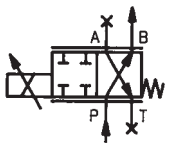
Q_{nom} = 14, 28 l/min



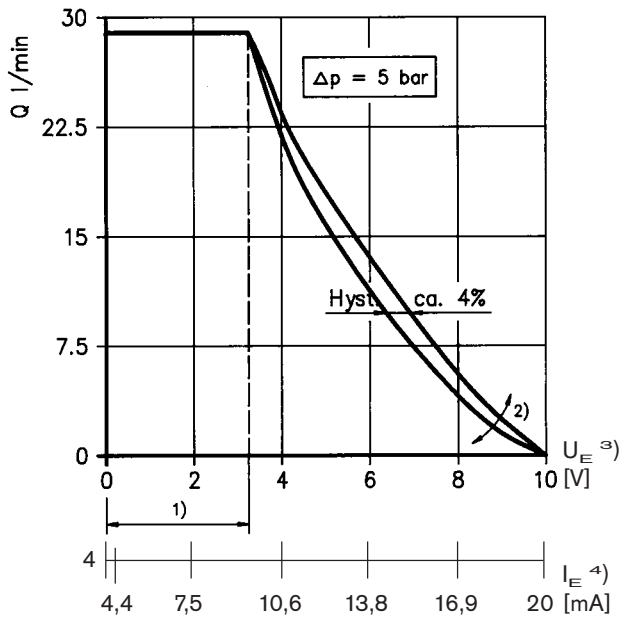
p_{max} = 250 bar, T —— x
p_{max} = 315 bar, T –┐ │



Q_{nom} = 28 l/min



p_{max} = 250 bar, T —— x
p_{max} = 315 bar, T –┐ │

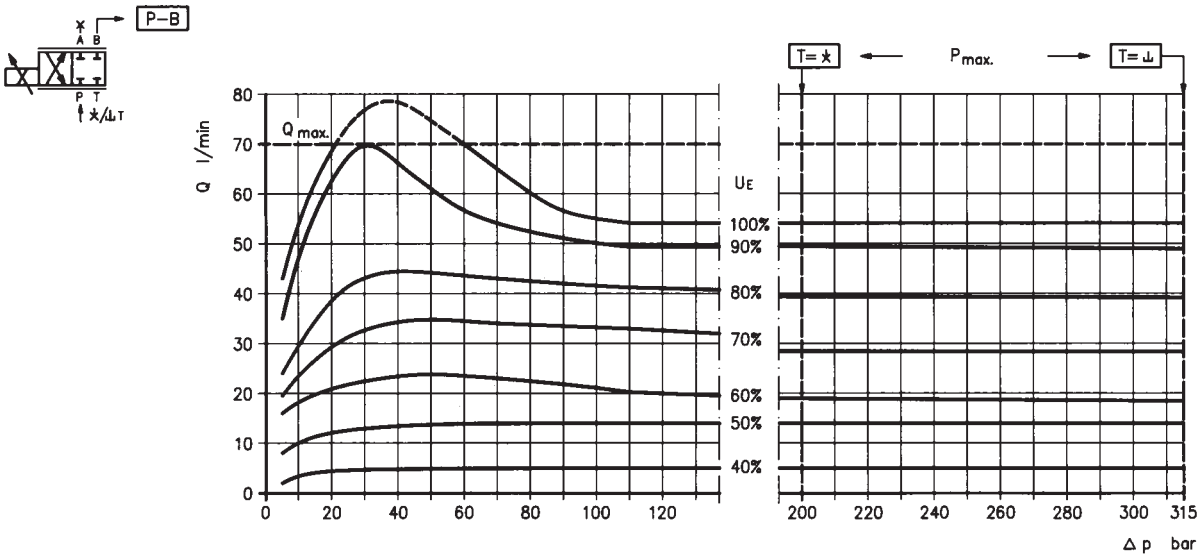


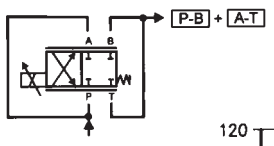
Valve amplifier

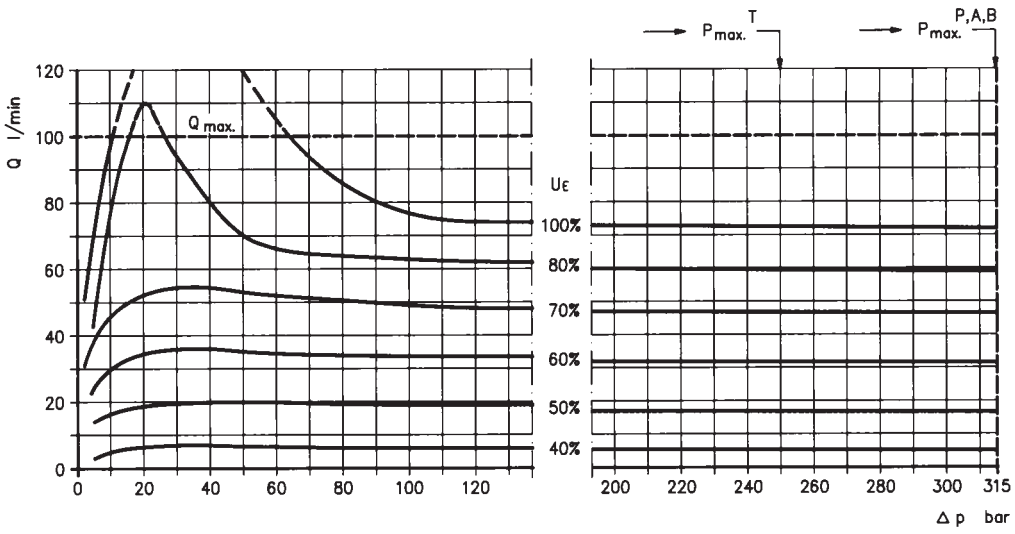
1) Zero adjustment
2) Sensitivity adjustment
3) Version: U_E = 0...+10 V
4) Version: I_E = 4...20 mA

Characteristic curves NG6 (measured with HLP 46, $\vartheta_{oil} = 40\,°C \pm 5\,°C$)

Operating limits

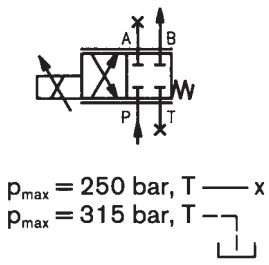




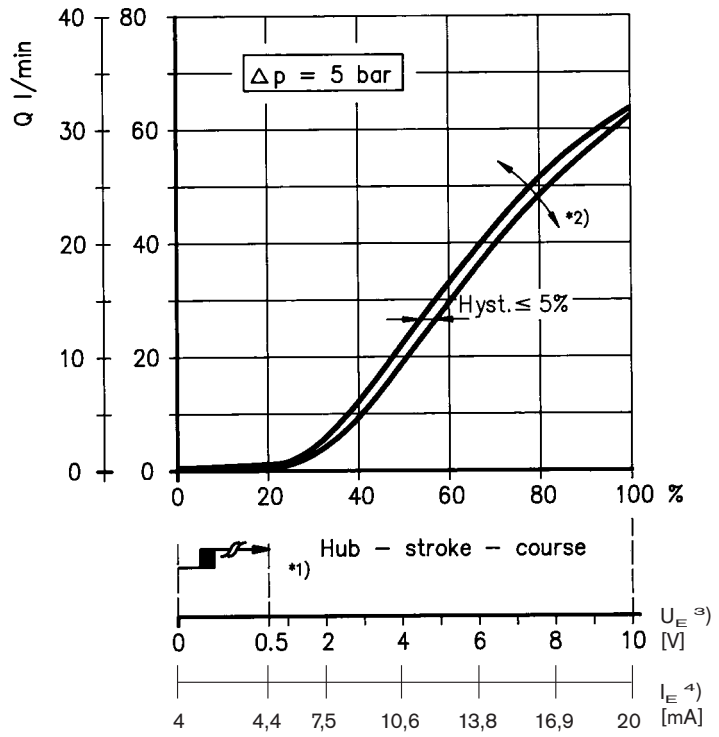


Characteristic curves NG10 (measured with HLP 46, $\vartheta_{oil} = 40\,°C \pm 5\,°C$)

Q_{nom} = 32, 63 l/min



p_{max} = 250 bar, T —— x
p_{max} = 315 bar, T —┐ └

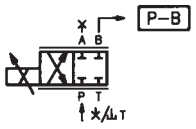


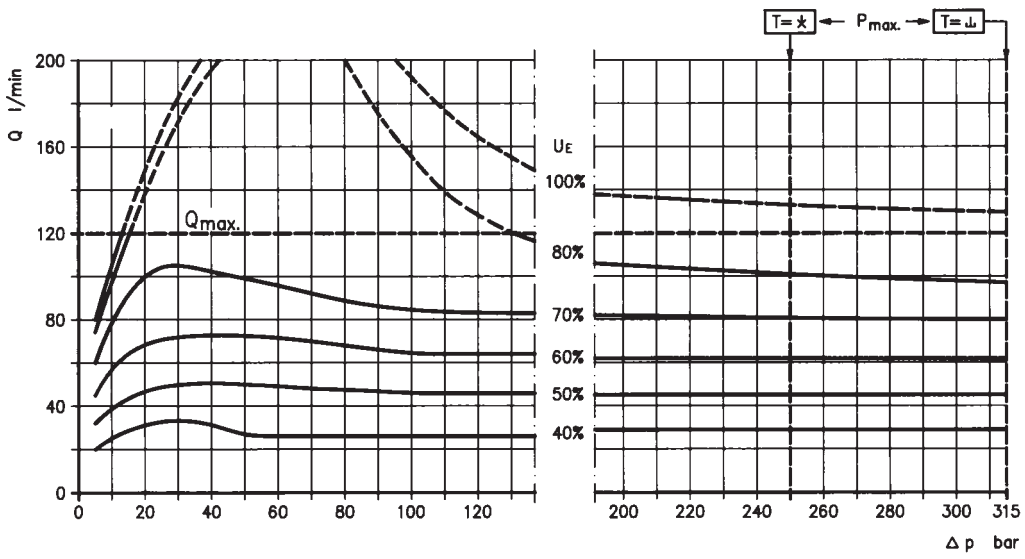
Valve amplifier

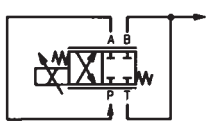
1) Zero adjustment
2) Sensitivity adjustment
3) Version: U_E = 0...+10 V
4) Version: I_E = 4...20 mA

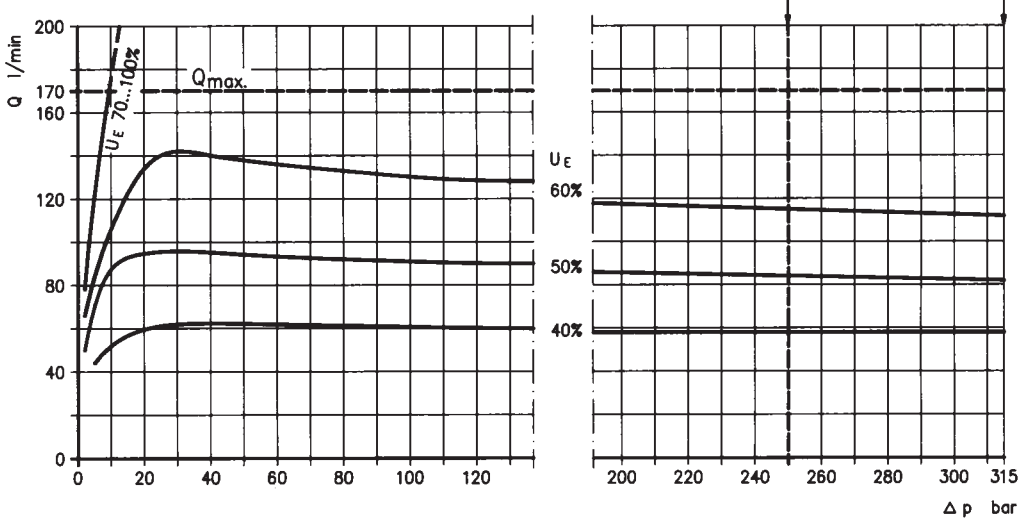
Characteristic curves NG10 (measured with HLP 46, $\vartheta_{oil} = 40\,°C \pm 5\,°C$)

Operating limits

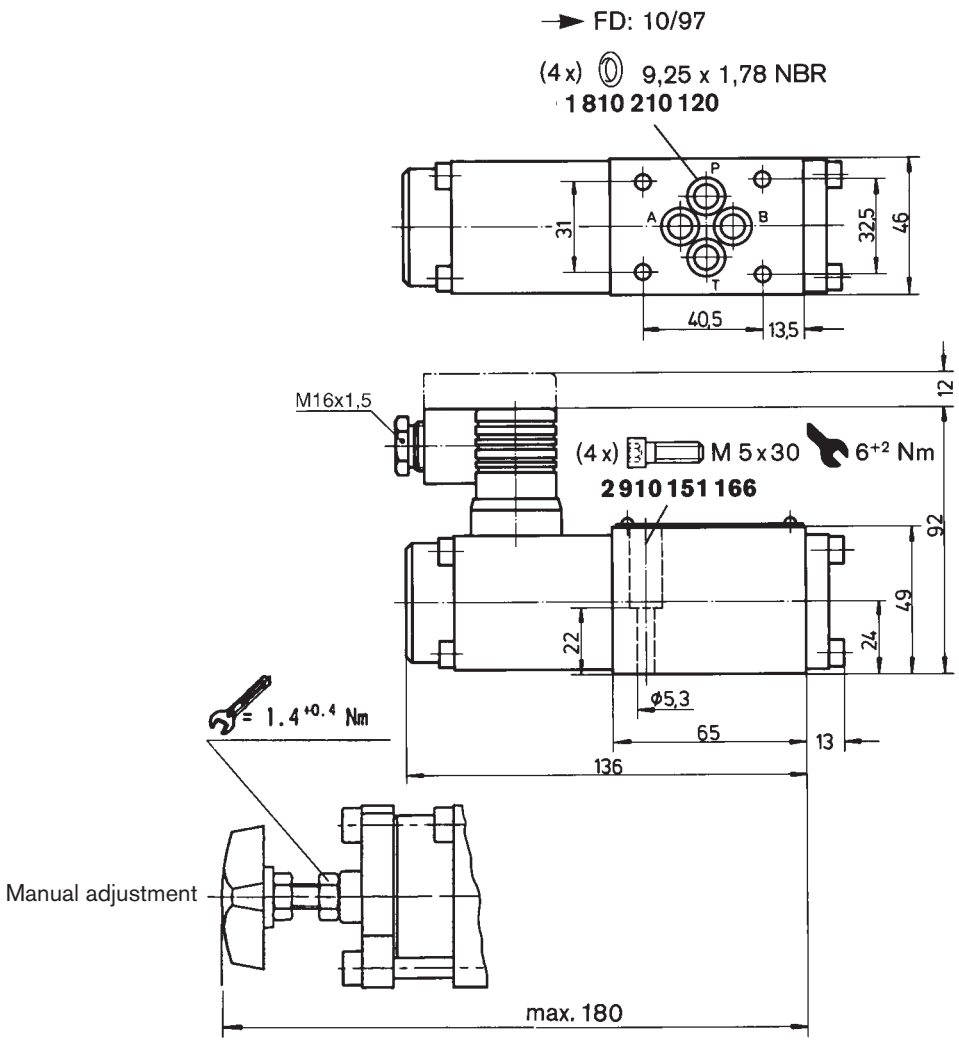


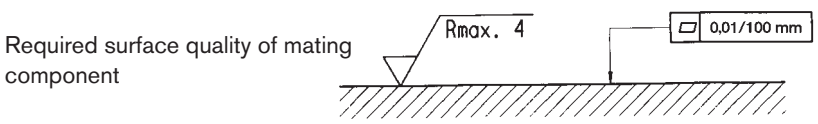






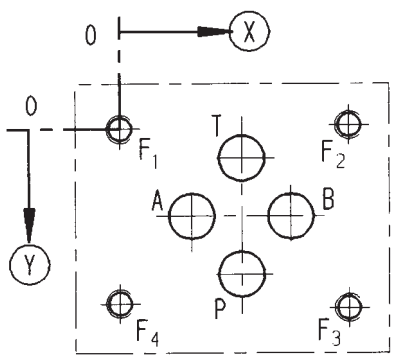
Unit dimensions NG6 (nominal dimensions in mm)





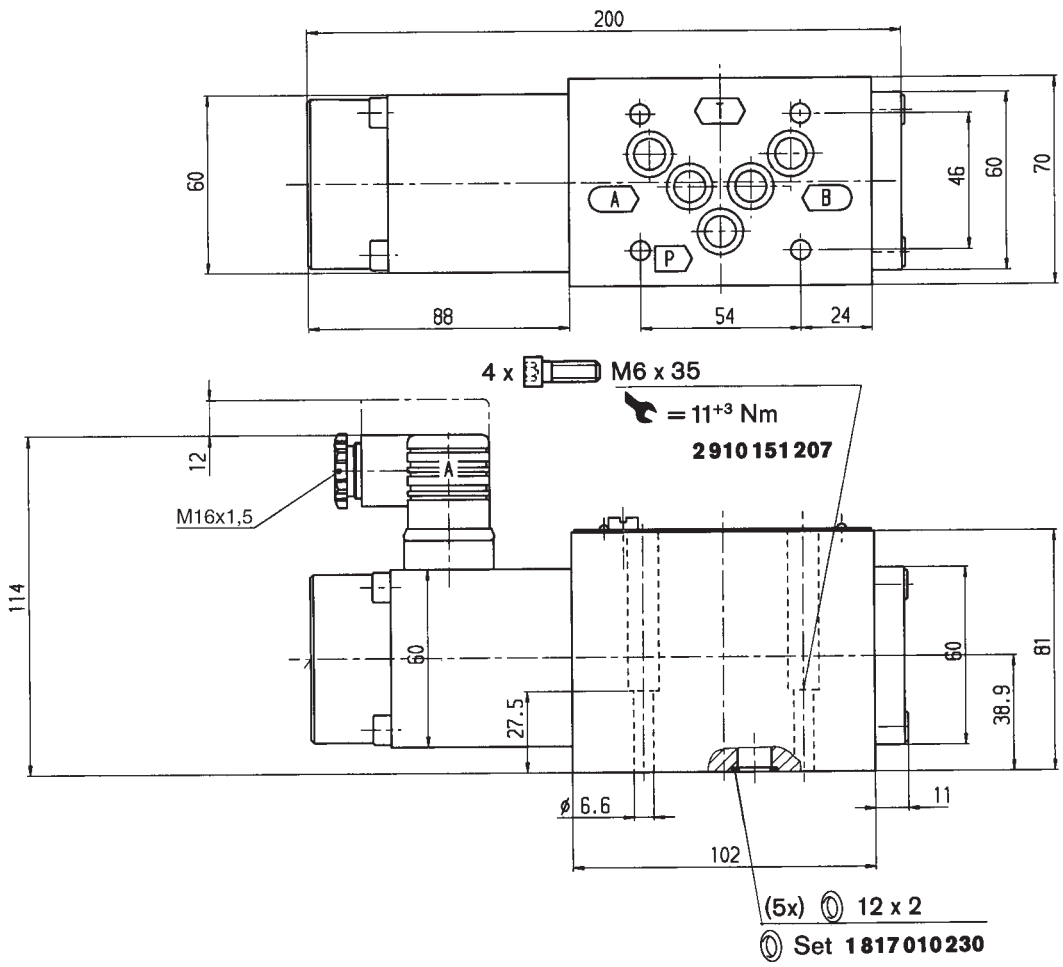
Mounting hole configuration: NG6 (ISO 4401-03-02-0-94)
For subplates see catalog sheet RE 45053

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

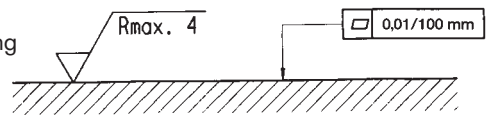


	P	A	T	B	F_1	F_2	F_3	F_4
Ⓧ	21.5	12.5	21.5	30.2	0	40.5	40.5	0
Ⓨ	25.9	15.5	5.1	15.5	0	–0.75	31.75	31
∅	8 [1]	8 [1]	8 [1]	8 [1]	M5 [2]	M5 [2]	M5 [2]	M5 [2]

Unit dimensions NG10 (nominal dimensions in mm)

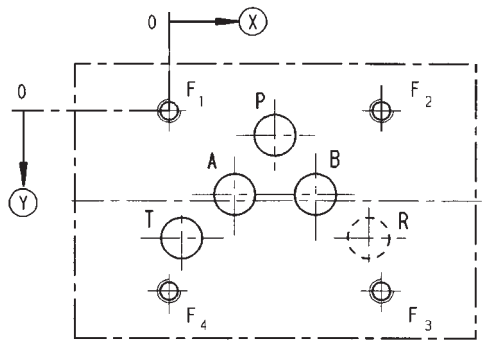


Required surface quality of mating component



Mounting hole configuration: NG10 (ISO 4401-05-04-0-94)
For subplates see catalog sheet RE 45055

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	R
Ⓧ	27	16.7	3.2	37.3	0	54	54	0	50.8
Ⓨ	6.3	21.4	32.5	21.4	0	0	46	46	32.5
∅	10.5 1)	10.5 1)	10.5 1)	10.5 1)	M6 2)	M6 2)	M6 2)	M6 2)	10.5 1)

Notes

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