

# Proportional directional valves

## Type 4WRA.../FB

NG 6 and 10  
Up to 315 bar  
Up to 75 L/min

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### Features

- Direct operated proportional directional valve to control the direction and magnitude of a flow
- For subplate mounting: Porting pattern conforms to ISO4401
- Actuation by means of proportional solenoids with central thread and removable coil
- Spring centred control spool

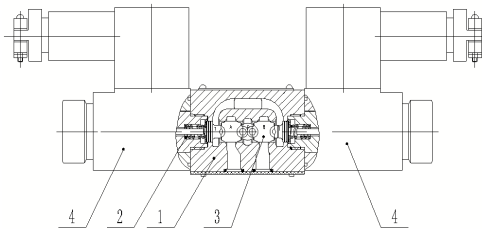
## Function and configurations

The 4/2- and 4/3-way proportional directional valves are designed as direct operated components for subplate mounting. They are actuated by means of proportional solenoids with central thread and removable coil. The solenoids are controlled either by external control electronics

The valves basically consist of: Body (1) with mounting surface, Control spool (3) with compression springs (2), Solenoids (4) with central thread

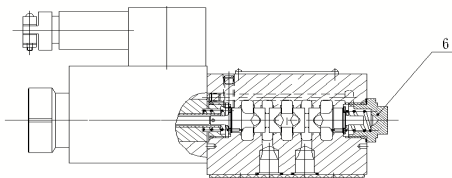
With the solenoids (4), de-energised, the control spool (3) is held in the central position by the compression springs (2).

Direct operation of the control spool (3) by energising one of the proportional solenoids(4) e.g. control of solenoid right, then movement of the control spool (3) to the left in proportion to the electrical input signal, and connection from P to A and B to T via orifice-like crosssections with progressive flow characteristics.



**Type 4WRA 10...-2X/...**

4WRA(E)...A-2X the 2 switched position valves are however only fitted with solenoid "a". A plug (6) is fitted in place on the "b" proportional solenoid.

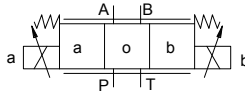


**Type 4WRA 10...A-2X/...**

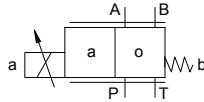
# Symbols

## Without integrated electronics

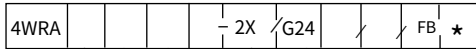
Type 4WRA...-2X/...



Type 4WRA...A-2X/...



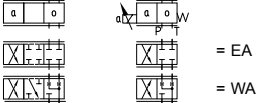
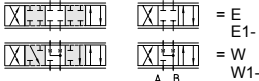
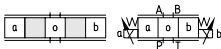
## Ordering code



Without integrated =No code

Nominal size 6 =6  
Nominal size 10 =10

Spool symbols



□ Transitional symbols

With symbols E1 -and W1-:

P → A:  $q_{vmax}$  B → T:  $q_v/2$

P → B:  $q_v/2$  A → T:  $q_{vmax}$

**Note:** For spools W and WA there is, in the neutral position, a connection between A to T and B to T with approx.3% of the relevant nominal cross-section.

Further information in plain text

FB ExplosionprotectiongradeEXd Mb  
FB1 ExplosionprotectiongradeEXd CT4Gb

V = FKM  
No code = NBR

No code= Solenoid type(current)  
-15= Solenoid current 2.5A  
-8= Solenoid current 1.5A  
Solenoid current 0.8A

Power supply voltage of electric control device:  
G24= Power supply voltage 24VDC

2X= Series 20~ 29  
( 20 to 29, unchanged installation and connection dimensions)

Nominal flow at a valve pressure differential  $\Delta P=10\text{bar}$

|        |     |         |
|--------|-----|---------|
| NG6:   | 07= | 7L/min  |
|        | 15= | 15L/min |
|        | 30= | 26L/min |
| NG 10: | 30= | 30L/min |
|        | 60= | 60L/min |

## Technical data

| 1. Hydraulic                                   |               |     |   |                                 |       |
|--|---------------|-----|---|---------------------------------|-------|
| Installation                                   |               |     | Optional, preferably horizontal   |                                 |       |
| Nominal size                                   |               |     | 6   | 10                              |       |
| Weight   | 4WRA... 2X    | Kg  | 2.0   | 6.6                             |       |
|  |               |     |   |                                 |       |
| Nominal flow $Q_{vnom}$ at $\Delta p = 10$ bar |               |     | L/min   | 7,15,26                         | 30,60 |
| Hysteresis                                     |               |     | %   | $\leq 5$                        |       |
| Reversal span                                  |               |     | %   | $\leq 1$                        |       |
| Response sensitivity                           |               |     | %   | $\leq 0.5$                      |       |
| Max.operating pressure                         | Ports A, B, P | bar | 315   |                                 |       |
|  | Port T        | bar | 210   |                                 |       |
| Pressure fluid                                 |               |     | Mineral oil (HL, HLP) to DIN 51524<br>Other pressure fluids on request! |                                 |       |
| Ambient air temperature range                  | 4WRA... 2X    | °C  | -20°C to 70°C (-4° F to 158° F)   |                                 |       |
|  |               |     |   |                                 |       |
| Viscosity range                                |               |     | mm <sup>2</sup> /s  | 20 to 380 (preferably 30 to 46) |       |
| Fluid Cleanliness Class                        |               |     | NAS1638 class9 or ISO 4406 class 20/18/15                               |                                 |       |

| 2. Electrical                 |                      |                  |                            |     |      |
|-------------------------------|----------------------|------------------|----------------------------|-----|------|
| 1) Solenoid data              |                      |                  |                            |     |      |
| Voltage type                  |                      |                  | DC                         |     |      |
| Command value signal for 4WRA |                      |                  | $\pm 10V$ or $4 \sim 20mA$ |     |      |
| Max.current per solenoid      |                      | A                | 2.5                        | 1.5 | 0.8  |
| Solenoid coil resistance      | Cold value at 20°C   | $\Omega$         | 2                          | 4.8 | 19.5 |
|                               | Max.warm value       |                  | 3                          | 7.2 | 28.8 |
| Duty                          |                      |                  | % ED100%                   |     |      |
| Max.coil temperature          |                      |                  | °C 150                     |     |      |
| Valve protection to EN 60529  |                      |                  | IP 65                      |     |      |
| 2) Control electronics        |                      |                  |                            |     |      |
| Amplifier                     | 4WRA... 2X           | VT-VSPA2-...- 2X |                            |     |      |
|                               |                      |                  |                            |     |      |
| Supply voltage                | Nominal voltage      | VDC              | 24                         |     |      |
|                               | Lower limiting value | V                | 21/22(4WRA)                |     |      |
|                               | Upper limiting value | V                | 35                         |     |      |
| Amplifier power consumption   | $I_{max}$            | A                | <1.8                       |     |      |
|                               | Impulse current      | A                | 3                          |     |      |

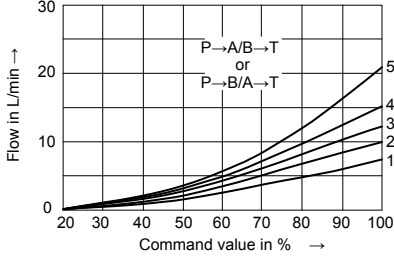
# Characteristic curves

(measured with HLP46,  $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

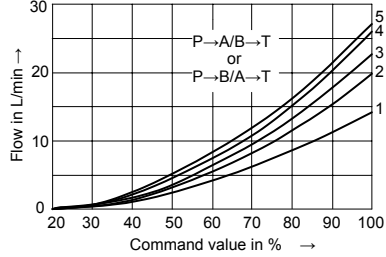
## · Type 4WRA (NG 6 and 10)

### NG 6

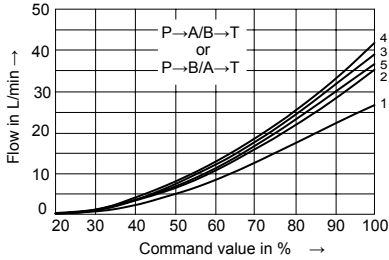
7 L/min nominal flow at a 10 bar valve pressure differential



15 L/min nominal flow at a 10 bar valve pressure differential



30 L/min nominal flow at a 10 bar valve pressure differential

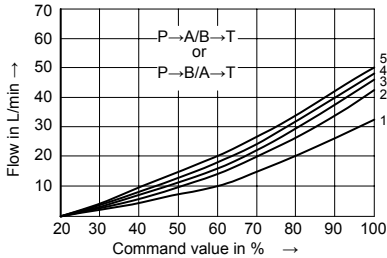


- 1  $\Delta p=10\text{bar}$  constant
- 2  $\Delta p=20\text{bar}$  constant
- 3  $\Delta p=30\text{bar}$  constant
- 4  $\Delta p=50\text{bar}$  constant
- 5  $\Delta p=100\text{bar}$  constant

$\Delta p$ =Valve pressure differential  
(inlet pressure  $p_p$  minus load pressure  $p_l$  minus return pressure  $p_r$ )

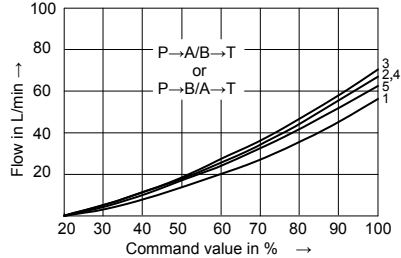
### NG 10

30 L/min nominal flow at a 10 bar valve pressure differential



- 1  $\Delta p=10\text{bar}$  constant
- 2  $\Delta p=20\text{bar}$  constant
- 3  $\Delta p=30\text{bar}$  constant
- 4  $\Delta p=50\text{bar}$  constant
- 5  $\Delta p=100\text{bar}$  constant

60 L/min nominal flow at a 10 bar valve pressure differential



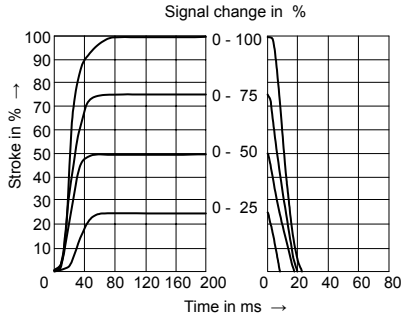
$\Delta p$ =Valve pressure differential  
(inlet pressure  $p_p$  minus load pressure  $p_l$  minus return pressure  $p_r$ )

# Characteristic curves

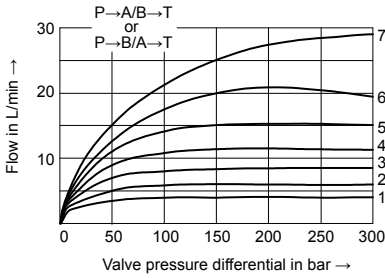
(measured with HLP46,  $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

## NG 6

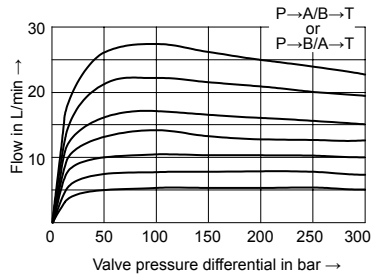
Transient function with a stepped form of electrical input sign



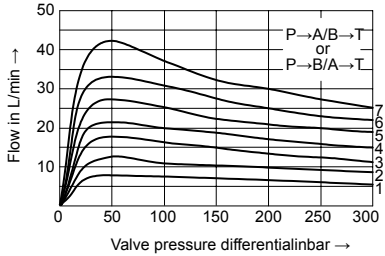
Performance limit, nominal flow 7 l/min



Performance limit, nominal flow 15 l/min



Performance limit, nominal flow 30 l/min



1. Com. value = 40 %
2. Com. value = 50 %
3. Com. value = 60 %
4. Com. value = 70 %
5. Com. value = 80 %
6. Com. value = 90 %
7. Com. value = 100 %

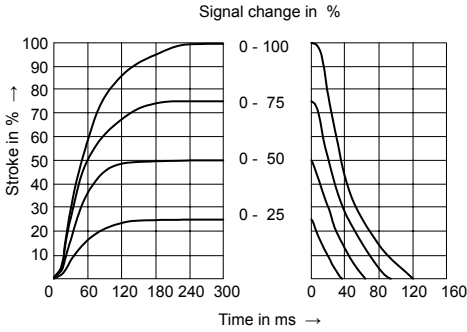
If the performance limits are exceeded then flow forces occur which lead to uncontrolled spool movements.

# Characteristic curves

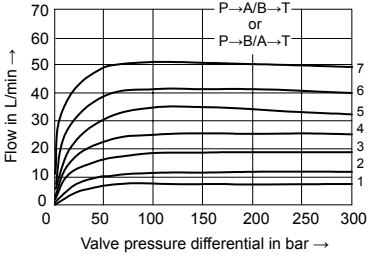
(measured with HLP46,  $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

## NG 10

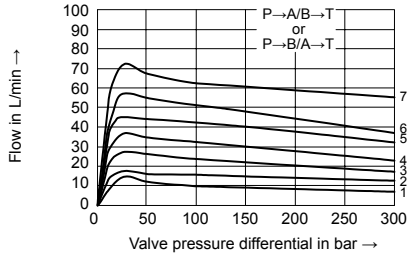
Transient function with a stepped form of electrical input sign



Performance limit, nominal flow 30l/min



Performance limit, nominal flow 60 l/min



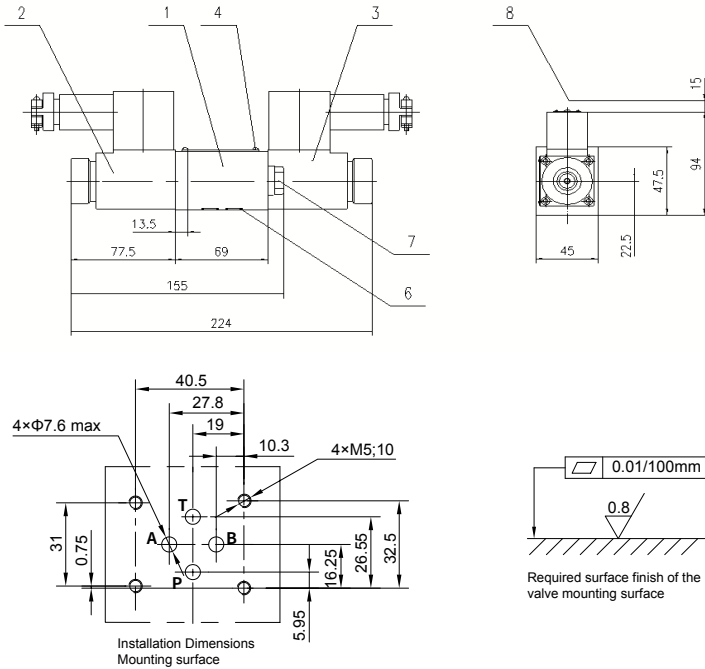
- 1.Com. value = 40 %
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- 4.Com. value = 70 %
- 5.Com. value = 80 %
- 6.Com. value = 90 %
- 7.Com. value = 100 %

If the performance limits are exceeded then flow forces occur which lead to uncontrolled spool movements.

# Unit dimensions

(nominal dimensions in mm)

## Type 4WRA6...2X



- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
  
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T  
(R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid  
(2 switching positions, versions EA or WA)
- 8 Space required to remove the plug-in connector

### Valve mounting screws

The following valve fixing screws are recommended:

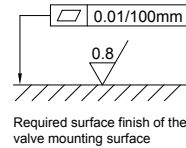
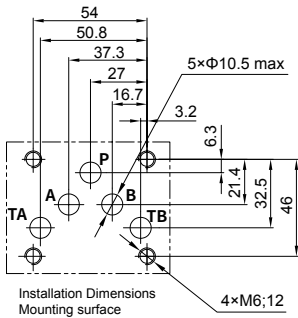
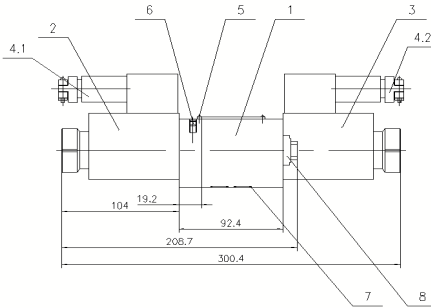
- 4 S.H.C.S.ISO 4762 - M5×50 - 10.9
- 4 GB / T 70.1 - M5×50 - 10.9
- Tightening torque  $M_A = 8.9 \text{ Nm} \pm 10\%$



# Unit dimensions

(nominal dimensions in mm)

## Type 4WRA10...2X



- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Valve bleed screw
- 7 Identical seal rings for ports A, B, P and T  
(R-ring 13×1.6×2 or O-ring 12×2)
- 8 Plug for valves with one solenoid  
(2 switching positions, versions EA or WA)
- 9 Space required to remove the plug-in connector

### Valve mounting screws

The following valve fixing screws are recommended:

- 4 S.H.C.S.ISO 4762 - M6×40 - 10.9
- 4 GB / T 70.1 - M6×40 - 10.9
- Tightening torque
- $M_A = 15.5 \text{ Nm} \pm 10\%$