Pressure reducing valve, pilot operated

Type DR

Size 10 to 32
Component series 5X
Maximum operating pressure 350 bar
Maximum flow 400 l/min

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</tbody>
</table>

Features

- For subplate mounting
- Porting pattern according to ISO 5781
- For threaded connection
- As cartridge valve
- 4 adjustment types, optional:
  - Rotary knob
  - Bushing with hexagon and protective cap
  - Lockable rotary knob with scale
  - Rotary knob with scale
- 5 pressure ratings
- Check valve, optional (only subplate mounting)

- More information:
  - Sub plates

Data sheet 45062

Information on available spare parts:
www.boschrexroth.com/spc
**Ordering code**

<table>
<thead>
<tr>
<th>Size</th>
<th>Subplate mounting &quot;–&quot;</th>
<th>Threaded connection &quot;G&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>= 10</td>
<td>= 10 (G1/2)</td>
</tr>
<tr>
<td>16</td>
<td>–</td>
<td>= 15 (G3/4)</td>
</tr>
<tr>
<td>25</td>
<td>= 20</td>
<td>= 20 (G1)</td>
</tr>
<tr>
<td>25</td>
<td>–</td>
<td>= 25 (G1 1/4)</td>
</tr>
<tr>
<td>32</td>
<td>= 30</td>
<td>= 30 (G1 1/2)</td>
</tr>
</tbody>
</table>

As cartridge valve = no code (version "C", without main spool insert)
As cartridge valve = – (version "C", with main spool insert)
For subplate mounting = –
For threaded connection = G

**Adjustment type for pressure adjustment**
- Rotary knob = 4
- Bushing with hexagon and protective cap = 5 (always with maximum pressure adjustment)
- Lockable rotary knob with scale = 6
- Rotary knob with scale = 7

**Symbols**

For subplate mounting

- 50 = Set pressure up to 50 bar
- 100 = Set pressure up to 100 bar
- 200 = Set pressure up to 200 bar
- 315 = Set pressure up to 315 bar
- 350 = Set pressure up to 350 bar (only version "M")

5X = Component series 50 to 59 (50 to 59: unchanged installation and connection dimensions)
Function, section

Pressure valves type DR are pilot operated pressure reducing valves that are controlled from the secondary circuit.

The pressure reducing valves basically comprise of a main valve (1) with main spool insert (3) and pilot control valve (2) with pressure adjustment element.

**Basic principle:**

In rest position, the valves are open. Hydraulic fluid flows from channel B via the main spool insert (3) to channel A without obstructions. The pressure available in channel A acts on the lower main spool side. At the same time, the pressure is applied to the spring-loaded side of the main spool (3) via the nozzle (4) and at the ball (6) in the pilot control valve (2) via the channel (5). It also acts on the ball (6) via nozzle (7), control line (8), check valve (9) and nozzle (10). Depending on the spring (11) setting, a pressure builds up in front of the ball (6), in the channel (5) and in the spring chamber (12), which keeps the control spool (13) in opened position. The hydraulic fluid in channel B can flow via the main spool insert (3) to channel A without obstructions until a pressure builds up in channel A that exceeds the value set at the spring (11) and opens the ball (6). The control spool (13) moves in closing direction.

The desired reduced pressure is achieved if there is a state of equilibrium between the pressure in channel A and the pressure set at the spring (11).

The pilot oil return from the spring chamber (14) is always effected externally via the control line (15) into the tank.

For the free flow back from channel A to channel B, you can optionally install a check valve (16).

A pressure gauge connection (17) allows for the control of the reduced pressure in channel A.

**Type DR..-4-5X/...Y...**

**Section a - a**

- **without check valve**
- **with check valve**
Technical Data (For applications outside these parameters, please consult us!)

### General

<table>
<thead>
<tr>
<th>Size</th>
<th>10 (type DR..20)</th>
<th>16 (type DR..25)</th>
<th>25 (type DR..20)</th>
<th>25 (type DR..25)</th>
<th>32 (type DR..30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subplate mounting – Type DR . -</td>
<td>kg</td>
<td>3.4</td>
<td>–</td>
<td>5.3</td>
<td>–</td>
</tr>
<tr>
<td>Cartridge valve – Type DRC</td>
<td>kg</td>
<td>1.2</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>– Type DRC 30</td>
<td>kg</td>
<td>1.5</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Threaded connection – Type DR .G</td>
<td>kg</td>
<td>5.3</td>
<td>5.2</td>
<td>5.1</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Installation position
Any

Ambient temperature range
°C
–30 to +50 (NBR seals)
–20 to +50 (FKM seals)

### Hydraulic

Maximum operating pressure – Port B
bar
350 1)

Maximum inlet pressure – Port B
bar
350 1)

Maximum outlet pressure – Port ...
bar
350 1)

Operating pressure range – Port A
bar
10 to 350 1)

Maximum backpressure – Port Y
bar
350 1)

Minimal set pressure Flow-dependent (see characteristic curves page 5)
bar

Maximum set pressure
bar

50; 100; 200; 315; 350 1)

Maximum flow – Subplate mounting
l/min
150 – 300

– Threaded connection
l/min
150 300 300 400 400

Hydraulic fluid
See table below

Hydraulic fluid temperature range
°C
–30 to +80 (NBR seals)
–20 to +80 (FKM seals)

Viscosity range
mm²/s
10 to 800

Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)
Class 20/18/15 2)

## Hydraulic fluid

<table>
<thead>
<tr>
<th>Classification</th>
<th>Suitable sealing materials</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oils and related hydrocarbons</td>
<td>HL, HLP, HLPD</td>
<td>NBR, FKM</td>
</tr>
<tr>
<td>Environmentally compatible</td>
<td>Insoluble in water</td>
<td>HETG</td>
</tr>
<tr>
<td></td>
<td>Soluble in water</td>
<td>HEES</td>
</tr>
<tr>
<td>Flame-resistant</td>
<td>Water-free</td>
<td>HFDU, HFDR</td>
</tr>
<tr>
<td></td>
<td>Water-containing</td>
<td>HFC (Fuchs Hydrotherm 46M, Petrofer Ultra Safe 620)</td>
</tr>
</tbody>
</table>

### Important information on hydraulic fluids!

1) 350 bar only possible with version without check valve

2) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the service life of the components.

For the selection of the filters see www.boschrexroth.com/filter.

• For more information and data on the use of other hydraulic fluids refer to data sheet 90220 or contact us!
• There may be limitations regarding the technical valve data (temperature, pressure range, service life, maintenance intervals, etc.!)!
**Characteristic curves** (measured with HLP46, $\theta_{\text{oil}} = 40 \, ^{\circ}\text{C} \pm 5 \, ^{\circ}\text{C})

**Outlet pressure** $p_A$ depending on the flow $q_v$ (B to A)

**Outlet pressure in bar**

<table>
<thead>
<tr>
<th>Flow in l/min</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
</tr>
</thead>
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<td>50</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
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<td>315</td>
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<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
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<td>300</td>
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<tr>
<td>150</td>
<td>200</td>
<td>250</td>
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<td>350</td>
<td>300</td>
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<td>350</td>
<td>350</td>
<td>50</td>
<td>100</td>
<td>150</td>
</tr>
</tbody>
</table>

1. Size 10
2. Size 25
3. Size 32

**Minimum set pressure** with $p_{A\min}$ depending on the flow $q_v$ (B to A)

**Reduced pressure in bar**

<table>
<thead>
<tr>
<th>Flow in l/min</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
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<tbody>
<tr>
<td>0</td>
<td>48</td>
<td>12</td>
<td>16</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>2</td>
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<td>50</td>
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<td>16</td>
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<td>5</td>
<td>10</td>
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<tr>
<td>100</td>
<td>16</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>150</td>
<td>5</td>
<td>16</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>200</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>2</td>
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<tr>
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<td>10</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>300</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>10</td>
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<tr>
<td>350</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

1. Size 10
2. Size 25
3. Size 32
4. $p_{A\min}$

Performance limit (system-dependent)

5. Size 10
6. Size 25
7. Size 32

The characteristic curves apply to the pressure at the valve output $p_T = 0$ bar across the entire flow range.
Characteristic curves (measured with HLP46, $\theta_{\text{oil}} = 40 \, ^\circ\text{C} \pm 5 \, ^\circ\text{C}$)

**Δp-q_v** characteristic curves (B to A; lowest pressure differential adjustable)

- **Pressure differential in bar**
- **Flow in l/min**

1. Size 10
2. Size 25
3. Size 32

Pilot flow depending on flow (B to A) and pressure differential

- **Pressure differential in bar**
- **Flow in l/min**

1. Size 10
2. Size 25
3. Size 32
4. $\Delta p = 50 \, \text{bar}$
5. $\Delta p = 200 \, \text{bar}$
Characteristic curves (measured with HLP46, \( \theta_{oil} = 40 ^\circ C \pm 5 ^\circ C \))

\[ \Delta p - q_v \] characteristic curves across the check valve (A to B)

- Flow resistance across check valve, main stage closed
- Flow resistance across check valve with completely opened main stage

1 Size 10
2 Size 25
3 Size 32
**Unit dimensions:** Type DRC…; cartridge valve (dimensions in mm)

Installation bore, see page 12.

1 Name plate
2.1 Y port for pilot oil return external
2.2 Y port optionally for pilot oil return external
3 Adjustment type "4"
4 Adjustment type "5"
5 Adjustment type "6"
6 Adjustment type "7"
7 Hexagon SW10
8 Space required to remove the key
9 Valve mounting bores
10 Seal rings
11 Main spool insert
12 Seal ring
13 Seal ring
14 Seal ring
15 Support ring
16 Support ring

**Valve mounting screws**
(separate order)
4 hexagon socket head cap screws
ISO 4762 - M8 x 40 - 10.9-4IZn-240h-L
with friction coefficient $\mu_{\text{local}} = 0.09$ to $0.14$,
Tightening torque $M = 31 \text{ Nm} \pm 10\%$
Material No. R913000205
Unit dimensions: Type DR…; threaded connection (dimensions in mm)

<table>
<thead>
<tr>
<th>Size</th>
<th>D1</th>
<th>ØD2</th>
<th>T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>G1/2</td>
<td>34</td>
<td>14</td>
</tr>
<tr>
<td>16 (Type DR 15 G…)</td>
<td>G3/4</td>
<td>42</td>
<td>16</td>
</tr>
<tr>
<td>25 (Type DR 20 G…)</td>
<td>G1</td>
<td>47</td>
<td>18</td>
</tr>
<tr>
<td>25 (Type DR 25 G…)</td>
<td>G1 1/4</td>
<td>58</td>
<td>20</td>
</tr>
<tr>
<td>32 (Type DR 30 G…)</td>
<td>G1 1/2</td>
<td>65</td>
<td>22</td>
</tr>
</tbody>
</table>

1 Name plate
2.1 Y port for pilot oil return external
3 Adjustment type "4"
4 Adjustment type "5"
5 Adjustment type "6"
6 Adjustment type "7"
7 Hexagon SW10
8 Space required to remove the key
9 Valve mounting bores
17 Pressure gauge connection
### Unit dimensions: Type DR…; subplate mounting (dimensions in mm)

<table>
<thead>
<tr>
<th>Size</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>L6</th>
<th>L7</th>
<th>L8</th>
<th>L9</th>
<th>L10</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>96</td>
<td>35.5</td>
<td>33</td>
<td>42.9</td>
<td>21.5</td>
<td>–</td>
<td>7.2</td>
<td>21.5</td>
<td>31.8</td>
<td>35.8</td>
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<tr>
<td>25</td>
<td>116</td>
<td>37.5</td>
<td>35.4</td>
<td>60.3</td>
<td>39.7</td>
<td>–</td>
<td>11.1</td>
<td>20.6</td>
<td>44.5</td>
<td>49.2</td>
</tr>
<tr>
<td>32</td>
<td>145</td>
<td>33</td>
<td>29.8</td>
<td>84.2</td>
<td>59.5</td>
<td>42.1</td>
<td>16.7</td>
<td>24.6</td>
<td>62.7</td>
<td>67.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
<th>B5</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>85</td>
<td>50</td>
<td>66.7</td>
<td>58.8</td>
<td>7.9</td>
<td>112</td>
<td>92</td>
<td>28</td>
</tr>
<tr>
<td>25</td>
<td>102</td>
<td>59.5</td>
<td>79.4</td>
<td>73</td>
<td>6.4</td>
<td>122</td>
<td>102</td>
<td>38</td>
</tr>
<tr>
<td>32</td>
<td>120</td>
<td>76</td>
<td>96.8</td>
<td>92.8</td>
<td>3.8</td>
<td>130</td>
<td>110</td>
<td>46</td>
</tr>
</tbody>
</table>

Item explanations, subplates, and valve mounting screws, see page 11.

Required surface quality of the valve mounting face:

- 0.01/100
- Rzmax 4
Unit dimensions

1. Name plate
2.1 Y port for pilot oil return external
2.2 Y port optionally for pilot oil return external
3. Adjustment type "4"
4. Adjustment type "5"
5. Adjustment type "6"
6. Adjustment type "7"
7. Hexagon SW10
8. Space required to remove the key
9. Valve mounting bore
17. Pressure gauge connection
18. Identical seal rings for ports A and B; identical seal rings for ports X and Y
19. Port B without function (blind hole)
20. Locating pin

Subplate mounting:
**Subplates** according to data sheet 45062
(separate order)
- Size 10 G 460/01 (G3/8)
  G 461/01 (G1/2)
- Size 20 G 412/01 (G3/4)
  G 413/01 (G1)
- Size 30 G 414/01 (G1 1/4)
  G 415/01 (G1 1/2)

Valve mounting screws (separate order)
- Size 10
  4 hexagon socket head cap screws metric
  ISO 4762 - M10 x 50 - 10.9-flZn-240h-L
  with friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14,
  Tightening torque $M_a = 60$ Nm $\pm 10\%$,
  Material no. R913000471
- Size 20
  4 ISO 4762 - M10 x 60 - 10.9-flZn-240h-L
  with friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14,
  Tightening torque $M_a = 60$ Nm $\pm 10\%$,
  Material no. R913000116
- Size 30
  6 ISO 4762 - M10 x 70 - 10.9-flZn-240h-L
  with friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14,
  Tightening torque $M_a = 60$ Nm $\pm 10\%$,
  Material no. R913000126
Installation bore (dimensions in mm)

Note!
The Ø32 bore can tap a Ø45 bore at any point. However, it must be observed that the connection bores and the valve mounting bores are not damaged!

1 A support ring and seal rings must be inserted into the bore before assembly of the main spool

2 Nozzle, separate order

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