Directional control valves, pilot-operated, with electrical position feedback and integrated electronics (OBE)

Type 4WRLE

Features

▶ Reliable – proven and robust design
▶ Safe
  – The control spool of the pilot control valve is in the “fail safe” position when the unit is switched off
  – The control spool of the main valve is in the spring-centered central position and/or in the offset position
▶ High quality – control spool and sleeve of the pilot control valve in servo quality
▶ Flexible – suitable for position, velocity and pressure control
▶ Precise – high response sensitivity and little hysteresis
▶ IO-Link interface, optional

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▶ Size 10 ...
▶ Component series 4X
▶ Maximum operating pressure 350 bar
▶ Rated flow 60 ... 1500 ml/min
▶ Digital interface, IO link for I4.0
## Ordering code

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
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<th>08</th>
<th>09</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
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<tbody>
<tr>
<td>4</td>
<td>WRL</td>
<td>E</td>
<td>J</td>
<td>–</td>
<td>4X</td>
<td>/</td>
<td>/</td>
<td>24</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

01 4 main ports

02 Directional control valve, pilot-operated

03 With integrated electronics (OBE)

04 Size 10

- Size 16
- Size 25
- Size 27
- Size 35

05 Symbols e.g. E, E1-, W6- etc.; possible version see page 4

### Rated flow \( (\Delta p = 5 \text{ bar/control edge}) \)

<table>
<thead>
<tr>
<th>06</th>
<th>Size 10</th>
<th>Size 16</th>
<th>Size 25</th>
<th>Size 27</th>
<th>Size 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>60 l/min</td>
<td>200 l/min</td>
<td>350 l/min</td>
<td>430 l/min</td>
<td>1000 l/min</td>
</tr>
<tr>
<td></td>
<td>(only symbol E, E1-, W6-, W8-, V, V1-)</td>
<td>(only symbol W6- and W8-)</td>
<td>(only symbol W6- and W8-)</td>
<td>(only symbol W6- and W8-)</td>
<td>(only symbol E, E1-, V, V1- and Q3-)</td>
</tr>
</tbody>
</table>

|   | 100 l/min | 250 l/min | 400 l/min | 600 l/min | 1200 l/min |
|   | (only symbol E, E1-, W6-, W8-) | (only symbol E, E1-, V, V1- and Q3-) | (only symbol E, E1-, V, V1- and Q3-) | (only symbol E, E1-, V, V1- and Q3-) | (only symbol E, E1-, V, V1- and Q3-) |

### Flow characteristic

07 Linear

- Linear with fine control range (available for NG 10, other sizes on request)
- Progressive with linear fine control (only symbol Q3-)

08 Overlap jump (opening point 5% with covered valve; only symbols E, E1-, W6-, W8-)

09 Component series 40 ... 49 (40 ... 49: unchanged installation and mounting dimensions)

### Seal material

10 NBR seals

- FKM seals

Seal material (observe compatibility of seals with hydraulic fluid used, see page 10)

### Pilot oil flow

11 External pilot oil supply, external pilot oil return

- Internal pilot oil supply, external pilot oil return
- Internal pilot oil supply; internal pilot oil return
- External pilot oil supply, internal pilot oil return

Pilot oil flow
# Ordering code

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
<th>06</th>
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<th>08</th>
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<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>WRL</td>
<td>E</td>
<td>J</td>
<td>-</td>
<td>4X</td>
<td>/</td>
<td>/</td>
<td>24</td>
<td>/</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **12** Without damping plate
- **With** damping plate

- **13** Supply voltage 24 V

## Interfaces of the control electronics

<table>
<thead>
<tr>
<th>14</th>
<th>Command value input ±10 V</th>
<th>A1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Command value input 4 ... 20 mA</td>
<td>F1</td>
</tr>
<tr>
<td></td>
<td>IO-Link interface</td>
<td>L1</td>
</tr>
<tr>
<td></td>
<td>Command value ±10 mA, actual value 4 ... 20 mA, release (connector 6+PE)</td>
<td>C6</td>
</tr>
</tbody>
</table>

- **15** Without electronics protection membrane
- **With** electronics protection membrane

- **16** For further details, see the plain text
Symbols

With symbol E1−, V1− and W8−:

- With symbol E1−:
P → A: $q_v \text{max}$  B → T: $q_v/2$
P → B: $q_v/2$  A → T: $q_v \text{max}$

Notice:
- Representation according to DIN ISO 1219-1. Hydraulic interim positions are shown by dashes.
- For information on the "switch-off behavior", refer to the technical data on page 10.
**Function, section:** Symbol E. and W.

The valve type 4WRLE is a pilot-operated directional control valve with electrical position feedback and integrated electronics (OBE).

**Set-up**
The valve basically consists of 3 main assemblies:
- Pilot control valve (1) with control spool and sleeve, return spring, control solenoid and inductive position transducer (optionally with electronics protection membrane (5) and damping plate (4))
- Main valve (2) with centering spring and position feedback
- On-board electronics (OBE) (3) with analog (6) or IO-Link interface

**Function**
When the integrated electronics (OBE) are switched off or inactive, the control spool of the pilot control valve is spring-operated in the “fail-safe” position. The control spool of the main valve is in its spring-centered central position.

The integrated electronics (OBE) compare the specified command value to the position actual value of the main valve control spool. In case of control deviations, the control solenoid will be activated. Due to the changed magnetic force, the pilot control spool is adjusted against the spring.

The flow, which is activated via the control cross-sections, leads to an adjustment of the main control spool. The stroke/control cross-section of the main control spool is regulated proportionally to the command value.

The pilot oil supply in the pilot control valve is either internal via port P or external via port X. The feedback can be internal via port T or external via port Y to the tank.

**Control solenoid shut-off**
In case of the following errors, the control solenoids are de-energized by the integrated electronics (OBE), the pilot control spool is set to its “fail-safe” position and unloads the pilot oil chambers of the main valve. Operated by the spring, the main valve control spool will move to the central position.
- Falling below the minimum supply voltage
- Only at interface “F1”:
  - Falling below the minimum current command value of 2 mA (includes cable break of the command value line (current loop)).
- Only at interface “L1”:
  - Enable inactive, communication interruption (watchdog)
  - In case of internal IO-Link error
- Only at interface “C6”:
  - Additionally, release inactive

**Damping plate “D”**
The damping plate (4) reduces the acceleration amplitudes on the on-board electronics (frequencies >300 Hz).

**Notice:**
Using the damping plate is not recommended for applications with mainly low-frequency excitation <300 Hz.

**Electronics protection membrane “-967”**
To prevent condensate formation in the housing of the integrated electronics (OBE), an electronics protection membrane (5) can be used. Recommended for use outside industry-standard conditions with high ambient air humidity and significant cyclic temperature changes (e.g. outdoors).

**Notice:**
Pilot-operated 4/3 directional control valves with positive overlap are functional in controlled or regulated axes. The overlap in the de-energized state is approx. 20% of the control spool stroke. While the electrical supply voltage is switching off, the drive may be accelerated for a short time in functional direction P to B.

For sectional drawing see page 6.
Function, section: Symbol V and V1-

The valve type 4WRLE is a pilot-operated directional control valve with electrical position feedback and integrated electronics (OBE).

Set-up
The valve basically consists of 3 main assemblies:

- Pilot control valve (1) with control spool and sleeve, return spring, control solenoid and inductive position transducer (optionally with electronics protection membrane (5) and damping plate (4))
- Main valve (2) with centering spring and position feedback
- On-board electronics (OBE) (3) with analog (6) or IO-Link interface

Function
When the integrated electronics (OBE) are switched off or inactive, the control spool of the pilot control valve is spring-operated in the “fail-safe” position. The control spool of the main valve is in its spring-centered offset position at approx. 6% of the stroke in direction P to B/A to T.

The integrated electronics (OBE) compare the specified command value to the position actual value of the main valve control spool. In case of control deviations, the control solenoid will be activated. Due to the changed magnetic force, the pilot control spool is adjusted against the spring.

The flow, which is activated via the control cross-sections, leads to an adjustment of the main control spool. The stroke/control cross-section of the main control spool is regulated proportionally to the command value. In case of a command value presetting of 0 V, the electronics adjust the control spool of the main valve to central position.

The pilot oil supply in the pilot control valve is either internal via port P or external via port X. The feedback can be internal via port T or external via port Y to the tank.

Control solenoid shut-off
In case of the following errors, the control solenoids are de-energized by the integrated electronics (OBE), the pilot control spool is set to its “fail-safe” position and unloads the pilot oil chambers of the main valve. Operated by the spring, the main valve control spool will move to the offset position (approx. 6% P → B/A → T).

- Falling below the minimum supply voltage
- Only at interface “F1”:
  - Falling below the minimum current command value of 2 mA (includes cable break of the command value line (current loop)).
- Only at interface “L1”:
  - Enable inactive, communication interruption (watchdog)
  - In case of internal IO-Link error
- Only at interface “C6”:
  - Additionally, release inactive

Damping plate “D” and electronics protection membrane “-967” see page 5.

Notice:

Pilot-operated 4/3 directional control valves are only functional in the active control loop and do not have a locking basic position when deactivated. Consequently "external isolator valves" are required in many applications and must be taken into account regarding the switch-on/switch-off order. While the electrical supply voltage is switching off, the drive may be accelerated for a short time in functional direction P to B.
**Pilot oil supply** (schematic illustration)

1. Plug screw M6 according to DIN 906, wrench size 3
   - pilot oil return
2. Plug screw M6 according to DIN 906, wrench size 3
   - pilot oil supply
3. Plug screw M12 x 1.5 according to DIN 906, wrench size 6
   - pilot oil supply
4. Plug screw 1/16-27 NPTF, SW4
   - pilot oil return
5. Plug screw 1/16-27 NPTF, SW4
   - pilot oil supply
6. Housing cover main stage (position transducer side)

**Pilot oil supply**
- **External:** 2, 3, 5 closed
- **Internal:** 2, 3, 5 open

**Pilot oil return**
- **External:** 1, 4 closed
- **Internal:** 1, 4 open

Further explanations on page 8.
Pilot oil supply

Version "XY"
External pilot oil supply
External pilot oil return
In this version, the pilot oil is supplied from a separate control circuit (external).
The pilot oil return is not directed into channel T of the main valve but is separately directed to the tank via port Y (external).

Version "PY"
Internal pilot oil supply
External pilot oil return
With this version, the pilot oil is supplied from channel P of the main valve (internal).
The pilot oil return is not directed into channel T of the main valve but is separately directed to the tank via port Y (external).

In the subplate, port X is to be closed.

Version "XT"
External pilot oil supply
Internal pilot oil return
In this version, the pilot oil is supplied from a separate control circuit (external).
The pilot oil is directly returned to channel T of the main valve (internal).
In the subplate, port Y is to be closed.

Notice:
The modification of the pilot oil supply may only be performed by authorized specialists or at the factory.
The maximum admissible operating parameters must be observed, see page 9.

Technical data
(For applications outside these values, please consult us!)

<table>
<thead>
<tr>
<th>General</th>
</tr>
</thead>
<tbody>
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<td>Size</td>
</tr>
<tr>
<td>NG</td>
</tr>
<tr>
<td>Installation position</td>
</tr>
<tr>
<td>Ambient temperature range °C</td>
</tr>
<tr>
<td>Maximum storage time years</td>
</tr>
<tr>
<td>Sine test according to DIN EN 60068-2-6</td>
</tr>
<tr>
<td>Without damping plate</td>
</tr>
<tr>
<td>With damping plate</td>
</tr>
<tr>
<td>Noise test according to DIN EN 60068-2-64</td>
</tr>
<tr>
<td>Without damping plate</td>
</tr>
<tr>
<td>With damping plate</td>
</tr>
<tr>
<td>Transport shock according to DIN EN 60068-2-27</td>
</tr>
<tr>
<td>Without damping plate</td>
</tr>
<tr>
<td>With damping plate</td>
</tr>
<tr>
<td>Shock according to DIN EN 60068-2-27</td>
</tr>
<tr>
<td>With damping plate</td>
</tr>
<tr>
<td>Weight kg</td>
</tr>
<tr>
<td>Maximum relative humidity (no condensation) %</td>
</tr>
<tr>
<td>Maximum solenoid surface temperature °C</td>
</tr>
<tr>
<td>MTTFd value according to EN ISO 13849 years</td>
</tr>
<tr>
<td>75 (for further details see data sheet 08012)</td>
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<tr>
<td>Conformity</td>
</tr>
<tr>
<td>CE according to EMC directive 2014/30/EU, tested according to EN 61000-6-2 and EN 61000-6-3</td>
</tr>
<tr>
<td>RoHS directive 2015/65/EU</td>
</tr>
<tr>
<td>REACH ordinance (EC) no. 1907/2006</td>
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</tbody>
</table>

1) Not recommended for applications with mainly low-frequency excitation < 300 Hz

Bosch Rexroth AG, RE 29123, edition: 2019-07
### Technical data

(For applications outside these values, please consult us!)

#### Hydraulic

<table>
<thead>
<tr>
<th>Size</th>
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<th>16</th>
<th>25</th>
<th>27</th>
<th>35</th>
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<tbody>
<tr>
<td>Maximum operating pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Ports A, B, P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- External pilot oil supply</td>
<td>bar</td>
<td>350</td>
<td>270</td>
<td>350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Internal pilot oil supply</td>
<td>bar</td>
<td>280</td>
<td>270</td>
<td>280</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Port X</td>
<td>bar</td>
<td>280</td>
<td>270</td>
<td>280</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Ports T, Y</td>
<td>bar</td>
<td>250</td>
<td>210</td>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum pilot pressure (pilot control valve)</td>
<td>bar</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Maximum flow</td>
<td>l/min</td>
<td>300</td>
<td>800</td>
<td>1250</td>
<td>1850</td>
<td>4700</td>
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<tr>
<td>Rated flow ($\Delta p = 5$ bar/control edge)</td>
<td>l/min</td>
<td>60/100</td>
<td>200/250</td>
<td>350/400</td>
<td>430/600</td>
<td>1000/1200/1500</td>
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<tr>
<td>Pilot oil flow 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>▶ Symbol E, W</td>
<td>l/min</td>
<td>2.4</td>
<td>3.5</td>
<td>7.5</td>
<td></td>
<td>23</td>
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<tr>
<td>▶ Symbol V, Q3-</td>
<td>l/min</td>
<td>4.5</td>
<td>11.5</td>
<td>22</td>
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<td>29</td>
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<tr>
<td>Maximum leakage flow (inlet pressure 100 bar)</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>▶ Symbol E, E1-</td>
<td>l/min</td>
<td>0.06</td>
<td>0.13</td>
<td>0.17</td>
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<td>0.61</td>
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<tr>
<td>- Main valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Main valve + pilot control valve</td>
<td>l/min</td>
<td>0.14</td>
<td>0.28</td>
<td>0.42</td>
<td></td>
<td>1.01</td>
</tr>
<tr>
<td>▶ Symbol W6-, W8-</td>
<td>l/min</td>
<td>0.12</td>
<td>0.26</td>
<td>0.35</td>
<td></td>
<td>1.23</td>
</tr>
<tr>
<td>- Main valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Main valve + pilot control valve</td>
<td>l/min</td>
<td>0.2</td>
<td>0.41</td>
<td>0.6</td>
<td></td>
<td>1.63</td>
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<tr>
<td>Maximum zero flow (inlet pressure 100 bar)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Symbol V, V1-</td>
<td>l/min</td>
<td>1.7</td>
<td>2.3</td>
<td>2.8</td>
<td>3.3</td>
<td>7.2</td>
</tr>
<tr>
<td>- Main valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Main valve + pilot control valve</td>
<td>l/min</td>
<td>1.85</td>
<td>2.6</td>
<td>3.2</td>
<td>3.7</td>
<td>7.65</td>
</tr>
<tr>
<td>▶ Symbol Q3-</td>
<td>l/min</td>
<td>0.55</td>
<td>1.9</td>
<td>2.2</td>
<td>2.6</td>
<td>2.05</td>
</tr>
<tr>
<td>- Main valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Main valve + pilot control valve</td>
<td>l/min</td>
<td>0.4</td>
<td>1.6</td>
<td>1.8</td>
<td>2.2</td>
<td>1.6</td>
</tr>
<tr>
<td>Flow unloading central position $\Delta p = 5$ bar/control edge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Symbol W6-</td>
<td>l/min</td>
<td>2.8</td>
<td>2.8</td>
<td>4</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>▶ Symbol W8-</td>
<td>l/min</td>
<td>2.8</td>
<td>1.4</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Pilot oil volume</td>
<td>0 ... 100%</td>
<td>cm³</td>
<td>1.3</td>
<td>2.9</td>
<td>6.8</td>
<td>6.8</td>
</tr>
</tbody>
</table>

| Hydraulic fluid | See table page 10 |
| Viscosity range | ▶ Recommended | mm²/s | 20 ... 100 |
| | ▶ Maximum | mm²/s | 10 ... 800 |

| Hydraulic fluid temperature range (flown-through) | °C | 20 ... +70 |
| Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c) | Class 18/16/13 4) |  |

2) Flow for deviating $\Delta p$ (control edge): \[
q_c = q_{\text{Nom}} \sqrt{\frac{\Delta p}{5}}
\]

3) At port X and Y with stepped input signal from 0 ... 100% (pilot pressure 100 bar)

4) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components. Available filters can be found at www.boschrexroth.com/filter.

Explanation of the footnotes see page 10.
Technical data
(For applications outside these values, please consult us!)

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<th>Classification</th>
<th>Suitable sealing materials</th>
<th>Standards</th>
<th>Data sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oils</td>
<td>HL, HLP</td>
<td>NBR, FKM</td>
<td>DIN 51524</td>
<td>90220</td>
</tr>
<tr>
<td>Bio-degradable</td>
<td>▶ Insoluble in water</td>
<td>HETG, HEES</td>
<td>ISO 15380</td>
<td>90221</td>
</tr>
<tr>
<td></td>
<td>▶ Soluble in water</td>
<td>HEPG</td>
<td>ISO 15380</td>
<td></td>
</tr>
<tr>
<td>Flame-resistant</td>
<td>▶ Water-free</td>
<td>HFDU (glycol base)</td>
<td>ISO 12922</td>
<td>90222</td>
</tr>
<tr>
<td></td>
<td>▶ Containing water</td>
<td>HFC (Fuchs: Hydroterm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)</td>
<td>NBR</td>
<td>90223</td>
</tr>
</tbody>
</table>

Important notices on hydraulic fluids:

- For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- Bio-degradable and flame-resistant – containing water:
  If components with galvanic zinc coating (e.g. version “J3” or “JS”) or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves - particularly in connection with local heat input.

Flame-resistant – containing water:
- Due to the increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30 % as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended - if possible specific to the installation - to back up the return flow pressure in ports T to approx. 20 % of the pressure differential at the component.
- Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, the command value profile is to be adjusted for proportional and high-response valves.

Static/dynamic

<table>
<thead>
<tr>
<th>Size</th>
<th>NG</th>
<th>10</th>
<th>16</th>
<th>25</th>
<th>27</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysteresis</td>
<td>%</td>
<td>&lt; 0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response sensitivity</td>
<td>%</td>
<td>&lt; 0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of inversion</td>
<td>%</td>
<td>&lt; 0.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing tolerance $q_{\text{max}}$</td>
<td>%</td>
<td>≤ 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actuating time for 0 ... 100%</td>
<td>ms</td>
<td>25</td>
<td>37</td>
<td>36</td>
<td>36</td>
<td>55</td>
</tr>
<tr>
<td>Switch-off behavior (after electric shut-off)</td>
<td>▶ Symbols E, E1-, W6-, W8-</td>
<td>Pilot control valve in fail-safe position, main valve moves to overlapped spring-centered central position</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▶ Symbol V, V1-</td>
<td>Pilot control valve in fail-safe position, main valve moves to spring-centered “offset position” (approx. 6%, P→B/A→T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▶ Symbol Q3</td>
<td>Pilot control valve in fail-safe position, main valve moves to spring-centered “offset position” (P blocked, A/B to port T open)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature drift (temperature range 20 °C ... 80 °C)</td>
<td>%/10 °C</td>
<td>Zero shift &lt; 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero compensation</td>
<td>Ex plant</td>
<td>±1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Technical data
(For applications outside these values, please consult us!)

### Electrical, integrated electronics (OBE) – Interface “A1” and “F1”

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative duty cycle</td>
<td>% 100 (continuous operation)</td>
</tr>
<tr>
<td>Protection class according to EN 60529</td>
<td>IP 65 with mounted and locked plug-in connectors</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>VDC 24</td>
</tr>
<tr>
<td>▶ Terminal A</td>
<td>VDC min. 19 / max. 36</td>
</tr>
<tr>
<td>▶ Terminal B</td>
<td>VDC 0</td>
</tr>
<tr>
<td>Maximum admissible residual ripple</td>
<td>Vpp 2.5</td>
</tr>
<tr>
<td>Maximum power consumption</td>
<td>VA 40</td>
</tr>
<tr>
<td>Fuse protection, external</td>
<td>At 2.5 (time-lag)</td>
</tr>
<tr>
<td>Input, version &quot;A1&quot;</td>
<td>▶ Valve amplifier VDC 0 ... ±10</td>
</tr>
<tr>
<td>▶ Terminal D (U_D)</td>
<td>mA 4 ... 20</td>
</tr>
<tr>
<td>▶ Terminal E (I_D)</td>
<td>mA 4 ... 20</td>
</tr>
<tr>
<td>Maximum voltage of the differential inputs against 0 V</td>
<td>D → B; E → B (max. 18 V)</td>
</tr>
<tr>
<td>Test signal, version &quot;A1&quot;</td>
<td>LVDT</td>
</tr>
<tr>
<td>▶ Terminal F (U_1)</td>
<td>V 0 ... ±10</td>
</tr>
<tr>
<td>▶ Terminal C</td>
<td>Reference 0 V</td>
</tr>
<tr>
<td>Test signal, version &quot;F1&quot;</td>
<td>LVDT signal 4 ... 20 mA on external load 200 ... 500 Ω maximum</td>
</tr>
<tr>
<td>▶ Terminal F (I_1)</td>
<td>mA 4 ... 20</td>
</tr>
<tr>
<td>▶ Terminal C (I_1)</td>
<td>mA 4 ... 20</td>
</tr>
<tr>
<td>Functional ground and screening</td>
<td>See page 13 (EMC-compliant installation)</td>
</tr>
<tr>
<td>Adjustment</td>
<td>Calibrated in the plant, see valve characteristic curves page 15 ... 32</td>
</tr>
</tbody>
</table>

### Electrical, integrated electronics (OBE) – Interface “L1”

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative duty cycle</td>
<td>% 100 (continuous operation)</td>
</tr>
<tr>
<td>Protection class according to EN 60529</td>
<td>IP 65 with mounted and locked plug-in connectors</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>VDC 24</td>
</tr>
<tr>
<td>▶ Valve amplifier</td>
<td>VDC min. 18 / max. 30</td>
</tr>
<tr>
<td>▶ Pin 2</td>
<td>VDC 0</td>
</tr>
<tr>
<td>▶ IO-Link interface</td>
<td>VDC 24</td>
</tr>
<tr>
<td>▶ Pin 1</td>
<td>VDC min. 18 / max. 30</td>
</tr>
<tr>
<td>▶ Pin 3</td>
<td>VDC 0</td>
</tr>
<tr>
<td>Maximum current consumption</td>
<td>▶ Valve amplifier A 2</td>
</tr>
<tr>
<td>▶ IO-Link interface</td>
<td>mA 50</td>
</tr>
<tr>
<td>Maximum residual ripple</td>
<td>Vpp 1.3</td>
</tr>
<tr>
<td>Maximum current consumption</td>
<td>mA 50</td>
</tr>
<tr>
<td>Minimum process cycle time</td>
<td>ms 0.6</td>
</tr>
<tr>
<td>Bit rate COM3</td>
<td>kBaud (kbit/s) 230.4</td>
</tr>
<tr>
<td>Required master port class</td>
<td>Class B</td>
</tr>
<tr>
<td>Resolution</td>
<td>▶ A/D transformer bit 12 (110% valve opening)</td>
</tr>
<tr>
<td>▶ D/A transformer</td>
<td>bit 12 (110% valve opening)</td>
</tr>
<tr>
<td>Functional ground</td>
<td>Provide via valve block</td>
</tr>
<tr>
<td>Adjustment</td>
<td>Calibrated in the plant</td>
</tr>
<tr>
<td>Directive</td>
<td>IO-Link Interface and System Specification Version 1.1.2</td>
</tr>
</tbody>
</table>
Technical data
(For applications outside these values, please consult us!)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative duty cycle</td>
<td>% 100 (continuous operation)</td>
</tr>
<tr>
<td>Protection class according to EN 60529</td>
<td>IP 65 with mounted and locked plug-in connectors</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>VDC 24</td>
</tr>
<tr>
<td>– Terminal A</td>
<td>VDC min. 19 / max. 36</td>
</tr>
<tr>
<td>– Terminal B</td>
<td>VDC 0</td>
</tr>
<tr>
<td>Maximum admissible residual ripple</td>
<td>Vpp 2.5</td>
</tr>
<tr>
<td>Maximum power consumption</td>
<td>VA 40</td>
</tr>
<tr>
<td>Fuse protection, external</td>
<td>Ar 2.5 (time-lag)</td>
</tr>
<tr>
<td>Input</td>
<td>Load, $R_{\text{L}} = 200 , \Omega$</td>
</tr>
<tr>
<td>– Terminal D ($I_{D-E}$)</td>
<td>mA 0 ... ±10</td>
</tr>
<tr>
<td>– Terminal E ($I_{D-E}$)</td>
<td>Current loop $I_{D-E}$ feedback</td>
</tr>
<tr>
<td>Test signal</td>
<td>LVDT signal 4 ... 20 mA on external load 200 ... 500 Ω maximum</td>
</tr>
<tr>
<td>– Terminal F ($I_{F-B}$)</td>
<td>mA 4 ... 20</td>
</tr>
<tr>
<td>– Terminal B ($I_{F-B}$)</td>
<td>Current loop $I_{F-B}$ feedback</td>
</tr>
<tr>
<td>Functional ground and screening</td>
<td>See page 13 (EMC-compliant installation)</td>
</tr>
<tr>
<td>Adjustment</td>
<td>Calibrated in the plant, see valve characteristic curves page 15 ... 32</td>
</tr>
</tbody>
</table>

Bosch Rexroth AG, RE 29123, edition: 2019-07
### Electrical connections and assignment

<table>
<thead>
<tr>
<th>Contact</th>
<th>&quot;A1&quot; (6 + PE)</th>
<th>&quot;F1&quot; (6 + PE)</th>
<th>&quot;C6&quot; (6 + PE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>24 VDC supply voltage</td>
<td>GND, reference potential actual value</td>
<td>GND, reference potential actual value</td>
</tr>
<tr>
<td>B</td>
<td>Reference potential actual value</td>
<td>Reference potential actual value</td>
<td>Reference potential actual value</td>
</tr>
<tr>
<td>C</td>
<td>Command value ±10 V ((Re &gt; 100 , \text{kΩ}))</td>
<td>Command value 4 ... 20 mA ((Re = 200 , \text{Ω}))</td>
<td>Command value ±10 mA ((Re = 200 , \text{Ω}))</td>
</tr>
<tr>
<td>D</td>
<td>Reference potential command value</td>
<td>Reference potential command value</td>
<td>Reference potential command value</td>
</tr>
<tr>
<td>E</td>
<td>Actual value ±10 V ((Ri = 1 , \text{kΩ}))</td>
<td>Actual value 4 ... 20 mA (\text{Load max. 500} , \text{Ω})</td>
<td>Actual value 4 ... 20 mA (\text{Load max. 500} , \text{Ω})</td>
</tr>
<tr>
<td>FE</td>
<td>Functional ground (directly connected to the valve housing)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Command value:**
- Positive command value \((0 \ldots 10 \, \text{V} \text{ or } 12 \ldots 20 \, \text{mA})\) at D and reference potential at E cause flow from P → A and B → T.
- Negative command value \((0 \ldots -10 \, \text{V} \text{ or } 12 \ldots 4 \, \text{mA})\) at D and reference potential at E cause flow from P → B and A → T.

**Connection cable:**
- Up to 20 m cable length type LiYCY 7 x 0.75 mm²
- Up to 40 m cable length type LiYCY 7 x 1.0 mm²
- EMC-compliant installation:
  - Apply screening to both line ends
  - Use metal mating connector (see page 39)
- Alternatively up to 30 m cable length admissible
  - Apply screening on supply side
  - Plastic mating connector (see page 39) can be used

---

**Notice:**
Mating connectors, separate order, see page 39 and data sheet 08006.

---

**Connector pin assignment “L1”** (M12-5, A-coded, class B)

**Notices:**
- M12 sensor/actuator connection line, 5-pole; M12 connector/bush, A-coded, without shield, maximum cable length 20 m. Observe the voltage drop over the cable. Wire cross-section at least 0.34 mm².
- Mating connectors, separate order, see page 39 and data sheet 08006.
- Communication and parameter description see data sheet 29400-PA

---

**Notice:**
Mating connectors, separate order, see page 39 and data sheet 08006.

---

**Communications and parameter description see data sheet 29400-PA**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Allocation interface L1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L+</td>
<td>Voltage supply IO-Link</td>
</tr>
<tr>
<td>2</td>
<td>P24</td>
<td>Voltage supply valve electronics and power part (current consumption 2 A)</td>
</tr>
<tr>
<td>3</td>
<td>L-</td>
<td>Reference potential pin 1 ¹</td>
</tr>
<tr>
<td>4</td>
<td>C/Q</td>
<td>Data line IO-Link (SDCI)</td>
</tr>
<tr>
<td>5</td>
<td>N24</td>
<td>Reference potential pin 2 ¹</td>
</tr>
</tbody>
</table>

¹) Pin 3 and 5 are linked with each other in the valve electronics. The reference potentials L- and N24 of the two supply voltages must also be linked with each other on the power supply unit side.
Notices:

1) Position transducer, pilot control valve
2) Position transducer, main valve

▷ Electrical signals provided via control electronics (e.g. actual value) must not be used for switching off safety-relevant machine functions.

▷ The setting of the potentiometer at the factory must not be changed.
Characteristic curves: Flow characteristic “L” (valid for HLP46, $T_{\text{oil}} = 40 \pm 5 \, ^{\circ}C$; $\Delta p = 5 \, \text{bar/control edge}$)

Flow/signal function

---

1) Step compensation

1. P–A
2. B–T
3. P–B
4. A–T

---

Directional control valve | 4WRLE

RE 29123, edition: 2019-07, Bosch Rexroth AG
Characteristic curves: Flow characteristic “L”
(valid for HLP46, $\vartheta_{oil} = 40 \pm 5$ °C; $\Delta p = 5$ bar/control edge)

Flow/signal function

![Diagram of Flow/signal function with symbol W6- and W8-]

1) Step compensation

1 P–A
2 B–T
3 P–B
4 A–T

Bosch Rexroth AG, RE 29123, edition: 2019-07
**Characteristic curves:** Flow characteristic “L”  
(valid for HLP46, $\theta_{oil} = 40 \pm 5^\circ C; \Delta p = 5$ bar/control edge)

**Flow/signal function**

![Flow characteristic diagram](image)

1. P–A  
2. B–T  
3. P–B  
4. A–T
**Characteristic curves:** Flow characteristic “P”  
(valid for HLP46, $\theta_{oil} = 40 \pm 5 ^\circ C; \Delta p = 5$ bar/control edge)

**Flow/signal function**

![Diagram of flow/signal function](image)

1) Step compensation  
1 P−A  
2 B−T  
3 P−B  
4 A−T
**Characteristic curves:** Flow characteristic “P”  
(valid for HLP46, \( \theta_{\text{oil}} = 40 \pm 5 ^\circ\text{C} ; \Delta p = 5 \) bar/control edge)

**Flow/signal function**

![Graph showing flow characteristics and signal functions.](image)

1) Step compensation  
1. P–A  
2. B–T  
3. P–B  
4. A–T
**Characteristic curves:** Flow characteristic “P”  
(valid for HLP46, $T_{oil} = 40 \pm 5 \, ^\circ\text{C}; \Delta p = 5 \, \text{bar/control edge})

**Flow/signal function**

![Flow characteristic graph](image)

- Stroke in %
- $\pm U_{D-E}$ in V
- $\pm I_{D-E}$ in mA

1. P–A
2. B–T
3. P–B
4. A–T
**Characteristic curves:** Flow characteristic "M"  
(valid for HLP46, $\theta_{\text{oil}} = 40 \pm 5 ^\circ \text{C}; \Delta p = 5 \text{ bar/control edge})

**Flow/signal function**

**Symbol Q3, version "100"**

**Symbol Q3, version "250"**

**Symbol Q3, version "400"**

**Symbol Q3, version "600"**

1 P–A  
2 B–T  
3 P–B  
4 A–T
**Characteristic curves:** Flow characteristic "M"  
(valid for HLP46, $\theta_{oil} = 40 \pm 5 \, ^\circ C; \Delta p = 5$ bar/control edge)

**Flow/signal function**

![Flow characteristic graph](image)

Symbol Q3, version "1500"

1. P–A
2. B–T
3. P–B
4. A–T

**Characteristic curves**
(measured with HLP46, $\theta_{oil} = 40 \pm 5 \, ^\circ C$)

**Pressure/signal characteristic curve**

![Pressure/signal characteristic graph](image)
**Characteristic curves:** Size 10
(measured with HLP46, $\vartheta_{\text{oil}} = 40 \pm 5 \, ^\circ\text{C}$)

Transition function with stepped electric input signals

Symbols V and $Q_3$-

![Graph showing stroke in % and signal change in %](image)

- Main valve, port P = 10 bar
- Pilot control valve, port X = 210 bar

Frequency response characteristic curves

Symbols V and $Q_3$

![Graph showing amplitude ratio in dB and phase angle in °](image)

- Signal ±5%
- Signal ±25%
- Signal ±100%
**Characteristic curves:** Size 10
(valid for HLP46, \(T_{\text{oil}} = 40 \pm 5 ^\circ \text{C}\))

**Flow/load function** (with maximum valve opening; tolerance \(\pm 10\%\))

![Graph showing characteristic curves](image)

1. Maximum admissible flow
2. Recommended flow
   (flow velocity 30 m/s)
**Characteristic curves:** Size 16
(measured with HLP46, $\vartheta_{\text{oil}} = 40 \pm 5 ^\circ \text{C}$)

Transition function with stepped electric input signals

Symbols $V$ and $Q3^{-}$

![Graph showing transition function](image)

- Main valve, port $P = 10$ bar
- Pilot control valve, port $X = 210$ bar

Frequency response characteristic curves

Symbols $V$ and $Q3^{-}$

![Graph showing frequency response characteristic curves](image)

- Signal ±5%
- Signal ±25%
- Signal ±100%
Characteristic curves: Size 16
(valid for HLP46, $\theta_{oil} = 40 \pm 5 \, ^{\circ}C$)

Flow/load function  (with maximum valve opening; tolerance $\pm 10\%$)

1 Maximum admissible flow
2 Recommended flow
   (flow velocity 30 m/s)
**Characteristic curves:** Size 25
(measured with HLP46, $\theta_{\text{oil}} = 40 \pm 5 \, ^\circ\text{C}$)

Transition function with stepped electric input signals

Symbols $V$ and $Q_3^-$

Signal change in %

Stroke in % $\uparrow$

Time in ms $\rightarrow$

- Main valve, port $P = 10$ bar
- Pilot control valve, port $X = 210$ bar

Frequency response characteristic curves

Symbols $V$ and $Q_3^-$

Amplitude ratio in dB $\uparrow$

Phase angle in $^\circ$ $\uparrow$

- Signal $\pm 5%$
- Signal $\pm 25%$
- Signal $\pm 100%$

Frequency in Hz $\rightarrow$
Characteristic curves: Size 25
(valid for HLP46, $\theta_{\text{oil}} = 40 \pm 5 ^\circ C$)

Flow/load function (with maximum valve opening; tolerance ±10%)

1 Maximum admissible flow
2 Recommended flow
   (flow velocity 30 m/s)
**Characteristic curves:** Size 27  
(measured with HLP46, $\theta_{\text{oil}} = 40 \pm 5 \, ^\circ\text{C}$)

**Transition function with stepped electric input signals**

Symbols V and Q3-  

Signal change in %

Stroke in % $\uparrow$  

Time in ms $\rightarrow$

- Main valve, port P = 10 bar  
- Pilot control valve, port X = 210 bar

**Frequency response characteristic curves**

Symbols V and Q3-

Amplitude ratio in dB $\uparrow$  

Phase angle in ° $\uparrow$  

Frequency in Hz $\rightarrow$

- Signal ±5%  
- Signal ±25%  
- Signal ±100%
**Characteristic curves:** Size 27
(valid for HLP46, $\theta_{oil} = 40 \pm 5 ^\circ C$)

**Flow/load function**  (with maximum valve opening; tolerance ±10%)

1. Maximum admissible flow
2. Recommended flow
   (flow velocity 30 m/s)
**Characteristic curves:** Size 35
(measured with HLP46, $\theta_{oill} = 40 \pm 5 \, ^\circ C$)

Transition function with stepped electric input signals

Symbols V and Q3-

![Graph](image)

- Main valve, port P = 10 bar
- Pilot control valve, port X = 210 bar

Frequency response characteristic curves

Symbols V and Q3-

![Graph](image)

- Signal ±5%
- Signal ±25%
- Signal ±100%
Characteristic curves: Size 35
(valid for HLP46, $\theta_{\text{oil}} = 40 \pm 5 ^\circ \text{C}$)

Flow/load function  (with maximum valve opening; tolerance $\pm 10\%$)

1 Maximum admissible flow
2 Recommended flow
(flow velocity 30 m/s)
Dimensions: Size 10
(dimensions in mm)

Item explanations can be found on page 37.
Valve mounting screws and subplates, see page 12.

Notices:
The dimensions are nominal dimensions which are subject to tolerances.
**Dimensions: Size 16**
(dimensions in mm)

**Item explanations** can be found on page 37.
Valve mounting screws and subplates, see page 12.

**Notices:**
The dimensions are nominal dimensions which are subject to tolerances.
Dimensions: Sizes 25 and 27
(dimensions in mm)

NG | L1 | L2 | L3 | L4 | H1 | H2 | H3 | H4 | H4* | H5 | B1 | B2
---|----|----|----|----|----|----|----|----|----|----|----|----
25  | 19 | 364| 191| 274| 46 | 126| 150| 251| 120| 150| 251| 120|
27  | 20.5|371|198|277|50 |140|164|265|288|124|120|200|

Item explanations can be found on page 37.
Valve mounting screws and subplates, see page 12.

Notices:
The dimensions are nominal dimensions which are subject to tolerances.
**Dimensions: Size 35**
(dimensions in mm)

**Item explanations** can be found on page 37. **Valve mounting screws** and **subplates**, see page 12.

**Notices:**
The dimensions are nominal dimensions which are subject to tolerances.
Dimensions

1 Pilot control valve
2 Main valve
3 Integrated electronics (OBE)
4 Inductive position transducer (main valve)
5 Name plate
6 Identical seal rings for ports P, A, B, T
   Identical seal rings for ports X, Y
7 Space required for removing the mating connector
8.1 Mating connectors for version “A1”, “F1” and “C6”, separate order, see page 39 and data sheet 08006.
8.2 Mating connectors for version “L1”, separate order, see page 39 and data sheet 08006.
9 Locking pin
10 Machined valve contact surface
   ▶ Size 10:
   Porting pattern according to ISO 4401-05-05-0-05
   ▶ Size 16:
   Porting pattern according to ISO 4401-07-07-0-05
   Deviating from the standard:
   Ports P, A, B, T – Ø20 mm
   ▶ Size 25 and 27:
   Porting pattern according to ISO 4401-08-08-0-05
   Deviating from the standard:
   NG27: Ports P, A, B, T – Ø32 mm
   ▶ Size 35:
   Porting pattern according to ISO 4401-10-09-0-05
   Deviating from the standard:
   Ports P, A, B, T – Ø50 mm
11 Position G1 according to DIN 24340 Form A
12 Damping plate “D”
13 Dimension in () for version with damping plate "D"
13 Electronics protection membrane “-967”
### Dimensions

**Valve mounting screws (separate order)**

<table>
<thead>
<tr>
<th>Size</th>
<th>Quantity</th>
<th>Hexagon socket head cap screws</th>
<th>Material number</th>
</tr>
</thead>
</table>
| 10   | 4        | ISO 4762 · M6 x 45 · 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B  
  Tightening torque $M_A = 13.5 \text{ Nm} \pm 10\%$  
  or  
  ISO 4762 · M6 x 45 · 10.9  
  Tightening torque $M_A = 15.5 \text{ Nm} \pm 10\%$  
  or  
  ASME B18.3 · 1/4-20 UNC x 1 3/4" · ASTM-A574  
  Tightening torque $M_A = 15 \text{ Nm [11 ft-lbs]} \pm 10\%$  
  or  
  ISO 4762 · M6 x 60 · 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B  
  Tightening torque $M_A = 12.2 \text{ Nm} \pm 10\%$  
  or  
  ISO 4762 · M10 x 60 · 10.9-flZn/nC/480h/C  
  Tightening torque $M_A = 58 \text{ Nm} \pm 20\%$  
  or  
  ASME B18.3 · 1/4-20 UNC x 2 1/4" · ASTM-A574  
  Tightening torque $M_A = 15 \text{ Nm [11 ft-lbs]} \pm 10\%$  
  or  
  ASME B18.3 · 3/8-16 UNC x 2 1/4" · ASTM-A574  
  Tightening torque $M_A = 60 \text{ Nm [44 ft-lbs]} \pm 10\%$  
  or  
  ISO 4762 · M12 x 60 · 10.9-flZn/nC/480h/C  
  Tightening torque $M_A = 100 \text{ Nm} \pm 20\%$  
  or  
  ASME B18.3 · 1/2-13 UNC x 2 1/4" · ASTM-A574  
  Tightening torque $M_A = 110 \text{ Nm [81 ft-lbs]} \pm 10\%$  
  or  
  ISO 4762 · M20 x 90 · 10.9-flZn/nC/480h/C  
  Tightening torque $M_A = 465 \text{ Nm} \pm 20\%$  
  or  
  ISO 4762 · M20 x 90 · 10.9  
  Tightening torque $M_A = 610 \text{ Nm} \pm 20\%$  
  or  
  ASME B18.3 · 3/4-10 UNC x 3 1/2" · ASTM-A574  
  Tightening torque $M_A = 395 \text{ Nm [291 ft-lbs]} \pm 10\%$  
  or  
  ASME B18.3 · 1/2-13 UNC x 2 1/4" · ASTM-A574  
  Tightening torque $M_A = 110 \text{ Nm [81 ft-lbs]} \pm 10\%$  
  or  
  ISO 4762 · M20 x 90 · 10.9  
  Tightening torque $M_A = 610 \text{ Nm} \pm 20\%$  
  or  
  ASME B18.3 · 3/4-10 UNC x 3 1/2" · ASTM-A574  
  Tightening torque $M_A = 395 \text{ Nm [291 ft-lbs]} \pm 10\%$  |

**Notice:**

- The tightening torque of the hexagon socket head cap screws refers to the maximum operating pressure.
- When replacing component series 3X with 4X, only the valve mounting screws listed here may be used (for size 16, a minimum screw length of 55 mm is admissible, as well). Prior to assembly, check the existing mounting bore on the block for sufficient screw-in depth.

**Subplates (separate order)** with porting pattern according to ISO 4401, see data sheet 45100.
**Accessories** (separate order)

**Valves with integrated electronics**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Mating connectors 6-pole + PE</th>
<th>Design</th>
<th>Version</th>
<th>Material number</th>
<th>Data sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>“A1”, “F1”, “C6”</td>
<td>For the connection of valves with integrated electronics, round connector 6+PE, line cross-section 0.5 ... 1.5 mm²</td>
<td>Straight</td>
<td>Metal</td>
<td>R900223890</td>
<td>08006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Straight</td>
<td>Plastic</td>
<td>R900021267</td>
<td>08006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Angled</td>
<td>Plastic</td>
<td>R900217845</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interface</th>
<th>Cable sets 6-pole + PE</th>
<th>Length in m</th>
<th>Material number</th>
<th>Data sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>“A1”, “F1”, “C6”</td>
<td>For the connection of valves with integrated electronics, round connector 6+PE, straight connector, shielded, potted-in mating connector, line cross-section 0.75 mm²</td>
<td>3.0</td>
<td>R901420483</td>
<td>08006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0</td>
<td>R901420491</td>
<td>08006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.0</td>
<td>R901420496</td>
<td>08006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20.0</td>
<td>R901448068</td>
<td>–</td>
</tr>
</tbody>
</table>

**Test and service devices**

<table>
<thead>
<tr>
<th>Material number</th>
<th>Data sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service case with test device for proportional servo valves with integrated electronics (OBE)</td>
<td>R901049737</td>
</tr>
</tbody>
</table>

**IO-Link gateways**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Description</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>S67E-PN-IOL8-DI4-M12-6P</td>
<td>IndraControl S67E PROFINET device in the plastic housing 8 IO-Link ports (4 x class A and 4 x class B), 4 digital inputs, 24 VDC, M12 quick connection technology</td>
<td>R911174436</td>
</tr>
<tr>
<td>S67E-S3-IOL8-DI4-M12-6P</td>
<td>IndraControl S67E Sercos device in the plastic housing 8 IO-Link ports (4 x class A and 4 x class B), 4 digital inputs, 24 VDC, M12 quick connection technology</td>
<td>R911174437</td>
</tr>
</tbody>
</table>
Further information

- Hydraulic valves for industrial applications
- Subplates
- Hydraulic fluids on mineral oil basis
- Environmentally compatible hydraulic fluids
- Flame-resistant, water-free hydraulic fluids
- Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)
- Reliability characteristics according to EN ISO 13849
- Hexagon socket head cap screw, metric/UNC
- General product information on hydraulic products
- Installation, commissioning and maintenance of servo valves and high-response valves
- Assembly, commissioning and maintenance of hydraulic systems
- Directional control valves, direct operated, with electrical position feedback and IO-Link interface
- Selection of filters
- Information on available spare parts
- Link hydraulics via IO-Link

Data sheet 07900
Data sheet 07600-B
Data sheet 045100
Data sheet 09220
Data sheet 090221
Data sheet 090222
Data sheet 090223
Data sheet 08012
Data sheet 08936
Data sheet 07008
Data sheet 07700

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