

# Pilot-operated proportional pressure reducing valves with or without digital on-board electronics (OBED)

## Type DRE(M), DRE(M)E and DRE(M)A



- ▶ Sizes 10 and 25
- ▶ Component series 7X
- ▶ Maximum operating pressure 315 bar
- ▶ Maximum flow 500 l/min



### Features

- ▶ For reducing a system pressure
- ▶ For subplate mounting
- ▶ Porting pattern according to ISO 5781
- ▶ Pressure-controlled, optional
- ▶ With digital on-board electronics (OBED), optional
- ▶ CE conformity according to EMC Directive 2014/30/EU
- ▶ Linear command value pressure characteristic curve
- ▶ With external pressure sensor, optional
- ▶ Pressure sensor adjustable for various applications
- ▶ Digital (IO-Link, Bluetooth®) and analog interface, optional
- ▶ Optional via Bluetooth, fast and easy analysis and structural adjustment by means of app function (easy2connect app)
- ▶ Maximum pressure limitation, optional

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**Ordering code**

|            |    |    |    |          |           |          |    |          |    |            |    |    |    |    |          |
|------------|----|----|----|----------|-----------|----------|----|----------|----|------------|----|----|----|----|----------|
| 01         | 02 | 03 | 04 | 05       | 06        | 07       | 08 | 09       | 10 | 11         | 12 | 13 | 14 | 15 | 16       |
| <b>DRE</b> |    |    |    | <b>-</b> | <b>7X</b> | <b>/</b> |    | <b>Y</b> |    | <b>G24</b> |    |    |    |    | <b>*</b> |

|    |                                                                                                        |                        |
|----|--------------------------------------------------------------------------------------------------------|------------------------|
| 01 | Proportional pressure reducing valve                                                                   | <b>DRE</b>             |
| 02 | Without maximum pressure limitation                                                                    | <b>no code</b>         |
|    | With maximum pressure relief                                                                           | <b>M</b> <sup>1)</sup> |
| 03 | For external control electronics                                                                       | <b>no code</b>         |
|    | With digital on-board electronics (OBED)                                                               | <b>E</b> ◇             |
|    | With digital on-board electronics (OBED), pressure-controlled (only with external pressure sensor "A") | <b>A</b> ◇             |
| 04 | Size 10                                                                                                | <b>10</b> ◇            |
|    | Size 25                                                                                                | <b>20</b> ◇            |
| 05 | Component series 70 ... 79 (70 ... 79: unchanged installation and mounting dimensions)                 | <b>7X</b>              |

**Pressure rating**

|    |                                                                    |                  |
|----|--------------------------------------------------------------------|------------------|
| 06 | 50 bar                                                             | <b>50</b>        |
|    | 100 bar                                                            | <b>100</b>       |
|    | 200 bar                                                            | <b>200</b> ◇     |
|    | 315 bar                                                            | <b>315</b> ◇     |
| 07 | External pilot oil return (separate and depressurized to the tank) | <b>Y</b>         |
| 08 | With check valve between port A and B                              | <b>no code</b> ◇ |
|    | Without check valve                                                | <b>M</b> ◇       |

**Pressure sensor**

|    |                                                                             |                        |
|----|-----------------------------------------------------------------------------|------------------------|
| 09 | Without (external control electronics and digital on-board electronics "E") | <b>no code</b>         |
|    | External (digital on-board electronics, pressure-controlled "A")            | <b>A</b> <sup>2)</sup> |

**Supply voltage**

|    |                     |            |
|----|---------------------|------------|
| 10 | Direct voltage 24 V | <b>G24</b> |
|----|---------------------|------------|

**Coil**

|    |                                                 |                  |
|----|-------------------------------------------------|------------------|
| 11 | 1600 mA                                         | <b>no code</b> ◇ |
|    | 800 mA (only with external control electronics) | <b>-8</b>        |

**Electrical connection**

|    |                                                        |                            |
|----|--------------------------------------------------------|----------------------------|
| 12 | <b>- Type DRE(M)</b>                                   |                            |
|    | Connector, 3-pole (2 + PE) according to EN 175301-803  | <b>K4</b> <sup>3)</sup>    |
|    | <b>- Type DRE(M)E and DRE(M)A – Version "A1", "F1"</b> |                            |
|    | Connector, 7-pole (6 + PE) according to EN 175201-804  | <b>K31</b> <sup>3)</sup> ◇ |
|    | <b>- Type DRE(M)E and DRE(M)A – Version "L1"</b>       |                            |
|    | Connector 5-pole, M12 x 1                              | <b>K24</b> <sup>3)</sup> ◇ |

**Electronics interface**

|    |                                                                                     |                           |
|----|-------------------------------------------------------------------------------------|---------------------------|
| 13 | External control electronics                                                        | <b>no code</b>            |
|    | Command value input 0 ... 10 V; actual value output 0 ... 10 V                      | <b>A1</b> <sup>4)</sup> ◇ |
|    | Command value input 4 ... 20 mA; actual value output 4 ... 20 mA                    | <b>F1</b> <sup>4)</sup>   |
|    | IO-Link interface (only with digital on-board electronics "E" and "A"; for class B) | <b>L1</b> <sup>5)</sup> ◇ |

**Accessories, service interface**

|    |                                                                                        |                |
|----|----------------------------------------------------------------------------------------|----------------|
| 14 | Without Bluetooth® interface                                                           | <b>no code</b> |
|    | With Bluetooth® interface (dongle; only with digital on-board electronics "E" and "A") | <b>B</b> ◇     |

Ordering code

|     |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |
|-----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|
| 01  | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11  | 12 | 13 | 14 | 15 | 16 |
| DRE | M  |    |    | -  | 7X | /  |    | Y  |    | G24 |    |    |    |    | *  |

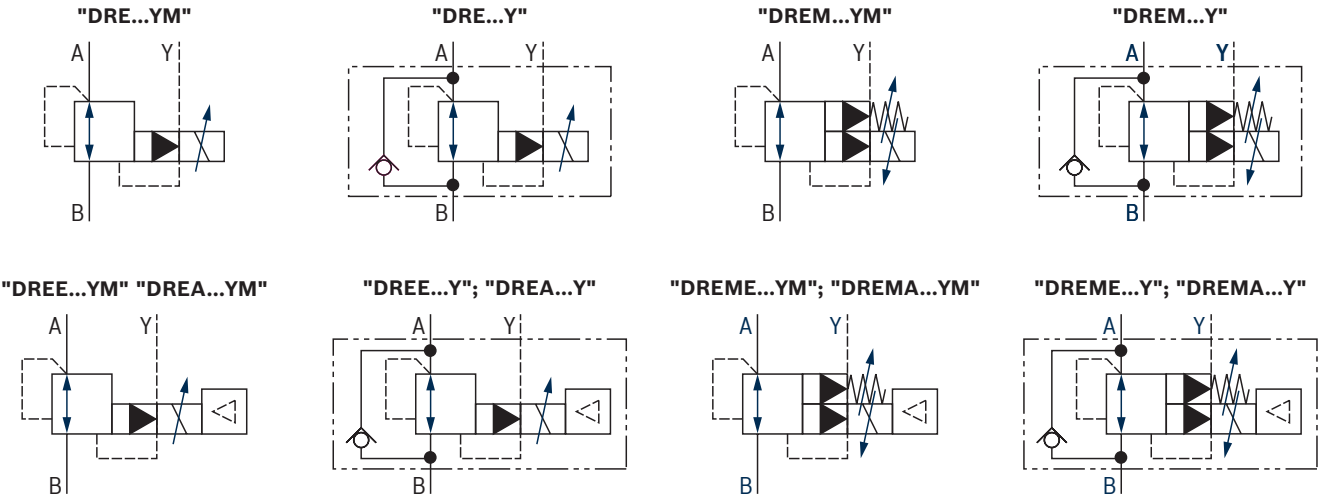
Seal material (observe compatibility of seals with hydraulic fluid used, see page 8)

|    |                                   |   |   |
|----|-----------------------------------|---|---|
| 15 | NBR seals                         | M | ◇ |
|    | FKM seals                         | V |   |
| 16 | Further details in the plain text |   |   |

- 1) Only for overpressure relief due to a pilot control valve error (for example, in case of contamination or over-current).
- 2) Pressure sensor adjustment via "easy2connect app" (for electrical connections and assignment, see page 12; pressure sensor, separate order, see page 20)
- 3) Mating connectors and cable sets, separate order, see page 20 and data sheet 08006.
- 4) Command value input switchable via Bluetooth® interface "B" ("A1" ↔ "F1")
- 5) Only for use in the industrial sector according to IO-Link specification and EN 61131-9. When used in the household / small business area, additional EMC measures are required for the I/O-Link system.

Notice: ◇ = Preferred type

Symbols



**Function, section: Type DRE(M)****General**

Valves of type DRE(M) are pilot-operated pressure reducing valves. They are used for reduction of an operating pressure in hydraulic systems.

These valves basically consist of a pilot control valve (1) with proportional solenoid (2), a main valve (3) with main spool insert (4), as well as an optional check valve (5).

**Basic principle**

The pressure in channel A is set in a command value-dependent form via the proportional solenoid (2). In rest position (no pressure in channel B), the spring (17) holds the main spool (4) in its initial position. The connection from channel B→A is closed. A start-up jump is thereby prevented.

The pressure in channel A acts on the spool face (7) of the main spool (4) via the bore (6). The pilot oil is taken from channel B and flows through the bore (8) to the constant-current control (9) that keeps the pilot flow constant independent of the pressure drop between channel A and B. From the constant-current control (9), the pilot flow flows into the spring chamber (10), through the bores (11) and (12) via the valve seat (13) into channel Y (14, 15, 16) and from there to the return flow.

The pressure required in channel A is preset at the related amplifier. The proportional solenoid moves the valve poppet (20) in the direction of the valve seat (13) and limits the pressure in the spring chamber (10) to the set value. If the pressure in channel A is lower than the preset command value, the higher pressure in the spring chamber (10) moves the main spool (4) to the right. The connection B→A is opened.

If the set pressure in A is reached, the forces at the main spool (4) are balanced – the main spool (4) is in control position.

Pressure in channel A x spool face (7) is equal to pressure in spring chamber (10) x spool face (7) minus spring force (17).

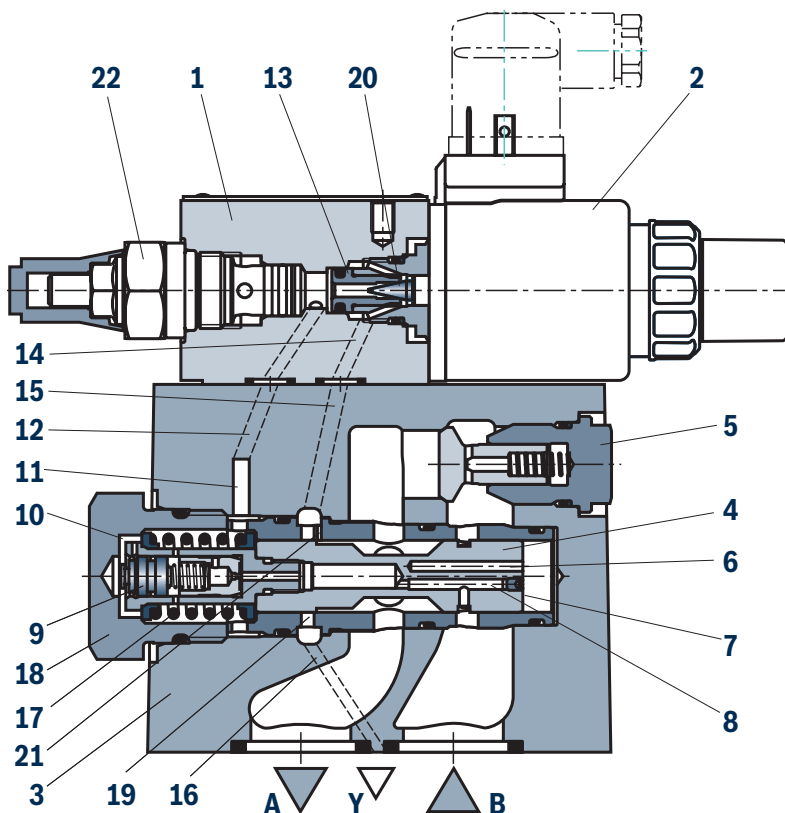
If in a standing hydraulic fluid column (e.g. cylinder piston at stop), the pressure in A is to be reduced, (e.g.) a lower command value is preset at the control electronics and in this way a lower pressure is preselected which is present immediately in the spring chamber (10). The higher pressure in A which acts on the spool face (7) of the main spool (4) pushes the main spool (4) to the stop against the plug screw (18). The connection A→B is blocked and A→Y is open. The force of the spring (17) now counteracts the hydraulic force acting on the surface (7) of the main spool (4). In this main spool position, the hydraulic fluid can flow from channel A via the control edge (19) to Y into the return flow.

When the pressure in A has dropped to the pressure in the spring chamber (10) plus pressure differential from spring (17), the main spool closes (4) the large control bores in the socket at the control edge A→Y. The residual pressure differential of approx. 10 bar to the new command value pressure in A is now only unloaded via the fine control bore (21). In this way, a favorable transient response without pressure undershoot is achieved.

For the free flow back from channel A→B, a check valve (5) can optionally be installed. Part of this flow from channel A simultaneously flows into the return flow via the open control edge (19) of the main spool (4) A→Y.

**Type DREM...**

For hydraulic protection against an inadmissibly high electric control current at the proportional solenoid, which imperatively results in increased pressures in port A, you can optionally install a spring-loaded pressure relief valve as maximum pressure limitation (22). The maximum pressure limitation is pre-set based on the relevant pressure rating (page 7).



Type DREM 10 ...

**Function, section: Type DRE(M)E and DRE(M)A****Type DRE(M)E** – with digital on-board electronics (OBED)

With regard to function and set-up, this version corresponds to type DRE(M).

The digital on-board electronics (OBED) (24) are mounted on the proportional solenoid. It may be equipped with different electric interfaces.

- ▶ Analog interface (XH1)
  - Interface "A1" (command value 0 ... 10 V)
  - Interface "F1" (command value 4 ... 20 mA)
- ▶ Digital interface (XH5)
  - IO-Link "L1"

**Type DRE(M)A** – with on-board digital electronics (OBED) and external pressure sensor connection

With regard to function and set-up, this version corresponds to type DRE(M)E.

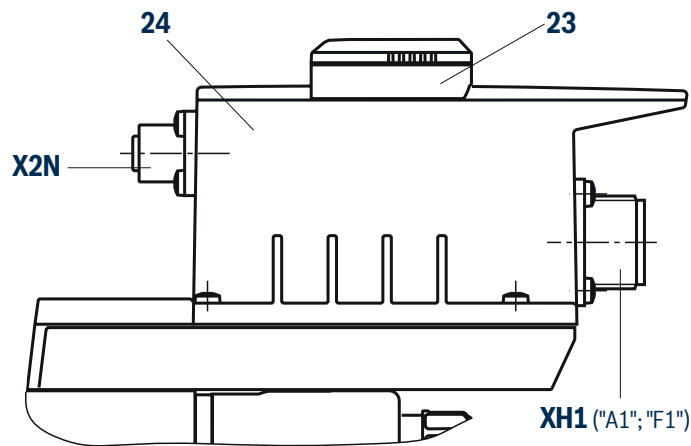
In this valve version, a pressure transducer can also be integrated externally in the system via the interface (X2N). If the command value is zero, the digital on-board electronics only apply the minimum control current to the proportional solenoid and the minimum set pressure is applied.

**Bluetooth® function**

The digital on-board electronics (OBED) provide the user with a digital diagnosis interface via a Bluetooth® dongle (Bluetooth® Low Energy). It may also be ordered as an accessory and retrofitted. The Bluetooth® dongle may only be attached when the valve is de-energized. By means of the "easy2connect app", the valve status can be displayed and configurations at the valve can be carried out via the Bluetooth® dongle (23).

**Notice:**

- ▶ The "easy2connect app" can be downloaded in the App Store (iOS) or Google Play Store (Android). For further information, see "Project planning information" on page 21.
- ▶ Further information on the Bluetooth® dongle VT-ZBT-1-1X (R901505294) as well as set-up and installation of the app is available in data sheet 30581 and operating instructions 30581-B.



**Type DRE(M)E and DRE(M)A...A...**

**Technical data**

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

| General                                            |                                                                                                 |       |                                                                                         |                     |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------|---------------------|
| Size                                               |                                                                                                 | NG    | 10                                                                                      | 25                  |
| Type of connection                                 |                                                                                                 |       | Subplate mounting                                                                       |                     |
| Porting pattern (subplate mounting)                |                                                                                                 |       | ISO 5781-06-07-0-00                                                                     | ISO 5781-08-10-0-00 |
| Weight                                             | ► "DRE(M)"                                                                                      | kg    | 5.0                                                                                     | 6.2                 |
|                                                    | ► "DRE(M)E"                                                                                     | kg    | 5.4                                                                                     | 6.6                 |
|                                                    | ► "DRE(M)A"                                                                                     | kg    | 5.4                                                                                     | 6.6                 |
| Installation position                              |                                                                                                 |       | Any                                                                                     |                     |
| Ambient temperature range                          | ► Without "OBED"                                                                                | °C    | −20 ... +80                                                                             |                     |
|                                                    | ► With "OBED"                                                                                   | °C    | −20 ... +60                                                                             |                     |
| Storage temperature range                          |                                                                                                 | °C    | −20 ... +80                                                                             |                     |
| Maximum storage time                               |                                                                                                 | Years | 1 (if the storage conditions are observed, refer to the operating instructions 07600-B) |                     |
| Maximum relative humidity (no condensation)        |                                                                                                 | %     | 97                                                                                      |                     |
| Protection class according to EN 60529             |                                                                                                 |       | IP65 (if suitable and correctly mounted mating connectors are used)                     |                     |
| MTTF <sub>D</sub> values according to EN ISO 13849 |                                                                                                 | Years | 75 (for further details see data sheet 08012) <sup>1)</sup>                             |                     |
| Sine test according to EN 60068-2-6                |                                                                                                 |       | 10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes                                   |                     |
| Noise test according to EN 60068-2-64              |                                                                                                 |       | 20 ... 2000 Hz / 10 g <sub>RMS</sub> / 30 g peak / 30 min. / 3 axes                     |                     |
| Transport shock according to EN 60068-2-27         |                                                                                                 |       | 15 g / 11 ms / 3 shocks / 3 axes                                                        |                     |
| Conformity                                         | ► CE according to EMC Directive 2014/30/EU, tested according to                                 |       | EN 61000-6-2 and EN 61000-6-3 <sup>2)</sup>                                             |                     |
|                                                    | ► UKCA according to Electromagnetic Compatibility Regulations SI 2016/1091, tested according to |       | EN 61000-6-2 and EN 61000-6-3 <sup>2)</sup>                                             |                     |
|                                                    | ► RoHS Directive                                                                                |       | 2011/65/EU <sup>3)</sup>                                                                |                     |

1) "OBED" voltage supply switched off.

2) Only valves with "OBED".

3) The product fulfills the substance requirements of the RoHS Directive 2011/65/EU.

## Technical data

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

| Hydraulic                                                                                                      |                                  |       |                                        |     |
|----------------------------------------------------------------------------------------------------------------|----------------------------------|-------|----------------------------------------|-----|
| Size                                                                                                           |                                  | NG    | 10                                     | 25  |
| Maximum operating pressure                                                                                     | ▶ Port A, B                      |       | 315                                    |     |
|                                                                                                                | – "DRE(M)"; "DRE(M)E"; "DRE(M)A" | bar   |                                        |     |
|                                                                                                                | ▶ Port Y                         | bar   | Separate and depressurized to the tank |     |
| Hydraulic fluid                                                                                                |                                  |       | See table, page 8                      |     |
| Hydraulic fluid temperature range                                                                              |                                  | °C    | –20 ... +80                            |     |
| Viscosity range                                                                                                | ▶ Recommended                    | mm²/s | 30 ... 46                              |     |
|                                                                                                                | ▶ Maximum admissible             | mm²/s | 15 ... 380                             |     |
| Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c) |                                  |       | Class 18/16/13 <sup>4)</sup>           |     |
| Maximum flow                                                                                                   |                                  | l/min | 300                                    | 500 |
| Maximum set pressure <sup>5)</sup>                                                                             |                                  | bar   | 50; 100; 200; 315                      |     |
| Minimum set pressure (command value 0)                                                                         |                                  | bar   | 2                                      |     |
| Maximum pressure relief <sup>6)</sup>                                                                          | ▶ Pressure rating 50 bar         | bar   | 70                                     |     |
|                                                                                                                | ▶ Pressure rating 100 bar        | bar   | 130                                    |     |
|                                                                                                                | ▶ Pressure rating 200 bar        | bar   | 230                                    |     |
|                                                                                                                | ▶ Pressure rating 315 bar        | bar   | 350                                    |     |
| Pilot flow                                                                                                     |                                  | l/min | 0.8                                    |     |

<sup>4)</sup> 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 life cycle of the components.

<sup>5)</sup> Pressure ratings 50 ... 315 bar can be adjusted by the customer by ±10% via IO-Link and app. The maximum operating pressure must be observed.

<sup>6)</sup> Fixedly set.

**Technical data**

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

| Hydraulic fluid |                      | Classification                                                                                                 | Suitable sealing materials | Standards | Data sheet |
|-----------------|----------------------|----------------------------------------------------------------------------------------------------------------|----------------------------|-----------|------------|
| Mineral oils    |                      | HL, HLP, HLPD, HVLP, HVLPD                                                                                     | NBR, FKM                   | DIN 51524 | 90220      |
| Bio-degradable  | ► Insoluble in water | HETG                                                                                                           | FKM                        | ISO 15380 | 90221      |
|                 |                      | HEES                                                                                                           | FKM                        |           |            |
|                 | ► Soluble in water   | HEPG                                                                                                           | FKM                        | ISO 15380 |            |
| Flame-resistant | ► Water-free         | HFDU (glycol base)                                                                                             | FKM                        | ISO 12922 | 90222      |
|                 |                      | HFDU (ester base)                                                                                              | FKM                        |           |            |
|                 |                      | HFDR                                                                                                           | FKM                        |           |            |
|                 | ► Containing water   | HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046) | NBR                        | ISO 12922 | 90223      |

**Important information 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 "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause an 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 considering conditions specific to the installation – to back up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.

**Static / Dynamic**

| Type                                                             |                   |         | "DRE(M)" <sup>7)</sup> | "DRE(M)E" | "DRE(M)A" |
|------------------------------------------------------------------|-------------------|---------|------------------------|-----------|-----------|
| Hysteresis <sup>8)</sup>                                         | %                 |         | 7                      | 7         | 1         |
| Range of inversion <sup>8)</sup>                                 | %                 |         | <0.5                   | <0.5      | 0.2       |
| Response sensitivity <sup>8)</sup>                               | %                 |         | <0.5                   | <0.5      | 0.2       |
| Manufacturing tolerance <sup>8)</sup>                            | %                 |         | ±3.5                   | ±1.5      | ±1        |
| Temperature drift                                                | ► Electronics     | %/10 K  | 0.3                    |           |           |
|                                                                  | ► Complete valve  | %/10 K  | 0.2                    |           |           |
| Linearity <sup>8)</sup>                                          | %                 |         | ±2                     | ±2        | ±1        |
| Repetition accuracy <sup>8)</sup>                                | %                 |         | ±2                     | ±1        | ±0.5      |
| Step response<br>$T_u + T_g$ <sup>9)</sup><br>( $q_v = 0$ l/min) | ► Dead volume 1 l | 10%→90% | ms                     | 130       |           |
|                                                                  |                   | 90%→10% | ms                     | 130       |           |
|                                                                  | ► Dead volume 5 l | 10%→90% | ms                     | 180       |           |
|                                                                  |                   | 90%→10% | ms                     | 150       |           |

<sup>7)</sup> Technical data determined with external control electronics VT-MSPA1-2X (data sheet 30232) and 1600 mA coil (see "Characteristic curves" on page 13)

<sup>8)</sup> From nominal pressure

<sup>9)</sup> Adaptation via "easy2connect app" is supported.

## Technical data

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

| Electrical               |                       |           |         |
|--------------------------|-----------------------|-----------|---------|
| Version                  |                       | "G24"     | "G24-8" |
| Minimum solenoid current | mA                    | <100      |         |
| Maximum solenoid current | mA                    | 1600 ±10% | 800 ±5% |
| Solenoid coil resistance | ▶ Cold value at 20 °C | Ω         | 5.5     |
|                          | ▶ Maximum hot value   | Ω         | 20.6    |
|                          |                       |           | 33      |

| Electrical, digital on-board electronics (OBE) – interface "A1" |                                                       |                  |                              |
|-----------------------------------------------------------------|-------------------------------------------------------|------------------|------------------------------|
| Supply voltage                                                  | ▶ Nominal value                                       | VDC              | 24                           |
|                                                                 | ▶ Minimum                                             | VDC              | 18                           |
|                                                                 | ▶ Maximum                                             | VDC              | 30                           |
|                                                                 | ▶ Maximum residual ripple                             | V <sub>pp</sub>  | 2.5                          |
|                                                                 | ▶ Maximum power consumption                           | VA               | 30                           |
|                                                                 | ▶ Current consumption during operation <sup>10)</sup> |                  |                              |
|                                                                 | – Maximum                                             | A <sub>eff</sub> | <2                           |
|                                                                 | – Impulse current                                     | A                | 3.2                          |
|                                                                 | ▶ Fuse protection, external                           | A <sub>T</sub>   | 2.5 (time-lag)               |
| Charging capacity (externally effective)                        |                                                       | μF               | <20                          |
| Relative duty cycle time according to VDE 0580                  |                                                       |                  | S1 (continuous operation)    |
| Functional ground and screening                                 |                                                       |                  | See pin assignment, page 11  |
| Command value<br>(differential amplifier)                       | ▶ Measurement range                                   | V                | 0 ... 10                     |
|                                                                 | ▶ Input resistance                                    | kΩ               | >100                         |
| Actual value<br>(test signal)                                   | ▶ Output range                                        | V                | 0 ... 10 <sup>11); 12)</sup> |
|                                                                 | ▶ Minimum load impedance                              | kΩ               | >2                           |

| Electrical, digital on-board electronics (OBE) – interface "F1" |                                                       |                  |                              |
|-----------------------------------------------------------------|-------------------------------------------------------|------------------|------------------------------|
| Supply voltage                                                  | ▶ Nominal value                                       | VDC              | 24                           |
|                                                                 | ▶ Minimum                                             | VDC              | 18                           |
|                                                                 | ▶ Maximum                                             | VDC              | 30                           |
|                                                                 | ▶ Maximum residual ripple                             | V <sub>pp</sub>  | 2.5                          |
|                                                                 | ▶ Maximum power consumption                           | VA               | 30                           |
|                                                                 | ▶ Current consumption during operation <sup>10)</sup> |                  |                              |
|                                                                 | – Maximum                                             | A <sub>eff</sub> | <2                           |
|                                                                 | – Impulse current                                     | A                | 3.2                          |
|                                                                 | ▶ Fuse protection, external                           | A <sub>T</sub>   | 2.5 (time-lag)               |
| Charging capacity (externally effective)                        |                                                       | μF               | <20                          |
| Relative duty cycle time according to VDE 0580                  |                                                       |                  | S1 (continuous operation)    |
| Functional ground and screening                                 |                                                       |                  | See pin assignment, page 11  |
| Command value                                                   | ▶ Input current range                                 | mA               | 4 ... 20                     |
|                                                                 | ▶ Input resistance                                    | Ω                | 100 (+2 V diode path)        |
| Actual value<br>(test signal)                                   | ▶ Output range                                        | mA               | 4 ... 20 <sup>11); 12)</sup> |
|                                                                 | ▶ Maximum load                                        | Ω                | 475                          |

<sup>10)</sup> The making current peak is usually higher (depending on power supply unit, supply line and capacities).

<sup>11)</sup> Equivalent to 0 ... 100% of the pressure rating for type DRE(M)A (see functional description 29277-FK)

<sup>12)</sup> Equivalent to 0 ... 2000 mA for type DRE(M)E (see functional description 29277-FK)

**Technical data**

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

| Electrical, digital on-board electronics (OBE) – interface "L1" |                                                       |                                                          |                     |
|-----------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------|---------------------|
| Supply voltage                                                  | ▶ Valve amplifiers                                    |                                                          |                     |
|                                                                 | – Nominal value                                       | VDC                                                      | 24                  |
|                                                                 | – Minimum                                             | VDC                                                      | 18                  |
|                                                                 | – Maximum                                             | VDC                                                      | 30                  |
|                                                                 | – Maximum residual ripple                             | Vpp                                                      | 2.5                 |
|                                                                 | – Maximum power consumption                           | VA                                                       | 30                  |
|                                                                 | – Current consumption during operation <sup>10)</sup> | Rated current                                            | A <sub>eff</sub> <2 |
|                                                                 |                                                       | Impulse current                                          | A 3.2               |
|                                                                 | ▶ IO-Link interface                                   |                                                          |                     |
|                                                                 | – Nominal value                                       | VDC                                                      | 24                  |
|                                                                 | – Minimum                                             | VDC                                                      | 18                  |
|                                                                 | – Maximum                                             | VDC                                                      | 30                  |
|                                                                 | – Maximum residual ripple                             | Vpp                                                      | 1.3                 |
|                                                                 | – Maximum power consumption                           | VA                                                       | 1.2                 |
|                                                                 | – Maximum current consumption                         | A                                                        | 0.5                 |
|                                                                 | – Minimum process cycle time                          | ms                                                       | 1                   |
| Charging capacity (externally effective)                        |                                                       | μF                                                       | <20                 |
| Relative duty cycle time according to VDE 0580                  |                                                       | S1 (continuous operation)                                |                     |
| Functional ground and screening                                 |                                                       | Provide via valve block                                  |                     |
| Bit rate COM3                                                   |                                                       | kBaud (kbit/s)                                           | 230.4               |
| Required master port class                                      |                                                       | Class B                                                  |                     |
| Directive                                                       |                                                       | IO-Link Interface and System Specification Version 1.1.4 |                     |

<sup>10)</sup> The making current peak is usually higher (depending on power supply unit, supply line and capacities).

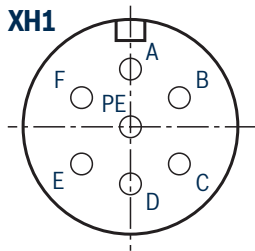
**Notice:**

EMC Directive conditions see page 22.

## Electrical connections and assignment

### Connector pin assignment "XH1", 6-pole + PE according to DIN 43563

| Pin | Interface assignment                                                     |                                                                                                            |
|-----|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|     | "A1"                                                                     | "F1"                                                                                                       |
| A   | Supply voltage                                                           | Supply voltage                                                                                             |
| B   | GND                                                                      | GND                                                                                                        |
| C   | Reference potential actual value<br>(connect to GND on the control side) | Reference potential actual value<br>(connect to GND on control side; current loop $I_{F-C}$ feedback)      |
| D   | Command value                                                            | Command value                                                                                              |
| E   | Reference potential command value<br>(connect to GND on control side)    | Reference potential command value<br>(connect to GND on the control side, current loop $I_{D-E}$ feedback) |
| F   | Actual value                                                             | Actual value                                                                                               |
| PE  | Functional ground (directly connected to the valve housing)              |                                                                                                            |



#### Command value:

- "A1": 0 ... +10 V
- "F1": 4 ... 20 mA

#### Connection cable:

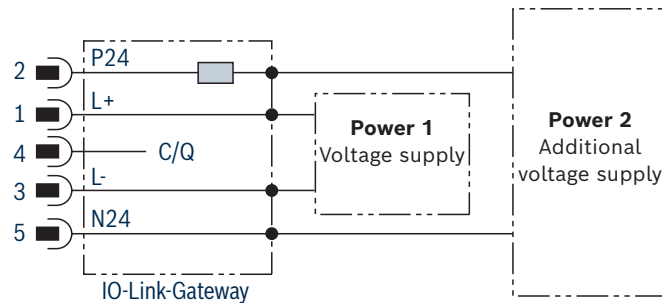
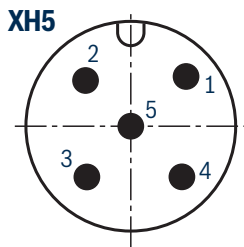
- Up to 20 m cable length type LiYCY 7 x 0.75 mm<sup>2</sup>
- Up to 40 m cable length type LiYCY 7 x 1.0 mm<sup>2</sup>



#### Notice:

- Mating connectors, separate order, see page 20 and data sheet 08006.
- EMC Directive conditions see page 22.

### Connector pin assignment "L1" (coding A, M12, 5-pole, class B)



#### Notice:

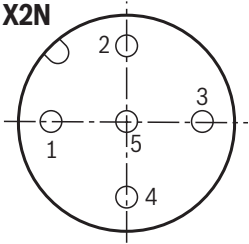
- M12 sensor/actuator connection line, 5-pole; M12 connector/bush, A-coded, without shield, maximum cable length 20 m. Observe the voltage drop over the cable. Wire cross-section at least 0.34 mm<sup>2</sup>.
- Mating connectors, separate order, see page 20 and data sheet 08006.
- For communication and parameter description, see functional description 29277-FK

| Pin | Signal | Assignment interface "L1"                                                                                                                                                                                                                  |
|-----|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | L+     | Voltage supply IO-Link                                                                                                                                                                                                                     |
| 2   | P24    | Voltage supply for valve electronics pressure sensor, Bluetooth® dongle (incl. LEDs, etc.), and power section of max. 1.6 A continuous current and up to 2 A as making current. Potential is galvanically separated from supply L+ and L-. |
| 3   | L-     | Reference potential pin 1                                                                                                                                                                                                                  |
| 4   | C/Q    | Data line IO-Link (SDCI)                                                                                                                                                                                                                   |
| 5   | N24    | Reference potential pin 2 (galvanically separated from supply L+ and L-)                                                                                                                                                                   |

Electrical connections and assignment

Connector pin assignment for analog configurable pressure sensor interface "X2N" (coding A), M12, 5-pole, socket

| Pin    | Signal                     | Interface                                                                                                                                                   |
|--------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | $U_S$                      | Voltage supply for pressure sensor from the valve supply $+U_B$ or P24, max. 50 mA (short-circuit-proof). Observe the voltage range of the pressure sensor. |
| 2      | $I_{Meas}$                 | Current input 4 ... 20 mA, connected to GND via 100 $\Omega$ load resistance +2 V diode path. Measuring input configurable via Bluetooth® or IO-Link.       |
| 3      | GND                        | Reference potential; do not connect in the case of two-wire system (current input).                                                                         |
| 4      | $U_{Meas}$                 | Voltage input 0 ... 10 V ( $Re_{min} = 50\text{ k}\Omega$ )                                                                                                 |
| 5      | n.c.                       | No connection; insulated bore in the socket.                                                                                                                |
| Thread | Shield (functional ground) | Connected to the housing via the thread.                                                                                                                    |

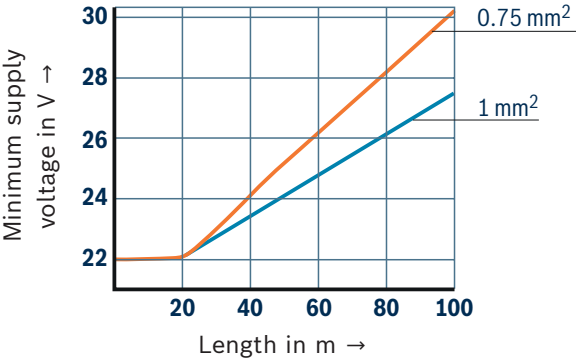


- Notice:**
- In the condition as supplied, the actual value input PIN 4 0.1 ... 10 V of the pressure sensor interface is configured.
  - Connection cable up to 10 m cable length with screening connected to both line ends.
  - The pressure sensor signal interface is always configured to voltage signal.
  - The pressure sensor signal can be independently changed via IO-Link or via the Bluetooth® interface by means of "easy2connect app".

Type DREM

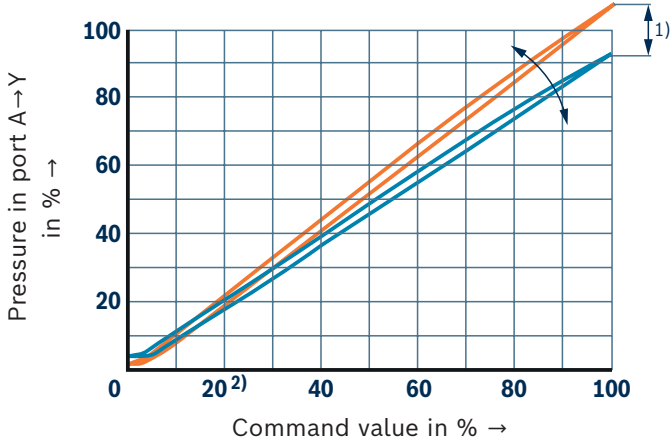
| Connection at device connector | Connection at mating connector |
|--------------------------------|--------------------------------|
|                                |                                |

- Connection cable** (recommendation):
- 2-wire, 0.75 or 1 mm<sup>2</sup> plus protective grounding conductor and screening
  - Only connect the screening to PE on the supply side
  - Maximum admissible length = 100 m
- The minimum supply voltage at the power supply unit depends on the length of the supply line (see diagram).



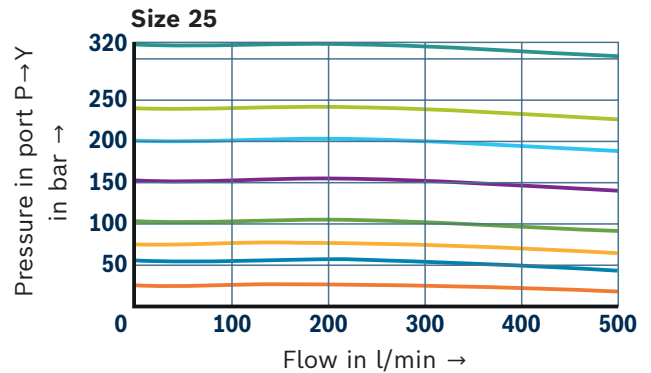
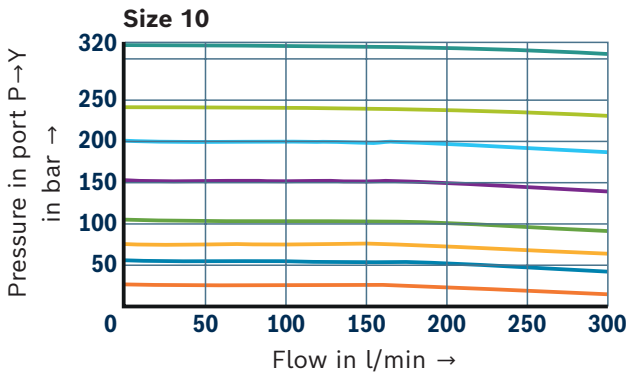
**Characteristic curves: Type DRE(M)**  
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ )

**Pressure in port A→Y dependent on the command value** (flow = 0.8 l/min; actuator is closed)

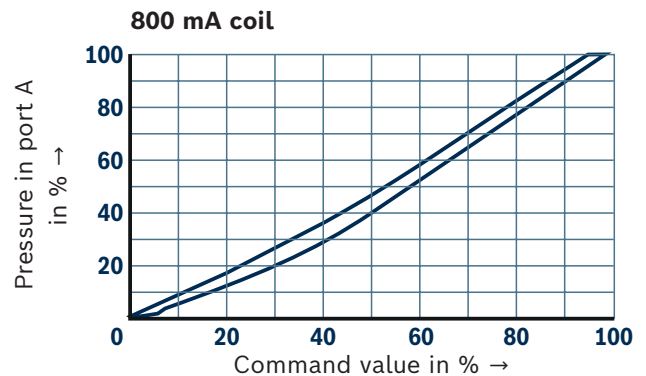
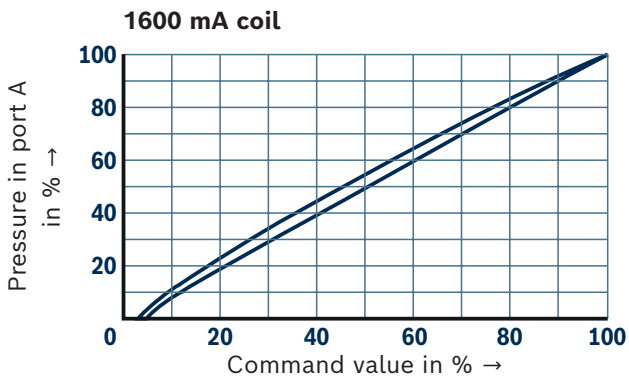


- 1) In order to be able to adjust several valves to the same characteristic curve, the manufacturing tolerance can - with version "DRE(M)" - be changed at the external amplifier (see page 20) using the command value attenuator "G". In this connection, do not set the pressure higher than the maximum set pressure of the pressure rating with command value 100%.
- 2) At 20% zero point calibration at the factory

**Pressure in port A→Y dependent on the flow** (constant pressure differential 60 bar)



**Pressure in port A depending on the command value** (amplifier VT-MSPA1-2X, pressure rating "100"; example for all pressure ratings)

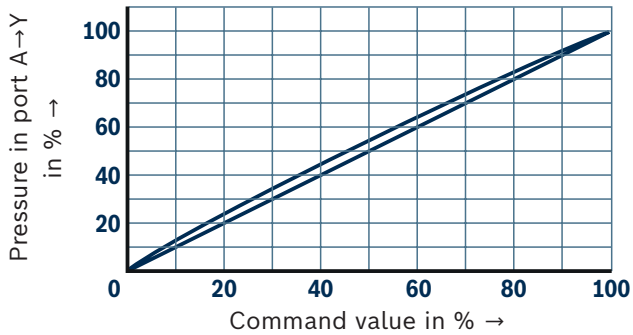


**Notice:**

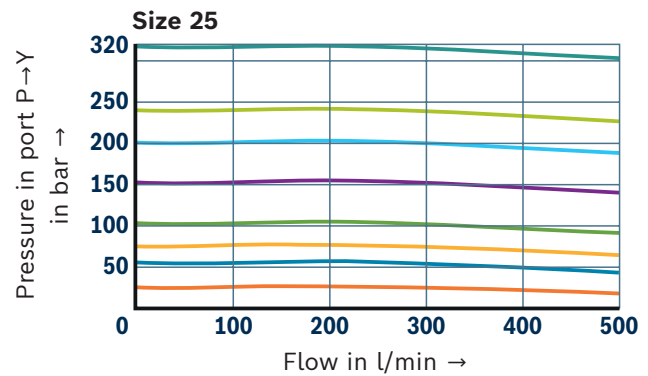
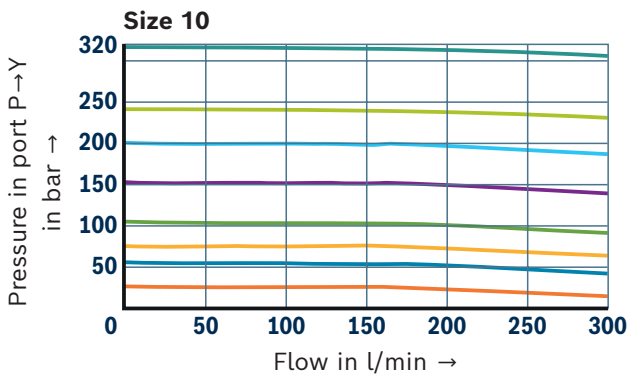
Typical characteristic curves which are subject to tolerance variations.

**Characteristic curves:** Type DRE(M)E  
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ )

**Pressure in port A→Y dependent on the command value** (flow = 0.8 l/min; actuator is closed)



**Pressure in port A→Y dependent on the flow** (constant pressure differential 60 bar)

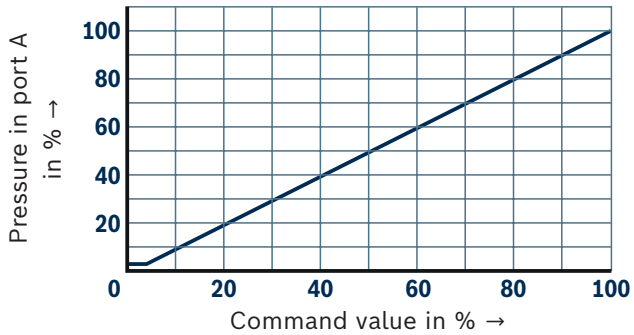


**Notice:**

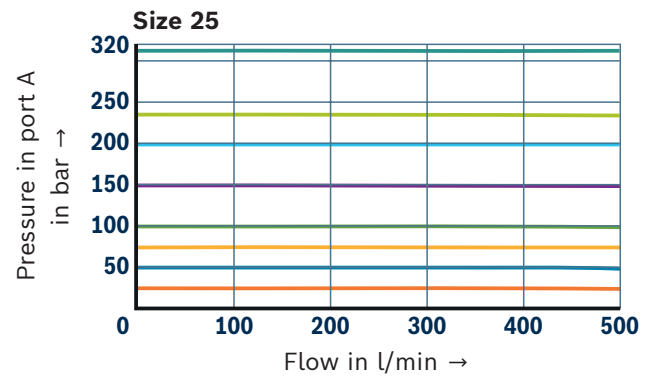
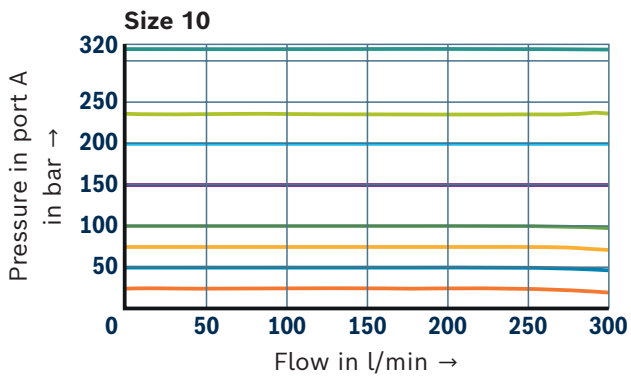
Typical characteristic curves which are subject to tolerance variations.

**Characteristic curves:** Type DRE(M)A  
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ )

**Pressure in port A dependent on the command value** (flow = 0.8 l/min; actuator is closed)



**Pressure in port A dependent on the flow** (constant pressure differential 60 bar)



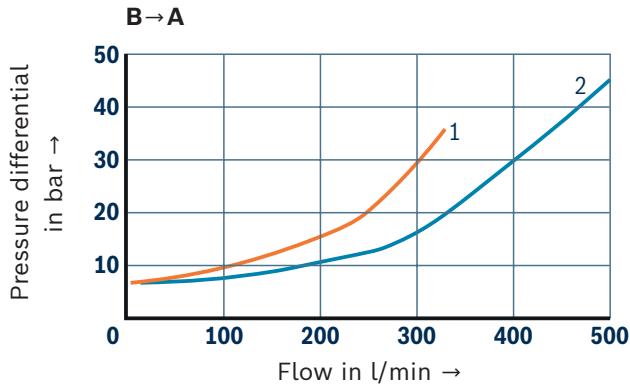
**Notice:**

Typical characteristic curves which are subject to tolerance variations.

## Characteristic curves

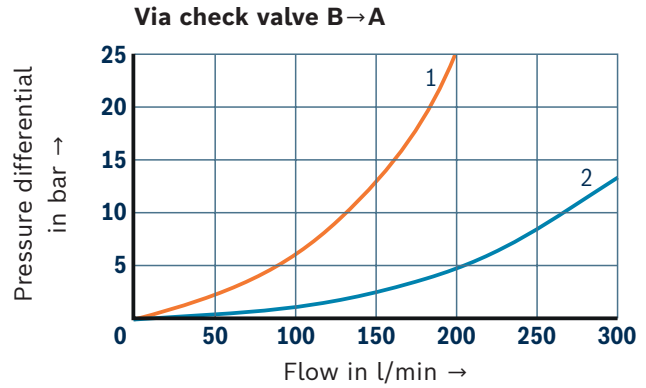
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ )

### $\Delta p$ - $q_V$ characteristic curves



1 Size 10

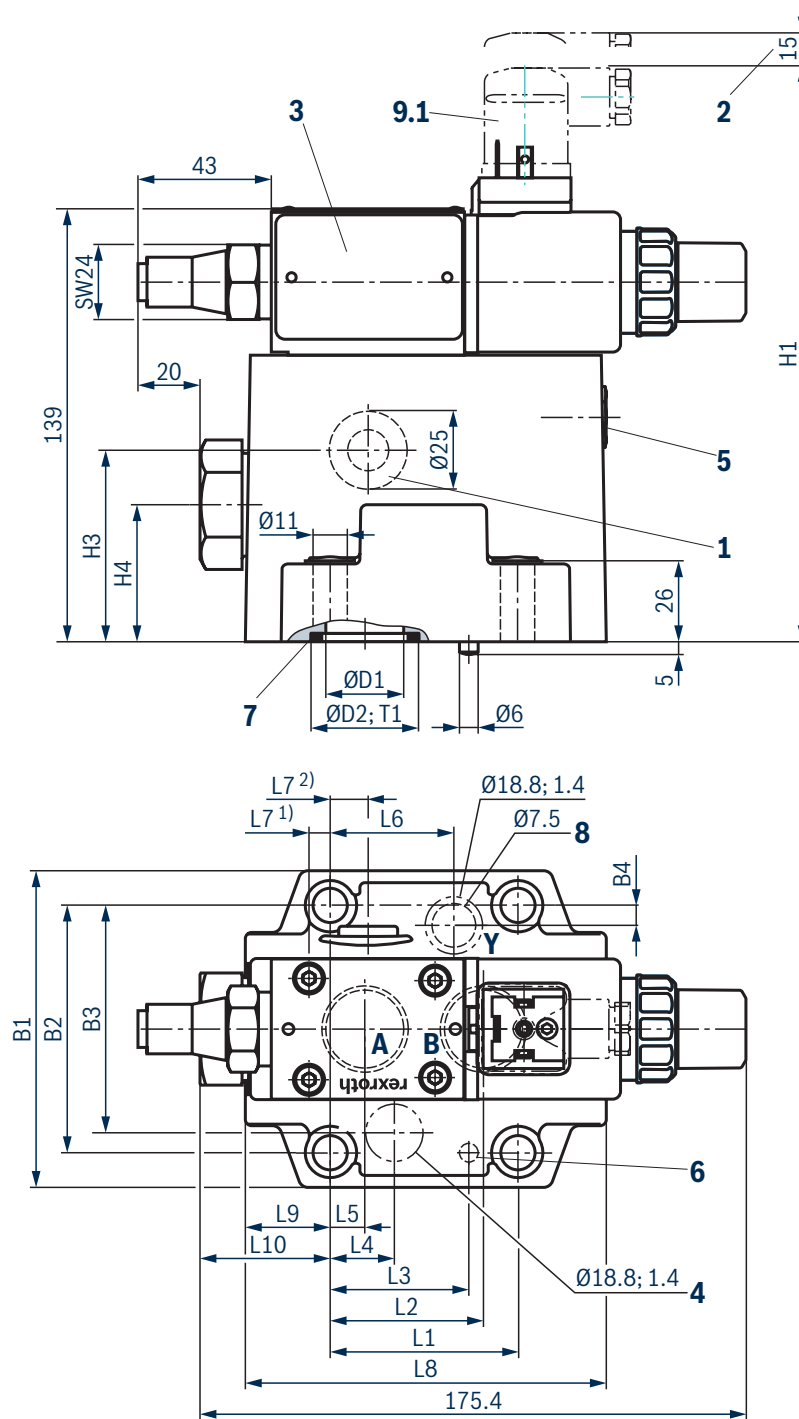
2 Size 25



#### Notice:

Typical characteristic curves which are subject to tolerance variations.

**Dimensions:** Type DRE(M)  
(Dimensions in mm)



Required surface quality of the  
valve connection surface

1) Size 10

2) Size 25

**For item explanations, valve mounting screws and subplates,** see page 19.

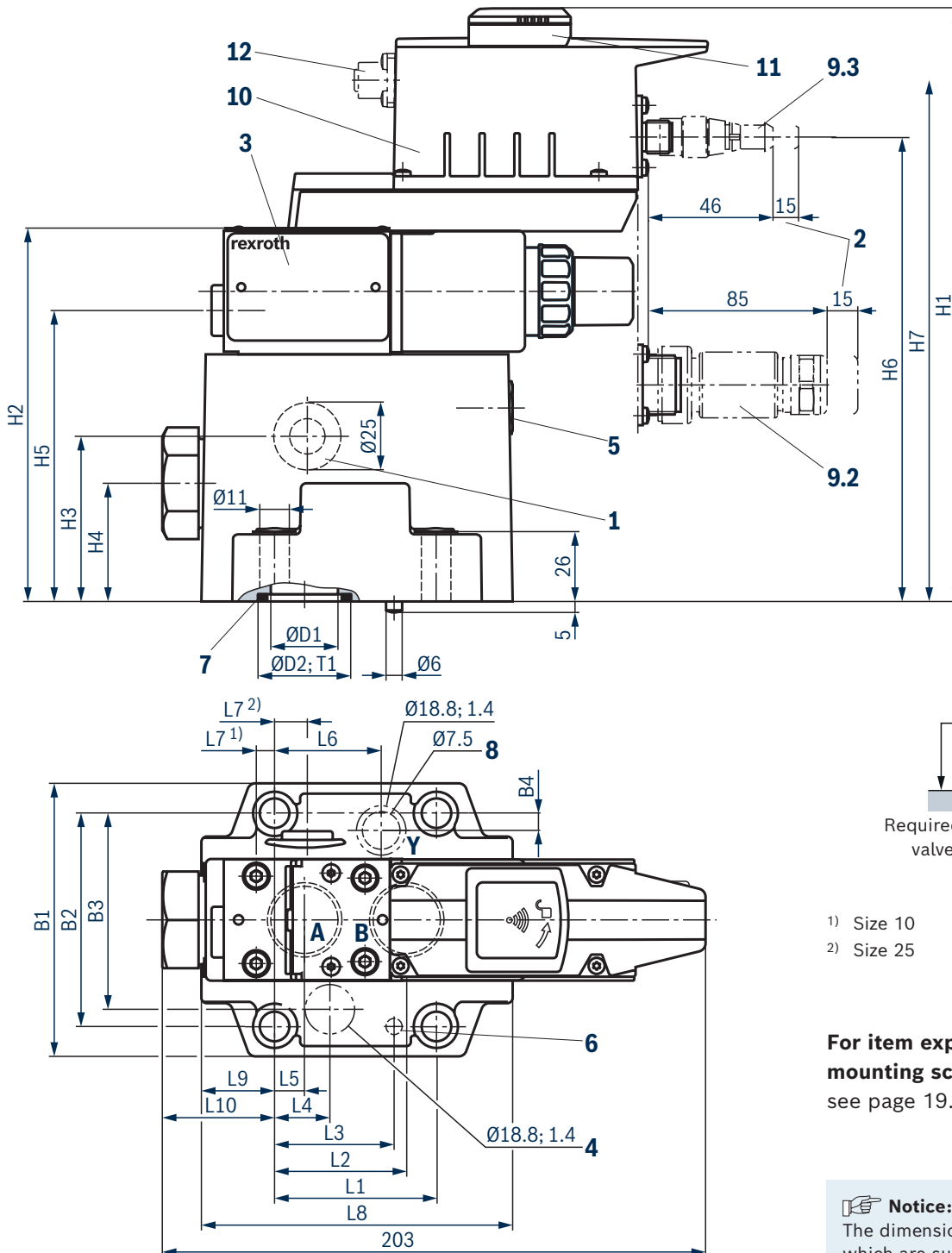
**Notice:**

The dimensions are nominal dimensions which are subject to tolerances.

| NG | L1   | L2   | L3   | L4   | L5   | L6   | L7   | L8  | L9   | L10  | L11 | L12  |
|----|------|------|------|------|------|------|------|-----|------|------|-----|------|
| 10 | 42.9 | 35.8 | 31.8 | 21.5 | 7.2  | 21.5 | 5    | 116 | 44.5 | 59.5 | 61  | 9.05 |
| 25 | 60.3 | 49.2 | 44.5 | 20.6 | 11.1 | 39.7 | 12.2 | 116 | 27.3 | 42   | 78  | 8.85 |

| NG | H1  | H2  | H3 | H4 | B1  | B2   | B3   | B4  | B5 | B6   | ØD1 | ØD2H11 | T1  |
|----|-----|-----|----|----|-----|------|------|-----|----|------|-----|--------|-----|
| 10 | 171 | 125 | 58 | 36 | 85  | 66.7 | 58.8 | 7.9 | 84 | 8.65 | 15  | 21.8   | 2   |
| 25 | 185 | 139 | 64 | 44 | 102 | 79.4 | 73   | 6.4 | 97 | 8.8  | 25  | 34.5   | 2.7 |

**Dimensions:** Type DRE(M)E and DRE(M)A  
(Dimensions in mm)



Required surface quality of the  
valve connection surface

1) Size 10

2) Size 25

**For item explanations, valve mounting screws and subplates, see page 19.**



 **Notice:**

The dimensions are nominal dimensions which are subject to tolerances.

| NG | L1   | L2   | L3   | L4   | L5   | L6   | L7   | L8  | L9   | L10  | L11 | L12  |
|----|------|------|------|------|------|------|------|-----|------|------|-----|------|
| 10 | 42.9 | 35.8 | 31.8 | 21.5 | 7.2  | 21.5 | 5    | 116 | 44.5 | 59.5 | 61  | 9.05 |
| 25 | 60.3 | 49.2 | 44.5 | 20.6 | 11.1 | 39.7 | 12.2 | 116 | 27.3 | 42   | 78  | 8.85 |

| NG | H1    | H2  | H3 | H4 | H5    | H6    | H7  | B1  | B2   | B3   | B4  | B5 | B6   | ØD1 | ØD2H11 | T1  |
|----|-------|-----|----|----|-------|-------|-----|-----|------|------|-----|----|------|-----|--------|-----|
| 10 | 207.4 | 124 | 58 | 36 | 94.2  | 158.9 | 180 | 85  | 66.7 | 58.8 | 7.9 | 84 | 8.65 | 15  | 21.8   | 2   |
| 25 | 221.4 | 138 | 64 | 44 | 108.2 | 172.9 | 194 | 102 | 79.4 | 73   | 6.4 | 97 | 8.8  | 25  | 34.5   | 2.7 |

## Dimensions

- 1** Upon delivery, this port (G 1/4) is closed. After removal of the blanking plug, an external and separate depressurized pilot oil return to the tank is, however, also possible here.
- 2** Space required to remove the mating connector
- 3** Name plate
- 4** Blind counterbore
- 5** Check valve, optional
- 6** Locating pin
- 7** Identical seal rings for ports A and B  
Identical seal rings for port Y and blind counterbore (pos. 4)
- 8** Pilot oil return always external, separate and depressurized to the tank or optional at pos. 1
- 9.1** Mating connector without circuitry for connector "K4" (separate order, see page 20 and data sheet 08006)
- 9.2** Mating connectors with version "A1" and "F1" (separate order, see page 20 data sheet 08006)
- 9.3** Mating connectors with version "L1" (separate order, see page 20 data sheet 08006)
- 10** Digital on-board electronics (OBED)
- 11** Bluetooth® dongle (separate order, see page 20)
- 12** External connection for pressure sensor with version "DRE(M)A ... A" (pressure sensor, separate order, see page 20)

### Valve mounting screws (separate order)

| Size   | Quantity | Hexagon socket head cap screws                                                                                                                                    | Material number   |
|--------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 10, 25 | 4        | <b>ISO4762 - M10 x 45-10.9 - fLZn/nc/480h/C</b><br>Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$ ; Tightening torque $M_A = 59 \text{ Nm} \pm 10\%$ | <b>R913015578</b> |
|        | or       |                                                                                                                                                                   |                   |
|        | 4        | <b>ISO 4762 - M10 x 45 - 10.9</b><br>Friction coefficient $\mu_{\text{total}} = 0.12 \dots 0.17$ ; tightening torque $M_A = 75 \text{ Nm} \pm 10\%$               | <b>R900003230</b> |

#### Notice:

The tightening torque of the hexagon socket head cap screws refers to the maximum operating pressure.

**Subplates** (separate order) with porting pattern according to ISO 5781 see data sheet 45100.

**Accessories** (separate order)**Pressure sensor for external connection of pressure sensor** (without connection line)

| Type                | Material number   | Data sheet |
|---------------------|-------------------|------------|
| HM20-2X/400-H-K35-N | <b>R901466598</b> | –          |

**Bluetooth® dongle**

|                                                    | Material number   | Data sheet |
|----------------------------------------------------|-------------------|------------|
| Bluetooth® dongle                                  | <b>R901505294</b> | 30581-B    |
| Empty cover (for valves without Bluetooth® dongle) | <b>R961013819</b> | –          |

**Mating connectors and cable sets**

| Item<br>1)                                                     | Designation                                                                                                                                                                                                                 | Version                                        | Short designation | Material<br>number | Data sheet |  |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-------------------|--------------------|------------|--|
| 9.1                                                            | Mating connector;<br>for valves with "K4" connector,<br>2-pole + PE, design A                                                                                                                                               | Without circuitry, M16 x 1.5, 0 ... 250 V, "a" | Z4                | R901017010         | 08006      |  |
|                                                                |                                                                                                                                                                                                                             | Without circuitry, M16 x 1.5, 0 ... 250 V, "b" |                   | R901017011         |            |  |
| 9.2                                                            | Mating connector;<br>for valves with round connector,<br>6-pole + PE                                                                                                                                                        | Straight, metal, PG11                          | 7PZ31...M         | R900223890         | 08006      |  |
| 9.3                                                            |                                                                                                                                                                                                                             | Straight, metal with mechanical locking        | –                 | R901044595         | –          |  |
|                                                                |                                                                                                                                                                                                                             | Straight, plastic, PG11                        | 7PZ31...K         | R900021267         | 08006      |  |
|                                                                |                                                                                                                                                                                                                             | Angled, plastic, PG11                          | 7PZ31...K         | R900217845         |            |  |
| Cable sets;<br>for valves with round connector,<br>6-pole + PE |                                                                                                                                                                                                                             | Plastic, 3.0 m                                 | 7PZ31 BF6         | R901420483         |            |  |
|                                                                |                                                                                                                                                                                                                             | Plastic, 5.0 m                                 |                   | R901420491         |            |  |
|                                                                |                                                                                                                                                                                                                             | Plastic, 10.0 m                                |                   | R901420496         |            |  |
|                                                                |                                                                                                                                                                                                                             | Plastic, 20.0 m                                |                   | R901448068         |            |  |
| 12                                                             | Cable sets;<br>for analog sensors for connection<br>of the Rexroth pressure sensors<br>type HM20, shielded, 5-pole,<br>A-coding, PUR/PVC, straight<br>connector M12, on straight socket<br>M12, line cross-section 0.34 mm² | 0.6 m                                          | –                 | R901111709         | –          |  |
|                                                                |                                                                                                                                                                                                                             | 1.0 m                                          | –                 | R901111712         |            |  |
|                                                                |                                                                                                                                                                                                                             | 2.0 m                                          | –                 | R901111713         |            |  |

<sup>1)</sup> See dimensions on pages 17 and 18.**External control electronics**

|                | Type        | Data sheet |
|----------------|-------------|------------|
| Modular design | VT-MSPA1-2X | 30232      |

**Test and service devices**

|                                                                                             | Material number   | Data sheet |
|---------------------------------------------------------------------------------------------|-------------------|------------|
| Service case with test device for continuous control valves with on-board electronics (OBE) | <b>R901049737</b> | 29685      |

**IO-Link gateways**

| Designation                    | Description                                                                                                                                                            | Material number   |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>S67E-PN-IOL8-DI4-M12-6P</b> | IndraControl S67E<br>PROFINET device in plastic housing<br>8 IO-Link ports (4 x class A and 4 x class B), 4 digital inputs, 24 VDC,<br>M12 quick connection technology | <b>R911174436</b> |
| <b>S67E-S3-IOL8-DI4-M12-6P</b> | IndraControl S67E<br>Sercos device in plastic housing<br>8 IO-Link ports (4 x class A and 4 x class B), 4 digital inputs, 24 VDC,<br>M12 quick connection technology   | <b>R911174437</b> |

## Project planning information

### ► IT security

The operation of installations, systems and machines basically requires the implementation of a holistic IT security concept which is state-of-the-art in terms of technology.

As components of such installations, systems and machines, Rexroth products and their properties must be taken into account in the corresponding, holistic IT security concept.

Unless otherwise documented, Rexroth products are designed for operation in local, physically and logically secured networks with access restrictions for authorized persons, and they are not classified according to IEC 62443-4-2.

- Compliance with the maximum operating pressure (315 bar) is mandatory.
- Type DRE(M)E and DRE(M)A are delivered ex works with standard parameter set 2 (mean dead volume). For predefined parameter sets, see functional description 29277-FK.
- The parameter set can be selected and changed using the "easy2connect app" or via IO-Link.
- For configuration, the pressure controller can be deactivated using the "easy2connect app" or via IO-Link.

### ► "easy2connect app"

- For valves with Bluetooth interface, the password should be changed using the "easy2connect app" during commissioning. For further information, see functional description 29277-FK.
- Pressure command value characteristic curve adjustment (found in the app under "Controller"): For applications with non-linear relationships between the actual pressure value and the pressure command value, an individual pressure command value characteristic curve can be stored. By entering a maximum of 10 increasing support points, the pressure command value characteristic curve can be defined. Among other things, the function can be used for replacement of the previous valve families.
- The system behavior of the pressure controller can be influenced via the switching integrator. Two options are available to the customer; the I share can be frozen (default value) or deleted.
- For further information, see functional description 29277-FK.

## Certification

| Title                        | Document number |
|------------------------------|-----------------|
| EU Declaration of Conformity | DCTC-31000-175  |
| China certificate            | DCTC-31000-181  |
| India certificate            | DCTC-31000-182  |
| South Korea certificate      | DCTC-31000-183  |
| US certificate               | DCTC-31000-184  |



#### Notice:

The Bluetooth® dongle is certified for the regions and/or economic areas included in the table.

## EMC Directive requirements

- ▶ General
  - The valve has to be connected to the ground potential with low impedance.
  - If necessary, provide an optional external surge protection in the valve supply (especially for line lengths over 30 m).
  - In a strong electro-magnetic environment, further EMC measures may be required, such as shielding of the complete device via metal housings or the use of ferrites on supply and signal lines.
  - The regulations for ESD-compliant handling of sensitive electronics must be observed.
- ▶ Interface "A1" and "F1"
  - Plastic mating connector: up to 30 m, a shielded 6+PE supply line with cable shield applied on one side is required.
  - Metal mating connector: a shielded supply line 6+PE with cable shield on both sides is required.
- ▶ Interface "L1"
  - The IO-Link supply line can be realized unshielded (max. length 20 m) according to the IO-Link specification.

## Further information

- |                                                                              |                                                                        |
|------------------------------------------------------------------------------|------------------------------------------------------------------------|
| ▶ Hydraulic valves for industrial applications                               | Operating instructions 07600-B                                         |
| ▶ Subplates                                                                  | Data sheet 45100                                                       |
| ▶ Hydraulic fluids on mineral oil basis                                      | Data sheet 90220                                                       |
| ▶ Environmentally compatible hydraulic fluids                                | Data sheet 90221                                                       |
| ▶ Flame-resistant, water-free hydraulic fluids                               | Data sheet 90222                                                       |
| ▶ Flame-resistant hydraulic fluids – containing water (HFAE, HFAS, HFB, HFC) | Data sheet 90223                                                       |
| ▶ Bluetooth® dongle                                                          | Data sheet 30581                                                       |
| ▶ Reliability characteristics according to EN ISO 13849                      | Data sheet 08012                                                       |
| ▶ Assembly, commissioning and maintenance of hydraulic systems               | Data sheet 07900                                                       |
| ▶ Proportional pressure reducing valve                                       | Functional description 29277-FK                                        |
| ▶ Bluetooth® dongle                                                          | Operating instructions 30581-B                                         |
| ▶ Information on available spare parts                                       | <a href="http://www.boschrexroth.com/spc">www.boschrexroth.com/spc</a> |

## Notes

## Notes

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