

# Proportional pressure reducing valve of 3-way design, pilot operated

**RE 29186/07.05**  
Replaces: 11.02

1/12

## Types 3DRE(M) and 3DRE(M)E

Sizes 10 and 16  
 Component series 6X  
 Maximum operating pressure 315 bar  
 Maximum flow: 125 l/min (size 10)  
 300 l/min (size 16)



H6062

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## Features

- Pilot operated valve for reducing a pressure (P to A) and limiting (A to T) a system pressure
- Actuation by proportional solenoid
- For subplate mounting:
  - Position of ports to DIN 24340, form A and ISO 4401
  - Subplates to data sheets RE 45054 and RE 45056 (separate order, see pages 9 and 10)
- Maximum pressure relief function, optional
- Valve and control electronics from a single source
- Control electronics for type 3DRE(M):
  - Analogue amplifier type VT-VSPA1(K)-1 in Euro-card format (separate order), see page 5
  - Digital amplifier type VT-VSPD-1 in Euro-card format (separate order), see page 5
  - Analogue amplifier type VT 11131 of modular design (separate order), see page 5
- Linear command value/pressure characteristic curve
- Integrated electronics (OBE) with type 3DRE(M)E:
  - Low manufacturing tolerance of the command value/pressure characteristic curve
  - Ramp times can be adjusted separately for pressure build-up and pressure reduction

Information on available spare parts:  
[www.boschrexroth.com/spc](http://www.boschrexroth.com/spc)

### Ordering code

<b>3DRE</b>				<b>P-6X/</b>		<b>G24</b>		<b>V</b>	<b>*</b>
<b>Without</b> maximum pressure relief function <b>= No code</b> <b>With</b> maximum pressure relief function <b>= M</b>							Further details in clear text		
For external control electronics <b>= No code</b> With integrated electronics (OBE) <b>= E</b>							<b>Seal material</b> FKM seals, suitable for phosphate ester (HFD-R)		
Size 10 <b>= 10</b> Size 16 <b>= 16</b>							<b>Electrical connection for 3DRE, 3DREM:</b> <b>K4 =</b> <b>Without</b> cable sockets, with component plugs to DIN EN 175301-803 Cable sockets – separate order, see page 6		
Subplate mounting <b>= P</b>									
Component series 60 to 69 <b>= 6X</b> (60 to 69: unchanged installation and connection dimensions)									
<b>Pressure stage</b> 50 bar <b>= 50</b> 100 bar <b>= 100</b> 200 bar <b>= 200</b> 315 bar (size 10 only) <b>= 315</b>							<b>K31 =</b> <b>for 3DREE, 3DREME</b> <b>Without</b> cable socket, with component plug to DIN EN 175201-804 Cable socket – separate order, see page 6		
<b>Pilot oil supply and pilot oil drain</b> Pilot oil supply internal, pilot oil drain external <b>= Y</b> Pilot oil supply external, pilot oil drain external <b>= XY</b>							<b>Supply voltage for control electronics</b> <b>G24 =</b> 24 V DC		

## Standard types

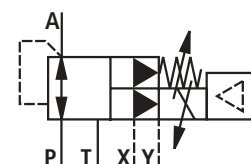
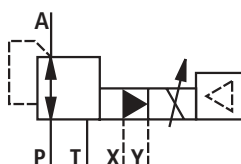
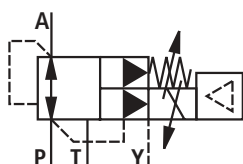
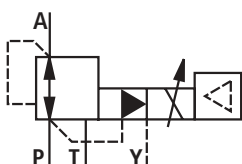
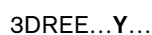
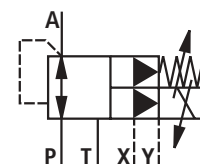
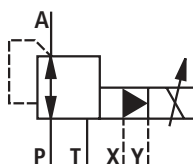
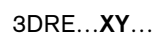
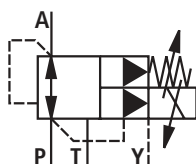
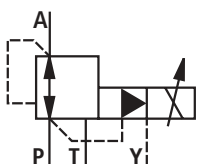
## Size 10

Type	Material number
3DREE 10 P-6X/50YG24K31V	R900954521
3DREE 10 P-6X/100YG24K31V	R900954517
3DREE 10 P-6X/200YG24K31V	R900948621
3DREE 10 P-6X/315YG24K31V	R900952587

## Size 16

Type	Material number
3DREE 16 P-6X/50YG24K31V	R900954524
3DREE 16 P-6X/100YG24K31V	R900954522
3DREE 16 P-6X/200YG24K31V	R900954523

## Symbols



## Function, section

Valves of types 3DRE(M) and 3DRE(M)E are electrically pilot operated 3-way pressure reducing valves with pressure relief function for the actuator.

They are used to reduce a system pressure.

### Technical structure

The valves consist of three main assemblies:

- Pilot valve (1) optionally with maximum pressure relief function (16)
- Proportional solenoid (2)
- Main valve (3) with main spool (4)

### Function

General function:

- Command value-related adjustment of the pressure to be reduced in channel A by proportional solenoid (2).
- When no pressure is applied in port P, main spool (4) is held by springs (5) and (6) in the central position.
- Here, the connections from P to A and A to T are closed.
- Pilot oil flows from bore (7) via flow controller (8), pilot valve (1) to orifice (9), throttling gap (10), pipe (11) to port Y. This port must be connected at zero pressure to the tank.

Pressure reduction:

- Build-up of pilot pressure in control chamber (12) as a function of the command value.
- Pressure is built up in spring chamber (14) via orifice (13) and the main spool is shifted to the right.
- Hydraulic fluid flows from P to A.
- The actuator pressure in port A is applied to spring chamber (15).

- An increase in the pressure in port A to the pressure set on pilot valve (1) causes main spool (4) to be pushed to the left. The pressure in port A becomes virtually the same as the pressure set on pilot valve (1).

Pressure relief function:

- When the pressure in port A exceeds the pressure set on pilot valve (1), main spool (4) is shifted further to the left.
- This causes the connection from A to T to open and limits the pressure applied in port A to the set command value.

### Type 3DREM

The valve is optionally available with an additional spring-loaded pilot valve (16) to provide a maximum pressure relief function.

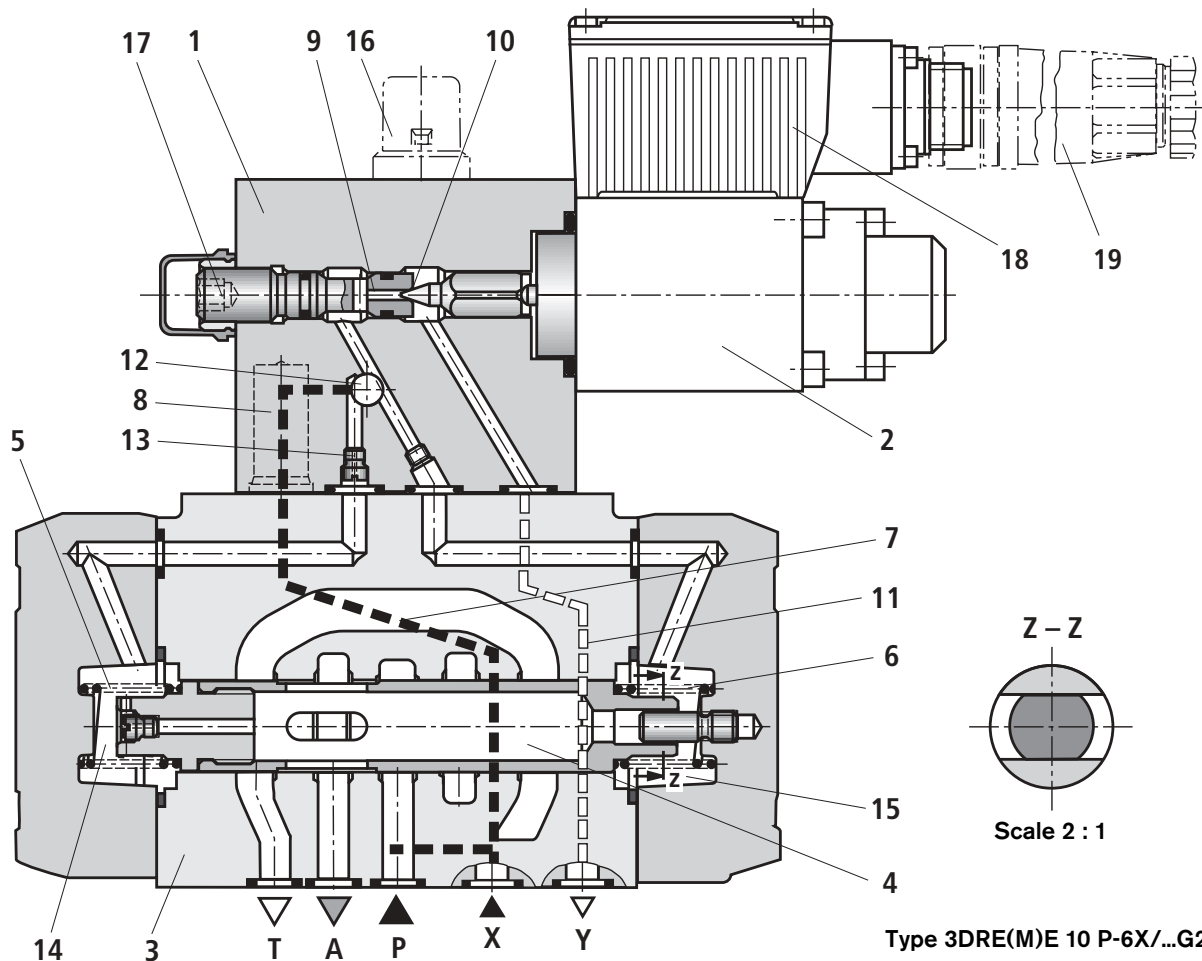
**Types 3DREE and 3DREME** – with integrated electronics (OBE)

In terms of function and structure, these valves correspond to types 3DRE and 3DREM, except for the integrated electronics. The electronics that is accommodated in housing (19) receives the supply and command value voltage via cable socket (19).

The command value/pressure characteristic curve (zero point on spindle (17)) and the gradient are adjusted in the factory with narrow tolerances on the  $I_{\max}$  potentiometer (R30, see page 7) in the electronics.

The ramp time for pressure build-up and pressure reduction can be adjusted independently of each other with the help of two potentiometers.

For further details with regard to the integrated electronics, see page 7.



**Technical data** (for applications outside these parameters, please consult us!)**General**

Size			<b>10</b>	<b>16</b>
Weight	– 3DRE and 3DREM	kg	7.7	10.2
	– 3DREE and 3DREME	kg	7.8	10.3
Installation orientation	Optional, preferably horizontal			
Storage temperature range		°C	– 20 to + 80	
Ambient temperature range	– 3DRE and 3DREM	°C	– 20 to + 70	
	– 3DREE and 3DREME	°C	– 20 to + 50	

**Hydraulic** (measured with HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$  and  $p = 100\text{ bar}$ )

Size			10	16
Max. operating pressure	– Ports P, A and X	bar	315	P and X = 315; A = 250
	– Port Y		Separately and at zero pressure to tank	
Max. set pressure	– Pressure stage 50 bar	bar	50	50
in channel A	– Pressure stage 100 bar	bar	100	100
	– Pressure stage 200 bar	bar	200	200
	– Pressure stage 315 bar	bar	315	–
Min. set pressure channel A at zero command value		bar	See characteristic curves on page 8	
Maximum pressure relief function (infinitely adjustable)			Pressure adjustment range:	Factor setting:
	– Pressure stage 50 bar	bar	30 to 70	to 70 bar
	– Pressure stage 100 bar	bar	50 to 130	to 130 bar
	– Pressure stage 200 bar	bar	90 to 230	to 230 bar
	– Pressure stage 315 bar (size 10 only)	bar	150 to 350	to 350 bar
Max. permissible flow		l/min	125	300
Pilot oil flow		l/min	1	
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524; further hydraulic fluids on enquiry!	
Hydraulic fluid temperature range		°C	– 20 to + 80	
Viscosity range		mm <sup>2</sup> /s	15 to 380	
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 20/18/15 <sup>1)</sup>	
Hysteresis (see command value/pressure char. curve on page 8)		%	± 2 of max. set pressure	
Repeatability		%	< ± 2 of max. set pressure	
Linearity		%	± 3.5 of max. set pressure	
Manufacturing tolerance of	– 3DRE and 3DREM	%	± 2.5 of max. set pressure	
command value/pressure	– 3DREE and 3DREME	%	± 1.5 of max. set pressure	
char. curve, referred to hysteresis curve, increasing pressure				
Switching time		ms	100 to 200 (depending on system)	

<sup>1)</sup> The cleanliness classes specified for components must be adhered to hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

**Technical data** (for applications outside these parameters, please consult us!)**Electrical**

Size			10	16
Supply voltage			V	24 DC
Min. control current			mA	100
Max. control current	– 3DRE and 3DREM	mA	1600	
	– 3DREE and 3DREME	mA	1440 to 1760	
Solenoid coil resistance	– Cold value at 20 °C	Ω	5.4	
	– Max. hot value	Ω	7.8	
Duty cycle			%	100
Electrical connection	– 3DRE and 3DREM		With component plug to DIN EN 175301-803	
			Cable socket to DIN EN 175301-803 <sup>1)</sup>	
	– 3DREE and 3DREME		With component plug to DIN EN 175201-804	
			Cable socket to DIN EN 175201-804 <sup>1)</sup>	
Type of protection of the valve to EN 60529			IP65 with cable socket mounted and locked	

**Control electronics**

<b>Integrated</b> electronics (OBE) with types 3DREE and 3DREME			Integrated in the valve, see page 7	
<b>External</b> control electronics for types 3DRE and 3DREM				
• Amplifier in Euro-card format (separate order)	analogue		VT-VSPA1(K)-1 to data sheet RE 30111	
	digital		VT-VSPD-1 to data sheet RE 30123	
• Amplifier of modular design (separate order)	analogue		VT 11131 to data sheet RE 29865	

<sup>1)</sup> Separate order, see page 6**Note:**

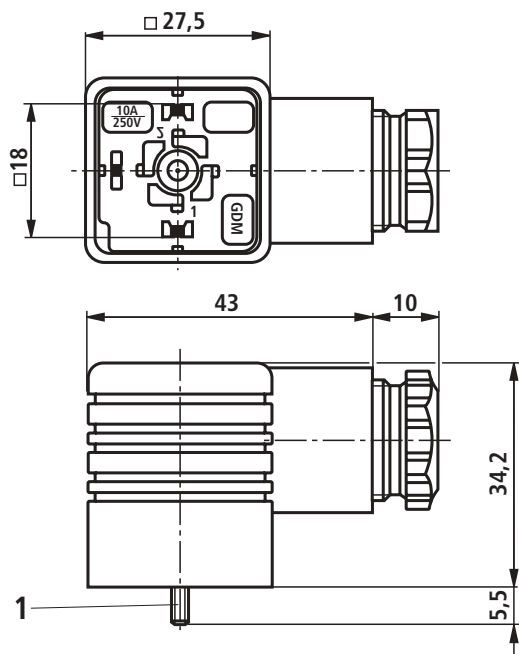
For details regarding **environment simulation testing** in the fields of EMC (electromagnetic compatibility), climate and mechanical stress, see RE 29186-U (declaration on environmental compatibility).

## Electrical connection, cable sockets (nominal dimensions in mm)

For types **3DRE** and **3DREM** – for **external** control electronics

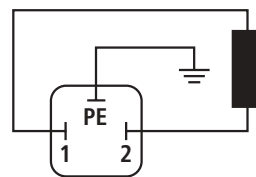
Cable socket to DIN EN 175301-803

Separate order stating material no. **R901017011**

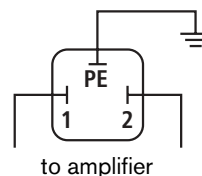


1 Fixing screw M3,  
tightening torque  $M_T = 0.5 \text{ Nm}$

Connection to component plug



Connection to cable socket



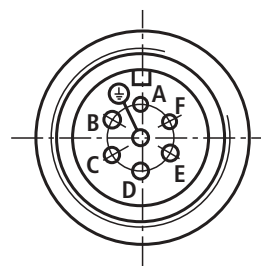
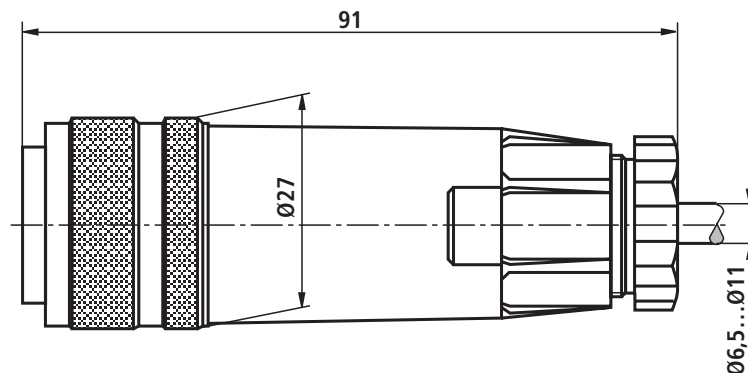
For types **3DREE** and **3DREME** – with **integrated** electronics (OBE)

Cable socket to DIN EN 175201-804

Separate order stating material no. **R900021267**

(plastic version)

For pin assignment, see Block circuit diagram on page 7

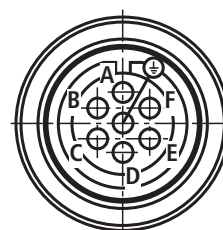
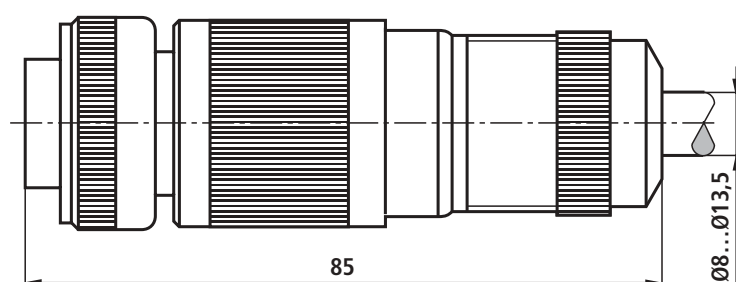


Cable socket to DIN EN 175201-804

Separate order, stating material no. **R900223890**

(metal version)

For pin assignment, see Block circuit diagram on page 7



## Integrated electronics (OBE) of types DREE and DREME

### Function

The integrated electronics is controlled via the two differential amplifier connections D and E.

The ramp generator generates from a command value step-change (0 to 10 V or 10 to 0 V) a delayed increase or drop of the solenoid current. Potentiometer R14 can be used to adjust the rise time, potentiometer R13 to adjust the drop time of the solenoid current.

The maximum ramp time of 5 s is only possible over the full command value range. In the case of minor changes in the command value, the ramp time shortens accordingly.

The command value/solenoid current characteristic curve is adjusted to the valve by means of the characteristic curve generator so that non-linearities in the hydraulic system are compensated for and a linear command value/pressure characteristic curve is obtained.

The current regulator regulates the solenoid current independently of the solenoid coil resistance.

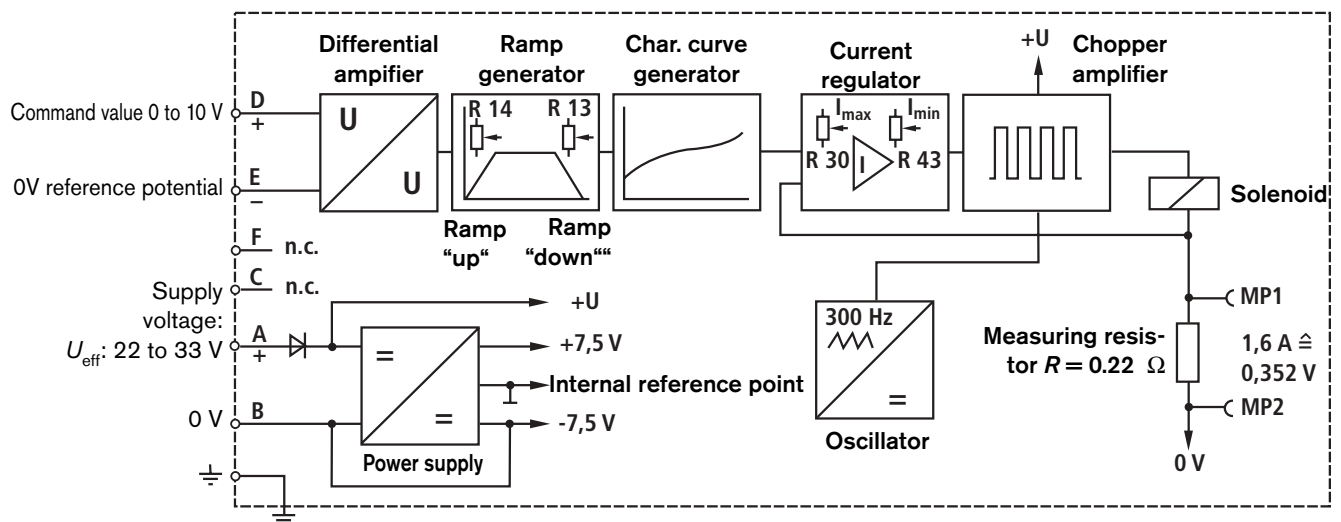
Potentiometer R30 can be used to change the gradient of the command value/current characteristic curve and hence the gradient of the command value/pressure characteristic curve of the proportional pressure control valve.

Potentiometer R43 serves for adjusting the biasing current. This setting should not be changed. If required, adjust the zero point of the command value/pressure characteristic curve on the valve seat.

A chopper amplifier forms the power stage of the electronics for controlling the proportional valve. It is pulse-width-modulated with a clock frequency of 300 Hz.

The solenoid current can be measured at both measuring sockets MP1 and MP2. A voltage drop of 0.352 V at the measuring resistor corresponds to a solenoid current of 1.6 A.

### Block circuit diagram / pin assignment of integrated electronics



### Supply voltage

Power supply unit with rectifier

Single-phase rectification or three-phase current bridge:

$U_{\text{eff}} = 22 \text{ to } 33 \text{ V}$

Residual ripple content on the power supply unit : < 5 %

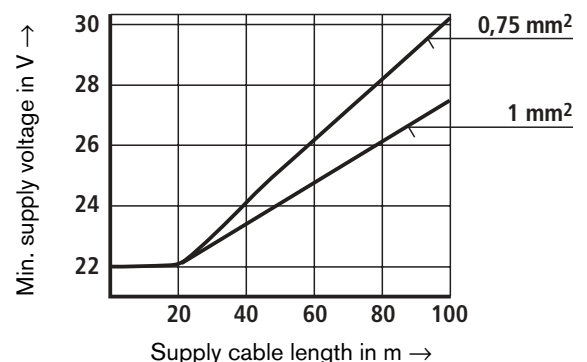
Output current:  $I_{\text{eff}} = \text{max. } 1.4 \text{ A}$

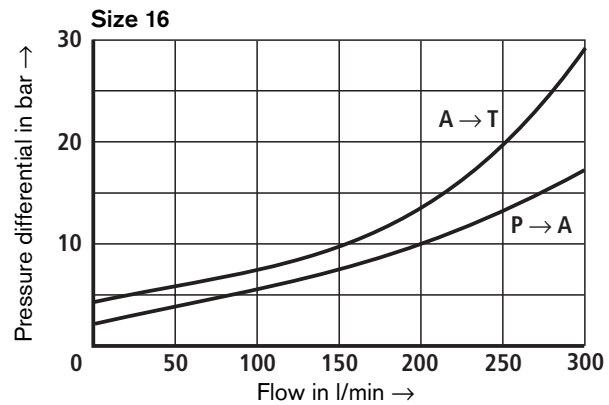
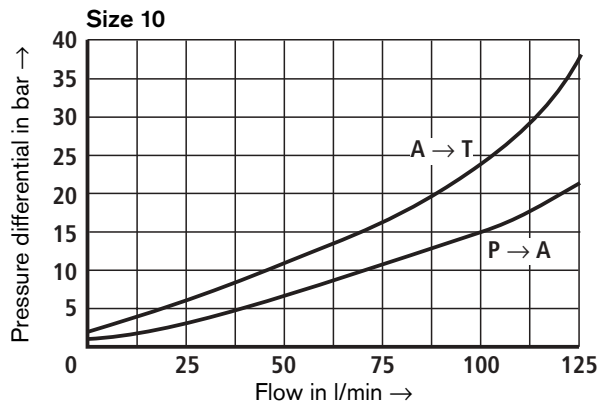
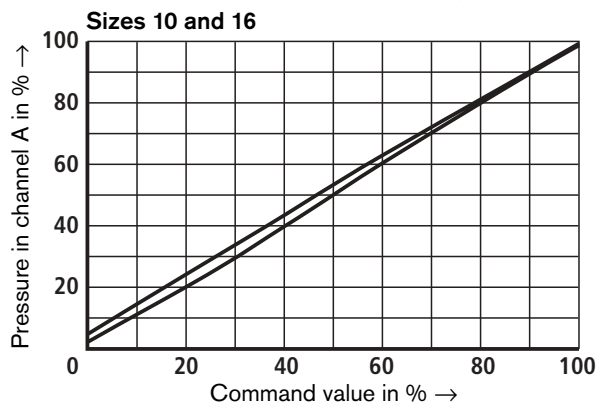
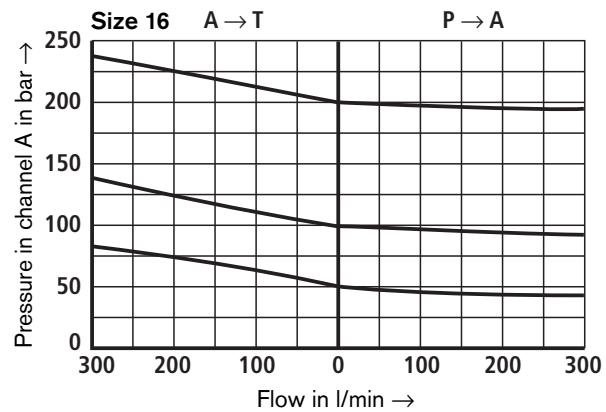
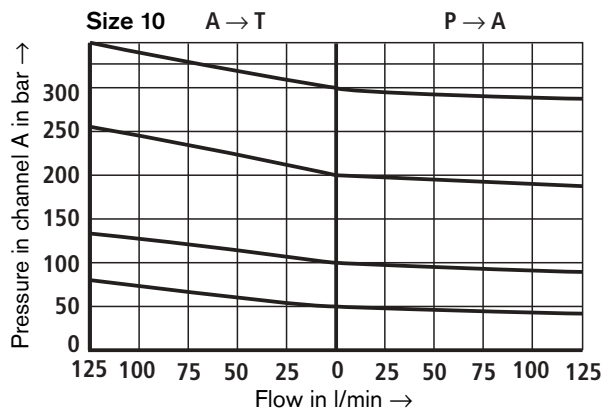
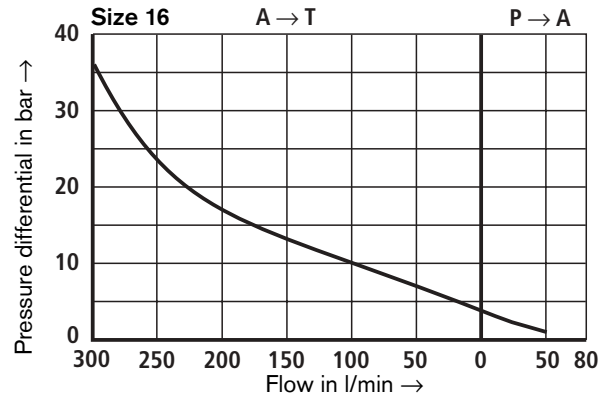
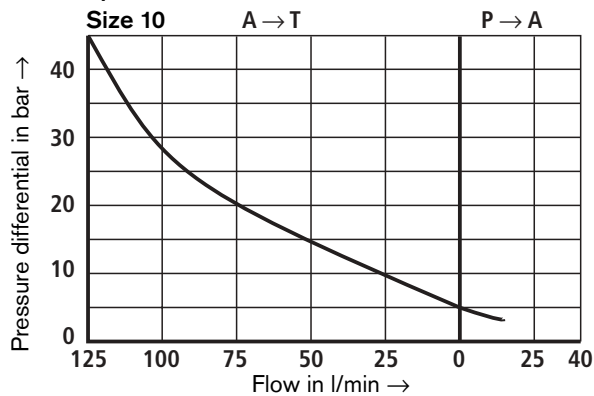
Supply cable:

- Recommended: 5-wire, 0.75 or 1 mm<sup>2</sup> with protective conductor and shield
- Outer diameter 6.5 to 11 mm
- Shield to 0 V supply voltage
- Max. permissible length 100 m

The minimum supply voltage of the power supply unit depends on the length of the supply cable (see diagram).

In the case of lengths > 50 m, a capacitor of 2200 μ must be provided in the supply cable in the vicinity of valve.

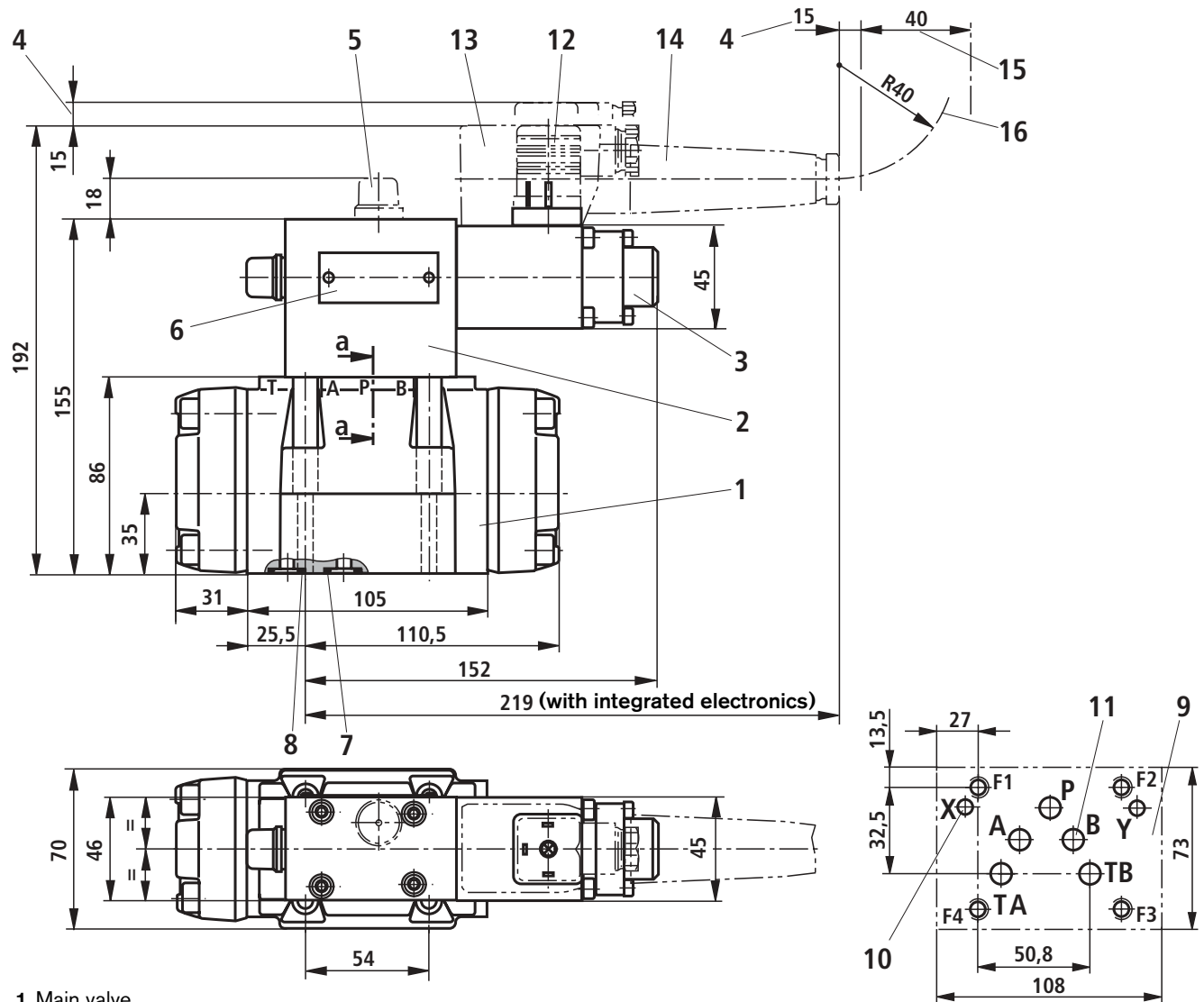


**Characteristic curves** (measured with HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$  and  $p = 100\text{ bar}$ )

**Pressure in channel A – command value** (measured at flow 0 L/min)

**Pressure in channel A – flow**

**Min. set pressure – flow**


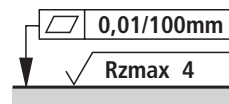


## Unit dimensions (nominal dimensions in mm)

## Size 10



- 1 Main valve
- 2 Pilot valve
- 3 Proportional solenoid
- 4 Space required to remove cable socket
- 5 Maximum pressure relief function (type 3DREM...)  
When using these valves, observe the notes on page 4!
- 6 Nameplate
- 7 Identical seal rings for ports A, B, P, TA and TB
- 8 Identical seal rings for ports X and Y
- 9 Machined mounting face, position of ports to DIN 24340 form A and ISO 4401-05-05-0-94  
Deviating from standard: – port TB
- 10 In the case of "internal" pilot oil supply (version Y), port X on the subplate must be plugged.
- 11 Port B on the subplate must be plugged
- 12 Cable socket for type 3DRE(M)  
(separate order, see page 6)
- 13 Integrated electronics (types 3DREE, 3DREME)  
with component plug



Required surface quality of mounting face

**Tolerances to:** General tolerances ISO 2768-mK

Subplates to data sheet RE 45054 and valve fixing screws must be ordered separately.

**Subplates:** G 535/01 (G 3/4) ] **With ports**  
G 536/01 (G 1) ] X and Y

**Valve fixing screws:**

4 socket head cap screws M6 x 45 DIN 912-10.9;  
tightening torque  $M_T = 15.5 \text{ Nm}$

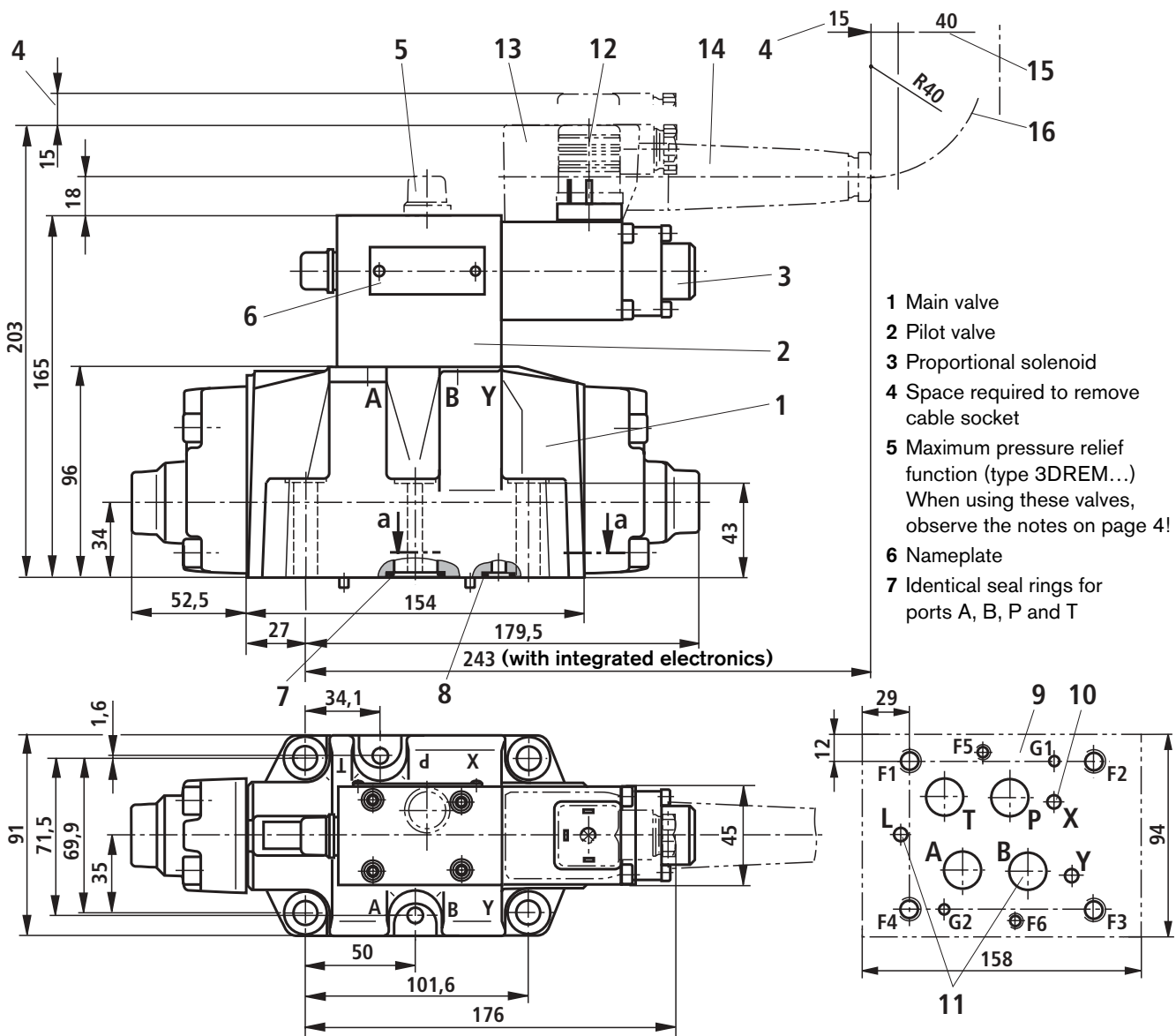
14 Cable socket for type 3DRE(M)E  
(separate order, see page 6)

15 Space required for cable bending radius when cable socket is removed

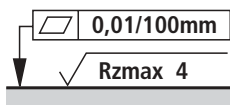
16 Cable bending radius

## Unit dimensions (nominal dimensions in mm)

Size 16



Sectional drawing, see page 11



Required surface quality of mounting face

**Tolerances to:** General tolerances ISO 2768-mK

Subplates to data sheet RE 45056 and valve fixing screws must be ordered separately.

**Subplates:** G 172/01 (G 3/4); G172/02 (M27 x2)  
 G 174/01 (G 1); G174/02 (M33 x2)  
 G 174/08 (Flansch)

**Valve fixing screws:**

4 socket head cap screws M10 x 60 DIN 912-10.9;  
 tightening torque  $M_T = 73 \text{ Nm}$

2 socket head cap screws M6 x 60 DIN 912-10.9;  
 tightening torque  $M_T = 15.5 \text{ Nm}$

## Pilot oil supply

### Type 3DRE...-.../...XY      Pilot oil supply external Pilot oil drain external

With this version, the pilot oil is supplied from a separate control circuit (external).

The pilot oil drain is not directed to the T-channel of the main valve, but fed separately to the tank via port Y (external).

### Type 3DRE...-.../...Y...      Pilot oil supply internal Pilot oil drain external

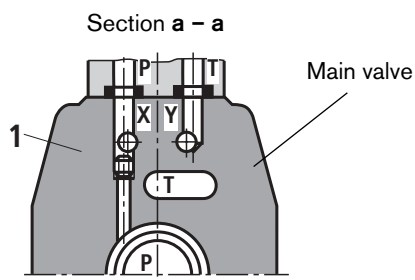
With this version, the pilot oil is supplied from the P-channel of the main valve (internal).

The pilot oil drain is not directed to the T-channel of the main valve, but fed separately to the tank via port Y (external).

Port X on the subplate must be plugged.

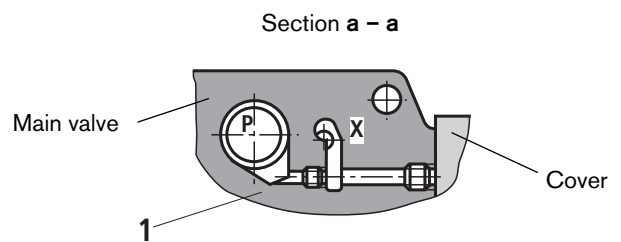
Item 1: Plug screw M6 DIN 906-8.8 SW 3

**Size 10** For section location, see page 9



Pilot oil supply (section a – a)	external:	1 Closed
	internal:	1 Open
Pilot oil drain	external:	

**Size 16** For section location, see page 10



Pilot oil supply (section a – a)	external:	1 Closed
	internal:	1 Open
Pilot oil drain	external:	

## Notes

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