

**RE 29 186/11.02**

Replaces: 12.99

**Proportional pressure reducing valve  
3-way version  
Types 3DRE(M) and 3DRE(M)E**

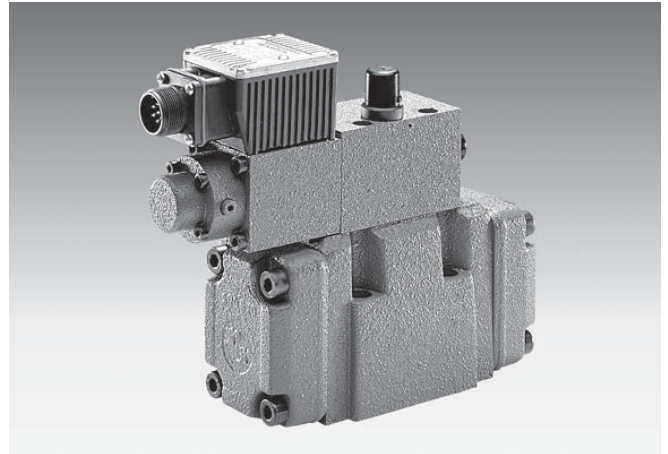
Nominal sizes 10 and 16

Series 6X

Maximum operating pressure 315 bar

Maximum flow 125 L/min (NS 10)

Maximum flow 300 L/min (NS 16)



HI/AD 6062/98

Type 3DREME 10 P-6X/...G24K31V with integrated control electronics

**Overview of contents**

Contents	Page
Features	1
Ordering details	2
Preferred types	2
Symbols	2
Function, section	3
Technical data	4 and 5
Electrical connections, plug-in connectors	6
Control electronics	7
Characteristic curves	8
Unit dimensions	9 and 10
Pilot oil supply	11

**Features**

- Pilot operated valve for pressure reduction (P to A) and limitation (A to T) of a system pressure
- Operation via proportional solenoids
- For subplate mounting:
  - Porting pattern to DIN 24 340, Form A, ISO 4401 and CETOP-RP 121H
  - Subplates to catalogue sheets RE 45 054 and RE 45 056 (separate order, see pages 9 and 10)
- Maximum pressure limitation, optional
- Control electronics for type 3DRE(M):
  - Analogue amplifier type VT-VSPA1(K)-1 in Eurocard format (separate order), see page 5
  - Digital amplifier type VT-VSPD-1 in Eurocard 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 control electronics for type 3DRE(M)E:
  - Low example spread of the command value-pressure-characteristic curve
  - Independently adjustable ramp times for increasing and decreasing the pressure



© 2002

by Bosch Rexroth AG, Industrial Hydraulics, D-97813 Lohr am Main

All rights reserved. No part of this document may be reproduced or stored, processed, duplicated or circulated using electronic systems, in any form or by any means, without the prior written authorisation of Bosch Rexroth AG. In the event of contravention of the above provisions, the contravening party is obliged to pay compensation.

This document was prepared with the greatest of care, and all statements have been examined for correctness. This document is subject to alterations for reason of the continuing further developments of products. No liability can be accepted for any incorrect or incomplete statements.

## Ordering details

<b>3DRE</b>				<b>P – 6X /</b>		<b>G24</b>		<b>V</b>	*
<b>Without</b> maximum pressure limitation <b>With</b> maximum pressure limitation	<b>= No code</b> <b>= M</b>							<b>V =</b>	Further details in clear text FKM seals, suitable for phosphate ester (HFD-R)
For external control electronics With integrated control electronics	<b>= No code</b> <b>= E</b>								<b>Electrical connections for 3DRE, 3DREM:</b>
Nominal size 10 Nominal size 16	<b>= 10</b> <b>= 16</b>								<b>K4 = Without</b> plug-in connector, with component plug to DIN EN 175 301-803 Plug-in connector – separate order, see page 6
Subplate mounting	<b>= P</b>								<b>For 3DRE, 3DREM:</b>
Series 60 to 69 (60 to 69: unchanged installation and connection dimensions)	<b>= 6X</b>								<b>K31 = Without</b> plug-in connector, with component plug to E DIN 43563-AM6-3 Plug-in connector – separate order, see page 6
<b>Pressure stage</b>								<b>Supply voltage for the control electronics</b>	
50 bar	<b>= 50</b>							<b>G24 =</b>	24 V DC
100 bar	<b>= 100</b>								<b>Pilot oil supply and drain</b>
200 bar	<b>= 200</b>								Internal pilot oil supply
315 bar (only NS 10)	<b>= 315</b>								External pilot oil drain
									<b>Y =</b>
									External pilot oil drain
									<b>XY =</b>
									External pilot oil supply
									External pilot oil drain

## Preferred types (readily available)

### NS 10

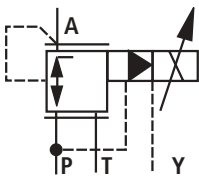
Material No.	Type
R900954521	3DREE 10 P-6X/50YG24K31V
R900954517	3DREE 10 P-6X/100YG24K31V
R900948621	3DREE 10 P-6X/200YG24K31V
R900952587	3DREE 10 P-6X/315YG24K31V

### NS 16

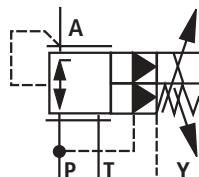
Material No.	Type
R900954524	3DREE 16 P-6X/50YG24K31V
R900954522	3DREE 16 P-6X/100YG24K31V
R900954523	3DREE 16 P-6X/200YG24K31V

## Symbols

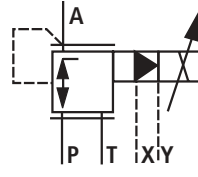
3 DRE(E)...P/...Y



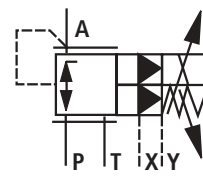
3 DREM(E)...P/...Y



3 DRE(E)...P/...XY



3 DREM(E)...P/...XY



## Function, section

The valve types 3DRE(M) and 3DRE(M)E are electrically pilot operated 3-way pressure reducing valves with pressure safety for the actuators. They are used to reduce a system pressure.

### Technical design

The valve comprises of three main groups:

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

### Function

General function:

- Command value related adjustment of the pressure which is to be reduced in port A via the proportional solenoid (2).
- When port P is depressurised the main spool (4) is held in the centre position by the springs (5) and (6).
- The connection from P to A and A to T is closed in this condition.
- Pilot oil flows from drilling (7) via the flow controller (8), over the pilot control valve (1) to orifice (9), the throttle gap (10), and via line (11) to port Y. This connection is to be connected to tank at zero pressure.

Pressure reduction:

- Build-up of the pilot pressure in control chamber (12) as a function of the command value.
- Via orifice (13) the pressure builds up in spring chamber (14) and moves the main spool (4) to the right. Pressure fluid flows from P to A.

- The actuator pressure in port A is applied to spring chamber (15)
- Increase in pressure in port A to the set pressure of the pilot control valve (1) causes the main spool (4) to move to the left. The pressure in port A is virtually the same as the set pressure at the pilot control valve (1).

Pressure safety:

- If the pressure in port A exceeds the set pressure of the pilot control valve (1), then the main spool (4) is moved further to the left.
- The connection from A to T is thereby opened and so limits the pressure acting in port A to the set command value.

### Type 3DREM

Optionally the valve can be fitted with an additional spring loaded pilot control valve (16) for the maximum pressure limitation function.

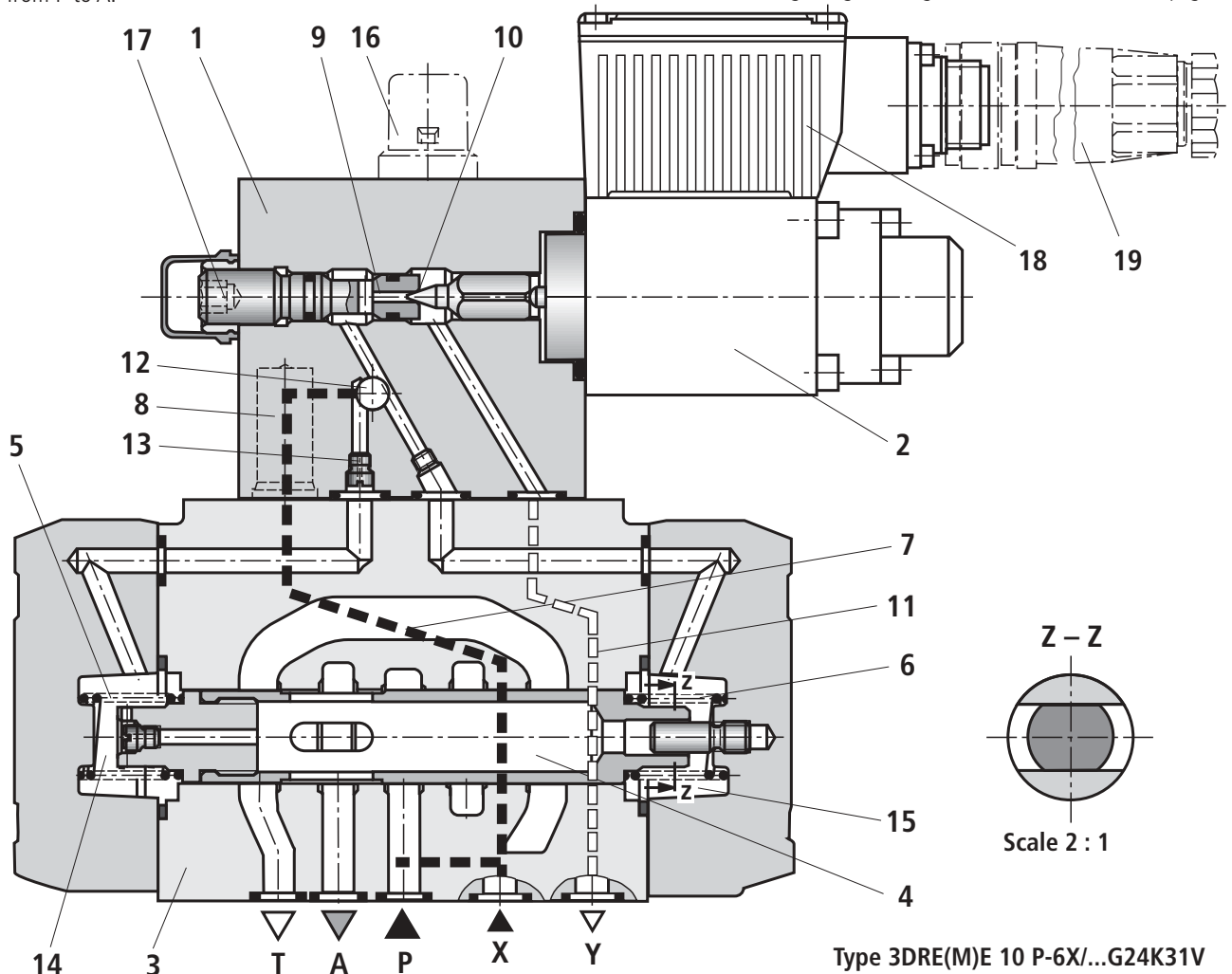
### Types 3DREE and 3DREME (with integrated control electronics)

The function and design of these valves, with the exception of the integrated electronics, is the same as the types 3DRE and 3DREM. The control electronics which are located within the housing (18) receive their supply and command value voltages via the plug-in connector (19).

The command value-pressure-characteristic curve (zero point at spindle (17)) and increase at the  $l_{max}$  potentiometer (R30, see page 7) is factory pre-set with a low example spread.

Via two potentiometers the ramp times for the increase and decrease in pressure can be independently adjusted.

For further details regarding the integrated control electronics see page 7.



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

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

**Hydraulic** (measured with HLP 46;  $\vartheta_{oil} = 40 \text{ °C} \pm 5 \text{ °C}$  and  $p = 100 \text{ bar}$ )

Max. operating pressure	Ports P, A and X	bar	315	P and X = 315; A = 250
	Port Y		Separate and at zero pressure to tank	
Max. settable pressure in port A	Pressure stage 50 bar	bar	50	50
	Pressure stage 100 bar	bar	100	100
	Pressure stage 200 bar	bar	200	200
	Pressure stage 315 bar	bar	315	–
Min. settable pressure in port A with a zero command value		bar	See characteristic curves on page 8	
Max. pressure safety (steplessly adjustable)	Pressure stage 50 bar		30 to 70	Setting as delivered: At 70 bar
	Pressure stage 100 bar		50 to 130	At 130 bar
	Pressure stage 200 bar		90 to 230	At 230 bar
	Pressure stage 315 bar (only NS 10)		150 to 350	At 350 bar
Max. permissible flow		L/min	125	300
Pilot oil flow		L/min	1	
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524, Further pressure fluids on request!	
Pressure fluid temperature range		°C	– 20 to + 80	
Viscosity range		mm <sup>2</sup> /s	15 to 380	
Cleanliness class to ISO code			Max. permissible degree of contamination of the pressure fluid is to ISO 4406 (c) class 20/18/15 <sup>1)</sup>	
Hysteresis (see command value-pressure-characteristic curve on page 8)		%	± 2 of max. settable pressure	
Repeatability accuracy		%	< ± 2 of max. settable pressure	
Linearity		%	± 3.5 of max. settable pressure	
Example spread of the com.value-pressure-char.curve, referring to the hysteresis characteristic curve, pressure increasing	3DRE and 3DREM	%	± 2.5 of max. settable pressure	
	3DREE and 3DREME	%	± 1.5 of max. settable pressure	
Switching time		ms	100 to 200 (dependent of the system)	

<sup>1)</sup> The cleanliness class stated for the components must be adhered too in hydraulic systems. Effective filtration prevents faults from occurring and at the same time increases the component service life.  
For the selection of filters see catalogue sheets RE 50 070, RE 50 076 and RE 50 081.

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

Supply voltage			24 V 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 20°C	Ω	5.4
	Max. warm value	Ω	7.8
Duty		%	100
Electrical connections	3DRE and 3DREM		With component plug to DIN EN 175 301-803
			Plug-in connector to DIN EN 175 301-803 <sup>1)</sup>
	3DREE and 3DREME		With component plug to E DIN 43 563-AM6-3
			Plug-in connector to E DIN 43 563-BF6-3/Pg11 <sup>1)</sup>
Valve protection to DIN 40 050			IP65 with mounted and fixed plug-in connector
<b>Control electronics</b>			
– For 3DREE and 3DREME			Integrated into the valve, see page 7
– For 3DRE and 3DREM			
• Amplifier in Eurocard format (separate order)		Analogue	VT-VSPA1(K)-1 to catalogue sheet RE 30 111
		Digital	VT-VSPD-1 to catalogue sheet RE 30 123
• Amplifier of modular design (separate order)		Analogue	VT 11131 to catalogue sheet RE 29 865

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



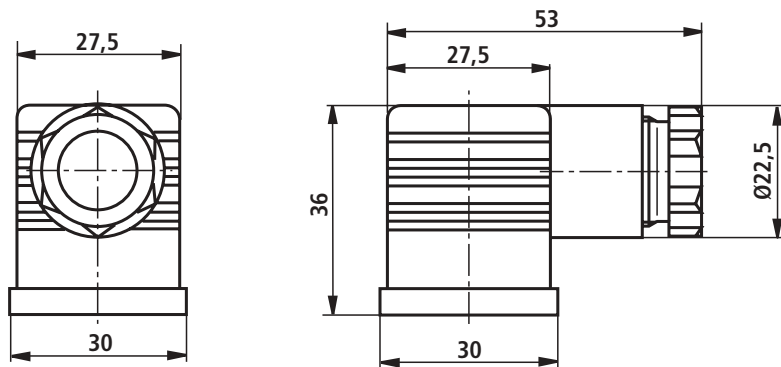
**Note:** For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 186-U (declaration regarding environmental compatibility).

## Electrical connections, plug-in connectors (dimensions in mm)

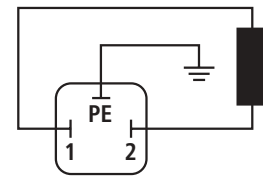
### For types 3DRE and 3DREM (for external control electronics)

Plug-in connector to DIN EN 174 301-803

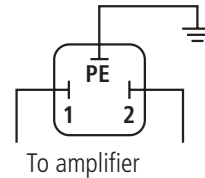
Separate order under Material No. **R900074684**



Connections at component plug



Connections at plug-in connector

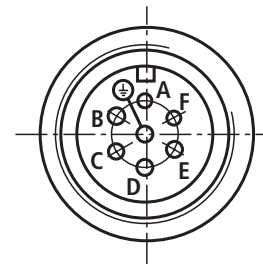
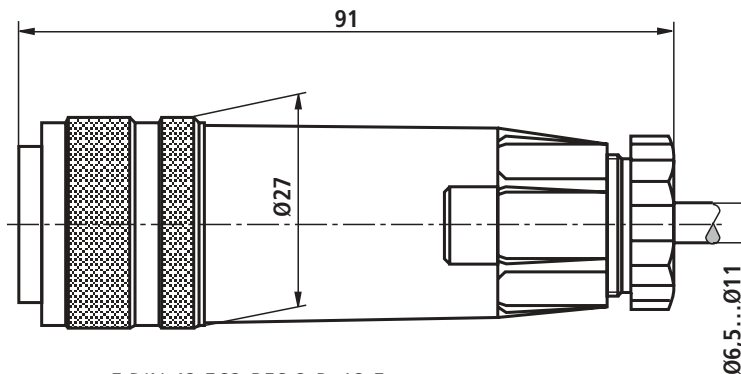


### For types 3DREE and 3DREME (with integrated control electronics)

Plug-in connector E DIN 43 563-BF6-3/Pg11

Separate order under Material No. **R900021267** (plastic version)

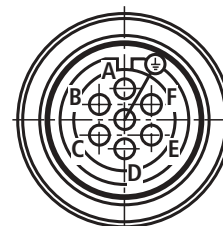
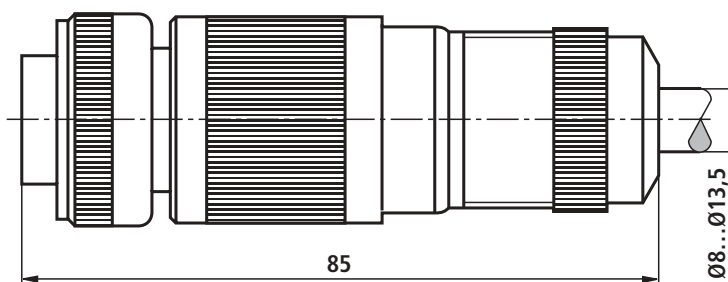
For pin allocation see block circuit diagram on page 7



Plug-in connector E DIN 43 563-BF6-3-Pg13,5

Separate order under Material No. **R9000223890** (metal version)

For pin allocation see block circuit diagram on page 7



## Integrated control electronics for types 3DREE, 3DREME

### Function

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

The ramp generator produces from a command value jump (0 to 10 V or 10 to 0 V) a delayed increase or decrease in the solenoid current. At potentiometer R14 the rate of increase in time and at potentiometer R13 the rate of decrease in time of the solenoid current can be set.

Only over the full command value range is the maximum ramp time of 5 s possible. With smaller command value changes the ramp time is accordingly shortened.

Via the characteristic curve generator, the command value-solenoid current characteristic curve is so matched to the valve, that non-linearities in the hydraulics can be compensated for, so that a linear command value-pressure-characteristic curve is obtained.

The current regulator controls the solenoid current independently from the solenoid coil resistance.

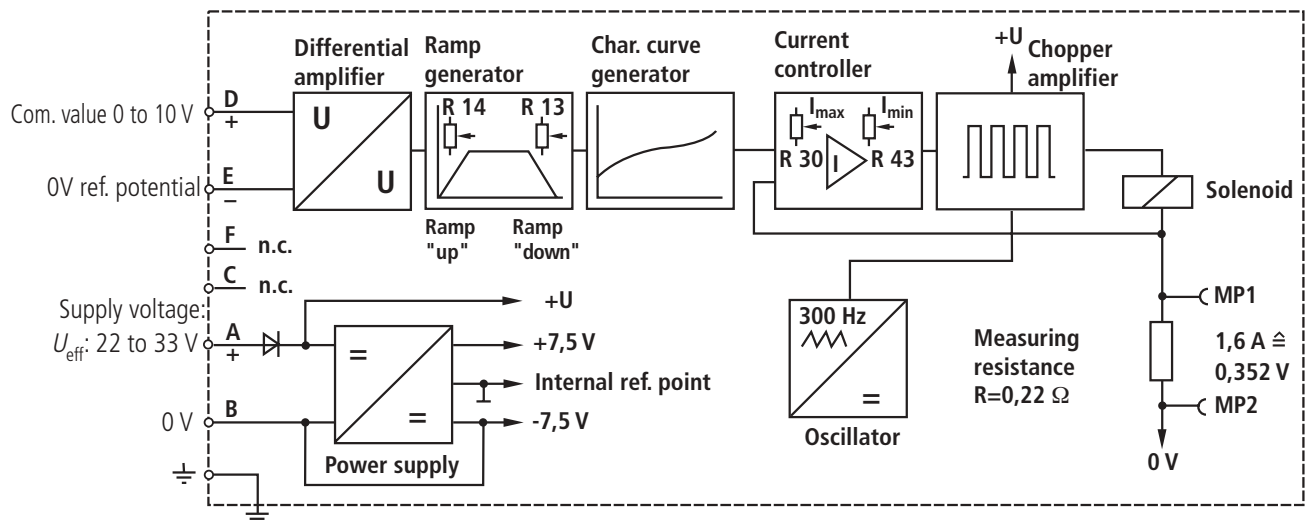
At potentiometer R30 the increase of the command value-current characteristic curve, and thereby also the increase rate of the command value-pressure-characteristic curve of the proportional pressure valve may be altered.

The potentiometer R43 is used to adjust the biasing current. This setting should not be altered. If necessary, the zero point of the command value-pressure-characteristic curve is adjustable at the valve seat.

The power stage of the electronics for the control of the proportional solenoid forms a chopper amplifier. It is pulse width modulated with a pulse frequency of 300 Hz.

The solenoid current may be measured at the two measurement sockets MP1 and MP2. A voltage drop of 0.352 V at the measurement resistor relates to a solenoid current of 1.6 A.

### Block circuit diagram / pin allocation of the integrated control electronics



### Supply voltage

Power supply with rectification

Single phase rectification or three phase bridge:  $U_{\text{eff}} = 22$  to  $33$  V

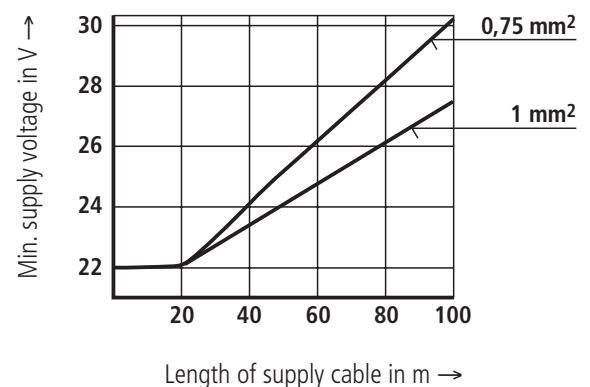
Residual ripple at power supply:  $< 5\%$

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

- Supply cable:
- Recommended 5 cores  $0.75$  or  $1$  mm<sup>2</sup> with protective conductor and screen
  - Outside diameter  $6.5$  to  $11$  mm
  - Screen to  $0$  V supply voltage
  - Max. permissible length  $100$  m

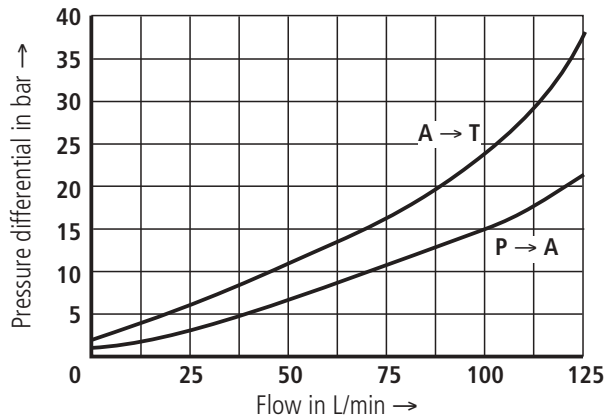
The minimum supply voltage at the power supply is dependent on the length of the supply cable (see diagram).

For lengths  $> 50$  m a capacitor of  $2200$  μF must be installed near the valve in the supply line.

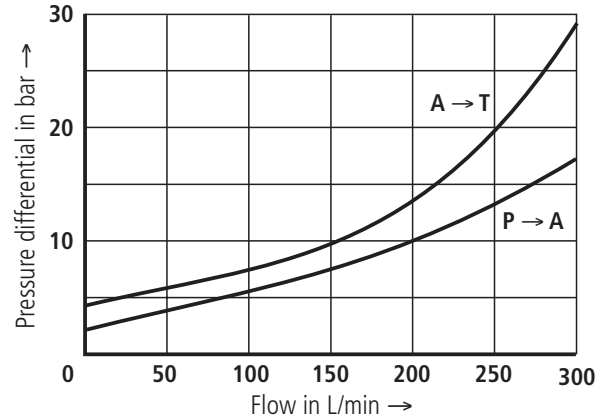


**Characteristic curves** (measured with HLP 46;  $\vartheta_{oil} = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$  and  $p = 100 \text{ bar}$ )

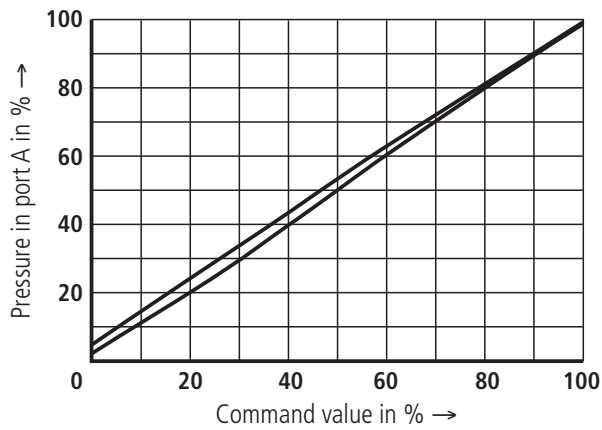
**NS 10**



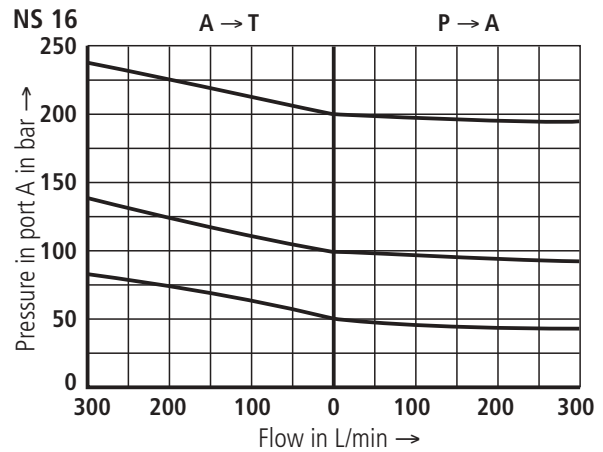
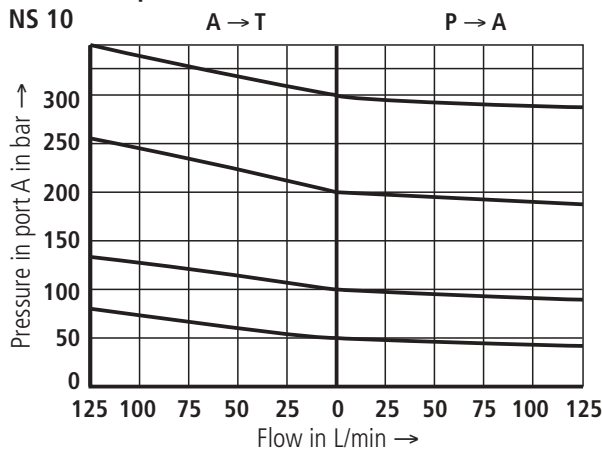
**NS 16**



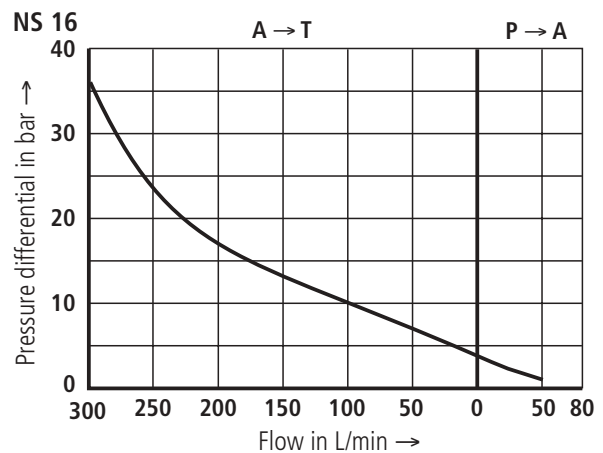
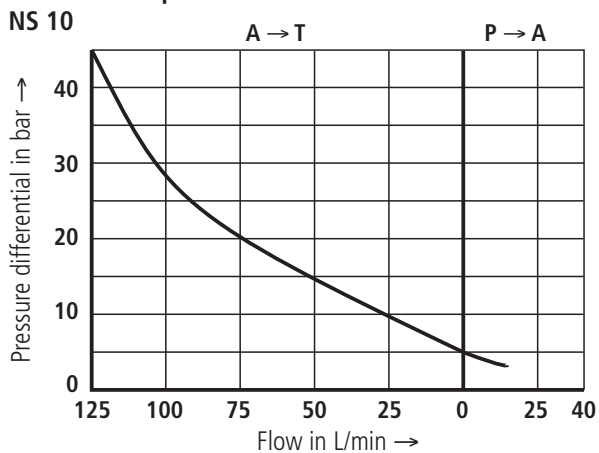
**Pressure in port A – command value** (measured at flow 0 L/min)  
**NS 10 and 16**



**Pressure in port A – flow**

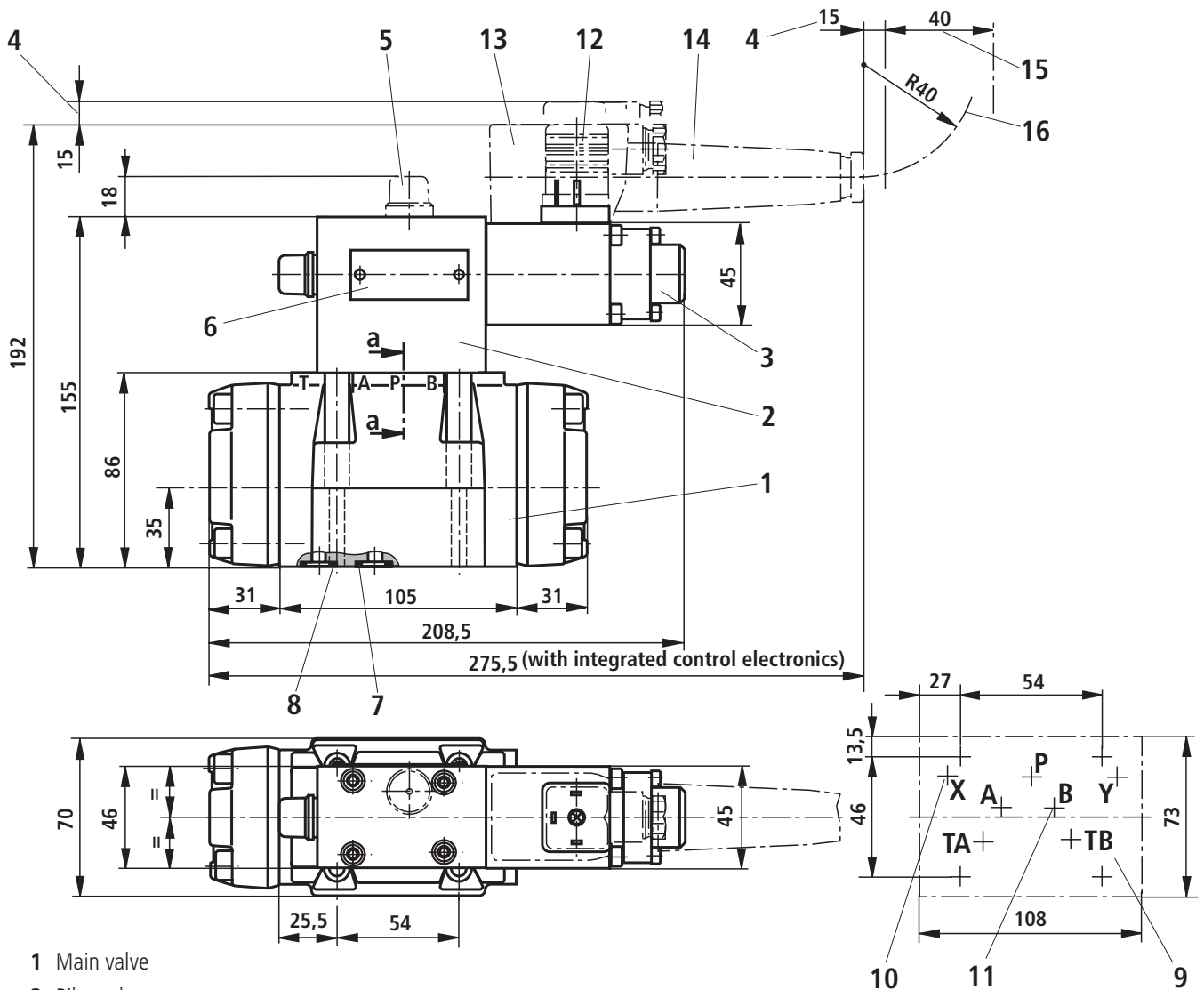


**Min. settable pressure – flow**

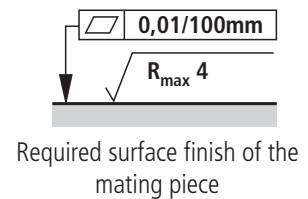




**Unit dimensions: NS 10** (dimensions in mm)



- 1 Main valve
- 2 Pilot valve
- 3 Proportional solenoid
- 4 Space required to remove the plug-in connector
- 5 Maximum pressure limitation (type 3DREM...)  
Please take into account the notes on page 4 when utilising this valve!
- 6 Name plate
- 7 Identical seal rings for ports A, B, P and T
- 8 Identical seal rings for ports X and Y
- 9 Machined valve mounting face, porting pattern to DIN 24 340 Form A, ISO 4401 and CETOP-RP 121 H
- 10 When pilot oil supply is „internal“ (version Y) port X in the subplate must be plugged.
- 11 Port B in the subplate must be plugged
- 12 Plug-in connector to 3DRE(M) (separate order, see page 6)
- 13 Integrated control electronics (types 3DREE, 3DREME) with component plug
- 14 Plug-in connector for type 3DRE(M)E (separate order, see page 6)
- 15 Space required for cable bend radius when removing the plug-in connector
- 16 Cable bend radius

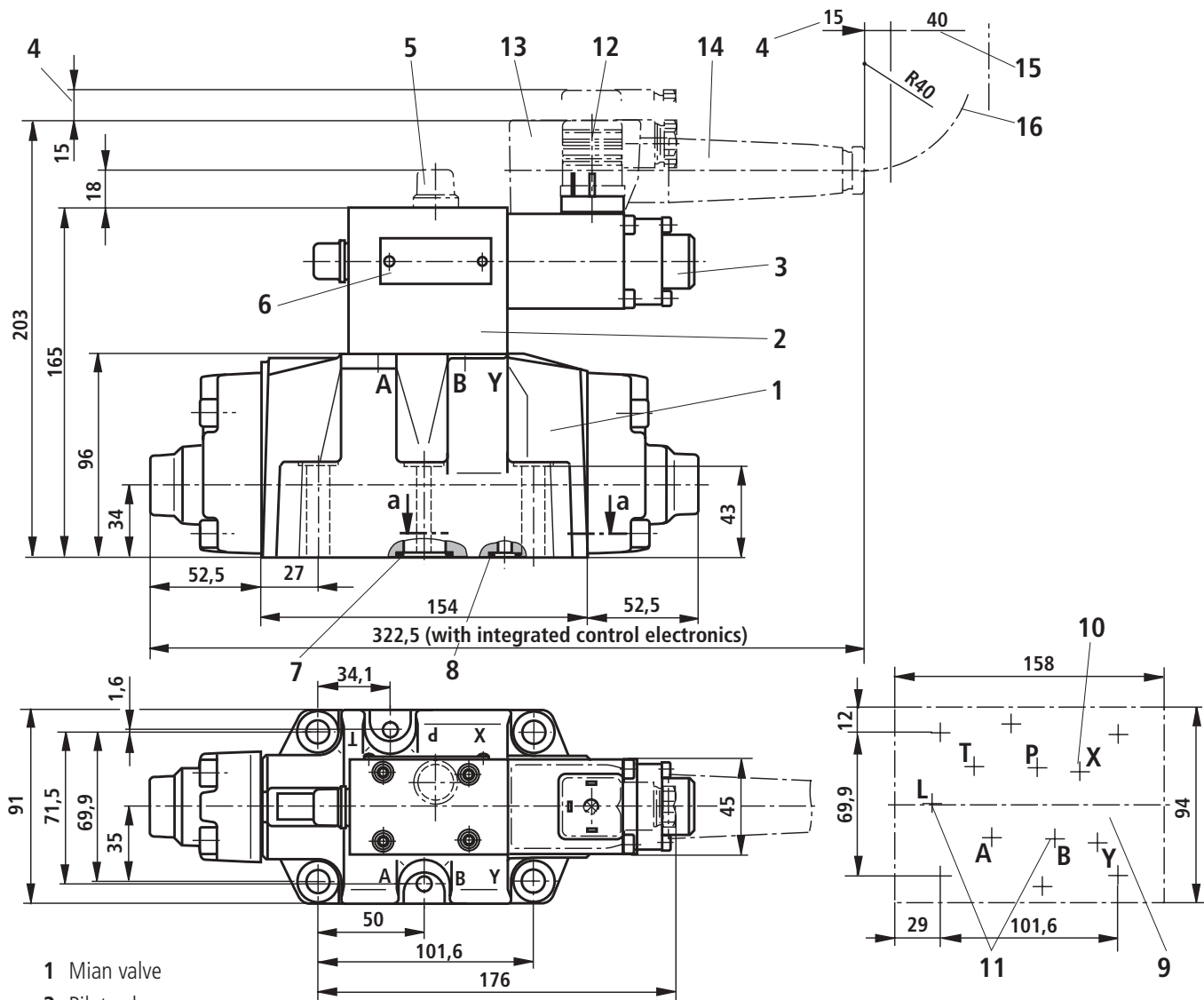


For section details see page 11

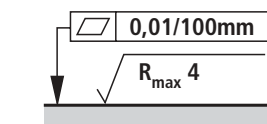
Subplates to catalogue sheet RE 45 054 and valve fixing screws must be ordered separately.

**Subplates:** G 535/01 (G 3/4) } **With** ports  
 G 536/01 (G 1) } X and Y  
**Valve fixing screws:** 4 off M6 x 45 DIN 912-10.9;  
 $M_A = 15.5 \text{ Nm}$

**Unit dimensions: NS 16** (dimensions in mm)



- 1 Main valve
- 2 Pilot valve
- 3 Proportional solenoid
- 4 Space required to remove the plug-in connector
- 5 Maximum pressure safety (type 3DREM...)  
Please take into account the notes on page 4 when utilising this valve.
- 6 Name plate
- 7 Identical seal rings for ports A, B, P and T
- 8 Identical seal rings for ports X and Y
- 9 Machined valve mounting face, porting pattern to DIN 24 340 Form A, ISO 4401 and CETOP-RP 121 H
- 10 When pilot oil supply is „internal“ (version Y) port X in the subplate must be plugged.
- 11 Ports B and L in the subplates must be plugged
- 12 Plug-in connector for type 3DRE(M) (separate order, see page 6)
- 13 Integrated control electronics (types 3DREE, 3DREME) with component plug
- 14 Plug-in connector for type 3DRE(M)E (separate order, see page 6)
- 15 Space required for cable bend radius when removing the plug-in connector
- 16 Cable bend radius



Required surface finish of the mating piece

For section details see page 11

Subplates to catalogue sheet RE 45 056 and valve fixing screws must be ordered separately.

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

**Valve fixing screws:** 4 off M10 x 60 DIN 912-10.9;  
 $M_A = 73 \text{ Nm}$   
 2 off M6 x 60 DIN 912-10.9;  
 $M_A = 15.5 \text{ Nm}$

## Pilot oil supply

### Type 3DRE...-.../...XY

#### External pilot oil supply External pilot oil drain

With this version the pilot oil supply is via a separate pilot oil supply circuit (external).

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

### Type 3DRE...-.../...Y...

#### Internal pilot oil supply External pilot oil drain

With this version the pilot oil supply is taken from the P port of the main valve (internal).

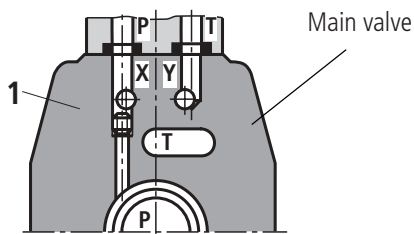
The pilot oil drain is not fed into the T port of the main valve but separately to tank via port Y (external).

In the subplate port X has to be plugged.

Position **1**: Plug M6 DIN 906-8.8 3A/F

**NS 10** For section location see page 9

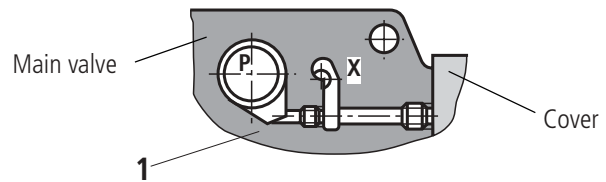
Section a – a



Pilot oil supply (section a – a)	External:	<b>1</b>	Plugged
	Internal:	<b>1</b>	Open
Pilot oil drain	External		

**NS 16** For section location see page 10

Section a – a



Pilot oil supply (section a – a)	External:	<b>1</b>	Plugged
	Internal:	<b>1</b>	Open
Pilot oil drain	External		

---

**Bosch Rexroth AG**  
**Industrial Hydraulics**

D-97813 Lohr am Main  
Zum Eisengießer 1 • D-97816 Lohr am Main  
Telefon 0 93 52 / 18-0  
Telefax 0 93 52 / 18-23 58 • Telex 6 89 418-0  
eMail [documentation@boschrexroth.de](mailto:documentation@boschrexroth.de)  
Internet [www.boschrexroth.de](http://www.boschrexroth.de)

**Bosch Rexroth Limited**

Cromwell Road, St Neots,  
Cambs, PE19 2ES  
Tel: 0 14 80/22 32 56  
Fax: 0 14 80/21 90 52  
E-mail: [info@boschrexroth.co.uk](mailto:info@boschrexroth.co.uk)

The data specified above only serves to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. It must be remembered that our products are subject to a natural process of wear and ageing.