

RE 29 142/11.02

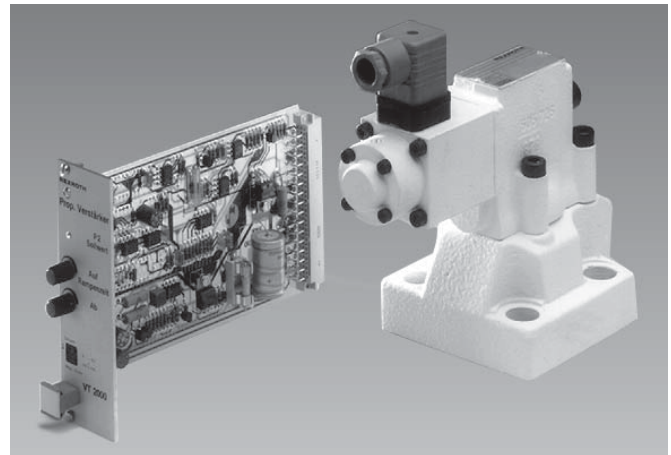
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**Proportional pressure relief valve
Types DBE(M) and DBE(M)E**Nominal size 32 ¹⁾

Series 3X

Maximum operating pressure 350 bar

Maximum flow 600 L/min

¹⁾ NS 10; 25, Series 5X see RE 29 160

Type DBE 30-3X/...G24K4... with plug-in connector and associated control electronics (separate order)

Overview of contents

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Features

- Pilot operated valve for limiting a system pressure
- Operation via proportional solenoids
- For subplate mounting:
 - Porting pattern to DIN 24 340, form E
 - Subplates to catalogue sheet RE 45 064, (separate order, see page 8)
- Optional additional maximum pressure limitation by means of a spring loaded pilot control valve
- Control electronics for type DBE(M):
 - Analogue amplifier VT-VSPA1-1 in Eurocard format (separate order, see page 5)
 - Analogue amplifier VT 2000 (separate order, see page 5)
 - Digital amplifier VT-VSPD-1 in Eurocard format (separate order, see page 5)
 - Analogue amplifier VT 11030 of modular design (separate order, see page 5)
- Integrated control electronics for type DBE(M)E:
 - Low example spread of the command value-pressure-characteristic curve
 - Independently adjustable up and down ramps



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Ordering details

DBE	30-3X/	G24	*
Proportional pressure relief valve			Further details in clear text
Without maximum pressure limitation = No code			M = NBR seals, suitable for mineral oil (HL, HLP) to DIN 51 524
With maximum pressure limitation = M			V = FKM seals
For external control electronics = No code			Electrical connections
With integrated control electronics = E			For DBE; DBEM:
Nominal size 32 = 30			K4 = Without plug-in connector, with component plug to DIN EN 175 301-803 Plug-in connector – separate order, see page 5
Series 30 to 39 (30 to 39: unchanged installation and connection dimensions) = 3X			For DBEE; DBEME:
Pressure stage			K31 = Without plug-in connector, with component plug to E DIN 43 563-AM6-3 Plug-in connector – separate order, see page 5
Up to 50 bar = 50			G24 = Supply voltage to the control electronics 24 V DC
Up to 100 bar = 100			
Up to 200 bar = 200			
Up to 315 bar = 315			
Up to 350 bar = 350			
Internal pilot oil supply, external pilot oil drain = Y			
External pilot oil supply, external pilot oil drain = XY			

Special protection versions on request!

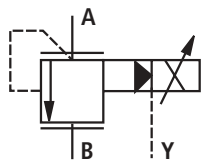
Preferred types

Material No.	Type DBEME
R900954717	DBEME 30-3X/50YG24K31M
R900954713	DBEME 30-3X/100YG24K31M
R900954714	DBEME 30-3X/200YG24K31M
R900954715	DBEME 30-3X/315YG24K31M
R900954716	DBEME 30-3X/350YG24K31M

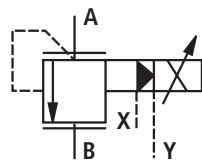
Further preferred types and standard units are to be found in the EPS (Standard Price List).

Symbols

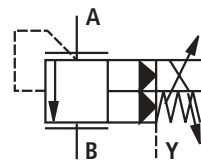
Type DBE(E) 30-3X/...Y...



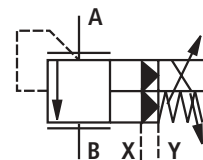
Type DBE(E) 30-3X/...XY...



Type DBEM(E) 30-3X/...Y...



Type DBEM(E) 30-3X/...XY...



Function, section

Valve types DBE and DBEM are pilot operated pressure relief valves. They are used to limit the pressure in a hydraulic system. With these valves it is possible, in relation to the electrical command value, to infinitely adjust the pressure to be limited. These valves basically consist of the pilot control valve (1) with proportional solenoid (2) and the main valve (3) with main spool insert (4).

Type DBE...

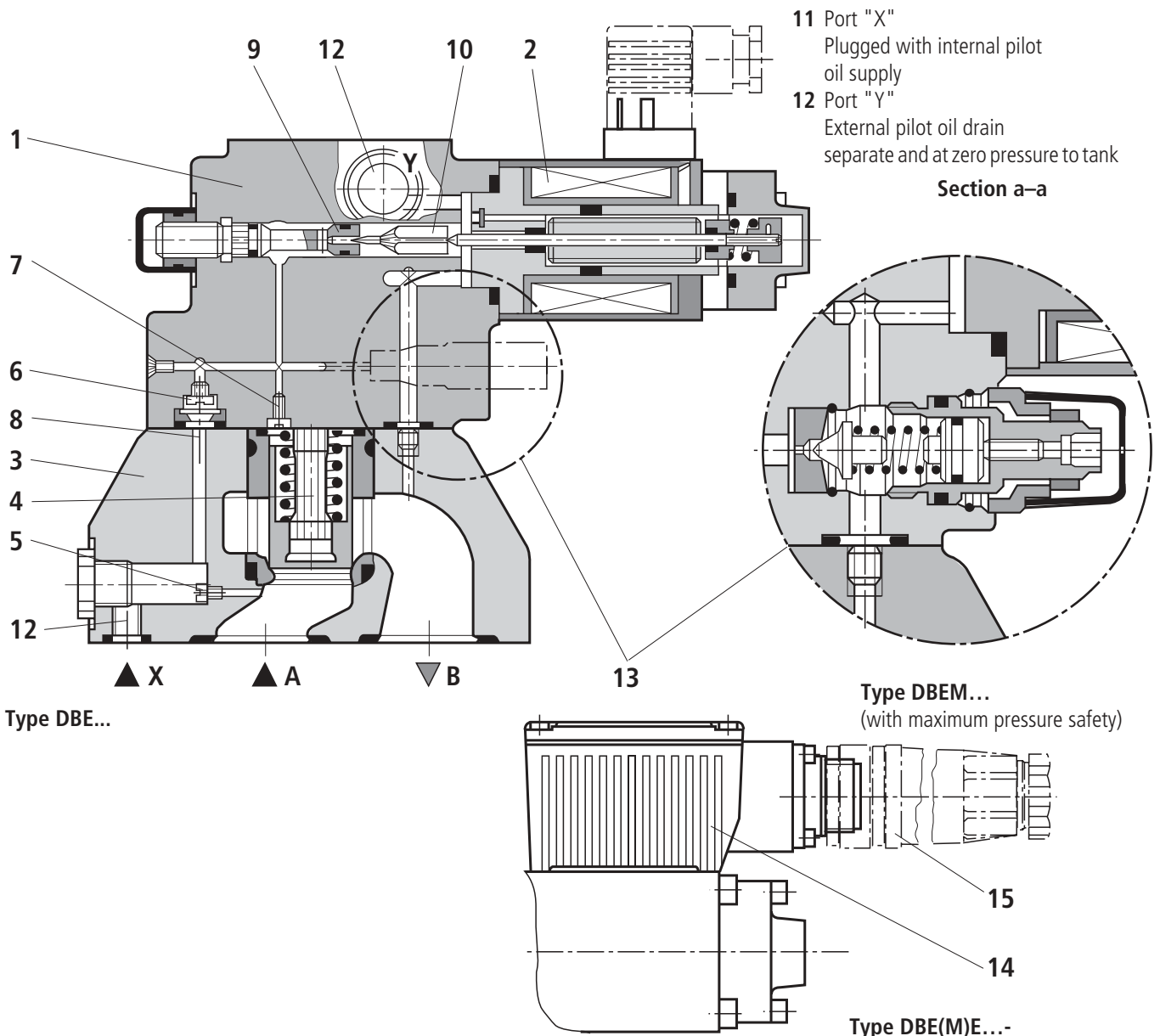
The adjustment of the pressure is command value dependent via a proportional solenoid (2). The pressure present in port A acts on the underside of the main spool (4). At the same time this pressure acts on the spring loaded side of the main spool (4) via control line (8) which is fitted with orifices (5, 6, 7). The hydraulic force acts on the pilot poppet (10) via valve seat (9) against the force proportional solenoid (2). When the hydraulic force overcomes the solenoid force then the pilot poppet (10) opens. Due to the fact that the pilot oil can now flow to tank via port Y (12) a pressure drop occurs at the orifices (5, 6) which acts on the main spool and lifts it against the force of the return spring (10). The connection from A to B is opened and there is no longer any increase in pressure.

Type DBEM...

Optionally the valve can be supplied with an additional spring loaded pilot control valve (13) for maximum pressure safety (redundant pressure safety function). It is recommended that this version is always selected! When applying these valves take the guidelines stated on page 4 into account.

Types DBEE and DBEME (with integrated control electronics)

The function and design of these valves, with the exception of the integrated control electronics, is basically the same as the types DBE and DBEM. The control electronics which are located in the housing (14) receive the supply and command value voltages via the plug-in connector (15). The command value-pressure-characteristic curve (zero point at valve seat (9) and the increase at the I_{max} potentiometer (R30) in the control electronics) is factory pre-set with a low example spread. At the two potentiometers it is possible to independently adjust the ramp times for increase in pressure and decrease in pressure. For further details regarding the integrated control electronics, see pages 5 and 6.



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

General

Installation			Optional
Storage temperature range		°C	– 20 to + 80
Ambient temperature range	DBE and DBEM	°C	– 20 to + 70
	DBEE and DBEME	°C	– 20 to + 50
Weight	DBE and DBEM	kg	6.0
	DBEE and DBEME	kg	6.2

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

Maximum operating pressure	Ports A, B and X	bar	350
	Port Y		Separate and at zero pressure to tank
Maximum settable pressure	Pressure stage 50 bar	bar	50
	Pressure stage 100 bar	bar	100
	Pressure stage 200 bar	bar	200
	Pressure stage 315 bar	bar	315
	Pressure stage 350 bar	bar	350
Minimum settable pressure at port A with a zero command value		bar	See characteristic curves on page 7
Maximum pressure safety (infinitely adjustable)			Adjustable pressure range: Setting as required:
	Pressure stage 50 bar	bar	30 to 70 Up to 70 bar
	Pressure stage 100 bar	bar	50 to 130 Up to 130 bar
	Pressure stage 200 bar	bar	90 to 230 Up to 230 bar
	Pressure stage 315 bar	bar	150 to 350 Up to 350 bar
	Pressure stage 350 bar	bar	180 to 390 Up to 390 bar
Maximum flow		L/min	600
Pilot flow		L/min	0.7 to 2
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 ² /s	15 to 380
Cleanliness class to ISO code			Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 20/18/15 ¹⁾
Hysteresis (see command value-pressure-char. curves on page 7)		%	± 1.5 of max. settable pressure
Repeatability		%	< ± 2 of max. settable pressure
Linearity		%	± 3.5 of max. settable pressure
Example spread of the com.value-pressure-char. curve, relating to the hysteresis char. curve, pressure increasing	DBE und DBEM	%	± 2.5 of max. settable pressure
	DBEE und DBEME	%	± 1.5 of max. settable pressure
Stepped response $T_u + T_g$	0 → 100 %	ms	150
	100 → 0 %	ms	150

1) The cleanliness class stated for the components must be adhered to 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, 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	DBE and DBEM	mA
	DBEE and DBEME	mA
Coil resistance	Cold value at 20°C	Ω
	Max. warm value	Ω
Duty	%	100
Electrical connections	DBE and DBEM	With component plug to DIN EN 175 301-803
		Plug-in connector to DIN EN 175 301-803 ¹⁾
	DBEE and DBEME	With component plug to E DIN 43 563-AM6-3
		Plug-in connector to E DIN 43 563-BF6-3/Pg11 ¹⁾
Valve protection to DIN 40 050		IP 65 with mounted and fixed plug-in connector
Control electronics		
– For DBEE and DBEME		Integrated into the valve, see page 6
– For DBE and DBEM		
• Amplifier in Eurocard format ¹⁾		Analogue
		Digital
• Amplifier of modular design ¹⁾		Analogue

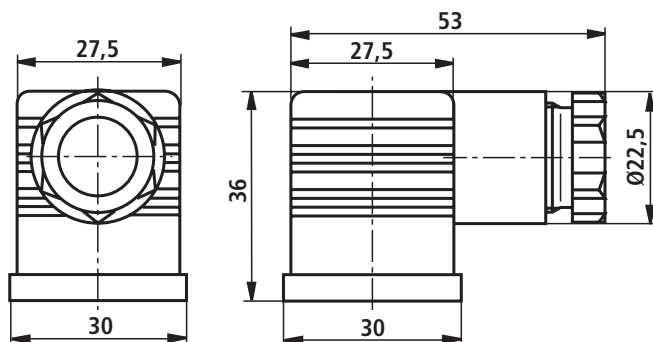
¹⁾ Separate order

 **Note:** For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 142-U (declaration regarding environmental compatibility).

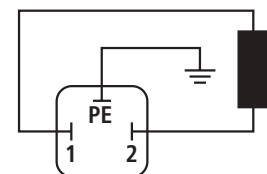
Electrical connections, plug-in connectors

For types DBE and DBEM (for external control electronics)

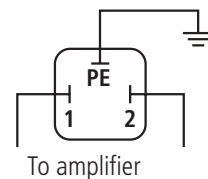
Plug-in connector to DIN EN 175 301-803, separate order under Material No. **R900074684**



Connections at component plug

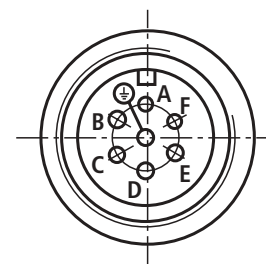
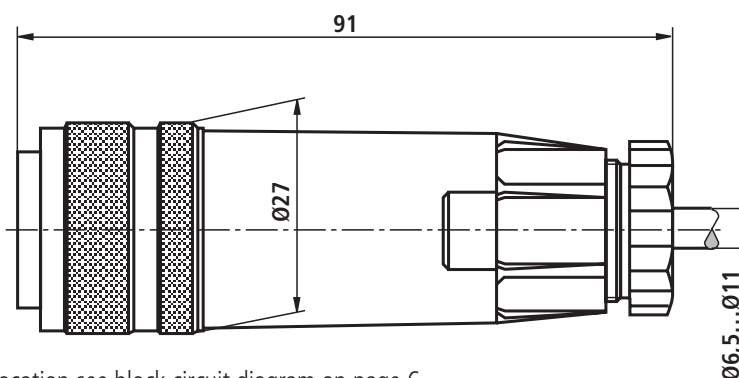


Connections at plug-in connector



For types DBEE and DBEME (with integrated control electronics)

Plug-in connector to E DIN 43 563-BF6-3/Pg11, separate order under Material No. **R900021267** (plastic version)



For pin allocation see block circuit diagram on page 6

Integrated control electronics for types DBEE, DBEME

Function

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

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

The maximum ramp time of 5 s is only possible over the complete command value range. With smaller command value changes the ramp time is accordingly shortened.

The command value-solenoid current characteristic curve is matched to the valve via the characteristic curve generator in such a way that any nonlinearities are compensated for in the hydraulics and thus a linear command value-pressure-characteristic curve is formed.

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

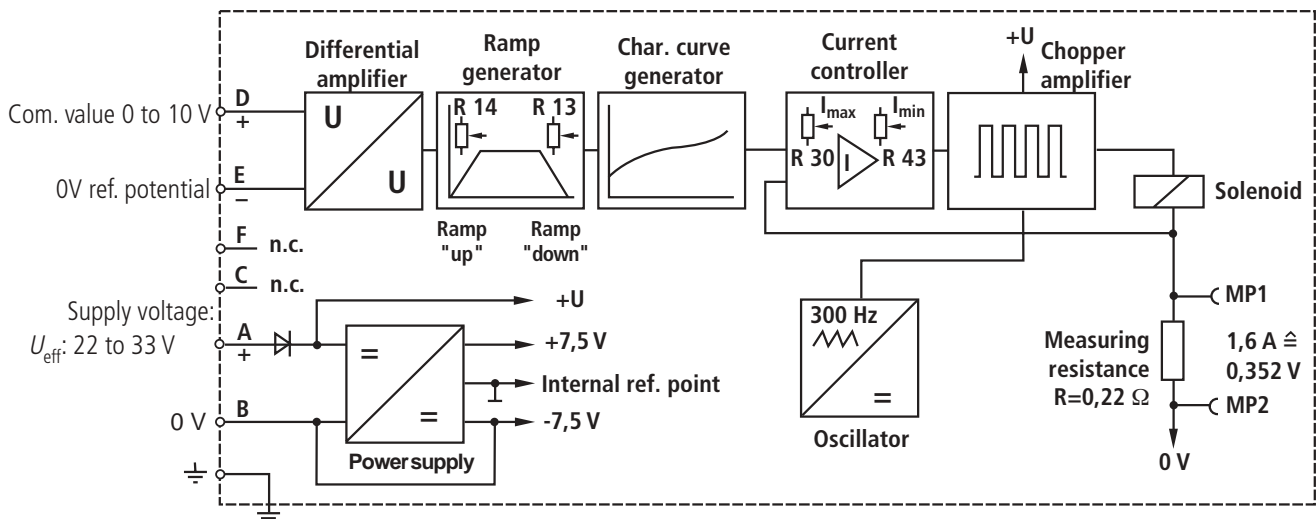
At the potentiometer R30 the increase of the command value current characteristic curve and thus also the increase of the command value pressure characteristic curve of the proportional pressure valve may be altered.

Potentiometer R43 is used for the setting the bias current. This setting should not be altered. If necessary the zero point of the command value-pressure-characteristic curve may be set 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 300 Hz.

The solenoid current may be measured at the test points MP1 and MP2. A voltage decrease of 0.352 V at the measuring resistance equals a solenoid current of 1.6 A.

Blockcircuit 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

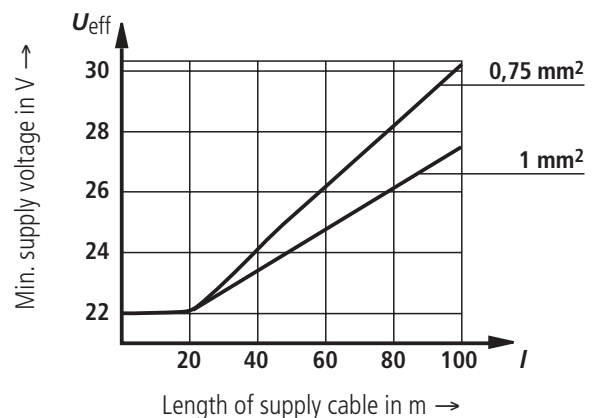
Residual ripple at power supply: $< 5\%$

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

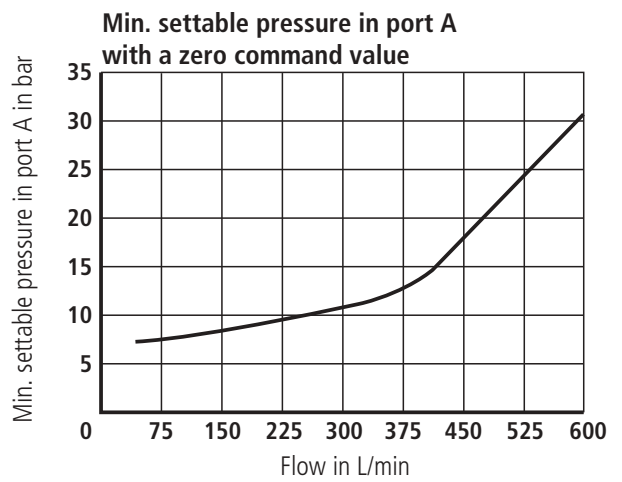
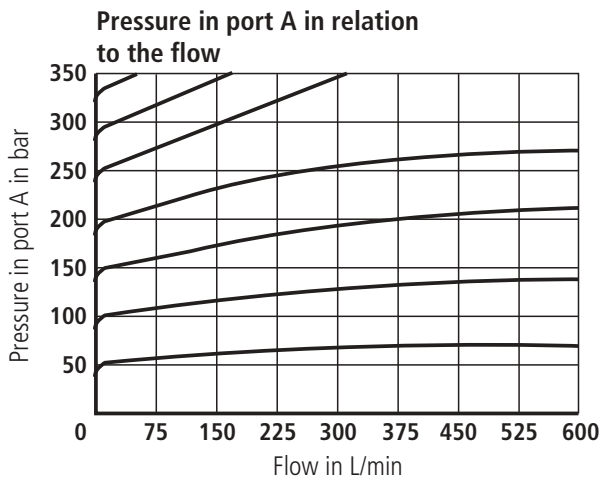
- Supply cable:
- Recommended 5 core 0.75 or 1 mm² with protective conductor and screen
 - Outside diameter 6.5 to 11 mm
 - Screen on 0 V supply voltage
 - Max. permissible length 100 m

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

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

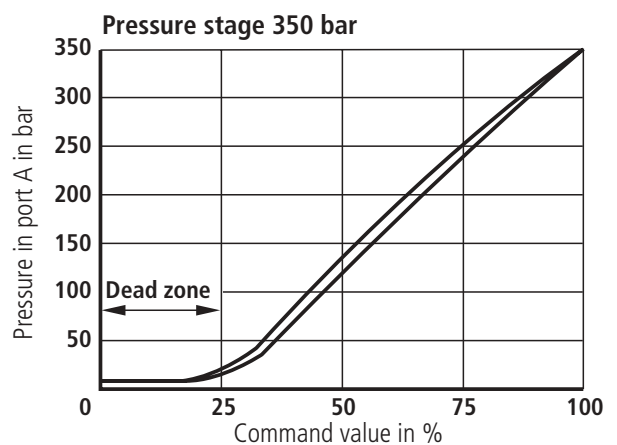
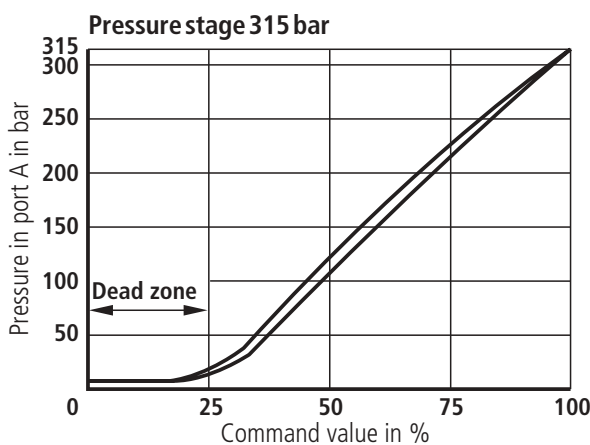
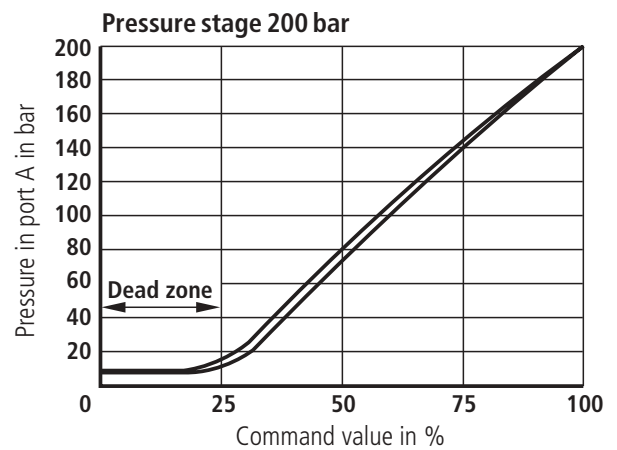
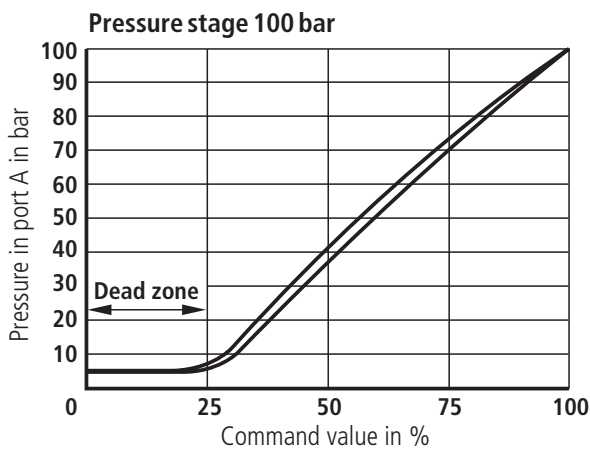
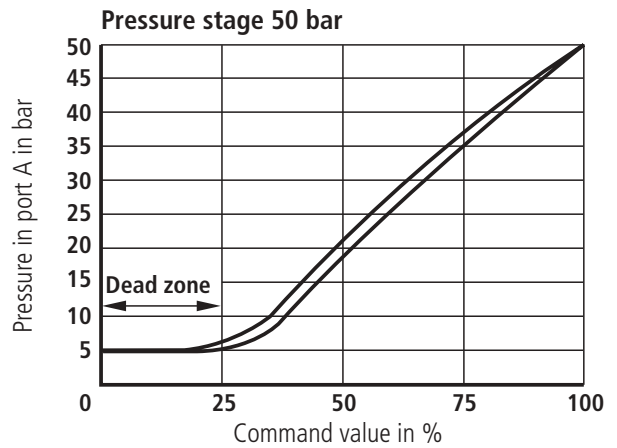


Characteristic curves (measured with HLP 46, $\vartheta_{oil} = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$ and $p = 100 \text{ bar}$)

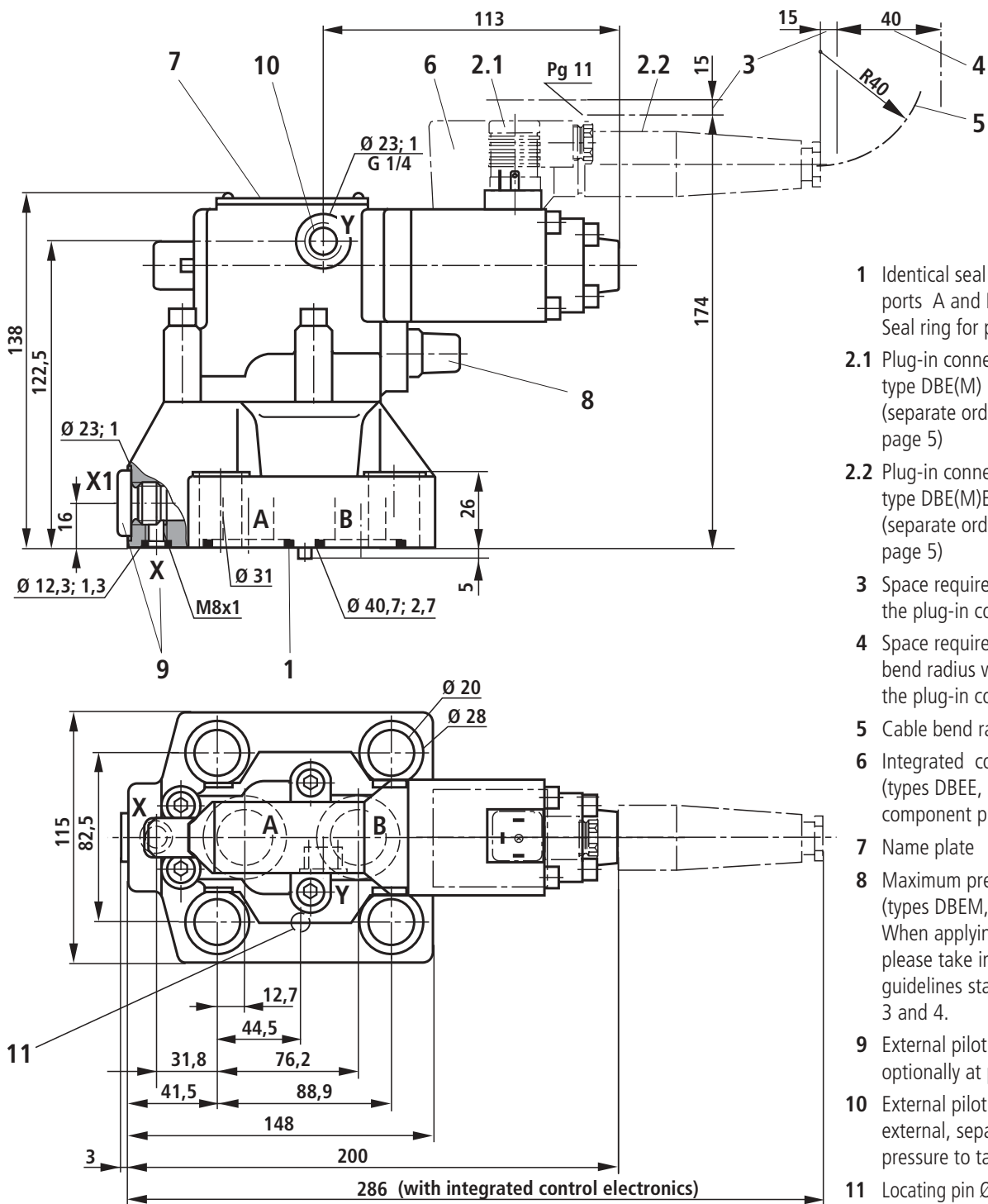


Note: So that the minimum settable pressure can be achieved the bias current must not exceed 100 mA.

Pressure in port A in relation to the command value
(measured at a flow of 27 L/min)



Unit dimensions (dimensions in mm)



- 1 Identical seal rings for ports A and B
Seal ring for port X
- 2.1 Plug-in connector for type DBE(M)
(separate order, see page 5)
- 2.2 Plug-in connector for type DBE(M)E
(separate order, see page 5)
- 3 Space required to remove the plug-in connector
- 4 Space required for the cable bend radius when removing the plug-in connector
- 5 Cable bend radius
- 6 Integrated control electronics (types DBEE, DBEME) with component plug
- 7 Name plate
- 8 Maximum pressure limitation (types DBEM, DBEME)
When applying this valve, please take into account the guidelines stated on pages 3 and 4.
- 9 External pilot oil supply, optionally at ports X or X1
- 10 External pilot oil drain, always external, separate and at zero pressure to tank
- 11 Locating pin $\varnothing 6$ mm

0,01/100mm
 R_{max}^4
 Required surface finish of the mating piece

Subplates to catalogue sheet RE 45 064 and valve fixing screws must be ordered separately.

Subplates:

G 410/01 (G 1 1/4)
G 411/01 (G 1 1/2)

Valve fixing screws:

M18 x 50 DIN 912-10.9;
 $M_A = 160$ Nm

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