

RE 29 160/11.02

Replaces: 12.98

Proportional pressure relief valve Types DBE(M) and DBE(M)E

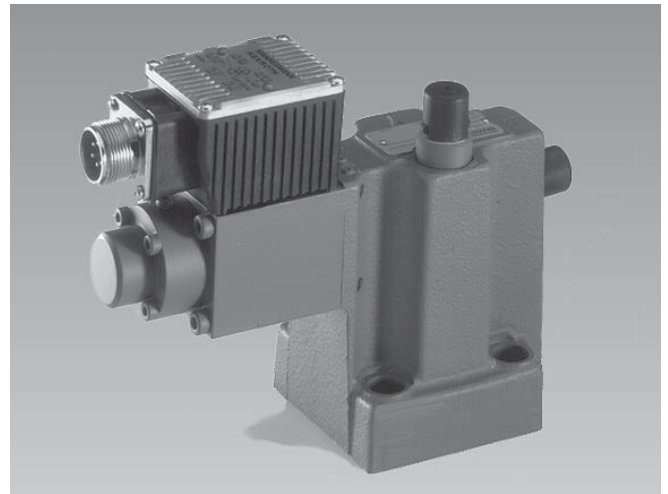
Nominal sizes 10, 25 ¹⁾

Series 5X

Maximum operating pressure 350 bar

Maximum flow 400 L/min

¹⁾ NS 32, Series 3X see RE 29 142



H/A 3457/92

Type DBEME 10-5X/...G24K31... with integrated control electronics

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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 pages 8 and 9)
- Optional maximum pressure limitation function via spring loaded pilot control valve
- External control electronics for types DBE and DBEM:
 - Analogue amplifier type VT-VSPA1-1 in Eurocard format (separate order, see page 5)
 - Digital amplifier type VT-VSPD-1 in Eurocard format (separate order, see page 5)
 - Amplifier type VT 11131 of modular design (separate order, see page 5)
- Integrated control electronics for types DBEE and DBEME:
 - Low example spread of the command value-pressure-characteristic curve
 - Independently adjustable ramp time for pressure increase and pressure decrease



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Ordering details

	DBE		-5X/		G24		*
Proportional pressure relief valve							Further details in clear text
Without maximum pressure limitation							M = NBR seals, suitable for mineral oil (HL, HLP) to DIN 51 524
With maximum pressure limitation							V = FKM seals
For external control electronics							Electrical connections
With integrated control electronics							For DBE; DBEM:
Nominal size 10							K4 = Without plug-in connector, with component plug to DIN EN 175 301-803
Nominal size 25							Plug-in connector – separate order, see page 5
Series 50 to 59 (50 to 59: unchanged installation and connection dimensions)							For DBEE; DBEME:
Pressure stage							K31 = Without plug-in connector, with component plug to E DIN 43 563-AM6-3
Up to 50 bar							Plug-in connector – separate order, see page 5
Up to 100 bar							
Up to 200 bar							
Up to 315 bar							
Up to 350 bar							
External pilot oil drain							G24 = Supply voltage for the control electronics 24 V DC
Unloading port X, external pilot oil drain							

Preferred types

NS 10

Material No.	Type DBEME 10
R900908585	DBEME 10-5X/50YG24K31M
R900954707	DBEME 10-5X/100YG24K31M
R900954708	DBEME 10-5X/200YG24K31M
R900536812	DBEME 10-5X/315YG24K31M
R900941261	DBEME 10-5X/350YG24K31M

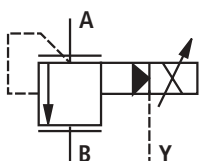
NS 25

Material No.	Type DBEME 20
R900954711	DBEME 20-5X/50YG24K31M
R900937307	DBEME 20-5X/100YG24K31M
R900954709	DBEME 20-5X/200YG24K31M
R900536813	DBEME 20-5X/315YG24K31M
R900954710	DBEME 20-5X/350YG24K31M

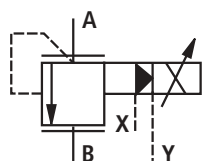
Further preferred types and standard units are to be found in the EPS (Standard Price List).

Symbols

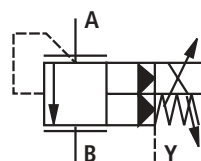
Type DBE(E)...-5X/...Y...



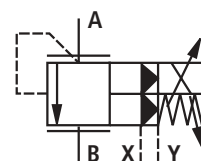
Type DBE(E)...-5X/...XY...



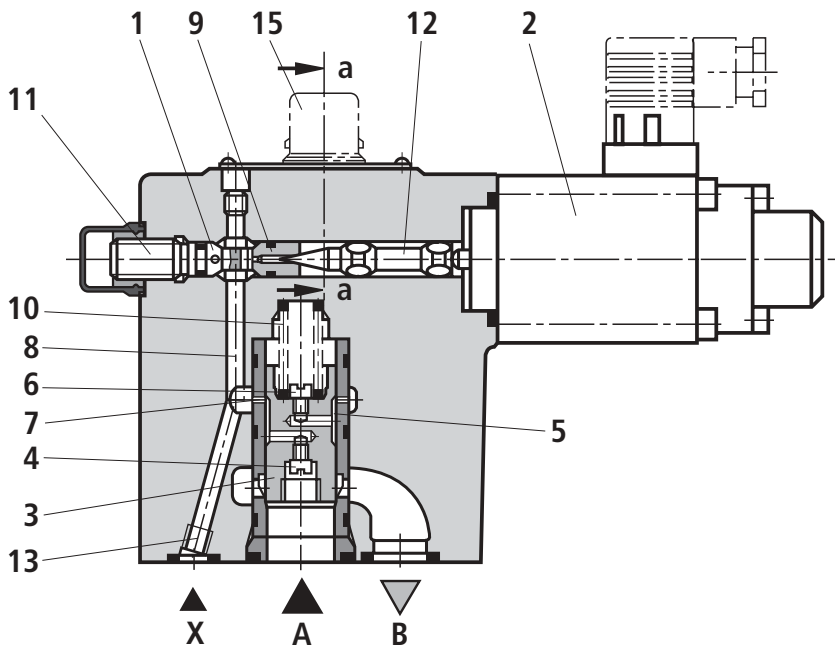
Type DBEM(E)...-5X/...Y...



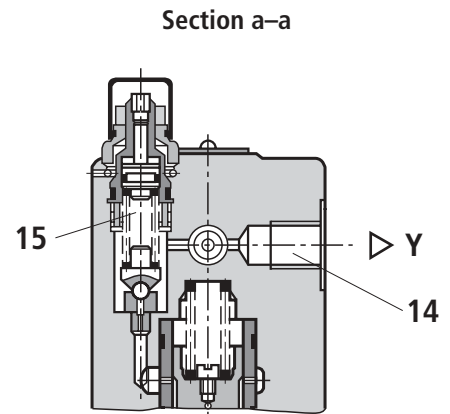
Type DBEM(E)...-5X/...XY...



Function, section



Type DBE...-5X/...XY...G24K4.



Type DBEM...-5X/...
with maximum pressure safety

- 13** Version "XY" – with additional unloading port X
- 14** Port Y – external pilot oil drain separate and at zero pressure to tank

DBE and DBEM valves are pilot operated pressure relief valves. They are used to limit the pressure in hydraulic systems. In relation to the electrical command value the pressure to be limited may be infinitely set with these valves. Basically these valves consist of a pilot valve (1) installed in the mutual housing, with proportional solenoid (2) and the main spool insert (3).

Type DBE...

The pressure present in port A is applied to the underside of the main spool (3). At the same time the pressure is applied via the orifice (4), ring channel (5) and orifice (6) to the spring loaded side of the main spool (3). Via the radial bore (7), control bore (8) and orifice (9) the hydraulic force at the pilot poppet (12) acts against the command value dependent force of the proportional solenoid (2). If the hydraulic force overcomes the solenoid force then the pilot poppet (12) opens. Because of the now possible pilot oil flow via port Y (14) to tank there is a pressure drop at the orifice (4), which effects the main spool (3) and lifts it against the force of the return spring (10). The connection of ports A to B is opened and there is no further pressure increase.

At port X (13) the valve may be unloaded or the maximum pressure may be limited.

Type DBEM...

Optionally the valve is available with an additional spring loaded pilot valve (15) for maximum pressure limitation (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).

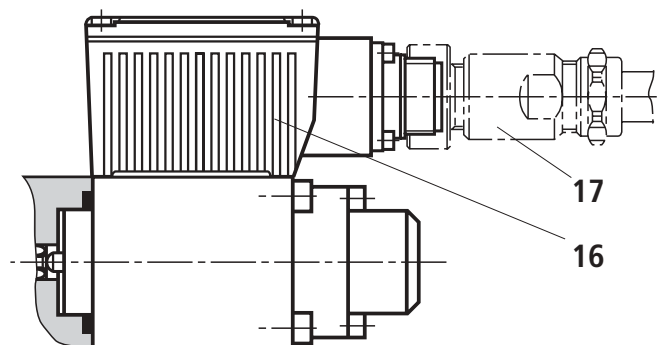
Types DBEE and DBEME (with integrated control electronics)

In function and design these valves are basically the same at the types DBE and DBEM, apart from the integrated electronics. The control electronics which are located in housing (16) receive the supply and command value voltages via the plug-in connector (17).

At the factory, the command value-pressure-characteristic curve (zero point at valve seat (11) and increases at I_{max} potentiometer (R30) in the control electronics) is pre-set with very little model deviation.

The ramp times for pressure increase and decrease may be set independently from each other at two potentiometers.

For further details regarding the integrated electronics see pages 5 and 6.



Type DBEE...-5X/...G24K31...

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

General			NS 10	NS 25
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	3.4	3.8
	DBEE and DBEME	kg	3.5	3.9

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

Max. operating pressure	Ports A, B and X	bar	350		
	Port Y		Separate and at zero pressure to tank		
Max. 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		
Min. settable pressure with a zero command value		bar	See characteristic curves on page 7		
Max. pressure safety (infinitely adjustable)			Adjustment range:	Setting as supplied:	
		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	200 to 390	Up to 390 bar		
Max. flow		L/min	200	400	
Pilot flow		L/min	0.5 to 1.8	0.5 to 2.1	
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524, Other 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			Max. permissible degree of contamination of the pressure fluid is to ISO 4406 (c) class 20/18/15 ¹⁾		
Hysteresis (see command-pressure-characteristic curve)		%	± 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, referring 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	dependent on the flow and of the system pipe work volume (A)	
	100 → 0 %	ms	150		


¹⁾ 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	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 (separate order)	Analogue		VT-VSPA1-1 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

¹⁾ Separate order see below

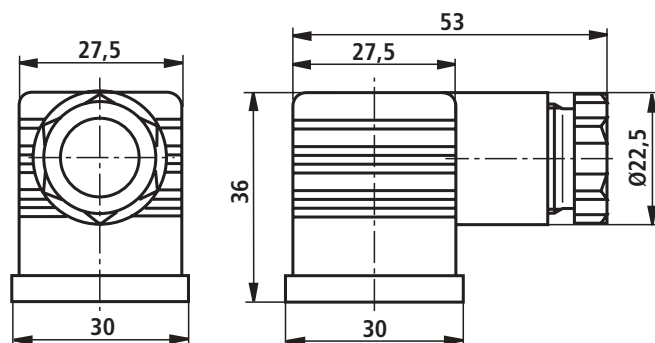
 **Note:** For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 160-U (declaration regarding environmental compatibility).

Electrical connections, plug-in connectors

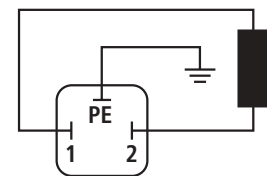
For types DBE and DBEM (for external control electronics)

Plug-in connector to DIN EN 175 301-803

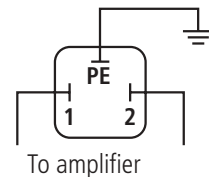
Separate order under Material No. **R900074684**



Connections at component plug



Connections at plug-in connector

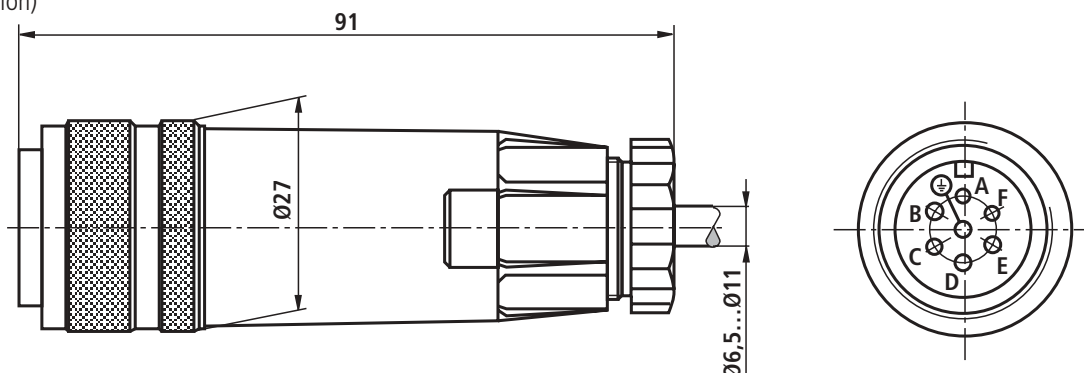


For types DBEE and DBEME (with integrated control electronics)

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 via the two differential amplifier ports 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 potentiometer R14 the increase time and the decrease time of the solenoid current may be set 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 shortened.

The command value-solenoid current characteristic curve is matched to the valve, via the characteristic curve generator, in such a way that non-linearities are compensated for in the hydraulics so that a linear command value-pressure-characteristic curve is formed.

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

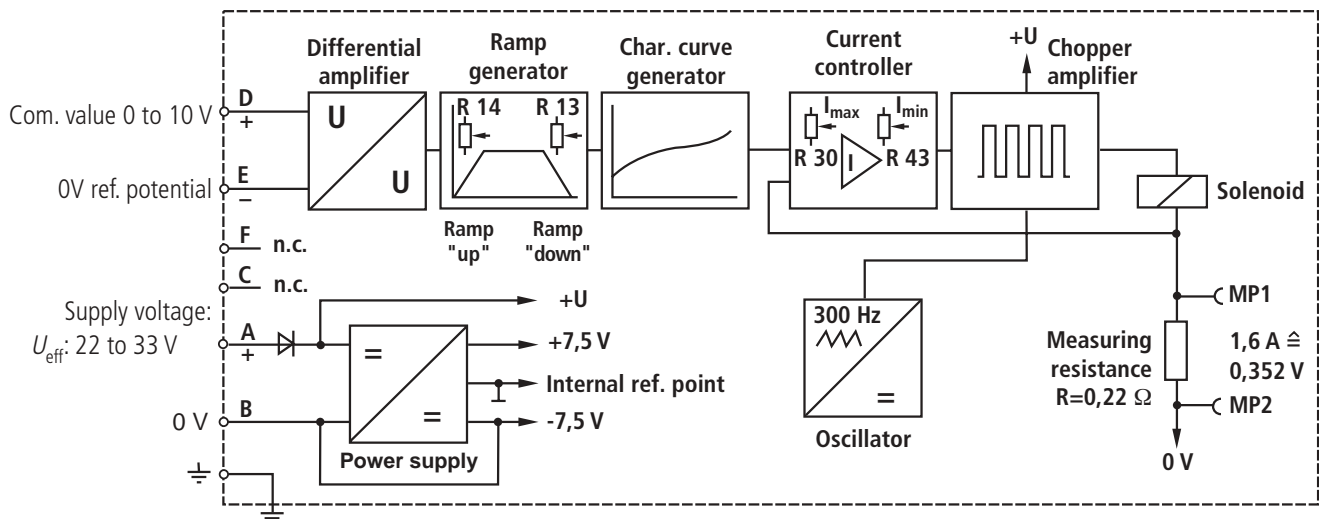
At the potentiometer R30 the increase of the command value-current-characteristic curve and thus also the increase of the command value-pressure-characteristic curve of the proportional pressure valve may be altered.

The 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 of 300 Hz.

The solenoid current may be measured at both 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.

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

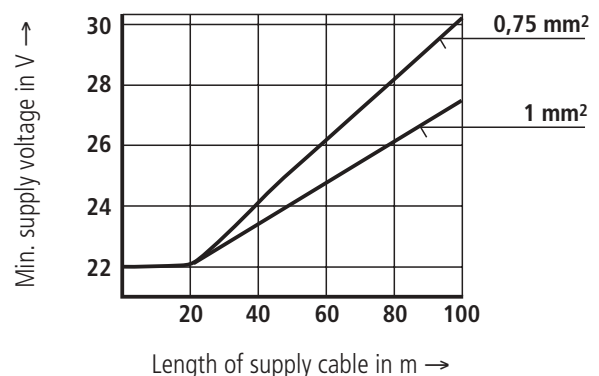
Residual ripple at power supply: $< 5\%$

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

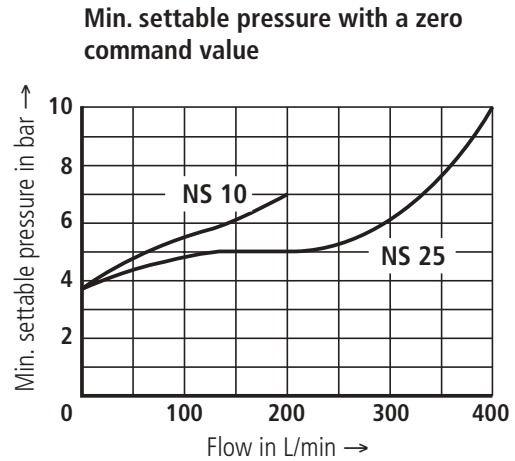
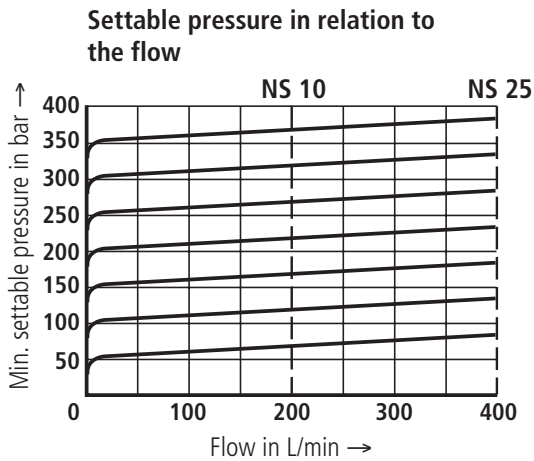
- Supply cable:
- Recommended 5 core 0.75 or 1 mm² with protective conductor and screen
 - Outside diameter 6.5 to 11 mm
 - Screen on 0 V supply voltage
 - Max. permissible length 100 m

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.



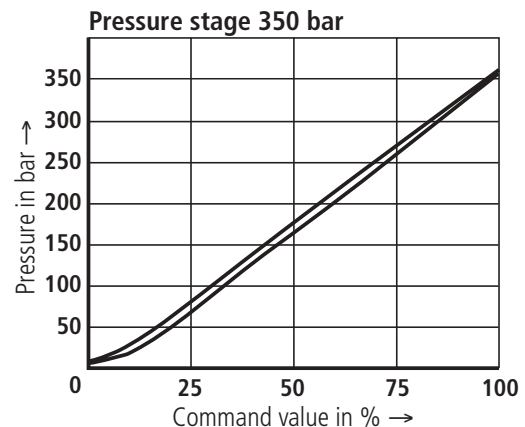
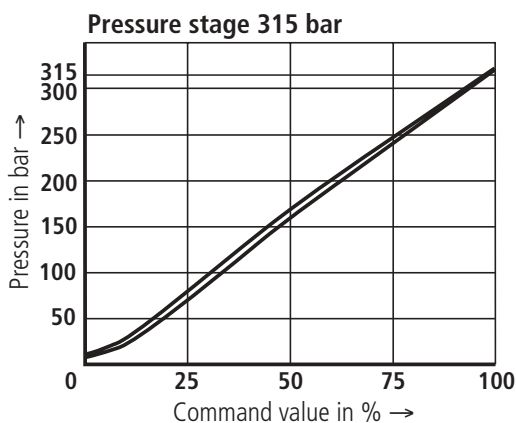
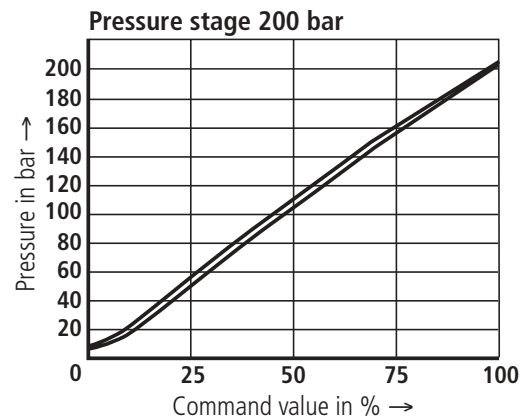
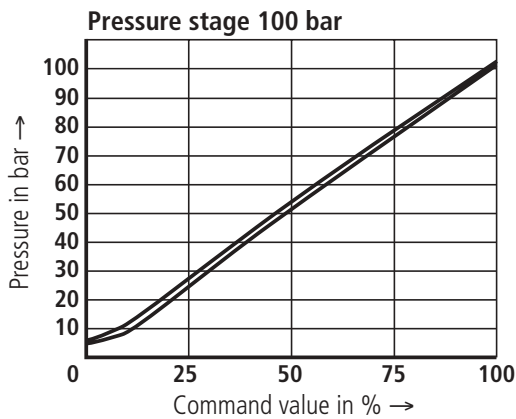
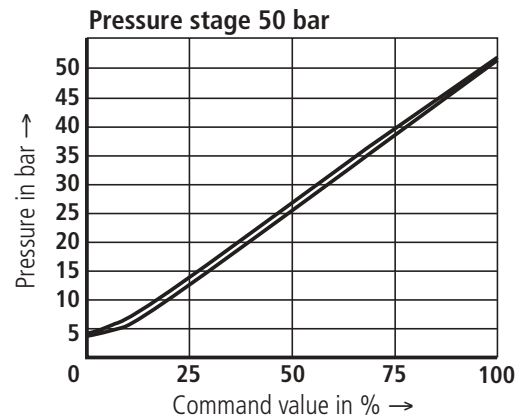
Characteristic curves (measured with HLP 46; $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$)



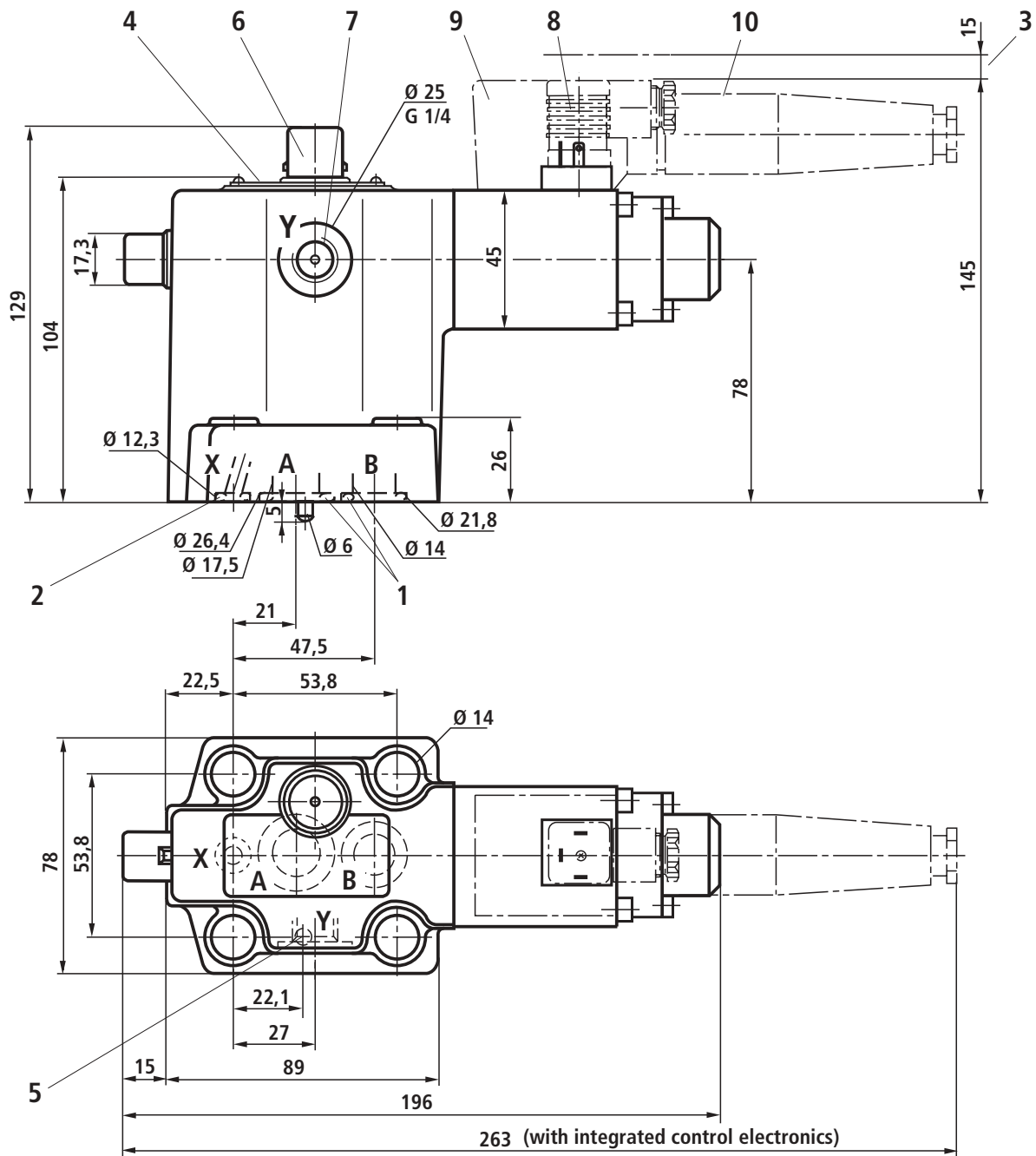
The characteristic curves are valid for an output pressure in B = 0 bar over the entire flow range.

Note: In order for the minimum settable pressure to be reached, the pilot current must not be higher than 100 mA.

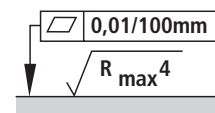
Command value-pressure-characteristic curves
(measured at a flow of 27 L/min)



Unit dimensions: NS 10 (dimensions in mm)



- 1 Different seal rings for ports A and B
- 2 Seal ring for port X
- 3 Space required to remove the plug-in connector
- 4 Name plate
- 5 Locating pin
- 6 Maximum pressure imitation (types DBEM, DBEME)
When using these valves, please take into account the guidelines stated on page 4!
- 7 External pilot oil drain, separate and at zero pressure to tank
- 8 Plug-in connector for type DBE(M)
(separate order, see page 5)
- 9 Integrated control electronics
- 10 Plug-in connector for type DBE(M)E
(separate order, see page 5)



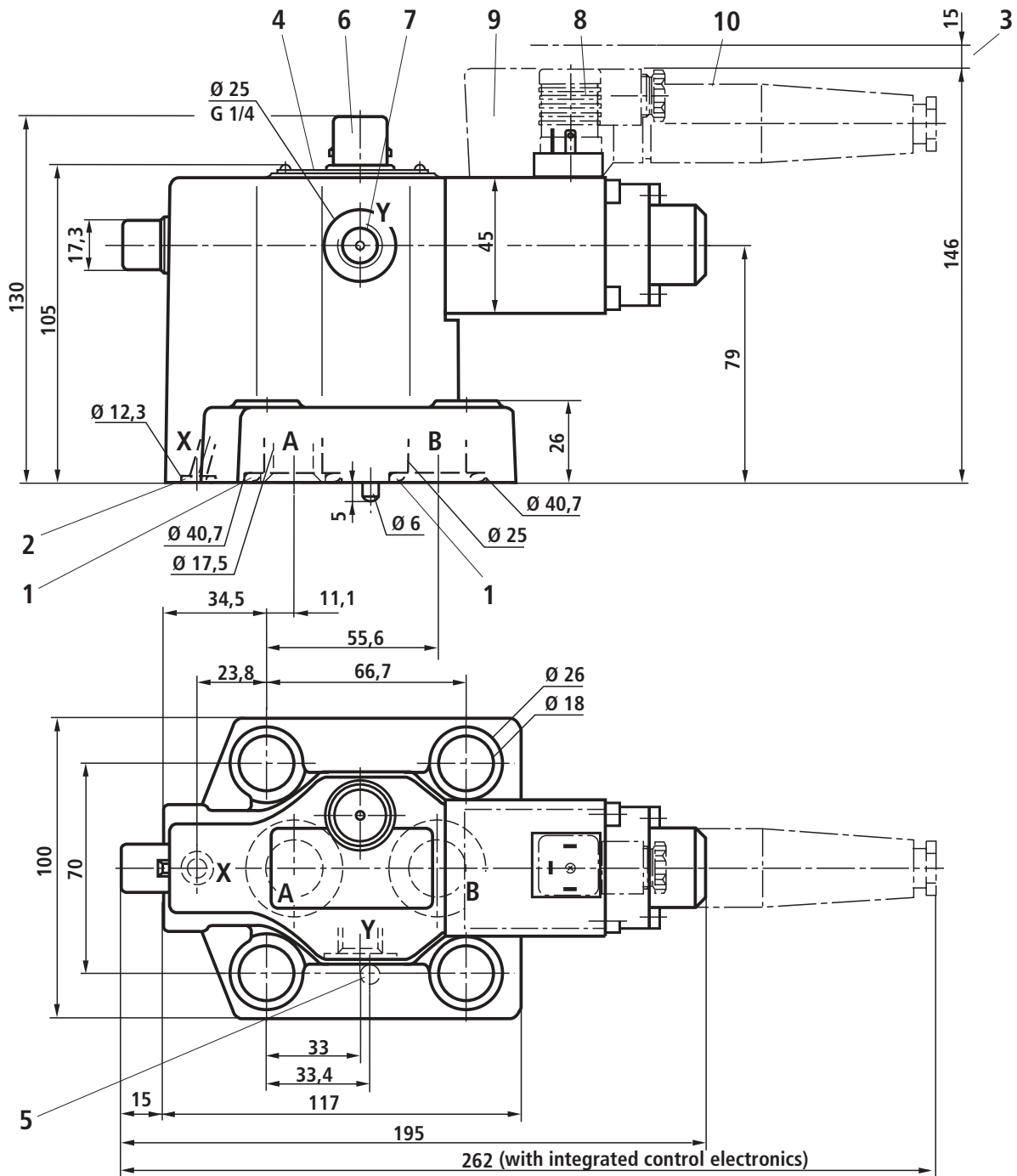
Required surface finish of the mating piece

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

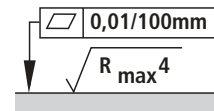
Subplates: G 545/01 (G 3/8)
G 546/01 (G 1/2)

Valve fixing screws: M12 x 50 DIN 912-10.9;
 $M_A = 70 \text{ Nm}$

Unit dimensions: NS 25 (dimensions in mm)



- 1 Identical seal rings for ports A and B
- 2 Seal ring for port X
- 3 Space required to remove the plug-in connector
- 4 Name plate
- 5 Locating pin
- 6 Maximum pressure limitation (types DBEM, DBEME)
When using these valves, please take into account the guidelines stated on page!
- 7 External pilot oil drain, separate and at zero pressure to tank
- 8 Plug-in connector for type DBE(M)
(separate order, see page 5)
- 9 Integrated control electronics
- 10 Plug-in connector for type DBE(M)E
(separate order, see page 5)



Required surface finish of the mating piece

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

Subplates: G 408/01 (G 3/4)
G 409/01 (G 1)

Valve fixing screws: M16 x 50 DIN 912-10.9;
 $M_A = 150 \text{ Nm}$

Notes

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