RE 29 158/11.02

Replaces: 12.98

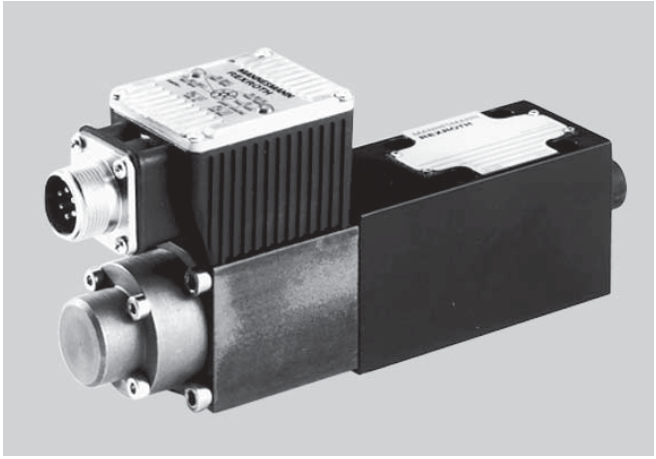
Proportional pressure relief valve Types (Z)DBE and (Z)DBEE

Nominal size 6

Series 1X

Maximum operating pressure 315 bar

Maximum flow 30 L/min



H/A 3598/93

Type DBEE 6..-1X/...G24K31... with integrated control electronics

Overview of contents

Features

- Valve for limiting a system pressure
- Operation via proportional solenoids
- For subplate mounting or of sandwich plate design:
  Porting pattern to DIN 24 340, Form A6
  Subplates to catalogue sheet RE 45 052
  (separate order, see pages 9 and 10)
- Valve and control electronics from a single source
- External control electronics for types DBE and ZDBE:
  - 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
  - Analogue amplifier of modular design type VT 11131 (separate order), see page 5
- Types DBEE and ZDBEE with integrated control electronics:
  - Low example spread of the command value-pressure-characteristic curve
  - Independently adjustable up and down ramps

Ordering details

	DBE		6		–1X /		G24			*

Subplate mounting **= No code**
Sandwich plate **= Z**

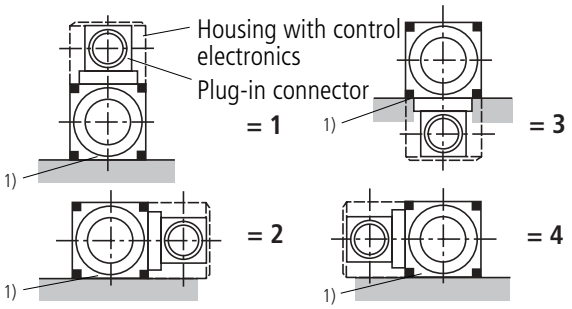
Proportional pressure relief valve

For external control electronics **= No code**
With integrated control electronics **= E**

Nominal size 6 **= 6**

Subplate mounting valve **= No code**
Sandwich plate P → T **= VP**

Position of the plug-in connector for the type ZDBE
Position of housing with control electronics, type ZDBEE



1) Valve mounting side (R-ring grooves in the housing)

Series 10 to 19 **= 1X**
(10 to 19: unchanged installation and connection dimensions)

Pressure stage 50 bar **= 50**
Pressure stage 100 bar **= 100**
Pressure stage 200 bar **= 200**
Pressure stage 315 bar **= 315**

Further details in clear text

M = NBR seals, suitable for mineral oil (HL, HLP) to DIN 51 524

V = FKM seals, suitable for phosphate ester

Electrical connections
For DBE; ZDBE:

K4 = **Without** plug-in connector, with component plug to DIN EN 175 301-803
Plug-in connector – separate order, see page 5

For DBEE; ZDBEE:

K31 = **Without** plug-in connector, with component plug to E DIN 43 563-AM6-3
Plug-in connector – separate order, see page 5

G24 = Supply voltage for the control electronics, 24 V DC

No code = Internal pilot oil drain
(Recommended: Subplate mounting up to q_{Vmax}=15 L/min)

Y = External pilot oil drain
(only possible with subplate mounting)

Preferred types

Type DBEE

Material No.	Type
R900954432	DBEE 6-1X/50YG24K31M
R900919359	DBEE 6 -1X/100YG24K31M
R900954433	DBEE 6-1X/200YG24K31M
R900546987	DBEE 6-1X/315YG24K31M

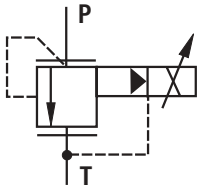
Type ZDBEE

Material No.	Type
R900954434	ZDBEE 6 VP2-1X/50G24K31M
R900954435	ZDBEE 6 VP2-1X/100G24K31M
R900954436	ZDBEE 6 VP2-1X/200G24K31M
R900954437	ZDBEE 6 VP2-1X/315G24K31M

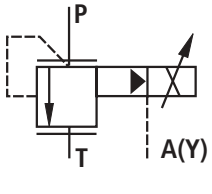
Further preferred types and standard units are to be found in the EPS (Standard Price List).

Symbols (for sandwich plate symbol: ① = component side, ② = subplate side)

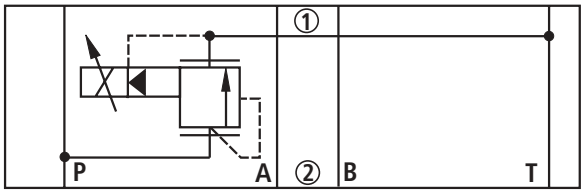
Type DBE(E) 6…



Type DBE(E) 6…Y..



Type ZDBE(E) 6 VP…



Function, section

Types DBE and ZDBE

Proportional pressure relief valves types DBE and ZDBE are operated by means of a proportional solenoid. These valves are used to limit a system pressure. With these valves it is possible to infinitely adjust the system pressure, which is to be limited, in relation to the electrical command value.

These valves basically consist of a proportional solenoid (1), the housing (2), the valve cartridge (3), the spool (4) and the pilot poppet (8).

The proportional solenoid proportionally converts the electrical current into a mechanical force. An increase in current causes a corresponding rise in the solenoid force. The solenoid armature chamber is filled with hydraulic fluid and is pressure balanced.

The setting of the system pressure is carried out via the proportional solenoid (1) in relation to the command value. Pressure arising from the system is port P acts on the right hand side of the spool (4). At the same time the system pressure acts via the control line (6) which is fitted with an orifice (5) on the spring loaded side of the spool (4).

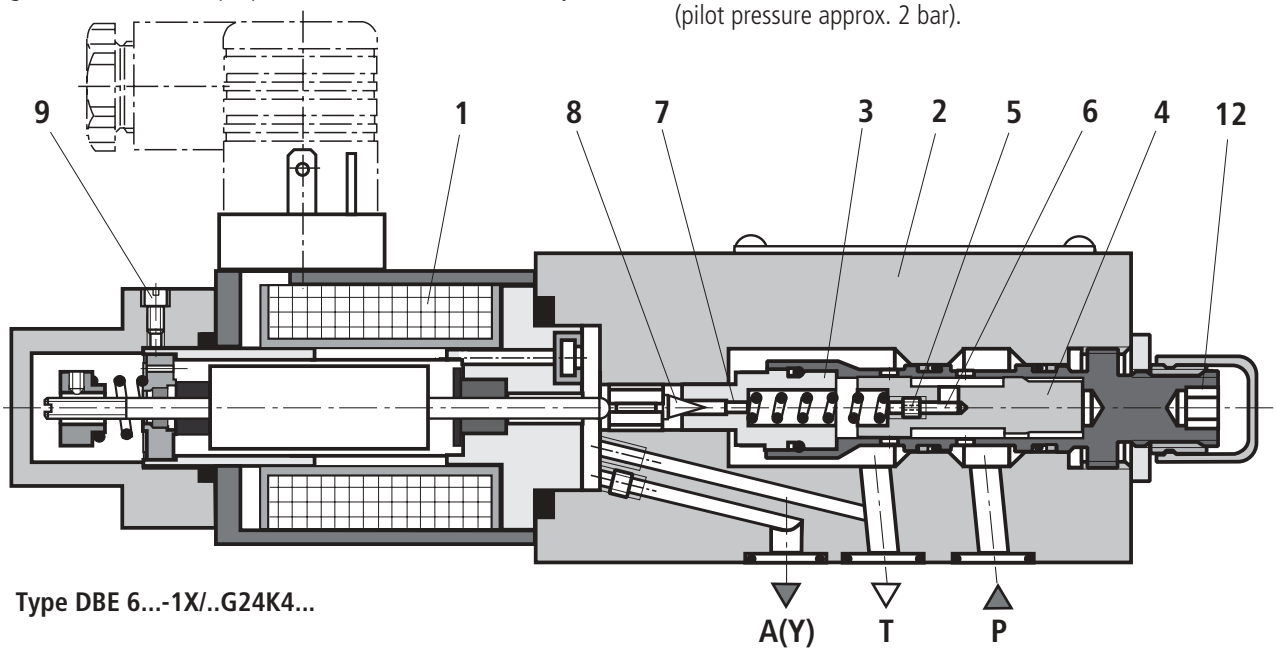
Via a further orifice (7) the system pressure acts on the pilot poppet (8) against the force of the proportional solenoid (1). Once the system pressure has reached the pre-set value the pilot poppet (8) lifts from its seat. Depending on the model, pilot oil can now flow away externally via port A (Y) or internally into the tank, this has the effect of limiting the pressure on the spring loaded side of the spool (4). If the system pressure continues to rise slightly then the higher pressure on the right hand side of the spool pushes the spool to the left into control position P to T.

At a minimum control current - corresponding to a command value of zero - the minimum settable pressure will be set.

Note!

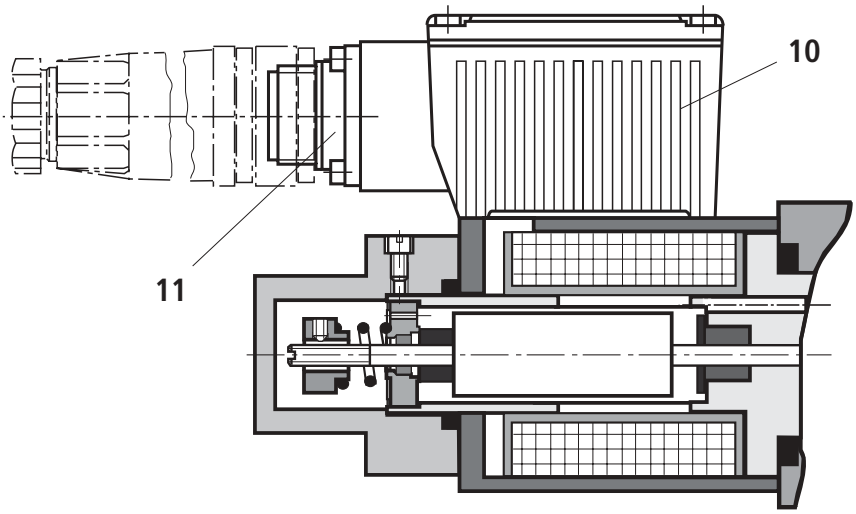
To ensure optimim function, the valve must be bled at the commissioning stage:

- Remove bleed screw (9),
- Pour hydraulic fluid into the open threaded hole, Pos. 9,
- When no more bubbles appear, re-fit screw, Pos. 9.
- The tank should be prevented from draining. Where installation conditions are applicable a back pressure insert should be used (pilot pressure approx. 2 bar).



Type DBE 6...-1X/..G24K4...

Types DBEE and ZDBEE (with integrated control electronics)



In terms of function and design, these valves basically correspond to the types DBE and ZDBE. An additional housing (10) is fitted on the proportional solenoid which contains the control electronics. Supply and command value voltages are applied to the connector (11).

The command value-pressure-characteristic curve (zero point at the valve cartridge (12) and the increase at the I_{max} potentiometer (R30) in the control electronics) is factory pre-set.

At two potentiometers it is possible to independently adjust the ramp times for the increase and decrease in pressure.

For further details regarding the integrated electronics see page 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 ZDBE	°C	– 20 to + 70
	DBEE and ZDBEE	°C	– 20 to + 50
Weight	DBE and ZDBE	kg	2.4
	DBEE and ZDBEE	kg	2.5

Hydraulic (measured with HLP 46; ϑ_{oil} = 40 °C ± 5 °C)

Max. operating pressure	Ports P ; P1 – P2; A1 – A2; B1 – B2	bar	315
	Port T	bar	50
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
Min. settable pressure with a zero a command value		bar	See characteristic curves on page 8
Return pressure port A; with external pilot oil drain (Y)			Separate and at zero pressure to tank
Pilot oil flow		L/min	0.6 to 1.2
Max. flow		L/min	30
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			Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 20/18/15[1)]
Hysteresis		%	± 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 ZDBE	%	± 2,5 of max. settable pressure
	DBEE und ZDBEE	%	± 1.5 of max. settable pressure
Step response $T_u + T_g$	10 % → 90 %	ms	Approx. 80] depending on
	90 % → 10 %	ms	Approx. 50] installation

Electrical

Voltage type			24 V DC
Min. control current		mA	100
Max. control current		mA	1600
Coil resistance	Cold value at 20°C	Ω	5.4
	Max. warm value	Ω	7.8
Duty		%	100
Electrical connections	DBE and ZDBE		With component plug to DIN EN 175 301-803
			Plug-in connector to DIN EN 175 301-803 [2)]
	DBEE and ZDBEE		With component plug to E DIN 43 563-AM6-3
			Plug-in connector to E DIN 43 563-BF6-3/Pg11 [2)]
Valve protection to DIN 40 050			IP 65 with mounted and fixed plug-in connector

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

2) Separate order, see page 5

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

Electrical

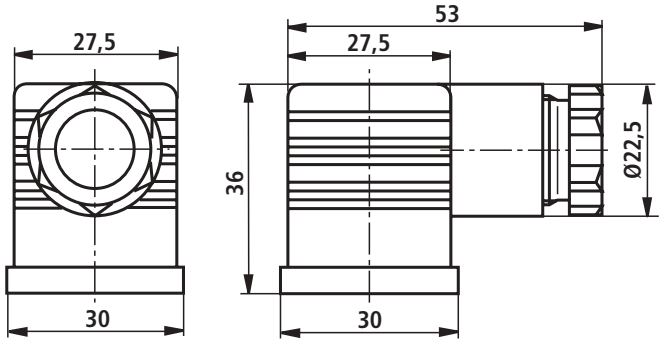
Control electronics		
– For DBEE and ZDBEE		Integrated into the valve, see page 6
– For DBE and ZDBE		
• Amplifier in Eurocard format	Analogue	VT-VSPA1-1 to catalogue sheet RE 30 111
(separate order)	Digital	VT-VSPD-1 to catalogue sheet RE 30 123
• Amplifier of modular design (separate order)	Analogue	VT 11131 to catalogue sheet RE 29 865

Note: For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 158-U (declaration regarding environmental compatibility).

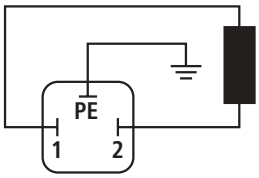
Electrical connections, plug-in connector

For types DBE, ZDBE (for external control electronics)

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



Connections at component plug

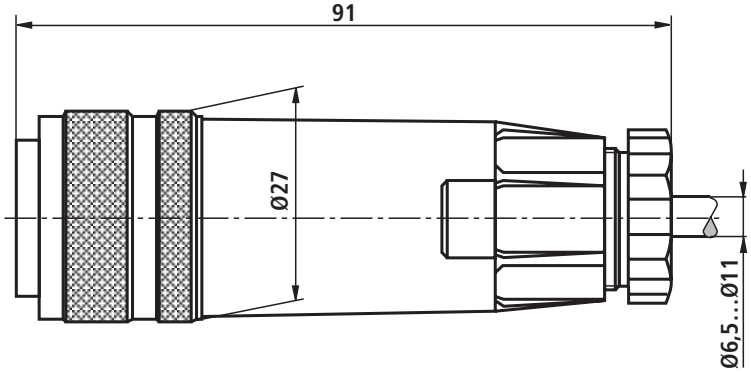


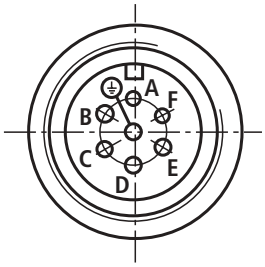
Connections at plug-in connector

To amplifier

For types DBEE, ZDBEE (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

Funetion

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.

The ramp times of 5 s is only possible over the complete command value range. 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.

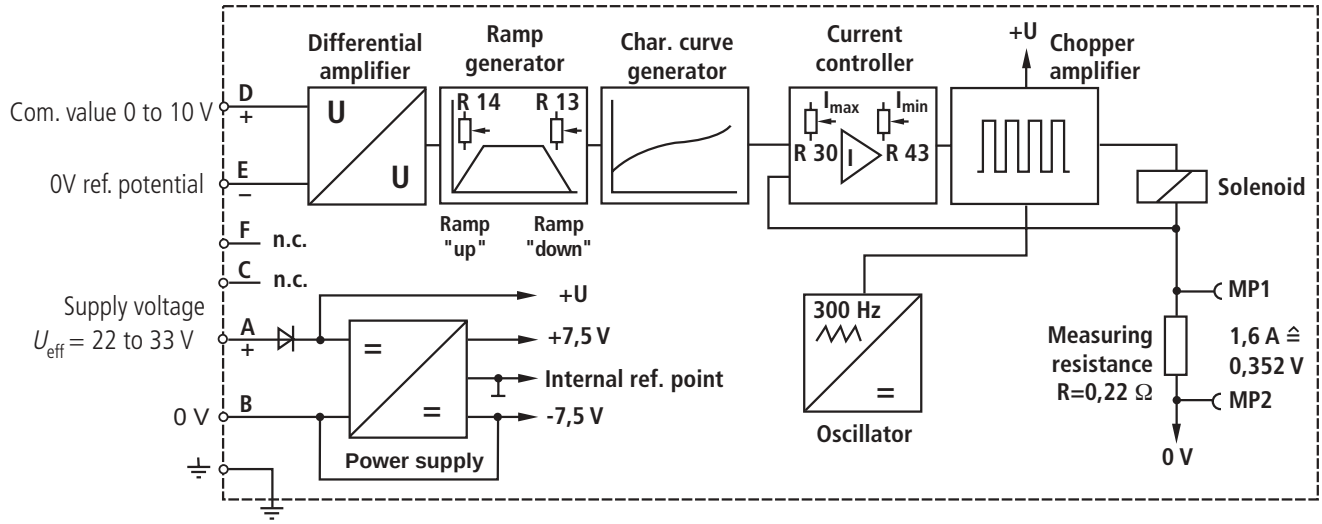
At potentiometer R30 the increase of the command value-current-characteristic curve, and thereby also the increase rate of the command value-pressure-characteristic curve of the proportional pressure valve may be altered.

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 can be adjusted 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_{eff} = 22 to 33 V

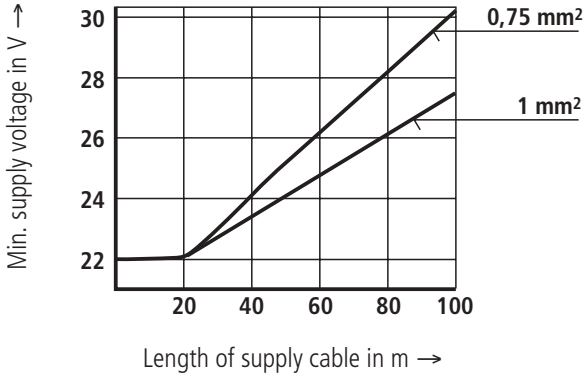
Residual ripple at power supply: < 5 %

Output current: I_{eff} = 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 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).

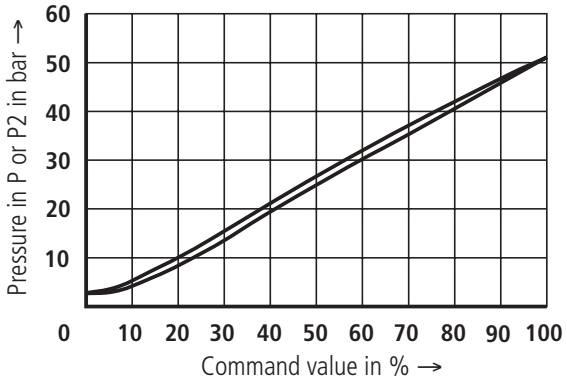
For lengths > 50 m a capacitor of 2200 µF must be installed near the valve in the supply line.



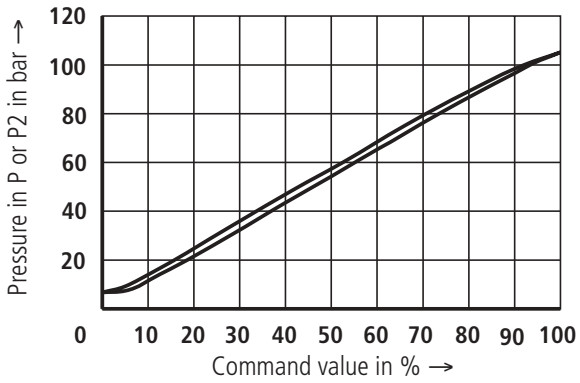
Characteristic curves (measured with HLP 46; ϑ_{oil} = 40 °C ± 5 °C)

Pressure in ports P or P2 in relation to the command value (q_V = 5 L/min)

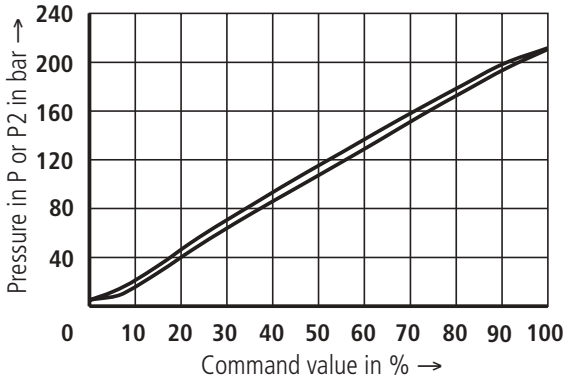
Pressure stage 50 bar (external and internal)



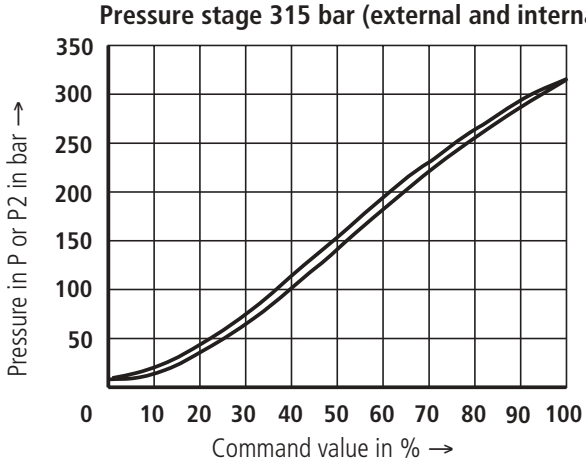
Pressure stage 100 bar (external and internal)



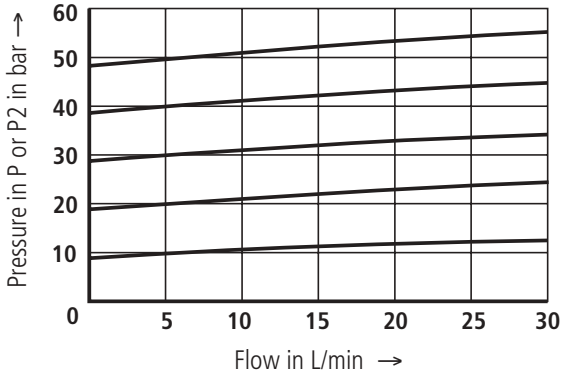
Pressure stage 200 bar (external and internal)



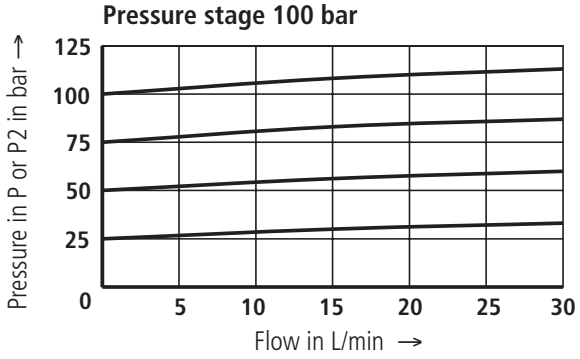
Pressure stage 315 bar (external and internal)



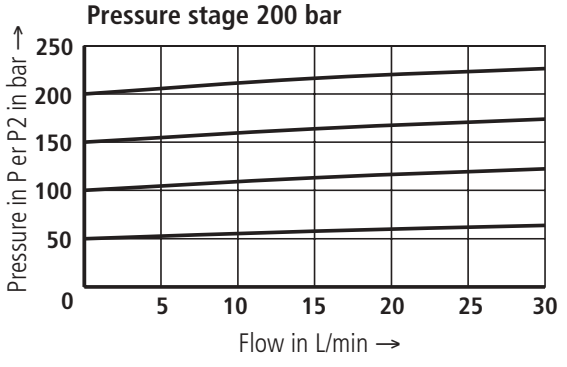
Pressure stage 50 bar



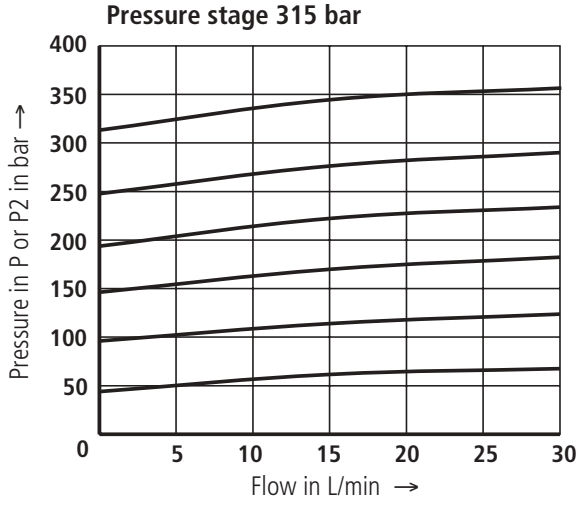
Pressure stage 100 bar



Pressure stage 200 bar



Pressure stage 315 bar



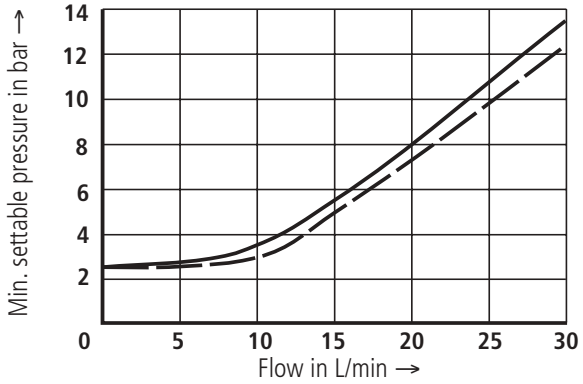
The characteristic curves were measured without back pressure at port A (external pilot oil drain) and T (internal pilot oil drain).
With an internal pilot oil drain the pressure in P or P2 increases by the pressure acting in port T.

Characteristic curves (measured with HLP 46; ϑ_{oil} = 40 °C ± 5 °C)

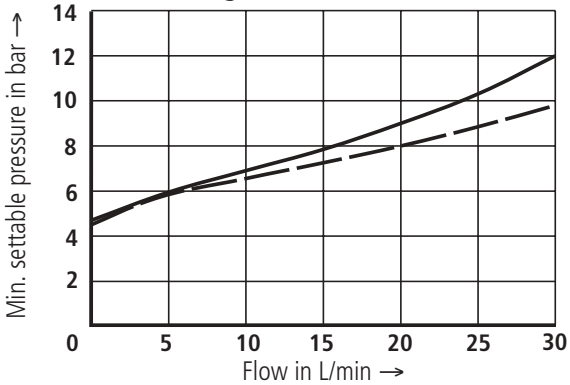
Min. settable pressure at port P or P2 with a 0 command value

Pilot oil drain ——— internal – – – external

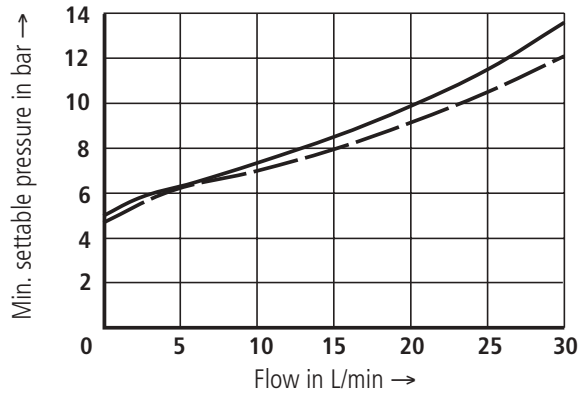
Pressure stage 50 bar



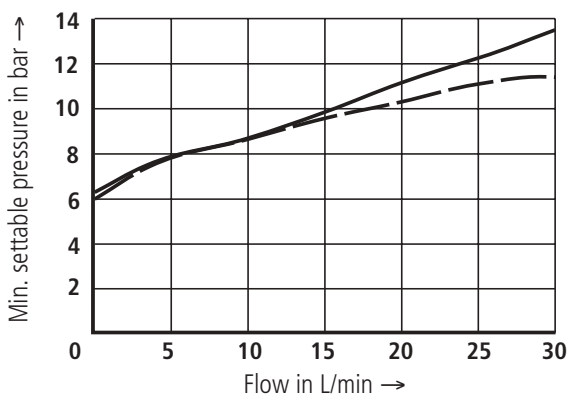
Pressure stage 100 bar



Pressure stage 200 bar

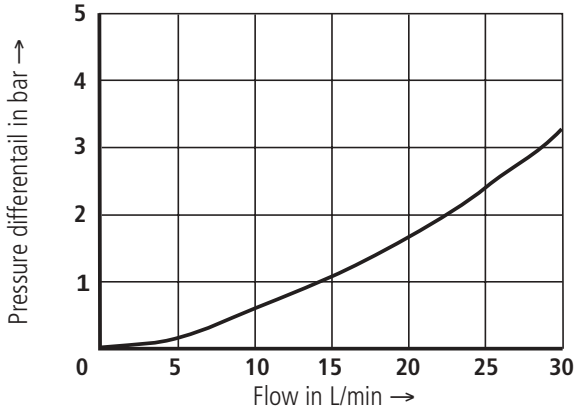


Pressure stage 315 bar

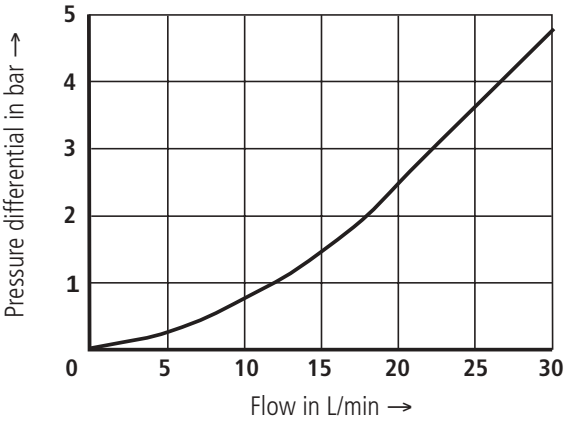


The characteristic curves were measured without back pressure at port A (external pilot oil drain) and T (internal pilot oil drain).
With an internal pilot oil drain the pressure in P or P2 increases by the pressure acting in port T.

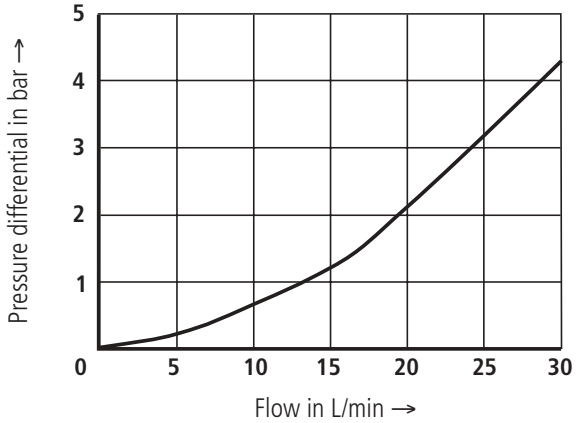
Pressure differentail A1 → A2 und B1 → B2

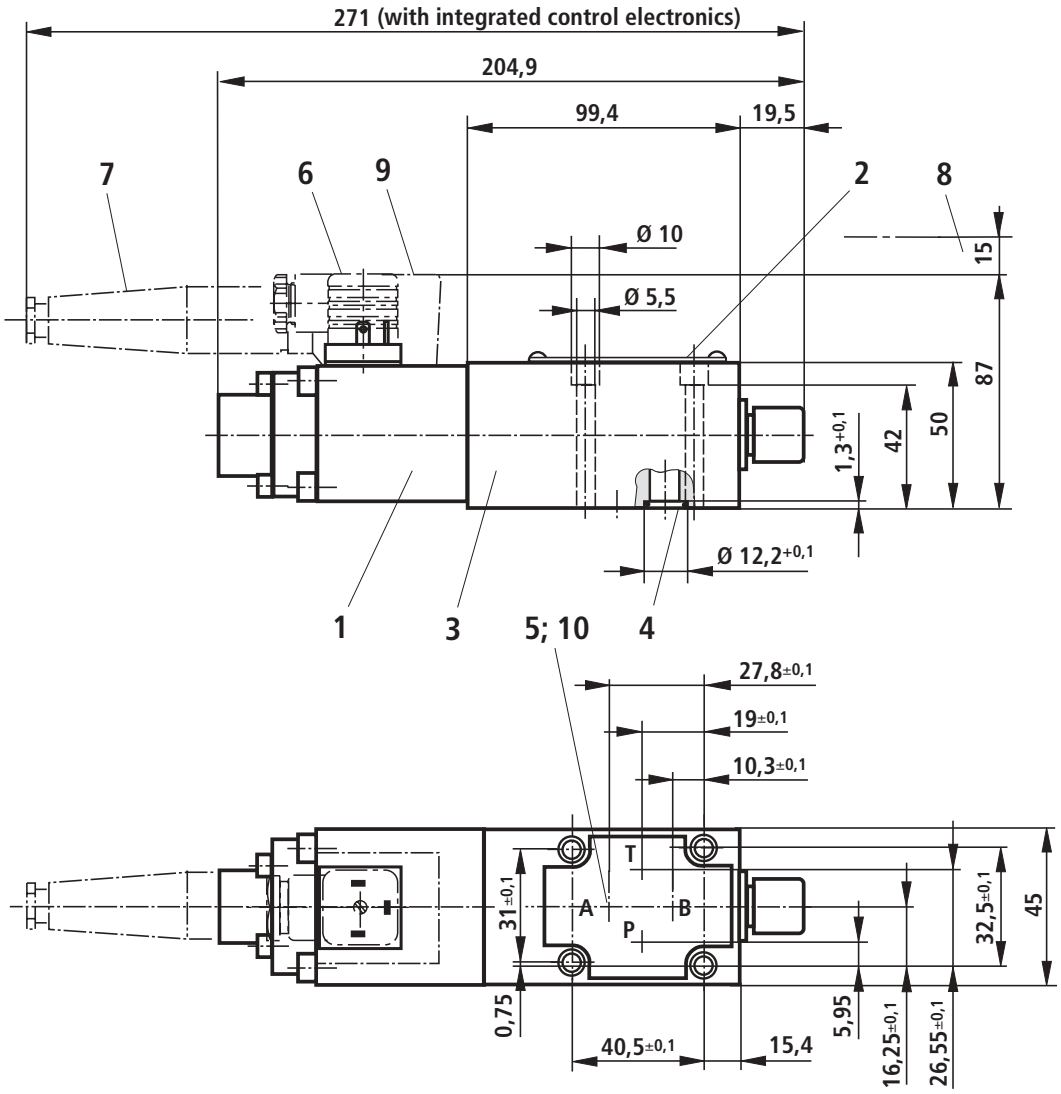


Pressure differential P1 → P2

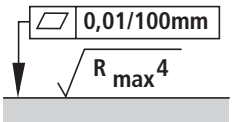


Pressure differential T1 → T2





1 Proportional solenoid
2 Name plate
3 Valve housing
4 Identical seal rings for ports A, B, P and T
5 Pilot oil drain for version Y is external via port A (Y)
6 Plug-in connector for type DBE (separate order, see page 5)
7 Plug-in connector for type DBEE separate order, see page 5
8 Space required to remove the plug-in connector
9 Integrated control electronics
10 Porting pattern to DIN 24 340; Form A6



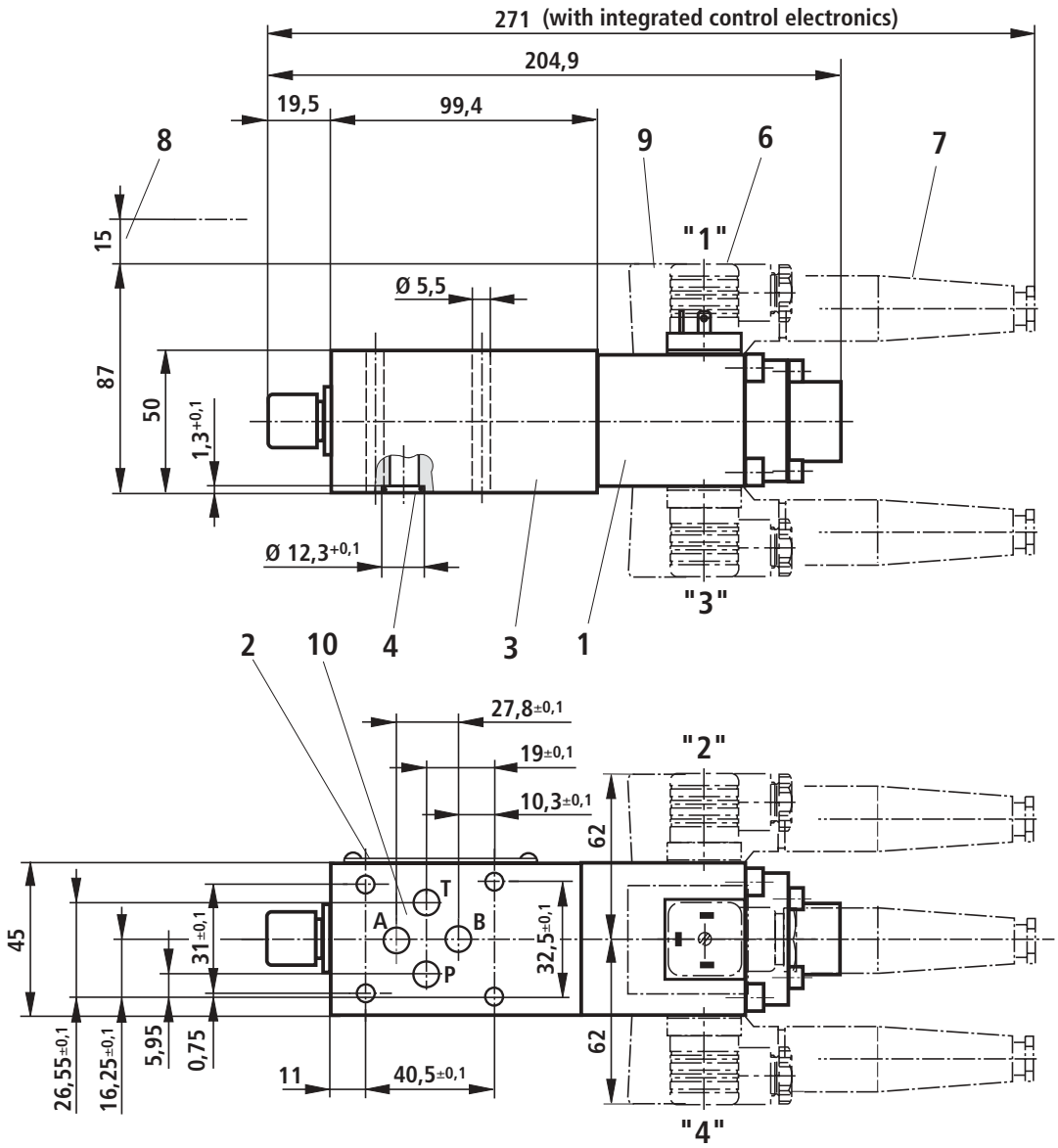
Required surface finish of the mating piece

Subplates to catalogue sheet RE 45 052 and valve fixing screws must be ordered separately.

Subplates: G 341/01 (G 1/4)
G 342/01 (G 3/8)
G 502/01 (G 1/2)

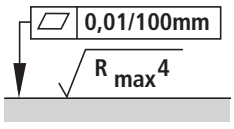
Valve fixing screws: M5 x 50 DIN 912-10.9;
M_A = 7 Nm

Unit dimensions: types ZDBE and ZDBEE (dimensions in mm)



"1" to "4" – position of the plug-in connector or the housing with control electronics (see ordering details)

1 Proportional solenoid
2 Name plate
3 Valve housing
4 Identical seal rings for ports A, B, P and T
6 Plug-in connector for type ZDBE (separate order, see page 5)
7 Plug-in connector for type ZDBEE separate order, see page 5
8 Space required to remove the plug-in connector
9 Integrated control electronics
10 Porting pattern to DIN 24 340; Form A6



Required surface finish of the mating piece

Subplates to catalogue sheet RE 45 052 and valve fixing screws must be ordered separately.

Subplates: G 341/01 (G 1/4)
G 342/01 (G 3/8)
G 502/01 (G 1/2)

Valve fixing screws: M5 DIN 912-10.9;
M_A = 7 Nm

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