RE 29 176/11.02

Ersetzt: 12.98

Proportional pressure reducing valve, pilot operated Types DRE(M) and DRE(M)E

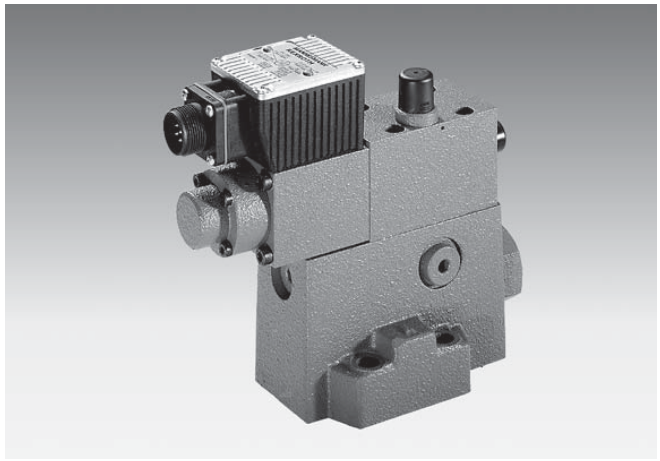
Nominal sizes 10 and 25 [1)]

Series 5X

Maximum operating pressure 315 bar

Maximum flow 300 L/min

[1)] NS 32 see RE 29 178



H/A/D 5963/98

Type DREME 20 -5X/...Y...G24K31…

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Features

- Valve used for reducing an operating pressure
- Operation via proportional solenoids
- For subplate mounting:
  Porting pattern to DIN 24 340 Form D, for subplates see catalogue sheet RE 45 062 (separate order), see page 8
- Third flow path A to Y, 6 mm diameter
- Lowest settable pressure 2 bar at zero command value
- Linearised command value-pressure-characteristic curve
- Main spool closed from B to A in the de-energised position
- Good transient response
- Optional check valve between A and B
- Maximum pressure limitation, optional
- Valve and electronics from one source
- Controls for type DRE:
  - 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 11724 of modular design (separate order), see page 5
- Type DREE with integraed control electronics:
  - Low example spread for the command value-pressure-characteristic curve
  - Independently adjustable ramp times for increasing and decreasing the pressure

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Ordering details

DRE				5X/		Y		G24			*

Without maximum pressure limitation = **No code**
With maximum pressure limitation = **M**

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

Nominal size 10 = **10**
Nominal size 25 = **20**

Series 50 to 59 = **5X**
(50 to 59: unchanged installation and connection dimensions)

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

Pilot oil drain always external, separate and at zero pressure to tank = **Y**

With check valve between A and B = **No code**
Without check valve = **M**

Power supply for the control electronics
24 V DC = **G24**

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 (HFD-R)

Electrical connections
For DRE; DREM:

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

For DREE; DREME:

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

Preferred types (readily available)

NS 10

Material No.	Type DREE(M) 10
R900954506	DREE 10 -5X/50YMG24K31M
R900950719	DREE 10 -5X/100YMG24K31M
R900937022	DREE 10 -5X/200YMG24K31M
R900937209	DREE 10 -5X/315YMG24K31M

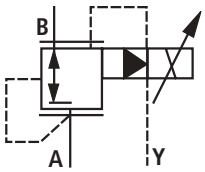
NS 25

Material No.	Type DREE(M) 20
R900954511	DREE 20 -5X/50YMG24K31M
R900954508	DREE 20 -5X/100YMG24K31M
R900954509	DREE 20 -5X/200YMG24K31M
R900954510	DREE 20 -5X/315YMG24K31M

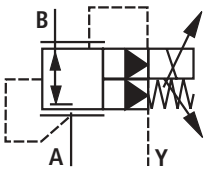
Further preferred types and standard units can be found in the EPS (Standard Price list).

Symbols

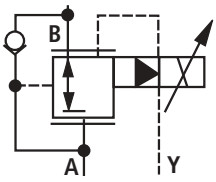
DRE(E).-5X/…**YM**…



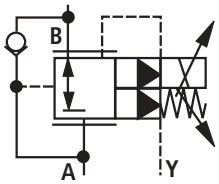
DREM(E).-5X/…**YM**…



DRE(E).-5X/…**Y**…



DREM(E).-5X/…**Y**…



Function, section

The valve types DRE and DREM are pilot operated pressure reducing valves. They are used for the reduction of a working pressure.

The valve basically consists of the pilot valve (1) with proportional solenoid (2), main valve (3) with main spool assembly (4), as well as an optional check valve (5).

Type DRE...

The setting of the pressure in port A is dependent on the voltage present at the proportional solenoids (2).

At rest – with no pressure in port B – the spring (17) holds the main spool (4) in its initial position. The connection from B to A is closed. A start-up jump is therefore avoided.

The pressure in port A acts via connection (6) on the area (7) of the main spool. The pilot oil is taken from port B and passes through the connection (8) to the constant flow controller (9), which holds the pilot oil flow constant independent of pressure drops between port A and B. From the constant flow controller (9) the pilot oil flow passes into the spring chamber (10), through the connections (11) and (12) via valve seat (13) into the Y port (14, 15, 16) and from there into the drain line.

The pressure required in port A is defined at the relevant amplifier. The proportional solenoid presses the valve cone (20) against the valve seat (13) and limits the pressure in spring chamber (10) to the set value. If the pressure in port A is lower than the command value, then the higher pressure in the spring chamber (10) pushes the main spool to the right. The connection from B to A is opened.

When the required pressure in port A is achieved, the main spool is force balanced – the main spool is in its control position.

Pressure in port A • spool area (7) =
Pressure in spring chamber (10) • spool area – spring force (17)

If in a fluid column (e.g. cylinder piston against its stop) the pressure in port A is to be lowered, then the command value potentiometer is set, at the relevant amplifier, to a lower pre-set value that is immediately effective in spring chamber (10). The higher pressure in port A acting on area (7) of the main spool and presses the main spool onto the plug (18). The connection A to B is closed and A to Y is opened. The spring (17) force now acts against the hydraulic force on area (7) of the main spool. In this main spool position the pressure fluid from port A can flow via the control land (19) to Y then into the drain line.

When the pressure in port A has dropped to the pressure acting in the spring chamber (10) plus the Δp from the spring (17), then the main spool closes at the control land A to Y the large control connection in the bush.

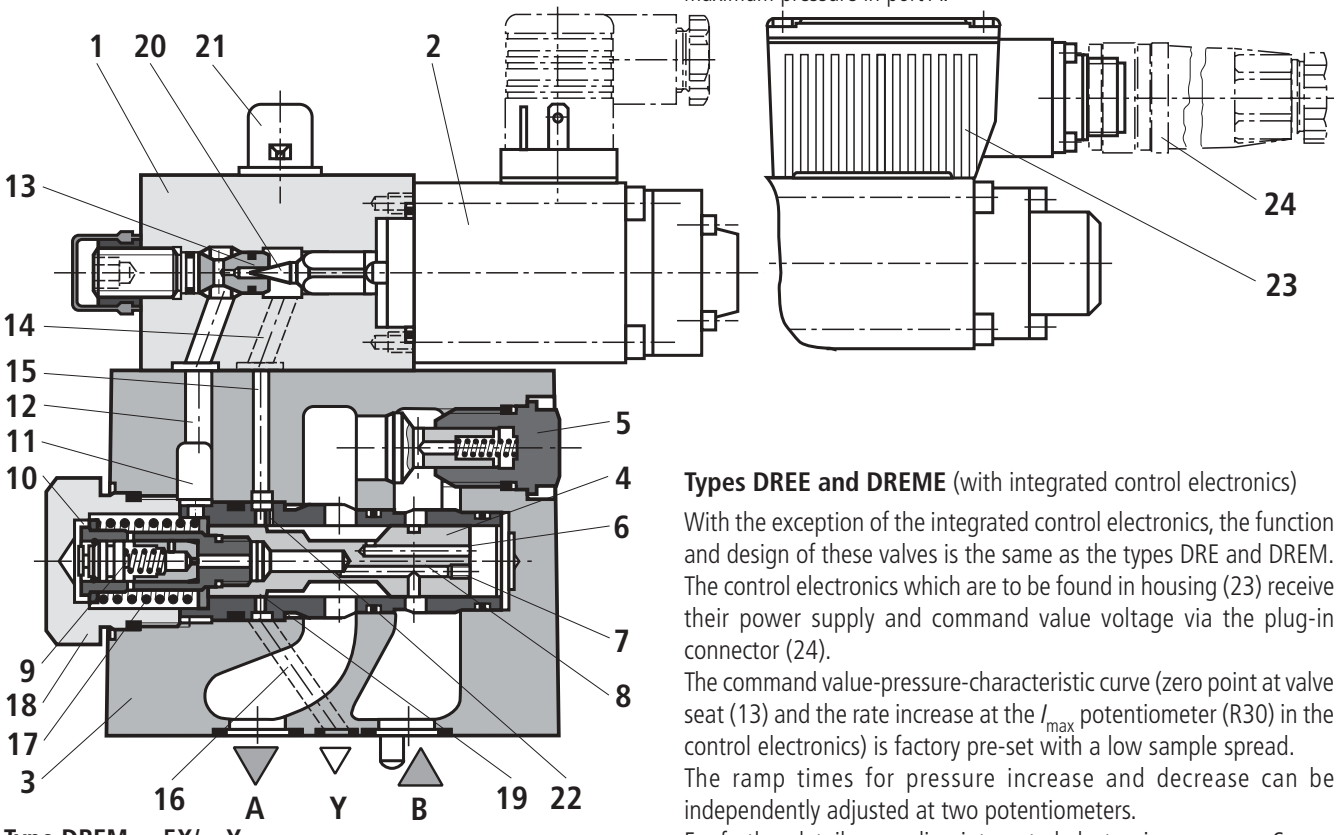
The remaining pressure differential of approx. 10 bar compared to the new command value pressure in port A is then unloaded via the fine control connection (22). Thereby a good transient response without pressure under shooting is achieved.

In order to allow free-flow from port A to B a check valve (5) can be fitted as an optional extra. A part of the oil flow from port A flows simultaneously via the open control land (19) of the main spool from A to Y to the return line.

Type DREM...

In order to ensure that excessive hydraulic pressures (hydraulic safety) do not occur due to unpermissibly high control currents at the proportional solenoid, that automatically causes higher pressure in port A, a spring loaded maximum pressure relief valve (21), for maximum pressure safety, can be optionally installed if required.

Note: When the pressure fluid flows from port A to port B via the check valve (5), the parallel flow of oil via Y to tank affects the deceleration process of the actuator attached to port A, if this is being decelerated by a throttle valve in port B (e.g. proportional directional valve). Under such circumstances, the third direction A to Y is not suitable for limiting the maximum pressure in port A.



Type DREM…-5X/…Y…

Types DREE and DREME (with integrated control electronics)

With the exception of the integrated control electronics, the function and design of these valves is the same as the types DRE and DREM. The control electronics which are to be found in housing (23) receive their power supply and command value voltage via the plug-in connector (24).

The command value-pressure-characteristic curve (zero point at valve seat (13) and the rate increase at the I_{max} potentiometer (R30) in the control electronics) is factory pre-set with a low sample spread.

The ramp times for pressure increase and decrease can be independently adjusted at two potentiometers.

For further details regarding integrated electronics, see page 6.

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

General			**NS10**	**NS25**
Installation			Optional	
Storage temperature range		°C	– 20 to + 80	
Ambient	DRE and DREM	°C	– 20 to + 70	
temperature range	DREE and DREME	°C	– 20 to + 50	
Weight	DRE and DREM	kg	5.1	6.0
	DREE and DREME	kg	5.2	6.1

Hydraulic (measured with HLP 46; ϑ_{oil} = 40 °C ± 5 °C and p = 100 bar)

Max. operating pressure	Ports A and B	bar	315	
	Port Y		Separate and at zero pressure to tank (inside pipe Ø ≥ 5 mm; pipe length < 2500 mm)	
Max. settable pressure	Pressure stage 50 bar	bar	50	
in port A	Pressure stage 100 bar	bar	100	
	Pressure stage 200 bar	bar	200	
	Pressure stage 315 bar	bar	315	
Min. settable pressure with a zero command value in port A		bar	2	
Max. pressure limitation			Pressure setting range:	Set pressure as delivered:
	Pressure stage 50 bar	bar	30 to 70	At 70 bar
	Pressure stage 100 bar	bar	50 to 130	At 130 bar
	Pressure stage 200 bar	bar	90 to 230	At 230 bar
	Pressure stage 315 bar	bar	150 to 350	At 350 bar
Max. permissible flow of the main valve		L/min	200	300
Pilot oil flow		cm^3/min	800	
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524, Phosphate ester (HFD-R)	
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		%	± 2.5 of max. settable pressure	
Repeatability		%	< ± 2 of max. settable pressure	
Linearity		%	± 2 of max. settable pressure	
Example spread of the	DRE und DREM	%	± 2.5 of max. settable pressure	
com. value-pressure-char.	DREE und DREME	%	± 1.5 of max. settable pressure	
curve, referring to the hysteresis char. curve, pressure increasing				
Step response $T_u + T_g$	10 → 90 %	ms	130 [measured with standing oil column of	
	90 → 10 %	ms	120 [15 litres at port A	

[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!)

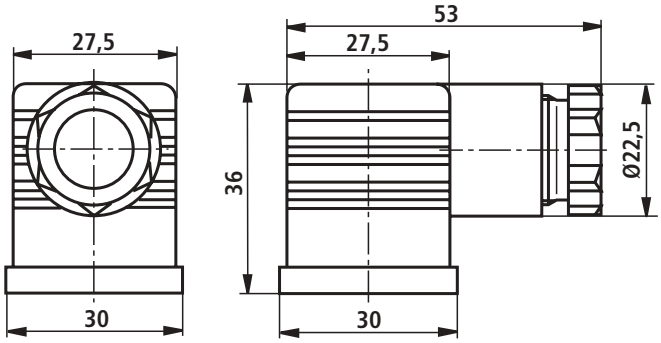
Electrical

Supply voltage			24 V DC
Min. solenoid current	DRE and DREM	mA	50
	DREE and DREME	mA	100
Max. solenoid current	DRE and DREM	mA	800 (equals 100 % command value)
	DREE and DREME	mA	1440 to 1760
Coil resistance	Cold value at 20°C	Ω	19.5 for DRE / DREM ; 5.4 Ω for DREE / DREME
	Max. warm value	Ω	28.8 for DRE / DREM ; 7.8 Ω for DREE / DREME
Duty			Continuous
Electrical connections	DRE and DREM		With component plug to DIN EN 175 301-803
[1] Separate order,			Plug-in connector to DIN EN 175 301-803 [1]
see below	DREE and DREME		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 DREE and DREME			Integrated in the valve (see page 6)
– For DRE and DREM			
• Amplifier in Eurocard format		Analogue	VT-VSPA1(K)-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 11724 to catalogue sheet RE 29 866

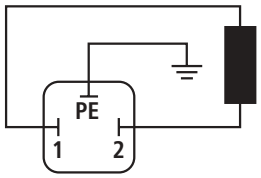
Note: For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 176-U (declearation regarding environmental compatibility).

Electrical connections, plug-in connectors

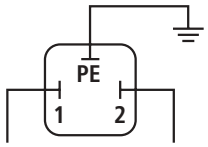
For types DRE, DREM (for external control electronics)
Plug-in connector to DIN EN 175 301-803
Separate order under Material No. **R900074684**



Connections at component plug

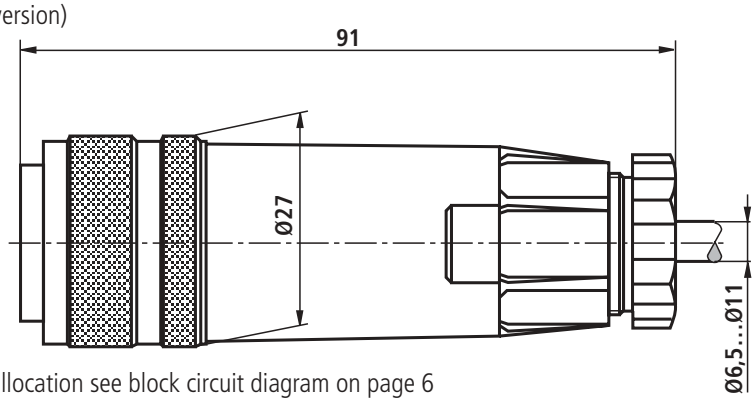


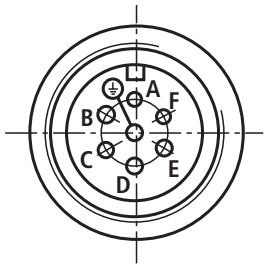
Connections at plug-in connector



To amplifier

For types DREE, DREME (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

Function

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

The ramp generator produces a from 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.

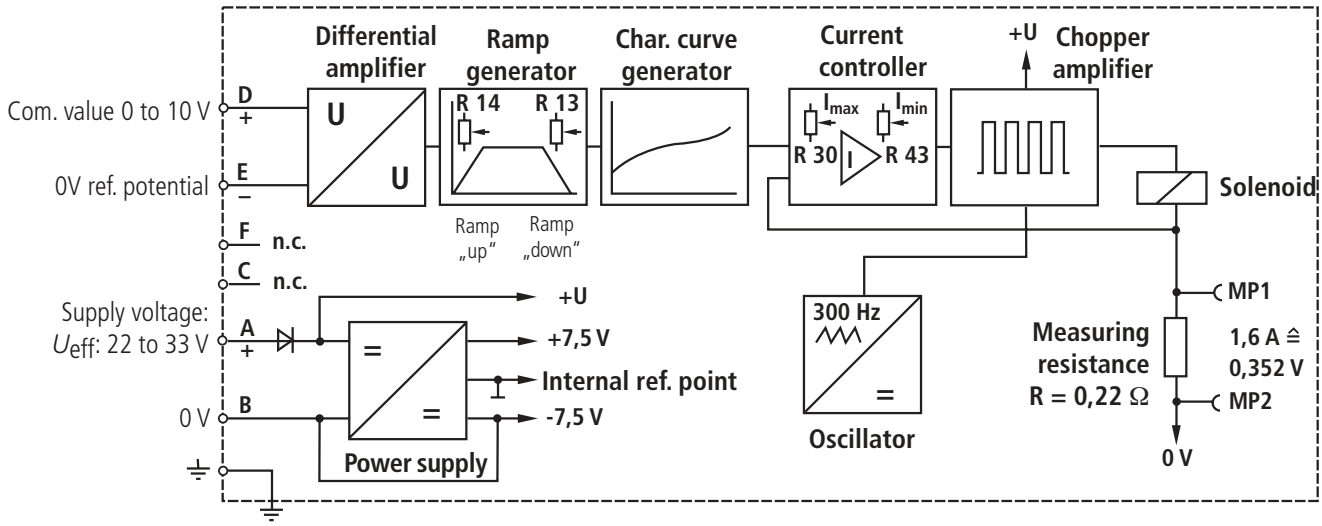
At potentiometer R30 the increase of the command value-current characteristic curve, and thereby also the increase rate of the command value-pressure-characteristic curve of the proportional pressure valve may be altered.

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_{eff} = 22 to 33 V

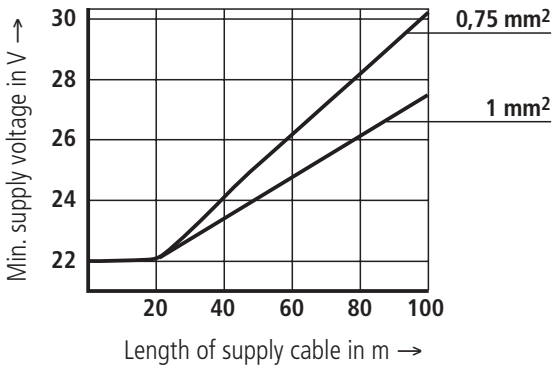
Residual ripple at power supply: < 5 %

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).

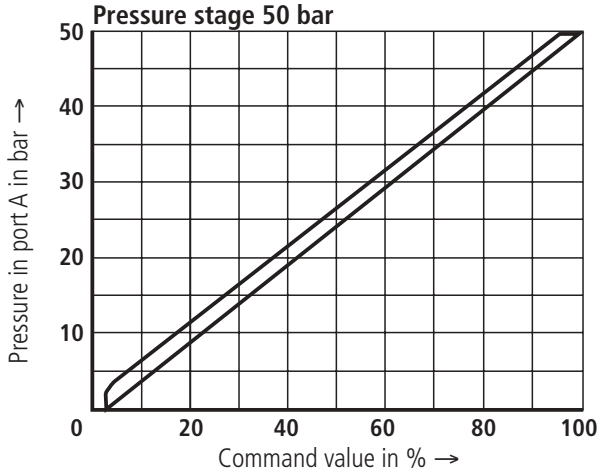
For lengths > 50 m a capacitor of 2200 µF must be installed near the valve in the supply line.



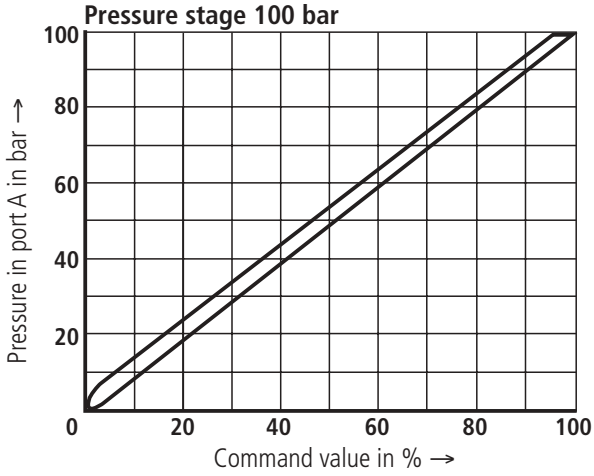
Characteristic curves (measured with HLP 46; ϑ_{oil} = 40 °C ± 5 °C)

Pressure in port A in relation to the command value

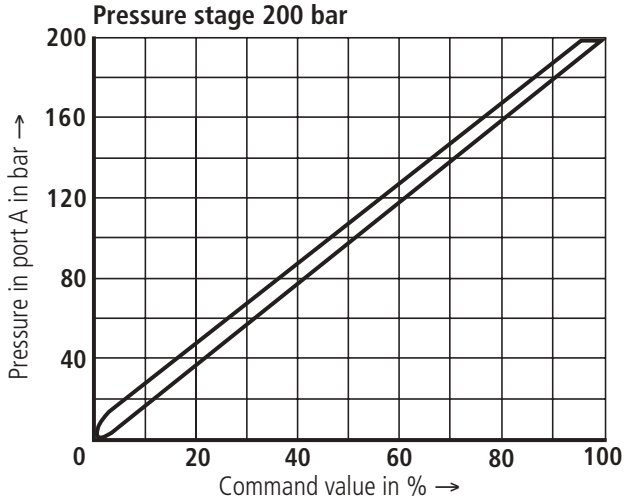
Pressure stage 50 bar



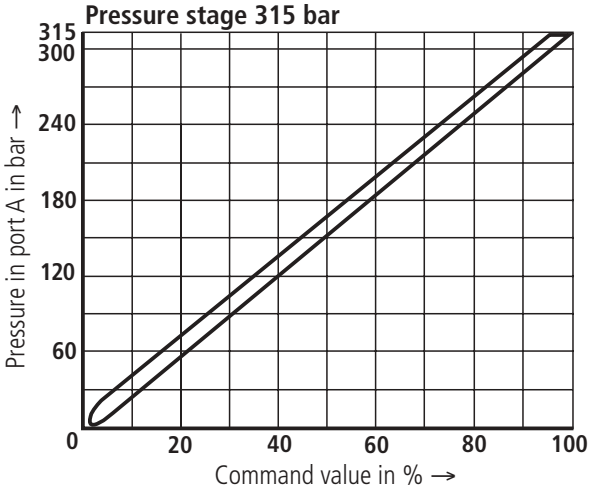
Pressure stage 100 bar



Pressure stage 200 bar

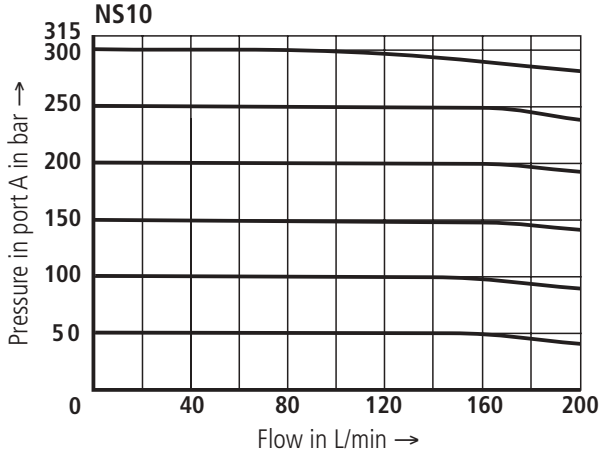


Pressure stage 315 bar

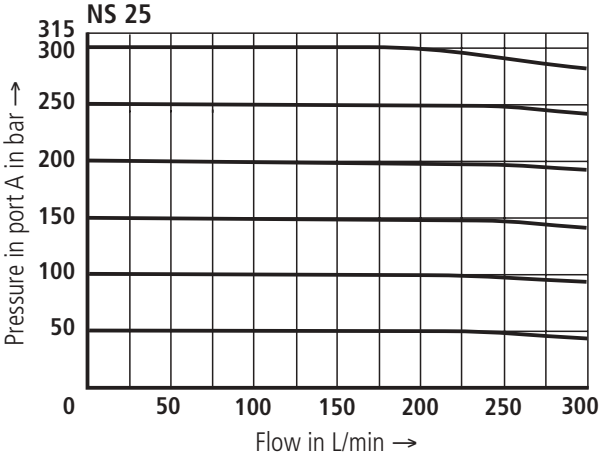


Pressure in port A in relation to the flow q_v

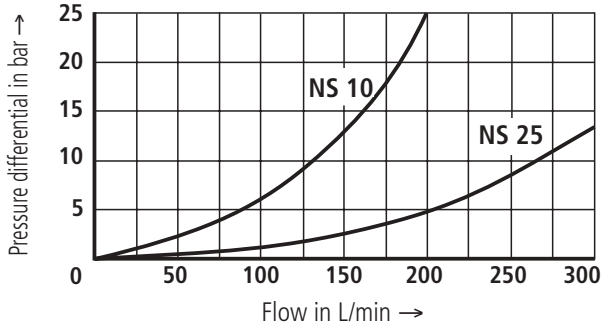
NS10



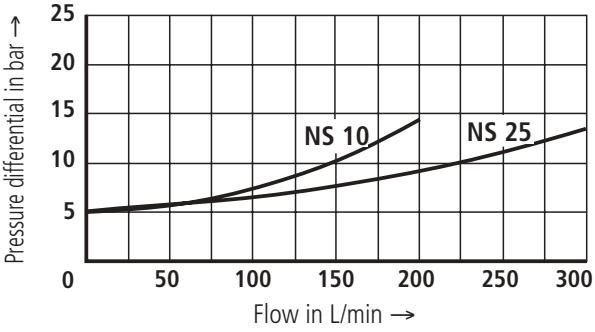
NS 25



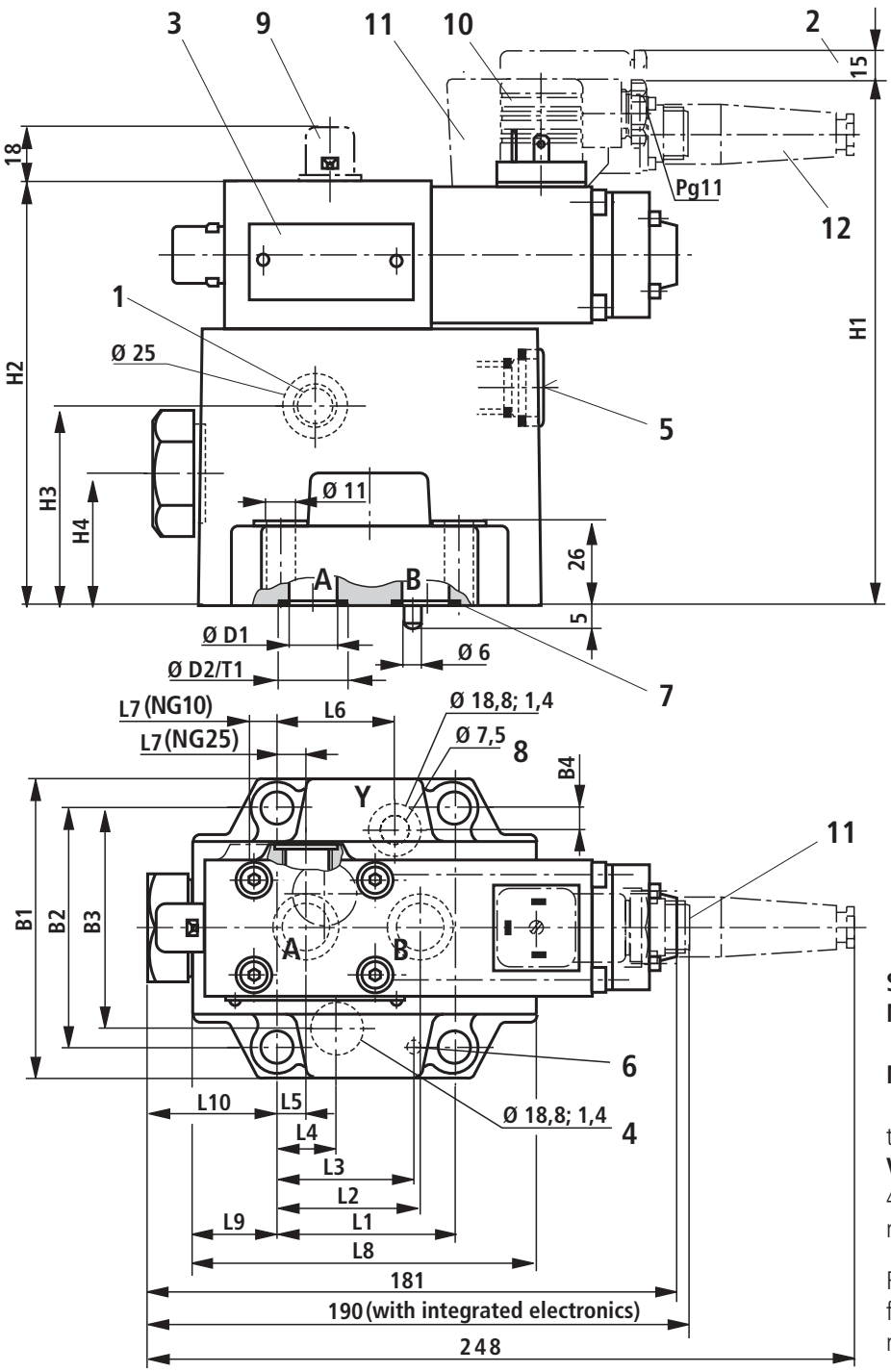
Pressure differential over the check valve for flow from A to B



Pressure differential from B to A



Unit dimensions (dimensions in mm)



1 As supplied, this (G1/4) port is plugged. After removal of this plug this port can also be used as an external pilot oil drain which has to return to tank at zero pressure.

2 Space required to remove the plug-in connector

3 Name plate

4 Blind counterbore

5 Check valve, optional

6 Locating pin

7 Identical seal rings for ports A and B
Identical seal rings for port Y and blind counterbore (Pos. 4)

8 Pilot oil drain always external and separate to tank at zero pressure, or optionally as per Pos. 1

9 Max. pressure limitation, (types DREM…; DREME). When using these valves please take the guidelines stated on page 4 into account!

10 Plug-in connector for type DRE(M) (seperate order, see page 5)

11 Integrated control electronics (types DREE, DREME) with component plug „K31"

12 Plug-in connector for type DRE(M)E (separate order, see page 5)

Subplates

Nom. size 10: G 460/01 (G 3/8)
G 461/01 (G 1/2)

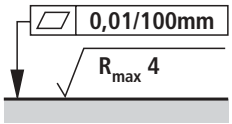
Nom. size 25: G 412/01 (G 3/4)
G 413/01 (G 1)

to catalogue sheet RE 45 062 and

Valve fixing screws

4 off, M10 x 45 DIN 912-10.9, M_A = 75 Nm must be ordered separately.

Required surface finish of the mating piece



NS	B1	B2	B3	B4	ØD1	ØD2 H11	H1	H2	H3	H4
10	85	66.7	58.8	7.9	15	21.8	172	127	58	36
25	102	79.4	73	6.4	25	34.8	186	141	64	44

NS	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	T1
10	42.9	35.8	31.8	21.5	7.2	21.5	5	116	44.5	59.5	2.0
25	60.3	49.2	44.5	20.6	11.1	39.7	12.2	116	27.3	42	2.9

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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.