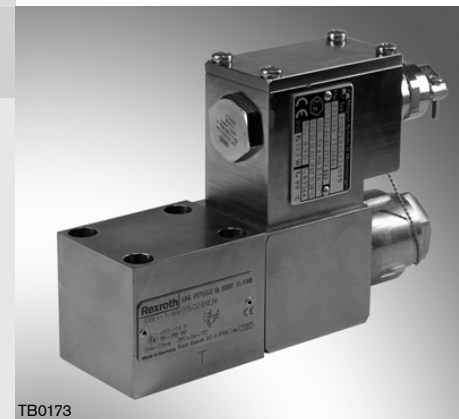


# Proportional pressure relief valve directly operated

RE 29162-XE-B2/01.08

Type DBET.../...XE

Nominal size 6  
Unit series 6X  
Maximum operating pressure 420 bar  
Maximum flow rate 2 l/min



**ATEX units**  
For potentially explosive atmospheres

## Part II Technical Data Sheet



### Information on explosion protection:

Range of application in accordance with the Explosion Protection Directive and type of protection

- Range of application as per 94/9/EG
- **II2G:** Type of protection Ex e mb IIT4 as per EN 60079-0:2004, EN 60079-7:2003 and EN 60079-18:2004
- **II2D:** Type of protection Ex tD A21 T130°C IP67 as per prEN 61241-0:2005 and EN 61241-1:2005

## What you need to know about these Operating Instructions

These Operating Instructions apply to the explosion-proof version of Rexroth valves, and consist of the following three parts:

- Part I General Information RE 07010-X-B1
- Part II Technical Data Sheet RE 29162-XE-B2
- Part III Product-specific Instructions RE 29162-XE-B3

**Mat. No. R901172919**

You can find further information on the correct handling of Rexroth hydraulic products in our publication "General product information for hydraulic products", RE 07008.

## Overview of Contents

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## Features

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- Directly operated proportional pressure relief valve with solenoid actuation for proper use in potentially explosive atmospheres
- For subplate mounting:  
Mounting hole configuration as per ISO 4401-03-02-0-05
- Wet-pin DC solenoid
- Electrical connection is a single terminal with cable gland
- The metal outer parts are galvanized for protection against corrosion (resistance to seawater)

## Ordering data and scope of delivery

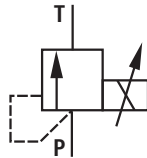
<b>DBET</b>	<b>-6X/</b>	<b>G24</b>	<b>XE</b>	<b>J</b>	<b>V</b>
<p>Proportional pressure relief valve</p> <p><b>Solenoid position</b> Viewing direction: looking at cable gland</p> <p>Facing upwards = 1 To the right = 2 Facing downwards = 3 To the left = 4</p> <p>Unit series 60 to 69 = 6X (60 to 69: installation and connection dimensions unchanged)</p> <p><b>Max. pressure stage</b></p> <p>Up to 50 bar = 50 Up to 100 bar = 100 Up to 200 bar = 200 Up to 315 bar = 315 Up to 350 bar = 350 Up to 420 bar = 420</p> <p>Internal control oil return = no code External control oil return (Y connected internally to T) = Y</p> <p>Voltage 24 V DC = G24</p>		<p><b>Seal material</b> FKM seals <b>Note:</b> Ensure that seals and pressure fluid are compatible!</p> <p><b>Surface protection</b> Resistant to seawater</p> <p>V =</p> <p>J =</p> <p>XE = "Increased safety" explosion protection See information on explosion protection, page 6, for details</p>			

**Included in scope of delivery:**

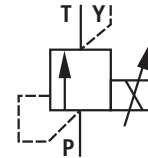
Valve operating instructions with Declaration of Conformity in Part III

## Symbols

Internal control oil return



External control oil return



## Function, sectional diagram

### General

DBET.../...XE proportional pressure relief valves are remote control poppet valves that are used to limit system pressure. They are actuated by a proportional solenoid with central thread and removable coil. The interior of the solenoid is connected to port T or Y, and is filled with pressure fluid. These valves can infinitely adjust the system pressure that needs to be limited, on the basis of an electric setpoint.

The solenoid is actuated by an external VT-MSPA1-200 amplifier (see Technical Data Sheet RE 30233-200). This amplifier must not supply the solenoid with a current in excess of 1.0 A. To achieve this required level of safety when operating the valve in a potentially explosive atmosphere, the solenoid current must be monitored and limited. For this, the VT-MUXA2 safety module (see Technical Data Sheet RE 30290) must be used.

### Construction

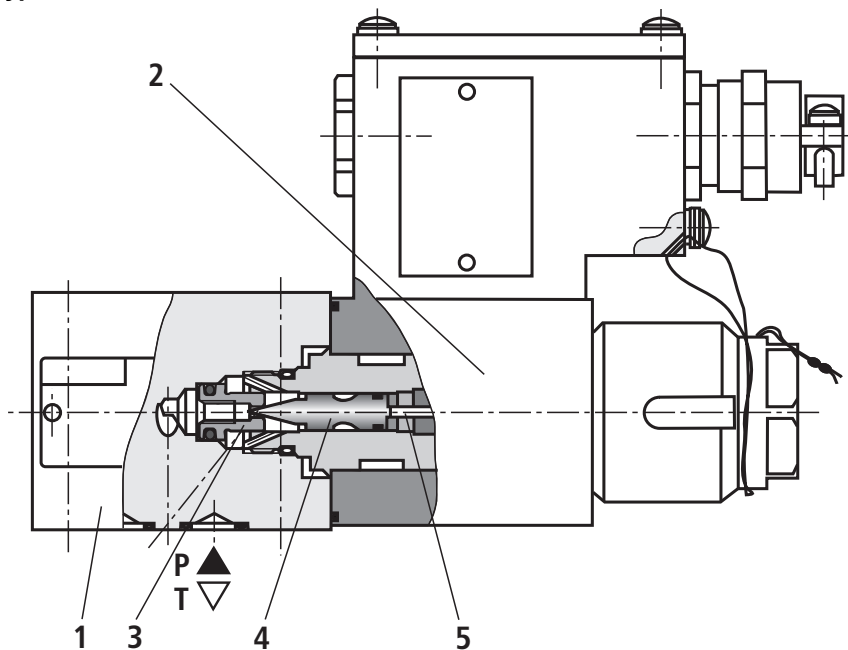
The valve basically comprises:

- Housing with mounting surface (1)
- A proportional solenoid (2)
- Valve seat (3)
- Valve cone (4)
- Armature plunger (5)

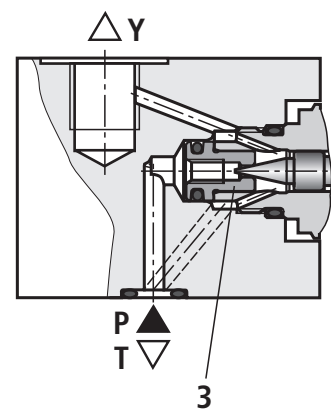
### Basic principle

To adjust the system pressure, a setpoint is input in the trigger electronics. Based on this setpoint, the electronics actuate the solenoid coil with electrical current. The proportional solenoid converts the current to a mechanical force, which acts on the valve cone (4) by means of the armature plunger (5). The valve cone (4) presses onto the valve seat (3) and shuts off the connection between ports P and T or Y. If the hydraulic force acting on the valve cone (4) is equivalent to the magnetic force, the valve regulates the set pressure by lifting the valve cone (4) off the valve seat (3), so that pressure fluid can flow from port P to port T or Y. If the setpoint is zero, the proportional solenoid (2) only receives the minimum control current, and the set pressure is at the minimum level.

### Type DBET.../...XE



### Type DBET.../...Y...XE



## Technical data

### General

Installation position		Optional, preferably horizontal
Storage temperature range	°C	-20 ... +70
Ambient temperature range	°C	-20 ... +70
Weight	kg	2.7

### Hydraulic

Max. operating pressure	Port P	bar	420
Max. set pressure at setpoint 10 V	Pressure stage 50 bar	bar	52.5
	Pressure stage 100 bar	bar	105
	Pressure stage 200 bar	bar	210
	Pressure stage 315 bar	bar	330
	Pressure stage 350 bar	bar	370
	Pressure stage 420 bar	bar	420
Max. set pressure at setpoint 0		bar	See characteristic curves, page 8
Return pressure	Ports T, Y	bar	0 (separate return line to tank)
Max. operating pressure	Dummy countersink A, B	bar	350
Max. flow rate		l/min	See characteristic curves, page 9 <sup>1)</sup>
Pressure fluid			Mineral oil (HL, HLP) nach DIN 51524 Ignition temperature > 180 °C
Pressure fluid temperature range		°C	-15 ... +80 (preferably +40 ... +50)
Viscosity range		mm <sup>2</sup> /s	20 ... 380 (preferably 30 ... 46)
Maximum permissible degree of contamination of pressure fluid Purity class to ISO 4406(c)			Class 20/18/15 <sup>2)</sup>
Hysteresis		%	< 7 of max. set pressure
Range of inversion		%	< 0.5 of max. set pressure
Sensitivity		%	< 0.5 of max. set pressure
Linearity		%	See characteristic curves, page 8
Manufacturing tolerance of setpoint/pressure curve based on 0.8 l/min, pressure rising	at setpoint 20 %	%	< ±1.5 of max. set pressure <sup>3)</sup>
	at setpoint 100 %	%	< ±5 of max. set pressure <sup>4)</sup>
Step response (T <sub>u</sub> + T <sub>g</sub> ) 0 → 100 % or 100 % → 0 Line volume < 20 cm <sup>3</sup> ; q <sub>V</sub> = 0.8 l/min		ms	100 (depending on the system!)

<sup>1)</sup> Exceeding the maximum flow rate of the pressure stage results in back pressure in port P that lies above the maximum nominal pressure of the valve.

<sup>2)</sup> The purity classes stated for the components must be complied with in hydraulic systems. Effective filtration prevents problems and also extends the service life of components.

For a selection of filters, see Technical Data Sheets RE 50070, RE 50076 and RE 50081.

<sup>3)</sup> Zero is calibrated at the factory

<sup>4)</sup> Calibration is possible via the amplifier

## Technical data

Electrical			
Voltage type		DC; PWM signal 100 ... 500 Hz	
Signal type		Analog	
Maximum current	A	1.03	
Limit rating	W	13.3	
Solenoid coil resistance	Cold value at 20 °C	Ω	8.3
	Maximum hot value	Ω	12.56
Cyclic duration factor	%	100	
Coil temperature	°C	Up to 130	
Cable gland	Threaded connection	M20 x 1.5	
	Cable diameter	mm	6 ... 12
	Thermal resistance	°C	-20 ... +130
	Degree of protection to EN 60529:1991+A1:2000	IP 67 when mounted	
	Seal material	FKM	
Required thermal resistance of connecting cable	°C	≥ 115	

## Information on explosion protection

Range of application as per Directive RL 94/9/EG	II2G, II2D
Type of protection of valve	c (EN 13463-5:2001-01)
Maximum surface temperature <sup>1)</sup>	130°C (T4)
Type of protection of solenoid	II2G Ex e mb IIT4 as per EN 60079-0:2004, EN 60079-7:2003 as per EN 60079-18:2004 II2D Ex tD A21 T130°C IP67 as per prEN 61241-0:2005 and EN 61241-1:2005
Type test certification of solenoid	EX5 06 04 39919 009
Special conditions for safe use	

## Trigger electronics

Amplifier in modular design <sup>2)</sup>	VT-MSPA1-200 (Data Sheet RE 30223-200)
Safety module <sup>2)</sup>	VT-MUXA2-1 (Data Sheet RE 30290-B2)

<sup>1)</sup> As the solenoid coils may reach a high surface temperature, European standards ISO 13732-1 and EN 982 on the prevention of accidental contact must be observed

<sup>2)</sup> See RE 30290-B2 for the electric circuitry of the valve, amplifier and safety module.

## Electrical connection

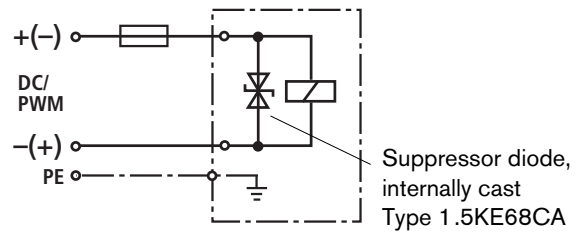
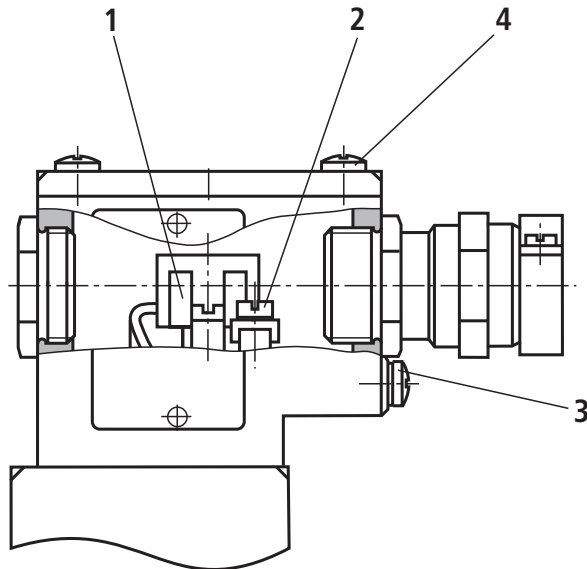
The type-tested actuating solenoid of the valve is equipped with a terminal box and a type-tested cable gland.

The connection is insensitive to polarity.

### Note:

A fuse appropriate for the valve solenoid's nominal current (max.  $3 \times I_{nom}$  to EN 60127) must be connected to the solenoid on the line side, to protect against short circuit.

The breaking capacity of the fuse must match the possible short-circuit current of the supply source.



### Properties of terminals and fastening elements

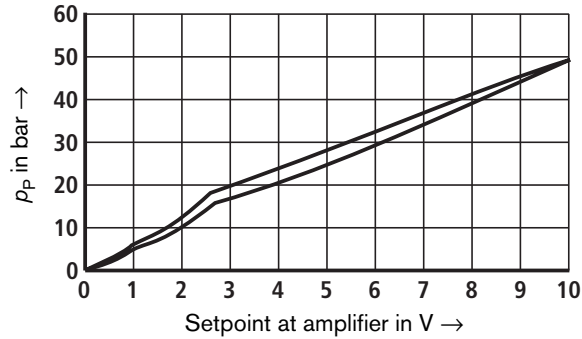
Item	Function	Connectable conductor cross-section	Tightening torque
1	Operating voltage connection	Single wire 0.75...2.5 mm <sup>2</sup> Stranded 0.75...1.5 mm <sup>2</sup>	0.4 ... 0.5 Nm
2	Connection for protective earth conductor	Single wire up to 2.5 mm <sup>2</sup> Stranded up to 1.5 mm <sup>2</sup>	1.4 ... 2.4 Nm
3	Connection for equipotential bonding conductor	Single wire up to 4 mm <sup>2</sup> Stranded up to 4 mm <sup>2</sup>	3.5 ... 4.5 Nm
4	Cover screws	–	1.0 ... 1.1 Nm

**Characteristic curves** (measured with HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ )

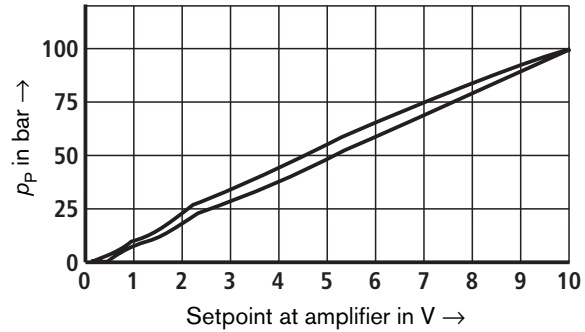
**Pressure in port P ( $p_p$ ) as a function of the setpoint**

Measured with: Flow rate: 0.8 l/min  
VT-MSPA1-200 amplifier with VT-MUXA2-1 safety module

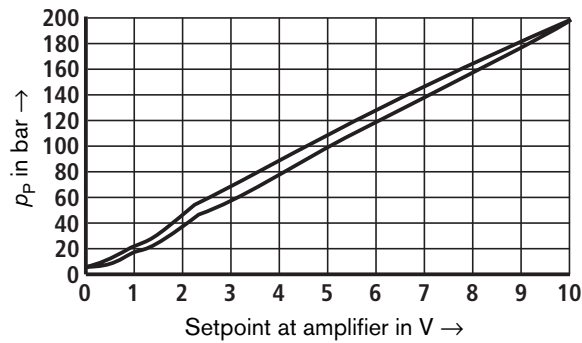
**Pressure stage 50 bar**



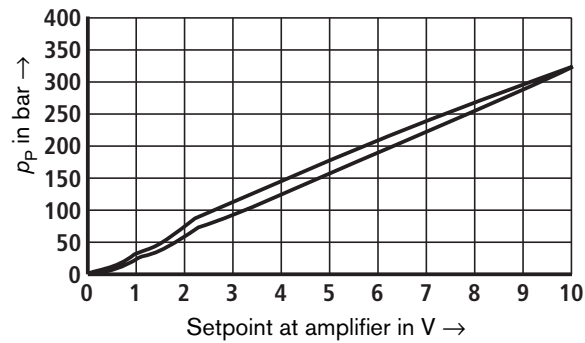
**Pressure stage 100 bar**



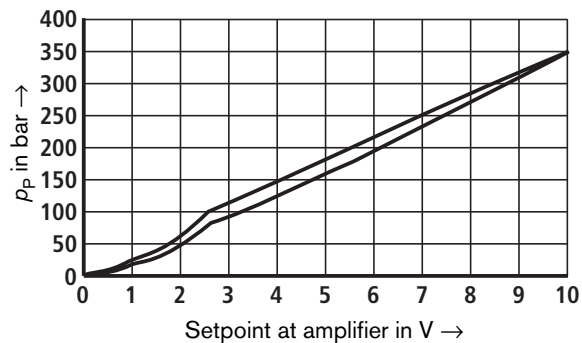
**Pressure stage 200 bar**



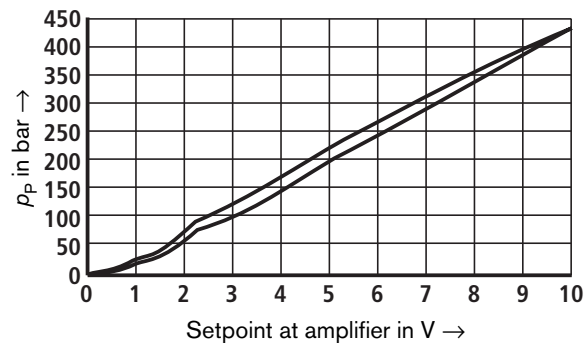
**Pressure stage 315 bar**



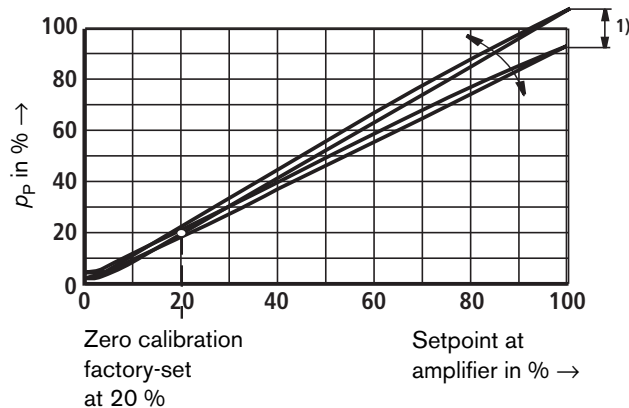
**Pressure stage 350 bar**



**Pressure stage 420 bar**



**Calibration of manufacturing tolerance**



1) The manufacturing tolerance can be compensated using the Gw potentiometer of the series-connected VT-MSPA1-200 amplifier.

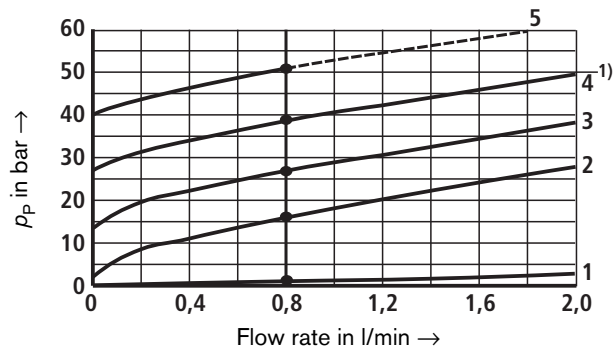


## Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ )

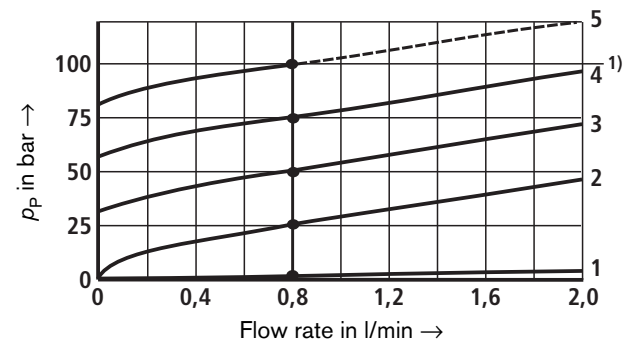
### Pressure in port P ( $p_p$ ) as a function of the flow rate

VT-MSPA1-200 amplifier with VT-MUXA2-1 safety module.

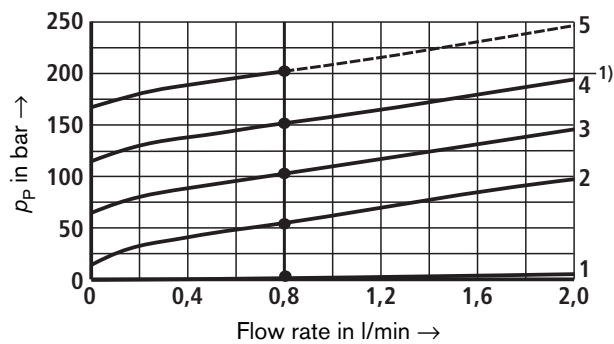
#### Pressure stage 50 bar



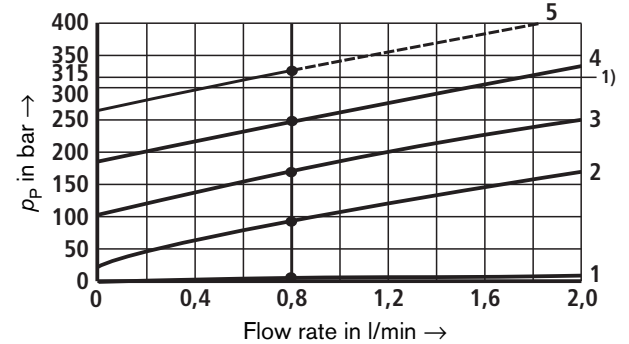
#### Pressure stage 100 bar



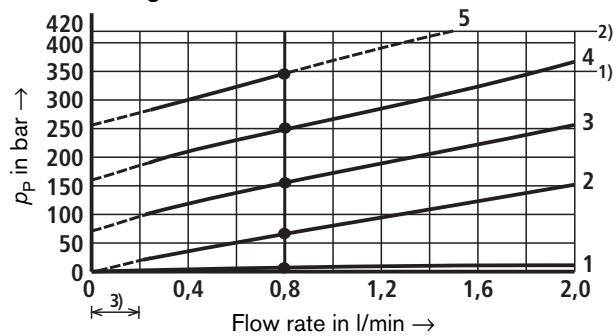
#### Pressure stage 200 bar



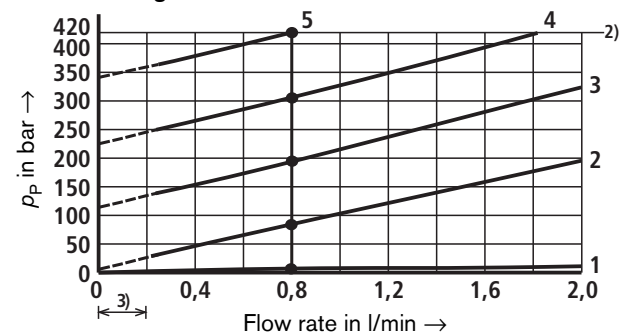
#### Pressure stage 315 bar



#### Pressure stage 350 bar



#### Pressure stage 420 bar



1) Flow rate limit of pressure stage

2) Flow rate limit and maximum pressure

3) Theoretical curve profile at a flow rate less than 0.2 l/min

Applicable for all pressure stages:

Curve 1 = 0 % setpoint

Curve 2 = 25 % setpoint

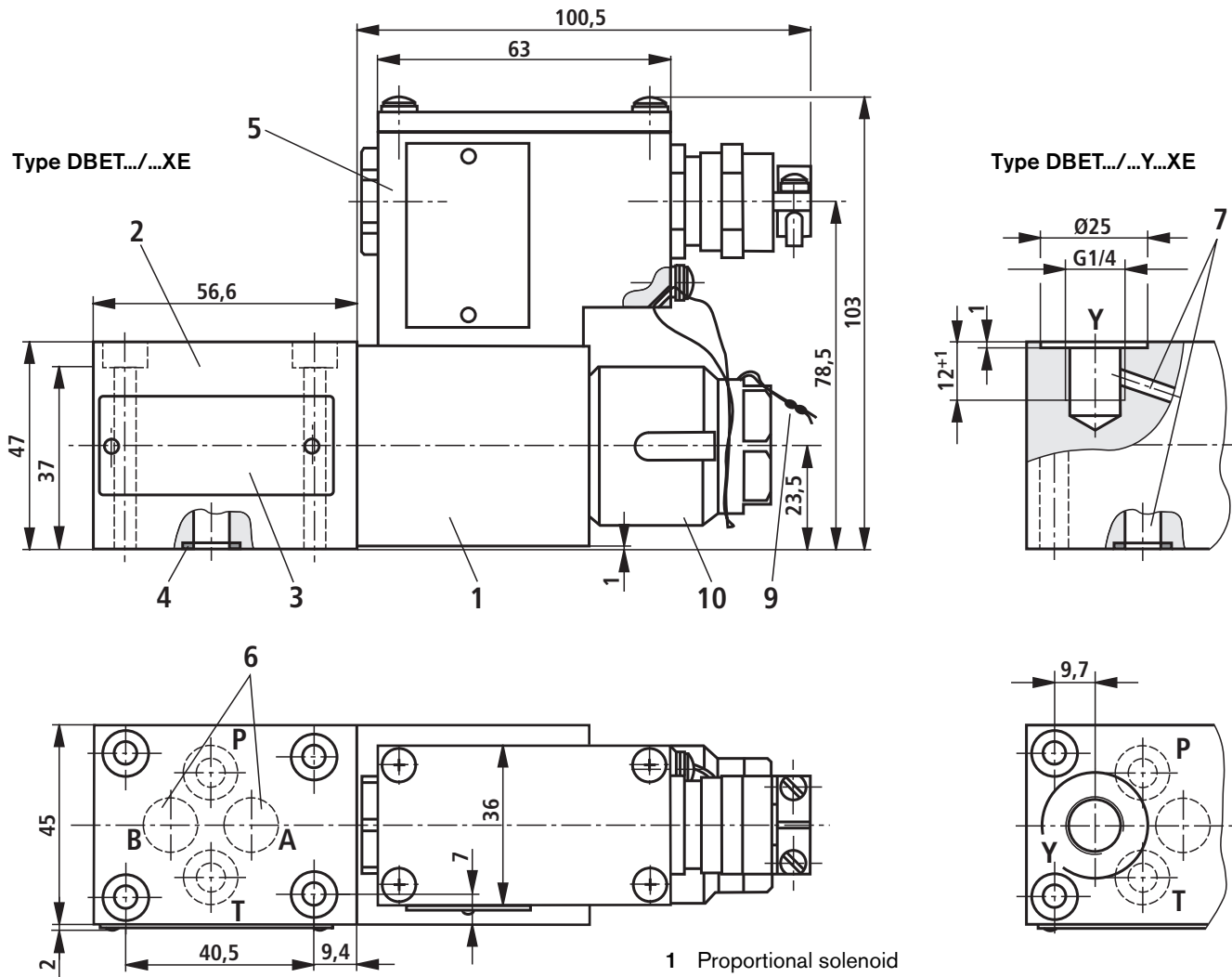
Curve 3 = 50 % setpoint

Curve 4 = 75 % setpoint

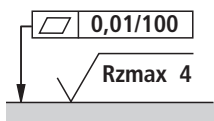
Curve 5 = 100 % setpoint

The curves were measured without back pressure in port T ( $p_T = 0\text{ bar}$ ).

Unit dimensions (in mm)



- 1 Proportional solenoid
- 2 Valve housing
- 3 Nameplate
- 4 Same seals for ports P, A, B and T
- 5 Terminal box
- 6 Dummy countersinks A and B
- 7 In version ..Y.. (external control oil return), port Y is internally connected to port T  
Port T is **not** plugged
- 8 Machined valve bearing surface, position of ports as per ISO 4401-03-02-0-05  
Different from the standard:  
- No locating pin  
- "A" and "B" ducts **not** drilled
- 9 Factory setting secured by retaining wire
- 10 Fastening nuts for solenoid



Required surface quality of valve bearing surface

**Valve fastening bolts:**

(not included in scope of delivery)  
In order to ensure a secure connection, use only the following valve fastening bolts:

**4 cheese-head bolts**

**ISO 4762-M5X45-10.9-flZn-240h-L**

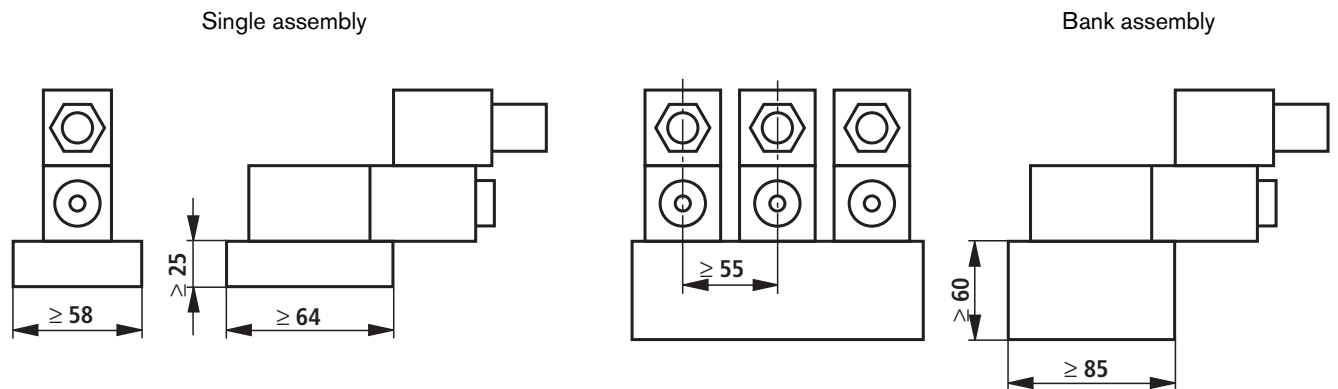
(coefficient of friction 0.09 - 0.14 to VDA 235-101);

Order separately, Mat. No. **R913000140**

## Installation conditions (dimensions in mm)

	Single assembly	Bank assembly
Subplate dimensions	Minimum dimensions Length $\geq 64$ , width $\geq 58$ , height $\geq 25$	Minimum cross-section Height $\geq 60$ , width $\geq 85$
Thermal conductivity of subplate (based on 300°C)	$\geq 35,2 \text{ W / (K} \cdot \text{m)}$ , (EN-GJS-500-7 to DIN EN 1563:2005)	
Minimum distance between valve longitudinal axes	$\geq 55 \text{ mm}$	

### Block diagram



## Notes

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