

# Proportional pressure reducing valve with DC motor actuation

**RE 29173/12.05**  
Replaces: 04.05  
29174

1/12

## Type (Z)DRS

Size 6  
Component series 1X  
Maximum operating pressure 210 bar  
Maximum flow 30 l/min



H/A/D/7121/03

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## Features

- Pilot operated valve for pressure reduction in port A or P1 with pressure relief function
- Actuation by DC motor
- For subplate mounting or sandwich plate design:  
Position of ports to ISO 4401-03-02-0-94
- Self-locking DC motor → in the event of a supply voltage failure or fault message of the control electronics, the pressure setting is maintained
- Connect the tank port at zero pressure <sup>1)</sup>
- Controlling:  
Electrical amplifier type VT-MRMA1-1-1X/V0/0  
(separate order), see page 6
- Position feedback
- Integrated pressure monitoring (optional)

<sup>1)</sup> Changes in the tank pressure result in changes in the set, reduced pressure.

### Ordering code

	<b>DRS</b>	<b>6</b>	<b>-1X/</b>		<b>M</b>	<b>G24</b>	<b>K32</b>		<b>G</b>	<b>*</b>
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Subplate mounting= <b>no code</b>	
Sandwich plate design = <b>Z</b>	
Pressure reducing valve with DC motor actuation = <b>DRS</b>	
Size = <b>6</b>	
Pressure reduction in channel A (subplate mounting) = <b>no code</b>	
Pressure reduction in channel P1 (sandwich plate) = <b>VP</b>	
Component series 10 to 19 (10 to 19: unchanged installation and connection dimensions) = <b>1X</b>	
Pressure stage 50 bar = <b>50</b>	
Pressure stage 100 bar = <b>100</b>	
Pressure stage 210 bar = <b>210</b>	
Without pressure transducer on the component = <b>A</b>	
With pressure transducer on the component = <b>S</b>	

	Further details in clear text
<b>G =</b>	With position feedback
<b>M =</b>	<b>Seal material</b> NBR seals Suitable for mineral oil (HL, HLP) to DIN 51524
<b>V =</b>	FKM seals Observe compatibility of seal material with hydraulic fluid used!
<b>K32 =</b>	<b>Electrical connection</b> <b>Without</b> cable socket With component plug type GO51FAVM Cable socket – separate order, see page 6
<b>G24 =</b>	<b>Supply voltage of control electronics</b> 24 V DC voltage
<b>M =</b>	Available only without check valve

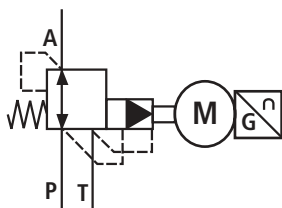
### Standard types

Type DRS	Material number
DRS 6 -1X/50AMG24K32MG	R901025496
DRS 6 -1X/100AMG24K32MG	R901055990
DRS 6 -1X/210AMG24K32MG	R901055991

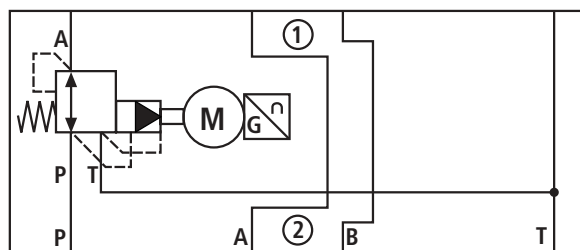
Type ZDRS	Material number
ZDRS 6 VP-1X/50AMG24K32MG	R901025495
ZDRS 6 VP-1X-/100AMG24K32MG	R900756973
ZDRS 6 VP-1X/210AMG24K32MG	R90077725

### Symbols (1) = component side, (2) = plate side

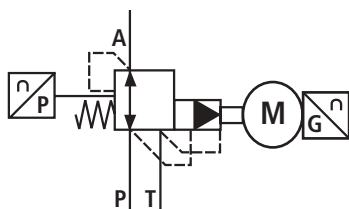
DRS 6...A... without pressure transducer



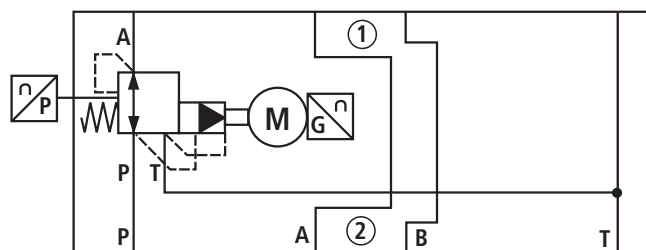
ZDRS 6...A... without pressure transducer



DRS 6...S... with pressure transducer



ZDRS 6...S... with pressure transducer



## Function, section

Valves of types DRS and ZDRS are pilot operated 3-way pressure reducing valve with pressure relief function for the actuator.

They are used to reduce a system pressure.

### Structure

The valves consist of three main assemblies:

- Pilot control valve (1)
- DC motor (2) with position feedback
- Main valve (3) with main spool (4)
- Optionally with or without pressure transducer (18)

### Functional description, type DRS

- Adjustment of the pressure to be reduced in channel **A** via DC motor (2) in dependence upon the command value.
- When no pressure is applied in port **P**, spring (17) holds main spool (4) in the initial position → connection from port **A** to **T** is open, connection from port **P** to **A** is closed.
- Pressure connection from port **P** to ring channel (5); pilot oil flows through bore (6) via flow controller (7) into pilot control chamber (16); via orifice (8), throttling gap (9) into chamber (10) and through bores (11, 12) to port **T**.

### Pressure reduction

- Pilot pressure builds up in pilot control chamber (16) as a function of the command value
- Main spool (4) is shifted to the right → hydraulic fluid flows from **P** to **A**
- The actuator pressure is applied in port **A** to spring chamber (15) via channel (13) and orifice (14)
- An increase in the pressure in port **A** to the set command pressure causes the main spool to be shifted to the right to the control position; the pressure in port **A** becomes virtually

the same as the pressure set on pilot valve (1).

**Pressure relief function** - not available in the case of contamination

- When the pressure in port **A(P1)** exceeds the set command pressure, main spool (4) is shifted further to the left.
- This results in closing of the connection from **P** to **A(P1)**, opening of the connection from **P1** to **T** and limitation of the pressure applied in port **A(P1)** according to the set command value.

### Pressure monitoring

In the case of valves with integrated pressure transducer, the latter is connected to the electronics and serves for sensing and monitoring the set pressure. Depending on the valve type, in channel **A** or **P1**. A further alternative is a valve without integrated pressure transducer, but with pressure measuring sandwich plate. See application example RE 62003 and RE 29260, sandwich plate with pressure transducer.

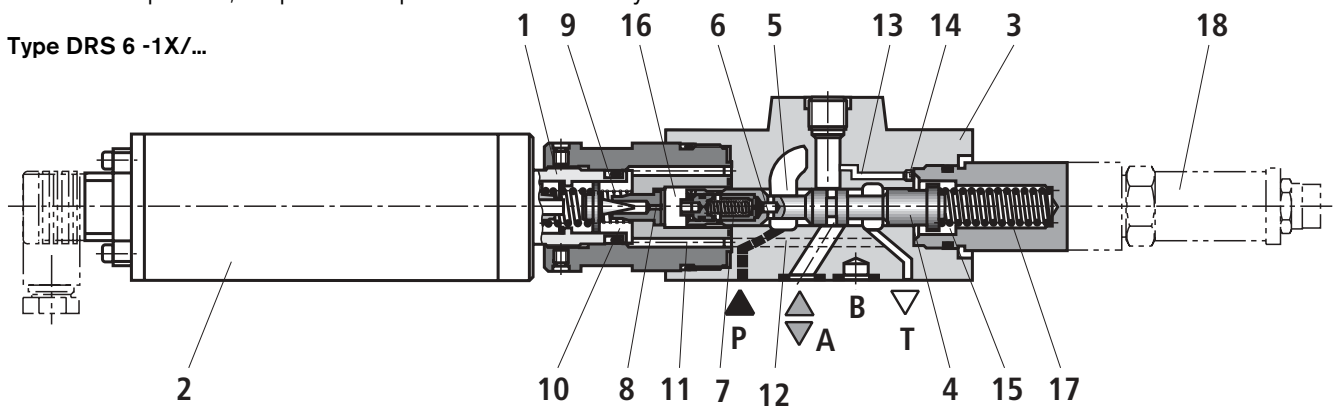
### Type ZDRS

In principle, the function of this valve corresponds to that of type DRS. The pressure is, however, reduced in channel **P1**.

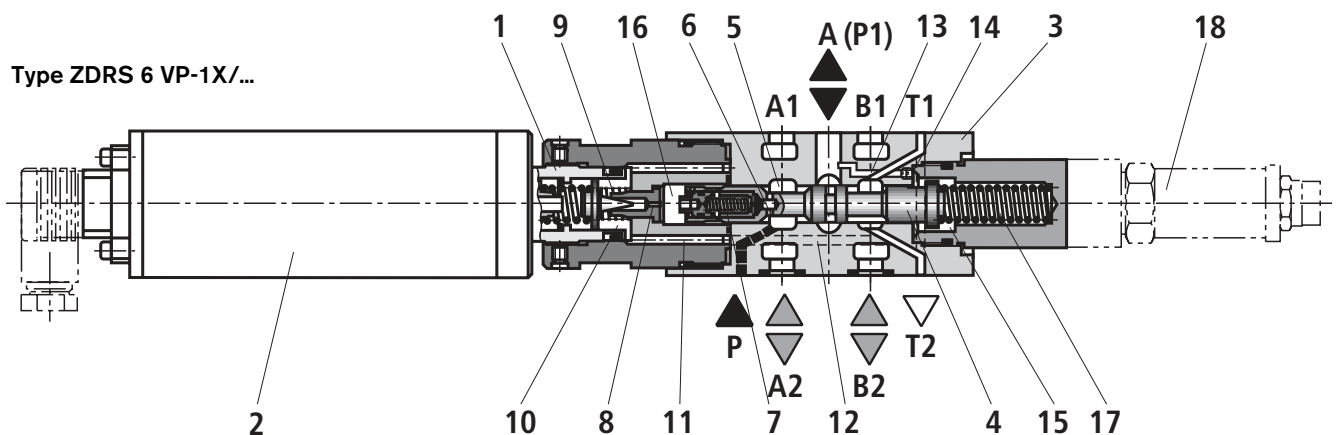
### Note:

When the voltage supply of the control electronics is disconnected or fails, the DC motor remains at its current position and consequently, the pressure set last is maintained, provided that the hydraulic supply is available.

Type DRS 6 -1X/...



Type ZDRS 6 VP-1X/...



## Overview of documentation

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The present data sheet RE 29173 provides information about the pilot operated pressure reducing valve with DC motor actuation.

Overview of entire documentation	Document no.			
	German RD .....	English RE .....	French RF .....	Spanish RS .....
Analogue amplifier module Type VT-MRMA1-1-1X/V0/0	<b>30214</b>			
Declaration on environmental compatibility. Details about environmental testing in the fields of EMC (electromagnetic compatibility), climate and mechanical stress	<b>30214-U</b>			
Power supply unit type VT-NE30-1X	<b>29929</b>			
Pressure transducer with integrated electronics Type HM17-1X	<b>30269</b>			
Sandwich plate with pressure sensor type Z1SRD-1X	<b>29260</b>			
Proportional pressure reducing valve with DC motor actuation, type (Z)DRS, size 6, component series 1X	<b>29173</b>			
Application example	<b>62003</b>			

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

Installation orientation			Optional (preferably horizontal)
Weight	DRS	kg	1.6
	ZDRS	kg	1.5
Storage temperature range		°C	-20 to +80
Ambient temperature range		°C	-20 to +60

**Hydraulic** (measured at  $v = 46 \text{ mm}^2/\text{s}$ ,  $\vartheta = 40 \text{ °C}$ )

Max. operating pressure			
	Port P or P2	bar	250
	Ports P1, A and B	bar	210
	Port T	bar	Separately and at zero pressure to tank <sup>1)</sup> (30 l/min flow possible)
Max. set pressure in channel P1 and A	Pressure stage 50 bar	bar	50
	Pressure stage 100 bar	bar	100
	Pressure stage 210 bar	bar	210
Min. pressure in channel P or P2		bar	Set pressure in channel A or channel P1 plus 20 bar
Min. set pressure at 0 command value in channel A or P1		bar	See characteristic curves on page 9 (max. 3 bar)
Max. permissible flow		l/min	30
Pilot flow		l/min	0.65
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524 further hydraulic fluids on enquiry!
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 20/18/15 <sup>2)</sup>
Hydraulic fluid temperature range		°C	-20 to +80
Viscosity range		mm <sup>2</sup> /s	15 to 280
Hysteresis		%	< 2 of settable max. pressure
Repeatability		%	< ± 1 of settable max. pressure
Linearity		%	< 2 of settable max. pressure
Response sensitivity		%	< 0.5 of settable max. pressure
Manufacturing tolerance of comm. value/pressure curve		%	< ± 6 of settable max. pressure <sup>3)</sup>
Step response $T_u + T_g$	0% → 100%	ms	] $T_u + T_g$ measured with static hydraulic fluid column of < 5 litres
	100% → 0%	ms	


<sup>1)</sup> Pressures > 10 bar can result in the destruction of the motor


<sup>2)</sup> The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets: RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

<sup>3)</sup> By matching of the zero point and the span in electronics type VT-MRMA1-1-1X/VO/0, the tolerance of the complete unit (valve + electronics) can be reduced.

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

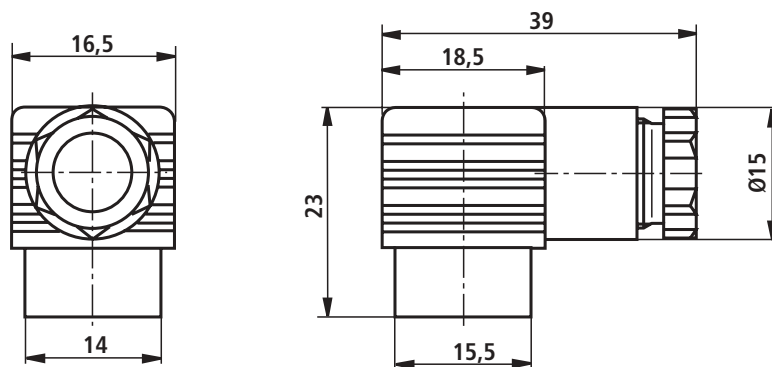
<b>Electrical, valve</b>			
Nominal voltage	$U_N$	V	18
Nominal current	$I_N$	A	$0.5 \pm 20\%$
Max. continuous current	$I_{max}$	A	0.5
Resistance	$R$	$\Omega$	9.9
Winding temperature	$\vartheta_w$	$^{\circ}\text{C}$	$\approx 20$
	$\Delta\vartheta_{w\text{ perm.}}$	K	100
Type of protection of the valve to EN 60529		IP 65 (with cable socket mounted and locked)	
<b>Electrical, control electronics</b>			
Control electronics		Amplifier type VT-MRMA1-1-1X/V0/0 of modular design (separate order) to RE 30214  <b>⚠ Caution!</b> <b>Valves of type (Z)DRS 6</b> must not be used for safety-relevant machine functions, since only the electrical part is safeguarded, but not the hydraulic part. This means that when the hydraulic pressure in P falls to 0 bar, then the actuator pressure (A) or secondary pressure (P1) inevitably becomes 0 bar as well.	

 **Note:** For details with regard to **environment simulation testing** in the fields of EMC (electromagnetic compatibility), climate and mechanical stress, see RE 29173-U (declaration on environmental compatibility).

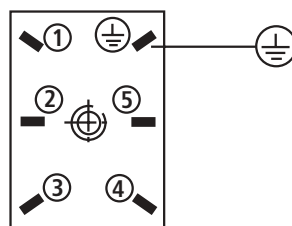
**Electrical connection** (nominal dimensions in mm)


**Cable socket**

Separate order stating material no. **R900021448** (plastic version)



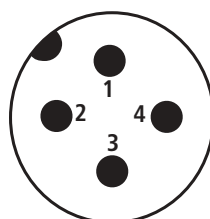
Version (Z)DRS... 1X/...



- 1 Position feedback +
- 2 Position feedback output
- 3 Position feedback -
- 4 Motor +
- 5 Motor -
-  PE = GND

**Pressure transducer version S**

(4-pin M12 plug-in connector; viewed to contact side)



Voltage	Current (two-conductor system)
1 → auxiliary energy + (+ $U_0$ )	1 → auxiliary energy + (+ $U_0$ )
2 → n.c.	2 → n.c.
3 → auxiliary energy - (0V)	3 → auxiliary energy - (0V)
4 → output signal	4 → n.c.

## Electrical connection (nominal dimensions in mm)

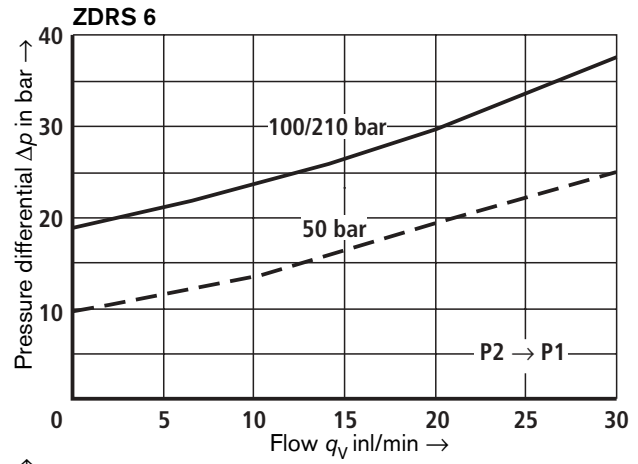
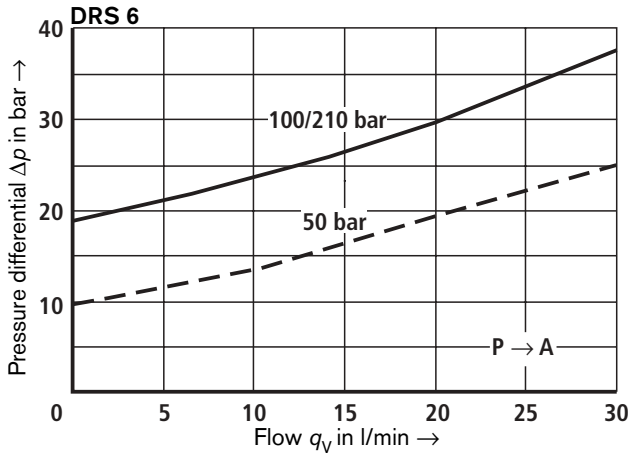
### Cable sockets for pressure transducer

Technical data				Designation	Material no.
Current carrying capacity	4 A		04 POL (with 2 m cable)	<b>R900773031</b>	
Temperature range	-25 to 90 °C		04 POL (with 5 m cable)	<b>R900779498</b>	
Type of protection	IP 67				
Contacts	CuZn				
Contact surface	Gold-plated			04 POL (with 2 m cable)	<b>R900779504</b>
Housing	TPU			04 POL (with 5 m cable)	<b>R900779503</b>
Seal material	FKM				
Fitting	CuZn/Ni				
Wire cross-section	4 x 0.34 mm				
Sheath material	PUR				
Shield	Not connected on plug side		04 POL (without cable) <sup>1)</sup>	<b>R900773042</b>	
Sheath diameter	Ø 5.0 mm				
Sheath colour	Black				
Bending radius for dyn. applications	min. 50 mm				
			04 POL (without cable) <sup>1)</sup>	<b>R900779509</b>	

<sup>1)</sup> Type of protection IP 68

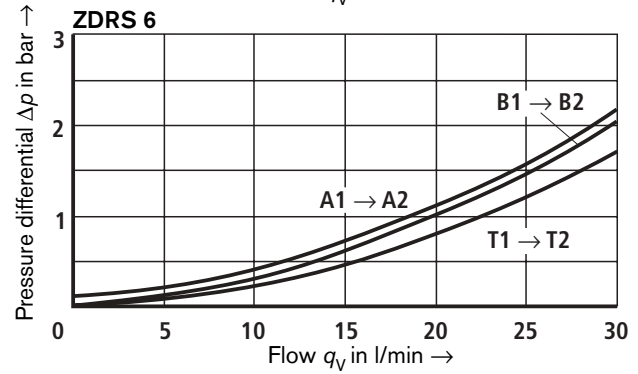
**Characteristic curves** (measured at  $v = 46 \text{ mm}^2/\text{s}$  and  $\vartheta = 40 \text{ }^\circ\text{C}$ )

$\Delta p$ - $q_v$  characteristic curves

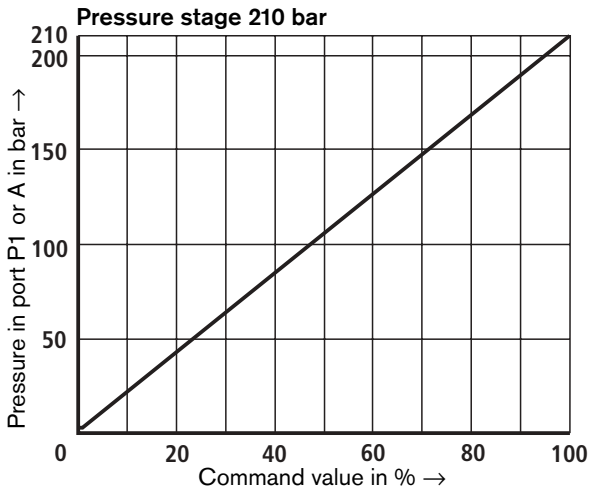
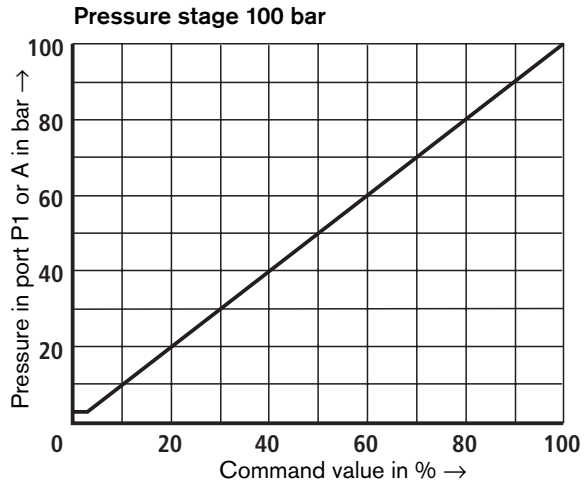
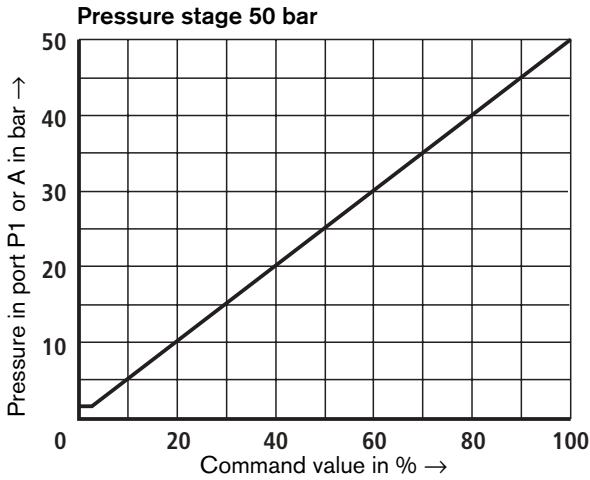


**Note:**

The  $\Delta p$  value indicated corresponds to the minimum pressure present in port P (P2) minus the maximum pressure to be controlled in port A (P1).



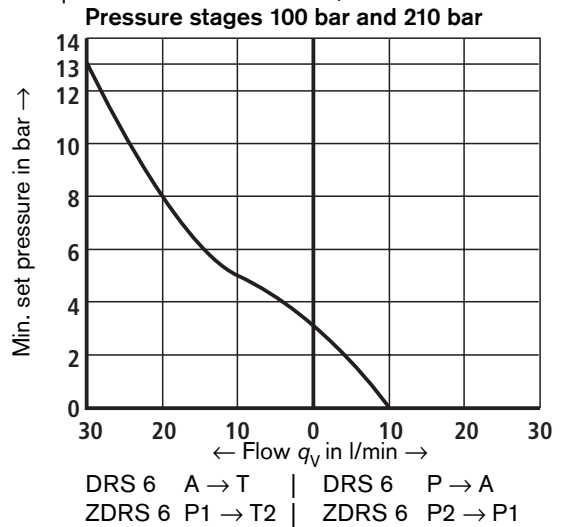
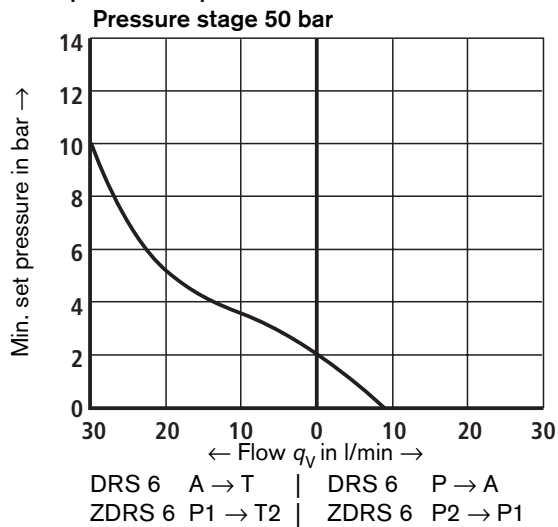
**Pressure in port P1 or A in dependence upon command value**



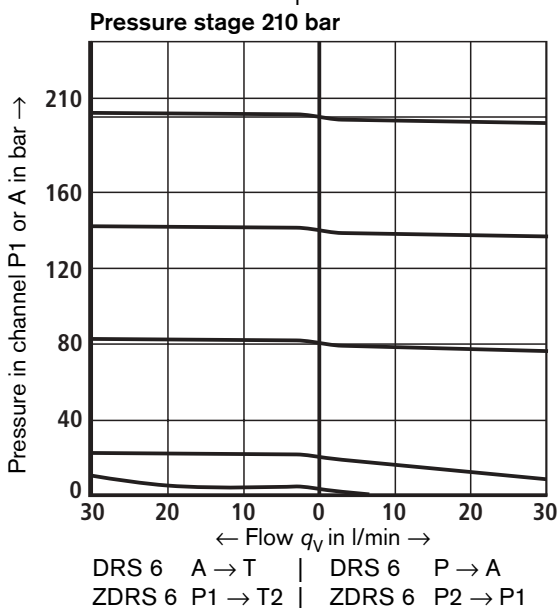
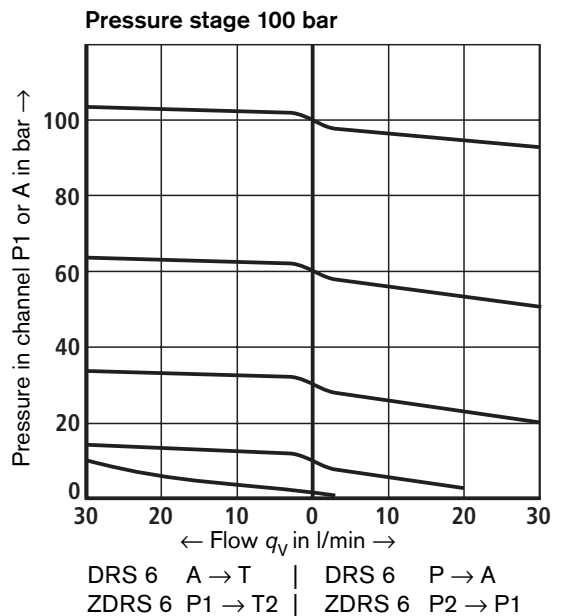
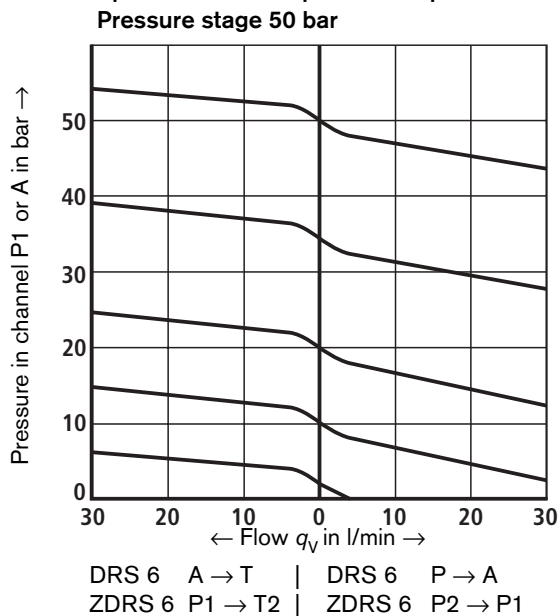


**Characteristic curves (measured at  $v = 46 \text{ mm}^2/\text{s}$  and  $\vartheta = 40 \text{ }^\circ\text{C}$ )**

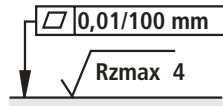
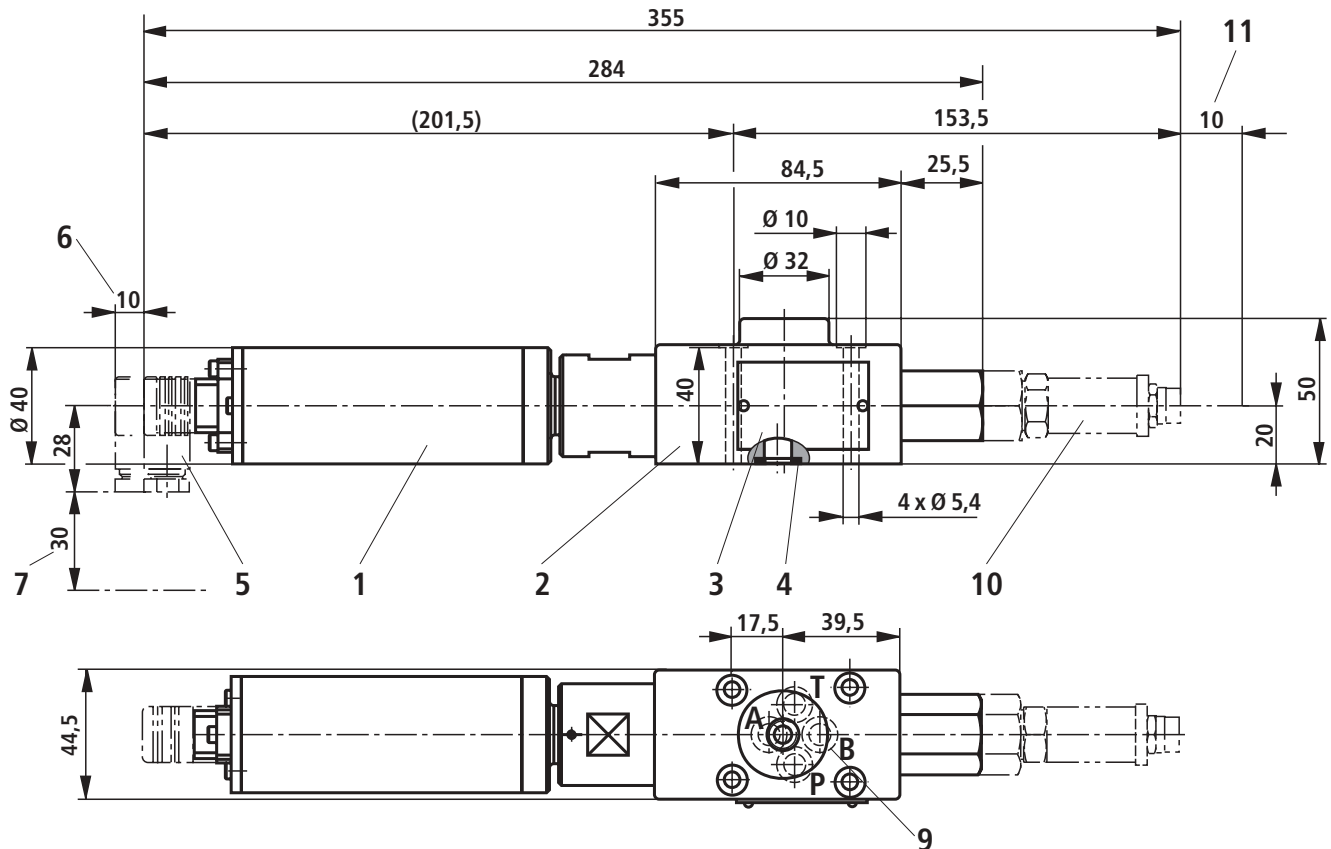
Min. set pressure in port P1 or A at 0 V command value (without backpressure in channel T or T1)



Pressure in port P1 or A in dependence upon the flow

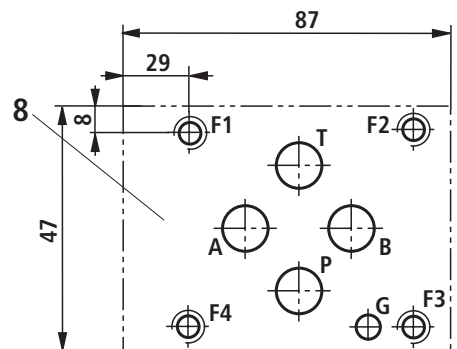


Unit dimensions, type DRS 6 (nominal dimensions in mm)



Required surface quality of mating surface

**Tolerances:**  
 – General tolerances ISO 2768-mK



- 1 DC motor
- 2 Valve housing
- 3 Nameplate
- 4 Identical seal rings for ports A, P, T and blind hole B
- 5 Cable socket, separate order, see pages 6 and 7
- 6 Space required to remove cable socket
- 7 Space required for connecting cable

**Note:** The direction, in which the cable socket leads the cable away from the valve, can vary by 90° through 360°.

- 8 Position of ports to ISO 4401-03-02-0-94  
 Deviating from standard:  
 – Locating pin not provided for this valve
- 9 Blind hole (port B)
- 10 Pressure transducer for type DRS ...S
- 11 Space required to remove cable socket

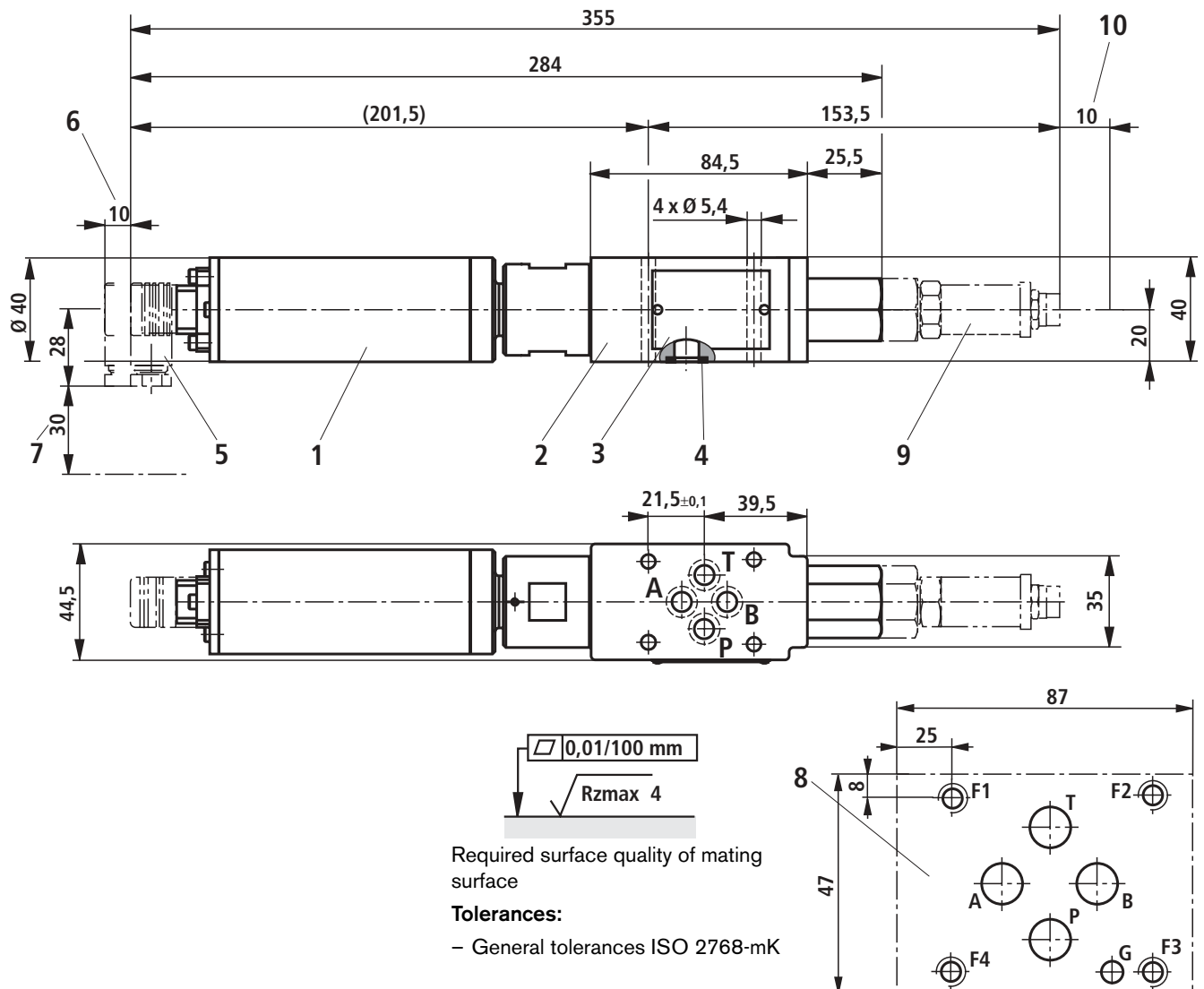
**Subplates to data sheet RE 45052 and valve fixing screws must be ordered separately.**

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

**Valve fixing screws:**

- 4 socket head cap screws ISO 4762 - M5 x 50 - 10.9-flZn-240h-L (friction coefficient  $\mu_{total} = 0.09$  to  $0.14$ );  
 tightening torque  $M_T = 7$  Nm  $\pm$  10%,  
 material no. **R913000064**
- or
- 4 socket head cap screws ISO 4762 - M5 x 50 - 10.9  
 (friction coefficient  $\mu_{total} = 0.12$  to  $0.17$ );  
 tightening torque  $M_T = 8.1$  Nm  $\pm$  10%,

## Unit dimensions, type ZDRS 6 (nominal dimensions in mm)



- 1 DC motor
- 2 Valve housing
- 3 Nameplate
- 4 Identical seal rings for ports A, P, T and blind hole B
- 5 Cable socket, separate order, see pages 6 and 7
- 6 Space required to remove cable socket
- 7 Space required for connection cable
 

**Note:** The direction, in which the cable socket leads the cable away from the valve, can vary by 90° through 360°.
- 8 Position of ports to ISO 4401-03-02-0-94  
Deviating from standard:
  - Locating pin not provided for this valve
- 9 Pressure transducer for type ZDRS ...S
- 10 Space required to remove cable socket

**Subplates to data sheet RE 45052 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:

- 4 socket head cap screws ISO 4762 - M5 - 10.9-fzZn-240h-L**  
(friction coefficient  $\mu_{\text{total}} = 0.09$  to 0.14);  
tightening torque  $M_T = 7 \text{ Nm} \pm 10\%$ ,  
or
- 4 socket head cap screws ISO 4762 - M5 - 10.9**  
(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);  
tightening torque  $M_T = 8.1 \text{ Nm} \pm 10\%$ ,

## Notes

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