Service

Rexroth Bosch Group

Proportional pressure reducing valve, pilot operated

RE 29179/02.07 Replaces: 07.05 1/12

Type ZDRE; ZDREE

Size 10 Component series 1X Maximum operating pressure 315 bar Maximum flow 80 l/min



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Information on available spare parts: www.boschrexroth.com/spc

Features

Page	- Pilot operated valve for reducing a system pressure
1	 Actuation by proportional solenoid
2	 Sandwich plate design
2	- Position of ports to DIN 24340 form A and ISO 4401
3	 Subplates to data sheet RE 45054 (separate order)
3	 Sandwich plate with lateral pilot oil ports X, Y
4	(separate order, see page 3)
5	- 4 pressure stages
6	 Valve and control electronics from a single source
7, 8	 External control for type ZDRE:
7	 Analogue amplifier VT-VSPA1(K)-1 in Euro-card format
9, 10	(separate order), see page 7
	Digital amplifier VT-VSPD-1 in Euro-card format
	(separate order), see page 7
	Analogue amplifier VI 11131 of modular design (separate order), see page 7
	 Integrated electronics (OBE) for type ZDREE:
	 Low manufacturing tolerance of the command value/pressure characteristic curve
	 Ramp times can be adjusted separately for pressure build-up and pressure reduction

Ordering code



X and Y are not provided on the mounting faces of the directional valve housing. If required, use sandwich plate HSZ 10 B... on page 3 (separate order).

Standard types

Туре	Material no.
ZDREE 10 VP2-1X/50XLMG24K31M	R900954705
ZDREE 10 VP2-1X/100XLMG24K31M	R900921799
ZDREE 10 VP2-1X/200XLMG24K31M	R900948587
ZDREE 10 VP2-1X/315XLMG24K31M	R900935341

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

Type ZDRE





Type ZDREE 10...1X/...L

Sandwich plate with X and Y port (separate order)

Type HSZ 10 B097-3X/M01

Material no.: **R900320785** Plate dimensions (length x width x height): 100 x 70 x 30 mm Weight: 2.5 kg Size of ports X and Y: G 1/4 Dimension drawing no.: R900262648



Function, section ((1) = component side, (2) = plate side)

Type ZDRE

Valves of type ZDRE... are pilot operated 3-way pressure reducing valves of sandwich plate design, i.e. with pressure limitation of the actuator pressure.

They are used to reduce a system pressure.

These valves basically consist of pilot part (1) with proportional solenoid (2), main valve (3) and pilot piston (4). The pressure in channel P1 is adjusted in dependence upon the command value via the proportional solenoid (2).

At rest, i.e. without pressure in channel P2, pilot piston (4) opens the connection from channel P2 to P1.

The pressure in channel P1 acts via bore (5) on piston area (6). The pilot oil for the pilot valve is taken from channel P1 and flows via bore (5) and orifice (7) into spring chamber (8). From there, it flows via valve seat (9), bore (10) and the Y-channel back to the tank.

The pressure required in channel P1 is selected on the associated amplifier. The proportional solenoid presses valve poppet (11) against valve seat (9) and closes the connection between spring chamber (8) and bore (10). Thus, both chambers (6) and (8) are pressure-compensated, and compression spring (12) shifts piston (4) to the right towards the opening direction P2 to P1. As soon as actuator pressure P1 has increased to the value set on the pilot valve, valve poppet (11) opens and limits the pressure in spring chamber (8). Pilot piston (4) now moves to the left to the control position. When actuator pressure P1 exceeds the value set on the pilot valve, the pilot piston is moved further to the left and blocks the flow from P2 to P1 and opens the connection P1 to the tank at control land (13) until this pressure has dropped again to the set value.





Type ZDREE - with integrated electronics (OBE)

In terms of function and structure, these valves correspond to those of type ZDRE, except for the integrated electronics. The electronics (OBE) that is accommodated in housing (14) receives its supply and command value voltage from cable socket (15).

The command value/pressure characteristic curve is adjusted in the factory with narrow tolerances.

The ramp time for pressure build-up and pressure reduction can be adjusted independently of one another by means of two potentiometers. For further details regarding the integrated electronics (OBE), see pages 7 and 8.

Pilot oil supply to the directional valve fitted above

IF ▲ Caution!

- · With direct operated directional valves, the sealing arrangements for the X and Y ports are missing on the mounting face of the housing. In order to prevent hydraulic fluid from draining, the pilot oil supply from P2 to X and the pilot oil drain between the directional valve and the ZDRE(E) must be plugged (version XL).
- · As a result of leakage due to the spool clearance from "P" to "B", pressure may build up in channel "B"!

With versions XY and XL the connection between P2 and X is closed.



Type ZDRE(E) 10...1X/...XY



X2

P2

External

• In the case of a **pilot operated** proportional directional valve in conjunction with the ZDRE(E), the proportional directional valve has to be the version with "external pilot oil supply".

With versions Y and L, plug port X on the subplate.



Type ZDRE(E) 10...1X/...Y



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

Weight $-2DRE$ kg5.4-ZDREEkg5.5Installation orientationPreferred orientation of the proportional solenoid is downwards or horizontalStorage temperature range-ZDRE°C-2DREE°C-20 to + 70temperature range-ZDREE°C-2DREE°C-20 to + 50Hydraulic (measured with HLP 46; ϑ_{01} = 40 °C ± 5 °C)Max. operating pressure-Port P1ba-Port P2 (A; B; Xba350-Port Y or LLine separately and at zero pressure to tank-Port Y or LLine separately and at zero pressure to tank-Port Y or LLine separately and at zero pressure to tank-Portsure stage 50 barba-Portsure stage 200 barbar-Portsure stage 200 barbar-Pressure stage 200 barbar-Pressure stage 200 barbar-Pressure stage 315 barbar-Pressure stage 305 barbarMax. permissible flowI/minMax. permissible flowI/minHydraulic fluid itemperature range°C-20 to + 80Vaccosity range-mr²-20 E + 80± 2 of ρ_{min} Attack fuid - classes to ISO 4406 (c)-20 FE%-20 FE%-	General					
$ \begin{array}{ c c c } - ZDREE & kg & 5.5 \\ \hline Prefered orientation \\ \hline Prefered orientation of the proportional solenoid is downwards or horizontal \\ \hline Storage temporature range & C & -20 to + 70 \\ \hline 2DRE & C & -20 to + 50 \\ \hline Prefered orientation (measured with HLP 46; \beta_{oll} = 40 ^{\circ}{\rm C} \pm 5 ^{\circ}{\rm C} \ -20 to + 50 \\ \hline Hydraulic (measured with HLP 46; \beta_{oll} = 40 ^{\circ}{\rm C} \pm 5 ^{\circ}{\rm C} \ -20 to + 70 \\ \hline -2DrE & C & -20 to + 50 \\ \hline Hydraulic (measured with HLP 46; \beta_{oll} = 40 ^{\circ}{\rm C} \pm 5 ^{\circ}{\rm C} \ -20 to + 70 \\ \hline -2DrE & -Port P & ba & 350 \\ \hline -Port P & ba & 350 \\ \hline -Port P & Dr & L & Line separately and at zero pressure to tank \\ \hline -Ports P2; A; B; X & bar & 350 \\ \hline -Port V or L & L & Line separately and at zero pressure to tank \\ \hline -Poresure stage 50 bar & bar & 50 \\ \hline -Pressure stage 100 bar & bar & 100 \\ \hline -Pressure stage 200 bar & bar & 315 \\ \hline Min. set pressure channel P1 at zero command value & bar & See p_{km}; q, characteristic curve on page 10 \\ \hline Max. permissible flow & Umin & 80 \\ \hline Hydraulic fluid \\ \hline Hydraulic fluid fluid = Umin the hy \\ Hydraulic fluid fluid emperature range & C & -20 to + 80 \\ \hline Vincoutly range & mark/s & 15 to 380 \\ \hline Max. permissible degree of curvaniantion of the hy \\ Hydraulic fluid temperature range & C & -20 to + 80 \\ \hline Viscoutly range & mark/s & 15 to 380 \\ \hline Max. permissible degree of curvaniantion of the hy the set or (HD-R) \\ \hline Hystoresis & -2DREE & \% & 12 of p_{max} \\ \hline Respectatolity & 0 & -2DRE & \% & 12 0 f p_{max} \\ \hline Manufacturing tolerance & -ZDRE & \% & 120 \\ \hline Det tolerance & -ZDRE & \% & 120 \\ \hline Det tolerance & -ZDRE & \% & 120 \\ \hline Max. control current & -ZDRE & \% & 120 \\ \hline Max. control current & -ZDRE & \% & 120 \\ \hline Max. control current & -ZDRE & \% & 120 \\ \hline Det tolerance & -ZDRE & \% & 120 \\ \hline Det tolerance & -ZDRE & \% & 120 \\ \hline Det tolerance & -ZDRE & \% & 120 \\ \hline Det tolerance & -ZDRE & \% & 100 \\ \hline Det tolerance & -ZDRE & \% & 100 \\ \hline Det tolerance & -ZDRE & \% & 100 \\ \hline Det tolerance & -ZDRE & \% & 100 \\ \hline Det tolerance & -ZDRE & \% & 100 \\ \hline Det t$	Weight	– ZDRE	kg	5.4		
Installation orientation Preferred orientation of the proportional solenoid is downwards or horizontal Storage temperature range $-2DRE$ $^{\circ}C$ -20 to + 80 Ambient $-2DRE$ $^{\circ}C$ -20 to + 70 Hydraulic (measured with HLP 46; β_{oil} = 40 °C ± 5 °C) -20 to + 50 Max. operating pressure $-Port P1$ bar 315 $-Port T$ bar 350 $-Port T$ bar $-Port T$ bar 350 $-Port T$ bar $-Port T$ bar 50 $-Port T$ bar in channel P1 $-Pressure stage 100 bar bar 100 -Pressure stage 200 bar bar 50 100 -Pressure stage 200 bar bar 200 -Pressure stage 200 bar 100 -Pressure stage 200 bar bar 100 -Pressure stage 200 bar 100 -Pressure stage 200 bar bar 100 -Pressure stage 200 bar 100 Max. permissible flow Vimin 80 6 to 0.9 Pressure stage 200 bar 100 Max. permissible flow Vimin 80 for Pressure stage 200 fa$		– ZDREE	kg	5.5		
lis downwards or horizontal Storage temperature range $^{\circ}$ C $^{\circ}$ 20 to + 90 Ambient $^{\circ}$ ZDRE $^{\circ}$ C $^{\circ}$ 20 to + 50 Hydraulic (measured with HLP 46; $\vartheta_{oll} = 40$ °C ± 5 °C) Hydraulic (measured with HLP 46; $\vartheta_{oll} = 40$ °C ± 5 °C) $^{\circ}$ Port P1 bar 315 $^{\circ}$ Port P2; A; B; X bar 350 $^{\circ}$ Port Y or L Line separately and at zero pressure to tank Max. set pressure $^{\circ}$ Pressure stage 50 bar bar 50 $^{\circ}$ Port Y or L Line separately and at zero pressure to tank $^{\circ}$ Pressure stage 00 bar bar 100 $^{\circ}$ Pressure stage 00 bar bar 315 $^{\circ}$ Pressure stage 00 bar bar 315 $^{\circ}$ Pressure stage 00 bar bar 315 $^{\circ}$ Pressure stage 315 bar 315 $^{\circ}$ Pressure stage 315 bar 315 $^{\circ}$ Pressure stage 316 bar 300 $^{\circ}$ Pressure stage 316 bar 315 $^{\circ}$ Pressure stage 316 bar 300 $^{\circ}$ Pressure stage 316 bar 30 $^{\circ}$ Pressure stage 30 $^{\circ}$ Pressure stage 316 bar 30	Installation orientation			Preferred orientation of the proportional solenoid		
$\begin{aligned} & \text{Storage temperature range} & \begin{tabular}{ c $				is downwards or horizontal		
Ambient -2 DREE -3 Or $+70$ Hydraulic (measured with HLP 46; $\vartheta_{oil} = 40$ °C ± 5 °C) -20 to $+50$ Max. operating pressure $-Port P1$ bar $-Port P1$ bar 350 $-Port P1$ bar 350 $-Port P1$ bar 350 $-Port P1$ bar 250 $-Port P1$ V r L Line separately and at zero pressure to tank Max. set pressure $-Pressure stage 100$ bar bar $-Pressure stage 200$ bar bar 300 $-Pressure stage 315$ bar bar 315 Min. set pressure channel P1 at zero command value bar $80 = e_{Emin} q_v$ characteristic curve on page 10 Max. permissible flow I/min 0.0 0.0 Hydraulic fluid I/mineral oil (HL, HLP) to DIN 51524, phosphate ester (HFD-R) Hydraulic fluid fluid temperature range nC -20 to $+80$ Viscosity range mm ² /s 51 to 380 350 degas Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c) $+2 c$ of P_{max} -20 REE $9 \pm 2 c$ of P_{max} Step respone $T_{u} + T_{0}$	Storage temperature range			- 20 to + 80		
temperature range $-ZDRE + C = 20 to + 80$ Hydraulic (measured with HLP 46; $\vartheta_{oll} = 40 \text{ °C} \pm 5 \text{ °C}$) Max. operating pressure $-Port P1$ ba 315 -Port P2; A; B; X bar 350 -Port Y or L Line separately and at zero pressure to tank Max. set pressure $-Pressure stage 50 \text{ bar}$ bar 300 -Pressure stage 100 bar bar 310 -Pressure stage 100 bar bar 310 -Pressure stage 100 bar bar 315 Min. set pressure channel P1 at zero command value bar See $\rho_{Emin}(q, \text{characteristic curve on page 10}$ Max. permissible flow I/min 80 Hydraulic fluid temperature range $^{\circ}C$ -20 to + 80 Viscosity range mm ² /s 15 to 380 Max. permissible flow I/min 80 Hydraulic fluid temperature range $^{\circ}C$ -20 to + 80 Viscosity range mm ² /s 15 to 380 Max. permissible flow I/min 80 Hydraulic fluid cleaniness class to ISO 4406 (c) Hydraulic fluid cleaniness class to ISO 4406 (c) Hydraulic fluid $-2ZDRE 96$ $\pm 2 \text{ of } \rho_{max}$ Linearity $90 \div 120 \text{ m}$ to 5 lites $-ZDRE 96$ $\pm 2 \text{ of } \rho_{max}$ Manufacturing tolerance $-ZDRE 96$ $\pm 2 \text{ of } \rho_{max}$ Step response $T_u + T_q$ $10 \rightarrow 90\%$ ms -150 Measure with a static hydraulic fluid column of $90 \rightarrow 10\%$ ms -120 5 litres in port P1 Electrical Min. control current mA 100 Max. control current $-ZDRE mA 1400 \text{ to 760}$ Solenoid coil resistance $-CDRE mA 1400 \text{ to 101N EN 175201-804}$ Cable socket to DI	Ambient			- 20 to + 70		
Hydraulic (measured with HLP 45; $\mathcal{W}_{oil} = 40 °C \pm 5 °C$) Max. operating pressure - Port P1 bar 315 - Port T bar 350 - Port T bar 250 - Port T bar 50 - Port Y or L Line separately and at zero pressure to tank Max. set pressure - Pressure stage 50 bar bar - Pressure stage 200 bar bar 50 - Pressure stage 200 bar bar 200 - Pressure stage 315 bar bar 315 Max. permissible flow I/min 80 Pilot oil flow I/min 80 Pilot oil flow I/min 80 Viscosity range mm²/s Max. permissible degree of contamination of the hy- Class 20/18/15 ° ³ draule fluid - cleaniness class to ISO 4406 (c) Hysteresis Hysteresis - ZDRE % ± 2 of ρ_{max} Manufacturing tolerance - ZDRE % ± 1.5 of max. set pressure referred to the hysteresis App = 10% mas - 150 Measured with a static hydraulic fluid column of 90 → 10% ms -	temperature range			- 20 to + 50		
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$ \frac{-\operatorname{Port}\operatorname{P}_{2}; A; B; X \qquad bar \qquad 350 \\ -\operatorname{Port} T \qquad bar \qquad 250 \\ -\operatorname{Port} T \qquad bar \qquad 250 \\ -\operatorname{Port} Y \circ L \qquad \text{Line separately and at zero pressure to tank} \\ \operatorname{Max. set pressure stage 50 bar \qquad bar \qquad 50 \\ -\operatorname{Pressure stage 100 bar \qquad bar \qquad 100 \\ -\operatorname{Pressure stage 200 bar \qquad bar \qquad 200 \\ -\operatorname{Pressure stage 315 bar \qquad bar \qquad 315 \\ \operatorname{Min. set pressure channel P1 at zero command value \qquad bar \qquad See P_{E,\min}, q, characteristic curve on page 10 \\ \operatorname{Max. permissible flow \qquad //min \qquad 80 \\ \operatorname{Picesure stage 315 bar \qquad bar \qquad 100 \\ \operatorname{Pressure stage 316 bar \qquad 0.9 \\ \operatorname{Hydraulic fluid } \\ \operatorname{Hydraulic fluid fund } \\ \operatorname{Hydraulic fluid temperature range \qquad C \qquad -20 to + 80 \\ \operatorname{Viscosity range \qquad mm^{2}/e \qquad 15 to 380 \\ Max. permissible degree of contamination of the hy-draulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 4406 (c) \\ \operatorname{Hydraulic fluid - cleanliness class to ISO 50 \\ \operatorname{Hydraulic fluid - cleanlines class to ISO 50 \\ \operatorname{Hydraulic fluid - cleanlines class to ISO 50 \\ \operatorname{Hydraulic fluid - cleanlines class to ISO 50 \\ \operatorname{Hydraulic fluid - cleanlines class to ISO 50 \\ \operatorname{Hydraulic fluid - class class to ISO 50 \\ \operatorname{Hydraulic fluid - class class to ISO 50 \\ \operatorname{Hydraulic fluid - class class to ISO 50 \\ \operatorname{Hydraulic fluid - class$	Max. operating pressure	– Port P1	bar	315		
$\begin{array}{c c c c c c c } \hline -Port T & bar 250 \\ \hline Port Y or L & Line separately and at zero pressure to tank \\ \hline Pressure stage 50 bar & bar 50 \\ \hline Pressure stage 200 bar & bar 200 \\ \hline Pressure stage 200 bar & bar 200 \\ \hline Pressure stage 2015 bar & bar 200 \\ \hline Pressure stage 2015 bar & bar 315 \\ \hline Pressure stage 2015 bar & bar 315 \\ \hline Pressure stage 315 bar & bar 315 \\ \hline Pressure stage 315 bar & bar 315 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 315 bar & bar 300 \\ \hline Pressure stage 30 bar & long 300 \\ \hline Pressure stage 30 bar bar 30 \\ \hline Pressure st$		– Ports P2; A; B; X	bar	350		
$\begin{array}{ c c c c c c } & -\operatorname{Pers} V \ or \ L \\ & Line separately and at zero pressure to tank \\ & -\operatorname{Pressure stage 50 bar} \ bar \ 50 \\ & -\operatorname{Pressure stage 100 bar} \ bar \ 100 \\ & -\operatorname{Pressure stage 200 bar} \ bar \ 200 \\ & -\operatorname{Pressure stage 315 bar} \ bar \ 315 \\ & -\operatorname{Pressure stage 315 bar} \ bar \ 315 \\ & -\operatorname{Pressure stage 315 bar} \ bar \ 315 \\ & -\operatorname{Pressure stage 315 bar} \ bar \ 315 \\ & -\operatorname{Pressure stage 315 bar} \ bar \ 315 \\ & -\operatorname{Pressure stage 315 bar} \ bar \ 315 \\ & -Pressure stage 316 bar \ 316 \\ & -\operatorname{Pressure stage 316 bar \ 315 \\ & -\operatorname{Pressure stage 316 \ 316 \\ & -\operatorname{Pressure stage 316 \ 316 \\ & -\operatorname{Pressure stage 316 \ 316 \ 316 \\ & -\operatorname{Pressure stage 316 \ 316 \ 316 \\ & -\operatorname{Pressure stage 316 \ 316 \ 316 \\ & -\operatorname{Pressure stage 316 \ 316 \ 316 \ 316 \ 316 \ 316 \\ & -\operatorname{Pressure stage 316 \ 3$		– Port T	bar	250		
$\begin{array}{c} \mbox{Hax} set pressure \\ \mbox{in channel P1} & - \mbox{Pressure stage 50 bar} & bar \\ \mbox{-Pressure stage 200 bar} & bar \\ \mbox{-Pressure stage 316 bar } & mm^2/s \\ \mbox{-Pressure stage 316 bar }$		– Port Y or L	_	Line separately and at zero pressure to tank		
in channel P1 $ \begin{array}{c} - \operatorname{Pressure stage 100 bar} & bar \\ - \operatorname{Pressure stage 200 bar} & bar \\ - \operatorname{Pressure stage 200 bar} & bar \\ 200 \\ - \operatorname{Pressure stage 200 bar } & bar \\ 200 \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - \operatorname{Presure stage 200 bar } & bar \\ - Presure stage 200 b$	Max. set pressure	– Pressure stage 50 bar	bar	50		
$ \frac{-\operatorname{Pressure stage 200 \ bar}{-\operatorname{Pressure stage 315 \ bar}} bar 200 \\ \frac{-\operatorname{Pressure stage 315 \ bar}{-\operatorname{Pressure stage 315 \ bar}} bar 315 \\ 315 \\ 316 \\$	in channel P1	 Pressure stage 100 bar 	bar	100		
$ \begin{array}{ c c c c c } & -Pressure stage 315 bar bar \\ Pressure channel P1 at zero command value bar \\ See $P_{Emin} q_{c}$ characteristic curve on page 10 \\ Amax permissible flow \\ Vmin \\ B0 \\ \hline \end{tabular} \\ Set to 0.9 \\ \hline \end{tabular} \\ $		 Pressure stage 200 bar 	bar	200		
Min. set pressure channel P1 at zero command value bar See p_{Emin} - q_{ν} characteristic curve on page 10 Max. permissible flow //min 80 Pilot oil flow //min 80 Pilot oil flow //min 80 Pilot oil flow //min 0.6 to 0.9 Hydraulic fluid temperature range °C - 20 to + 80 Viscosity range mm ² /s 15 to 380 Max. permissible degree of contamination of the hy- draulic fluid - cleanliness class to ISO 4406 (c) Hysteresis % ± 2 of p_{max} Repeatability // start = 20 f p_{max} Repeatability % ± 3.5 of p_{max} Manufacturing tolerance $-ZDRE$ % ± 2 of p_{max} Step response $T_u + T_q$ 10 → 90% ms ~ 150 Measured with a static hydraulic fluid column of 90 → 10% ms ~ 120 5 litres in port P1 Electrical Supply voltage V 24 DC Type of signal Min. control current mA 100 Max. control current $-ZDRE$ mA 1600 Max. control current $-ZDRE$ mA 1600 -ZDREE mA 1440 to 1760 Solenoid coil resistance $-Cle max$ 100 Max. control current $-Cle mA$ 1600 -ZDREE mA 1600 -ZDRE MA 1600 $-ZDRE MA 1600 -ZDRE MA 1600 -ZDRE MA 1600-ZDRE MA 1600 -ZDRE MA 1600 -ZDRE MA 1600 -ZDRE MA 1600 -ZDRE MA 1600 MA 20 20 \Omega 5.4-Max. hot value \Omega 7.8-ZDRE MA 1600 MA 20 20 \Omega 5.4-Max. hot value \Omega 7.8-ZDRE MA 1600 MA 20 20 \Omega 5.4-Max. hot value \Omega 7.8-ZDRE MA 1600 MA 20 20 \Omega 5.4-Max. hot value \Omega 7.8-ZDRE MA$		 Pressure stage 315 bar 	bar	315		
Max. permissible flow I/min 80 Pilot oil flow I/min 0.6 to 0.9 Hydraulic fluid Mineral oil (HL, HLP) to DIN 51524, phosphate ester (HFD-R) Hydraulic fluid temperature range °C - 20 to + 80 Viscosity range mm²/s 15 to 380 Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c) Class 20/18/15 ¹⁾ Hysteresis % ± 2 of p _{max} Repeatability % <± 2 of p _{max} Linearly % ± 3.5 of p _{max} Manufacturing tolerance -ZDRE % ± 2 of p _{max} Step response T _u + T _g 10 → 90% ms ~ 150 Masured with a static hydraulic fluid column of 90 → 10% Supply voltage V 24 DC Sters in port P1 Electrical Supply voltage V 24 DC Analogue Min. control current mA 1600 - -ZDRE mA 1600 - 2DRE 5.4 - Duty cycle M 1440 to 1760 5.4 - - Cable socket to DIN EN 175301-803 Cable socket to DIN EN 1753	Min. set pressure channel	P1 at zero command value	bar	See $p_{\text{E min}}$ - q_{v} characteristic curve on page 10		
Pilot oil flow $ Imin 0.6 to 0.9$ Hydraulic fluid $ Imin 0.6 to 0.9$ Mineral oil (HL, HLP) to DIN 51524, phosphate ester (HFD-R) Hydraulic fluid temperature range $C = -20 \text{ to } + 80$ Viscosity range mm^2/s 15 to 380 Class 20/18/15 1 Class 20/18/15 1 Class 20/18/15 1 Hysteresis $+2 \text{ of } p_{max}$ Repeatability $0 \leq \pm 2 \text{ of } p_{max}$ Repeatability $0 \leq \pm 2 \text{ of } p_{max}$ Linearity $0 \leq \pm 2 \text{ of } p_{max}$ Manufacturing tolerance $-ZDRE + 0/6 \pm 2 - \frac{1}{2} \text{ of max}$ set pressure referred to the hysteresis $-ZDREE + 0/6 \pm 2 - \frac{1}{2} \text{ of max}$ set pressure referred to the hysteresis Step response $T_u + T_g$ $10 \rightarrow 90\%$ ms ~ 150 Measured with a static hydraulic fluid column of $90 \rightarrow 10\%$ ms ~ 120 $\frac{100}{5}$ litres in port P1 Electrical Supply voltage V 24 DC Type of signal $Analogue$ Min. control current mA 100 Max. control current $-ZDRE$ mA 1600 -ZDREE mA 1600 -ZDREE mA 1600 -ZDREE M 1440 to 1760 Solenoid coil resistance $-Cold value at 20 ^{\circ}C \Omega$ 5.4 $-Max. hot value \Omega$ 7.8 Duty cycle 0 0.5 4.5 -ZDREE 0 0.5 $4.5-ZDREE$ 0 0.5 0 0.5 0.5 $4.5-ZDREE$ 0 0.5 $0.$	Max. permissible flow		l/min	80		
Mineral oil (HL, HPD to DIN 51524, phosphate ester (HFD-R)Hydraulic fluid temperature range°C-20 to + 80Viscosity rangemm²/s15 to 380Max. permissible degree of contamination of the hy- draulic fluid - cleanliness class to ISO 4406 (c)Class 20/18/15 ¹⁾ Max. permissible degree of contamination of the hy- draulic fluid - cleanliness class to ISO 4406 (c) $\pm 2 \text{ of } \rho_{max}$ Repeatability% $\pm 2 \text{ of } \rho_{max}$ Linearity% $\pm 2 \text{ of } \rho_{max}$ Manufacturing tolerance $= ZDRE$ $= ZDRE$ $-ZDREE$ % ± 1.5 $= 2DREE$ % ± 1.6 $= 2DREE$ % ± 2.6 $= 2DREE$ % ± 2.6 $= 2DREE$ % ± 1.6 $= 2DR$	Pilot oil flow		l/min	0.6 to 0.9		
Hydraulic fluid temperature range°C- 20 to + 80Viscosity rangemm²/s15 to 380Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)Class 20/18/15 ¹⁾ Hysteresis% ± 2 of p_{max} Repeatability% $\leq \pm 2$ of p_{max} Linearity% ± 3.5 of p_{max} Manufacturing tolerance $-ZDRE$ % ± 2 $-ZDREE$ % ± 1.5 of max. set pressure referred to the hysteresisStep response $T_u + T_g$ $10 \rightarrow 90\%$ ms ~ 150 Manufacturing tolerance $-ZDREE$ % ± 1.5 of max. set pressure referred to the hysteresisStep response $T_u + T_g$ $10 \rightarrow 90\%$ ms ~ 150 Measured with a static hydraulic fluid column of $90 \rightarrow 10\%$ Step response Tu + T_g $10 \rightarrow 90\%$ ms ~ 150 Measured with a static hydraulic fluid column of ~ 120 Step response Tu + T_g $10 \rightarrow 90\%$ ms ~ 150 Measured with a static hydraulic fluid column of ~ 120 Step response Tu + T_g $10 \rightarrow 90\%$ ms ~ 160 Step response Tu + T_g $10 \rightarrow 90\%$ ms ~ 150 Max. control currentmA100Max. control current $-ZDRE$ mAMax. control current $-ZDRE$ 5.4 $-ZDRE$ mA1440 to 1760Solenoid coil resistance $-Cold$ value at 20 °C 5.4 $-Max.$ hot value Ω 7.8 Duty cycle%100Electrical connection </td <td colspan="3">Hydraulic fluid</td> <td>Mineral oil (HL, HLP) to DIN 51524, phosphate ester (HFD-R)</td>	Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524, phosphate ester (HFD-R)		
Viscosity rangemm²/s15 to 380Max. permissible degree of contamination of the hy- draulic fluid - cleanliness class to ISO 4406 (c)Class 20/18/15 ¹⁾ Hysteresis% ± 2 of p_{max} Repeatability% ± 2 of p_{max} Linearity% ± 3.5 of p_{max} Manufacturing tolerance $-ZDRE$ % ± 2 $-ZDREE$ % ± 1.5 of max. set pressure referred to the hysteresis characteristic curve (increasing pressure)Step response $T_u + T_g$ $10 \rightarrow 90\%$ ms~ 150 $90 \rightarrow 10\%$ ms~ 150Measured with a static hydraulic fluid column of $90 \rightarrow 10\%$ Electrical 120 5 litres in port P1ElectricalAnalogueMax. control currentmA100Max. control currentmA100Max. control currentmA100Max. control currentmA100Max. hot value Ω 7.8Duty cycle%100Electrical connection $-ZDRE$ % $-ZDRE$ %100Electrical connection $-ZDRE$ % $-ZDRE$ %100Electrical connection $-ZDRE$ % $-ZDRE$ %100Type of protection of the valve to EN 60529With component plug to DIN EN 175201-804 Cable socket to DIN EN 175201-804 Cable socket to DIN EN 175201-804	Hydraulic fluid temperature	e range	°C	- 20 to + 80		
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c) Class 20/18/15 ¹⁾ Hysteresis % ± 2 of ρ_{max} Repeatability % ± 2 of ρ_{max} Linearity % ± 2 of ρ_{max} Manufacturing tolerance $-ZDRE$ % ± 1.5 Of max. set pressure referred to the hysteresis characteristic curve (increasing pressure) Step response $T_u + T_g$ $10 \rightarrow 90\%$ ms ~ 150 Beaured with a static hydraulic fluid column of $90 \rightarrow 10\%$ ms ~ 120 5 litres in port P1 Electrical Supply voltage V 24 DC 24 DC Type of signal Analogue Analogue Max. control current MA 100 Max. control current - ZDRE mA 1440 to 1760 5.4 Solenoid coil resistance - Cold value at 20 °C Ω 5.4 Duty cycle % 100 100 Electrical connection - ZDRE With component plug to DIN EN 175301-803 Cable socket to DIN EN 175301-803 Cable socket to DIN EN 175301-803 ²⁾ - ZDRE With component plug to DIN EN 175201-804 Cable so	Viscosity range		mm²/s	15 to 380		
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Repeatability% $< \pm 2$ of p_{max} Linearity% ± 3.5 of p_{max} Manufacturing tolerance $-ZDRE$ % ± 2 $-ZDREE$ %Manufacturing tolerance $-ZDRE$ % ± 1.5 of max. set pressure referred to the hysteresis characteristic curve (increasing pressure)Step response $T_u + T_g$ $10 \rightarrow 90\%$ ms ~ 150 $90 \rightarrow 10\%$ Measured with a static hydraulic fluid column of $90 \rightarrow 10\%$ Electrical $10 \rightarrow 90\%$ ms ~ 120 5 litres in port P1Electrical $10 \rightarrow 90\%$ ms ~ 120 5 litres in port P1Supply voltageV 24 DC 7 Type of signalAnalogue 7 7 Max. control current $-ZDRE$ mA 1600 $-ZDREE$ mA 1440 to 1760 78 Solenoid coil resistance $-Cold$ value at 20 °C Ω 5.4 $-Max. hot value$ Ω 7.8 Duty cycle% 100 Electrical connection $-ZDRE$ $With component plug to DIN EN 175301-803Cable socket to DIN EN 175301-803Cable socket to DIN EN 175201-804Cable socket to DIN EN 175201-804Type of protection of the valve to EN 60529IP 65 with cable socket mounted and locked$	Hysteresis		%	$\pm 2 \text{ of } p_{\text{max}}$		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Repeatability		%	<± 2 of p _{max}		
$\begin{array}{l lllllllllllllllllllllllllllllllllll$	Linearity		%	\pm 3.5 of $p_{\rm max}$		
$ \begin{array}{c c c c c c c } \hline - \text{ZDREE} & \% & \pm 1.5 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Manufacturing tolerance	– ZDRE	%	± 2 of max. set pressure referred to the hysteresis		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		– ZDREE	%	\pm 1.5 $^{-}$ characteristic curve (increasing pressure)		
90 → 10%ms~ 120 5 litres in port P1ElectricalSupply voltageV24 DCType of signalAnalogueMin. control currentmA100Max. control current– ZDREmA1600– ZDREEmA1440 to 1760Solenoid coil resistance– Cold value at 20 °CΩ5.4– Max. hot valueΩ7.8Duty cycle%100Electrical connection– ZDREWith component plug to DIN EN 175301-803– ZDREEWith component plug to DIN EN 175301-803 20– ZDREEWith component plug to DIN EN 175201-804– ZDREIP 65 with cable socket mounted and locked	Step response $T_{u} + T_{g}$	10 → 90%	ms	~ 150 Measured with a static hydraulic fluid column of		
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Min. control current mA 100 Max. control current - ZDRE mA 1600 - ZDREE mA 1440 to 1760 Solenoid coil resistance - Cold value at 20 °C Ω 5.4 - Max. hot value Ω 7.8 Duty cycle % 100 Electrical connection - ZDRE % - ZDREE % 100 Type of protection of the value to EN 60529 With component plug to DIN EN 175201-804 ²⁾ Type of protection of the value to EN 60529 IP 65 with cable socket mounted and locked	Type of signal			Analogue		
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- Max. hot value Ω 7.8 Duty cycle % 100 Electrical connection - ZDRE With component plug to DIN EN 175301-803 - ZDREE With component plug to DIN EN 175301-803 ²⁾ - ZDREE With component plug to DIN EN 175201-804 Type of protection of the valve to EN 60529 IP 65 with cable socket mounted and locked	Solenoid coil resistance	 Cold value at 20 °C 	Ω	5.4		
Duty cycle % 100 Electrical connection - ZDRE With component plug to DIN EN 175301-803 - ZDREE Cable socket to DIN EN 175301-803 ²⁾ - ZDREE With component plug to DIN EN 175201-804 Cable socket to DIN EN 175201-804 ²⁾ Type of protection of the valve to EN 60529 IP 65 with cable socket mounted and locked		– Max. hot value	Ω	7.8		
Electrical connection - ZDRE With component plug to DIN EN 175301-803 - ZDREE Cable socket to DIN EN 175301-803 ²⁾ - ZDREE With component plug to DIN EN 175201-804 Cable socket to DIN EN 175201-804 ²⁾ Type of protection of the valve to EN 60529 IP 65 with cable socket mounted and locked	Duty cycle		%	100		
Cable socket to DIN EN 175301-803 ²⁾ - ZDREE With component plug to DIN EN 175201-804 Cable socket to DIN EN 175201-804 ²⁾ Type of protection of the valve to EN 60529 IP 65 with cable socket mounted and locked	Electrical connection	– ZDRE		With component plug to DIN EN 175301-803		
- ZDREE With component plug to DIN EN 175201-804 Cable socket to DIN EN 175201-804 ²⁾ Type of protection of the valve to EN 60529 IP 65 with cable socket mounted and locked				Cable socket to DIN EN 175301-803 2)		
Cable socket to DIN EN 175201-804 ²⁾ Type of protection of the valve to EN 60529 IP 65 with cable socket mounted and locked		– ZDREE		With component plug to DIN EN 175201-804		
Type of protection of the valve to EN 60529 IP 65 with cable socket mounted and locked				Cable socket to DIN EN 175201-804 ²⁾		
	Type of protection of the valve to EN 60529			IP 65 with cable socket mounted and locked		

For explanation of footnotes $^{1)}$ and $^{2)}\!,$ see page 7

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

Control electronics

– For ZDREE		Integrated in the valve (see page 8)	
– For ZDRE			
 Amplifier in Euro-card format 	analogue	VT-VSPA1(K)	-1 to data sheet RE 30111
(separate order) digit		VT-VSPD-1 to data sheet RE 30123	
Amplifier of modular design (separate order) analog		VT 11131 to data sheet RE 29865	
¹⁾ The cleanliness classes specified for components r	must be	²⁾ Separate order, see below	
adhered to hydraulic systems. Effective filtration pro malfunction and, at the same time, prolongs the set of components.	events rvice life	F Note:	For details regarding environment simulation testing in the fields of EMC (electromagnetic compatibility), climate and mechanical stress,
For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.			see RE 29179-U (declaration on environmental compatibility).

Elctrical connection, cable sockets (nominal dimensions in mm)

For type ZDRE – for external control electronics Cable socket to DIN EN 175301-803 Separate order stating material no. **R901017011**

Connection to component plug





Connection to cable socket





1 Fixing screw M3, tightening torque $M_{\rm T} = 0.5$ Nm

For type ZDREE – with integrated electronics (OBE) Cable socket to DIN EN 175201-804 Separate order stating material no. **R900021267** (plastic version)

Cable socket to DIN EN 175201-804 Separate order stating material no. **R900223890** (metal version)





For pin assignment, see Block circuit diagram on page 8.

Integrated electronics (OBE) of type ZDREE

Function

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

The ramp generator generates from a command value stepchange (0 to 10 V or 10 to 0 V) a delayed increase or drop of the solenoid current. Potentiometer R14 can be used to adjust the rise time, potentiometer R13 to adjust the drop time of the solenoid current.

The maximum ramp time of 5 s is only possible over the full command value range. In the case of minor changes in the command value, the ramp time shortens accordingly.

The command value/solenoid current characteristic curve is adjusted to the valve by means of the characteristic curve generator so that non-linearities in the hydraulic system are compensated for and a linear command value/pressure characteristic curve is obtained. The current regulator regulates the solenoid current independently of the solenoid coil resistance.

Potentiometer R30 can be used to change the gradient of the command value/current characteristic curve and hence the gradient of the command value/pressure characteristic curve of the proportional pressure control valve.

Potentiometer R43 serves for adjusting the biasing current. This setting should not be changed. If required, adjust the zero point of the command value/pressure characteristic curve on the valve seat.

A chopper amplifier forms the power stage of the electronics for controlling the proportional valve. It is pulse-width-modulated with a clock frequency of 300 Hz.

The solenoid current can be measured at both measuring sockets MP1 and MP2. A voltage drop of 0.352 V at the measuring resistor corresponds to a solenoid current of 1.6 A.



Supply voltage

Power supply unit with rectifier

Single-phase rectification or three-phase current bridge: $U_{\rm eff} =$ 22 to 33 V

Residual ripple content on the power supply unit : < 5 %

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

- Supply cable: Recommended: 5-wire, 0.75 or 1 mm² with protective conductor and shield
 - Outer diameter 6.5 to 11 mm
 - Shield to 0 V supply voltage
 - Max. permissible length 100 m

The minimum supply voltage of the power supply unit depends on the length of the supply cable (see diagram).

In the case of lengths > 50 m, a capacitor of 2200 μ must be provided in the supply cable in the vicinity of valve.



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



Pressure in channel P1 in dependence upon the command value







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

Pressure/flow characteristic curves







Flow $q_{\rm V}$ in l/min

 $P1 \rightarrow TA2 | P2 \rightarrow P1$

Unit dimensions (nominal dimensions in mm)



- 1 Proportional solenoid Observe position of cable socket! (See also Ordering code)
- 2 Nameplate
- 3 Valve housing
- 4 Space required to remove cable socket
- **5** Identical seal rings for ports A2, B2, P2, TA2, TB2 Identical seal rings for ports X2, Y2
- 6 Cable socket for type ZDRE (separate order, see page 7)
- 7 Integrated electronics (type ZDREE) with component plug
- 8 Cable socket for type ZDREE (plastic or metal version) (separate order, see page 7)
- **9** Position of ports to DIN 24340 Form A and ISO 4401 (X, Y as required)

Г	\square	0,01/100mm
¥		Rzmax 4
-	V	

Required surface quality of mating part

Tolerances to: - General tolerances ISO 2768-mK

Subplates to data sheet RE 45054 and valve fixing screws must be ordered separately.

Subplates:	G 535/01 (G 3/4)	with port X and Y
	G 536/01 (G 1)	with port X and Y

Valve fixing screws (separate order)

4 socket head cap screws ISO 4762 - M6 - 10.9 (friction coefficient $\mu_{total} = 0.14$); tightening torque $M_T = 15.5$ Nm (please adjust in the case of changed surfaces)

Notes

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