

Electric Drives
and Controls

Hydraulics

Linear Motion and
Assembly Technologies

Pneumatics

Service

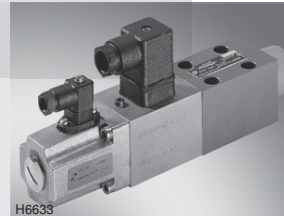
Rexroth
Bosch Group

3/3 proportional directional valves
direct operated, with electrical
position feedback as pilot valves
for control systems SY(H)DFE.

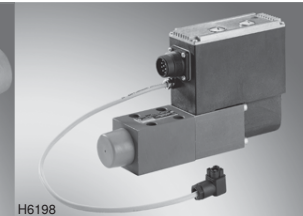
RE 29016/01.12
Replaces: 06.10

1/14

Type VT-DFP.



Type VT-DFP-2X/... with mating
connector (separate order)



Type VT-DFPE-2X/... with integrated
electronics

Component series 2X
Maximum operating pressure 350 bar

Table of contents

Contents

Features	
Ordering code	
Technical data	
Electrical connection	
Unit dimensions	
Project planning information	
More information	

Page

1	– Pilot valve for the pressure and flow control system SY(H)DFE.
2	– Actuation by means of a proportional solenoid with electrical feedback
4	– Control electronics:
6	• VT-DFP for SY(H)DFE1 → external control electronics VT 5041-3X
11	• VT-DFPE for SY(H)DFEE → integrated, analog
13	• VT-DFPC for SY(H)DFEC → integrated, digital with CAN bus interface
13	• VT-DFPn for Sytronix DFE n 5000 (SY(H)DFEn) → Integrated, digital with CAN bus interface, for variable-speed operation

Features

Ordering code

VT-DFP	-	A	-	2X	/	G24	K0	/	0				/	V	-	*
VT-DFPE	-	A	-	2X	/	G24	K0	/	0	A	0	C	/	V	-	*
VT-DFPC	-	A	-	2X	/	G24	K0	/	0	A	0	C	/	V	-	*
VT-DFPn	-	A	-	2X	/	G24	K0	/	0	A	0	C	/	V	-	*
1		2		3		4	5		6	7	8	9		10		11

Series

1	Pilot valve for external electronics	VT-DFP
	Pilot valve with integrated analog electronics	VT-DFPE
	Pilot valve with integrated digital electronics	VT-DFPC
	Pilot valve with integrated digital electronics, variable-speed	VT-DFPn

Spool design

2	Standard (not for HFC fluids)	A
	2-groove spool (for replacement purposes only)	B
	4-groove spool (e.g. for HFC fluids)	C

3	Component series	2X
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4	Direct voltage 24 V	G24
---	---------------------	------------

5	Connector (without mating connector) ¹⁾	K0
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Installation orientation plug-in connector (VT-DFP) and/or integrated electronics (also see page 3)

6	Radially to the pump axis	0
	Folded 90° in the direction of the subplate with counterclockwise direction of rotation	1
	Folded 90° in the direction of the subplate with clockwise direction of rotation	2

Additional functions: Closed-loop control

		A	B	C	D	R		
7	VT-DFP						(without)	
	VT-DFPE	Selectable pressure controller (high signal)	●					A
		Power limitation adjustable at the OBE valve		●				B
		Power limitation adjustable via analog input			●			C
		Pressure controller that can be switched off (high signal)				●		D
VT-DFPC	Standard	●					A	
VT-DFPn	Teach-In version for cyclic operation	●					A	
	Real-time version (speed calculation without Teach-In)					●	R	

Electronics assembly, option

		A	B	C	D	R		
8	VT-DFP						(without)	
	VT-DFPE	Standard electronics with leakage oil compensation	●	-	-	●		0
		Standard electronics without leakage oil compensation	●	●	●	●		1
	VT-DFPC	Standard	●					0
	VT-DFPn	Standard	●					0

Actual pressure value input (description of plug-in connectors on page 6)

		Plug-in connector			
9	VT-DFP				(without)
	VT-DFPE VT-DFPC VT-DFPn	Current input 4...20 mA		X1	C
		Voltage input 0...10 V (standard)		X1	V
		Voltage input 1...10 V		X1	E
		Voltage input 0.5...5 V (Standard) ²⁾		X2	F

10	FKM seals suitable for mineral oils (HL, HLP) according to DIN 51524 and HFC fluids ³⁾	V
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11	Further details in plain text, e.g. SO variant	
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● = available

- = not available

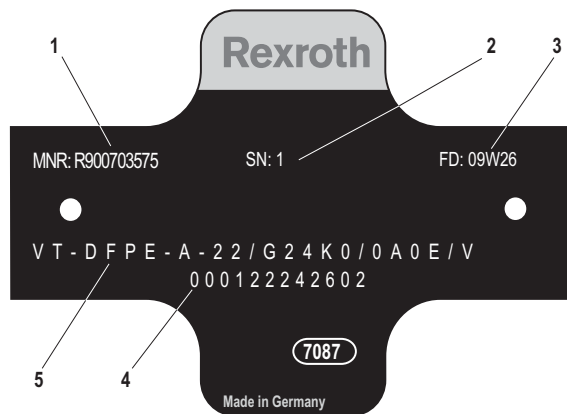
Preferred program

Ordering code

Note on feature 6: Installation orientation of the valve electronics			
Clockwise direction of rotation, installation orientation 0	Clockwise direction of rotation, installation orientation 2	Counterclockwise direction of rotation, installation orientation 0	Counterclockwise direction of rotation, installation orientation 1

- 1) Connector dependent on the valve type (see "Technical data" and "Electrical connection")
- 2) With the SY(H)DFEn control system with analog interfaces, the plug-in connector X2 cannot be used as actual pressure value input. Thus, a separate pressure transducer has to be used and connected to plug-in connector X1 in this case.
- 3) Only in connection with SYHDFE and spool design C (feature 2)

Example of nameplate



- 1 Material number
- 2 Serial number
- 3 Date of manufacture
- 4 Production order number
- 5 Type designation

Ordering code: Accessories

Version 10/2011, enquire availability

Accessories for VT-DFP	Material number	Data sheet
Mating connector for solenoid plug	R901017011	08006
Mating connector for position transducer of valve	R900023126	08006
Compact power supply unit VT-NE32-1X	R900080049	29929

Accessories for VT-DFPE, VT-DFPC and VT-DFPn	Material number	Data sheet
Mating connector 12-pin for central connection X1 without cable (assembly kit)	R900884671	08006
Mating connector 12-pin for central connection X1 with cable set 2 x 5 m	R900032356	
Mating connector 12-pin for central connection X1 with cable set 2 x 20 m	R900860399	
Test device VT-PDFE-1-1X/V0/0 for SY(H)DFEE and SY(H)DFEC	R900757051	29689-B
Compact power supply unit VT-NE32-1X	R900080049	29929

Accessories for VT-DFPC and VT-DFPn only	Material number	Data sheet
Converter USB/serial for laptops without serial interface VT-ZKO-USB/S-1-1X/V0/0	R901066684	
Cable for connecting a WIN-PED PC (RS232) to the X2 interface Length 3 m	R901156928	
T connector for the simultaneous connection of a WIN-PED PC (RS232) and use of the input at plug-in connector X2	R901117164	
Mating connector for interface X3, M12, straight, can be connected independently 5-pin, shielded, A-coded, cable diameter 6...8 mm	R901076910	

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

general					
Type		VT-DFP	VT-DFPE	VT-DFPC	VT-DFPn
Storage temperature range	°C	-20 ... +70	0 ... +70	0 ... +70	0 ... +70
Ambient temperature range	°C	-20 ... +60	0 ... +60	0 ... +50	0 ... +50
Weight	kg	1.96	2.25	2.25	2.25
hydraulic					
Hydraulic fluid		Mineral oil (HL, HLP) according to DIN 51524; HFC fluids only in connection with SYHDFE control system and C spool design C (feature 2 of ordering code)			
Hydraulic fluid temperature range	°C	-20 ... +70			
Viscosity range	mm ² /s	20 ... 380			
Maximum admissible degree of contamination of the hydraulic fluid according to ISO 4406		Class 18/16/13 (for particle size ≤ 4/6/14 µm)			
Operating pressure	Port A, P	bar		350	
	Port T	bar		100	

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

electric		VT-DFP	VT-DFPE	VT-DFPC	VT-DFPn
Type		External control electronics VT 5041-3X	Integrated, analog	Integrated, digital	Integrated, digital
Operating voltage	U_B	See data sheet 30242	24 VDC +40 % -5 %	24 VDC +40 % -5 %	24 VDC +40 % -5 %
Operating range (short-time operation)			35 V		
Upper limit	$U_B(t)_{max}$		21 V		
Lower limit	$U_B(t)_{min}$				
Current consumption (in static control operation)			0.6 A		
Rated current	$I_{Nominal}$	1.25 A			
Maximum current	I_{max}				
Inputs	Actual pressure value input X1; pin 10 and 11	See data sheet 30242	Determination by means of ordering code	Parameterizable: 0...20 mA; 4...20 mA; 0...10 V; 0...5 V; 0.5...5 V; 0.1...10 V; 1...10 V	
	Analog current inputs, load		R_B	100 Ω	100 Ω
	Analog voltage inputs		R_E	$\geq 50 \text{ k}\Omega$	$\geq 100 \text{ k}\Omega$
Digital inputs	Logic 0	$\leq 0.6 \text{ V}$	$\leq 8 \text{ V}$	$\leq 8 \text{ V}$	
	Logic 1	$\geq 21 \text{ V}$	$\geq 14 \text{ V}$	$\geq 14 \text{ V}$	
Outputs	$n_{command} / p_{actual} / U_{OUT} 1^{1)}$	See data sheet 30242	0 ... 10 V 1.5 mA	$\pm 10 \text{ V}$ 2 mA	$\pm 10 \text{ V}$ 2 mA
	$\alpha_{actual} / U_{OUT} 2^{2)}$		$\pm 10 \text{ V}$ 1.5 mA	$\pm 10 \text{ V}$ 2 mA	$\pm 10 \text{ V}$ 2 mA
	Digital outputs		Logic 0 Logic 1	$U_a < 1 \text{ V}$ $U_a \geq U_B - 5 \text{ V}; 10 \text{ mA}$ (short-circuit-proof)	
Solenoid coil resistance	Ω	2.1 ... 3.2			
Coil resistance position transducer at 20 °C	Between port 1 and 2	Ω	Approx. 113		
	Between port 3 and 4	Ω	Approx. 101		
Electrical connection		See page 6	See page 7	See page 8	See page 9
Protection class according to EN 60529		IP 65 with mounted and locked plug-in connectors			

Notice:

For information on the environment simulation testing for the areas of EMC (electro-magnetic compatibility), climate and mechanical load, see data sheet 30030-U.

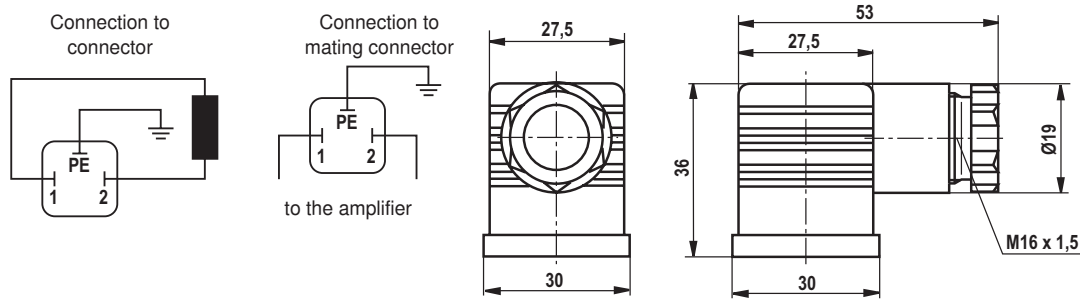
^{1, 2)} With VT-DFPC and VT-DFPn, the outputs are parameterizable, condition as supplied see pages 8/9

Electrical connection: Type VT-DFP... (for external analog electronics)

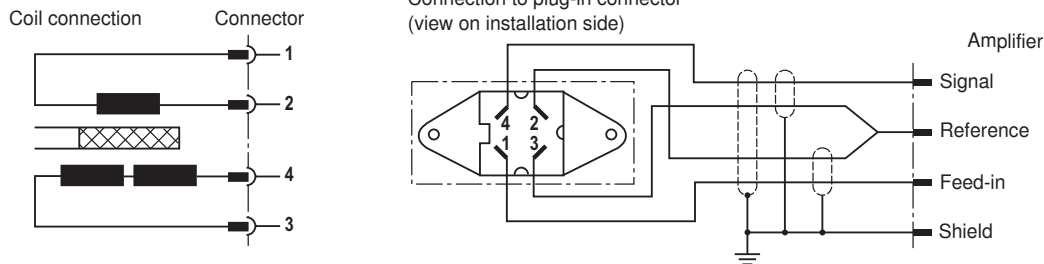
Details on the electrical connection to the VT 5041-3X amplifier are described in data sheet 30242.

Solenoid

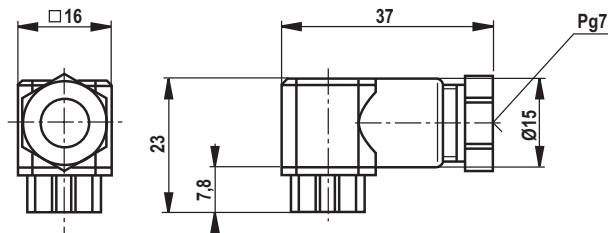
Mating connector 3-pin Z4 M SW according to DIN EN 175301-803
(separate order, see page 4)



Inductive position transducer



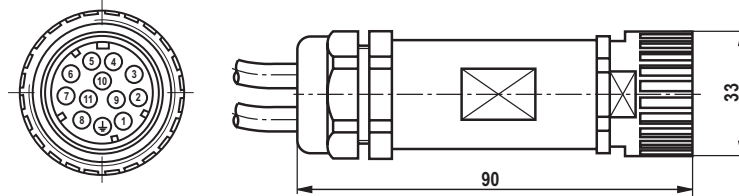
Mating connector 4-pin Pg7-G4W1F/Pg7 SW
(separate order, see page 4)



Electrical connection: VT-DFPE... (with integrated analog electronics)

X1: Central connection

Mating connector according to EN 175201-804 (12-pin), ordering code see section Accessories on page 4



Allocation of connector or mating connector and cable set

Pin	Signal	Description	Signal direction	Type of signal	Allocation in the cable set (accessories)
1	$+U_B$	Voltage supply	IN	24 V DC	1
2	0 V = L0	Reference potential for the voltage supply	-		2
PE	Earth	Earthing connection for the electronics	-		Green/Yellow
3	Fault	Signals failures, e.g. cable break command / actual values, controller monitoring (logic 0 = error)	OUT	Logic 24 V	White
4	M0	Reference potential for analog signals	-		Yellow
5	α_{command}	Swivel angle command value	IN	Analog ± 10 V	Green
6	α_{actual}	Actual swivel angle value normalized	OUT	Analog ± 10 V	Violet
7	p_{command}	Pressure command value	IN	Analog 0...10 V	Pink
8	p_{actual}	Actual pressure value normalized	OUT	Analog 0...10 V ¹⁾	Red
9		Function depends on electronics type and additional function, see below			Brown
10	Actual pressure value H	Actual pressure value input: Signal level depends on feature 14 of the ordering code With type "F" (0.5...5 V) reserved	IN	Analog	Black
11	Actual pressure value L		-	Analog	Blue
n.c.					Gray

Supply line 3 x 1.0 mm²

Supply line 10 x 0.14 mm² shielded (one end of the shield must be connected to the control!)

Functions at pin 9

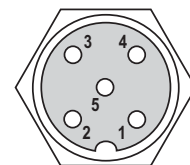
Pin	Additional function	Function dependent on feature 7 of the ordering code (see page 2)	Signal direction	Type of signal
9	--A...	Switching to different oil volume adjustment (switch T_D)	IN	Logic 24 V
	--B...	Power limitation active	OUT	Logic 24 V
	--C...	Command value of power limitation	IN	Analog 0...10 V
	--D...	Switch off pressure controller	IN	Logic 24 V

¹⁾ When using a pressure transducer with raised zero point (e. g. (4... 20 mA), a voltage of -1...-2.5 V will be output in the event of a cable break.

X2: Connection of pressure transducer HM 16 (mating connector M12)

Pin	Signal HM 16	Pin	
1	OUT, $+U_B$	2	n.c.
3	Reference L0		
4	IN, analog, 0.5 to 5 V DC	5	n.c.

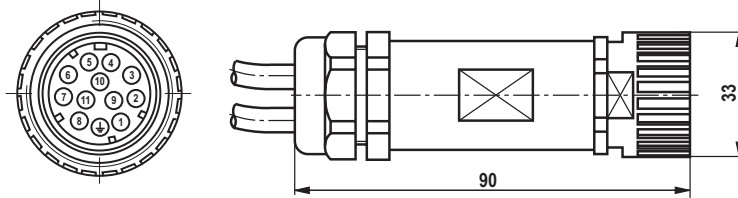
Top view on mating connector



Electrical connection: VT-DFPC... (with integrated digital electronics)

X1: Central connection

Mating connector according to EN 175201-804 (12-pin), ordering code see section Accessories on page 4



Allocation of connector or mating connector and cable set

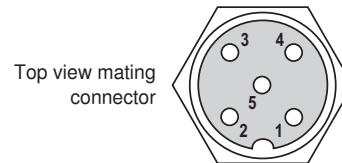
Pin	Signal	Description	Signal direction	Type of signal	Allocation in the cable set (accessories)
1	+U _B	Voltage supply	IN	24 V DC	1
2	0 V = L0	Reference potential for the voltage supply	-		2
PE	Earth	Earthing connection for the electronics	-		Green/Yellow
3	Fault	Signals failures, e.g. cable break command / actual values, controller monitoring (logic 0 = error)	OUT	Logic 24 V	White
4	M0	Reference potential for analog signals	-		Yellow
5	AI2	Analog input AI2 Standard: Swivel angle command value	IN	Analog ±10V	Green
6	U _{OUT2}	Analog output Standard: Actual swivel angle value normalized	OUT	Analog ±10V	Violet
7	AI1	Analog input AI1 Standard: Pressure command value	IN	Analog 0...10 V	Pink
8	U _{OUT1}	Analog output Standard: Actual pressure value normalized	OUT	Analog ±10 V	Red
9	DI1	Digital input DI1	IN	Logic 24 V	Brown
10	Actual pressure value H	Actual pressure value input: Signal level depends on feature 14 of the ordering code	IN	Analog	Black
11	Actual pressure value L		-	Analog	Blue
n.c.					Gray

Supply line 3 x 1.0 mm²

Supply line 10 x 0.14 mm² shielded (one end of the shield must be connected to the control!)

X2: Connection of pressure transducer HM 16 and serial interface RS232 (mating connector M12)

Pin	Signal HM 16	Pin	Signal RS232
1	OUT, +U _B	2	RxD
3	Reference L0		
4	IN, analog, 0.5 to 5 V DC	5	TxD



X3: Connection CAN bus and digital input 2 (DI2) (connector M12)

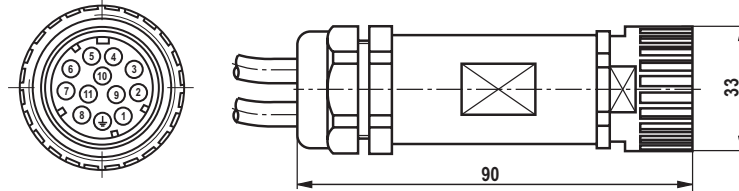
Pin	Signal input	Pin	Signal CAN
1	n.c.	3	CAN GND
2	IN, digital IN2 (DI2)	4	CAN-HIGH
		5	CAN-LOW



Electrical connection: VT-DFPn... (with integrated digital electronics)

X1: Central connection

Mating connector according to EN 175201-804 (12-pin), ordering code see section Accessories on page 4



Allocation of connector or mating connector and cable set

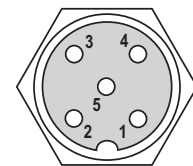
Pin	Signal	Description	Signal direction	Type of signal	Allocation in the cable set (accessories)
1	$+U_B$	Voltage supply	IN	24 V DC	1
2	0 V = L0	Reference potential for the voltage supply	-		2
PE	Earth	Earthing connection for the electronics	-		Green/Yellow
3	Fault	Signals failures, e.g. cable break command / actual values, controller monitoring (logic 0 = error)	OUT	Logic 24 V	White
4	M0	Reference potential for analog signals	-		Yellow
5	AI2	Analog input AI2 Standard: Swivel angle command value	IN	Analog ± 10 V	Green
6	U_{OUT2}	Analog output Standard: Actual swivel angle value normalized	OUT	Analog ± 10 V	Violet
7	AI1	Analog input AI1 Standard: Pressure command value	IN	Analog 0...10 V	Pink
8	U_{OUT1}	Analog output Standard: Speed command value	OUT	Analog ± 10 V	Red
9	DI1	Digital input DI1 Dependent on additional function (feature 7 of the ordering code): – Teach-In version: Synchronization bit DI1 – Real-time version: Activate real-time operation	IN	Logic 24 V	Brown
10	Actual pressure value H	Actual pressure value input: Signal level depends on feature 9 in the ordering code	IN	Analog	Black
11	Actual pressure value L		-	Analog	Blue
n.c.					Gray

Supply line 3 x 1.0 mm²

Supply line 10 x 0.14 mm² shielded (one end of the shield must be connected to the control!)

X2: Serial interface RS232 and a switchable digital input S1/pressure transducer input for HM 16 (mating connector M12)

Pin	Signal input	Pin	Signal RS232
1	OUT, $+U_B$	2	RxD
3	Reference L0		
4	Analog input 0.5...5 V for HM 16 or Digital input 0 V low, 10 V high (max. 12 V) Dependent on additional function (feature 7 of the ordering code): – Teach-In version: Digital input "Variable-speed operation on, S1" – Real-time version: Input as analog input for pressure transducer HM 16	5	TxD

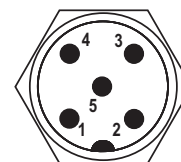


Top view mating connector

Electrical connection: VT-DFPn... (continued)

X3: CAN bus and digital input 2 (connector M12)

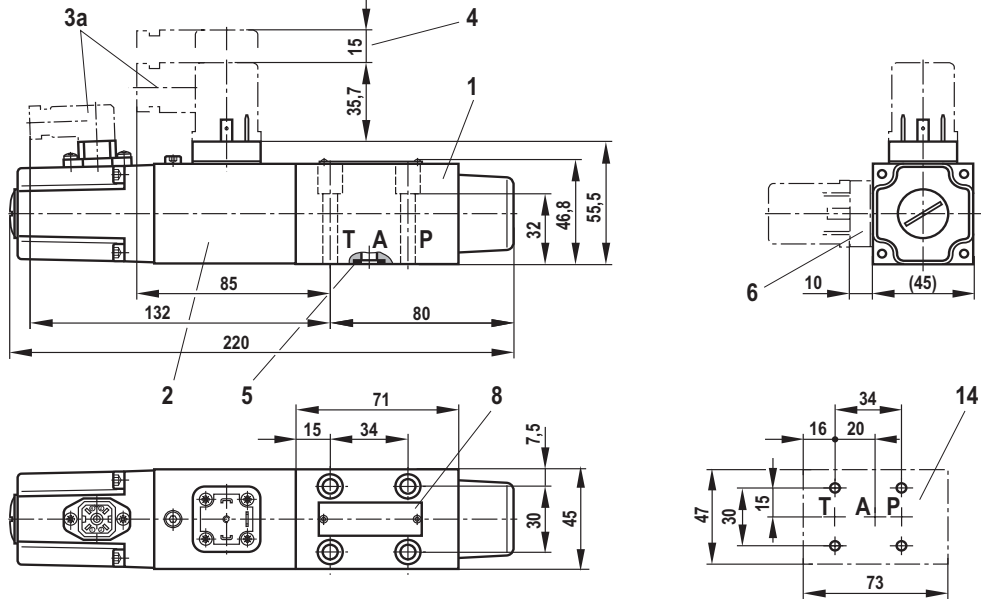
Pin	Signal input	Pin	Signal CAN
1	n.c.	3	CAN GND
2	IN, digital IN2 (DI2) Dependent on additional function (feature 7 of the ordering code): – Teach-In version: Start Teach-In, S2 – Real-time version: Manual speed provision active, speed is applied according to the real-time operation status and the setting of the R parameters.	4	CAN-HIGH
		5	CAN-LOW



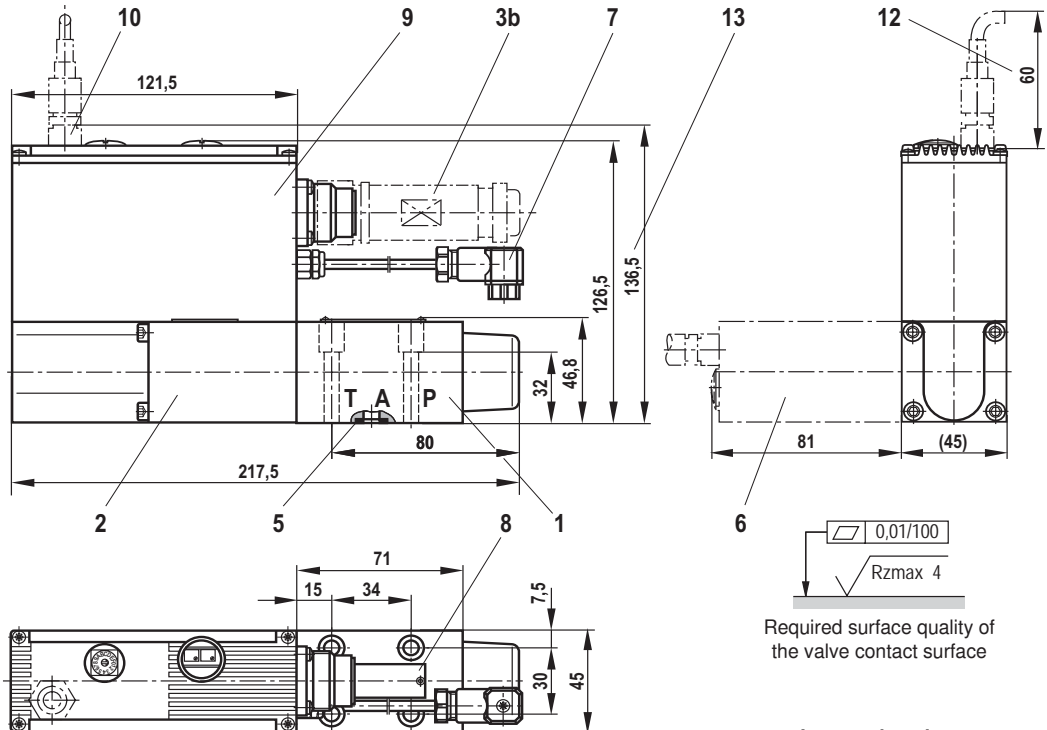
Top view
connector

Unit dimensions (dimensions in mm)

Type VT-DFP...2X/...



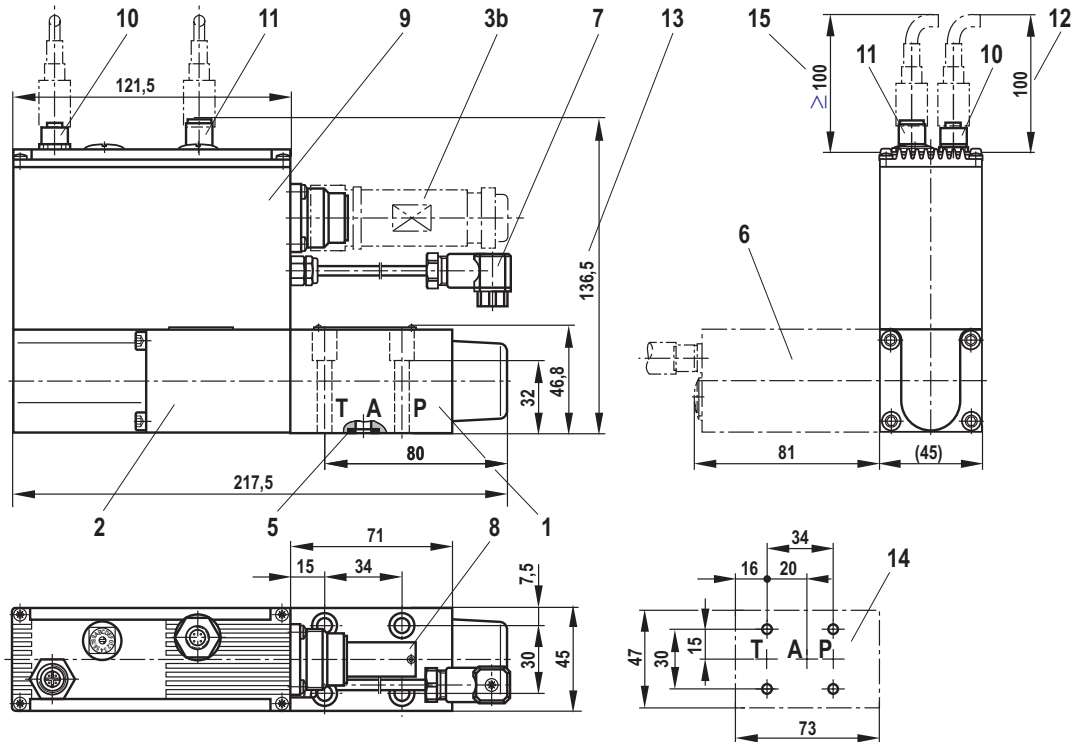
Type VT-DFPE...2X/...



Item explanation see page 12

Unit dimensions (dimensions in mm)

Type VT-DFPC...2X/... and VT-DFPn...2X/...



- 1 Valve housing
- 2 Proportional solenoid with position transducer
- 3a Mating connectors for solenoid and position transducer (separate order see page 4)
- 3b Mating connector for connector X1 (separate order see page 4)
- 4 Space required for removing the mating connector
- 5 Identical seal rings for ports P, A, and T
- 6 Solenoid rotated by 90° (installation orientation "2")
- 7 Connection swivel angle position sensor (rotary angle sensor VT-SWA-1-1X)
- 8 Name plate
- 9 Integrated electronics
- 10 Mating connector X2 for connecting a pressure transducer HM 16 (only with VT-DFPE.../...F, VT-DFPC... and VT-DFPn)
- 11 Mating connector X3 for connecting the CAN bus (only with VT-DFPC... and VT-DFPn)
- 12 Space required for plug-in connection (HM 16)

- 13 Dimension for version VT-DFPE...F, VT-DFPC and VT-DFPn (connection for HM 16 or CAN bus)
- 14 Machined valve mounting face
- 15 Space required for CAN connection (plug-in connection on the customer side)

Valve mounting screws for all types:

4 hexagon socket head cap screws
ISO4762-M6X40-10.9-fIZn-240h-L,
Friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14
according to VDA 235-101,
Tightening torque $M_A = 7$ Nm,
Material number: **R913000058**

Project planning information

Supplementary notes on the SY(H)DFE control systems can be found in the operating instructions (see section "More information about this control system" on this page.).

More information on control systems SY(H)DFE

Operating instructions for SY(H)DFE1	30011-B
Operating instructions for SY(H)DFEE	30012-B
Operating instructions for SY(H)DFEC	30027-B
Operating instructions for SY(H)DFEn	30014-B
Data sheet for SYDFE.-2X	30030
Data sheet for SYDFEn-2X	62240
Data sheet for SYDFE.-3X	30630
Data sheet for SYDFEn-3X	62241
Data sheet for SYHDFE.-1X	30035
Data sheet for SYHDFEn-1X	62242
Data sheet for external control electronics VT 5041-3X for SYDFE1	30242
Data sheet for swivel angle sensor VT-SWA-1-1X	30268
Data sheet for pressure transducer HM 12-1X and HM 13-1X	29933
Data sheet for pressure transducer HM 16-1X	30266
Data sheet for pressure transducer HM 17-1X	30269
Operating instructions for test device VT-PDFE	29689-B
Current information is also available on the Internet under the address http://www.boschrexroth.com/sydfc (English) or http://www.boschrexroth.de/sydfc (German).	

Notes

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