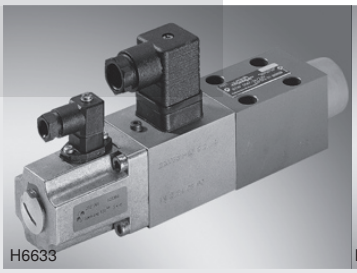
Rexroth
Bosch Group

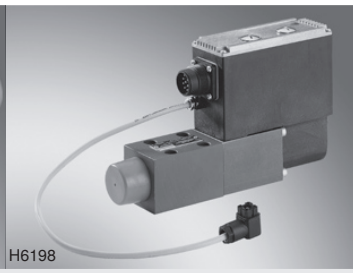
3/3 proportional directional valves direct operated, with electrical position feedback as pilot valves for control systems SY(H)DFE.

RE 29016/06.10 1/12
Replaces: 09.09

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

Features

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

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 (not for new applications)	**B**
	4-groove spool (e.g. for HFC fluids)	**C**

3	Component series	**2X**

4	DC voltage 24V	**G24**

5	Connector (without mating connector) [1]	**K0**

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 of the pump	**1**
	Folded 90° in the direction of the subplate with clockwise direction of rotation of the pump	**2**

	Additional functions: Closed-loop control		**A**	**B**	**C**	**D**	
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	Standard	●				**A**

Electronics assembly, option

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**

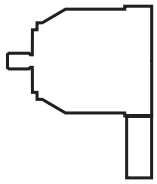
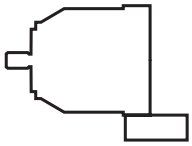
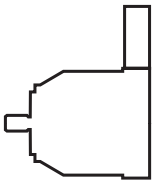
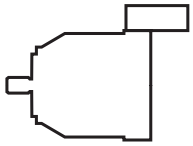
	Actual pressure value input (description of the plug-in connectors on page 7, 8 and 9)		Plug-in connector	
9	VT-DFP			(without)
	VT-DFPE VT-DFPC VT-DFPn	Current input 4...20 mA	X1	**C**
		Voltage input 0...10 V (standard)	X1	**V**
		Voltage input 1...10 V	X1	**E**
		Voltage input 0.5...5 V (standard) [2]	X2	**F**

10	FKM seals suitable for mineral oils (HL, HLP) according to DIN 51524 and HFC fluids [3]	**V**

11	Further details in the plain text e.g. SO variant	

● = Available - = Not available Standard program

Ordering code

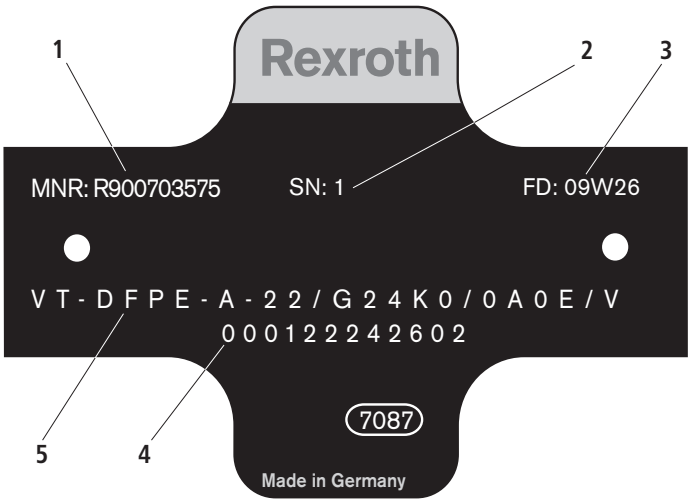
Note on feature 6: Installation orientation of the valve electronics			
Direction of rotation clockwise, installation orientation 0	Direction of rotation clockwise, installation orientation 2	Direction of rotation counterclockwise, installation orientation 0	Direction of rotation counterclockwise, installation orientation 1
			

[1] Connector dependent on the valve type (see technical data and electronic connection)

[2] With the SYDFEn 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 Fabrication order number
5 Type designation

Ordering code: Accessories

Version 4/2009, enquire availability

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

Accessories for VT-DFPE, VT-DFPC and VT-DFPn	**Material number**	**Data sheet**
Mating connector 12-pin for central connection X1 without cable (construction kit)	R900884671	
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	RE 29689-B
Compact power supply unit VT-NE32-1X	R900080049	RE 29929

Accessories only for VT-DFPC and VT-DFPn (serial access)	**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	

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 fluid only in connection with SYHDFE control system and C spool design			
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!)

electrical						
Type			VT-DFP	VT-DFPE	VT-DFPC	VT-DFPn
Control			External control electronics VT 5041-3X	Integrated, analog	Integrated, digital	Integrated, digital
Operating voltage		U_B		24 VDC +40 % –5 %	24 VDC +40 % –5 %	24 VDC +40 % –5 %
Operating range (short-time operation)						
	Upper limit value	$U_B(t)_{max}$		35 V		
	Lower limit value	$U_B(t)_{min}$		21 V		
Current consumption (in static control operation)						
	Rated current	$I_{Nominal}$		0.6 A		
	Maximum current	I_{max}		1.25 A		
Inputs	Actual pressure value input X1; pin 10 and 11	U or I	See data sheet RE 30242	Determination by means of type 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	100 Ω
	Analog voltage inputs	R_E		≥ 50 kΩ	≥ 100 kΩ	≥ 100 kΩ
	Digital inputs	Logic 0		≤ 0.6 V	≤ 8 V	≤ 8 V
		Logic 1		≥ 21 V	≥ 14 V	≥ 14 V
Outputs	p_{actual} / $U_{OUT}1$ [1)]	U_A		0…10 V	±10 V	±10 V
		I_{max}		1.5 mA	2 mA	2 mA
	α_{actual} / $U_{OUT}2$ [2)]	U_A		±10 V	±10 V	±10 V
		I_{max}		1.5 mA	2 mA	2 mA
	Digital outputs	Logic 0		U_a < 1 V		
		Logic 1		$U_a \geq U_B$ – 5 V; 10 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			

Note:

Information on environment simulation testing for the areas EMC (electro-magnetic compatibility), climate and mechanical load, see RE 30030-U (declaration on environmental compatibility).

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

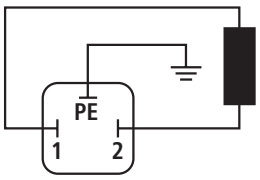
Electrical connection: Type VT-DFP... (for external analog electronics)

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

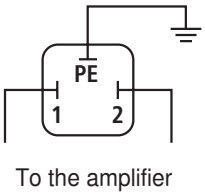
Solenoid

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

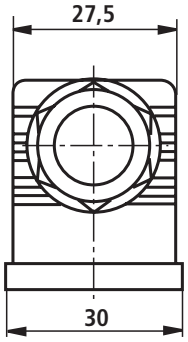
Connection at connector

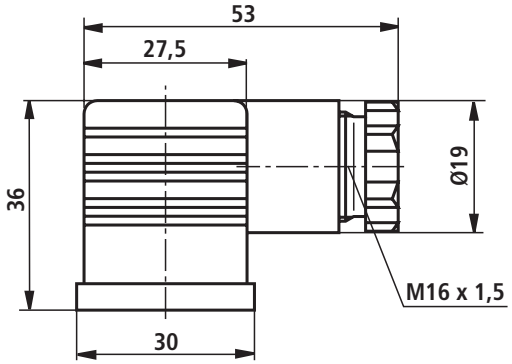


Connection at mating connector



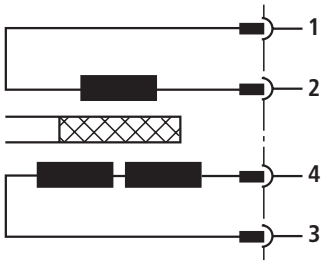
To the amplifier



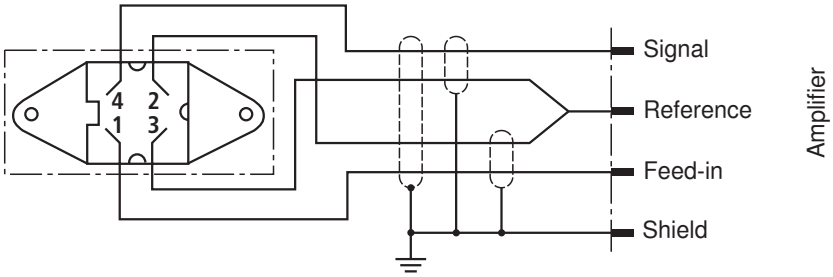


Inductive position transducer

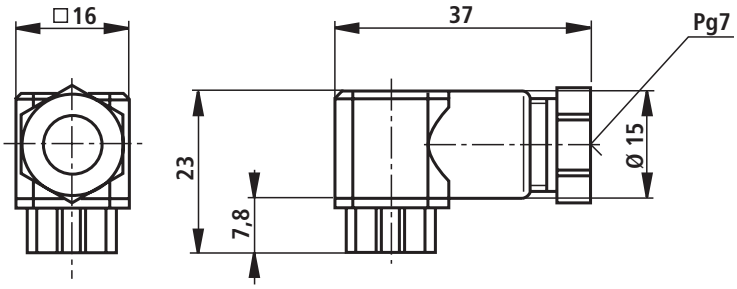
Coil connection Connector



Connection at plug-in connector
(top view on connector)



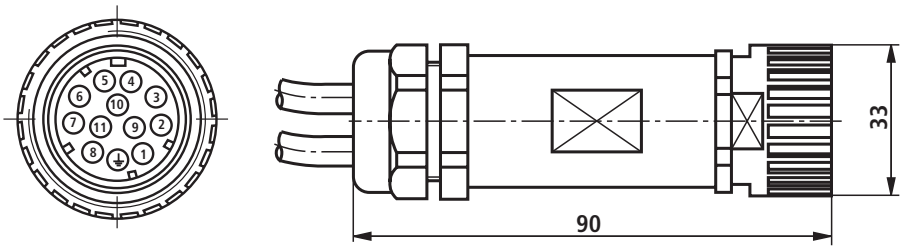
Mating connector 4-pole Pg7-G4W1F/Pg7 SW
(separate order see page 4)



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



Device of connector allocation 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	Supply line 3 x 1.0 mm²
2	0 V = L0	Reference potential for the voltage supply	-		2	
PE	Earth	Earthing connection for the electronics	-		Green/yellow	
3	Failure	Signals failures, e.g. cable break command / actual values, controller monitoring (logic 0 = error)	OUT	Logic 24 V	White	Supply line 10 x 0.14 mm² shielded (one end of the shield must be connected to the control!)
4	M0	Reference potential for analog signals	-		Yellow	
5	$\alpha_{Command}$	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 in the type code. With type “F” (0.5...5 V) reserved	IN	Analog	Black	
11	Actual pressure value L		-	Analog	Blue	
n.c.					Gray	

Functions at pin 9

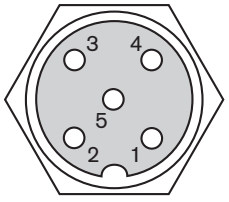
Pin	Additional function	Function in dependence on feature 7 of the ordering code (see page 2)	Signal direction	Type of signal
9	-..A…	Switching to different oil volume adjustment (Switch T_D)	IN	Logic 24 V
	-..B…	Power limitation active	OUT	Logic 24 V
	-..C…	Command value of power limitation	IN	Analog 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 case 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.

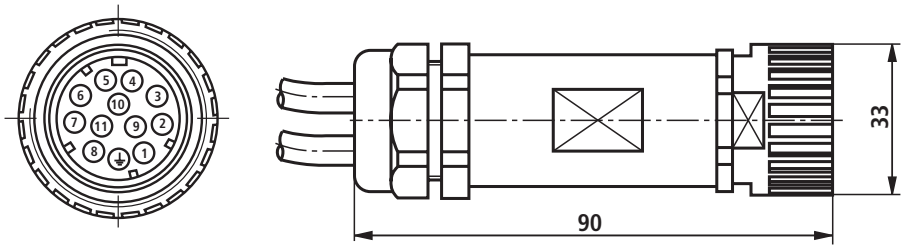
Top view mating connector



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



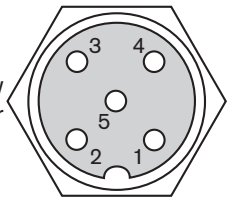
Device of connector allocation or mating connector and cable set

Pin	Signal	Description	Signal direction	Type of signal	Allocation in the cable set (accessories)	
1	$+U_B$	Voltage supply	IN	24 V DC	1	Supply line 3 x 1.0 mm²
2	0 V = L0	Reference potential for the voltage supply	-		2	
PE	Earth	Earthing connection for the electronics	-		Green/yellow	
3	Failure	Signals failures, e.g. cable break command / actual values, controller monitoring (logic 0 = error)	OUT	Logic 24 V	White	Supply line 10 x 0.14 mm² shielded (one end of the shield must be connected to the control!)
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: 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 in the type code.	IN	Analog	Black	
11	Actual pressure value L		-	Analog	Blue	
n.c.					Gray	

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

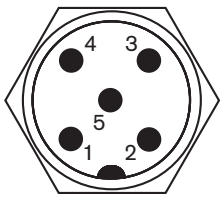
Top view mating connector



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

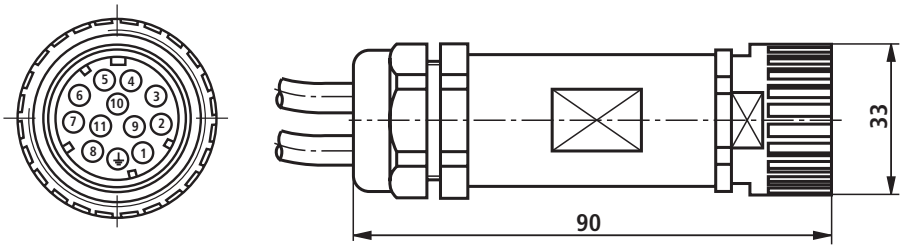
Top view connector



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

X1: Central connection

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



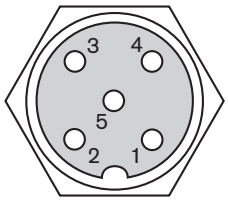
Device of connector allocation or mating connector and cable set

Pin	Signal	Description	Signal direction	Type of signal	Allocation in the cable set (accessories)	
1	$+U_B$	Voltage supply	IN	24 V DC	1	Supply line 3 x 1.0 mm²
2	0 V = L0	Reference potential for the voltage supply	-		2	
PE	Earth	Earthing connection for the electronics	-		Green/yellow	
3	Failure	Signals failures, e.g. cable break command / actual values, controller monitoring (logic 0 = error)	OUT	Logic 24 V	White	Supply line 10 x 0.14 mm² shielded (one end of the shield must be connected to the control!)
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 Standard: Synchronization bit DI1	IN	Logic 24 V	Brown	
10	Actual pressure value H	Actual pressure value input: Signal level depends on feature 14 in the type code.	IN	Analog	Black	
11	Actual pressure value L		-	Analog	Blue	
n.c.					Gray	

X2: Serial interface RS232 and a selectable 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 Digital input 0 V low, 10 V high (max. 12 V) Standard: Variable-speed operation ON, S1	5	TxD

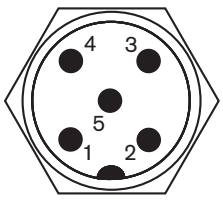
Top view mating connector



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

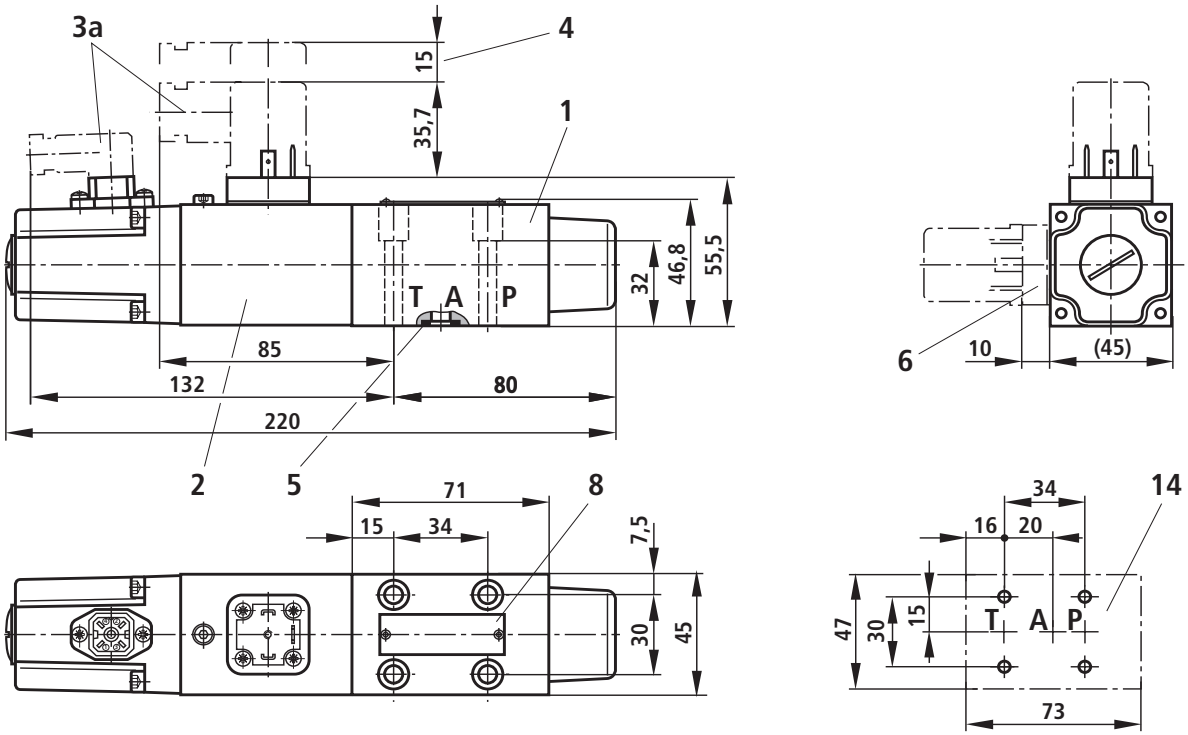
Pin	Signal input	Pin	Signal CAN
1	n.c.	**3**	CAN GND
2	IN, digital IN2 (DI2) Standard: Start Teach-In, S2	**4**	CAN-HIGH
		5	CAN-LOW

Top view connector

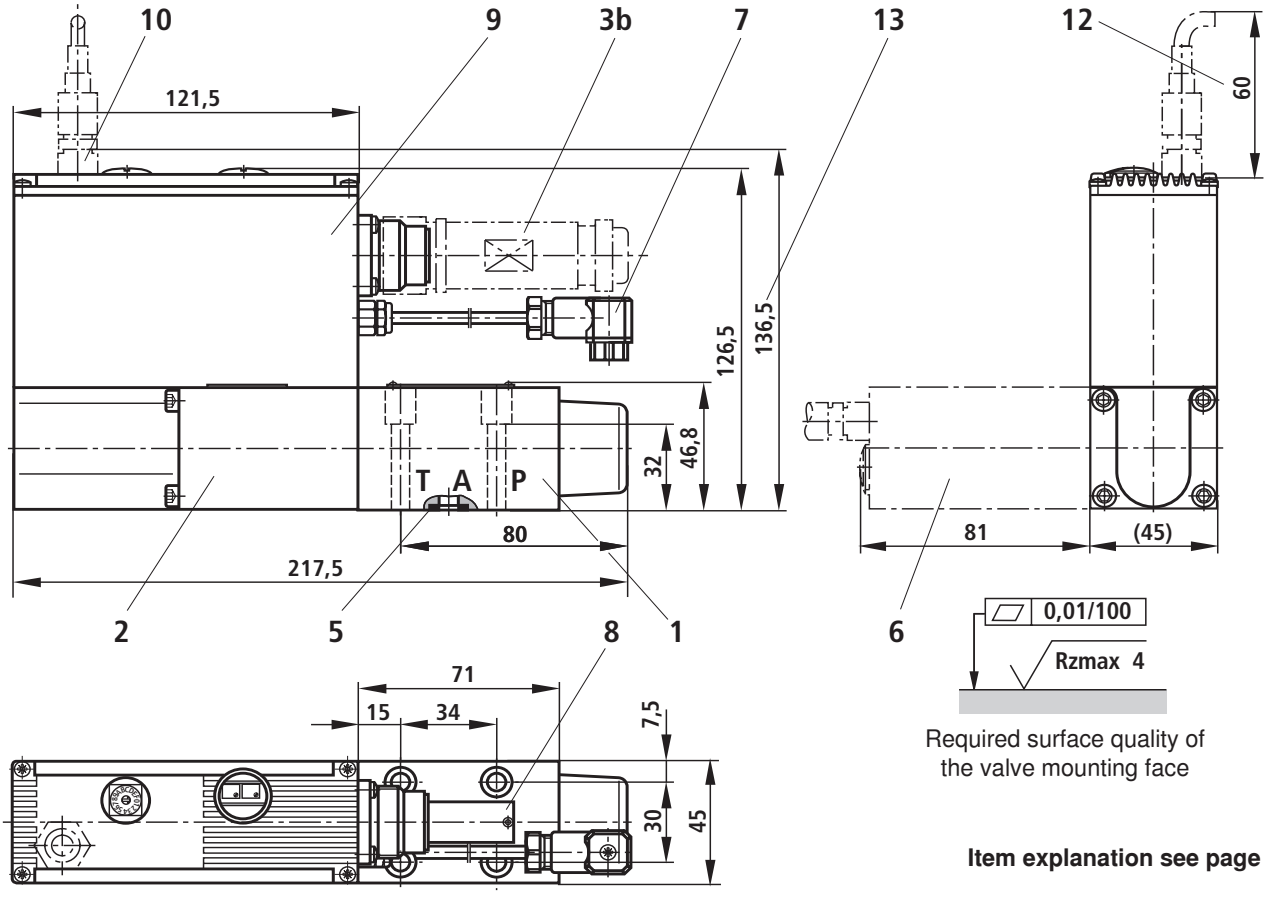


Unit dimensions (dimensions in mm)

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



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

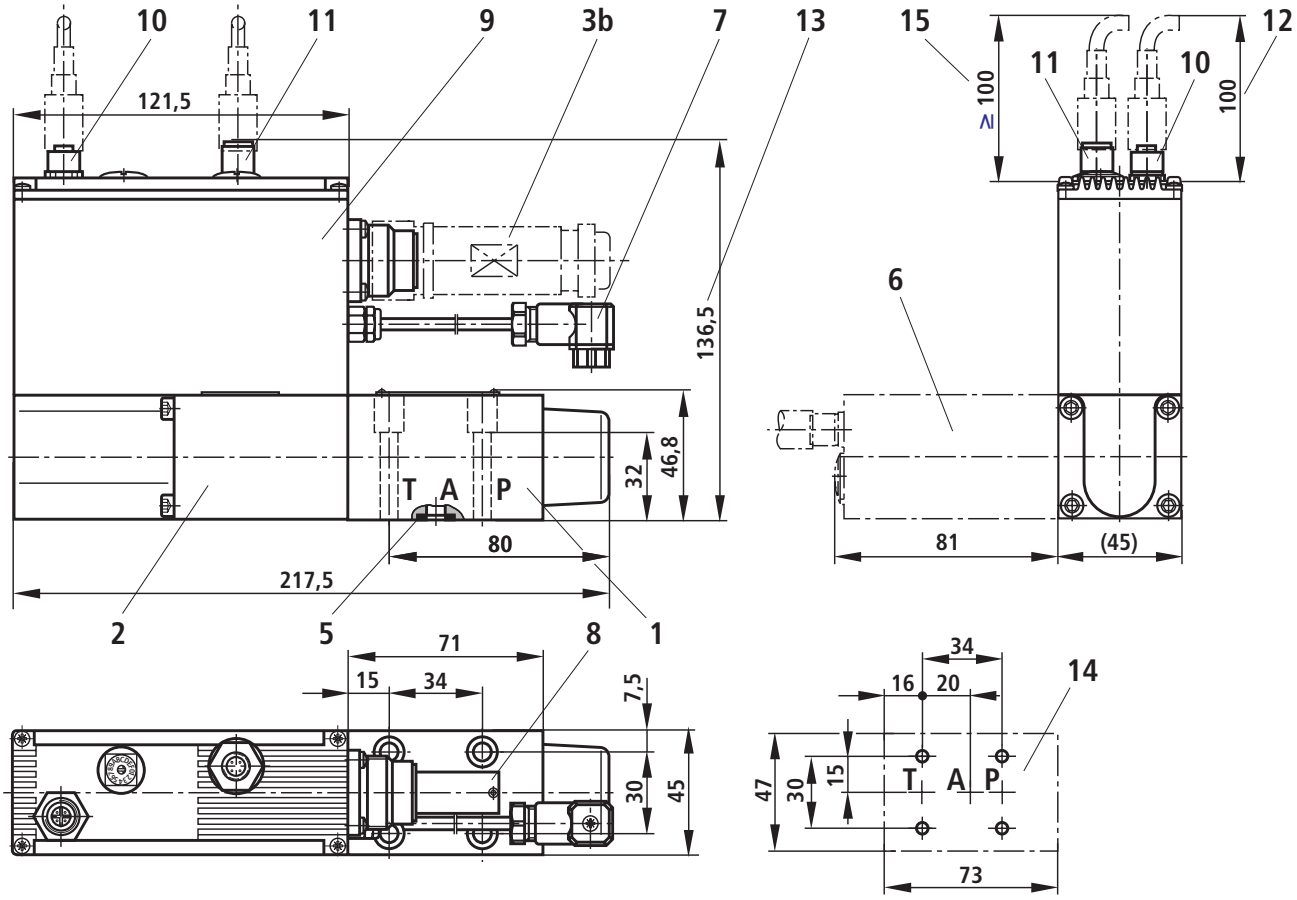


Required surface quality of the valve mounting face

Item explanation see page 11

Unit dimensions (dimensions in mm)

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



1 Valve housing

2 Proportional solenoid with position transducer

3a Mating connector 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° (attachment direction “2”)

7 Connection swivel angle position sensor (rotary angle sensor VT-SWA-1-1X)

8 Nameplate

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 contact surface

15 Space required for CAN connection (plug-in connection on customer side)

Valve mounting screws for all types:

4 hexagon socket head cap screw ISO4762-M6X40-10.9-flZn-240h-L, friction coefficient μ_{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 “Further information about this control system” on this page.).

More information on control systems SY(H)DFE

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

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