RE 30035
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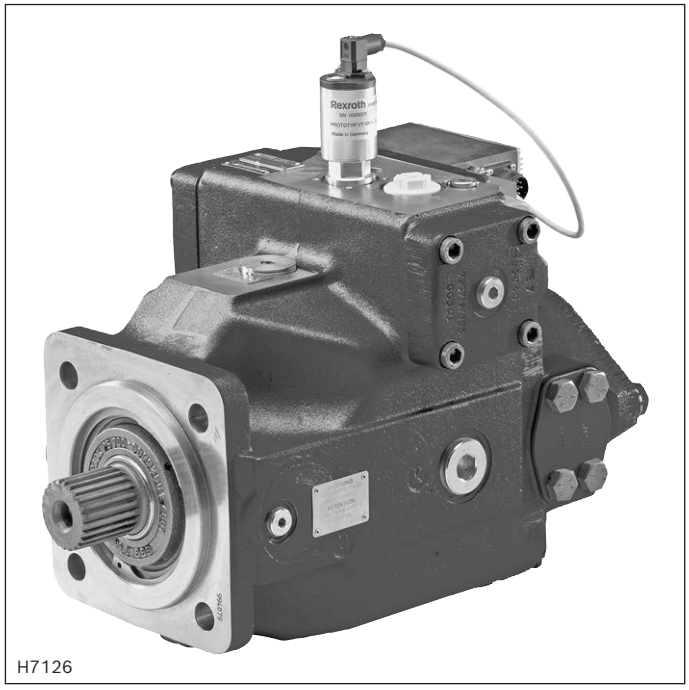
rexroth
A Bosch Company

Pressure and flow control system

Type SYHDFEE, SYHDFEC, SYHDFEn, SYHDFED, SYHDFEF



H7126

- Size 40 ... 355
- Component series 1X
- Maximum operating pressure 350 bar
- With axial piston variable displacement pump A4VSO
- Function: Swivel angle control, pressure control, torque limitation, master/slave
- Communication: Sercos, PROFINET, EtherCAT, EtherNET/IP, POWERLINK, VARAN, analog

Features

The control system is used for the electro-hydraulic control of swivel angle, pressure and power (partially optional) of an axial piston variable displacement pump.
It consists of the following components:

- A4VSO axial piston variable displacement pump optimized for the operation in the control system
- VT-DFP. proportional valve as pilot valve with integrated electronics including inductive position transducer for valve position sensing.
- Position transducer for sensing the swivel angle
- Pressure transducer with suitable signal level and dynamics (optional)

Contents

Ordering code: Pump of the control system

01		02		03	04		05	06	07	08	09		10		See following pages
	–	1X	/			–			B	25		–		–	...

Series

01	Control system with internal analog electronics	**SYHDFEE**
	Control system with internal digital electronics – CAN bus	**SYHDFEC** [1]
	Variable-speed control system with internal digital electronics	**SYHDFEn** [2]
	Control system with internal digital electronics (Ethernet-based bus systems)	**SYHDFED**
	Control system with internal digital electronics (Ethernet-based bus systems)	**SYHDFEF**
	Pump combinations (see order example page 8)	**SY2DFE.** **SY3DFE.**

02	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	**1X**

Size		**040**	**071**	**125**	**180**	**250**	**355**	
03	Displacement in cm³	0	71	125	180	250	355	**e.g. 071**

Direction of rotation looking at the drive shaft

04	Clockwise	✓	✓	✓	✓	✓	✓	**R**
	Counterclockwise	✓	✓	✓	✓	✓	✓	**L**

Hydraulic fluid

05	Mineral oil according to DIN 51524 (HL/HLP)	✓	✓	✓	✓	✓	✓	**P**
	HFC	–	✓	✓	✓	✓	✓	**F**

Drive shaft variant

06	Cylindrical with fitting key DIN 6885 (not in connection with through-drive)	✓	✓	✓	✓	✓	✓	**P**
	Splined shaft profile DIN 5480	✓	✓	✓	✓	✓	✓	**Z**

Connection flange (Ø centering in mm)

07	ISO 4-hole	✓	✓	✓	✓	✓	✓	**B**

Port for working lines pressure port B and suction port S

08	Port B and S: SAE, laterally displaced by 90°, metric mounting thread, 2. pressure port B1 opposite B – upon delivery closed with flange plate	✓	✓	✓	✓	✓	✓	**25**

Through-drive (All through-drives with single pumps come without a hub and are operationally safe, provided with an end cover)

09	**Without** through-drive	✓	✓	–	–	–	–	**N00**
	Universal through-drive, closed operationally safe with end cover at the factory; for components for the adaptation of further pump stages, see page 34	–	–	✓	✓	✓	✓	**U99**
	Through-drive, closed operationally safe with end cover at the factory; components for the adaptation of more pump stages see page 33	✓	✓	–	–	–	–	**K99**
	Centering / **Attachment pump** [3] (examples)							
	SAE Ø82.55 mm / A10VSO..31 NG18, PGF2, PGH2, PGH3, AZPF	✓	✓	–	–	–	–	**KC1**

Base pump variant

10	Standard (internal pilot oil)	✓	✓	✓	✓	✓	✓	**0000**
	External supply	✓	✓	✓	✓	✓	–	**0576**

[1] Blocked for new applications

[2] CAN bus blocked for new applications

[3] Observe the conditions for the attachment pumps, see page 41.

Ordering code: Type SYHDFEE – pilot control and preload valve

01	02		03	04		05	06	07	08	09		10		11	12	13	14	15	16		17
	–	1X	/			–			B	25		–		–							–	*

Control spool version

11	Standard	**A**
	4 grooves	**C**

Installation orientation of the integrated electronics (see below and "Dimensions")

12	Radially to the pump axis	**0**
	Folded 90° in the direction of the subplate	**2**

Additional functions: Closed-loop control

13	Switchable 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**

Electronics assembly

14	Standard electronics **with** leakage oil compensation	**0**
	Standard electronics **without** leakage oil compensation	**1**

Actual pressure value input (see "Electrical connections")

15	Current input 4 ... 20 mA	Port X1	**C**
	Voltage input 0 ... 10 V	Port X1	**V**
	Voltage input 1 ... 10 V	Port X1	**E**
	Voltage input 0.5 ... 5 V	Port X2	**F**

Pressure transducer

16	HM 20-2X/315-F-C13-0.5, measurement range 315 bar (0.5 ... 5 V) with connection cable 0.5 m for direct connection to X2 (only version "F")	**L**
	Without pressure transducer	**X**

17	Further details in the plain text	*

Ordering code: Type SYHDFEC – pilot control and preload valve

01		02		03	04		05	06	07	08	09		10		11	12	13	14	15	16		17
	–	1X	/			–			B	25		–		–			A	0			–	*

Control spool version

11	Standard	**A**
	4 grooves	**C**

Installation orientation of the integrated electronics (see below and "Dimensions")

12	Radially to the pump axis	**0**
	Folded 90° in the direction of the subplate	**2**

Additional functions: Closed-loop control

13	Standard	**A**

Electronics assembly

14	Standard	**0**

Actual pressure value input (see "Electrical connections")

15	Current input 4 ... 20 mA	Port X1	**C**
	Voltage input 0 ... 10 V	Port X1	**V**
	Voltage input 1 ... 10 V	Port X1	**E**
	Voltage input 0.5 ... 5 V	Port X2	**F**

Pressure transducer

16	HM 20-2X/315-F-C13-0.5, measurement range 315 bar (0.5 ... 5 V) with connection cable 0.5 m for direct connection to X2 (only version "F")	**L**
	Without pressure transducer	**X**

17	Further details in the plain text	*

Ordering code: Type SYHDFEn – pilot control and preload valve

01	02		03	04		05	06	07	08	09		10		11	12	13	14	15	16		17
	–	1X	/			–			B	25		–		–				**0**			–	*

Control spool version

11	Standard	**A**
	4 grooves	**C**

Installation orientation of the integrated electronics (see below and "Dimensions")

12	Radially to the pump axis	**0**
	Folded 90° in the direction of the subplate	**2**

Additional functions: Closed-loop control

13	"Teach-in version" for cyclic operation	**A**
	Real-time version (speed calculation **without** "teach-in")	**R**

Electronics assembly

14	Standard	**0**

Actual pressure value input (see "Electrical connections")

15	Current input 4 ... 20 mA	Port X1	**C**
	Voltage input 0 ... 10 V	Port X1	**V**
	Voltage input 1 ... 10 V	Port X1	**E**
	Voltage input 0.5 ... 5 V [4)]	Port X2	**F**

Pressure transducer

16	HM 20-2X/315-F-C13-0.5, measurement range 315 bar (0.5 ... 5 V) with connection cable 0.5 m for direct connection to X2 (only version "F")	**L**
	Without pressure transducer	**X**

17	Further details in the plain text	*

4) With version "A" (item 13) and with analog interfaces, the switching input X2 cannot always be used as actual pressure value input depending on the configuration (see operating instructions 30014-B).

Ordering code: Type SYHDFED – pilot control and preload valve

01		02		03	04		05	06	07	08	09		10		11	12	13	14	15		16
	–	1X	/			–			B	25		–		–	**A**			**0**		**–**	*****

Control spool version

11	Standard	**A**

Installation orientation of the integrated electronics (see below and "Dimensions")

12	Radially to the pump axis	**0**
	Folded 90° in the direction of the subplate	**2**

Additional functions: Closed-loop control

13	Standard	**A**
	For variable-speed operation	**N** [5]

Field bus interface

14	Sercos III	**S**
	EtherCAT (CANopen profile)	**T**
	VARAN (servo drive profile)	**V**
	Ethernet/IP	**E**
	PROFINET RT	**N**
	Powerlink	**W**

Actual pressure value input (freely configurable)**; parameter setting on delivery** (see "Electrical connections")

15	Voltage input 0 ... 10 V	Port XH4	**V**
	Voltage input 0.5 ... 5 V	Port X2M1	**F**

16	Further details in the plain text	*****

[5] On request

Ordering code: Type SYHDFEF – pilot control and preload valve

01	02		03	04		05	06	07	08	09		10		11	12	13	14	15	16		17
	–	1X	/			–			B	25		–		–	A		A				–	*

Control spool version

11	Standard	**A**

Installation orientation of the integrated electronics (see below and "Dimensions")

12	Radially to the pump axis	**0**
	Folded 90° in the direction of the subplate	**2**

Additional functions: Closed-loop control

13	Standard	**A**

Field bus interface

14	Sercos III	**S**
	EtherCAT (CANopen profile)	**T**
	VARAN (servo drive profile)	**V**
	Ethernet/IP	**E**
	PROFINET RT	**N**
	Powerlink	**W** [5]

Actual pressure value input (freely configurable)**; parameter setting on delivery** (see "Electrical connections")

15	Voltage input 0 ... 10 V	Port XH1	**V**
	Voltage input 0.5 ... 5 V	Port X2N	**F**

Pressure transducer

16	HM 20-2X/315-F-C13-0.5, measurement range 315 bar (0.5 ... 5 V) with connection cable 0.5 m for direct connection to X2N (only version "F")	**L**
	Without pressure transducer	**X**

17	Further details in the plain text	*

[5] On request

Ordering code: Order examples

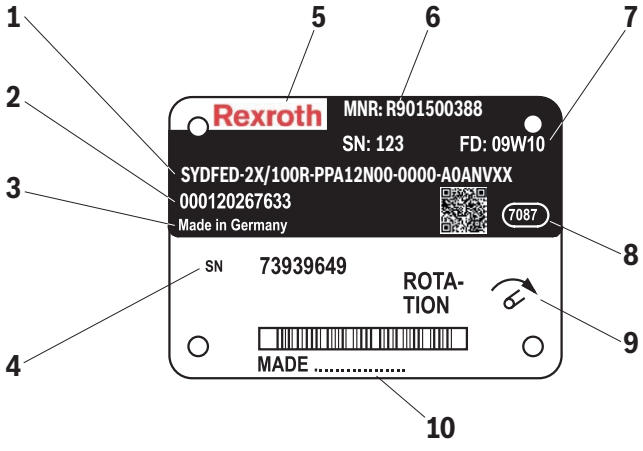
Order example for single pump: SYHDFEE-1X/250R-VZB25U99-0576-A0A0V

Order example for pump combinations (material numbers or type designations must be combined with "+")

Main pump (1st pump)		Attachment pump (2nd pump)
SY2HDFEE-1X/125-125/01240219	+	01240219
SY2HDFEE-1X/125-125/SYHDFEE-1X/125R-VZB25U99-0000-A0B0V	+	SYHDFEE-1X/125R-VZB25U99-0000-A0B0V

- SY2HDFEE-1X/125-125/... — Double pump
- SY2HDFEE-1X/125-125/... — Size of the main pump
- SY2HDFEE-1X/125-125/... — Size of the attachment pump or pump abbreviation if the attachment pump is not SYHDFE (e.g. PGF)
- SY2HDFEE-1X/125-125/SYHDFEE-1X/125R-VZB25U99-0000-A0B0V — Material number without "R9" for the main pump or type designation if material number not known
- SY2HDFEE-1X/125-125/SYHDFEE-1X/125R-VZB25U99-0000-A0B0V + SYHDFEE-1X/125R-VZB25U99-0000-A0B0V — Pump combination, mounted with accessories
- + SYHDFEE-1X/125R-VZB25U99-0000-A0B0V — Material number without "R9" for the attachment pump or type designation if material number not known

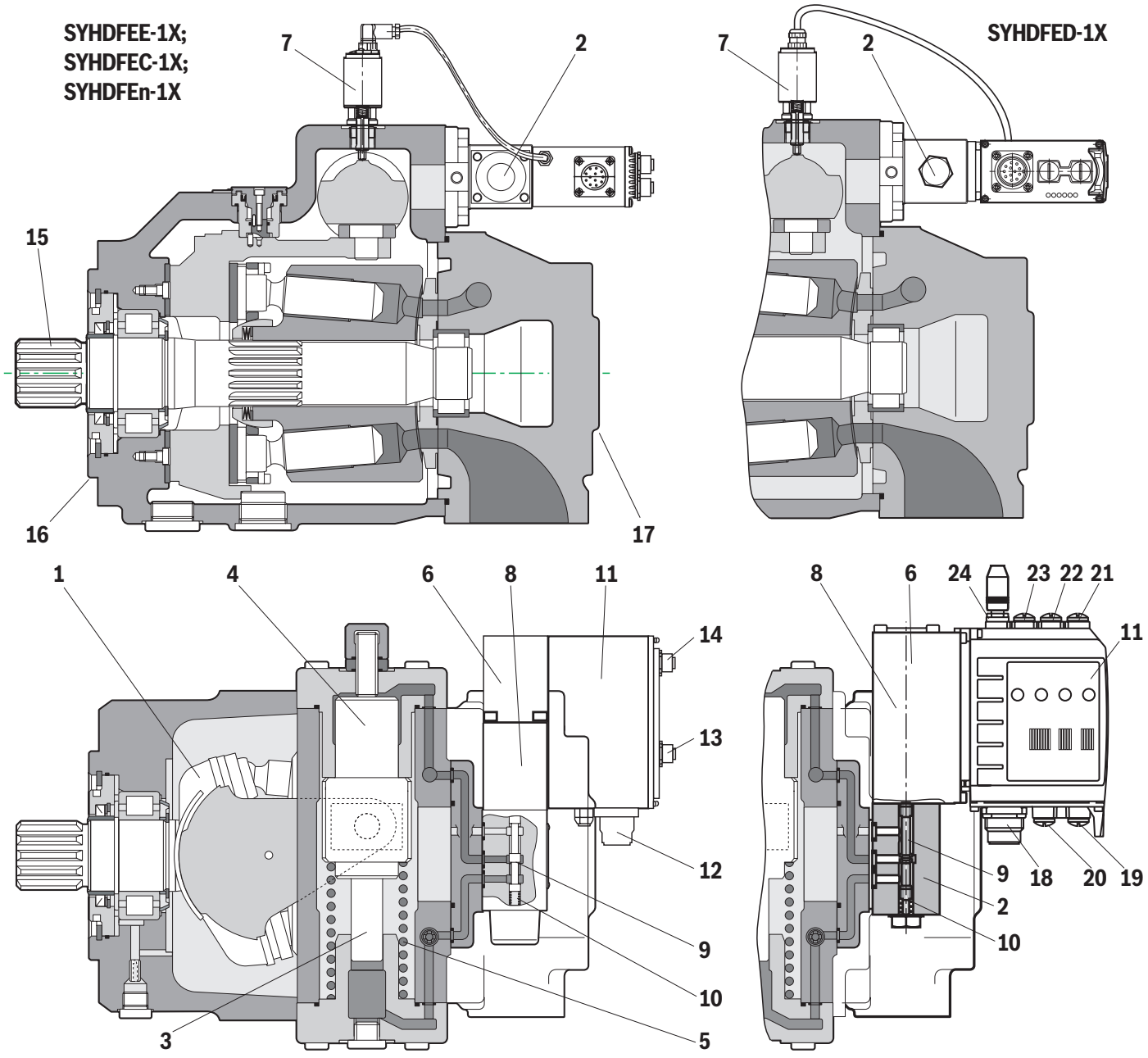
Example of name plate (single pump)



1 Material short text
2 Production order number
3 Designation of origin
4 Fabrication number
5 Word mark
6 Material number, serial number underneath
7 Date of production
8 Plant
9 Indication of direction of rotation
10 Production location

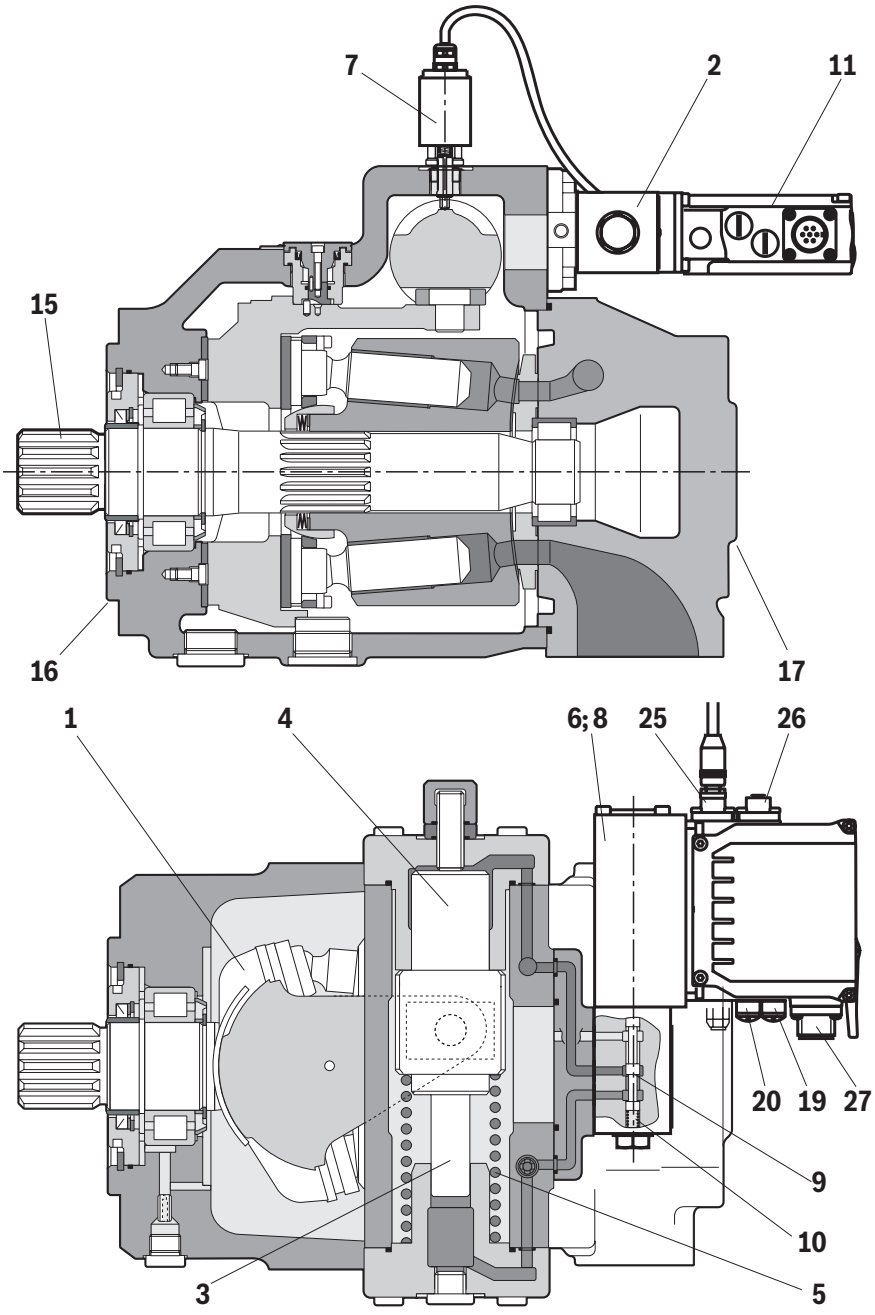
☞ **Notice:**
For enquiries regarding the control system, material number, production order number, serial number, and date of production are necessary.

Section: Type SYHDFEE, SYHDFEC, SYHDFEn, SYHDFED



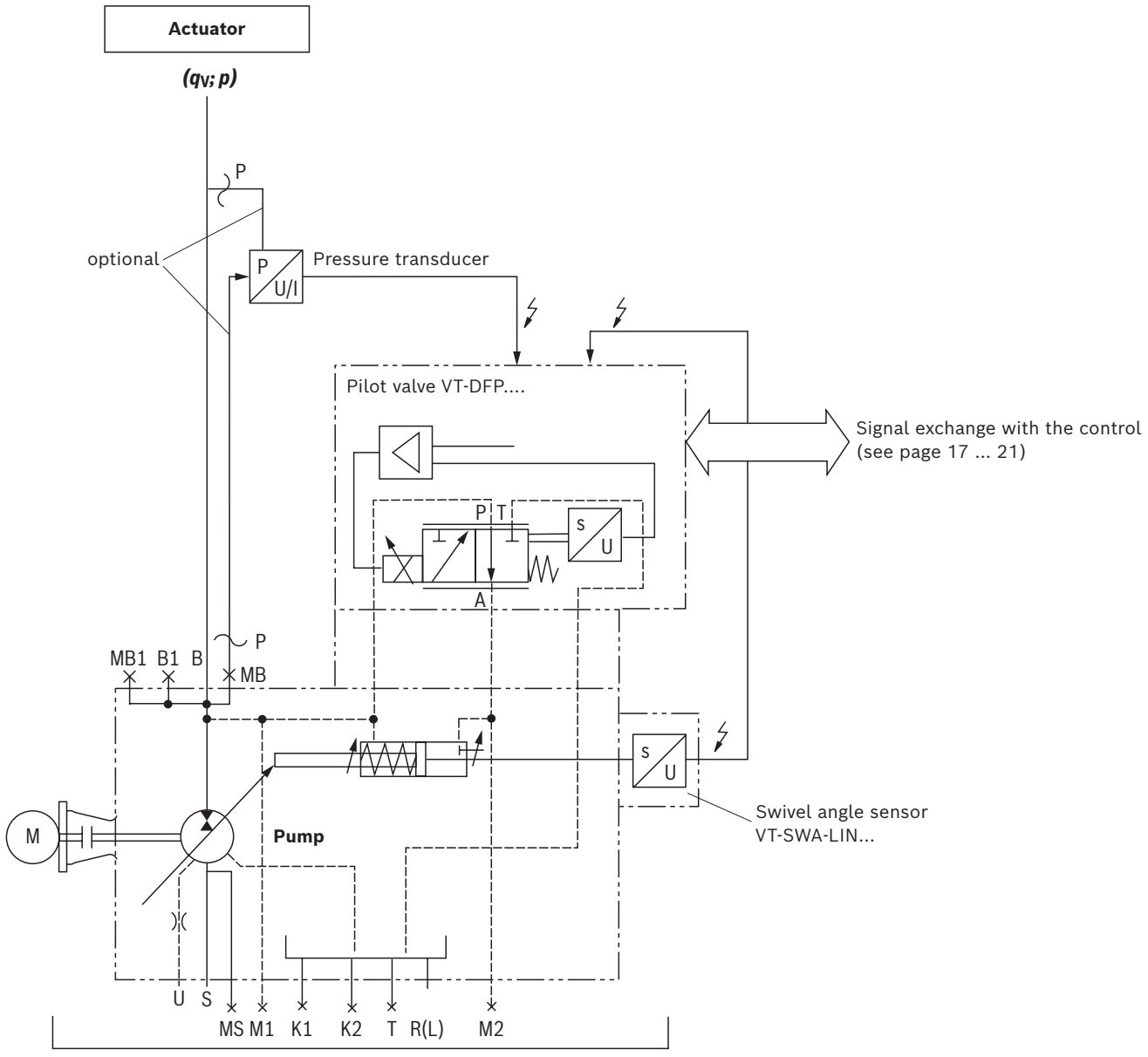
1 Swash plate
2 Pilot valve
3 Counter piston
4 Actuating piston
5 Spring
6 Inductive position transducer for valve position
7 Swivel angle position sensor
8 Proportional solenoid
9 Valve spool
10 Spring
11 Integrated electronics
12 Connector X1
13 Mating connector X3 for connection of the CAN bus (only available with SYHDFEC/SYHDFEn)
14 Connector X2 for connection of the HM20 pressure transducer cable version (with SYHDFEE only with actual pressure value input "F", with SYHDFEC/SYHDFEn always available)
15 Drive shaft
16 Connection flange
17 Subplate, optionally with through-drive
18 Connector XH4
19 Multi Ethernet interface X7E1
20 Multi Ethernet interface X7E2
21 Configurable sensor interface X2M1
22 Configurable sensor interface X2M2
23 Reserved, X2N
24 Actual swivel angle value input X8A

Section: Type SYHDFEF



1 Swash plate
2 Pilot control valve
3 Counter piston
4 Actuating piston
5 Spring
6 Inductive position transducer for valve position
7 Swivel angle position sensor
8 Proportional solenoid
9 Valve spool
10 Spring
11 Integrated electronics
15 Drive shaft
16 Connection flange
17 Subplate, optionally with through-drive
19 Multi Ethernet interface X7E1
20 Multi Ethernet interface X7E2
25 Actual swivel angle value input X8A1
26 Configurable sensor interface X2N
27 Connector XH1

Schematic diagram: Type SYDFE. – actuating system supplied internally



S	Suction port
K1, K2	Flushing port
T	Fluid drain
MB	Measuring port operating pressure (M14x1.5)
MS	Measuring port suction pressure
M1, M2	Measuring port control chamber pressure
R(L)	Fluid filling + bleeding (leakage connection)
U	Flushing port
B	Pressure port
B1	2. Pressure port/additional port
MB1	Measuring port operating pressure NG250/355: G1/4 NG 40/71/125/180: Blind flange attached to B1 with pressure measuring port G1/4

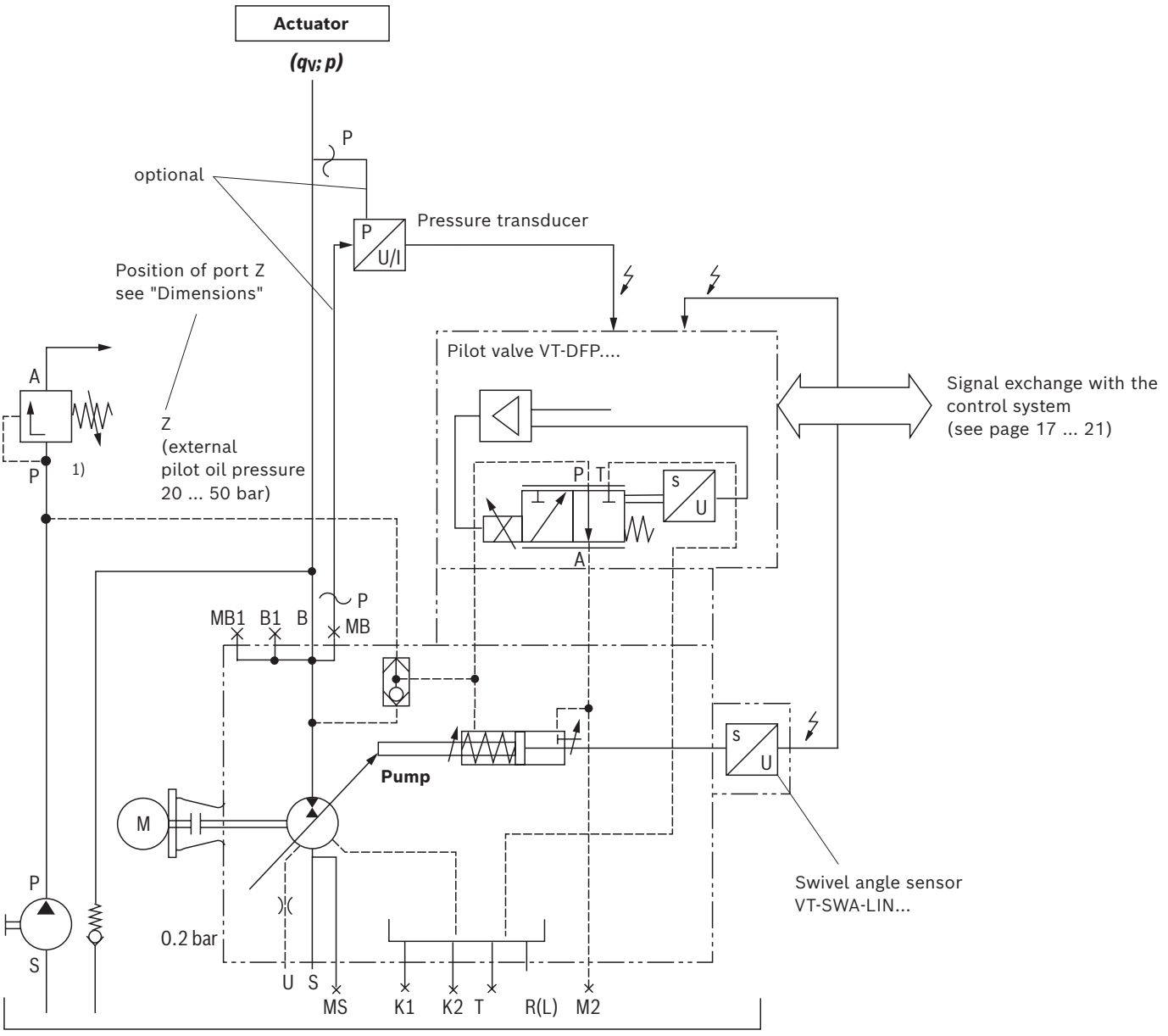
When using the HM20-2X/...C13 pressure transducer:

- Installation in MB or MB1 (pump) in connection with electronic version for actual pressure value input "F"
- For attachment of an HM20-2X/315-F-C13-0.5 in MB, an adapter from M14 x 1.5 to G1/4 (material no. R900695665) is required.
- Due to the installation position, the HM20 cable version cannot be used for all sizes without restrictions (check use with M12 extension cable).

When using an external pressure transducer:
Installation in line B (preferably close to the actuator) and electrical connection via central connection X1

Explanation in the operating instructions (see page 44)

Schematic diagram: Type SYHDFE... – actuating system supplied externally



S	Suction port
K1, K2	Flushing port
T	Fluid drain
MB	Measuring port operating pressure (M14x1.5)
MS	Measuring port suction pressure
M1, M2	Measuring port control chamber pressure
R(L)	Fluid filling + bleeding (leakage connection)
U	Flushing port
B	Pressure port
B1	2. Pressure port/additional port
MB1	Measuring port operating pressure NG250/355: G1/4 NG 40/71/125/180: Blind flange attached to B1 with pressure measuring port G1/4
Z	External pilot oil pressure (DIN 3852 M14 x 1.5; 12 deep ($p_{max(abs)}$ = 50 bar)

Important information on external supply:

- In the case of an actuating system with external supply, the pump adjustment will - in case of voltage failure - not switch to zero stroke but to the negative stop (displacement of 100% flow from the system to the tank).
- With an active fault message, it is imperative that the machine control reacts (e.g. switching off the drive motor of the pump, interrupting the external supply of the actuating system).
- The command values for pressure and flow must always be greater than zero ($p_{Command} \geq 3$ bar, $\alpha_{Command} \geq 5\%$) as due to drift or tolerances, there is no exact "zero" pressure or "zero" swivel angle. Under unfavorable conditions, smaller command value presettings can lead to cavitation.
- The actual pressure value must not be less than 10 bar for more than 10 minutes (lubrication).
- Port Z must be connected to tank level in case of non-use. Closing is not admissible.

1) Maximum pressure limitation must be provided by the customer.

Technical data

(For applications outside these values, please consult us!)

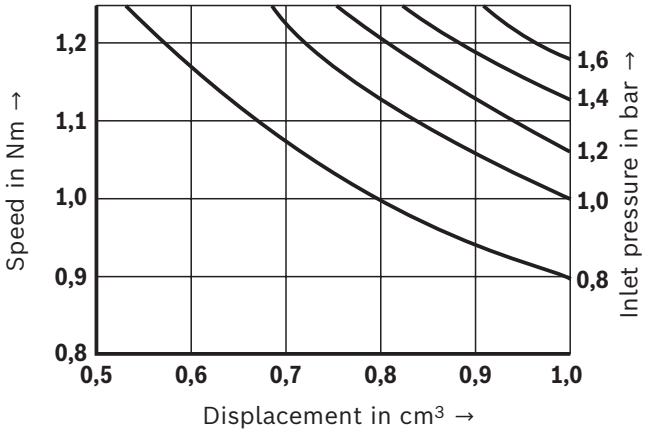
Mechanical and hydraulic								
Size			40	71	125	180	250	355
Displacement		cm^3	40	71	125	180	250	355
Speed [1]	▶ Maximum at $V_{g\,max}$	rpm	2600	2200	1800	1800	1900	1700
	▶ Maximum at $V_{g\,max}$ and HFC fluids	rpm	–	2200	1800	1800	1500	1500
Minimum speed [2]		rpm	200					
Maximum flow	▶ n_{nom} and $V_{g\,max}$	l/min	104	156	225	324	450	533
	▶ n_E = 1500 rpm and $V_{g\,max}$	l/min	60	107	186	270	375	533
Maximum power (Δp = 350 bar)	▶ n_{nom}, $V_{g\,max}$	kW	61	91	131	189	263	311
	▶ n_E = 1500 rpm and $V_{g\,max}$	kW	35	62	109	158	219	311
Maximum torque (Δp = 350 bar)		Nm	223	395	696	1002	1391	1976
Maximum drive torque	▶ Fitting key	Nm	380	700	1392	1400	2300	3557
	▶ Splined shaft "S" overall torque	Nm	446	790	1392	2004	2782	3952
	▶ Maximum through-drive torque	Nm	223	395	696	1002	1391	1976
Drive shaft load (see below)	▶ Maximum axial force	N	600	800	1000	1400	1800	2000
	▶ Maximum radial force [3]	N	1000	1200	1600	2000	2000	2200
Weight (without filling quantity)		kg	39	53	88	102	184	207
Moment of inertia around drive axis		kgm^2	0.0049	0.0121	0.03	0.055	0.0959	0.19
Filling quantity of the housing		l	2	2.5	5	4	10	8
Maximum operating pressure [4]		bar	350					
Minimum operating pressure		bar	≥ 20					
Admissible inlet pressure		bar	0.8 ... 30.0					
Hydraulic fluid			Mineral oil (HL, HLP) according to DIN 51524; HFC optional (see ordering code)					
Hydraulic fluid temperature range		°C	–20 ... +70					
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Class 18/16/13 (for particle size ≤ 4/6/14 µm)					

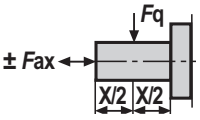
1) The values apply at an absolute pressure of 1 bar at suction opening S. With a reduction of the displacement or an increase in the inlet pressure, the speed can be increased according to the following characteristic curve.
With a reduced inlet pressure, the speed is to be reduced.

2) Does not apply to HFC fluids, formula for determining the minimum speed on page 14

3) In case of higher radial forces, please consult us.
Not applicable for use of HFC fluids

4) When using HFC fluids, also see data sheet 92053.





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

Determination of the minimum speed at HFC hydraulic fluid (see ordering code)

Size		**71**	**125**	**180**	**250**	**355**
Speed (n_0)	rpm	750	850	600	550	450
Viscosity (v_0)	mm²/s	25				

Admissible load:

$$x = \left(\frac{p}{p_{Nenn}} \bullet \frac{V_g}{V_{g\,max}}\right) = \frac{v}{v_0} \bullet \frac{n}{n_0}$$

$$n = n_0 \bullet \frac{v_0}{v} \bullet \left(\frac{p}{p_{Nenn}} \bullet \frac{V_g}{V_{g\,max}}\right)$$

With SYHDFEn, the minimum speed can be determined by means of the derating function.

- Example 1:
  A4VSO125; v = 16 cSt
  → n= 1328 rpm (with nominal load)
- Example 2:
  A4VSO250; n = 500 rpm; 10 cSt
  → x= (10/25 • 500/550) = 0.364 (= 127 bar at $V_{g\,max}$)

Electric					
Type				SYHDFEE	SYHDFEC, SYHDFEn
Operating voltage			VDC	24 $^{+40\%}_{-5\%}$	24 $^{+40\%}_{-5\%}$
Operating range (short-time operation)	▶ Upper limit value		V	35	
	▶ Lower limit value		V	21	
Current consumption (in static control operation)	▶ Rated current		A	0.6	
	▶ Maximum current		A	1.25	
Inputs	▶ Actual pressure value input X1; pin 10 and 11			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, load [5]		Ω	100	
	▶ Analog, voltage		kΩ	≥ 50	≥ 100
	▶ Digital	Logic 0	V	≤ 0.6	≤ 8
		Logic 1	V	≥ 21	≥ 14
Outputs	▶ p_{act} / $U_{OUT}1$ [6]		V	0 ... 10	±10
			mA	1.5	2
	▶ α_{act} / $U_{OUT}2$ [6]		V	±10	±10
			mA	1.5	2
	▶ Digital	Logic 0	V	U_a < 1 V	
		Logic 1	V	$U_a \geq U_B$ – 5 V; 10 mA (short-circuit-proof)	
Ambient temperature range at the pump			°C	0 ... 60	0 ... 50
Storage temperature range (pump + electronics)			°C	0 ... 70	0 ... 70
Electronics design				Integrated at pilot control valve (OBE)	
Protection class according to EN 60529	▶ Pump incl. pilot control valve			IP65 (If suitable and correctly mounted mating connectors are used)	

[5] Maximum admissible input current 30 mA for configuration on current input.

[6] With types SYHDFEC, SYHDFEn, SYHDFED and SYHDFEF, the outputs are parameterizable. Condition as supplied see "Electrical connection".

Technical data

(For applications outside these values, please consult us!)

Electric				
Type			SYHDFED	SYHDFEF
Supply voltage [7]	▶ Nominal voltage	VDC	24	
	▶ Lower limit value	VDC	18	
	▶ Upper limit value	VDC	36	
	▶ Maximum residual ripple	Vpp	2.5	
Maximum power consumption		W	40	
Required fuse protection, external		A	4, time-lag	
AD/DA resolution	▶ Analog inputs	Bit	12	
	▶ Analog outputs [6]	Bit	10	
Actual pressure value Input [8]	▶ Analog voltage	V	0 ... 10	
	▶ Analog current	mA	0 ... 20 [5]	
Ambient temperature range at the pump		°C	0 ... +60	
Storage temperature range (pump + electronics)		°C	+5 ... +40	0 ... +40
Electronics design			Integrated at pilot control valve (OBE)	
Protection class according to EN 60529	▶ Pump incl. pilot control valve		IP65 (If suitable and correctly mounted mating connectors are used)	

[5] Maximum admissible input current 30 mA for configuration on current input.

[6] With types SYHDFEC, SYHDFEn, SYHDFED and SYHDFEF, the outputs are parameterizable. Condition as supplied see "Electrical connection".

[7] With type SYHDFED and SYHDFEF, supply voltage is used directly for sensor connections X2M1, X2M2 and X8M (no internal voltage limitation).

[8] – Type VT-DFPD: XH4; pin 10 and 11
– Type VT-DFPF: XH1: pin D and E

☞ **Notice:**
Information on the environment simulation testing for the areas EMC (electro-magnetic compatibility), climate and mechanical load, see data sheet 29016.

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

Bearing flushing
With the following operating conditions, bearing flushing is necessary for safe continuous operation:
- Applications with special fluids (not mineral fluids) due to limited lubricity and tight operating temperature range
- Operation with boundary conditions of temperature and viscosity with mineral oil operation

With vertical installation (drive shaft upwards), bearing flushing is recommended for lubrication of the front bearing and the shaft seal ring.
The bearing is flushed using port "U" in the area of the front flange of the variable displacement pump.
The flushing fluid flows through the front bearing and exits with the pump leakage at the leakage connection.

Recommended flushing quantities in l/min:

Size		40	71	125	180	250	355
Flushing quantity	l/min	3	4	5	7	10	15

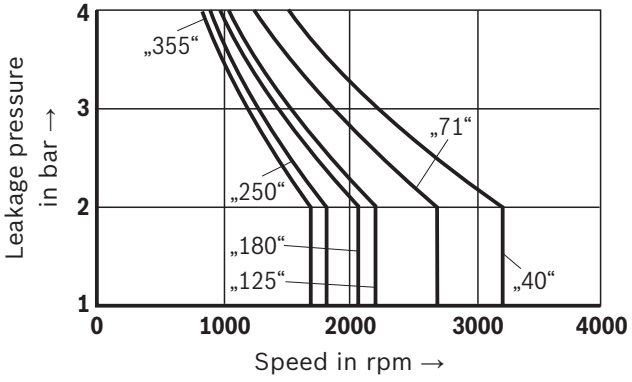
The specified flushing quantities result in a pressure differential between port "U"(including fitting) and the leakage chamber of approx. 2 bar (series 1) and approx. 3 bar (series 3).
When using the external bearing flushing, the throttle screw in port U has to be screwed-in to the stop.

Leakage pressure
The admissible leakage pressure (housing pressure) depends on the speed (see diagram).

Maximum leakage pressure (housing pressure)
- 4 bar absolute

These specifications are guidelines; under special operating conditions, a limitation may become necessary.

Direction of flow:
- S → B



Electrical connection: Type SYHDFEE

▶ X1, central connection

Assignment of connector or mating connector and cable set

Pin	Signal	Description	Signal direction	Type of signal	Assignment in cable set (accessories)	
1	+ U_B	Voltage supply	IN	24 VDC	1	Supply line 3 x 1.0 mm²
2	0 V = L0	Reference potential for the voltage supply	–	–	2	
PE	Ground	Grounding connection for the electronics	–	–	green/yellow	
3	Fault	Signals faults, 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	$a_{Command}$	Swivel angle command value	IN	analog ± 10 V	green	
6	a_{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 electronic type and additional function, see below	–	–	brown	
10	Actual pressure value H	Actual pressure value input: Signal level depends on pos. 15 in the ordering code. With version "F" (0.5 ... 5 V) reserved	IN	analog	black	
11	Actual pressure value L		–	analog	blue	
n.c.					gray	

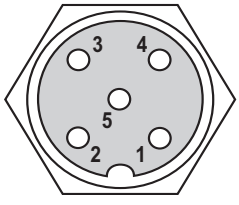
Functions at pin 9

Pin	Additional function	Function dependent on pos. 7 of the ordering code (order, see ordering code)	Signal direction	Type of signal
9	"A"	Selecting a 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 20

Pin	Signal HM 20	Pin	
1	OUT, +U_B	2	n.c.
3	Reference L0		
4	IN, analog, 0.5 ... 5 VDC	5	n.c.



☞ **Notice:**
Mating connectors, separate order, see page 43.

Electrical connection: Type SYHDFEC

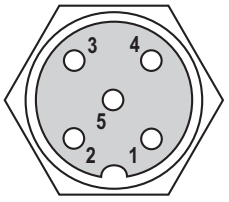
▶ X1, central connection

Assignment of connector or mating connector and cable set

Pin	Signal	Description	Signal direction	Type of signal	Assignment in cable set (accessories)	
1	+ U_B	Voltage supply	IN	24 VDC	1	Supply line 3 x 1.0 mm²
2	0 V = L0	Reference potential for the voltage supply	–	–	2	
PE	Ground	Grounding connection for the electronics	–	–	green/yellow	
3	Fault	Signals faults, 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 Factory setting: Swivel angle command value	IN	analog ± 10V	green	
6	U_{OUT2}	Analog output Factory setting: Actual swivel angle value, normalized	OUT	analog ±10 V	violet	
7	AI1	Analog input AI1 Factory setting: Pressure command value	IN	analog 0 ... 10 V	pink	
8	U_{OUT1}	Analog output Factory setting: 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 depending on pos. 15 of the ordering code	IN	analog	black	
11	Actual pressure value L		–	analog	blue	
n.c.					gray	

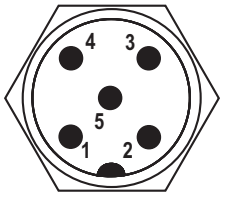
▶ X2, connection of pressure transducer HM 20 and serial interface RS232 (mating connector M12)

Pin	Signal HM 20	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 of 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



☞ **Notice:**
Mating connectors, separate order, see page 43.

Electrical connection: Type SYHDFEn

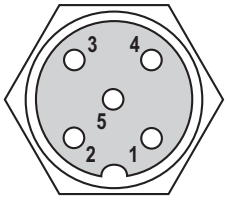
▶ X1, central connection

Assignment of connector or mating connector and cable set

Pin	Signal	Description	Signal direction	Type of signal	Assignment in cable set (accessories)	
1	+ U_B	Voltage supply	IN	24 VDC	1	Supply line 3 x 1.0 mm²
2	0 V = L0	Reference potential for the voltage supply	–	–	2	
PE	Ground	Grounding connection for the electronics	–	–	green/yellow	
3	Fault	Signals faults, 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 Factory setting: Swivel angle command value	IN	analog ±10 V	green	
6	U_{OUT2}	Analog output Factory setting: Actual swivel angle value, normalized	OUT	analog ±10 V	violet	
7	AI1	Analog input AI1 Factory setting: Pressure command value	IN	analog 0 ... 10 V	pink	
8	U_{OUT1}	Analog output Factory setting: Speed command value	OUT	analog ± 10 V	red	
9	DI1	Digital input DI1 Dependent on additional function (pos. 13 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 pos. 15 in the ordering code.	IN	analog	black	
11	Actual pressure value L		–	analog	blue	
n.c.					gray	

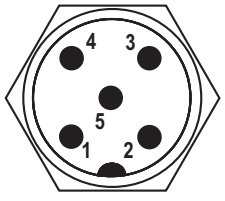
▶ X2, serial interface RS232 and a switchable digital input S1/pressure transducer input for HM20

Pin	Signal input	Pin	Signal RS232
1	OUT, +U_B	2	RxD
3	Reference L0		
4	Analog input 0.5 ... 5 V for HM 20 or digital input 0 V low, 10 V high [1] Dependent on additional function (pos. 13 of the ordering code): ▶ Teach-In version: Digital input "Variable-speed operation on, S1" ▶ Real-time version: Input as analog input for pressure transducer HM20	5	TxD



▶ X3, connection of 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) Depending on additional function (pos. 13 of the ordering code), factory setting: ▶ Teach-In version: Start Teach-In, S2 ▶ Real-time version: Manual speed presetting active, speed is applied according to the real-time operation status and the setting of the R parameters.	4	CAN-HIGH
		5	CAN-LOW



[1] For valves with date of manufacture including 2013 max. 12 V.
For valves after date of production 2014 max. U(B).

☞ **Notice:**
Mating connectors, separate order, see page 43.

Electrical connection: Type SYHDFED

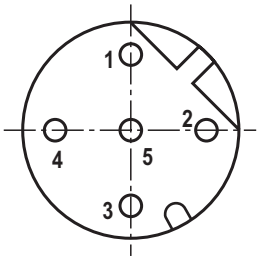
▶ XH4, central connection

Assignment of connector or mating connector and cable set

Pin	Signal	Description	Signal direction	Type of signal	Assignment in cable set (accessories)	
1	+ U_B	Voltage supply	IN	24 VDC	1	Supply line 3 x 1.0 mm²
2	0 V = L0	Reference potential for the voltage supply	–	–	2	
PE	Ground	Grounding connection for the electronics	–	–	green/yellow	
3	DO	Switching output 24 V max. 1.5 A Factory setting: Error signal	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 2 (or digital input, configuration via software)	IN	analog ± 10 V or 0 ... 20 mA (digital 24 V)	green	
6	AO2	Analog output 2 Factory setting: Actual swivel angle value, normalized	OUT	analog ± 10 V or 0 ... 20 mA	violet	
7	AI1	Analog input 1 (or digital input, configuration via software)	IN	analog ± 10 V or 0 ... 20 mA (digital 24 V)	pink	
8	AO1	Analog output 1 Factory setting: Actual pressure value, normalized	OUT	analog ± 10 V or 0 ... 20 mA	red	
9	DI	Digital input (use freely configurable)	IN	logic 24 V	brown	
10	Actual pressure value H	Actual pressure value input (analog input 8): Signal level depends on parameter setting. Factory setting dependent on pos. 13 of the ordering code: 0 ... 10 V (V) or deactivated (F)	IN	analog 0 ... 10 V, 0 ... 20 mA (freely configurable)	black	
11	Actual pressure value L		–	analog	blue	
n.c.					gray	

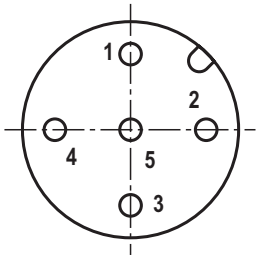
▶ X7E1 and X7E2, connector pin assignment for Ethernet interface (coding D), M12, 4-pole, socket

Pin	Assignment
1	TxD +
2	RxD +
3	TxD –
4	RxD –
5	Not used



▶ X2M1 and X2M2, analog configurable sensor interface (coding A), M12, 5-pole, socket

Pin	Assignment
1	+ 24 V voltage output (sensor supply) [1]
2	Sensor signal input current (4 ... 20 mA) [2]
3	GND
4	Sensor signal input voltage (0 ... 10 V) [2]
5	Negative differential amplifier input to pin 4 (optional)



[1] Maximum load capacity 50 mA, voltage output same as voltage supply connected to input XH4.

[2] Only one signal input per interface configurable

Notice:
- ▶ X2N, reserved (not used)
- ▶ X8A, actual swivel angle value input (coding A), M12, 5-pole, socket M12
- ▶ Mating connectors, separate order, see page 43.

Electrical connection: Type SYHDFEF

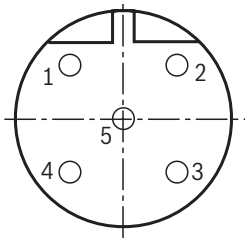
▶ XH1, central connection

Assignment of connector or mating connector and cable set

Pin	Signal	Description	Signal direction	Type of signal	Assignment in cable set (accessories)	
A	+ U_B	Voltage supply	IN	24 VDC	brown	Supply line 3 x 1.0 mm²
B	0 V = L0	Reference potential for the voltage supply	–	–	yellow	
PE	Ground	Grounding connection for the electronics	–	–	green/yellow	
C	–	Do not use	–	–	green	Supply line 10 x 0.14 mm² shielded (one end of the shield must be connected to the control)
D	AI1	Analog input 1 (freely-configurable)	IN	analog ± 10 V or 0 ... 20 mA	blue	
E	M0	Reference potential for analog signals	–	–	gray	
F	AO2	Analog output 1 (freely-configurable)	OUT	analog ± 10 V or 0 ... 20 mA	white	

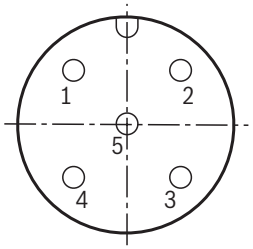
▶ X7E1 and X7E2, connector pin assignment for Ethernet interface (coding D), M12, 4-pole, socket

Pin	Assignment
1	TxD +
2	RxD +
3	TxD –
4	RxD –
5	Not used



▶ X2N, analog configurable sensor interface (coding A), M12, 5-pole, socket

Pin	Assignment
1	+ 24 V voltage output (sensor supply) [1)]
2	Analog input voltage 2 (0 ... 10 V)
3	GND
4	Analog input voltage 4 (0 ... 10 V)
5	Analog input voltage 3 (0 ... 10 V)

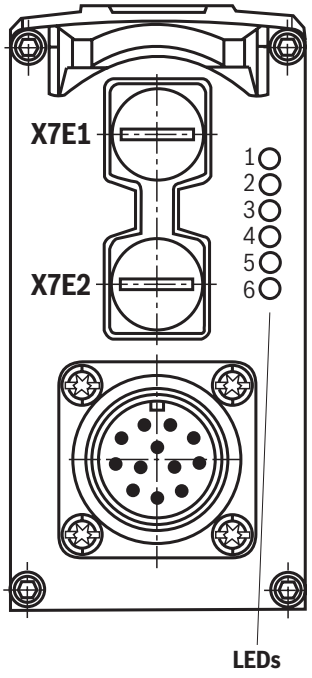


1) Maximum load capacity 3 x 25 mA, voltage output same as voltage supply connected to input XH1.

☞ **Notice:**
- ▶ X8A1, actual swivel angle value input (coding A), M12, 5-pole, socket M12
- ▶ Mating connectors, separate order, see page 43.

LED displays: Type SYHDFED

LED	Interface	Sercos	EtherNET/IP	EtherCAT	PROFINET RT	POWERLINK	VARAN
1	**X7E1**	Activity	Activity	Not used	Activity	Not used	Active
2		Link	Link	Link/activity	Link	Link/data activity	Link
3	**Electronics module**	S	Network status	Network status	Network status	Status/error	Network status
4		Module status	Module status	Module status	Module status	Module status	Module status
5	**X7E2**	Activity	Activity	Not used	Activity	Not used	Not used
6		Link	Link	Link/activity	Link	Link/data activity	Not used



Displays of the status LEDs

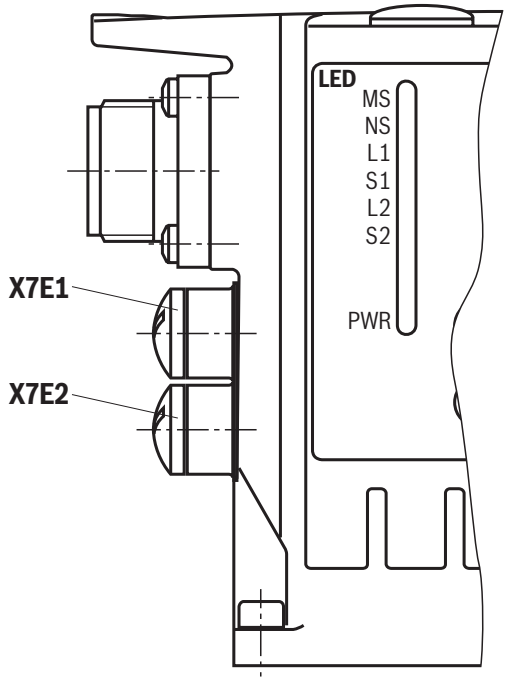
Network status LED (LED 3)	Display status
See firmware and software description 30338-FK	

Module status LED (LED 4)	Display status
Off	No voltage supply
Green-red, flashing	Self-test
Green, flashing	Drive ready for operation
Green	In control
Orange, flashing	Warning
Red, flashing	Error

☞ **Notice:**
- For the connection to the M12 sockets, we recommend using self-locking mating connectors
- LEDs 1, 2, 5 and 6 relate to interfaces "X7E1" and "X7E2"
  - Link: Cable plugged in, connection established (permanently lit)
  - Activity: Data sent/received (flashing)
- The network status LED 3 (NS) indicates the status of the control communication, see firmware and software description 30338-FK.
- Module status LED 4 relates to the electronics module
- For a detailed description of the diagnosis LEDs, please refer to the functional description Rexroth HydraulicDrive HDx.

LED displays: Type SYHDFEF

LED	Interface	Sercos	EtherNET/IP	EtherCAT	PROFINET RT	POWERLINK	VARAN
MS	**Electronics module**	Module status	Module status	Module status	Module status	Module status	Module status
NS		S	Network status and others	Network status and others	Network status and others	Status/error	Network status and others
L1	**X7E1**	Link and others	Link and others	Link/activity	Link and others	Link/data activity	Link and others
S1		Activity and others	Activity and others	Not used	Activity and others	Not used	Active and others
L2	**X7E2**	Link and others	Link and others	Link/activity	Link and others	Link/data activity	Not used
S2		Activity and others	Activity and others	Not used	Activity and others	Not used	Not used
PWR	**XH1**	Power	Power	Power	Power	Power	Power



Displays of the status LEDs

Power LED (LED PWR)	Display status
Off	No voltage supply
Green	Operation

Module status LED (LED MS)	Display status
Off	No voltage supply
Green-red, flashing	Initialization
Green, flashing	Drive ready for operation
Green	Drive active
Orange, flashing	Warning
Red, flashing	Error
Green, rapidly flashing	Firmware must be loaded

☞ **Notice:**
- For the connection to the M12 sockets, we recommend using self-locking mating connectors
- Module status LED MS relates to the electronics module
- The network status LED NS indicates the status of the control communication, see application description 30338-FK
- LEDs L1, S1, L2 and S2 relate to interfaces "X7E1" and "X7E2"
  - Link: Cable plugged in, connection established (permanently lit)
  - Activity: Data sent/received (flashing)
- For a detailed description of the diagnosis LEDs, please refer to the functional description Rexroth HydraulicDrive HDx.

Control loop quality

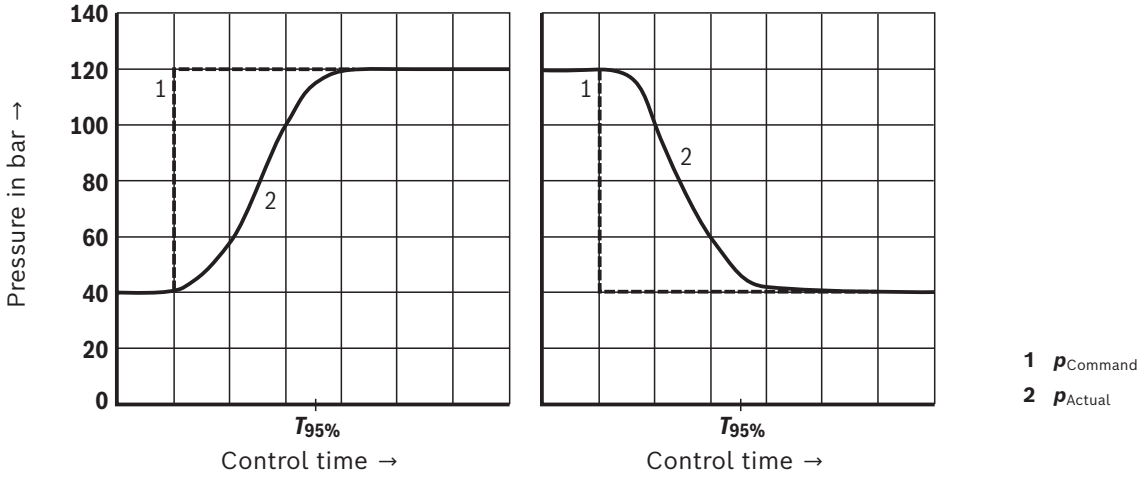
	Swivel angle control	Pressure control [1]
Linearity tolerance	≤ 1.0%	≤ 1.5% (≤ 1.0% [2])
Temperature error	≤ 0.5% / 10 K	≤ 0.5% / 10 K
Hysteresis	≤ 0.2%	≤ 0.2%
Repetition accuracy	≤ 0.2%	≤ 0.2%

1) Without considering the pump pulsation
2) With SYDFEC, SYDFEn, SYDFED and SYDFEF using the integrated calibration function

☞ **Notice:**
- The specified values are only valid when using the system-related components specified in this data sheet (see page 43).
- At pressures < 20 bar, higher tolerances have to be anticipated due to lower actuating forces.

Characteristic curves
(measured with HLP46, ϑ_{oil} = 40 ± 5 °C)

Transition function for pressure command value step (control spool version "A")



1 $p_{Command}$
2 p_{Actual}

$T_{95\%}$ in ms with connected hydraulic fluid volumes (lines and actuators)

Hydraulic fluid volume in l	$T_{95\%}$ in ms
< 5	150
5 ... 10	200
15 ... 25	250

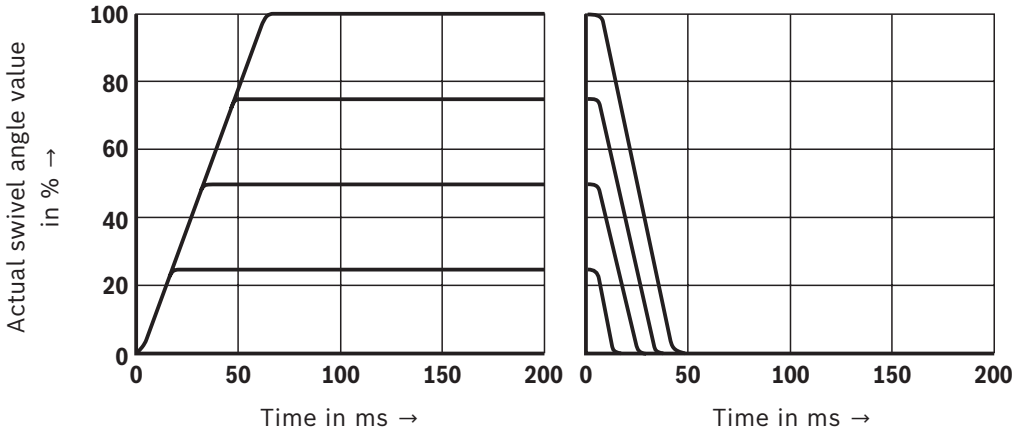
☞ **Notice:**
- For pressures up to 40 bar, the values of the response times are greater.
- The specified curve shapes and control times refer to a drive speed of 1500 rpm and are only reached with an optimization of the pressure controller.

Characteristic curves

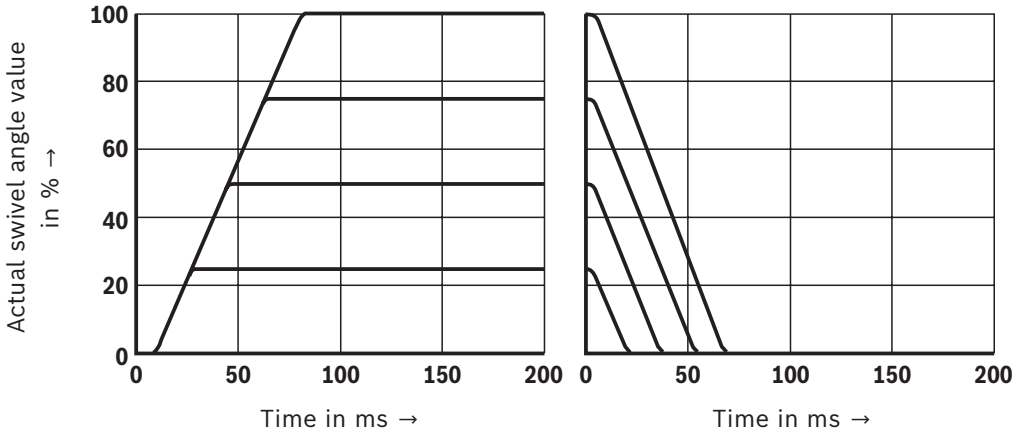
(measured with HLP46, ϑ_{oil} = 40 ± 5 °C)

Transition function with swivel angle command value step (control spool version "A")

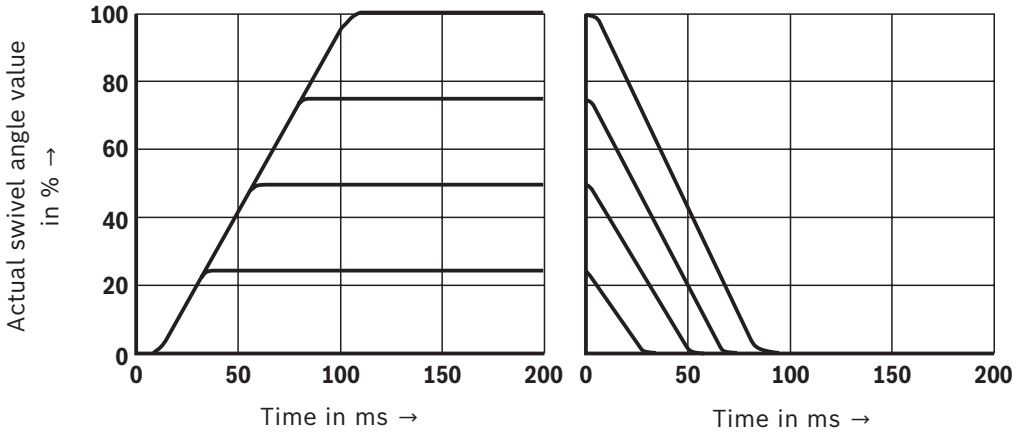
NG40 and 71 (***p*** = 100 bar)



NG125 (***p*** = 100 bar)



NG180 (***p*** = 100 bar)

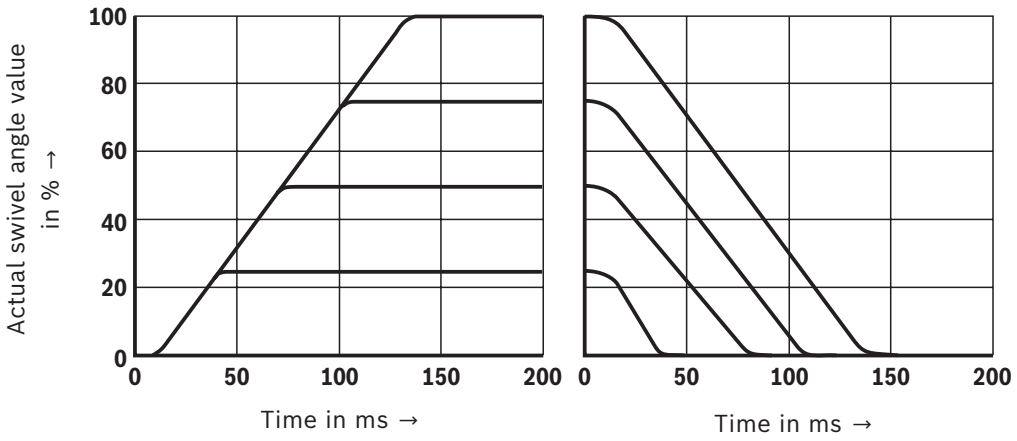


Characteristic curves

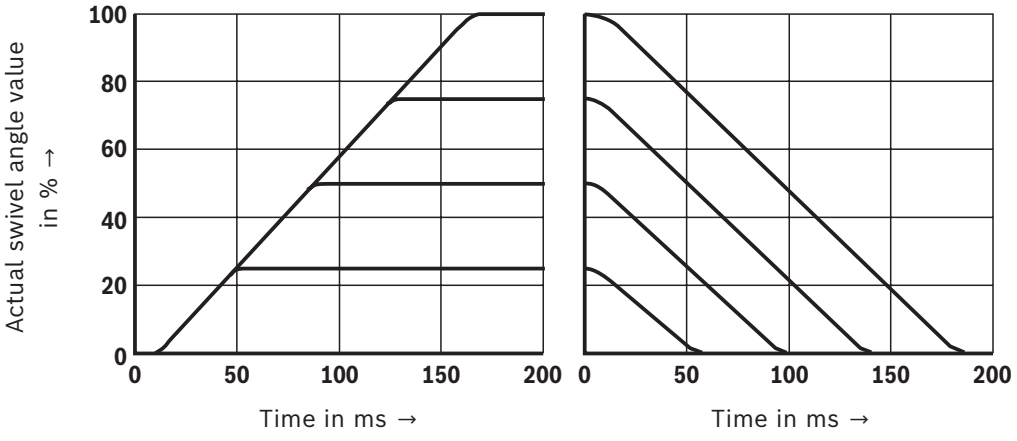
(measured with HLP46, ϑ_{oil} = 40 ± 5 °C)

Transition function with swivel angle command value step (control spool version "A")

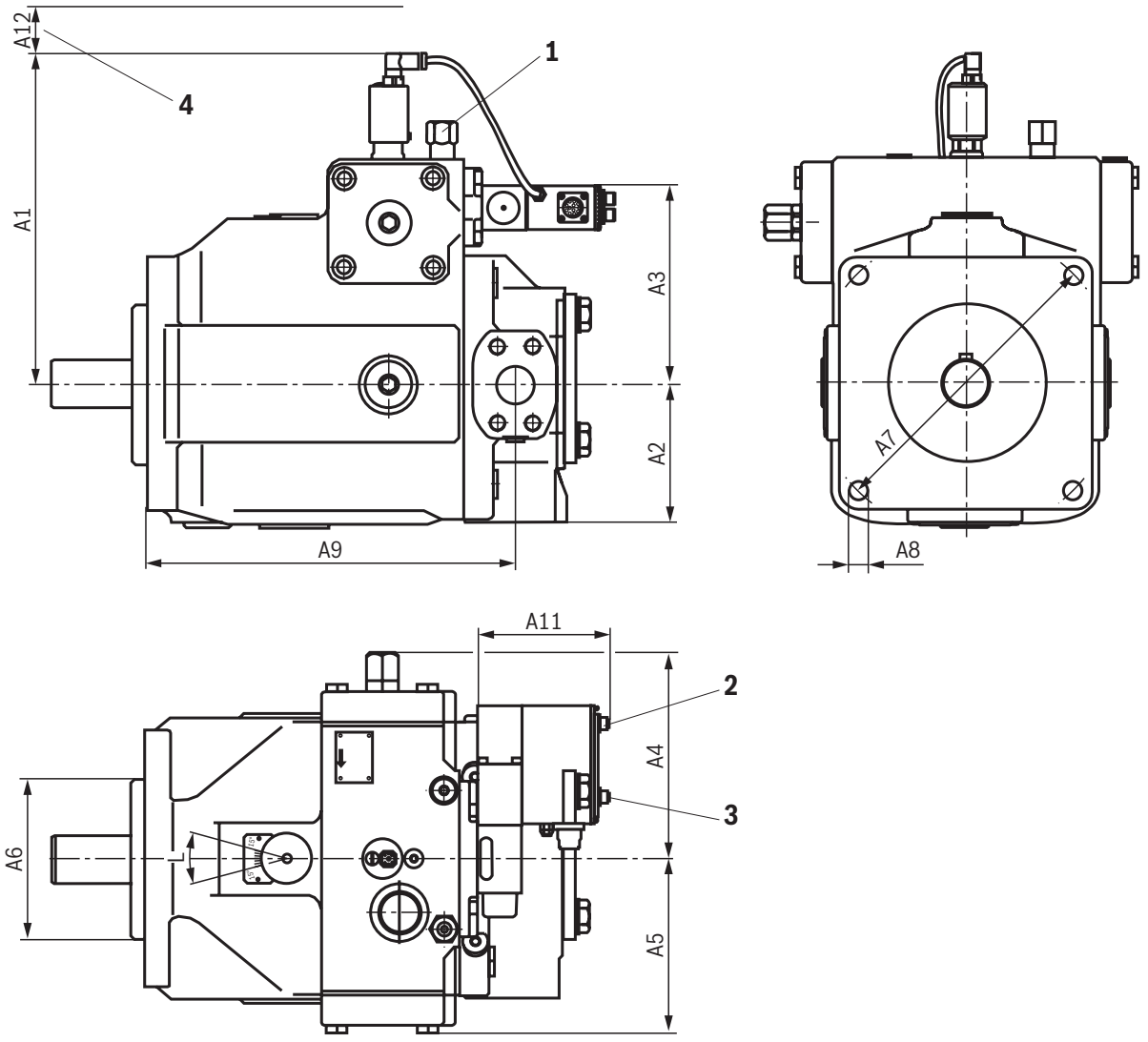
NG250 (***p*** = 100 bar)



NG355 (***p*** = 100 bar)



Dimensions: Type SYHDFEE, SYHDFEn and SYHDFEC (installation orientation "0") (dimensions in mm)



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
40	239	80	127	130	104	125	160	15	227	325	137	25
71	256	92.5	141	149	127	140	180	15	254	352	137	25
125	291	112.5	171	177	147	160	200	20	310	421	137	25
180	291	116	171	177	147	160	200	20	318	421	137	25
250	339	144	207	212	179	224	280	24	380	483	137	25
355	339	144	207	212	179	224	280	24	393	575	137	25

1 Port Z (for version SYHDFE.-1X...0576) (DIN 3852 M14 x 1.5; 12 deep ($p_{max(abs)}$ = 50 bar)

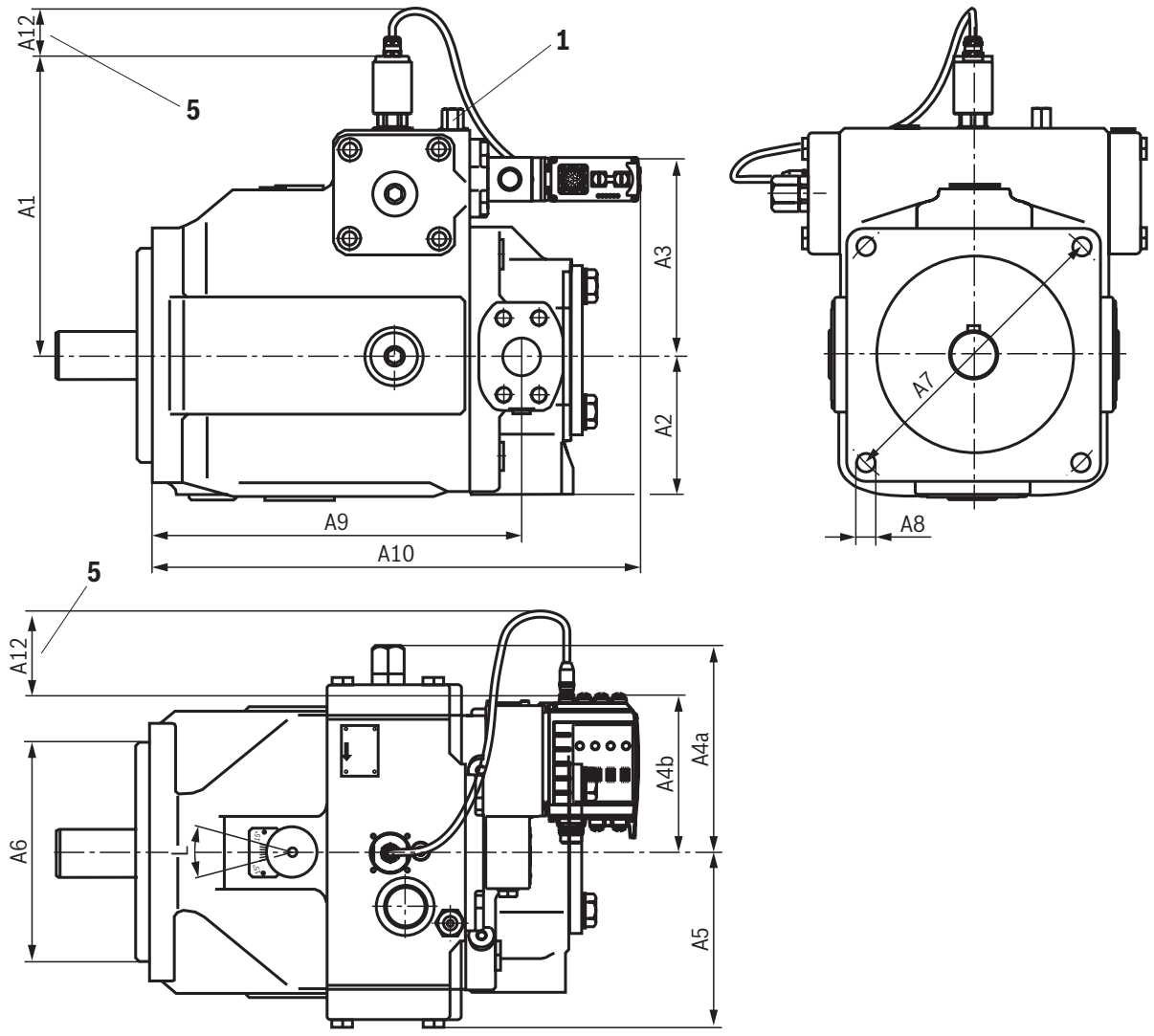
2 Port X2 (pressure transducer HM16) is available with SYHDFEE with actual pressure value input "F", as well as with SYDFEC

3 Connection X3 (CAN bus) is available with SYDFEC

4 Space required for removing the mating connector

☞ **Notice:**
Dimensions base pump (axial piston variable displacement pump A4VSO) see data sheet 92050.

Dimensions: Type SYHDFED (installation orientation "0") (dimensions in mm)



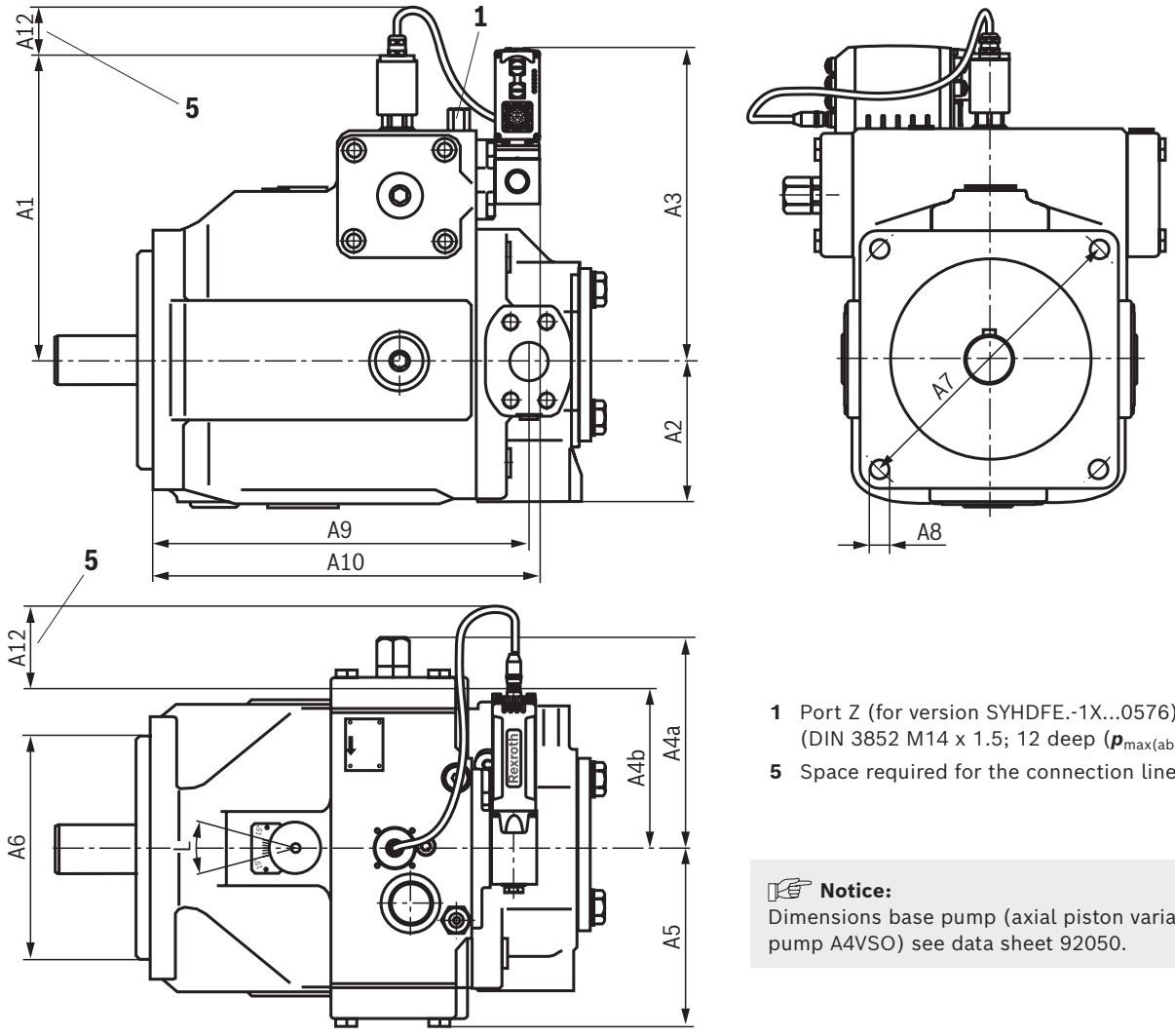
NG	A1	A2	A3	A4a	A4b	A5	A6	A7	A8	A9	A10	A12
40	212	80	127	130	167	104	125	160	15	227	348	100
71	229	92.5	141	149	167	127	140	180	15	254	375	100
125	264	112.5	171	177	167	147	160	200	20	310	444	100
180	264	116	171	177	167	147	160	200	20	318	444	100
250	312	144	207	212	167	179	224	280	24	380	506	100
355	312	144	207	212	167	179	224	280	24	380	598	100

1 Port Z (for version SYHDFE.-1X...0576) (DIN 3852 M14 x 1.5; 12 deep ($p_{max(abs)}$ = 50 bar)

5 Space required for the connection line

☞ **Notice:**
Dimensions base pump (axial piston variable displacement pump A4VSO) see data sheet 92050.

Dimensions: Type SYHDFED (installation orientation "1") (dimensions in mm)



1 Port Z (for version SYHDFE.-1X...0576) (DIN 3852 M14 x 1.5; 12 deep ($p_{max(abs)}$ = 50 bar)

5 Space required for the connection line

☞ **Notice:**
Dimensions base pump (axial piston variable displacement pump A4VSO) see data sheet 92050.

NG	A1	A2	A3	A4a	A4b	A5	A6	A7	A8	A9	A10	A12
40	212	80	241	130	167	104	125	160	15	227	235	100
71	250	92.5	255	149	167	127	140	180	15	254	262	100
125	264	112.5	285	177	167	147	160	200	20	310	331	100
180	264	116	285	177	167	147	160	200	20	318	331	100
250	312	144	321	212	167	179	224	280	24	380	393	100
355	312	144	321	212	167	179	224	280	24	393	485	100

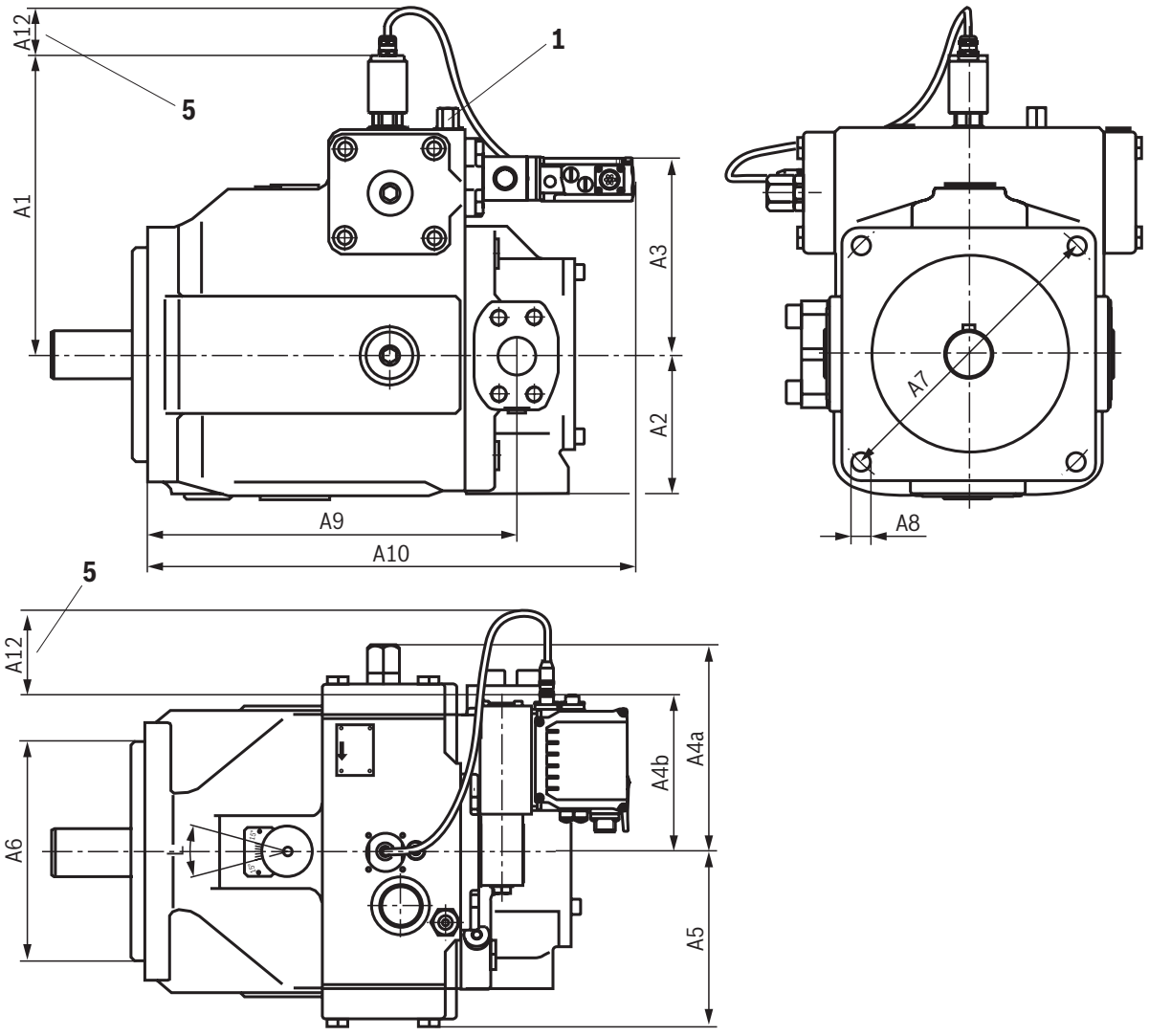
Shaft ends:

NG	Shaft Ø	= P [1)]	= Z [2)]
40	32	AS 10 x 8 x 56	W 32 x 2 x 14 x 9g
71	40	AS 12 x 8 x 68	W 40 x 2 x 18 x 9g
125	50	AS 14 x 9 x 80	W 50 x 2 x 24 x 9g
180	50	AS 14 x 9 x 80	W 50 x 2 x 24 x 9g
250	60	AS 18 x 11 x 100	W 60 x 2 x 28 x 9g
355	70	AS 20 x 12 x 100	W 70 x 3 x 22 x 9g

[1)] Cylindrical with fitting key DIN 6885

[2)] Splined shaft profile DIN 5480

Dimensions: Type SYHDFEF (installation orientation "0") (dimensions in mm)



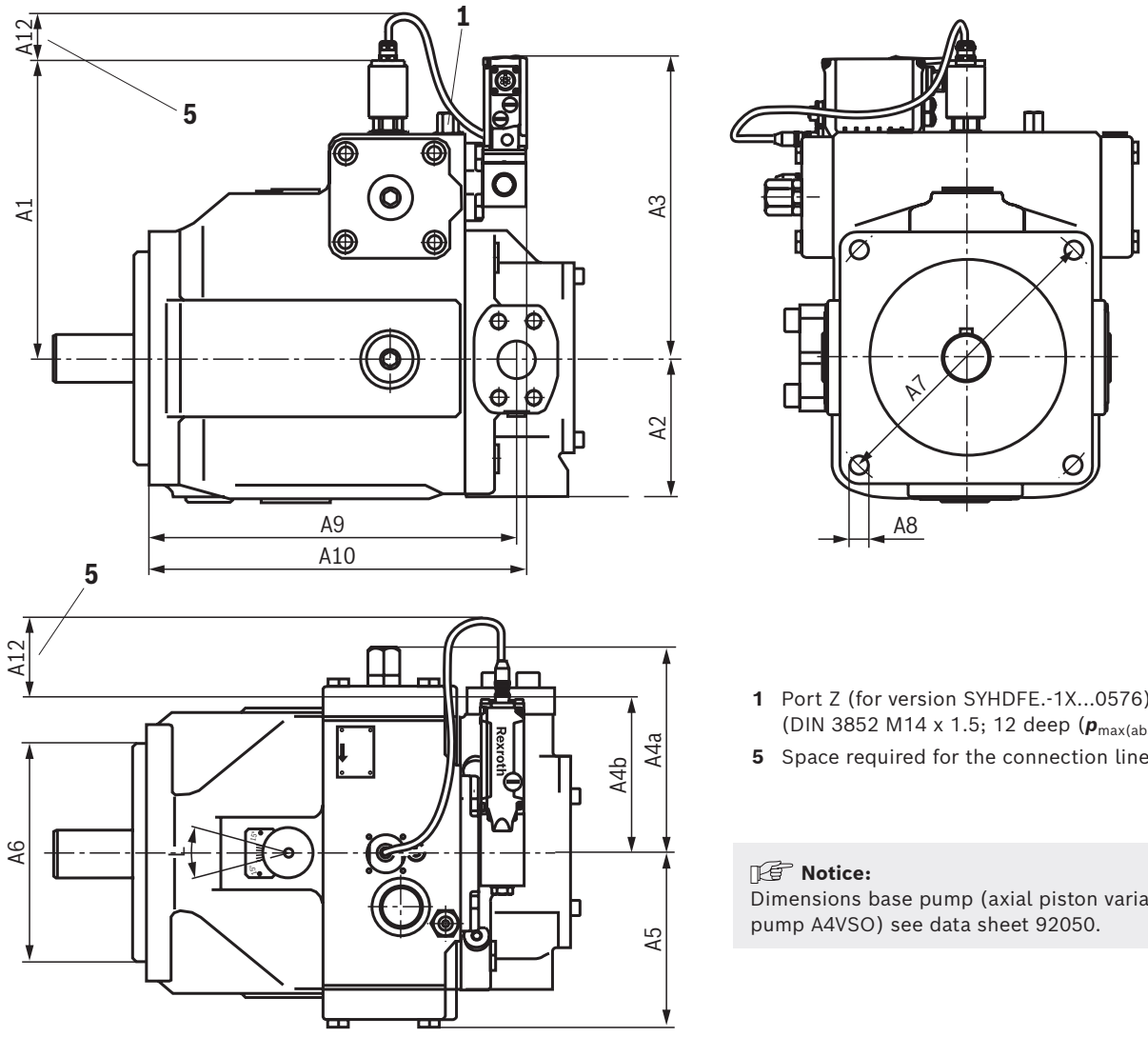
NG	A1	A2	A3	A4a	A4b	A5	A6	A7	A8	A9	A10	A12
40	212	80	127	130	167	104	125	160	15	227	348	100
71	229	92.5	141	149	167	127	140	180	15	254	375	100
125	264	112.5	171	177	167	147	160	200	20	310	444	100
180	264	116	171	177	167	147	160	200	20	318	444	100
250	312	144	207	212	167	179	224	280	24	380	506	100
355	312	144	207	212	167	179	224	280	24	380	598	100

1 Port Z (for version SYHDFE.-1X...0576) (DIN 3852 M14 x 1.5; 12 deep ($p_{max(abs)}$ = 50 bar)

5 Space required for the connection line

☞ **Notice:**
Dimensions base pump (axial piston variable displacement pump A4VSO) see data sheet 92050.

Dimensions: Type SYHDFEF (installation orientation "1") (dimensions in mm)



1 Port Z (for version SYHDFE.-1X...0576) (DIN 3852 M14 x 1.5; 12 deep ($p_{max(abs)}$ = 50 bar)

5 Space required for the connection line

☞ **Notice:**
Dimensions base pump (axial piston variable displacement pump A4VSO) see data sheet 92050.

NG	A1	A2	A3	A4a	A4b	A5	A6	A7	A8	A9	A10	A12
40	212	80	241	130	167	104	125	160	15	227	235	100
71	250	92.5	255	149	167	127	140	180	15	254	262	100
125	264	112.5	285	177	167	147	160	200	20	310	331	100
180	264	116	285	177	167	147	160	200	20	318	331	100
250	312	144	321	212	167	179	224	280	24	380	393	100
355	312	144	321	212	167	179	224	280	24	393	485	100

Shaft ends:

NG	Shaft Ø	= P [1)]	= Z [2)]
40	32	AS 10 x 8 x 56	W 32 x 2 x 14 x 9g
71	40	AS 12 x 8 x 68	W 40 x 2 x 18 x 9g
125	50	AS 14 x 9 x 80	W 50 x 2 x 24 x 9g
180	50	AS 14 x 9 x 80	W 50 x 2 x 24 x 9g
250	60	AS 18 x 11 x 100	W 60 x 2 x 28 x 9g
355	70	AS 20 x 12 x 100	W 70 x 3 x 22 x 9g

[1)] Cylindrical with fitting key DIN 6885

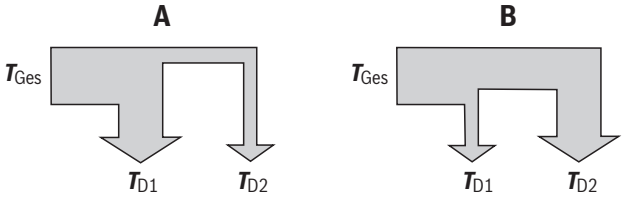
[2)] Splined shaft profile DIN 5480

Through-drives: Drive and through-drive torques

Maximum drive and through-drive torques

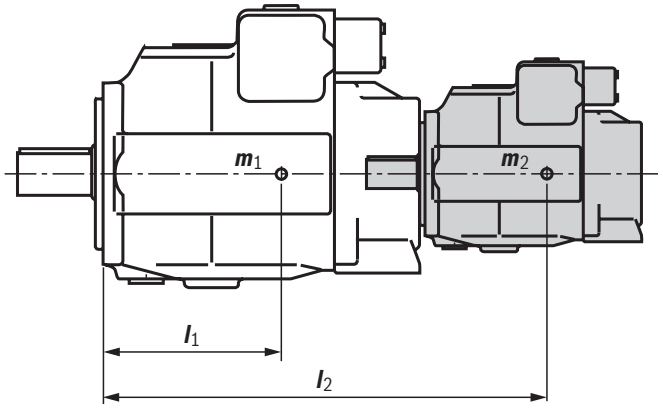
Size			40	71	125	180	250	355
Splined shaft								
▶ Total drive torque at the shaft of pump 1								
– (Pump 1 + pump 2)	$T_{total\ max}$	Nm	446	790	1392	2004	2782	3952
▶ Through-drive torque **A**	$T_{D1\ max}$	Nm	223	395	696	1002	1391	1976
	$T_{D2\ max}$	Nm	223	395	696	1002	1391	1976
▶ Through-drive torque **B**	$T_{D1\ max}$	Nm	223	395	696	1002	1391	1976
	$T_{D2\ max}$	Nm	223	395	696	1002	1391	1976
Fitting key								
▶ Total drive torque at the shaft of pump 1								
– (Pump 1 + pump 2)	$T_{total\ max}$	Nm	380	700	1392	1400	2300	3557
▶ Through-drive torque **A**	$T_{D1\ max}$	Nm	223	395	696	1002	1391	1976
	$T_{D2\ max}$	Nm	157	305	696	398	909	1581
▶ Through-drive torque **B**	$T_{D1\ max}$	Nm	157	305	696	398	909	1581
	$T_{D2\ max}$	Nm	223	395	696	1002	1391	1976

Distribution of through-drive torques



Mass torque (relates to mounting flange of main pump)

Size			40	71	125	180	250	355
Maximum mass torque	$T_{m\ adm.}$	Nm	1800	2000	4200	4200	9300	9300
Maximum mass torque for dynamic mass acceleration of 10 g = 98.1 m/sec²	$T_{m\ adm.}$	Nm	180	200	420	420	930	930
Weight (SYHDFE or A4VSO...DR)	m	kg	39	53	88	102	184	207
Distance of the center of gravity	l_1	mm	120	140	170	180	210	220



m_1, m_2 Weight of the pump in kg

l_1, l_2 Distance of the center of gravity in mm

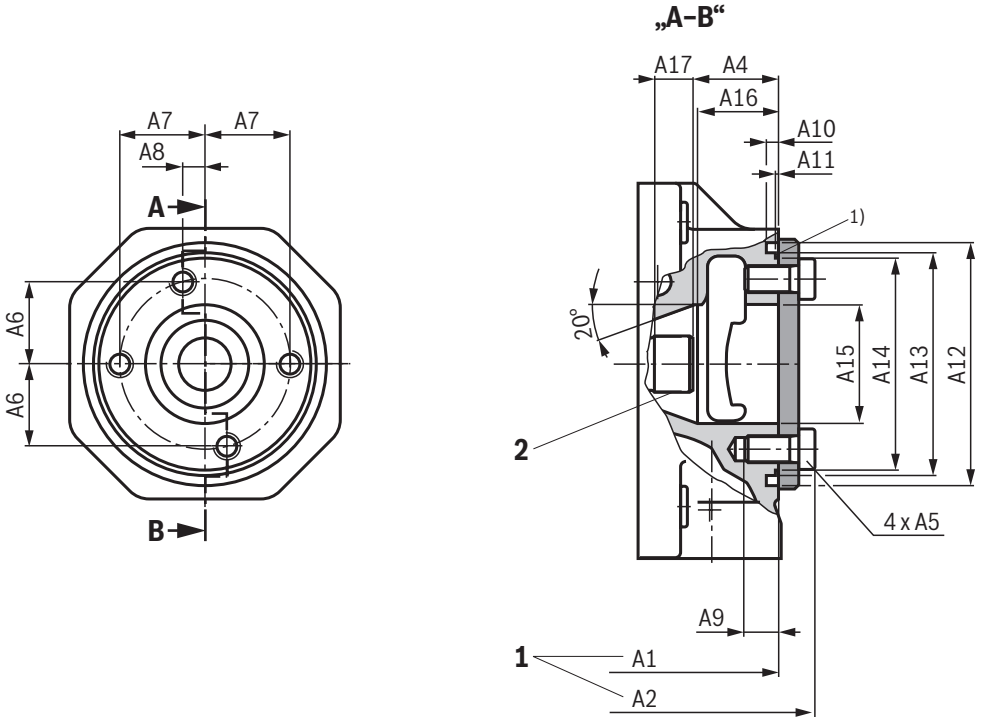
$$T_m = m_1 \cdot l_1 \cdot \frac{1}{102} + m_2 \cdot l_2 \cdot \frac{1}{102} \quad [Nm]$$

Dimensions: Through-drives – sizes 40 and 71 (dimensions in mm)

The control systems of size 40 to 71 are partly supplied with through-drive "K99".
Their advantage is that the through-drive is subsequently convertible. By simply exchanging the intermediate flange and the hub, the through-drive can be adjusted to the on-site requirements.
The assemblies as exchange kits can be ordered separately, see "Accessories for through-drives" on page 41 as well as data sheet 95581.

Small centering diameters have been directly integrated into the pump port subplate. Here, a subsequent modification is not possible. In this connection, observe the "Ordering code" as well as "Accessories for through-drives". Hubs for through-drives can be ordered separately.

▶ **"K99"** With through-drive shaft, without hub, without intermediate flange, closed operationally safe with end cover.



NG Main pump	A1	A2	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
40	263	280	$51.3^{\pm1}$	M12; 25	$37^{+0.2}$	$37^{+0.2}$	–	18	9	$2.3^{+0.1}$	Ø118H7	Ø105g6
71	291	310	$48^{\pm1}$	M12; 25	$42.3^{+0.15}$	$45^{+0.15}$	$15.4^{\pm15}$	18	9	$2.7^{+0.1}$	Ø130H7	Ø116g6

NG Main pump	A14	A15	A16	A17	Splined shaft profile DIN 5480	[1] **Seal ring for later attachment** (separate order)
40	$Ø97.6^{-0.4}$	Ø52	44	14	W25 x 1.25 x 18 x 9g	99 x 3
71	$Ø106.4^{-0.4}$	Ø63	38	16	W30 x 1.25 x 22 x 9g	110.72 x 3.53

1 Up to pump mounting face
2 For splined shaft profile DIN 5480, see table

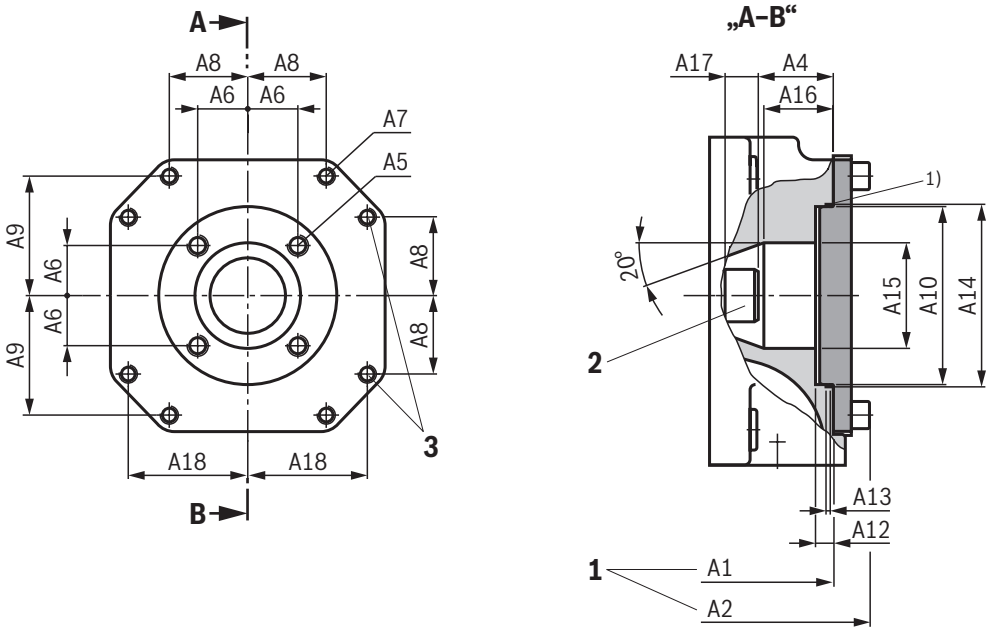
☞ **Notice:**
Drawing without cover.

Dimensions: Through-drives – size 125 ... 355 (dimensions in mm)

The control systems of size 125 ... 355 are supplied with universal through-drives "U99".
Their advantage is that the through-drive is subsequently convertible. By simply exchanging the intermediate flange and the hub, the through-drive can be adjusted to the on-site requirements.

The assemblies as exchange kits can be ordered separately, see "Accessories for through-drives" on page 41 as well as data sheet 95581.

▶ **"U99"** With through-drive shaft, without hub, without intermediate flange, closed operationally safe with end cover.



NG Main pump	A1	A2	A4	A5	A6	A7	A8	A9	A10	A12	A13
125	347	368	$49.7^{\pm1}$	M14; 15	$33.2^{+0.15}$	M12; 18	–	$79.2^{+0.15}$	$Ø118^{H7}$	9	$2.8^{+0.2}$
180	371	392	$49.7^{\pm1}$	M14; 15	$33.2^{+0.15}$	M12; 18	–	$79.2^{+0.15}$	$Ø118^{H7}$	9	$2.8^{+0.2}$
250	431	455	$61.4^{\pm1}$	M20; 22	$44.5^{+0.15}$	M10; 15	$58.15^{+0.15}$	$86.2^{+0.15}$	$Ø160^{H7}$	9	$2.8^{+0.2}$
355	460	487	$61.4^{\pm1}$	M20; 22	$44.5^{+0.15}$	M10; 15	$58.15^{+0.15}$	$86.2^{+0.15}$	$Ø160^{H7}$	9	$2.8^{+0.2}$

NG Main pump	A14	A15	A16	A17	A18	Splined shaft profile DIN 5480	[1] Seal ring for later attachment (separate order)
125	$Ø121^{+0.1}$	Ø70	46	22	–	W35 x 1.25 x 26 x 9g	118 x 2
180	$Ø121^{+0.1}$	Ø70	46	25	–	W35 x 1.25 x 26 x 9g	118 x 2
250	$Ø163^{+0.1}$	Ø87	64	30.5	$86.2^{+0.15}$	W42 x 1.25 x 32 x 9g	160 x 2
355	$Ø163^{+0.1}$	Ø87	64	34	$86.2^{+0.15}$	W42 x 1.25 x 32 x 9g	160 x 2

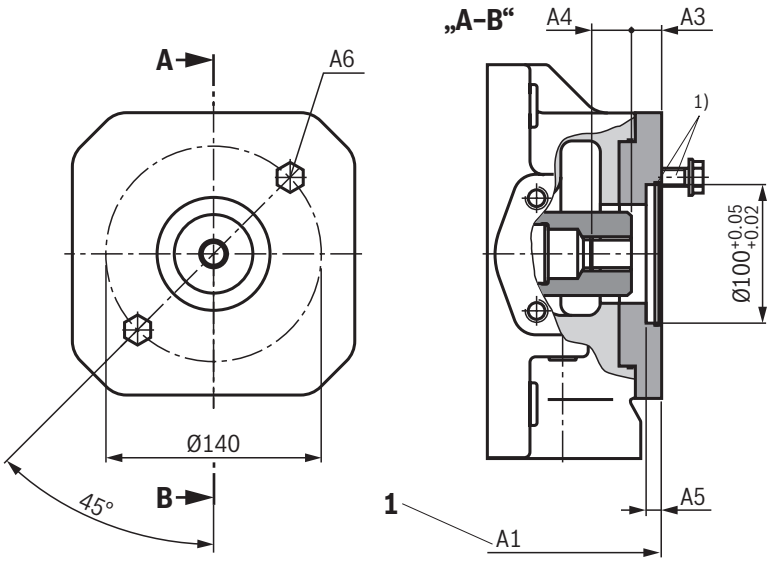
1 Up to pump mounting face
2 For splined shaft profile DIN 5480, see table
3 Only NG250 and 355

☞ **Notice:**
Drawing without cover.

Dimensions: Through-drives (dimensions in mm)

▶ **"UB3"** **Flange** ISO 3019-2 100, 2-hole

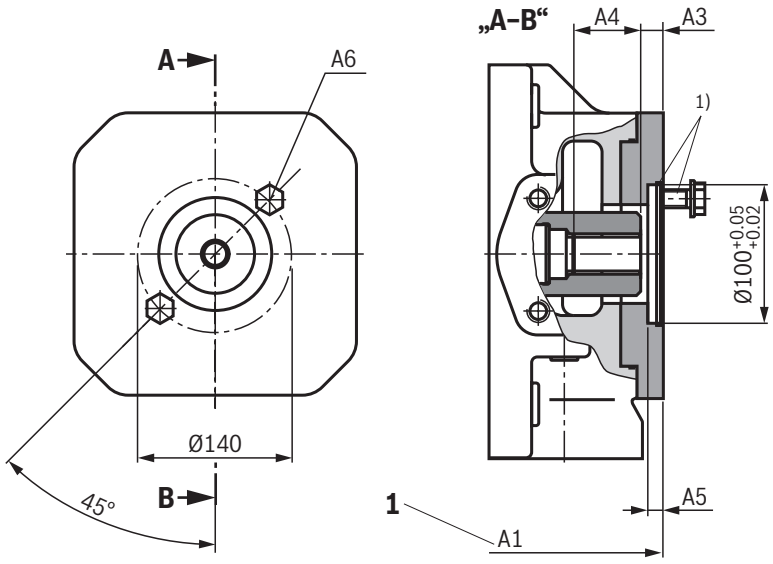
Hub for splined shaft, 22-4 SAE B, 7/8″, 16/32 DP; 13T [3] for attachment of an A10VSO 28/31 splined shaft "S" (see data sheet 92711)



NG	A1	A3	A4	A5	A6 [2]
125	369	20.5	24.9	10	M12
180	393	20.5	24.9	10	M12
250	upon request				
355	upon request				

▶ **"UB4"** **Flange** ISO 3019-2 100, 2-hole

Hub for splined shaft, 25-4 SAE B-B, 1″, 16/32 DP; 15T [3] for attachment of an A10VSO 45/31 splined shaft "S" (see data sheet 92711)



NG	A1	A3	A4	A5	A6 [2]
125	369	18.9	29.5	10	M12
180	393	18.9	29.5	10	M12
250	453	20.9	29.5	10	M12
355	482	20.9	29.5	10	M12

[1] 2 mounting screws and seal ring included in the scope of delivery.

[2] Thread according to DIN 13 (for maximum tightening torques, see page 44).

[3] According to ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5

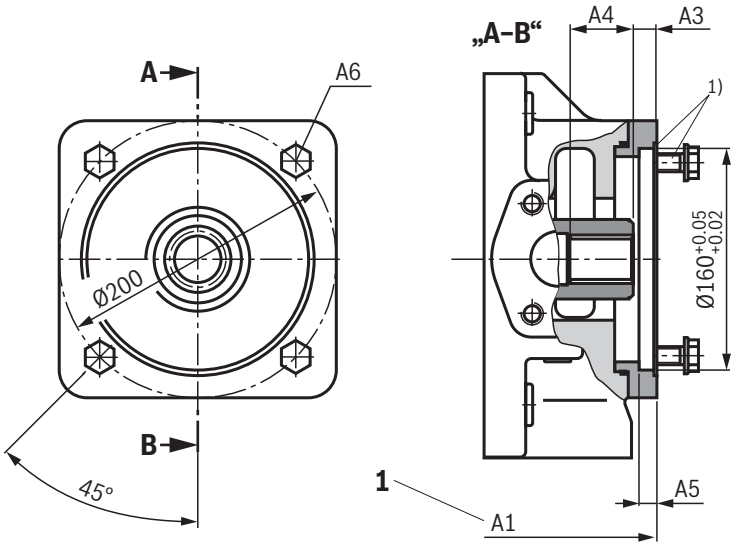
1 Up to pump mounting face

☞ **Notice:**
Before determining the design, please request a binding installation drawing.

Dimensions: Through-drives (dimensions in mm)

▶ **"UB8"** **Flange** ISO 3019-2 160, 4-hole

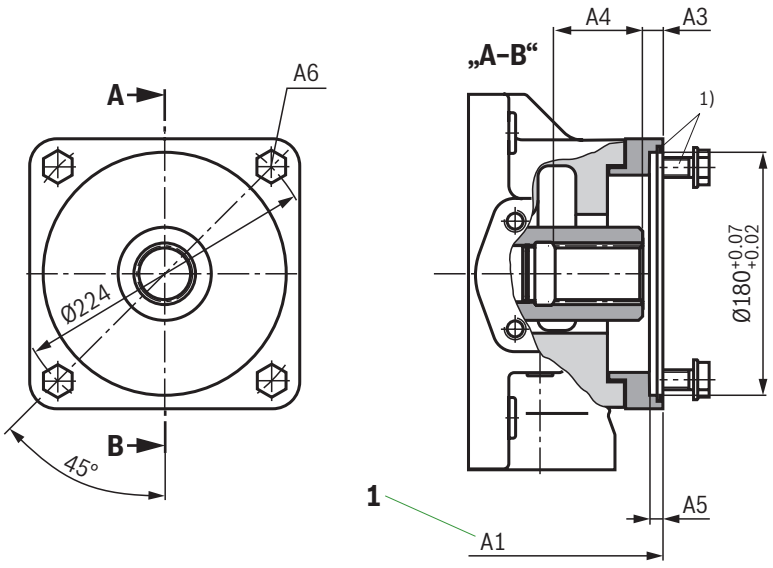
Hub for splined shaft, 32-4 SAE C, 1 1/4″, 12/24 DP; 14T [3] for attachment of an A10VSO 71/32 splined shaft "S" (see data sheet 92714)



NG	A1	A3	A4	A5	A6 [2]
125	upon request				
180	upon request				
250	453	20.9	38	9	M16
355	upon request				

▶ **"UB7"** **Flange** ISO 3019-2 180, 4-hole

Hub for splined shaft, 44-4 SAE D, 1 3/4″, 8/16 DP; 13T [3] for attachment of an A10VSO 140/31(32) splined shaft "S" (see data sheet 92711, 92714)



NG	A1	A3	A4	A5	A6 [2]
180	406	10.6	62	9	M16
250	453	10.6	64	9	M16
355	482	10.6	64	9	M16

[1] 2 mounting screws and seal ring included in the scope of delivery.

[2] Thread according to DIN 13 (for maximum tightening torques, see page 44).

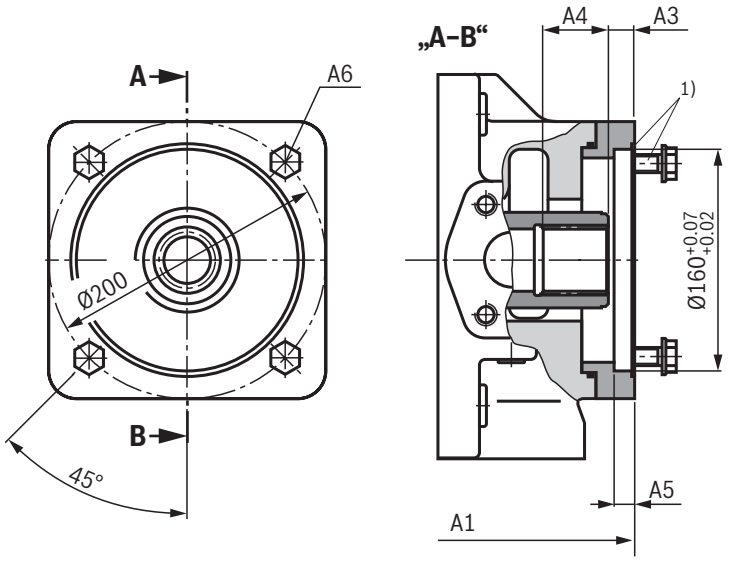
[3] According to ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5

1 Up to pump mounting face

☞ **Notice:**
Before determining the design, please request a binding installation drawing.

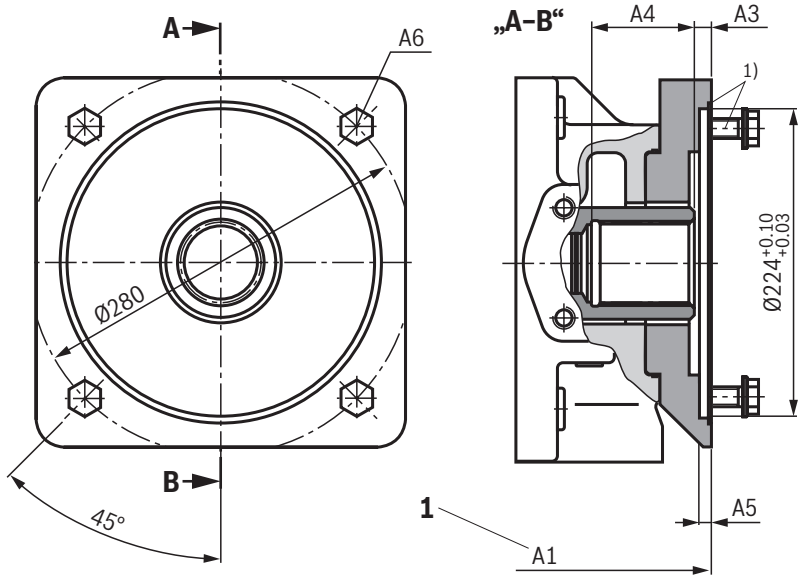
Dimensions: Through-drives (dimensions in mm)

▶ **"U34"** **Flange** ISO 3019-2 160, 4-hole
Hub according to DIN 5480 N50 x 2 x 24 x 8H for attachment of an A4VSO/G 125 or 180 splined shaft



NG	A1	A3	A4	A5	A6 2)
125	369	12.5	51.6	9	M16
180	369	12.5	51.6	9	M16
250	453	12.5	54	9	M16
355	482	12.5	54	9	M16

▶ **"U35"** **Flange** ISO 3019-2 224, 4-hole
Hub according to DIN 5480 N60 x 2 x 28 x 8H for attachment of an A4VSO/G or A4CSG 250 splined shaft



NG	A1	A3	A4	A5	A6 2)
250	469	12.6	75	9	M20
355	498	12.6	75	9	M20

1) 2 mounting screws and seal ring included in the scope of delivery.
2) Thread according to DIN 13 (for maximum tightening torques, see page 44).

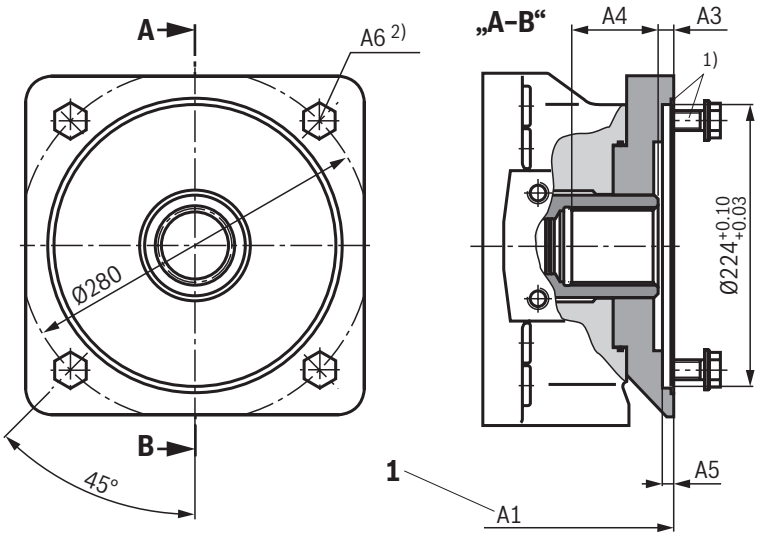
1 Up to pump mounting face

☞ **Notice:**
Before determining the design, please request a binding installation drawing.

Dimensions: Through-drives (dimensions in mm)

▶ **"U77"** **Flange** ISO 3019-2 224, 4-hole

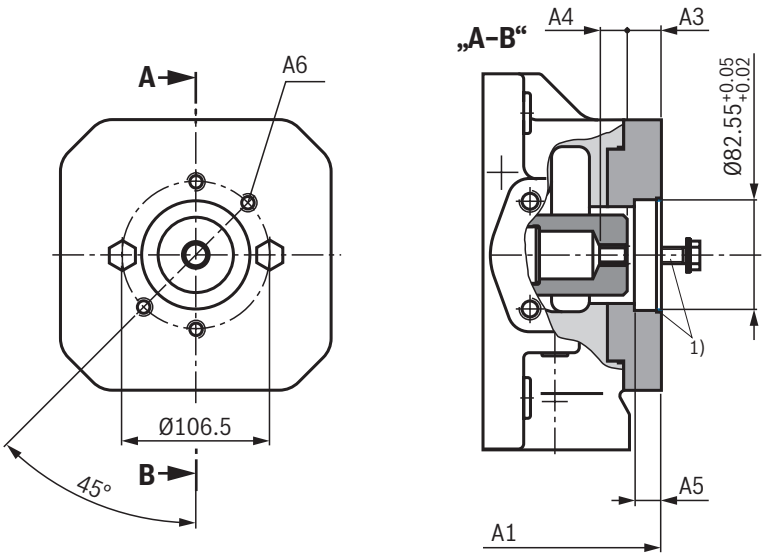
Hub according to DIN 5480 N70 x 3 x 22 x 8H for attachment of an A4VSO/G or A4CSG 355 splined shaft



NG	A1	A3	A4	A5	A6 2)
355	498	12.5	75	9	M20

▶ **"U01"** **Flange** ISO 3019-1 82-2 (SAE A)

Hub for splined shaft, 16-4 SAE A, 5/8″, 16/32 DP; 9T [3] for attachment of an external gear pump AZ-PF-1X-004 ... 022 (see data sheet 10089); recommendation: special version of the gear pumps, please contact us.



NG	A1	A3	A4	A5	A6 2)
125	369	16	19.4	13	M10
180	393	16	19.4	13	M10
250	453	16	19.4	13	M10
355	482	16	19.4	13	M10

1) 2 mounting screws and seal ring included in the scope of delivery.
2) Thread according to DIN 13 (for maximum tightening torques, see page 44).
3) According to ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5

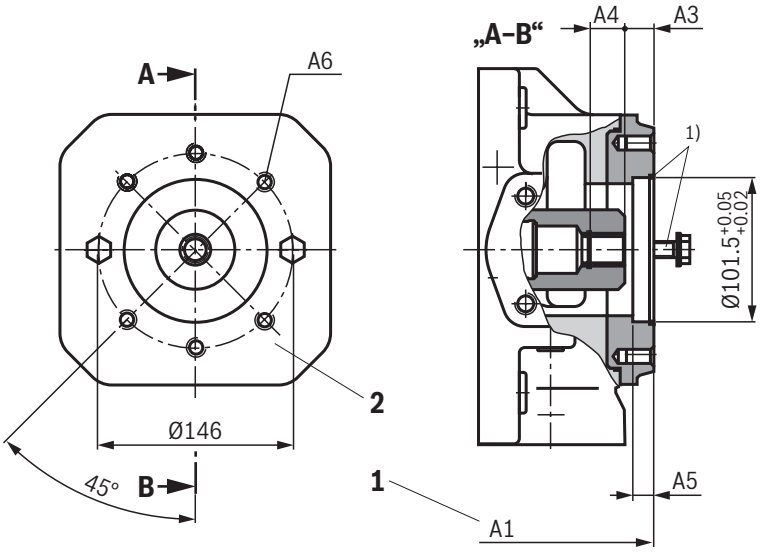
1 Up to pump mounting face

☞ **Notice:**
Before determining the design, please request a binding installation drawing.

Dimensions: Through-drives (dimensions in mm)

▶ **"U68"** **Flange** ISO 3019-1 101-2 (SAE B)

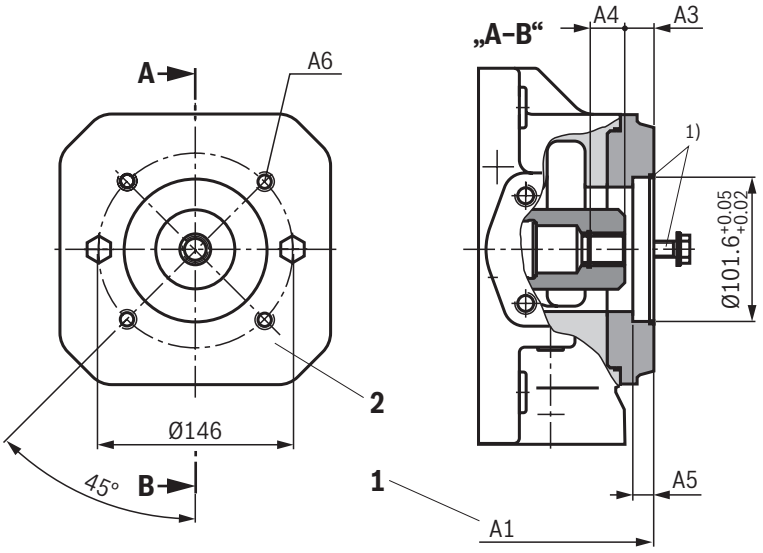
Hub for splined shaft 22-4 SAE B, 7/8″, 16/32 DP; 13T [3] for attachment of an external gear pump AZ-PN-1X020...032 (see data sheet 10091) or A10VO 28/31 and 52(53); splined shaft "S" (see data sheet 92701 and 92703); recommendation: special version of the gear pumps, please contact us.



NG	A1	A3	A4	A5	A6 [2]
125	369	28	25	13	M12
180	393	28	25	13	M12
250	453	19.5	23.1	13	M12
355	482	19.5	23.1	13	M12

▶ **"U04"** **Flange** ISO 3019-1 101-2 (SAE B)

Hub for splined shaft 25-4 SAE B-B, 1″, 16/32 DP; 15T [3] for attachment of an A10VO 45/31 and 52 (53), splined shaft "S" (see data sheet 92701 and 92703) or an internal gear pump PGH4 (see data sheet 10223)



NG	A1	A3	A4	A5	A6 [2]
125	369	18.9	29.4	13	M12
180	393	18.9	29.4	13	M12
250	453	18.9	29.4	13	M12
355	482	18.9	29.4	13	M12

1) 2 mounting screws and seal ring included in the scope of delivery.

2) Thread according to DIN 13 (for maximum tightening torques, see page 44).

3) According to ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5

1 Up to pump mounting face

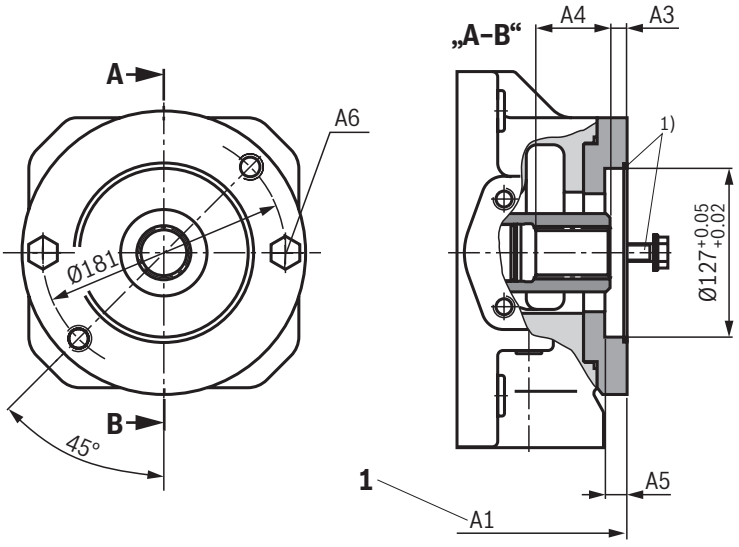
2 Only NG125 and 180

☞ **Notice:**
Before determining the design, please request a binding installation drawing.

Dimensions: Through-drives (dimensions in mm)

▶ **"U24"** **Flange** ISO 3019-1 127-2 (SAE C)

Hub for splined shaft 38-4 SAE C-C, 1 1/2″, 12/24 DP; 17T [3] for attachment of an A10VO 100/31 splined shaft, "S" (see data sheet 92701) or A10VO 85/52(53), splined shaft "S" (see data sheet 92703) or an internal gear pump PGH5 (see data sheet 10223)



NG	A1	A3	A4	A5	A6 [2]
125	369	10.4	50	13	M16
180	393	10.4	50	13	M16
250	453	12.4	55	13	M16
355	482	12.4	55	13	M16

1) 2 mounting screws and seal ring included in the scope of delivery.

2) Thread according to DIN 13 (for maximum tightening torques, see page 44).

3) According to ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5

1 Up to pump mounting face

☞ **Notice:**
Before determining the design, please request a binding installation drawing.

Hubs for standard electric motor coupling

Couplings with gear rim for ambient temperature up to 80 °C (e.g. for motor assemblies with motor IM V1)

Motor		SYHDFE.-1X		Shaft Z	
Frame size/ characteristic	Shaft diameter	NG71 Shaft W40 x 2 x 18 x 9g	NG125/180 Shaft W50 x 2 x 24 x 9g	NG250 Shaft W60 x 2 x 28 x 9g	NG355 Shaft W70 x 3 x 22 x 9g
225/0	60	R900026054	R900026055	–	–
250/0	65	R900026058	R900026059	–	–
280/0	75	R900026062	R900026063	R900714636	–
315/0	80	R901037250	R901076760	R900088584 [1]	R900210961 [1]
315/1	80	–	R900026068	R900783295	R900210960

1) Maximum 40 °C

Accessories for through-drives

The following conditions apply to the attachment pumps listed in the table:
- PGH with shaft "R", flange "U2", see data sheet 10223
- PGF3 with shaft "J", flange "U2", see data sheet 10213
- AZPF with shaft "R", front cover "R", see data sheet 10089

Flange and through-drive (see ordering code page 2) must be the same. Check in the current data sheet of the gear pump whether the shaft ends have the same specified dimensions.

Attachment kits for axial piston variable displacement pumps and SYHDFE control systems

Components universal through-drive "U99"	Main pump SYHDFE.-1X		Attachment pump			
	NG125 NG180	NG250 NG355	Size and type		Through-drive centering hub	Flange designation
Mounting kit	**R902447035**	**R902447037**	NG18	SYDFE.-2X A10VSO / BR31 Shaft S or R	U52 82.55 mm 3/4″	SAE J744 82-1 (A-B)
Flange kit	**R902446836**	**R902446850**				
Hub	**R902446823**	**R902446843**				
Mounting kit	**R902446996**	**R902446998**	NG28		UB3 100 mm 7/8″	ISO 3019-2 100B2HW
Flange kit	**R902446808**	**R902446809**				
Hub	**R902446824**	**R902446844**				
Mounting kit	**R902447001**	**R902447003**	NG45		UB4 100 mm 1″	ISO 3019-2 100B2HW
Flange kit	**R902446808**	**R902446809**				
Hub	**R902446825**	**R902446845**				
Mounting kit	On request	On request	NG45	SYDFE.-3X A10VSO / BR32 Shaft S or R	UE1 125mm 1″	ISO 3019-2 125B4HW
Flange kit	On request	**R902446813**				
Hub	**R902446825**	**R902446845**				
Mounting kit	**R902447014**	**R902447016**	NG71		UB8 160 mm 1 1/4″	ISO 3019-2 160B4HW
Flange kit	**R902446816**	**R902446817**				
Hub	**R902446826**	**R902443227**				
Mounting kit	**R902447021**	**R902447022**	NG100		UB9 180 mm 1 1/2″	ISO 3019-2 180B4HW
Flange kit	**R902446818**	**R902446820**				
Hub	**R910943555**	**R910921237**				
Mounting kit	**R902447025**	**R902447026**	NG140		UB7 180 mm 1 3/4″	ISO 3019-2 180B4HW
Flange kit	**R902446818**	**R902446820**				
Hub	**R910904588**	**R902446849**				
Mounting kit	**R902447010**	**R902447011**	NG40	SYHDFE-1X A4VSO / BR30 Shaft Z	U31 125mm W 32 x 2 x 14 x 9g	ISO 3019-2 125B4HW
Flange kit	**R902446812**	**R902446813**				
Hub	**R902446828**	**R902446846**				
Mounting kit	**R902447012**	**R902447013**	NG71		U33 140mm W 40 x 2 x 18 x 9g	ISO 3019-2 140B4HW
Flange kit	**R902446814**	**R902446815**				
Hub	**R902491155**	**R902446847**				
Mounting kit	**R902447019**	**R902447020**	NG125 NG180		U34 160 mm W 50 x 2 x 24 x 9g	ISO 3019-2 160B4HW
Flange kit	**R902446816**	**R902446817**				
Hub	**R902446848**	**R902446830**				
Mounting kit		**R902447028**	NG250		U35 224 mm W 60 x 2 x 28 x 9g	ISO 3019-2 224B4HW
Flange kit		**R902446822**				
Hub		**R910902972**				
Mounting kit		**R902447029**	NG355		U77 224 mm W 70 x 3 x 22 x 9g	ISO 3019-2 224B4HW
Flange kit		**R902446822**				
Hub		**R910941327**				

☞ **Notice:**
The order numbers for the combination of pumps are contained in the table and in data sheet 95581.

Accessories for through-drives

Attachment kits for axial piston variable displacement pumps and SYHDFE control systems

Components universal through-drive "K99"	Main pump SYHDFE.-1X		Attachment pump			
	NG40	NG71	Size and type		Through-drive centering hub	Flange designation
Mounting kit	On request	R902546965 [1]	NG18	SYDFE.-2X A10VSO / BR31 Shaft S or R	K52 82.55 mm 3/4″	ISO 3019-1-82-2
Hub		–				
Mounting kit	R902488855	R902566875	NG28		KB3 100 mm 7/8″	ISO 3019-2 100B2HW
Mounting kit	On request	R902450062	NG45	SYDFE.-2X A10VSO / BR31 Shaft S or R	KB4 100 mm 1″	ISO 3019-2 100B2HW
Mounting kit	–	**R902543215**	NG45	SYDFE.-3X A10VSO / BR32 Shaft S or R	KE1 125mm 1″	ISO 3019-2 125B4HW
Mounting kit	–	**R902543416**	NG71		KB8 160 mm 1 1/4″	ISO 3019-2 160B4HW
Mounting kit	**R902425118**	**R910904879**	NG40	SYHDFE-1X A4VSO / BR10 Shaft Z	K31 125mm W 32x2x14x9g	ISO 3019-2 125B4HW
Mounting kit	–	**R902403972**	NG71		K33 140mm W 40x2x18x9g	ISO 3019-2 140B4HW

Components universal through-drive "U99"	Main pump SYHDFE.-1X		Attachment pump		
	NG125 NG180	NG250 NG350	Size and type	Through-drive centering hub	Flange designation
Mounting kit	**R902447030**	**R902447032**	PGF2, PGH2, PGH3, AZPF	U01	SAE J744 82-2(A-B)
Flange kit	**R902446836**	**R902446850**		82.55	
Hub	**R902446831**	**R902497505**		5/8″	
Mounting kit	**R902447040**	**R902447042**	PGF 3	U68	SAE J744 101-2(B)
Flange kit	**R902446837**	**R902446851**		101.6 mm	
Hub	**R902446824**	**R902446844**		7/8″	
Mounting kit	**R902447045**	**R902447047**	PGH 4	U04	SAE J744 101-2(B)
Flange kit	**R902446837**	**R902446851**		101.6 mm	
Hub	**R902446825**	**R902446845**		1″	
Mounting kit	**R902447052**	**R902447053**	PGH 5	U24	SAE J744 127-2(B)
Flange kit	**R902446838**	**R902446852**		127 mm	
Hub	**R910943555**	**R910921237**		1 1/2″	

Through-drive components	Main pump SYHDFE.-1X		Attachment pump		
	NG40	NG71	Size and type	Through-drive centering hub	Flange designation
Hub	On request	On request	PGF2, PGH2, PGH3, AZPF	K01 82.55 mm 5/8″	ISO 3019-1-82-2

☞ **Notice:**
The order numbers for the combination of pumps are contained in the table and in data sheet 95581.

[1] Only with through-drive "K01"

Accessories (separate order)

SYDFE1	**Material number**	**Data sheet**
External control electronics VT 5041-3X/1 without power limitation, without swivel angle display	**R901236404**	30242
External control electronics VT 5041-3X/2 without power limitation, with swivel angle display	**R901263598**	30242
External control electronics VT 5041-3X/3 with power limitation, with swivel angle display	**R901196678**	30242
Mating connector for solenoid plug	**R901017011**	08006
Mating connector for position transducer of valve	**R900023126**	08006
Mating connector for position transducer of pump	**R900013674**	–
Pressure transducer HM 20-2X, measurement range 315 bar (4 ... 20 mA)	**R901342029**	30272
Pressure transducer HM 20-2X, measurement range 315 bar (0.1 ... 10 V)	**R901342030**	30272
Card holder VT 3002-1-2X/32D	**R900020153**	29928
Compact power supply unit VT-NE32-1X	**R900080049**	29929

SYDFEE, SYDFEC, SYDFEn	**Material number**	**Data sheet**
Mating connector 12-pole for central connection X1 without cable (assembly kit)	**R900884671**	08006
Mating connector 12-pole for central connection X1 with cable set 2 x 5 m	**R900032356**	–
Mating connector 12-pole for central connection X1 with cable set 2 x 20 m	**R900860399**	–
Pressure transducer HM 20-2X, measurement range 315 bar (4 ... 20 mA)	**R901342029**	30272
Pressure transducer HM 20-2X, measurement range 315 bar (0.1 ... 10 V)	**R901342030**	30272
Test device VT-PDFE-1-1X/V0/0	**R900757051**	29689-B
Compact power supply unit VT-NE32-1X	**R900080049**	29929

SYDFEC and SYDFEn	**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 pressure transducer at connector X2	**R901117164**	–
Mating connector for interface X3, M12, straight, can be connected independently, 5-pole, shielded, A-coded, cable diameter 6 ... 8 mm	**R901076910**	–
Converter USB/CAN bus for the connection of a computer to a CAN bus system	**R901071963**	–
Cable for the connection of CAN bus / X3 to CAN bus converter (D-Sub)	**R901152127**	–

SYDFED	**Material number**	**Data sheet**
Mating connector 12-pole for central connection XH4 without cable (assembly kit)	**R900884671**	08006
Mating connector 12-pole for central connection XH4 with cable set 2 x 5 m	**R900032356**	–
Mating connector 12-pole for central connection XH4 with cable set 2 x 20 m	**R900860399**	–
Pressure transducer HM 20-2X, measurement range 315 bar (4 ... 20 mA)	**R901342029**	30272
Pressure transducer HM 20-2X, measurement range 315 bar (0.1 ... 10 V)	**R901342030**	30272
Test device VT-PDFE-1-1X/V0/0	**R900757051**	29689-B
Compact power supply unit VT-NE32-1X	**R900080049**	29929
Ethernet connection cable M12 to RJ45 (connection X7E1 & X7E2), additional information type designation RKB0044/xxx.x (xxx.x: length in meters)	**R911172135**	

SYDFEF	**Material number**	**Data sheet**
Mating connector 6-pole for central connection XH1 without cable (assembly kit)	**R900021267**	08006
Mating connector 6-pole for central connection XH1 with cable set 3 m	**R901420483**	08006
Mating connector 6-pole for central connection XH1 with cable set 5 m	**R901420491**	08006
Mating connector 6-pole for central connection XH1 with cable set 10 m	**R901420496**	08006
Pressure transducer HM 20-2X, measurement range 315 bar (4 ... 20 mA)	**R901342029**	30272
Pressure transducer HM 20-2X, measurement range 315 bar (0.1 ... 10 V)	**R901342030**	30272
Pressure transducer HM 20-2X, measurement range 315 bar (0.5 ... 5 V) with 0.5 m cable	**R901342038**	30272
Ethernet connection cable M12 to RJ45 (connection X7E1 & X7E2), additional information type designation RKB0044/003,0	**R911343806**	–

Project planning information

- Command values may only be switched via relays with gold-plated contacts (low voltage, low currents).
- Always shield command and actual value cables.
- The distance to aerial lines or radios must be at least 1 m.
- Do not lay signal lines close to power lines.
- For amending notes on the SYDFE control system, see the operating instructions (see "Further information").

Installation information

Tightening torques:

- The tightening torques specified in this data sheet are maximum values and must not be exceeded (maximum values for screw-in threads).
  Manufacturer's specifications regarding the maximum admissible tightening torques of the fittings used are to be observed.
- For mounting screws according to DIN 13, we recommend checking the tightening torque case by case according to VDI 2230, version 2003.

Further information

Operating instructions for SY(H)DFEE	Operating instructions 30012-B
Operating instructions for SY(H)DFEn	Operating instructions 30014-B
Operating instructions for SY(H)DFEC	Operating instructions 30027-B
Operating instructions for SY(H)DFED	Operating instructions 30017-B
Operating instructions for SY(H)DFEF	Operating instructions 30013-B
Data sheet for universal through-drive for connecting two pumps into one combination	Data sheet 95581
Data sheet for axial piston variable displacement pump A4VSO	Data sheet 92050
Data sheet for axial piston variable displacement pump A4VSO for HFC	Data sheet 92053
Data sheet for swivel angle sensor VT-SWA-LIN-1X	Data sheet 30263
Technical information: Modification options for variable displacement pump A4VSO for DFE control	Data sheet 30637
Data sheet for pressure transducer HM 20-2X	Data sheet 30272
Operating instructions for test device VT-PDFE	Operating instructions 29689-B
Internet	www.boschrexroth.com/sydfe
Information on available spare parts	www.boschrexroth.com/spc

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