

Servo-hydraulic pump unit

Type SHP4V with A4VZA and MS2N



SHP4V

- ▶ Size 71
- ▶ Component series 1X
- ▶ Nominal pressure 330 bar
- ▶ Maximum flow: 227 l/min

Features

- ▶ Servo-hydraulic pump unit consisting of an axial piston variable displacement pump including a control or adjustment device and a servo motor
- ▶ With axial piston variable displacement pump A4VZA, NG71
- ▶ With servo synchronous motor MS2N10 / MS2N13
- ▶ Optimized attachment and with regard to installation space through direct attachment of the pump without piping and direct coupling of pump and motor
- ▶ Low operating noise
- ▶ Optical swivel angle display
- ▶ Short control times
- ▶ Change in the flow direction in the event of an adjustment of the swash plate by means of zero position or reversal of direction of rotation

Contents

Features	1
Ordering code	2
Symbol	3
Function	4
Technical data	5, 6
Characteristic curves	7 ... 10
Dimensions: SHP4V	11
Hydraulic connections	12
Electrical connections	13, 14
Further information	15
Notes	16

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14
SHP	4V	-	1X	/			/	-		-			/

01	Servo-hydraulic pump unit	SHP
02	Axial piston pump A4VZA for 4-quadrant operation with variable displacer volume	4V
03	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X

Motor version

04	MS2N10, length of an assembly R, low rotor inertia, winding 2500 rpm	N10-R0BL
	MS2N13, length of an assembly E, average rotor inertia, winding 2000 rpm	N13-E1BH

Cooling

05	External ventilation, axial 230 V/50 Hz (MS2N10)	A
	External ventilation, axial 115 V/60 Hz (MS2N10)	B
	External cooling, axial 3x400V (MS2N13)	C
	Water cooling	L

Encoder

06	Standard - 128 signal periods, Hiperface, single-turn (BS)	B
----	--	----------

Connector

07	Dual cable connection M58, fixed, A side / M17, rotatable (MS2N10)	A
	Terminal box size 3, A or B side (MS2N13)	E
08	Pump nominal size NG 071	071

Pump adjustment

09	Set pressure min. 20 / max. 100 bar; adjustment volume 42.1 ccm	OV1
	Set pressure min. 50 / max. 350 bar; adjustment volume 21.5 ccm	OV2
	Set pressure min. 150 / max. 315 bar; adjustment volume 10.5 ccm	OV3
	Digital, electro-hydraulic adjustment, with high-response valve	HS5
	Digital, electro-hydraulic control system, high-response valve with OBE	HS5E

Pump sensor

10	Without inductive position transducer	Y
	With inductive position transducer AWAX004D02	A
	Only for HS5 (sensor included in pump adjustment)	N
	Only with HS5E	-
11	Direction of rotation alternating	W

Seal material, pump

12	FKM	V
----	-----	----------

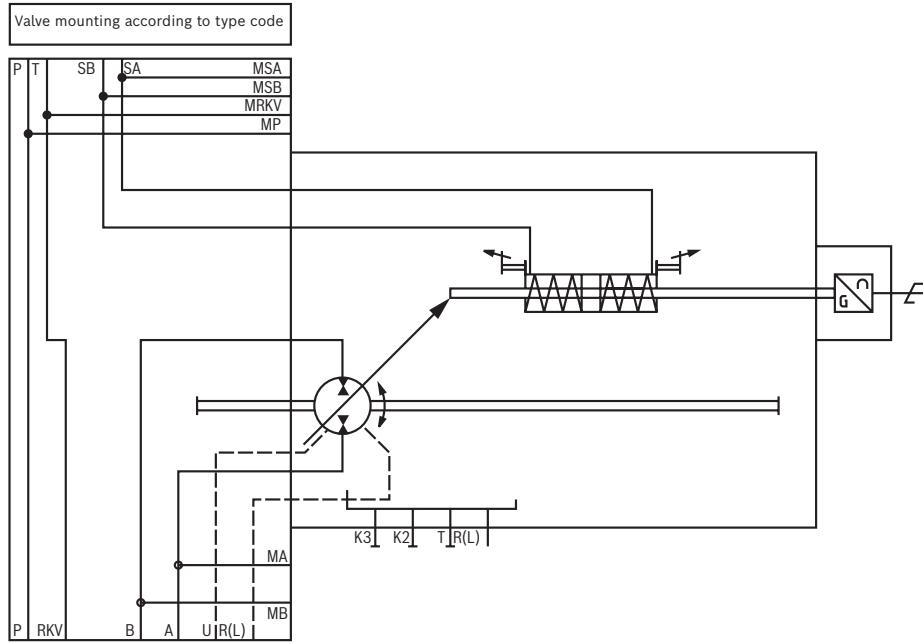
Control valve

13	For HS5 and HS5E (valve included in pump adjustment)	N
	Proportional directional valve 4WREE6V08-3X/V/24F1-822	C
	Proportional directional valve 4WREE6V08-3X/V/24A1-822	D

Measuring ports

14	Closed (without Minimes connections)	N
	With Minimes connection	M

Symbol



Function

The motor converts the electric power (U, I) of the converter into mechanical power (M, n) (rotating shaft). The pump then converts the rotating motion into a hydraulic power (p, Q), so that either an actuator can be operated directly or hydraulic power can be provided in a hydraulic system as required.

A counterclockwise rotating pump ($\hat{=}$ clockwise rotating motor) creates a flow from B to A at the pump. In the case of a clockwise rotating pump ($\hat{=}$ counterclockwise rotating motor), the direction of flow at the pump is from A to B.

The synchronous servo motor enables the speed to be realized variably.

In addition, there is the option to control the swivel angle of the pump via the control valve.

The SHP4V consisting of A4VZA and MS2N has the possibility to cover very wide operating ranges with swivel angle and speed adjustment.

On request, the servo-hydraulic pump unit can also be provided with 2-point adjustment.

Technical data

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

general			
Axial piston variable displacement pump A4VZA		NG71	
Synchronous servo motor		MS2N10	MS2N13
Weight moment of inertia	kgm ²	0.0268	0.1021
Maximum flow	l/min	227	
Weight	kg	140	240
Ambient temperature range	°C	0 ... +40	
Viscosity	mm ² /s	max. 10 ... 400 in continuous operation	
hydraulic (pump)			
Displacement volume $V_{g \max}$	cm ³	71	
Max. speed at $V_{g \max}$	rpm	3200	
Pressure at the connection for actuator line A or B			
Nominal pressure p_{nom}	bar	330	The nominal pressure corresponds to the max. design pressure
Peak pressure p_{max}	bar	380	The peak pressure corresponds to the maximum operating pressure within a single operating period. The sum of the single operating periods must not exceed the total operating period.
Single operating period	s	1	
Total operating period	h	300	
Recommended boost pressure P sp (input)			
Min. boost pressure	bar	5 (6 absolute)	
Max. boost pressure	bar	25	
Summated pressure			
Maximum pressure high-pressure side A or B	bar	330	
Maximum pressure low-pressure side A or B	bar	25	
Angular acceleration max. (alpha)	rad/S ²	11000	
Housing pressure at the port			
Max. static pressure PL_{max} (see data sheet 92115)	bar	3 (4 absolute)	

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HLP	FKM	DIN 51524	90220
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Class 20/18/15 ¹⁾	



Important information on hydraulic fluids:

- For further information and data on the use of other hydraulic fluids, please contact us.

- ¹⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

Adjustment device				
Pump adjustment		OV1	OV2/HS5(E)	OV3
Set pressure (SA;SB) p_{min}	bar	20	50	150
Set pressure (SA;SB) p_{max}	bar	100	315	315
Adjustment volume $V_{s \max}$	cm ³	42.1	21.5	10.5



Notice!

For assembly, commissioning and maintenance of hydraulic systems please observe the data sheet 07900. The servo-hydraulic pump unit is constructed and manufactured in accordance with the harmonized EN standards/specifications.

Technical data

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

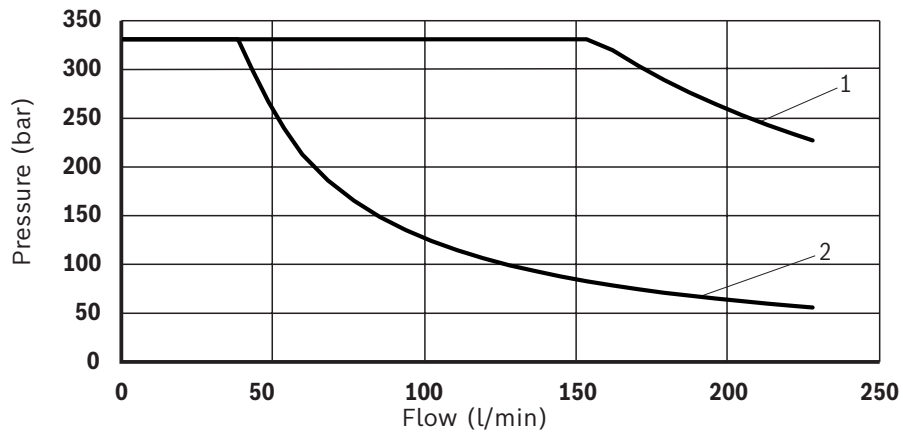
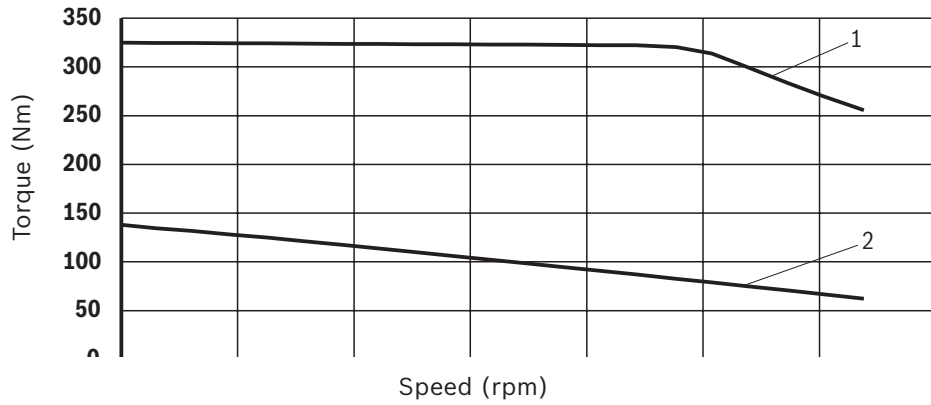
electric (motor)					
Motor type		MS2N10		MS2N13	
Cooling type		A/B (IC413, external ventilation)	L (IC3W7, water cooling)	C (IC413, external ventilation)	L (IC3W7, water cooling)
Continuous power $P_{\text{electric Peak}}$ (regulated link connection 750 V)	kW	20	39	60	84
Maximum power $P_{\text{electric Peak}}$ (regulated link connection 750 V)	kW	85	85	140	150
Permanent standstill torque - 100 K	Nm	138	186	300	345
Standstill current - 100 K	A	72.4	96.2	116	138
Maximum torque 20 °C (cold)	Nm	335		692	642
Maximum torque 100 K (warm)	Nm	325		657	610
Maximum current	A	220		305	
Protection class according to DIN EN 60529		IP65 with shaft seal ring			

Fans				
		MS2N10...A	MS2N10...B	MS2N13...C
Rated voltage	V	230	115	400/480
Rated current	A	0.26/0.23	0.46	0.21/0.28
Frequency	Hz	50/60	60	50/60

Water cooling			
		MS2N10...L	MS2N13...L
Power loss	kW	3.3	3.2
Inlet temperature, coolant	°C	+10 ... +40	+10 ... +40
Maximum admissible inlet pressure	bar	6.0	6.0
Coolant connection 2 x ISO 228	bar	G1/8	G1/4
Min. flow	l/min	6	

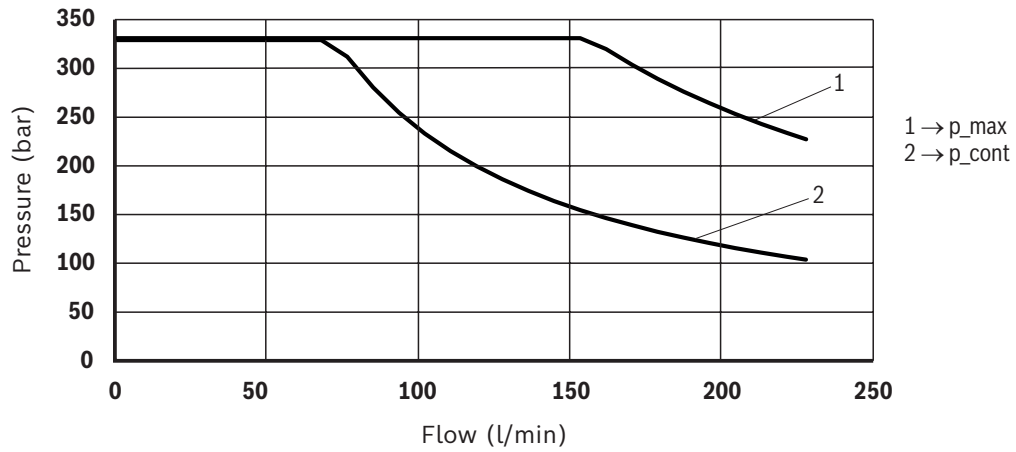
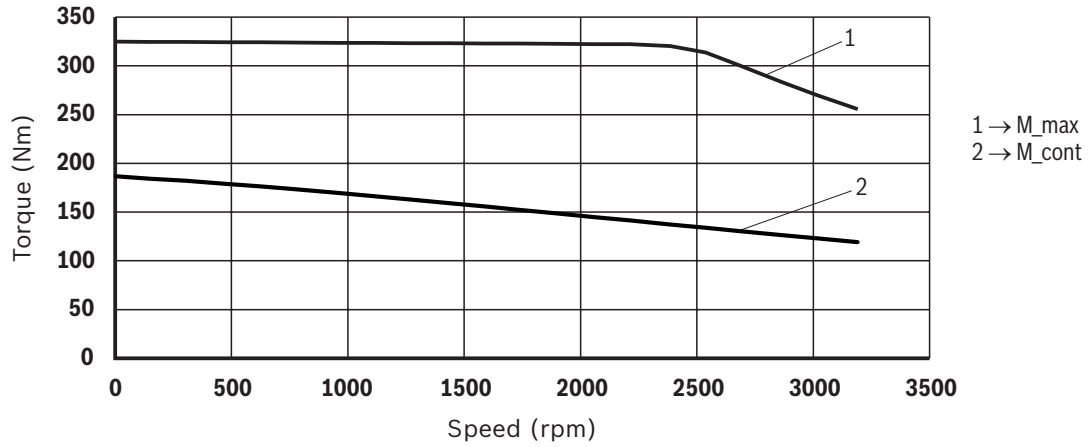
Characteristic curves

Axial piston pump A4VZA71 with motor MS2N10_R0BLA
(external ventilation)



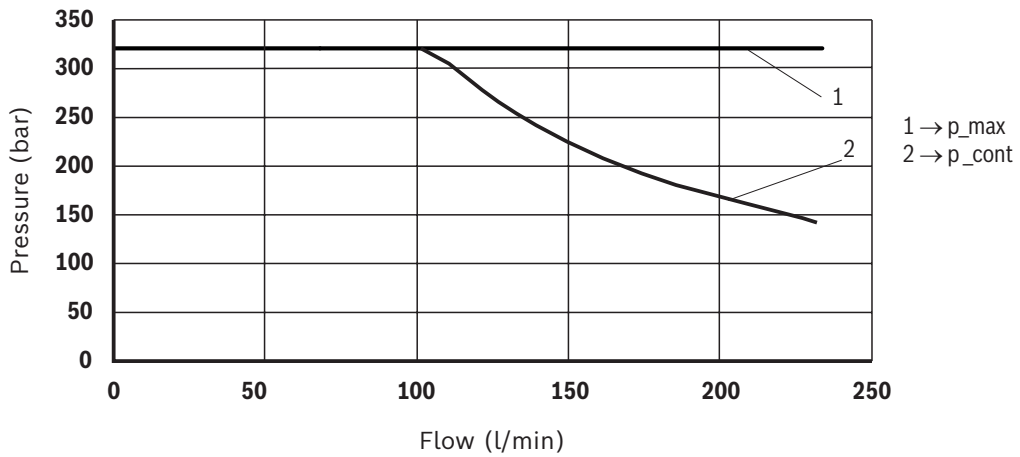
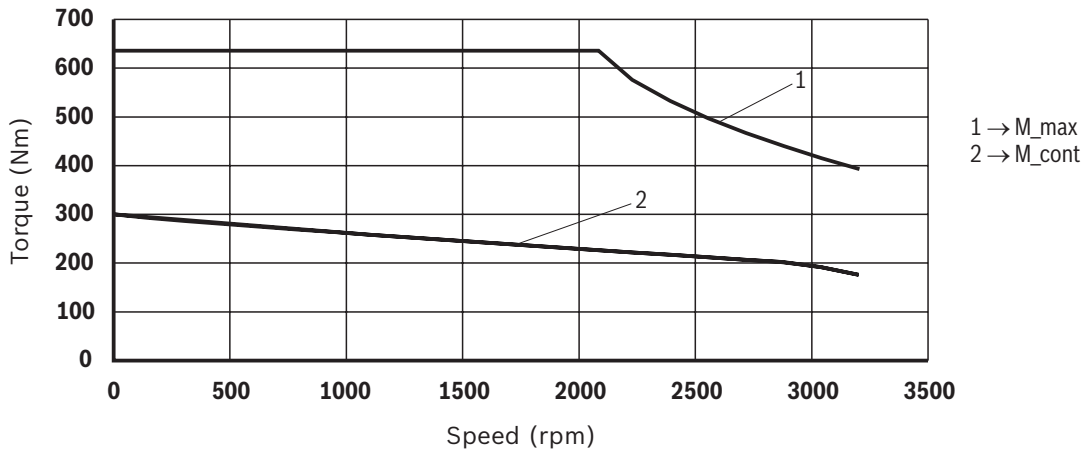
Characteristic curves

Axial piston pump A4VZA71 with motor MS2N10_R0BLL
(water cooling)



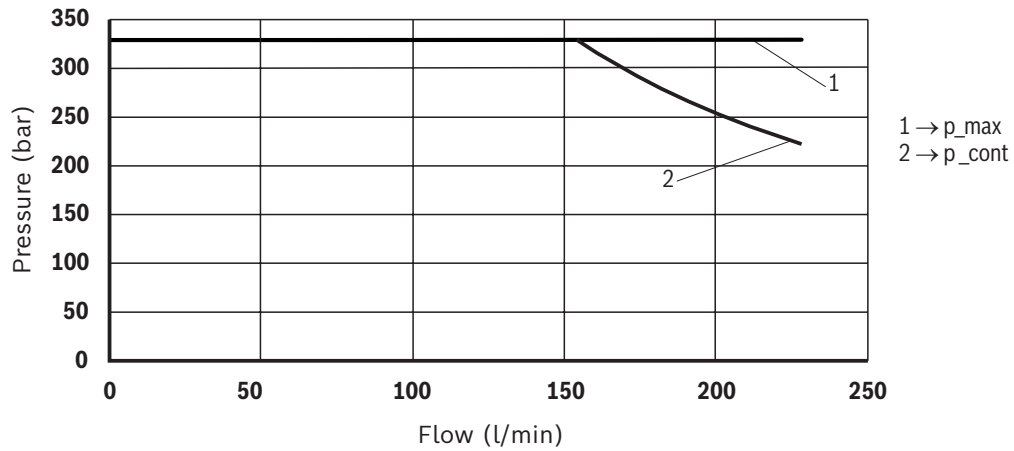
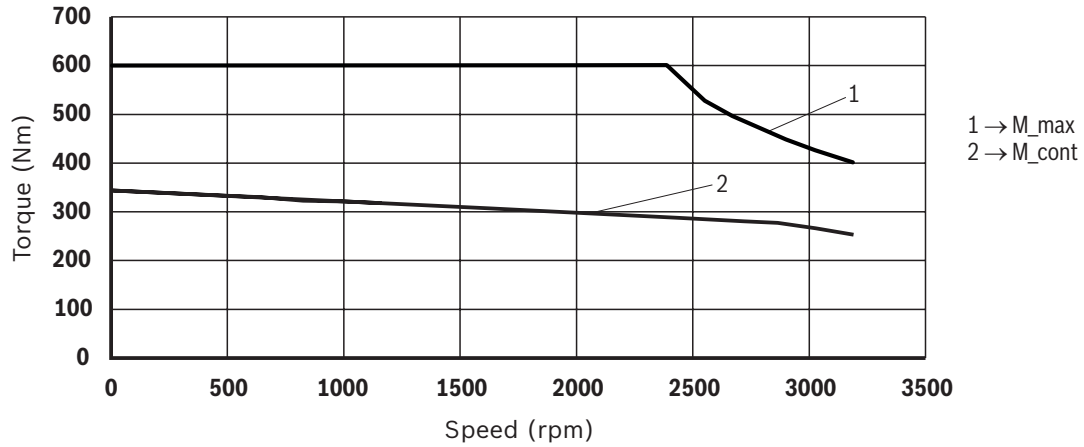
Characteristic curves

Axial piston pump A4VZA71 with motor MS2N13_E1BHC
(external ventilation)



Characteristic curves

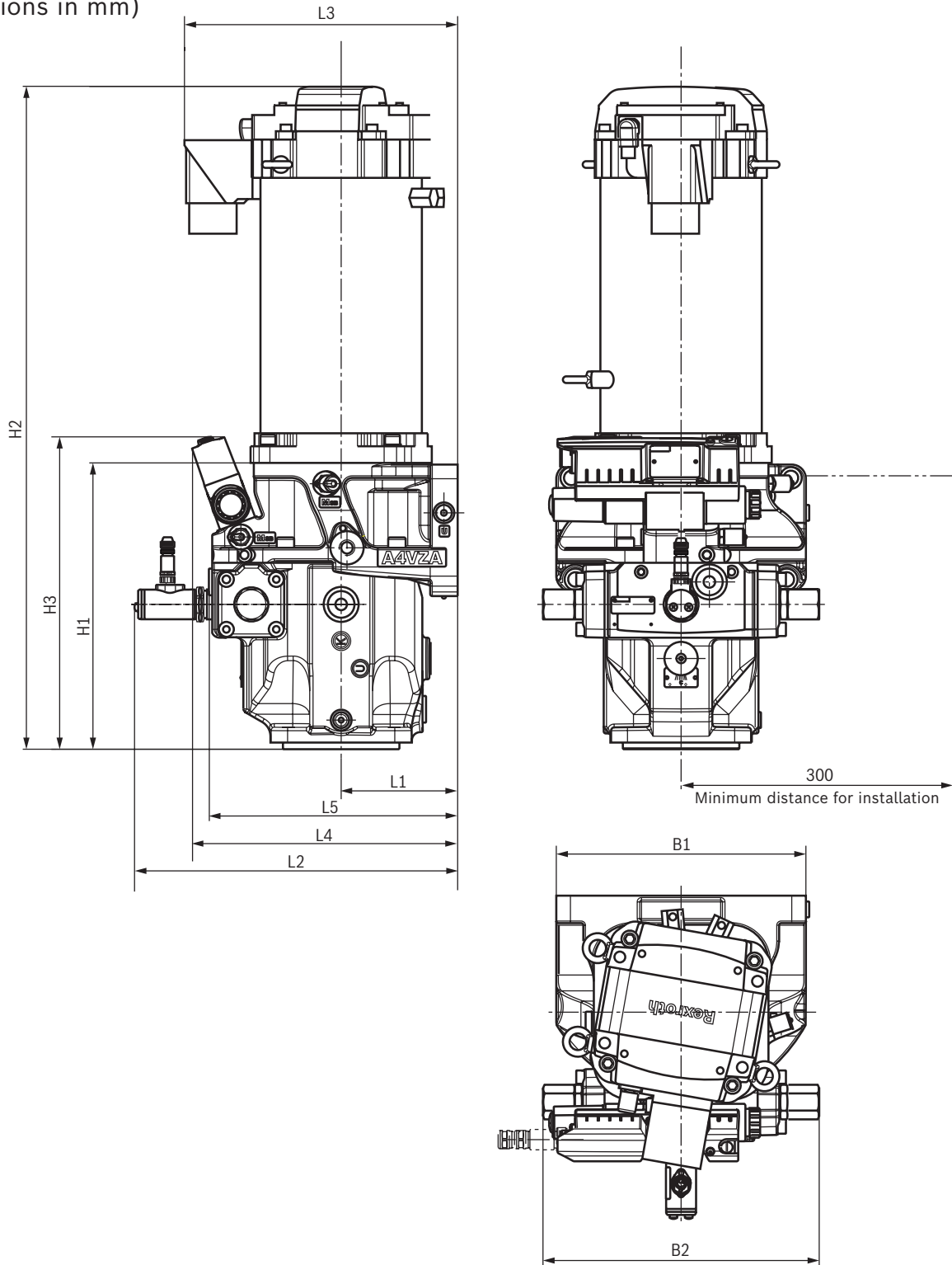
Axial piston pump A4VZA71 with motor MS2N13_E1BHL (water cooling)



Notice!

Characteristic curves are not affected by efficiency η_{max} . They were produced at the regulated link connection (750 V). These are the 100 K curves with the recommended drive controller HMS01_W210 (MS2N10) or HMS01_W300 (MS2N13)

Dimensions: SHP4V
(dimensions in mm)

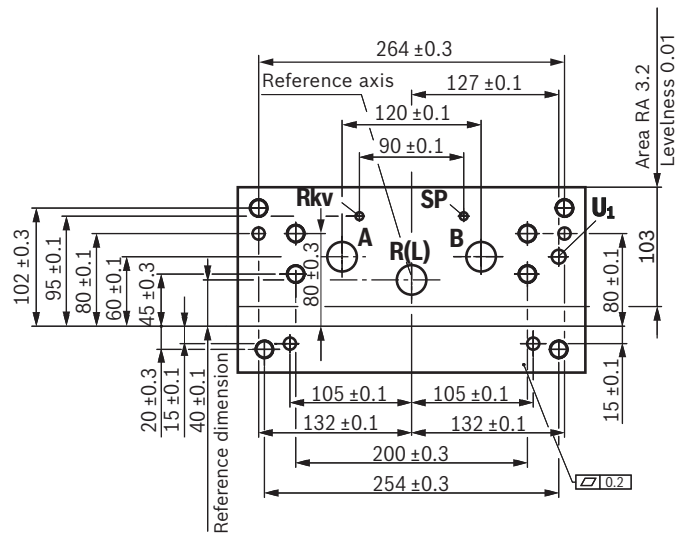


Size	H1	H2 max	H3	B1	B2	L1	L2	L3	L4	L5
MS2N10	344	996	427	300	332	140	388	345	339	299
MS2N13		1085						368		

Hydraulic connections

Hole pattern for direct block mounting of the pump (hole pattern HP_99019; R901529453)

Port	Size in mm
A, B working port (high-pressure side)	∅ 25
SP set pressure connection	∅ 6.8
R(L) return flow drain port	∅ 25
Rkv return flow pilot fluid	∅ 6.8
U ₁ bearing flushing	∅ 12



Recommended mounting elements

HEXAGON SOCKET HEAD CAP SCREW ISO4762-M16X60-10.9-&	M16x60	MA: 280 NM ± 10	R988025669
---	--------	-----------------	-------------------

Notice!

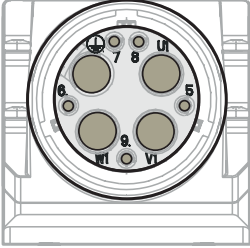
For detailed information on the pump and the various adjustment versions, see data sheet 51175

Electrical connections:

Electrical interface, motor

M58 power connector, fixed (thread)

Pin assignment two-cable connection, power

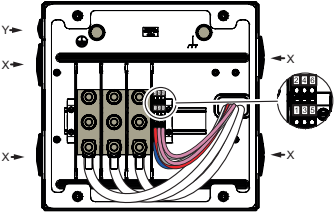

	Designation	Function encoder (without brake) Bx
	U1	A1
	V1	A2
	W1	A3
	⊕	PE
	5	TP(+)
	6	TP(-)
	7	n.c.
	8	n.c.
	9	n.c.

Setting range

The output direction of the power and encoder plug connectors can be selected when ordering

Terminal box "E"

The terminal boxes of the motors are optimized for the respective motor current. Upon delivery, the openings of the terminal boxes are closed with blind screws. Cable entries are not included in the scope of delivery. Assembled connection cables are supplied with cable entry.

	MS2N 1)	Terminal / data	ctrlX / IndraDrive	Cable RL2 RLB2 2)
	U	Bolt M10, MA, 10 ... 20 Nm Rated cross-section 6 ... 120 mm ² Rated current 269 A	A1	1
	V		A2	2
	W		A3	3
	1	Tension spring connection 0.5 ... 2.5 mm ² with wire end ferrule	BD(+)	7
	2		BD(-)	8
	3		1TP1(+)	5
	4		1TP2(-)	6
	5		2TP1(+)	
	6	2TP2(-)		
	⊕	Screw connection M10, MA 10 Nm	PE	GNYE
Shld	Shld			

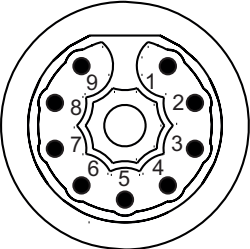
1) Terminals 1, 2 are not used for motors without holding brakes

2) Unused connecting wires must be insulated in the terminal box

Electrical interface, encoder

Encoder plug M17

Pin assignment two-cable connection, encoder

	Designation	Function encoder Bx
	1	+UB
	2	n.c.
	3	Data+
	4	Data-
	5	A+
	6	A-
	7	B+
	8	B-
	9	GND

Setting range

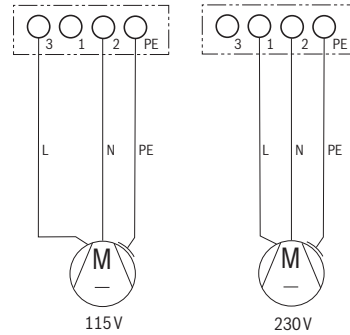
The outgoing direction of the encoder plug connector M17 is adjustable.

Electrical connections:

Electrical interface, motor fan

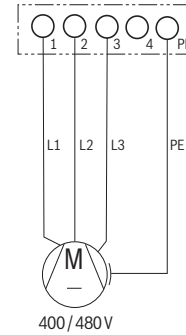
Fan, single-phase 115 / 230 V

Assignment		Port
1	L1 230 V	Screw connection 0.5 ... 1.5 mm ²
2	N	
3	L1 115 V	
⊕	PE	



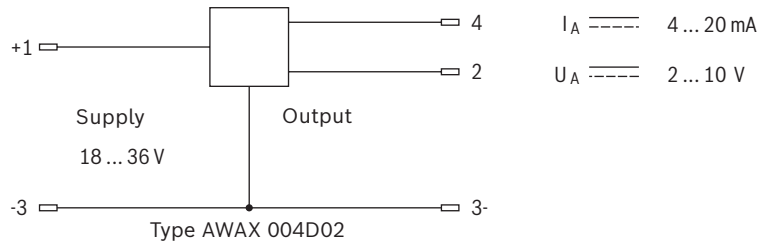
Fan, 3-phase 400 / 480 V

Assignment		Port
1	L1 230 V	Screw connection 0.5 ... 2.5 mm ² 22 ... 12 AWG Clamping screws M3 / Tightening torque 0.5 ... 0.7 Nm
2	N	
3	L1 115 V	
⊕	PE	

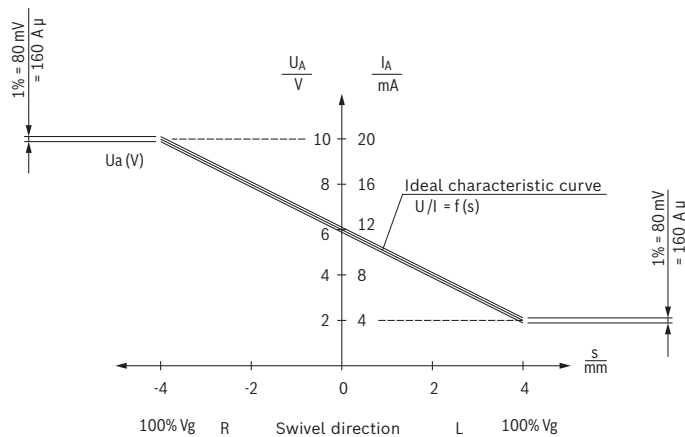


Electrical interface, swivel angle sensor

Pin assignment



Current-voltage diagram



Further information

- ▶ Axial piston variable displacement pump A4VZA series 1X for servo-hydraulic axes Data sheet 92115
- ▶ Proportional directional valves, direct operated, with electrical position feedback and integrated electronics (OBE) type 4WREE Data sheet 29105
- ▶ Control and adjustment systems HM, HS5 and EO series 1x and 30 Data sheet 92076
- ▶ Motor-pump group type ABHPG Data sheet 51175
- ▶ MS2N synchronous servo motors Operating instructions R911347580
- ▶ MS2N synchronous servo motors Project planning description R911347582
- ▶ Hydraulic fluids on mineral oil basis Data sheet 90220

- ▶ Information on available spare parts

www.boschrexroth.com/spc

Bosch Rexroth AG
 Industrial Hydraulics
 Zum Eisengießer 1
 97816 Lohr am Main, Germany
 Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

© All rights reserved to Bosch Rexroth AG, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.
 The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification.
 It must be remembered that our products are subject to a natural process of wear and aging.

Notes

Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

© All rights reserved to Bosch Rexroth AG, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.
The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification.
It must be remembered that our products are subject to a natural process of wear and aging.