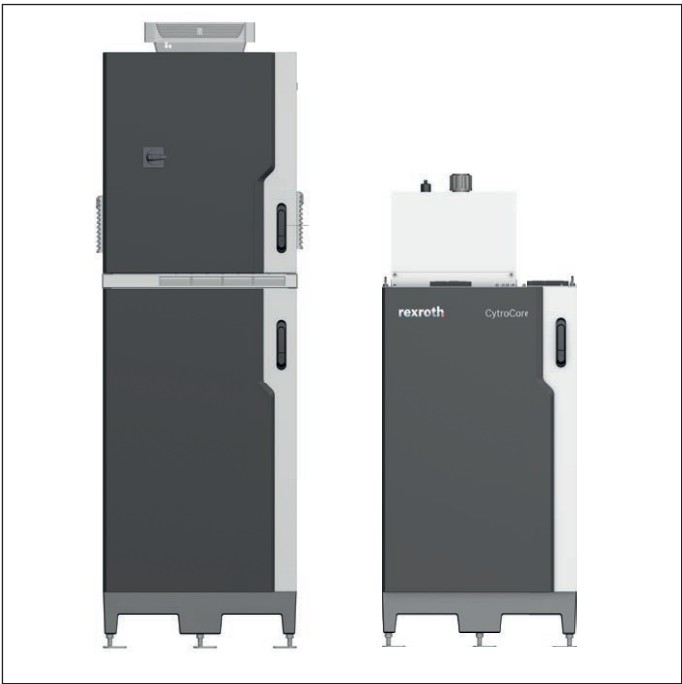


Servo-hydraulic drive unit CytroCore for compressor drives

Type SHS-I/CB...



- ▶ Component series 1X
- ▶ Maximum operating pressure 315 bar
- ▶ Maximum flow 227 l/min

Features

- ▶ Compact drive unit with integrated servo hydraulics, electrics and control software
- ▶ Dynamic pump unit SHP4V/071 with axial piston variable displacement pump A4VZA and servo synchronous motor MS2N
- ▶ High efficiency through positive displacer control without valves in the main circuit
- ▶ High power density and small space required
- ▶ Low operating noise
- ▶ Optimized for identical actuators (double-acting cylinders / hydraulic motors)
- ▶ Condition monitoring via CytroConnect
- ▶ Option:
Modular version of the drive unit, consisting of servo-hydraulic module and e-kit (electronic components incl. software)

Contents

Features	1
Ordering code for servo-hydraulic module	2
Ordering code for e-kit (modular design)	3
Circuit diagram	4
Technical data	5 ... 7
Characteristic curves	8
Dimensions of drive unit (compact)	9
Dimensions of drive unit (modular)	10
Electrical connections (compact)	11
Control communication	12
Control of external outlet valves	12
Cylinder position signals	12
Safe stop with time control	12
Electrical interface description:	
Control cabinet interior view	13
Mains connection	13
Protective grounding	13
Accessories	13 ... 15
Further information	16

Ordering code for servo-hydraulic drive unit

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18										
SHS	-		/	CB	-	P	/	1X	-	C			B	/	PD		/	00	M	/	B	E	/	AAB		-	001

01	Servo-hydraulic system solution	SHS
02	Integrated construction	I
	Modular design (servo hydraulics)	M

Version

03	CytroBox design	CB
04	Displacer control (primary control)	P
05	Component series 10 to 19 (10 to 19: unchanged installation and connection dimensions)	1X
06	Oscillating volume standard, max. 11 l	C

Outfeed function

07	Internal	A
	External interface	E

Control cabinet

08	Standard including 24 V / main switch	P
	Without/modular design	N

Cooling

09	Standard, hydraulic unit water cooled / control cabinet air cooled	B
----	--	---

Hydraulic power unit

10	A4VZA071 / MS2N13-E1BHL with HS5E	PD
----	-----------------------------------	----

Electric power unit

11	HCS03-210	E
	Without/modular design	N

Hydraulic control/supply unit

12	AZPFF-22-019/004 / MS2N07-D0BHL	00
----	---------------------------------	----

Electric control/power unit

13	HMS01.1-020	M
	Without/modular design	N

Oil cooling

14	15 kW	C
15	Filter in hydraulic control/supply unit (standard 6 µm)	E
16	Sensor technology	AAB

Condition monitoring

17	Without	N
	CytronConnect	C
18	Serial number only for customer/application-specific designs	001

Ordering code for e-kit (modular design)

01	02	05	06	07	08
SHE	-	K	/	/	- C

01	Electrics for servo-hydraulic drives	SHE
----	--------------------------------------	------------

02	E-kit	K
----	-------	----------

Main component

05	Drive control/power unit	HMS01-020
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Main component

06	Drive power unit	HCS03-210
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Software functionality

07	Integrated	F
	Without	N

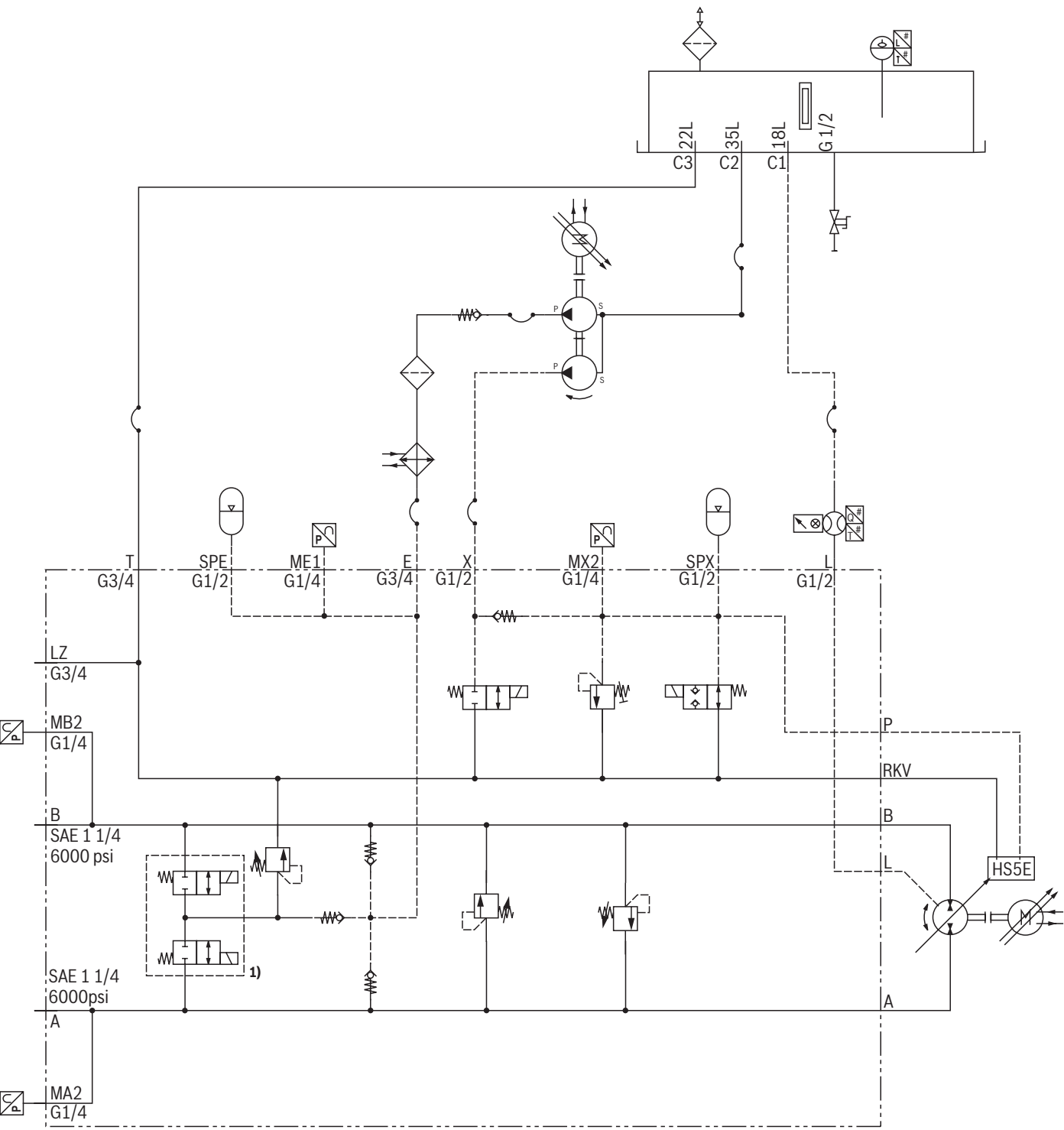
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08	Application, e.g.	Press
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Order example for standard version:

SHE-K/HMS01-020/HCS03-210/F-CYTROCORE;
Order number: R901602754

Circuit diagram



1) Valves are not included in the "External" output option and must be installed near the actuator.

Technical data

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

General			
Installation position		Upright, static, level ground	
Ambient temperature range (during operation)	°C	+5 ... +40	At temperatures > +40°C: Reduce nominal power by 2%/K (see R911318789_edition 06, page 29)
Relative air humidity	%	5 ... 95 non-condensing	
Installation height above sea level	m	< 1000 without derating	
Condensation, icing		Not admissible	
Corrosion protection class EN ISO 12944		C2	
Place of installation		Containers or industrial halls (stationary applications)	
Protection class according to IEC 60529		IP54	
Measuring surface sound pressure level	dB(A)	<78 ±3	
Seismic safety	m/s ² (g)	None	
Length of hydraulic line (drive unit to actuator)	m	≤ 10 (see outfeed function Page 7)	
Direct sunlight		None (see installation)	
Chemical resistance		None	
Weight without oil	► Compact drive unit	kg	915
	► Servo-hydraulic module	kg	660



Notice:

For special installation conditions, please consult your sales department.

Hydraulic			
Maximum flow	l/min	227	
Maximum tank capacity	l	22.5	Approx. 30 (required for initial filling)
Hydraulic fluid		Mineral oil HLP 46 according to DIN 51524 (ISO 15380)	
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)		Class 18/16/13	
Maximum temperature range of the hydraulic fluid	°C	+5 ... +65	
Optimal operating temperature range of hydraulic fluid	°C	+45 ... +60	
Maximum leakage temperature A4VZA pump	°C	+90	

Servo-hydraulic drive			
Maximum speed power unit	Rpm	3200	
Minimum speed of power unit	Rpm	200	
Maximum speed control/supply unit	Rpm	2000	
Minimum speed control/supply unit	Rpm	700	



Important notice on hydraulic fluids:

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

Technical data

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

Hydraulic				
Nominal pressure p_{nom}		bar	315	
Maximum pressure relief p_{max}		bar	330	(set at delivery, value can be reduced as required)
Minimum pressure (high-pressure side)		bar	15	Pressure (side A or B) required to prevent damage to the axial piston unit
Minimum pressure (low-pressure side)	▶ static	bar	10	Required pressure (side A or B) to safeguard the function
	▶ dynamic	bar	15	
Nominal pressure differential (working pressure) p_{eff}		bar	305	Difference between A/B and B/A corresponds to the design pressure for the customer
Rate of pressure change Ra_{max}		bar/s	16000	Maximum admissible pressure build-up and pressure reduction speed for a pressure change across the entire pressure range
Actuating time t_{min}		s	0.12	At swivel angle -100 % to +100 % at minimum pilot pressure 100 bar
Summated pressure				
Maximum pressure	▶ High-pressure side A or B p_{HD}	bar	330	The maximum pressures at the connections A and B must not be exceeded on the high-pressure and low-pressure sides.
	▶ Low-pressure side A or B p_{ND}	bar	30	
Cooling water supply				
Flow		l/min	30	
Inlet temperature		°C	15 ... 20	
Maximum coolant inlet pressure		bar	6	
Maximum glycol content		%	30	
Connections			W_{in} and W_{out} G1/2	

Technical data

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

Electrical			
Voltage (according to IEC 60038)	V _{AC}	380 ... 415	400 ... 480
Frequency range	Hz	48 ... 52	58 ... 62
Nominal voltage ¹⁾	V _{AC}	400 (at 50 Hz)	
Continuous mains input current at nominal power	A	146	
Mains fuse feed-in according to EN 60204-1	A	160	
Mains version		TN-S; TN-C; TT network	
Continuous power at 400 V, 50 Hz	► P _{electr. constant}	kW	65
Peak power at 400 V/50 Hz	► P _{electr. peak}	kW	95.5 at 3050 rpm

¹⁾ Derating in case of lower voltage than nominal voltage

Braking resistor			
Maximum continuous power operation (at 40 °C ambient temperature and 200 K surface temperature)	► Compact drive unit	W	450 (10 Ω)
	► Modular drive unit (e-kit)	W	1080 (5 Ω)

Outfeed function:

The external output can be selected in order to ensure adequate cooling of the actuator. An oil exchange rate of at least 30% should be guaranteed for this. The oil exchange rate must be increased depending on the external heat supply to the actuator.

Oil exchange rate from hose to cylinder dimensions	
Internal > 30% (see example calculation)	External < 30% (see example calculation)

Example calculation

Internal:

Cylinder volume $250/160/60 = \sim 4.32 \text{ l}$

Pipe/hose volume DN31, 2.5 m = $\sim 1.89 \text{ l}$

$\Rightarrow (4.3-1.9)/4.3 = 55\% > 30\%$

External:

Cylinder volume $200/125/60 = \sim 1.89 \text{ l}$

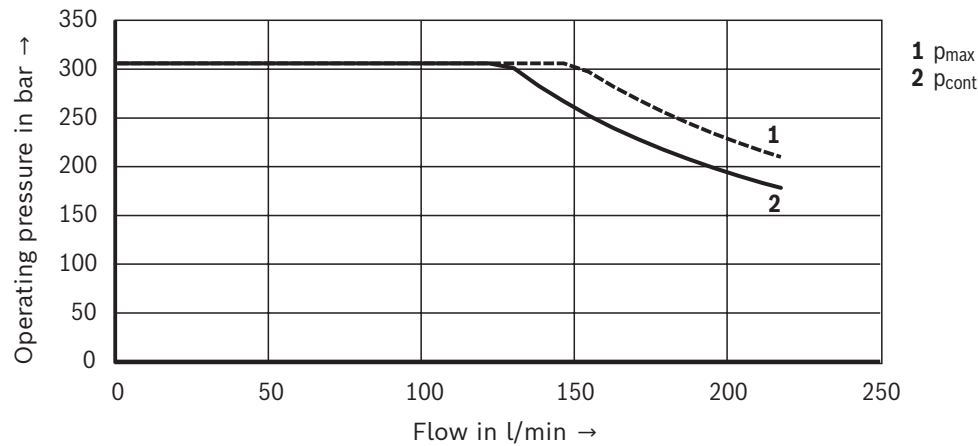
Pipe/hose volume DN25, 3 m = $\sim 1.5 \text{ l}$

$\Rightarrow (1.9-1.5)/1.9 = 21\% < 30\%$

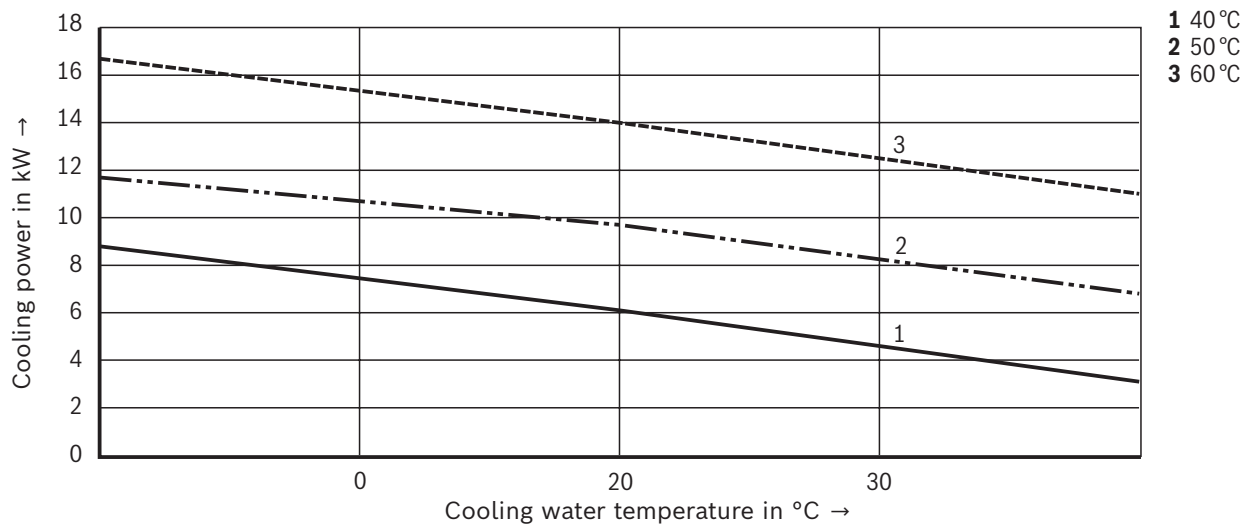
□

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

Pressure/volume flow characteristic curve

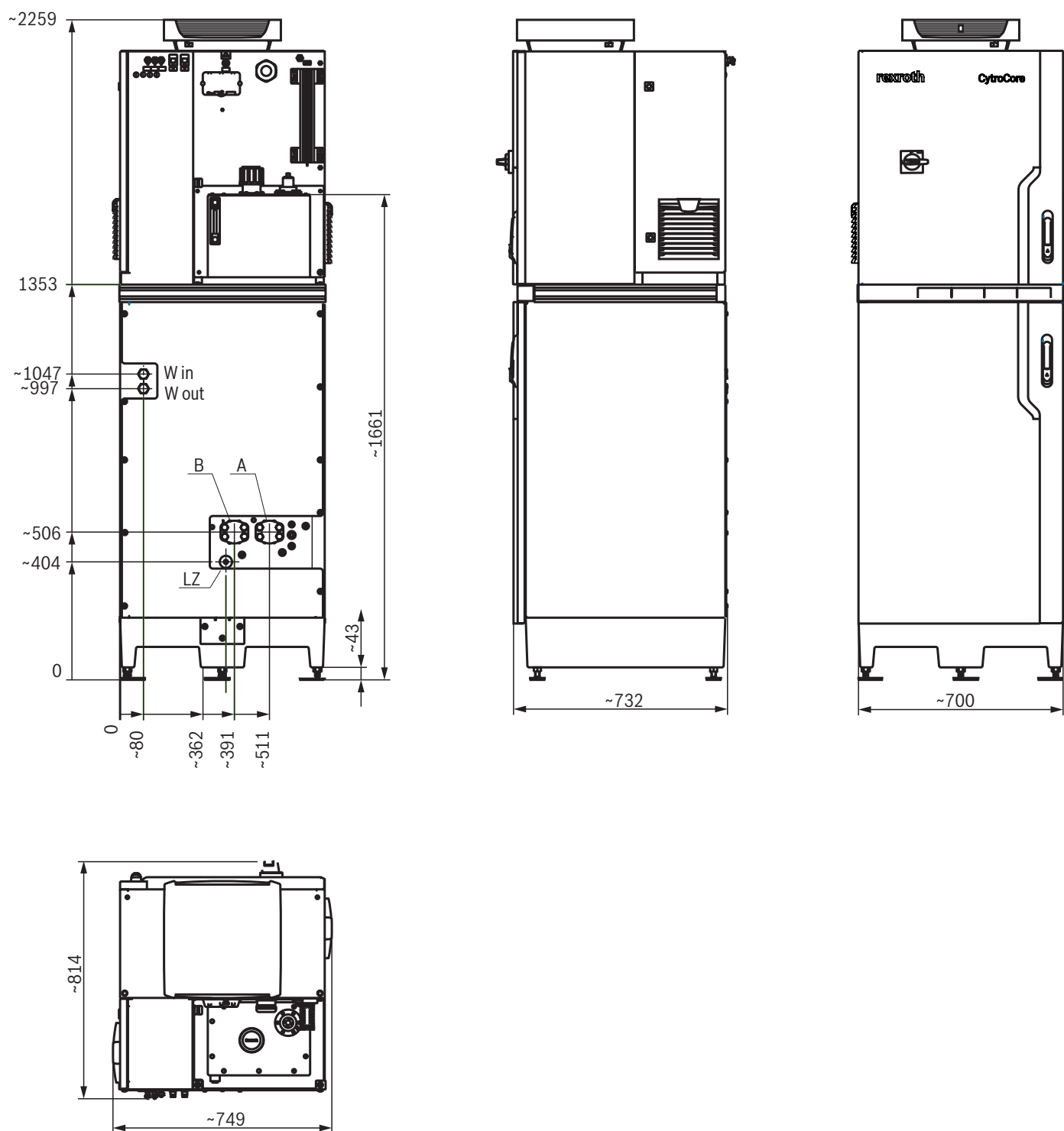


Cooler characteristic curve
(measured dependent on the oil temperature)



 **Notice:**
Typical characteristic curves which are subject to tolerance variations.

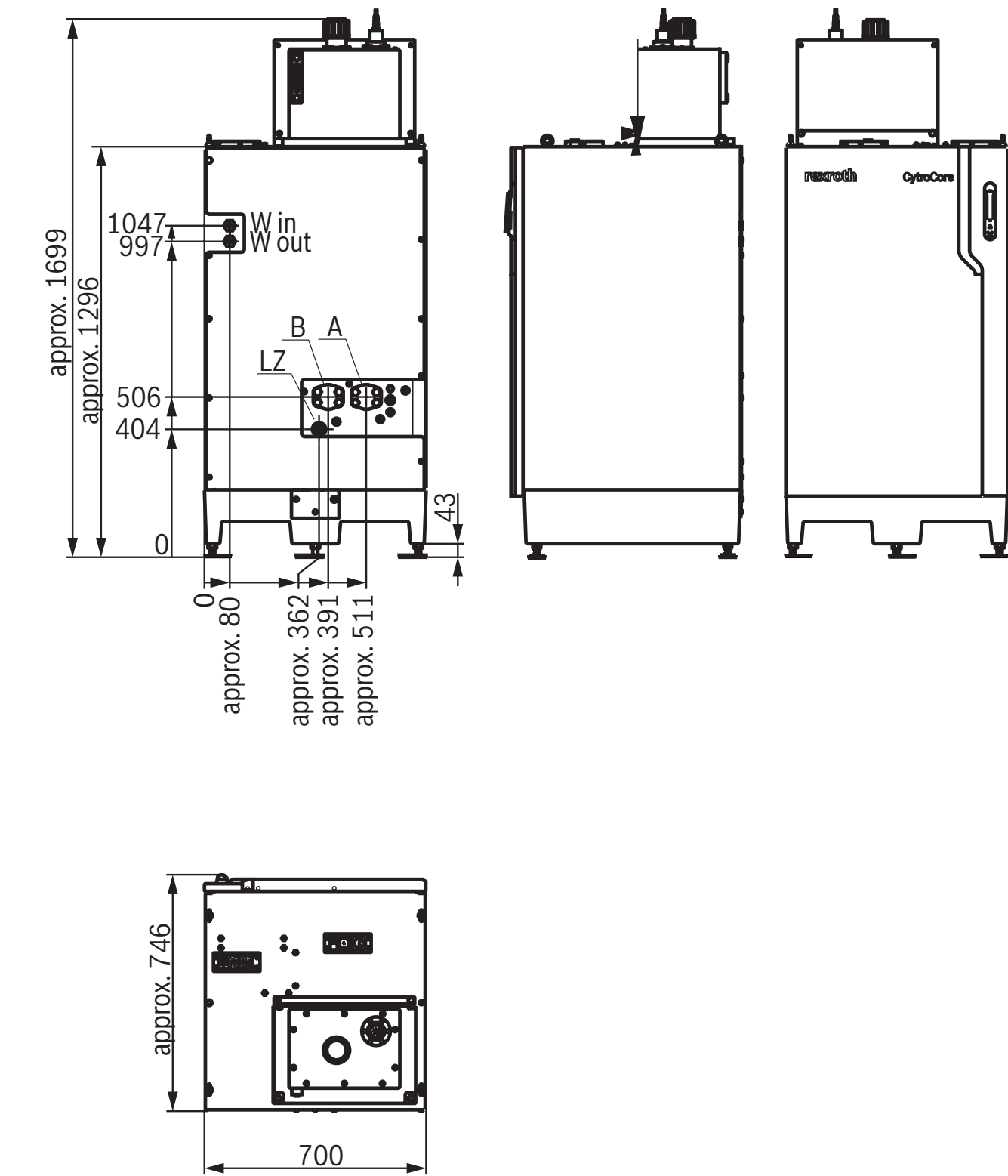
Dimensions Drive unit (compact): (Dimensions in mm)



Ports hydraulic power unit to cylinder

Port	Size
A/B	SAE 1 1/4 - 6000 PSI (metric/UNC)
W _{in} /W _{out}	G 1/2
LZ	G 3/4

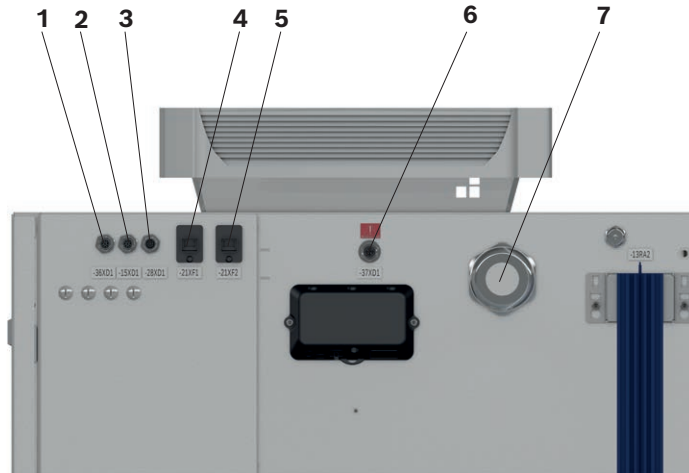
Dimensions Drive unit (modular):
(Dimensions in mm)



Ports hydraulic power unit to cylinder

Port	Size
A/B	SAE 1 1/4 - 6000 PSI (metric/UNC)
Win/Wout	G 1/2
LZ	G 3/4

Electrical connections (compact): Rear outer wall control cabinet



- 1 -36XD1: Control of external outlet valves (optional)
- 2 -15XD1: Cylinder position signals
- 3 -28XD1: Safe stop 1 with time control t (SS1-t)
- 4 -21XF1: Control communication (network out) (optional)
- 5 -21XF2: Control communication (network input)
- 6 -7XD1: CytroConnect (plugged in as delivered)
- 7 Cable gland M63 for connection line

Control communication -21XF1 and -21XF2

RJ45 (IP67)	Position	Port	Function
	4	-21XF1 (network output)	Multi-Ethernet control communication
	5	-21XF2 (network input)	

Control external outlet valves -36XD1 (optional)

 (Mating connector)	Pin	Function	Signal
	1	–	Not assigned
	2	Outlet valve B	+24 VDC
	3	Operating voltage	0 VDC
	4	Outlet valve A	+24 VDC
	5	Protective grounding conductor	PE

M12x1; 5-pole
D-coded

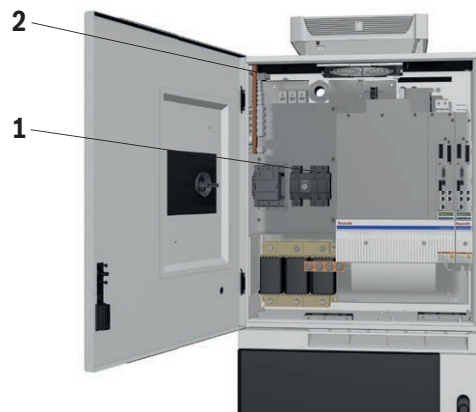
Position signals cylinder -15XD1

 (Mating connector)	Pin	Function	Signal
	1	Operating voltage	+24 VDC
	2	Operating voltage	0 VDC
	3	Normally open proximity switch position A	END_POSITION_A_NO
	4	Normally open proximity switch position B	END_POSITION_B_NO
	5	–	Not assigned
	6	GND reference analog input	AGND
	7	Analog input +	IA+
M12x1; 8-pole A-coded	8	Analog input –	IA–

Safe stop with time control (SS1-t) -28XD1

 (Connector)	Pin	Function	Signal
	1	Output dynamic channel 1	DYN_CH1
	2	Input channel 1	SI_CH1
	3	Output dynamic channel 2	DYN_CH2
	4	Input channel 2	SI_CH2
	5	Not assigned	–
	6	Not assigned	–
	7	Not assigned	–
M 12x1; 8-pole A - coded	8	Not assigned	–

Electrical interface description: Control cabinet interior view



- 1 -6QA1: Mains connection on main switch
(external conductors L1, L2 and L3)
- 2 -XPE: Protective grounding (PE)

Mains connection

The mains connection is made with the external conductors directly on the load break switch

Cable cross-section in mm ²	
Finely stranded with wire finishing	1x70
Multi-wire	1x70

Contact	Function
1	Connection to the supply network phase 1 (L1)
3	Connection to the supply network phase 2 (L2)
5	Connection to supply network phase 3 (L3)

Protective grounding (PE)

PE bar terminal

Cable cross-section in mm ²	
Finely stranded with wire finishing	1x70
Multi-wire	1x70

Contact	Function
PE bar	Connection for protective grounding conductor (PE)

Accessories (separate order)

Control communication -21XF1 and -21XF2

Designation	Version	Material number
CONNECTOR IE-PS-V04P-RJ45-FH	Connector without cable	R901469479
NETWORK CABLE RJ45/IP67-RJ45 5M	Length 5 m Certificate: CAT X A / RoHS	R901471844
NETWORK CABLE RJ45/IP67-RJ45 10M	Length 10 m Certificate: CAT X A / RoHS	R901471845
NETWORK CABLE RJ45/IP67-RJ45 20M	Length 20 m Certificate: CAT X A / RoHS	R901492613

Accessories (separate order)

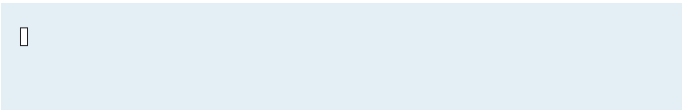
Safe Torque Off (STO) -28XD1

Designation	Version	Material number
MATING CONNECTOR 8P 7000-17121-2910500	Bush straight shielded 8-pole M12, with free line end PUR, length 5 m (8x0.25 mm ² / Ø7.0 mm), 24 VAC/DC, max. 1.5 A; IP67	R913002121
MATING CONNECTOR 8P 7000-17121-2911000	Bush straight shielded 8-pole M12, with free line end PUR, length 10 m (8x0.34 mm ² / Ø6.2 mm), 30 VAC/DC, max. 2 A; IP65 and IP67 in plugged and screwed state	R901467712

Control external outlet valves -36XD1 (optional)

Position signals cylinder -15XD1

Designation	Version	Material number
LINE CONNECTOR 8P 7000-17081-2910500	Connector straight shielded 8-pole M12, with free line end PUR, length 5 m (8x0.25 mm ² / Ø7.0 mm), 24 VAC/DC, max. 1.5 A; IP67	R913002119
LINE CONNECTOR 8P 7000-17081-2911000	Connector straight shielded 8-pole M12, with free line end PUR, length 10 m (8x0.25 mm ² / Ø7.0 mm), 24 VAC/DC, max. 1.5 A; IP67	R913002641



Accessories for modular design (separate order)

Quantity	Designation	Version	Material number	Data sheet
1	RL2-166KBB-NN-005.0	Power cable MS2N13	R914504837	R911401938
1	RL2-042DBB-NN-005.0	Power cable MS2N07	R911374896	R911401938
2	RG2-002ABB-NN-005.0	Encoder cable	R911371234	R911401938
2	RKB0044/005.0 (*****-REB0400-*****)	HS5E valve Sercos cable	R911343807	–
1	MATING CONNECTOR 12P N11REFF 2XD8 BG&	HS5E valve mating connector	R900884671	08006
3	VT-SSBA1-PWM-1X/V002/5	HS5E valve Sercos cable	R901290194	30362
2	MATING CONNECTOR 3P Z4L1 SW +10MSPEZ	Valve cable	R900217138	08006

In addition, the following components are required:

Quantity	Designation	Version
1	Solid-state relay	Relay for internal flushing valve
1	Sirius Safety Relay ADV REL 2NO+2NO TV	Safety switch
2	QUINT4_CAP/24DC/3.8/1KJ/PT	Uninterruptible power supply with 24 V direct current



Notice:

Other cable lengths, e.g. 10 m, 15 m, available on request

CytroConnect (optional)

Quantity	Designation	Version	Material number	Data sheet
1	INDUSTRIAL COMPUTER CCS-EDGE-1X/LTE-GL-NN	CytroConnect with modem	R901515106	
1	INDUSTRIAL COMPUTER CCS-EDGE-1X/LAN-NN-NN	CytroConnect without modem	R901562208	

Further information

- | | |
|---|--------------------------------|
| ▶ Servo-hydraulic drive unit CytroCore, type SHS-I/CB... | Instructions 51203-B |
| ▶ SHP4V servo-hydraulic pump unit | Data sheet 51195 |
| ▶ Axial piston pump variable displacement pump A4VZA series 10 | Data sheet 92115 |
| ▶ MS2N synchronous servo motors | Data sheet R911347582 |
| ▶ IndraDrive, supply units, power sections H MV, H MS, H MD, H CS02, H CS03 | Data sheet R911318789 |
| ▶ Directional spool valve | Data sheet 23178 |
| ▶ Hydraulic fluids based on mineral oils | Data sheet 90220 |
| ▶ Environmentally compatible hydraulic fluids | Data sheet 90221 |
| ▶ Hexagon socket head cap screw, metric/UNC | Data sheet 08936 |
| ▶ Mating connectors and cable sets for valves and sensors | Data sheet 08006 |
| ▶ Hydraulic valves for industrial applications | Operating instructions 07600-B |
| ▶ Information on available spare parts | |