

Servo-hydraulic actuator

Type CytroForce-M Integrated



- ▶ Component series 1X
- ▶ Nominal forces up to 195 kN
- ▶ Maximum travel velocity 500 mm/s
- ▶ Maximum traveling distance 1000 mm

Features

- ▶ Ready-to-install solution, easy installation and compact design
- ▶ Complete system with converter and software package
- ▶ Bus connection/service interface (Sercos, EtherCAT, EtherNet/IP, PROFINET)
- ▶ Safety technology (optional)
- ▶ Flexible set-up
- ▶ Maintenance-free
- ▶ Robust in use

Contents

| | |
|---|-----------|
| Features | 1 |
| Ordering code | 2, 3 |
| Function | 4 |
| Technical data | 5 |
| Dimensions: Hydraulic block, integrated | 6 ... 9 |
| Cylinder data | 10 |
| Connection types: Cylinder | 11 |
| Accessories (separate order) | 12 ... 14 |
| Further information | 15 |
| Notes | 16 |

Ordering code

| | | | | | | | | | | | | |
|-------------------|----------|----------|----------|----------|----------|----------|----|----|----------|----------|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 |
| CYTROFORCE | - | M | - | I | / | / | | | E | A | | |

| | | |
|----|------------|-------------------|
| 01 | CytroForce | CYTROFORCE |
|----|------------|-------------------|

Size

| | | |
|----|--------|----------|
| 02 | Medium | M |
|----|--------|----------|

Solution space

| | | |
|----|--|-----------|
| 03 | Differential cylinder with fixed displacement pump | A1 |
| | Tandem cylinder with fixed displacement pump | E1 |

Type

| | | |
|----|---------------------|-------------|
| 04 | Integrated | I |
| 05 | Nominal force in kN | .120 |
| 06 | Velocity in mm/s | ..80 |
| 07 | Stroke in mm | .380 |

Cooling type

| | | |
|----|---|----------|
| 08 | Self-cooling (natural convection) | N |
| | External ventilation axial 230V/50Hz (MS2N) | A |

Rated current

| | | |
|----|-------|------------|
| 09 | 28 A | 028 |
| | 36 A | 036 |
| | 54 A | 054 |
| | 70 A | 070 |
| | 100 A | 100 |

Connectivity

| | | |
|----|----------------|----------|
| 10 | Multi-Ethernet | E |
|----|----------------|----------|

Ordering code

| | | | | | | | | | | | | | | | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|--|---|--|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | | | |
| CYTROFORCE | - | M | - | | I | | / | | / | | | E | | A | |

Safety technology

| | | |
|----|---|----|
| 11 | No safety components | 00 |
| | Safety zone module (1x) | 01 |
| | Safety zone module (1x) and control unit HAT (1x) | 02 |
| | Control unit HAT (1x) | 04 |

Version

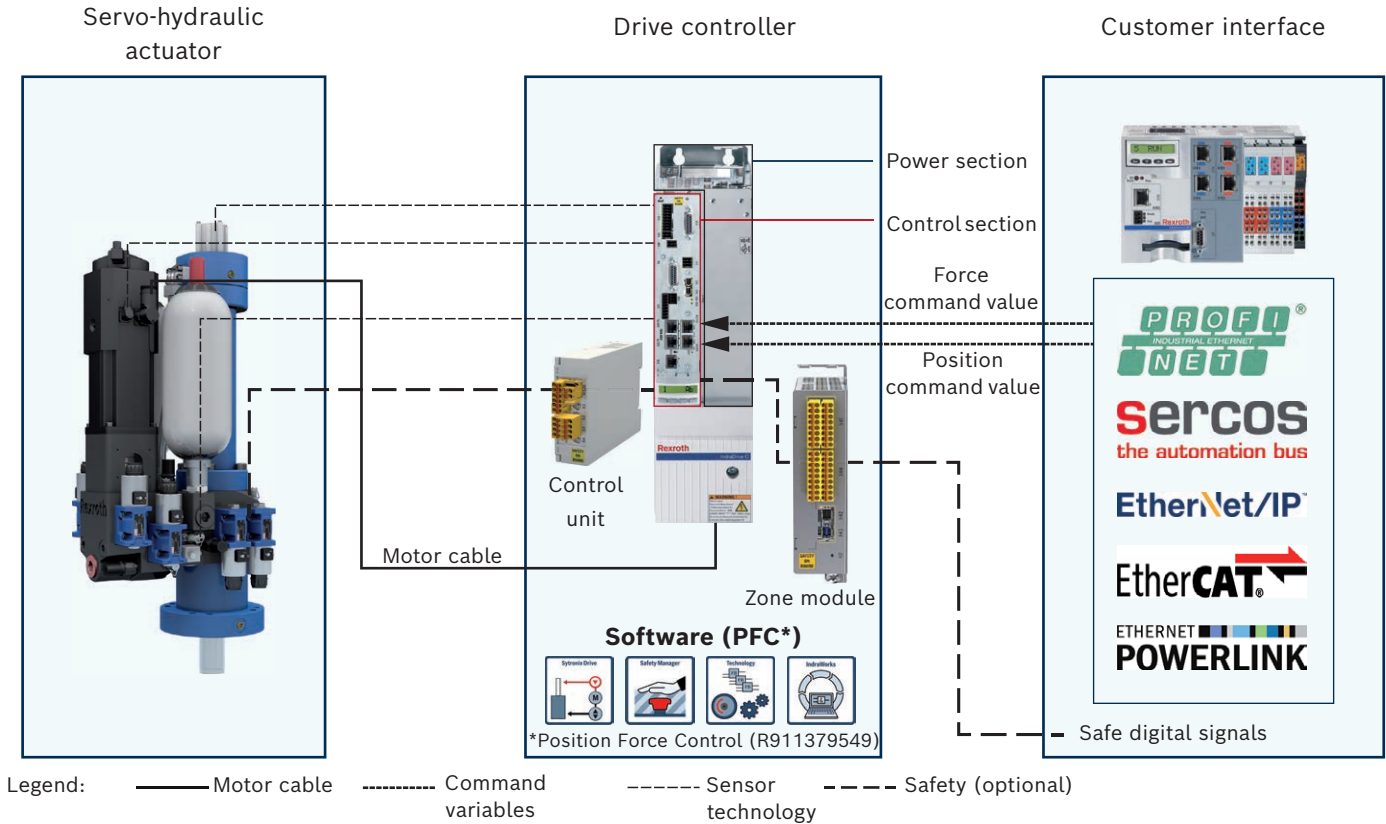
| | | |
|----|---------|---|
| 12 | Version | A |
|----|---------|---|

Special versions

| | | |
|----|-------------------|----|
| 13 | Standard | 00 |
| | *Special versions | |

Function

CytroForce axes can easily be integrated into the system. All relevant signal cables of sensors and actuators are directly connected to the drive controller, target and actual values can be connected using the most common bus systems. The use of a throttle insert is required when, due to prevailing operating conditions, flows can occur during the switching processes, which exceed the performance limit of the valve.



Technical data

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

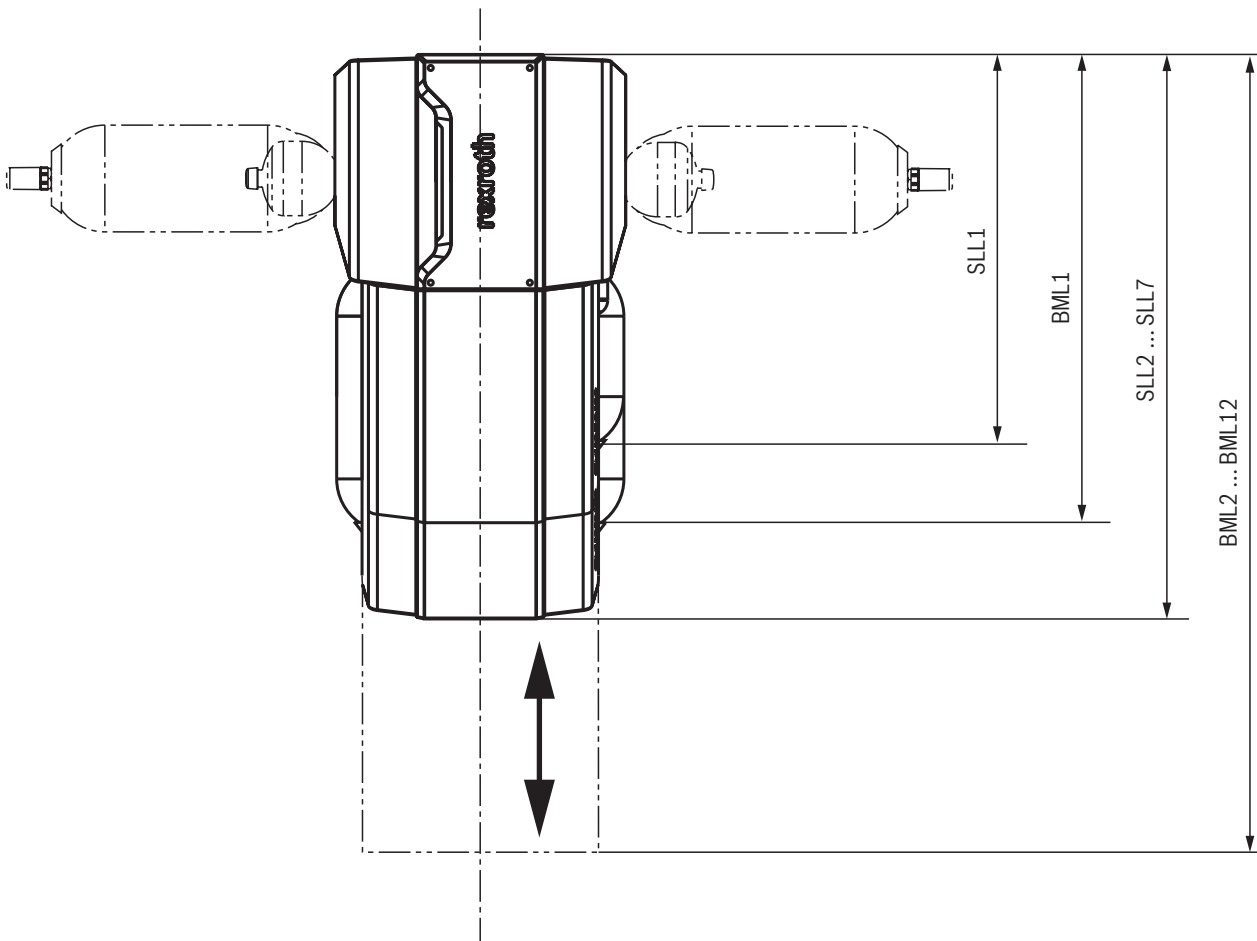
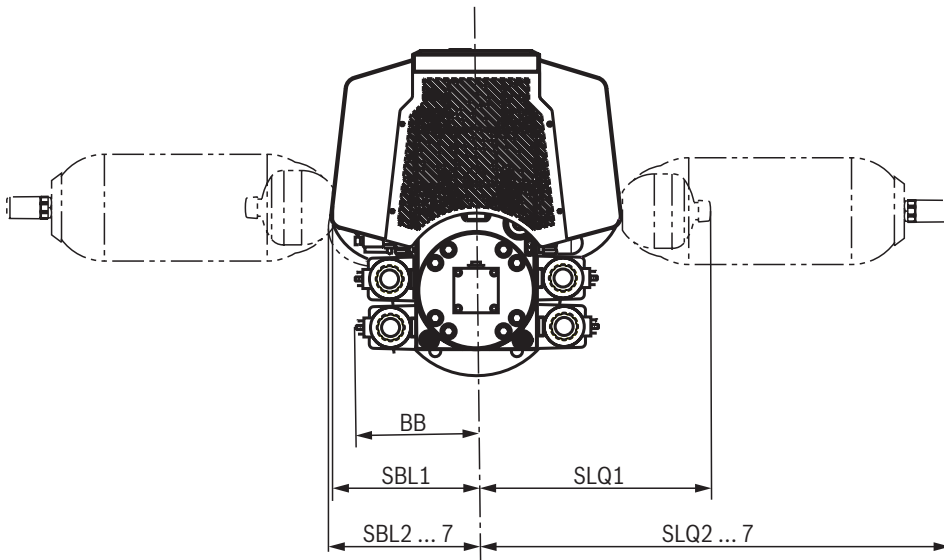
| General | | |
|---|--|---|
| Installation position | | any |
| Ambient temperature range ¹⁾ | ▶ Operation | °C 0 ... +40 |
| | ▶ Transport | °C -10 ... +70 |
| Storage temperature range ¹⁾ | | °C -10 ... +55 |
| Installation height ³⁾ | above sea level in m | 0 ... 1000 |
| Shock load during transport and storage ¹⁾ | | Class 2M1 according to EN 60721-3-2 |
| | ▶ Radial | m/s ² 100 |
| | ▶ Axial | m/s ² 30 |
| Weight | ▶ Block, fitted (depending on options) | kg Depending on the configuration |
| | ▶ Cylinder | kg see data sheet 17338 |
| Relative humidity ¹⁾ | ▶ Operation | % 5 ... 95 |
| | ▶ Transport | % 5 ... 95 |
| | ▶ Storage | % 5 ... 75 |
| Condensation ¹⁾ | | not admissible |
| Protection class according to EN 60529 | | IP65 (Valid for manifold block with attachment parts) |

¹⁾ In case of use of servo motor MS2N07

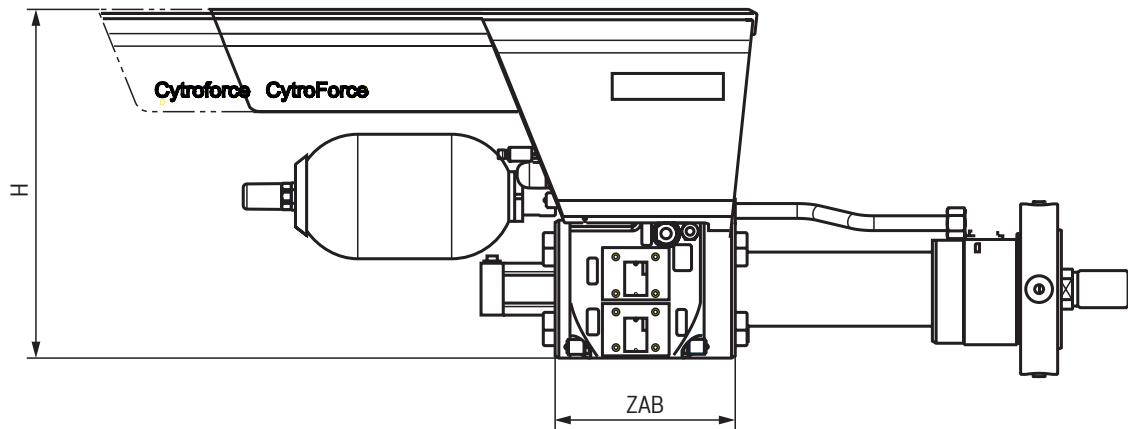
| Hydraulic | | |
|--|-----------|---------------------------------|
| Nominal pressure | bar | 290 ¹⁾ |
| Maximum operating pressure | bar | 315 ²⁾ |
| Accumulator pressure, absolute | ▶ minimum | bar 2.9 (see FLP) |
| | ▶ maximum | bar 5.0 (see FLP) |
| Oil volume | l | Depending on the configuration |
| Compensation volume | l | Depending on the configuration |
| Hydraulic fluid | | HLP 46 (see fluid sign on axis) |
| Hydraulic fluid temperature range (flown-through) | °C | 0 ... +75 |
| Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c) | | Class 18/16/13 ³⁾ |

¹⁾ Maximum design pressure at which the nominal force of the axis is reached. This pressure must not be exceeded during operation.²⁾ Maximum system pressure that may occur in case of error (secured by means of pressure relief valve)³⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.For the selection of filters, see www.boschrexroth.com/filter.

Dimensions: Hydraulic block, integrated
(dimensions in mm)



Dimensions: Hydraulic block, integrated
(dimensions in mm)



For rough size determination: Selection of desired quantity and alignment of the block as well as the motor and accumulator components.

Example:

If, for example, you only have a diagonally mounted accumulator with 1.4 l on the left, you look for the corresponding code in the list (here SLQ3). As it is only a unilateral accumulator, only the code "BB" is added for the other side to get the width.

For the cylinders, the cylinder connection width (ZAB) is added to the relevant cylinder data.

Dimensions: Hydraulic block, integrated
(dimensions in mm)

| Designation H | Description (Height) | Component | Value (mm) |
|------------------|-----------------------------------|--|---------------|
| BML1 | Block motor length 1 | Servo motor MS2N07-C0BNN-BSUG0-NNNNN-NN; self-cooling | 589 |
| BML2 | Block motor length 2 | Servo motor MS2N07-C0BQN-BSUG0-NNNNN-NN; self-cooling | 589 |
| BML3 | Block motor length 3 | Servo motor MS2N07-D0BNN-BSUG0-NNNNN-NN; self-cooling | 647 |
| BML4 | Block motor length 4 | Servo motor MS2N07-D0BRN-BSVG0-NNNNN-NN; self-cooling | 647 |
| BML5 | Block motor length 5 | Servo motor MS2N07-E0BNN-BSVG0-NNNNN-NN; self-cooling | 705 |
| BML6 | Block motor length 6 | Servo motor MS2N07-E0BQN-BSVG0-NNNNN-NN; self-cooling | 705 |
| BML7 | Block motor length 7 | Servo motor MS2N07-C0BNA-BSVG0-NNNNN-NN; external ventilation axial 230 V/50 Hz | 710 |
| BML8 | Block motor length 8 | Servo motor MS2N07-C0BQA-BSVG0-NNNNN-NN; external ventilation axial 230 V/50 Hz | 710 |
| BML9 | Block motor length 9 | Servo motor MS2N07-D0BNA-BSVG0-NNNNN-NN; external ventilation axial 230 V/50 Hz | 768 |
| BML10 | Block motor length 10 | Servo motor MS2N07-D0BRA-BSVG0-NNNNN-NN; external ventilation axial 230 V/50 Hz | 768 |
| BML11 | Block motor length 11 | Servo motor MS2N07-E0BNA-BSVG0-NNNNN-NN; external ventilation axial 230 V/50 Hz | 826 |
| BML12 | Block motor length 12 | Servo motor MS2N07-E0BQA-BSVG0-NNNNN-NN; external ventilation axial 230 V/50 Hz | 826 |
| SLL1 | Accumulator length longitudinal 1 | Accumulator HAD0,7-100-1X/2G04E-1N111-BA | 435 |
| SLL2 | Accumulator length longitudinal 2 | Accumulator HAD1,0-200-1X/2G04E-1N111-BA | 454 |
| SLL3 | Accumulator length longitudinal 3 | Accumulator HAD1,4-140-1X/2G04E-1N111-CE | 454 |
| SLL4 | Accumulator length longitudinal 4 | Accumulator HAD2,0-100-1X/2G05E5-1N111-CE | 520 |
| SLL5 | Accumulator length longitudinal 5 | Accumulator HAD2,8-70-1X/5G04C-1N111-CE | 535 |
| SLL6 | Accumulator length longitudinal 6 | Accumulator HAB4-50-6X/0G07G-2N111-CE | 680 |
| SLL7 | Accumulator length longitudinal 7 | Accumulator HAB6-30-6X/0G07G-2N111-CE | 812 |
| SBL1 | Accumulator width longitudinal 1 | Accumulator HAD0,7-100-1X/2G04E-1N111-BA | 201 |
| SBL2 | Accumulator width longitudinal 2 | Accumulator HAD1,0-200-1X/2G04E-1N111-BA | 211 |
| SBL3 | Accumulator width longitudinal 3 | Accumulator HAD1,4-140-1X/2G04E-1N111-CE | 217 |
| SBL4 | Accumulator width longitudinal 4 | Accumulator HAD2,0-100-1X/2G05E5-1N111-CE | 216 |
| SBL5 | Accumulator width longitudinal 5 | Accumulator HAD2,8-70-1X/5G04C-1N111-CE | 232 |
| SBL6 | Accumulator width longitudinal 6 | Accumulator HAB4-50-6X/0G07G-2N111-CE | 226 |
| SBL7 | Accumulator width longitudinal 7 | Accumulator HAB6-30-6X/0G07G-2N111-CE | 226 |
| SLQ1 | Accumulator length diagonal 1 | Accumulator HAD0,7-100-1X/2G04E-1N111-BA | 368 |
| SLQ2 | Accumulator length diagonal 2 | Accumulator HAD1,0-200-1X/2G04E-1N111-BA | 454 |
| SLQ3 | Accumulator length diagonal 3 | Accumulator HAD1,4-140-1X/2G04E-1N111-CE | 454 |
| SLQ4 | Accumulator length diagonal 4 | Accumulator HAD2,0-100-1X/2G05E5-1N111-CE | 520 |
| SLQ5 | Accumulator length diagonal 5 | Accumulator HAD2,8-70-1X/5G04C-1N111-CE | 535 |
| SLQ6 | Accumulator length diagonal 6 | Accumulator HAB4-50-6X/0G07G-2N111-CE | 680 |
| SLQ7 | Accumulator length diagonal 7 | Accumulator HAB6-30-6X/0G07G-2N111-CE | 812 |
| BB | Block width (1/2) | | 192 |
| ZAB | Cylinder connection width | Width, cylinder flange at the block | 180 |

Dimensions: Hydraulic block, integrated
(Dimensions in mm, all values refer to the maximum versions)

E1 tandem cylinder

| Forces Design pressure 290 bar | | Explanation /boundary condition | Value | | |
|--|----------------------------|--|--------------|-------------------|--------------------|
| ∅AL (mm) | | | | | 80 |
| Force generated by pressure | Rapid traverse, extending | 160 bar | kN | 13 | 20 |
| Traction force | Rapid traverse, retracting | 290 bar | kN | 23 | 36 |
| Force generated by pressure | Force traverse, extending | 290 bar | kN | 122 | 195 |
| Traction force | Force traverse, retracting | 160 bar | kN | 68 | 108 |
| Velocity | | | | | |
| | Rapid traverse, extending | | mm/s | 500 ¹⁾ | 500 ¹⁾ |
| | Rapid traverse, retracting | | mm/s | 500 ¹⁾ | ~500 ¹⁾ |
| | Force traverse, extending | F = const | mm/s | 150 (142) | 95 (89) |
| | Force traverse, retracting | F = const | mm/s | 150 (142) | 95 (89) |
| Stroke ²⁾ | | | | | |
| | Maximum | | mm | 1000 | 1000 |
| | Minimum | | mm | 200 | 200 |

¹⁾ Velocity specifications: load-free; values in brackets with counterforce (nominal force, η_{vol} pump: 95%)

²⁾ Shorter process strokes possible according to EAT

A1 differential cylinder

| Forces Design pressure 290 bar | | Explanation /boundary condition | Value | | |
|--|----------------------------|--|--------------|-----------|-----------|
| ∅AL (mm) | | | | | 80 |
| Force generated by pressure | Force traverse, extending | 290 bar | kN | 146 | 228 |
| Traction force | Force traverse, retracting | 290 bar | kN | 74 | 116 |
| Velocity | | | | | |
| | Force traverse, extending | F = const | mm/s | 126 (119) | 81 (76) |
| | Force traverse, retracting | F = const | mm/s | 248 (236) | 159 (151) |
| Stroke | | | | | |
| | Maximum | | mm | 750 | 500 |
| | Minimum | | mm | 200 | 200 |

¹⁾ Velocity specifications: load-free; values in brackets with counterforce (nominal force, η_{vol} pump: 95%)

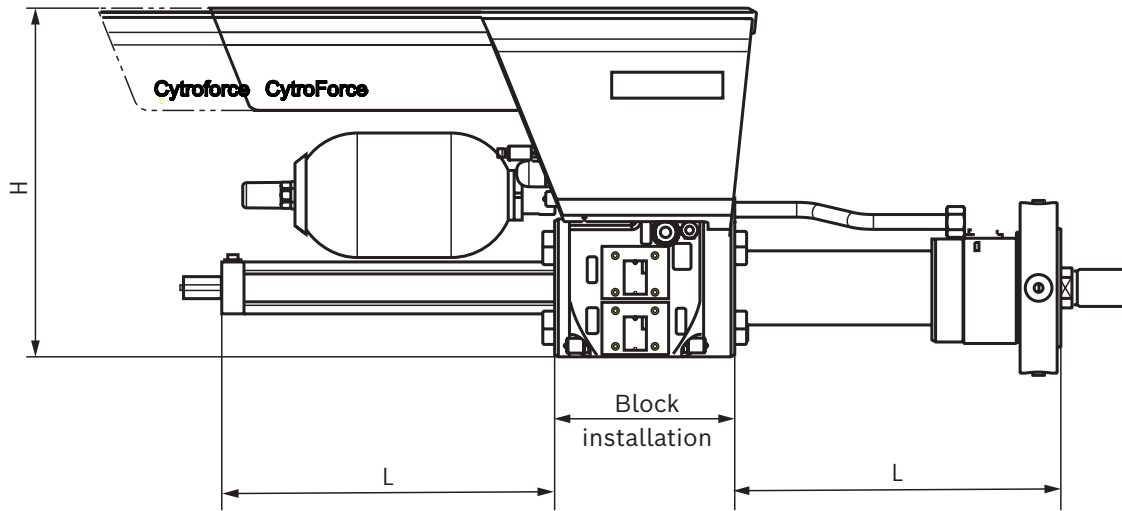
Notice:

All data defined as maximum data. Variable depending on customer design.

Cylinder data

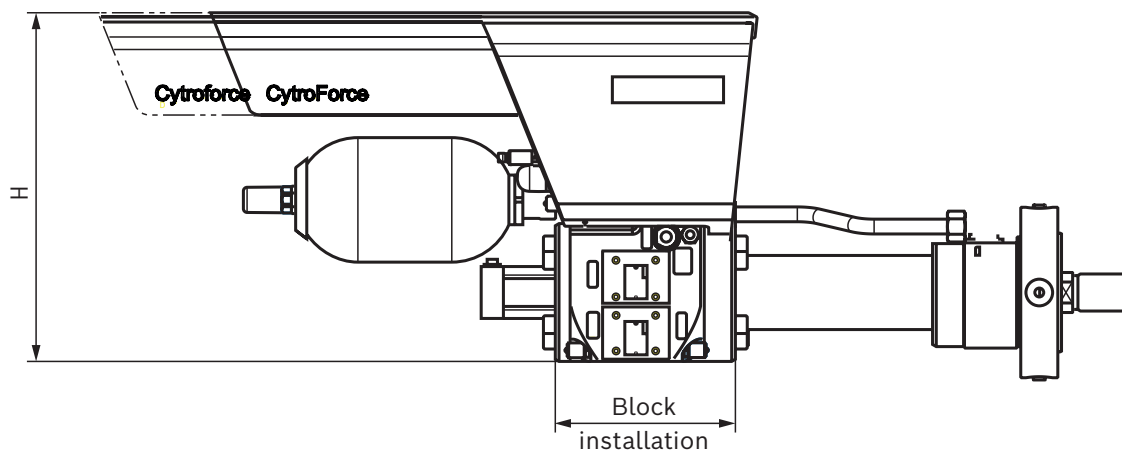
(dimensions in mm)

Cylinder (tandem)



| Piston | Piston rod | Area ratio | Areas | | | maximum stroke length |
|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | | | Piston | Rod | Ring | |
| $\varnothing AL$ (mm) | $\varnothing MM$ (mm) | φ A1/A2 | A1 (cm ²) | A2 (cm ²) | A3 (cm ²) | L (mm) |
| 80 | 45 | 5.37 | 42.2 | 7.9 | 34.4 | 1000 |
| 100 | 55 | 5.37 | 67.2 | 12.4 | 54.8 | 1000 |






Cylinder (differential)



| Piston | Piston rod | Area ratio | Areas | | | maximum stroke length |
|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | | | Piston | Rod | Ring | |
| $\varnothing AL$ (mm) | $\varnothing MM$ (mm) | φ A1/A3 | A1 (cm ²) | A2 (cm ²) | A3 (cm ²) | L (mm) |
| 80 | 56 | 1.96 | 50.2 | - | 25.6 | 750 |
| 100 | 70 | 1.96 | 78.5 | - | 40.1 | 500 |

Connection types: Cylinder

Possible flanges

| Installation position | Solution space | MP3 | MF3 | MF4 | MT4 | MS2 |
|-----------------------|----------------|---|---|--|---|---|
| | |  |  |  |  |  |
| Head side | A1 | ✓ | ✓ | ✓ | ✓ | (✓) |
| | E1 | | | | | |
| Base side | A1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| | E1 | | ✓ | | ✓ | ✓ |

(✓) possible upon request as ETO

Piston rod ends

| Designation | Data sheet |
|--|------------|
| Male thread as CDH3 for swivel head CGAS | 17042 |
| Male thread as CDH3 for swivel head CGAK | 17042 |
| Internal thread | 17042 |
| Pitch circle with internal thread | 17042 |

Accessories (separate order)

Valve cable with LED and Z-diode-suppressor

| Cable length | Material number | Data sheet |
|--------------|-----------------|------------|
| 3 m | R900032021 | 08006 |
| 5 m | R900032015 | |
| 10 m | R900217138 | |

Connector switching amplifier with cable

| Cable length | Material number | Data sheet |
|--------------|-----------------|------------|
| 3 m | R901290194 | 30362 |
| 5 m | R901354308 | |
| 10 m | R901354307 | |

Sensor cable 4-pole, M12x1

| Cable length | Connector version | Material number | Data sheet |
|--------------|-------------------|-----------------|------------|
| 5 m | straight | R901290194 | 08006 |
| 5 m | angled | R901354308 | |

Connection cable SSI encoder

| Cable length | Designation | Material number |
|--------------|--|-----------------|
| 5 m | CABLE SET 7P Z31 BF6 +5M | R901420491 |
| 15 m | MATING CONNECTOR 7PZ31B63PG11MSPEZ15M | R901387203 |

Connection cable (pressure sensor HM20, temperature sensor TA2105)

| Cable length | Designation | Material number |
|--------------|--|-----------------|
| 2 m | MATING CONNECTOR 4P M12 STRAIGHT 2M | R900773031 |
| 5 m | MATING CONNECTOR 4P M12 STRAIGHT 5M | R900779498 |
| 2 m | MATING CONNECTOR 4P M12 ANGLED 2M | R900779504 |
| 5 m | MATING CONNECTOR 4P M12 ANGLED 5M | R900779503 |

Accessories (separate order)**CAT5e cable, screen version ITP**

Long cables (maximum 100 m) for connecting the drive system with the superior control system and/or remote communication participants

| Cable length | Material number |
|--------------|-------------------------------|
| 30 m | R911389233 |
| xxx.x m | RKB0021/xxx.x (max. 100 m) |

CAT5e cable, screen version ITP

Short cables (maximum XX m) for connecting devices arranged next to each other in the control cabinet

| Cable length | Designation | Material number |
|--------------|---------------|-----------------|
| 0,19 m | RKB0013/00,19 | R911329741 |
| 0,25 m | RKB0013/00,25 | R911317797 |
| 0,35 m | RKB0013/00,35 | R911317800 |
| 0,55 m | RKB0013/00,55 | R911317801 |

Cables for safety zone module HSZ01

| Length | Designation | Material number |
|--------|---------------|-----------------|
| 0.25 m | RKB0061/00.25 | R911372773 |
| 0.35 m | RKB0061/00.35 | R911372772 |
| 0.55 m | RKB0061/00.55 | R911372771 |
| 1 m | RKB0062/001.0 | R911372775 |
| 2 m | RKB0062/002.0 | R911372776 |
| 3 m | RKB0062/003.0 | R911372777 |
| 4 m | RKB0062/004.0 | R911372779 |
| 5 m | RKB0062/005.0 | R911372780 |
| 6 m | RKB0062/006.0 | R911372781 |
| 7 m | RKB0062/007.0 | R911372782 |
| 8 m | RKB0062/008.0 | R911372783 |
| 9 m | RKB0062/009.0 | R911372784 |
| 10 m | RKB0062/010.0 | R911372785 |
| 11 m | RKB0062/011.0 | R911372786 |
| 12 m | RKB0062/012.0 | R911372787 |
| 13 m | RKB0062/013.0 | R911372788 |
| 14 m | RKB0062/014.0 | R911372789 |
| 15 m | RKB0062/015.0 | R911372790 |
| 20 m | RKB0062/020.0 | R911372791 |
| 30 m | RKB0062/030.0 | R911372792 |
| 50 m | RKB0062/050.0 | R911372793 |
| 75 m | RKB0062/075.0 | R911372794 |
| 100 m | RKB0062/100.0 | R911372795 |

Accessories (separate order)

Connection cable (clogging indicator, filter)

| Cable length | Designation | Material number |
|--------------|---|-------------------|
| 3 m | MATING CONNECTOR 4P Z24M12X1 +3MSPEZ | R900064381 |

Service kit

for taking oil samples and for replenishing minor oil quantities

| Description | Designation | Material number |
|---|--------------------------|-------------------|
| Case without cartridges | MAINTENANCE SET SY-SHA | R961013500 |
| 1 HPL cartridge filled with oil | FLUID KIT HLP 46-01 0.25 | R961013501 |
| 2 HPL cartridges filled with oil | FLUID KIT HLP 46-02 0.25 | R961013504 |

Further information

CytroForce

- | | |
|--------------------------|--------------------|
| ▶ Operating instructions | Data sheet 62280-B |
| ▶ Sales information | Data sheet 08137 |

Electrics

- | | |
|---|---|
| ▶ IndraDrive control parts CSB02, CSE02, CSH01, CDB02 | Project planning instructions R911338961 |
| ▶ IndraDyn S, synchronous motors MS2N | Operating instructions R911347580 |
| ▶ Rexroth IndraDrive supply units, power parts HMV, HMS, HMD, HCS02, HCS03 | Project planning instructions R911318789 |
| ▶ Rexroth IndraDrive drive systems with HMV01/02 HMS01/02, HMD, HCS02/03 | Project planning instructions R911309635 |
| ▶ IndraDyn S, synchronous servo motors MS2N | Project planning instructions R911347582 |
| ▶ Rexroth IndraDrive additional components and accessories | Project planning instructions R911306139 |
| ▶ Control cabinet: Air-conditioning, EMC, set-up, protection class, electrics, IndraDrive, Rexroth EFC/FV, Sytronix | Project planning instructions R911344987 |

Pump

- | | |
|-------------------------------|------------------|
| ▶ Axial piston pump A10FZG3CC | Data sheet 91485 |
|-------------------------------|------------------|

Cylinder

- | | |
|---|------------------|
| ▶ Mounting elements for hydraulic cylinders | Data sheet 17042 |
|---|------------------|

Software

- | | |
|---|---|
| ▶ Rexroth Sytronix SvP 7020 PFC speed-variable positioning of hydraulic axes (PCF software) | Commissioning instruction R911379549 |
|---|---|

Safety technology - optional

Option 1: STO SIL3 (Safe Torque Off) by using a different control part
 Option 2: with additional SLS (Safe Limited Speed). For this purpose, hydraulic and electrical components are required.
 This option is suitable for **encoder-independent** applications up to SIL3 of IEC 62061 and/or category 4 , PL e of ISO 13849 or for encoder-dependent applications up to SIL2 of IEC 62061 and/or category 3, PL d of ISO 13849.
 For further information, please refer to the application description R911338919 - IndraDrive, integrated safety technology "Safe Motion" (from MPx-18)

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Notes

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