

EWELLIX

Lifting and Actuating Systems

EWELLIX Linear actuators, EWELLIX lifting columns, EWELLIX control units, EWELLIX operating elements

Catalog

We pioneer motion

SCHAEFFLER

Contents

1 Introduction 5
1.1 Core technologies 5
1.2 Product overview 10
1.3 Engineering Tools 14
1.4 Configuring the linear actuator system 15
1.5 Product range comparison 21
1.6 Product benefits 31
1.7 Customization options 36
2 Selection procedure 42
3 EWELLIX linear actuators 46
3.1 MATRIX 46
3.1.1 MAX1 47
3.1.2 MAX3 53
3.1.3 MAX7 59
3.2 RUNNER 65
3.3 CAJA35C 72
3.4 ECOMAG 77
3.5 CAHB 82
3.5.1 CAHB-10 84
3.5.2 CAHB-20A 92
3.5.3 CAHB-20E, CAHB-20S 98
3.5.4 CAHB-21E, CAHB-21S 105
3.5.5 CAHB-22E, CAHB-22S 113
3.5.6 Electrical specification for CAHB..E 121
3.5.7 Electrical specification for CAHB..S 123
3.5.8 Attachment options for CAHB..E and CAHB..S 127
3.5.9 Functional overview of CAHB..S 131
3.5.10 CAHB-30A 145
3.5.11 CAHB-31N 151
3.5.12 CAHB – Environmental tests 157
3.6 CAR, CAP, CAT 164
3.6.1 CAR22 165
3.6.2 CAP32 170
3.6.3 CAT32B, CAP43B 180
3.6.4 CAT33, CAP43A 196
3.6.5 CAT33H 212
3.6.6 CAR40 225
3.6.7 Replacement parts 233
3.7 CAHM 241
4 EWELLIX lifting columns 249
4.1 CPMA 249
4.2 CPMB 266
4.3 CPMT 283
4.4 TFG 292
4.5 THG 299

4.6 TLC 307
4.7 TLG 313
4.8 TLT 321
4.9 TXG 331
4.10 FRE 337

5 EWELLIX control units 340
5.1 BCU 340
5.2 VCU 344
5.3 SCU 348
5.4 MCU 353
5.5 COMPACT 356
5.6 SEM 360

6 EWELLIX operating elements 363
6.1 Hand switch CAES 363
6.2 Hand switch EHA1 365
6.3 Hand switch EHA3 368
6.4 Hand switch EHE1 371
6.5 Hand switch HSM, HSF 373
6.6 Pneumatic hand switch PHC 375
6.7 Foot switch ST 376
6.8 Pneumatic foot switch PFP 379
6.9 Desk switch ST 381
6.10 Desk switch STK 383
6.11 Pneumatic desk switch PAM 385

7 New solution for medical applications 387
7.1 EWELLIX linear actuator CAMT 387
7.2 EWELLIX linear actuator EMA-80M 395

8 Glossary and symbols description 404
8.1 Glossary 404
8.2 Symbols description 406

1 Introduction

1.1 Core technologies

1.1.1 Linear systems

Our extensive experience and knowledge of linear systems allows us to satisfy the most demanding requirements using linear actuators, lifting columns, and control units.

EWELLIX linear actuators

1 EWELLIX linear actuators

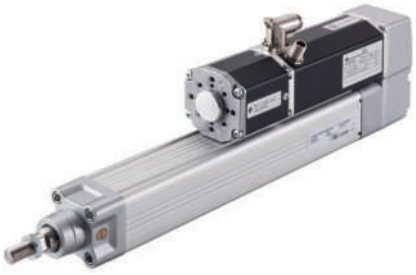


001D5B11

We offer a wide range of linear actuators for simple industrial applications or specific health care applications. Our versatile range provides everything from low to high load capacities and medium operating speeds to quiet and aesthetically designed systems.

Electromechanical EWELLIX linear actuators

2 Electromechanical EWELLIX linear actuators



001D5B14

Our range of electromechanical linear actuators meets the requirements of demanding industrial applications involving high loads and speeds in continuous operation. These linear actuators provide the best controllability and reliability for programmable motion cycles.

EWELLIX lifting columns

3 EWELLIX lifting columns



001D5B16

We offer a wide range of options for various applications. In addition, our lifting columns are quiet, robust, powerful, resistant to high offset loads, and feature an attractive design.

EWELLIX control units

4 EWELLIX control units



001D5B17

EWELLIX control units are ideal for applications focused on system control and offer connections for foot switches, hand switches, or desk switches

EWELLIX operating elements

Schaeffler offers various operating elements for the position control of your technical equipment. The range includes:

- hand switches
- foot switches
- desk switches

These operating elements can be used with control units to drive linear actuators and lifting columns or, in AC versions, directly with the elements.

1.1.2 Ball screw drives and roller screw drives

For applications in which rotary motion must be converted into linear motion, we offer a comprehensive range of solutions, including rolled ball screw drives, roller screw drives, and ground ball screw drives.

Miniature ball screw drives

5 Miniature ball screw drives



001D5B18

The miniature ball screw drives are very compact and operate with low noise levels.

Rolled ball screw drives

6 Rolled ball screw drives



001D5B1B

We offer several highly precise recirculating systems to cover most application requirements and to reduce or eliminate backlash.

Ground ball screw drives

Ground ball screw drives from Schaeffler provide increased rigidity and precision.

Roller screw drives

7 Roller screw drives



Roller screw drives go far beyond the limits of ball screw drives and offer ultimate precision, rigidity, high speed, and acceleration. In addition, backlash can be reduced or eliminated. Long leads are available for very fast movements.

1.1.3 Linear guidance technology

To provide optimal solutions for all your guidance requirements, our product range features shaft guidance systems, profile rail guides, and precision rail guides.

Linear ball bearings

8 Linear ball bearings



Cost-effective, simple, and self-aligning shaft guidance systems from Schaeffler provide unlimited stroke, adjustable preload, and excellent sealing performance. They are also available in corrosion-resistant versions and premounted on an aluminum housing as a unit.

Precision rail guides

9 Precision rail guides



Precision rail guides offer a range of modular options and feature various rolling elements and cages. These guides are characterized by high precision, load carrying capacity, and rigidity, and are equipped with an anti-creep system. They are also available as a ready-to-mount kit.

Profile rail guides

10 Profile rail guides



Profile rail guides provide unlimited stroke through hinged rails and excellent rigidity, enabling them to withstand moment loads in all directions. They are ready to mount, easy to maintain, and highly reliable. They are available in ball or roller versions, as well as in standard and miniature sizes.

1

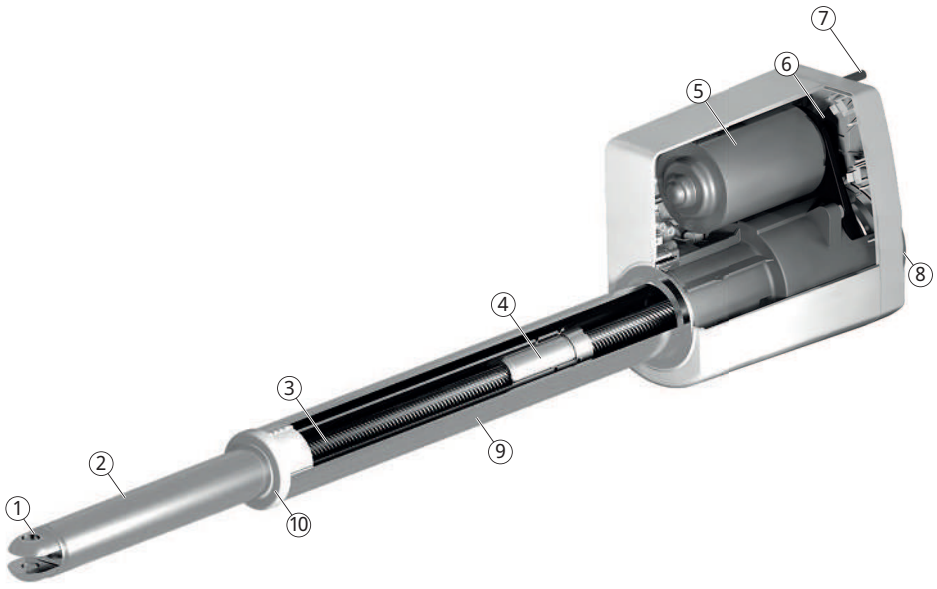
1.2 Product overview

1.2.1 EWELLIX linear actuators

Linear actuators enable precise, controlled, and repeatable pushing and pulling movements in linear applications. Linear actuators serve as efficient, virtually maintenance-free, and environmentally friendly alternatives to hydraulic or pneumatic cylinders.

Linear actuators with modular design and open architecture offer the ability to select and integrate components to achieve customized solutions within existing housings. The application potential is further expanded through the introduction of technologies for specific purposes, such as Hall sensors, limit switches, potentiometers, friction clutches, or back-up nuts. Equipped with a DC brushed motor or an AC brushed motor, the duty cycle is designed for up to 20 %, or up to 40 % when equipped with an AC motor.

11 EWELLIX linear actuator



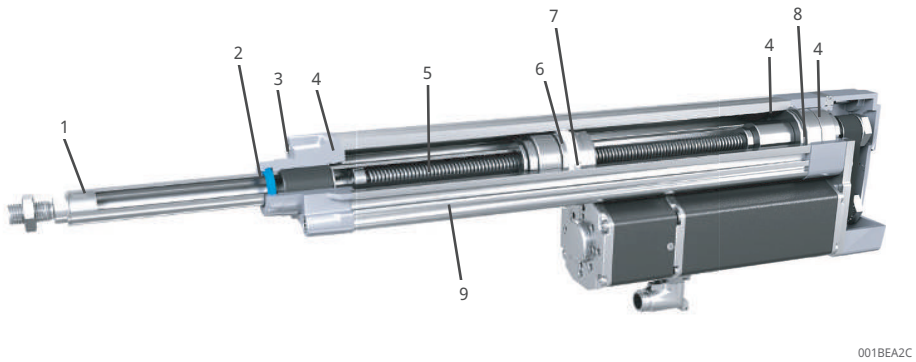
1	Front attachment	2	Inner tube or push tube
3	Screw drive	4	Nut
5	Electric motor	6	Gearbox
7	Power cable	8	Rear attachment
9	Outer tube and protection tube	10	Sealing system

1.2.2 Electromechanical EWELLIX linear actuators

Electromechanical linear actuators enable precise, controlled, and repeatable pushing and pulling movements in linear applications. Linear actuators serve as efficient, virtually maintenance-free, and environmentally friendly alternatives to hydraulic or pneumatic cylinders.

Linear actuators with modular design and open architecture offer the ability to select and integrate components to achieve customized solutions within existing housings. The application potential is further expanded through the introduction of technologies for specific purposes, such as Hall sensors, limit switches, potentiometers, friction clutches, or back-up nuts.

12 Electromechanical EWELLIX linear actuator



1	Push tube that moves the load	2	Shaft seal to protect against the ingress of contaminants
3	Opening to let the linear actuator breath (not visible)	4	Flat seal between the housings
5	Screw drive with nut for converting rotary motion into linear motion	6	Magnet ring for proximity sensors to detect position
7	Anti-rotation device	8	Bearing to support the load
9	Protection tube		

1.2.3 EWELLIX lifting columns

Lifting columns enable precise, controlled, and repeatable lifting movements in linear actuator applications, including those involving torsion loads and offset loads.

Lifting columns with modular design and open architecture offer the ability to select and integrate components such as linear actuators to achieve customized solutions within existing aluminum profiles. The application potential is further expanded through the introduction of technologies for specific purposes, such as Hall sensors, limit switches, and integrated circuits for switch mode power supplies and motor control. Equipped with a brushed DC motor or AC motor, the duty cycle is designed for up to 10 % at maximum load.

13 EWELLIX lifting column



001D5B28

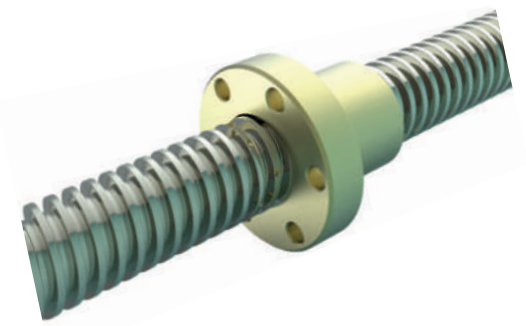
1	Outer tube	2	Inner tube
3	Screw drive and nut	4	Cable feedthrough
5	Power supply	6	Electric motor
7	Gearbox	8	Control board
9	Cable connector		

1.2.4 Screw drives

Ball screw drives and roller screw drives are key components in the design of electromechanical linear actuators. They convert rotary motor motion into linear motion. Their efficiency, load characteristics, and speed characteristics have a significant influence on the performance of electromechanical linear actuators. Thanks to decades of experience in the manufacture of ball screw drives and roller screw drives, as well as continuous product and process development, Schaeffler develops precision screw drive solutions that meet even the most demanding applications in terms of efficiency, precision, durability, and value. All screw drives are manufactured from high-strength materials with specific heat-treatment.

Trapezoidal screw drive

14 Trapezoidal screw drive

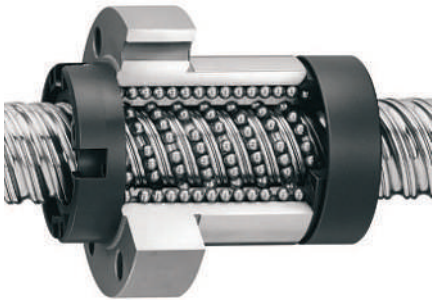


001D5B2B

These screw drives convert torque into linear motion through direct sliding friction. A typical assembly group consists of a steel screw drive and a plastic nut. Some of the electromechanical linear actuators are equipped with trapezoidal screw drives with a relatively high coefficient of friction, making them well suited for self-locking applications. Linear actuators with trapezoidal screw drives provide high static forces, withstand severe vibrations, operate quietly, and represent cost-effective solutions.

Rolled precision ball screw drives

15 Rolled precision ball screw drives



001D5B2D

Ball screw drive assemblies provide high-performance solutions for a wide range of applications requiring high loads, precise drive performance, durability, and value. High-tech machinery combined with precise control of cold-forming and metallurgical processes enables the production of screw drives that offer virtually the same accuracy and performance as ground ball screw

drives, but at a lower cost. The standard lead accuracy is G9 according to ISO 286-2:1988. Production meets G7 lead accuracy from a nominal screw drive shaft diameter of 20. On request, ball screw drives with G5 lead accuracy according to ISO 3408-3:2006 can be supplied, which are defined for positioning screw drives and provide a lead accuracy equivalent to that of ground G5 ball screw drives.

1.3 Engineering Tools

To simplify the product selection process, Schaeffler offers a series of free web tools that allow a quick and easy navigation through the complete range of linear actuator components.

1.3.1 Actuator Selection Assistant

Users can select the desired product family from columns, linear actuators, rotary actuators, and controls. After entering a few simple parameters, users are guided through the product selection process.

Key features include:

- 4 complete product lines
- dynamic filtering of the results
- ranking of results by application
- product comparison (up to 3 at a time)
- display of the compatible control unit for the selected column or linear actuator
- cost savings calculator
- direct link to product drawing, technical data sheet, and catalogs

A web-based version of the tool is available.

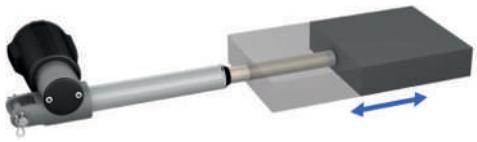
medias | Engineering Tool |
Actuator select |
https://www.schaeffler.de/std/204A

1.4 Configuring the linear actuator system

1.4.1 Definition and type of linear actuator

Electromechanical linear actuators enable precise, controlled, and repeatable pushing and pulling movements in linear actuator applications.

16 Push, pull



001D5B2F

17 Clamping, gripping



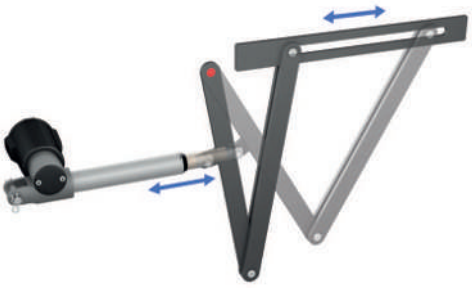
001D5B32

18 Lifting, lowering



001D5B36

19 Opening, closing



001D5B38

Linear actuators serve as efficient, virtually maintenance-free, and environmentally friendly alternatives to hydraulic or pneumatic types.

Standard versions can handle loads of up to 50 kN, achieve speeds of more than 150 mm/s, and enable travel of up to 700 mm. They can be closed systems in aluminum, zinc, or polymer housings that are ready for immediate installation and simple plug-in operation.

Linear actuators with modular design and open architecture offer the ability to select and integrate components to achieve customized solutions within existing housings. The application potential is further expanded through the introduction of technologies for specific purposes, such as Hall sensors, limit switches, potentiometers, friction clutches, ball detent clutches, or back-up nuts.

Linear actuators of the screw drive type powered by an electric AC motor or DC motor essentially consist of a trapezoidal screw drive (screw shaft/threaded spindle) with drive nut and push tube, with a gearbox positioned between the motor and the screw drive.

When power is supplied, the motor rotates the threaded spindle, causing the drive nut to move and the push tube to extend. When the motor rotation is reversed, the push tube retracts

1.4.2 Ball screw drive and trapezoidal screw drive

Traditional types of trapezoidal screw drives include ball screw drives and ACME screw drives, the specifications of which depend on the configuration and load requirements of the respective linear actuator.

Ball screw drives

20 Ball screw drives



001D5B3B

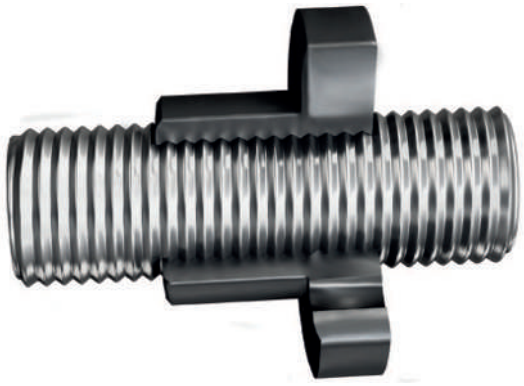
Solid steel ball screw drives consist of a spindle and a ball nut with a ball recirculation system for converting rotary motion into smooth, accurate, and reversible linear motion (or torque into thrust force). The row of circular rolling elements is housed in a closed system between the nut and the screw drive to provide a design with extremely low coefficients of friction. The low frictional resistance minimizes wear, improves efficiency, and reduces operating temperature for a longer service life.

Ball screw drives can handle high loads with very high efficiency, achieve high duty cycles, operate over a wide temperature range, and deliver the precision required for linear actuators to operate over long periods at high speeds and achieve high dynamic performance.

Brakes are typically used in ball screw drive linear actuators or non-self locking gearboxes to prevent back-driving and ensure high static load performance.

Trapezoidal screw drives

21 Trapezoidal screw drives



001D5B3E

These screw drives convert torque into linear motion through direct sliding friction. A typical assembly group consists of a steel screw drive and a plastic nut.

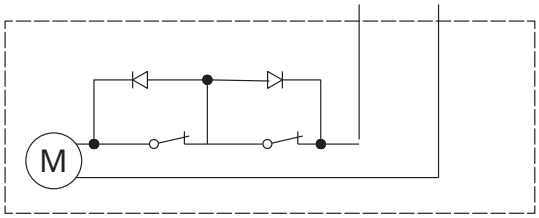
Some of the products are equipped with ACME screw drives with a relatively high coefficient of friction, making them well suited for self-locking applications. Linear actuators with ACME screws provide high static forces, withstand severe vibrations, operate quietly, and represent cost-effective solutions. Brakes can be used to increase the static load performance.

1.4.3 Performance considerations

Beyond the basic fundamentals of a linear actuator, applications may require feedback on position and/or direction, limitation of motion or travel in a particular direction, or protection against dynamic overload. Appropriate technologies have been developed for these purposes.

Limit switches

22 Limit switches

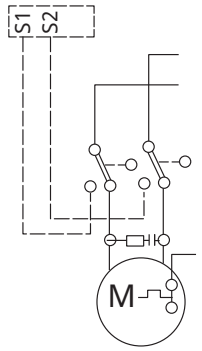


001D5B41

The purpose of a limit switch is to limit the movement or travel of the linear actuator in both directions. It is used with DC and AC versions. When activated, the switch typically opens an electrical contact integrated into the motor circuit. By reversing the voltage, the limit switch circuit is bypassed, the motor runs in the opposite direction, and the switch is released. The second limit switch functions in the same way but for the opposite direction. These devices prevent linear actuators from running into the mechanical end stops.

End stop signal

23 End stop signal

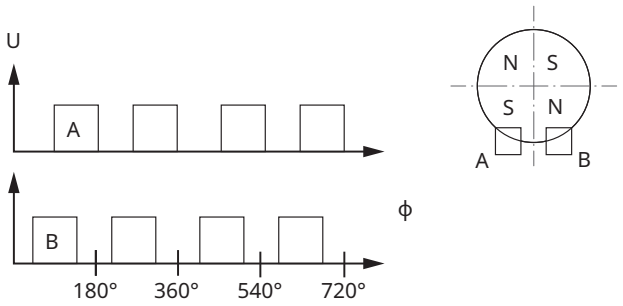


001D5B43

Its purpose is to provide information indicating when the linear actuator reaches a position in a particular direction. When activated, the switch opens or closes an electrical contact. When the contact is closed, current will flow through the switch; when the contact is open, no current will flow through the switch. These devices can be used in the application to prevent actuators from running into the mechanical end stops and enable adjustment of the stroke length. For example, an end-stop output can be used by a control board to limit the stroke of the linear actuator.

Hall sensors

24 Hall sensors



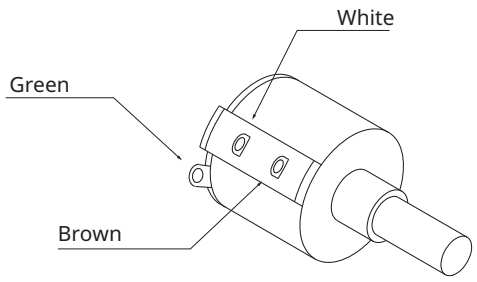
001CA420

U	V	Voltage
φ	°	Motion angle

These rotary or linear sensor devices are incremental non-contact sensors used to determine the relative position of a linear actuator. Two sensors detect the changing magnetic field created by a rotating magnet and then relay corresponding output pulses to a control unit that provides feedback regarding the travel distance. Two sensors can also be used to detect the direction of movement. After calibration, the travel distance can be determined by pulse counting.

Potentiometer

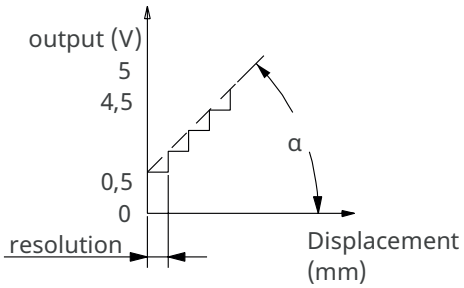
25 Potentiometer



A potentiometer is an analog feedback device. The potentiometer can be regarded as an absolute sensor that provides a unique value in each position. It is sometimes referred to as a variable resistor that can be read and fed into a control device for position control of the application.

Absolute analog position output signal

26 Absolute analog position output signal

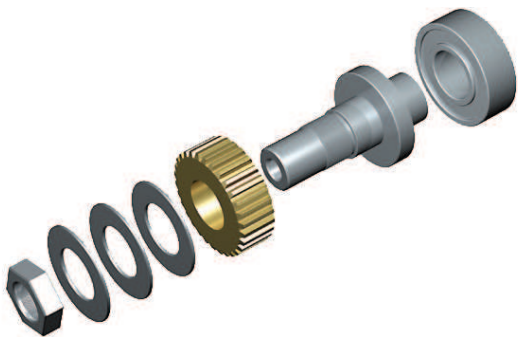


tan (α) = output relation to displacement (V/mm)

An absolute analog position output signal uses a non-contact sensor, meaning there is no wear, and absolute positioning provides a unique value from 0.5 V to 4.5 V in each position. The input voltage is 5 V or 10 to 55 V, depending on the series. The output signal can be read and fed into a controller for position control of the application. It is the better of the two solutions, whether Hall sensor or potentiometer.

Friction clutch

27 Friction clutch



This function protects the linear actuator from mechanical damage when it reaches one of its mechanical end positions or when the maximum dynamic load is temporarily exceeded. A friction clutch consists of a series of steel discs engaging with a hub and a series of friction rings engaging with a housing.

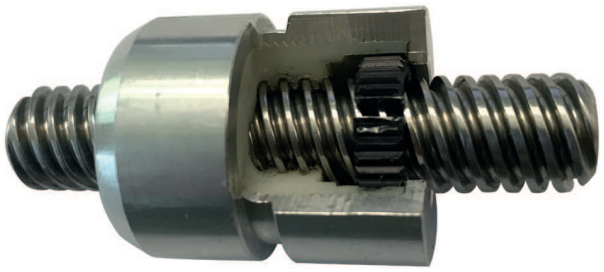
Pressure is exerted on the discs and rings by an adjuster acting through a spring and a pressure plate. The friction clutch is not intended as a load limiter, but serves only to protect the linear actuator and end-user equipment in the event of dynamic overload.

Ball detent clutch

A ball detent clutch transmits force through hardened balls retained in detents on the shaft and held in place with springs. In the event of excessive torque/ load condition, the balls are pressed out of their detents, disengaging the trapezoidal screw drive from the motor.

Back-up nut

28 Back-up nut



001D5B48

The back-up nut prevents the linear actuator from failing in the event of a defect in the drive nut. The back-up nut is generally made of metal and has higher shear strength than the drive nut. It only comes into contact with the spindle thread if the drive nut thread fails. The back-up nut supports the load and can lower the load (signaling need for repair).

Stick-slip effect

The cycle of alternating sticking and slipping when two surfaces rub against each other results in vibration and noise. Resonances may occur in other materials. This effect can sometimes be heard, felt, or seen. With linear actuators and columns, a stick-slip effect has been observed between Delrin and aluminum or steel, for example between the drive nut and spindle, as well as between the sliding element and profile.

1.5 Product range comparison

1.5.1 EWELLIX linear actuators

29 EWELLIX linear actuators



001D5B4B

1 EWELLIX linear actuators

Linear actuator	max. load	max. speed	Stroke	Voltage	Use	Details
	F_{max}	v_{max}	S	U		
	kN	mm/s	mm	V		
MATRIX	8	13	700	12, 24	Medical	➤46|3.1
RUNNER	12	8	700	24	Medical	➤65|3.2
CAJA35C	3.5	7.5	250	24	Medical	➤72|3.3
ECOMAG	6	9	300	24	Medical	➤77|3.4
CAHB	10	60	700	12, 24, 48	Harsh environment	➤82|3.5
CAT, CAR	4	193	700	12, 24, 120, 230, 3×400	Industrial	➤164|3.6
CAHM	50	74	700	24, 230, 3×400	Industrial	➤241|3.7
EMA-80M	20	25	700	48, 220	Medical	➤395|7.2
CAMT	6	6.5	250	24	Medical	➤387|7.1

Some products were developed for a specific application, but are also suitable for other applications requiring similar performance.

If you require a force greater than 12 kN, refer to our HA 1 catalog.

Further information

HA 1 | High-Performance Actuators |
https://www.schaeffler.de/std/2023

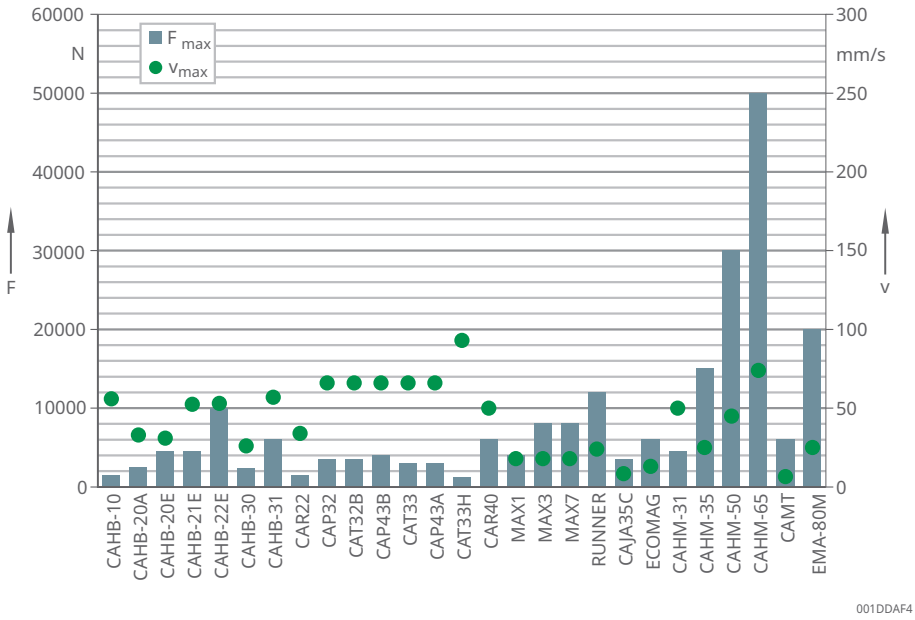
1

1.5.1.1 Force and speed characteristics

The diagram provides a quick overview of the rated load and speed of the linear actuators. Use this diagram to quickly assess which linear actuator is best suited for your application.

The rated load describes the weight that the linear actuator can push or pull at the rated duty cycle without overheating. The speed is the maximum linear speed that the linear actuator can achieve without load when operated at the rated voltage.

30 Rated load and speed of linear actuators



F_{max} max. load | v_{max} max. speed

1.5.2 EWELLIX lifting columns

31 EWELLIX lifting columns



001D5B4E

Schaeffler offers a wide range of lifting columns in terms of push and pull force, offset load during movement, stroke length, and input voltage. Most are approved as components of a medical device that complies with IEC 60601-1.

2 EWELLIX lifting columns

Lifting column	max. force	Offset load	max. speed	Stroke	Voltage		Use	Details
	F_{max}		v_{max}	S	U			
	kN	Nm	mm/s	mm	V DC	V AC		
CPMA, CPMB	2	250	15	400	24 to 30	100 to 240	Medical	➤266|4.2
CPMT	6	1400	34	600	24	–	Medical	➤283|4.3
TFG	2.5	500	15	700	–	120, 230	Medical	➤292|4.4
THG	2	1000	15	700	24	–	Medical	➤299|4.5
TLC	4	2100	11	700	–	120, 230	Medical	➤307|4.6
TLG	4	2800	10	700	24	–	Medical	➤313|4.7
TLT	4	1000	25	700	24	–	Medical	➤321|4.8
TXG	1.5	210	17	600	24	120, 230	Medical	➤331|4.9
FRE	–	–	–	700	–	–	Medical	➤337|4.10

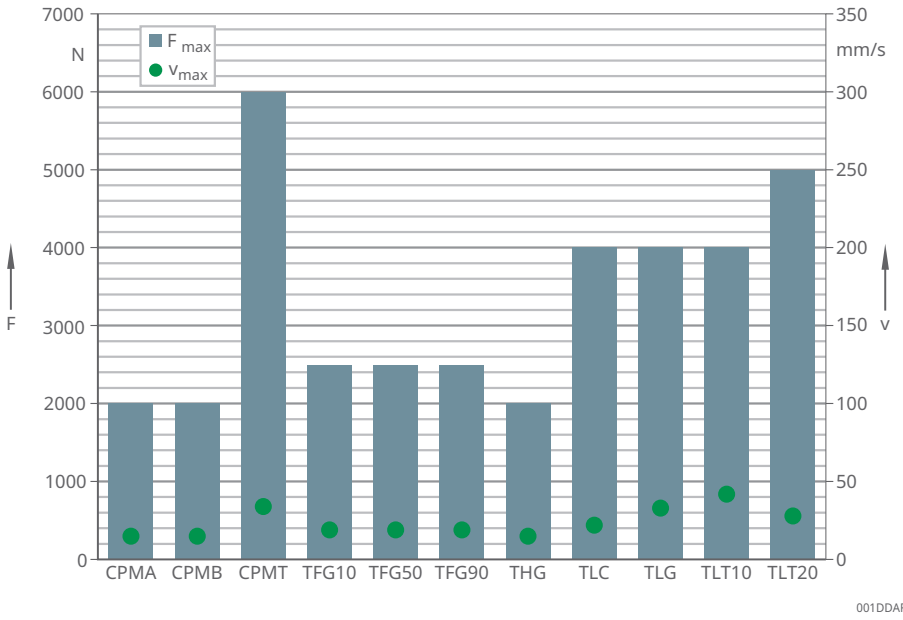
1.5.2.1 Force and speed characteristics

The diagram provides a quick overview of the rated load and speed of the linear actuators. Use this diagram to quickly assess which linear actuator is best suited for your application.

The rated load describes the weight that the linear actuator can push or pull at the rated duty cycle without overheating. The speed is the maximum linear speed that the linear actuator can achieve without load when operated at the rated voltage. Some products were developed for a specific application, but are also suitable for other applications requiring similar performance.

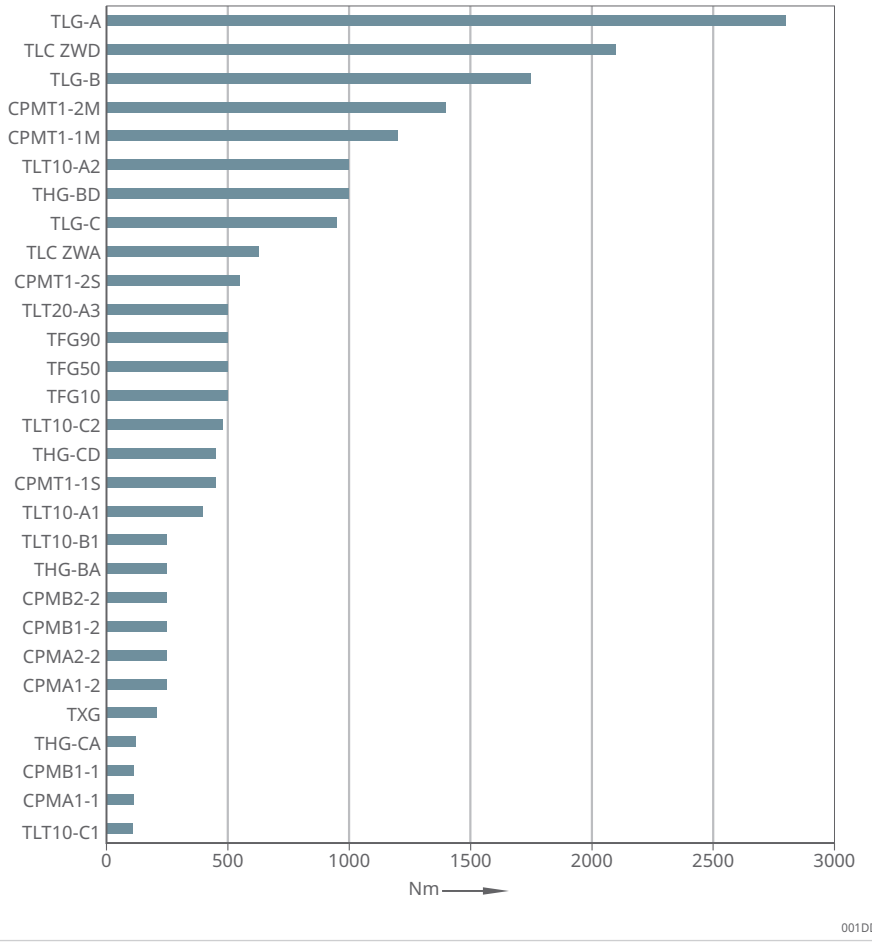
1

32 Rated load and speed of lifting columns



F_{max} max. load | v_{max} max. speed

33 Offset force at a stroke of 400 mm



1.5.3 EWELLIX control units

34 EWELLIX control units



001D5B50

Schaeffler offers a wide range of control units in terms of number of connections, functions, and input voltages. They are compatible with EWELLIX linear actuators and EWELLIX lifting columns. Most are approved as components for medical devices that comply with IEC 60601-1.

In order to select the proper accessories for linear actuators and lifting columns, please use the table below. Start by selecting the linear actuator or lifting column and search horizontally for compatible control units identified by a black dot, then select the corresponding operating elements vertically.

Some products do not require control units. Therefore, search horizontally for the corresponding operating elements.

1

3 Combination matrix for systems

System	Control units						Operating elements		
	BCU	VCU	SCU	MCU	SEM	COMPACT	Hand switch	Desk switch	Foot switch
Linear actuators									
CAHB-10	✓	✓	–	–	–	–	–	–	–
CAJA	✓	✓	✓	–	–	–	–	–	–
ECOMAG	✓	✓	✓	✓	✓	–	–	–	–
MAGDRIVE	✓	✓	✓	✓	–	–	–	–	–
MAX1, MAX3	✓	✓	✓	✓	–	–	–	–	–
MAX70	–	–	–	–	–	–	PHC	PAM	PFP
MAX72	–	–	–	–	–	–	EHA1	STA	STF
RUNNER	✓	✓	✓	✓	–	–	–	–	–
Lifting columns									
CPMA, CPMB	–	–	–	–	–	–	EHA4	STK	STL
CPMT	✓	✓	✓	–	–	–	–	–	–
TFG10	✓	✓	✓	–	–	✓	–	–	–
TFG50, TFG90	–	–	–	–	–	–	EHA3	STE	STJ
THG	✓	✓	✓	✓	–	–	–	–	–
TLC electric	–	–	–	–	–	–	–	–	–
TLC low voltage	–	–	–	–	–	–	EHA1	–	–
TLC pneumatic	–	–	–	–	–	–	PHC	PAM	PFP
TLG	✓	✓	✓	✓	–	–	–	–	–
TLT	✓	✓	✓	✓	–	–	–	–	–
TXG10	–	–	–	–	–	✓	–	–	–
TXG40, TXG50, TXG80, TXG90	–	–	–	–	–	–	EHE	STA	STF
Operating elements									
Hand switch									
EHA1	–	–	–	✓	–	–			
EHA3	✓	✓	–	–	–	–			
EHE	–	–	–	–	✓	✓			
Desk switch									
STA	–	–	–	✓	–	–			
STE	✓	✓	✓	–	–	–			
HSM	–	–	–	–	–	✓			
HSF	–	–	–	–	–	✓			
Foot switch									
STF	–	–	–	✓	–	–			
STJ	✓	✓	✓	–	–	–			

✓ suitable
– not suitable

1.5.4 EWELLIX operating elements

35 EWELLIX operating elements



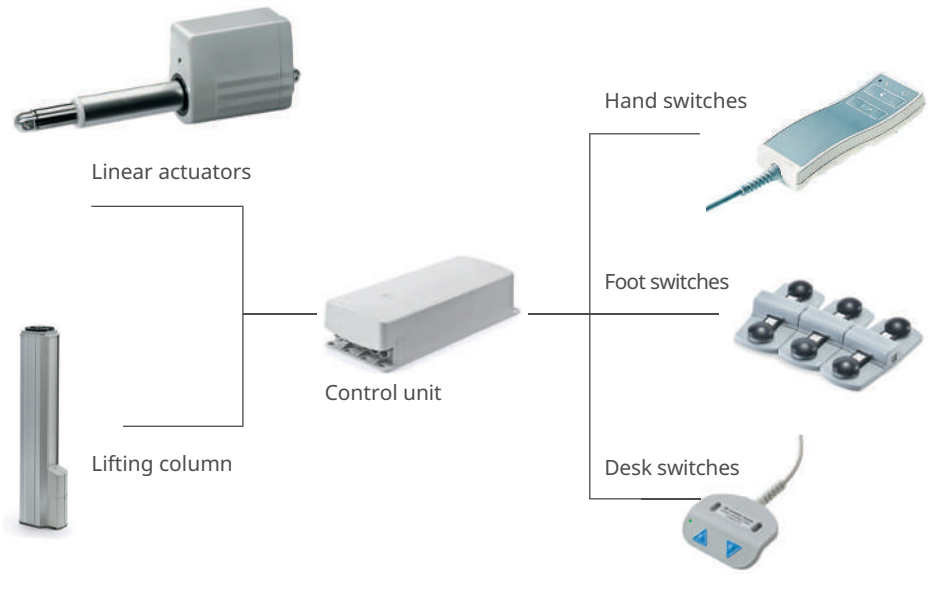
001CD09F

Schaeffler offers a wide range of operating elements for the position control of your equipment. The range includes: hand switches, foot switches, desk switches.

4 Combination matrix for control units and operating elements

Control unit	Operating elements		
	Hand switch	Desk switch	Foot switch
BCU	EHA3	STE	STJ
VCU	EHA3	STE	STJ
SCU	EHA3	STE	STJ
MCU	EHA1	STA	STF
COMPACT	–	HSM, HSF	–
SEM	EHE	–	–

36 Combination matrix for control units



001D65D7

1.5.5 Input voltage

AC or DC refers to the voltage used to power the system or the standalone linear actuator or lifting column.

For example, an AC system is supplied with AC voltage through a cable connected to the mains power, typically AC 230 V in Europe and AC 120 V in the USA. An AC system, linear actuator, or lifting column does not necessarily mean that the motor itself is an AC motor.

For a linear actuator or lifting column, the motor voltage may differ from the mains voltage. The control unit that drives the DC lifting column or linear actuator is equipped with a power supply for voltage conversion. The linear actuator and lifting column may also feature an integrated power supply. In this case, the equipment is powered from the mains supply, while the motor and other devices are powered through a DC cable. This system is simple to operate and is therefore the most user-friendly.

37 Example of a standalone lifting column with AC motor: TLC



001D5B54

38 Example of a standalone linear actuator with DC motor and integrated power supply: MAX7



001C129B

39 Example of a standalone lifting column with DC motor and integrated power supply: CPMA



001CF0D7

40 Example of an AC system with DC linear actuator and lifting column: SCU, TLG, MATRIX



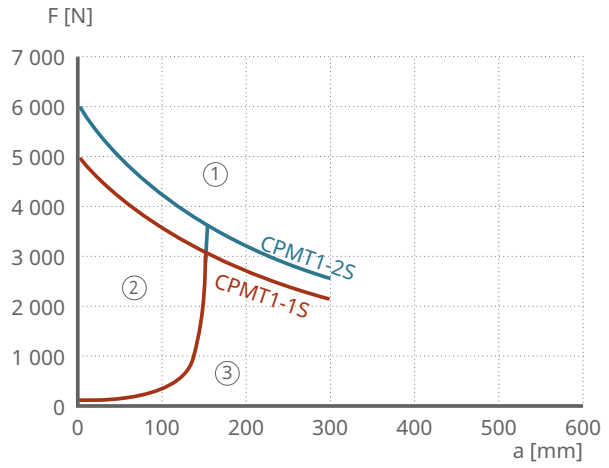
001D5B5E

1.5.6 Reading performance diagrams

A technical description is available for each system family in the product range chapter. This includes a performance overview, a detailed product description, and information on motors and adapters. In addition, a dedicated table containing the key technical data is provided for each product type and product size. The offset load behavior is specifically described here with regard to the lifting column.

Below is a general description of how to read the axial force/linear speed diagram.

41 Offset load diagram CPMT1-1S, CPMT1-2S



F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Offset load in extended state

For CPMT1-2M

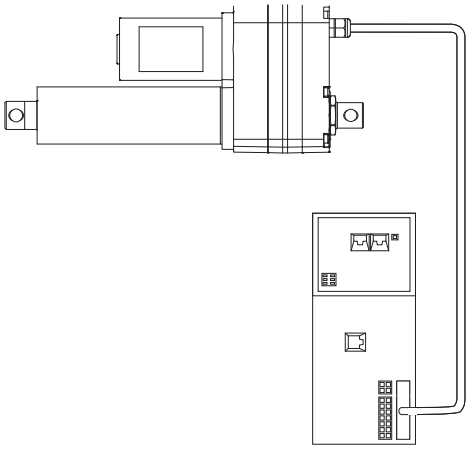
- 4500 N at 200 mm:
  The lifting column can lift and lower a load of 450 kg with the center of gravity located 200 mm from the center point of the column.
- 3000 N at 300 mm:
  The lifting column can lift and lower a load of 300 kg with the center of gravity located 300 mm from the center point of the column.
- 3000 N at 450 mm:
  The lifting column can lift and lower a load of 300 kg with the center of gravity located 450 mm from the center point of the column.
- 1000 N at 450 mm:
  The lifting column can lift a load of 100 kg with the center of gravity located 450 mm from the center point of the column. However, retraction during lowering is not optimal. We recommend increasing the weight or changing the load distance. To increase the load distance, you can change the center of gravity of the lifted part.

1.6 Product benefits

1.6.1 Replacement of pneumatic and hydraulic systems

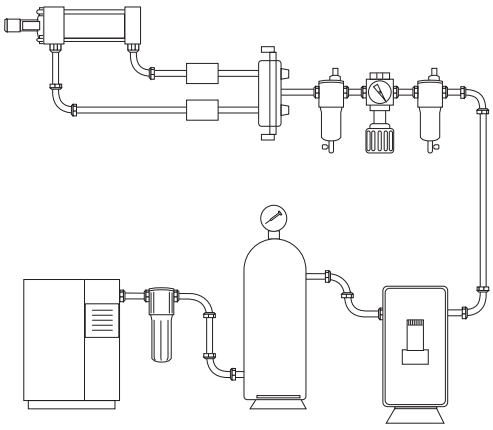
Linear movements in modern applications place high demands on movement profiles. Pneumatic and hydraulic cylinders quickly reach their performance limits. Electromechanical linear actuators from Schaeffler offer improved performance and simpler setup in applications that traditionally use pneumatic and hydraulic cylinders.

42 Electromechanical principle



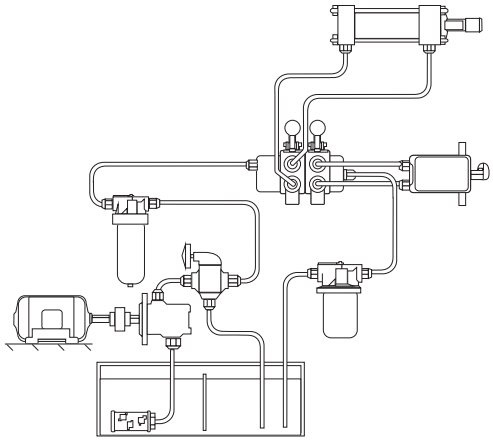
001D5B61

43 Pneumatic principle



001D5B63

44 Hydraulic principle



001D5B66

In addition to eliminating air or oil from applications, Schaeffler electric linear actuators offer many advantages. Key benefits include a high degree of flexibility, positioning accuracy even at any intermediate target, improved productivity due to low maintenance requirements, new programming options, and seamless integration into machine control systems. These benefits enable new and reliable concepts that can be integrated into a variety of production processes, ultimately allowing new application possibilities.

Electric linear actuators with ball screw drives offer an energy-saving alternative to pneumatic types.

Replacement of pneumatic cylinders

Pneumatic cylinders are based on a technology invented in the year 1728. The commercial use of this technology started at the beginning of the 20th century. The principle of pneumatic technology appears simple. Air is pressed through valves on one of the two sides of a pneumatic cylinder, causing movement of the push tube. A significant amount of equipment is required for the pneumatic system to run. The more cylinders that are present in a system, the lower the cost per cylinder. However, even with a small number of cylinders in a system, the overall equipment costs are relatively high. Schaeffler electric linear actuators operated by motors with position feedback are fully controllable.

Replacement of hydraulic cylinders

Hydraulic cylinders are traditionally used in high-load applications. The force range of Schaeffler linear actuators has been expanded. In fact, Schaeffler electric linear actuators can deliver a force of up to 12 kN for DC motors and up to 50 kN for AC motors, enabling more applications to switch from hydraulic to electric solutions. Schaeffler electric linear actuators are more reliable, easier to control, and cleaner to operate than hydraulic cylinders. They eliminate typical operational problems such as contamination, oil leaks, fluid maintenance, and disposal procedures and do not require ancillary equipment.

The technology of hydraulic cylinders is based on Pascal's hydrostatic law and offers virtually "unlimited" force. It is the most powerful technology for many applications. The cost of a hydraulic cylinder is moderate, but a significant amount of installation equipment is required to put it into operation. Operating and maintenance costs are high, while waste disposal is problematic.

Hydraulic cylinders obtain their power from pressurized hydraulic fluid (typically oil). Installation requires expensive piping, filters, pumps, and electronic/fluid connections (valves). Control is quite complicated when dealing with hysteresis, supply pressure, and temperature changes. Hydraulic systems are reliable when the hydraulic fluid is well maintained. However, with insufficient maintenance, the seals are prone to leakage, which can lead to contamination.

Schaeffler electric linear actuators provide solutions to many of the problems associated with hydraulic cylinders. The motor is directly connected to the linear movement of the push tube, enabling excellent position feedback and full controllability. Force transmission is typically achieved using a rotating screw drive and a nut with or without rolling elements, enabling a load capacity of up to 50 kN. Installation is simple, maintenance requirements are low, and there is reduced noise generation and contamination. Due to efficiencies of up to 50 %, operating costs are very low.

Controllability

Electric drive systems are equipped with a screw drive that offers simple controllability by counting the number of revolutions of the screw drive or other mechanically connected elements. You can control the position, the displacement as well as the speed.

Precision

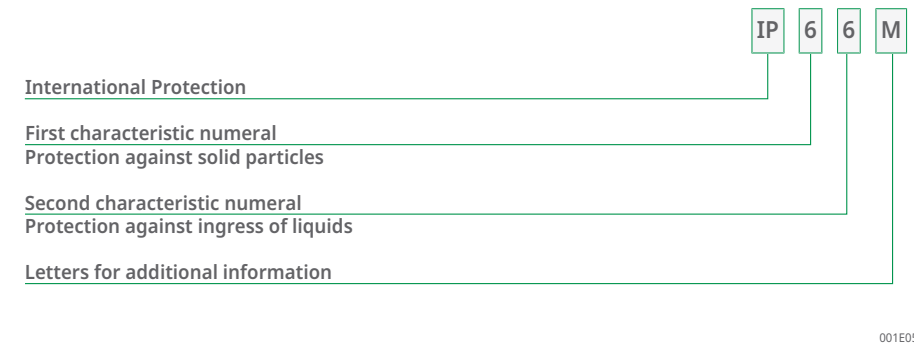
The precision depends on the resolution of the position feedback system and how the output is used by the control board. The backlash of the driving mechanism affects whether the direction of the load and movement changes. The accuracy also depends on the setup and accuracy of the system.

Holding force

Electric drive systems offer high stability and self-locking capability that prevent unplanned movement under static overload or shock conditions, even when power is not supplied. In addition to the built-in brake and short circuit at standstill used in most brushed DC motors, all mechanical drive components contribute to providing stability.

Degrees of protection provided by enclosures

45 Protection codes (IP)



The IP code, International Protection Rating, or IEC 60529 standard, sometimes also interpreted as Ingress Protection Marking, classifies and rates the degree of protection provided by mechanical and electrical enclosures against intrusion (body parts such as hands and fingers), dust, accidental contact, and water. This standard is published by the International Electrotechnical Commission (IEC). The equivalent European standard is DIN EN 60529.

Safety and environmental compatibility

Safety typically begins with the high holding force in relation to the load applied during normal use of the application, which should be lower than the rated load of the electric drive system. The risk of abnormal use of the application should also be considered. For some applications or functions in the medical industry, the manufacturer of the medical device must perform a risk assessment and comply with certain regulations such as IEC 60601-1, General Requirements for Basic Safety and Essential Performance. As components of medical devices, some Schaeffler electric drive systems have been tested under the same conditions to demonstrate compliance with IEC 60601-1 and are UL registered for RU marking. The statement that the safety factor of the complete system is 2, 2.5, or 4 is not enough. This standard requires verification of every individual component of the drive system used with a supported mass. Depending on the material, possible changes, safety system, and calculation method, a tensile safety factor of up to 12 may be required.

No issues occur with electric cylinders in relation to leaking fluids or contaminated air. Since fluid is not continuously under high pressure, there is also no risk to operating personnel in the event of cylinder failure.

Without fluid that must be moved or held in position and with a good protection rating of up to IP66M (during movement) and IP69K (when the cylinder is at a standstill), the risk of leakage and contamination is virtually negligible. Thanks to the static protection against ingress of media, the linear actuator can be cleaned easily. Actuators with an IP69K protection rating are suitable for cleaning under high pressure and at high temperatures, helping to eliminate the risk of contamination afterward.

RoHS

Our standard products fall under Category 11 in Annex I of Directive 2011/65/EU and therefore do not need to comply with the provisions of the Directive before July 22, 2019. Nevertheless, most of our standard products are already included in a list in which we declare that the products do not contain, in any homogeneous part thereof, any restricted substances exceeding the limit values specified in Annex II of Directive 2011/65/EU.

REACH Regulation (EC) 1907/2006

Schaeffler has policies, procedures, and dedicated resources in place to comply with Regulation (EC) 1907/2006, the Regulation concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals.

CE marking

Most of our products bear the CE marking and are supplied with a certificate of conformity signed by the factory.

Installation

Installation has been simplified. In most cases, the electric drive systems require only the mechanical connection of 2 attachment points and plugging in of the electrical connector. The system is then ready for operation.

Virtually maintenance-free

Schaeffler's experience in manufacturing the main components of linear actuators, screw drives, bearings, guides, seals, and lubrication enables us to maximize the service life. Thanks to the special hardening treatment of screw drives and balls, the linear actuators maintain their high performance and efficiency throughout their entire service life. Unlike their fluid-powered alternatives, the electromechanical linear actuator systems are maintenance-free. With electromechanical system technology, filter changes and air bleeding are a thing of the past. Simply mount the actuator, plug the cable into the PLC, and you will be up and running in record time.

Tests

Environmental, electrical, and mechanical tests are performed at Schaeffler facilities or by external laboratories and are recorded internally or by external bodies such as UL.

1.7 Customization options

1.7.1 Customization of electromechanical linear actuators

For its standard electromechanical linear actuator product range, Schaeffler offers a comprehensive customization program that meets virtually all application requirements. There are 3 levels of customization that depend on specific requirements and implementation complexity.

Basic customization

These basic design options can be implemented quickly and easily:

- stroke length
- retracted length
- fastening holes and mounting holes
- colors
- cables and plugs
- reduced load capacity

Advanced customization

These design options are more complex and require a dedicated project in collaboration with the customer:

- materials
- housings
- guidance system (for lifting column)
- gearbox (e.g., with hand crank)
- screw drive (e.g., lead, treatments)
- screw nut (e.g., additional backup nut)
- painting and surface treatment
- output signal

Full customization

If the standard product range cannot fully meet the technical requirements, Schaeffler can provide fully customized solutions tailored to each customer.

Examples of basic and advanced customizations

CPMA with colored guide tubes

46 CPMA with colored guide tubes



001D5B6A

Lifting columns with internal cable routing give equipment designers the option of removing the shroud or cover, even when the guide tube assembly must be wired on both sides. For optimal integration into the existing application, EWELLIX offers customer-specific color customization for the inner and outer guide tubes. This is generally recommended in conjunction with CPMA and CPMB lifting columns but can also be requested for other lifting columns or linear actuators.

CAHB-10 with customized power cable

47 CAHB-10 with customized power cable

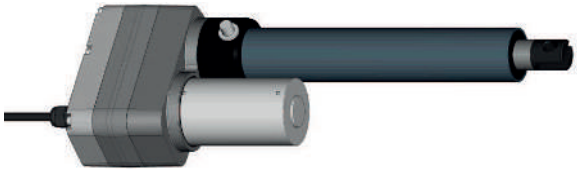


001D5B6C

Cable length and connector can be customized upon request, enabling the selected solution to be seamlessly integrated, quickly, installed, and immediately ready for operation.

CAHB..E with trunnion mounting

48 CAHB..E with trunnion mounting



001D5B6E

To optimize application design or create a ready-to-use solution, Schaeffler offers customized adjustment of the retracted and extended lengths and of the attachment configurations.

Lifting column for high offset loads

49 Lifting column for high offset loads

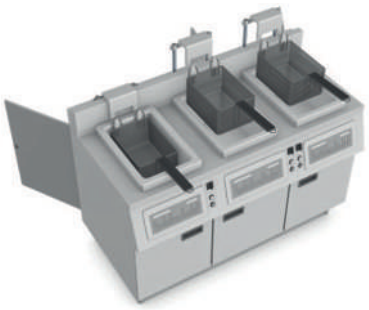


001D5B71

Precise movement, rigidity, and reliability are among the most important features of patient tables. Schaeffler special lifting columns provide patients with smooth and safe access thanks to their high precision and maximum lifting functionality. The user-friendly open motor interface allows the connection of any motor on the customer side and makes the system highly flexible and easily accessible.

Clam shell grill

50 Clam shell grill



001D5B75

Clam shell grills with electrical lifting facility can be automated using a linear actuator. This not only enables precise steak preparation for the customer, but also improves overall operating efficiency.

Motor customization is possible when long service life is required. To ensure perfect French fries, the lifting mechanism of the fryer basket can be automated using a linear actuator.

The operator benefits from simplicity and convenience and can focus on other preparation tasks.

Special motor and external switches

51 Special motor and external switches



001D5B78

For special applications such as commercial kitchen equipment, where a higher duty cycle and long service life are required, Schaeffler offers specific motors such as a brushless DC version. Schaeffler can also offer the integration of external switches to enable multiple adjustable position feedback options or other forms of complete system integration.

Very long stroke and graduated tube

52 Very long stroke and graduated tube



001D5B7A

For medical applications such as mobile fluid delivery and collection systems, where fluid pressure depends on the height of the bag, Schaeffler offers an automated solution with a linear actuator and a robust 1 m-long inner tube for suspending the bag.

The laser-engraved graduated tube provides quick visual information about the height.

Marking on the push tube

53 Marking on the push tube



001D5B7C

For medical applications such as mobile fluid delivery and collection systems, where fluid pressure depends on the height of the bag, Schaeffler offers an automated solution with a linear actuator and a robust 1 m-long inner tube for suspending the bag. The laser-engraved push tube provides quick visual information about the height.

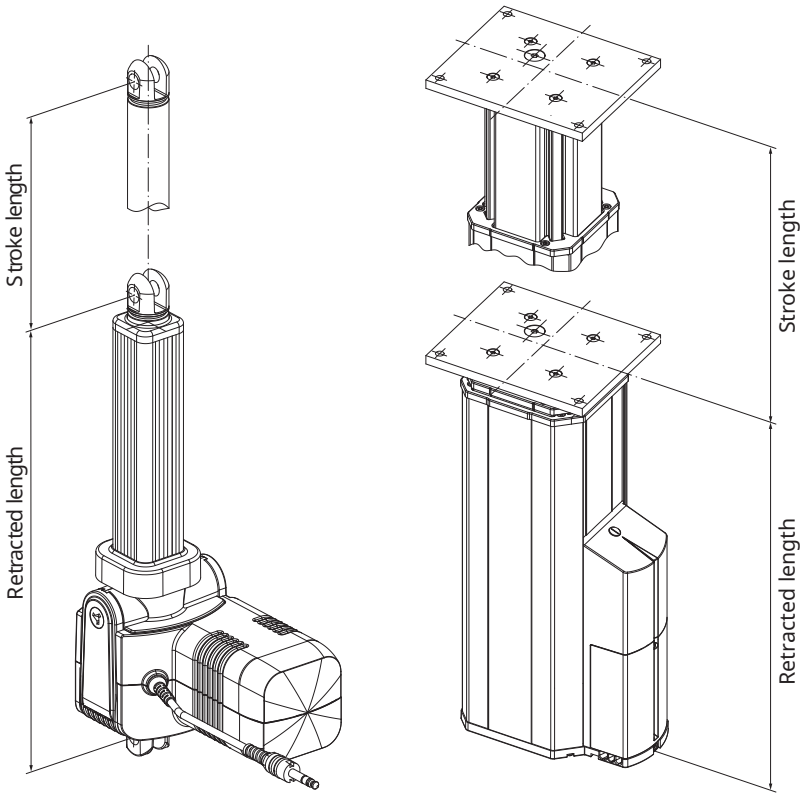
1.7.2 Customization request form

Customization request for linear actuator or column

Company: Preferred contact method:

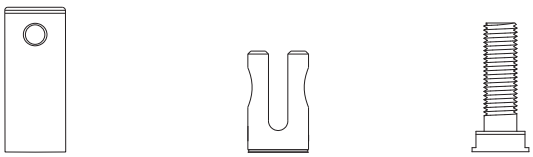
Country: ◯ Tel.:

Contact person: ◯ Email:



Preferred series (if known)

1. Stroke length: mm
2. Retracted length: mm
3. Cable length: mm Connection: Pinning:

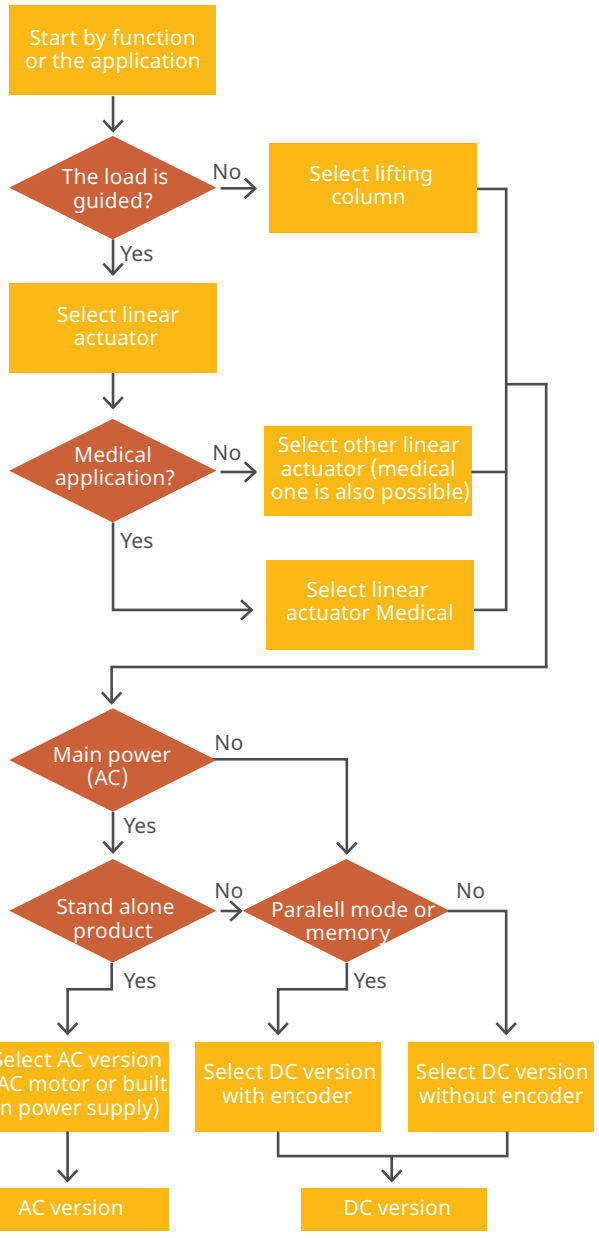


4. Rear attachment: Rod with bore ◯ Rod clevis with bore ◯ Thread ◯ Inside diameter, width
5. Front attachment: Rod with bore ◯ Rod clevis with bore ◯ Thread ◯ Inside diameter, width
6. Max. push/pull force:
7. Color:
8. If you require further information, describe it here:

2 Selection procedure

Using the described process, the user can select the correct solution based on the linear actuator, lifting column, and electronics that meet the requirements of the application. If further assistance is required, please contact Schaeffler for comprehensive technical support.

54 Selection process



AC version

- Selection by load and direction, offset load (for lifting column), stroke, speed, protection rating, and the degree of self-locking/holding/static force.
- Check environment and standard: protection class, duty cycle, temperature, standard.
- If required, select accessories: power or mains cable, connection plates, wires, inlet/outlet boxes.
- Select compatible operating elements per number of functions to be controlled.

DC version

- Selection by load and direction, offset load (for lifting column), stroke, speed, protection rating, and the degree of self-locking/holding/static force.
- Check environment and standard: protection class, duty cycle, temperature, standard
- Selection of the control unit: channel per motor, output per channel, total output power (see compatibility matrix), accessories
- Select compatible operating elements per number of functions to be controlled.

Selection by load and direction, offset load (for lifting column), stroke, speed, self-locking/holding/static force, dimensions

- The rated load should correspond to the maximum force applied to the actuator during the movement. Consider the “worst-case scenario” as well as the direction; push is the extension direction and pull is the retraction direction.
- For the lifting column, both the load and the offset load/distance must be taken into account.
- The static load should correspond to the force applied to the linear actuator when the linear actuator is static. Consider the dynamic effect of vibration or chocks on the application.
- The stroke length of the linear actuator, including the tolerance, must correspond to the travel distance of the application. In the case of the limit switch option, the additional stroke length required to reach the mechanical end stop of the linear actuator should be considered for additional safety.
- The speed should correspond to the expected running time. Note that with a DC motor, the speed changes depending on the load as well as voltage fluctuations, unless a switch-mode power supply is used.
- For some products, you can select the attachment dimensions and retracted length. Consider the tolerance.

Check environment and standard: protection class, duty cycle, temperature, standard

- Each product must have an environmental and standard specification that should correspond to the application environment.
- Protection rating
- Ambient temperature during operation, storage conditions
- Duty cycle % or t_{ON} and t_{OFF} are specified.
- The longest running time must not exceed the specified ON time.
- The shortest rest time should be longer than the running time multiplied by the ratio t_{ON} / t_{OFF}, or the running time multiplied by (1– specified duty cycle) and divided by the duty cycle.

Formula:

𝑓1 Rest time calculation

$$R > \frac{N \cdot t_{ON}}{t_{OFF}}$$

N	s	Time running under load
R	s	Rest time
t_{ON}	s	ON time
t_{OFF}	s	OFF time

or

𝑓2 Alternative rest time calculation

$$R > \frac{N \cdot (1 - D)}{D}$$

D	%	Duty factor
N	s	Time running under load
R	s	Rest time

Example:

- t_{ON} / t_{OFF} = 85 s / 340 s
  or D 20 %
- The running time must be less than 85 s.
- If the running time is 30 s, the rest time must be greater than at least120 s

𝑓3 Example rest time calculation

$$\frac{30 \cdot 340}{85} = 120 \text{ s}$$

or

𝑓4 Example alternative rest time calculation

$$R > \frac{30 \cdot (1 - 20)}{20}$$

therefore

𝑓⃞5 Example alternative rest time calculation

$$R > \frac{30 \cdot \left(1 - 0.2\right)}{0.2}$$

Some products were developed for a specific application, but are also suitable for other applications requiring similar performance.

Selection of the control unit: channel per motor, output per channel, total output power ➤26|▦3

- Select the control unit that is compatible with the selected linear actuator or lifting column. Consider the total number of channels required by each product; some columns may require 2.
- Accessories can be selected: power cable or mains cable, additional wires, inlet and outlet housings, connection plates.

Selecting compatible operating elements per number of functions to be controlled

- Select the operating element that is compatible with the control unit.
- The type of operating element must be selected: the operating element may have a different number of buttons depending on the number of functions to be controlled (e.g., only the up and down functions require 2 buttons); the number of buttons increases depending on the number of linear actuators or lifting columns to be controlled or if memory positions or other functions are required.

3 EWELLIX linear actuators

3.1 MATRIX

The MATRIX series has been developed for medical devices and includes powerful linear AC actuators and DC actuators with direct current motors.

EWELLIX MATRIX linear actuators operate very quietly, require minimal space, and can be installed at almost any angle in a vertical or horizontal position. The series is medically approved. The Matrix series can be supplied as a complete system including control units, operating elements, and accessories.

Characteristics

- developed for medical devices
- medically approved
- complete system including control units, operating elements, and accessories
- back-up nut as standard
- safety factor of up to 4

Benefits

- synchronization possible
- low-noise operation with smooth running
- compact and aesthetic design
- available as an option:
  - anti-pinching protection
  - incremental position feedback
  - emergency lowering

3.1.1 MAX1

55 Linear actuator MAX1



001C0FFD

Benefits

- low-noise operation
- complete system including control unit, operating elements, and accessories
- synchronization possible
- compact and aesthetically pleasing
- back-up nut as standard

5 Technical data MAX1

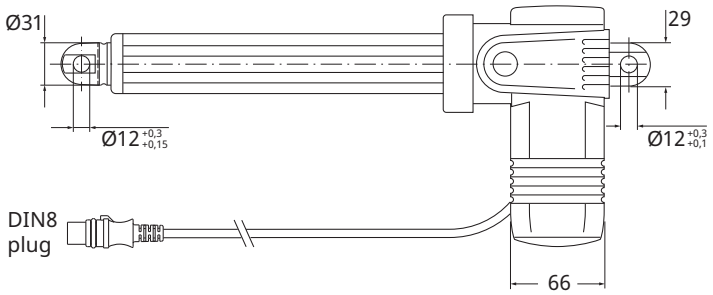
Feature	Unit	MAX1..-A	MAX1..-B	MAX1..-C
Rated push force	N	4000	2000	1500
Rated pull force	N	4000	2000	1500
min. speed (full load)	mm/s	5	6	13
max. speed (no load)	mm/s	7	9	18
min. stroke S	mm	50	50	50
max. stroke S	mm	700	700	700
Retracted length L	mm	S + 195 / 260 [1)]	S + 195 / 260 [1)]	S + 195 / 260 [1)]
Voltage	V DC	24	24	24
Power consumption	W	120	120	120
Current consumption	A	5	5	5
Duty cycle	%	10 ($^1/_9$)	10 ($^1/_9$)	10 ($^1/_9$)
min. ambient temperature	°C	0	0	0
max. ambient temperature	°C	+40	+40	+40
Protection code (IP)	–	IP66S	IP66S	IP66S
Weight (at 200 mm stroke)	kg	4	3.7	3.6
Color	–	Gray	Gray	Gray

1) For S ≤ 350 mm: L = 195 + S
For S > 350 mm: L = 260 + S

3

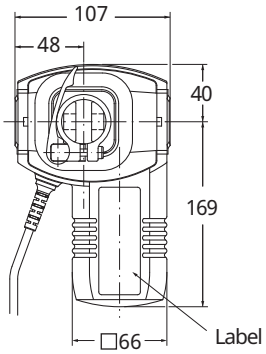
Dimensional drawings

56 Side view



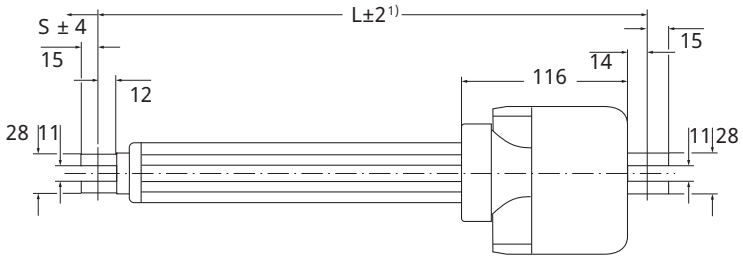
001C10BD

57 Front view



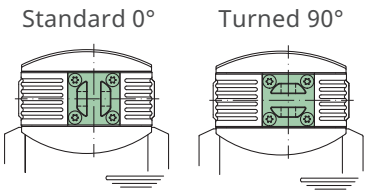
001C109D

58 Top view



001C104B

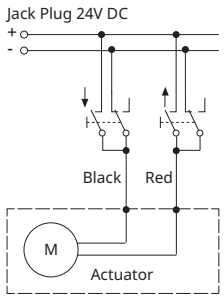
59 Rear mounting



001C106D

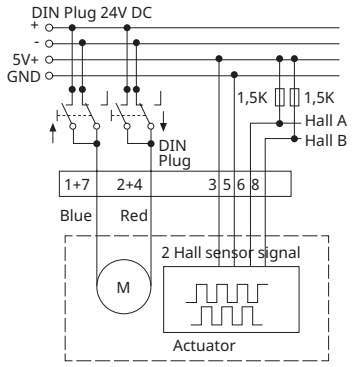
Wiring diagrams

60 Jack plug DC 24 V



001C102D

61 DIN-8 plug DC 24 V



001C103D

Valid for MAX 11 only. MAX 10 must be operated using a BCU, VCU, SCU, or MCU control unit.

Suitable control units and accessories

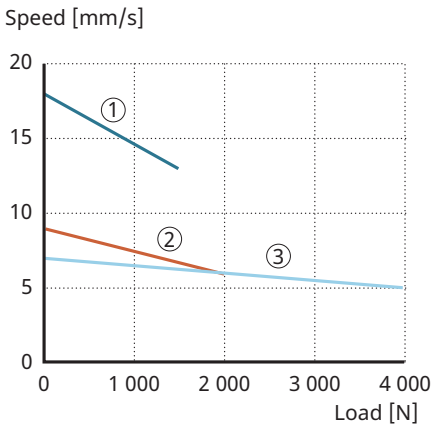
6 Suitable operating elements and control units

Operating elements	Switches	Control unit			
		SCU	VCU	BCU	MCU
EHA1	M	–	–	–	✓
EHA3	M	✓	✓	✓	–
STJ	F	✓	✓	✓	–
STF	F	–	–	–	✓
STE	T	✓	✓	✓	–
STA	T	–	–	–	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

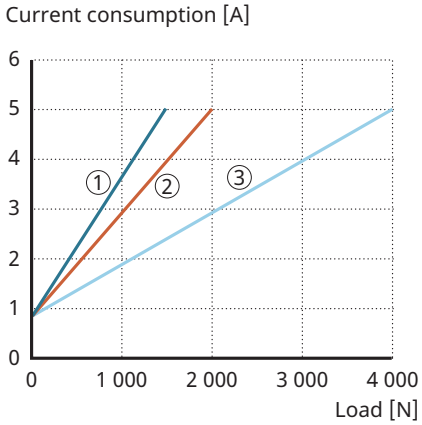
Performance diagrams

62 Speed-load diagram



1	MAX1..-C	2	MAX1..-B
3	MAX1..-A		

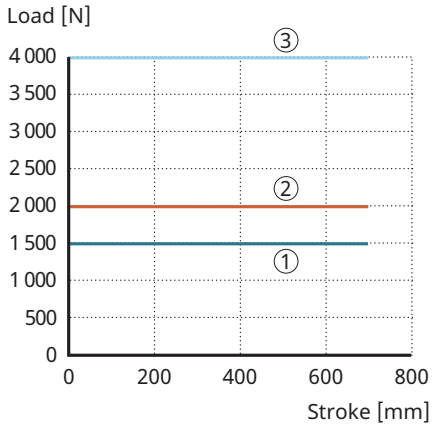
63 Current-load diagram



1	MAX1..-C	2	MAX1..-B
3	MAX1..-A		

Load limit

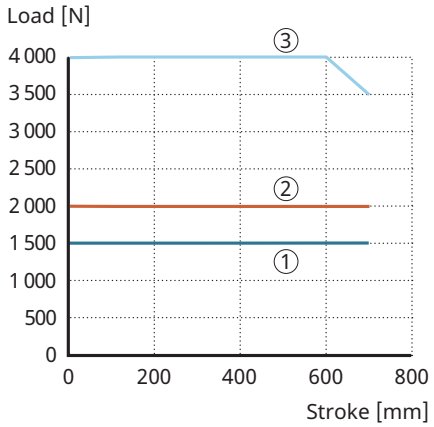
64 Load limit (push and pull) for safety factor SF =1



001C113D

1	MAX1..-C	2	MAX1..-B
3	MAX1..-A		

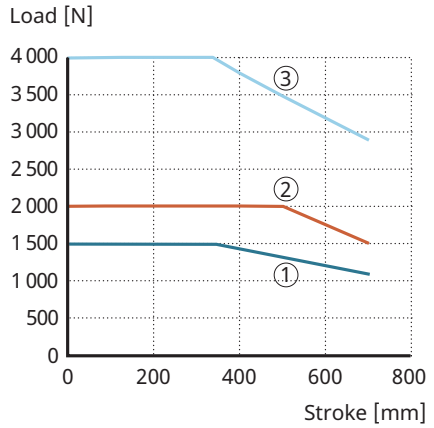
65 Load limit (push and pull) for safety factor SF =2



001C114D

1	MAX1..-C	2	MAX1..-B
3	MAX1..-A		

66 Load limit (push and pull) for safety factor SF = 4 (EN 60601)



001C115D

1	MAX1..-C	2	MAX1..-B
3	MAX1..-A		

Ordering key

67 Ordering designation



Type

Voltage

0	DC 24 V
1	DC 24 V with integrated current shutdown

Load

A	4000 N
B	2000 N
C	1500 N

Stroke (S)

050 245	50 mm
100 295	100 mm
150 345	150 mm
200 395	200 mm
250 445	250 mm
300 495	300 mm
350 545	350 mm
400 660	400 mm
450 710	450 mm
500 760	500 mm
550 810	550 mm
600 860	600 mm
650 910	650 mm
700 960	700 mm
– – – – – –	Other stroke lengths; 50 < S < 700 mm, available on request

Cable/connecting plug

0B	Coiled cable, 0.75 m (not extended) / DIN-8 plug, available on request
C5	Straight cable, 2.5 m / DIN-8 plug
0A	Coiled cable, 0.75 m (not extended) / jack plug
25	Straight cable, 2.5 m / jack plug
– –	Cables in special lengths available on request

Alignment of rear attachment

0	No fork head (customized option)
1	Standard (in accordance with drawing)
2	Rotated by 90°

Option 1

0	No option, only valid for linear actuator “A” (push and pull)
E	Quick release + EKZm, push, fork head bore parallel to button (for linear actuator in version “C”, L = +115 mm)[1)]
F	Quick release + EKZm, push, fork head bore at 90° to button (for linear actuator in version “C”, L = +115 mm)[1)]
M	Push load direction, for linear actuator in version “B” and “C”
N	Pull load direction, for linear actuator in version “B” and “C”

Option 2

0	No option
F	Dual Hall encoder, DIN-8 plug
M	Service life monitoring, available on request
P	Service life monitoring, dual Hall encoder, DIN-8 plug, available on request

Option 3

–	No option
V	Emergency lowering, fork head bore parallel to clamping lever (for linear actuator in version “A”, L+30 mm)
W	Emergency lowering, fork head bore at 90° to clamping lever (for linear actuator in version “A”, L+30 mm), available on request

Customization

[1)] EKZm: mechanical anti-pinching protection, min. stroke 150 mm to 300 mm

001DF30E

3.1.2 MAX3

68 Linear actuator MAX3



001C118D

Benefits

- low-noise operation
- complete system including control unit, operating elements, and accessories
- synchronization possible
- compact and aesthetically pleasing
- back-up nut as standard

7 Technical data MAX3

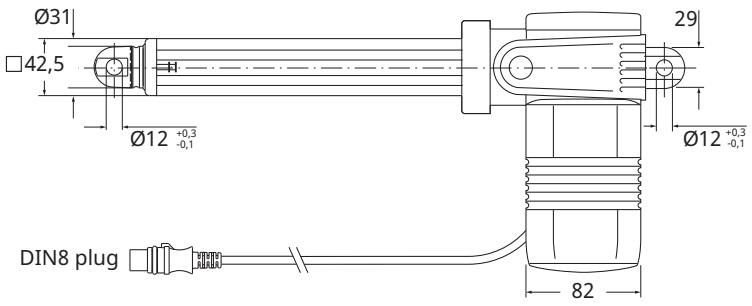
Feature	Unit	MAX3..-A	MAX3..-B	MAX3..-C
Rated push force	N	8000	4000	3000
Rated pull force	N	6000 [1)]	4000	3000
min. speed (full load)	mm/s	5	6	13
max. speed (no load)	mm/s	7	9	18
min. stroke S	mm	50	50	50
max. stroke S	mm	700	700	700
Retracted length L	mm	S + 215 / 280 [2)]	S + 215 / 280 [2)]	S + 215 / 280 [2)]
Voltage	V DC	12 / 24	12 / 24	12 / 24
Power consumption	W	120	120	120
Current consumption	A	5	5.2	5.2
Duty cycle	%	10 ($^1/_9$)	10 ($^1/_9$)	10 ($^1/_9$)
min. ambient temperature	°C	0	0	0
max. ambient temperature	°C	+40	+40	+40
Protection code (IP)	–	IP66S	IP66S	IP66S
Weight (at 200 mm stroke)	kg	4.5	4.2	4
Color	–	Gray	Gray	Gray

1) The max. load for medical applications is 5000 N.

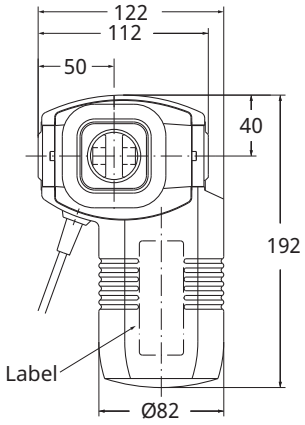
2) For S ≤ 350 mm: L = 215 + S
For S > 350 mm: L = 280 + S

Dimensional drawings

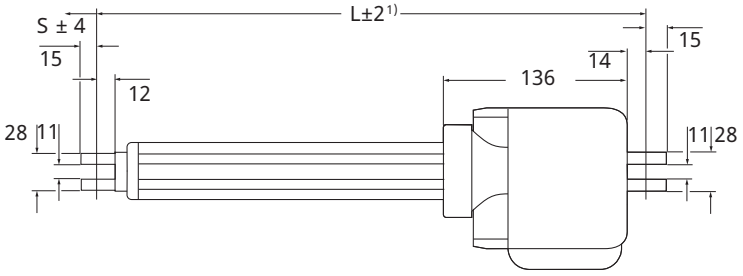
69 Side view



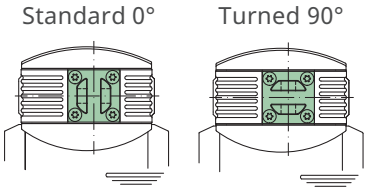
70 Front view



71 Top view

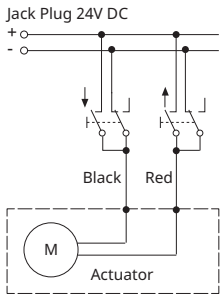


72 Rear mounting



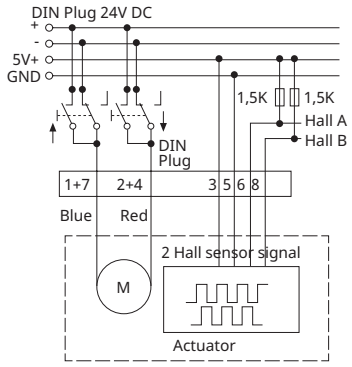
Wiring diagrams

73 Jack plug DC 24 V



001C102D

74 DIN-8 plug DC 24 V



001C103D

Valid for MAX 31 only. MAX 30 must be operated using a BCU, VCU, SCU, or MCU control unit.

Suitable control units and accessories

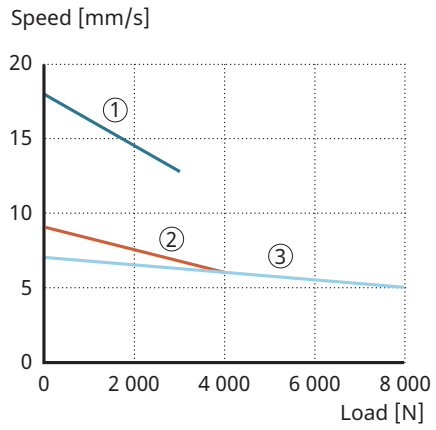
8 Suitable operating elements and control units

Operating elements	Switches	Control unit			
		SCU	VCU	BCU	MCU
EHA1	M	–	–	–	✓
EHA3	M	✓	✓	✓	–
STJ	F	✓	✓	✓	–
STF	F	–	–	–	✓
STE	T	✓	✓	✓	–
STA	T	–	–	–	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

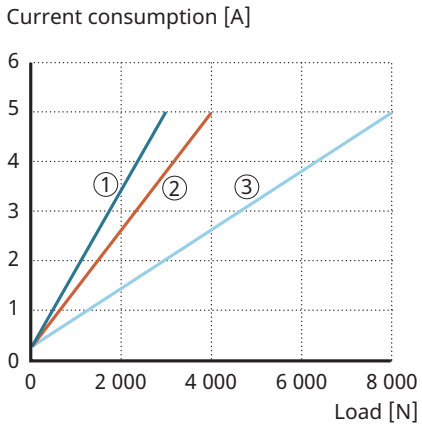
Performance diagrams

75 Speed-load diagram



1	MAX3..-C	2	MAX3..-B
3	MAX3..-A		

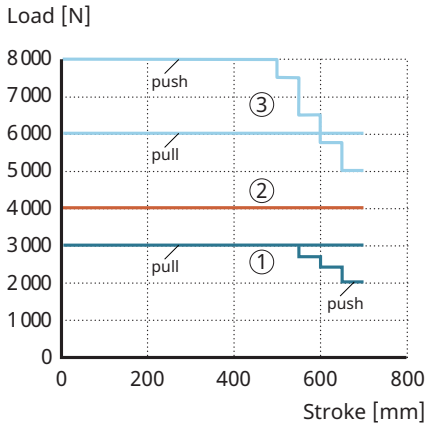
76 Current-load diagram



1	MAX3..-C	2	MAX3..-B
3	MAX3..-A		

Load limit

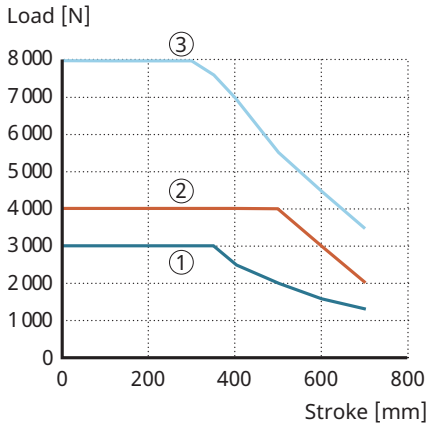
77 Load limit (push and pull) for safety factor SF =1



001C125D

1	MAX3..-C	2	MAX3..-B
3	MAX3..-A		

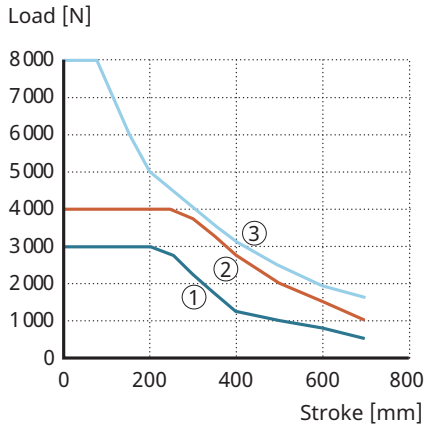
78 Load limit (push and pull) for safety factor SF =2



001C126D

1	MAX3..-C	2	MAX3..-B
3	MAX3..-A		

79 Load limit (push and pull) for safety factor SF = 4 (EN 60601)

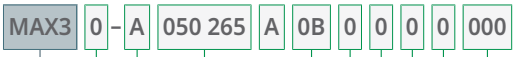


001C127D

1	MAX3..-C	2	MAX3..-B
3	MAX3..-A		

Ordering key

80 Ordering designation



Type

Voltage

0	DC 24 V
1	DC 24 V with integrated current shutdown, available on request
2	DC 12 V, available on request

Load

A	8000 N
B	4000 N
C	3000 N

Stroke (S)

050 265	50 mm
100 315	100 mm
150 365	150 mm
200 415	200 mm
250 465	250 mm
300 515	300 mm
350 565	350 mm
400 680	400 mm
450 730	450 mm
500 780	500 mm
550 830	550 mm
600 880	600 mm
650 930	650 mm
700 980	700 mm
– – – – – –	Other stroke lengths; 50 < S < 700 mm, available on request

Cable/connecting plug

0B	Coiled cable, 0.75 m (not extended) / DIN-8 plug, available on request
C5	Straight cable, 2.5 m / DIN-8 plug
0A	Coiled cable, 0.75 m (not extended) / jack plug
25	Straight cable, 2.5 m / jack plug
––	Cables in special lengths, available on request

Alignment of rear attachment

0	No fork head (customized option)
1	Standard (in accordance with drawing)
2	Rotated by 90°, available on request

Option 1

0	No option, only valid for linear actuator “A” (push and pull)
E	Quick release + EKZm, push, fork head bore parallel to button (for linear actuator in version “C”, L = +115 mm)[1)]
F	Quick release + EKZm, push, fork head bore at 90° to button (for linear actuator in version “C”, L = +115 mm)[1)], available on request
K	Electrical anti-pinching protection, motor direction pull
L	Electrical anti-pinching protection, motor direction push
M	Push load direction, for linear actuator in version “B” and “C”
N	Pull load direction, for linear actuator in version “B” and “C”

Option 2

0	No option
F	Dual Hall encoder, DIN-8 plug
M	Service life monitoring, available on request
P	Service life monitoring, dual Hall encoder, DIN-8 plug, available on request

Option 3

–	No option
V	Emergency lowering, fork head bore parallel to clamping lever (for linear actuator in version “A”, L+30 mm)
W	Emergency lowering, fork head bore 90° to clamping lever, available on request (for linear actuator in version “A”, L+30 mm)

Customization

[1)] EKZm: mechanical anti-pinching protection, min. stroke 150 mm to 300 mm

001DF31E

3.1.3 MAX7

81 Linear actuator MAX7



001C129B

Benefits

- wide-range power supply
- operational readiness indicator
- plug and play with integrated control unit
- developed for medical products, in accordance with IEC 60601-1

9 Technical data MAX7

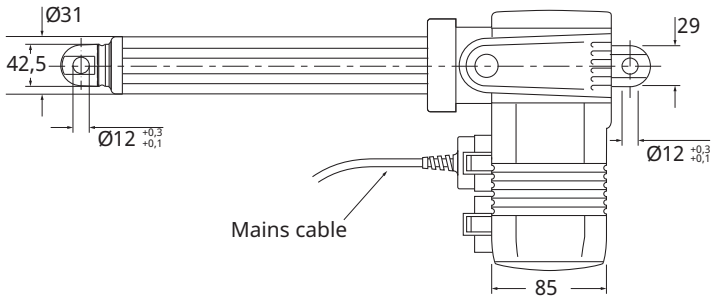
Feature	Unit	MAX7..-A	MAX7..-B	MAX7..-C
Rated push force	N	8000	4000	3000
Rated pull force	N	6000 [1)]	4000	3000
min. speed (full load)	mm/s	6	8	13
max. speed (no load)	mm/s	7.5	10	18
min. stroke S	mm	50	50	50
max. stroke S	mm	700	700	700
Retracted length L	mm	S + 215 / 280 [2)]	S + 215 / 280 [2)]	S + 215 / 280 [2)]
Voltage	V AC	100 ... 240 at 50/60 Hz	100 ... 240 at 50/60 Hz	100 ... 240 at 50/60 Hz
Power consumption	W	180	180	180
Current consumption at AC 100 V	A	3.2	3.2	3.2
Current consumption at AC 240 V	A	1.6	1.6	1.6
Duty cycle	%	10 ($^1/_9$)	10 ($^1/_9$)	10 ($^1/_9$)
min. ambient temperature	°C	0	0	0
max. ambient temperature	°C	+40	+40	+40
Protection code (IP)	–	IP66S	IP66S	IP66S
Weight (at 200 mm stroke)	kg	4.8	4.5	4.2
Color	–	Gray	Gray	Gray

1) The max. load for medical applications is 5000 N.

2) For S ≤ 350 mm: L = 215 + S
For S > 350 mm: L = 280 + S

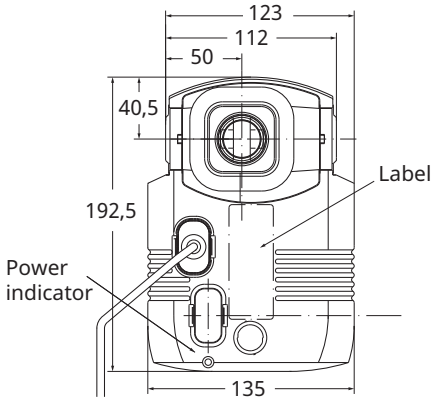
Dimensional drawings

82 Side view



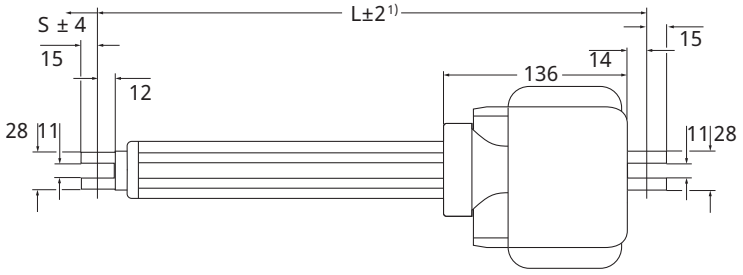
001C130E

83 Front view



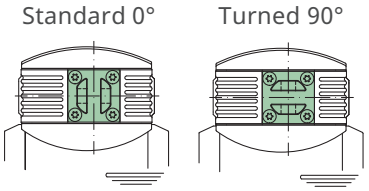
001C12FE

84 Top view



001C12CD

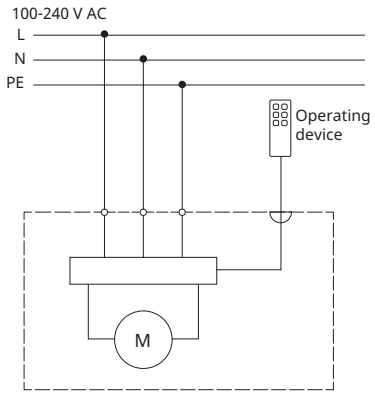
85 Rear mounting



001C106D

Wiring diagrams

86 Connection diagram AC 100 ... 240 V



Suitable control units and accessories

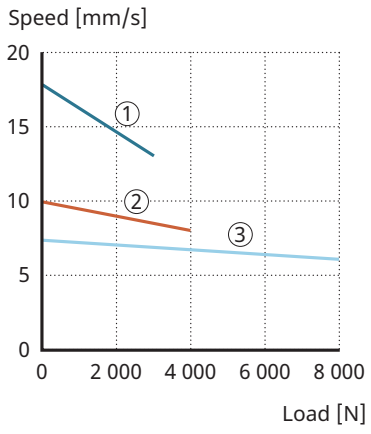
10 Suitable operating elements and control units

Operating elements	Switches	MAX70	MAX72/74
EHA1	M	–	✓
PHC	M	✓	–
STF	F	–	✓
PFP	F	✓	–
STA	T	–	✓
PAM	T	✓	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

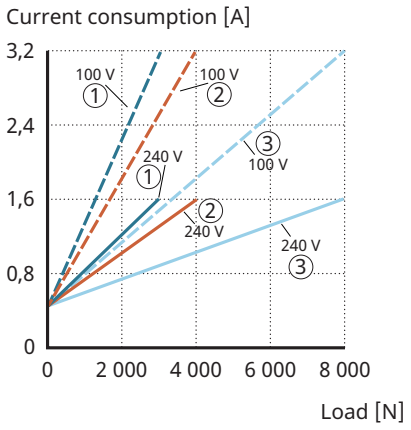
Performance diagrams

87 Speed-load diagram



1	MAX7..-C	2	MAX7..-B
3	MAX7..-A		

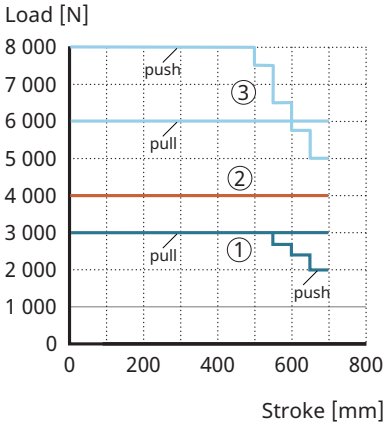
88 Current-load diagram



1	MAX7..-C	2	MAX7..-B
3	MAX7..-A		

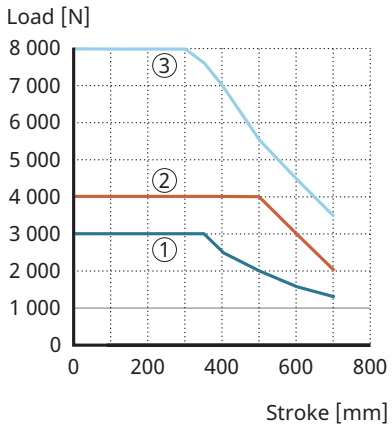
Load limit

89 Load limit (push and pull) for safety factor SF =1



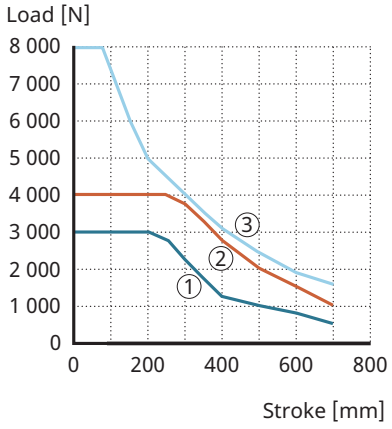
1	MAX7..-C	2	MAX7..-B
3	MAX7..-A		

90 Load limit (push and pull) for safety factor SF =2



1	MAX7..-C	2	MAX7..-B
3	MAX7..-A		

91 Load limit (push and pull) for safety factor SF = 4 (EN 60601)



1	MAX7..-C	2	MAX7..-B
3	MAX7..-A		

11 Accessories

Accessories	Plug	Country	Ordering designation	Order number
Straight cable 3.5 m	Schuko	DE	ZKA-140306-3500	0121723
Straight cable 3.5 m	SEV	CH	ZKA-140316-3500	0121737
Straight cable 3.5 m	UL	USA	ZKA-140355-3500	0121724
Straight cable 3.5 m	Hospital-grade plug	USA	ZKA-140360-3500	0121732
Straight cable 3.5 m	British plug	UK	ZKA-140350-3500	0121743
Coiled cable 1.2 m/2.2 m	Schuko	DE	ZKA-140342-1500	0121728
Straight polyurethane cable 3.5 m	SEV	CH	ZKA-140426-3500	0121740
Strain relief for mains cable	–	–	ZUB-952253	0102848
Tool for plugs (jack plug/D-sub/power supply)	–	–	ZWS-140375	0125322

Ordering key

92 Ordering designation

MAX7 | 0 | – | A | 050 245 | A | 0 | 0 | 0 | 0 | V | 000

Type

Voltage

0	AC 100-240 V/50-60 Hz, integrated pneumatic control
2	AC 100-240 V/50-60 Hz, integrated low-voltage control with additional 24 V output
4	AC 100-240 V/50-60 Hz, integrated low-voltage control

Load

A	4000 N
B	2000 N
C	3000 N

Stroke (S)

050 265	50 mm
100 315	100 mm
150 365	150 mm
200 415	200 mm
250 465	250 mm
300 515	300 mm
350 565	350 mm
400 680	400 mm
450 730	450 mm
500 780	500 mm
550 830	550 mm
600 880	600 mm
650 930	650 mm
700 980	700 mm
––––––	Other stroke lengths; 50 < S < 700 mm, available on request

Cable/connecting plug

0	No cable

Alignment of rear attachment

0	No fork head (customized option)
1	Standard (in accordance with drawing)
2	Rotated by 90°, available on request

Option 1

0	No option, only valid for linear actuator “A” (push and pull)
E	Quick release + EKZm, push, fork head bore parallel to button (for linear actuator in version “C”, L = +115 mm)[1)]
F	Quick release + EKZm, push, fork head bore at 90° to button (for linear actuator in version “C”, L = +115 mm)[1)], available on request
K	Electrical anti-pinching protection, motor direction pull, available on request
L	Electrical anti-pinching protection, motor direction push, available on request
M	Push load direction, for linear actuator in version “B” and “C”
N	Pull load direction, for linear actuator in version “B” and “C”

Option 2

0	No option

Option 3

-	No option
V	Emergency lowering, fork head bore parallel to clamping lever (for linear actuator in version “A”, L+30 mm)
W	Emergency lowering, fork head bore at 90° to clamping lever (for linear actuator in version “A”, L+30 mm), available on request

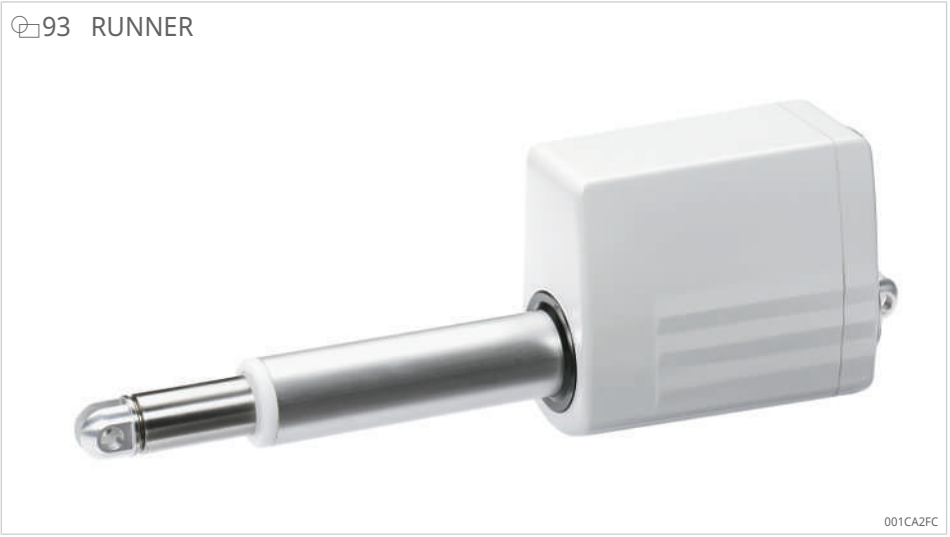
Customization

[1)] EKZm: mechanical anti-pinching protection, min. stroke 150 mm to 300 mm

001DF32E

3.2 RUNNER

93 RUNNER



Benefits

- High push load and pull load
- Compact
- Back-up nut as standard
- High safety factor
- Silent operation

12 Technical data RU20 to RU25

Characteristic	Unit	RU20	RU21	RU22	RU23	RU24	RU25
Power supply	–	DC	DC	DC	DC	DC	DC
Voltage	V	24	24	24	24	24	24
Power consumption	W	–	–	–	–	–	–
Current consumption	A	7	7	7	10	10	10
Protection type	–	IPX4S, IPX6S	IPX4S, IPX6S	IPX4S, IPX6S	IPX4S, IPX6S	IPX4S, IPX6S	IPX4S, IPX6S
Nominal push load	N	8000	10000	12000 [1)]	8000	10000	12000 [1)]
Nominal pull load	N	8000	8000	8000	8000	8000	8000
Speed (full load to no load)	mm/s	7 ... 10	5 ... 8	4 ... 7	8 ... 15	6 ... 12	5 ... 9
Stroke length S	mm	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700
Retracted length L [2)]	mm	S + 215 / 315	S + 215 / 315	S + 215 / 315	S + 215 / 315	S + 215 / 315	S + 215 / 315
Duty cycle	%	10	10	10	10	10	10
Ambient temperature	°C	+10 ... +40	+10 ... +40	+10 ... +40	+10 ... +40	+10 ... +40	+10 ... +40
Mass	kg	4.7	4.7	4.7	4.7	4.7	4.7
Color	–	Gray	Gray	Gray	Gray	Gray	Gray

1) The safe working load for medical applications is 10000 N in accordance with IEC 60601.

2) S ≤ 500 mm: L = S + 215
S > 500 mm: L = S + 315

13 Technical data RU30 to RU35

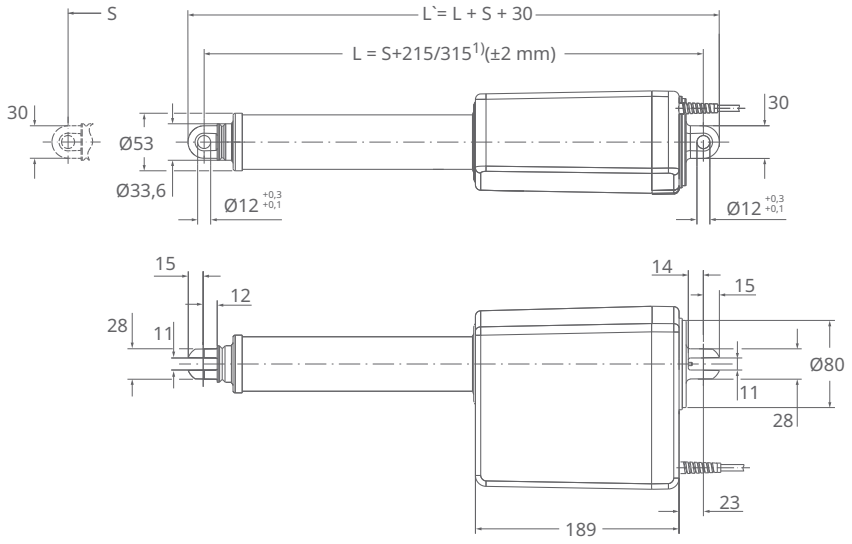
Characteristic	Unit	RU30	RU31	RU32	RU33	RU34	RU35
Power supply	–	DC	DC	DC	DC	DC	DC
Voltage	V	24	24	24	24	24	24
Power consumption	W	–	–	–	–	–	–
Current consumption	A	7	7	7	10	10	10
Protection type	–	IPX4S, IPX6S	IPX4S, IPX6S	IPX4S, IPX6S	IPX4S, IPX6S	IPX4S, IPX6S	IPX4S, IPX6S
Nominal push load	N	8000	10000	12000 [3)]	8000	10000	12000 [3)]
Nominal pull load	N	8000	8000	8000	8000	8000	8000
Speed (full load to no load)	mm/s	14 ... 15	11 ... 13	9 ... 10	17 ... 24	14 ... 20	11 ... 15
Stroke length S	mm	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700
Retracted length L [4)]	mm	S + 215 / 315	S + 215 / 315	S + 215 / 315	S + 215 / 315	S + 215 / 315	S + 215 / 315
Duty cycle	%	10	10	10	10	10	10
Ambient temperature	°C	+10 ... +40	+10 ... +40	+10 ... +40	+10 ... +40	+10 ... +40	+10 ... +40
Mass	kg	4.7	4.7	4.7	4.7	4.7	4.7
Color	–	Gray	Gray	Gray	Gray	Gray	Gray

3) The safe working load for medical applications is 10000 N in accordance with IEC 60601.

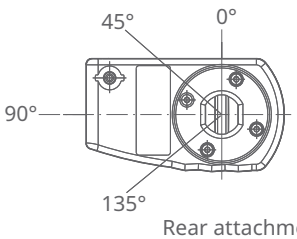
4) S ≤ 500 mm: L = S + 215
S > 500 mm: L = S + 315

Dimensional drawings

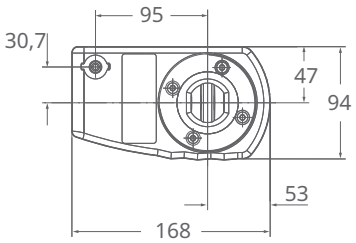
94 RUNNER dimensions



95 RUNNER Positions rear attachment

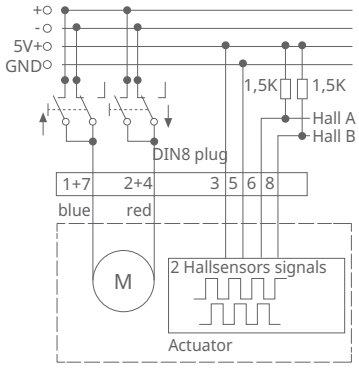


96 Rear attachment dimension

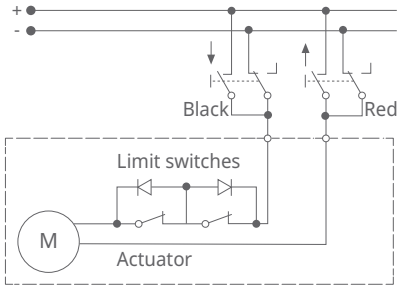


Wiring diagrams

97 DIN plug DC 24 V and DC 36 V



98 Jack plug DC 24 V



Suitable control units and accessories

14 Suitable control units

Linear actuator	Control unit			
	SCU	VCU	BCU	MCU
RU20, RU21, RU22	✓	✓	✓	✓
RU23, RU24, RU25	✓	✓	–	✓

✓ suitable
– not suitable

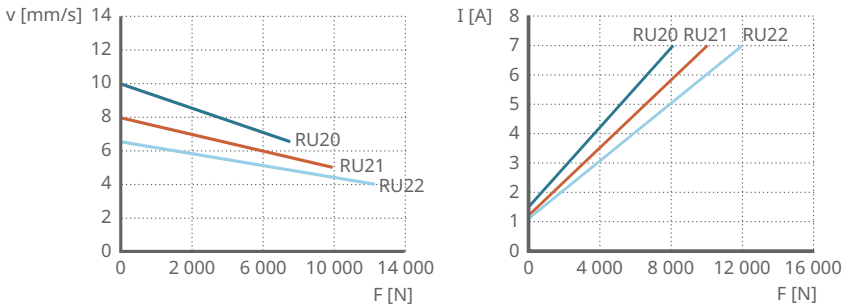
15 Suitable operating elements

Operating element		Control unit			
Designation	**Switches**	**SCU**	**VCU**	**BCU**	**MCU**
EHA1	M	–	–	–	✓
EHA3	M	✓	✓	✓	–
STJ	F	✓	✓	✓	–
STF	F	–	–	–	✓
STA	T	–	–	–	✓
STE	T	✓	✓	✓	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

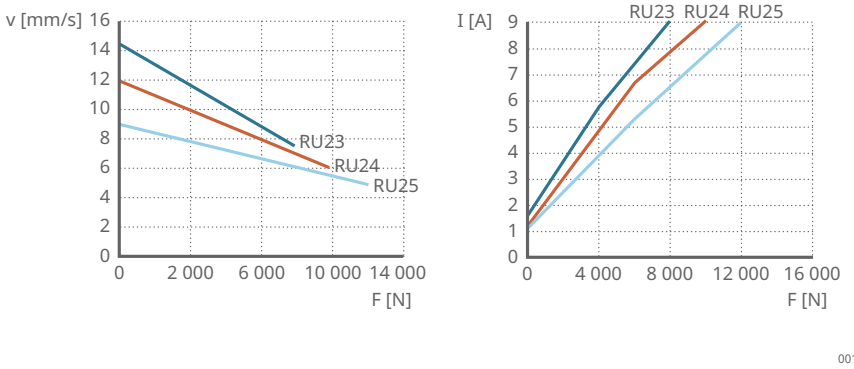
Performance diagrams

99 Performance diagram RU20, RU21, RU22



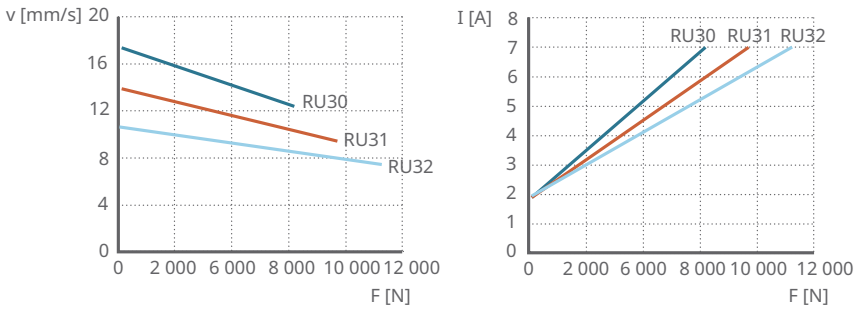
v	Speed	F	Load
I	Current consumption		

100 Performance diagram RU23, RU24, RU25



v	Speed	F	Load
I	Current consumption		

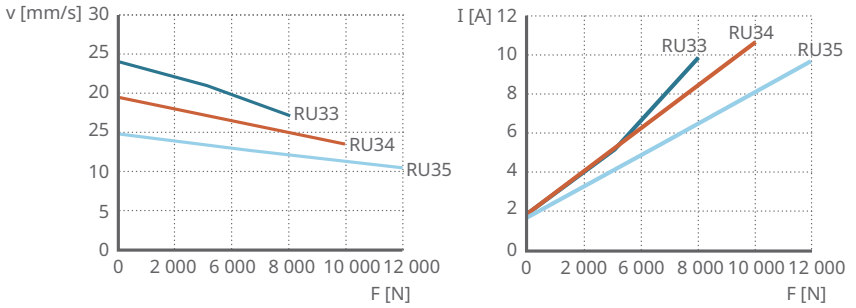
101 Performance diagram RU30, RU31, RU32



001CA4CD

v	Speed	F	Load
I	Current consumption		

102 Performance diagram RU33, RU34, RU35

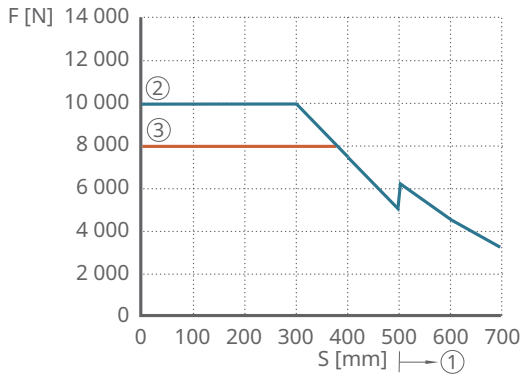


001CA4CF

v	Speed	F	Load
I	Current consumption		

Load limit

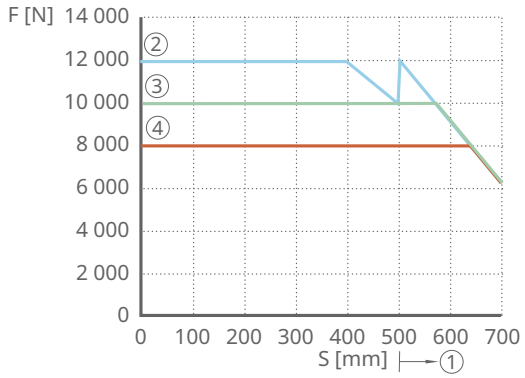
103 Push load limit, safety factor S = 4 in accordance with IEC 60601, emergency lowering optional S = 2.5



001CA60F

1	Extended retracted length at S > 500 mm	2	RU21, RU22, RU24, RU25 ,RU31, RU32, RU34, RU35
3	RU20, RU23, RU30, RU33		
F	Load	S	Stroke

104 Push load limit, safety factor S = 2 in accordance with IEC 60601



001CA61F

1	Extended retracted length at S > 500 mm	2	RU22, RU25, RU32, RU35
3	RU21, RU24, RU31, RU34	4	RU20, RU23, RU30, RU33
F	Load	S	Stroke

Ordering key

105 Ordering designation RUNNER

RU 2 0 – 050 315 A 15 0 0 0 V – 00

Type

Voltage

2	DC 24 V
3	DC 36 V, available on request

Load/speed

	DC 24 V	DC 36 V, available on request
0	8000 N/7-10 mm/s	14 to 15 mm/s
3	8000 N/8-15 mm/s	17 to 24 mm/s
1	10000 N/5-8 mm/s	11 to 13 mm/s
4	10000 N/6-12 mm/s	14 to 20 mm/s
2	12000 N/4-7 mm/s	9 to 10 mm/s
5	12000 N/5-9 mm/s	11 to 15 mm/s

Stroke (S)/retracted length (L)

050 315	50 mm/315 mm
100 315	100 mm/315 mm
150 365	150 mm/365 mm
200 415	200 mm/415 mm
250 465	250 mm/465 mm
300 515	300 mm/515 mm
350 565	350 mm/565 mm
400 615	400 mm/615 mm
450 665	450 mm/665 mm
500 715	500 mm/715 mm
550 865	550 mm/865 mm
600 915	600 mm/915 mm
650 965	650 mm/965 mm
700 XXX	700 mm/1 015 mm
SSS LLL	50 < S ≤ 500 mm/S + 215, available on request
SSS LLL	500 < S < 700 mm/S + 315, available on request
XXX XXX	S > 700 mm (customized), available on request

Protection type/color

A	IPX4S, gray
B	IPX6S, gray

Cable

15	Straight cable, 1,5 m, DIN-8 plug
0D	Straight cable, 1,5 m, jack plug 180°, available on request

Alignment of rear attachment

0	0°
2	45°, available on request
4	90°, available on request
6	135°, available on request

Option 1

0	No option
K	Electrical anti-pinching protection (safety switch), load direction pull, L + 20 mm, available on request
L	Electrical anti-pinching protection (safety switch), load direction pull, L + 20 mm, available on request
M	Mechanical end stop, L + 25 mm, available on request
N	Electrical anti-pinching protection, load direction pull, with mechanical end stop, L + 45 mm, available on request
P	Electrical anti-pinching protection, load direction push, with mechanical end stop, L + 45 mm, available on request

Option 2

0	No option
A	Dual Hall encoder, 14 pulses, DIN-8 plug

Option 3

–	No option
V	Emergency lowering, L + 53 mm (for load direction push only), available on request

Customization

001DF778

3.3 CAJA35C

106 CAJA35C



001CF013

Benefits

- quick-release solution for rapid intervention during cardiopulmonary resuscitation (CPR)
- detachable cable for quick assembly and service
- integrated brake to ensure self-locking and stability under maximum static compressive load

16 Technical data CAJA35C

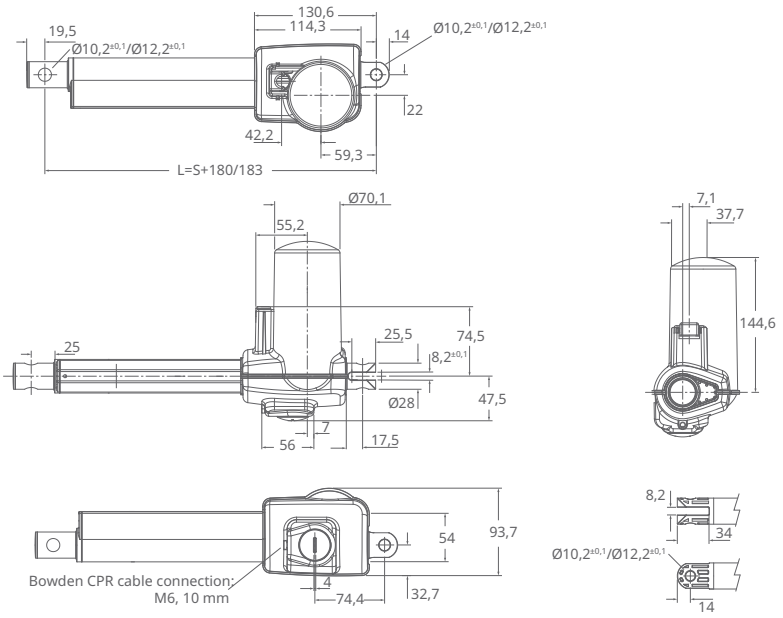
Feature	Unit	CAJA35C
Rated push force	N	3500
Speed (full load ... no load)	mm/s	5.5 to 8.5
Stroke S	mm	30 to 250
Retracted length L [1)]	mm	S + 180 [2)]
Voltage	V DC	24
Current consumption	A	4
Duty cycle	%	10
Ambient temperature	°C	+10 to +40
Protection code (IP)	–	IP56
Mass	kg	2.5
Color	–	Gray

1) Tolerance ±3 mm

2) Retracted length +3 mm when clevis is used as front attachment (L = S + 183)

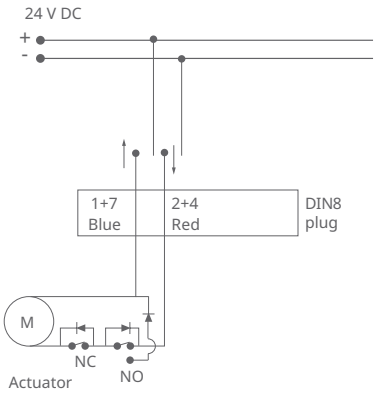
Dimensional drawings

107 Dimensions CAJA35C



Wiring diagrams

108 Connecting diagram CAJA35C, DC version



Suitable control units and accessories

17 Suitable operating elements

Operating element		Control		
Designation	**Switch**	**SCU**	**VCU**	**BCU**
EHA3	M	✓	✓	✓
STJ	F	✓	✓	✓
STE	T	✓	✓	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

3

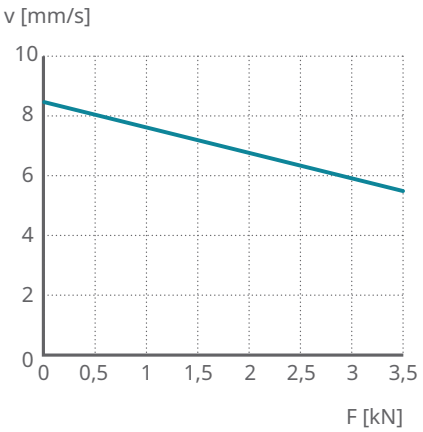
18 Suitable controls

Linear actuator	Control		
	SCU	VCU	BCU
CAJA35C	✓	✓	✓

✓ suitable

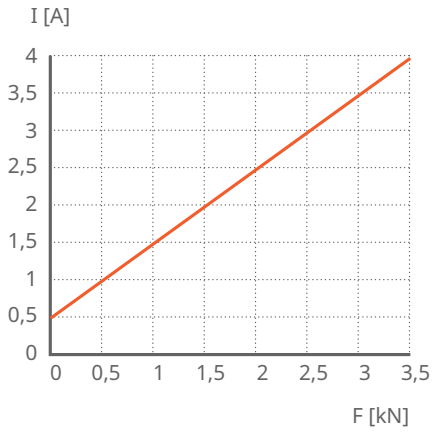
Performance diagrams

109 Speed-load diagram CAJA35C



v	Speed	F	Load

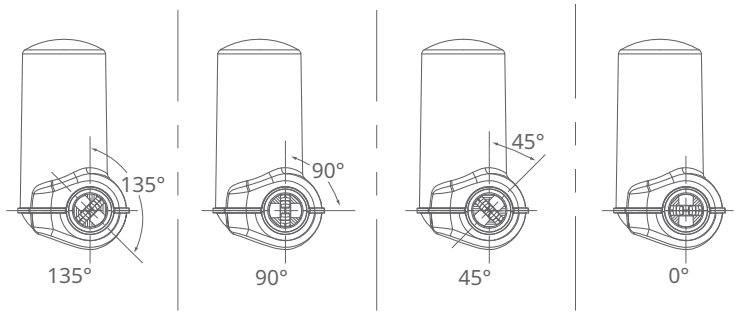
110 Current-load diagram CAJA35C



I	Current consumption	F	Load

Alignment

111 Orientation



Accessories

19 Accessories CAJA35C

Straight motor cable	Length
	mm
G517C0-094001-0460	460
G517C0-094001-1350	1350
G517C0-094001-2650	2650

Ordering key

112 Ordering designation CAJA35C



Type

Stroke

100	100 mm
200	200 mm
250	250 mm
XXX	Customization: 30 ... 250 mm

Rear attachment

A	Clevis end, metal, Ø10,2 mm
B	Clevis end, metal, Ø12,2 mm

Front attachment

A	Tube with hole and metal bushings, Ø10,2 mm
B	Tube with hole and metal bushings, Ø12,2 mm
C	Clevis end, metal, Ø10,2 mm (increase “L” by 3 mm)
D	Clevis end, metal, Ø12,2 mm (increase “L” by 3 mm)

Alignment of attachment (clockwise)

0	0°
1	45°
9	90°
2	135°

Housing material

ABS UL94 V0

Protection type (with mains cables M6, 10 mm connected)

IP56

Option 1

0	No option
1	Anti-pinching solution linear actuator (“push only”)

Option 2

0	No option
1	With back-up nut (for “push” load)

Option 3

0	No option
1	Motor with thermoswitch

Customization

000	Standard series

001DF788

3.4 ECOMAG

113 ECOMAG



Benefits

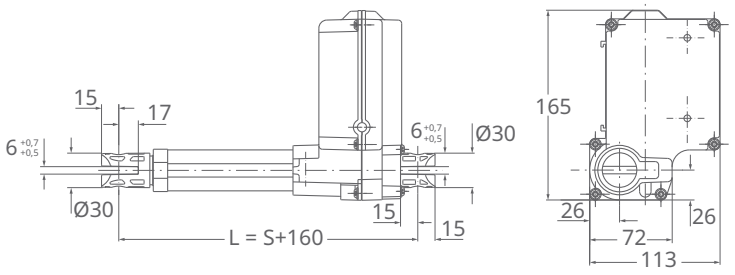
- compact
- cost-effective
- low-noise operation
- control unit can be mounted on the linear actuator

20 Technical data ECOMAG

Feature	Unit	Push versions		Pull-push versions	
		ECO2, ECO4	ECO6, ECO8	ECO3, ECO5	ECO7, ECO9
Rated push force	N	2000	6000	2000	6000
Rated pull force	N	0	0	2000	4000
Speed (full load to no load)	mm/s	9 to 13	4 to 7	9 to 13	4 to 7
Stroke S	mm	50 to 300	50 to 300	50 to 300	50 to 300
Retracted length L	mm	S + 160	S + 160	S + 160	S + 160
Voltage	DC V	24	24	24	24
Power consumption	W	70	120	70	120
Current consumption	A	4	6	4	6
Duty cycle	%	10	10	10	10
	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Ambient temperature	°C	+10 to +40	+10 to +40	+10 to +40	+10 to +40
Protection code (IP)	–	IPX4S	IPX4S	IPX4S	IPX4S
Mass	kg	2.1	2.1	2.5	2.5
Color	–	Black or gray	Black or gray	Black or gray	Black or gray

Dimensional drawings

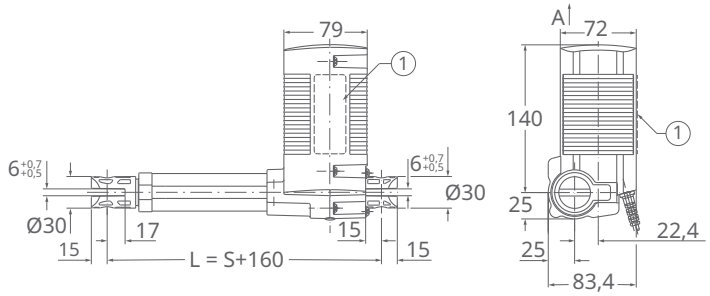
114 ECO2, ECO3, ECO6, ECO7



001C2816

S	Stroke	L	Retracted length

115 ECO4, ECO5, ECO8, ECO9

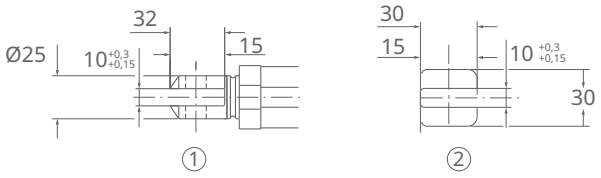


001C2CA1

S	Stroke	L	Retracted length
1	Product label		

Attachments

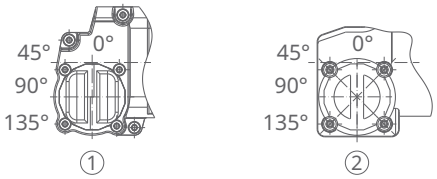
116 Attachment



001C281B

1	Front attachment	2	Rear attachment

117 Alignment of the attachment

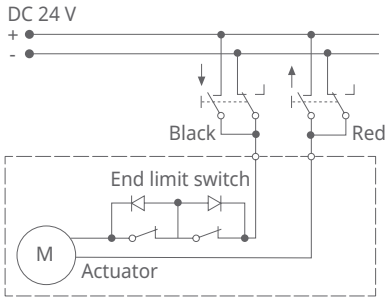


001C2C51

1	Push versions: ECO2, ECO4, ECO6, ECO8	2	Pull-push versions: ECO3, ECO5, ECO7, ECO9

Wiring diagrams

118 Connecting diagram



Suitable control units and accessories

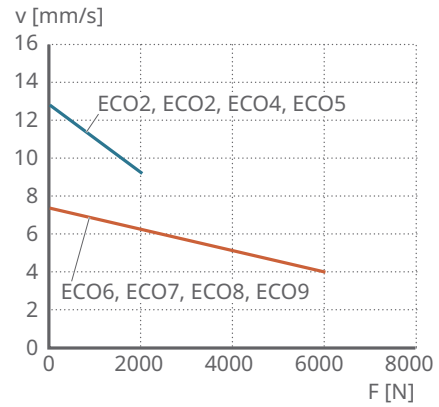
21 Suitable control units and operating elements for ECOMAG

Operating element		Control unit				
Designation	**Switch**	**SCU**	**VCU**	**BCU**	**MCU**	**SEM**
EHA1	M	–	–	–	✓	–
EHA3	M	✓	✓	✓	–	–
EHE	M	–	–	–	–	✓
STJ	F	✓	✓	✓	–	–
STF	F	–	–	–	✓	–
STA	T	–	–	–	✓	–
STE	T	✓	✓	✓	–	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Performance diagrams

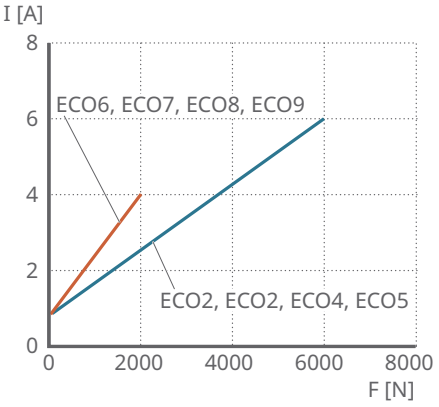
119 Speed-load diagram



001C2824

v	Speed	F	Load

120 Power diagram: current, load

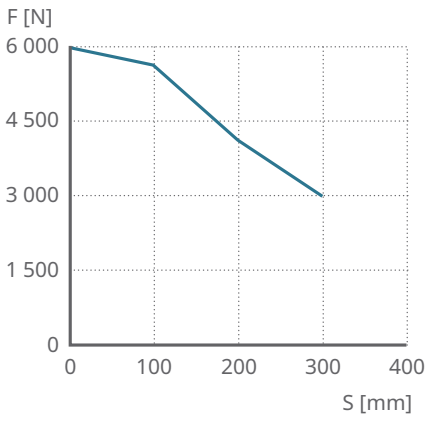


001C2827

I	Current consumption	F	Load

Load limit

121 Push load reduction, safety factor SF = 4



001C2823

F	Lush load	S	Stroke

Ordering key

122 Ordering designation ECOMAG

ECO 2 0 – 0 05 M M 1 A 0 000

Type

Load/housing

	Push	Pull	Housing
2	2000 N	0 N	Large
3	2000 N	2000 N	Large
4	2000 N	0 N	Small
5	2000 N	2000 N	Small
6	6000 N	0 N	Large
7	6000 N	4000 N	Large
8	6000 N	0 N	Small
9	6000 N	4000 N	Small

Encoder

0	No encoder, coiled cable, 2-pin Mini-Fit plug or customized design, available on request
9	No encoder, coiled cable, DIN-8 plug or customized design
F	Dual Hall encoder, 8 pulses, straight cable, DIN-8 plug (small housing only)

Current cut-off

0	None
1	Yes (not available for ECO4, ECO5, ECO8), available on request

Stroke S

05	50 mm
10	100 mm
15	150 mm
20	200 mm
25	250 mm
30	300 mm
00	Other stroke lengths; 50 < S < 300 mm, available on request

Front attachment (slot depth 17 mm)

M	Bore Ø12 mm, slot width 10 mm
X	Customized, available on request

Rear attachment (groove depth 15 mm)

M	Bore Ø12 mm, slot width 10 mm
X	Customized, available on request

Orientation of rear attachment

1	0°
3	45°
5	90°
7	135°, available on request

Color

A	Black (available only for small housing)
B	Gray

Option

0	No option
A	Back-up nut (available only for actuators with 6 kN, mandatory for IEC 60601-1), only for ECO7, ECO9, L = +23 mm

Customized

001E0175

3.5 CAHB

The CAHB series with 7 families of linear drives is virtually maintenance-free, self-locking up to twice the rated load and has a protection class up to IP69K/IP66M. It is suitable for low, medium and high loads in mobile applications.

Additional design options are available including limit switches, positioning feedback and manual override.

The smart CAHB..S versions offer unique features at a competitive cost with integrated control system and advanced functions.

Characteristics

New Smart CAHB..S **versions**

- integrated control system with I/O and CAN bus SAE J1939
- movement with soft start/stop and parallel movement of 2 linear drives
- monitoring of the main linear drive functions with diagnostics

For all versions

- electronic or mechanical overload protection and thermal protection
- long stroke and high speed
- high holding force up to 20000 N
- low backlash
- Absolute or incremental Position feedback and limit switches option
- Manual override option
- IP protection classes IP69K/IP66M with ventilation
- anti-rotation device, free spinning (option for E design)
- Stainless steel push tube with anti rotation, free spinning attachment and corrosion protected metal parts
- wide temperature range (−40 °C to 85 °C)
- high efficiency
- virtually maintenance-free
- mechanical, electrical and climatic tests

Benefits

- higher productivity with fast and smooth movement
- easy and quick integration into customer devices
- higher reliability and protection
- cost effective and virtually maintenance-free
- Monitoring and onboard diagnostics

CAHB performance overview

22 CAHB performance overview

Family	Version	Rated force	Speed (up to)	max. stroke	Power supply	Voltage				Integrated control system
		N	mm/s	mm		V				
CAHB-10 ... A	CAHB-10...1A	120	56	300	DC	12	24	–	–	No
	CAHB-10...2A	240	30	300	DC	12	24	–	–	No
	CAHB-10...3A	500	16	300	DC	12	24	–	–	No
	CAHB-10...4A	750	10	300	DC	12	24	–	–	No
	CAHB-10...5A	1000	8	300	DC	12	24	–	–	No
	CAHB-10...6A	1500	8	300	DC	12	24	–	–	No
CAHB-20 ... A	CAHB-20...1A	1500	33	610	DC	12	24	–	–	No
	CAHB-20...2A	2500	17	610	DC	12	24	–	–	No
CAHB-20 ... E/S	CAHB-20...1E or S	1500	31	700	DC	12	24	48	24 to 48	Yes
	CAHB-20...2E or S	2500	23	700	DC	12	24	48	24 to 48	Yes
	CAHB-20...3E or S	4500	13	700	DC	12	24	48	24 to 48	Yes
CAHB-21 ... E/S	CAHB-21...1E or S	1500	51	700	DC	12	24	48	24 to 48	Yes
	CAHB-21...2E or S	2500	41	700	DC	12	24	48	24 to 48	Yes
	CAHB-21...3E or S	4500	23	700	DC	12	24	48	24 to 48	Yes
CAHB-22 ... E/S	CAHB-22...1E or S	2300	57	700	DC	12	24	48	24 to 48	Yes
	CAHB-22...2E or S	3500	45	700	DC	12	24	48	24 to 48	Yes
	CAHB-22...3E or S	6800	22	610	DC	12	24	48	24 to 48	Yes
	CAHB-22...4E or S	10000	13	450	DC	12	24	48	24 to 48	Yes
CAHB-30 ... A	CAHB-30...1A	1500	26	610	AC	115 (60 Hz)		230 (50 Hz)		No
	CAHB-30...2A	2300	13	610	AC	115 (60 Hz)		230 (50 Hz)		No
CAHB-31 ... N	CAHB-31...1N	2300	57	610	AC	115 (60 Hz)		230 (50 Hz)		No
	CAHB-31...2N	4500	28	610	AC	115 (60 Hz)		230 (50 Hz)		No
	CAHB-31...3N	6000	15	610	AC	115 (60 Hz)		230 (50 Hz)		No

3.5.1 CAHB-10

123 CAHB-10



001CF02A

Benefits

- designed and tested under demanding conditions
- reliable and cost-effective
- reduced overall set time
- virtually maintenance-free

Characteristics

- compact and robust design, IP66S/IP69K, wide temperature range and corrosion resistant
- integrated limit switches, optional absolute or incremental positioning feedback
- integrated thermal protection

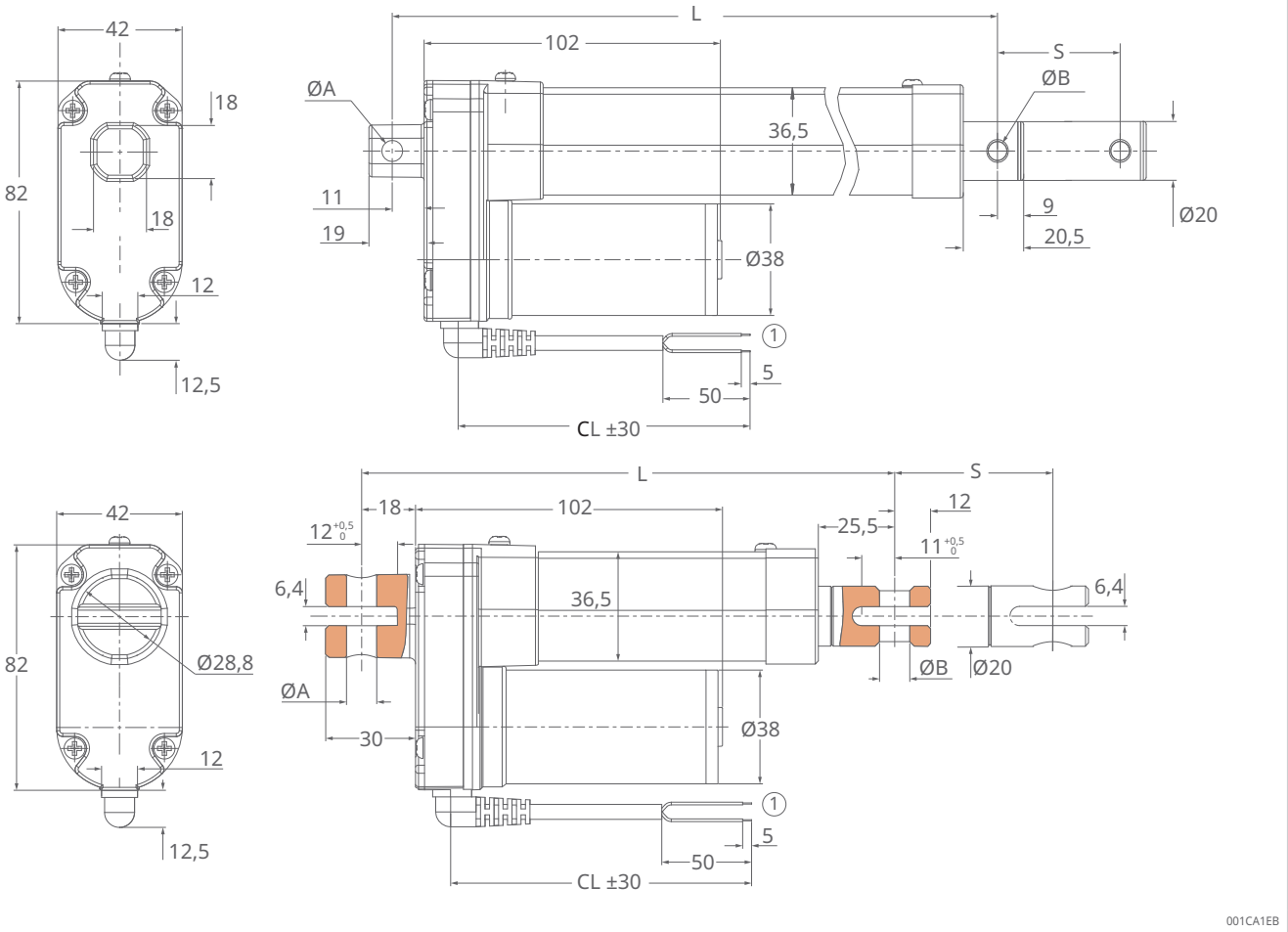
23 Technical data CAHB-10

Characteristic	Unit	CAHB-10...1	CAHB-10...2	CAHB-10...3	CAHB-10...4	CAHB-10...5	CAHB-10...6
Rated push force	N	120	240	500	750	1000	1500
Rated pull force	N	120	240	500	750	1000	1500
Holding force [1)]	N	2500	2500	2500	2500	2500	2500
Speed (full load ... no load)	mm/s	45 ... 56	24 ... 30	13 ... 16	8 ... 10	6 ... 8	5 ... 8
Stroke S	mm	50 ... 300	50 ... 300	50 ... 300	50 ... 300	50 ... 300	50 ... 300
Voltage	V DC	12 / 24	12 / 24	12 / 24	12 / 24	12 / 24	12 / 24
Rated consumption DC 12 V	A	4	3.5	3.2	3	2.8	4.4
Rated consumption DC 24 V	A	2.2	2	1.8	1.8	1.6	2.8
Duty cycle	%	25	25	25	25	25	20
Ambient temperature	°C	−40 ... +85	−40 ... +85	−40 ... +85	−40 ... +85	−40 ... +85	−40 ... +85
protection code (IP)	-	IP66S, IP69K	IP66S, IP69K	IP66S, IP69K	IP66S, IP69K	IP66S, IP69K	IP66S, IP69K
Mass (at 300 mm stroke)	kg	1.5	1.5	1.5	1.5	1.5	1.5
Color	–	silver	silver	silver	silver	silver	silver
Limit switch	–	yes	yes	yes	yes	yes	yes
Thermal protection	–	yes	yes	yes	yes	yes	yes

1) The holding force is the highest load a powered-down actuator can statically hold without slipping backward.

Basic configuration and optional 2-Hall encoder

124 Dimensions



24 Mounting CAHB-10...1 to CAHB-10...6

		Unit	Ø A	Ø B
Rod end with bore	A	mm	6.4 (0/+0.1)	6.4 (0/+0.1)
Rod end with bore	B	mm	8.0 (0/+0.1)	8.0 (0/+0.1)
Fork head with hole	C	mm	10.1 (0/+0.1)	10.1 (0/+0.1)

25 Tolerances CAHB-10

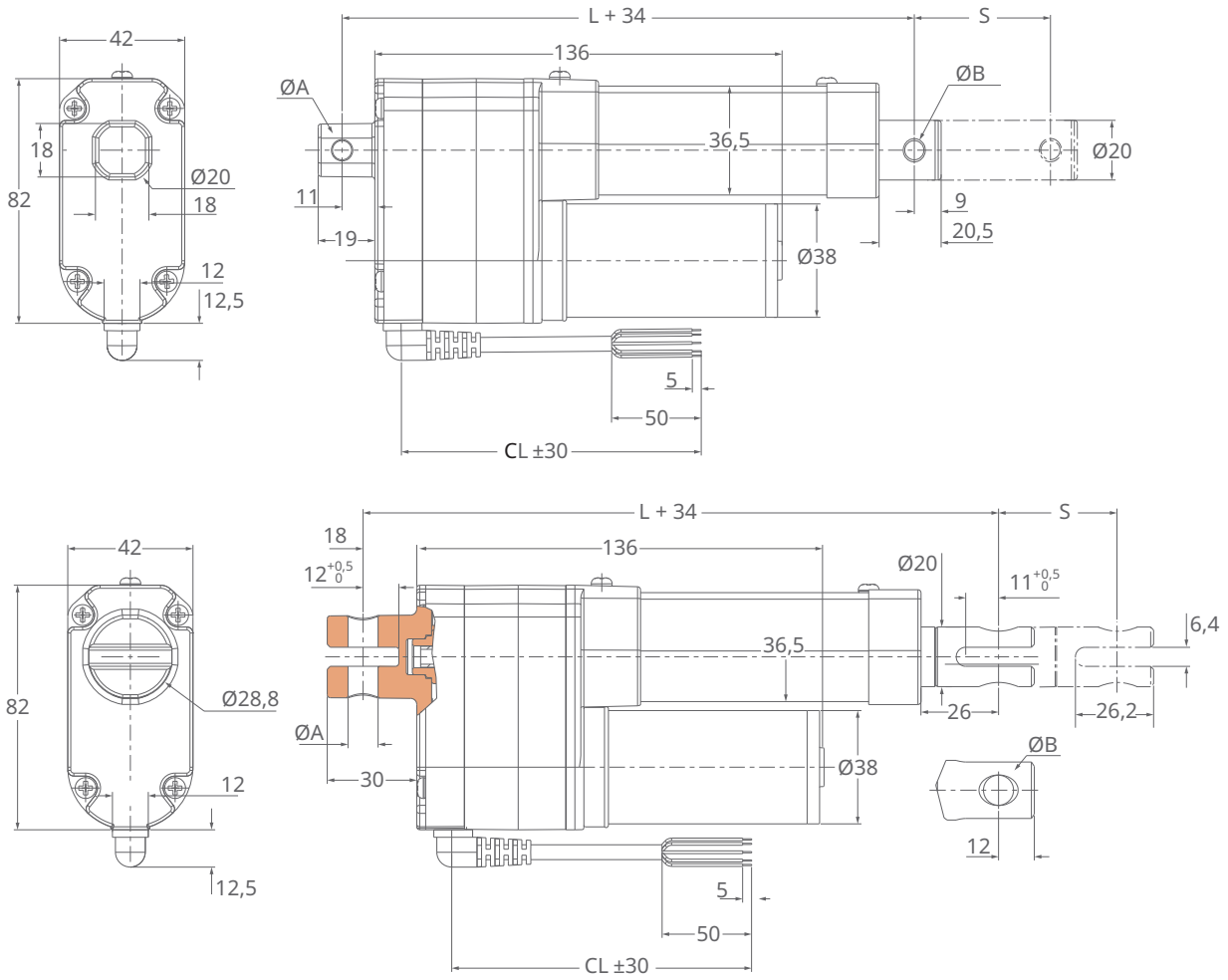
Type	Tolerance Stroke	Tolerance Retracted length
	mm	mm
CAHB-10...1, CAHB-10...2	(−1, +5)	(−5, +1)
CAHB-10...3, CAHB-10...4	(−3, +3)	(−3, +3)
CAHB-10...5, CAHB-10...6	(−4, +2)	(−2, +4)

26 Calculation of the retracted lengths L, CAHB-10...1 to CAHB-10...6

Stroke	mm	50	100	150	200	250	300
Retracted length L with rod end front + rod end rear	mm	158	209	260	311	362	413
Retracted length L with rod end front + fork head rear	mm	165	216	267	318	369	420
Retracted length L with fork head front + rod end rear	mm	172	223	274	325	376	427
Retracted length L with fork head front + fork head rear	mm	179	230	281	332	383	434

Optional potentiometer and absolute analog value

125 Dimensions



27 Mounting CAHB-10...1 to CAHB-10...6

		Unit	Ø A	Ø B
Rod end with bore	A	mm	6.4 (0/+0.1)	6.4 (0/+0.1)
Rod end with bore	B	mm	8.0 (0/+0.1)	8.0 (0/+0.1)
Fork head with hole	C	mm	10.1 (0/+0.1)	10.1 (0/+0.1)

28 Tolerances CAHB-10

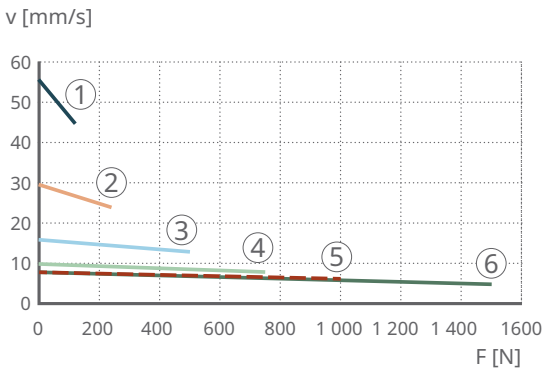
Type	Tolerance Stroke	Tolerance Retracted length
	mm	mm
CAHB-10...1, CAHB-10...2	(−1, +5)	(−5, +1)
CAHB-10...3, CAHB-10...4	(−3, +3)	(−3, +3)
CAHB-10...5, CAHB-10...6	(−4, +2)	(−2, +4)

29 Calculation of the retracted lengths L, CAHB-10...1 to CAHB-10...6

Stroke	mm	50	100	150	200	250	300
Retracted length L with rod end front + rod end rear	mm	192	243	294	345	396	447
Retracted length L with rod end front + fork head rear	mm	199	250	301	352	403	454
Retracted length L with fork head front + rod end rear	mm	206	257	308	359	410	461
Retracted length L with fork head front + fork head rear	mm	213	264	315	366	417	468

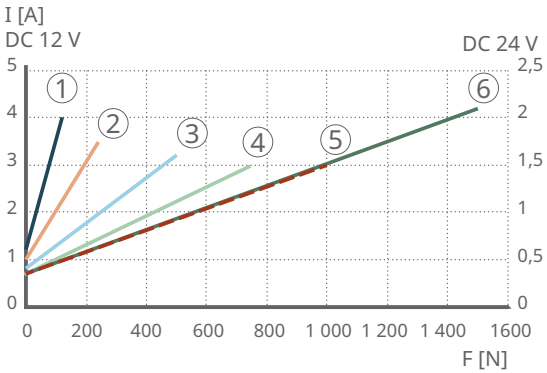
Performance diagrams

126 Speed-load diagram CAHB-10



1	CAHB-10...1	2	CAHB-10...2
3	CAHB-10...3	4	CAHB-10...4
5	CAHB-10...5	6	CAHB-10...6
v	Speed	F	Load

127 Current-load diagram CAHB-10



1	CAHB-10...1	2	CAHB-10...2
3	CAHB-10...3	4	CAHB-10...4
5	CAHB-10...5	6	CAHB-10...6
I	Current	F	Load

Encoder resolution

30 Encoder resolution

Characteristic	Unit	CAHB-10...1	CAHB-10...2	CAHB-10...3	CAHB-10...4	CAHB-10...5	CAHB-10...6
Encoder resolution	mm/pulse	0.3	0.15	0.075	0.05	0.0375	0.0375

Potentiometer resolution

31 Potentiometer resolution CAHB-10...1 to CAHB-10...6

Stroke	mm	50 – 80	80 – 160	160 – 300
Minimum resistance value of potentiometer	Ω	700 – 1300	700 – 1300	700 – 1300
Potentiometer resolution	Ω/mm	100	50	16.6

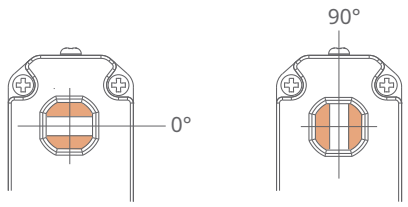
Absolute analog output signal

32 Absolute analog output signal CAHB-10...1 to CAHB-10...6

Stroke	mm	50 – 80	80 – 160	160 – 300
Initial value versus L position	V	0.5	0.5	0.5
Resolution	mm	0.024	0.049	0.146
Position feedback change	V/mm	0.05	0.025	0.0083

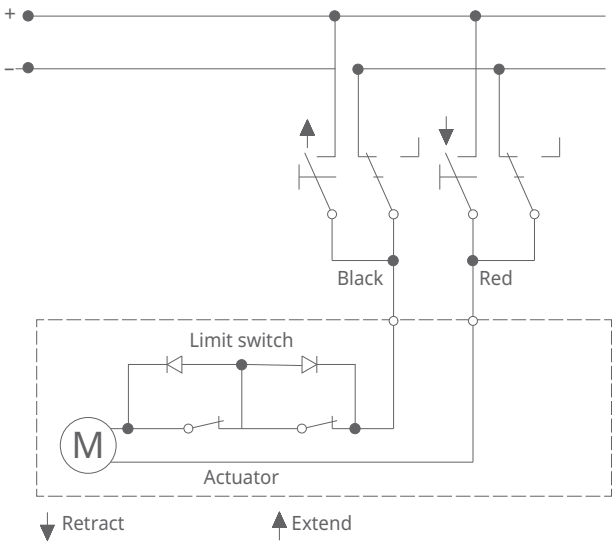
Attachment orientation (see order designation “Attachment orientation”)

128 Attachment orientation

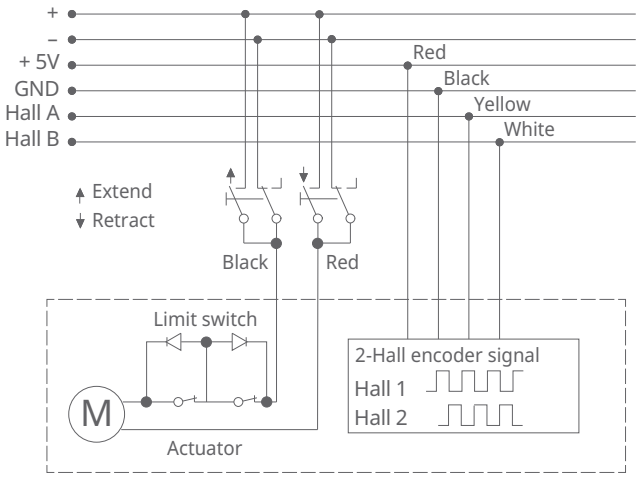


Wiring diagrams

129 Basic configuration DC 12 V, DC 24 V

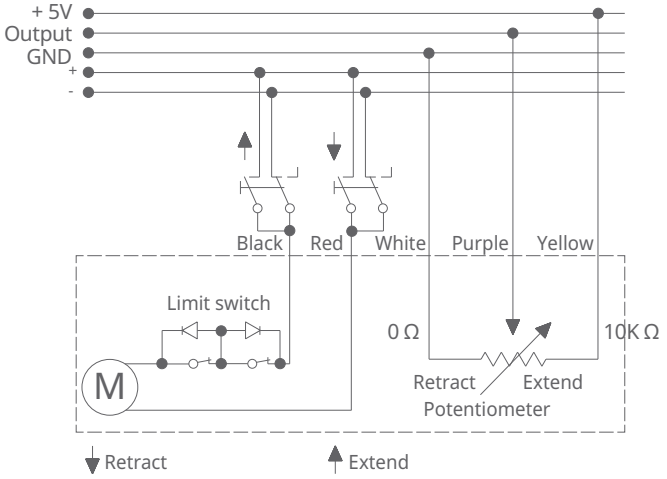


130 2-Hall encoder DC 12 V, DC 24 V



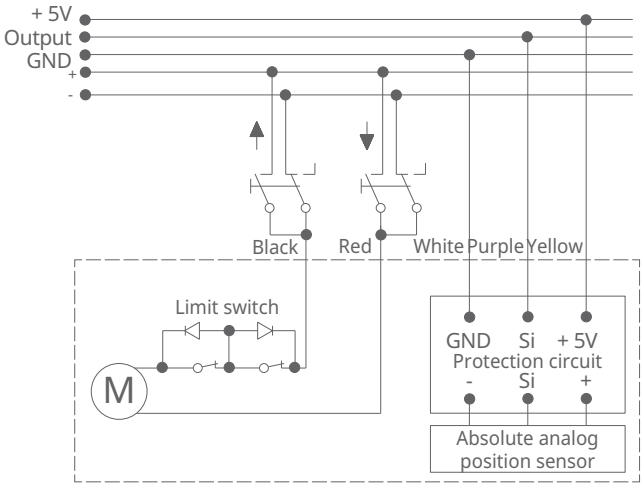
001DBBF0

131 Potentiometer DC 12 V, DC 24 V



001DBBE0

132 Absolute analog output signal DC 12 V, DC 24 V



001DBBD0

Ordering key

133 Order designation for CAHB-10

CAHB – 10 – A 1 A – 050 158 – A A A 0 A – 000

Type

Voltage

A	DC 12 V
B	DC 24 V

Load

1	120 N
2	240 N
3	500 N
4	750 N
5	1000 N
6	1500 N

Design

A	TR12 screw
X	Customization

3 × digital stroke length and 3 × digital retracted length (mm)

Stroke	Retracted length basic conf.[1)]	With front fork head C	With rear fork head C	With potentiometer or absolute analog output A, P
050	158	+14	+7	+34
100	209	+14	+7	+34
150	260	+14	+7	+34
200	311	+14	+7	+34
250	362	+14	+7	+34
300	413	+14	+7	+34

Degree of protection

A	Standard (IP66S/69K)

Front attachment

A	Rod with hole Ø6.4 (0, +0.1) mm
B	Rod with hole Ø8 (0, +0.1) mm
C	Fork head with hole Ø10.1 (0, +0.1) mm
X	Customization

Rear attachment

A	Rod with hole Ø6.4 (0, +0.1) mm
B	Rod with hole Ø8 (0, +0.1) mm
C	Fork head with hole Ø10.1 (0, +0.1) mm
X	Customization

Hole direction of the attachments

A	0°
B	90°

Option 1: position output

0	No option
A	Absolute analog output signal
P	Potentiometer
H	2-Hall encoder

Cable length

A	600 mm without connector
B	1 000 mm without connector
C	1 500 mm without connector
D	2 000 mm without connector
E	2 500 mm without connector
F	3 000 mm without connector

Customization

X

[1)] Basic configuration: the retracted length with front and rear “rod with hole” attachment, without “potentiometer” and without “absolute analog output signal”

001E01B5

3.5.2 CAHB-20A

134 CAHB-20A



001CF036

Benefits

- compact design, tested for high stress
- robust and reliable
- thermal protection and virtually maintenance-free

Characteristics

- integrated overload and thermal protection
- robust design
- IP66
- optional potentiometer and limit switches

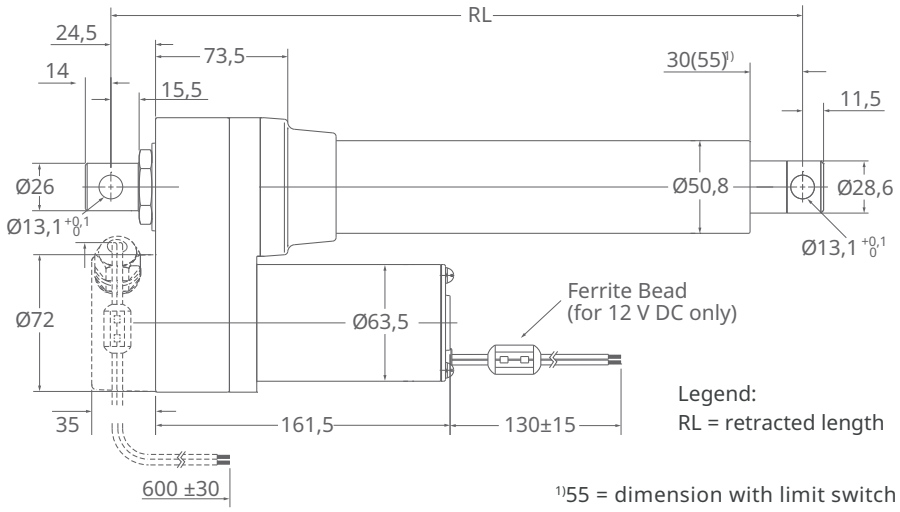
33 Technical information for the CAHB-20A

Characteristic	Unit	CAHB-20...1A	CAHB-20...2A
Rated push force	N	1500	2500
Rated pull force	N	1500	2500
Holding force [1)]	N	10000	10000
Speed (full load to no load)	mm/s	27–33	13–17
Stroke S	mm	102 to 610	102 to 610
Voltage	V DC	12 / 24	12 / 24
Rated voltage DC 12 V	A	16	14
Rated voltage DC 24 V	A	8	7
Duty cycle of operation	%	25	25
Ambient temperature	°C	–40 to +85	–40 to +85
IP protection	-	IP66	IP66
Weight (at 305-mm stroke)	kg	5.5	5.5
Color	–	Black	Black

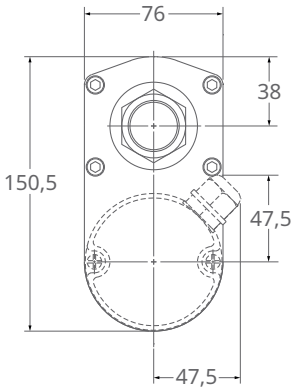
1) The holding force is the highest load a powered-down drive can statically hold without slipping backward.

Basic configuration (dashed line for optional limit switch)

135 Side view of basic configuration (dashed line for optional limit switch)



136 Rear view



Without limit swicth:

- RED (+) & BLACK (–) = retraction
- RED (–) & BLACK (+) = extension

With limit switch:

- RED (+) & BLACK (–) = extension
- RED (–) & BLACK (+) = retraction

34 Calculation of the installation length (RL) for CAHB-20A basic configuration

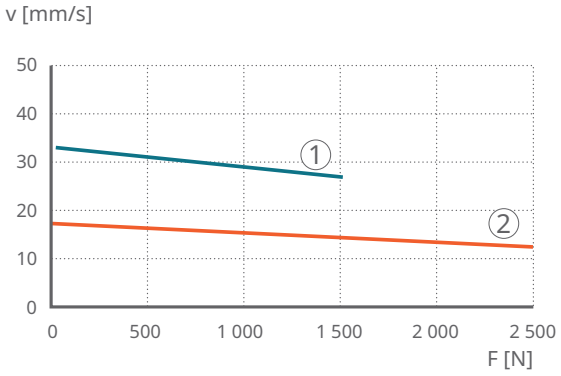
Stroke	Unit	With limit switch 2)						Without limit switch 3)					
mm		102	153	204	305	457	610	102	153	204	305	457	610
Installation length (RL)	mm	338	389	440	592	744	897	262	313	364	465	668	821

2) Tolerance: S and RL = ±5.0 mm (if S ≥ 305 mm, S = ±7.5 mm)

3) Tolerance: S = ±2.5 mm and L = ±3.8 mm

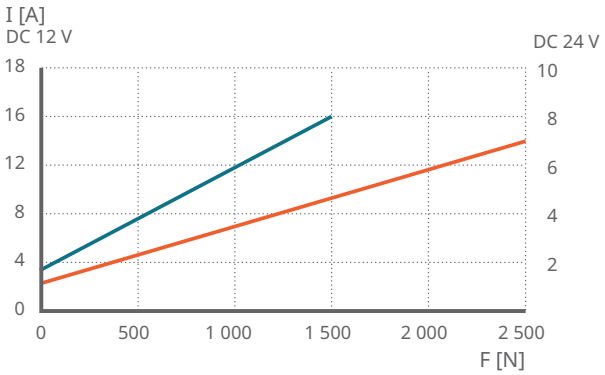
Performance diagrams

137 Speed-load diagram for CAHB-20A



1	CAHB-20...1	2	CAHB-20...2
v	Speed	F	Load

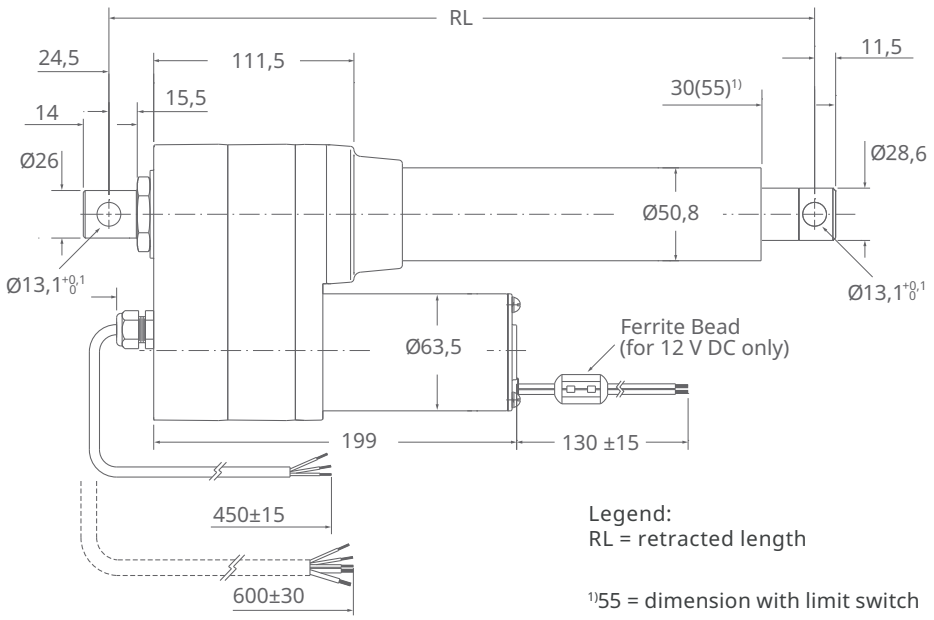
138 Current-load diagram for CAHB-20A



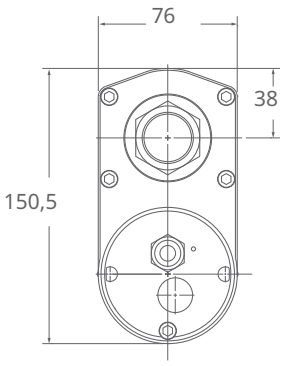
1	CAHB-20...1	2	CAHB-20...2
I	Current consumption	F	Load

Optional potentiometer (dashed line for optional limit switch)

139 Side view of optional potentiometer (dashed line for optional limit switch)



140 Rear view



Without limit swicth:

- RED (+) & BLACK (–) = retraction
- RED (–) & BLACK (+) = extension

With limit switch:

- RED (+) & BLACK (–) = extension
- RED (–) & BLACK (+) = retraction

35 Calculation for installation length (RL) for CAHB-20A optional potentiometer

Stroke	Unit	With limit switch [4]						Without limit switch [5]					
mm		102	153	204	305	457	610	102	153	204	305	457	610
Installation length (RL)	mm	376	427	478	630	782	935	300	351	402	503	706	859

4) Tolerance: S and RL = ±5.0 mm (if S ≥ 305 mm, S = ±7.5 mm)

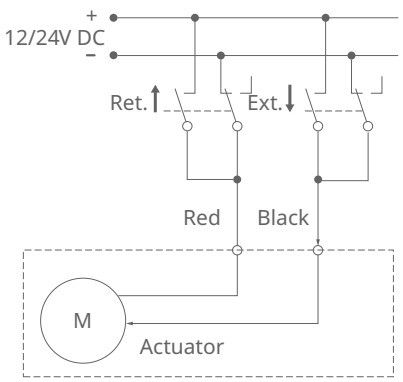
5) Tolerance: S = ±2.5 mm and L = ±3.8 mm

36 Potentiometer resolution for CAHB-20A

Stroke	mm	102	153	204	305	457	610
Ω/mm	mm	59.0	59.0	29.5	29.5	9.84	9.84

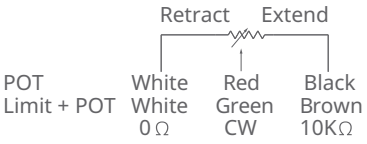
Wiring diagrams

141 Connection diagram for CAHB-20A



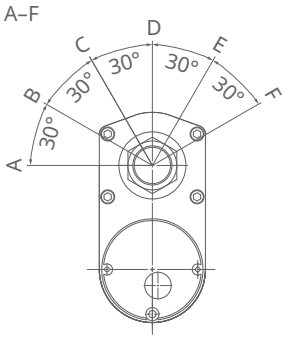
Electrical diagrams

142 Electrical diagrams for CAHB-20A



Attachment orientation

143 Attachment orientation



Ordering key

144 Order designation for CAHB-20A

CAHB – 20 – A 1 A – 102 262 – A A A 0 0 0 – 000

Type

Voltage

A	DC 12 V
B	DC 24 V

Load

1	1500 N
2	2500 N

Design

A

3 × digital stroke length and 3 × digital retracted length (mm)

Stroke	Retracted length basic conf.[1)]	with Limit switch	with Potentiometer
		L	P
102	262	+76	+38
153	313	+76	+38
204	364	+76	+38
305	465	+127	+38
457	668	+76	+38
610	821	+76	+38

Degree of protection

A	Standard: IP66

Attachment diameter (Front and rear)

A	Standard (hole: Ø13.1 mm)
X	Customization

Attachment orientation (Front and rear)

A	Standard (0°)
B	30°
C	60°
D	90°
E	120°
F	150°
X	Customization

Option 1

0	None
L	Limit switch (only for load version 2 500 N)

Option 2

0	None
P	Potentiometer

Option 3

0	None
T	Thermal protection

Customization

[1)] Basic configuration: the retracted length: without “limit switch”, without “potentiometer”

001E01C5

The linear drives have protection clutch and EMC filter.

3.5.3 CAHB-20E, CAHB-20S

145 CAHB-20E, CAHB-20S



001CF040

Benefits

- high productivity
- reliability and safety
- saves development time
- cost effectiveness
- quick time to market (for Smart version)

Characteristics

- holding force
- overload protection
- corrosion protection and stainless steel tube
- Manual override option
- higher protection class and virtually maintenance-free

smart version features S

- integrated control system with complete motion control
- true absolute position contactless sensor
- Monitoring and on board diagnostics (force, voltage, temperature)
- I/O and CAN bus SAE J1939 communication

37 Technical information for the CAHB-20E

Characteristic	Unit	CAHB-20E								
		12 V			24 V			48 V		
Rated push force	N	1500	2500	4500	1500	2500	4500	1500	2500	4500
Rated pull force	N	1500	2500	4500	1500	2500	4500	1500	2500	4500
Max pull/push force [1]	N	2600	3800	6300	2600	3800	6300	2600	3800	6300
Holding force [2]	N	➤102|150								
Speed without load [3]	mm/s	27.0	23.5	13.5	29.0	22.0	13.0	31.0	23.0	13.0
Speed with the rated force [3]	mm/s	24.5	17.5	10.5	25.5	19.0	11.0	27.5	20.0	11.0
Rated voltage	V DC	12	12	12	24	24	24	48	48	48
Nominal current at rated load [3]	A	12.5	15	17	5	6.5	8	2.6	3.8	4.2
Nominal current (clutch activation)	A	18.4	21	22.4	6.8	8.8	10.4	4.3	5.6	5.8
Duty cycle of operation	%	10	10	10	20	20	20	20	20	20
ON time/OFF time	s	85 / 765	85 / 765	85 / 765	85 / 340	85 / 340	85 / 340	85 / 340	85 / 340	85 / 340
Stroke	mm	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700
Backlash	mm	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Mass at 200-mm stroke	kg	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Color	–	Black	Black	Black	Black	Black	Black	Black	Black	Black
Ambient temperature [4]	°C	−40 to +85	−40 to +85	−40 to +85	−40 to +85	−40 to +85	−40 to +85	−40 to +85	−40 to +85	−40 to +85
IP protection	–	IP69K, IP66M								
Standards/EMC	–	EN 61000-6-2:2005, EN 61000-6-4:2007/A1:2011								
Salt spray test	–	ISO 9227:2012, 250 h								

[1] Upper limit of the pull/push force limited by the clutch. The lower limiting value is just above the rated force. The limitation of the force will happen between these 2 limits.

[2] The holding force is the highest load a powered-down drive can statically hold without slipping backward. For maximum static load, refer to the “Static load” diagrams.

[3] The speed and current data in this list is defined at +20 °C.

[4] Full performance from 0 °C to +40 °C, for use at low temperatures (−40 °C to −25 °C) please contact Schaeffler.

38 Technical information for the CAHB-20S

Characteristic	Unit	CAHB-20S					
		12 V			24 V ... 48 V		
Rated push force	N	1500	2500	4500	1500	2500	4500
Rated pull force	N	1500	2500	4500	1500	2500	4500
Max pull/push force [5]	N	2600	3800	6300	2600	3800	6300
Holding force [6]	N	➤103|146					
Speed without load [7]	mm/s	27.0	23.5	13.5	29.0	22.0	13.0
Speed with the rated force [7]	mm/s	24.5	17.5	10.5	25.5	19.0	11.0
Rated voltage [8]	V DC	12	12	12	24 ... 48	24 ... 48	24 ... 48
Nominal current [7]	A	12.5	15	17	5.0 ... 2.5	6.5 ... 3.3	8.0 ... 4.0
Max. current, nominal current [9]	A	31.3	31.3	31.3	20.7 ... 10.4	20.7 ... 10.4	20.7 ... 10.4
Duty cycle [10]	%	10	10	10	20	20	20
ON time/OFF time	s	85 / 765	85 / 765	85 / 765	85 / 340	85 / 340	85 / 340
Stroke S	mm	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700
Backlash	mm	0.6	0.6	0.6	0.6	0.6	0.6
Max. manual override torque	Nm	1.5	1.2	1.0	1.5	1.2	1.0
Max. manual override speed	min^{-1}	1600	1600	1600	1600	1600	1600
Mass at 200-mm stroke	kg	4.8	4.8	4.8	4.8	4.8	4.8
Color	–	Black	Black	Black	Black	Black	Black
Ambient temperature [11]	°C	−40 ... +85	−40 ... +85	−40 ... +85	−40 ... +85	−40 ... +85	−40 ... +85
IP protection	–	IP69K, IP66M					
Standards/EMC	–	See environmental performances – electrical tests					
Salt spray test	–	ISO 9227:2012, 500 h					

[5] Upper limit of the pull/push force, limited by the E-clutch.

[6] The holding force is the highest load a powered-down drive can statically hold without slipping backward. For maximum static load, refer to the “Static load” diagrams.

[7] The speed and current data in this list is defined at +20 °C, PWM 100 %

[8] Version for 12 V with DC 12-V motor, version for 24–48 V withDC 24-V motor.

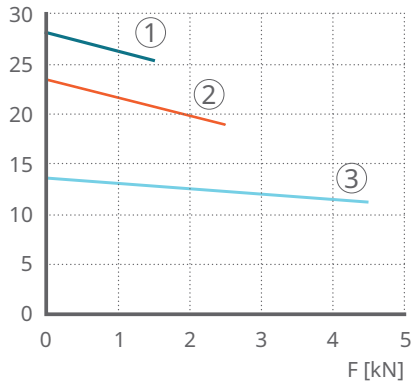
[9] Max. current is the upper limit of the input current to the drive. In any circumstances, the current will not exceed to max. current.

[10] Duty cycle is at +20 °C.

[11] Full performance from 0 °C to +40 °C, for use at low temperatures (−40 °C to −25 °C) please contact Schaeffler.

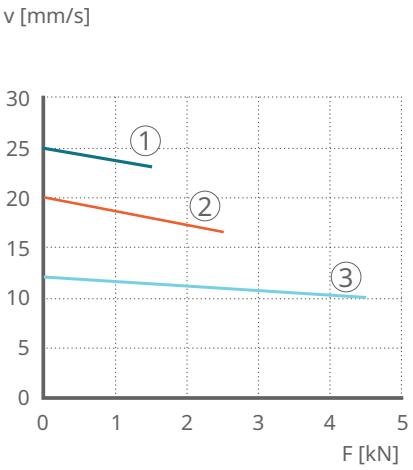
Performance diagrams

146 Speed-load diagram for CAHB-20E



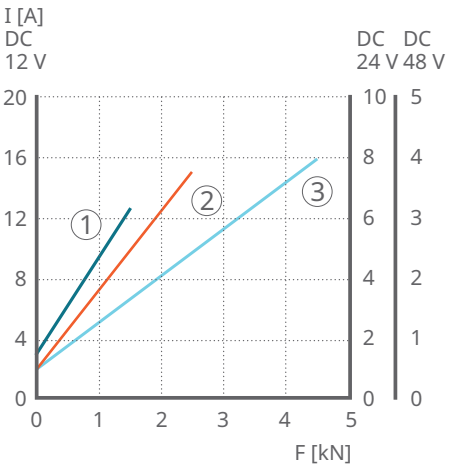
1	CAHB-20...1E	2	CAHB-20...2E
3	CAHB-20...3E	F	Load
v	Speed		

147 Speed-load diagram for CAHB-20S



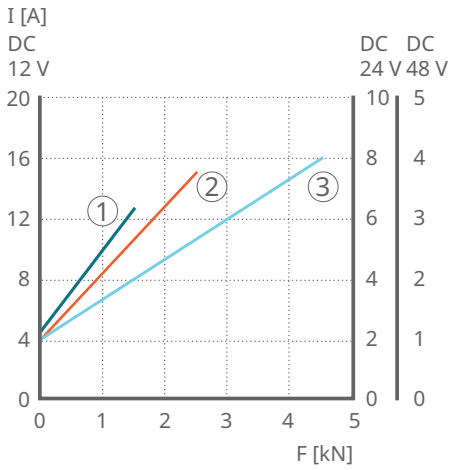
1	CAHB-20...1S	2	CAHB-20...2S
3	CAHB-20...3S	F	Load
v	Speed		

148 Current-load diagram for CAHB-20E



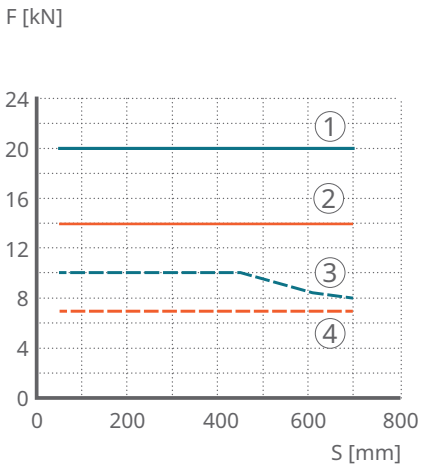
1	CAHB-20...1E	2	CAHB-20...2E
3	CAHB-20...3E	F	Load
I	Current consumption		

149 Current-load diagram for CAHB-20S



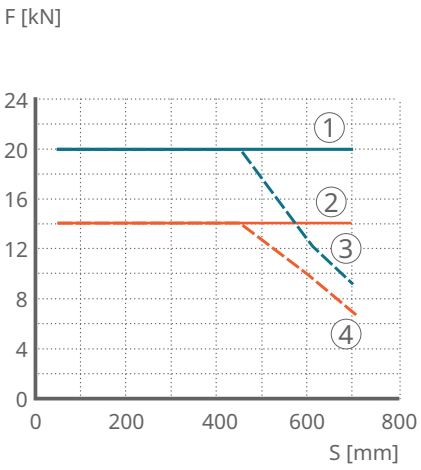
1	CAHB-20...1S	2	CAHB-20...2S
3	CAHB-20...3S	F	Load
I	Current consumption		

150 Static load stroke length for CAHB-20E



1	Ultimate CAHB-20...E (push)	2	Ultimate CAHB-20...E (pull)
3	Recommended CAHB-20...E (push)	4	Recommended CAHB 20...E (pull)
S	Stroke	F	Load

151 Static load stroke length for CAHB-20S

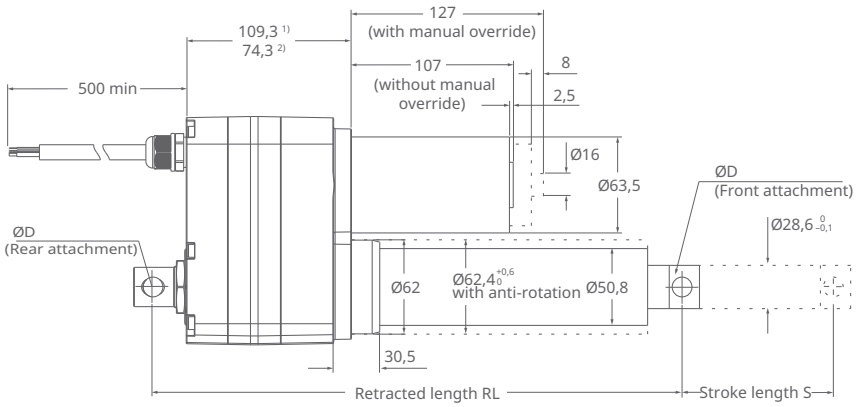


001D177D

1	Ultimate CAHB-20...S (push)	2	Ultimate CAHB-20...S (pull)
3	Recommended CAHB-20...S (push)	4	Recommended CAHB 20...S (pull)
S	Stroke	F	Load

Dimensional drawings

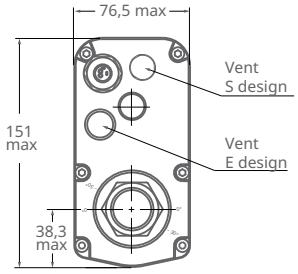
152 Side view dimensions for CAHB-20E, CAHB-20S



1) 109,3 for E design with position output
2) 74,3 for E design without position output and S design

001D307B

153 Rear view dimensions for CAHB-20E, CAHB-20S



001D306B

39 Tolerances for CAHB-20E, CAHB-20S

Design	Stroke tolerance	Installation length tolerance
	mm	mm
CAHB-20E	±2	±2
CAHB-20S	±1	±1

Calculation of the installation length (RL)

40 Calculation of the installation length (RL)

Stroke	Baseline: Rod with hole attachment		Fork head attachment	Anti-rotation tube with free-spinning front attachment		Rod end spherical plain bearing with anti-rotation tube	
	50 ... 305	306 ... 700	50 ... 700	50 ... 305	306 ... 700	50 ... 305	306 ... 700
	mm	mm	mm	mm		mm	mm
CAHB-20E							
Installation length (RL) with no position output [12]	160+S	211+S	+12	+5	−11	+47	+19
Installation length (RL) with position output [13]	195+S	246+S	+12	+5	−11	+47	+19
CAHB-20S							
Installation length (RL)	167+S	202+S	+12	+0	+0	+43	+33

[12] 160 + 50 (stroke) +12 (fork head attachment) + 5 (anti-rotation tube with free-spinning front attachment) = 227

[13] 246 + 400 (stroke) +19 (rod end spherical plain bearing with anti-rotation tube) = 665

3.5.4 CAHB-21E, CAHB-21S

154 CAHB-21E, CAHB-21S



001CF041

Benefits

- high productivity
- reliability and safety
- saves development time
- cost effectiveness
- quick time to market (for Smart version)

Characteristics

- high holding force
- high speed
- mechanical overload protection
- corrosion protection and stainless steel tube
- Manual override option
- higher protection class, practical, maintenance-free

smart version features S

- integrated control system with complete motion control
- true absolute position contactless sensor
- Monitoring and on board diagnostics (force, voltage, temperature)
- I/O and CAN bus SAE J1939 communication

41 Technical information for the CAHB-21E

Characteristic	Unit	CAHB-21E								
		12 V			24 V			48 V		
Rated push force	N	1500	2500	4500	1500	2500	4500	1500	2500	4500
Rated pull force	N	1500	2500	4500	1500	2500	4500	1500	2500	4500
Max pull/push force [1]	N	2500	3600	6300	2500	3600	6300	2500	3600	6300
Holding force [2]	N	➤110|⧉159								
Speed without load [3]	mm/s	49.5	37	24.0	52.5	38	22.5	51.5	41.0	23.5
Speed with the rated force [3]	mm/s	43	31.5	19.0	50	31.5	21.0	46.0	33.5	19.0
Rated voltage	V DC	12	12	12	24	24	24	48	48	48
Nominal current at rated load [3]	A	14.5	16	19	7	7.5	10.5	4.0	4.5	5.0
Nominal current (clutch activation)	A	19.2	20.2	24.8	9.1	9.3	13.7	5.6	6.1	6.4
Duty cycle [4]	%	10	10	10	20	20	20	20	20	20
ON time/OFF time	s	85 / 765	85 / 765	85 / 765	85 / 340	85 / 340	85 / 340	85 / 340	85 / 340	85 / 340
Stroke S	mm	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700	50 to 700
Backlash	mm	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Mass at 200-mm stroke	kg	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Color	–	Black	Black	Black	Black	Black	Black	Black	Black	Black
Ambient temperature [5]	°C	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85
IP protection	–	IP69K, IP66M								
Standards/EMC	–	EN 61000-6-2:2005, EN 61000-6-4:2007/A1:2011								
Salt spray test	–	ISO 9227:2012, 250 h								

[1] Upper limit of the pull/push force limited by the clutch. The lower limiting value is just above the rated force. The limitation of the force will happen between these 2 limits.

[2] The holding force is the highest load a powered-down drive can statically hold without slipping backward. For maximum static load, refer to the “Static load” diagrams.

[3] The speed and current data in this list is defined at +20 °C.

[4] Duty cycle: Output force and movement of the linear drive are in the same direction of travel, otherwise the duty cycle is 10 % (25 s ON/225 s OFF).

[5] Full performance from 0 °C to +40 °C, for use at low temperatures (−40 °C to −25 °C) please contact Schaeffler.

42 Technical information for the CAHB-21S

Characteristic	Unit	CAHB-21S					
		12 V			24 V ... 48 V		
Rated push force	N	1500	2500	4500	1500	2500	4500
Rated pull force	N	1500	2500	4500	1500	2500	4500
Max pull/push force [6]	N	2500	3600	6300	2500	3600	6300
Holding force [7]	N	➤110|160					
Speed without load [8]	mm/s	49.5	37.0	24.0	52.5	38.0	22.5
Speed with the rated force [8]	mm/s	43.0	31.5	19.0	50.0	31.5	21.0
Rated voltage [9]	V DC	12	12	12	24 ... 48	24 ... 48	24 ... 48
Nominal current [8]	A	14.5	16.0	19.0	7.0 ... 3.5	7.5 ... 3.8	10.5 ... 5.3
Max. current, nominal current [10]	A	31.3	31.3	31.3	20.7 ... 10.4	20.7 ... 10.4	20.7 ... 10.4
Duty cycle [11]	%	10	10	10	20	20	20
ON time/OFF time	s	85 / 765	85 / 765	85 / 765	85 / 340	85 / 340	85 / 340
Stroke S	mm	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700
Backlash	mm	0.6	0.6	0.6	0.6	0.6	0.6
Max. manual override torque	Nm	1.0	1.0	1.0	1.0	1.0	1.0
Max. manual override speed	min^{-1}	1600	1600	1600	1600	1600	1600
Mass at 200-mm stroke	kg	4.8	4.8	4.8	4.8	4.8	4.8
Color	–	Black	Black	Black	Black	Black	Black
Ambient temperature [10]	°C	–25 ... +85	–25 ... +85	–25 ... +85	–25 ... +85	–25 ... +85	–25 ... +85
IP protection	–	IP69K, IP66M					
Standards/EMC	–	See environmental performances – electrical tests					
Salt spray test	–	ISO 9227:2012, 500 h					

6) Upper limit of the pull/push force, limited by the E-clutch.

7) The holding force is the highest load a powered-down drive can statically hold without slipping backward. For maximum static load, refer to the “Static load” diagrams.

8) The speed and current data in this list is defined at +20 °C, PWM 100 %

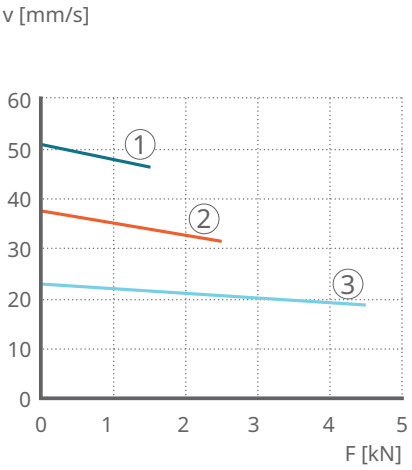
9) Version for 12 V with DC 12-V motor, version for 24–48 V withDC 24-V motor.

10) Max. current is the upper limit of the input current to the drive. In any circumstances, the current will not exceed to max. current.

11) The duty cycle is for temperatures of +20 °C and where the direction of the output force of the linear drive is in the same direction of movement as the linear drive, otherwise the duty cycle is 10 % (25 s ON/225 s OFF)

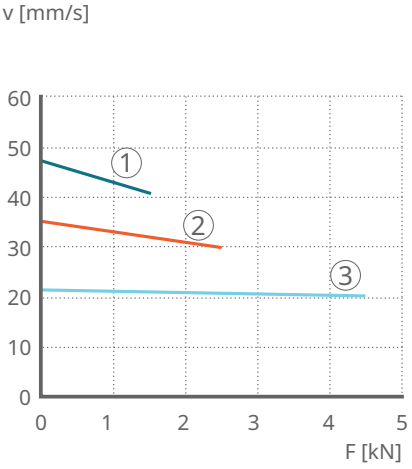
Performance diagrams

155 Speed-load diagram for CAHB-21E



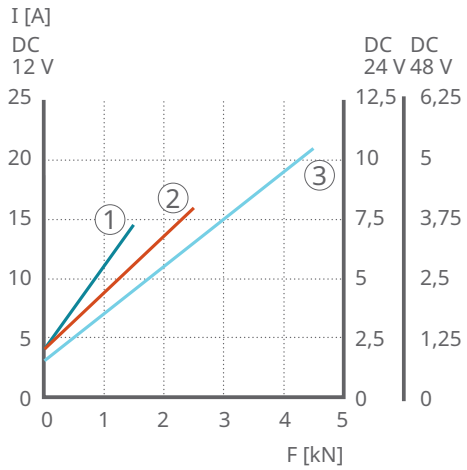
1	CAHB-21...1E	2	CAHB-21...2E
3	CAHB-21...3E	F	Load
v	Speed		

156 Speed-load diagram for CAHB-21S



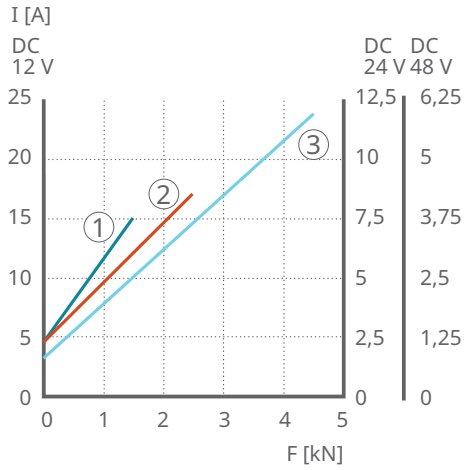
1	CAHB-21...1S	2	CAHB-21...2S
3	CAHB-21...3S	F	Load
v	Speed		

157 Current-load diagram for CAHB-21E



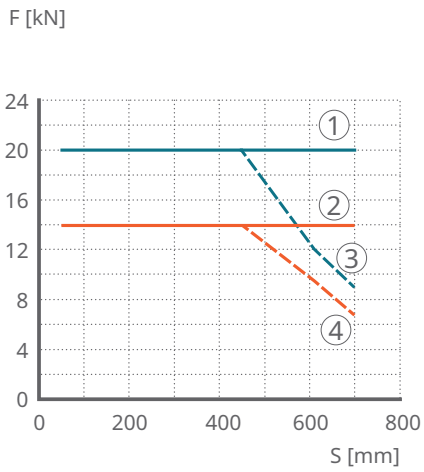
1	CAHB-21...1E	2	CAHB-21...2E
3	CAHB-21...3E	F	Load
I	Current consumption		

158 Current-load diagram for CAHB-21S



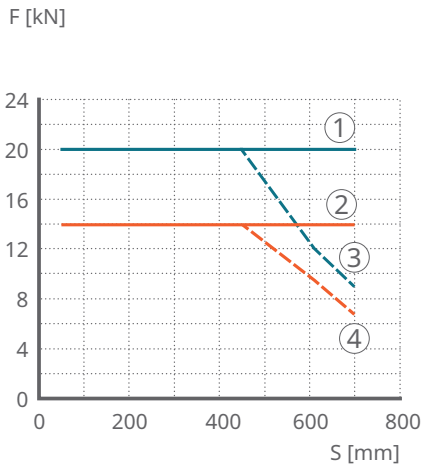
1	CAHB-21...1S	2	CAHB-21...2S
3	CAHB-21...3S	F	Load
I	Current consumption		

159 Static load stroke length for CAHB-21E



1	Ultimate CAHB-21...E (push)	2	Ultimate CAHB-21...E (pull)
3	Recommended CAHB-21...E (push)	4	Recommended CAHB 21...E (pull)
S	Stroke	F	Load

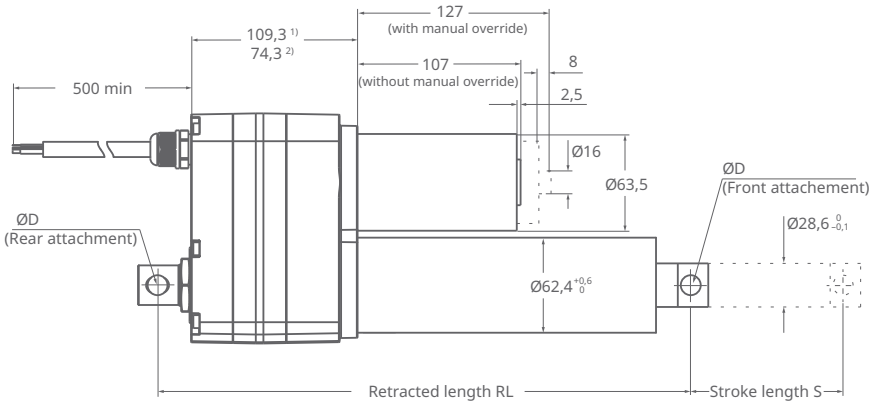
160 Static load stroke length for CAHB-21S



1	Ultimate CAHB-21...S (push)	2	Ultimate CAHB-21...S (pull)
3	Recommended CAHB-21...S (push)	4	Recommended CAHB 21...S (pull)
S	Stroke	F	Load

Dimensional drawings

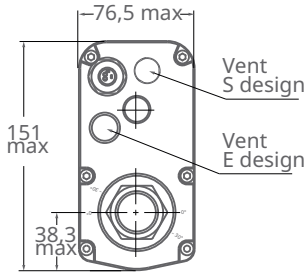
161 Side view dimensions for CAHB-21E, CAHB-21S



1) 109,3 for E design with position output
2) 74,3 for E design without position output and S design

001D309B

162 Rear view dimensions for CAHB-21E, CAHB-21S



001D308B

43 Tolerances for CAHB-21E and CAHB-21S

Design	Stroke tolerance	Installation length tolerance
	mm	mm
CAHB-21E with LS (S ≤ 305)	±2	±2
CAHB-21E without LS (S ≤ 305)	(−2, −0.5)	±2
CAHB-21E with LS (S > 305)	±3	±2
CAHB-21E without LS (S ≤ 305)	(−3, −1)	±2
CAHB-21S	±1	±1

Calculation of the installation length (RL)

44 Calculation of the installation length (RL)

Stroke	Baseline: Rod with hole attachment		Fork head attachment	Anti-rotation tube with free-spinning front attachment	Rod end spherical plain bearing with anti-rotation tube	
	50 ... 305	306 ... 700	50 ... 700	50 ... 700	50 ... 305	306 ... 700
	mm	mm	mm	mm	mm	mm
CAHB-21E						
Installation length (RL) with no option [12]	182+S	217+S	+12	+1	+43	+31
Installation length (RL) with LS	191+S	226+S	+12	+1	+43	+31
Installation length (RL) with position output	217+S	252+S	+12	+1	+43	+31
Installation length (RL) with LS and position output [13]	226+S	261+S	+12	+1	+43	+31
CAHB-21S						
Installation length (RL)	182+S	217+S	+12	+0	+43	+33

[12] 182 + 50 (stroke) + 12 (fork head attachment) + 1 (anti-rotation tube with free-spinning front attachment) = 245

[13] 261 + 400 (stroke) + 31 (rod end spherical plain bearing with anti-rotation tube) = 692

3.5.5 CAHB-22E, CAHB-22S

163 CAHB-22E, CAHB-22S



001CF044

Benefits

- high productivity
- reliability and safety
- saves development time
- cost effectiveness
- quick time to market (for Smart version)

Characteristics

- high force
- high speed
- high holding force
- mechanical overload protection
- corrosion protection and stainless steel tube
- Manual override option
- higher protection class, practical, maintenance-free

smart version features S

- integrated control system with complete motion control
- true absolute position contactless sensor
- Monitoring and on board diagnostics (force, voltage, temperature)
- I/O and CAN bus SAE J1939 communication

45 Technical information for the CAHB-22E

Characteristic	Unit	CAHB-22E											
		12 V				24 V				48 V			
Rated push force	N	2300	3500	6800	10000	2300	3500	6800	10000	2300	3500	6800	10000
Rated pull force	N	2300	3500	6800	10000	2300	3500	6800	10000	2300	3500	6800	10000
Max pull/push force [1]	N	3500	4900	9500	14000	3500	4900	9500	14000	3500	4900	9500	14000
Holding force [2]	N	➤118|⧉168											
Speed without load [3]	mm/s	55.0	45.0	22.0	13.0	53.0	45.0	22.0	13.0	57.0	45.0	22.0	13.0
Speed with the rated force [3]	mm/s	42.0	36.0	15.5	10.2	42.0	37.0	17.0	10.2	50.0	37.0	18.5	10.2
Rated voltage	V DC	12	12	12	12	24	24	24	24	48	48	48	48
Nominal current at rated load [3]	A	18	19.5	19.5	19	8	9.5	9.5	8.5	4.5	5	5	4.3
Nominal current (clutch activation)	A	24.3	25.5	25.5	25	10.6	12.3	12.3	10.9	6.5	7	7	5.5
Duty cycle [4]	%	10	10	10	10	20	20	20	20	20	20	20	20
ON time/OFF time	s	85/765	85/765	85/765	85/765	85/340	85/340	85/340	85/340	85/340	85/340	85/340	85/340
Stroke S	mm	50 to 700	50 to 700	50 to 610	50 to 450	50 to 700	50 to 700	50 to 610	50 to 450	50 to 700	50 to 700	50 to 610	50 to 450
Backlash	mm	1.0	1.0	0.6	0.6	1.0	1.0	0.6	0.6	1.0	1.0	0.6	0.6
Mass at 200-mm stroke	kg	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Color	–	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black
Ambient temperature [5]	°C	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85	−25 to +85
IP protection	–	IP69K, IP66M											
Standards/EMC	–	EN 61000-6-2:2005, EN 61000-6-4:2007/A1:2011											
Salt spray test	–	ISO 9227:2012, 250 h											

1) Upper limit of the pull/push force limited by the clutch. The lower limiting value is just above the rated force. The limitation of the force will happen between these 2 limits.

2) The holding force is the highest load a powered-down drive can statically hold without slipping backward. For maximum static load, refer to the “Static load” diagrams.

3) The speed and current data in this list is defined at +20 °C.

4) Duty cycle: Output force and movement of the linear drive are in the same direction of travel, otherwise the duty cycle is 10 % (25 s ON/225 s OFF).

5) Full performance from 0 °C to +40 °C, for use at low temperatures (−40 °C to −25 °C) please contact Schaeffler.

46 Technical information for the CAHB-22S

Characteristic	Unit	CAHB-22S							
		12 V				24 V ... 48 V			
Rated push force	N	2300	3500	6800	10000	2300	3500	6800	10000
Rated pull force	N	2300	3500	6800	10000	2300	3500	6800	10000
Max pull/push force [6]	N	3500	4900	9500	14000	3500	4900	9500	14000
Holding force [7]	N	➤118|169							
Speed without load [8]	mm/s	55.0	45.0	22.0	13.0	53.0	45.0	22.0	13.0
Speed with the rated force [8]	mm/s	42.0	36.0	15.5	10.2	42.0	37.0	17.0	10.2
Rated voltage [9]	V DC	12	12	12	12	24 – 48	24 – 48	24 – 48	24 – 48
Nominal current [8]	A	18.0	19.5	19.5	19.0	8.0 – 4.0	9.5 – 4.8	9.5 – 4.8	8.5 – 4.3
Max. current, nominal current [10]	A	31.3	31.3	31.3	31.3	20.7 – 10.4	20.7 – 10.4	20.7 – 10.4	20.7 – 10.4
Duty cycle [11]	%	10	10	10	10	20	20	20	20
ON time/OFF time	s	85/765	85/765	85/765	85/765	85/340	85/340	85/340	85/340
Stroke S	mm	50 ... 700	50 ... 700	50 ... 610	50 ... 450	50 ... 700	50 ... 700	50 ... 610	50 ... 450
Backlash	mm	1.0	1.0	0.6	0.6	1.0	1.0	0.6	0.6
Max. manual override torque	Nm	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Max. manual override speed	min^{-1}	1600	1600	1600	1600	1600	1600	1600	1600
Mass at 200-mm stroke	kg	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Color	–	Black	Black	Black	Black	Black	Black	Black	Black
Ambient temperature [10]	°C	−25 ... +85	−25 ... +85	−25 ... +85	−25 ... +85	−25 ... +85	−25 ... +85	−25 ... +85	−25 ... +85
IP protection	–	IP69K, IP66M							
Standards/EMC	–	See environmental performances – electrical tests							
Salt spray test	–	ISO 9227:2012, 500 h							

[6] Upper limit of the pull/push force, limited by the E-clutch.

[7] The holding force is the highest load a powered-down drive can statically hold without slipping backward. For maximum static load, refer to the “Static load” diagrams.

[8] The speed and current data in this list is defined at +20 °C, PWM 100 %

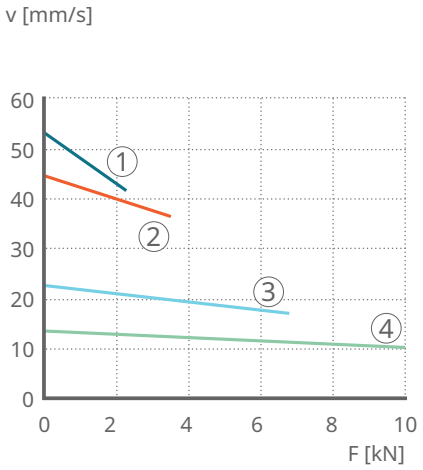
[9] Version for 12 V with DC 12-V motor, version for 24–48 V withDC 24-V motor.

[10] Max. current is the upper limit of the input current to the drive. In any circumstances, the current will not exceed to max. current.

[11] The duty cycle is for temperatures of +20 °C and where the direction of the output force of the linear drive is in the same direction of movement as the linear drive, otherwise the duty cycle is 10 % (25 s ON/225 s OFF)

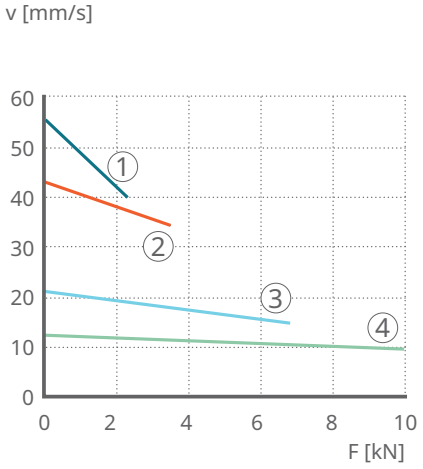
Performance diagrams

164 Speed-load diagram for CAHB-22E



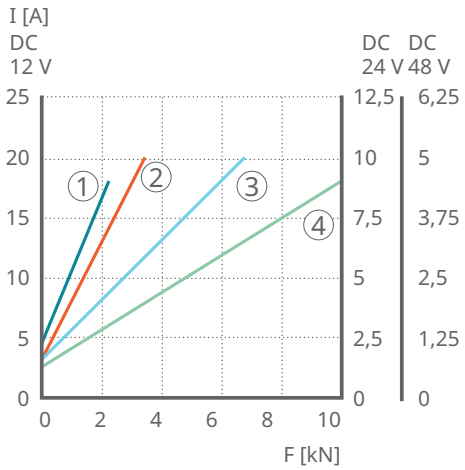
1	CAHB-22...1E	2	CAHB-22...2E
3	CAHB-22...3E	4	CAHB-22...4E
F	Load	v	Speed

165 Speed-load diagram for CAHB-22S



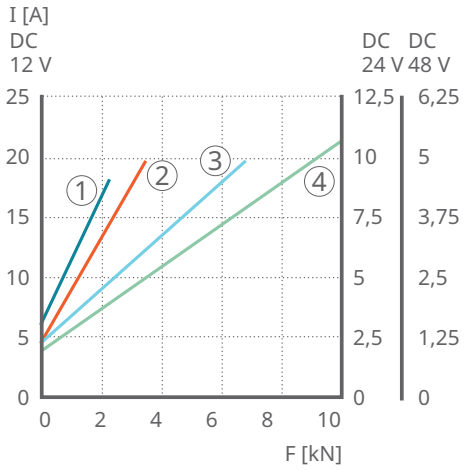
1	CAHB-22...1S	2	CAHB-22...2S
3	CAHB-22...3S	4	CAHB-22...4S
F	Load	v	Speed

166 Current-load diagram for CAHB-22E



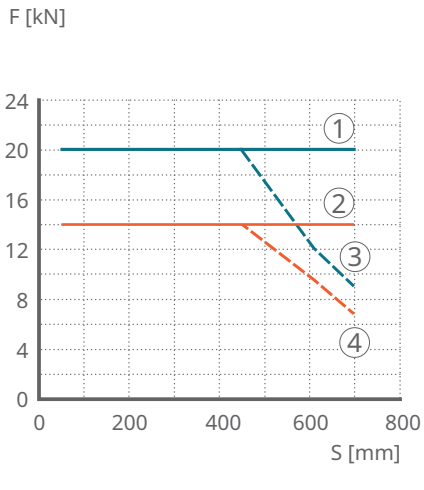
1	CAHB-22...1E	2	CAHB-22...2E
3	CAHB-22...3E	4	CAHB-22...4E
F	Load	I	Current consumption

167 Current-load diagram for CAHB-22S



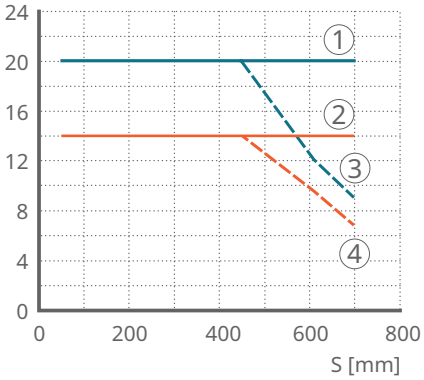
1	CAHB-22...1S	2	CAHB-22...2S
3	CAHB-22...3S	4	CAHB-22...4S
F	Load	I	Current consumption

168 Static load stroke length for CAHB-22E



1	Ultimate CAHB-22...E (push)	2	Ultimate CAHB-22...E (pull)
3	Recommended CAHB-22...E (push)	4	Recommended CAHB 22...E (pull)
S	Stroke	F	Load

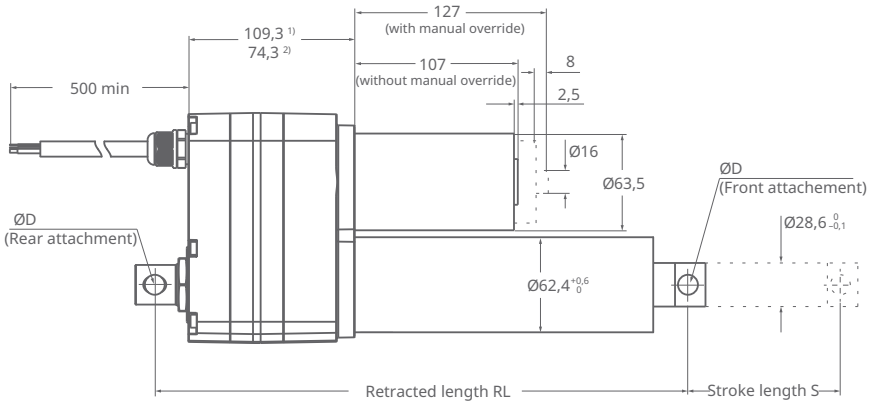
169 Static load stroke length for CAHB-22S



1	Ultimate CAHB-22...S (push)	2	Ultimate CAHB-22...S (pull)
3	Recommended CAHB-22...S (push)	4	Recommended CAHB 22...S (pull)
S	Stroke	F	Load

Dimensional drawings

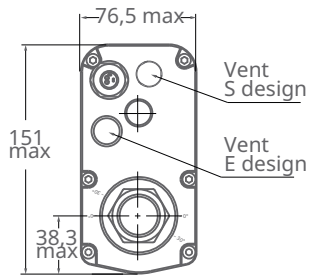
170 Side view dimensions for CAHB-22E, CAHB-22S



1) 109,3 for E design with position output
2) 74,3 for E design without position output and S design

001D30BB

171 Rear view dimensions for CAHB-22E, CAHB-22S



001D30AB

47 Tolerances for CAHB-22E, CAHB-22S

Design	Stroke tolerance	Installation length tolerance
	mm	mm
CAHB-22E with LS (S ≤ 305)	±2	(0, +4)
CAHB-22E without LS, 1E/2E (S ≤ 305)	(−3, −1.5)	(0, +4)
CAHB-22E without LS, 3E/4E (S ≤ 305)	(−2, −0.5)	(0, +4)
CAHB-22E with LS (S > 305)	±3	(0, +4)
CAHB-22E without LS, 1E/2E (S > 305)	(−4, −2)	(0, +4)
CAHB-22E without LS, 3E/4E (S > 305)	(−3, −1)	(0, +4)
CAHB-22S	±1	±1

Calculation of the installation length (RL)

48 Calculation of the installation length (RL)

Stroke	Baseline: Rod with hole attachment		Fork head attachment	Anti-rotation tube with free-spinning front attachment	Rod end spherical plain bearing with anti-rotation tube	
	50 ... 305	306 ... 700	50 ... 700	50 ... 700	50 ... 305	306 ... 700
	mm	mm	mm	mm	mm	mm
CAHB-22E						
Installation length (RL) with no option [12]	194+S	229+S	+12	+7	+49	+37
Installation length (RL) with LS	200+S	235+S	+12	+7	+49	+37
Installation length (RL) with position output	229+S	264+S	+12	+7	+49	+37
Installation length (RL) with LS and position output [13]	235+S	270+S	+12	+7	+49	+37
CAHB-22S						
Installation length (RL)	200+S	235+S	+12	+0	+43	+33

[12] 194 + 50 (stroke) + 12 (fork head attachment) + 7 (anti-rotation tube with free-spinning front attachment) = 263

[13] 270 + 400 (stroke) + 37 (rod end spherical plain bearing with anti-rotation tube) = 707

3.5.6 Electrical specification for CAHB..E

Power input voltage tolerance

49 Power input voltage tolerance

Power input	Tolerance version
DC 12-V version	DC 10 V...DC 16 V
DC 24-V version	DC 21 V...DC 26 V
DC 48-V version	DC 40 V...DC 55 V

Wire connection without position output

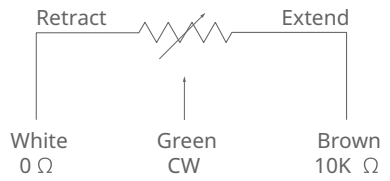
50 Wire connection without position output

Wire no.	AWG	Color	Application
1	14	Red	Motor supply (+) À extension, (–) À retraction
2	14	Black	Motor supply (–) À extension, (+) À retraction

Reference standard for cables: UL758, UL1581 and CSA C22.2 no. 210

Wire connection with position output

172 Potentiometer

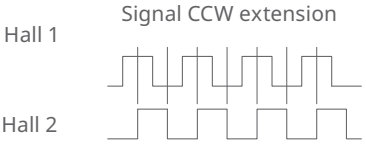


51 Wire connection with potentiometer

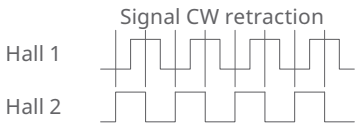
Wire no.	AWG	Color	Application
1	22	Green	See picture description
2	22	White	See picture description
3	22	Brown	See picture description
4	14	Red	Motor supply (+) À extension, (–) À retraction
5	14	Black	Motor supply (–) À extension, (+) À retraction

Reference standard for cables: UL758, UL1581 and CSA C22.2 no. 210

173 Extend encoder signal



174 Retract encoder signal

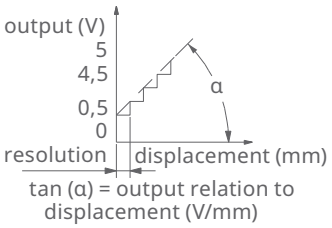


52 Wire connection with encoder

Wire no.	AWG	Color	Application	
1	26	Green	Sensor signal 1	Encoder
2	26	Yellow	Sensor signal 2	Encoder
3	26	Black	Sensor supply GND	Encoder
4	26	Red	5-V sensor supply	Encoder
5	14	Red	Motor supply (+) À extension, (–) À retraction	
6	14	Black	Motor supply (–) À extension, (+) À retraction	

Reference standard for cables: UL758, UL1581 and CSA C22.2 no. 210

175 Wire connection with absolute analog output



Absolute analog position output

- Input voltage: DC 10 V~DC 55 V
- Current consumption: max. 15 mA
- Analog output signal (voltage): DC 0 V~DC 5 V
- Max. current output: 5 mA

Absolute analog output signal configuration

- Retracted 0.5 ± 0.15 V
- Extended 4.5 V up to maximum

53 Wire connection with absolute analog output

Wire no.	AWG	Color	Application
1	22	Green	Output signal
2	22	White	Sensor supply GND
3	22	Brown	DC +10 V~DC 55 V sensor supply
4	14	Red	Motor supply (+) À extension, (–) À retraction
5	14	Black	Motor supply (–) À extension, (+) À retraction

Reference standard for cables: UL758, UL1581 and CSA C22.2 no. 210

54 Output relation to travel and resolution

Linear actuator	Hall sensor	Potentiometer (stroke [S])			Absolute analog position output signal (stroke [S])			Resolution of the absolute analog position output signal		
	Ω/mm	Ω/mm			V/mm			mm		
CAHB-20...E	2.76	59.06	if	S = 050 – 125	0.0295	if	S = 050 – 125	0.0413	if	S = 050 – 125
		29.53	if	S = 126 – 250	0.0148	if	S = 126 – 250	0.0827	if	S = 126 – 250
		9.84	if	S = 251 – 700	0.0049	if	S = 251 – 700	0.2480	if	S = 251 – 700
CAHB-21...E	1.56	33.33	if	S = 050 – 222	0.0167	if	S = 050 – 222	0.0732	if	S = 050 – 222
		16.67	if	S = 223 – 444	0.0083	if	S = 223 – 444	0.1465	if	S = 223 – 444
		5.56	if	S = 445 – 700	0.0028	if	S = 445 – 700	0.4395	if	S = 445 – 700
CAHB-22...1E	1.4	30	if	S = 050 – 254	0.0150	if	S = 050 – 254	0.0814	if	S = 050 – 254
CAHB-22...2E	1.4	15	if	S = 255 – 508	0.0075	if	S = 255 – 508	0.1628	if	S = 255 – 508
		5	if	S = 509 – 700	0.0025	if	S = 509 – 700	0.4883	if	S = 509 – 700

Linear actuator	Hall sensor	Potentiometer (stroke [S])			Absolute analog position output signal (stroke [S])			Resolution of the absolute analog position output signal		
	Ω/mm	Ω/mm			V/mm			mm		
CAHB-22...3E	2.8	60	if	S = 050 – 127	0.030	if	S = 050 – 127	0.0407	if	S = 050 – 127
CAHB-22...4E	2.8	30	if	S = 128 – 254	0.015	if	S = 128 – 254	0.0814	if	S = 128 – 254
		10	if	S = 255 – 700	0.005	if	S = 255 – 700	0.2441	if	S = 255 – 700

3.5.7 Electrical specification for CAHB..S

CAN bus + I/O

Cable and I/O option 1: code A and code C

- CAHB-20S ➤135|198
- CAHB-21S ➤139|202
- CAHB-22S ➤143|206

55 CAN bus + I/O

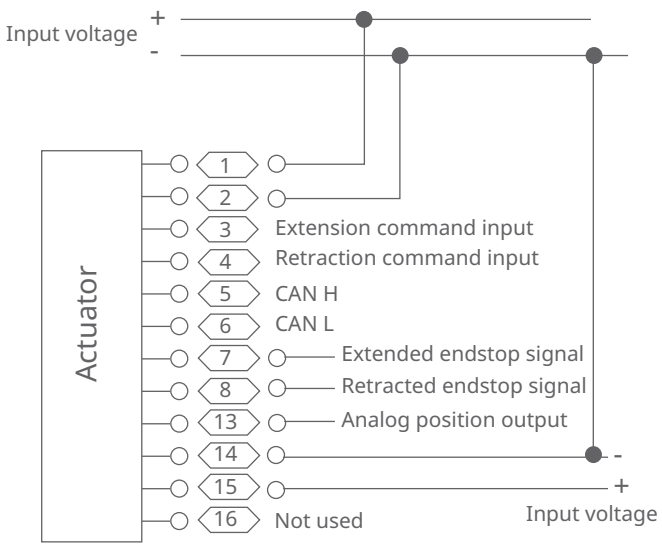
Wire no.	AWG	Color	Application
1	14	Red	Connect VCC supply (+) to positive DC 9 V ... DC 16 V (12-V version) DC 18 V ... DC 55 V (24 – 48-V version)
2	14	Black	Supply (-) GND Connect to negative
3	26	Red	Extension command input High level: DC 5 V ... DC 55 V Low level: DC 0 V ... DC 1.19 V Max. current consumption: 1 mA Delay before movement and stop: 50 ms
4	26	Black	Retraction command input High level: DC 5 V ... DC 55 V Low level: DC 0 V ... DC 1.19 V Max. current consumption: 1 mA Delay before movement and stop: 50 ms
5	26	Yellow	CAN H (CAN bus J1939)
6	26	Blue	CAN L (CAN bus J1939)
7	26	Gray	End stop signal (Digital output, open collector) Normal (L): hi-Z Extended (H): V supply – 1.8 V. Max. current consumption: 10 mA
8	26	Orange	End stop signal (Digital output, open collector) Normal (L): hi-Z Retracted (H): V supply – 1.8 V. Max. current consumption: 10 mA
13	26	Green	Analog position signal output Retracted position: 0.5 ± 0.02 V Extended position: 5 V/10 V (standard) Max. current output: 15 mA Max. ripple: 200 mV Transaction delay: 20 ms Linear feedback 0.5 % tan(α)=4.5/stroke (V/mm), code A or 9.5/stroke (V/mm), code C Resolution: 10 V/4000/tan(α)

Wire no.	AWG	Color	Application
14	26	White	Analog position sensor supply (-) GND Common ground with core no. 2
15	26	Brown	Analog position sensor supply (+) For position sensor output 0 V ~ 5 V [1]: DC 8 V ... DC 27 V For position sensor output 0 V ~ 10 V [1]: DC 13 V ... DC 27 V Max. current consumption: 15 mA
16	26	Purple	Reserved, not to be connected

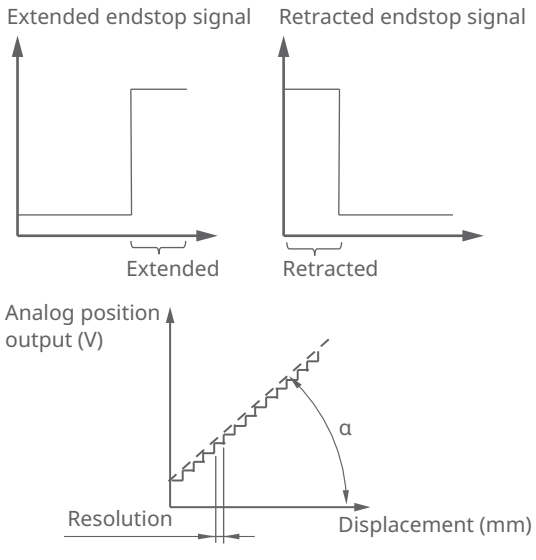
[1] Position sensor output selected via the order designation

Reference standard for cables: UL758, UL1581 and CSA C22.2 no. 210

176 CAN BUS + I/O output



177 CAN BUS+ I/O output signal



CAN bus + Input

Cable and I/O option 1: code B

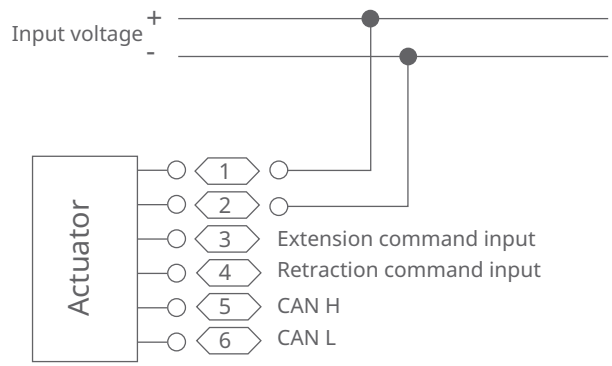
- CAHB-20S ➤135|198
- CAHB-21S ➤139|202
- CAHB-22S ➤143|206

56 CAN bus + Input

Wire no.	AWG	Color	Application
1	14	Red	Connect VCC supply (+) to positive DC 9 V ... DC 16 V (12-V version) DC 18 V ... DC 55 V (24 – 48-V version)
2	14	Black	Supply (-) GND Connect to negative
3	26	Red	Extension command input High level: DC 5 V ... DC 55 V Low level: DC 0 V ... DC 1.19 V Max. current consumption: 1 mA Delay before movement and stop: 50 ms
4	26	Black	Retraction command input High level: DC 5 V ... DC 55 V Low level: DC 0 V ... DC 1.19 V Max. current consumption: 1 mA Delay before movement and stop: 50 ms
5	26	Yellow	CAN H (CAN bus J1939)
6	26	Blue	CAN L (CAN bus J1939)

Reference standard for cables: UL758, UL1581 and CSA C22.2 no. 210

178 CAN bus + Input

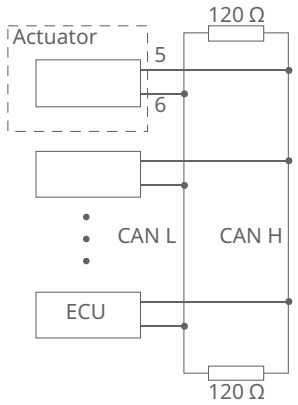


Termination resistance option

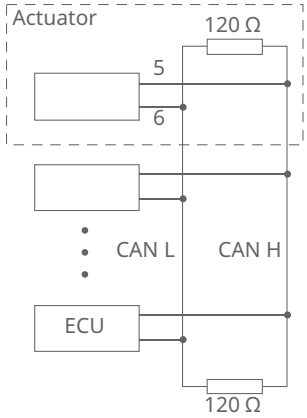
Bus type option 2

- CAHB-20S ➤135|198
- CAHB-21S ➤139|202
- CAHB-22S ➤143|206

179 Without termination resistor (code C)



180 With termination resistor (code T)

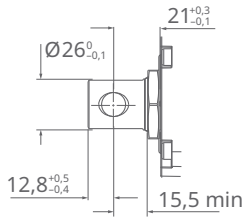


The vehicle CAN bus system requires a termination resistor. The CAHB 2xS could be equipped one.

3.5.8 Attachment options for CAHB..E and CAHB..S

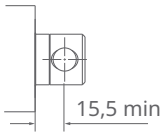
Attachment type: rod end with hole (according to order overview, attachment diameter A – E)

181 Rear attachment



001CF046

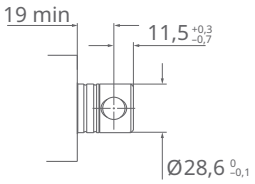
182 Front attachment without anti-rotation tube



Attachment orientation: "A" to “F”

001D315B

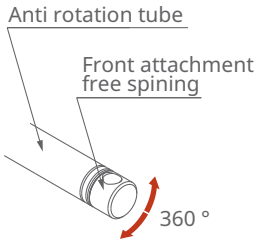
183 Front attachment with anti-rotation tube



Attachment orientation: "G" to “L”

001D316B

184 Anti-rotation tube rod end



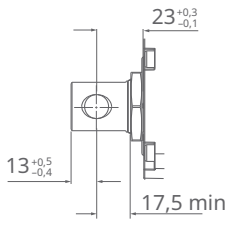
001D3179

57 Rod end with bore

Hole version	A	B	C	D	E
	mm	mm	mm	mm	mm
Hole diameter Ø	13.1	12.8	12.5	14	12.2
Tolerance	H11	H11	H11	H11	H11

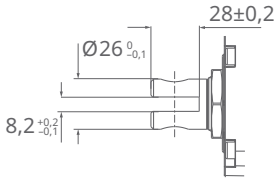
Attachment type: fork head with hole (according to order overview, attachment diameter F – G)

185 Rear attachment



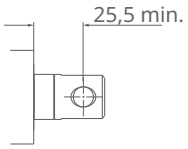
001CF047

186 Rear attachment



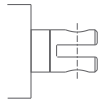
001CF04F

187 Front attachment without anti-rotation tube



001CF048

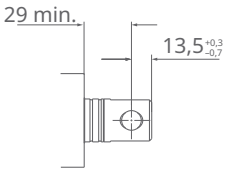
188 Front attachment without anti-rotation tube



Attachment orientation: "A" to “F”

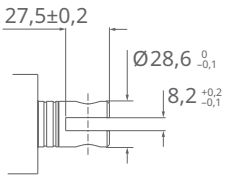
001D319B

189 Front attachment with anti-rotation tube



001CF04C

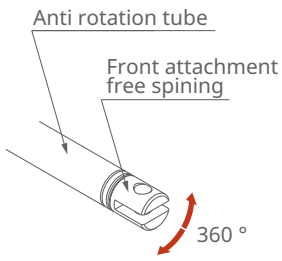
190 Front attachment with anti-rotation tube



Attachment orientation: "G" to “L”

001D31AA

191 Fork head anti-rotation tube



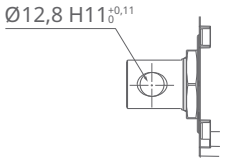
001D318A

58 Fork head with hole

Hole version	F	G
	mm	mm
Hole diameter Ø	12.2	12.8
Tolerance	H11	H11

Attachment type: rod end spherical plain bearing (attachment diameter I as per order overview)

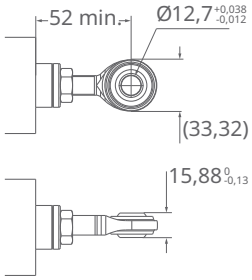
192 Rear attachment



"I" and "B" have the same rear attachment

001D31B8

193 Front attachment with anti-rotation tube



Attachment orientation: "G" to "L"

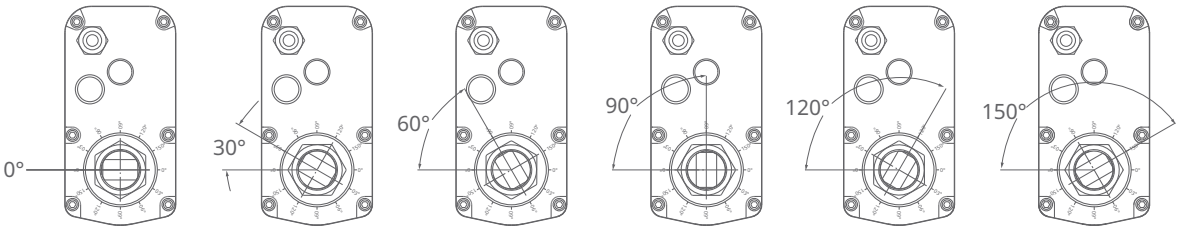
001D31CB

59 Rod end spherical plain bearing

Hole version	I (Rear Attachment)	I (front Attachment)
	mm	mm
Hole diameter Ø	12.8	12.7

Attachment orientation (see order designation “Attachment orientation”)

194 Attachment orientation



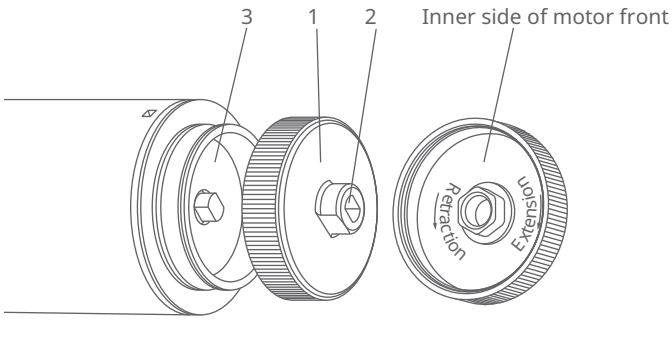
60 Attachment orientation

Attachment orientation	Designation	
A	0°	without anti-rotation tube
B	30°	without anti-rotation tube
C	60°	without anti-rotation tube
D	90°	without anti-rotation tube
E	120°	without anti-rotation tube
F	150°	without anti-rotation tube
G	0°	with anti-rotation tube and free-spinning front attachment
H	30°	with anti-rotation tube and free-spinning front attachment
I	60°	with anti-rotation tube and free-spinning front attachment
J	90°	with anti-rotation tube and free-spinning front attachment
K	120°	with anti-rotation tube and free-spinning front attachment
L	150°	with anti-rotation tube and free-spinning front attachment

Manual operation

Release the motor cover (1). Use the slot (2) to rotate the motor shaft (3) in the right direction.

195 Manual operation



1	Motor cover	2	Slot
3	Motor shaft		

3.5.9 Functional overview of CAHB..S

61 Functional overview of CAHB-20S, CAHB-21S, CAHB-22S

		CAHB-2...S only	CAN bus + I/O Order code Option 1, code A or C	CAN bus + Input Order code Option 1, code B
Interface	Voltage version	DC 12 V	✓	✓
		DC 24 V...DC 48 V	✓	✓
	Cable	n° supply of cores	2	2
		n° low-current cores	10	4
	BUS	CAN bus SAE J1939, 250 or 500 Kbit/s [1]	✓	✓
Functions	Movement	Soft start/soft stop	✓	✓
	E clutch	Force limitation (calibration, temperature compensation)	✓	✓
	Adjustable end stops	Adjustable retracted and extended length via I/O and CAN bus	–	–
	Parallel motion	Linear drive with the same length up to	2 pcs.	2 pcs.
Command	Command I/O	Motion Extend / Retract	✓	✓
	CAN bus J1939	Motion Extend / Retract	✓	✓
		Movement relative to drive length in 1/10-mm increments	✓	✓
		Speed, command set in %	✓	✓
		Max. force, command set in N	✓	✓
Real-time feedback	I/O signal end stop	End stop extended	✓	–
		End stop retracted	✓	–
	Position feedback by I/O	0 V ... 10 V or 0 V ... 5 V, absolute, analog	✓	–
	CAN bus J1939 feedback	Drive length in 1/10 mm increments	✓	✓
		Force in N	✓	✓
		Speed in %	✓	✓
		Flag for end stop retracted	✓	✓
		Flag for end stop extended	✓	✓
		Flag for operation during retraction	✓	✓
		Flag for operation during extension	✓	✓
Diagnostics by CAN bus (onboard)	Application monitoring	Voltage, upper limit reached	✓	✓
		Temperature, upper limit reached	✓	✓
		Force, upper limit reached	✓	✓
		Linear drive blocked	✓	✓
	Integrity monitoring	Error Code	✓	✓
Regulations and testing	Compliance	CE marking, Declaration of Incorporation for partly completed machinery: RoHS, EMV + REACH	✓	✓
	Environmental tests	Mechanics	Extended ➤157|3.5.12	Extended ➤157|3.5.12
		Climate	Extended ➤157|3.5.12	Extended ➤157|3.5.12
		Electrical system	Extended ➤157|3.5.12	Extended ➤157|3.5.12
		Load dump protection, chassis connected to negative terminal	✓	✓
		Load dump protection, housing not connected	✓	✓
		Reinforced load dump protection [2], housing connected to negative terminal	Option for DC 12 V	Option for DC 12 V
		Reinforced load dump protection [2], housing not connected	Option for DC 12 V	Option for DC 12 V

✓ available

1) The baud rate is 250 Kbit/s by default. To change the CAN baud rate for the CAN message, the control unit ECU used for the setting must support both 500 Kbit/sand 250 Kbit/s.

2) For vehicles without centralized load dump protection

Ordering key

196 CAHB-20E order designation, part 1

CAHB – 20 A 1 E – 050 0210 – B A A – B A A 0 0 T – 000

Type

Voltage

A	DC 12 V
B	DC 24 V
D	DC 48 V
E	DC 12 V with manual operation
F	DC 24 V with manual operation
H	DC 48 V with manual operation

Load

1	1500 N
2	2500 N

Design

E

3 × digital stroke length and 3 × digital retracted length (mm)

Stroke	Retracted length basic conf.[1]	with rod clevis	With spherical plain bearing[2]	With anti-rotation device	With position output
		F, G	I	G to L	A, P, E
050	0210	+12	+42	5	+35
100	0260	+12	+42	5	+35
150	0310	+12	+42	5	+35
200	0360	+12	+42	5	+35
250	0410	+12	+42	5	+35
300	0460	+12	+42	5	+35
350	0561	+12	+30	-11	+35
400	0611	+12	+30	-11	+35
450	0661	+12	+30	-11	+35
500	0711	+12	+30	-11	+35
600	0811	+12	+30	-11	+35
700	0911	+12	+30	-11	+35

Degree of protection

B	Standard: IP69K/IP66M and equipped with a vent, built-in thermal protection, protection clutch and EMC filter

Attachment diameter (Front and rear)

A	Rod end with hole Ø 13.1 mm
B	Rod end with hole Ø 12.8 mm
C	Rod end with hole Ø 12.5 mm
D	Rod end with hole Ø 14 mm
E	Rod end with hole Ø 12.2 mm
F	Fork head with hole Ø 12.2 mm and slot 8.2 mm
G	Fork head with hole Ø 12.8 mm and slot 8.2 mm
I	Rod end spherical plain bearing Ø 12.7 mm, rear end with hole Ø 12.8 mm (requires anti-rotation tube option)
X	Customization

Attachment orientation (Front and rear)

A	0° without anti rotation tube
B	30° without anti rotation tube
C	60° without anti rotation tube
D	90° without anti rotation tube
E	120° without anti rotation tube
F	150° without anti rotation tube
G	0°: with anti rotation tube and free spinning front attachment
H	30° with anti rotation tube and free spinning front attachment
I	60° with anti rotation tube and free spinning front attachment
J	90° with anti rotation tube and free spinning front attachment
K	120° with anti rotation tube and free spinning front attachment
L	150° with anti rotation tube and free spinning front attachment
X	Customization

001E01D5

197 CAHB-20E order designation, part 2



Option 1: limit switch
0 Not available

Option 2: position output
0 No option
A Absolute analog output signal
P Potentiometer
E Encoder

Thermal protection
T Standard integrated thermal switch

Customization
Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

[1] Basic configuration: the retracted length with “rod end with hole” attachment, without “anti-rotation tube”, without “position output”

[2] For “spherical bearing” attachment, the “anti-rotation tube” option is mandatory. To calculate the retracted length, the length “with anti-rotation device” must be added.

001E01F5

Standard linear drives are IP protection class IP69K/IP66M and are equipped a vent, built-in thermal protection, protection clutch and EMC filter.

198 CAHB-20S order designation, part 1

CAHB – 20 A 1 S – 050 0217 – 1 A G A C T – 000

Type

Voltage

A	DC 12 V
B	DC 24–48 V
E	DC 12 V with manual operation
F	DC 24–48 V with manual operation

Load

1	1500 N
2	2500 N
3	4500 N

Design

S

Stroke

Stroke	Retracted length basic conf.[1)]	With fork head F, G	With Spherical plain bearing I
050	0217	+12	+43
100	0267	+12	+43
150	0317	+12	+43
200	0367	+12	+43
250	0417	+12	+43
300	0467	+12	+43
350	0552	+12	+33
400	0602	+12	+33
450	0652	+12	+33
500	0702	+12	+33
600	0802	+12	+33
700	0902	+12	+33

Parallel operation self-controlled

1	1 linear drive is operated independently
2	Two line actuators are operated simultaneously in parallel mode

Attachment diameter (Front and rear)

A	Rod end with hole Ø 13.1 mm
B	Rod end with hole Ø 12.8 mm
C	Rod end with hole Ø 12.5 mm
D	Rod end with hole Ø 14 mm
E	Rod end with hole Ø 12.2 mm
F	Fork head with hole Ø 12.2 mm and slot 8.2 mm
G	Fork head with hole Ø 12.8 mm and slot 8.2 mm
I	Rod end spherical plain bearing Ø 12.7 mm, rear end with hole Ø 12.8 mm
X	Customization

Attachment orientation (Front and rear)

G	0°: with anti rotation tube and free spinning front attachment
H	30° with anti rotation tube and free spinning front attachment
I	60° with anti rotation tube and free spinning front attachment
J	90° with anti rotation tube and free spinning front attachment
K	120° with anti rotation tube and free spinning front attachment
L	150° with anti rotation tube and free spinning front attachment
X	Customization

Option 1: wiring and I/O variants

A	Analog I/O (bus, 2 x command inputs, 2 x end stop outputs, absolute analog position output signal 0–10 V)
C	Analog I/O (bus, 2 x command inputs, 2 x end stop outputs, absolute analog position output signal 0–5 V)
B	Bus (Bus, 2 command input)

Option 2: bus type

C	Standard CAN without termination resistor
T	CAN with termination resistor

001E01E5

199 CAHB-20S order designation, part 2

CAHB	–	20	A	1	S	–	050 0217	–	1	A	G	A	C	T	–	000

Protection

T	Standard chassis connected to negative terminal, built-in thermal protection
U	Chassis connected to negative terminal, reinforced load dump protection[2], built-in thermal protection
V	Chassis not connected, Built-in thermal protection
W	Chassis not connected, reinforced load dump protection[2], built-in thermal protection

Customization

Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

[1] Basic configuration: the retracted length with “rod end with hole” attachment

[2] For vehicles without centralized load dump protection, the option only applies to 12 V

001E0205

200 CAHB-21E order designation, part 1

CAHB – 21 A 1 E – 050 0232 – B A A 0 0 T – 000

Type

Voltage

A	DC 12 V
B	DC 24 V
D	DC 48 V
E	DC 12 V with manual operation
F	DC 24 V with manual operation
H	DC 48 V with manual operation

Load

1	1500 N
2	2500 N
3	4500 N

Design

E

3 × digital stroke length and 4 × digital retracted length (mm)

Stroke	Retracted length basic conf.[1]	With fork head	With spherical plain bearing[2]	With anti-rotation device	With limit switch	With position output
		F, G	I	G to L	L	A, P, E
050	0232	+12	+42	1	+9	+35
100	0282	+12	+42	1	+9	+35
150	0332	+12	+42	1	+9	+35
200	0382	+12	+42	1	+9	+35
250	0432	+12	+42	1	+9	+35
300	0482	+12	+42	1	+9	+35
350	0567	+12	+30	1	+9	+35
400	0617	+12	+30	1	+9	+35
450	0667	+12	+30	1	+9	+35
500	0717	+12	+30	1	+9	+35
600	0817	+12	+30	1	+9	+35
700	0917	+12	+30	1	+9	+35

Degree of protection

B	Standard: IP69K/IP66M and equipped with a vent, built-in thermal protection, protection clutch and EMC filter

Attachment diameter (Front and rear)

A	Rod end with hole Ø 13.1 mm
B	Rod end with hole Ø 12.8 mm
C	Rod end with hole Ø 12.5 mm
D	Rod end with hole Ø 14 mm
E	Rod end with hole Ø 12.2 mm
F	Fork head with hole Ø 12.2 mm and slot 8.2 mm
G	Fork head with hole Ø 12.8 mm and slot 8.2 mm
I	Rod end spherical plain bearing Ø 12.7 mm, rear end with hole Ø 12.8 mm (requires anti-rotation tube option)
X	Customization

Attachment orientation (Front and rear)

A	0° without anti rotation tube
B	30° without anti rotation tube
C	60° without anti rotation tube
D	90° without anti rotation tube
E	120° without anti rotation tube
F	150° without anti rotation tube
G	0° with anti rotation tube and free spinning front attachment
H	30° with anti rotation tube and free spinning front attachment
I	60° with anti rotation tube and free spinning front attachment
J	90° with anti rotation tube and free spinning front attachment
K	120° with anti rotation tube and free spinning front attachment
L	150° with anti rotation tube and free spinning front attachment
X	Customization

001E0215

201 CAHB-21E order designation, part 2

CAHB – 21 A 1 E – 050 0232 – B A A 0 0 T – 000

Option 1: limit switch

0 None (mandatory for version with 1500 N, 2500 N and version with DC 48 V)
L Limit switch (valid only for load version 4500 at DC 12 or 24 V)

Option 2: position output

0 No option
A Absolute analog output signal
P Potentiometer
E Encoder

Thermal protection

T Standard integrated thermal switch

Customization

Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

[1] Basic configuration: the retracted length with “rod end with hole” attachment, without “anti-rotation tube”, without “position output”

[2] For “spherical bearing” attachment, the “anti-rotation tube” option is mandatory. To calculate the retracted length, the length “with anti-rotation device” must be added.

001E0225

Standard linear drives are IP protection class IP69K/IP66M and are equipped a vent, built-in thermal protection, protection clutch and EMC filter.

202 CAHB-21S order designation, part 1

CAHB – 21 A 1 S – 050 0232 – 1 A G A C T – 000

Type

Voltage

A	DC 12 V
B	DC 24–48 V
E	DC 12 V with manual operation
F	DC 24–48 V with manual operation

Load

1	1500 N
2	2500 N
3	4500 N

Design

S

3 × digital stroke length and 4 × digital retracted length (mm)

Stroke	Retracted length basic conf.[1)]	With fork head F, G	With Spherical plain bearing I
050	0232	+12	+43
100	0282	+12	+43
150	0332	+12	+43
200	0382	+12	+43
250	0432	+12	+43
300	0482	+12	+43
350	0567	+12	+33
400	0617	+12	+33
450	0667	+12	+33
500	0717	+12	+33
600	0817	+12	+33
700	0917	+12	+33

Parallel operation self-controlled

1	1 linear drive is operated independently
2	Two line actuators are operated simultaneously in parallel mode

Attachment diameter (Front and rear)

A	Rod end with hole Ø 13.1 mm
B	Rod end with hole Ø 12.8 mm
C	Rod end with hole Ø 12.5 mm
D	Rod end with hole Ø 14 mm
E	Rod end with hole Ø 12.2 mm
F	Fork head with hole Ø 12.2 mm and slot 8.2 mm
G	Fork head with hole Ø 12.8 mm and slot 8.2 mm
I	Rod end spherical plain bearing Ø 12.7 mm, rear end with hole Ø 12.8 mm
X	Customization

Attachment orientation (Front and rear)

G	0° with anti rotation tube and free spinning front attachment
H	30° with anti rotation tube and free spinning front attachment
I	60° with anti rotation tube and free spinning front attachment
J	90° with anti rotation tube and free spinning front attachment
K	120° with anti rotation tube and free spinning front attachment
L	150° with anti rotation tube and free spinning front attachment
X	Customization

Option 1: wiring and I/O variants

A	Analog I/O (bus, 2 x command inputs, 2 x end stop outputs, absolute analog position output signal 0–10 V)
C	Analog I/O (bus, 2 x command inputs, 2 x end stop outputs, absolute analog position output signal 0–5 V)
B	Bus (Bus, 2 command input)

Option 2: bus type

C	Standard CAN without termination resistor
T	CAN with termination resistor

001E0235

203 CAHB-21S order designation, part 2

CAHB – 21 A 1 S – 050 0232 – 1 A G A C T – 000

Protection

T	Standard chassis connected to negative terminal, built-in thermal protection
U	Chassis connected to negative terminal, reinforced load dump protection[2], built-in thermal protection
V	Chassis not connected, Built-in thermal protection
W	Chassis not connected, reinforced load dump protection[2], built-in thermal protection

Customization

Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

[1] Basic configuration: the retracted length with “rod end with hole” attachment

[2] For vehicles without centralized load dump protection, the option only applies to 12 V

001E0245

204 CAHB-22E order designation, part 1

CAHB – 22 A 1 E – 050 0244 – B A A 0 0 T – 000

Type

Voltage

A	DC 12 V
B	DC 24 V
D	DC 48 V
E	DC 12 V with manual operation
F	DC 24 V with manual operation
H	DC 48 V with manual operation

Load

1	2300 N
2	3500 N
3	6800 N
4	10000 N

Design

E

3 × digital stroke length and 4 × digital retracted length (mm)

Stroke	Retracted length basic conf.[1)]	With fork head	With spherical plain bearing[2)]	With anti-rotation device	With limit switch	With position output
		F, G	I	G to L	L	A, P, E
050	0244	+12	+42	+7	6	+35
100	0294	+12	+42	+7	6	+35
150	0344	+12	+42	+7	6	+35
200	0394	+12	+42	+7	6	+35
250	0444	+12	+42	+7	6	+35
300	0494	+12	+42	+7	6	+35
350	0579	+12	+30	+7	6	+35
400	0629	+12	+30	+7	6	+35
450	0679	+12	+30	+7	6	+35
500	0729	+12	+30	+7	6	+35
600	0829	+12	+30	+7	6	+35
700	0929	+12	+30	+7	6	+35

Degree of protection

B	Standard: IP69K/IP66M and equipped with a vent, built-in thermal protection, protection clutch and EMC filter

Attachment diameter (Front and rear)

A	Rod end with hole Ø 13.1 mm
B	Rod end with hole Ø 12.8 mm
C	Rod end with hole Ø 12.5 mm
D	Rod end with hole Ø 14 mm
E	Rod end with hole Ø 12.2 mm
F	Fork head with hole Ø 12.2 mm and slot 8.2 mm
G	Fork head with hole Ø 12.8 mm and slot 8.2 mm
I	Rod end spherical plain bearing Ø 12.7 mm, rear end with hole Ø 12.8 mm (requires anti-rotation tube option)
X	Customization

001E0255

205 CAHB-22E order designation, part 2

CAHB – 22 A 1 E – 050 0244 – B A A 0 0 T – 000

Attachment orientation (Front and rear)

A	0° without anti rotation tube
B	30° without anti rotation tube
C	60° without anti rotation tube
D	90° without anti rotation tube
E	120° without anti rotation tube
F	150° without anti rotation tube
G	0°: with anti rotation tube and free spinning front attachment
H	30° with anti rotation tube and free spinning front attachment
I	60° with anti rotation tube and free spinning front attachment
J	90° with anti rotation tube and free spinning front attachment
K	120° with anti rotation tube and free spinning front attachment
L	150° with anti rotation tube and free spinning front attachment
X	Customization

Option 1: limit switch

0	None (mandatory for version with 2300 N, 3500 N and version with DC 48 V)
L	Limit switch (valid for load version 6 800 N and 10 000 N)

Option 2: position output

0	No option
A	Absolute analog output signal
P	Potentiometer
E	Encoder

Thermal protection

T	Standard integrated thermal switch

Customization

Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

[1] Basic configuration: the retracted length with “rod end with hole” attachment, without “anti-rotation tube”, without “position output”

[2] For “spherical bearing” attachment, the “anti-rotation tube” option is mandatory. To calculate the retracted length, the length “with anti-rotation device” must be added.

001E0265

Standard linear drives are IP protection class IP69K/IP66M and are equipped a vent, built-in thermal protection, protection clutch and EMC filter.

206 CAHB-22S order designation, part 1

CAHB – 22 A 1 S – 050 0250 – 1 A G A C T – 000

Type

Voltage

A	DC 12 V
B	DC 24–48 V
E	DC 12 V with manual operation
F	DC 24–48 V with manual operation

Load

1	2300 N
2	3500 N
3	6800 N
4	10000 N

Design

S

3 × digital stroke length and 4 × digital retracted length (mm)

Stroke	Retracted length basic conf.[1)]	With fork head F, G	With Spherical plain bearing
050	0250	+12	+43
100	0300	+12	+43
150	0350	+12	+43
200	0400	+12	+43
250	0450	+12	+43
300	0500	+12	+43
350	0585	+12	+33
400	0635	+12	+33
450	0685	+12	+33
500	0735	+12	+33
600	0835	+12	+33
700	0935	+12	+33

Parallel operation self-controlled

1	1 linear drive is operated independently
2	Two line actuators are operated simultaneously in parallel mode

Attachment diameter (Front and rear)

A	Rod end with hole Ø 13.1 mm
B	Rod end with hole Ø 12.8 mm
C	Rod end with hole Ø 12.5 mm
D	Rod end with hole Ø 14 mm
E	Rod end with hole Ø 12.2 mm
F	Fork head with hole Ø 12.2 mm and slot 8.2 mm
G	Fork head with hole Ø 12.8 mm and slot 8.2 mm
I	Rod end spherical plain bearing Ø 12.7 mm, rear end with hole Ø 12.8 mm
X	Customization

Attachment orientation (Front and rear)

G	0° (Standard) with Free spinning
H	30° with Free spinning
I	60° with Free spinning
J	90° with Free spinning
K	120° with Free spinning
L	150° with Free spinning

Option 1: wiring and I/O variants

A	Analog I/O (bus, 2 x command inputs, 2 x end stop outputs, absolute analog position output signal 0–10 V)
C	Analog I/O (bus, 2 x command inputs, 2 x end stop outputs, absolute analog position output signal 0–5 V)
B	Bus (Bus, 2 command input)

Option 2: bus type

C	Standard CAN without termination resistor
T	CAN with termination resistor

001E0275

207 CAHB-22S order designation, part 2

CAHB – 22 A 1 S – 050 0250 – 1 A G A C T – 000

Protection

T	Standard chassis connected to negative terminal, built-in thermal protection
U	Chassis connected to negative terminal, reinforced load dump protection[2], built-in thermal protection
V	Chassis not connected, Built-in thermal protection
W	Chassis not connected, reinforced load dump protection, built-in thermal protection

Customization

Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

[1] Basic configuration: the retracted length with “rod end with hole” attachment

[2] For vehicles without centralized load dump protection, the option only applies to 12 V.

001E0285

3.5.10 CAHB-30A

208 CAHB-30A



001CF052

Benefits

- powered by AC voltage
- designed and tested for harsh environments
- reliable and cost-effective
- reduced development and startup times
- virtually maintenance-free

Characteristics

- optional potentiometer and limit switches
- self-locking
- integrated thermal and overload protection
- robust design, IP65S, wide temperature range, corrosion resistant

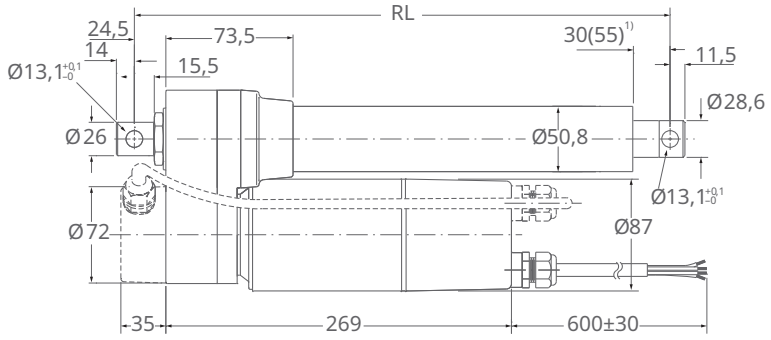
62 Technical information for the CAHB-30A

Characteristic		Unit	CAHB–30A...1	CAHB–30A...2
Rated push force		N	1500	2300
Rated pull force		N	1500	2300
Holding force [1]		N	10000	10000
Speed (full load ... no load)	AC 115 V/60 Hz	mm/s	25 to 26	12 to 13
	AC 230 V/50 Hz	mm/s	21 to 22	11 to 12
Stroke S		mm	102 to 610	102 to 610
Voltage		V AC	115 / 230	115 / 230
Nominal current	AC 115 V/60 Hz	A	2.3	1.8
	AC 230 V/50 Hz	A	1.35	1.4
Duty cycle of operation		%	25	25
ON time / OFF time		s	94 / 376	94 / 376
Ambient temperature		°C	–26 to +65	–26 to +65
IP protection		–	IP65S	IP65S
Mass		kg	9	9
Color		–	Black	Black

1) The holding force is the highest load a powered-down drive can statically hold without slipping backward.

Basic configuration (dashed line for optional limit switch)

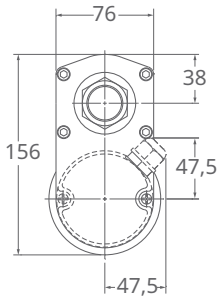
209 Side view of basic configuration (dashed line for optional limit switch)



Legend:
RL = retracted length
1) 55 = dimension with limit switch

001D31FB

210 Rear view



001CF053

63 Calculation of the installation length (RL): basic configuration

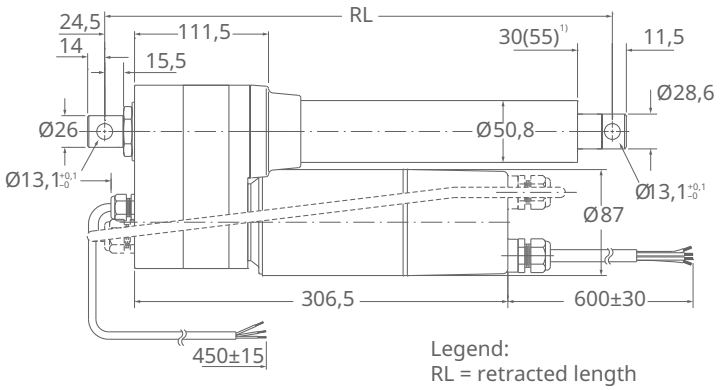
Stroke	Unit	With limit switch [2]						Without limit switch [3]					
		102	153	204	305	457	610	102	153	204	305	457	610
Installation length (RL)	mm	440	440	440	592	744	897	380	415	415	465	668	821

2) Tolerance: S and RL = ±5.0 mm (if S ≥ 305 mm, S = ±7.5 mm)

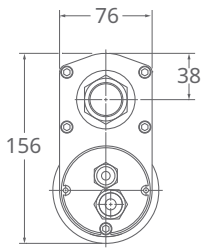
3) Tolerance: S = ±2.5 mm and L = ±3.8 mm

Optional potentiometer (dashed line for optional limit switch)

211 Side view of optional potentiometer (dashed line for optional limit switch)



212 Rear view



64 Calculation of the installation length (RL): optional potentiometer

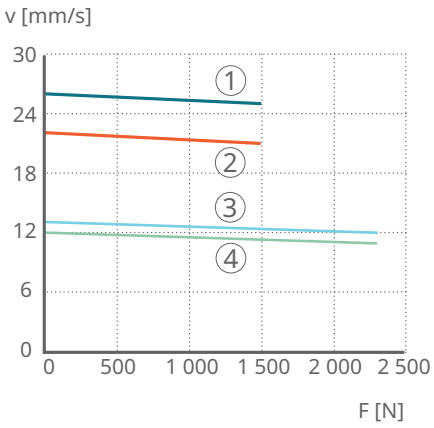
Stroke	Unit	With limit switch [4]						Without limit switch [5]					
		102	153	204	305	457	610	102	153	204	305	457	610
Installation length (RL)	mm	478	478	478	630	782	935	418	453	453	503	706	859

4) Tolerance: S and RL = ±5.0 mm (if S ≥ 305 mm, S = ±7.5 mm)

5) Tolerance: S = ±2.5 mm and L = ±3.8 mm

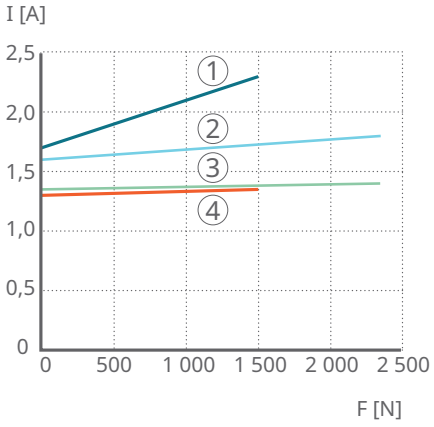
Performance diagrams

213 Speed-load diagram for CAHB-30A



1	AC 115 V	2	AC 230 V
3	AC 115 V	4	AC 230 V
F	Load	v	Speed

214 Current-load diagram for CAHB-30A



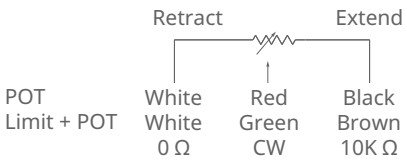
1	AC 115 V	2	AC 230 V
3	AC 115 V	4	AC 230 V
F	Load	I	Current consumption

Electrical specifications

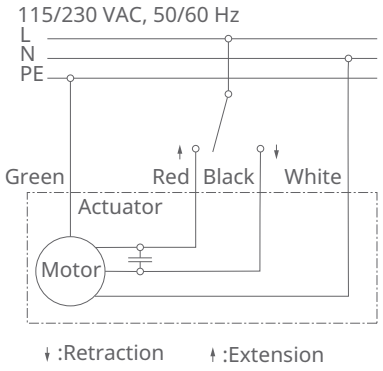
65 Potentiometer resolution for CAHB-30A

Stroke	**mm**	**102**	**153**	**204**	**305**	**457**	**610**
Ω/mm	mm	59.0	59.0	29.5	29.5	9.84	9.84

215 Electrical diagrams for CAHB-30A

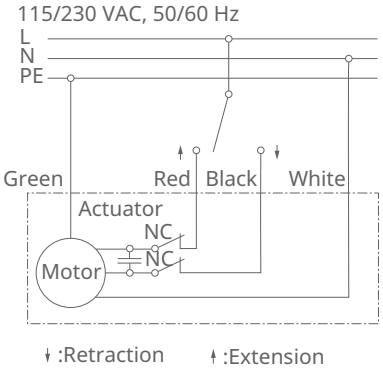


216 Connection diagram for CAHB-30A



001D322B

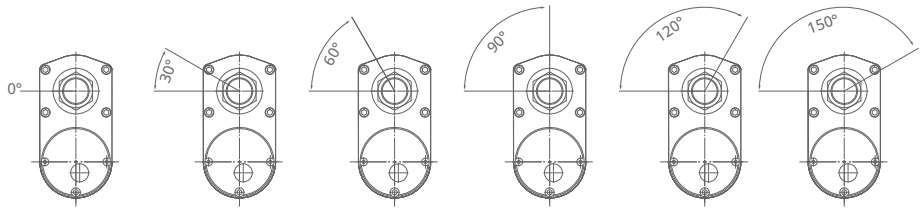
217 Connection diagram for CAHB-30A with limit switch



001D323B

Attachment orientation

218 Attachment orientation for CAHB-30A



001D321B

Ordering key

219 Order designation for CAHB-30A

CAHB – +30 | N | 1 | A | – | 102 380 | – | A | A | A | 0 | 0 | – | 000

Type

Voltage

N	AC 115 V
P	AC 230 V

Load

1	1500 N
2	2300 N

Screw

A	Ball Screw

3 × digital stroke length and 3 × digital retracted length[1] (mm)

Stroke	Retracted length basic conf.[2]	With limit switch L	With potentiometer P
102	380	+60	+38
153	415	+25	+38
204	415	+25	+38
305	465	+127	+38
457	668	+76	+38
610	821	+76	+38

Degree of protection

A	Standard (IP 65)

Attachment diameter (Front and rear)

A	Standard (hole: Ø13.1 mm)
X	Customized, available on request

Attachment orientation (Front and rear)

A	Standard (0°)
B	30°
C	60°
D	90°
E	120°
F	150°
X	Customized, available on request

Option 1

0	None
L	Limit switch (only for load version 2 300 N)

Option 2

0	None
P	Potentiometer

Customization

[1] Use the letter “A” to represent “10” if the retracted length exceeds 999 mm, for example: 1002 mm becomes A02

[2] Basic configuration: the retracted length: without “limit switch”, without “potentiometer”

001E0295

3.5.11 CAHB-31N

220 CAHB-31N



001CF056

Benefits

- powered by AC voltage
- high efficiency
- designed and tested for harsh environments
- reliable and cost-effective
- reduced development and startup times
- virtually maintenance-free

Characteristics

- optional potentiometer and limit switches
- Ball screw with a brake
- self-locking
- integrated thermal and overload protection
- robust design, IP65, wide temperature range, corrosion resistant

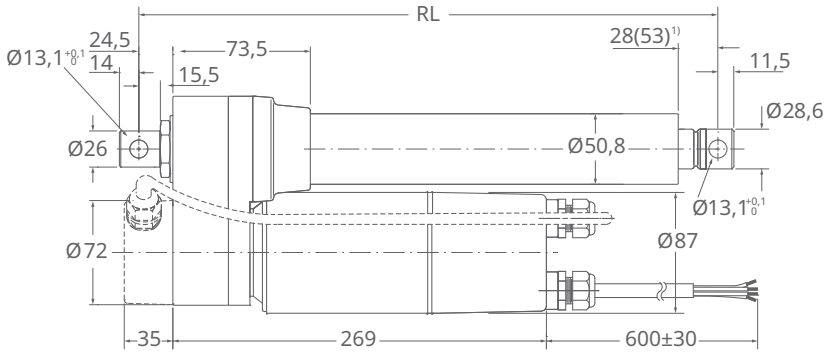
66 Technical information for the CAHB-31N

Characteristic		Unit	CAHB–31N...1	CAHB–31N...2	CAHB–31N...3
Rated push force		N	2300	4500	6000
Rated pull force		N	2300	4500	6000
Holding force [1]		N	13600	13600	13600
Speed (full load ... no load)	AC 115 V/60 Hz	mm/s	48 to 57	22 to 28	13 to 15
	AC 230 V/50 Hz	mm/s	40 to 50	20 to 24	11 to 13
Stroke S		mm	102 to 610	102 to 610	102 to 610
Voltage		V AC	115 / 230	115 / 230	115 / 230
Nominal current	AC 115 V/60 Hz	A	3	2.6	2.2
	AC 230 V/50 Hz	A	1.5	1.4	1.4
Duty cycle of operation		%	25	25	25
ON time / OFF time		s	94 / 376	94 / 376	94 / 376
Ambient temperature		°C	–26 to +65	–26 to +65	–26 to +65
IP protection		–	IP65S	IP65S	IP65S
Mass		kg	9.5	9.5	9.5
Color		–	Black	Black	Black

[1] The holding force is the highest load a powered-down drive can statically hold without slipping backward.

Basic configuration (dashed line for optional limit switch)

221 Side view of basic configuration (dashed line for optional limit switch)

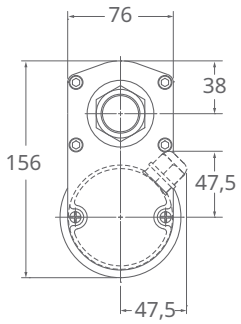


Legend:
RL = retracted length

[1] 53 = dimension with limit switch

001D325B

222 Rear view



001CF05A

67 Calculation of the installation length (RL): basic configuration

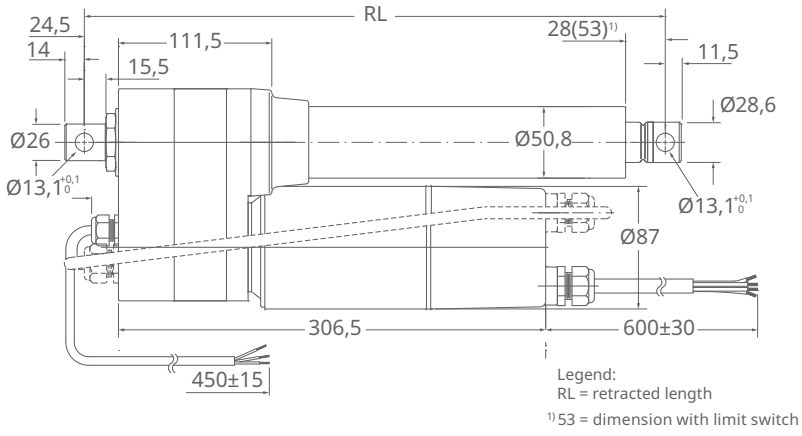
Stroke	Unit	With limit switch [2]						Without limit switch [3]					
		102	153	204	305	457	610	102	153	204	305	457	610
Installation length (RL)	mm	444	444	495	659	811	964	380	419	419	521	735	888

2) Tolerance: S and RL = ±5.0 mm (if S ≥ 305 mm, S = ±7.5 mm)

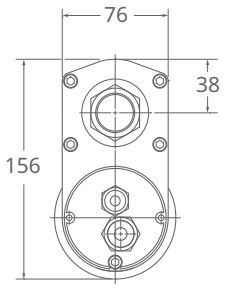
3) Tolerance: S = ±2.5 mm and L = ±3.8 mm

Optional potentiometer (dashed line for optional limit switch)

223 Side view of optional potentiometer (dashed line for optional limit switch)



224 Rear view



68 Calculation of the installation length (RL): optional potentiometer

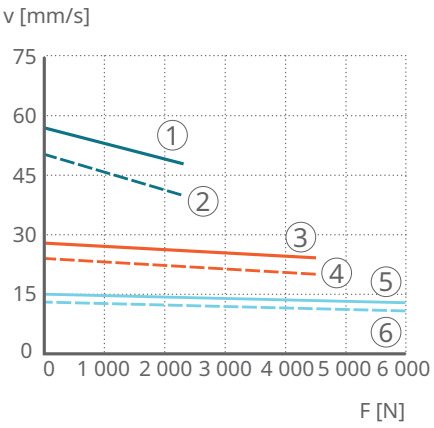
Stroke	Unit	With limit switch [4]						Without limit switch [5]					
		102	153	204	305	457	610	102	153	204	305	457	610
Installation length (RL)	mm	482	482	533	697	849	1002 (code A02)	418	457	457	559	773	926

4) Tolerance: S and RL = ±5.0 mm (if S ≥ 305 mm, S = ±7.5 mm)

5) Tolerance: S = ±2.5 mm and L = ±3.8 mm

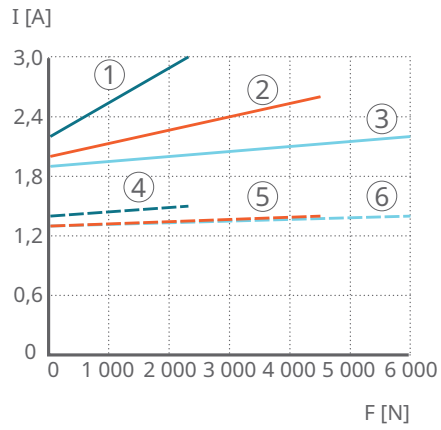
Performance diagrams

225 Speed-load diagram for CAHB-31N



1	AC 115 V	2	AC 230 V
3	AC 115 V	4	AC 230 V
5	AC 115 V	6	AC 230 V
F	Load	v	Speed

226 Current-load diagram for CAHB-31N



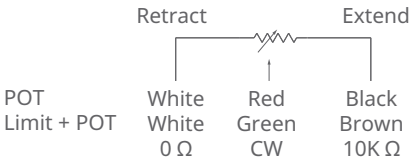
1	AC 115 V	2	AC 230 V
3	AC 115 V	4	AC 230 V
5	AC 115 V	6	AC 230 V
F	Load	I	Current consumption

Electrical specifications

69 Potentiometer resolution for CAHB-31N

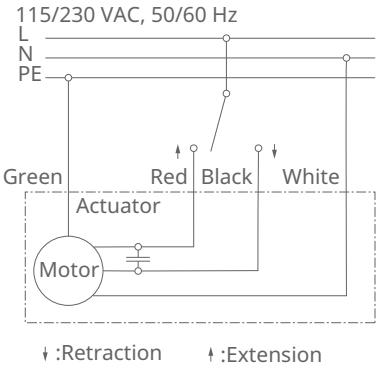
Stroke	**mm**	**102**	**153**	**204**	**305**	**457**	**610**
Potentiometer resolution	Ω/mm	59.0	59.0	29.5	29.5	9.84	9.84

227 Electrical diagrams for CAHB-31N



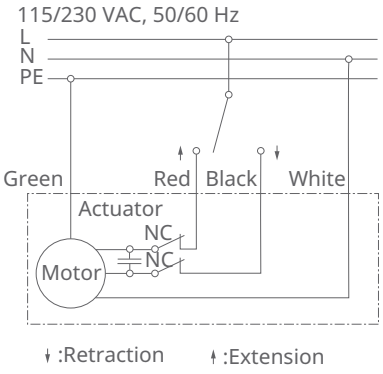
001D32AA

228 Connection diagram for CAHB-31N



001D322B

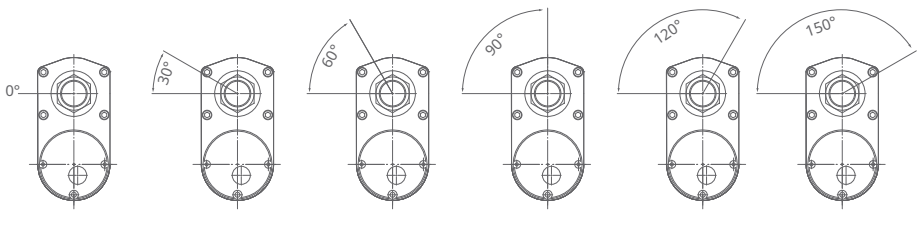
229 Connection diagram for CAHB-31N with limit switch



001D323B

Attachment orientation

230 Attachment orientation for CAHB-31N



001D327B

Ordering key

231 Order designation for CAHB-31N

CAHB – 31 N 1 – N – 102 380 – A A A 0 0 – 000

Type

Voltage

N	AC 115 V
P	AC 230 V

Load

1	1500 N
2	2300 N
2	2300 N

Screw

N	Ball Screw

3 × digital stroke length and 3 × digital retracted length[1] (mm)

Stroke	Retracted length basic conf.[2]	With limit switch L	With potentiometer P
102	380	+64	+38
153	419	+25	+38
204	419	+76	+38
305	521	+138	+38
457	735	+76	+38
610	888	+76	+38

Degree of protection

A	Standard (IP 65)

Attachment diameter (Front and rear)

A	Standard (hole: Ø13.1 mm)
X	Customized, available on request

Attachment orientation (Front and rear)

A	Standard (0°)
B	30°
C	60°
D	90°
E	120°
F	150°
X	Customized, available on request

Option 1

0	None
L	Limit switch (only for load version 6 000 N)

Option 2

0	None
P	Potentiometer

Customization

[1] Use the letter “A” to represent “10” if the retracted length exceeds 999 mm, for example: 1002 mm becomes A02

[2] Basic configuration: the retracted length: without “limit switch”, without “potentiometer”

001E02A5

3.5.12 CAHB – Environmental tests

70 Climatic tests for CAHB..E, CAHB-10, CAHB-30A, CAHB-31N

Test and Standard	CAHB..E		CAHB-10		CAHB-30A, CAHB-31N	
	Performance	Report No.	Performance	Report No.	Performance	Report No.
Cold test EN60068-2-1 (Ab)	Storage at low temperature Temperature: −40 °C Duration: 6 h Not connected Tested at room temperature.	PH_TR0295	Storage at low temperature Temperature: −40 °C Duration: 96 h Not connected Tested at room temperature.	"Low temperature for CAHB-10"	Storage at low temperature Temperature: −40 °C Duration: 8 h Not connected Tested at room temperature.	PH_TR0265
Cold test EN60068-2-1 (Ad)	Storage at low temperature Temperature: −30 °C Duration: 6 h Linear drive is not activated/connected Tested at low temperature.	PH_TR0295	Storage at low temperature Temperature: −20 °C Duration: 96 h Linear drive is not activated/connected Tested at low temperature.	"Low temperature for CAHB-10"	Storage at low temperature Temperature: −26 °C Duration: 8 h Not connected Tested at room temperature.	PH_TR0265
Dry heat EN60068-2-2 (Bb)	Storage at high temperature Temperature: +90 °C Duration: 72 h Linear drive is not activated/connected. Tested at room temperature	PH_TR0278	Storage at high temperature Temperature: +85 °C Duration: 96 h Linear drive is not activated/connected. Tested at room temperature	"High temperature for CAHB-10"	–	–
Change of temperature EN60068-2-14 (Na)	Rapid change of temperature High temperature: +100 °C over 60 min Low temperature: −30 °C over 60 min Transition time: < 10 s Duration: 100 cycles Linear drive is not activated/connected. Tested at room temperature.	PH_TR0278	–	–	–	–
Salt mist EN60068-2-52 (Kb)	Salt spray test Salt solution: 5 % sodium chloride (NaCl) 4 spray period, 2 h at a time. Humidity storage for 7days after each test Linear drive not activated/connected. Exposure time: 250 h	PH_TR0268	Salt spray test Salt solution: 5 % sodium chloride (NaCl) 4 spray period, 2 h at a time. Humidity storage for 7days after each test Linear drive not activated/connected. Exposure time: 96 h	"Salt spray test for CAHB-10"	–	–

Test and Standard	CAHB..E		CAHB-10		CAHB-30A, CAHB-31N	
	Performance	Report No.	Performance	Report No.	Performance	Report No.
Protection class IEC 60529	1st Test subject: IP6XM	SHIN160703 6235PS	1st Test subject: IPX6S	COM12-GPE080184AN, COM12-GPE080183AN	–	–
	Test condition: movement		Test condition: static			
	Dust used in testing: talcum powder		Type of dust: talcum powder			
	Dust concentration: 2 kg/m³					
	Chamber volume, dust is kept in suspension during the test					
	Test duration: 8 h		Test duration: 8 h			
Protection class IEC 60529	2. Test subject: IPX6M	SHIN160703 6235PS	2. Test subject: IPX6S	COM12-GPE080184AN, COM12-GPE080183AN	2. Test subject: IPX5S	SHIN160804 2057MR
	Test condition: movement		Test condition: static		Test condition: static	
	Flow: 100 l/min		Flow: 100 (1 ±5 %) l/min		Flow: 12.5 l/min	
	Nozzle diameter: Ø12.5 mm		Nozzle diameter: Ø12.5 mm		Nozzle diameter: Ø6.3 mm	
	Distance: 2.5 ~ 3.0 m		Distance: 2.5 ~ 3.0 m		Distance: 2.5 ~ 3.0 m	
	Test duration: 3 min		Test duration: 3 min		Test duration: 3 min	
Protection class ISO 20653:2013	3. Test subject: IPX9K	SHIN160703 6235PS	3. Test subject: IPX9K	SHIN151004 8959MR-01	–	–
	Test condition: static		Test condition: static			
	Water flow: 14~16 l/min		Water flow: 14~16 l/min			
	Water pressure: 8000~10000 kPa		Water pressure: 8000~10000 kPa			
	Water temperature: 80 to −5 °C		Water temperature: 80 to−5 °C			
	Test angle: 0°, 30°, 60°, 90°		Test angle: 0°, 30°, 60°, 90°			
	Test distance from jet to sample: 100~150 mm		Test distance from jet to sample: 100~150 mm			
	Test duration: 30 s/position		Test duration: 30 s/position			
Resistance to chemical product	–	–	Reagent on the surface, 3days	SHIN210402 0949MR-01	–	–
			100 h			
			0# Diesel			
			Mobile H46 antiwear hydraulic			
			Hydraulan DOT brake oil			
			Ethylene glycol solution 50 %			
			Urea saturated solution			
			DEF			
			NPK (15-15-15)			

71 Climatic tests for CAHB..S

Test and Standard	CAHB..S	
	Performance	Report No.
Temperature shock test	−55 °C to +95 °C, ≤15 S	SHIN2007039234MR
	100 cycles	
Temperature cycle test	−40 °C to +85 °C 18 h/cycle	SHIN2106042981PS
	10 cycles	

Test and Standard	CAHB..S	
	Performance	Report No.
High temperature soak test (Operational)	+85 °C, 96 h	SHIN2012077900MR-01
Low temperature soak test (Operational)	−40 °C, 96 h	SUIN2101000352MR
Storage temperature	−55 °C to +110 °C, 24 h	SUIN2012009686MR
Humidity and temperature cycles ISO16750-4:2010 Section 5.6	+25 °C, 95 %rF to+55 °C, 95 %rF	SUIN2012009687MR
	24 h/cycle, 6 cycles	
Salt mist EN60068-2-52 (Kb)	500 h	PH_TR0404
Protection class IEC 60529	IP6xS, IP6xM	SHIN1607036235PS
Degree of protection ISO 20653:2013	IPx9K	SHIN1607036235PS
Resistance to chemical product	Reagent on the surface, 3days	SHIN2104020959MR
	100 h	
	0# Diesel	
	Mobile H46 antiwear hydraulic	
	Hydraulan DOT brake oil	
	Ethylene glycol solution 50 %	
	Urea saturated solution	
	DEF	
	NPK (15-15-15)	

72 Mechanical tests for CAHB..E, CAHB-10, CAHB-30A, CAHB-31N

Test and Standards	CAHB..E			CAHB-10		CAHB-30A, CAHB-31N	
	Performance		Report No.	Performance	Report No.	Performance	Report No.
Vibration EN60068-2-6 (Fdb) EN60068-w2-6 (Fc)	Test subject: random vibration		SHIN1607036235PS SHIN1702007025PS	–	–	–	–
	Frequency (Hz)	Spectral					
	(g2/Hz)	Power density					
	10	0.005					
	200	0.02					
	300	0.01					
	350	0.002					
	Test direction: X/Y/Z axis						
	Test duration: 2 h/axis, 6 h total						
	Test subject: sine wave						
	Test Condition:						
	Frequency range: 5~25~200 Hz						
	Amplitude: 3.3 mm (p-p)						
	Acceleration: 4 g						
	Sweep speed: 10 ct/min						
	Test direction: X/Y/Z axis						
	Test duration: 2 h/axis, 6 h total						
Vibration Conditions specified by Schaeffler	–		–	Test Item:	SHIN1805034119SC SHIN1805032588SC	–	–
				Vibration nominal value (g-eff)	Dwell time (min)		
				5	10		
				10	10		
				15	10		
				20	10		
				20	20		
				20	30		
				Test equipment designation			
				Hold tester	Typhoon 2.5+		

73 Mechanical tests for CAHB..S

Test and Standard	CAHB..S	
	Performance	Report No.
Mechanical shock	245~500 m/s^2	SUIN2106004489MR
	3~100 impacts/axis	
Mechanical shock (Drop)	1-m height onto concrete	PH_TR0430
Random vibration for AG/CE wheeled vehicle	24 h/axis	SUIN2106004491MR
	5 Hz at a spectral acceleration density of 5.29 $(m/s^2)^2/Hz$	
	100 Hz at a spectral acceleration density of 14.44 $(m/s^2)^2/Hz$	
	1000 Hz at a spectral acceleration density of 14.44 $(m/s^2)^2/Hz$	
	2000 Hz at a spectral acceleration density of 3.66 $(m/s^2)^2/Hz$	
Vibration-random resistance	6.9 g-eff	SHIN2011076082PS
	2 h/axis	

74 Electrical tests for CAHB..E, CAHB-10, CAHB-30A, CAHB-31N

Test and Standards	CAHB..E		CAHB-10		CAHB-30A, CAHB-31N	
	Performance	Report No.	Performance	Report No.	Performance	Report No.
Power supply DC 12 V ASAE EP455 (1990)	Supply voltages: +10 V ~ +16 V	PH_TR0267 PH_TR0302	–	–	–	–
	Over voltage: +26 V/5 min					
	Reverse polarity: −26 V/5 min					
	Short-circuit to ground: 16 V/ 5 min					
	Short-circuit to positive: 16 V					

Test and Standards	CAHB..E		CAHB-10		CAHB-30A, CAHB-31N	
	Performance	Report No.	Performance	Report No.	Performance	Report No.
Power supply DC 24 V ASAE EP455 (1990)	Supply voltages: +21 V ~ +26 V	PH_TR0267 PH_TR0302	–	–	–	–
	Over voltage: +36 V/5 min					
	Reverse polarity: −36 V/5 min					
	Short-circuit to ground: 32 V/ 5 min					
	Short-circuit to positive: 32 V					
Safety menu Low Voltage Directive EN 60335-1: 2012 + A11: 2014	–	–	–	–	Rated voltage: AC 230 V	UL 4787638796
					Rated frequency: 50 Hz	
					Nominal current: 1.5 A	
					Degree of protection: IP65	
EN 60335-2-97: 2006 + A11:	–	–	–	–	Rated voltage: AC 230 V	UL 4787638796
2008 + A2:2010 + A12:					Rated frequency: 50 Hz	
2015					Nominal current: 1.5 A	
EN 62233: 2008					Degree of protection: IP65	
EMC, HF immunity EN 61000-6-1	–	–	Test passed for 12-V/24-V-motor	70.888.12.1063.02	–	–
EN 61000-6-2	Test passed for 12-V/24-V-motor	708881688102-00				
EMC, emitted interference EN 61000-6-3	–	–	Within the limits for 12 V/24 V motors	70.888.12.1063.02	–	–
EN 61000-6-4	Within the limits for 12 V/24 V motors	708881688102-00	–	–	–	–
EN 50081-2 (1993) EN 55011 (1998)	–	–	–	–	Class B	EM99777 (IA4=CAHB-30 CAHB-31 series
EMC, interference in motor vehicles ISO 7637-2	ISO 7637 load dump test only accepted on motor power connection	708881688103-00	–	–	–	–
UL certification					UL 325 ANSI/ CAN/UL-Door	20190822-E507157
UL registration	Cable flammability test VW-1 (UL758, UL1581, CSA C22.2 N°.210)	BELDEN E357312-S 2C14 SHIELDED				
		BELDEN E357312-S 3C22 2C14				
		BELDEN E357312-S 2C14 4C26				

75 Electrical tests for CAHB..S

Test and Standard	CAHB..S	
	Performance	Report No.
Electrical “Steady State” load DC 12 V ISO 16750-2, 3rd output	• Supply voltage: 14 ± 0.2 (motor running), 12 ± 0.2 (motor not running) • Over voltage: 18 V/60 min • Reverse polarity: −26 V/5 min • Short-circuit to ground: 16 V/5 min • Short-circuit to positive: 16 V/1 min/10 times • Jump start: 24 V/60±6 s • Ground reference and supply offset: supply line offset ±2 V, ground line offset ±1 V. • Ground reference disconnection • Power supply disconnection • Superimposed AC voltage on supply lines: 16 V/Upp 4 V/120 s/ 5 times • Start cycle: level I to IV/tol. −0.2 V/duration ±10 % • Gradual decrease and increase of the supply voltage: min. supply 6–10 V, max. supply 16–21 V, 0.5 V/min • Momentary drop in supply voltage: 100 ms/4.5 V • Recovery behavior after drop in supply: min. voltage 4.5 V 0.5 V/ 10 s reduction • Load shedding: test A (without central protection) 100 V/ 400 ms/1 Ω (valid for 12-V version, protection code “U“)	WTU21U03019493V-2 (valid for 12-V version, protection codes “T” and “U“)
Electrical “Steady State” load DC 24 V ISO 16750-2, 3rd output	• Supply voltage: 28±0.2 (motor running), 24±0.2 (motor not running) • Over voltage: 36 V/60 min • Reverse polarity: −36 V/5 min • Short-circuit to ground: 32 V/5 min • Short-circuit to positive: 32 V/1 min/10 times • Jump start: 36 V/60±6 s • Ground reference and supply offset: supply line offset ±2 V, ground line offset ±1 V. • Ground reference disconnection • Power supply disconnection • Superimposed AC voltage on supply lines: 32 V/Upp 4 V/120 s/ 5 times • Start cycle: level I to III/voltage tol. −0.2 V/duration ±10 % • Gradual decrease and increase of the supply voltage: min. supply 8 – 18 V, max. supply 32 V, 0.5 V/min • Momentary drop in supply voltage: 100 ms/9 V • Recovery behavior after drop in supply: min. voltage 10 V 0.5 V/ 10 s reduction • Load shedding: test B (with central protection) 58 V/350 ms/2 Ω (valid for24-V version, protection code “T“)	WTU21U03019492V-2 (valid for 24-Vversion, protection code “T”)
Sinusoid Changes of Supply Voltage	12-V systems: test level: Vb1: 12 V, Vb2: 6 V, Vb3: 8 V 24-V systems: test level: Vb1: 24 V, Vb2: 8 V, Vb3: 10 V	WTU21U03019493V-2 (valid for 12-Vversion, protection code “T”) WTU21U03019492V-2 (valid for 24-Vversion, protection code “T”)
EMC, transient conducted disturbances ISO 7637-3	CCC, ICC	WTU21U03019493V-1 (valid for 12-Vversion, protection code “T”) WTU21U03019492V-1 (valid for 24-Vversion, protection code “T”)
EMV, conducted disturbances on power lines ISO 7637-2	Positive Inductance Transient Tests Pulse 2a 2b Positive and Negative Burst Coupling Tests Pulse 3a 3b Pulse 4, Cranking Test Cranking Test at Low Temperature Pulse 4	WTU21U03019493V-1 (valid for 12-Vversion, protection code “T”) WTU21U03019492V-1 (valid for 24-Vversion, protection code “T”)

Test and Standard	CAHB..S	
	Performance	Report No.
EMC, conducted emissions/interferences	Class 3	WTU21U08086163V (valid for 12-Vversion, protection code “T”)
EMC, conducted emission EN 61000-6-4	0.15 MHz ... 0.5 MHz QP = 79, AV=66 (dBµV) 0.5 MHz ... 30 MHz QP = 73, AV=60 (dBµV)	EED39M000483 (valid for 12-Vversion, protection code “T”)
EMC Radiated Emissions/Interference Test CISPR 25-2008	Class 3	WTU21U08086163V (valid for 12-Vversion, protection code “T”)
EMC, radiated emission EN 61000-6-4	30 MHz ... 230 MHz QP = 50 (dBµV/m) 230 MHz ... 1000 MHz QP = 57 (dBµV/m)	EED39M000483 (valid for 12-Vversion, protection code “T”) EED39M000482 (valid for 24-Vversion, protection code “T”)
EMC Radiated Emission EN55011	Class A	WTU21U09098252E (valid for 24-V version, protection code “V”)
EMC, discharge of static electricity IEC61000-4-2	Air discharge: ±8 kV Contact discharge: ±4 kV	EED39M000483 (valid for 12-Vversion, protection code “T”) EED39M000482 (valid for 24-Vversion, protection code “T”)
EMC, electrical fast transient/burst immunity (EFT) IEC61000-4-4	5 kHz, 5/50 ms, 15 ms, 300 ms Supply line ±2 kV, signal line ±1 kV	EED39M000483 (valid for 12-Vversion, protection code “T”) EED39M000482 (valid for 24-Vversion, protection code “T”)
EMC Power-frequency magnetic field immunity IEC61000-4-8	50 Hz, 1 min, XYZ, 30 A/m	EED39M000483 (valid for 12-Vversion, protection code “T”) EED39M000482 (valid for 24-Vversion, protection code “T”)
UL registration	Cable flammability test VW-1 (UL758, UL1581, CSA C22.2 N°.210)	BELDEN E357312-S 1PR14 1PR26 2C26 BELDEN E357312-S

3.6 CAR, CAP, CAT

The modular design of the CAR, CAP, and CAT series allows key components such as motors, gearboxes, screws, attachments, etc. to be easily replaced. Customized linear actuators can be easily and cost-effectively built from standard components. Thanks to its high flexibility, the CAT series is suitable for a wide range of applications.

Benefits

- reliable and robust linear actuators for industrial applications
- wide range of components
- right-hand and left-hand versions
- option for feedback via incremental or absolute position

Characteristics

- compact
- robust design
- modular
- with lifetime lubrication
- high efficiency

3.6.1 CAR22

232 CAR22



001CF05E

Benefits

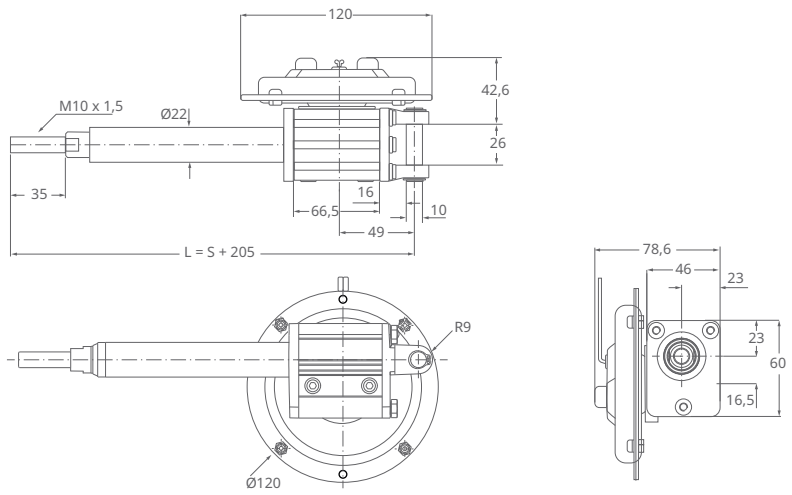
- reliable and robust linear actuators for industrial applications
- available in right-hand and left-hand versions
- maintenance-free

76 Technical data CAR22

Feature			Unit	CAR22
Rated push force			N	1000 to 1500
Rated pull force			N	1000 to 1500
Speed (full load ... no load)			mm/s	11 to 34
Stroke S			mm	50 to 300
Retracted length L			mm	S + 205
Voltage	AC		V	12 / 24
Power consumption			W	120
Current consumption	DC	12 V	A	10
	DC	24 V	A	4
Duty cycle			%	25
Ambient temperature			°C	–20 to +70
Protection code (IP)			–	IP44
Mass			kg	1.2 to 1.6

Dimensional drawings

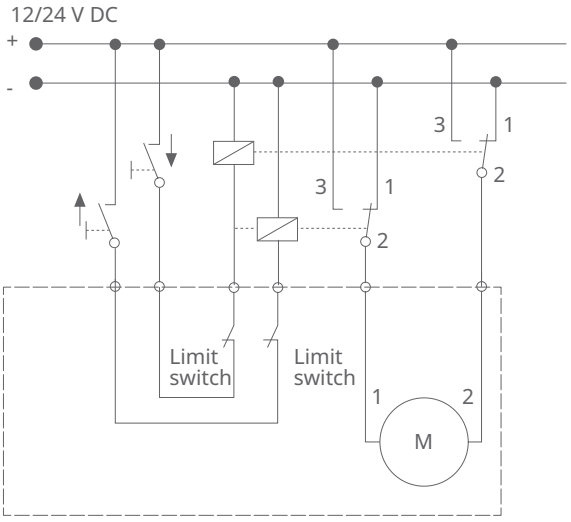
233 Dimensions CAR22



S	mm	Stroke
L	mm	Retracted length

Wiring diagrams

234 Connecting diagram CAR22

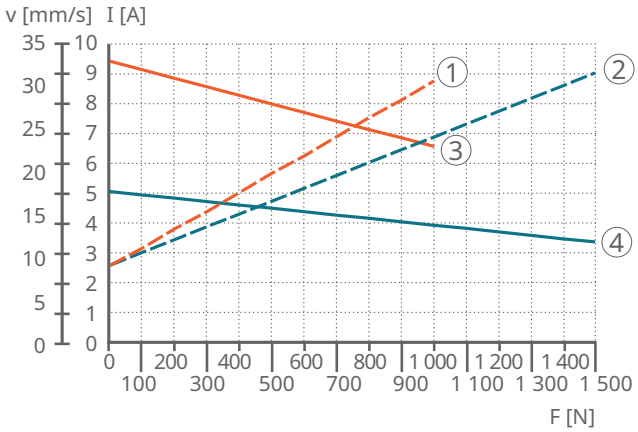


77 Suitable operating elements and controls CAR22

Linear actuator	Limit switch
CAR22	**CAXE 22**
P12B	✓
P24B	✓
✓	suitable

Performance diagrams

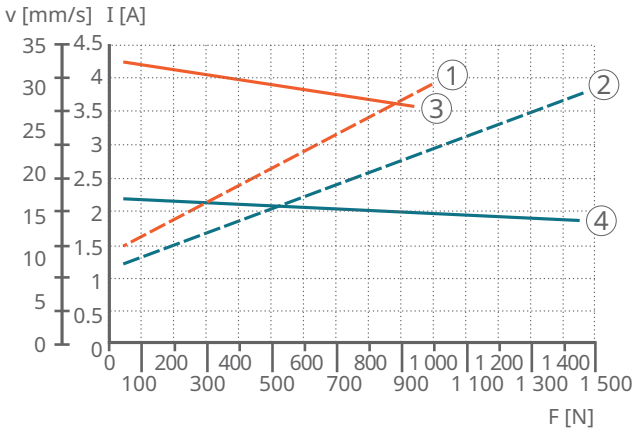
235 Performance diagram CAR22.../P12B



001D17A7

1	I (A) gear 1	2	I (A) gear 2
3	v (mm/s) gear 1	4	v (mm/s) gear 2
F	Load	v	Speed

236 Performance diagram CAR22.../P24B

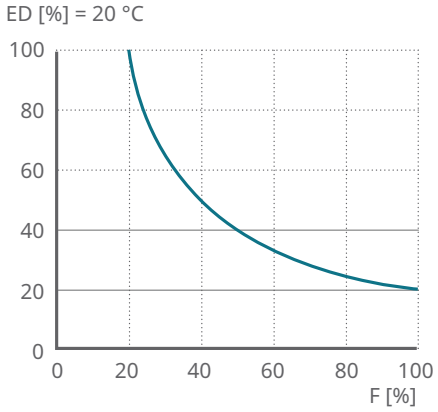


001D17AA

1	I (A) gear 1	2	I (A) gear 2
3	v (mm/s) gear 1	4	v (mm/s) gear 2
F	Load	v	Speed

Duty cycle

237 Duty cycleCAR22.../P12B



F	Load	ED	Duty cycle

Ordering key

238 Ordering designation CAR22

Load [N]/speed at full load [mm/s]		Motor options	
1500/xx	1000/xx	No motor	0000
1500/18–11	1000/34-21	DC 12 V, flat motor, IP44	P12B
1500/17-14.5	1000/33-28	DC 24 V, flat motor, IP44	P24B

1 2 — Gearbox

CAR | R | 22 | x | 050 | x | 1 | / | 0000

Type

Motor installation

R	Right
L	Left

Stroke (S)

050	50 mm
100	100 mm
150	150 mm
200	200 mm
300	300 mm
-	Other stroke lengths available on request

001DF3FE

CAR22 – Type codes for accessories and spare parts

78 Accessories and spare parts for CAR22

Description	Ordering designation	Order number
Motor DC 12 V (flat motor)	P12B	M/0405516-V01
Motor DC 24 V (flat motor)	P24B	M/0405517-V01
Limit switch for stroke = 50 mm	CAXE22X50	M/0412019
Limit switch for stroke = 100 mm	CAXE22X100	M/0412020
Limit switch for stroke = 150 mm	CAXE22X150	M/0412021
Limit switch for stroke = 200 mm	CAXE22X200	M/0412022
Limit switch for stroke = 300 mm	CAXE22X300	M/0412023
Proximity switch for CAXE	CAXE	M/0432369

Description	Ordering designation	Order number
Front attachments, rod end type	575–22	M/0430575–22
Front attachments, rod clevis type	576–22	M/0430576–22
Rear attachments, single bracket with ear type	580–22	M/0430580–22
Rear attachments, bracket with ball joint type	581–22	M/0430581–22

3.6.2 CAP32

239 CAP32



001CF069

Benefits

- high-efficiency ball screw
- extension tube (stainless steel)
- protection tube (steel)
- enhanced corrosion resistance
- mechanical overload protection (clutch)
- with lifetime lubrication
- robust, designed for harsh environments
- no back-driving
- motor with thermal protection

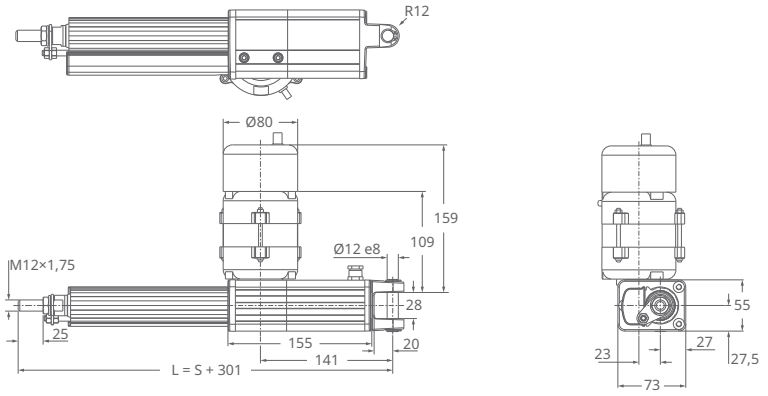
79 Technical data CAP32

Feature			Unit	CAP32	
				AC	DC
Rated push force			N	1500 ... 3500	1000 ... 3500
Rated pull force			N	1500 ... 3500	1000 ... 3500
Speed (full load ... no load)			mm/s	6 ... 32 [1)]	6 ... 66 [1)]
Stroke S			mm	50 ... 700	50 ... 700
Retracted length L			mm	S + 301	S + 301
Voltage	AC		V	120 / 230	–
	DC		V	–	12 / 24
Power consumption	AC	120 V	W	98 (brake 133.2 W)	n/a
	AC	230 V	W	92 (brake 117.3 W)	–
	DC	12 V / 24 V	W	–	n/a
Current consumption	AC	120 V	A	0.82 (brake +0.29 A)	–
	AC	230 V	A	0.4 (brake +0.11 A)	–
	DC	12 V	A	–	13
	DC	24 V	A	–	9
	DC	24 V	A	–	5 (for motor P24CW)
Duty cycle			%	30	25
Ambient temperature			°C	–20 ... +50	–20 ... +50
Protection code (IP)			–	IP20, IP54	IP20, IP54
Mass			kg	2.9 ... 5.0	2.9 ... 5.0

[1)] depending on selected motor

Dimensional drawings

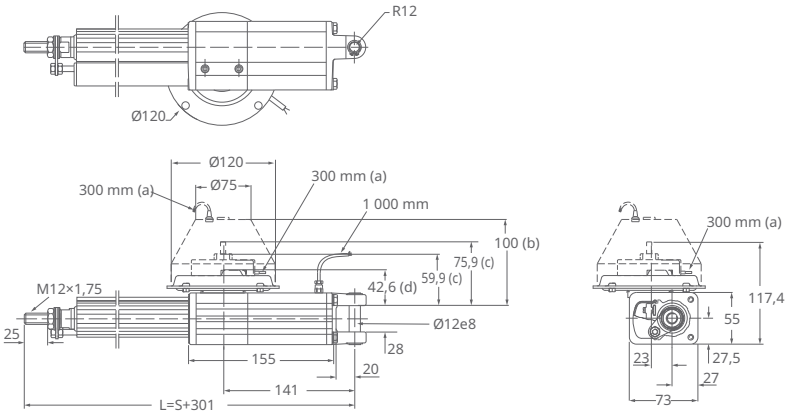
240 Dimensions CAP32, AC



E110C, E110CB, E220C, E220CB
120 or 230 V AC motor

001DC5B7

241 Dimensions CAP32, DC



D12C, P24C, P24CB, P24CS, P24CW

001DC5C7

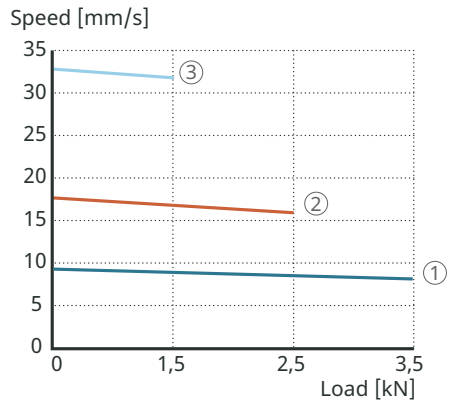
S	mm	Stroke
L	mm	Retracted length

3

Performance diagrams

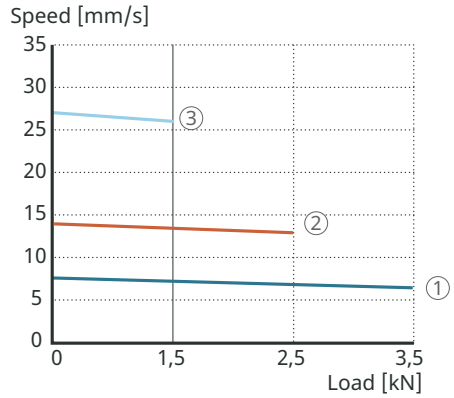
AC version

242 Speed-load diagram CAP32, AC 120 V



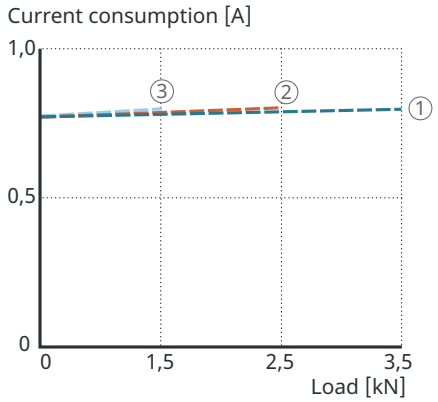
1	Gear 1	2	Gear 2
3	Gear 4		

243 Speed-load diagram CAP32, AC 230 V



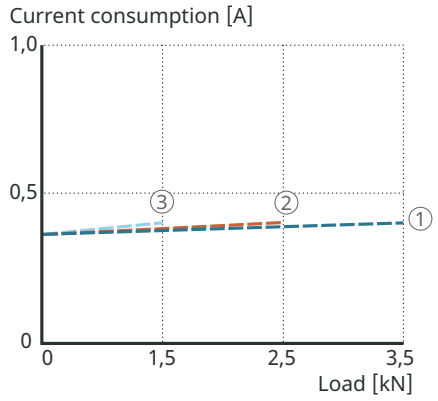
1	Gear 1	2	Gear 2
3	Gear 4		

244 Current-load diagram CAP32, AC 120 V



1	Gear 1	2	Gear 2
3	Gear 4		

245 Current-load diagram CAP32, AC 230 V

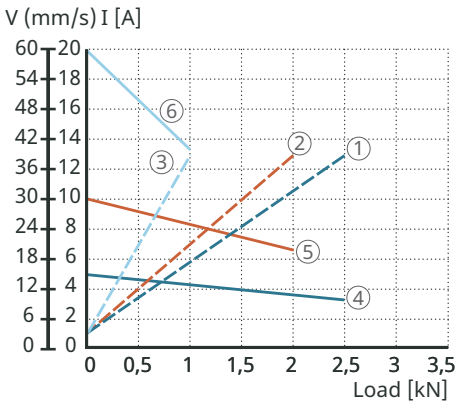


1	Gear 1	2	Gear 2
3	Gear 4		

Deviations of ±10 % from the values in the diagram may occur.

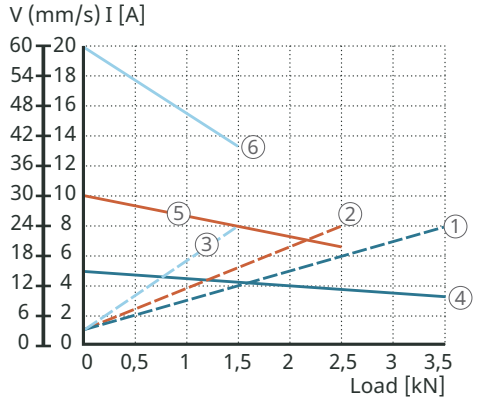
DC version

246 Performance diagram CAP32.../D12C



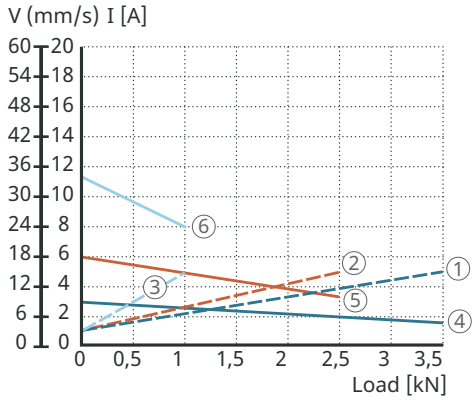
1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

247 Performance diagram CAP32...//P24C/P24CS/P24CB



1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

248 Performance diagram CAP32.../P24CW



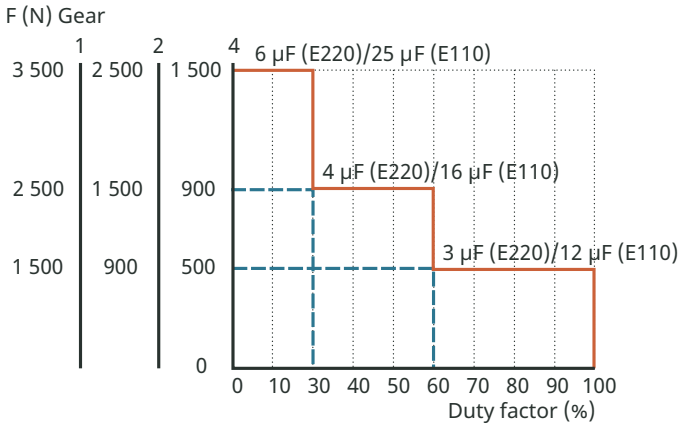
1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

Deviations of ±10 % from the values in the diagram may occur.

Duty cycle

AC version

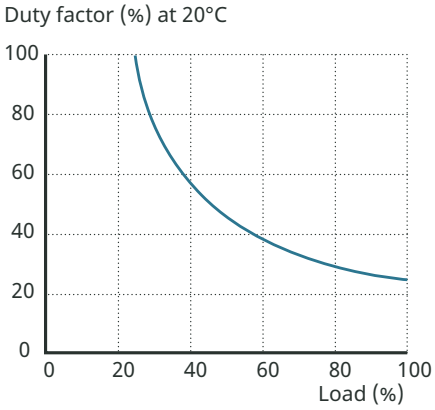
249 Duty cycle CAP32, AC 230/120 V



F	Load		

DC version

250 Duty cycle CAP32, DC

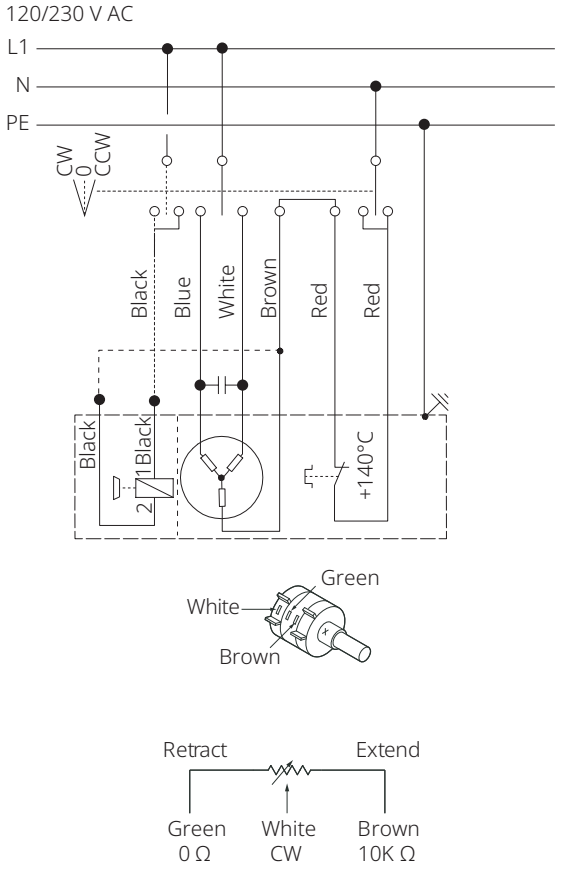


001D6677

Wiring diagrams

AC version

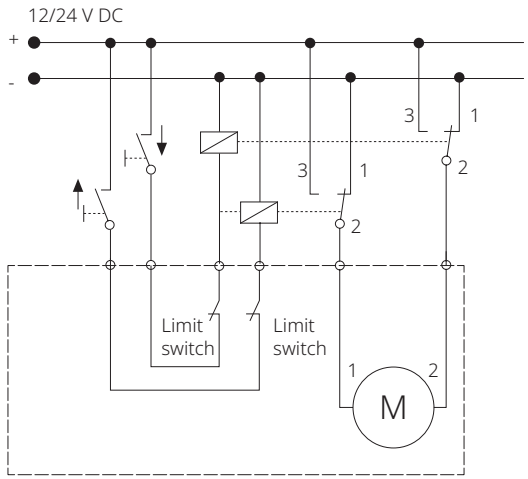
251 Connecting diagram CAP32 AC version

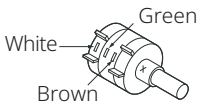


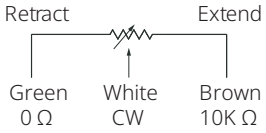
001D6686

DC version

252 Wiring diagram CAP32 DC version







001D6697

Ordering key

253 Ordering designation CAP32

Dynamic load [N]/speed [mm/s]

3500/xx	2500/xx	1500/xx
3500/B	2500/16	1500/32
3500/B	2500/16	1500/32
3500/6	2500/13	1500/26
3500/6	2500/13	1500/26
3500/xx	2500/xx	1500/xx
2500/15-10	2000/30-20	1000/60-40
3500/15-10	2500/30-20	1500/60-40
3500/10-6	2500/18-12	1500/36-26
3500/15-10	2500/30-20	1500/60-40
3500/15-10	2500/30-20	1500/60-40

Motor options

No motor	0000
AC 120 V/60 Hz, 1-phase, IP54	E110C
AC 120 V/60 Hz, 1-phase, brake, IP20	E110CB
AC 230 V/50 Hz, 1-phase, IP54	E220C
AC 230 V/50 Hz, 1-phase, brake, IP20	E220CB
No motor	0000
DC 12 V, flat motor, IP44	D12C
DC 24 V, flat motor, IP44	P24C
DC 24 V, flat motor, low speed, IP44	P24CW
DC 24 V, flat motor, extended shaft, IP44	P24CS
DC 24 V, flat motor, brake, IP20	P24CB

1 2 4
Gearbox

CAP R 32 x 050 x 1 S / E110CB

Type

Motor installation

R	Right
L	Left

Stroke (S)

050	50 mm
100	100 mm
200	200 mm
300	300 mm
400	400 mm
500	500 mm
700	700 mm
– – –	Other stroke lengths; 50 < S < 700 mm, available on request

Cable/connecting plug

S	Back-up nut

001DF45E

CAP32 – Type codes for accessories and spare parts

80 Accessories and spare parts for CAP32

Description	Ordering designation	Order number
Motor DC 12 V (flat motor)	D12C	M/0405518
Motor DC 24 V (flat motor)	P24C	M/0405519-V01
Motor DC 24 V (flat motor with brake)	P24CB	M/0405523-V01
Motor DC 24 V (flat motor with extended shaft)	P24CS	M/0405522-V01
Motor DC 24 V (flat motor with low speed)	P24CW	M/0405521-V01
Motor AC 120 V (cylindrical motor)	E110C	M/0405533
Motor AC 120 V (cylindrical motor with brake)	E110CB	M/0405534
Motor AC 230 V (cylindrical motor)	E220C	M/0405531
Motor AC 230 V (cylindrical motor with brake)	E220CB	M/0405532
Capacitor value 25 µF (AC 120 V)	Capacitor 25 µF	M/0430670-16
Capacitor value 6 µF (AC 230 V)	Capacitor 6 µF	M/0430670-03
Limit switch for stroke = 50 mm	CAXE32X50	M/0412030
Limit switch for stroke = 100 mm	CAXE32X100	M/0412031
Limit switch for stroke = 200 mm	CAXE32X200	M/0412033
Limit switch for stroke = 300 mm	CAXE32X300	M/0412034
Limit switch for stroke = 500 mm	CAXE32X500	M/0412036
Limit switch for stroke = 700 mm	CAXE32X700	M/0412037
Proximity switch for CAXE	CAXE	M/0432369
Front attachments, rod end type	575–32	M/0430575–32

Description	Ordering designation	Order number
Front attachments, rod clevis type	576–32	M/0430576–32
Rear attachments, single bracket with ear type	580–32	M/0430580–32
Rear attachments, universal joint type	582–32	M/0431780–32

3.6.3 CAT32B, CAP43B

254 CAT32B, CAP43B



001D5B99

Benefits

- compact
- robust design
- modular
- with lifetime lubrication
- high efficiency
- digital encoder feedback

81 Technical data CAT32B and CAP43B

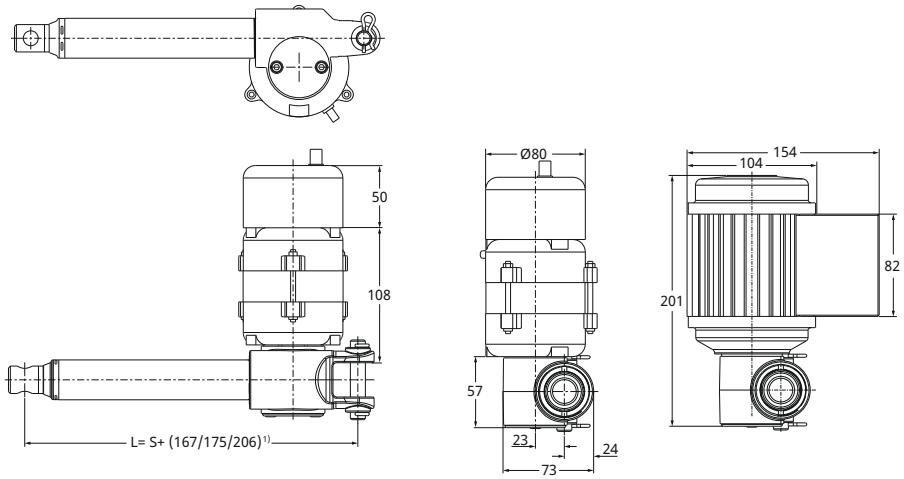
Feature			Unit	CAT32B	CAT32B	CAP43B
				AC	DC	DC
Rated push force			N	1500 ... 3500	1000 ... 4000	1500 ... 4000
Rated pull force			N	1500 ... 3500	1000 ... 4000	1500 ... 4000
Speed (full load ... no load)			mm/s	6.5 ... 32 [1]	6 ... 66 [1]	6 ... 66 [1]
Stroke S			mm	50 ... 700	50 ... 700	50 ... 700
Retracted length L			mm	S + 167/175/206 [2]	S + 167/175/206 [2]	S + 167/175/206 [2]
Voltage	AC		V	120, 230 / 400	–	–
	DC		V	–	12 / 24	24
Power consumption	AC	120 V	W	98 (brake 133.2 W)	–	–
	AC	230 V	W	92 (brake 117.3 W)	–	–
	AC	400 V	W	80	–	–
	DC	12 V / 24 V	W	–	n/a	n/a
Current consumption	AC	120 V	A	0.82 (brake 0.29 A)	–	–
	AC	230 V	A	0.4 (brake 0.11 A)	–	–
	AC	400 V	A	0.2	–	–
	DC	12 V	A	–	18	–
	DC	24 V	A	–	9	9
	DC	24 V	A	–	5 (for motors C24CW and P24CW)	5 (for motors C24CW and P24CW)
Duty cycle			%	30	20	20
Ambient temperature			°C	–20 ... +50	–20 ... +50	–20 ... +50
Protection code (IP)			–	IP20, IP54	IP20, /IP44, IP66 [1]	IP44
Mass			kg	2 ... 3.5	2 ... 3.5	2.0 ... 2.7

[1] depending on selected motor

[2] dimension depends on selected front attachment

Dimensional drawings

255 Dimensions CAT32B,AC version



E110C, E110CB, E220C, E220CB
AC motor: 120V, 230V

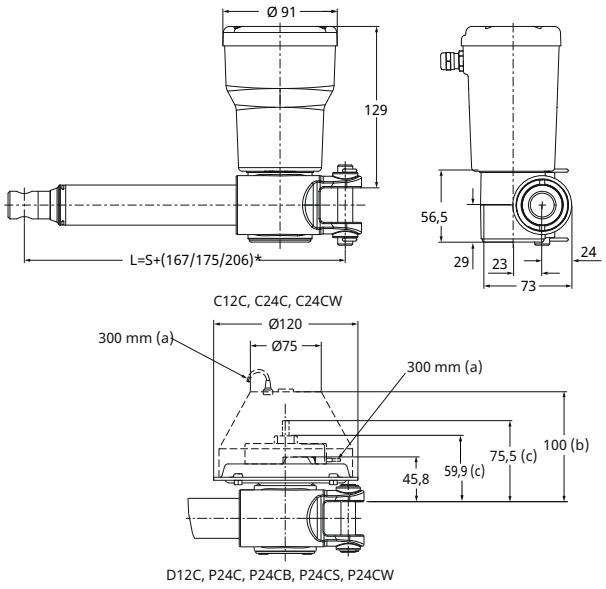
E380C
AC motor: 400V

001DCAE2

1) dimension depends on selected front attachment

S	mm	Stroke
L	mm	Retracted length

256 Dimensions CAT32B,DC version



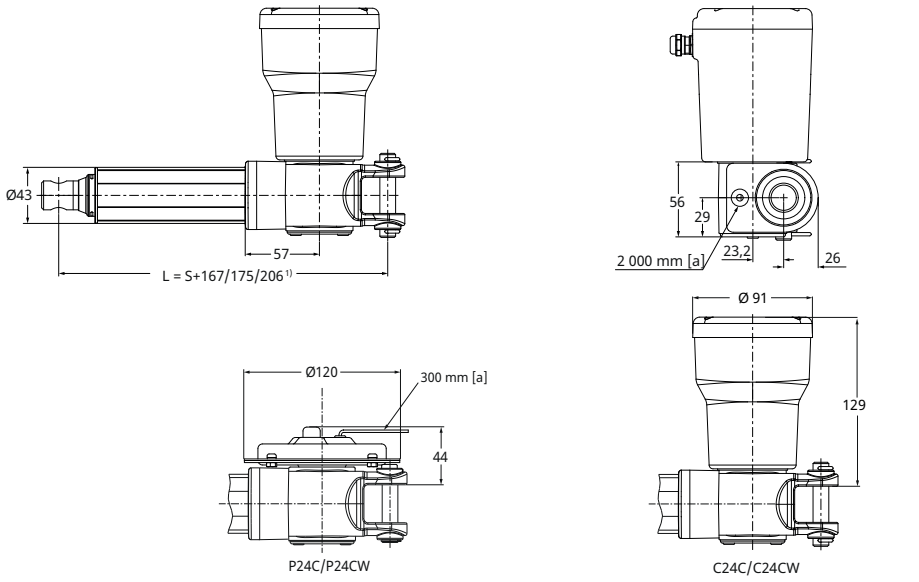
001DCAEF

a	Cable length	b	Cover for brake (P24CB)
c	Extended shaft (P24CS)	d	Motor (P24C)

1) dimension depends on selected front attachment

S	mm	Stroke
L	mm	Retracted length

257 Dimensions CAP43B



a	Cable length

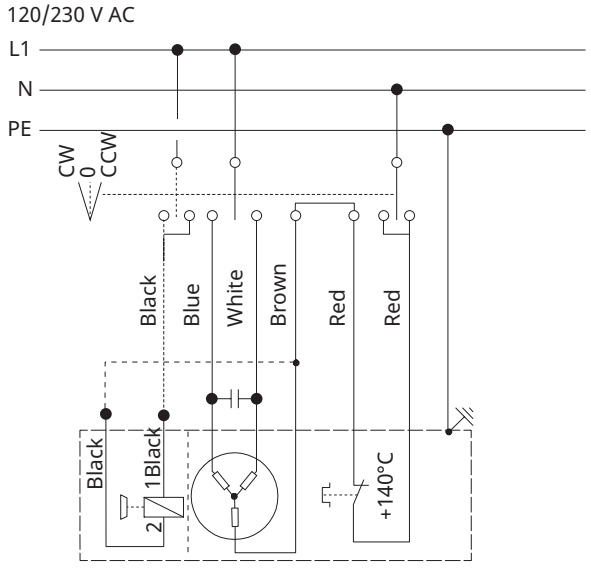
1) dimension depends on selected front attachment

S	mm	Stroke
L	mm	Retracted length

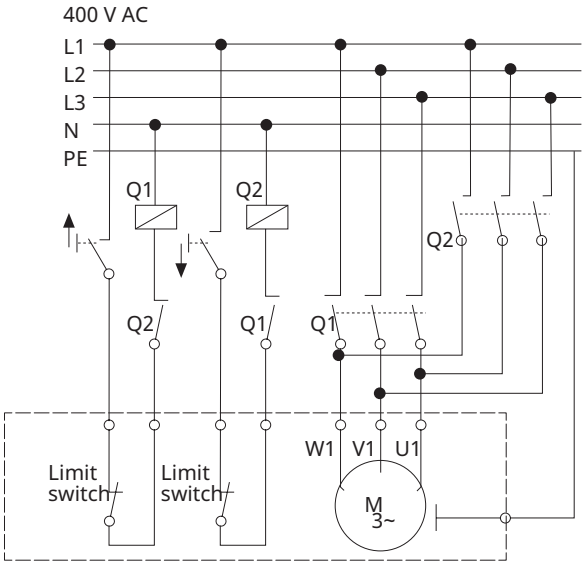
Wiring diagrams

AC version

258 Connecting diagram CAT32B and CAP43B, AC 120/230 V

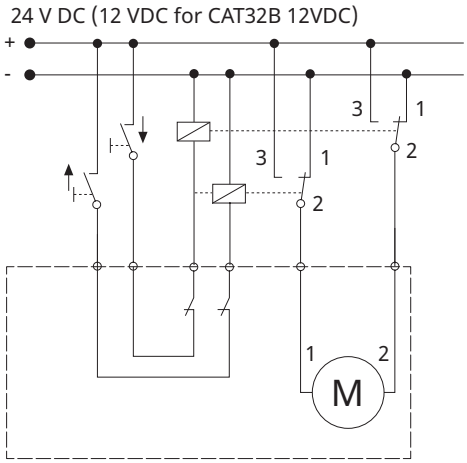


259 Connecting diagram CAT32B and CAP43B, AC 400 V

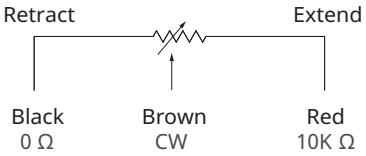


DC version

260 Connecting diagramCAT32B and CAP43B, DC 24 V



261 Wiring diagram for linear potentiometer CAP43B



Connection diagram for linear potentiometer only for CAP 43B.

001D66C7

Suitable control units and accessories

AC version

82 Suitable operating elements and controls CAT32B AC version

Linear actuator	Limit switch	Encoder
CAT32B AC	**CAXE 32B**	**E2**
E110C	✓	✓
E110CB	✓	✓
E220C	✓	✓
E220CB	✓	✓
E380C	✓	✓

✓ suitable

DC version

83 Suitable operating elements and controls CAT32B DC version and CAP43B

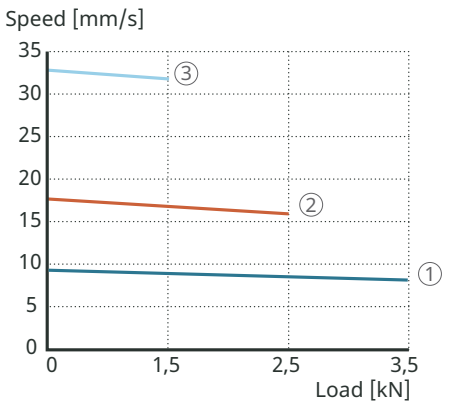
Linear actuator	Limit switch	Encoder
CAT32B DC, CAP43B	**CAXE 32B**	**E2**
C12C	✓	✓
D12C	✓	✓
C24C	✓	✓
C24CW	✓	✓
P24C	✓	✓
P24CB	✓	✓
P24CS	✓	✓
P24CW	✓	✓

✓ suitable

Performance diagrams

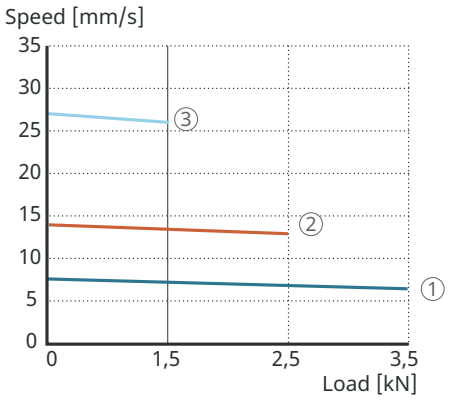
AC version

262 Speed-load diagram CAT32B, AC 120 V



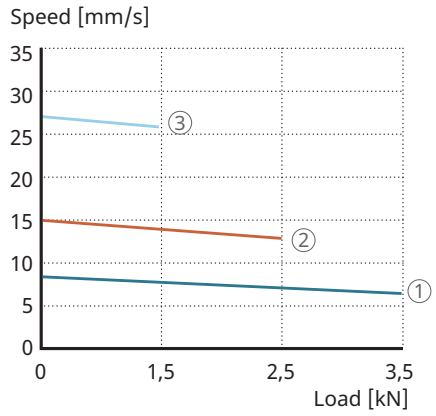
1	Gear 1	2	Gear 2
3	Gear 4		

263 Speed-load diagram CAT32B, AC 230 V



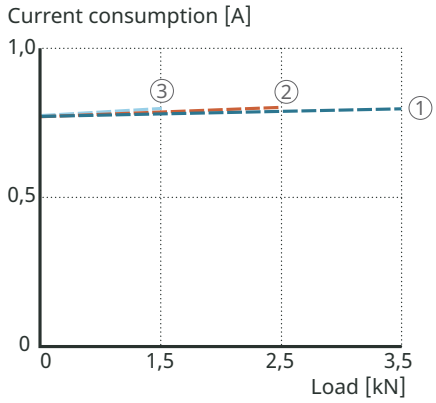
1	Gear 1	2	Gear 2
3	Gear 4		

264 Speed-load diagram CAT32B, AC 400 V



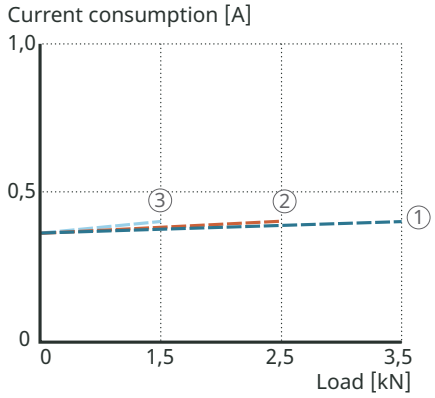
1	Gear 1	2	Gear 2
3	Gear 4		

265 Current-load diagram CAT32B, AC 120 V



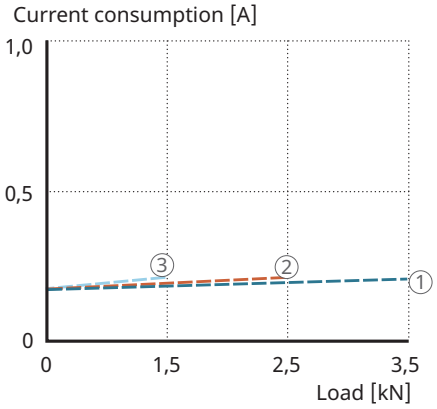
1	Gear 1	2	Gear 2
3	Gear 4		

266 Current-load diagram CAT32B, AC 230 V



1	Gear 1	2	Gear 2
3	Gear 4		

267 Current-load diagram CAT32B, AC 400 V

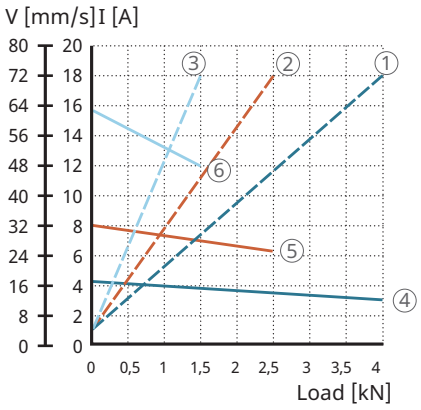


1	Gear 1	2	Gear 2
3	Gear 4		

Deviations of ±10 % from the values in the diagram may occur.

DC version

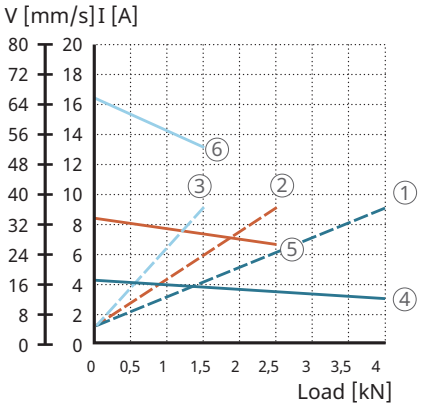
268 Performance diagram CAT32B.../C12C



001DF47E

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

269 Performance diagram CAT32B.../C24C, CAP43B.../C24C

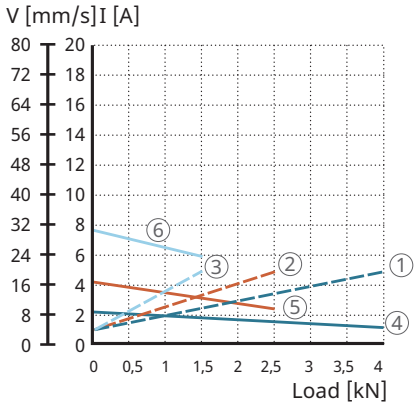


001DF48E

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

3

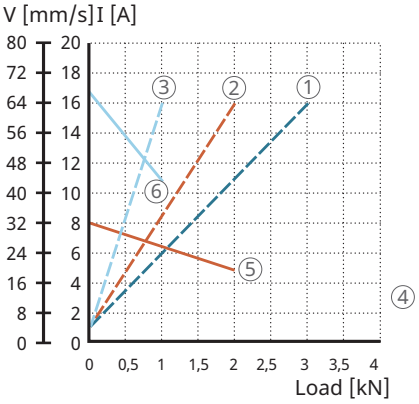
270 Performance diagram CAT32B.../C24CW, CAP43B.../C24CW



001DF49E

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

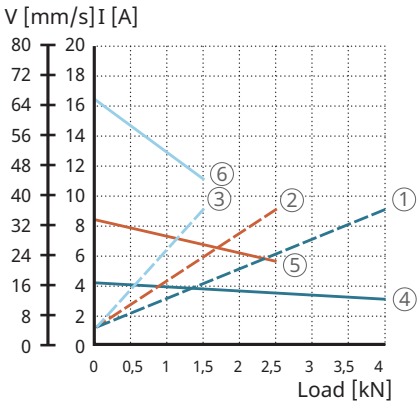
271 Performance diagram CAT32B.../D12C



001DF4AE

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

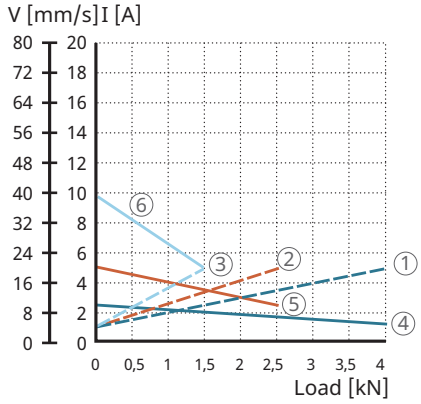
272 Performance diagram CAT32B.../P24C/P24CB/24CS, CAP43B.../P24C



001DF4BE

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

273 Performance diagram CAT32B.../P24CW, CAP43B.../P24CW



001DF4CE

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

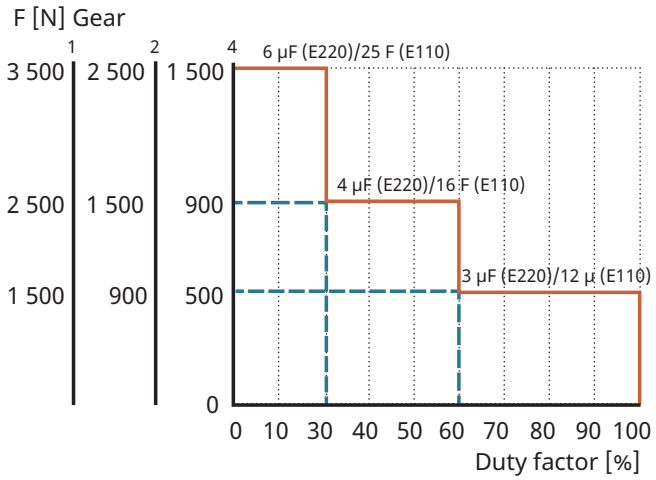
Deviations of ±10 % from the values in the diagram may occur.

3

Duty cycle

AC version

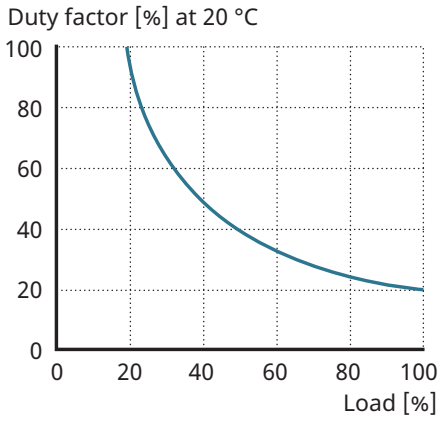
274 Duty cycle CAT32B, AC 230/120 V



F Load

DC version

275 Duty cycle CAT32B and CAP43B



CAT 32B – Type codes for accessories and spare parts

84 Accessories and spare parts for CAT32B

Description	Ordering designation	Order number
Motor DC 12 V (flat motor)	D12C	M/0405518
Motor DC 24 V (flat motor)	P24C	M/0405519-V01
Motor DC 24 V (flat motor with brake)	P24CB	M/0405523-V01
Motor DC 24 V (flat motor with extended shaft)	P24CS	M/0405522-V01
Motor DC 24 V (flat motor with low speed)	P24CW	M/0405521-V01
Motor AC 120 V (cylindrical motor)	E110C	M/0405533
Motor AC 120 V (cylindrical motor with brake)	E110CB	M/0405534
Motor AC 230 V (cylindrical motor)	E220C	M/0405531
Motor AC 230 V (cylindrical motor with brake)	E220CB	M/0405532
Capacitor value 25 µF (AC 120 V)	Capacitor 25 µF	M/0430670-16
Capacitor value 6 µF (AC 230 V)	Capacitor 6 µF	M/0430670-03
Limit switch for stroke = 50 mm	CAXE32X50	M/0412030
Limit switch for stroke = 100 mm	CAXE32X100	M/0412031
Limit switch for stroke = 200 mm	CAXE32X200	M/0412033
Limit switch for stroke = 300 mm	CAXE32X300	M/0412034
Limit switch for stroke = 500 mm	CAXE32X500	M/0412036
Limit switch for stroke = 700 mm	CAXE32X700	M/0412037
Proximity switch for CAXE	CAXE	M/0432369
Front attachments, rod end type	575–32	M/0430575–32
Front attachments, rod clevis type	576–32	M/0430576–32
Rear attachments, single bracket with ear type	580–32	M/0430580–32
Rear attachments, universal joint type	582–32	M/0431780–32

CAP 43B – Type codes for accessories and spare parts

85 Accessories and spare parts for CAP43B

Description	Ordering designation	Order number
Motor DC 24 V (cylindrical motor)	C24C	M/0405536
Motor DC 24 V (cylindrical motor with low speed)	C24CW	M/0405537
Motor DC 24 V (flat motor)	P24C	M/0405519-V01
Motor DC 24 V (flat motor with low speed)	P24CW	M/0405521-V01
Front attachments, rod end type	575–32	M/0430575–32
Front attachments, rod clevis type	576–32	M/0430576–32
Rear attachments, single bracket with ear type	580–32	M/0430580–32
Rear attachments, universal joint type	582–32	M/0431780–32

Ordering key

276 Ordering designation CAT32B

Load [N]/speed at full load [mm/s]			Motor options	
4000/xx	2000/xx	1500/xx	No motor	0000
3000/17–11	2000/34-19	1000/67-43	DC 12 V, flat motor, IP44	D12C
3500/8	2000/16	1500/32	AC 120 V/60 Hz, 1-phase, IP54	E110C
3500/8	2000/16	1500/32	AC 120 V/60 Hz, 1-phase, brake, IP20	E110CB
3500/6,5	2000/13	1500/26	AC 230 V/50 Hz, 1-phase, IP54	E220C
3500/6,5	2000/13	1500/26	AC 230 V/50 Hz, 1-phase, brake, IP20	E220CB
3500/7	2000/14	1500/32	AC 400 V/50 Hz, 3-phase, IP55	E380C
4000/xx	2000/xx	1 500/xx	No motor	0000
4000/17-12	2500/32-25	1500/63-48	DC 12 V, IP66	C12C
4000/17-13	2500/33-26	1500/65-52	DC 24 V, IP66	C24C
4000/9-5	2500/17-10	1500/31-24	24 V DC, motor with low speed, IP66	C24CW
4000/16-12	2500/33-22	1500/65-44	DC 24 V, flat motor, IP44	P24C
4000/16-12	2500/33-22	1500/65-44	DC 24 V, flat motor, brake, IP20	P24CB
4000/16-12	2500/33-22	1500/65-44	DC 24 V, flat motor, extended shaft, IP44	P24CS
4000/16-6	2500/18-12	1500/36-26	DC 24 V, flat motor, low speed, IP44	P24CW

1 2 4
Gearbox

CAT	R	32B	x	050	1	A1	G1	E2	F	E110CB	T2

Type

Motor installation

R	Right
L	Left

Stroke (S)

050	50 mm
100	100 mm
200	150 mm
300	200 mm
400	250 mm
500	300 mm
700	350 mm
– – –	Other stroke lengths available on request

Rear attachment

A1	Rod clevis, Ø12,0 mm
A2	Rod clevis, Ø12,7 mm
K1	Single bracket with ear, Ø12,0 mm
K2	Single bracket with ear, Ø12,7 mm

Cable/connecting plug

G1	Hole, Ø12,0 mm
G2	Hole, Ø12,7 mm
G3	Male thread, M12
G4	Female thread, M12
G5	Rod clevis, Ø10,1 mm

Feedback

	No encoder (no code)
E2	Encoder (for all standard motors)

Option

F	Friction clutch (not available with optional encoder)
Z	No friction clutch
S	Back-up nut

Option for CxxC motors

T2	Straight cable, 2,0 m, no plug
T2P	Straight cable, 2,0 m, jack plug
T6	Straight cable, 6,0 m, no plug

001DF4DE

277 Ordering designation CAP43B

Load [N]/speed at full load [mm/s]			Motor options	
4000/xx	2500/xx	1500/xx	No motor	0000
4000/17-13	2500/33-26	1500/65-52	DC 24 V, IP44	C24C
4000/9-5	2500/17-10	1500/31-24	DC 24 V, low speed, IP44	C24CW
4000/17–11	2500/34-19	1500/66-38	DC 24 V, flat motor, IP44	P24C
4000/10-6	2500/18-12	1500/36-26	DC 24 V, flat motor, low speed, IP44	P24CW

1 2 4
Gearbox

CAP R 43B x 100 x 1 A1 G1 F / C24CW T2

Type

Motor installation
R Right
L Left

Stroke (S)
100 100 mm
200 200 mm
300 300 mm
400 400 mm
500 500 mm
700 700 mm

Rear attachment
A1 Rod clevis, Ø12,0 mm
A2 Rod clevis, Ø12,7 mm
K1 Single bracket with ear, Ø12,0 mm
K2 Single bracket with ear, Ø12,7 mm

Front attachment
G1 Hole, Ø12,0 mm
G2 Hole, Ø12,7 mm
G3 Male thread, M12
G4 Female thread, M12
G5 Rod clevis, Ø10,1 mm

Option
F Friction clutch
S Back-up nut

Cable option for C24C[W] motors
T2 Straight, 2,0 m
T6 Straight cable, 6,0 m, no plug

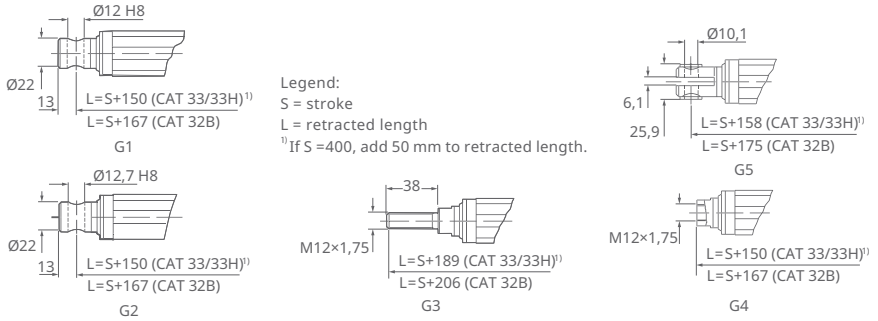
001DF4EE

3

Detailed drawings of front and rear attachments for CAT and CAP and motor options for CAT

Front attachments and retracted length

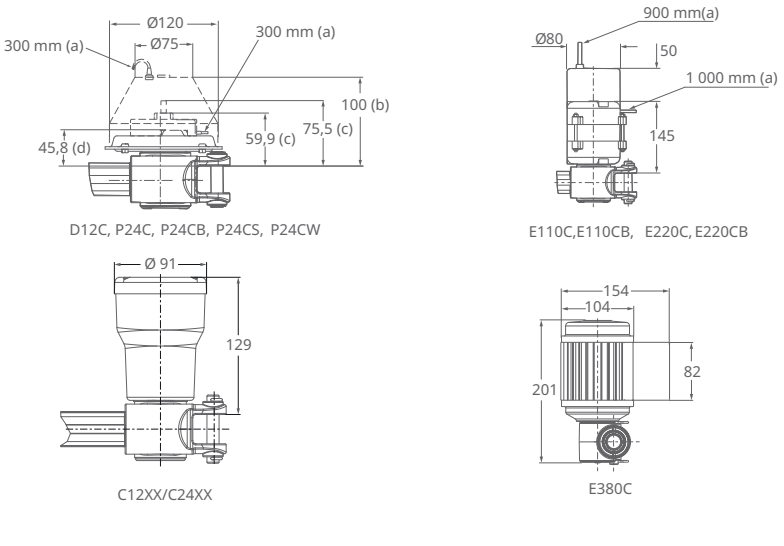
278 Front attachments and retracted length



S	mm	Stroke
L	mm	Retracted length

Motor options for CAT

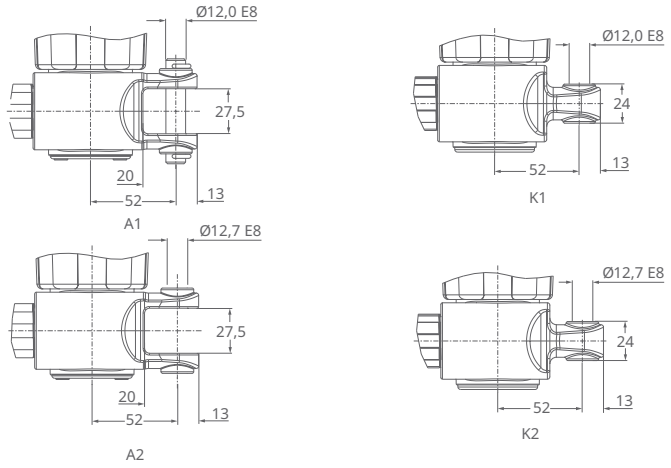
279 Motor options for CAT



a	Cable length	b	Cover for brake
c	Extended shaft	d	Motor

Rear attachments

280 Rear attachments



3.6.4 CAT33, CAP43A

281 CAT33, CAP43A



Benefits

- compact
- robust design
- highly efficient
- with lifetime lubrication
- digital encoder feedback

86 Technical data CAT33 and CAP43A

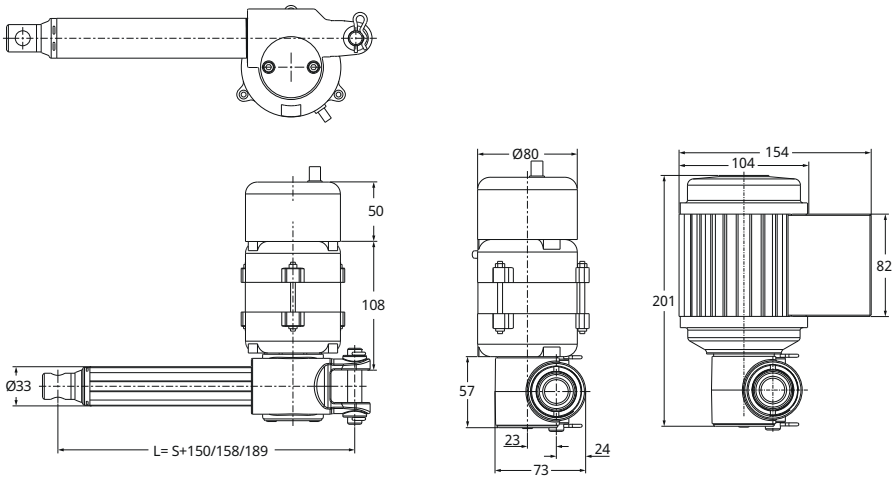
Feature			Unit	CAT33		CAP43A
				AC	DC	DC
Rated push force			N	800 ... 3000	800 ... 3000	1000 ... 3000
Rated pull force			N	800 ... 3000	800 ... 3000	1000 ... 3000
Speed (full load ... no load)			mm/s	5 ... 24 [1]	6 ... 66 [1]	6 ... 66 [1]
Stroke S			mm	100 ... 400	100 ... 400	100 ... 400
Retracted length L			mm	S + 150/158/189 [2]	S + 150/158/189 [2]	S + 150/158/189 [2]
Voltage	AC		V	120, 230 / 400	–	–
	DC		V	–	12 / 24	24
Power consumption	AC	120 V	W	98 (brake 133.2 W)	–	–
	AC	230 V	W	92 (brake 117.3 W)	–	–
	AC	400 V	W	80	–	–
	DC	12 V / 24 V	W	–	n/a	n/a
Current consumption	AC	120 V	A	0.82 (brake +0.29 A)	–	–
	AC	230 V	A	0.4 (brake +0.11 A)	–	–
	AC	400 V	A	0.2	–	–
	DC	12 V	A	–	18	–
	DC	24 V	A	–	9	9
	DC	24 V	A	–	5 (for motors C24CW and P24CW)	5 (for motors C24CW and P24CW)
Duty cycle			%	30	15	15
Ambient temperature			°C	–20 ... +50	–20 ... +50	–20 ... +50
Protection code (IP)			–	IP20, IP54, IP55	IP20, /IP44, IP66 [1]	IP44
Mass			kg	2 ... 2.7	2 ... 2.7	2 ... 2.7

[1] depending on selected motor

[2] dimension depends on selected front attachment

Dimensional drawings

282 Dimensions CAT33,AC version



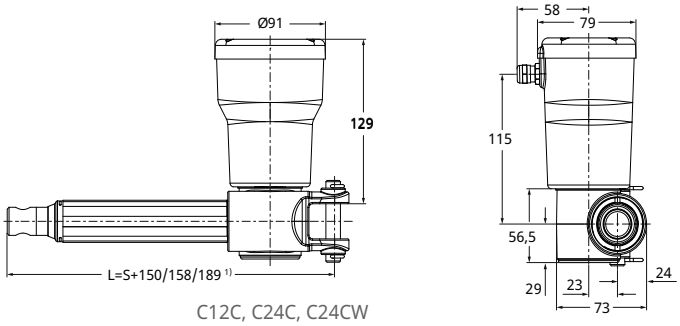
E110C, E110CB, E220C, E220CB
AC motor: 120V, 230V

E380C
AC motor: 400V

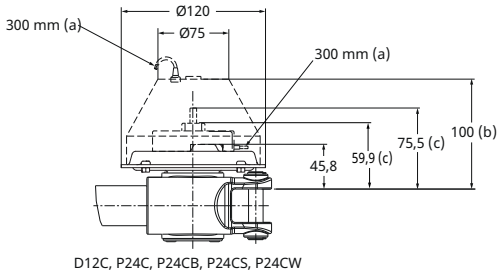
001DCAFC

S	mm	Stroke
L	mm	Retracted length

283 Dimensions CAT33,DC version



C12C, C24C, C24CW



D12C, P24C, P24CB, P24CS, P24CW

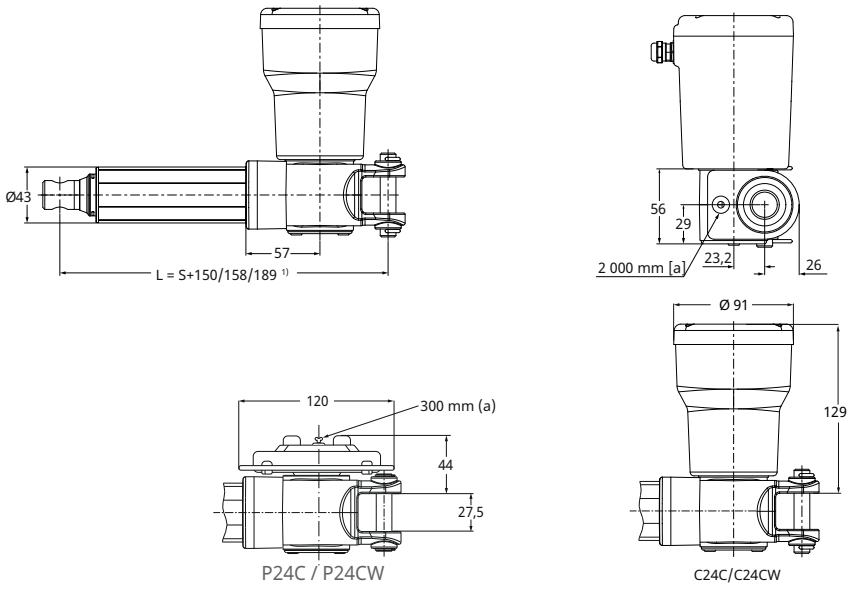
001DCB09

a	Cable length	b	Cover for brake (P24CB)
c	Extended shaft (P24CS)	d	Motor (P24C)

1) dimension depends on selected front attachment

S	mm	Stroke
L	mm	Retracted length

284 Dimensions CAP43A

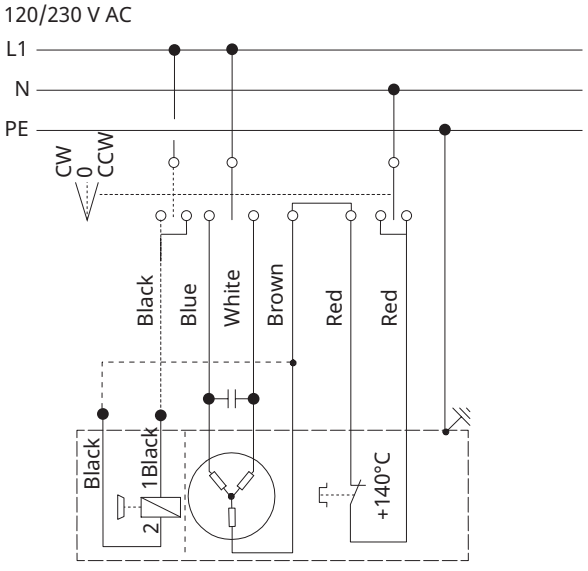


1) dimension depends on selected front attachment

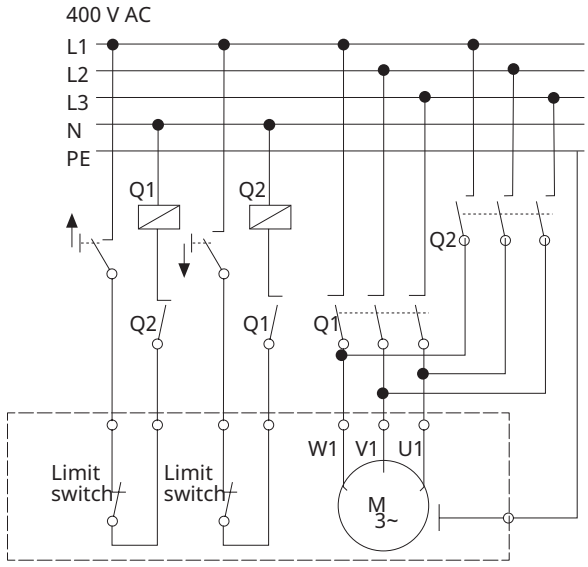
Wiring diagrams

AC version

285 Connecting diagram CAT33, AC 120/230 V

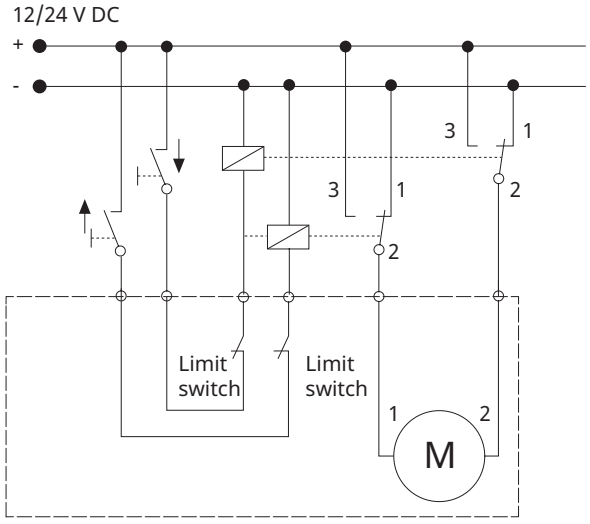


286 Connecting diagram CAT33, AC 400 V

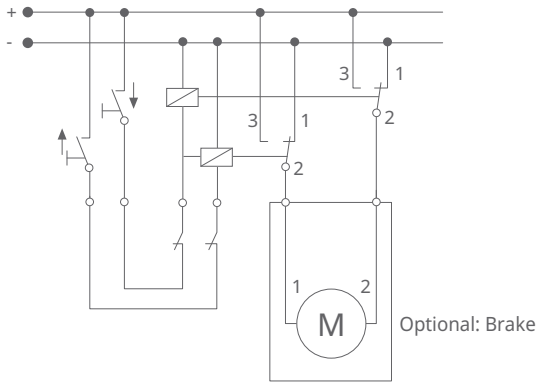


DC version

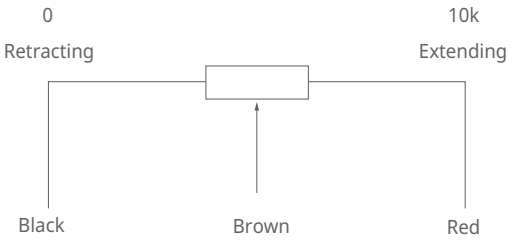
287 Connecting diagramCAT33, DC 12/24 V



288 Connecting diagram CAP43A



289 Wiring diagram for linear potentiometer



Suitable control units and accessories

AC version

87 Suitable operating elements and controls CAT33 AC version

Linear actuators	Limit switch	Encoder
CAT33 AC	**CAXD33**	**E2**
E110C	✓	✓
E110CB	✓	✓
E220C	✓	✓
E220CB	✓	✓
E380C	✓	✓

✓ suitable

DC version

88 Suitable operating elements and controls CAT33 DC version and CAP43A

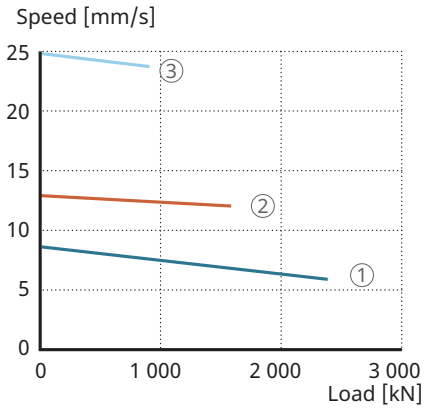
Linear actuators	Encoder
CAT33 DC, CAP43A	**E2**
C12C	✓
D12C	✓
C24C	✓
C24CW	✓
P24C	✓
P24CB	✓

Linear actuators	Encoder
CAT33 DC, CAP43A	**E2**
P24CS	✓
P24CW	✓
✓	suitable

Performance diagrams

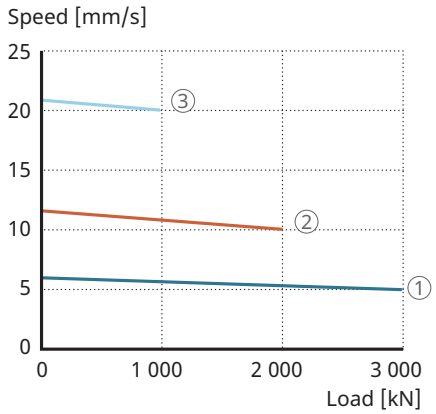
AC version

290 Speed-load diagram CAT33, AC 120 V



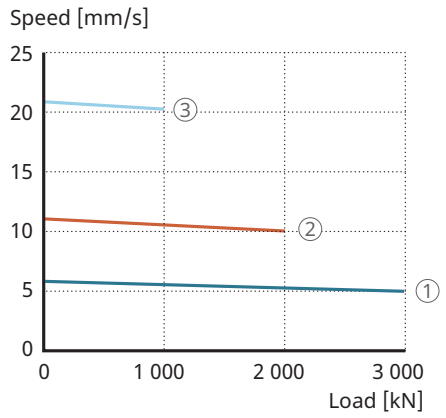
1	Gear 1	2	Gear 2
3	Gear 4		

291 Speed-load diagram CAT33, AC 230 V



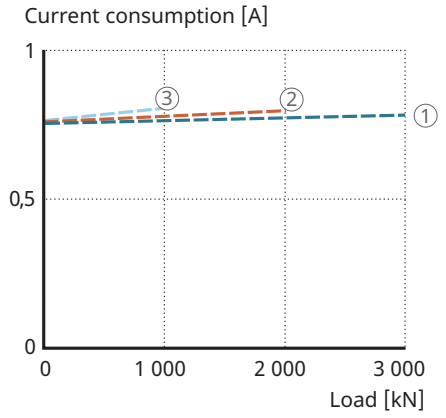
1	Gear 1	2	Gear 2
3	Gear 4		

292 Speed-load diagram CAT33, AC 400 V



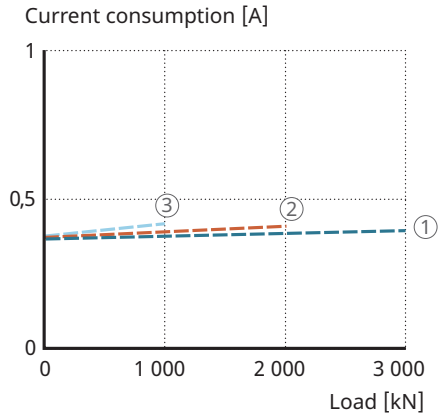
1	Gear 1	2	Gear 2
3	Gear 4		

293 Current-load diagram CAT33, AC 120 V



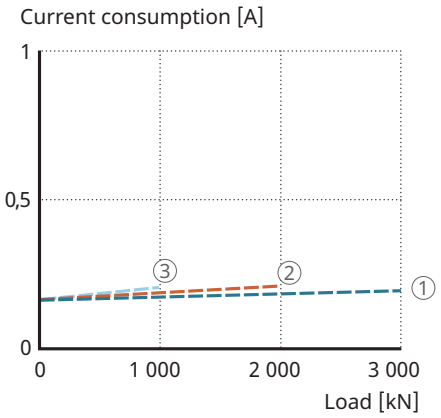
1	Gear 1	2	Gear 2
3	Gear 4		

294 Current-load diagram CAT33, AC 230 V



1	Gear 1	2	Gear 2
3	Gear 4		

295 Current-load diagram CAT33, AC 400 V

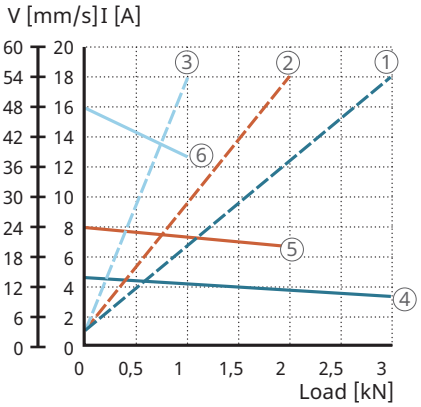


1	Gear 1	2	Gear 2
3	Gear 4		

Deviations of ±10 % from the values in the diagram may occur.

DC version

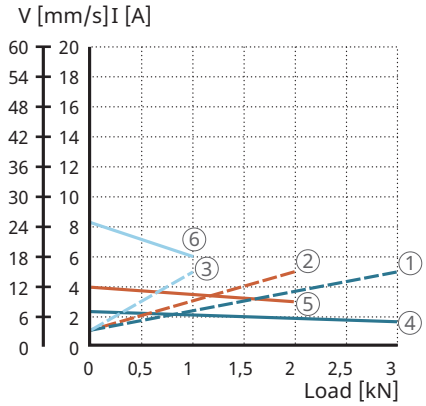
296 Performance diagram CAT33.../C12C



1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

3

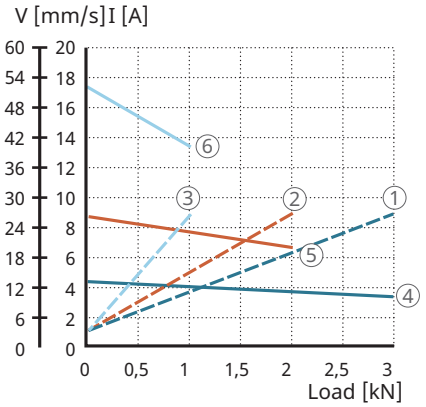
297 Performance diagram CAT33.../C24C, CAP43A.../C24C



001DF56E

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

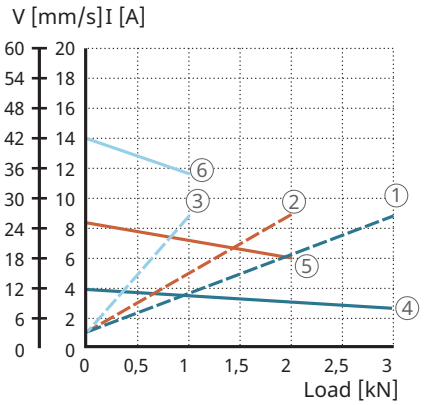
298 Performance diagram CAT33.../C24CW, CAP43A.../C24CW



001DF57E

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

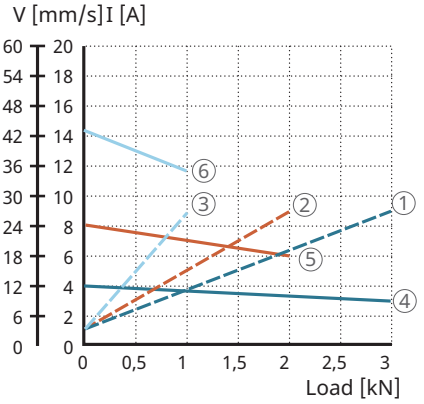
299 Performance diagram CAT33.../D12C



001DF58E

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

300 Performance diagram CAT33.../P24C/P24CB/P24CS, CAP43A.../P24C

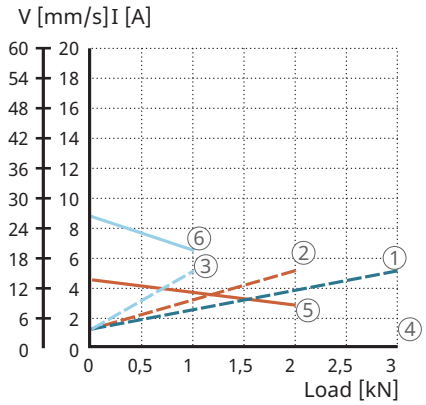


001DF59E

1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
1	I [A] gear 1	2	I [A] gear 2
3	I [A] gear 4	4	v [mm/s] gear 1
v	Speed	I	Current consumption

3

301 Performance diagram CAT33.../P24CW, CAP43A.../P24CW



001DF5AE

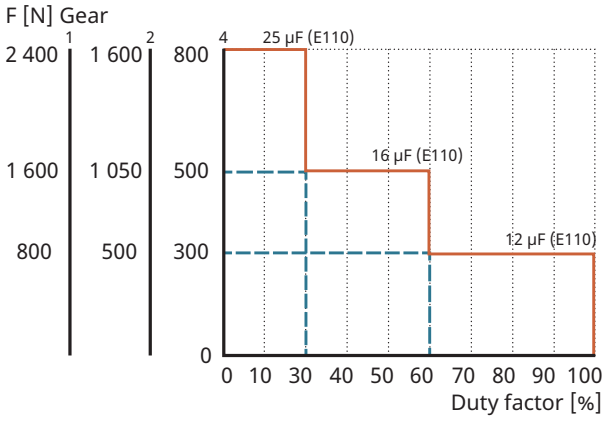
1	I (A) gear 1	2	I (A) gear 2
3	I (A) gear 4	4	v (mm/s) gear 1
5	v (mm/s) gear 2	6	v (mm/s) gear 4
v	Speed	I	Current consumption

Deviations of ±10 % from the values in the diagram may occur.

Duty cycle

AC version

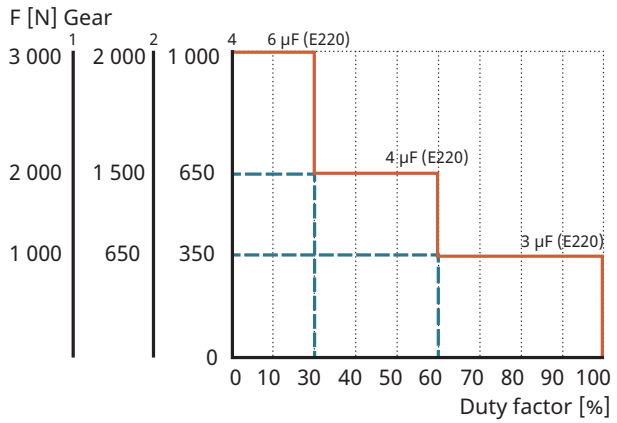
302 Duty cycle CAT33, AC 120 V



001D6806

F	Load

303 Duty cycle CAT33, AC 230 V

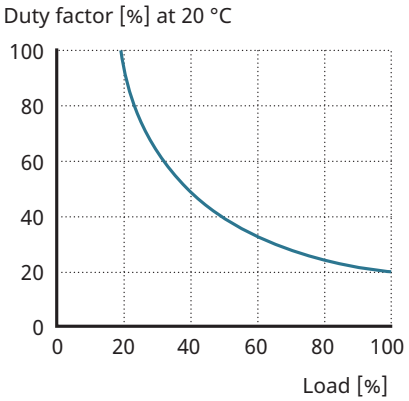


001D6817

F	Load

DC version

304 Duty cycle CAT33 and CAP43A, DC version



001D6887

CAT33 – Type codes for accessories and spare parts

89 Accessories and spare parts for CAT33

Description	Ordering designation	Order number
Motor DC 12 V (cylindrical motor)	C12C	M/0405535
Motor DC 12 V (flat motor)	D12C	M/0405518
Motor DC 24 V (cylindrical motor)	C24C	M/0405536
Motor DC 24 V (cylindrical motor with low speed)	C24CW	M/0405537
Motor DC 24 V (flat motor)	P24C	M/0405519-V01
Motor DC 24 V (flat motor with brake)	P24CB	M/0405523-V01
Motor DC 24 V (flat motor with extended shaft)	P24CS	M/0405522-V01
Motor DC 24 V (flat motor with low speed)	P24CW	M/0405521-V01
Motor AC 120 V (cylindrical motor)	E110C	M/0405533
Motor AC 120 V (cylindrical motor with brake)	E110CB	M/0405534
Motor AC 230 V (cylindrical motor)	E220C	M/0405531
Motor AC 230 V (cylindrical motor with brake)	E220CB	M/0405532
Motor AC 400 V (cylindrical motor)	E380C	M/0411607
Capacitor value 25 µF (AC 120 V)	Capacitor 25 µF	M/0430670-16
Capacitor value 6 µF (AC 230 V)	Capacitor 6 µF	M/0430670–03
Limit switch for any stroke, normally closed	CAXD33, NC	M/0440054
Limit switch for any stroke, normally open	CAXD33, NO	M/0440053
Front attachments, rod end type	575–32	M/0430575–32
Front attachments, rod clevis type	576–32	M/0430576–32
Rear attachments, single bracket with ear type	580–32	M/0430580–32
Rear attachments, universal joint type	582–32	M/0431780–32

CAP43A – Type codes for accessories and spare parts

90 Accessories and spare parts for CAP43A

Description	Ordering designation	Order number
Motor DC 24 V (cylindrical motor)	C24C	M/0405536
Motor DC 24 V (cylindrical motor with low speed)	C24CW	M/0405537
Motor DC 24 V (flat motor)	P24C	M/0405519-V01
Motor DC 24 V (flat motor with low speed)	P24CW	M/0405521-V01
Front attachments, rod end type	575–32	M/0430575–32
Front attachments, rod clevis type	576–32	M/0430576–32
Rear attachments, single bracket with ear type	580–32	M/0430580–32
Rear attachments, universal joint type	582–32	M/0431780–32

Ordering key

305 Ordering designation CAT33

Load [N]/speed at full load [mm/s]			Motor options	
3000/xx	2000/xx	1000/xx	No motor	0000
2400/6	1600/12	800/24	AC 120 V/60 Hz, 1-phase, IP54	E110C
2400/6	1600/12	800/24	AC 120 V/60 Hz, 1-phase, brake, IP20	E110CB
3000/5	2000/10	1000/20	AC 230 V/50 Hz, 1-phase, IP54	E220C
3000/5	2000/10	1000/20	AC 230 V/50 Hz, 1-phase, brake, IP20	E220CB
3000/5	2000/10	1000/20	AC 400 V/50 Hz, 3-phase, IP55	E380C
3000/xx	2000/xx	1000/xx	No motor	0000
3000/13-10	2000/24-20	1000/48-38	DC 12 V, IP66	C12C
2400/ 11–7	1600/21-15	800/39-21	DC 12 V, flat motor, IP44	D12C
3000/13-10	2000/26-20	1000/52-40	DC 24 V, IP66	C24C
3000/7-5	2000/13-9	1000/25-18	DC 24 V, low speed, IP66	C24CW
3000/17–11	2000/34-19	1000/66-38	DC 24 V, flat motor, IP44	P24C
3000/12-9	2000/25-18	1000/43-35	DC 24 V, flat motor, brake, IP20	P24CB
3000/17–11	2000/34-19	1000/66-38	DC 24 V, flat motor, IP44, extended shaft	P24CS
3000/10-16	2000/18-12	1000/36-26	DC 24 V, flat motor, low speed, IP44	P24CW

1 2 4
Gearbox

CAT	R	33	x	100	x	1	A1	G1	E2	F	/	E110CB	T2

Type

Motor installation
R Right
L Left

Stroke (S)
100 100 mm
200 200 mm
300 300 mm
400 400 mm
– – – Other stroke lengths available on request

Rear attachment
A1 Rod clevis, Ø12,0 mm
A2 Rod clevis, Ø12,7 mm
K1 Single bracket with ear, Ø12,0 mm
K2 Single bracket with ear, Ø12,7 mm

Front attachment
G1 Hole, Ø12,0 mm
G2 Hole, Ø12,7 mm
G3 Male thread, M12
G4 Female thread, M12
G5 Rod clevis, Ø10,1 mm

Feedback
– No encoder (no code)
E2 Encoder (for all standard motors)

Option
F Friction clutch (not available with optional encoder)
Z No friction clutch

Option for CxxC motors
T2 Straight cable, 2,0 m, no plug
T2P Straight cable, 2,0 m, jack plug
T6 Straight cable, 6,0 m, no plug

001DF5BE

3

306 Ordering designation CAP43A

Load [N]/speed at full load [mm/s]			Motor options	
3000/xx	2000/xx	1000/xx	No motor	0000
3000/13-10	2000/26-20	1000/52-40	DC 24 V, IP44	C24C
3000/7-5	2000/13-9	1000/25-18	DC 24 V, IP44	C24CW
3000/17–11	2000/34-19	1000/66-38	DC 24 V, flat motor, IP44	P24C
3000/7-5	2000/13-8	1000/26-19	DC 24 V, flat motor, low speed, IP44	C24CW

1 2 4
Gearbox

CAP R 43A x 100 x 1 A1 G1 F / C24CW T2

Type

Motor installation
R Right
L Left

Stroke (S)
100 100 mm
200 200 mm
300 300 mm
400 400 mm

Rear attachment
A1 Rod clevis, Ø12,0 mm
A2 Rod clevis, Ø12,7 mm
K1 Single bracket with ear, Ø12,0 mm
K2 Single bracket with ear, Ø12,7 mm

Front attachment
G1 Hole, Ø12,0 mm
G2 Hole, Ø12,7 mm
G3 Male thread, M12
G4 Female thread, M12
G5 Rod clevis, Ø10,1 mm

Option
F Friction clutch

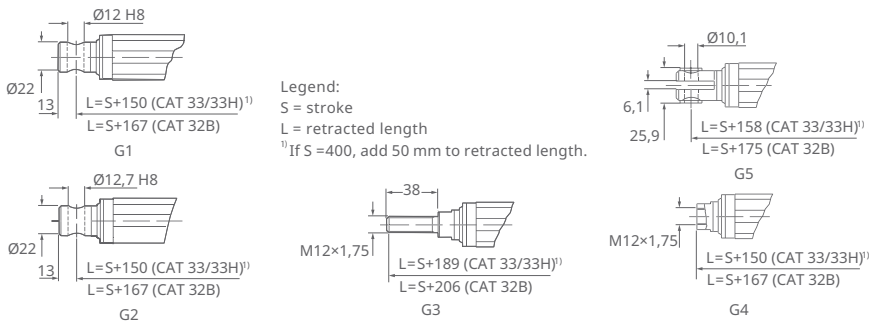
Cable option for C24C[W] motors
T2 Straight, 2,0 m
T6 Straight cable, 6,0 m, no plug

001DF5CE

Detailed drawings of front and rear attachments for CAT and CAP and motor options for CAT

Front attachments and retracted length

307 Front attachments and retracted length



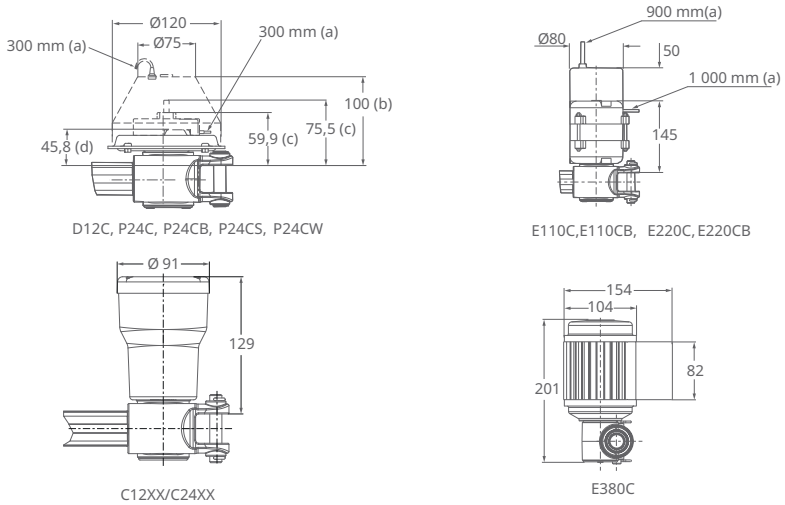
001DCAD5

S mm Stroke

L	mm	Retracted length

Motor options for CAT

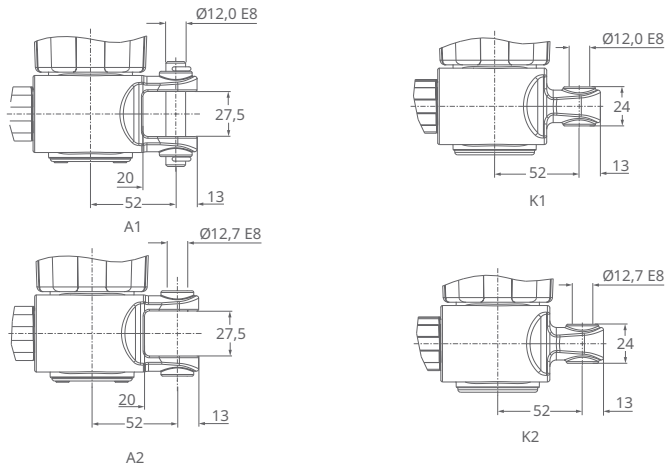
308 Motor options for CAT



a	Cable length	b	Cover for brake
c	Extended shaft	d	Motor

Rear attachments

309 Rear attachments



3.6.5 CAT33H

310 CAT33H



001D5C19

Benefits

- compact
- robust design
- modular
- with lifetime lubrication
- high efficiency
- digital encoder feedback

91 Technical data CAT33H

Feature			Unit	CAT33H	
				AC	DC
Rated push force			N	500 ... 1200	400 ... 1200
Rated pull force			N	500 ... 1200	400 ... 1200
Speed (full load ... no load)			mm/s	20 ... 90 [1)]	17 ... 93 [1)]
Stroke S			mm	100 ... 400	100 ... 400
Retracted length L			mm	S + 150/158/189 [2)]	S + 150/158/189 [2)]
Voltage	AC		V	120, 230 / 400	–
	DC		V	–	12 / 24
Power consumption	AC	120 V	W	98 (brake 133.2 W)	–
	AC	230 V	W	92 (brake 117.3 W)	–
	AC	400 V	W	80	–
	DC	12 V / 24 V	W	–	n/a
Current consumption	AC	120 V	A	0.82 (brake +0.29 A)	–
	AC	230 V	A	0.4 (brake +0.11 A)	–
	AC	400 V	A	0.2	–
	DC	12 V	A	–	18
	DC	24 V	A	–	9
	DC	24 V	A	–	5 (for motors C24CW and P24CW)
Duty cycle			%	30	20

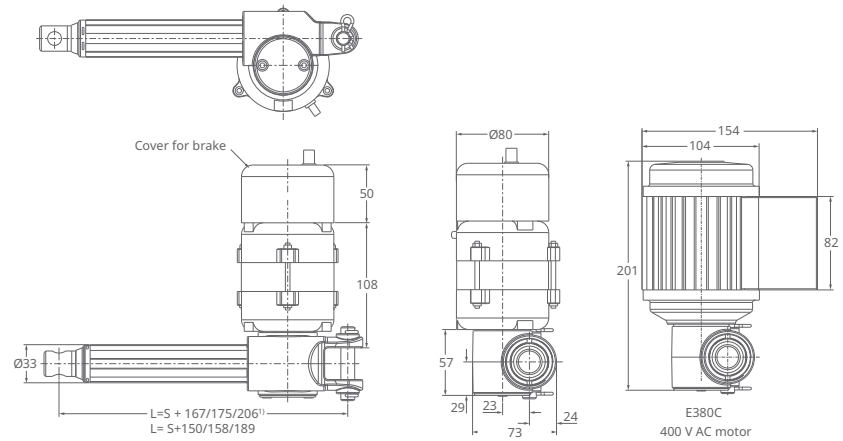
Feature	Unit	CAT33H	
		AC	DC
Ambient temperature	°C	–20 ... +50	–20 ... +50
Protection code (IP)	–	IP20, IP54, IP55	IP20, /IP44, IP66 [1]
Mass	kg	2 ... 2.7	2 ... 2.7

1) depending on selected motor

2) dimension depends on selected front attachment

Dimensional drawings

311 Dimensions CAT33H – AC version



Legend:
S = stroke
L = retracted length

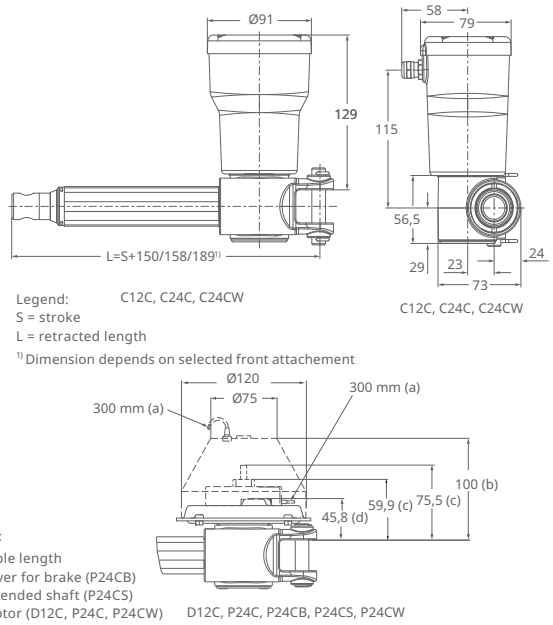
E110C, E110CB, E220C, E220CB
120 or 230 V AC motor

E110C, E110CB, E220C, E220CB
120 or 230 V AC motor

[1] Dimension depends on selected front attachement

001DCB16

312 Dimensions CAT33H – DC version



Legend:
S = stroke
L = retracted length

C12C, C24C, C24CW

C12C, C24C, C24CW

[1] Dimension depends on selected front attachement

Legend:
(a) = cable length
(b) = cover for brake (P24CB)
(c) = extended shaft (P24CS)
(d) = motor (D12C, P24C, P24CW)

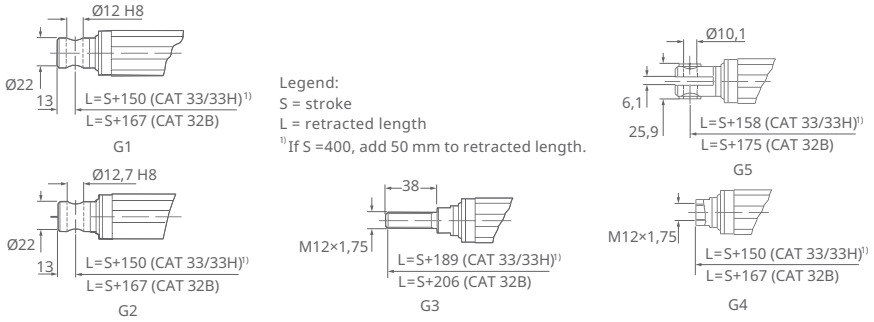
D12C, P24C, P24CB, P24CS, P24CW

001DCB23

3

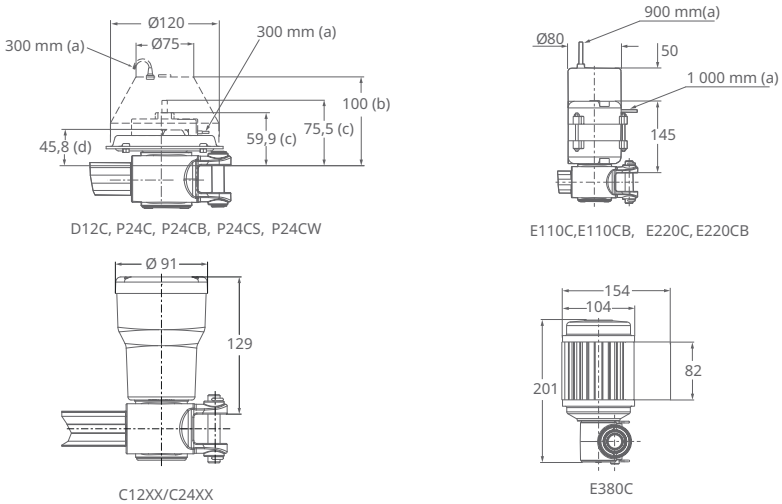
Detailed drawings of front and rear attachments for CAT and CAP43 and motor options for CAT

313 Front attachments and retracted length



001DCAD5

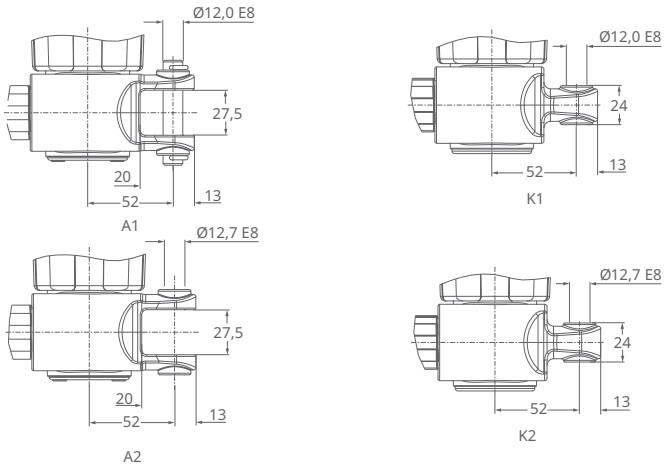
314 Motor options for CAT



001DCABA

a	Cable length	b	Cover for brake
c	Extended shaft	d	Motor

315 Rear attachments

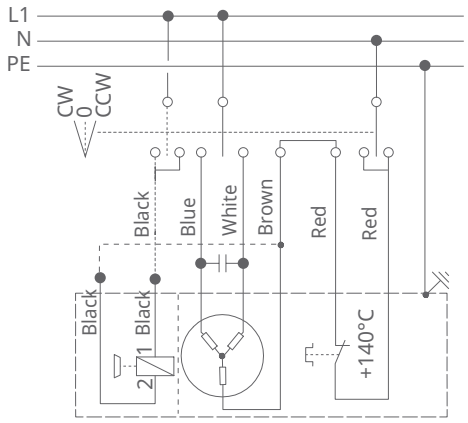


001DCAC7

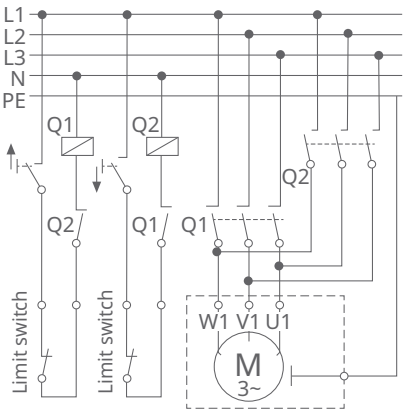
Wiring diagrams

AC version

316 AC single-phase alternating current: 120 V, 230 V

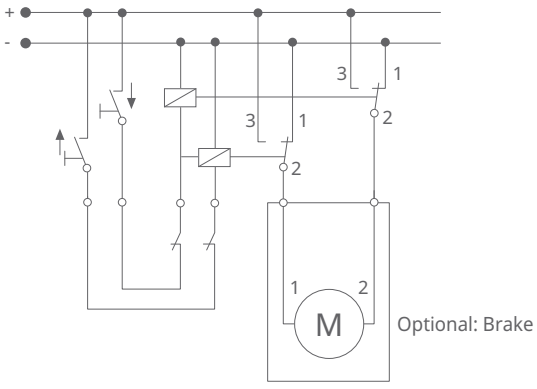


317 AC three-phase alternating current: 400 V



DC version

318 DC: 12 V, 24 V



Suitable control units and accessories

AC version

92 Suitable operating elements and controls CAT33H AC version

Linear actuator	Encoder
CAT33H AC	**E2**
E110C	✓
E110CB	✓
E220C	✓
E220CB	✓
E380C	✓
✓	suitable

DC version

93 Suitable operating elements and controls CAT33H DC version

Linear actuator	Encoder
CAT33H DC	**E2**
C12C	✓
D12C	✓
C24C	✓
C24CW	✓
P24C	✓
P24CB	✓
P24CS	✓
P24CW	✓
✓	suitable

CAT 33H – Type codes for accessories and spare parts

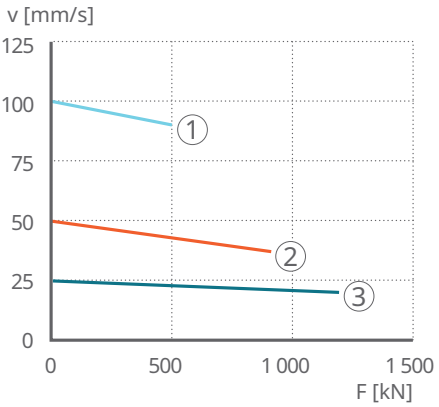
94 Accessories and spare parts for CAT33H

Description	Ordering designation	Order number
Motor DC 12 V (cylindrical motor)	C12C	M/0405535
Motor DC 12 V (flat motor)	P24C	M/0405518-V01
Motor DC 24 V (cylindrical motor)	C24C	M/0405536
Motor DC 24 V (cylindrical motor with low speed)	C24CW	M/0405537
Motor DC 24 V (flat motor)	P24C	M/0405519-V01
Motor DC 24 V (flat motor with brake)	P24CB	M/0405523-V01
Motor DC 24 V (flat motor with extended shaft)	P24CS	M/0405522-V01
Motor DC 24 V (flat motor with low speed)	P24CW	M/0405521-V01
Motor AC 120 V (cylindrical motor)	E110C	M/0405533
Motor AC 120 V (cylindrical motor with brake)	E110CB	M/0405534
Motor AC 230 V (cylindrical motor)	E220C	M/0405531
Motor AC 230 V (cylindrical motor with brake)	E220CB	M/0405532
Motor AC 400 V (cylindrical motor)	E380C	M/0411607
Capacitor value 25 µF (AC 120 V)	Capacitor 25 µF	M/0430670-16
Capacitor value 6 µF (AC 230 V)	Capacitor 6 µF	M/0430670–03
Front attachments, rod end type	575–32	M/0430575–32
Front attachments, rod clevis type	576–32	M/0430576–32
Rear attachments, single bracket with ear type	580–32	M/0430580–32
Rear attachments, universal joint type	582–32	M/0431780–32

Performance diagrams

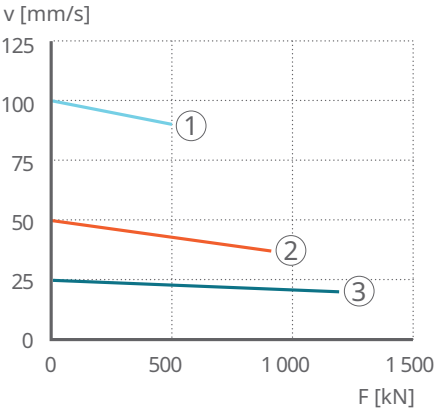
AC version

319 Speed-load diagram CAT33H, AC 120 V



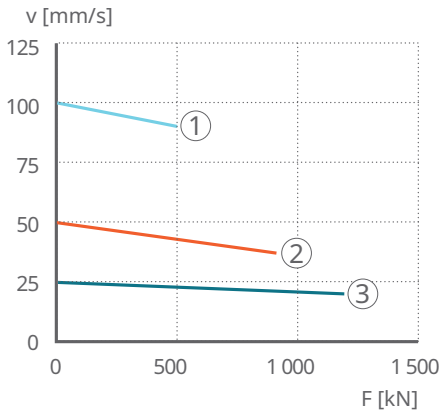
1	Gear 1	2	Gear 3
3	Gear 2	F	Load
v	Speed		

320 Speed-load diagram CAT33H, AC 230 V



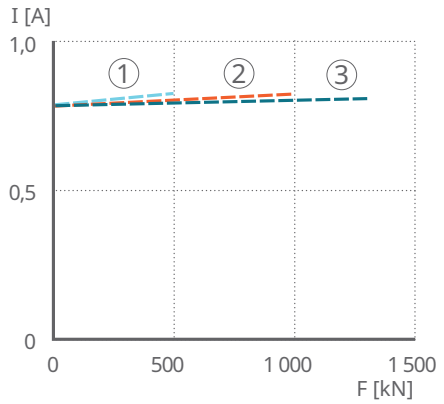
1	Gear 1	2	Gear 3
3	Gear 2	F	Load
v	Speed		

321 Speed-load diagram CAT33H, AC 400 V



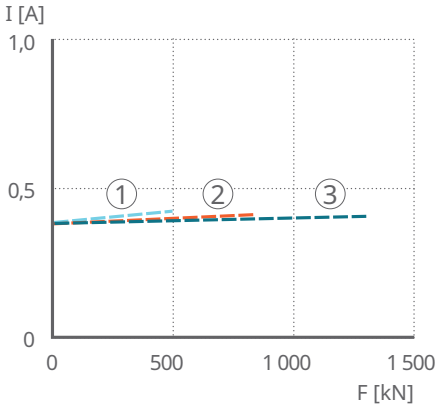
1	Gear 1	2	Gear 3
3	Gear 2	F	Load
v	Speed		

322 Current-load diagram CAT33H, AC 120 V



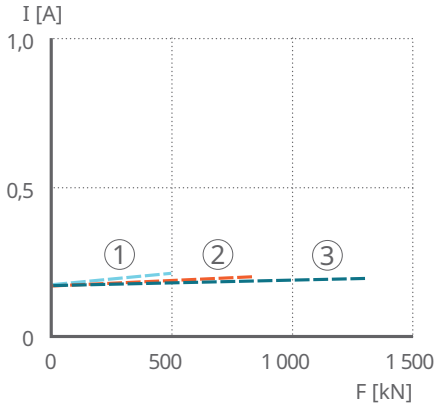
1	Gear 1	2	Gear 3
3	Gear 2	F	Load
I	Current consumption		

323 Current-load diagram CAT33H, AC 230 V



1	Gear 1	2	Gear 3
3	Gear 2	F	Load
I	Current consumption		

324 Current-load diagram CAT33H, AC 400 V

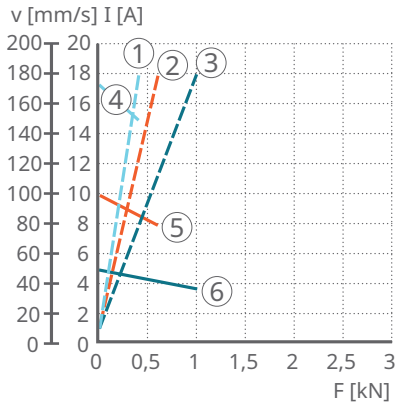


1	Gear 1	2	Gear 3
3	Gear 2	F	Load
I	Current consumption		

Deviations of ±10 % from the values in the diagram may occur.

DC version

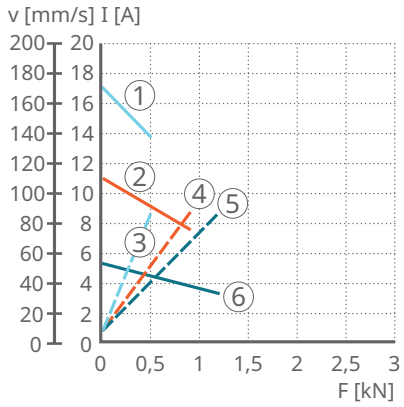
325 Performance diagram CAT33H.../C12C



001D17BC

1	I [A] gear 1	2	I [A] gear 2
3	I [A] gear 4	4	v [mm/s] gear 1
5	v [mm/s] gear 2	6	v [mm/s] gear 4
v	Speed	I	Current consumption
F	Load		

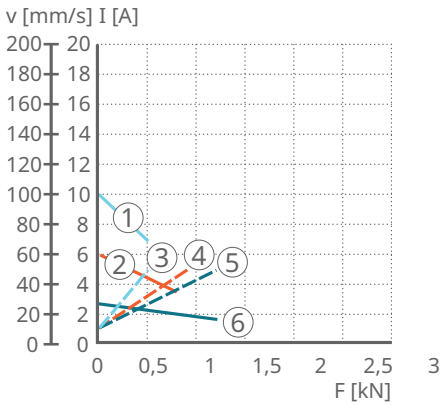
326 Performance diagram CAT33H.../C24C



001D17BE

1	I [A] gear 1	2	I [A] gear 2
3	I [A] gear 4	4	v [mm/s] gear 1
5	v [mm/s] gear 2	6	v [mm/s] gear 4
v	Speed	I	Current consumption
F	Load		

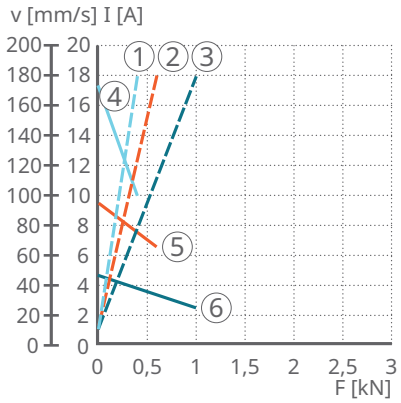
327 Performance diagram CAT33H.../C24CW



001D17C1

1	I [A] gear 1	2	I [A] gear 2
3	I [A] gear 4	4	v [mm/s] gear 1
5	v [mm/s] gear 2	6	v [mm/s] gear 4
v	Speed	I	Current consumption
F	Load		

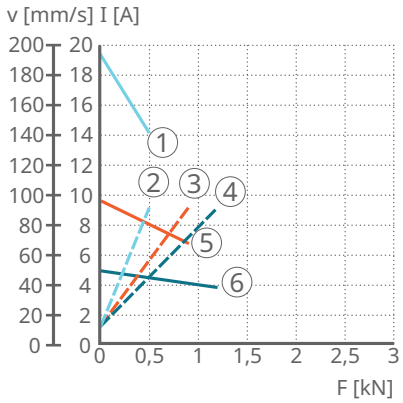
328 Performance diagram CAT33H.../D12C



001D17C3

1	I [A] gear 1	2	I [A] gear 2
3	I [A] gear 4	4	v [mm/s] gear 1
5	v [mm/s] gear 2	6	v [mm/s] gear 4
v	Speed	I	Current consumption
F	Load		

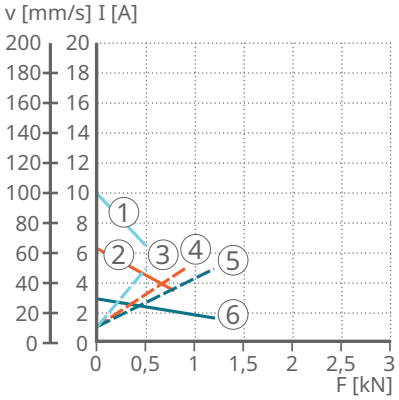
329 Performance diagram CAT33H.../P24...



001D17C4

1	I [A] gear 1	2	I [A] gear 2
3	I [A] gear 4	4	v [mm/s] gear 1
5	v [mm/s] gear 2	6	v [mm/s] gear 4
v	Speed	I	Current consumption
F	Load		

330 Performance diagram CAT33H.../P24CW



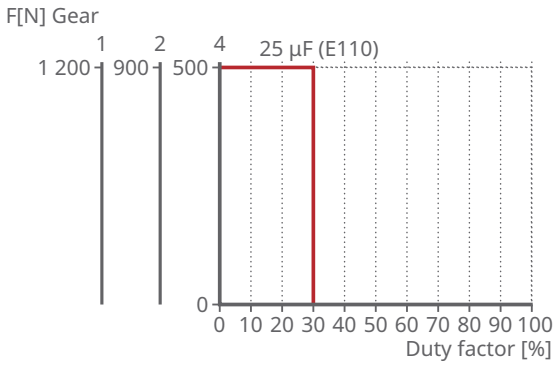
001D17C8

1	I [A] gear 1	2	I [A] gear 2
3	I [A] gear 4	4	v [mm/s] gear 1
5	v [mm/s] gear 2	6	v [mm/s] gear 4
v	Speed	I	Current consumption
F	Load		

Deviations of ±10 % from the values in the diagram may occur.

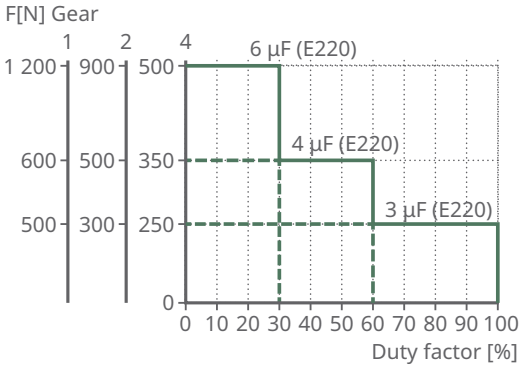
Duty cycle

331 CAT33H AC: 120 V



001C36DC

332 CAT33H AC: 230 V



001C36DE

Ordering key

333 Ordering designation CAT33H

Load [N]/speed at full load [mm/s]			Motor options	
1200/xx	900/xx	600/xx	No motor	0000
1200/20	900/37	500/90	AC 120 V/60 Hz, 1-phase, IP54	E110C
1200/20	900/37	500/90	AC 120 V/60 Hz, 1-phase, brake, IP20	E110CB
1200/20	900/37	500/90	AC 230 V/50 Hz, 1-phase, IP54	E220C
1200/20	900/37	500/90	AC 230 V/50 Hz, 1-phase, brake, IP20	E220CB
1200/20	900/37	500/90	AC 400 V/50 Hz, 3-phase, IP55	E380C
1200/xx	900/xx	600/xx	No motor	0000
1200/50-38	600/100-80	400/174-150	DC 12 V, IP66	C12C
1200/47-25	600/95-65	400/170-100	DC 12 V, flat motor, IP44	D12C
1200/56-36	900/113-79	500/174-140	DC 24 V, IP66	C24C
1200/27-17	900/60-35	500/100-69	24 V DC, motor with low speed, IP66	C24CW
1200/48-37	900/95-65	500/193-140	DC 24 V, flat motor, IP44	P24C
1200/48-37	900/95-65	500/193-140	DC 24 V, flat motor, brake, IP20	P24CB
1200/48-37	900/95-65	500/193-140	DC 24 V, flat motor, extended shaft, IP44	P24CS
1200/30-17	900/63-35	500/100-65	DC 24 V, flat motor, low speed, IP44	P24CW

1 2 4
Gearbox

CAT R 33 H x 100 x 1 A1 G1 E2 F / E110CB T2P

Type

Motor installation
R Right
L Left

Stroke (S)
100 100 mm
200 200 mm
300 300 mm
400 400 mm
- Other stroke lengths available on request

Rear attachment
A1 Rod clevis, Ø12,0 mm
A2 Rod clevis, Ø12,7 mm
K1 Single bracket with ear, Ø12,0 mm
K2 Single bracket with ear, Ø12,7 mm

Front attachment
G1 Hole, Ø12,0 mm
G2 Hole, Ø12,7 mm
G3 Male thread, M12
G4 Female thread, M12
G5 Rod clevis, Ø10,1 mm

Feedback
- No encoder (no code)
E2 Encoder (for all standard motors)

Option
F Friction clutch (not available with optional encoder)
Z No friction clutch

Option for CxxC motors
T2 Straight cable, 2,0 m, no plug
T2P Straight cable, 2,0 m, jack plug
T6 Straight cable, 6,0 m, no plug

001DF5DE

3.6.6 CAR40

334 CAR40



001CF094

Benefits

- reliable and robust linear actuators for industrial applications
- wide range of components
- available in right-hand and left-hand versions

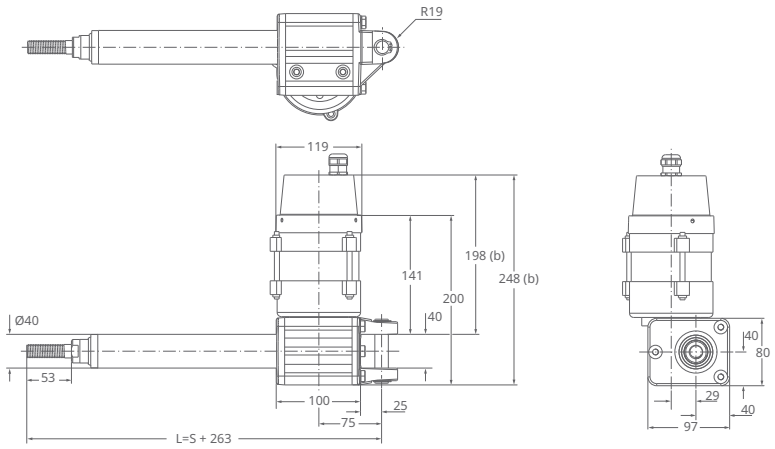
95 Technical data CAR40

Feature			Unit	CAR40	
				AC	DC
Rated push force			N	2000 to 6000	2000 to 6000
Rated pull force			N	2000 to 6000	2000 to 6000
Speed (full load ... no load)			mm/s	9 ... 40 [1)]	8 to 50
Stroke S			mm	100 to 700	100 to 700
Retracted length L			mm	S + 263	S + 263
Voltage	AC		V	120 / 230	–
	DC		V	–	24
Power consumption	AC	120 V	W	360	–
	AC	230 V	W	299	–
	DC	24 V	W	–	n/a
Current consumption	AC	120 V	A	3 (brake +0.29 A)	–
	AC	230 V	A	1.3 (brake +0.11 A)	–
	DC	24 V	A	–	16
Duty cycle			%	40	25
Ambient temperature			°C	–20 to +70	–20 to +70
Protection code (IP)			–	IP20, IP54	IP20, IP54
Mass			kg	5.8 to 8.4	5.8 to 8.4

1) depending on selected motor

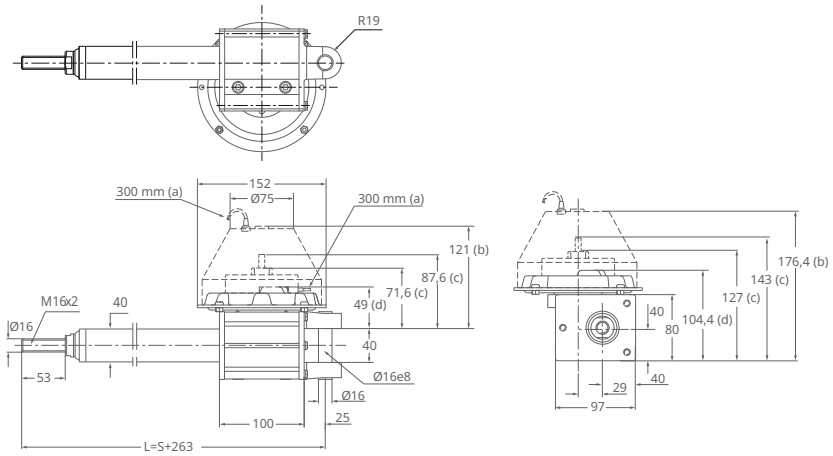
Dimensional drawings

335 Dimensions CAR40 – AC version



S	mm	Stroke
L	mm	Retracted length

336 Dimensions CAR40 – DC version

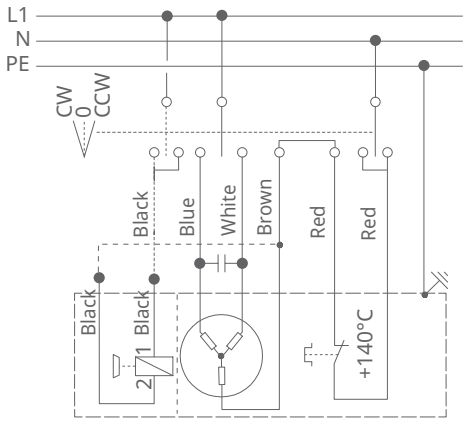


S	mm	Stroke
L	mm	Retracted length

Wiring diagrams

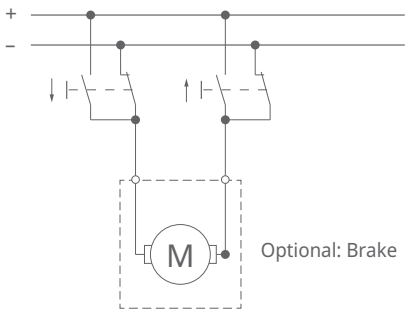
AC version

337 AC single-phase alternating current: 120 V, 230 V



DC version

338 DC: 12 V, 24 V



Suitable control units and accessories

AC version

96 Suitable operating elements and controls CAR40 AC version

Linear actuator	Limit switch
CAR40 AC	**CAXE40**
E110D	✓
E110DB	✓
E220D	✓
E220DB	✓
✓	suitable

DC version

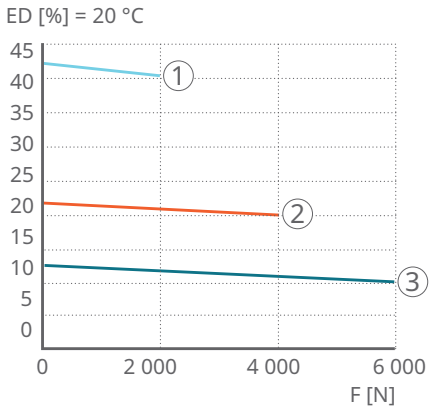
97 Suitable operating elements and controls CAR40 DC version

Linear actuator	Limit switch
CAR40 DC	**CAXE40**
P24D	✓
P24DS	✓
P24DB	✓
✓	suitable

Performance diagrams

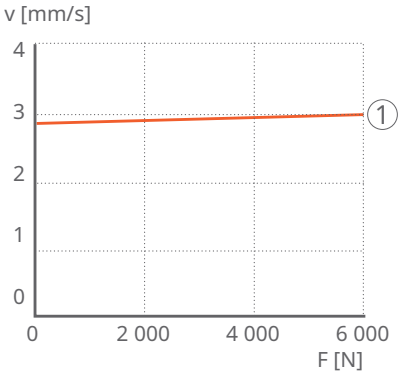
AC version

339 Speed-load diagram CAR40, AC 120 V



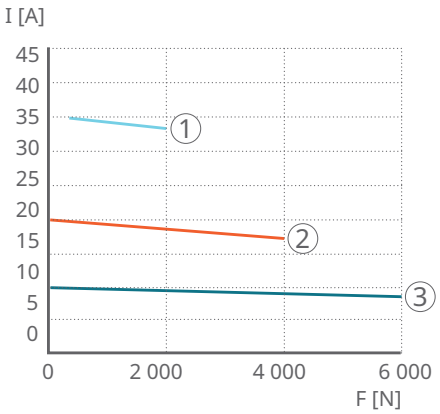
1	Gear 1	2	Gear 3
3	Gear 2	F	Load
ED	Duty cycle		

340 Speed-load diagram CAR40, AC 230 V



1	CAR40	F	Load
v	Speed		

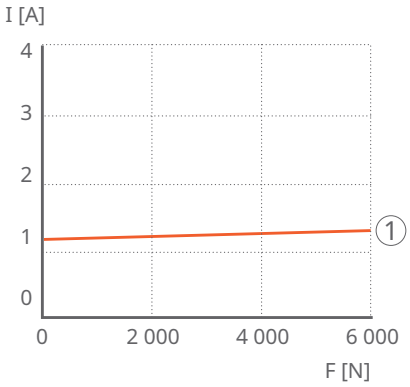
341 Current-load diagram CAR40, AC 120 V



001D17CF

1	Gear 1	2	Gear 3
3	Gear 2	F	Load
I	Current consumption		

342 Current-load diagram CAR40, AC 230 V



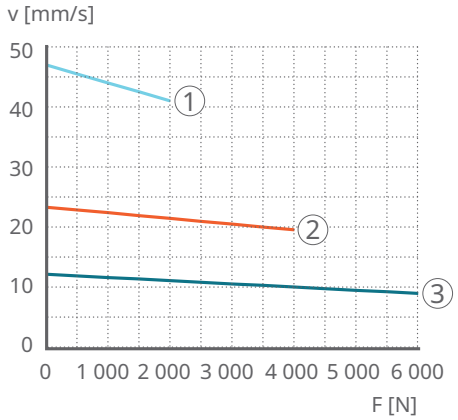
001D17D1

1	CAR40	F	Load
I	Current consumption		

3

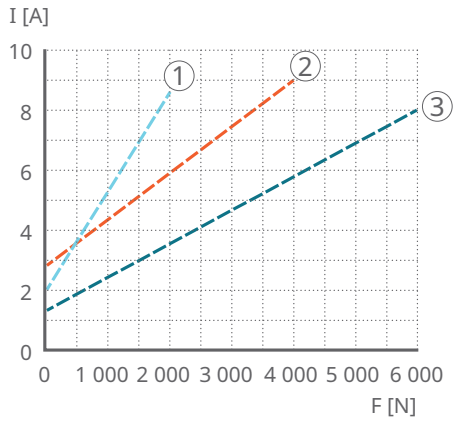
DC version

343 Speed-load diagram CAR40, DC 24 V



1	Gear 1	2	Gear 3
3	Gear 2	F	Load
v	Speed		

344 Current-load diagram CAR40, DC 24 V



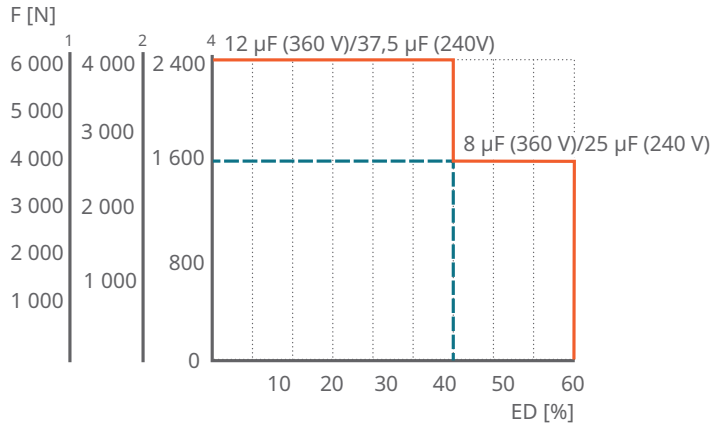
1	Gear 1	2	Gear 3
3	Gear 2	F	Load
I	Current consumption		

Deviations of ±10 % from the values in the diagram may occur.

Duty cycle

AC version

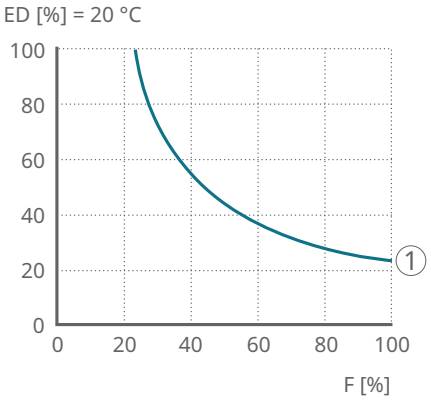
345 Duty cycle CAR40, AC



ED	Duty cycle	F	Load

DC version

346 Duty cycle CAR40, DC



1	CAR40	ED	Duty cycle
F	Load		

CAR 40 – Type codes for accessories and spare parts

98 Accessories and spare parts for CAR40

Description	Ordering designation	Order number
Motor DC 24 V (flat motor)	P24D	M/0405524-V01
Motor DC 24 V (flat motor with extended shaft)	P24DS	M/0405526-V01
Motor DC 24 V (flat motor with brake)	P24DB	M/0405525-V01
Motor AC 120 V (cylindrical motor)	E110D	M/0405529
Motor AC 120 V (cylindrical motor with brake)	E110DB	M/0405530
Motor AC 230 V (cylindrical motor)	E220D	M/0405527
Motor AC 230 V (cylindrical motor with brake)	E220DB	M/0405528
Capacitor value 12 µF (motor AC 230 V)	Capacitor 12 µF	M/0430670–04
Limit switch for stroke = 100 mm	CAXE40X100	M/0412051
Limit switch for stroke = 300 mm	CAXE40X300	M/0412054
Limit switch for stroke = 500 mm	CAXE40X500	M/0412056
Limit switch for stroke = 700 mm	CAXE40X700	M/0412057
Proximity switch for CAXE	CAXE	M/0432369
Front attachments, rod end type	575–40	M/0430575–40
Front attachments, rod clevis type	576–40	M/0430576–40
Rear attachments, single bracket with ear type	590–40	M/0430590–40
Rear attachments, bracket with ball joint type	581–40	M/0430581–40

Ordering key

347 Ordering designation CAR40

Dynamic load [N]/speed [mm/s]

			Motor options	
6000/xx	4000/xx	2000/xx	No motor	0000
6000/10	4000/20	2000/40	AC 120 V/60 Hz, 1-phase, IP54	E110D
6000/10	4000/20	2000/40	AC 120 V/60 Hz, 1-phase, brake, IP20	E110DB
6000/9	4000/17	2000/34	AC 230 V/50 Hz, 1-phase, IP54	E220D
6000/9	4000/17	2000/34	AC 230 V/50 Hz, 1-phase, brake, IP20	E220DB
6000/xx	4000/xx	2000/xx	No motor	0000
6000/13-8	4000/25-18	2000/50-38	DC 24 V, flat motor, IP44	P24D
6000/13-8	4000/25-18	2000/50-38	DC 24 V, flat motor, extended shaft, IP44	P24DS
6000/13-8	4000/25-18	2000/50-38	DC 24 V, flat motor, brake, IP20	P24DB

1 2 4
Gearbox

CAR R 40 x 100 x 1 F S / E110DB

Type

Motor installation
R Right
L Left

Stroke (S)
100 100 mm
300 300 mm
500 300 mm
700 500 mm
- Other stroke lengths available on request

Option 1
F Friction clutch
Z No friction clutch

Option 2
- No back-up nut
S Back-up nut

001DF5EE

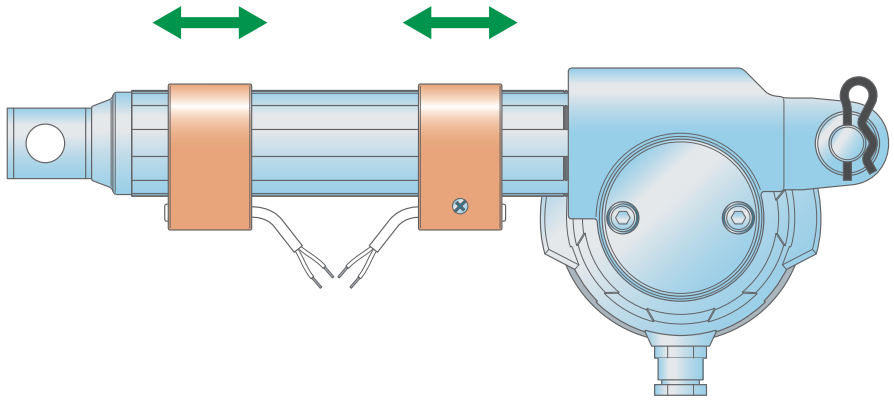
3.6.7 Replacement parts

3.6.7.1 EWELLIX limit switch CAXD

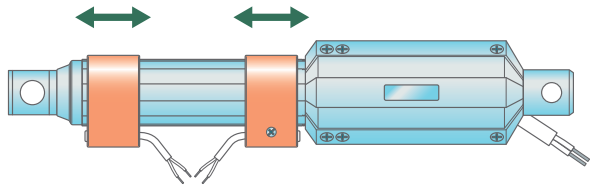
EWELLIX limit switch CAXD is an electronically controlled limit switch based on reed technology. It is mounted on the protection tube to indicate the positions of the actuator. When combined with actuator control units, the limit switch enables the stroke to be set to any desired length.

- CAXD designed for the following linear actuators
  - CAT33
  - CALA36A
- A CAXD is required for each end position
- The use of limit switches reduces the useful stroke of CAT33 by 20 mm and CALA36A by 25 mm (affects the retracted position)

348 EWELLIX linear actuator CAT



349 EWELLIX linear actuator CALA36A



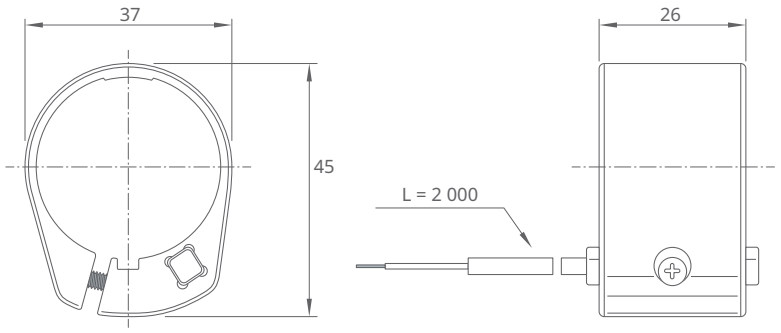
99 Technical data, CAXD

Characteristic	Unit	CAXD
Power supply	–	DC
Operating voltage	V	5 ... 30
Current max.	mA	100
Voltage drop	V	< 5
Electrical function	–	NC: normally closed NO: normally open
Response time	ms	0.3
Release time	ms	0.6
Operating temperature	°C	–20 ... +50
Sensor element protection type	–	IP67
Vibration/shock, sensor element	–	According to IEC 90947-5-2
Cable length L	mm	2000

Characteristic	Unit	CAXD
Cable diameter D	mm	3
Cable material	–	PUR
Cable cross-section	mm^2	2 × 0.14
Housing color	–	Black

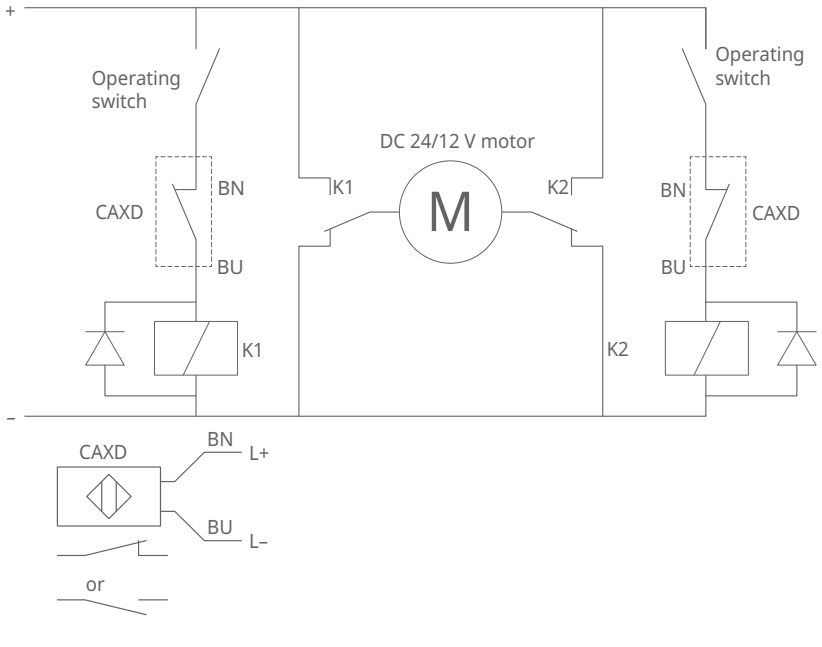
Dimensional drawings

350 Dimensions



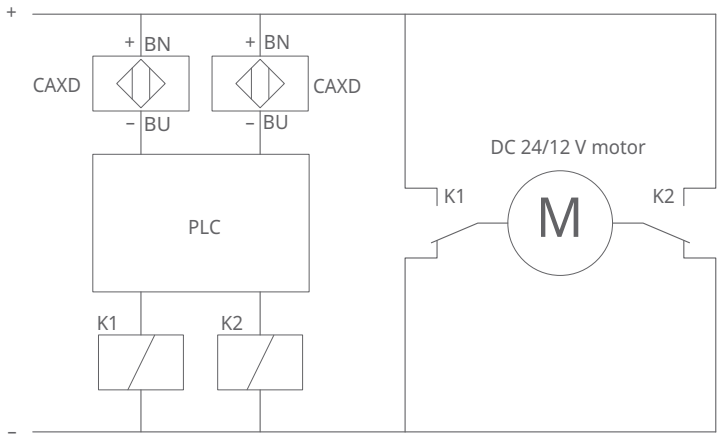
Wiring diagrams

351 Connection diagram



BN	Cable color Brown	BU	Cable color Blue

352 Connection diagram for PLC use



BN	Cable color Brown	BU	Cable color Blue

Never connect the limit switches to an AC power supply.

Ordering key

100 Order key limit switch CAXD

Code	Description
CAXD 33 LIMIT SWITCH, NC	Opener (Normally Closed, NC)
CAXD 33 LIMIT SWITCH, NO	Closer (Normally Open, NO)

3.6.7.2 EWELLIX limit switch CAXE

The EWELLIX limit switch CAXE is based on 2 complementary (NO/NC) proximity switches mounted on a special protection tube to indicate the end positions of the actuator. When combined with actuator controllers or other PLC controllers, the limit switch enables the stroke to be set to any desired length.

- CAXE developed for the following linear actuators
  - CAR22
  - CAR32
  - CAR40
  - CAT32B
  - CARN32
- It is recommended to place the limit switch at a distance of at least 10 mm from the end stop to avoid mechanical defects.
- For this option, the front attachment G3 must be selected.

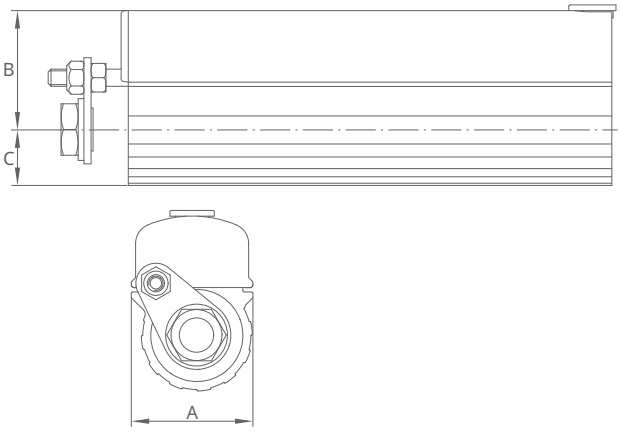
101 Technical data, CAXE

Characteristic	Unit	CAXE
Power supply	–	DC
Operating voltage	V	5 ... 30
Current max.	mA	100
Protection class	-	III
Voltage drop	V	< 5
Electrical function	–	NC: normally closed NO: normally open
Response time	ms	0.3
Release time	ms	0.6
Operating temperature	°C	–20 ... +70
Sensor element protection type	–	IP67
Vibration/shock, sensor element	–	According to IEC 60947-5-1
Cable length L	mm	2000
Cable diameter D	mm	3
Cable material	–	PUR
Cable cross-section	mm^2	3 × 0.14

The sensor has no overload protection and no reverse polarity protection.

Dimensional drawings

353 Dimensions

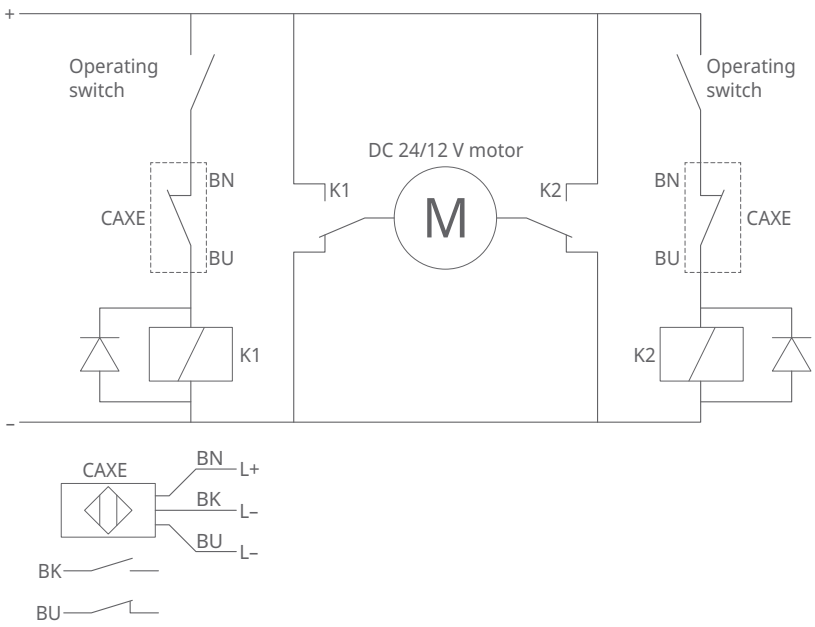


102 Dimensions

Limit switch	A	B	C
CAXE 22	42.5	37	14
CAXE 32	47.5	40	20
CAXE 32B	47.5	40	20
CAXE 40	46	46	23

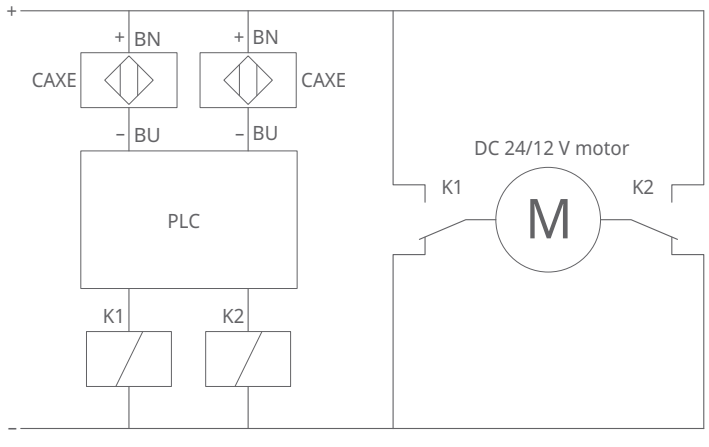
Wiring diagrams

354 Connection diagram



BK	Cable color Black	BN	Cable color Brown
BU	Cable color Blue		

355 Connection diagram for PLC use



BN	Cable color Brown	BU	Cable color Blue

Never connect the limit switches to an AC power supply.

Ordering key

356 Order key CAXE



Type

022	CAXE32	CAR 22
032	CAXE32	CAR 32, CARN 32
32B	CAXE32B	CAT 32B
040	CAXE40	CAR 40

Actuator stroke (mm)

050	050	CAR 22, 32 CARN 32 and CAT 32B
100	100	CAR 22, 32, 40, CARN 32 and CAT 32B
150	150	CAR 22
200	200	CAR 22, 32 CARN 32 and CAT 32B
300	300	CAR 22, 32, 40, CARN 32 and CAT 32B
400	400	CAT 32B
500	500	CAR 32, 40, CARN 32 and CAT 32B
700	700	CAR 32, 40, CARN 32 and CAT 32B

001DC082

3.6.7.3 Feedback for EWELLIX linear actuator CAT – EWELLIX encoder E2

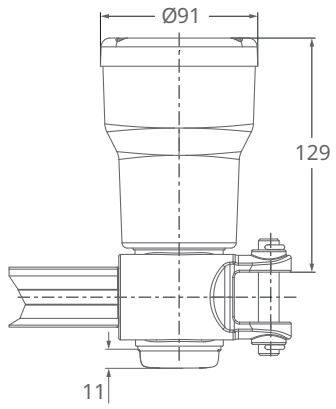
- can be fitted to all standard motors
- Hall effect, two channels, offset by 90°
- arranged on the gearbox housing
- 2 pulses/channel and motor revolution
- supply voltage: DC 5 V to DC 24 V
- final resolution according to gear ratio and base type of the linear actuator

103 Feedback EWELLIX encoder E2

EWELLIX linear actuator	Gearbox	Pulses at 1 mm stroke	Resolution (mm) per pulse
CAT33	1	16.67	0.06
	2	8.33	0.12
	4	4.17	0.24
CAT33H	1	4.00	0.25
	2	2.00	0.50
	4	1.00	1.00
CAT32B	1	12.50	0.08
	2	6.25	0.16
	4	3.13	0.32

Dimensional drawings

357 Dimensions EWELLIX encoder E2

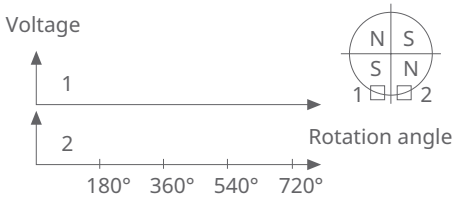


Encoder option E2

001D33F9

Wiring diagrams

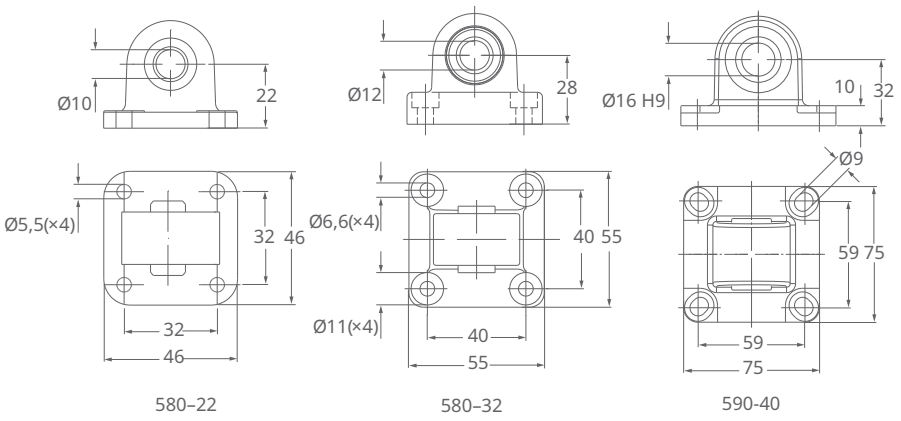
358 Connecting diagram



001D33EB

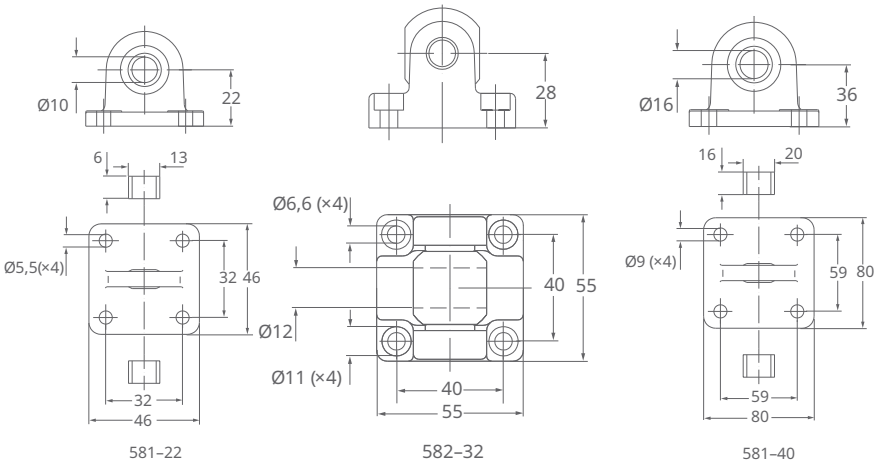
Attachments

359 Attachments 580-22, 580-32, 590-40



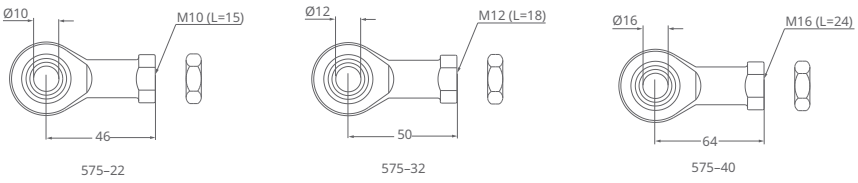
001DCB4A

360 Attachments 581-22, 582-32, 581-40



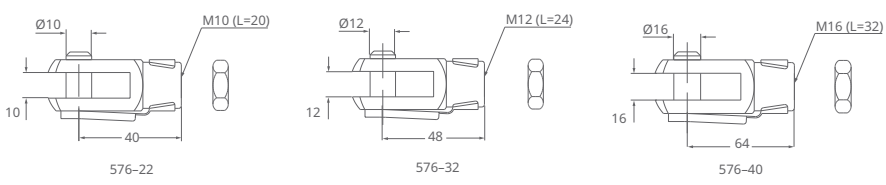
001DCB84

361 Attachments 575-22, 575-32, 575-40



001DCB91

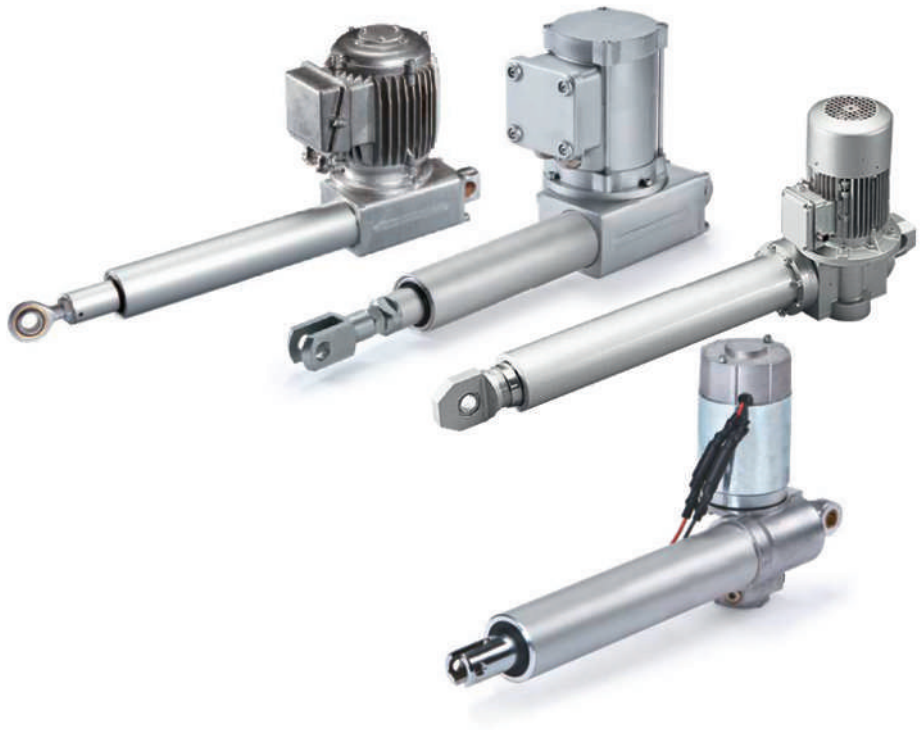
362 Attachments 576-22, 576-32, 576-40



001DCB9E

3.7 CAHM

363 CAHM



The CAHM series consists of screw-driven linear actuators with worm gears. They meet the highest requirements for industrial and other applications. The linear actuators are available in several different motor versions. The CAHM series provides powerful (up to 50000 N), fast, and quiet motion with high safety and high duty cycles. The linear actuators feature many interface options, such as Hall encoder, limit switches, extended shaft, etc.

Benefits

- modular
- robust
- reliable
- high speed and/or high load
- all-metal design

Characteristics

- ideal for high-load applications
- wide speed/force range
- robust design

If you require a force greater than 12 kN, you will find corresponding information in catalog HA 1 for high-performance actuators.

HA 1 | High-Performance Actuators |
https://www.schaeffler.de/std/2023

104 Technical data DC 12 V and DC 24 V

Feature	Unit	CAHM-31...D1	CAHM-31...D3	CAHM-35...D2
Voltage	V DC	12	24	24
Screw drive type	–	LN and LS	LN and LS	LN and LS
Max. rated push force	N	1000 to 4000	1000 to 4000	10000 to 15000
Max. rated pull force	N	1000 to 4000	1000 to 4000	10000 to 15000
Max speed (at full load)	mm/s	5 to 50	5 to 45	3 to 27
Stroke S	mm	100 to 700	100 to 700	100 to 700
Retracted length L	mm	S+230	S+230	–
Power consumption	W	168 to 192	144 to 192	528 to 840
Current consumption	A	14 to 16	6 to 8	22 to 35
Duty cycle	%	10	10	10
Ambient temperature	°C	–10 to +40	–10 to +40	–10 to +40
Protection code (IP)	IP	IP44	IP44	IP54

105 Technical data AC 230 V

Feature	Unit	CAHM-31...A2	CAHM-35...A2
Voltage	AC V	230	230
Screw drive type	–	LN and LS	LS
Max. rated push force	N	500 to 2600	5000 to 15000
Max. rated pull force	N	500 to 2600	5000 to 15000
Max speed (at full load)	mm/s	5 to 50	2 to 12
Stroke S	mm	100 to 700	100 to 700
Retracted length L	mm	S+230	–
Power consumption	W	200 to 230	700 to 750
Current consumption	A	1 to 11	3.3 to 3.5
Duty cycle	%	25	10 to 15
Ambient temperature	°C	–10 to +40	–10 to +40
Protection code (IP)	-	IP54	IP54

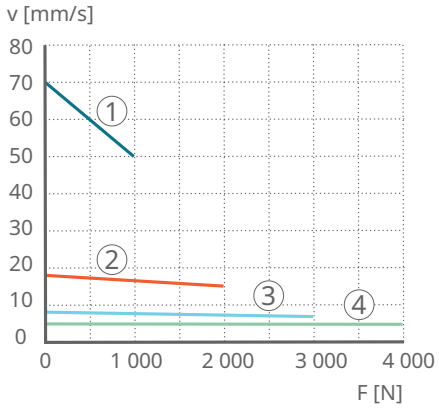
106 Technical data 3 × AC 400 V

Feature	Unit	CAHM-31...A4	CAHM-35...A4	CAHM-50...A4	CAHM-65...A4
Voltage	AC V	3 × 400	3 × 400	3 × 400	3 × 400
Screw drive type	–	LN and LS	LS and BN	BN	BN
Max. rated push force	N	1000 to 4500	10000 to 15000	15000 to 30000	18000 to 50000
Max. rated pull force	N	1000 to 4500	10000 to 15000	15000 to 30000	18000 to 50000
Max speed (at full load)	mm/s	5 to 50	2 to 25	9 to 45	9 to 74
Stroke S	mm	100 to 700	100 to 700	100 to 700	100 to 700
Retracted length L	mm	S+230	–	S+465	S+446
Power consumption	W	210 to 280	500 to 920	1200 to 1650	1900 to 3000
Current consumption	A	0.5 to 0.6	1.4 to 1.8	2.8 to 3.5	3.6 to 3.9
Duty cycle	%	40	10 to 25	10	10
Ambient temperature	°C	–10 to +40	–10 to +40	–10 to +40	–10 to +40
Protection code (IP)	-	IP54	IP54	IP54	IP54

Performance diagrams

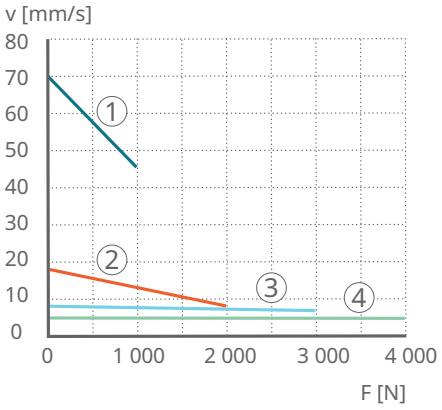
CAHM-31 DC version

364 Speed-load diagram CAHM-31 DC version, motor D1 12 V



1	CAHM 3110-LN	2	CAHM 3130-LN
3	CAHM 3110-LS	4	CAHM 3150-LS
F	Load	v	Speed

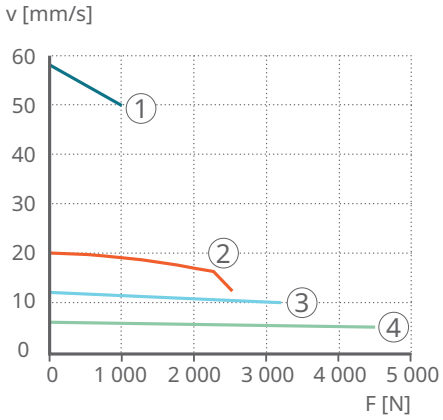
365 Speed-load diagram CAHM-31 DC version, motor D2 24 V



1	CAHM 3110-LN	2	CAHM 3130-LN
3	CAHM 3110-LS	4	CAHM 3150-LS
F	Load	v	Speed

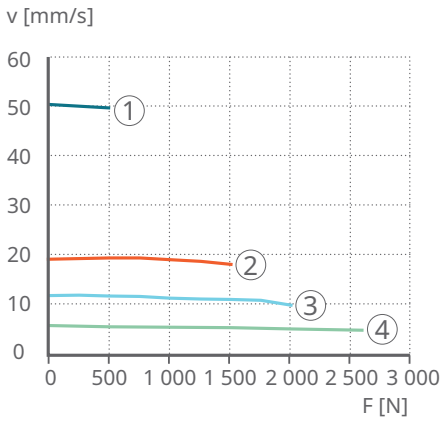
CAHM-31 AC version

366 Speed-load diagram CAHM-31 AC version, motor A4 3 × 400 V



1	CAHM 3110-LN	2	CAHM 3130-LN
3	CAHM 3110-LS	4	CAHM 3150-LS
F	Load	v	Speed

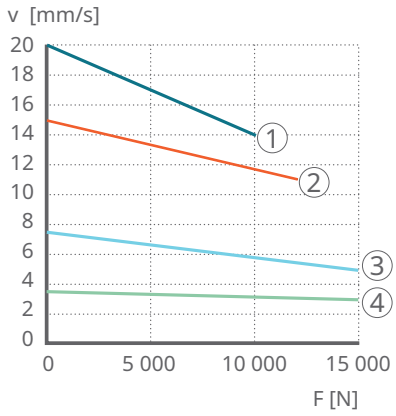
367 Speed-load diagram CAHM-31 AC version, motor A2 230 V



1	CAHM 3110-LN	2	CAHM 3130-LN
3	CAHM 3110-LS	4	CAHM 3150-LS
F	Load	v	Speed

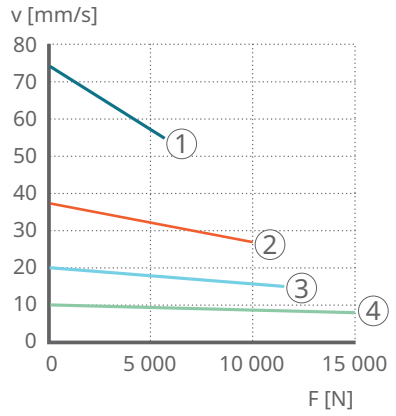
CAHM-35 DC version

368 Speed-load diagram CAHM-35 DC version, motor D2 24 V, LS 20 × 4



1	CAHM-3507	2	CAHM-3510
3	CAHM-3520	4	CAHM-3540
F	Load	v	Speed

369 Speed-load diagram CAHM-35 DC version, motor D2 24 V, BN 25 × 10

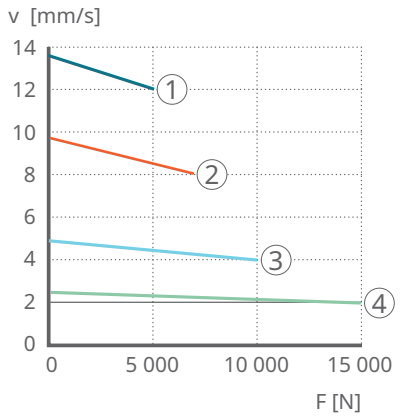


1	CAHM-3507	2	CAHM-3510
3	CAHM-3520	4	CAHM-3540
F	Load	v	Speed

3

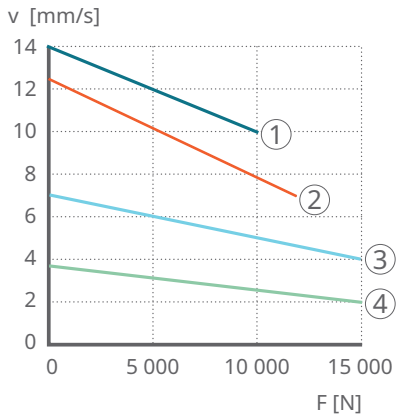
CAHM-35 AC version

370 Speed-load diagram CAHM-35 AC version, motor A2 230 V, LS 20 × 4



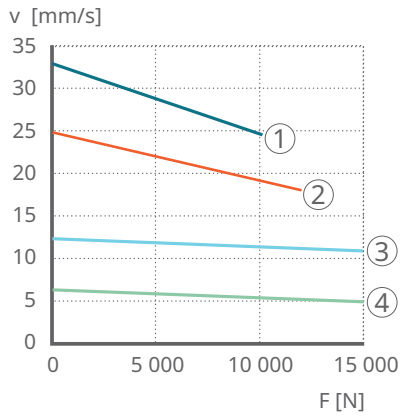
1	CAHM-3507	2	CAHM-3510
3	CAHM-3520	4	CAHM-3540
F	Load	v	Speed

371 Speed-load diagram CAHM-35 AC version, motor A4 3 × 400 V, LS 20 × 10



1	CAHM-3507	2	CAHM-3510
3	CAHM-3520	4	CAHM-3540
F	Load	v	Speed

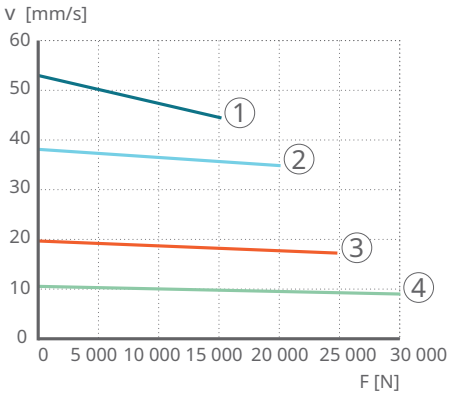
372 Speed-load diagram CAHM-35 AC version, motor A4 3 × 400 V, BN 25 × 10



1	CAHM-3507	2	CAHM-3510
3	CAHM-3520	4	CAHM-3540
F	Load	v	Speed

CAHM-50 AC version

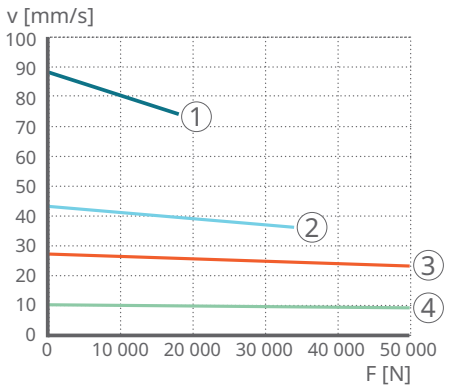
373 Speed-load diagram CAHM-50 AC version, motor A4 3 × 400 V



1	CAHM-5004	2	CAHM-5012
3	CAHM-5006	4	CAHM-5023
F	Load	v	Speed

CAHM-65 AC version

374 Speed-load diagram CAHM-65 AC version, motor A4 3 × 400 V



1	CAHM-6506	2	CAHM-6520
3	CAHM-6513	4	CAHM-6550
F	Load	v	Speed

4 EWELLIX lifting columns

4.1 CPMA

For ophthalmic equipment

375 CPMA



001CF0D7

Benefits

- wide-range power supply
- “plug and play” concept
- control with soft start and soft stop
- accessories for multiple outlet sockets
- cable routing through the column

Standards

- IEC 60601-1

107 Technical data CPMA

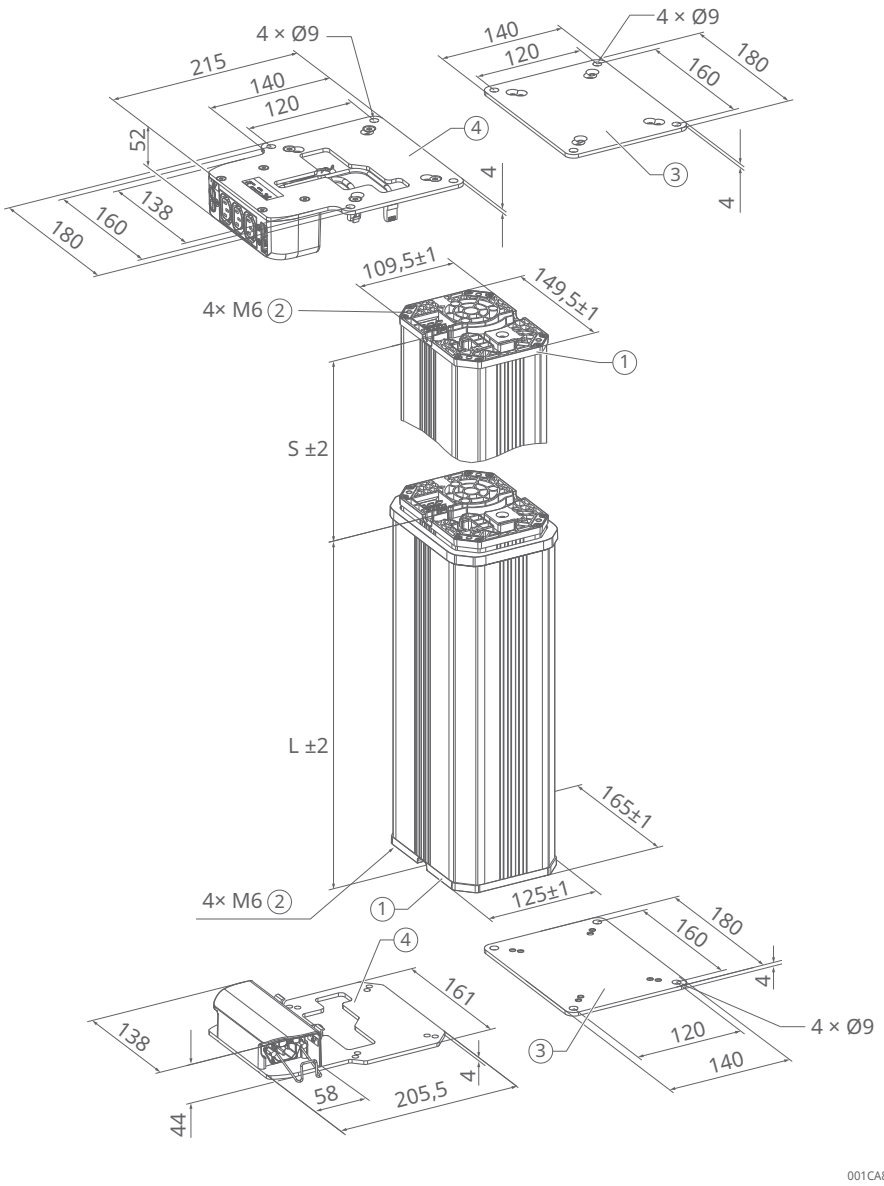
Feature	Unit	CPMA1-1	CPMA1-2	CPMA2-2
Rated push force	N	1000	2000	2000
Rated pull force	N	0	0	0
Static load in push way	N	8000	8000	8000
Dynamic offset load	Nm	≤ 115 [1]	≤ 250 [1]	≤ 250 [1]
Static offset load	Nm	≤ 500	≤ 500	≤ 500
Speed (full load to no load)	mm/s	14 to 15	11 to 15	11 to 15
Lifting column version (number of guide tubes)	–	2-part	2-part	2-part
Stroke S	mm	230 to 400	230 to 400	200 to 400
Retracted length L	mm	S + 160	S + 160	S + 160
Voltage	V	AC 100 V ... 240 V	AC 100 V ... 240 V	DC 24 V
Mains frequency	Hz	50 to 60	50 to 60	–
Power consumption (standby)	W	1 [2] ... 2.1	1 [2] ... 2.1	–
Current consumption	A	1.5	1.6	5
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Ambient temperature during operation	°C	+10 to +40	+10 to +40	+10 to +40
	°F	+50 to +104	+50 to +104	+50 to +104
Protection code (IP)	–	IP20	IP20	IP20
Protection class IEC 61140	–	I	I	–
Type of control	–	Electrical	Electrical	Electrical
Noise level	dB(A)	45	45	45
Mass	kg	8 to 11	9 to 12	8 to 11

1) for details, see bending load diagram

2) The lowest value applies when operating at the lowest voltage.

Dimensional drawings

376 Dimensions CPMA, CPMB



S	Stroke	L	Retracted length
1	Base plate	2	Thread for fastening screws
3	Mounting plate, not included in scope of delivery	4	Socket box inlet or socket box outlet, not included in scope of delivery

Mounting plates are not included in the scope of delivery and are available separately as accessories.

As an alternative to the mounting plates, use socket boxes. Socket boxes are not included in the scope of delivery and must be ordered separately as accessories.

Fastening screws are not included in the scope of delivery.

More flexibility with CPMA series design options

- more hygienic design, easy to clean with outer tube at the top
- more aesthetically pleasing design with outer tube at the bottom

377 Installation with outer tube at the top: positions A or B for motor (M)



001CCFDF

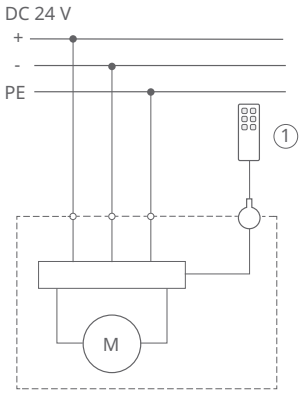
378 Installation with outer tube at the bottom: positions A or B for motor (M)



001CCFE0

Wiring diagrams

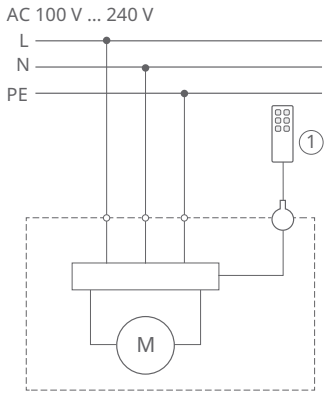
379 Connecting diagram DC 24 V



001CE352

1	Operating element

380 Connecting diagram AC 100 V to AC 240 V



001CE362

1	Operating element

Suitable control units and accessories

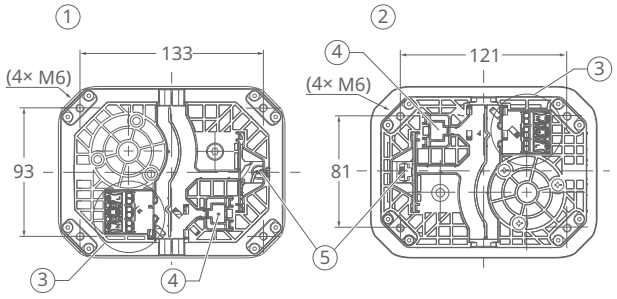
108 Suitable operating elements and accessories, CPMA

Accessories			Lifting columns		
			CPMA1-1	CPMA1-2	CPMA2-2
Operating element	M	EHA4	✓	✓	✓
	F	STL	✓	✓	✓
	T	STK	✓	✓	✓
Socket box inlet		ZDV-348220-002	✓	✓	–
Socket box outlet		ZDV-348221-002	✓	✓	–
External power supply DC 24 V			–	–	✓
Mains cable		ZKA-140449-2500	✓	✓	–
		ZKA-140450-2500	✓	✓	–
		ZKA-140451-2500	✓	✓	–
		ZKA-140452-2500	✓	✓	–
		ZKA-140458-2500	✓	✓	–
		ZKA-140460-2500	✓	✓	–
Detachable mains cable		ZKA-140453-2500	–	–	–
		ZKA-140454-2500	–	–	–
		ZKA-140455-2500	–	–	–
		ZKA-140456-2500	–	–	–
		ZKA-140459-2500	–	–	–
		ZKA-140461-2500	–	–	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Connections and mounting

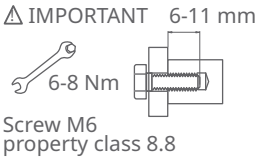
381 Outer tube base plate and inner tube base plate



001CA8BF

1	Outer tube base plate	2	Inner tube base plate
3	Mains connection, terminal strip	4	RJ45 LAN connection
5	RJ45 operation		

382 Mounting

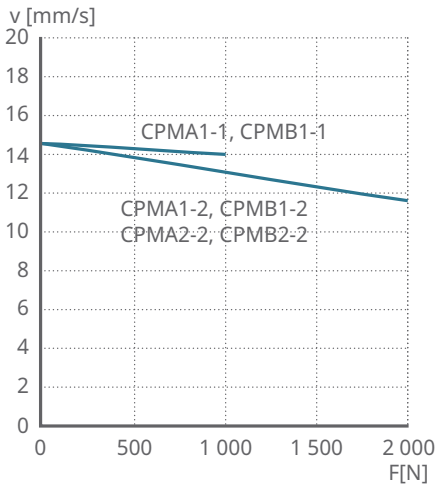


001D3498

The lifting column must be mounted on a flat and rigid surface using 4 M6 screws, which must be screwed 6 mm to 11 mm into the lifting column. The overall screw length must be matched to the height of the mounting arrangement.

Performance diagrams

383 Speed-load diagram

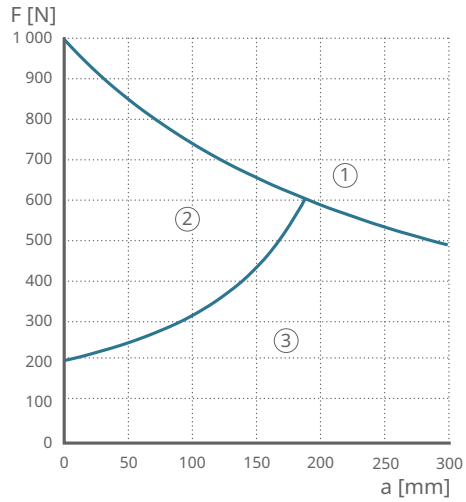


001CD021

v	Speed	F	Load

Offset load diagrams

384 Offset load diagram at 300 mm stroke: CPMA1-1, CPMB1-1

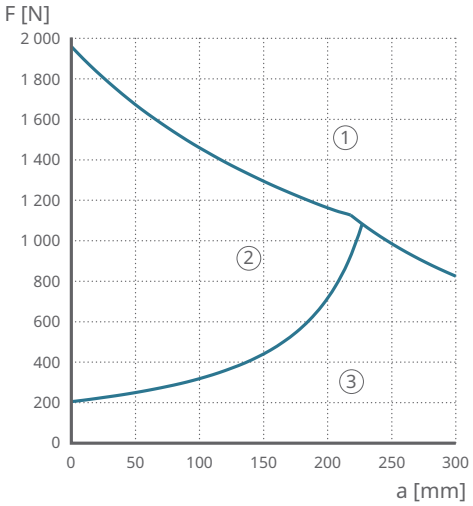


001CD025

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Load distance with fully extended column in the ideal axis

385 Offset load diagram at 300 mm stroke: CPMA1-2, CPMB1-2, CPMA2-2, CPMB2-2



001CD01F

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Load distance with fully extended column in the ideal axis

4.1.1 Socket box inlet – ZDV

386 Socket box inlet – ZDV



001CF0D9

Benefits

- multi-functional “plug-and-play” accessory
- detachable mains cable
- replaceable fuses
- LAN connection
- easy handling
- cable strain relief

Standards

- IEC 60601-1

Technical data

- 3 IEC mains inlet socket with holder
- 1 RJ45 for operating element
- 1 RJ45 for LAN
- 2 replaceable fuses, 8 A
- plate with holes compatible with CPMA lifting column plates
- can be attached to inner and outer tube

109 Suitable combinations with socket box inlet, ZDV-348220-002

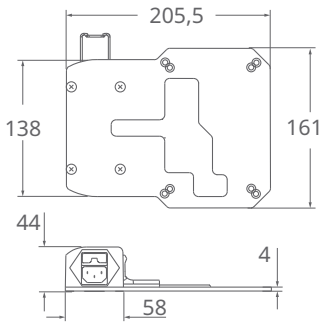
Combinations			**Socket box inlet**
			ZDV-348220-002
Lifting column		CPMA1-1, CPMB1-1	✓
		CPMA1-2, CPMB1-2	✓
		CPMA2-2, CPMB2-2	–
Operating element	M	EHA41-13N10N-000	✓
	F	STL01-GW1000-X190	✓
	T	STK01-SW3000-X100	✓
	T	STK01-UW3000-X100	✓
Mains cable		ZKA-140449-2500	–
		ZKA-140450-2500	–
		ZKA-140451-2500	–
		ZKA-140452-2500	–
		ZKA-140458-2500	–
		ZKA-140460-2500	–

Combinations		Socket box inlet
		ZDV-348220-002
Detachable mains cable	ZKA-140453-2500	✓
	ZKA-140454-2500	✓
	ZKA-140455-2500	✓
	ZKA-140456-2500	✓
	ZKA-140459-2500	✓
	ZKA-140461-2500	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Dimensional drawings

387 Dimensions of socket box inlet – ZDV



001DDCF9

4.1.2 Socket box outlet – ZDV

388 Socket box outlet – ZDV



001CF0E1

Benefits

- multi-functional “plug-and-play” accessory
- 3 IEC outlet sockets
- replaceable fuses
- integrated mounting plate
- LAN connection
- easy handling

Standards

- IEC 60601-1

Technical data

- 3 IEC mains inlet sockets
- 1 RJ45 for operating element
- 1 RJ45 for LAN
- 2 replaceable fuses, 8 A
- integrated mounting plate with 4 holes, 9 mm diameter
- 4 screws for attaching to the CPMA column
- can be attached to inner and outer tube

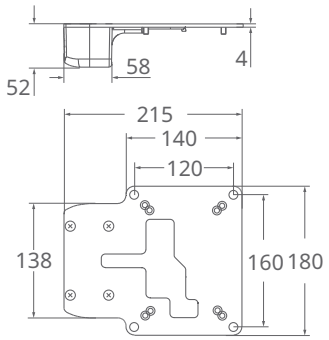
110 Suitable combinations with socket box outlet, ZDV-348221-002

Combinations			**Socket box outlet**
			ZDV-348221-002
Lifting column		CPMA1-1, CPMB1-1	✓
		CPMA1-2, CPMB1-2	✓
		CPMA2-2, CPMB2-2	–
Operating element	M	EHA41-13N10N-000	✓
	F	STL01-GW1000-X190	✓
	T	STK01-SW3000-X100	✓
	T	STK01-UW3000-X100	✓
Mains cable		ZKA-140449-2500	–
		ZKA-140450-2500	–
		ZKA-140451-2500	–
		ZKA-140452-2500	–
		ZKA-140458-2500	–
		ZKA-140460-2500	–
Detachable mains cable		ZKA-140453-2500	–
		ZKA-140454-2500	–
		ZKA-140455-2500	–
		ZKA-140456-2500	–
		ZKA-140459-2500	–
		ZKA-140461-2500	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Dimensional drawings

389 Dimensions of socket box outlet – ZDV



001DDCF7

4.1.3 Mounting plate – ZPL

390 Mounting plate – ZPL



001CF0ED

Benefits

- easy handling

Technical data

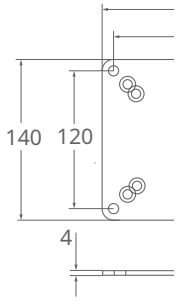
- can be attached to inner and outer tube
- mounting plate with 4 holes, 9 mm diameter

111 Compatibility of mounting plate ZPL

Mounting plate	Lifting columns		
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2
ZPL-348382	✓	✓	✓

Dimensional drawings

391 Dimensions of mounting plate – ZPL



001DDCF4

4.1.4 Mains cable and detachable mains cable – ZKA

392 Mains cable straight, 2.5 m – ZKA



001CD05F

393 Detachable mains cable straight, 2.5 m – ZKA



001CD06F

Benefits

- easy handling
- marked with product label

Standards

- IEC 60601-1

112 Compatibility of mains cable ZKA

Mains cable	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
ZKA-140449-2500	✓	✓	–	–	–
ZKA-140450-2500	✓	✓	–	–	–
ZKA-140451-2500	✓	✓	–	–	–
ZKA-140452-2500	✓	✓	–	–	–
ZKA-140458-2500	✓	✓	–	–	–
ZKA-140460-2500	✓	✓	–	–	–

113 Compatibility of detachable mains cable ZKA

Detachable mains cable	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
ZKA-140453-2500	✓	✓	–	–	–
ZKA-140454-2500	✓	✓	–	–	–
ZKA-140455-2500	✓	✓	–	–	–
ZKA-140456-2500	✓	✓	–	–	–
ZKA-140459-2500	✓	✓	–	–	–
ZKA-140461-2500	✓	✓	–	–	–

4.1.5 Desk switch – STK

394 Desk switch STK



001CD07F

Benefits

- simple and precise
- attractive design
- tactile buttons with finger guide
- 2-color LED status indicator for power supply and feedback

Standards

- IEC 60601-1

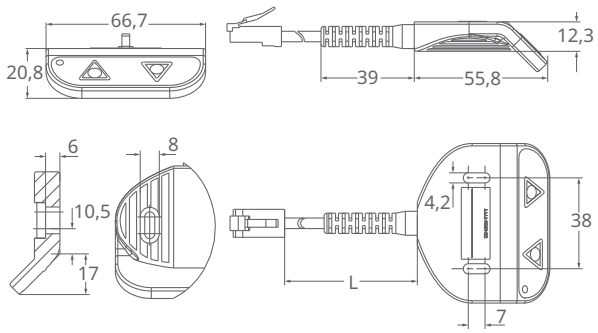
114 Compatibility of desk switch STK

Desk switch	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
STK01-SW3000-X100	✓	✓	✓	✓	✓
STK01-UW3000-X100	✓	✓	✓	✓	✓

Technical data and ordering designation ➤265|4.1.9

Dimensional drawings

395 Dimensions STK



115 Dimensions of desk switch – STK

Designation	Unit	L
STK01-SW3000-X100	mm	500
STK01-UW3000-X100	mm	1000

4.1.6 Hand switch – EHA

396 Hand switch EHA4



Benefits

- robust, ergonomic design
- tactile buttons
- easy-to-mount holder
- 2-color LED status indicator for power supply and feedback

Standards

- IEC 60601-1

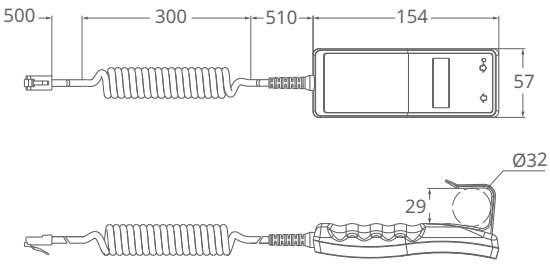
116 Compatibility of hand switch EHA

Hand switch	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
EHA	✓	✓	✓	✓	✓

Technical data and ordering designation ➤265|4.1.9

Dimensional drawings

397 Dimensions EHA4



4.1.7 Foot switch – STL

398 Foot switch STL



Benefits

- easy handling
- ergonomic design

Standards

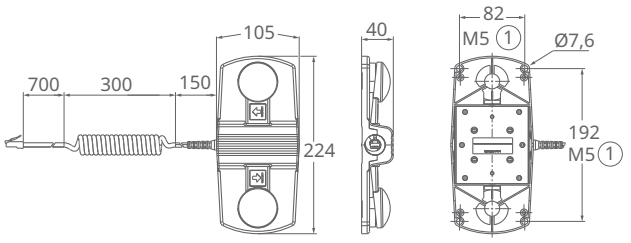
- IEC 60601-1

117 Compatibility of foot switch STL

Foot switch	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
STL01	✓	✓	✓	✓	✓

Dimensional drawings

399 Dimensions STL



1	Position

4.1.8 Accessories

Technical data for operating elements

118 Technical data for operating elements

Feature	Unit	EHA4	STL	STK
max. number of operating channels	–	1	1	1
Operating power supply	DCV/mA	5/20	5/20	5/20
Protection code (IP)	–	IP67	IPX2	–
Color	–	Gray	Gray and anthracite	Gray
Indicator	–	2-color LED status indicator for power supply and feedback	–	2-color LED status indicator for power supply and feedback
Plug	–	RJ45	RJ45	RJ45
Holder	–	with holder	–	–
Symbols	–	With [Up]/[Down] arrows	With [Up]/[Down] arrows	With [Up]/[Down] arrows

119 Approved accessories

Designation	Cable length	Plug	Country	Ordering designation	Order number
Mains cable					
Mains cable straight	2.5 m	Schuko	DE, FR, ...	ZKA-140449-2500	0130015
		British Standard	UK	ZKA-140451-2500	0130017
		NEMA	USA, JP, ...	ZKA-140452-2500	0130018
		SEV	CH	ZKA-140458-2500	0130256
		AS 3112	PRC, AUS, ...	ZKA-140460-2500	0130391

Designation	Cable length	Plug	Country	Ordering designation	Order number
Detachable mains cable straight	2.5 m (for insertion into the socket box inlet)	Schuko	DE, FR. ...	ZKA-140453-2500	0130019
		NEMA	USA, JP, ...	ZKA-140456-2500	0130022
		SEV	CH	ZKA-140459-2500	0130257
		AS 3112	PRC, AUS, ...	ZKA-140461-2500	0130392
Operating elements					
Desk switch with LED	0.5 m	–	–	STK01-SW3000-X100	0130025
Desk switch with LED	1 m	–	–	STK01-UW3000-X100	0130026
Hand switch with LED	Coiled cable 1.3 m	–	–	EHA41-13N00N-000	0131033
Foot switch	Coiled cable 1.3 m	–	–	STL01-GW1000-X100	0131873
Miscellaneous					
Socket box inlet: IEC, RJ45 LAN, RJ45 operating element	–	–	–	ZDV-348220-002	0130030
Socket box outlet: 3× IEC, RJ45 LAN, RJ45 operating element	–	–	–	ZDV-348221-002	0130032
Mounting plate	–	–	–	ZPL-348382	0130024

4.1.9 Ordering designation

400 Ordering designation CPMA

CPMA 1 – 1 2 200 A A 0 – 000

Type

Voltage

1	AC 100 ... 240 V 50/60 Hz	
2	DC 24 V	

Load

	Push	
1	1000 N	Only for AC version
2	2000 N	

Guide tube unit

2	2-piece	

Stroke S

200	200 mm	Only for DC version
230	230 mm	
250	250 mm	
300	300 mm	
400	400 mm	
...	Other lengths in increments of 10 mm, starting at 200 mm or 230 mm for the AC version up to 400 mm, are available on request	

Motor alignment[1)]

A	Motor in inner tube	
B	Motor in outer tube	

Operating device alignment

A	Socket for operating device as for motor	
B	Socket for operating device on both sides	

LAN cable through

0	No	
1	LAN cable through	Not compatible with socket for operating device on both sides

[1)] Lifting column can be installed with outer tube at the top or bottom

001E0577

4.2 CPMB

For incubators and warming beds

401 CPMB



001CF110

Benefits

- wide-range power supply
- “plug and play” concept
- control with soft start and soft stop
- low noise level
- cable routing through the column
- grounding continuity

Standards

- IEC 60601-1

120 Technical data CPMB

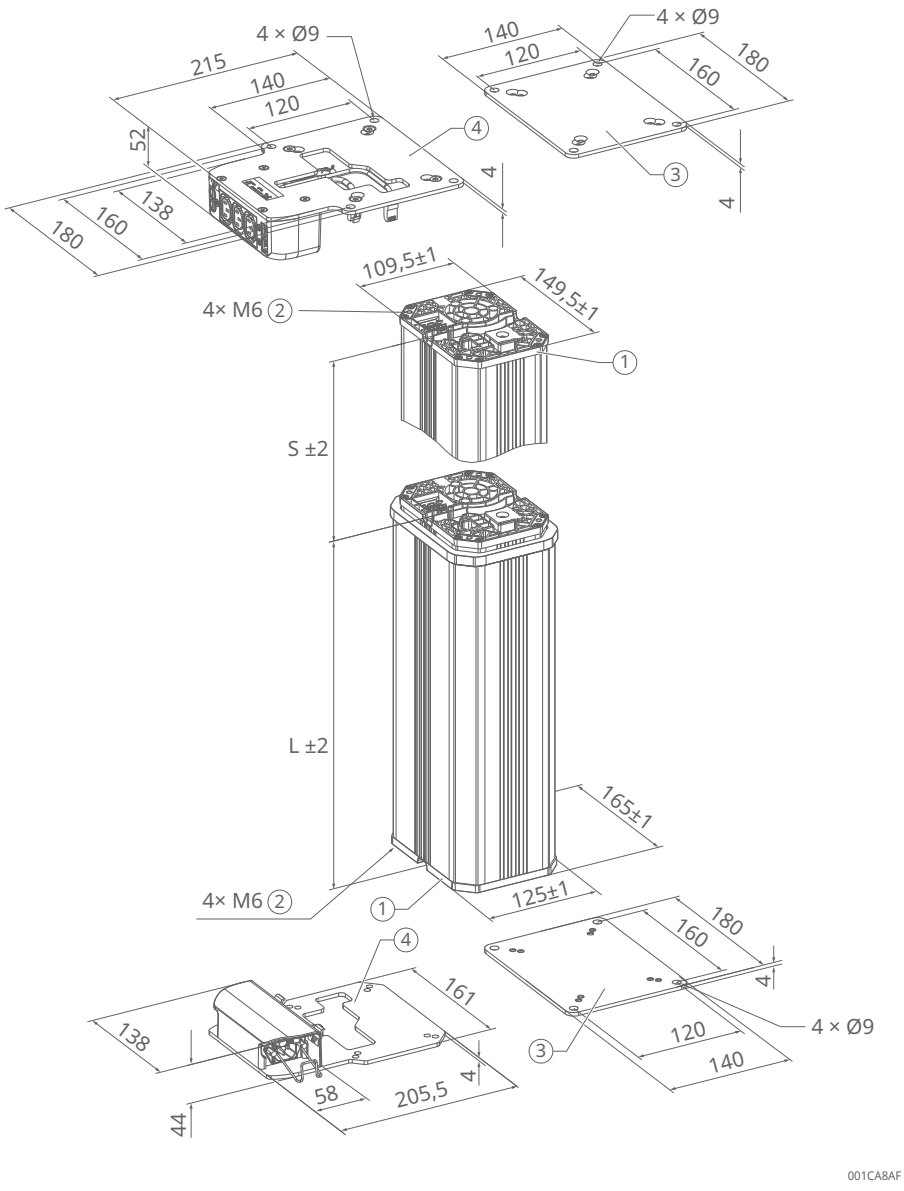
Feature	Unit	CPMB1-1	CPMB1-2	CPMB2-2
Rated push force	N	1000	2000	2000
Rated pull force	N	0	0	0
Static load in push way	N	8000	8000	8000
Dynamic offset load	Nm	≤ 115 [1]	≤ 250 [1]	≤ 250 [1]
Static offset load	Nm	≤ 500	≤ 500	≤ 500
Speed (full load to no load)	mm/s	14 to 15	11 to 15	11 to 15
Lifting column version (number of guide tubes)	–	2-part	2-part	2-part
Stroke S	mm	230 to 400	230 to 400	200 to 400
Retracted length L	mm	S + 160	S + 160	S + 160
Voltage	V	AC 100 V ... 240 V	AC 100 V ... 240 V	DC 24 V
Mains frequency	Hz	50 to 60	50 to 60	–
Power consumption (standby)	W	1 [2] ... 2.1	1 [2] ... 2.1	–
Current consumption	A	1.5	1.6	5
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Ambient temperature during operation	°C	+10 to +40	+10 to +40	+10 to +40
	°F	+50 to +104	+50 to +104	+50 to +104
Protection code (IP)	–	IP20	IP20	IP20
Protection class IEC 61140	–	I	I	–
Type of control	–	Electrical	Electrical	Electrical
Noise level	dB(A)	45	45	45
Mass	kg	8 to 11	9 to 12	8 to 11

[1] for details, see bending load diagram

[2] The lowest value applies when operating at the lowest voltage.

Dimensional drawings

402 Dimensions CPMA, CPMB



S	Stroke	L	Retracted length
1	Base plate	2	Thread for fastening screws
3	Mounting plate, not included in scope of delivery	4	Socket box inlet or socket box outlet, not included in scope of delivery

Mounting plates are not included in the scope of delivery and are available separately as accessories.

As an alternative to the mounting plates, use socket boxes. Socket boxes are not included in the scope of delivery and must be ordered separately as accessories.

Fastening screws are not included in the scope of delivery.

More flexibility with CPMB series design options

- more hygienic design, easy to clean with outer tube at the top
- more aesthetically pleasing design with outer tube at the bottom

403 Installation with outer tube at the top: positions A or B for motor (M)

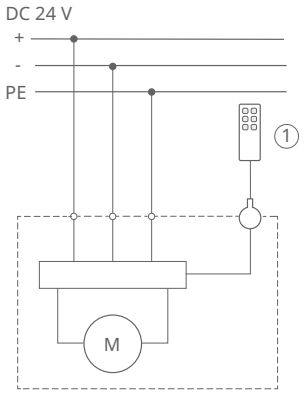


404 Installation with outer tube at the bottom: positions A or B for motor (M)



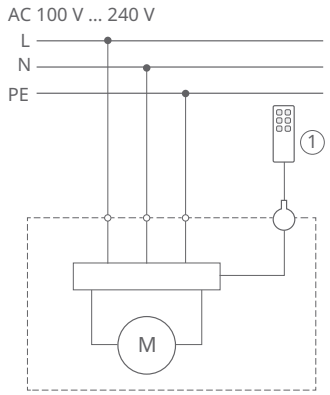
Wiring diagrams

405 Connecting diagram DC 24 V



1	Operating element	

406 Connecting diagram AC 100 V to AC 240 V



001CE362

1	Operating element		

Suitable control units and accessories

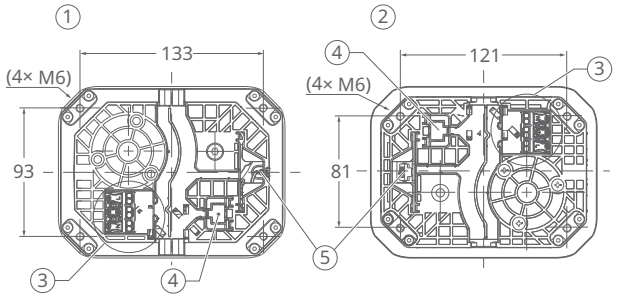
121 Suitable operating elements and accessories, CPMB

Accessories			Lifting columns		
			CPMB1-1	CPMB1-2	CPMB2-2
External power supply DC 24 V			–	–	✓
Operating element	M	EHA4	✓	✓	✓
	F	STL	✓	✓	✓
	T	STK	✓	✓	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Connections and mounting

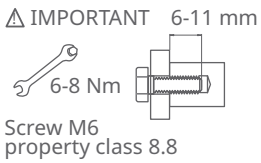
407 Outer tube base plate and inner tube base plate



001CA8BF

1	Outer tube base plate	2	Inner tube base plate
3	Mains connection, terminal strip	4	RJ45 LAN connection
5	RJ45 operation		

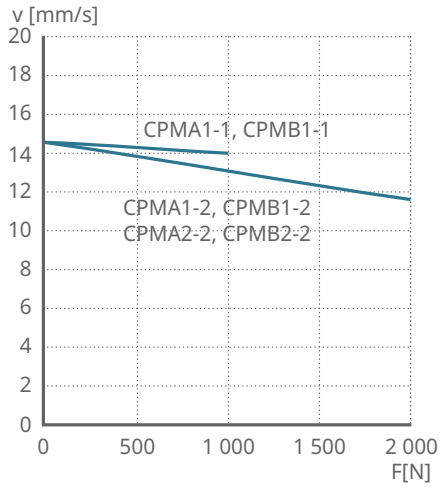
408 Mounting



The lifting column must be mounted on a flat and rigid surface using 4 M6 screws, which must be screwed 6 mm to 11 mm into the lifting column. The overall screw length must be matched to the height of the mounting arrangement.

Performance diagrams

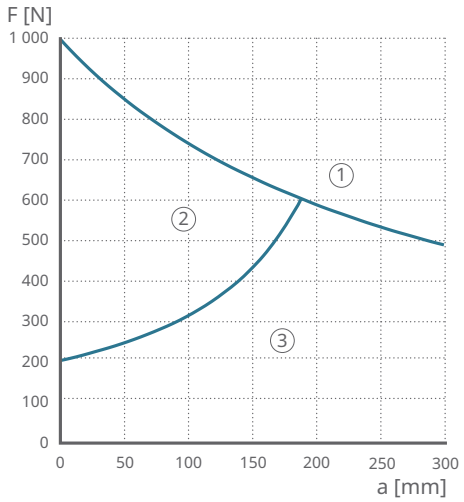
409 Speed-load diagram



v	Speed	F	Load

Offset load diagrams

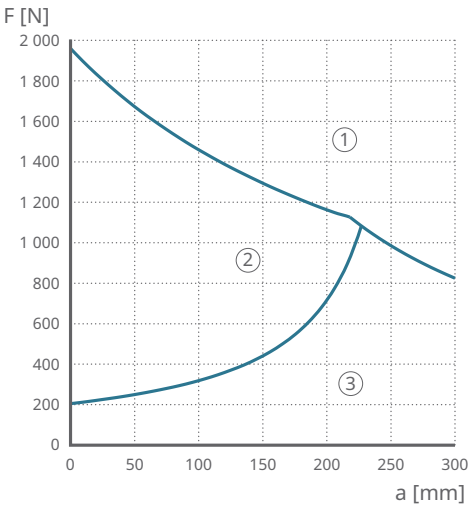
410 Offset load diagram at 300 mm stroke: CPMA1-1, CPMB1-1



F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Load distance with fully extended column in the ideal axis

411 Offset load diagram at 300 mm stroke: CPMA1-2, CPMB1-2, CPMA2-2, CPMB2-2



F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Load distance with fully extended column in the ideal axis

4.2.1 Socket box inlet – ZDV

412 Socket box inlet – ZDV



001CF0D9

Benefits

- multi-functional “plug-and-play” accessory
- detachable mains cable
- replaceable fuses
- LAN connection
- easy handling
- cable strain relief

Standards

- IEC 60601-1

Technical data

- 3 IEC mains inlet socket with holder
- 1 RJ45 for operating element
- 1 RJ45 for LAN
- 2 replaceable fuses, 8 A
- plate with holes compatible with CPMA lifting column plates
- can be attached to inner and outer tube

122 Suitable combinations with socket box inlet, ZDV-348220-002

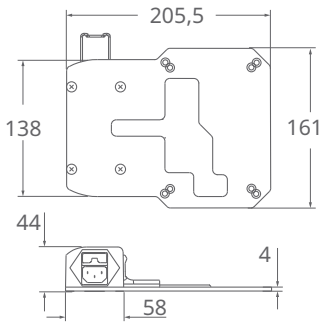
Combinations			**Socket box inlet**
			ZDV-348220-002
Lifting column		CPMA1-1, CPMB1-1	✓
		CPMA1-2, CPMB1-2	✓
		CPMA2-2, CPMB2-2	–
Operating element	M	EHA41-13N10N-000	✓
	F	STL01-GW1000-X190	✓
	T	STK01-SW3000-X100	✓
	T	STK01-UW3000-X100	✓
Mains cable		ZKA-140449-2500	–
		ZKA-140450-2500	–
		ZKA-140451-2500	–
		ZKA-140452-2500	–
		ZKA-140458-2500	–
		ZKA-140460-2500	–

Combinations		Socket box inlet
		ZDV-348220-002
Detachable mains cable	ZKA-140453-2500	✓
	ZKA-140454-2500	✓
	ZKA-140455-2500	✓
	ZKA-140456-2500	✓
	ZKA-140459-2500	✓
	ZKA-140461-2500	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Dimensional drawings

413 Dimensions of socket box inlet – ZDV



001DDCF9

4.2.2 Socket box outlet – ZDV

414 Socket box outlet – ZDV



001CF0E1

Benefits

- multi-functional “plug-and-play” accessory
- 3 IEC outlet sockets
- replaceable fuses
- integrated mounting plate
- LAN connection
- easy handling

Standards

- IEC 60601-1

Technical data

- 3 IEC mains inlet sockets
- 1 RJ45 for operating element
- 1 RJ45 for LAN
- 2 replaceable fuses, 8 A
- integrated mounting plate with 4 holes, 9 mm diameter
- 4 screws for attaching to the CPMA column
- can be attached to inner and outer tube

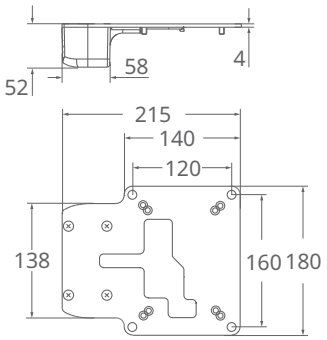
123 Suitable combinations with socket box outlet, ZDV-348221-002

Combinations			**Socket box outlet**
			ZDV-348221-002
Lifting column		CPMA1-1, CPMB1-1	✓
		CPMA1-2, CPMB1-2	✓
		CPMA2-2, CPMB2-2	–
Operating element	M	EHA41-13N10N-000	✓
	F	STL01-GW1000-X190	✓
	T	STK01-SW3000-X100	✓
	T	STK01-UW3000-X100	✓
Mains cable		ZKA-140449-2500	–
		ZKA-140450-2500	–
		ZKA-140451-2500	–
		ZKA-140452-2500	–
		ZKA-140458-2500	–
		ZKA-140460-2500	–
Detachable mains cable		ZKA-140453-2500	–
		ZKA-140454-2500	–
		ZKA-140455-2500	–
		ZKA-140456-2500	–
		ZKA-140459-2500	–
		ZKA-140461-2500	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Dimensional drawings

415 Dimensions of socket box outlet – ZDV



4.2.3 Mounting plate – ZPL

416 Mounting plate – ZPL



Benefits

- easy handling

Technical data

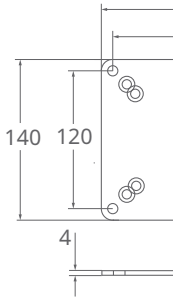
- can be attached to inner and outer tube
- mounting plate with 4 holes, 9 mm diameter

124 Compatibility of mounting plate ZPL

Mounting plate	Lifting columns		
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2
ZPL-348382	✓	✓	✓

Dimensional drawings

417 Dimensions of mounting plate – ZPL



4.2.4 Mains cable and detachable mains cable – ZKA

418 Mains cable straight, 2.5 m – ZKA



001CD05F

419 Detachable mains cable straight, 2.5 m – ZKA



001CD06F

Benefits

- easy handling
- marked with product label

Standards

- IEC 60601-1

125 Compatibility of mains cable ZKA

Mains cable	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
ZKA-140449-2500	✓	✓	–	–	–
ZKA-140450-2500	✓	✓	–	–	–
ZKA-140451-2500	✓	✓	–	–	–
ZKA-140452-2500	✓	✓	–	–	–
ZKA-140458-2500	✓	✓	–	–	–
ZKA-140460-2500	✓	✓	–	–	–

126 Compatibility of detachable mains cable ZKA

Detachable mains cable	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
ZKA-140453-2500	✓	✓	–	–	–
ZKA-140454-2500	✓	✓	–	–	–
ZKA-140455-2500	✓	✓	–	–	–
ZKA-140456-2500	✓	✓	–	–	–
ZKA-140459-2500	✓	✓	–	–	–
ZKA-140461-2500	✓	✓	–	–	–

4.2.5 Desk switch – STK

420 Desk switch STK



001CD07F

Benefits

- simple and precise
- attractive design
- tactile buttons with finger guide
- 2-color LED status indicator for power supply and feedback

Standards

- IEC 60601-1

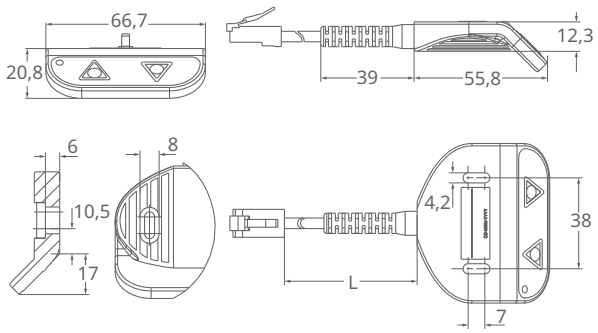
127 Compatibility of desk switch STK

Desk switch	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
STK01-SW3000-X100	✓	✓	✓	✓	✓
STK01-UW3000-X100	✓	✓	✓	✓	✓

Technical data and ordering designation ➤265|4.1.9

Dimensional drawings

421 Dimensions STK



128 Dimensions of desk switch – STK

Designation	Unit	L
STK01-SW3000-X100	mm	500
STK01-UW3000-X100	mm	1000

4.2.6 Hand switch – EHA

422 Hand switch EHA4



Benefits

- robust, ergonomic design
- tactile buttons
- easy-to-mount holder
- 2-color LED status indicator for power supply and feedback

Standards

- IEC 60601-1

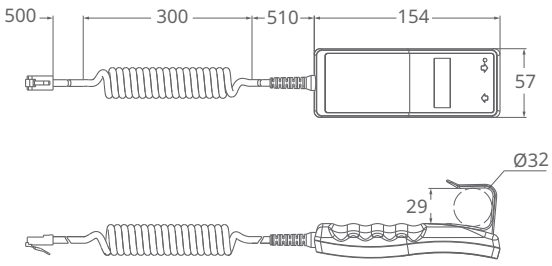
129 Compatibility of hand switch EHA

Hand switch	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
EHA	✓	✓	✓	✓	✓

Technical data and ordering designation ➤265|4.1.9

Dimensional drawings

423 Dimensions EHA4



4.2.7 Foot switch – STL

424 Foot switch STL



Benefits

- easy handling
- ergonomic design

Standards

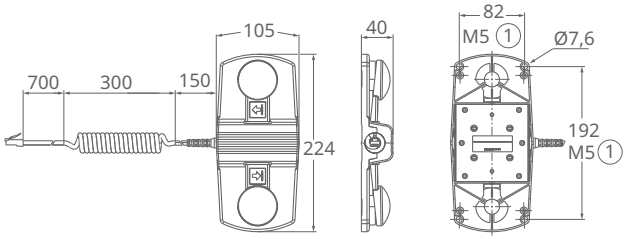
- IEC 60601-1

130 Compatibility of foot switch STL

Foot switch	Lifting columns			Socket boxes	
	CPMA1-1, CPMB1-1	CPMA1-2, CPMB1-2	CPMA2-2, CPMB2-2	ZDV-348220-002	ZDV-348221-002
STL01	✓	✓	✓	✓	✓

Dimensional drawings

425 Dimensions STL



1	Position

4.2.8 Accessories

Technical data for operating elements

131 Technical data for operating elements

Feature	Unit	EHA4	STL	STK
max. number of operating channels	–	1	1	1
Operating power supply	DCV/mA	5/20	5/20	5/20
Protection code (IP)	–	IP67	IPX2	–
Color	–	Gray	Gray and anthracite	Gray
Indicator	–	2-color LED status indicator for power supply and feedback	–	2-color LED status indicator for power supply and feedback
Plug	–	RJ45	RJ45	RJ45
Holder	–	with holder	–	–
Symbols	–	With [Up]/[Down] arrows	With [Up]/[Down] arrows	With [Up]/[Down] arrows

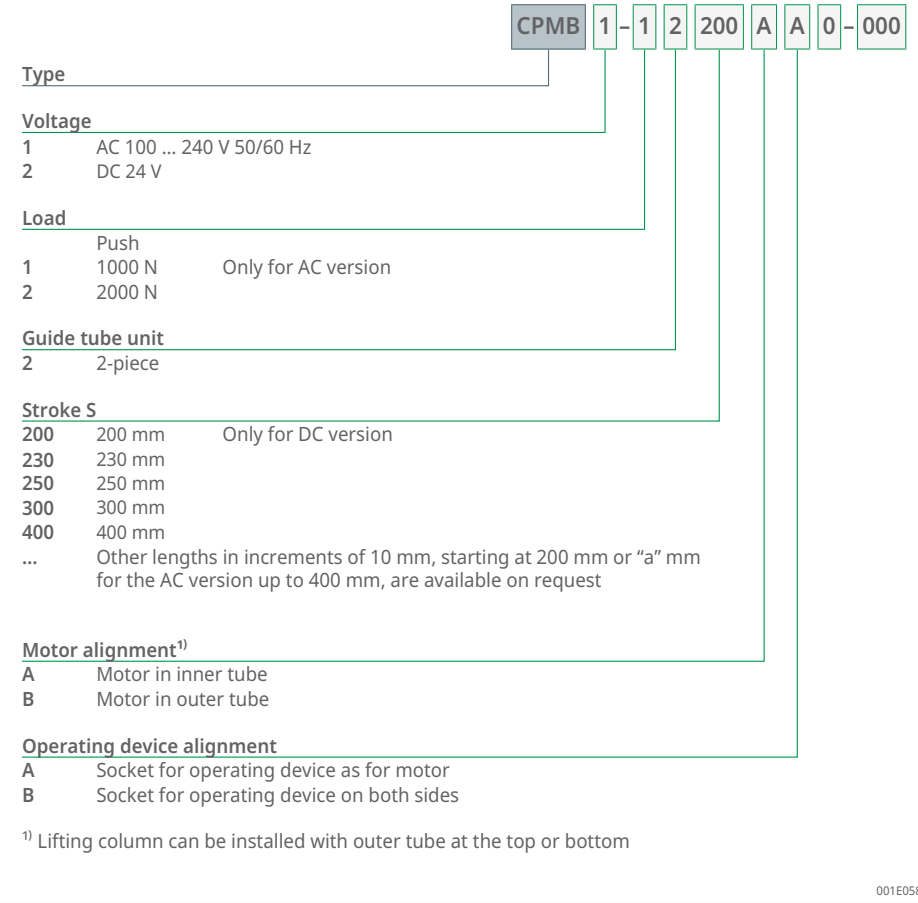
132 Approved accessories

Designation	Cable length	Plug	Country	Ordering designation	Order number
Mains cable					
Mains cable straight	2.5 m	Schuko	DE, FR, ...	ZKA-140449-2500	0130015
		British Standard	UK	ZKA-140451-2500	0130017
		NEMA	USA, JP, ...	ZKA-140452-2500	0130018
		SEV	CH	ZKA-140458-2500	0130256
		AS 3112	PRC, AUS, ...	ZKA-140460-2500	0130391

Designation	Cable length	Plug	Country	Ordering designation	Order number
Detachable mains cable straight	2.5 m (for insertion into the socket box inlet)	Schuko	DE, FR. ...	ZKA-140453-2500	0130019
		NEMA	USA, JP, ...	ZKA-140456-2500	0130022
		SEV	CH	ZKA-140459-2500	0130257
		AS 3112	PRC, AUS, ...	ZKA-140461-2500	0130392
Operating elements					
Desk switch with LED	0.5 m	–	–	STK01-SW3000-X100	0130025
Desk switch with LED	1 m	–	–	STK01-UW3000-X100	0130026
Hand switch with LED	Coiled cable 1.3 m	–	–	EHA41-13N00N-000	0131033
Foot switch	Coiled cable 1.3 m	–	–	STL01-GW1000-X100	0131873
Miscellaneous					
Socket box inlet: IEC, RJ45 LAN, RJ45 operating element	–	–	–	ZDV-348220-002	0130030
Socket box outlet: 3× IEC, RJ45 LAN, RJ45 operating element	–	–	–	ZDV-348221-002	0130032
Mounting plate	–	–	–	ZPL-348382	0130024

4.2.9 Ordering designation

426 Ordering designation CPMB



4.3 CPMT

For medical devices

427 CPMT



Benefits

- low installation height
- long stroke
- high load carrying capacity
- high safety and reliability
- flexible design options

Standards

- IEC 60601-1

133 Technical data CPMT

Feature	Unit	CPMT1-1S	CPMT1-1M	CPMT1-2S	CPMT1-2M
Rated push force	N	5000	5000	6000	6000
Rated pull force	N	4000	4000	4000	4000
Static push load [1]	N	15000	15000	15000	15000
Static factor under load conditions [2]	–	4	4	4	4
Dynamic offset load	Nm	≤ 450 [3]	≤ 1200 [3]	≤ 550 [3]	≤ 1400 [3]
Static offset load	Nm	≤ 1000	≤ 3000	≤ 1000	≤ 3000
Speed (full load to no load)	mm/s	14 to 34	14 to 34	12 to 26	12 to 26
Lifting column version (number of guide tubes)	–	3-piece	3-piece	3-piece	3-piece
Stroke S	mm	400 to 600	300 to 600	400 to 600	300 to 600
Retracted length L	mm	S/2 + 120	S/2 + 240	S/2 + 120	S/2 + 240
Voltage	V DC	24 to 30	24 to 30	24 to 30	24 to 30
Current consumption under push load	A	≤ 12	≤ 12	≤ 10	≤ 10
Current consumption under pull load	A	≤ 10	≤ 10	≤ 7	≤ 7

Feature	Unit	CPMT1-1S	CPMT1-1M	CPMT1-2S	CPMT1-2M
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Ambient temperature during operation	°C	+10 to +40	+10 to +40	+10 to +40	+10 to +40
	°F	+50 to +104	+50 to +104	+50 to +104	+50 to +104
Protection code (IP)	–	IP20	IP20	IP20	IP20
Mass	kg	16.5 to 20	19 to 23.5	16.5 to 20	19 to 23.5

4

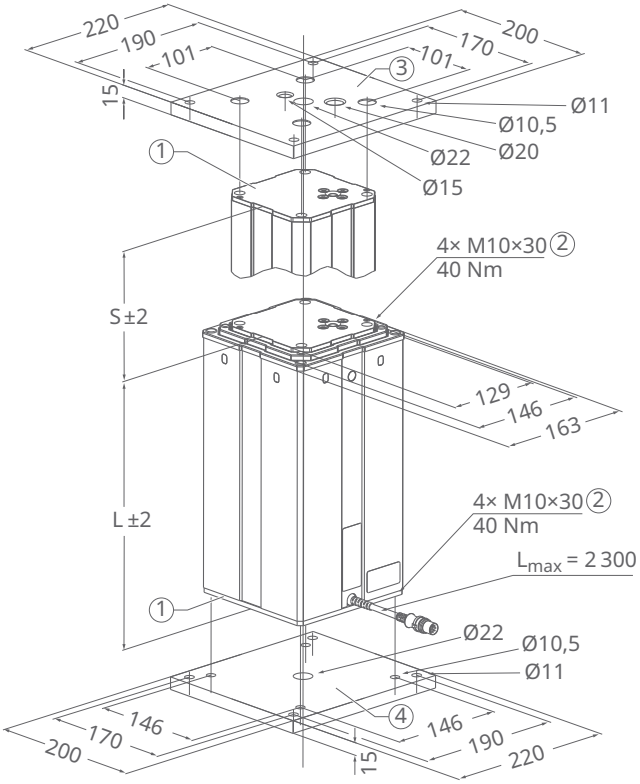
1) conforms to static load in accordance with IEC 60601-2-46

2) static pull safety factor to prevent mechanical hazards in accordance with IEC 60601-1

3) for details, see bending load diagram

Dimensional drawings

428 Dimensions CPMT



001CA74F

S	Stroke	L	Retracted length
1	Base plate	2	Thread for fastening screws
3	Upper mounting plate, not included in scope of delivery	4	Lower mounting plate, not included in scope of delivery

Mounting plates are not included in the scope of delivery and are available separately as accessories.

Fastening screws are not included in the scope of delivery and are available separately as accessories.

Configuration options

429 CPMT configuration options – option S



001CF142

430 CPMT configuration options – option M



001CF145

431 DIN-8 plug and flying leads cable



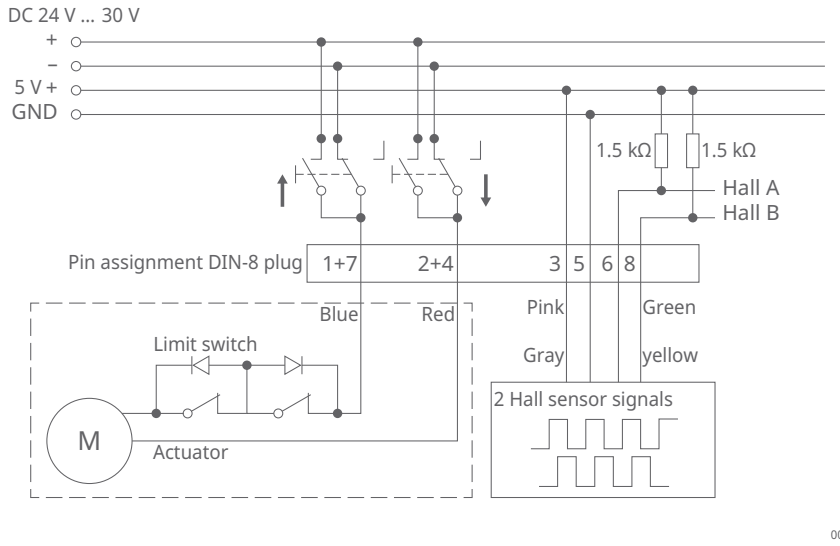
001CA72F

134 Flying leads cable and DIN-8 plug: Pin assignment

Wire color	Pin	Pin assignment
Blue	1 + 7	+ motor power supply (DC 24 V ... 30 V)
Red	2 + 4	– motor power supply (DC 24 V ... 30 V)
Pink	3	DC 5 V Hall encoder
Gray	5	GND Hall encoder
Yellow	6	Hall sensor signal A
Green	8	Hall sensor signal B

Wiring diagrams

432 Connecting diagram DC 24 V to 30 V



Suitable control units and accessories

135 Suitable control units and operating elements for CPMT

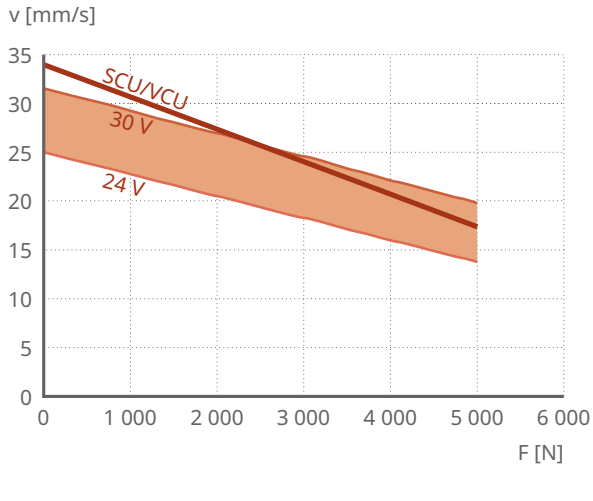
Operating element		Control unit		
Designation	**Switch**	**SCU**	**VCU**	**BCU** [4]
EHA3	M	✓	✓	✓
STJ	F	✓	✓	✓
STE	T	✓	✓	✓

[4] Reduced load carrying capacity: CPMT1-1 ≤ 3000 N. CPMT1-2 ≤ 4000 N

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

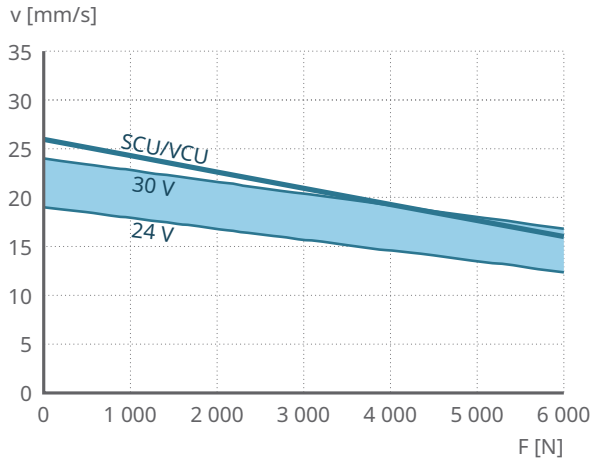
Performance diagrams

433 Speed-load diagram CPMT1-1



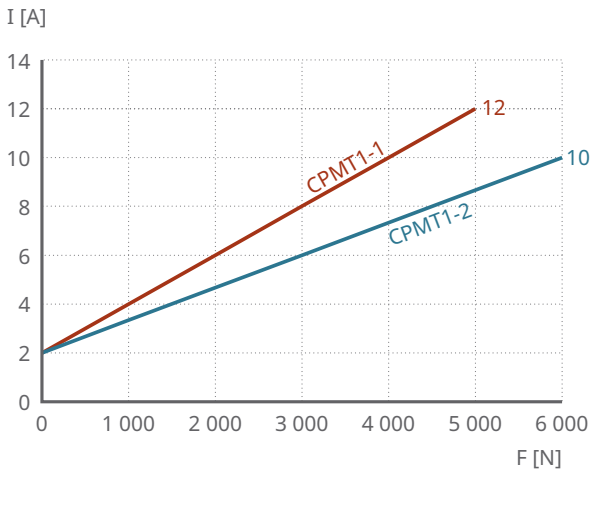
v	Speed	F	Load

434 Speed-load diagram CPMT1-2



v	Speed	F	Load

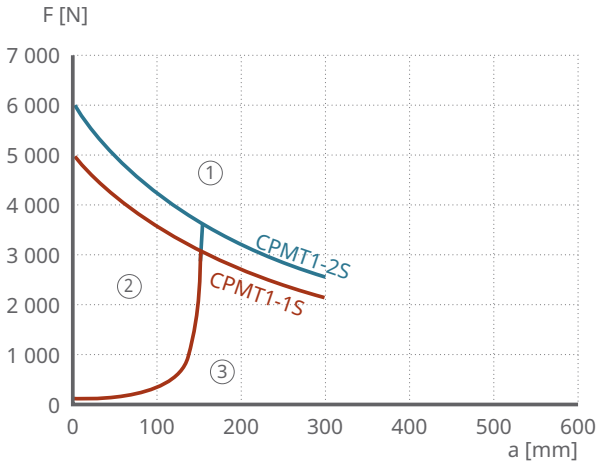
435 Current-load diagram



I	Current consumption	F	Load

Offset load diagrams

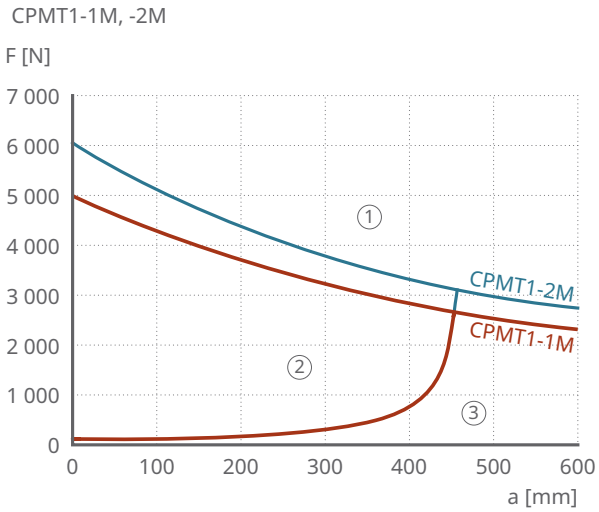
436 Offset load diagram CPMT1-1S, CPMT1-2S



F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Offset load in extended state

437 Offset load diagram CPMT1-1M, CPMT1-2M



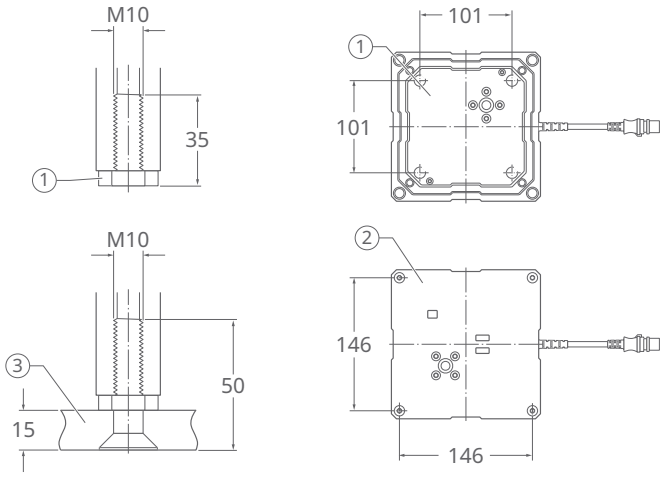
001CA771

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Offset load in extended state

Mounting details

438 Mechanical connections



001CA711

1	Base plate of the inner tube	2	Base plate of the outer tube
3	Mounting plate (accessory)		

The lifting column must be mounted on a flat and rigid surface using 4 screws M10 (accessories), which must be screwed 25 mm to 35 mm into the lifting column.

Additional attachment options

439 Additional attachment options CPMT



001CF148

Optional threads can be configured on the outer tube section for additional attachment options. For further information, please contact Schaeffler.

- size and position options
- high strength for supporting attached linear actuators

Accessories

136 Accessories

Designation	Ordering designation
Control units	
Control unit SCU, 3 or 6 ports	SCUXX-003XXX-000
Control unit VCU, 3 or 5 ports	VCUXX-003XX0-000
Control unit BCU, 3 ports	BCUX3-XX3100-0000
Operating elements	
Hand switch EHA3, 1 ... 5 channels	EHA3X-23MXXN-000
Foot switch STJ0, 1 ... 3 channels	STJ0X-XXXXXX-XX00
Table switch STE, 1 ... 5 channels	STEXX-XXXXXX-XX00
Mounting materials	
Upper mounting plate	ZPL–290268
Lower mounting plate	ZPL–290265
Fastening screw for mounting plate (4 screws/plate required)	ZBE–510707

Ordering key

440 Ordering designation CPMT



Type

Voltage

1	DC 24 ... 30 V

Load

	Push	Pull
1	5000 N	4000 N
2	6000 N	4000 N

Retracted length

S	Stroke/2 + 120 mm
M	Stroke/2 + 240 mm

Stroke S

300	300 mm	For retracted length M only
350	350 mm	For retracted length M only
400	400 mm	
450	450 mm	
500	500 mm	
550	550 mm	
600	600 mm	
...	Other	In increments of 10 mm, starting at 300 mm (or 400 mm for retracted length S) up to 600 mm, available on request

Electrical options

F	Dual Hall encoder, end limit switches

Cable options

1	1 m cable with DIN-8 plug
2	2.3 m cable with DIN-8 plug
3	2.3 m cable with flying leads

001DFF99

4.4 TFG

441 TFG



001CF14A

Benefits

- push or pull load
- compact design
- fast movement
- high performance
- “Plug and play” concept

Standards

- IEC 60601-1

137 Technical data TFG

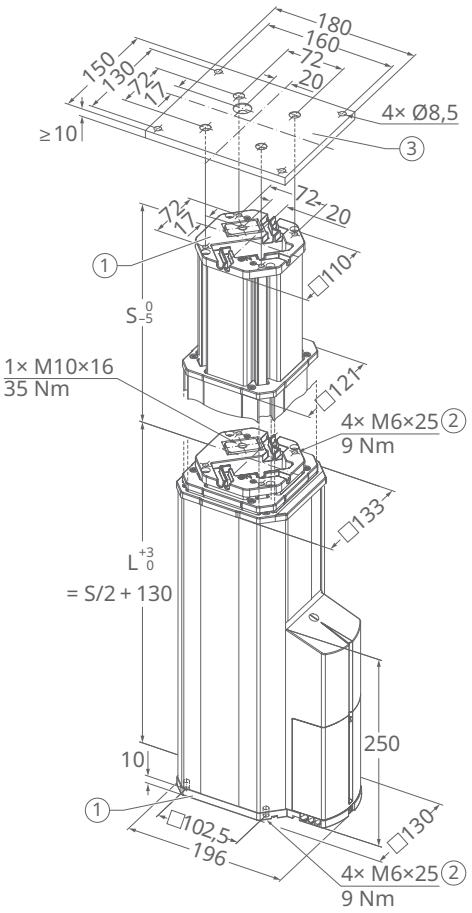
Feature	Unit	TFG10	TFG50	TFG90
Rated push force	N	2500	2500	2500
Rated pull force	N	2500	2500	2500
Offset load	Nm	≤ 500 [1)]	≤ 500 [1)]	≤ 500 [1)]
Speed (full load to no load)	mm/s	15 to 19	15 to 19	15 to 19
Lifting column version (number of guide tubes)	–	3-piece	3-piece	3-piece
Stroke S	mm	200 to 700	200 to 700	200 to 700
Retracted length L	mm	S/2 + 130	S/2 + 130	S/2 + 130
Voltage	V	DC 24 V	AC 120 V	AC 230 V
Mains frequency	Hz	–	50 to 60	50
Power consumption	W	120	160	160
Current consumption	A	5	1.8	1
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Duty cycle, short-time operation	min	3 min	3 min	3 min
Ambient temperature during operation	°C	+10 to +40	+10 to +40	+10 to +40
	°F	+50 to +104	+50 to +104	+50 to +104
Protection code (IP)	–	IP30	IP30	IP30

Feature	Unit	TFG10	TFG50	TFG90
Protection class IEC 61140	–	SELV	I	I
Type of control	–	Electrical	Electrical	Electrical
Mass	kg	8 to 19	8 to 19	8 to 19

1) for details, see bending load diagram

Dimensional drawings

442 Dimensions TFG



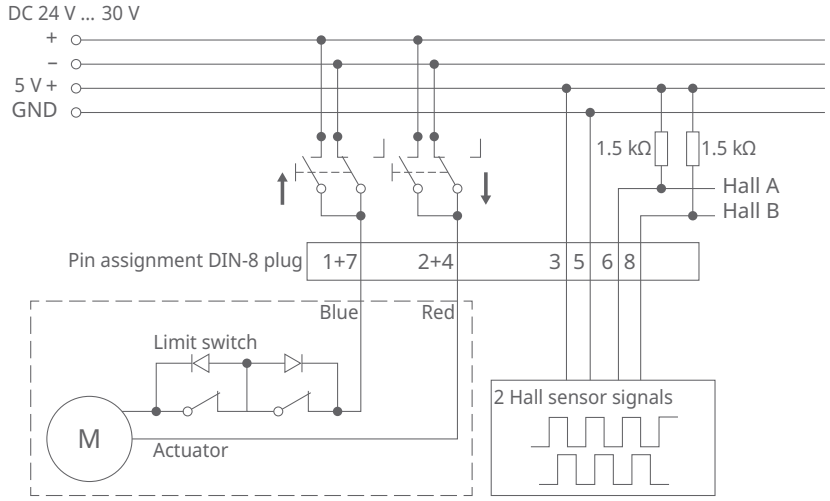
S	Stroke	L	Retracted length, without mounting plates
1	Base plate	2	Thread for fastening screws
3	Mounting plate, not included in scope of delivery		

Mounting plates are not included in the scope of delivery and are available separately as accessories.

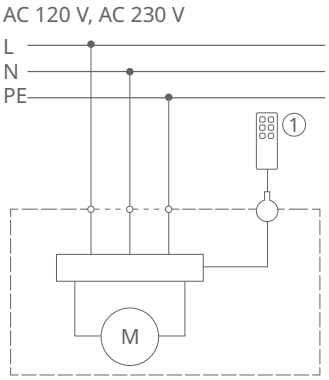
Fastening screws are not included in the scope of delivery and are available separately as accessories.

Wiring diagrams

443 Connecting diagram DC 24 V, DIN-8 plug



444 Connecting diagram AC 120 V to AC 230 V



1	Operating device

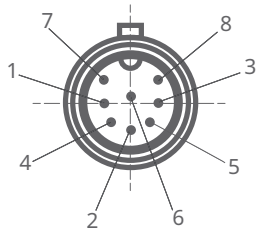
Suitable control units and accessories

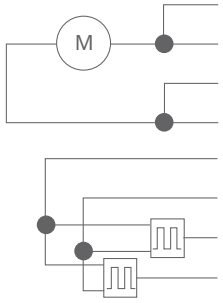
138 Suitable control units and operating elements for TFG

Operating element		Control unit			
Designation	**Switch**	**SCU**	**VCU**	**BCU**	**COMPACT**
EHA3	M	✓	✓	✓	–
STJ	F	✓	✓	✓	–
STE	T	✓	✓	✓	–
HSM	T	–	–	–	✓
HSF	T	–	–	–	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

445 TFG10: pin assignment for permanently attached cable with DIN-8 plug, cable length 1.5 m





	Polarity DC 24 V	
	Extending	Retracting
1 7	(+)	(–)
2 4	(–)	(+)

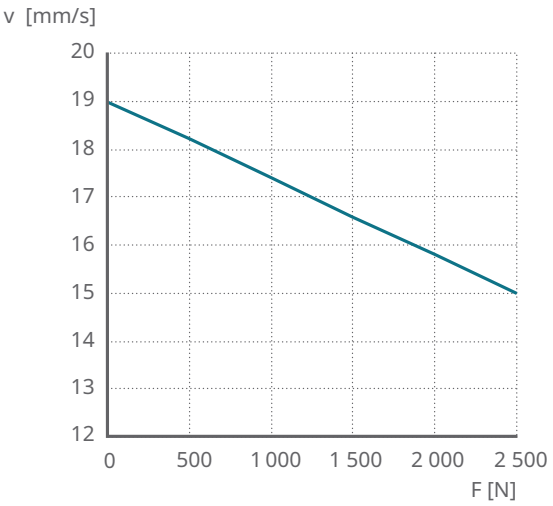
3	(+) DC 4.5 ... 24 V
5	(GND) Ground
6	Hall sensor 1
8	Hall sensor 2

001DFFD9

4

Performance diagrams

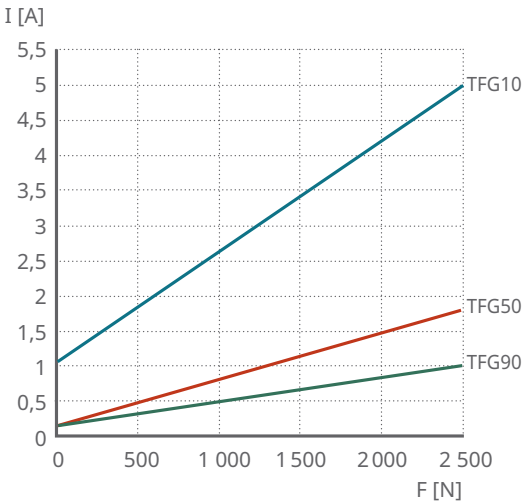
446 Speed-load diagram



001D1806

v	Speed	F	Load

447 Current-load diagram TFG

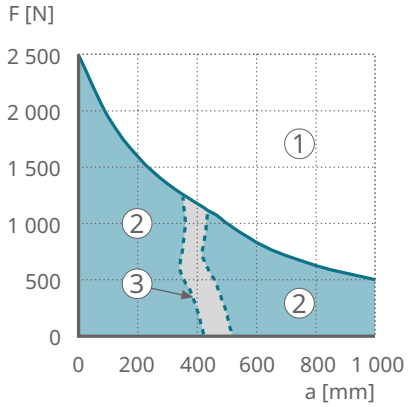


I	Current consumption	F	Load

4

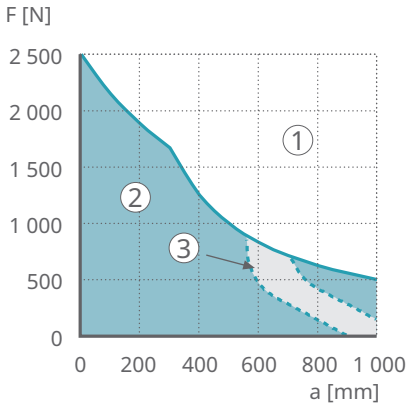
Offset load diagrams

448 Offset load diagram TFG, 200 mm stroke



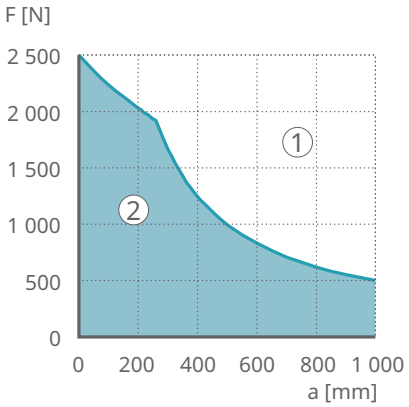
F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Stick-slip effect		

449 Offset load diagram TFG, 300 mm stroke



F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Stick-slip effect		

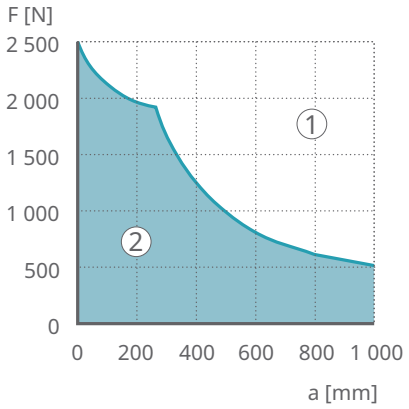
450 Offset load diagram TFG, 400 mm stroke



001D391B

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range

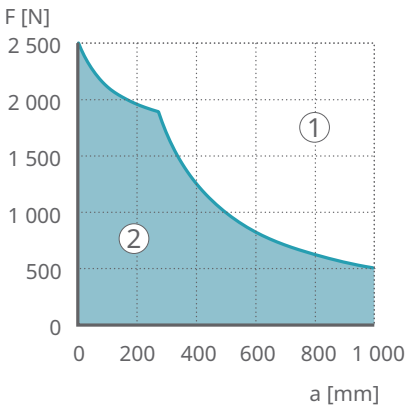
451 Offset load diagram TFG, 500 mm stroke



001D391D

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range

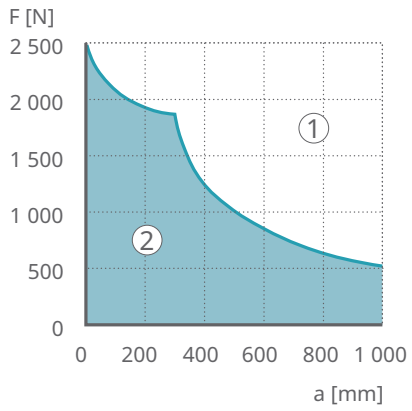
452 Offset load diagram TFG, 600 mm stroke



001D3922

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range

453 Offset load diagram TFG, 700 mm stroke



F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range

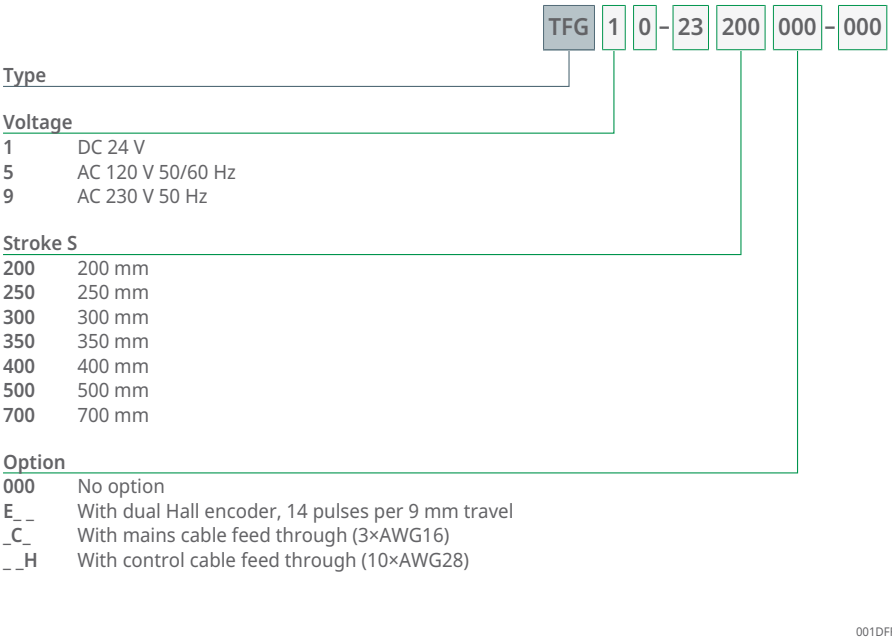
Accessories

139 Accessories TFG

Accessories	Ordering designation	Order number
Upper mounting plate	ZPL-333360	0124808
Lower mounting plate	ZPL-264363	0124814
Push tube fastening screw, M10×25 (1 screw required)	ZBE-510978	0125359
Fastening screw for upper mounting plate, M6×30 (4 screws/plate required)	ZBE–510709	0125560
Fastening screw for lower mounting plate, M6×30 (4 screws/plate required)	ZBE–510709	0125560
Mains cable with SEV plug, 3000 mm, black, 3 × 0.75 mm²	ZKA-304345-3000	0128699
Mains cable with Schuko plug, 3000 mm, black, 3 × 0.75 mm²	ZKA-304346-3000	0121729
Mains cable with US plug, 3000 mm, black, 3 × 0.75 mm²	ZKA-304347-3000	0121762

Ordering key

454 Ordering designation TFG



4.5 THG

455 THG



001CF14C

Benefits

- compact design
- robust

Standards

- IEC 60601-1

140 Technical data THG

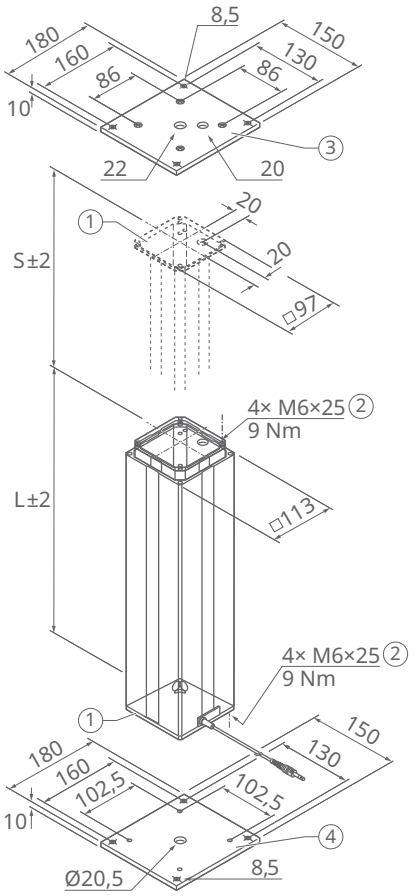
Feature	Unit	THG10–BA, THG11–BA	THG10–CA, THG11–CA	THG10–BD, THG11–BD	THG10–CD, THG11–CD
Rated push force	N	2000	1000	2000	1000
Rated pull force	N	0	0	0	0
Offset load	Nm	≤ 250 [1)]	≤ 120 [1)]	≤ 1000 [1)]	≤ 450 [1)]
Speed (full load to no load)	mm/s	5 to 7	12 to 15	5 to 7	12 to 15
Lifting column version (number of guide tubes)	–	2-piece	2-piece	3-piece	3-piece
Stroke S	mm	200 to 700	200 to 700	200 to 700	200 to 700
Retracted length L	mm	S + 270	S + 270	S + 180	S + 180
Voltage	V DC	24	24	24	24
Power consumption	W	120	120	120	120
Current consumption	A	5	5	5	5
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Ambient temperature during operation	°C	+10 to +40	+10 to +40	+10 to +40	+10 to +40
	°F	+50 to +104	+50 to +104	+50 to +104	+50 to +104
Protection code (IP)	–	IP30	IP30	IP30	IP30

Feature	Unit	THG10–BA, THG11–BA	THG10–CA, THG11–CA	THG10–BD, THG11–BD	THG10–CD, THG11–CD
Protection class IEC 61140	–	SELV	SELV	SELV	SELV
Type of control	–	Electrical	Electrical	Electrical	Electrical
Mass	kg	8 to 14	8 to 14	8 to 14	8 to 14

1) for details, see bending load diagram

Dimensional drawings

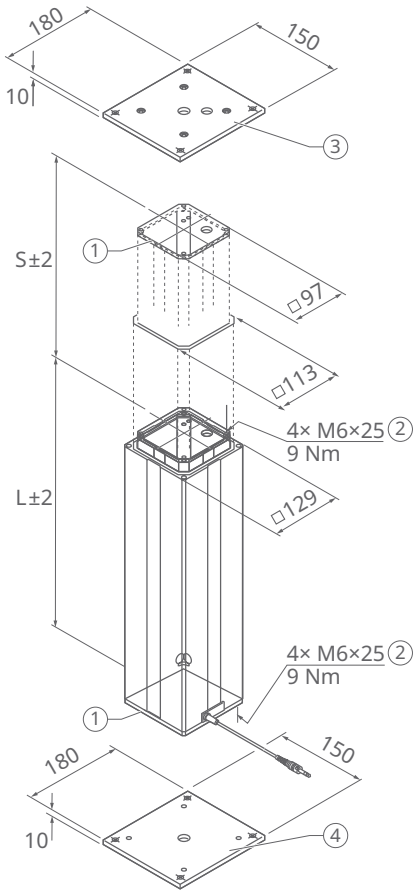
456 Dimensions THG, 2-piece guide tube unit



001CF151

S	Stroke	L	Retracted length, without mounting plates
1	Base plate	2	Thread for fastening screws
3	Upper mounting plate, not included in scope of delivery	4	Lower mounting plate, not included in scope of delivery

457 Dimensions THG, 3-piece guide tube unit



001CF153

S	Stroke	L	Retracted length, without mounting plates
1	Base plate	2	Thread for fastening screws
3	Upper mounting plate, not included in scope of delivery	4	Lower mounting plate, not included in scope of delivery
Remaining dimensions as for variant with 2-piece guide tube unit			

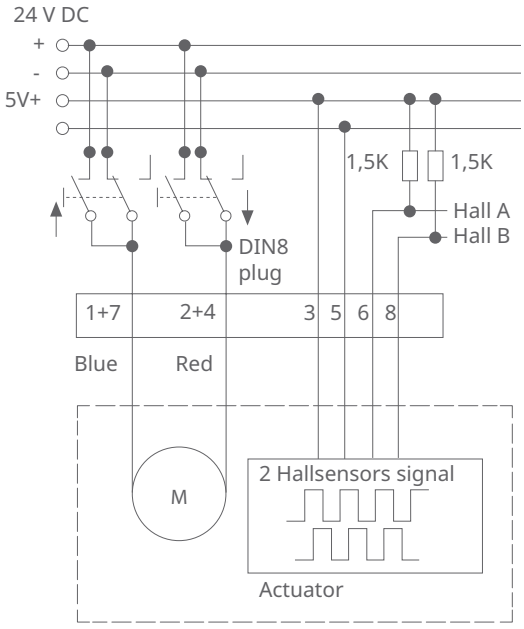
Mounting plates are not included in the scope of delivery and are available separately as accessories.

Fastening screws are not included in the scope of delivery and are available separately as accessories.

Wiring diagrams

The connecting diagram is only valid for THG11. THG10 must be operated with a BCU, MCU, SCU, or VCU control unit.

458 Connecting diagram THG



Suitable control units and accessories

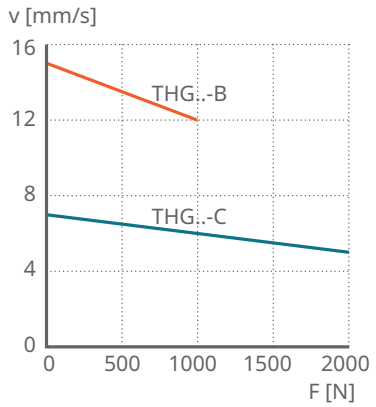
141 Suitable control units and operating elements

Operating element		Control unit			
Designation	**Switch**	**SCU**	**VCU**	**BCU**	**MCU**
EHA1	M	–	–	–	✓
EHA3	M	✓	✓	✓	–
STF	F	–	–	–	✓
STJ	F	✓	✓	✓	–
STA	T	–	–	–	✓
STE	T	✓	✓	✓	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

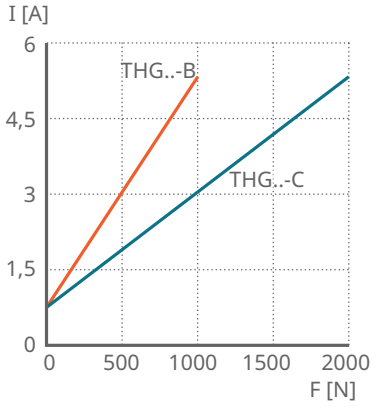
Performance diagrams

459 Speed-load diagram THG



v	Speed	F	Load

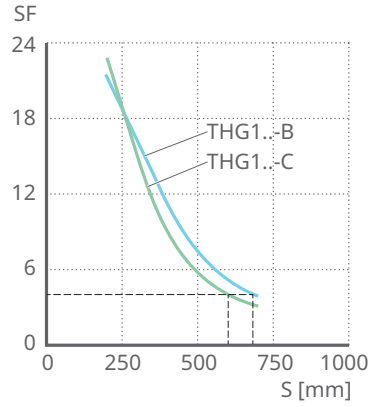
460 Current-load diagram THG



I	Current consumption	F	Load

Safety factor under load conditions

461 Safety factor under load conditions



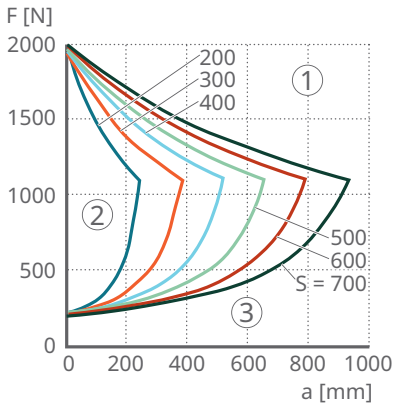
SF	Safety factor	S	Stroke

Example for reading the safety factor SF = 4

4

Offset load diagrams

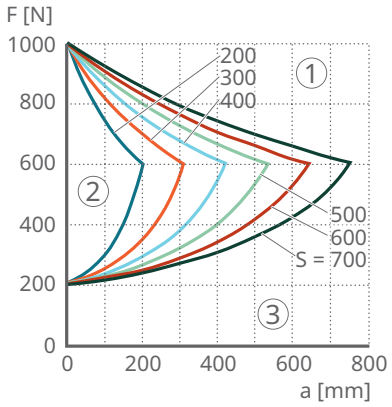
462 Offset load diagram THG1..–BD



001D3928

F	Load	a	Load distance from center of column
S	Stroke in mm	1	Overload range
2	Ideal load range	3	Underload range

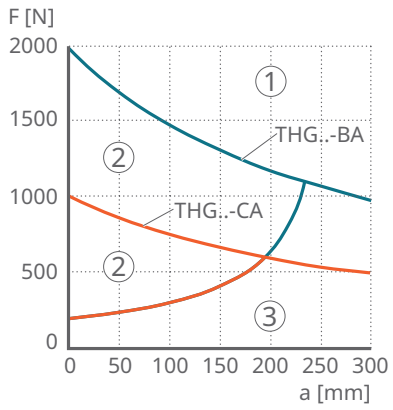
463 Offset load diagram THG1..–CD



001D3929

F	Load	a	Load distance from center of column
S	Stroke in mm	1	Overload range
2	Ideal load range	3	Underload range

464 Offset load diagram THG1..–BA, THG1..–CA



001D392D

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Accessories

142 Accessories THG

Accessories	Ordering designation	Order number
Upper mounting plate for 2-piece guide tube unit	SPL-264265	0125688
Lower mounting plate for 2-piece guide tube unit	SMT-264363	0124814
Upper mounting plate for 3-piece guide tube unit	SPL-264265	0125688
Lower mounting plate for 3-piece guide tube unit	SPL-264237	0125622
Fastening screw for mounting plate, M6×30 (4 screws/plate required)	ZBE–510709	0125560

Ordering key

465 Ordering designation THG



Type

Voltage

0	DC 24 V
1	DC 24 V with integrated current shutdown, available on request

Load

B	2000 N
C	1000 N, available on request

Guide tube unit

A	2-piece
D	3-piece

Stroke S

2	200 mm
3	300 mm
4	400 mm
5	500 mm
6	600 mm
7	700 mm

Cable/connecting plug

1	Straight cable, 10 m, jack plug, available on request
2	Straight cable, 2.3 m, jack plug
A	Spiral cable, 0.6 m, jack plug, available on request
3	Straight cable, 1.0 m, DIN-8 plug
4	Straight cable, 2.3 m, DIN-8 plug
B	Spiral cable, 0.6 m, DIN-8 plug

Option

0	No option
A	Single Hall encoder, 8 pulses, cable with jack plug
B	Potentiometer, 1 kΩ, 2 watts, 0.25% linearity, 10 turns (3-piece guide tube unit only), available on request
C	Cable feedthrough, 5 × 0.75 mm^2, top +160 mm, bottom +800 mm, available on request
D	Cable feedthrough, single Hall encoder, 8 pulses, cable with jack plug, available on request
E	Cable feedthrough, potentiometer (3-piece guide tube unit only), available on request
F	Dual Hall encoder, cable with DIN-8 plug, available on request
G	Cable feedthrough, dual Hall encoder, cable with DIN-8 plug, available on request

001DFFE9

4.6 TLC

466 TLC



001CF154

Benefits

- push or pull load
- high offset load
- quiet
- high performance
- “Plug and play” concept

Standards

- IEC 60601-1

143 Technical data TLC

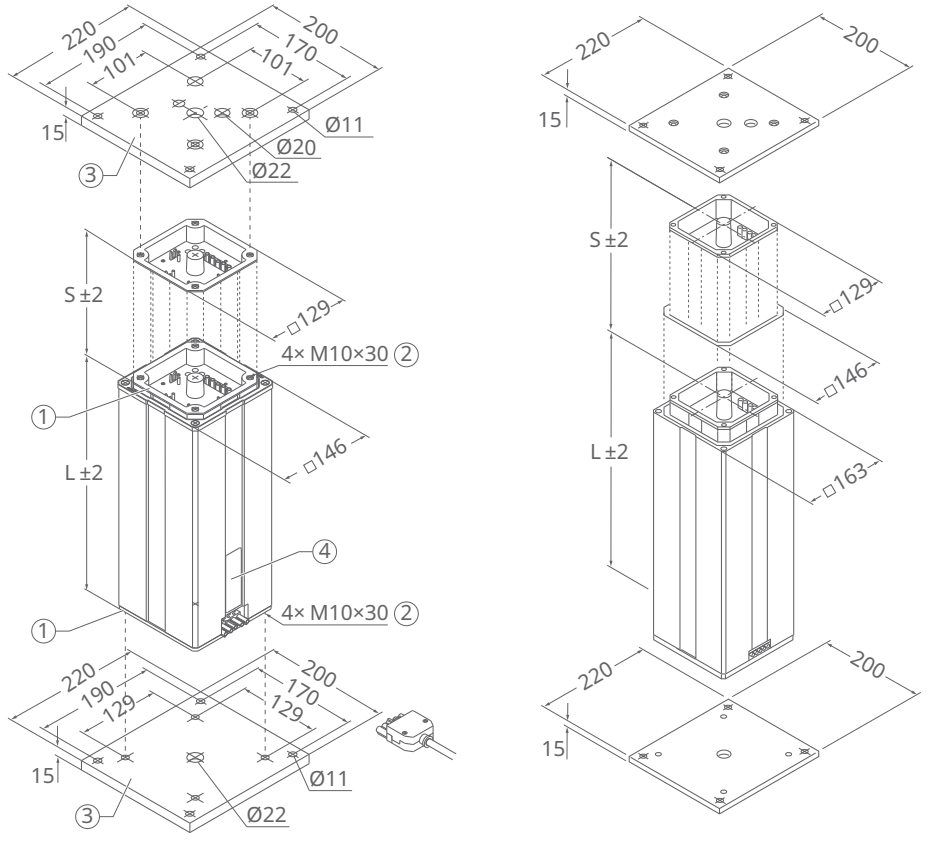
Feature		Unit	TLC12ZWAS	TLC12ZWAK	TLC12ZWDS	TLC12ZWDK
Rated push force		N	4000	4000	4000	4000
Rated pull force		N	4000	4000	4000	4000
Offset load		Nm	≤ 630 [1)]	≤ 630 [1)]	≤ 2100 [1)]	≤ 2100 [1)]
Speed (full load to no load)	AC 120 V	mm/s	16 to 22	16 to 22	16 to 22	16 to 22
	AC 230 V	mm/s	11 to 17	11 to 17	11 to 17	11 to 17
Lifting column version (number of guide tubes)		–	2-piece	2-piece	3-piece	3-piece
Stroke S		mm	100 to 700	100 to 700	255 to 700	255 to 700
Retracted length L	Compressive load version	mm	S + 175	S + 175	S + 60	S + 60
	Pull variant	mm	S + 185	S + 185	S + 70	S + 70
Voltage		V AC	120 or 230	120 or 230	120 or 230	120 or 230
Mains frequency	AC 120 V	Hz	60	60	60	60
	AC 230 V	Hz	50	50	50	50
Power consumption	AC 120 V	W	1200	1200	1200	1200
	AC 230 V	W	890	890	890	890
Current consumption	AC 120 V	A	10	10	10	10
	AC 230 V	A	4.1	4.1	4.1	4.1

Feature		Unit	TLC12ZWAS	TLC12ZWAK	TLC12ZWDS	TLC12ZWDK
Duty cycle, intermittent operation	AC 120 V	min	ON: 0.8 min / OFF: 37 min	ON: 0.8 min / OFF: 37 min	ON: 0.8 min / OFF: 37 min	ON: 0.8 min / OFF: 37 min
	AC 230 V	min	ON: 1 min / OFF: 37 min	ON: 1 min / OFF: 37 min	ON: 1 min / OFF: 37 min	ON: 1 min / OFF: 37 min
Duty cycle, short-time operation	AC 120 V	min	1.2	1.2	1.2	1.2
	AC 230 V	min	2	2	2	2
Ambient temperature during operation		°C	+10 to +40	+10 to +40	+10 to +40	+10 to +40
		°F	+50 to +104	+50 to +104	+50 to +104	+50 to +104
Protection code (IP)		–	IP20, IP30	IP20, IP30	IP20, IP30	IP20, IP30
Protection class IEC 61140		–	I	I	I	I
Type of control		–	Electrical	Pneumatic	Electrical	Pneumatic
Mass		kg	15.2 to 24.5	15.2 to 24.5	18.3 to 30.5	18.3 to 30.5

[1] for details, see bending load diagram

Dimensional drawings

467 Dimensions TLC



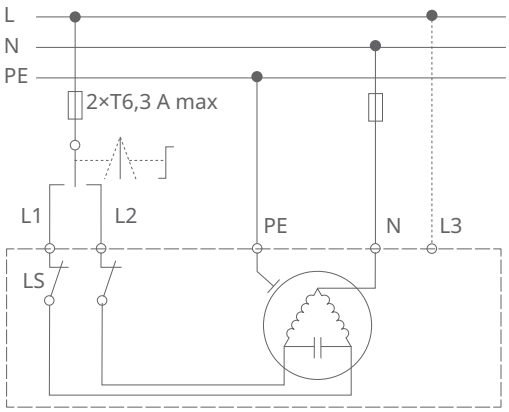
Left: 2-piece guide tube unit		Right: 3-piece guide tube unit	
S	Stroke	L	Retracted length
1	Base plate	2	Thread for fastening screws
3	Mounting plate, not included in scope of delivery	4	Position of the type plate

Mounting plates are not included in the scope of delivery and are available separately as accessories.

Fastening screws are not included in the scope of delivery and are available separately as accessories.

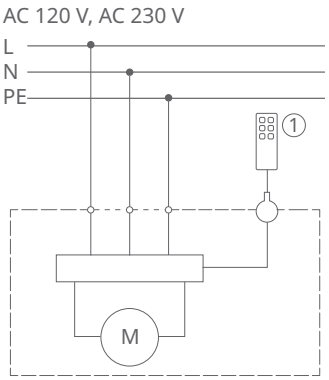
Wiring diagrams

468 Connecting diagram, electrical control



001C53AA

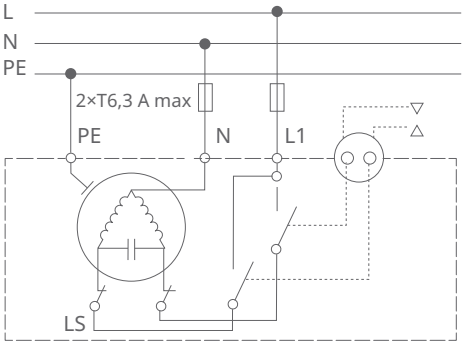
469 Connecting diagram AC 120 V, AC 230 V, low-voltage control



001DCBAB

1	Operating device

470 Connecting diagram, pneumatic control



001C53AF

Suitable control units and accessories

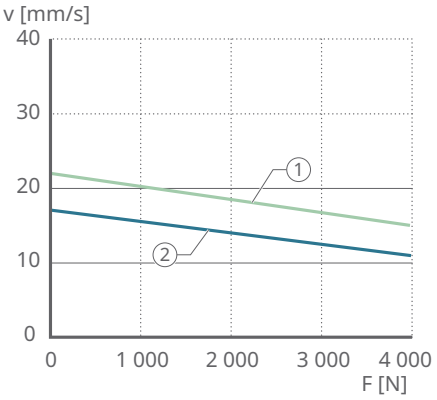
144 Suitable control units and operating elements for TLC, pneumatic

Operating element		Control unit:
Designation	Switch	Pneumatic lifting columns TLC12ZWAK, TLC12ZWDK with integrated control unit
PHC	M	✓
PFP	F	✓
PAM	T	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Performance diagrams

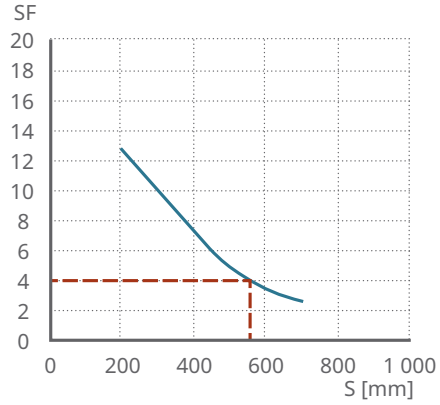
471 Speed-load diagram



v	Speed	F	Load
1	Version AC 120 V	2	Version AC 230 V

Safety factor under load conditions

472 Safety factor under load conditions

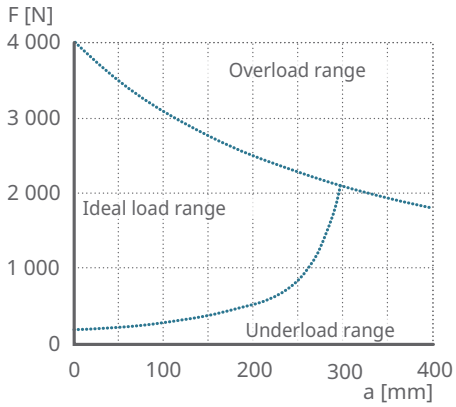


SF	Safety factor	S	Stroke

Example of reading for safety factor SF = 4

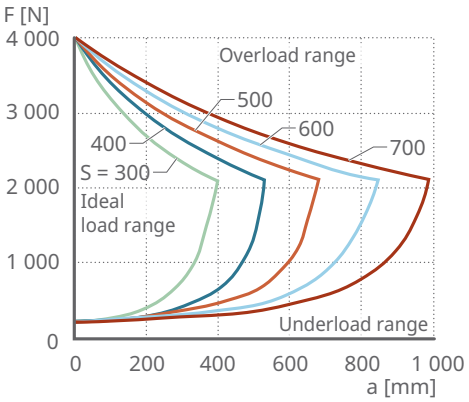
Offset load diagrams

473 Offset load diagram, 2-piece guide unit tube



F	Load	a	Load distance from center of column

474 Offset load diagram, 3-piece guide unit tube



F	Load	a	Load distance from center of column
S	Stroke in mm		

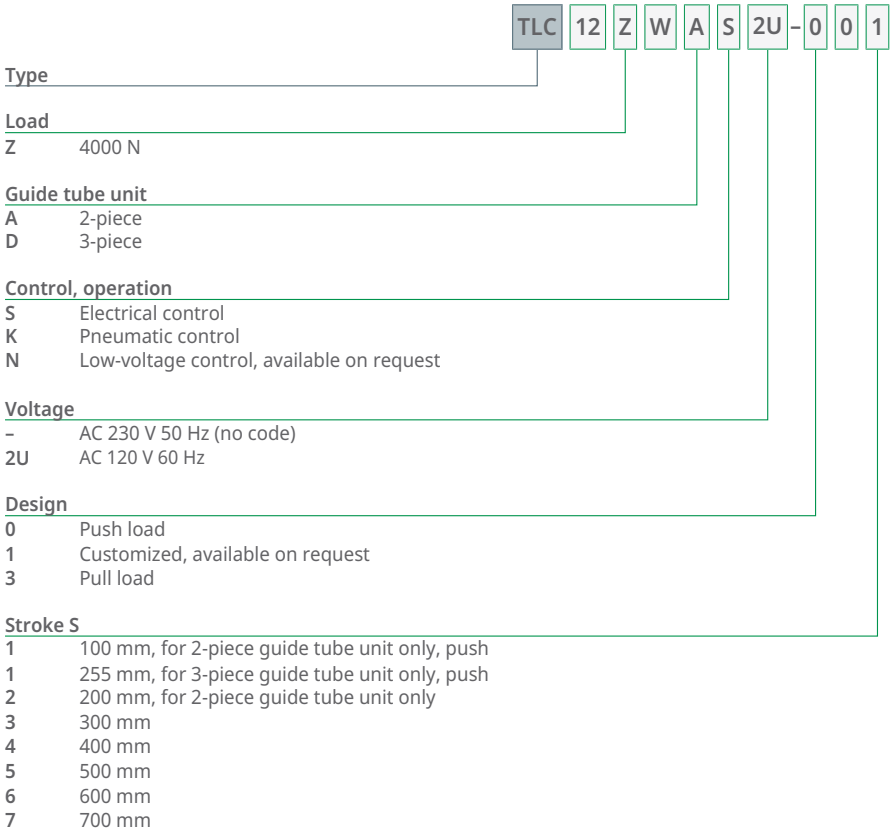
Accessories

145 Accessories

Designation		Order code	Order number
Upper mounting plate	For 2-piece guide tube unit	ZPL–290268	0125624
Upper mounting plate	For 3-piece guide tube unit	ZPL–290268	0125624
Lower mounting plate	For 2-piece guide tube unit	ZPL–290351	0125625
Lower mounting plate	For 3-piece guide tube unit	ZPL–290265	0125623
Fastening screw for mounting plate	4 screws/plate required	ZBE–510707	0125360
AC plug TLC	3-pin	ZEL–265518	0124866
AC plug TLC	5-pin	ZEL–265519	0124864

Ordering key

475 Ordering designation TLC



4.7 TLG

476 TLG



001CF158

Benefits

- high offset load
- high performance

Standards

- IEC 60601-1

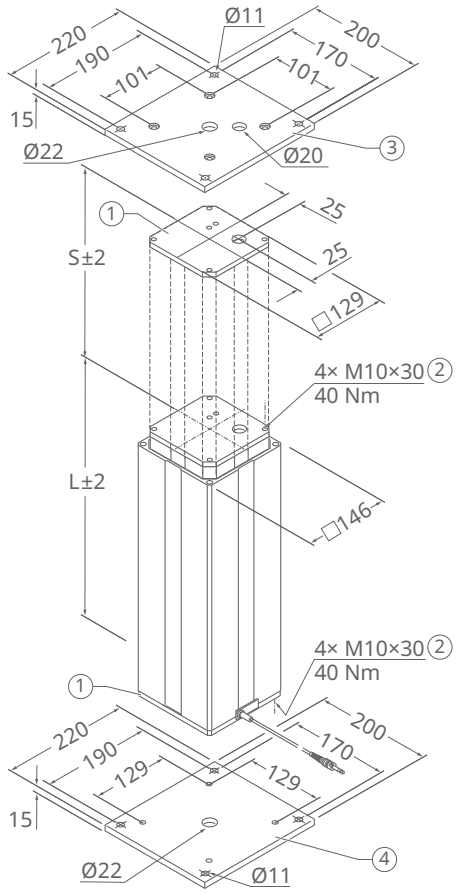
146 Technical data TLG

Feature	Unit	TLG10-A, TLG11-A	TLG10-B	TLG10-C, TLG11-C
Rated push force	N	4000	2500	1500
Rated pull force	N	0	0	0
Offset load	Nm	≤ 2800 [1)]	≤ 1750 [1)]	≤ 950 [1)]
Speed (full load to no load)	mm/s	10 to 14	13 to 17	25 to 33
Lifting column version (number of guide tubes)	–	2-piece or 3-piece	2-piece or 3-piece	2-piece or 3-piece
Stroke S	mm	200 to 700	200 to 700	200 to 700
Retracted length L	mm	S + 180	S + 180	S + 180
Voltage	V DC	24	24	24
Power consumption	W	156	156	156
Current consumption	A	6	6	6
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Ambient temperature during operation	°C	+10 to +40	+10 to +40	+10 to +40
	°F	+50 to +104	+50 to +104	+50 to +104
Protection code (IP)	–	IP30	IP30	IP30
Protection class IEC 61140	–	SELV	SELV	SELV
Type of control	–	Electrical	Electrical	Electrical
Mass	kg	15 to 30	15 to 30	15 to 30

[1)] for details, see bending load diagram

Dimensional drawings

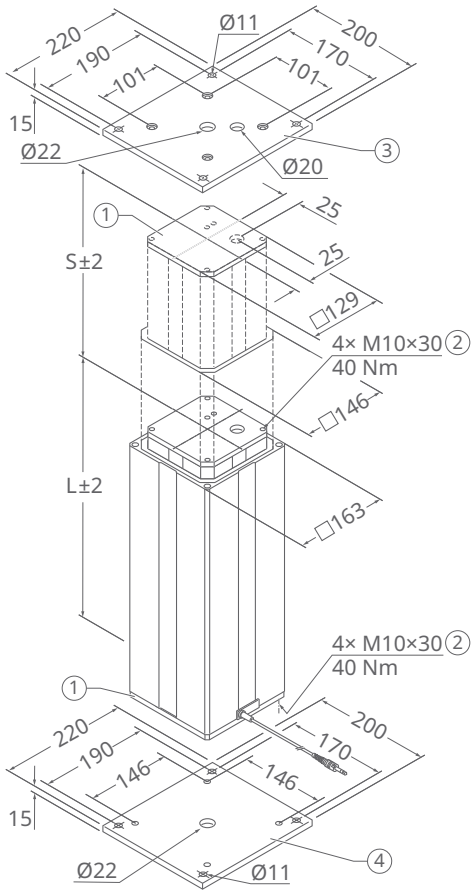
477 Dimensions TLG, 2-piece guide tube unit



001D23ED

S	Stroke	L	Retracted length
1	Base plate	2	Thread for fastening screws
3	Upper mounting plate, not included in scope of delivery	4	Lower mounting plate, not included in scope of delivery

478 Dimensions TLG, 3-piece guide tube unit



S	Stroke	L	Retracted length
1	Base plate	2	Thread for fastening screws
3	Upper mounting plate, not included in scope of delivery	4	Lower mounting plate, not included in scope of delivery

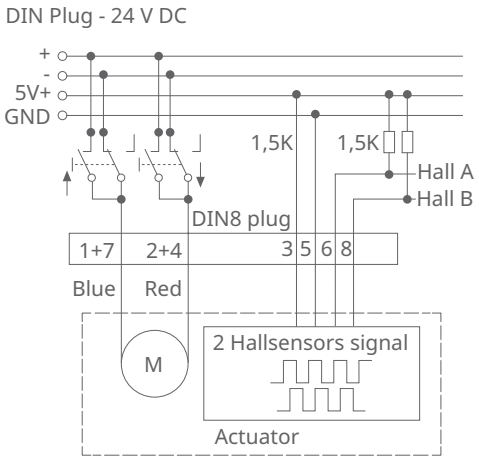
Mounting plates are not included in the scope of delivery and are available separately as accessories.

Fastening screws are not included in the scope of delivery and are available separately as accessories.

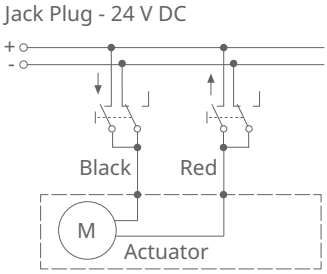
Wiring diagrams

The connecting diagrams are only valid for TLG11. TLG10 must be operated with a BCU, MCU, SCU, or VCU control unit.

479 Connecting diagram DC 24 V, DIN-8 plug



480 Connecting diagram DC 24 V, jack plug



Suitable control units and accessories

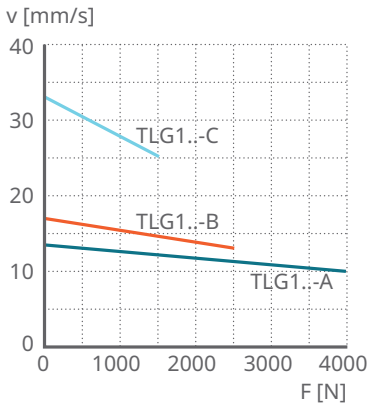
147 Suitable control units and operating elements

Operating element		Control unit			
Designation	**Switch**	**SCU**	**VCU**	**BCU**	**MCU**
EHA1	M	–	–	–	✓
EHA3	M	✓	✓	✓	–
STF	F	–	–	–	✓
STJ	F	✓	✓	✓	–
STA	T	–	–	–	✓
STE	T	✓	✓	✓	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Performance diagrams

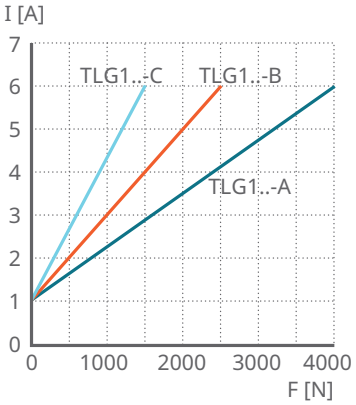
481 Speed-load diagram TLG



001D1813

v	Speed	F	Load

482 Current-load diagram TLG

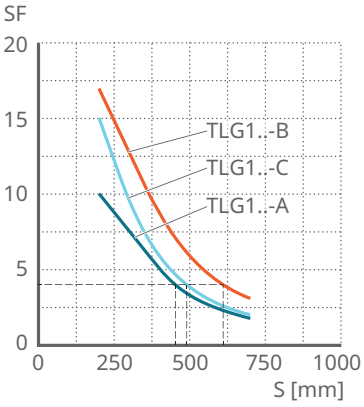


001D1817

I	Current consumption	F	Load

Safety factor under load conditions

483 Safety factor under load conditions



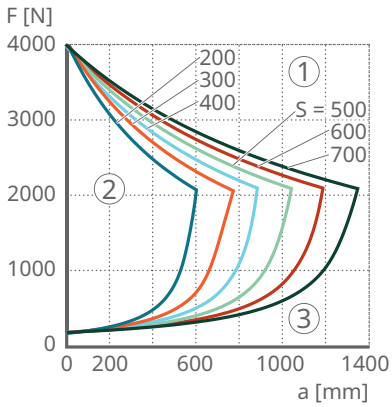
001D1819

SF	Safety factor	S	Stroke

Example for reading the safety factor SF = 4

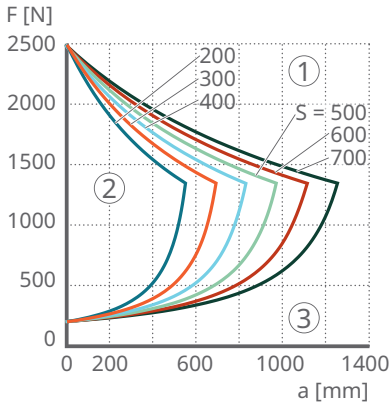
Offset load diagrams

484 Offset load diagram TLG1..-AD



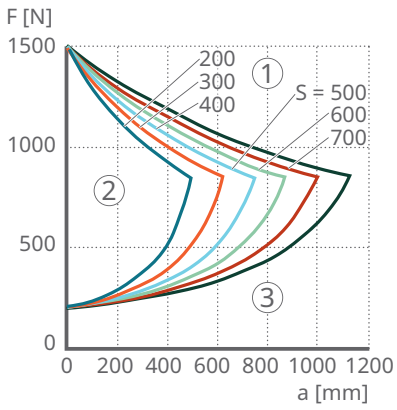
F	Load	a	Load distance from center of column
S	Stroke in mm	1	Overload range
2	Ideal load range	3	Underload range

485 Offset load diagram TLG1..-BD



F	Load	a	Load distance from center of column
S	Stroke in mm	1	Overload range
2	Ideal load range	3	Underload range

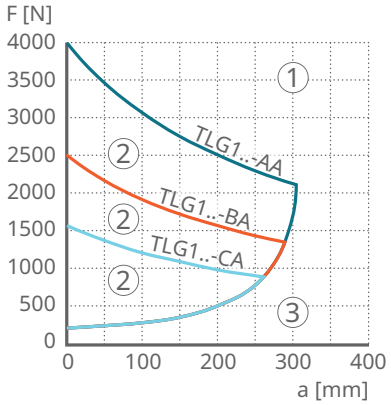
486 Offset load diagram TLG1..-CD



001D3939

F	Load	a	Load distance from center of column
S	Stroke in mm	1	Overload range
2	Ideal load range	3	Underload range

487 Offset load diagram TLG1..-AA, TLG1..-BA, TLG1..-CA



001D393D

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

Accessories

148 Accessories TLG

Accessories	Ordering designation	Order number
Upper mounting plate for 2-piece guide tube unit	ZPL–290268	0125624
Lower mounting plate for 2-piece guide tube unit	ZPL–290351	0125625
Upper mounting plate for 3-piece guide tube unit	ZPL–290268	0125624
Lower mounting plate for 3-piece guide tube unit	ZPL–290265	0125623
Fastening screw for mounting plate (4 screws/plate required)	ZBE–510707	0125360

Ordering key

488 Ordering designation TLG



Type

Voltage

1	DC 24 V
2	DC 24 V with integrated current shutdown (only for versions with loads of 4000 N and 1500 N), available on request

Load

A	4000 N
B	2500 N
C	1500 N

Guide tube unit

A	2-piece
D	3-piece

Stroke S

2	200 mm
3	300 mm
4	400 mm
5	500 mm
6	600 mm
7	700 mm

Cable/connecting plug

1	Straight cable, 10 m, jack plug, available on request
2	Straight cable, 2.3 m, jack plug
A	Spiral cable, 0.6 m, jack plug, available on request
3	Straight cable, 1.0 m, DIN-8 plug
4	Straight cable, 2.3 m, DIN-8 plug
B	Spiral cable, 0.6 m, DIN-8 plug

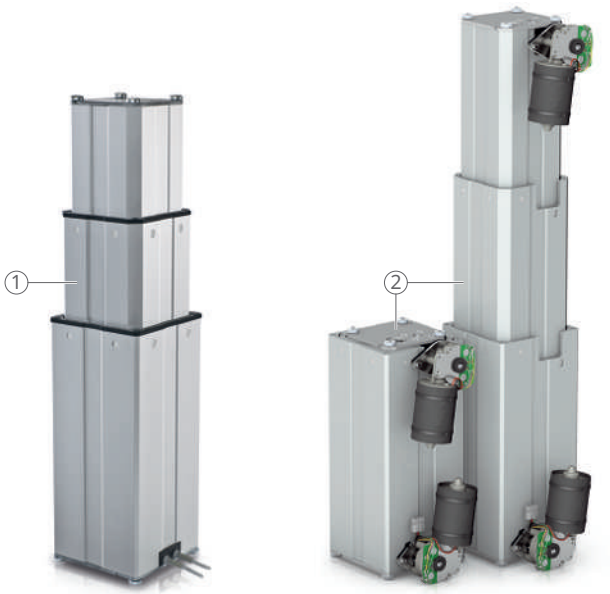
Option

0	No option
A	Single Hall encoder, 8 pulses, cable with jack plug
B	Potentiometer, 1 kΩ, 2 watts, 0.25% linearity, 10 turns available on request
C	Cable feedthrough, 5×0.75 mm^2, LED output, top +160 mm, bottom +800 mm, available on request
D	Cable feedthrough, single Hall encoder, 8 pulses, cable with jack plug, available on request
E	Cable feedthrough, potentiometer, available on request
F	Dual Hall encoder, cable with DIN-8 plug
G	Cable feedthrough, dual Hall encoder, cable with DIN-8 plug, available on request

001E00A9

4.8 TLT

489 EWELLIX lifting columns TLT1, TLT20



1	TLT1	2	TLT20

Benefits

- very small installation dimension
- high performance

Standards

- IEC 60601-1

149 Technical data TLT1

Feature	Unit	TLT10–A1	TLT10–A2	TLT10–B1	TLT10–C1	TLT10–C2
Rated push force	N	3000	4000	2000	1000	2000
Rated pull force	N	0	0	0	0	0
Offset load	Nm	≤ 400 [1)]	≤ 1000 [1)]	≤ 250 [1)]	≤ 110 [1)]	≤ 480 [1)]
Speed (full load to no load)	mm/s	11 to 16	13 to 19	13 to 19	25 to 36	25 to 42
Lifting column version (number of guide tubes)	–	3-piece	3-piece	3-piece	3-piece	3-piece
Stroke S	mm	300 to 700	300 to 700	300 to 700	300 to 700	300 to 700
Retracted length L	mm	S/2 + 170	S/2 + 240	S/2 + 170	S/2 + 170	S/2 + 240
Voltage	V DC	24	24	24	24	24
Power consumption	W	168	168	192	192	216
Current consumption	A	2 × 3.5	2 × 3.5	2 × 4.5	2 × 4.5	2 × 4.5
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Ambient temperature during operation	°C	+10 to +40	+10 to +40	+10 to +40	+10 to +40	+10 to +40
	°F	+50 to +104	+50 to +104	+50 to +104	+50 to +104	+50 to +104
Protection code (IP)	–	IP40	IP40	IP40	IP40	IP40
Protection class IEC 61140	–	SELV	SELV	SELV	SELV	SELV
Type of control	–	Electrical	Electrical	Electrical	Electrical	Electrical
Mass	kg	15 to 30	15 to 30	15 to 30	15 to 30	15 to 30

[1)] for details, see bending load diagram

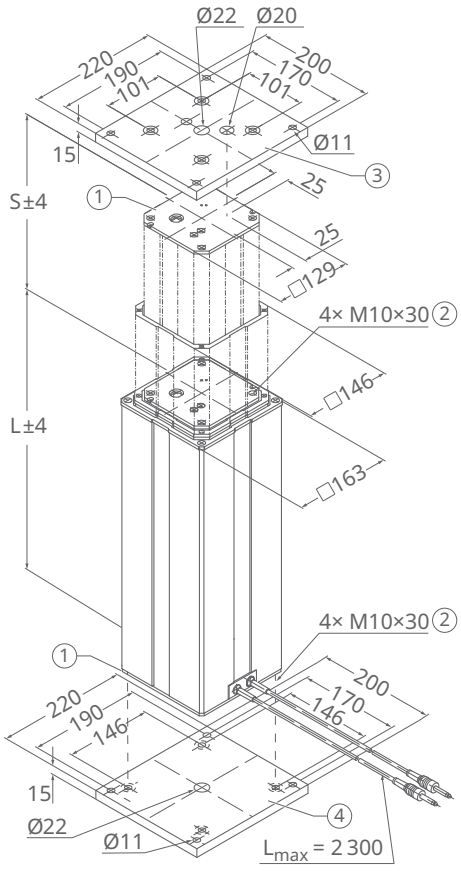
150 Technical data TLT20

Feature	Unit	TLT20–A3
Rated push force	N	5000
Rated pull force	N	0
Offset load	Nm	≤ 500 [2)]
Speed (full load to no load)	mm/s	18 to 28
Lifting column version (number of guide tubes)	–	3-piece
Stroke S	mm	300 to 700
Retracted length L	mm	S/2 + 130
Voltage	V DC	24
Power consumption	W	312
Current consumption	A	2 × 6.5
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min
Ambient temperature during operation	°C	+10 to +40
	°F	+50 to +104
Protection code (IP)	–	IP00
Protection class IEC 61140	–	SELV
Type of control	–	Electrical
Mass	kg	15 to 30

2) for details, see bending load diagram

Dimensional drawings

490 Dimensions TLT1



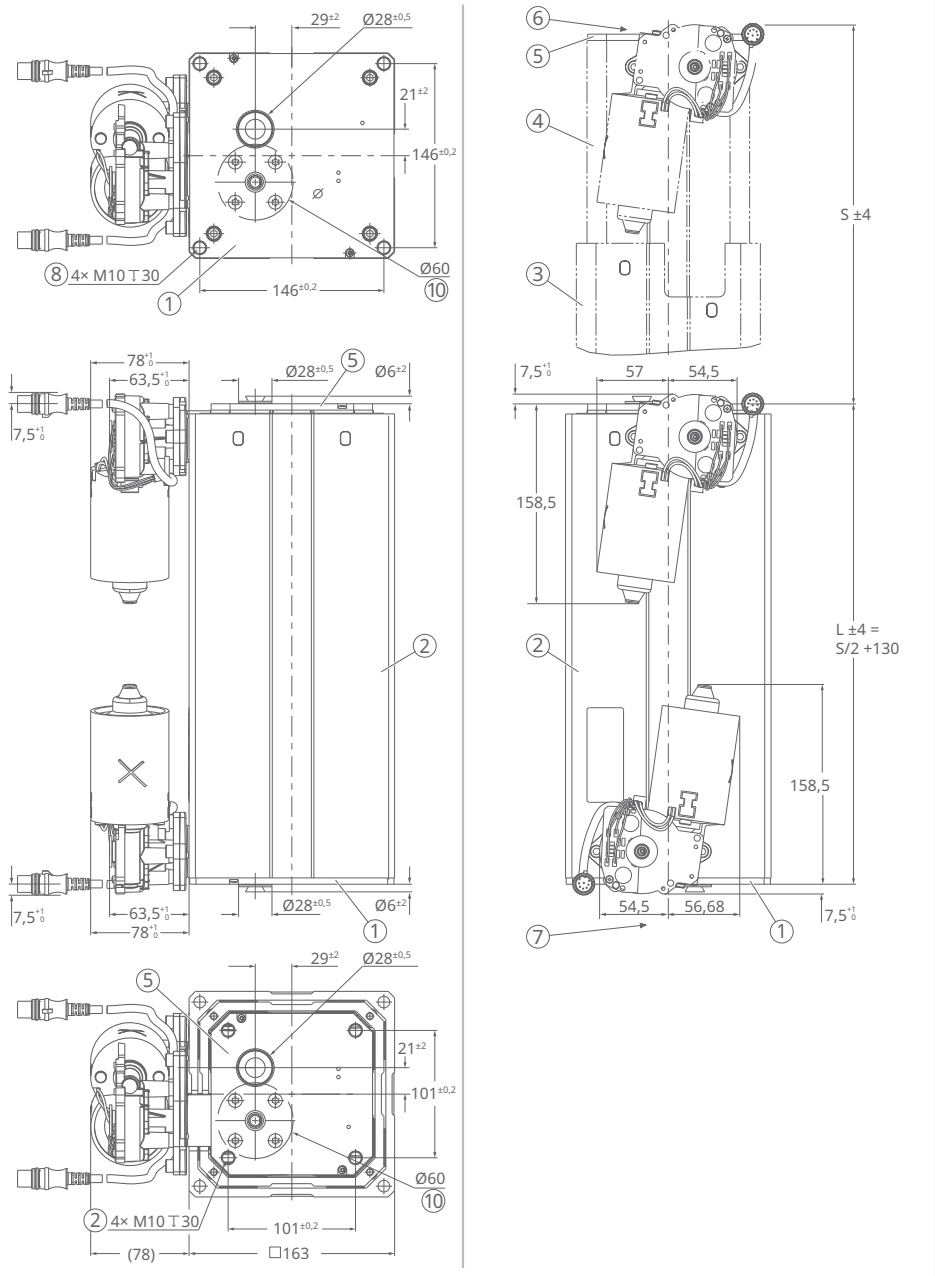
001D23F2

S	Stroke	L	Retracted length
1	Base plate	2	Thread for fastening screws
3	Upper mounting plate, not included in scope of delivery	4	Lower mounting plate, not included in scope of delivery

Mounting plates are not included in the scope of delivery and are available separately as accessories.

Fastening screws are not included in the scope of delivery and are available separately as accessories.

491 Dimensions TLT20



1	Outer tube base plate	2	Outer tube
3	Middle tube	4	Inner tube
5	Inner tube base plate	6	Upper mounting plate, optional (not shown)
7	Lower mounting plate, optional (not shown)	8	Transport screws/fastening screws
10	Area of force distribution (must be fully supported)		
S	Stroke	L	Retracted length

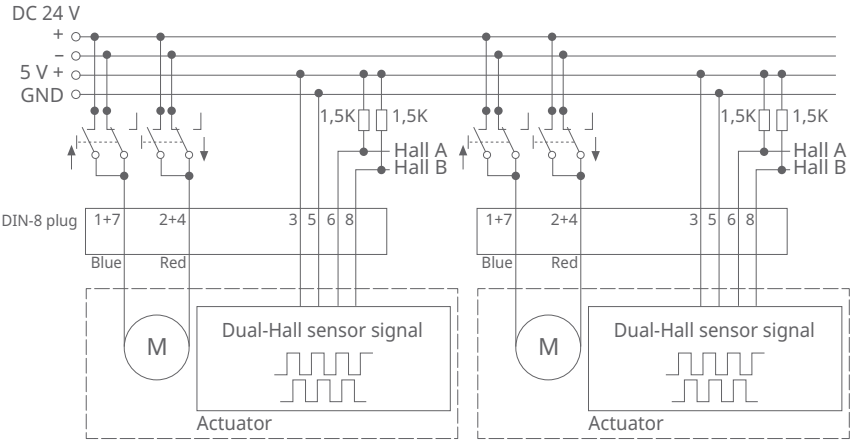
Mounting plates are not included in the scope of delivery and are available separately as accessories.

Fastening screws are not included in the scope of delivery and are available separately as accessories.

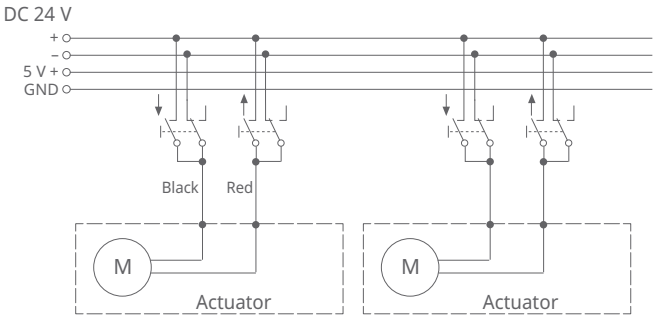
Wiring diagrams

The TLT1 connecting diagrams are only valid for TLT11. TLT10 must be operated with a BCU, MCU, SCU, or VCU control unit.

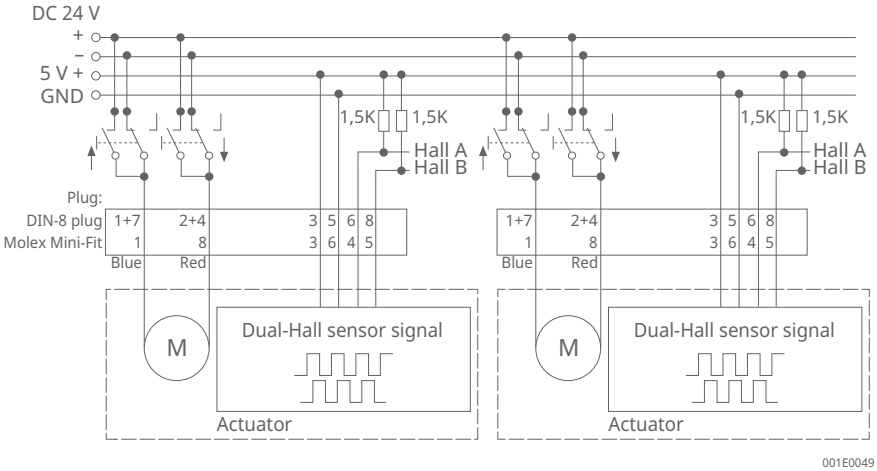
492 Connecting diagram DC 24 V, TLT1, DIN-8 plug



493 Connecting diagram DC 24 V, TLT1, jack plug



494 Connecting diagram DC 24 V, TLT20



Suitable control units and accessories

151 Suitable control units and operating elements

Operating element		Control unit			
Designation	**Switch**	**SCU**	**VCU**	**BCU**	**MCU**
EHA1	M	–	–	–	✓
EHA3	M	✓	✓	✓	–
STF	F	–	–	–	✓
STJ	F	✓	✓	✓	–
STA	T	–	–	–	✓
STE	T	✓	✓	✓	–

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

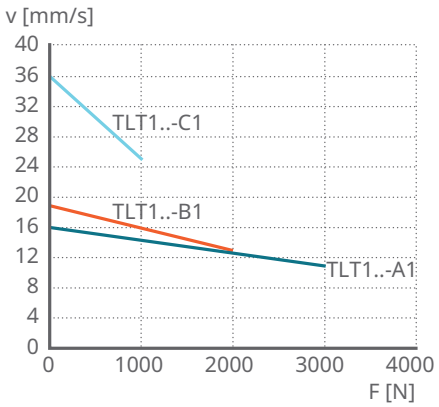
152 Suitable control units and operating elements for TLT20

Operating element		Control unit		
Designation	**Switch**	**SCU1, SCU5, SCU9**	**VCU5, VCU8, VCU9**	**BCU5, BCU8**
EHA3	M	✓	✓	✓
STJ	F	✓	✓	✓
STE	T	✓	✓	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

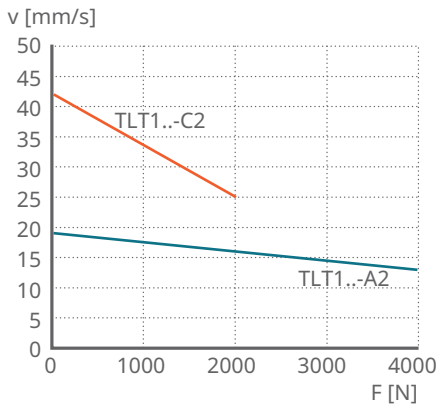
Performance diagrams

495 Speed-load diagram TLT1..–A1, TLT1..–B1, TLT1..–C1



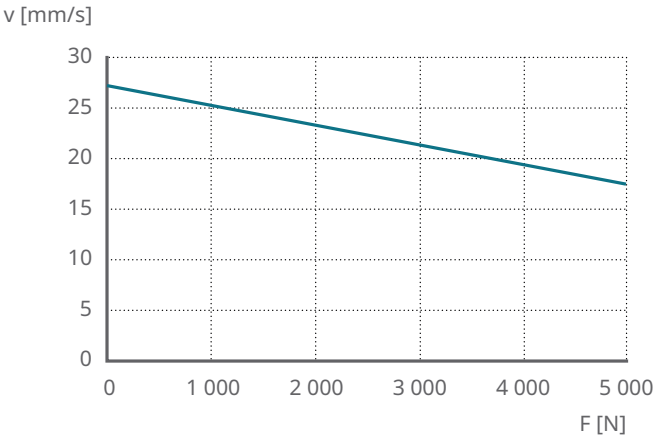
v	Speed	F	Load

496 Speed-load diagram TLT1..–A2, TLT1..–C2



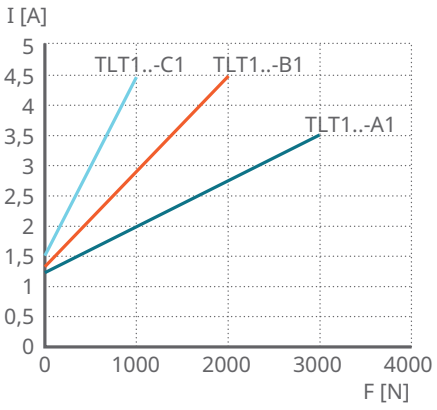
v	Speed	F	Load

497 Speed-load diagram TLT20



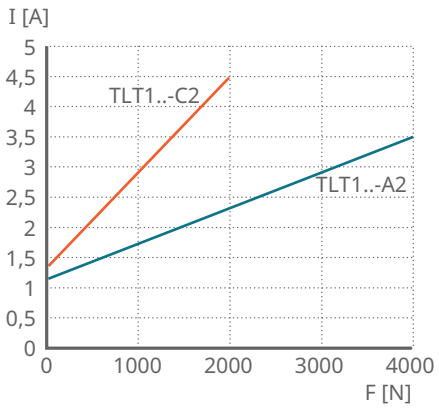
v	Speed	F	Load

498 Current-load diagram TLT1..–A1, TLT1..–B1, TLT1..–C1



I	Current consumption	F	Load

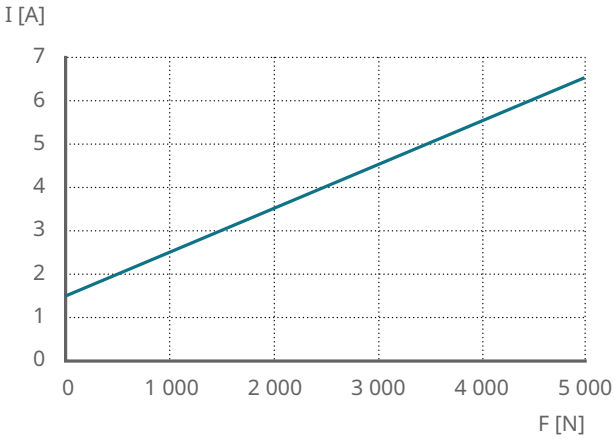
499 Current-load diagram TLT1..–A2, TLT1..–C2



001D181F

I	Current consumption	F	Load

500 Current-load diagram TLT20

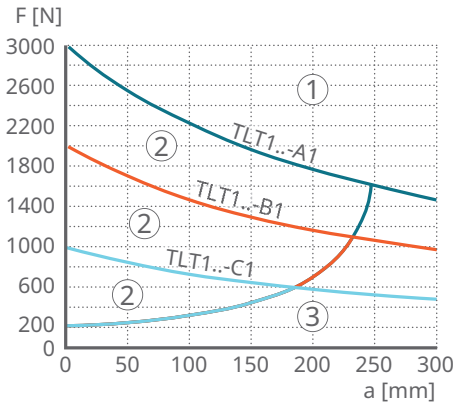


001DD986

I	Current consumption	F	Load

Offset load diagrams

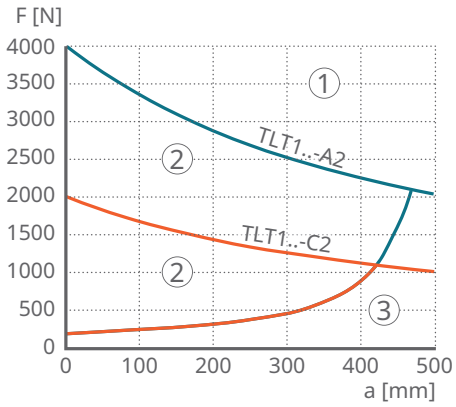
501 Offset load diagram TLT1..–A1, TLT1..–B1, TLT1..–C1



001D393F

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

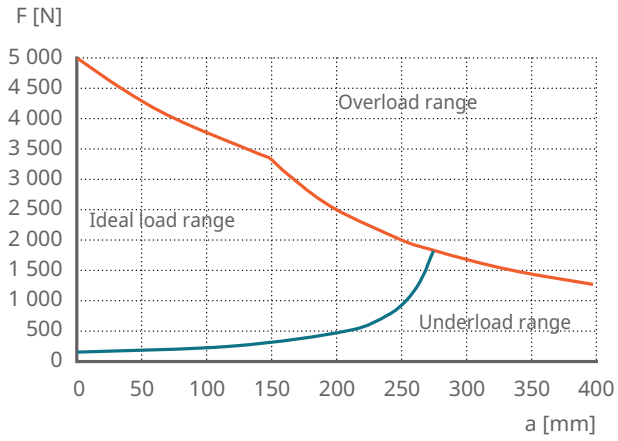
502 Offset load diagram TLT1..–A2, TLT1..–C2



001D3942

F	Load	a	Load distance from center of column
1	Overload range	2	Ideal load range
3	Underload range		

503 Offset load diagram TLT20



001E0079

F	Load	a	Load distance from center of column

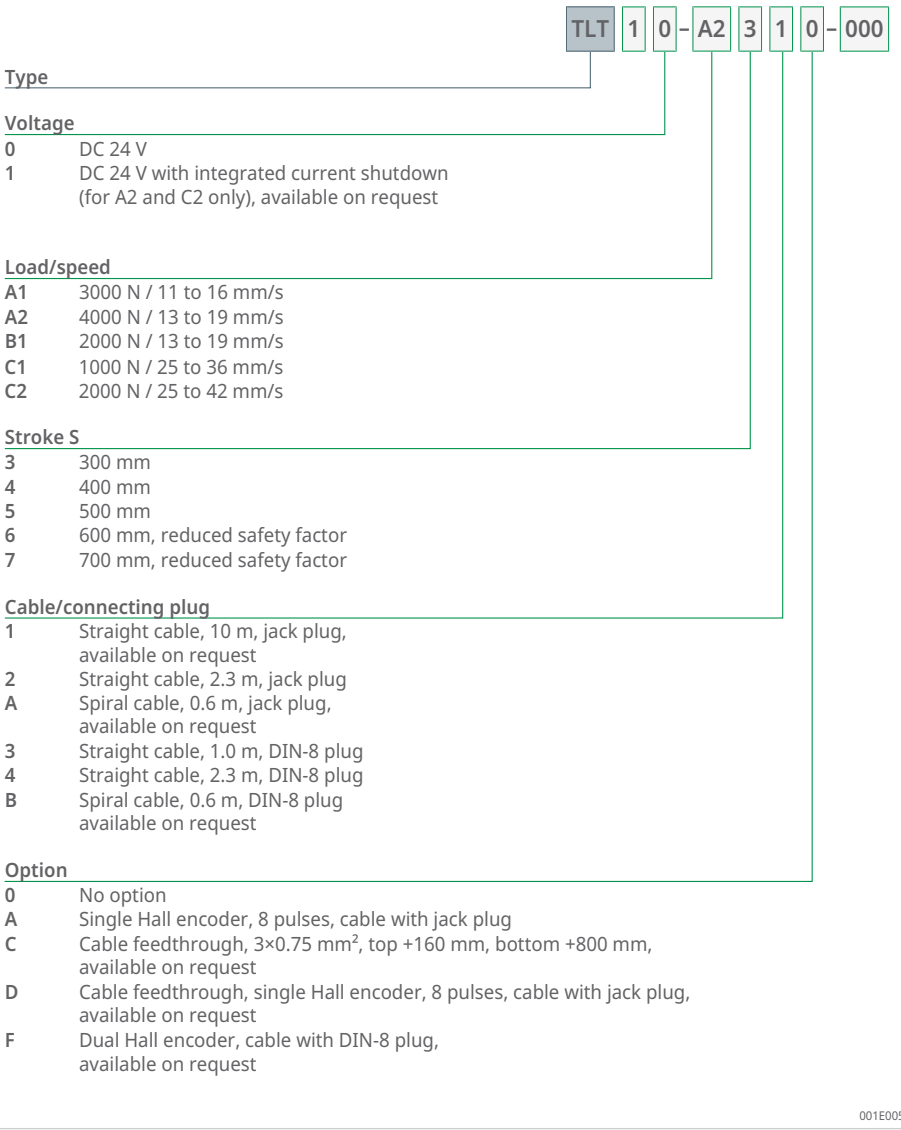
Accessories

153 Accessories TLT

Accessories	Ordering designation	Order number
Upper mounting plate	ZPL–290268	0125624
Lower mounting plate	ZPL–290265	0125623
Fastening screw for mounting plate (4 screws/plate required)	ZBE–510707	0125360

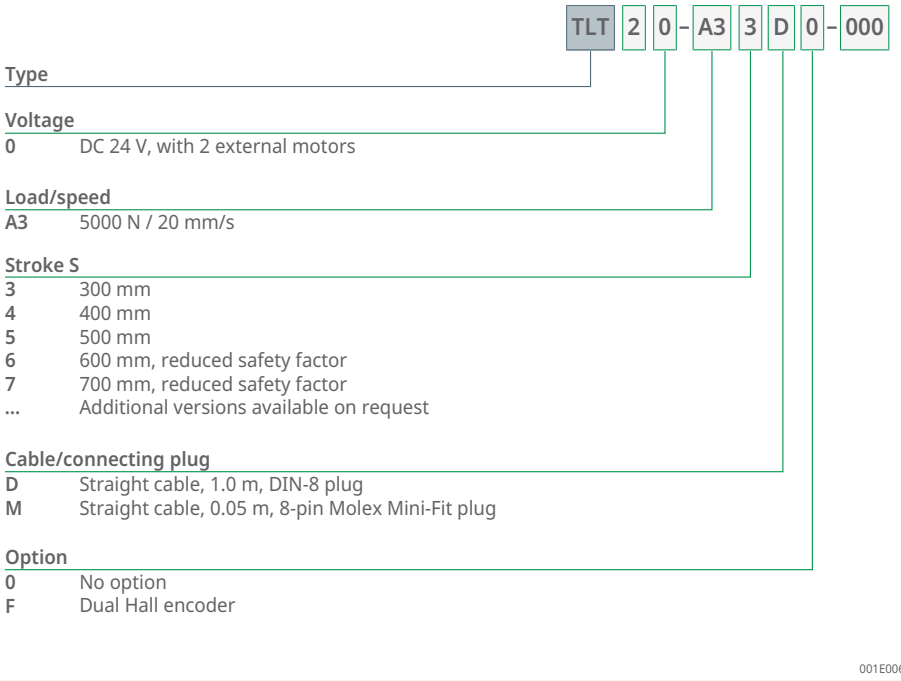
Ordering key

504 Ordering designation TLT1



4

505 Ordering designation TLT20



4.9 TXG

506 TXG



001CF15B

Benefits

- High-performance, high-speed lifting
- aesthetic design

Standards

- IEC 60601-1

154 Technical data TXG

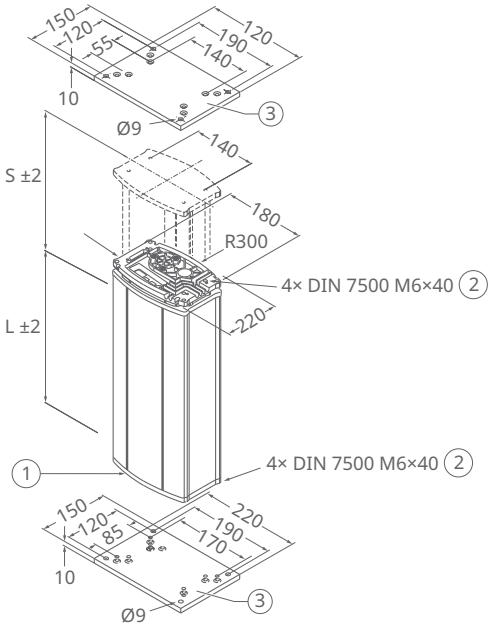
Feature	Unit	TXG10	TXG40, TXG50	TXG80, TXG90
Rated push force	N	1500	1500	1500
Rated pull force	N	0	0	0
Offset load	Nm	≤ 210 [1)]	≤ 210 [1)]	≤ 210 [1)]
Speed (full load to no load)	mm/s	17 ... 23	17 ... 23	17 ... 23
Lifting column version (number of guide tubes)	–	2-part	2-part	2-part
Stroke S	mm	200 ... 600	200 ... 600	200 ... 600
Retracted length L	mm	S + 180	S + 180	S + 180
Voltage	V	DC 24 V	AC 120 V	AC 230 V
Mains frequency	Hz	–	50 ... 60	50 ... 60
Current consumption	A	5	1.8	0.9
Duty cycle, intermittent operation	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Ambient temperature during operation	°C	+10 ... +40	+10 ... +40	+10 ... +40
	°F	+50 ... +104	+50 ... +104	+50 ... +104
Protection code (IP)	–	IP30	IP30	IP30
Protection class IEC 61140	–	III (SELV)	II / (I) [2)]	II / (I) [2)]
Type of actuation	–	Electrical	Electrical	Electrical
Mass	kg	8 ... 13	9 ... 14	9 ... 14

1) for details, see bending load diagram

2) mandatory for cable feed through

Dimensional drawings

507 Dimensions TXG



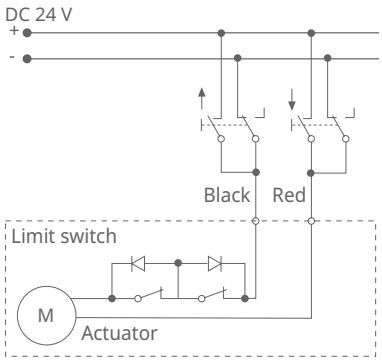
S	Stroke	L	Retracted length, without mounting plates
1	Base plate	2	Thread for fastening screws
3	Mounting plate, not included in scope of delivery		

Mounting plates are not included in the scope of delivery and are available separately as accessories.

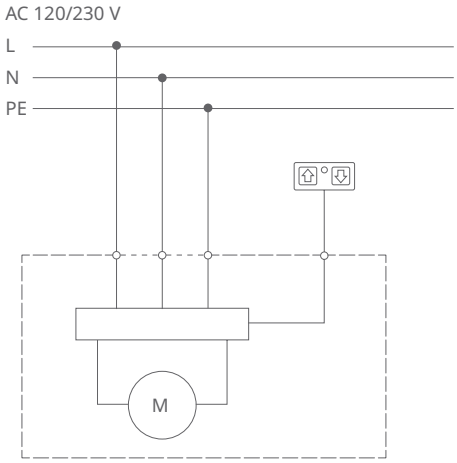
Fastening screws are not included in the scope of delivery.

Wiring diagrams

508 Connecting diagram DC 24 V



509 Connecting diagram AC 120 V, AC 230 V



Suitable control units and accessories

155 Suitable control units and operating elements for TXG10

Operating element		Control unit
Designation	**Switch**	**COMPACT**
HSM	T	✓
HSF	T	✓

T Desk switch
✓ suitable

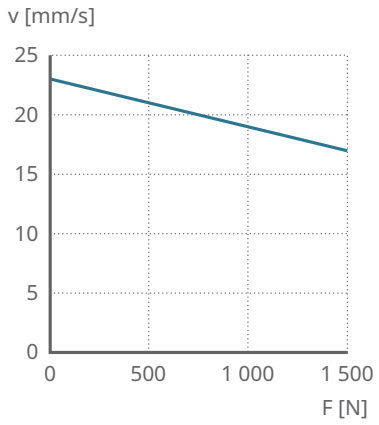
156 Suitable operating elements for TXG40, TXG50, TXG80, TXG90

Operating element		Lifting columns (with integrated control unit)			
Designation	**Switch**	**TXG40**	**TXG50**	**TXG80**	**TXG90**
EHE1	M	✓	✓	✓	✓
STF	F	✓	✓	✓	✓
STA	T	✓	✓	✓	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable

Performance diagrams

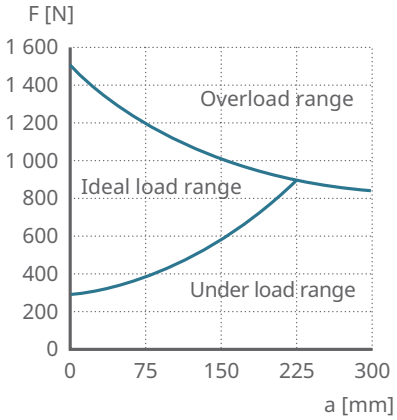
510 Speed-load diagram



v	Speed	F	Load

Offset load diagrams

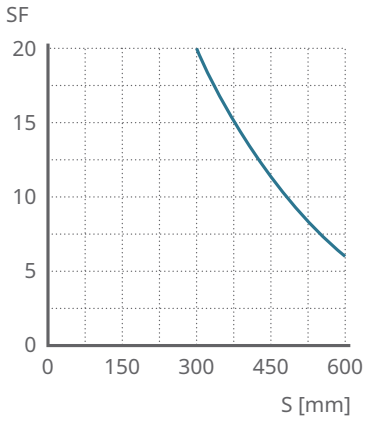
511 Offset load diagram TXG



F	Load	a	Load distance from center of column

Safety factor under load conditions

512 Safety factor under load conditions



SF	Safety factor	S	Stroke

Accessories

157 Accessories

Designation		Plug	Country	Order number
Mains cable, straight, 3 m	2-pin	Euro	General	0121730
Mains cable, straight, 3 m	3-pin	Schuko	General	0121729
Mains cable, straight, 3 m	3-pin	SEV	CH	0128699
Mains cable, straight, 3 m	2-pin	UL	USA	0126322
Mains cable, straight, 3 m	3-pin	UL	USA	0121762
Upper or lower mounting plate		–	–	0124874

Ordering key

513 Ordering designation TXG



Type

Voltage

1	DC 24 V (slave actuator)
4	AC 120 V, 50/60 Hz, class II
5	AC 120 V, 50/60 Hz, class I, mandatory for cable feedthrough option
8	230 V AC, 50 Hz, class II
9	230 V AC, 50 Hz, class I mandatory for cable feedthrough option

Color

5	Natural anodized coating

Option

000	None
EYX	Control cable feed through
EYF	Mains cable feed through
EYS	Single Hall encoder for compact/slave use
2AA	Control cable feed through, mains cable feed through
EXG	Connection of TXG to BCU/VCU, available on request
KKK	Customized, available on request

Stroke S for retracted length L=S+180 or L= S+160 mm

L=S+180	L=S+160	
200	**4CY**	200 mm
300	**4DY**	300 mm
400	**4EY**	400 mm
500	**4FY**	500 mm
600	**4GY**	600 mm

001E0089

4.10 FRE

514 FRE



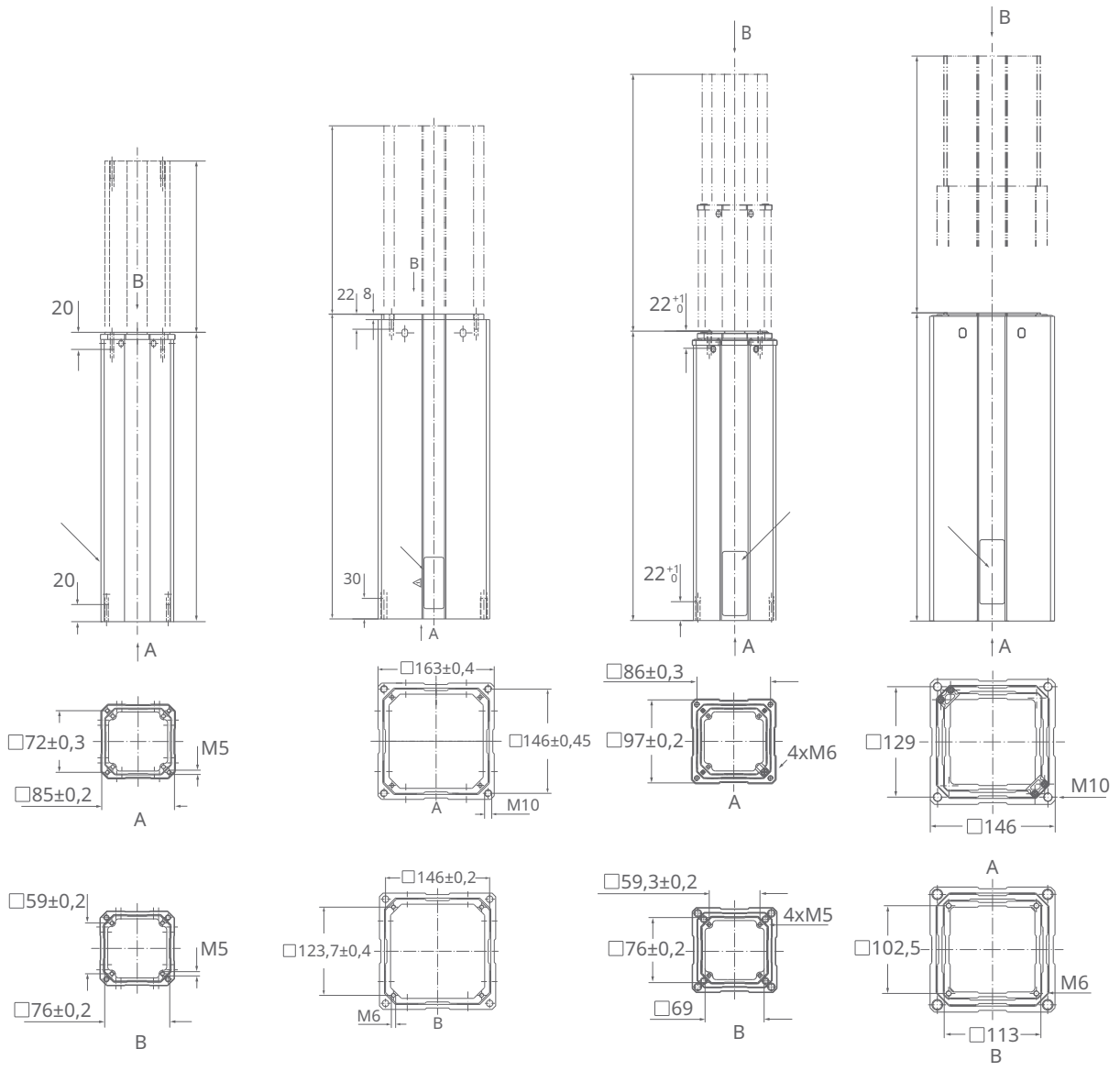
001CF179

Benefits

- attractive design
- stable
- universal application

Dimensional drawings

515 Dimensions FRE



158 Types FRE

Type	Guide tube unit (number of guide tubes)		Profile dimensions in mm							Retracted length
	2-piece	3-piece	76 × 76	85 × 85	97 × 97	113 × 113	129 × 129	146 × 146	163 × 163	mm
FRE–A085	✓		x	x						Stroke + 138
FRE–A113	✓				x	x				Stroke + 148
FRE–A146	✓						x	x		Stroke + 168
FRE–D097		✓	x	x	x					Stroke + 38
FRE–D129		✓			x	x	x			Stroke + 53
FRE–D163		✓					x	x	x	Stroke + 53
FRE–B097 [1)]	✓			x	x					N/A
FRE–B129 [1)]	✓					x	x			N/A

Type	Guide tube unit (number of guide tubes)		Profile dimensions in mm							Retracted length
	2-piece	3-piece	76 × 76	85 × 85	97 × 97	113 × 113	129 × 129	146 × 146	163 × 163	mm
FRE–B163 [1]	✓							x	x	N/A
FRE–E113 [1]		✓		x	x	x				N/A
FRE–E146 [1]		✓				x	x	x		N/A

[1] Options are available on request only. Please contact Schaeffler.

Ordering key

516 Ordering designation FRE

FRE – A085 – 5 000 20 – 000

Type

Combination

	Guide tube unit, 2-piece/largest tube size
A085	85×85 mm
A113	113×113 mm
A146	146×146 mm
B097	97×97 mm
B129	129×129 mm
B163	163×163 mm
	Guide tube unit, 3-piece/largest tube size
D097	97×97 mm
D129	129×129 mm
D163	163×163 mm
E113	113×113 mm
E146	146×146 mm
V...	Guide tube unit, 4-piece, available on request
F...	Guide tube unit, 5-piece, available on request
S...	Guide tube unit, 6-piece, available on request
Z...	Guide tube unit, 7-piece, available on request

Color

5	Natural anodized
6	Black anodized, available on request

Option

000	No option
MCM	Cover
MCN	Pull version
2EA	Pull version, with cover

Stroke

20	200 mm
30	300 mm
40	400 mm
50	500 mm
60	600 mm
70	700 mm, available on request
...	Other stroke lengths available on request

001E0099

5 EWELLIX control units

5.1 BCU

517 BCU



001CF17B

Benefits

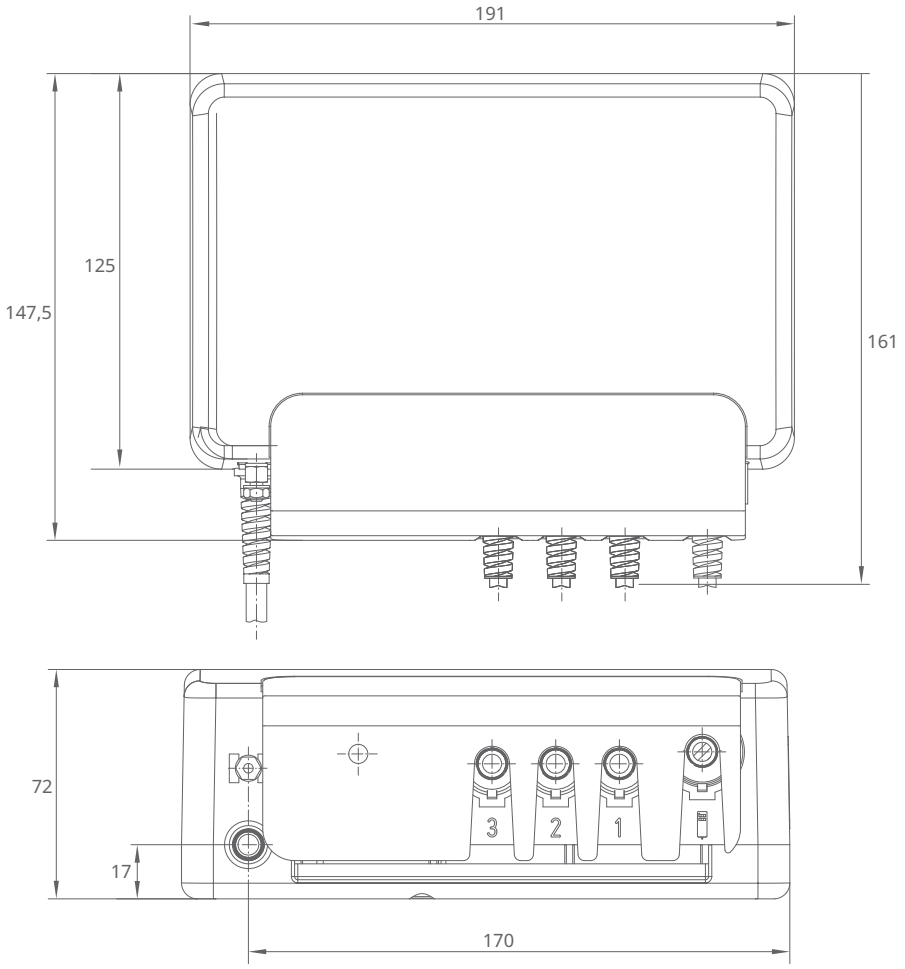
- compact 3-channel linear actuator control unit
- single fault safety
- overload and over-temperature protection
- approved for medical applications
- easy to clean
- low standby current

159 Technical data

Feature	Unit	BCU5	BCU8
Actuator connection sockets (DIN 8)	–	3	3
Operation element sockets (HD15)	–	1	1
Single-fault safety	–	Yes	Yes
Encoder signal processing	–	No	No
Input voltage	V AC	120	230
Frequency	Hz	60	50
Input current, max.	A	2.5	1.3
Power consumption in standby	W	1.2	1.5
Output voltage	V DC	24	24
Output current	A	7	7
Duty cycle: intermittent	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Duty cycle: short time	min	2	2
Ambient temperature during operation	°C	0 ... +40	0 ... +40
Humidity	%	5 ... 85	5 ... 85
Protection code (IP)	–	IPX4	IPX4
Approvals	–	IEC 60601-1	IEC 60601-1
Mass	kg	2.3	2.3

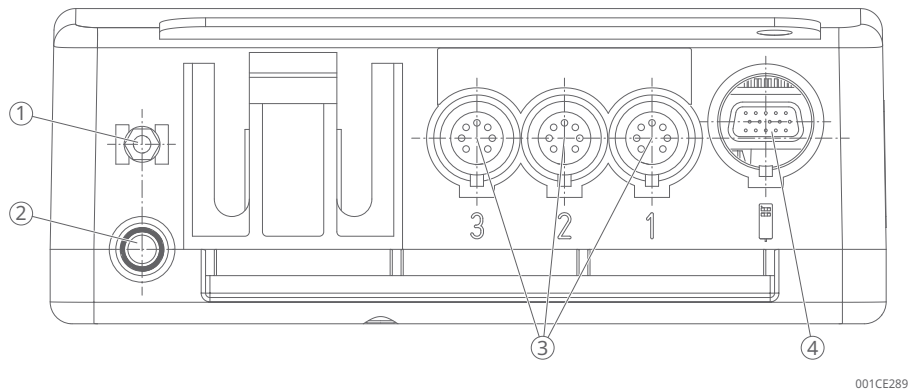
Dimensional drawings

518 Dimensions



Wiring diagrams

519 Connections, without protective cover



1	Optional: earth connection	2	Mains cable
3	Connection for 3 actuators	4	Connection for operating device

Suitable control units and accessories

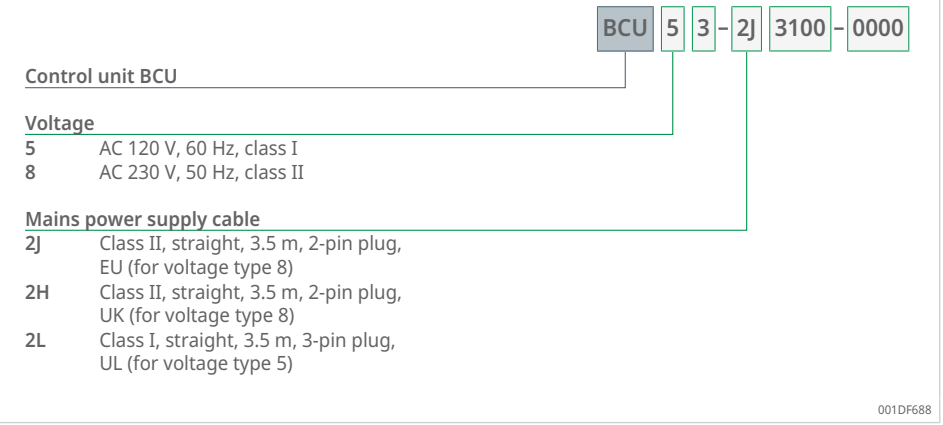
160 Suitable linear actuators, lifting columns, and operating elements

Product			Control unit	
			BCU5	BCU8
Linear actuator		CARE33A	✓	✓
		RU20, RU21, RU22	✓	✓
		MAX10, MAX30	✓	✓
		ECOMAG	✓	✓
Lifting column		THG10	✓	✓
		TLG10	✓	✓
		TLT10	✓	✓
		TFG10	✓	✓
		CPMT1	✓	✓
		TXG10	✓	✓
Operating element	M	EHA3	✓	✓
	F	STJ	✓	✓
	T	STE	✓	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Ordering key

520 Ordering designation BCU



Each BCU requires a BCP.

521 Ordering designation BCP

BCP 11 – A 000 – 0 000

BCU parameterization

Function

11	All channels individually
21	Channel 2+1
30	All channels simultaneously
T1	Trendelenburg

Motor

A	ECO2, ECO3, ECO4, ECO5	3.7A	Actuator 1	-
C	TLT10[1], TXG10 (EXG)	4.7A	Actuator 1	-
E	TFG, ECO6, ECO8, ECO9	5.7A	Actuator 1	-
M	MAX10, MAX30, THG10, TLG10	6.7A		
R	RU20, RU21, RU22	8.5A		
S	CPMT1–1[2]	8.5A		
T	CPMT1–2[2]	8.5A		

Soft start/stop

0	Hard
3	Medium
6	Soft (on request)

[1] TLT is a 2-motor actuator. If simultaneous operation is required, BCP21-CC... is recommended.

[2]) Reduced stroke forces: CPMT-1 up to 3000 N, CPMT1-2 up to 4000 N.

001DF698

5.2 VCU

522 VCU



001CF186

Benefits

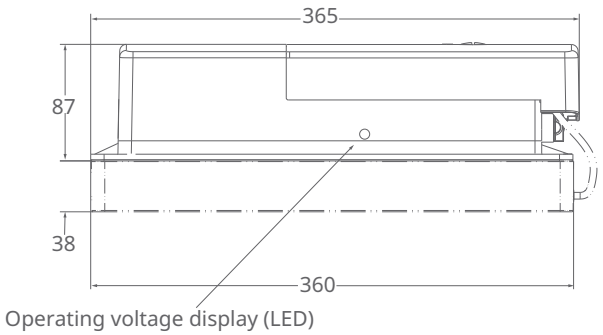
- compact 5-channel linear actuator control unit
- single fault safety
- overload and over-temperature protection
- approved for medical applications
- easy to clean
- low standby current

161 Technical data

Characteristic	Unit	VCU5	VCU8	VCU9
Linear actuator ports (DIN 8)	–	3 or 5	3 or 5	3 or 5
Operation element sockets (HD15)	–	2	2	2
Battery ports	–	1	1	1
End switch ports	–	2	2	2
Single-fault safety	–	Yes	Yes	Yes
Encoder processing	–	No	No	No
Input voltage	V AC	120	230	230
Frequency	Hz	60	50	50
Input current, max.	A	2.5 ... 6.5	1.3 ... 3.3	1.3 ... 3.3
Standby power	W	2.6 ... 3.9	2.6 ... 3.9	2.6 ... 3.9
Output voltage	V DC	24	24	24
Output current, max.	A	7 ... 18	7 ... 18	7 ... 18
Duty cycle: intermittent	min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Duty cycle: short time	min	2	2	2
Ambient temperature	°C	+5 ... +40	+5 ... +40	+5 ... +40
Humidity	%	5 ... 85	5 ... 85	5 ... 85
Protection code (IP)	–	IPX4	IPX4	IPX4
Approvals	–	IEC 60601-1	IEC 60601-1	IEC 60601-1
Weight without battery	kg	2.4 ... 3.8	2.4 ... 3.8	2.4 ... 3.8
Weight with battery	kg	5.4 ... 8.8	5.4 ... 8.8	5.4 ... 8.8

Dimensional drawings

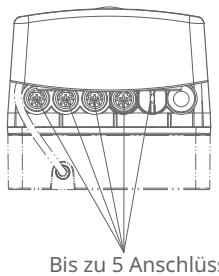
523 Dimensions VCU



001D370A

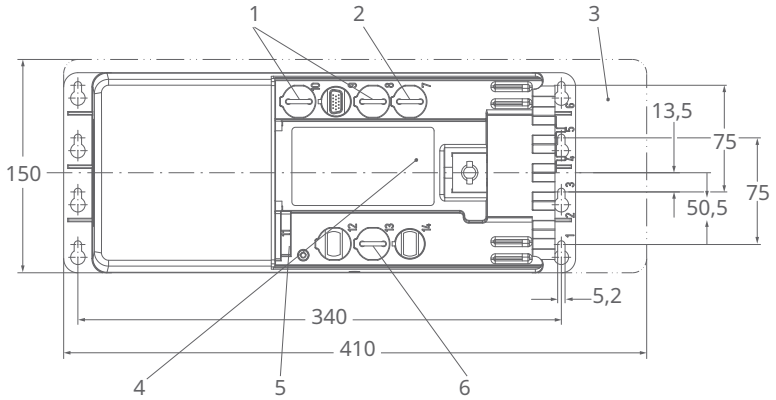
Wiring diagrams

524 Connecting diagram 1 VCU



001D36E9

525 Connecting diagram 2 VCU

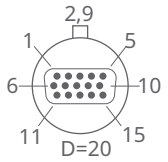


1. Two connections for HD15 operating devices
2. HD15 limit switch connection
3. Additional space for mounting
4. Data plate software
5. Mains connection
6. D-Sub 9 battery connection (optional)

001D36FA

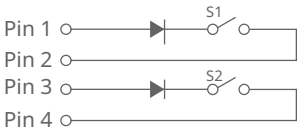
Pin assignment of HD15 connector for limit switches

526 Wiring plan VCU



001CF184

527 Wiring plan VCU



001D371B

162 Pin assignment of HD15 connector for limit switches VCU

Function	Pin	Wire color (ZKA-160627-2500)
24 V DC (common ground)	1, 3, 5, 7, 9	White/yellow, white/green, gray-pink, black, blue
Switch 1	2	Brown-green
Switch 2	4	Red-blue
NC	6, 8, 10, 11, 12, 14	Violet, red, pink, gray, yellow, brown
DC 20–40 V max. 50 mA	13	Green
GND	15	White

Suitable control units and accessories

163 Suitable linear actuators, lifting columns, and operating elements

Linear system			Control unit		
			VCU5	VCU8	VCU8
Linear actuator		RU20, RU21, RU22	✓	✓	✓
		RU23, RU24, RU25	✓	✓	✓
		MAX10, MAX30	✓	✓	✓
		ECOMAG	✓	✓	✓
Lifting column		THG10	✓	✓	✓
		TLG10	✓	✓	✓
		TLT10	✓	✓	✓
		TFG10	✓	✓	✓
		CPMT1	✓	✓	✓
		TXG10	✓	✓	✓
Operating element	M	EHA3	✓	✓	✓
	F	STJ	✓	✓	✓
	T	STE	✓	✓	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

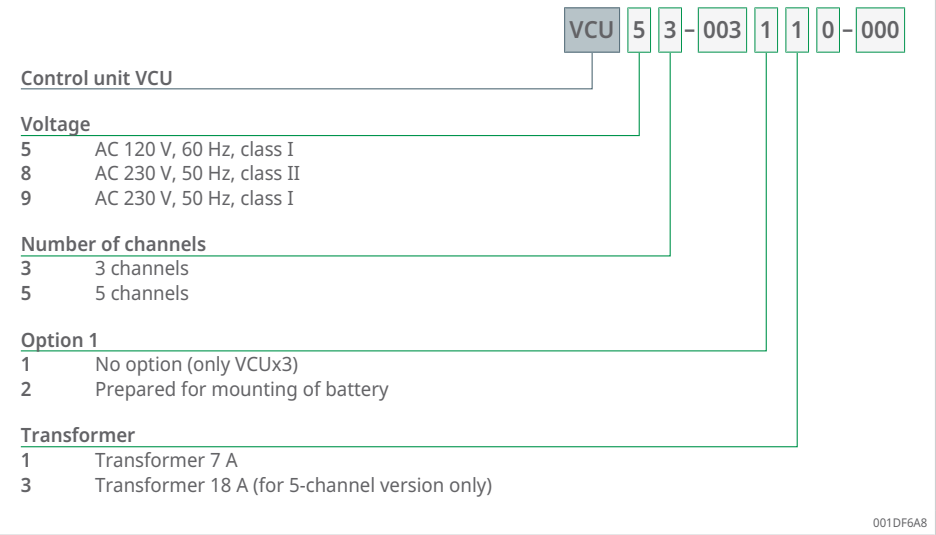
Accessories

164 Accessories VCU

Description	Plug	Ordering designation	Order number
Mains cable, 2-pole	Euro	ZKA-160608-3500	0105726
Mains cable, 3-pole	Schuko	ZKA-160637-3500	0118821
Mains cable, 3-pole	SEV	ZKA-160638-3500	0118822
Mains cable, 3-pole	UL	ZKA-160639-3500	0105588
Mains cable, 3-pole	UK	ZKA-160609-3500	0105631
Mains cable, 3-pole	UL, hospital grade	ZKA-160640-3500	0118823
Mains cable, 3-pole	Australia, China	ZKA-160661-3500	0129953
Battery pack 2.7 Ah		ZBA-160208-0400	0118806
Holder for 4.5-Ah battery		ZBA-160207-1000	0121266
Removable battery 4.5 Ah		ZBA-160209	0126155

Ordering key

528 Ordering designation VCU



529 Ordering designation VCP

VCP 11 – A 0 – 0 000

VCU parameterization

Function

11	All channels individually
21	2 channels simultaneously + 1 or 3 individually
22	2 + 2 channels simultaneously + 1 individually
30	All channels simultaneously, 3-channel version only
41	4 channels simultaneously + 1 individually, 5-channel version only
50	All channels simultaneously, 5-channel version only
T1	Trendelenburg (2 channels) + 1 or 3 individually

Actuators

A	ECO2, ECO3, ECO4, ECO5	3.7A	Actuator 1	-
C	TLT10[1] , TXG10 (EXG)	4.7A		-
E	TFG, ECO6, ECO7, ECO8, ECO9	5.7A	Actuator 2	-
M	MAX10, MAX30, TLG10, THG10	6.7A	Actuator 3	-
R	RU20, RU21, RU22	8.5A	Actuator 4	- (For SCUx3: insert zero)
S	CPMT1–1[2]	11.7A	Actuator 5	- (For SCUx3: insert zero)
T	CPMT1–2[2]	10.2A		
U	RU23, RU24, RU25	11,7 A (reduced stroke function: only 8.5 A when using the 7 A transformer)		

Soft start

0	Hard= start 0 ms, stop 0 ms
3	Medium= start 400 ms, stop 200 ms

The SCU solution offers significantly more options than those indicated in the type keys.
Please inquire about additional functions such as “virtual limit switches,” “external limit switches,” etc.

[1] TLT is a 2-motor actuator. For simultaneous operation, VCP21-CC... is recommended.

[2] reduced stroke forces: CPMT-1 up to 3000 N, CPMT1-2 up to 4000 N when using 7 A transformer

001DF6B8

5.3 SCU

530 SCU



001CF186

Benefits

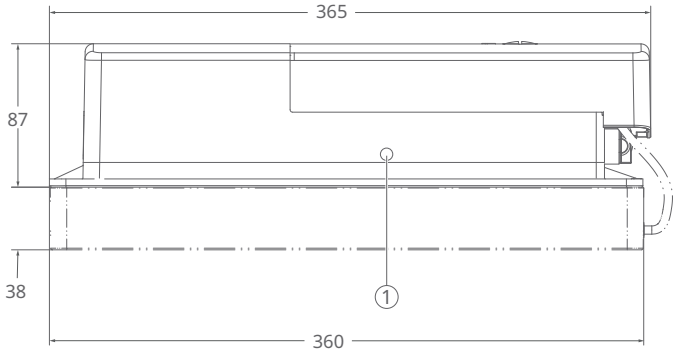
- compact control unit for 6 actuators
- first failure safety
- overload protection and overtemperature protection
- approved for medical applications
- easy to clean
- low standby current
- RS232 interface

165 Technical data

Feature		Unit	SCU1	SCU5	SCU9
Actuator connecting sockets (DIN 8)		–	6	3 or 6	3 or 6
Operation element sockets (HD15)		–	3	3	3
Battery connecting sockets (D-sub 9)		–	1	1	1
Limit switch connecting sockets		–	4	4	4
First failure safety		–	Yes	Yes	Yes
Pulse generator		–	Yes	Yes	Yes
Input voltage	AC	V	–	120	230
	DC	V	24	–	–
Frequency		Hz	–	60	50
max. input current		A	0.8	4.3	4.3
Standby power		W	0.8	4.3	4.3
Output voltage	DC	V	24	24	24
max. output current		A	30	18	18
Duty cycle: intermittent		min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min	ON: 1 min / OFF: 9 min
Duty cycle: short time		min	2	2	2
Ambient temperature		°C	+5 ... +40	+5 ... +40	+5 ... +40
Humidity		%	5 ... 85	5 ... 85	5 ... 85
Protection code (IP)		–	IPX4	IPX4	IPX4
Approvals		–	EN 60601–1	EN 60601–1	EN 60601–1
			UL 60601–1	UL 60601–1	UL 60601–1
Weight without rechargeable battery		kg	1.2	3.8	3.8
Weight with rechargeable battery		kg	4.2	6.8	6.8

Dimensional drawings

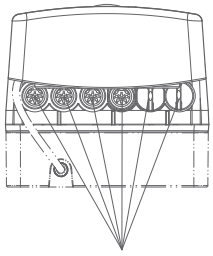
531 Dimensions, with rechargeable battery and cover



1	Operating voltage indicator

Wiring diagrams

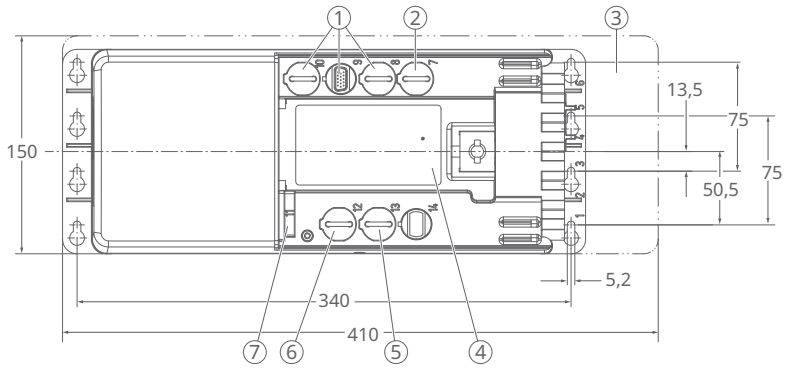
532 Connecting diagram SCU



Up to 6 connections with DIN8 plug

001D372B

533 Dimensions and connections, without cover

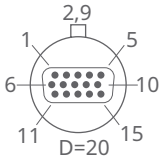


001DC031

1	Connection for 3 operating devices	2	Connection for limit switches
3	Additional space for installation	4	Software product label
5	Optional: connection for rechargeable battery	6	Communication interface
7	Mains connection		

Pin assignment of HD15 connector for limit switches, available on request (requires a customized SCP)

534 Pin assignment SCU



001CF18A

166 Pin assignment of HD15 connector for limit switches, available on request SCU

Function	Pin	Wire color (ZKA-160627-2500)
Switch 1	2	Brown-green
Switch 2	4	Red-blue
Switch 3	6	Brown-green
Switch 4	8	Brown-green
DC 24 V (common ground)	1, 3, 5, 7	White/yellow, white/green, gray/pink, black

Function	Pin	Wire color (ZKA-160627-2500)
Optional external power supply for binary outputs	9	Blue
Binary output 1 (DC 22-40 V /1 A)	10	Pink
Binary output 2 (DC 22-40 V /1 A)	11	Gray
GND for binary outputs	12	Yellow
DC 22-24 V max. 50 mA	13	Green
DC 5 V pulsed	14	Brown
GND	15	White

Suitable control units and accessories

167 Suitable linear actuators, lifting columns, and operating elements

Linear system			Control unit		
			SCU1	SCU5	SCU9
Linear actuator		RU20, RU21, RU22	✓	✓	✓
		RU23, RU24, RU25	✓	✓	✓
		MAX10, MAX30	✓	✓	✓
		ECOMAG: ECO4F, ECO5F, ECO8F, ECO9F	✓	✓	✓
		CAJA35C	✓	✓	✓
Lifting column		THG10	✓	✓	✓
		TLG10	✓	✓	✓
		TLT10	✓	✓	✓
		TFG10	✓	✓	✓
Operating element	M	EHA3	✓	✓	✓
	F	STJ	✓	✓	✓
	T	STE	✓	✓	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Accessories

168 Accessories SCU

Designation	Plug	Ordering designation	Order number
Mains cable, 3-pole	Schuko	ZKA-160637-3500	0118821
Mains cable, 3-pole	SEV	ZKA-160638-3500	0118822
Mains cable, 3-pole	UL	ZKA-160639-3500	0105588
Mains cable, 3-pole	UK	ZKA-160609-3500	0105631
Mains cable, 3-pole	UL, hospital grade	ZKA-160640-3500	0118823
Mains cable, 3-pole	Australia, China	ZKA-160661-3500	0129953
Holder for 4.5-Ah battery		ZBA-160207-1000	0126155
Removable battery 4.5 Ah		ZBA-160209	0126154

Ordering key

535 Ordering designation SCU



Control unit SCU

Voltage

1	DC 24 V (for 6-channel version only)
5	AC 120 V, 60 Hz, class I
9	AC 230 V, 50 Hz, class I

Number of channels

3	3 channels
6	6 channels

Battery

1	None (for SCU16 only)
2	Prepared for mounting of battery
3	Battery 2.7 Ah, mounted under the housing base

Transformer

0	None (for SCU16 only)
3	Standard (AC version)

Interface

0	Without RS232
1	With RS232 (for 6-channel version only)

001DF6C8

536 Ordering designation SCP



SCU parameterization

Function

11	All channels individually
21	Channels 2+1(+1+1+1)
22	Version with six (6) channels: 2+2+1+1
30	Version with three (3) channels, all channels simultaneously
31	Version with six (6) channels: 3+1+1+1
41	Version with six (6) channels: 4+1+1
60	Version with six (6) channels, all channels simultaneously
T1	Trendelenburg T+1 (+1+1)

Actuators

A	ECO4F, ECO5F	3.7A	Actuator 1	-
C	TLT 10[1)]	4.7A	Actuator 2	-
E	TFG10, ECO8F, ECO9F	5.7A	Actuator 3	-
M	MAX10, MAX30, TLG10, THG10	6.7A	Actuator 4	-[2)]
R	RU20, RU21, RU22	8.5A	Actuator 5	-[2)]
D	MD22, MD23	8.5A	Actuator 6	-[2)]
U	RU23, RU24, RU25	11.7A		
S	CPMT1–1	11.7A		
T	CPMT1–2	10.2A		

Soft start

0	Hard
3	Medium
6	Soft (on request)

The SCU solution offers significantly more options than those indicated in the type keys. Please inquire about additional functions such as “virtual limit switches,” “external limit switches,” etc.

[1)] TLT is a 2-motor actuator. If simultaneous operation is required, VCP21-CC... is recommended.

[2)] for SCUx3: insert zero

001DF6D8

5.4 MCU

537 MCU



001CF18D

Benefits

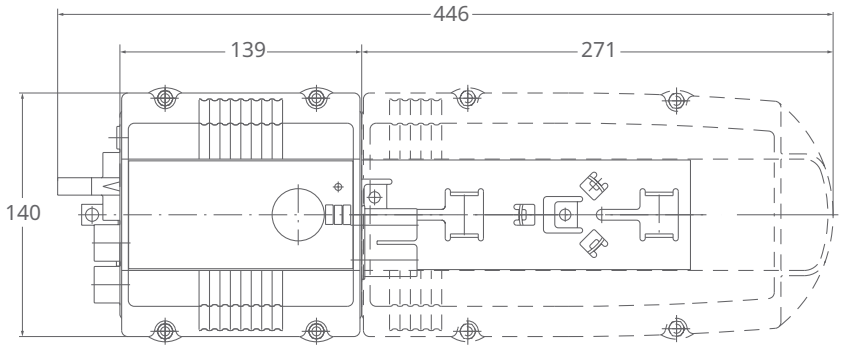
- suitable for mobile applications
- LED indicator for battery charge level
- acoustic signal for low charge status

169 Technical data MCU

Feature	Unit	MCU
Motor connections	No.	2
Operating element connections	No.	1
Battery connections	No.	1
Input voltage	V DC	28
Output voltage	V DC	24
Output current (max)	A	9.5
Duty cycle: intermittent	min	1/9
Ambient temperature	°C	+10 to +40
Humidity	%	85
Protection code (IP)	–	IPX4
Approvals	EN/UL	EN 60601–1/DIN EN 60601-1-2
		UL 2601/EN ISO 10535
Mass	kg	4.9

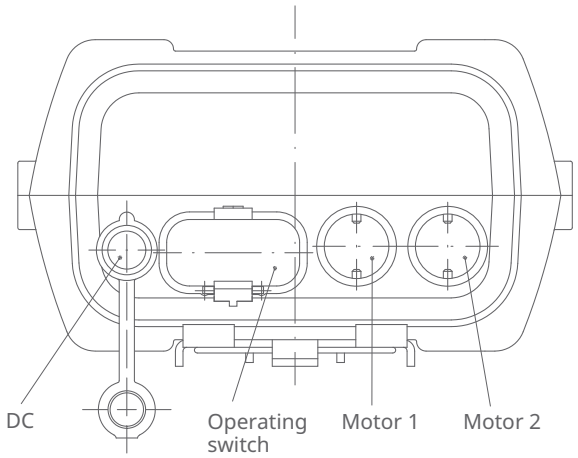
Dimensional drawings

538 Dimensions MCU



Wiring diagrams

539 Connecting diagram MCU



Suitable control units and accessories

170 Suitable linear actuators, lifting columns, and operating elements

Linear system			Control unit
			MCU
Linear actuator		MAX1, MAX3	✓
		ECOMAG	✓
Lifting column		THG	✓
		TLG	✓
		TLT1	✓
Operating element	M	EHA1	✓
	F	STF	✓
	T	STA	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

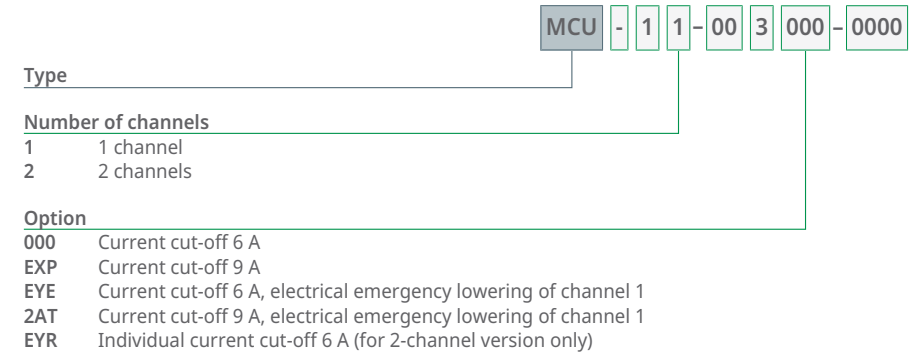
Accessories

171 Accessories

Designation	Plug	Ordering designation	Order number
Battery 4.5 Ah	–	ZBA-142211	0126153
Mains adapter AC 100 V ... AC 240 V	Euro	ZDV-142378-2500	0132841
Mains adapter AC 100 V ... AC 240 V	UL	ZDV-142381-2500	0132843
Wall charging station	–	ZLA-142221	0126159
Tool for connector (socket/D-Sub/mains connection cable)	–	ZBG-140375	0125322

Ordering key

540 Ordering designation MCU



5.5 COMPACT

541 COMPACT



001CF191

Benefits

- enables synchronized movement of 3 linear actuators
- up to 4 memory positions (depending on operating element)
- possibility to connect up to 4 operating elements
- enhanced control convenience
- adjustable positions for container and shelf stop
- low travel speed ranges
- highly efficient switched-mode power supply (SMPS)
- low standby power consumption, low field emissions

172 Technical data COMPACT

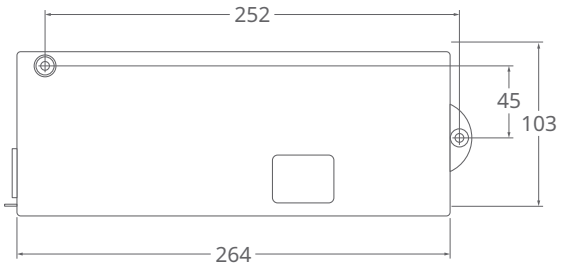
Feature		Unit	COMPACT
Motor connections (DIN8)		No.	3
Operating element connections (DIN7)		No.	1
Battery connections		No.	0
Limit switch connections (LogicConnector DATA)		No.	1
Single fault safety		yes/no	No
Encoder processing		yes/no	yes
Nominal voltage/frequency		V AC / Hz	EU: 230 / 50
			US: 120 / 60
Input current (max)	AC 120 V	A	10
	AC 230 V	A	5
Standby power		W	0.5
Output voltage (rated)		V DC	24
Output sum current (rated)		A	15
Output current per channel (max)		A	8
Ambient temperature		°C	0–+30
Humidity		%	5–85
Protection code (IP)		–	IP20
Protection class		–	I
Approvals		EN/UL	EN 60335-1/UL/CSA 60950-1
Mass		kg	2.3

Dimensional drawings

542 Dimensions COMPACT



543 Dimensions COMPACT



Suitable control units and accessories

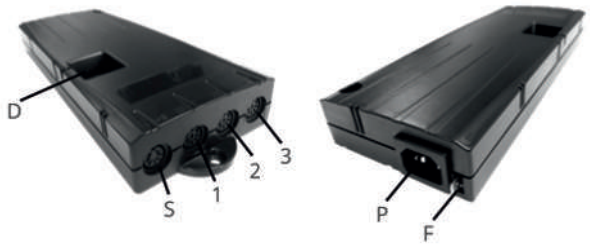
173 Suitable lifting columns and operating elements

Linear system			Control unit
			COMPACT
Lifting column		THG10	✓
		TXG10	✓
Operating element	T	TOUCH-UD-MDF-4M2-LD	✓
	T	HSM-OD-2-LD	✓
	T	HSF-MDF-4M4-LD	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Switching cycles

544 Switching cycles



001CF196

1	Motor socket 1 (M1)	2	Motor socket 2 (M2)
3	Motor socket 3 (M3)	S	Hand switch socket (HS)
P	Mains socket	F	Functional earth
D	LogicConnector DATA for sensors, squeeze lines and cascading		

174 Switching cycles

High-power cycle:	20 s up	19 A at 20 V, 380 W
	20 s down	7 A at 33 V, 231 W
	Pause:	9 min
Normal cycle 1/9	30 s up	15 A at 24 V, 360 W
	30 s down	7 A at 33 V, 231 W
	Pause:	9 min
Normal cycle 2/18	2 min operation:	7 A at 33 V, 231 W
	Pause:	18 min

Desk switch

175 Desk switch

Designation	Designation	Order number
Particularly simple desk switch (up/down)	HSM-OD-2-LD	0123247
Desk switch with display for 2 motor groups (up/down and memory)	HSF-MDF-4M4-LD	0123246

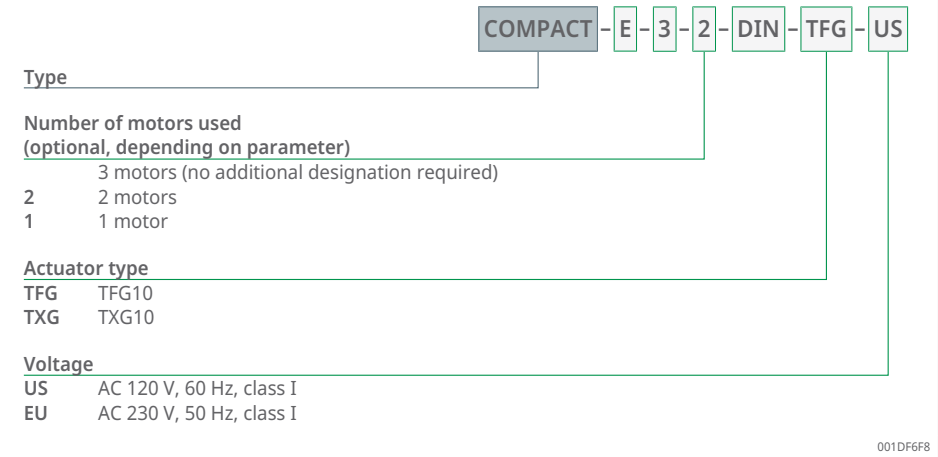
Accessories

176 Accessories COMPACT

Designation	Ordering designation	Order number
Mains cable, straight, 3 m, Schuko plug (Germany, France, ...)	LOG-CBL-PWK	0131665
Mains cable, straight, 3 m, UL plug (US)	LOG-CBL-PWK-US-SJT	0131666
Cable for cascading, length 0.5 m	LOG-CBL-HT-SYNC-500	0131678
Cable for cascading, length 1.5 m	LOG-CBL-HT-SYNC-1500	0132061

Ordering key

545 Ordering designation COMPACT



5.6 SEM

546 SEM



001CF199

Benefits

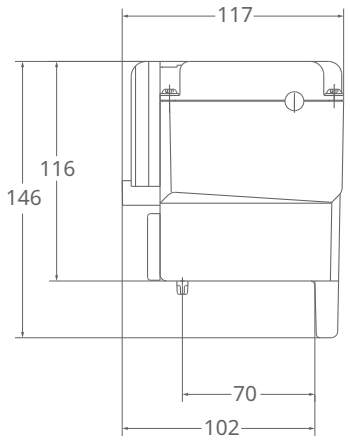
- controls up to 4 linear actuators
- suitable for care beds

177 Technical data SEM1

Feature	Unit	SEM1
Motor connections	No.	4
Operating element connections	No.	1
Supply voltage/frequency	V AC / Hz	230 / 50
		120 / 60
Output voltage	V DC	24
Output current (max)	A	5
Duty cycle	min	1/9
Ambient temperature	°C	+10–+40
Protection code (IP)	-	IPX4
Approvals	UL	UL 60601–1 (1st edition)
Mass	kg	1.8

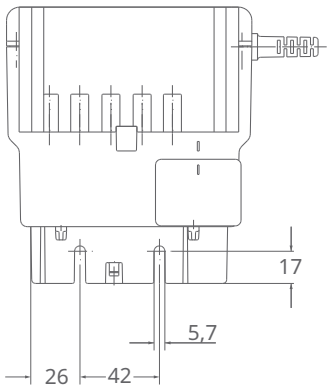
Dimensional drawings

547 Dimensions SEM



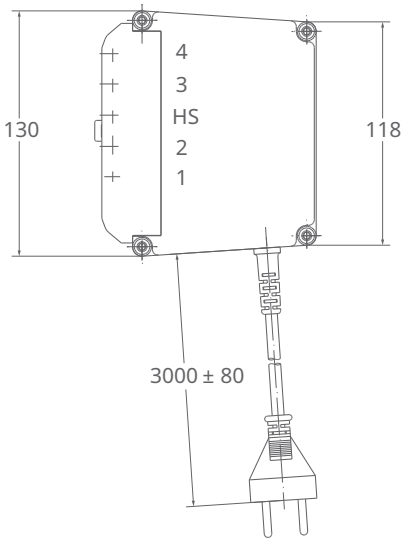
001CF19B

548 Dimensions SEM



001CF19C

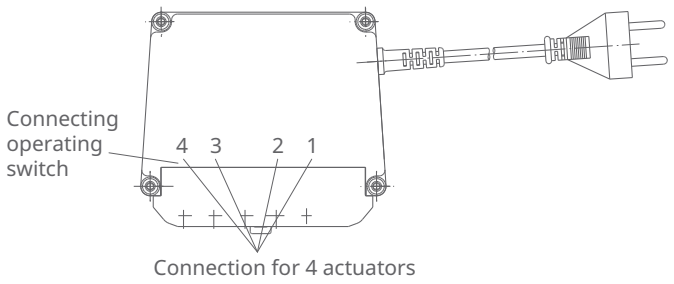
549 Dimensions SEM



001CF1A0

Wiring diagrams

550 Connecting diagram SEM



Suitable control units and accessories

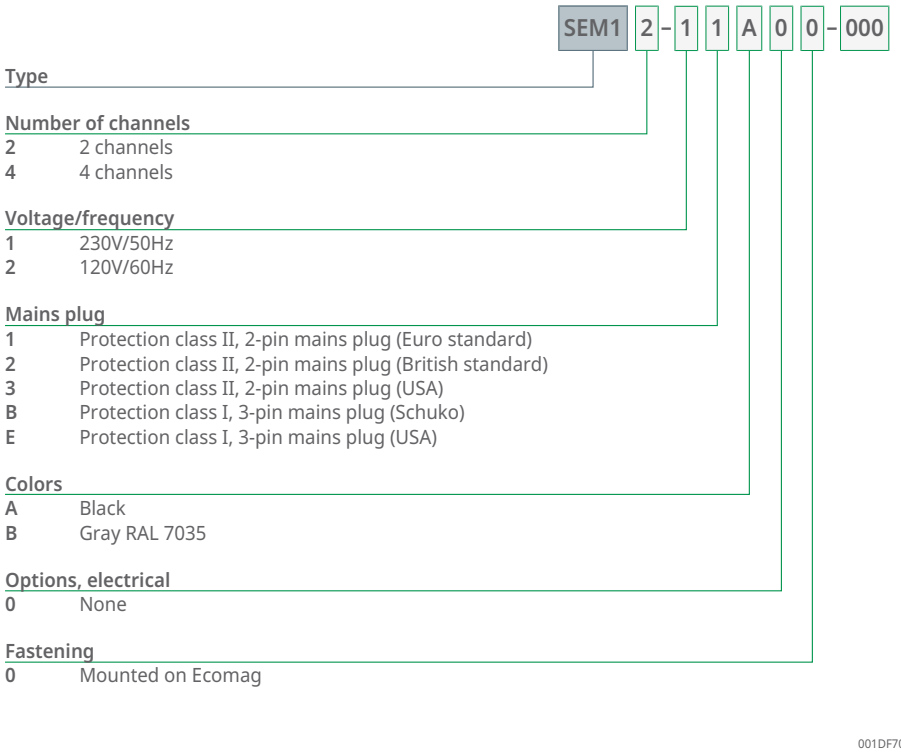
178 Suitable linear actuators, lifting columns, and operating elements

Linear system			Control unit
			SEM1
Linear actuator		ECOMAG	✓
Operating element	M	EHE1	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Ordering key

551 Ordering designation SEM



6 EWELLIX operating elements

6.1 Hand switch CAES

552 Hand switch CAES



001CF1A4

Benefits

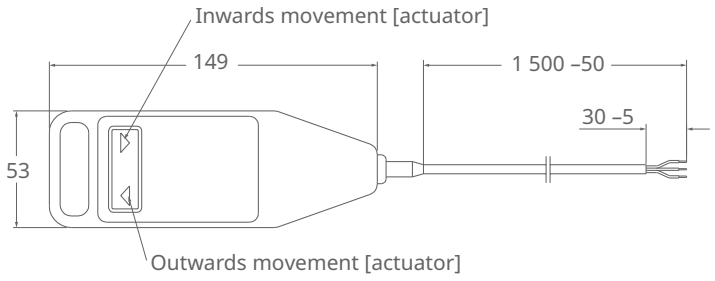
- robust ergonomic design
- membrane keyboard
- clearly marked buttons

179 Technical data hand switch CAES

Feature	Unit	CAES31C
Max. operating channels	No.	1
Operating power supply	V DC /mA	30/33
Protection code (IP)	–	IP54
Color	–	Black

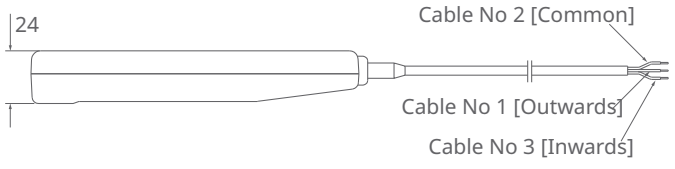
Dimensional drawings

553 Dimensions hand switch CAES



001D377A

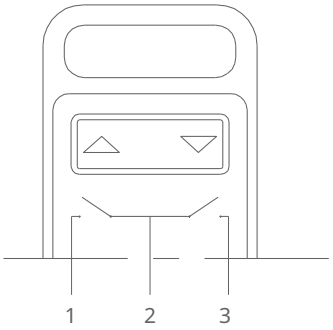
554 Dimensions hand switch CAES



001D378B

Wiring diagrams

555 Connecting diagram hand switch CAES



001CF1A6

Suitable control units and accessories

180 Suitable control units

Operating element		Control units		
Designation	**Switch**	**CAED 3-24R**	**CAED 9-24R**	**CAEV 110/220**
CAES 31C	M	✓	✓	✓

M Hand switch
✓ suitable

Ordering key

181 Ordering designation hand switch CAES

Designation	Characteristics
CAES 31C	No connector, 2 buttons

6.2 Hand switch EHA1

556 Hand switch EHA1



Benefits

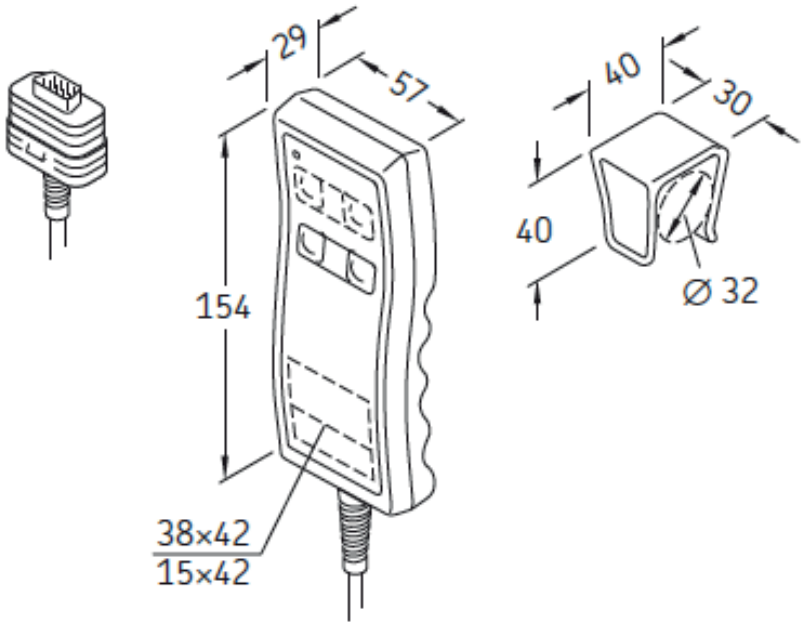
- robust ergonomic design
- tactile buttons, clearly marked
- easy-to-mount holder

182 Technical data hand switch EHA1

Feature	Unit	EHA1
Max. operating channels	No.	2
Operating power supply	V DC /mA	12/50
Protection code (IP)	–	IP67
Color	–	Gray

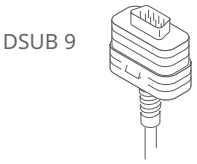
Dimensional drawings

557 Dimensions hand switch EHA1



Wiring diagrams

558 Connection EHA1



Suitable control units and accessories

183 Suitable control units and linear actuators

Operating element		Linear actuator	Control units
Designation	**Switch**	**MAX7**	**MCU**
EHA1	M	✓	✓

M Hand switch
✓ suitable

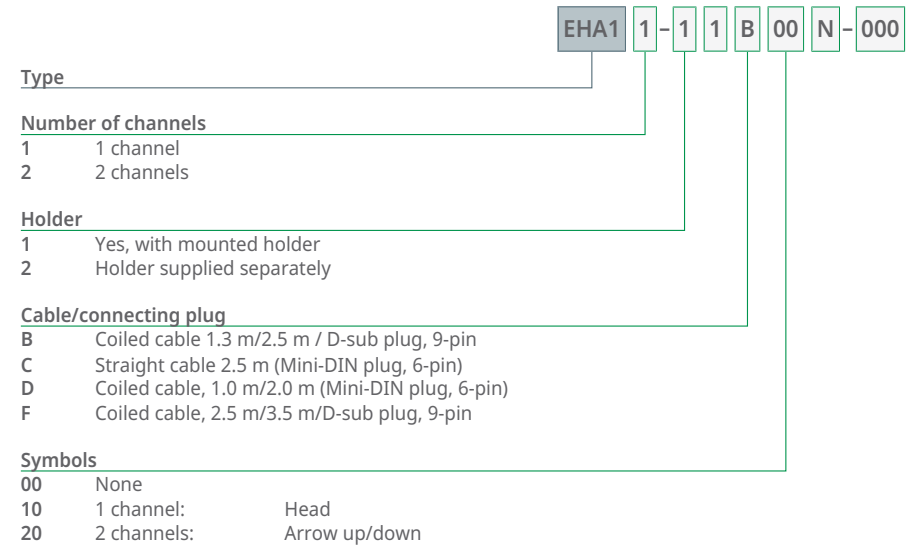
Accessories

184 Accessories hand switch EHA1

Designation	Ordering designation	Order number
Holder with self-adhesive attachment	ZBG–145361–000	0125538

Ordering key

559 Ordering designation hand switch EHA1



6.3 Hand switch EHA3

560 Hand switch EHA3



001D0406

Benefits

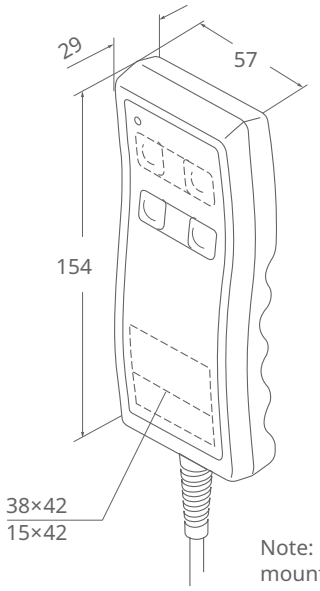
- robust ergonomic design
- tactile buttons, clearly marked
- easy-to-mount holder

185 Technical data hand switch EHA3

Feature	Unit	EHA3
Max. operating channels	No.	5
Operating power supply	V DC /mA	12/50
Protection code (IP)	–	IP67
Color	–	Gray
Cable coiled cable 1.3 m/2.5 m	–	D-sub 15-pin

Dimensional drawings

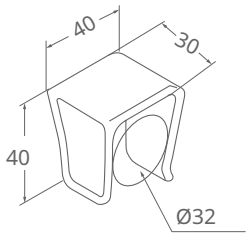
561 Dimensions hand switch EHA3



Note: hook included but not mounted on the switch.

001D37BB

562 Dimensions hook for EHA3

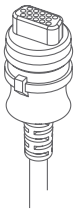


001CF1B1

Wiring diagrams

563 Connection EHA3

High density
D-Sub 15



001D37AB

Suitable control units and accessories

186 Suitable control units and lifting columns for hand switch EHA3

Operating element		Lifting column		Control units							
Designation	Switch	TFG50	TFG90	SCU1	SCU5	SCU9	VCU5	VCU8	VCU9	BCU5	BCU8
EHA3	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

M Hand switch
✓ suitable

Accessories

187 Accessories hand switch EHA3

Designation	Ordering designation	Order number
Holder with self-adhesive attachment	ZBG–145361–000	0125538

Ordering key

564 Ordering designation hand switch EHA3



Type

Number of channels

1	1 channel
2	2 channels
3	3 channels
4	4 channels, available on request
5	5 channels
A	1 channel with 3 memory positions (for SCU only)
B	2 channels with 3 memory positions (for SCU only)
C	3 channels with 3 memory positions (for SCU only)

Symbols

00	None	
10	1 channel: 2nd row from top	Arrow up/down
11		Head
12		Foot
13		Height
14		Anti-Trendelenburg
20	2 channels: 1st–2nd row from top	Arrow up/down
21		Head/foot
22		Head/height
23		Height/head
29		Height/Anti-Trendelenburg
30	3 channels: 1st–3rd row from top	Arrow up/down
31		Head/foot/height
32		Height/head/foot
39		Height/Anti-Trendelenburg/head
40	4 channels: 1st–4th row from top	Arrow up/down
47		Height/Anti-Trendelenburg/head/foot
50	5 channels: 1st–5th row from top	Arrow up/down

001DF738

6.4 Hand switch EHE1

565 Hand switch EHE1



001D040B

Benefits

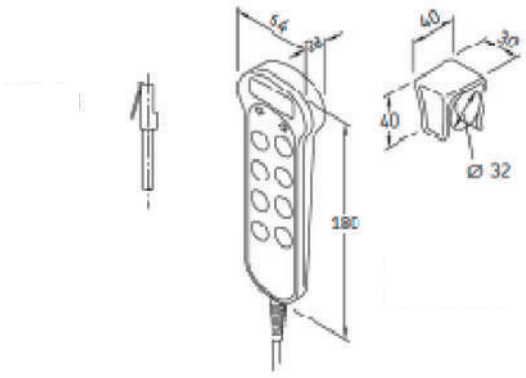
- simple and precise
- flexible operation
- ergonomic design

188 Technical data hand switch EHE1

Feature	Unit	EHE1
Max. operating channels	No.	2
Operating power supply	V DC /mA	38/50
Protection code (IP)	–	IP67
Color	–	Gray
Cable coiled cable 1.1 m/2.5 m	–	FCC plug

Dimensional drawings

566 Dimensions hand switch EHE1



001DDB24

Suitable control units and accessories

189 Suitable control units and lifting columns for hand switch EHE1

Operating element		Lifting column				Control units	
Designation	Switch	TXG4 [1]	TXG5 [1]	TXG8 [1]	TXG9 [1]	SEM1 2	SEM1 2
EHE1	M	✓	✓	✓	✓	✓	✓

[1] only with FCC plug

M Hand switch
✓ suitable

6

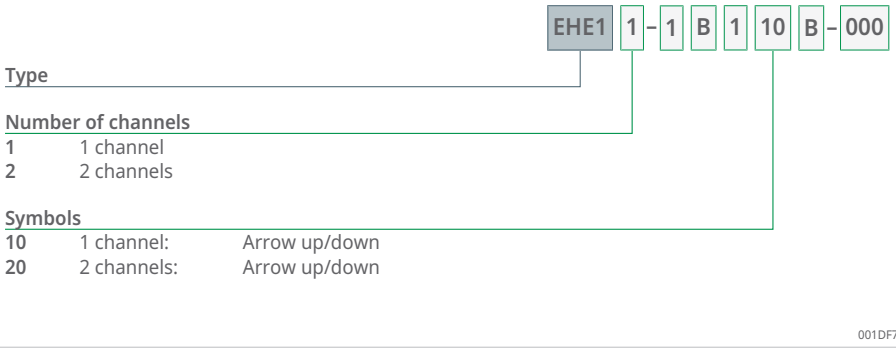
Accessories

190 Accessories hand switch EHE1

Designation	Ordering designation	Order number
Holder	ZBG–145361–000	0125538

Ordering key

567 Ordering designation hand switch EHE1



6.5 Hand switch HSM, HSF

568 Hand switch HSM, HSF



001CF1BE

Benefits

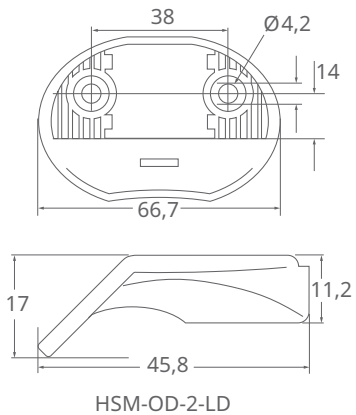
- simple and precise
- attractive design
- various functions

191 Technical data hand switch HSM, HSF

Feature	Unit	HSM-OD-2-LD	HSF-MDF-4M4-LD
Max. operating channels	No.	1	1 or 2
Operating power supply	V DC /mA	5/50	5/50
Protection code (IP)	–	IP32	IP32
Color	–	Black	Black

Dimensional drawings

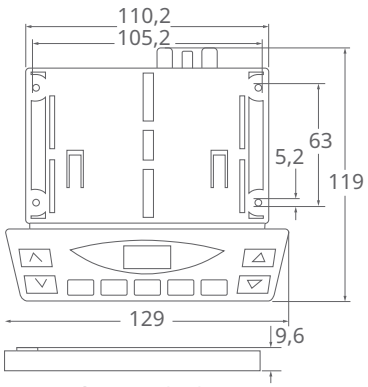
569 Dimensions HSM-OD-2-LD



HSM-OD-2-LD

001CF1B9

570 Dimensions HSF-MDF-4M4-LD



HSF-MDF-4M4-LD

001CF1BD

Suitable control units and accessories

192 Suitable control units for hand switchHSM and HSF

Operating element		Control units
Designation	**Switch**	**COMPACT**
HSM-OD-2-LD	M	✓
HSF-MDF-4M4-LD	M	✓

M Hand switch
✓ suitable

Ordering key

193 Ordering designation hand switch HSM and HSF

Designation	Characteristics
HSM-OD-2-LD	DIN-7 plug
HSF-MDF-4M4-LD	DIN-7 plug

6.6 Pneumatic hand switch PHC

571 Pneumatic hand switch PHC



001D040D

Benefits

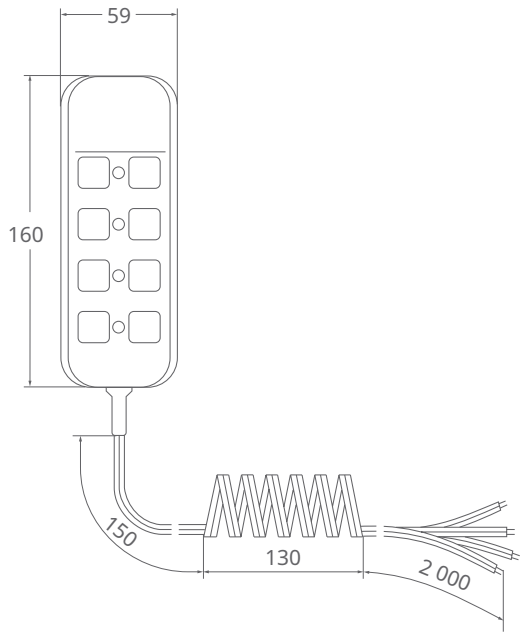
- simple and precise
- flexible operation, also from a greater distance
- ergonomic design

194 Technical data hand switch PHC

Feature	Unit	PHC
Max. operating channels	No.	4
Operating power supply	V DC /mA	N/A
Protection code (IP)	–	IP66
Color	–	Gray

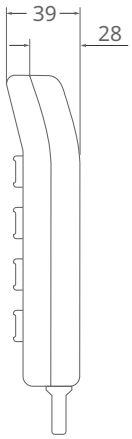
Dimensional drawings

572 Dimensions hand switch PHC



001CF1C1

573 Dimensions hand switch PHC, side view



001CF1C2

Suitable linear actuators and accessories

195 Suitable control units and linear actuators for hand switch PHC

Operating element		Linear actuator	Control units		
Designation	**Switch**	**MAX7**	**TLC Pneumatic**	**TGC Pneumatic**	**THC Pneumatic**
PHC	M	✓	✓	✓	✓

M Hand switch
✓ suitable

Ordering key

196 Ordering designation hand switch PHC

Designation	Characteristics
PHC 1 – 130517	1 channel with arrows up/down, without holder
PHC 2 – 130625	2 channel with arrows up/down, without holder
PHC 3 – 130756	3 channel with arrows up/down, without holder
PHC 4 – 130955	4 channel with arrows up/down, without holder

Other symbols/with holder available on request.

6.7 Foot switch ST

574 Foot switch ST



001CF1D1

Benefits

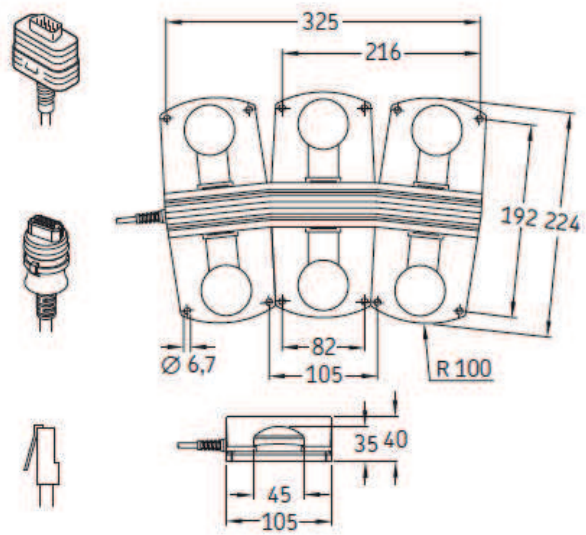
- simple and precise
- ergonomic design
- various plug options

197 Technical data foot switch ST

Feature	Unit	ST
Max. operating channels	No.	3
Operating power supply	V DC /mA	12/50
Protection code (IP)	–	IPX5
Color	–	Blue/anthracite

Dimensional drawings

575 Dimensions foot switch ST



Suitable control units and accessories

198 Suitable control units, lifting columns, and linear actuators for foot switch STJ and STF

Operating element		Lifting column		Linear actuator	Control units			
Designation	Switch	TFG 50	TXG4, TXG5 , TXG8, TXG9 [1]	MAX7	SCU 1, SCU 5, SCU 9	VCU 5, VCU 8, VCU 9	BCU 5, BCU 8	MCU
STJ	F	✓			✓	✓	✓	
STF	F		✓	✓				✓

1) only with FCC plug

F Foot switch
✓ suitable

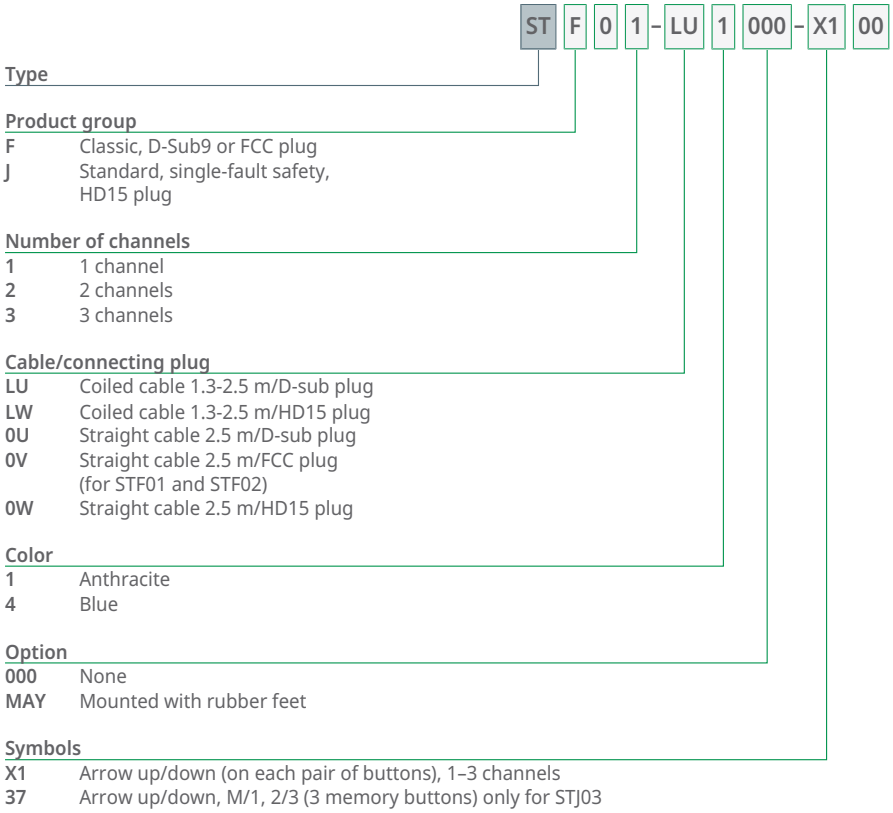
Accessories

199 Accessories foot switch ST

Designation	Ordering designation	Order number
Rubber feet (100 pcs.)	ZBE-135310	0102879
Sticker arrow up	ZKL-135309-0001	0124871
Sticker arrow down	ZKL-135309-0002	0124870

Ordering key

576 Ordering designation foot switch ST



6.8 Pneumatic foot switch PFP

577 Pneumatic foot switch PFP



001CF1CC

Benefits

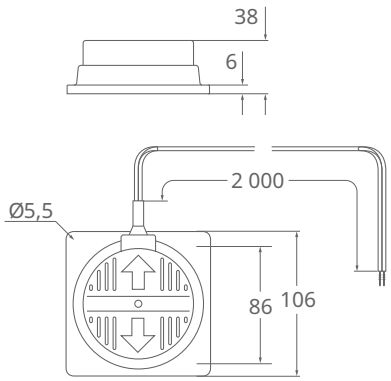
- robust ergonomic design
- simple and precise
- flexible operation, also from a greater distance

200 Technical data foot switch PFP

Feature	Unit	PFP 1K	PFP 1
Max. operating channels	No.	1	1
Operating power supply (DC)	V/mA	N/A	N/A
Protection code (IP)	–	IP21	IP21
Color	–	Gray	Anthracite

Dimensional drawings

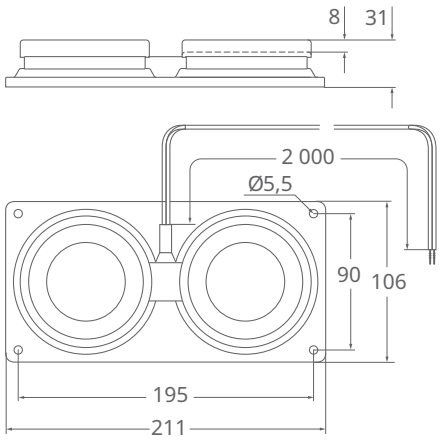
578 Dimensions foot switch PFP 1K-130652



PFP 1K–130652

001CF1C8

579 Dimensions foot switch PFP 1-121545



PFP 1–121545

001CF1CA

Suitable linear actuators and accessories

201 Suitable control units and linear actuators for foot switch PFP

Operating element		Linear actuator	Control units		
Designation	**Switch**	**MAX7**	**TLC Pneumatic**	**TGC Pneumatic**	**THC Pneumatic**
PFP	F	✓	✓	✓	✓

F Foot switch
✓ suitable

Ordering key

202 Ordering designation foot switch PFP

Designation	Characteristics
PFP 1K – 130652	No connector, 2 buttons
PFP 1 – 121545	

Other versions on request.

6.9 Desk switch ST

580 Desk switch ST



Benefits

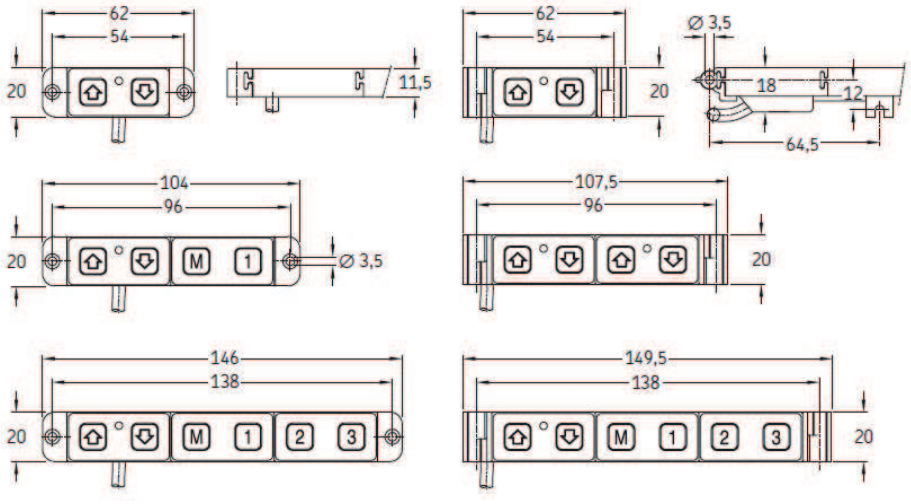
- simple and precise
- attractive design
- position memory

203 Technical data desk switch ST

Feature	Unit	ST
Max. operating channels	No.	3
Operating power supply	V DC /mA	12/50
Protection code (IP)	–	IPX0
Color	–	Black

Dimensional drawings

581 Dimensions desk switch ST



Suitable control units and accessories

204 Suitable control units, lifting columns, and linear actuators for desk switch STA and STE

Operating element		Lifting column [1]		Linear actuator [1]	Control units			
Designation	**Switch**	**TFG 50**	**TXG4, TXG5 , TXG8, TXG9 [2]**	**MAX7**	**SCU 1, SCU 5, SCU 9**	**VCU 5, VCU 8, VCU 9**	**BCU 5, BCU 8**	**MCU**
STA	T		✓	✓				✓
STE	T	✓			✓	✓	✓	

[1] with integrated control units

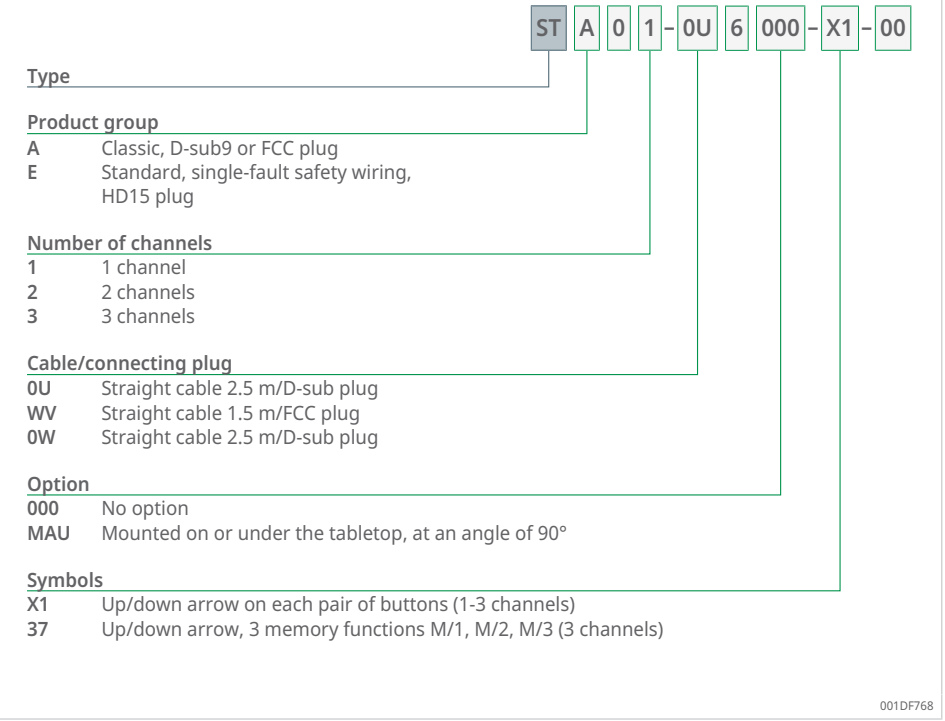
[2] only with FCC plug

T Desk switch

✓ suitable

Ordering key

582 Ordering designation desk switch ST



6.10 Desk switch STK

583 Desk switch STK



001CF1E5

Benefits

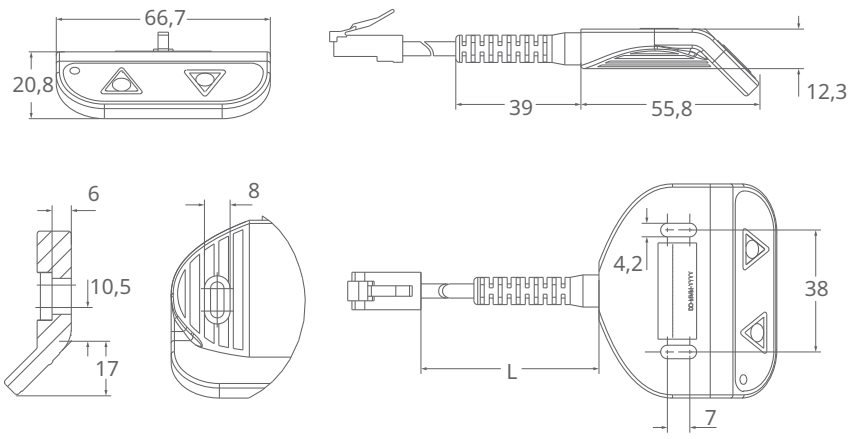
- simple and precise
- attractive design
- tactile buttons with finger guide
- LED 2 colors for power and feedback status

205 Technical data desk switch STK

Feature	Unit	STK
Max. operating channels	No.	1
Operating power supply	V DC /mA	12/50
Color	–	Gray
Indicator	–	2-color LED status indicator for power supply and feedback
Plug	–	RJ45
Symbols	–	with arrows up/down

Dimensional drawings

584 Dimensions desk switch STK



001DD48B

206 Dimensions STK

Operating element	L (mm)
STK01-SW3000-X100	500
STK01-UW3000-X100	1000

Suitable control units and accessories

207 Suitable lifting columns and accessories for desk switch STK

Operating element		Lifting columns			Socket boxes	
Designation	Switch	CPMA1–1	CPMA1–2	CPMA2–2	ZDV–348220–002	ZDV–348221–002
STK01-SW3000-x100	T	✓	✓	✓	✓	✓
STK01-UW3000-x100	T	✓	✓	✓	✓	✓

T Desk switch
✓ suitable

Ordering key

208 Ordering designation desk switch STK

Part number	Order number	Characteristics
STK01-SW3000-x100	130025	Desk switch with LED, cable 0.5 m
STK01-UW3000-x100	130026	Desk switch with LED, cable 1 m

6.11 Pneumatic desk switch PAM

585 Pneumatic desk switch PAM



001D040C

Benefits

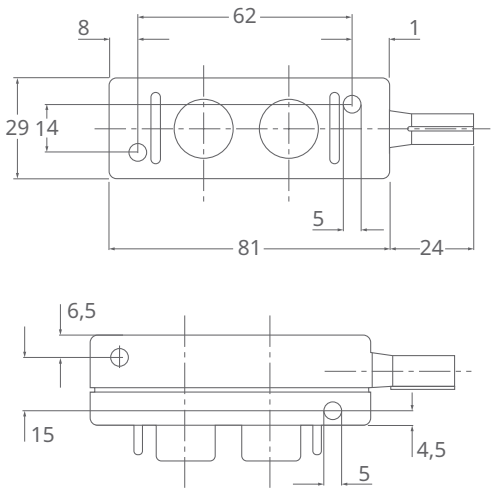
- operation with air (no electricity)
- attractive design

209 Technical data pneumatic desk switch PAM

Feature	Unit	PAM
Max. operating channels	No.	1
Tube	–	Straight, 1.5 m
Color	–	Anthracite

Dimensional drawings

586 Dimensions pneumatic desk switch PAM



001DCDCD

Suitable control units and accessories

210 Suitable control units and linear actuators for pneumatic desk switch PAM

Operating element		Linear actuator	Control units		
Designation	**Switch**	**MAX7**	**TLC Pneumatic**	**TGC Pneumatic**	**THC Pneumatic**
PAM	T	✓	✓	✓	✓

T Desk switch
✓ suitable

Ordering key

211 Ordering designation pneumatic desk switch PAM

Designation
PAM–130256

7 New solution for medical applications

7.1 EWELLIX linear actuator CAMT

EWELLIX linear actuator for operating tables and treatment chairs

587 CAMT



Benefits

- play-free movement
- easy installation
- compact design

Standards

- IEC 60601-1
- IEC 60601-1-2

212 Technical data CAMT

Feature		CAMT20
Rated push force	N	6000
Rated pull force	N	6000
Static load (push/pull) [1]	N	13200
Safety factor under load conditions [2] [3]	–	4

Feature		CAMT20
Speed (full load ... no load) [4]	mm/s	5 to 6.5
Stroke S	mm	50 to 250
Voltage (DC)	V	24
Current consumption	A	10
Duty cycle	%	10
Ambient temperature	°C	+10 to +40
Protection code (IP)	–	IP20
Mass [5]	kg	5.8

1) Safety factor against mechanical hazards according to IEC 60601-2-46

2) static safety factor in accordance with IEC 60601-1

3) Depending on the stroke, the push force is reduced. For further information, see the Safety factor under load conditions diagram.

4) Speed at DC 24 V; the speed with VCU and SCU is higher. For further information, see the Speed-load diagram.

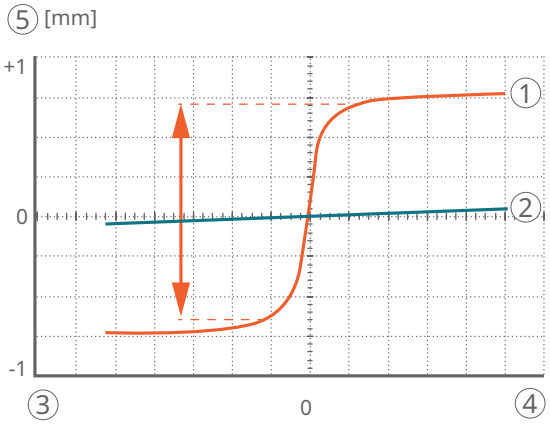
5) for stroke S = 250 mm, without attachment

Product benefits

Play-free movement – enhanced comfort

Since all parts are play-free, the CAMT provides completely smooth movement. Unlike conventional linear actuators, which experience jerking during load changes, the CAMT performs a continuous movement.

588 Play free movement



1	Axial clearance of a standard linear actuator	2	Play-free CAMT [6]
3	Push load	4	Pull load
5	Play		

Easy installation – completely straightforward

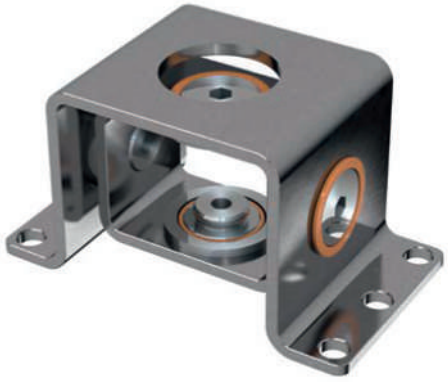
Thanks to the new design with additional front and rear attachment with 1 or 2 degrees-of-freedom in movement.

589 Front attachment: play-free



001CF1F1

590 Rear attachment: play-free



001CF1F2

Compact design – perfect system integration

The compact design simplifies system integration. It can be used as a single actuator or in combination with other actuators (CAMT or lifting column) to generate a combined movement

591 Lift modules and tilt modules for operating tables

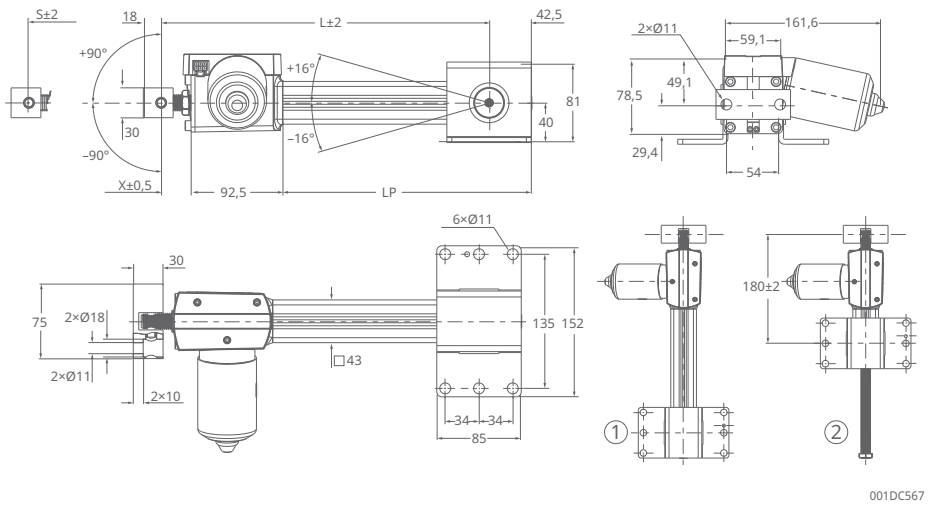


001CF1F6

Dimensional drawings

Connection with 1 degree-of-freedom (CAMT20-..-00..-BC-AF..-000)

592 Dimensions for attachment with 1 degree-of-freedom

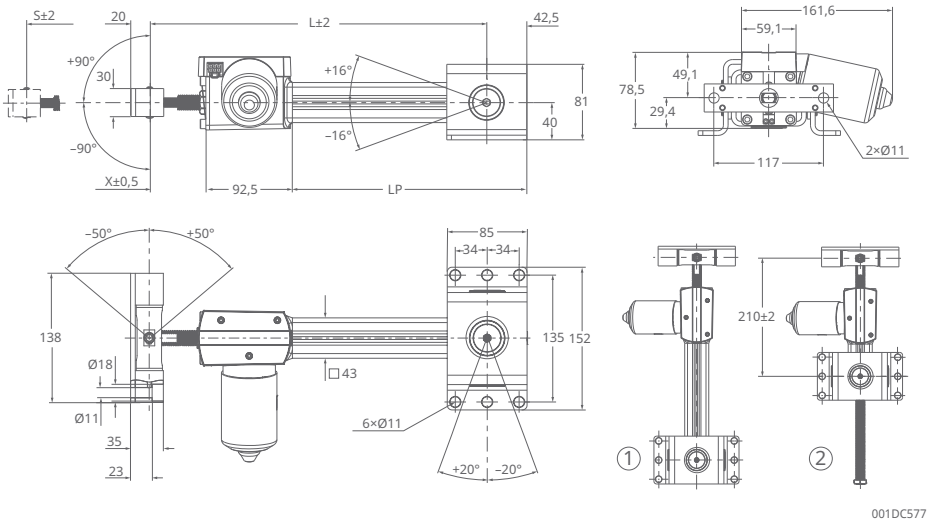


L	Retracted length	X	Offset
S	Stroke	LP	Protection tube length
1	Long protection tube	2	Short protection tube

Long protection tube: L = S + X + 50 mm
Short protection tube: L = X + 150 mm
Standard offset: X = 30 mm

Connection with 2 degrees-of-freedom (CAMT20-..-00..-CC-AF..-000)

593 Dimensions for attachment with 2 degrees-of-freedom

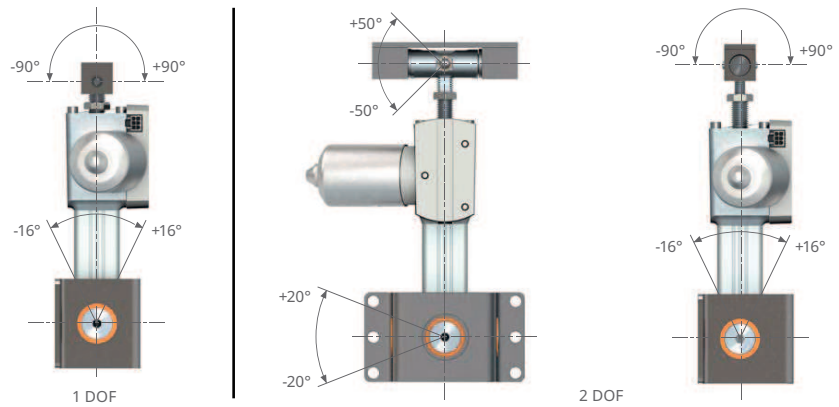


L	Retracted length	X	Offset
S	Stroke	LP	Protection tube length
1	Long protection tube	2	Short protection tube

Long protection tube: L = S + X + 50 mm
Short protection tube: L = X + 150 mm
Standard offset: X = 60 mm

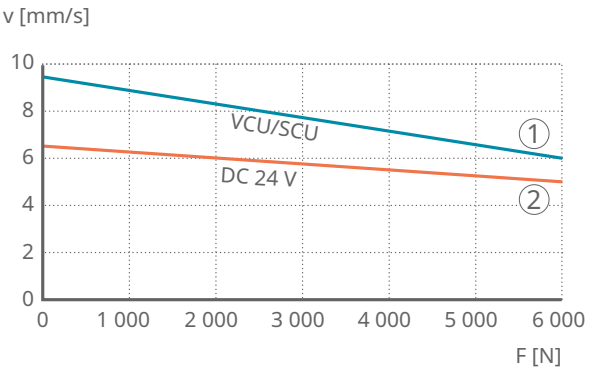
Angle of movement, play at front and rear attachment

594 Angle of movement at front and rear attachment



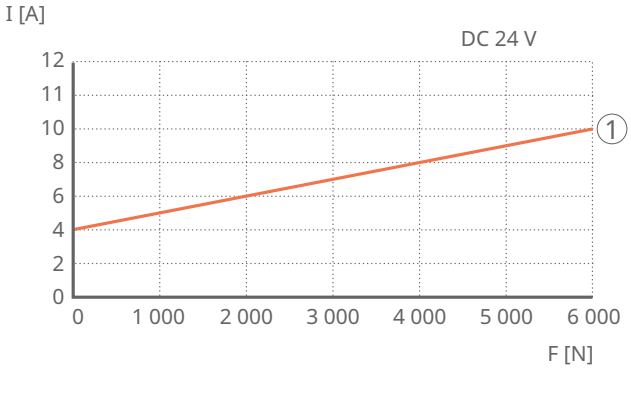
Performance diagrams

595 Speed-load diagram CAMT



1	VCU, SCU	2	DC 24 V

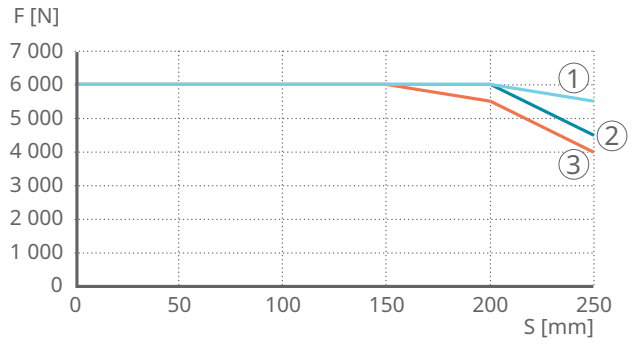
596 Current-load diagram CAMT



1	DC 24 V		

Load limit

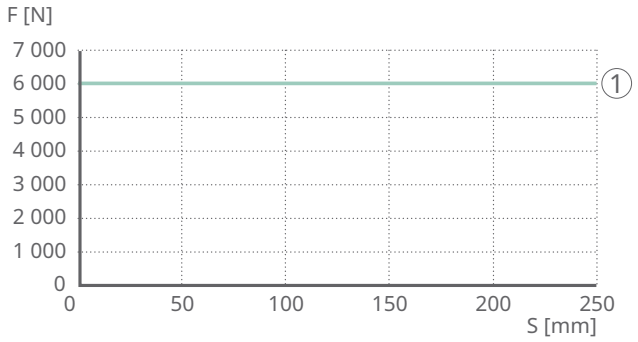
597 Push load limit with safety factor SF = 4 (IEC 60601-1)



001D1C9E

1	Attachment with 2 degrees-of-freedom, with long protection tube [7]	2	Clevis attachment
3	Attachment with 1 degree-of-freedom [7] [8]		

598 Load limit (pull and push) with safety factor SF = 2.2 (IEC 60601-2-46)

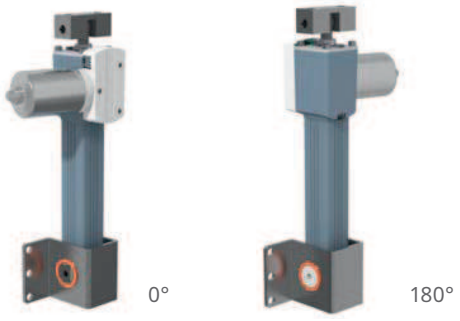


001D1CA1

1	CAMT		

Orientation of rear attachment

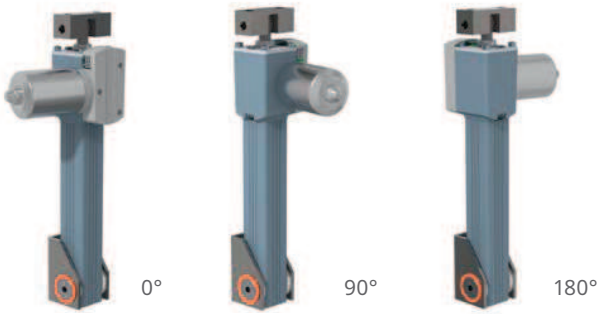
599 Standard bracket (1 degree-of-freedom and 2 degrees-of-freedom)



Standard bracket (1 DOF and 2 DOF)

001D38EB

600 U-bracket (1 degree-of-freedom)



U-bracket (1 DOF)

001D38F9

Suitable control units and accessories

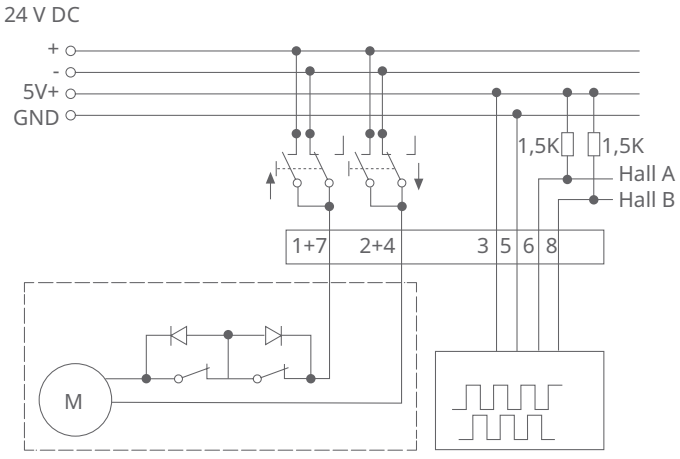
213 Suitable control units and accessories for CAMT

Operating element		Control units		
Designation	**Switch**	**SCU1, SCU5, SCU9**	**VCU5, VCU8, VCU9**	**BCU5, BCU8**
EHE1	M	✓	✓	✓
STJ	F	✓	✓	✓
STE	T	✓	✓	✓

M Hand switch
F Foot switch
T Desk switch
✓ suitable
– not suitable

Wiring diagrams

601 Connecting diagram CAMT

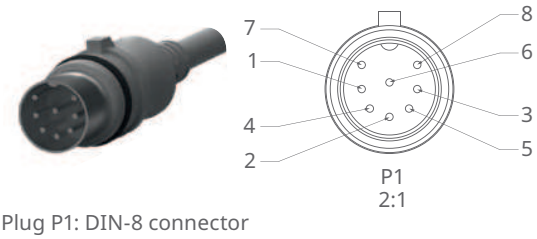


Encoder resolution 0,02127 mm/edge

001D38AB

Electrical connection

602 Plug P1: DIN-8 plug



Plug P1: DIN-8 connector

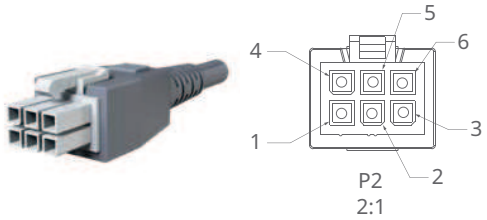
001D38BB

603 Open flying leads



001DDB34

604 Plug P2: 6-pin Molex, Mini-Fit Jr. connector



Plug P2: Molex Mini-fit Jr. 6-pole

001D38DB

214 Electrical connection CAMT

Plug P1	Color	Cross-section	Function	Plug P2
1+7	Blue	AWG 16	– on, + off	4
2+4	Red	AWG 16	+ on, – off	1
3	Pink	AWG 24	+5 V	2
5	Gray	AWG 24	GND	5
6	Yellow	AWG 24	Hall sensor signal 1	3
8	Green	AWG 24	Hall sensor signal 2	6

Ordering key

605 Ordering designation CAMT



Type

Load
2 6000 N

Voltage
0 DC 24 V

Stroke S
050 50 mm
100 100 mm
150 150 mm
200 200 mm
250 250 mm
xxx Customized (10 mm increments), available on request[1)]

Distance between front attachment and gearbox (offset "X", see dimensional drawing)
00 Standard
xx Customized (10 mm increments), available on request[1)]

Protection tube length "LP", see dimensional drawing
00S Short (shortest possible length)
00L Long (trapezoidal spindle covered in retracted position)
xxx Customized (10 mm increments), available on request[1)]

Front attachment
A Joint, D12 H7 bore
B Attachment with 1 degree-of-freedom
C Attachment with 2 degrees-of-freedom
D Joint, D8 JS7 bore

Rear attachment
B Attachment with 1 degree-of-freedom 0°
C Attachment with 2 degrees-of-freedom 0°
E Attachment with 1 degree-of-freedom 180°, available on request
F U-bracket attachment with 1 degree-of-freedom 0°, available on request
G U-bracket attachment with 1 degree-of-freedom 90°, available on request
H U-bracket attachment with 1 degree-of-freedom 180°, available on request
I Attachment with 2 degrees-of-freedom 180°, available on request

Mechanical options
A Back-up nut

Electrical options
F End limit switch

Cable options
A 1 m, straight, with DIN-8 plug
B 2.3 m, straight, with DIN-8 plug
C 2.3 m, straight, with flying leads
0 Without cable, available on request

[1)] Customized lengths must be clarified with the customer, as restrictions may apply due to varying application. Contact Schaeffler for further information.

001E0185

7.2 EWELLIX linear actuator EMA-80M

The EWELLIX linear actuator EMA-80M is a modular electromechanical linear actuator that has been specially developed for use in medical applications. It replaces hydraulic applications in medical imaging patient tables, offering a compact, energy-efficient, and maintenance-free alternative for demanding motion tasks.

Features

Each component is designed for use in patient tables and meets the medical standard according to IEC 60601-1 for medical electrical equipment.

The following features enable reliable and safe use in medical technology:

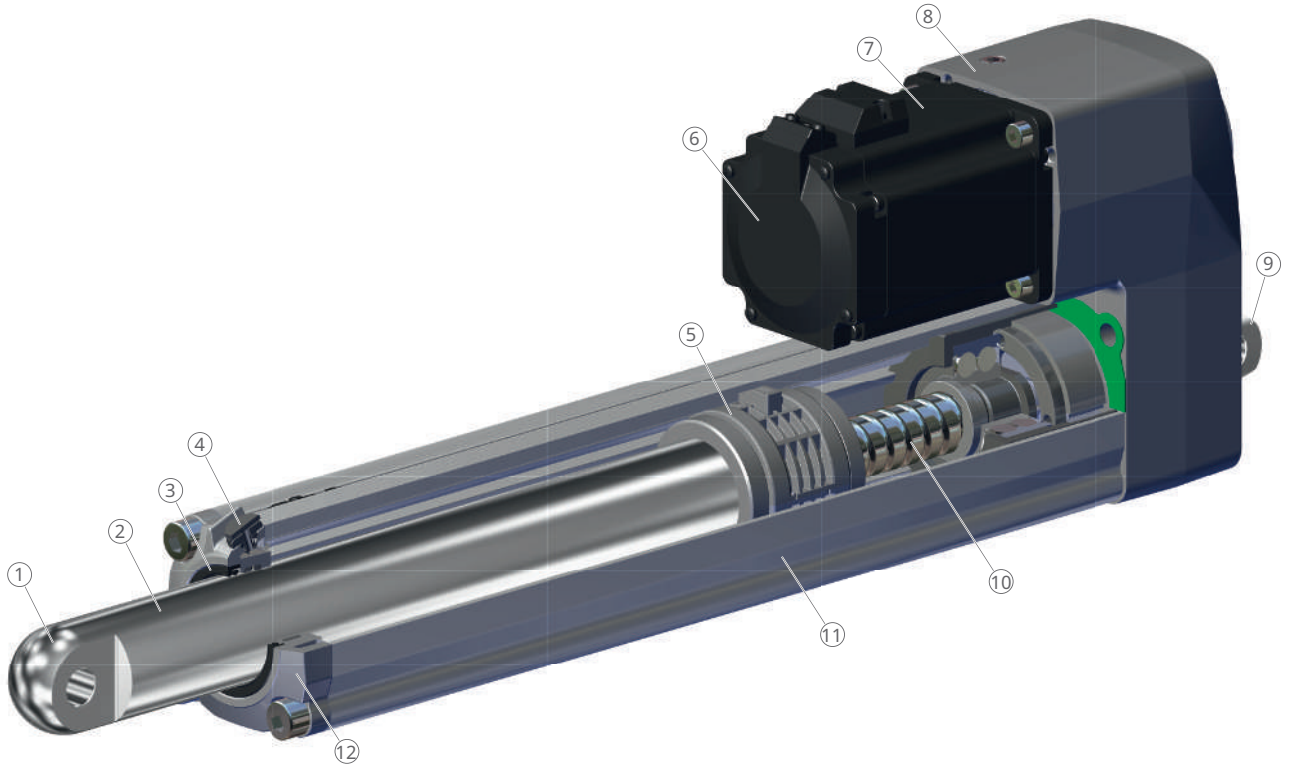
- Linear unit
  - push tube with front attachment
  - ball screw drive with back-up nut
  - precise positioning thanks to encoder
  - sealing system conforms to degree of protection IP65M
- Gearbox
  - three-stage helical gearbox with gear ratio i = 15:1
  - manual override for emergency adjustment in the event of a power failure
- Motor
  - either with DC-motor or AC-motor
  - magnetic, optical or mechanical encoder

Benefits

- optimal lifetime even in the presence of high forces
- precise positioning and repeat accuracy
- compact design with short installation length when retracted
- high static load safety factor and self-locking brake
- high speed and long duty cycle for increased productivity
- smooth, quiet movements

Product assembly

606 Assembly of the linear actuator



1	Front attachment	2	Push tube
3	Sealing	4	Vent plug
5	Threaded nut with back-up nut and magnet	6	Encoder
7	Motor	8	Gearbox
9	Rear attachment	10	Ball screw drive
11	Protection tube	12	Front cover

The interfaces and assemblies have the following functions:

- Front attachment:
  - mechanical connection between the push tube of the drive and the moving part of the application
  - Standard attachment with rod end
- Rear attachment:
  - mechanical connection between the gearbox of the linear actuator and the moving part of the application
  - Standard attachment with rod end
- Encoder:
  - precise motion control and operation monitoring

Screw drive

The linear actuator is equipped with a ball screw drive.

The screw drive converts the rotary motion of the motor into precise and efficient linear motion, ensuring a high load carrying capacity and long lifetime.

Back-up nut

The back-up nut is additionally integrated into the main nut as standard. During normal operation, the back-up nut is not in contact with the ball screw drive. The back-up nut prevents the linear actuator from collapsing if the threaded nut fails. If the back-up nut engages, the linear actuator can no longer be moved.

Once the back-up nut is engaged, the linear actuator must be replaced.

The function of the back-up nut is designed for both load directions.

7.2.1 Performance overview

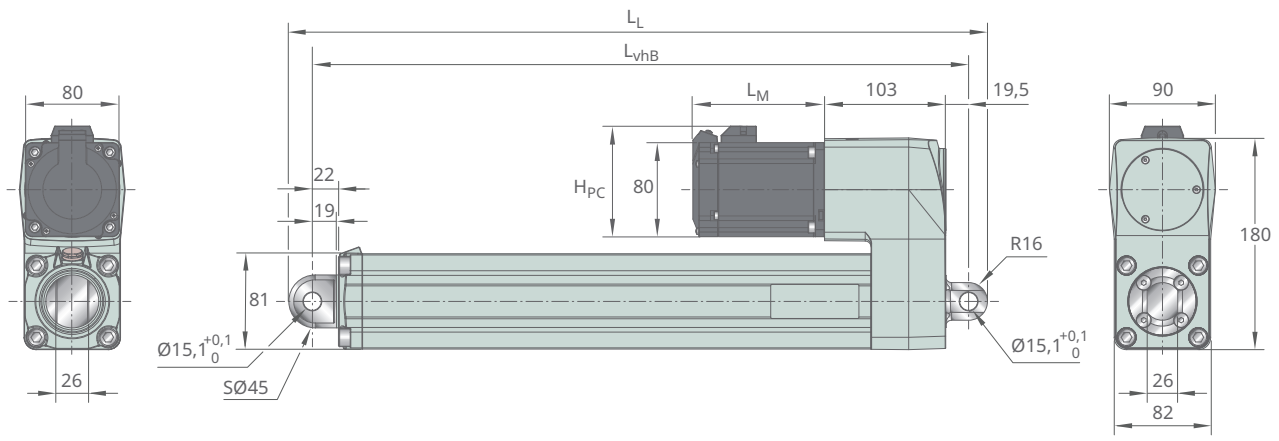
The following table shows the performance data and the mechanical characteristic values of the linear actuator.

215 Performance overview of the EWELLIX linear actuator EMA-80M

Characteristic	Symbol	Unit	Variant DC	Variant AC
Performance data				
max. linear speed	v_{max}	mm/s	25	25
Duty cycle	ED_L	%	20	20
Voltage	–	V	48	220
Power consumption	–	W	750	750
Current consumption	–	A	18.7	5.5
Mechanical data				
Rated push force	–	kN	20	20
Rated pull force	–	kN	20	20
Stroke	S	mm	50 ... 700	50 ... 700
Mass	m	kg	13.2	13.2
Ambient data				
Ambient temperature	–	°C	+10 ... +40	+10 ... +40
Load capacity safety factor	–	–	4	4
Protection code (IP)	–	–	IP65M	IP65M
Medical standard	–	–	IEC 60601-1 ed 3.2	IEC 60601-1 ed 3.2

7.2.2 Geometric data

607 Linear actuator dimensions



216 Dimensions of linear actuator

Characteristic	Variant DC	Variant AC
H_{PC}	93	89
L_M	90.9 ±1	90.9 ±1
L_{vhB}	H_0 + 258	H_0 + 258
L_L	L_{vhB} + 36	L_{vhB} + 36

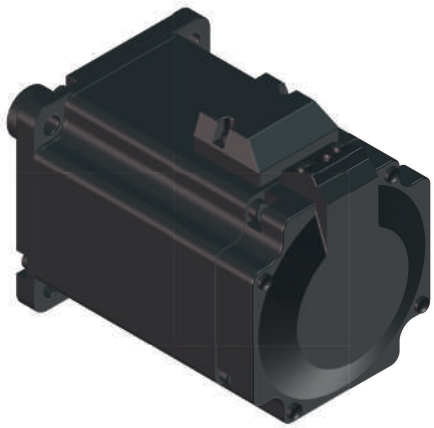
H_0	mm	nominal stroke
H_{PC}	mm	Height of connector
L_L	mm	Length from front attachment to rear attachment
L_M	mm	Length of motor
L_{vhB}	mm	Retracted length

7.2.3 Motor

The electric motor is the primary drive element of the linear actuator and converts electrical energy into rotary motion. For the EWELLIX linear actuator EMA-80M, a motor in 2 configuration variants with direct current DC 48 V or alternating current AC 220 V is available.

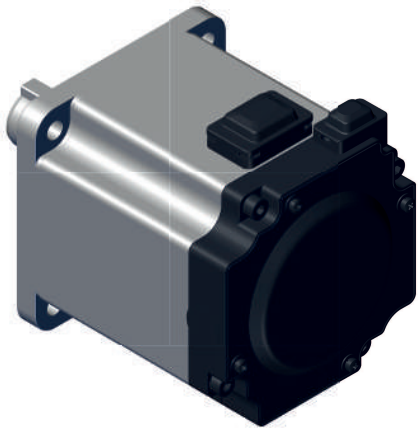
The alignment relative to the gearbox must be observed when ordering motors.

608 Motor DC 48 V



001D09CC

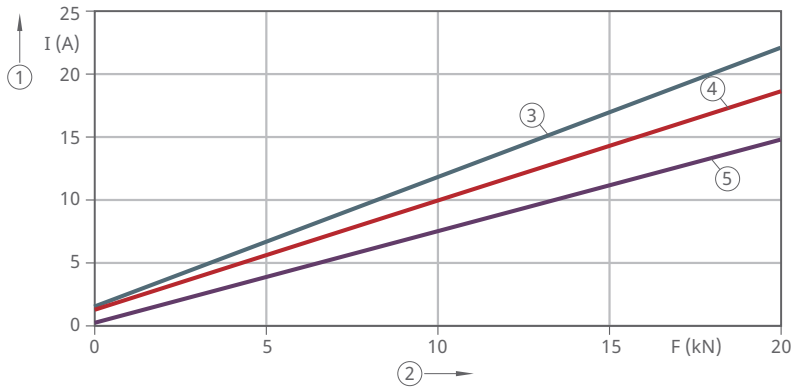
609 Motor AC 220 V



001D09CD

7.2.3.1 Diagrams force-current

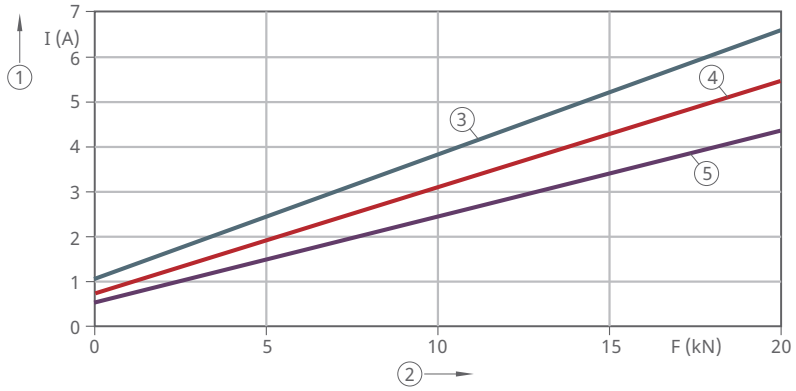
610 Diagram force-current DC 48 V



001D0749

1	Current consumption I	2	Force F
3	I and F at 25 mm/s	4	I and F at 20 mm/s
5	I and F at 15 mm/s		

611 Diagram force-current AC 220 V



001D0746

1	Current consumption I	2	Force F
3	I and F at 25 mm/s	4	I and F at 20 mm/s
5	I and F at 15 mm/s		

7.2.3.2 Encoder

Depending on the application requirements, various encoders are used for position feedback and speed feedback of the electromagnetic linear actuator to ensure precise control and reliable operation monitoring.

Three different encoders are available for the linear actuator:

- Hall sensor
- Optical rotary encoder
- Mechanical absolute encoder

7.2.4 Notes on orientation

Various orientations are available for the linear actuator:

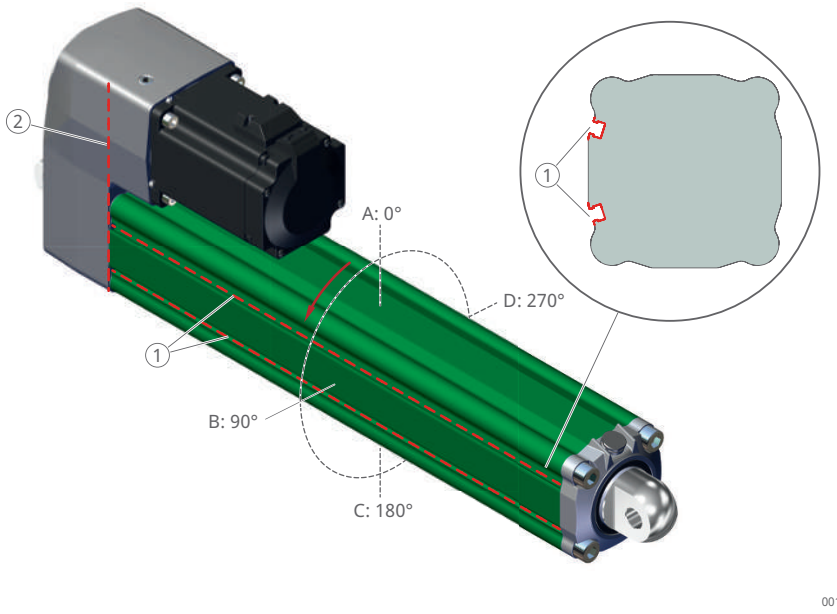
- entire linear unit relative to the gearbox (with vent plug)
- motor relative to the gearbox
- front cover with vent plug relative to the slot

7.2.4.1 0° reference for the linear unit

The 0° reference for the linear unit is the gearbox.

The linear unit can be rotated in 90° increments.

612 Possible orientation of the linear unit

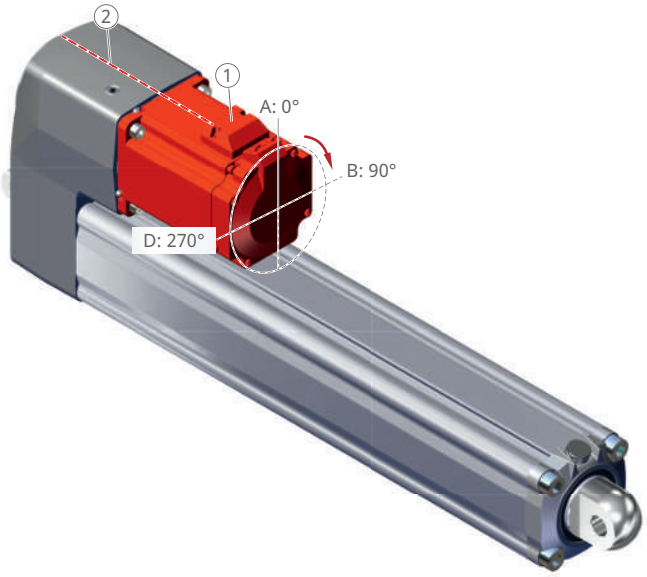


1	Position of the slot	2	Position of the gearbox

7.2.4.2 0° reference for the motor

The 0° reference for the motor is the gearbox position. The motor can be rotated to the 0° position, 90° position or 270° position. The motor cannot be positioned at 180° due to the location of the connectors.

613 Possible orientation of the motor



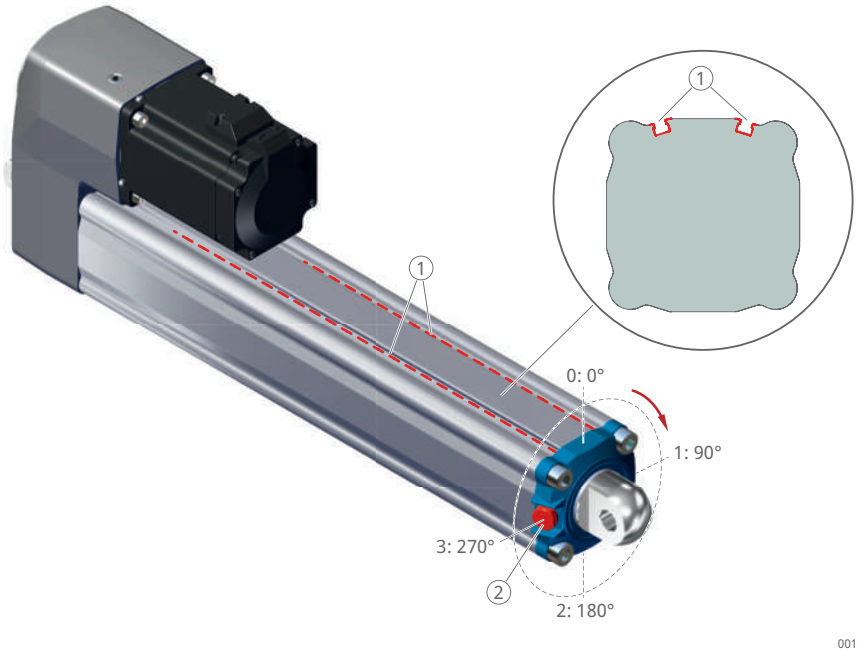
1	Position of the connectors	2	Position of the gearbox

7.2.4.3 0° reference for front cover with vent plug

The 0° reference for the front cover with vent plug is the slot. The front cover with vent plug can be rotated in 90° increments.

The front cover with vent plug must be protected against water accumulation. The orientation must be selected accordingly.

614 Possible orientation of the front cover with vent plug



1	Position of the slot	2	Position of the vent plug

7.2.5 Ordering designation

615 Ordering designation EMA-80M

EMA80 – M B 0350 M 0 0 1 – MM 00 0 000 A 0 – 00

Product version
Linear actuator EMA-80
M Medical

Spindle type
B Ball screw drive 25×10 with back-up nut

Stroke
50...700 Stroke in mm (in 50-mm increments)

Push tube interface and front attachment
M Rod end with opening Ø15 mm, width 26 mm

Front cover with vent plug (relative to the slot)
0 Orientation vent plug 0°
1 Orientation vent plug 90°
2 Orientation vent plug 180°
3 Orientation vent plug 270°

Bearing housing (relative to the slot)
0 Standard with mechanical brake

Limit switch
0 None
1 2x magnetic sensor fitted, PNP normally closed (NC)

Gearbox type and ratio
MM Helical gearbox, 3-stage, i15

Rear attachment and orientation
00 No rear attachment
MA Rod end with opening Ø15 mm, width 26 mm, 0°
MB Rod end with opening Ø15 mm, width 26 mm, 90°

Options
0 Cover
1 Manual override

Motor
000 No motor

Motor included in the scope of delivery and fitted by Schaeffler.
L41 Leadshine BLDC DC 48 V with 23-bit hall sensor on the motor
L42 Leadshine BLDC DC 48 V with 23-bit optical rotary encoder on the motor
L43 Leadshine BLDC DC 48 V with 23-bit absolute encoder (mechanical) on the motor
L21 Leadshine BLDC AC 220 V with 23-bit hall sensor on the motor
L22 Leadshine BLDC AC 220 V with 23-bit optical rotary encoder on the motor
L23 Leadshine BLDC AC 220 V with 23-bit absolute encoder (mechanical) on the motor

Linear unit orientation (slot relative to the gearbox)
A 0°
B 90°
C 180°
D 270°

Motor orientation
0 No motor fitted
A 0°
B 90°
D 270°

Customized options
00 No options

001DCC7B

8 Glossary and symbols description

8.1 Glossary

A	
Absolute movement	A movement referenced from a fixed absolute zero position.
Equivalent dynamic axial load	Load of constant magnitude over a complete motion cycle that has the same effect on the service life of the linear unit as the actual fluctuating load.
Axial load	Load in which the force acts along the axis of the linear actuator (bearing) in any direction.
B	
Load	of an application acting on the push tube in an axial direction.
Acceleration	The change in speed as a function of time from a lower speed to a higher speed.
Motion profile	A method of describing a motion operation in terms of time, position, and speed. Typically, speed is characterized as a function of time or distance which results in a triangular or trapezoidal profile.
Bushing	A cylindrical sleeve inserted into a machine part to reduce friction between moving parts.
BLDC motor	Synchronous motor type powered by a DC supply, in which an inverter generates an AC signal to drive the motor.
C	
Configurator (product)	Name given to the software used to configure a specific linear actuator from an existing list of components and options based on the configuration character string.
D	
Continuous torque	The torque that the motor can continuously deliver without time limitation.
Torque	A measure of rotational force that generates rotational motion.
Dynamic load rating	Constant that is used to calculate the service life of a screw drive. The value for the dynamic load rating represents the load under which 90% of a sufficiently large number of identical screw drives can achieve a service life of one million revolutions.
E	
Root mean square value	The root mean square value is the square root of the mean of the squared values.
Units (metric)	A decimal system of weights and measures based on the kilogram and meter.
Duty cycle	The ratio between motor on-time and total cycle time within a specified operation cycle (considered under normal ambient working conditions).
Electrode	The part of a resistance welding gun that facilitates the high voltage current path to the parts being welded.
Electromechanical linear actuator	A self-contained system that converts rotary motion (from a motor) into linear motion.
Anodized	Protective treatment for aluminum in which the metal is electrolytically treated in a chemical bath to produce a protective aluminum oxide film with a very smooth surface.
Limit switch	A switch actuated by part of the movement of a machine or device in order to change the associated electrical circuit.
F	
Foot mount	Mounting plates attached to the front and end of a linear actuator to mount the actuator parallel to a flat surface.
G	
Accuracy	An absolute measurement defining the difference between expected and actual position.
	Force of gravity acting on a body. Determined by multiplying the mass of the object by the acceleration due to gravity.
Screw drive assembly group	Device that converts rotary motion into linear motion.
H	
Hall effect sensor	A magnetically controlled transistor switch that controls a DC circuit. It has no moving parts and theoretically has unlimited contact life.
Holding force	Maximum external force that can be applied to a stopped linear actuator without causing any linear movement. It is typically specified by the holding torque of an electromechanical brake acting on the motor.
Stroke length	The linear distance that the push tube of a linear actuator can extend or retract.
K	
Keyway	An axially arranged slot along a shaft in which a key may be located.
Force	The action of one body on another which tends to change the state of motion of that body. Typically described in terms of magnitude, direction, and point of application of the force.
Ball screw drive	A screw drive assembly group with a ball nut containing one or more circuits of recirculating steel balls rolling between the nut and the screw drive.
Ball bearing	A support element that enables smooth, low-friction motion between two surfaces loaded against each other using balls as rolling elements.

L	
Bearing	A support element that enables smooth, low-friction motion between two surfaces loaded against each other.
Service life (in km)	Service life in km that 90 % of a sufficiently large group of apparently identical linear actuators can achieve or exceed.
Service life (in revolutions or operating hours)	The nominal life is expressed as the number of revolutions (or number of operating hours at constant rotary speed) that 90% of a sufficiently large number of identical screw drives will achieve or exceed before the first signs of material fatigue become apparent.
Power	How much work is done in a specific amount of time.
Linear actuator	A linear actuator is a device responsible for moving or controlling a mechanism or system and is also referred to as an electromechanical linear actuator.
Linear speed	The linear speed is the change in position as a function of time.
Max linear speed	Maximum linear speed is the linear speed that a linear unit or linear actuator can achieve without damaging the mechanical system. Limiting factors may include the recirculating system of the balls or rollers, heat dissipation when using trapezoidal screw drives, or other factors. If the linear actuator motor is capable of rotating at a higher speed, its speed must be limited.
Humidity (relative)	A ratio that indicates the amount of water vapor in the air. It is usually expressed as a percentage. At any temperature, it is the amount of water vapor in the air divided by the amount of water vapor that would be present at saturation.
M	
Mass	The amount of matter contained in an object.
Moment	Rotational forces acting on a linear axis, typically expressed as yaw, pitch, and roll.
Motor	A device that converts electrical energy into mechanical energy.
N	
Proximity sensor	A device for detecting the position of a linear actuator or application. Proximity sensors deliver either a sourcing signal or a sinking signal to a device such as a programmable logic controller (PLC).
O	
O-ring	A ring made of synthetic rubber with a circular cross-section, used as a seal.
P	
Positioning accuracy	The maximum deviation between the actual position and the target position, as defined in standard VDI/DGQ 3441.
R	
Radial load	Load in which the force acts perpendicular to the axis of the linear actuator.
Friction	The resistance to motion of two surfaces that are in direct contact.
Resolver	A feedback device consisting of a stator and a rotor that provides position and speed information to the drive for motor commutation.
Roller screw drive	A screw drive assembly group with a roller nut containing guided steel rollers that rotate both around their own axis and around the screw drive (planetary rollers).
S	
PLC (programmable logic controller)	An industrial digital computer used to control machines and processes by continuously monitoring analog and digital inputs and making decisions based on customer programs.
Angular contact ball bearing	Angular contact ball bearings have raceways in the inner and outer rings that are displaced relative to each other in the direction of the bearing axis. This means that they are designed to accommodate combined loads, i.e., simultaneously acting radial and axial loads.
Servo-motor	A motor used in closed-loop control systems in which feedback is used to control motor speed, motor position, or motor torque.
Backlash	Also known as axial clearance, this is the distance that the push tube can travel during a change in force direction. The linear actuator housing is fixed and the drive shaft does not rotate. It is calculated by summing the backlash values of the various components in the kinematic chain, such as the screw drive, bearing, and anti-rotation device (for the linear unit), as well as the coupling and gearbox (for the complete linear actuator). This value applies to new linear actuators.
Peak torque	The peak force is the maximum torque that a motor can provide for a short period of time (peak) to generate a pull force without being mechanically damaged or overheating.
Peak force	The peak force is the maximum force that a linear actuator can push or pull for a short period of time (peak) without being mechanically damaged or overheating.
Rod-type linear actuator	A linear actuator that uses a rod attached to its piston to transmit force.
Static axial force	Maximum axial force that may only be applied to a linear unit if it is not moving.
Stiffness	The stiffness of an object, representing its resistance to deformation under an applied force.
Lead	Describes the axial distance that a screw drive moves during one complete rotation of either the screw or the nut.
Spur gearbox	A gear or gear system with radial teeth that run parallel to the axle.
Current	The flow of charge through a conductor.

T	
Thermal load	The thermal load describes the force that the linear actuator can continuously exert without overheating. The thermal load is calculated using a formula that takes into account varying load conditions over different time phases of a complete motion cycle.
Trapezoidal screw drive	A screw drive with a thread design (e.g., a trapezoidal thread) in which gliding surfaces exist between the screw and the nut.
Moment of inertia	Property of an object that resists a change in motion. The moment of inertia depends on the mass and shape of the object. The greater the mass of an object, the greater its inertia and the more force is required to accelerate and decelerate it.
U	
Overheating	The heat in a system is largely dissipated into the surrounding air. Dissipation can be accelerated by various forms of ventilation. If heat dissipation is lower than heat generation, overheating will occur.
Gear ratio	This refers to the transmission and conversion of movements, linear and rotational speeds, forces, and torques in a geared mechanism. The gear ratio (also known as reduction ratio) is the ratio between the input and output variable, e.g., the ratio of input speed to output speed.
Ambient temperature	The temperature of the cooling medium, typically air, immediately surrounding the linear actuator or other device.
V	
Deceleration	The change in speed as a function of time from a higher speed to a lower speed.
Volt	Difference in electrical potential between two points.
W	
Watt	A unit of power or a rate of doing work. The power dissipated by a resistance of one ohm carrying a current of one ampere is one watt.
Repeatability	The ability of a positioning system to return to exactly the same position during operation (from the same direction and with the same load and speed).
Efficiency	Ratio of output power versus input power.
Z	
Cycle	A complete movement of a linear actuator from the start position through intermediate positions and back to the start position
Cycle time	Time for one complete motion cycle, from the start of the cycle until the start of the next cycle
Cylinder	A mechanical device which produces a linear force to achieve a reciprocating linear motion. There are 2 common types: pneumatic and hydraulic. The cylinders use the energy of a compressed medium (gas or liquid) to convert the rotating input energy of a motor into linear motion.

8.2 Symbols description

A			
a	m/s^2	Acceleration	The change in speed as a function of time from a lower speed to a higher speed.
a_{max}	m/s^2	Max. acceleration	The maximum permissible change is speed as a function of time from a lower speed to a higher speed. Exceeding this value may result in damage.
C			
C	kN	Dynamic load capacity	Constant that is used to calculate the service life of a ball screw drive or roller screw drive. The value for the dynamic load rating represents the load under which 90 % of a sufficiently large number of identical screw drives can achieve a service life of 1 million revolutions.
D			
D	%	Duty cycle of linear actuator	The ratio of active time at full load to the total cycle time within a specified operating cycle.
D_{unit}	%	Duty cycle of linear unit	The ratio of active time to total cycle time within a specified operating cycle.
d_{screw}	mm	Screw drive diameter	Describes the outside diameter of the screw shaft.
F			
F	N	Force (linear actuator) or load (application)	The action of one body on another which tends to change the state of motion of that body. Typically described in terms of magnitude, direction, and point of application of the force. The force refers to the performance capability of the linear actuator, whereas the load describes the weight of an application acting in the axial direction on the push tube.
$F_{0\,max}$	N	Max. static axial force	Maximum axial force that may only be applied to a linear unit if it is not moving.

$F_{A\ max}$	N	Max. dynamic axial load of the application	Maximum axial push or pull load required to fulfill the specifications of the application.
F_c	N	Continuous force	The continuous force describes the force that the linear actuator can continuously maintain without overheating and without the use of a brake. The continuous force curve in the performance diagram shows the relationship between continuous force and speed.
F_{c0}	N	Continuous force at zero speed	The continuous force at zero speed describes the force that the linear actuator can continuously maintain without overheating and without the use of a brake.
$F_{c\ vmax}$	N	Continuous force at max. speed	The continuous force at max. speed describes the force that the linear actuator can continuously move at the maximum permissible linear speed without overheating.
F_{hold}	kN	Holding force of the brake	Describes the maximum axial load the engaged brake (optional motor brake) can hold if the motor is disabled. This value must not exceed the maximum axial force of the linear actuator.
F_{L10}	N	Max. dynamic axial force	Maximum dynamic axial force for use in the theoretical L_{10} service life calculation.
F_m	N	Equivalent dynamic axial load	Load of constant magnitude over a complete motion cycle that has the same effect on the service life of the linear unit as the actual fluctuating load.
F_{max}	N	max. dynamic axial force	The maximum dynamic axial force describes the maximum force that an electromechanical linear actuator can generate during movements without damaging parts. The acceleration/deceleration of masses must be taken into account.
F_p	N	Peak force	The peak force describes the maximum force that the linear actuator can push or pull for a short period without being damaged mechanically or by overheating. The duration of the peak depends on the temperature of the system at the time the peak occurs.
F_{p0}	N	Peak force at zero speed	The peak force at zero speed is the maximum force that the linear actuator can maintain for a short period without the use of a brake.
$F_{p\ vmax}$	N	Peak force at max. speed	The peak force at max. speed is the maximum force that the linear actuator can maintain for a short period without the use of a brake.
$F_{U\ max}$	N	max. dynamic axial force of the linear unit	Maximum dynamic axial force of the linear unit.
I			
I	A	Rated current	The rated current consumption of the motor.
I_{peak}	A	Peak current	The maximum current consumption of the motor for a short period of time.
i	–	Reduction ratio	Describes the factor obtained by dividing the number of revolutions at the gearbox input by the number of revolutions at the gearbox output. A reduction ratio of 2 means that the gearbox output (linear unit side) rotates at half the speed of the gearbox input (motor side). Using a reduction ratio allows smaller motors with less torque to be used to achieve higher force, but at a lower speed.
IP	–	Protection code (IP)	International protection rating (also referred to as Ingress Protection, IP) describes the protection level of a product using two characteristic numerals. The first numeral describes the protection against dust, the second against water. The higher the value, the better the protection.
J			
J	$kg \cdot m^2$	Moment of inertia	Property of an object that resists a change in motion. The moment of inertia depends on the mass and shape of the object. The greater the mass of an object, the greater its inertia and the more force is required to accelerate and decelerate it. Since electromechanical linear actuators are available in various lengths, the moment of inertia is typically specified for a stroke of 0 mm, followed by the difference in moment of inertia ΔJ for each additional 100 mm.
J_{brake}	$kg \cdot m^2$	Moment of inertia of the brake	Property of an object that resists a change in motion. The moment of inertia depends on the mass and shape of the object. The greater the mass of an object, the greater its inertia and the more force is required to accelerate and decelerate it. As the brake is typically optional, this value must be added to the moment of inertia of the electromechanical linear actuator.
J_{lu}	$kg \cdot m^2$	Moment of inertia of linear unit	Property of an object that resists a change in motion. The moment of inertia depends on the mass and shape of the object. The greater the mass of an object, the greater its inertia and the more force is required to accelerate and decelerate it. Since linear units are available in various lengths, the moment of inertia is typically specified for a stroke of 0 mm, followed by the difference in moment of inertia ΔJ for each additional 100 mm.
L			

$L_{10\ dist}$	km	Service life distance	Service life in km that 90 % of a sufficiently large group of apparently identical linear actuators can achieve or exceed.
M			
M	Nm	Torque	A measure of the rotational force applied to a linear axis to produce rotational motion.
$M_{A\ max}$	Nm	Required max. torque of the motor	Maximum rotational force (torque) of a motor required for the linear actuator to push or pull the maximum application load.
M_{Ac}	Nm	Required continuous torque	A measure of the continuous rotational force (torque) that a motor must deliver without overheating.
M_{c0}	Nm	Rated motor torque, low speed	Rotational motor force (torque) that the motor can continuously deliver at low speed.
M_{max}	Nm	Max. torque	The maximum torque is the upper limit of torque. Exceeding this value may result in damage to the associated parts.
M_{p0}	Nm	peak motor torque, low speed	Rotational motor force (torque) that the motor can deliver at low speed for a short period of time.
$M_{U\ max}$	Nm	Max. input torque of the linear unit	Maximum input torque for the linear unit.
m	kg	Mass	Physical quantity used to describe the amount of matter in a component. Mass is independent of location and given in kg.
Δm	kg	Difference in mass	Since electromechanical linear actuators are available in various lengths, mass is typically specified for a stroke of 0 mm, followed by indication of the difference in mass Δm for each additional 100 mm.
m_{arot0}	kg	Mass of the anti-rotation device	The mass of the optional anti-rotation device must be added to the mass of the linear actuator.
m_{brake}	kg	Mass of the brake	The mass of the optional brake must be added to the mass of the linear actuator.
m_{lu}	kg	Mass of the linear unit	Since linear units are available in various lengths, mass is typically specified for a stroke of 0 mm, followed by indication of the difference in mass Δm for each additional 100 mm.
N			
n_{cycles}	–	Number of cycles	The number of motion cycles that a linear actuator must complete without the occurrence of damage during the expected service life of the application.
n_{max}	min^{-1}	Max. speed	Describes the maximum permissible number of complete revolutions of a shaft. Exceeding this value may result in damage.
P			
P	W	Rated power	The rated power of the motor, calculated by multiplying the rated voltage by the rated current.
p_{screw}	mm	Screw drive lead	Describes the axial distance that a screw drive moves during one complete rotation of either the screw or the nut.
R			
R	Ω	Resistance	The opposition to the flow of charge through a conductor.
S			
S	mm	Stroke	The linear distance that the push tube of a linear actuator can extend or retract.
S_0	mm	Internal overstroke	Additional stroke that is not part of the specified stroke length of the linear actuator. It is used to prevent the screw drive nut from touching the mechanical end stops when moving over the full specified stroke.
$S_{backlash}$	mm	Backlash	Axial play present in the push tube of the linear actuator without rotation of the screw drive. It corresponds to the mechanical axial play of the internal parts of the linear actuator.
S_{cycle}	m	Distance traveled per motion cycle	Distance traveled by a push tube for one complete motion cycle, from one start position to the next start position in both directions.
S_{max}	mm	Max. stroke	The maximum stroke describes the mechanical limit to which a linear actuator can extend or retract. Limiting factors include side loads (buckling), speed (wobbling of the screw drive inside), limitations in the manufacturing process, and other factors.
T			
T_{amb}	°C	Ambient temperature	Temperature of the environment around the object.
t	s	Time	Time in seconds required for a specific activity.
t_{cycle}	s	Cycle time	Time for one complete motion cycle, from the start of the cycle until the start of the next cycle.
t_L	h	Required service life in hours	The service life of a linear actuator in hours required to operate an application throughout its expected service life without damage.
U			
U	V	Rated voltage	The supply voltage required by the electric motor.

v			
v	mm/s	Linear speed	The linear speed is the change in position as a function of time.
v_{max}	mm/s	Max. linear speed	Maximum linear speed is the linear speed that a linear unit or linear actuator can achieve without damaging the mechanical system. Limiting factors may include the recirculating system of the balls or rollers, heat dissipation when using trapezoidal screw drives, or other factors. If the linear actuator motor is capable of rotating at a higher speed, its speed must be limited.
v_{min}	mm/s	Min. linear speed	Minimum linear speed of a linear actuator equipped with induction motors that can be adjusted through the integrated frequency inverter.
η			
η	%	Efficiency	Ratio of output power to input power.
η_{lu}	%	Efficiency of the linear unit	Ratio of output power to input power of the linear unit.

Schaeffler Technologies AG & Co. KG
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
www.schaeffler.de/en
info.de@schaeffler.com

In Germany:
Phone 0180 5003872
From other countries:
Phone +49 9721 91-0

All information has been carefully compiled and checked by us, but we cannot guarantee complete accuracy. We reserve the right to make corrections. Therefore, please always check whether more up-to-date or amended information is available. This publication supersedes all deviating information from older publications. Printing, including excerpts, is only permitted with our approval.
© Schaeffler Technologies AG & Co. KG
LA 1 / 01 / en-US / 2026-06