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1.1 LINEARMECH LINEAR ACTUATORS

Linearmech electromechanical linear actuators are motorized mechanical cylinders able to transform a rotary movement of a motor into a linear motion.

Able to work under push or pull load. Due to the mechanical resistance of their components, many actuators can support push loads higher than pull loads.

Their main characteristics are the high performance reliability, with or without load, and the low noise level.

Their installation is simple and not expansive: it requires just a front and rear hinging as for standard hydraulic and pneumatic cylinders.

They can effectively replace pneumatic and hydraulic cylinders being able to perform:

- Reliability in push-pull motion
- Accuracy in stopping position
- Position holding under load (self-locking)
- Energy consumption during operation only
- Easy installation; only power and control electrical cables are required
- High safety in load lifting (static self-locking and safety nut available)
- Safe operation even in very high or very low temperature conditions without risk of freezing or fire; electromechanical cylinders do not use air or oil under pressure

The wide range of sizes, stroke lengths, motor types, linear speeds and available accessories makes it easy to use these products not only in new applications but also to replace hydraulic and pneumatic cylinders, improving the solution in terms of performances and economical advantages.

Linearmech S.r.l. Technical Dpt. is available to carry out calculations, technical checks and norm certifications issue according to customer requirements.

The technical catalogue in PDF format and 3D/2D models of standard products selected with a configurator can be downloaded on our website www.linearmech.it. For customized products and dimensioned drawings, please contact: info@linearmech.it.

Linearmech S.r.l. offers:

- Complete range of **standard electromechanical linear actuators** as per catalogue.

The mounting is carried out upon customer's purchase order. All components are available on stock. This ensure very short delivery time and immediate availability in case of machine stop.

- **Customized electromechanical linear and rotative actuators.**

The customization is carried out according to customer specific requirements. It can involve simple modifications of existing models up to the design and execution of completely tailor-made products, exclusively manufactured for a specific customer.

On request, products can be marked with customized label.

Linearmech electro-mechanical actuators are totally manufactured in Italy in the plant located in Anzola dell’Emilia (Bologna). All components used in the production are of Italian manufacture.

As a matter of fact, the entire product can be defined as “Made in Italy”, assuring a constant total quality, checked by professional and skilled personnel.
1.2 LINEARMECH ACTUATORS RANGE

Linearmech linear actuators range consists of two main product groups determined by their different linear drives:
- Acme screw linear actuators;
- Ball screw linear actuators.

### LINEARMECH ELECTROMECHANICAL ACTUATORS

**Acme screw LINEAR ACTUATORS**

<table>
<thead>
<tr>
<th>Model</th>
<th>$F_{\text{max}}$</th>
<th>$V_{\text{max}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMR 01</td>
<td>1300 N</td>
<td>52 mm/s</td>
</tr>
<tr>
<td>LMR 02</td>
<td>3000 N</td>
<td>40 mm/s</td>
</tr>
<tr>
<td>LMR 03</td>
<td>6000 N</td>
<td>25 mm/s</td>
</tr>
</tbody>
</table>

**Duty cycle**
- 15% on 10 min
- 30% on 10 min

**Ball screw LINEAR ACTUATORS**

<table>
<thead>
<tr>
<th>Model</th>
<th>$F_{\text{max}}$</th>
<th>$V_{\text{max}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSA 08</td>
<td>4000 N</td>
<td>63 mm/s</td>
</tr>
<tr>
<td>BSA 10</td>
<td>5000 N</td>
<td>63 mm/s</td>
</tr>
<tr>
<td>BSA 11</td>
<td>5000 N</td>
<td>125 mm/s</td>
</tr>
<tr>
<td>BSA 12</td>
<td>9000 N</td>
<td>58 mm/s</td>
</tr>
</tbody>
</table>

**Duty cycle**
- 50% on 10 min
- 100% on 10 min

### GEARMOTORS

**for rotative actuators**

<table>
<thead>
<tr>
<th>Model</th>
<th>$M_t$</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR 15</td>
<td>3 Nm</td>
<td>520 rpm</td>
</tr>
<tr>
<td>MR 31</td>
<td>15 Nm</td>
<td>185 rpm</td>
</tr>
<tr>
<td>MR 40FC</td>
<td>15 Nm</td>
<td>185 rpm</td>
</tr>
</tbody>
</table>
1.2 LINEARMECH ACTUATORS RANGE

LMR Series
Acme screw linear actuators, 3 sizes available. DC motor.
Built-in adjustable stroke end switches activated by self-keeping commutation devices.
Load capacity up to 6 000 N, linear speed up to 52 mm/s

ATL Series
Acme screw linear actuators, 5 sizes available. DC or AC 1-phase or 3-phase motors.
Adjustable stroke end magnetic reed switches and external adjustable stroke end electric switches.
Load capacity up to 11 000 N, linear speed up to 150 mm/s

CLA Series
Acme screw linear actuators, 6 sizes available. DC or AC 1-phase or 3-phase motors.
Adjustable electric cam-operated stroke end switches fitted in closed box.
Rotative potentiometer for positioning control.
Load capacity up to 10 000 N, linear speed up to 100 mm/s

LMI 02
Acme screw linear actuator with compact cylindrical shape, small overall dimensions. DC motor.
Max load 750 N, linear speed up to 20 mm/s

LMP 03
Acme screw linear actuator with motor mounted parallel to actuator axis. DC motor.
Max load 280 N, linear speed up to 190 mm/s

UAL 0
Acme screw linear actuator, timing belts and pulleys transmission, with parallel motor design. DC motor.
Adjustable stroke end magnetic reed switches.
Max load 390 N, linear speed up to 600 mm/s

BSA Series
Ball screw linear actuators, 4 sizes available. DC or AC 1-phase or 3-phase motors. Motor brake available.
Adjustable stroke end magnetic reed switches and external adjustable stroke end electric switches.
Load capacity up to 9 000 N, linear speed up to 125 mm/s

CLB Series
Ball screw linear actuators, 2 sizes available. DC or AC 1-phase or 3-phase motors. Motor brake available.
Adjustable electric cam-operated stroke end switches fitted in closed box.
Rotative potentiometer for positioning control.
Load capacity up to 7 000 N, linear speed up to 125 mm/s

UBA 0
Ball screw linear actuator, timing belts and pulleys transmission with motor mounted parallel to actuator axis.
DC motor. Adjustable stroke end magnetic reed switches.
Max load 420 N, linear speed up to 500 mm/s

MR Series
Motorgears for rotative actuators. DC motor. Bi-directional, incremental encoder with 2 output channels
Adjustable electric cam-operated stroke end switches. Rotative potentiometer single turn 5 kOhm.
Linearmech linear actuators are totally manufactured in Italy and assembled in our plant located in Bologna. All materials used in the production are of Italian origin.

Methodical controls are carried out in-line during manufacturing process to monitor the production quality and functional checks are carried out on every finished assembled product to ensure the total quality and reliability of the final product.

**Input drives**
- Worm gear, geometric design for high performances and efficiency.
  - Worm shaft fitted or extracted directly on the electric motor shaft for a more compact and cost effective solution, allowing the integrated electric motor mounting on the actuator housing.
  - Helical wormwheel in bronze EN 1982 – CuSn12-C or in plastic material and high resistance Delrin® 500
  - Timing belts UNI ISO 5296-1:1991

**Housing**
- Casting in aluminium alloy EN 1706 AC-AlSi9T6 machined with CNC machinery to ensure a high precision level.
- Die casting in aluminium EN 1706 AC-AlSi11Cu2(Fe) machined in the bearing housing.

**Trapezoidal acme screws**
- Tr profile ISO 2901 ... ISO 2904
  - Material: steel C 43 (UNI 7847)
  - Rolled and subjected to straightening process to ensure the regular alignment in operation and avoiding undesirable noises and loss of efficiency.
  - Max pitch error ± 0.5 mm over 300 mm thread length

**Bronze nuts**
- Tr profile ISO 2901 ... ISO 2904
  - Material: Bronze EN 1982 – CuAl9 Tr 1-start
  - Bronze EN 1982 CuSn12 Tr 2 or 3 starts
  - Delrin® 500

**Ball screws**
- Rolled and hardened, manufactured by Servomech SpA S.U.
  - Material: steel 42 CrMo 4 (UNI EN 10083)
  - Precision Class ISO IT 7
  - Max pitch error ± 0.5 mm over 300 mm thread length

**Ball nuts**
- Manufactured by Servomech SpA S.U.
  - Material: steel 18 NiCrMo 5 (UNI EN 10084)
  - Hardened and ground
  - Microfinishing
  - Max axial backlash (0.07 ÷ 0.08)
  - Ball nut without play or pre-loaded on request

**Push rods**
- Material: Chrome plated steel ST 52 DIN 2391 - tolerance on outer diameter f7
- Anodized aluminium for small size actuators
- Push rods in stainless steel AISI 304 on request

**Outer protective tubes**
- Drawn profiles in aluminium EN AW 6060 T5
- Aluminium alloy tubes 6060 UNI 90005/1 anodizing 20 µm
- Cold-drawn steel St 52.2 DIN 2391

**Front and rear attachments**
- Wide range of options: clevis ends and ball joints
  - Both front and rear attachments are provided with self-lubricating bronze bushes to reduce frictions and sticking and to improve the efficiency (not available for small size actuators).
1.4 SELECTION CRITERIA

In order to select the most suitable linear actuator, it is first necessary to analyse the application to determine the required performances and the working conditions.

1. Basic performances required
   - Stroke
   - Push or pull load
   - Linear speed

1.1 The load and the linear speed, if considered separately, determine the required type of linear actuator to be selected; if considered as contemporaneous performances they determine the required power and, therefore, the actuator’s size.

1.2 The stroke length may influence the selection of the actuator’s size only in case of very long stroke lengths and high push loads; in such a case, the buckling resistance of the screw should be checked. For more details and support, please contact our Technical Dpt.

2. Working and duty cycle

The single working cycle and the total actuator’s duty cycle determine the choice of an actuator with acme screw or, alternatively, with ball screw.

The section “Performances and Features” states the duty cycle with max load admitted for each actuator.

The duty cycle, expressed in % over a 10 minutes period, is the percentage of time referred to 10 minutes, during which the actuator can operate under the maximum load conditions stated in this catalogue at (-10 ... +40) °C environment temperature.

Generally, the acme screw linear actuators can work with duty cycle of 15% or 30% over 10 minutes (depending on the electric motor type), while the ball screw linear actuators can work with duty cycle of 50% up to 100% (depending on the electric motor type).

For preliminary checks or any doubt concerning the selection, please contact our Technical Dpt.

3. Electric motor type

Depending on the series and the type, linear actuators are available with 12, 24 or 36 V DC motor or with AC 1-phase or 3-phase motor.

Some types of motors are available also with positioning or stopping brake.

The motors available for each actuator are stated in the specific section “Performances and Features” and in the table concerning the motors specifications at the end of this catalogue.
4. Accessories
Linearmech linear actuators are supplied with a wide range of accessories as indicated in the specific section “Accessories” for each actuator size:

- adjustable stroke end limit switches
- incremental bi-directional encoders with 2 output channels
- analogic rotative potentiometer
- brake motor
- overload electronic protection
- dynamic overload mechanical protection
- many type of front attachments
- rear fixing supports
- stainless steel push rod
- electronic dynamic braking device
- programmable drivers

5. Working environment conditions
The external environment conditions in which the actuator is working are particularly important and shall be considered and evaluated, since they may strongly influence the regular functioning and the lifetime of the linear actuator.

The standard equipment of the linear actuators as well as the stated protection level against water and dust, are sufficient to enable the regular functioning in the main industrial applications.

Nevertheless, we recommend to report particular working environment conditions such as:

- Outside use, without proper auxiliary protections;
- Environment temperature lower than -10 °C or higher than +40 °C;
- Dusty environment and with polluting substances;
- Environments which require strong washing with acid or basic solutions;
- Use with strong external induced vibrations.

Finally, we are convinced that there is always a solution to any problem; what is important is to highlight and to analyze the problem in advance.

Our Technical Dpt. is available to evaluate with you the best technical and economical solution.
**OVERALL DIMENSIONS**

La = Lc + Stroke

Length Stroke ≤ 300 mm Stroke > 300 mm

<table>
<thead>
<tr>
<th>Length [mm]</th>
<th>Stroke ≤ 300 mm</th>
<th>Stroke &gt; 300 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc</td>
<td>90 + Stroke</td>
<td>140 + Stroke</td>
</tr>
<tr>
<td>T</td>
<td>78 + Stroke</td>
<td>128 + Stroke</td>
</tr>
</tbody>
</table>

**PERFORMANCES AND FEATURES**

- Pull-Push load up to 1 300 N
- Linear speed up to 52 mm/s
- Standard stroke lengths: 50, 100, 150, 200, 250, 300 mm
  (min. stroke limited by FC switches: 50 mm)
  (for different / longer stroke lengths please contact us)
- Aluminium housing and rear attachment
- Anodized aluminium push rod – tolerance f8
- Aluminium front attachment
- 12, 24 or 36 V DC motor with electromagnetic noise suppressor (motor features details on page 69)
- Duty cycle with max load:
  15% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per dimensional drawing (right-hand, code RH)
- Standard protection IP65
  - Test IP6X according to EN 60529 §12 §13.4-13.6
  - Test IPX5 according to EN 60529 §14.2.5
  (tests made with not running actuator)
- Long-life lubrication, maintenance free

**ACCESSORIES**

- Stainless steel push rod (code SS)
- Two adjustable built-in stroke end switches (code FC2)
- Two adjustable built-in stroke end switches, switching off the motor (code FC2X)
- Extra switch for intermediate position (code FC)
- 2-channels incremental encoder on motor shaft
  1 ppr (code Gl 21)
  4 ppr (code Gl 24)
  (wiring diagrams on page 75)

**OPTIONS**

- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)
ACME SCREW LINEAR ACTUATOR  LMR 01

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

1-start acme screw  Tr 12×3

2-starts acme screw  Tr 12×6 (P3)

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>LMR 01</th>
<th>RL1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
</tr>
</tbody>
</table>
OVERALL DIMENSIONS

La = Lc + Stroke

PERFORMANCES AND FEATURES
- Pull-Push load up to 3000 N
- Linear speed up to 41 mm/s
- Standard stroke lengths:
  50, 100, 150, 200, 250, 300, 400 mm
  (min. stroke limited by FC switches: 50 mm)
  (for different / longer stroke lengths please contact us)
- Aluminium housing and rear attachment
- Chrome-plated steel push rod
- Stainless steel AISI 303 front attachment
- 12, 24 or 36 V DC motor with electromagnetic noise suppressor (motor features details on page 69)
- Duty cycle with max. load:
  15% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per dimensional drawing (right-hand, code RH)
- Standard protection IP65
  - Test IP6X according to EN 60529 §12 §13.4-13.6
  - Test IPX5 according to EN 60529 §14.2.5
  (tests made with not running actuator)
- Long-life lubrication, maintenance free

OPTIONS
- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

ACCESSORIES
- Stainless steel push rod (code SS)
- Two adjustable built-in stroke end switches (code FC2)
- Two adjustable built-in stroke end switches, switching off the motor (code FC2X)
- Extra switch for intermediate position (code FC)
- 2-channels incremental encoder on motor shaft:
  1 ppr (code Gi 21)
  4 ppr (code Gi 24)
  (wiring diagrams on page 75)

STROKE CODE | STROKE [mm] | LENGTH [mm] | MASS [kg]  
-------------|-------------|-------------|------------
C50  | 50 | 180 | 230 | 2  
C100 | 100 | 230 | 330 | 2.3  
C150 | 150 | 280 | 430 | 2.45  
C200 | 200 | 330 | 530 | 2.6  
C250 | 250 | 380 | 630 | 2.75  
C300 | 300 | 430 | 730 | 2.9  
C400 | 400 | 580 | 980 | 3.2  

Length Stroke ≤ 300 mm Stroke > 300 mm
Lc [mm] | 130 + Stroke | 180 + Stroke
T [mm] | 107 + Stroke | 157 + Stroke

Number of pulses for 100 mm stroke
<table>
<thead>
<tr>
<th>Ratio</th>
<th>RN2</th>
<th>RN1</th>
<th>RL2</th>
<th>RL1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gi21</td>
<td>246</td>
<td>492</td>
<td>775</td>
<td>1550</td>
</tr>
<tr>
<td>Gi24</td>
<td>984</td>
<td>1968</td>
<td>3100</td>
<td>6200</td>
</tr>
</tbody>
</table>
PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10% less, electrical consumption 2 times more)

1-start acme screw Tr 14×4

2-starts acme screw Tr 14×8 (P4)

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>LMR 02</th>
<th>RL1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
</tr>
</tbody>
</table>
PERFORMANCES AND FEATURES

- Pull-Push load up to 6,000 N
- Linear speed up to 25 mm/s
- Standard stroke lengths: 100, 150, 200, 250, 300, 400, 500 mm
  (min. stroke limited by FC switches: 50 mm)
  (for different / longer stroke lengths please contact us)
- Aluminium housing and rear attachment
- Chrome-plated steel push rod – tolerance f7
- Stainless steel AISI 303 front attachment
- 12, 24 or 36 V DC motor with electromagnetic noise suppressor (motor features details on page 69)
- Duty cycle with max. load: 15% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per dimensional drawing (right-hand, code RH)
- Standard protection IP65
- Test IP6X according to EN 60529 §12 §13.4-13.6
- Test IPX5 according to EN 60529 §14.2.5
  (tests made with not running actuator)
- Long-life lubrication, maintenance free

ACCESSORIES

- Stainless steel push rod (code SS)
- Two adjustable built-in stroke end switches (code FC2)
- Two adjustable built-in stroke end switches, switching off the motor (code FC2X)
- Extra switch for intermediate position (code FC)
- 2-channels incremental encoder on motor shaft
  1 ppr (code GI 21)
  4 ppr (code GI 24)
  (wiring diagrams on page 75)

OPTIONS

- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)
ACME SCREW LINEAR ACTUATOR  LMR 03

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

1-start acme screw  Tr 16x4

2 starts acme screw  Tr 16x8 (P4)

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>LMR 03</th>
<th>RL1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
</tr>
</tbody>
</table>
PERFORMANCES AND FEATURES

- Pull-Push load up to 2000 N
- Linear speed up to: 48 mm/s (DC motor) / 30 mm/s (AC motor)
- Standard stroke lengths: 100, 150, 200, 300 mm (for different / longer stroke lengths please contact us)
- Aluminium alloy housing and rear attachment, with bronze bush
- Anodized aluminium outer tube
- Anodized aluminium push rod – tolerance h8
- Stainless steel AISI 303 front attachment
- Motors: (motor features details on page 69 and 70)
  - 12 or 24 V DC motor with permanent magnets
  - AC 3-phase or 1-phase motor
- Duty cycle with max load:
  - DC motor max. 15% over 10 min at (-10 ... +40) °C
  - AC motor max. 30% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per sketch (right-hand, code RH)

- Standard protection:
  - with DC motor IP65
  - Test IP6X according to EN 60529 §12 §13.4-13.6
  - with AC motor IP55
  - Tests made with not running actuator
- Long-life lubrication, maintenance free

ACCESSORIES

- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Two adjustable stroke end reed switches (code FCM)
- Extra switches for intermediate positions

OPTIONS

- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)
PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor

<table>
<thead>
<tr>
<th>1-start acme screw Tr 13.5×3</th>
<th>2-starts acme screw Tr 14×8 (P4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06 kW - 2 pole motor</td>
<td>0.06 kW - 2 pole motor</td>
</tr>
<tr>
<td><strong>RATIO</strong></td>
<td><strong>LOAD [N]</strong></td>
</tr>
<tr>
<td>RN1</td>
<td>1500</td>
</tr>
<tr>
<td>RL1</td>
<td>2000</td>
</tr>
</tbody>
</table>

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

1-start acme screw Tr 13.5×3

2-starts acme screw Tr 14×8 (P4)

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>ATL 02</th>
<th>RL1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FCM</th>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
</table>
**PERFORMANCES AND FEATURES**

- Pull-Push load up to 2 500 N
- Linear speed up to 32 mm/s
- Standard stroke lengths: 100, 150, 200, 300 mm (for different / longer stroke lengths please contact us)
- Aluminium alloy housing and rear attachment, with bronze bush
- Anodized aluminium outer tube
- Anodized aluminium push rod – tolerance h8
- Stainless steel AISI 303 front attachment
- 12, 24 or 36 V DC motor with electromagnetic noise suppressor (motor features details on page 69)
- Duty cycle with max load: 15% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per sketch (right-hand, code RH)

**STROKES AND FEATURES**

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH</th>
<th>T [mm]</th>
<th>MASS [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C100</td>
<td>100</td>
<td>Lc [mm] 243</td>
<td>La [mm] 343</td>
<td>225</td>
</tr>
<tr>
<td>C150</td>
<td>150</td>
<td>293</td>
<td>443</td>
<td>275</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>343</td>
<td>543</td>
<td>325</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>443</td>
<td>743</td>
<td>425</td>
</tr>
</tbody>
</table>

**OVERALL DIMENSIONS**

La = Lc + Stroke

<table>
<thead>
<tr>
<th>Length</th>
<th>Stroke ≤ 300 mm</th>
<th>Stroke &gt; 300 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc [mm]</td>
<td>143 + Stroke</td>
<td>158 + Stroke</td>
</tr>
<tr>
<td>T [mm]</td>
<td>125 + Stroke</td>
<td>125 + Stroke</td>
</tr>
</tbody>
</table>

**ACCESSORIES**

- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Two adjustable stroke end reed switches (code FCM)
- Extra switches for intermediate positions

**OPTIONS**

- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)
ACME SCREW LINEAR ACTUATOR

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

1-start acme screw  Tr 13.5×3

2-starts acme screw  Tr 14×8 (P4)

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>ATL 05</th>
<th>RL1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
</tr>
</tbody>
</table>
PERFORMANCES AND FEATURES

- Pull-Push load up to 4 000 N
- Linear speed up to 150 mm/s
- Standard stroke lengths: 100, 150, 200, 300, 400, 500 mm
  (for different / longer stroke lengths please contact us)
- Aluminium alloy housing and rear attachment, with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Stainless steel AISI 303 front attachment
- 12, 24 or 36 V DC motor with electromagnetic noise suppressor
  (motor features details on page 69)
- Duty cycle with max. load: 15% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per sketch
  (right-hand, code RH)
- Standard protection IP65
  - Test IP6X according to EN 60529 §12 §13.4-13.6
  - Test IPX5 according to EN 60529 §14.2.5
  (tests made with not running actuator)
- Long-life lubrication, maintenance free

ACCESSORIES

- Stainless steel push rod (code SS)
- Mechanical overload protection: safety clutch
  (code FS)
- Rear bracket (code SP)
- Two adjustable stroke end reed switches
  (code FCM)
- Extra switches for intermediate positions

OPTIONS

- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)
PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

1-start acme screw Tr 14×4

2-starts acme screw Tr 14×8 (P4)

3-starts acme screw Tr 14×12 (P4)

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th></th>
<th>ATL 08</th>
<th>RL1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
<td>Accessories</td>
</tr>
</tbody>
</table>

- 19 -
OVERALL DIMENSIONS

La = Lc + Stroke

<table>
<thead>
<tr>
<th>Length</th>
<th>w/o and with FCE</th>
<th>with FCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc [mm]</td>
<td>166 + Corsa</td>
<td>220 + Corsa</td>
</tr>
<tr>
<td>T [mm]</td>
<td>139 + Corsa</td>
<td>166 + Corsa</td>
</tr>
</tbody>
</table>

STROKE CODE

<table>
<thead>
<tr>
<th></th>
<th>C100</th>
<th>C150</th>
<th>C200</th>
<th>C300</th>
<th>C400</th>
<th>C500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working stroke length w/o and with FCE [mm]</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Working stroke length with FCM [mm]</td>
<td>73</td>
<td>123</td>
<td>173</td>
<td>273</td>
<td>373</td>
<td>473</td>
</tr>
</tbody>
</table>

FCE cable length 1.5 m

Stroke end electric switches FCE

OVERALL DIMENSIONS

La = Lc + Stroke

<table>
<thead>
<tr>
<th></th>
<th>C100</th>
<th>C150</th>
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FCE cable length 1.5 m

Stroke end electric switches FCE

OVERALL DIMENSIONS

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FCE cable length 1.5 m

Stroke end electric switches FCE

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FCE cable length 1.5 m

Stroke end electric switches FCE

OVERALL DIMENSIONS

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FCE cable length 1.5 m

Stroke end electric switches FCE

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FCE cable length 1.5 m

Stroke end electric switches FCE

OVERALL DIMENSIONS

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FCE cable length 1.5 m

Stroke end electric switches FCE

OVERALL DIMENSIONS

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</tr>
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<td>173</td>
<td>273</td>
<td>373</td>
<td>473</td>
</tr>
</tbody>
</table>

FCE cable length 1.5 m

Stroke end electric switches FCE

OVERALL DIMENSIONS

La = Lc + Stroke

<table>
<thead>
<tr>
<th></th>
<th>C100</th>
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<th>C300</th>
<th>C400</th>
<th>C500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working stroke length w/o and with FCE [mm]</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Working stroke length with FCM [mm]</td>
<td>73</td>
<td>123</td>
<td>173</td>
<td>273</td>
<td>373</td>
<td>473</td>
</tr>
</tbody>
</table>
### PERFORMANCES AND FEATURES
- Push load up to 5,000 N
- Pull load up to 4,000 N
- Linear speed up to 140 mm/s
- Standard stroke lengths: 100, 150, 200, 300, 400, 500 mm
  (for different / longer stroke lengths please contact us)
- Aluminium alloy housing and rear attachment, with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE
  in stainless steel AISI 303 with bronze bush
- AC 3-phase or 1-phase motor
  (motor features details on page 70)
- Duty cycle with max load: 30% over 10 min at (-10...+40) °C
- Standard protection IP55 (IP54 with brake)
- Standard motor mounting position as per sketch
  (right-hand, code RH)
- Long-life lubrication, maintenance free

### PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH1</td>
<td>1750</td>
<td>23</td>
<td>1250</td>
<td>47</td>
</tr>
<tr>
<td>RV1</td>
<td>2620</td>
<td>15</td>
<td>1860</td>
<td>30</td>
</tr>
<tr>
<td>RN1</td>
<td>4490</td>
<td>7.5</td>
<td>3230</td>
<td>15</td>
</tr>
<tr>
<td>RL1</td>
<td>5000</td>
<td>3.5</td>
<td>5000</td>
<td>7.5</td>
</tr>
<tr>
<td>RXL1</td>
<td>5000</td>
<td>2</td>
<td>5000</td>
<td>3.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH2</td>
<td>1070</td>
<td>47</td>
<td>790</td>
<td>93</td>
</tr>
<tr>
<td>RV2</td>
<td>1620</td>
<td>30</td>
<td>1180</td>
<td>60</td>
</tr>
<tr>
<td>RN2</td>
<td>2880</td>
<td>15</td>
<td>2080</td>
<td>30</td>
</tr>
<tr>
<td>RL2</td>
<td>4800</td>
<td>7.5</td>
<td>3520</td>
<td>15</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH3</td>
<td>800</td>
<td>70</td>
<td>560</td>
<td>140</td>
</tr>
<tr>
<td>RV3</td>
<td>1210</td>
<td>45</td>
<td>860</td>
<td>90</td>
</tr>
<tr>
<td>RN3</td>
<td>2190</td>
<td>22</td>
<td>1540</td>
<td>45</td>
</tr>
<tr>
<td>RL3</td>
<td>3680</td>
<td>11</td>
<td>2680</td>
<td>22</td>
</tr>
</tbody>
</table>

### ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Mechanical overload protection, safety clutch (code FS)
- Brake motor
- Two adjustable stroke end reed switches (code FCM)
- Extra switches for intermediate positions
- Electromechanical stroke end switch for linear speed up to 30 mm/s (code FCE)
  (technical data on page 72)

### OPTIONS
- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

### ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATL 10</td>
<td>RL1</td>
<td>C200</td>
<td>CA 230/400 V</td>
<td>FCM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**OVERALL DIMENSIONS**

La = Lc + Stroke

<table>
<thead>
<tr>
<th></th>
<th>w/o and with FCE</th>
<th>with FCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc [mm]</td>
<td>166 + Stroke</td>
<td>220 + Stroke</td>
</tr>
<tr>
<td>T [mm]</td>
<td>139 + Stroke</td>
<td>166 + Stroke</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>C100</th>
<th>C150</th>
<th>C200</th>
<th>C300</th>
<th>C400</th>
<th>C500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working stroke length w/o and with FCE [mm]</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Working stroke length with FCM [mm]</td>
<td>73</td>
<td>123</td>
<td>173</td>
<td>273</td>
<td>373</td>
<td>473</td>
</tr>
</tbody>
</table>

**STROKE END ATTACHMENTS**

- FCE cable length 1.5 m
- Stroke end electric switches FCE
- Stroke end reed switches FCM

**FRONT ATTACHMENT**

- Standard head with threaded hollow bore
- Stroke end electric switches FCE

**OVERALL DIMENSIONS**

<table>
<thead>
<tr>
<th></th>
<th>w/o and with FCE</th>
<th>with FCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc [mm]</td>
<td>166 + Stroke</td>
<td>220 + Stroke</td>
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**OVERALL DIMENSIONS**

<table>
<thead>
<tr>
<th></th>
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<td>273</td>
<td>373</td>
<td>473</td>
</tr>
</tbody>
</table>
PERFORMANCES AND FEATURES
- Pull-Push load up to 4 000 N
- Linear speed up to 150 mm/s
- Standard stroke lengths: 100, 150, 200, 300, 400, 500 mm
  (for different / longer stroke lengths please contact us)
- Aluminium alloy housing and rear attachment, with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE
  in stainless steel AISI 303 with bronze bush
- DC 12 or 24 V motor
  (motor features details on page 69)
- Duty cycle with max load:
  30% over 10 min at (-10 ... +40) °C
- Standard protection IP54
- Standard motor mounting position as per sketch
  (right-hand, code RH)
- Long-life lubrication, maintenance free

ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Mechanical overload protection: safety clutch
  (code FS)
- Brakemotor
- Bi-directional incremental encoder, 100 ppr
  with zero set pulse, Push-Pull, 8÷24 Vdc (code EH38)
- Two adjustable stroke end reed switches (code FCM)
- Extra switches for intermediate positions
- Electromechanical stroke end switch
  for linear speed up to 30 mm/s (code FCE)
  (technical data on page 72)

OPTIONS
- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

<table>
<thead>
<tr>
<th>1-start</th>
<th>acme screw Tr 14×4</th>
</tr>
</thead>
<tbody>
<tr>
<td>RATIO</td>
<td>LOAD [N]</td>
</tr>
<tr>
<td>RH1</td>
<td>680</td>
</tr>
<tr>
<td>RV1</td>
<td>1020</td>
</tr>
<tr>
<td>RN1</td>
<td>1770</td>
</tr>
<tr>
<td>RL1</td>
<td>2960</td>
</tr>
<tr>
<td>RXL1</td>
<td>4000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2-starts</th>
<th>acme screw Tr 14×8 (P4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RATIO</td>
<td>LOAD [N]</td>
</tr>
<tr>
<td>RH2</td>
<td>430</td>
</tr>
<tr>
<td>RV2</td>
<td>650</td>
</tr>
<tr>
<td>RN2</td>
<td>1160</td>
</tr>
<tr>
<td>RL2</td>
<td>1970</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3-starts</th>
<th>acme screw Tr 14×12 (P4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RATIO</td>
<td>LOAD [N]</td>
</tr>
<tr>
<td>RH3</td>
<td>310</td>
</tr>
<tr>
<td>RV3</td>
<td>470</td>
</tr>
<tr>
<td>RN3</td>
<td>840</td>
</tr>
<tr>
<td>RL3</td>
<td>1430</td>
</tr>
</tbody>
</table>

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATL 10</td>
<td>RL1</td>
<td>C200</td>
<td>CC 24 V</td>
<td>FCM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACME SCREW LINEAR ACTUATOR

OVERALL DIMENSIONS

<table>
<thead>
<tr>
<th>Length</th>
<th>Stroke ≤ 300 mm</th>
<th>Stroke &gt; 300 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc [mm]</td>
<td>232 + Stroke</td>
<td>247 + Stroke</td>
</tr>
<tr>
<td>T [mm]</td>
<td>206 + Stroke</td>
<td>206 + Stroke</td>
</tr>
<tr>
<td>Q [mm]</td>
<td>252</td>
<td>267</td>
</tr>
</tbody>
</table>

Standard head with threaded hollow bore

Lc = Q + Stroke

Stoke end reed switches FCM

Stroke end electric switches FCE

FCE cable length 1.5 m

148 + Stroke

89 + Stroke
ACME SCREW LINEAR ACTUATOR

PERFORMANCES AND FEATURES
- Push load up to 11,000 N
- Pull load up to 8,000 N
- Linear speed up to 93 mm/s
- Standard stroke lengths:
  - 100, 150, 200, 300, 400, 500, 600, 700, 800 mm
  (for different /longer stroke lengths please contact us)
- Aluminium alloy housing and rear attachment, with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard front head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- AC 3-phase or 1-phase motor
  (motor features on page 70)
- Standard protection IP55 (IP54 with brake)
- Duty cycle with max load:
  - 30% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per sketch
  (right-hand, code RH)
- Long-life lubrication, maintenance free

ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Mechanical overload protection: safety clutch (code FS)
- Brake motor
- Two adjustable stroke end reed switches (code FCM)
- Extra switches for intermediate positions
- Electro-mechanical stroke end switch for linear speed up to 30 mm/s (code FCE)
  (technical data on page 72)

OPTIONS
- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor

### 1-start acme screw Tr 18×4

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV1</td>
<td>3130</td>
<td>23</td>
<td>2450</td>
<td>47</td>
</tr>
<tr>
<td>RN1</td>
<td>9620</td>
<td>5.5</td>
<td>7320</td>
<td>11</td>
</tr>
<tr>
<td>RL1</td>
<td>11000</td>
<td>2.5</td>
<td>11000</td>
<td>5.5</td>
</tr>
</tbody>
</table>

### 2-starts acme screw Tr 18×8 (P4)

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV2</td>
<td>2070</td>
<td>47</td>
<td>1590</td>
<td>93</td>
</tr>
<tr>
<td>RN2</td>
<td>6710</td>
<td>11</td>
<td>4500</td>
<td>22</td>
</tr>
<tr>
<td>RL2</td>
<td>10280</td>
<td>5.5</td>
<td>7660</td>
<td>11</td>
</tr>
</tbody>
</table>

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATL 12</td>
<td>RL1</td>
<td>C200</td>
<td>CA 230/400 V</td>
<td>FCM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PERFORMANCES AND FEATURES

- Pull-Push load up to 2 000 N
- Linear speed up to 48 mm/s (DC motor)
- Linear speed up to 30 mm/s (AC motor)
- Standard stroke lengths: 100, 150, 200, 250, 300 mm (for different / longer stroke lengths please contact us)
- Aluminium alloy housing and rear attachment
- Anodized aluminium outer tube
- Anodized aluminium push rod – tolerance h8
- Rear attachment:
  - A1 zinc-plated steel
  - A2 aluminium alloy with bronze bush
- Stainless steel AISI 303 front attachment
- Motors: (motor features details on page 69 and 70)
  - 12 or 24 V DC motor with permanent magnets
  - AC 3-phase or 1-phase motor
- Duty cycle with max load:
  - DC motor max.15% over 10 min at (-10 ... +40) °C
  - AC motor max.30% over 10 min at (-10 ... +40) °C
- Standard protection:
  - with DC motor IP65
  - with AC motor IP55
- Standard motor mounting position as per sketch (right-hand, code RH)
- Long-life lubrication, maintenance free

ACCESSORIES

- Stainless steel push rod (code SS)
- Rear bracket (code SP) with rear attachment A2
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off the motor (not available with AC 3-phase motor) (code FC2X)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control (code POR5K)

NOTE: Extra limit switch and rotative potentiometer cannot be selected together

OPTIONS

- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)
ACME SCREW LINEAR ACTUATOR  CLA 20

PERFORMANCES with AC  3-phase  50 Hz  230/400 V  or 1-phase 50 Hz  230 V motor

<table>
<thead>
<tr>
<th>1-start acme screw Tr 13.5×3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06 kW - 2 pole motor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN1</td>
<td>1500</td>
<td>11</td>
</tr>
<tr>
<td>RL1</td>
<td>2000</td>
<td>5.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2-starts acme screw Tr 14×8 (P4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06 kW - 2 pole motor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN2</td>
<td>1000</td>
<td>30</td>
</tr>
<tr>
<td>RL2</td>
<td>1100</td>
<td>15</td>
</tr>
</tbody>
</table>

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

1-start acme screw Tr 13.5×3

2-starts acme screw Tr 14×8 (P4)

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA 20</td>
<td>RL1</td>
<td>C200</td>
<td>CC 24 V</td>
<td>FC2</td>
<td>POR 5K</td>
<td></td>
</tr>
</tbody>
</table>
1. STROKE END SWITCHES BOX AND POTENTIOMETER
2. MOTOR SHAFT EXTENSION for:
   - Emergency manual activation
   - Stroke end switches and potentiometer adjustment

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH T [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C100</td>
<td>100</td>
<td>290</td>
<td>390</td>
<td>273</td>
<td>280</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>390</td>
<td>590</td>
<td>373</td>
<td>380</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>490</td>
<td>790</td>
<td>473</td>
<td>480</td>
</tr>
</tbody>
</table>

La = Lc + Stroke
Q = Attachment A1
Attachment A2

CLM 25 AC motor

OVERALL DIMENSIONS

STROKE END SWITCHES BOX AND POTENTIOMETER
Motor shaft extension for:
- Emergency manual activation
- Stroke end switches and potentiometer adjustment

<table>
<thead>
<tr>
<th>Q [mm]</th>
<th>Attachment A1</th>
<th>Attachment A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>195</td>
<td>202</td>
<td></td>
</tr>
</tbody>
</table>

ROE
ROD END
CLEVIS END
Clevis end
BALL JOINT
Ball joint

FRONT ATTACHMENT

STROKE
Q = Attachment A1
Attachment A2

Lc = Q + Stroke
**PERFORMANCES AND FEATURES**

- Push load up to 5 000 N
- Pull load up to 4 000 N
- Linear speed up to 93 mm/s
- Standard stroke lengths: 100, 150, 200, 250, 300 mm (for different / longer stroke lengths please contact us)
- Aluminium alloy housing
- Rear attachment:
  - A1 zinc-plated steel
  - A2 aluminium alloy with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- AC 3-phase or 1-phase motor (motor features on page 70)
- Duty cycle with max load:
  - 30% over 10 min at (-10 ... +40) °C
- Standard protection:
  - with AC motor without brake IP55
  - with AC brake-motor IP54
- Standard motor mounting position as per sketch (right-hand, code RH)
- Long-life lubrication, maintenance free

**ACCESSORIES**

- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP) with rear attachment A2
- Mechanical overload protection: safety clutch (code FS)
- Brake motor
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off the motor (not available with AC 3-phase motor) (code FC2X)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control (code POR5K)

NOTE: Extra limit switch and rotative potentiometer cannot be selected together

**OPTIONS**

- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

**PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor**

<table>
<thead>
<tr>
<th>RATIO</th>
<th>0.09 kW - 4 pole motor</th>
<th>0.12 kW - 2 pole motor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOAD [N]</td>
<td>SPEED [mm/s]</td>
</tr>
<tr>
<td>RH1</td>
<td>1750</td>
<td>23</td>
</tr>
<tr>
<td>RV1</td>
<td>2620</td>
<td>15</td>
</tr>
<tr>
<td>RN1</td>
<td>4490</td>
<td>7.5</td>
</tr>
<tr>
<td>RL1</td>
<td>5000</td>
<td>3.5</td>
</tr>
<tr>
<td>RXL1</td>
<td>5000</td>
<td>2</td>
</tr>
</tbody>
</table>

**2-starts acme screw Tr 14×8 (P4)**

<table>
<thead>
<tr>
<th>RATIO</th>
<th>0.09 kW - 4 pole motor</th>
<th>0.12 kW - 2 pole motor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOAD [N]</td>
<td>SPEED [mm/s]</td>
</tr>
<tr>
<td>RH2</td>
<td>1070</td>
<td>47</td>
</tr>
<tr>
<td>RV2</td>
<td>1620</td>
<td>30</td>
</tr>
<tr>
<td>RN2</td>
<td>2880</td>
<td>15</td>
</tr>
<tr>
<td>RL2</td>
<td>4800</td>
<td>7.5</td>
</tr>
</tbody>
</table>

**Self-locking conditions**

Information about statically self-locking conditions with pull or push load on page 68.

**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA 25</td>
<td>RL1</td>
<td>C200</td>
<td>CA 230/400 V</td>
<td>FC2</td>
<td>POR 5K</td>
<td></td>
</tr>
</tbody>
</table>
1. STROKE END SWITCHES BOX AND POTentiometer
2. MOTOR SHAFT EXTENSION for:
   Emergency manual activation
   Stroke end switches and potentiometer adjustment

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH</th>
<th>T [mm]</th>
<th>ACTUATOR - ATTACHMENT A1</th>
<th>STROKE [mm]</th>
<th>LENGTH</th>
<th>T [mm]</th>
<th>ACTUATOR - ATTACHMENT A2</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C100</td>
<td>100</td>
<td>290</td>
<td>390</td>
<td>273</td>
<td>100</td>
<td>297</td>
<td>397</td>
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<td>4.1</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>390</td>
<td>590</td>
<td>373</td>
<td>200</td>
<td>397</td>
<td>597</td>
<td>380</td>
<td>4.4</td>
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<tr>
<td>C300</td>
<td>300</td>
<td>490</td>
<td>790</td>
<td>473</td>
<td>300</td>
<td>497</td>
<td>797</td>
<td>480</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.
PERFORMANCES AND FEATURES

- Pull-Push load up to 4 000 N
- Linear speed up to 100 mm/s
- Standard stroke lengths:
  - 100, 150, 200, 250, 300 mm
  (for different / longer stroke lengths please contact us)
- Aluminium alloy housing
- Rear attachment:
  - A1 zinc-plated steel
  - A2 aluminium alloy with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE
  in stainless steel AISI 303 with bronze bush
- 12, 24 or 36 V DC motor
  with electromagnetic noise suppressor
  (motor features details on page 69)
- Duty cycle with max load:
  15% over 10 min at (-10...+40) °C
- Standard protection IP65:
  Test IP6X according to EN 60529 §12 §13.4-13.6
  Test IPX5 according to EN 60529 §14.2.5
  (tests made with not running actuator)

ACCESSORIES

- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP) with rear attachment A2
- Mechanical overload protection: safety clutch (code FS)
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off the motor (code FC2X)
  (not available with AC 3-phase motor)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control (code POR5K)
  NOTE: Extra limit switch and rotative potentiometer cannot be selected together

OPTIONS

- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with 24 V DC motor

(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

1-start acme screw Tr 14×4

2-starts acme screw Tr 14×8 (P4)

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA 25</td>
<td>RL1</td>
<td>C200</td>
<td>CC 24 V</td>
<td>FC2</td>
<td>POR 5K</td>
<td></td>
</tr>
</tbody>
</table>

CLA 25 DC motor
ACME SCREW ACTUATORS
CLA 25 S - CLA 25 M

OVERALL DIMENSIONS

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH [mm]</th>
<th>T [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH [mm]</th>
<th>T [mm]</th>
<th>MASS [Kg] DC motor</th>
<th>MASS [Kg] AC motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>C300</td>
<td>300</td>
<td>516</td>
<td>816</td>
<td>481</td>
<td>523</td>
<td>823</td>
<td>4.8</td>
<td>6.0</td>
</tr>
<tr>
<td>C400</td>
<td>400</td>
<td>616</td>
<td>1016</td>
<td>581</td>
<td>623</td>
<td>1023</td>
<td>5.1</td>
<td>6.3</td>
</tr>
<tr>
<td>C500</td>
<td>500</td>
<td>716</td>
<td>1216</td>
<td>681</td>
<td>723</td>
<td>1223</td>
<td>5.4</td>
<td>6.6</td>
</tr>
<tr>
<td>C600</td>
<td>600</td>
<td>816</td>
<td>1416</td>
<td>781</td>
<td>823</td>
<td>1423</td>
<td>5.7</td>
<td>6.9</td>
</tr>
<tr>
<td>C700</td>
<td>700</td>
<td>916</td>
<td>1616</td>
<td>881</td>
<td>923</td>
<td>1623</td>
<td>6.0</td>
<td>7.2</td>
</tr>
<tr>
<td>C800</td>
<td>800</td>
<td>1016</td>
<td>1816</td>
<td>981</td>
<td>1023</td>
<td>1823</td>
<td>6.3</td>
<td>7.5</td>
</tr>
</tbody>
</table>

1. STROKE END SWITCHES BOX AND POTENTIOMETER
2. MOTOR SHAFT EXTENSION for:
   - Emergency manual activation
   - Stroke end switches and potentiometer adjustment

FRONT ATTACHMENT

ROD END
ROE

CLEVIS END
FO

BALL JOINT
TS

Standard head with threaded hollow bore

Q = Lc + Stroke

STROKE END SWITCHES BOX AND POTENTIOMETER

Motor shaft extension for:
- Emergency manual activation
- Stroke end switches and potentiometer adjustment
CLA 25 S and CLA 25 M are reinforced versions of CLA 25 linear actuator, with stronger linear drive part to improve push load resistance in case of long stroke lengths. For tables and performances graphs with the available ratios please refer to CLA 25 linear actuator. Furthermore, compared to CLA 25 actuator, the anti-turn device (AR) is here available.

**Buckling push load diagram**

**PERFORMANCES AND FEATURES**
- Pull-Push load up to 5 000 N
- Linear speed up to 100 mm/s (DC motor)
- Linear speed up to 90 mm/s (AC motor)
- Standard stroke lengths: 300, 400, 500, 600, 700, 800 mm
  (for different / longer stroke lengths please contact us)
- Aluminium alloy housing
- Rear attachment:  
  - A1 zinc-plated steel  
  - A2 aluminium alloy with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE  
  stainless steel AISI 303 with bronze bush
- Motors:  
  - 12, 24 or 36 V DC motor  
  - with electromagnetic noise suppressor  
  - AC 3-phase or 1-phase motor  
  (motor features details on page 69, 70)
- Duty cycle with max load:  
  DC motor max 15% over 10 min at (-10 ... +40) °C  
  AC motor max 30% over 10 min at (-10 ... +40) °C
- Standard protection:  
  - with DC motor IP65  
  - Test IP6X according to EN 60529 §12 §13.4-13.6  
  - Test IPX5 according to EN 60529 §14.2.5  
  (tests made with not running actuator)  
  - with AC motor without brake IP55  
  - with AC brake-motor IP54

**ACCESSORIES**
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP) with rear attachment A2
- Mechanical overload protection: safety clutch (code FS)
- AC 1-phase or 3-phase brakemotor
- Anti-turn device (code AR)
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off the motor (code FC2X)  
  (not available with AC 3-phase motor)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control (code POR5K)

**OPTIONS**
- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

**NOTES**
- Extra limit switch and rotative potentiometer cannot be selected together

**Self-locking conditions**
Information about statically self-locking conditions with pull or push load on page 68.

**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>CC 24 V</th>
<th>FC2</th>
<th>POR 5K</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA 25 S</td>
<td>RL1</td>
<td>C300</td>
<td>CC 24 V</td>
<td>FC2</td>
<td>POR 5K</td>
<td>Options</td>
</tr>
</tbody>
</table>

- Standard motor mounting position as per sketch (right-hand, code RH)  
- Long-life lubrication, maintenance free

**NOTE:** Extra limit switch and rotative potentiometer cannot be selected together
PERFORMANCES AND FEATURES

- Pull-Push load up to 10 000 N
- Linear speed up to 8 mm/s (DC motor)
- Linear speed up 3.7 mm/s (AC motor)
- Standard stroke lengths: 200, 300, 400, 500, 600, 700, 800 mm (for different / longer stroke lengths please contact us)
- Cast iron housing with integral rear attachment and bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Stainless steel AISI 303 front attachment BA
- Motors:
  - 12, 24 or 36 V DC motor with electromagnetic noise suppressor
  - AC 3-phase or 1-phase motor (motor features details on pages 69 and 70)
- Duty cycle with max load:
  - DC motor max 15% over 10 min at (-10 ... +40) °C
  - AC motor max 30% over 10 min at (-10 ... +40) °C
- Standard protection:
  - with DC motor IP65
  - Test IP6X according to EN 60529 §12 §13.4-13.6
  - Test IPX5 according to EN 60529 §14.2.5 (tests made with not running actuator)
  - with AC motor without brake IP55
  - with AC brake-motor IP54
- Standard motor and first stage gearbox unit mounting position as per sketch (right-hand, code RH)
- Long-life lubrication, maintenance free

ACCESSORIES

- Different front attachments
- Stainless steel push rod (code SS)
- Mechanical overload protection: safety clutch (code FS)
- Anti-turn device (code AR)
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off the motor (not available with AC 3-phase motor) (code FC2X)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control (code POR5K)

NOTE: Extra limit switch and rotative potentiometer cannot be selected together

OPTIONS

- Motor and first stage gearbox unit mounting position on opposite side (left-hand, code LH)
$\text{PERFORMANCES with 24 V DC motor}$

(Performances with 12 V DC motor: same load, linear speed 10% less, electrical consumption 2 times more)

2-starts acme screw $\text{Tr } 18 \times 8$ (P4)

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RL/RH2</td>
<td>3600</td>
<td>3.7</td>
</tr>
<tr>
<td>RL/RV2</td>
<td>5500</td>
<td>2.4</td>
</tr>
<tr>
<td>RL/RN2</td>
<td>9600</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>CLA 28</th>
<th>RL1</th>
<th>C800</th>
<th>CC 24 V</th>
<th>FC2</th>
<th>POR 5K</th>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CLA 28 T linear actuator differs from CLA 28 on the protective tube execution, which is made of zinc-plated steel, ext. Ø 50 mm, allowing the fitting of a bracket with self-lubricating bushes on protective tube itself. The actuator can be hinged on these bushes, reducing by this way the attachments centre distance and improving the total resistance against push load buckling.

A typical application is lifting motion on solar trackers.

<table>
<thead>
<tr>
<th>OVERALL DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard head with threaded hollow bore</td>
</tr>
<tr>
<td>BA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FRONT ATTACHMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BALL JOINT</td>
</tr>
<tr>
<td>CLEVIS END</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc</td>
</tr>
<tr>
<td>178 + Stroke</td>
</tr>
<tr>
<td>J</td>
</tr>
<tr>
<td>on customer's demand</td>
</tr>
</tbody>
</table>

T dimension is on customer's demand according to the following formula:

\[ 120 \leq T \leq \frac{\text{Stroke}}{2} \]
PERFORMANCES AND FEATURES

- Pull-Push load up to 10 000 N
- Linear speed up to 8 mm/s (DC motor)
- Linear speed up to 3.7 mm/s (AC motor)
- Standard stroke lengths:
  400, 500, 600, 700, 800, 900, 1 000 mm
  (for different / longer stroke lengths please contact us)
- Cast iron housing with integral rear attachment
- Zinc-plated steel hinge on outer tube
  with self-lubricating bushes
- Zinc-plated steel outer tube with increased thickness
- Chrome-plated steel push rod – tolerance f7
- Stainless steel AISI 303 front attachment
- Motors:
  - 12, 24 or 36 V DC motor
    with electromagnetic noise suppressor
  - AC 3-phase or 1-phase motor
    (motor features details on pages 69, 70)
- Duty cycle with max load:
  DC motor max 15% over 10 min at (-10 ... +40) °C
  AC motor max 30% over 10 min at (-10 ... +40) °C
- Standard protection:
  with DC motor IP65
  - Test IP6X according to EN 60529 §12 §13.4-13.6
  - Test IPX5 according to EN 60529 §14.2.5
    (tests made with not running actuator)
  with AC motor without brake IP55
  with AC brake-motor IP54

ACCESSORIES

- Different front attachments
- Stainless steel push rod (code SS)
- Anti-turn device (code AR)
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off
  the motor (code FC2X)
  (not available with AC 3-phase motor)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control
  (code POR5K)

NOTE: Extra limit switch and rotative potentiometer
      cannot be selected together

OPTIONS

- Motor and first stage gearbox unit mounting
  position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

Self-locking conditions

Information about statically self-locking conditions with
pull or push load on page 68.

ORDERING CODE EXAMPLE

CLA 28 T  RL1  C800  CC 24 V  FC2  POR 5K

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACME SCREW LINEAR ACTUATOR  LMI 02

PERFORMANCES AND FEATURES
- Pull-Push load up to 750 N
- Linear speed up to 19 mm/s
- Standard stroke lengths: 100, 150, 200, 250, 300 mm
- Aluminium rear attachment
- Anodized aluminium housing and protective tube
- Anodized aluminium push rod
- Stainless steel AISI 303 front attachment
- 12 or 24 V DC motor, standard protection IP54

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>LMI 02</th>
<th>RL1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
</tr>
</tbody>
</table>

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10% less, electrical consumption 2 times more)

<table>
<thead>
<tr>
<th>STROKE CODE [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH</th>
<th>MASS [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C100</td>
<td>100</td>
<td>345</td>
<td>1.05</td>
</tr>
<tr>
<td>C150</td>
<td>150</td>
<td>395</td>
<td>1.30</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>445</td>
<td>1.55</td>
</tr>
<tr>
<td>C250</td>
<td>250</td>
<td>495</td>
<td>1.80</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>545</td>
<td>2.05</td>
</tr>
</tbody>
</table>

OVERALL DIMENSIONS
La =Lc + Stroke

STROKE Lc [mm] La [mm] T [mm]
C100 100 345 445 329 1.05
C150 150 395 545 379 1.30
C200 200 445 645 429 1.55
C250 250 495 745 479 1.80
C300 300 545 845 529 2.05

Duty cycle with max load:
15% over 10 min at (-10 ... +40) °C
Long-life lubrication, maintenance free

ACCESSORIES
- Stainless steel push rod (code SS)
- Two adjustable stroke end switches (code FCM)
- Extra switches for intermediate position

Motor cable length 0.3 m
ACCESSORIES
- Fixing attachment turned at 90° (code RPT 90)
- Stainless steel push rod (code SS)
- Two adjustable stroke end switches (code FCM)
- Extra switches for intermediate position
- 2-channels incremental encoder on motor shaft
  1 ppr (code GI 21) or 4 ppr (code GI 24)
  (wiring diagrams on page 75)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10% less, electrical consumption 2 times more)

PERFORMANCES AND FEATURES
- Pull-Push load up to 280 N
- Linear speed up to 190 mm/s
- Standard stroke lengths: 100, 150, 200, 250, 300 mm
- Aluminium alloy housing
- Anodized aluminium protective tube
- Anodized aluminium push rod
- Stainless steel AISI 303 front attachment
- 12, 24 or 36 V DC motor
  with electromagnetic noise suppressor
- Standard protection IP30
- Duty cycle with max load:
  15% over 10 min at (-10 ... +40) °C
- Long-life lubrication, maintenance free

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMP 03</td>
<td>RL1</td>
<td>C200</td>
<td>CC 24 V</td>
<td>FCM</td>
<td></td>
</tr>
</tbody>
</table>

OVERALL DIMENSIONS

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH</th>
<th>MASS [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc [mm]</td>
<td>La [mm]</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>C100</td>
<td>100</td>
<td>252</td>
<td>352</td>
</tr>
<tr>
<td>C150</td>
<td>150</td>
<td>302</td>
<td>452</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>352</td>
<td>552</td>
</tr>
<tr>
<td>C250</td>
<td>250</td>
<td>402</td>
<td>652</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>452</td>
<td>752</td>
</tr>
</tbody>
</table>
OVERALL DIMENSIONS

La = Lc + Stroke

Stroke end reed switches FCM

Lc

La = Lc + Stroke

T

Length

STROKE

CODE

STROKE

[mm]

LENGTH

[mm]

T

[mm]

MASS

standard

motor

[kg]

MASS

brake motor

[kg]

C100

100

343

443

309

3.5

4.0

C200

200

443

643

409

3.8

4.3

C300

300

543

843

509

4.1

4.6

C400

400

643

1043

609

4.4

4.9

C500

500

743

1243

709

4.7

5.2

ROE

ROD END

FO

CLEVIS END

TS

BALL JOINT

FRONT ATTACHMENT

ACME SCREW LINEAR ACTUATOR

UAL 0
PERFORMANCES AND FEATURES
- Pull-Push load up to 400 N
- Linear speed up to 600 mm/s
- Standard stroke lengths: 100, 200, 300, 400, 500 mm
  (for different / longer stroke lengths please contact us)
- Aluminium alloy housing and rear attachment with bronze bush
- Anodized aluminium outer tube
- Chrome-plated push rod – tolerance f7
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- 12 or 24 V DC motor
  (motor features details on page 69)
- Duty cycle with max load:
  30% over 10 min at (-10 ... +40) °C
- Standard protection IP 54
- Long-life lubrication, maintenance free

ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Brake motor
- Two adjustable stroke end reed switches (code FCM)
- Extra switch for intermediate position
- Bi-directional incremental encoder, 100 ppr with zero set pulse, Push-Pull, 8÷24 Vcc
  (code EH38)
  (encoder features details on page 75)

OPTIONS
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV1</td>
<td>210</td>
<td>200</td>
<td>4</td>
</tr>
<tr>
<td>RN1</td>
<td>390</td>
<td>100</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV2</td>
<td>120</td>
<td>400</td>
<td>4</td>
</tr>
<tr>
<td>RN2</td>
<td>230</td>
<td>200</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV3</td>
<td>90</td>
<td>600</td>
<td>4</td>
</tr>
<tr>
<td>RN3</td>
<td>170</td>
<td>300</td>
<td>4</td>
</tr>
</tbody>
</table>

Self-locking conditions
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>UAL 0</th>
<th>RL1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
</tr>
</tbody>
</table>

- 41 -
BALL SCREW LINEAR ACTUATOR  BSA 08

OVERALL DIMENSIONS

La = Lc + Stroke

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH</th>
<th>T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lc [mm]</td>
<td>La [mm]</td>
<td></td>
</tr>
<tr>
<td>C100</td>
<td>100</td>
<td>327</td>
<td>427</td>
<td>296</td>
</tr>
<tr>
<td>C150</td>
<td>150</td>
<td>377</td>
<td>527</td>
<td>346</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>427</td>
<td>627</td>
<td>396</td>
</tr>
<tr>
<td>C250</td>
<td>250</td>
<td>477</td>
<td>727</td>
<td>446</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>527</td>
<td>827</td>
<td>496</td>
</tr>
<tr>
<td>C400</td>
<td>400</td>
<td>627</td>
<td>1027</td>
<td>596</td>
</tr>
<tr>
<td>C500</td>
<td>500</td>
<td>727</td>
<td>1227</td>
<td>696</td>
</tr>
</tbody>
</table>

Motor cable length 0.3 m

Stroke end reed switches FCM

Pin Ø10 h7

Stroke end reed switches FCM

Motor cable length 0.3 m
PERFORMANCES AND FEATURES

- Pull-Push load up to 5,000 N
- Linear speed up to 64 mm/s
- Standard stroke lengths:
  100, 150, 200, 250, 300, 400, 500 mm
- Ball screw BS 14 x 5 (technical details on page 66)
- Aluminium alloy housing and rear attachment with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Stainless steel AISI 303 front attachment with bronze bush
- 12, 24 or 36 V DC motor with electromagnetic noise suppressor (motor features details on page 69)

(BRAKE NOT AVAILABLE)
- Duty cycle with max load:
  50% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per sketch (right-hand, code RH)
- Standard protection IP 65
- Test IP6X according to EN 60529 §12 §13.4-13.6
- Test IPX5 according to EN 60529 §14.2.5 (tests made with not running actuator)
- Long-life lubrication, maintenance free

ACCESSORIES

- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Mechanical overload protection: safety clutch (code FS)
- Two adjustable stroke end reed switches (code FCM)
- Extra switch for intermediate position

OPTIONS

- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with 24 V DC motor

(Performances with 12 V DC motor: same load, linear speed 10% less, electrical consumption 2 times more)

Self-locking conditions
Brake motor not available. Therefore the statically self-locking condition is not achievable.
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSA 08</td>
<td>RL2</td>
<td>C200</td>
<td>CC 24 V</td>
<td>FCM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
BALL SCREW LINEAR ACTUATOR  BSA 10  AC motor

OVERALL DIMENSIONS

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>Actuator - FCE switches</th>
<th>Actuator - FCM switches</th>
<th>T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STROKE [mm]</td>
<td>LENGTH</td>
<td>STROKE [mm]</td>
<td>LENGTH</td>
</tr>
<tr>
<td>C100</td>
<td>85</td>
<td>281</td>
<td>366</td>
<td>53</td>
</tr>
<tr>
<td>C150</td>
<td>135</td>
<td>331</td>
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<td>103</td>
</tr>
<tr>
<td>C200</td>
<td>185</td>
<td>381</td>
<td>566</td>
<td>153</td>
</tr>
<tr>
<td>C250</td>
<td>235</td>
<td>431</td>
<td>666</td>
<td>203</td>
</tr>
<tr>
<td>C300</td>
<td>285</td>
<td>481</td>
<td>766</td>
<td>253</td>
</tr>
<tr>
<td>C400</td>
<td>385</td>
<td>581</td>
<td>966</td>
<td>353</td>
</tr>
<tr>
<td>C500</td>
<td>485</td>
<td>681</td>
<td>1166</td>
<td>453</td>
</tr>
</tbody>
</table>

Self-locking conditions
Self-locking condition is achievable with brake motor only.
Information about statically self-locking conditions with pull or push load on page 68.
BALL SCREW LINEAR ACTUATOR  BSA 10  AC motor

PERFORMANCES AND FEATURES
- Push load up to 5 000 N
- Pull load up to 4 000 N
- Linear speed up to 58 mm/s
- Standard stroke lengths: 100, 150, 200, 250, 300, 400, 500 mm
  (for different / longer stroke lengths please contact us)
- Ball screw BS 14 x 5 (technical details on page 66)
- Aluminium alloy housing and rear attachment with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- 3-phase or 1-phase motor (motor features details on page 70)
- Duty cycle with max load: 100% over 10 min at (-10 ... +40) °C
- Standard protection IP 55 (IP 54 with brake)
- Standard motor mounting position as per sketch (right-hand, code RH)
- Long-life lubrication, maintenance free

PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor

<table>
<thead>
<tr>
<th>RATIO</th>
<th>0.09 kW - 4 pole motor</th>
<th>0.12 kW - 2 pole motor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOAD [N]</td>
<td>SPEED [mm/s]</td>
</tr>
<tr>
<td>RH1</td>
<td>2180</td>
<td>29</td>
</tr>
<tr>
<td>RV1</td>
<td>3290</td>
<td>19</td>
</tr>
<tr>
<td>RN1</td>
<td>5000</td>
<td>9</td>
</tr>
<tr>
<td>RL1</td>
<td>5000</td>
<td>4.5</td>
</tr>
<tr>
<td>RXL1</td>
<td>5000</td>
<td>2.5</td>
</tr>
</tbody>
</table>

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>BSA 10</th>
<th>RL1</th>
<th>C200</th>
<th>CA 230/400 V</th>
<th>FCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
</tr>
</tbody>
</table>
**BALL SCREW LINEAR ACTUATOR** BSA 10 DC motor

**OVERALL DIMENSIONS**

La = Lc + Stroke

---

**STROKE CODE**

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH Lc [mm]</th>
<th>LENGTH La [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH Lc [mm]</th>
<th>LENGTH La [mm]</th>
<th>T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C100</td>
<td>85</td>
<td>281</td>
<td>366</td>
<td>53</td>
<td>313</td>
<td>366</td>
<td>239</td>
<td>4.8</td>
</tr>
<tr>
<td>C150</td>
<td>135</td>
<td>331</td>
<td>466</td>
<td>103</td>
<td>363</td>
<td>466</td>
<td>289</td>
<td>4.9</td>
</tr>
<tr>
<td>C200</td>
<td>185</td>
<td>381</td>
<td>566</td>
<td>153</td>
<td>413</td>
<td>566</td>
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<td>5.1</td>
</tr>
<tr>
<td>C250</td>
<td>235</td>
<td>431</td>
<td>666</td>
<td>203</td>
<td>463</td>
<td>666</td>
<td>389</td>
<td>5.2</td>
</tr>
<tr>
<td>C300</td>
<td>285</td>
<td>481</td>
<td>766</td>
<td>253</td>
<td>513</td>
<td>766</td>
<td>439</td>
<td>5.4</td>
</tr>
<tr>
<td>C400</td>
<td>385</td>
<td>581</td>
<td>966</td>
<td>353</td>
<td>613</td>
<td>966</td>
<td>539</td>
<td>5.7</td>
</tr>
<tr>
<td>C500</td>
<td>485</td>
<td>681</td>
<td>1166</td>
<td>453</td>
<td>713</td>
<td>1166</td>
<td>639</td>
<td>6.0</td>
</tr>
</tbody>
</table>

---

**Self-locking conditions**

Self-locking condition is achievable with brake motor only.

Information about statically self-locking conditions with pull or push load on page 68.
PERFORMANCES AND FEATURES
- Push load up to 5,000 N
- Pull load up to 4,000 N
- Linear speed up to 63 mm/s
- Standard stroke lengths:
  - 100, 150, 200, 250, 300, 400, 500 mm
  (for different / longer stroke lengths please contact us)
- Ball screw BS 14 x 5 (technical details on page 66)
- Aluminium alloy housing and rear attachment with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE
  in stainless steel AISI 303 with bronze bush
- 12 or 24 V DC motor
  (motor features details on page 69)
- Duty cycle with max load:
  - 100% over 10 min at (-10 ... +40) °C
- Standard protection IP 54
- Standard motor mounting position as per sketch
  (right-hand, code RH)
- Long-life lubrication, maintenance free

ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Mechanical overload protection:
  safety clutch (code FS)
- Brake motor
- Two adjustable stroke end reed switches
  (code FCM)
- Extra switch for intermediate position
- Electro-mechanical stroke end switch (code FCE)
  (for linear speed up to 30 mm/s)
  (technical data on page 72)
- Bi-directional incremental encoder, 100 ppr
  with zero set pulse, Push-Pull, 8÷24 Vcc
  (code EH38)
  (encoder features details on page 75)

OPTIONS
- Motor mounting position on opposite side
  (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH1</td>
<td>800</td>
<td>63</td>
<td>4</td>
</tr>
<tr>
<td>RV1</td>
<td>1260</td>
<td>40</td>
<td>4</td>
</tr>
<tr>
<td>RN1</td>
<td>2350</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>RL1</td>
<td>4130</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>RXL1</td>
<td>5000</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSA 10</td>
<td>RL1</td>
<td>C200</td>
<td>OC 24 V</td>
<td>FCM</td>
<td></td>
</tr>
</tbody>
</table>
OVERALL DIMENSIONS

La = Lc + Stroke

Self-locking conditions
Self-locking condition is achievable with brake motor only.
Information about statically self-locking conditions with pull or push load on page 68.
PERFORMANCES AND FEATURES

- Push load up to 5000 N
- Pull load up to 4000 N
- Linear speed up to 117 mm/s
- Standard stroke lengths: 100, 150, 200, 250, 300, 400, 500 mm (for different / longer stroke lengths please contact us)
- Ball screw BS 14 x 10 (technical details on page 66)
- Aluminium alloy housing and rear attachment with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- AC 3-phase or 1-phase brakemotor (motor features details on page 70)
- Duty cycle with max load: 100% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per sketch (right-hand, code RH)
- Standard protection IP 54
- Long-life lubrication, maintenance free

ACCESSORIES

- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Mechanical overload protection: safety clutch (code FS)
- Two adjustable stroke end reed switches (code FCM)
- Extra switch for intermediate position

OPTIONS

- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor

<table>
<thead>
<tr>
<th>RATIO</th>
<th>Ball screw BS 14 x 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.09 kW - 4 pole motor</td>
</tr>
<tr>
<td>LOAD [N]</td>
<td>SPEED [mm/s]</td>
</tr>
<tr>
<td>RH2</td>
<td>1120</td>
</tr>
<tr>
<td>RV2</td>
<td>1730</td>
</tr>
<tr>
<td>RN2</td>
<td>3100</td>
</tr>
<tr>
<td>RL2</td>
<td>5000</td>
</tr>
</tbody>
</table>

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSA 11</td>
<td>RL1</td>
<td>C200</td>
<td>CA 230/400 V</td>
<td>FCM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 49 -
OVERALL DIMENSIONS

La = Lc + Stroke

Length [mm]

<table>
<thead>
<tr>
<th>Lc</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>243 + Stroke</td>
<td>212 + Stroke</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH</th>
<th>T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C100</td>
<td>100</td>
<td>Lc 343</td>
<td>La 443</td>
<td>312</td>
</tr>
<tr>
<td>C150</td>
<td>150</td>
<td>Lc 393</td>
<td>La 543</td>
<td>362</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>Lc 443</td>
<td>La 643</td>
<td>412</td>
</tr>
<tr>
<td>C250</td>
<td>250</td>
<td>Lc 493</td>
<td>La 743</td>
<td>462</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>Lc 543</td>
<td>La 843</td>
<td>512</td>
</tr>
<tr>
<td>C400</td>
<td>400</td>
<td>Lc 643</td>
<td>La 1043</td>
<td>612</td>
</tr>
<tr>
<td>C500</td>
<td>500</td>
<td>Lc 743</td>
<td>La 1243</td>
<td>712</td>
</tr>
</tbody>
</table>

Self-locking conditions
Self-locking condition is achievable with brake motor only.
Information about statically self-locking conditions with pull or push load on page 68.
PERFORMANCES AND FEATURES
- Push-Pull load up to 5 000 N
- Linear speed up to 125 mm/s
- Standard stroke lengths:
  100, 150, 200, 250, 300, 400, 500 mm
  (for different / longer stroke lengths please contact us)
- Ball screw BS 14 x 10 (technical details on page 66)
- Aluminium alloy housing and rear attachment with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- 12 or 24 V DC brakemotor
  (motor features details on page 69)
- Duty cycle with max load:
  100% over 10 min at (-10 … +40) °C
- Standard motor mounting position as per sketch (right-hand, code RH)
- Standard protection IP 54
- Long-life lubrication, maintenance free

ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Mechanical overload protection: safety clutch (code FS)
- Two adjustable stroke end reed switches (code FCM)
- Extra switch for intermediate position

OPTIONS
- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH2</td>
<td>410</td>
<td>125</td>
<td>4</td>
</tr>
<tr>
<td>RV2</td>
<td>640</td>
<td>80</td>
<td>4</td>
</tr>
<tr>
<td>RN2</td>
<td>1200</td>
<td>40</td>
<td>4</td>
</tr>
<tr>
<td>RL2</td>
<td>2100</td>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSA 11</td>
<td>RL1</td>
<td>C200</td>
<td>CC 24 V</td>
<td>FCM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### OVERALL DIMENSIONS

**Formula:**

La = Lc + Stroke

**Table:**

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH</th>
<th>T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C100</td>
<td>100</td>
<td>Lc [mm] 379</td>
<td>La [mm] 479</td>
<td>338</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>Lc [mm] 479</td>
<td>La [mm] 679</td>
<td>438</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>Lc [mm] 579</td>
<td>La [mm] 879</td>
<td>538</td>
</tr>
<tr>
<td>C400</td>
<td>400</td>
<td>Lc [mm] 679</td>
<td>La [mm] 1079</td>
<td>638</td>
</tr>
<tr>
<td>C500</td>
<td>500</td>
<td>Lc [mm] 779</td>
<td>La [mm] 1279</td>
<td>738</td>
</tr>
<tr>
<td>C600</td>
<td>600</td>
<td>Lc [mm] 879</td>
<td>La [mm] 1479</td>
<td>838</td>
</tr>
<tr>
<td>C700</td>
<td>700</td>
<td>Lc [mm] 979</td>
<td>La [mm] 1679</td>
<td>938</td>
</tr>
<tr>
<td>C800</td>
<td>800</td>
<td>Lc [mm] 1079</td>
<td>La [mm] 1879</td>
<td>1038</td>
</tr>
</tbody>
</table>

**Self-locking conditions**

Self-locking condition is achievable with brake motor only.

Information about statically self-locking conditions with pull or push load on page 68.
**PERFORMANCES AND FEATURES**
- Push-Pull load up to 9 000 N
- Linear speed up to 58 mm/s
- Standard stroke lengths:
  - 100, 200, 300, 400, 500, 600, 700, 800 mm
- Ball screw BS 20 x 5 (technical details on page 66)
- Aluminium alloy housing and rear attachment with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- AC 3-phase or 1-phase brakemotor (motor features details on page 70)
- Duty cycle with max load:
  - 100% over 10 min at (-10 ... +40) °C
- Standard motor mounting position as per sketch (right-hand, code RH)
- Standard protection IP 54
- Long-life lubrication, maintenance free

**ACCESSORIES**
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Mechanical overload protection:
  - safety clutch (code FS)
- Two adjustable stroke end reed switches (code FCM)
- Extra switch for intermediate position

**OPTIONS**
- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

**PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor**

<table>
<thead>
<tr>
<th>RATIO</th>
<th>0.18 kW - 4 pole motor</th>
<th>0.25 kW - 2 pole motor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOAD [N]</td>
<td>SPEED [mm/s]</td>
</tr>
<tr>
<td>RV1</td>
<td>4300</td>
<td>29</td>
</tr>
<tr>
<td>RN1</td>
<td>9000</td>
<td>7</td>
</tr>
<tr>
<td>RL1</td>
<td>9000</td>
<td>3.5</td>
</tr>
</tbody>
</table>

**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSA 12</td>
<td>RL1</td>
<td>C200</td>
<td>CA 230/400 V</td>
<td>FCM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OVERALL DIMENSIONS

La = Lc + Stroke

STROKE END SWITCHES BOX AND POTENTIOMETER

1. STROKE END SWITCHES BOX AND POTENTIOMETER
2. MOTOR SHAFT EXTENSION for:
   - Emergency manual activation
   - Stroke end switches and potentiometer adjustment

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH T [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lc [mm]</td>
<td>La [mm]</td>
<td></td>
<td>Lc [mm]</td>
<td>La [mm]</td>
<td></td>
</tr>
<tr>
<td>C100</td>
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<td>348</td>
<td>448</td>
<td>317</td>
<td>100</td>
<td>5.2</td>
</tr>
<tr>
<td>C150</td>
<td>150</td>
<td>398</td>
<td>548</td>
<td>367</td>
<td>150</td>
<td>5.3</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>448</td>
<td>648</td>
<td>417</td>
<td>200</td>
<td>5.5</td>
</tr>
<tr>
<td>C250</td>
<td>250</td>
<td>498</td>
<td>748</td>
<td>467</td>
<td>250</td>
<td>5.6</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>548</td>
<td>848</td>
<td>517</td>
<td>300</td>
<td>5.8</td>
</tr>
<tr>
<td>C400</td>
<td>400</td>
<td>648</td>
<td>1048</td>
<td>617</td>
<td>400</td>
<td>6.1</td>
</tr>
</tbody>
</table>

ROD END
CLEVIS END
BALL JOINT

FRONT ATTACHMENT

STROKE END SWITCHES BOX AND POTENTIOMETER

1. STROKE END SWITCHES BOX AND POTENTIOMETER
2. MOTOR SHAFT EXTENSION for:
   - Emergency manual activation
   - Stroke end switches and potentiometer adjustment

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH T [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lc [mm]</td>
<td>La [mm]</td>
<td></td>
<td>Lc [mm]</td>
<td>La [mm]</td>
<td></td>
</tr>
<tr>
<td>C100</td>
<td>100</td>
<td>348</td>
<td>448</td>
<td>317</td>
<td>100</td>
<td>5.2</td>
</tr>
<tr>
<td>C150</td>
<td>150</td>
<td>398</td>
<td>548</td>
<td>367</td>
<td>150</td>
<td>5.3</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>448</td>
<td>648</td>
<td>417</td>
<td>200</td>
<td>5.5</td>
</tr>
<tr>
<td>C250</td>
<td>250</td>
<td>498</td>
<td>748</td>
<td>467</td>
<td>250</td>
<td>5.6</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>548</td>
<td>848</td>
<td>517</td>
<td>300</td>
<td>5.8</td>
</tr>
<tr>
<td>C400</td>
<td>400</td>
<td>648</td>
<td>1048</td>
<td>617</td>
<td>400</td>
<td>6.1</td>
</tr>
</tbody>
</table>
**PERFORMANCES AND FEATURES**

- Push load up to 5 000 N
- Pull load up to 4 000 N
- Linear speed up to 117 mm/s
- Standard stroke lengths: 100, 150, 200, 250, 300, 400 mm
- Ball screw BS 14 x 5 or BS 14 x 10 (technical details on page 66)
- Aluminium alloy housing
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Rear attachment:
  - A1: zinc-plated steel rod end with bronze bush
  - A2: aluminium alloy with bronze bush
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- AC 3-phase or 1-phase motor (motor features details on page 70)
- Duty cycle with max load:
  - 100% over 10 min at (-10 ... +40) °C
- Standard protection IP 55 (IP 54 with brake)
- Standard motor mounting position as per sketch (right-hand, code RH)
- Long-life lubrication, maintenance free

**ACCESSORIES**

- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP) with rear attachment A2
- Mechanical overload protection:
  - safety clutch (code FS)
  - Brakemotor
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off the motor (code FC2X) (not available with AC 3-phase motor)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control (code POR5K)

**OPTIONS**

- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

**PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor**

<table>
<thead>
<tr>
<th>Ball screw BS 14 x 5</th>
<th>0.09 kW - 4 pole motor</th>
<th>0.12 kW - 2 pole motor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOAD [N]</strong></td>
<td><strong>SPEED [mm/s]</strong></td>
<td><strong>LOAD [N]</strong></td>
</tr>
<tr>
<td>RH1</td>
<td>2170</td>
<td>29</td>
</tr>
<tr>
<td>RV1</td>
<td>3270</td>
<td>19</td>
</tr>
<tr>
<td>RN1</td>
<td>5000</td>
<td>9.5</td>
</tr>
<tr>
<td>RL1</td>
<td>5000</td>
<td>4.5</td>
</tr>
<tr>
<td>RXL1</td>
<td>5000</td>
<td>2.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ball screw BS 14 x 10</th>
<th>0.09 kW - 4 pole motor</th>
<th>0.12 kW - 2 pole motor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOAD [N]</strong></td>
<td><strong>SPEED [mm/s]</strong></td>
<td><strong>LOAD [N]</strong></td>
</tr>
<tr>
<td>RH2</td>
<td>1120</td>
<td>58</td>
</tr>
<tr>
<td>RV2</td>
<td>1730</td>
<td>37</td>
</tr>
<tr>
<td>RN2</td>
<td>3100</td>
<td>19</td>
</tr>
<tr>
<td>RL2</td>
<td>5000</td>
<td>9.5</td>
</tr>
</tbody>
</table>

**Self-locking conditions**

Self-locking condition is achievable with brake motor only.
Information about statically self-locking conditions with pull or push load on page 68.

**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>Actuator</th>
<th>CLB 25</th>
<th>RL1</th>
<th>C200</th>
<th>CA 230/400 V</th>
<th>FC2</th>
<th>POR 5K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected ratio</td>
<td></td>
<td></td>
<td></td>
<td>Stroke end switches</td>
<td>Accessories</td>
<td>Options</td>
</tr>
</tbody>
</table>

- 55 -
BALL SCREW LINEAR ACTUATOR  CLB 25  DC motor

OVERALL DIMENSIONS

La = Lc + Stroke

1. STROKE END SWITCHES BOX AND POTENTIOMETER
2. MOTOR SHAFT EXTENSION for:
   Emergency manual activation
   Stroke end switches and potentiometer adjustment

<table>
<thead>
<tr>
<th>STROKE CODE</th>
<th>STROKE [mm]</th>
<th>LENGTH [mm]</th>
<th>T [mm]</th>
<th>STROKE [mm]</th>
<th>LENGTH [mm]</th>
<th>T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C100</td>
<td>100</td>
<td>348</td>
<td>448</td>
<td>100</td>
<td>355</td>
<td>455</td>
<td>324</td>
</tr>
<tr>
<td>C150</td>
<td>150</td>
<td>398</td>
<td>548</td>
<td>150</td>
<td>405</td>
<td>555</td>
<td>374</td>
</tr>
<tr>
<td>C200</td>
<td>200</td>
<td>448</td>
<td>648</td>
<td>200</td>
<td>455</td>
<td>655</td>
<td>424</td>
</tr>
<tr>
<td>C250</td>
<td>250</td>
<td>498</td>
<td>748</td>
<td>250</td>
<td>505</td>
<td>755</td>
<td>474</td>
</tr>
<tr>
<td>C300</td>
<td>300</td>
<td>548</td>
<td>848</td>
<td>300</td>
<td>555</td>
<td>855</td>
<td>524</td>
</tr>
<tr>
<td>C400</td>
<td>400</td>
<td>648</td>
<td>1048</td>
<td>400</td>
<td>655</td>
<td>1055</td>
<td>624</td>
</tr>
</tbody>
</table>
PERFORMANCES AND FEATURES
- Push load up to 5,000 N
- Pull load up to 4,000 N
- Linear speed up to 125 mm/s
- Standard stroke lengths: 100, 150, 200, 250, 300, 400 mm
- Ball screw BS 14 x 5 or BS 14 x 10 (technical details on page 66)
- Aluminium alloy housing
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Rear attachment:
  - A1: zinc-plated steel rod end with bronze bush
  - A2: aluminium alloy with bronze bush
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- 12 or 24 V DC brakemotor (motor features details on page 69)
- Duty cycle with max load:
  - 100% over 10 min at (-10 ... +40) °C
- Standard protection IP 54
- Standard motor mounting position as per sketch (right-hand, code RH)
- Long-life lubrication, maintenance free

ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP) with rear attachment A2
- Mechanical overload protection: safety clutch (code FS)
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off the motor (code FC2X)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control (code POR5K)

NOTE: Extra limit switch and rotative potentiometer cannot be selected together

OPTIONS
- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH1</td>
<td>800</td>
<td>63</td>
<td>4</td>
</tr>
<tr>
<td>RV1</td>
<td>1260</td>
<td>40</td>
<td>4</td>
</tr>
<tr>
<td>RN1</td>
<td>2350</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>RL1</td>
<td>4130</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>RXL1</td>
<td>5000</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH2</td>
<td>410</td>
<td>125</td>
<td>4</td>
</tr>
<tr>
<td>RV2</td>
<td>640</td>
<td>80</td>
<td>4</td>
</tr>
<tr>
<td>RN2</td>
<td>1200</td>
<td>40</td>
<td>4</td>
</tr>
<tr>
<td>RL2</td>
<td>2100</td>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>

Self-locking conditions
Self-locking condition is achievable with brake motor only.
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLB 25</td>
<td>RL1</td>
<td>C200</td>
<td>CC 24 V</td>
<td>FC2</td>
<td>POR 5K</td>
<td></td>
</tr>
</tbody>
</table>
**BALL SCREW LINEAR ACTUATOR**  
**CLB 27**

**OVERALL DIMENSIONS**

\[ L_a = L_c + \text{Stroke} \]

\[ L_c \]

\[ T \]

**Standard head with threaded hollow bore**

1. **STROKE END SWITCHES BOX AND POTENTIOMETER**
2. **MOTOR SHAFT EXTENSION** for:
   - Emergency manual activation
   - Stroke end switches and potentiometer adjustment

### STROKE END SWITCHES BOX AND POTENTIOMETER

- Actuator - Attachment A1
  - C100: Stroke 100 [mm] Length 336 [mm] T 436 [mm] Stroke 100 [mm] Length 343 [mm] T 443 [mm] Stroke 300 [mm] Mass 5.3 [Kg] 5.8 [Kg]
  - C150: Stroke 150 [mm] Length 386 [mm] T 536 [mm] Stroke 150 [mm] Length 393 [mm] T 543 [mm] Stroke 350 [mm] Mass 5.5 [Kg] 6.0 [Kg]
  - C400: Stroke 400 [mm] Length 636 [mm] T 1036 [mm] Stroke 400 [mm] Length 643 [mm] T 1043 [mm] Stroke 600 [mm] Mass 6.5 [Kg] 7.0 [Kg]

### MOTOR SHAFT EXTENSION

- Actuator - Attachment A2
  - C100: Stroke 100 [mm] Length 336 [mm] T 436 [mm] Stroke 100 [mm] Length 343 [mm] T 443 [mm] Stroke 307 [mm] Mass 239 [Kg] 246 [Kg]
  - C150: Stroke 150 [mm] Length 386 [mm] T 536 [mm] Stroke 150 [mm] Length 393 [mm] T 543 [mm] Stroke 357 [mm] Mass 5.5 [Kg] 6.0 [Kg]
  - C400: Stroke 400 [mm] Length 636 [mm] T 1036 [mm] Stroke 400 [mm] Length 643 [mm] T 1043 [mm] Stroke 607 [mm] Mass 6.5 [Kg] 7.0 [Kg]

**FRONT ATTACHMENT**

- Rod End (ROE)
- Clevis End (FO)
- Ball Joint (TS)

- \[ Q + \text{Stroke} = L_c \]
PERFORMANCES AND FEATURES
- Push load up to 7 000 N
- Pull load up to 4 000 N
- Linear speed up to 58 mm/s
- Standard stroke lengths:
  100, 150, 200, 300, 400, 500 mm
- Ball screw BS 16 x 5 (technical details on page 66)
- Aluminium alloy housing
- Anodized aluminium outer tube
- Chrome-plated steel push rod
- Rear attachment:
  - A1: zinc-plated steel rod end with bronze bush
  - A2: aluminium alloy with bronze bush
- Standard head BA or rod end ROE in stainless steel AISI 303 with bronze bush
- AC 3-phase or 1-phase motor (motor features details on page 70)
- Duty cycle with max load:
  100% over 10 min at (-10 ... +40) °C
- Standard protection IP 55 (IP 54 with brake)
- Standard motor mounting position as per sketch (right-hand, code RH)
- Long-life lubrication, maintenance free

ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP) with rear attachment A2
- Mechanical overload protection:
  - safety clutch (code FS)
  - Brakemotor
- Adjustable electric stroke end switches (code FC2)
- Adjustable electric stroke end switches, switching off the motor (code FC2X)
  (not available with AC 3-phase motor)
- Extra switch for intermediate position (code FC)
- Rotative potentiometer 5kOhm for positioning control (code POR5K)

NOTE: Extra limit switch and rotative potentiometer cannot be selected together

OPTIONS
- Motor mounting position on opposite side (left-hand, code LH)
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with AC 3-phase 50 Hz 230/400 V or 1-phase 50 Hz 230 V motor

<table>
<thead>
<tr>
<th>RATIO</th>
<th>0.09 kW - 4 pole motor</th>
<th>0.12 kW - 2 pole motor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOAD [N]</td>
<td>SPEED [mm/s]</td>
</tr>
<tr>
<td>RH1</td>
<td>2160</td>
<td>29</td>
</tr>
<tr>
<td>RV1</td>
<td>3260</td>
<td>19</td>
</tr>
<tr>
<td>RN1</td>
<td>5990</td>
<td>9.5</td>
</tr>
<tr>
<td>RL1</td>
<td>7000</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Self-locking conditions
Self-locking condition is achievable with brake motor only.
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Selected ratio</th>
<th>Required stroke</th>
<th>Motor</th>
<th>Stroke end switches</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLB 27</td>
<td>RL1</td>
<td>C200</td>
<td>CA 400 V</td>
<td>FC2</td>
<td>POR 5K</td>
<td></td>
</tr>
</tbody>
</table>
BALL SCREW LINEAR ACTUATOR

OVERALL DIMENSIONS

La = Lc + Stroke

<table>
<thead>
<tr>
<th>LENGTH</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lc</td>
<td>281 + Stroke</td>
</tr>
<tr>
<td>T</td>
<td>249 + Stroke</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STROKE [mm]</th>
<th>LENGTH [mm]</th>
<th>T [mm]</th>
<th>MASS [Kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lc [mm]</td>
<td>La [mm]</td>
<td>standard motor</td>
</tr>
<tr>
<td>100</td>
<td>381</td>
<td>481</td>
<td>349</td>
</tr>
<tr>
<td>200</td>
<td>481</td>
<td>681</td>
<td>449</td>
</tr>
<tr>
<td>300</td>
<td>581</td>
<td>881</td>
<td>549</td>
</tr>
<tr>
<td>400</td>
<td>681</td>
<td>1081</td>
<td>649</td>
</tr>
<tr>
<td>500</td>
<td>781</td>
<td>1281</td>
<td>749</td>
</tr>
</tbody>
</table>

FRONT ATTACHMENT

ROD END

CLEVIS END

BALL JOINT

[Diagrams of FRONT ATTACHMENT, ROD END, CLEVIS END, and BALL JOINT]
PERFORMANCES AND FEATURES
- Push-Pull load up to 420 N
- Linear speed up to 500 mm/s
- Standard stroke lengths:
  100, 200, 300, 400, 500 mm
  (for different / longer stroke lengths please contact us)
- Ball screw BS 14 x 5 or BS 14 x 10
  (technical details on page 66)
- Aluminium alloy housing and rear attachment
  with bronze bush
- Anodized aluminium outer tube
- Chrome-plated steel push rod – tolerance f7
- Standard head BA or rod end ROE
  in stainless steel AISI 303 with bronze bush
- 12 or 24 V DC motor
  (motor features details on page 69)
- Duty cycle with max load:
  100% over 10 min at (-10 ... +40) °C
- Standard protection IP 54
- Long-life lubrication, maintenance free

ACCESSORIES
- Different front attachments
- Stainless steel push rod (code SS)
- Rear bracket (code SP)
- Two adjustable stroke end reed switches
  (code FCM)
- Extra switch for intermediate position
- Bi-directional incremental encoder, 100 ppr
  with zero set pulse, Push-Pull, 8÷24 Vcc
  (code EH38)
  (encoder features details on page 75)

OPTIONS
- Fixing attachment turned at 90° (code RPT 90)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV1</td>
<td>210</td>
<td>250</td>
<td>4</td>
</tr>
<tr>
<td>RN1</td>
<td>420</td>
<td>125</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATIO</th>
<th>LOAD [N]</th>
<th>SPEED [mm/s]</th>
<th>CURRENT [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV2</td>
<td>110</td>
<td>500</td>
<td>4</td>
</tr>
<tr>
<td>RN2</td>
<td>220</td>
<td>250</td>
<td>4</td>
</tr>
</tbody>
</table>

Self-locking conditions
Self-locking condition is achievable with brake motor only.
Information about statically self-locking conditions with pull or push load on page 68.

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>UBA 0</th>
<th>RN1</th>
<th>C200</th>
<th>CC 24 V</th>
<th>FCM</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Selected ratio</td>
<td>Required stroke</td>
<td>Motor</td>
<td>Stroke end switches</td>
<td>Accessories</td>
<td>Options</td>
</tr>
</tbody>
</table>
11. GEARMOTORS for rotative actuators

MR 15
- Output torque 3 Nm
- Output flange 56 B14
- DC motor 24V or 12V
- Bi-directional incremental magnetic encoder
  2 channels: GI21 1 ppr
  GI24 4 ppr

MR 31
- Output torque 15 Nm
- Output flange 63 B14
- DC motor 24V or 12V
- Bi-directional incremental magnetic encoder
  2 channels: GI21 1 ppr
  GI24 4 ppr

MR 40 FC
- Output torque 15 Nm
- Output flange 63 B14
- DC motor 24V or 12V
- Built-in stroke end switches to control output shaft rotations
- Rotative potentiometer, single turn, 5 kOhm
GEARMOTORS for rotative actuators

OVERALL DIMENSIONS

PERFORMANCES AND FEATURES
- Max torque up to 3 Nm
- Output flange IEC 56B14
- Aluminium housing and flange
- 12 or 24 V DC motor with electromagnetic noise suppressor (motor features details on page 69)
- Standard protection IP 65
- Standard motor mounting position (right-hand, RH)
- Long-life lubrication, maintenance free

ENCODER
- 2-channels bidirectional magnetic encoder for positioning and/or speed feedback
- Encoder mounting directly on the motor shaft
- Encoder resolution: 1 ppr (code GI 21) or 4 ppr (code GI 24)
- Encoder counting as regards to gearbox shaft:

<table>
<thead>
<tr>
<th>Number of pulses / 10 output turns</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RN</td>
</tr>
<tr>
<td>Gl 21</td>
<td>115</td>
</tr>
<tr>
<td>Gl 24</td>
<td>460</td>
</tr>
</tbody>
</table>

OPTIONS
- Motor mounting position on opposite side (left-hand, code LH)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>MR 15</th>
<th>RL</th>
<th>CC 24 V</th>
<th>Gl 21</th>
<th>LH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gearmotor</td>
<td>Selected ratio</td>
<td>Motor</td>
<td>Encoder</td>
<td>Options</td>
</tr>
</tbody>
</table>
PERFORMANCES AND FEATURES
- Max torque up to 15 Nm
- Output flange IEC 63B14
- Aluminium housing and flange
- 12 or 24 V DC motor with electromagnetic noise suppressor (motor features details on page 69)
- Standard protection IP 65
- Standard motor mounting position (right-hand, RH)
- Long-life lubrication, maintenance free

OPTIONS
- Motor mounting position on opposite side (left-hand, LH)

PERFORMANCES with 24 V DC motor
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

ENCODER
- 2-channels bidirectional magnetic encoder for positioning and/or speed feedback
- Encoder fitted directly on the motor shaft
- Encoder resolution:
  1 ppr (code GI 21) or 4 ppr (code GI 24)
- Encoder counting as regards the gearbox shaft

<table>
<thead>
<tr>
<th>Number of impulses / 10 output turns</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RN</td>
</tr>
<tr>
<td>GI 21</td>
<td>260</td>
</tr>
<tr>
<td>GI 24</td>
<td>1 040</td>
</tr>
</tbody>
</table>

ORDERING CODE EXAMPLE
MR 31 RL CC 24 V GI 21 LH

Gearmotor Selected ratio Motor Encoder Options
GEARMOTORS for rotative actuators  MR 40 FC

OVERALL DIMENSIONS

STROKE END SWITCHES
- Electric cam-operated stroke end switches (code FC2) to control the number of output shaft rotations
- Adjustable electric stroke end switches switching off the motor (code FC2X)

POTENTIOMETER
- Rotative potentiometer 5 kΩ for positioning control (code POR 5k)

PERFORMANCES WITH 24 V DC MOTOR
(Performances with 12 V DC motor: same load, linear speed 10 % less, electrical consumption 2 times more)

PERFORMANCES AND FEATURES
- Max. torque up to 15 Nm
- Output flange IEC 63B14
- Stroke end switches for turns control:
  min. 20 turns ÷ max. 140 turns
- Aluminium housing and flange
- 12 or 24 V DC motor with electromagnetic noise suppressor (motor features details on page 69)
- Standard protection IP 65
- Standard motor mounting position (right-hand, RH)
- Long-life lubrication, maintenance free

STROKE END SWITCHES
- Electric cam-operated stroke end switches (code FC2) to control the number of output shaft rotations
- Adjustable electric stroke end switches switching off the motor (code FC2X)

POTENTIOMETER
- Rotative potentiometer 5 kΩ for positioning control (code POR 5k)

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Gearmotor</th>
<th>Ratio</th>
<th>Motor</th>
<th>Accessories</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR 40 FC</td>
<td>RL1</td>
<td>CC 24 V</td>
<td>GI 21</td>
<td>POR 5K</td>
</tr>
</tbody>
</table>

Motor cable length 0.3 m

(Further specifications about stroke end switches and potentiometer at page 74)
12. GENERAL FEATURES

12.1 Ball screws

Rolled ball screw, tolerance class IT7.
Screws material: steel 42 CrMo 4 (UNI EN 10083-1) induction hardening treatment for surface hardness 58÷61 HRc
Nuts material: steel 18 NiCrMo 5 (UNI EN 10084) hardened and ground, surface hardness 58÷61 HRc, with balls surface microfinishing.
Standard axial backlash between screw and nut lower than 0.1 mm.
Executions with zero backlash or preloaded available on request.
Rolled ball screws and ball nuts are completely made in Italy, in-house manufactured by Servomech SpA S.U, Bologna.

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Ball screw</th>
<th>Ball diameter [mm]</th>
<th>Nr of ball circuits</th>
<th>Dynamic load $C_a$ [N]</th>
<th>Static load $C_{oa}$ [N]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSA 08</td>
<td>BS 14 × 5</td>
<td>3.175</td>
<td>2</td>
<td>4 900</td>
<td>6 200</td>
</tr>
<tr>
<td>BSA 10</td>
<td>BS 14 × 5</td>
<td>3.175</td>
<td>2</td>
<td>4 900</td>
<td>6 200</td>
</tr>
<tr>
<td>BSA 11</td>
<td>BS 14 × 10</td>
<td>3.175</td>
<td>2</td>
<td>5 300</td>
<td>6 900</td>
</tr>
<tr>
<td>CLB 25</td>
<td>BS 14 × 5</td>
<td>3.175</td>
<td>2</td>
<td>4 900</td>
<td>6 200</td>
</tr>
<tr>
<td></td>
<td>BS 14 × 10</td>
<td>3.175</td>
<td>2</td>
<td>5 300</td>
<td>6 900</td>
</tr>
<tr>
<td>CLB 27</td>
<td>BS 16 × 5</td>
<td>3.175</td>
<td>3</td>
<td>7 800</td>
<td>11 400</td>
</tr>
<tr>
<td>BSA 12</td>
<td>BS 20 × 5</td>
<td>3.175</td>
<td>3</td>
<td>9 100</td>
<td>15 400</td>
</tr>
<tr>
<td>UBA 0</td>
<td>BS 14 × 5</td>
<td>3.175</td>
<td>2</td>
<td>4 900</td>
<td>6 200</td>
</tr>
<tr>
<td></td>
<td>BS 14 × 10</td>
<td>3.175</td>
<td>2</td>
<td>5 300</td>
<td>6 900</td>
</tr>
</tbody>
</table>

Static and dynamic load according to norm ISO 3408 and DIN 69051
12. GENERAL FEATURES

Ball screws LOAD - LIFETIME diagram
A linear actuator is in self-locking condition when:

- A push or pull load applied on a not running linear actuator does not start the linear movement (statically self-locking).
- Switching off the motor power supply of a running linear actuator, with push or pull load, the movement stops (dynamically self-locking).

Self-locking conditions are described in the following situations:

1. **Totally static self-locking**
   - Not running actuator, no load vibration.
   - A push or pull load (up to the maximum permissible) applied on the actuator does not start the linear movement: 1-starts acme screw linear actuators.

2. **Partially static self-locking**
   - Not running actuator, no load vibration.
   - A push or pull load (up to 70% of the maximum permissible) applied on the actuator does not start the linear movement: 2-starts acme screw linear actuators, ratios RL and RN.
   - A push or pull load (up to 50% of the maximum permissible) applied on the actuator does not start the linear movement: 2-starts acme screw linear actuators, ratios RV and RH.
   - A push or pull load (up to 30% of the maximum permissible) applied on the actuator does not start the linear movement: 3-starts acme screw linear actuators.

   NOTE: for loads higher than the stated ones we suggest to use a brakemotor.

3. **Static back-driving**
   - Ball screw actuators are basically static back-driving even with applied load values lower than 20% of the maximum value allowed.
   - Therefore, we recommend to use a brakemotor.

   For all uncertain self-locking conditions, both static and dynamic, please contact our Technical Dpt.

**Stopping accuracy**

Switching off the motor power supply, the actuator stopping depends on the following factors:

- actuator efficiency and linear speed;
- motor inertia;
- load inertia.

It is important to evaluate the correlation of all these factors to verify the need of a electric braking and, therefore, a load deceleration ramp and/or a brakemotor.

Generally, acme screw linear actuators working at a linear speed up to 15÷20 mm/s do not require auxiliary braking devices. Under high loads in the moving direction or when stopping accuracy and repeatability are required, brakemotor is recommended.

The brake is not available on actuators that fit small DC motors without interchangeable brushes (see page 69). In such cases the stopping accuracy and the static back driving should be improved by our electronic dynamic braking device (see page 77).

For any doubts concerning your application, we recommend you to contact our Technical Dpt. for further proper evaluations.
12. GENERAL FEATURES

12.3 DC MOTORS

Motors with interchangeable brushes (actuators ATL 10, UAL 0, BSA 10, BSA 11, UBA 0, CLB 25, CLB 27)

Permanent magnet DC motors, without fan, available with or without brake.
Long-life brushes, easy to replace.

Bipolar power supply cable 2 x 1 mm², 1.5 m length. Motor weight: 1.3 kg.

Motor with brake total weight: 1.8 kg.

Power supply: 0.4 A at 24 V; 0.85 A at 12 V
Braking torque: 0.5 Nm

WARNING! The motor brake is normally closed; to open it, a constant rated voltage power supply is required. With lower voltage, the brake does not open.

Motors with non-interchangeable brushes (linear actuators LMR, ATL, CLA, LMP, LMI Series)

Permanent magnet DC motors, without fan.
The brake is not available; the brushes are not interchangeable.

Standard motors winding has insulation class B.
These motors have open enclosures: the actuator is fitted with proper motor outer protections which allow to reach motor Protection Class IP 65.
The performance diagrams concerning actuators with DC motor stated in this catalogue, show the input power variation depending on the load variation.
This allows to select power supply / drivers properly.

Motor wires connection – Actuator push rod travelling direction

<table>
<thead>
<tr>
<th>Actuator with DC motor, RIGHT-HAND mounting</th>
<th>LMR 01</th>
<th>LMR 03</th>
<th>ATL 02</th>
<th>ATL 05</th>
<th>ATL 08</th>
<th>ATL 12</th>
<th>CLA 20</th>
<th>CLA 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire color A</td>
<td>red</td>
<td>red</td>
<td>brown</td>
<td>brown</td>
<td>brown</td>
<td>red</td>
<td>brown</td>
<td>brown</td>
</tr>
<tr>
<td>Wire color B</td>
<td>black</td>
<td>black</td>
<td>blue</td>
<td>blue</td>
<td>blue</td>
<td>blue</td>
<td>blue</td>
<td>blue</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actuator with DC motor, LEFT-HAND mounting</th>
<th>LMR 01</th>
<th>LMR 03</th>
<th>ATL 02</th>
<th>ATL 05</th>
<th>ATL 08</th>
<th>ATL 12</th>
<th>CLA 20</th>
<th>CLA 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire color A</td>
<td>red</td>
<td>red</td>
<td>blue</td>
<td>blue</td>
<td>blue</td>
<td>blue</td>
<td>blue</td>
<td>blue</td>
</tr>
<tr>
<td>Wire color B</td>
<td>black</td>
<td>brown</td>
<td>brown</td>
<td>red</td>
<td>brown</td>
<td>brown</td>
<td>brown</td>
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</tr>
</tbody>
</table>
## 12. GENERAL FEATURES

### 12.4 AC MOTOR

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Motor</th>
<th>Power kW</th>
<th>N° of poles</th>
<th>Input voltage Vca</th>
<th>Frequency Hz</th>
<th>Rated current A</th>
<th>Capacitor uF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATL 02</td>
<td>AC 3-phase</td>
<td>0.06</td>
<td>2</td>
<td>230/400</td>
<td>50</td>
<td>0.7-0.4</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>AC 1-phase</td>
<td>0.06</td>
<td></td>
<td>230</td>
<td></td>
<td>0.68</td>
<td>5</td>
</tr>
<tr>
<td>ATL 10</td>
<td>AC 3-phase</td>
<td>0.12</td>
<td>2</td>
<td>230/400</td>
<td>50</td>
<td>0.81-0.46</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.09</td>
<td>4</td>
<td></td>
<td></td>
<td>0.8-0.45</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>AC 1-phase</td>
<td>0.12</td>
<td>2</td>
<td>230</td>
<td></td>
<td>2.6</td>
<td>12.5</td>
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<td>0.09</td>
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<td></td>
<td></td>
<td>1.6</td>
<td>12.5</td>
</tr>
<tr>
<td>ATL 12</td>
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<td>230/400</td>
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<td></td>
<td>0.18</td>
<td>4</td>
<td></td>
<td></td>
<td>1.1-0.66</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>AC 1-phase</td>
<td>0.25</td>
<td>2</td>
<td>230</td>
<td></td>
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<td>20</td>
</tr>
<tr>
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<td>0.18</td>
<td>4</td>
<td></td>
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<td>1.9</td>
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<tr>
<td>CLA 20</td>
<td>AC 3-phase</td>
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<td>2</td>
<td>230/400</td>
<td>50</td>
<td>0.7-0.4</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>AC 1-phase</td>
<td>0.06</td>
<td></td>
<td>230</td>
<td></td>
<td>0.68</td>
<td>5</td>
</tr>
<tr>
<td>CLA 25</td>
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<td>0.12</td>
<td>2</td>
<td>230/400</td>
<td>50</td>
<td>0.81-0.46</td>
<td>-</td>
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<td></td>
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<td>0.09</td>
<td>4</td>
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<td>0.8-0.45</td>
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<tr>
<td></td>
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<td>2</td>
<td>230</td>
<td></td>
<td>2.6</td>
<td>12.5</td>
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<td>230/400</td>
<td>50</td>
<td>0.7-0.4</td>
<td>-</td>
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<tr>
<td></td>
<td>AC 1-phase</td>
<td>0.06</td>
<td></td>
<td>230</td>
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<td>0.68</td>
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<td>BSA 10</td>
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<td>50</td>
<td>0.81-0.46</td>
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<td>0.09</td>
<td>4</td>
<td></td>
<td></td>
<td>0.8-0.45</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>AC 1-phase</td>
<td>0.12</td>
<td>2</td>
<td>230</td>
<td></td>
<td>2.6</td>
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<td></td>
<td>1.6</td>
<td>12.5</td>
</tr>
<tr>
<td>BSA 12</td>
<td>AC 3-phase</td>
<td>0.25</td>
<td>2</td>
<td>230/400</td>
<td>50</td>
<td>1.3-0.75</td>
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<td>1.17-0.66</td>
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<tr>
<td></td>
<td>AC 1-phase</td>
<td>0.25</td>
<td>2</td>
<td>230</td>
<td></td>
<td>2.1</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.18</td>
<td>4</td>
<td></td>
<td></td>
<td>1.9</td>
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<td>AC 3-phase</td>
<td>0.12</td>
<td>2</td>
<td>230/400</td>
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<td>0.81-0.46</td>
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<td>4</td>
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<td>0.8-0.45</td>
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<tr>
<td></td>
<td>AC 1-phase</td>
<td>0.12</td>
<td>2</td>
<td>230</td>
<td></td>
<td>2.6</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.09</td>
<td>4</td>
<td></td>
<td></td>
<td>1.6</td>
<td>12.5</td>
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</tbody>
</table>
### 12. GENERAL FEATURES

#### 12.4 AC MOTOR

<table>
<thead>
<tr>
<th>Insulation class (1)</th>
<th>Motor protection class (1)</th>
<th>Fan</th>
<th>Brake</th>
<th>Brake coil power supply (2) (3)</th>
<th>Brake rated current A</th>
<th>Braking torque Nm</th>
<th>Brake protection class</th>
</tr>
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<tbody>
<tr>
<td>F</td>
<td>IP 55</td>
<td>Not available</td>
<td>Not available</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>F</td>
<td>IP 55</td>
<td>Standard</td>
<td>On request</td>
<td>DC powered by rectifier</td>
<td>0.05</td>
<td>1.7</td>
<td>IP 44</td>
</tr>
<tr>
<td>F</td>
<td>IP 55</td>
<td>Standard</td>
<td>On request</td>
<td>DC powered by rectifier</td>
<td>0.09</td>
<td>4</td>
<td>IP 44</td>
</tr>
<tr>
<td>F</td>
<td>IP 55</td>
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<td>Not available</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>F</td>
<td>IP 55</td>
<td>Standard</td>
<td>On request</td>
<td>DC powered by rectifier</td>
<td>0.05</td>
<td>1.7</td>
<td>IP 44</td>
</tr>
<tr>
<td>F</td>
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<td>-</td>
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</tr>
<tr>
<td>F</td>
<td>IP 55</td>
<td>Standard</td>
<td>On request</td>
<td>DC powered by rectifier</td>
<td>0.05</td>
<td>1.7</td>
<td>IP 44</td>
</tr>
<tr>
<td>F</td>
<td>IP 55</td>
<td>Standard</td>
<td>On request</td>
<td>DC powered by rectifier</td>
<td>0.09</td>
<td>4</td>
<td>IP 44</td>
</tr>
</tbody>
</table>

(1) Higher insulation and protection classes available on request.

(2) Normally closed activated by DC electromagnet.
   The electromagnet is powered by a 1-phase rectifier fitted in the terminal box.

(3) Motors with separately powered brake available on request.
   This solution shall be used for applications with frequency inverter.
13. STROKE END SWITCHES AND POSITIONING CONTROL

GENERAL NOTE

In case the linear actuator is used in an application where the stroke end switches must be connected to PLC or PC, we suggest to make the connection with a galvanic separation circuit.

![Diagram of galvanic separation circuit]

13.1 Magnetic stroke end switches (reed) FCM
(linear actuators ATL, BSA, UAL, UBA Series, LMI 02 and LMP 03)

The magnetic field of the ring fixed on the nut activates the reed contact of the switch locked on the protective tube with a clamp. The position of the switches along the tube is easily adjustable. The switches used to determine any intermediate position (between Lc and La) will switch over in two different positions, depending on the push rod motion direction (extending or retracting).

**WARNING!** The magnetic reed-switches can work only if connected to a wiring control circuit in order to activate the electric relay. Do not connect them in series between the power supply and the electric motor!

**REED CONTACT RATED VALUE**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>DC</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3 ... 130) V</td>
<td>20 W</td>
<td>20 VA</td>
</tr>
<tr>
<td>Max. commutable current</td>
<td>300 mA (resistive load)</td>
<td>3 W</td>
</tr>
<tr>
<td>Max. inductive load</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**Standard: NC switch** (normally closed contact) equipped with signalling LEDS and protective varistor against voltage peaks.

**Standard cable length 2 m; wires 2 x 0.75 mm²**

Different configurations available on request: NO (normally open); CS (exchanging contact).

For more information please contact our Technical Dpt.

13.2 Electric stroke end switches FCE (actuators ATL 10, ATL 12, BSA 10, BSA 12)

Two electric switches, installed inside a sealed plastic box, are activated by two adjustable rings through a shaft collar.

**Standard switches are wired on the NC contact, cable length 1.5 m; wires 4 x 0.75 mm²**

On request, they can be wired on the NO contact or on the switch-over contact CS (for available configurations please contact our Technical Dpt).

**Min retracted length Lc** is adjusted by ring 1. FC1 switch is connected with the WHITE and the BROWN cables.

**Max extended length La** is adjusted by ring 2. FC2 switch is connected with the YELLOW and the GREEN cables.

The position of the brass rings along the stainless steel supporting rod is easily adjustable.

**WARNING!** The electric reed switches can work only if connected to a wiring control circuit in order to activate the electric relay. Do not connect them in series between the power supply and the electric motor!
13. STROKE END SWITCHES AND POSITIONING CONTROL

13.3 Electric stroke end switches FC (linear actuators LMR Series)

Each of the two micro-switches is fitted in a slot with a cam for switches commutation. A screw allows to lock the assembly in the desired position, adjusting in this way the switching position. The nut with suitable shape makes the cams rotate, so to activate the switches. This cam-operated device provides a stable and self-keeping commutation of the switches. The MIN. RETRACTED LENGTH $L_c$ of the actuator is adjusted and controlled by switch FC1. The MAX. EXTENDED LENGTH $L_a$ of the actuator is adjusted and controlled by switch FC2.

Following pictures show the switching sequence for switch FC2.

Standard switches have silver-plated contacts, max. current 12 A with resistive load - 6 A with inductive load. Switches with gold-plated contacts, very low contact resistance for low working voltage (if connected to PLC or PC), max. current 0.1 A, available on request.

STANDARD switch connection

Code FC2: two electric cam-operated switches, wired on contact NC (to be connected into the external control circuit). On request, the switches can be wired on the contact NO or on switch-over contact CS. Code FC2X: two electric cam-operated switches, internally wired between power supply and electric motor, in order to switch off the power supply directly, without relays.

MOTOR
RED (0.75 mm²)
BLACK (0.75 mm²)
FC 1
RED (0.22 mm²)
WHITE (0.22 mm²)
FC 2
YELLOW (0.22 mm²)
GREEN (0.22 mm²)

POWER SUPPLY
BLACK (0.75 mm²)
RED (0.75 mm²)

M =
FC1
FC2
13.4 Electric cam-operated stroke end switches (linear actuators CLA and CLB Series)

Code **FC2**: two electric cam-operated switches, wired on contact NC (to be connected into the external control circuit). On request, the switches can be wired on the contact NO or on the switch-over contact CS. (For available configurations please contact our Technical Dpt).

Code **FC2X**: two electric cam-operated switches, internally wired between power supply and electric motor, in order to switch off the power supply directly, without relays. Available for actuators with Dc or AC 1-phase motor.

Code **FC2 + FC** or **FC2X + FC**: Stroke end switches FC2 or FC2X with a third switch for any intermediate position. The third switch can be wired on contact NC or NO on request. (For different configurations please contact our Technical Dpt).

<table>
<thead>
<tr>
<th>SWITCH RATED VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage</strong></td>
</tr>
<tr>
<td>250 Vac</td>
</tr>
<tr>
<td>30 Vdc</td>
</tr>
<tr>
<td>125 Vdc</td>
</tr>
</tbody>
</table>

**POR 5k**: rotative potentiometer, single turn (340°), 5 kOhm ± 20 %, linearity ± 2 %

The rotative potentiometer is an absolute transducer, whose output signal is proportional to the current position of the actuator push rod. Analogic output signal.

Standard cable: 4 x 0.25 mm² + shield, 1.5 m length (for different configurations please contact us).

POR 5k standard wiring diagram:

- POR Power supply: 0 V dc
- Reference signal: ZERO
- Reference signal: RETURN
- POR Power supply: + V cc
- SHIELD

**Lc** = actuator retracted length, **La** = **Lc** + Stroke – actuator extended length
13.5 Encoder GI (linear actuators LMR 01, LMR02, LMR 03 and LMP03)

Hall effect, bi-directional, incremental encoder
Output configuration: PUSH-PULL
Code GI 21: 2 output channels, 1 pulse per revolution
Code GI 24: 2 output channels, 4 pulses per revolution
Cable length: as motor cable
Protected against polarity inversion
Protected against any incorrect output connection
NOTE: For conductive cables colour, please refer to the wiring diagram in the “Installation Instructions” supplied with the product.

13.6 Encoder EH38 (linear actuators ATL 10, UAL 0, BSA 10, UBA 0)

Bi-directional, incremental, optical encoder
Output configuration: PUSH-PULL
Code EH38: 2 output channels, 100 pulses per revolution, with zero set pulse
Cable length: 1.3 m
Protected against short circuit
Protected against polarity inversion
Protected against any incorrect output connection
Input voltage: 8÷24 Vcc
No load power consumption: 100 mA
Max. commutable current: 50 mA per channel

NOTE: Safety clutch FS cannot be used with rotative encoder (the position reference would be lost due to its slipping).
14.1 LME 01 - Electronic overload protection

LME 01 is an electronic device that protects DC motors against current overloads due to a persistent dynamic overload applied on the actuator.

The electronic protection LME 01 is suitable for all LINEARMECH actuators with DC motor.

LME 01 is connected between electric motor and power supply.

An electronic circuit inside monitors the input current and, as this reaches the preset threshold value, LME 01 cuts it off.

A trimmer enables the threshold current value adjustment within a continuous range.

Protection intervention can be delayed to allow the motor start. This delay time can be set within a continuous range with a trimmer.

Turn off the power supply to reset the device.

The electronic circuit is inside a plastic box with flats for easy mounting.

### TECHNICAL DATA

<table>
<thead>
<tr>
<th>Model</th>
<th>24 V</th>
<th>12 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage [V dc]</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>Output voltage [V dc]</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>Current threshold range [A]</td>
<td>2 ... 10</td>
<td>4 ... 20</td>
</tr>
<tr>
<td>Delay time range [s]</td>
<td>0 ... 1.5</td>
<td></td>
</tr>
<tr>
<td>Max. duty cycle</td>
<td>15 % over 10 min</td>
<td></td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 30</td>
<td></td>
</tr>
<tr>
<td>Box material</td>
<td>ABS</td>
<td></td>
</tr>
<tr>
<td>Box dimensions [mm]</td>
<td>89 × 64 × 30</td>
<td></td>
</tr>
<tr>
<td>Connection cables length: 150 mm, with fast-on connectors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>LME 01</th>
<th>24 V</th>
<th>ATL 02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Actuator connected to LME 01</td>
<td></td>
</tr>
</tbody>
</table>
Small size DC motors fitted on many of Linearmech actuators are not available with mechanical brake (operation and/or static brake). There is no accuracy on actuator’s stop position without the mechanical brake on the motor, when switching off the power on motor itself. The uncertainty depends on the speed, the load inertia and other factors such as actuator’s performances and efficiency.

Thanks to the new Linearmech LME 02 control is possible to: power supply the actuator with 12 or 24Vdc; manage electromechanical limit switches (FCE, FC2) or magnetic limit sensors (FCM); dynamic braking the actuator when the motor is switched off, by closing in short circuit the motor (slowing down the motor rotor and the load).

When the motor is switched off, it is closed in short circuit. This condition, with the actuator in still position, increases the self-locking capacity of the actuator. This is an help to hold the position and the load even when the ratio and the pitch of linear actuator’s screw are non self-locking. When the “Electronic dynamic braking” does not ensure the desired accuracy, it is recommended to use different solutions with brake motors. The “Electronic dynamic braking” is more effective on low speed linear actuators. The effectiveness lowers while speed and efficiency increase (acme screws with more starts or ball screws).

Please contact our Technical Dept. for more details.

The LME 02 control device can be connected to the actuator according to the following wiring diagrams.

**WORKING MODE**

LME 02 device must be fitted between power supply and actuator motor according to the above wiring diagrams. Actuator push rod moves forward (FW) or reverse (REV), depending on power supply polarization on LME02 input pins.

Powering on this device the actuator push rod moves. The actuator stops when power supply is switched off or limit switches positions are reached (same running conditions as per actuators with FC2X but with the advantage that switches do not cut off the motor current). In both conditions, the “Electronic dynamic braking” is active. The braking is held even without power supply.

The switch FC2X (see pages 73 and 74) is an internal wiring between power supply and electric motor in order to switch off the power supply directly, without relays, when the limit positions are reached.

**TECHNICAL FEATURES**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>12 or 24 Vdc</td>
</tr>
<tr>
<td>Nominal current</td>
<td>10 A</td>
</tr>
<tr>
<td>Peak current</td>
<td>15 A</td>
</tr>
<tr>
<td>Intervention time</td>
<td>20 ms</td>
</tr>
</tbody>
</table>

---

**Diagram**

[Diagram showing wiring connections and components]
14.3 LME 11 - Single actuator programmable driver

LME 11 is a programmable driver for a single actuator with DC motor. It allows to control the linear actuator push rod position and the linear speed, as well as the maximum force. Furthermore, starting-stopping ramp time, max. speed and required push rod position can be set. Two stroke end switches prevent mechanical stop at the end of the stroke. LME 11 allows also to monitor the input current and to cut it off in case of overload during linear motion. Protection intervention and delay time can be set with a trimmer.

LME 11 can control a linear actuator with DC motor, two normally closed stroke end switches and a feedback device: rotative potentiometer (single turn, 5 kOhm) or bi-directional encoder or 1-channel pulse generator (PUSH-PULL / OPEN COLLECTOR, max. 1 kHz).

The system driver-linear actuator can work in different ways, depending on software parameters value. Generally, the unit is supplied with three different closed loop working modes already stored.

**Working mode 0**
The push rod actuator can be set in three different preset positions L (input N) between two software limit positions Lc (SW) and La (SW), within the range limited by two stroke end switches - Lc (FC) and La (FC) positions.

The motor supply is activated by the signal CYCLE START+ input N and automatically stopped when the push rod reaches the set position L (input N).

**Working mode 1**
The push rod actuator can be set in any position L between two software limit positions Lc (SW) and La (SW), within the range limited by two stroke end switches - Lc (FC) and La (FC) positions.

The motor runs only when the signal CYCLE START+ input N is on (JOG mode).

**Working mode 2**
The push rod actuator can be set in position L defined by an external, analog reference signal (potentiometer or any other device with output 0 ... 5 V dc or 4 ... 20 mA) between two software limit positions Lc (SW) and La (SW), within the range limited by two stroke end switches - Lc (FC) and La (FC) positions; Varying the reference signal level, the actuator motor runs automatically until the push rod reaches the set position.

Other working modes can be obtained with a different software.
14.4 LME 12 - Two-actuators programmable driver

The synchronization of two actuators is extremely important in those applications requiring the movement of covers, traps or hoods. A non-synchronized movement of the actuators would cause loads and/or deformations on the units. LME 12 driver integrates both control and activation functions allowing the implementation of dedicated software solutions depending on application requirements.

LME 12 is a programmable driver for synchronizing two linear actuators with DC motors.

LME 12 is a single board which integrates two LME 12 driver units.

Each actuator is provided with a microprocessor with its relevant parameters set.

Based on the preset parameter values, LME 12 calculates the time related position of the actuator push rod. Startup, it makes the two actuators move simultaneously and, based on to the feedback signals, it monitors the current position of both push rods.

The system will stop automatically and an error signal will appear in the following two cases:
- the difference between the real position of any of the two push rods and the corresponding calculated position is higher than preset value;
- the difference of the real position between the two push rods is higher than another preset value.

Two drivers LME 12 can be connected into a 4-axis system.

Working modes: see chapter about LME 11.

LME 11 and LME 12 - Technical features

- Rated input voltage: 24 V dc or 12 V dc
- Input voltage limits: (10 ...30) V dc
- Automatic shut-off in case of input voltage lower than preset value (important when the driver is powered by battery)
- Protected against input polarity inversion
- Max input current: 10 A
- Automatic shut-off in case a preset temperature value is reached (over-heating protection)
- Emergency input
- Movement enabling input
- 3 positioning drive inputs
- Analogic input (V or mA)
- Encoder input (max. frequency 1 kHz)
- MODBUS communication port
- Status output for system functioning monitoring
- Signal LEDS
- Dimensions LME 11: 144 x 107 x 76 mm
- Dimensions LME 12: 116 x 160 x 76 mm
- Fixing on rail DIN-EN 50022

General note about working modes:
All software parameter values can be varied using an additional display (available on request) or through MODBUS communication port.
Transport and Handling

Linearmech electromechanical actuators are very robust products, since they are structurally built with metallic components; nevertheless, motors provided with their protections, stroke end switches and encoders require a particular care and attention in packaging and during transport and handling. Therefore, we recommend to handle the actuators using their supporting points, such as the housing, and not the stroke end devices or motor. Finally, we recommend not to bang the actuators one against the other or against machine surfaces. The electric components of stroke end switches, encoders and motors must be handled with care!

Storage

During storage, electro-mechanical actuators shall be protected against atmospheric agents and dust or other polluters settling on the push rod. We recommend to store the products in environment temperature range within (-10 ... +40) °C

Installation

Linear actuators must be installed to work with push or pull axial load only. Lateral and radial loads are not permissible. The front and rear fixing attachments must be aligned!

Ball joint front attachment is recommended in case the alignment of front and rear fixing points cannot be guaranteed. An incorrect installation can cause loss of power, malfunctioning, noise and lubricant leakage. The actuator minimum retracted length (Lc) and maximum extended length (La) are the operation limits. Make sure that the application does not require a stroke length longer than the one fixed by these limits. The use of the actuator exceeding its max. extended length (La) and min. retracted length (Lc) and the provided internal protections, cause collision against the mechanical stops with consequent possible damage of screw and bronze nut.

Commissioning and use

Linearmech linear actuators are supplied with long-life lubricant and therefore maintenance-free. Before activating the actuator, the following checks must be carried out:

- Verify the motor shaft turning direction (motor wiring connection) and the related push rod travelling direction.
  Wires connection related to the push rod travelling direction is shown on page 69, in the section concerning electric motors wires connection.
- Verify the stroke end switches position: the minimum limit Lc nor the maximum limit La can be exceeded.
- Make sure that the electric motor and the stroke end switches are connected correctly and that the right voltage is used.

During commissioning and tests, do not exceed the working conditions stated for each actuator as allowed duty cycle in % over 10 minutes. Any misuse can cause over-heating and unintentional premature damaging.

For further explanations and in case of doubts please contact Linearmech S.r.l.

The compliance failure of any recommended and suggested instructions for handling, storage, installation, commissioning and use of the product implies the immediate lost of warranty.