

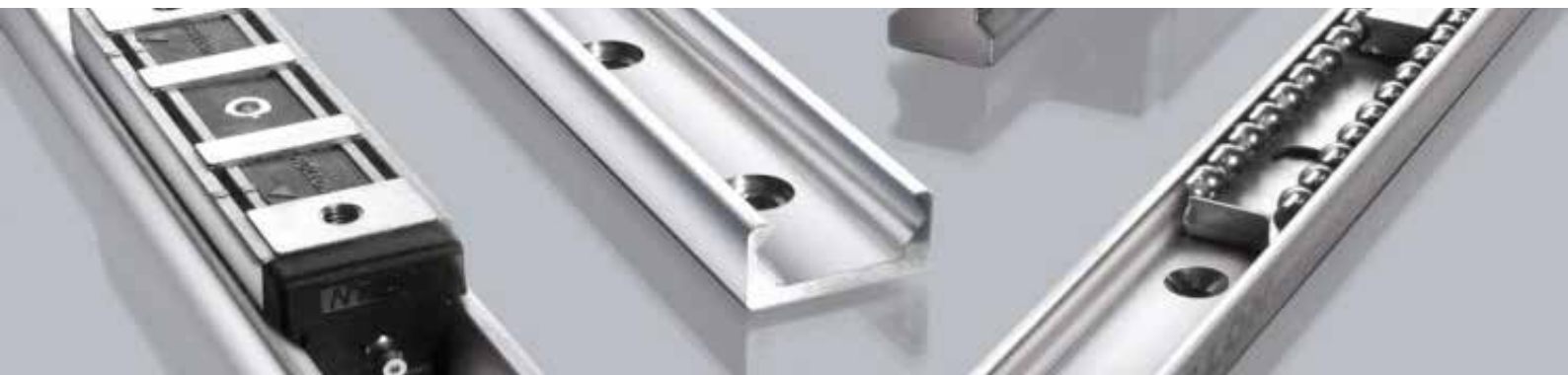
A LEADING MANUFACTURER IN LINEAR MOTION

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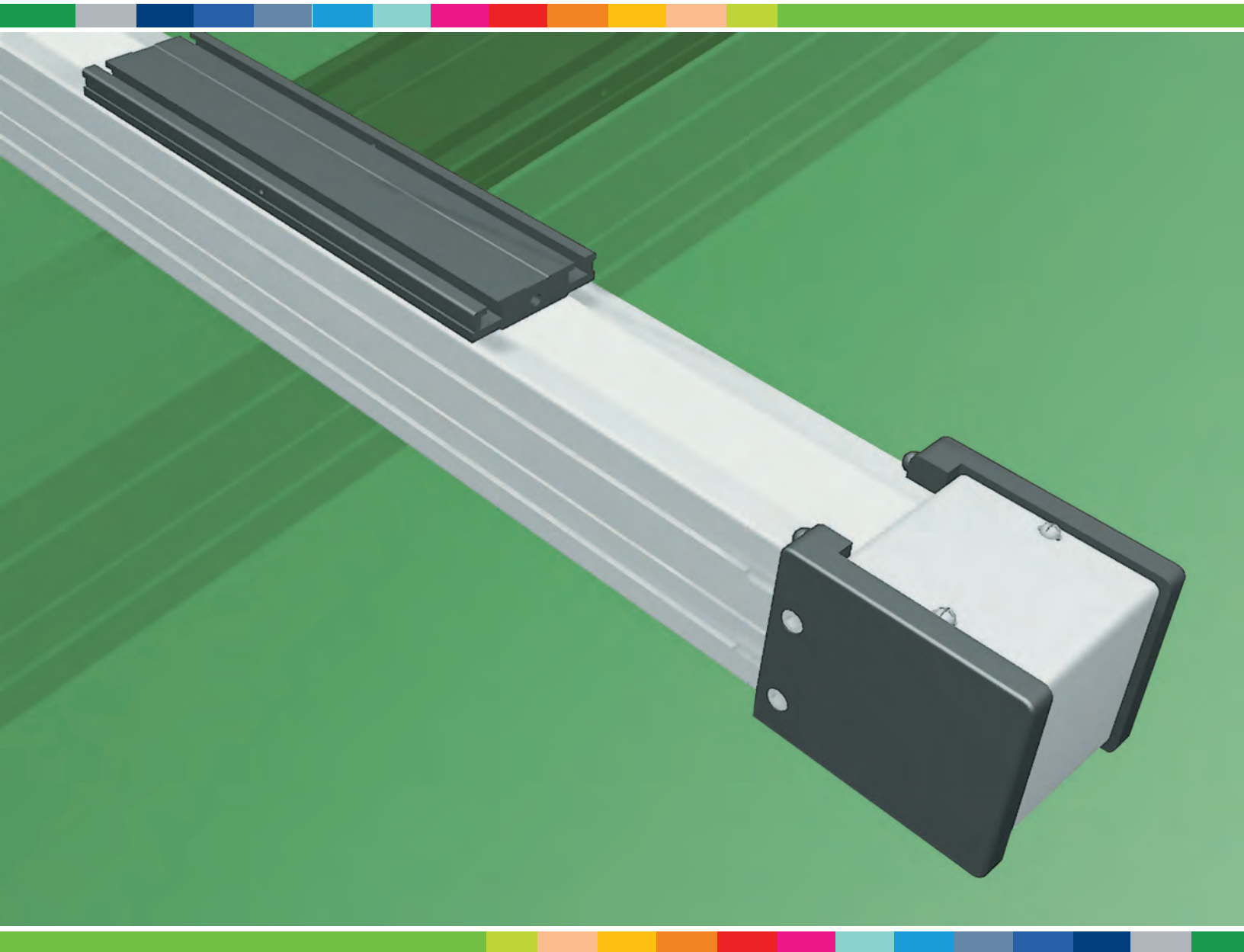
SUMMERS

TEL: 0800 055 6663

E-MAIL: SALES@GERALD-SUMMERS.CO.UK



ACTUATORLINE – ECO series



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ECO Series

The **ECO** series is comprised of variously-sized linear units so that the designer and/or user is able to select the most suitable system according to load and shuttling speed required.

The **ECO** series actuators are constructed of self-supporting, extruded aluminum and incorporate a linear motion system. This system incorporates a maintenance free ball bearing guide, which is fitted inside the extruded body.

The **ECO** series use polyurethane transmission belts reinforced with high tensile strength steel wire, AT pitch, and parabolic profiles.

Extruded Bodies

The aluminium extrusions used for the **ECO** series were designed and manufactured in cooperation with a leading company in this field, to obtain the right combination of high mechanical strength and reduced weight. The anodized aluminium alloy 6060 used (see physical-chemical characteristics on page 19) was extruded with dimensional tolerances complying with UNI 3879 standards.

T-slots are provided for fast, hassle-free mounting of accessories (proximity switch runner, etc.).

Carriage

The carriage of the **ECO** series is made of anodized aluminium. Carriages of two different lengths are available for each size of linear unit.

Driving Belt

The **ECO** series actuators use polyurethane transmission belts reinforced with embedded steel wires, AT pitch and parabolic profiles. This type of belt is ideal because of its high load transmission capabilities, compact size and low noise. Used in conjunction with backlash-free pulleys, smooth reciprocating motion can be achieved. Optimization of the maximum belt width-to-body dimension ratio enables the following performance characteristics to be achieved:

- High speed
- Low noise
- Low wear

The driving belt is guided by specific slots in the aluminium extruded body which covers the inside components.

3 The Linear Motion System

The linear motion system has been designed to meet high load, speed and maximum acceleration conditions. The following linear motion system is offered:

ECO SP series with ball bearing guides

- One ball bearing guide with high load capacity is mounted onto a seat on the aluminium body.
- The carriage of the linear unit is assembled on one or two preloaded ball bearing blocks.
- The four-ball row configuration enables the carriage to handle loading evenly in the radial (normal) and lateral (transverse) directions.
- The blocks have seals on both ends and, when necessary, an additional scraper can be fitted for very dusty conditions.
- The ball bearing carriages of the **SP** versions are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent rotating elements and prevents misalignment of these in the circuits.

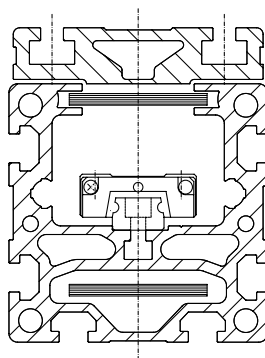
- Lubrication reservoirs (pockets) installed on the front of the ball bearing blocks supply the right amount of lubricant, thus promoting maintenance-free operation.

The linear motion system described above offers:

- High speed and acceleration
- High load capacity
- High bending permissible moments
- Low friction
- Long life
- Maintenance free
- Low noise

ECO 60

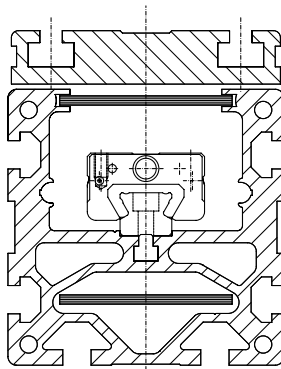
- Profile dimensions:
60 x 60 mm



ECO 60 SP

ECO 80

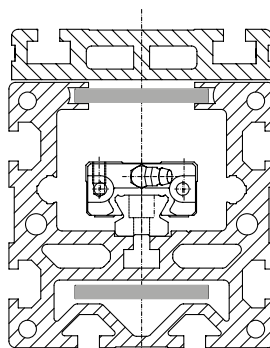
- Profile dimensions:
80 x 80 mm



ECO 80 SP

ECO 100

- Profile dimensions:
100 x 100 mm



ECO 100 SP

The sectioned drawings on the previous page show the main characteristics and permit initial selection according to application requirements. For final selection, refer to the data and dimensions indicated in the pages listed in the table.

| Type | Max. permissible | | Max. permissible axial load (F_x) [N] | Max. speed [m/s] | Max. acceleration [m/s ²] | Max. positioning repeatability [mm] | See pag. |
|-------------|---------------------------|----------------------------------|---|------------------|---------------------------------------|-------------------------------------|----------|
| | radial (F_z) stat [N] | lateral (F_y) load*1 dyn [N] | | | | | |
| ECO 60 SP2 | 1400 | 540 | 820 | 4.0 | 50 | 0.1 | 8 |
| ECO 80 SP2 | 4840 | 1750 | 1270 | 5.0 | 50 | 0.1 | 9 |
| ECO 80 SP1 | 2420 | 870 | 1270 | 5.0 | 50 | 0.1 | 9 |
| ECO 100 SP2 | 8680 | 4180 | 2650 | 5.0 | 50 | 0.1 | 10 |
| ECO 100 SP1 | 4340 | 2090 | 2650 | 5.0 | 50 | 0.1 | 10 |

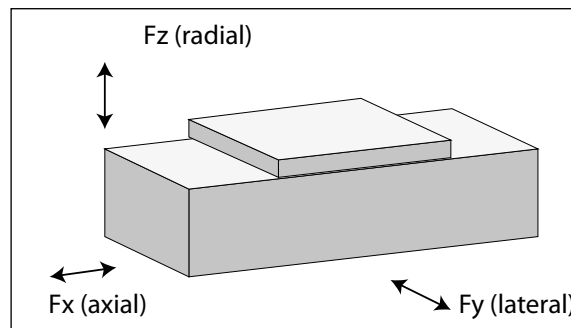
*1 Reasonable operating life and system rigidity can be obtained from the values given. These values **do not** relate to the theoretical maximum permitted load capacity of the linear motion system.

The load capacity of **ECO** series actuators depends on the linear motion system used and may vary according to the loading direction: radial or lateral. The maximum load in an axial direction depends on the type of driving belt used.

The maximum recommended values for the radial load (F_z) and the lateral load (F_y) indicated above incorporate a substantial factor of safety to ensure long life cycles.

Experience shows that these values ensure safe static loading and adequate life for most applications.

For special conditions (such as high shocks, vibrations, dusty environments, acceleration forces and high bending moments, etc), contact **Rollon** for further technical advice. Maximum permissible values for speed, acceleration and positioning repeatability can be significantly decreased in the presence of high loads.



ECO 60 SP2 with standard ball bearing guide

Technical Data

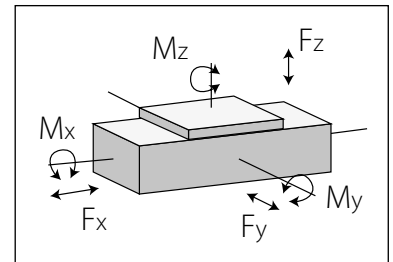
| | ECO 60 SP2 |
|--|-------------------------|
| Min. useful stroke length [mm] | 100 |
| Max. useful stroke length [mm] | 3700 |
| Max. positioning repeatability [mm] * | 0.1 |
| Max. speed [m/s] | 4.0 |
| Max. acceleration [m/s ²] | 50 |
| Type of belt | 32 AT 5 |
| Type of pulley | ø 44 - Z 28 - Zero Play |
| Carriage displacement per pulley turn [mm] | 140 |
| Carriage weight [kg] | 0.51 |
| Zero travel weight [kg] | 3.5 |
| Weight for 100 mm useful stroke [kg] | 0.45 |

* The positioning repeatability depends upon the type of transmission used.

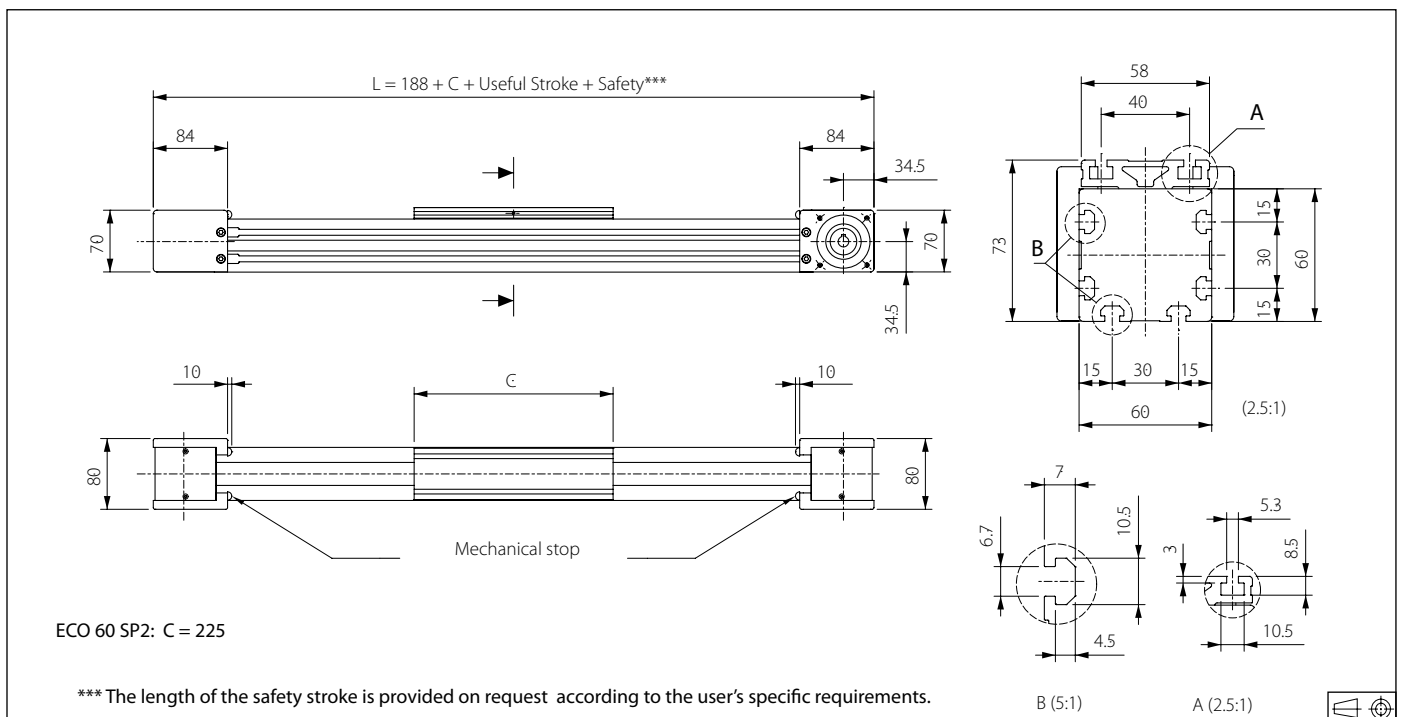
ECO 60 SP - Theoretical and maximum permissible loads

| | ECO 60 SP2 | | | |
|---------------------|-------------|------|--------------|------|
| | Theoretical | | Permissible* | |
| | stat. | dyn. | stat. | dyn. |
| F _x [N] | 1360 | 1020 | 1090 | 820 |
| F _y [N] | 7000 | 4490 | 1400 | 540 |
| F _z [N] | 7000 | 4490 | 1400 | 540 |
| M _x [Nm] | 42 | 34 | 8 | 4 |
| M _y [Nm] | 260 | 210 | 52 | 25 |
| M _z [Nm] | 260 | 210 | 52 | 25 |

* Reasonable operating life and system rigidity can be obtained from the values given.



ECO 60 SP2 dimensions



7 ECO 80 SP2 - ECO 80 SP1

ECO 80 SP2 and ECO 80 SP1 With ball bearing guide

Technical Data

| | ECO 80 SP2 | ECO 80 SP1 |
|--|-------------------------|-------------------------|
| Min. useful stroke length [mm] | 100 | 100 |
| Max. useful stroke length [mm] | 6000 | 6000 |
| Max. positioning repeatability [mm] * | 0.1 | 0.1 |
| Max. speed [m/s] | 5.0 | 5.0 |
| Max. acceleration [m/s ²] | 50 | 50 |
| Type of belt | 50 AT 5 | 50 AT 5 |
| Type of pulley | ø 59 - Z 37 - Zero Play | ø 59 - Z 37 - Zero Play |
| Carriage displacement per pulley turn [mm] | 185 | 185 |
| Carriage weight [kg] | 1.6 | 0.9 |
| Zero travel weight [kg] | 7.7 | 5.9 |
| Weight for 100 mm useful stroke [kg] | 0.8 | 0.8 |

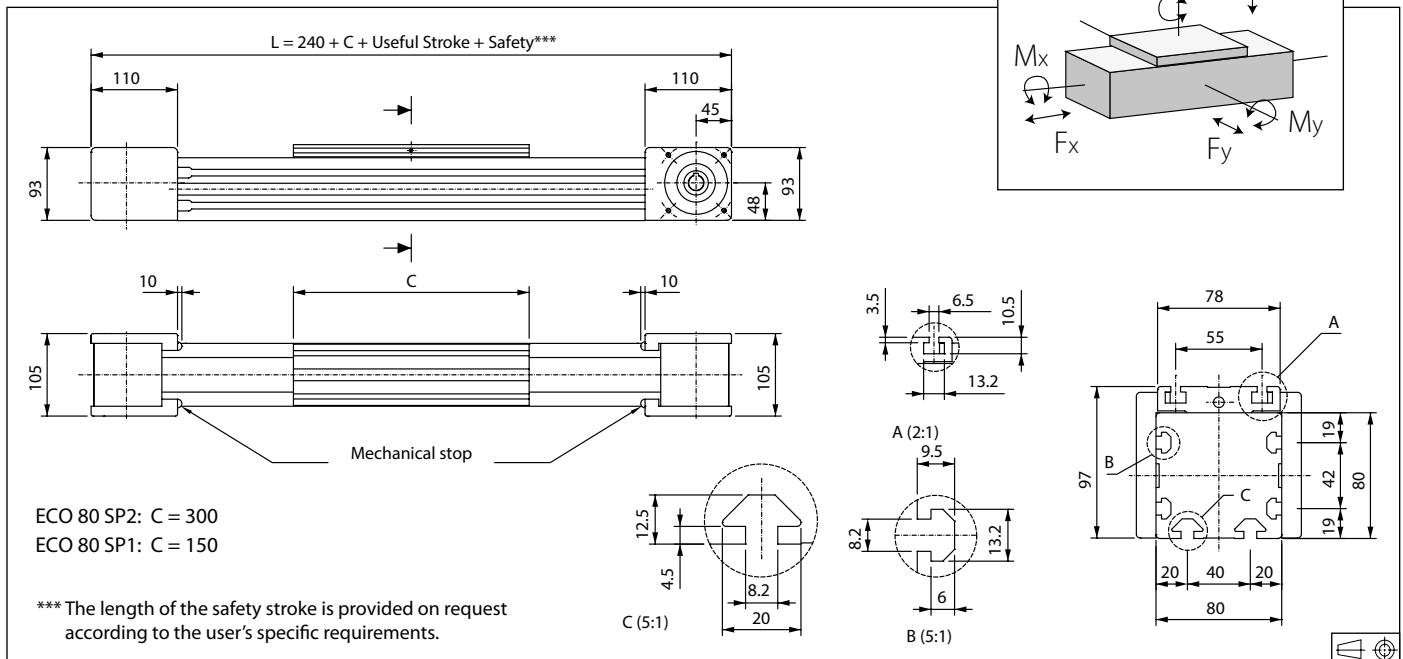
* The positioning repeatability depends upon the type of transmission used.

ECO 80 SP — Theoretical and maximum permissible loads

| | ECO 80 SP2 | | | | ECO 80 SP1 | | | |
|---------------------|-------------|-------|--------------|------|-------------|------|--------------|------|
| | Theoretical | | Permissible* | | Theoretical | | Permissible* | |
| | stat. | dyn. | stat. | dyn. | stat. | dyn. | stat. | dyn. |
| F _x [N] | 2120 | 1590 | 1700 | 1270 | 2120 | 1590 | 1700 | 1270 |
| F _y [N] | 24200 | 14600 | 4840 | 1750 | 12100 | 7280 | 2420 | 870 |
| F _z [N] | 24200 | 14600 | 4840 | 1750 | 1200 | 7280 | 2420 | 870 |
| M _x [Nm] | 260 | 150 | 52 | 18 | 130 | 74 | 26 | 9 |
| M _y [Nm] | 1460 | 880 | 290 | 110 | 71 | 40 | 14 | 5 |
| M _z [Nm] | 1460 | 880 | 290 | 110 | 71 | 40 | 14 | 5 |

* Reasonable operating life and system rigidity can be obtained from the values given.

ECO80 SP2 – ECO 80 SP1 dimensions



ECO 100 SP2 and ECO 100 SP1 With ball bearing guide

Technical Data

| | ECO 100 SP2 | ECO 100 SP1 |
|--|-------------------------|-------------------------|
| Min. useful stroke length [mm] | 100 | 100 |
| Max. useful stroke length [mm] | 6000 | 6000 |
| Max. positioning repeatability [mm] * | 0.1 | 0.1 |
| Max. speed [m/s] | 5.0 | 5.0 |
| Max. acceleration [m/s ²] | 50 | 50 |
| Type of belt | 50 AT 10 | 50 AT 10 |
| Type of pulley | ø 76 - Z 24 - Zero Play | ø 76 - Z 24 - Zero Play |
| Carriage displacement per pulley turn [mm] | 240 | 240 |
| Carriage weight [kg] | 2.9 | 1.5 |
| Zero travel weight [kg] | 16.7 | 12.5 |
| Weight for 100 mm useful stroke [kg] | 1.3 | 1.3 |

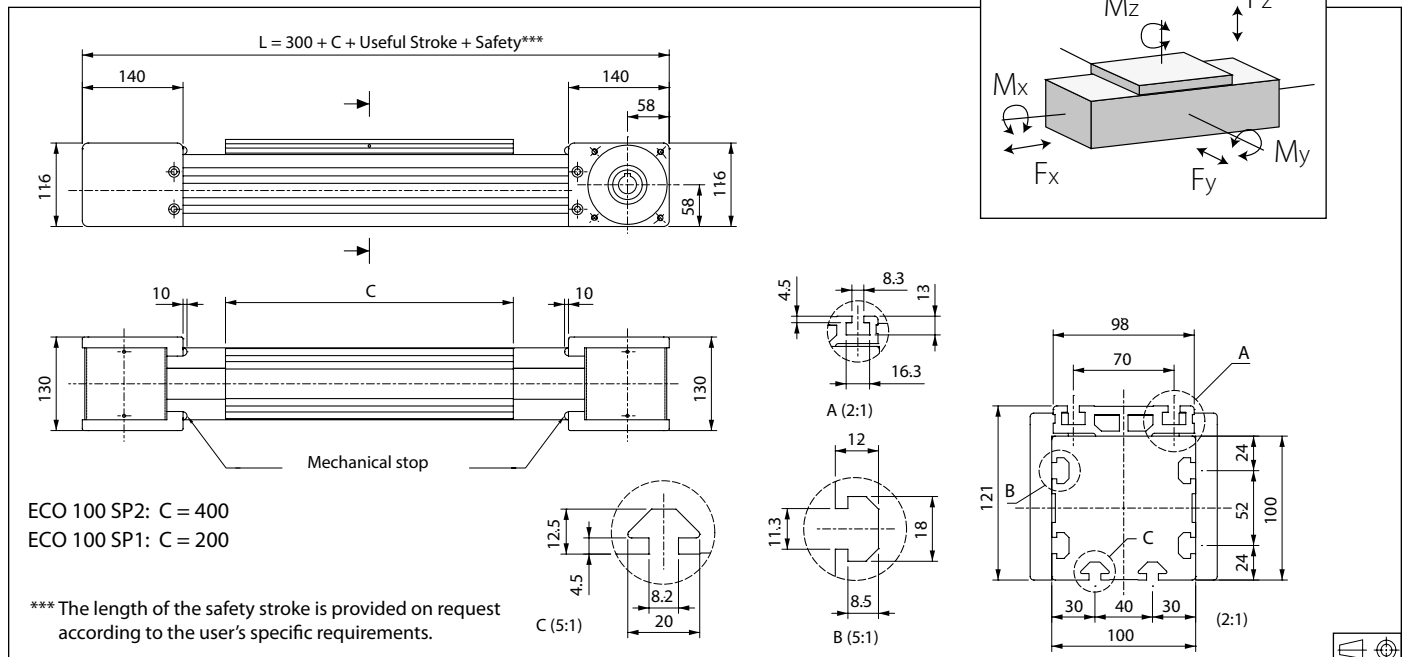
* The positioning repeatability depends upon the type of transmission used.

ECO 100 SP – Theoretical and maximum permissible loads

| | ECO 100 SP2 | | | | ECO 100 SP1 | | | |
|---------------------|-------------|-------|--------------|------|-------------|-------|--------------|------|
| | Theoretical | | Permissible* | | Theoretical | | Permissible* | |
| | stat. | dyn. | stat. | dyn. | stat. | dyn. | stat. | dyn. |
| F _x [N] | 4410 | 3310 | 3530 | 2650 | 4410 | 3310 | 3530 | 2650 |
| F _y [N] | 43400 | 34800 | 8680 | 4180 | 21700 | 17400 | 4340 | 2090 |
| F _z [N] | 43400 | 34800 | 8680 | 4180 | 21700 | 17400 | 4340 | 2090 |
| M _x [Nm] | 620 | 480 | 120 | 58 | 310 | 240 | 62 | 29 |
| M _y [Nm] | 3820 | 3060 | 760 | 370 | 170 | 130 | 34 | 16 |
| M _z [Nm] | 3820 | 3060 | 760 | 370 | 170 | 130 | 34 | 16 |

* Reasonable operating life and system rigidity can be obtained from the values given.

ECO 100 SP2 – ECO 100 SP1 dimensions

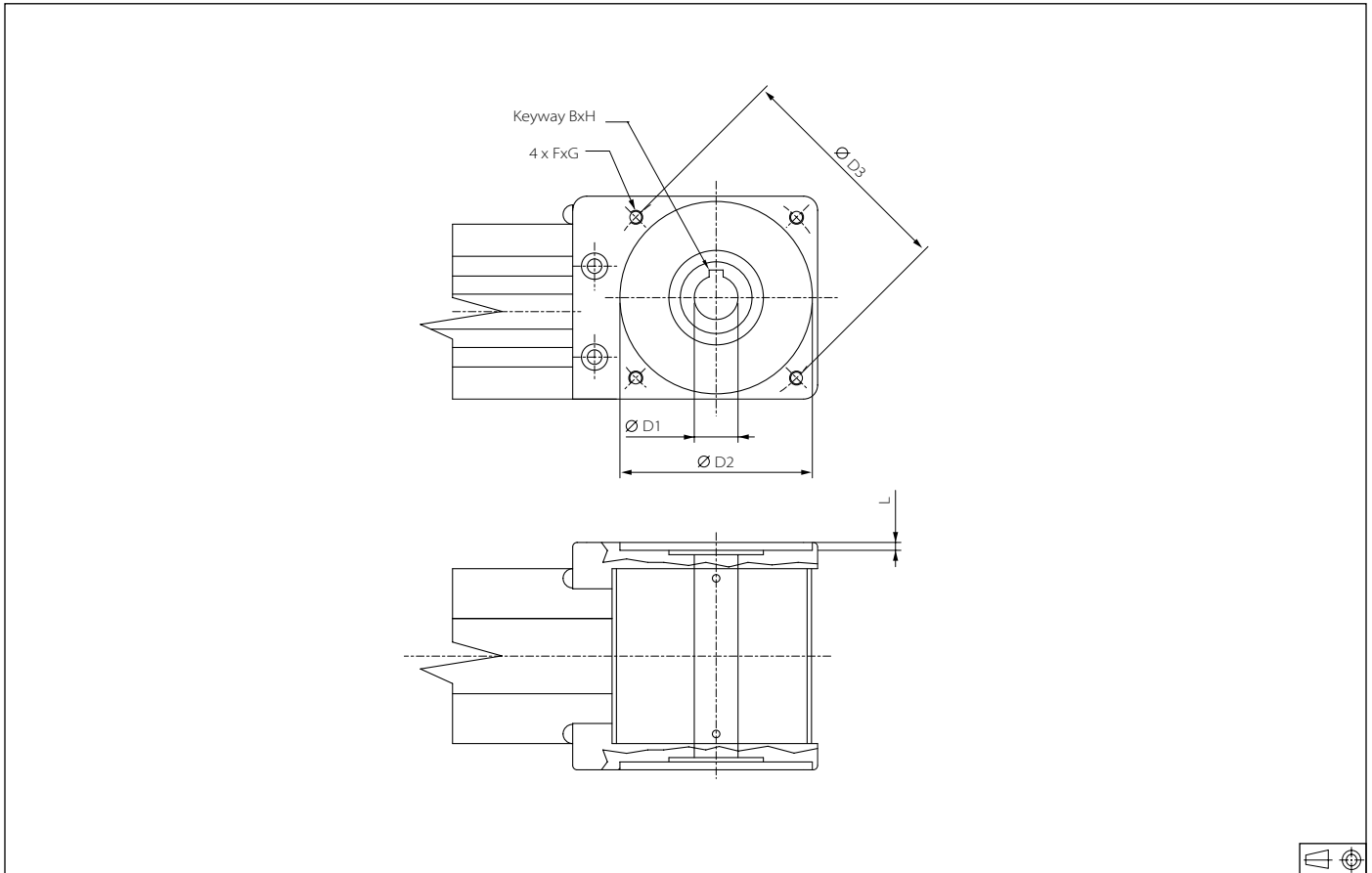


A hollow shaft with a pre-machined flange is standard on the **ECO** series.

Transmission of torque to the drive pulley

Torque is transmitted to the drive pulley by means of assembly with a reduction unit or motor. This system may create backlash in the case of alternating loads and high level acceleration. For further information, contact **Rollon**.

Hollow shaft



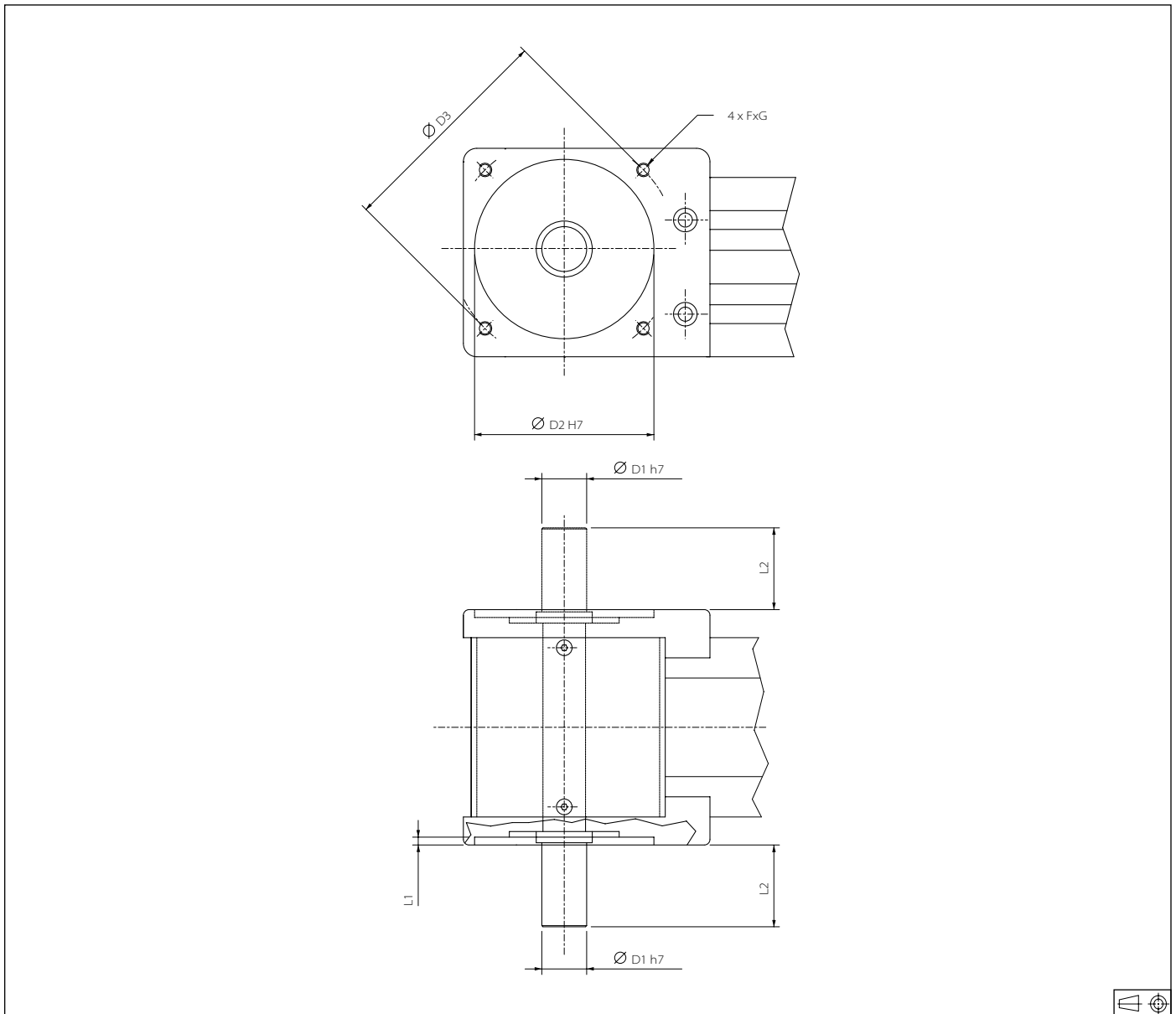
An (optional) connection flange may be required to fit the standard reduction units selected by **Rollon**. For further information, contact **Rollon**.

Hollow shafts

Unit: mm

| | D1 | D2 | D3 | L | KEYWAY B x H | F | G |
|----------------|------|-------|-----|-----|--------------|----|----|
| ECO 60 | 12H7 | 60H7 | 75 | 3.5 | 4 x 4 | M5 | 12 |
| ECO 80 | 19H7 | 80H7 | 100 | 3.5 | 6 x 6 | M6 | 16 |
| ECO 100 | 25H7 | 110H7 | 130 | 4.5 | 8 x 7 | M8 | 20 |

Simple shaft AS type



Position of the simple shaft to the right or to the left of the driving head.

Simple shafts

Unit: mm

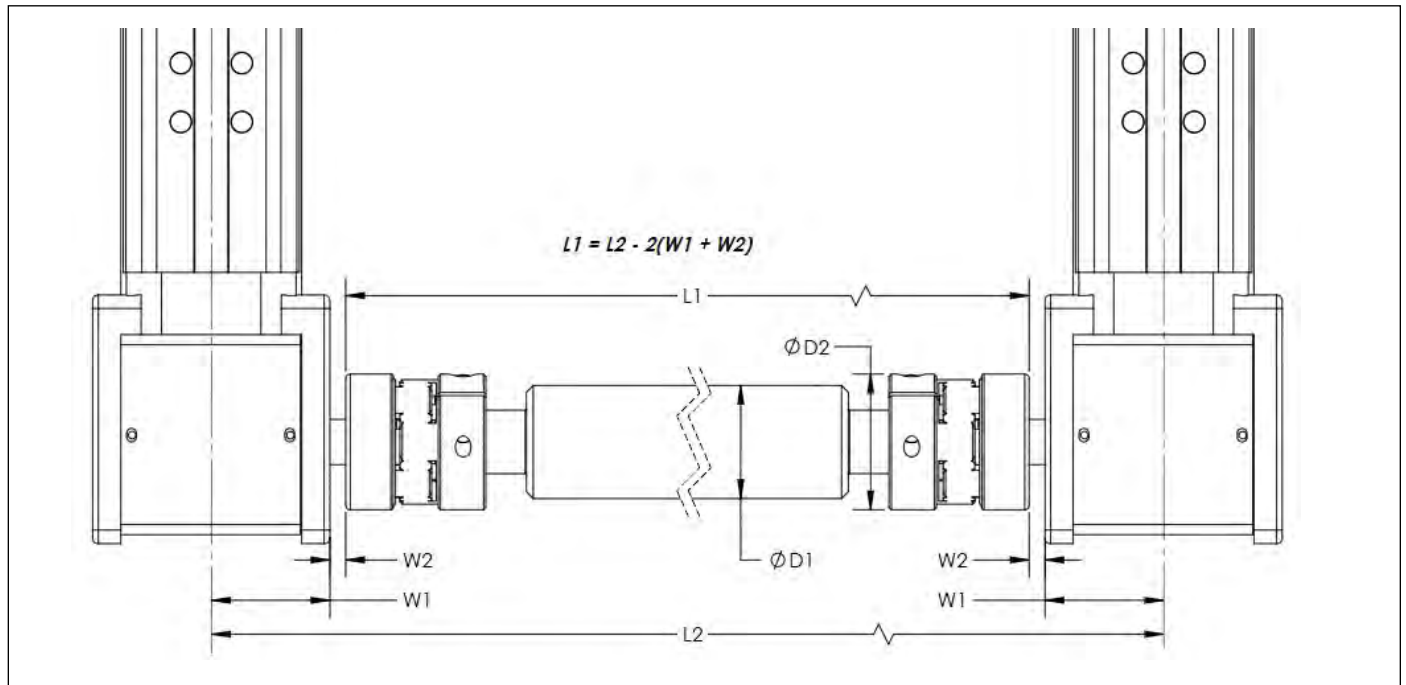
| | D1 | D2 | D3 | L1 | L2 | F | G | Applicable to Unit |
|--------------|------|-------|-----|-----|------|----|----|--------------------|
| AS 12 | 12H7 | 60H7 | 75 | 3.5 | 25 | M5 | 12 | ECO 60 |
| AS 20 | 20H7 | 80H7 | 100 | 3.5 | 36.5 | M6 | 16 | ECO 80 |
| AS 25 | 25H7 | 110H7 | 130 | 4.5 | 50 | M8 | 20 | ECO 100 |

Parallel shaft kit for ECO units in parallel

When movement consisting of two linear units in parallel is essential, a parallel kit can be used. This consists of **Rollon** precision joints complete with tapered splines and hollow aluminium drive shafts.

The total length of the parallel shaft kit required for an application can be determined based on the distance (from centerline to centerline) of each parallel actuator. The final length of the shaft kit required is denoted by L1 and is calculate by a formula as shown in the image below.

The final part number for ordering purposes follows the format of EKZ-Size Number-L1, where the size number is based on the actuator size (i.e. EKZ-90-1000 for an ECO 80 unit with a shaft length of 1000mm.)



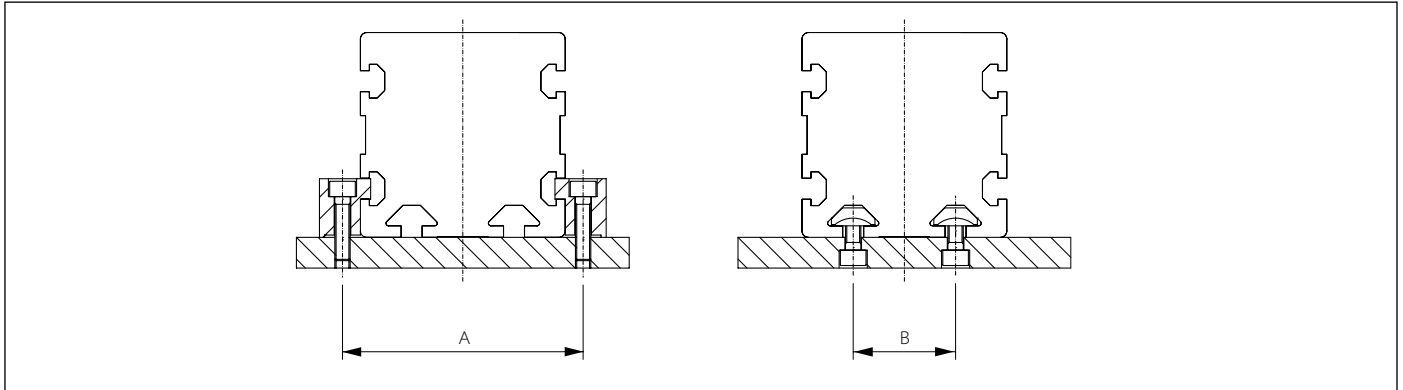
Units: mm

| Parallel Shaft Kit | Shaft Type | D1 | D2 | L2 | W1 | W2 | L1 | Applicable to Actuator: |
|--------------------|------------|----|----|----------|------|------|----------|-------------------------|
| EKZ-20 | AS 12 | 35 | 40 | 215-3083 | 40 | 1.5 | 132-3000 | ECO 60 |
| EKZ-90 | AS 20 | 50 | 60 | 279-3119 | 52.5 | 7 | 160-3000 | ECO 80 |
| EKZ-200 | AS 25 | 60 | 70 | 347-3161 | 65 | 15.5 | 186-3000 | ECO 100 |

The linear motion systems used for the **ECO** series enables it to support loads in any direction. The units can therefore be installed in any position.

To install the units, we recommend use of the T-slots in the aluminium extruded bodies as shown below:

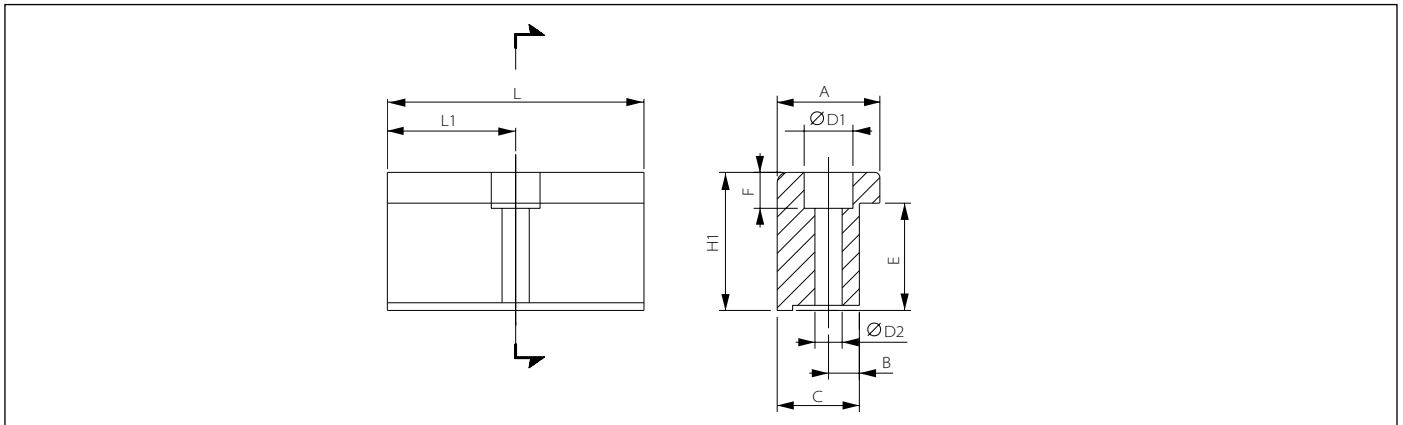
Mounting with brackets or T nuts



Unit: mm

| | A | B |
|----------------|-----|----|
| ECO 60 | 72 | 30 |
| ECO 80 | 94 | 40 |
| ECO 100 | 120 | 40 |

Mounting brackets



Anodized aluminium block for mounting the linear units through the side slots of the body.

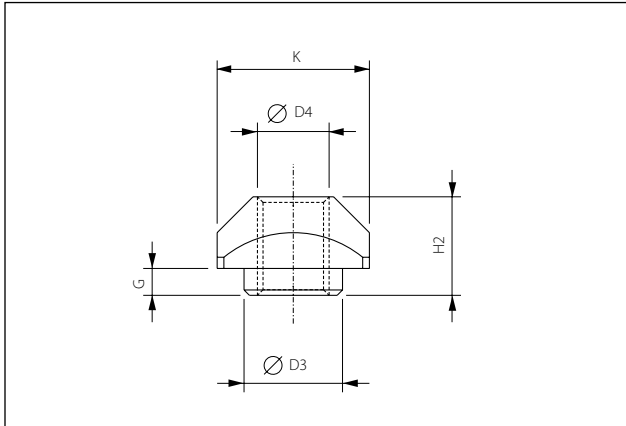
Unit: mm

| | A | H1 | B | C | E | F | D1 | D2 | L | L1 |
|----------------|------|------|----|----|------|------|------|------|-----|----|
| ECO 60 | 20 | 17.5 | 6 | 16 | 11.5 | 7 | 9.5 | 5.3 | 50 | 25 |
| ECO 80 | 20 | 20.7 | 7 | 16 | 14.7 | 7 | 10.5 | 6.5 | 50 | 25 |
| ECO 100 | 36.5 | 28.5 | 10 | 31 | 18.5 | 10.5 | 16.5 | 10.5 | 100 | 50 |

13 Assembly and Accessories

T-nuts

Steel nuts to be used in the slots of the body



Unit: mm

| | | D3 | D4 | G | H2 | K |
|---------|---|-----|----|-----|-----|----|
| ECO 60 | L | 6.7 | M5 | 2.3 | 6.5 | 10 |
| ECO 60 | C | - | M5 | - | 5 | 10 |
| ECO 80 | L | 8 | M6 | 3.3 | 8.3 | 13 |
| ECO 80 | C | - | M6 | - | 5.8 | 13 |
| ECO 80 | I | - | M6 | - | 6.5 | 17 |
| ECO 100 | L | 11 | M8 | 3 | 11 | 17 |
| ECO 100 | C | - | M8 | - | 8 | 16 |
| ECO 100 | I | - | M8 | - | 6.5 | 17 |

L = Side

C = Carriage

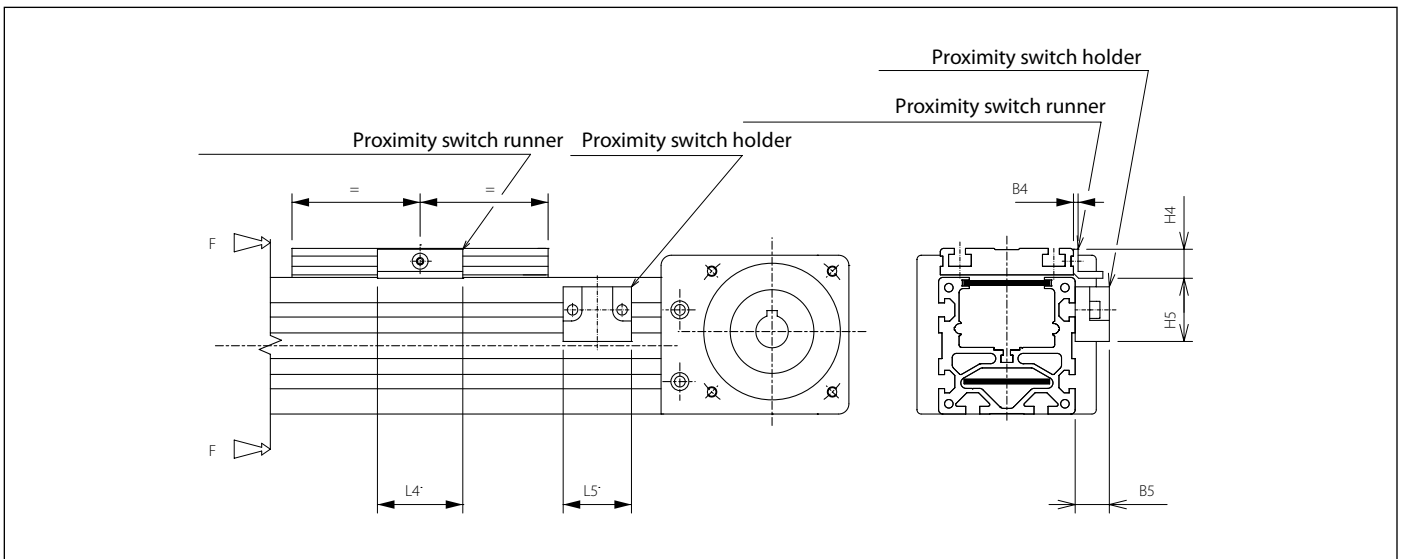
I = Lower

Proximity switch holder

Red anodized aluminum block equipped with T-nuts for fixing into the body slots.

Proximity switch runner

L-shaped bracket composed of zinc-plated iron, mounted on the carriage and used for the proximity switch operation.



Dimensions

| ECO | B4 | B5 | L4 | L5 | H4 | H5 | Proximity Switch Size |
|-----|----|----|----|----|------|------|-----------------------|
| 60 | 10 | 14 | 25 | 29 | 12 | 31.5 | Ø8 |
| 80 | 18 | 20 | 50 | 40 | 17.5 | 36.5 | Ø12 |
| 100 | 18 | 20 | 50 | 40 | 17.5 | 44 | Ø12 |

SP linear units with ball bearing guides

Maintenance-free linear ball guides are used in the **ECO SP** linear units.

The ball bearing carriages of the **SP** versions are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent rotating elements and prevents misalignment of these in the circuits.

On the front plates of the linear blocks special lubrication reservoirs are mounted which continuously provide the necessary quantity of lubricant to the ball rows under load. If a longer service life is required or in case of high dynamic or high loading applications, contact **Rollon** for further verification.

15 Additional Technical Data

General data about the aluminium used:

Chemical composition [%]

| Al | Mg | Si | Fe | Mn | Zn | Cu | Impurities |
|-----------|-----------|-----------|------|------|------|------|------------|
| Remainder | 0.35-0.60 | 0.30-0.60 | 0.30 | 0.10 | 0.10 | 0.10 | --- |

Physical characteristics

| Density | Young's modulus | Thermal expansion coeff. (20° - 100° C) | Thermal conductivity (20° C) | Specific heat (0° - 100° C) | Resistivity | Melting point |
|------------------|-----------------|---|------------------------------|-----------------------------|--------------------------------|---------------|
| $\frac{g}{cm^3}$ | GPa | $\frac{10^{-6}}{°K}$ | $\frac{W}{m \cdot K}$ | $\frac{J}{kg \cdot K}$ | $\Omega \cdot m \cdot 10^{-9}$ | °C |
| 2.70 | 69 | 23 | 200 | 880-900 | 33 | 600-655 |

Mechanical properties

| UTS | YS | e | BHN |
|-----|-----|----|-------|
| MPa | MPa | % | --- |
| 205 | 165 | 10 | 60-80 |

Area Moment of Inertia of the Aluminum Body

| | $I_x [10^7 \text{ mm}^4]$ | $I_y [10^7 \text{ mm}^4]$ | $I_p [10^7 \text{ mm}^4]$ |
|----------------|---------------------------|---------------------------|---------------------------|
| ECO 60 | 0.037 | 0.054 | 0.093 |
| ECO 80 | 0.117 | 0.173 | 0.280 |
| ECO 100 | 0.439 | 0.342 | 0.781 |

Weight

| | [kg/m] |
|----------------|--------|
| ECO 60 | 3.17 |
| ECO 80 | 5.56 |
| ECO 100 | 9.84 |

Driving Belt:

The drive belt is manufactured from low friction polyurethane elastomer reinforced with high tensile strength steel wire.

| | Type of belt | Belt width [mm] | Specific strength for tooth F_{USP} [N/cm] | Max. permissible tensile stress F [N] | Specific elastic load C_{SP} [N] | Weight kg/m |
|----------------|--------------|-----------------|--|---|------------------------------------|-------------|
| ECO 60 | 32 AT 5 | 32 | 35.3 | 2240 | $0.560 \cdot 10^6$ | 0.105 |
| ECO 80 | 50 AT 5 | 50 | 35.3 | 3500 | $0.875 \cdot 10^6$ | 0.164 |
| ECO 100 | 50 AT 10 | 50 | 73.5 | 7500 | $2.120 \cdot 10^6$ | 0.290 |

For information on corrosion resistant sealing strips and driving belts, contact **Rollon**.

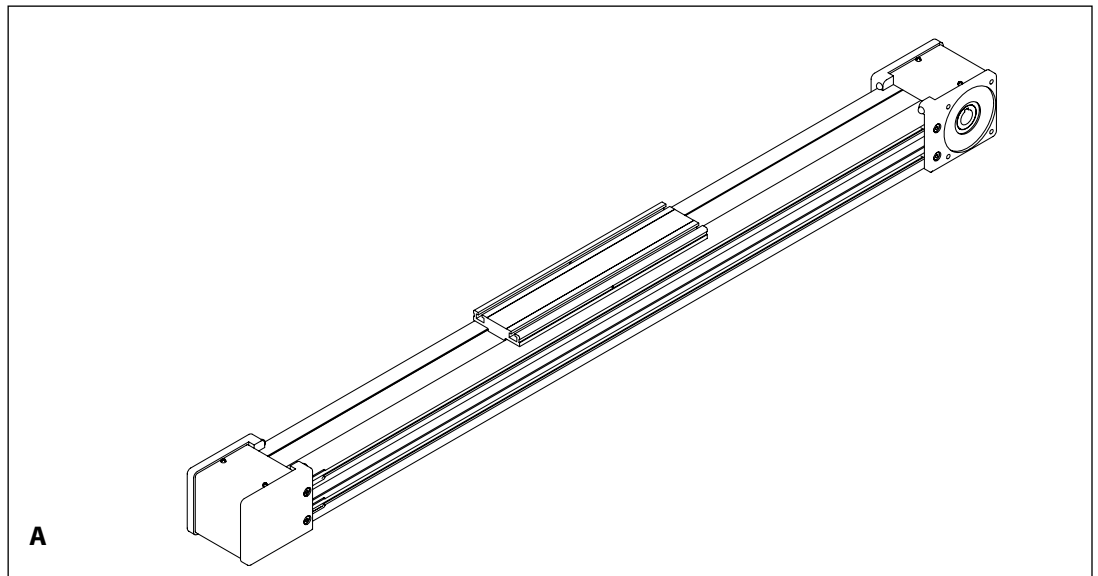
Previously, customers wishing to build multi-axis units have had to design, draw and manufacture all the elements necessary to assemble two or more axes. **Rollon** now offers the accessory mounting brackets and hardware necessary to configure the multi-axis units.

In addition to standard elements, **Rollon** also provides plates for special applications.

Application examples

- A** - Linear units:
 - X axis 1 ECO 80

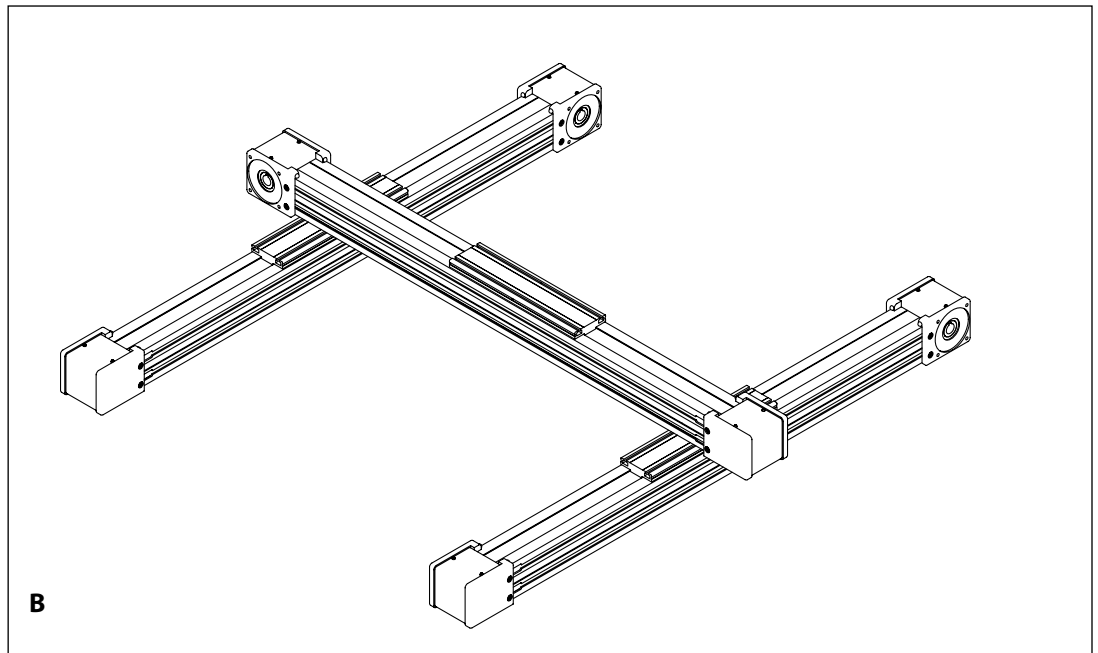
One axis system



- B** - Linear units:
 - X axis: 2 ECO 80
 - Y axis: 1 ECO 80

Two axis X-Y system

Connection parts:
 2 bracket kits for the ECO 80 unit (Y axis) onto the carriages of the ECO 80 units (X axis).



Photocopy and send the sheet below to: **ROLLON Corp.** 101 Bilby Road, Suite B, Hackettstown NJ 07840 – E-Mail: info@rolloncorp.com
 Tel.: (973) 300-5492 – Fax: (908) 852-2714 – www.rolloncorp.com – www.rollonnews.com – www.actuatorline.com

General data:

Company: _____
 Address: _____
 Phone: _____
 E-mail: _____

Date: _____ Inquiry N°: _____
 Contact: _____
 City/Zip/Postal Code: _____
 Country: _____
 Fax: _____

| Technical data: | | Select unit: | <input type="radio"/> metric | <input type="radio"/> standard | X axis | Y axis | Z axis |
|---|-----------------|--|---|--------------------------------|--------|--------|--------|
| Useful stroke (Including safety overtravel) | | S | [mm or in] | | | | |
| Load to be moved | | P | [kg or lbm] | | | | |
| Location of load P center of gravity from centerline of actuator carriage and actuator body (see Fig. 1 on next page) | Direction X | L _x P | [mm] | | | | |
| | Direction Y | L _y P | [mm or in] | | | | |
| | Direction Z | L _z P | [mm or in] | | | | |
| Additional forces | Direction (+/-) | F _x (F _y , F _z) | [N or lbf] | | | | |
| Position of forces | Direction X | L _x F _x (F _y , F _z) | [mm or in] | | | | |
| | Direction Y | L _y F _x (F _y , F _z) | [mm or in] | | | | |
| | Direction Z | L _z F _x (F _y , F _z) | [mm or in] | | | | |
| Orientation (choose orientation type number from Figure 1 on next page and indicate degrees if Type 5) | | | | | | | |
| Max. velocity | | v | [m/s or in/s] | | | | |
| Max. acceleration | | a | [m/s ² or in/ s ²] | | | | |
| Positioning accuracy | | ΔS | [mm or in] | | | | |
| Positioning repeatability (+/-) | | ΔR | [mm or in] | | | | |
| Travel accuracy - straightness (+/-) | | | [mm or in] | | | | |
| Travel accuracy - flatness (+/-) | | | [mm or in] | | | | |
| Required life | | L _h or L ₁₀ | [hours, years or km] | | | | |
| Operating Temperature Range | | | (°C, °F) | | | | |
| Duty Cycle | | Duration (i.e. 24/7) | [cycles per second, minutes, hours] | | | | |
| Quantity | | | | | | | |
| Part Number | | | | | | | |

Application type:

Operating Environment:

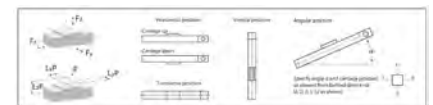
- Retrofit: Clean Severe Contamination
- New Design: Moderate Contamination Corrosive
- Budgetary Quote Detailed Quote Firm Quote

Quote needed by: _____ Order needed by: _____

Solutions Engineer: _____ Sales Agent: _____

Get Fast Memeber: Yes No

Figure 1 details on next page

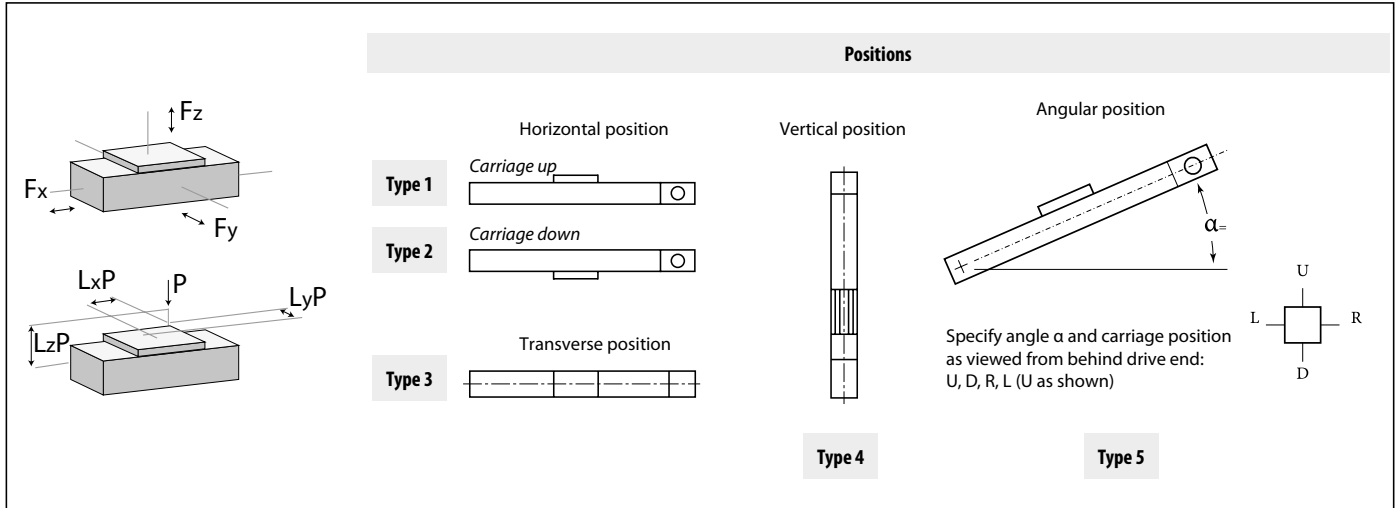


ATTENTION: Please attach any drawings, sketches, motion profiles, and duty cycle data that is available for your application.

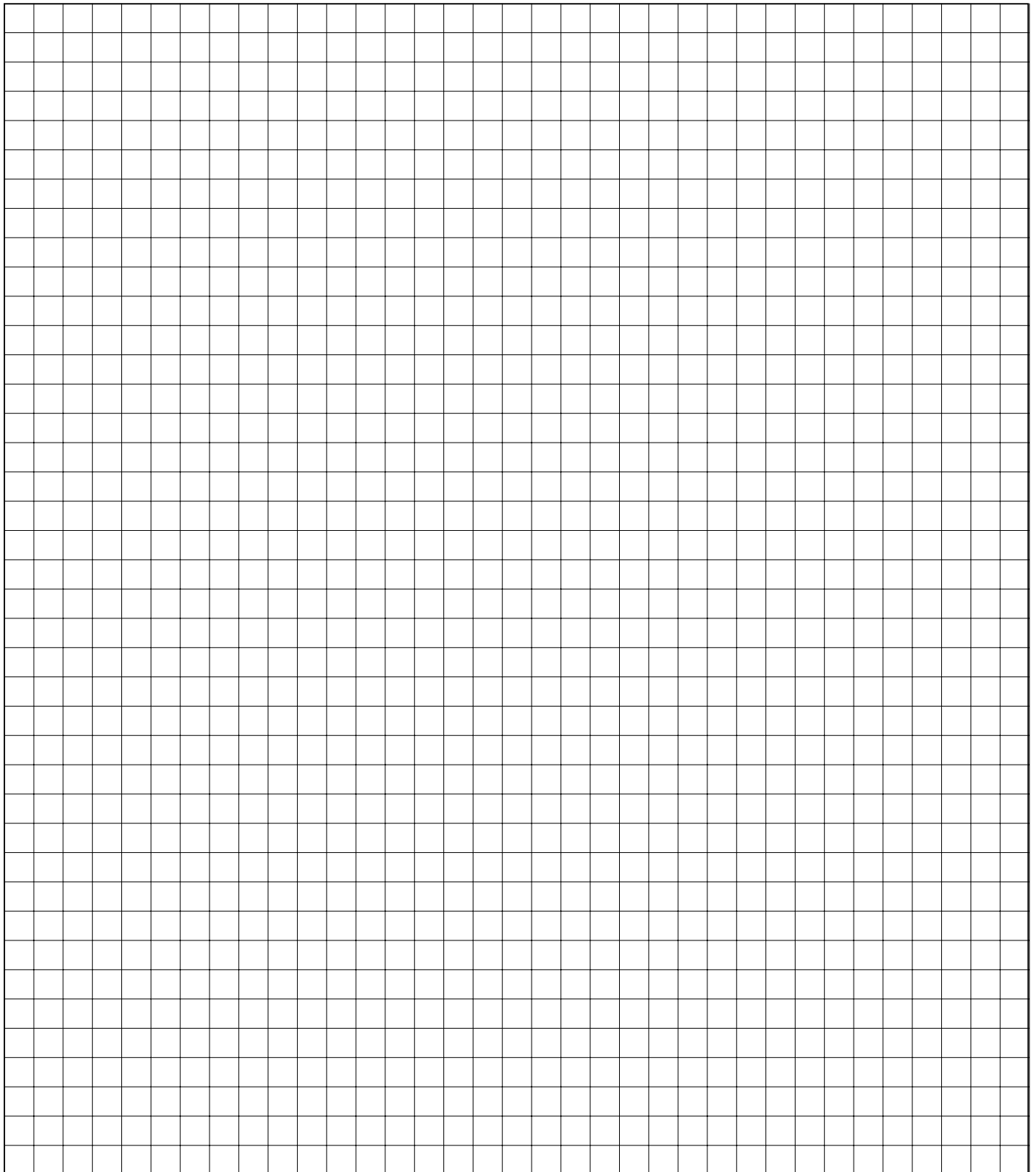
All the drawings in this catalog are available in CAD files on www.actuatorline.com

Consult Rollon if you do not find the CAD file you are seeking. An interactive data sheet form can be found at www.actuatorline.com

Figure 1



Additional Notes



ROLLON®

Linear Evolution



USA

ROLLON Corporation

101 Bilby Road, Suite B
Hackettstown, NJ 07840
Phone: +1 (973) 300-5492
Toll free: +1 (877) 976-5566
Fax: +1 (908) 852-2714
E-Mail: info@rolloncorp.com
www.rolloncorp.com
www.actuatorline.com
www.rollonnews.com

Germany

ROLLON GmbH

Bonner Straße 317-319
D-40589 Düsseldorf
Phone: (+49) 2102 87 450
Fax: (+49) 21 02 87 45 10
E-Mail: info@rollon.de
www.rollon.de

Italy

ROLLON S.r.l.

Via Trieste 26
I-20871 Vimercate (MB)
Phone: (+39) 039 62 591
Fax: (+39) 039 62 59 205
E-Mail: infocom@rollon.it
www.rollon.it

France

ROLLON S.A.R.L.

Les Jardins d'Eole, 2 allée des Séquoias
F-69760 Limonest
Phone: (+33) (0)4 74 71 93 30
Fax: (+33) (0)4 74 71 95 31
E-Mail: infocom@rollon.fr
www.rollon.fr

NL

ROLLON B.V.

P.O. Box 1916900 AD Zevenaar
Phone: (+31) 316 581 999
Fax: (+31) 316 341 236
E-Mail: info@rollon.nl
www.rollon.nl

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