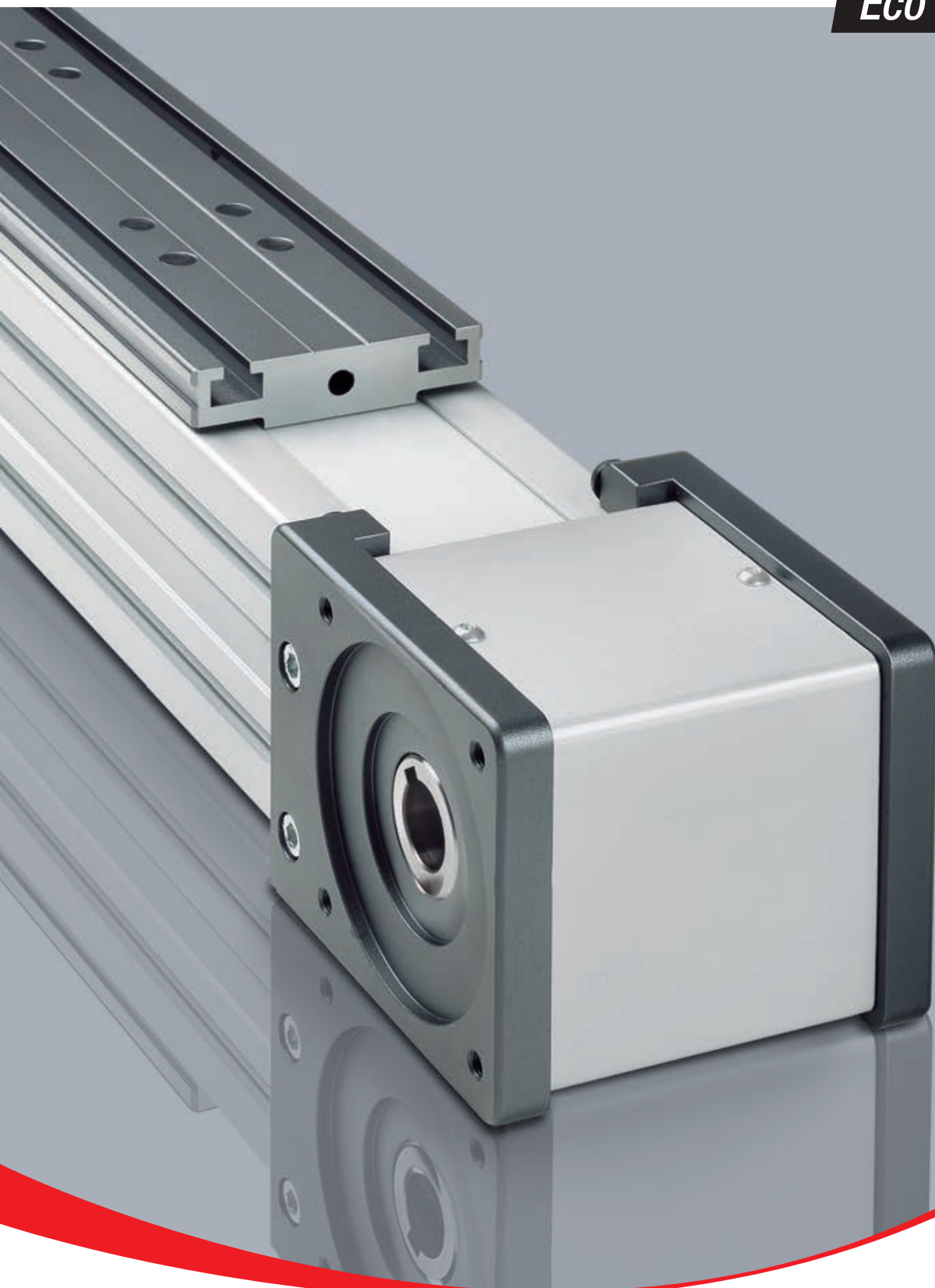


ROLLON®
BY TIMKEN

Eco System



> Eco System


















1 ECO series

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Pre-selection overview



Application Priority	Driving system	Section
<p>Max. speed from 4 to 15 [m/s] Max. acceleration from 10 to 50 [m/s²] Stroke up to 10 m</p>	 Belt	 Square
		 Rectangular
		 Other section
<p>High precision up to ± 0,005 [mm] Stroke up to 3.5 m</p>	 Ball screw	 Square
		 Rectangular
<p>Heavy loads up to 4.000 Kg Infinite stroke Multiple independent carriages</p>	 Rack and pinion	 Rectangular
		 Other section
<p>Vertical mounting Profile moving</p>	 Ω Belt	 Square
		 Rectangular
		 Rectangular
		 Other section

* Optimal reliability in dirty environments thanks to plastic compound coated rollers

Protection	Rollon solution		
	Product Family		Product
 Protected	Plus System		ELM
	Modline		MCR/MCH with protection
 Semi-protected	Eco System		ECO
	Modline		MCR/MCH
	Uniline System		UNILINE
Open	Smart System		E-SMART
 Protected with suction	Clean Room System		ONE
 Protected	Plus System		ROBOT
Open	Smart System		R-SMART
	Modline		TCR/TCS
Open*	Speedy Rail A		SAB
 Semi-protected	Precision System		TV
			TVS
			TT
			TH
Open	Tecline		PAS
			PAR
Open*	Speedy Rail A		SAR
 Semi-protected	Smart System		S-SMART
 Semi-protected	Plus System		SC
Open	Modline		ZCR/ZCH
Open*	Speedy Rail A		ZSY

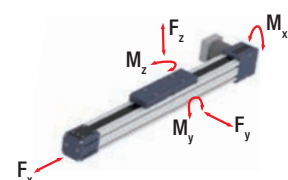
Technical features overview



Reference		Section		Driving			Anticorrosion	Protection
Product Family	Product	Balls	Rollers	Toothed belt	Ball screw	Rack and pinion		
Plus System		ELM						 Protected
		ROBOT						 Protected
		SC						 Semi-protected
Clean Room System		ONE						 Protected with suction
Smart System		E-SMART						
		R-SMART						
		S-SMART						 Semi-protected
Eco System		ECO						 Semi-protected
Uniline System		A/C/E/ED/H						 Semi-protected
Modline		MCR MCH						 Semi-protected
		TCR TCS						 Semi-protected
		ZCR ZCH						 Semi-protected
		ZMCH						 Semi-protected
















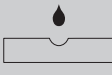
















Reported data must be verified according to the application.
* Longer stroke is available for jointed version

Size	Max. load capacity per carriage [N]			Max. static moment per carriage [Nm]			Max. speed [m/s]	Max. acceleration [m/s ²]	Repeatability accuracy [mm]	Max stroke (per system) [mm]
	F _x	F _y	F _z	M _x	M _y	M _z				
50-65-80-110	4980	129400	129400	1392	11646	11646	5	50	± 0,05	6000*
100-130-160-220	9545	258800	258800	22257	28986	28986	5	50	± 0,05	6000*
65-130-160	6682	153600	153600	13555	31104	31104	5	50	± 0,05	2500
50-65-80-110	4980	104800	104800	1126	10532	10532	5	50	± 0,05	6000*
30-50-80-100	4980	130860	130860	1500	12039	12039	4	50	± 0,05	6000*
120-160-220	9960	258800	258800	21998	28468	28468	4	50	± 0,05	6000*
50-65-80	2523	51260	51260	520	3742	3742	4	50	± 0,05	2000
60-80-100	4565	76800	76800	722	7603	7603	5	50	± 0,05	6000*
40-55-75	19360	11000	17400	800,4	24917	18788	7	15	± 0,05	5700*
65-80-105	3984	51260	51260	520	5536	5536	5	50	± 0,1	10100*
140-170 200-220-230 280-360	9960	266400	266400	42624	61272	61272	5	50	± 0,1	11480
60-90-100 170-220	7470	174480	174480	12388	35681	35681	4	25	± 0,1	2500
105	4980	61120	61120	3591	10390	10390	3	25	± 0,1	2100

P
L
SC
R
SS
SE
SU
SM
L

Technical features overview



Reference		Section		Driving			Anticorrosion	Protection
Product Family	Product	Balls	Rollers	Toothed belt	Ball screw	Rack and pinion		
Precision System		TH						 Semi-protected
		TT						 Semi-protected
		TV						 Semi-protected
		TVS						 Semi-protected
Tecline		PAR PAS						
Speedy Rail A		SAB						
		ZSY						
		SAR						

Reported data must be verified according to the application.

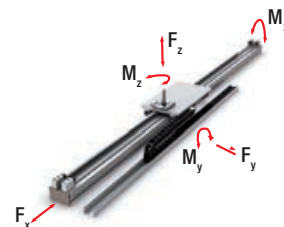
* Longer stroke is available for jointed version

Size	Max. load capacity per carriage [N]			Max. static moment per carriage [Nm]			Max. speed [m/s]	Max. acceleration [m/s ²]	Repeatability accuracy [mm]	Max stroke (per system) [mm]
	F _x	F _y	F _z	M _x	M _y	M _z				
70-90-110-145	32600	153600	153600	6682	5053	5053	2		± 0,005	1500
100-155-225-310	30500	230500	274500	30195	26625	22365	2,5		± 0,005	3000
60-80-110	11538	85000	85000	1080	2316	2316	2,5		± 0,01	3000
170-220	66300	258800	258800	19410	47360	47360	1	5	± 0,02	3500
118-140-170-200-220-230-280-360	10989	386400	386400	65688	150310	150310	4	10	± 0,05	10800*
60-120-180-250	4565	3620	3620	372	362	362	15	10	± 0,2	7150
180	4980	2300	2600	188	806	713	8	8	± 0,2	6640
120-180-250	3598	3620	3620	372	453	453	3	10	± 0,15	7150*

P
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ECO series



> ECO series description



Fig. 1

The ECO SYSTEM units are linear actuators made of a self-supporting extruded aluminum frame and are driven by a polyurethane belt with AT metric profile steel inserts.

- Three different sizes available: 60mm, 80mm, 100mm
- Version available with recirculating ball bearing or roller rails
- Reduced weight ensured by the light frame and the aluminum sliders
- High sliding speed

The ECO SYSTEM series actuators are offered with two motion systems:

ECO SYSTEM – SP

Featuring a maintenance free recirculating linear guide rail fitted inside the profile.

ECO SYSTEM – CI

Featuring four rollers with a Gothic arch outer profile sliding on hardened steel bars placed inside the profile.

> The components

Extruded bodies

The anodized aluminum extrusion used for the profile of the Rollon ECO series linear units was designed and manufactured by industry experts to optimise weight while maintaining mechanical strength. The anodized aluminum alloy 6060 used (see physical-chemical characteristics below) was extruded with dimensional tolerances compliant with EN 755-9 standards.

Driving belt

The Rollon ECO series linear units use steel reinforced polyurethane drive belts with AT pitch. This belt is ideal due to its high load transmission characteristics, compact size and low noise. Used in conjunction with a backlash-free pulley, smooth alternating motion can be achieved.

Optimisation of the maximum belt width/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 aluminum extruded body thus covering the inside components.

Carriage

The carriage of the Rollon ECO series linear units is made of anodized aluminum. Two different length carriages are available for each type of linear unit.

General data about aluminum used: AL 6060

Chemical composition [%]

Al	Mg	Si	Fe	Mn	Zn	Cu	Impurites
Remainder	0.35-0.60	0.30-0.60	0.30	0.10	0.10	0.10	0.05-0.15

Tab. 1

Physical characteristics

Density	Coeff. of elasticity	Coeff. of thermal expansion (20°-100°C)	Thermal conductivity (20°C)	Specific heat (0°-100°C)	Resistivity	Melting point
$\frac{\text{kg}}{\text{dm}^3}$	$\frac{\text{kN}}{\text{mm}^2}$	$\frac{10^{-6}}{\text{K}}$	$\frac{\text{W}}{\text{m} \cdot \text{K}}$	$\frac{\text{J}}{\text{kg} \cdot \text{K}}$	$\Omega \cdot \text{m} \cdot 10^{-9}$	°C
2.70	69	23	200	880-900	33	600-655

Tab. 2

Mechanical characteristics

Rm	Rp (02)	A	HB
$\frac{\text{N}}{\text{mm}^2}$	$\frac{\text{N}}{\text{mm}^2}$	%	—
205	165	10	60-80

Tab. 3

> The linear motion system

The linear motion system has been designed to meet the load capacity, speed, and maximum acceleration conditions of a wide variety of applications. Two linear motion systems are offered:

ECO...SP with ball bearing guides

- A ball bearing guide with high load capacity is mounted in a dedicated seat on the inside of the aluminum body.
- The carriage is assembled on two pre-loaded ball bearing blocks.
- The two ball bearing blocks enable the carriage to withstand loading in the four main directions.
- The two blocks have seals on both sides and, if 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 revolving parts and prevents misalignment.
- Lubrication reservoirs (pockets) installed on the front of the ball bearing blocks supply the appropriate amount of grease, thus promoting a long maintenance interval.

The linear motion system described above offers:

- High speed and acceleration
- High load capacity
- High permissible bending moments
- Low friction
- Long life
- Maintenance Free (dependent on application)
- Low noise
- Suitable for long stroke

ECO...CI with gothic arch bearing guides inside the body

- Two hardened steel rods (58/60 HRC tolerance h6) are securely inserted inside the aluminum body.
- The carriage is fitted with six bearing assemblies each having a gothic arch groove machined into its outer race to run on the steel rods.
- The six bearings are mounted on steel pins, two of which are eccentric, to allow setting of running clearance and pre-load.
- To keep the running tracks clean and lubricated, four grease impregnated felt seals, complete with grease reservoirs, are fitted on the ends of the carriage.
- The driving belt is supported by the entire length of the profile in order to avoid deflection as well as to protect the linear guide.

The linear motion system described above offers:

- Good positioning accuracy
- Low noise
- Maintenance Free (dependent on application)

ECO SP

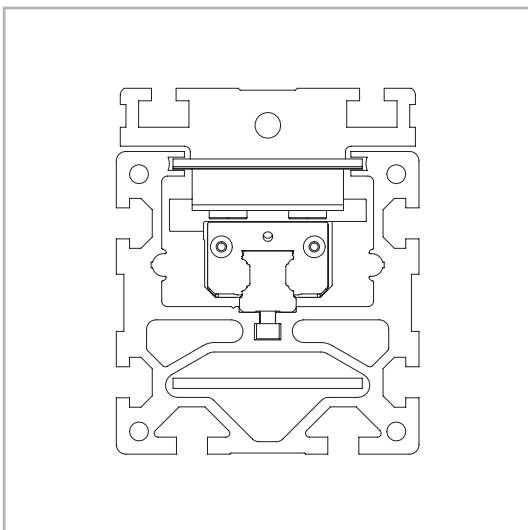


Fig. 2

ECO CI

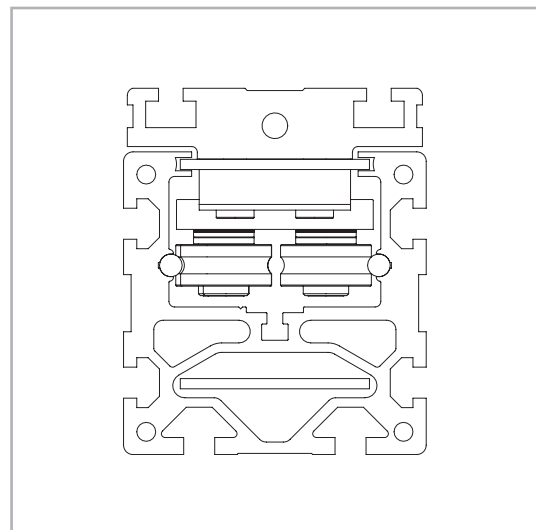
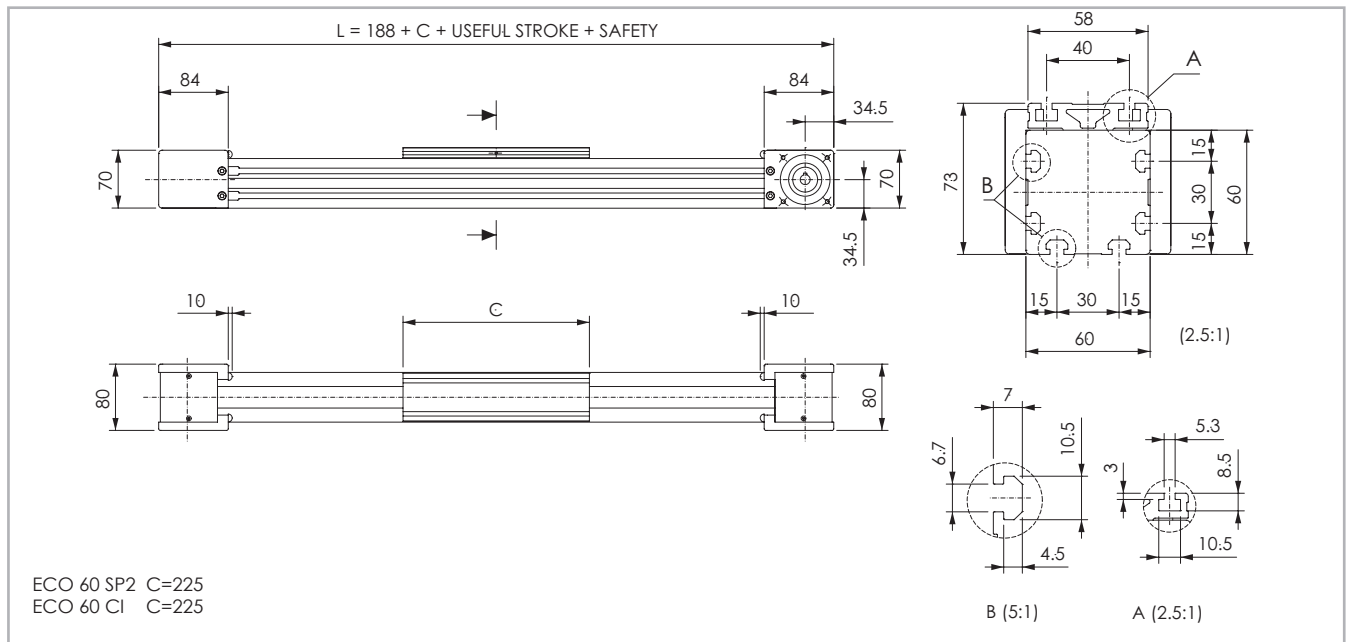


Fig. 3

> ECO 60 SP2 - ECO 60 CI

ECO 60 SP2 - ECO 60 CI Dimensions



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 4

Technical data

	Type	
	ECO 60 SP2	ECO 60 CI
Max. useful stroke length [mm]	3700	6000
Max. positioning repeatability [mm]*1	± 0.05	± 0.05
Max. speed [m/s]	4.0	1.5
Max. acceleration [m/s ²]	50	1.5
Type of belt	32 AT 5	32 AT 5
Type of pulley	Z 28	Z 28
Pulley pitch diameter [mm]	44.56	44.56
Carriage displacement per pulley turn [mm]	140	140
Carriage weight [kg]	0.51	0.80
Zero travel weight [kg]	3.5	3.2
Weight for 100 mm useful stroke [kg]	0.45	0.68
Starting torque [Nm]	0.24	0.32
Moment of inertia of pulleys [g mm ²]	163000	163000
Rail size [mm]	12 mini	Ø6

*1) Positioning repeatability is dependant on the type of transmission used

Tab. 4

Moments of inertia of the aluminum body

Type	I_x [10 ⁷ mm ⁴]	I_y [10 ⁷ mm ⁴]	I_p [10 ⁷ mm ⁴]
ECO 60	0.037	0.054	0.093

Tab. 5

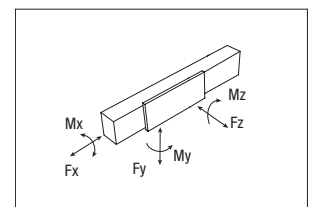
Driving belt

The driving belt is manufactured with friction resistant polyurethane, with steel cord reinforcement for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight kg/m
ECO 60	32 AT 5	32	0.105

Tab. 6

Belt length (mm) SP2/CI = 2 x L - 166



ECO 60 SP2 - ECO 60 CI - Load capacity

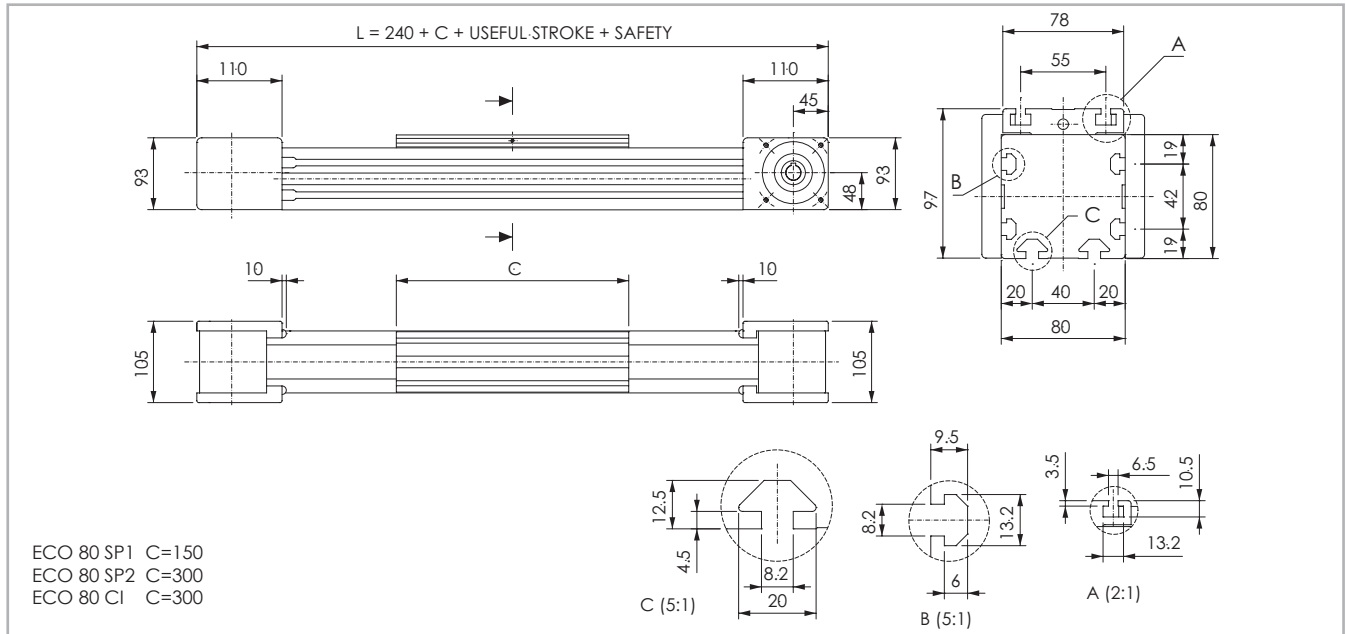
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]		M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.	
ECO 60 SP2	1344	922	7060	6350	7060	46.2	325	325	
ECO 60 CI	1344	922	1648	3072	1110	24.4	33	76.2	

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 7

> ECO 80 SP2 - ECO 80 SP1 - ECO 80 CI

ECO 80 SP2 - ECO 80 SP1 - ECO 80 CI Dimensions



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 5

Technical data

	Type		
	ECO 80 SP2	ECO 80 SP1	ECO 80 CI
Max. useful stroke length [mm]	6000	6000	6000
Max. positioning repeatability [mm]*1	± 0.05	± 0.05	± 0.05
Max. speed [m/s]	5.0	5.0	1.5
Max. acceleration [m/s ²]	50	50	1.5
Type of belt	50 AT 5	50 AT 5	50 AT 5
Type of pulley	Z 37	Z 37	Z 37
Pulley pitch diameter [mm]	58.89	58.89	58.89
Carriage displacement per pulley turn [mm]	185	185	185
Carriage weight [kg]	1.6	0.9	2.1
Zero travel weight [kg]	7.7	5.9	8.2
Weight for 100 mm useful stroke [kg]	0.8	0.8	0.65
Starting torque [Nm]	0.75	0.75	0.75
Moment of inertia of pulleys [g mm ²]	706000	706000	706000
Rail size [mm]	15	15	Ø6

*1) Positioning repeatability is dependant on the type of transmission used

Tab. 8

Moments of inertia of the aluminum body

Type	I_x [10 ⁷ mm ⁴]	I_y [10 ⁷ mm ⁴]	I_p [10 ⁷ mm ⁴]
ECO 80	0.117	0.173	0.280

Tab. 9

Driving belt

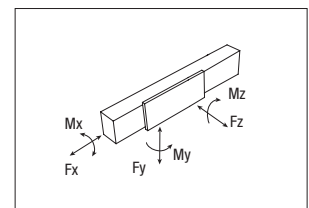
The driving belt is manufactured with friction resistant polyurethane, with steel cord reinforcement for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight kg/m
ECO 80	50 AT 5	50	0.164

Tab. 10

Belt length (mm) SP2/CI = 2 x L - 240

SP1 = 2 x L - 90



ECO 80 SP2 - ECO 80 SP1 - ECO 80 CI - Load capacity

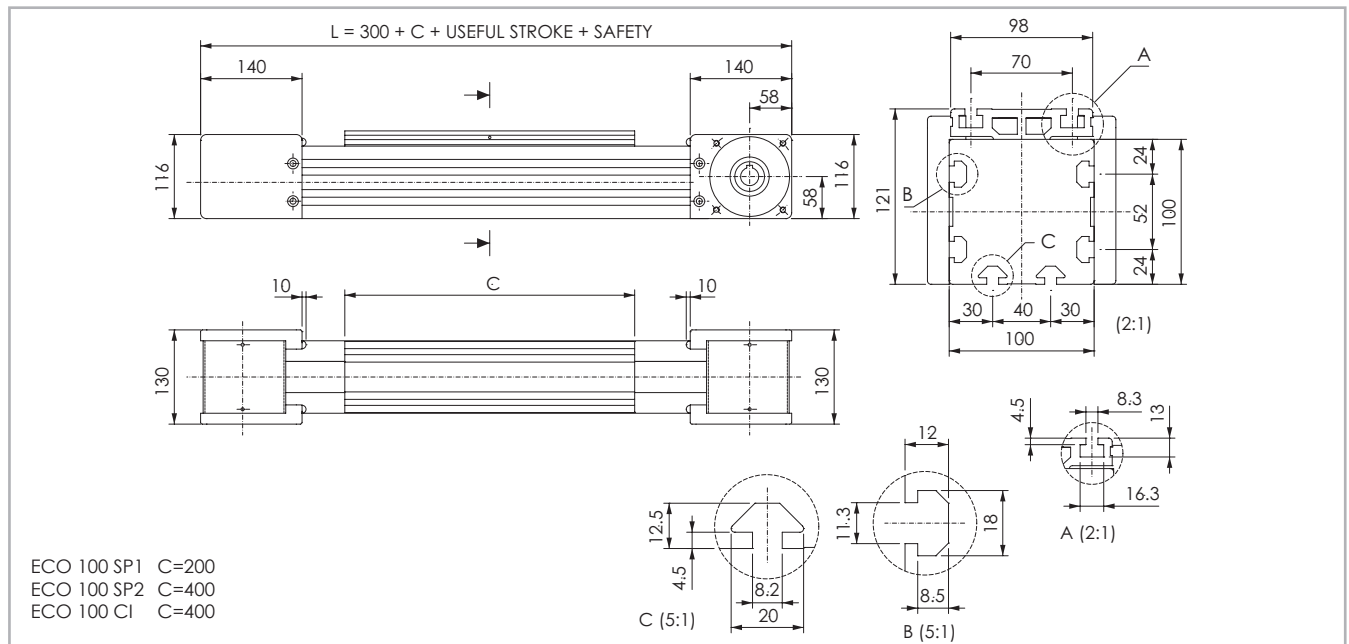
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
ECO 80 SP2	2100	1440	48400	22541	48400	320	3412	3412
ECO 80 SP1	2100	1440	24200	11271	24200	160	175	175
ECO 80 CI	2100	1770	4229	8731	2849	83	129	297

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 11

> ECO 100 SP2 - ECO 100 SP1 - ECO 100 CI

ECO 100 SP2 - ECO 100 SP1 - ECO 100 CI Dimensions



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 6

Technical data

	Type		
	ECO 100 SP2	ECO 100 SP1	ECO100 CI
Max. useful stroke length [mm]	6000	6000	6000
Max. positioning repeatability [mm]*1	± 0.05	± 0.05	± 0.05
Max. speed [m/s]	5.0	5.0	1.5
Max. acceleration [m/s ²]	50	50	1.5
Type of belt	50 AT 10	50 AT 10	50 AT 10
Type of pulley	Z 24	Z 24	Z 24
Pulley pitch diameter [mm]	76.39	76.39	76.39
Carriage displacement per pulley turn [mm]	240	240	240
Carriage weight [kg]	2.9	1.5	3.3
Zero travel weight [kg]	16.7	12.5	17.1
Weight for 100 mm useful stroke [kg]	1.3	1.3	1.1
Starting torque [Nm]	1.90	1.35	1.35
Moment of inertia of pulleys [g mm ²]	2070000	2070000	2070000
Rail size [mm]	20	20	Ø10

*1) Positioning repeatability is dependant on the type of transmission used

Tab. 12

ECO 100 SP2 - ECO 100 SP1 - ECO 100 CI - Load capacity

Type	F _x [N]		F _y [N]		F _z [N]	M _x [Nm]	M _y [Nm]	M _z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
ECO 100 SP2	4565	2832	76800	35399	76800	722	7603	7603
ECO 100 SP1	4565	2832	38400	17700	38400	361	334	334
ECO 100 CI	4565	3740	9154	20079	6167	214	310	962

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 15

Moments of inertia of the aluminum body

Type	I _x [10 ⁷ mm ⁴]	I _y [10 ⁷ mm ⁴]	I _p [10 ⁷ mm ⁴]
ECO 100	0.342	0.439	0.781

Tab. 13

Driving belt

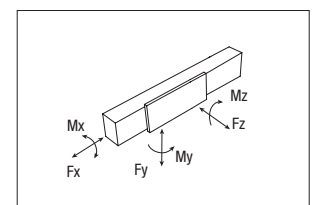
The driving belt is manufactured with friction resistant polyurethane, with steel cord reinforcement for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight kg/m
ECO 100	50 AT 10	50	0.290

Tab. 14

$$\text{Belt length (mm) SP1} = 2 \times L - 112$$

$$\text{SP2/CI} = 2 \times L - 312$$



> Lubrication

ECO linear units with ball bearing guides

ECO linear are equipped with self lubricating linear ball guides.

The ball bearing carriages of the ECO series are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment of these in the circuits.

Special lubrication reservoirs are mounted on the front plates of the linear blocks which continuously provide the necessary amount of grease to the ball raceways under load. These lubrication reservoirs also considerably reduce the frequency of lubrication of the module. This system guarantees

a long interval between maintenances: every 5000 km or 1 year of use, based on the value reached first. If a longer service life is required or in case of high dynamic or high loaded applications please contact our offices for further verification.

ECO

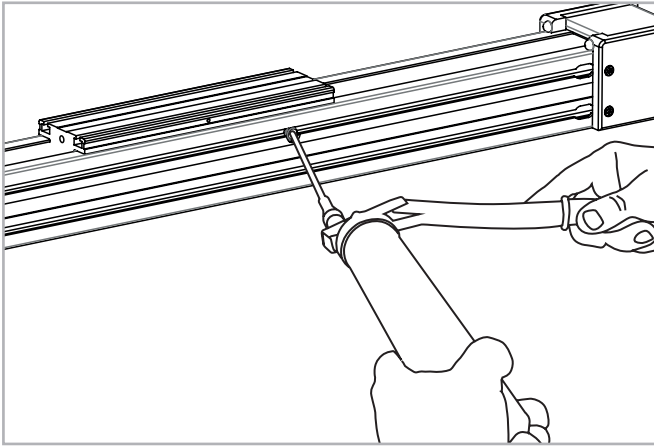


Fig. 7

- Insert the tip of the grease gun in the specific grease blocks.
- For lubrication of linear units use lithium soap grease NLGI 2.
- For specially stressed applications or difficult environmental conditions, lubrication should be carried out more frequently. Refer to Rollon for further advice.

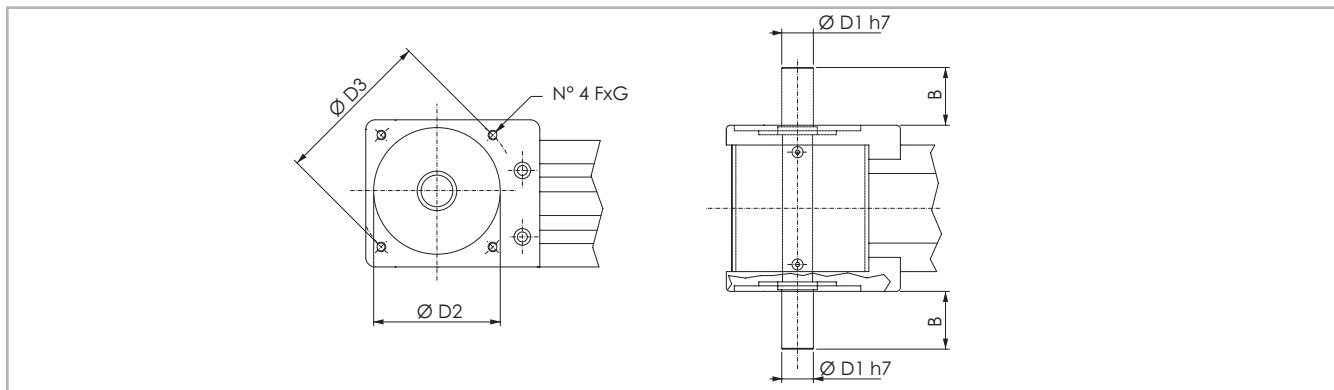
Quantity of lubricant necessary for re-lubrication:

Type	Unit: [cm ³]
ECO 60	1
ECO 80	1.4
ECO 100	2.8

Tab. 16

> Simple shafts

AS type simple shafts



Position of the simple shaft can be to the left or right of the drive head.

Fig. 8

Dimensions (mm)

Applicable to unit	Shaft type	D1	D2	D3	B	F	G	Head code AS left	Head code AS right
ECO 60	AS 12	12	60	75	25	M5	12	2G	2I
ECO 80	AS 20	20	80	100	36.5	M6	16	2G	2I
ECO 100	AS 25	25	110	130	50	M8	20	2G	2I

Tab. 17

> Hollow shafts

Transmission of torque to the drive pulley

Torque is transmitted to the drive pulley from a hollow shaft and keyway.

This system may create backlash in the case of alternating loads and high level acceleration. For further information, contact our offices.

Hollow shaft

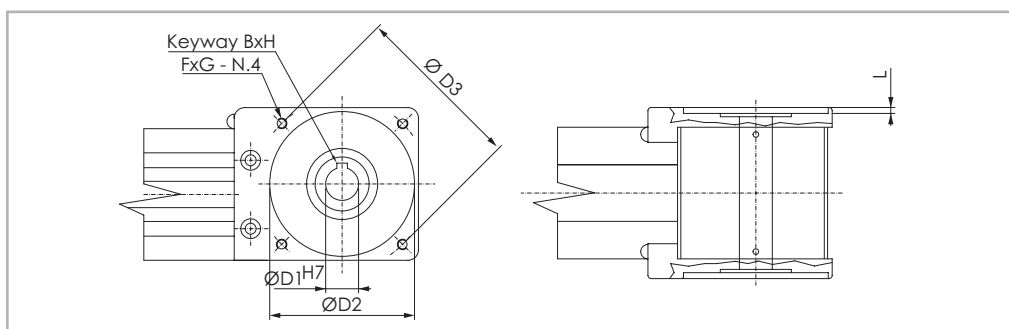


Fig. 9

An (optional) connection flange is required to fit the standard reduction units selected by Rollon.

For further information, contact our offices

Unit	Shaft type	D1	D2	D3	L	Key way BxH	F	G	Drive head code
ECO 60	AC 12	12H7	60	75	3.5	4 x 4	M5	12	2A
ECO 80	AC 19	19H7	80	100	3.5	6 x 6	M6	16	2A
ECO 100	AC 25	25H7	110	130	4.5	8 x 7	M8	20	2A

Tab. 18

> Linear units in parallel

Synchronisation kit for use of ECO linear units in parallel

When movement consisting of two linear units in parallel is essential, a synchronisation kit must be used. The kit contains original Rollon blade type precision joints complete with tapered splines and hollow aluminum drive shafts.

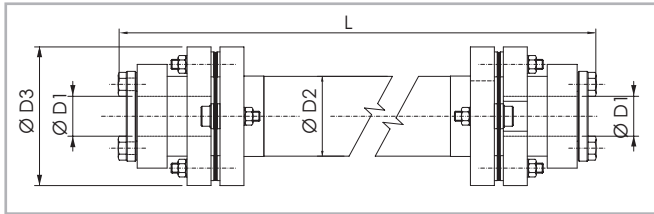


Fig. 10

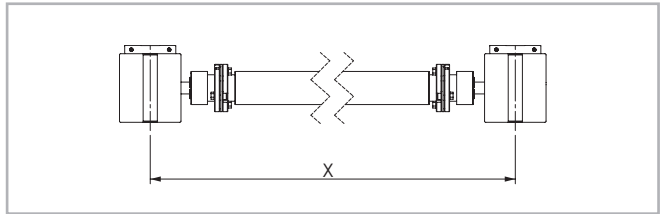


Fig. 11

Unit	Shaft type	D1	D2	D3	Code	Formula for length calculation
ECO 60	AP 12	12	25	45	GK12P...1A	$L = X - 88$ [mm]
ECO 80	AP 20	20	40	69.5	GK20P...1A	$L = X - 116$ [mm]
ECO 100	AP 25	25	70	99	GK25P...1A	$L = X - 165$ [mm]

Tab. 19

> Accessories

Fixing by brackets

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

To install the units, we recommend use of the dedicated T-slots in the aluminum extruded bodies as shown below.

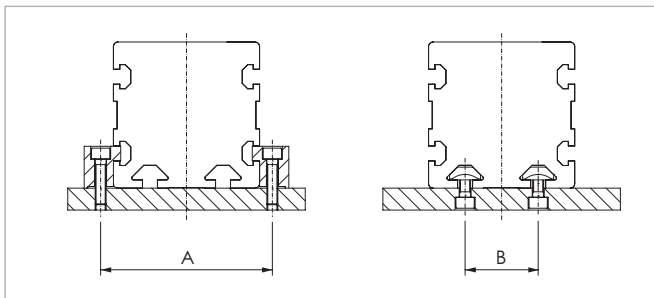


Fig. 12

Moment of inertia [g mm²] C1 + C2 · (X-Y)

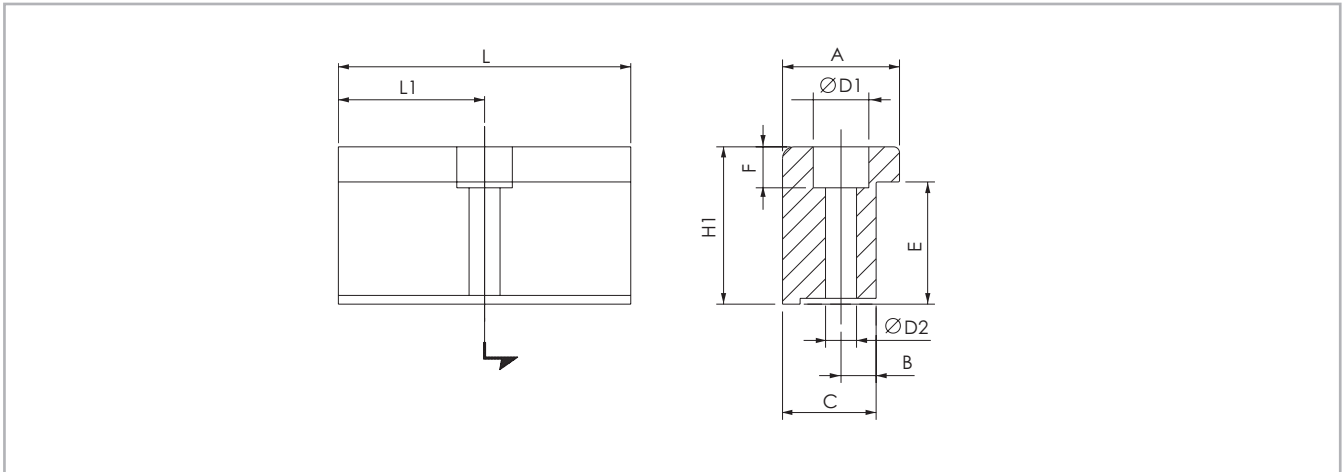
	C1	C2	Y	Weight [Kg] C1+C2 · (X-Y)	
	[g mm ²]	[g mm ²]	[mm]	C1 [Kg]	C2 [Kg mm]
GK12P	61.456	69	166	0.308	0.00056
GK15P	906.928	464	210	2.28	0.00148
GK20P	1.014.968	464	250	2.48	0.00148
GK25P	5.525.250	4.708	356	6.24	0.0051

Tab. 20

Unit	A (mm)	B (mm)
ECO 60	72	30
ECO 80	94	40
ECO 100	120	40

Tab. 21

Fixing brackets



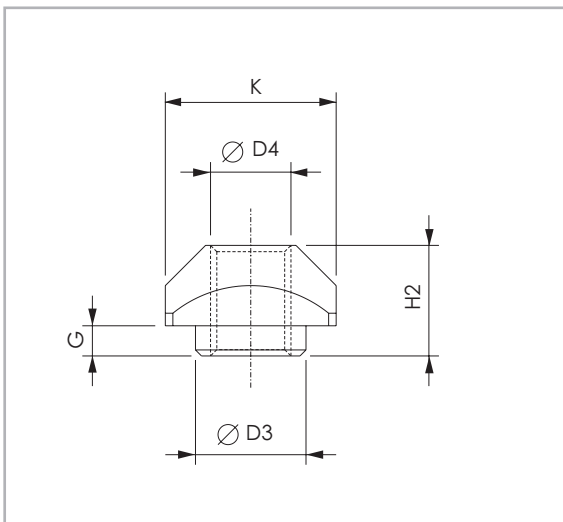
Anodized aluminum block for fixing the linear units through the side slots of the body

Fig. 13

Unit	A	H1	B	C	E	F	D1	D2	L	L1	Code
ECO 60	20	17.5	6	16	11.5	6	9.4	5.3	50	25	1001490
ECO 80	20	20.7	7	16	14.7	7	11	6.4	50	25	1001491
ECO 100	36.5	28.5	10	31	18.5	11.5	16.5	10.5	100	50	1001233

Tab. 22

T-nuts



Steel nuts to be used in the slots of the body.

Fig. 14

Dimensions (mm)

Unit		D3	D4	G	H2	K	Code
ECO 60	S	6.7	M5	2.3	6.5	10	1000627
ECO 60	C	-	M5	-	5	10	1000620
ECO 80	S	8	M6	3.3	8.3	13	1000043
ECO 80	C	-	M6	-	5.8	13	1000910
ECO 80	L	-	M6	-	6.5	17	1000911
ECO 100	S	11	M8	3	11	17	1000932
ECO 100	C	-	M8	-	8	16	1000942
ECO 100	L	-	M8	-	6.5	17	1000943

S = Side - C = Carriage - L = Lower

Tab. 23

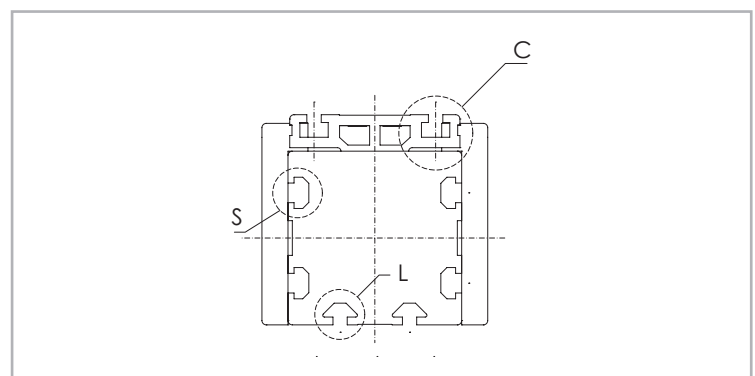


Fig. 15

Proximity

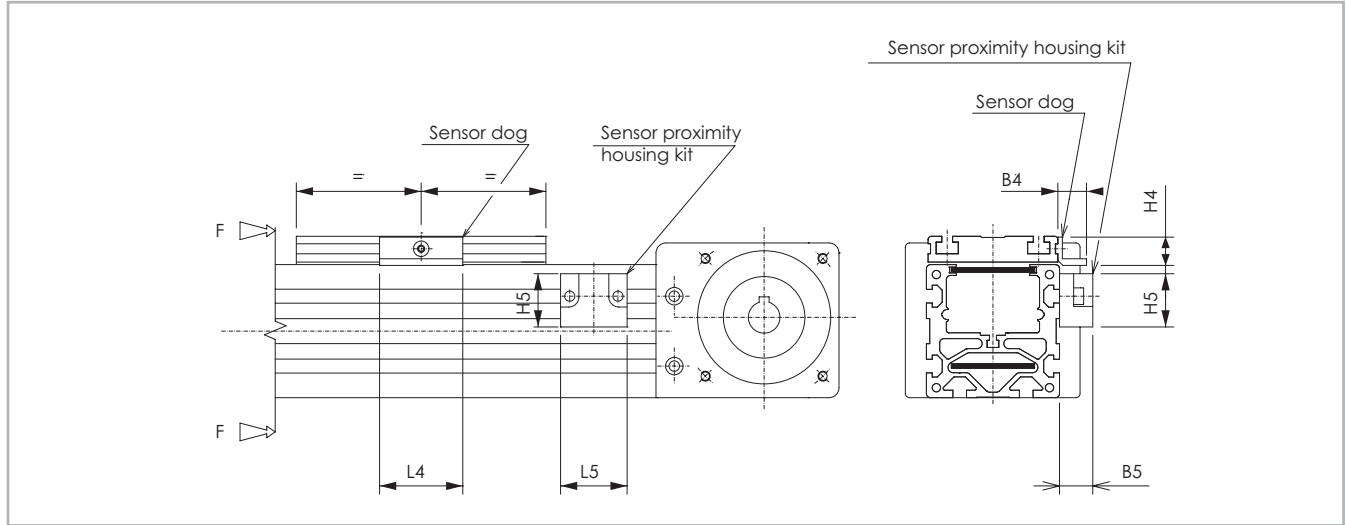


Fig. 16

Sensor proximity housing kit

Anodized aluminum block, red colour, equipped with T-nuts for fixing into the body slots.

Sensor dog

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

Unit	B4	B5	L4	L5	H4	H5	For proximity	Sensor dog Code	Sensor proximity housing kit code
ECO 60	9.5	14	25	29	12	22.5	Ø 8	G000268	G000213
ECO 80	17.2	20	50	40	17	32	Ø 12	G000267	G000209
ECO 100	17.2	20	50	40	17	32	Ø 12	G000267	G000210

Tab. 24

Ordering key



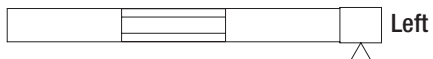
> Identification codes for the ECO linear unit

C	06 06=60 08=80 10=100	2A	0 2000	1A 1A=SP1 2A=SP2 1C=CI	
					Linear motion system <i>see pg. ES-4</i>
					L=total length of the unit
					Driving head code <i>see pg. ES-8</i>
					Linear unit size <i>see from pg. ES-5 to pg. ES-7</i>
					ECO series <i>see pg. ES-2</i>

In order to create identification codes for Actuator Line, you can visit: <http://configureactuator.rollon.com>



Left / right orientation



Multiaxis systems



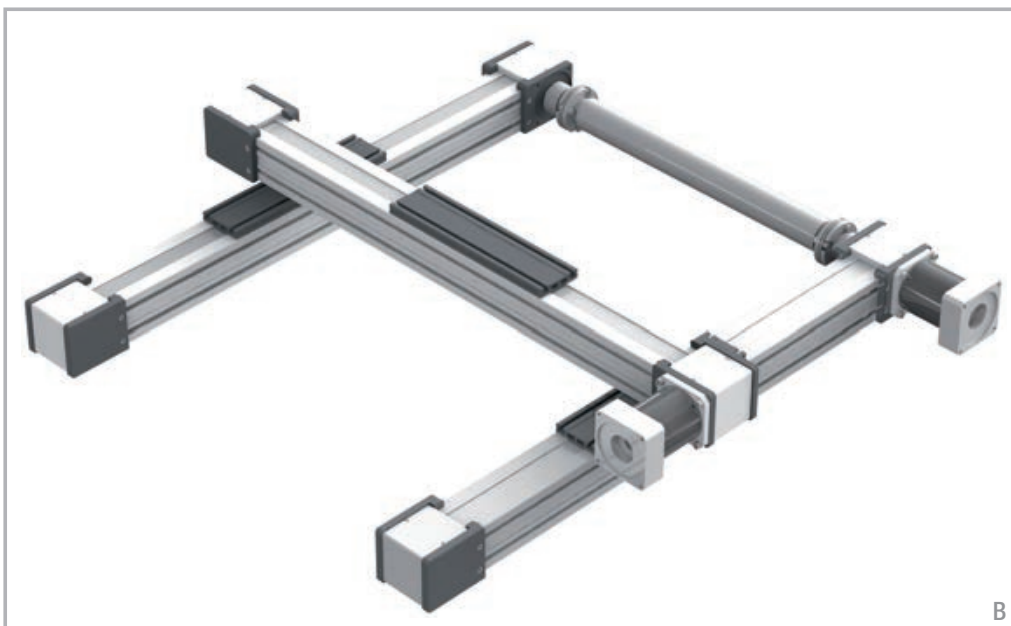
Previously, customers wishing to build multiaxis units have had to design, draw and manufacture all the elements necessary to assemble two or more axis. Rollon now offers a set of fittings including brackets and cross plates to enable multiaxis units to be built. In addition to standard elements, Rollon also provides plates for special applications.

ECO axis system



A - Linear units: X axis 1 ECO 80

Two axis X-Y system



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

Connection kit: 2 Kits of fixing brackets for the ECO 80 unit (Y axis) on the carriages of the ECO 80 units (X axis).

Static load and service life

> Static load

In the static load test, the radial load rating F_y , the axial load rating F_z , and the moments M_x , M_y und M_z indicate the maximum allowed load values. Higher loads will impair the running characteristics. To check the static load, a safety factor S_0 is used, which accounts for the special conditions of the application defined in more detail in the table below:

All load capacity values refer to the actuator well fixed to a rigid structure. For cantilever applications the deflection of the actuator profile must be taken in account.

Safety factor S_0

No shocks or vibrations, smooth and low-frequency change in direction High mounting accuracy, no elastic deformations, clean environment	2 - 3
Normal assembly conditions	3 - 5
Shocks and vibrations, high-frequency changes in direction, substantial elastic deformations	5 - 7

Fig. 1

The ratio of the actual to the maximum allowed load must not be higher than the reciprocal value of the assumed safety factor S_0 .

$\frac{P_{fy}}{F_y} \leq \frac{1}{S_0}$	$\frac{P_{fz}}{F_z} \leq \frac{1}{S_0}$	$\frac{M_1}{M_x} \leq \frac{1}{S_0}$	$\frac{M_2}{M_y} \leq \frac{1}{S_0}$	$\frac{M_3}{M_z} \leq \frac{1}{S_0}$
---	---	--------------------------------------	--------------------------------------	--------------------------------------

Fig. 2

The above formulae only apply to a one load case. If one or more of the forces described are acting simultaneously, the following calculation must be carried out:

$\frac{P_{fy}}{F_y} + \frac{P_{fz}}{F_z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \leq \frac{1}{S_0}$	P_{fy}	= acting load (y direction) (N)
	F_y	= static load rating (y direction) (N)
	P_{fz}	= acting load (z direction) (N)
	F_z	= static load rating (z direction) (N)
	M_1, M_2, M_3	= external moments (Nm)
	M_x, M_y, M_z	= maximum allowed moments in the different load directions (Nm)

Fig. 3

The safety factor S_0 can be at the lower limit given if the acting forces can be determined with sufficient accuracy. If shocks and vibrations act on the system, the higher value should be selected. In dynamic applications, higher safeties are required. For further information, please contact our Application Engineering Department.

Belt safety factor referred to the dynamic F_x

Impact and vibrations	Speed / acceleration	Orietation	Safety Factor
No impacts and/or vibrations	Low	horizontal	1.4
		vertical	1.8
Light impacts and/or vibrations	Medium	horizontal	1.7
		vertical	2.2
Strong impacts and/or vibrations	High	horizontal	2.2
		vertical	3

Tab. 1

> Service life

Calculation of the service life

The dynamic load rating C is a conventional quantity used for calculating the service life. This load corresponds to a nominal service life of 100 km.

The calculated service life, dynamic load rating and equivalent load are linked by the following formula:

$$L_{km} = 100 \text{ km} \cdot \left(\frac{Fz\text{-dyn}}{P_{eq}} \cdot \frac{1}{f_i} \right)^3$$

L_{km} = theoretical service life (km)
 $Fz\text{-dyn}$ = dynamic load rating (N)
 P_{eq} = acting equivalent load (N)
 f_i = service factor (see tab. 2)

Fig. 4

The effective equivalent load P_{eq} is the sum of the forces and moments acting simultaneously on a slider. If these different load components are known, P is obtained from the following equation:

For SP types

$$P_{eq} = P_{fy} + P_{fz} + \left(\frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \right) \cdot F_y$$

Fig. 5

For CI and CE types

$$P_{eq} = P_{fy} + \left(\frac{P_{fz}}{F_z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \right) \cdot F_y$$

Fig. 6

The external constants are assumed to be constant over time. Short-term loads that do not exceed the maximum load ratings have no relevant effect on the service life and can therefore be neglected in the calculation.

Service factor f_i

f_i	
no shocks or vibrations, smooth and low-frequency changes in direction; ($\alpha < 5\text{m/s}^2$) clean operating conditions; low speeds ($< 1 \text{ m/s}$)	1.5 - 2
Slight vibrations; medium speeds; (1-2 m/s) and medium-high frequency of the changes in direction ($5\text{m/s}^2 < \alpha < 10 \text{ m/s}^2$)	2 - 3
Shocks and vibrations; high speeds ($> 2 \text{ m/s}$) and high-frequency changes in direction; ($\alpha > 10\text{m/s}^2$) high contamination, very short stroke	> 3

Tab. 2

Speedy Rail A Lifetime

The rated lifetime for SRA actuators is 80,000 Km.

Static load and service life Uniline



> Static load

In the static load test, the radial load rating F_y , the axial load rating F_z , and the moments M_x , M_y and M_z indicate the maximum allowed load values. Higher loads will impair the running characteristics. To check the static load, a safety factor S_0 is used, which accounts for the special conditions of the application defined in more detail in the table below:

Safety factor S_0

No shocks or vibrations, smooth and low-frequency change in direction High mounting accuracy, no elastic deformations, clean environment	1 - 1.5
Normal assembly conditions	1.5 - 2
Shocks and vibrations, high-frequency changes in direction, substantial elastic deformations	2 - 3.5

Fig. 7

The ratio of the actual to the maximum allowed load must not be higher than the reciprocal value of the assumed safety factor S_0 .

$\frac{P_{fy}}{F_y} \leq \frac{1}{S_0}$	$\frac{P_{fz}}{F_z} \leq \frac{1}{S_0}$	$\frac{M_1}{M_x} \leq \frac{1}{S_0}$	$\frac{M_2}{M_y} \leq \frac{1}{S_0}$	$\frac{M_3}{M_z} \leq \frac{1}{S_0}$
---	---	--------------------------------------	--------------------------------------	--------------------------------------

Fig. 8

The above formulae apply to a one load case. If one or more of the forces described are acting simultaneously, the following test must be carried out:

$\frac{P_{fy}}{F_y} + \frac{P_{fz}}{F_z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \leq \frac{1}{S_0}$	<ul style="list-style-type: none"> P_{fy} = acting load (y direction) (N) F_y = static load rating (y direction) (N) P_{fz} = acting load (z direction) (N) F_z = static load rating (z direction) (N) M_1, M_2, M_3 = external moments (Nm) M_x, M_y, M_z = maximum allowed moments in the different load directions (Nm)
--	--

Fig. 9

The safety factor S_0 can be at the lower limit given if the acting forces can be determined with sufficient accuracy. If shocks and vibrations act on the system, the higher value should be selected. In dynamic applications, higher safeties are required. For further information, please contact our Application Engineering Department.

> Calculation formulae

Moments M_y and M_z for linear units with long slider plate

The allowed loads for the moments M_y and M_z depend on the length of the slider plate. The allowed moments M_{zn} and M_{yn} for each slider plate length are calculated by the following formulae:

$$S_n = S_{min} + n \cdot \Delta S$$

$$M_{zn} = \left(1 + \frac{S_n - S_{min}}{K}\right) \cdot M_{zmin}$$

$$M_{yn} = \left(1 + \frac{S_n - S_{min}}{K}\right) \cdot M_{ymin}$$

M_{zn} = allowed moment (Nm)

M_{zmin} = minimum values (Nm)

M_{yn} = allowed moment (Nm)

M_{ymin} = minimum values (Nm)

S_n = length of the slider plate (mm)

S_{min} = minimum length of the slider plate (mm)

ΔS = factor of the change in slider length

K = constant

Fig. 10

Type	M_{ymin} [Nm]	M_{zmin} [Nm]	S_{min} [mm]	ΔS	K
A40L	22	61	240	10	74
A55L	82	239	310		110
A75L	287	852	440		155
C55L	213	39	310		130
C75L	674	116	440		155
E55L	165	239	310		110
E75L	575	852	440		155
ED75L (M_z)	1174	852	440		155
ED75L (M_y)	1174	852	440		270

Tab. 3

Moments M_y and M_z for linear units with two slider plates

The allowed loads for the moments M_y and M_z are related to the value of the distance between the centers of the sliders. The allowed moments $M_{y,n}$ and $M_{z,n}$ for each distance between the centers of the sliders are calculated by the following formulae:

$L_n = L_{min} + n \cdot \Delta L$ $M_y = \left(\frac{L_n}{L_{min}} \right) \cdot M_{y,min}$ $M_z = \left(\frac{L_n}{L_{min}} \right) \cdot M_{z,min}$	<p>M_y = allowed moment (Nm)</p> <p>M_z = allowed moment (Nm)</p> <p>$M_{y,min}$ = minimum values (Nm)</p> <p>$M_{z,min}$ = minimum values (Nm)</p> <p>L_n = distance between the centers of the sliders (mm)</p> <p>L_{min} = minimum value for the distance between the centers of the sliders (mm)</p> <p>ΔL = factor of the change in slider length</p>
--	--

Fig. 11

Type	$M_{y,min}$ [Nm]	$M_{z,min}$ [Nm]	L_{min} [mm]	ΔL
A40D	70	193	235	5
A55D	225	652	300	5
A75D	771	2288	416	8
C55D	492	90	300	5
C75D	1809	312	416	8
E55D	450	652	300	5
E75D	1543	2288	416	8
ED75D	3619	2288	416	8

Tab. 4

> Service life

Calculation of the service life

The dynamic load rating C is a conventional quantity used for calculating the service life. This load corresponds to a nominal service life of 100 km. The corresponding values for each liner unit are listed in Table 45 shown

below. The calculated service life, dynamic load rating and equivalent load are linked by the following formula:

$L_{km} = 100 \text{ km} \cdot \left(\frac{C}{P} \cdot \frac{f_c}{f_i} \cdot f_n \right)^3$	<p>L_{km} = theoretical service life (km)</p> <p>C = dynamic load rating (N)</p> <p>P = acting equivalent load (N)</p> <p>f_i = service factor (see tab. 5)</p> <p>f_c = contact factor (see tab. 6)</p> <p>f_n = stroke factor (see fig. 13)</p>
--	---

Fig. 12

The effective equivalent load P is the sum of the forces and moments acting simultaneously on a slider. If these different load components are known, P is obtained from the following equation:

$$P = P_{fy} + \left(\frac{P_{fz}}{F_z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \right) \cdot F_y$$

Fig. 13

The external constants are assumed to be constant over time. Short-term loads that do not exceed the maximum load ratings have no relevant effect on the service life and can therefore be neglected in the calculation.

Service factor f_i

f_i	
No shocks or vibrations, smooth and low-frequency changes in direction; clean operating conditions; low speeds (<1 m/s)	1 - 1.5
Slight vibrations; medium speeds; (1-2,5 m/s) and medium-high frequency of the changes in direction	1.5 - 2
Shocks and vibrations; high speeds (>2.5 m/s) and high-frequency changes in direction; high contamination	2 - 3.5

Tab. 5

Contact factor f_c

f_c	
Standard slider	1
Long slider	0.8
Double slider	0.8

Tab. 6

Stroke factor f_h

The stroke factor f_h accounts for the higher stress on the raceways and rollers when short strokes are carried out at the same total run distance. The following diagram shows the corresponding values (for strokes above 1 m, f_h remains 1):

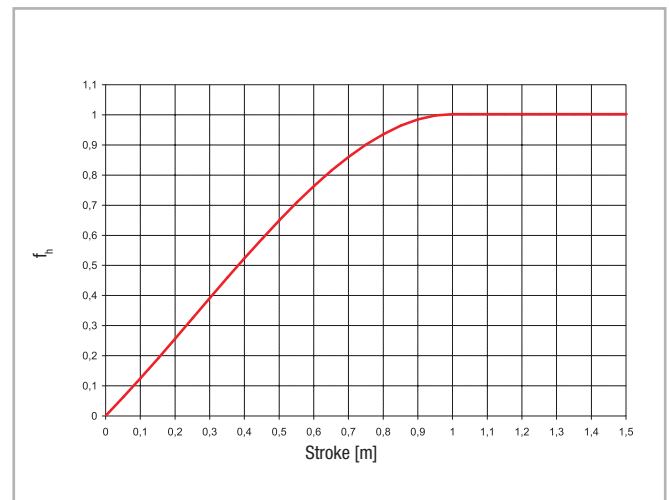


Fig. 14

> Determination of the motor torque

The torque C_m required at the drive head of the linear axis is calculated by the following formula:

$$C_m = C_v + \left(F \cdot \frac{D_p}{2} \right)$$

- C_m = torque of the motor (Nm)
- C_v = starting torque (Nm)
- F = force acting on the toothed belt (N)
- D_p = pitch diameter of pulley (m)

Fig. 15

Data sheet 

General data: Date: Inquiry N°:

Address: Contact:

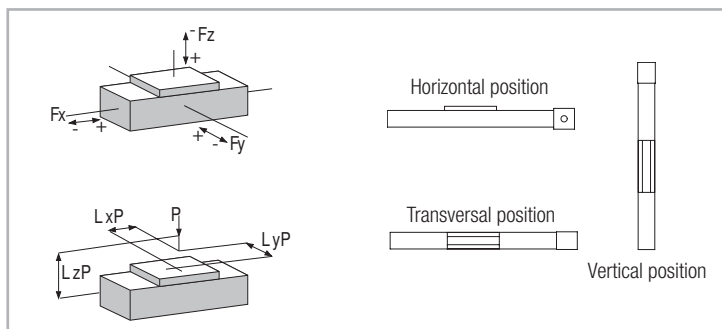
Company: Zip Code:

Phone: Fax:

E-Mail:

Technical data:

				X axis	Y axis	Z axis
Useful stroke (Including safety overtravel)		S	[mm]			
Load to be translated		P	[kg]			
Location of Load in the	X-Direction	LxP	[mm]			
	Y-Direction	LyP	[mm]			
	Z-Direction	LzP	[mm]			
Additional force	Direction (+/-)	Fx (Fy, Fz)	[N]			
Position of force	X-Direction	Lx Fx (Fy, Fz)	[mm]			
	Y-Direction	Ly Fx (Fy, Fz)	[mm]			
	Z-Direction	Lz Fx (Fy, Fz)	[mm]			
Assembly position (Horizontal/Vertical/Transversal)						
Max. speed		V	[m/s]			
Max. acceleration		a	[m/s ²]			
Positioning repeatability		Δs	[mm]			
Required life		L	yrs			



Attention: Please enclose drawing, sketches and sheet of the duty cycle



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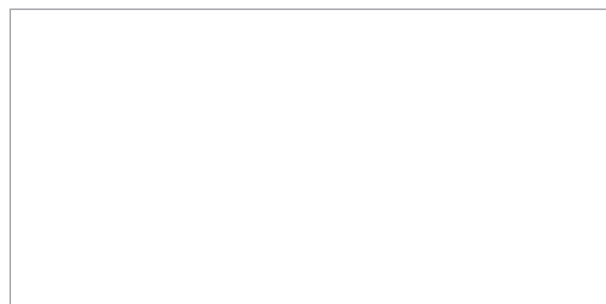
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