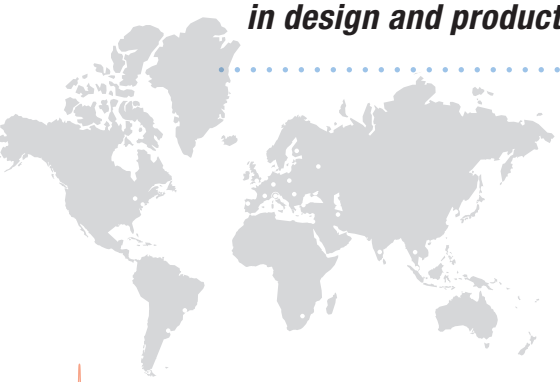
ROLLON®
BY TIMKEN

Plus System

We design and produce in order to support you

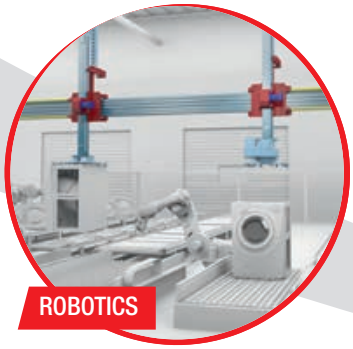
An international group for technology, a local support for service

Over 40 years of know how in design and production

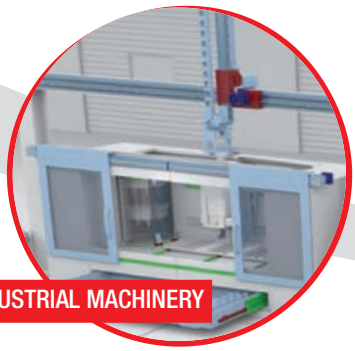


Values

Applications



ROBOTICS



INDUSTRIAL MACHINERY

LOGISTICS

RAILWAY

Collaboration

High level technical consulting

Cross competences in several industrial sectors for an effective problem-solving

Solutions

From a full range of standard products to customer specific solutions for best perfomance


INTERIORS AND ARCHITECTURE


MEDICAL


SPECIAL VEHICLES


AERONAUTICS

A complete range for linear motion which reaches every customer

Linear and curved guides with ball and roller bearings,
with hardened raceways, high load capacities, self-alignment and capable of working in dirty environments.

Linear Line

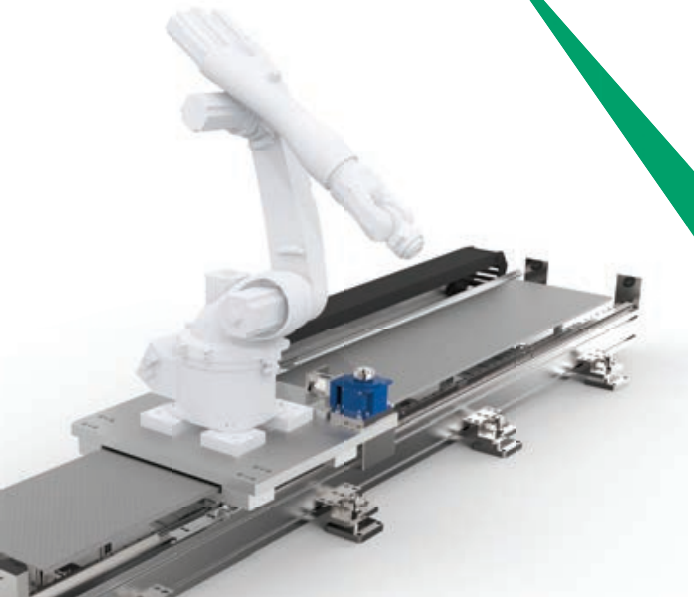
Telescopic Line

Telescopic guides with ball bearings,
with hardened raceways, high load capacities and high rigidity, resistant to shocks and vibrations. For partial, total or extension up to 200% of the length of the guide.

Actuator Line

Linear actuators with different drive and guide configurations,
available with belt, screw or rack and pinion drives to cover a wide range of precision and speed requirements. Guides with bearings or recirculating ball systems for varying load capacities and environments.

A global provider of solutions for applications for linear motion



Actuator System Line

Integrated actuators for industrial automation,
wide ranging solutions that span industrial sectors: from machinery servo systems to high precision assembly systems, packaging lines and high speed production lines. Evolved from Actuator Line series in order to meet the most demanding customer needs.

Content

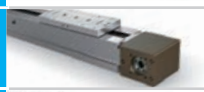
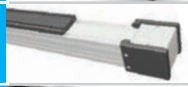
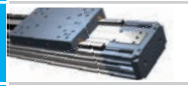
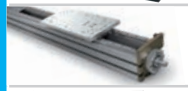
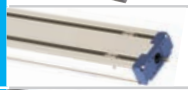
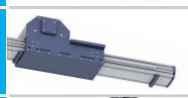
Plus System

Technical features overview

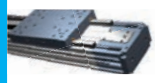
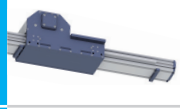
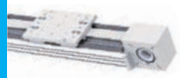
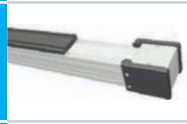
Pre-selection overview

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

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

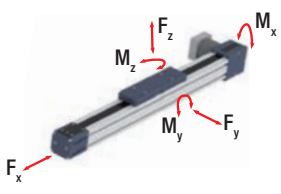
Protection	Rollon solution		
	Product Family		Product
Protected	Plus System		ELM
	Modline		MCR/MCH with protection
Semi-protected	Eco System		ECO
	Modline		MCR/MCH
	Uniline System		UNILINE
Open	Smart System		E-SMART
Protected with suction	Clean Room System		ONE
Protected	Plus System		ROBOT
Open	Smart 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

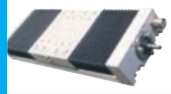
Reference			Section		Driving			Anticorrosion	Protection
Product Family		Product	Balls	Rollers	Toothed belt	Ball screw	Rack and pinion		
Plus System		ELM	●	●	●			●	Protected
		ROBOT	●	●	●			●	Protected
		SC	●		●			●	Semi-protected
Clean Room System		ONE	●		●			●	Protected with suctions
Smart System		E-SMART	●		●				
		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	●	●	●			●	
		ZCR ZCH	●	●	●			●	
		ZMCH	●		●			●	

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/s²]	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*	PLS
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*	CRS
30-50-80-100	4980	130860	130860	1500	12039	12039	4	50	± 0,05	6000*	SS
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*	ES
40-55-75	19360	11000	17400	800,4	24917	18788	7	15	± 0,05	5700*	US
65-80-105	3984	51260	51260	520	5536	5536	5	50	± 0,1	10100*	ML
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	

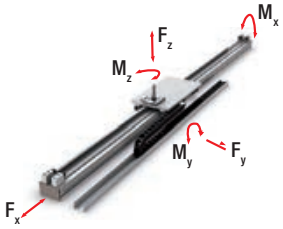


Technical features overview

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/s²]	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	PS
	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*	TL
	60-120-180-250	4565	3620	3620	372	362	362	15	10	± 0,2	7150	SRA
	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*	



ELM series

ELM series description

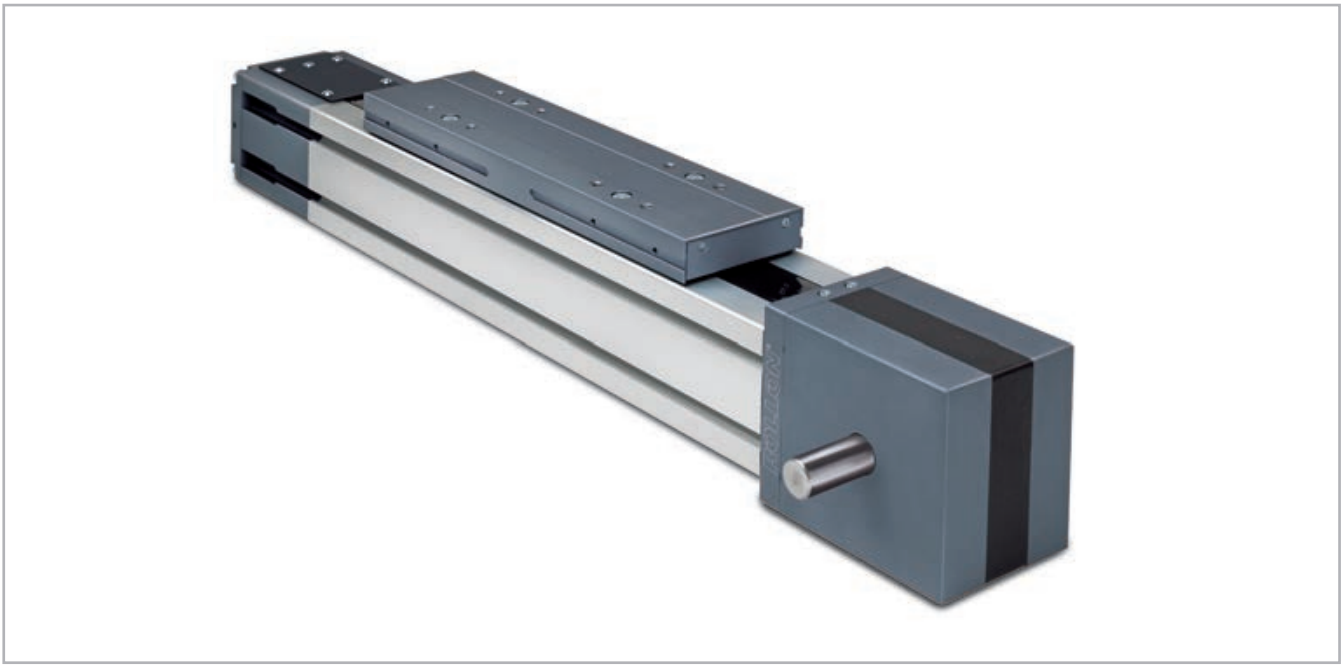


Fig. 1

ELM

This is Rollon's highly versatile, premier line of completely enclosed belt driven linear actuators.

The ELM linear units are available in four sizes from 50 mm to 110 mm. They have a self-supporting structure with a robust profile of extruded and anodized aluminum. The thrust force is transmitted by a steel reinforced, polyurethane belt. The moving carriage is guided and supported by a linear guide system or optional cam roller system.

A polyurethane sealing strip ensures complete protection of the belt drive and linear guide system against dust, dirt and other contaminants. It avoids the fragility of other sealing systems such as stainless steel strips.

The components used for linear motion and accessories promote a "maintenance-free" system. The pulleys, bearings and drive shafts are among the most robust in the industry. The ELM is the best product for applications in very aggressive working environments that also require high speed duty cycles and position repeatability.

Corrosion resistant version

All Plus System series of linear actuators are available with stainless steel elements, for applications in harsh environments and/or subject to frequent washes.

The Plus System linear units are constructed using extruded anodized 6060 and 6082 Anti-Corrosive Aluminum, which houses bearings, linear rails, nuts and bolts and components made of stainless steel preventing or delaying corrosion caused by humidity experienced in the environments where the linear units are used.

Special no-deposit surface treatments are combined with a food grade lubrication system to allow use in highly sensitive applications, such as the food and pharmaceutical industries where product contamination is prohibited.

- Internal stainless steel elements
- Anodized 6060 and 6082 Anti-Corrosive Aluminum Profile
- AISI 440 stainless steel linear rails
- Lubricated with organic food grade vegetable oils

The components

Extruded profile

The anodized 6060 aluminum alloy extrusion used for the profile of the Rollon ELM series linear units were designed and manufactured by industry experts to optimize weight while maintaining mechanical strength. (see physical-chemical characteristics below).The dimensional tolerances comply with EN 755-9 standard.

Driving belt

The Rollon ELM 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. Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

Carriage

The carriage of the Rollon ELM series linear units are made entirely of anodized aluminum. Each carriage has mounting holes fitted with stainless steel thread inserts. Rollon offers multiple carriages to accommodate a vast array of applications. The unique design of the carriage allows for the sealing strip to pass through the carriage as well as house brush seals to remove contaminates from the sealing strip.

Sealing strip

Rollon ELM series linear units are equipped with a polyurethane sealing strip to protect all of the internal components from dust, contaminates, and other foreign objects. The sealing strip runs the length of the body and is kept in position by micro-bearings located inside the carriage. This minimizes resistance as the strip passes through the carriage while providing maximum protection.

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
$\frac{kg}{dm^3}$	$\frac{kN}{mm^2}$	$\frac{10^{-6}}{K}$	$\frac{W}{m \cdot K}$	$\frac{J}{kg \cdot K}$	$\Omega \cdot m \cdot 10^{-9}$	°C
2.7	69	23	200	880-900	33	600-655

Tab. 2

Mechanical characteristics

Rm	Rp (02)	A	HB
$\frac{N}{mm^2}$	$\frac{N}{mm^2}$	%	—
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:

ELM...SP with ball bearing guides

- A ball bearing guide with high load capacity is mounted in a dedicated seat inside the 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 right amount of grease, thus promoting 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 (depending on applications)
- Low noise

ELM...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 linear motion system described above offers:

- Good positioning accuracy
- Low noise
- Maintenance free (depending on applications)

ELM SP section

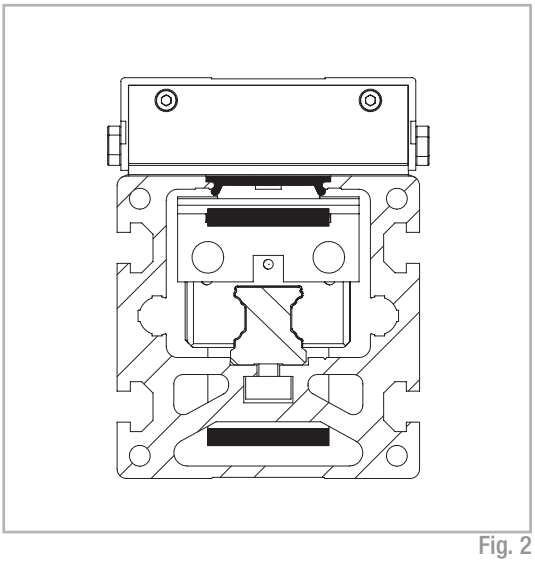


Fig. 2

ELM CI section

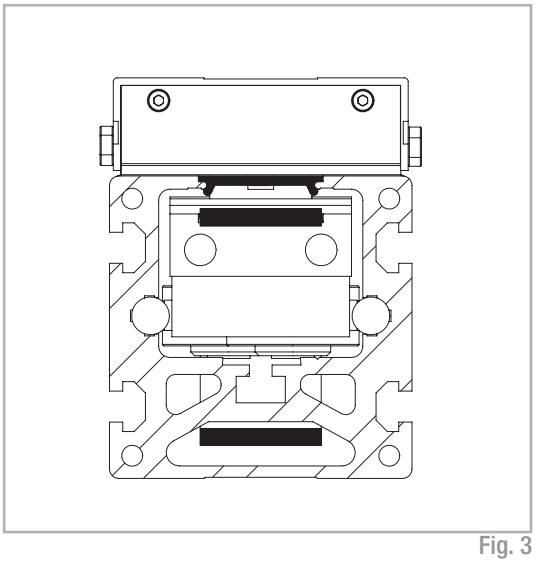
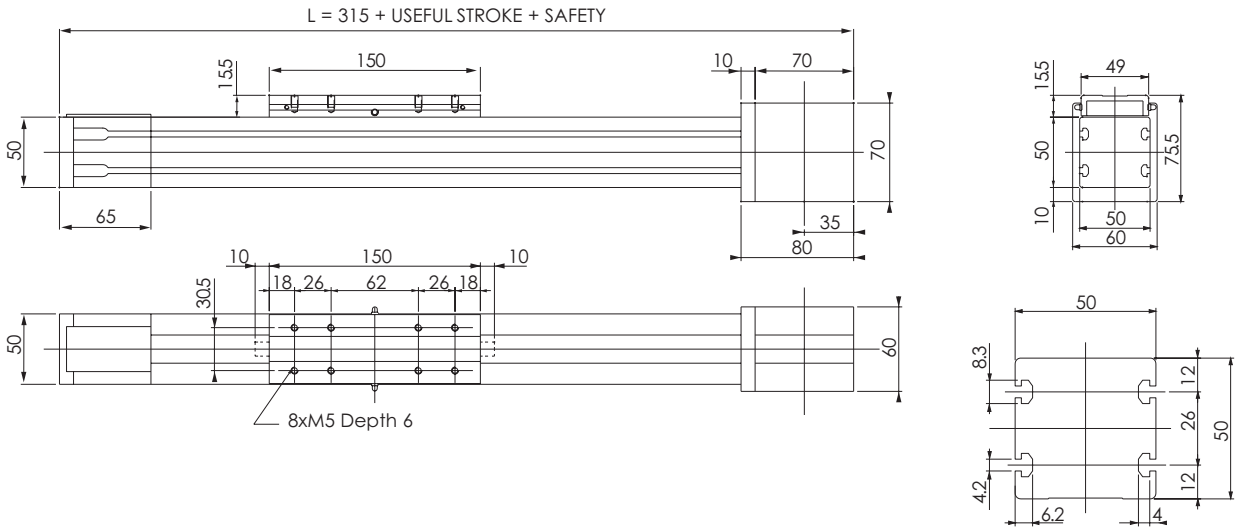


Fig. 3

ELM 50 SP - ELM 50 CI

ELM 50 SP - ELM 50 CI Dimension



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

Fig. 4

Technical data

	Type	
	ELM 50 SP	ELM 50 CI
Max. useful stroke length [mm]	6130	5830*1
Max. positioning repeatability [mm]*2	± 0.05	± 0.05
Max. speed [m/s]	4.0	1.5
Max. acceleration [m/s²]	50	1.5
Type of belt	22 AT 5	22 AT 5
Type of pulley	Z 23	Z 23
Pulley pitch diameter [mm]	36.61	36.61
Carriage displacement per pulley turn [mm]	115	115
Carriage weight [kg]	0.4	0.5
Zero travel weight [kg]	1.8	1.7
Weight for 100 mm useful stroke [kg]	0.4	0.3
Starting torque [Nm]	0.4	0.4
Moment of inertia of pulleys [g mm²]	19810	19810
Rail size [mm]	12 mini	Ø6

*1) It is possible to obtain strokes up to 9000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 4

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ELM 50	0.025	0.031	0.056

Tab. 5

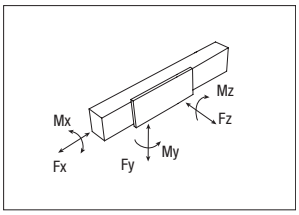
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ELM 50	22 AT 5	22	0.072

Tab. 6

Belt length (mm) = 2 x L - 130 (SP and CI Models)



ELM 50 - Load capacity

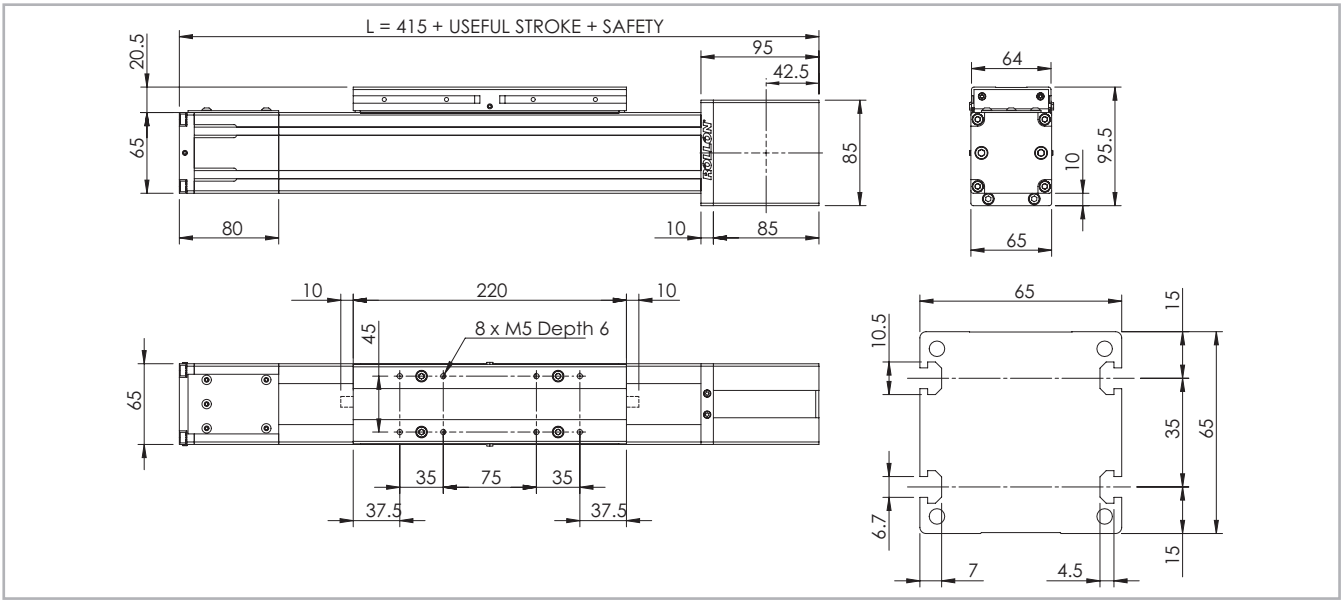
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ELM 50 SP	809	508	7060	6350	7060	46.2	233	233
ELM 50 CI	809	624	1648	3072	1110	19.1	27	45.7

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

Tab. 7

ELM 65 SP - ELM 65 CI

ELM 65 SP - ELM 65 CI Dimension



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

Fig. 5

Technical data

	Type	
	ELM 65 SP	ELM 65 CI
Max. useful stroke length [mm]*1	6060	5760
Max. positioning repeatability [mm]*2	± 0.05	± 0.05
Max. speed [m/s]	5.0	1.5
Max. acceleration [m/s²]	50	1.5
Type of belt	32 AT 5	32 AT 5
Type of pulley	Z 32	Z 32
Pulley pitch diameter [mm]	50.93	50.93
Carriage displacement per pulley turn [mm]	160	160
Carriage weight [kg]	1.1	1.0
Zero travel weight [kg]	3.5	3.3
Weight for 100 mm useful stroke [kg]	0.6	0.5
Starting torque [Nm]	1.5	1.5
Moment of inertia of pulleys [g mm²]	117200	117200
Rail size [mm]	15	Ø6

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 8

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ELM 65	0.060	0.086	0.146

Tab. 9

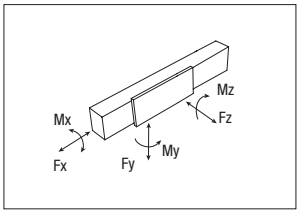
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ELM 65	32 AT 5	32	0.105

Tab. 10

Belt length (mm) = 2 x L - 180 (SP model)
2 x L - 145 (CI model)



ELM 65 - Load capacity

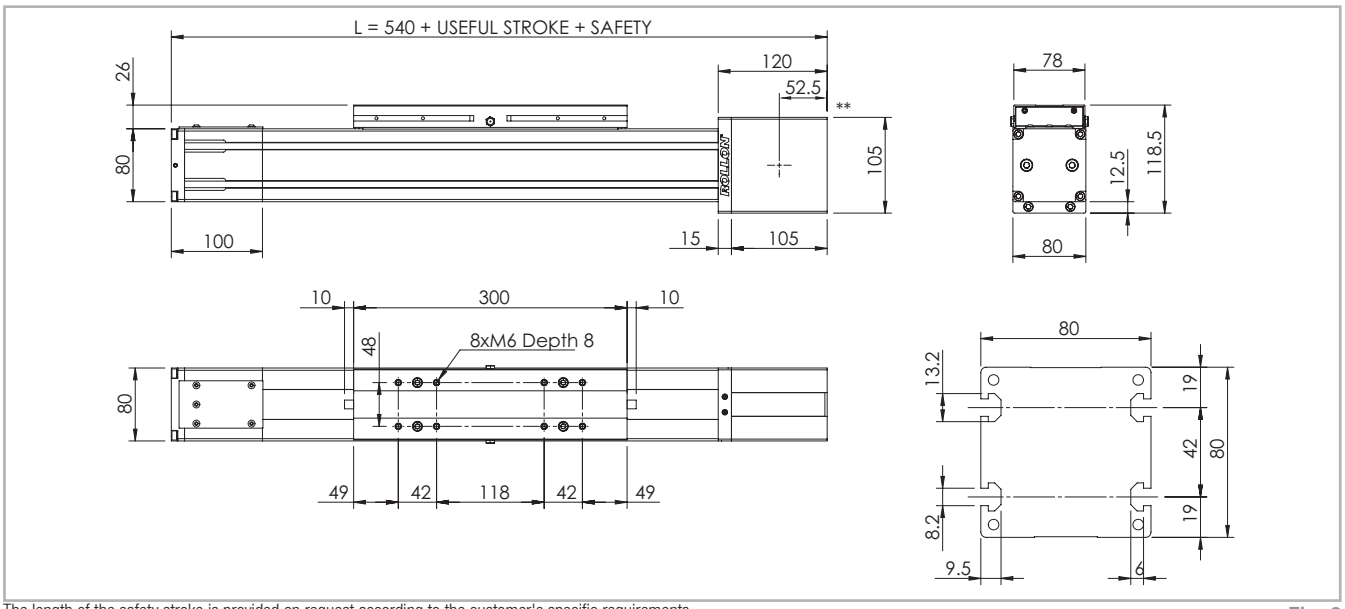
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ELM 65 SP	1344	883	48400	22541	48400	320	1376	1376
ELM 65 CI	1344	1075	4229	8731	2849	69.5	80.1	117

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

Tab. 11

ELM 80 SP - ELM 80 CI

ELM 80 SP - ELM 80 CI Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.
** For ELM80 with AC19 see PLS-11 for head length. Constant for total length calculation 554mm.

Fig. 6

Technical data

	Type	
	ELM 80 SP	ELM 80 CI
Max. useful stroke length [mm]*1	5980	5680
Max. positioning repeatability [mm]*2	± 0.05	± 0.05
Max. speed [m/s]	5.0	1.5
Max. acceleration [m/s²]	50	1.5
Type of belt	32 AT 10	32 AT 10
Type of pulley	Z 19	Z 19
Pulley pitch diameter [mm]	60.48	60.48
Carriage displacement per pulley turn [mm]	190	190
Carriage weight [kg]	2.7	2.5
Zero travel weight [kg]	10.5	9.5
Weight for 100 mm useful stroke [kg]	1.0	0.8
Starting torque [Nm]	2.2	2.2
Moment of inertia of pulleys [g mm²]	388075	388075
Rail size [mm]	20	Ø10

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 12

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ELM 80	0.136	0.195	0.331

Tab. 13

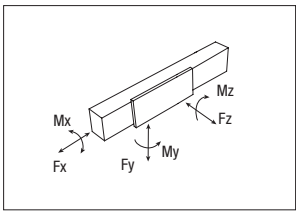
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ELM 80	32 AT 10	32	0.185

Tab. 14

Belt length (mm) = 2 x L - 230 (SP and CI Models)



ELM 80 - Load capacity

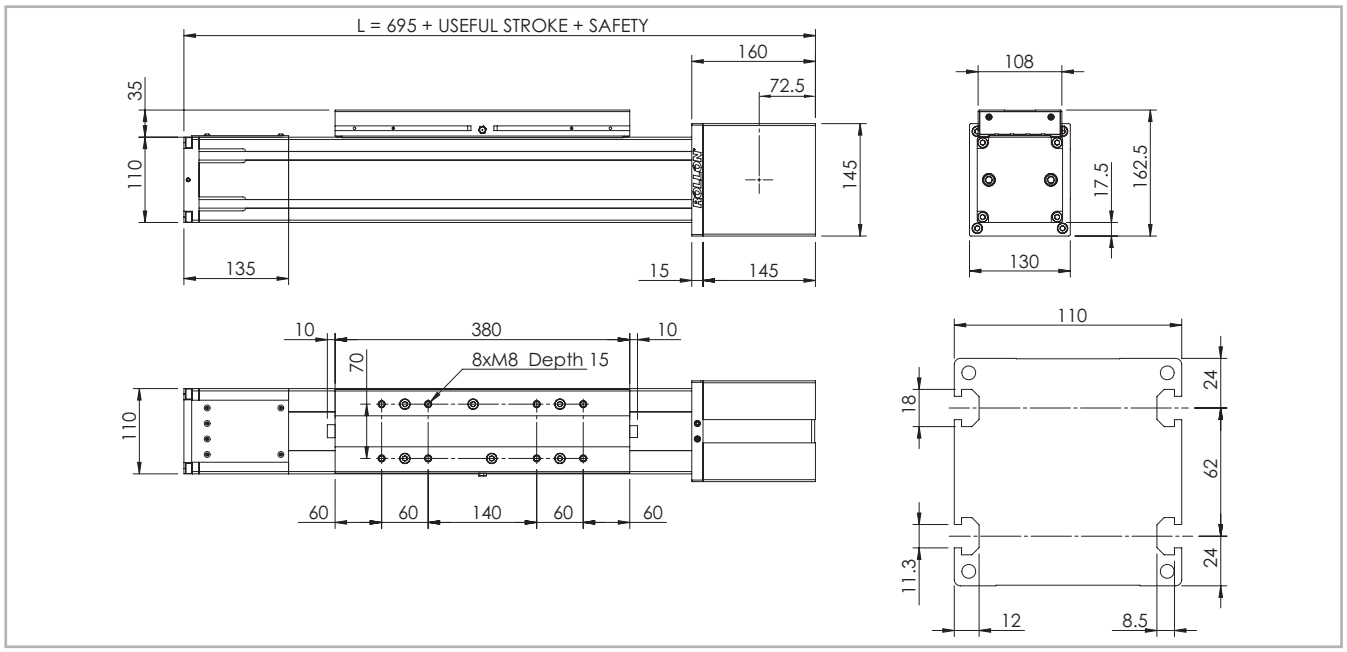
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ELM 80 SP	2258	1306	76800	35399	76800	722	5606	5606
ELM 80 CI	2258	1795	9154	20079	6167	177	352	454

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

Tab. 15

ELM 110 SP - ELM 110 CI

ELM 110 SP - ELM 110 CI Dimension



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

Fig. 7

Technical data

	Type	
	ELM 110 SP	ELM 110 CI
Max. useful stroke length [mm]*1	5900	5600
Max. positioning repeatability [mm]*2	± 0.05	± 0.05
Max. speed [m/s]	5.0	1.5
Max. acceleration [m/s²]	50	1.5
Type of belt	50 AT 10	50 AT 10
Type of pulley	Z 27	Z 27
Pulley pitch diameter [mm]	85.94	85.94
Carriage displacement per pulley turn [mm]	270	270
Carriage weight [kg]	5.6	5.1
Zero travel weight [kg]	22.5	21.6
Weight for 100 mm useful stroke [kg]	1.4	1.1
Starting torque [Nm]	3.5	3.5
Moment of inertia of pulleys [g mm²]	$2.193 \cdot 10^6$	$2.193 \cdot 10^6$
Rail size [mm]	25	Ø10

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 16

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ELM 110	0.446	0.609	1.054

Tab. 17

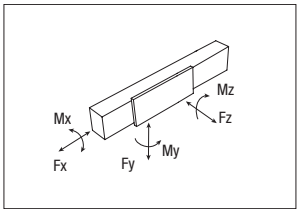
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ELM 110	50 AT 10	50	0.290

Tab. 18

Belt length (mm) = 2 x L - 290 (SP and CI Models)



ELM 110 - 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.
ELM 110 SP	4980	3300	129400	58416	129400	1392	11646	11646
ELM 110 CI	4980	4140	9154	20079	6167	254	308	427

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

Tab. 19

Lubrication

SP linear units with ball bearing guides

SP Linear units are equipped with self lubricating linear ball guides.

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 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: SP version: 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.

CI linear units with gothic arch bearing guides

Linear units with gothic arch bearing guides are equipped with an extended period lubrication system. Four grease impregnated felt scrapers, complete with grease reservoirs, guarantee a service life of ca. 6000 km without relubrication. If relubrication is required to obtain a higher service life please contact our offices.

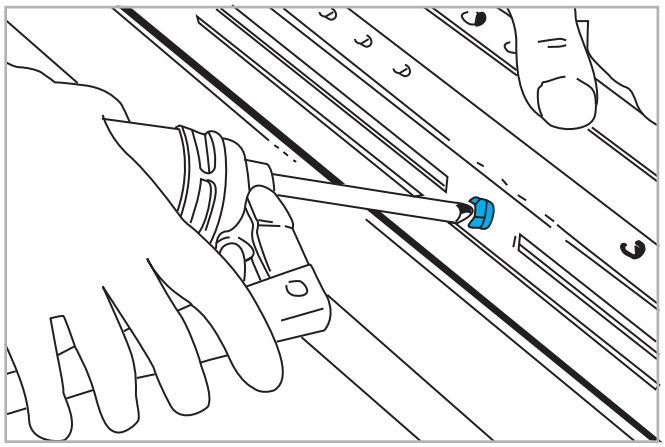


Fig. 8

Quantity of lubricant necessary for re-lubrication:

Type	Unit: [cm³]
ELM 50 SP	1
ELM 65 SP	1.4
ELM 80 SP	2.8
ELM 110 SP	4.8

Tab. 20

- 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 enviromental conditions, lubrication should be carried out more frequently. Refer to Rollon for further advice.

Planetary gears

Assembly to the right or to the left of the driving head

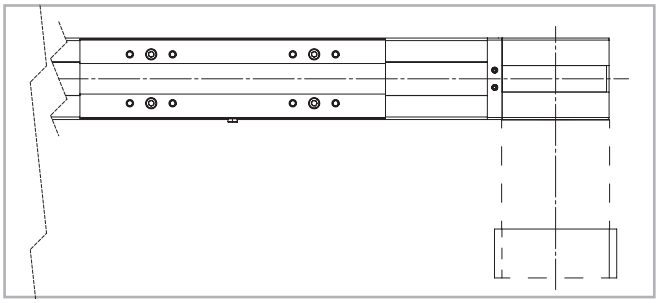


Fig. 9

The series ELM linear units can be fitted with several different drive systems. In each case, the driving pulley is attached to the reduction gearshaft by means of a tapered coupling to ensure high accuracy over a long period of time.

Versions with planetary gears

Planetary gears are used for highly dynamic robot, automation and handling applications involving high stress cycles with high precision requirements. Standard models are available with clearance from 3' to 15' and with a reduction ratio from 1:3 to 1:1000. For assembly of non-standard planetary gear, contact our offices.

Type	Left	Right	Gear type
ELM 50	4E	4C	MP 060
ELM 65	4E	4C	MP 060
ELM 65	6E	6C	MP 080
ELM 80	4E	4C	MP 080
ELM 80	6E	6C	MP 105
ELM 110	4E	4C	MP 105
ELM 110	6E	6C	MP 130

Tab. 21

Simple shaft version

Simple shaft type AS

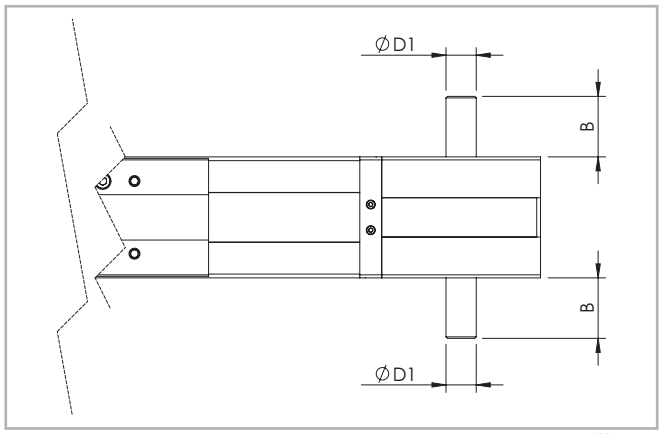


Fig. 10

Unit	Shaft type	B	D1
ELM 50	AS 12	25	12h7
ELM 65	AS 15	35	15h7
ELM 80	AS 20	40	20h7
ELM 110	AS 25	50	25h7

Tab. 22

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

Unit	Shaft type	Head code AS left	Head code AS right	Head code double AS
ELM 50	AS 12	1E	1C	1A
ELM 65	AS 15	1E	1C	1A
ELM 80	AS 20	1E	1C	1A
ELM 110	AS 25	1E	1C	1A

Tab. 23

Simple shaft type AE 10 for encoder assembly + AS

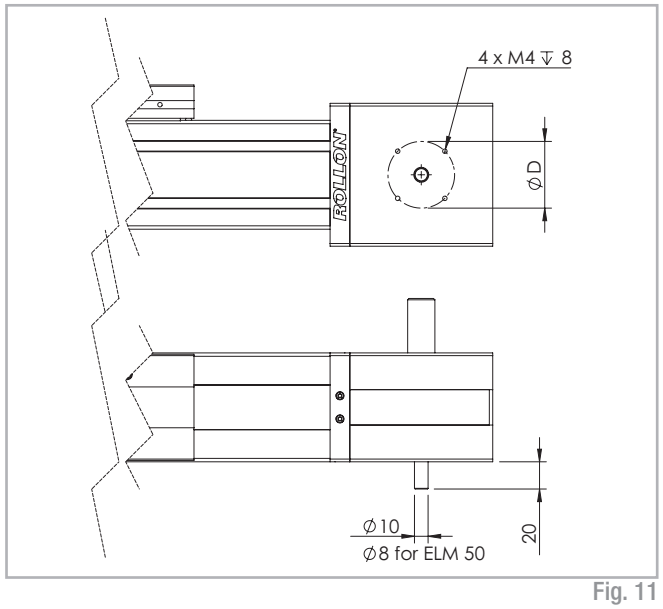


Fig. 11

Unit	Head code AS right + AE	Head code AS left + AE	ØD
ELM 50	VF	VG	49
ELM 65	1G	1I	49
ELM 80	1G	1I	49
ELM 110	1G	1I	76

Tab. 24

Position of the simple shafts for encoder assembly to the right or to the left on the drive head.

Shaft with centering pilot

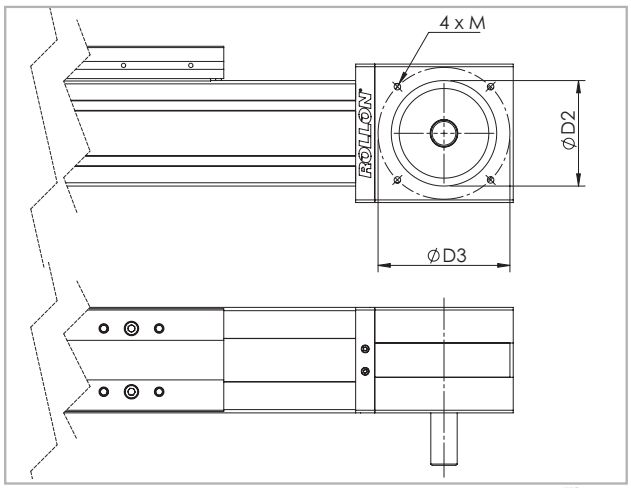


Fig. 12

Unit	Shaft type	D2	D3	M	Head code AS left	Head code AS right
ELM 50	AS 12	55	70	M5	VQ	VP
ELM 65	AS 15	60	85	M6	UQ	UP
ELM 80	AS 20	80	100	M8	UN	UM
ELM 80	AS 20	80	100	M6	TD	UD
ELM 110	AS 25	110	130	M8	UL	UI

Tab. 25

Rollon can provide driving heads with output shaft, centering diameter and threads.

Air Hole

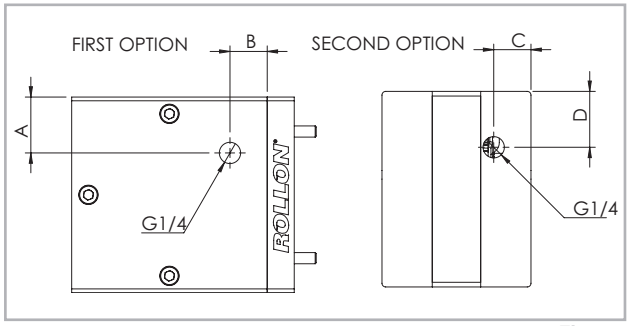


Fig. 13

Unit	First		Second	
	A	B	C	D
ELM 50	20	10	14	20
ELM 65	20	11	14	20
ELM 80	30	20	20	30
ELM 110	45	20,5	33	30

Tab. 26

Hollow shafts

AC hollow shaft type

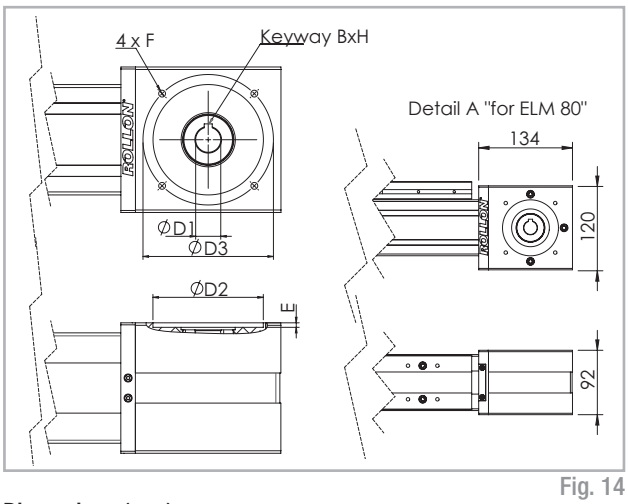


Fig. 14

Appliable to unit	Shaft type	Head code
ELM 50	AC 12	2A
ELM 80	AC 19	2A
ELM 110	AC 25	2A
ELM 110	AC 32	2C

Tab. 27

An (optional) connection flange is required to fit the standard reduction units selected by Rollon. For further information contact our offices

Dimensions (mm)

Appliable to unit	Shaft type	D1	D2	D3	E	F	Keyway B x H
ELM 50	AC 12	12H7	60	75	3.5	M5	4 x 4
ELM 80*	AC 19	19H7	80	100	3.5	M6	6 x 6
ELM 110	AC 25	25H7	110	130	4.5	M8	8 x 7
ELM 110	AC 32	32H7	130	165	4.5	M10	10 x 8

* Dimensions of head change (see detail "A" Fig. 14)

Tab. 28

Linear units in parallel

Synchronization kit for use of ELM linear units in parallel

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

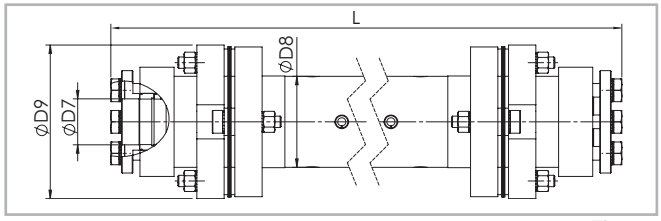


Fig. 15

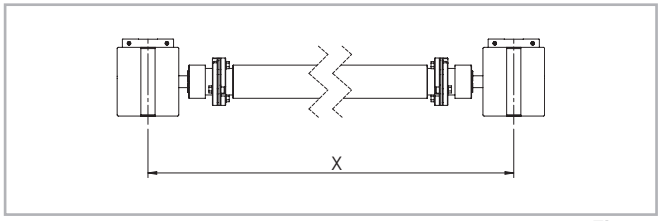


Fig. 16

Dimensions (mm)

Appliable to unit	Shaft type	D7	D8	D9	Code	Formula for length calculation
ELM 50	**AP 12**	12	25	45	GK12P...1A	L= X-68 [mm]
ELM 65	**AP 15**	15	40	69.5	GK15P...1A	L= X-74 [mm]
ELM 80	**AP 20**	20	40	69.5	GK20P...1A	L= X-97 [mm]
ELM 110	**AP 25**	25	70	99	GK25P...1A	L= X-165 [mm]

Tab. 29

Accessories

Fixing by brackets

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

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

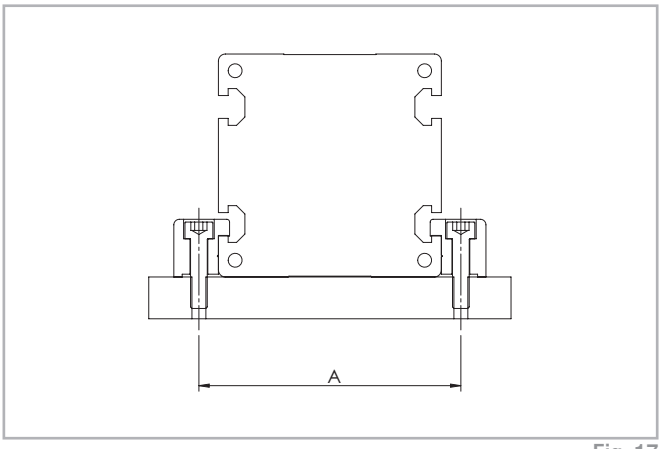


Fig. 17

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

	C1	C2	Y	Weight [Kg] C1+C2 · (X-Y)	
	[g mm²]	[g mm²]	[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. 30

Unit	A (mm)
ELM 50	62
ELM 65	77
ELM 80	94
ELM 110	130

Tab. 31

Warning:
Do not fix the linear units through the drive ends.

Fixing brackets

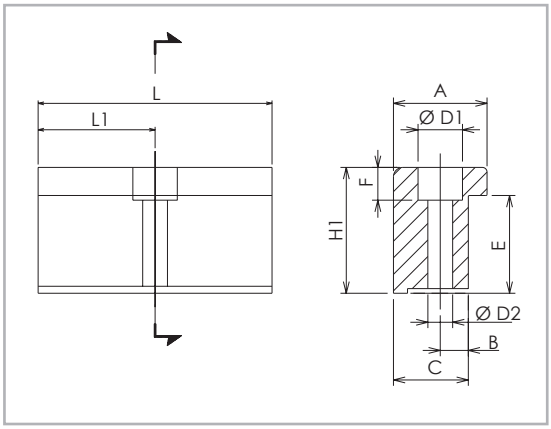


Fig. 18

Dimensions (mm)

Unit	A	H1	B	C	E	F	D1	D2	L	L1	Code
ELM 50	20	14	6	16	10	6	10	5.5	35	17.5	1000958
ELM 65	20	17.5	6	16	11.5	6	9.4	5.3	50	25	1001490
ELM 80	20	20.7	7	16	14.7	7	11	6.4	50	25	1001491
ELM 110	36.5	28.5	10	31	18.5	11.5	16.5	10.5	100	50	1001233

Tab. 32

Fixing bracket

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

T-Nuts

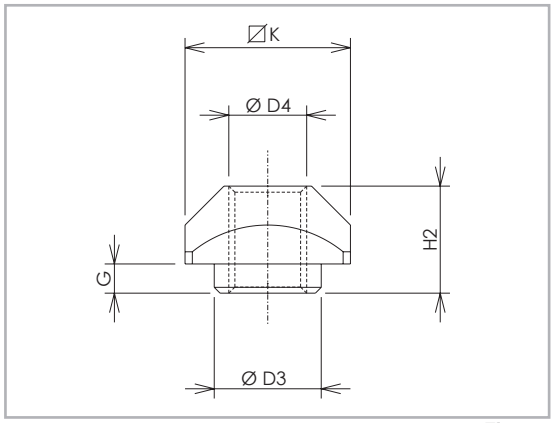


Fig. 19

Dimensions (mm)

Unit	D3	D4	G	H2	K	Code
ELM 50	-	M4	-	3.4	8	1001046
ELM 65	6.7	M5	2.3	6.5	10	1000627
ELM 80	8	M6	3.3	8.3	13	1000043
ELM 110	11	M8	2.8	10.8	17	1000932

Tab. 33

T-nuts

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

Proximity ELM...SP - ELM...CI series

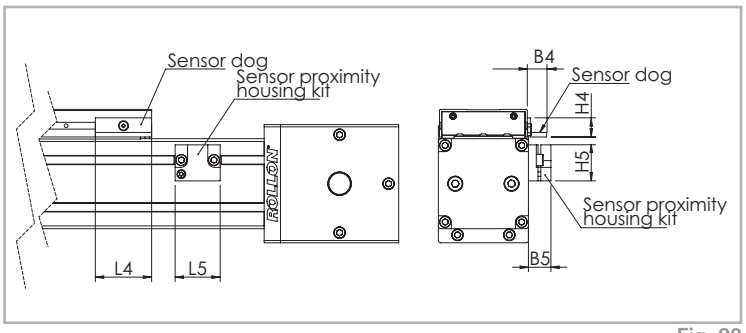


Fig. 20

Sensor proximity housing kit

Red anodized aluminum sensor holder, equipped with T-nuts for fixing onto the profile.

Sensor dog

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

Dimensions (mm)

Unit	B4	B5	L4	L5	H4	H5	For proximity	Sensor dog code	Sensor proximity housing kit code
ELM 50	9.5	14	25	29	11.9	22.5	Ø 8	G000268	G000211
ELM 65	17.2	20	50	40	17	32	Ø 12	G000267	G000212
ELM 80	17.2	20	50	40	17	32	Ø 12	G000267	G000209
ELM 110	17.2	20	50	40	17	32	Ø 12	G000267	G000210

Tab. 34

Ordering key

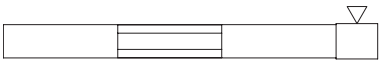
Identification codes for the ELM linear unit

E	06 05=50 06=65 08=80 11=110	1C	2000	1A 1A=SP 1C=CI	D	
					Multiple carriage	
				Linear motion system *see pg. PLS-4*		
			L = total length of the unit			
		Driving head code *see pg. PLS-10 - PLS-11*				
	Linear unit size *see from pg. PLS-5 to pg. PLS-8*					
ELM Series *see pg. PLS-2*						

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

Configure Actuator

Left / right orientation



ROBOT series

ROBOT series description

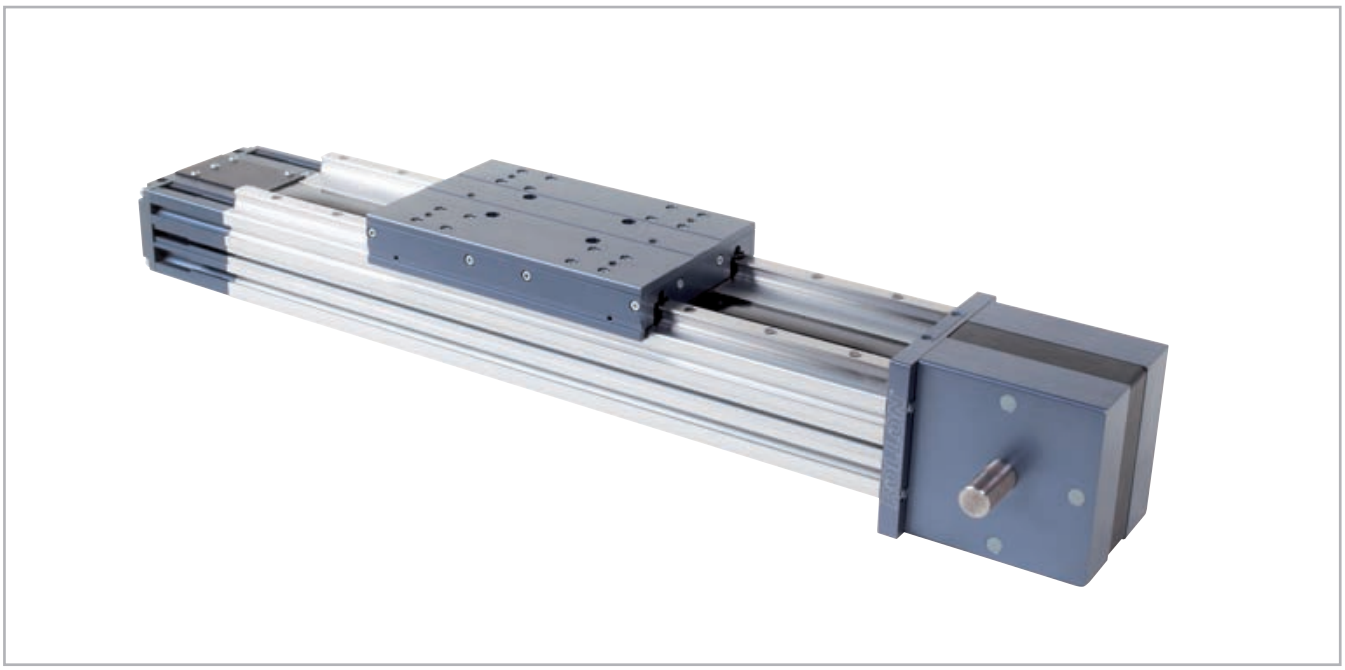


Fig. 21

ROBOT

The ROBOT series is particularly well-suited for heavy load applications where significant carriage pitch, yaw or roll moments are applied; or for the linear conveyance of SCARA-type and 6 axis articulated arm robots on a transfer or factory automation line. As a robust, high load choice, the ROBOT Series is the linear actuator for the most demanding applications.

Available in four sizes from 100 mm to 220 mm, the ROBOT series linear units have a rigid structure made by a heavy rectangular cross-section of extruded and anodized aluminum. The thrust force is transmitted by a steel reinforced polyurethane. The carriage is running on two parallel linear guides with four self-lubricated "maintenance-free" caged ball bearing blocks, positioned to support the carriage and all incident loads and moments. Multiple independent or idler style carriages are available to further enhance load or moment carrying capacity.

A polyurethane sealing strip ensures complete protection of the driving belt against dirt, chips, liquids and other contaminants.

The ROBOT series is the clear choice for heavy, high-speed, fluctuating load and moment applications in aggressive environments where repeatable, maintenance-free industrial automation is required.
For all sizes of the ROBOT series a 2C version with 2 independent carriages is also available. Each carriage is driven by its own belt. The driving head can accomodate two gearboxes, one on each side. This solution is ideal for pick & place application or loading and unloading machine.

Corrosion resistant version

All Plus System series of linear actuators are available with stainless steel elements, for applications in harsh environments and/or subject to frequent washes.

The Plus System linear units are constructed using extruded anodized 6060 and 6082 Anti-Corrosive Aluminum, which houses bearings, linear rails, nuts and bolts and components made of stainless steel, preventing or delaying corrosion caused by humidity experienced in the environments where the linear units are used.

Special no-deposit surface treatments are combined with a food grade lubrication system to allow use in highly sensitive applications, such as the food and pharmaceutical industries where product contamination is prohibited.

- Internal stainless steel elements
- Anodized 6060 and 6082 Anti-Corrosive Aluminum Profile
- AISI 440 stainless steel linear rails
- Lubricated with organic food grade vegetable oils

The components

Extruded profile

The anodized 6060 aluminum alloy extrusion used for the profile of the Rollon ROBOT series linear units were designed and manufactured by industry experts to optimize weight while maintaining mechanical strength. The dimensional tolerances comply with EN 755-9 standards. T-slots are provided in the side and bottom faces to facilitate mounting.

Driving belt

The Rollon ROBOT 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 backlash-free pulleys, smooth alternating motion can be achieved. Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

The provision of guidance for the belt within the body causes it to run central on the pulley, there by ensuring long service life.

Carriage

The carriage of the Rollon ROBOT series linear units are made entirely of anodized aluminum. Each carriage has mounting holes fitted with stainless steel thread inserts. Rollon offers multiple carriages to accommodate a vast array of applications. The unique design of the carriage allows for the sealing strip to pass through the carriage as well as house brush seals to remove contaminates from the sealing strip.

Sealing strip

Rollon ROBOT series linear units are equipped with a polyurethane sealing strip to protect all of the internal components from dust, contaminants, and other foreign objects. The sealing strip runs the length of the body and is kept in posi-tion by micro-bearings located with in the carriage. This minimizes frictional resistance as the strip passes through the carriage while providing maximum protection.

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. 35

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
$\frac{kg}{dm^3}$	$\frac{kN}{mm^2}$	$\frac{10^{-6}}{K}$	$\frac{W}{m \cdot K}$	$\frac{J}{kg \cdot K}$	$\Omega \cdot m \cdot 10^{-9}$	°C
2.7	69	23	200	880-900	33	600-655

Tab. 36

Mechanical characteristics

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

Tab. 37

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:

ROBOT ...SP with ball bearing guides

- Two ball bearing guides with high load capacity are mounted in two dedicated seats on the outer sides of the body.
- The carriage is assembled on four pre-loaded ball bearing blocks.
- The four ball row configuration enable the carriage to withstand loading in the four main directions.
- The four 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.
- The lubrication reservoirs (pockets) fitted on the cages considerably decreases re-lubrication frequency. Lubrication reservoirs (pockets) installed on the front of the ball bearing blocks supply the right amount of grease, thus promoting long maintenance interval.

The linear motion system described above offers:

- High speed and acceleration
- High load capacity
- High bending permissible moments
- Low friction
- Long duration
- Maintenance free (dependent on application, see page PLS-32 "Lubrication")
- Low noise

ROBOT CE with gothic arch bearing guides

- Two hardened steel rods (58/60 HRC hardness, tolerance: h6) are securely inserted into the aluminum body.
- The carriage is fitted with six bearing assemblies (except for ROBOT 160), each having agothic arch groove machined into its outer race to run on the steel rods.
- The six bearings (except for ROBOT 160) are mounted on steel pins, of which are eccentric to allow the running clearance and preload to be set.
- To keep the running tracks clean and lubricated, four grease impregnated felt seals, complete with grease reservoirs, are fitted at the ends.

The linear motion system described above offers:

- Good positioning accuracy
- Low noise
- Maintenance free (dependant on application)

ROBOT SP section

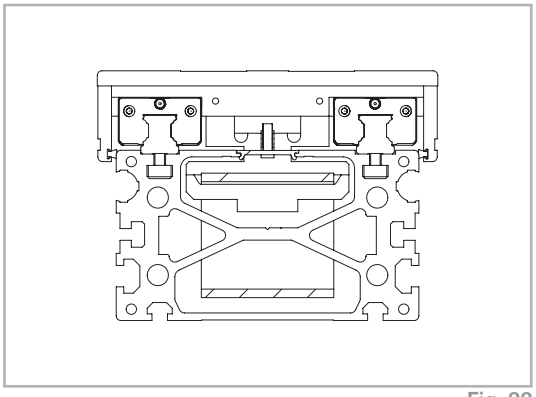


Fig. 22

ROBOT CE section

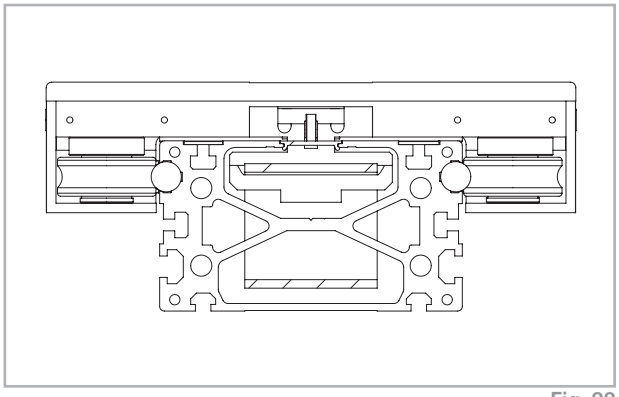


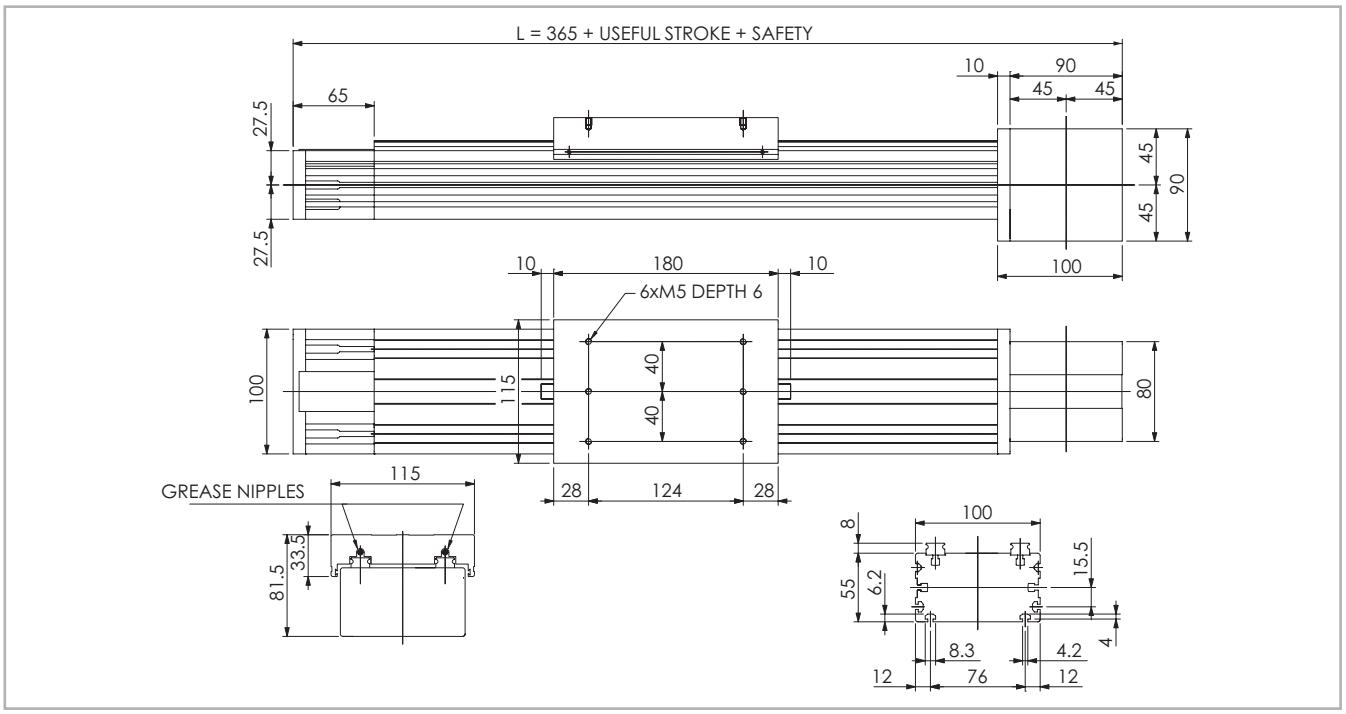
Fig. 23

ROBOT 2C

For both the SP an CE linear motion system is available the 2C version, which features 2 independent carriages on a single actuator.

ROBOT 100 SP

ROBOT 100 SP dimensions



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

Fig. 24

Technical data

	Type
	ROBOT 100 SP
Max. useful stroke length [mm]	6100
Max. positioning repeatability [mm]*1	± 0.05
Max. speed [m/s]	4.0
Max. acceleration [m/s²]	50
Type of belt	32 AT 5
Type of pulley	Z 23
Pulley pitch diameter [mm]	36.61
Carriage displacement per pulley turn [mm]	115
Carriage weight [kg]	2.4
Zero travel weight [kg]	4.5
Weight for 100 mm useful stroke [kg]	0.8
Starting torque [Nm]	1.3
Moment of inertia of pulleys [g mm²]	87200
Rail size [mm]	15 mini

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

Tab. 38

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 100	0.05	0.23	0.28

Tab. 39

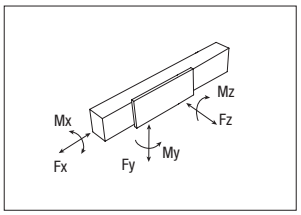
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 100 SP	32 AT 5	32	0.105

Tab. 40

Belt length (mm) = 2 x L - 115



ROBOT 100 SP - Load capacity

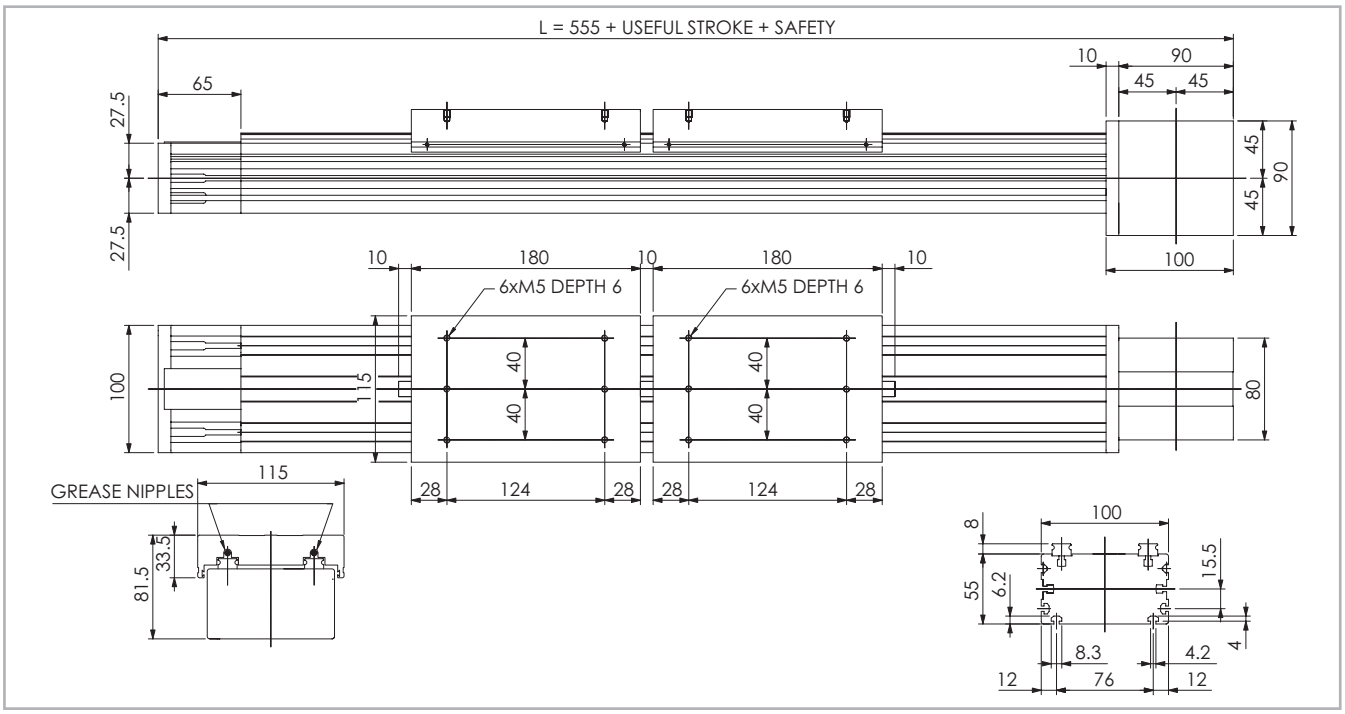
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 100 SP	1176	739	22800	21144	22800	775	1322	1322

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

Tab. 41

ROBOT 100 SP-2C DOUBLE INDEPENDENT CARRIAGES

ROBOT 100 SP-2C dimensions



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

Fig. 25

Technical data

	Type
	ROBOT 100 SP-2C
Max. useful stroke length [mm]	5910
Max. positioning repeatability [mm]*1	± 0.05
Max. speed [m/s]	4.0
Max. acceleration [m/s²]	50
Type of belt	16 AT 5
Type of pulley	Z 23
Pulley pitch diameter [mm]	36.61
Carriage displacement per pulley turn [mm]	115
Carriage weight [kg]	2.4
Zero travel weight [kg]	8.0
Weight for 100 mm useful stroke [kg]	0.8
Starting torque [Nm]	1.3
Moment of inertia of pulleys [g mm²]	16220
Rail size [mm]	15 mini

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

Tab. 42

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 100	0.05	0.23	0.28

Tab. 43

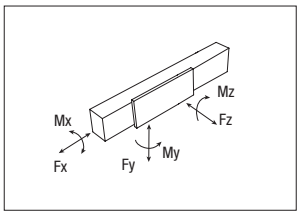
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 100 SP-2C	16 AT 5	16	0.05

Tab. 44

Belt length (mm) = 2 x L - 115
Two belts for each actuator.



ROBOT 100 SP-2C - Load capacity

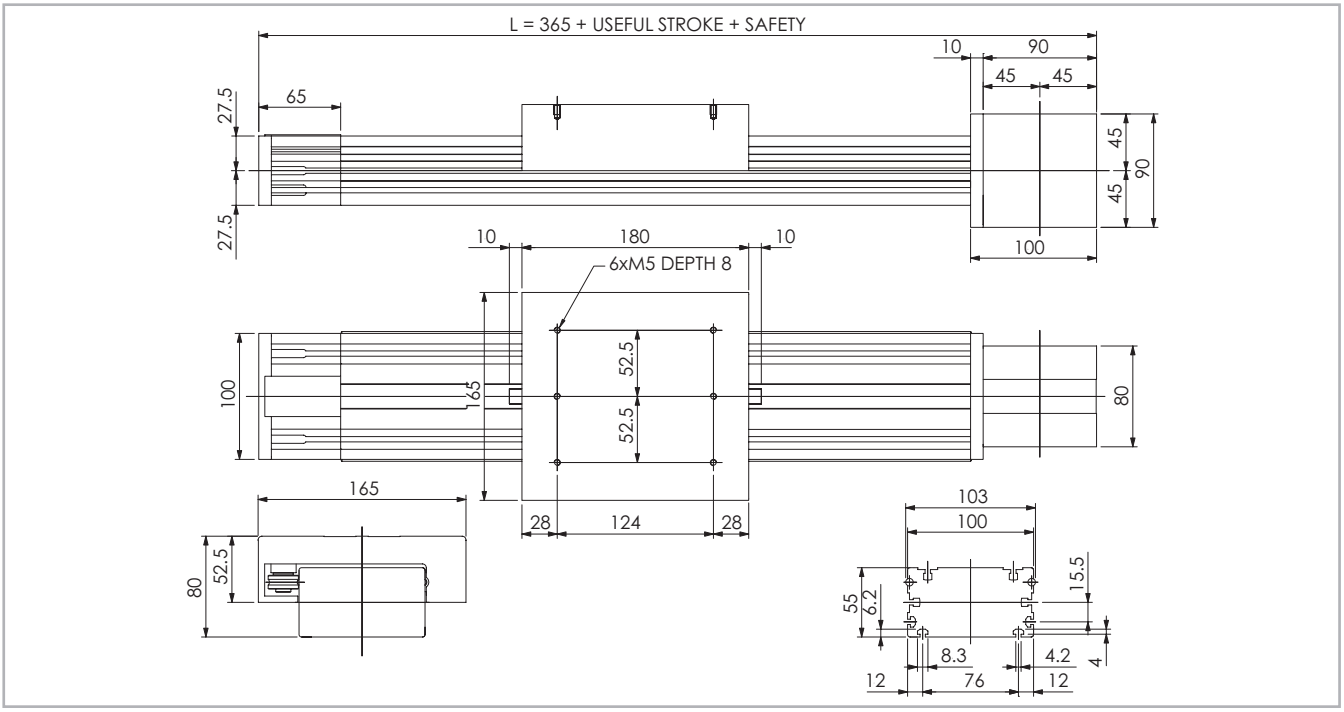
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 100 SP-2C	588	370	22800	21144	22800	775	1322	1322

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

Tab. 45

ROBOT 100 CE

ROBOT 100 CE dimensions



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

Fig. 26

Technical data

	Type
	ROBOT 100 CE
Max. useful stroke length [mm]	5800
Max. positioning repeatability [mm]*1	± 0.05
Max. speed [m/s]	1.5
Max. acceleration [m/s²]	1.5
Type of belt	32 AT 5
Type of pulley	Z 23
Pulley pitch diameter [mm]	36.61
Carriage displacement per pulley turn [mm]	115
Carriage weight [kg]	3.4
Zero travel weight [kg]	5.5
Weight for 100 mm useful stroke [kg]	0.8
Starting torque [Nm]	1.3
Moment of inertia of pulleys [g mm²]	87200
Rail size [mm]	Ø6

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

Tab. 46

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 100	0.05	0.23	0.28

Tab. 47

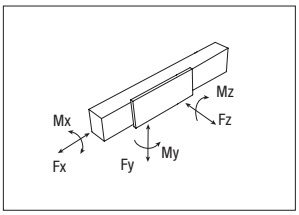
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 100-CE	32 AT 5	32	0.105

Tab. 48

Belt length (mm) = 2 x L - 115



ROBOT 100 CE - Load capacity

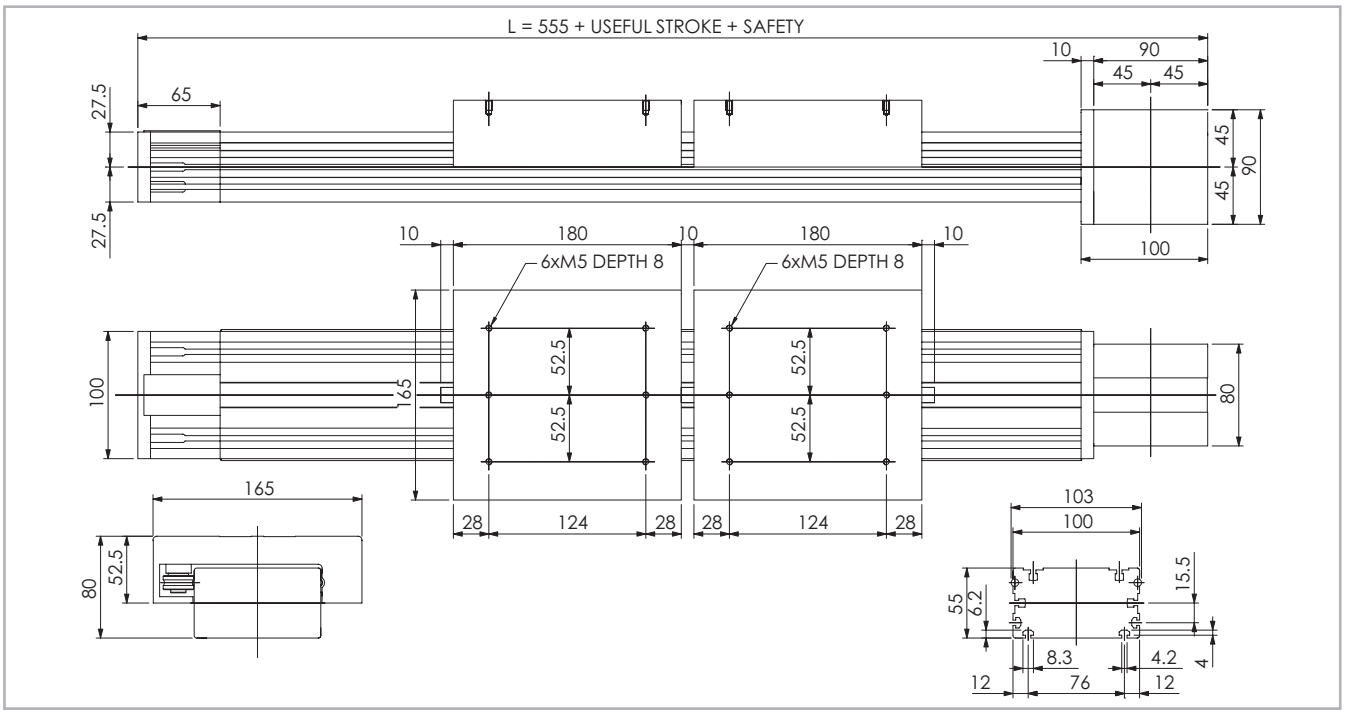
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 100 CE	1176	907	4229	8731	2849	174	101	233

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

Tab. 49

ROBOT 100 CE-2C DOUBLE INDEPENDENT CARRIAGES

ROBOT 100 CE-2C dimensions



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

Fig. 27

Technical data

	Type
	ROBOT 100 CE-2C
Max. useful stroke length [mm]	5610
Max. positioning repeatability [mm]*1	± 0.05
Max. speed [m/s]	1.5
Max. acceleration [m/s²]	1.5
Type of belt	16 AT 5
Type of pulley	Z 23
Pulley pitch diameter [mm]	36.61
Carriage displacement per pulley turn [mm]	115
Carriage weight [kg]	3.4
Zero travel weight [kg]	10.5
Weight for 100 mm useful stroke [kg]	0.8
Starting torque [Nm]	1.3
Moment of inertia of pulleys [g mm²]	16220
Rail size [mm]	Ø6

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

Tab. 50

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 100	0.05	0.23	0.28

Tab. 51

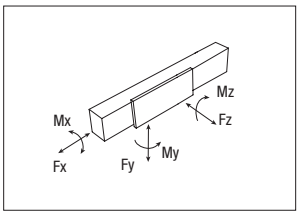
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 100 CE-2C	16 AT 5	16	0.05

Tab. 52

Belt length (mm) = 2 x L - 115
Two belts for each actuator.



ROBOT 100 CE-2C - Load capacity

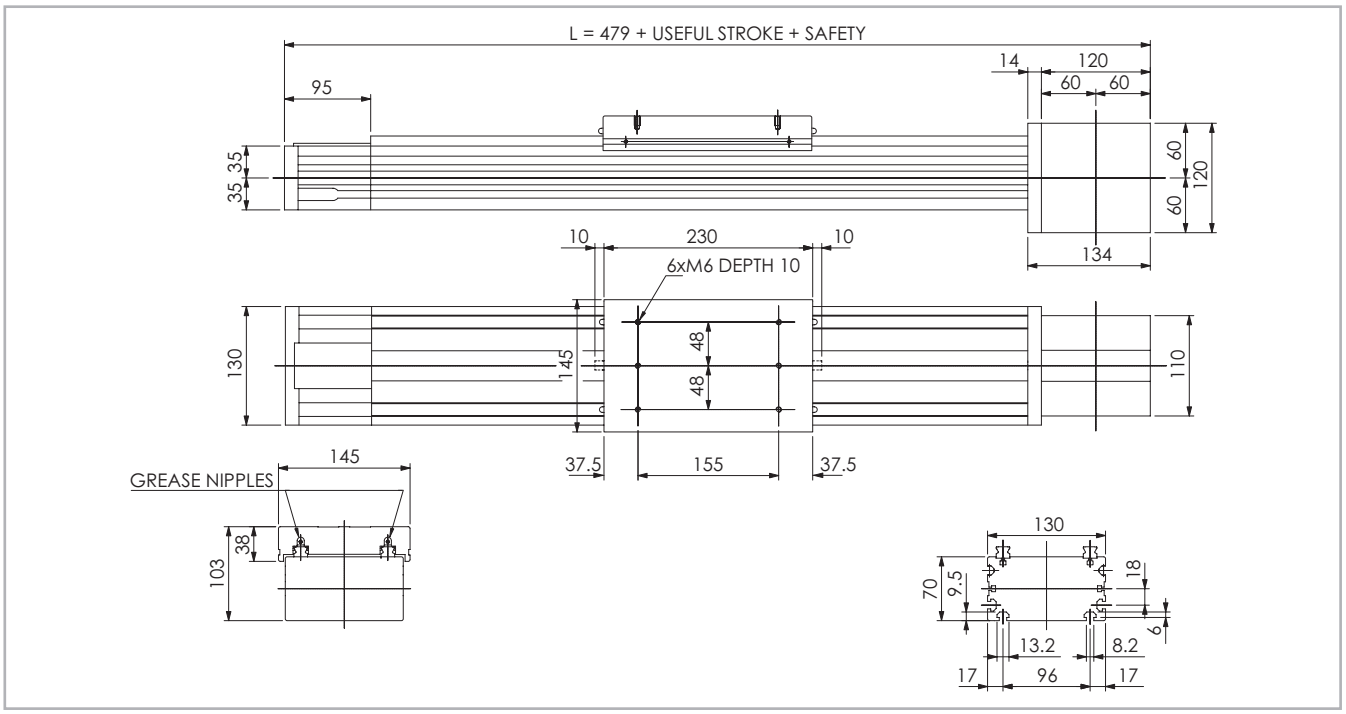
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 100 CE-2C	588	454	4229	8731	2849	174	101	233

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

Tab. 53

ROBOT 130 SP

ROBOT 130 SP dimensions



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

Fig. 28

Technical data

	Type
	ROBOT 130 SP
Max. useful stroke length [mm]*1	6050
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s²]	50
Type of belt	50 AT 10
Type of pulley	Z 17
Pulley pitch diameter [mm]	54.11
Carriage displacement per pulley turn [mm]	170
Carriage weight [kg]	2.8
Zero travel weight [kg]	9.1
Weight for 100 mm useful stroke [kg]	1.2
Starting torque [Nm]	2.7
Moment of inertia of pulleys [g mm²]	493200
Rail size [mm]	15

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 54

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 130	0.15	0.65	0.79

Tab. 55

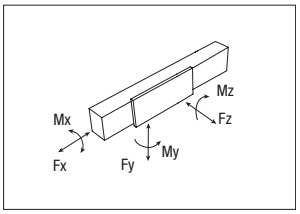
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 130 SP	50 AT 10	50	0.29

Tab. 56

Belt length (mm) = 2 x L - 103



ROBOT 130 SP - Load capacity

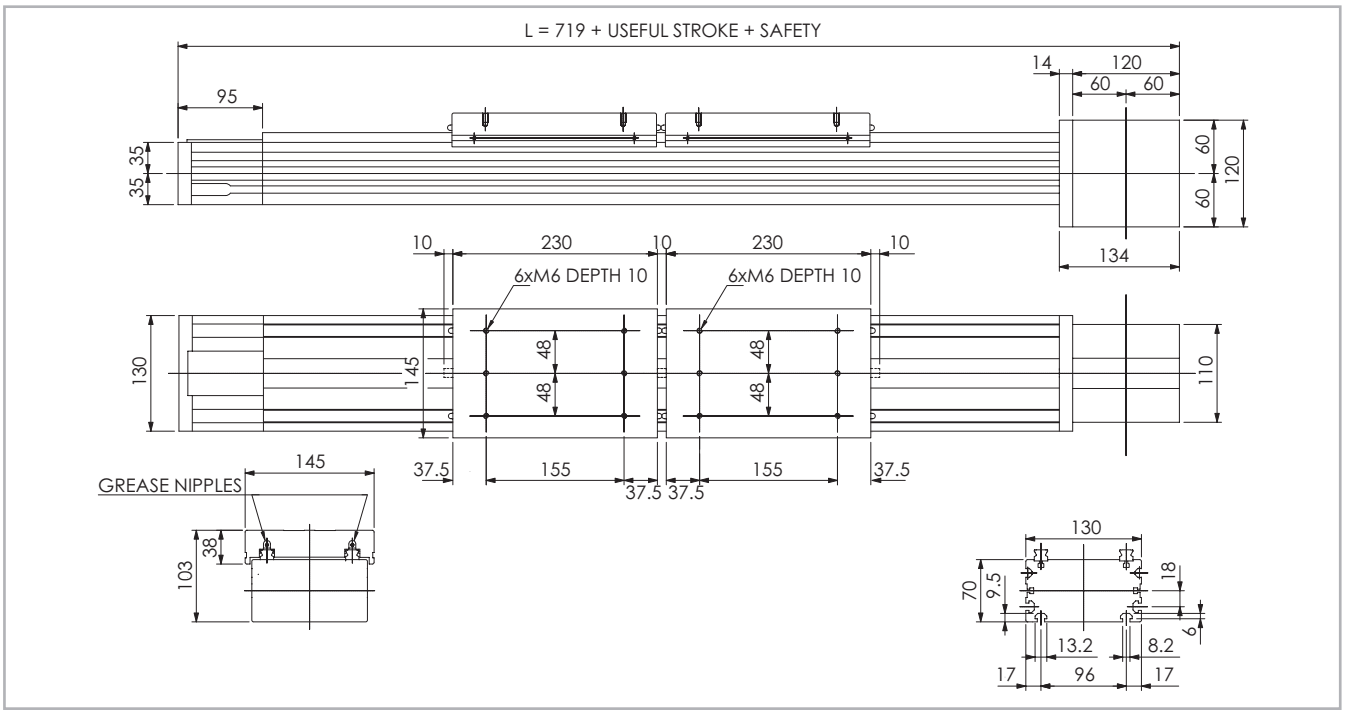
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 130 SP	3112	1725	96800	45082	96800	4646	6340	6340

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

Tab. 57

ROBOT 130 SP-2C DOUBLE INDEPENDENT CARRIAGES

ROBOT 130 SP-2C dimensions



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

Fig. 29

Technical data

	Type
	ROBOT 130 SP-2C
Max. useful stroke length [mm]*1	5810
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s²]	50
Type of belt	25 AT 10
Type of pulley	Z 17
Pulley pitch diameter [mm]	54.11
Carriage displacement per pulley turn [mm]	170
Carriage weight [kg]	2.8
Zero travel weight [kg]	14.9
Weight for 100 mm useful stroke [kg]	1.2
Starting torque [Nm]	2.7
Moment of inertia of pulleys [g mm²]	196200
Rail size [mm]	15

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 58

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 130	0.15	0.65	0.79

Tab. 59

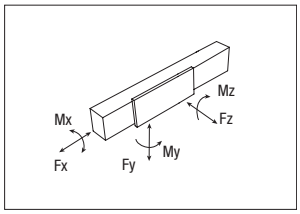
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 130 SP-2C	25 AT 10	25	0.16

Tab. 60

Belt length (mm) = 2 x L - 103
Two belts for each actuator.



ROBOT 130 SP-2C - Load capacity

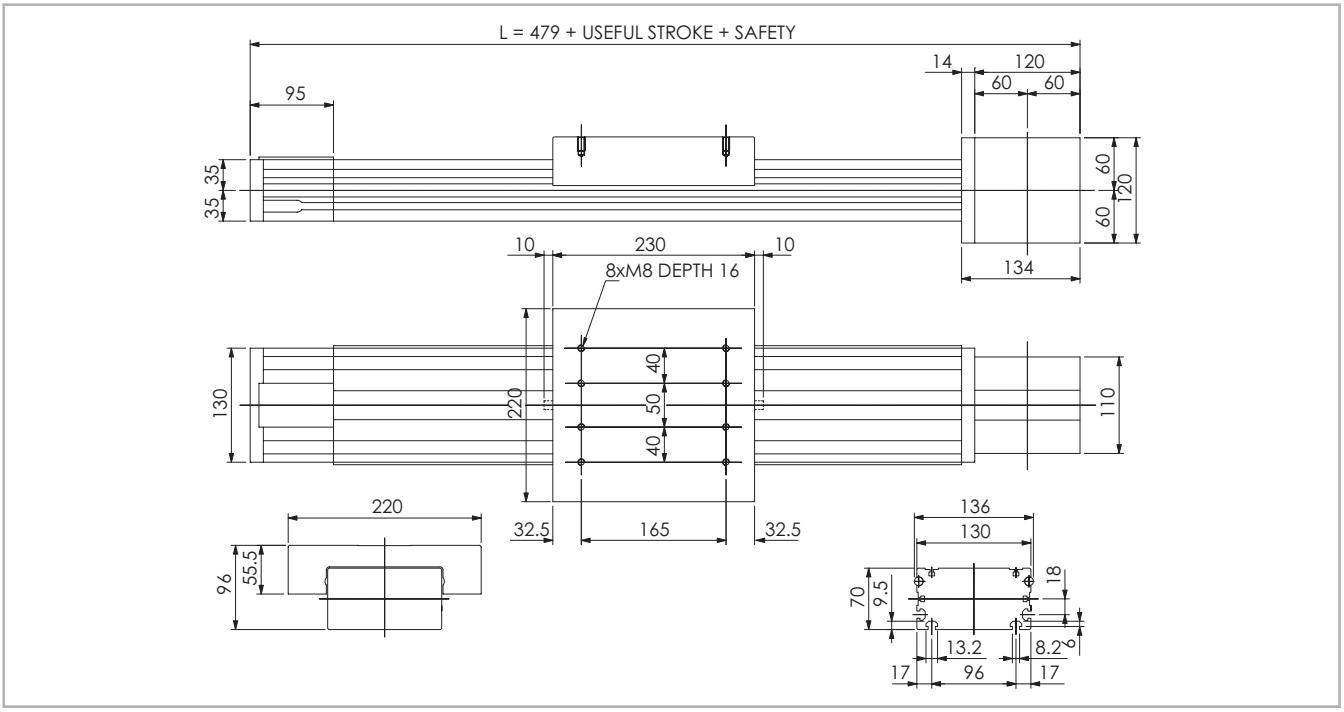
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 130 SP-2C	1556	862	96800	45082	96800	4646	6340	6340

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

Tab. 61

ROBOT 130 CE

ROBOT 130 CE dimensions



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

Fig. 30

Technical data

	Type
	ROBOT 130 CE
Max. useful stroke length [mm]*1	5750
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	1.5
Max. acceleration [m/s²]	1.5
Type of belt	50 AT 10
Type of pulley	Z 17
Pulley pitch diameter [mm]	54.11
Carriage displacement per pulley turn [mm]	170
Carriage weight [kg]	4.3
Zero travel weight [kg]	10.3
Weight for 100 mm useful stroke [kg]	1.1
Starting torque [Nm]	2.7
Moment of inertia of pulleys [g mm²]	493200
Rail size [mm]	Ø10

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 62

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 130	0.15	0.65	0.79

Tab. 63

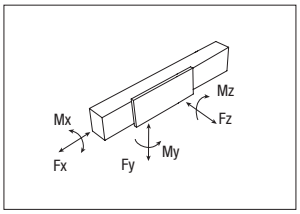
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 130 CE	50 AT 10	50	0.29

Tab. 64

Belt length (mm) = 2 x L - 103



ROBOT 130 CE - Load capacity

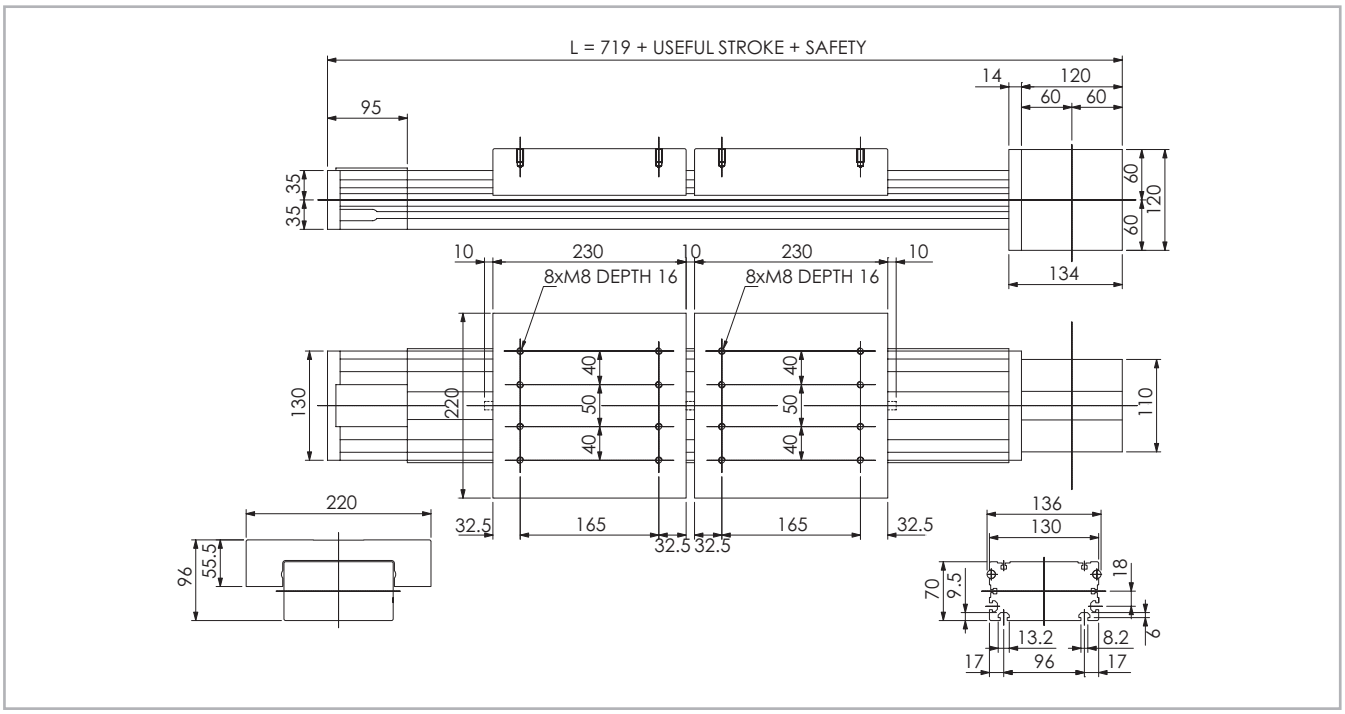
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 130 CE	3112	2437	9154	20079	6167	498	275	635

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

Tab. 65

ROBOT 130 CE-2C DOUBLE INDEPENDENT CARRIAGES

ROBOT 130 CE-2C dimensions



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

Fig. 31

Technical data

	Type
	ROBOT 130 CE-2C
Max. useful stroke length [mm]*1	5510
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	1.5
Max. acceleration [m/s²]	1.5
Type of belt	25 AT 10
Type of pulley	Z 17
Pulley pitch diameter [mm]	54.11
Carriage displacement per pulley turn [mm]	170
Carriage weight [kg]	4.3
Zero travel weight [kg]	17.4
Weight for 100 mm useful stroke [kg]	1.1
Starting torque [Nm]	2.7
Moment of inertia of pulleys [g mm²]	196200
Rail size [mm]	Ø10

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 66

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 130	0.15	0.65	0.79

Tab. 67

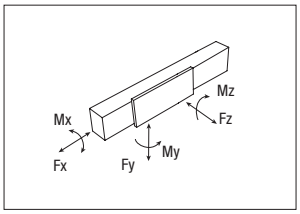
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 130 CE-2C	25 AT 10	25	0.16

Tab. 68

Belt length (mm) = 2 x L - 103
Two belts for each actuator.



ROBOT 130 CE-2C - Load capacity

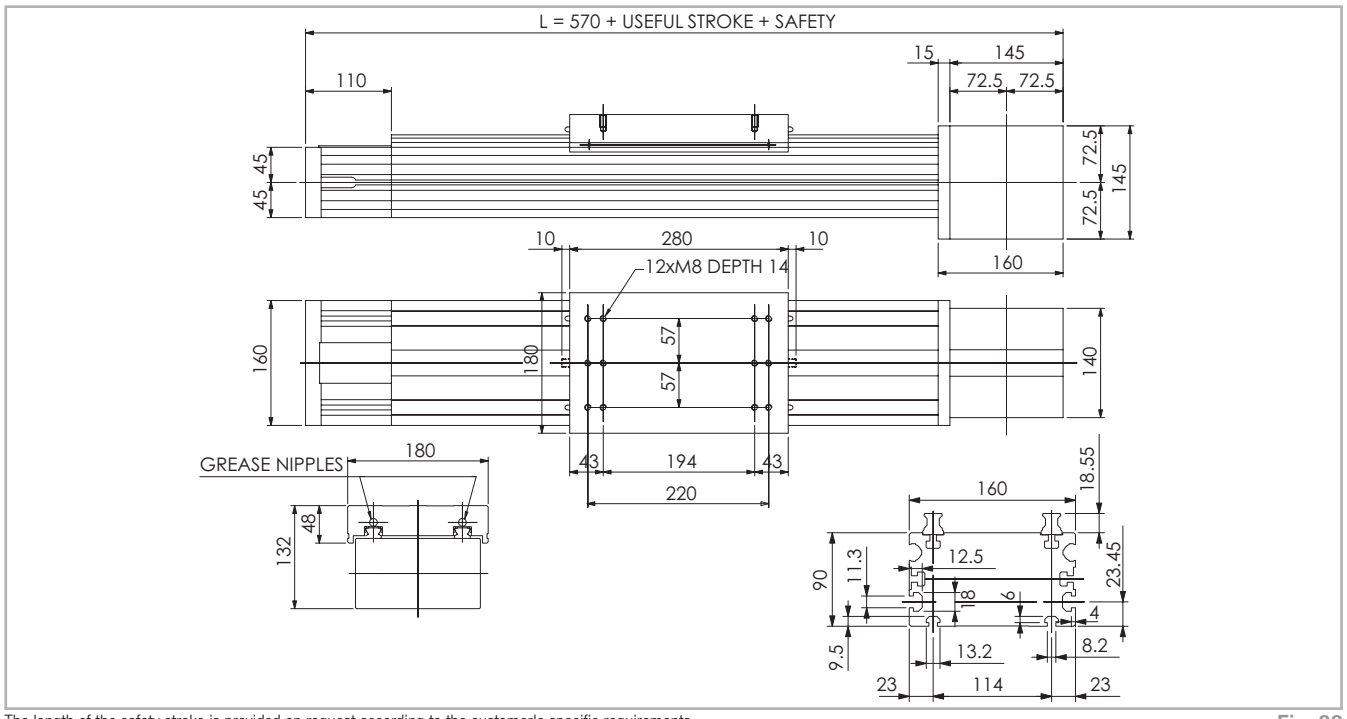
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 130 CE-2C	1556	1219	9154	20079	6167	498	275	635

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

Tab. 69

ROBOT 160 SP

ROBOT 160 SP dimensions



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

Fig. 32

Technical data

	Type
	ROBOT 160 SP
Max. useful stroke length [mm]*1	6000
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s²]	50
Type of belt	70 AT 10
Type of pulley	Z 20
Pulley pitch diameter [mm]	63.66
Carriage displacement per pulley turn [mm]	200
Carriage weight [kg]	5.3
Zero travel weight [kg]	21
Weight for 100 mm useful stroke [kg]	1.9
Starting torque [Nm]	4.5
Moment of inertia of pulleys [g mm²]	$1.202 \cdot 10^6$
Rail size [mm]	20

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 70

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 160	0.37	1.51	1.88

Tab. 71

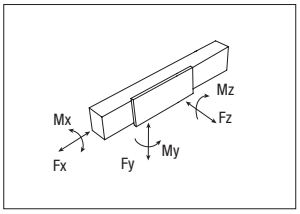
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 160 SP	70 AT 10	70	0.41

Tab. 72

Belt length (mm) = 2 x L - 130



ROBOT 160 SP - Load capacity

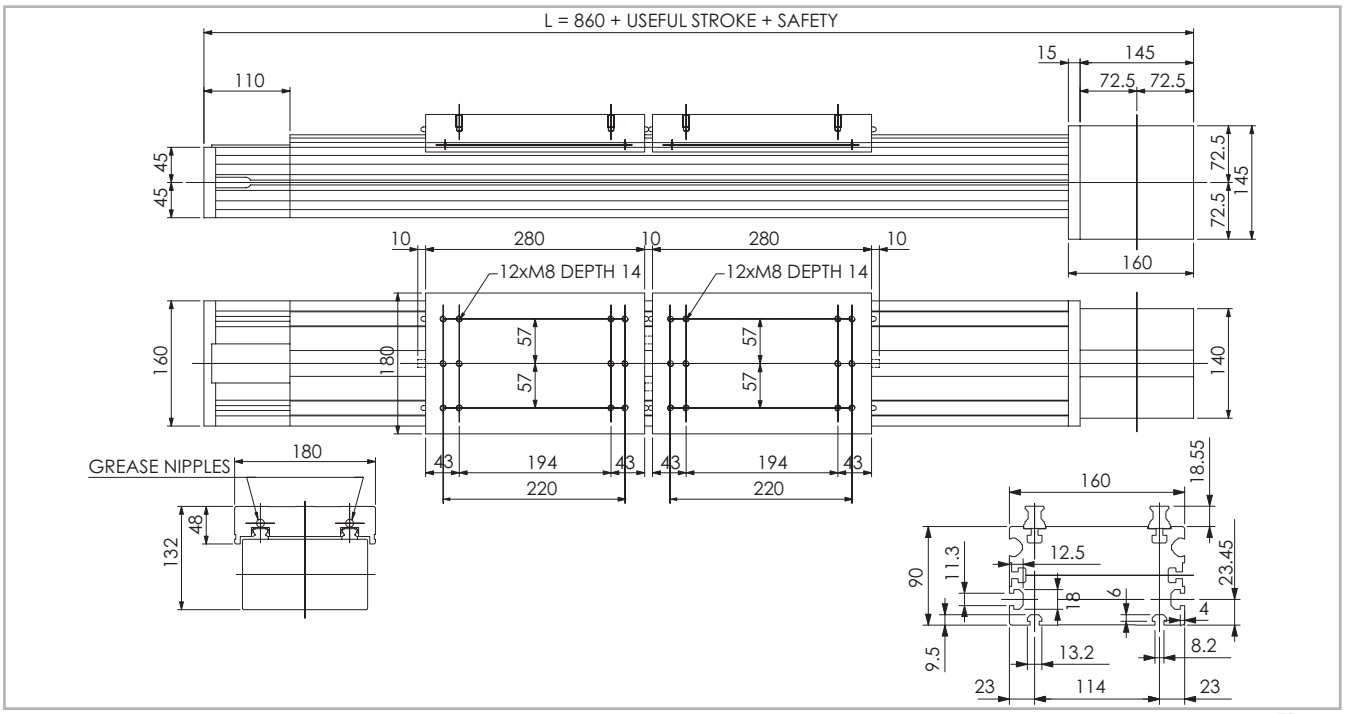
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 160 SP	5229	3024	153600	70798	153600	8755	12211	12211

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

Tab. 73

ROBOT 160 SP-2C DOUBLE INDEPENDENT CARRIAGES

ROBOT 160 SP-2C dimensions



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

Fig. 33

Technical data

	Type
	ROBOT 160 SP-2C
Max. useful stroke length [mm]*1	5710
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s^2]	50
Type of belt	32 AT 10
Type of pulley	Z 19
Pulley pitch diameter [mm]	60.48
Carriage displacement per pulley turn [mm]	190
Carriage weight [kg]	5.3
Zero travel weight [kg]	30
Weight for 100 mm useful stroke [kg]	1.9
Starting torque [Nm]	4.5
Moment of inertia of pulleys [g mm^2]	210300
Rail size [mm]	20

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 74

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]
ROBOT 160	0.37	1.51	1.88

Tab. 75

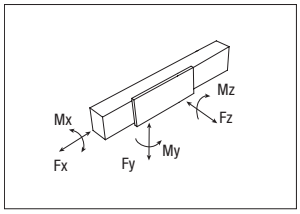
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 160 SP-2C	32 AT 10	32	0.185

Tab. 76

Belt length (mm) = 2 x L - 130
Two belts for each actuator.



ROBOT 160 SP - Load capacity

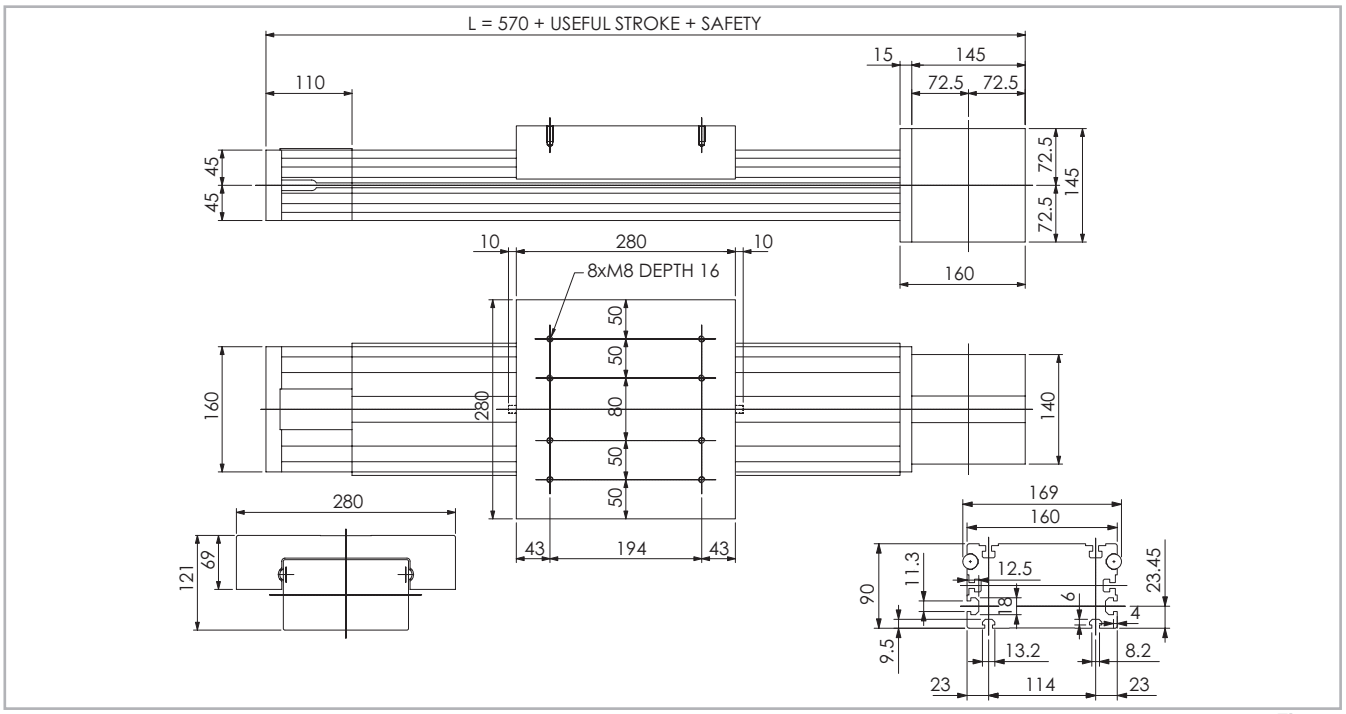
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 160 SP-2C	2258	1306	153600	70798	153600	8755	12211	12211

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

Tab. 77

ROBOT 160 CE

ROBOT 160 CE dimensions



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

Fig. 34

Technical data

	Type
	ROBOT 160 CE
Max. useful stroke length [mm]*1	5700
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	1.5
Max. acceleration [m/s²]	1.5
Type of belt	70 AT 10
Type of pulley	Z 20
Pulley pitch diameter [mm]	63.66
Carriage displacement per pulley turn [mm]	200
Carriage weight [kg]	8.6
Zero travel weight [kg]	23
Weight for 100 mm useful stroke [kg]	2.2
Starting torque [Nm]	4.5
Moment of inertia of pulleys [g mm²]	$1.202 \cdot 10^6$
Rail size [mm]	Ø16

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 78

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 160	0.37	1.51	1.88

Tab. 79

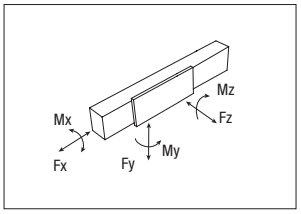
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 160 CE	70 AT 10	70	0.41

Tab. 80

Belt length (mm) = 2 x L - 130



ROBOT 160 CE - Load capacity

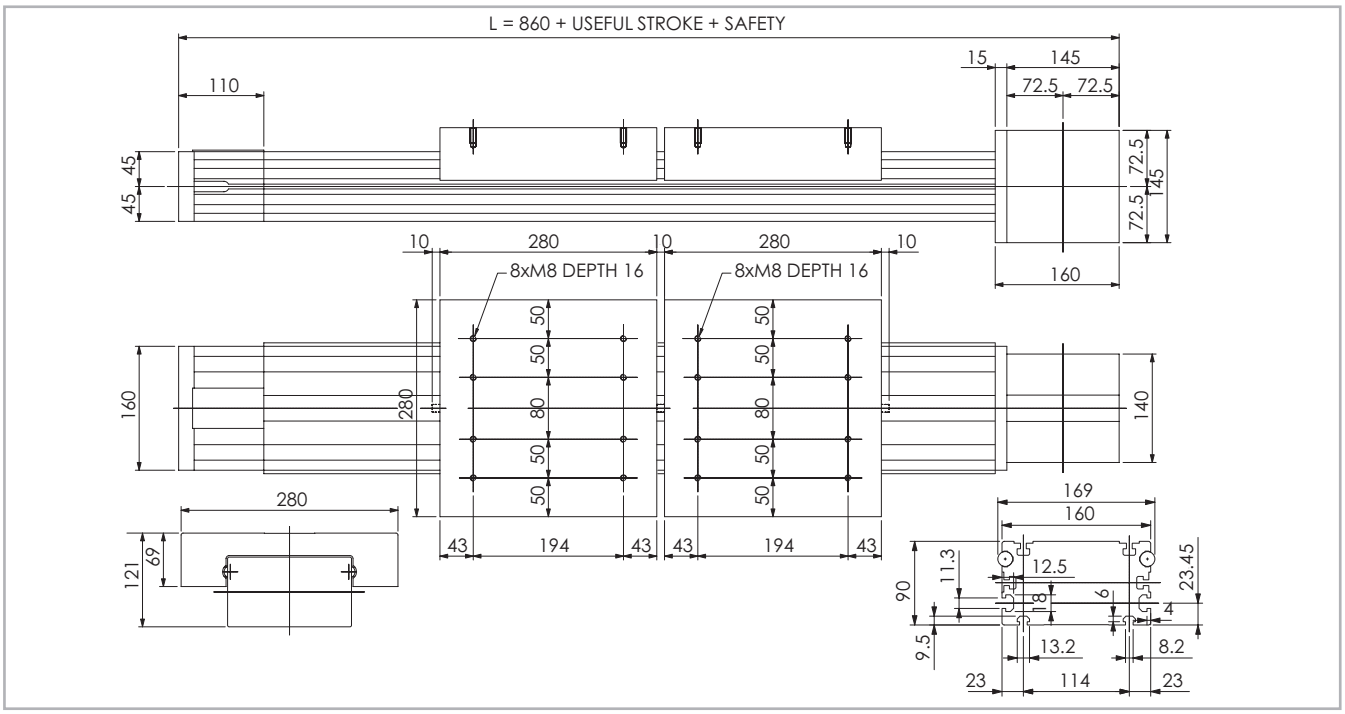
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 160 CE	5229	4158	15538	35366	8585	1053	653	1507

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

Tab. 81

ROBOT 160 CE-2C DOUBLE INDEPENDENT CARRIAGES

ROBOT 160 CE-2C dimensions



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

Fig. 35

Technical data

	Type
	ROBOT 160 CE-2C
Max. useful stroke length [mm]*1	5410
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	1.5
Max. acceleration [m/s²]	1.5
Type of belt	32 AT 10
Type of pulley	Z 19
Pulley pitch diameter [mm]	60.48
Carriage displacement per pulley turn [mm]	190
Carriage weight [kg]	8.6
Zero travel weight [kg]	32
Weight for 100 mm useful stroke [kg]	2.2
Starting torque [Nm]	4.5
Moment of inertia of pulleys [g mm²]	210300
Rail size [mm]	Ø16

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 82

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 160	0.37	1.51	1.88

Tab. 83

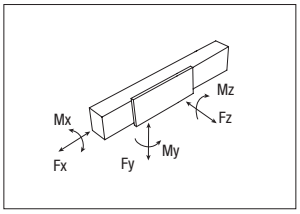
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 160 CE-2C	32 AT 10	32	0.185

Tab. 84

Belt length (mm) = 2 x L - 130
Two belts for each actuator.



ROBOT 160 CE-2C - Load capacity

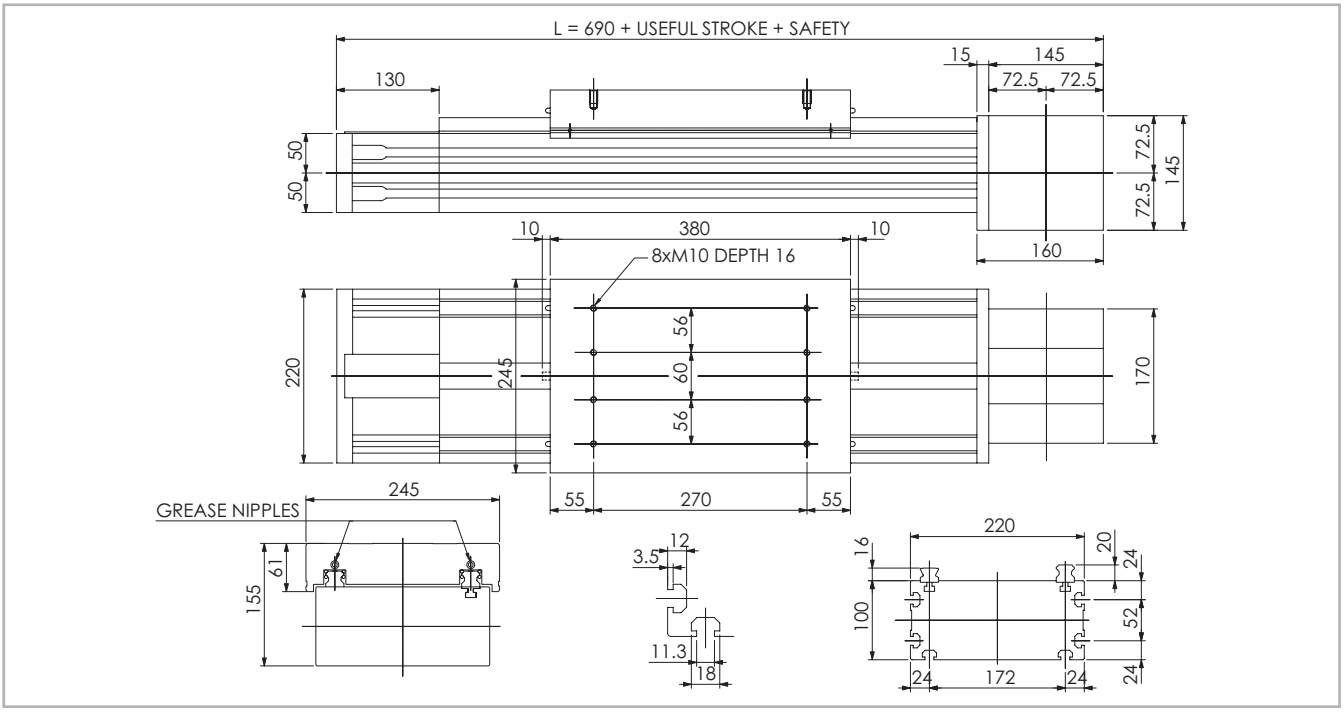
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 160 CE-2C	2258	1795	15538	35366	8585	1053	653	1507

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

Tab. 85

ROBOT 220 SP

ROBOT 220 SP dimensions



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

Fig. 36

Technical data

	Type
	ROBOT 220 SP
Max. useful stroke length [mm]*1	5900
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s²]	50
Type of belt	100 AT 10
Type of pulley	Z 25
Pulley pitch diameter [mm]	79.58
Carriage displacement per pulley turn [mm]	250
Carriage weight [kg]	14.4
Zero travel weight [kg]	41
Weight for 100 mm useful stroke [kg]	2.5
Starting torque [Nm]	6.4
Moment of inertia of each pulley [g mm²]	$4.114 \cdot 10^6$
Rail size [mm]	25

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 86

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 220	0.65	3.26	3.92

Tab. 87

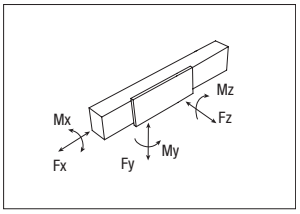
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 220 SP	100 AT 10	100	0.58

Tab. 88

Belt length (mm) = 2 x L - 120



ROBOT 220 SP - Load capacity

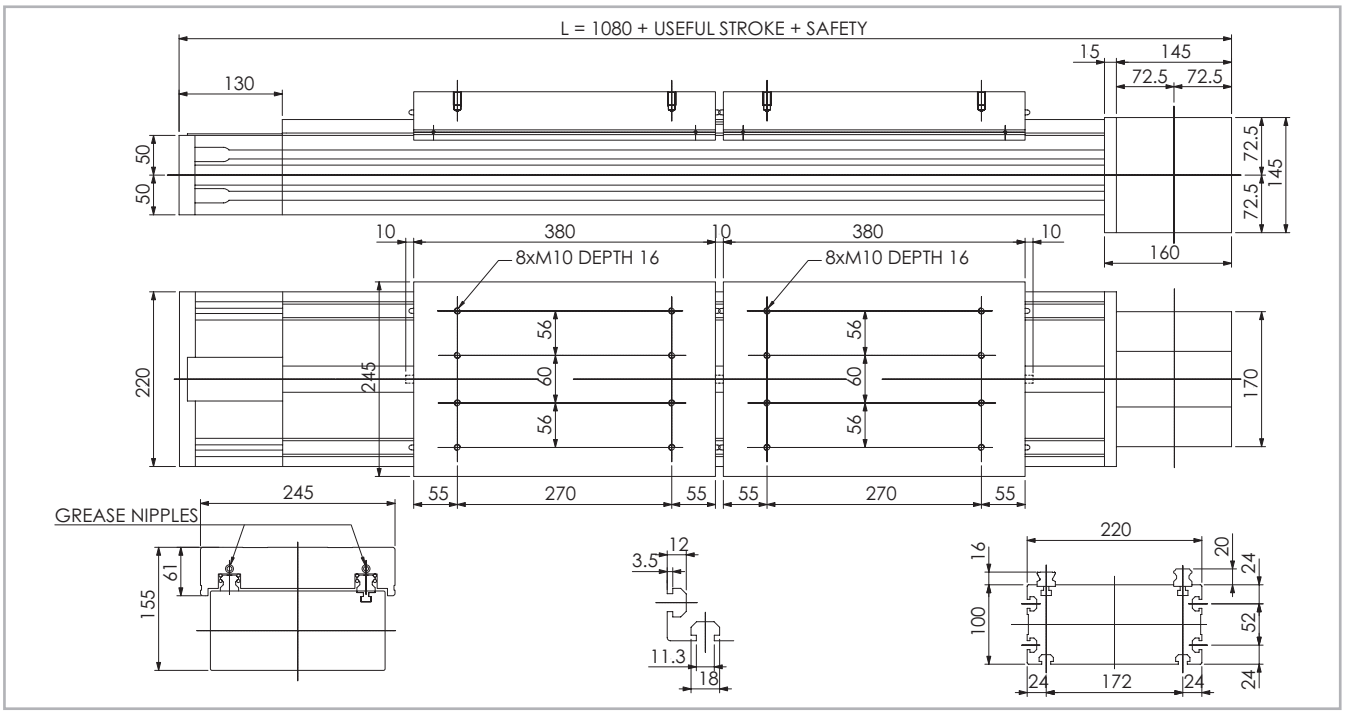
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ROBOT 220 SP	9545	6325	258800	116833	258800	22257	28986	28986

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

Tab. 89

ROBOT 220 SP-2C DOUBLE INDEPENDENT CARRIAGES

ROBOT 220 SP-2C dimensions



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

Fig. 37

Technical data

	Type
	ROBOT 220 SP-2C
Max. useful stroke length [mm]*1	5510
Max. positioning repeatability [mm]*2	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s²]	50
Type of belt	40 AT 10
Type of pulley	Z 25
Pulley pitch diameter [mm]	79.58
Carriage displacement per pulley turn [mm]	250
Carriage weight [kg]	13.3
Zero travel weight [kg]	46
Weight for 100 mm useful stroke [kg]	2.5
Starting torque [Nm]	6.4
Moment of inertia of pulleys [g mm²]	$2.026 \cdot 10^6$
Rail size [mm]	25

*1) It is possible to obtain strokes up to 11000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 90

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ROBOT 220	0.65	3.26	3.92

Tab. 91

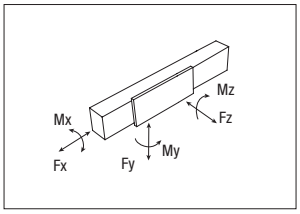
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
ROBOT 220 SP-2C	40 AT 10	40	0.23

Tab. 92

Belt length (mm) = 2 x L - 120
Two belts for each actuator.



ROBOT 220 SP-2C - 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.
ROBOT 220 SP-2C	3818	2530	258800	116833	258800	22257	28986	28986

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

Tab. 93

Lubrication

SP linear units with ball bearing guides

SP Linear units are equipped with self lubricating linear ball guides.

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 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: SP version: 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.

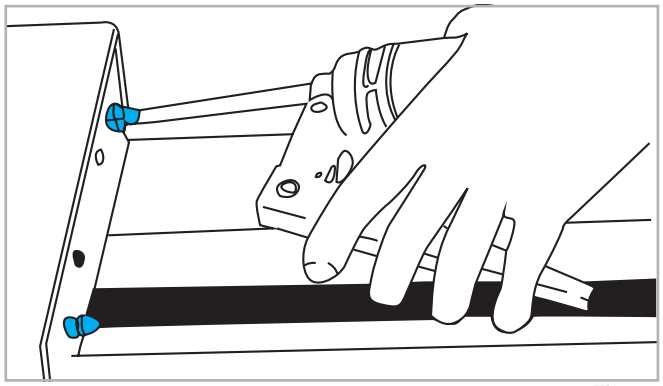


Fig. 38

- Insert grease gun in the specific grease nipples.
- Type of lubricant: Lithium soap grease of class NLGI 2.
- For specially stressed applications or difficult environemental conditions, lubrication should be carried out more frequently. Apply to Rollon for further advice.

Linear units type CE with gothic arch bearing guides

Linear units with gothic arch bearing guides are equipped with along period lubrication system. Four grease impregnated felt scrapers, complete with grease reservoirs, guarantee a service life of ca. 6000 km without relubrication. If relubrication is required to obtain a higher service life please contact our offices.

Quantity of lubricant necessary for re-lubrication of each block:

Type	Unit: [cm³]
ROBOT 100 SP	0.7
ROBOT 130 SP	0.7
ROBOT 160 SP	1.4
ROBOT 220 SP	2.4

Tab. 94

Planetary gears

Assembly to the right or to the left of the driving head

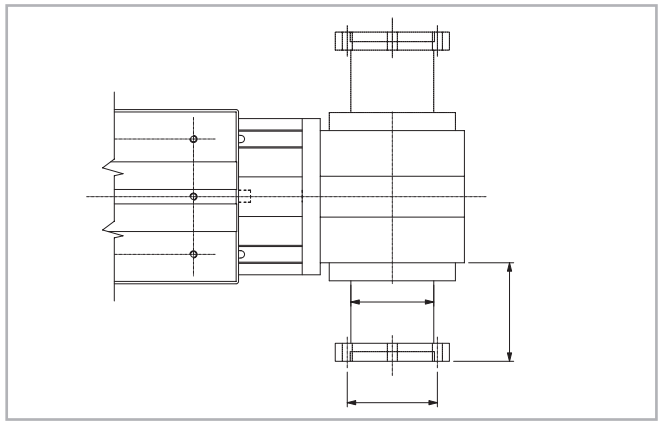


Fig. 39

The series Robot linear units can be fitted with several different drive systems. In each case, the driving pulley is attached to the reduction gear-shaft by means of a tapered coupling to ensure high accuracy over a long period of time.

Versions with planetary gears

Planetary gears are used for highly dynamic robot, automation and handling applications involving stressing cycles and with high level precision requirements. Standard models are available with clearance from 3' to 15' and with a reduction ratio from 1:3 to 1:1000. For assembly of non-standard planetary gear, contact our offices.

Type	Left	Right	Gear type
Robot 100	4E	4C	MP 060
Robot 130	4E	4C	MP 080
Robot 130	6E	6C	MP 105
Robot 160	4E	4C	MP 105
Robot 220	4E	4C	MP 105
Robot 220	6E	6C	MP 130

Tab. 95

Simple shaft version

Simple shaft type AS

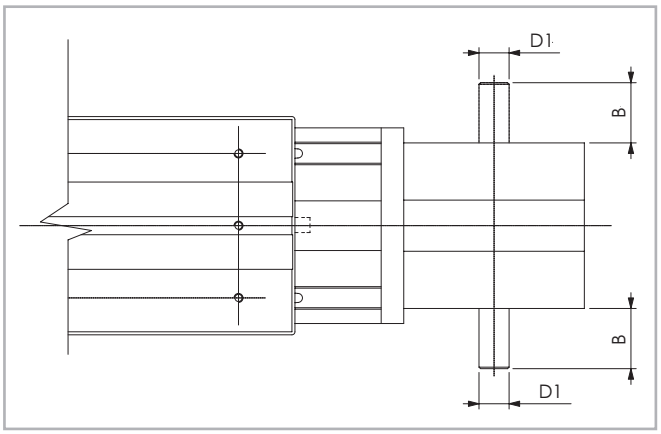


Fig. 40

Unit	Shaft type	B	D1
ROBOT 100	AS 15	35	15h7
ROBOT 130	AS 20	40	20h7
ROBOT 160	AS 25	50	25h7
ROBOT 220	AS 25	50	25h7

Tab. 96

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

Unit	Shaft type	Head code AS left	Head code AS right	Head code double AS
ROBOT 100	AS 15	1E	1C	1A
ROBOT 130	AS 20	1E	1C	1A
ROBOT 160	AS 25	1E	1C	1A
ROBOT 220	AS 25	1E	1C	1A

Tab. 97

AS with centering rings

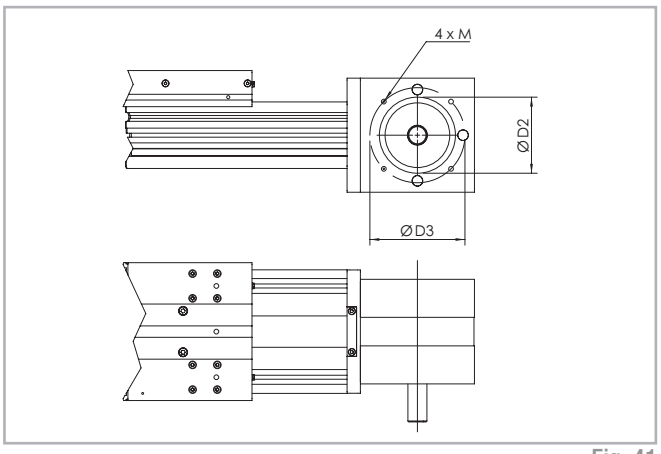


Fig. 41

Unit	Shaft type	D2	D3	M	Head code AS right	Head code AS left
ROBOT 100	AS 15	80	100	M6	VL	VM
ROBOT 130	AS 20	80	100	M6	TC	TD
ROBOT 160	AS 25	110	130	M8	UB	UC
ROBOT 220	AS 25	110	130	M8	VP	VQ

Tab. 98

Simple shaft type AE 10 for encoder assembly + AS

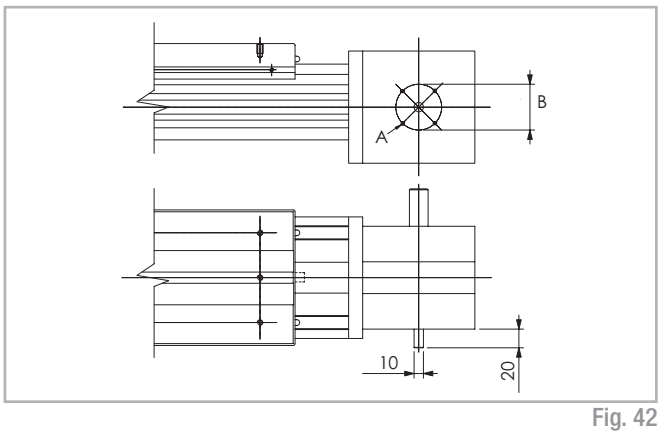


Fig. 42

Unit	A	B	Head code AS right + AE	Head code AS left + AE
ROBOT 100	4xM4	Ø49	1G	1I
ROBOT 130	4xM4	Ø79	1G	1I
ROBOT 160	4xM4	Ø76	1G	1I
ROBOT 220	4xM4	Ø76	1G	1I

Tab. 99

Position of the simple shafts for encoder assembly to the right or to the left on the driving head.

Hollow shafts

AC hollow shaft type

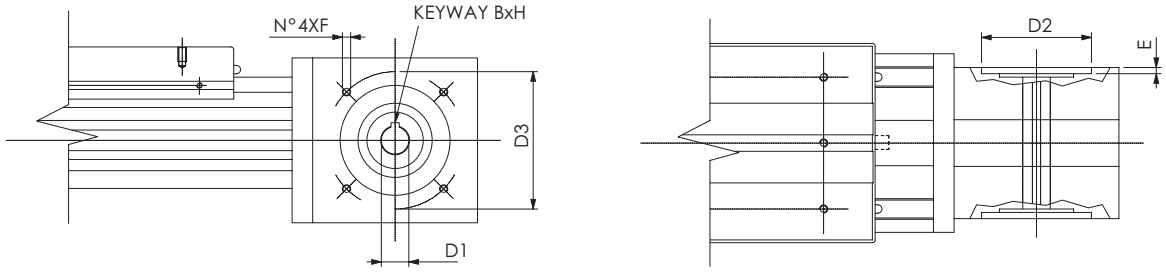


Fig. 43

Unit mm

Appliable to unit	Shaft type	D1	D2	D3	E	F	Keyway B x H	Head code
ROBOT 100	AC19	19H7	80	100	3	M6	6 x 6	2A
ROBOT 130	AC19	19H7	80	100	4.5	M6	6 x 6	2A
ROBOT 130	AC20	20H7	80	100	4.5	M6	6 x 6	2C
ROBOT 130	AC25	25H7	110	130	4.5	M8	8 x 7	2E
ROBOT 160	AC25	25H7	110	130	4.5	M8	8 x 7	2A
ROBOT 160	AC32	32H7	130	165	4.5	M10	10 x 8	2C
ROBOT 220	AC25	25H7	110	130	4.5	M8	8 x 7	2A
ROBOT 220	AC32	32H7	130	165	4.5	M10	10 x 8	2C

Tab. 100

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

For further informations contact our offices

Accessories

Fixing by brackets

The linear motion systems used for the Rollon series ROBOT linear units enable support of loads in any direction. They can therefore be installed in any position.

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

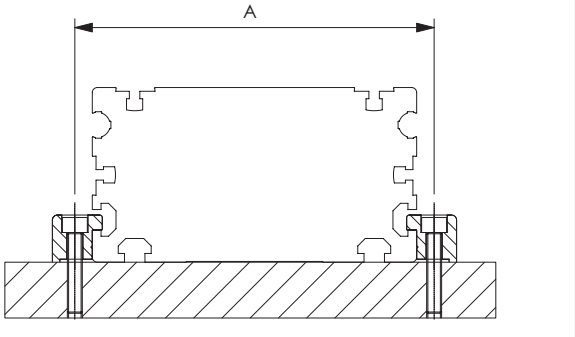


Fig. 44

Unit	A (mm)
ROBOT 100	112
ROBOT 130	144
ROBOT 160	180
ROBOT 220	240

Tab. 101

Fixing brackets

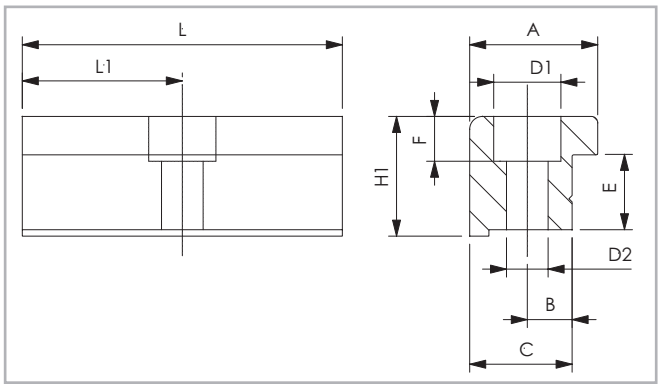


Fig. 45

Anodised aluminum block for fixing the linear units through the side T-slots of the body.

Fixing by T-nuts

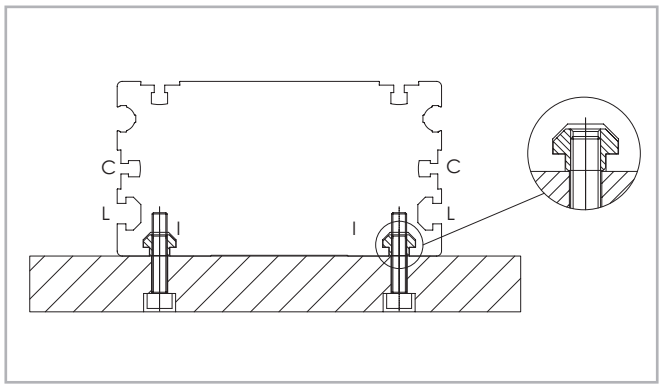


Fig. 46

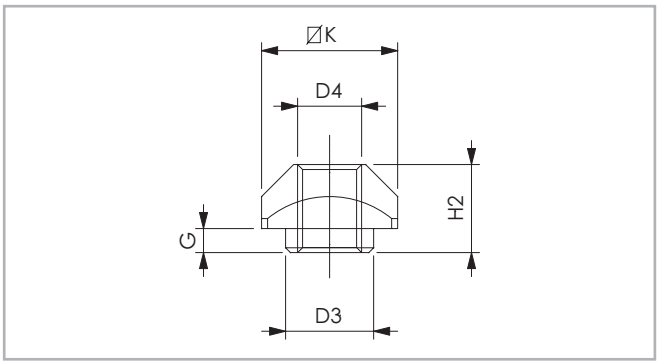
Warning:
Do not fix the linear units through the drive ends.

Dimensions (mm)

Unit	A	B	C	E	F	D1	D2	H1	L	L1	Code
ROBOT 100	20	6	16	10	5.5	9.5	5.3	14	35	17.5	1000958
ROBOT 130	20	7	16	12.7	7	10.5	6.5	18.7	50	25	1001061
ROBOT 160	36.5	10	31	18.5	10.5	16.5	10.5	28.5	100	50	1001233
ROBOT 220	36.5	10	31	18.5	10.5	16.5	10.5	28.5	100	50	1001233

Tab. 102

T-nuts



L=Side / **C**=Central / **I**=Lower - see fig. 45

Fig. 47

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

Dimensions (mm)

Unit		D3	D4	G	H2	K	Code
ROBOT 100	L-I	-	M4	-	3.4	8	1001046
ROBOT 130	C	-	M3	-	4	6	1001097
ROBOT 130	L-I	8	M6	3.3	8.3	13	1000043
ROBOT 160	C	-	M6	-	5.8	13	1000910
ROBOT 160	I	8	M6	3.3	8.3	13	1000043
ROBOT 160	L	11	M8	2.8	10.8	17	1000932
ROBOT 220	L-I	11	M8	2.8	10.8	17	1000932

Tab. 103

Proximity ROBOT...SP

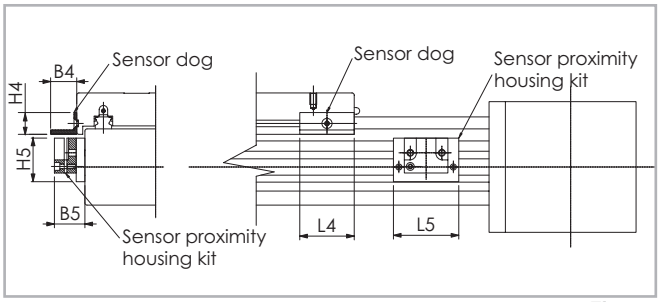


Fig. 48

Sensor proximity housing kit

Red anodized aluminum sensor holder, 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 proximity switch operations.

Dimensions (mm)

Unit	B4	B5	L4	L5	H4	H5	For proximity	Sensor dog code	Sensor proximity housing kit code
ROBOT 100 SP	9.5	20	25	45	12	25	Ø 8	G000268	G000092
ROBOT 130 SP	21	28	50	60	20	40	Ø 12	G000269	G000126
ROBOT 160 SP	21	28	50	64	20	40	Ø 12	G000269	G000123
ROBOT 220 SP	21	28	50	70	20	40	Ø 12	G000269	G000207

Tab. 104

Warning:

If a bellow is used, it is not possible to assemble the proximity switch holders to the aluminum body.

Proximity ROBOT...CE

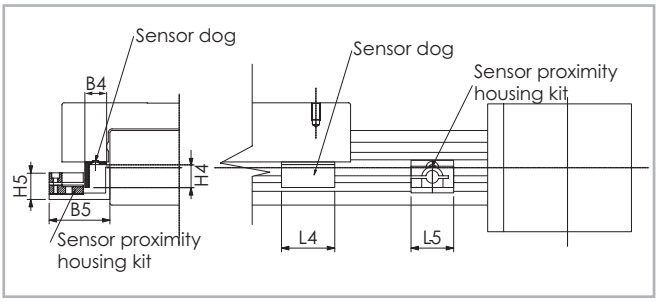


Fig. 49

Sensor proximity housing kit

Red anodized aluminum sensor holder, 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 proximity switch operations.

Dimensions (mm)

Unit	B4	B5	L4	L5	H4	H5	For proximity	Sensor dog code	Sensor proximity housing kit code
ROBOT 100 CE	9.5	47	25	29	12	20	Ø 8	G000268	G000756
ROBOT 130 CE	21	57	50	40	20	25	Ø 12	G000269	G000125
ROBOT 160 CE	21	57	50	40	20	28.5	Ø 12	G000269	G000124

Tab. 105

Warning:

If a bellow is used, it is not possible to assemble the proximity switch holders to the aluminum body.

Protections

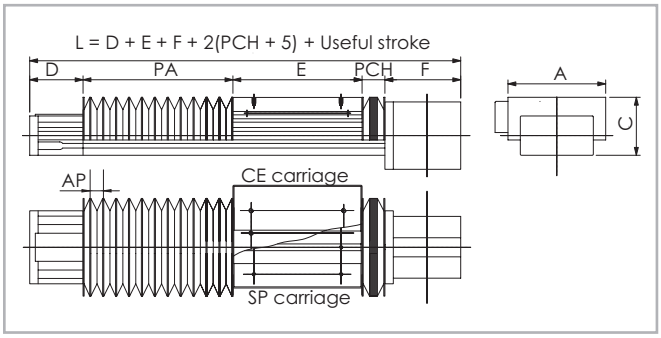


Fig. 50

Standard protections

The Rollon series ROBOT linear units are equipped with a polyurethane sealing strip to protect all parts inside the body against dust and foreign matter. The sealing strip runs the length of the body and is kept in position by micro-bearings located within the carriage. This ensures very low frictional resistance as it passes through the carriage.

Protection of ball bearing guides

The four ball bearing blocks have seals on both sides and, where necessary, an additional scraper can be fitted for very dusty conditions.

Special protection

To use these linear units in very critical environments, they can be fitted with a bellows system in addition to the standard protection. The bellows is fixed to the carriage and the ends of the body with Velcro tape for easy assembly and disassembly.

The total length (L) of the linear unit will vary:

See Fig. 50.

Dimensions (mm)

Unit	A	C	D	E	F
ROBOT 130	174	103	95	230	135
ROBOT 160	204	131.5	110	280	160
ROBOT 220	275	149.5	130	380	160

Tab. 106

Standard material: Thermally welded nylon coated with polyurethane

Materials on demand: Nylon coated with PVC, fiberglass, stainless steel

Warning: The use of bellows does not allow the assembly of the proximity switch holders to the aluminum body.

Assembly kits

Fig. 51

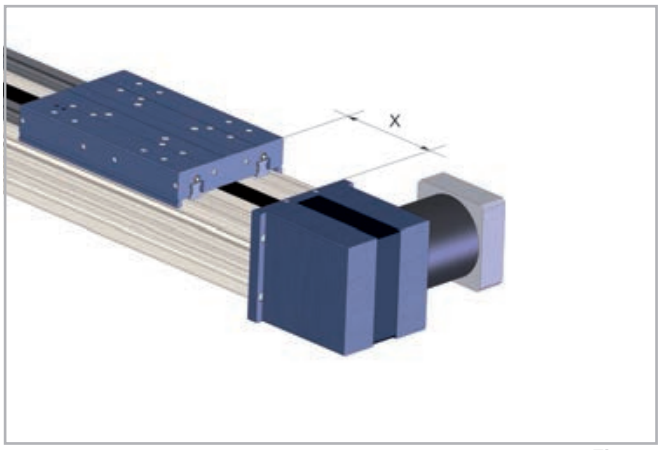


Fig. 52

For the direct assembly of Robot linear units on other types of actuators Rollon offers dedicated assembly kits (brackets) in order to fix those brackets the ends of the actuator must be free of rails. The table below gives the codes of the assembly kit. The allowed combination of assembly as well as the length without rails at each end.

Kit	Code	X No rail at each end (mm)
 ROBOT 100 - ELM 65	G000205	75
 ROBOT 100 - ROBOT 130	G000201*	155
 ROBOT 100 - ECO 80	G000203	90
 ROBOT 100 - E-SMART 50	G000642	60
 ROBOT 130 - ELM 65	G000196	75
 ROBOT 130 - ELM 80	G000195	90
 ROBOT 130 - ROBOT 130	G000197*	155
 ROBOT 130 - ROBOT 160	G000197*	190
 ROBOT 160 - ELM 80	G000204	90
 ROBOT 160 - ELM 110	G000452	120
 ROBOT 160 - ROBOT 160	G000202*	190
ROBOT 160 - ROBOT 220	G000202*	255
 ROBOT 220 - ELM 110	G000199	120

* Additional fixing holes are requested on the robot plate

Tab. 107

Ordering key

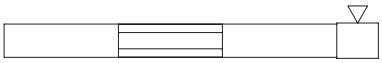
Identification codes for the ROBOT linear unit

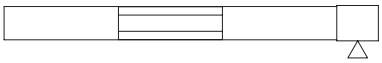
R	13	1C	2000	1A	-075	D	
	10=100			1A=SP			
	13=130			1C=CE			
	16=160					Multiple carriage	
	22=220				ROBOT	075 ROBOT 130 - ELM 65	090 ROBOT 130 - ELM 80
					on ELM	075 ROBOT 100 - ELM 65	120 ROBOT 130 - ELM 110
						120 ROBOT 130 - ELM 110	*see pg. PLS-38*
				Linear motion system *see pg. PLS-17*			
			L = total length of the unit				
		Driving head code *see pg. PLS-33 - PLS-34*					
	Linear unit size *see from pg. PLS-18 to pg. PLS-31*						
Linear unit serie ROBOT *see pg. PLS-15*							

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

Configure Actuator

Left / right orientation





SC series

SC series description

Fig. 53

SC

The SC series linear units are specifically designed for vertical motion in gantry applications, or in applications where the aluminum profile must move while the carriage remains fixed.

Available in three sizes: 65 mm, 130 mm and 160 mm, the SC linear actuator has a self-supporting structure made by a profile (square profile for SC 65) of extruded and anodized aluminum.

The SC is a stiff vertical system, guaranteed by the use of two parallel linear guides, four "maintenance-free" caged ball bearing blocks and a wide belt drive.

The SC Series has been designed for heavy loads and high cycle applications. It is specifically designed and configured to be compatible and assembled with the ROBOT Series actuators without the need for adaptor plates.

Corrosion resistant version

All Plus System series of linear actuators are available with stainless steel elements, for applications in harsh environments and/or subject to frequent washes.

The Plus System linear units are constructed using extruded anodized 6060 and 6082 Anti-Corrosive Aluminum, which houses bearings, linear rails, nuts and bolts and components, all of which are made of low carbon SS AISI 303 and 404C steel, to prevent or delay corrosion caused by humidity experienced in the environments where the linear units are used.

Special no-deposit surface treatments are combined with a food grade lubrication system to allow use in highly sensitive applications, such as the food and pharmaceutical industries where product contamination is prohibited.

- Internal stainless steel elements
- Anodized 6060 and 6082 Anti-Corrosive Aluminum Profile
- Very low carbon SS AISI 303 and 404C steel linear rails, nuts and bolts and components
- Lubricated with organic food grade vegetable oils

The components

Extruded profile

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

Side slots are provided for fast, trouble-free mounting of accessories (proximity switch runner, etc.). Power cables and/or air hoses (gripper, etc.) can be passed inside the body.

Driving belt

The Rollon SC series linear units use steel reinforced polyurethane drive belt 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. Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

Carriage

The carriage is an enveloping structure that houses the entire linear motion system consisting of a drive pulley and two driven pulleys.The external parts are made of anodized aluminum. Dimensions vary according to type. One of the two configurations shown on page PLS-48 can be used for fast, simple assembly of the SC series. The carriage also houses brush seals to remove contaminants from the system.

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. 108

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
$\frac{kg}{dm^3}$	$\frac{kN}{mm^2}$	$\frac{10^{-6}}{K}$	$\frac{W}{m \cdot K}$	$\frac{J}{kg \cdot K}$	$\Omega \cdot m \cdot 10^{-9}$	°C
2.7	69	23	200	880-900	33	600-655

Tab. 109

Mechanical characteristics

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

Tab. 110

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.

SC series with ball bearing guides

- Two ball bearing guides with high load capacity are mounted in two dedicated seats on the outer sides of the aluminum body.
- The carriage of the linear unit is assembled on four pre-loaded ball bearing blocks with plastic retention cages.
- The four ball row configuration enables the carriage to withstand loading in the four main directions.
- The four blocks have seals on both sides and, where necessary, an additional scraper can be fitted for very dusty conditions.
- Lubrication reservoirs (pockets) installed on the front of the ball bearing blocks supply the right amount of grease, thus promoting long maintenance intervals.

The linear motion system described above offers:

- High speed and acceleration
- High load capacity
- High permissible bending moments
- Low friction
- Long life
- Low noise
- Free maintenance (dependent on application)

SC section

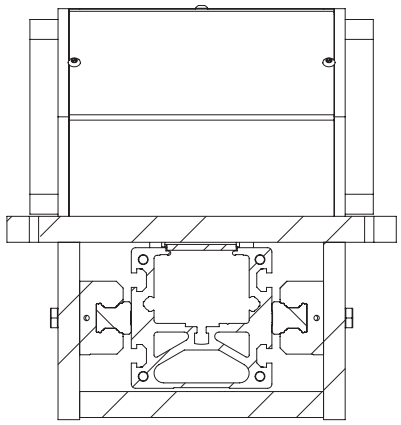
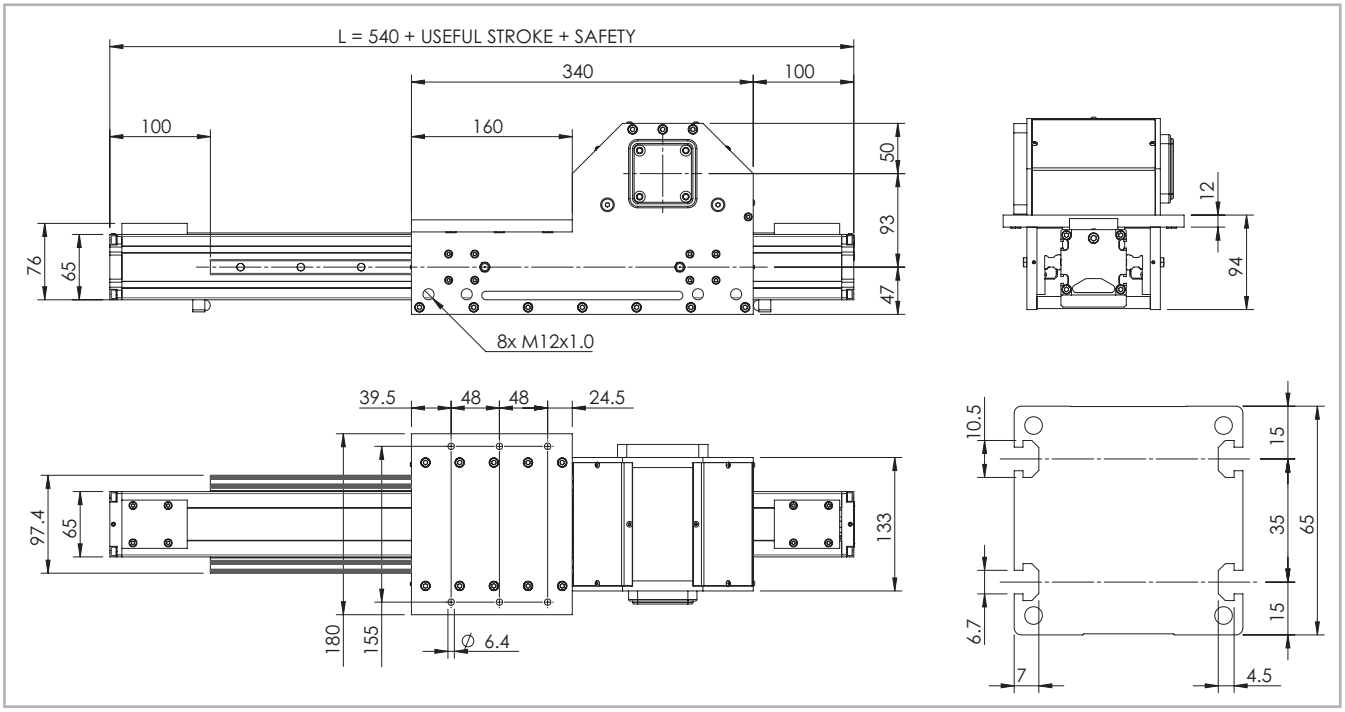


Fig. 54

SC 65 SP

SC 65 SP Dimensions



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

Fig. 55

Technical data

	Type
	SC 65 SP
Max. useful stroke length [mm]	1500
Max. positioning repeatability [mm]*1	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s²]	50
Type of belt	32 AT 5
Type of pulley	Z 32
Pulley pitch diameter [mm]	50.93
Carriage displacement per pulley turn [mm]	160
Carriage weight [kg]	7.8
Zero travel weight [kg]	11.6
Weight for 100 mm useful stroke [kg]	0.7
Starting torque [Nm]	1.3
Rail size [mm]	15

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

Tab. 111

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
SC 65	0.06	0.09	0.15

Tab. 112

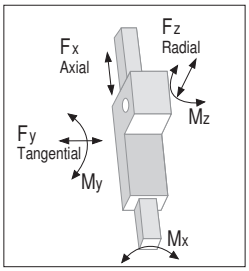
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
SC 65	32 AT 5	32	0.105

Tab. 113

Belt length (mm) = L + 85



SC 65 SP - Load capacity

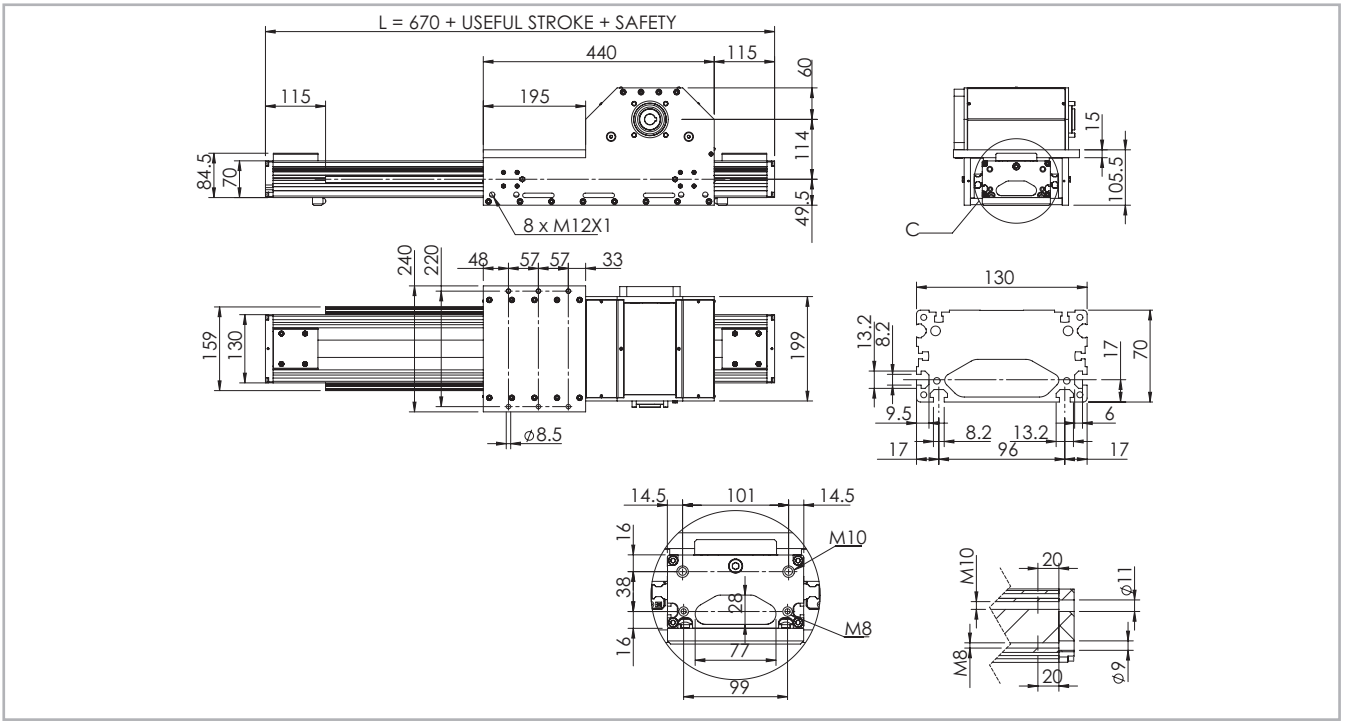
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
SC 65 SP	1344	883	96800	45082	96800	3775	11616	11616

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

Tab. 114

SC 130 SP

SC 130 SP Dimensions



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

Fig. 56

Technical data

	Type
	SC 130 SP
Max. useful stroke length [mm]	2000
Max. positioning repeatability [mm]*1	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s²]	50
Type of belt	50 AT 10
Type of pulley	Z 20
Pulley pitch diameter [mm]	63.66
Carriage displacement per pulley turn [mm]	200
Carriage weight [kg]	13.5
Zero travel weight [kg]	23
Weight for 100 mm useful stroke [kg]	1.4
Starting torque [Nm]	3
Rail size [mm]	15

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

Tab. 115

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
SC 130	0.15	0.65	0.79

Tab. 116

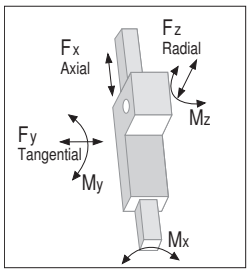
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
SC 130	50 AT 10	50	0.209

Tab. 117

Belt length (mm) = L + 101



SC 130 SP - Load capacity

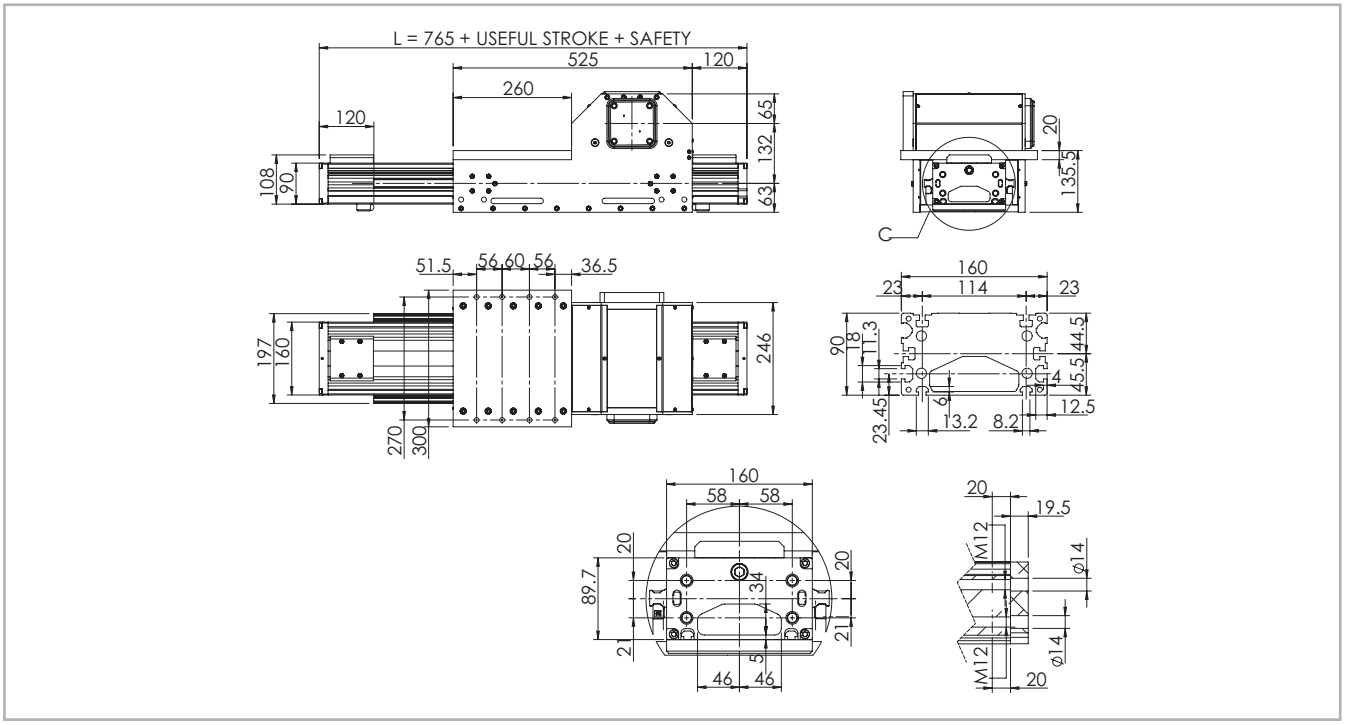
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
SC 130 SP	3735	2160	96800	45082	96800	6921	16311	16311

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

Tab. 118

SC 160 SP

SC 160 SP Dimensions



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

Fig. 57

Technical data

	Type
	SC 160 SP
Max. useful stroke length [mm]	2500
Max. positioning repeatability [mm]*1	± 0.05
Max. speed [m/s]	5.0
Max. acceleration [m/s²]	50
Type of belt	70 AT 10
Type of pulley	Z 25
Pulley pitch diameter [mm]	79.58
Carriage displacement per pulley turn [mm]	250
Carriage weight [kg]	32
Zero travel weight [kg]	48
Weight for 100 mm useful stroke [kg]	1.9
Starting torque [Nm]	6.1
Rail size [mm]	20

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

Tab. 119

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
SC 160	0.37	1.50	1.88

Tab. 120

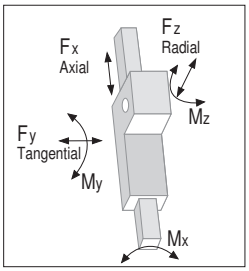
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight [kg/m]
SC 160	70 AT 10	70	0.407

Tab. 121

Belt length (mm) = L + 121



SC 160 SP - 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.
SC 160 SP	6682	4428	153600	70798	153600	13555	31104	31104

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

Tab. 122

Lubrication

SP linear units with ball bearing guides

SP Linear units are equipped with self lubricating linear ball guides. 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 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: SP version: 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.

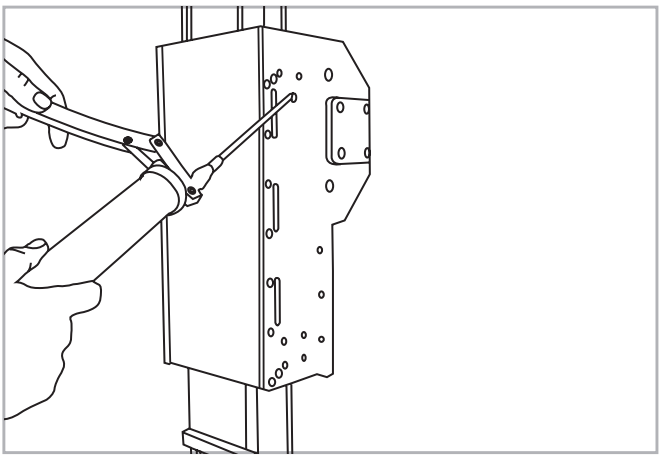


Fig. 58

- 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 enviromental conditions, lubrication should be carried out more frequently. Refer to Rollon for further advice.

Quantity of lubricant necessary for re-lubrication of each block:

Type	Unit: [cm³]
SC 65	0.7
SC 130	0.7
SC 160	1.4

Tab. 123

Planetary gears

Assembly to the right or to the left of the driving head

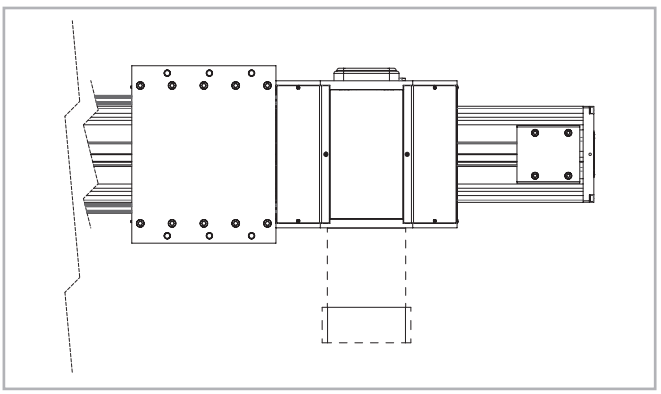


Fig. 59

Motion can be achieved with standard transmission types as follows:

- Planetary gears
- Worm gears
- Versions with simple shaft
- Versions with hollow shaft

Versions with planetary gears

Planetary gears are used for highly dynamic robot, automation and handling applications involving stressing cycles and with high level precision requirements. Standard models are available with a clearance ranging from 3' to 15' and with a reduction ratio from 1:3 to 1:1000. For assembly of non-standard planetary gear, contact our offices.

Type	Left	Right	Gear type
SC 65	4EA	4CA	MP 080
SC 130	4EA	4CA	MP 105
SC 160	4EA	4CA	MP 130

Tab. 124

Simple shaft version

Simple shaft type AS

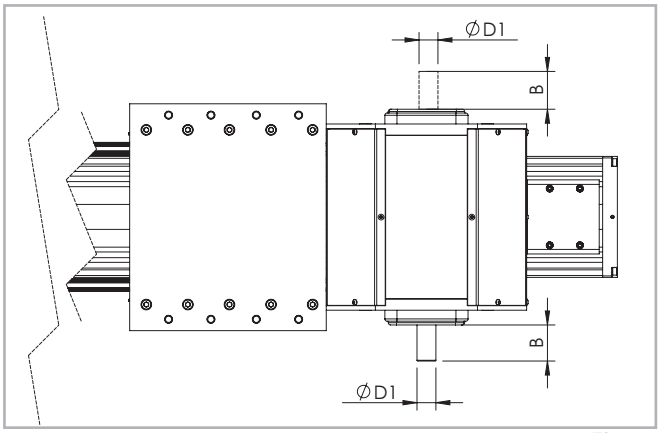


Fig. 60

Unit	Shaft type	B	D1
SC 65	AS 20	40	20h7
SC 130	AS 25	50	25h7
SC 160	AS 25	50	25h7

Tab. 125

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

Unit	Shaft type	Head code AS left	Head code AS right	Head code double AS
SC 65	AS 20	1EA	1CA	1AA
SC 130	AS 25	1EA	1CA	1AA
SC 160	AS 25	1EA	1CA	1AA

Tab. 126

Hollow shafts

AC hollow shaft type

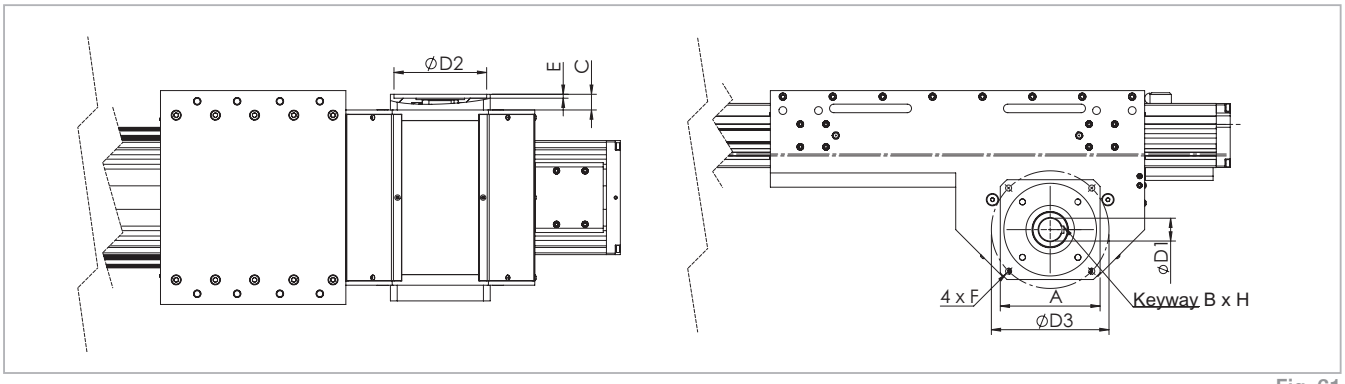


Fig. 61

Unit mm

Appliable to unit	Shaft type	D1	D2	D3	A	C	E	F	Keyway B x H	Head code
SC 65 SP	AC 19	19H7	80	100	90	13	3	M6	6 x 6	2AA
SC 65 SP	AC 20	20H7	80	100	90	13	3	M6	6 x 6	2BA
SC 130 SP	AC 20	20H7	80	100	115	19	4.5	M6	6 x 6	2AA
SC 130 SP	AC 25	25H7	110	130	115	19	4.5	M8	8 x 7	2BA
SC 160 SP	AC 32	32H7	130	165	140	22	5.5	M10	10 x 8	2AA

Tab. 127

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

For further information contact our offices

Accessories

Fixing by brackets

The ball bearing guide linear drive systems of Rollon SC series linear units enable support of loads in any direction. They can therefore be installed in any position. To install the SC series units, we recommend use of one of the two systems indicated below:

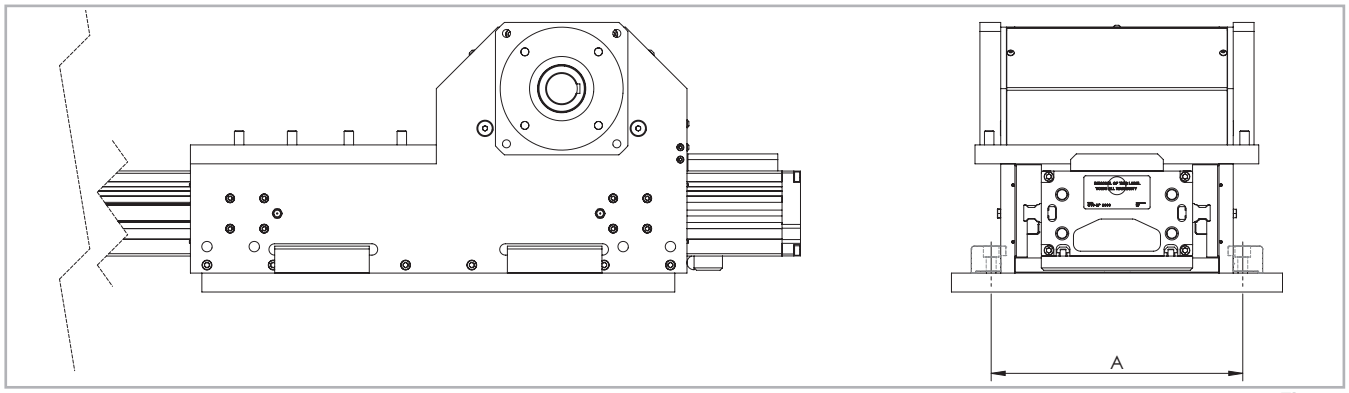


Fig. 62

Fixing brackets **Material: Anodized aluminum**

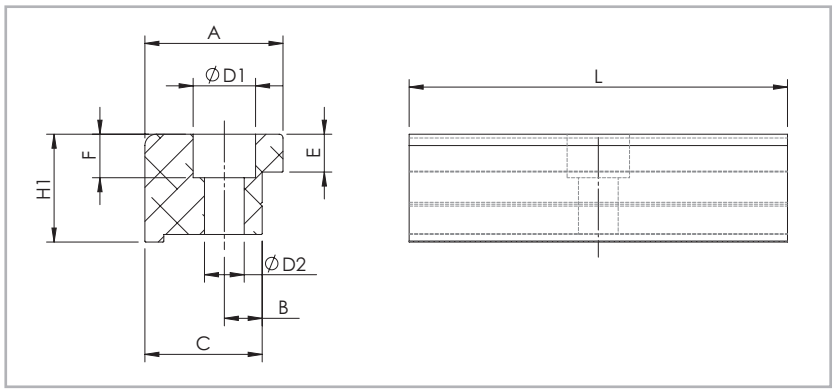


Fig. 63

Unit	A (mm)
SC 65 SP	147
SC 130 SP	213
SC 160 SP	266

Tab. 128

Unit	A	B	C	E	F	D1	D2	H1	L	Code
SC 65 SP	20	6	16	10	5.5	9.5	5.3	14	35	1001491
SC 130 SP	20	7	16	12.7	7	10.5	6.5	18.7	50	1001491
SC 160 SP	36.5	10	31	18.5	10.5	16.5	10.5	28.5	100	1001233

Tab. 129

Direct fixing

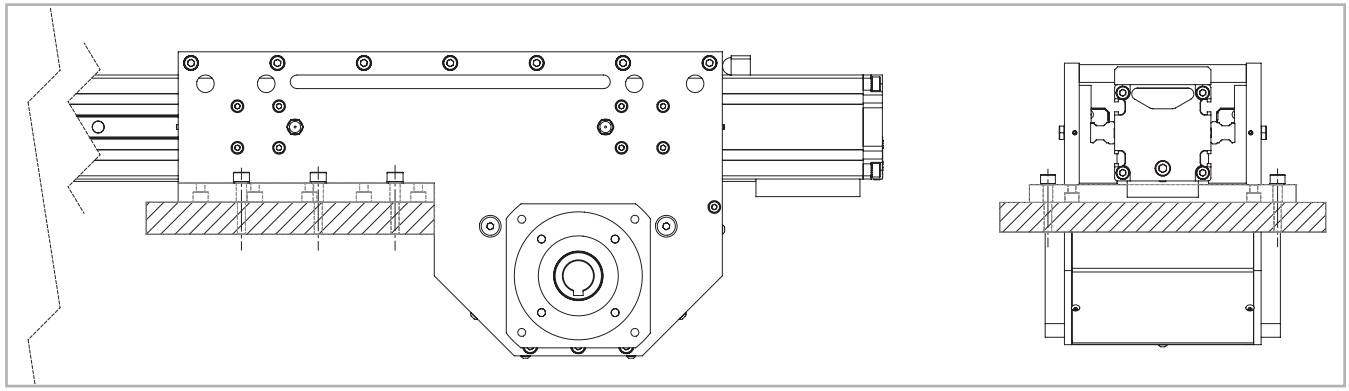


Fig. 64

T-nuts

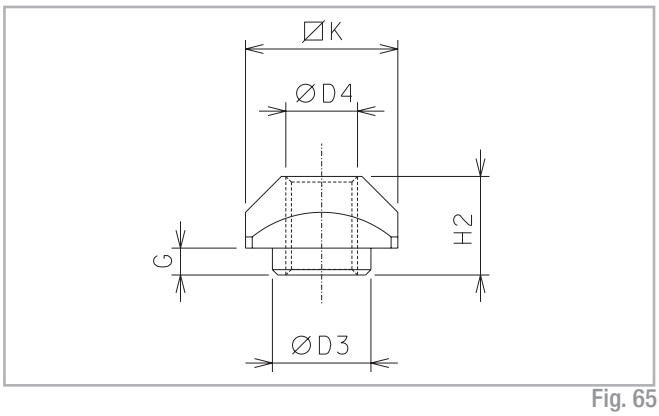


Fig. 65

Steel nuts to be used in the slots of the body

Fixing by T-nuts

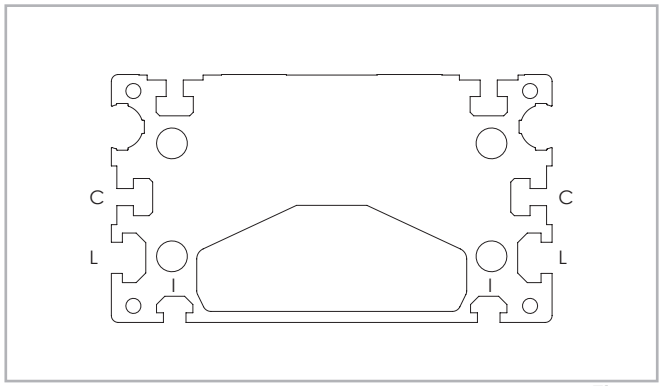


Fig. 66

Warning:
Do not fix the linear units through the drive ends.

Unit	Slot	D3	D4	G	H2	K	Code
SC 65	L	6.7	M5	2.3	6.5	10	1000627
SC 130	L-I	8	M6	3.3	8.3	13	1000043
SC 130	C	-	M3	-	4	6	1001097
SC 160	I	8	M6	3.3	8.3	13	1000043
SC 160	L	11	M8	2.8	10.8	17	1000932
SC 160	C	-	M6	-	5.8	13	1000910

L = Side - **I** = Lower - **C**=Central

Tab. 130

Proximity

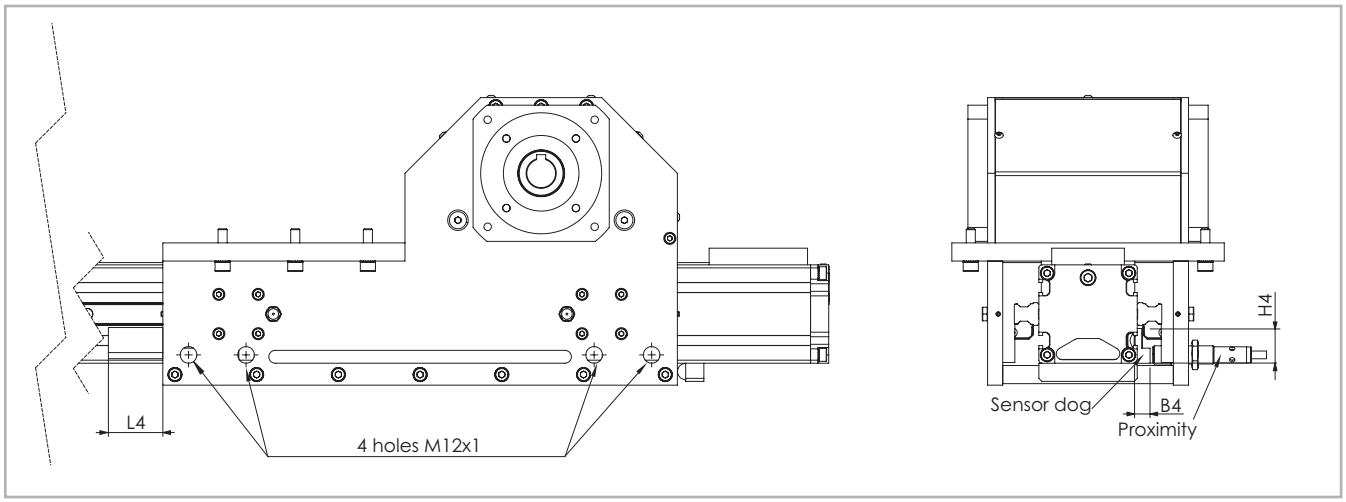


Fig. 67

Fitting of the proximity switch

Proximity switches can be mounted on four threaded mounting holes that are positioned on the sides of the carriage. Do not over-torque the switches during installation as this can cause interference with the proximity switch runner and damage the sensor.

Sensor dog

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

Unit	B4	H4	L4	Sensor dog Code
SC 65	8.5	23	50	G001997
SC 130	8.4	25	50	G001862
SC 160	10	27	50	G000272

Tab. 131

Protections

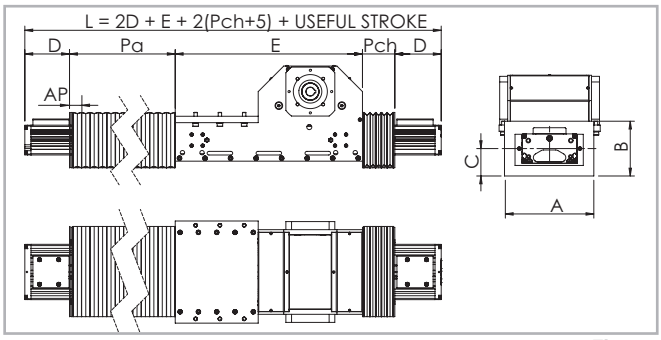


Fig. 68

Protection of ball bearing guides

The four ball bearing blocks have seals on both sides and an additional scraper can be fitted for very dusty conditions.

Special protection

For use in hostile conditions, the SC can be fitted with a bellows system in addition to the standard protection. The bellows is fixed to the carriage and drive ends with hook and loop fasteners for ease of assembly and disassembly.

The total length (L) of the linear unit will vary:

See Fig. 68.

Dimensions (mm)

Unit	A	B	C	D	E
SC 65	135	109	54,5	100	340
SC 130	212	130	64	115	440
SC 160	248	150	73	120	525

Tab. 132

Standard material: Thermally welded nylon coated with polyurethane

Materials on demand: Nylon coated with PVC, fiberglass, stainless steel

Warning: The use of bellows does not allow the assembly of the proximity switch holders to the aluminum body.

Ordering key

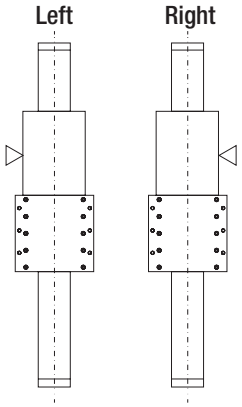
Identification codes for the SC linear unit

S	13 06=65 13=130 16=160	1 CA	2000	1A 1A=SP
				Linear motion system *see pg. PLS-42*
			L = total length of the unit	
		Driving head code *see pg. PLS-47*		
	Linear unit size *see from pg. PLS-43 to pg. PLS-45*			
Linear unit series SC *see pg. PLS-40*				

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

Configure Actuator

Left / right orientation



Multiaxis systems

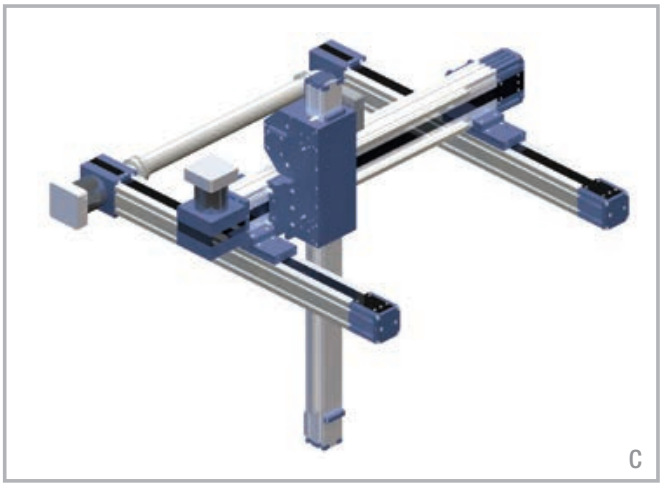
Previously, customers wishing to build multiaxis units have had to design, draw and manufacture all the elements necessary to assemble two or more axis. Rollon now offers a set of fittings including brackets and cross plates, to enable multiaxis units to be built. The SC series is also pre-engineered to facilitate direct connection with the units of the ROBOT series. In addition to standard elements, Rollon also provides plates for special applications.

Application examples:

Two axis - X-Y system

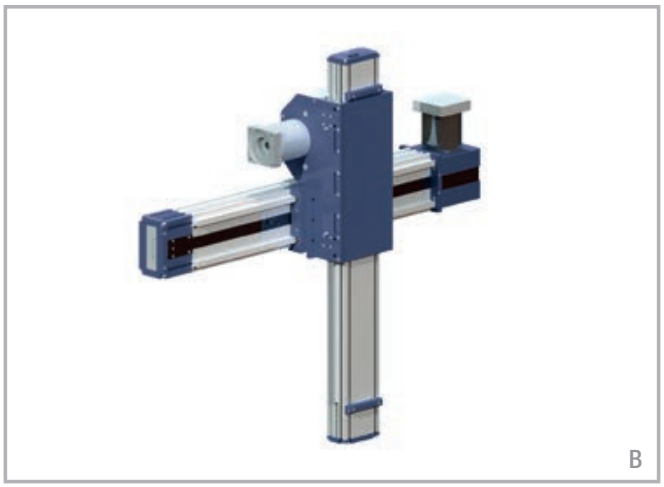
A - Linear units: X axis: 2 ELM 80 SP... Y axis: 1 ROBOT 160 SP...
Connection part: 2 kits of fixing brackets for ROBOT 160 SP... on to the carrieages of ELM 80 SP...

Three axis - X-Y-Z system



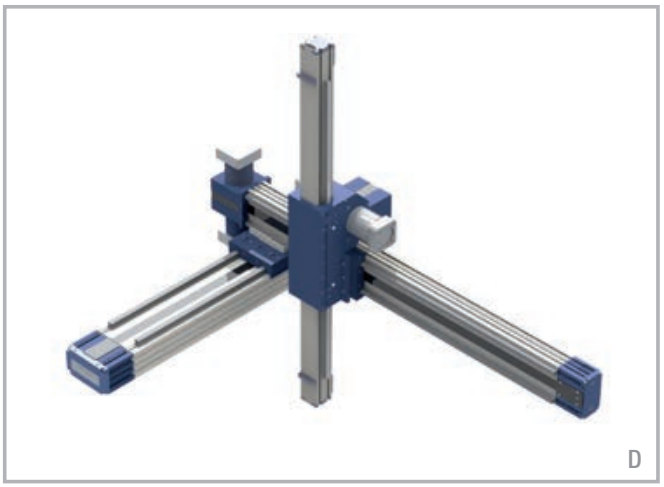
C - Linear units: X axis: 2 ELM 65 SP... Y axis: 1 ROBOT 130 SP...
Z axis: 1 SC 65
Connection part: 2 kits of fixing brackets for ROBOT 130 SP... on to the carrieages of ELM 65 SP... The SC 65 unit is directly assembled on to the ROBOT 130 SP... unit without further elements.

Two axis - Y-Z system



B - Linear units: X axis: 1 ROBOT 220 SP... Z axis: 1 SC 160
Connection part: None
The SC 160 unit is directly assembled on to the ROBOT 220 SP... unit without further elements

Three axis - X-Y-Z system



D - Linear units: X axis: 1 ROBOT 220 SP... Y axis: 1 ROBOT 130 SP...
Z axis: SC 65
Connection part: 1 kit of fixing brackets for ROBOT 130 SP... unit to the carriage of the ROBOT 220 SP... unit. The SC 65 unit is directly assembled on to the ROBOT 130 SP... unit without further elements.

Notes

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.

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

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:

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

L_{km} = theoretical service life (km)
Fz-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; ($\alpha < 5m/s^2$) clean operating conditions; low speeds (<1 m/s)	1.5 - 2
Slight vibrations; medium speeds; (1-2 m/s) and medium-high frequency of the changes in direction ($5m/s^2 < \alpha < 10\ m/s^2$)	2 - 3
Shocks and vibrations; high speeds (>2 m/s) and high-frequency changes in direction; ($\alpha > 10m/s^2$) 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 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:

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.

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

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:

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

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:

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

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

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

M_{zn} = allowed moment (Nm)
$M_{z\,min}$ = minimum values (Nm)
M_{yn} = allowed moment (Nm)
$M_{y\,min}$ = 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	$M_{y\,min}$ [Nm]	$M_{z\,min}$ [Nm]	S_{min} [mm]	ΔS	K
A40L	22	61	240		74
A55L	82	239	310		110
A75L	287	852	440		155
C55L	213	39	310		130
C75L	674	116	440	10	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_{yn} and M_{zn} for each distance between the centers of the sliders are calculated by the following formulae:

$$L_n = L_{min} + n \cdot \Delta L$$

$$M_y = \left(\frac{L_n}{L_{min}}\right) \cdot M_{y\,min}$$

$$M_z = \left(\frac{L_n}{L_{min}}\right) \cdot M_{z\,min}$$

M_y = allowed moment (Nm)
M_z = allowed moment (Nm)
$M_{y\,min}$ = minimum values (Nm)
$M_{z\,min}$ = minimum values (Nm)
L_n = distance between the centers of the sliders (mm)
L_{min} = minimum value for the distance between the centers of the sliders (mm)
ΔL = factor of the change in slider length

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:

$$L_{km} = 100\ km \cdot \left(\frac{C}{P} \cdot \frac{f_c}{f_i} \cdot f_h\right)^3$$

L_{km} = theoretical service life (km)
C = dynamic load rating (N)
P = acting equivalent load (N)
f_i = service factor (see tab. 5)
f_C = contact factor (see tab. 6)
f_h = stroke factor (see fig. 13)

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):

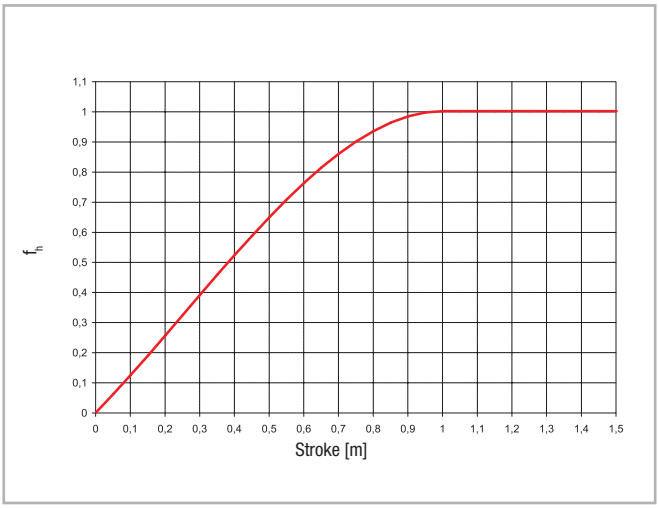


Fig. 14

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

Warnings and legal notes

Before incorporating the partly completed machinery, we recommend consulting this chapter carefully, in addition to the assembly manual supplied with the individual modules. The information contained in this chapter and in the manuals for the individual modules, is provided by highly qualified and certified personnel, possessing adequate competence in incorporating the partly completed machinery.

Precaution in installation and handling operations. Significantly heavy equipment.

When handling the axis or system of axes, always make sure that the support or anchoring surfaces do not leave room for bending.

In order to stabilize the axis or system of axes, before handling it is mandatory to securely block the mobile parts. When moving axes with vertical translation (Z AXES) or combination systems (horizontal X and/or more than one vertical Z), it is mandatory to use the vertical movement to put all of the axes at the corresponding lower limit switch.

Do not overload. Do not subject to torsion stress.

Do not leave exposed to atmospheric agents.

Before mounting the motor on the gearbox, it is advisable to perform a pre-test of the motor itself, without connection to the gear unit. The testing of this component was not carried out by the manufacturer of the machine. It will therefore be the responsibility of the customer of Rollon to perform the testing of the same, in order to verify its correct operation.

The manufacturer cannot be considered responsible for any consequences derived from improper use or any use other than the purpose the axis or system of axes was designed for, or derived from failure to comply, during incorporation phases, with the rules of Good Technique and with what is indicated in this manual.

Avoid damage. Do not operate with inadequate tools

Warning: moving parts. Do not leave objectson the axis

Special installations: check the depth of the threads on moving elements

Make sure that the system has been installed on a level floor surface.

In use, accurately comply with the specific performance values declared in the catalog or, in particular cases, the load and dynamic performance characteristics requested in the phase prior to design.

For modules or parts of modular systems with vertical movement (Z axis), it is mandatory to mount self-braking motors to neutralize the risk of the axis dropping.

The images in this manual are to be considered merely an indication and not binding; therefore, the supply received could be different from the images contained in this manual, and Rollon S.p.A has deemed it useful to insert only one example.

Systems supplied by Rollon S.p.A. were not designed/envisaged to operate in ATEX environments.

Residual risks

- Mechanical risks due to the presence of moving elements (X, Y axes).
- Risk of fire resulting from the flammability of the belts used on the axes, for temperatures in excess of 250 °C in contact with the flame.
- The risk of the Z axis dropping during handling and installation operations on the partly completed machinery, before commissioning.
- Risk of the Z axis dropping during maintenance operations in the case of a drop in the electrical power supply voltage.
- Crushing hazard near moving parts with divergent and convergent motion.
- Shearing hazard near moving parts with divergent and convergent motion.
- Cutting and abrasion hazards.

Basic components

The Partly Completed Machinery shown in this catalog is to be considered a mere supply of simple Cartesian axes and their accessories agreed when the contract is stipulated with the client. The following are therefore to be considered excluded from the contract:

1. Assembly on the client's premises (direct or final)
2. Commissioning on the client's premises (direct or final)
3. Testing on the client's premises (direct or final)

It is therefore understood that the aforementioned operations in points 1.,2., and 3. are not chargeable to Rollon.

Rollon is the supplier of Partly Completed Machinery, the (direct or final) client is responsible for testing and safely checking all equipment which, by definition, cannot be theoretically tested or checked at our facilities where the only movement possible is manual movement (for example: motors or reduction gears, cartesian axes movements that are not manually operated, safety brakes, stopper cylinders, mechanical or induction sensors, decelerators, mechanical limit switches, pneumatic cylinders, etc.). The partly completed machine must not be commissioned until the final machine, in which it is to be incorporated, has been declared compliant, if necessary, with the instructions in Machinery Directive 2006/42/CE.

Instructions of an environmental nature

ROLLON operates with respect for the envirorment, in order to limit environmental impact. The following is a list of some instructions of an environmental nature for correct management of our supplies. Our products are mainly composed of:

Material	Details of the supply
Alluminum alloys	Profiles, pleates, various details
Steel with various composition	Screws, racks and pinions, and rails
Plastic	PA6 – Chains PVC – Covers and sliding block scrapers
Rubber of various types	Plugs, seals
Lubrification of various types	Used for the lubrication of sliding rails and bearings
Rust proof protectione	Rust proof protection oil
Wood, polyethylene, cardboard	Transport packaging

At the end of the product's life cycle, it is therfore possible to recover the various elements, in compliance with current regulations on waste issues.

Safety warnings for handling and transport

- The manufacturer has paid the utmost attention to packaging to minimize risks related to shipping, handling and transport.
- Transport can be facilitated by shipping certain components dismantled and appropriately protected and packaged.
- Handling (loading and unloading) must be carried out in compliance with information directly provided on the machine, on the packing and in the user manuals.
- Personnel authorized to lift and handle the machine and its components shall possess acquired and acknowledged skills and experience in the specific sector, besides having full control of the lifting devices used.
- During transport and/or storage, temperature shall remain within the allowed limits to avoid irreversible damage to electric and electronic components.
- Handling and transport must be carried out with vehicles presenting adequate loading capacity, and the machines shall be anchored to the established points indicated on the axes.
- DO NOT attempt to bypass handling methods and the established lifting points in any way.
- During handling and if required by the conditions, make use of one or more assistants to receive adequate warnings.
- If the machine has to be moved with vehicles, ensure that they are adequate for the purpose, and perform loading and unloading without risks for the operator and for people directly involved in the process.
- Before transferring the device onto the vehicle, ensure that both the machine and its components are adequately secured, and that their profile does not exceed the maximum bulk allowed. Place the necessary warning signs, if necessary.
- DO NOT perform handling with an inadequate visual field and when there are obstacles along the route to the final location.
- DO NOT allow people to either transit or linger within the range of action when lifting and handling loads.
- Download the axes just near the established location and store them in an environment protected against atmospheric agents.
- Failure to comply with the information provided might entail risks for the safety and health of people, and can cause economic loss.
- The Installation Manager must have the project to organize and monitor all operative phases.
- The Installation Manager shall ensure that the lifting devices and equipment defined during the contract phase are available.
- The Manager of the established location and the Installation Manager shall implement a “safety plan” in compliance with the legislation in force for the workplace.
- The “safety plan” shall take into account all surrounding work-related activities and the perimeter spaces indicated in the project for the es tablished location.
- Mark and delimit the established location to prevent unauthorized personnel from accessing the installation area.
- The installation site must have adequate environmental conditions (lighting, ventilation, etc.).
- Installation site temperature must be within the maximum and minimum range allowed.
- Ensure that the installation site is protected against atmospheric agents, does not contain corrosive substances and is free of the risk of explosion and/or fire.
- Installation in environments presenting a risk of explosion and/or of fire must ONLY be carried out if the machine has been DECLARED COMPLIANT for such use.
- Check that the established location has been correctly fitted out, as defined during the contract phase and based on indications in the relative project.
- The established location must be fitted out in advance to carry out complete installation in compliance with the defined methods and schedule.

Note

- Evaluate in advance whether the machine must interact with other production units, and that integration can be implemented correctly, in compliance with standards and without risks.
- The manager shall assign installation and assembly interventions ONLY to authorized technicians with acknowledged know-how.
- State of the art connections to power sources (electric, pneumatic, etc.) must be ensured, in compliance with relevant regulatory and legislative requirements.
- “State of the art” connection, alignment and leveling are essential to avoid additional interventions and to ensure correct machine function.
- Upon completion of the connections, run a general check to ascertain that all interventions have been correctly carried out and compliance with requirements.
- Failure to comply with the information provided might entail risks for the safety and health of people, and can cause economic loss.

Transport

- Transport, also based on the final destination, can be done with different vehicles.
- Perform transport with suitable devices that have adequate loading capacity.
- Ensure that the machine and its components are adequately anchored to the vehicle.

Handling and lifting

- Correctly connect the lifting devices to the established points on the packages and/or on the dismantled parts.
- Before handling, read the instructions, especially safety instructions, provided in the installation manual, on the packages and/or on the dismantled parts.
- DO NOT attempt, in any way, to bypass handling methods and the established lifting, moving and handling points of each package and/or dismantled part.
- Slowly lift the package to the minimum necessary height and move it with the utmost caution to avoid dangerous oscillations.
- DO NOT perform handling with an inadequate visual field and when there are obstacles along the route to reach the final location.
- DO NOT allow people to either transit or linger within the range of action when lifting and handling loads.
- Do not stack packages to avoid damaging them, and reduce the risk of sudden and dangerous movements.
- In case of prolonged storage, regularly ensure that there are no variations in the storage conditions of the packages.

Check axis integrity after shipment

Every shipment is accompanied by a document (“Packing list”) with the list and description of the axes.

- Upon receipt check that the material received corresponds to specifications in the delivery note.
- Check that packaging is perfectly intact and, for shipments without packaging, check that each axis is intact.
- In case of damages or missing parts, contact the manufacturer to define the relevant procedures.

Notes

Notes

Data sheet

General data: **Date:** ..... **Inquiry N°:** .....

Address: ..... **Contact:** .....

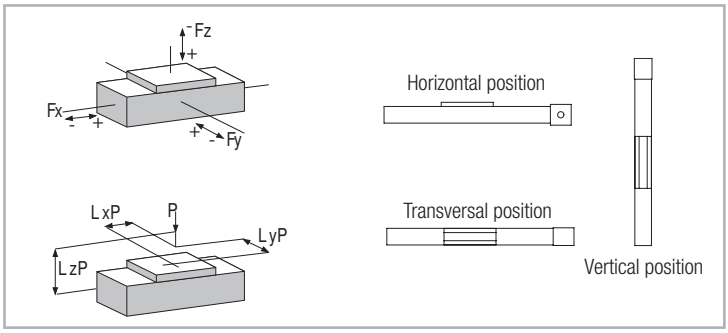
Company: ..... **Zip Code:** .....

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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BY TIMKEN

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