Precision System

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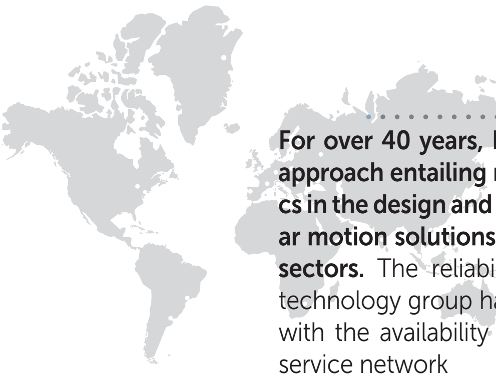
TO SUPPORT YOU, WE DESIGN AND PRODUCE

An industrialized process with various levels of customization

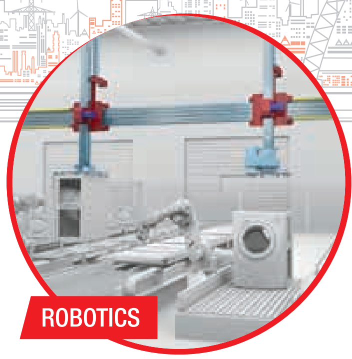


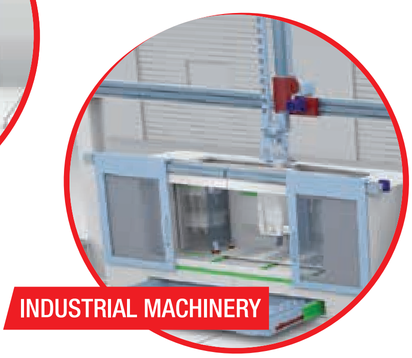
For over 40 years, Rollon has adopted an approach entailing responsibility and ethics in the design and production of our linear motion solutions for different industrial sectors. The reliability of an international technology group has now been combined with the availability of a local support and service network

VALUES

PERFORMANCE

Rollon's goal is to help our clients become more competitive in their markets through technological solutions, design simplification, productivity, reliability, duration, and low maintenance.





COLLABORATION

High-level technical consulting and cross-competence allow us to identify the needs of our clients and transform them into guidelines for continuous exchange, while **our strong specialization in the different industrial sectors becomes an factor in developing projects and innovative applications.**

SOLUTIONS APPLICATIONS

Rollon takes on the task of design and development of linear motion solutions, taking care of everything for our customers, so that they can concentrate on their core business. **We offer everything from individual components to specifically designed, mechanically integrated systems: the quality of our applications is an expression of our technology and competence.**

DIVERSIFIED LINEAR SOLUTIONS FOR EVERY APPLICATION REQUIREMENT

Linear and telescopic rails

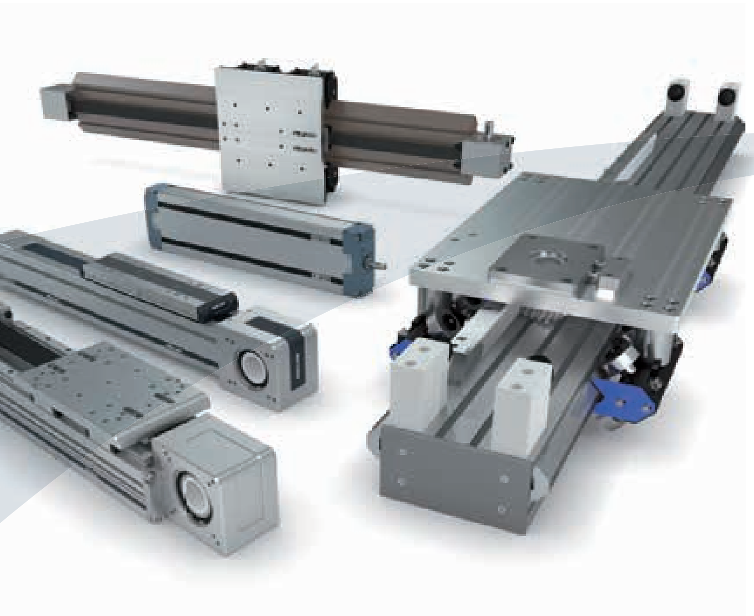
Linear Line

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

Telescopic Line

Telescopic rails with ball and roller bearings, with hardened raceways, high load capacities, low bending, resistant to shocks and vibrations. For partial, total or extended extraction up to 200% of the length of the guide.

Linear actuators and automation systems



Actuator Line

Linear actuators with different rail configurations and transmissions, available with belt, screw, or rack and pinion drives for different needs in terms of precision and speed. Rails with bearings or ball recycle systems for different load capacities and critical environments.

Actuator System Line

Integrated actuators for industrial automation, used in applications in several industrial sectors: automated industrial machinery, precision assembly lines, packaging lines and high speed production lines. The Actuator Line evolves to satisfy the requests of our most discerning clients.

Precision System

TH series

TH series description

Fig. 1

TH linear actuators are rigid and compact, ball screw driven linear units, that enable high positioning accuracy and repeatability in all process phases. With optimal performance assured, TH actuators have a repeatability within 5 µm.

Thrust force transmission is achieved by means of super high efficient ball screws, which are available in several precision classes and a variety of leads. Linear motion is based on two or four preloaded re-circulating ball bearing blocks, with ball retainer technology, mounted on two precision aligned parallel rails. The TH series is available in single carriage or double carriage versions to meet different load requirements.

The TH linear units also feature safe rail and screw lubrication through a dedicated channel for each component. The incredibly compact structure of the TH actuator makes it the ideal solution for applications where space is limited.

- Extremely compact dimensions
- High positioning accuracy
- High load capacity and stiffness
- Preloaded ball screw
- Block with ball retainer
- Internal protected rails and ball screw
- Safe lubrication through dedicated channels for each component (block and ball screw)

The components

Aluminum base unit and carriage

The anodized extrusions used for the profile and carriages of the Rollon TH-series linear units were designed and manufactured in cooperation with industry experts to achieve high-level accuracy and to maximize mechanical properties. The anodized aluminum alloy 6060 used and was extruded with dimensional tolerances complying with UNI 3879 standards.

Linear motion system

Precision ball bearing guides with ground rails and preloaded blocks are used on Rollon TH series linear units. Use of this technology makes it possible to obtain the following features:

- **High accuracy running parallelism**
- **High positioning accuracy**
- **High level of rigidity**
- **Reduced wear**
- **Low resistance to movement**

Drive system

Rollon TH-series linear units use precision ball screws with either preloaded or non-preloaded ball screw nuts. The standard precision class of the ball screws used is ISO 7, however ISO 5 precision class is also available upon request. The ballscrew on the TH unit is available in different diameters and leads (see specifications tables). Use of this type of technology makes it possible to obtain the following features:

- **High speed (for long pitch screws)**
- **High load capacity and accurate thrust forces**
- **Superior mechanical performance**
- **Reduced wear**
- **Low resistance to movement**

Protection

Rollon TH series linear units are equipped with sealing strips in order to protect the mechanical components inside the linear unit against contaminants. In addition, the ball bearing guides and ball screws have their own protection system, including scrapers and lip seals to remove contaminates from the raceways of the ball bearings.

General data about aluminum used: AL 6060

Chemical composition [%]

Al	Mg	Si	Fe	Mn	Zn	Cu	Impurites
Remaining	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

TH 70 SP2

TH 70 SP2 Dimensions (single carriage)

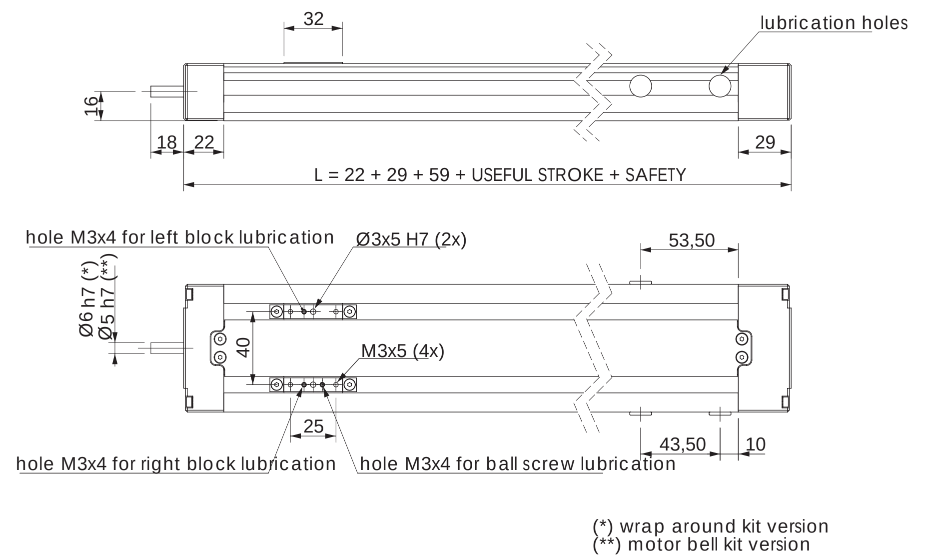


Fig. 2

Technical data

	Type
	TH 70 SP2
Useful stroke length [mm]	290 *1
Max. speed [m/s]	See page PS-14
Carriage weight [kg]	0.152
Zero travel weight [kg]	0.58
Weight for 100 mm useful stroke [kg]	0.26
Rail size [mm]	9 mini

*1 Max stroke 591mm. For more information please contact Rollon.

Tab. 4

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TH 70 SP2	0.0054	0.0367	0.042

Tab. 6

Ball screw precision

Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5*	ISO 7	ISO 5*	ISO 7
TH 70 / 8-2.5	0.023	0.05	0.01	0.02

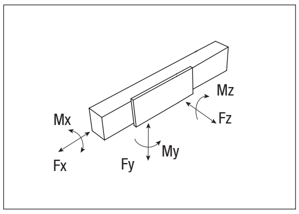
* ISO5 available only for max stroke 370mm. For more information please contact Rollon.

Tab. 5

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn.
TH 70 SP2	8-2.5	2220	1470

Tab. 7



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TH 70 SP2	4990	3140	4990	99.8	12.8	12.8

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

Tab. 8

TH 70 SP4

TH 70 SP4 Dimensions (dual carriage)

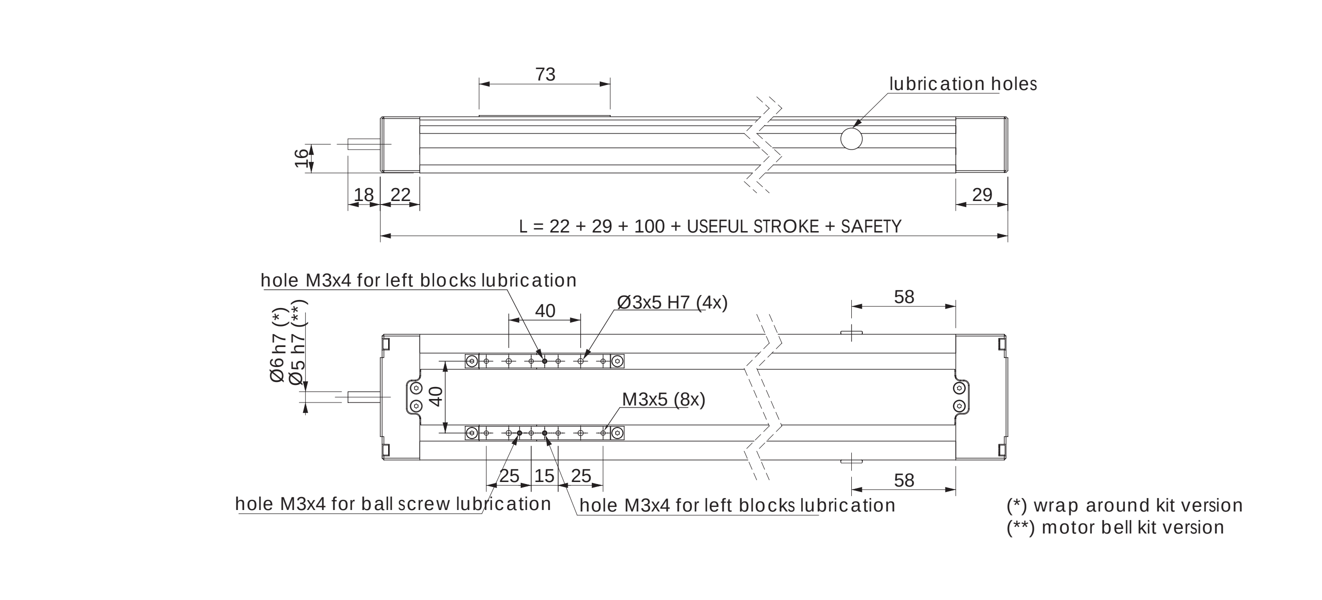


Fig. 3

Technical data

	Type TH 70 SP4
Useful stroke length [mm]	249 *1
Max. speed [m/s]	See page PS-14
Carriage weight [kg]	0.268
Zero travel weight [kg]	0.8
Weight for 100 mm useful stroke [kg]	0.26
Rail size [mm]	9 mini

*1 Max stroke 550mm. For more information please contact Rollon.

Tab. 9

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]
TH 70 SP4	0.0054	0.0367	0.042

Tab. 11

Ball screw precision

Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5*	ISO 7	ISO 5*	ISO 7
TH 70 / 8-2.5	0.023	0.05	0.01	0.02

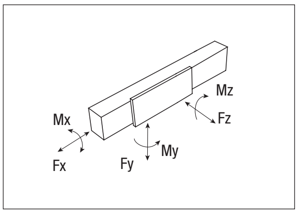
* ISO5 available only for max stroke 330mm. For more information please contact Rollon.

Tab. 10

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn
TH 70 SP4	8-2.5	2220	1470

Tab. 12



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TH 70 SP4	9980	6280	9980	200	319	319

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

Tab. 13

Note: for SP4 model the load capacities are valid only when the sliders are fixed together

TH 90 SP2

TH 90 SP2 Dimensions (single carriage)

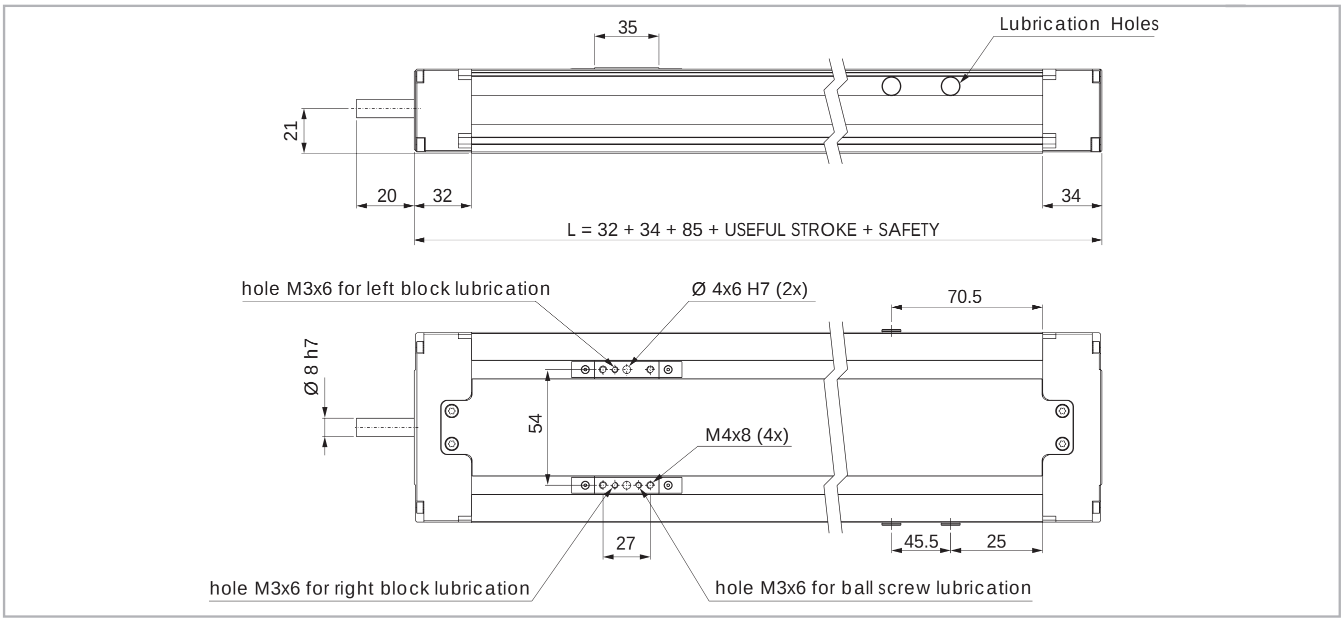


Fig. 4

Technical data

	Type TH 90 SP2
Max. useful stroke length [mm]	665
Max. speed [m/s]	See page PS-14
Carriage weight [kg]	0.65
Zero travel weight [kg]	1.41
Weight for 100 mm useful stroke [kg]	0.6
Rail size [mm]	12 mini

Tab. 14

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]
TH 90 SP2	0.0130	0.0968	0.1098

Tab. 16

Starting torque

Type	Ball Screw	[Nm]
TH 90 SP2	12-05	0.07
	12-10	0.08

Tab. 17

Ball screw precision

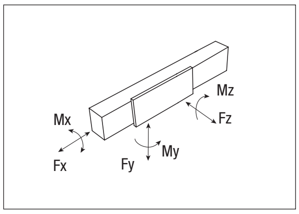
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TH 90 / 12-05	0.023	0.05	0.01	0.02
TH 90 / 12-10	0.023	0.05	0.01	0.02

Tab. 15

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn.
TH 90 SP2	12-05	9000	4300
	12-10	6600	3600

Tab. 18



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TH 90 SP2	7060	6350	7060	192	24	24

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

Tab. 19

TH 90 SP4

TH 90 SP4 Dimensions (dual carriage)

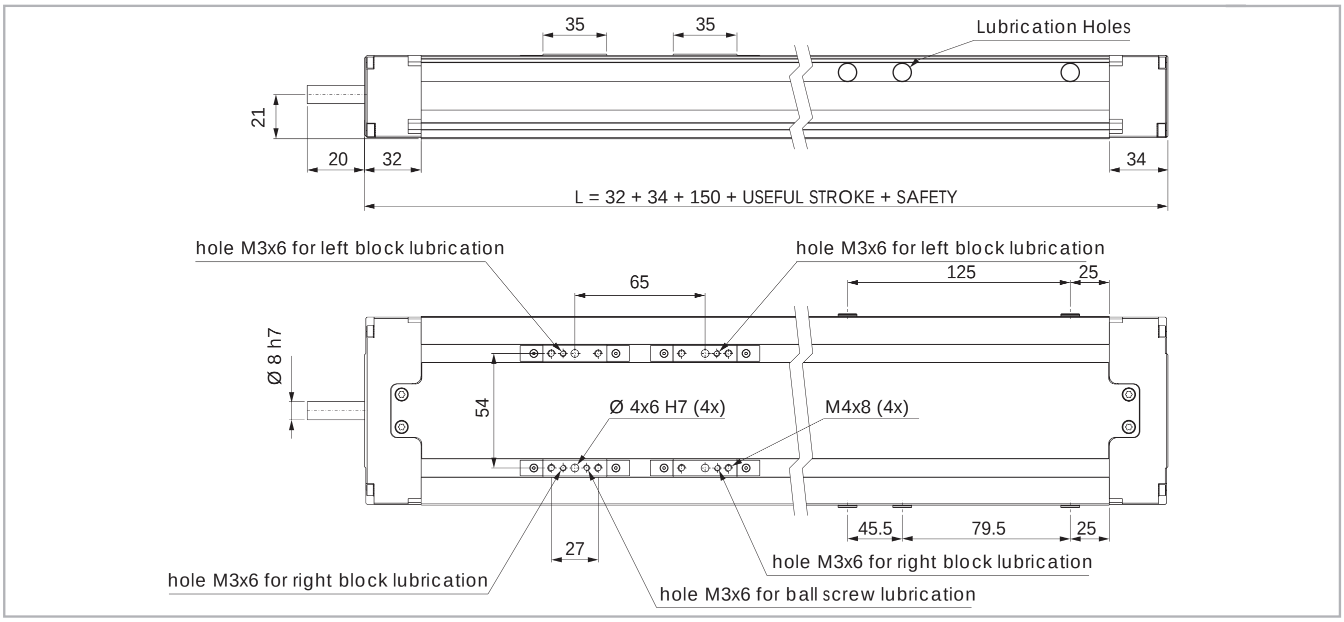


Fig. 5

Technical data

	Type
	TH 90 SP4
Max. useful stroke length [mm]	600
Max. speed [m/s]	See page PS-14
Carriage weight [kg]	0.90
Zero travel weight [kg]	2.04
Weight for 100 mm useful stroke [kg]	0.6
Rail size [mm]	12 mini

Tab. 20

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]
TH 90 SP4	0.0130	0.0968	0.1098

Tab. 22

Starting torque

Type	Ball Screw	[Nm]
TH 90 SP4	12-05	0.07
	12-10	0.08

Tab. 23

Ball screw precision

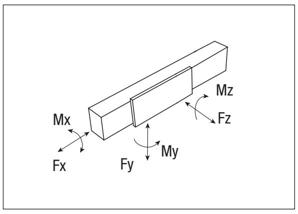
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TH 90 / 12-05	0.023	0.05	0.01	0.02
TH 90 / 12-10	0.023	0.05	0.01	0.02

Tab. 21

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn
TH 90 SP4	12-05	9000	4300
	12-10	6600	3600

Tab. 24



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TH 90 SP4	14120	12699	14120	384	459	459

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

Tab. 25

Note: for SP4 model the load capacities are valid only when the sliders are fixed together

TH 110 SP2

TH 110 SP2 Dimensions (single carriage)

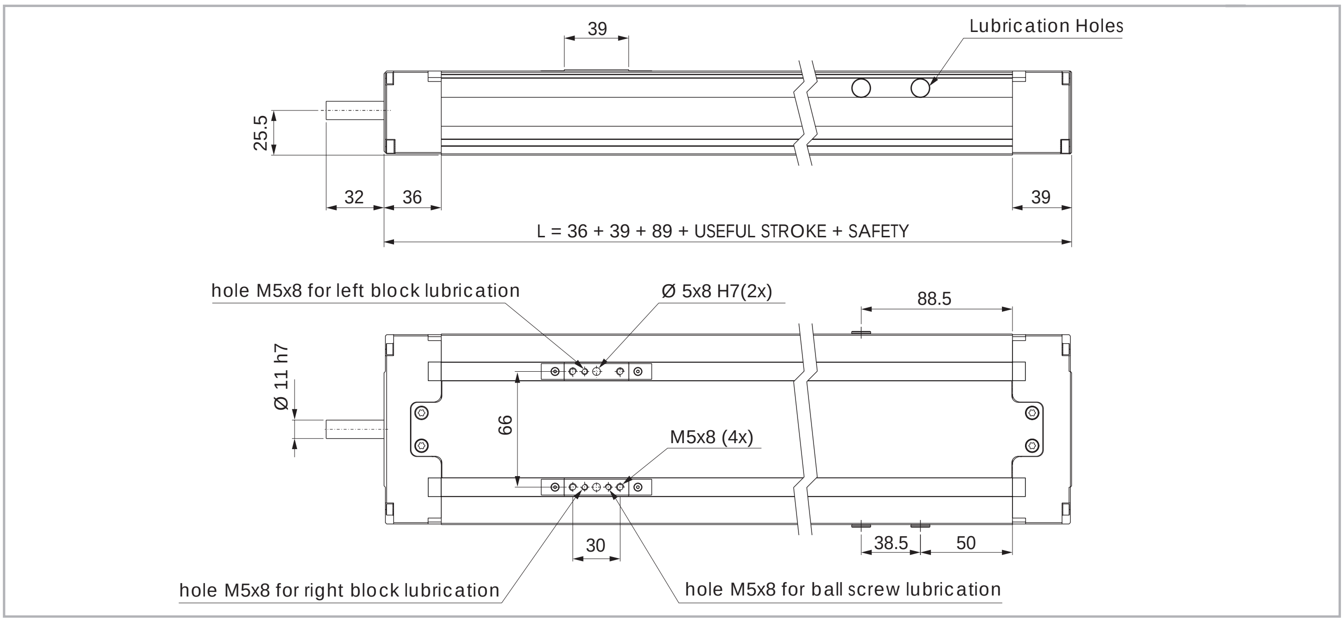


Fig. 6

Technical data

	Type
	TH 110 SP2
Max. useful stroke length [mm]	1411
Max. speed [m/s]	See page PS-14
Carriage weight [kg]	0.76
Zero travel weight [kg]	2.65
Weight for 100 mm useful stroke [kg]	0.83
Rail size [mm]	15

Tab. 26

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]
TH 110 SP2	0.0287	0.2040	0.2327

Tab. 28

Starting torque

Type	Ball Screw	[Nm]
TH 110 SP2	16-05	0.16
	16-10	0.23
	16-16	0.27

Tab. 29

Ball screw precision

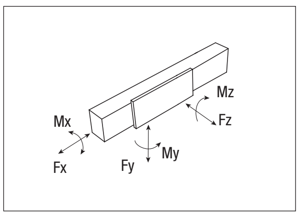
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TH 110 / 16-05	0.023	0.05	0.005	0.045
TH 110 / 16-10	0.023	0.05	0.005	0.045
TH 110 / 16-16	0.023	0.05	0.005	0.045

Tab. 27

Load capacity F_X

Type	F_x [N]		
	Screw	Stat.	Dyn.
TH 110 SP2	16-05	17400	11800
	16-10	18300	10500
	16-16	18800	10300

Tab. 30



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TH 110 SP2	48400	22541	48400	1549	350	350

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

Tab. 31

TH 110 SP4

TH 110 SP4 Dimensions (Dual carriage)

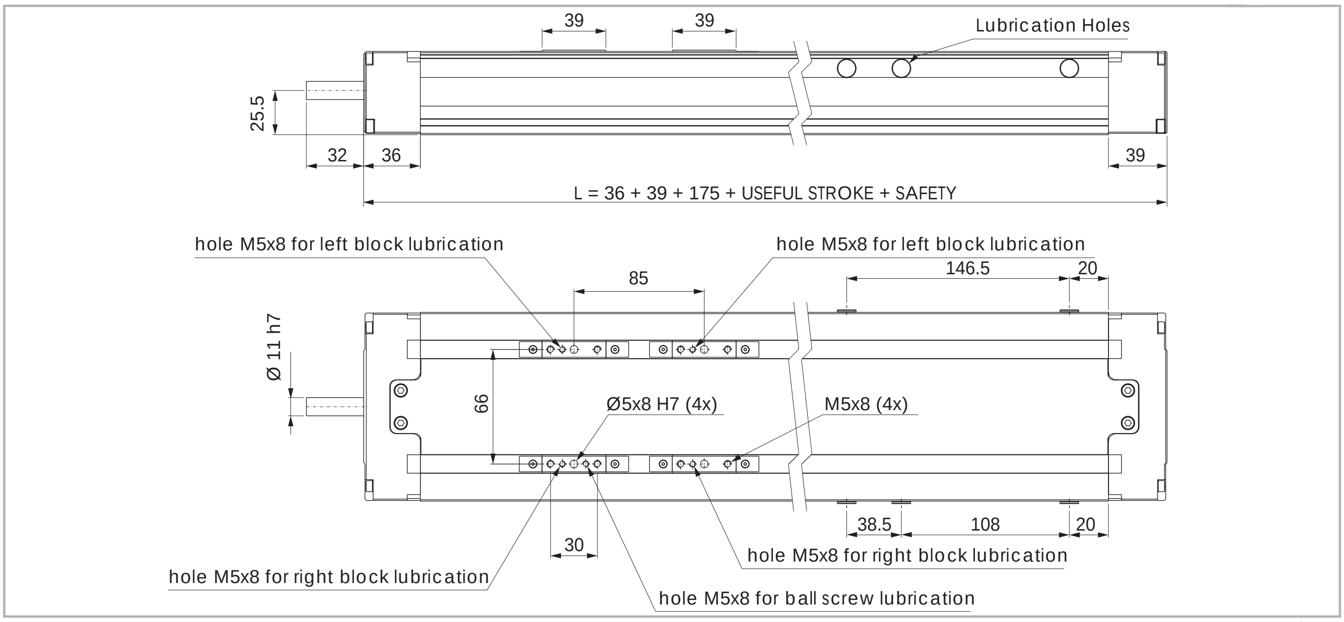


Fig. 7

Technical data

	Type
	TH 110 SP4
Max. useful stroke length [mm]	1325
Max. speed [m/s]	See page PS-14
Carriage weight [kg]	1.26
Zero travel weight [kg]	4.00
Weight for 100 mm useful stroke [kg]	0.83
Rail size [mm]	15

Tab. 32

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]
TH 110 SP4	0.0287	0.2040	0.2327

Tab. 34

Starting torque

Type	Ball Screw	[Nm]
TH 110 SP4	16-05	0.16
	16-10	0.23
	16-16	0.27

Tab. 35

Ball screw precision

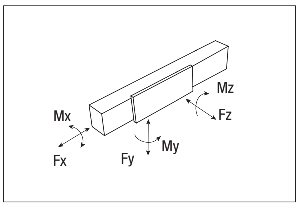
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TH 110 / 16-05	0.023	0.05	0.005	0.045
TH 110 / 16-10	0.023	0.05	0.005	0.045
TH 110 / 16-16	0.023	0.05	0.005	0.045

Tab. 33

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn
TH 110 SP4	16-05	17400	11800
	16-10	18300	10500
	16-16	18800	10300

Tab. 36



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TH 110 SP4	96800	45082	96800	3098	2606	2606

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

Tab. 37

Note: for SP4 model the load capacities are valid only when the sliders are fixed together

TH 145 SP2

TH 145 SP2 Dimensions (single carriage)

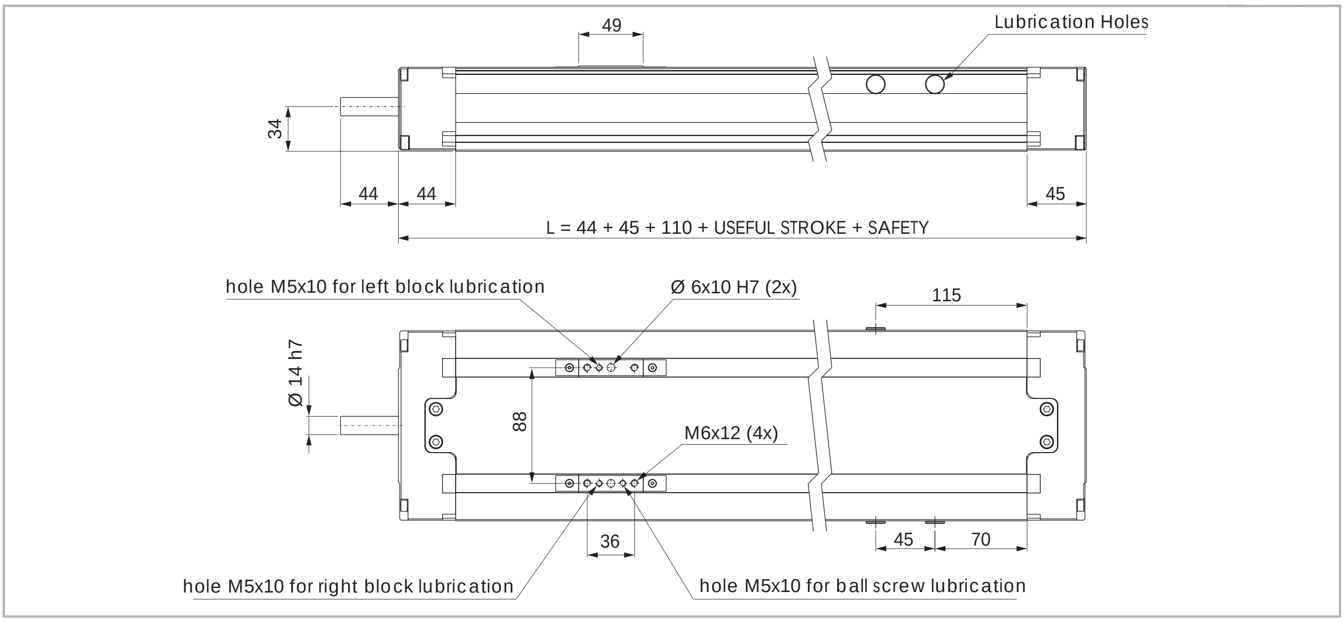


Fig. 8

Technical data

	Type
	TH 145 SP2
Max. useful stroke length [mm]	1690
Max. speed [m/s]	See page PS-14
Carriage weight [kg]	1.45
Zero travel weight [kg]	5.9
Weight for 100 mm useful stroke [kg]	1.6
Rail size [mm]	20

Tab. 38

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]
TH 145 SP2	0.090	0.659	0.749

Tab. 40

Starting torque

Type	Ball Screw	[Nm]
TH 145 SP2	20-05	0.22
	20-20	0.35
	25-10	0.29

Tab. 41

Ball screw precision

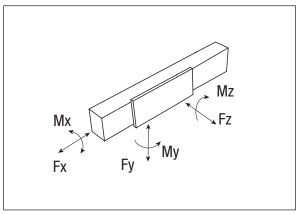
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TH 145 / 20-05	0.023	0.05	0.005	0.045
TH 145 / 20-20	0.023	0.05	0.005	0.045
TH 145 / 25-10	0.023	0.05	0.005	0.045

Tab. 39

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn.
TH 145 SP2	20-05	25900	14600
	20-20	23900	13400
	25-10	32600	16000

Tab. 42



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TH 145 SP2	76800	35399	76800	3341	668	668

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

Tab. 43

TH 145 SP4

TH 145 SP4 Dimensions (dual carriage)

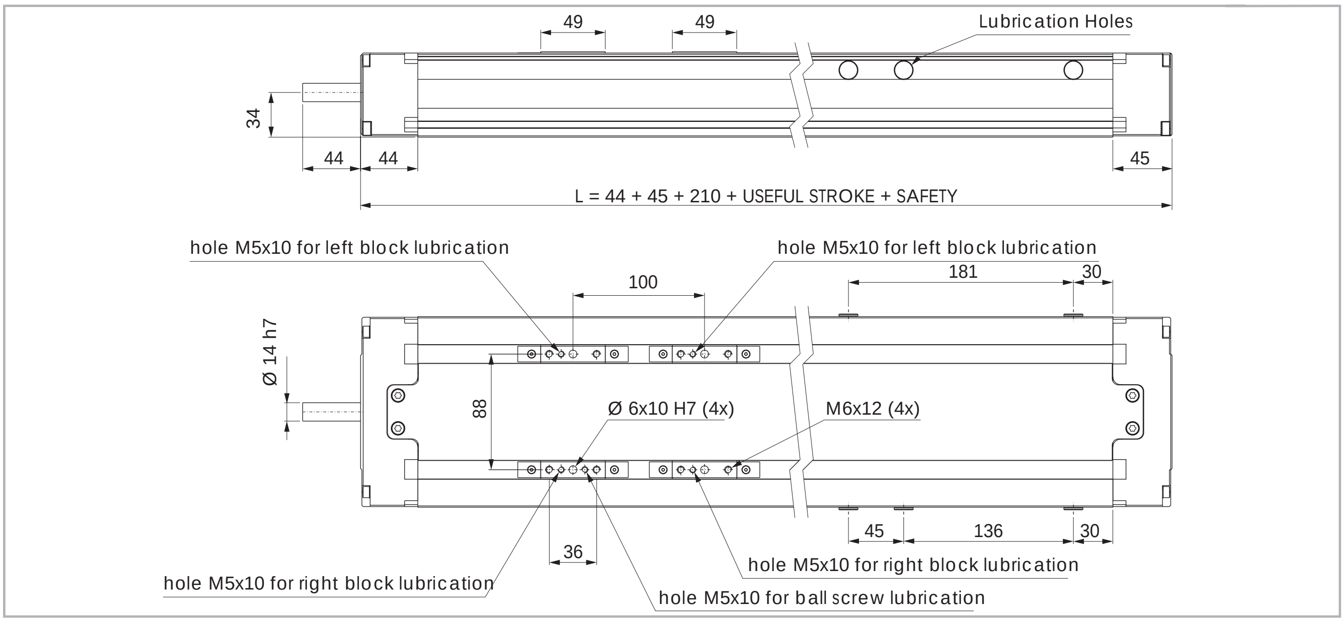


Fig. 9

Technical data

	Type
	TH 145 SP4
Max. useful stroke length [mm]	1590
Max. speed [m/s]	See page PS-14
Carriage weight [kg]	2.42
Zero travel weight [kg]	8.3
Weight for 100 mm useful stroke [kg]	1.6
Rail size [mm]	20

Tab. 44

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]
TH 145 SP4	0.090	0.659	0.749

Tab. 46

Starting torque

Type	Ball Screw	[Nm]
TH 145 SP4	20-05	0.22
	20-20	0.35
	25-10	0.29

Tab. 47

Ball screw precision

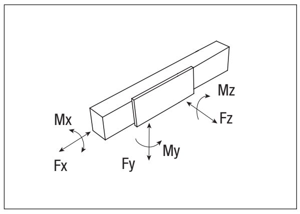
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TH 145 / 20-05	0.023	0.05	0.005	0.045
TH 145 / 20-20	0.023	0.05	0.005	0.045
TH 145 / 25-10	0.023	0.05	0.005	0.045

Tab. 45

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn.
TH 145 SP4	20-05	25900	14600
	20-20	23900	13400
	25-10	32600	16000

Tab. 48



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TH 145 SP4	153600	70798	153600	6682	5053	5053

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

Tab. 49

Note: for SP4 model the load capacities are valid only when the sliders are fixed together

Motor connections

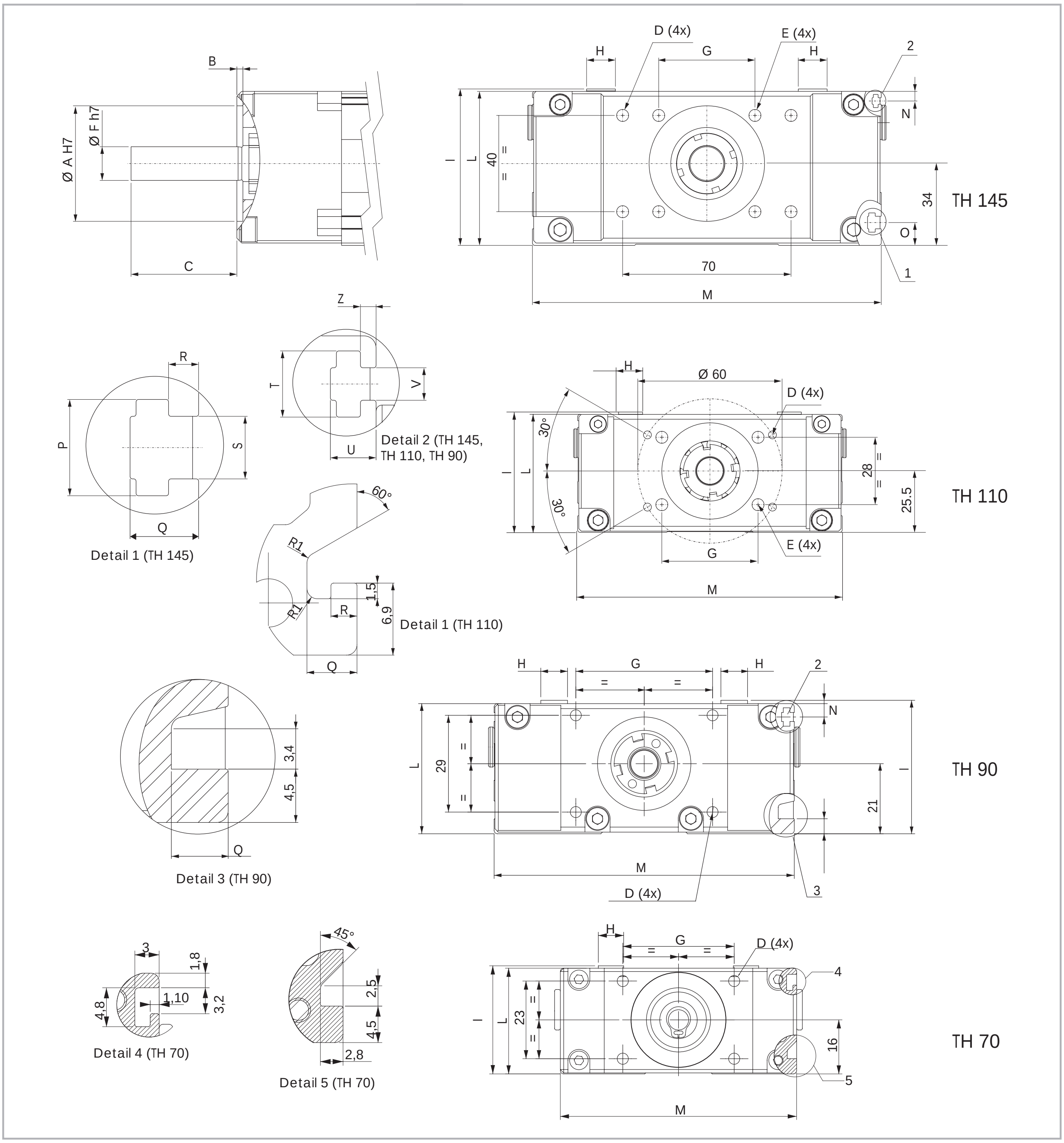


Fig. 10

Units [mm]

Type	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q	R	S	T	U	V	Z
TH 70	28	2.5	18	M4x8	-	5 or 6	33	7.5	32	31.3	70	-	-	-	-	-	-	-	-	-	-
TH 90	28	2.5	20	M4x8	-	8	41	8	40	39	90	4	4.5	-	4.8	-	-	5.5	3.8	2.7	1.3
TH 110	40	2.5	32	M4x8	M6x10	11	40	10	50	49	110	4	-	-	4.8	2.5	-	5.5	3.8	2.7	1.3
TH 145	48	2.5	44	M6x10	M6x12	14	40	12	65	64	145	4	9.5	8	5.7	2.5	5.2	5.5	3.8	2.7	1.3

Tab. 50

Lubrication

TH linear units with ball bearing guides

TH Linear units are equipped with self lubricating linear ball guides. The ball bearing carriages are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents mis-alignment of these in the circuits.

This system guarantees a long interval between maintenances: every 2000 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.

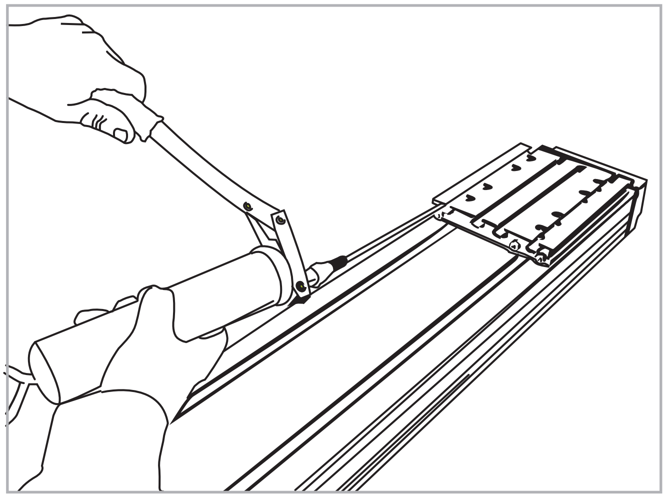


Fig. 11

Amount of lubricant needed to lubricate carriages:

Type	Quantity [cm³]
TH 70	0.23
TH 90	0.5
TH 110	0.7
TH 145	1.4

Tab. 52

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

Ball screws

The ball screw nuts for the Rollon TH series linear slides should be re-lubricated every 100 km.

Type	Quantity [cm³] for grease nipple
08-2.5	0.1
12-05	0.2
12-10	0.2
16-05	0.41
16-10	0.78
16-16	0.6
20-05	0.79
20-20	1.0
25-10	1.2

Tab. 51

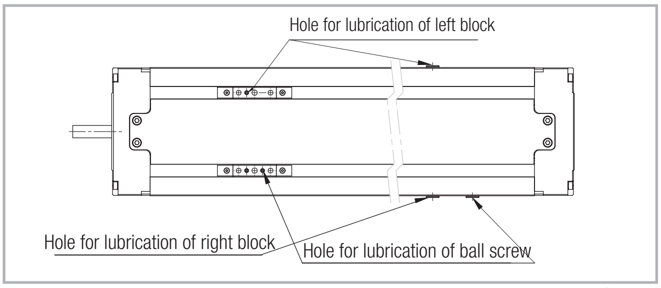
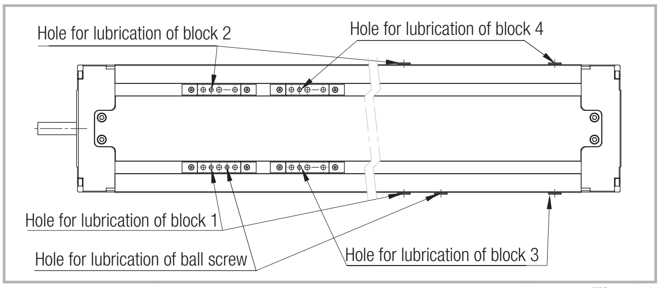


Fig. 12



Please refer to page PS-5 for the position of the holes for lubrication for TH 90 SP 4.

Fig. 13

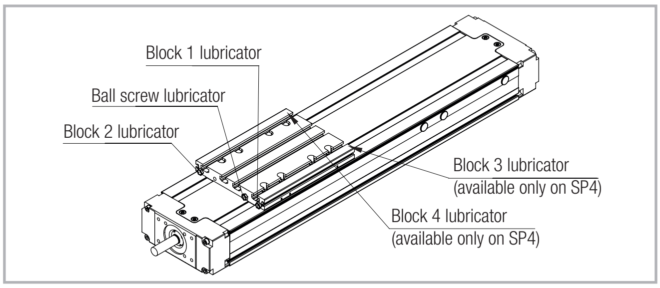


Fig. 14

Critical speed

The maximum linear speed of Rollon TH series linear units depends on the critical speed of the screw (based on its diameter and length) and on the max. permissible speed of the ball screw nut used.

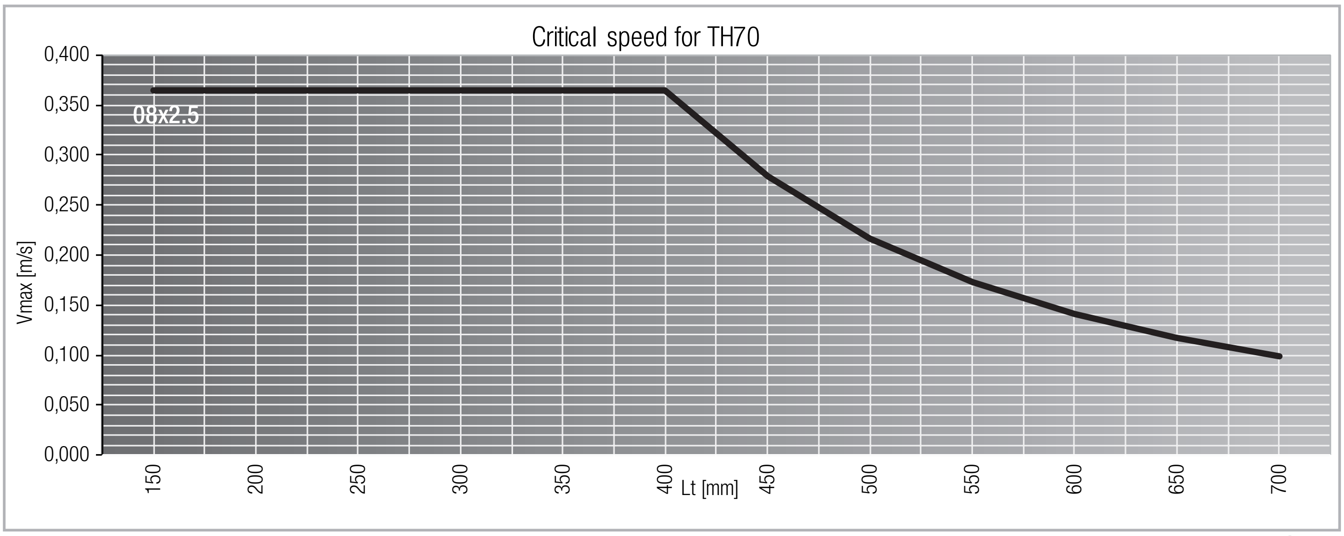


Fig. 15

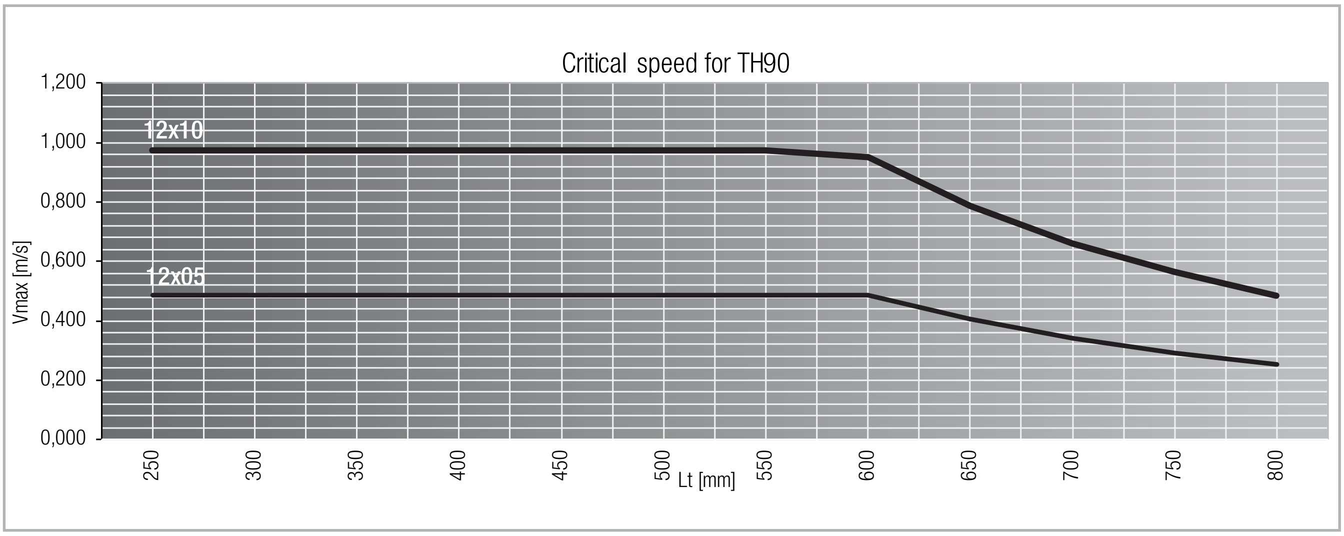


Fig. 16

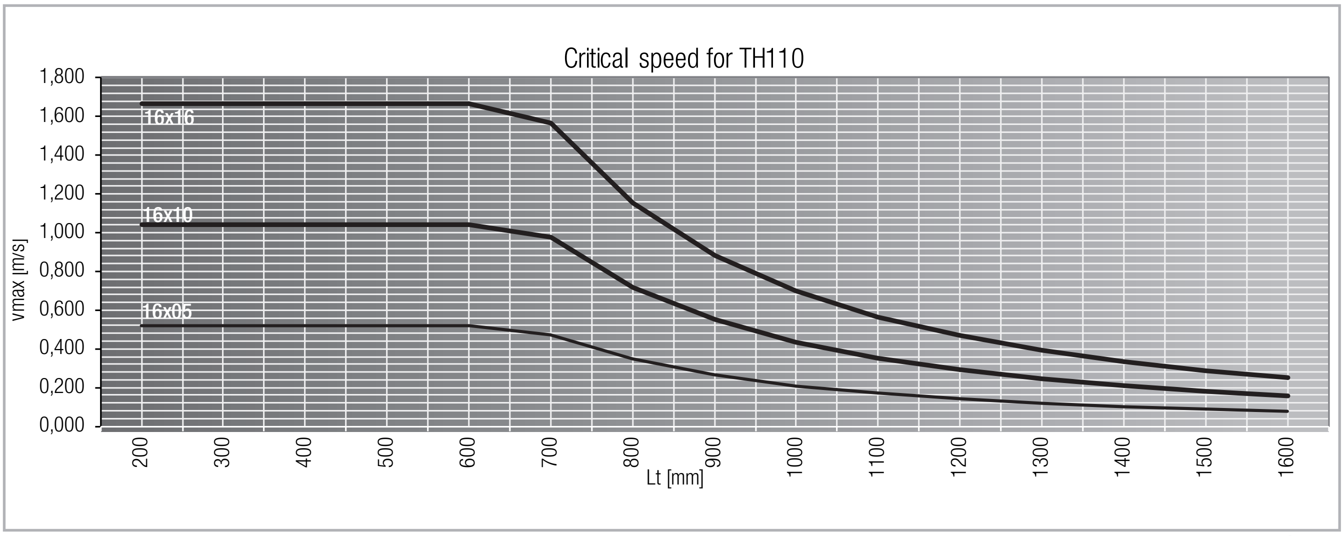


Fig. 17

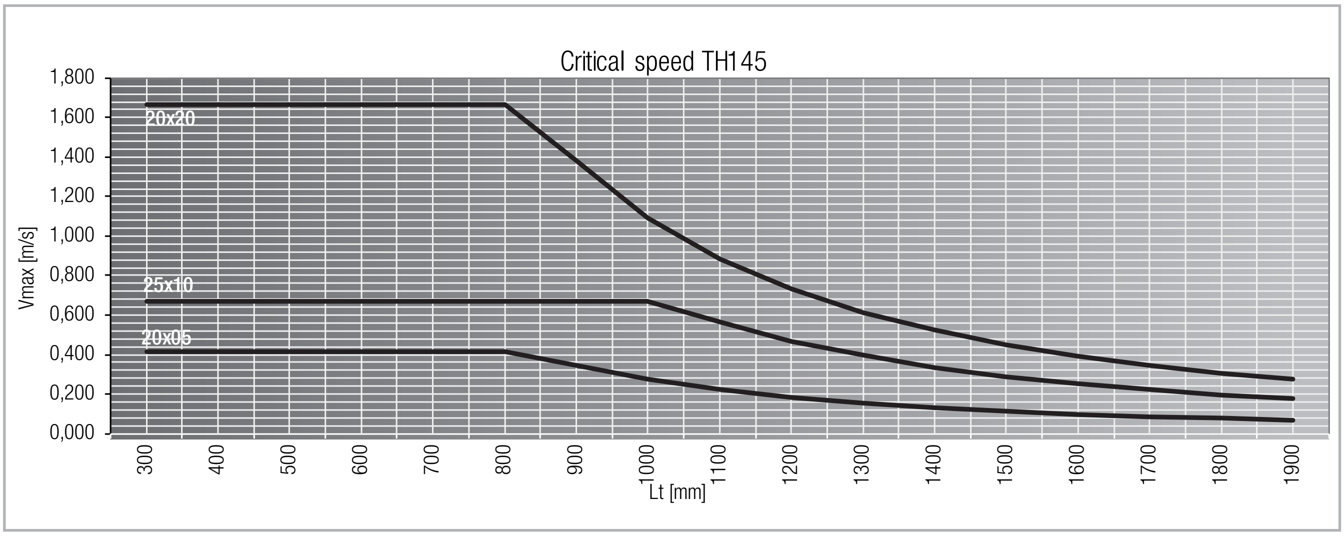


Fig. 18

Accessories

Fixing by brackets

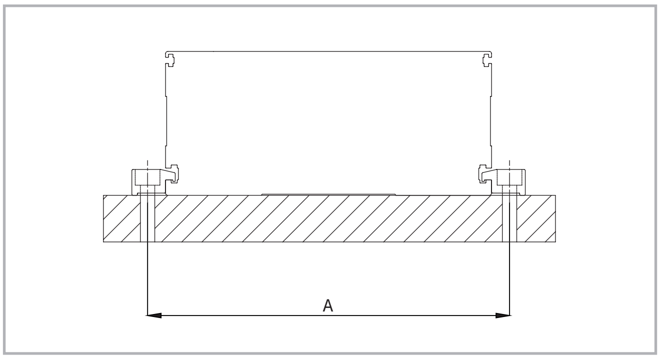


Fig. 19

Units (mm)

Type	A Unit mm
TH 70	82
TH 90	102
TH 110	126
TH 145	161

Tab. 53

Fixing brackets

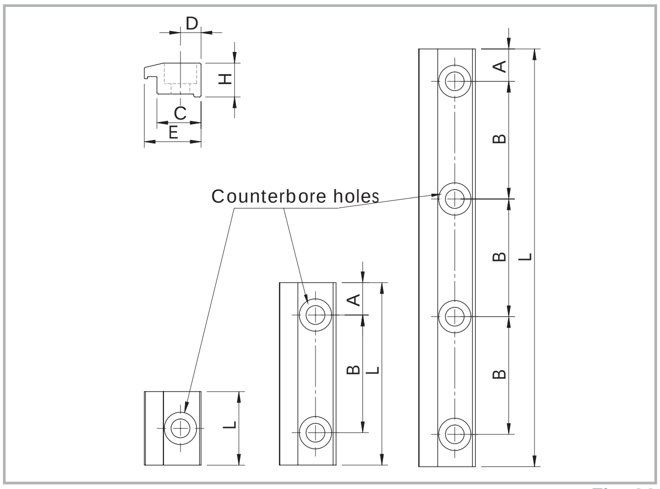


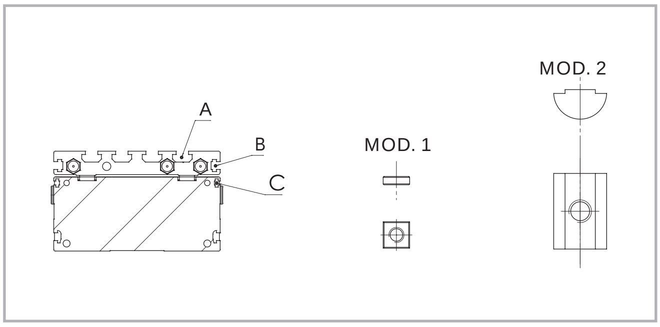
Fig. 20

Dimensions (mm)

Type	N° holes	Counterbore for screw	A	B	C	D	E	H	L	Code Rollon
TH 70	1	M4	-	-	12.5	6.5	15	9	22	1005198
TH 90	2	M4	11	40	10.5	4.5	14.5	9.1	62	1003385
	4	M4	8.5	30	10.5	4.5	14.5	9.1	107	1003509
	4	M4	8.5	20	10.5	4.5	14.5	9.1	77	1003510
	1	M4	-	-	10.5	4.5	14.5	9.1	25	1003612
TH 110 TH 145	4	M5	8.5	30	15	7	19.3	11.5	107	1002805
	4	M6	11	40	15	7	19.3	11.5	142	1002864
	1	M6	-	-	15	7	19	11.5	25	1002970
	2	M6	11	40	15	7	19	11.5	62	1002971
	4	M5	20	20	15	7	19	11.5	100	1003311

Tab. 54

T nuts



21

Units (mm)

Type	A	B	C
TH 70	Mod. 1 M4 - 963.0407.81	Mod. 1 M4 - 963.0407.81	-
TH 90	Mod. 2 M5 - 6000436	-	Mod. 1 M2.5 - 6001361
TH 110	Mod. 2 M5 - 6000436	Mod. 1 M4 - 963.0407.81	Mod. 1 M2.5 - 6001361
TH 145	Mod. 2 M6 - 6000437	Mod. 1 M4 - 963.0407.81	Mod. 1 M2.5 - 6001361

Tab. 55

Proximity

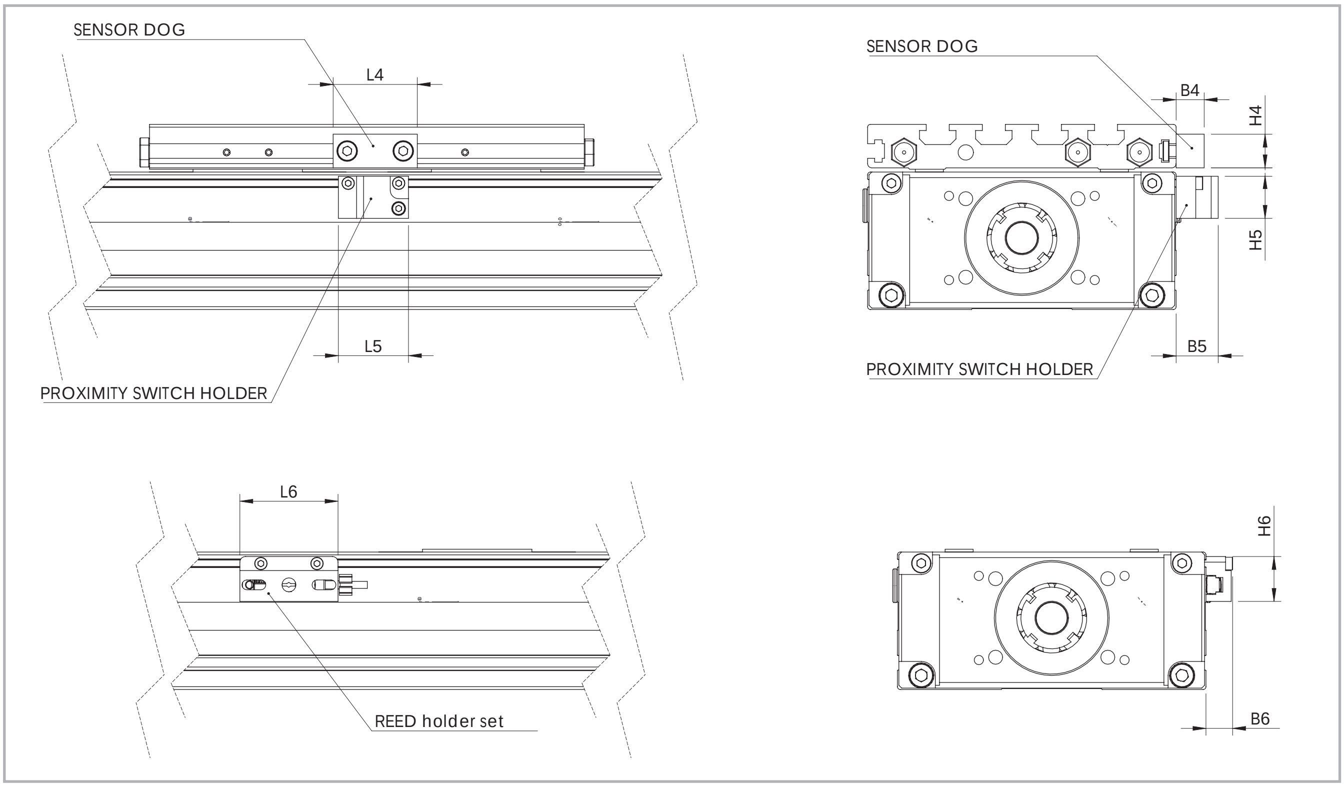


Fig. 22

Units (mm)

	B4	B5	B6	L4	L5	L6	H4	H5	H6	Sensor	Proximity holder set	Sensor dog	REED holder set
TH 70	8	10	8	30	25	35	10	18	18	Ø 6.5	G001975	G001976	G001974
TH 90	10	15	9.5	12	25	35	6	15	16	Ø 8	G001193	G001203	G001204
TH 110	10	15	9.5	30	25	35	12	15	16	Ø 8	G001193	G001198	G001204
TH 145	10	15	9.5	30	25	35	12	15	16	Ø 8	G001193	G001198	G001204

Tab. 56

External carriage

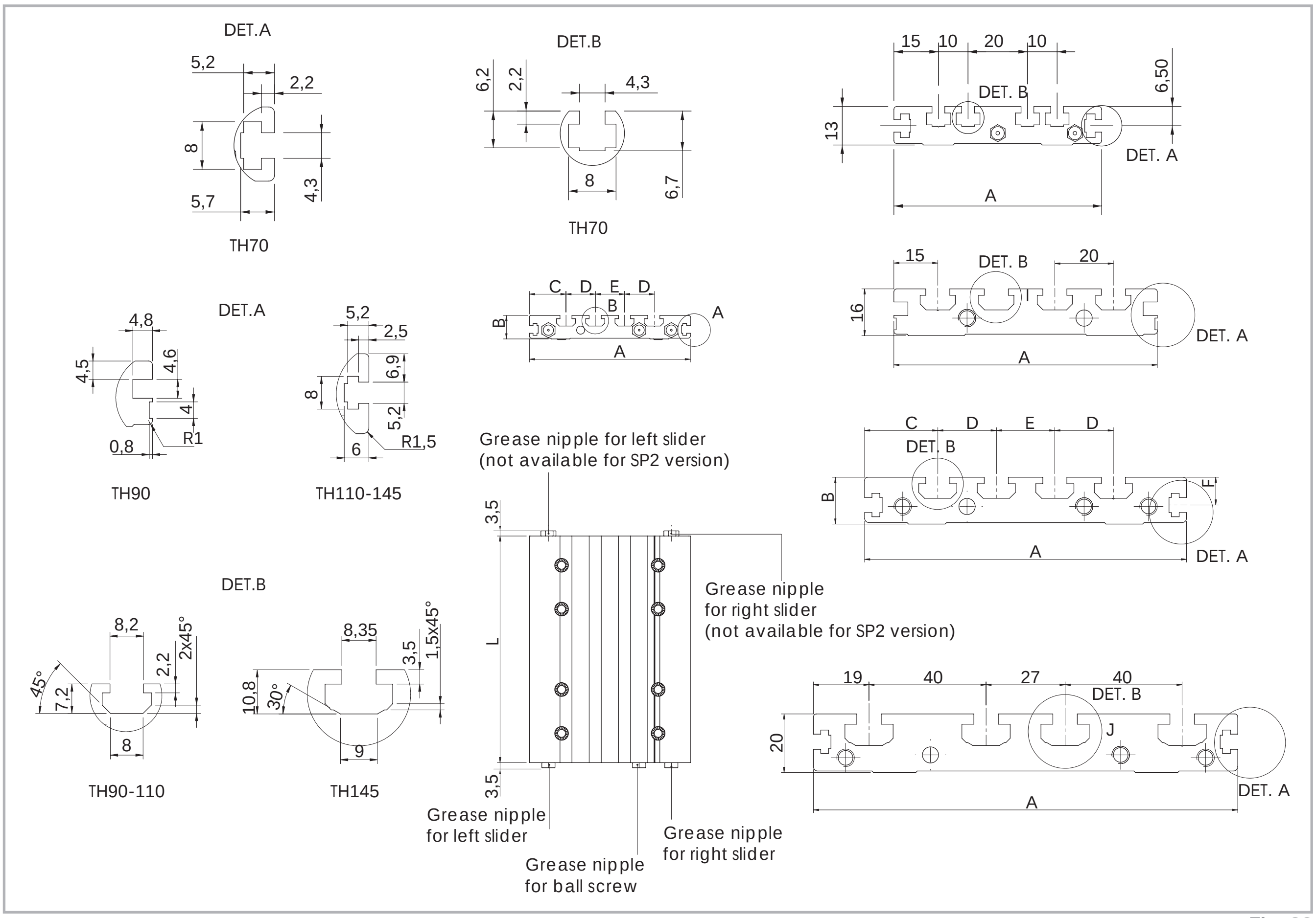
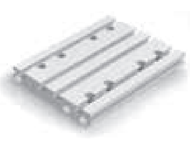


Fig. 23

External carriage for SP2	Type	A	B	C	D	E	F	L	Code
	**TH 70**	70	13	15	10	20	6,5	60	G001957
	TH 90	90	16	15	20	20	6.8	60	G001195
	TH 110	110	16	25	20	20	9.5	60	G001059
	TH 145	145	20	19	40	27	9.5	80	G001062

Tab. 57

External carriage for SP4	Type	A	B	C	D	E	F	L	Code
	**TH 70**	70	13	15	10	20	6,5	95	G001958
	TH 90	90	16	15	20	20	6.8	125	G001194
	TH 110	110	16	25	20	20	9.5	155	G001060
	TH 145	145	20	19	40	27	9.5	190	G001061

Tab. 58

Coupling	Motor bell Kit
	

Tab. 59

Assembly kits

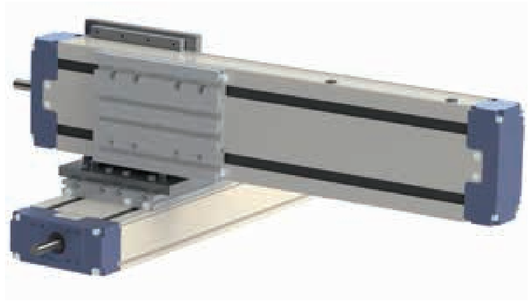
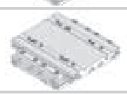

X-Y_2

Fig. 24


X-Z

Fig. 25

For the direct assembly of TH linear units on multiple axis system Rollon offers dedicated assembly kits. The table below shows the allowed combinations as well as the assembly kit codes.

Kit		Code
	**TH 90 - TH 90 XY_2**	G001199
	**TH 90 - TH 110 XY_2**	G001199
	**TH 90 - TH 110 XZ**	G001205
	**TH 110 - TH 110 XY_2**	G001080
	**TH 110 - TH 110 XZ**	G001083
	**TH 110 - TH 145 XY_2**	G001079
	**TH 110 - TH 145 XZ**	G001084
	**TH 145 - TH 145 XY_2**	G001081
	**TH 145 - TH 145 XZ**	G001085
	**TH 90 - TH 90 XY_1**	G001483
	**TH 90 - TH 90 XY_3**	G001483 + G001194
	**TH 110 - TH 110 XY_1**	G001173
	**TH 110 - TH 110 XY_2**	G001173 + G001060
	**TH 145 - TH 145 XY_1**	G001362
	**TH 145 - TH 145 XY_2**	G001362 + G001061

Tab. 60

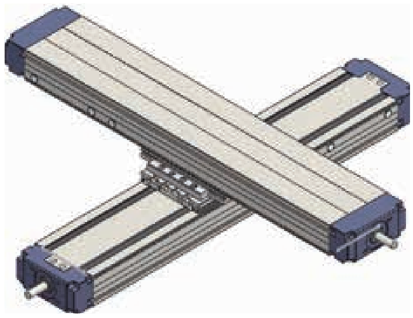

X-Y_1

Fig. 26

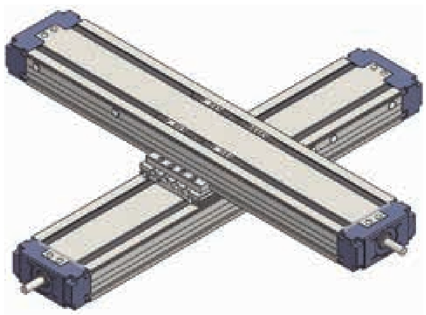

X-Y_1

Fig. 27

Wrap around kit

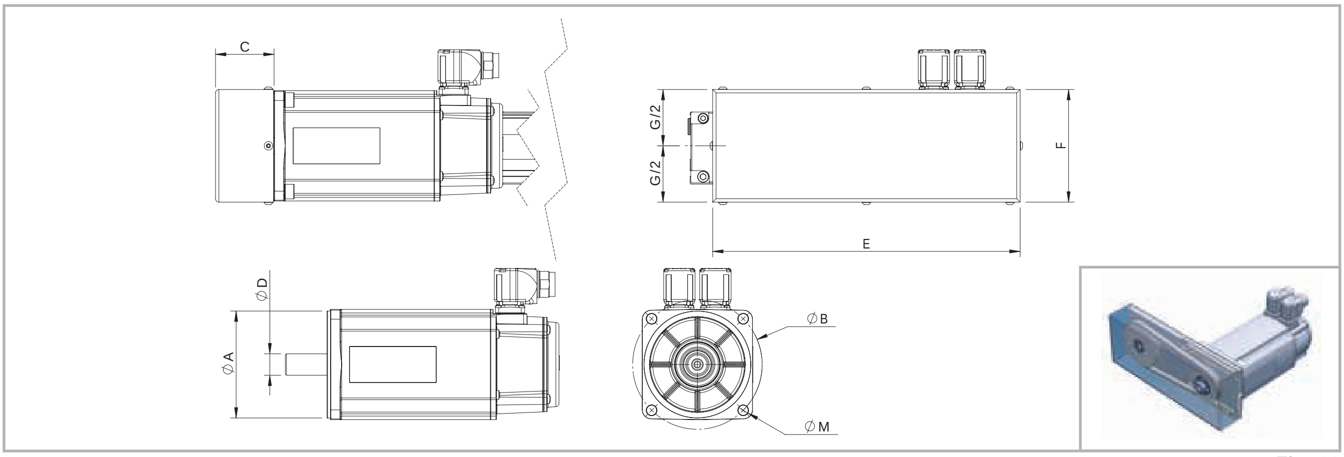


Fig. 28

Unit	Ratio	A	B	C	D	E	F	M	Code
TH 90	1 : 1	Ø 40	Ø 63	30	Ø 9	168	63	M4	G001592
TH 110	1 : 1	Ø 40	Ø 63	40.5	Ø 9	233	88	M4	G001011
TH 110	1 : 1	Ø 50	Ø 70	40.5	Ø 14	233	88	M4	G001055
TH 110	1 : 1	Ø 60	Ø 75	40.5	Ø 14	233	88	M6	G001013
TH 145	1 : 1	Ø 80	Ø 100	52	Ø 14	273	100	M6	G000984
TH 145	1 : 1	Ø 95	Ø 115	52	Ø 19	273	100	M8	G000988

Tab. 61

For further information please contact Rollon Technical Dept.

Mounting of the motor

Rollon TH Series linear units can be supplied with different types of motor mounts, adapter flanges, and with torsionally stiff couplings for screw and motor connections that enable fast, hassle-free assembly of the motors.

The types of bells available for the related units are shown in the table motor mounts:

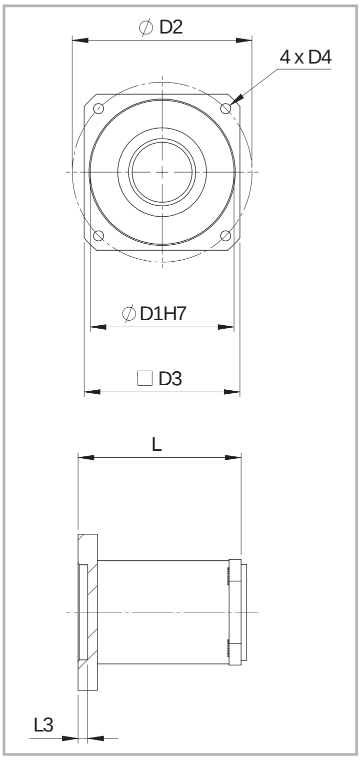


Fig. 29

Unit	D1	D2	D3	D4	L	L3	Code
TH70	Ø 30	Ø 45	38	M3	52	4	G002000
TH70	Ø 40	Ø 63	54	M4	49	3.5	G002001
TH70	Ø 50	Ø 70	60	M4	59	4	G002002
TH90	Ø 40	Ø 63	56	M5	50	3	G001192
TH110	Ø 60	Ø 75	65	M6	68	4	G001051
TH110	Ø 73,1	Ø 98,4	86	M5	76.7	2	G001074
TH110	Ø 60	Ø 75	65	M5	68	4	G001119
TH110	Ø 50	Ø 70	65	Ø 5.4	75	11	G001200
TH145	Ø 50	Ø 70	80x60	M4	92	21	G000979
TH145	Ø 70	Ø 85	80x85	M6	92	4	G001066
TH145	Ø 70	Ø 90	80x85	M5	92	5	G001067
TH145	Ø 80	Ø 100	90	M6	92	4	G001068
TH145	Ø 50	Ø 65	80x85	M5	92	21	G001069
TH145	Ø 60	Ø 75	80x85	M6	92	4	G001070
TH145	Ø 50	Ø 70	80x85	M5	92	21	G001071
TH145	Ø 73	Ø 98,4	85	M5	92	4	G001072
TH145	Ø 55	68X40	85x60	Ø6,4	82	11	G001073

Tab. 62

Ordering key

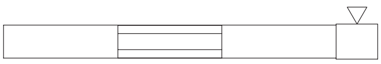
Identification code for the TH linear units

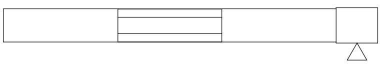
H	09	1205	5P	0800	1A
	07=70	08-2.5	5P=ISO 5		1A=SP2 set for motor bell kit
	09=90	12-05	7N=ISO 7		2A=SP4 set for motor bell kit
	11=110	12-10			3A=SP2 set for wrap around kit
	14=145	16-05			4A=SP4 set for wrap around kit
		16-10			
		16-16			
		20-05			
		20-20			
		25-10			
					Head configuration code
				L=total length of th unit	
			Type *see from pg. PS-4 to pg. PS-11, tab. 5, 10, 15, 21, 27, 33*		
		B/S diameter and lead			
	Size *see from pg. PS-4 to pg. PS-11*				
Linear unit serie TH *see pg. PS-2*					

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

Configure Actuator

Left / right orientation


Right


Left

TT series

TT series description

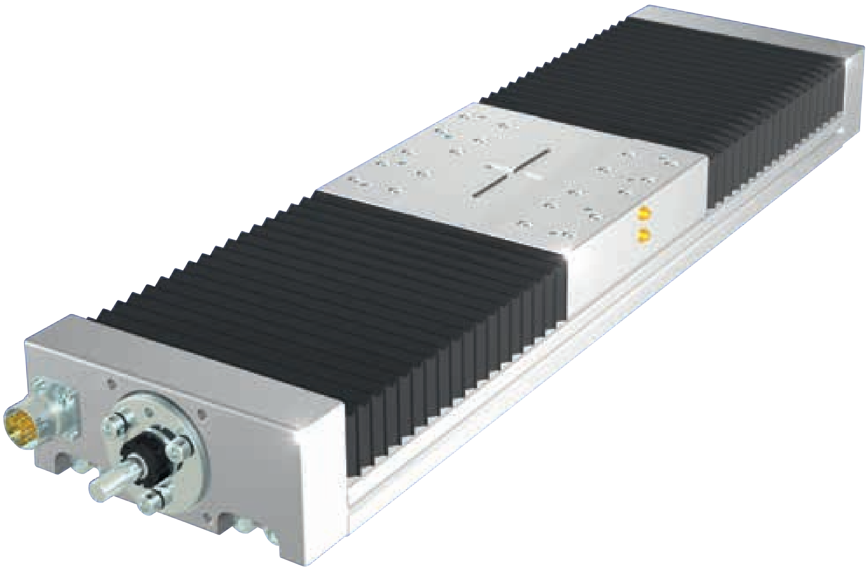


Fig. 30

TT

The TT is a linear actuator series mainly used for high accuracy positioning within a 10 µm range and precision repeatability within 5 µm. Manufactured using a very rigid extruded anodized aluminum base structure, this actuator series is designed for high loads and precise movements that are typically required in machine tools and other exacting machine design applications.

All mounting surfaces and reference datums have been produced to significantly reduce the deviations of pitch, yaw and roll along the entire stroke. The heavy duty carriage is driven by a C5 or C7 preloaded ball screw drive and the payload is supported by a system of four runner blocks mounted on two parallel linear guides. High speeds can be accomplished by specifying available super lead ball screw drivers.

The TT series contains all the necessary features and hardware to make multi-axis configurations and assembly easy. All TT units are 100% inspected and supplied with certificates of accuracy.

The components

Aluminum base unit and carriage

The base and carriages of the Rollon TT series linear units were designed and manufactured in co-operation with industry experts to obtain the high-level of accuracy and maximize mechanical properties. Anodized aluminum alloy 6060 was used with dimensional tolerances complying with UNI 3879 standards. To guarantee highly precise movement, the bodies are precision machined on all outer surfaces and in the areas where the mechanical components are fitted, such as ball bearing guides and ball screw supports.

Linear motion system

Precision ball bearing guides with ground rails and preloaded blocks are used on Rollon TT series linear units. Use of this technology makes it possible to obtain the following features:

- **High accuracy running parallelism**
- **High positioning accuracy**
- **High level of rigidity**
- **Reduced wear**
- **Low resistance to movement**

Drive system

Rollon TT-series linear units use precision ball screws with either preloaded or non-preloaded ball screw nuts. The standard precision class of the ball screws used is ISO 5, however ISO 7 precision class is also available upon request. The ballscrew on the TH unit is available in different diameters and leads (see specifications tables). Use of this type of technology makes it possible to obtain the following features:

- **High speed (for long pitch screws)**
- **High load capacity and accurate thrust forces**
- **Superior mechanical performance**
- **Reduced wear**
- **Low resistance to movement**

Protection

Rollon TT-series linear units are equipped with bellows in order to protect the mechanical and electrical components inside the linear unit against contaminants. In addition to the bellows system, the ball bearing guides and ball screws have their own protection including scrapers and lip seals to remove contaminates from the raceways of the ball bearings.

General data about aluminum used: AL 6060

Chemical composition [%]

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

Tab. 63

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. 64

Mechanical characteristics

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

Tab. 65

TT 100

TT 100 Dimensions

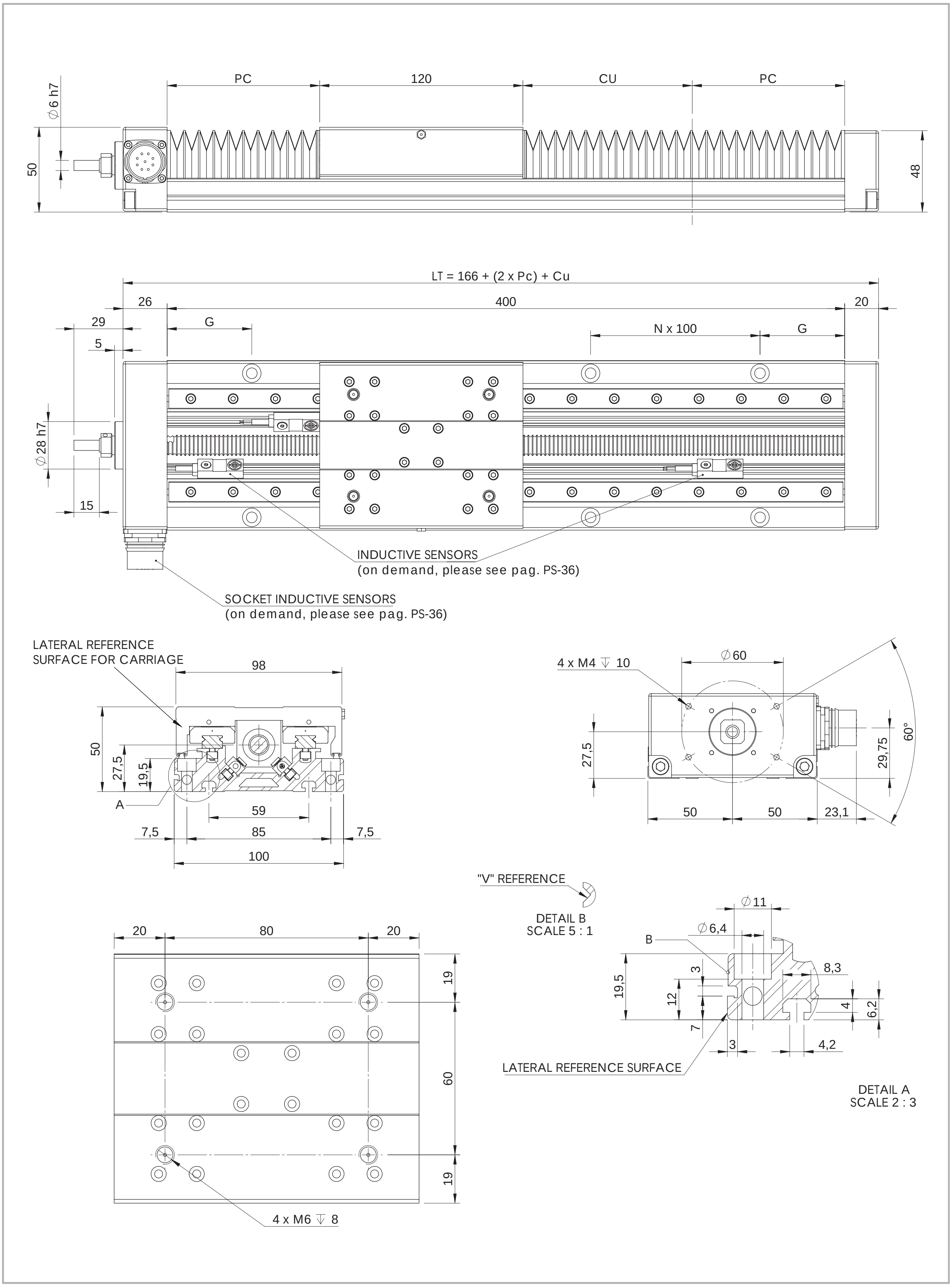


Fig. 31

Technical data

Useful stroke CU [mm]	Total length LT [mm]	G Dimension [mm]	Weight [Kg]
46	246	50	2.5
114	346	50	3
182	446	50	4
252	546	50	5
320	646	50	6
390	746	50	7
458	846	50	7
526	946	50	8
596	1046	50	9
664	1146	50	10
734	1246	50	11
802	1346	50	11
940	1546	50	13

Note: for the ballscrew 12/10 the max. useful stroke is 664 mm.

Tab. 66

Technical data

	Type
	TT 100
Max. speed [m/s]	See page PS-35
Carriage weight [kg]	0.93
Rail size [mm]	12 mini

Tab. 68

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]
TT 100	0.006	0.144	0.150

Tab. 69

Ball screw precision

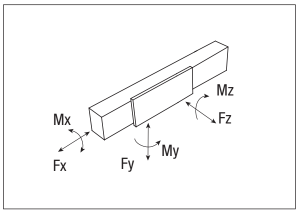
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TT 100 / 12-05	0.023	0.05	0.01	0.02
TT 100 / 12-10	0.023	0.05	0.01	0.02

Tab. 67

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn.
TT 100	12-05	9000	4300

Tab. 70



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TT 100	9980	6280	9980	274	349	349

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

Tab. 71

TT 155

TT 155 Dimensions

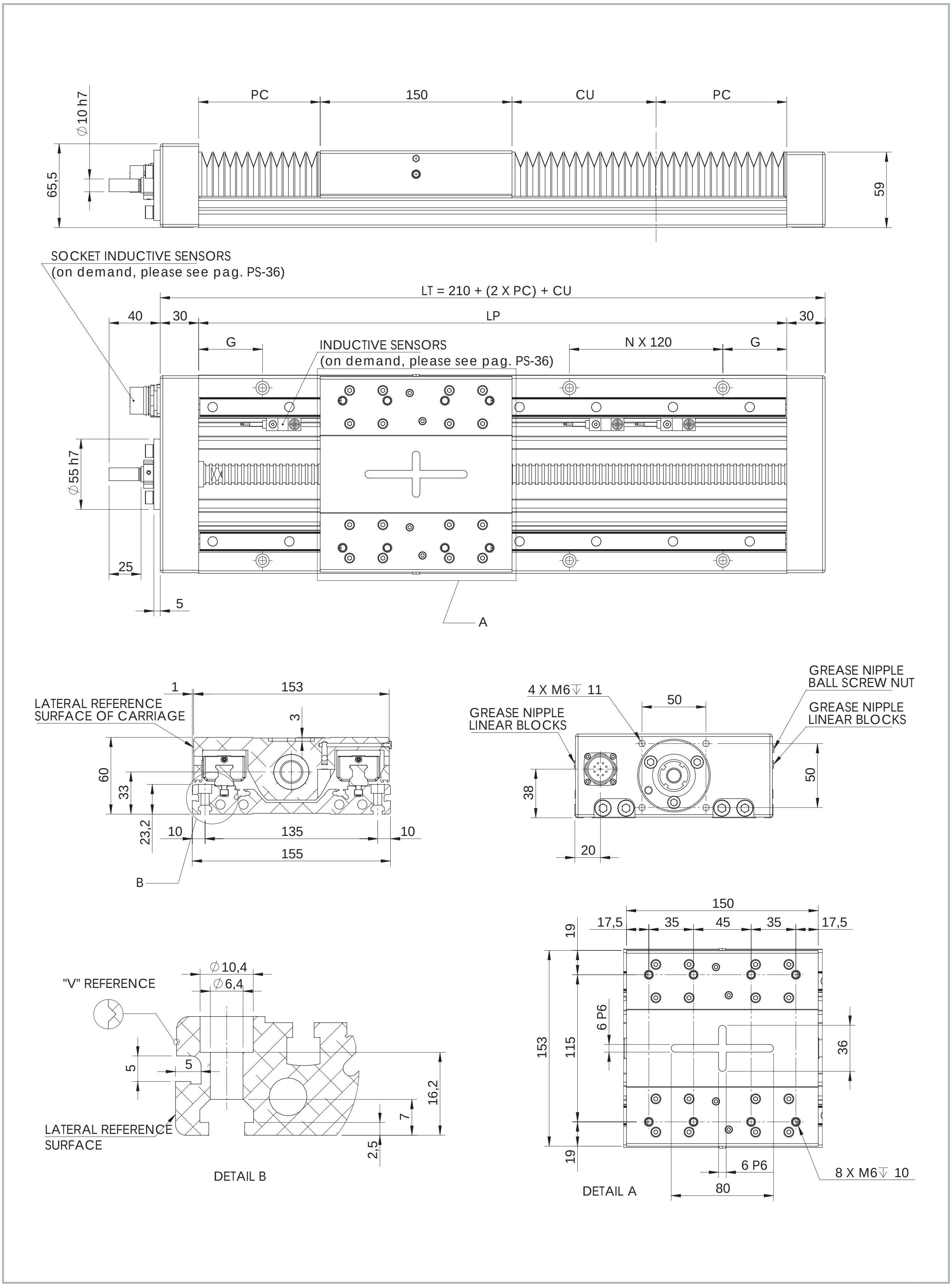


Fig. 32

Technical data

Useful stroke CU [mm]	Total length LT [mm]	G Dimension [mm]	Weight [Kg]
92	340	20	7.5
140	400	50	8.5
188	460	20	9
236	520	50	10
282	580	20	11
330	640	50	12
378	700	20	13
424	760	50	13
520	880	50	15
614	1000	50	17
710	1120	50	18
806	1240	50	20
900	1360	50	21
994	1480	50	23
1090	1600	50	25
1184	1720	50	26
1280	1840	50	28
1376	1960	50	30
1470	2080	50	31

Note: for the ballscrew Ø16 the max. useful stroke is 994 mm.

Tab. 72

Technical data

	Type
	TT 155
Max. speed [m/s]	See page PS-35
Carriage weight [kg]	2.93
Rail size [mm]	15

Tab. 74

PS

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]
TT 155	0.009	0.531	0.54

Tab. 75

Ball screw precision

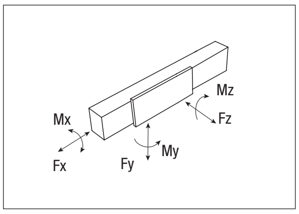
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TT 155 / 16-05	0.023	0.05	0.005	0.045
TT 155 / 16-10	0.023	0.05	0.005	0.045
TT 155 / 20-05	0.023	0.05	0.005	0.045
TT 155 / 20-20	0.023	0.05	0.005	0.045

Tab. 73

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn.
TT 155	16-05	17400	11800
	16-10	18300	10500
	20-05	25900	14600
	20-20	23900	13400

Tab. 76



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TT 155	96800	45082	96800	5082	2972	2972

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

Tab. 77

TT 225

TT 225 Dimensions

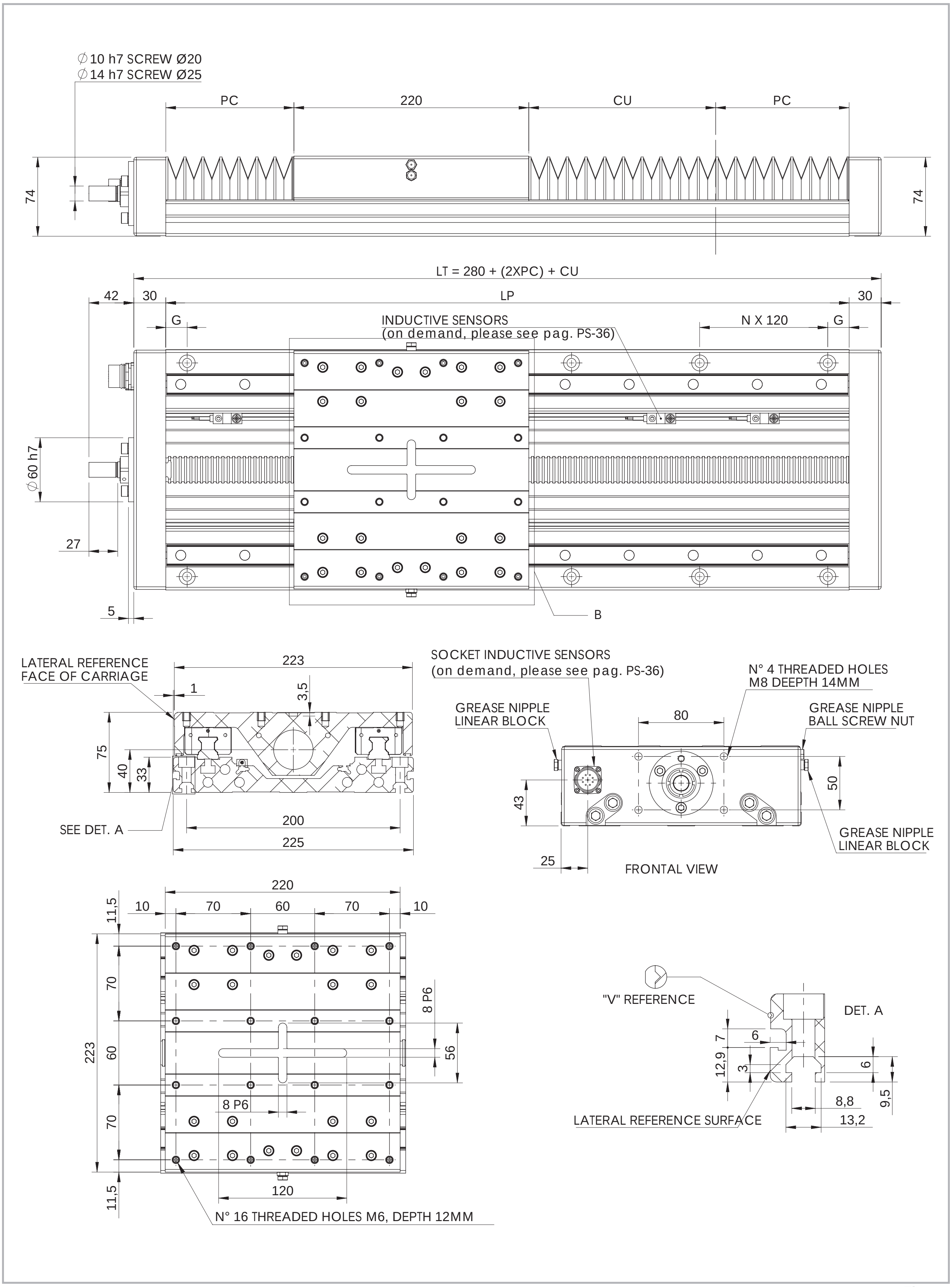


Fig. 33

Technical data

Useful stroke CU [mm]	Total length LT [mm]	G Dimension [mm]	Weight [Kg]
92	400	50	15
144	460	20	16
196	520	50	17
248	580	20	19
300	640	50	20
352	700	20	21
404	760	50	23
508	880	50	25
612	1000	50	28
714	1120	50	31
818	1240	50	33
922	1360	50	36
1026	1480	50	39
1234	1720	50	44
1440	1960	50	49
1648*	2200	50	54
1856*	2440	50	60
2062*	2680	50	65
2270*	2920	50	70

Note: for the ballscrew Ø20 the max. useful stroke is 1440 mm.
* For the indicated lengths Rollon does not guarantee the tolerance values shown on pag. PS-33

Tab. 78

Technical data

	Type
	TT 225
Max. speed [m/s]	See page PS-35
Carriage weight [kg]	5.4
Rail size [mm]	20

Tab. 80

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]
TT 225	0.038	2.289	2.327

Tab. 81

Ball screw precision

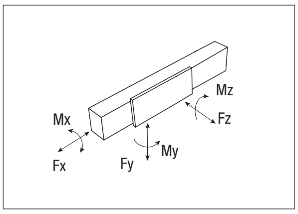
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TT 225 / 20-05	0.023	0.05	0.005	0.045
TT 225 / 20-20	0.023	0.05	0.005	0.045
TT 225 / 25-05	0.023	0.05	0.005	0.045
TT 225 / 25-10	0.023	0.05	0.005	0.045
TT 225 / 25-25	0.023	0.05	0.005	0.045

Tab. 79

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn.
TT 225	20-05	25900	14600
	20-20	23900	13400
	25-05	41200	19800
	25-10	32600	16000
	25-25	30500	15100

Tab. 82



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TT 225	153600	70798	153600	12288	9984	9984

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

Tab. 83

TT 310

TT 310 Dimensions

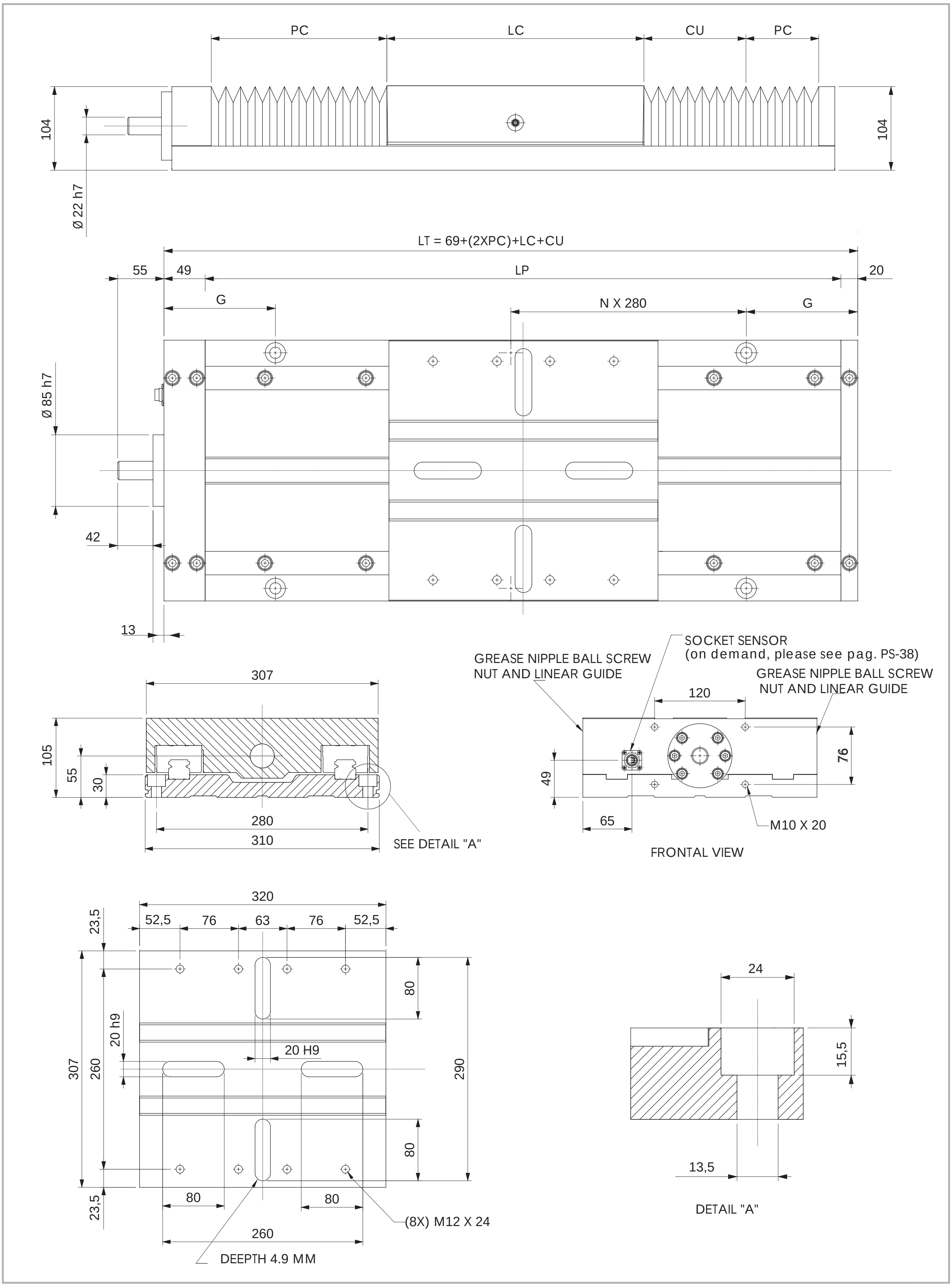


Fig. 34

Technical data

Useful stroke CU [mm]	Total length LT [mm]	G Dimension [mm]	Weight [Kg]
100	560	140	47
150	625	172.5	50
200	690	65	53
250	760	100	56
300	825	132.5	59
350	895	167.5	62
400	965	62.5	65
450	1030	95	68
500	1100	130	71
600*	1235	197.5	77
800*	1505	192.5	89
1000*	1750	175	100
1200*	2000	160	111
1600*	2495	127.5	133
2000*	2990	235	156
2400*	3485	202.5	178
3000*	4225	292.5	211

* For the indicated lengths Rollon does not guarantee the tolerance values shown on pag. PS-33

Tab. 84

Technical data

	Type
	TT 310
Max. speed [m/s]	See page PS-36
Carriage weight [kg]	16.6
Rail size [mm]	30

Tab. 86

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]
TT 310	0.1251	8.56	8.008

Tab. 87

Ball screw precision

Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TT 310 / 32-05	0.023	0.05	0.008	0.045
TT 310 / 32-10	0.023	0.05	0.008	0.045
TT 310 / 32-32	0.023	0.05	0.008	0.045

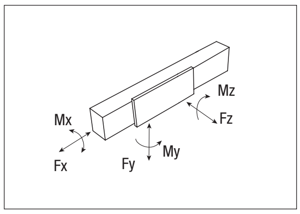
Tab. 85

Load capacity F_x

Type	F_x *1 [N]		
	Screw	Stat.	Dyn.
TT 310	32-05	11538	8947
	32-10	11538	8947
	32-32	11538	8947

*1 Referred to the Max axial load on the bearings not the Ball Screw

Tab. 88



Load capacity

Type	F_y [N]		F_z [N]		M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.
TT 310	230500	128492	274500	146031	30195	26625	22365

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

Tab. 89

PS

Lubrication

TT linear units with ball bearing guides

TT Linear units are equipped with self lubricating linear ball guides. The ball bearing carriages are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents mis-alignment of these in the circuits.
This system guarantees a long interval between maintenances: every 2000 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.

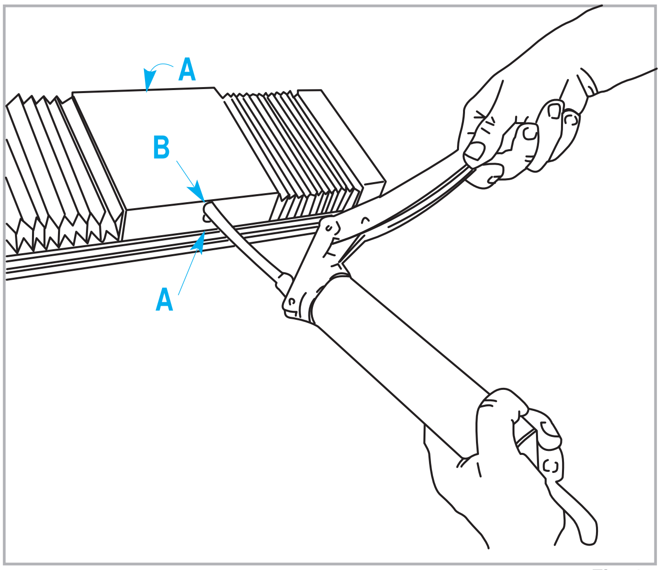


Fig. 35

- Insert the tip in the specific grease nipples:
A - Linear block - B - Ball screw nut
- Type of lubricant: Lithium soap grease of class 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 block re-lubrication at each point:

Type	Quantity [cm³] for grease nipple
TT 100	1.4
TT 155	1.4
TT 225	2.8
TT 310	5.6

Tab. 90

Ball screws

The ball screw nuts of Rollon TT series linear units must be relubricated every 100 km.

Standard lubrication

Lubrication of the ball bearing blocks and the ball screw nut is facilitated by grease nipples located on the sides of the carriage of the Rollon TT series actuators. The linear units are lubricated with class NLGI2 lithium soap grease.

Amount of lubricant recommended for ball screw nut re-lubrication

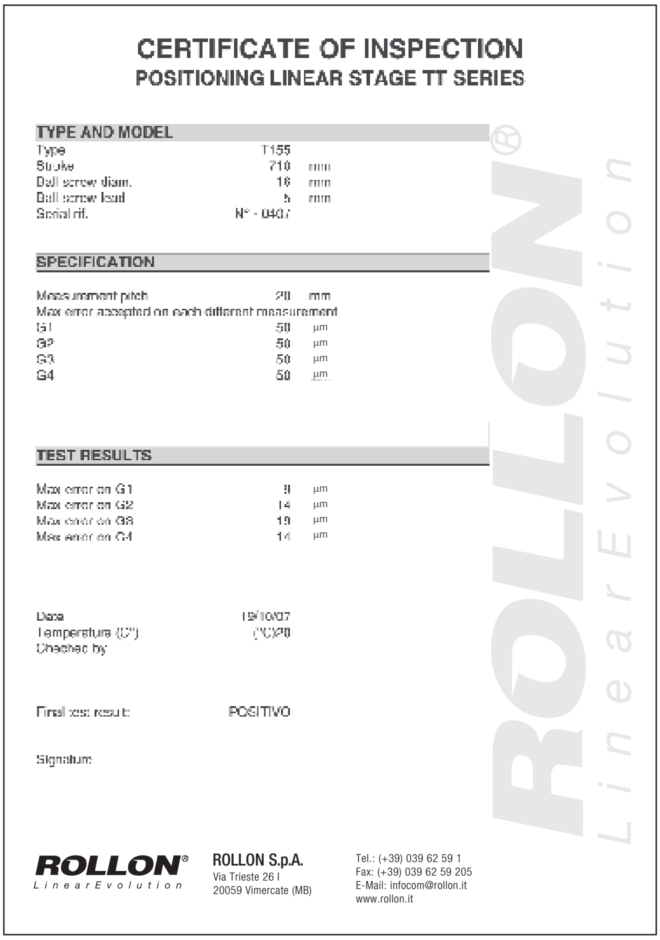
Type	Quantity [cm³] for grease nipple
12-05	0.3
12-10	0.3
16-05	0.41
16-10	0.78
20-05	0.79
20-20	1
25-05	1.2
25-10	1.2
25-25	1.58
32-05	1.8
32-10	2.0
32-32	3.0

Tab. 91

Accuracy certificate

The Rollon TT series linear units are high accurate products. The base and the carriages are made of aluminum extrusions that are manufactured by means of high precision machining of all external faces and all mounting surfaces of mechanical components (linear guides, ball screw supports, etc.). This results in excellent repeatability, positioning accuracy and running parallelism. Rollon TT series linear units are 100% tested and will be delivered with a certificate of accuracy.

The certificate shows all parallel tolerances during the movement of the carriage on the base unit. The figures can be used for eventual electronic compensations during the movement of the linear units.
The maximum deviations are shown as follows:
G1 - rolling 50 μm
G2 - pitching 50 μm
G3 - yawing 50 μm
G4 - parallelism carriage/base unit 50μm


CERTIFICATE OF INSPECTION
POSITIONING LINEAR STAGE TT SERIES

TYPE AND MODEL
Type T155
Stroke 710 mm
Ball screw diam. 16 mm
Ball screw lead 5 mm
Serial rif. N° - 0407

SPECIFICATION
Measurement pitch 20 mm
Max error accepted on each different measurement
G1 50 µm
G2 50 µm
G3 50 µm
G4 50 µm

TEST RESULTS
Max error on G1 9 µm
Max error on G2 14 µm
Max error on G3 15 µm
Max error on G4 14 µm

Data 19/10/07
Temperatura (C°) (°C)20
Checked by

Final test result POSITIVO

Signature

ROLLON® LinearEvolution
ROLLON S.p.A.
Via Trieste 26 I
20059 Vimercate (MB)
Tel.: (+39) 039 62 59 1
Fax: (+39) 039 62 59 205
E-Mail: infocom@rollon.it
www.rollon.it

Type	Screw	Fixing torques screws 12.9	
		On aluminum	On steel
TT 100	M6	10 Nm	14 Nm
TT 155	M6	10 Nm	14 Nm
TT 225	M8	15 Nm	30 Nm
TT 310	M12	60 Nm	120 Nm

Tab. 92

Note :Values for base unit length (Lt) <_ 2000 mm
These values are measured while linear unit is fixed with brackets on a reference table with parallelism error < 2 μm.
The fixing torques of the bolt must follow the indicated values in the table.

ATTENTION: The mentioned accuracy grades are valid only if the linear unit is fixed on a continuous mounting surface with the same length. The errors of the mounting surface may negatively influence the accuracy of the Rollon linear unit. Rollon does not guarantee the above mentioned parallelism tolerances for applications when the linear unit is mounted without support or as a cantilever.

The graphs below show an example of measurement of accuracy along the stroke the deviation is given.
Each actuator delivered is provided with the graphs.

Precision G1

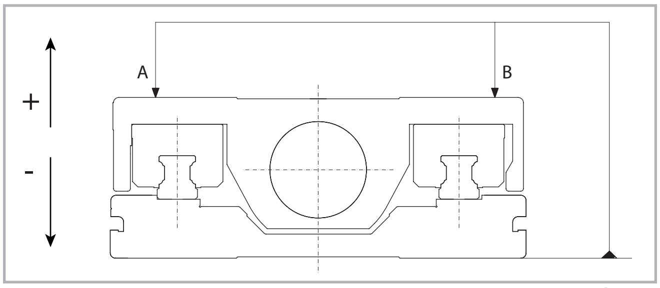
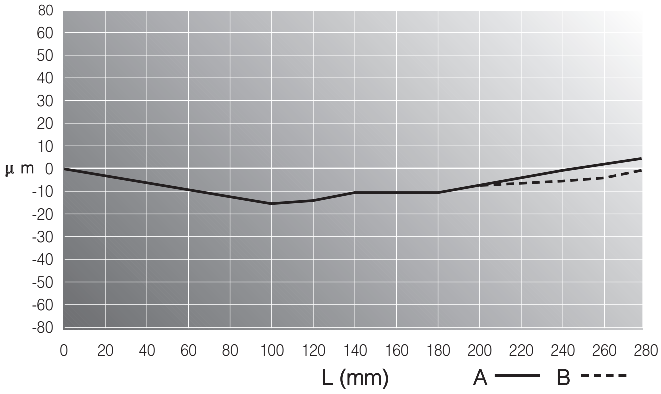


Fig. 36



Precision G2

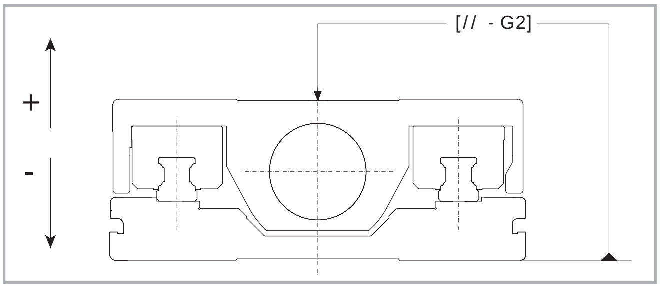
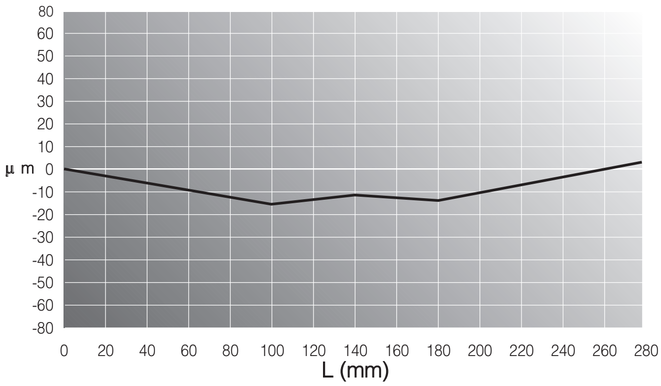


Fig. 37



Precision G3

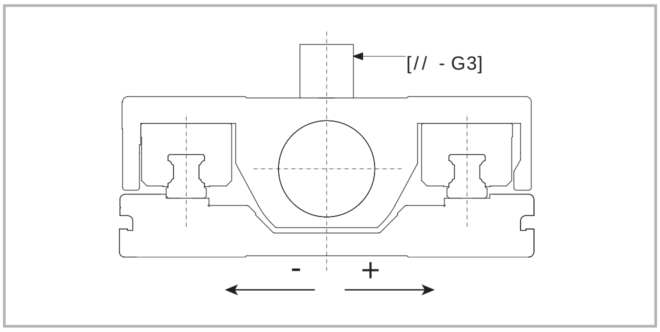
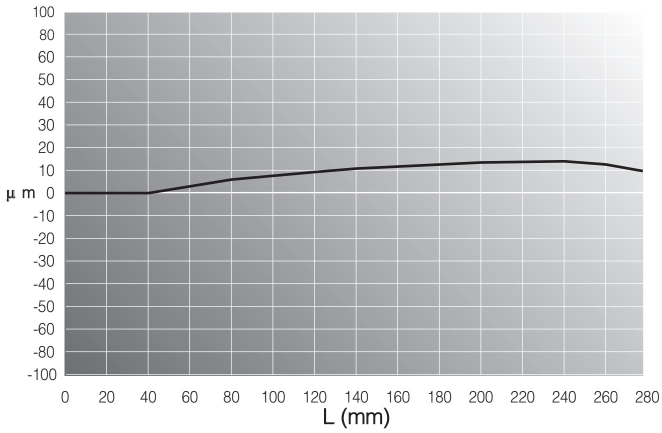


Fig. 38



Precision G4

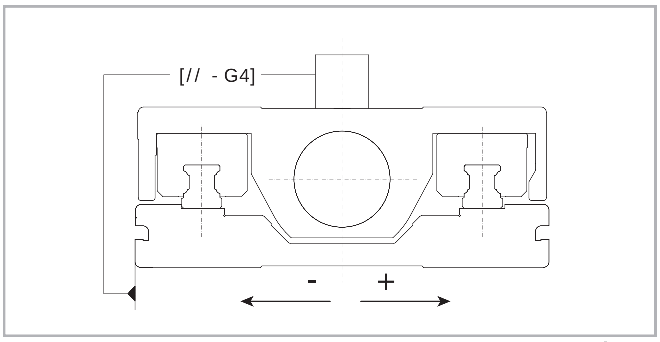
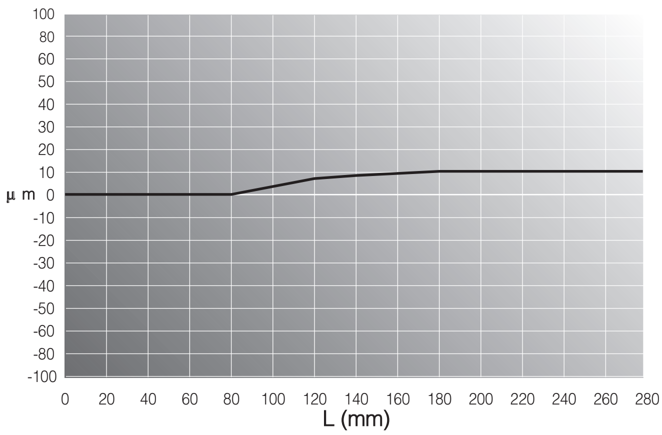


Fig. 39



Critical speed

The maximum linear speed of Rollon TT series linear units depends on the critical speed of the screw (based on its diameter and length) and on the max. permissible speed of the ball screw nut used.

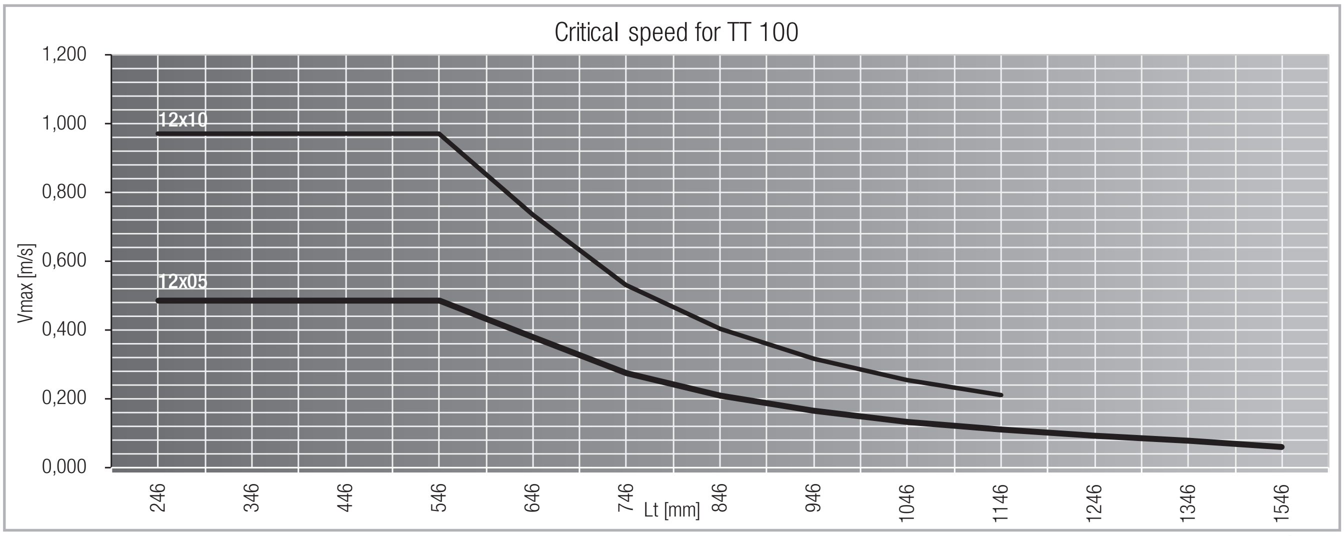


Fig. 40

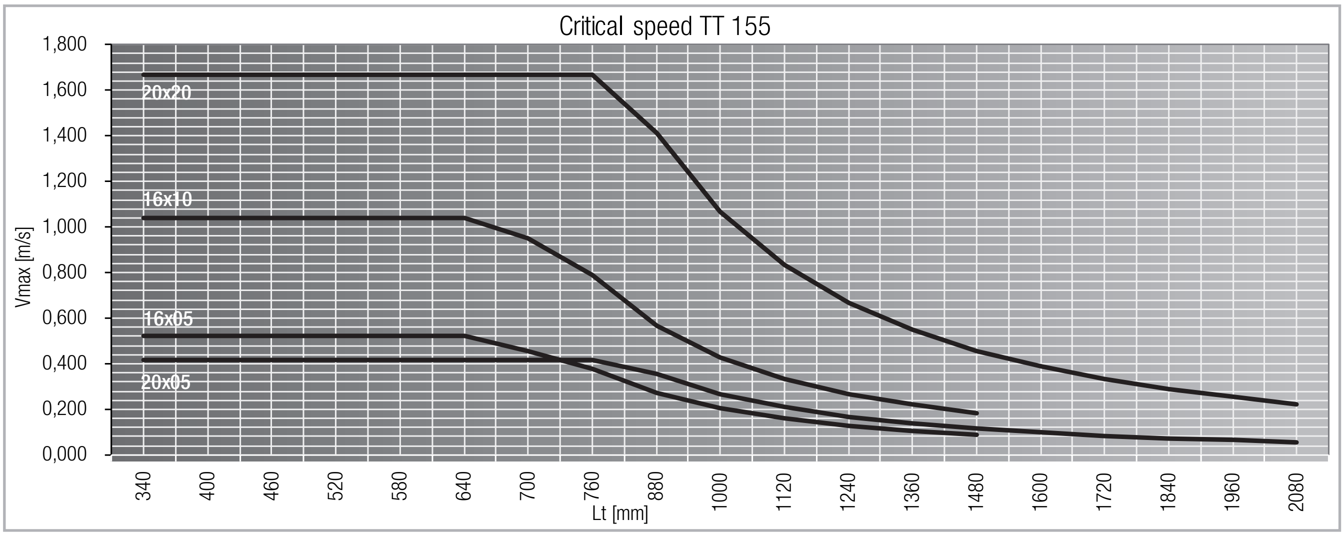


Fig. 41

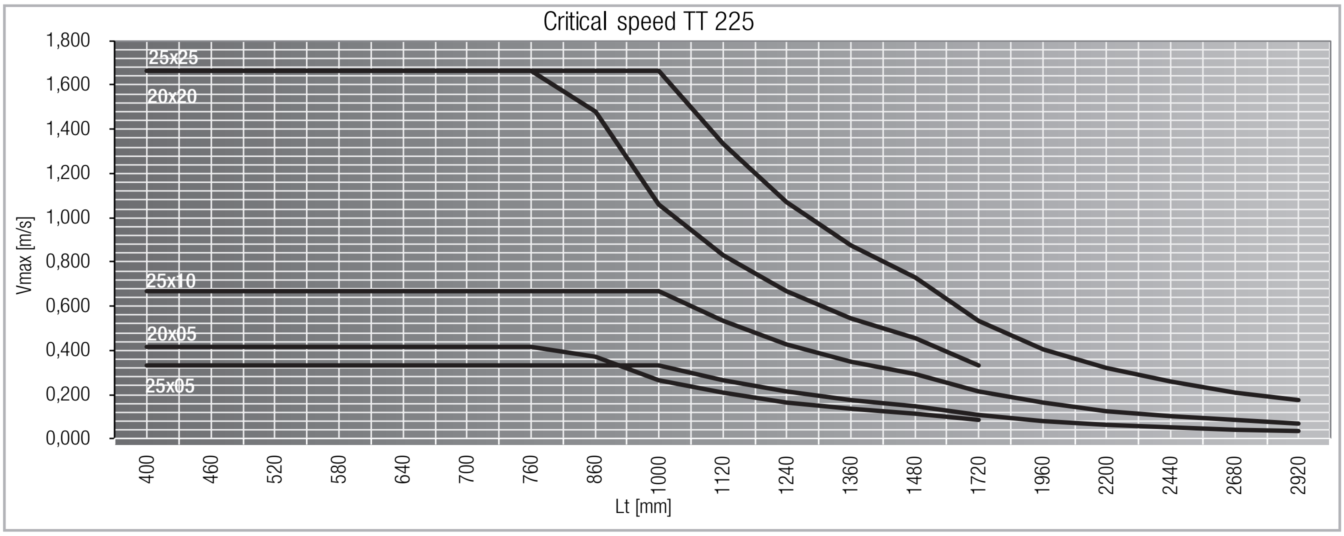


Fig. 42

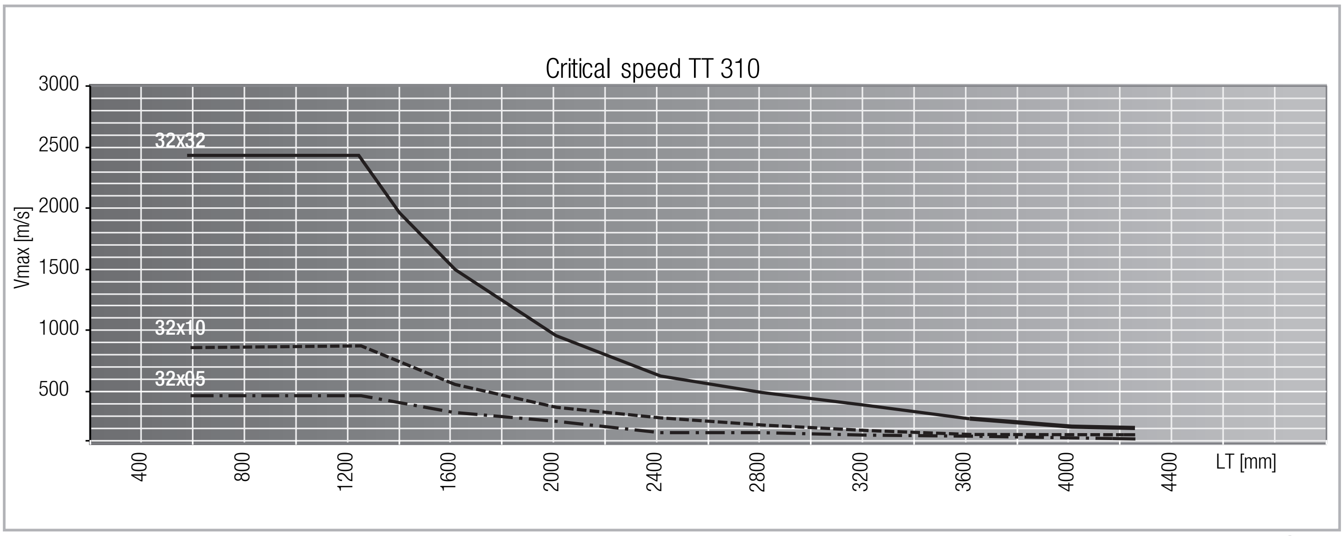


Fig. 43

Accessories

Mounting of the motor

Rollon TT Series linear units can be supplied with different types of motor mounts, adapter flanges, and with torsionally stiff couplings for screw and motor connections that enable fast, hassle-free assembly of the motors.

The types of bells available for the related units are shown in the table motor mounts:

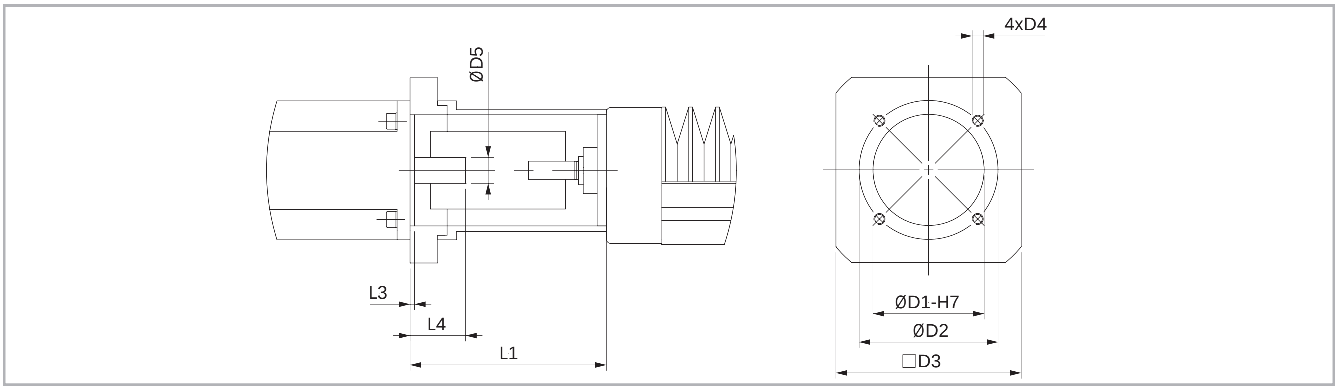


Fig. 44

Units [mm]

Type of unit	Ø D1	Ø D2	Ø D3	D4	Ø D5		L1	L3	L4		Kit code
					min.	max.			min.	max.	
TT 100	60	75	65	M6	5	16	68	4	25	27	G000321
	73.1	98.4	86	M5	5	16	76.7	2	33.7	35.7	G000322
	40	64.5	65	M5	5	16	68	4	25	27	G000336
	50	70	65	M5	5	16	77.5	3.5	34.5	36.5	G000433
TT 155	70	85	80	M6	10	20	90	4	20	34	G000311
	70	90	80	M5	10	20	90	5	20	34	G000312
	80	100	90	M6	10	20	90	4	20	34	G000313
	50	65	80	M5	10	20	90	5	20	34	G000314
	60	75	80	M6	10	20	90	4	20	34	G000315
	50	70	80	M5	10	20	90	5	20	34	G000316
	73	98.4	85	M5	10	20	90	4	20	34	G000317
	55.5	125.7	105	M6	10	20	100	5	30	44	G000318
	60	99	85	M6	10	20	98	4	28	42	G000319
TT 225	80	100	100	M6	10	28	106	5	30	48	G000302
	95	115	100	M8	10	28	106	5	30	48	G000303
	110	130	115	M8	10	28	106	5	30	48	G000304
	60	75	100	M6	10	28	106	5	30	48	G000305
	70	85	100	M6	10	28	106	5	30	48	G000306
	70	90	100	M5	10	28	106	5	30	48	G000307
	50	70	96x75	M4	10	28	101	4	30	48	G000308
	55.5	125.7	105	M6	10	28	106	5	30	48	G000309
	73.1	98.4	96	M5	10	28	101	3	30	48	G000310
	130	165	150	M10	10	28	106	5	30	48	G000363
TT 310	Option										

Tab. 93

Fixing by brackets

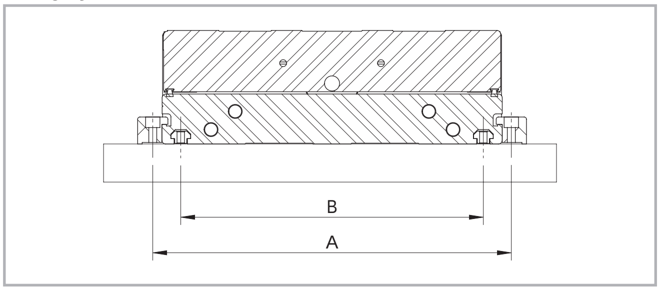


Fig. 45

Type	A Unit mm	B Unit mm
TT 100	112	59
TT 155	167	135
TT 225	237	200

Tab. 94

Fixing brackets

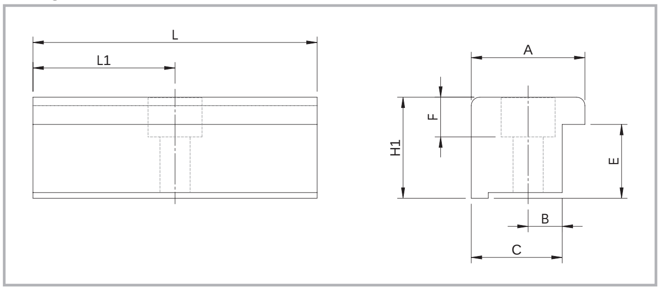


Fig. 46

Type	A	B	C	E	F	D1	D2	H1	L	L1	Code Rollon
TT 100	18.5	6	16	7	4.5	9.5	5.3	9.8	50	25	1002353
TT 155	20	6	16	11	7	9.5	5.3	15.8	50	25	1002167
TT 225	20	6	16	13	7	9.5	5.3	17.8	50	25	1002354

Tab. 98

T nuts

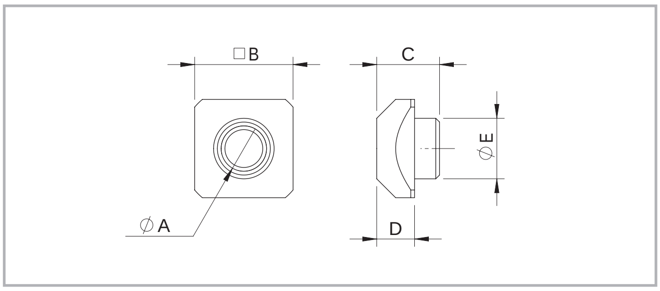


Fig. 47

Type	Ø A	□B	C	D	Ø E	Code Rollon
TT 100	M4	8	-	3.4	-	1001046
TT 155	M5	10	6.5	4.2	6.7	1000627
TT 225	M6	13	8.3	5	8	1000043

Tab. 99

Proximity	Type	PNP-NO	PNP-NC
	TT 100	G001981	G001980
	TT 155	G001981	G001980
	TT 225	G001981	G001980
	TT 310	/	/

Tab. 95

End cap	Type	Code
	TT 100	G000245
	TT 155	G000244
	TT 225	G000244
	TT 310	/

Tab. 100

Cable Strain Relief	Type	Code
	TT 100	G000249
	TT 155	G000248
	TT 225	G000248
	TT 310	/

Tab. 96

9 Pin Fixed Connector	Type	Code
	TT 100	G000191
	TT 155	G000191
	TT 225	G000191
	TT 310	/

Tab. 101

9 Pin Back-Shell Connector	Type	To crimp	To solder
	TT 100	6000516	6000589
	TT 155	6000516	6000589
	TT 225	6000516	6000589
	TT 310	/	/

Tab. 97

Assembly kits

The Rollon TT series linear units must be mounted to the application's surface in an appropriate way in order to achieve maximum accuracy of the system. The evenness of the mounting surface determines the final result of the movement of the system.The aluminum base and the carriage of the Rollon TT linear units have a lateral reference surface, indicated by a groove (except on the TT 310). On the carriage's surface are two reference slots at 90° angles, useful for accurate mounting of X-Y-systems. The Rollon TT series linear units can be fixed to the mounting surface from above the base unit by screws (fig. 48), through T-slots (fig. 49), or through appropriate mounting brackets (fig. 50), depending on the application. For high accuracy applications, Rollon recommends bolting the unit down from above. For mounting dimensions please refer to the dimensional drawings of the units.

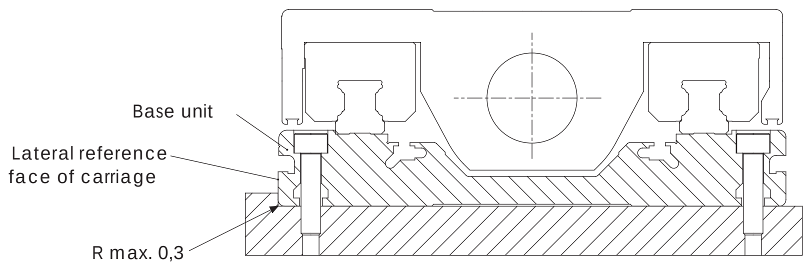


Fig. 48

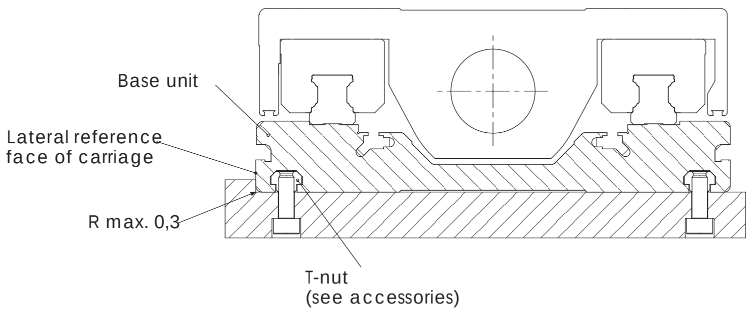


Fig. 49

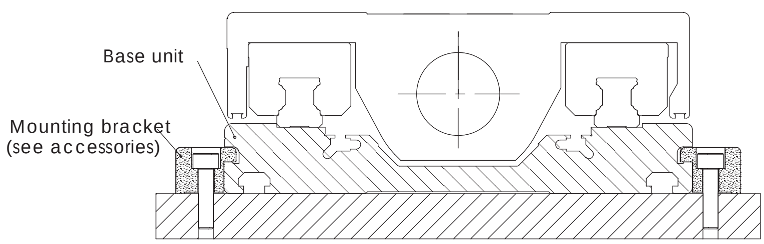


Fig. 50

Ordering key

Identification code for the TT linear units

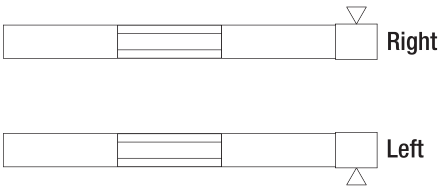
T	10	1205	5P	0880	1A
	10=100	12-05	5P=ISO 5		
	15=155	12-10	7N=ISO 7		
	22=225	16-05			
	31=310	16-10			
		20-05			
		20-20			
		25-05			
		25-10			
		25-25			
		32-05			
		32-10			
		32-32			

- 1A: Head configuration code
- 0880: L=total length of th unit
- 5P: Type *see from pg. PS-24 to pg. PS-30*
- 1205: B/S diameter and lead *see from pg. PS-24 to pg. PS-30*
- 10: Size *see from pg. PS-24 to pg. PS-30*
- T: Linear unit series TT *see pg. PS-22*

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

Configure Actuator

Left / right orientation



TV series

TV series description

Fig. 51

TV

TV series linear units have a rigid anodized aluminum extrusion with a square cross-section. Transmission of motion is achieved by means of a precision C5 or C7 rolled ball screw drive.

The payload is supported by a dual block, single linear guide system which ensures high precision and high rigidity.

The components

Extruded bodies

The anodized aluminum extrusions used for the bodies of the Rollon TV series linear units were designed and manufactured in cooperation with a leading company in this field to obtain the accuracy and high mechanical properties necessary to accommodate the bending and torsional stresses. Aluminum alloy 6060 was used and was extruded with dimensional tolerances complying with EN 755-9 standards. T-slots are provided in the side and bottom faces to facilitate mounting.

Carriage

The carriage of the Rollon TV series linear units is made entirely of anodized aluminum. The dimensions vary depending on the size of the actuator. The carriage is installed on 2 linear runner blocks on a single linear guide rail.

Drive system

Rollon TV series linear units use a precision rolled ball screw. The standard precision class of the ball screw used is ISO 7 without a preloaded nut. ISO 5 precision class with preloaded nut is available upon request. The ball screws of linear units can be supplied with different diameter and leads. Use of this type of technology makes it possible to obtain the following features:

- **High speed (for long pitch screws)**
- **Highly accurate thrust**
- **Superior mechanical performance**
- **Reduced wear**
- **Low resistance to movement**

Protection

Rollon TV series linear units are equipped with an external steel protective strip in order to protect mechanical components inside the linear units against contaminants. A resin deflector compresses the steel strip on its own magnetic base with very low friction.

General data about aluminum used: AL 6060

Chemical composition [%]

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

Tab. 102

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

Tab. 103

Mechanical characteristics

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

Tab. 104

TV 60

TV 60 Dimensions

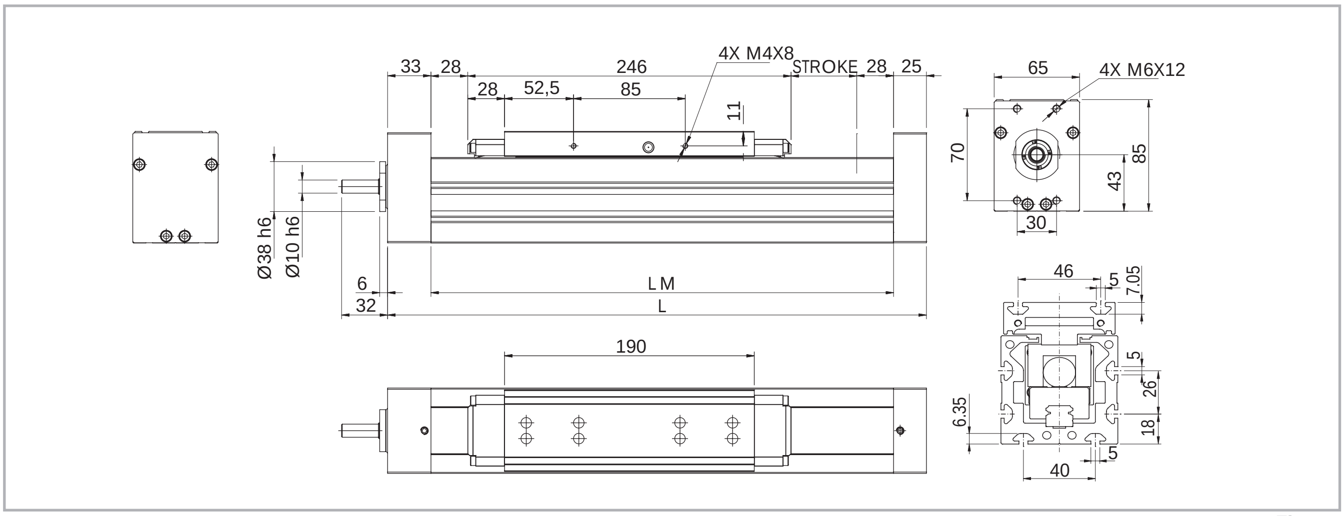


Fig. 52

Technical data

	Type
	TV 60
Max. useful stroke length [mm]	2000
Max. speed [m/s]	See page PS-47
Basement length LM [mm]	LT - 58
Total length LT [mm]	Stroke + 360
Carriage weight [kg]	1.41
Zero travel weight [kg]	4.6
Weight for 100 mm useful stroke [kg]	0.65
Rail size [mm]	15

Tab. 105

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]
TV 60	0.064	0.081	0.145

Tab. 107

Ball screw precision

Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TV 60 / 16-05	0.023	0.05	0.01	0.05
TV 60 / 16-10	0.023	0.05	0.01	0.05
TV 60 / 16-16	0.023	0.05	0.01	0.05

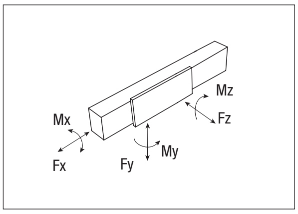
Tab. 106

Load capacity F_x

Type	F_x *1 [N]		
	Screw	Stat.	Dyn.
TV 60	16-05	4551	4327
	16-10	4551	4327
	16-16	4551	4327

*1 Referred to the Max axial load on the bearings not the Ball Screw

Tab. 108



Load capacity

Type	F_y [N]		F_z [N]		M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.
TV 60	35000	18000	35000	18000	286	1353	1353

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

Tab. 109

TV 80

TV 80 Dimensions

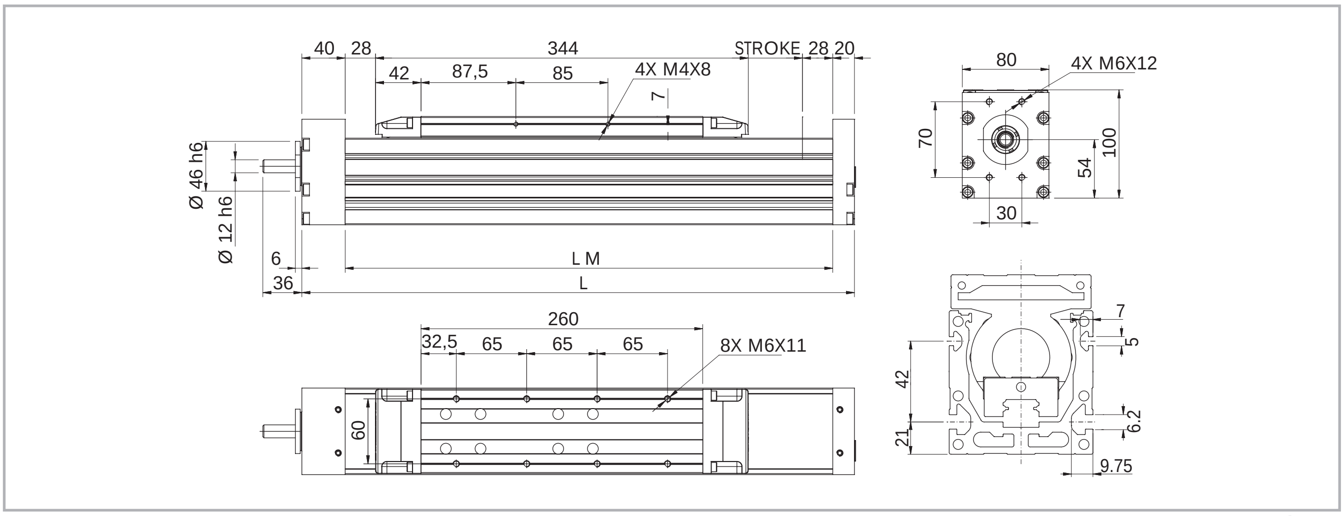


Fig. 53

Technical data

	Type
	TV 80
Max. useful stroke length [mm]	3000
Max. speed [m/s]	See page PS-47
Basement length LM [mm]	LT - 60
Total length LT [mm]	Stroke + 460
Carriage weight [kg]	2.5
Zero travel weight [kg]	7.8
Weight for 100 mm useful stroke [kg]	0.95
Rail size [mm]	20

Tab. 110

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]
TV 80	0.106	0.152	0.258

Tab. 112

Ball screw precision

Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TV 80 / 20-05	0.023	0.05	0.01	0.05
TV 80 / 20-20	0.023	0.05	0.01	0.05

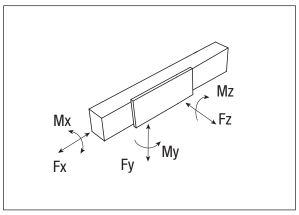
Tab. 111

Load capacity F_x

Type	F_x *1 [N]		
	Screw	Stat.	Dyn.
TV 80	20-05	5705	4912
	20-20	5705	4912

*1 Referred to the Max axial load on the bearings not the Ball Screw

Tab. 113



Load capacity

Type	F_y [N]		F_z [N]		M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.
TV 80	59900	34200	59900	34200	646	1573	1573

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

Tab. 114

TV 110

TV 110 Dimensions

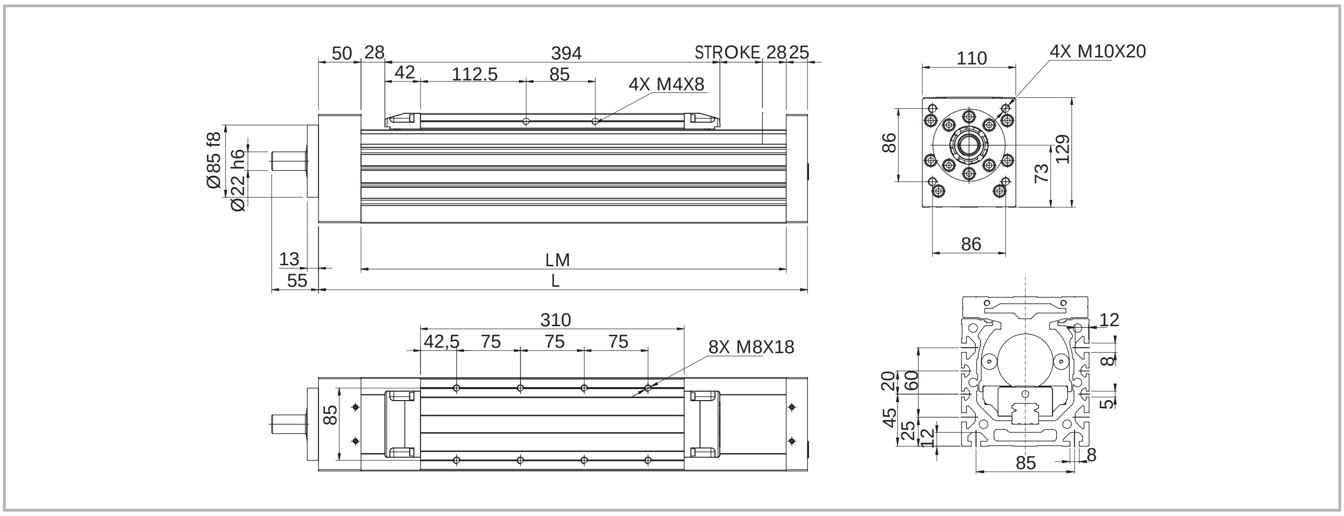


Fig. 54

Technical data

	Type
	TV 110
Max. useful stroke length [mm]	3000
Max. speed [m/s]	See page PS-47
Basement length LM [mm]	LT - 75
Total length LT [mm]	Stroke + 525
Carriage weight [kg]	5.33
Zero travel weight [kg]	16.8
Weight for 100 mm useful stroke [kg]	1.9
Rail size [mm]	25

Tab. 115

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]
TV 110	0.432	0.594	1.026

Tab. 117

Ball screw precision

Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TV 110 / 32-05	0.023	0.05	0.01	0.05
TV 110 / 32-10	0.023	0.05	0.01	0.05
TV 110 / 32-32	0.023	0.05	0.01	0.05

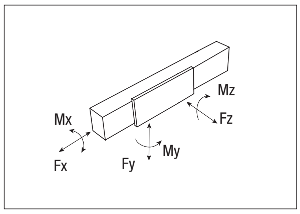
Tab. 116

Load capacity F_x

Type	F_x *1 [N]		
	Screw	Stat.	Dyn.
TV 110	32-05	11538	8947
	32-10	11538	8947
	32-32	11538	8947

*1 Referred to the Max axial load on the bearings not the Ball Screw

Tab. 118



Load capacity

Type	F_y [N]		F_z [N]		M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.
TV 110	85000	49600	85000	49600	1080	2316	2316

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

Tab. 119

Lubrication

TV 60, TV 80, TV 110 linear units

Rollon TV series linear units are equipped with ball bearing guides lubricated with grease lithium soap based grade 2. Re-lubrication is required every 3-6 months or approximately 2000 Km of linear travel. The application environment and applied loads may infl uence the re-lubrication periods.

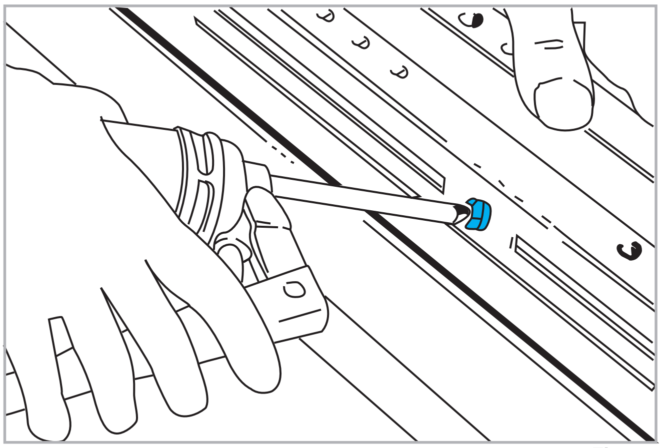


Fig. 55

- Type of lubricant: Lithium soap grease of class 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 block re-lubrication at each point:

Type	Quantity [g] of grease for each nipple
TV 60	1.4
TV 80	2.6
TV 110	5.0

Tab. 120

Ball screws

The ball screw nuts of Rollon TV series linear units must be re-lubricated every 100 km.

Grease Nipples position

The position of grease nipples for the linear blocks and for the ball screw nuts are indicated in the specific drawings of each product.

Amount of lubricant recommended for ball screw nut re-lubrication

Type	Quantity [g] for grease nipple
16-05	0.6
16-10	0.8
16-16	1.0
20-05	0.9
20-20	1.7
32-05	2.3
32-10	2.8
32-32	3.7

Tab. 121

Critical speed

The maximum linear speed of Rollon TV series linear units depends on the critical speed of the screw (based on its diameter and length) and on the max. permissible speed of the ball screw nut used.

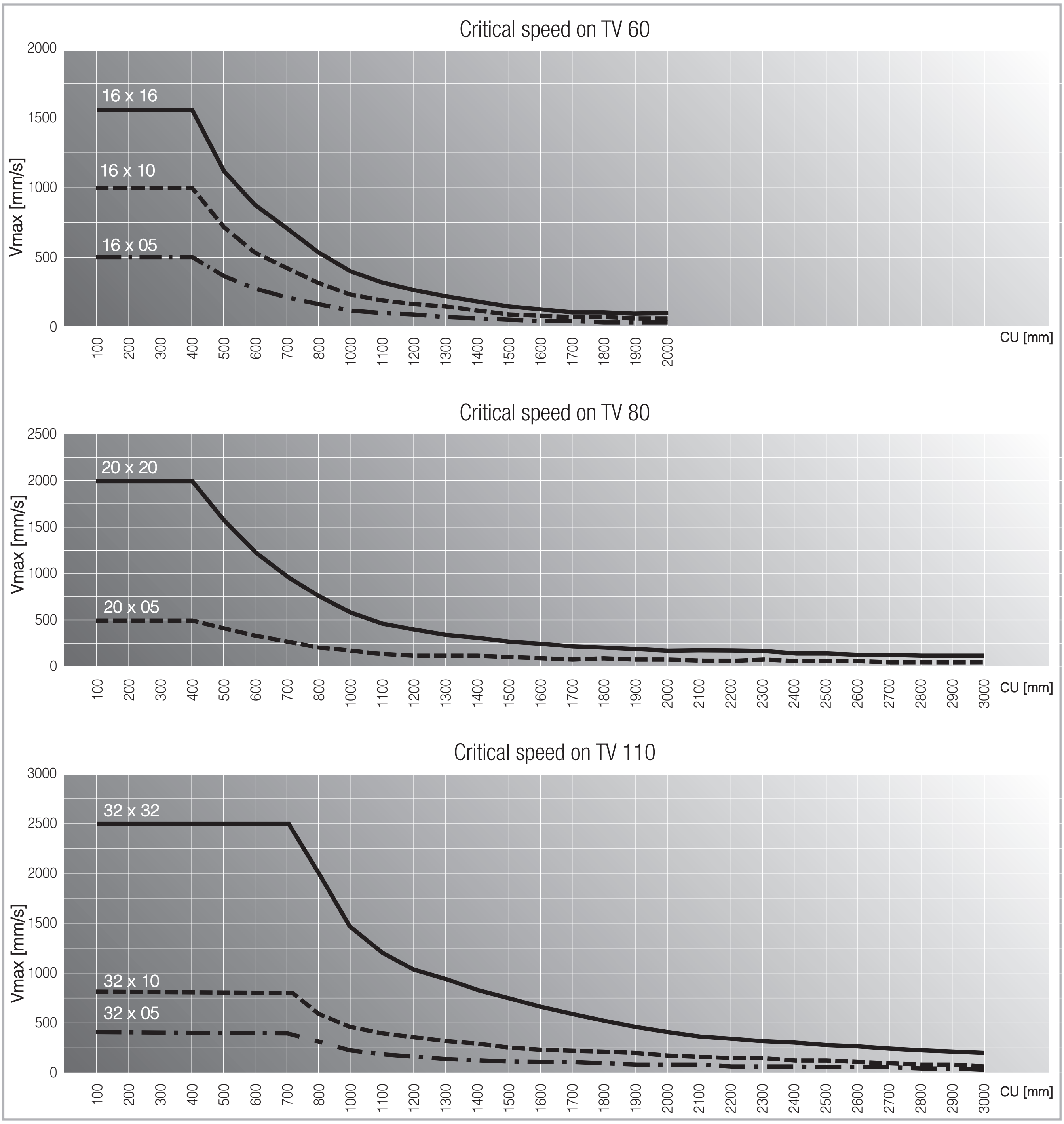


Fig. 56

Accessories

Fixing by brackets

The linear motion systems used for the Rollon TV series linear units enables them to support loads in any direction. They can therefore be installed in any position. To install the units, we recommend the use of the dedicated slots in the extruded bodies as shown below.

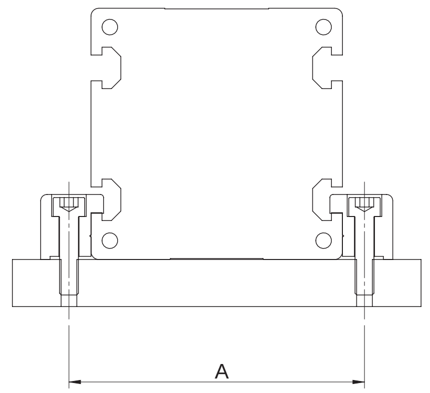


Fig. 57

Type	A [mm]
TV 60	77
TV 80	94
TV 110	130

Tab. 122

Warning: Do not secure the linear units by means of the T-slots in the Drive head or Idle head at either end of the actuator.

Fixing bracket

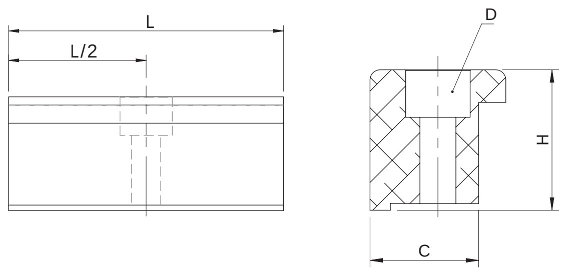


Fig. 58

Dimensions / Unit [mm]

Type	C	H	L	D	Code Rollon
TV 60	16	19.5	35	M5	1002358
TV 80	16	22.5	50	M6	1004552
TV 110	31	27	100	M10	1002360

Tab. 123

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

T-nuts

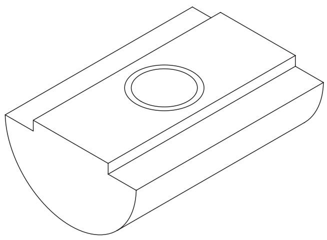


Fig. 59

Code Rollon

Slot dimension [mm]	M5	M6	M8
5	6001038	-	-
6	-	6001863	-
8	-	6001044	6001045

Tab. 124

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

Proximity

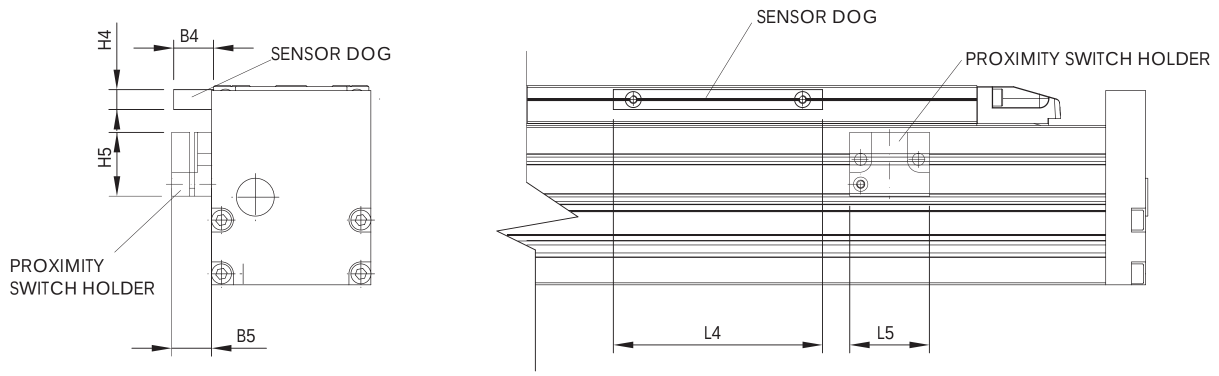


Fig. 60

Proximity switch holder

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

Sensor dog

Zinc-plated steel plate, mounted on the carriage and used for the proximity switch operation.

Unit [mm]

Type	B4	B5	L4	L5	H4	H5	Sensor	Proximity holder set	Sensor dog
TV 60	20	20	105	40	10	32	Ø12	G000849	G000581
TV 80	20	20	105	40	10	32	Ø12	G000849	G000581
TV 110	20	20	105	40	10	32	Ø12	G000850	G000581

Tab. 125

Ordering key

Identification code for the TV linear units

V	06	1605	5P	0800	1A
	06=60	16-05	5P=ISO 5		
	08=80	16-10	7N=ISO 7		
	11=110	16-16			
		20-05			
		20-20			
		32-05			
		32-10			
		32-32			

L=total length of th unit

Type *see from pg. PS-43 to pg. PS-45, tab. 106, 111, 116*

B/S diameter and lead

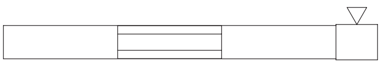
Size *see from pg. PS-43 to pg. PS-45*

Linear unit series TV *see pg. PS-41*

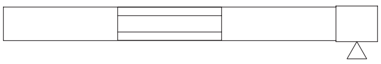
In order to create identification codes for Actuator Line, you can visit: **http://configureactuator.rollon.com**

Configure Actuator

Left / right orientation



Right



Left

TVS series

TVS series description

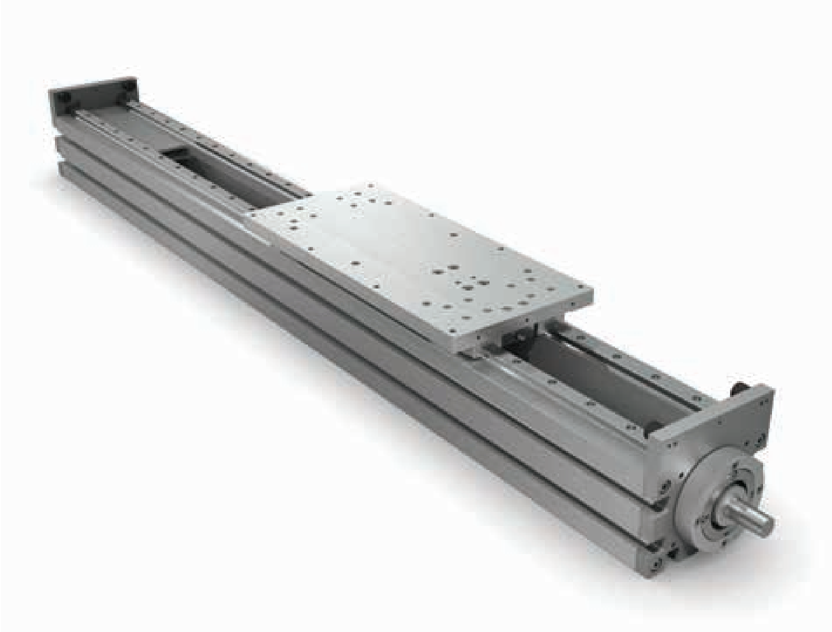


Fig. 61

TVS

TVS series linear actuators have a rigid anodized and extruded aluminum alloy profile and transmission of motion is achieved by means of a precision rolled ball screw drive. Recirculating ball guides with cage as linear motion components ensure high precision and high rigidity. TVS linear actuators are available with profiles of different sizes: 170 - 220.

The components

Extruded bodies

The anodized 6060 aluminum alloy extrusion used for the profile of the Rollon TVS 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.

Drive system

Rollon TVS series linear units use a precision rolled ball screw. The standard precision class of the ball screw used is ISO 7 without a preloaded nut. ISO 5 precision class with preloaded nut is available upon request. The ball screws of linear units can be supplied with different diameter and leads. This type of technology makes it possible to obtain the following features:

- **Highly accurate thrust**
- **Superior mechanical performance**
- **Reduced wear**
- **Low resistance to movement**

Carriage

The carriage of the Rollon TVS series linear units is made entirely of anodized aluminum. The dimensions vary depending on the size of the actuator.

Protection

Rollon TVS series linear units can be equipped with an external steel protective strip in order to protect mechanical components inside the linear units against contaminants. A resin deflector compresses the steel strip on its own magnetic base with very low friction.

General data about aluminum used: AL 6060

Chemical composition [%]

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

Tab. 126

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. 127

Mechanical characteristics

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

Tab. 128

The linear motion system

The linear motion system has been designed to meet load capacity and precision conditions of a wide variety of applications.

TVS with recirculating ball guides

The recirculating ball guides used for TVS have the cage system. The cage included has two purposes: it reduces the friction between the guide and the slider, increasing their service life, and allows lubrication refills to be performed more rarely. The assembly of recirculating ball guides normally also involves the machining of the related seat in the profile. Due to the cage keeping the ball bearings apart, these units are regarded as permanently lubricated; considering the average life of handling devices, no maintenance is needed before 5000km.

Main advantages of this configuration:

- High load capacity
- Long lasting
- High precision
- High rigidity

TVS section

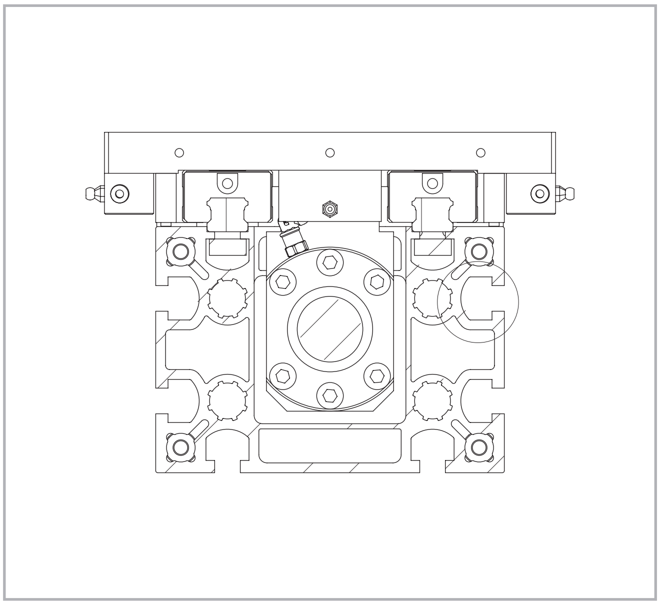
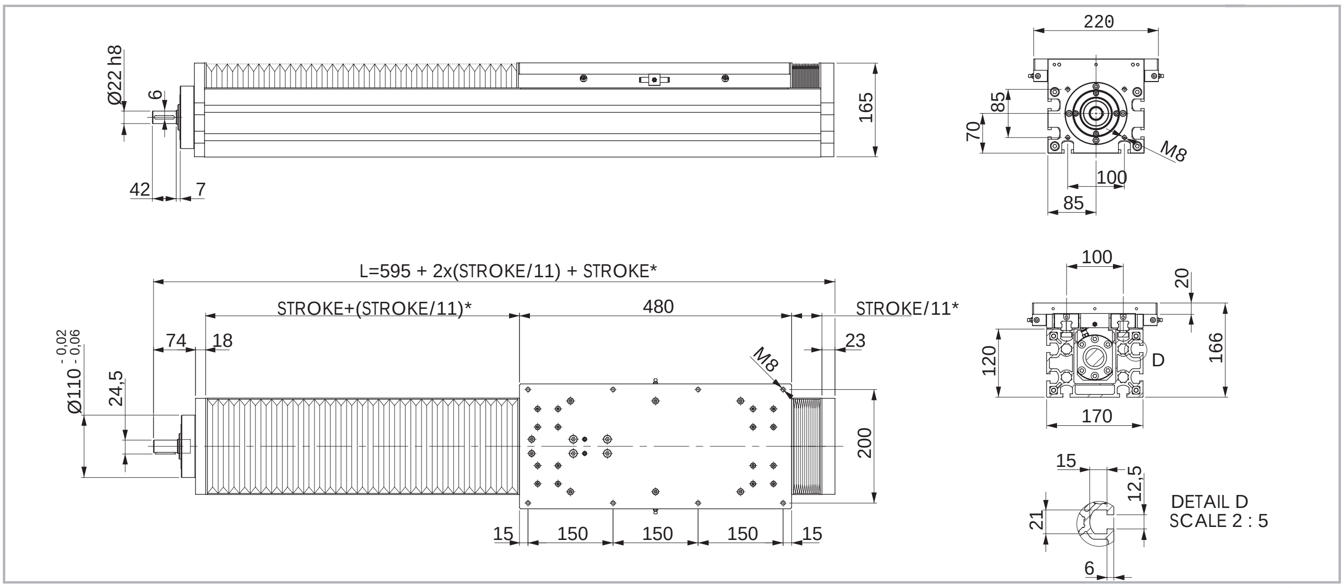


Fig. 62

TVS 170

TVS 170 Dimensions



*To be calculated by Rollon technical department based on the stroke of the actuator.

Fig. 63

Technical data

	Type
	TVS 170
Max. useful stroke length [mm]	3000
Max. speed [m/s]	See page PS-57
Carriage weight [kg]	9.9
Zero travel weight [kg]	28.9
Weight for 100 mm useful stroke [kg]	2.7
Rail size [mm]	20

Tab. 129

Ball screw precision

Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TVS 170	0.023	0.05	0.02	0.02

Tab. 130

Moments of inertia of the aluminum body

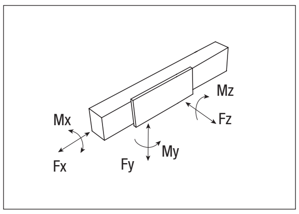
Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TVS 170	1.944	0.799	2.742

Tab. 131

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn
TVS 170	32-05	64200	25900
	32-10	66300	29800
	32-20	49700	24100
	32-32	48600	22700

Tab. 132



Load capacity

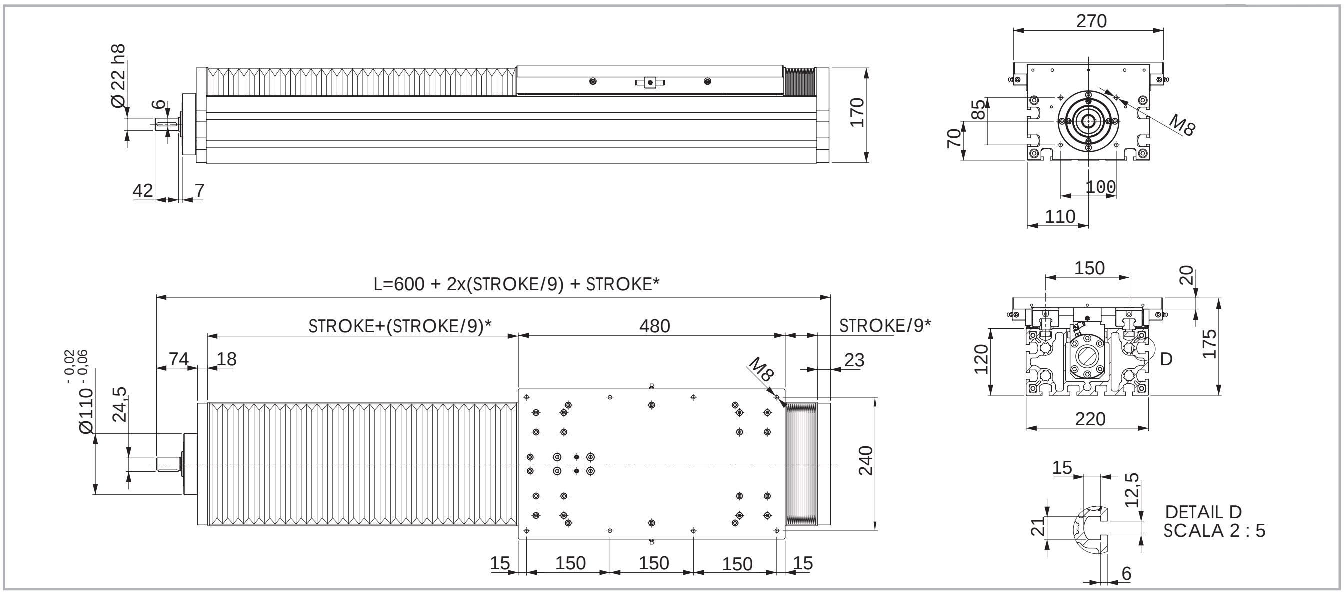
Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TVS 170	153600	70798	153600	7680	29184	29184

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

Tab. 133

TVS 220

TVS 220 Dimensions



*To be calculated by Rollon technical department based on the stroke of the actuator.

Fig. 64

Technical data

	Type
	TVS 220
Max. useful stroke length [mm]	3500
Max. speed [m/s]	See page PS-57
Carriage weight [kg]	13.3
Zero travel weight [kg]	37.4
Weight for 100 mm useful stroke [kg]	3.6
Rail size [mm]	25

Tab. 134

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]
TVS 220	4.394	1.247	5.641

Tab. 136

Ball screw precision

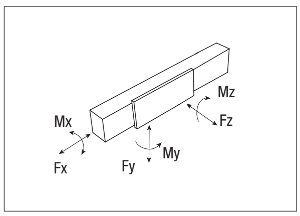
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TVS 220	0.023	0.05	0.02	0.02

Tab. 135

Load capacity F_x

Type	F_x [N]		
	Screw	Stat.	Dyn
TVS 220	32-05	64200	25900
	32-10	66300	29800
	32-20	49700	24100
	32-32	48600	22700

Tab. 137



Load capacity

Type	F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TVS 220	258800	116833	258800	19410	47360	47360

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

Tab. 138

Lubrication

TVS linear units with ball bearing guides

TVS Linear units are equipped with self lubricating linear ball guides. The ball bearing carriages are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents mis-alignment of these in the circuits.

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

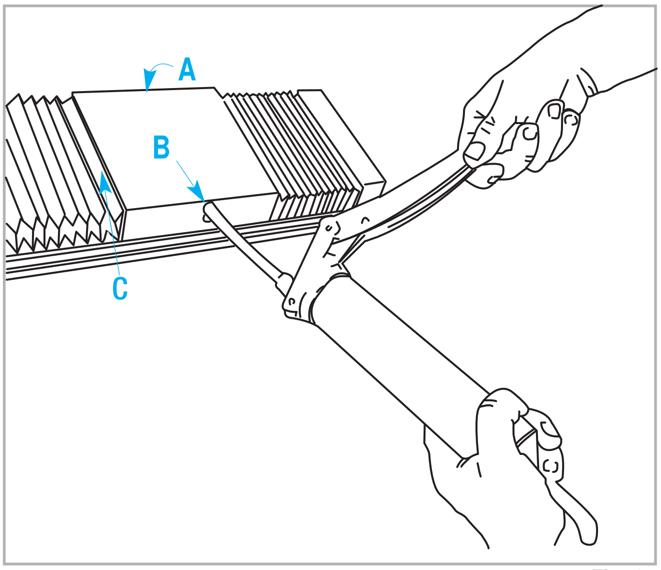


Fig. 65

- Insert the tip in the specific grease nipples:
  A and B - Linear block - C - Ball screw nut
- Type of lubricant: Lithium soap grease of class 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 block re-lubrication at each point:

Type	Quantity [cm^3] for grease nipple
TVS 170	1.4
TVS 220	2.8

Tab. 139

Ball screws

The ball screw nuts of Rollon TVS-series linear units must be relubricated every 100 km.

Amount of lubricant recommended for ball screw nut re-lubrication

Type	Quantity [cm^3] for grease nipple
32-05	1.8
32-10	2.0
32-20	2.0
32-32	3.0

Tab. 140

Standard lubrication

Lubrication of the ball bearing blocks and the ball screw nut is facilitated by grease nipples located on the sides of the carriage of the Rollon TVS series actuators. The linear units are lubricated with class NLGI2 lithium soap grease.

Critical speed

The maximum linear speed of Rollon TVS series linear units depends on the critical speed of the screw (based on its diameter and length) and on the max. permissible speed of the ball screw nut used.

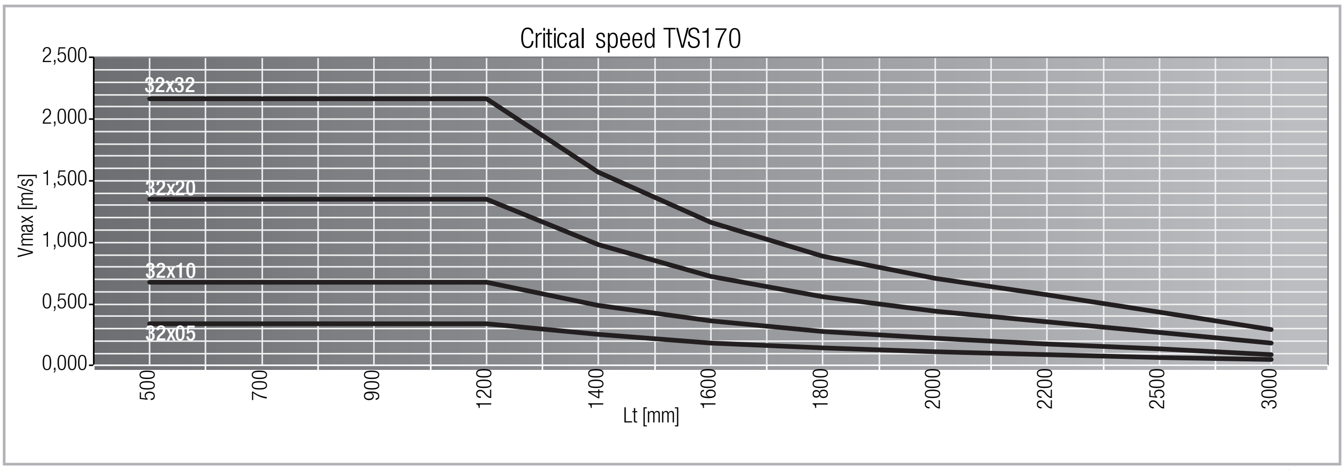


Fig. 66

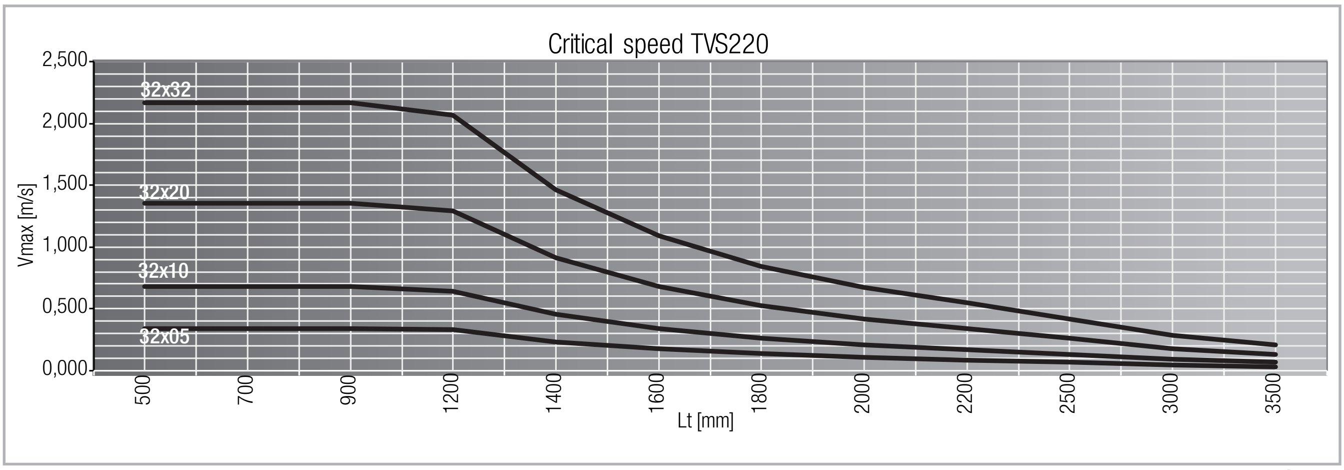


Fig. 67

Accessory

Semi-rounded threaded inserts with spring

Material: galvanised steel.

Important: to be inserted through the longitudinal slots before assembling.

Suitable for series:

TVS 170 - TVS 220

Plastic compound spring for vertical positioning of insert.

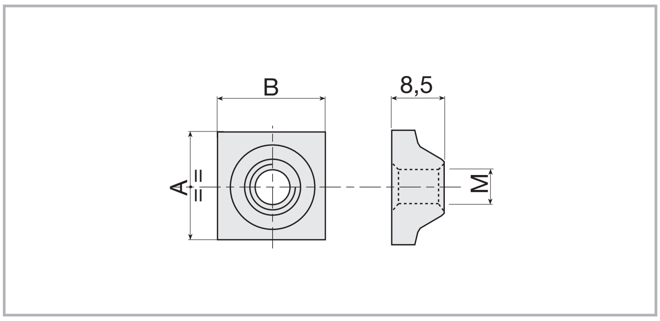


Fig. 68

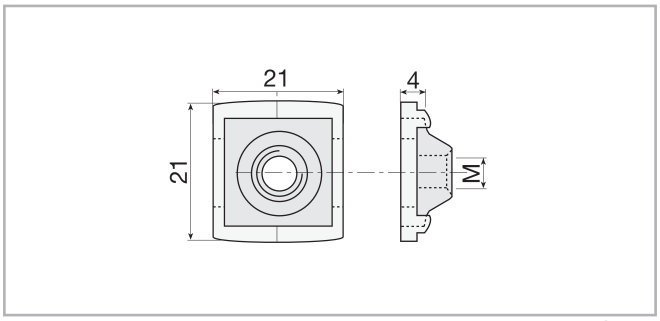


Fig. 69

Thread	AxB	
	18x18	20x20
M4	209.0031	209.0023
M5	209.0032	209.0019
M6	209.0033	209.1202
M8	209.0034	209.0467

Tab. 141

Spring	Code
Suitable for all insert 18x18	101.0732

Tab. 142

Alignment nuts

Alignment nut for slot 12.5 mm

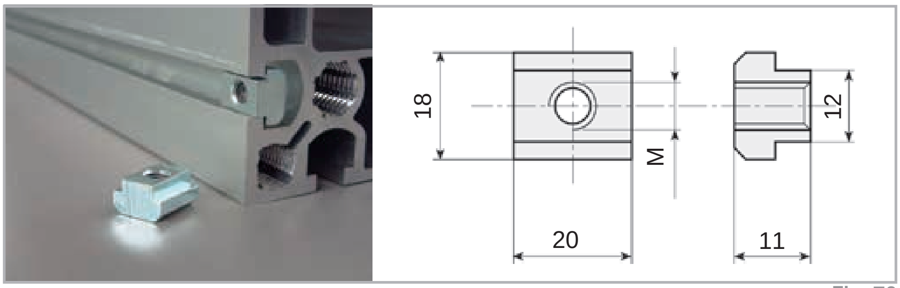


Fig. 70

Material: galvanised steel. Suitable for series:
TVS 170 - TVS 220

Thread	Code
M5	215.1768
M6	215.1769
M8	215.1770
M10	215.2124

Tab. 143

Alignment nut for slot 12.5 mm front insertable

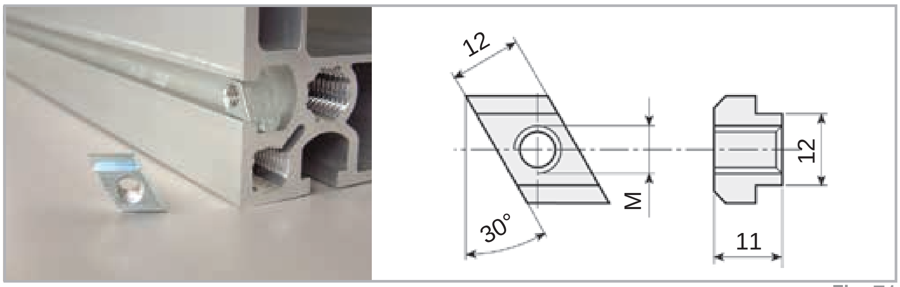


Fig. 71

Material: galvanised steel. Suitable for series:
TVS 170 - TVS 220

Thread	Code
M5	215.1771
M6	215.1772
M8	215.1773
M10	215.2125

Tab. 144

Threaded nuts and plates

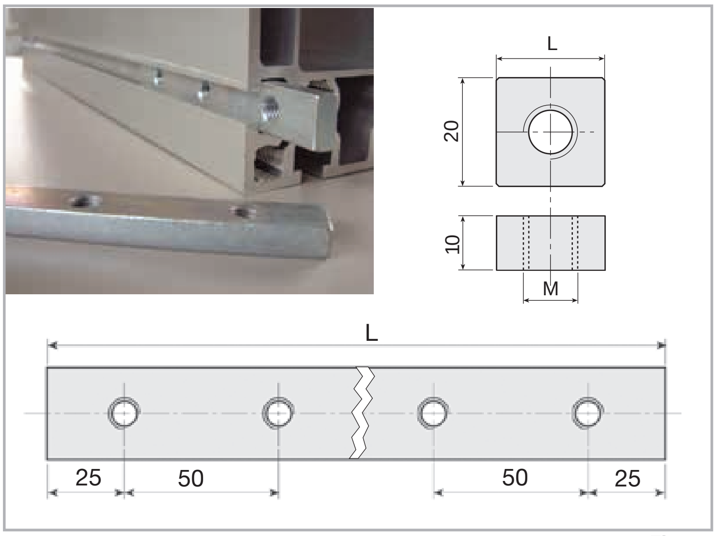


Fig. 72

M12 (CH19) hexagonal-head screws can be used as stud bolts in profiles with 12.5 mm slots.

Material: galvanised steel. Suitable for series:
TVS 170 - TVS 220

Thread	Threaded holes	L	Code
M10	1	40	215.0477
M12	1	40	209.1281
M10	1	20	209.1277
M10	2*	80	209.1776
M10	3*	150	209.1777
M10	4*	200	209.1778
M10	5*	250	209.1779
M10	6*	300	209.1780
M10	7*	350	209.1781

* Hole centre-distance: 50 mm.

Tab. 145

Profile anchor brackets

Material: alluminum alloy (Rs=310 N/mm²).

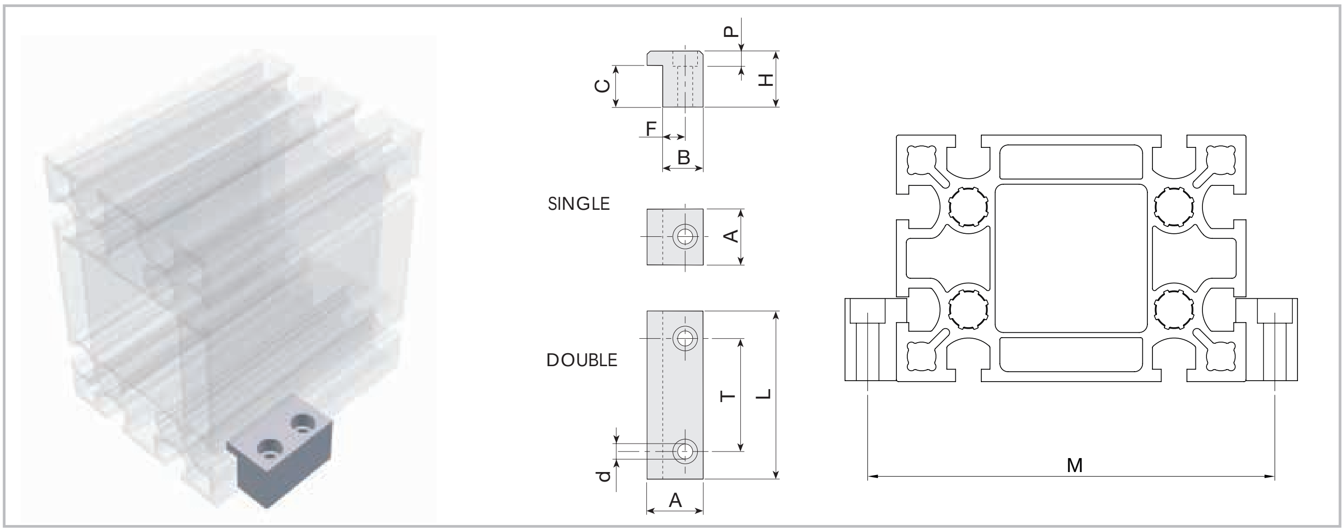


Fig. 73

Profile	A	L	T	d	H	P	C	F	B	M	Single code	Double code
TVS 170	30	90	50	11	40	11	28.3	14	25	198	415.0767	415.0762
TVS 220	30	90	50	11	40	11	28.3	14	25	248	415.0767	415.0762

Tab. 146

Ordering key

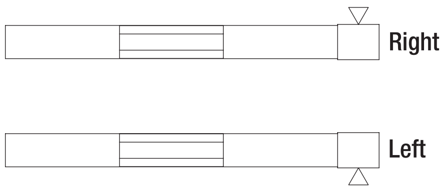
Identification code for the TVS linear units

TVS	17	3205	5P	02000	1A
	17=170	32-05	5P=ISO 5		
	22=220	32-10	7N=ISO 7		
		32-20			
		32-32			
					Carriage option
				L=total length of the unit	
			Type *see from pg. PS-54 to pg. PS-55, tab. 130, 135*		
		B/S diameter and lead			
	Size *see from pg. PS-54 to pg. PS-55*				
Linear unit series TVS *see pg. PS-51*					

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

Configure Actuator

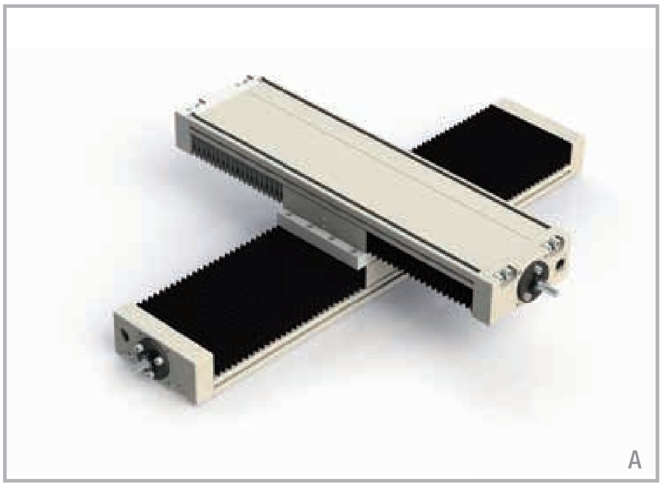
Left / right orientation



Multiaxis systems

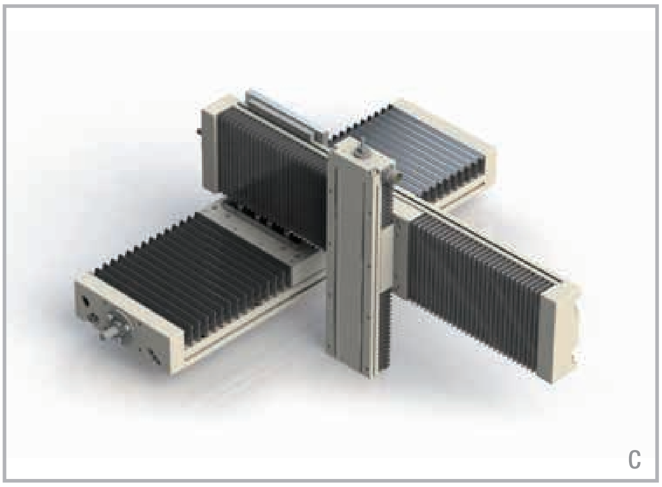
Rollon Precision System series linear units have been specifically designed to be modular and therefore to permit fast, trouble-free setup of multi-axis systems. Rollon can provide all the connection elements necessary for combining the various sizes and lengths of Precision System series linear units.

System with 2 horizontal axes



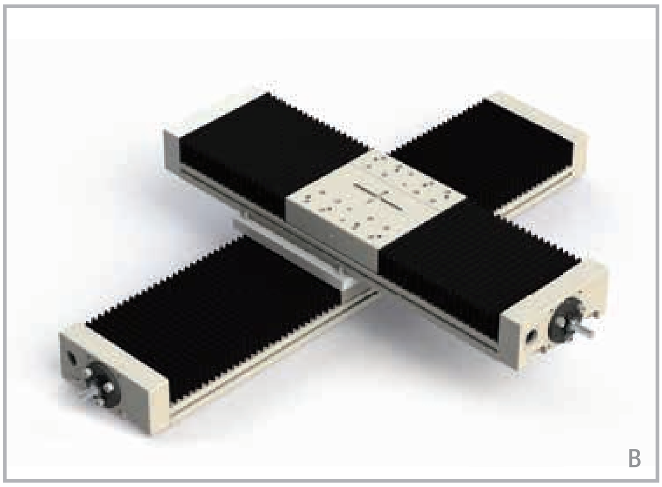
A - Direct fastening of the Y-axis on the X-axis ("base unit on carriage" assembly) using screws without intermediate brackets.

Three-axes system



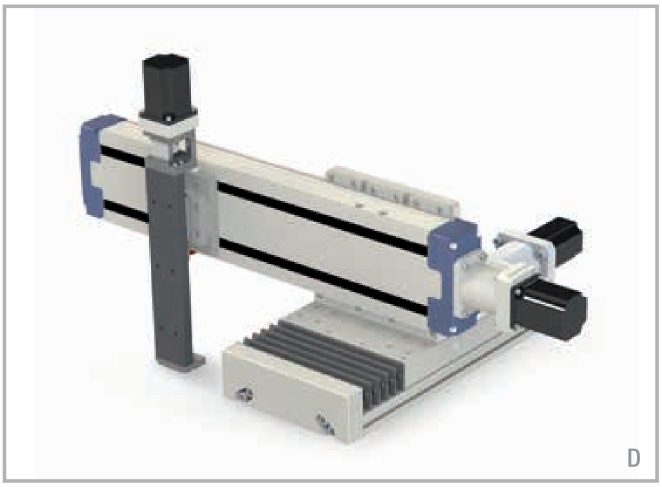
C - Fastening of the Y-axis on the X-axis (“base unit on carriage“ assembly) using 90° brackets.
Fastening of the Z-axis on the Y-axis (“carriage on carriage" assembly) using a “cross“ plate.

System with 2 horizontal axes



B - Fastening of the Y-axis on the X-axis ("carriage on carriage" assembly) using a "cross" plate.

Three-axes system



D - Fastening of the Y-axis on the X-axis (“base unit on carriage assembly) using 90° brackets.

Connection plates are available only upon request

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:

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

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; ($\alpha < 5 m/s^2$) 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.

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

Fig. 8

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

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

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:

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

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):

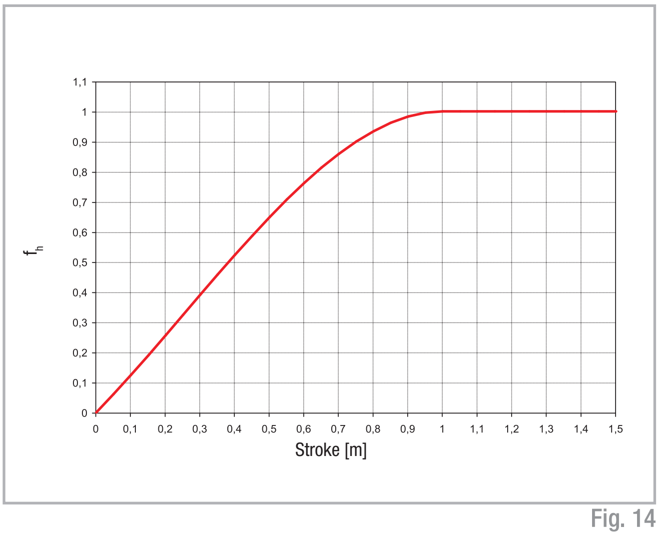


Fig. 14

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 established 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.

Data sheet

General data:

Date: .... Inquiry N°: ....

Address: ....

Contact: ....

Company: ....

Zip Code: ....

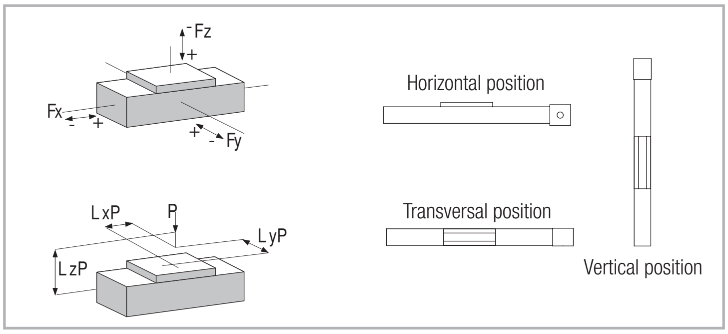
Phone: ....

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

Distributors for Australia & New Zealand

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