

**ROLLON®**  
Linear Evolution

*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 contaminants from the raceways of the ball bearings.

### General data about aluminum used: AL 6060

#### Chemical composition [%]

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

Tab. 1

#### Physical characteristics

Density	Coeff. of elasticity	Coeff. of thermal expansion (20°-100°C)	Thermal conductivity (20°C)	Specific heat (0°-100°C)	Resistivity	Melting point
kg dm <sup>3</sup>	kN mm <sup>2</sup>	10 <sup>-6</sup> K	W m . K	J kg . K	Ω . m . 10 <sup>-9</sup>	°C
2.7	69	23	200	880-900	33	600-655

Tab. 2

#### Mechanical characteristics

Rm	Rp (02)	A	HB
N mm <sup>2</sup>	N mm <sup>2</sup>	%	—
205	165	10	60-80

Tab. 3

## TH 90 SP2

### TH 90 SP2 Dimensions (single carriage)

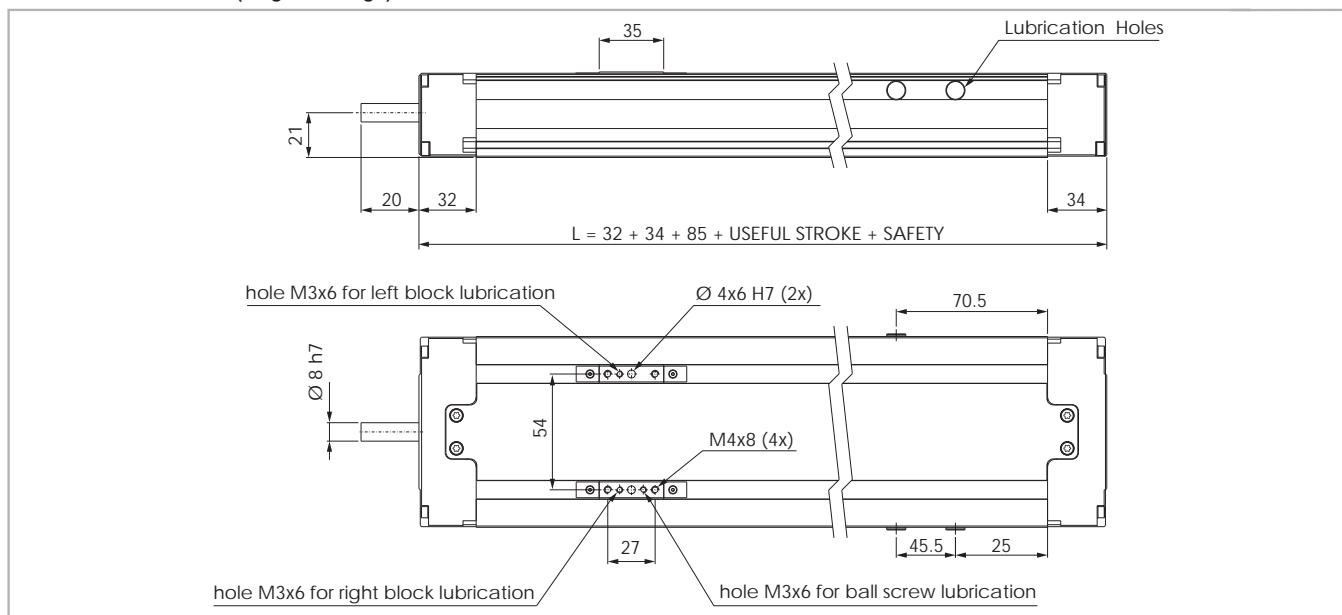


Fig. 2

### Technical data

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

Tab. 4

### 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	0.02	0.02
TH 90 / 12-10	0.023	0.05	0.02	0.02

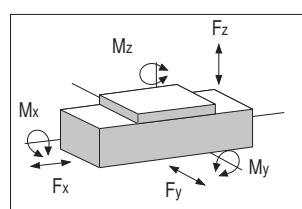
Tab. 5

### TH 90 SP2 - Load capacity

Type	$F_y$ [N]		$F_z$ [N]		$M_x$ [Nm]		$M_y$ [Nm]		$M_z$ [Nm]	
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.
TH 90 SP2	6930	4616	6930	4616	188	126	26	17	26	17

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

Tab. 8



## TH 90 SP4

### TH 90 SP4 Dimensions (dual carriage)

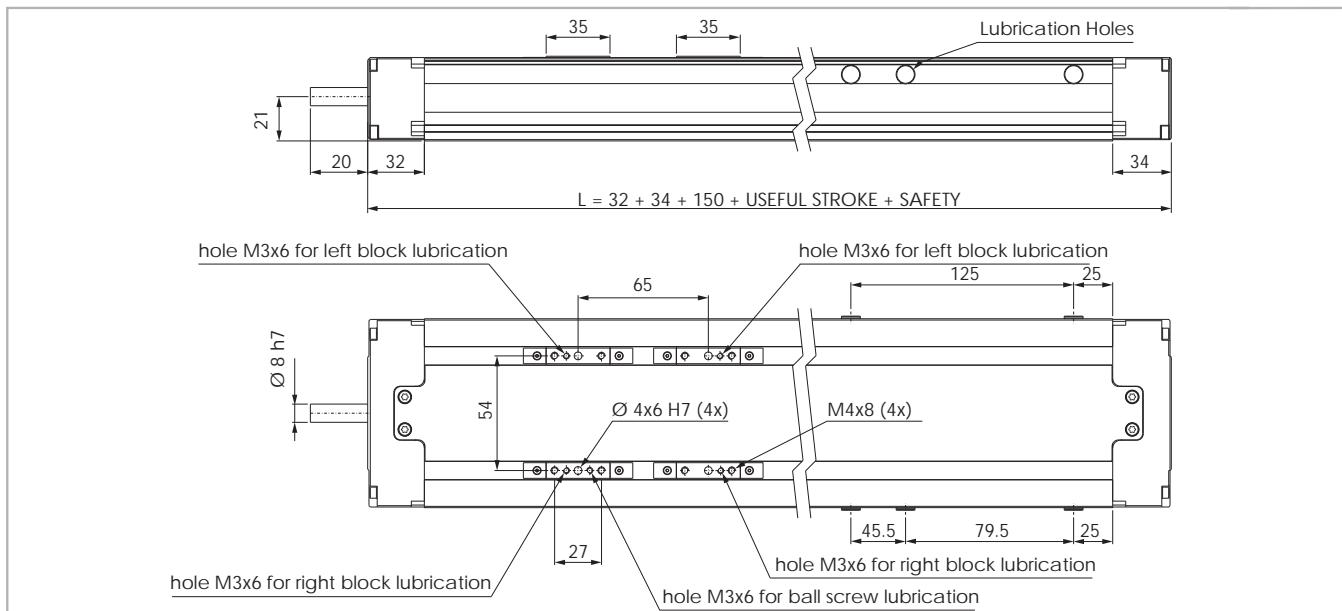


Fig. 3

### Technical data

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

Tab. 9

### Moments of inertia of the aluminum body

Type	$I_x$ [ $10^7 \text{ mm}^4$ ]	$I_y$ [ $10^7 \text{ mm}^4$ ]	$I_p$ [ $10^7 \text{ mm}^4$ ]
TH 90 SP4	0.0130	0.0968	0.1098

Tab. 11

### Ball screw precision

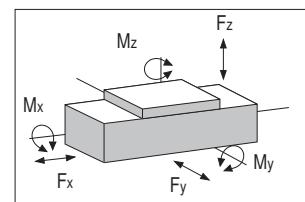
Type	Max. positioning precision [mm/300mm]		Max. repeatability precision [mm]	
	ISO 5	ISO 7	ISO 5	ISO 7
TH 90 / 12-05	0.023	0.05	0.02	0.02
TH 90 / 12-10	0.023	0.05	0.02	0.02

Tab. 10

### TH 90 SP4 - Load capacity $F_x$

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

Tab. 12



### TH 90 SP4 - Load capacity

Type	$F_y$ [N]		$F_z$ [N]		$M_x$ [Nm]		$M_y$ [Nm]		$M_z$ [Nm]	
	Stat.	Dyn	Stat.	Dyn	Stat.	Dyn	Stat.	Dyn	Stat.	Dyn
TH 90 SP4	13860	9232	13860	9232	377	251	450	300	450	300

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 110 SP2

### TH 110 SP2 Dimensions (single carriage)

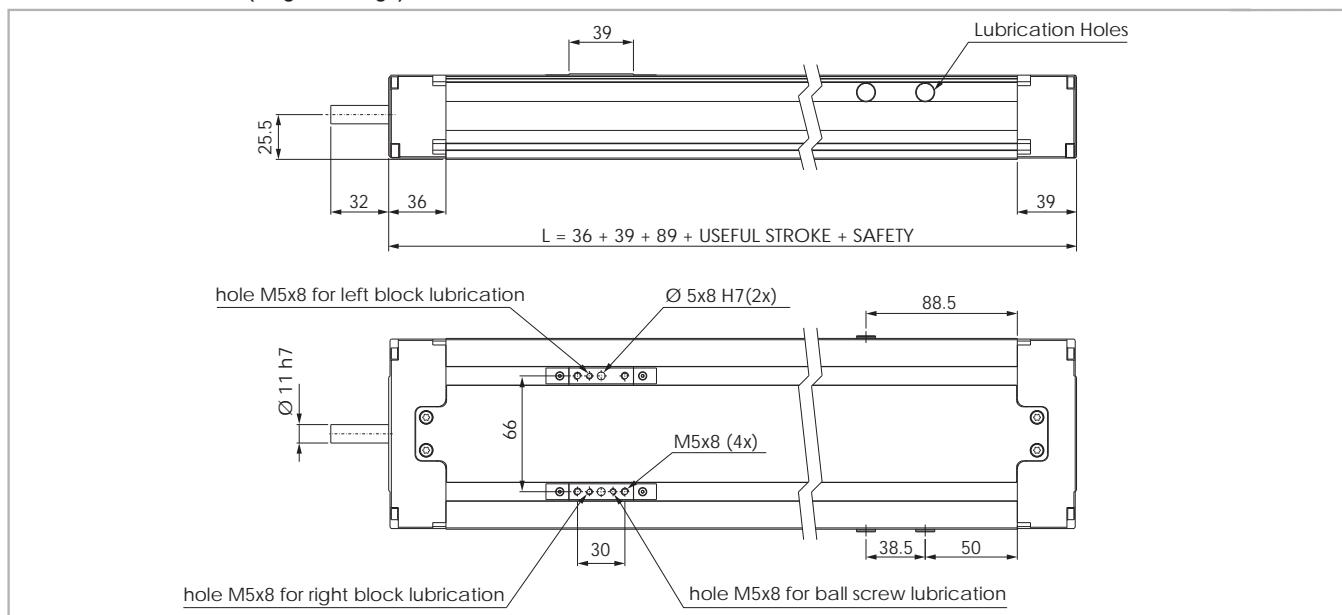


Fig. 4

### Technical data

Type	TH 110 SP2
Max. useful stroke length [mm]	1411
Max. speed [m/s]	See page PS-12
Carriage weight [kg]	0.76
Zero travel weight [kg]	2.65
Weight for 100 mm useful stroke [kg]	0.83

Tab. 14

### 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

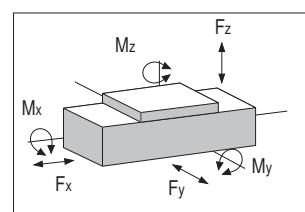
Tab. 15

### TH 110 SP2 - Load capacity

Type	$F_y$ [N]		$F_z$ [N]		$M_x$ [Nm]		$M_y$ [Nm]		$M_z$ [Nm]	
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.
TH 110 SP2	24200	14560	24200	14560	774	466	132	74	132	74

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

Tab. 18



## TH 110 SP4

### TH 110 SP4 Dimensions (Dual carriage)

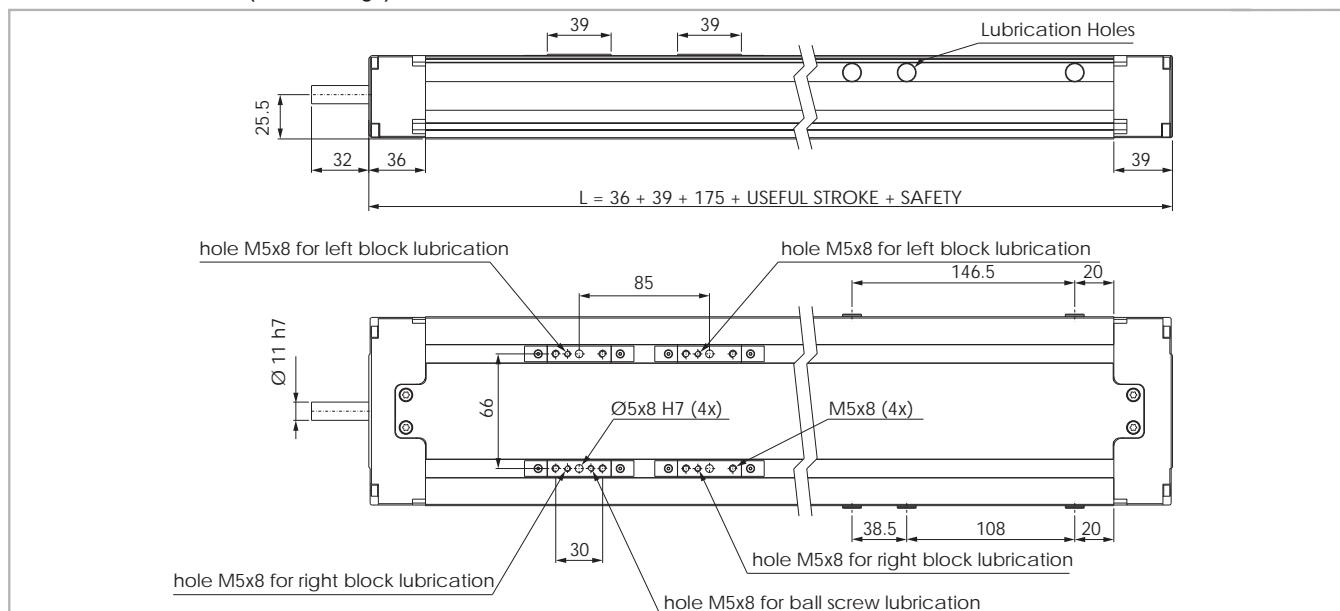


Fig. 5

### Technical data

	Type
	TH 110 SP4
Max. useful stroke length [mm]	1325
Max. speed [m/s]	See page PS-12
Carriage weight [kg]	1.26
Zero travel weight [kg]	4.00
Weight for 100 mm useful stroke [kg]	0.83

Tab. 19

### 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. 20

### Moments of inertia of the aluminum body

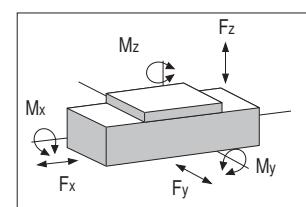
Type	$I_x$ [ $10^7$ mm $^4$ ]	$I_y$ [ $10^7$ mm $^4$ ]	$I_p$ [ $10^7$ mm $^4$ ]
TH 110 SP4	0.0287	0.2040	0.2327

Tab. 21

### TH 110 SP4 - Load capacity $F_x$

Type	$F_x$ [N]		
	Screw	Stat.	Dyn
TH 110 SP4	16-05	17195	12640
	16-10	13420	9900
	16-16	13900	9900

Tab. 22



### TH 110 SP4 - Load capacity

Type	$F_y$ [N]		$F_z$ [N]		$M_x$ [Nm]		$M_y$ [Nm]		$M_z$ [Nm]	
	Stat.	Dyn	Stat.	Dyn	Stat.	Dyn	Stat.	Dyn	Stat.	Dyn
TH 110 SP4	48400	29120	48400	29120	1549	932	1356	816	1356	816

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

Tab. 23

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)

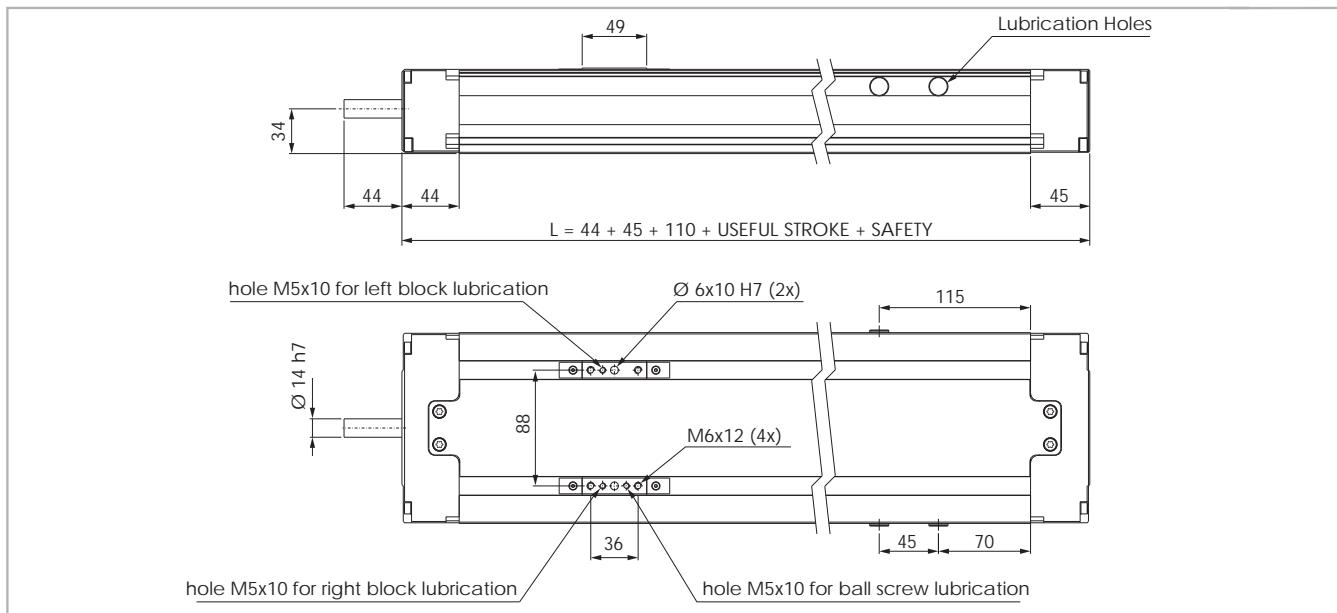


Fig. 6

### Technical data

Type	TH 145 SP2
Max. useful stroke length [mm]	1690
Max. speed [m/s]	See page PS-12
Carriage weight [kg]	1.45
Zero travel weight [kg]	5.9
Weight for 100 mm useful stroke [kg]	1.6

Tab. 24

### 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

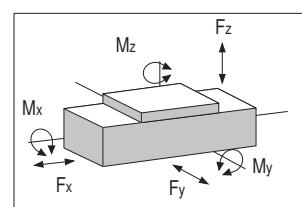
Tab. 25

### TH 145 SP2 - Load capacity

Type	$F_y$ [N]		$F_z$ [N]		$M_x$ [Nm]		$M_y$ [Nm]		$M_z$ [Nm]	
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.
TH 145 SP2	43400	34800	43400	34800	1888	1514	310	240	310	240

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

Tab. 28



## TH 145 SP4

### TH 145 SP4 Dimensions (dual carriage)

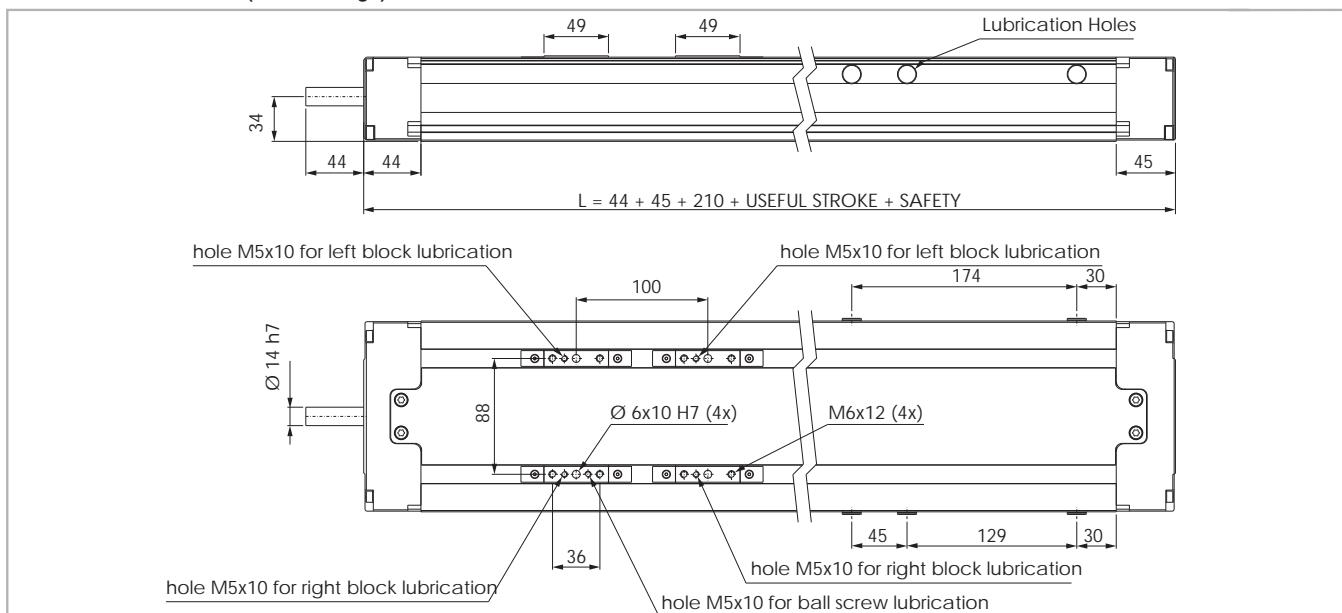


Fig. 7

### Technical data

	Type
	TH 145 SP4
Max. useful stroke length [mm]	1590
Max. speed [m/s]	See page PS-12
Carriage weight [kg]	2.42
Zero travel weight [kg]	8.3
Weight for 100 mm useful stroke [kg]	1.6

Tab. 29

### 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. 30

### Moments of inertia of the aluminum body

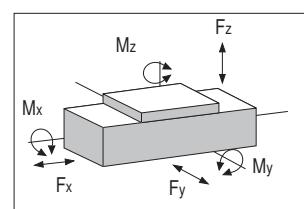
Type	$I_x$ [10 <sup>7</sup> mm <sup>4</sup> ]	$I_y$ [10 <sup>7</sup> mm <sup>4</sup> ]	$I_p$ [10 <sup>7</sup> mm <sup>4</sup> ]
TH 145 SP4	0.090	0.659	0.749

Tab. 31

### TH 145 SP4 - Load capacity $F_x$

Type	$F_x$ [N]		
	Screw	Stat.	Dyn.
TH 145 SP4	20-05	23545	14700
	20-20	19445	12250
	25-10	29573	16270

Tab. 32



### TH 145 SP4 - Load capacity

Type	$F_y$ [N]		$F_z$ [N]		$M_x$ [Nm]		$M_y$ [Nm]		$M_z$ [Nm]	
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.	Stat.	Dyn.
TH 145 SP4	86800	69600	86800	69600	3776	3028	2855	2290	2855	2290

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

Tab. 33

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

## > Motor connections

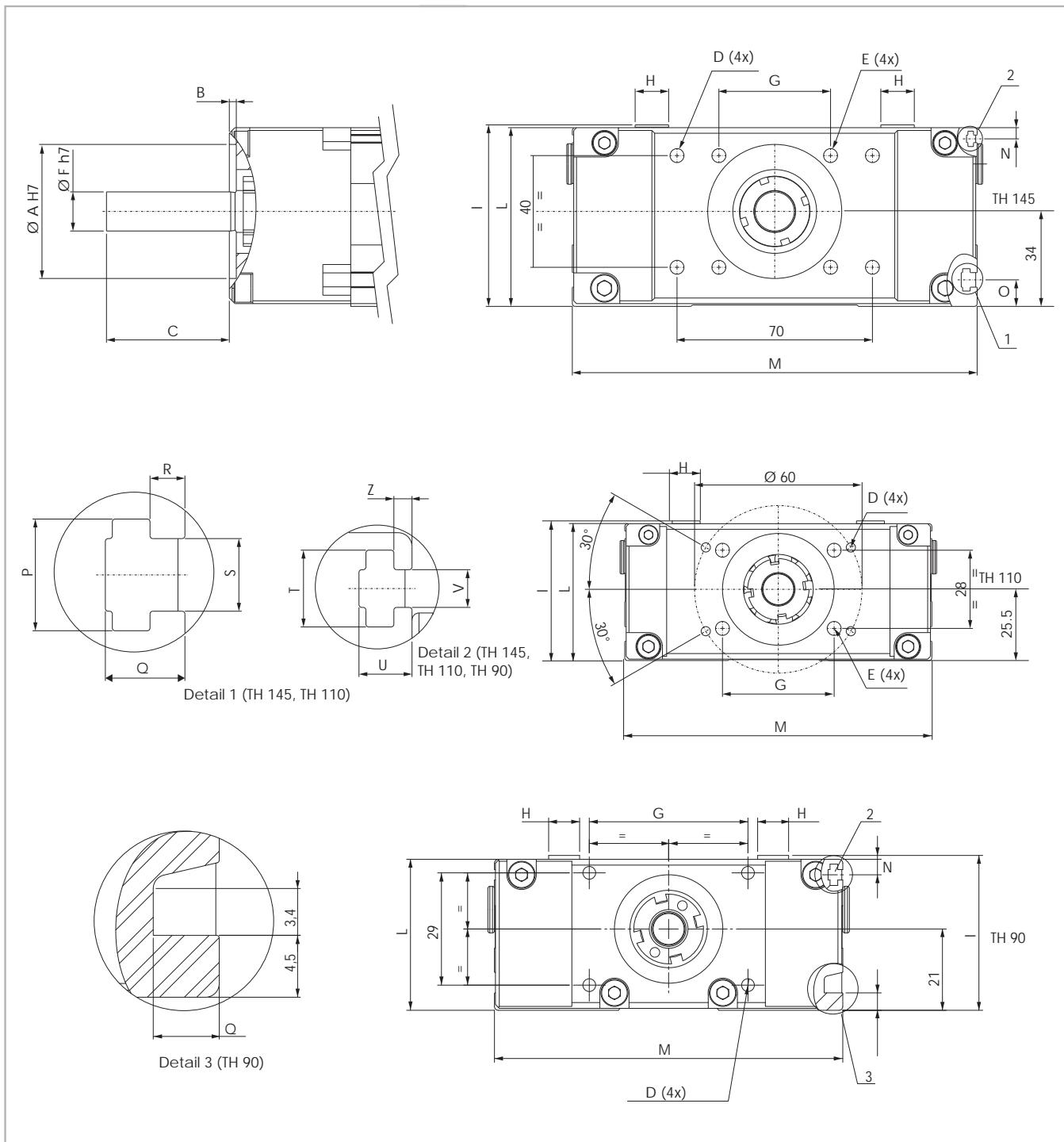


Fig. 8

**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 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	9.5	8	4.8	2.5	5.2	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. 34

## Lubrication

### SP linear units with ball bearing guides

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

Special lubrication reservoirs are mounted on the front plates of the linear blocks which continuously provide the necessary amount of grease to the

ball raceways under load. These lubrication reservoirs also considerably reduce the frequency of lubrication of the module. This system guarantees a long interval between maintenances: SP version: every 5000 km or 1 year of use, based on the value reached first. If a longer service life is required or in case of high dynamic or high loaded applications please contact our offices for further verification.

### Amount of lubricant needed to lubricate carriages:

Type	Quantity [ g ]
TH 90	1
TH 110	0.8
TH 145	1.4

Tab. 37

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

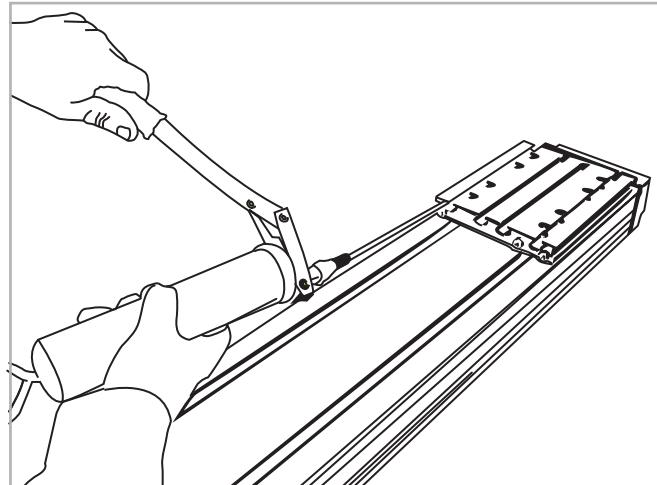


Fig. 9

### Ball screws

The ball screw nuts for the Rollon TH series linear slides should be re-lubricated every 50 million revolutions. Use the following conversion table to determine the re-lubrication interval in linear distance traveled (km) as shown.

Type	Quantity [g] for grease nipple
12-05	0.3
12-10	0.3
16-05	0.6
16-10	0.8
16-16	1.0
20-05	0.9
20-20	1.7
25-10	1.7

Tab. 35

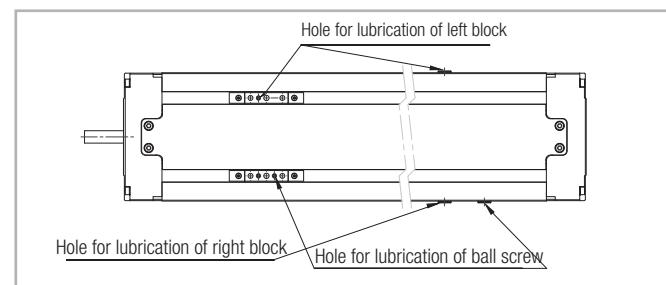


Fig. 10

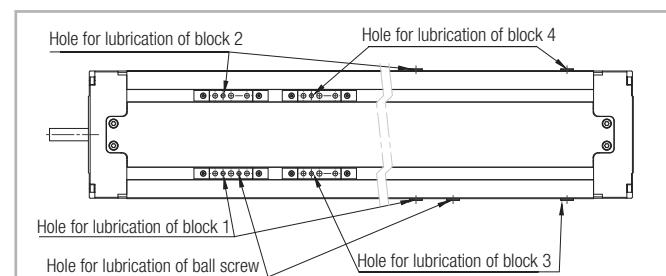


Fig. 11

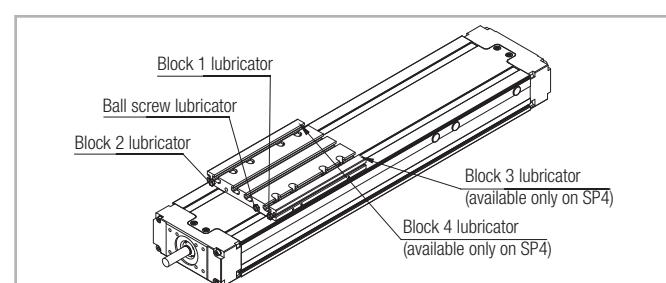


Fig. 12

## ➤ 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. The limit speed for Rollon TH series units can be calculated using the following formula:

$$V_{\max} = \frac{f}{\ell_n^2} \text{ [m/s]}$$

Tab. 38

## ➤ Calculation factors

Screw diameter and lead	Calculation factor ( $f$ )	Critical length of the screw ( $\ell_n$ ) [mm]
12-05	$0.629 \cdot 10^5$	
12-10	$1.258 \cdot 10^5$	
16-05	$1.487 \cdot 10^5$	
16-10	$3.160 \cdot 10^5$	
16-16	$5.230 \cdot 10^5$	
20-05	$2.155 \cdot 10^5$	
20-20	$8.608 \cdot 10^5$	
25-10	$5.352 \cdot 10^5$	

$$\ell_n = LT - \left( \frac{LT - Cu}{2} \right)$$

LT = Total length

Cu = Useful stroke

Tab. 39

The maximum linear speed, which depends on the ball screw nut, is indicated directly in the table below.

Screw diameter and lead	Max. linear speed of the bell screw nut [m/s] ISO 7	Max. linear speed of the bell screw nut [m/s]	
		ISO 7	ISO 5
12-05	0.56		0.69
12-10	1.11		1.39
16-05	0.42		0.52
16-10	0.83		1.04
16-16	1.33		1.67
20-05	0.33		0.42
20-20	1.33		1.67
25-10	0.53		0.67

Tab. 40

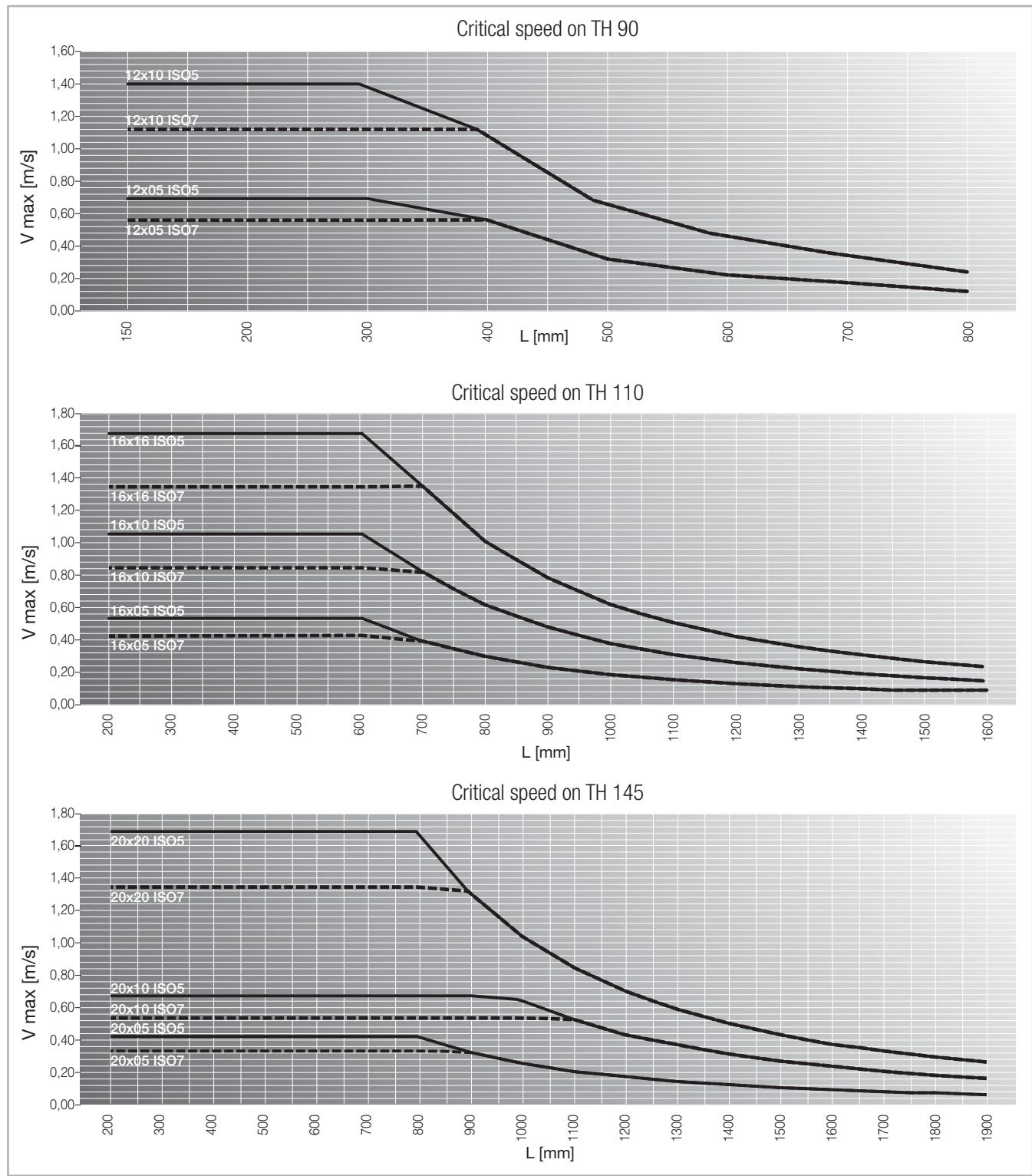


Fig. 13

## Accessories

### Fixing by brackets

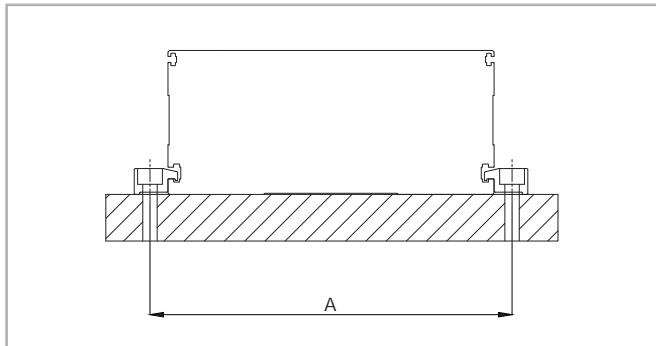


Fig. 14

### Fixing brackets

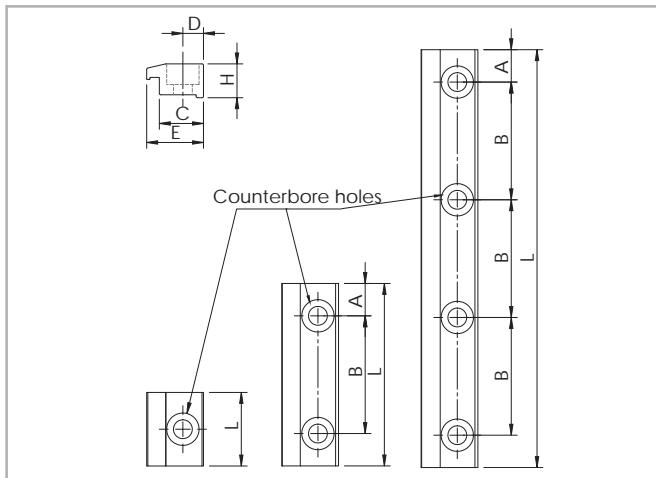


Fig. 15

### Dimensions (mm)

Type	N° holes	Counterbore for screw	A	B	C	D	E	H	L	Code Rollon
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. 42

### T nuts

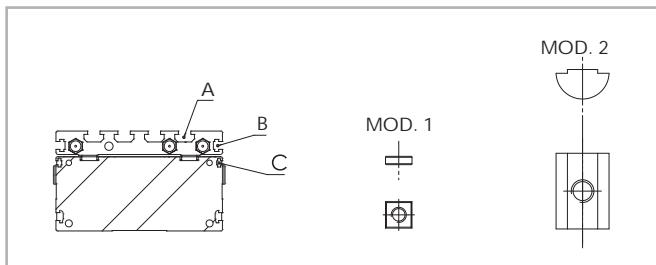


Fig. 16

### Units (mm)

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

Tab. 41

## Proximity

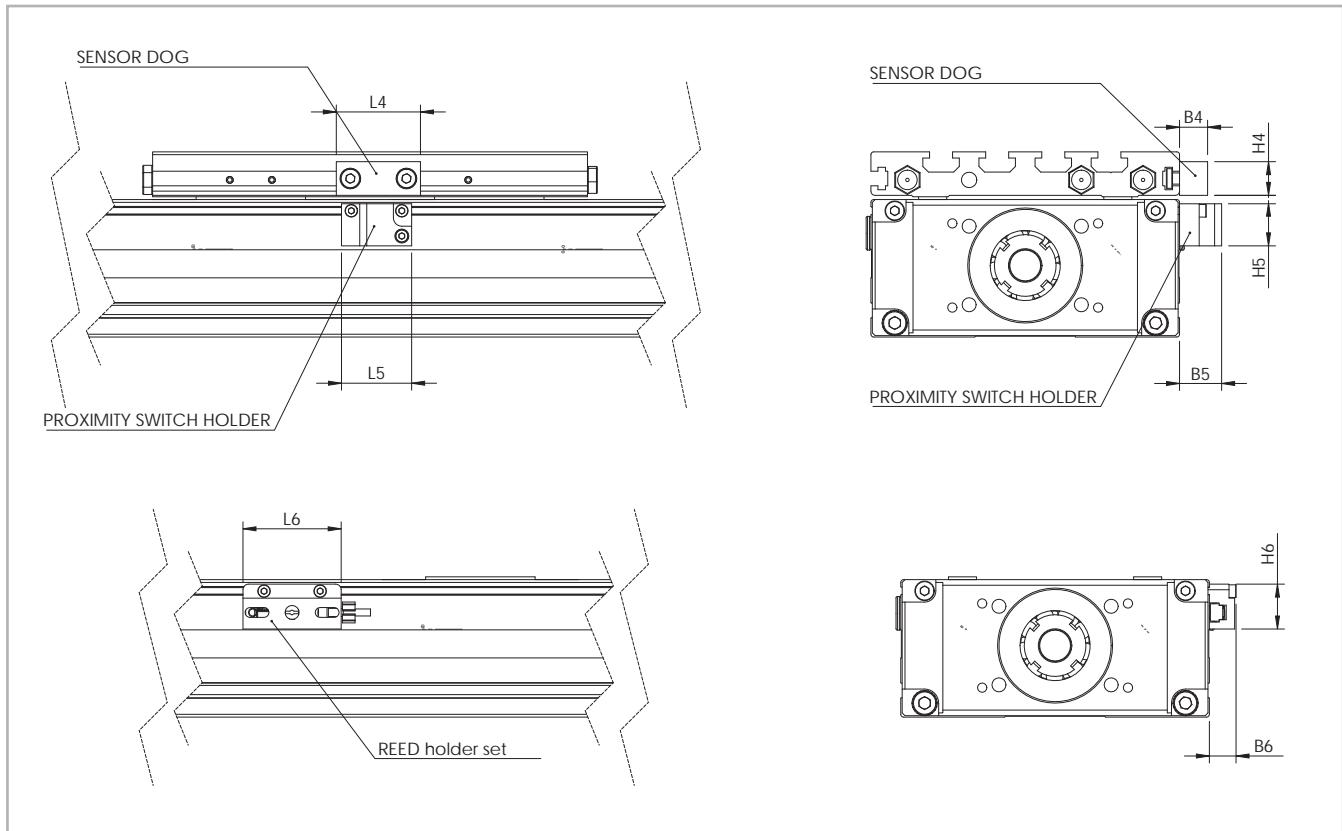


Fig. 17

## Units (mm)

	B4	B5	B6	L4	L5	L6	H4	H5	H6	Sensor	Proximity holder set	Sensor dog	REED holder set
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. 44

## External carriage

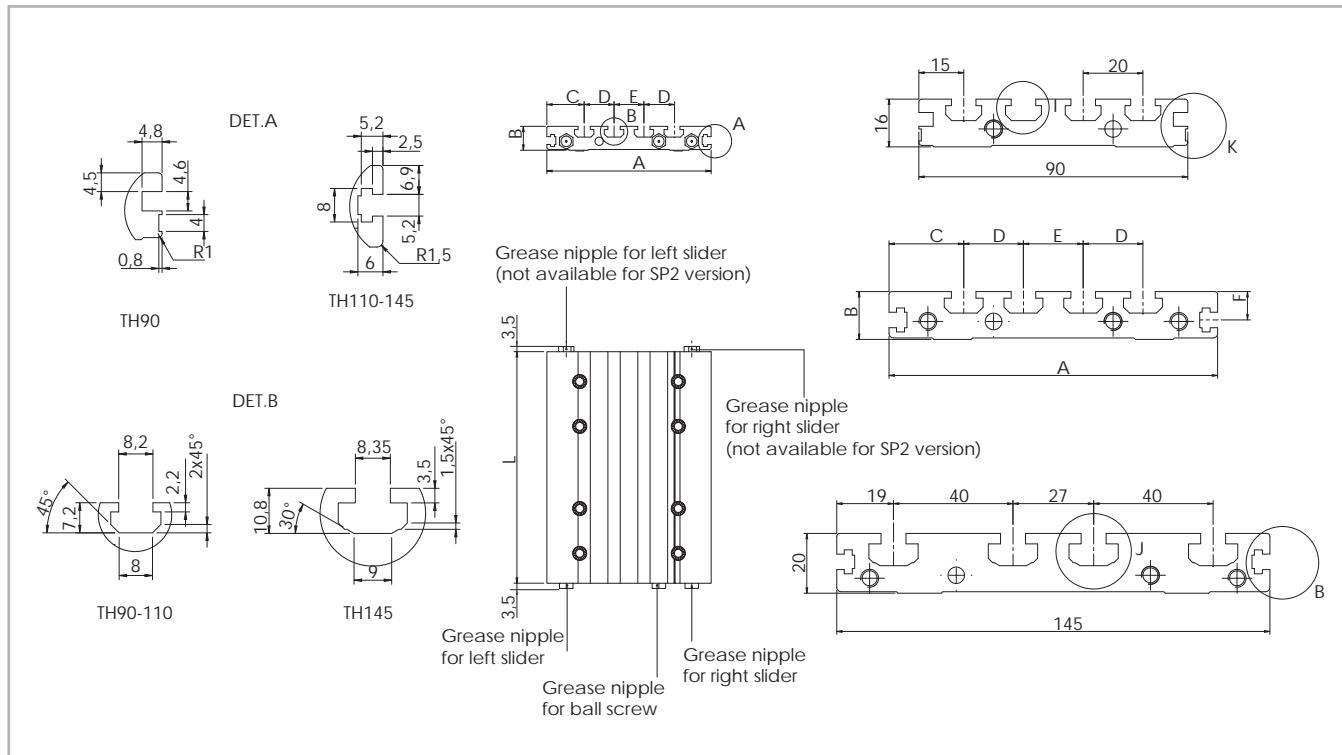


Fig. 18

External carriage for SP2	Type	A	B	C	D	E	F	L	Code
	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. 45

External carriage for SP4	Type	A	B	C	D	E	F	L	Code
	TH 90	90	16	15	20	20	6.8	125	G001194
	TH 110	110	16	25	20	20	9.5	150	G001060
	TH 145	145	20	19	40	27	9.5	190	G001061

Tab. 46



see pg. PS-18

Tab. 47

## Assembly kits

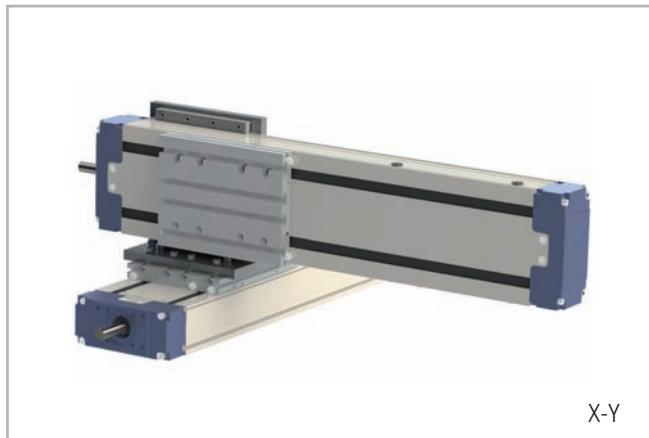


Fig. 19



Fig. 20

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
	TH 90 - TH 110 XZ
	TH 110 - TH 110 XY
	TH 110 - TH 110 XZ
	TH 110 - TH 145 XY
	TH 110 - TH 145 XZ
	TH 145 - TH 145 XY
	TH 145 - TH 145 XZ

Tab. 48

## Wrap around kit

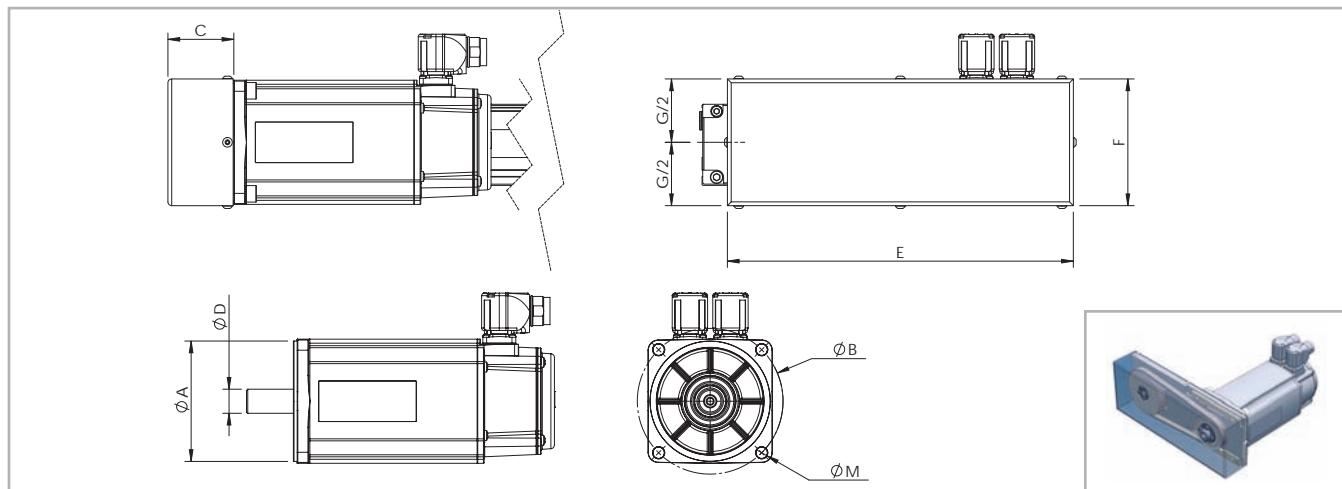


Fig. 21

Unit	Ratio	A	B	C	D	E	F	M	Code
TH 110	1 : 1	Ø 40	Ø 63	40.5	Ø 14	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

For further information please contact Rollon Technical Dept.

Tab. 49

## 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.

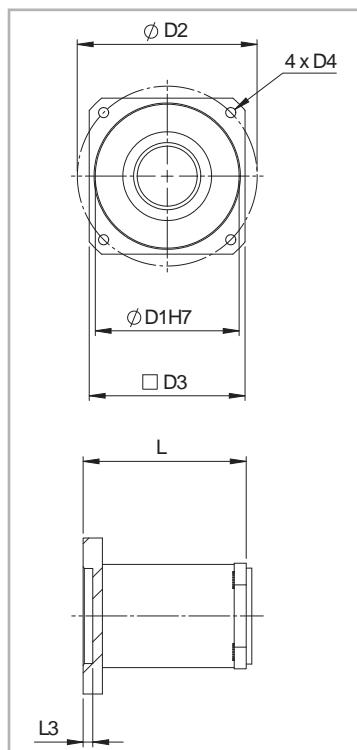


Fig. 22

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

Unit	D1	D2	D3	D4	L	L3	Code
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	Ø 6,4	82	11	G001073

Tab. 50

## Ordering key



### > Identification code for the TH linear units

H	09	1205	5P	0800	1A	
	09=90	12-05	5P=ISO 5		1A=SP2	
	11=110	12-10	7N=ISO 7		set for motor bell kit	
	14=145	16-05			2A=SP4	
		16-10			set for motor bell kit	
		16-16			3A=SP2	
		20-05			set for wrap around kit	
		20-20			4A=SP4	
		25-10			set for wrap around kit	
					Head configuration code	
					L=total length of th unit	
					Type see from pg. PS-4 to pg. PS-9, tab. 5, 10, 15, 20, 25, 30	
					B/S diameter and lead see pg. PS-12	
					Size see from pg. PS-4 to pg. PS-9	
					Linear unit serie TH see pg. PS-2	

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