Operating Instructions

euroLINE 85 KL

Issue: December 2019

Article no.: 1076555

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Change History:

Document Code	Date	Revision
MAN_EN_1076555_euroLINE85 KL_R1a.doc	November 2007	New document
MAN_EN_1076555_euroLINE85 KL_R2a.doc	November 2008	PTC Values; NTC Values added
MAN_EN_1076555_euroLINE85-KL_R3a.doc	May 2013	Update of the document. Adjustment to current German document: “MAN_DE_1072446_euroLINE85-KL_R4b.doc” (June 2010) referring to English document “MAN_EN_1076555_euroLINE 85 KL_R2a.doc” (November 2008)
MAN_EN_1076555_euroLINE85-KL_R3b.doc	January 2018	Characteristics of PTC 2 temperature sensor implemented (see section *Characteristics of PTC 2 temperature sensor (102PS1J), page 16*)
MAN_EN_1076555_euroLINE85-KL_R3c.doc	December 2019	Pin assignment (13 & 14) Temperature changed (page 18)

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1 Safety

1.1 Definition of Warning Notes

WARNING

Indicates potential danger. Non-observance of the safety provisions may cause death or severe injury.

CAUTION

Indicates potential danger. Non-observance of the safety provisions may cause property damage or injury

NOTE Offers additional information.

1.2 General Warning Notes

The linear unit euroLINE 85 KL must only be commissioned by specialists who received safety-technical instruction and are able to assess potential dangers. Furthermore, all chapters of these operating instructions must have been read and understood completely.

WARNING

The system must be powered down for all assembly, disassembly or repair work. There is a high danger of injury.

CAUTION

Motor connectors must not be inserted or disconnected when live. Risk of burning of the contacts and risk of flying sparks.

CAUTION

Linear modules always have to be operated in connection with suitable safety devices (e.g. safety cell, protective room, protective housing, light curtain).

CAUTION OF HOT SURFACE

During operation, heating of the motor, in particular of stepper motors, can cause the burns of the skin when touching the motor. Install a protective device, if possible! Do not touch the marked areas or wait for an adequate cooling time.

NOTE Observe the Declaration of Incorporation (see section *Declaration of Incorporation, page 44*).

1.3 Special Hazard Warnings

In addition, this operating instructions also contains the following special hazard warning:

DANGER FROM CRUSHING AND SHEARING

These places of the components pose the danger of crushing and shearing limbs in operation.

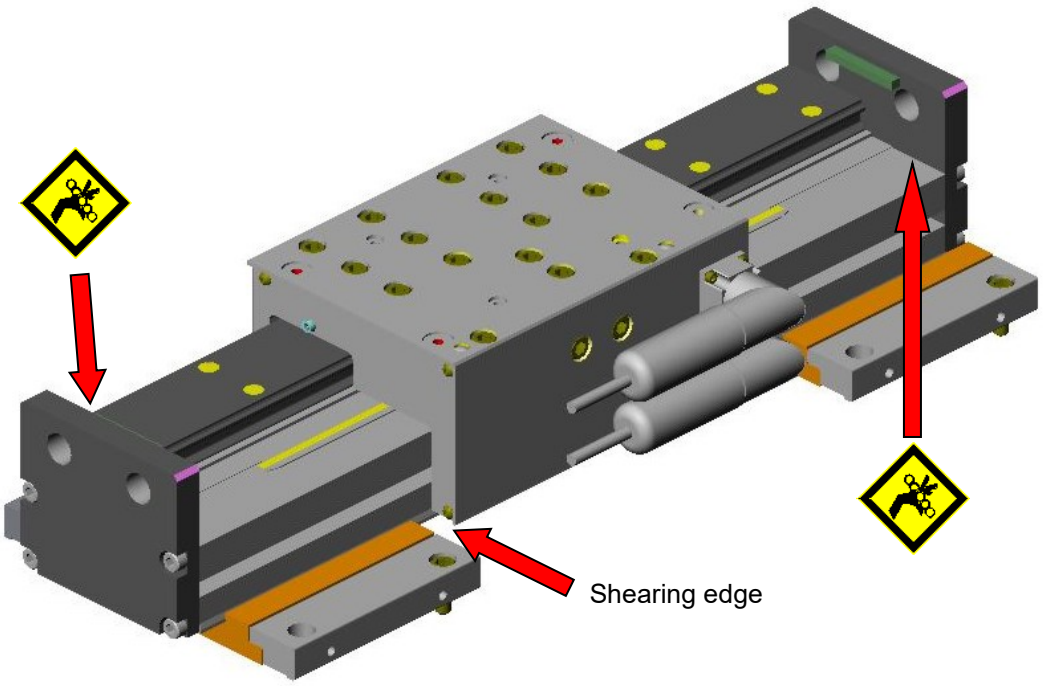


Figure 1: Risks of crushing and shearing on the euroLINE 85 KL

CAUTION OF MAGNETIC FIELD

The basic body of the linear motors contains strong permanent magnets that could damage magnetic data media (e.g. disks or credit cards).

CAUTION OF MAGNETIC FIELD

The euroLINE unit may not be used in an environment containing magnetic dusts or small parts!

2 Intended use

The linear unit euroLINE 85 KL (see *Figure 2*) is a precise, straight-line adjustment unit with ironless linear motor that is used as an attachment part in connection with other components in industrial applications. In combination with a variety of standardized assembly elements as well as the other linear units from IEF-Werner, it is also possible to set up complex, multi-axis positioning systems.

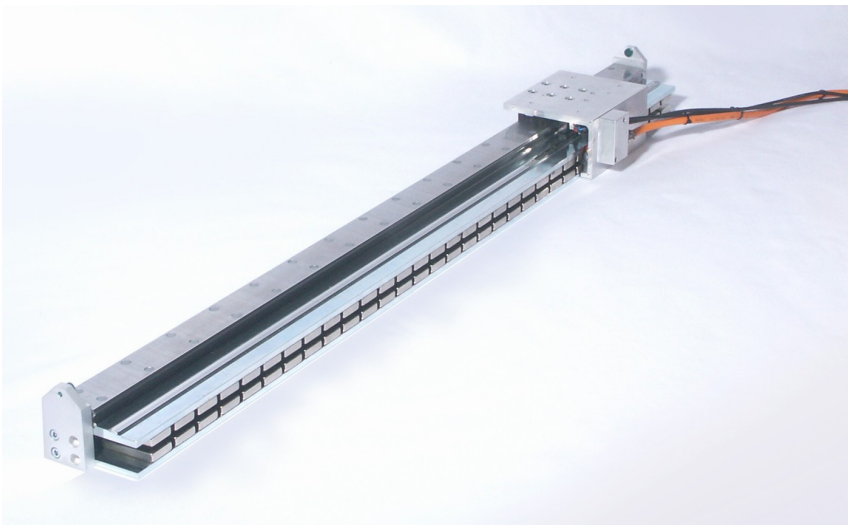


Figure 2: Linear unit euroLINE 85 KL

Areas of Application:

- Component insertion systems
- Handing of small parts
- Loading and unloading stations
- Measuring and test technology
- etc.

2.1 Reasonably Foreseeable Misuse

The euroLINE 85 KL adjustment unit is **not** to be used for deviating applications, in particular for the transport of persons and animals. The use as a pressing/bending device for cold working of metal is not allowed.

The use of the linear module without additional measures is **not** possible in the chemical or food industry or in explosive atmospheres.

In case of doubt, consult the manufacturer.

3 Assembly Instructions

3.1 Installation Position

The TG 1001150 subassembly is intended for horizontal application of the euroLINE 85 KL. The TG 1001295 subassembly is used for vertical application of the euroLINE 85 KL. In case of vertical application, the linear drive units are equipped with a pneumatic weight compensation cylinder and the slide versions with a pneumatically actuated spring-operated brake.

The static clamping force of the spring power brake is 500N. The spring power brake must not be used for dynamic braking movements. It should only be activated after positioning (standstill).

CAUTION

For vertical installation, the linear drive units must be provided with a pneumatic weight compensation cylinder and the slide version with a pneumatically operated spring-operated brake (see *Figure 3, below* and *euroLINE 85 KL Z-Axis (Parts List for TG1001295), page 29*).

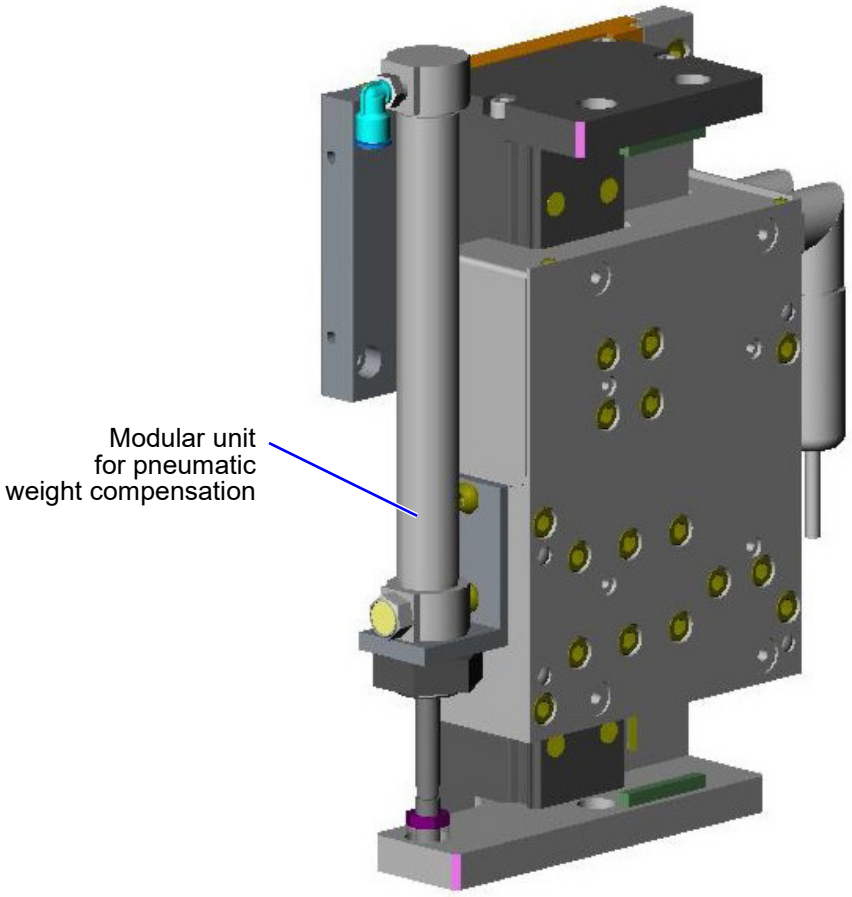


Figure 3: euroLINE 85 KL, Z-axis (TG1001295)

3.2 Cross Mounting

Standard mounting material (clamping element, centering sleeve, mounting bracket) is available for cross mounting of two euroLINE 85 KL linear drive units.

A variety of axis combinations is possible.

Examples:

- Mounting X-axis: adapter plate Art.-No.1066624
- X/Y-system, X/Z-system: adapter plate Art.-No.: 1067532
- Y/Y/X(/Z)-system: adapter-plate Art.-No.1067532; Art.-No. 1070357, Art.-No. 1067583 (compensating element)
- etc.

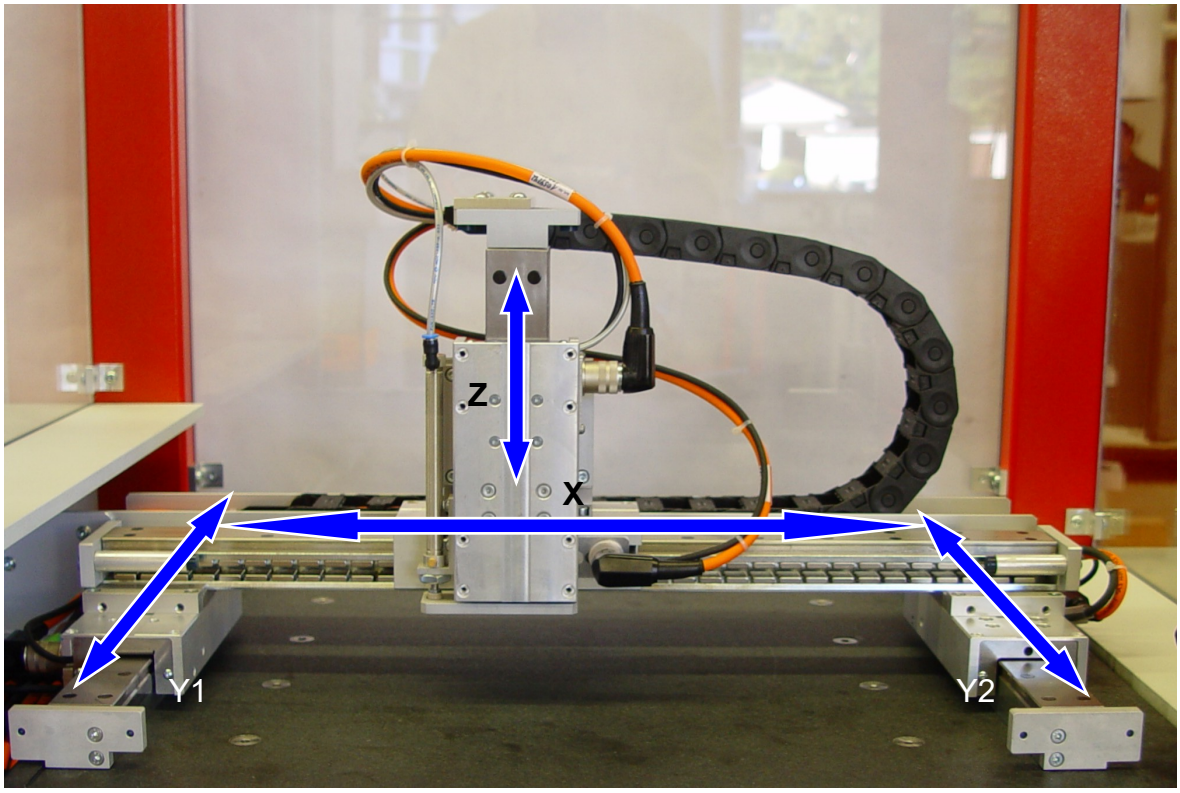


Figure 4: X/Y(/Y)/Z-System (Portal)

NOTE The dimensional drawings for the mounting accessories (centering sleeve, adapter plate) are to be found in section from *Drawings of accessories page 38, onwards*.

3.3 Attachment

The attachment of the linear unit euroLINE 85 KL can be performed to the basic body (see *Figure 5*), the slide (see *Figure 6, page 12* to *Figure 11, page 14*) or by means of adapter plates 1067532, 1066624, 1070357 or 1067583 (compensating element).

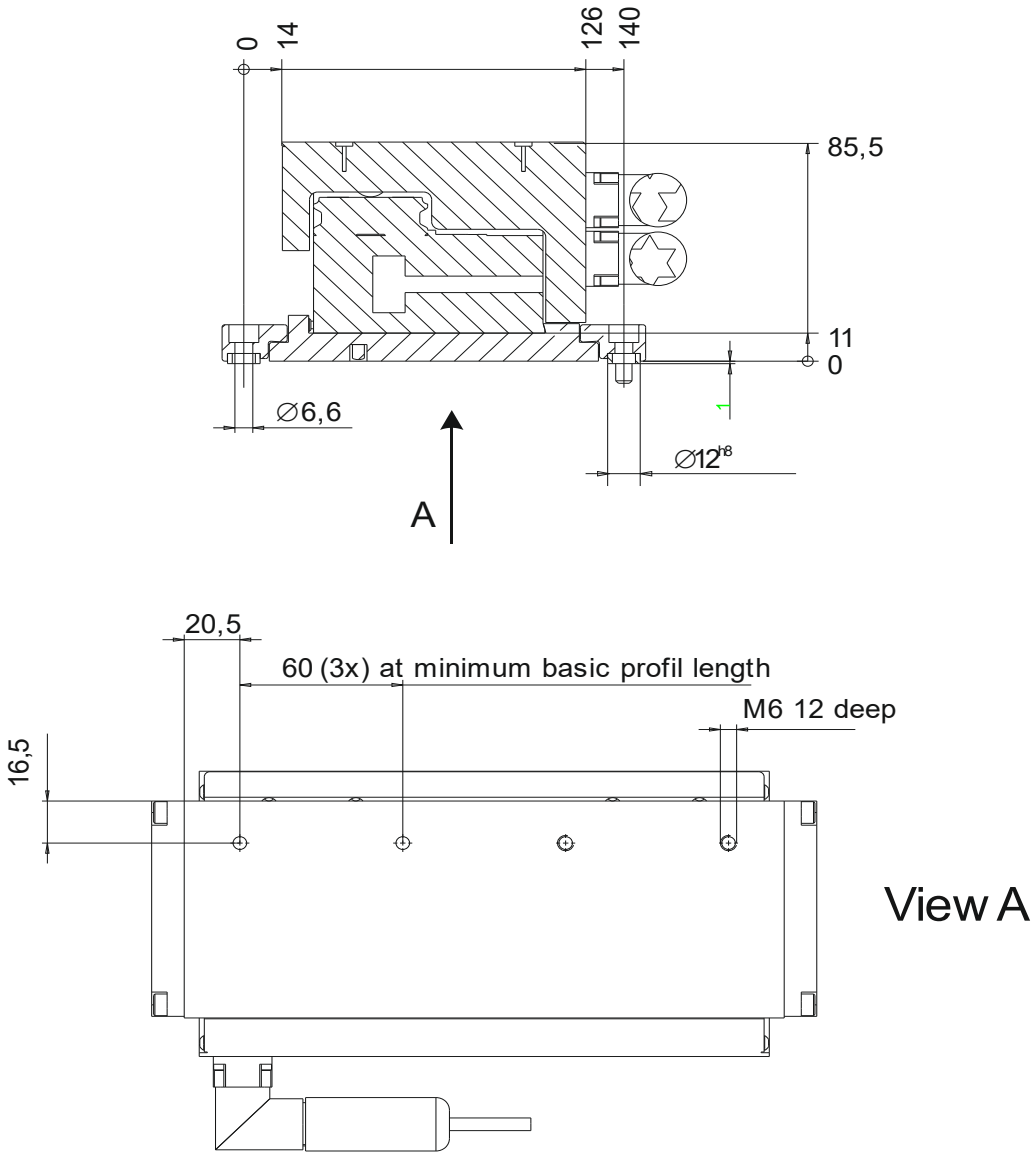


Figure 5: Attachment to the basic body

NOTE The installation area has to be a flat surface.
Any deviations from an ideal flat plane directly affect the processing precision.

NOTE Attachments on slide, see *Figure 6, page 12* to *Figure 11, page 14.*

3.3.1 Installation of actuators

The actuators (cylinders, pick up-modules, etc.) that are to be installed on the euroLINE 85 KL linear drive unit can be attached via drilling pattern on the slide.

Appropriate drilling patterns are available for the four possible slide sizes.

NOTE The depth of the threaded holes (8 mm) must be observed!

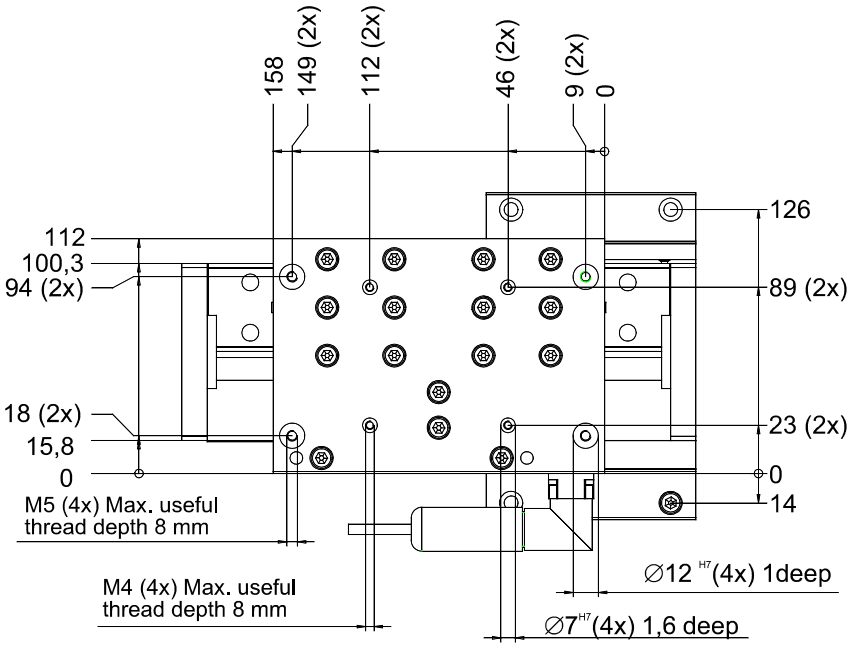


Figure 6: Slide version 1; Slide length L=158 mm

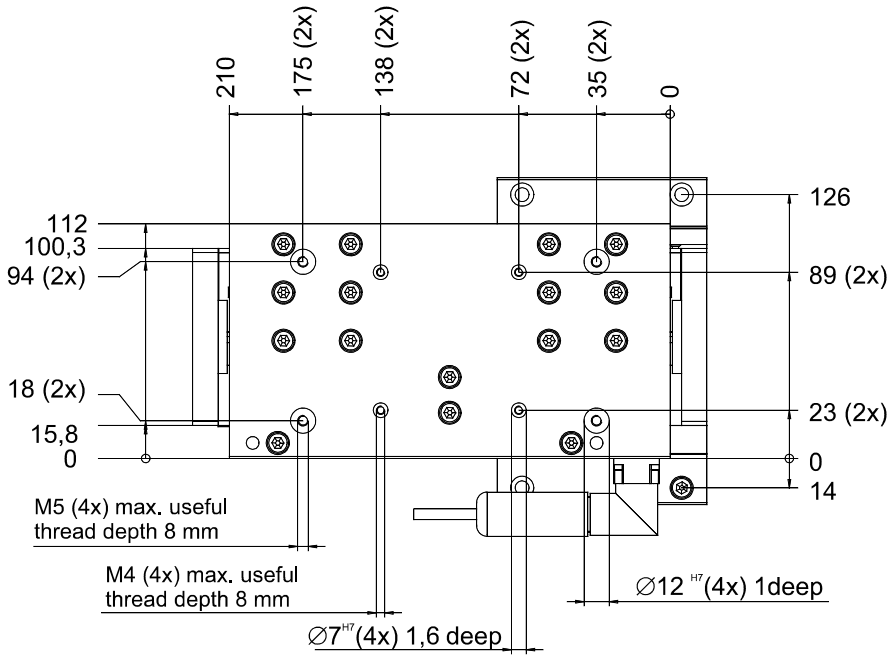


Figure 7: Slide version 2; Slide length L=210 mm

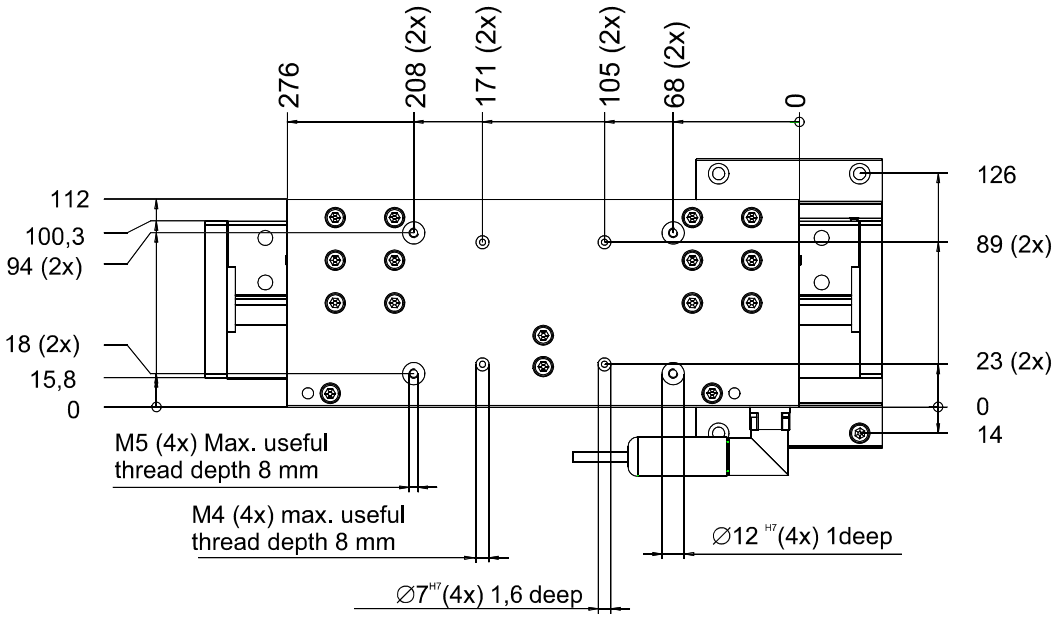


Figure 8: Slide version 3; Slide length L= 276 mm

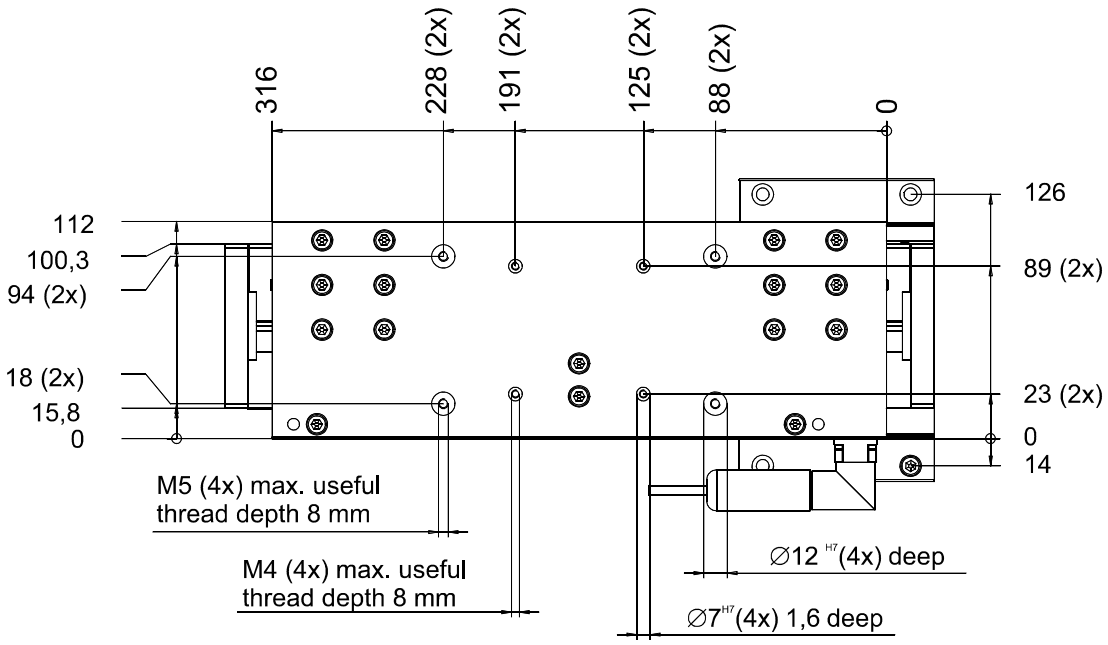


Figure 9: Slide version 4; Slide length L= 316 mm

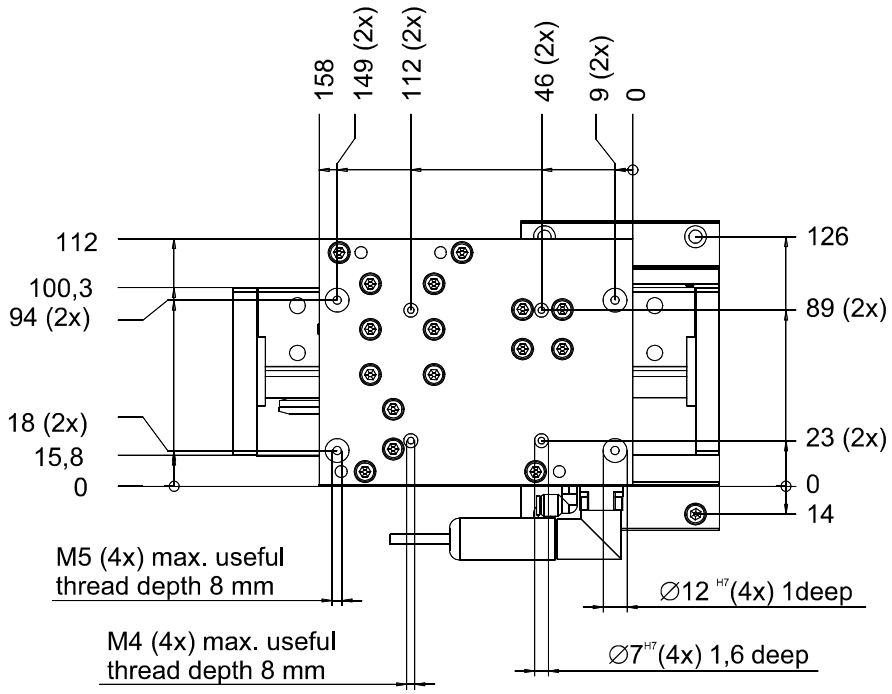


Figure 10: Slide version 5 (with brake); Slide length L= 158 mm

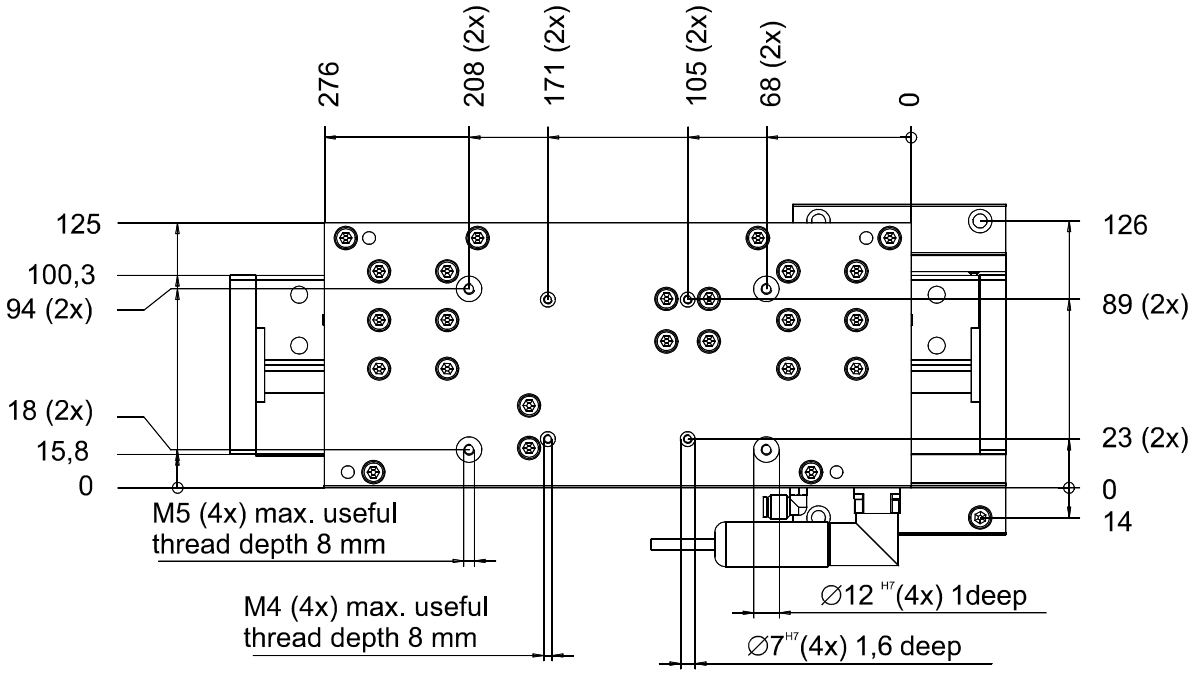


Figure 11: Slide version 6 (with break); Slide length L= 276 mm

3.4 Wiring

3.4.1 Motor and signal connection

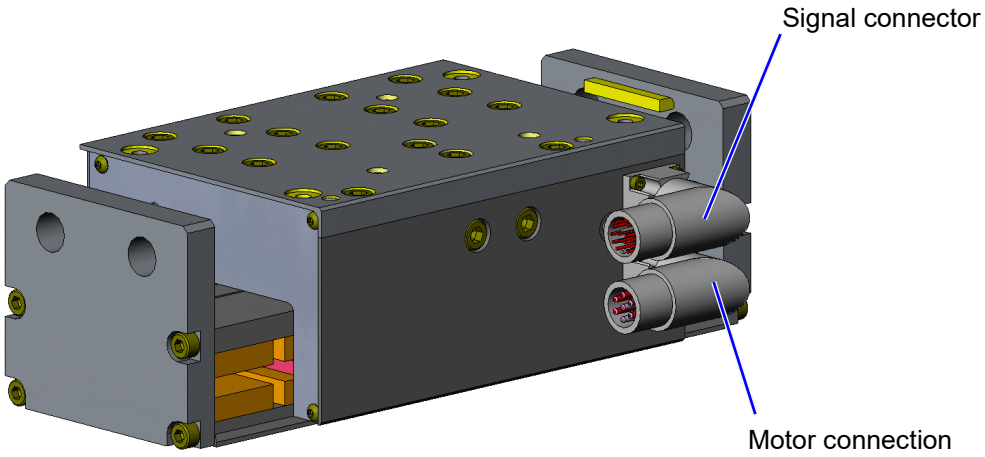


Figure 12: Motor and signal connection

3.4.1.1 Characteristics PTC Temperature Sensor Type KTY84/151 (Standard)

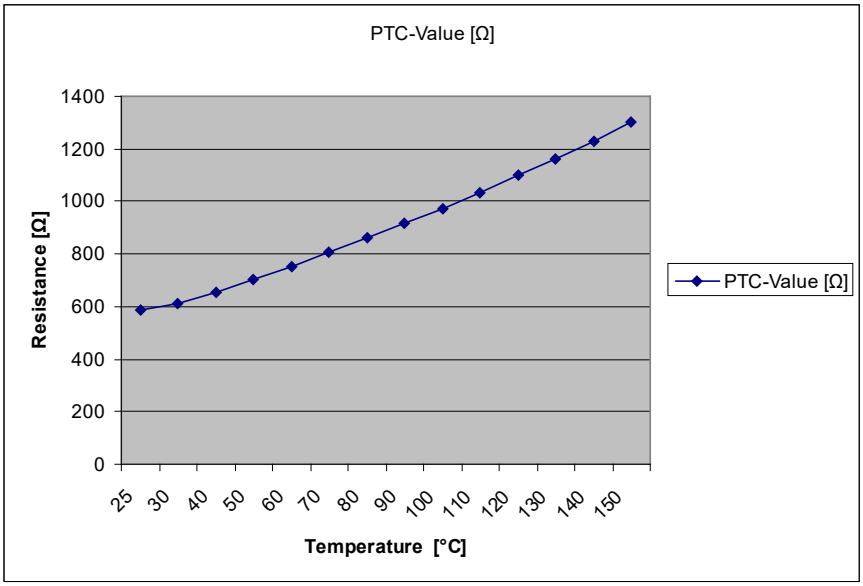
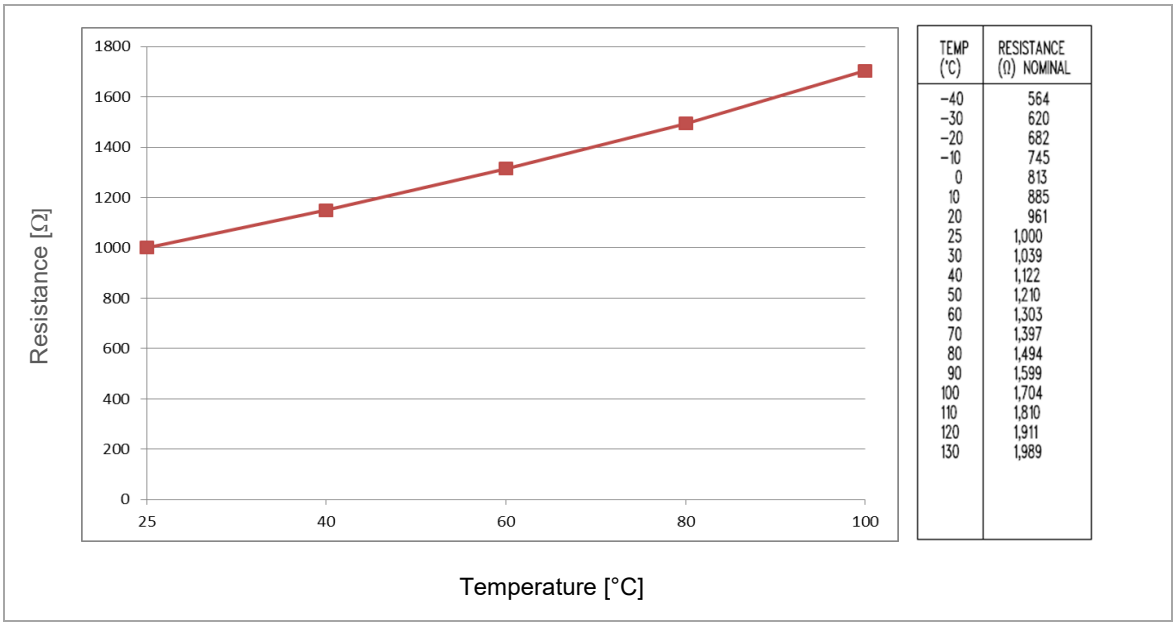


Figure 13: Characteristics PTC Temperature Sensor

The usage of a PCT temperature sensor is labelled/documented on the type plate with „euro LINE 85 KL **PTC**“ or „euro LINE 85 KLZ **PTC**“ (see *Figure 20, page 22*).

3.4.1.2 Characteristics of PTC 2 temperature sensor (102PS1J)

This temperature sensor replaces the previously installed PTC temperature sensor type KTY84/151.



TEMP (°C)	RESISTANCE (Ω) NOMINAL
−40	564
−30	620
−20	682
−10	745
0	813
10	885
20	961
25	1,000
30	1,039
40	1,122
50	1,210
60	1,303
70	1,397
80	1,494
90	1,599
100	1,704
110	1,810
120	1,911
130	1,989

Figure 14: Characteristics of PTC 2 temperature sensor

The usage of a PTC temperature sensor is documented on the type plate with “PTC“ or “PTC 2“(see *Figure 20, page 22*).

3.4.1.3 Characteristic Temperature Sensor Type NTC (Option)

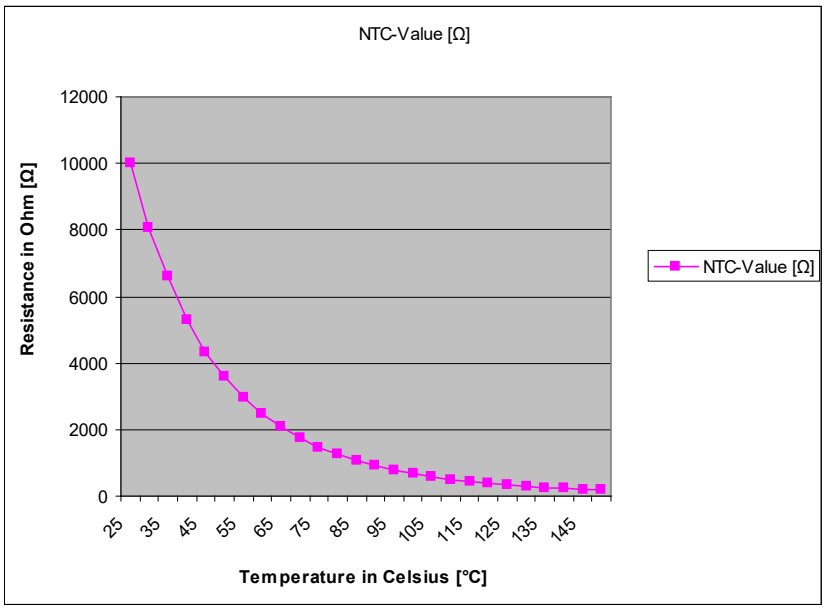


Figure 15: Characteristics NTC Temperature Sensor

The usage of an NTC temperature sensor is labelled/documented on the type plate with „euroLINE 85 KL **NTC**“ oder „euroLINE 85 KLZ **NTC**“(see *Figure 20, page 22*).

3.4.1.4 Motor connection

- Description motor connection: installation box M17, 7-pins

Connector assignment, motor connection, connector M17, 7 pins

Pin	Description
1	Motor U
2	Motor V
3	Motor W
4	not assigned
5	not assigned
6	not assigned
⏚	PE

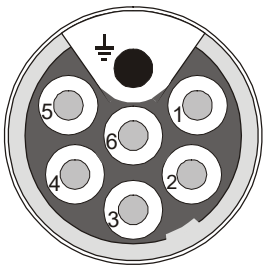


Figure 16: View of motor connector M17, 7 pins (looking towards the pins)

Technical data of the plug-in connection

Topic	Value
Temperature range [°C]	-20°C to130°C
Protection type	IP67 (plugged)
Maximum rated constant current	1mm² : 10 A / 2mm² : 14 A
Rated voltage [AC/V]	630 VAC
Test voltage (L – L)	6000 V
Current flow resistance [mΩ]	< 5 mΩ

3.4.1.5 Signal connection

- Description signal connection: Installation box M17, 17 pins

Figure 17: View of signal connector M17, 17 pins (looking towards the pins)

Optical Encodersystem Type 20									Hall-Sensor			Motor				
Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 12	Pin 9	Pin 10	Pin 11	Pin 13	Pin 14	Pin 15	Pin 16	Pin 17
0V	+5V	Z1 +	Z1 -	Z2 -	Z2 +	Z0 -	Z0 +	NAS	*	*	*	Temp -	Temp +	*	*	*

* not assigned

Technical data of the plug-in connection

Topic	Value
Temperature range [°C]	-20°C to 130°C
Protection type	IP67 (plugged)
Maximum rated constant current	3,6 A
Rated voltage [AC/V]	63 V (AC / DC)
Test voltage (L – L)	1500 V
Current flow resistance [mΩ]	< 15 mΩ

3.4.1.6 Installation Situation Measuring System

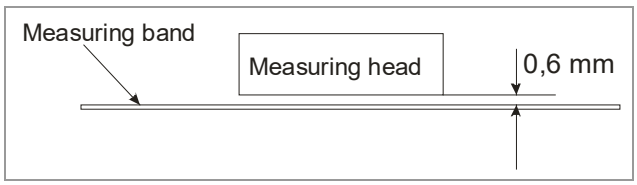


Figure 18: Spacing of the Measuring Band ↔ Measuring Head

3.4.1.7 Screen concept, Type 20

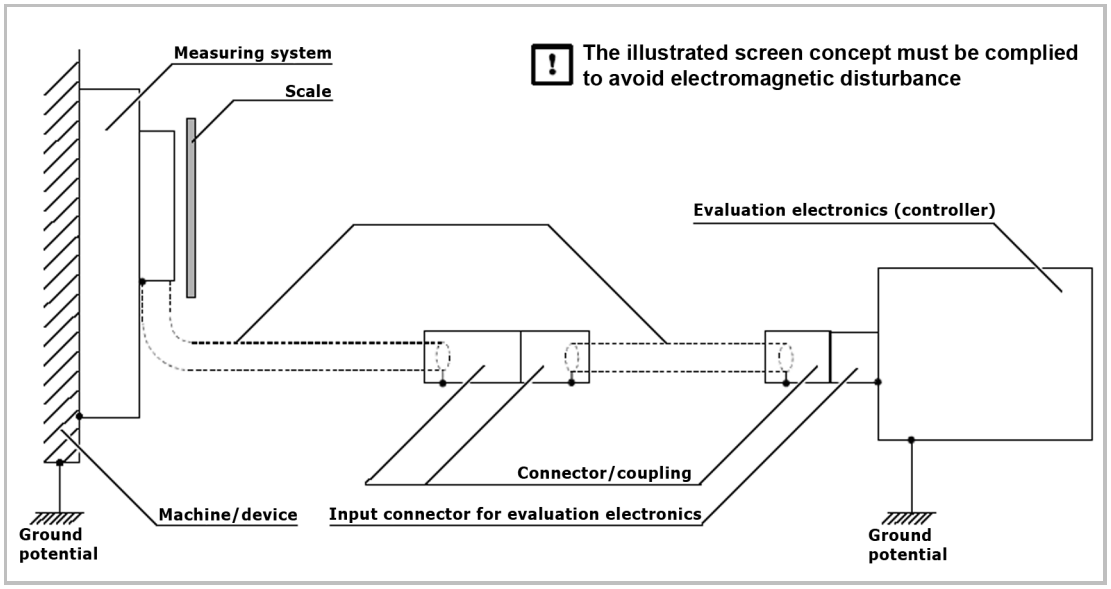


Figure 19: Screen concept of the optical measurement system

3.4.2 Cable Routing

For all moving cables, suitable cable routing has to be used to effectively prevent cable breaks. The minimum radius r_{min} for cable routing chains is calculated for IEF cables according to the following formula:

$$r_{min} \geq 10 \times \text{cable diameter}$$

When other cables are used, EN 60204 must be observed. In addition, it must be ensured that a space reserve of 30% is kept free within the routing chains. A strain relief for the cables has to be attached at the outlet of the cable routing chain.

We recommend to procure original cables and cable routing chains from IEF-Werner. Please contact us, we will be pleased to provide advice.

3.5 Technical Data

3.5.1 Tightening Torques for Screw Connections [Nm]

Property class	M2,5	M3	M4	M5	M6	M8
8.8	0,5	1,28	2,7	5,5	9,5	23
10.9	0,8	1,8	3,8	8	13	32
12.9	1,0	2,1	4,6	9,5	16	39

3.5.2 Technical Data of the Linear Unit euroLINE85 KL

		Slide type (slide length)			
Designation	**Unit**	**Type 158**	**Type 210**	**Type 276**	**Type 316**
Slide length	[mm]	158	210	276	316
Width of basic body	[mm]	85			
Stroke in 60 mm grid (depending on slide type)	[mm]	6 ... to ... 1789 (depending on type of slide)			
Continuous feed force	[N]	120		240	
Maximum speed	[m/s]	6,5			
Maximum acceleration	[m/s²]	100			
Basic weight carriage body l = 245 mm	[g]	5350			
Weight per 60 mm extra length	[g]	1370			
Maximum handling weight	[g]	5000		10000	
Linearity measuring system	[µm]	± 5			
Repetition accuracy	[µm]	± 5			
Temperature range	[° C]	0 to + 50			
Coil type		**S2**		**S4**	
Coil length	[mm]	122		243,8	
Force constant	[N/A]	34,1		68,2	
Continuous current	[A]	3,5			
Peak current for 1s (S2 mode, VDE 0530 and IEC)	[A]	11			
Permanent force	[N]	120		240	
Peak force	[N]	375*		750*	
Maximum DC intermediate circuit voltage	[V/DC]	380		380	
Phase resistance at 25 °C (U,V,W)	[Ω]	8,5		17,0	
Phase resistance at 125 °C (U,V,W)	[Ω]	10,4		20,8	
Inductance at 1 kHz	[mH]	3,4		6,8	
Anti EMK	[V/mps]	36,22		72,44	
Pole distance (north pole – north pole)	[mm]	60,96		60,96	
Coil maximum operating temperature	[° C]	110		110	

* for 1s (S2 mode, VDE 0530 and IEC)

3.5.3 Technical Data of Coil euroLINE 85 KL

		Slide type (slide length)			
Designation	**Unit**	**Type 158**	**Type 210**	**Type 276**	**Type 316**
Slide length	[mm]	158	210	276	316
Coil length (coil 2)	[mm]	122		243,8	
Force constant	[N/A]	35,59		71,17	
Continuous current	[A]	3,5			
Peak current for 1s	[A]	11*			
Permanent force	[N]	120		240	
Peak force	[N]	380*		760*	
Maximum DC intermediate circuit voltage	[V/DC]	380			
Phase resistance at 25° (U,V,W)	[Ω]	8,5		17,0	
Phase resistance at 125° (U,V,W)	[Ω]	10,4		20,8	
Inductance at 1kHz	[mH]	3,4		6,8	
Anti EMK	[V/mps]	36,22		72,44	
Pole distance (north pole – north pole)	[mm]	60,96		60,96	
Coil maximum operating temperature	[C°]	110			

* for 1s (S2 mode, VDE 0530 and IEC

3.5.4 Type Plate

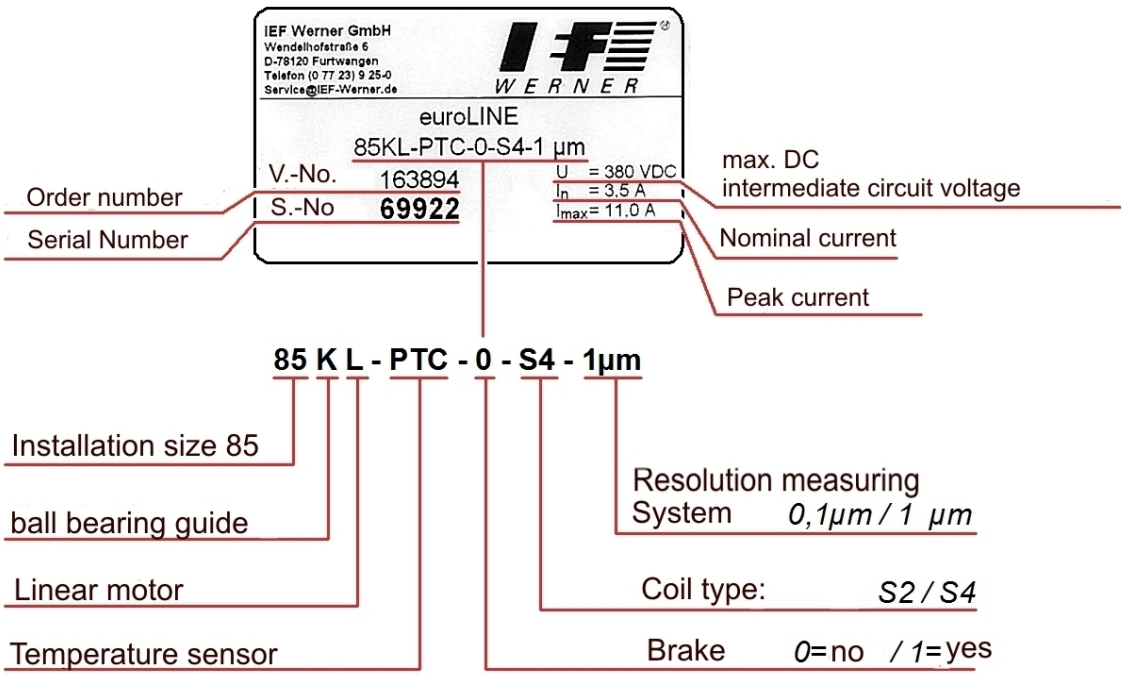


Figure 20: Type plate

3.5.5 Slide variant euroLINE 85 KL

variant	carriage length [mm]	carriage [pcs.]	configuration		coil	feed force [N]
1	158	2	M	*	S2	120
2	210	2	M, H	*	S2	120
3	276	2	M	*	S4	240
4	316	2	M, H	*	S4	240
5	158	1	M, B	*	S2	120
6	276	2	M, B	*	S4	240

* M: measuring system, H: hall sensor, B: brake

3.5.6 Permissible Moments, Load Capacity

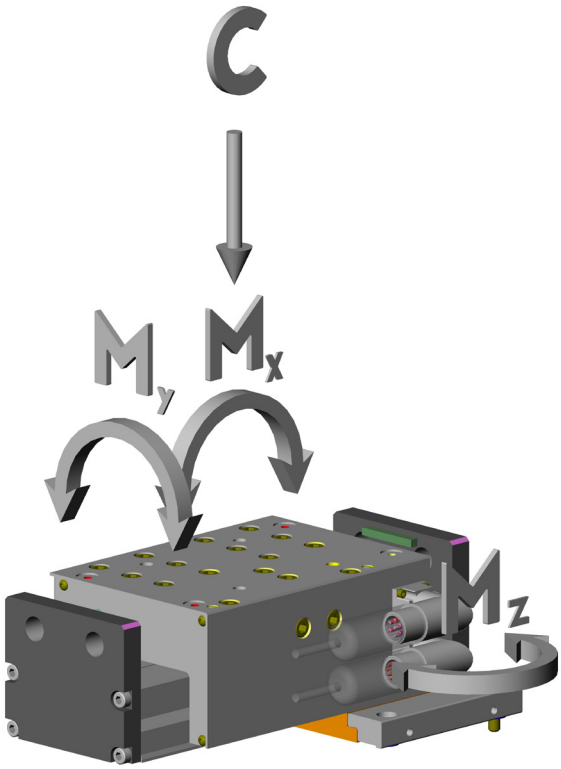


Figure 21: Torques for euroLINE 85 KL, slide variant 1 - 6

Slide variant	Slide length [mm]	Carriages [no.]	Equipment	Mx [Nm]	My [Nm]	Mz [Nm]	Feed force [N]	coil	Weight [g]
1	158	2	M *	200	200	200	120	S2	2157
2	210	2	M, H *	200	200	200	120	S2	2463
3	276	2	M *	200	200	200	240	S4	3072
4	316	2	M, H *	200	200	200	240	S4	3326
5	158	1	M, B *	100	100	100	120	S2	2441
6	276	2	M, B *	200	200	200	240	S4	3850

* M: Measuring system, H: Hall sensor, B: Brake

4 Maintenance

CAUTION

Repairs have to be generally performed by specialist personnel who have read and understood the operating instructions.
Only when original spare parts are used can warranty claims be accepted by IEF-Werner GmbH.

CAUTION

Always **de-energize** the system before beginning the repair.

4.1 Maintenance of Optical Measuring System

CAUTION

Modifications and repairs of this measuring system may be performed only by the manufacturer or by persons authorized by the manufacturer.

The manufacturer will not be liable for damage resulting from unauthorized manipulation of the measuring system. All warranty claims become void by unauthorized manipulations.

The measuring system is generally maintenance-free.

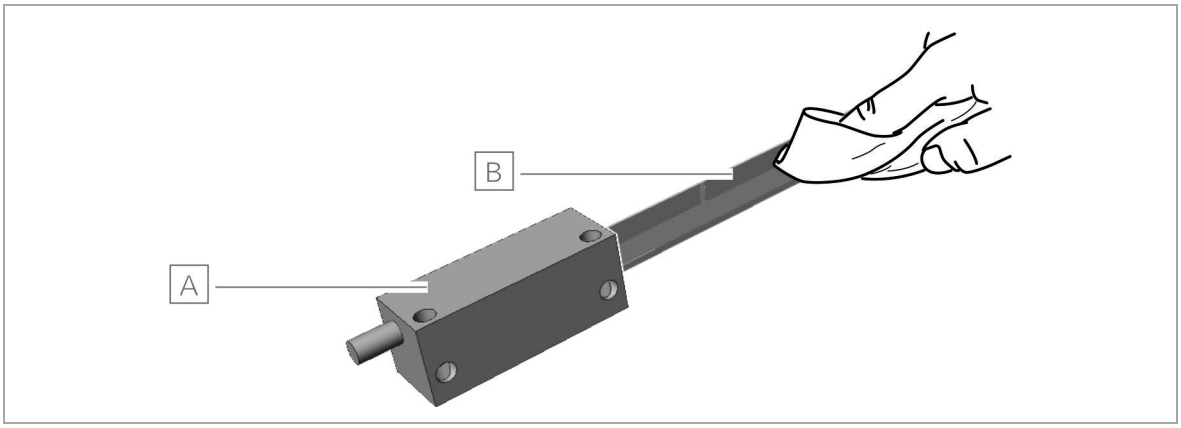
However:

- Open measuring systems are sensitive to soiling and therefore have to be protected by the user against the effects of dirt by design measures.
- This applies in particular for the protection of the measuring band divisions (measuring band surface) and the side of the measuring head facing the measuring band (sensor window).
- Coarse and uneven soiling and deposits (e.g. oil, grease or water) are especially critical. Depending on the installation position and the ambient conditions, occasional cleaning of the measuring band surface or of the sensor window can be required. When using the monitoring signal that is output by the measuring head, the necessity for cleaning is indicated.

When the assemblies are cleaned, it must be observed that deposited particles can scratch the sensor and the scale.

Rough soiling must be cleaned with a soft brush.

For final cleaning use please cotton wool or a soft cloth, in case of severe soiling use acetone or methylated spirit.



A Measuring head B Measuring tape surface

Figure 22: Cleaning open measuring system

4.2 Guide Lubrication

The guide slides have received a longtime lubrication in the factory for an operating performance of 10,000 km. To achieve a higher operating performance, we recommend to regularly relubricate the guide. Via re-grease nipples the guide can be relubricated with a special hand-held grease gun (Art.-No.: 1067378, grease: ISOFLEX Super LDS 18, see *Figure 23*).

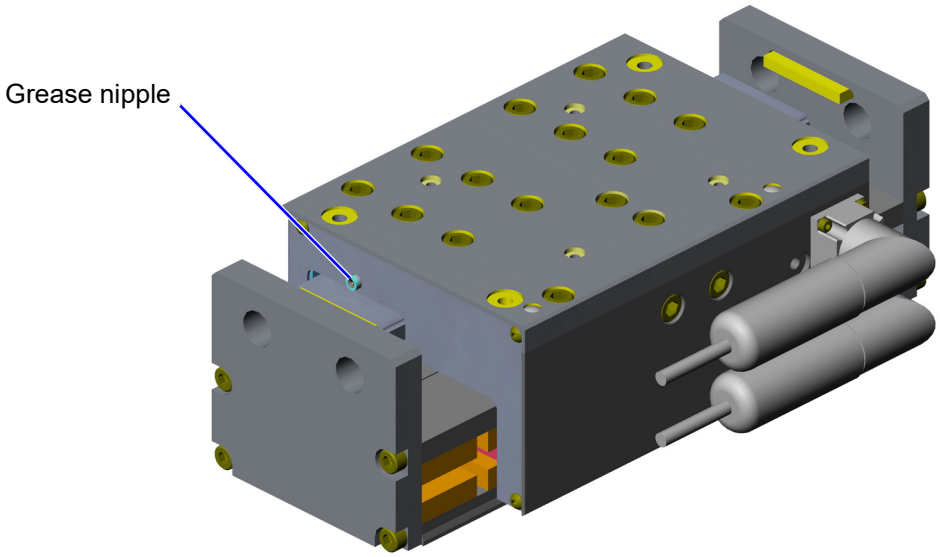


Figure 23: Lubrication of the guide

The recommended maintenance interval is approx. 500 operating hours for normal ambient conditions. The maintenance interval should be shortened if the ambient conditions are severe (high dust content, high humidity, high temperature, high travel distance).

5 Troubleshooting

Malfunction	Cause	Correction
Increased running noise	Nominal service life of guide carriages exceeded	Complete exchange of guide carriages*
	Torque load on guide carriages too high, therefore play in the guide carriage	Complete exchange of guide carriages*
	Motor coil does not run "free" and scrapes	Exchange the complete slide unit*
	Error in power electronics or control unit	Check and exchange power electronics or control unit, if necessary
Linear unit does not move	Blockage by magnetic foreign parts in the area of the magnets	• Remove foreign parts • check motor coil for damage*
	Motor coil does not run "free" and blocks	Exchange the complete slide unit*
	Clamp connection of motor cable in terminal box loose	Reconnect clamp U,V,W Caution: Only in de-energized condition
	Pins of motor plug connection loose	Reconnect Caution: only in de-energized condition
	Pin contacts of motor plug connection oxidized, burnt off	• Replace male and female connector Caution: only in de-energized condition
	Sensor cable defective	Replace sensor cable
	Measuring system defective	• Check distance measuring head ↔ measuring band, nominal spacing = 0.6 mm • Replace complete slide, if required
	Motor coil defective	Exchange the complete slide unit*
	Hall sensor defective	Exchange the complete slide unit*
	Guide carriage defective (binding, blockage)	Exchange of guide carriages and the guide rail, if required*
	Brake module defective (for vertical applications)	Exchange brake module*
	No pressure or incorrect pressure applied to the weight compensation cylinder	Check pneumatic pressure
	Weight compensation cylinder defective	Exchange weight compensation cylinder
	Error in power electronics or control unit	Check components and exchange, if necessary
Loss of position	Measuring system defective	• Check distance measuring head ↔ measuring band, nominal spacing = 0.6 mm • Replace measuring head or complete slide, if required
	Measuring band soiled, damaged	Clean measuring band, replace, if required

*Ex works, or by IEF service engineer

6 Parts lists and drawings

6.1 euroLINE 85 KL (Parts List TG1001150)

Drawing Pos.	Art. no.	Part (1)/ Part group (0)	Designation	Wearing part = V Spare part = E
10	1001202	0	Basic body 85 KL compl.	E
20	1000908	0	Rail guide	V
30	626061	1	Fillister head screw, galvanized DIN 912, Type M4 x 16	
40	1057416	1	Protection cap for guide rail	
50	1001144	0	Measuring Tape	E
60	1067418	1	End plate	
70	626059	1	Fillister head screw, galvanized DIN 912, Type M5 x 16	
80	1018826	1	Damper Type 15	E
90	1001149	0	Slide compete	E, V

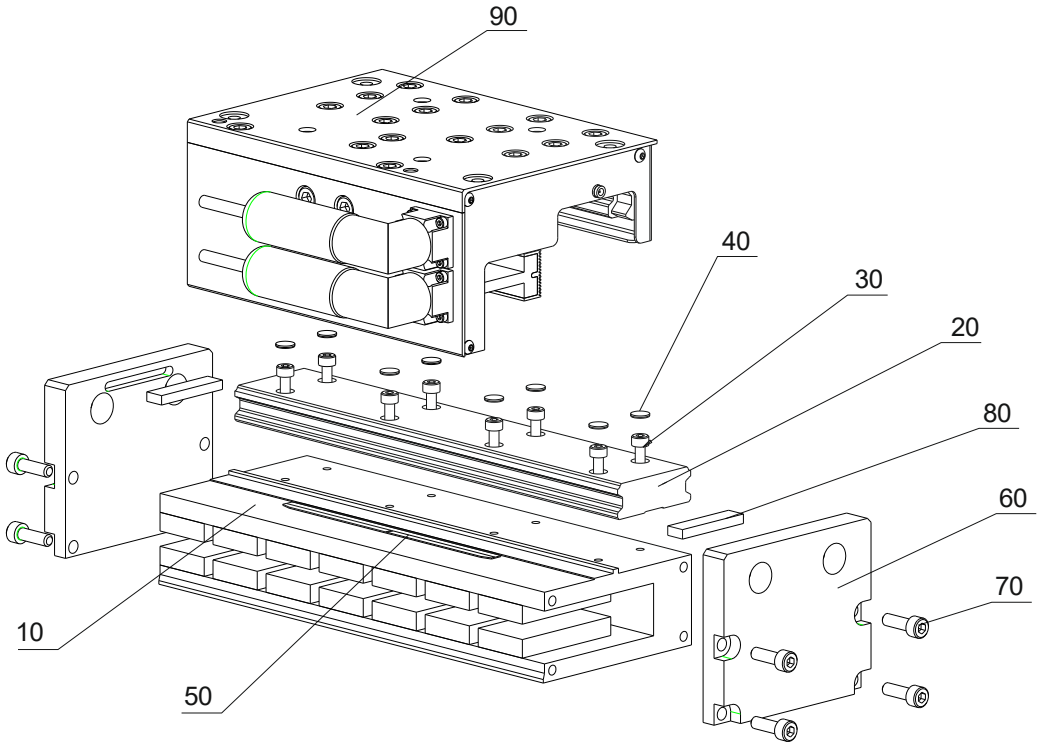


Figure 24: Exploded view TG 1001150

6.2 euroLINE 85 KL Z-Axis (Parts List for TG1001295)

Drawing pos.	Art. no.	Part (1)/ Part group (0)	Description	Wearing part = V Spare part = E
10	1001202	0	Basic body, complete	E
20	1000908	0	Rail guide	V
30	626061	1	Cylinder head screw, galvanized, DIN 912, Type: M4 x 16	
40	1057416	1	Seal cap for guide rail	
50	1001144	0	Measuring Tape	E
60	1067418	1	End stop	
70	626059	1	Cylinder head screw, galvanized, DIN 912, Type: M5 x 16	
80	1018826	1	Damper, type 15	E
90	1001149	0	Slide, complete	E, V
100	1070970	1	End plate	
110	1067888	1	Weight compensation cylinder max. stroke = 125mm	V
	1067890	1	Weight compensation cylinder max. stroke = 250mm	V
	1037891	1	Weight compensation cylinder max. stroke = 370mm	V

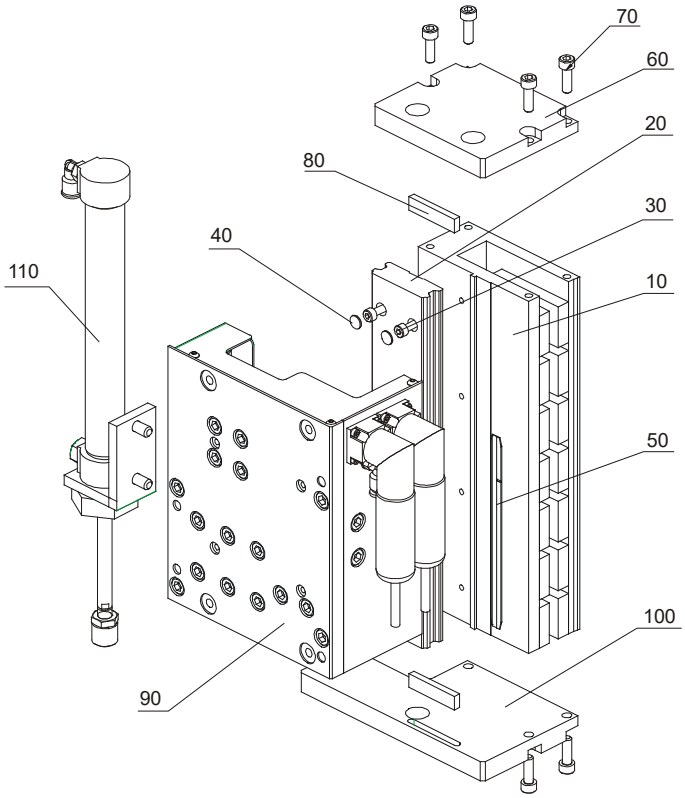


Figure 25: Exploded view of euroLINE TG 1001295

6.3 Dimensional Drawings for euroLINE 85 KL, Mounting Versions 1-6

6.3.1 Mounting Version 1

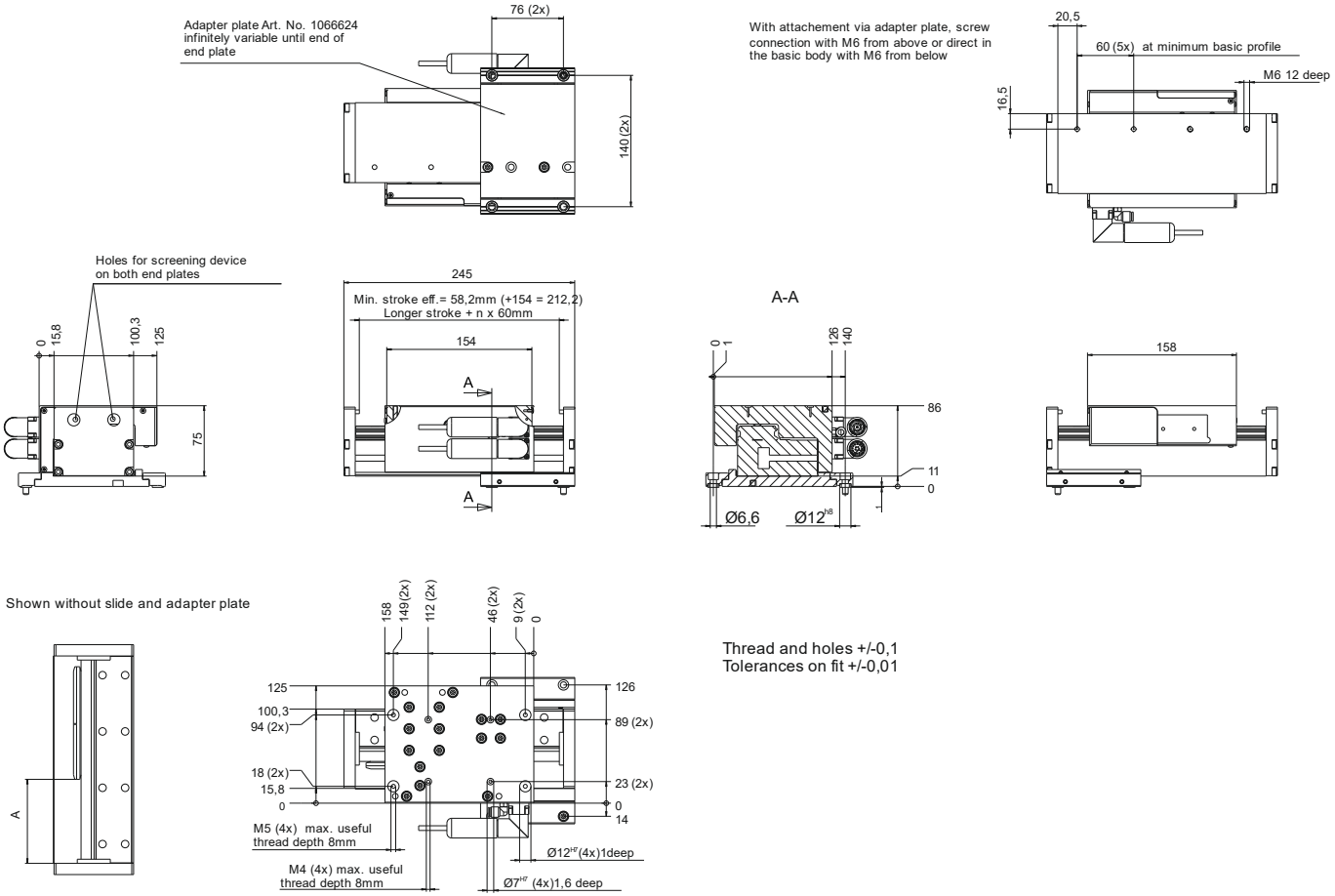


Figure 26: euroLINE 85 KL Slide variant 1

6.3.2 Mounting Version 2

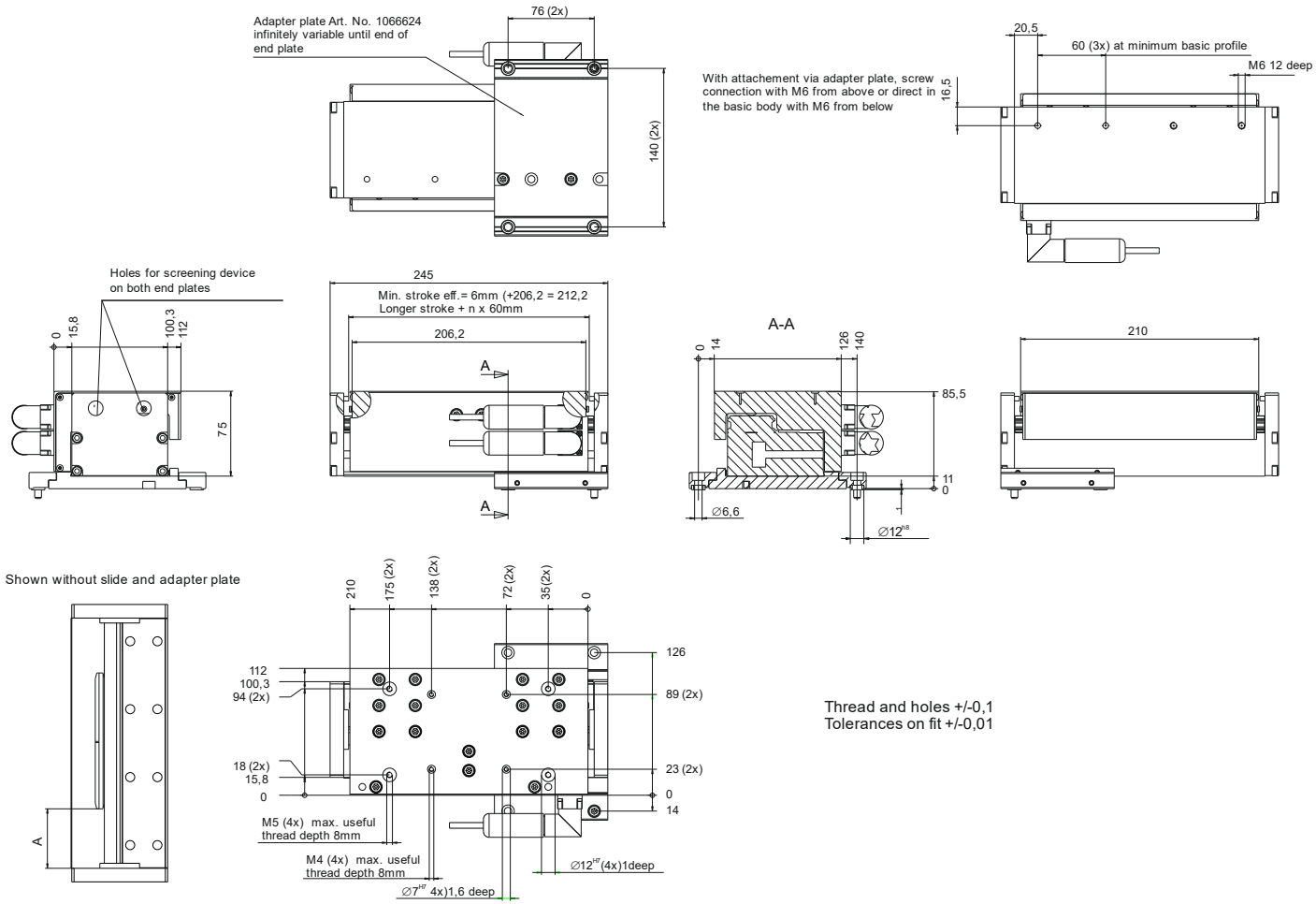


Figure 27: euroLINE 85 KL Slide variant 2

6.3.3 Mounting Version 3

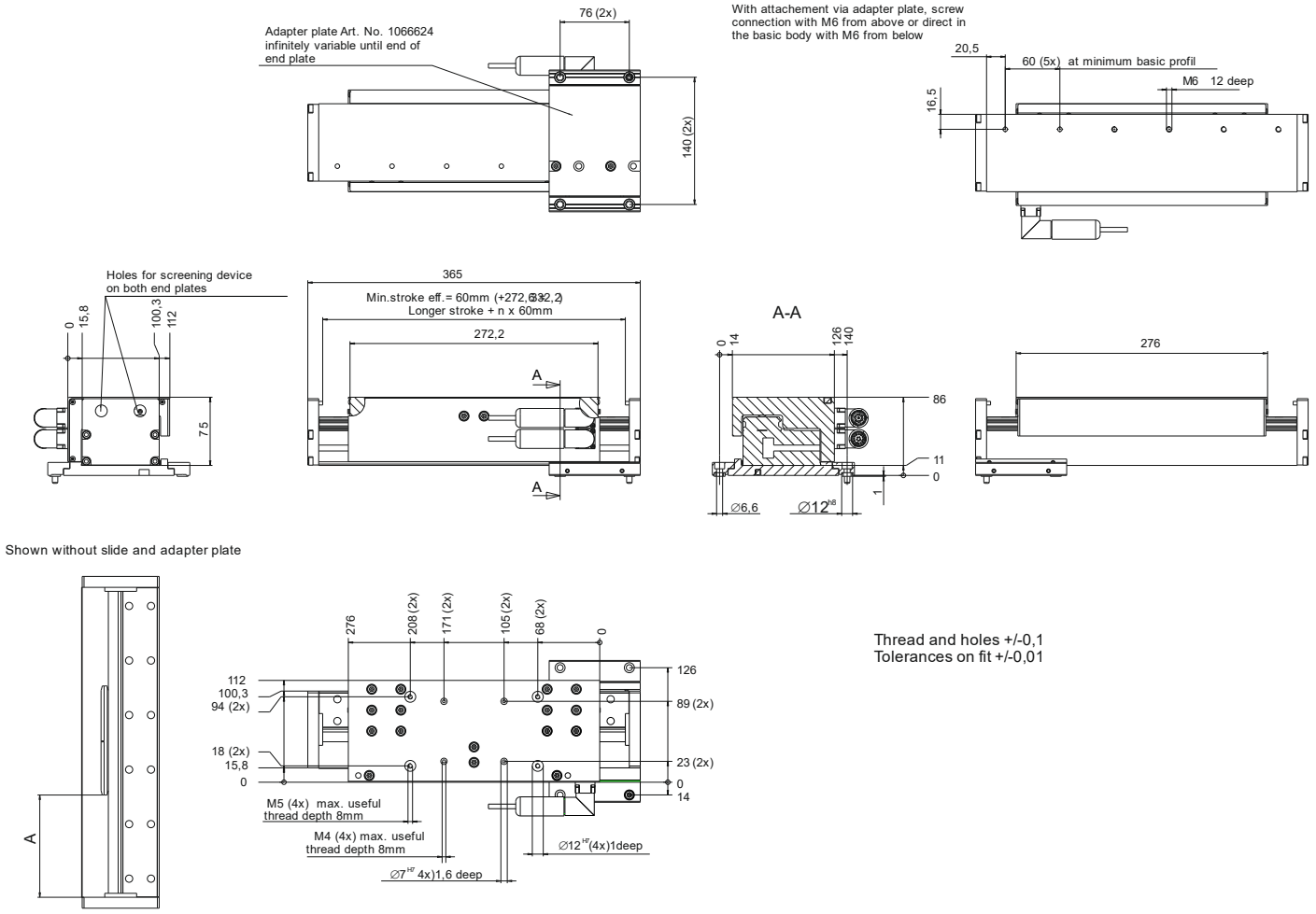


Figure 28: euroLINE 85 KL Slide variant 3

6.3.4 Mounting Version 4

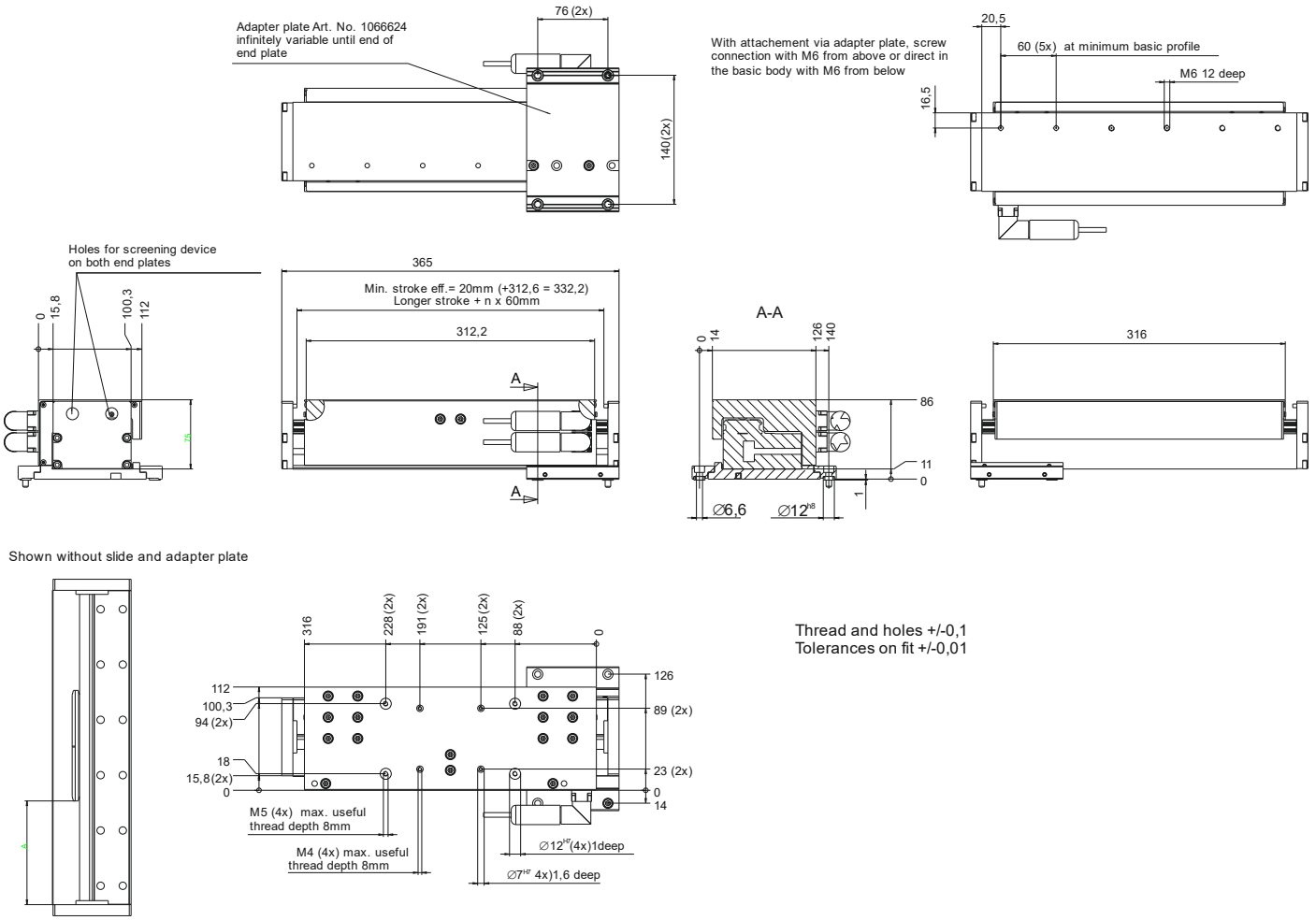


Figure 29: euroLINE 85 KL Slide variant 4

6.3.5 Mounting Version 5

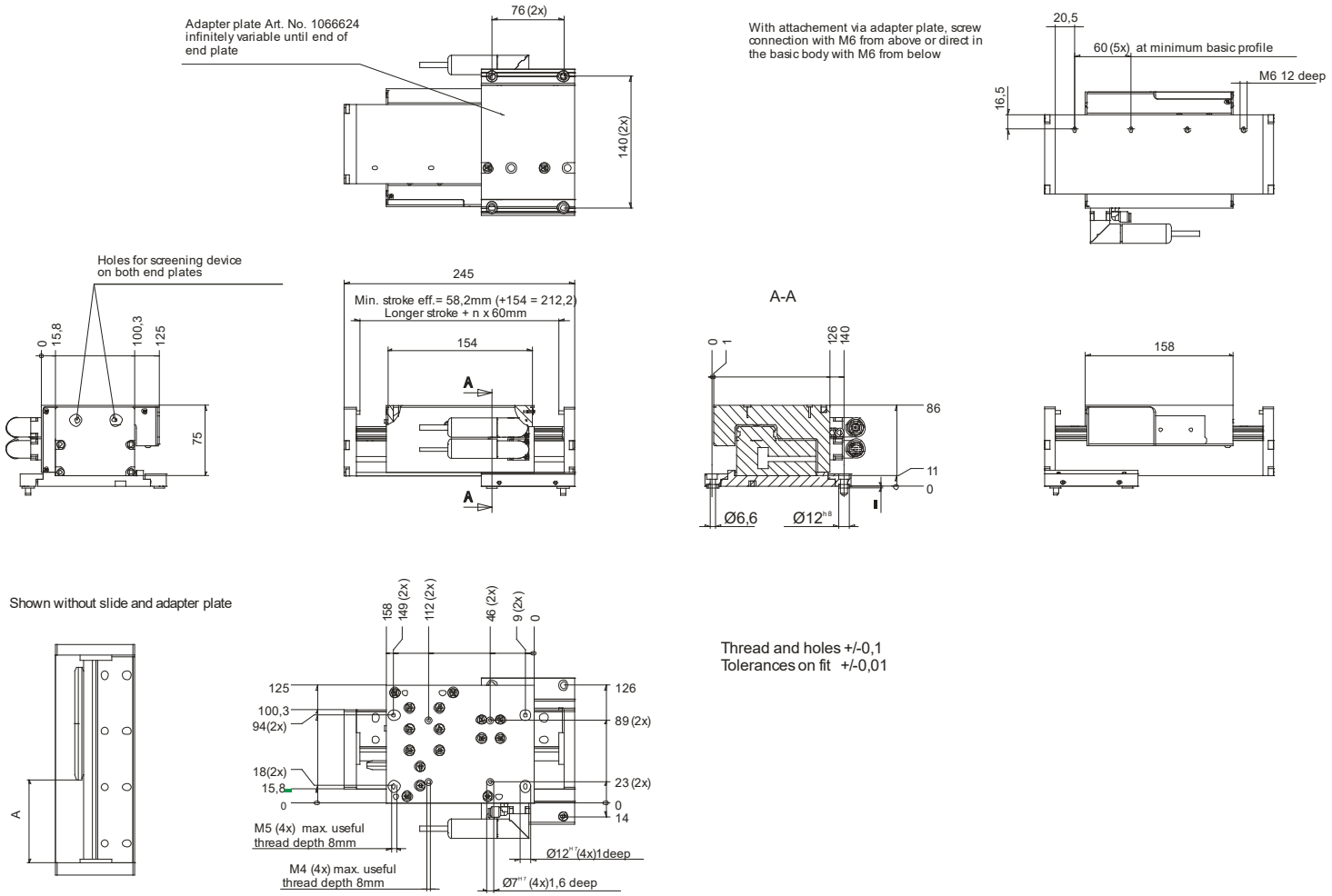


Figure 30: euroLINE 85 KL Slide variant 5 (with brake, without weight compensation)

6.3.6 Mounting Version 6

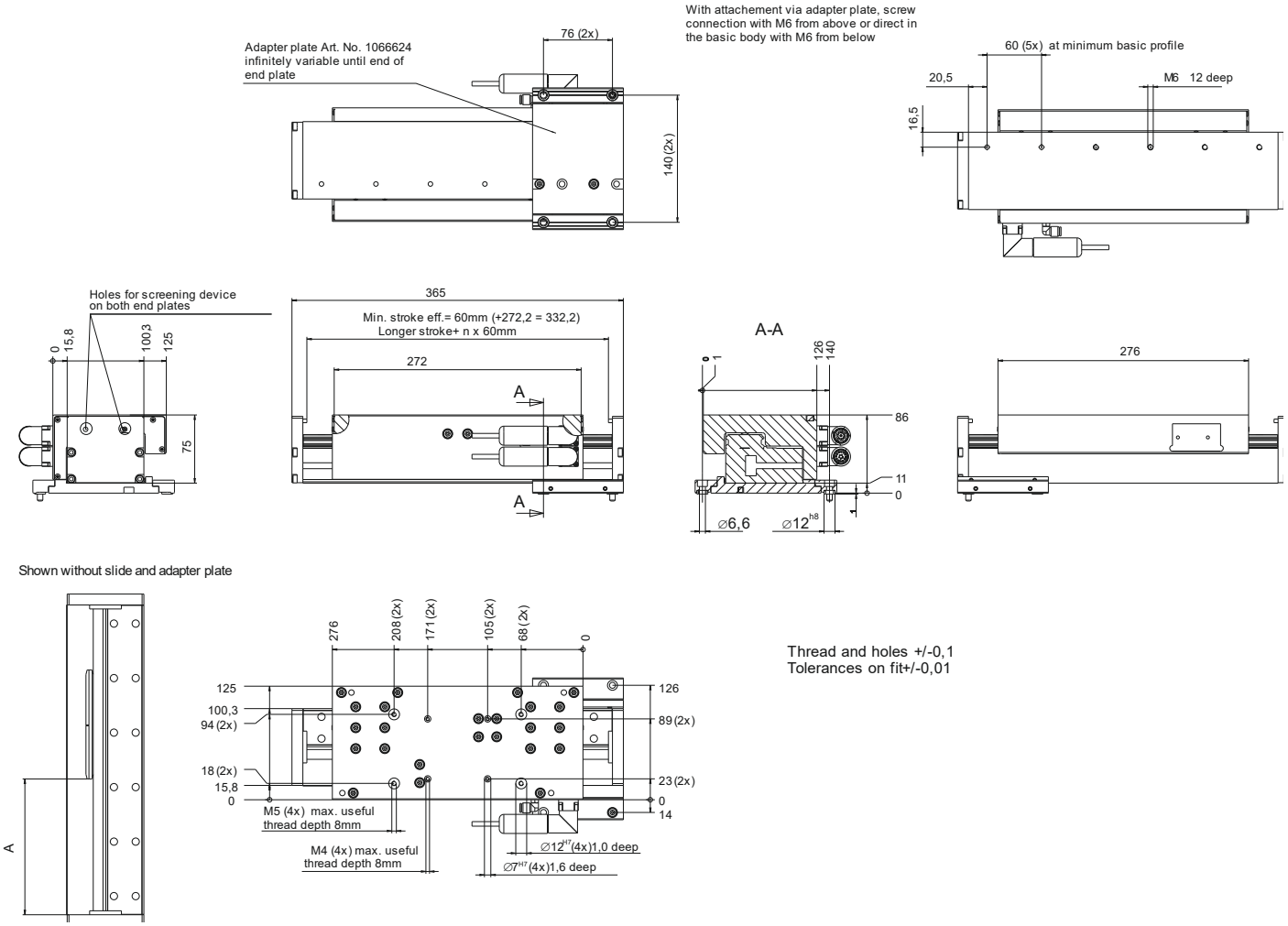


Figure 31: euroLINE 85 KL Slide variant 6 (with brake, without weight compensation)

6.4 Dimensional drawings of Z-axis euroLINE 85 KL, Mounting Variant 5 and 6

6.4.1 Z-Axis, Mounting Variant 5

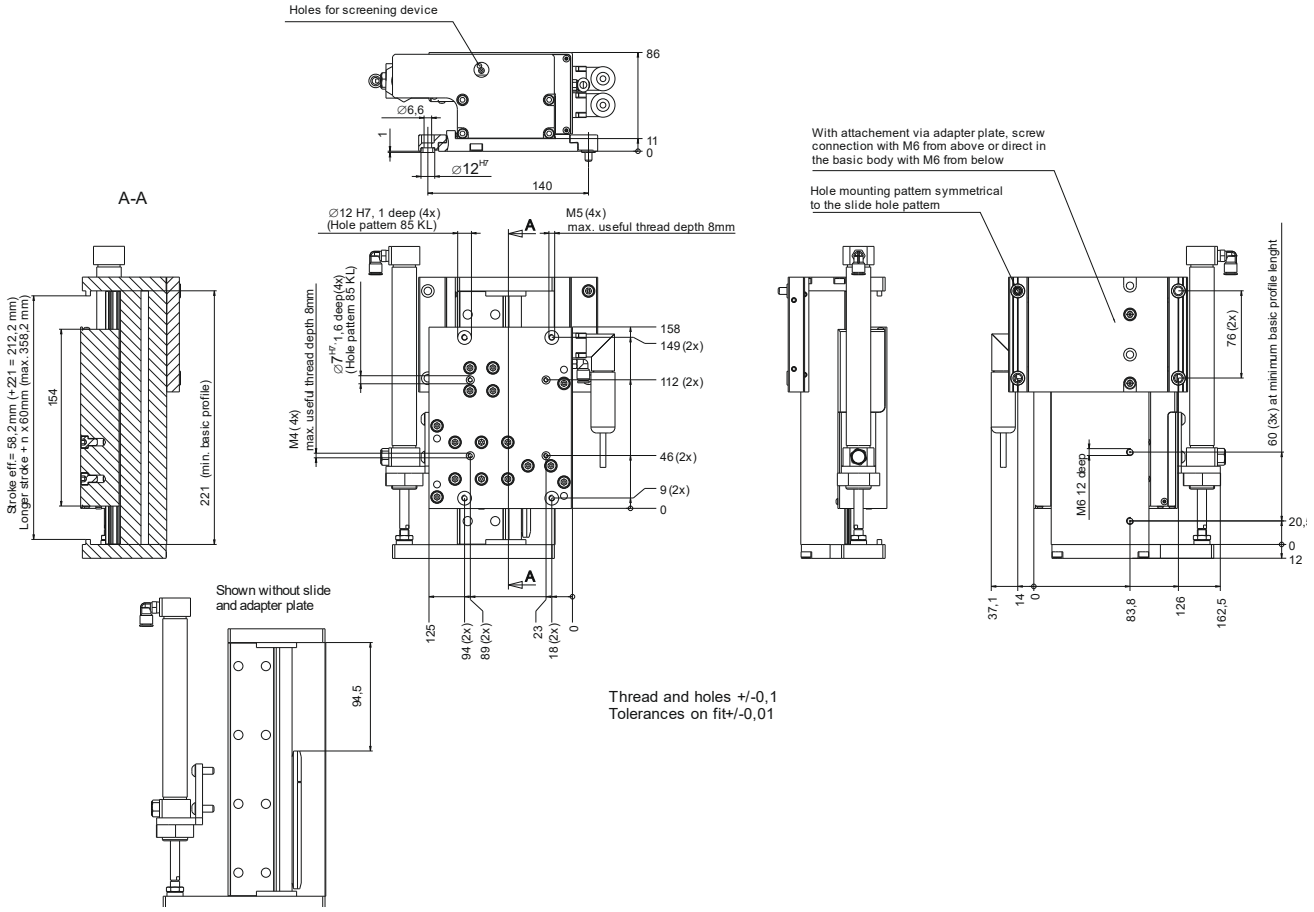


Figure 32: euroLINE 85 KL Z-axis Slide variant 5 (with brake, without weight compensation)

6.4.2 Z-Axis, Mounting Variant 6

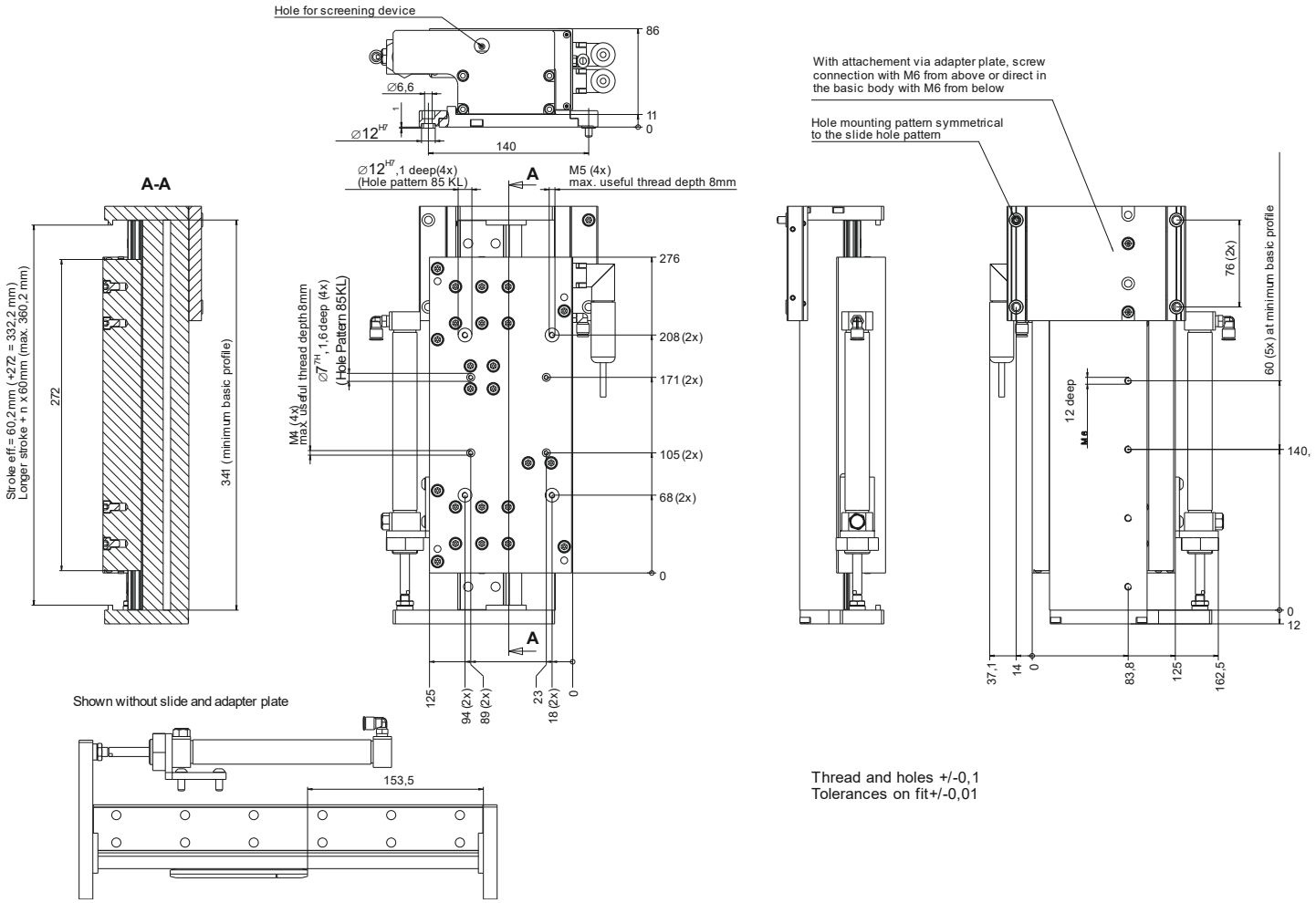


Figure 33: euroLINE 32 KL Z-axis Var. 6 (with brake, without weight compensation)

6.5 Drawings of accessories

6.5.1 Centering bushing 1024021

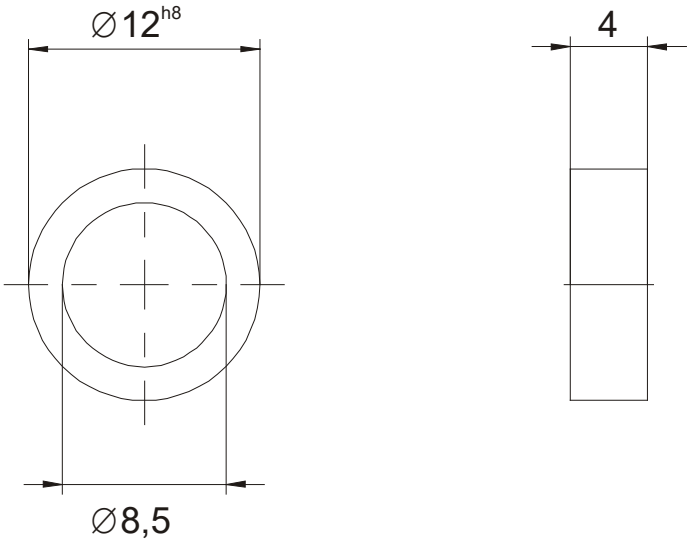
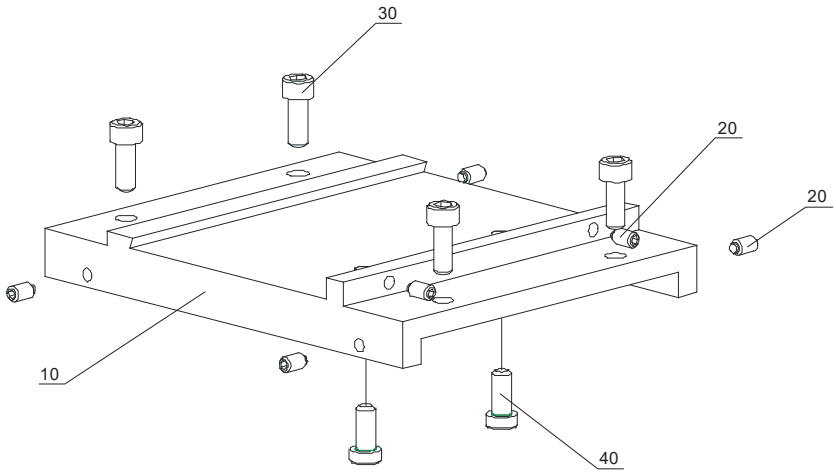


Figure 34: Centering bushing

6.5.2 Adapter plate (cross-mounting) 1067532

Pos.	Art. no.	Description
10	1067567	Adapter plate
20	1018771	Grub screw, type: GN913.3-M5-8-KU
30	626056	Cylinder head screw, DIN 912, M6 x 16
40	626503	Cylinder head screw, DIN 7984, Type: M6 x 14



Weight 560 gr

Figure 35: Adapter plate 1067532, exploded view

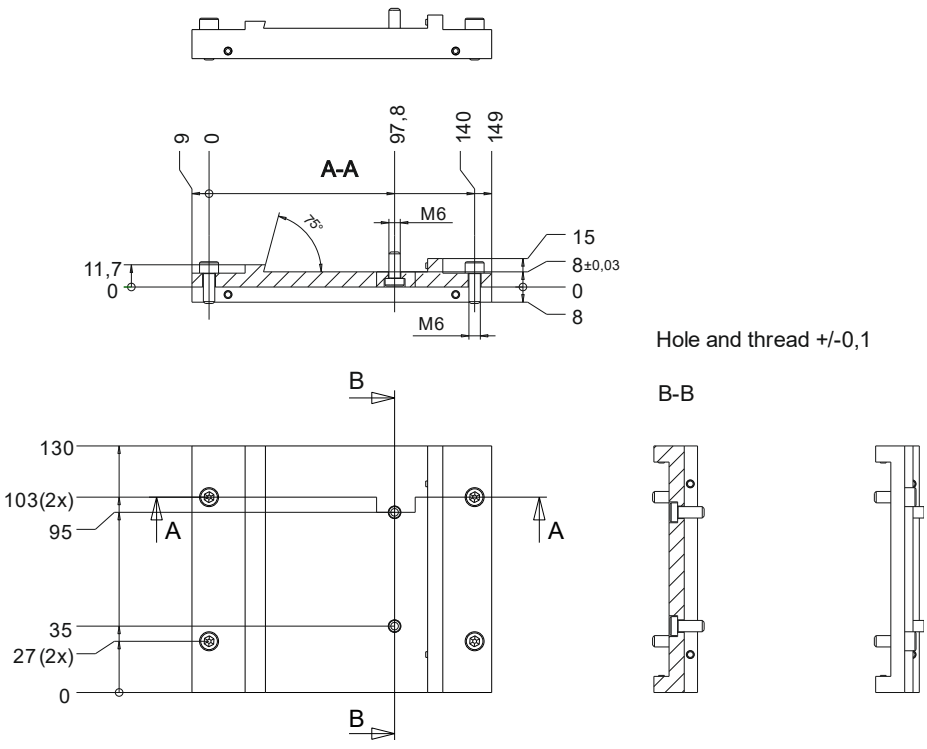


Figure 36: Adapter plate 1067532, dimension drawing

6.5.3 Adapter plate 1066624

Pos.	Art. no.	Description
10	1066626	Adapter plate 85 KL
20	626056	Cylinder head screw, DIN 912, M6 x 16
30	1018771	Grub screw, type: GN913.3-M5-8-KU
40	1066689	Clamping element 85 KL
50	1024021	Centering ring

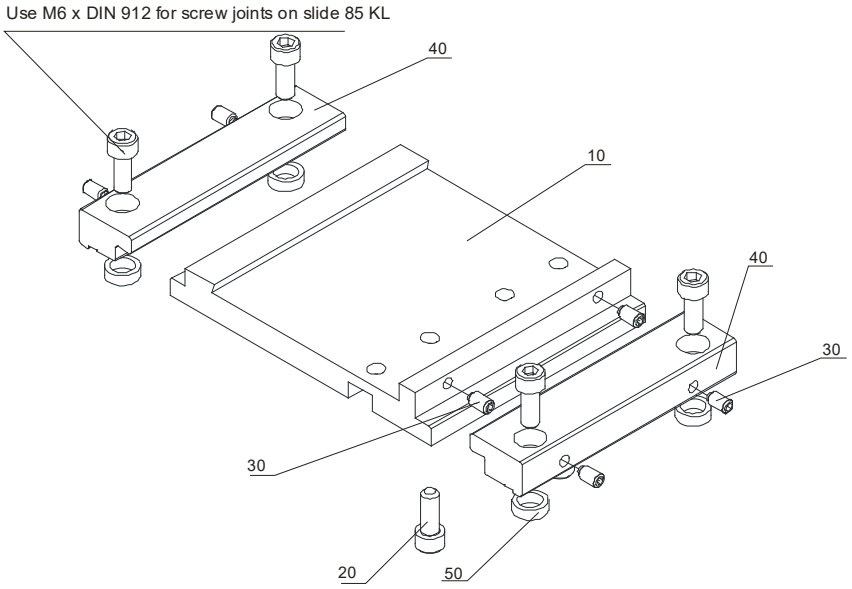


Figure 37: Adapter plate 1066624, exploded view

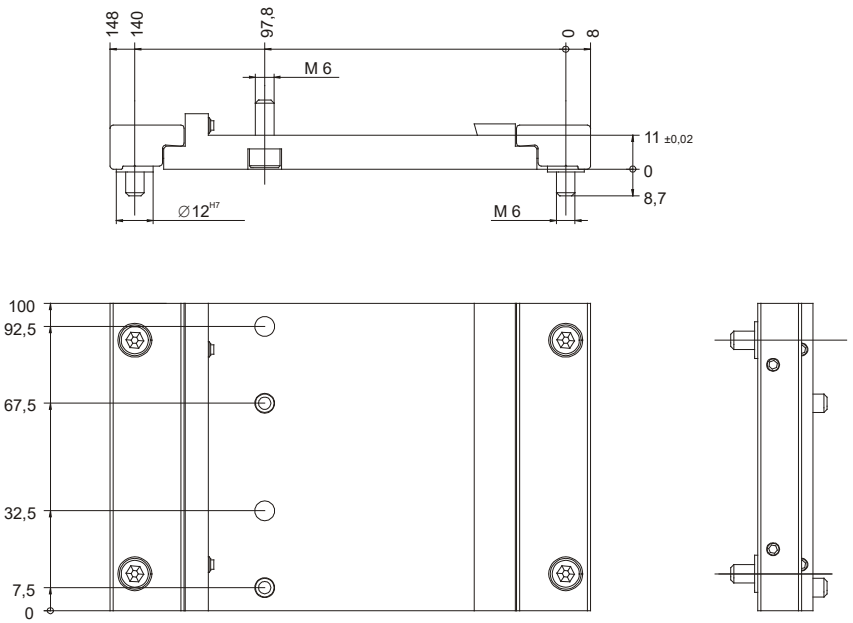


Figure 38: Adapter plate 1066624, dimension drawing

6.5.4 Adapter plate 1070357

Pos.	Art. no.	Description
10	1070346	Adapter plate
20	626062	Cylinder head screw, DIN 912, M4 x 12
30	1008664	Centering bushing, ZBH-7

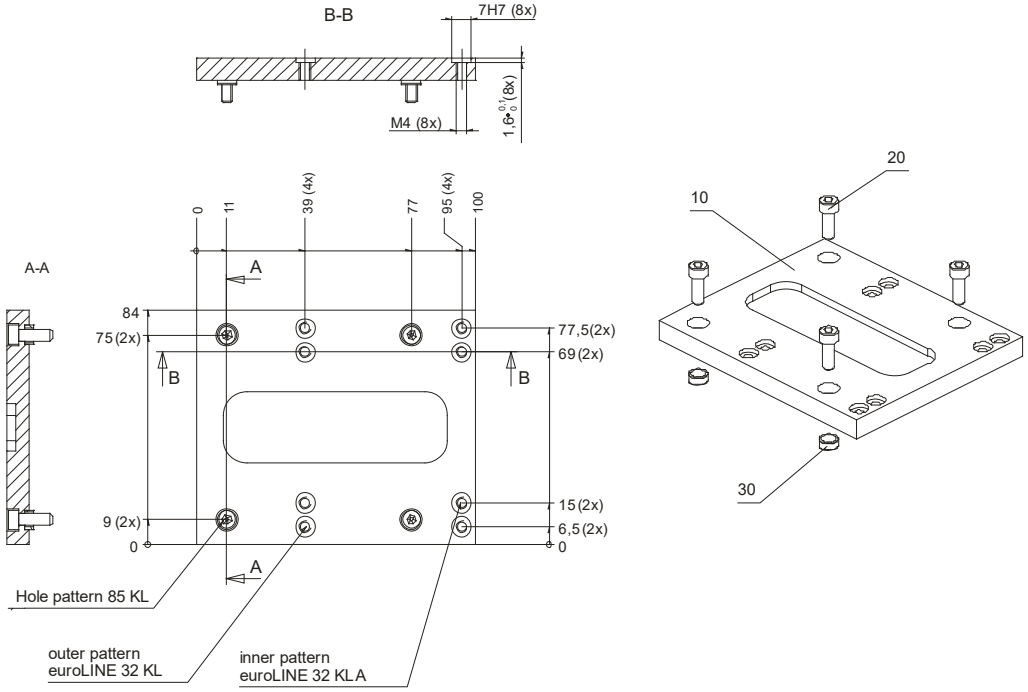


Figure 39: Adapter plate 85KL / 32KLA, complete

6.5.5 Compensating element 1067583

Pos.	Art. no.	Description
10	1067582	Compensating element
20	626056	Cylinder head screw, DIN 912, M6 x 16
30	1064648	Lock bolt for compensating element
40	626123	Countersunk screw, DIN 7991, M4 x 6
50	1066689	Clamping element 85 KL
60	1018771	Grub screw, type: GN913.3-M5-8-KU
70	1024021	Centering ring

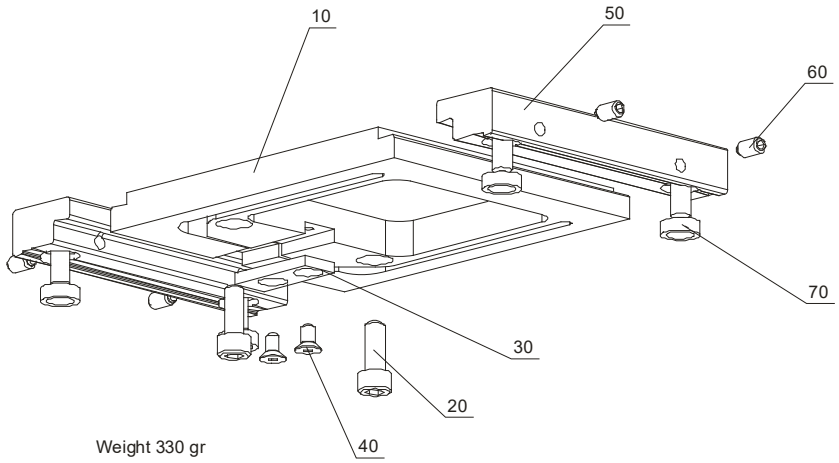


Figure 40: Compensating element, exploded view

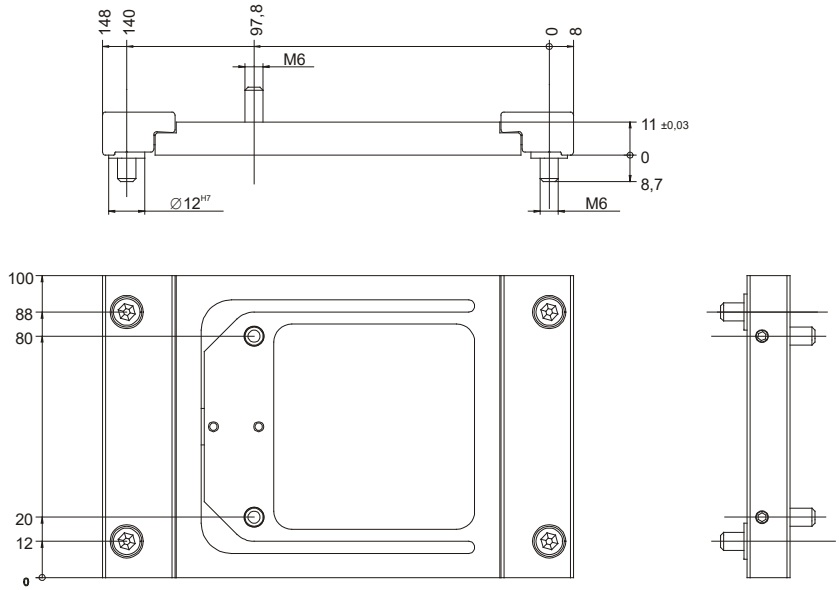


Figure 41: Compensating element, dimension drawing

6.5.6 Stopper, variable 1067460

Pos.	Art. no.	Description
10	1067472	Stopper 85 KL
20	1018826	Damper, 15
30	1067500	Grub screw, GN913.3-M10-16-MS
40	1067500	Cylindrical pin, DIN 6325, 5m6 x 20

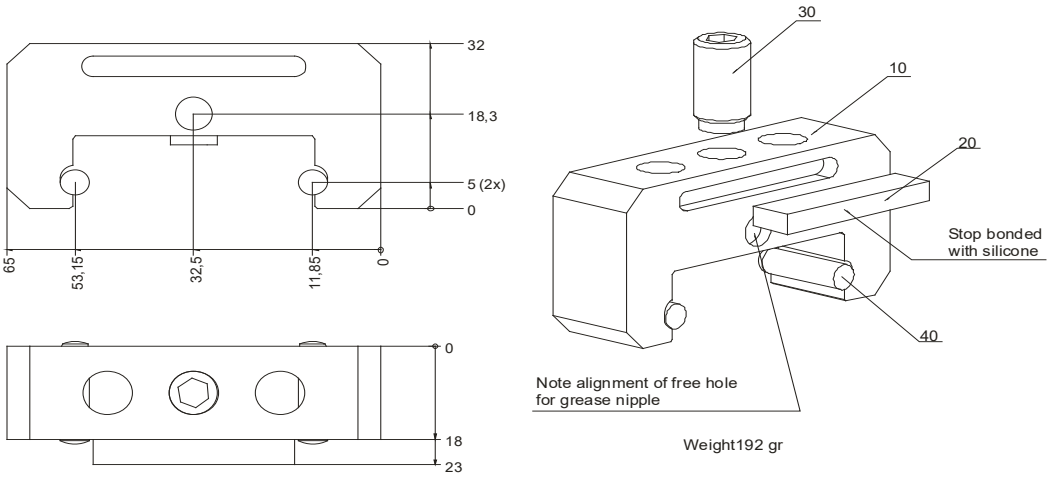


Figure 42: Stopper, exploded view

7 Declaration of Incorporation

EC declaration of incorporation in the sense of the EC directive 2006/42/EC (machinery), Annex II 1. B.

The manufacturer:

IEF-Werner GmbH

Wendelhofstraße 6

78120 Furtwangen - Germany

hereby declares that the following products (the incomplete machine / partial machine):

Designation	IEF-Werner parts group number
euroLINE 85 KL	TG1001150
euroLINE 82 KL, vertical	TG1001295

where possible based on the scope of delivery, correspond to the following basic requirements of the directive on **Machinery (2006/42/EC)**:

- Annex I, item: 1.1.2; 1.1.3; 1.1.5; 1.3.2; 1.3.4; 1.5.1; 1.7.3;

The incomplete machine also corresponds to the following further directives:

- Directive **2014/30/EU** of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.
- Directive **2014/35/EU** of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.

The technical documents were generated according to Annex VII part B and may be electronically submitted to the national authorities upon justified request.

List of some applied harmonised standards:

- EN ISO 12100-1,-2 / EN ISO 13857 / EN ISO 13850 / EN 60201-1

Commissioning of the incomplete machine delivered by us is not permitted until it has been determined that the overall system into which the incomplete machine is installed meets the basic safety and health protection requirements according to Annex I of the above EC directive 2006/42/EC.

Name and address of the documentation officer: IEF-Werner GmbH, Furtwangen

Furtwangen, December 2019

Stefan Deck (manager)