User's Manual

euroLINE 32 KPA

1076718

June 08 Edition

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We are always grateful for suggestions for improvements and information about errors.

Manufacturer's Declaration
according to the EC Machinery Directive

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We herewith declare that the following products:

Description of Products	Subassemblies
euroLINE 32 KPA	1001415

are intended for installation in a machine and that putting into operation is not allowed before it is found that the machine in which these products are to be installed complies with the provisions of the EC Directive 98/37/EC of June 22, 1998.

Applicable harmonized standards are:

ISO 12100-1 : 04-2004

ISO 12100-2 : 04-2004

EN 294

Furtwangen, June 16, 2008

(Manfred Bär, Managing Director)

Contents

1 Safety

1.1 Areas of Application

The euroLINE 32 KPA linear drive unit is a precise, straight-line adjustment unit with piezoceramic drive 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 drive units from IEF Werner GmbH, it is also possible to set up complex, multi-axis positioning systems.

Areas of Application

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

The euroLINE 32 KPA 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.

1.2 Definition of the Alerts

WARNING

Indicates a potentially hazardous situation or task, which, if not avoided, could result in serious injury or death. Read the warnings before performing the task.

CAUTION

Indicates a potentially hazardous situation. which, if not avoided, could result in minor or moderate injury, damage to equipment or material. Read the cautions before performing the task.

NOTE Gives additional information.

1.3 General Safety Instructions

The linear drive unit may be put into operation only by specialist personnel who have received technical safety instructions. In addition, all chapters of the Operating Manual have to be read and understood completely.

WARNING

The system has to be de-energized for all installation, disassembly or repair work. High risk of injuries!

CAUTION

Motor connectors or clamp connectors may not be inserted or disconnected under live conditions. Risk of burning of the contacts.

2 Installation

2.1 Installation Position

The euroLINE 32 KPA is intended for horizontal use.

The attachment of the euroLINE 32 KPA to the basic body can be performed by means of clamping elements (*see Figure 1*), or on the slide (*see Figure 3*) via threaded holes.

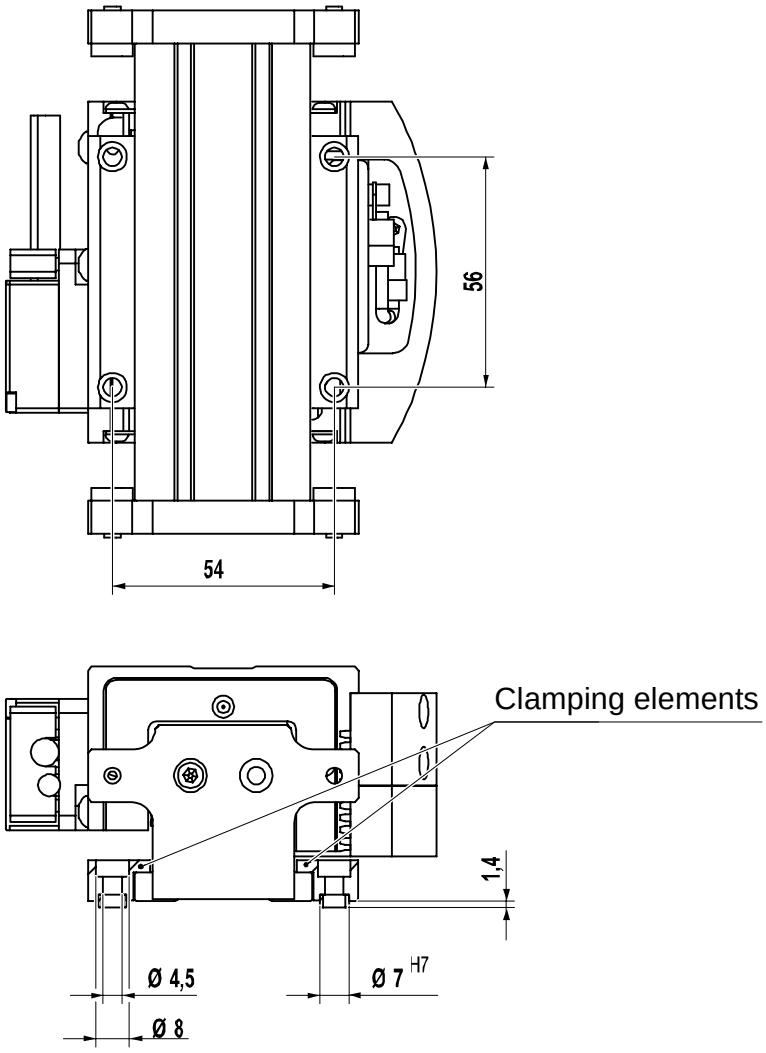


Figure 1: Attachment on basic body by means of clamping elements

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

NOTE Attachment on slide (see *Figure 3*, page 10).

2.2 Technical Data of the euroLINE 32 KPA

Designation	Value
Width of basic body [mm]	43
Max. stroke [mm] in 40 mm raster	22 - 450*
Continuous feed force [N]	16
Maximum speed [mm/s]	200
Basic weight [g] carriage body L=111 mm	525
Weight [g] per 40 mm extra length	166
Maximum handling weight [g]	4000
Linearity [µm]	± 5
Resolution [µm], standard	1
Resolution [µm], option	0,1
Repetition accuracy [µm]	± 3
Temperature range [º C]	+15 to + 50
Operating voltage	270 V (RMS)
Input current	320mA (RMS)
Rated frequency	40 kHz
Max. energy consumption	15 W

*** Larger strokes on request**

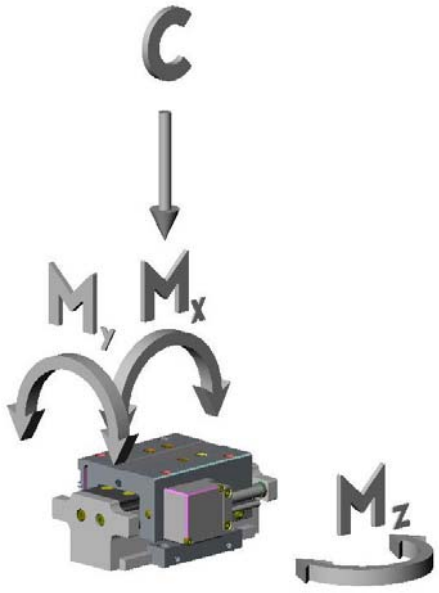


Figure 2: euroLINE 32 KPA, allowed torques and carrying capacity

Version	Slide length [mm]	Carriage [Units]	Equipment	Mx [Nm]	My [Nm]	Mz [Nm]	Feed force [N]	Weight [g]
1	83	1	M*	10	10	10	16	590

* M: With measuring system

2.3 Installation of Actuators

The actuators (cylinders, pick-up modules, etc.) that are to be installed on the euroLINE 32 KPA linear drive unit can be attached via the drilling pattern on the slide. Appropriate drilling patterns are available for the four possible slide sizes. The placement tolerance of centering drillings 7^{H7} is ± 0.01 mm.

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

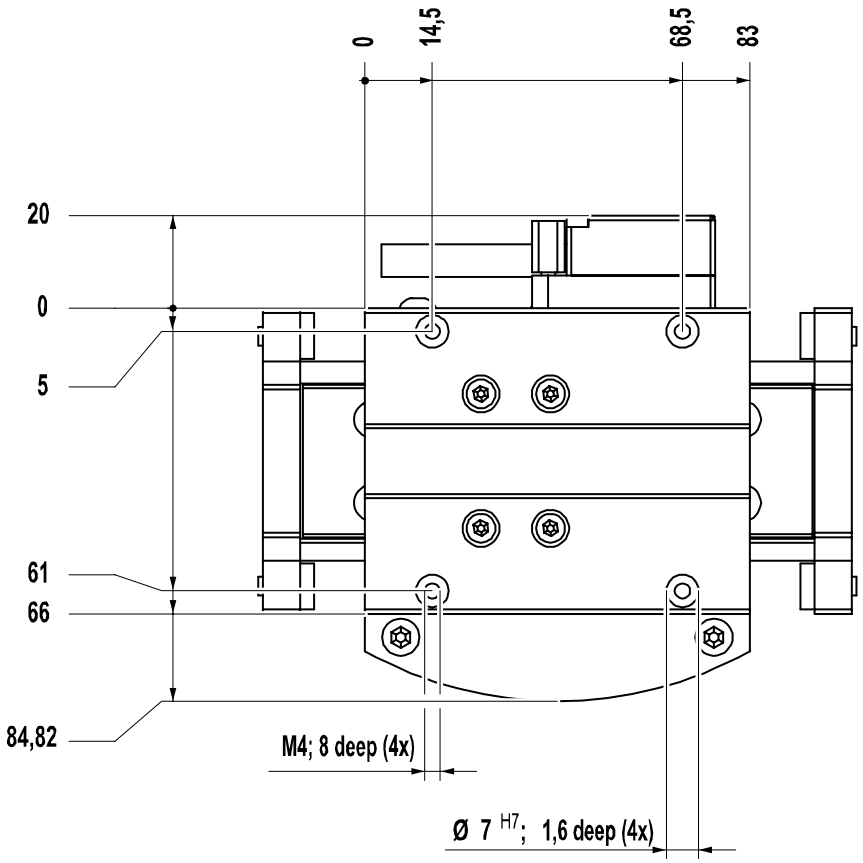


Figure 3: Slide length L=83 mm

2.4 Transverse Mounting

Standard mounting material (clamping element, centering sleeve, mounting bracket) is available for transverse mounting of the euroLINE 32 KPA linear drive units.

A variety of axis combinations is possible:

- XZ-system
- XY-system
- XYZ-system
- 2 * XYZ-system (portal)
- etc.

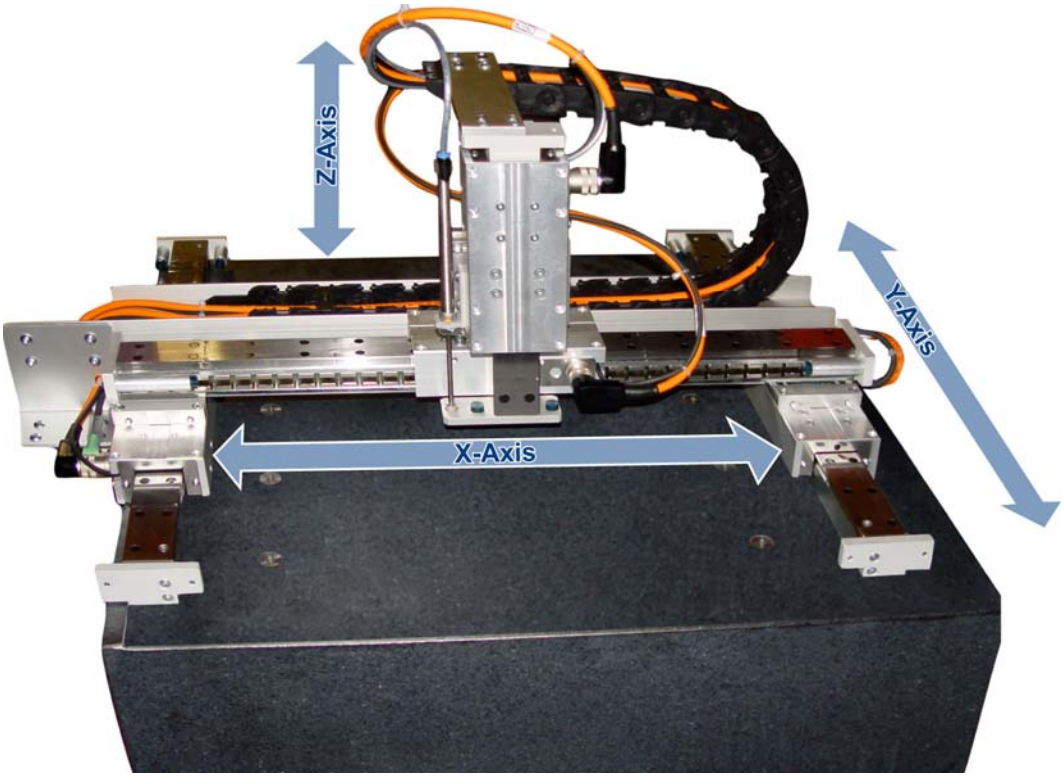


Figure 4: XYZ-system (portal)

NOTE The dimensional drawings for the mounting accessories are to be found in *Section 12, Accessory Drawings, page 26.*

3 Wiring

3.1 Connection of Motor and Encoder

3.1.1 Motor

On the euroLINE 32 KPA, the motor is connected via 3 terminals that are located on a board in the terminal box. The motor wires are connected to the terminals U, V and W. The ground wire is directly connected with the base plate of the terminal box by means of a cable lug. During final assembly, it must be observed that the load on the motor cable is correctly relieved by the strain relief.

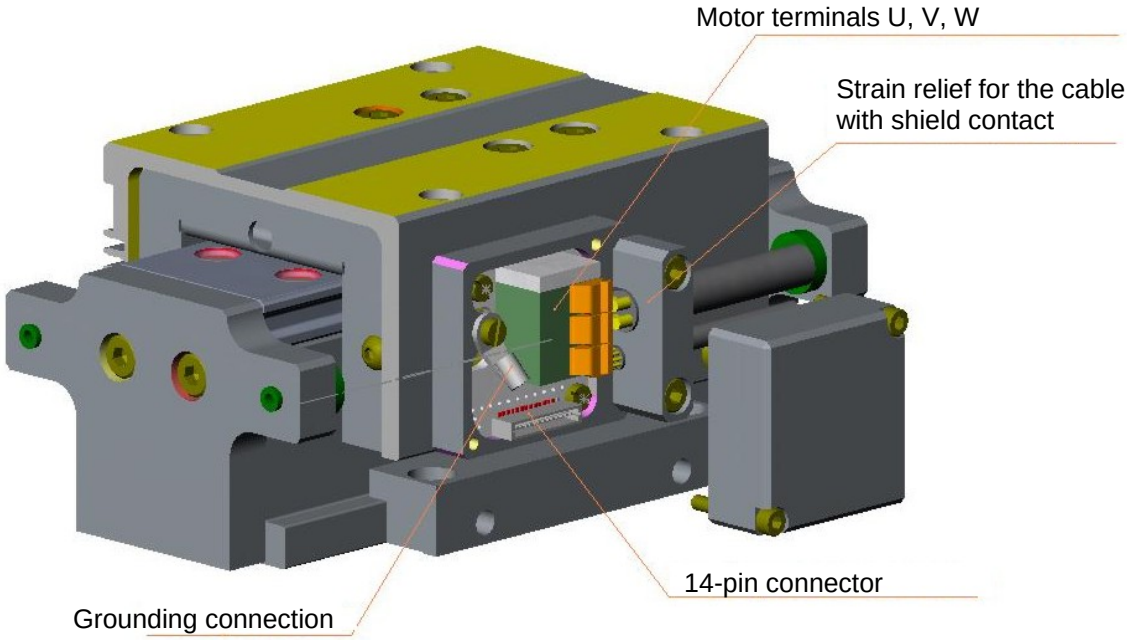


Figure 5: Terminal box for motor encoder connection

3.1.2 Encoder Signal

A 14-pin connector is available on the board in the terminal box. The data of the optical encoder system are transferred via this 14-pin connector. The optical encoder system is an RS 422 / TTL interface.

Assignment of 14-pin connector

Optical encoder system type 20								
Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 12
0 V	+ 5V	Z1 +	Z1 -	Z2 -	Z2 +	Z0 -	Z0 +	NAS

The NAS signal provides information on the signal quality of the optical measuring system.

NAS = negated monitoring signal
System ok → NAS signal high
System not ok → NAS signal low

3.1.3 Arrangement of the Measuring Band and Head in the Optical Encoder System Type 20

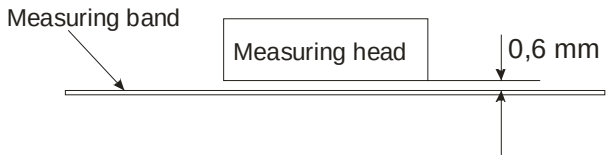


Figure 6: Spacing of the measuring band - head

3.1.4 Shield Concept: Optical Encoder System Type 20

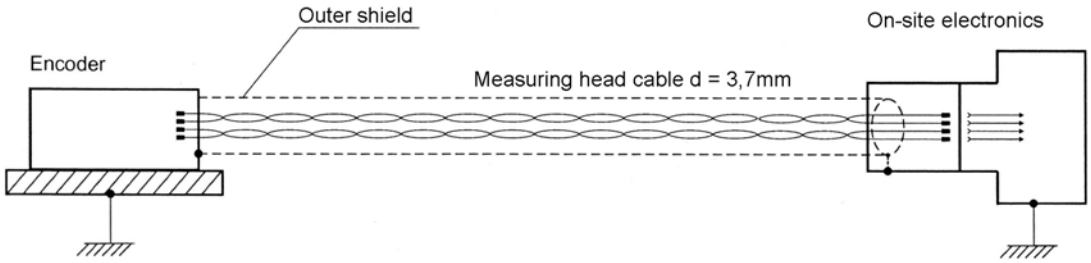


Figure 7: Shield concept of the optical encoder system type 20

3.1.5 Information Concerning the Maintenance of the 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 manipulations of the measuring system. All warranty claims become void by unauthorized manipulations.

NOTE The measuring system is maintenance-free.

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.

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

Coarse soiling must be cleaned with a soft brush. Cotton wool or a soft cloth and acetone or denaturated alcohol are suitable for fine cleaning.

4 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:

$$r_{min} \geq \textbf{10 x cable diameter}$$

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.

4.1 IEF Cable Set:

We recommend the use of original IEF cable sets. A highly flexible shielded cable with art. No. 1076814 is available for the supply of the motor. The minimum bending radius is 51 mm. We can offer this cable in different cable harness versions.

Ready-made harnesses with 14-pin JST connectors in different lengths are available for the supply of the encoder system.

The following standard lengths are available:

- 5 meters: Art. No. 1065887
- 10 meters: Art. No. 1072664

5 Pre-tensioning of the Piezoceramic Drive Element

The piezoceramic drive element generates a feed force which is transferred by the ceramic fingers of the drive element to the ceramic track by means of friction. For this purpose, the ceramic fingers must be pre-tensioned on the ceramic track. This pre-tension is produced by two eccentric screws on the drive element. Two drilled holes in the basic body serve for activation of the eccentric screws. The eccentric screws can be actuated using a screw-driver for slotted screws.

The ceramic fingers are pressed against the ceramic track by turning the screwdriver clockwise. When the screwdriver is turned counterclockwise, the ceramic fingers are loosened and lifted from the ceramic track.

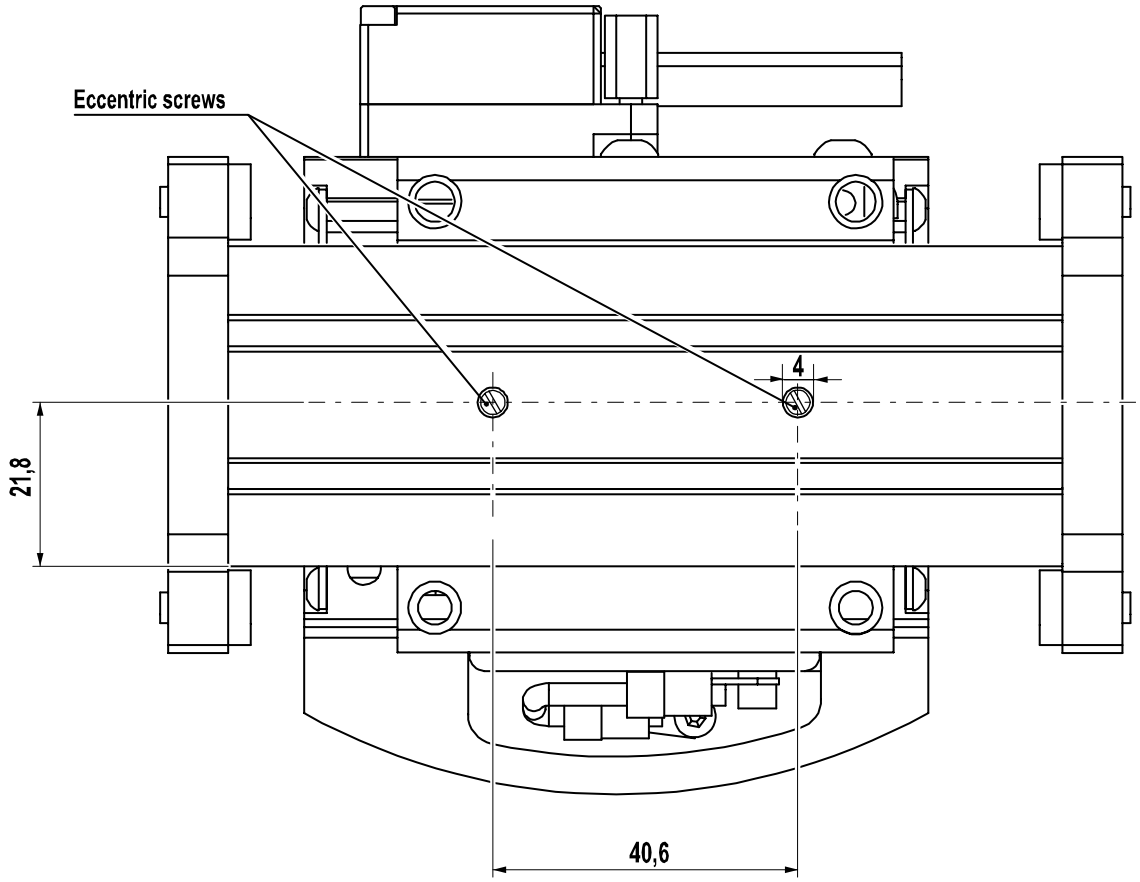


Figure 8: Drilled holes in basic body

6 Mounting / Removing the Slide from the Basic Body

When the slide is mounted on or removed from the basic body, take care that that the ceramic fingers of the piezoceramic drive are in a tension-free condition. The relieving of the tension of the ceramic fingers is described in Chapter 5. If the ceramic fingers are tensioned, the ceramic fingers or the ceramic track could be damaged so that the function is no longer ensured.

In addition, when the guide carriage is inserted onto the rail, we must be careful that the guide carriage is pushed on with little effort. The canting of the guide carriage can damage the circulating ball system. This could affect the operating characteristics or the service life.

7 Maintenance/Repairs

CAUTION

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

CAUTION

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

7.1 Lubrication

7.1.1 Guide Lubrication

The guide carriages 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. Relubrication is performed with AFF lubricant (with clean room capability) via a grease nipple that is mounted on the slide with a hand-held grease gun (IEF-Art.No. 1072729), see *Figure 9*.

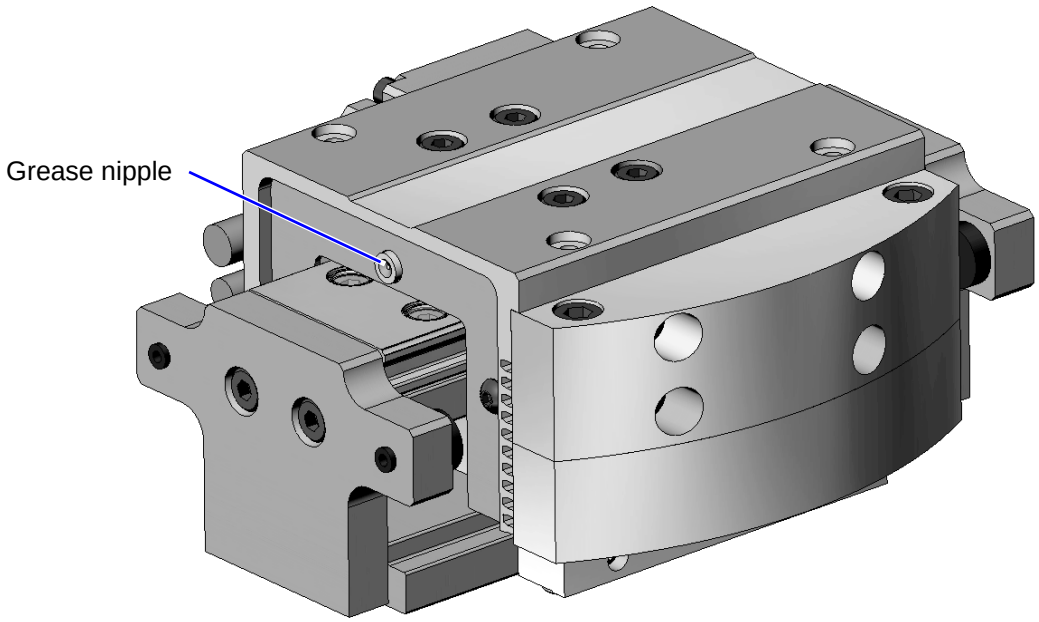


Figure 9: Lubrication of the guide carriage

The recommended maintenance intervals are approx. 500 operating hours in normal ambient conditions. The maintenance intervals should be reduced for unfavorable ambient conditions (large amounts of dust, high humidity, high temperature, high operating performance).

8 Troubleshooting

Malfunction	Cause	Correction
Increased running noise	Nominal service life of guide carriage exceeded	Complete exchange of guide carriages*
	Torque load on guide carriage too high, therefore play in the guide carriage	Complete exchange of guide carriages*
	Piezoceramic drive element does not run "free" and scrapes	Exchange the complete carriage unit*
	Error in power electronics or control unit	Check, if necessary, exchange of power electronics, control unit
Linear unit does not move	Blockage of piezoceramic drive element by mechanic foreign parts	Remove foreign parts, ensure the freedom of movement of piezoceramic drive element
	Clamp connection of motor cable in terminal box loose	Reconnect clamp, U,V,W Caution: Only in de-energized condition
	14-pin connector in terminal box loose	Reconnect 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 - Measuring head , replace complete slide, if required *
	Piezoceramic drive element defective	Replace the piezoceramic drive element *
	Guide carriage defective (rough running, blockage)	Exchange of guide carriages and the guide rail, if required *
	Piezoceramic drive element not pre-tensioned on ceramic track	Create pre-tension by actuating the eccentric screws on the piezoceramic drive element.
	Ceramic track soiled (grease / oil)	Clean ceramic track with acetone or denaturated alcohol. Use cotton wool or a soft cloth.
	Ceramic track worn	Replace ceramic track *
	Drive finger on piezoceramic drive element worn	Replace piezoceramic drive element *
Loss of position	Measuring system defective	- Check distance measuring head – measuring band, nominal spacing = 0.6 mm - Measuring head, replace complete slide, if required
	Measuring band soiled, damaged	Clean measuring band, replace, if required

* in the factory or by an IEF Werner service technician

9 Parts List euroLINE 32 KPA

9.1 euroLINE 32 KPA (TG 1001415)

Drawing Pos.	Article No.	Part (1)/ Subassembly (0)	Designation	Wearing part = V Replacement part = E
10	1001420	0	Basic body 32 KPA, complete	E,V
20	1001138	0	Rail guide	V
30	626710	1	Fillister head screw, galvanized, DIN 912 Type: M4 x 8	
40	1057416	1	Protection cap for guide rail	
50	626483	1	Fillister head screw, galvanized, DIN 912 Type: M4 x 10	
60	1001144	0	Measuring band	E
70	1068982	1	End plate	
80	26481	1	Damper, green, PUR 80 Shore	
90	626483	1	Fillister head screw, galvanized, DIN 912 Type: M4 x 10	
100	1001419	0	Slide 32 KPA	E,V

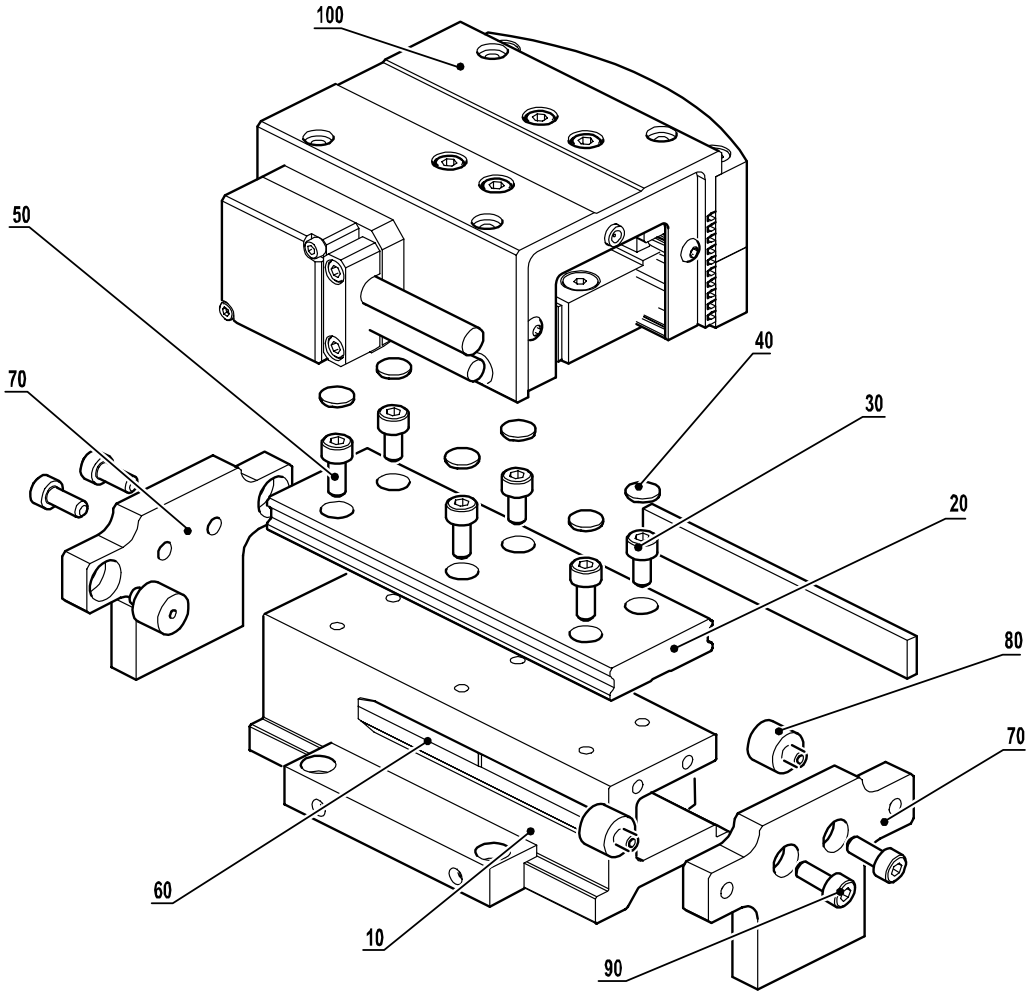
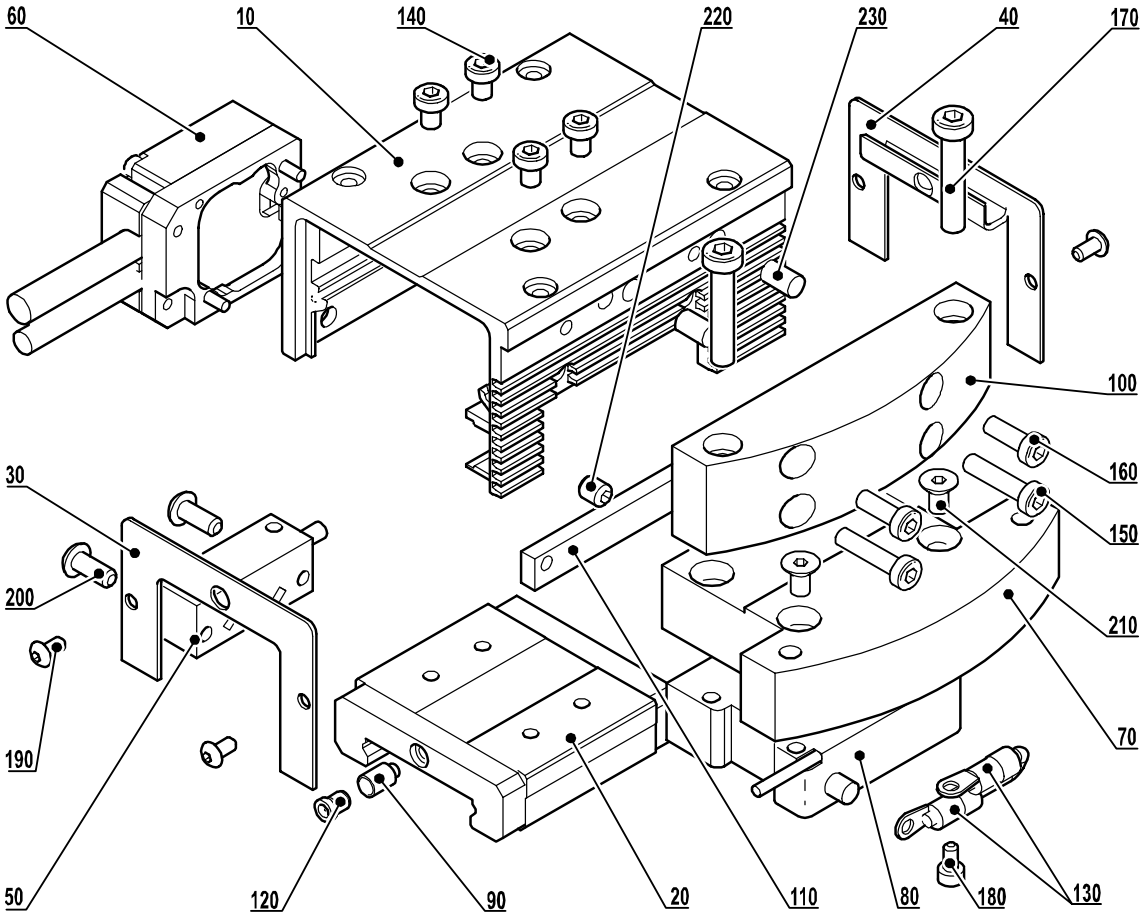


Figure 9: Exploded view TG 1001415

9.2 Parts List, Slide, Complete euroLINE 32 KPA (TG 1001419)

Drawing Pos.	Article No.	Part (1)/ Subassembly (0)	Designation	Wearing part = V Replacement part = E
10	1076076	1	Slide	
20	1073191	1	Runner block	V
30	1068360	1	Cover	
40	1068608	1	Cable covering	
50	1068374	1	Measuring head, 5-fold interpolation (standard)	E
50	1068374	1	Measuring head, 50-fold interpolation (option)	E
60	1068685	1	Terminal box, complete	E
70	1076065	1	Assembly bracket	
80	1038872	1	Motor HR-4	E,V
90	1063894	1	Adaptor	
100	1076066	1	Holder	
110	1076068	1	Clamping rail	
120	1028704	1	Funnel-shaped lubrication nipple	
130	726659	1	Crimp-type cable lug	
140	1004723	1	Fillister head screw M4 x 6	
150	627477	1	Fillister head screw M4 x 18	
160	626950	1	Fillister head screw M4 x 12	
170	626973	1	Fillister head screw M5 x 25	
180	1043200	1	Fillister head screw M3 x 6	
190	1072646	1	Oval head screw M3 x 8	
200	1060676	1	Oval head screw M4 x 10	
210	1060673	1	Countersunk screw M4 x 8	
220	1068973	1	Threaded pin M5 x 6	
230	626323	1	Cylindrical pin 5m6 x 8	



10Figure : Exploded view TG 1001419

10 Tightening Torques for Screw Connections

Strength class	M2.5	M3	M4	M5	M6
8.8	0.5	1.28	2.7	5.5	9.5
10.9	0.8	1.8	3.8	8	13
12.9	1.0	2.1	4.6	9.5	16

Information in Nm

11 Dimensional Drawing for euroLINE 32 KPA

(see next page)

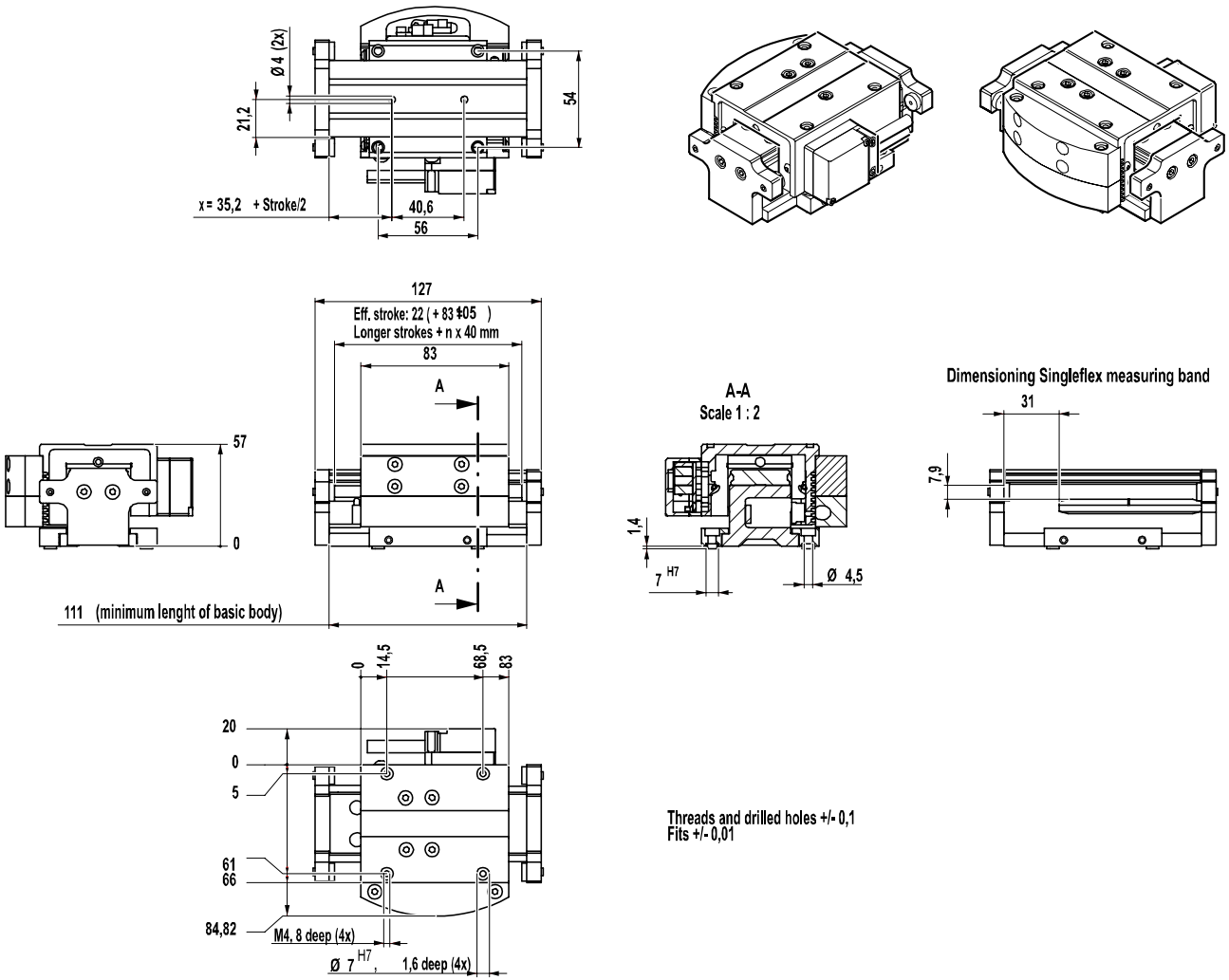


Figure 11: euroLINE 32 KPA

12 Accessory Drawings

12.1 Centering Sleeve 1008664

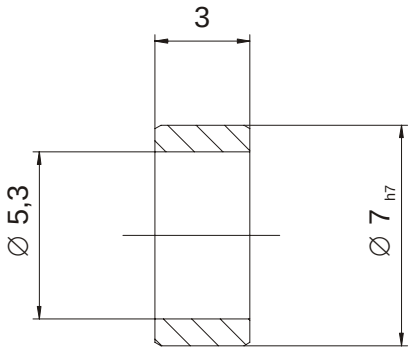


Figure 12: Centering sleeve

12.2 Clamping Element 32 KPA 1076691

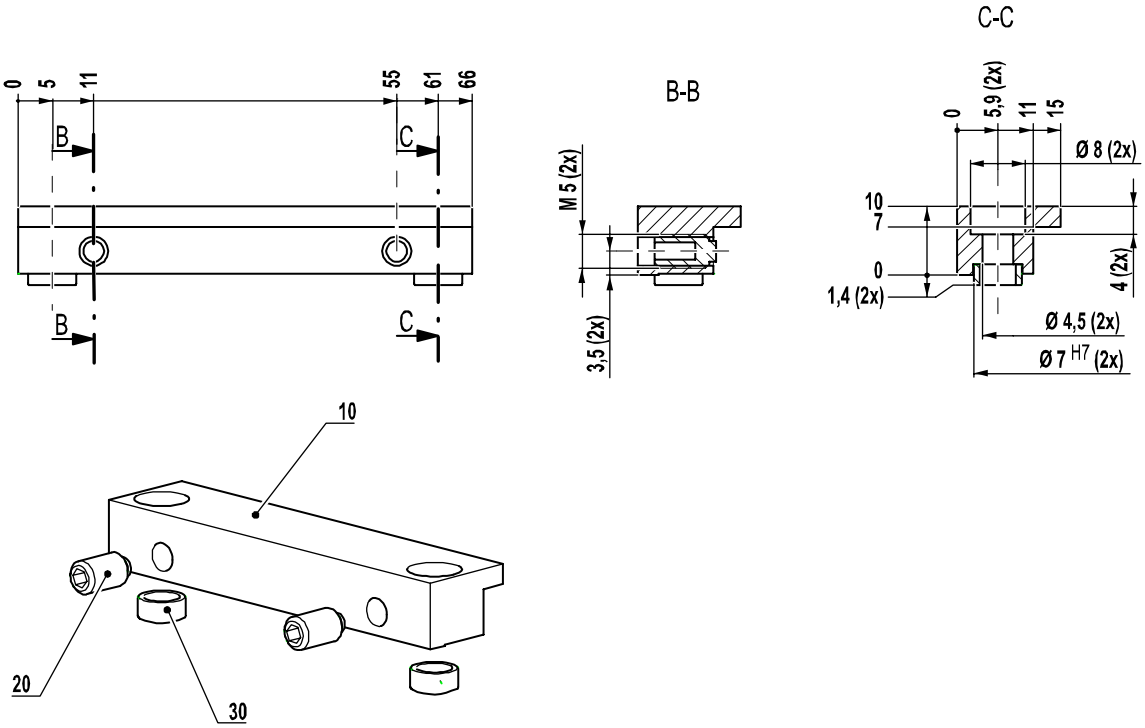


Figure 13: Clamping element

12.3 Assembly Bracket 1071776

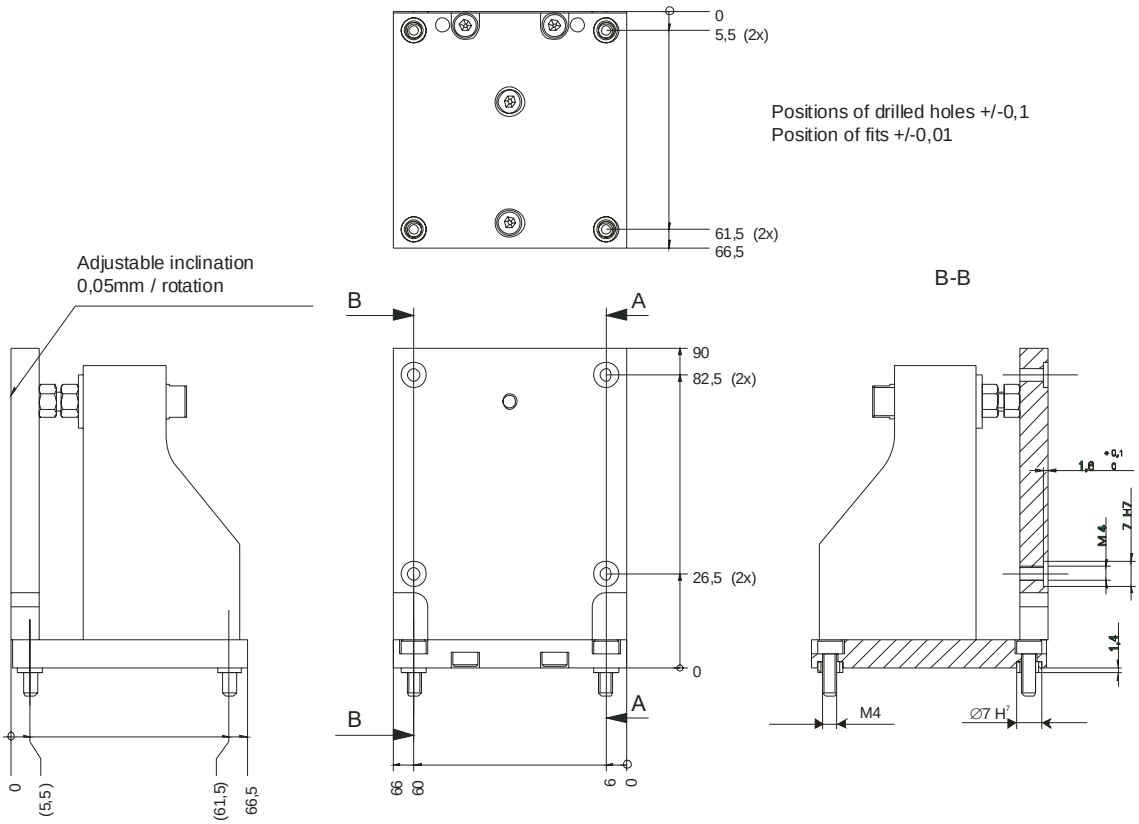


Figure 14: Assembly bracket