

Operating Manual

# ***profiLINE 70***

1039734

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**Manufacturer's Declaration**  
according to EC Machinery Directive 89/392/EEC, Annex II B

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We herewith declare that the following products:

Description of Products	Subassemblies
profiLINE 70	1000734
profiLINE 115	1000604
profiLINE 140	1000303
profiLINE 200	1000221

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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 in the version of 91/368/EEC.

Applicable harmonized standards, in particular:

**EN 292-1    EN 292-2    EN 294**



Furtwangen, 21.01.2003

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(Manfred Bär, Managing Director)



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## 1 Safety

### 1.1 Areas of Application

The profiLINE 70 movement unit is a precise, linear adjustment unit with spindle 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 movement units from IEF Werner, it is also possible to set up complex, multi-axis positioning systems.

Areas of Application

- Component insertion systems
- Palletizing systems
- Loading and unloading stations
- Manipulators for the packaging industry
- etc.

The profiLINE 70 movement 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



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#### WARNING

Indicates a potentially hazardous situation. Disregarding the safety regulations can result in serious injuries or death.

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#### CAUTION

Indicates a potentially hazardous situation. Disregarding the safety regulations can result in material damage or injuries.

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#### NOTE

Offers additional information.

### 1.3 General Safety Instructions

The linear unit may be put into operation only by specialist personnel who have received technical safety instructions and can envision potential hazards. In addition, the chapters 1 to 6 of the Operating Manual have to be read and understood completely.



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**WARNING**

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

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**CAUTION**

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

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**CAUTION**

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

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**CAUTION**

During operation, the heating of the motor, in particular of stepper motors, can cause the burning of the skin when touching the motor.  
Install a protective device!

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**NOTE**      Observe the Manufacturer's Declaration

## 2 Installation

### 2.1 Installation Position

The installation position is optional, i.e. the profiLINE 70 movement unit can be installed horizontally as well as vertically.



#### CAUTION

With the vertical installation position, use only motors with spring-operated brake to prevent the lowering of the drive in de-energized condition!

### 2.2 Attachment of profiLINE 70

The attachment of the profiLINE 70 movement unit is performed exclusively from "below". Threaded bushes with M5 thread are available for this purpose. The number of the threaded bushes depends on the length of the rail guide. For the number, see the Table of Dimensions in Chapter 9 (Variable n).



#### CAUTION

During the attachment, make sure that the maximum screwing depth of 9 mm is not exceeded because this could severely damage the guide system.

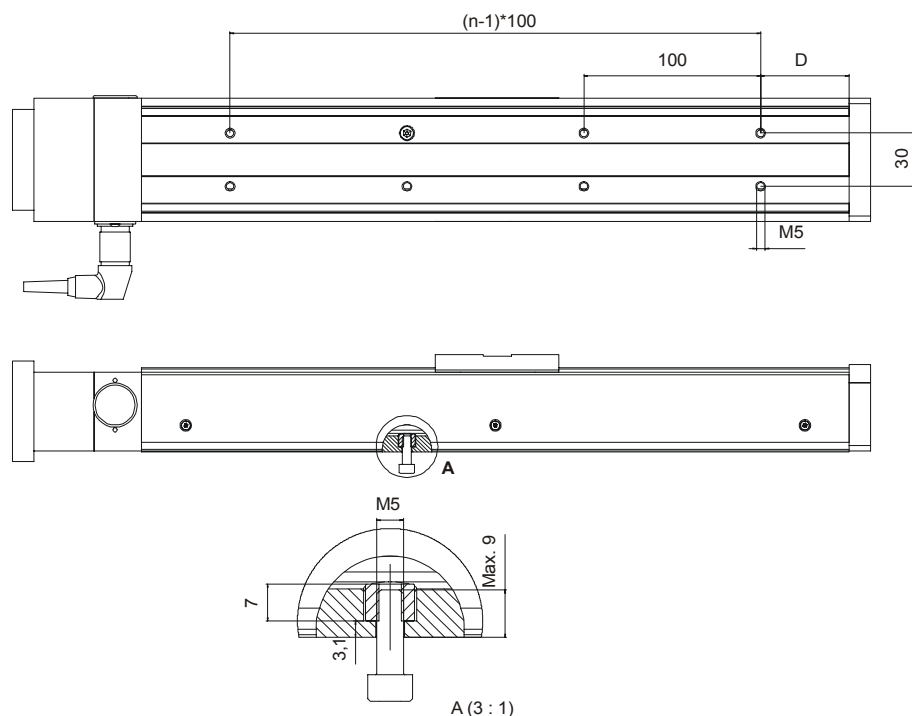


Figure 1: Attachment of the Movement Unit

#### NOTE

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

## 2.3 Technical Data

Maximum carrying capacity C1 [N]	2000
Maximum carrying capacity C2 [N]	2000
Maximum axial load F [N]	1500
Maximum torque Mx [Nm]	100
Maximum torque My [Nm]	150
Maximum torque Mz [Nm]	100
Temperature range [° C]	0 / + 60
Precision accuracy [mm/300 mm] *	≤ 0.02
Repetition accuracy [µm]	± 3
Leadscrew error [µm/300 mm]	8
Weight [kg] basic carriage with 35 mm stroke, without motor	2.65
Weight increase [kg] per 100 mm length	0.73
Possible leadscrew	5 and 10

- The specified processing precision is reached only when the movement unit is installed on an absolutely plane surface. The carriage body has to contact the installation surface over the complete area. We recommend using a ground hard stone plate or a ground steel plate as the plane installation area.

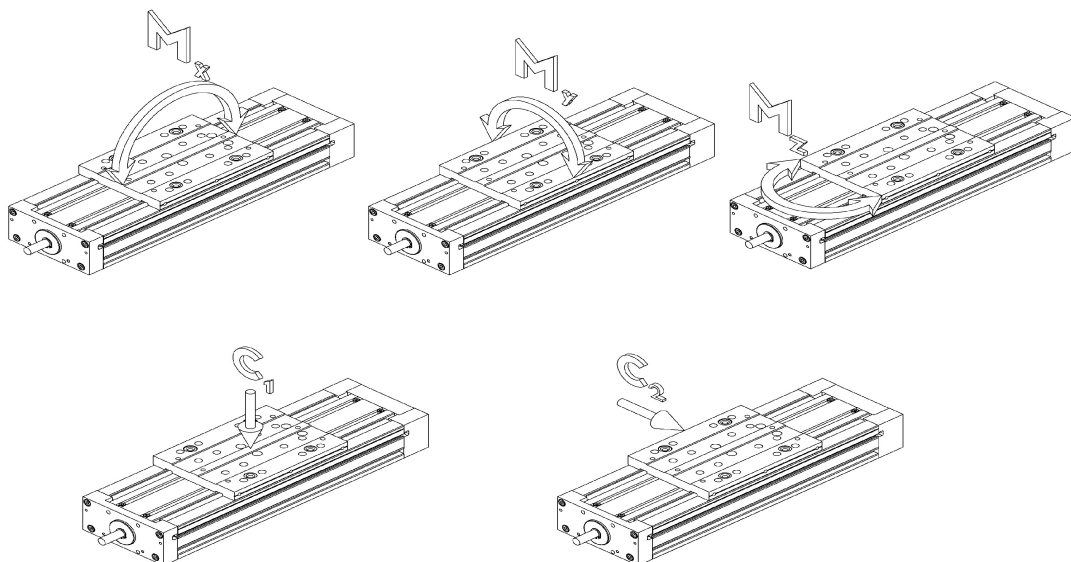


Figure 2: Torques and Carrying Capacity of profiLINE 70

## 2.4 Installation of Actuators

The actuators (cylinders, pick-up modules, etc.) that are to be installed on the profiLINE 70 movement unit can be attached via the drilling pattern on the carriage. Four threaded holes (M5) and four pin holes 3H7 mm diameter are available for attachment.

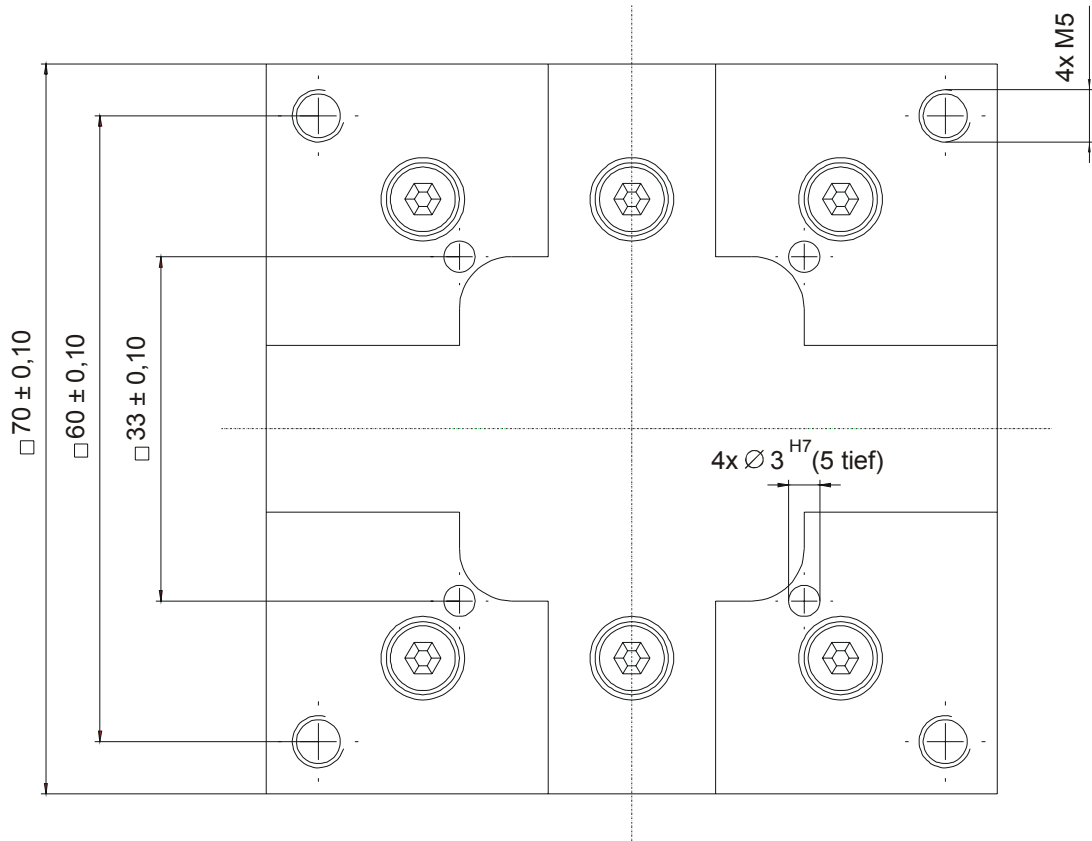


Figure 3: profiLINE 70 Drilling Pattern

## 2.5 Transverse Mounting

A X-Y connection plate, article No. 1031426, is available for the transverse mounting of two profilLINE 70. This connection plate has three pin holes into which alignment pins are inserted. The alignment pins serve to perform the alignment for the transverse mounting.

Two methods are possible for the transverse mounting of the profilLINE 70 movement units.

### Guide body on carriage

The transverse mounting is performed by means of a X-Y connection plate, article No. 1031426. The overall height of the transverse mounting is 122 mm.

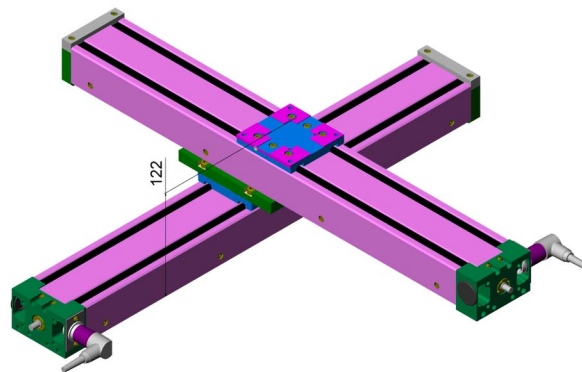


Figure 4: Basic Body on the Carriage

### Carriage on carriage

The transverse mounting is performed by means of two X-Y connection plates, article No. 1031426. The overall height of the transverse mounting is 134 mm.

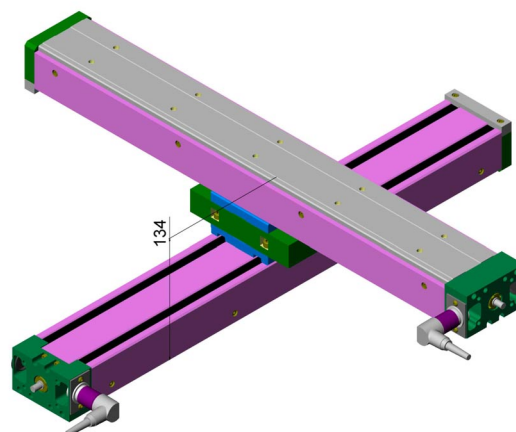


Figure 5: Carriage on Carriage

### 3 Wiring

#### 3.1 Initiators

Inductive proximity switches (PNP break contacts, green switch operating point) are used as standard stroke limit switches.



#### CAUTION

These stroke limit switches are not safety limit switches according to EN60204-1

Optionally, an additional reference point switch (PNP make contact, red switch operating point) can be used. A LED is available for detection of the switch status. Initiators and cables are installed in an aluminium profile and routed centrally to a plug.

<i>Technical Data</i>	
Operating voltage	10...30 VDC
Operating voltage residual ripple	< 10 %
Current load capacity	$I_a \leq 150 \text{ mA}$
Voltage drop at $I_a \text{ mx.}$	$\leq 3.5 \text{ V}$
Switching frequency	$\leq 1 \text{ kHz}$
Self current consumption	$\leq 10 \text{ mA}$
Nominal operating distance on steel	2 mm
Switch hysteresis (H)	3...15 %
Reproducibility ( $R_{\text{max}}$ )	$\pm 3\%$
Operating temperature	- 25 ° ... + 70 °C
Protection class	IP 67
Short-circuit proof (response value for short-circuit protection 160 mA)	Yes
Protected against polarity reversal	Yes
Switch covered	LED off
Switch not covered	LED lights

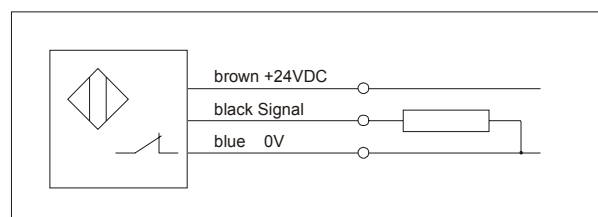
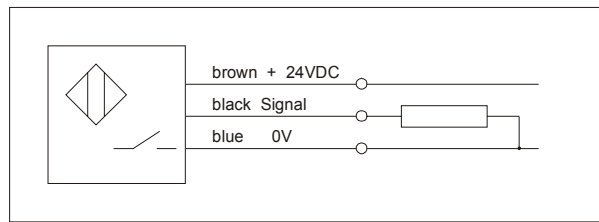


Figure 6: Electrical Connection of PNP Break Contact

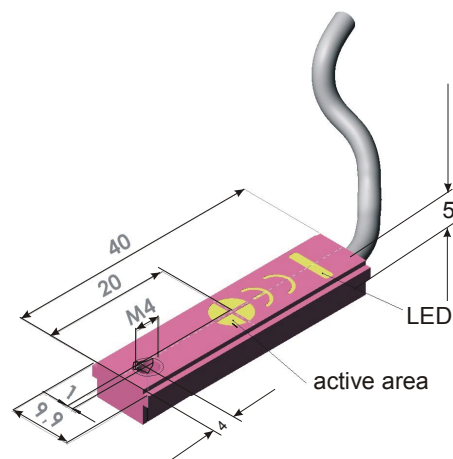


**Figure 7: Electrical Connection of PNP Make Contact**

Pin-no.	assignment	IEF-cable
1	+ 24 V	brown
2	limit switch -movement	green
3	0 V	white
4	limit switch +movement	yellow
5	Reference switch	grey

**Figure 8: Pin Assignment, View of Pins**



**Figure 9: Initiator**

### 3.1.1 Installation of Initiators

Initiators and cables are installed in a side piece and routed centrally to a plug. The initiators can be installed on the right or on the left side of the linear unit.

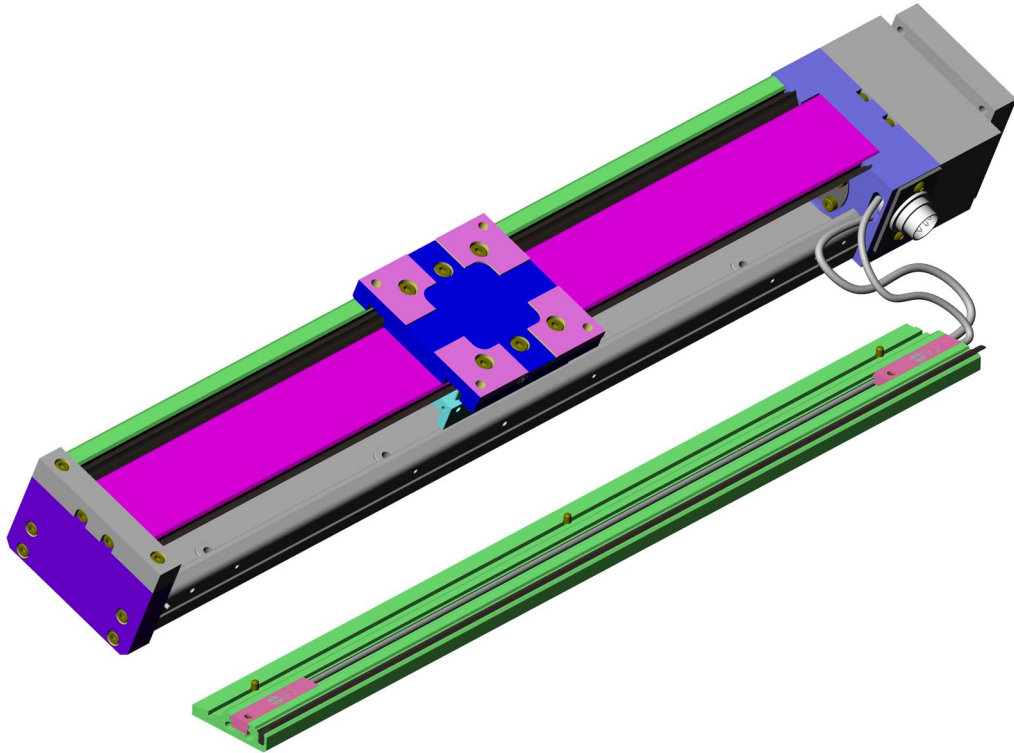


Figure 10: Installation of Initiators

## 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:

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

When different 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 also order cables and cable routing chains at IEF Werner.

## 5 Motor Installation



### CAUTION

Wire the motors according to the motor data sheet.

When using customer-specific motors, inquire at the respective manufacturer with which cable the motor has to be connected.

### 5.1 Axial Motor Installation

On the profiLINE 70, the motor is installed in an extension to the spindle via an axial motor flange. The motor shaft is coupled with the spindle shaft by means of a pluggable coupling.

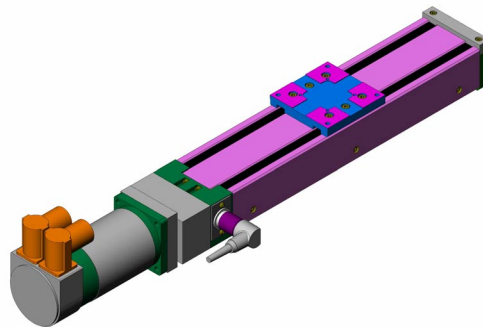


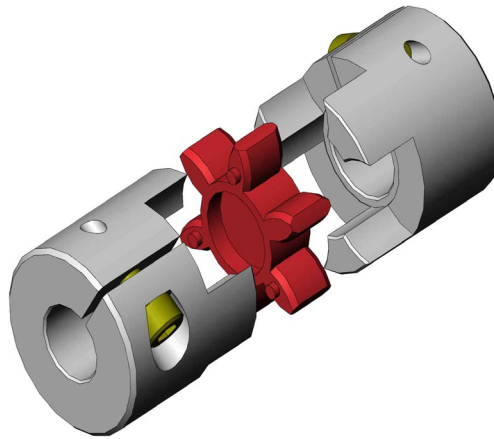
Figure 11: Carriage Unit with Motor Installed

#### 5.1.1 Pluggable Coupling

The pluggable coupling system consists of the spindle coupling hub, the motor coupling hub and an elastic ring gear. The following hubs are available:

Diameter motor shaft	of	Motor coupling hub	Article No.
6 H7			1030810
6.35 H7			1030811
8 H7			1030812
9 H7			1030813
11 H7			1030814
14 H7			1030815
Toothed ring red			1030816

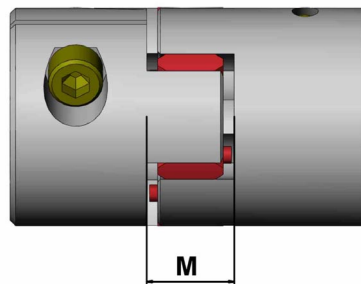
Different motor shaft diameters are available on request.



**Figure 12: Pluggable Coupling**

**NOTE**

When installing the coupling, special care must be taken not to load the elastic ring gear with axial pressure. It has to be ensured that the installation dimension "M" =13 mm is observed in the installed condition. Light greasing can reduce the axial installation force.



**Figure 13: Coupling with Installation Dimension**

## 6 Maintenance/Repairs



### CAUTION

Repairs have to be generally performed by specialist staff who have read and understood the Operating Manual.  
Only use original replacement parts, otherwise IEF-Werner will not accept any warranty.



### CAUTION

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

### 6.1 Lubrication

The ball guide and the ball screw can be lubricated from the outside via a grease nipple on the carriage unit. We recommend a lubrication interval of 600 operating hours. Greasing should be performed with the lubricant Isoflex NCA 15 (Klüber Co.). This lubricant is available in 50 g tubes, Article No. 729148, from IEF-Werner.

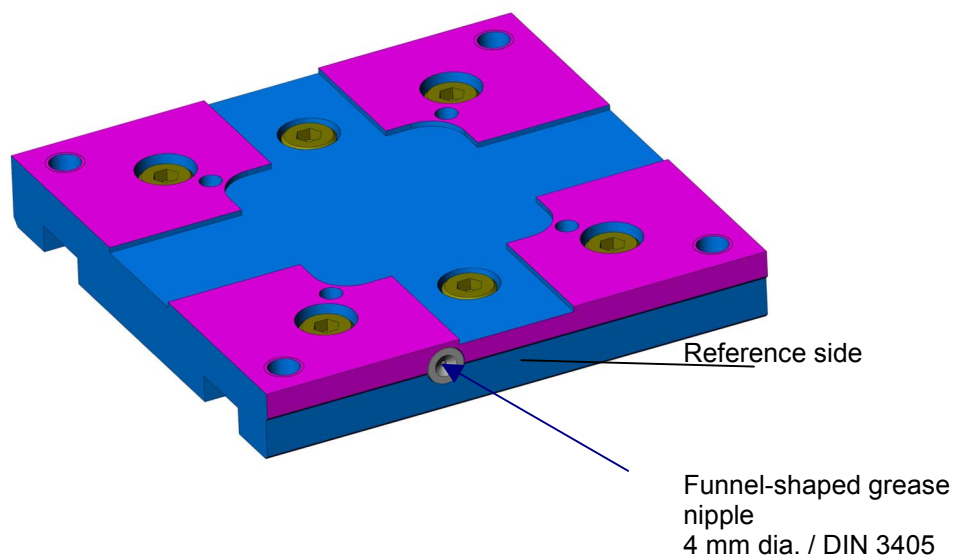


Figure 14: Location of Grease Nipple

## 6.2 Sealing Lip System

The movement unit is equipped with a sealing lip system of oil and coolant-resistant NBR material to protect the interior against contamination.

In the case of increased friction, we recommend to lightly apply grease to the sealing lips in order to increase the sliding characteristics. We recommend the replacement of worn sealing lips by new ones, parts number 1032457.



**Figure 15: Sealing Lip System**

## 7 Error Analysis

Error	Reason	Error Handling
Increased running noise		
	Nominal service life of guide carriage or ball screw exceeded	Complete replacement of basic unit
	Axial bearing unit defective	Replace unit, Pos. 270 (Drawing TG 1000734)
	Guide carriage, ball screw runs dry	Lubricate via grease nipple on carriage unit
	Loose bearing defective	Replace ball bearing, Pos. 260 (Drawing TG 1000734).
	End plates are not aligned to be flush with the ball screw	Align end plate, Pos. 50 and "motor" end plate, Pos.70 (Drawing TG 1000734)
	Pluggable coupling defective	Replace defective coupling, Pos. 70 – 120 or 130 (Drawing TG 1000736)
	Coupling collides with flanged housing	Align coupling
	Motor (motor bearing) defective	Replace motor (Drawing TG 1000734)
	Motor with brake, brake does not open correctly	Apply current to the brake, if the brake still does not open correctly, replace motor (Drawing TG 1000734)
Linear unit does not move		
	Limit switch cable not connected	Connect the cable
	Limit switch defective	Replace limit switch, Pos. (Drawing TG1000604)
	Limit switch cable defective	Check and replace limit switch cable as required
	Soldered connection on socket became loose	Solder wires
	Incorrect motor connection	Check and change connection assignment, if required
	Motor defective	Replace motor (Drawing TG 1000734)
	Error in power electronics or control unit	Check the power electronics or the control unit
	Motor cable defective	Check motor cable, replace cable, if required

<b>Error</b>	<b>Reason</b>	<b>Error Handling</b>
Play on reversal		
	Axial bearing unit not firmly screwed to end plate	Tighten screws, Pos. 250 (Drawing TG 1000734)
	Axial bearing unit defective	Replace unit, Pos. 270 (Drawing TG 1000734)
	Groove nut not tightened	Tighten groove nut, Pos. 280 (Drawing TG 1000734) and secure with threaded pins on the side
	Pluggable coupling defective	Replace defective coupling, Pos. 70 – 120 or 130 (Drawing TG 1000736)
	Coupling is in contact with the flanged housing	Align coupling
Linear unit moves mechanically against the stop during the reference run		
	Incorrect direction of rotation	Change motor direction of rotation
	Broken motor cable	Replace cable

## 8 Parts Lists

### 8.1 profiLINE 70

TG 1000734

Drawing Pos.	Article No.	Part (1)/ Subassembly (0)		Designation	Wearing part = V Replacement part = E
10		1	+	Guide unit	V
20		1	+	Side piece	
30		1	+	Cover	
40	1031421	1		Carriage	
50	1030001	1		End plate	
60	1030002	1		Strip	
70	1030391	1		Bearing plate	
80	732284	1		Plastic cover	
90	1032457	1		Sealing lip	V
100	25165	1		Inductive switch, PNP break contact	E
110	30887	1		Special screw	
120	726744	1		Inductive switch, PNP make contact	E
130	626038	1		Oval head screw, zinc-plated	
140	25626	1		Retaining sheet metal	
150	725163	1		Round plug	
160	725164	1		Angular coupling	
170	1030007	1		Tension rod	
180	627091	1		Filister head screw M3x6	
190	626707	1		Filister head screw M3x12	
200	626706	1		Filister head screw M3x10	
210	626708	1		Filister head screw M3x16	
220	1000736	0		Flange for axial motor installation	
230	626294	1		Cylindrical pin 2m6 x 6	
240	626709	1		Filister head screw M3x20	
250	626705	1		Filister head screw M3x8	
260	1031611	1		Loose bearing	V
270	1031610	1		Axial bearing	V
280		1		Groove nut	

+ Use according to version

\* Article No. depending on the components used, will be defined in detail in specific customer parts list.

## 8.2 profiLINE 70 Axial Motor Installation

TG 1000736

Drawing Pos.	Article No.	Part (1)/ Subassembly (0)		Designation	Wearing part = V Replacement part = E
10	1030826	1		Adapter flange	
20/30/40		1	+	Flange plate, specific for the motor	
50	626621	1		Filister head screw M5x50	
60	626051	1		Cylindrical pin 5m6 x 50	
70	1030810	1		Coupling half 6H7	
70-120		1	+	Coupling half, specific for the motor	
130	1030816	1		Toothed ring red	V

+ Use according to version

\* Article No. depending on the components used, will be defined in detail in specific customer parts list.

## 9 Standard Lengths

Effective stroke [mm]	Length of basic unit L [mm]	Dimension D	Overall length [mm]	n
35	150	25	235	2
85	200	50	285	2
185	300	50	385	3
285	400	50	485	4
385	500	50	585	5
485	600	50	685	6

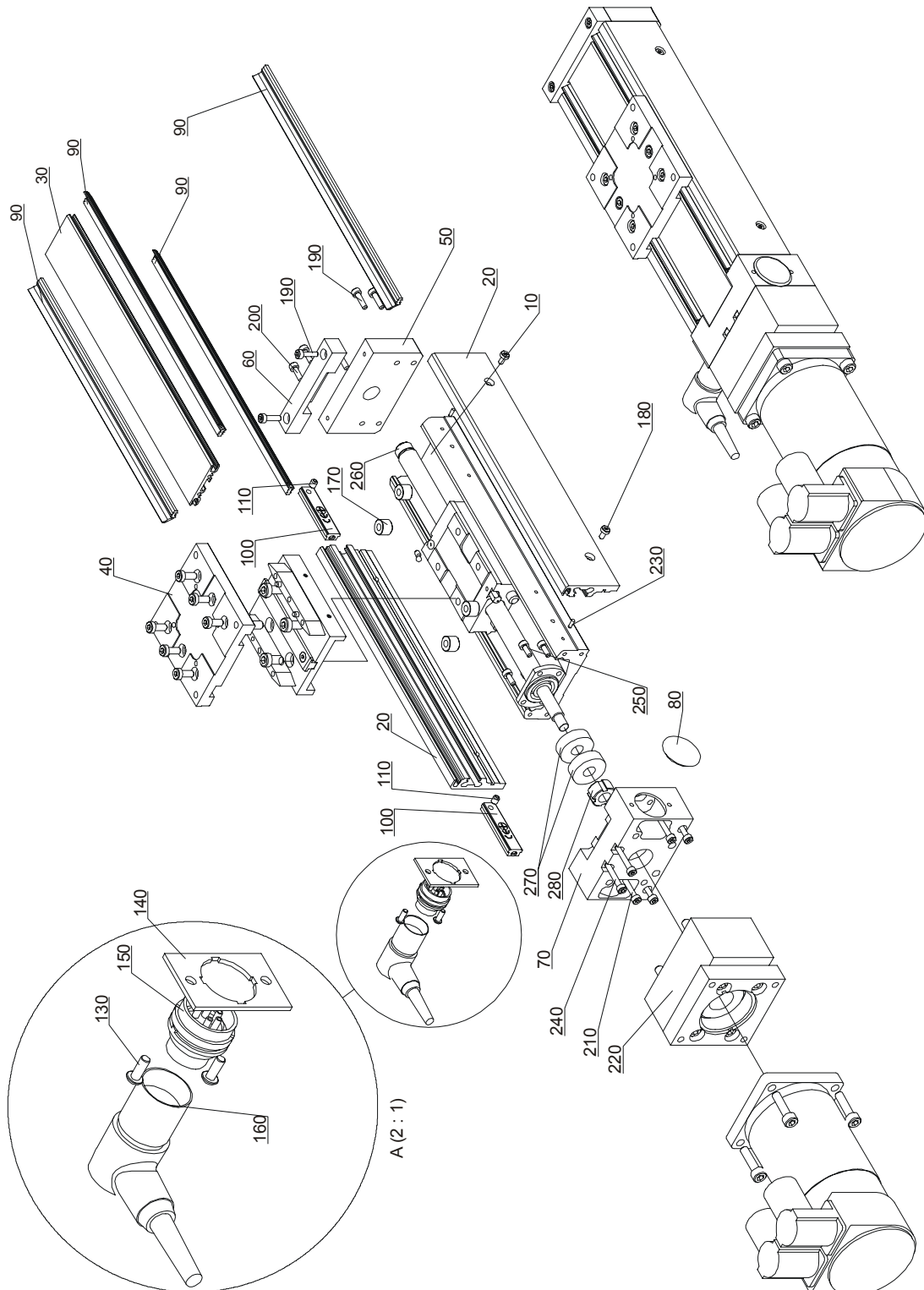
## 10 Tightening Torques [Nm] for Screw Connections

Strength class	M3	M4	M5	M6	M8	M10	M12	M14	M16
8.8		2,7	5,5	9,5	23	46	80	125	195
10.9		3,8	8	13	32	64	110	180	275
12.9	2,1	4,6	9,5	16	39	77	135	215	330

## 11 Scaled Drawings

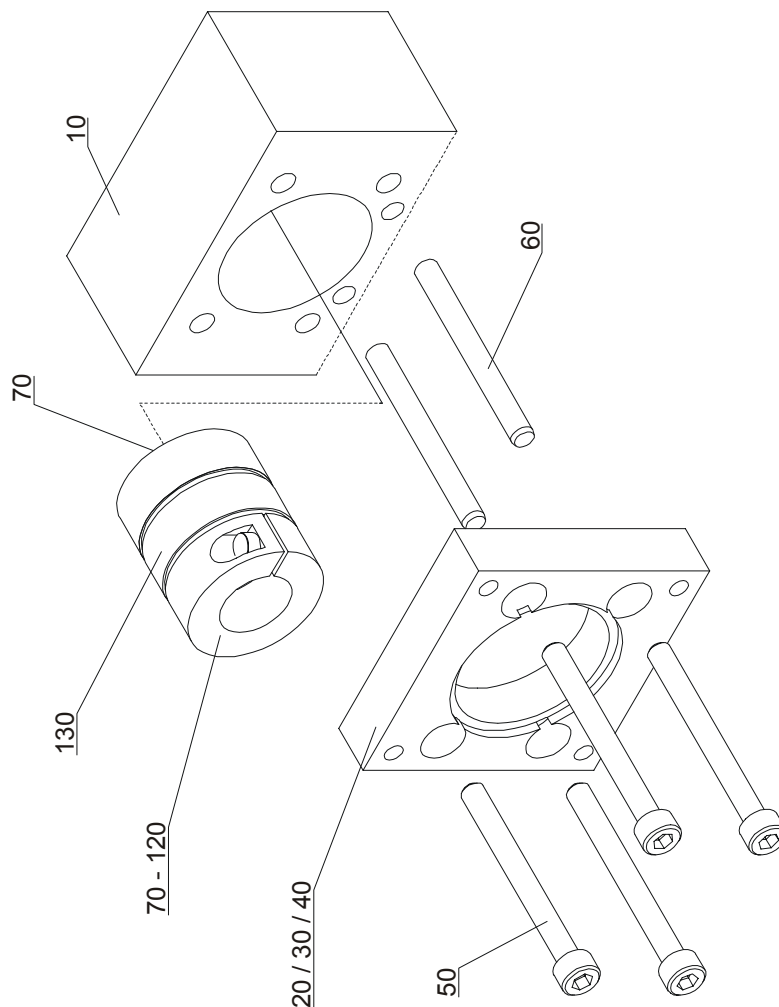
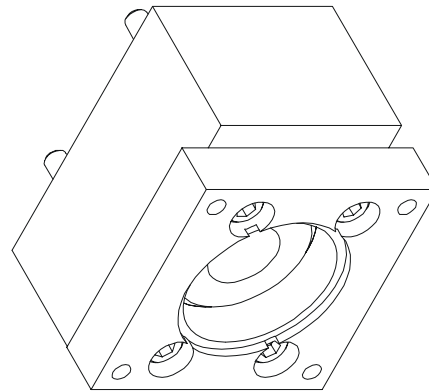
### 11.1 Exploded View

Subassembly No. 1000734



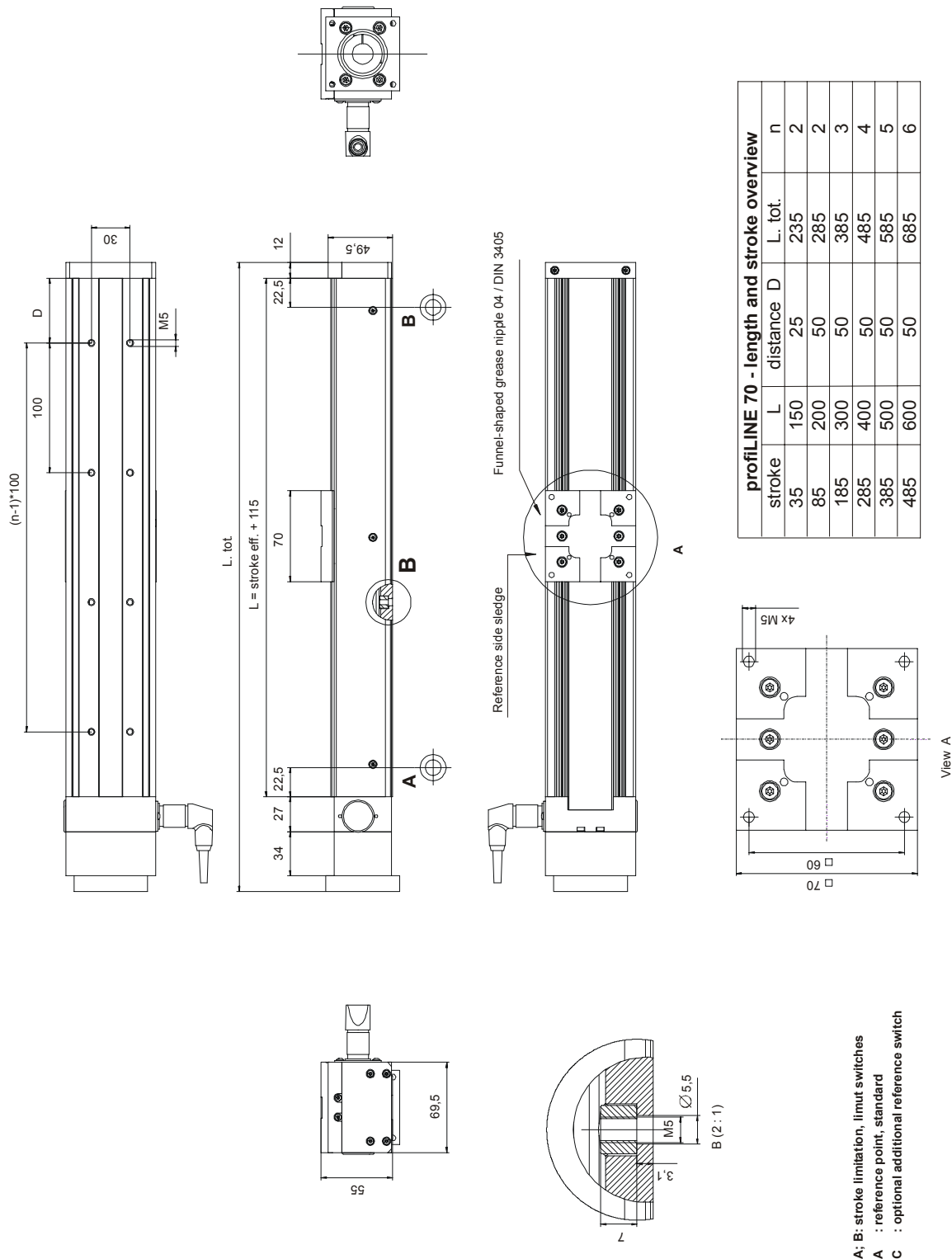
## 11.2 Exploded View of Axial Motor Flange

Subassembly No.: 1000736



### 11.3 Installation Variant 5

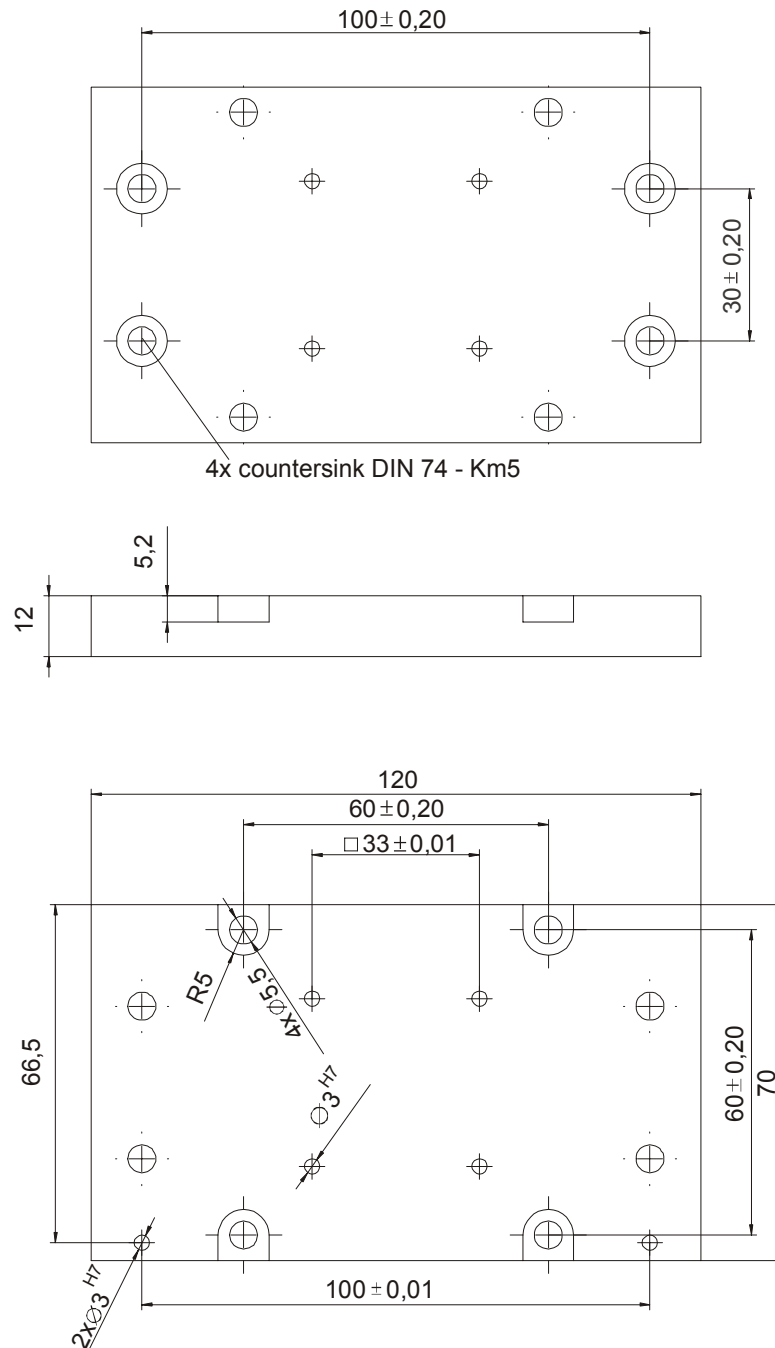
Subassembly No.: 1000734



A: B: stroke limitation, limit switches  
A : reference point, standard  
C : optional additional reference switch

## 11.4 Adapter Plate

Article No. 1031426



The adapter plate is required for transverse mounting

- carriage on basic body (once) and
- carriage on carriage (twice)

Mounting plate article no. 1031426

