Operating Manual

Module 160/15

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IEF Werner GmbH
Wendelhofstraße 6
78120 Furtwangen - Deutschland
Phone: 07723-925-0
Fax: 07723-925-100
www.IEF-Werner.de
info@IEF-Werner.de

history:

Dokumentcode	Date	modification
...R4b.doc	April 2006	New table with planetary gear boxes, external greasing
...R4c.doc	November 2006	New table with planetary gear boxes, external greasing

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

Contents

Manufacturer's Declaration

according to the EC Machinery Directive

IEF Werner GmbH

Wendelhofstr.6

D-78120 Furtwangen - Germany

Phone: +49 7723 925-0

Fax: +49 7723 925-100

We herewith declare that the following product:

Designation	Parts Group
Modul 160/15	1000477

is intended for installation in a machine and that putting into operation is not allowed before it is found that the machine in which this product is 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, April, 2006

(Manfred Bär, Managing Director)

1 Safety

1.1 Definition of the Alerts

WARNING

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

CAUTION

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

NOTE Offers additional information.

1.2 General Safety Instructions

WARNING

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

CAUTION

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

CAUTION

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

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!

1.3 Special warning

In addition to the notes, warnings and cautions referred to above you will also find the adjacent symbol in the Operating Manual. The risk of crushing of limbs exists at this position.

NOTE Observe the Manufacturer's Declaration

1.4 Manufacturer´s Declaration

For safe operation of the components please observe following abridgement of the manufacturer´s declaration:

- The putting into operation of the linear module is prohibited until it is determined that the machine in which it is to be installed complies with the provisions of the EC Directive 98/37/EC dated June 22, 1998 or the corresponding national standards and the conformity with the Machinery Directive was determined by the manufacturer of the overall equipment or the agency that will be putting it into circulation.

2 Areas of Application

The Linear ***Modul 160/15*** has been developed for handling applications in automated systems.

The Linear Module is based on a high quality guidance system, ideal for high dynamic forces and precision positioning. The guidance system mounted inside the axis extrusion is well protected against the ingress of dirt, however excessive levels of dirt and contamination are not advised. Further the guiding elements are consisting of special sealings, which protect the guiding ways for rough dirt.

The use of the linear unit ***Modul 160/15*** with a lot of dirt and aggressiv dusts should be avoided, because there are no protection covers, for example, covers for the expansion bellow, available.

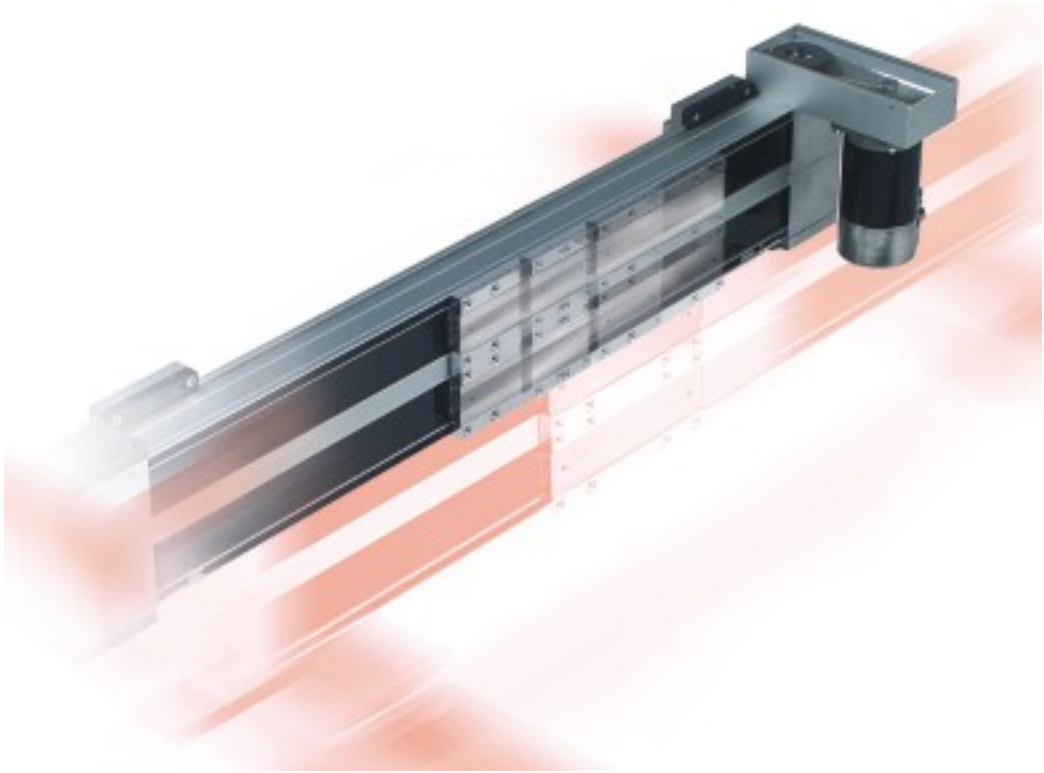

Figure 1: Module 160/15

The linear unit ***Modul 160/15*** is an allrounder and useable in many using areas. Applications range from simple programmable stop devices in the timber industry to high precision, automatic placement systems in the electronic industry for SMD components. Light assembly automation, load and unload systems for machine tools, manipulators for the packaging industry and pick and place systems are just a small number of examples.

Above mentioned linear units are not suited for transportation of people and animals or as press- and bending device for cold working on metal.

For special applications in the chemical field, the food sector or in an explosive surrounding you need to take additional measures. In case of doubt, please contact manufacturer.

3 Installation

3.1 Installation Position

The linear unit Modul 160/15 can either be horizontally or vertically mounted.

CAUTION

If you mount the Modul 160/15 vertically, only use motors with a spring power brake to avoid the trolley dropping down when the electrical supply is switched off.

3.2 Technical Data of Module 160/15

Parameter	Value
Repetition accuracy	+/- 0,05 mm
Weight (without motor at 0 mm stroke)	10,4 kg
Weight increase per 100 mm stroke	1,4 kg
Maximum movement speed	5 m/s
Maximum acceleration	40 m/s²
Maximum transferable feed force with maximum movement speed (5 m/s)	1278 N
Maximum torque Mx	150 Nm
Maximum torque My	150 Nm
Maximum torque Mz	150 Nm
Carrying capacity C1	2000 N
Carrying capacity C2	1000 N
Guide rigidity x	*See Figure 7, Page 14*
Geometrical moment of inertia of profile cross-section at center of gravity:	
I_x	1196016 mm^4
I_y	8689482 mm^4

Figure 2: Technical Data

3.3 Technical Data when Using a Planetary Gearbox

The following gearboxes can be used:

Gearbox types	Single-stage x :1	Torsional play, single-stage (arcmin)	Two-stage x :1	Torsional play, two-stage (arcmin)	Three-stage x :1	Torsional play, three-stage (arcmin)
TP 004 MF 1	5; 7; 10	< 5	21; 31; 61; 91	< 5	--------	--------
PLF 64 HP	4; 5; 8	< 3	16; 20; 25; 32; 40; 64	< 5	--------	--------
PLFE 64	3; 4; 5; 8	< 20	9; 12; 15; 16; 20; 25; 32; 40; 64	< 25	--------	--------
PLE 60	3; 4; 5; 8	< 20	9; 12; 15; 16; 20; 25; 32; 40; 64	< 25	60; 80; 100; 120; 160; 200; 256; 320; 512	< 30
WPLE 60	3; 4; 5; 8	< 30	9; 12; 15; 16; 20; 25; 32; 40; 64	< 35	60; 80; 100; 120; 160; 200; 256; 320; 512	< 40
PLE 80	3; 4; 5; 8	< 12	9; 12; 15; 16; 20; 25; 32; 40; 60	< 17	60; 80; 100; 120; 160; 200; 256; 320; 512	< 22
WPLE 80	3; 4; 5; 8	< 25	9; 12; 15; 16; 20; 25; 32; 40; 64	< 30	60; 80; 100; 120; 160; 200; 256; 320; 512	< 35
PLS 70 OP 11	3; 4; 5; 8; 10	< 3	12; 15; 16; 20; 25; 32; 40; 64; 100	< 5	--------	--------
WPLS 70 OP 11	4; 5; 8; 10	< 5	16; 20; 25; 32; 40; 64; 100	< 7	--------	--------
PLS 90 OP 11	3; 4; 5; 8; 10	< 3	12; 15; 16; 20; 25; 32; 40; 64; 100	< 5	--------	--------
WPLS 90 OP 11	4; 5; 8; 10	< 5	16; 20; 25; 32; 40; 64; 100	< 7	--------	--------

Figure 3: Gear types

3.4 Recommended input speeds

CAUTION

When using a planetary gearbox, attention must be paid to the recommended input speeds (**specification in rpm**).

3.4.1 Table recommended input speeds

Gearbox types	Single-stage [rpm]	Two-stage [rpm]	Three-stage [rpm]
TP 004 MF 1	3300	4000	--------
PLF 64 HP	5500	5500	--------
PLFE 64	4000	4000	--------
PLE 60	4000	4000	4000
WPLE 60	3000	3000	3000
PLE 80	4000	4000	4000
WPLE 80	3000	3000	3000
PLS 70 OP 11	5000	5000	--------
WPLS 70 OP 11	3000	3000	--------
PLS 90 OP 11	4500	4500	--------
WPLS 90 OP 11	2500	2500	--------

Figure 4: recommended input speeds

3.5 Load Cases

3.5.1 Torques and Load Cases

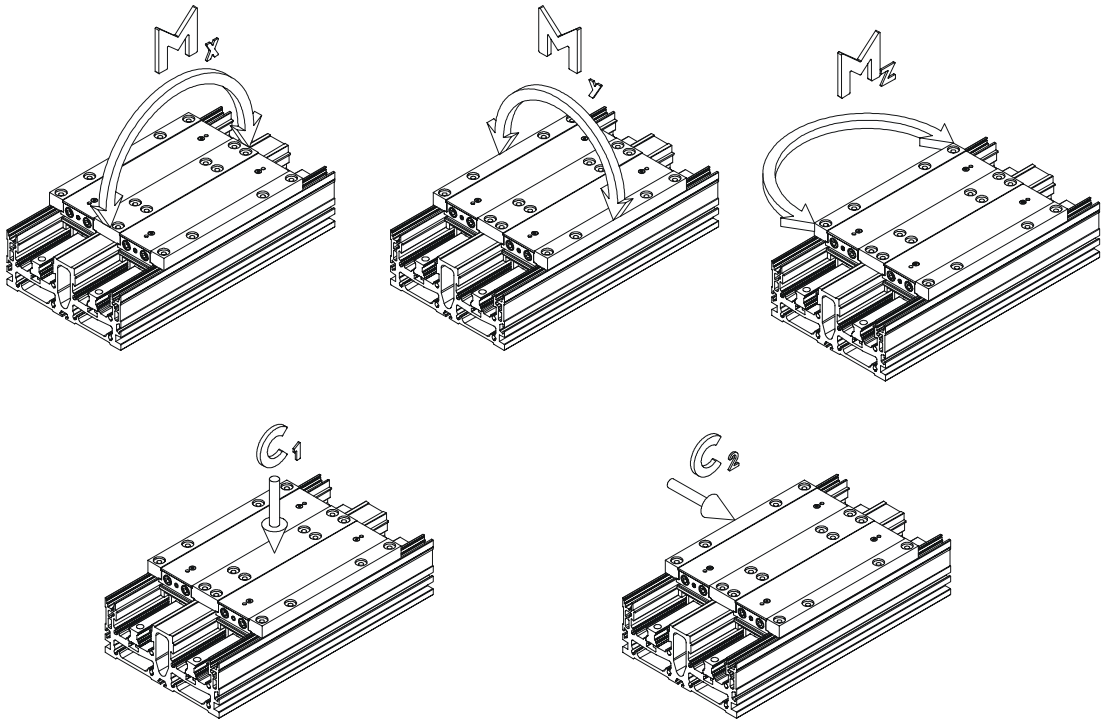

Figure 5: Torques and Load Cases

Excerpt from Table Technical Data *(Figure 2, page 10)*:

Messgröße	Wert
Maximum torque Mx	150 Nm
Maximum torque My	150 Nm
Maximum torque Mz	150 Nm
Carrying capacity C1	2000 N
Carrying capacity C2	1000 N

Figure 6: Table of Torques and Load Cases

3.5.2 Tilting of the Carriage Unit with Side Load

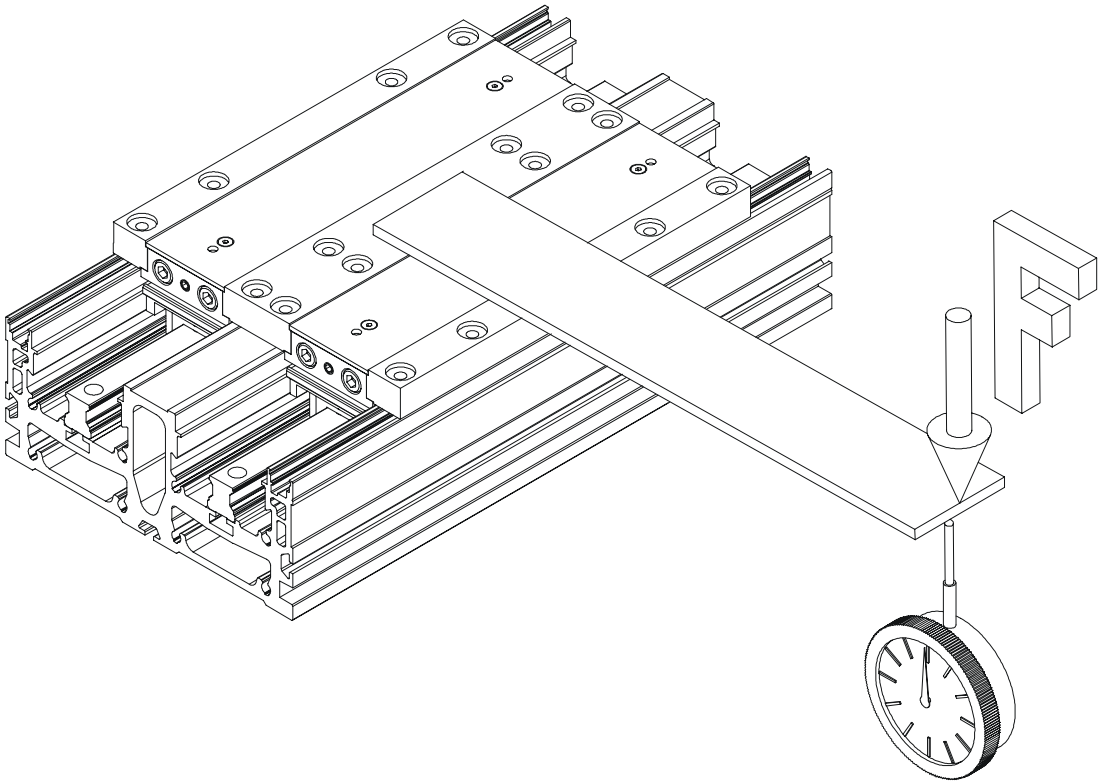

Figure 7: Tilting of the Carriage

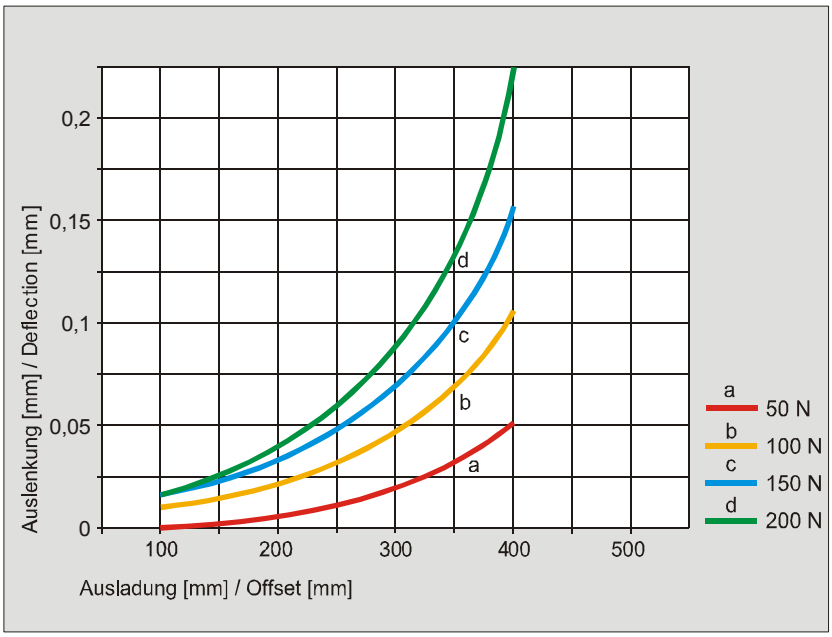

Figure 8: Deflection Diagram

3.6 Attachment

In most applications, the module 160/15 is attached with clamping profiles to a flat assembly surface. The carriage moves freely.

Avoid other attachments of the linear module, e.g. by additional drillings in the body. These drillings can cause damage to the guidance base and to the internal parts of the module.

CAUTION

The clamping area should have a planeness of 0.1mm/m².

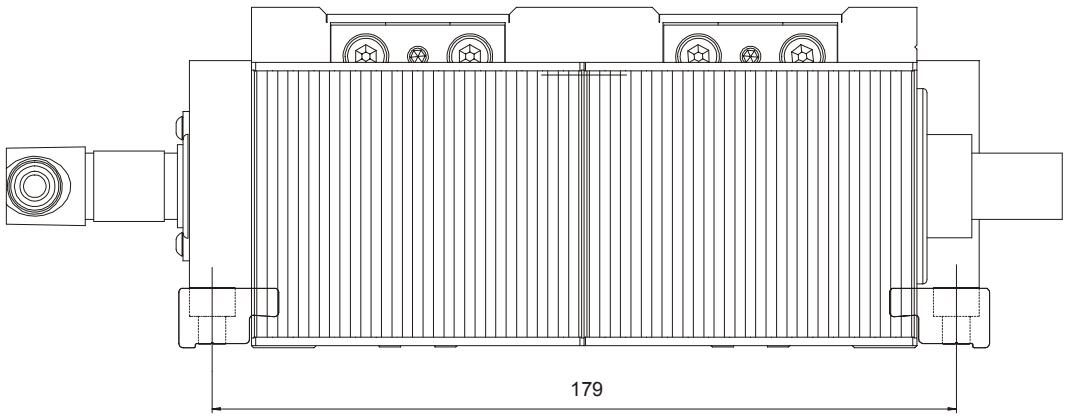

Figure 9: Attachment with Clamping elements / Clamping Profile

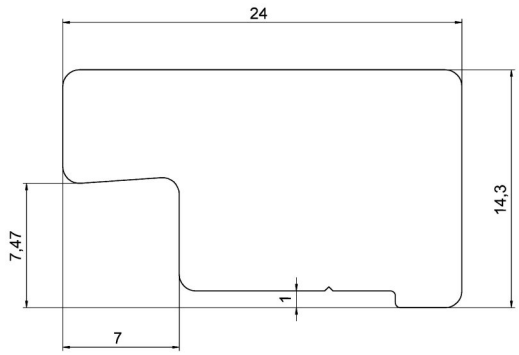

Figure 10: Dimensional Drawing of the Clamping Profile / Clamping Element

CAUTION

Pay attention to the crushing positions shown in Figure 11!

Crushing Positions (*view Figure 11, Page 16*).

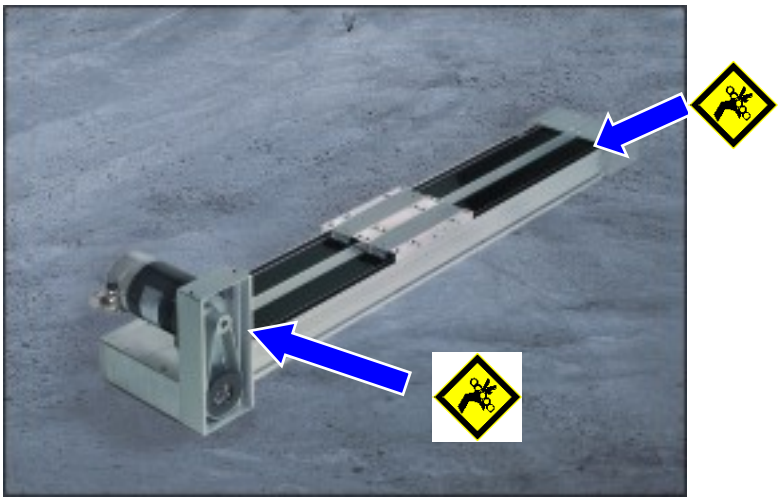

Figure 11: Potential Crushing Positions

Figure 12 indicates the drilling template of a standard slide.

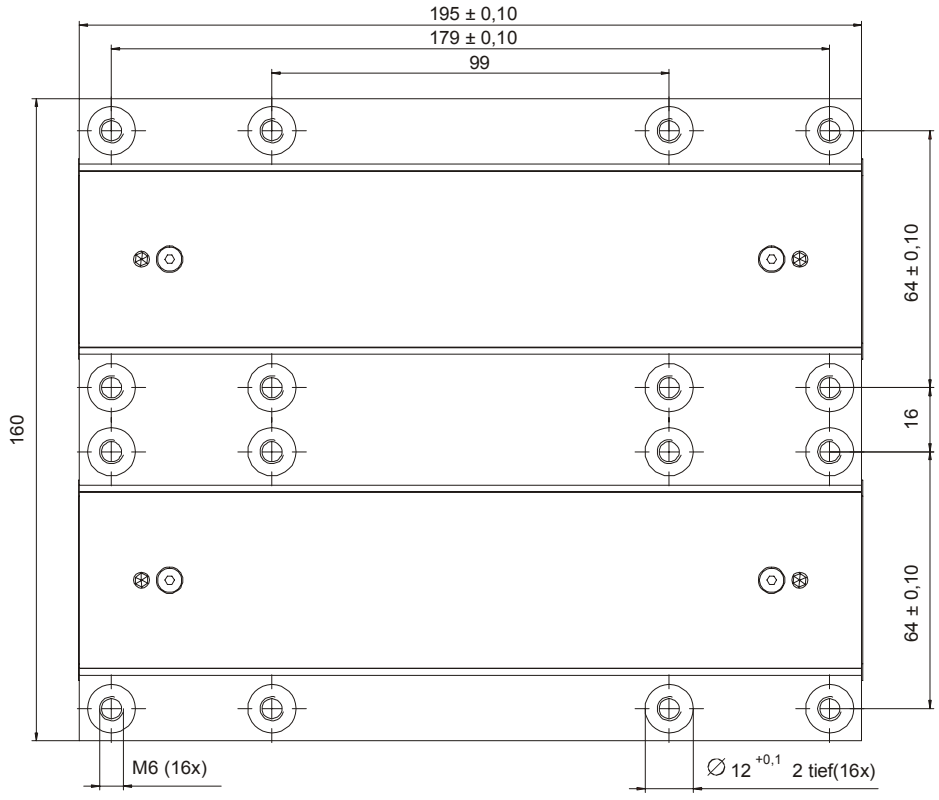

Figure 12: Standard Carriage Drilling Pattern

Figure 13 indicates the drilling template of a long slide.

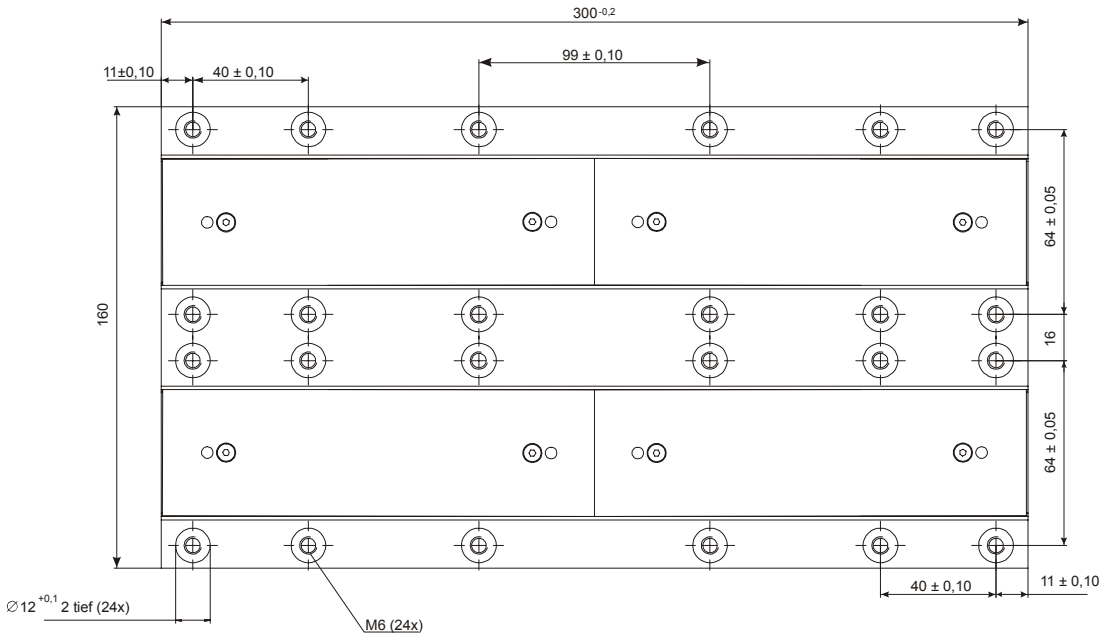

Figure 13: Long Carriage Drilling Pattern

Figure 14 Indicates a centering ring to take up clamping elements:

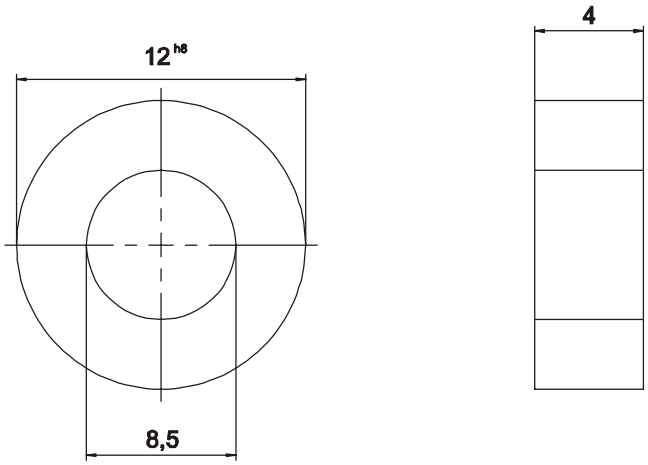

Figure 14: Centering Ring (Art.No. 1024021)

With the M6 threaded holes on the carriage, different axis configurations can be achieved, possibly via an adapter plate.

The counterbores with 12 mm dia. serve for centering of the clamping elements with possible ajdustment.

3.7 Installation of Actuators

Actuators (gripper modules, cylinders) attached to the linear module are normally attached via the drilling pattern on the carriage (see Figure 12, page 16 and Figure 13, page 17) to the linear unit.

4 Wiring

4.1 Motors

CAUTION

The electrical connection of the motors is performed according to the motor data sheet. For customer-specific motors, the data sheet must be requested from the respective manufacturer and the motor connected accordingly.

4.2 Initiators

Inductive proximity switches (PNP break contacts, Article No.: 025165) are used as standard limit switches for the distance traveled. These switches are not safety limit switches according to EN60204-1. Optionally, an additional reference point switch (PNP make contact, Article No.: 726744) can also be retrofitted in the module 80/15. The active switch area is marked with a colored circle symbol. The break contacts have a green dot, the make contacts have a red dot. The initiators and their supply lines are protected in a cable duct which is integrated in the basic body and are routed jointly to a connector.

A plastic strip serves to cover the cable duct. The replacement of an initiator or its shifting is easily possible after removal of this plastic strip from the cable duct.

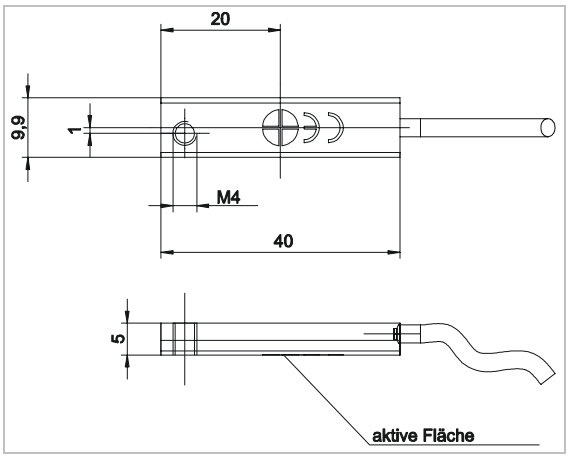

Figure 15: Initiator Dimensional Sketch

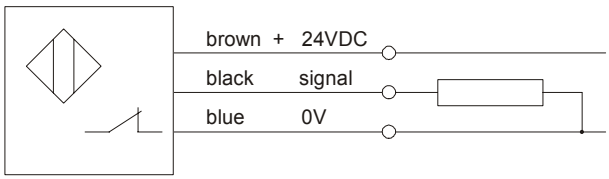

Figure 16: PNP Break Contact Connection Designation

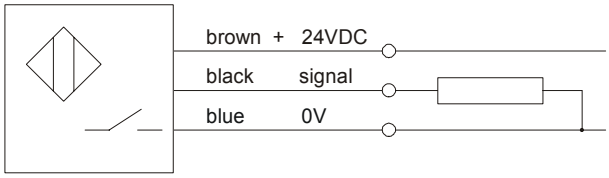

Figure 17: PNP Make Contact Connection Drawing

4.2.1 Technical Data of Initiators

Parameter	Value
Operating voltage including ripple	(10 ... 30) VDC ≤ 15 %
Current load capacity	I_a ≤ 200 mA
Voltage drop at I_a max.	≤ 2,5 V
Switching frequency	≤ 1000 Hz
Self current consumption	≤ 15 mA
Nominal operating distance on steel	1,5 mm ± 10 %
Switch hysteresis	(3 ... 20) %
Reproducibility (U = const.)	± 0,01 mm
Operating temperature	- 25 °C ... + 70 °C
Protection class	IP 65
Short-circuit proof	yes
Protected against polarity reversal	yes

Figure 18: Technical Data of Initiators

4.2.2 Limit switch plug

pin-no.	assignment	colour
1	+ 24 VDC	brown
2	Limit switch negative movement	green
3	0 V	white
4	Limit switch positive movement	yellow
5	Reference switch	grey

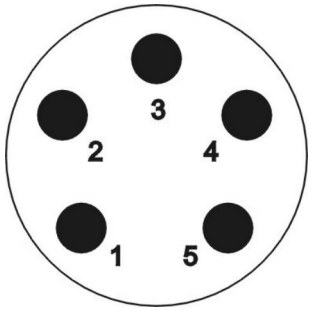

Figure 19: Connection Drawing of limit switch Plug

4.3 Cable Routing

For all moving cables, suitable cable routing has to be used to effectively prevent cable breaks.

The minimum radius $\mathbf{r}_{min}$ for cable routing chains is calculated for IEF cables according to the following formula:

$$\mathbf{r}_{min} \geq \mathbf{10 \times cable\ diameter.}$$

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.

5 Preventive Maintenance

During the design of module 80/15, great importance was placed on the use of maintenance-free components. All roller elements are provided with lifetime lubrication in the factory.

The guide carriages are equipped with auxiliary lubrication elements. An operating performance of 10000 km is therefore achieved with the initial lubrication. In single-shift operation with a stroke of 500 mm and 20 cycles per minute, this is equivalent to an operating performance of almost 5 years.

After reaching the specified operating performance, the guide carriage can be relubricated with a special grease gun (IEF Werner Art. No.: 1055123 for module) *(see Figure 20 and Figure 21, Page 21).*

NOTE Do not use greases containing ester oils.

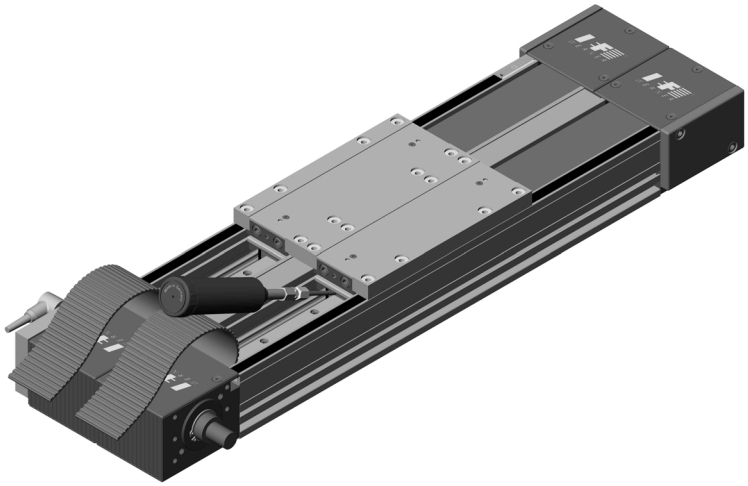

Figure 20: Lubrication of the Guide Carriage

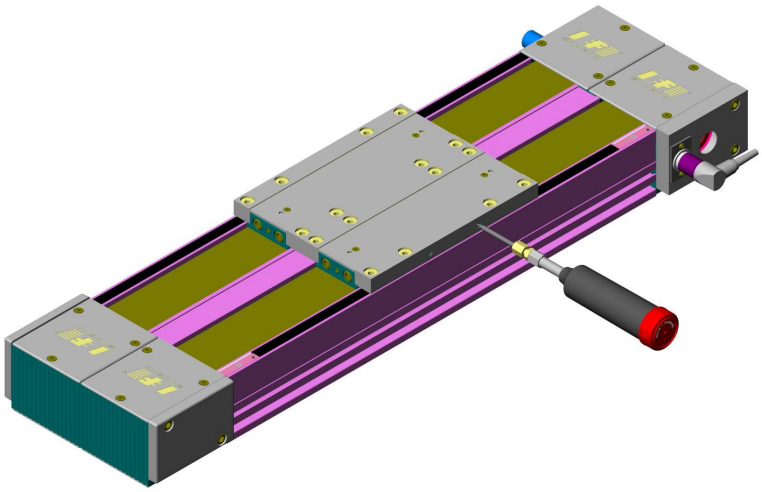

Figure 21: Lubrication of the Guide Carriage (external lubrication)

6 Error Analysis

Error Table Part 1

Error	Reason	Error Handling
Increased running noise	Nominal service life of guide carriage exceeded	Replace all guide carriages
	Guide carriages worn by overload (excessive torques, etc.)	Replace all guide carriages, reduce load
	Guide carriages worn by excessive soiling	Replace all guide carriages, clean and relubricate guide rails more frequently
	Guide rails worn	Replace guide rails, replace all guide carriages, check load, protect linear module from excessive soiling
	Guide rails corroded	Replace guide rails, replace guide carriages as required
	Pulley worn	Replace pulley
	Drive unit worn	Replace drive unit
	Toothed belt runs dry	Lightly grease toothed belt on the toothed inner side
	Excessive toothed belt tension	Readjust toothed belt tension on carriage part
	Toothed belt runs canted	Align toothed belt on fastener (pressure piece and gear segment), evenly tighten M6 fillister head screws!
	Heavy soiling of toothed belt on the toothed inner side	Replace toothed belt, protect linear module from heavy soiling
	Toothed belt defective	Replace toothed belt
	Motor (motor bearing) defective	Replace motor
	Motor with brake, brake does not release	Apply current to the brake, if the brake still does not release, replace motor

Error Table Part 2

Error	Reason	Error Handling
Linear unit does not move	Limit switch cable not connected	Connect the cable
	Limit switch defective	Replace limit switch
	Limit switch cable defective	Check limit switch cable
	Soldered connection on socket became loose	Solder wires
	Incorrect motor connection	Check and change connector assignment, if required
	Motor defective	Replace motor
	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
	Belt transmission: Toothed disk slips	Firmly tighten clamping set and secure screws with safety lacquer
	Planetary gearbox: Coupling between motor and planetary gearbox slips	Firmly tighten coupling and secure screws with safety lacquer
	Motor with brake, brake does not release	Apply current to the brake, if the brake still does not release, replace motor
Play on reversal	Gearbox toothed belt not tensioned	Tension gearbox toothed belt
	Toothed disk of motor has play (parallel key connection)	Replace toothed disk of motor and, if the parallel key groove of the motor is damaged, replace motor
	Drive tooth belt not tensioned	Tension drive tooth belt
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

7 Repair Instructions

WARNING

Always de-energize the system before beginning the repair.

WARNING

Generally, repairs must be performed by specialist personnel who have read and understood the Operating Manual.

CAUTION

Only when original parts are used can warranty claims be accepted by IEF-Werner.

7.1 Special Installation Instructions

Toothed belt tension:

Adjustment with threaded pin (belt tension adjusted at the factory, *see Figure 22: adjusting screw for belt tension*

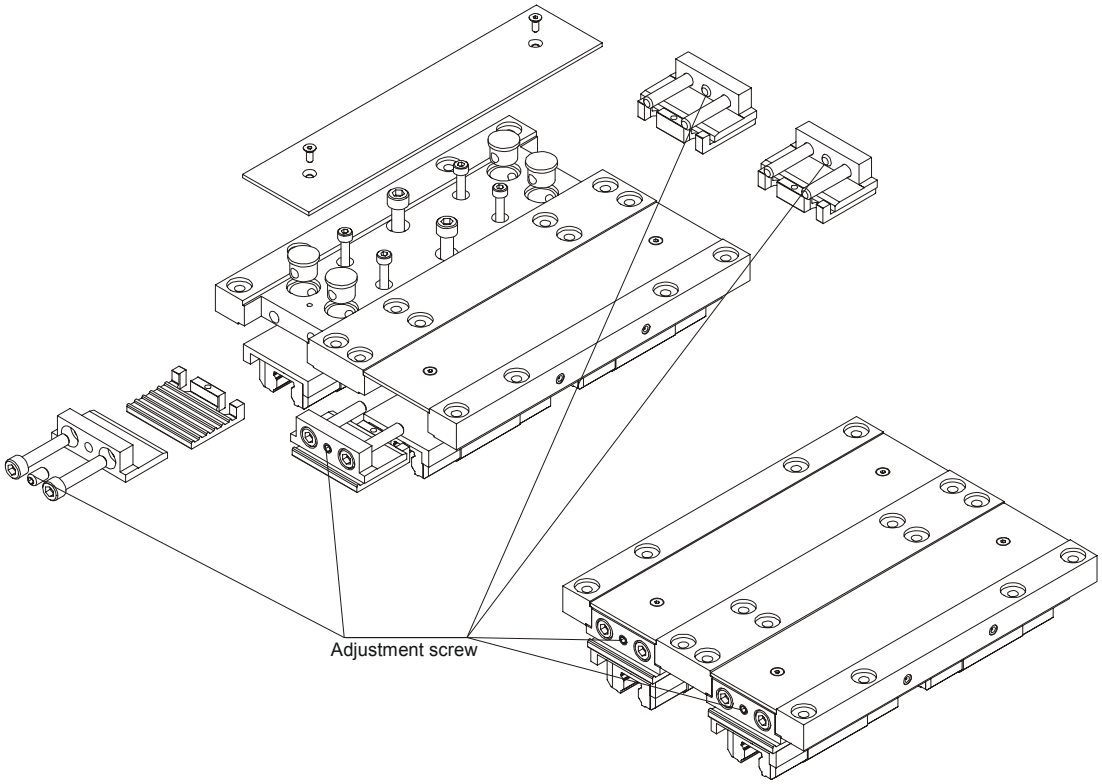

Figure 22: adjusting screw for belt tension

NOTE Do not remove the safety lacquer at the adjusting screw

Gearbox toothed belt tension: 150N (motor mounting variant 1-4)

7.2 Guiding System

7.2.1 General

The guide rail is applied to the reference side of the basic body (marked by a 90° notch). The reference side of the carriage plate which is indicated by two locating pins which are attached one-sided is on the same side as the reference side of the basic body. The adapter plate is attached on the reference side on the two guide carriages. When new, the guide carriages have an increased slide resistance. After a short run-in period (1 to 2 days), the slide resistance is reduced to normal.

NOTE Do not interchange carriage plate and adapter plate with the carriage plate and adapter plate of another linear unit module 80/15.

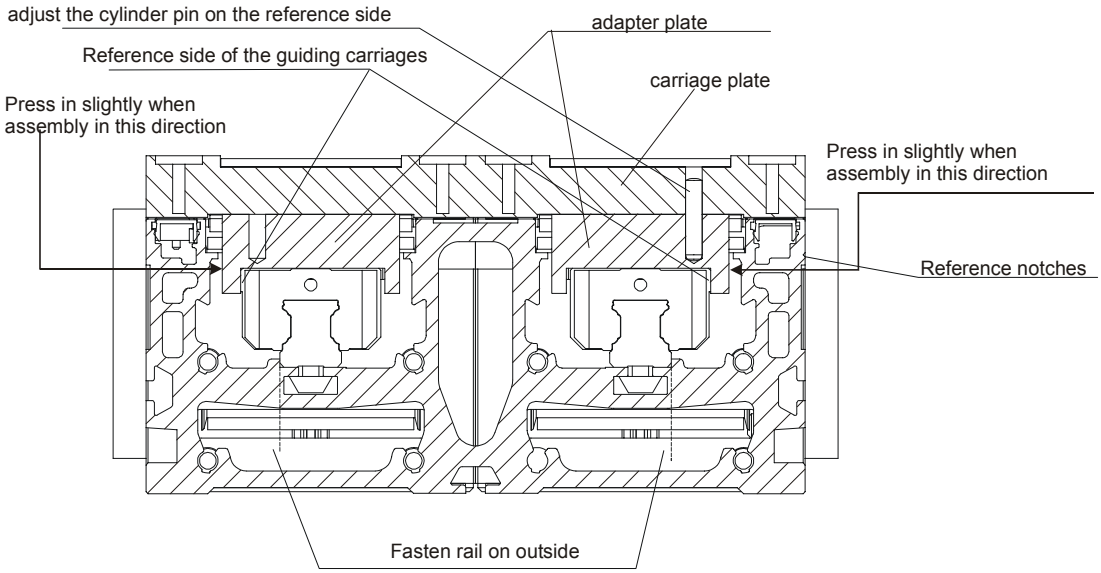

Figure 23: Guiding system

7.3 Replace the toothed belt

- loosen the screws M6x35 (Pos.70, *Figure 26, page 31 und Figure 27, page 32*), remove the thrust piece (Pos.30)
- remove the cover (Pos.120, *Figure 25, page 30*)
- remove the damaged toothed belt, fit the new toothed belt
- clamp the toothed belt between the toothed segment (Pos. 20, *Figure 26, page 31*) and the thrust piece (Pos. 30) and tighten the toothed belt by fastening the screws (Pos. 70).
- tension of belt ex factory preset:

CAUTION

Do not remove locking lacquer at screws!

- attach covers (Pos. 120, *Figure 25, page 30*) again.

8 General Data

8.1 Technical Data

(*chap. 3.2,* Technical Data of Module 160/15*, page 10)*

8.2 Tightening Torques for Screw Connections

Screw 8.8	Tightening torque [Nm]
M3	1,1
M4	2,5
M5	5,0
M6	8,5
M8	21,0
M10	41,0
M12	71,0
Screw 12.9	**Tightening torque [Nm]**
M4 (attachment of guide rail)	4.9

8.3 Distances Between Axes and Number of Teeth

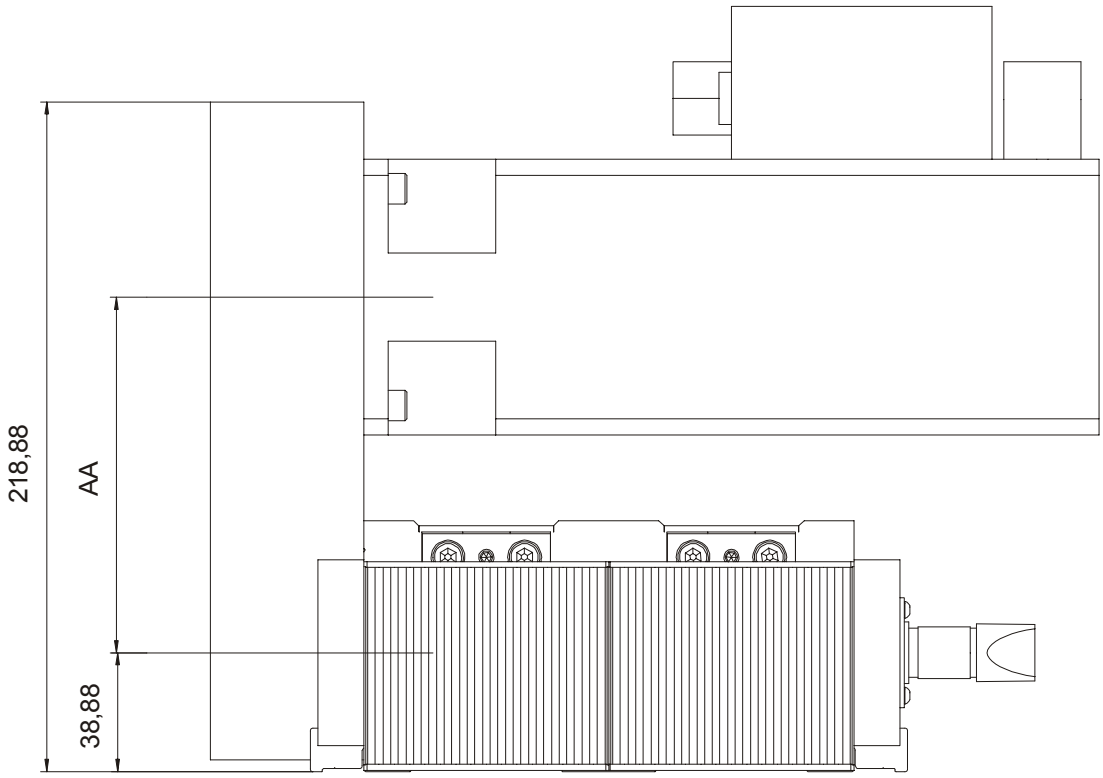

Figure 24: Explanation of the Table of Distances between Axes, Subassembly No.: 1000475

Distances Between Axes According to Standard Gear Ratios

I	Z1 output	Z2 drive	Drilled hole drive	L- toothed belt	AA [mm]	Feed constant [mm]
1:1	42	42	Maximum dia. 32 mm	450 mm	120	140
2.1 : 1	42	20	Maximum dia. 16 mm	390 mm	116.18	66.667
2.625:1	42	16	Maximum dia. 14 mm	390 mm	120.73	53.33
3 : 1	42	14	Maximum dia. 12 mm	375 mm	115.35	46.667

9 Parts Lists

9.1 Modul 160/15

Part group No. 1000477, *see Figure 25, page 30*

Z-Pos.	Art.-No.	part (1) / partgroup (0)	+	Designation
10	1000478	0		basic profile 160/15
20	1000688	0		guide profile type 15
30	1021376	1		toothed belt 50ATL5
	1021376	1		toothed belt 80/ATL5
70	626061	1		cheese head screw M4x16
80	1021419	1		groove stone 2xM4
	731466	1		groove stone
100	1019279	1		Housing
110	626037	1		cheese head screw M6x20
115	626340	1		cylinder pin Ø6m6x20
120	1034373	1		Cover sheet
130	626124	1		Countersunk screw M4x10
140	1045543	1		Supporting disk DIN 988-36x45x0,1
150	1019278	1		Bearing cover
160	1043375	1		Bearing cover 2
170	028585	1		Limit switch holder
180	025165	1		Inductive switch, PNP break contact
190	726744	1	+	Inductive switch, PNP make contact
200	030887	1		Special screw M4x7 hexagon socket
203	725164	1		Angular coupling WKV 50/6
205	725163	1		Connector SFV 50/6
208	025626	1		Retaining sheet metal
209	626038	1		Oval head screw ISO 7380-M3x8-8.8
210	1044440	1		Plastic Clip
220	1044440	1		Plastic Clip
250	1018813	1		Drive set
270	1042982	1		Pulley 80/15/50
280	1018827	1	+	Stopper
290	1029613	1	+	Carriage unit 80/15/195 PS
300	1022293	2		Supporting disk DIN 988-35x45x2,5
310	626330	8		Cylindrical pin DIN 6325 5m6 x 24
	1029658	1	+	Carriage unit 80/15/300 PS
	1000041	0	+	Motor
	1000475	0	+	Belt transmission
	1000476	0	+	Flange
	1019192	1	+	Type 105 clamping profile
	028674	1	+	Type easyLINE clamping element
	220702	1	+	Type 140 clamping element
	1021641	1	+	Type 80 clamping element
	1000462	0	+	Connection plate
	1024734	1	+	Counter sunk bush

+ Usage depending on version

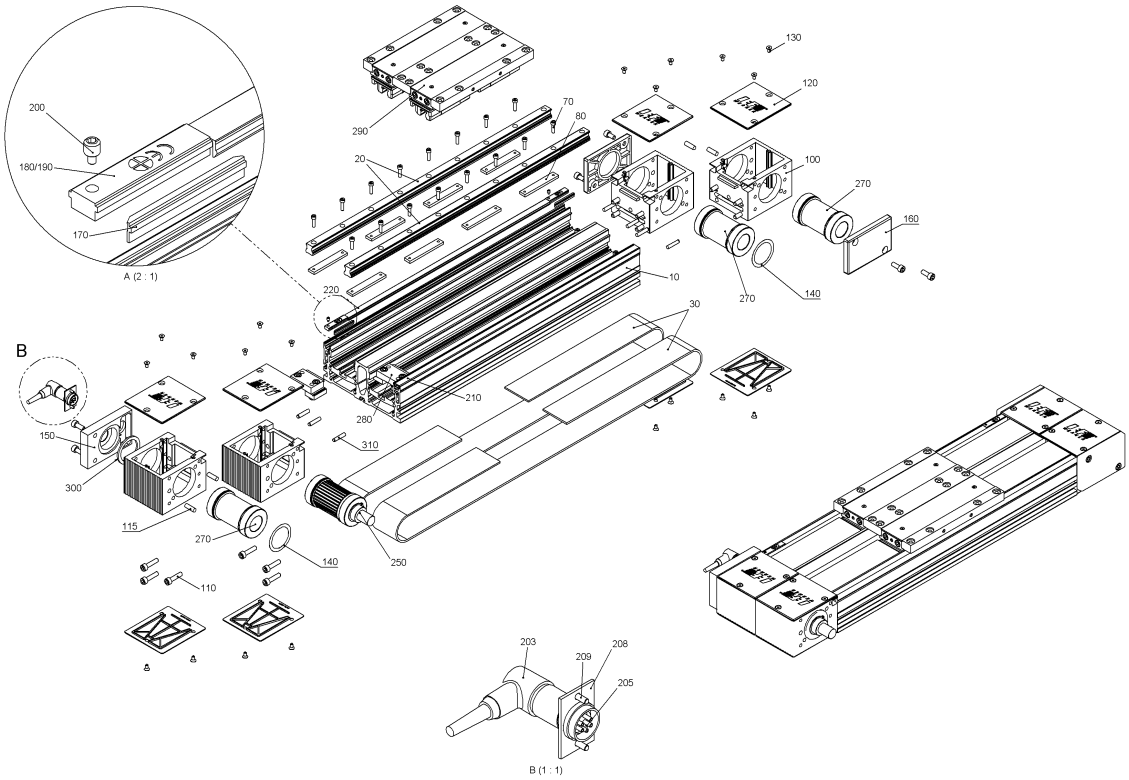

Figure 25: Module 160/15 Installation Variant 1, Exploded View

9.2 Module 80/15/195 PS Carriage, Complete

Article No. 1029613, for the drawing see Figure 26, page 31

Drawing Pos.	Article No.	Part (1)/ Parts group (0)	Designation
10	1029382	1	Guide carriage, size 15
20	1018797	1	Gear segment, complete
30	1023935	1	Pressure piece
40	1041818	1	Adapter plate
50	1041781	1	Carriage plate
60	1023944	1	Cover
70	626483	1	Fillister head screw DIN 912-M4x10-8.8
80	626484	1	Fillister head screw DIN 912-M4x25-8.8
90	626500	1	Fillister head screw DIN 912-M6x18-8.8
100	626049	1	Fillister head screw DIN 912-M6x35-8.8
110	626115	1	Hexagon socket head countersunk screw ISO 10642-M3x8-8.8
120	626190	1	Threaded pin DIN 913-M6x10-8.8
130	1023942	1	Threaded bush
140	626317	1	Cylindrical pin ISO 8734-4x20-A
150	1031602	1	O-ring, type 1,80-1,80
160	1028704	1	T-lubrication nipple, DIN 3405, type 04

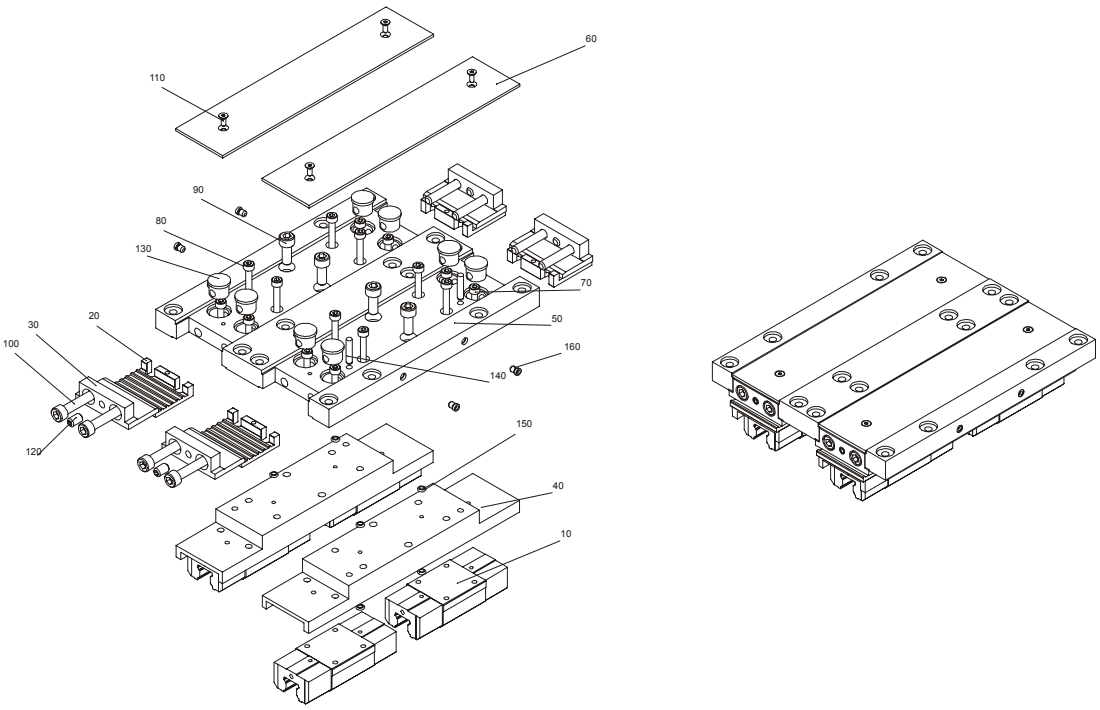

Figure 26: Module 160/15 Carriage, Complete, 1029613

9.3 Module 160/15/300 PS Long Carriage, Complete

Article No. 1029658, for the drawing see Figure 27, page 32

Z-Pos.	Art.-Nr.	Teil (1) / Teilegruppe (0)	Bezeichnung
10	1029382	1	Guide carriage, size 15
20	1018797	1	Gear segment, complete
30	1023935	1	thrust piece
40	1042096	1	distance plate
50	1042092	1	Slide plate
60	1018770	1	Cover
70	626483	1	Fillister head screw DIN 912-M4x10-8.8
80	626484	1	Fillister head screw DIN 912-M4x25-8.8
90	626500	1	Fillister head screw DIN 912-M6x18-8.8
100	626049	1	Fillister head screw DIN 912-M6x35-8.8
110	626115	1	Hexagon socket head countersunk screw ISO 10642-M3x8-8.8
120	626190	1	Threaded pin DIN 913-M6x10-8.8
130	1023942	1	Threaded bush
140	626317	1	Cylindrical pin ISO 8734-4x20-A
150	1031602	1	O-ring, type 1,80-1,80
160	1028704	1	T-lubrication nipple, DIN 3405, type 04

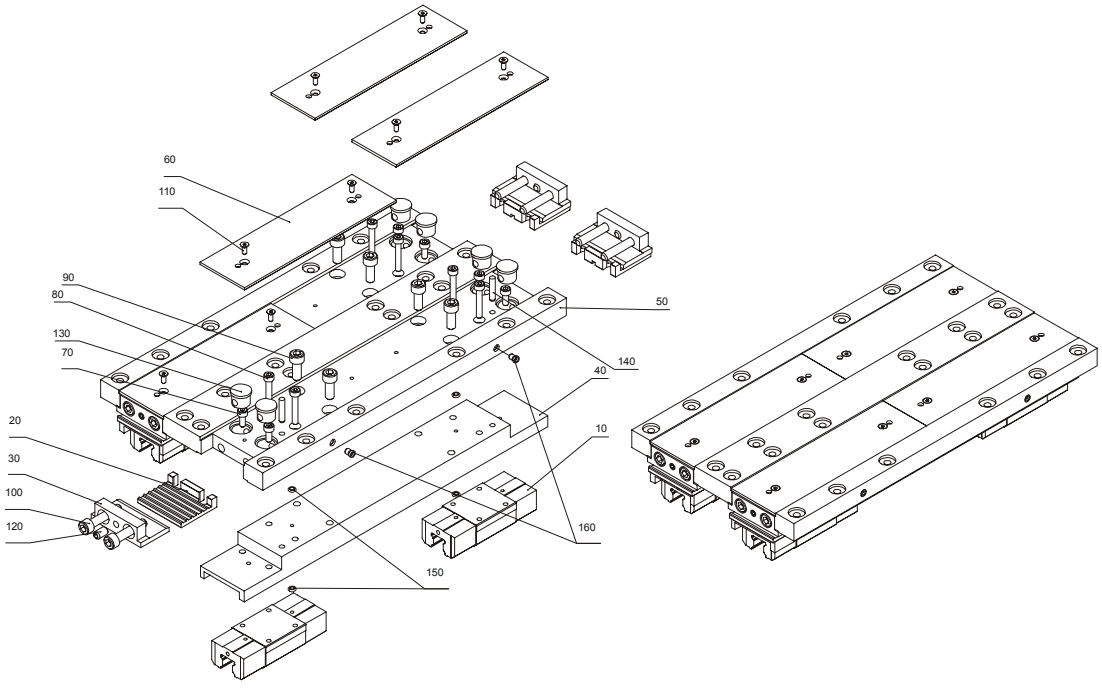

Figure 27: Module 160/15 Long Carriage, complete. 1029658

9.4 Gearbox Modul 160/15

Subassembly No. 1000475, for the drawing see Figure 28, page 34

Drawing Pos.	Article No.	Part (1)/ Parts group (0)	+	Designation
10	1021557	1		Housing
20	029690	1		Toothed disk AT5/42-0
30	1007376	1	+	Toothed disk AT5/42-2
40	028722	1	+	Toothed disk AT5/42-2
50	1006664	1	+	Toothed disk AT5/42-2
60	732770	1		Clamping set 16/32
70	732770	1	+	Clamping set 16/32
80	732294	1	+	Clamping set 20/38
90	734168	1	+	Clamping set 22/40
95	526735	1	+	Toothed disk AT5/20-2 including clamping set 12
98	525983	1	+	Toothed disk AT5/20-2 including clamping set 14
100	525984	1	+	Toothed disk AT5/20-2 including clamping set 16
110	1005790	1	+	Toothed disk AT5/14-2 including clamping set 10
120	1005756	1	+	Toothed disk AT5/14-2 including clamping set 12
130	1003999	1		Belt transmission cover
140	028574	1		Connecting link
150	626072	1		Oval head screw ISO 7380-M4x8-8.8
160	1004001	1		Push-in cover
170	730353	1	+	Toothed belt 25AT5/390
180	732286	1	+	Toothed belt 25AT5/375
190	908243	1	+	Toothed belt 25AT5/450

+ Usage depending on version

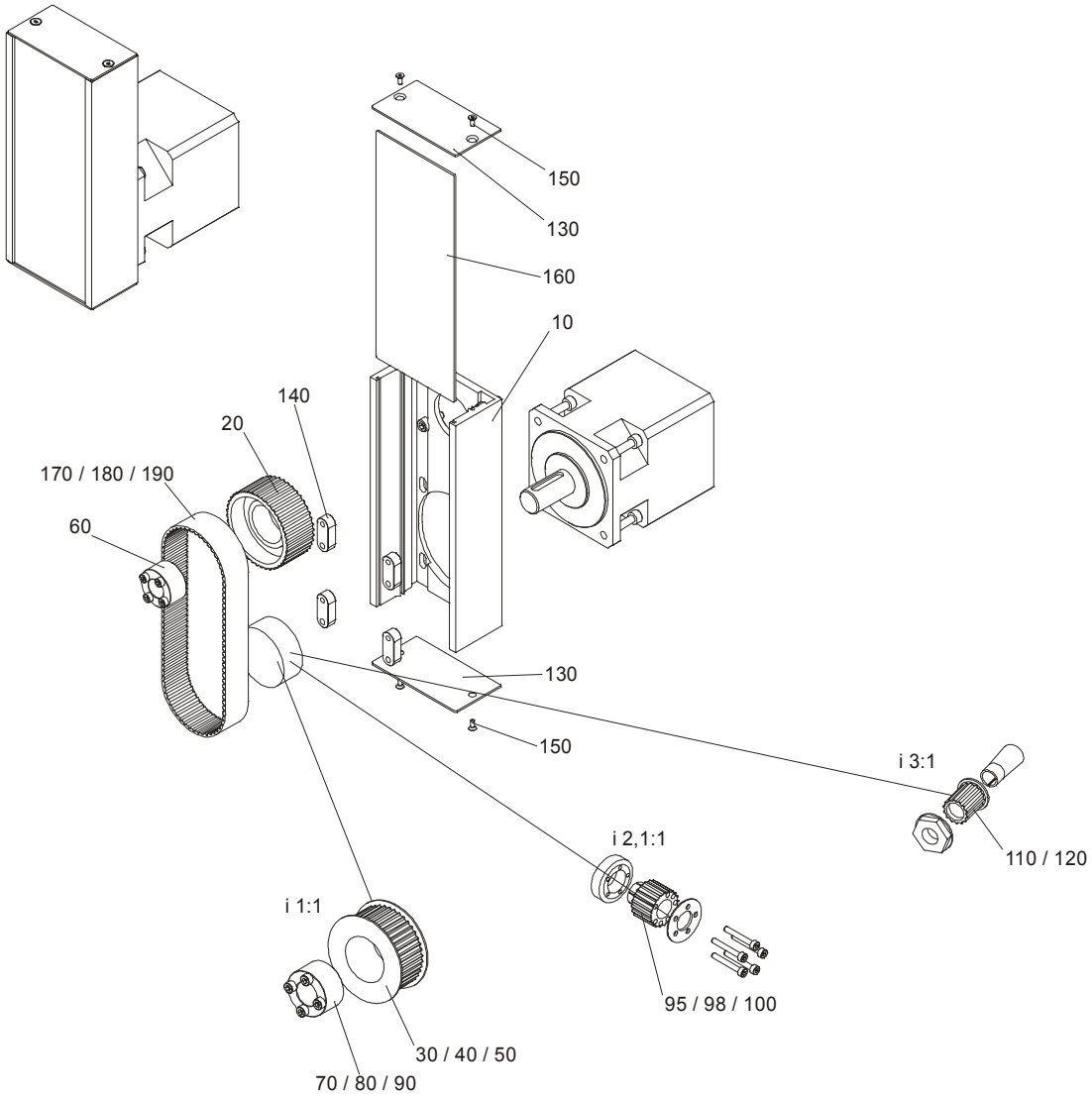

Figure 28: Module 160/15 Belt Transmission, Part group No. 1000475

9.5 Flange

Subassembly No. 1000476, for the drawing, see Figure 29, page 35

Drawing Pos.	Article No.	Part (1)/ Parts group (0)	+	Designation
10	1022105	1		Flange, axial
20	1022129	1		Flange plate, axial
30	734161	1		Plastic cover
40	626037	1		Fillister head screw DIN 912 - M6x20-8.8
50	626244	1		Fillister head screw DIN 912-M6x60-8.8
60	627215	1		Retaining ring
70	1022199	1	+	Coupling dia.=16
75	1022203	1		Toothed ring red
80	1022201	1	+	Coupling dia.=20
90	1022202	1	+	Coupling dia.=22
100	1006530	1	+	Sleeve 12/16
110	1007310	1	+	Sleeve 15/20
120	1008886	1	+	Sleeve 14/16
130	1022206	1	+	Sleeve 19/22

+ Usage depending on version

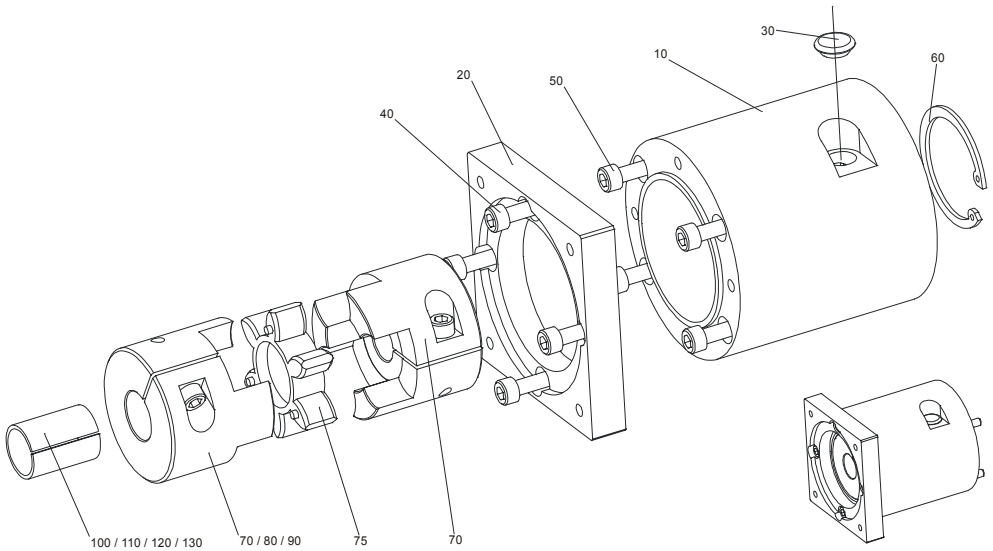

Figure 29: Module 160/15 Flange i=1:1, Part group No. 1000476

CAUTION

Please you to consider additionally the supply enclosed wearing part list relating to orders.

10 Installation Variants

10.1 Overview of Installation Variants

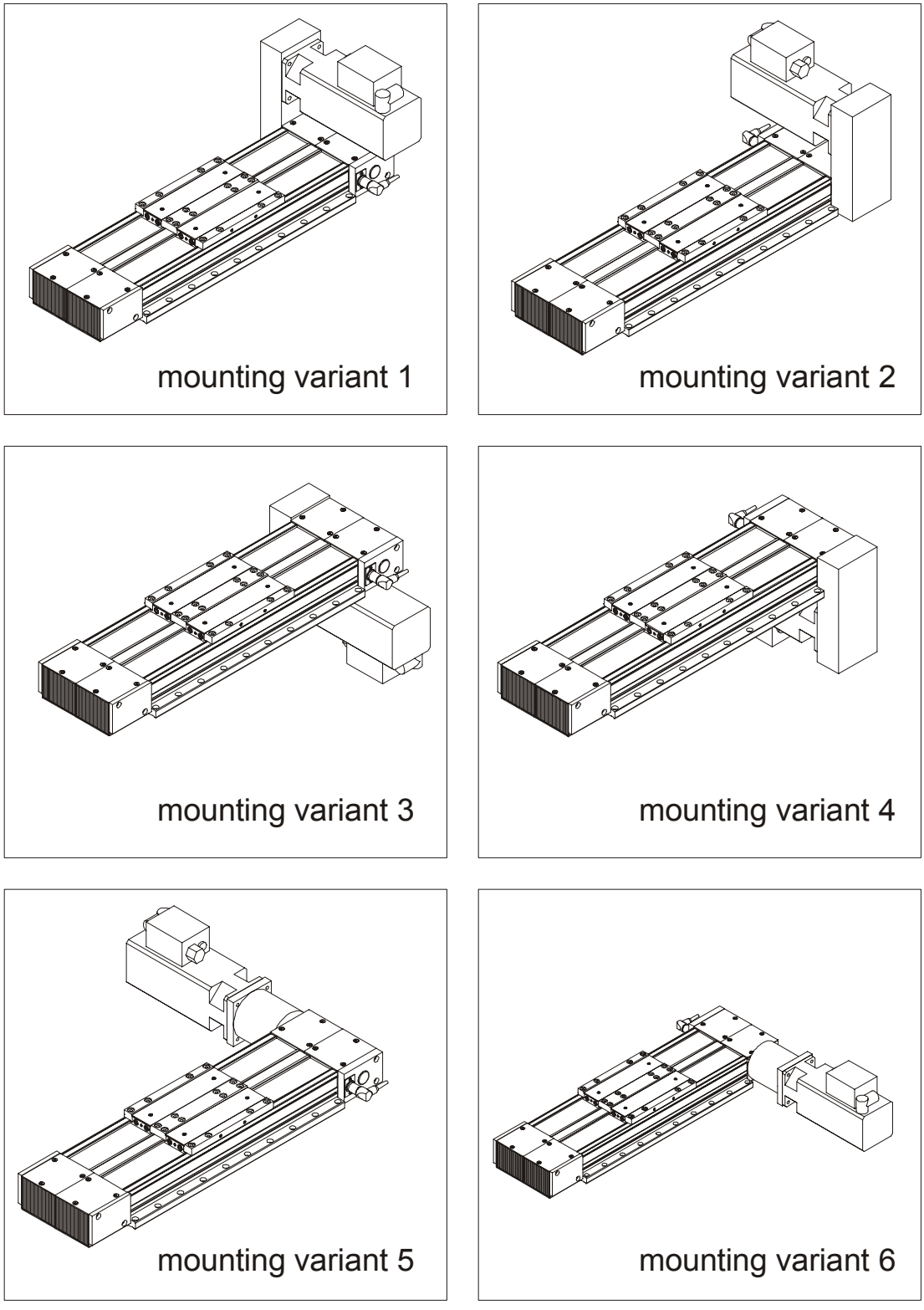

Figure 30: Installation Variants Modul 160/15

10.2 Module 160/15 Installation Variant 1

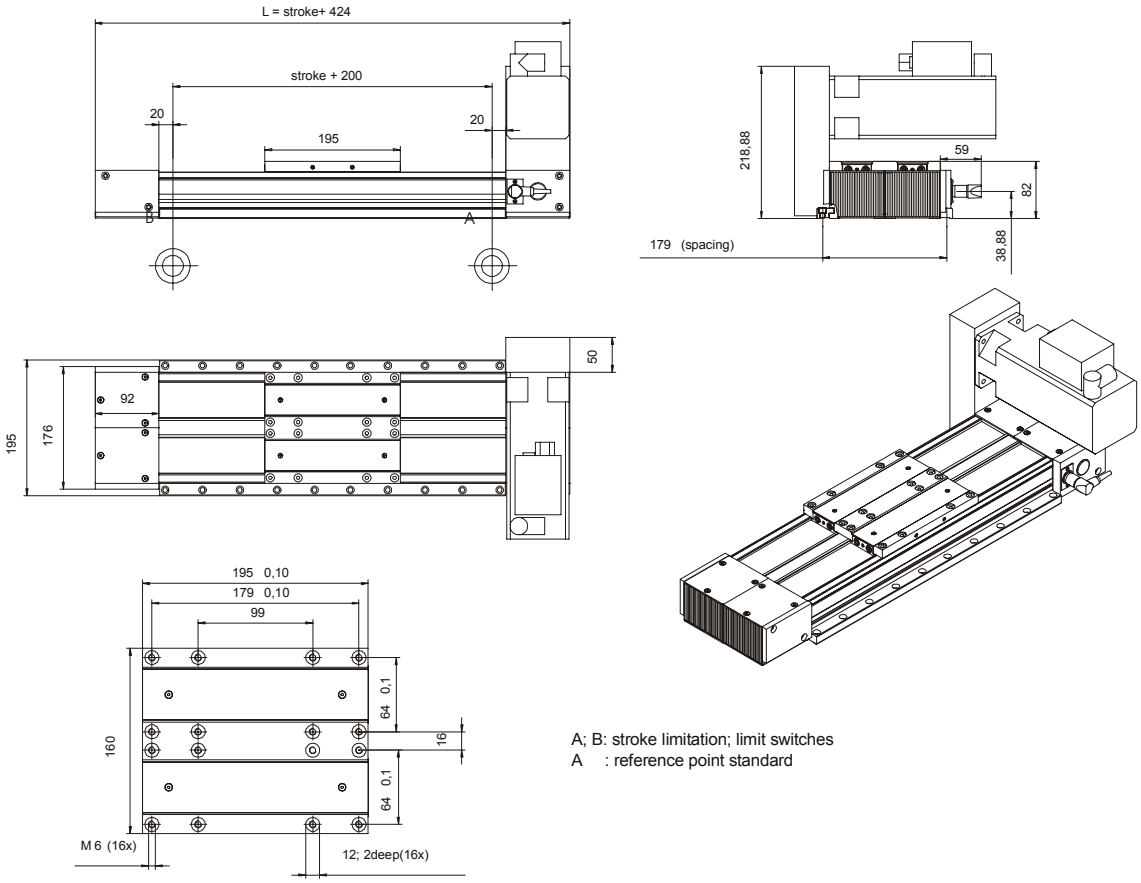

Figure 31: Module 160/15, Part group Number 1000477

10.3 Module 160/15 Installation Variant 5

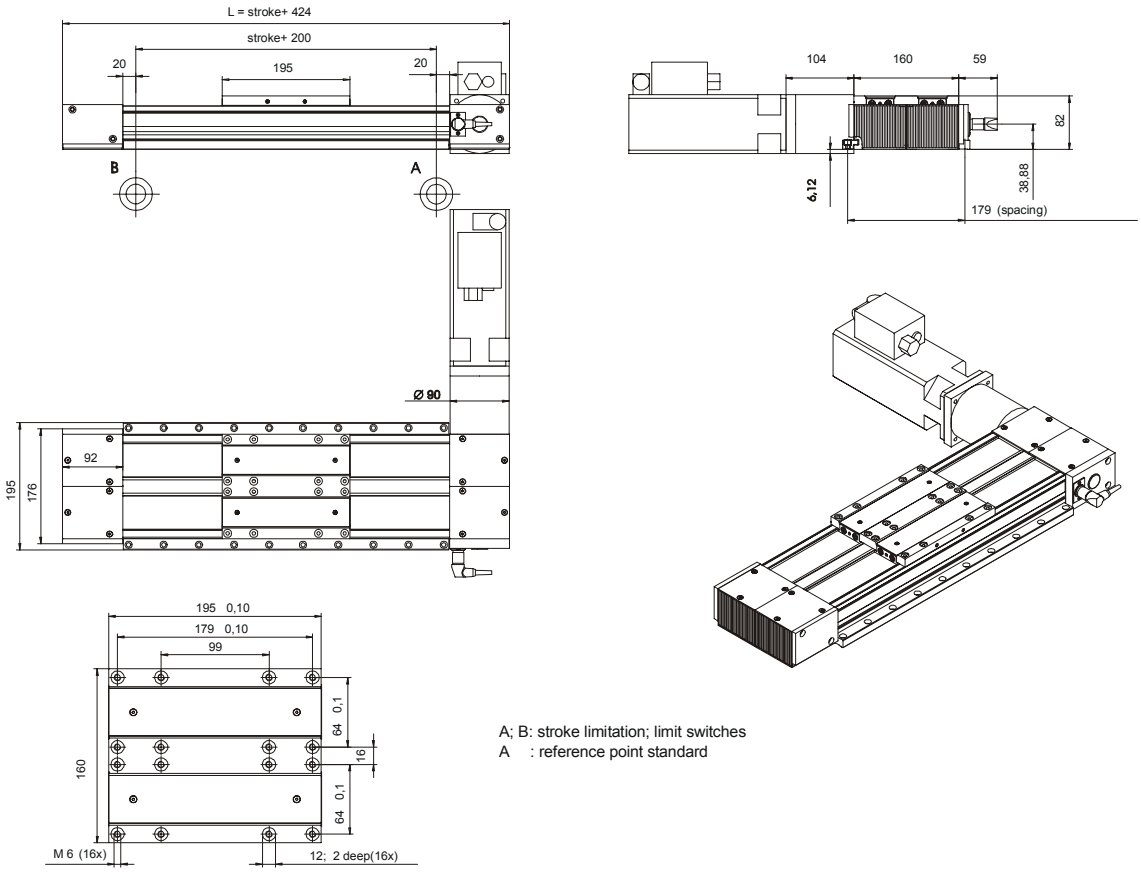

Figure 32: Module 160/15, Part group Number 1000477

11 Accessory Drawings

11.1 Clamping Element 80/15 with Adjustment

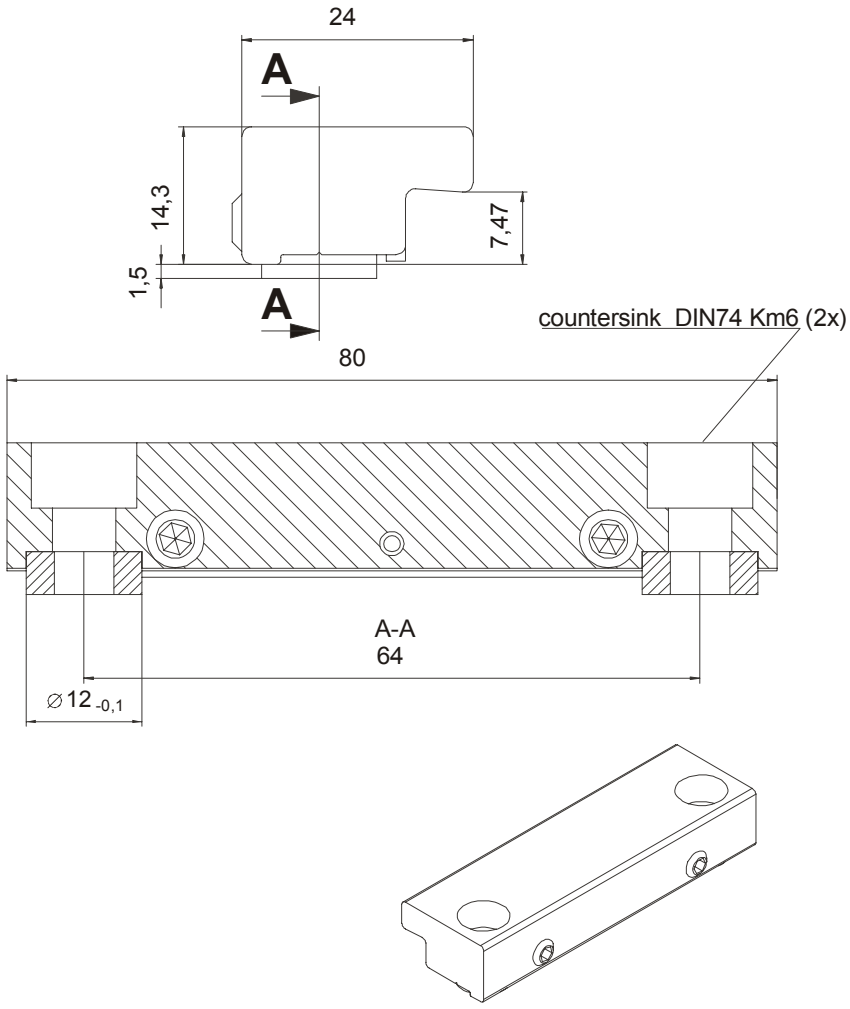

Figure 33: Clamping Element 80/15, Article No.: 1021614

11.2 Clamping Element 105

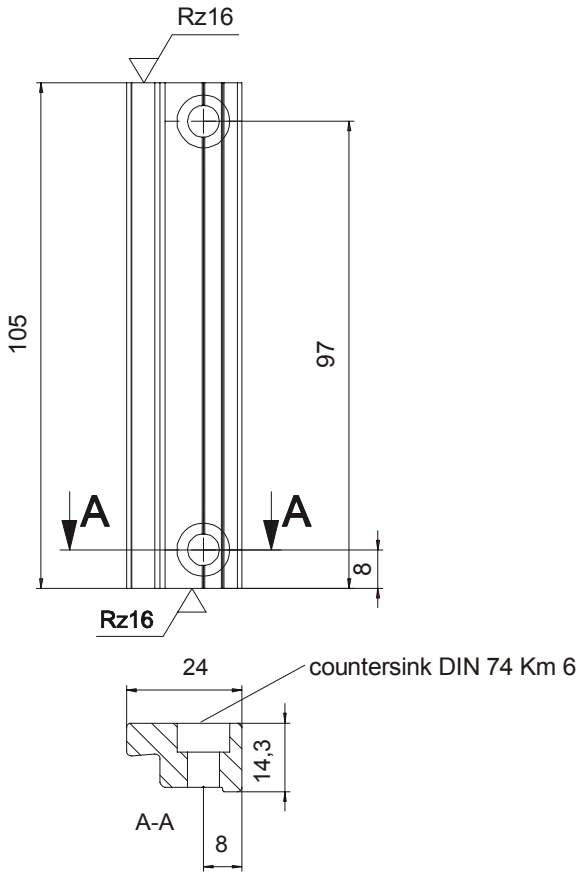

Figure 34: Clamping Element 105, Article No.: 028674

11.3 Clamping Element 140

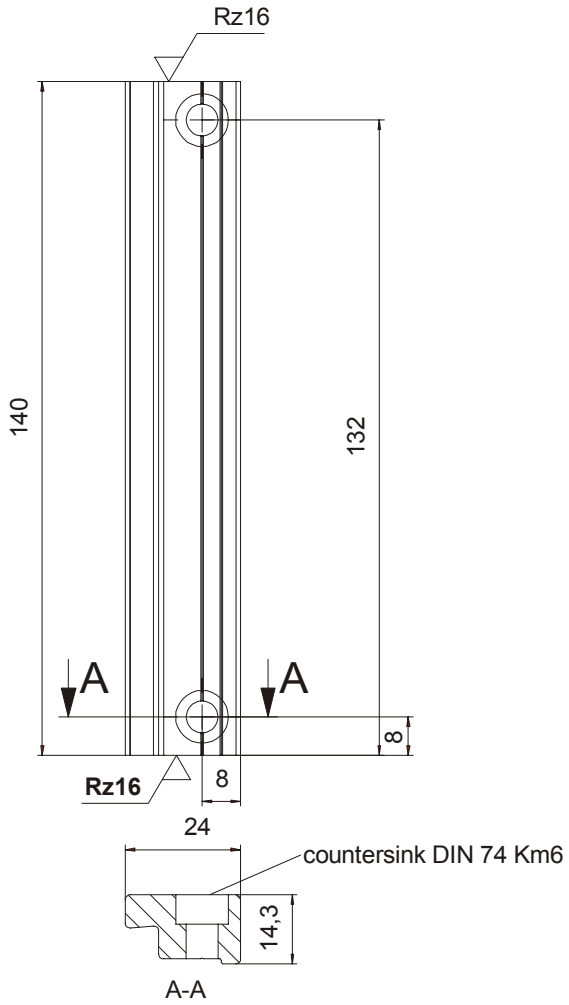

Figure 35: Clamping Element 140, Article No.: 220702

11.4 Holding Bracket, Left

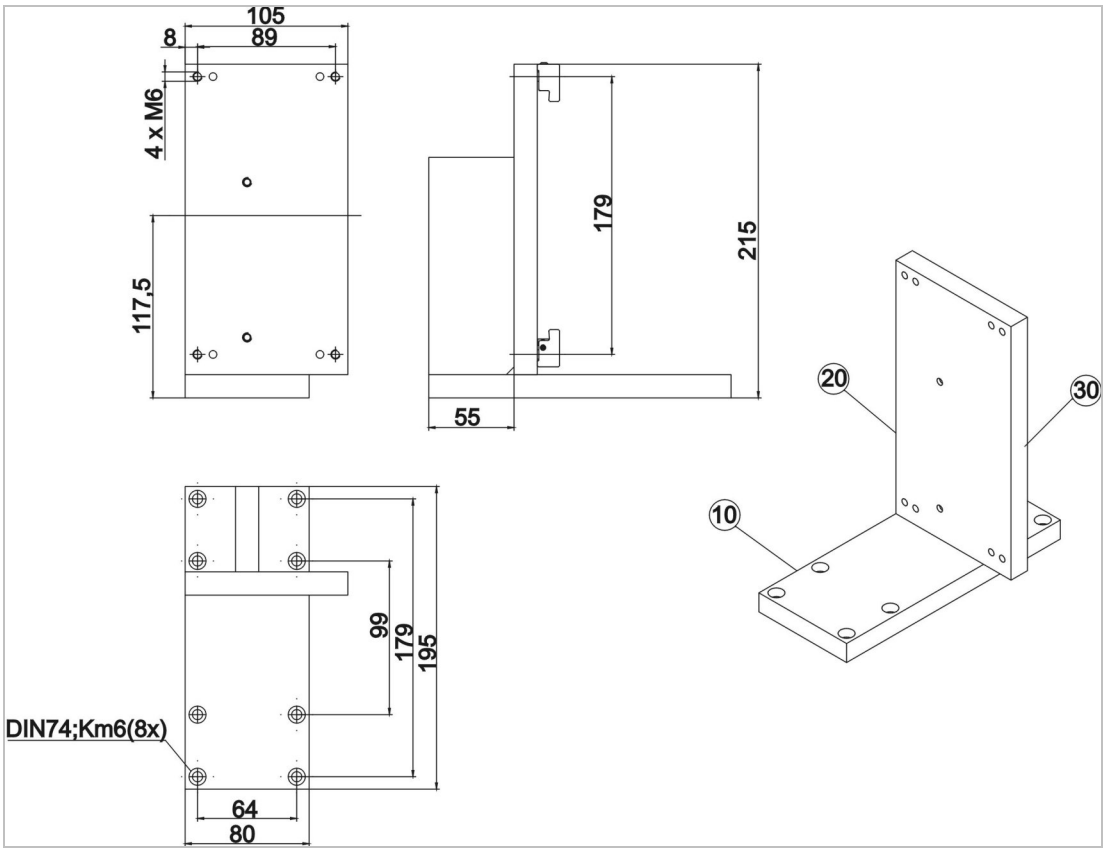

Figure 36: Holding Bracket, Left, Article No.: 1024891

11.5 Holding Bracket, Right

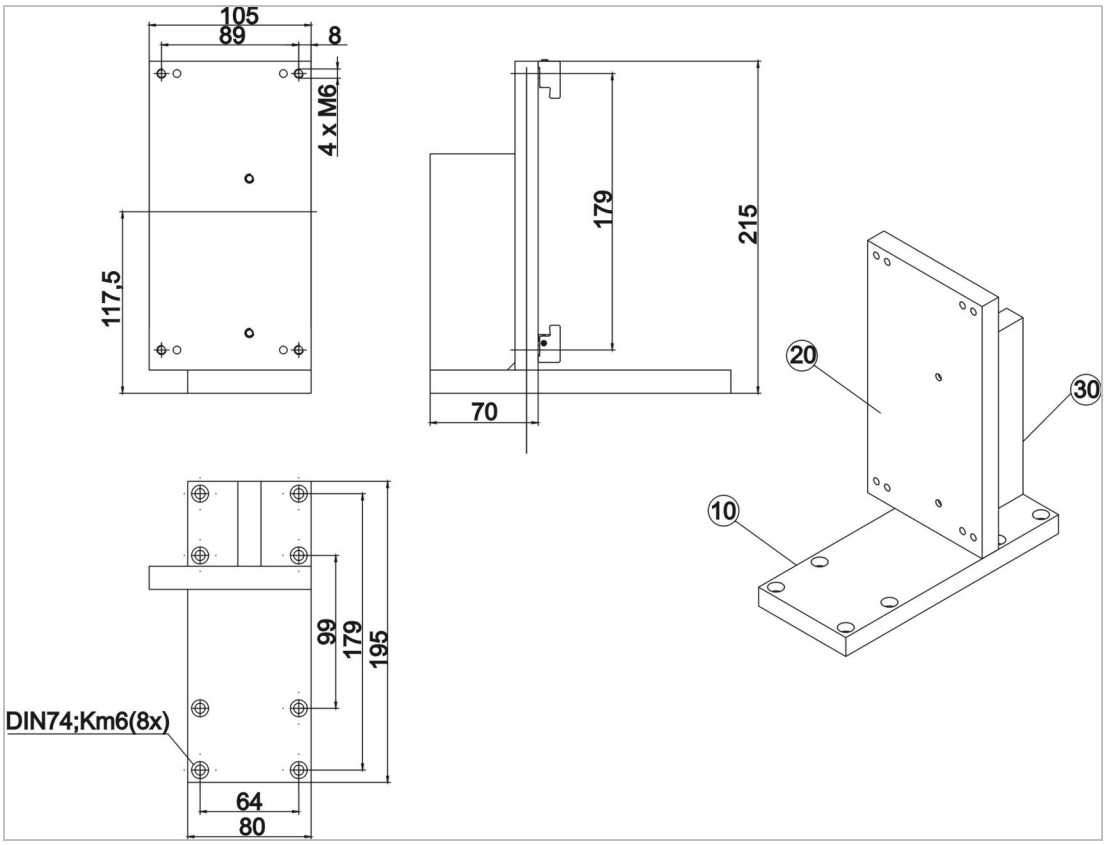

Figure 37: Holding Bracket, Right, Article No.: 1024560

11.6 Holding Bracket 160/15

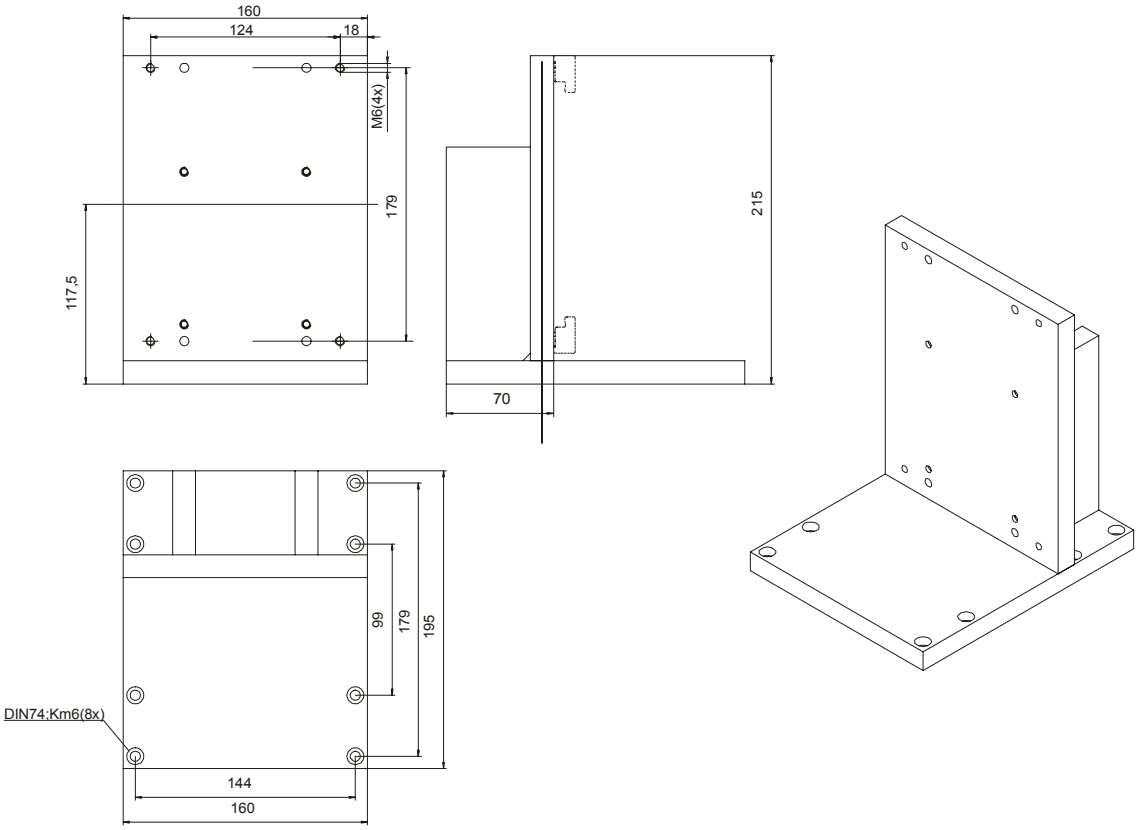

Figure 38: Holding Bracket 160/15