

Operating Manual
Modul 105/105S
Modul 142/142S

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Manufacturer's Declaration

according to the EC Machinery Directive

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We herewith declare that the following product:

Designation	Parts Group
easyLINE	1000010
easyLINE S	1000020
easyLINE AL	1000019
Modul 68	1000018
Modul 105	1000012
Modul 105 S	1000014
Modul 142	1000015
Modul 142 S	1000017
Modul 142 G	1000228

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, May, 2006

(Manfred Bär, Managing Director)

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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.

6

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 Safety Instructions



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

Linear module types 105 and 142 are precise, linear positioning units having a toothbelt drive system. The module types 105 S and module 142 S have a ballscrew drive. The wide range of IEF Werner linear products can be used for many kinds of industrial automation, either integrated with new or existing automation or in combinations with other IEF Werner linear modules. Utilising a module 105 or 142 in conjunction with modules 68, 68D or easyLINE, numerous combinations can be achieved to provide simple or complex multi-axis handling systems.

Applications range from:

- simple programmable stop devices in the timber industry
- 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
- 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 modules can either be horizontally or vertically mounted.



CAUTION

If you mount the module vertically, only use motors with a spring power brake to avoid the carriage dropping down when the electrical supply is switched off.

3.2 Technical Data

	Modul 105	Modul 105 S	Modul 142	Modul 142 S
repeat accuracy	+/- 0,04 mm	+/- 0,02 mm	+/- 0,04 mm	+/- 0,02 mm
weight (without motor)	4,5 kg	6,3 kg	11,2 kg	11,2 kg
weight increase per 100 mm stroke	0,8 kg	1,05 kg	1,25 kg	1,5 kg
maximum speed	2 m/s	1 m/s	2 m/s	1 m/s
Mx (view Figure 1)	50 Nm	50 Nm	240 Nm	240 Nm
My (view Figure 1)	70 Nm	70 Nm	230 Nm	230 Nm
Mz (view Figure 1)	35 Nm	35 Nm	110 Nm	110 Nm
static load carrying capacity C1	1500 N	1500 N	3800 N	3800 N
static load carrying capacity C2	700 N	700 N	2100 N	2100 N

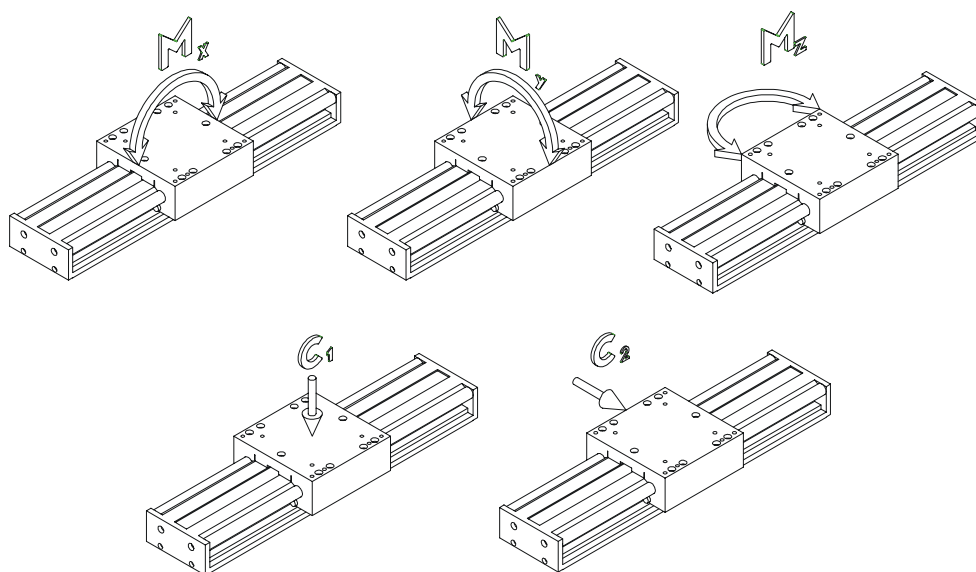


Figure 1: Torques and Load Cases Modul 105 and Modul 142

Critical Spindle Speed

While the maximum traverse speeds on the linear modules with toothed belt drive is basically limited by the drive motor, the critical spindle speed must be taken into consideration on the linear modules with spindle drive. It determines the maximum possible traverse speed (see graph), primarily in the case of long strokes. The traverse speed can be calculated from the spindle speed on the basis of the following equation.

$$v = n/60 * h$$

v = traverse speed [mm/s]

n = spindle speed [U/min]

h = leadscrew pitch [mm]

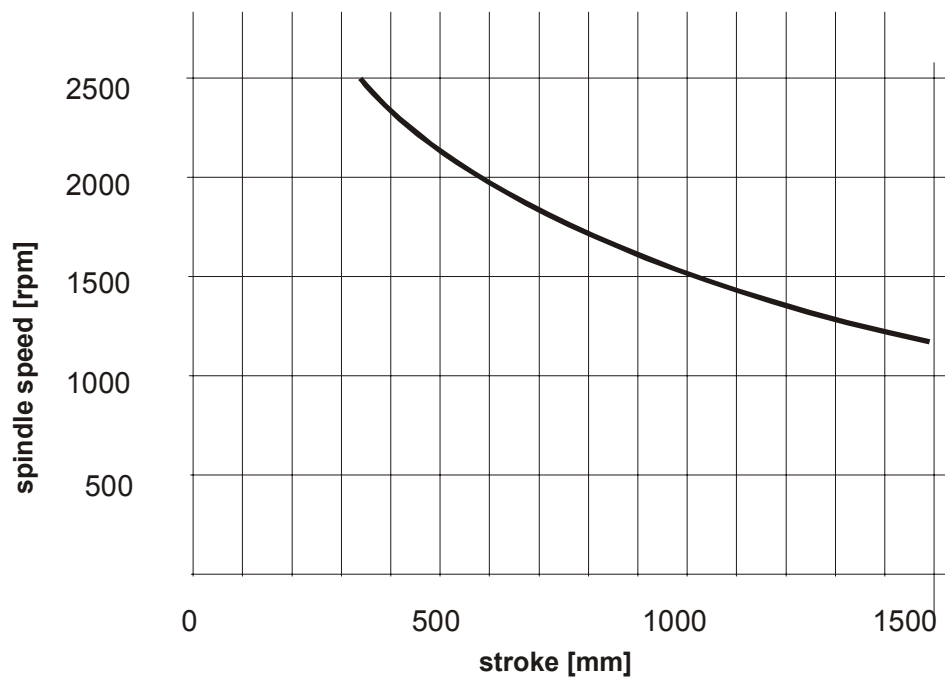


Figure 2: Critical Spindle Speed

3.2.1 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	-----	-----
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	-----	-----
WPLS70 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	-----	-----



CAUTION

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

Gearbox types	Single-stage [rpm]	Two-stage [rpm]	Three-stage [rpm]
TP 004 MF 1	3300	4000	-----
PLF 64 HP	5500	5500	-----
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	-----

3.3 Securing the Linear Modules

The use of clamping elements allows the linear units module 105 and module 142 to be easily secured to a level mounting surface. Standard length clamping elements are available for the cross-mounting of linear units. For the correct size refer to the connecting element section, Page 20/21, of the technical documentation. (see Figure 3 to Figure 9, page 10 to page 16).

For safety reasons, continuous clamping sections are advised. This ensures hazardous shear points are avoided.



CAUTION

The clamping area should have a planeness of 0.1mm/m^2 .

Avoid drilling holes in the basic body. This can damage the internal parts and distorts the guide base.

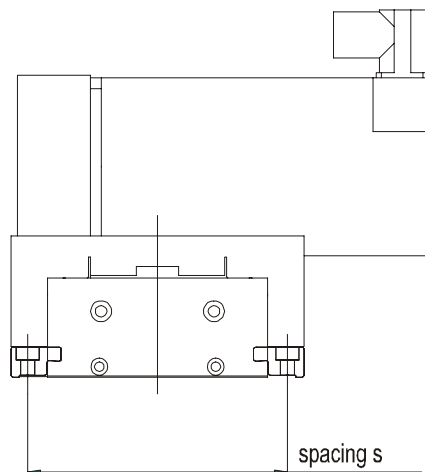


Figure 3: Securing the Modules with Clamping Elements / Clamping Sections

Mounting detail

Linear module	Spacing s	thread
Modul 105	124 mm	M6
Modul 142	168 mm	M8

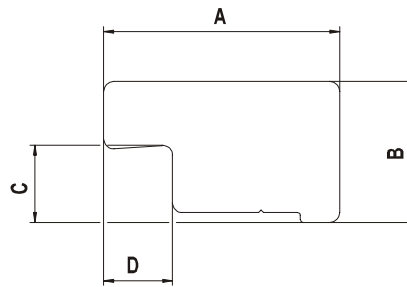


Figure 4: Drawing Clamping Elements / Clamping Sections

Dimension of the clamping elements / clamping sections

Linear module	A	B	C	D
Modul 105 Modul 105 S	24 mm	14,3 mm	7,7 mm	7 mm
Modul 142 Modul 142 S	30 mm	15,5 mm	7,9 mm	7,5 mm

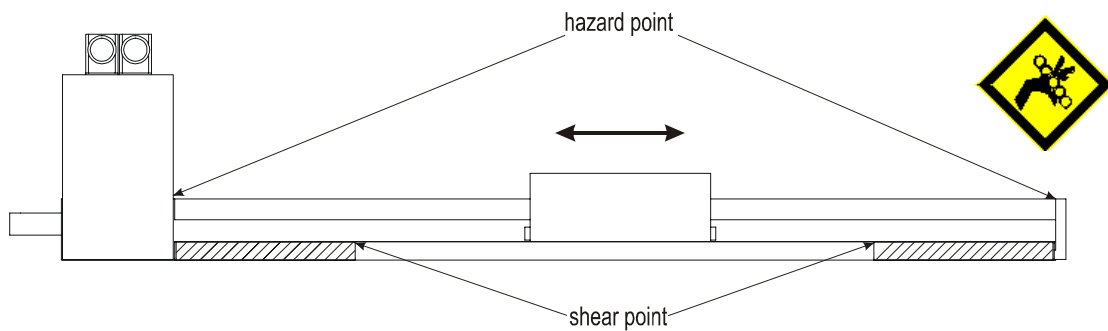


Figure 5: Securing the Linear Modules with Standard Clamping Elements

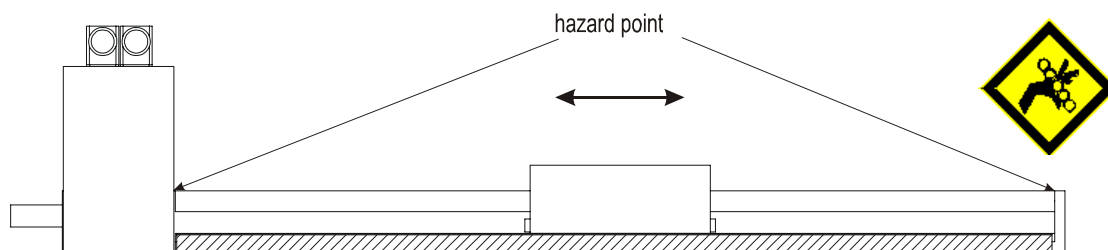


Figure 6: Securing the Linear Modules with Continuous Clamping Sections (no Shear Points)

As a second possibility the linear modules can be attached at it's carriage. The basic body moves free. However, in this case the motor, motor cable, limit switch cable and also encoder- or resolver cable have to be moved. For this kind of attachment you need special connecting screws(see Figure 8)

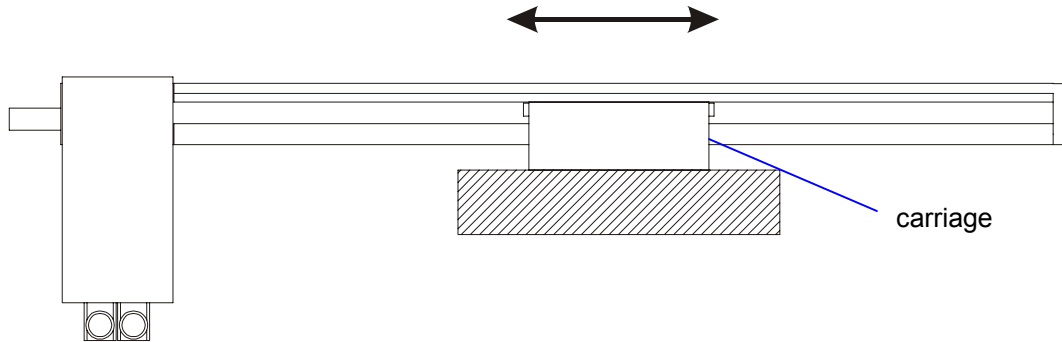
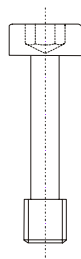


Figure 7: Attachment at the Carriage (for Mounting Detail see Figure 9)



Modul 68, easyLINE, M105, M105S: M6

Modul 142, Modul 142 S: M8

Figure 8: Connecting Screws

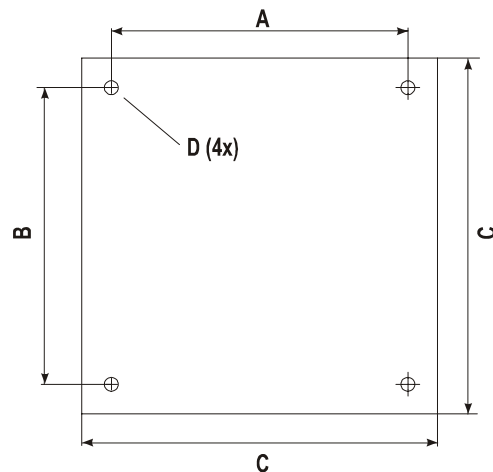


Figure 9: Connecting Holes in the Carriage

Connecting Holes in the Carriage

linear module	A	B	C	thread (D)
Modul 105 / Modul 105 S	124 mm	124 mm	140 mm	M6
Modul 142 7 Modul 142 S	168 mm	168 mm	190 mm	M8

3.4 Attachment of Grippers, Cylinders, etc.

Actuators (grippers, cylinders) attached to the linear modules are normally mounted on the carriage, see *Figure 9*. If you assemble according to *Figure 7*, you can mount the actuators according to the mounting example of *Figure 10*. Only very light elements (less than 1 kg) can be attached directly on the end plate. In this case, you should equip the end plate with a suitable mounting plate.

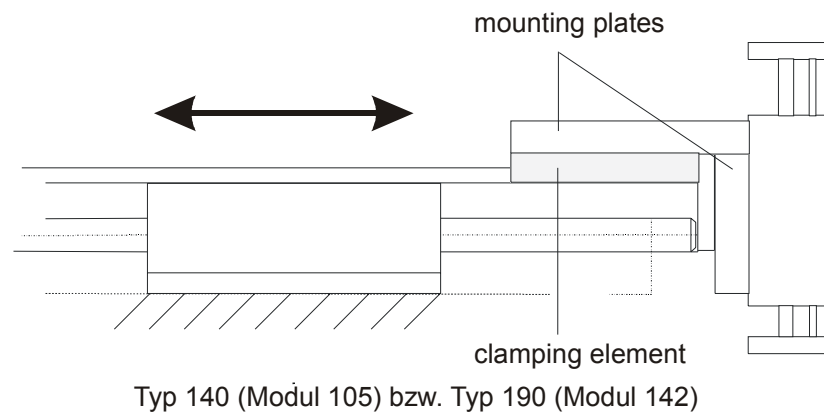


Figure 10: Mounting Example

4 Wiring

4.1 Motors



CAUTION

Wire the motor according to its data sheet. If you use customized motors ask the manufacturer which cables should be used to wire the motor.

4.2 Initiators

Inductive proximity switches (PNP-NC, art. no. 025165) are generally used as limit switches. These inductive limit switches are not security limit switches according to EN60204-1.

By request an additional reference switch (PNP-NO, art. no. 726744) can be installed. The active switching is marked with a coloured circle symbol. NC's are marked with a green point. NO's are marked with a red point. The initiators with feed wires lay in a cable channel which is integrated in the base unit. They are connected centrally to a plug.

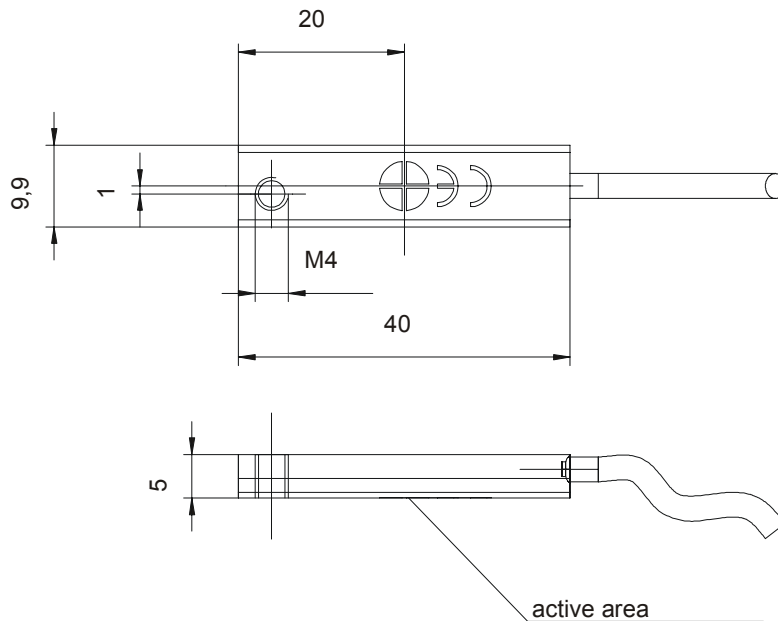


Figure 11: Dimensions Initiator

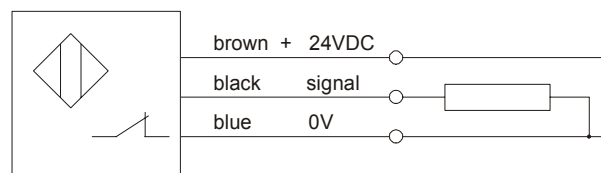


Figure 12: PNP Break Contact Connection Designation

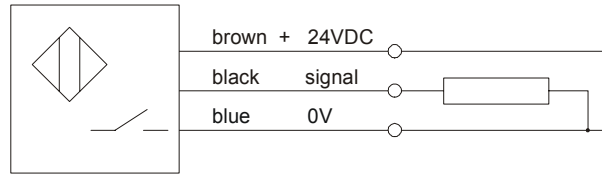


Figure 13: PNP Make Contact Connection Drawing

4.2.1 Technical Data of Initiators

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

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

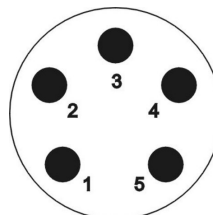


Figure 14: Connection Drawing of Limit Switch Plug

4.3 Cable Routing

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

The minimum radius 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.

5 Preventive Maintenance

In the design of the linear module series, great significance was attached to the use of low-maintenance components. All rolling element units are given lifetime lubrication at the factory. In order to prevent the danger of overgreasing of the linear bearings, no external lubricating nipples were fitted on the carriage section. However, in order to guarantee a long service life for the dirt scraper, we recommend that you wet the guide shafts at regular intervals using a special grease. Proceed accordingly when using a ball roller spindle. The lubricant can be obtained from IEF in 50 g tubes*. If a bellows is used, this should also be cleaned at regular intervals to remove coarse dirt particles. However, never use compressed air to do this.

The recommended maintenance intervals are normally approximately 200 operating hours under normal ambient conditions. Under more difficult ambient conditions (large amounts of dust, high humidity, high temperature), the maintenance intervals should be shortened.

NOTE Don't use pressure air for cleaning!

* for linear bearings: art.no. 732934,
for spindles: art.no. 729148

6 Troubleshooting

error	reason	solving the problem
increased running noise	the lifetime of the linear bearings is exceeded	replace the linear bearings
	the linear bearings are damaged because of overloading	replace the linear bearings, reduce loading
	the linear bearings are damaged because of intense dirt	replace the linear bearings, clean the guide shafts more often, if necessary use a bellows-boot cover
	the guide shafts are damaged	change the guide shafts, replace the linear bearings, check the loading, protect the linear module from intense dirt, if necessary use a bellows-boot cover
	the guide shafts are rusty	replace the guide shafts, if necessary replace the linear bearings, grease the guide shafts more often
	the reversing unit is damaged	change the reversing unit
	the drive assembly is damaged	replace the drive assembly
	the toothed drive belt moves dry	grease the toothed drive belt on the toothed side
	the tension of the toothed drive belt is too tight	adjust spacer bushings
	the toothed drive belt doesn't move straight	align the toothed drive belt at the belt coupling, fit adjusted spacer bushings
	dirt on the inside of the toothed drive belt	replace the toothed drive belt, protect the linear module from intense dirt
	toothed drive belt damaged	change the toothed drive belt
	motor (motor bearing) damaged	change the motor
motor with brake, the brake doesn't open	connect 24 VDC to the brake, if the brake doesn't still open change the motor	

continuation

the linear module doesn't move	Limit switch cable not connected	connect the cable
	Initiator damaged	change initiator
	Limit switch cable damaged	check the limit switch cable
	the soldered joint at the connector is separated	solder the strands
	motor wiring not correct	check the wiring and change it if necessary
	motor damaged	change the motor
	error in the amplifier or in the controller	check the amplifier and the controller
	motor cable	check the motor cable, if necessary replace the motor cable
reverse clearance	toothed gear belt not tensioned	tension toothed gear belt
	toothed motor pulley wheel has clearance (keyway)	replace the toothed motorwasher, replace the motor if the keyway of the motor shaft is damaged
	toothed drive belt not tensioned	Pull the reversing unit back towards its limit stop (spacer bushing)
the linear module crashes during the search of the home position	sense of rotation wrong	change sense of rotation
	parting of the motor cable	replace the cable
	the carriage doesn't switch the initiator	change the limit switch

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 Module 105 and Module 142

7.1.1 Replacing the Linear Bearings

Disassembly

- Detach the carriage unit from the driver (toothed belt) by undoing the two connecting screws (A) (see Figure 15, page 24)

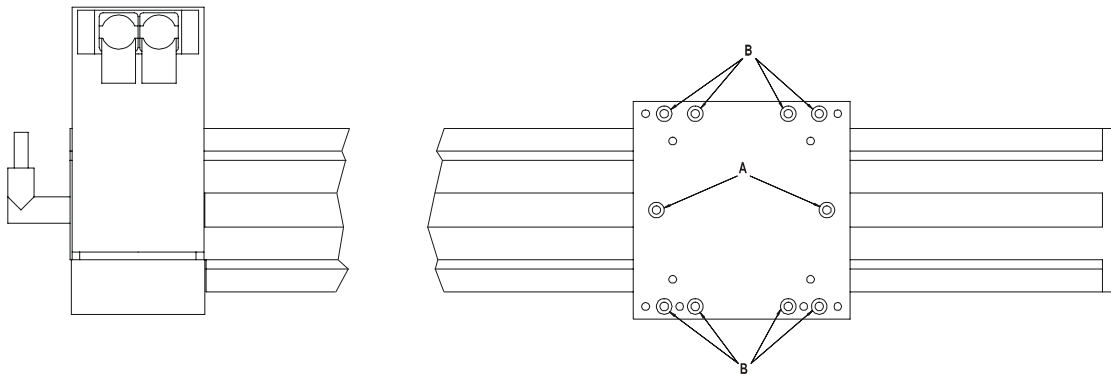


Figure 15: Top View Lineare Module

Remove the end plate by undoing the four connecting screws (C). The toothed belt is relaxed (see Figure 16, page 25).

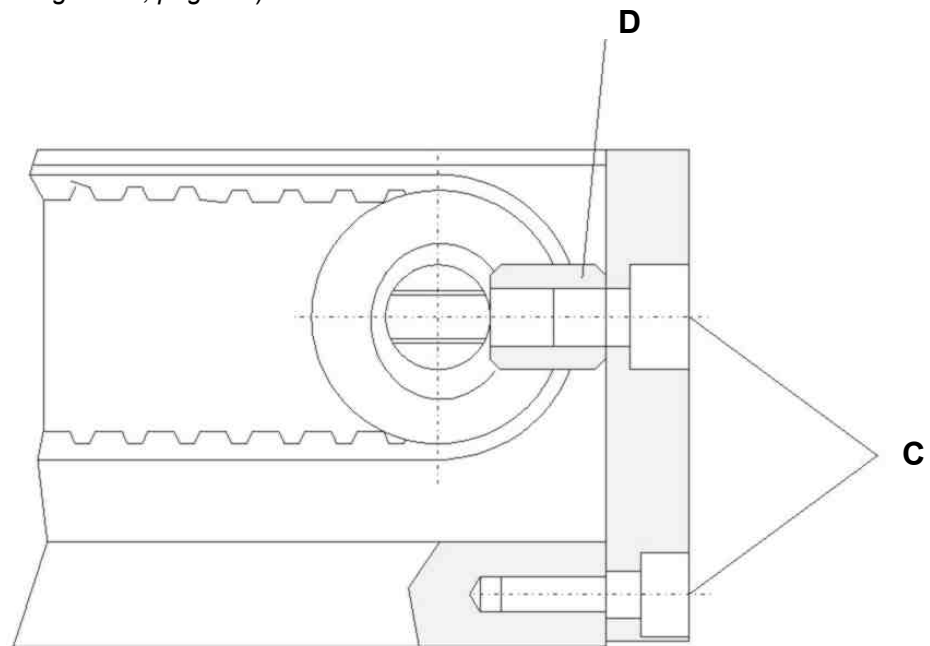


Figure 16: Reversing Unit Module 105 / Module 142

- Pull the complete carriage unit off the guide shafts.
- Press the faulty linear bearings out of the holes.



CAUTION

Since July 1999 the linear bearings are secured with screws. Before pressing out the old linear bearings remove the screws. Don't forget to secure the new linear bearings.

Reassembly

- Insert new, greased linear bearings.
- Before the carriage unit is fitted, the screw connections (Figure 15, B) between the carriage plate and clamping block (see Figure 15, page 24) must first be undone on one side. This is to prevent distortion of the linear bearings while they are being drawn onto the guide.
- Attach the end plate.



CAUTION

The two spacer bushings (Figure 16, D) must be fitted to limit and control the tensioning of the toothed belt.

- Tighten the connecting screws (Figure 15, B) between the carriage plate and clamping block.
- Connect the driver and carriage unit (Figure 15, A).

7.1.2 Replacing the Reversing Unit

- Detach the carriage unit from the driver by undoing the two connecting screws (see Figure 15, **A**).
- Remove the end plate by undoing the four connecting screws (see Figure 16, **C**). The toothed belt is relaxed.
- Open the driver by undoing the connecting screws (see Figure 17, **E**).

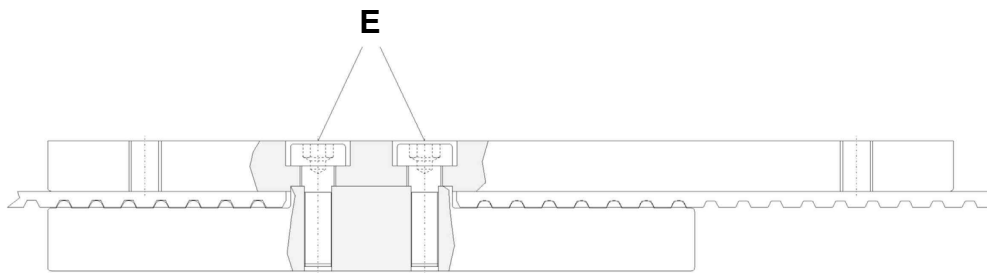


Figure 17: Open the Driver

- Replace the reversing unit, use the old spacer bushings (see Figure 16, **D**).



CAUTION

When doing so, take special care that the axial bearing unit has sufficient play inside the basic body.

- Connect the toothed belt with the driver (see Figure 17, **E**).
- Fit the end plate (see Figure 16, **C**).



CAUTION

The two spacer bushings (see Figure 16, **D**) must be fitted as shaft stops in order to limit and control the tensioning of the toothed belt. Use the old spacer bushing pairs (D).

- Connect the carriage unit and driver (see Figure 15, **A**).

7.1.3 Changing the Motor Module 105

Variation 1

- Undo the motor flange fastening screws (F). The flange can then be moved gently towards the basic body. The toothed belt is relaxed (see Figure 18).

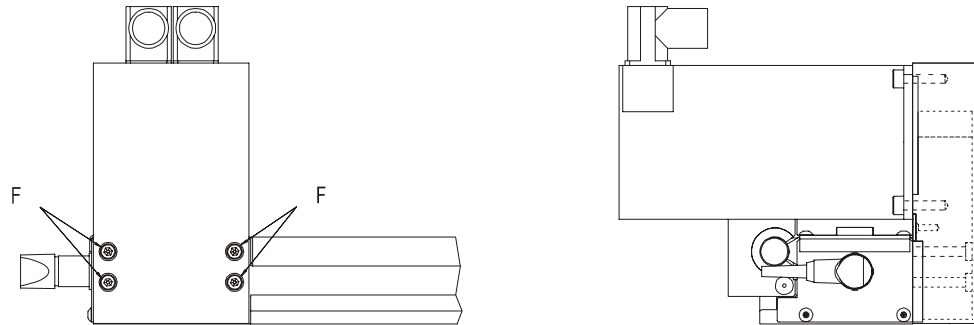


Figure 18: Linear Unit and Belt Drive, Variation 1

- Detach the motor and motor flange by undoing the fastening screws.
- Pull the toothed motor pulley from the motor shaft and fit to the new motor. (Use a pulling-off device).

The execution of the toothed motor pulley varies depending on the order (see Figure 19)

- Typ 1: Toothed pulley with separate clamping assembly
- Typ 2: Toothed pulley with integrated clamping assembly and central clamping
- Typ 3: Toothed pulley with integrated clamping cone and 5 clamping screws
- Typ 4: Toothed pulley with keyway

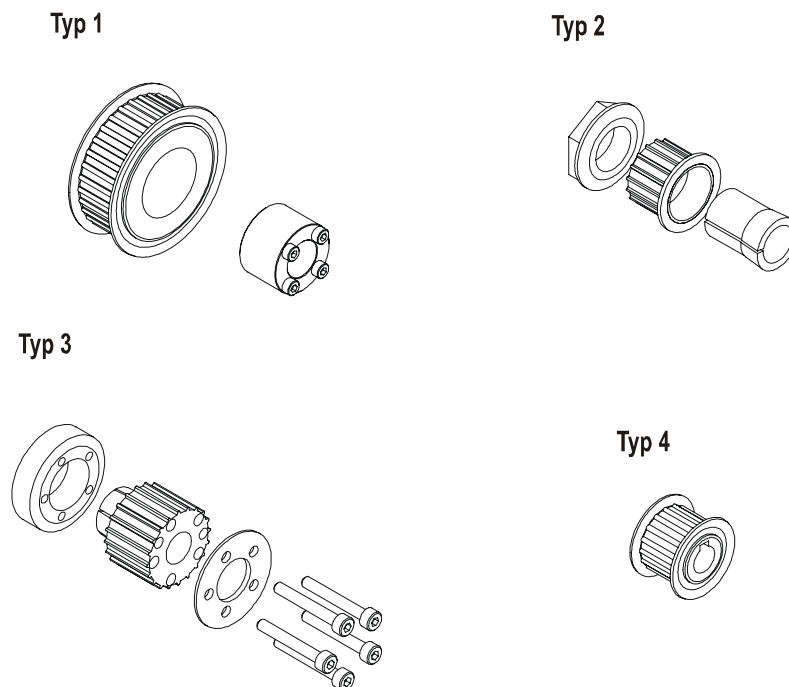


Figure 19: Variations of the Toothed Motor Pulley



VORSICHT

- Wire the new motor according to the technical information. Check the spin of the motor.
- Attach the motor to the motor flange.
- Press the motor away from the basic body. The toothed gear belt is tensioned. Then tighten screws (see *Figure 18, F*) securely.

Variation 2

Disassembly

- Remove the motor flange cover by undoing the fastening screws (see *Figure 20, G*).

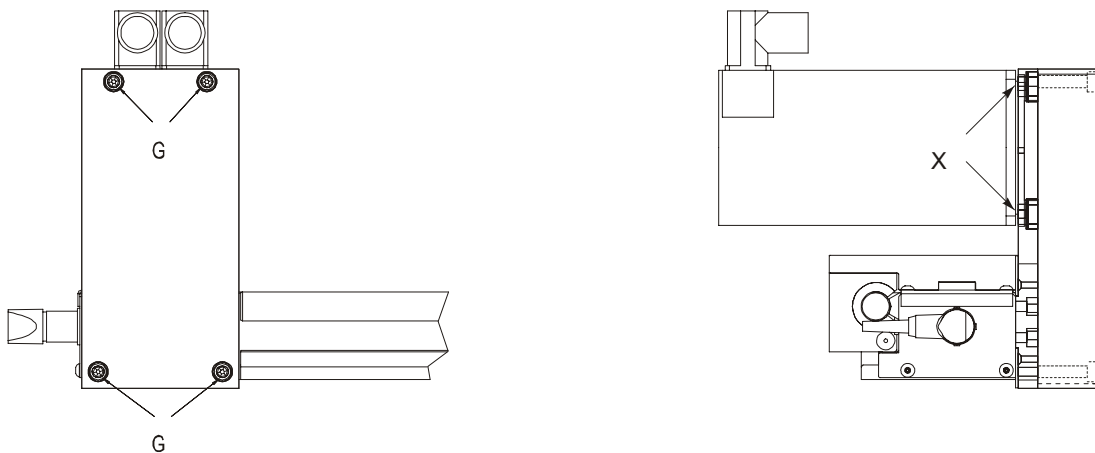


Figure 20: Linear Unit and Belt Drive, Variation 2

- Detach the motor and motor flange plate by undoing the fastening screws.
- Pull the toothed motor pulley from the motor shaft and fit to the new motor. (Use a pulling-off device).

The execution of the toothed motor pulley varies depending on the order (see *Figure 19*)

- Typ 1: Toothed pulley with separate clamping assembly
- Typ 2: Toothed pulley with integrated clamping assembly and central clamping
- Typ 3: Toothed pulley with integrated clamping cone and 5 clamping screws
- Typ 4: Toothed pulley with keyway.

Reassembly

- Wire the new motor according to the technical information.
- Check the spin of the motor.
- Attach the motor to the motor flange plate. Before tightening the fastening screws, press the motor away from the basic body. The toothed gear belt is tensioned.
- Then tighten the fastening screws securely.
- Reattach the motor flange cover.

7.1.4 Changing the Toothed Gear Belt Module 105

Variation 1

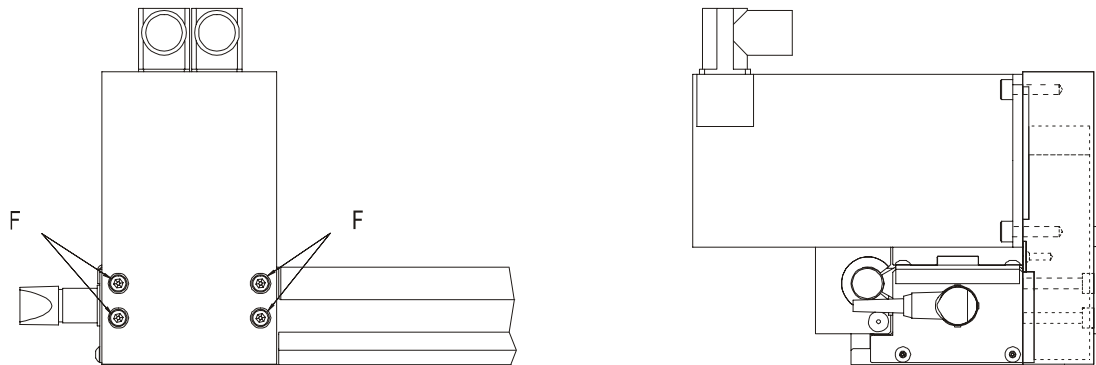


Figure 21: Belt Drive, Variation 1

- Remove the motor (see Section 7.1.3 “Changing the Motor”, page27).
- Remove the motor flange cover by undoing the fastening screws (see Figure 21, F).
- Replace the toothed belt.
- Refit the motor flange. Do not yet tighten the fastening screws.
- Attach the motor to the motor flange.
- Press the motor away from the basic body. The toothed gear belt is tensioned. Then tighten screws (see Figure 21, F) securely.

Variation 2

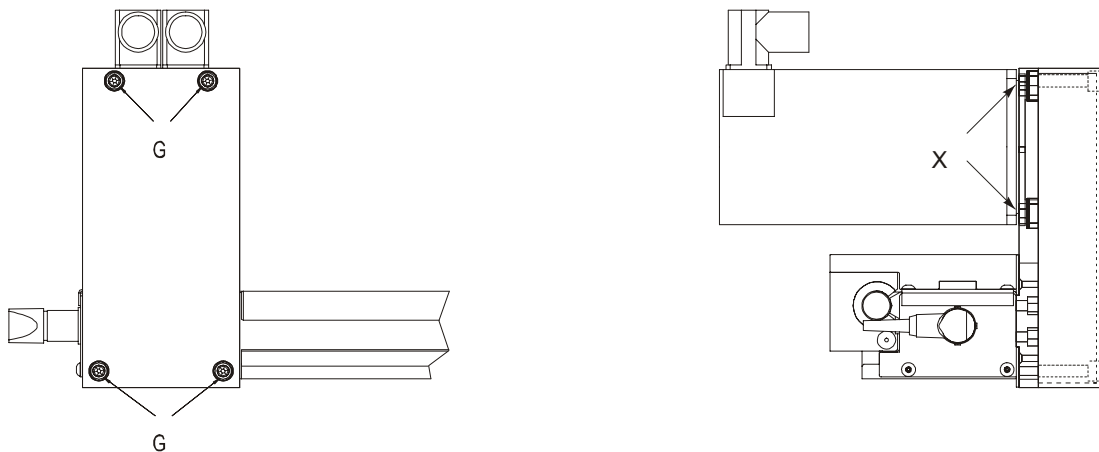


Figure 22: Belt Drive, Variation 2

- Remove the motor flange cover (see Section 7.1.3 “Changing the Motor”, page27).
- Undo the motor fastening screws (see Figure 22, X). The motor can then be moved gently towards the basic body. The toothed belt is relaxed.
- Replace the toothed belt.
- Press the motor away from the basic body. The toothed belt is tensioned. Tighten the motor fastening screws (see Figure 22, X).
- Fit the motor flange cover.

7.1.5 Changing the Motor, Module 142

Disassembly:

- Remove the motor flange cover by undoing the screws (*Figure 23, X*).

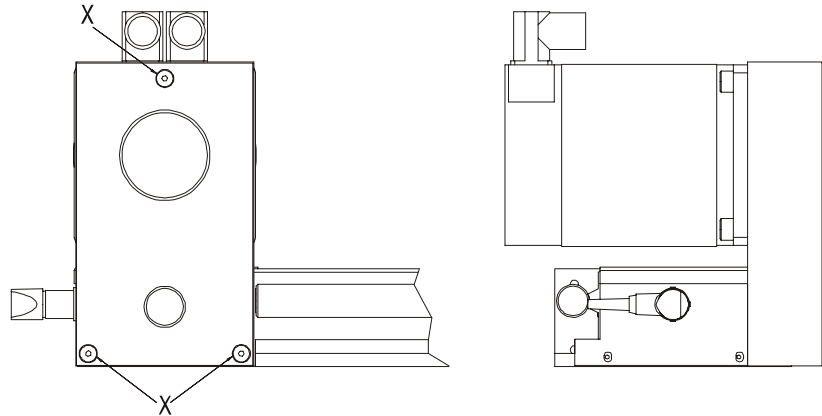


Figure 23: Belt Drive, Module 142

- Undo the motor fastening screws
- The toothed gear belt is relaxed
- Remove the motor
- Pull the toothed motor pulley (*see Figure 19, page 27*) off the motor shaft and subsequently mount it on the new motor



CAUTION

Do not hit the motor shaft

Reassembly:

- Wire up the new motor according to the motor data sheet. Check the direction of rotation
- Attach the motor to the motor flange
- Press the motor away from the basic body. The toothed gear belt is tensioned. Then tighten up the motor fastening screws
- Reattach the motor flange cover

7.1.6 Changing the Toothed gear Belt, Module 142

- Remove the motor flange cover by undoing the fastening screws (**X**) (*see Figure 23, page 30*)
- Undo the motor fastening screws. The toothed gear belt is relaxed
- Replace the defective toothed gear belt with a new toothed gear belt
- Press the motor away from the basic body. The toothed gear belt is tensioned. Then tighten up the motor fastening screws
- Reattach the motor flange cover

7.1.7 Changing Initiators

- Remove the cover plate (H) on the motor side (see Figure 24, H). If necessary, remove the motor (see Section 7.1.3 “Changing the Motor”, page 27).
- Desolder the initiator cable from the component connector. Next, pull out the cover strip which serves as a profile groove cover and the faulty initiator.
- Insert a new initiator and the cover strip.
- Insert the initiator cable through the hole in the basic profile.
- Solder the initiator cable onto the component connector.
- Secure the cover plate back in position and refit the motor if necessary.

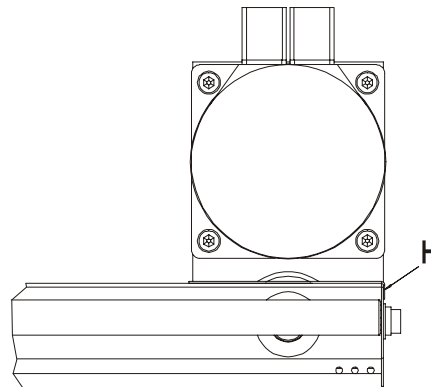


Figure 24: Belt Drive, View from the Motor Side

7.1.8 Changing the Toothed Drive Belt

- Detach the carriage unit from the driver by undoing the two connecting screws (see Figure 15, A).
- Remove the end plate by undoing the four connecting screws (C). The toothed belt is relaxed (see Figure 16)
- Remove the cover plate (H) attached on the motor side (see Figure 24, H)
- It may be necessary to remove the motor in order to do this (see Section 7.1.3 “Changing the Motor”, page 27).
- Open the driver by undoing the connecting screws (see Figure 17, E).
- Replace the toothed belt.
- Connect the toothed belt to the driver.
- Refit the cover plate.
- Attach the end plate.



CAUTION

The two spacer bushings (D) must be installed as shaft stops in order to limit and control the tensioning of the toothed belt.

- Connect the carriage unit and driver.

7.1.9 Changing the Drive Assembly Module 105

Disassembly

- Detach the carriage unit from the driver by undoing the two connecting screws (see *Figure 15, A*).
- Remove the end plate by undoing the four connecting screws. The toothed belt is relaxed (see *Figure 16, C*).
- Remove the motor and motor flange. (see *Section 7.1.3 "Changing the Motor", page 27* and *Section 7.1.4 "Changing the Toothed Gear Belt, page 29*). Remove the cover plate on the motor side (see *Figure 24, H*).
- Open the driver by undoing the connecting screws (see *Figure 17, E*).
- Press out the drive assembly by undoing the four fastening screws gradually (see *Figure 25*).

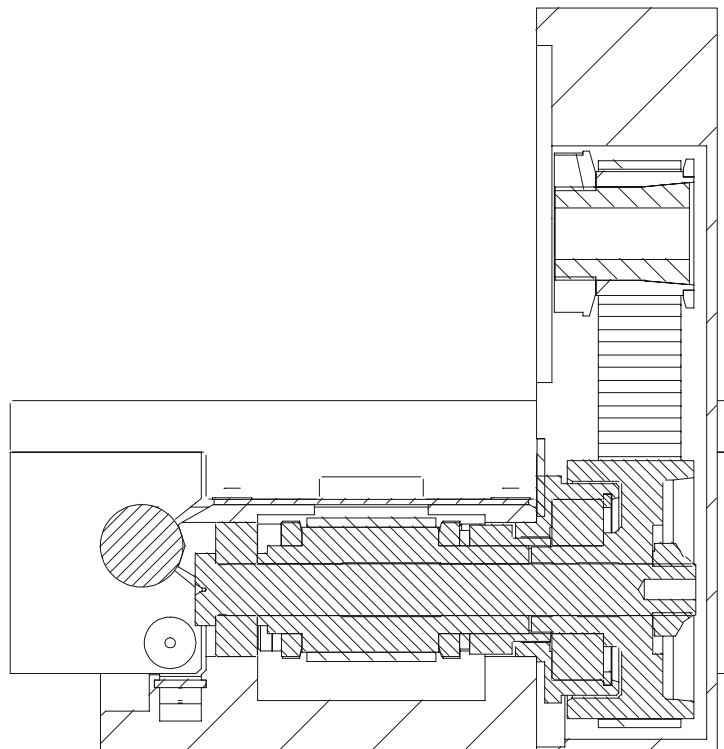


Figure 25: Cutaway View Drive Assembly, Module 105

Reassembly

- Install a new drive assembly and tighten the fastening screws.
- Refit the cover plate (see *Figure 24, H*).
- Refit the motor flange and motor (see *Section 7.1.3 "Changing the Motor", page 27* and *Section 7.1.4 "Changing the Toothed Gear Belt, page 29*).
- Connect the toothed belt with the driver.
- Attach the end plate.



CAUTION

The two spacer bushings (D) must be fitted as a shaft stop, in order to reproducibly limit the tensioning distance of the toothed belt.

- Connect the carriage unit with the driver.

7.1.10 Changing the Drive Assembly, Module 142

Disassembly:

- Detach the carriage unit from the driver by undoing the two screws attached centrally in the running direction (see Figure 15, A)
- Remove the end plate on the reversing side by undoing the four connecting screws. The toothed gear belt is relaxed (see Figure 16, C)

NOTE Particular care must be taken to ensure that the two spacer bushings do not get lost.

- Undo the toothed belt by undoing the screws of the driver (see Figure 17, E)
- Remove the motor flange cover by undoing the screws of the motor flange (see Figure 23, X)
- Undo the motor fastening screws. The toothed gear belt is relaxed. Remove the toothed gear belt and the motor
- Remove the angle plate attached to the motor side (see Figure 24, H)
- Remove the toothed pulley by undoing the screws of the shaft of the drive assembly (see Figure 26, Y).

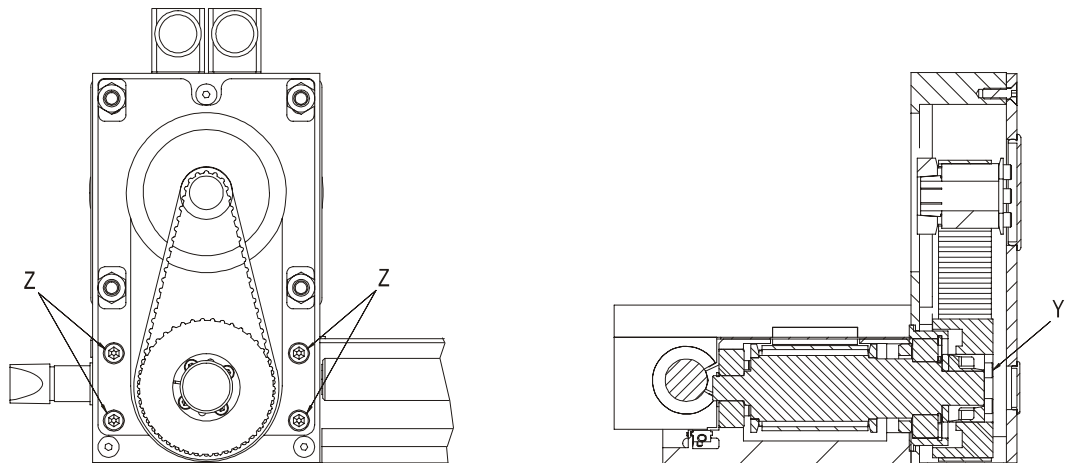


Figure 26: Open Drive Assembly of Module 142 and Cutaway View

- Remove the motor flange by undoing the screws (Z) of the linear unit
- Remove the defective drive assembly from the guide profile

Reassembly:

- Insert the new drive assembly
- Mount the motor flange on the linear unit by tightening the screws (Z)
- Connect the toothed drive belt to the driver (see Figure 17, E)
- Attach the end plate (see Figure 16, C,D)

CAUTION



The two spacer bushings (D) must be fitted as a shaft stop, in order to reproducibly limit the tensioning distance of the toothed belt.

- Attach the angle plate (see Figure 24, H)

- Fit the motor flange (see *Figure 26, Z*)
- Connect the toothed pulley to shaft of the drive assembly by means of the clamping assembly
Push the clamping assembly all the way back. Ensure that the screws (Y) (see *Figure 26, page 33*) are evenly tightened in turn. Check that the toothed pulley turns freely
- Attach the motor to the motor flange
- Fit the toothed gear belt
- Press the motor away from the basic body. The toothed gear belt is tensioned. Then tighten up the motor fastening screws
- Reattach the motor flange cover (see *Figure 23, X*)

7.2 Modul 105 S and Modul 142 S

7.2.1 Changing the Cover Belt

Module 105 S

- Remove the holding plates and holding-down clamps by undoing the fastening screws I and (see Figure 27, K)
- Replace the old cover belt with a new, greased one.
- Fit the two holding-down clamps and the holding plate on the motor side.
- Tension the cover belt and fit the holding plate at the end plate and cut to length.

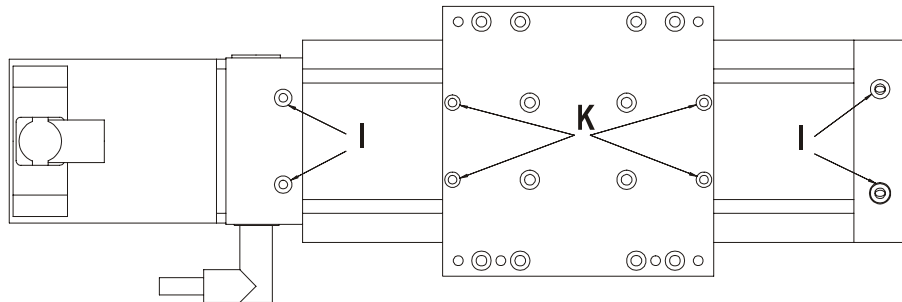


Figure 27: Module 105 S

Module 142 S

- Remove the holding plates by undoing the fastening screws (see Figure 28, L).
- Pull out the old cover belt, and insert a new, greased one.
- Refit the holding plate on the motor side by fastening screws (see Figure 28, L).
- Tension the cover belt and fit the holding plate at the end plate and cut to length.

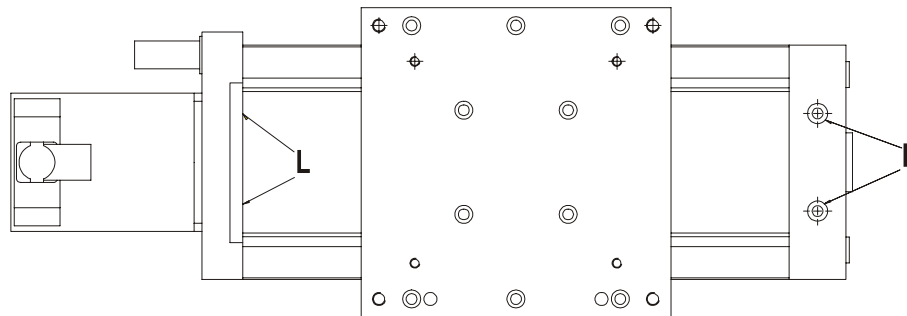


Figure 28: Module 142 S

7.2.2 Replacing the Spindle Bearing on the End Plate Side

- Remove the holding plate for the cover belt at the end plate (see *Figure 27, page 35* and *Figure 28, page 35*).
- Remove the nut screw (**N**) and threaded ring (**M**) (*Figure 29*) (mounting hole on the end plate side in the spindle for locking).

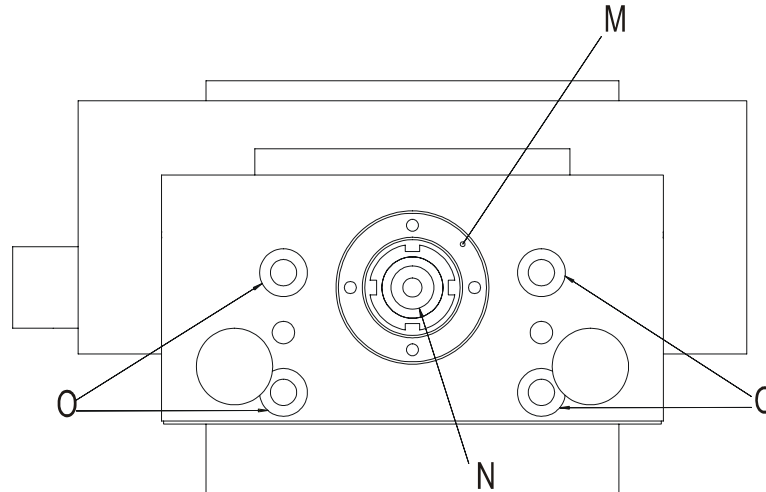


Figure 29: spindle bearing on the end plate side

- Remove the end plates by undoing the four fastening screws (*Figure 29, O*)
- Replace the spindle bearing on the end plate side.
- Insert the threaded ring (**M**), tighten it and secure it with locking compound.
- Tighten the end plate on the spindle with the nut screw (*Figure 29, N*) (mounting hole on the end plate side in the spindle for locking).
- Screw the end plate tight.
- Tighten the nut screw (*Figure 29, N*) and secure it with locking compound.
- Tension the cover belt and fit the holding plate.

7.2.3 Replacing the Linear Bearings

- Remove the holding plate for the cover belt on the end plate side (see *Figure 27, page 35* and *Figure 28, page 35*).
- Remove the nut screw (*Figure 29, N*) and stopping ring (*Figure 29, M*) (mounting hole on the end plate side in the spindle for locking).
- Remove the end plates by undoing the four fastening screws (*Figure 29, O*)
- Separate the clamping blocks from the carriage plate by undoing the fastening screws (*Figure 30, P*) and pull out towards the end plate side.
- Replace the linear bearings. Push the clamping blocks back on and connect to the carriage plate.



CAUTION

Since July 1999 the linear bearings are secured with screws. Before pressing out the old linear bearings remove the screws. Don't forget to secure the new linear bearings.

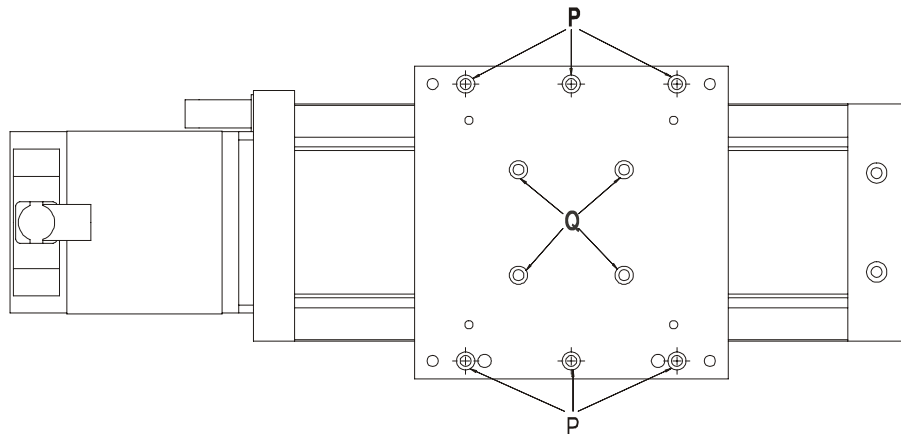


Figure 30: M142 S, Linear Bearings on the End Plate Side

- Tighten the end plate onto the spindle with the nut screw (*Figure 29, N*) (mounting hole on the end plate side in the spindle for locking).
- Securely screw the end plate in position: Tighten the nut screw (**N**) and secure it with locking compound.
- Tension the cover belt and fit the holding plate.

7.2.4 Changing the motor

- Undo the fastening screws for the motor and pull off the motor towards the rear.
- Mount the new motor.



CAUTION

Do not hit the motor.

- Securely screw the motor in position.

7.2.5 Changing the Clutch (Variation 1)

- Undo the fastening screws for the motor and pull off the motor.
- Remove the nut screw (Figure 29, N) (mounting hole on the end plate side in the spindle for locking).
- Push the carriage toward the motor flange, the spindle and the clutch come out of the basic body (see Figure 31).
- Replace the clutch with a new one (Use a pulling-off device).
- Push the carriage back. Pull the spindle back into the end plate by fastening the countersunk screw (Figure 29, N) (mounting hole on the end plate side in the spindle for locking).
- Mount the motor and tighten the fastening screws.



CAUTION

Do not hit the motor.

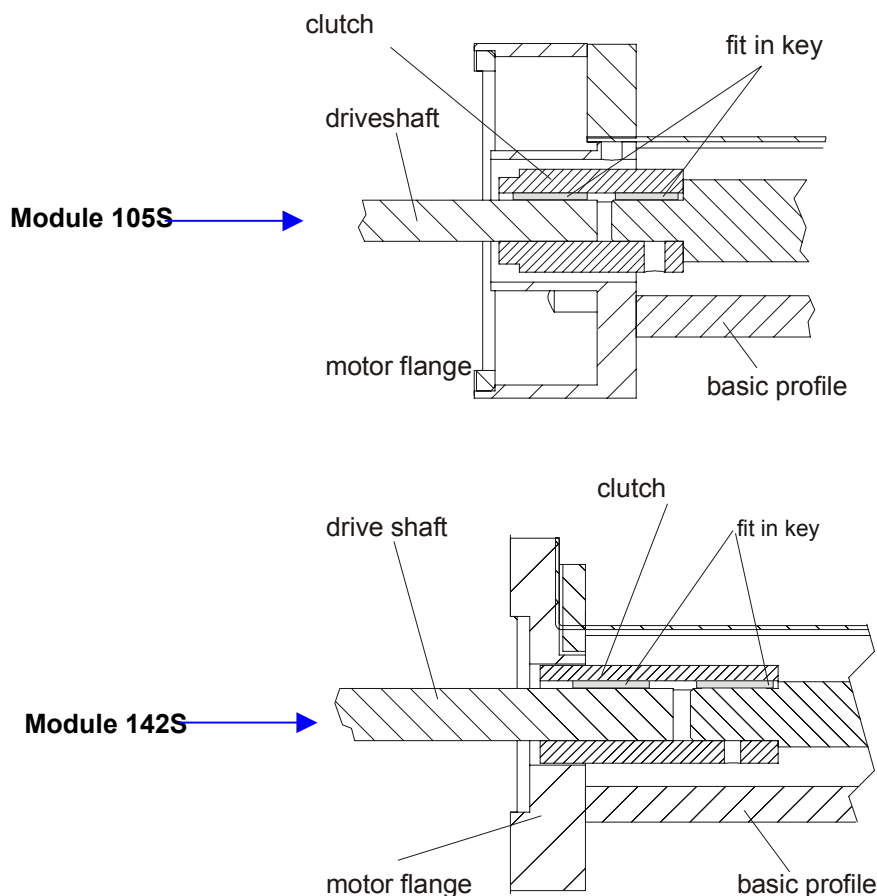


Figure 31: Sectional View (Clutch), Variation 1

7.2.6 Changing the Clutch (Variation 2): Elastomer Coupler

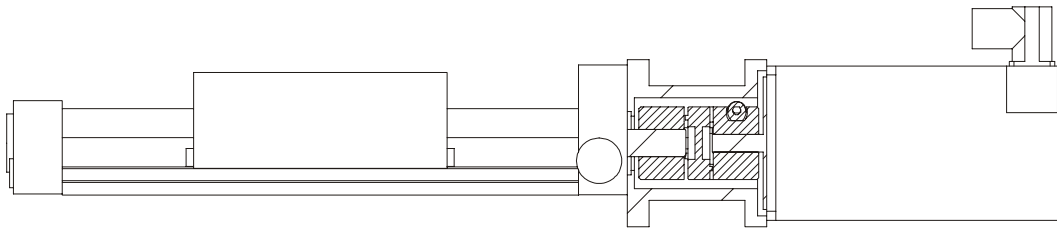


Figure 32: sectional view (clutch), design 2

- Undo the fastening screws for the motor and pull away the motor to the rear
- Undo the clamping screws
- Disassemble the old half-couplings
- Install the new half-couplings
- Tighten the clamping screws



CAUTION

Tightening torque 11 Nm.

- Mount the motor and tighten the fastening screws

7.2.7 Changing Initiators

- Desolder the initiator cable from the socket.
- Loosen the threaded pin of the initiator.
- Exchange the cover strips and faulty initiator through the holes in the end plate.
- Solder the initiator cable onto the socket.

7.2.8 Replacing the Spindle



CAUTION

Never remove the spindle nut from the spindle!

Disassembly

- Remove the motor.
- Remove the holding plate for the cover belt on the end plate (see *Figure 27, page 35* and *Figure 28, page 35*).
- Remove the nut screw (*Figure 29, N*) (mounting hole on the end plate side in the spindle for locking).
- Remove the end plate by undoing the four fastening screws (*Figure 29, O*)
- Separate the carriage from the driver by undoing the fastening screws (*Figure 30, Q*)
- Pull the spindle with driver out of the basic body towards the end plate side.
- Separate the driver from the spindle nut. To do this, The pressure plate (see *Figure 33, R, module 105 S*) or the threaded ring (see *Figure 33, S, module 142 S*) must be removed from the driver.
- Remove the driver from the spindle nut.

Reassembly

- Put the driver onto the new spindle nut. The opening of the driver faces towards the end plate side.
- Fit the pressure plate (module 105 S) or the threaded ring (module 142 S) and secure with locking compound.
- Put the clutch of the faulty spindle onto the new spindle (see *Figure 31, page 38* and *Figure 32, page 39*).
- Insert the spindle into the basic body from the end plate side.
- Connect the carriage plate with the driver.
- Mount the end plate onto the spindle with the countersunk screw (*Figure 29, N*) (mounting hole on the end plate side in the spindle for locking).
- Securely screw the end plate into position. Tighten the countersunk screw and secure with locking compound (see *Figure 29, page 36*)-
- Tension the cover belt and fit the holding plate (see page 35 *Figure 27* and *Figure 28*).
- Move the carriage manually backwards and forwards across the entire travel. It must be possible to evenly and easily move the carriage over the entire travel range.
- Refit the motor.

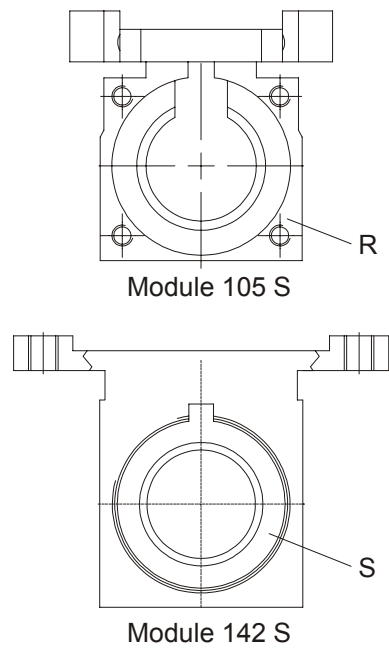


Figure 33: Driver Module 105S und Module 142S

7.3 Module 105 und Module 142 Parallel Drive System

Only the variations of a parallel drive system compared to an individual linear module are explained below.

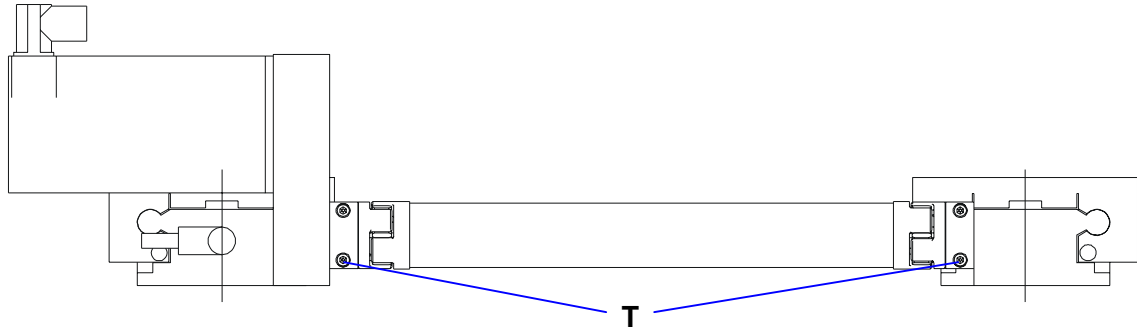


Figure 34: Parallel Drive System

7.3.1 Changing the shaft coupling connection shaft

- The connecting shaft between the master and slave axis can be removed and refitted without disassembling one of the two axes.

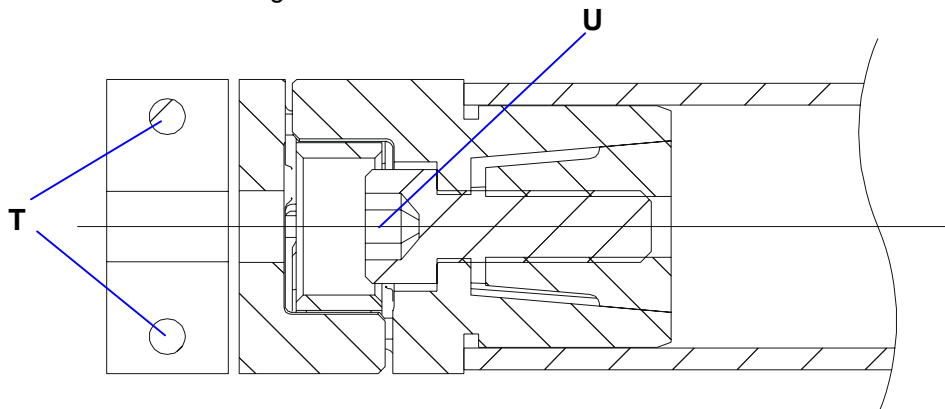


Figure 35: Shaft Coupling Parallel Drive System

- Undo the fastening screws (*Figure 35, T*) of the shaft couplings integrated in the connecting shaft.
- The entire connecting shaft can be removed.
- Undo the clamping screw (*Figure 35, U*). The clamping cone is undone.
- The shaft coupling and connecting tube can be separated.
- Assemble a new shaft coupling and connecting tube.
- Securely tighten the clamping screw (12 Nm) (*Figure 35, U*).
- If the slides of the master and the slave axis are not mechanically connected, pull the side of the master and the slave axis at the motor side or at the end plate side towards the limit stop.
- Securely tighten the fastening screws (8.5 Nm) (*Figure 35, T*).

7.3.2 Replacing the Slave Drive Set

Disassembly

- Undo the fastening screws of the shaft couplings integrated in the connecting shaft (Figure 35, T).
- Remove the connecting shaft.
- Decouple the carriage unit of the slave axis from the driver by undoing the two connecting screws (A) (see Figure 15, page 24, A).
- Remove the end plate of the slave axis by undoing the four connecting screws (C). The toothed belt is relaxed (see Figure 16, C).
- Remove the cover plate of the slave axis on the drive side.
- Open the driver of the slave axis by undoing the connecting screws (see Figure 17, E).
- Remove the retaining ring (V, module 105) resp. the pressure plate (W, module 142) (see Figure 36, page 43).

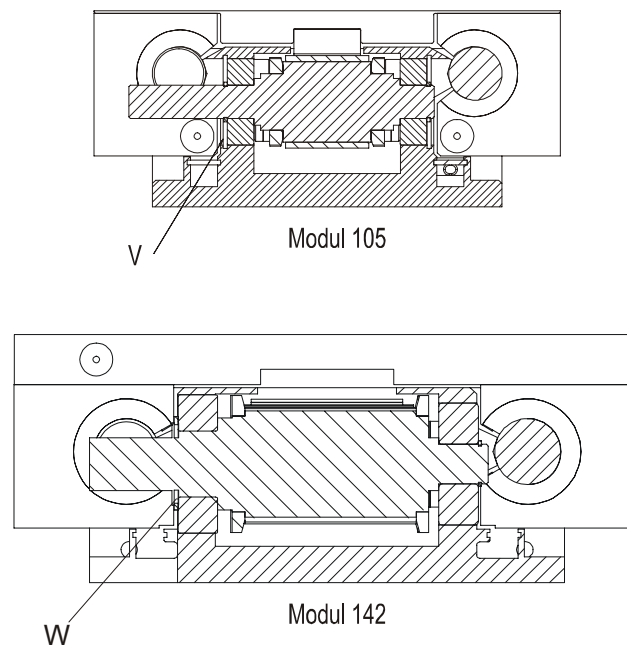


Figure 36: Slave Drive Set

Reassembly

- Replace the slave axis drive set.
- Remove the retaining ring (V, module 105) resp. the pressure plate (module 142) (see Figure 36, page 43)..
- Replace the slave axis drive set.
- Fit the or pressure plate (see Figure 36, page 43, W).
- Connect the toothed belt with the driver.
- Refit the cover plate.
- Fit the end plate.
- Connect the carriage unit with the driver.
- If the slides of the master and the slave axis are not mechanically connected, pull the slide of the master and the slave axis at the motor side or at the end plate side towards the limit stop.
- Install the connecting shaft.
- Securely tighten the fastening screws (see Figure 35, page 42, T).

8 Spare Parts

8.1 M105

designation	IEF art.no.
linear bearing Typ 16	1000466
Reversing unit	525137
Drive assembly	customized *
Drive assembly parallel drive slave	525822
Toothed drive belt/tooth	732766
Guiding shaft d=Ø16mm	025195
Toothed gear belt	customized *
shaft coupling	1063251
initiator PNP-NC	025165
initiator PNP-NO	726744
Special grease 50 gr.	732934

8.2 Modul 105 S

designation	IEF art.no.
linear bearing Typ 16	1000466
spindle	customized *
clutch	customized *
guiding shaft d=Ø16mm	025195
initiator PNP-NC	025165
initiator PNP-NO	726744
Special grease for linear bearing 50 gr.	732934
Special grease for spindle 50 gr.	729148

* Pay attention to the customized spare part list.

8.3 M142

Bezeichnung	Artikelnummer
linear bearing Typ 20	1000469
Reversing unit	1034955
Drive assembly standard	526783
Drive assembly parallel drive master	526785
Drive assembly parallel drive slave	525817
Toothed drive belt/tooth	732765
Guiding shaft d=Ø20mm	025794
Toothed gear belt	customized *
Torsion clutch (only for parallel drive)	1063253
initiator PNP-NC	025165
initiator PNP-NO	726744
Special grease for linear bearing 50 gr.	732934

8.4 Modul 142 S

Bezeichnung	Artikelnummer
linear bearing Typ 20	1000469
spindle	customized *
clutch	customized *
Guiding shaft d=Ø20 mm	025794
initiator PNP-NC	025165
initiator PNP-NO	726744
Special grease for linear bearing 50 gr.	732934
Special grease for spindle 50 gr.	729148

* Pay attention to the customized spare part list.

