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0. Safety Notes to Loading Magazine Operation

0.1 Operation

- Safety devices such as doors, protective hoods and covers shall neither be dismantled nor put out of operation. Before starting work, they must be closed. Do not open them during operation!

- Promptly notify the responsible persons of any safety affecting changes that may have occurred at the loading magazine.

- During a running program, do not switch off the loading magazine via main switch. Such switch-off may lead to damages.

- Do not press the EMERGENCY STOP key, unless persons or the unit are exposed to danger (and prior to the commencement of maintenance and repair works).

- When transporting, be careful that the loading magazine is safely secured and provided with sufficient stability (see section 2 of these Operating Instructions).

- Install the loading magazine such that the centerline of the autolathe spindle is precisely in alignment with the feed bar's centerline (see section 3 of these Operating Instructions).

- Before commissioning, check the electric interface and operating voltage (see section 4 of these Operating Instructions).

- Before commissioning, fill in 80 liters of any of the oil brand recommended in section 1.3 of these Operating Instructions.

- Do not throw any waste into the oil!

- Speed limitations (vibrations, noise) arising from workpiece dimensions and non-straight material bars, should be taken into account.

0.2 Maintenance and Repair

- Maintenance, overhaul, and repair works should be done by specifically trained personnel or instructed persons only.
- For all works on the loading magazine, especially in case of opened covers, press the EMERGENCY STOP key and close the compressed air shut-off valve at the loading magazine.
  For maintenance or repair works, the main switch of the automatic lathe must be OFF.
  The unit should be free of any pressure and tension.
- When doing repair work on electric devices, the relevant regulations (VDE 0113, DIN VDE 0160; DIN VDE 0660; Rules for the Prevention of Accidents as issued by employers' liability insurance associations) should be observed.
- When, in case of specific repair works, the unit must be ready for operation, special care is required. Ensure that there are no persons staying within the danger area.
- Safety devices removed for repair or maintenance purposes have to be remounted after completion of the works immediately.
- Only use clean oils as recommended in section 1.3 of these Operating Instructions.

0.3 Intended Use

The FMB-loading magazine is determined for assembly with machine tools and exclusively serves to supply automatic lathes with round, square or hexagonal bar and tube shaped materials.
The commissioning is forbidden until it has been ascertained that the unit is in accordance with the EG directives.
Material diameters should be in accordance with the "Technical Data" section.
Other profile materials should be used after loading magazine manufacturer consultation only.
Furthermore, the intended use emerges from the technical data as well as the requirements in terms of oil filling and material bars, especially their straightness (see section 1.4).
When the requirements as specified by the manufacturer are met, the loading magazine will work below the maximum permissible noise level. Any application going beyond should be deemed as not being in accordance with the intended use. Manufacturer shall not be liable for any damages resulting therefrom; the risk shall solely be borne by user.
The loading magazine shall only be used in dry rooms having a temperature between +15 ºC and +40 ºC and a humidity of 30 % to 75 % (non-condensing).
Altitude must not exceed 1000 meters above sea level.
Intended use also includes the observance of the operating, maintenance and overhaul conditions as specified by manufacturer.
The loading magazine shall not be used by any other persons than those being acquainted therewith and taught in its inherent dangers. The relevant regulations for the prevention of accidents as well as all other commonly recognized safety rules should be observed. Any unauthorized loading magazine modification shall exempt the manufacturer from any and all liabilities for damages resulting therefrom.

0.4 Symbols and Notes Explanation

This symbol you will find at all work safety notes made in these Operating Instructions, where danger to the lives and limbs of persons is given. Mind these notes and be careful in such cases!

Attention!

This symbol is used at those parts of these Operating Instructions that need to be followed in particular so that guidelines, regulations, notes and the correct sequence of work are observed and any damages to or destruction of the unit prevented.

0.5 Industrial Property Rights

We reserve, at any time, our property right to these Operating Instructions and the documents attached thereto.

Without our written approval, they must not be copied, duplicated or transferred or made available to third parties.

0.6 Safety Measures

The flawless and safe operation of the loading magazine presupposes proper transport, professional installation and commissioning as well as careful operation and maintenance.

Read and carefully observe these Operating Instructions before commissioning the loading magazine!

The loading magazine is constructed in compliance with the state of the art and safe for operation. Danger, however, may emanate from the loading magazine, if it is improperly used by untrained personnel or for unintended improper applications.

The loading magazine shall only be used, maintained and repaired by persons being familiar with these Operating Instructions and the applicable regulations on work safety and accident prevention.

Non-observance of the following items may result in physical injuries or material damages. Therefore, it should be ensured that the operators read and follow these Operating Instructions.

For loading magazine manufacture and documentation preparation, the following regulations were taken into account:

EC-Council Directive on Machines (98/37/EC)

DIN EN ISO 12100

DIN-EN 60 204

DIN EN 62709

In case of deliveries within the EU, the loading magazine is "CE" marked. Besides, the “EC Conformity Declaration“ is attached.

Attention! We would like to point out that the operator of the unit must guarantee the CE conformity if any components are changed essentially.

0.7 Safety Devices

0.7.1 Covers

Following the applicable regulations, the loading magazine is secured by means of covers that prevent moving parts from being reached. The cover above the lateral material storage is monitored via a positively actuated and forcibly opening switch with safety function.
With no exposure to danger, it is possible, in automatic mode of operation, to open the cover over the lateral material storage in steps 17 to 20 for bar material follow-up.

Via the –S74 switch with safety function and the contactor with the forcibly led –K20 contacts, the voltage supply for the solenoid valves is switched off. Only the valves -Y1.1 (close guide channel), -Y8.1 (feed bar swing in), -Y10.1 (remnant flap swing in) and -Y7 (steady rest) are exempted therefrom. These valves continue to be triggered in order to ensure a safe continuation of the machining of the bar being in the guide channel. Additionally, the opened position of the cover will be evaluated in the PLC. If the loading magazine is not in the automatic mode of operation, or, during automatic mode of operation, not within the steps 17 to 20, then, in case of an opened cover, an error message will be shown on the control panel display:

FAULT: COVERS NOT CLOSED

Automatic operation is turned off then.

In manual operation it is, in case of an opened cover, not possible to trigger a solenoid valve via the functional keys on the control panels.

When making conversion work, strictly observe the sequence of works as specified in the Operating Instructions!

Before opening the cover (except for material bar follow-up in program steps 17 to 20), press EMERGENCY STOP key and close the compressed air shut-off valve at the loading magazine to ventilate the unit.

During loading magazine operation, covers of any kind (protective hoods, etc.) must neither be dismantled nor put out of operation. This also applies to any and all non-electrically monitored and firmly screwed cover parts.

0.7.2 Guide Tube/Telescopic Tube between Loading Magazine and Autolathe

0.7.2.1 Autolathe with Movable Spindle Stock

The guide tube/telescopic tube bridges the distance between the loading magazine's front end and the spindle end of the autolathe. It serves as a protective cover and prevents rotating parts from being ejected.

Before commissioning, the specified guide tube/telescopic tube shall be mounted in between the autolathe spindle and the loading magazine. During loading magazine operation, the guide tube/telescopic tube must be present.

Movable spindle stock autolathes must not be operated without telescopic tubes or fixed spindle-reducing elements projecting from the loading magazine into the spindle of the autolathe.

Attention!

Assemble the telescopic tube as described in the drawing enclosed. This drawing can be requested from FMB by stating the respective order number.

The inner diameter of the guide tube/telescopic tube depends on the feed bar built-in.

Fixed Spindle Reducing Element:

Should assembly of a telescopic tube be impossible, the autolathe can be operated with a fixed spindle-reducing element. To this effect, the guide tube of the loading magazine as contained in the conversion kit is slid into the spindle. Thus, maximum possible bar diameter is restricted.
The following should be noted:

- The guide tube's outer diameter must be 1 to 2 mm smaller than the spindle's inner diameter.
- Guide tube length must be specified such that it bridges the gap between loading magazine and spindle, whilst excluding any potential spindle destruction.
- The guide tube's inner diameter must be 2 mm bigger than the diameter of the feed bar built-in.
- The smallest wallthickness of the guide tube should be 2 mm at least.

0.7.2.2 Autolathe with Fixed Spindle Stock

The guide tube bridges the distance between the loading magazine's front end and the spindle end of the autolathe. It serves as a protective cover and prevents rotating parts from being ejected.

Before commissioning, the specified guide tube shall be mounted in between the autolathe spindle and the loading magazine. During loading magazine operation, the guide tube must be present.

The guide tube's inner diameter depends on the feed bar built-in. When installing the loading magazine, the guide tube's length must be taken into account (see sect. 6.9.4.3). It shall be specified such that there is a distance of 5 mm at max. between the end of the autolathe spindle and the front end of the guide tube or such that the tube projects into the autolathe spindle. This gap must not be within operator's reach!

0.7.3 EMERGENCY STOP Device

As required in VDE 0113, the loading magazine is fitted with an EMERGENCY STOP device. When pressing the –S69 EMERGENCY STOP key on the control panel, the 24 V-direct voltage supply for all PLC outputs is disconnected. The contactors -K20 and -K21 are switched off as well. Via -K21, the voltage supply for the power pack that supplies the voltage for the drive motor is disconnected. Consequently, the motor, and thus the feed bar, are incapable of moving any longer.
On the control panel, the following message appears:

EMERGENCY STOP

Through the second switching element of the EMERGENCY STOP key, this EMERGENCY STOP message is also communicated to the autolathe, where it must be processed in accordance with the regulations.

When an EMERGENCY STOP is actuated at the autolathe, the loading magazine's control system must be switched off as well.

0.7.4 Automatic Lathe Protective Hoods

When there is a „protective hood closed" contact available from the autolathe, the voltage supply for the -N3 amplifier module, which triggers the -KY1 clutch, will be disconnected. As a result, the feed bar cannot be moved with the material bar any longer.
Hence, in case of a non-closed protective hood, any endangering by the material bar of persons staying within the autolathe's working space is safely excluded.

1. Technical Data and Operating Materials

1.1 Technical Data / Storage Conditions

Material passage in guide channel: 42 mm at max.

Power consumption: 1.5 KW

Feed force: 550 N at max. (continuously adjustable)

Insertion speed: 0 to 400 mm/s (adjustable)
Feed speed: 700 mm/s at max. (adjustable)
Return speed: 700 mm/s

Remnant length: 530 mm at max.

Dimensions: see installation plan on page 20 and 21

Weight: 3.2 m – 1000 kg
4.2 m – 1200 kg
excluding oil filling, packaging, and material

Loading time: approx. 30 s (in case of 3200 mm bars)

Oil filling: 80 l oil (viscosity: 150 cSt at +40 ºC)
not included in scope of delivery

Operating conditions:

- Ambient temperature between +15 ºC and +40 ºC (depends on oil viscosity)
- Humidity from 30 % to 75 % (non condensing)
- Altitude must not exceed 1000 m above sea level.

Storage conditions:
The loading magazine shall only be stored in dry rooms having an ambient temperature between –20 ºC and +65 ºC.

Operating voltage:
400 V/50 Hz (standard version/200 V, when ordered)
As specified in VDE 0113, the continuous operating voltage must range within 100 % ± 10 % of the mains voltage. Frequency must be within 0.99 up to 1.01 of the rated frequency.

Control voltage: 24 VDC

Compressed air supply: min. 0.6 MPa (6 bar) max. 1,0 MPa (10 bar)

Air consumption: approx. 10 liters per loading process each and approx. 0.5 liters per steady rest double stroke

Noise level: 48 ± 5 dBA at max. (during bar change)

1.2 Electrical Connection between Loading Magazine and Automatic Lathe

Detailed data on the electrical connections and voltage supply of the loading magazine are given in the electrical documentation. The electrical connections have to be made by an authorized and qualified electrician with due regard to the VDE and local regulations, and, in particular, to the applicable protective measures.

1.3 Oil Filling

For oil filling, oils following
DIN 51 517 - 2 CL 150
DIN 51 506 VBL 150
DIN 51 519 ISO VG 150, are prescribed.

We recommend the following oil brands:

Oil	
Producer	**Type 150 cSt DIN 51 562 at +40 °C mm^2/s**
ARAL	MOTANOL HK 150
ESSO	NUTO 150
MOBIL	VACUOLINE 228
SHELL	MORLINA 150

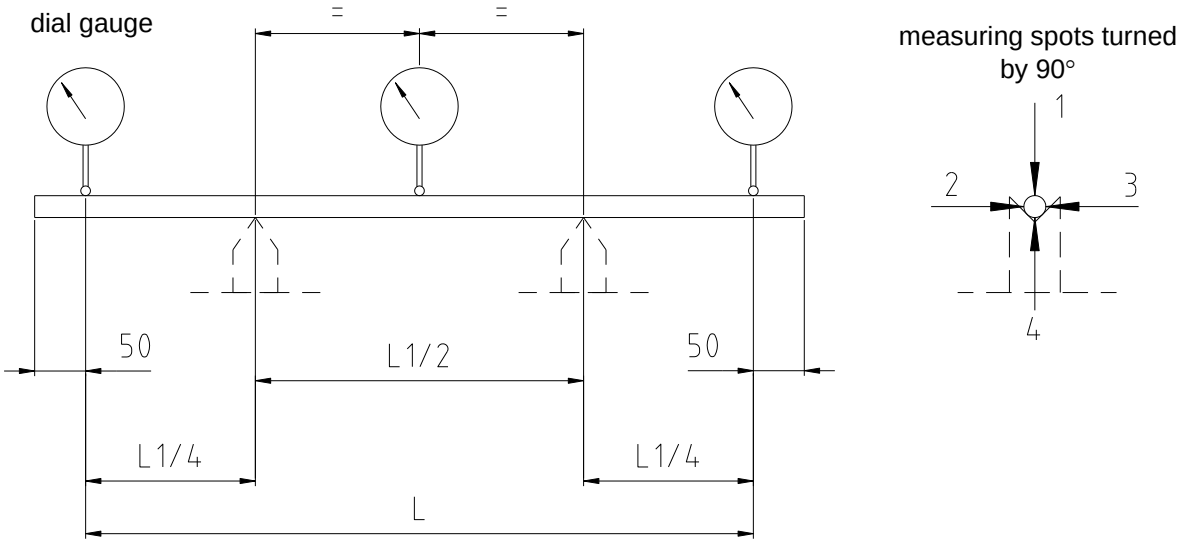
Note:
When machining polygonal materials, results can be improved by using oil with a viscosity of 220 cSt at +40 °C. Oil exchange intervals depend on the degree of soiling. The legal specifications governing waste oil disposal shall be observed.

1.4 Requirements on Material Bars and their Preparation

The speed that can be achieved with the material bar depends on its geometric material accuracy.

Non-straight bars strongly affect the achievable speeds.

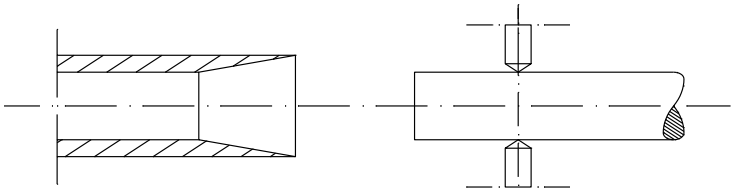
With raising diameters, the negative impact of non-straightness increases. Apart from straightness, out-of-round shaped and unbalanced bars affect the achievable speed. Non-straightness should not exceed a tolerance of 0.5 mm/m. The expression "mm per m" refers to a steady curvature over a measuring path of 1 m, but in no case to a short bend within one meter.



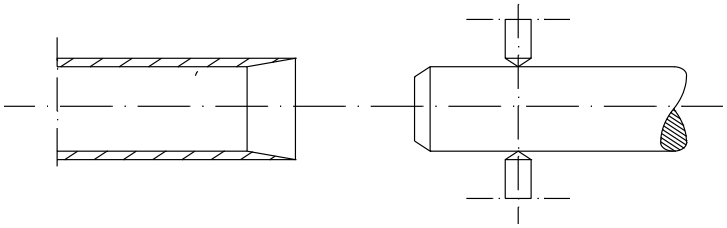
- For automatic material bar insertion into the spindle and collet of autolathe, the bar's front must be without any burr. This is necessary, as the collet opens for a few millimeters only.
- **The bar's end must not be bent or deformed as a result of cutting work.**
- **Bars must not be soiled by chips, sand or similar materials.**
- Because of their automatic insertion into the collet, square or hexagonal bars must not have any circumferential chamfer, but a plain end face instead that has been sawn, turned on a lathe or sheared cleanly.

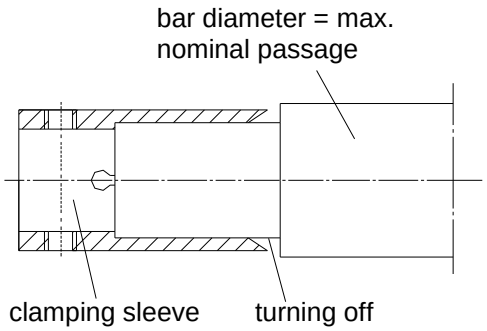
In case of bar ends with orbicular cross sections, pointing or chamfering is not required in general, as the bar is lifted by the gripper up to feed bar center level and, through the clamping sleeve's insertion taper, safely pressed into it.
When the material bar's diameter comes close to that of the feed bar and the thin-walled clamping sleeve, as a result thereof, has no more insertion taper, bar end chamfering or pointing is recommended.

bar diameter considerably smaller than feed bar diameter



bar diameter almost equal to feed bar diameter





When the guide channel is to be used up to full passage, the material bars' ends should be turned off for clamping sleeve reception. Note that the feed bar may never be bigger than the maximum material bar diameter to be machined on the autolathe.

Standard Guide Channels

Bar Capacity D	Bar Dimensions for Supply		
	Round, ∅	Hexagonal, WS	Square, WS
15	12 (15)	WS 10	WS 8
25	22 (25)	WS 19	WS 15
32	28 (32)	WS 24	WS 20
36	32 (36)	WS 28	WS 23
42	38 (42)	WS 32	WS 27

In brackets (): measure at bar end turning-off
Other guide channels (special versions) available on request.

2. Transport in Case of Installation and Dismantling

When delivered from the manufacturer originally, the loading magazine is fixed on a pallet for transport. For the 3200 and 4200 lengths, the pallet drawing nos. 23-2123-6000-D (ident no. 2023-141) and 23-2123-6002-D (ident. no. 2023-143), respectively, apply. Every support is linked with the pallet by means of four 10x80 DIN 571 hexagonal wood screws and four A10.5 DIN 9021 washers. The pallet must not be removed, unless the loading magazine has been placed behind the autolathe.

Attention!

Lifting devices and means of transport must be in compliance with the applicable regulations. No personnel shall stay within the swinging and working ranges!
Lifting device and stop means operators must have the performance certificates required.

The transport means and ways should be structured such that no damages to materials or persons can be caused. Where appropriate, such means and ways should be checked prior to the transport.

2.1 Loading Magazine Preparation for Transport

The following works should be done:

1. Remove existing material bars completely
   (both storage and guide channel must be empty).
2. Move feed bar fully to the rear.
3. Let loading magazine idle for 8 hours at least so that the oil filling can flow into the oil reservoir as completely as possible.
4. Turn autolathe main switch off.
5. The electrical connection to the automatic lathe, all electrical connections from the loading magazine to the control cabinet and the connection cable of the oil pump must be disconnected by specialized personnel (loosen plug-in connection).
   Attention! The oil reservoir and switch cabinet should be transported separately.
6. Empty the oil reservoir and dispose of oil with due regard to the legal specifications. Disconnect the connecting hoses for oil supply and oil return. Disconnected oil hose connections must be secured against the loss of residual oil.
7. Depressurize compressed air lead to the loading magazine.
   (branch valve, main valve, etc.)
8. Ventilate loading magazine by closing the shut-off valve at the maintenance unit.
9. Loosen anchoring on the ground (remove hexagonal nuts of UPAT dowels).
10. Mount the parts for crane transport (see section 2.2) as delivered by the loading magazine manufacturer and demount all loading magazine connections with fixed parts.
11. Lift loading magazine off by crane (see section 2.2).
12. When the loading magazine is to be transported other than by crane, it should be put on a pallet delivered from the loading magazine manufacturer and firmly connected with that pallet, through the available dowel holes in the bottom plates of the supports, by means of at least eight 10x80 DIN 571 hexagonal wood screws and eight A10.5 DIN 9021 washers.
13. Immediately after loading magazine lift-off, the dowels protruding from the ground must be cut flush therewith or removed therefrom (trip-obstacle).

2.2 Transport by Crane

No others than regulations conforming stop means being capable of standing the loads specified shall be used. They should be mounted in accordance with the transport sketch.

In case of transport by crane with the magazine being fixed on a pallet, the bigger weight should be observed (the weight of the pallet is approx. 200 kg).
The pallet should be fixed as described in section 2.1.

The rope's stop points are shown in the transport sketch.

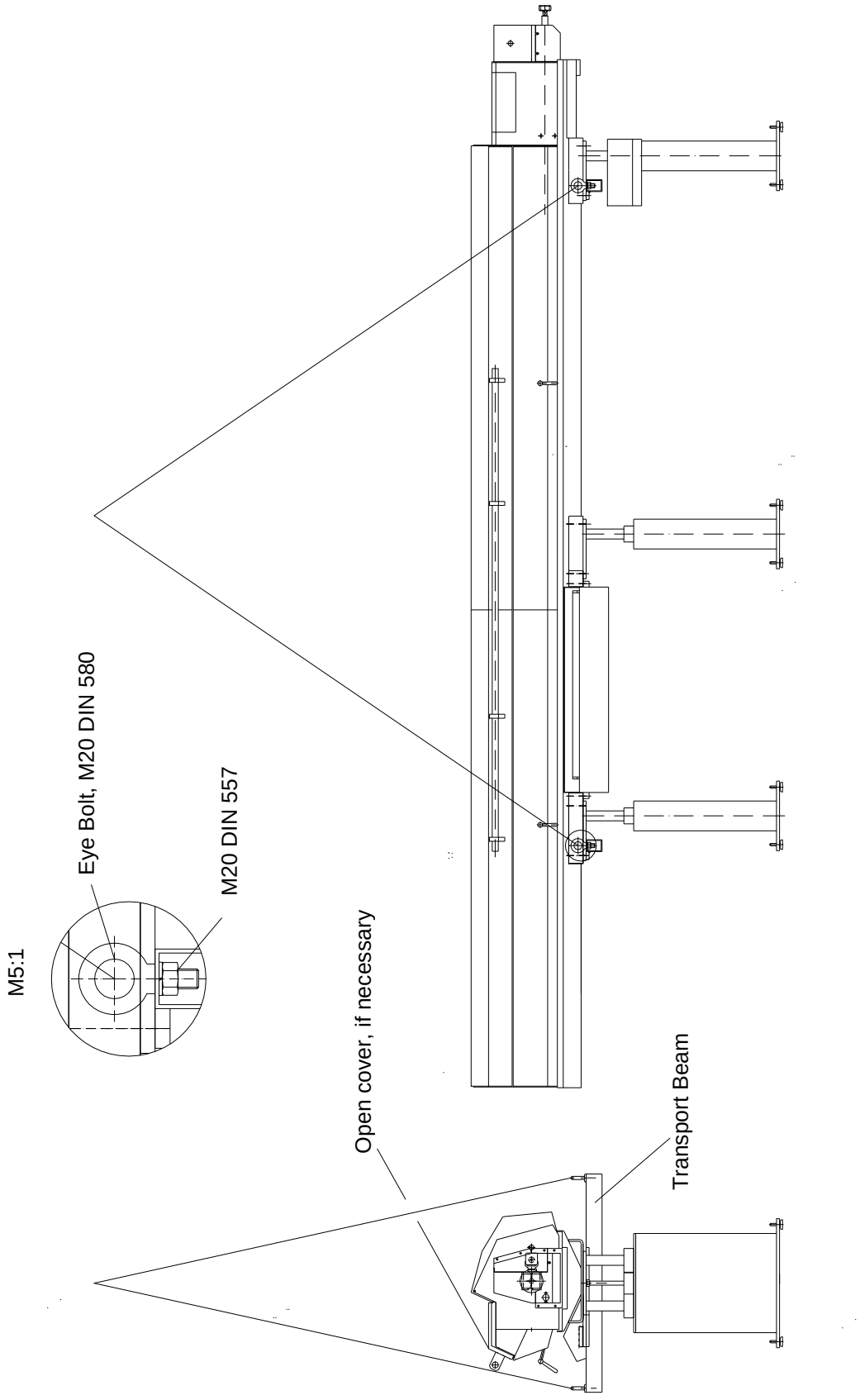
The transport beams delivered from the loading magazine manufacturer, drawing no. 23-2124-4447-E (ident. no. 2037-112), have to be mounted in accordance with the sketch.

The oil reservoir and switch cabinet should be transported separately. To this effect, the oil pump's and switch cabinet's connection cables have to be disconnected by specialized personnel. The connecting hoses for oil supply and return must be disconnected as well.

The fixing bolts are not laid out as carrying ones. The transport beam must fit close to the carrier as shown in the transport sketch.

Before loading magazine lift-off, check whether it has been prepared in compliance with section 2.1 and make sure that there are no persons staying within the danger area.
The parts delivered are laid out for the specified load cases only.

Transport Sketch



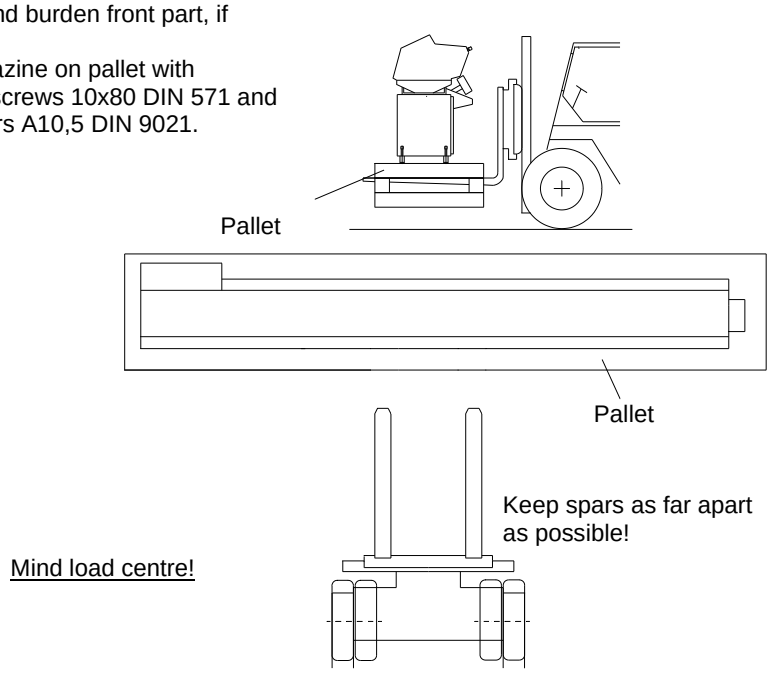
2.3 Transport by Forklift

For transport by forklift, the loading magazine should be prepared in accordance with section 2.1 and fixed, depending on size, on a pallet as mentioned under section 2. Pallets can be obtained from loading magazine manufacturer.

The forks should be positioned under the load's center. If necessary, the center should be determined anew in order to prevent the load from slipping away. During transport, no personnel shall stay within the dangerous area.

Mind the weights to be lifted (see section 1.1).

For transport, determine the load centre and burden front part, if needed.
Fix magazine on pallet with 8 wood screws 10x80 DIN 571 and 8 washers A10,5 DIN 9021.



2.4 Transport by Other Means

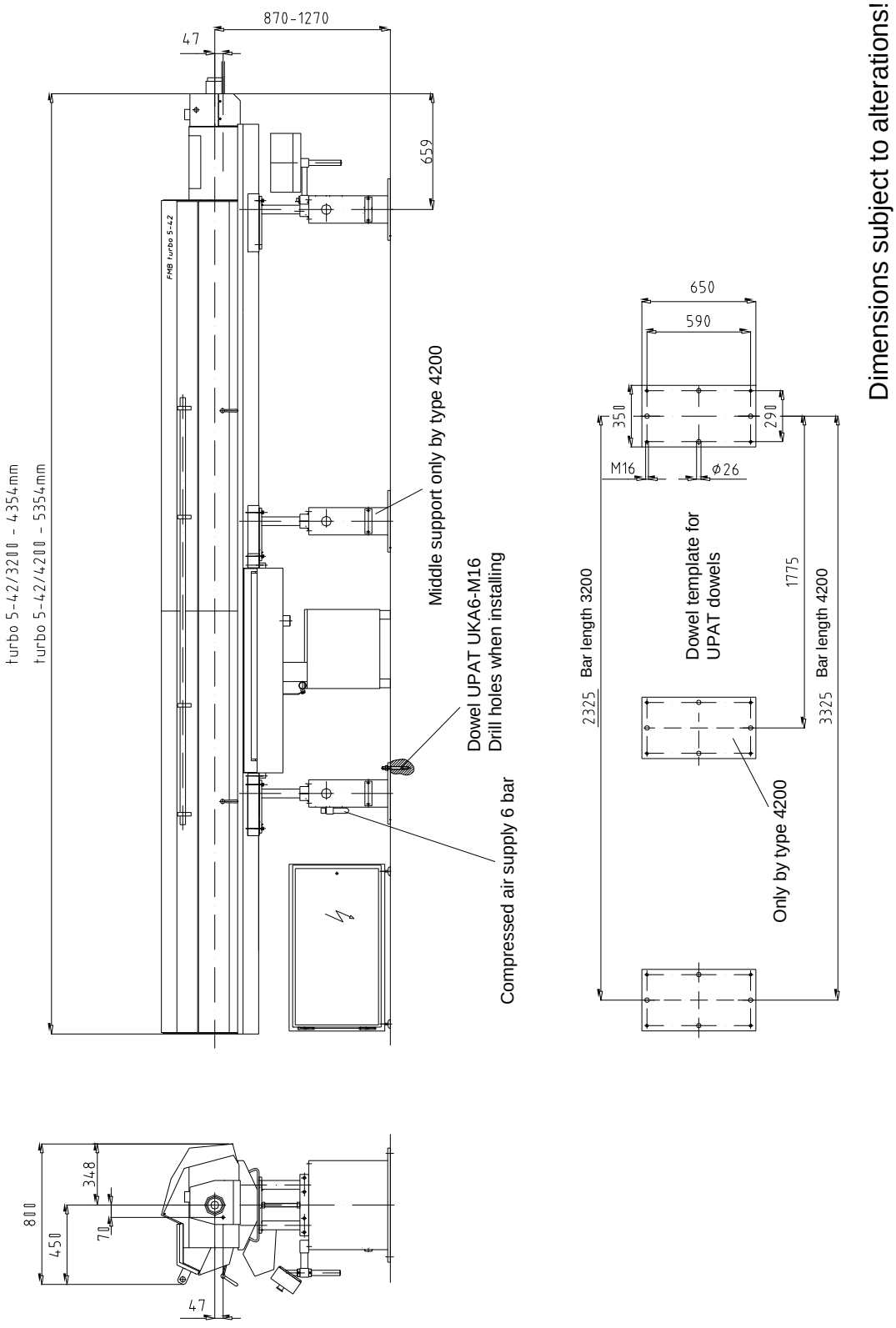
Except transport by crane, the loading magazine must be put on a pallet of the loading magazine's manufacturer and fixed accordingly. Prior to any transport, the loading magazine should be prepared in accordance with section 2.1. Pallets can be obtained from loading magazine manufacturer.

When transporting by mobile means (e.g. trucks, boats, containers), the pallet has to be additionally secured against occurring inertial forces. During transport, persons shall not be allowed to stay within the dangerous area.

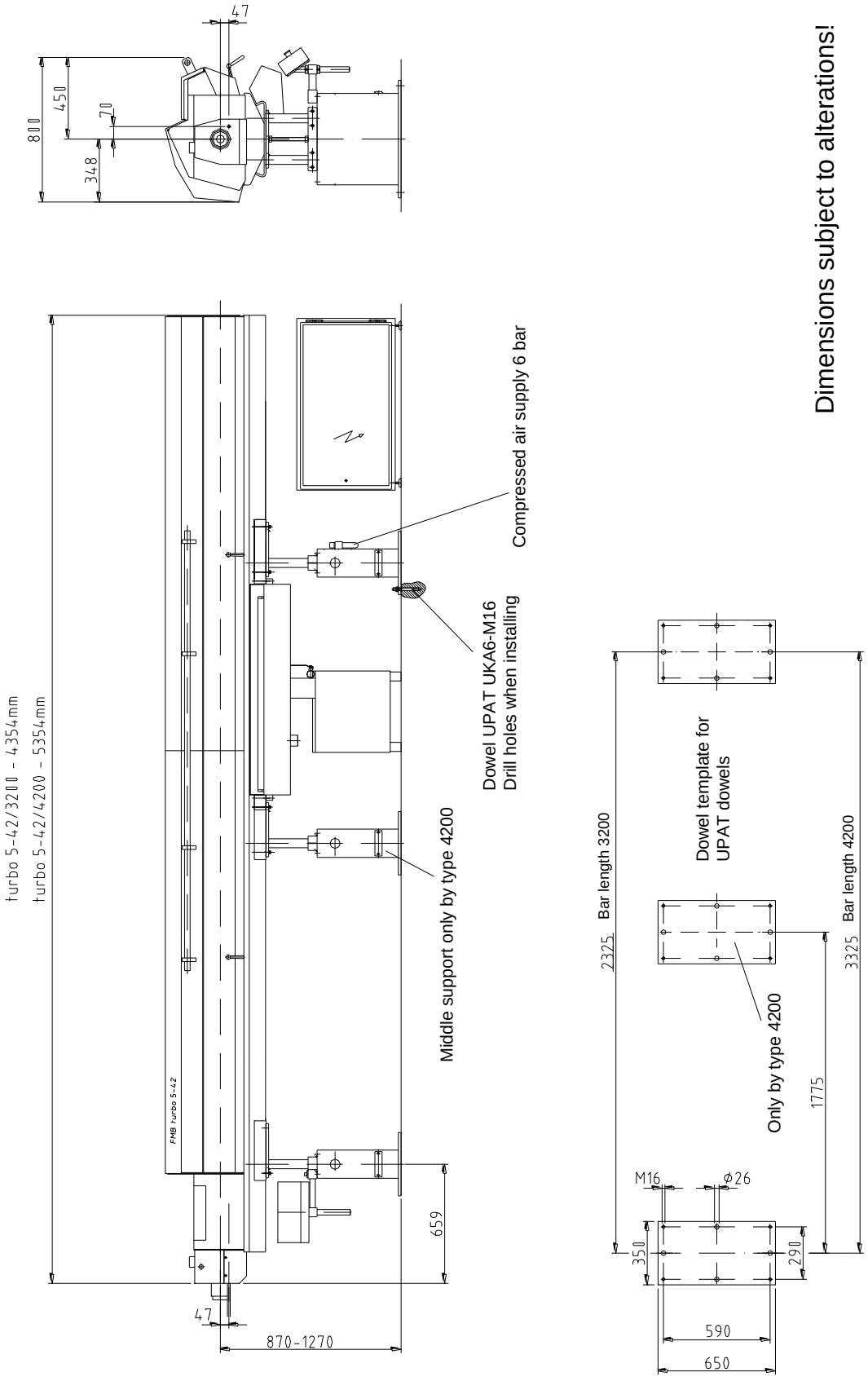
3. Installation

3.1 Installation Plan

Variants A; D



Variants B; C


47
800
450
70
348
Dimensions subject to alterations!
turbo 5-42/3200 - 4354mm
turbo 5-42/4200 - 5354mm
Compressed air supply 6 bar
Dowel UPAT UKA6-M16
Drill holes when installing
Middle support only by type 4200
FMB turbo 5-42
659
47
870-1270
Dowel template for
UPAT dowels
Bar length 3200
2325
Bar length 4200
3325
Only by type 4200
1775
M16
ø26
350
290
590
650

3.2 Ground Structure

The autolathe data are given in the machine documentation. The building, in which the loading magazine is intended to be installed, should be laid out for the loads occurring. The possible weight and operational loads as caused by the loading magazine in conjunction with the autolathe must have been taken into account. When ready for operation, the loading magazine's weight is as follows:

- **turbo 5-42** loaded with ∅42 / 3200 long – weight approx. 1500 kg
- **turbo 5-42** loaded with ∅42 / 4200 long – weight approx. 1800 kg

The building should be suitable for installing the unit. In case of doubt, a specialist should be consulted. Leads of any kind (power, water and others) must not be laid under the loading magazine.

3.3 Loading Magazine Alignment

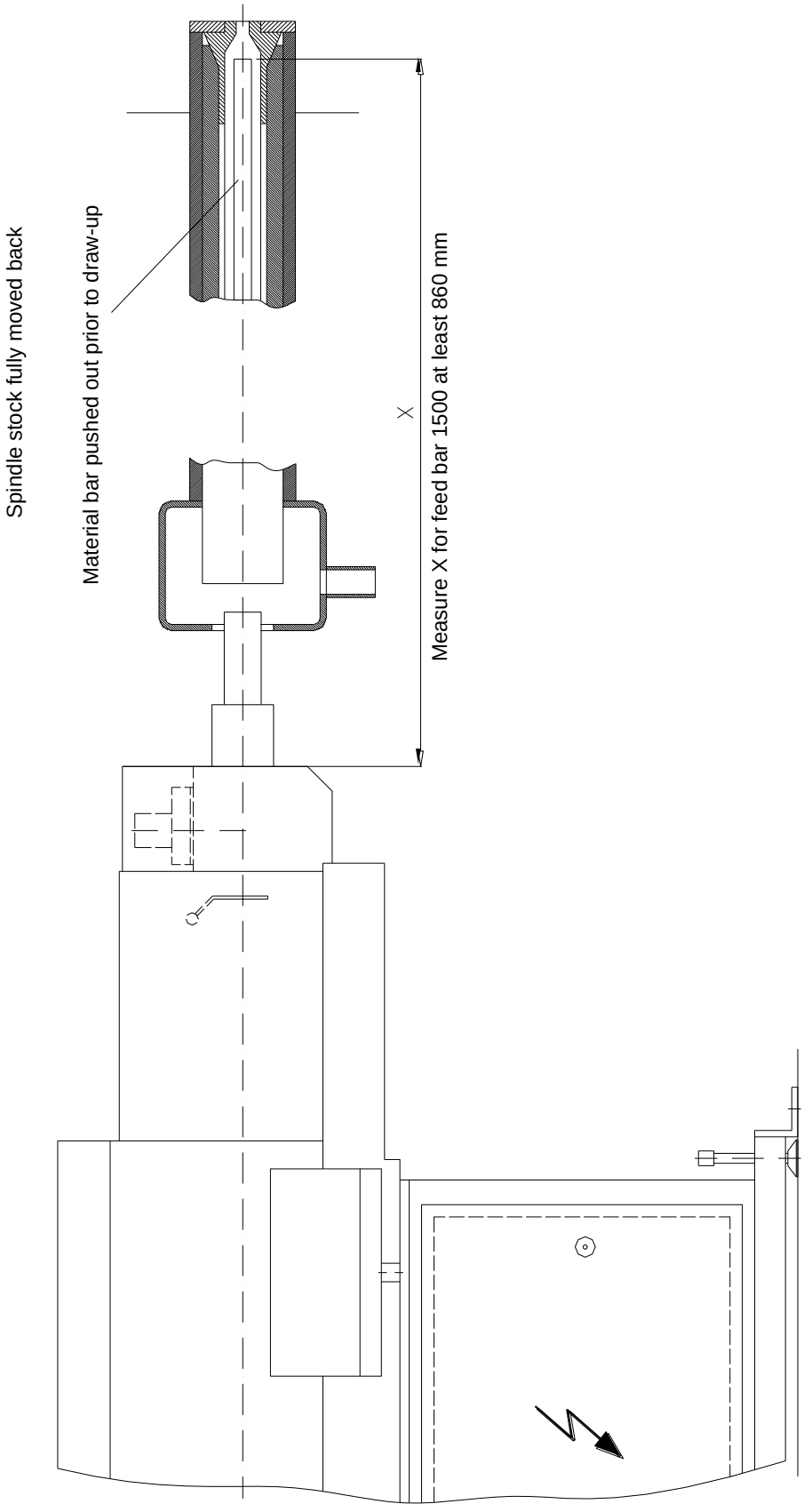
The loading magazine should be installed such that the centerline of the autolathe spindle is in exact alignment with the centerline of the feed bar. In case of an incorrect alignment, problems in relation to the loading magazine's functioning will emerge (feed bar seizure in the spindle; heavy vibrations, damage to the autolathe spindle).

The following works should be done:

1. Lift the loading magazine from the pallet (see sect.2).
2. Align the loading magazine's center roughly in lateral direction.
3. Adjust the height at the supports approximately by using the M20 threaded spindle (place underneath the foot plates enclosed).
4. Mount the conversion kit provided for the loading magazine.
5. In longitudinal direction, the loading magazine should be installed as close behind the autolathe as possible. It should be noted here that, prior to feed bar draw-up (turning on the lathe not yet possible), the material bar is slid out of the loading by the measure "x". The material bar must neither be inserted into the clamping system of the autolathe yet nor turned concurrently, as the gripper blades close for feed bar draw-up. As a result, the loading magazine and the autolathe might be damaged (for illustration see next page).
6. Fine-align the magazine preferably by using an optic made by M/S Breithaupt, Kassel. To this effect, the feed bar must be precisely adjusted in its rear and front positions.
7. Assembly of the guide tube/telescopic tube as enclosed in the loading magazine manufacturer's delivery between the magazine and the autolathe in accordance with sect. 6.9.4.3 or sect. 6.9.4.4.
8. For feed bar stop assembly see sect. 3.9.

Attention!

Loading magazine alignment is decisive to its functioning. It is recommended to have these works done by technicians of the manufacturer.
The loading magazine shall be commissioned in accordance with sect. 5.


Spindle stock fully moved back
Material bar pushed out prior to draw-up
X
Measure X for feed bar 1500 at least 860 mm

3.4 Fixing on the Ground

After its alignment to the autolathe spindle (sect. 3.3), the loading magazine must be fixed at the intended positions on the ground by using 8 M16 anchor bolts (recommendation: UPAT-UKA6-16).

Attention! **The fixing elements are not included in the scope of delivery.**

Should other fixing methods be applied, the same effect as described above shall be ensured.

Dowels must not damage carrying parts of building constructions and other facilities!

Before drilling the dowel holes, check the ground for the presence of supply leads (power cables, water, gas leads, etc.). Such cables or leads must not be drilled into. Consult a specialist, if necessary.

3.5 Compressed Air Supply

Compressed air supply is made via a 1/4" hose nozzle at the maintenance unit of the loading magazine. A shut-off valve must be installed before the loading magazine.
The compressed air supply should meet the following parameters:

- Pressure: 0.6 MPa – 1.0 MPa
- Air consumption: approx. 10 liters per loading process each
  approx. 0.5 liters per steady rest double stroke each

The air must be dry and filtered.

The supply lead must be laid such that no persons or materials are exposed to danger.

3.6 Electrical Connections

The electrical connection between magazine and autolathe is shown on sheet 3 (interface) of the electrical documentation attached hereto. Plug assignment and operating voltage are determined by the autolathe and already preset by the factory accordingly. Following VDE 0113, the continuous operating voltage must be within 100 % ± 10 % of the rated voltage, and frequency within 0.99 and 1.01 of the rated frequency.

Attention! **Check the interface in accordance with the electrical documentation and the explanations given in sect. 4 of these Operating Instructions.**

After having prepared the autolathe for loading magazine mount and completed the electrical connection, the oil pump's direction of rotation should be tested.

Attention! **The oil pump must rotate into the direction of the arrow available on the ventilator's cap. Should the pump rotate into wrong direction, no oil will be pumped into the guide channel. Reconnecting two wires of the connection line can change the direction of rotation. Before reconnecting, turn main switch at automatic lathe OFF!**

Attention! **Before first commissioning, checking the EMERGENCY STOP device and the electrically monitored cover for functionability is imperative (see sect. 0.7.1 and 0.7.3)!**

3.7 Avoidance of Dangerous Narrow Spaces

The loading magazine must be installed such that it can be accessed at any time from all sides for maintenance, repair and other works. All control elements must be accessible and operationable without any difficulty.
It must be possible to open the switch cabinet at any time. Be careful of machines or aggregates installed in close vicinity. During any work at the loading magazine, no persons or material assets must be endangered!

3.8 Repairs at the Automatic Lathe

If larger repairs at the autolathe are to be done in the quality required and without endangering persons and material assets, enough space should be provided beforehand. This means that, where appropriate, the loading magazine needs to be removed from its place. In such regard, always observe the transport and installation instructions (sect. 2 and 3)!

3.9 Front Feed Bar Stop

Prior to loading magazine commissioning, the feed bar's stroke to the front must be limited in order to prevent the bar from projecting into the working area of the autolathe. It may be clamped or caused to rotate or collide with tools and moving machine parts such that damages to the loading magazine and autolathe could be the consequence.

After having fixed and aligned the feed bar, a stop is to be mounted in the carriage guide of the loading magazine for feed bar stroke limitation.

The respective works are as follows:
(for illustration see next page)

1. Switch loading magazine into manual operation.

2. Open guide channel.

3. For unit ventilation, press EMERGENCY STOP key and close compressed air shut-off valve at the magazine.

4. Open cover.

5. Remove existing material from guide channel.

6. Close cover, pull EMERGENCY STOP key, open compressed air shut-off valve and delete fault.

7. Move feed bar into the autolathe's collet as shown in the illustration on next page.

8. Press EMERGENCY STOP key and close compressed air shut-off valve.

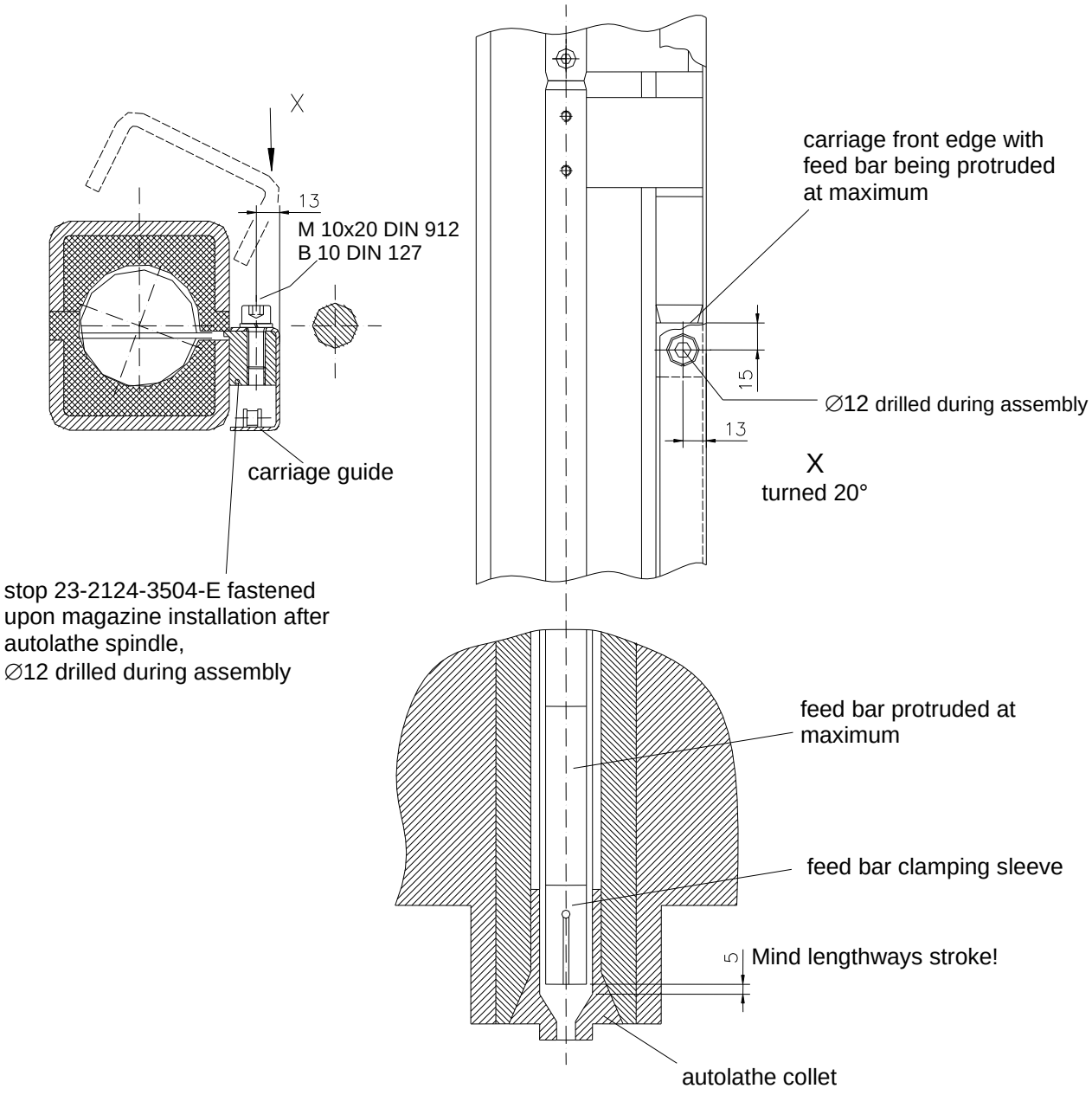
9. Open cover.

10. Drill a ∅12 mm hole into the carriage guide from topside 15 mm before the carriage's front edge and 13 mm measured from the rear (for illustration see next page).

11. Insert stop (dwg. no. 23-2124-3504-E / ident. no. 2025-739) from the front into carriage guide and slide to the rear till carriage is reached.

12. Fasten stop through the ∅12 mm hole with a M10x20 DIN 912 pan head screw and a A10 DIN 127 spring lock washer.

13. Close cover, pull EMERGENCY STOP key, open compressed air shut-off valve and delete fault.


X
13
M 10x20 DIN 912
B 10 DIN 127
carriage guide
stop 23-2124-3504-E fastened
upon magazine installation after
autolathe spindle,
∅12 drilled during assembly
carriage front edge with
feed bar being protruded
at maximum
15
∅12 drilled during assembly
13
X
turned 20°
feed bar protruded at
maximum
feed bar clamping sleeve
5
Mind lengthways stroke!
autolathe collet

4. Interface Explanations

Attention!

Standard switch-on is adjusted autolathe-specifically. For relay and contact designations as well as plug pin assignments see the electric circuit diagram, please.

4.1 Contacts from Autolathe to FMB Loading Magazine

- **Clamping device opened:**
  This contact switches the loading magazine's feed device on.
- **Cycle end, bar change start:**
  In case of autolathes with program jump facility, the contact should be applying in the bar front program before "collet open".
- **Autolathe ready for operation, automatic operation release:**
  The loading magazine cannot be switched into the automatic function, unless this contact is applying.
- **Loading magazine ON (option):**
  Via that contact (pulse), the autolathe can start the automatic function of the loading magazine.
- **Protective hoods closed:**
  The magazine cannot make any feed move, unless this contact is applying.
- **Autolathe EMERGENCY STOP**
  Potential-free contact of the autolathe. This contact is integrated into the EMERGENCY STOP circuit at the loading magazine.

4.2 Contacts from FMB Loading Magazine to Autolathe

- **No loading magazine fault (-K30):**
  No fault; contact closed. In case of fault, contact is open. When fault message is given, the spindle of the autolathe must not be capable of rotating.
- **Bar change end, program start (-K1):**
  Depending on the type of autolathe control, the magazine can output this contact as a pulse or a permanent contact. It signalizes the autolathe that the bar is slid into the autolathe or it serves as release for read-in, program start.
- **Bar change start or program stop (-K9):**
  Depending on the type of autolathe, the magazine can output this contact as an opening or a closing contact. Contact is made during machining of the last workpiece or after completion of such machining. It signalizes the autolathe that material bar machining is completed.
- **Automatic Operation ON (-K1M):**
  Contact is closed, when the magazine is in automatic operation.
- **Loading Magazine EMERGENCY STOP:**
  Potential-free contact from magazine. This contact should be integrated into the autolathe's EMERGENCY STOP circuit.

4.3 Program Suggestion for Automatic Lathe

Parts Program

- Move revolver into position
- Clamping device open (signal to loading magazine)
- Dwell-time (bar follow-up)
- Close clamping device

Machining

Bar end enquiry **Yes / No (-K9)**

Jump to bar front program
Parts program record beginning

Bar Front Program

- Move revolver into position
- Spindle speed (approx. 50 r.p.m. required in case of profile materials)
- Clamping device open
- Bar change start signal (program cycle end)
- The autolathe must wait until the new material bar is supplied and signal „-K1“ applying.
- Close clamping device
- Cut off bar front
- Re-jump to parts program

Attention! **Example for information only!**

5. Loading Magazine Commissioning

5.1 Commissioning Prerequisites

The loading magazine should be in accordance with the manufacturer's original delivery condition. All parts required for its operation must be mounted properly. Should you have any doubt in this respect, consult your loading magazine manufacturer!

Attention! **It is purposeful to have commissioning done by the loading manufacturer's service team.**

5.1.1 Fixing the Loading Magazine, Working According to Installation Plan

Before commissioning, the loading magazine should be installed and fixed in accordance with sect. 3.

5.1.2 Connection with the Automatic Lathe

The loading magazine's alignment and distance from the autolathe (see sect. 3) should be checked. The electrical connecting cable must be connected properly (see sect. 3.6).

5.1.3 Supply Media

Compressed air supply must be ensured (see sect. 1). Prior to commissioning, the compressed air system of the loading magazine should be checked for leakage (suds fits for that purpose). No pressure decrease should occur.
At the maintenance unit (see sect. 9), a pressure of 0.6 MPa should be set. When pressure decreases below 0.4 MPa, the –S11 pressure switch puts the control system into fault state.

5.1.4 Oil Filling

Prior to commissioning, the oil reservoir needs to be filled with 80 liters of any of the oil brands mentioned in sect. 1.3. Before fill-in, the oil reservoir should be checked for leakage. The built-in oil hoses and leads must neither be bent nor clogged. Oil flow must not be impaired. The return leads must be laid at steep declivity. Prior to commissioning, the oil pump should be subjected to a test run (30 minutes), during which the following items are to be checked:

- Running direction of the oil pump (reconnect electrically in accordance with sect. 3.6, if necessary);
- Oil flow-through of the guide channel (must be fully flown through after a short time);
- Tightness of the loading magazine, especially during feed bar run forward and return, when the guide channel is full of oil;
- Oil return flow to the oil reservoir.

When machining tube material cooling water must not get into the oil system of the loading magazine. Danger that the oil tank will be overflowing! Secure the tube end against the outflow of cooling water.

5.1.5 Mechanical Settings

Prior to commissioning, the following modules should be adjusted to the material to be machined:

- guide channel (see sect. 6.9)
- steady rest (see sect. 6.5)
- lateral material storage (see sect. 6.7)

5.1.6 Staff Instruction / Operating Instructions Study

Prior to commissioning, the operation-responsible personnel must be instructed.
Such instruction shall be based on these Operating Instructions.
Every operator should study them carefully.

Attention! **It is purposeful to have the instruction and training of the personnel done by the loading magazine manufacturer's service team.**

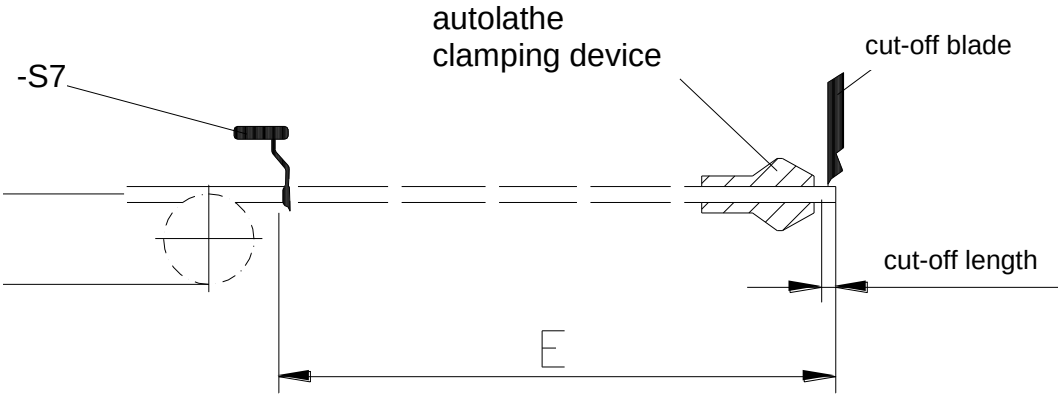
5.2 First-time Unit Activation

1. Turn main switch at the autolathe ON.
2. The FANUC PLC needs a few seconds until the RUN mode is active. Till that point, the red ERR LED on the control panel is lighting. When the LED is off, Automatic Menu 2 must be selected.
3. As, during transport, the feed bar's position may have changed, the reference run must be initiated by pressing the F8 key "REF".
   The reference run goes on automatically. The green LED in the F8 key lights. When the reference run is finished, the yellow LED will light up. Now, other operating functions can be activated on the control panel.
4. At this stage, the values for "FIRST INSERT TRAVEL", "POSITION FRONT LIMIT", "TRAVEL INTERVAL ON", and "POSITION REVERSE ROTATION" must be set in menu part "POSITIONS" of the "SERVICE" menu. To this effect, the feed bar with clamping sleeve is moved in Manual Operation Menu 1 into the respective position by using the keys F8 "FORW" or F7 "BACK". When pressing the HLP key now, the current position is indicated in the upper line of the display. This value must be entered in the menu part "POSITIONS".
5. Then, the steady rest and synchronized clutch functions can be selected in menu part "POSITIONS".
6. At "STANDARD SETTINGS" in the "PART" menu, the length in mm of the part produced in the autolathe must be entered at "ENTER PART LENGTH". Based on that value, the PLC computes the bar end (see section 5.3.3).
7. Now, after switch over into Automatic Menu and depending on the type of application, the steady rest as insertion help, the brake, the interval feed or the function without gripper, can be selected.
8. By means of the F3 key "S.1" or the F4 key "S.17", the step, in which the automatic operation is to be started, can be selected then. The step selected is shown in the first line of the display.
   Start in step 1, if a remnant or no material is in the clamping sleeve.
   Start in step 17, if the material bar is in the autolathe spindle and to be machined further on.
9. With the F2 key "STRT" the automatic operation is started.
   The green light emitting diode in the F2 key lights up.
10. When bar change was started with no remnant, the program continues running without fault message, provided that the CLR key was pressed in steps 1 to 4.
11. When the unit is switched on at commencement of work, the processing can be continued in the step in which the unit has been switched off.

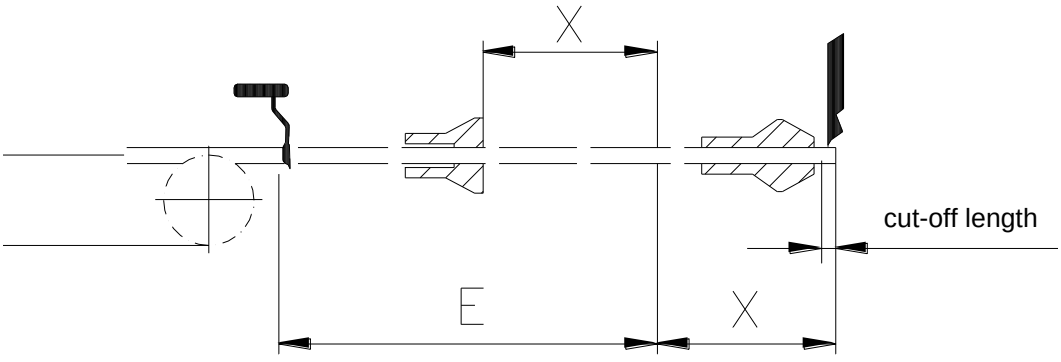
5.3 Settings at the Control System

5.3.1 Setting the Cut-off Position (End of First Insert)

- In manual operation 1, press the F6 key “SERV” to switch into the “SERVICE” menu.
- In menu part "POSITIONS", enter measure E in mm at „FIRST INSERT TRAVEL“. Measure E is the path from the switching flap of the –S7 starting switch to the cut-off position.
- Then view cut-off position in automatic operation.
- If position proves to be incorrect, rectify the value entered.
- For how to make entries on the operation panel see sect. 6.2.



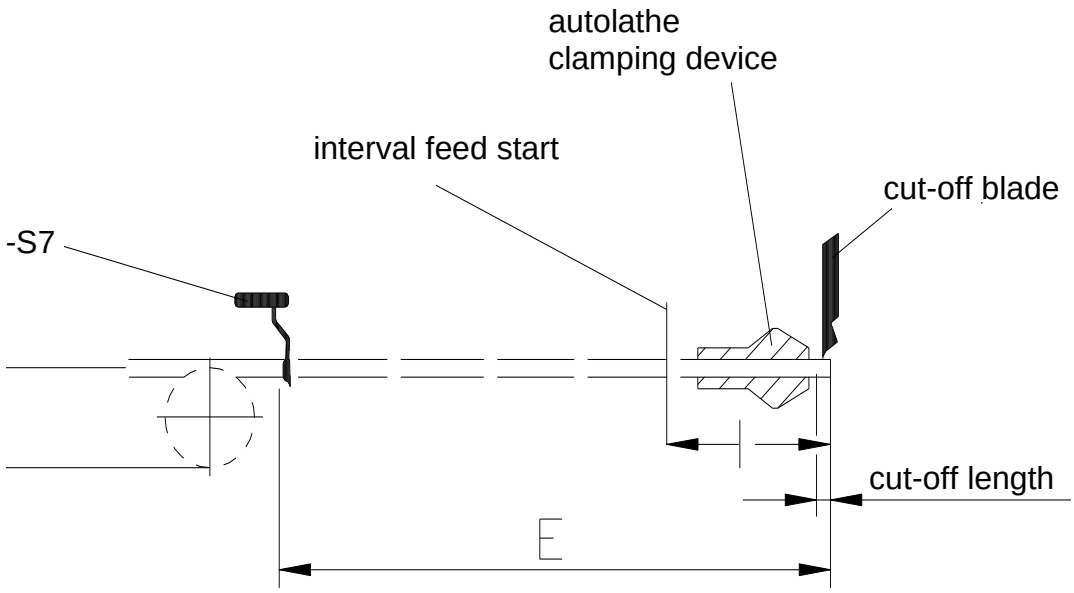
Long Autolathe



X = spindle stock travel / piece length

5.3.2 Setting the Interval Feed in Case of Polygonal Material Machining

For an easier insertion of polygonal materials into the autolathe collet, it is possible to control the material bar's feed movement in intervals at first insert. To this effect, the drive is switched on or off intermittently. The interval feed function is switched on in Automatic Operation Menu 1 via the F7 key "INTV". The path of the clocked feed movement is to be entered in the "SERVICE" menu, menu part "POSITIONS", at "TRAVEL INTERVAL ON". The PLC computes the start of the clocked feed movement by subtracting the entered value from cut-off position. In menu part "PART", the switch-on and currentless times of the feed movement can be entered under "SPECIAL SETTINGS". The time value is stated in tenths of a second.



E = first insert travel
I = interval feed

5.3.3 Setting the Bar End Values

Attention! Before setting the bar end, a reference run must have been made!

Move the feed bar with the clamping sleeve forward into the autolathe collet. Let the current position be displayed by pressing the HLP key and enter this value less 3 mm in the "SERVICE" menu in menu part "POSITIONS" under „POSITION FRONT LIMIT“. Then, in the “PART“ menu at "STANDARD SETTINGS“, enter at “ENTER PART LENGTH” the long measure of the part to be manufactured. The PLC subtracts the long measure from the front setting, thus computing the bar end value.

If, in automatic operation, the bar end value is reached or exceeded during parts follow-up, the step chain switches into step 18. Via the –K9 relay, the bar end signal is communicated to the autolathe.

The "POSITION FRONT LIMIT" does not need to be changed any more. The "PART LENGTH" must always match with the current part measure.

5.3.4 Setting the "POSITION REVERSE ROTATION" Value

At bar change, the feed bar starts running with the remnant at lower speed. From the set "POSITION REVERSE ROTATION" value on, the motor switches over to a higher speed.

The position, at which the remnant has left the autolathe spindle, must be determined. After determination of that value, enter it in the "SERVICE" menu, menu part "POSITIONS", at "POSITION REVERSE ROTATION".

5.4 Parameter Lists

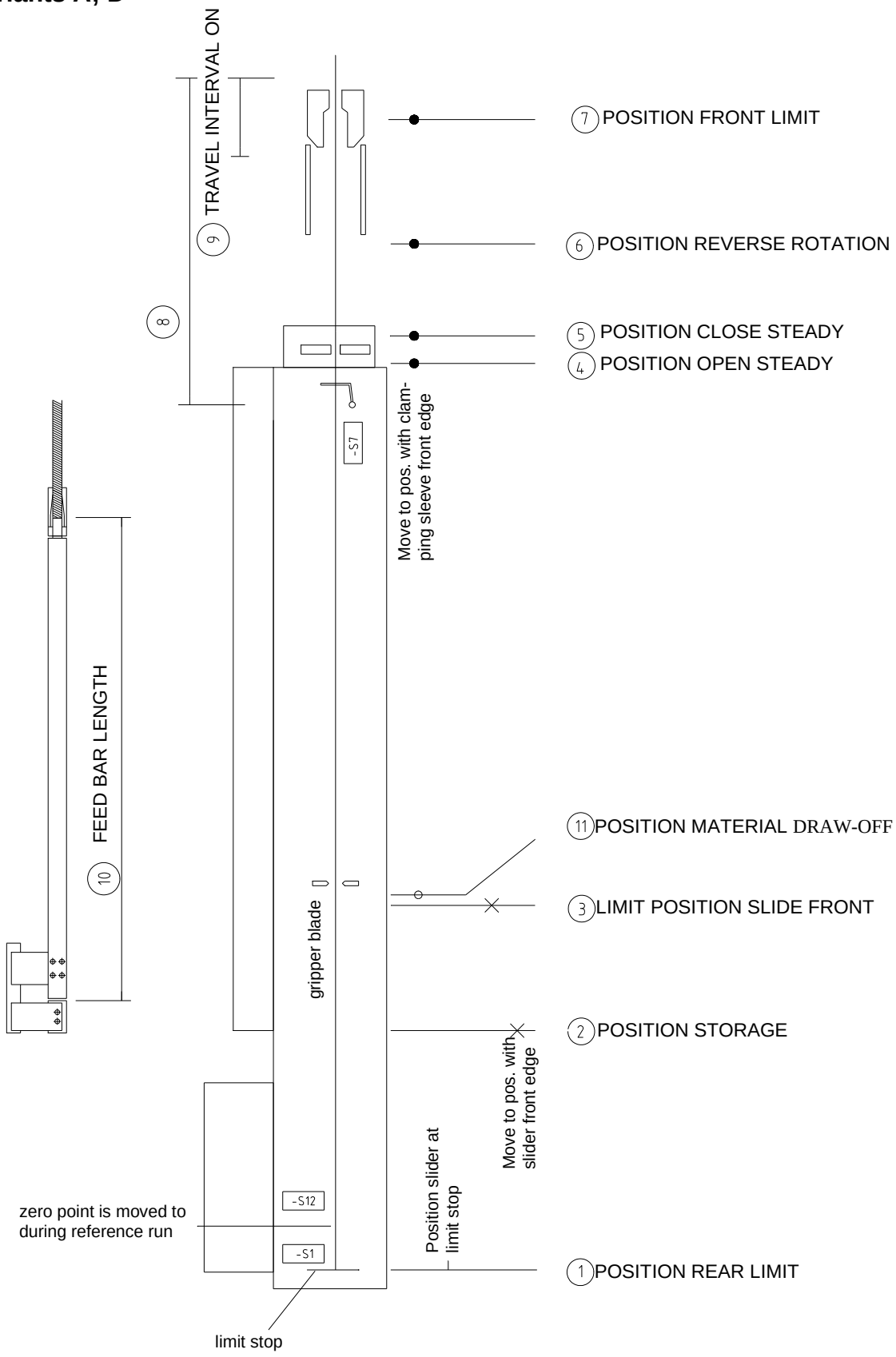
In the list below, the standard parameters are given. Determine the * marked values after loading magazine installation as described in sect. 5.3, enter them into the control panel and write them into the list shown below. The making of entries on the control panel is described in sect. 6.2.

Parameter List turbo 5-42 series 5			Variant 1		Variant 2		Variant 3		Variant 4		Variant 5	
	length		3200		4200							
	feed bar		1150	1150	1150	1150						
		Pos	standard values	current values	standard values	current values	standard values	current values	standard values	current values	standard values	current values
*FIRST INSERT TRAVEL		(8)	1200		1200							
*POSITION FRONT LIMIT		(7)	3300		4300							
POSITION REAR LIMIT		(1)	44		44							
POSITION MATERIAL DRAW-OFF		(11)	9		9							
POSITION OPEN STEADY		(4)	2450		3450							
POSITION CLOSE STEADY		(5)	2710		3710							
*TRAVEL INTERVAL ON		(9)	300		300							
*POSITION REVERSE ROTATION		(6)	2400		3400							
LIMIT POSITION SLIDE FRONT		(3)	1188		1188							
POSITION STORAGE		(2)	68		68							
FEED BAR LENGTH		(10)	1182		1182							

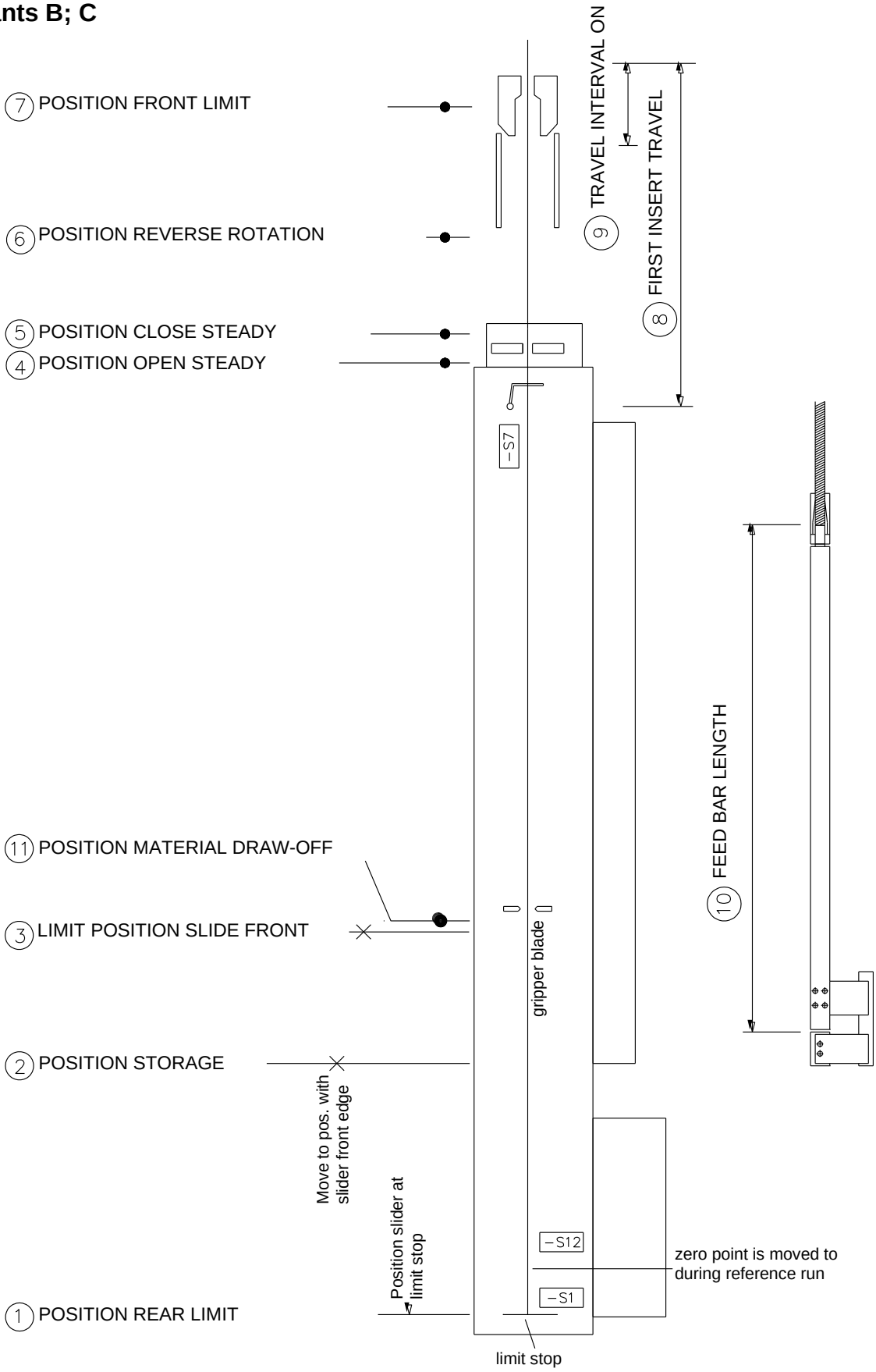
Parameter List turbo 5-42 series 5		Variant 1		Variant 2		Variant 3		Variant 4		Variant 5	
	Length	3200		4200		3200		4200			
	feed bar	1500	1500	1500	1500	1700	1700	1700	1700		
	Pos	standard values	current values	standard values	current values	standard values	current values	standard values	current values	standard values	current values
*FIRST INSERT TRAVEL	(8)	1600		1600		1600		1600			
*POSITION FRONT LIMIT	(7)	3300		4300		3300		4300			
POSITION REAR LIIMIT	(1)	44		44		44		44			
POSITION MATERIAL DRAW-OFF	(11)	9		9		9		9			
POSITION OPEN STEADY	(4)	2110		3110		1910		2910			
POSITION CLOSE STEADY	(5)	2360		3360		2160		3160			
*TRAVEL INTERVAL ON	(9)	300		300		300		300			
*POSITION REVERSE ROTATION	(6)	2400		3400		2400		3400			
LIMIT POSITION SLIDE FRONT	(3)	1540		1540		1740		1740			
POSITION STORAGE	(2)	68		68		68		68			
FEED BAR LENGTH	(10)	1532		1532		1732		1732			

5.5 Parameter Setting Positions Overview

Variants A; D



Variants B; C

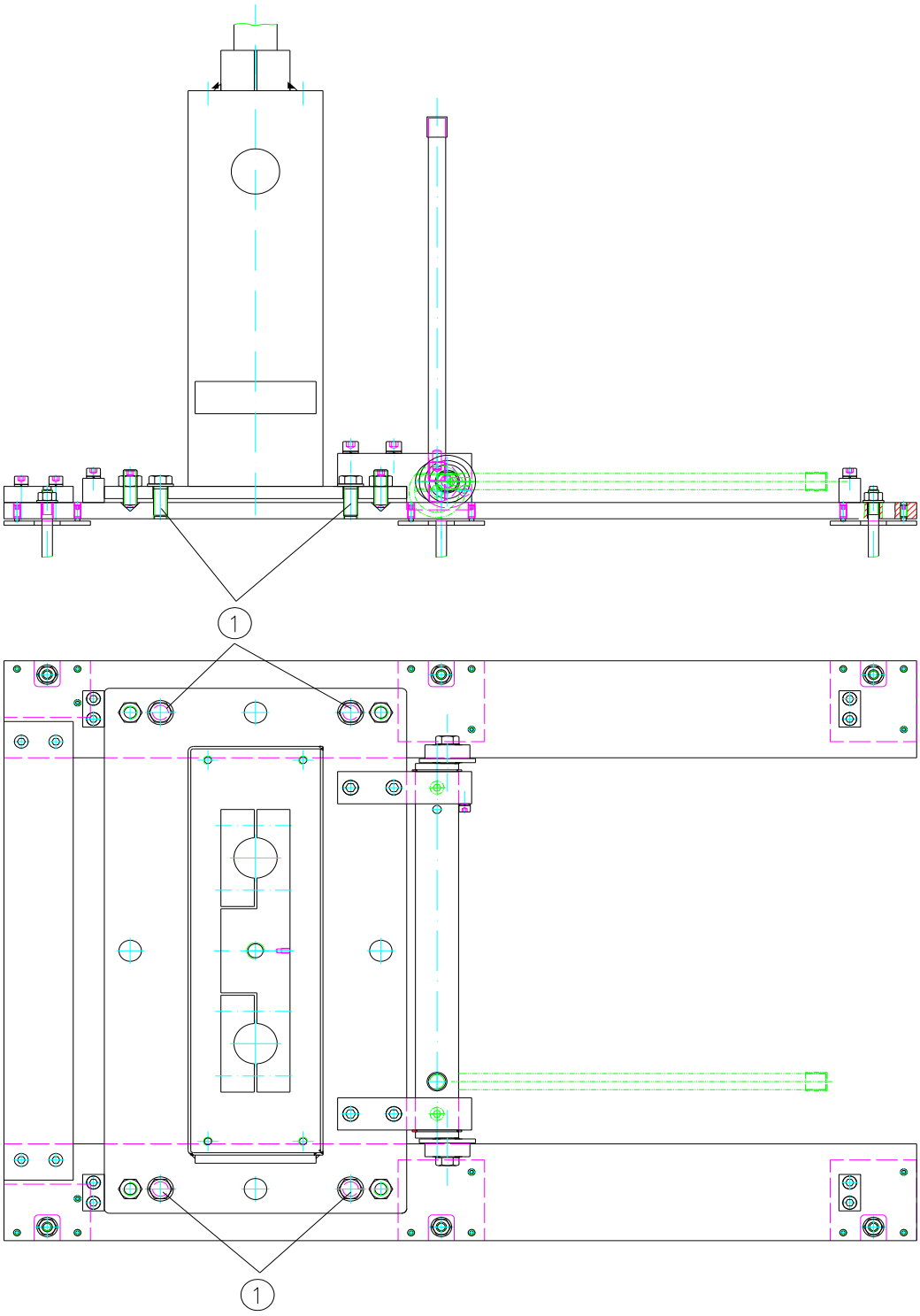

7 POSITION FRONT LIMIT
6 POSITION REVERSE ROTATION
5 POSITION CLOSE STEADY
4 POSITION OPEN STEADY
11 POSITION MATERIAL DRAW-OFF
3 LIMIT POSITION SLIDE FRONT
2 POSITION STORAGE
1 POSITION REAR LIMIT
9 TRAVEL INTERVAL ON
8 FIRST INSERT TRAVEL
10 FEED BAR LENGTH
-S7
gripper blade
Move to pos. with slider front edge
Position slider at limit stop
-S12
-S1
zero point is moved to during reference run
limit stop

6. Modules Description

6.1 Substructure

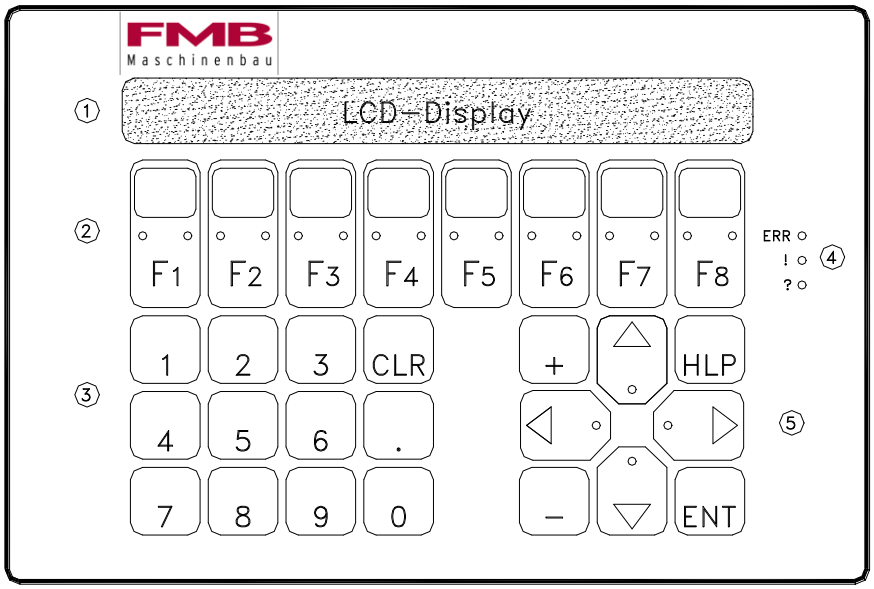
The carrier, supports, and oil reservoir modules form the substructure.
On the carrier, all parts of the loading magazine are mounted. The carrier, in turn, is screwed with the supports.
Every support can be adjusted into all directions by using 4 M 16x60 DIN 916 threaded bolts each. The screws must rest in the footplates enclosed in the scope of delivery.
After alignment, the supports have to be fastened on the ground by using M 16 anchor bolts (see sect.3).
The oil reservoir is to be placed underneath the magazine separately. Oil supply and discharge must be linked with the carrier and the oil pump connected electrically.
Upon loading magazine installation, the switch cabinet is to be placed on the ground.

6.1.1 Adjustment Facility (Option)



To prevent the loading magazine from tilting, it should be ensured, prior to item 1 fixing bolts loosening, that no material lies on the bar storage.
Before loosening the fixing bolts press EMERGENCY STOP key!

6.2 Bedientableau/Control panel/Tableau de commandes



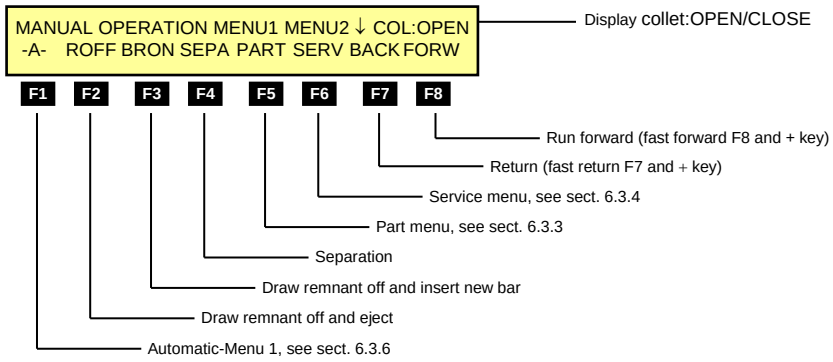
① = LCD-Display, 2zeilig mit je 40 Zeichen
② = Funktionstasten (auch als Softkeys) F1...F8 mit jeweils einer gelben und grünen Melde-LED
③ = Zehner-Tastatur für Sollwerteingabe
④ = wichtige Informations-LED's zum PCS-Status
⑤ = Cursortasten mit LED und Steuertasten für Menü und Sollwerteingabe

① = LCD-display, 2 lines with 40 characters each
② = Function keys (also as softkeys) F1...F8 with yellow and green LED indicator
③ = Numerical keypad for setpoint input
④ = Important information LEDs on PCS status
⑤ = Cursor keys with LED and control keys for menu and setpoint input

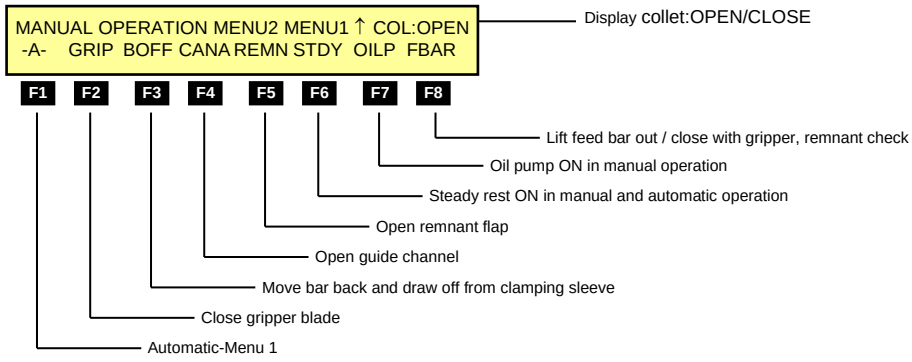
① = Ecran à cristaux liquides, 2 lignes à 40 caractères chacune
② = Touches de fonction (également programmables) F1 à F8 avec chacune une DEL jaune et une DEL verte
③ = Clavier à 10 chiffres pour l'entrée des valeurs de consigne
④ = DEL d'informations importantes concernant l'état PCS
⑤ = Touches à curseur avec DEL et touches de contrôle pour les menus et pour l'entrée des valeurs

6.3 Control Panel Menu Levels

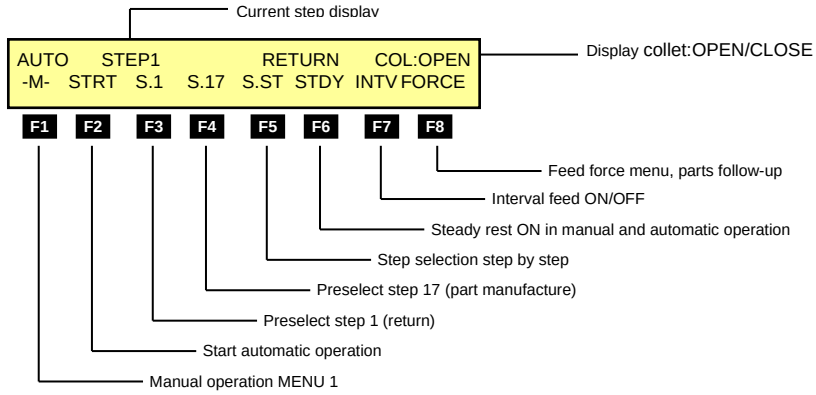
Manual Operation Menu 1



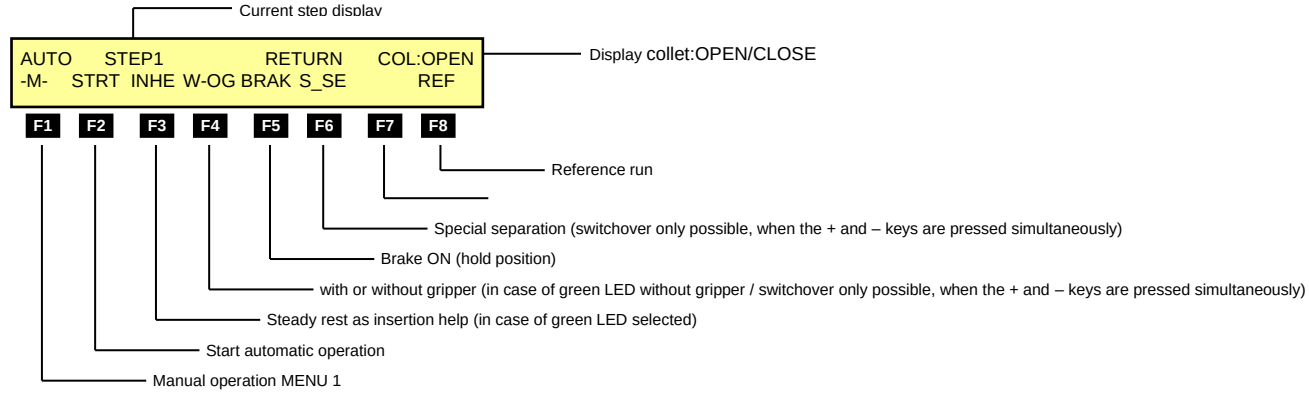
Manual Operation Menu 2



Automatic Menu 1



Automatic-Menu 2



6.3.1 Operation Levels Switchover

a) Switchover from manual operation menu 1 to manual operation menu 2 by pressing the cursor key ↓.

b) Switchover from manual operation menu 2 to manual operation menu 1 by pressing the cursor key ↑.

c) Switchover from manual operation to automatic menu 1 by means of the functional key F1 (-A-) from manual operation menu 1 or manual operation menu 2.

d) Switchover from automatic menu 1 to automatic menu 2 by pressing the cursor -key ↓.

e) Switchover from automatic menu 2 to automatic menu 1 by pressing the cursor key ↑.

f) Switchover from automatic menu to manual operation menu by means of the functional key F1 (-M-) from automatic menu 1 or automatic menu 2.

When pressing the HLP key, the following information appears in the manual operation menus in the first line of the display:

CURRENT POSITION +_____.__mm

In the second line, the text relating to the abbreviation above functional key F1 is shown. When the HLP key is kept pressed, the text can be paged forward or backward by using the cursor keys ↑ or ↓.

When pressing the HLP key in the automatic menus, the following information appears:

↑ AUTO-MENU 1 ↓ AUTO-MENU 2 COL: OPEN/CLOSE
ZÄHLER/COUNTER:_____ ZEIT/TIMER:__.__

The current values are displayed.

Similar to the manual operation menus, the cursor keys can be used to select the texts relating to the abbreviations above the functional keys.

6.3.2 Manual Operation Menu 1

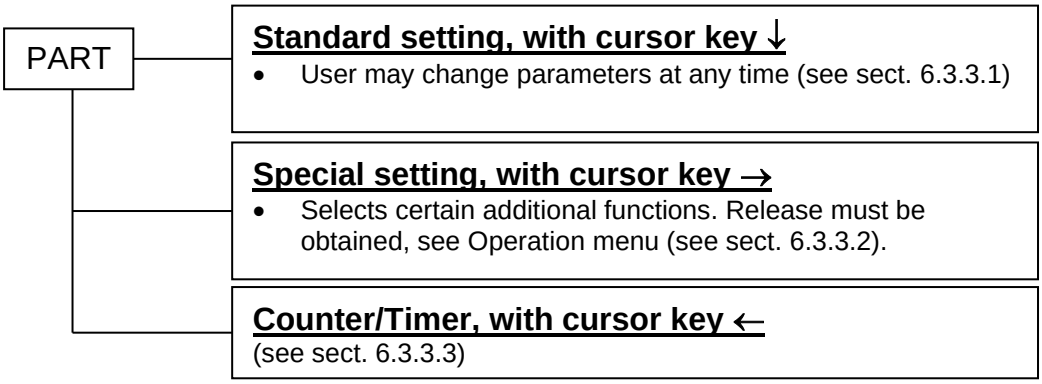
-A-
F1
Switchover into automatic menu 1

ROFF
F2
Remnant draw-off. Feed bar moves back. The remnant is drawn off the clamping sleeve and ejected.

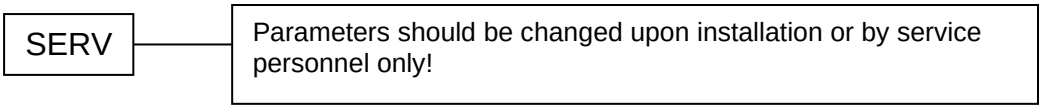
BRON
F3
Remnant draw-off and new bar insertion. Feed bar moves back. Remnant is ejected; new bar is pushed into clamping sleeve.

SEPA
F4
A new material bar is separated. Active in case of closed guide channel only.

PART
F5
Jumps into the PART menu



SERV
F6
Jumps into the SERVICE menu (see sect. 6.3.4)



BACK
F7
Feed bar moves back slowly. Fast return, when F7 and the + key are pressed simultaneously.

FORW
F8
Feed bar moves forward slowly. Fast forward, when F8 and the + key are pressed simultaneously.

6.3.3 Menu: OPERATION (PART) (SERV) (FORCE)

a) Press the respective key to call the menu.

b) Select the corresponding menu item by using the cursor keys.

c) When parameter flashes, it can be overwritten instantly. If it does not, a release must be obtained. Release can be obtained by pressing the keys **+** and **-** simultaneously.

d) Enter the values.

e) When a wrong value was entered, the former one can be retrieved by means of the CLR key.

f) Several parameters can be changed one after the other.

g) When the entered parameters are okay, the menu is to be left via the ENT key. The changed parameters will not be accepted in the control system, unless the menu is left via the ENT key.

h) Should the menu be aborted with the F1 key, the changed parameters will not be accepted, whilst the old ones remain valid.

i) After having obtained the release, a different steady rest and synchronized clutch type can be selected in the parameters Steady Rest Selection and Synchronized Clutch by using the **+** and **–** keys. (see sect. 6.3.4, SERVICE MENU: POSITIONS)

Note:

The parameters within the „SERVICE“ menu should be changed upon installation by the service team of the loading magazine manufacturer only.

6.3.3.1 Menu: PART, Standard Settings

MENU_PART	STANDARD SETTING ↓
← COUNTER/TIMER	SPECIAL SETTINGS →

↓ STANDARD SETTINGS

ENTER PART LENGTH:				_____.____mm
OK?	Y-ENT	N-CLR	ABORT-F1	CONT ↑↓

↓

FEED FORCE FOR PART FOLLOW-UP:				_____%
OK?	Y-ENT	N-CLR	ABORT-F1	CONT ↑↓

↓

FEED FORCE FOR FIRST INSERTION:				_____%
OK?	Y-ENT	N-CLR	ABORT-F1	CONT ↑↓

↓

FEED FORCE TO PRESS UPON:				_____%
OK?	Y-ENT	N-CLR	ABORT-F1	CONT ↑↓

↓

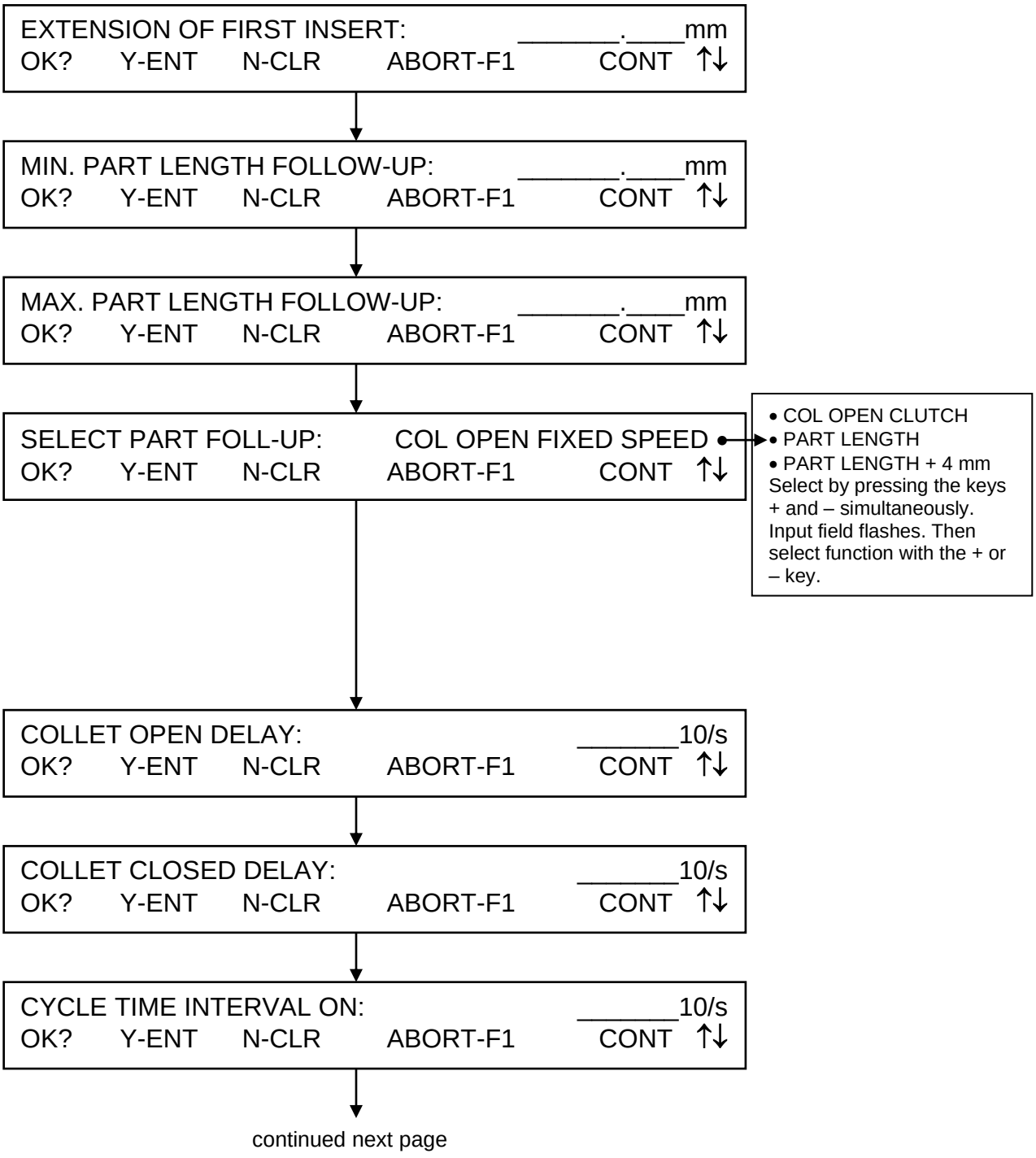
SPEED FOR PART FOLLOW-UP:				_____mm/s
OK?	Y-ENT	N-CLR	ABORT-F1	CONT ↑↓

↓

MENU: PART OK?		
Y-ENT	ABORT-F1	NO →

6.3.3.2 Menu: PART, Special Settings

→ **SPECIAL SETTINGS**



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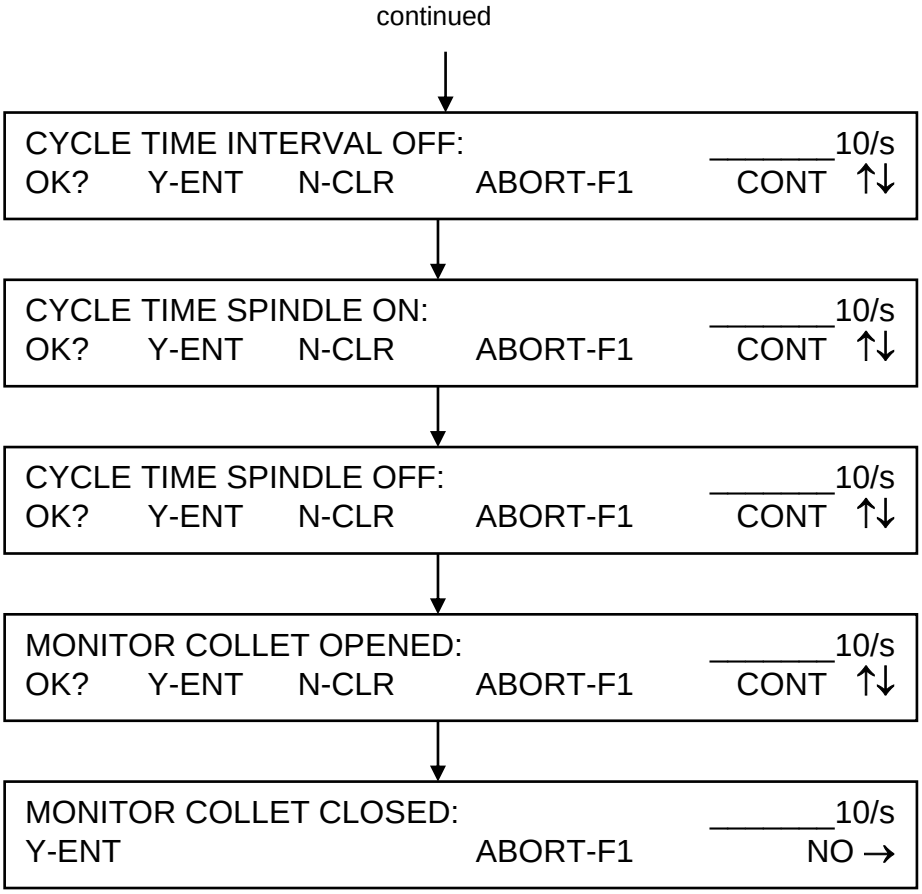
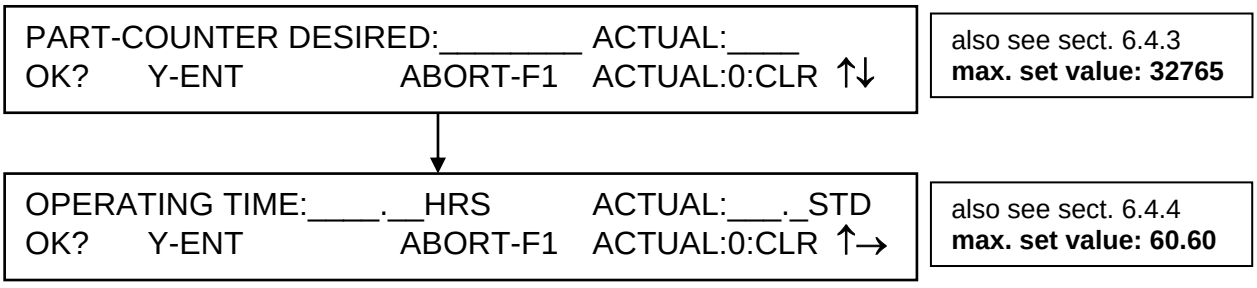


6.3.3.3 Menu: PART, Counter / Timer

← COUNTER/TIMER

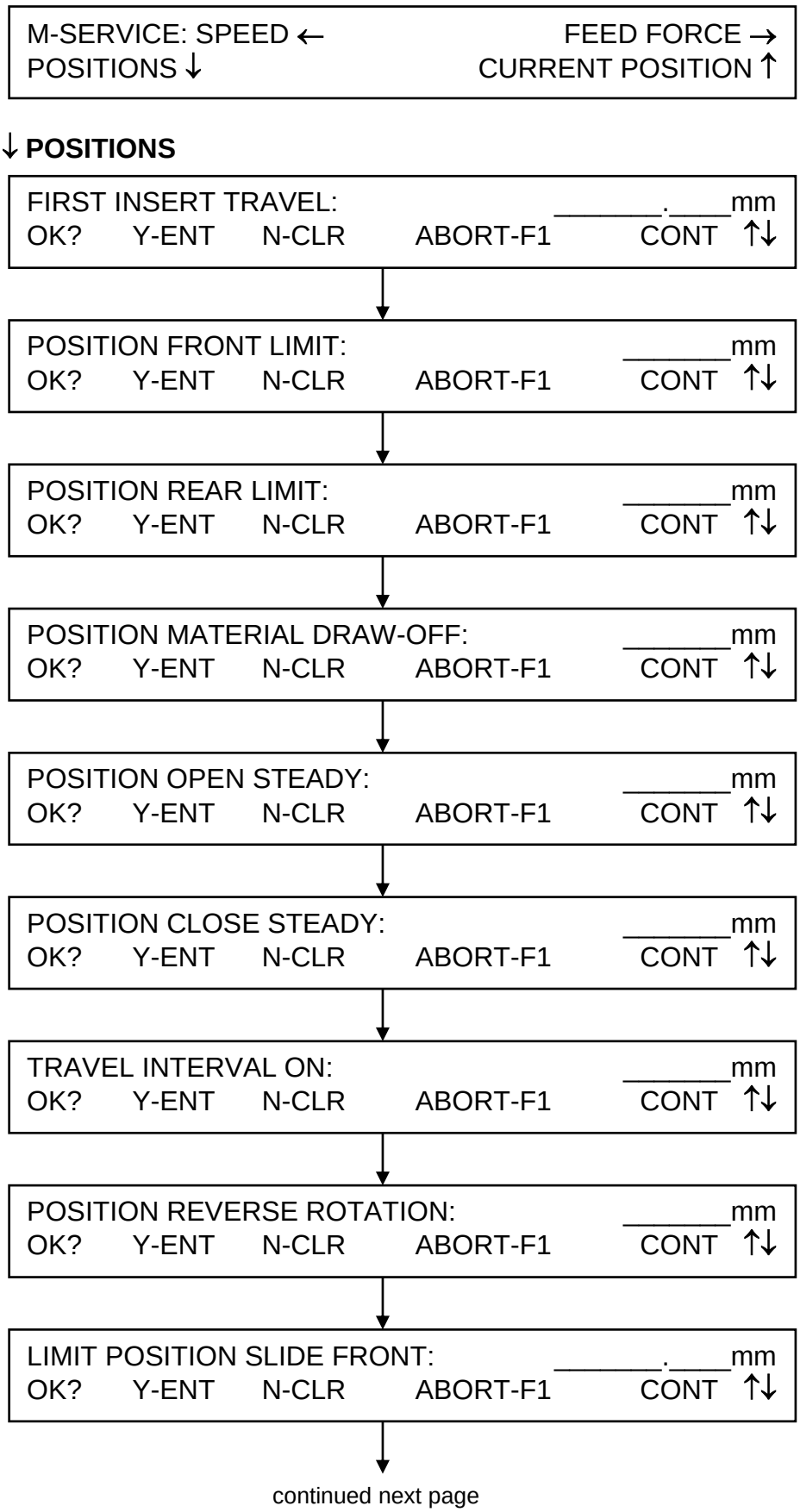


also see sect. 6.4.3
max. set value: 32765

also see sect. 6.4.4
max. set value: 60.60

__.__HRS In the input field, the 2 digits left side from the point are flashing. Here, the hours can be entered. For entering the minutes into the two digits right side from the point, the cursor key → must be pressed.

6.3.4 Menu: SERVICE



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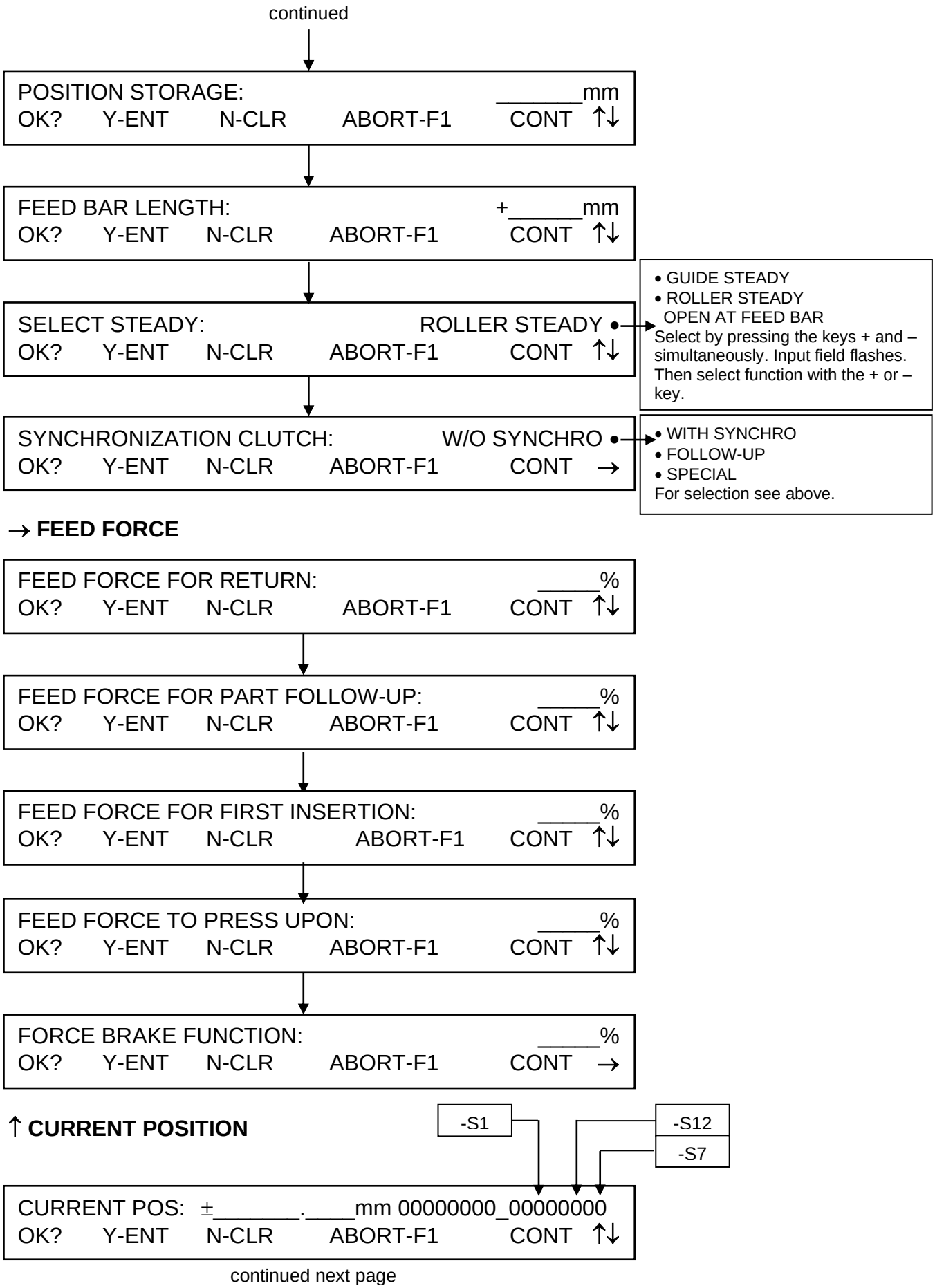

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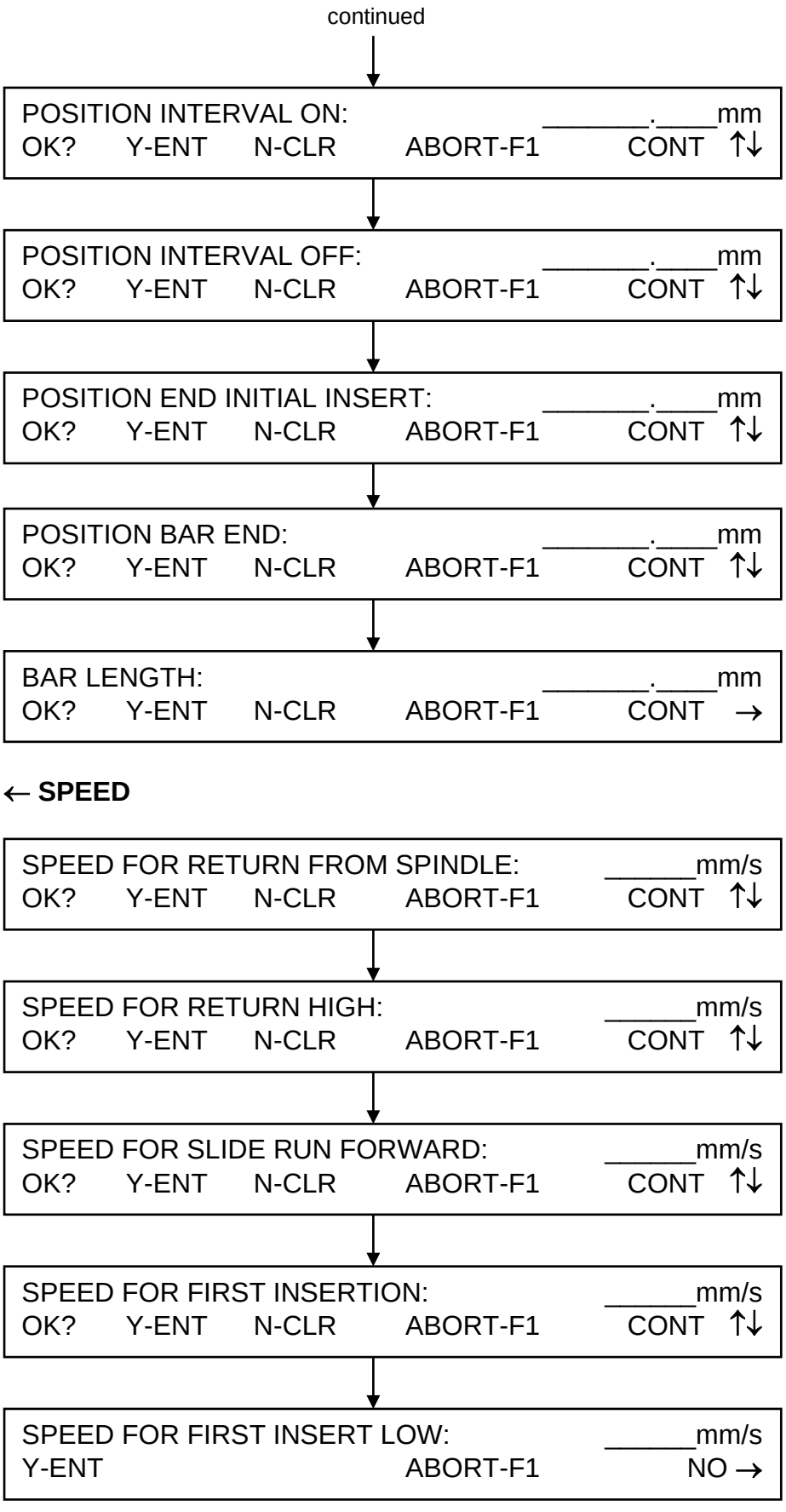

continued
POSITION INTERVAL ON: _____.____mm
OK? Y-ENT N-CLR ABORT-F1 CONT ↑↓
POSITION INTERVAL OFF: _____.____mm
OK? Y-ENT N-CLR ABORT-F1 CONT ↑↓
POSITION END INITIAL INSERT: _____.____mm
OK? Y-ENT N-CLR ABORT-F1 CONT ↑↓
POSITION BAR END: _____.____mm
OK? Y-ENT N-CLR ABORT-F1 CONT ↑↓
BAR LENGTH: _____.____mm
OK? Y-ENT N-CLR ABORT-F1 CONT →

← SPEED

SPEED FOR RETURN FROM SPINDLE: _____mm/s
OK? Y-ENT N-CLR ABORT-F1 CONT ↑↓
SPEED FOR RETURN HIGH: _____mm/s
OK? Y-ENT N-CLR ABORT-F1 CONT ↑↓
SPEED FOR SLIDE RUN FORWARD: _____mm/s
OK? Y-ENT N-CLR ABORT-F1 CONT ↑↓
SPEED FOR FIRST INSERTION: _____mm/s
OK? Y-ENT N-CLR ABORT-F1 CONT ↑↓
SPEED FOR FIRST INSERT LOW: _____mm/s
Y-ENT ABORT-F1 NO →

6.3.5 Manual Operation Menu 2

-A- F1	Switchover into Automatic Menu 1
GRIP F2	Close/open gripper blade
BOFF F3	Feed bar return with material bar, close gripper blade, material bar will be drawn off.
CANA F4	Open/close guide channel
REMN F5	Open/close remnant flap
STDY F6	Steady rest function switch on/off in manual and automatic operation
OILP F7	Oil pump switch on/off in manual operation
FBAR F8	Close gripper blade. If there are no remnant and no material bar in the clamping sleeve, the feed bar is lifted off. Upon next actuation of the F8 key, the lifted off feed bar will be swung in again. The feed bar must be in its rear limit position.

6.3.6 Automatic-Menu 1

-M- F1	Switchover into manual menu 1
STRT F2	Start automatic operation
S.1 F3	Selection of step 1: feed bar return from autolathe spindle
S.17 F4	Selection of step 17: part production
S.ST F5	Move on step by step from step 1-20
STDY F6	Steady rest function switch-on/off in manual and automatic operation
INTV F7	Interval feed switch-on
FORCE F8	Option to change the feed force for parts follow-up. Changing is possible in switched-on/off automatic operation. Setting is described in sect. 6.3.3 Menu: OPERATION.

6.3.7 Automatic-Menu 2

-M-
F1
Switchover into manual menu 1

STRT
F2
Start automatic operation

INHE
F3
The steady rest to serve as insertion help. The steady rest closes, when the bar's front, upon first insertion, has moved through the guide jaws. This way, the bar's front is raised into the center of the spindle.

W-OG
F4
Selection: with or without gripper function
(yellow LED = with gripper; green LED = without gripper)
Function can only be switched over when pressing the + and – keys simultaneously.

BRAK
F5
Brake ON. Feed bar will be kept in position.

S_SE
F6
Special separation
yellow LED = separation at opened guide channel
green LED = separation at closed guide channel
Function can only be switched over when pressing the + and – keys simultaneously.

REF
F8
When the automatic operation is not yet active, the reference run can be activated. As long as the function is active, the green LED in the F8 key lights. After reference run completion, the yellow LED will light (also see sect. 6.2).

6.4 Switching the Unit ON and OFF

6.4.1 Switching the Unit ON

The main switch at the autolathe must be in position ON. When the autolathe is ready for operation, pressing the F2 key in Automatic Menu 1 can start the loading magazine's automatic operation.
The loading magazine then continues its operation at the stepping point where it was switched off.
If, in switched-off condition, any change has been made, switch-on should be done in the sequence as described in sect. 5.2.

6.4.2 Switching the Unit OFF

The unit is to be switched off at the autolathe.

Attention!

Automatic operation should be shut down with the F2 "STOP" key, preferably after a bar change and after several parts have been produced with closed clamping devise.

Self-acting automatic operation switch-off after consumption of the material bar stock or response of safety devices at the autolathe or within the loading magazine.
Should the unit be switched off with the clamping device being open or during motor rotation, a reference run must be made by pressing the F2 key after switch-on.

On the control panel, the following text is displayed:

MAKE REFERENCE RUN
STRT

6.4.3 Operation with Parts Counter

Select manual operation menu 1 by pressing the F1 "-M-" key. Then press the F5 key "PART" to select the "PART" menu and move with cursor key ← into menu item "PARTS COUNTER". Enter set value and leave the menu by pressing the ENT key. Start automatic mode then. After reaching the set value, the counter switches the automatic mode off and the yellow LED above the F2 key will flash. Before resetting the actual value or the set and actual value, the automatic mode can no longer be started now.
To reset the actual value in menu item "PARTS COUNTER", press the CLR key. For resetting the set value in menu item "PARTS COUNTER", enter "0" or a new set value (0 = counter OFF).

6.4.4 Operation with Programmed Operating Time

Press the F1 "-M-" key to select manual operation menu 1. Then press the F5 key "PART" to select the „PART“ menu and proceed via the cursor key ← into menu item "PARTS COUNTER". There, use cursor key ↓ to select the menu item "OPERATING TIME“. Enter the set value and leave the menu by pressing the ENT key. Start the automatic mode. Upon reaching the set value, the operating time switches the automatic mode off causing the yellow LED above the F2 key to flash. Now, before resetting the actual value or the set and actual values, the automatic mode can no longer be started.
For resetting the actual value in menu item "OPERATING TIME", press the CLR key. To reset the set value in menu item “OPERATING TIME” enter „0“ at hours and minutes or a new set value (hours and minutes 0 = operating time OFF). For switchover from hours to minutes, press the cursor key →.

6.5 Steady Rest

The steady rest guides the material bar directly behind the autolathe spindle. Upon entry of the feed bar, the diameter of which is usually bigger than that of the material bar, the steady rest opens.
In case of closed position, the guide jaws are pressed together.
The opened position of the steady rest should be set such that the feed bar may pass, though. The guide jaws, however, should provide a slight guidance yet. For that purpose, the locking screw (see illustration) is available.

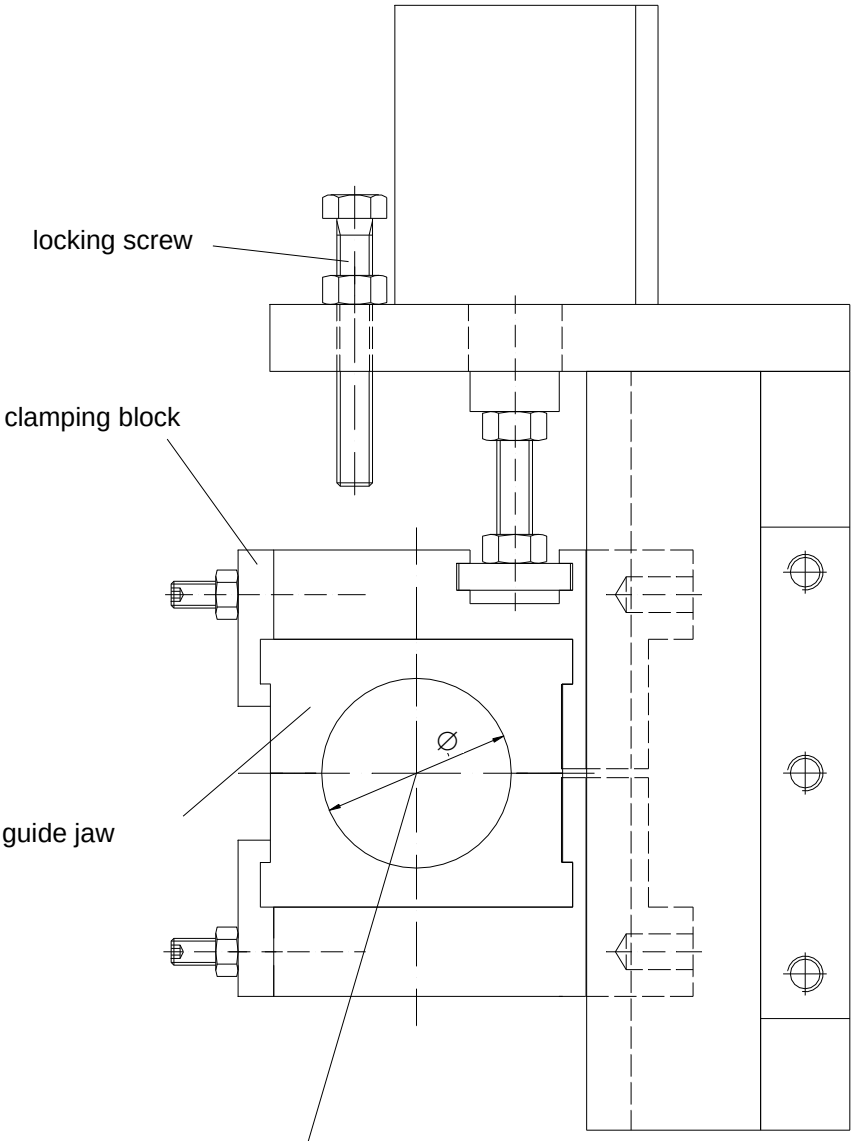
Changing the Guide Jaws

The steady rest’s guide jaws have to be matched with the material diameter. Selection should be made such that the jaw diameter does not exceed the autolathe spindle’s diameter. However, it should be 1 to 2 mm bigger than the diameter of the material to be machined.
For changing the jaws, loosen the hexagonal nuts at the clamping blocks.
Polyamide-made guide jaws are available in the sizes listed below:

Guide Jaws	Ident No.	Material Diameters to be Machined
D7	2021-764	from 5 to 6 mm
D10	2021-765	from 6 to 9 mm
D15	2021-766	from 9 to 14 mm
D16	2027-704	from 14 to 15 mm
D20	2021-767	from 15 to 19 mm
D22	2027-705	from 19 to 21 mm
D25	2021-768	from 21 to 24 mm
D28	2030-119	from 24 to 27 mm
D30	2021-769	from 27 to 29 mm
D32	2023-714	from 29 to 31 mm

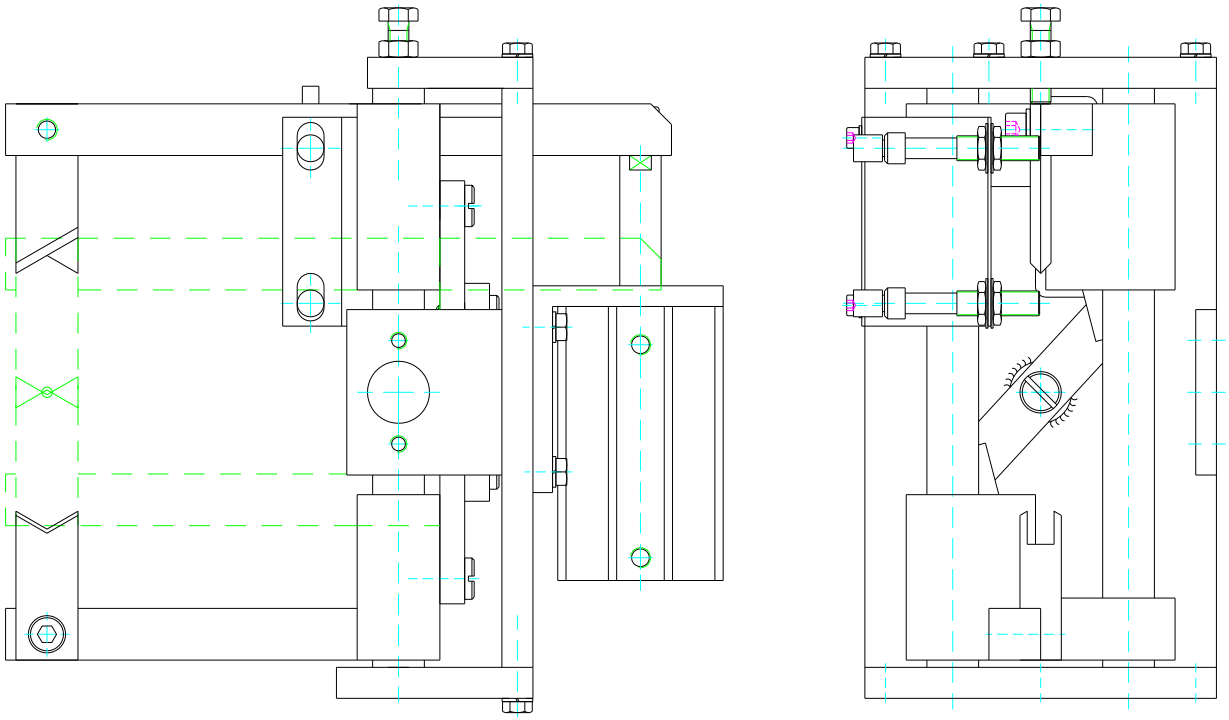
D34	2024-758	from 31 to 33 mm
D35	2021-770	from 33 to 34 mm
D36	2024-970	from 34 to 36 mm
D40	2024-717	from 36 to 39 mm
D42	2021-771	from 39 to 41 mm
D44	2029-328	from 41 to 42 mm

Before opening the cover, press the EMERGENCY STOP key and close the compressed air shut-off valve in order to ventilate the unit.



6.6 Gripper - Function and Mode of Operation

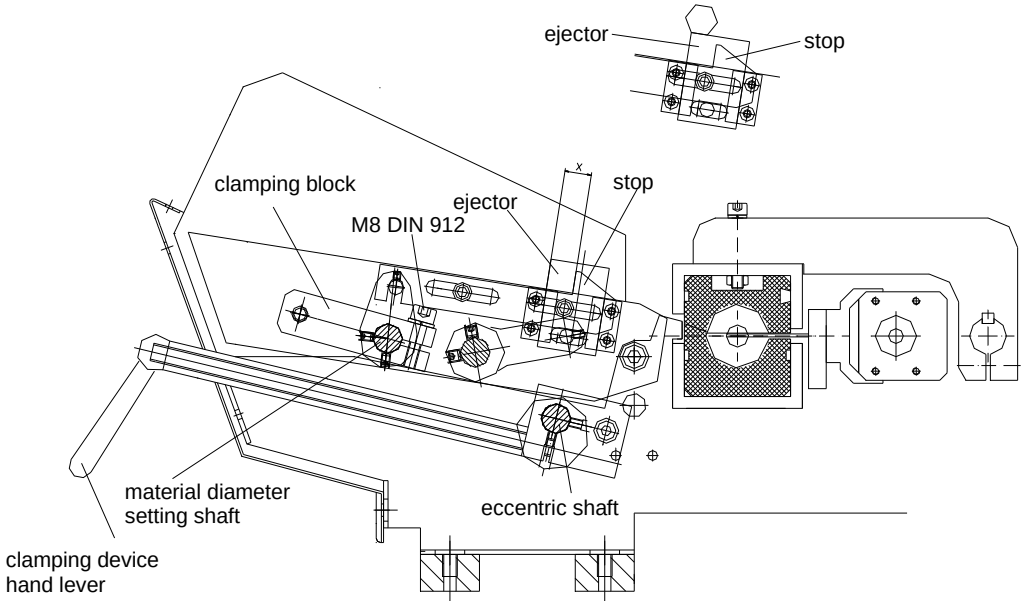
By means of the gripper it is possible to slide the swung-in material bar, before machining, into the clamping sleeve of the feed bar and to remove the remnant therefrom.
The gripper is actuated via a pneumatic cylinder.
The closing motion is made through a system of levers and the bars are raised to the center of the spindle automatically.
For draw-up, the material bar, or, in case of draw-off, the remnant, is transported into the gripping position between the gripper blades. Then the gripper is closed and the feed bar's clamping sleeve is slid, by means of the main drive, on to the material bar for draw-up and, for draw-off, pulled from the remnant.



6.7 Lateral material Storage

In the lateral material storage, the material bars are stocked up and separated for bar change. The separation device consists of ejectors and stops, which are distributed over the bar's length.

Example: Polygonal Material



6.7.1 Setting the Material Diameter

For setting the requested material diameter, a bar of the material to be machined should be laid on and the M8 DIN 912 screw (hexagon socket, size 6) of the clamping block loosened.
Then turn the stop by means of the M20 hexagonal nut (WS 30), which is situated right-side at the end of the setting shaft, such that between the ejector's and the stop's front edges a measure of approx. 2/3 of the material diameter (round, square materials) is available.
In case of polygonal material, the stop should be set such that the ejector, at maximum, lifts up across the entire storage area of the polygonal material (see illustration). Then drive the screw of the clamping block in.

6.7.2 Setting the Angle

The angle of the lateral material storage depends on both the size and shape of the material laid on. The following rule applies:

small polygonal material - biggest angle
big round material - smallest angle.

In order to adjust the angle of the lateral material storage, the clamping device of the eccentric shaft needs to be loosened by using the two hand levers. At such moment, the lateral material storage must be free of any material. Via the M20 hexagonal nut (WS 30) situated right side at the end of the eccentric shaft, the latter is moved such that the lateral material storage adjusts to the angle desired. Both hand levers of the eccentric shaft are cramped again, whilst controlling the required material's slideability by means of a bar laid on. Repeat setting process, if necessary.

6.8 Drive

The feed bar and, in conjunction therewith, the material bar are pulled by an 8 m long chain. At the rear deflection point, the drive motor with clutch is mounted. At the front deflection point, the incremental shaft encoder is situated, which communicates the feed bar's position to the PLC.

6.8.1 Clutch

The -KY1 feed clutch (electromagnetic clutch) transmits the motion from the –M1 feed motor to the feed chain drive. It delimits the torque to be transmitted. The PLC triggers the clutch via an amplifier module (-N3).

The feed force of the clutch depends on the direct voltage available and can be set on the control panel via the F8 key "FORCE" in Automatic Menu 1 or in Manual Operation Menu 1 in the "SERVICE" menu at "FEED FORCE". For a detailed description of the setting options, see sect. 6.2 Control Panel, please.

When in Automatic Menu 2 the "Brake ON" (F5, BRAK) function is selected on the control panel, the clutch is triggered with the value set in menu item "FEED FORCE" at "FORCE-BRAKE FUNCTION". During parts production, the triggering is active in case of a closed collet.

6.8.2 Motor and Servoamplifier

6.8.2.1 Servomotor with Tacho

Description

The servomotor is plate-mounted underneath the carrier.
For sufficient cooling, the motor should be installed such that the air can freely circulate around it. No optimum service life will be achieved, unless the motor is dust and splash-proof.

Mechanical Assembly During Repair Works

The roller bearings' service lives essentially depend on the thoroughness, which the assembly is done with.

- Be careful that the coupling elements without feather key are balanced well, as the servomotor has been balanced with the entire feather key (in case of motors with feather key).
- Thoroughly check the alignment of the servomotor's shaft with that of the spindle drive in order to avoid vibrations, unbalance or too heavy a straining of the shaft.
- Avoid any shock to the shaft, because the roller bearings, fittings or machined surfaces of the shaft might be impaired.

Electrical Connection

- Check whether the protective earth is connected properly. Earthing must be made through the motor's enclosure.
- Viewed from the motor shaft's end, the servomotor rotates clockwise when the red conductor of the motor is connected with the positive terminal.
- When the motor races, the connection leads of the tacho generator must be exchanged.
- If the motor rotates into the wrong direction, the leads of the tacho generator and the motor need to be exchanged.
- The servomotor must be protected electrically in order to avoid too high a current, which would lead to premature servomotor wear.
  In general, these servomotors are fed by an electronic supply unit, which supplies a more or less strongly inverted current.

6.8.2.2 Type BN Servoamplifier

The servo booster serves to trigger the built-in servo motor (highly dynamic direct current motor with permanent magnet and collector). All components are accommodated on a printed circuit board in European format (100x160 mm) and the customer module.

In case of the built-in version having the connection from the front (type V), all connections are located on the front plate. Besides, the trimming potentiometers and light emitting diodes are situated here. The control signals are connected via a 15-pin SUB-D socket, whereas the motor, tacho generator and operating voltage are connected through an 8-pin Combicon plug-in connection.

Trimming Potentiometers

The front plate of the amplifier is provided with apertures through which the 4 trimming potentiometers can be accessed. The order of these trimming potentiometers from top to bottom is as follows:

Designation on front plate	Designation in wiring diagram	Meaning	Effect in case of clock-wise direction of rotation
return	P 1	amplification setting	amplification increases
speed	P 2	speed setting	speed increases
zero point	P 3	zero point setting	
current	P 4	current setting	current increases

Attention! **The trimming potentiometers, upon commissioning, are adjusted by the loading magazine manufacturer in the factory and should not be readjusted at site any more!**

Light Emitting Diodes

On the amplifier's front panel, there are, above the trimming potentiometers, the following three light emitting diodes available:

Meaning	Color	Indication
fault	red	lights, when fault is stored, flashes as long as thermal switch is open
ready	green	lights, when ready, flashes when ready, but cleared
overflown	yellow	lights, when switchover from pulsed current to constant current was made

The **red** light emitting diode lights when a fault is given or stored. It flashes when the thermal safety switch of the cooling element has switched the amplifier to fault and temperature has not yet decreased such that the unit could be switched on again.

The **green** light emitting diode lights when the unit is ready for operation, i.e. when regulator release is closed and no fault applying. It flashes when the operating voltage is connected, but the final stage blocked, because either regulator release is missing or a fault given.

The **yellow** light emitting diode lights when the I^2t circuit, due to overflow, has switched back to constant current.

Upon mains voltage switch-on, the amplifier remains blocked until all voltages are stably available. During that period of a few tenths of a second, the red light emitting diode will light.

6.8.3 Chain Drive

The chain drive serves to move the feed bar.
At the rear end, the motor with the clutch is mounted, whereas the crank is mounted on its front end.
To ensure bar feed accuracy, the chain must be restretched every two months. For that purpose, a chain-stretching device is mounted at the rear deflection point. The chain should be stretched such that the loading magazine can still be moved by hand easily. If the chain is stretched too heavily, the loading magazine becomes stiff, whilst wear and tear will increase.

6.8.4 Crank

For maintenance works and settings, a crank can be used at a coupling mounted at the front deflection point of the chain drive. This crank is enclosed in the delivery loosely. It falls down when let off.

Before putting the crank on, press the EMERGENCY STOP key and close compressed air shut-off valve at the loading magazine to ventilate the unit. In order not to confuse the servo control system, the crank must only be used when main switch is ON.

Attention!

**Preferably, the electric manual feed should be used.
The crank shall be used in exceptional cases only!**

6.9 Guide Channel

In order to attenuate the vibrations that occur during turning, the guide channel consists of polyurethane inserts being kept in aluminium profiles.
The oil filling and the feed bar with its turnable clamping sleeve that sits on the material bar's end support this effect.

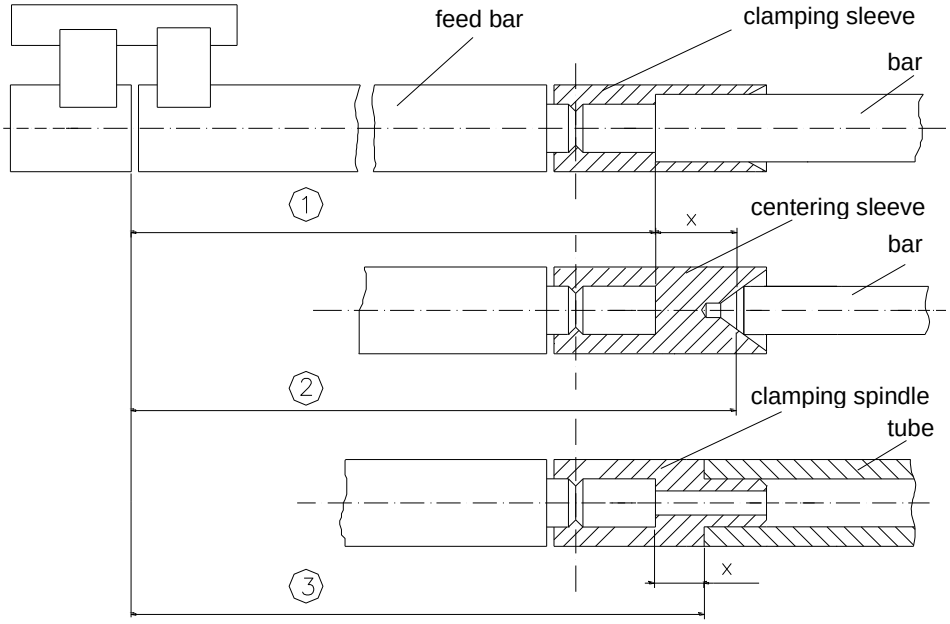
Depending on straightness, material bars with up to 20 mm difference in diameters can be machined without requiring the guide channel to be replaced (converted).

6.9.1 Feed Bar

The feed bar makes it possible to lead the bar end behind the collet of the autolathe. At its tip, it is provided with a bearing insert on which the clamping sleeve, which is to be replaced depending on the material, is mounted by means of threaded bolts. At its rear end, the feed bar is connected via a coupling piece with the carriage of the chain drive.

6.9.2 Clamping Sleeves / Centering Sleeves / Clamping Spindles - Function and Use

For bar end guidance, **clamping sleeves** (1), **centering sleeves** (2) or **clamping spindles** (3) are required at the feed bar.
At the turnable bearing insert of the feed bar, the clamping sleeves, centering sleeves and clamping spindles are fastened with threaded bolts.

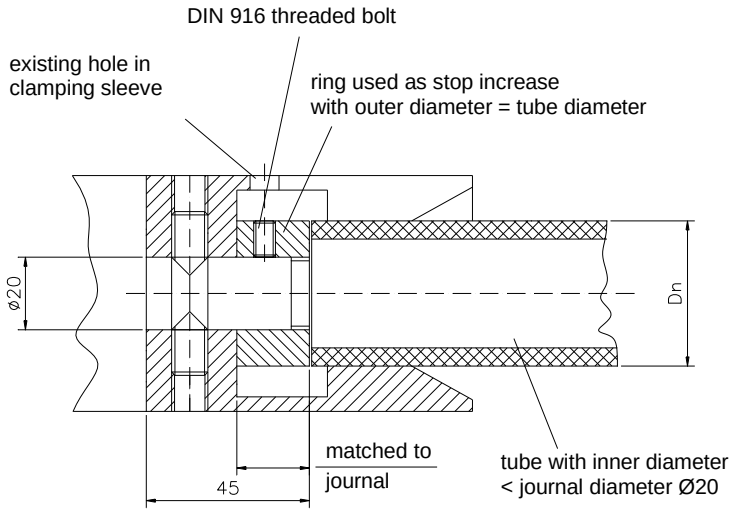


1 feed bar length with clamping sleeve
2 feed bar length with centering sleeve
3 feed bar length with clamping spindle

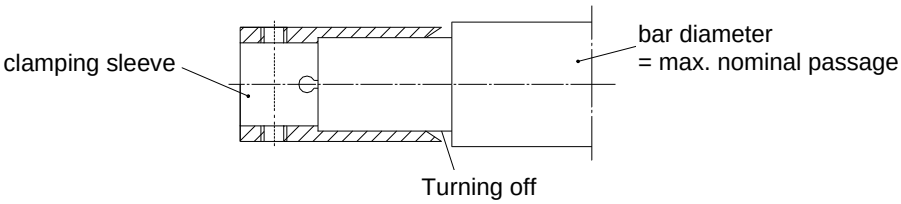
6.9.2.1 Working with Clamping Sleeve

For hexagonal as well as square materials and, in particular, brass as well as light metal profiles machining, clamping sleeves with punched in octagons or bihexagons should be used.

When machining tubes having inner diameters in excess of 20 mm, a ring should be mounted in the clamping sleeve for stop increase in order to obtain the same first setting as with full materials. This ring is matched in length such that it sits close to the bottom of the clamping sleeve's hole and forms one surface together with the journal. The ring should be secured by means of a threaded bolt, which is to be inserted through the lateral holes of the clamping sleeve.



When the guide tube/telescopic tube is to be used up to full passage, the ends of the material bars should be turned off for clamping sleeve reception.



Example of order:

Clamping sleeve **SHT** D 32 / 26.0

clamping diameter
given in 1/10 mm (here: 26.0 mm)

feed bar diameter or passage
(here: 32.0 mm)

Attention! In case of feed bar diameter 15, clamping sleeve **SHK** is required!

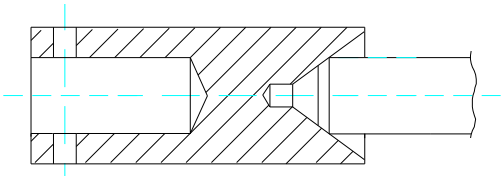
outer diameter (mm)	15	25	32	36	42
inner diameter (mm)	up to 13.0	up to 22.0	up to 28.0	up to 32.0	up to 42.0

Other guide channels and clamping sleeve diameters available on request.

6.9.2.2 Working with Centering Sleeve

Attention! **Centering sleeves cannot be used on movable spindle stock autolathes.**

Centering sleeves are used when bars having roughly feed bar diameter (guide channel diameter) are to be machined. Here, the remnant cannot be drawn to the rear.
At bar change, it will be ejected into the autolathe instead. At the side to be guided, the bar end must have a centric chamfer that fits into the centering sleeve.



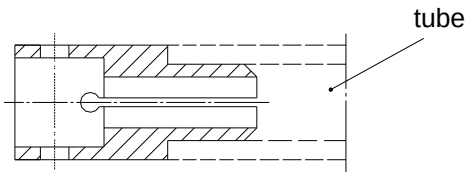
Control Panel Settings

- Switch on "W-0G" (without gripper, remnant removal to the front) function in Automatic Menu 2 (see sect.6.3.7);
- Activate "BRAK" (brake) function in Automatic Menu 2 (see sect.6.3.7);
- Determine feed bar extension by using the centering sleeve in accordance with the drawing shown on page 65;
- Enter new feed bar length in the "SERVICE" menu under "POSITIONS" at menu item "FEED BAR LENGTH" (before changing the value, the + and – keys must be pressed simultaneously until the value starts to flash). To leave the menu press the ENT key.

Attention! **When working with the centering sleeve, the remnant must be removed in forward direction (through the autolathe)! Should material diameter considerably deviate from the guide channel diameter used, a reduction of the maximum possible speed can be reckoned with.**

6.9.2.3 Working with Clamping Spindle

Clamping spindles enable tube materials to be guided at their inner diameters.



Control Panel Settings

- Determine feed bar extension by using the clamping spindle in accordance with the drawing shown on page 65.

- Enter new feed bar length in the "SERVICE" menu under "POSITIONS" at menu item "FEED BAR LENGTH" (before changing the value, the + and – keys must be pressed simultaneously until the value starts to flash). To leave the menu press the ENT key.

6.9.3 Guide Tube/Telescopic Tube between Loading Magazine and Autolathe

6.9.3.1 Autolathe with Movable Spindle Stock

The guide tube/telescopic tube bridges the distance between the front end of the loading magazine and the autolathe's spindle end. It serves as protective cover and prevents rotating parts from being ejected.

Before commissioning, the specified guide tube/telescopic tube shall be mounted between autolathe spindle and loading magazine. During loading magazine operation, the guide tube/telescopic tube must be present.

Autolathes with movable spindle stocks must not be operated without telescopic tubes or fixed spindle reductions projecting from the loading magazine into the spindle of the autolathe.

Attention!

Mount the telescopic tube in accordance with the drawing enclosed. By stating the respective order number, this drawing can be requested from FMB.

The inner diameter of the guide tube/telescopic tube depends on the feed bar built-in.

Fixed Spindle Reduction:

Should mounting of a telescopic tube be impossible, the autolathe can be operated with a fixed spindle reduction. For that purpose, the loading magazine guide tube contained in the conversion kit is slid into the spindle. Hence, the maximum possible bar diameter is limited.
The following should be noted:

- The guide tube's outer diameter must be 1 to 2 mm smaller than the spindle's inner diameter.
- The length of the guide tube should be fixed such that it bridges the gap between loading magazine and spindle, whilst excluding any spindle destruction.
- The guide tube's inner diameter must be 2 mm bigger than the diameter of the feed bar built-in.
- The smallest wallthickness of the guide tube should be 2 mm at least.

6.9.3.2 Autolathe with Fixed Spindle Stock

The guide tube bridges the distance between the front end of the loading magazine and the autolathe's spindle end. It serves as protective cover and prevents rotating parts from being ejected.

Before commissioning, the specified guide tube shall be mounted between autolathe spindle and loading magazine. During loading magazine operation, the guide tube must be present.

The guide tube's inner diameter depends on the feed bar built-in. When installing the loading magazine, the length of the guide tube must be taken into account (see sect. 6.9.4.3).
It should be fixed such that there is a gap of 5 mm at maximum between the end of the autolathe spindle and the guide tube's front end or such that the guide tube projects into the autolathe spindle. This gap must not be within operator's reach!

6.9.4 Magazine Conversion

Unit must be free of any pressure and tension!

The loading magazine is fitted and delivered with the guide channel diameter ordered. By using conversion kits, it can be converted to other passages as well.

To this effect, the following worksteps are necessary:

- polyurethane inserts replacement
- feed bar replacement
- guide tube replacement/reduction in the telescopic tube

Conversion Kit Order Example:

3200 / 1500 / 32

- 32 → **nominal guide channel passage** (information on insert)
- 1500 → **feed bar length L**
- 3200 → **length of lateral material storage** (max. bar length: 3,200 mm)

6.9.4.1 Polyurethane Inserts Replacement

Before replacement, possibly available material must be removed from the guide channel or the feed bar's clamping sleeve. To this effect, the magazine is switched into manual operation, the collet of the autolathe opened, the feed bar moved into the rear limit position, and the material drawn off the feed bar. Then the feed bar is swung out and the guide channel opened.

Attention!

Before swing-out, check whether the material is really drawn off!

All works mentioned can only be done when cover is closed!

Before opening the cover, press EMERGENCY STOP key and close compressed air shut-off valve at the magazine to ventilate the unit!

By using a larger screwdriver, the inserts, which are kept in position by means of elastic strips, can be removed from the aluminium profile. The new inserts should be placed into in the same way. (see illustrations on pages 76 and 78).

6.9.4.2 Feed Bar Replacement

Unit must be free of any pressure and tension!

Every conversion kit is fitted with a special feed bar and the respective lifting plate.

For replacement, proceed as follows:

1. Switch magazine into manual operation and open autolathe collet.
2. Move feed bar into its rear limit position.
3. Draw off and remove existing material from guide channel.
4. After material draw off, swing feed bar out.
5. Press EMERGENCY STOP key and close compressed air shut-off valve to ventilate the unit.
6. Open cover.
7. Remove fastening screws of the lifting plate and take feed bar together with them out.
8. Insert and align new feed bar and associated lifting plates.
9. Replace tappet.
10. Check the parts installed as to whether swing-in is possible again.
    The following points are essential in this respect:
    - seat of the inserts
    - carriage in rear limit position
    - no material in guide channel
    - the feed bar's lug must be within the guide.
11. Close cover, pull EMERGENCY STOP key, open compressed air shut-off valve and delete fault.
12. Swing in feed bar in manual operation.
13. Press EMERGENCY STOP key, close compressed air shut-off valve to ventilate the unit and open the cover.
14. Check lifting plates position as to whether feed bar can pass easily. If necessary, loosen fastening screws to adjust.
15. Close cover, pull EMERGENCY STOP key, open compressed air shut-off valve and delete fault.
16. Set steady rest in accordance with sect. 6.5.

6.9.4.3 Guide Tube Replacement

Unit must be free of any pressure and tension!

Attention! **Also see section 6.9.3.**

In the transition zone between steady rest and autolathe spindle, a guide tube is inserted. Depending on the type of conversion kit, this tube may project as a fixed spindle reduction into the spindle or end just before the spindle (5 mm).
In case of autolathes with movable spindle stock, the guide tube must project into the spindle or an adequate telescopic tube be used. Guide tube length and outer diameter must be adjusted to the dimensions of the spindle.

For guide tube replacement, proceed as follows:

1. Switch magazine into manual operation, open autolathe collet and move feed bar into rear limit position.
2. When material is available, draw off and remove it from guide channel (see sect. 8).
3. Press EMERGENCY STOP key and close compressed air shut-off valve to ventilate the unit.
4. Dismantle cover at the drain reservoir.
5. Open clamping block and remove guide tube receiver (aluminium-made part) completely.
6. Loosen threaded bolts in the guide tube receiver with sleeve and bushing and take parts out.
7. Mount new guide tube with sleeve and bushing in reverse order.
8. Mount cover.
9. Pull EMERGENCY STOP key, open compressed air shut-off valve and delete fault.

6.9.4.4 Replacing the Reduction Inserts in the Telescopic Tube

Attention!

The possible reduction inserts are included in the telescopic tube delivery. When replacing, mind the drawing enclosed. This drawing can be requested from FMB by stating the corresponding order number.

Attention!

Also see section 6.9.3.

How to replace the reduction inserts in the telescopic tube:

1 Switch the magazine into manual mode, open autolathe collet and move feed bar into its rear limit position.

2 Draw off material, if any, and remove it from guide channel.

3 Press EMERGENCY STOP key and close compressed air shut-off valve in order to vent the unit.

4 Demount cover at discharge container.

5 Open clamping block, push telescopic tube together, and mount reduction according to the drawing enclosed in the delivery.

6 Remount telescopic tube in reverse order.

7 Mount cover.

8 Release EMERGENCY STOP key, open compressed air shut-off valve and delete fault.

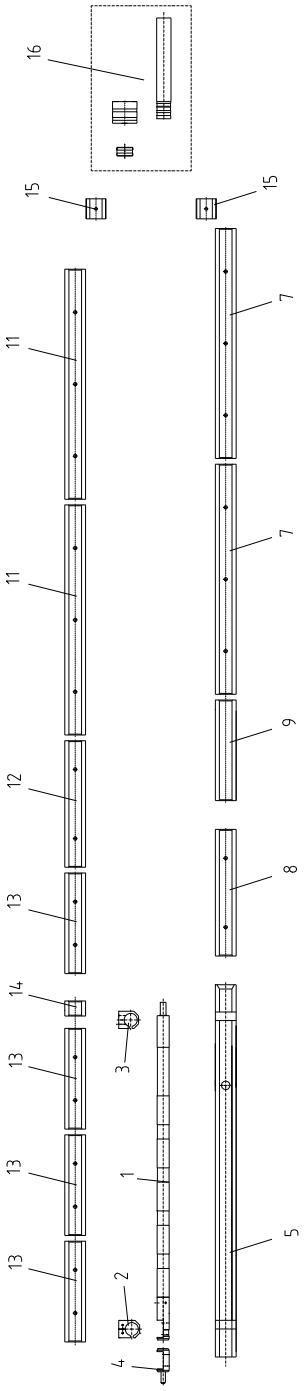
6.9.4.5 Installation Example: Conversion Kit D42/1150/3200-4200

(other conversion kits available on request)

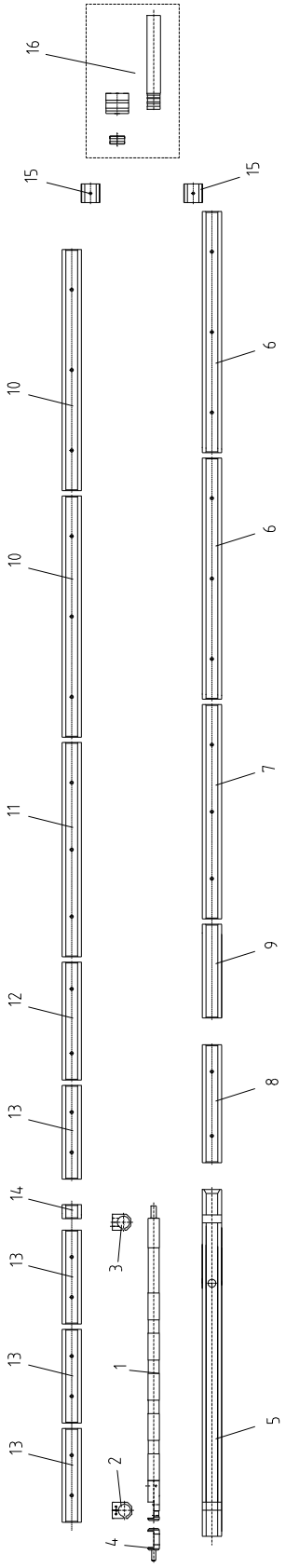
Pos.	Designation		pc./pcs. D42/3200	pc./pcs. D42/4200
1	feed bar		1	1
2	lifting plate, rear		1	1
3	lifting plate, front		1	1
4	tappet		1	1
5	insert, bottom, rear	1295	1	1
6	insert, bottom	900	-	2
7	insert, bottom	800	2	1
8	insert, bottom (remnant flap)	440	1	1
9	insert, bottom	350	1	1
10	insert, top	900	-	2
11	insert, top	800	2	1
12	insert, top	440	1	1
13	insert, top	350	4	4
14	insert, top	52	1	1
15	guide jaw		2	2
16	guide tube/telescopic tube		1 kit	1 kit

Conversion Kit Illustration

conversion kit D42/1150/3200



conversion kit D42/1150/4200



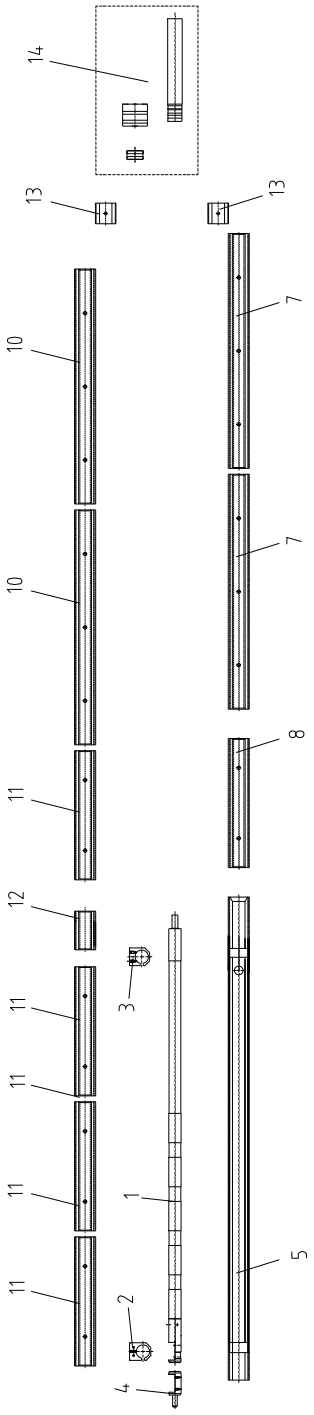
6.9.4.6 Installation Example: Conversion Kit D32/1500/3200-4200

(other conversion kits available on request)

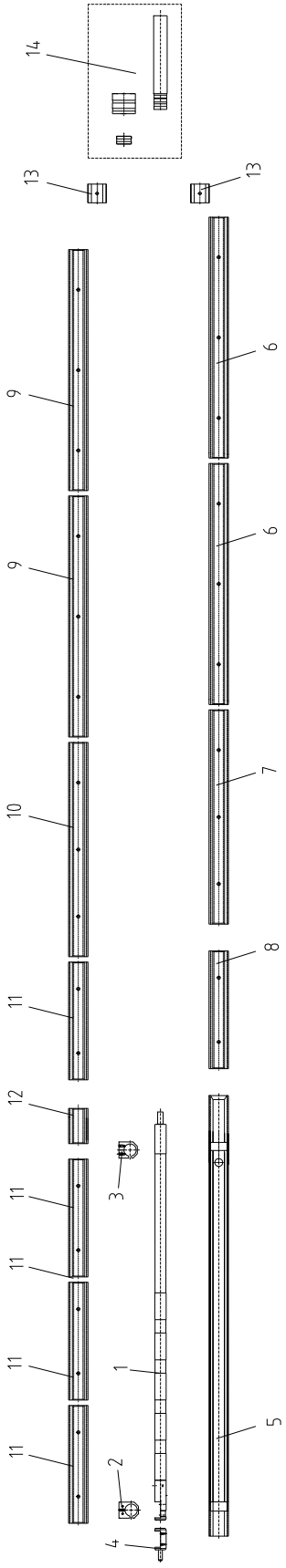
Pos.	Designation		pc./pcs. D32/3200	pc./pcs. D32/4200
1	feed bar		1	1
2	lifting plate, rear		1	1
3	lifting plate, front		1	1
4	tappet		1	1
5	insert, bottom, rear	1645	1	1
6	insert, bottom	900	-	2
7	insert, bottom	800	2	1
8	insert, bottom (remnant flap)	440	1	1
9	insert, top	900	-	2
10	insert, top	800	2	1
11	insert, top	440	4	4
12	insert, top	132	1	1
13	guide jaw		2	2
14	guide tube/telescopic tube		1 kit	1 kit

Conversion Kit Illustration

conversion kit D32/1500/3200



conversion kit D32/1500/4200



6.10 Oil Supply

The volume of the inflowing oil can be regulated with the shut-off valve that is mounted at the submerged pump. The oil should be supplied in the absolutely necessary volume only. For correct oil volume setting, the shut-off valve is turned roughly into “zero” position and then opened until smooth running is ensured.

Refill oil only when loading magazine is switched off and after a waiting time of 1 hour!

For smooth running of the loading magazine, oil viscosity is decisive, too (see Technical Data).

7. Functional Description

7.1 Mode of Operation

The magazine is loaded from the lateral storage through bar separation up to the guide channel.
When the feed bar is swung out and the guide channel opened, the material bar falls into the guide channel, which will close then. (Optionally, a bar lift can be supplied for storage).
Now, the slider pushes the material bar forward until the bar end is within gripper's reach.
The slider moves back with the feed bar being swung in. Then the gripper closes, the feed bar moves forward and slides the clamping sleeve over the material bar's end (for inner tensioning of tubes, clamping spindles are used). The feed starts.

After reaching the cut-off position, the feed bar stops and a signal is transmitted to the autolathe.
Now, machining starts.

The oil filled guide channel and the guide steady rest placed in between autolathe and guide channel ensure precise bar guidance, as it is required for machining.
The bearing inserts integrated into the feed bar allow for working at high speeds. The guide tube/telescopic tube fastened at the front of the magazine, additionally acts as a spindle reduction.
The loading magazine works at autolathe cycle. After manufacture of the last possible workpiece, the autolathe's workflow is stopped with the clamping device being open.
For remnant removal, the feed bar moves back. When the remnant is under the gripper blades, feed bar will stop moving. The gripper blades close and the feed bar moves into its rear limit position. The remnant is drawn off the clamping sleeve. If no remnant was supplied, a fault message will be released and the unit switched off. After having thrown the remnant from the remnant flap into the remnant bin, another remnant fall-out check is made via the gripper and the –S13 switch. If no error is reported, the feed bar swings out and opens the guide channel to receive a new material bar. Now, the workflow starts anew.

Should, in case of automatic operation, a fault occur, the automatic workflow will be interrupted (yellow LED in the F2 key to light on control panel). This fault message is communicated to the autolathe. The -K30 relay is released, whilst the error message is displayed on the control panel.

When the fault is removed and the error message acknowledged by pressing the CLR key, the current switching step will be displayed again. Now, automatic workflow can be started again by pressing the F2 key "STRT".

7.2 Automatic Workflow

Hereinafter, automatic operation with switched-on gripper function is depicted.

Display Information	Step Function
AUTO STEP:1 RETURN COL:OPEN -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Return from autolathe spindle at low speed. As of the value set at "POS. REVERSE ROTATION", the motor, at high speed, returns to "POSITION MATERIAL DRAW-OFF". When the position is reached, step 2 is switched into.
AUTO STEP:2 CLOSE GRIPPER BLADES -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Gripper blades close and grip the remnant. The no longer actuated –S14 switch and a transfer time switch into step 3.
AUTO STEP:3 DRAW-OFF REMNANT -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Gripper blades remain closed. Feed bar moves back into rear limit position. Switch –S1 switches into step 4.
AUTO STEP:4 OPEN GRIP. BLADE-OPEN CHANN. -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Guide channel opens. Gripper blades open. Remnant falls down to remnant flap. Switch -S14 switches into step 5.
AUTO STEP:5 OPEN REMNANT FLAP -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Guide channel is open. Remnant flap swings out. Remnant falls into remnant bin. The no longer actuated switch -S17 and a transfer time switch into step 6.
AUTO STEP:6 CLOSE REMNANT FLAP -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Guide channel is open. Remnant flap swings into base position. Gripper blades close and switch –S13, actuated in closed position, switches into step 7.
AUTO STEP:7 LIFT FEED BAR -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Guide channel is open. Feed bar is raised. The material separation moves down. The switching flap of the starting switch -S7 is swung down. Switches -S17 and-S22 switch into step 8.
AUTO STEP:8 SEPARATE MATERIAL -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Guide channel is open. Feed bar is ejected. Material separation moves up causing a new material bar to be raised from the lateral storage and to fall into the open guide channel. A transfer time and the switches -S5 and -S22 switch into step 9.

Display Information	Step Function
AUTO STEP:9 CLOSE CHANNEL -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Feed bar remains ejected. Guide channel closes. Switches -S22, -S6, and -S14 switch into step 10.
AUTO STEP:10 SLIDE FORWARDS/BACKWARDS -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Feed bar remains ejected. Slide moves forward and slides the bar end into the position that was entered under "LIMIT POSITION SLIDE FRONT" on the control panel. Then the slide moves back into the rear limit position. Switch -S1 switches into step 11.
A.S:11 FEED BAR SWING IN/CLOSE GRIPPER -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Feed bar swings into guide channel. Gripper blades close and grip the new material bar. Switch -S23, a transfer time and the non-actuated switch -S14 switch into step 12.
AUTO STEP:12 RUN FORWARD / PRESS UPON -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Gripper blades remain closed. Feed bar moves forward into "POSITION MATERIAL DRAW-OFF". The reached position and switch -S23 switch into step 13.
AUTO STEP:13 OPEN GRIPPER BLADES -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Gripper blades open. Switch -S14 switches into step 14.
AUTO STEP:14 FIRST INSERT COL:OPEN -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Oil pump switches on and continues to be switched on till step 19. Feed bar slides material bar into autolathe spindle until bar's front is in cut-off position. This position is computed out of the value entered under "FIRST INSERT TRAVEL". When the "INTERVAL FEED" function is selected, the motor slides the set travel with the set cycle time forward. Upon reaching the cut-off position, step 15 is switched into.
A.S:15 START LATHE (S12) COL:OPEN -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Via the –K1 relay, the message "BAR CHANGE END - PROGRAM START" is communicated to the autolathe. Upon autolathe collet closing, the contact "collet open" releases and switches into step 16.
A.S:16 MATERIAL CUT OFF (13) COL:CLOSE -M- STRT S.1 S.17 S.ST STDY INTV FORCE	The bar's front is cut-off. After cut-off, step 17 is switched into via the "collet open" contact.

Display Information	Step Function
A.S:17 PART PROD.BAR L.: COL:OPEN -M- STRT S.1 S.17 S.ST STDY INTV FORCE	The material bar is machined. Current bar length is shown in the display. When the message "collet open" is applying from the autolathe, the motor, with the clutch being switched on, slides the material bar forward. If, during parts follow-up, the value computed in the PLC for the bar end ("POSITION FRONT LIMIT" less "PART LENGTH") is exceeded, step 18 will be switched into.
A.S:18 INSERT LAST PART COL:OPEN -M- STRT S.1 S.17 S.ST STDY INTV FORCE	The last material is fed into the autolathe. Via the releasing contact "collet open", step 19 is switched into.
A.S:19 MACHINE LAST PART COL:CLOSE -M- STRT S.1 S.17 S.ST STDY INTV FORCE	The last workpiece is machined. Through the –K9 relay, the message "BAR END – PROGRAM STOP" is communicated to the autolathe. When the last part is machined completely, the autolathe uses contact "cycle end" to switch into step 20.
A.S:20 STOP LATHE / BAR CH. : COL:OPEN -M- STRT S.1 S.17 S.ST STDY INTV FORCE	Relay -K9 is switched on. A transfer time switches into step 1.

7.3 Error Messages

Display Information	Cause of Trouble, Remedy
EMERGENCY STOP	EMERGENCY STOP key on control panel is pressed.
FAULT: NO AIR PRESSURE CHECK AIR PRESSURE MIN: 4 BAR	Pressure switch -S11, check whether compressed air shut-off valve is open.
FAULT: MOTOR PROT. Q1 TRIPPED CHECK MOTOR M1, SWITCH Q1 ON	Switch motor protection switch -Q1 on again.
FAULT: MOTOR PROT. Q2 TRIPPED CHECK OIL PUMP, SWITCH Q2 ON	Switch motor protection switch -Q2 on again.
FAULT: GUIDE CHANNEL NOT CLOSED CHECK GUIDE CHANNEL BACK FORW	Solenoid valve -Y1.1 must be switched on.
FAULT: OPENING- CLOSING OF GUIDE CHANNEL NOT CORRECT	When the guide channel is open, switch -S5 must be actuated. In case of closed guide channel, switch -S6 must be actuated.
FAULT: PRESS UPON NOT CORRECT	When the clamping sleeve was pressed upon the new material bar, the "POSITION MATERIAL DRAW-OFF" has not been reached.
FAULT: NO RETURN OF REMNANT	During enquiry in steps 3 and 4, switch -S13 was actuated.
FAULT: NO NEW BAR IN GUIDE CHANNEL	During material insertion in steps 11 and 12, switch -S13 was actuated.
FAULT: MONITORING TIME BAR CHANGE EXPIRED	The bar change in step 20 as well as in steps 1 to 15 did not run correctly.
FAULT: MONITORING TIME MOTOR EXPIRED	A motor program was running too long, e.g. when from the autolathe the contact "collet open" is applying for more than 5 minutes.

Display Information	Cause of Trouble, Remedy
FAULT: PART FOLLOW UP TOO SHORT	Active only, if in the „PART“ menu under „SPECIAL SETTINGS“ a value >0 is entered at: "MIN. PART LENGTH FOLLOW-UP". When the entered value is not reached during parts follow-up, a fault message will be released.
FAULT: PART FOLLOW UP TOO LONG	Active only, if in the „PART“ menu under „SPECIAL SETTINGS“ a value >0 is entered at: "MAX. PART LENGTH FOLLOW-UP". When the entered value is exceeded during parts follow-up, a fault message will be released.
FAULT: COLLET OPENED TOO LONG	Active only, if in the „PART“ menu under „SPECIAL SETTINGS“ a value >0 is entered at: "MONITOR COLLET OPENED". The time value is stated in tenths of a second.
FAULT: COLLET CLOSED TOO LONG	Active only, if in the „PART“ menu under „SPECIAL SETTINGS“ a value >0 is entered at: "MONITOR COLLET CLOSED". The time value is stated in tenths of a second.
FAULT: SERVO CONTROLLER / MOTOR	Servocontroller releases a fault message.
FAULT: REMNANT JAMMED IN CLAMPING SLEEVE	During remnant fall-out check in step 6, switch -S13 was not actuated.
FAULT: AXIS CONTROLLER	The APM module releases a fault message.
FAULT: COVERS NOT CLOSED	Switches -S72 and -S74 are not actuated.
FAULT: STARTING SWITCH S7 NOT IN HOME POSITION	Actuation flap for switch -S7 is not in its initial position or switch -S7 is not actuated.
FAULT: REMNANT FLAP NOT CLOSED	Solenoid valve -Y10.1 is not switched on or switch -S17 was not actuated.

8. Removing a Material Bar from Guide Channel

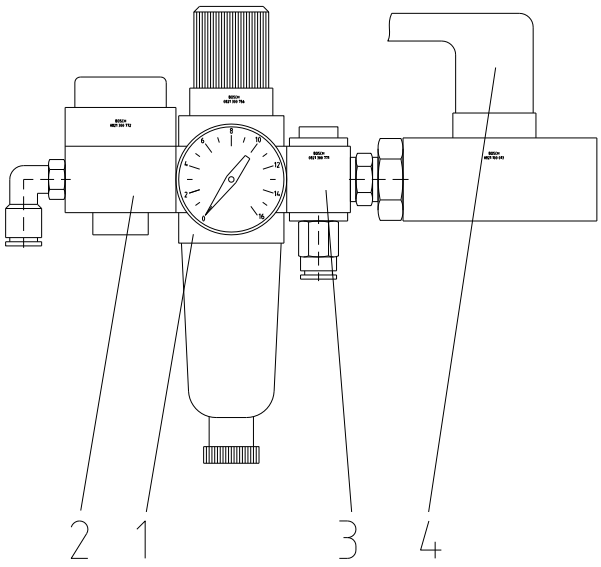
For removing a long material bar from the guide channel, the following worksteps are necessary:

- Select manual operation menu 2.
- Press the F3 key "BOFF"; the green LED in the F3 key lights (BOFF = draw long bar off).
- When the BOFF program is over, the yellow LED in the F3 key will light.
- Press the EMERGENCY STOP key and close compressed air shut-off valve at the loading magazine in order to ventilate the unit.
- Open cover.
- Slide material bar into the direction of the autolathe in order to enable gripper blade closing without material.
- Close cover.
- Unlock EMERGENCY STOP key and open compressed air shut-off valve at the loading magazine in order to aerate the unit.
- Press the F8 key "FBAR": Feed bar will be swung out.
- Press the F4 key "CANA": Guide channel will open.
- Press EMERGENCY STOP key.
- Disconnect compressed air supply by turning the shut-off valve in order to ventilate the unit.
- Open cover.
- Draw material bar to the rear into the direction of the magazine’s end.
- Should bars be on storage, empty storage.
- Move material ejector (separation) downward by turning the shaft.
- Raise material bar via lateral storage out of the guide channel.
- Convert magazine, if necessary, and re-load material bars as requested.
- Close cover.
- Connect compressed air supply again.
- Unlock EMERGENCY STOP key.
- Press the F4 key "CANA": The guide channel closes.
- Press the CLR key in order to delete the "GUIDE CHANNEL NOT CLOSED" fault message.
- Press the F8 key "FBAR": The feed bar is swung in again.

9. Maintenance Works and Settings

9.1 Maintenance Unit

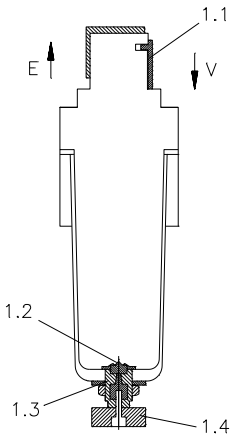
Ident. no. 2035-709



Consisting of:

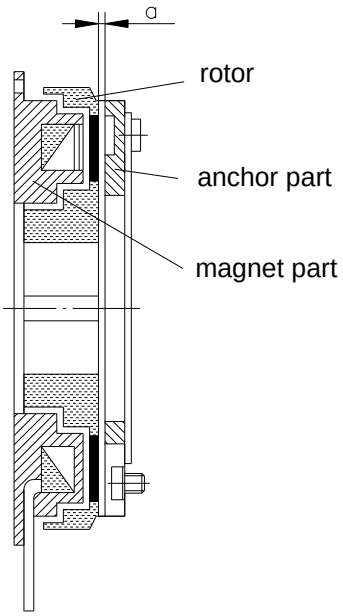
1. Filter pressure regulation valve
2. Shut-off valve (ball valve)
3. Distributor
4. Pressure switch -S11

When leaving the factory, the filter pressure regulation valve (1) is set to an operating pressure of 0.6 MPa (6 bar). For readjustment or in case of a new setting, the setting knob (1.1) is to be unlocked (U) and, at primarily applying pressure, turned to the right until the gauge shows the secondary pressure required. The following locking (L) of the setting knob (1.1) keeps the pressure setting constant.
Condensate Drainage: Semi-automatically.
In order to make the semi automatic drain valve ready for operation, the drain screw (1.4) must be removed. The drain valve closes when a pressure of more than 0.5 bar is available. As soon as the filter is switched pressure-free, the valve (1.4) opens and the condensate incurred is drained. Manual condensate drainage is possible by means of the drain screw in case of available pressure.



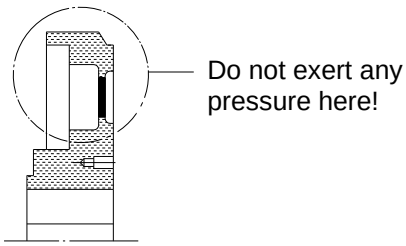
9.2 –KY1 Feed Clutch Maintenance

Check, in certain time intervals, whether the air gap a equals 0.2 mm. After a longer service time, air gap readjustment by removal of spacer washers becomes necessary.



Attention!

For rotor draw-off from the shaft, the rotor hub is provided with bores having internal threads. No pressure must be exerted on the outer thin-walled area of the rotor!



9.3 Servomotor with Tacho

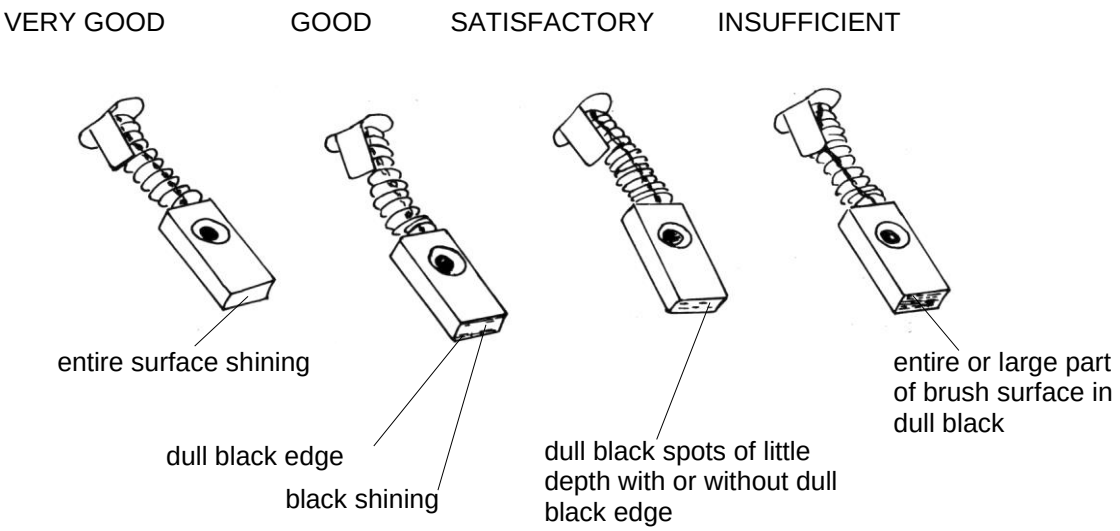
Maintenance

Bearings

The double protected (2LB) permanently lubricated bearings should be checked for temperature and noise build-up every 3,000 operating hours (also see sect. 6.8.2.1).

Brushes

- Their wear mostly depends on the servomotor's operating conditions. Replace the brushes, if they are worn down to 6 mm.
- The brushes should be checked after every six months at the latest. After such check, they must be precisely brought back into their initial positions. When replacing the brushes, the stoppers must be substituted as well.
- Be careful not to clamp in parts of the brush spring underneath the end piece.
- The commutation strip must have a regular brown-black and relatively shining coloring.
- The brushes must sit close to the collector with their entire surfaces. If not, they need to be bedded prior to the final check.
- The brush surface must be shiny. Should it, however, be dull altogether, a poor commutation is given, which means that the following points should be checked:
  - ♦ condition of the collector,
  - ♦ operating conditions of the servomotor,
  - ♦ quality of electronic power supply,
  - ♦ vibration load.

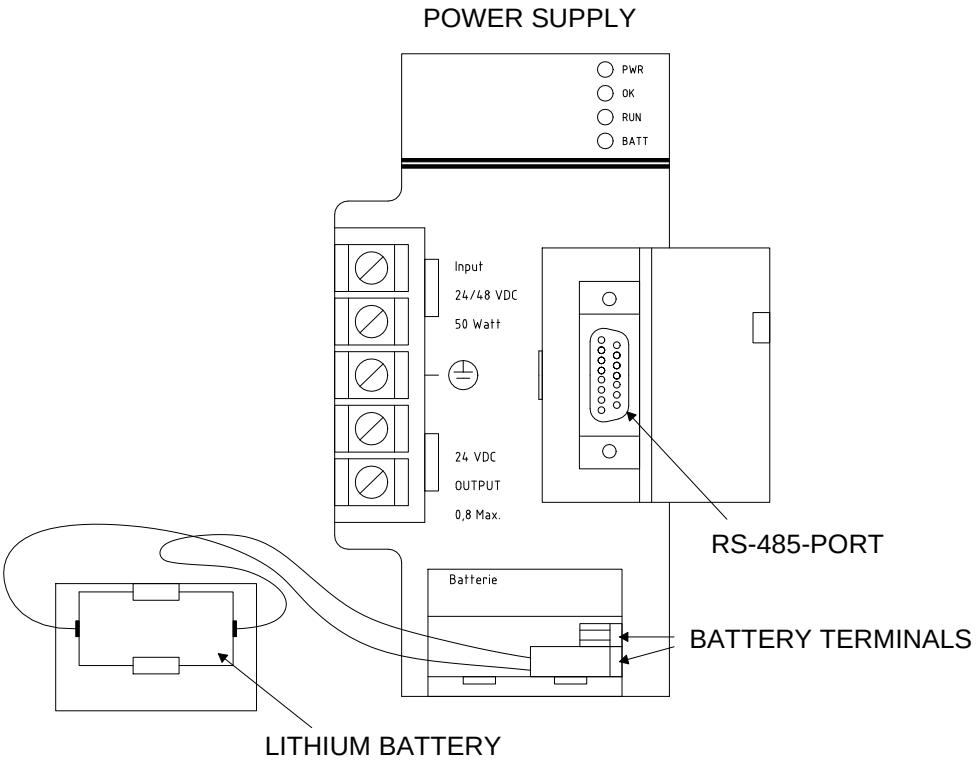


9.4 Buffer Battery

The buffer battery maintains the contents of the CPU memory, when the unit is switched off. Should the operating voltage have decreased such that no safe buffering can be ensured, the red light emitting diode “BATT” lights up at the power pack of the PLC. On the display of the control panel, the following message is shown:

Warning: Battery emptied! Do not disconnect mains voltage, unless battery is replaced!

When this message is deleted by pressing the CLR key without having replaced the battery, it will, after a while, appear again.



9.4.1 Buffer Battery Replacement

The battery (FMB ident. no. 2024-608) can be replaced with the voltage supply being connected. The battery should be replaced as follows:

- Remove battery cover on the bottom of the power supply front plate.
- Take battery out of the holding clamp.
- Press new battery into the holding clamp of the battery cover.
- Put the plug of the new battery into the socket at the power supply.
- Pull plug of the old battery out of the socket at the power supply.
- Press battery cover into power supply front plate again. Be careful not to squeeze the two wires.
- Press the CLR key on the control panel, when the message “Battery Emptied!” is still displayed.
- Switch supply voltage off and on again. Now, the red light emitting diode “BATT” at the power supply will not light any more.
- The PLC control system is ready for operation again.

Attention!

The new battery must be connected within 20 minutes after old battery removal. Otherwise, memory content will get lost in case of supply voltage breakdown!

Never throw any lithium battery into fire and never try to recharge a lithium battery. The battery may explode or release hazardous vapors!

Used batteries shall be treated as hazardous waste!

9.5 I/O Module Removal or Installation

The recommendations given below should be observed when removing or installing I/O modules.
The process wiring is connected via detachable terminal strips, which are enclosed in every I/O module delivery. Thus it is easy to wire the process connections in advance or to replace modules without mixing the process connections up.

Attention!

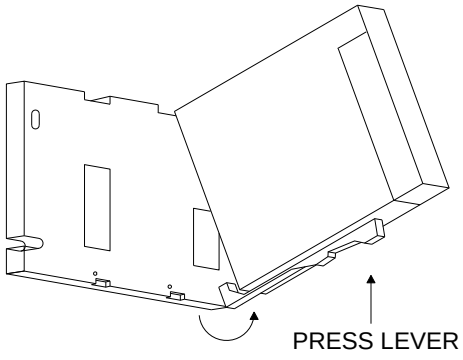
When installing and removing a module, the supply voltage must always be disconnected. In case of non-observance, the PLC may move to STOP or the module be damaged. Even persons could suffer damage.

9.5.1 Terminal Strip Part Removal

- Open plastic cover above terminal strip part.
- Push lever upwards to loosen terminal strip block.
- Grasp at loop and pull terminal strip block forward until contacts are off.
- Take terminal strip block out completely.

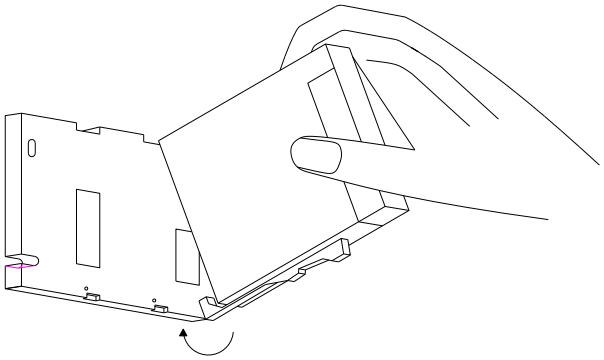
9.5.2 Module Removal

- Press unlocking lever at module bottom upward against module.
- With the unlocking lever being pressed, swing module in upward direction.
- Lift module off from front plate in upward direction.



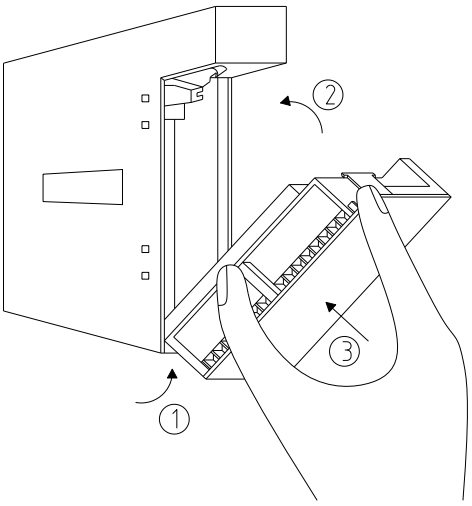
9.5.3 Module Installation

- Take module into your hand. The terminal strip part must be front, the unlocking lever on bottom.
- Tilt the module and put the hook, which is situated at the module's rear in the upper corner, into the slot at the chassis.
- Press module downward until the unlocking lever engages the notch in the chassis at the bottom of the module.



9.5.4 Terminal Strip Part Installation

- Hook the hinge available at the bottom of the terminal strip into the lower slot at the module.
- Press terminal strip block into the module's direction until it is engaged.



9.6 Importing a New Program into the PLC

The PLC program is stored on an EPROM that is accommodated in the CPU module. Should the loading magazine work with a modified program, the EPROM can be replaced as described below:

- View and notice down the current parameters in the "PART" and "SERVICE" menus so that the data can be taken over after EPROM replacement.
- Disconnect supply voltage.
- Remove buffer battery from power supply.
- Wait for 10 minutes.
- Take CPU module out and pull front cover off.
- Take EPROM out.
- Put new EPROM into the base and mind correct mounting position.
- Insert CPU front cover.
- Connect supply voltage.
- Put battery into power pack and close battery compartment cover.
- Apply +24 V with one conducting wire to input I 27.
- Disconnect supply voltage.
- Connect supply voltage.
- Make reference run.
- Enter current parameters into the "PART" and "SERVICE" menus.

10. Electric and Pneumatic Parts

-S1	feed bar, rear limit position
-S5	guide channel opened
-S6	guide channel closed
-S7	first insert start
-S11	pressure switch
-S12	reference switch
-S13	gripper blades closed
-S14	gripper blades opened
-S17	remnant flap swung in
-S22	feed bar ejected
-S23	feed bar swung in, within guide channel
-S74	cover lateral storage closed
-Q1	motor protection switch for M1 (feed motor)
-Q2	motor protection switch for M2 (oil pump)
-M1	drive motor
-T3	tacho for drive motor
-M2	oil pump
-KY1	feed clutch
-KY6	synchronized clutch
-G3	shaft encoder

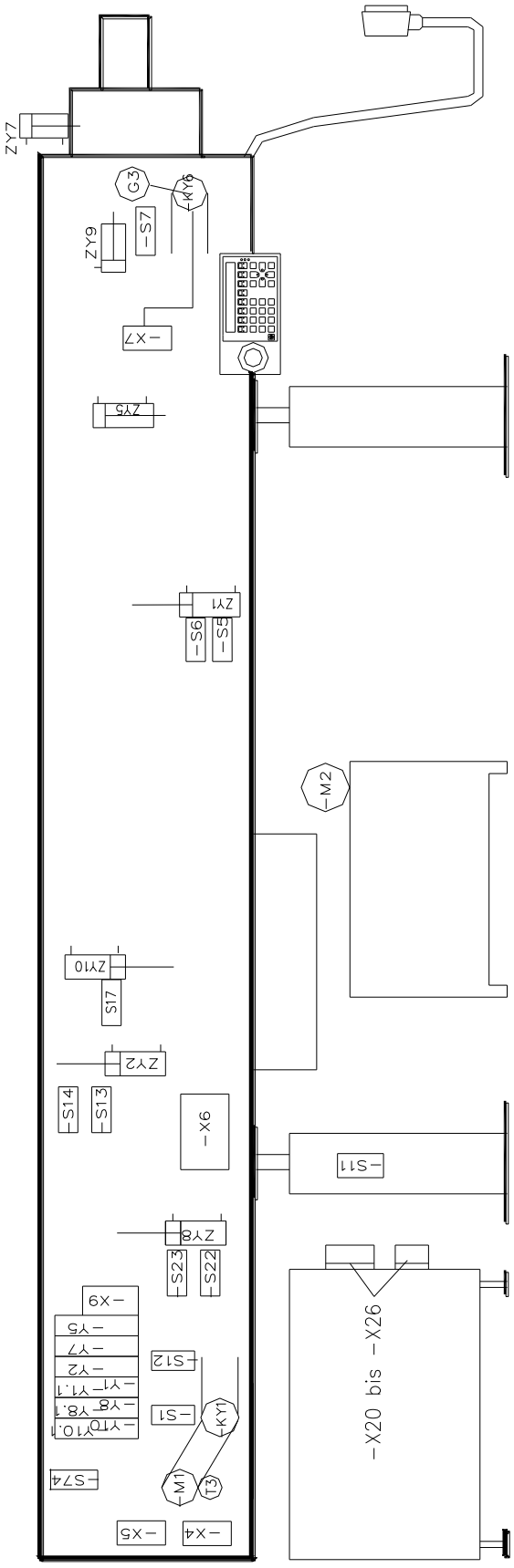
Solenoid valves

-Y1	open guide channel
-Y1.1	close guide channel
-Y2	close gripper blade
-Y5	separate material
-Y7	close steady rest
-Y8	raise feed bar up
-Y8.1	swing feed bar in
-Y10	swing remnant flap out
-Y10.1	swing remnant flap in

Pneumatic Cylinder

-ZY1	open/close guide channel
-ZY2	open/close gripper blade
-ZY5	separate material
-ZY7	open/close steady rest
-ZY8	raise up/swing in feed bar
-ZY9	swing switching flap of the starting switch in
-ZY10	swing out/in remnant flap

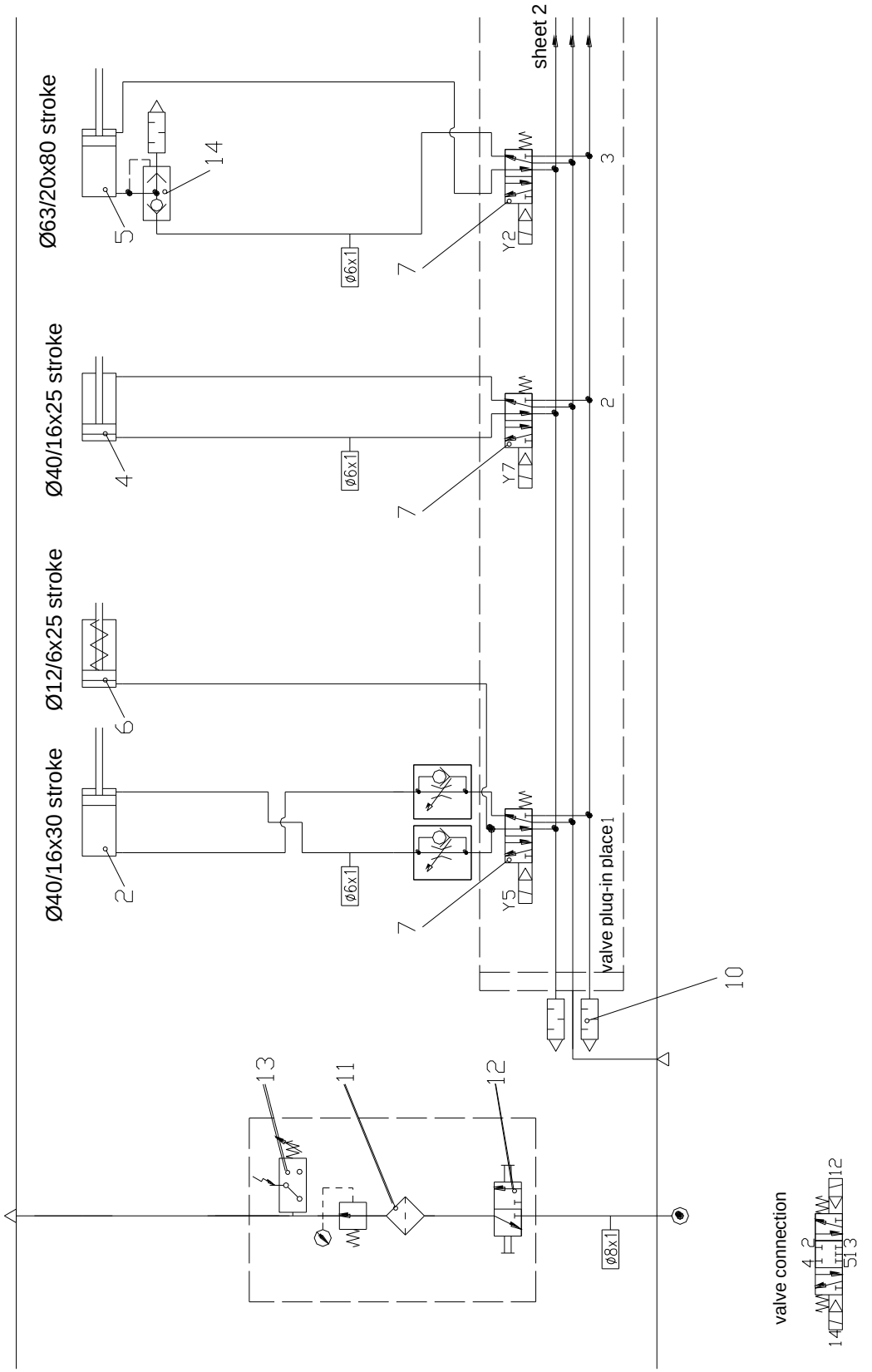
10.1 Electric and Pneumatic Parts Depiction



11. Parts List of Pneumatic Components

Pos.	Qty.	Designation/Type	Ident. No.
1	1	double-action cylinder - ADVU-50-80-P-A	2035-474
2	1	double-action cylinder - ADVU-50-30-A-P-A	2036-760
3	3	double-action cylinder - DNC-50-80-PPV-A	2034-712
4	1	double-action cylinder - ADVU-40-25-P-A	2035-476
5	1	double-action cylinder - ADVU-63-80-P-A	2035-477
6	1	single-action cylinder - ESN-12-25-P	2030-646
7	3	solenoid valve 5/2 VTS 02 AR – 0820 044 001	2038-796
8	3	solenoid valve 5/3 VTS 02 DR – 0820 044 601	2038-797
9	1	valve carrier system VTS 02 KT	2038-801
10	2	silencer G 1/8- 1827 000 019	2035-702
11	1	filter pressure regulating valve G 1/4 - 0821 300 756	2035-788
12	1	shut-off valve G 1/4 - 0821 300 773	2035-787
13	1	pressure switch 0.5 – 8 bar, 0821 100 015	2035-791
14	1	quick ventilation	2041-984

11.1 Pneumatic Diagram, Page 1



11.2 Pneumatic Diagram, Page 2