User's Manual

In-Line

MB806 Single Loader
MB807 Single Unloader

This manual is intended for the inline device specified on the previous page. The manual contains information to assist the operator to start and operate the device properly, and to maintain it. Hardware and software mentioned in this document are subjected to continuous development and improvement. Consequently, there may be minor discrepancies between the information in the document and the performance and design of the hardware and software. Specifications, dimensions and other statements mentioned in this document are subject to change without prior notice.

Conventions

In this manual angle brackets <> are used to indicate certain button names. Example: <Enter> stands for the ENTER button.

The manufacturer and its suppliers shall not be liable for any damages related to the software or hardware, or for any other damages whatsoever caused by the use of, or inability to use any manufacturers product. This is applicable even if the manufacturer has been advised of the damage risk. Under any circumstances, the manufacturer's entire liability shall be limited to replace such defective software or hardware, which was originally purchased from the manufacturer.

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1. Safety

Before starting the machine, it is necessary that the operator, foreman, and any other personnel involved in machine operation, maintenance, or service, understand and obey the following:

- Trained personnel must operate the machine only.
- Anyone operating this machine must obey all warning signs.
- All personnel involved in machine operation must understand the use of the emergency stop button and how to move machine elements in case of emergency. See the following sections entitled *Emergency Stop Button* and *Emergency Movement of Machine Elements* in this chapter.
- Apart from weekly maintenance described in Chapter 5, *Maintenance*, the machine is to be serviced by authorised personnel only.
- No hands or fingers are allowed in the vicinity of moving parts.
- Ensure that all covers and shields are intact, mounted and closed while the machine is in operation.
- Do not disable or disengage any safety switches or sensors.
- Do not use chemicals or other substances that may have any influence on the operator or other personnel involved in machine operation.

Emergency stop button

There is one emergency stop button on the machine, placed left of the control panel.

The emergency stop button is red and stops all machine movements immediately when pressed down.

An emergency stop button is released by being pulled up and/or turned counter clockwise.

The emergency stop button must be pressed down when hands, fingers, tools or other objects are in the risk area of movable machine elements.

Restart
To restart the machine after an emergency stop:

1. Release the emergency stop buttons by pulling them up and/or turning them counter clockwise.

2. Start the operation as normal.

Emergency movement of machine elements

The elevator cannot be moved by hand!

If an accident has occurred and an emergency movement of the elevator unit is required, use the following procedure:

1. Leave the power on. Do NOT turn off the main power switch.

2. Pull up the emergency stop button, if pressed down.

3. Press <F1> '<<' to skip elevator home positioning.

4. Press <F2> 'Hand'> in *Main* menu to enter *Hand* mode.

5. Press <F4> to enter *Elevator control*.

6. Use buttons <F2> '↑' and <F3> '↓' to move the elevator and remove the jammed object.

Warning signs

The warning signs on the machine must be observed as this machine contains moving and electrically live parts.

All signs must be kept clean and readable. If a sign is missing, it must be replaced immediately.

Electric shock

The sign warns of electric shock. Units on which this sign is placed contain dangerous voltage levels. Power must be switched off before opening the unit. Only authorised service personnel are allowed to operate the machine when the unit is open.

Figure 1-1 Electric shock

This sign is applied as follows on the machine:

- One sign on each openable cover on the electrical cabinet / elevator mechanism unit

Moving parts, risk of injury

The sign warns of moving machine parts. If this sign is placed on the machine, there is a risk of injury if any body part is near moving parts. Power must be switched off before service or maintenance.

Figure 1-2 Moving parts, risk of injury

This sign is applied as follows on the machine:

- One sign above board outfeed

Warnings

Attention
Throughout the manual, this symbol is used to call your attention to commands that starts machine movements or other events that need special attention. The symbol often refers to the warning signs, which must be obeyed to eliminate the risk of injury. If there are instructions accompanying this symbol, they must be followed.

Figure 1-3 Attention

2. Installation

The machine is delivered on a pallet:

Before unpacking the machine, make sure that the site is prepared as described below.

Then, unpack and position the machine on the site.

When the machine is located on its site, install it as described last in this chapter.

Site preparation

Prior to installing the machine, ensure that there is electric power and compressed air available on the site. See requirements below.

Make sure the environmental conditions meet the requirements specified below.

Note that it must be a free space of at least one meter around the machine, except for other devices and machines included in the production line.

Power supply requirements

Voltage

Supply voltage:	240 VAC
Voltage tolerance:	±10%
Frequency:	50Hz
Power consumption:	900 Watt maximum

Compressed air

The compressed air must be dry and clean.

Pressure:	6 bar
Largest particle size:	5 micron

Environmental requirements

Temperature

Operating:	+5 to +40°C (41 to 104°F)
Storage:	–40 to +60°C (-40 to 140°F)

Relative humidity

Operating:	<95%, non condensing
Storage:	100%

Dust and dirt

The machine does not require a clean-room environment but the level of dust and dirt must be kept as low as possible. The maintenance intervals are shortened by high temperature and dusty or dirty environment.

Installation

The installation must be carried out by authorized service personnel.

Placing the unit

Ensure that the floor is sturdy.
Place the machine on its site. To be able to install, maintain and service the machine, there must be a free space of at least one meter around it, except for other devices and machines included in the conveyor line.

Levelling

Level the complete line carefully along the conveyor belts. Use a spirit level across and along the elevator, and adjust the feet of the machine. The machine must stay steady on all feet when the adjustment is finished.

Mains supply

Mains supply is to be connected by an authorised electrician.

The internal power supply can be adapted to two different mains voltage levels, 115 or 230 VAC. Use the selector switch on the front of the power supply to select correct setting according to available mains voltage. Disconnect mains supply using the main switch, or by unplugging the mains cable, before changing selector switch position.

3. Product Description

This chapter describes the machine. The description is divided into the following main sections:

- Main parts of the machine, page 9.
- General function, page 10.
- Control panel and buttons in the panel, page 11.
- Operation modes, page 12.
- Alarms and messages, page 23.
- Signal tower and buzzer, page 24.

Main parts

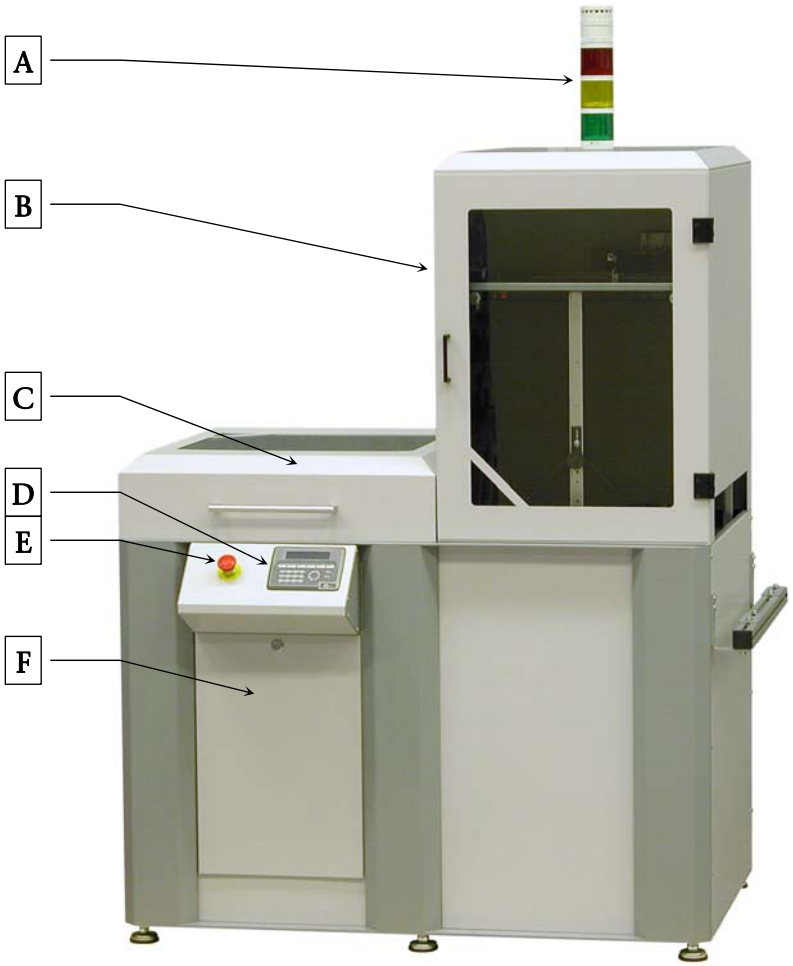


Figure 3-1 Single Loader/Unloader main parts

The following main parts are pointed out in the figure above, by the letters.

Main parts

A. Status indicator (Light tower)
B. Elevator unit
C. In-pusher, Out-pusher, PCB-conveyor
D. Control panel
E. Emergency stop
F. Electrical cabinet / elevator mechanism

General function

The Single Loader is designed to:
- Load PCBs from a rasterized magazine to an electronics production line.

The Single Unloader is designed to:
- Unload PCBs from an electronics production line into a rasterized magazine.

In both modes (Loader/Unloader), PCBs are transported to/from a removable magazine, which, if desired, can be moved between different machines in the production.

Each work mode is described in detail below.

Letters within brackets in following descriptions refer to the main parts pointed out on previous page.

Loader
A magazine containing PCBs is placed on the elevator in the elevator unit (B). When production is started via the control panel, the magazine is automatically positioned at the first magazine slot. A printed circuit board is pushed out from the magazine to the following machine, by the Out-pusher (C). When the pusher arm is back in its innermost position (home position), the elevator unit moves the magazine vertically to next slot containing a PCB and is ready to push out a new PCB to the following machine. When the magazine is empty, it is automatically transported to the magazine change level to be removed/replaced by the operator.

Unloader
An empty magazine is placed on the elevator in the elevator unit (B). When production is started via the control panel, the magazine is automatically positioned at the first magazine slot. Printed circuit boards from the preceding machine are transported onto the PCB-conveyor (C) and are pushed into the magazine by the In-pusher (C).
When the pusher arm is back in its innermost position (home position), the elevator unit moves the magazine vertically to next empty slot and is ready to receive a new PCB into the magazine. When the magazine is full, it is automatically transported to the magazine change level to be removed/replaced by the operator.

Control panel

Figure 3-2 Control panel

General
The machine is controlled from a control panel. The various display views and operation modes are described in the following sections.

The control panel buttons are described below.

Function Buttons
<F1>...<F4>:
The buttons have different functions depending on mode and display view. A text/symbol describing the function in current display view is shown above each button on the lower text row. Buttons are indicated by bold angle brackets < > and text in this manual. Example: **<F1> Auto**.

Control Buttons (red)
< ↵ >:
Also written as <Enter>, is used to enter password login in setup mode, to select setting options and to enter parameter values.
< ← >:
Erases the character to the left of the cursor when entering parameter values.

Numerical Buttons

Use the numerical buttons to enter values and passwords.

Cursor Buttons (red)

< ▲ > and < ▼ >:
Move cursor up or down.
These buttons also control manual elevator movements in the elevator control display view.
< ◄ > and < ► >:
Move cursor to the previous or next option.

Operation modes

Powering up

After completed initiation the *Main* menu is shown on the control panel.

Main menu

To control the machine, the following operation modes can be selected from the *Main* menu.

- *Automatic* mode
- *Opt.* menu (Optional/Misc. Functions))
- *Hand* mode (Manual mode)
- *Setup* mode

Selecting operation mode

You can select the desired operation mode from *Main* menu as follows:

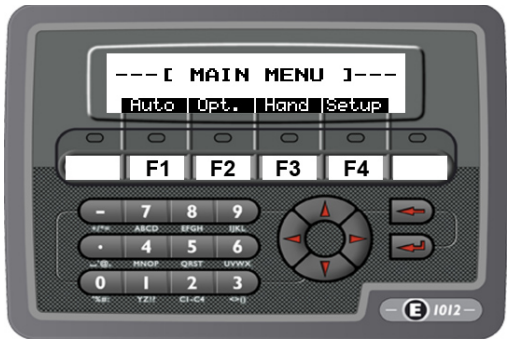
- To enter *Automatic* mode, press <F1> 'Auto'.
- To enter *Options* menu, press <F2> 'Opt'.
- To enter *Hand* mode, press <F3> 'Hand'.
- To enter *Setup* mode, press <F4> 'Setup'.

Press <F1> '«' repeatedly to return to *Main* menu from any sub-menu.

In case of emergency, use the emergency stop button to stop all machine movements immediately.

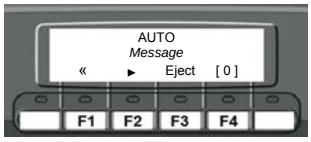
Automatic mode

Automatic mode is used for production, i.e. to provide the production line with printed circuit boards (Loader) and to gather them up at the end of the line (Unloader).

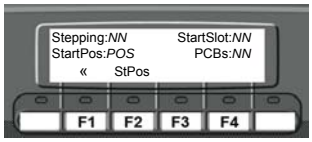


Select *Automatic* mode by pressing <F1> 'Auto' in the *Main* menu.
See page 10 for work mode descriptions in *Automatic* mode.

Automatic mode display views



Parameter/ <Button>	Description
	Automatic mode This display view is shown when entering *Automatic* mode.
<F1> « > <F2> ▸ > <F3> EJECT <F4> [0] [1]	Return to *Main* menu. *Automatic* mode is set to OFF. Select next *Auto* sub menu, see below. Press <F3> to change magazine. Press <F4> to toggle state between [0] and [1]. [0]: *Automatic* mode is OFF. Production disabled. [1]: *Automatic* mode is ON. Production enabled.
Message	Shows different messages during production (*Automatic* mode ON). Two machine states require operator action to continue production. The messages below, a short buzzer sound, and a lit yellow lamp indicate one of these states. 1. *Change magazine* Description: The machine has finished processing current magazine. Action: Change magazine tocontinue production. 2. *Close door* Description: The magazine door is open. Action: Close the door to continue production. During production, machine status messages (e.g. PCB infeed/outfeed) are displayed.

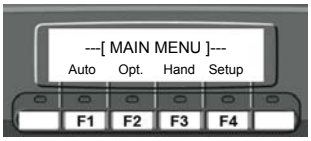


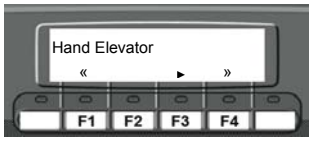
<F1> « > <F2> *StPos* > *Top* = *Btm* =	Return to previous menu. Toggle magazine start position. The uppermost magazine slot is slot number 1. Board processing will begin from the top of the magazine and continue downwards. The lowermost magazine slot is slot number 1. Board processing will begin from the bottom of the magazine and continue upwards.
<F3> <F4>	Not used. Not used.
Stepping: *NN*	Number of magazine slots to move before next PCB is loaded/unloaded. A value of 2 will skip one slot between each PCB during loading/unloading.
StartSlot: *NN*	Number of the first magazine slot that will be filled/emptied.
PCBs: *NN*	Loader: Shows number of PCBs left in the magazine. Unloader: Shows number of empty slots in the magazine. Note: Start slot, stepping, and first magazine slot can only be changed if production is stopped. (*Automatic* mode is OFF)

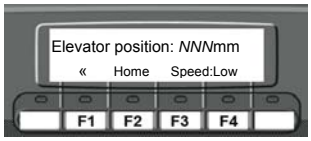
Hand mode

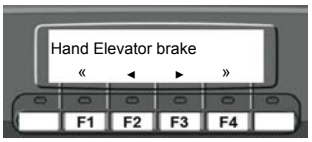
Hand mode is used to manually move the elevator unit, pusher, and other controllable machine functions.

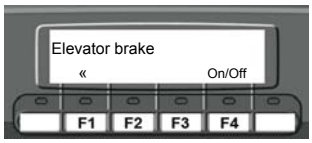
Select *Hand* mode by pressing <F3> 'Hand' in the *Main* menu.

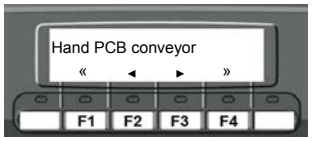


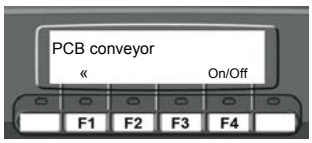




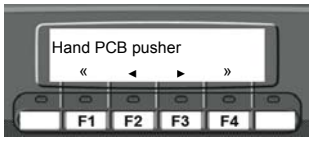
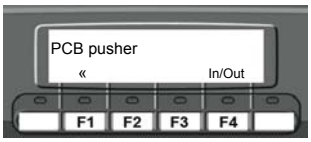
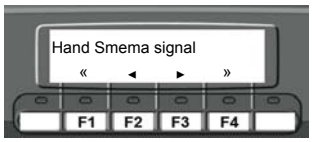
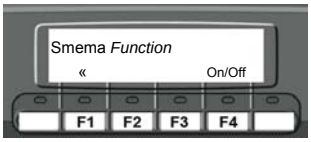
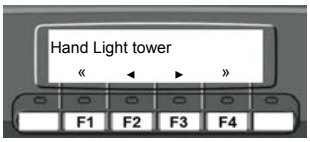
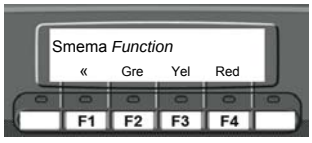
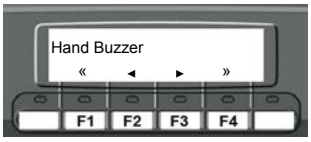
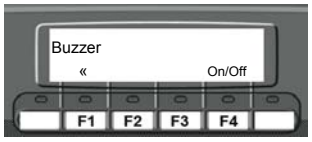








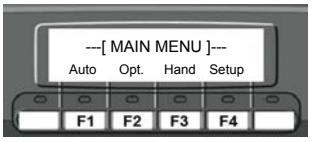
Parameter/ <Button>	Description
	First display view in *Hand* mode
<F1> « >	Return to *Main* menu.
<F2> Not used	Not used in this display.
<F3> ▸ >	Select next *Hand* sub menu.
<F4> » >	Enter current *Hand* sub menu.
*NNN*mm	This value shows the current position of the elevator unit, in millimetres, with reference to the home position sensor that gives a signal to the PLC when the elevator unit is in its uppermost position.
<F1> « >	Return to previous display.
<F2> Home	Start an elevator home positioning.
<F3> *Speed sel.*	Toggle Low/High speed.
<F4> *Speed sel.*	Toggle Low/High speed.
< ▲ > *Up*	Manually move the elevator upward.
< ▼ > *Down*	Manually move the elevator downward.
<F1> « >	Return to *Main* menu.
<F2> ◂ >	Select previous *Hand* sub menu.
<F3> ▸ >	Select next *Hand* sub menu.
<F4> » >	Enter current *Hand* sub menu.
<F1> « >	Return to previous display.
<F2> Not used	Not used in this display.
<F3> Not used	Not used in this display.
<F4> On/Off >	Toggle break status.
<F1> « >	Return to *Main* menu.
<F2> ◂ >	Select previous *Hand* sub menu.
<F3> ▸ >	Select next *Hand* sub menu.
<F4> » >	Enter current *Hand* sub menu.
<F1> « >	Return to previous display.
<F2> Not used	Not used in this display.
<F3> Not used	Not used in this display.
<F4> Off/On >	Run PCB conveyor. Note: Unloader only!

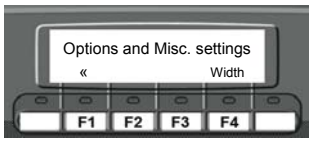
Parameter/ <Button>	Description
 	<F1> « > <F2> ◄ > <F3> ► > <F4> » > <F1> « > <F2> Not used <F3> Not used <F4> In/Out > Note: The PCB pusher will not move to *Out* position unless the elevator is home positioned and positioned somewhere between upper and lower magazine slot level.	Return to *Main* menu. Select previous *Hand* sub menu. Select next *Hand* sub menu. Enter current *Hand* sub menu. Return to previous display. Not used in this display. Not used in this display. Toggle PCB pusher status.
 	<F1> « > <F2> ◄ > <F3> ► > <F4> » > <F1> « > <F2> Not used <F3> Not used <F4> On/Off > *Function*	Return to *Main* menu. Select previous *Hand* sub menu. Select next *Hand* sub menu. Enter current *Hand* sub menu. Return to previous display. Not used in this display. Not used in this display. Toggle Smema signal status. Displays Smema function for current machine type. *Out BA* (Smema Out "Board Available") for Loader. *In RDY* (Smema In "Ready to receive") for Unloader.
 	<F1> « > <F2> ◄ > <F3> ► > <F4 » > <F1> « > <F2> Not used <F3> Not used <F4> Red >	Return to *Main* menu. Select previous *Hand* sub menu. Select next *Hand* sub menu. Enter current *Hand* sub menu. Return to previous display. Toggle green lamp status. Toggle yellow lamp status. Toggle red lamp status.
 	<F1> « > <F2> ◄ > <F3> ► > <F4 » > <F1> « > <F2> Not used <F3> Not used <F4> On/Off >	Return to *Main* menu. Select previous *Hand* sub menu. Select next *Hand* sub menu. Enter current *Hand* sub menu. Return to previous display. Not used in this display. Not used in this display. Toggle buzzer status.

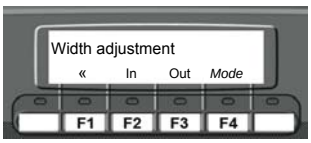
Option menu

The *Option* menu contains optional and miscellaneous functions and is easily accessed directly from the *Main* menu.

Select *Option* menu by pressing <F2> 'Opt' in *Main* menu.







Parameter/ <Button>	Description
	<u>*Option* menu</u> This view is displayed when entering *Option* menu.
<F1> « > <F2> Reserved <F3> Reserved <F4> Width >	Return to *Main* menu. Reserved for customer specific functions. Reserved for customer specific functions. Enter *Width adjustment* sub menu.
<F1> « > <F2> In > <F3> Out > <F4> *Mode* >	Return to previous display. Decrease width. Increase width. Toggle width adjustment mode. Available modes are: 1. Man. (Manual width adjustment) 2. Auto (Automatic width adjustment) Note 1: Auto mode is only selectable if the optional hardware for automatic width adjustment is installed. Note 2: Buttons <F2> In and <F3> Out are disabled if Auto mode is selected. Note 3: On the Loader, the width adjustment sub menu is only accessible in special cases.

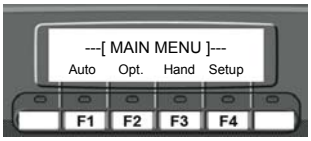
Setup mode

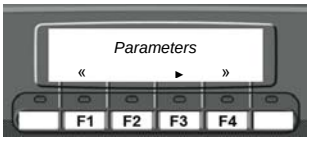
This mode is used to set up the machine for operation.

Password login is required to change most settings in *Setup* mode. Trying to modify a not modifiable parameter or to change a setting without entering correct *Password level* will generate the message "Access denied!" for a few seconds on the control panel.

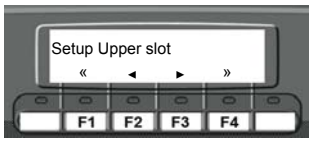
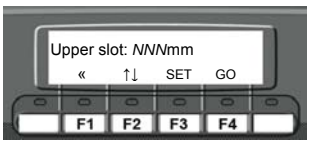
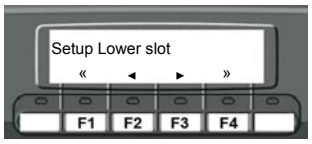
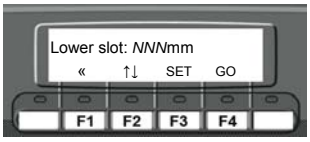
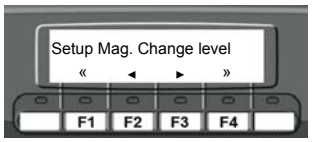
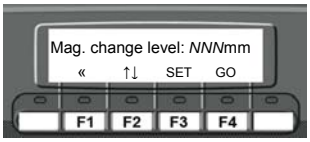
Setup sub menus are described on the following pages.

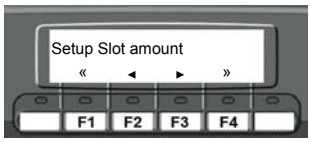
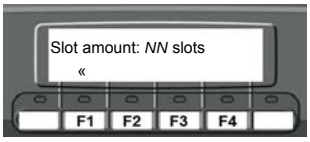
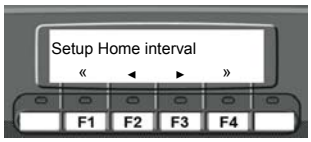
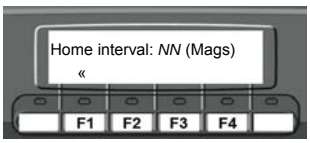
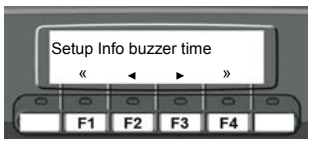
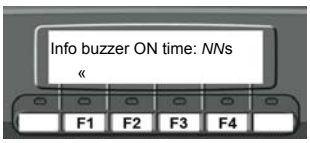
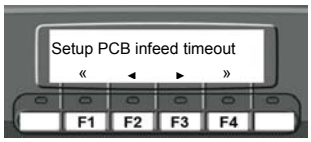
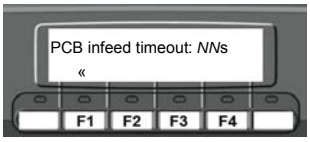
Select *Setup* mode by pressing <F4 Setup> in the *Main* menu.

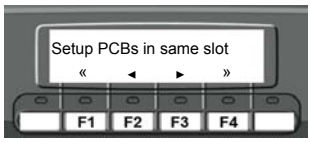
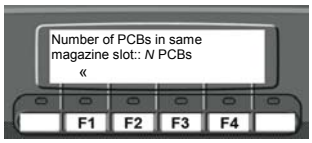
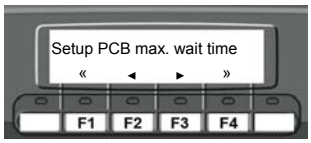
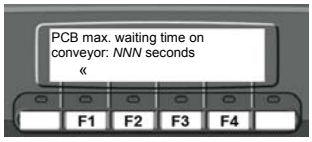
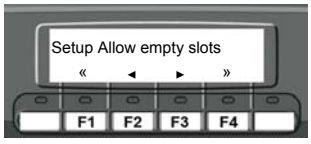
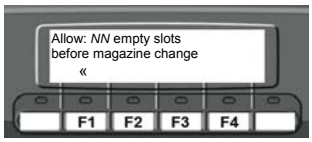


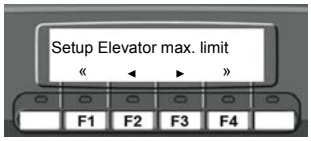


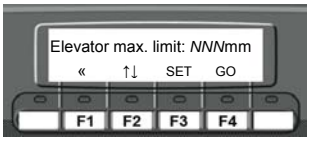
Parameter/ <Button>	Description
	Setup first display view. This view is displayed when entering *Setup* mode.
<F1> « > <F2> Not used <F3> ▸ > <F4> » >	Return to *Main* menu. Not used in this display. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
<F1> « > <F2> Load > <F3> Save > <F4> Del. >	Return to *Main* menu. Save current machine settings. Load a previously saved recipe. Delete a previously saved recipe.
Parameters	Recipes can be used, for example, when recurrent magazine settings are used. *Recipe* menu is used to save (store), load (recall) and delete recipes. A recipe contains the following parameters: -Elevator position for upper magazine slot -Elevator position for lower magazine slot -Total number of slots in the magazine -Total number of slots in the magazine -Start slot, stepping, and start position

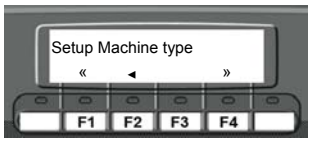
Parameter/ <Button>	Description
	
<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	
<F1> « > <F2> ↑↓ >	Return to previous display. Go to elevator control.
<F3 Set >	Sets the current elevator unit position as the level of the uppermost slot in the magazine.
<F4 GO >	Move the elevator to the position entered at *NNN*mm.
*NNN*mm	Distance in millimetres, from home position to first slot. This value can be changed manually via the control panel. Do not press <F3 Set > after a manual change.
	
<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter current *Setup* sub menu.
	
<F1> « > <F2> ↑↓ >	Return to previous display. Go to elevator control.
<F3 Set >	Sets the current elevator unit position as the level of the lowermost slot in the magazine.
<F4 GO >	Move the elevator to the position entered at *NNN*mm.
*NNN*mm	Distance in millimetres, from home position to last slot.
	
<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	
<F1> « > <F2> ↑↓ >	Return to previous display. Go to elevator control.
<F3 Set >	Sets the current elevator unit position as the position where magazine changes will be performed.
<F4 GO >	Move the elevator to the position entered at *NNN*mm.
*NNN*mm	Distance in millimetres, from home position to the position where magazine changes are performed.

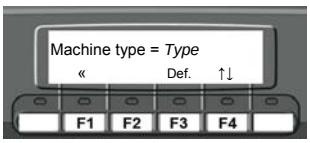
	Parameter/ <Button>	Description
	<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	<F1> « > <F2> Not used <F3> Not used <F4> Not used *NN*	Return to previous display. Total number of slots in the magazine.
	<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	<F1> « > <F2> Not used <F3> Not used <F4> Not used *NN*	Return to previous display. Number of processed magazines between home positionings. A value of 0 (zero) deactivates the function.
	<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	<F1> « > <F2> Not used <F3> Not used <F4> Not used *NN*	Return to previous display. Time, in seconds, for how long the buzzer should sound when an info message is displayed on the operator's panel during production. A value of 0 (zero) deactivates the function.
	<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	<F1> « > <F2> Not used <F3> Not used <F4> Not used *NN*	Return to previous display. Maximum allowed completion time for a PCB infeed from an external machine. Note: Unloader only!

Parameter/ <Button>	Description
	
<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	
<F1> « > <F2> Not used <F3> Not used <F4> Not used	Return to previous display.
N	Number of PCBs that are pushed in to the same magazine slot. Note: Unloader only! *Use this function with caution.* *A value higher than 1 may cause damage to PCBs.*
	
<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	
<F1> « > <F2> Not used <F3> Not used <F4> Not used	Return to previous display.
NNN	Maximum allowed time for a PCB to remain on the PCB conveyor before the buzzer sounds and an info message is displayed. A value of 0 (zero) deactivates the function. Note: Unloader only!
	
<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
	
<F1> « > <F2> Not used <F3> Not used <F4> Not used	Return to previous display.
NN	Maximum allowed number of empty slots before the magazine is automatically ejected. Note 1: Loader only! Note 2: A slot is considered empty if the board jam sensor, located at Loader outfeed, is not activated during a PCB out pushing cycle.









Parameter/ <Button>	Description
<F1> « > <F2> ◄ > <F3> ► > <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Select next *Setup* sub menu. Enter selected *Setup* sub menu.
<F1> « > <F2> ↑↓ > <F3> Set > <F4> GO > *NNN*mm	Return to previous display. Go to elevator control. Sets the current elevator unit position as the lowermost allowed elevator position. Move the elevator to the position entered at *NNN*mm. Distance in millimetres, from home position to max. limit.
<F1> « > <F2> ◄ > <F3> <F4> » >	Return to *Main* menu. Select previous *Setup* sub menu. Not used. Enter selected *Setup* sub menu.
<F1> « > <F2> Not used <F3> Def. > <F4> ↑↓ > *Type*	Return to previous display. Reset all settings to factory default settings. Change machine type. Available types are: 1. Loader 2. Unloader

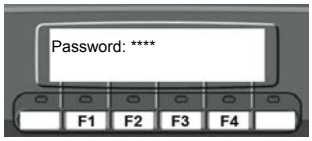
Passwords

A password is required to change/view some of the settings under the *Setup* sub menu. A password is not required to operate the machine during production.

Password levels

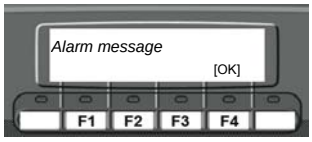
Settings that require a password are assigned different password levels, depending on how critical the setting is. Available password levels are:

- *Password 1*. User level 1. The password is ″1″ by default.
- *Password 2*. User level 2. The password is ″2″ by default.
- *Password 3*. Service level. The password is ″3″ by default.
- *Password 4*. Manufacturer level 1.
- *Password 5*. Manufacturer level 2.
- *Password 6*. Not used.
- *Password 7*. Not used.
- *Password 8*. Not used.



Parameter/ <Button>	Description
	Password login view. Use the numerical buttons to enter password for desired security level and close with <Enter>.
< ↵ >	Close password login. The action taken depends on the following: -If no password is entered, this view is left without any action. -If wrong password is entered, it is deleted and a new password can be entered, or the view can be left by pressing <Enter> again. -If correct password for any security level is entered, the message ″Level is...″ will be displayed for a few seconds, showing the corresponding security level before the previous display view is shown again.

Alarms



Alarms

An alarm that occurs in any mode is indicated with a buzzer sound, red warning light, and an alarm text on the control panel. The alarm text remains on the control panel display until the alarm is reset by pressing <F4 OK> or <Enter>, or the power is turned off.

Alarm table

The table below contains the alarm texts that are displayed in case of an alarm.

Alarm message / <Button>	Description
<F4 OK >	Press <F4 OK > for reset and return to previous display.
Alarm message	See alternatives below.
Access denied!	
Cause:	Trying to modify a not modifiable parameter or to change a setting without entering correct *Password* level will generate this message for a few seconds on the control panel.
Action:	Enter a valid password before changing parameters.
PLC stopped!	
Cause:	The PLC is in programming mode.
Action:	Flip the Stop/Run-switch on the PLC to Run position.
Emergency stop!	
Cause:	The emergency stop button is pressed down.
Action:	Pull up the emergency stop button. Restart the machine.
Elevator not home positioned!	
Cause:	An elevator movement was requested and the elevator is not home positioned.
Action:	Perform a home positioning or start production (Auto mode).
Pusher not home!	
Cause:	An elevator movement was requested and the pusher is not fully retracted.
Action:	Check air pressure, check pusher home position sensor.
Elevator jammed!	
Cause:	An elevator movement was expected but no position encoder signals were received within one second.
Action:	Remove jammed object, change motor relays, check motor voltage, or replace the elevator motor.

Alarm message / <Button>	Description
Pusher timeout! Cause: Action:	The pusher did not reach expected end position (in or out) within predefined time. Check air pressure, check pusher end position sensors.
PCB infeed timeout! Cause: Action:	The PCB conveyor did not receive a PCB within expected time. Increase infeed timeout time. See page 20.
Elevator reached max. limit! Cause: Action:	The elevator has reached the maximum allowed (software) distance away from the home position sensor. Go to elevator menu and perform a home positioning.
Automatic width adj. error! Cause: Action:	Automatic width adjustment is not working properly. Remove jammed object and restart the machine.
Elevator direction error! Cause: Action:	An elevator movement was performed and the encoder signals received by the PLC are inverted. Change motor relays, check motor voltage, or replace the elevator motor.
PCB conveyor jam sensor blocked! Cause: Action:	The PCB conveyor jam sensor was activated when an elevator movement was requested. Remove object activating the sensor.
PCB from magazine timeout! Cause: Action:	The PCB outfeed cycle was not completed within expected time. Remove jammed board.

Signal tower

The machine is equipped with a Signal tower, (beacon).

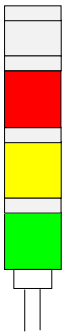


Figure 3-3 Signal tower

Buzzer
A built-in buzzer is on when an alarm is active. Reset alarms by pressing <F4 OK> or <Enter>. The buzzer also sounds shortly when the magazine is nearly full (if that function is activated) and when a magazine change is required.

Red light
Red light indicates active alarm.

Yellow light
Yellow light indicates a state that requires operator action. With *Automatic* mode ON, an *Info* message is shown on the control panel simultaneously with this light.

Green light
Green light indicates running machine, i.e. the machine is in production in *Automatic* mode.

4. Operation Setup

Setting up the machine for operation

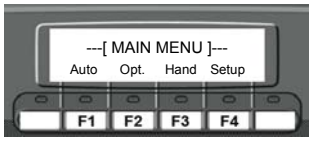
The setup procedures in this chapter are intended to be performed in a continuous sequence. Therefore, the activity numbering is made consecutively throughout the chapter.

Pusher Arm Position

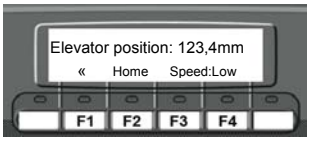
1. Set the pusher arm horizontal position by adjusting the pusher arm sideways to touch the PCBs in the centre.

Starting Up

2. Switch on the machine with the main power switch and wait until *Main* menu is displayed.



3. Press <F2 'Hand'> and <F4 »> to enter elevator control.

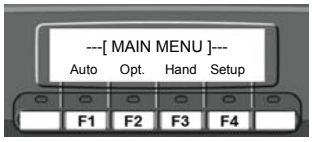


4. Press <F2 'Home'> to start a home positioning of the elevator unit. The elevator unit will then search for the home position sensor located near its physical uppermost position.

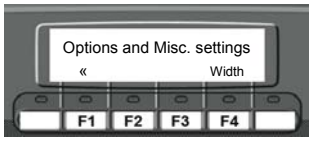
5. When home positioning is done, Press <F1 «> twice to go back to *Main* menu.

Adjusting width (Unloader)

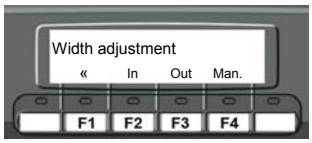
6. Select *Option* menu by pressing <F2 'Opt'> in the *Main* menu.



7. Press <F4 'Width'> to enter *Width adjustment* menu.



8. Press <F2> or <F3> to adjust width of the PCB conveyor, or press <F4> to change width adjustment to automatic if automatic width adjustment (optional function) is used in the production line.

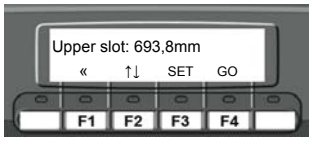


9. Press <F1 «> repeatedly to go back to *Main* menu.

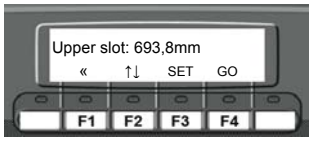
Setting upper slot level

Upper slot level is the level of the uppermost slot in the magazine. Following steps require a magazine on the elevator. Go to elevator control under *Hand* menu and manually move the elevator to a position where a magazine can be placed on the elevator.

10. Press <F4 'Setup'> in *Main* menu, locate *Upper slot* head menu and then press <F4 »> to enter *Upper slot* sub menu.



11. Press <F2> ↑↓> to go to elevator control, use the red buttons < ▲ > and < ▼ > to move the elevator to desired level, press <F1 «> to return to *Upper slot* sub menu, press <F3> Set> to store current elevator position as the uppermost available magazine slot. Fine adjustments are possible by manually modifying the numerical value and pressing <F4> GO> to verify position.
Instructions on how to use the numerical buttons are found on page 12.

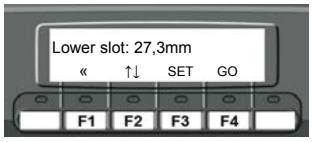


12. Press <F1 «> to go back to the previous screen.

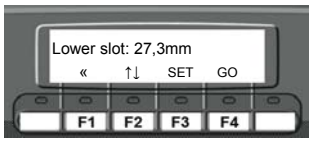
Setting lower slot level

Lower slot level is the level of the lowermost slot in the magazine.

13. Locate *Lower slot* head menu and then press <F4 »> to enter *Lower slot* sub menu.



14. Press <F2> ↑↓> to go to elevator control, use the red buttons < ▲ > and < ▼ > to move the elevator to desired level, press <F1 «> to return to *Lower slot* sub menu, press <F3> Set> to store current elevator position as the lowermost available magazine slot. Fine adjustments are possible by manually modifying the numerical value and pressing <F4> GO> to verify position. Do not press <F3> Set> after manually modifying the position value.

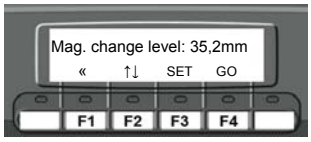


15. Press <F1 «> to go back to the previous screen.

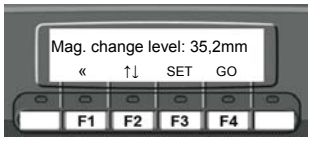
Setting magazine change level

Magagine change level is the level where magazine changes will be performed.

16. Locate *Mag. Chng level* head menu and then press <F4 »> to enter *Mag. Chng level* sub menu.



17. Press <F2> ↑↓> to go to elevator control, use the red buttons < ▲ > and < ▼ > to move the elevator to desired level, press <F1 «> to return to *Mag. Chng level* sub menu, press <F3> Set> to store current elevator position as the level where magazine changes will be performed. Fine adjustments are possible by manually modifying the numerical value and pressing <F4> GO> to verify position. Do not press <F3> Set> after manually modifying the position value.

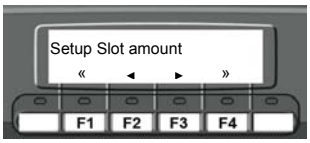


18. Press <F1 «> to go back to the previous screen.

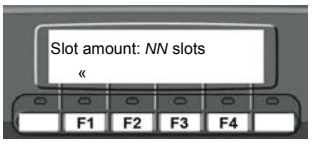
Setting the Slot amount

This value must equal the total number of slots in the magazine.

19. Locate the *Slot amount* sub menu and press <F4 »>.



20. Type in a new value at *NN* and press <Enter>.

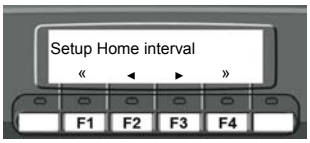


21. Press <F1 «> to go back to the previous screen.

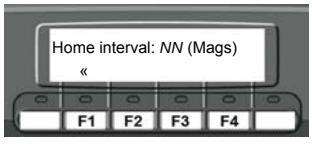
Setting the home positioning interval

This value determines how often the elevator will perform a home positioning during production (Automatic mode ON). The numerical value represents number of magazine changes between home positionings.

22. Locate the *Home interval* sub menu and press <F4 »>.



23. Type in a new value at *NNN* and press <Enter>.



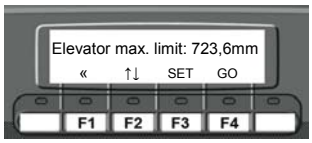
24. Press <F1 «> to go back to the previous screen.

Setting max. limit

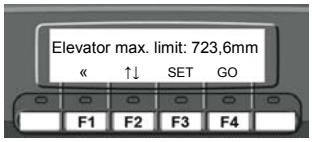
Max. limit is the maximum allowed moving distance (stroke length) for the elevator unit. The distance is measured from home position at the physical uppermost elevator position.

Max. limit is always set at the manufacturer.
A manufacturer password is required to change the value as an incorrect distance can cause machine damage.

25. Locate the *Max. limit* sub menu.



26. Press <F2> ↑↓> to go to elevator control. Use the red buttons < ▲ > and < ▼ > to move the elevator to desired level, press <F1 «> to return to *Max. limit* sub menu, press <F3> Set> to store current elevator position as the elevator max. limit. Fine adjustments are possible by manually modifying the numerical value and pressing <F4> GO> to verify position. Do not press <F3> Set> after manually modifying the position value.



27. Press <F1 «> to go back to the previous screen.

Finishing the Setup

The operation setup is now completed.
Set the machine in production mode as described in the section *Automatic mode,* in Chapter 3, page 13.

The machine contains moving parts that can cause damage and personal injury, if handled incorrectly.
Read the safety instructions in Chapter 1, Safety.

5. Maintenance

The maintenance instructions in this chapter comprise weekly, monthly and six month maintenance for the machine.

The maintenance is very important for a continuous operation without unintentional stops.

Follow the maintenance instructions carefully and keep the machine clean.

Lubricants

Unless other is stated, use the OKS 270 grease.

Grease should be applied in small amounts, just to give a thin film.

Specifications and part #'s for the lubricants are found in the end of this chapter.

Weekly
Clean the machine.
Clean the machine all over.

Monthly
Lubricate elevator lead screw.
Apply grease to the whole length of the lead screw.

Six month
Lubricate elevator guides.
Apply a small amount of grease to the whole length of the two guides.

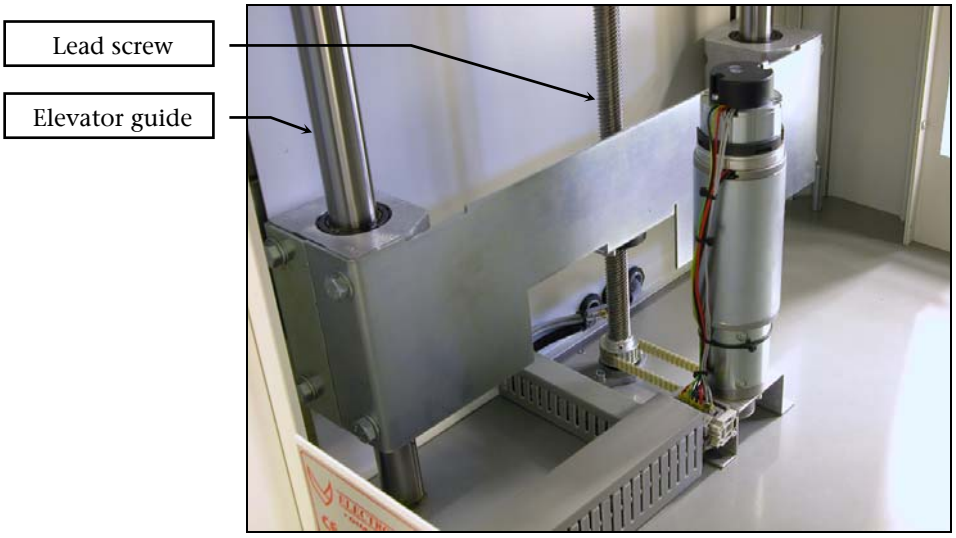


Figure 5-1 Lead screw and elevator guide

Lubricate pusher guide.
Apply a small amount of grease to the whole length, and both sides of the pusher guide.

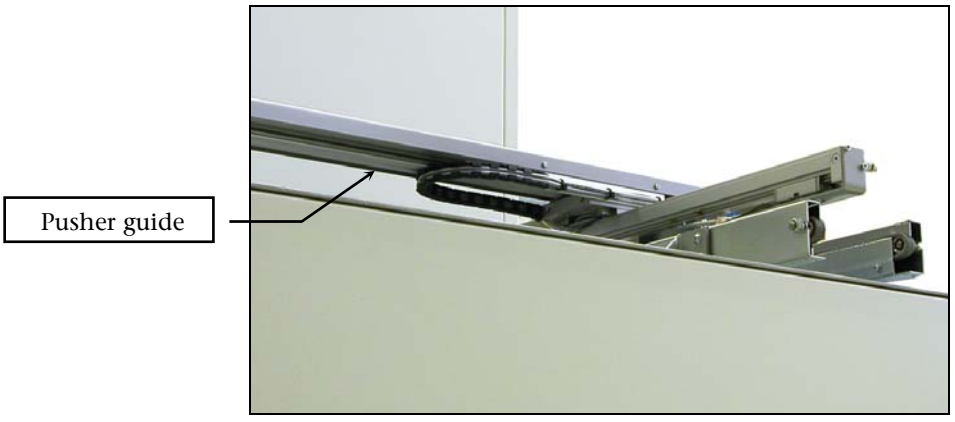


Figure 5-2 Pusher guide

Lubricate guide for width adjustment (Unloader).
Apply a small amount of grease to the whole length, and both sides of the guide for width adjustment.

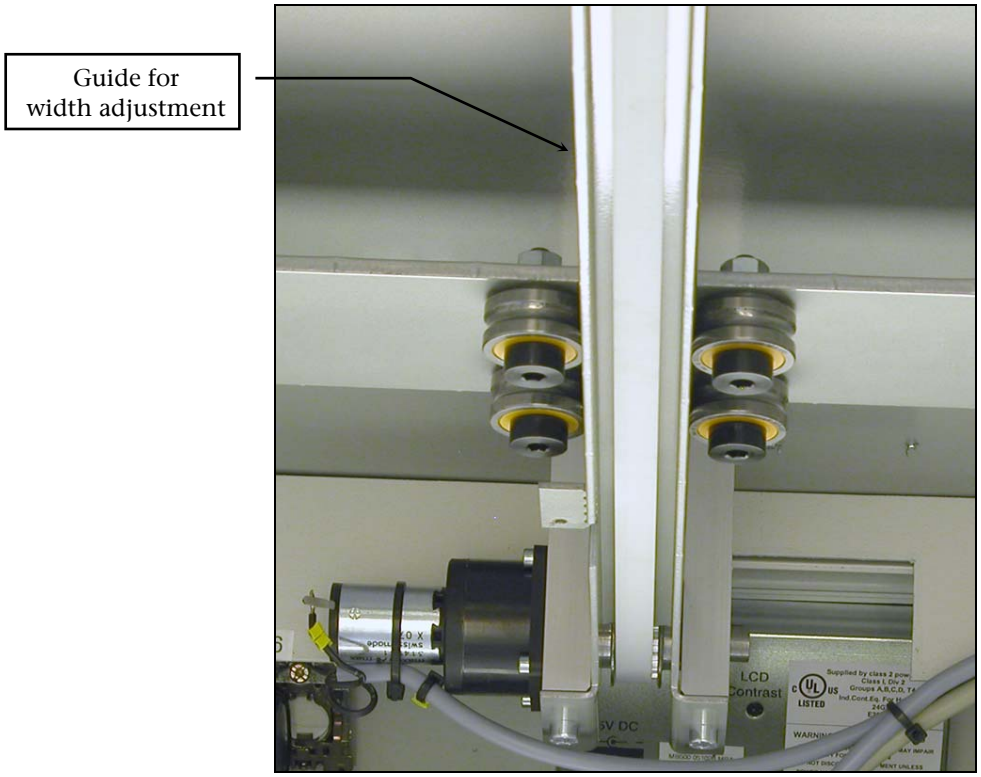


Figure 5-3 Guide for width adjustment

Lubricant specifications

This section contains lubricant data for:

- OKS 270 grease

OKS 270

OKS 270 is the base lubrication grease for the machine.

Data

Full product name: OKS 270
Type: Grease paste
Colour: Whitish
Flash point: >210°C

Supplier in Sweden

TriboTec AB
Box 203
S-435 24 Mölnlycke, Sweden
Phone: Nat. 031-88 78 80 Int. +46 31 78 80
www.tribotec.se

Manufacturer

OKS Spezialschmierstoffe GmbH
Triebstraße 9
D-80993 München
Phone: Nat. 089-14 98 920 Int. +49 89 14 98 920
www.oks-germany.com