

User Manual

Laminator LXS II



Version: LXS-S12/V3.87

Lapis Drucktechnologie GmbH
Weinheimerstr. 62
68309 Mannheim
Tel.: +49(0)621/7363866
Fax.: +49(0)621/7363868
Email: info@lapis-online.de

Table of contents

1. General information.....	5
Product description.....	5
Symbols and conventions.....	6
Intended use.....	6
Safety information.....	6
Environmental information.....	7
2. Connection and commissioning.....	9
Device overview.....	9
Unpacking and setting up the device.....	10
Connecting the device.....	11
Connecting to the power supply.....	11
Connecting to a computer.....	11
Switching on the device.....	11
Inserting film.....	12
3. The control panel (service).....	13
Control panel configuration.....	13
Key functions in the start menu.....	13
Key functions in the configuration menu.....	14
Device statuses.....	15
4. Configuration.....	17
Configuration via control panel (service).....	17
Configuration via interface.....	19
Configuration settings.....	21
System.....	26
5. Control.....	27
Control commands.....	27
Status query.....	29
Time chart of status	31

6. Troubleshooting..... 33

Types of errors and elimination.....	33
Error messages.....	34

7. Service..... 37

Windows-Application: LamiControl	37
Windows-Application: BootControl	38
AVR programming protocol.....	39

8. Attachment..... 41

Usage of alternative foil	41
Flow control: both sides lamination with flipper	44

General information

Product description

Our "smallest" laminator yet: A compact product from our series of laminators for plastic cards for challenging applications in the industrial sector. Developed with our substantial know-how, manufactured with care and distinction in Germany, and incorporating only high-quality materials. Add- on optional modules, Feeder and Flipper, are available; as well as an OEM-version.

Symbols and conventions

The following symbols and conventions are applied in this user manual.



The symbol indicates important information, which must be observed. A failure to do so may lead to injuries.



The symbol indicates parts of the device that are hot and should not be touched.



Good advice or information regarding important working steps.

Ready

Text in monospace type indicates contents on the display.

Taste

Framed text corresponds with a key on the control panel.

Intended use

The device is constructed in accordance with the latest engineering practice and per the recognised safety regulations. Nevertheless, danger to the life and limb of the user or third parties or damage to the device and other property may occur when using it.

The device must be operated exclusively when in a technically faultless condition, as intended, with an awareness of safety and potential hazards, and in accordance with the operating manual.

The device is intended exclusively for laminating suitable materials. Any other use or any use exceeding this is considered unintended use. The manufacturer shall not be liable for any damage that results from misuse. The operator is solely responsible for the resultant risk.

Safety instructions

The device is designed for an AC mains supply from 100 V to 240 V. It must be connected exclusively to sockets with a grounded conductor contact.

The device must be operated exclusively in a dry environment and must not be exposed to any moisture (spray, mist, etc.).

Do not operate the device in potentially explosive atmospheres.

Do not operate the device in close proximity to high voltage lines.

If the device is operated with an open cover then it is essential to ensure that clothing, hair, jewellery and similar personal effects cannot come into contact with the exposed, rotating parts.

The device or parts of it may become hot during lamination. Do not touch during operation and allow to cool prior to changing the film if necessary.

Risk of crushing when locking the heated rollers or closing the cover.

Only execute the actions described in this user manual. Further work must be carried out exclusively by trained personnel or service technicians.

Unprofessional intervention or modifications to the device may endanger operational safety.



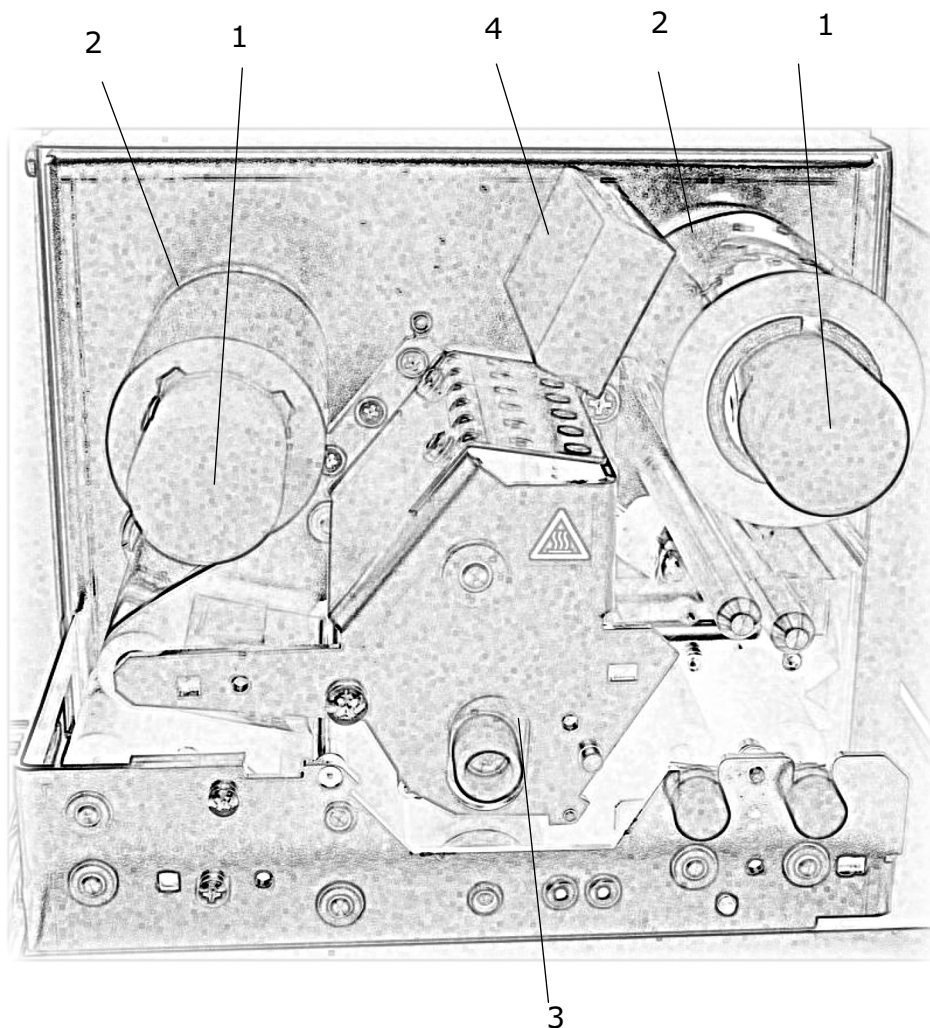
When opening the housing cover a risk of death exists due to live parts.


Environmental information

The device comprises materials that can be reused when processed by specialist recycling companies. The optimum design of the laminator facilitates a straightforward separation of the recyclable materials. Label the device as scrap and dispose of it in accordance with the legal regulations

Connection and commissioning

Device overview



- 1 Carrier roller
- 2 Spacer ring
- 3 Heated roller 
- 4 RFID module

Unpacking and setting up the device

- Remove the device from its packaging and place on a level surface.
- Check the laminator for transport damage.
- Check delivery for completeness.

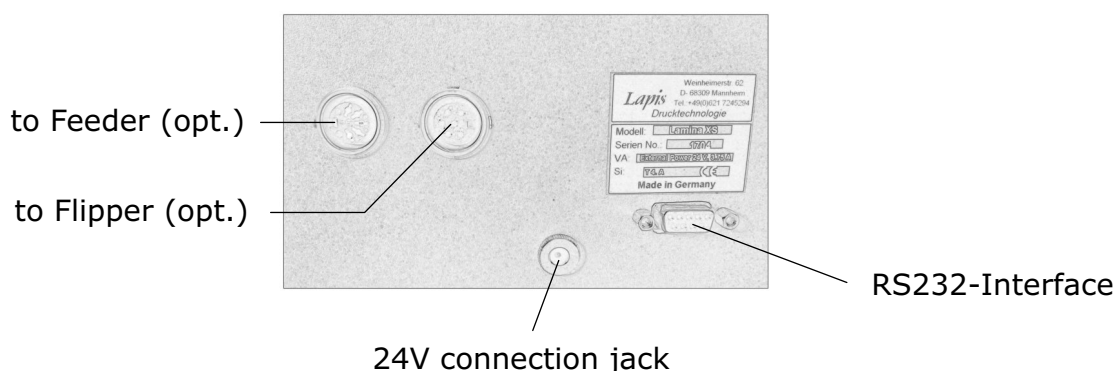
Scope of supply:

- Laminator
- Power adapter
- Mains cable



Store original packaging for subsequent transportation.

Connecting the device



Connecting to the power supply

The laminator is equipped with an external broad-range power pack for a mains voltage of 100 V to 240 V. Plug the mains cable into an earthed socket and the 24V cable into the 24V device connection jack.

Connecting to a computer

For configuration and service purposes the laminator must be connected to the computer with a suitable interface cable (optional).

Switching on the device

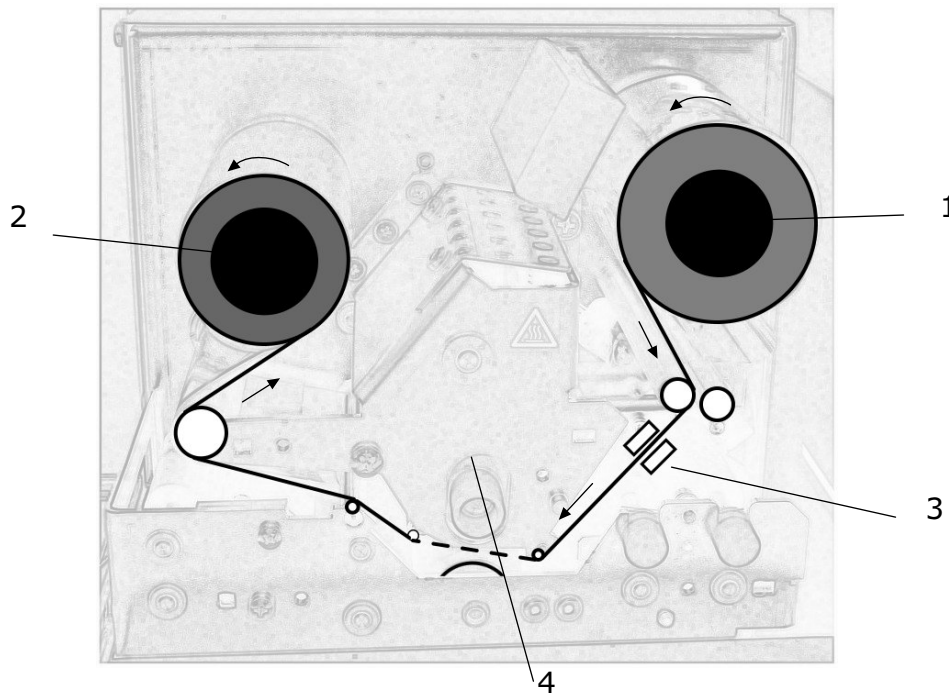
Once all connections have been established it is possible to switch the laminator on via the mains switch.

The device carries out initialisation with a simultaneous self-test. If no error is present, heated roller heating commences and the display indicates **HEATING**. After roughly 8 minutes the laminator is ready for operation and the display switches to the **Ready** status.




It is assumed that film is already present inside the device.

Inserting film



There is a risk of burning on the safety guard for the heated roller (4)

When inserting or exchanging patch film proceed as follows:

- Switch off the device and let it cool down
- Open housing cover
- When exchanging the film additionally empty carrier rollers (1,2)
- Slide the film roll onto the unwinding carrier roller (1) until it reaches the limit stop.
- Slide an empty film core onto the winding carrier roller (2) until it reaches the limit stop.
- Insert the film in accordance with the drawing shown above. Attach the start of the film to the empty core with adhesive tape.
- Switch on the device.
- Transport film with  to the first patch and when doing so check that the film runs correctly and crease-free.



The first index mark on the film should lie before sensor (3), in order that no patch is lost.

The control panel

Control panel configuration



The display informs the user of the current device status, reports errors and indicates configuration settings in the menu.

The keys enable control functions, the accessing of information and navigation within the menu.

If the device is switched on then the green LED illuminates. An error is additionally signalled via the red LED.









Farther settings are possible by the Windows tool.

The functionality of the control panel differs in the start menu and the configuration menu.

Key functions in the start menu







The start menu contains all functions on one level, making these directly accessible. Key navigation is not required. During lamination the buttons are locked.

Key	Function
	Transports the film forwards. Useful when inserting new film
	Transports the film backwards. Useful when inserting new film
	Transports a document manually from the tray

Taste	Funktion
	Displays the device no. and program version. If Feeder: switch on/off.
	Deletes error messages
	Switches to the configuration menu

Key functions in the configuration menu

The configuration menu offers setting options across multiple levels, in order to configure the laminator for the specific requirements. It is also equipped with test and service functions in order to support the configuration and function of the device. During lamination the buttons are locked.

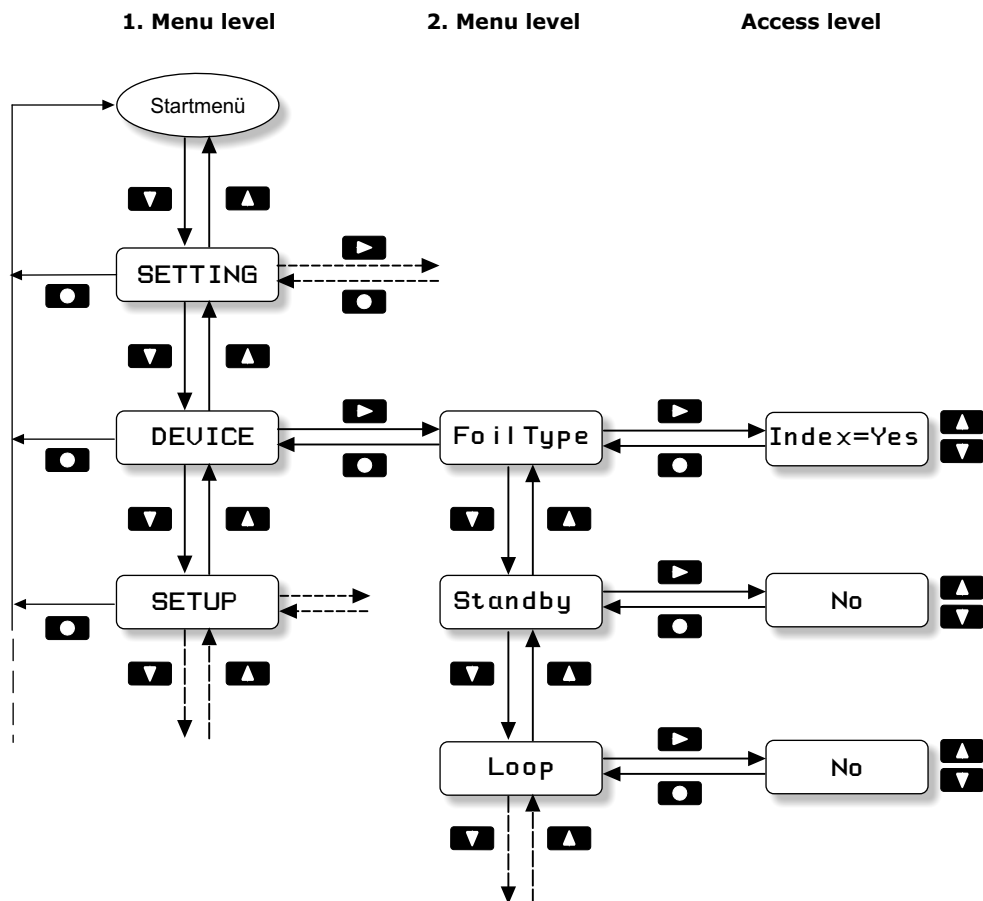
Taste	Funktion
	Start the configuration menu
	One menu level down
	One menu level up
	Scrolls forwards within the respective menu level. At access level changes or reduces the value.
	Scrolls forwards within the respective menu level. At access level changes or reduces the value.
	Scrolls forwards within the respective menu level. At access level changes or reduces the value.

Device statuses





Zustand	Beschreibung
Initialization	After the switch-on process the laminator is in the initialisation phase and carrying out the self-test
-- HEATING --	The laminator is in the heat-up phase
-- COOLING --	The laminator is in the cool-down phase
Ready	The laminator is ready for operation
in process	The laminator is in process
STANDBY	If the laminator is not used for 30 minutes it switches to energy-saving mode. The temperature of the heated roller drops in this mode. Press CLEAR to end. The energy-saving mode must be activated in the menu!
Feeder empty	Stack of card in feeder is empty
#64 retract	An error is displayed

Configuration

Configuration via control panel (service)



Within the access level the user works in editing mode:

Key	Function
	Increases / reduces the value or changes an option
	Special functions for some parameters
	Exits the editing mode. Changes are lost after the device is switched off.
	Exits the editing mode. Changes are retained after the device is switched off.

Menu structure

1. Menu level	2. Menu level	Access level = Default value	Special function on Access level (F1)
SETTING	Temperature Lamination Speed Delay Heatroller Cool Down Time Transport Speed LaminationLength FoilFurtherMove Foil Position Foil Position 2	150 °C 6 mm/s 200 ms 30 s 80 mm/s 86 mm 14 mm 0 x1/10mm 0 x1/10mm	Test Test
DEVICE	Foil Type Foil Category Standby Operation Mode eject direction double-sided	PATCH Normal foil No Normal backside no	



Farther settings are possible by the Windows tool.

Configuration via interface

The parameters accessible via the control panel can also be adjusted via the serial interface. Furthermore, there is an additional command for controlling the device.

The laminator is connected by means of a standard cable

RS-232 SERIAL SUB D9 connector jack

to the computer with fix RS232-Parameter:

19200 Baud, 8 Databits, no Parity, 1 Stopbit

The sequences for the command transfer are constructed as follows:

<ESC> *cmd* [*data*] **<CR>**

Examples:

Send:	Response:	Hints:
<ESC>T175<CR>	<CR>	set valid parameter
<ESC>T<CR>	175<CR>	readback without value

A few communication rules:

- <LF> is ignored
- Every command transfer is acknowledged with <CR>
- Every message from laminator is acknowledged with<CR>
- Sequences without parameter data deliver the actual value (ReadBack)

Italic characters in the command description are placeholders and must be replaced:

- *d* = Decimal number
- *p* = Boolean number: 0 oder 1 (1 Byte)
- *h* = Hexadecimal number: 1-9, A-F, a-f (1 Byte)
- *c* = Arbitrary character: 0-9,A-Z,a-z (1 Byte)
- *s* = Arbitrary string: ...
- <...> = Control carcter as <ESC> or <CR>
- **Bold**printed Character are directly be taken on.
- Underline refers to default setting

List of Commands

SETTING COMMANDS

Cd	Cool Down Time
Dd	Delay Heatroller
Gd	Lamination Speed
Hd	Transport Speed
Ld	Lamination Length
Nd	Foil Further Move
Pd	Foil Position
Td	Temperature

DEVICE COMMANDS

K01;p	Foil Type
K02;d	Operation Mode / Synchronization
K04;p	Direction of eject
K10;p	Single-/double-sided lamination (only with optional flipper)
K20;p	Foil Synchronisation (with / without index bar)
K40;p	Standby
K80;p	Foil Category (normal / alternative)

SYSTEM COMMANDS

!v	Read Programm-Version
y8a	Read Serial Number (Board)
y8b	Read Serial Number (Device)
y5	Read Tag-Info
S	Save Macro


CONTROL COMMANDS

!!	Reset
!c	Clear Error
!r	Alife-Status
!R	Ribbon-Status
!f	Status
E	Card eject to the printer
RB	next card with both sides laminating (only with optional flipper)
RC	next card starts cleaning procedure
RN	next patch (only for tests)
RS	next patch synchronization (only for tests)

Configuration settings

The different setting options configure the laminator for specific requirements. This is carried out either via the control panel or via the interface by means of a command set. There are exceptions, whereby access is only possible via one or the other method.



Simultaneous switching on of the device and pressing of the key  resets all settings to the standard values. The set-up values are an exception to this.

SETTING

Menu: **SETTING / Temperature**
Command: **<ESC>Td<CR>**

Setting the thermal energy for the heated roller for lamination. The correct temperature must be experimentally determined with consideration to the lamination speed, the film and the plastic card. The presetting must be considered a guideline value.

Setting range: 120...150...180 degree C

Menu: **SETTING / Lamination Speed**
Command: **<ESC>Gd<CR>**

Setting of the transport speed of the document during lamination. The correct speed must be experimentally determined with consideration to the lamination temperature, the laminate film and the plastic card. The presetting must be considered a guideline value.

In order to carry out a test it is possible to start the motor via

Setting range: 4...6...20 mm/s

Menu: **SETTING / Delay Heatroller**
Command: **<ESC>Dd<CR>**

Setting the waiting time, once the heated roller has lowered and lies on the document. Only after this time does the actual lamination start.

Setting range: 0...200...2000 ms

Menu: **SETTING / Cool Time Delay**
Command: <ESC>Cd<CR>

After settled cooling time, the status will be set to INPOS. Time is start after card is in parkposition and ready to eject to the printer.

Setting range: 0...30...60 s

Menu: **SETTING / Transport Speed**
Command: <ESC>Hd<CR>

Setting the transport speed of the plastic card outside of lamination. In order to carry out a test it is possible to start the motor via .

Setting range: 40...80...80 mm/s

Menu: **SETTING / Lamination Length**
Command: <ESC>Ld<CR>

Setting the lamination range.

Setting range: 80...86...100 mm

Menu: **SETTING / Foil Further Move**
Command: <ESC>Nd<CR>

Setting the foil further move. This parameter is important to separate the foil after lamination from the card.

Setting range: 10...14...30 mm

Menu: **SETTING / Foil Position**
Command: <ESC>Pd<CR>

With a change in the plastic card intake range, precise placement of the film is carried out.

With an enlarging of the intake range, the lamination of the plastic card starts later. Conversely, with a reduction in the intake range lamination starts earlier. The direction arrows on the display indicate the direction of travel once lamination starts.

Setting range: -30...0...+30 x 1/10mm

Menu: SETTING / Foil Position 2 (only with optional flipper)

This parameter is only used in connection with the optional flipper and the RB-command. Besides, it becomes plays cards second sometimes back-sided drawn. With a change in the plastic card intake range, precise placement of the film for back-side of the card is carried out.

With an enlarging of the intake range, the lamination of the plastic card starts later. Conversely, with a reduction in the intake range lamination starts earlier. The direction arrows on the display indicate the direction of travel once lamination starts.

Setting range: -30...0...+30 x 1/10mm

DEVICE

Menu: **DEVICE / Foil Type**

Command: <ESC>K01;p<CR> und <ESC>K20;p<CR>

Setting the film type.

Setting range: K01 = 1, K20 = 1: Patch (always with black marking)
 K01 = 0, K20 = 1: Thin film with black marking
 K01 = 0, K20 = 0: Thin film without black marking

The difference between patch and thin film with black marking is another lamination position of the card.

Menu: **DEVICE / Operation Mode**

Command: <ESC>K02;p<CR>

The laminator operates in 3 different modes. 1 of these is exclusively suitable for test purposes only in menu.

Setting range: 0 = Normal
 1 = Skip lamination
 Test: Normal Hoff (only menu)
 3 = Front lamination, if alternative foil
 4 = Back lamination, if alternative foi

The standard setting is "normal" and reflects normal operation.
 With the setting "Skip lamination" the plastic card is not laminated.

"Test: Hoff" also reflects the normal operating process, but the heating is off in this case.

Menu: **DEVICE / eject direction**

Command: <ESC>K04;p<CR>

Setting range: 0 = eject backside (to the exit stacker)
 1 = eject frontside (to the printer)
 eject backside and rotate (only menu and with flipper)

If card is eject to the printer, see also for the Status-Information and the E-Command.

Menu: **DEVICE / double-sided** **(only with optional flipper)**
Command: **<ESC>K10;p<CR>** **(only with optional flipper)**

Cards are laminated on both sides. In addition the optional flipper is required.

Setting range: 0 = double-sided inactive
 1 = double-sided active

Menu: **DEVICE / Standby**
Command: **<ESC>K40;p<CR>**

If the laminator is not used for 30 minutes it switches to energy-saving mode. The temperature of the heated roller drops in this mode. Press or sent a Clear-Command to finish. Also a card in entrance position stops standby state. The energy-saving mode must be active for this option!

Setting range: 0 = Standby off
 1 = Standby on

Menu: **DEVICE / Foil Category**

Selecting of the manually or automatically foil category. The "Alternative foil"-Option only makes sense in connection with front- and back-lamination (K02;3 and K02;4). The Option "Automatically" only makes sense in connection with RFID.

Setting range: Normal foil
 Alternative foil
 Automatically

Command: **<ESC>K80;p<CR>**

Change foil category. The "Alternative foil"-Option only makes sense in connection with front- and back-lamination commands (K02;3 and K02;4).

Setting range: 0 = Normal foil
 1 = Alternative foil

System

Function: Read Programm-Version

Startmenu: F1

Command: <ESC>!v<CR>

Reads the firmware version. Is shown in line 1 on the display.

As a response following a command transfer the user receives a sequence in the form e.g. <ESC>LXS-S12/V3.35<CR>

Function: Read Serial Number (Board)

Command: <ESC>y8a<CR>

Reads the serial number of board.

As a response following a command transfer the user receives a sequence in the form e.g. <ESC>PL13091570B06RL<CR>

Function: Read Serial Number (Device)

Startmenu: F1

Command: <ESC>y8b<CR>

Reads the serial number of device. Is shown in line 2 on the display.

As a response following a command transfer the user receives a sequence in the form e.g. <ESC>PL13091570M02RL<CR>

Function: Tag-Info

Command: <ESC>y5<CR>

Reads the 8-digit tag information.

As a response following a command transfer the user receives a sequence in the form e.g. <ESC>12345678<CR>.

No Tag Information responses with <ESC> no tag <CR>.

Function: Storage of Macro

Menu:

Command: <ESC>S<CR>

All configuration parameters are stored in the EEPROM so that these values are not lost after the switch-off process. When switching on the laminator the stored settings are reloaded and reused.


The command sequence is acknowledged with <ESC>+<CR>

Control

Control commands

Function: Reset
Command: <ESC>!!<CR>

The laminator is reset. The process equates to a restart after a Power On. Settings that are not saved in the macro are lost.

Function: Clear Error
Startmenu: 
Command: <ESC>!c<CR>

Deletes error messages, refer also to the "trouble-shooting" chapter.

Function: Eject
Command: <ESC>E<CR>

Start card eject to the printer (frontside). This command is only executable if the statusflag INPOS is active.

Function: Both sides lamination (only with optional flipper)
Command: <ESC>RB<CR>

For both sides lamination, send this command for each card before input to the laminator. This command is only executable if flipper is connected.

Function: next patch
Command: <ESC>RN<CR>

Foil-Transport to the next patch without reading ribbon status. Only for tests!

Function: next patch synchronization
Command: <ESC>RS<CR>

Foil-Transport to the next patch with reading and setting ribbon status. It can get lost up to 2 patches. Only for tests!

Function: **Cleaning**
Command: <ESC>RC<CR>

Next card starts the cleaning procedure without foil and temperature.

Status query

Function: **Status**
Command: **<ESC>!f<CR>**

Delivers detailed information on the current status of the laminator. The status can be requested at any time.

The response consists of 7 Bytes.

Format: **=hh/dd<CR>**

<i>hh</i> : Statuscode	Hint:
00: READY	Device is ready for work
01: WAIT	Temperature of heat roller too high / too low.
02: BUSY	Laminator is active
04: ERROR	Errorcode is setting
10: GOT IT	Document identified to start lamination
20: LAMI	Lamination of Document activ
40: EJECT	Ejection of Document activ
80: INPOS	card in eject position on frontside

<i>dd</i> : Errorcode	Hint
00	no Error
<i>dd</i>	Errorcode, see chapter "Trouble shooting"

Status bits also occur in combination. E.g. status code "42" means that the laminator is active and is presently outputting a document.

Function: **Alife-Status**
Command: **<ESC>!r<CR>**

Delivers information on the current status of the laminator. The status can be requested at any time.

The response only consists of 2 Bytes.

Format: **d<CR>**

<i>d</i> : Statuscode	Hint
0 = OK	Device is ready for work
1 = WAIT	Temperature of heat roller too high / too low
2 = BUSY	Laminator is active
3 = ERROR	Errorcode is setting

Function: **Ribbon-Status**
Command: **<ESC>!R<CR>**

Delivers information on the current status of the ribbon side. The status can be requested at any time.

The ribbon status will be refresh after RS-command and after start of laminating.

The response only consists of 2 Bytes.

Format: *d***<CR>**

d: Statuscode

0 = unknown

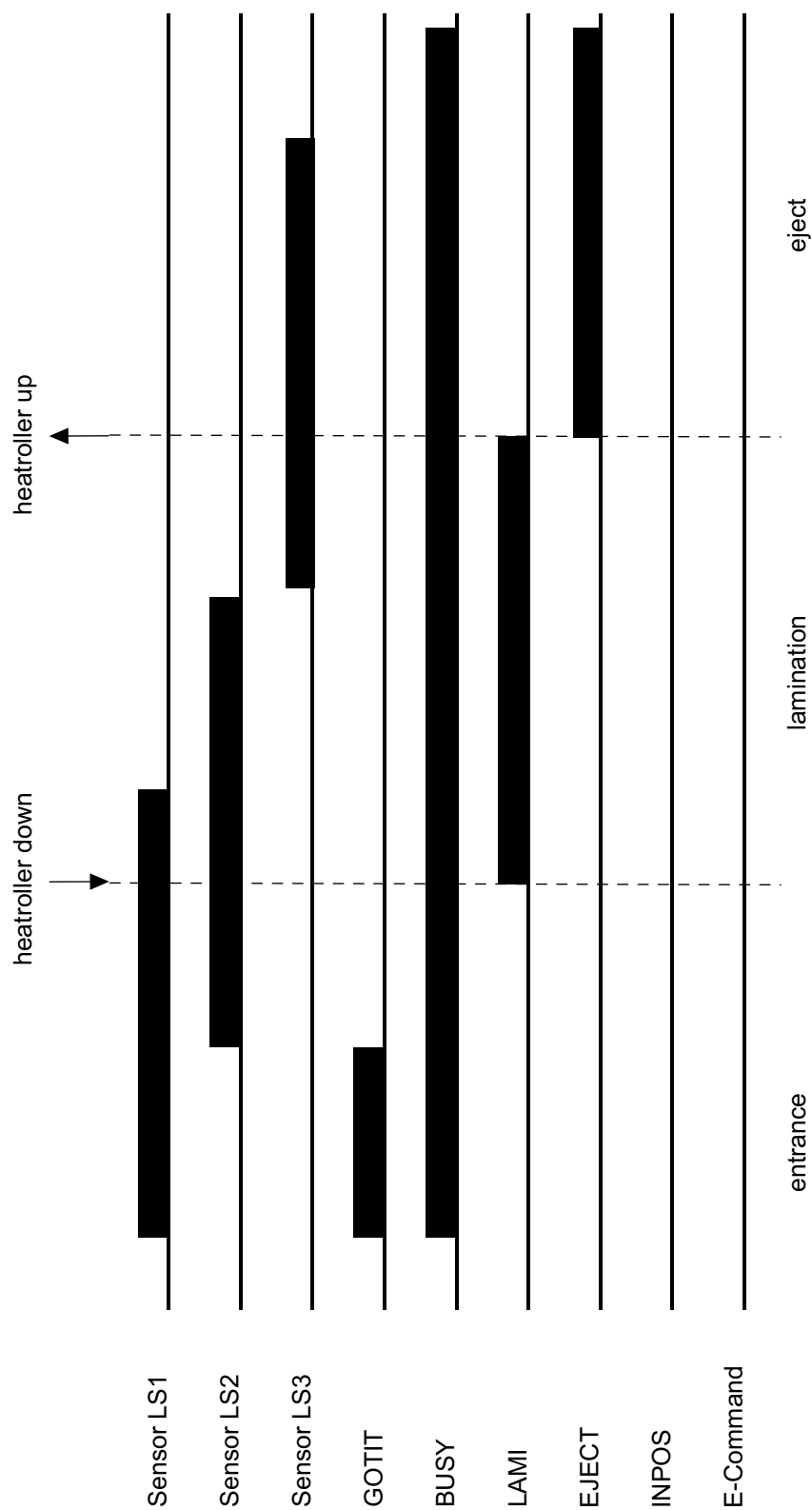
1 = next patch is recto

2 = next patch is verso

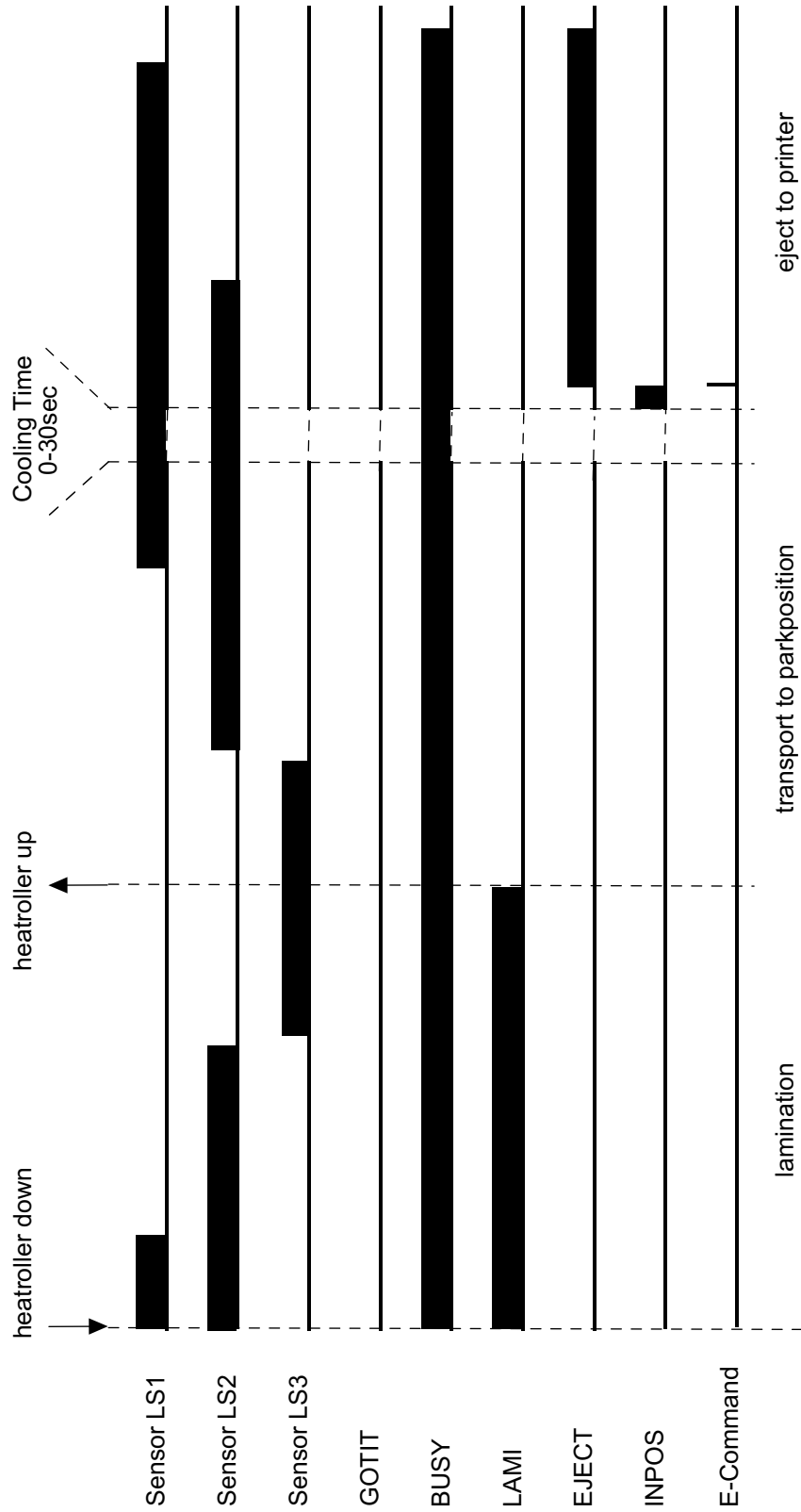
3 = busy

Time chart of status

Eject backside to the exit stacker



Eject frontside to the printer



continued from page 35

Troubleshooting

Types of errors and elimination

If an error occurs then this is signalled by the red ERROR LED whilst the error message is shown on the service-display. Different error codes indicate the cause of the problem. In a normal case it is possible to delete the error message after eliminating the problem with **CLEAR** after which the device is once again ready for operation.

Status	LED	Display
Rectifiable errors	blinks	errorcode < #80
Non rectifiable errors	on	errorcode > #80
System errors	on	errorcode > #90

"Rectifiable errors" are usually film or transport errors, which are simple to remedy.

"Non-rectifiable errors" are triggered by defective hardware. If a restart does not solve the problem then service intervention is necessary.

In the event of a "system error" the device must be returned to the factory.



As an alternative to the control panel it is also possible to query the error code via the status message and delete this via the Clear command.

Error messages

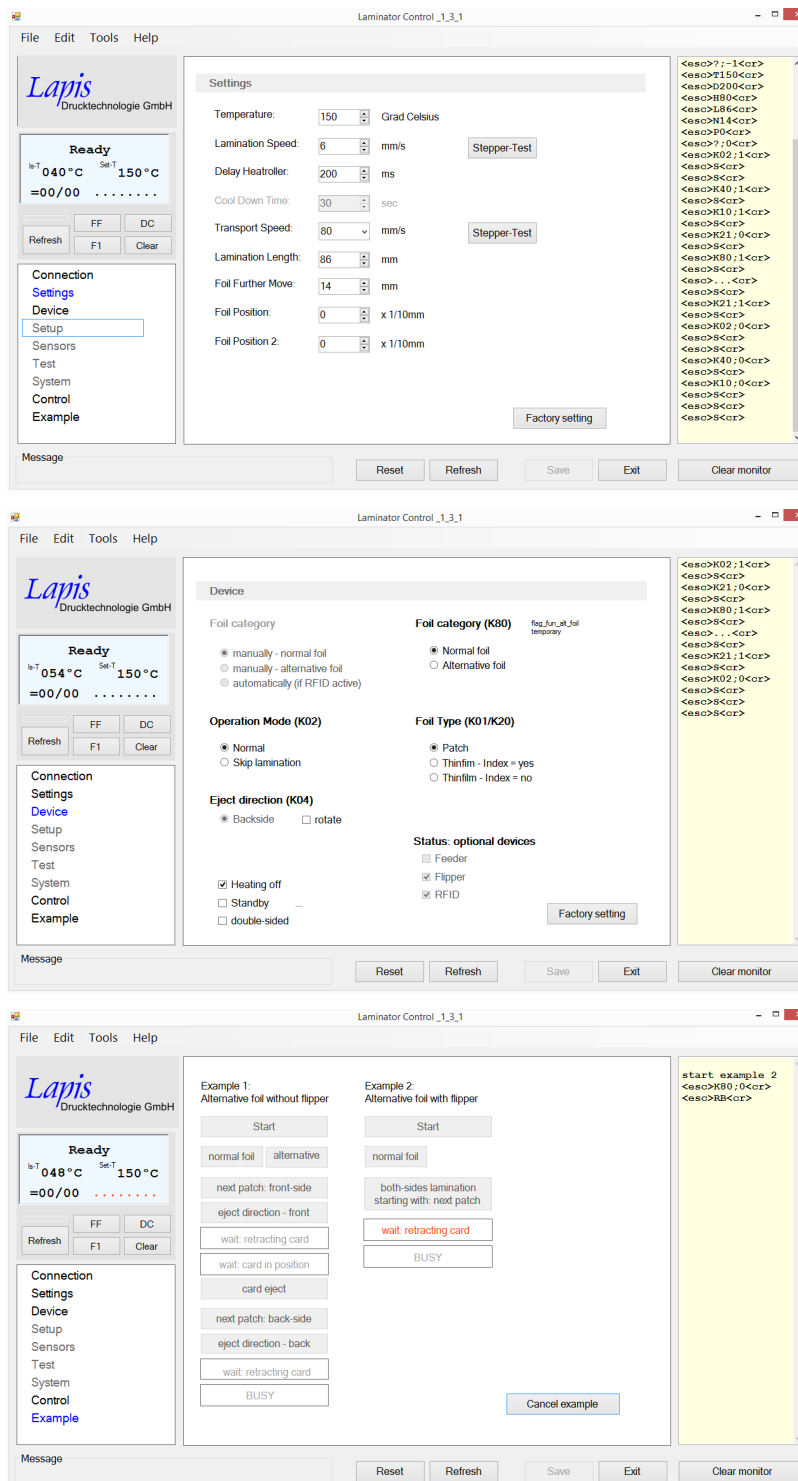
Error message	Cause	Remedy
#30 Standby	Laminator is switched to the energy saving mode.	Press Clear or send a Clear-Command to end.
#31 Feeder empty	Feeder is empty	Insert cards to feeder and press clear or send clear command.
#53 Tag invalid	Invalid tag information with initial acquisition of the film.	Use permissible / approved film material.
#54 RFID ERR=dd	Reader:Communication Error dd=24 read err dd=83 write err	Error message from tag reader. Indicates signal between reader and tag too weak. Visual inspection!
#55 RFID CRC	Reader transfer error. Contact problems between board and tag reader	Check connection cable (service)
#56 RFID MSG	No response from tag reader. Tag not seen or not read.	Use permissible / approved film material.
#57 FLIP data	No response from flipper.	Check connection cable
#61 card inside	Document located in the transport tray after restart or after CLEAR and could not be ejected	Remove document from the transport tray manually.
#62 eject	Ejection of the document failed.	Remove document from the transport tray manually.
#63 transport	Transport of the document failed.	Remove document from the transport tray manually.
#64 retract	Intake of the document failed.	Remove document from the transport tray manually.

Error message	Cause	Remedy
#65 ribbon end	Film end	Insert new film
#66 ribbon synch	Synchronisation of the film failed.	<ul style="list-style-type: none"> - Insert film with index marks - Insert film correctly - Configure correct film type
#67 ribbon trans	No film transport.	Check film
#70 FLIP error	Document located in flipper or flipper error	Press Clear or send a Clear-Command to end.
#71 Foil category	Foil category could not be read	Press Clear or send a Clear-Command to end. After this: Category = normal
#81 RFID no data	No response from tag reader.	Check tag reader. Contact service!
#82 ADC problem	Impermissible ADU values	Check temperature sensor. Contact service!
#83 ADC problem	No temperature increase to record	Check temperature sensor. Contact service
#84 heat roller	Heated roller not in limit position	Contact service!
#85 heating	Circuit breaker for high temperature has triggered.	Contact service!
#86 Sensor ???	Both sensors in transport tray see document	Check transport tray, otherwise Contact service!
#98 EEPROM/SETUP	No access to the EEPROM	Contact service!
#99 Call Service	Electronic type plate missing	Contact service!

Service

Windows-Application: LamiControl

Use this tool for tests and configuration of the LXS II laminator. You also can use the LamiControl-Tool for downloading the newest manual, application and firmware with programming. For some settings you need a password.



Windows-Application: BootControl

For service purposes the laminator is connected with the computer via the serial interface. A standard cable RS-232 SERIAL SUB D9 connector jack is used.

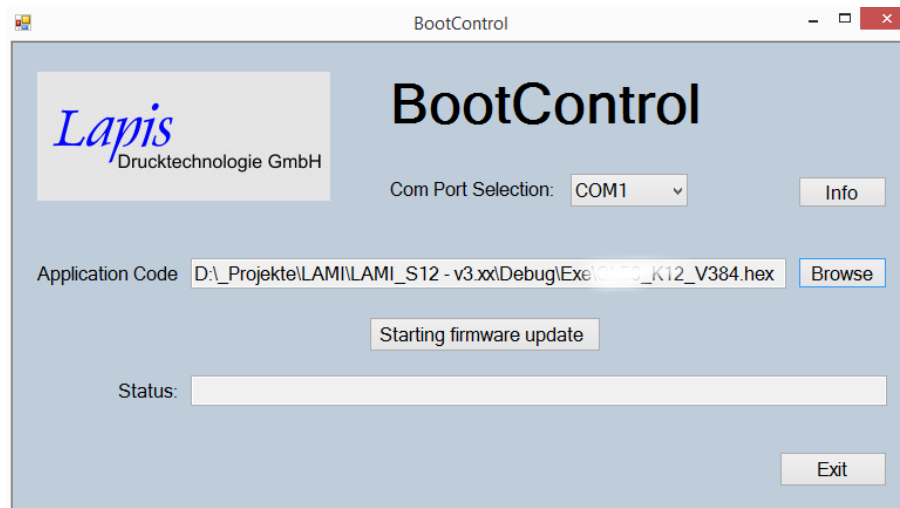
After starting the Windows application *BootControl* it is possible to load new firmware. Prior to this the interface agreements as well as the path for the access to the application code (*.HEX) must be stipulated

The download process normally can be started as follows:

- Switch on laminator
- Press „Starting firmware update“

If anything goes wrong and the update-process cannot started, you need the service-panel and started as follows:

- Switch on laminator and simultaneously hold the **F1** key down
- Press „Starting firmware update“



Alternative, you also can use the LamiControl-Tool for downloading the newest firmware and programming.

AVR Programming Protocol

The update process can also be started without Windows software via the sequence <ESC>U<CR>. The subsequent protocol must then be carried out independently:

Laminator	Host	Hint
^		BootLoader is ready
V1.31	@&\$	Start Download Sequence
?		ready for Download
XON		enable Interface
-	:naatddd...c	Send 1 HexLine (Intel-Hex-Format)
XOFF		if Checksum Error
%		disable interface
~		if Verify-Error in Flash-Page
#		HexLine closed
@		EOF identified, exit with error
		EOF identified, exit without error

After the AVRBL is started (via a reset, a power-up, or a jump from the main application), the following protocol must be observed:

1. Upon power-up, reset, or as a result of a jump from the main application, the AVRBL sends a '^' (BOOTLOADER_ACTIVE_CHAR) at your selected baud rate.
2. The host is then required to send the three-character entry sequence. This is used to prevent an inadvertent attempt of reprogramming from taking place. If the AVRBL does not receive these characters within the timeout period, the AVRBL tests to see if there is code located in the main application area of flash. If there is, then the AVRBL jumps to it, otherwise, execution stays within the AVRBL indefinitely, waiting for the entry sequence.
3. Once the three-character entry sequence has been sent, the bootloader sends the version string (Vx.xx) followed by a '?' (READY_CHAR).
4. Upon receipt of the READY_CHAR, the host application should send the hex file for the new/updated application program observing an X-ON / X-OFF handshaking protocol to control data flow. The handshaking is very important as the flash memory area writes much more slowly than the serial port can send data.

The programming software continues sending the hex file until it is all sent. After each line of ".hex" file is received by the bootloader, one of three characters is transmitted by the bootloader:

- '~' Line received with no errors.
- '%' Line received with no error, but an error occurred while flashing.
- '-' Checksum error detected while receiving the line.

5. After the programming is complete, the AVRBL sends either a '#', meaning the programming is all right, or an '@' indicating that an error has occurred and the program did not load successfully. In most cases an error during programming means that the main application program is corrupted and will need to be resent.

6. The AVRBL then starts the newly programmed application software. As stated in step 2, the AVRBL tests to see if there is code located in the main application area of flash. If there is, the AVRBL jumps to it, otherwise, execution stays within the AVRBL indefinitely, waiting for the entry sequence.

Character Definition

```
//define three character string to enter boot loader
#define char1 '@' /* reset codes.. start load codes.. */
#define char2 '&'
#define char3 '$'

// define bootloader active char
#define BOOTLOADER_ACTIVE_CHAR '^'

//define bootloader ready for file character
#define READY_CHAR '?'
// define line complete with no error character
#define LINE_COMPLETE_CHAR '~'

// define checksum error character
#define CS_ERROR_CHAR '-'

// define flash page error character
#define PAGE_ERROR_CHAR '%'

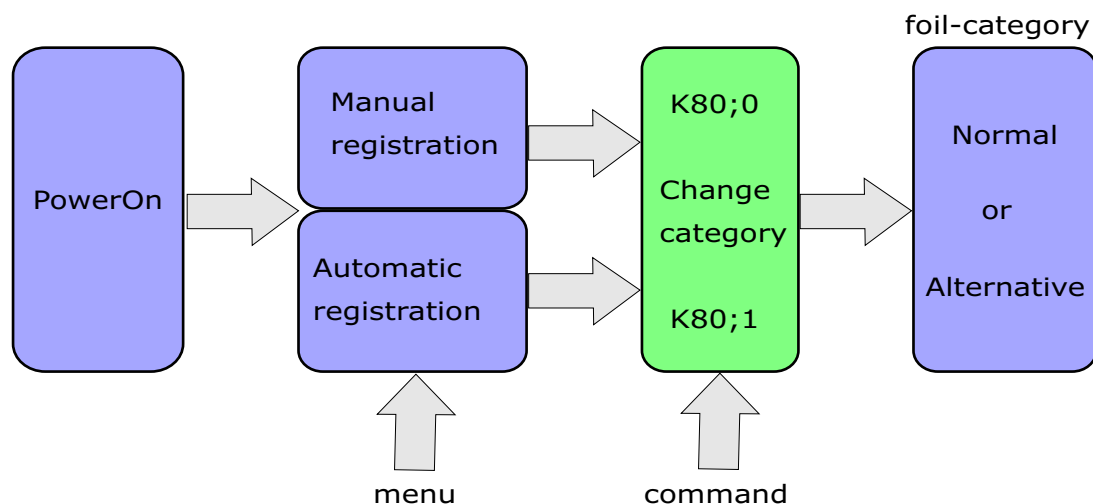
// define file complete, no errors character
#define FILE_COMPLETE_CHAR '@'
```


Attachment

Usage of alternative foil

With the usage of alternative foil a patch is in each case for card-front and card-back in alternate order intended. For the Laminator it is important for the synchronisation of the foil to know whether it concerns a normal or an alternative foil (foil category). The real foil transport takes place always directly before the lamination. At that time must be confessed by a suitable command in which manner the positioning has to take place not to synchronise normally on the following patch.

The category of the foil is read normally always after Power On about the RFID information. Besides, a short foil transport can originate. If one wants to avoid this or one works in general without RFID, one can suppress the automatic capture in the menu (optional display or windows tool). Besides, the manually definition of the category occurs again about the menu or also by command.



The following commands are important for the handling with alternative foil:

Foil category - normal foil: `<esc>K80;0<cr>`

Only makes sense if the definition of the foil category from should occur externally. This is also the standard default, if none automatic recognition was possible. Besides, is always synchronised on the following patch, even so if an alternative foil is inserted. Front- and back-command have no influence.

Foil category - alternative foil: `<esc>K80;1<cr>`

Only makes sense if the definition of the foil category from should occur externally. Front- and back-command have influence on the foil synchronisation.

Synchronization: `<esc>K02;0<cr>`

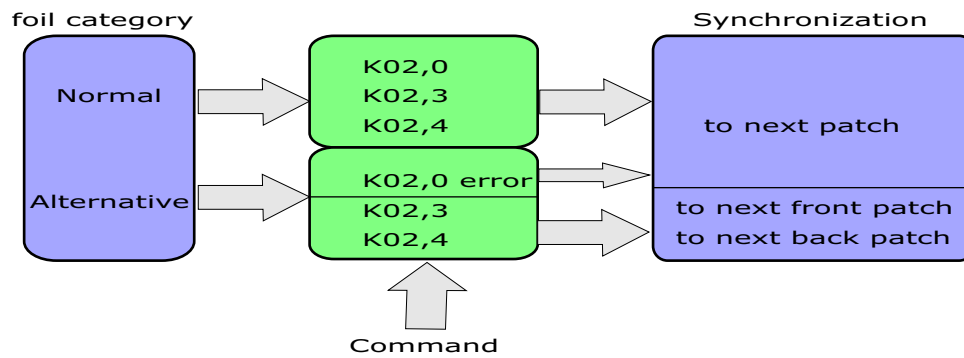
Regardless of the foil category it is always synchronised on the next patch. This is also the standard default.

Synchronization: `<esc>K02;3<cr>`

The next synchronisation starts from a front patch with followed change, provided that an alternative patch foil is inserted. With the first synchronization patches can be jumped over, if the ribbon status is still unknown.

Synchronisation: `<esc>K02;4<cr>`

The next synchronisation starts from a back-patch with followed change, provided that an alternative patch foil is inserted. With the first synchronisation patches can be jumped over, if the ribbon status is still unknown.



Ribbon-Status: **<esc>!R<cr>**

The ribbon status always indicates the position of the following patches. If the information is not available, a foil transport occurs before the synchronisation up to the reading. This is after a new start basically the case.

- 0 = unknown
- 1 = next patch is front
- 2 = next patch is back
- 3 = busy

Flow control: both sides lamination with flipper

Ribbon-Status: `<esc>RB<cr>`

The following card is laminated in the laminator on both sides. The command must be sent renewed for every card.

After the first lamination the card is turned in the flipper and is supplied to the laminator once more. After the second lamination the card about the flipper is ejected.

Foil category = "normal":

It is laminated on both sides and, besides, synchronized always on the following patch.

foil category = "alternative":

It is laminated on both sides. Besides, the foil is synchronized first on the front-sided and afterwards on the back-sided patch. Above the front-/ back-command can be changed the start condition.

