

Application Layer Communication Protocol for Communication with the Non- Fiscal Unit

Communication protocol version: 2.00

Document version: 2.00.03

Changes in the document

Changes in version 1.00

- Creation of the document

Changes in version 1.01

- GETDEVINFOEX command – changed response content (descriptive texts removed)
- getPrinterInfo command – released for use
- Added printer commands: getPrinterStatus, printEnable, printBarCode, printQRCode
- Added customer display commands
- Added cash drawer commands
- Added errors ENFU_PRN_INTERNAL_ERROR, ENFU_MEMORY_LOW, ENFU_QRCODE_ERROR, ENFU_ILLEGAL_COMMAND, ENFU_DEVICE_BUSY, ENFU_DSP_DISCONNECTED, ENFU_DSP_INTERNAL_ERROR

Changes in version 1.02

- Added information about displaying the full character on the matrix display (displayText command)
- Specification of the behaviour of clearing the contents of the display before displaying new data (displayText command)

Changes in version 1.03

- Formal adjustments
- Change in the printTextLine command – added option for printing a double height line
- Increased version number of communication protocol to 1.02

Changes in version 1.04

- Modified description of ENFU_DEVICE_BUSY, ENFU_REC_EMPTY errors
- Added obtainProgress, cancelRest commands
- Added addBufferText, clearBuffertext, printBufferText commands
- Added ENFU_PRN_BUFFER_FULL, ENFU_WRONG_STATE errors
- Increased version number of communication protocol to 1.03

Changes in version 1.05

- Added ENFU_FAILURE error
- Increased version number of communication protocol to 1.04

Changes in version 1.06

- Changed output parameter pcbVer of GETDEVINFOEX command to hwVer and changed format of its content

Changes in version 2.00.02

- Added GETCAPABILITY and cutPaper commands
- Changed format of version number from X.YYY to X.YYY.BB in commands GETDEVINFO, GETDEVINFOEX
- Added new bit value of printer status (0x20) for command getPrinterStatus
- Increased accepted maximum data length in QR code for command printQRCode

Changes in version 2.00.03

- Added ENFU_POWER_SUPPLY error
- More specified meaning of the printer status bit value 0x10 for the getPrinterStatus command

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1. Introduction

The application layer communication protocol for communication with a non-fiscal unit indicates the way in which it will be possible to work with the non-fiscal unit. It involves the exchange of communication messages in accordance with established procedures and methods, according to precise rules. This application layer communication protocol for communication with the non-fiscal unit is the only way to use the non-fiscal unit.

The non-fiscal unit is a unit that is part of the device and provides options for the use of printing, customer display and cash drawer for the master parts. By shutting down (or losing power), the non-fiscal unit loses all information about its status and does not offer any recovery options.

2. Terminology

2.1. Abbreviations

NFU	- Non-Fiscal Unit
ECR	- Electronic Cash Register
POS_APP	- Point of Sale Application
SW	- Software
FW	- Firmware

2.2. Terms

Electronic Cash Register (ECR)	<ul style="list-style-type: none">- A device designed to record turnover and cash receipts. It is also used to issue a cash receipt to the buyer about the purchase of goods and services.- The electronic cash register is a unit the interior of which consists of several cooperating parts and subsystems. One part is also a non-fiscal unit.
Point of Sale Application (POS_APP)	<ul style="list-style-type: none">- An application which, with its functionality, enables the cashier to register turnovers, cash receipts and print the cash receipt for the buyer.
Printer	<ul style="list-style-type: none">- A device designed for printing.- It is connected via an interface to a non-fiscal unit that can control it. It is not possible to change the printer type to another without implemented support in the non-fiscal unit.- It is used by the master part through the point of sale application.
Customer Display	<ul style="list-style-type: none">- A device designed to display information to the buyer.- It is connected via an interface to a non-fiscal unit that can control it. It is not possible to change the display type to another without implementing support in the non-fiscal unit.- It is used by the master part through the point of sale application.
Cash Drawer	<ul style="list-style-type: none">- A device intended for the storage of currency.- It is connected via an interface to a non-fiscal unit that can control it (only the open function is possible).- It is used by the master part through the point of sale application.
USB Port	<ul style="list-style-type: none">- Communication interface for USB communication.
Serial Port	<ul style="list-style-type: none">- Communication interface for serial communication using the RS-232 standard.
USB Device	<ul style="list-style-type: none">- A slave USB device (passive).
USB Host	<ul style="list-style-type: none">- A master USB device (active).
CDC	<ul style="list-style-type: none">- Communications Device Class.

3. Connection to Non-Fiscal Unit

It is possible to use a USB port or a serial port for communication with a non-fiscal unit.

The USB interface ensures secure transmission of messages between POS_APP and the NFU. This means that USB provides a secure connection between the two communication points.

The NFU is a USB Device and POS_APP is a USB Host. POS_APP establishes a connection with the NFU using the CDC, which is represented in the operating system by a virtual serial port.

The serial port interface does not provide a secure connection between the two communication points.

With this type of communication, it is necessary to use the line layer communication protocol to establish a secure connection. It will create a secure connection between the two points and will be able to transmit application communication protocol messages.

The link layer communication protocol (SLAVE device) is implemented on the NFU side according to the specification given in the document LinkLayer_RS232.doc (Synergy: 00.199.476).

It is also necessary to implement the link layer communication protocol (MASTER device) on the POS_APP side; its specification is also given in LinkLayer_RS232.doc (Synergy: 00.199.476).

4. Communication protocol

4.1. Communication frame

The proposed protocol represents two communicating roles: POS_APP and the NFU.

The POS_APP role is performed by the registration program that the NFU provides its services to, which requests them by sending a message containing a request for the requested service. The request is a command for the NFU to execute and send the result of this execution back to POS_APP as a response message.

All communication between POS_APP and the NFU takes place in frames composed of a request and a response.

The NFU never starts communication and always only responds to requests from POS_APP.

POS_APP never sends a request unless it has received a response to the last request. If the response does not arrive within the specified timeout, or if there is a disconnection, it means that the connection with the NFU has been interrupted and needs to be re-established in order to continue the cooperation.

4.2. Rules for the content of communication frames

The content of a communication frame consists of messages the format of which is similar for request and response.

Message format:

- Consists of several character fields separated by the character HT (0x09 hexa) Horizontal Tab.
- The whole message is terminated by the character LF (0x0A hexa) Line Feed.
- Characters are from the Windows 1250 code page.
- No message field may contain HT and LF characters in its ASCII text string (message delivery level encoding does not use 'escape sequences').
- The request message contains a field with the command identifier that will be executed after receiving the message. In addition, the required command is determined by a set of input parameters. The meaning and number of parameters is different for each type of command.
- The request message contains a field with the 'REQ' string.
- The response message contains the command identifier followed by the 'RSP' string and a set of output parameters.

Example of message format:

```
<Command ID> HT <REQ/RSP> HT <Par1> HT <Par2> HT... HT <ParN> LF
```

Where:

<Command ID>	- Command identifier that will be executed in the NFU after receiving the message.
<REQ/RSP>	- <REQ> – a request. - <RSP> – a response.
<Par1> ... <ParN>	- Command parameters – contain strings representing command arguments in the order 1,2, ...N.

Example of line print request:

```
<printTextLine> HT REQ HT <text> LF
```

POS_APP sends the string:

```
"PRN_PTL0x09REQ0x09Chlieb0x0A"
```

Sent request in hexadecimal encoding:

```
50 52 4E 5F 50 54 4C 09 52 45 51 09 43 68 6C 69 65 62 0A
```

Example of line print response:

```
<printTextLine> HT RSP HT <exception> LF
```

If the command is executed successfully (Exception = 0), the NFU sends the string:

```
"PRN_PTL0x09RSP0x0900x0A"
```

Received response in hexadecimal encoding:

```
50 52 4E 5F 50 54 4C 09 52 53 50 09 30 0A
```

In case of unsuccessful execution of the command (Exception = n, where n is the error code), the NFU sends the string:

```
"PRN_PTL0x09RSP0x09n0x0A"
```

5. Communication protocol commands

Each command consists of a request and a response. The command description scheme has the following form:

Request:

Command_ID	REQ/RSP	Par1	Par2	...	ParN
<i>xyz</i>	<i>REQ</i>	<i>parameter1</i>	<i>parameter2</i>	...	<i>parameterN</i>

Where:

- Command_ID - Command identifier.
- REQ/RSP - Direction of communication. There is always REQ for the request.
- Par1 ... ParN - Command parameters. Each parameter is represented in the form of a string.

Response:

Command_ID	REQ/RSP	Exception	Par1	Par2	...	ParN
<i>xyz</i>	<i>RSP</i>	<i>Exc.Code</i>	<i>parameter1</i>	<i>parameter2</i>	...	<i>parameterN</i>

Where:

- Command_ID - Command identifier.
- REQ/RSP - Direction of communication. There is always RSP for the response.
- Exception code - Indicates the return value of the command:
for a successful command = 0 followed by the response parameters
for a failed command $\neq 0$ not followed by response parameters
- Par1 ... ParN - Response parameters. Each parameter is represented in the form of a string. They are present in the response only if the command was executed successfully.

The response will be followed by a list of error codes that may occur during the execution of the command.

The description of individual commands in the list of error codes will not include error codes that relate to command encoding errors in messages sent from POS_APP to the NFU. These are the following error codes:

Exc.Code	Alias	Description
401	ENFU_DATA_TYPE	At least one of the sent parameters does not meet the formal requirements defined for its data type.
403	ENFU_EXTRA_FIELD	Some extra command fields were sent in the message. - Applies to all commands.
404	ENFU_MISSING_FIELD	Some command fields were not sent in the message. - Applies to all commands that have at least one parameter.
405	ENFU_MISSING_PRM	One of the required parameters was not sent in the message. - Applies to all commands that have at least one parameter.
406	ENFU_UNKNOWN_CMD	Unknown command.
410	ENFU_DEVICE_BUSY	The NFU is busy. - A new request for command execution was sent to the NFU before the end of the currently executed synchronous command. - Applies to all commands.
411	ENFU_NOT_SUPPORTED_CMD	Command is not supported in current version of NFU.

The commands are divided into two basic groups:

- synchronous
- asynchronous

Synchronous command:

- tests the conditions of executing an operation
- if the conditions for executing the operation are met, it starts the operation and waits for it to end
- the response to the command is the operation execution result

Asynchronous command:

- tests the conditions of executing an operation
- if the conditions for executing the operation are met, it starts the operation but does not wait for it to end
- the response to the command is the operation start result

Therefore, POS_APP does not receive a response with the result that the operation is executed. During the execution of the operation, POS_APP can determine the progress of the execution of the operation using the **obtainProgress** command.

The operation terminates successfully if the **obtainProgress** command returns 100%.

If an error is returned in the **obtainProgress** command during the execution of the operation, it means an error that occurred during the execution of the asynchronous operation.

Note:

Each asynchronous command will state that it is an asynchronous command.

5.1. Commands for finding information about the NFU

5.1.1. GETDEVINFO

Request:

Command_ID	REQ/RSP
GETDEVINFO	REQ

Response:

Command_ID	REQ/RSP	Exception	Par1	Par2	Par3	Par4	Par5	Par6	Par7
GETDEVINFO	RSP	Exc.Code	devType	countryID	swVersion	protocolVersion	fiscalType	serialNum	codePage

Where:

<i>devType</i>	- Device type ("NFU")	[max. 30 characters]
<i>countryID</i>	- Country identifier as defined in ISO 3166	[max. 2 characters]
	- The non-fiscal unit is not country specific and returns the ("-") string as an unknown country	
<i>swVersion</i>	- FW version of the non-fiscal unit ("X.YYY.BB")	[max. 30 characters]
	where:	
	• X = major version	
	• YYY = minor version	
	• BB = build number / number of patch	
<i>protocolVersion</i>	- Application layer communication protocol version ("X.YY")	[max. 5 characters]
<i>fiscalType</i>	- Fiscal ("F") / Non-fiscal version ("N") – non-fiscal unit returns ("N")	[max. 1 character]
<i>serialNum</i>	- Device serial number ("N/A")	[max. 30 characters]
<i>codePage</i>	- Character set code page ("Windows-1250")	[max. 30 characters]

Command description:

The command returns basic information about the device. This information allows systems operating with a non-fiscal unit to identify the device based on this information and to select the next correct access to the device accordingly.

Note:

The command is supported in the application communication protocol for historical reasons, due to compatibility with other ELCOM devices. One parameter (codePage) has been added at the end of the response compared to other devices, but it does not interfere with the compatibility with other existing systems because extra parameters in the response to this command should be ignored.

5.1.2. GETDEVINFOEX

Request:

Command_ID	REQ/RSP
GETDEVINFOEX	REQ

Response:

Command_ID	REQ/RSP	Exception	Par1	Par2	Par3	Par4	Par5	Par6	Par7	Par8	Par9
GETDEVINFOEX	RSP	Exc.Code	deviceName	manufacturer	nfuFwVer	hwVer	drvVer	llpVer	alpVer	serialNum	codePage

Where:

<i>deviceName</i>	- Device name ("NonFiscalUnit")	[max. 30 characters]
<i>manufacturer</i>	- Manufacturer ("ELCOM")	[max. 30 characters]
<i>nfuFwVer</i>	- FW version of the non-fiscal unit ("X.YYY.BB")	[max. 30 characters]
	where:	
	• X = major version	
	• YYY = minor version	
	• BB = build number / number of patch	
<i>hwVer</i>	- HW version of the non-fiscal unit ("XY.Z")	[max. 30 characters]
<i>drvVer</i>	- Driver version	[max. 30 characters]
<i>llpVer</i>	- Line layer communication protocol version ("X.YY")	[max. 5 characters]
<i>alpVer</i>	- Application layer communication protocol version ("X.YY")	[max. 5 characters]
<i>serialNum</i>	- Device serial number ("N/A")	[max. 30 characters]
<i>codePage</i>	- Character set code page ("Windows-1250")	[max. 30 characters]

Command description:

The command returns extended information about the device. It complements the information obtained with the **GETDEVINFO** command.

5.1.3. GETCAPABILITY

Request:

Command_ID	REQ/RSP	Par1
GETCAPABILITY	REQ	capabilityType

Where:

<i>capabilityType</i>	- type of asked capability:	[max. 2 characters]
	0 - printer	
	1 - customer display	
	2 - drawer	

Response:

Command_ID	REQ/RSP	Exception	Par1
GETCAPABILITY	RSP	Exc.Code	capabilitySupport

Where:

<i>capabilitySupport</i>	Asked capability support:	[max. 1 character]
	0 – no (capability is not supported)	
	1 – yes (capability is supported)	

Exc.Code	Alias	Description
106	ENFU_ILLEGAL	The <i>capabilityType</i> parameter is out of range.

Command description:

The command returns if the requested capability is supported in current version of NFU.

Note:

If the capability is not supported, then all commands intended for that capability return ENFU_NOT_SUPPORTED_CMD exception code.

5.2. Auxiliary commands during execution of operation in asynchronous mode

5.2.1. obtainProgress

Request:

Command_ID	REQ/RSP
<i>oP</i>	<i>REQ</i>

Response:

Command_ID	REQ/RSP	Exception	Par1
<i>oP</i>	<i>RSP</i>	<i>Exc.Code</i>	<i>progress</i>

Where:

progress - Percentage of the currently ongoing asynchronous operation <0, 100> [max. 3 characters]

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.

Command description:

The command is intended to determine the status of the currently executed asynchronous operation.

During the smooth progress of the executed asynchronous operation, *Exc.Code* = 0 and the *progress* indicates what percentage of the executed asynchronous operation is performed.

If an error occurs during the execution of an asynchronous operation, *Exc.Code* is set to the error code and the *progress* parameter is not in the response.

5.2.2. cancelRest

Request:

Command_ID	REQ/RSP
<i>cR</i>	<i>REQ</i>

Response:

Command_ID	REQ/RSP	Exception
<i>cR</i>	<i>RSP</i>	<i>Exc.Code</i>

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.

Command description:

The command prematurely terminates the currently executed asynchronous operation.

After the asynchronous operation is interrupted, this asynchronous operation is considered to be completed without error, and subsequent calls to the obtainProgress command will specify *Exc.Code* = 0 and *progress* = 100.

5.3. Printer commands

Note:

If the device *printer* is not supported in the used NFU version, all commands from this group will return exception code ENFU_NOT_SUPPORTED_CMD.

Command **GETCAPABILITY** can be used to check if the device is supported.

5.3.1. getPrinterInfo

Request:

Command_ID	REQ/RSP
<i>PRN_GPI</i>	<i>REQ</i>

Response:

Command_ID	REQ/RSP	Exception	Par1	Par2	Par3	Par4	Par5
<i>PRN_GPI</i>	<i>RSP</i>	<i>Exc.Code</i>	<i>printerName</i>	<i>printerManufacturer</i>	<i>charsPerLine</i>	<i>doubleWidthChars</i>	<i>doubleHeightChars</i>

Par6	Par7	Par8	Par9	Par10	Par11	Par12	Par13
<i>doubleSizeChars</i>	<i>numOfBitmaps</i>	<i>bitmapWidth</i>	<i>bitmapHeight</i>	<i>cutter</i>	<i>paperSensor</i>	<i>nearToEndSensor</i>	<i>headerTempSensor</i>

Par14
<i>pickUpHeaderSensor</i>

Where:

<i>printerName</i>	- Name of the printer	[max. 30 characters]
<i>printerManufacturer</i>	- Manufacturer of the printer	[max. 30 characters]
<i>charsPerLine</i>	- Number of characters per line	[max. 3 characters]
<i>doubleWidthChars</i>	- Double character width support (0 = no / 1 = yes)	[max. 1 character]
<i>doubleHeightChars</i>	- Double character height support (0 = no / 1 = yes)	[max. 1 character]
<i>doubleSizeChars</i>	- Support for double character width and height at the same time (0 = no / 1 = yes)	[max. 1 character]
<i>numOfBitmaps</i>	- Number of supported bitmaps	[max. 1 character]
<i>bitmapWidth</i>	- Supported bitmap width	[max. 3 characters]
<i>bitmapHeight</i>	- Supported bitmap height	[max. 3 characters]
<i>cutter</i>	- Cutter (0 = no / 1 = yes)	[max. 1 character]
<i>paperSensor</i>	- Paper sensor (0 = no / 1 = yes)	[max. 1 character]
<i>nearToEndSensor</i>	- Near paper end sensor (0 = no / 1 = yes)	[max. 1 character]
<i>headerTempSensor</i>	- Head temperature sensor (0 = no / 1 = yes)	[max. 1 character]
<i>pickUpHeaderSensor</i>	- Head lift sensor (0 = no / 1 = yes)	[max. 1 character]

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.

Command description:

The command returns information about the printer and its parameters.

5.3.2. getPrinterStatus

Request:

Command_ID	REQ/RSP
<i>PRN_GPS</i>	<i>REQ</i>

Response:

Command_ID	REQ/RSP	Exception	Par1
<i>PRN_GPS</i>	<i>RSP</i>	<i>Exc.Code</i>	<i>printerStatus</i>

Where:

<i>printerStatus</i>	- Printer status (bit value):	[max. 3 characters] 1 B in decimal
	0x01 – missing paper	
	0x02 – raised printer head	
	0x04 – printer head overheated	
	0x08 – printer disconnected	
	0x10 – power supply problem	
	0x20 – paper tape cutter problem	
	0x40 – unused	
	0x80 – unused	

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.

Command description:

The command returns the status of the printer.

5.3.3. printEnable

Request:

Command_ID	REQ/RSP	Par1
<i>PRN_PE</i>	<i>REQ</i>	<i>value</i>

Where:

<i>value</i>	- Print on / off	[max. 1 character]
	0 = Print off	
	1 = Print on	

Response:

Command_ID	REQ/RSP	Exception
<i>PRN_PE</i>	<i>RSP</i>	<i>Exc.Code</i>

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
201	ENFU_COVER_OPEN	Printer cover open / Printer head raised.
203	ENFU_REC_EMPTY	The printer is out of paper.
292	ENFU_PRN_DISCONNECTED	The printer is disconnected.

Command description:

The command turns print on / off to the printer. Print is still on when the NFU is turned on.

If print is off, the print functions will not print any output on the printer and the result of the operation will not contain any printer errors.

5.3.4. printTextLine

Request:

Command_ID	REQ/RSP	Parl
<i>PRN_PTL</i>	<i>REQ</i>	<i>data</i>

Where:

data

- A string to be printed on the printer.

[max. Number of characters / line]

Response:

Command_ID	REQ/RSP	Exception
<i>PRN_PTL</i>	<i>RSP</i>	<i>Exc.Code</i>

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
201	ENFU_COVER_OPEN	Printer cover open / Printer head raised.
203	ENFU_REC_EMPTY	The printer is out of paper.
292	ENFU_PRN_DISCONNECTED	The printer is disconnected.
295	ENFU_PRN_INTERNAL_ERROR	An internal error occurred while working with the printer.
320	ENFU_POWER_SUPPLY	Power supply problem. Check power adapter connection.

Command description:

The command prints one text line on the printer.

To print a double-width character, the ‘~’ character must precede the printed character. Printing double-width characters reduces the number of characters that can be printed on one line of the printer because the printed double-width character takes up the space of two characters.

To print a double-height line, the character with the ‘0x7F’ code must be specified as the first character in the string. If this character is in the first position in the string, the entire line is printed as double height. Double-width characters can be used in a double-height line.

Characters that do not fit in one line will be ignored.

5.3.5. addBufferText

Request:

Command_ID	REQ/RSP	Parl
<i>PRN_ABT</i>	<i>REQ</i>	<i>data</i>

Where:

data

- A string to be added to the text line buffer

[max. Number of characters / line]

Response:

Command_ID	REQ/RSP	Exception
<i>PRN_ABT</i>	<i>RSP</i>	<i>Exc.Code</i>

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.

303 ENFU_PRN_BUFFER_FULL Full text line buffer for print.

Command description:

The command places a line in the text line buffer. It is the population of text lines in the buffer, which will be continuously printed on the printer in the order in which they were loaded into the buffer. Continuous printing ensures smoother and faster printing. The format of the string that will be printed on the printer is the same as the format of the line in the **printTextLine** command.

5.3.6. clearBufferText

Request:

Command_ID	REQ/RSP
PRN_CBT	REQ

Response:

Command_ID	REQ/RSP	Exception
PRN_CBT	RSP	Exc.Code

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.

Command description:

The command clears the contents of the text line buffer populated with the **addBufferText** command.

5.3.7. printBufferText (asynchronous command)

Request:

Command_ID	REQ/RSP
PRN_PBT	REQ

Response:

Command_ID	REQ/RSP	Exception
PRN_PBT	RSP	Exc.Code

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
320	ENFU_POWER_SUPPLY	Power supply problem. Check power adapter connection.

Command description:

It is an asynchronous command that starts printing lines stored in a text line buffer populated with the **addBufferText** command in the background.

If the command is executed successfully, then:

- It copies the contents of the text line buffer to the printer's internal buffer and clears the contents of the text line buffer populated with the **addBufferText** command.
- Printing text lines from the printer's internal buffer has started and is running in the background.

If the command is not executed successfully, the contents of the text buffer are not copied to the printer's internal buffer. In this case, the populated lines remain in the buffer populated with the **addBufferText** command.

During printing, POS_APP can:

- Send additional new lines for printing to the text line buffer with the **addBufferText** command.
- Determine the progress of the operation using the **obtainProgress** command. If the **obtainProgress** command returns an error that occurred during the execution of the asynchronous **printBufferText** command, it is a good idea to clear the buffer with the **clearBufferText** command, print the interrupted print information, close the receipt, and reprint the entire receipt.
- Cancel an ongoing background process with the **cancelRest** command.
- Clear the contents of the text line buffer populated with the **addBufferText** command using the **clearBufferText** command.

5.3.8. setBitmap

Request:

Command_ID	REQ/RSP	Par1	Par2	Par3
PRN_SBMP	REQ	bitmapNumberID	lineNumber	data

Where:

<i>bitmapNumberID</i>	- Bitmap sequence number	<1, Number of supported bitmaps>
<i>lineNumber</i>	- Microline number of the bitmap being set	<0, Supported bitmap height>
<i>data</i>	- If <i>lineNumber</i> = 0 – the data contain a bitmap size in the form "width;height" - If <i>lineNumber</i> > 0 – bitmap microline data	[max. 256 characters formatted in BASE16, i.e. 128 B]

Response:

Command_ID	REQ/RSP	Exception
PRN_SBMP	RSP	Exc.Code

Exc.Code	Alias	Description
106	ENFU_ILLEGAL	The <i>bitmapNumberID</i> and <i>lineNumber</i> parameters are out of their defined range, or if <i>lineNumber</i> = 0, the <i>width</i> or <i>height</i> parameters are out of range.
297	ENFU_OPERATION_ERROR	An unspecified error occurred while executing the service.
304	ENFU_TOOBIG	Bitmap size is out of range. Applies if <i>lineNumber</i> = 0 and one of the <i>width</i> / <i>height</i> parameters is out of range.

Command description:

The command programs a bitmap into the NFU. The programmed bitmaps can be used to print the upper graphic logo, the lower graphic logo, or to print barcodes.

To program a bitmap, its size must be set first, where:

- The bitmap width is given by the *width*, the maximum value of which can be equal to the supported bitmap width, which can be read by the **getPrinterInfo** command – *bitmapWidth* parameter.
- The bitmap height is given by *height*, which is the number of bitmap microlines, the maximum value of which can be equal to the supported bitmap height, which can be read by the **getPrinterInfo** command – *bitmapHeight* parameter.

The bitmap size must be set by sending the parameter *lineNumber* = 0 and sending the bitmap *width* and *height* size in the *data* parameter. If a bitmap with the serial number *bitmapNumberID* has already been programmed, it will be deleted.

After setting the bitmap size, POS_APP should then send the bitmap content by successively sending individual microlines of this bitmap (if POS_APP does not do so, the given bitmap will remain empty, i.e. a white image in case of printing it). The recommended procedure is that POS_APP iteratively sends individual microlines in the *data* parameter (POS_APP successively calls the **setBitmap** command with the *lineNumber* parameter, which increments it by one from 1 to the *height* value after each successfully sent line).

One microline of the bitmap in the *data* parameter is transmitted in RAW format, where 0 indicates the white colour of the point and 1 the black colour of the printed point. There are 8 points (pixels) encoded in one byte, but one byte is transmitted in two text hexadecimal characters (e.g. one byte in which the combination of white and black points "00111111" is encoded means 0x3F in hexadecimal form and is transmitted as two text characters "3F" in the *data* parameter). The number of points written to one bitmap microline in the NFU memory is aligned to one byte, i.e. to 8 points.

The maximum supported number of bitmaps can be read by the **getPrinterInfo** command – *numOfBitmaps* parameter.

Note:

Turning the NFU off will delete all programmed bitmaps.

Example:

Programming bitmap 1 with width = 10 x height = 5 points (the content of the bitmap is a frame)

PRN_SBMP	REQ	1	0	10;5
PRN_SBMP	REQ	1	1	FFC0
PRN_SBMP	REQ	1	2	8040
PRN_SBMP	REQ	1	3	8040

PRN_SBMP REQ 1 4 8040
 PRN_SBMP REQ 1 5 FFC0

5.3.9. printBitmap

Request:

Command_ID	REQ/RSP	Par1
PRN_PBMP	REQ	bitmapNumberID

Where:

bitmapNumberID - The number of the bitmap that will be printed on the printer. <1, Number of supported bitmaps>

Response:

Command_ID	REQ/RSP	Exception
PRN_PBMP	RSP	Exc.Code

Exc.Code	Alias	Description
106	ENFU_ILLEGAL	Bitmap number is out of range.
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
201	ENFU_COVER_OPEN	Printer cover open / Printer head raised.
203	ENFU_REC_EMPTY	The printer is out of paper.
292	ENFU_PRN_DISCONNECTED	The printer is disconnected.
295	ENFU_PRN_INTERNAL_ERROR	An internal error occurred while working with the printer.
320	ENFU_POWER_SUPPLY	Power supply problem. Check power adapter connection.

Command description:

The command prints the selected bitmap on the printer.

The maximum supported number of bitmaps can be read by the **getPrinterInfo** command – *numOfBitmaps* parameter.

If one of the dimensions of the bitmap is zero, printing will not take place.

5.3.10. printBarCode (reserved, not implemented)

Response:

Command_ID	REQ/RSP	Exception
PRN_PBC	RSP	Exc.Code

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
201	ENFU_COVER_OPEN	Printer cover open / Printer head raised.
203	ENFU_REC_EMPTY	The printer is out of paper.
292	ENFU_PRN_DISCONNECTED	The printer is disconnected.
295	ENFU_PRN_INTERNAL_ERROR	An internal error occurred while working with the printer.
320	ENFU_POWER_SUPPLY	Power supply problem. Check power adapter connection.

Command description:

The command prints a barcode on the printer.

5.3.11. printQRCode

Request:

Command_ID	REQ/RSP	Par1
<i>PRN_PQRC</i>	<i>REQ</i>	<i>data</i>

Where:

data - A string that will be encoded in the QR code. <max. 624 characters>

Note: Accepted characters from ASCII table in hex code in the range of <0x20, 0x7E>
 The allowable set of characters from the ASCII table in hexadecimal is given by the interval <0x20, 0x7E>.

Response:

Command_ID	REQ/RSP	Exception
<i>PRN_PQRC</i>	<i>RSP</i>	<i>Exc.Code</i>

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
201	ENFU_COVER_OPEN	Printer cover open / Printer head raised.
203	ENFU_REC_EMPTY	The printer is out of paper.
292	ENFU_PRN_DISCONNECTED	The printer is disconnected.
295	ENFU_PRN_INTERNAL_ERROR	An internal error occurred while working with the printer.
298	ENFU_QRCODE_ERROR	Error generating QR code.
310	ENFU_MEMORY_LOW	Insufficient memory to generate QR code.
320	ENFU_POWER_SUPPLY	Power supply problem. Check power adapter connection.

Command description:

The command prints the QR code on the printer.

The number of characters that can be encoded into the QR code is given by:

- Level of QR code version used (= 19)
- ECC level (= Medium correction level)
- The type of data encoding – it is determined based on the data encoded in the QR code. The allowable set of characters from the ASCII table in hexadecimal is given by the interval <0x20, 0x7E>, which in the case of binary coding means at least 624 characters => data length accepted by the command set to 624 characters.

The size of the printed code is controlled by the NFU and it tries to adjust the size to fill as much of the paper as possible. The size of the printed code also depends on the size of the data encoded in the QR code.

5.3.12. cutPaper

Request:

Command_ID	REQ/RSP	Par1
<i>PRN_CP</i>	<i>REQ</i>	<i>cutType</i>

Where:

cutType - paper cutting type: [max. 1 character]
 0 = partial cut (preferred)
 1 = full cut

Note:

It may not have an effect for some printers

Response:

Command_ID	REQ/RSP	Exception
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<i>PRN_CP</i>	<i>RSP</i>	<i>Exc.Code</i>
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Exc.Code	Alias	Description
106	ENFU_ILLEGAL	The <i>cutType</i> parameter is out of range.
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
201	ENFU_COVER_OPEN	Printer cover open / Printer head raised.
203	ENFU_REC_EMPTY	The printer is out of paper.
292	ENFU_PRN_DISCONNECTED	The printer is disconnected.
295	ENFU_PRN_INTERNAL_ERROR	An internal error occurred while working with the printer.
320	ENFU_POWER_SUPPLY	Power supply problem. Check power adapter connection.
321	ENFU_CUTTER	The paper cutter is in bad condition
411	ENFU_NOT_SUPPORTED	Command is not supported, because the cutter is not present

Command description:

The command cuts the paper tape.

Note:

Not all types of printers have a tape cutter present.

If the cutter is not present then the **cutPaper** command is not supported. Information about cutter presence can be obtained with the **getPrinterInfo** command. If response parameter *cutter* from **getPrinterInfo** command has a value 0, then the cutter is not present and then the **cutPaper** command is not supported.

5.4. Customer display commands

Note:

If the device *customer display* is not supported in the used NFU version, all commands from this group will return exception code ENFU_NOT_SUPPORTED_CMD.

Command **GETCAPABILITY** can be used to check if the device is supported.

5.4.1. getDisplayInfo

Request:

Command_ID	REQ/RSP
<i>DSP_GDI</i>	<i>REQ</i>

Response:

Command_ID	REQ/RSP	Exception	Par1	Par2	Par3	Par4	Par5
<i>DSP_GDI</i>	<i>RSP</i>	<i>Exc.Code</i>	<i>displayName</i>	<i>displayManufacturer</i>	<i>displayType</i>	<i>columnsCount</i>	<i>rowsCount</i>

Par6	Par7
<i>backlightControl</i>	<i>contrastControl</i>

Where:

<i>displayName</i>	- Name of the display	[max. 30 characters]
<i>displayManufacturer</i>	- Manufacturer of the display	[max. 40 characters]
<i>displayType</i>	- Type of the display:	[max. 1 character]
	0 = segment	
	1 = matrix	

columnsCount - Number of columns (characters per row) [max. 1 character]

Note:

If *displayType* = 0 (segment), the decimal separator (dot, comma) is part of the previous character on the display – this means that if *columnsCount* = 10, it displays a max. 10 characters and it is possible to enter a dot or comma after each character, so the string sent to the NFU can in this case become twice as long: "1.2,3.4,5.6,7.8,9.0,". If there is no character before the dot or comma or it is a dot / comma, the dot / comma character is understood as a separate character.

rowsCount - Number of rows [max. 1 character]

backlightControl - Display backlight control (0 = no / 1 = yes) [max. 1 character]

contrastControl - Display contrast control (0 = no / 1 = yes) [max. 1 character]

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
291	ENFU_DSP_DISCONNECTED	The display is disconnected.

Command description:

The command returns information about the customer display and its parameters.

5.4.2. displayText

Request:

Command_ID	REQ/RSP	Par1	Par2
DSP_DT	REQ	rowNum	data

Where:

rowNum - Row number <1, Number of supported rows>

data - A string to be shown on the display [max. Number of columns]

Response:

Command_ID	REQ/RSP	Exception
DSP_DT	RSP	Exc.Code

Exc.Code	Alias	Description
106	ENFU_ILLEGAL	Row number is out of range.
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
291	ENFU_DSP_DISCONNECTED	Display disconnected or other display hardware problem.
294	ENFU_DSP_INTERNAL_ERROR	Unspecified error when working with the display.
297	ENFU_OPERATION_ERROR	An unspecified error occurred while executing the service.

Command description:

The command displays text on the desired display row, but first clears the contents of the display row before displaying the required text. If the row number is out of the permitted range, the contents of all display rows are deleted. Characters that do not fit in the row will be ignored.

If the NFU uses a segment customer display (the type of display used can be read by the **getDisplayInfo** command – *displayType* parameter), the decimal separator (dot, comma) is part of the previous character on the display – that is, if *columnsCount* = 10, it displays a max. 10 characters and it is possible to enter a dot or comma after each character so the string sent to the NFU can in this

case become twice as long: "1.2,3.4,5.6,7.8,9.0,". If there is no character before the dot or comma or it is a dot / comma, the dot / comma character is understood as a separate character.

If the NFU uses a matrix customer display (the type of display used can be read by the **getDisplayInfo** command – *displayType* parameter), the NBSP (non-breaking space) character is used to display all points (pixels) of the character.

5.4.3. displaySetBacklight

Request:

Command_ID	REQ/RSP	Par1
<i>DSP_DSB</i>	<i>REQ</i>	<i>value</i>

Where:

value - Switching the display backlight on / off [max. 1 character]
 0 = Backlight off
 1 = Backlight on

Response:

Command_ID	REQ/RSP	Exception
<i>DSP_DSB</i>	<i>RSP</i>	<i>Exc.Code</i>

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
291	ENFU_DSP_DISCONNECTED	The display is disconnected.

Command description:

The command turns on / off the display backlight if the display has such a function for controlling the backlight (it can be found out with the **gedDisplayInfo** command and the *backlightControl* parameter).

5.4.4. displaySetContrast

Request:

Command_ID	REQ/RSP	Par1
<i>DSP_DSC</i>	<i>REQ</i>	<i>value</i>

Where:

value - Display contrast setting indicated as a percentage in the range <0, 100> [max. 3 characters]

Response:

Command_ID	REQ/RSP	Exception
<i>DSP_DSC</i>	<i>RSP</i>	<i>Exc.Code</i>

Exc.Code	Alias	Description
106	ENFU_ILLEGAL	Contrast is out of range.
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
291	ENFU_DSP_DISCONNECTED	The display is disconnected.

Command description:

The command sets the display contrast if the display has such a function for contrast control (it can be found out with the **gedDisplayInfo** command and the *contrastControl* parameter).

5.5. Cash drawer commands

Note:

If the device *drawer* is not supported in the used NFU version, all commands from this group will return exception code ENFU_NOT_SUPPORTED_CMD.

Command **GETCAPABILITY** can be used to check if the device is supported.

5.5.1. openDrawer

Request:

Command_ID	REQ/RSP
<i>DRW_OD</i>	<i>REQ</i>

Response:

Command_ID	REQ/RSP	Exception
<i>DRW_OD</i>	<i>RSP</i>	<i>Exc.Code</i>

Exc.Code	Alias	Description
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.

Command description:

The command opens the cash drawer.

6. Detailed description of errors and recommended reactions to errors

Exc.Code	Alias	Description
106	ENFU_ILLEGAL	An incorrect value for one of the parameters was sent.
111	ENFU_FAILURE	An internal device error has occurred. To continue, it is necessary to try restarting the non-fiscal unit. If the error occurs even after restarting the NFU, it is necessary to visit the service.
207	ENFU_WRONG_STATE	The device in the given status does not allow the execution of the command. Description: - An asynchronous command was executed on the device, which is still being executed, and a request for the execution of a command was sent to the device via communications, which cannot be executed in the given status. Solution: - It is necessary to wait for the end of the asynchronous operation and the progress of such an operation can be monitored by executing the obtainProgress command or to terminate it prematurely by executing the cancelRest command.
201	ENFU_COVER_OPEN	- Printer cover is open / Printer head is raised.
203	ENFU_REC_EMPTY	- The printer is out of paper.
292	ENFU_PRN_DISCONNECT	- The printer is disconnected. Description: - The line may not have been printed completely, and the print command must be repeated to print the entire line. Such an unprinted line may look fine at first glance, but it is only because the error occurred in the part where the microlines are empty => after reprinting the line, a duplicate line could be printed on the receipt, which could be misleading information for the buyer. - If you print lines stored in the text line buffer using the <code>printBufferText</code> command, an error occurred while printing a line. Solution: - In the event of this error, it is recommended to cancel the receipt (terminate by cancellation) and print the entire receipt again (also due to the fact that the receipt is on one piece of paper).
291	ENFU_DSP_DISCONNECTED	Disconnected display or other display hardware problem preventing communication with the display.
294	ENFU_DSP_INTERNAL_ERROR	Unspecified error when working with the display. Restarting the device may help.
295	ENFU_PRN_INTERNAL_ERROR	An internal error occurred while working with the printer. Possible causes: - Overheated printer head – can be determined by reading the printer status information using the <code>getPrinterStatus</code> command. If the printer head cools down, you can continue with other printing operations. After the head has cooled, the solution applies as in the case of errors (ENFU_COVER_OPEN, ENFU_REC_EMPTY, ENFU_PRN_DISCONNECT).
297	ENFU_OPERATION_ERROR	An unspecified error occurred while executing the service.
298	ENFU_QRCODE_ERROR	Error generating QR code.
301	ENFU_ILLEGAL_COMMAND	The conditions for executing this command are not met (the device does not have the required functionality).
303	ENFU_PRN_BUFFER_FULL	Full buffer of text lines for printing – it is necessary to call the printBufferText command for printing, call the clearBufferText command for deletion.
304	ENFU_TOOBIG	The bitmap size setting is out of range.

310	ENFU_MEMORY_LOW	Insufficient memory to execute the requested operation. Causes: <ul style="list-style-type: none">- QR code generation – please contact Elcom with the procedure for how to simulate the given status.
320	ENFU_POWER_SUPPLY	Power supply problem. Causes: <ul style="list-style-type: none">- Most likely, the power adapter is not connected.
404	ENFU_MISSING_FIELD	Some command fields were not sent in the message. <ul style="list-style-type: none">- Applies to all commands that have at least one parameter.
403	ENFU_EXTRA_FIELD	Some extra command fields were sent in the message.
405	ENFU_MISSING_PRM	One of the required parameters was not sent in the message. <ul style="list-style-type: none">- Applies to all commands that have at least one parameter.
406	ENFU_UNKNOWN_CMD	Unknown command.
410	ENFU_DEVICE_BUSY	The NFU is busy. <ul style="list-style-type: none">- A new request for command execution was sent to the NFU before the end of the currently executed command. Solution: <ul style="list-style-type: none">- If POS_APP waits to complete the previous order for the specified time (in this case, contact Elcom with the procedure for simulating the given status).- Another possible solution is to try and extend the command end time on the POS_APP side.
411	ENFU_NOT_SUPPORTED_CMD	Command is not supported in current version of NFU.

7. Timing

The time during which POS_APP receives a response with the result of the execution of the request is composed of the time needed to deliver the request and the response and the time of executing the command on the part of the non-fiscal unit (NFU).

Exceeding the response time means breaking the connection between POS_APP and the NFU.

Command	Typical command execution time	
	RS232 (115,200 [baud])	USB
GETDEVINFO	130 [ms]	50 [ms]
GETDEVINFOEX	160 [ms]	50 [ms]
getPrinterInfo	??? [ms]	??? [ms]
printEnable	??? [ms]	??? [ms]
printTextLine	??? [ms]	210 [ms]
setBitmap	1 microline = 100 [ms] Bitmap with maximum size = 38,000 [ms]	1 microline = 30 [ms] Bitmap with maximum size = 10,000 [ms]
printBitmap	Entire black bitmap with maximum size: ??? [ms]	Entire black bitmap with maximum size: 3,500 [ms]
printBarCode	??? [ms]	??? [ms]
printQRCode	??? [ms]	??? [ms]
getDisplayInfo	??? [ms]	??? [ms]
displayText	??? [ms]	??? [ms]
displaySetBacklight	??? [ms]	??? [ms]
displaySetContrast	??? [ms]	??? [ms]
openDrawer	??? [ms]	??? [ms]