

COM Application description SD-Card

English

SCU series FSoE-Master and -Slaves



EtherCAT Safety over EtherCAT

SMX series



CANopen Modbus EtherNet/IP DeviceNet Safety over EtherCAT

Application description for SMX and SCU series devices.

Status: 08/2022

NOTE

The German version is the original version of the application description

- ➔ *Contact the manufacturer immediately if the application description is missing!*
- ➔ *Always keep the manual at hand*
- ➔ *Make sure that the manual is complete!*
- ➔ *Obtain this manual only through the original publisher!*

Subject to modification.

The content of this documentation has been compiled extremely carefully according to our current level of information.

Nevertheless, we indicate that this document cannot always be updated simultaneously with the technical progress.

Information and specifications can be changed at any time. Please contact BBH Products GmbH for the latest version.

Devices of the Company

BBH Products GmbH
Böttgerstraße 40
D-92637 Weiden
GERMANY

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2. General Information

2.1. Identification

For devices of SCU series: **SCU-x-EC/NM and SDU-x**
and of SMX series: **SMX1x/2/xxM and SMX100-x/2/xxM**

Firmware Version: The firmware version is indicated on the device rating plate.

From version status: *03-01-00-01 (SCU-x-EC/NM) and*
05-00-00-01 (SDU-x, SMX1x/2/xxM and SMX100-x/2/xxM)

Hardware Version: The hardware version is indicated on the device rating plate.



BBH Products GmbH
Böttgerstraße 40
D-92637 Weiden

GERMANY

Phone: +49 961 / 4 82 44 0
Fax: +49 961 / 4 82 44 33
E-Mail: info@bbh.net

2.2. Important information for use

The documentation is part of the product and describes how to load the configuration from the SD card into the SCU and SDU or SMX module.

The programming and parameterization of the devices are described in the programming manual.

More detailed information on the devices and their installation can be found in the installation manual for the SCU/SMX series. Precise knowledge and understanding of the manual is a mandatory prerequisite for installation or modification of the device function or device parameters. (see chapter 2.4 Other applicable documents).

The documentation is intended for all persons involved in integration and installation planning and who perform assembly, installation, commissioning and service work on the product.

The documentation must be made available to this group of persons in a legible condition.

Make sure that the persons responsible for integration, plant and operation, as well as persons who work with the modules under their own responsibility, have read and understood the documentation in full.

In case of ambiguities or further information requirements, please contact BBH Products GmbH.

2.3. Copyright

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Any duplication, processing, distribution, or other use, in whole or in part, without the express permission of BBH Products GmbH is prohibited.

2.4. Valid documents

The following documents must be read carefully and must be considered:

- Installation Manual of the series:
 - ➔ *HB-37500-810-11-xxF-EN (SCU)*
 - ➔ *HB-37352-810-01-xxF-EN (SMX Gen2)*
 - ➔ *HB-37421-810-01-xxF-EN (SMX100)*
- Programming Manual SafePLC2:
 - ➔ *HB-37480-820-01-xxF-EN Programming Manual SafePLC2*
- Programming manual of the series :
 - ➔ *HB-37500-820-10-xxF-EN SCU Programming Manual*
 - ➔ *HB-37350-820-01-xxF-EN SMX Programming Manual*
 - ➔ *HB-37420-820-01-xxF-EN SMX100 Programming Manual*
- Error list SCU-series:
 - ➔ *HB-37500-813-02-xxF-EN Error list SCU*
- Error list SDU-devices:
 - ➔ *HB-37500-813-02-xxF-EN Error list SCU – SDU modules*
- Error list SMX devices:
 - ➔ *HB-37350-130-40-xxF Error list SMX*
 - ➔ *HB-37420-130-41-xxf Error list SMX100*
- Validation report (validation acc. to SafePLC² printout):
 - ➔ *Programming software printout*
- Test report (TÜV test report for sample approval of SCU devices, etc.):
 - ➔ *Test report SCU series.*
- Manufacturer documents of the components connected via the bus and directly:
 - ➔ *External documents*

xx = placeholder for the currently valid version.





Always use the current edition of the documentation and software.
If anything is unclear or further information is required, please contact the publisher directly.

If required, you can also obtain the documentation in printed form from BBH Products GmbH.

2.5. Structure of the safety instructions

2.5.1. Symbols and signal words

The following symbols and signal words are used in this documentation. The combination of a pictogram and a signal word classifies the respective safety note. The symbol may vary depending on the type of hazard.

	Symbol	Signal word	Description
Death		DANGER	Draws your attention to a dangerous situation that will cause <u>death or severe injury</u> if it is not avoided.
Injury + property damage		WARNING	Draws your attention to a dangerous situation that can cause death or <u>severe injury</u> if it is not avoided
		CAUTION	Draws your attention to a dangerous situation that can cause <u>minor to moderate injury</u> , if it is not avoided.
Material damage		ATTENTION	Draws your attention to possible <u>malfunctions</u> and <u>material damage</u> .
No damage		NOTICE	Draws your attention to useful hints and tips that can facilitate handling and operation.
		SAFETY NOTE	Draws your attention to the use and the effects of safety information.

2.5.2. Safety Information

The safety information applies not only to one specific action, but to several actions within a topic. The pictograms used indicate either a general or specific hazard.

Structure of a safety notice:

SIGNALWORD

Description of the hazard source



Type and danger of the source.

Possible consequences in case of disregard.

3. Safety

The following general safety instructions are intended to prevent personal injury and damage to property. The operator must ensure that the basic safety instructions are observed and complied with.

Make sure that the persons responsible for planning and integration, the persons responsible for the plant and its operation, as well as persons who work on the device under their own responsibility have read and understood the operating instructions completely.

In case of ambiguities or further information requirements, please contact BBH Products.

3.1. General safety information

- Never install, commission or start damaged products. Please complain immediately to transport company about any damage.
- Never open the device housing and / or never carry out modifications arbitrarily. Mortal danger due to the loss of safety functions.
- In case of improper use, incorrect installation or operation, there is a risk of serious personal injury or property damage.
- Further information can be found in the documentation.

DANGER



Working on the wiring or on the electric system can cause electric shock. Electric shock can cause death or severe injuries due to electric current. Therefore, work on the electric system may only be carried out by qualified persons in according to TRBS 1203.

(For qualified persons, knowledge of valid regulations and standards as well as of the valid accident prevention rules is presumed).

NOTICE

Work may only be carried out after the Installation manual has been read carefully and if the installation manual is strictly observed. The device data (technical data) must be considered.

NOTICE

The content of this application description is limited to the functional description of the SD card of the SCU, SDU as well as the SMX modules.

The programming and parameterization of the devices are described in the programming manual, the basic function of the devices or their installation in the installation manual. Precise knowledge and understanding of these is a mandatory prerequisite for installation or modification of the device function or device parameters.

3.2. Terms

The SCU assemblies manufactured by BBH Products GmbH serve to implement safety relevant functions by safe communication via FSoE and non-safe communication by means of EtherCAT. These are always having a two channel design: system A and system B.

- The term "**safe**" used in the following refers in each case to the classification as a safe function on the basis of DIN EN ISO 13849-1, DIN EN 61508-1:2011-02
- The term "**safe function for application up to PL e or SIL 3**" designates functions in the sense of the above standards with corresponding integrity (reliability).
- The term "**non-safe**" refers to functions and data interfaces that do not or not completely fulfill the requirements according to the aforementioned standards..

The software "**SafePLC²**" is used for programming and configuration of the modules of the SCU series of the company BBH.

The abbreviation **SMX** refers to the base units in this document.

- The abbreviation **SCU** refers in this document to the FSoE master modules SCU-x-EC/x.
- The abbreviation **SDU** refer to the FSoE slave modules of the SCU series.
- The **-S variants** of the assemblies are identical to the standard devices

3.3. Safe status




The safe status of the device is:

- All outputs of the group are safely switched off, and the unit is in the error status. The error status remains until its cause has been eliminated and the current error status has been confirmed.
- The status of the unit is permanently shown on the 7-segment display, if the 7-segment display is supplied with voltage.
- Errors are sequentially displayed by a letter and 4 numbers (cf. Troubleshooting).

3.4. Labelling / Rating plate

The rating plate is mounted on the left sidewall of the assembly, and contains the following information:

- Type = Type designation
- Product No.: = Product number
- Serial No.: = Serial number
- HW-Release: = Hardware Release marking
- FW-Release: = Firmware Release marking
- NORM: = Safety category
- Power = Properties of the voltage supply
- Input: = Properties of the inputs
- Output: = Properties of the outputs
- Date: = Manufacture date (week number / year)

	Date: 05/2019
Product No.: 1655	Serial No.: 000131
	
HW-Release: 11-11	
FW-Release: 03-00-00-19	
	
Type: SCU-1-EC	
NORM:	SIL 3: IEC 61508 / IEC 62061
Cat. 4 / PL e:	EN ISO 13849-1
Rated isolated voltage:	EN 50178
Power:	24 VDC / -15%...+20% / 0...50°C
X11.1- X11.2:	2 A / 9 A
X11.1 / X.2:	
INPUT:	
I00...I13 (Digital):	24 VDC
OUTPUT:	
Q1...Q4 (Digital):	24 VDC / 2 A
Q5...Q6 (Relay):	240 VAC / 24 VDC / 2 A



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 WWW.bbh.Products.de see operating manual for the response time!

Figure 1: Rating plate SCU-1-EC

4. Requirements

4.1. Device description

The **SCU-x-EC** (SCU for short), **SDU-x** (SDU) and **SMX** have an SD card slot on the front. This enables the configuration data to be reloaded onto the devices when the modules are replaced or a back-up is made. (see figure 3)

4.2. Function of SD-Card

A correctly formatted SD card should contain the configuration data for the host module.

4.2.1. Contents of the SD card

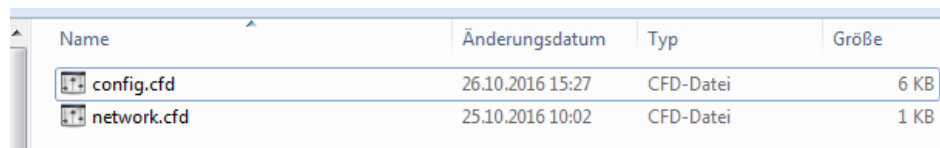
The following files must be present on the SD card in the "bin" folder for an update:

SCU:

File name in folder	Meaning
/bin/ config.toc	TOC configuration (*.toc)

SMX/SDU:

File name in folder	Meaning
/bin/ config.cfd	SCU configuration (*.cfg2)
/bin/ network.cfd	Network configuration (*.cfdNetwork)



Name	Änderungsdatum	Typ	Größe
config.cfd	26.10.2016 15:27	CFD-Datei	6 KB
network.cfd	25.10.2016 10:02	CFD-Datei	1 KB

Figure 2: Example of the folder view on the SD card of the SDU modules

NOTICE In order for the files to be recognized by the device, it is mandatory to rename them to the file names provided.

➔ see tables above

5. Applications

5.1. Data transfer to a SCU/SMX device

The following steps must be observed when recording to a module:

1. Make sure that the module is in a de-energized state.
2. Insert the SD card with the correct data into the SD card slot (MC) provided on the front.

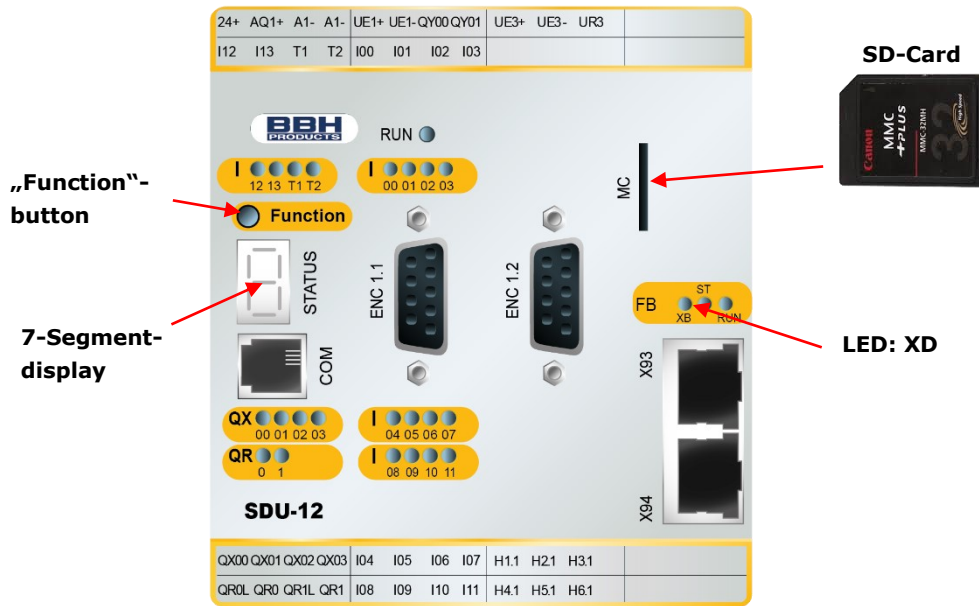


Figure 3 Insert SD card into the card slot provided on the module.

3. Afterwards, supply the respective module with voltage again.
4. During the startup phase, the configuration data is checked:
 1. Configuration data identical:
If the data match, nothing happens
> The host module is up to date and starts normally
 2. Configuration data different:
If the CRCs of the configuration data are different after the POR of the module, alarm **A 1212** is displayed on the host module.

Alarm Code	A 1212
Alarm Meldung	SD Karte mit neuem Applikationsprogramm gefunden
Ursache	Auf der eingelegten SD Karte steht ein neues Applikationsprogramm zum bespielen bereit. Das System wartet auf Bestätigung durch Nutzer.
Fehlerbeseitigung	<ul style="list-style-type: none"> • Zweifaches Drücken des Reset Tasters lädt das Anwendungsprogramm remanent in das Gerät • Entfernen sie die SD Karte wenn das Programm nicht geändert werden soll

Figure 4: Alarm display for different configuration data

The system waits for confirmation from the user.
This is done when the user starts the data transfer by pressing the Function button twice.

NOTICE

- During the writing of the flash of the host module, the **LED XB** signals the data traffic by orange-green pulsing, in addition a "5" appears in the **7-segment display**.
- The SD card must not be removed during the data transfer.
- All data is always written (configuration + network configuration, see chapter 4.2.1)

The data transfer is completed when the "5" on the 7-segment display goes out and starts normally

5. The process is now complete and the device is ready.

ATTENTION

- If the (host) device runs into a fatal error (due to an incorrect configuration, removal of the SD card or voltage interruption of the module during the flash process), the device goes into a safe state.

The configuration must then be loaded via a direct connection using the SafePLC2 programming software.

➔ See programming manual of the respective series, chapter "Transferring the program to the device" or chapter "Device interfaces".

WARNING

The device must be in a de-energized state during insertion or removal of the SD card..

Faulty voltages or short circuits can lead to defects in the module!

DANGER

Work on the wiring or the electrical system can lead to electric shock or death.

Therefore, this work may only be carried out by qualified persons as defined in TRBS 1203.

6. Malfunction and troubleshooting

If the module does not work properly, it automatically switches to the safe state and indicates the fault state via LED (see installation manual SCU/SMX, chapter " LED displays").

Please first check the displayed error code (7-segment display) with the aid of the SCU, SDU or SMX error list (error codes and measures).

- ➔ If it is not possible to eliminate the error condition, please contact the manufacturer. The documents mentioned here are listed in chapter 2.4 Valid documents.

7. List of abbreviations

Abbreviation	Meaning	Comment
BBH	Manufacturer of assemblies	
CRC	Cyclic Redundancy Check	Cyclic checksum calculation
Cat.	Category according to EN 13849-1	Architecture category
DIN	Deutsches Institut für Normung	German Standardization Institute
EMC	Electromagnetic compatibility	
EN	European norm	
EtherCAT	EtherCAT (name)	Data protocol
FSoE	Fail Safe over EtherCAT	Safe data transfer via EtherCAT protocol
HW	Hardware	
IP	International Protection	Protection class according to the norm
ISO	International Organization for Standardization	
LED	Light Emitting Diode	Electroluminescent diode
PLC	Programmable Logic Controller	
POR	Power On Reset	RESET procedure
SafePLC²	Program for the programming of PLC	Programming surface for the programming of assemblies developed by BBH
SCU	Safe Control Unit	FSoE Master assembly to process encoder data, input data and output data
SD-Card	Memory card for reading the safety program to the device	
SDU	Safe Drive Unit	FSoE assembly to record encoder values
SW	Software	
VDE	Verband der Elektrotechnik	Registered Association of the Electrical, Electronic and Information Technology Association

Table 1: Abbreviations in the current document