ABB i-bus®
Uninterruptible Power Supply Unit
NTU/S 12.2000.1
Product Manual

Power and productivity
for a better world™

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1 General

The Uninterruptible Power Supply Unit NTU/S 12.2000.1 with 12 V DC from ABB STOTZ-KONTAKT, provides professional back-up buffering should the mains supply fail on smaller systems in detached houses, larger systems in workshops, trade and commercial premises, or for the highest demands in office buildings, industrial facilities, hotels or hospitals.

Simple installation and commissioning makes considerable savings in terms of time and money. The Uninterruptible Power Supply Unit is a modular installation device (MDRC), with a module width of 8 space units in Pro*M*-Design, for fast and comfortable installation in every distribution board.

1.1 Use of the product manual

This manual provides you with detailed technical information relating to the Uninterruptible Power Supply Unit, its installation and commissioning.

This manual is divided into the following sections:

Chapter 1	General
Chapter 2	Device technology
Chapter 3	Commissioning
Chapter 4	Planning and application
Chapter A	Appendix

1.1.1 Notes

Notes and safety instructions are represented as follows in this manual:

Note
Tips for usage and operation

Examples
Application examples, installation examples, programming examples

Important
These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury.

Caution
These safety instructions are used if there is a danger of material damage with inappropriate use.

Danger
These safety instructions are used if there is a danger for life and limb with inappropriate use.

Danger
These safety instructions are used if there is a danger to life with inappropriate use.

1.2 Product and functional overview

The Uninterruptible Power Supply Unit NTU/S 12.2000.1 is a modular installation device in Pro*M*-Design, for snap-on mounting on a mounting rail in a universal, wall-mounted or ceiling panel distribution board as well as in distributed surface mounted housings. The NTU/S provides sufficient performance for all types of demanding applications, with a buffered output voltage of 12 V DC, and a maximum output current of 2 A.

The NTU/S is ideal for the following fields of application:

- Uninterrupted or mains-free operation of 12 V I&HAS (Intrusion and Hold-up Alarm Systems) devices, e.g. motion detectors or sirens,
- Uninterrupted or mains-free operation of 12 V KNX devices with and without security functions, e.g. room controllers, IP routers, telephone gateways or zone terminals,
- Uninterrupted or mains-free operation of devices not used for KNX and security technology,
- Self-contained additional power supply for intrusion alarm panels, in conjunction with a changeover contact, for sending an operating malfunction to the intrusion alarm panel.

2 Device technology

NTU/S 12.2000.1

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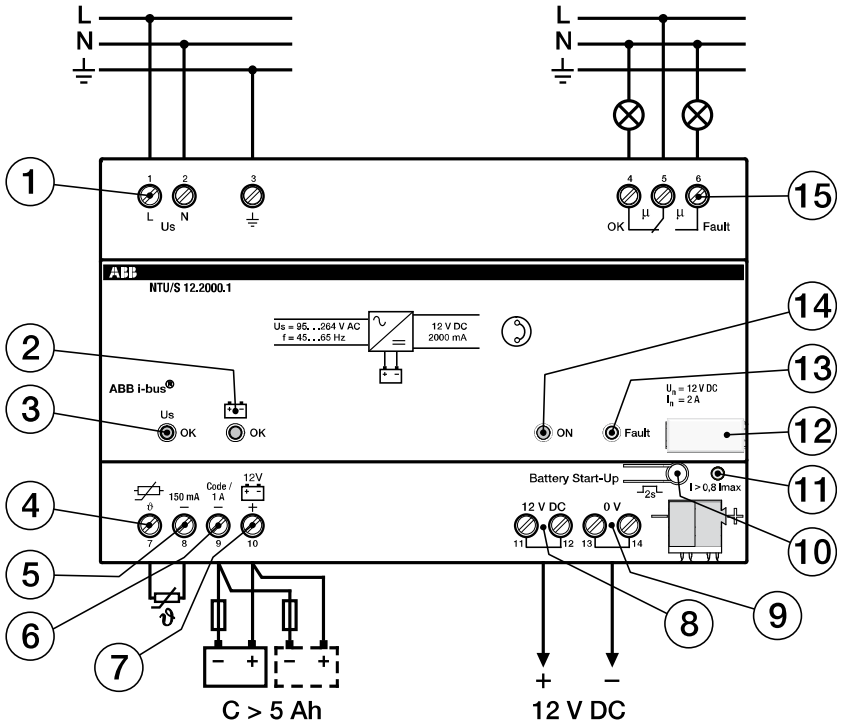
The Uninterruptible Power Supply Unit NTU/S 12.2000.1 is a modular installation device in Pro*M*-Design, for snap-on mounting on a 35 mm mounting rail in a universal, wall-mounted or ceiling panel distribution board as well as in distributed surface mounted housings.
The power supply delivers sufficient power for all types of demanding applications with a buffered output voltage of 12 V DC and a maximum output current of 2 A.
Operating malfunctions of the power supply are signalled via a changeover contact and can be sent for evaluation purposes.
Up to two 12 V DC sealed lead-acid batteries (gel cell) can be connected in parallel with the power supply, in conjunction with the KS/K 4.1 and KS/K 2.1 cable sets, or the AM/S 12.1 battery module.

2.1 Technical data

Operating voltage	Mains voltage U_s	95…265 V AC
	Mains frequency	45…65 Hz
	Power consumption	Max. 55 W at 230 V AC
	Leakage loss	Max. 8 W at 230 V AC
	Rated voltage U_n	13 V DC ± 0.5 V SELV
	Rated current I_n	2 A ± 5 %
Connections	Mains voltage Output Accumulator/battery module Changeover contact Conductor cross-section for all screw terminals	3 screw terminals 4 screw terminals 4 screw terminals 3 screw terminals 0.2…2.5 mm^2 stranded 0.2…4 mm^2 solid core
	Tightening torque	Maximum 0.6 Nm
Accumulator	Accumulator type	12 V DC sealed lead-acid batteries (gel cell)
	Number	Maximum 2 in parallel
	Rated charging current	1 A
	Temperature control	Temperature-controlled adjustment of charging voltage via temperature sensor (included in cable set KS/K 4.1)
Battery module	Number	Maximum 1
	Rated charging current	150 mA
	Temperature control	Temperature-controlled adjustment of charging voltage via internal temperature sensor in battery module
Floating changeover contact	Nominal voltage	230 V AC or 5 V DC or 12 V DC
	Maximum switching current	1 A at 230 V DC
	Minimum switching current	10 mA at 5 V DC or 4 mA at 12 V DC

Operating and display elements	Push buttons	Battery start-up
	LED green	Battery supply OK
	LED green	Mains supply OK
	LED green	Normal operation ON
	LED yellow	Malfunction Fault
	LED yellow	Overload warning I > 0.8 I_{max}
Enclosure	IP 20	to EN 60529
Safety class	II	to EN 61140
Isolation category	**Overvoltage category**	III to EN 60664-1
	Pollution degree	2 to EN 60664-1
Temperature range	Operation	−5 °C…+45 °C
	Transport	−25 °C…+70 °C
	Storage	−25 °C…+55 °C
Ambient conditions	Maximum air humidity	93 %, no condensation allowed
Design	Modular installation device (MDRC)	Modular installation device, Pro*M*
	Dimensions	90 x 144 x 64.5 mm (H x W x D)
	Mounting width	8 modules at 18 mm
	Mounting depth	64.5 mm
Installation	On 35 mm mounting rail	to EN 60715
Mounting position	as required	
Weight	0.38 kg	
Housing, colour	Plastic housing, grey	
CE mark	In accordance with the EMC guideline and low voltage guideline	EN 50130-4, EN 61000-6-3

2.2 Connection schematics



1 Mains voltage

2 LED battery voltage OK

3 LED mains power supply U_s OK

4 Temperature sensor PTC+

5 Battery connection < 5 Ah / PTC−

6 Battery connection ≥ 5 Ah / PTC−

7 Battery connection +

8 Output 12 V+

9 Output 12 V−

10 Battery start up push button

11 Overload warning I > 0.8 I_{max}

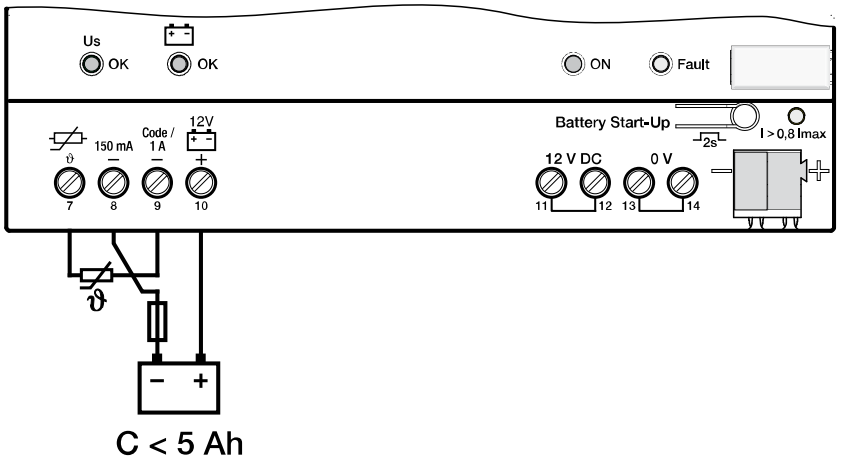
12 Label carrier

13 LED malfunction Fault

14 LED normal operation ON

15 Changeover contact

Connection schematic for battery C < 5 Ah:



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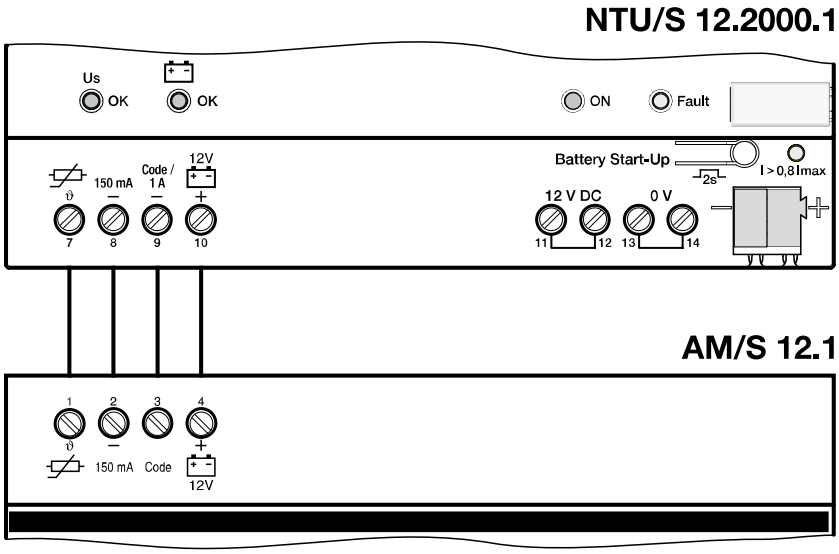
Connection schematic for battery module AM/S 12.1:



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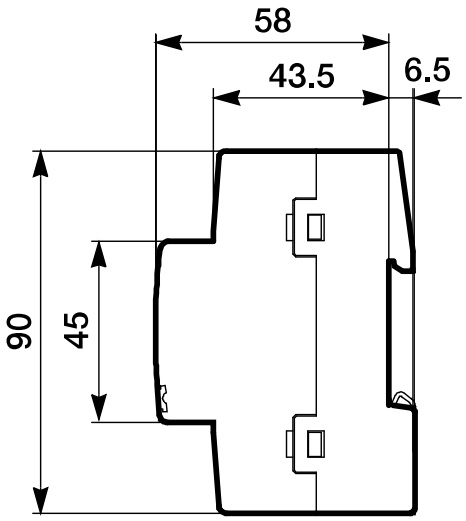
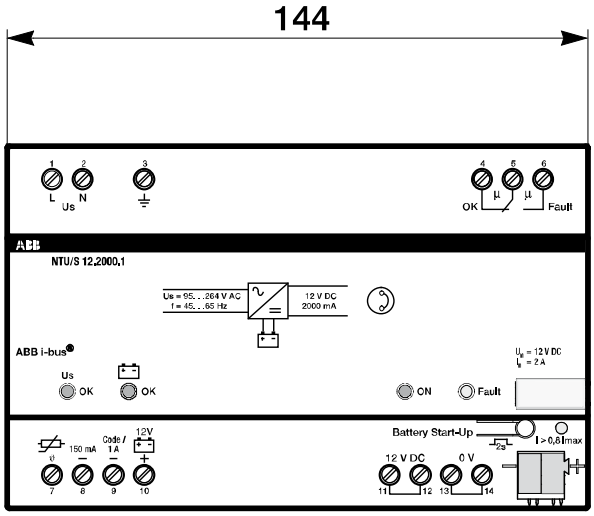
2.3 Dimension drawing





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2.4 Assembly and installation

The device is a modular installation device for quick installation in the distribution board on 35 mm mounting rails to EN 60715.

Accessibility of the device for the purpose of operation, testing, visual inspection, maintenance and repair must be provided compliant to VDE 0100-520.

The installation and commissioning may only be carried out by qualified electrical specialists. The appropriate norms, guidelines, regulations and specifications should be observed when planning and setting up electrical installations.

- Protect the device from damp, dirt and damage during transport, storage and operation.
- Only operate the device within the specified technical data limits!
- The device should only be operated in an enclosed housing (distribution board)!

Connection

The electrical connection is implemented using screw terminals.
The terminal designation is located on the housing.

Cleaning

If the device becomes dirty, it can be cleaned using a dry cloth. Should a dry cloth not remove the dirt, the device can be cleaned using a slightly damp cloth and soap solution. Corrosive agents or solutions should never be used.

Maintenance

The device is maintenance-free. No repairs should be carried out by unauthorised personnel if damage occurs, e.g. during transport and/or storage. The warranty expires if the device is opened.

2.5 Connections

Mains voltage

The mains voltage supply serves as the primary supply for the power supply. The phase (L), neutral (N) and earth (PE) are connected using three screw terminals (see Connection schematics, page 9).

Output

The 12 V DC output has two screw terminals for 12 V and 0 V (see Connection schematics, page 9), and is used for supplying the connected load. A maximum load current of 2 A is permissible.

Changeover contact

The changeover contact is used for signalling operating faults (see Operating states, page 19) of the Uninterruptible Power Supply Unit. The changeover contact is a floating contact and can assume two different positions:

- *Position normal operation "OK":* There is no malfunction. Contacts 4 and 5 are closed and contacts 5 and 6 are opened.
- *Position "Fault":* There is a fault present. Contacts 4 and 5 are opened and contacts 5 and 6 are closed.

Caution

The operation of the changeover contact at high switching operation frequencies can lead to loss of contact material.

This increases the contact resistance so that operation at low output powers is no longer possible.

Battery/battery module

The four screw terminals are used for connection of a battery module with Cable Set KS/K 4.1 or the Battery Module AM/S 12.1 (see Connection schematics, page 9). The battery or battery module are used for backing up the power supply.

Caution

The different connection methods for batteries with a capacity less than and greater than 5 Ah, for the temperature sensor as well as for the battery module must be observed!
If the connection method is not observed, it can lead to damage of the battery or battery module.

If a 12 V DC sealed lead acid battery (gel cell) is used, a temperature sensor (integrated into Cable Set KS/K 4.1) must be connected to the battery! Accordingly, a temperature-controlled adjustment of the charging voltage (charging current) is used in dependence on the external temperature.
If a temperature sensor is not connected, the battery capacity may be reduced.

2.6 Operating and display elements

Push button

If the *Battery Start-Up* push button is actuated for two seconds, the battery mode will start during initial commissioning without the mains power supply. During normal operation, a manual battery test can be performed when the button is pushed.

The battery test is used for checking the connected batteries or Battery Module AM/S 12.1. The test internally switches to battery operation, and checks the battery or the battery module, to ensure that they function correctly. Should the test be unsuccessful, the power supply switches to the *Fault* state.

LEDs

Five different LEDs whose functions are described in more detail in the following are located on the front of the NTU/S.
An overview of the displayed operating states can be found in chapter Operating state display, page 24.

LED *ON*	
LED colour	Green
Display status	Immediate
State display (device)	Output voltage OK: LED on Overload/short circuit: LED off

LED U_s *OK*	
LED colour	Green
Display status	Immediate
State display (mains operation)	Mains operation OK: LED on Mains voltage failure: LED off

LED OK	
LED colour	Green
Display status	Immediately after a battery test. One battery test is undertaken about every 15 minutes, or after the Battery Start-Up push button is pushed.
State display (battery)	Battery OK: LED on Battery defective or fault: LED off

LED *Fault*	
LED colour	Yellow
Display status	Immediately after mains voltage failure, battery fault or overload/short circuit
State display (fault)	Fault: LED on No fault: LED off

LED *I > 0.8 I_{max}*	
LED colour	Yellow
Display status	Immediate
State display (output current)	Exceeds 82 % ± 5 % of I_{max}: LED on Below 78 % ± 5 % of I_{max}: LED off

3 Commissioning

3.1 Overview

After mounting of the Uninterruptible Power Supply Unit NTU/S 12.2000.1, there are two options available for commissioning:

- With mains supply,
- Without mains supply.

3.1.1 Commissioning with mains supply

Connect the cables to the marked terminals of the power supply and apply the mains voltage supply. The green LEDs *ON* and U_S *OK* light up. As long as a battery or battery module is not connected, the changeover contact will be in the *Fault* position and the yellow *Fault* LED lights up. The power supply will switch over to normal operation as soon as the battery or battery module is connected, see Connection schematics, page 9.

3.1.2 Commissioning without mains voltage

See the Connection schematics, page 9 for connection of the battery to the marked power supply connection terminals via the Cable Set KS/K 4.1 or the battery module. If mains supply voltage is not available, press the *Battery Start-Up* push button for two seconds. The device then starts battery operation and the green LEDs *ON* and  *OK* light up. As long as mains voltage is not connected, the changeover contact will be in the *Fault* position and the yellow *Fault* LED lights up. The end of battery operation can be achieved by briefly disconnecting the battery. When mains voltage is applied, the power supply will switch over to normal operation.

Important
The capacity of the battery will decrease with time even though a high-performance and sophisticated charge control system is used. The batteries should be replaced every four years in order to guarantee the buffer (back-up) times!

Note
The battery test is carried out automatically at 15 minute intervals in normal operation. The device internally switches to battery operation and checks the battery or the battery module to ensure that it functions correctly. A faulty battery is only determined after the battery test. A battery test can be triggered manually by pressing the *Battery Start-Up* push button during operation.

Caution

Should the yellow LED *Fault* light up, and the green LED ON is off, this indicates a short circuit or an overload on the load end. The fault should be immediately rectified in this case.

Caution

For uninterrupted operation of the 12 V DC supply voltage during a mains voltage failure, the use of 12 V DC sealed lead acid batteries in conjunction with the Cable Set KS/K 4.1 or the Battery Module AM/S 12.1 is necessary.

The different connection methods for batteries with a capacity less than and greater than 5 Ah, the temperature sensor as well as the battery module must be observed!
If the connection method is not observed, it can lead to damage of the battery or battery module.

If a 12 V DC sealed lead acid battery (gel cell) is used, a temperature sensor (integrated into Cable Set KS/K 4.1) must be connected to the battery! Accordingly, a temperature-controlled adjustment of the charging voltage (charging current) is used in dependence on the external temperature.
If a temperature sensor is not connected the battery capacity may be reduced.

3.2 Operating states

The following operating states are possible:

- Normal operation
- Battery operation at mains voltage failure
- Mains operation with battery fault
- Overload/short circuit operation

3.2.1 Normal operation

In normal operation, the power supply is supplied from the mains and the connected battery or battery module is charged. There are no overloads or short circuits on the output and there are no battery faults. The changeover contact is in the *OK* position.
The LEDs U_s *OK*, Battery supply *OK* and operation *ON* light up.

3.2.2 Battery operation at mains voltage failure

In battery operation, the connected loads are only supplied by the battery. The LED mains voltage U_s *OK* switches off and the LED *Fault* lights up. The changeover contact switches to the *Fault* position after about five minutes.

Mains voltage recovery

After mains voltage recovery, the changeover contact switches immediately to *OK* and battery operation is ended. The LED mains voltage U_s *OK* lights up and the LED *Fault* switches off.

End of battery mode (battery discharged and no mains voltage)

The connected loads can no longer be supplied, the output voltage reduces to 0 V, the changeover contact switches immediately to the position *Fault* and all LEDs switch off.

Note
At mains voltage failures that are less than five minutes, the changeover contact remains in the position OK. This prevents an error message from being issued with brief mains voltage failures.

3.2.3 Mains operation with battery fault

There is a battery malfunction, i.e., an open circuit, a short circuit, a defect, incorrect polarity or total discharge influences the function of the battery. Supply is exclusively from the mains. Accordingly, interruption free function of the power supply is no longer provided.
The LED battery supply *OK* switches off after a maximum of 15 minutes. This is dependent on the battery test. The LED *Fault* lights up directly after the battery test and the changeover contact switches over to position *Fault*.

Recovery of the battery supply

The position of the changeover contact changes to *OK* after a successful battery test. The LED battery supply *OK* lights up and the LED *Fault* switches off.

Mains voltage failure with battery fault

The connected load can only be supplied for a short time (dependent on the remaining battery charge). Then the output voltage drops to 0 V, the changeover contact switches immediately to the position *Fault* and all LEDs switch off.

3.2.4 Overload/short circuit operation

If a load current exceeding 1.6 A (±5 %) is drawn, the yellow LED $I > 0.8\ I_{max}$ lights up. Should the current (overload operation) exceed 2.1 A (±5 %), the yellow LED *Fault* lights up and the changeover contact switches to the position *Fault*. The green LED *ON* switches off. Depending on the overload involved,
the output voltage may drop down to 0 V!

End of overload operation (overload removed)

If the overload is removed (output current less than 2.0 A ± 5 %), the changeover contact switches directly again to OK, the LED *ON* lights and the LED *Fault* switches off. If the output current falls below 1.6 A (± 5 %), the yellow LED $I > 0.8\ I_{max}$ switches off.

Note
If mains operation recommences and battery charging continues after mains voltage and/or battery failure, it may occur that a battery fault (changeover contact is positioned at *Fault* and LED *Fault* lights up) is indicated for some time (a few hours). When the battery has again charged to about 30 %, the LED *Fault* goes off and the changeover contact will again be in position *OK*.

4 Planning and application

4.1 Device application

The Uninterruptible Power Supply Unit NTU/S 12.2000.1 is particularly suitable for the supply of:

- 12 V devices from the areas of security technology, e.g. motion detectors and signal devices.
- 12 V KNX devices with and without safety functions, e.g. Room Controller RC/A x.x, IP Router IPR/S x.x, Telephone Gateway TG/S x.x and Zone Terminal MT/x.
- 12 V devices from outside the KNX and security technology field.

4.2 Back-up supply

The NTU/S can buffer the connected loads for a few milliseconds, approx. 200 ms at 230 V or 50 ms at 115 V without a connected battery in the event of a mains failure.

To bridge for longer periods of mains failure, the NTU/S can be provided with two sealed lead acid 12 V DC batteries. The mains failure back-up time is dependent on the current consumption of the load connected, the battery capacity and the current level of battery charge.

ABB STOTZ-KONTAKT offers three different batteries with various capacities, SAK 7, SAK 12 and SAK 17 as well as the Battery Module AM/S 12.1 as a modular installation device (MDRC).

Important
Incorrect handling can lead to premature degradation of the charge and capacity of the batteries. Rooms at room temperature or cool rooms are recommended for operation of the battery. Furthermore, the accumulator should not be stored for an extended period when it is discharged.

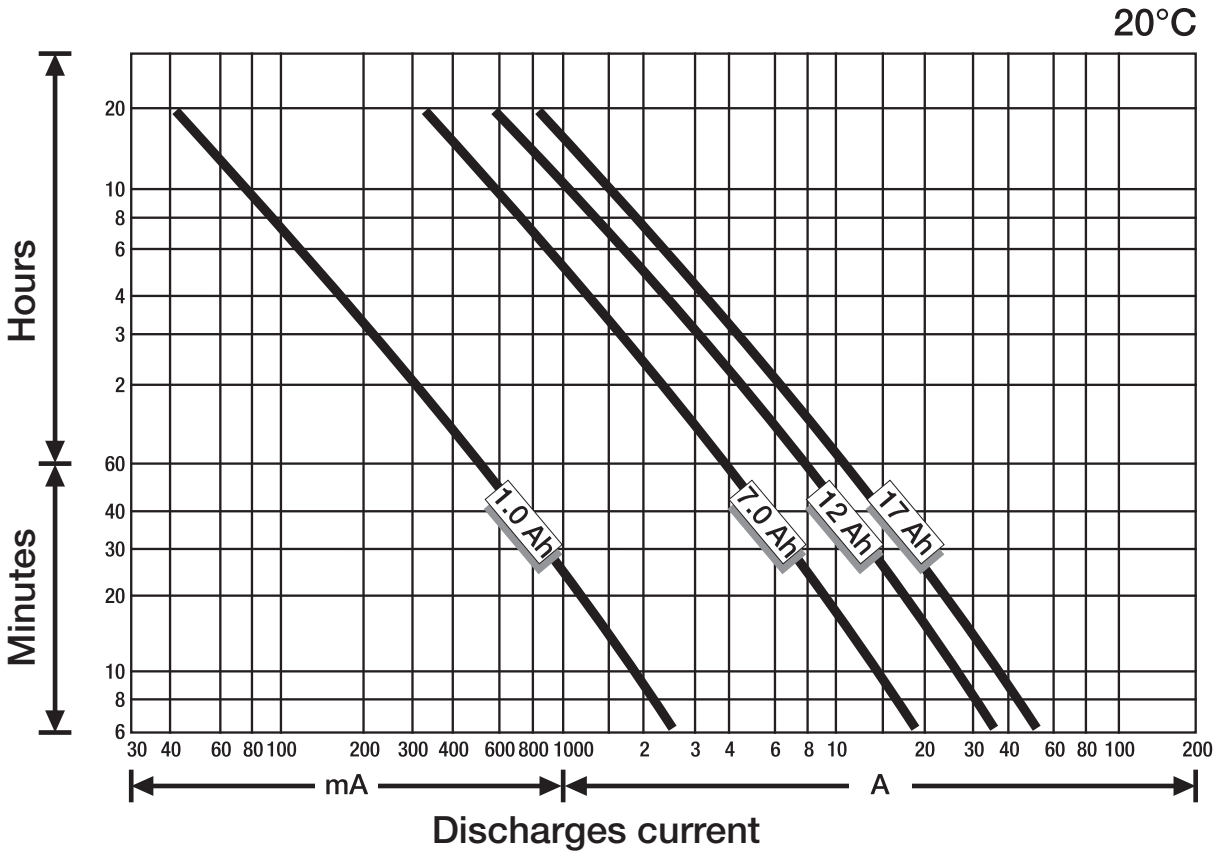
4.3 Connection of the floating contact

Contacts 5 and 6 of the changeover contact can be used for transferring fault signals. In this way, e.g. it is possible to indicate via a LED whether the device is operational or whether there is a fault. It is also possible to allow an automatic message to be sent to a service technician via a telephone dialling device.

A Appendix

A.1 Overview of device run time in battery operation

The progression of the curve in the following illustration provides an overview of the operating times of the devices with the Uninterruptible Power Supply Unit back up. The curve indicates the operating time in dependence on the discharge current and the battery capacity.



Note
The operating times shown with battery operation are the ideal back up times of the power supply. The back up times can only be achieved if the charge level at the start of a mains voltage failure is approx. 100 % and the battery still achieves its rated capacity. (The capacity of the battery reduces over the lifetime of the battery).

A.2 Operating state displays

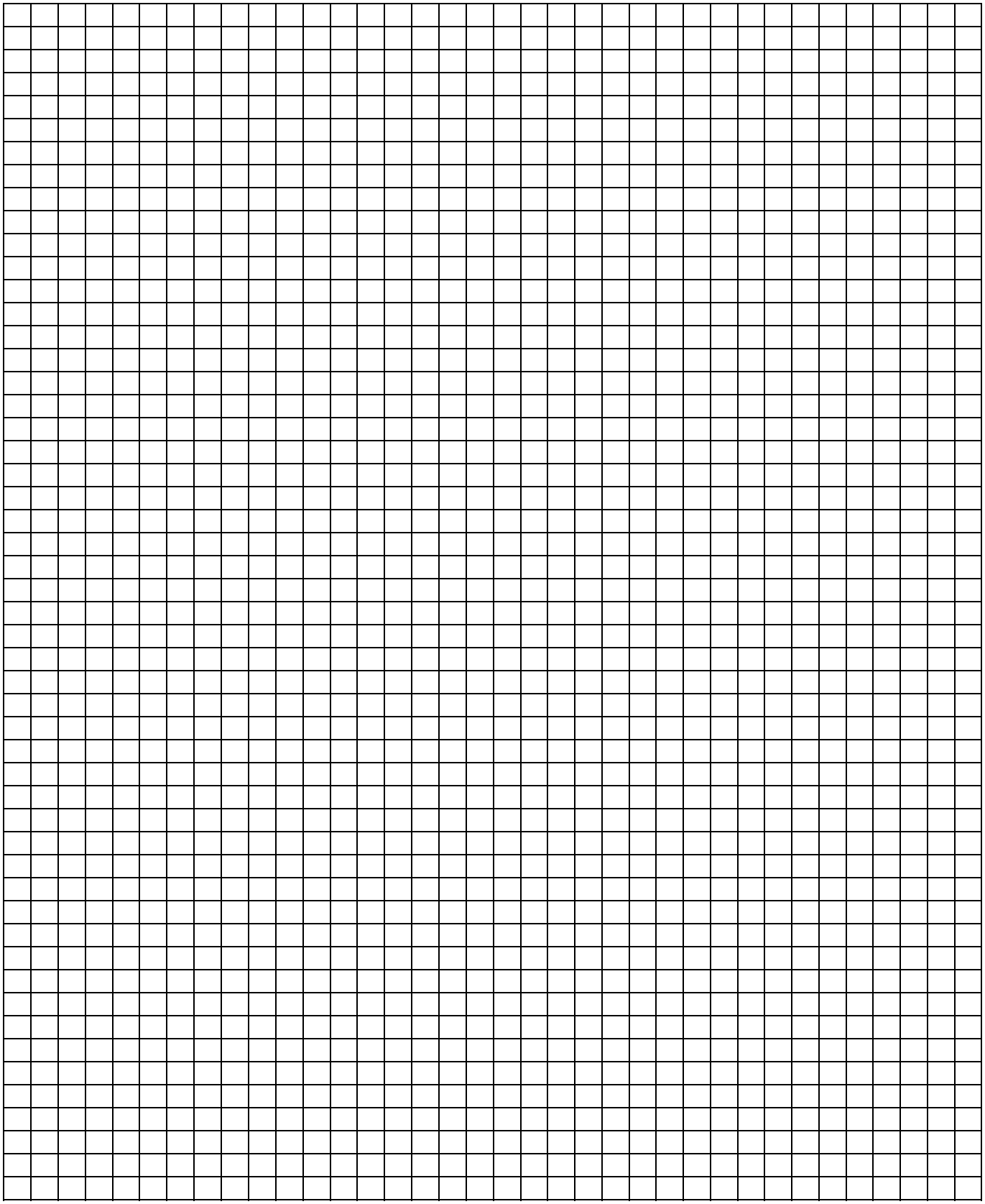
The following tables shows how the operating states are displayed by LEDs on the Uninterruptible Power Supply Unit:

LED					Operating state
ON	**Us OK**	**OK**	**Fault**	**I > 0.8 Imax**	
ON	ON	ON	OFF	OFF	Normal operation
ON	OFF	ON	ON	OFF	No mains supply
ON	ON	OFF	ON	OFF	Battery fault
ON	ON	ON	OFF	ON	Overload warning
OFF	ON	ON	ON	ON	Overload/short circuit
OFF	OFF	OFF	OFF	OFF	Device off

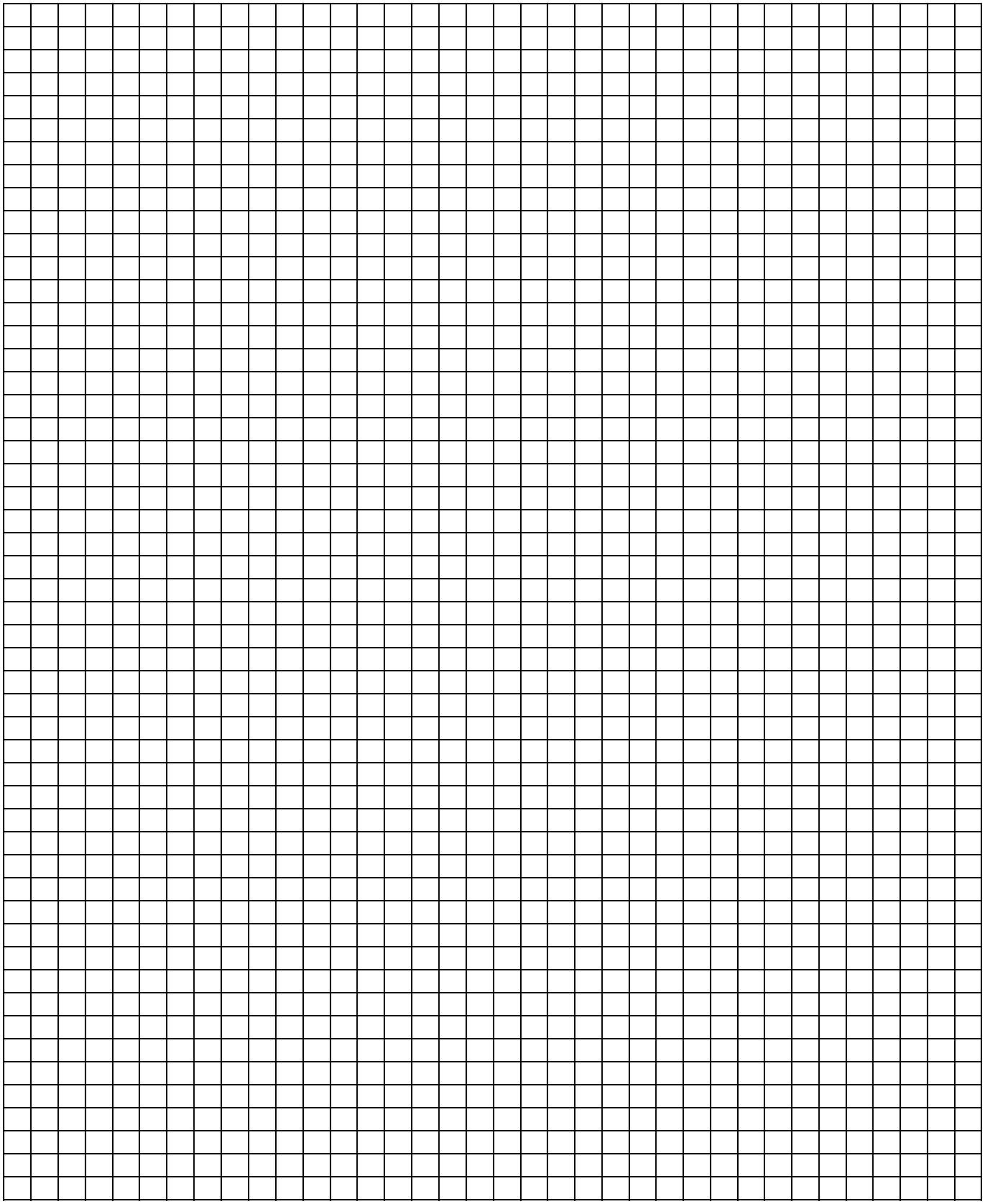
A.3 Ordering information

Short description	Designation	Order No.	bbn 40 16779 EAN	Price group	Weight 1 pc. [kg]	Packaging [pc.]
NTU/S 12.2000.1	Uninterruptible Power Supply Unit	2CDG 110 070 R0011	**681 17 9**	26	0.38	1

A.4 Notes



A.5 Notes



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