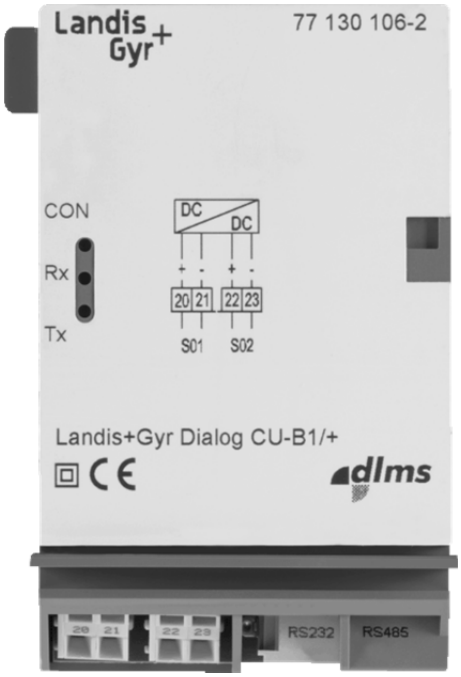
Communication

Industrial and Commercial

CU-B1, B2, B4

E65C

User Manual



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Revision history

Version	Date	Comments
–	12.03.2001	First edition
a	19.09.2001	Modifications to face plate, RS232, RS485 interface, applications
b	27.02.2002	Technical Data 1.2 Pulse length ≥ 30 ms
c	22.03.2002	Pin allocation of RS 485 corrected
d	16.09.2002	Version CU-B3 cancelled
e	31.01.2003	New layout L+G
f	06.07.2005	Old phone no. replaced by new one
g	16.04.2009	New RS485 installation note
h	07.11.2011	Layout adaptation
k	18.04.2016	Updated disclaimer. Additional warning information based on standards. Updated company name.

Table of contents

About this document

Range of validity

The present user manual applies to communication unit CU-Bx with interfaces CS / RS232 / S0 for meters ZxDxxxAT/CT.

Relating documents

This user manual supplements the meter operating instructions and is incomplete without the data contained there.

Purpose

In addition to operating instructions for the meters, the user manual contains all the information necessary for operation of the CU-Bx communication unit for the intended purpose. This includes:

Provision of knowledge concerning characteristics, construction and function of the communication unit CU-Bx

Information about possible dangers, their consequences and measures to prevent any danger

Details concerning the performance of all work throughout the service life of the communication unit CU-Bx (installation, commissioning, operation, maintenance, decommissioning and disposal)

Target group

The contents of this user manual are intended for technically qualified personnel of energy supply companies responsible for the system planning, installation and commissioning, operation, maintenance, decommissioning and disposal of the meters.

Conditions

Users of this manual are familiar from their training with the basic principles of electrical engineering, in particular with the principles of energy measurement, including circuitry types, connection technology, etc.

Subdivision

This user manual is divided in a logical manner suitable for learning and application, i.e. the individual sections follow the sequence of information probably required during the various phases of the service life of the communication unit CU-Bx.

1 Device description

1.1 Review

1.1.1 General view

The communication unit CU-Bx is a unit complete in itself with its own plastic case. It can be fitted in and removed from meters ZxDxxxAT/CT without opening the calibration seal. The spring-loaded terminals for the external connections are at the bottom, while plug contacts at the rear provide connection to the meter electronics.

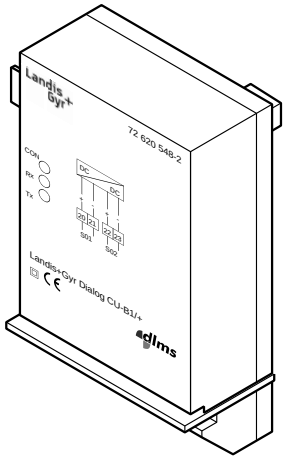

Fig. 1 Communication unit CU-Bx, removed

1.1.2 Purpose of use

The communication unit CU-Bx is used to supplement the ZxDxxxAT/CT meters. It contains an RS485 and an RS232 interface depending on version for remote scanning of the meter and two signal inputs (S0 interfaces) for connecting external signal transmitters.

The RS485 interface can be used for simple remote reading (e.g. with several meters). The RS232 interface remains free for local use or serves for the connection of an external communication device (e.g. modem).

With version CU-Bx/+ the RS232 interface provides additional functions, such as time-window or initializing of the external modem.

Any other use of the communication unit is considered improper.

1.1.3 Type designation

The type designation of this communication unit CU-Bx is added to that of the meter (see meter operating instructions), but is not shown on the main face plate of the meter. It is specified directly on the case of the communication unit and can be seen through the front door of the meter through an opening on the tariff face plate.

Versions

The communication unit CU-Bx is available in the following versions:

Version	S01/S02	S1	S2
CU-B1	2 S0	RS232	RS485
CU-B2		RS485	RS485
CU-B4		RS232	RS485

1.2 Technical data

1.2.1 Inputs and outputs

Pulse inputs

- Type: S0 interface
- Application: Version CU-B1
- Standard: IEC 61393 / DIN 43864
- Operating conditions:
  - Rated voltage ..... 24 V DC
  - Max. voltage ..... 27 V DC
  - Condition "On" ..... min. 10, max. 27 mA
  - Current Condition "Off" ..... max. 2 mA
  - Pulse length .....≥ 30 ms
  - Max conductor length depending on environment .....and connecting cable, normally up to 0.5 m
  - Insulation resistance to meter ..... 4 kVAC / 50 Hz, 1 min ..... (creep distance min. 6.2 mm)

RS485 interface

- Type: symmetric, serial, asynchronous, bi-directional interface
- Application: Versions CU-B1, CU-B2, CU-B4
- Standard: ISO-8482
- Operating conditions:
  - Signal condition binary 1 ..... difference voltage < -0,2 V DC
  - Signal condition binary 0 ..... difference voltage > 0,2 V DC
  - Max. bit rate ..... 38'400 bps
  - Max. number of slaves 31
  - Max conductor length .....depending on environment and connecting cable up to 300 m
  - Insulation resistance to meter ..... 4 kVAC / 50 Hz, 1 min ..... (creep distance min. 6.2 mm)

RS232 interface

- Type: asymmetric, serial, asynchronous, bi-directional interface
- Application: Versions CU-B1, CU-B4
- Standard: DIN 66259
- Mode of operation: transparent / with additional functions
- Operating conditions:
  - Rated voltage ..... ±12 V DC
  - Max. voltage ..... ±25 V DC
  - Max. bit rate ..... 57'600 bps
  - Max conductor length
    ..... depending on environment and connecting cable up to 15 m
  - Insulation resistance to meter ..... 4 kVAC / 50 Hz, 1 min
    ..... (creep distance min. 6.2 mm)

1.2.2 External influences

Same as meters (see meter operating instructions).

1.2.3 Weight and dimensions

- Weight..... approx. 80 g
- Width ..... 65 mm
- Height ..... 103 mm
- Depth ..... 38 mm

1.2.4 Connections

Pulse inputs (S0 interface)

Type: screwless spring-loaded terminals

Communication interfaces (RS232 and RS485)

Type: RJ12 plug

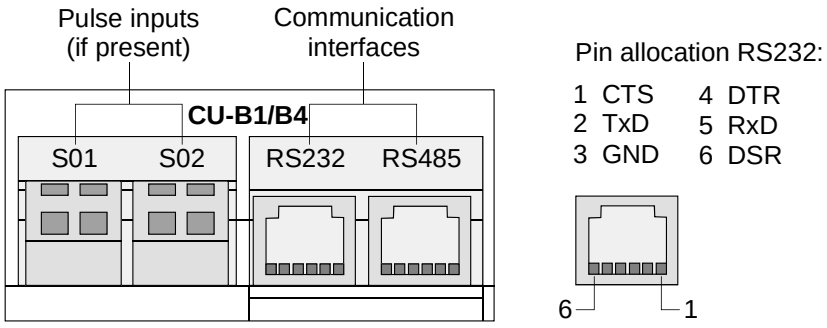

Fig. 2 External connections communication unit CU-B1/B4

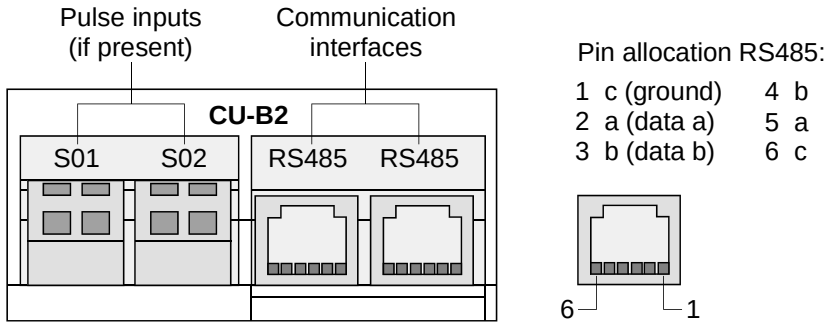

Fig. 3 External connections communication unit CU-B2

Connections to meter

Type: 10-pin and 4-pin p.c.b. connector

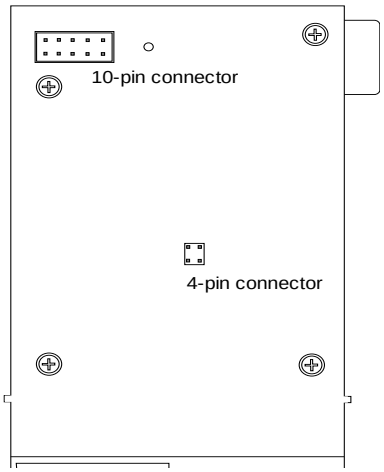

Fig. 4 Internal connections at rear of communication unit CU-Bx

1.2.5 Connection diagram

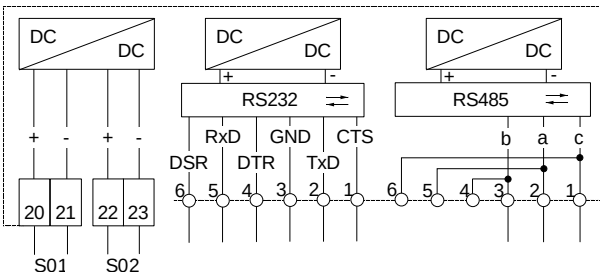

Fig. 5 Connection diagram communication unit CU-B1/B4

CTS: Clear To Send

TxD: Transmitted Data

GND: Signal ground

DTR: Data Terminal Ready

RxD: Received Data

DSR: Data Set Ready

In the transparent RS232 interface, connections CTS, DTR and DSR are connected to ground (GND) by the software.

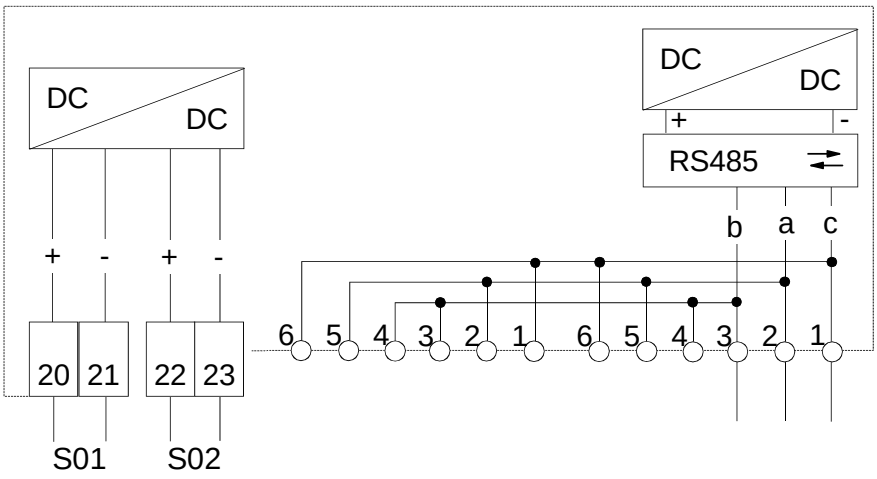

Fig. 6 Connection diagram communication unit CU-B2

c: Ground
a: Data a
b: Data b

2 Safety

2.1 Safety information

The following symbols are used to draw your attention to the relevant danger level, i.e. the severity and probability of any danger, in the individual sections of this document.

Danger
Identifies an extraordinarily great and immediate danger that could lead to serious physical injury or death.

Warning
Indicates a potentially hazardous situation that may result in minor physical injury or material damage. Always consult the User Manual when this symbol is used on the equipment to find out the nature of the potential hazards and any actions that must be taken to avoid them.

Note
Indicates general details and other useful information to help you with your work.

In addition to the danger level, safety information also describes the type and source of the danger, its possible consequences and measures for avoiding the danger.

Failure to use the equipment as described in this manual may result in circumventing the protection afforded by the design of the equipment.

2.2 Responsibilities

The owner of the meters – usually the utility company – is responsible for assuring that all persons engaged in working with meters, such as service personnel:

- Have read and understood the relevant sections of the user manual.
- Are appropriately qualified for the work to be performed.
- Strictly observe the safety regulations (laid down in section 2.3) and the operating instructions as specified in the individual sections.

In particular, the owner of the meters bears responsibility for the protection of persons, prevention of material damage and the training of personnel.

For this purpose, Landis+Gyr provides training on a variety of products and solutions. Please contact your local Landis+Gyr representative if interested.

2.3 Safety regulations

The following safety regulations must be observed at all times:

- Changing of the communication unit must only be made on meters not under voltage.
- The meter connections must not be under voltage during installation or when opening. Contact with live parts is dangerous to life. The relevant fuses should therefore be removed and kept in a safe place until the work is completed, so that other persons cannot replace them unnoticed.
- Local safety regulations must be observed. Installation of the meters must be performed exclusively by technically qualified and suitably trained personnel.
- Secondary circuits of current transformers must be short-circuited (at the test terminal block) without fail before opening. The high voltage produced by the interrupted current transformer is dangerous to life and destroys the transformer.
- Transformers in medium or high voltage systems must be earthed on one side or at the neutral point on the secondary side. Otherwise they can be statically charged to a voltage which exceeds the insulation strength of the meter and is also dangerous to life.
- The meters must be held securely during installation. They can cause injuries if dropped.
- Meters which have fallen must not be installed, even if no damage is apparent. They must be returned for testing to the service and repair department responsible (or the manufacturer). Internal damage can result in functional disorders or short-circuits.
- The meters must on no account be cleaned with running water or with high pressure devices. Water penetrating can cause short-circuits.

3 Mechanical construction

The communication unit CU-Bx is a unit complete in itself with its own case. If present, it is fitted under the front door, is therefore secured by a company seal and can be exchanged or fitted in the field if necessary.

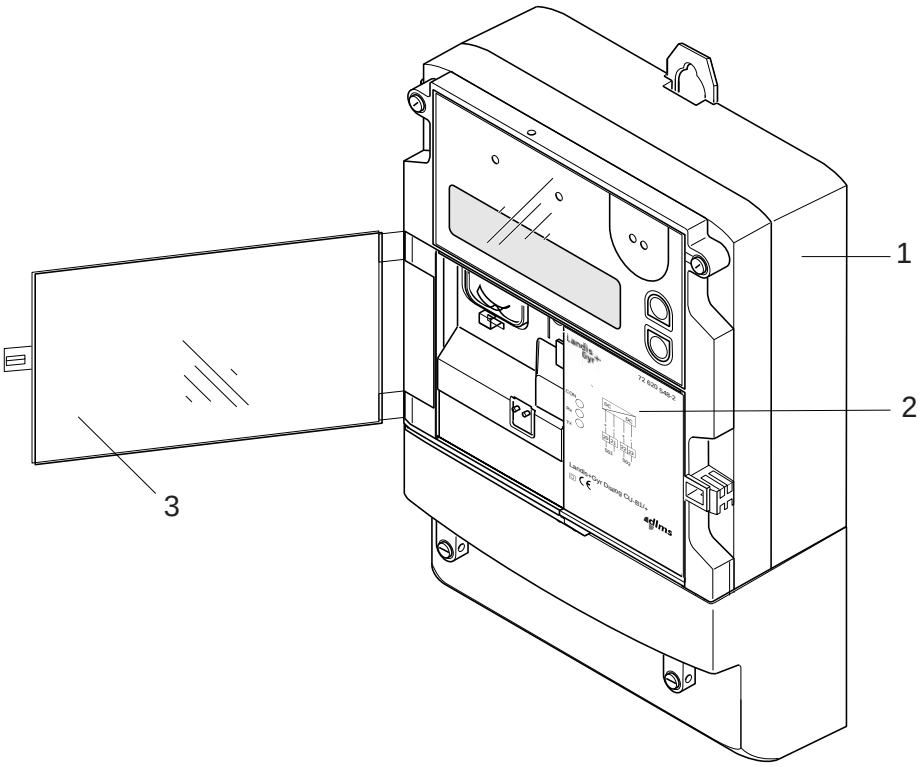

Fig. 7 Communication unit CU-Bx fitted in meter

1 Meter
2 Communication unit CU-Bx
3 Front door

The communication unit CU-Bx has the following connections (see also section 1.2.4):

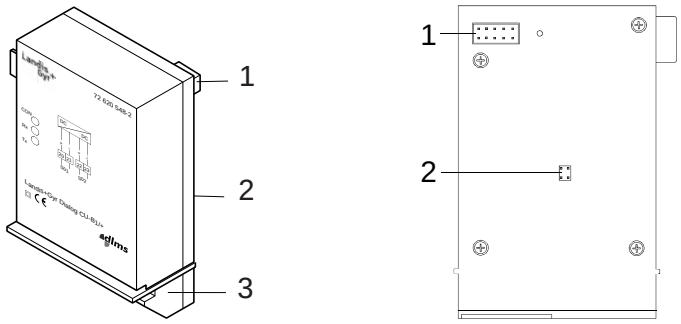

Fig. 8 Connections for communication unit CU-Bx

1 10-pin meter connector
2 4-pin meter connector
3 Interface connecting terminals

The face plate of the communication unit CU-Bx looks like this:

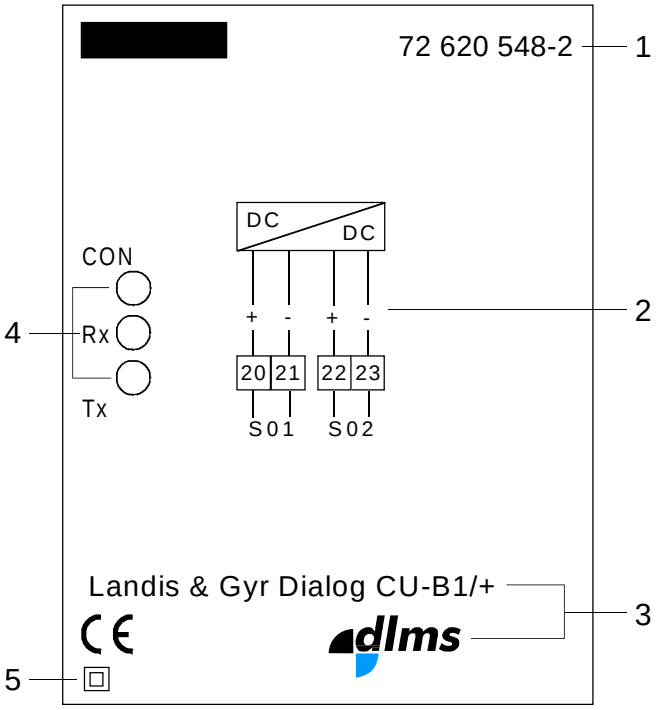

Fig 9 Face plate of the communication unit CU-Bx (example CU-B1)

1 Serial number
2 Diagram of pulse inputs (only on CU-B1)
3 /+ and dlms symbol depending on parametrizing
4 Transmit/receive diodes
5 Double protective insulation according to IEC 61010 (second version 2001-2, overvoltage category III)

The face plate can contain other data specific to the country, e.g. warnings, etc.

4 Function

The various interfaces of the communication unit CU-Bx (S0, RS485 and RS232) are controlled by a microprocessor in the communication unit CU-Bx, which communicates with the microprocessor of the meter.

4.1 Pulse inputs (S0 interfaces)

The CU-Bx communication unit can receive pulses from external pulse generators via pulse inputs and record these in the total energy register or, if provided, in the data profile. The pulse generators must comply with the conditions of the S0 interface according to IEC 61393 or DIN 43864.

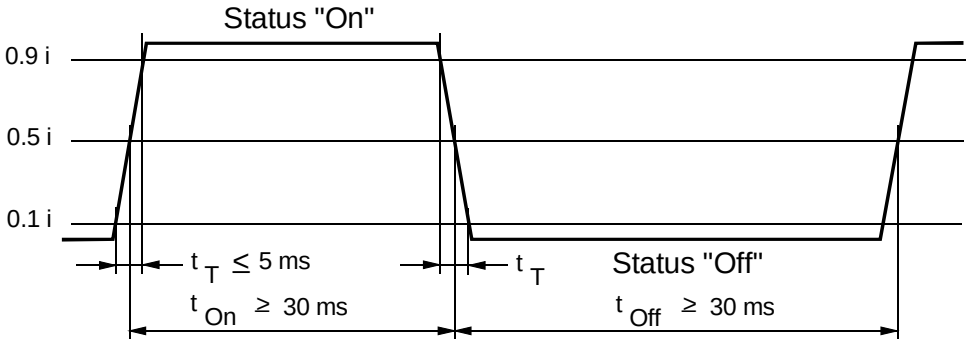

Fig. 10 Pulse specification of S0 interface

The pulse inputs use terminals 20 and 21 (S01) or 22 and 23 (S02) of the left-hand terminals in the communication unit CU-Bx. See also sections 1.2.4 "Connections" and 1.2.5 "Connection diagram".

Application

The pulses from meters connected via the S0 interfaces are each fed to a total energy register and – in versions with demand recording – to a P running register. If the meter has a data profile memory, it can also record the energy status and/or the mean value of demand P running of the external meters in the data profile.

4.2 RS485 interface

The serial bi-directional RS485 interface is standardised to ISO-8482. The RS485 interface is based on the principle of a difference signal for transmitter and receiver and permits the connection of several drivers to the transmission path. Up to 32 transceivers (transmitters/receivers) can be connected to one line, so that operation is possible as bus or as local semi-duplex "multipoint" network.

Several closely situated meters can be connected for example via the RS485 interface of the CU-Bx with a bus system and then connected centrally to a modem to perform readouts and parameterising.

Protocol

Depending on the version the RS485 interface supports only the communication protocol according to IEC 61107 or the communication according to IEC 61107 and to DLMS.

4.3 RS232 interface

The asymmetric, serial, asynchronous bi-directional RS232 interface complies with the standard of DIN 66259. Via the RS232 interface of the communication unit CU-Bx

- an external modem can be operated, e.g. for data transfer with a central, or
- a direct connection to the RS232 interface of a computer can be established.

Protocol

Depending on the version the RS232 interface supports only the communication protocol according to IEC 61107 or the communication according to IEC 61107 and to DLMS.

The RS232 standard defines various data and control signals (see section 5.4.3 "Pin allocation RS232").

In the "transparent" version the interface only performs the communication and requires a so-called intelligent external modem for this purpose.

In the version with additional functions the interface controls and monitors an external modem and can operate with time-windows. It is then dependent on a transparent external modem.

4.3.1 Receive and transmit times

When used in the telephone answering mode TAB, the control centre periodically calls the measuring point to read the data, synchronize the time or to transmit timer tables or other parameters.

The receive time can be limited for incoming calls in order to operate other units with the same telephone line.

If the units are connected in parallel with the same telephone line, the number of ringing tones determines the priority. The modem accepts incoming calls immediately within the receive time. Outside the receiving time, however, it does not accept incoming calls at all or only after a large number of ringing tones.

Time-window

The time-window determines how and at what times the meter can communicate with the control centre for remote reading:

- **No readiness**
  The (external) modem is out of service.
- **Reception at all times, daily, weekly or monthly**
  In this mode of operation the modem always accepts incoming calls from the control centre for remote reading or in defined time-windows according to the form of ringing tones defined under "Modem settings". Outside this communication window the modem can also accept incoming calls following a freely parameterised number of ringing tones.

Emergency window

An emergency window can be activated with weekly or monthly communication windows. The modem opens this emergency window 24 hours after the regular communication window if no remote reading has taken place within the regular time-window.

Possibilities of access with or without time-window:

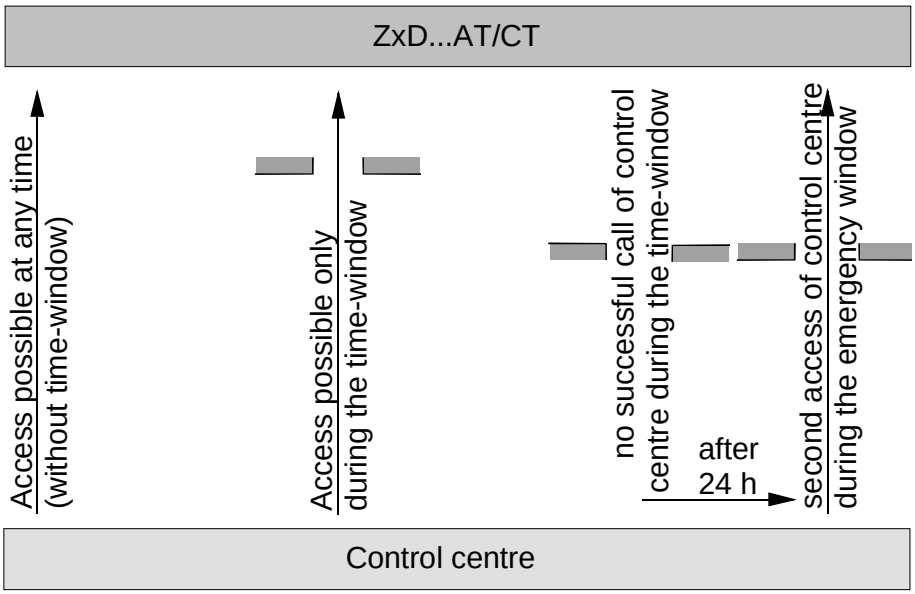

Fig. 11 Summary of access possibilities with or without time-window, with time and emergency window

Communication between ZxDxxxAT/CT meters and control centre can take place in the ways illustrated above:

- from control centre to meter at any time
- from control centre to meter daily, weekly or monthly during a defined time-window
- from control centre to meter daily, weekly or monthly during a defined time-window with additional emergency window

The emergency window is open to the control centre 24 hours after the regular time-window, if the meter has not called there during the regular time-window.

Outside of the time-window the modem accepts no call or only after a large number of ring signals.

4.3.2 Function of LEDs

Functions of the individual LEDs during normal operation:

CON: This LED has no function in the CU-B2 version (without RS232). In versions CU-B1 and CU-B4 (with RS232) this LED is continuously lit if there is a connection between the communication unit and the control centre. Data exchange can take place.

Rx: This LED indicates the reception of characters via the RS232 or RS485 interface. The characters are extended by 100 ms. If this LED is flashing, it indicates reception of the "Ring" function.

Tx: This LED indicates the transmission of characters via the RS232 or RS485 interface. The characters are extended by 100 ms.

4.4 Application of interfaces

Single application

Application 1

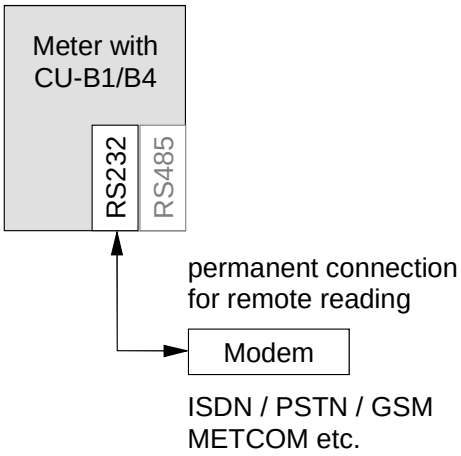

Fig. 12 Example of an application of CU-B1 or B4

In this application the meter is permanently connected to the telephone network via its RS232 interface and the modem connected.

Multiple application

Application 2

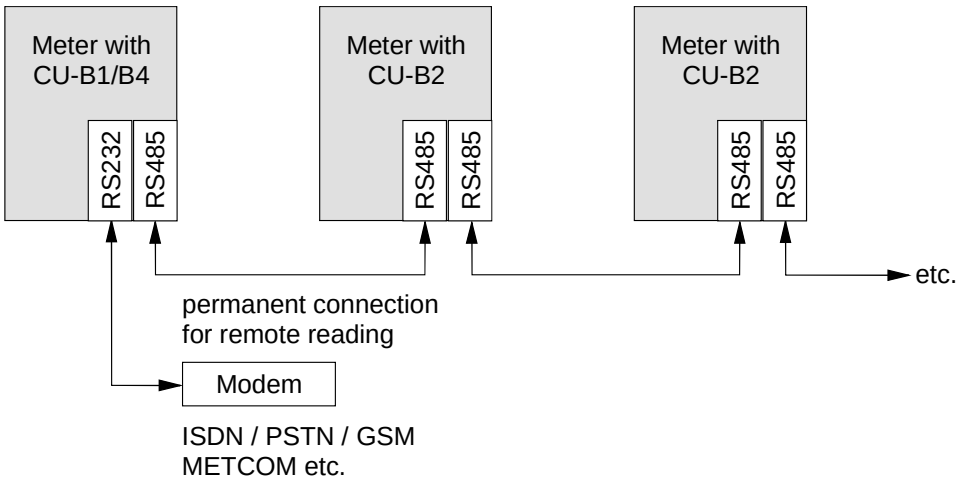

Fig. 13 Example of an application of CU-B1/B4 as master together with CU-B2 as slaves

This application permits several (up to 31) ZxDxxxAT/CT meters to be connected with one communication unit CU-B2 as slaves to one meter with communication unit CU-B1 or CU-B4 as master. The two terminals of the RS485 interface are looped internally (see also Fig. 6) and serve as connections from one meter to the next as shown above.

Communication with all meters takes place via the master, i.e. via its RS232 interface. This can be connected by the user to a PC or laptop to perform temporary operations such as service functions or re-parametrization. It serves on the other hand as fixed connection to a communication network via an ISDN, PSTN, GSM modem, etc.

Application 3

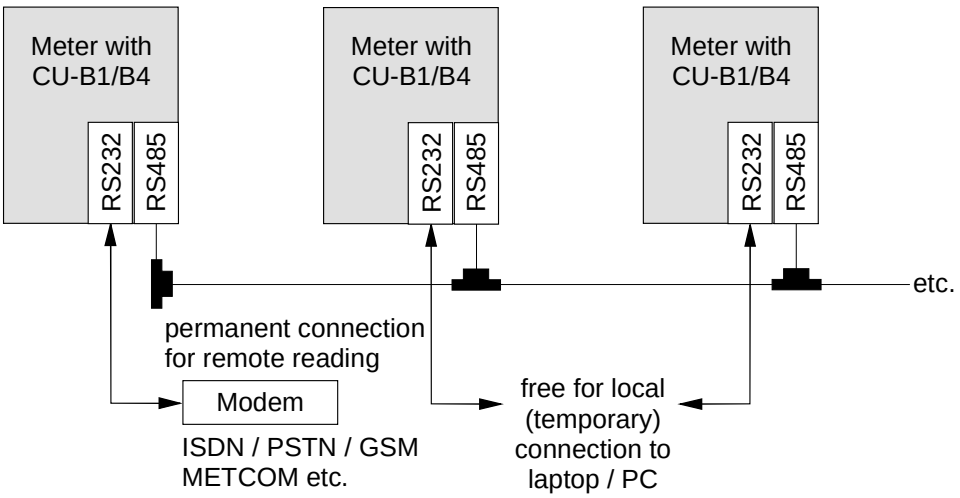

Fig. 14 Example of an application of several CU-B1/B4

As in the first example, several (up to 32) ZxDxxxAT/CT meters can be connected via the RS485 interface for common readout. The difference to application 1, however, is that all communication units have a free RS232 interface, which can serve for temporary service functions or fixed communication.

5 Installation and commissioning

Connection to electrcal installations
Dangers can arise from live electrical installations to which the meters are connected. Touching live parts is dangerous to life. All safety information should therefore be strictly observed without fail.

5.1 Introduction

The following personal and technical conditions must be fulfilled for installation and commissioning of the communication unit CU-Bx:

- The work described below must only be performed by technically qualified and suitably trained persons.
- These persons must be familiar with and observe the normal local safety regulations.
- Strictly observe the details in section 2 "Safety", in particular the safety regulations, as well as all information concerning safe operation in this section.
- Before starting work check that the material and tools required are all present (as in section 5.2).

5.2 Material and tools required

The following material and tools are required for installation of the communication unit CU-Bx:

- Correct communication unit CU-Bx (according to type designation)
- Correct connection diagram
- Meter (without communication unit CU-Bx) normally already installed and in service
- Company seals
- Size 1 screwdriver for screwless spring-loaded terminals
- Sealing pliers for company own seals
- Phase tester or universal measuring instrument
- Possibly buzzer

5.3 Fitting the communication unit CU-Bx

No voltage on meter
There must be no voltage applied to the meter when fitting the communication unit CU-Bx. Contact with live parts is dangerous to life. Disconnect the meter from the power supply as described in the meter operating instructions.

The communication unit CU-Bx should be fitted in the meter as follows:

1. Ensure that no voltage is applied to the meter.
2. Remove the company seals on the front door and terminal cover.
3. Open the front door and remove the terminal cover.

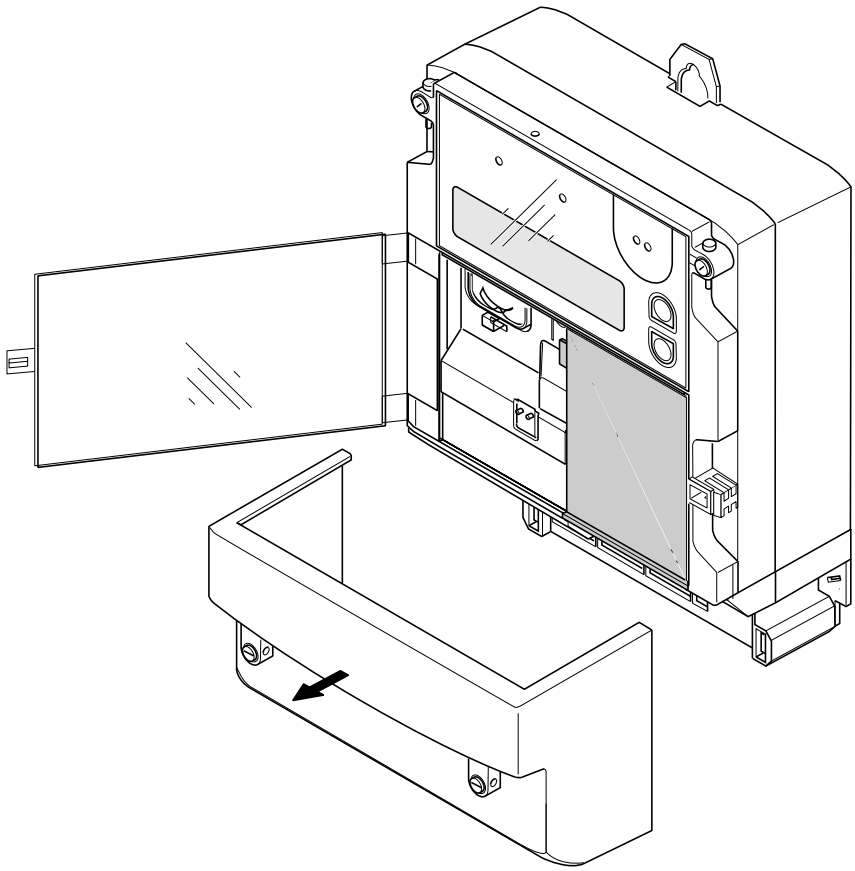

Fig. 15 Meter prepared for fitting communication unit CU-Bx

4. Remove the built-in "dummy" communication unit.

5. Insert the communication unit carefully at the place provided in the meter. Ensure correct fitting of the connectors.

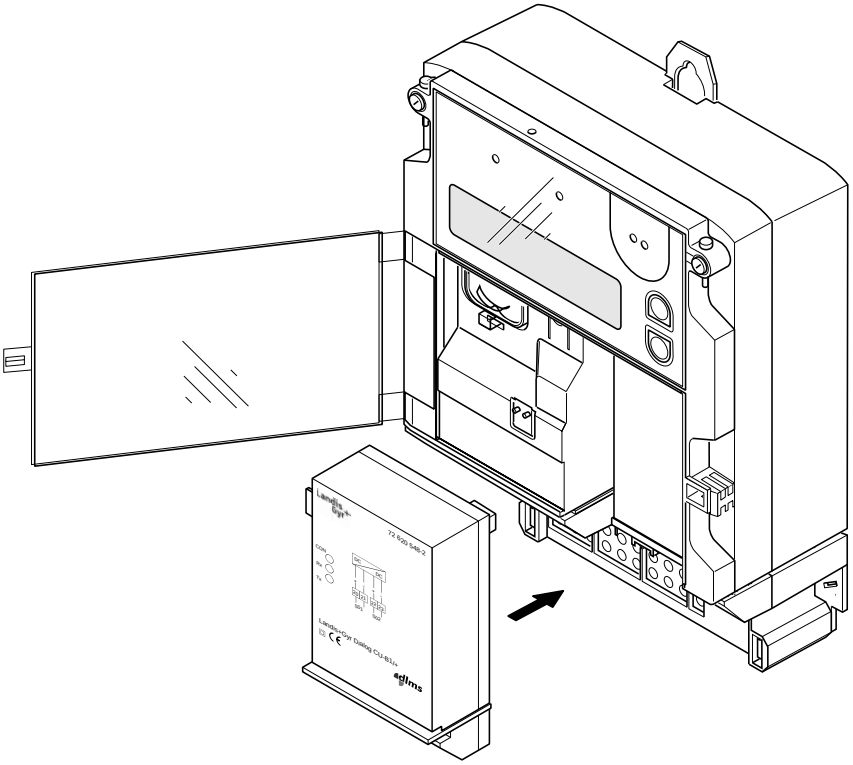

Fig. 16 Fitting communication unit CU-Bx in meter

6. Close and seal the front door.

5.4 Connecting the communication unit CU-Bx

Connection conductors without supply during installation

The connecting conductors must not be connected to the supply during installation of the communication unit CU-Bx. Contact with live parts is dangerous to life. Remove the corresponding fuses and keep these in a safe place until completing the work, so that other persons cannot replace them unnoticed.

Open the voltage connections in the test terminal block (e.g. TVS14). For this purpose release the screw of the relevant jumper with an insulated screwdriver, move the jumper away from the terminal on the voltage transformer side and then retighten the screw.

If no test terminal block is present, the primary voltage must be interrupted, i.e. the system switched off.

5.4.1 Connecting the signal inputs

Connect the signal inputs of the communication unit CU-Bx as follows according to the connection diagram:

1. Shorten the connecting wires of the signal inputs and outputs to the required length and strip them for approx. 4 mm (wires and strands up to 2.5 mm^2 can be connected).
2. If stranded wire is used, it is recommended to provide it with ferrules for connection.
3. Connect the connecting wires of the signal inputs and outputs as follows to the screwless spring-loaded terminals (the terminals are numbered as shown on the connection diagram):
   - Insert a size 1 screwdriver in the upper opening and insert it turning slightly upwards (Fig. 17 A).
   - Now place the stripped connecting wire in the lower opening and hold it there securely (Fig. 17 B).
   - Withdraw the screwdriver. The connecting wire is then firmly fixed (Fig. 17 C).

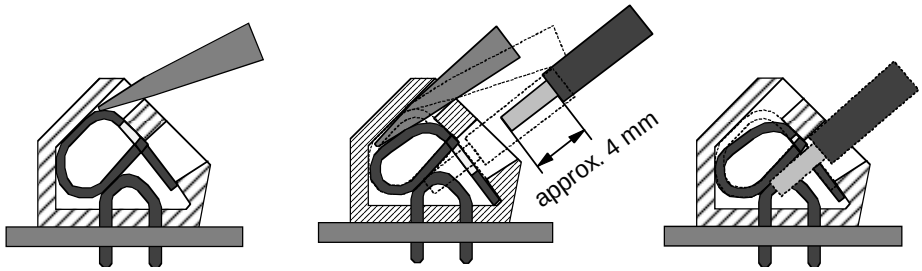

Fig. 17 Connection in screwless spring-loaded terminals

Correct length of insulation
The insulation of the connecting line must extend as far as the terminal indentation, i.e. there must be no further bare part of the connecting line visible above the terminal edge (as shown in Fig. 17 C). Touching live parts is dangerous to life. The stripped part of the connecting wire should be shortened if necessary.

If a connecting wire must be disconnected again for any reason, this is performed in the reverse sequence:

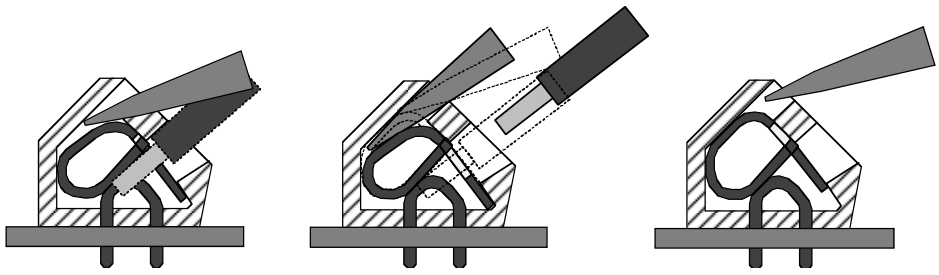

Fig. 18 Releasing connection from spring-loaded terminal

Withdrawing of connection wires
Never withdraw connecting wires with the terminal closed, since this could damage the terminal.

5.4.2 Connecting the communication interfaces

Insert the connecting cable with the RJ12 connectors in the relevant sockets (RS232 left, RS485 right) until the connectors can be heard to engage.

5.4.3 Pin allocation RS232

Connection to PC, terminal or laptop

Data receiver			Meter with CU-Bx	
DB-9 socket			RJ12 socket	
Pin	Signal	Direction	Pin	Signal
7	RTS	→	1	CTS
2	RxD	←	2	TxD
5	GND		3	GND
6	DSR	←	4	DTR
3	TxD	→	5	RxD
4	DTR	→	6	DSR

Significance of signals:

CTS Clear To Send

RTS Request To Send (for connection to modem)

TxD Transmitted Data

RxD Received Data

DTR Data Terminal Ready (Data Terminal = PC, terminal, laptop)

DSR Data Set Ready (Data Set = modem)

GND Signal ground

Connection to modem

Data receiver			Meter with CU-Bx	
DB-9 socket			RJ12 socket	
Pin	Signal	Direction	Pin	Signal
8	CTS	→	1	CTS
3	RxD	←	2	TxD
5	GND		3	GND
4	DTR	←	4	DTR
7	RTS 1)	←		
2	TxD	→	5	RxD
6	DSR	→	6	DSR

1) The modem must be configured so that RTS need not be used. RTS at the DB-9 socket should be connected to DTR at the RJ12 socket, so that the RTS input to the modem has a defined potential. RTS must also be set to "logic 1".

5.4.4 Connecting the RS485 interface

Connect the RS485 interface according to the diagram on the faceplate.

External wiring of RS485
In order to function correctly, all 3 wires (data a, data b and Common GND) must be connected. RS485 operation with only 2 wires (without Common GND) is forbidden as the RS485 interface may not function correctly or be damaged.

5.5 Commissioning and functional check

Removing and inserting of preliminary fuses
The preliminary fuses must be re-inserted for commissioning and functional check of the meter with communication unit CU-Bx. While the terminal cover is not screwed on there is danger of contact with the connection terminals. Contact with live parts is dangerous to life. The fuses should always be removed to make any modifications to the installation and kept in a safe place until work is completed to prevent other persons re-inserting them unnoticed.

The installed meter with installation unit CU-Bx should be put into operation and checked as follows:

1. Connect a signal source to the interface to check the S0 interface. If the meter is prepared for processing the signal, check after a time whether the register(s) concerned has/have changed.
2. Perform a data readout via the interface to check the RS485 or RS232 interface with a suitable unit (laptop, handheld terminal).
3. Ensure that the units connected to the RS485 interface have different addresses. These are the IEC unit address for IEC 61107 or the physical unit address for dlms.
4. Also ensure that all units connected have the same bit rate for the RS485 interface.

6 Measures in event of faults

6.1 Removing the communication unit CU-Bx

Precautions at removal of communication unit

The connecting conductors and the meter must not be connected to the supply during removal of the communication unit CU-Bx. Contact with live parts is dangerous to life. Remove the corresponding fuses and keep them in a safe place until completing the work, so that other persons cannot replace them unnoticed.

Open the voltage connections in the test terminal block (e.g. TVS14). For this purpose release the screw of the relevant jumper with an insulated screwdriver, move the jumper away from the terminal on the voltage transformer side and then retighten the screw.

If no test terminal block is present, the primary voltage must be interrupted, i.e. the system switched off.

Remove the communication unit CU-Bx from the meter as follows:

1. Check with a phase tester or universal measuring set whether the connecting conductors of the meter are voltage-free. If not, remove the corresponding fuses and keep them in a safe place until installation is completed to prevent other persons replacing them unnoticed.
2. Remove the company seals on the front door and terminal cover.
3. Remove the terminal cover and open the front door.
4. Remove the communication unit CU-Bx from the meter by pulling on the flap at the left top side.

6.2 Repairing the communication unit CU-Bx

Communication units CU-Bx must only be repaired by the responsible service and repair centre (or manufacturer).

Adopt the following procedure if the CU-Bx needs to be repaired:

1. If installed, remove the communication unit CU-Bx as described in section 6.1 and fit a replacement communication unit CU-Bx if necessary.

Meter operation only with communication unit or dummy
For safety reasons the meter must not be operated without communication unit or a "dummy" communication unit.

If no spare communication unit is available, a "dummy" unit must be used

2. Describe the error found as exactly as possible and state the name and telephone number of the person responsible in case of inquiries.
3. Pack the communication unit CU-Bx to ensure it can suffer no further damage during transport. Preferably use the original packing if available. Do not enclose any loose components.
4. Send the CU-Bx to the responsible service and repair centre.

7 Decommissioning and disposal

Electronic waste treatment
This product must not be disposed of in regular waste. Use a professional electronic waste treatment process.

The components used to manufacture the device can, in the main, be broken down into constituent parts and sent to an appropriate recycling or disposal facility. When the product is removed from use, the whole product must be sent to a professional electronic waste treatment process. The waste treatment and disposal plants must be approved by local regulatory authorities.

The end processing of the product and recycling of its components must always be carried out in accordance with the rules and regulations of the country where the end processing and recycling are done.

On request, Landis+Gyr will provide more information about the environmental impact of the product.

Disposal and environmental protection regulations
The following are general guidelines and should NOT take priority over local disposal and environmental policies which should be adhered to without compromise.

Components	Disposal
Printed circuit boards	Delivered to recycling plants
Metal components	Sorted and delivered to metal recycling plants
Plastic components	Sorted and delivered to re-granulation if at all possible

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Landis+Gyr
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