SIEMENS

Installation

ULAF+ V4.2

Installation Manual

A3118-X300-M100-1-76D1

Important Notice on Product Safety

Elevated voltages are inevitably present at specific points in this electrical equipment. Some of the parts can also have elevated operating temperatures.

Non-observance of these conditions and the safety instructions can result in personal injury or in property damage.

Therefore only trained and qualified personnel may install and maintain the system.

The system complies with the standard EN 60950. All equipment connected has to comply with the applicable safety standards.

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Issues

Change indications:

N = new; G = modified; 0 = deleted;

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This document consists of a total of 300 pages.

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1 Introduction

ULAF+ is a modular system for transmitting TDM based 2 Mbit/s- and nx64 kbit/s data and voice signals. The signals are transmitted either via

- copper cables, using HDSL technology, via
- copper cables, using SHDSL technology (one wire pair) or via
- an optical fiber cable, using TCM (Time Compression Multiplex) technology at a wavelength of 1300 nm.

The modular concept of ULAF+ allows the use of one and the same basic module, both in the subrack and in the desktop unit. The Network Operator or the customer is therefore able to adapt the basic module to his specific requirements by equipping it with various interface modules.

In detail, the system consists of the following components:

- the subrack
- the Operating & Maintenance Interface unit (OMI/OMI SNMP)
- the HTU/STU/STU2/QSTU/STU4/BSTU/BSTU4/LR-DSTU/BOTU/OTU termination units
- the G.703 termination units GTU (Interface converter)
- the HDSL regenerator (REG)
- the SHDSL regenerators SRU and BSRU
- a series of submodules (such as remote power supply, subscriber interfaces) for individual configuration of the system.

For local operation and maintenance of ULAF+, the system can be

- controlled and configured via a Local Craft Terminal (LCT) which is connected to the OMI/OMI SNMP or to the desktop units and/or
- controlled and configured via a DIP switch (only applies to pure 2 Mbit/s applications).

Visual indication of the operating status is provided by LEDs on the front of the plug-in units or the desktop units.

The AccessIntegrator management software is used for centralized operation and maintenance.

1.1 Documentation overview

The ULAF+ customer documentation comprises the following manuals:

- **Technical Description (TED)**
  The Technical Description for ULAF+ gives an overview of the structure and function of the system and all its components. The subsystem descriptions contain detailed information about the individual submodules, a complete product overview and detailed technical data about the system.
- **Installation Manual (IMN)**
  The Installation Manual contains installation notes for the individual system components or submodules. The IMN contains tables and diagrams with the Pin assignments of the connectors, settings of the address switches and the operating elements and module-specific alarm tables.
- **User Manual (UMN)**
  The User Manual describes all the procedures of the LCT required for the operation and administration of a fully functioning system. If errors do occur, cross references are provided so that the normal operating mode can be restored.

ULAF+ documentation is supplemented by the manuals for the AccessIntegrator management software:

- **System Description (TED)**
  is intended for those interested in learning more about the overall structure and functional scope of the software.
- **Installation and System Administration Manual (ADMN)**
  The *installation part* of the manual is intended for anyone involved in the installation and configuration of the software. It describes the procedures for initial installation of the system, installation of a new version of the software and modification of the existing OS configuration.
  The *administration part* is intended to be used by anyone who configures the software for other users. It describes the tasks which must be performed in order to guarantee trouble-free and reliable management of the network elements.
- **User Manual (UMN)**
  is intended for those who are monitoring and maintaining the network elements by means of the AccessIntegrator.

1.2 Notes on product safety

It is inevitable that in electrical systems certain parts of the equipment will be under voltage. A number of parts can also become very hot during operation.

Ignoring this situation and the warnings given can result in personal injury or damage to property.

1.2.1 Representation conventions

This manual uses various different types of indiction to make you aware of product safety:

- **Information**

Information gives useful notes which pertain to particular situations and specifically draw the reader's attention to them. Information will be highlighted in the text using an information symbol.

- **Warning**

Warnings give important information, which it is vital to follow to prevent damage. Warnings will be highlighted in the text using a warning symbol.

1.2.2 Handling modules and submodules

Fig. 1.1 ESD symbol

Modules that bear the ESD symbol are equipped with electrostatic sensitive devices, i.e. the appropriate safety precautions must be observed when handling these modules.

Inserting/ removing modules

The plug-in units can be removed and inserted while the power is still applied.

To remove and insert plug-in units, the screws in the front of the plug-in units should be undone.

The voltage must be interrupted before the submodules are removed and inserted.

If neither the ULAF+ desktop unit nor the terminal device are earthed, to prevent static discharge you must connect the terminal device before switching on the ULAF+ desktop unit.

A wrist band must always be worn when unpacking, packing, touching, removing or inserting modules bearing the ESD symbol, see Fig. 1.1, This wrist band is to be grounded when working with ULAF+ components. This will ensure that electrostatically sensitive components are not damaged.

Basically the conductor tracks or components on the modules may not be touched. The modules may only be held by their edges.

Once they have been removed, place the modules in the conductive plastic envelope provided and then store them or dispatch them in special boxes or special transport cases bearing ESD symbol.

To avoid further damage, defective modules are to be handled with as much care as new modules.

Modules located in an enclosed, unopened housing are always protected.

European Standard EN50082-1 contains information on correct handling of electrostatic sensitive modules.

Disposal of equipment and units

All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.

The correct disposal and separate collection of your old appliance will help prevent potential negative consequences for the environment and human health. It is a precondition for reuse and recycling of used electrical and electronic equipment.

For more detailed information about disposal of your old appliance, please contact your SIEMENS partner.

The statements quoted above are only fully valid for equipment which is installed in the countries of the European Union and is covered by the directive 2002/96/EC. Countries outside the European Union may have other regulations regarding the disposal of electrical and electronic equipment.

1.2.3 Stacking the desktop units

Because of the generated heat you may stack the desktop units only in a room with capacity 20 degrees above zero.
It is recommend to use a 19” subrack to accommodate one or more desktop models. This subrack provides space for 8 desktop models included their enclosure. You will find ordering information in the ULAF+ price list.

1.3 Notes on protection against laser radiation

Normal operation

In normal operation the unit is fully encapsulated. It therefore belongs to Laser class 1.

Interruption of a glass fiber

Where there is an interruption to a glass fiber (fiber break or connector unplugged from the device) an automatic laser shutdown circuit is activated. The resulting average optical power in this case is 0.025 mW (OTU) and is classified as harmless, as defined by Laser class 1. The light output in conjunction with the BOTU/QOTU depends on the SFP modules used. Optical interfaces that are not used should be fitted with protective caps to prevent contamination.

Dangerous fault

The device correspond to the Laser class 1 in any disturbances. The safety precautions (see Fig. 1.2) should be noted.

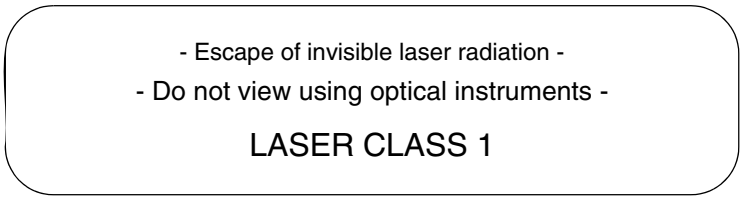


Fig. 1.2 Laser safety precautions

1.4 Overvoltage protection

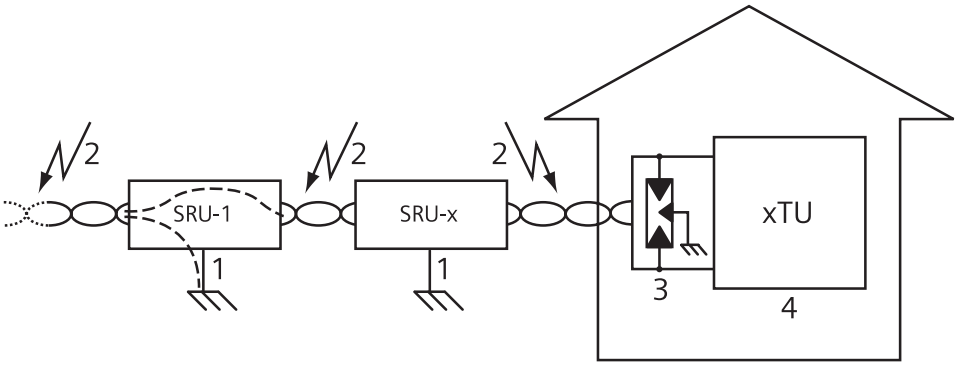


Fig. 1.3 Overvoltage protection

Fig. 1.3 shows an example with a SHDSL loop with some (probably) inserted SRUs. Overvoltage (2) caused by i.e. lightning or mains can occur anywhere on the loop.

1.4.1 Protection of a network element

An overvoltage protection as a primary stage is mandatory in connection with any ULAF+ network elements (3). Usually it is a 3-electrode-arrestor with a spark-over voltage of > 130 V. When the desktop model is remote powered by 180 V the spark-over voltage has to be > 200 V and the desktop model shall be earthed (4).

1.4.2 Protection of the SHDSL regenerator (SRU)

The SHDSL regenerator needs no additional protection. If possible the SRU should be earthed at the appropriate Pin (1) (chapter 2.21.2). This causes the overvoltage to be shorted to earth (path a). Otherwise the overvoltage will appear at the next line section (path b).

1.4.3 Requirements of the 3-electron-arrester for primary protection

Tab. 1.1 shows for example the technical characteristics of a 3-electron-arrester by the EPCOS company. The type is called T23-A230XF4.

DC spark-overvoltage in ionized mode	> 130 V or > 200 V
Impulse spark-overvoltage at 100 V/µs Impulse spark-overvoltage at 1 kV/µs	< 350 V < 450 V
Nominal impluse discharge current	20 kA (wave 8/20µs)
Single impulse discharge current	25 kA (wave 8/20µs)
Nominal alternation discharge current (50 Hz, 1 s)	10 A
Single alternation discharge current (50 Hz, 9 cycles)	50 A
Insulation restistance at 100 V_{DC} (a or b to center)	> 10 GΩ
Glow voltage	approx. 200 V

Tab. 1.1 Requirements of the 3-electron-arrester

1.5 EMC and product safety

1.5.1 EMC

The CE conformity declaration for the product is met when the installation and cabling is carried out in compliance with the instructions in the ULAF+ Installation Manual (Chap. 2). Where necessary project-specific documents should be taken into account.

Deviations from the specifications or independent changes made during installation, e.g. the use of cable types with a lower shielding mass, can lead to the CE protection requirements being violated. In such cases the conformity declaration will be invalidated. Responsibility for any problems that may occur thereafter then lies with the person responsible for deviating from the specifications.

1.5.2 Product safety

Before you open the desktop device you must interrupt the feed and also disconnect the interface connector. You have to guarantee the easy access to the main socket.

All work on the open unit may only be performed by authorized specialists (maintenance staff). Considerable danger (electric shock, fire) for maintenance staff and the user can be incurred with unauthorized opening of or improper work on the unit.

The unit complies with:

- The relevant safety regulations for IT installations (EN 60950-1 and EN 60950-21). It is recommended that all interface connections (e.g. routers) be set up first, and only then should the ULAF+ desktop unit be connected with the 230 volt mains (prevention of damages caused by electrical discharges).
- EU Directive, RoHS 2002/95/EC, with regard to dangerous substances in electrical and electronic equipment.

A prerequisite is that all connected devices also meet these requirements.

Non-adherence to specifications or modifications to setup (for example, use of SFP modules not approved for this product) can lead to violation of security provisions. This would invalidate the Declaration of Conformity. Liability for any associated problems then lies with the person responsible for the modifications or for non-adherence to specifications.

2 Hardware and Software Installation

This chapter describes how to install the hardware components and the management software (LCT) of ULAF+:

- The ULAF+ subrack (S3105-B128-A210) (Chapter 2.2)
- The ULAF+ subrack (S3105-B128-C210 / -C211) (Chapter 2.3)
- The Operating and Maintenance Interface OMI (Chapter 2.4)
- The Operating and Maintenance Interface OMI SNMP (Chapter 2.5)
- The HTU termination unit (Chapter 2.6)
- The STU termination unit (Chapter 2.7)
- The STU termination unit with G.703 64 kbit/s (codirectional) (chapter 2.8)
- The STU2 termination unit (Chapter 2.9)
- The BSTU termination unit (Chapter 2.10)
- The QSTU termination unit (Chapter 2.11)
- The STU4 termination unit (Chapter 2.12)
- The BSTU4 termination unit (Chapter 2.13)
- The Ethernet over TDM Inverse Multiplexer GTU4 (Chapter 2.14)
- The Long Reach termination unit LR-DSTU (Chapter 2.15)
- The OTU termination unit (Chapter 2.16)
- The BOTU/QOTU termination unit (Chapter 2.17)
- The G.703 termination unit GTU (Chapter 2.18)
- The Interface- and submodules (Chapter 2.19)
- The HDSL regenerator (Chapter 2.20)
- The SHDSL regenerator SRU (Chapter 2.21)
- The SHDSL regenerator BSRU (Chapter 2.22)
- The Housing for xDSL regenerators (Chapter 2.23)
- Installation of the LCT software (Chapter 2.24)

2.1 General requirements/check list

The following tasks must be carried out for each system component before/during installation:

- The scope of delivery and installation are complete:
  - Check the delivery for completeness using the parts list.
  - Cabling and placement of the shelves must be checked for each individual system component using the installation instructions.
  - The plug-in units must be fitted securely.
  - Both the external and the internal cabling are correct.
- The hardware is in the as-delivered state:
  - Check the hardware-specific settings of the plug-in units and the submodules
  - The system voltage is connected and continuously available.
- There is ULAF+ and, if required, AccessIntegrator documentation on site (chapter 3).
- The LCT is installed and operational (if the system is not configured via the DIP switches) (chapter 2.24).

2.2 The ULAF+ subrack (S3105-B128-A210)

The ULAF+ subrack accepts double eurocard size plug-in units. Slot 0 is reserved for the Operating and Maintenance Interface unit (OMI/OMI SNMP). The remaining slots can either be equipped with HTU-, STU-, STU2-, BSTU-, QSTU-, STU4-, BSTU4-, GTU4-, BOTU-, OTU- or GTU plug-in units.

This chapter describes the settings which must be made on the subrack for trouble-free operation.

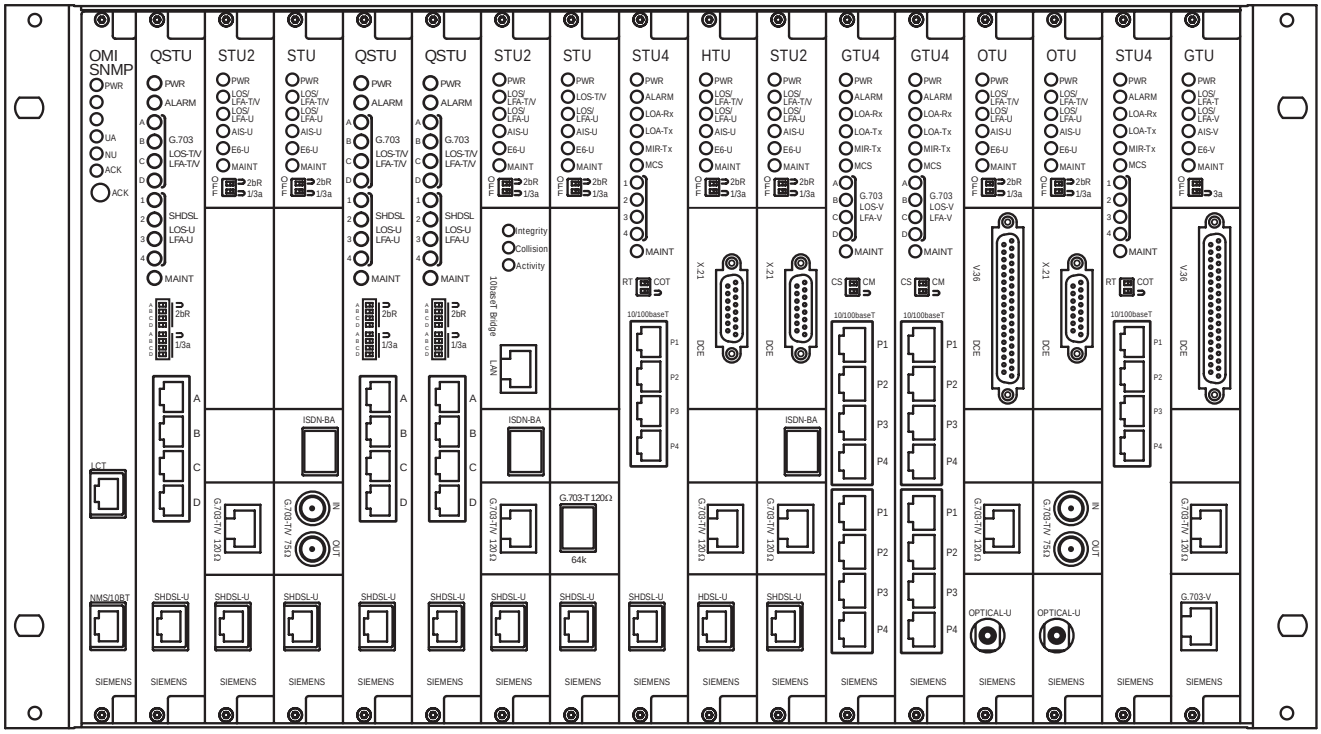


Fig. 2.1 ULAF+ subrack (S3105-B128-A210)

Cable compartment

A cable compartment can be fastened with screws to the bottom of the 19” subrack. The compartment is obtainable as an accessory (see [1]) and is used for cable laying.

For subracks arranged one on top of the other and fully equipped with RPSII or STU2/BSTU/QSTU/STU4/BSTU4 with activated RPS, it is imperative that there is a distance of 3 height units (6 HU = subrack height) for a trouble-free heat dissipation.

In the subrack a maximum of 32 SHDSL lines can be remotely fed. In order to be able to operate more than 32 SHDSL lines with remote power feeding, you must use the S3105-B128-C210 subrack (chapter 2.3).

Mounting bracket for ETSI racks

To enable you to use the 19” subrack in an ETSI rack you must break out the mounting bracket located on the back of the subrack and attach it to one side of the subrack.

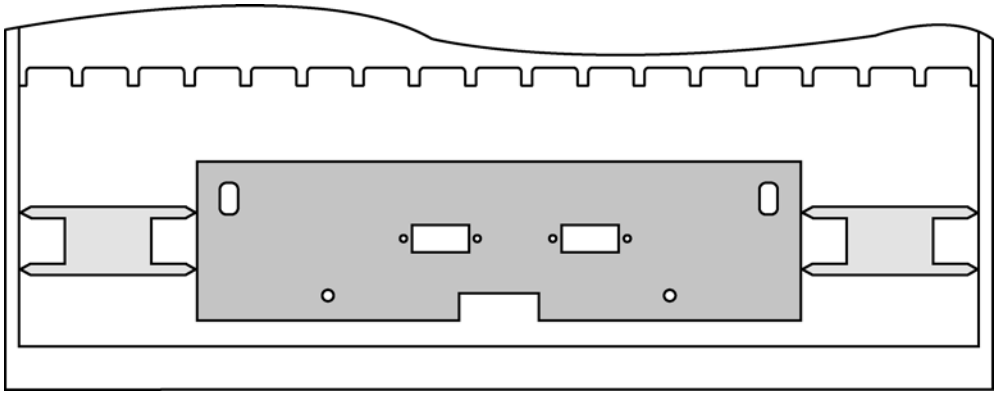


Fig. 2.2 Mounting bracket for ETSI racks

2.2.1 Backplane of the subrack

You can configure the cascading of the subracks (chapter 2.2.6) and termination of the OMI bus using the DIP switches on the backplane.

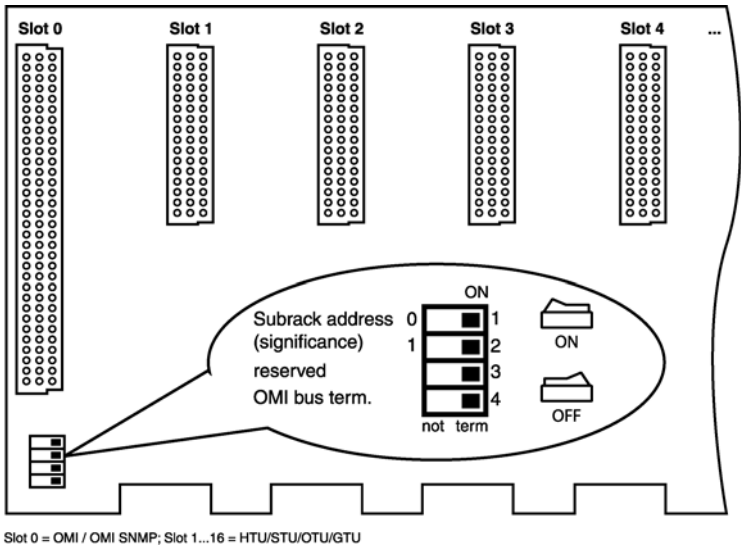


Fig. 2.3 Backplane of the subrack

DIP switch 1	DIP switch 2	DIP switch 3 [1)]	DIP switch 4	Description	Slot number
ON	ON	ON	--	Subrack address 1 [1)]	Slots 1 ... 16
OFF	ON	ON	--	Subrack address 2	Slots 18 ... 33
ON	OFF	ON	--	Subrack address 3	Slots 35 ... 50
OFF	OFF	ON	--	Subrack address 4	Slots 52 ... 67
--	--	--	ON	OMI bus terminated [1)]	
--	--	--	OFF	OMI bus open	

1) Default settings

Tab. 2.1 DIP switches of the backplane

2.2.2 External connections of the subrack

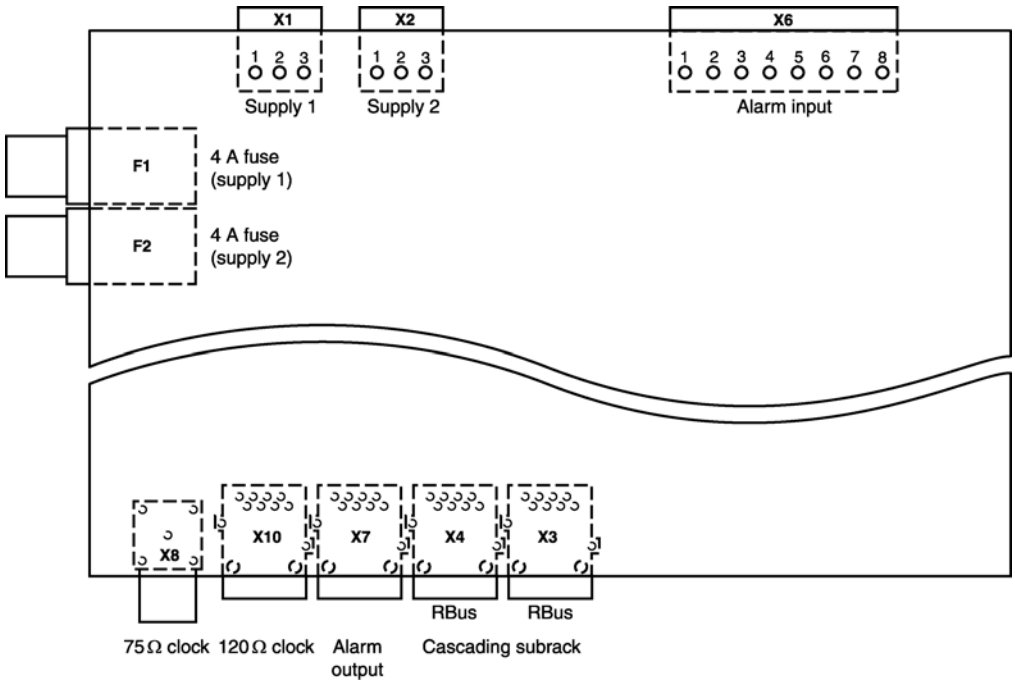


Fig. 2.4 External connections of the subrack (backplane)

In the following tables, you will find the Pin assignment of the individual connectors for the external connections of the subrack. The numbering relates to Fig. 2.15.

Pin	Description
1	Input 1
2	Grounding GND
3	Input 2
4	Grounding GND
5	Input 3
6	Grounding GND
7	Input 4
8	Grounding GND

Tab. 2.2 Pin assignment - Subrack alarm input (connector X6)

i Provided for subsequent expansions. The alarm input is not supported in the current firmware version of the OMI/OMI SNMP.

Conductor	Description
1 Inner conductor	Clock
1 Outer conductor	Shield

Tab. 2.3 Pin assignment - Subrack clock 75 Ω (connector X8)

Pin	Description
1	Not assigned
2	Not assigned
3	Grounding GND (shield)
4	Clock a
5	Clock b
6	Grounding
7	Grounding
8	Grounding

Tab. 2.4 Pin assignment - Subrack 120 Ω clock (connector X10)

Pin	Description
Supply 1 (Connector X1)	
1	48 V / 60 V (-)
2	48 V / 60 V (+)
3	Grounding, GND
Supply 2 (Connector X2)	
1	48 V / 60 V (-)
2	48 V / 60 V (+)
3	Grounding, GND

Tab. 2.5 Pin assignment - Subrack supply (connector X1/X2)

Pin	Description
1	Grounding
2	Urgent alarm, relay contact 1
3	Urgent alarm, relay contact 2
4	Non-urgent alarm, relay contact 1
5	Non-urgent alarm, relay contact 2
6	Alarm acknowledgment, relay contact 1
7	Alarm acknowledgment, relay contact 2
8	Grounding

Tab. 2.6 Pin assignment - Subrack alarm output (connector X7)

In the case of the alarm output Pin 2 is connected to Pin 3; Pin 4 to Pin 5 and Pin 6 to Pin 7. Contact rating

- 60 V/0.2 A for an floating relay contact
- 100 V/0.2 A for a grounded relay contact.

2.2.3 Power supply to the subrack, fusing

The subrack power supply is -48 V_{DC} or -60 V_{DC} . A redundant power supply is provided using connectors X1 and X2 and is decoupled via diodes. Each path is protected by a 8 A fuse. 5x20 mm Pin-type fuses with a high breaking capacity (sand filled) must be used.

- **Operation with one voltage source:**
  ⇒ Connector X1 and X2 must be short circuited
  Failure of the power supply or the power supply dropping below a threshold of around 36 V_{DC} triggers an urgent alarm.
- **Operation with redundant power supply:**
  ⇒ Power sources are connected to separately connector X1 or connector X2
  Failure of one power supply or the power supply dropping below a threshold of around 36 V_{DC} triggers an alarm.

Failure of one power supply or the power supply dropping below a threshold of around 36 V_{DC} triggers a non-urgent alarm.

Screw terminals are provided for connecting the power supply (max. conductor cross section 2.5 mm^2). The upper part of the connector can be pulled off for easier handling.

You must provide 8 AT fuses for each power connector (X1 and X2).

2.2.4 Grounding of the subrack

The subrack must be effectively grounded, i.e. the casing must be connected with ground in such a way that the requirements (cable line diameter, ground resistance, labeling, contacts, etc.) fulfill safety standard EN 60950-1:2006. It is grounded in the following way

- normally via the rack in which the subrack is installed, or
- with a screw and a serrated lock washer on the side panel.

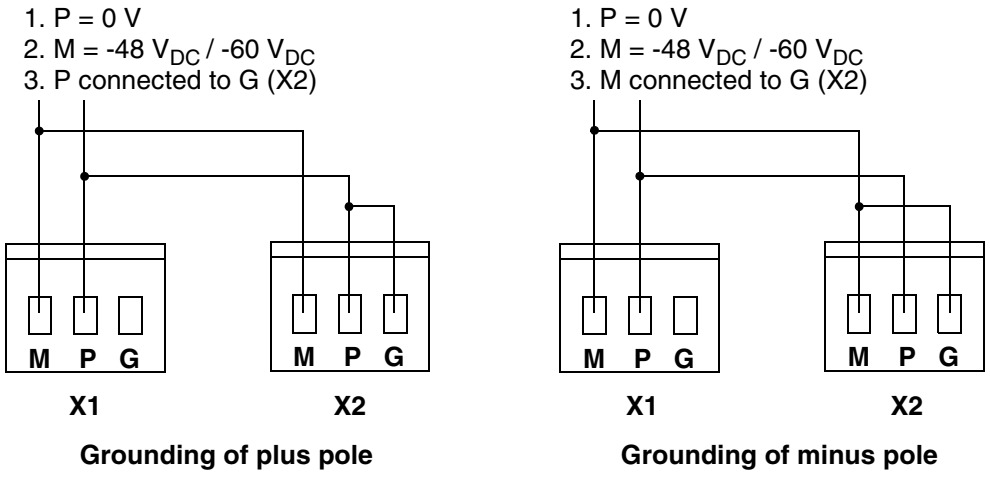
The line diameter must not be smaller than the diameter of feed line, but must be at least 1.5 mm^2.

2.2.5 Ground connection of the battery supply

Shall one of the poles of the battery be grounded and there is no grounding for the central power supply, proceed as follows:

For a grounded positive pole Pin 2 is connected to Pin 3 on supply connectors X1 or X2 (see Fig. 2.4) and for a grounded negative pole Pin 1 to Pin 3.

Example: For operation with a -48 V_{DC} / -60 V_{DC} power supply the unit must be wired as follows (see Fig. 2.5):



(Viewed from the rear towards the backplane)

Fig. 2.5 Grounding of battery supply (connectors X1 and X2)

i Supply voltage supervision only functions if the positive pole is grounded.

2.2.6 Subrack cascading

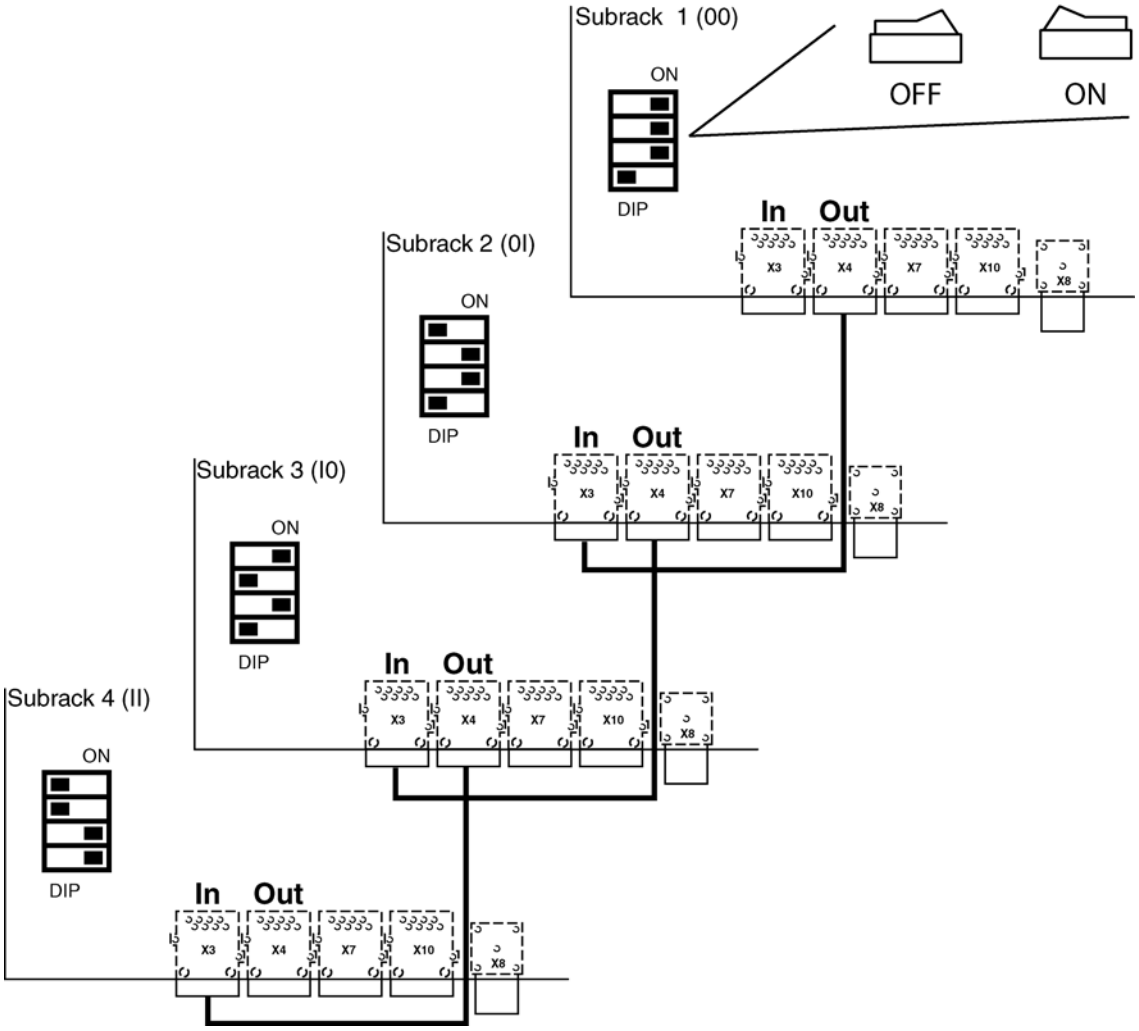


Fig. 2.6 Cascading the subrack

A maximum of four subracks can be cascaded. When they are cascaded, only one Operating and Maintenance Interface unit (OMI/OMI SNMP) may be used. The termination units can be used as required.

i In order to be able to cascade subracks equipped with QSTUs, the QSTUs must have Firmware-ID 349 at least.

Each subrack needs a unique address. You define the address by setting the DIP switches on the backplane of the subrack, see Fig. 2.3 and Tab. 2.1.

The OMI bus on the last subrack must be terminated when the subracks are cascaded. The termination is set using the DIP switches on the backplane, see Fig. 2.4 and Tab. 2.1.

i The overall length of the up to three cascading cables may **not** exceed 20 m.

2.3 The ULAF+ subrack (S3105-B128-C210 / -C211)

The ULAF+ subrack accepts double eurocard size plug-in units. Slot 0 is reserved for the Operating and Maintenance Interface unit (OMI/OMI SNMP). The remaining slots can either be equipped with HTU-, STU-, STU2-, BSTU-, STU4-, BSTU4-, QSTU-, GTU4-, LR-DSTU-, BOTU-, OTU- or GTU plug-in units.

This chapter describes the settings which must be made on the subrack for trouble-free operation.

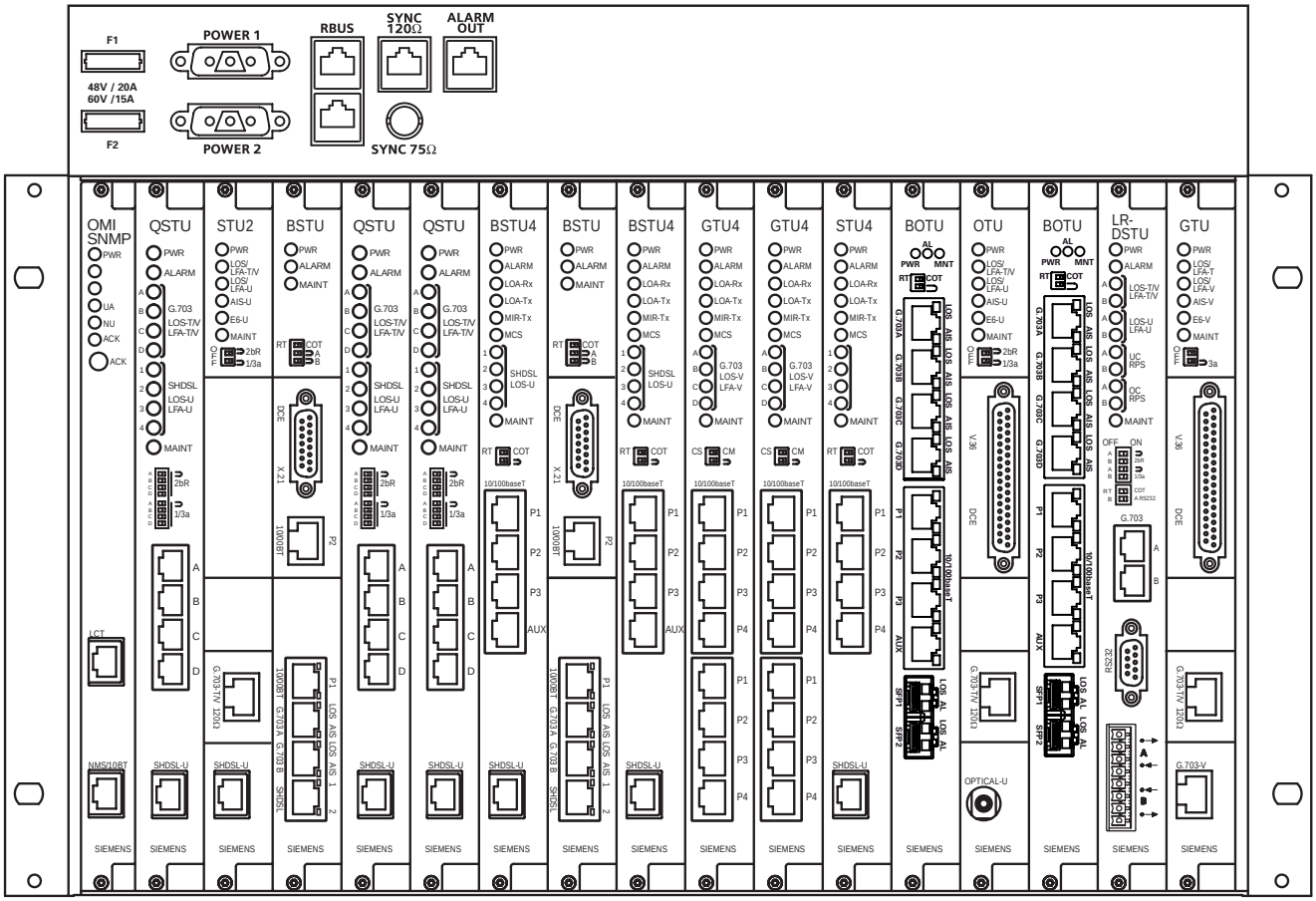


Fig. 2.7 ULAF+ subrack (S3105-B128-C210 / -C211)

Cable compartment

A cable compartment can be fastened with screws to the bottom of the 19” subrack. The compartment is obtainable as an accessory (see [1]) and is used for cable laying.

For subracks arranged one on top of the other and fully equipped with HTU/RPSII or STU/STU2/BSTU/QSTU/STU4/BSTU4 with activated RPS, it is imperative that there is a distance of 3 height units (6 HU = plug-in unit height, on top edge of the rack, without connector panel) for a trouble-free heat dissipation.

In the subrack a maximum of 64 SHDSL lines can be remotely fed. In contrast to the subrack described above, you can operate no more than 32 SHDSL lines with remote power feeding.

The subrack is a built-in unit. It must be installed in an environment that complies with the requirements of a fire protection casing according to safety standard EN 60950-1:2001.

Mounting bracket for ETSI racks

To enable you to use the 19” subrack in an ETSI rack you must break out the mounting bracket located on the back of the subrack and attach it to one side of the subrack.

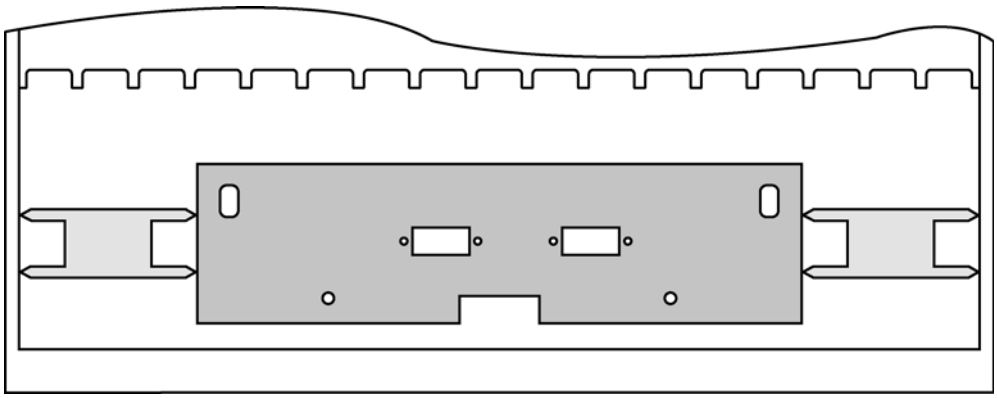


Fig. 2.8 Mounting bracket for ETSI racks

2.3.1 Backplane of the subrack

You can configure the cascading of the subracks (chapter 2.3.6) and termination of the OMI bus using the DIP switches on the backplanes.

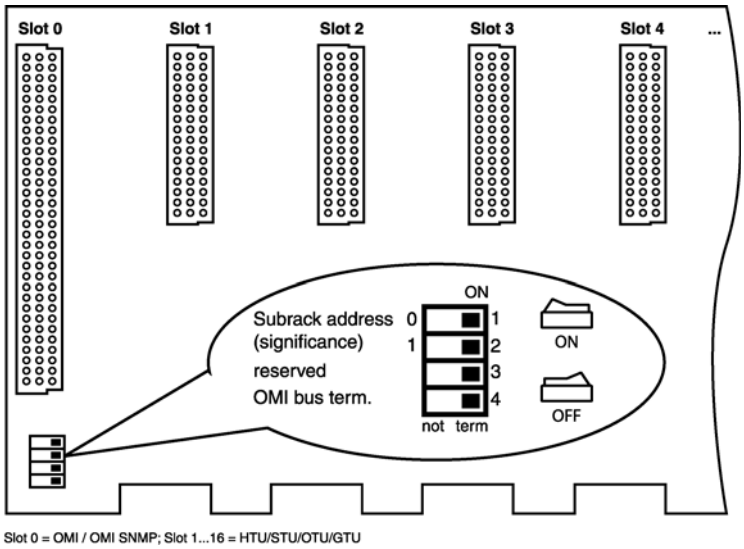


Fig. 2.9 Backplane of the subrack

DIP switch 1	DIP switch 2	DIP switch 3 [1)]	DIP switch 4	Description	Slot number
ON	ON	ON	--	Subrack address 1 [1)]	Slots 1 ... 16
OFF	ON	ON	--	Subrack address 2	Slots 18 ... 33
ON	OFF	ON	--	Subrack address 3	Slots 35 ... 50
OFF	OFF	ON	--	Subrack address 4	Slots 52 ... 67
--	--	--	ON	OMI bus terminated [1)]	
--	--	--	OFF	OMI bus open	

1) Default settings

Tab. 2.7 DIP switches of the backplane

2.3.2 External connections of the subrack

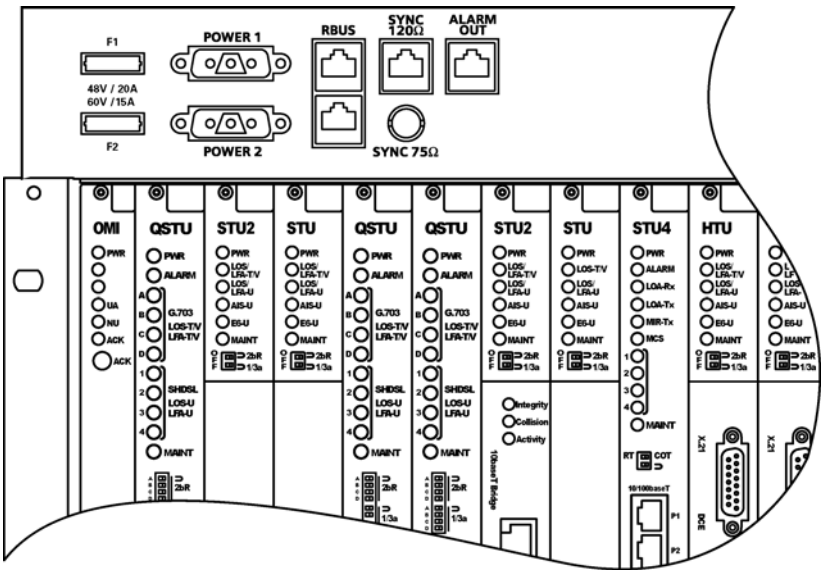


Fig. 2.10 External connections of the subrack (backplane)

In the following tables, you will find the Pin assignment of the individual connectors for the external connections of the subrack

Conductor	Description
1 Inner conductor	Clock
1 Outer conductor	Shield

Tab. 2.8 Pin assignment - Subrack clock 75 Ω (connector SYNC 75 Ω)

Pin	Description
1	Not assigned
2	Not assigned
3	Grounding GND (shield)
4	Clock a
5	Clock b
6	Grounding
7	Grounding
8	Grounding

Tab. 2.9 Pin assignment - Subrack 120 Ω clock (connector SYNC 120 Ω)

Fig. 2.11 Subrack supply connector Power 1 and Power 2

Pin	Description
Supply 1 (Connector: Power 1)	
A1	48 V / 60 V (+)
A2	Grounding, GND
A3	48 V / 60 V (-)
Supply 2 (Connector: Power 1)	
A1	48 V / 60 V (+)
A2	Grounding, GND
A3	48 V / 60 V (-)

Tab. 2.10 Pin assignment - Subrack supply (connector Power 1 and Power 2)

Pin	Description
1	Grounding
2	Urgent alarm, relay contact 1
3	Urgent alarm, relay contact 2
4	Non-urgent alarm, relay contact 1
5	Non-urgent alarm, relay contact 2
6	Alarm acknowledgment, relay contact 1
7	Alarm acknowledgment, relay contact 2
8	Grounding

Tab. 2.11 Pin assignment - Subrack alarm output (connector ALARM OUT)

In the case of the alarm output Pin 2 is connected to Pin 3; Pin 4 to Pin 5 and Pin 6 to Pin 7. Contact rating

- 60 V_{DC} / 0.2 A for an floating relay contact
- 100 V_{DC} / 0.2 A for a grounded relay contact.

The setup is only fully separated from the primary power supply when both connectors Power 1 and Power 2 have been unplugged.

2.3.3 Power supply to the subrack, fusing

The subrack power supply is -48 V_{DC} or -60 V_{DC} . Power is supplied redundantly via connectors Power 1 and Power 2 and is decoupled with diodes.

Recommended fuse protection for a fully equipped subrack is as follows:
– For a 48 V_{DC} supply → 20 A fuse
– For a 60 V_{DC} supply → 16 A fuse

- **Operation with one voltage source:**
  ⇒ Connector Power 1 and Power 2 must be short circuited
  Failure of the power supply or the power supply dropping below a threshold of around 36 V_{DC} triggers an urgent alarm.
- **Operation with redundant power supply:**
  ⇒ Power sources are connected to separately connector Power 1 or connector Power 2.
  Failure of one power supply or the power supply dropping below a threshold of around 36 V_{DC} triggers an alarm.

The unit is connected with a 3W3 D-Sub mixed-pole connector with high current contacts. The cable must have a line diameter of 2.5 mm^2.

You must fuse the cables to the subrack with 20 AT.

2.3.4 Protective grounding of the subrack

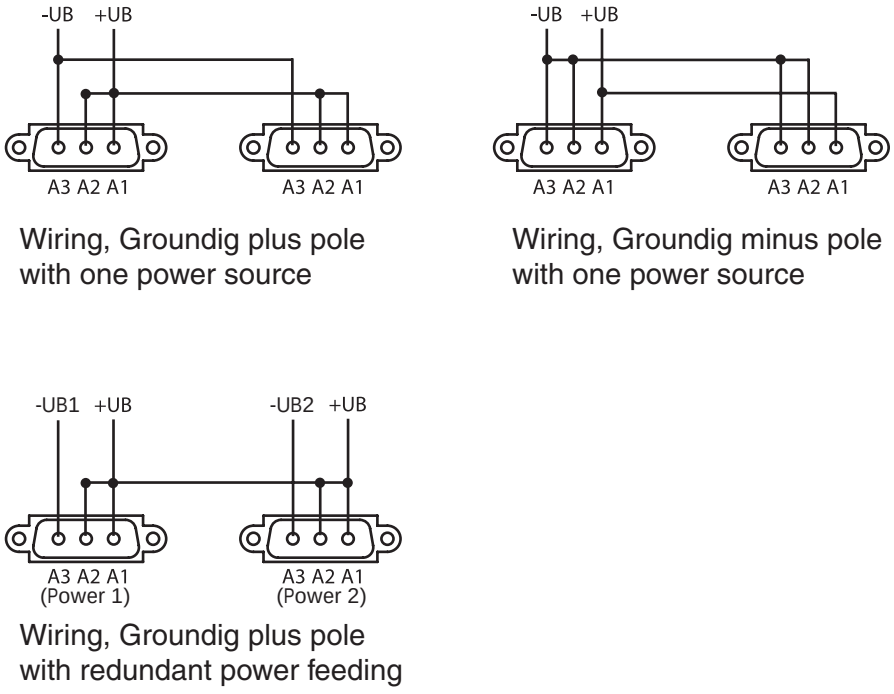
The subrack must be effectively grounded, i.e. the casing must be connected with ground in such a way that the requirements (cable line diameter, ground resistance, labeling, contacts, etc.) fulfill safety standard EN 60950-1:2006. It is grounded in the following way
- normally via the rack in which the subrack is installed, or
- with a screw and a serrated lock washer on the side panel.

The line diameter must be at least 2.5 mm^2.

2.3.5 Ground connection of the battery supply

One of the poles of the battery must be grounded (there is no grounding for the central power supply), proceed as follows:

If the plus pole is to be grounded, on power supply connectors Power 1 and Power 2 (Fig. 2.12) pin A2 must be connected to pin A1, and if the minus pole is grounded pin A2 must be connected to pin A3.



Wiring, Groundig plus pole with one power source

Wiring, Groundig minus pole with one power source

Wiring, Groundig plus pole with redundant power feeding

Fig. 2.12 Grounding of battery supply (connectors X1 and X2)

The combination of grounded minus pole and redundant power supply is not possible.

Supply voltage supervision only functions if the positive pole is grounded.

2.3.6 Subrack cascading

A maximum of four subracks can be cascaded. When they are cascaded, only one Operating and Maintenance Interface unit (OMI/OMI SNMP) may be used. The termination units can be used as required.

i

You will not find an "In/Out" designation on the subrack for the RBus connections since both connectors are wired in parallel. The designation "In/Out" is only used in Fig. 2.13 to indicate a possible wiring scheme for the subracks.

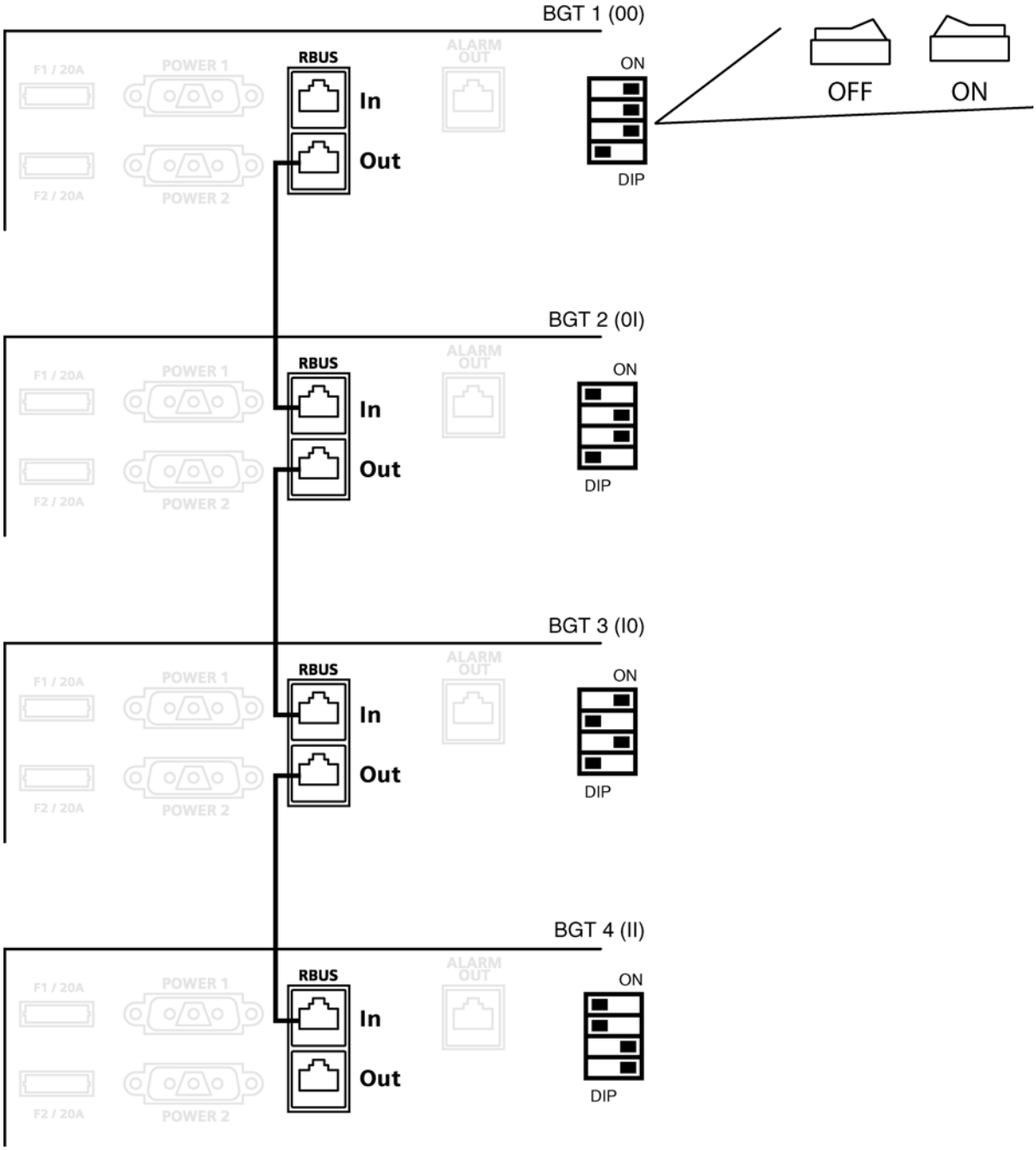


Fig. 2.13 Cascading the subrack

i In order to be able to cascade subracks equipped with QSTUs, the QSTUs must have Firmware-ID 3.49 at least.

Each subrack needs a unique address. You define the address by setting the DIP switches on the backplane of the subrack, see Fig. 2.9 and Tab. 2.7.

The OMI bus on the last subrack must be terminated when the subracks are cascaded. The termination is set using the DIP switches on the backplane, see Fig. 2.10 and Tab. 2.7.

i The overall length of the up to three cascading cables may **not** exceed 20 m.

2.4 Operating and Maintenance Interface OMI

Application of the OMI

The Operating and Maintenance Interface unit (OMI) is the link between the termination units (xTU) and the LCT or AccessIntegrator. One OMI can administer up to 64 termination units in four subracks.

i

The OMI must always be inserted into slot 0 in the subrack. Should the subracks be cascaded, only one OMI may be used.

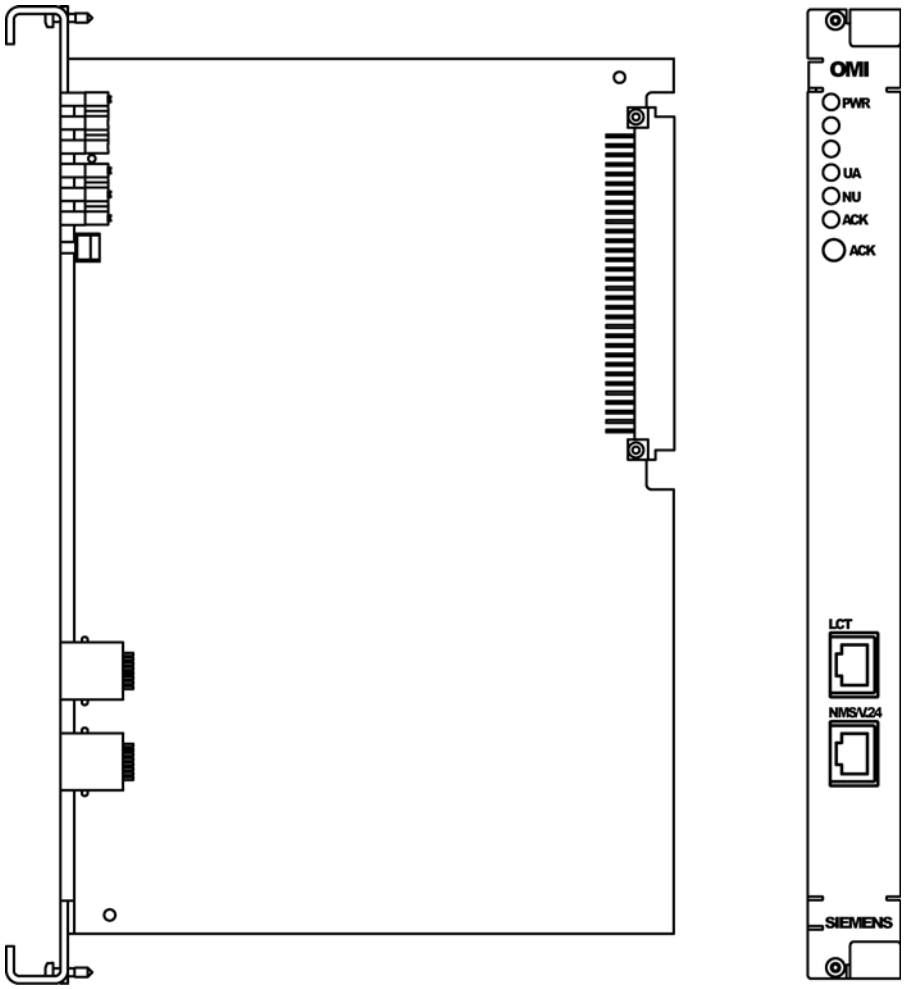


Fig. 2.14 Operating and Maintenance Interface unit (OMI)

2.4.1 Pin assignment of the connectors

The connections for the LCT or AccessIntegrator are on the front of the OMI. The two connections take the form of RJ45 connectors. Tab. 2.12 explains the pin assignment of these interfaces. The complete configuration cable can be ordered under the number C195-A336-A2.

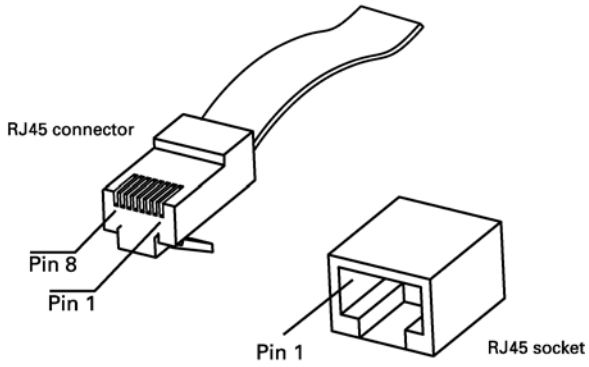


Fig. 2.15 RJ45 connector of the OMI for the LCT or AccessIntegrator

Pin	Name	Description
3	RXD_LI	Receive signal
4	TXD_LI	Transmit signal
5	GND_LI	Ground connection

Tab. 2.12 RS232 interface for the LCT and the AccessIntegrator (OMI)

i The pins 1, 2, 6, 7 and 8 must not be connected.

An adapter cable is available for connecting the LCT interface to the RS232 interface of your PC.

The transmission rate is 9600 baud. The data format of the interface is as follows:

- 8 data bits
- 1 start bit
- 1 stop bit
- No parity
- No handshake

2.4.2 Supervision and alarm signalling of the OMI

There are four LEDs on the front panel of the OMI for indicating the status, see Fig. 2.16.

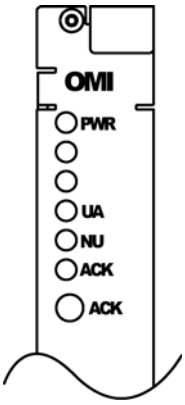


Fig. 2.16 Visual signalling of the OMI

Indication (LED)	Description	Description
Green	PWR	Power on
Red	UA	Urgent alarm
Red	NU	Non-urgent alarm
Yellow	ACK	Acknowledged alarm

Tab. 2.13 Visual signalling of the OMI

Alarm acknowledgment

It is possible to suppress an alarm (urgent/non-urgent) with the alarm acknowledgment button (ACK) on the front of the OMI. An alarm acknowledged in this way is indicated by a yellow LED on the OMI. The LED of the urgent or non-urgent alarm is canceled and the alarm output of the corresponding plug-in unit blocked.

If a new alarm occurs after you have clicked on the alarm acknowledgment button, the ‘urgent alarm (UA)’ or ‘non-urgent alarm (ND)’ LED is reactivated. After the acknowledged alarms have disappeared, the yellow LED goes out.

2.5 Operating and Maintenance Interface OMI SNMP

Application

The Operating and Maintenance Interface unit OMI SNMP is the link between the transmission modules and the LCT or AccessIntegrator. One OMI SNMP can administer up to 64 transmission modules in 4 subracks.

i

The OMI SNMP must always be inserted into slot 0 in the subrack. Should the subracks be cascaded, only one OMI SNMP may be used.

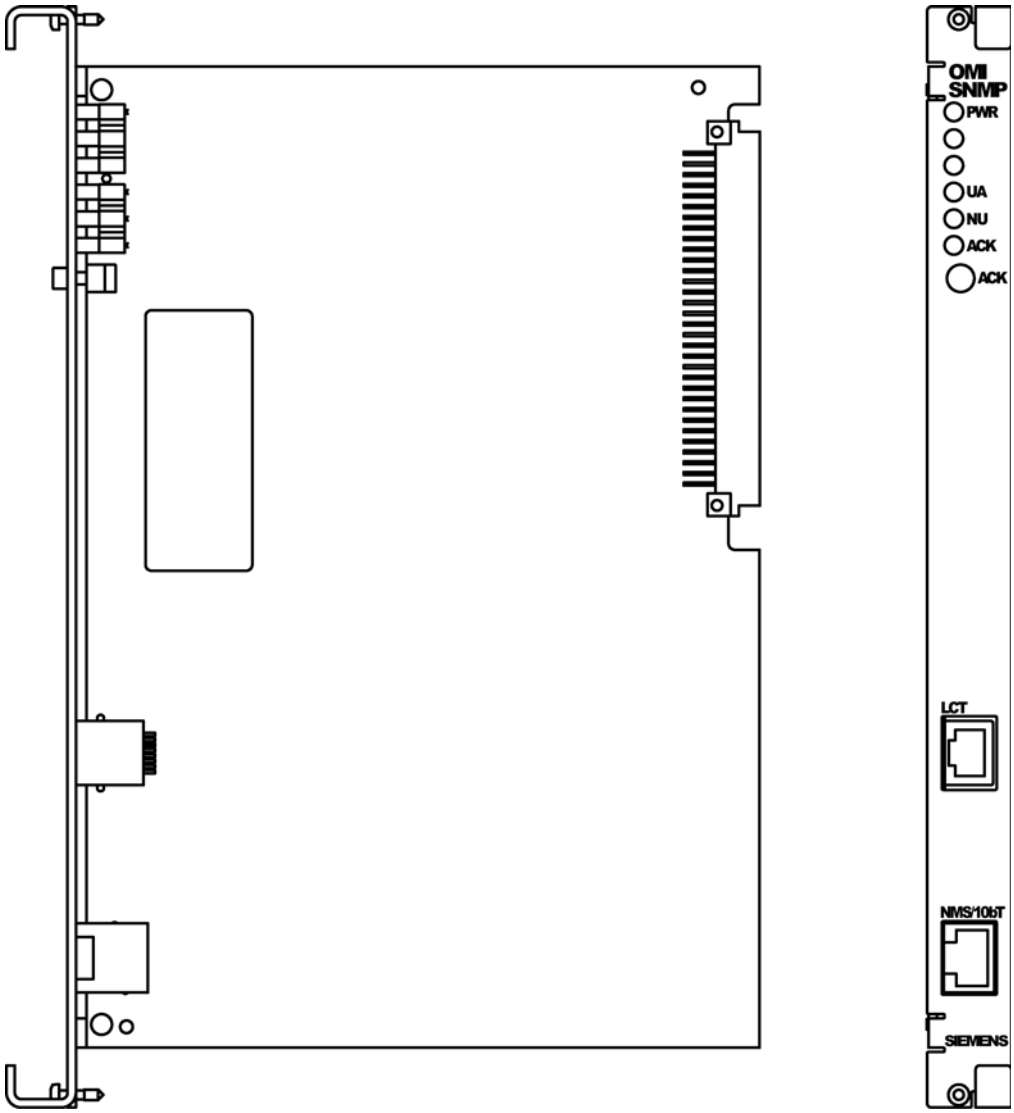


Fig. 2.17 Operating and Maintenance Interface OMI SNMP

2.5.1 Pin assignment of the connectors

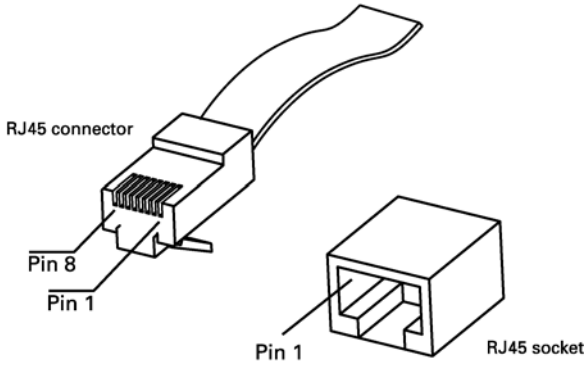


Fig. 2.18 RJ45 connector of the OMI SNMP

Pin	Name	Description
3	RxD	Receive signal
4	TxD	Transmit signal
5	GND	Ground connection

Tab. 2.14 RS232 interface for the LCT

i The pins 1, 2, 6, 7 and 8 must not be connected.

An adapter cable is available for connecting the LCT interface to the RS232 interface of your PC.

The transmission rate is 9600 baud. The data format of the interface is as follows:

- 8 data bits
- 1 start bit
- 1 stop bit
- No parity
- No handshake

Pin	Name	Description
1	TxD+	Transmit signal
2	TxD-	Transmit signal
3	RxD+	Receive signal
4	GND	Ground connection
5	Not assigned	
6	RxD-	Receive signal
7	Not assigned	
8	Not assigned	

Tab. 2.15 10Base-T interface for the AccessIntegrator

2.5.2 Supervision and alarm signalling of the OMI SNMP

There are four LEDs on the front panel for indicating the status (Fig. 2.19).

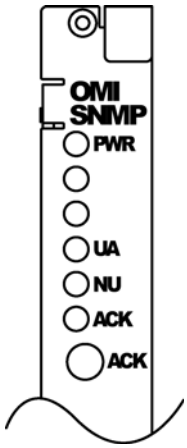


Fig. 2.19 Visual signalling of the OMI SNMP

Indication (LED)	Description	Description
Green	PWR	Power on
Red	UA	Urgent alarm
Red	NU	Non-urgent alarm
Yellow	ACK	Acknowledged alarm

Tab. 2.16 Visual signalling of the OMI SNMP

Alarm acknowledgment

It is possible to acknowledge an alarm (urgent/non-urgent) with the alarm acknowledgment button (ACK) on the front panel of the OMI SNMP. An alarm acknowledged in this way is indicated by a yellow LED on the OMI SNMP. The LED of the urgent or non-urgent alarm is canceled and the alarm output of the corresponding plug-in unit blocked.

If a new alarm occurs after you have clicked on the alarm acknowledgment button, the ‘urgent alarm (UA)’ or ‘non-urgent alarm (ND)’ LED is reactivated. After the acknowledged alarms have disappeared, the yellow LED goes out.

2.5.3 Inband Management with OMI SNMP

If a site does not provide facilities for connecting a ULAF+ device directly to the Management DCN of AccessIntegrator, you can use the GTU to help transfer the management data over one or several free timeslots of a 2 Mbit/s transmission link.

Fig. 2.20 shows a typical application of the GTU as Inband Management for AccessIntegrator.

For this application the GTU's must be equipped with an Ethernet interface (chapter 2.19.3.6) which is configured for 'Half Duplex' mode (Tab. 2.160).

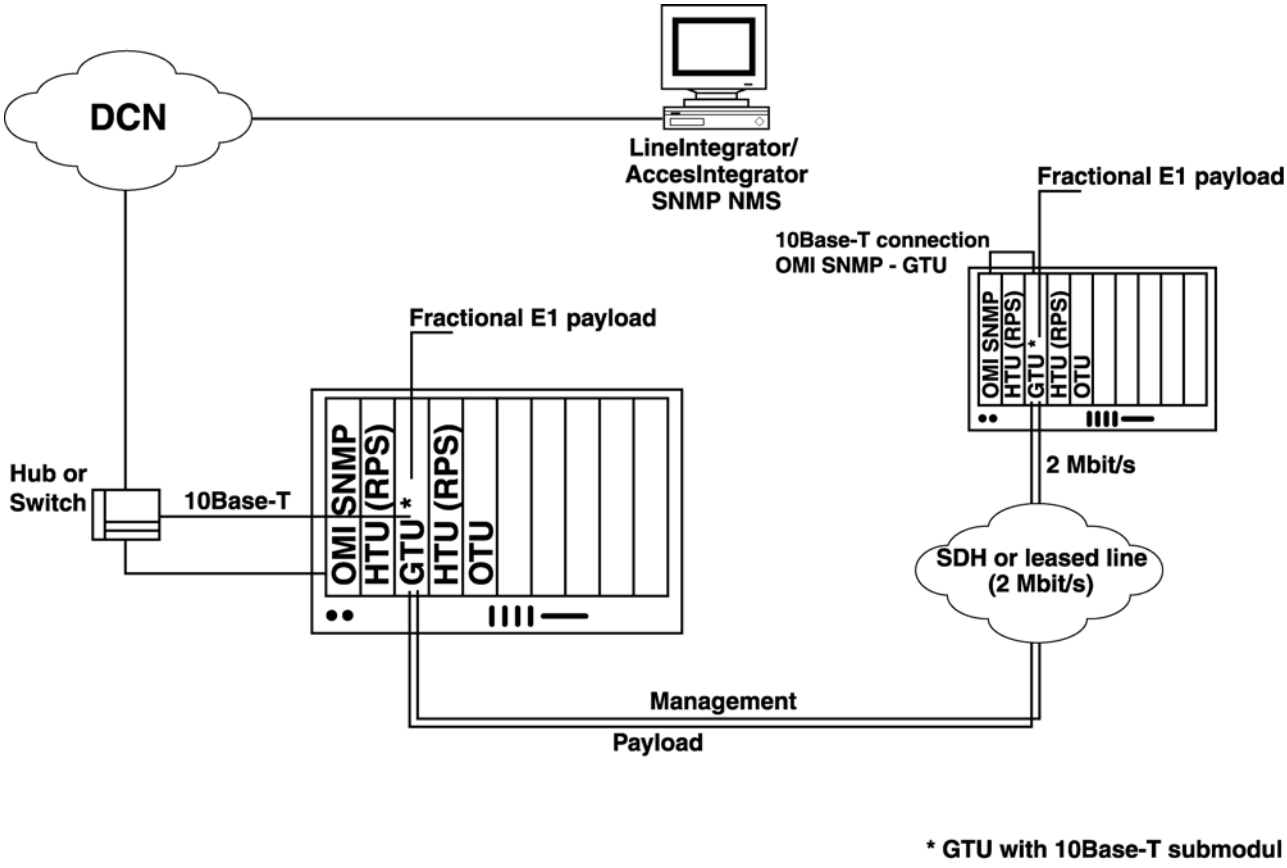


Fig. 2.20 Inband Management with OMI SNMP

2.6 HTU termination unit

Application

The HTU termination unit can be used as a plug-in unit or as a desktop unit. This chapter describes which settings are to be made for the HTU. The interface modules are described in chapter 2.19.

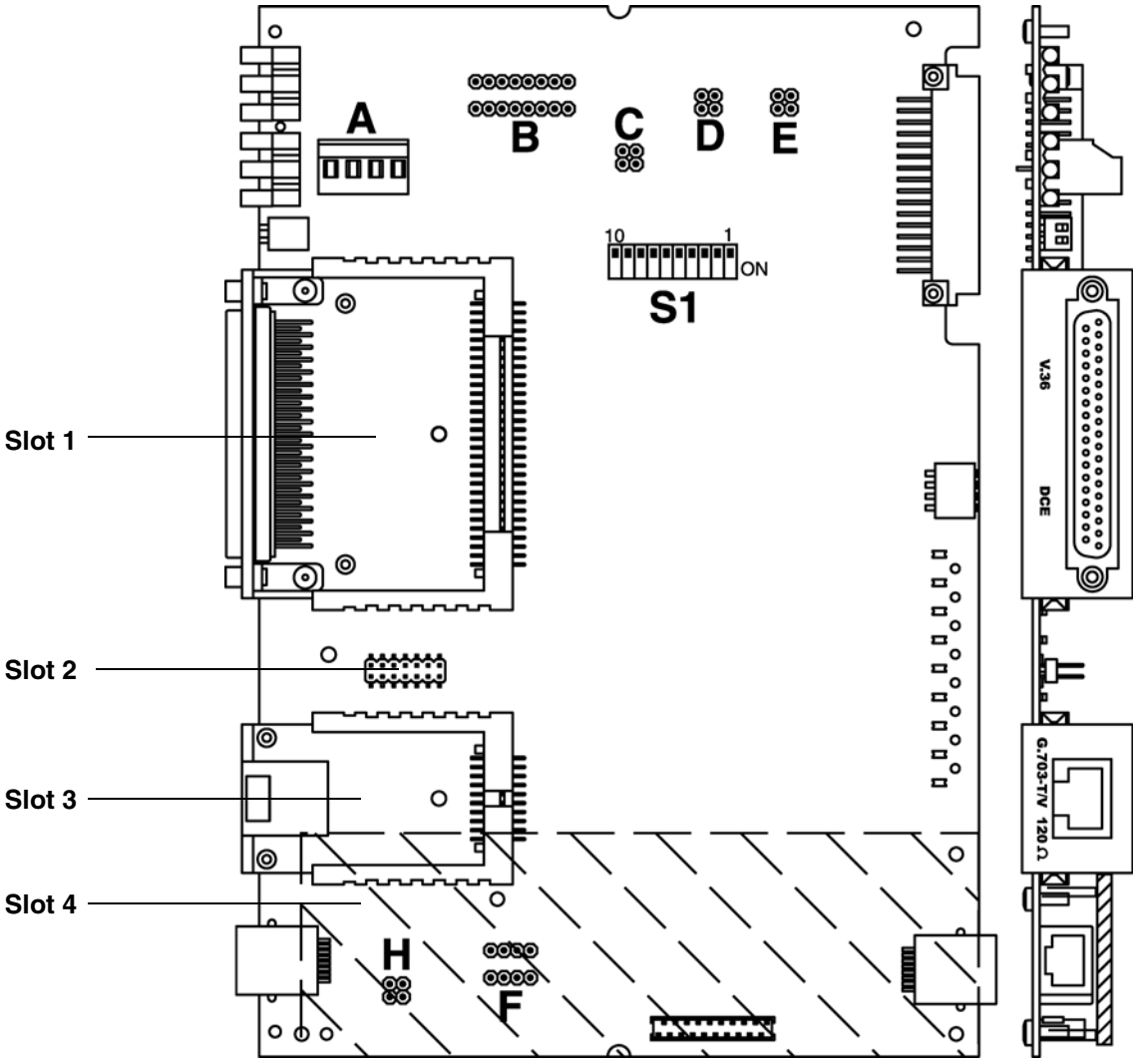


Fig. 2.21 HTU motherboard

2.6.1 Configuration of the HTU via the DIP switches

Tab. 2.21 shows the possible settings of the DIP switches (G) on the HTU.

DIP switch	Setting	Description
1	On	NT mode[1)]
	Off	LT mode[2)]
2	On	Module for data interface in DTE mode
	Off	Module for data interface in DCE mode [1)2)]
3	On	Configuration via the DIP switches
	Off	Configuration via the LCT/AccessIntegrator [1)2)]
4 [3)] 5 [3)]	On Off	Structured mode
4 [3)] 5 [3)]	Off Off	Transparent mode[1)2)]
4 [3)] 5 [3)]	Off On	ISDN-PRA mode
6 [3)]	On	AIS recognition activated
	Off	AIS recognition deactivated[1)2)]
7 [3)]	On	AIS insertion[1)2)]
	Off	AIS insertion deactivated
8 [3)]	On	External clock-in activated
	Off	Clock-in deactivated[1)2)]
9 [3)]	On	Remote power supply activated
	Off	Remote power supply deactivated[1)2)]
10 [3)]	On	Customization activated
	Off	Customization deactivated [1)2)]

1) Default setting, desktop unit
2) Default setting, plug-in unit
3) Only operable if DIP switch 3 is ‘ON’

Tab. 2.17 Configuration of the HTU using the DIP switches

i To connect ULAF-2 units to the ULAF+, the NTA-2.C and the LT/NT-2.C must have firmware version 6.4.1 or higher. If not, the firmware may need to be updated.

2.6.1.1 HTU with G.703 interface “onboard”

This version of the HTU is fixedly equipped with a G.703 interface (RJ45 / 120 Ω). Slot 3 (Fig. 2.21) is not applicable.

Below you will find the Pin assignment (Tab. 2.18) and the configuration of the DIP switches for the RJ45 connector (2 Mbit/s) (Tab. 2.19).

Pin	Signal name	Description
1	G703_TXA	Transmit data
2	G703_TXB	Transmit data
3	Shield(T)	Ground connection for Tx line shield 1)
4	G703_RXA	Receive data
5	G703_RXB	Receive data
6	Shield(R)	Ground connection for Rx line shield 1)
7	Not assigned	
8	Not assigned	
Shield	Shield	RJ45 connector shield 1)

1) See Tab. 2.19

Tab. 2.18 Pin assignment of the RJ45 connector (2 Mbit/s)

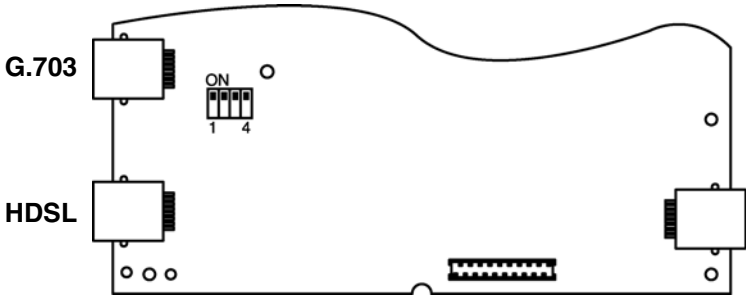


Fig. 2.22 DIP switches for the RJ45 connector (2 Mbit/s) of the HTU

Switch				Description
1	2	3	4	
OFF	OFF	X	X	Shield (RJ45) not connected to the ground
ON 1)	OFF	X	X	Shield (RJ45) connected via capacitor to the ground
ON	ON 1)	X	X	Shield (RJ45) connected to the ground
X	X	ON 1)	X	Tx shield not connected to the ground
X	X	OFF	X	Tx shield connected via capacitor to the ground
X	X	X	ON 1)	Rx shield connected to the ground
X	X	X	OFF	Rx shield connected via capacitor to the ground

1) Default settings

Tab. 2.19 Configuration of the RJ45 connector (2 Mbit/s)

2.6.2 Power supply to the HTU

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

Power supply to the desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})
- Remotely fed via HDSL interface
- Redundant power feeding (Local power supply and remotely fed)

Power supply modes

Tab. 2.20 shows you the various power supply modes and the required power adapters therefore:

	Plug-in		Desktop	
	without RPS	with RPS	without RPS	with RPS
Local power supply with 110 / 230 V_{AC}	–	–	X	SNP-A03T-S
Local power supply with 48 / 60 V_{DC}	X	X	X	X
Remotely fed via HDSL interface	X 1)	–	1)	–
Redundant power feeding (local power supply AC and remotely fed)	–	–	NTU	–
Redundant power feeding (local power supply AC and DC)	–	–	LT25W	LT25W

1) Power via remote device
X Direct power supply without power adapter required
SNP-A03T-S Power adapter SNP-A03T-S
LT25W Power adapter LT25W required
NTU Power adapter NTU required
– Not possible

Tab. 2.20 Power supply modes

You use jumpers to select the type of supply, see chapter 2.6.4. Fig. 2.23 shows the terminals to which the supply cables are assigned.

Modifications to the type of supply and grounding may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply. To do this you must remove the power cord connector and reset the jumpers as detailed in chapter 2.6.4:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Change the jumpers as detailed in chapter 2.6.4
5. Remove the power cord connector or replace the existing power cord with a new battery cable
6. Screw the screws on the bottom of the unit into the casing

7. Screw the screws on the bottom of the unit into the casing

Modules that are configured for DC supply may never be connected to a 230 V_{AC} supply directly.

Converting from local supply to remotely fed

For converting the desktop unit from local supply to remotely fed proceed as follows:

1. Disconnect the power cord and also disconnect all interface cables
2. Interrupt the HDSL link
3. Release the screws on the bottom of the unit
4. Open the casing by removing the top of the unit
5. Take the module out of the casing and lay the pc board on flat surface
6. Remove the power cord (**Warning:** You must not bend the board)
7. Change the jumpers as detailed in chapter 2.6.4
8. Before closing an older casing, ensure that the two board clamps are inserted
9. Screw the screws on the bottom of the unit into the casing

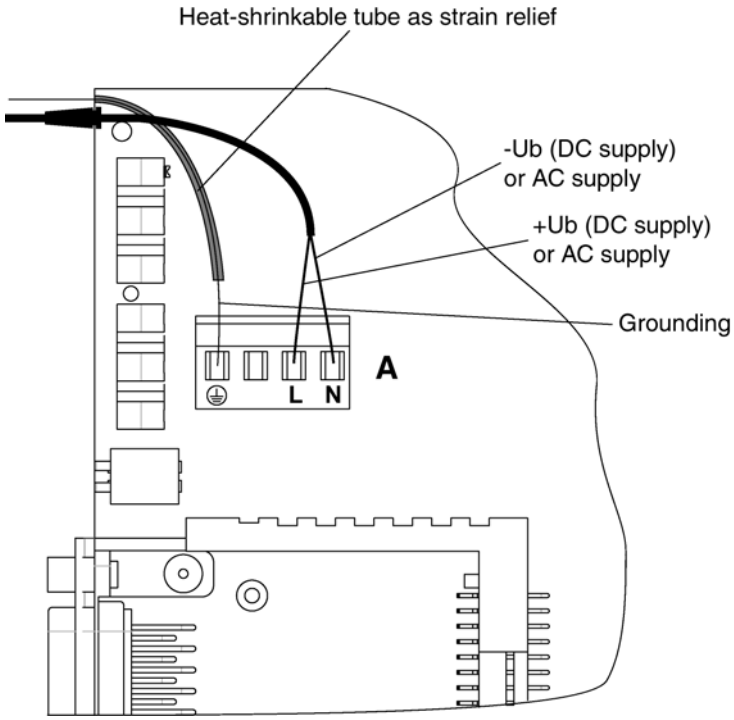


Fig. 2.23 Terminal block (A) for the supply via the cable

The cable for external grounding is connected to terminal block A and fed out through the cable feed-through hole (Fig. 2.24). The connection is made in the same way as the connection for the power supply described above.

The cable for external grounding can be ordered in connectorized form.

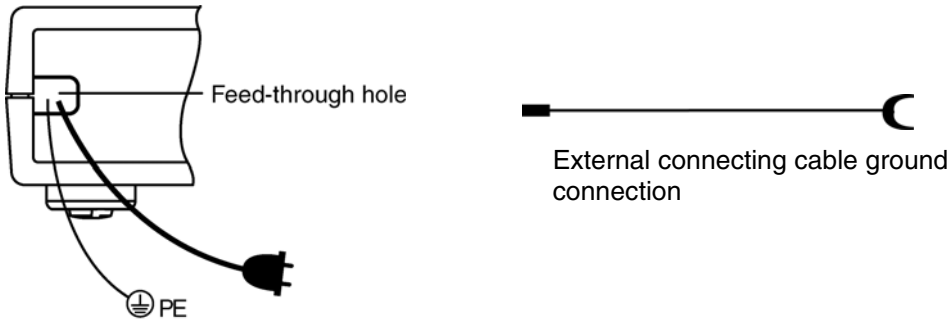


Fig. 2.24 External grounding of desktop unit

If remote power supply > 120 V is applied, grounding is mandatory due to safety reasons. In this application the battery feeding must be grounded too.

2.6.3 Power modes of HTU needing external power adapter

Following desktop configurations require an external power adapter for local power feeding with 230 V_{AC}:

- HTU desktop equipped with an RPS module
- HTU desktop, remotely fed and redundant power feeding with local AC power
- HTU desktop, local AC power feeding and redundant power feeding with local DC power

This chapter explains the different applications and procedures for connecting the power adapters to the desktop units.

Desktop power adapter SNP-A03T-S

HTU desktops equipped with an RPS module have to be powered by DC. If 230 V_{AC} powering is needed, the power adapter SNP-A03T-S has to be used, which generates 48 V_{DC} on the far side.

It is also possible to use a backup battery for redundant power feeding of the LT25W. Therefore the power adapter has to be modified as described in section “Redundant battery connection LT25W“ (Fig. 2.27).

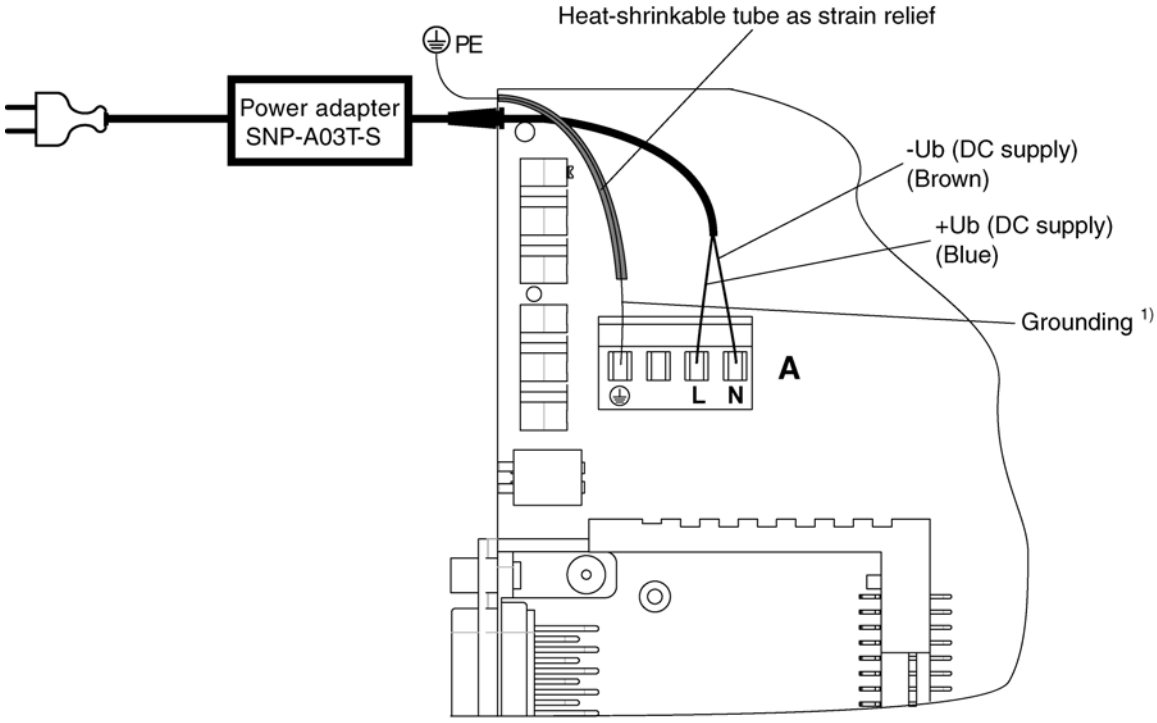
Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Connecting desktop power adapter SNP-A03T-S

For connecting desktop power adapter SNP-A03T-S, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.6.3, Fig. 2.31 to battery supply (48 V_{DC})
7. Connect the desktop power adapter according to Fig. 2.25 (**Warning**: You must not bend the board)

8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Before closing an older casing, ensure that the two board clamps are inserted
11. Screw the screws on the bottom of the unit into the casing



1) With remote power supply (> 120 V) grounding is a mandatory requirement

Fig. 2.25 Connecting desktop power adapter SNP-A03T-S

Redundant battery connection LT25W

In order to provide desktop power adapter LT25W with an additional battery supply you must open the LT25W and connect a second cable. Proceed as follows:

1. Disconnect the net cable and also disconnect all interface cables
2. Open the power adapter by releasing the four screws on the bottom of the unit
3. Remove the bottom of the casing of the power adapter
4. Connect the supplied cable to the terminal (1) as shown in Fig. 2.26
5. Replace the cable feed-through (2) (Fig. 2.26) for a cable with the one supplied for two cables

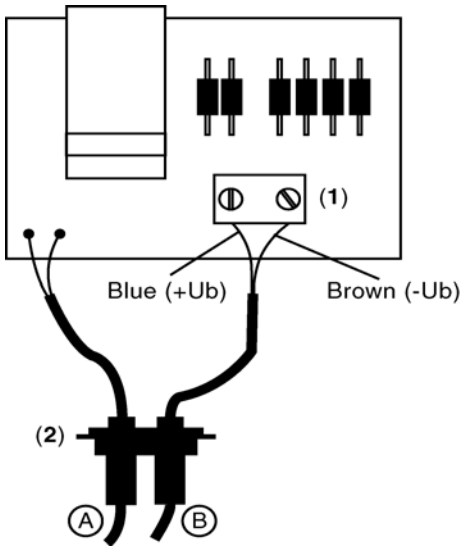


Fig. 2.26 Connecting the battery cable to desktop power adapter LT25W

6. Close the power adapter and screw the four screws into the casing
7. Connect the power adapter to the desktop unit as described above in 2 to 11
8. Connect the battery (Fig. 2.27)

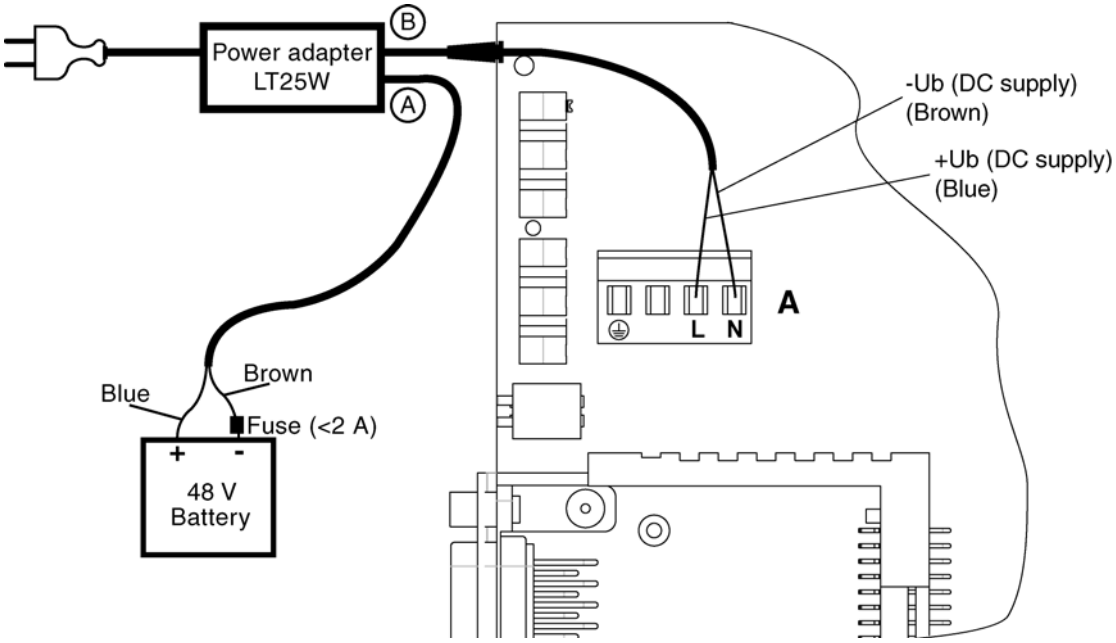


Fig. 2.27 Connecting the battery to desktop power adapter LT25W

Desktop power adapter NTU

For redundant power feeding of an HTU desktop by local 110 / 230 V_{AC} and remote power the adapter NTU has to be used, which generates 120 V_{AC} on the far side. Desktop configured for this application will normally take the power from the local source. If this fails the desktop will switch automatically to remote power.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

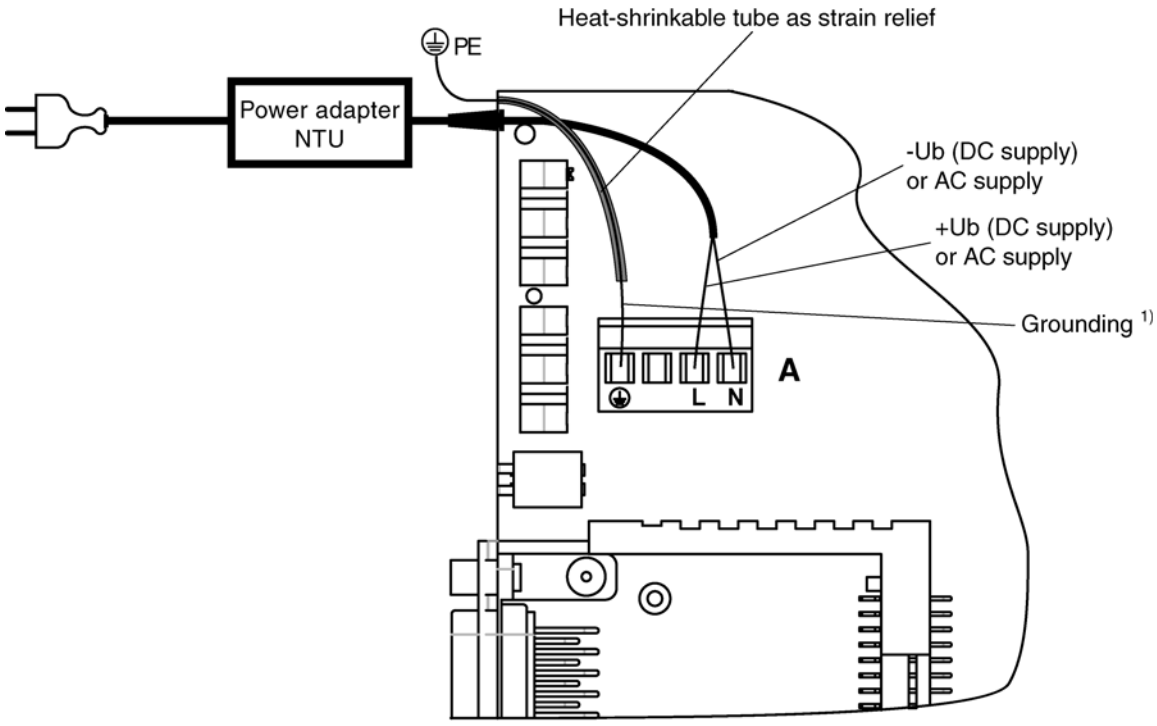


Fig. 2.28 Connecting desktop power adapter NTU

Connecting desktop power adapter NTU

For connecting desktop power adapter NTU, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.6.4, Fig. 2.32 to remote supply (additional jumpers are included with desktop unit NTU)
7. Connect the desktop power adapter according to Fig. 2.25 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Before closing an older casing, ensure that the two board clamps are inserted
11. Screw the screws on the bottom of the unit into the casing

2.6.4 Set the HTU power supply via jumpers

Below, you will find the individual jumper settings for the HTUs. The following types of use are described

- **HTU used as a desktop unit**
  - Local AC supply
  - Local DC supply; without RPS
  - Local DC supply; with RPS
  - Remote supply
- **Use as a plug-in unit**
  - Local DC supply; without RPS
  - Local DC supply; with RPS

The casing must be opened to change the jumper settings on the desktop unit. For this, the screws on the bottom of the unit must be released.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

The jumper settings for plug-in unit and desktop units are different. An HTU which is configured as a plug-in unit may not be used with the same settings as the desktop unit. Likewise an HTU with its jumpers set for use as a desktop unit must be reconfigured before being used as a plug-in unit.
Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

Jumper	Meaning
B	Select the supply
C	Select the activation mode
D	Select the voltage range
E	Select the power-fail alarm mode
F	Select the HDSL-side supply

Tab. 2.21 Meaning of jumpers B, C, D, E, F on the HTU

Desktop unit local supply; AC

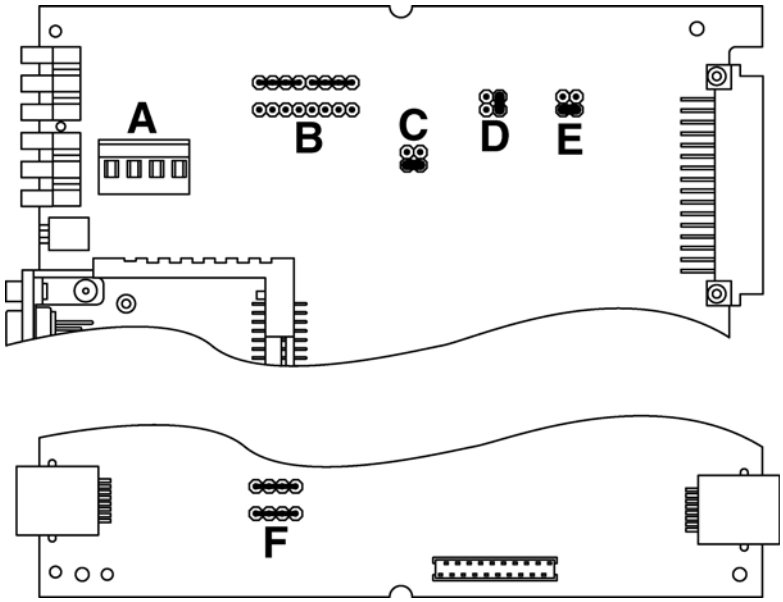


Fig. 2.29 Jumper settings: HTU Desktop unit local supply; AC

Desktop unit, local supply; DC; without RPS

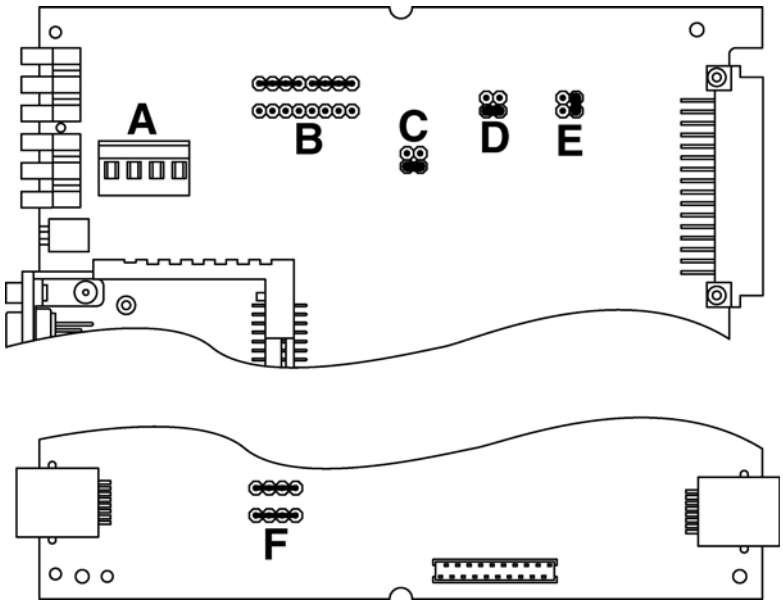


Fig. 2.30 Jumper settings: HTU Desktop unit, local supply; DC; without RPS

Desktop unit, local supply; DC; with RPS; with desktop power adapter SNP-A03T-S

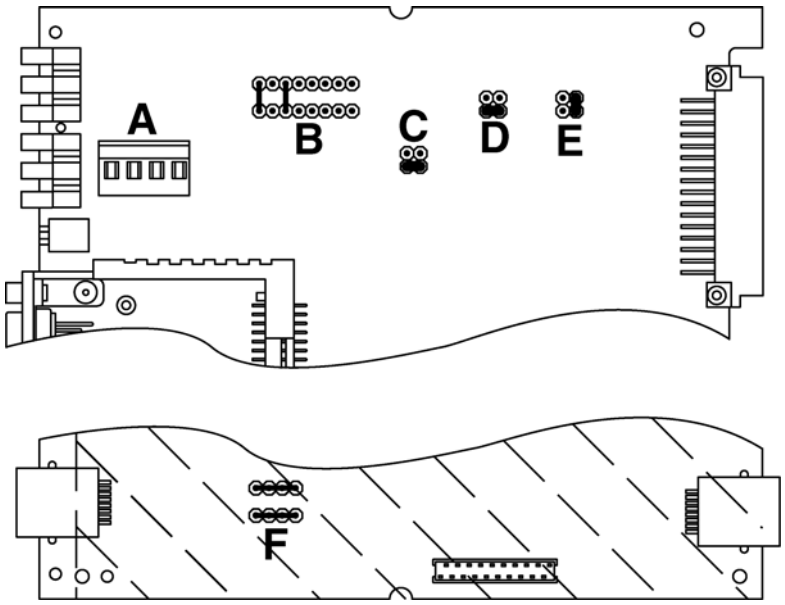


Fig. 2.31 Jumper settings: HTU desktop unit, local supply; DC; with RPS; with desktop power adapter SNP-A03T-S

For a DC supply > 60 V_{DC} with RPS, the HTU must be grounded.

Desktop unit supplied remotely

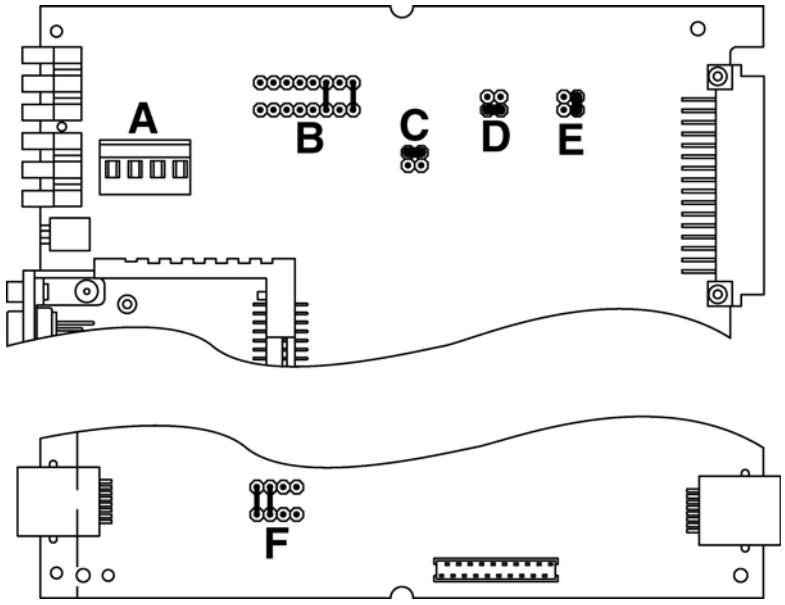


Fig. 2.32 Jumper settings: HTU desktop unit supplied remotely

For a remote power supply > 120 V_{DC}, the HTU must be grounded.

Desktop unit supplied redundantly with desktop power adapter NTU

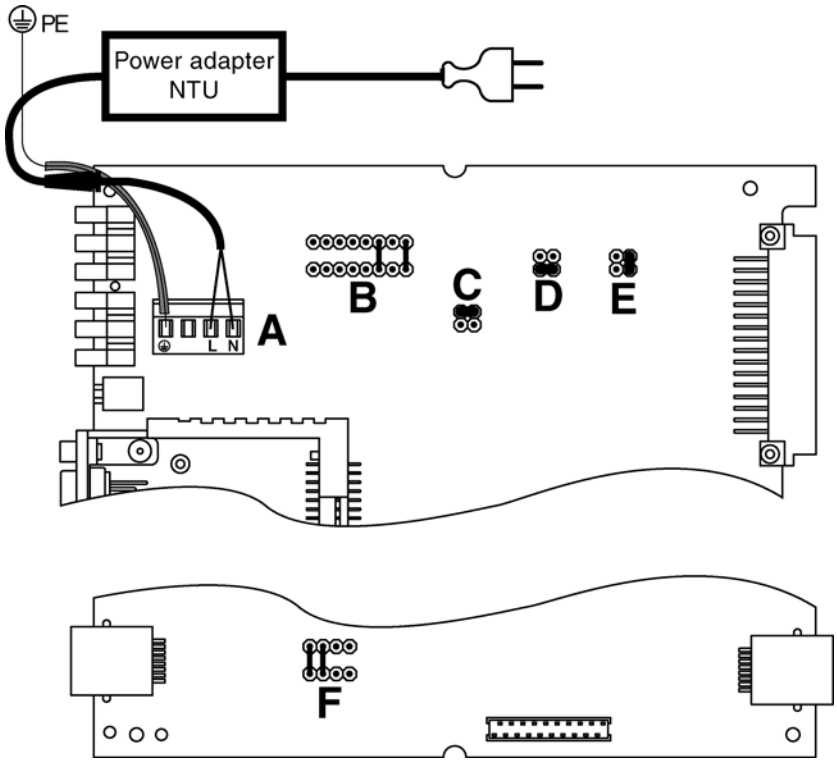


Fig. 2.33 HTU desktop unit supplied redundantly with desktop power adapter NTU

Plug-in unit

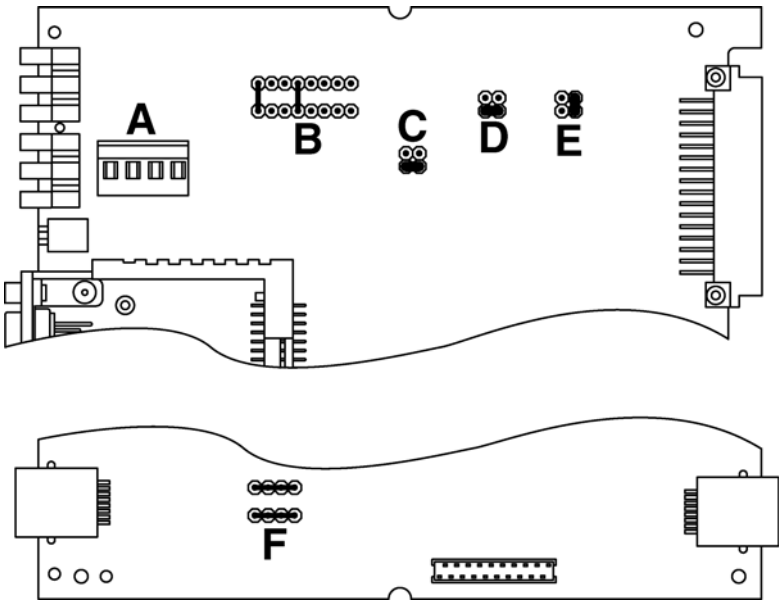


Fig. 2.34 Jumper settings: HTU plug-in unit with and without RPS

2.6.5 Pin assignment of the HDSL interface via Jumper

Pin assignment of the HDSL interface

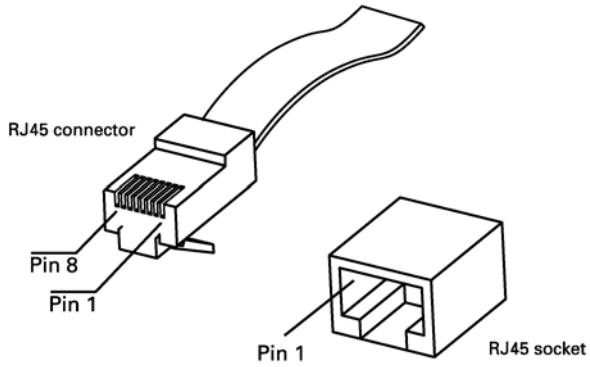


Fig. 2.35 RJ45 connector of the HDSL interface

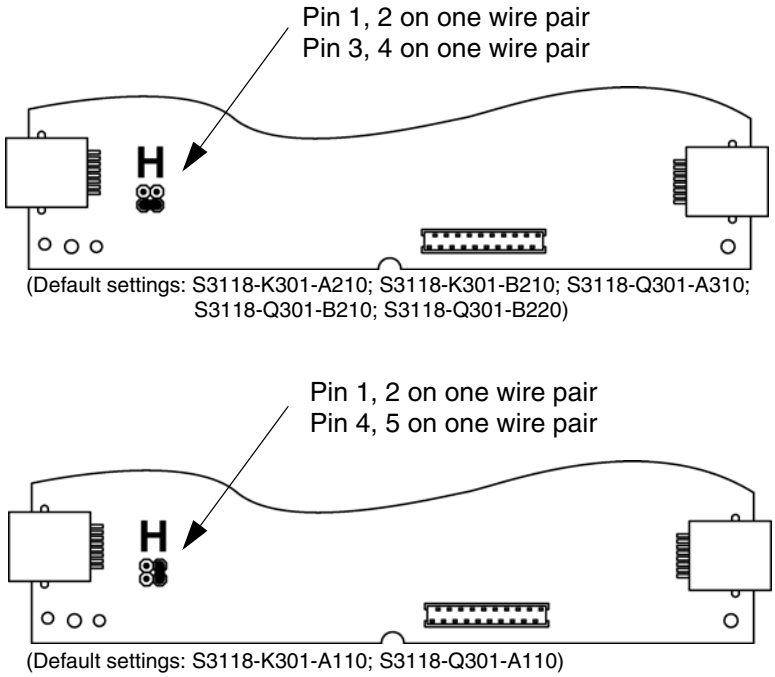


Fig. 2.36 Pin assignment of the HDSL interface

2.6.6 Conversion of the HTU: plug-in unit - Desktop unit and Desktop unit - plug-in unit

This chapter describes the conversion of a plug-in unit to a desktop unit, or of a desktop unit to a plug-in unit.

The conversion of the HTU from a plug-in unit to a desktop unit may only be made by trained personnel.

The jumper settings for the plug-in units are not identical to those of the desktop units. When a plug-in unit is converted to a desktop unit the jumpers must be set correctly. Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

Conversion of plug-in unit → desktop unit

Proceed as follows when converting a plug-in unit to a desktop unit:

1. Undo the screws on the front of the plug-in unit and pull it out of the subrack
2. Undo the screws on the back of the motherboard to allow the front panel to be removed
3. Lay the module on a flat surface
4. Pull off the two optical waveguide blocks
5. Insert the optical waveguides on the “Desktop side” into the module, see Fig. 2.37 and supplement the waveguides with a third block
6. Make a hole for the required submodules openings in the back of the housing at the nominal break point
7. Set the jumpers and the DIP switches according to chapter 2.5.1 and 2.6.4 respectively
8. For the local power supply, the cable must be connected according to chapter 2.6.4 (**Warning:** You must not bend the board)
9. Insert the required submodules into the corresponding slots and secure these with the safety bolt
10. Insert the motherboard into the casing (note the front-/backside!)
11. Before closing an older casing, ensure that the two board clamps are inserted.
12. Close the unit and screw the screws into the bottom of casing

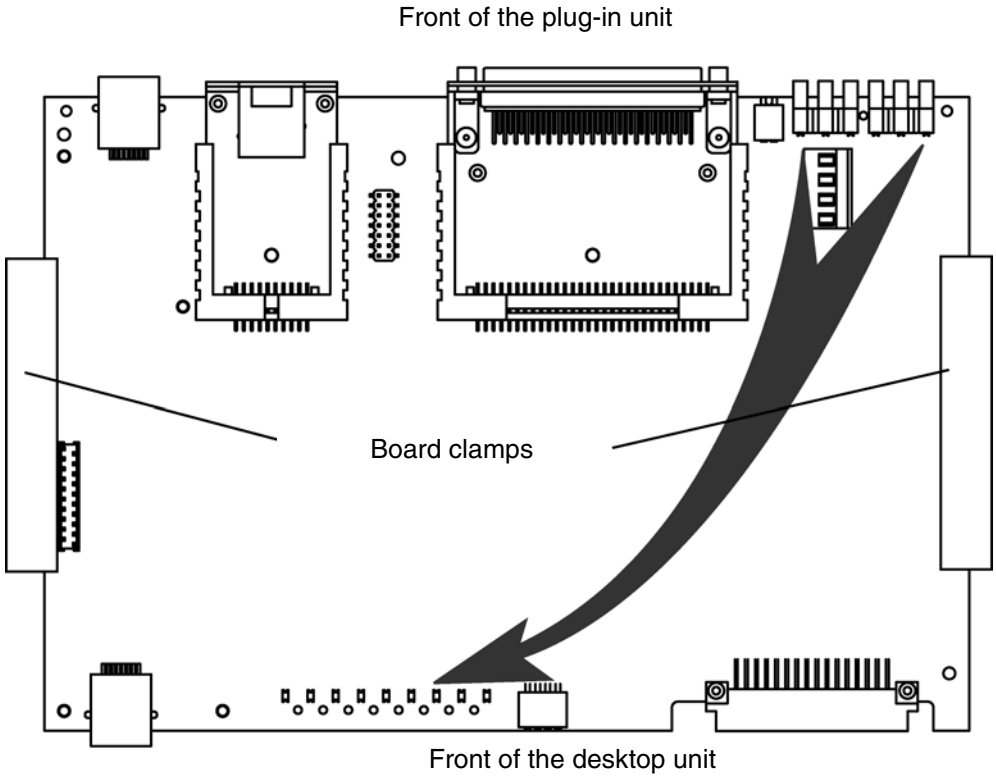


Fig. 2.37 Conversion plug-in unit → desktop unit

⚠ The jumper settings for the desktop units are not identical to those of the plug-in units. When a desktop unit is converted to a plug-in unit the jumpers must be set correctly. Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

Conversion of desktop unit → plug-in unit

Proceed as follows when converting a desktop unit to a plug-in unit:

1. Interrupt the power supply at the desktop unit
2. Open the casing by removing the screws on the underside
3. Take the module out of the casing and lay the pc board on a flat surface
4. Remove the power cable (**Warning:** You must not bend the board)
5. Remove the optical waveguides and reinsert two groups on the front of the plug-in unit, see Fig. 2.37
6. Install the front panel on the front of the plug-in unit, see Fig. 2.37
7. Set the jumpers and the DIP switches according to chapter 2.6.4
8. Insert the plug-in unit into the location provided in the ULAF+ subrack (slot 1...16)

2.6.7 Supervision and alarm signalling of the HTU

The operating mode and alarm signalling of the HTU are indicated by means of LEDs on the front of the unit.

2.6.7.1 Visual signalling of the plug-in unit

When the HTU is used as a plug-in unit, the front panel is equipped with six LEDs, see Fig. 2.38.

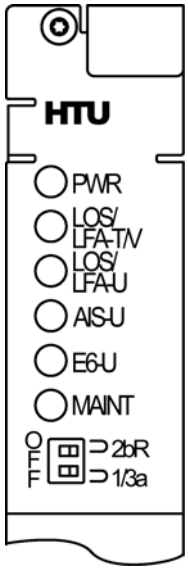


Fig. 2.38 Visual signalling of the HTU plug-in unit

LED	Color	Status	
		Off	On
PWR	green	no power supply	power supply ok
LOS/LFA-T/V [1)]	red	no alarm	loss of signal/loss of frame alignment at T/V
LOS/LFA-U [1)]	red	no alarm	loss of signal/loss of frame alignment at U
AIS-U	yellow	no alarm	AIS at U
E6-U	yellow	no alarm	block error rate $>10^{-6}$ at U
MAINT	yellow	no maintenance function	local maintenance function active

1) Visual signalling according to Fig. 2.39

Tab. 2.22 Visual signalling of HTU plug-in unit

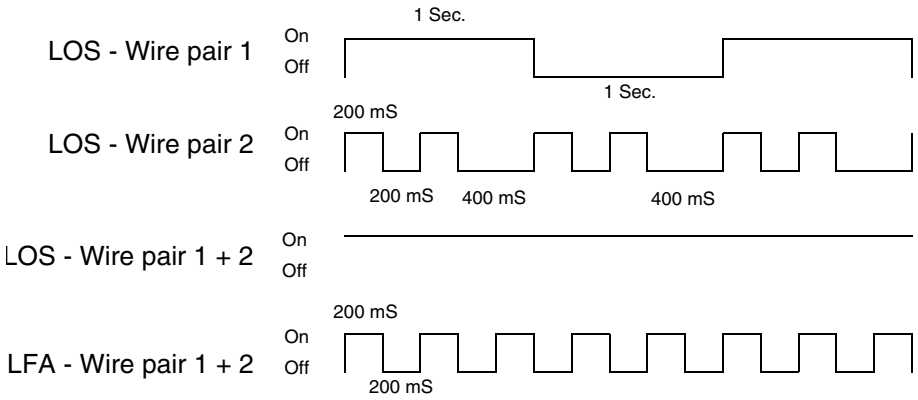


Fig. 2.39 Visual signalling LOS/LFA

2.6.7.2 Visual signalling of the desktop unit

In contrast to the plug-in unit, the desktop unit has three additional LEDs. The meaning of the LEDs is explained in Tab. 2.23.

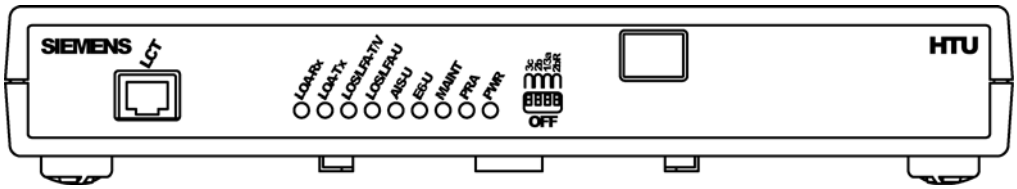


Fig. 2.40 Visual signalling of the desktop unit

LED	Color	Status	
		Off	On
LOA-Rx	yellow	no permanent 0 or 1 (data interface; line 104/receive data)	permanent 0 or 1
LOA-Tx	yellow	no permanent 0 or 1 (data interface; line 103/transmit data)	permanent 0 or 1
LOS/LFA-T/V 1)	red	no alarm	loss of signal/loss of frame alignment at T/V
LOS/LFA-U 1)	red	no alarm	loss of signal/loss of frame alignment at U
AIS-U	yellow	no alarm	AIS at U
E6-U	yellow	no alarm	block error rate >10^{-6} at U
MAINT	yellow	no maintenance function	local maintenance function active
PRA	green	no ISDN-PRA operation	PRA operation
PWR	green	no power supply	power supply ok

1) Visual signalling according to Fig. 2.39

Tab. 2.23 Visual signalling of the desktop unit

2.6.8 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator or
- using DIP switches on the modules or
- using control lines 140/141 (V.35/V36).

The procedure for inserting loopbacks by means of management software can be found in the user manual of ULAF+ [2] or AccessIntegrator [6].

The various loopbacks are shown in Fig. 2.41 to Fig. 2.44. The names of the individual loopbacks are explained in Tab. 2.24.

Loopback 2b can be inserted locally at the NT or remotely at the LT (loopback 2bR) using DIP-switches.

Loopback	Meaning/effect
Loopback 1	U-interface - direction V-interface (LT)
Loopback 1A	Regenerator Loopback - U-interface direction
Loopback 2b [1)]	U-interface direction - local - in the digital unit
Loopback 2bR [1)]	U-interface direction - remote - in the digital unit
Loopback 3a [1)]	DTE1/DTE2-interface direction - in the termination unit
Loopback 3c	DTE2-interface direction - at the subscriber interface

1) Loopbacks are transparent

Tab. 2.24 Designation of the loopbacks on the HTU

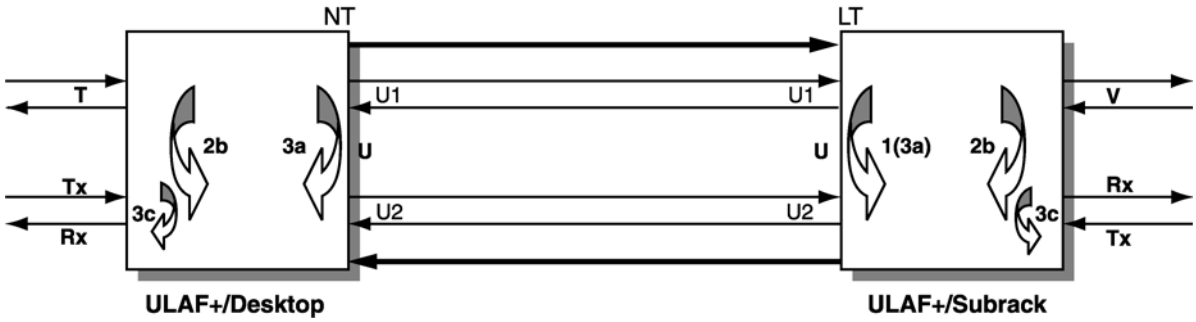


Fig. 2.41 “Access Network’ loopback concept

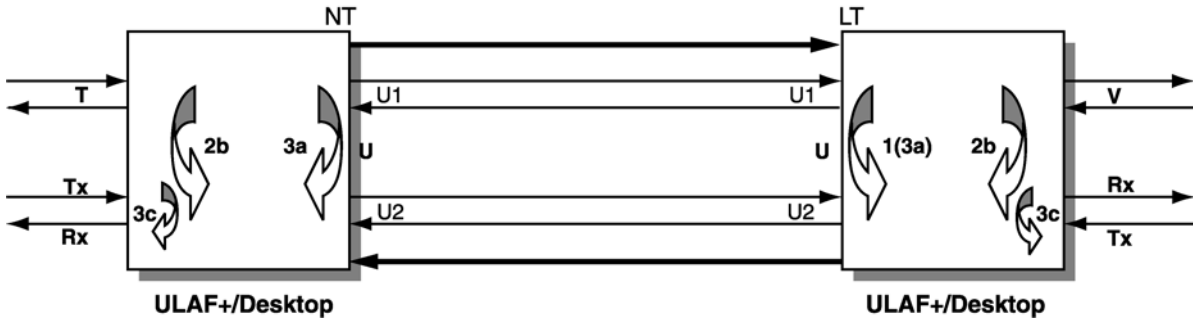


Fig. 2.42 ‘Campus Network’ loopback concept

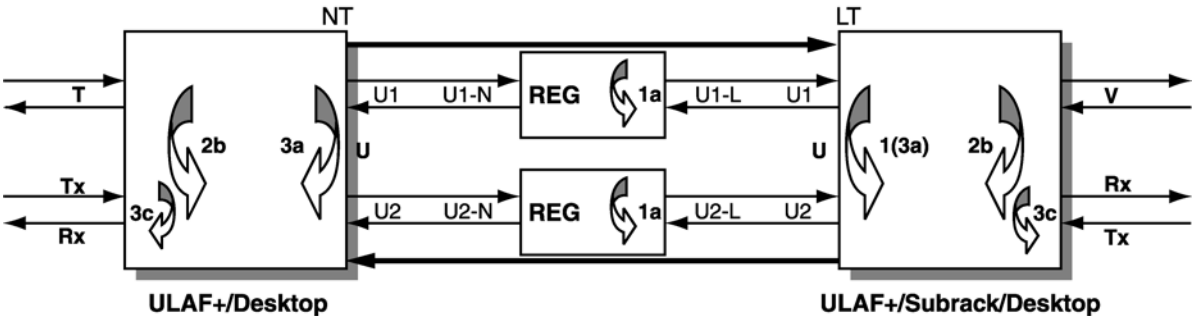


Fig. 2.43 Regenerator loopback

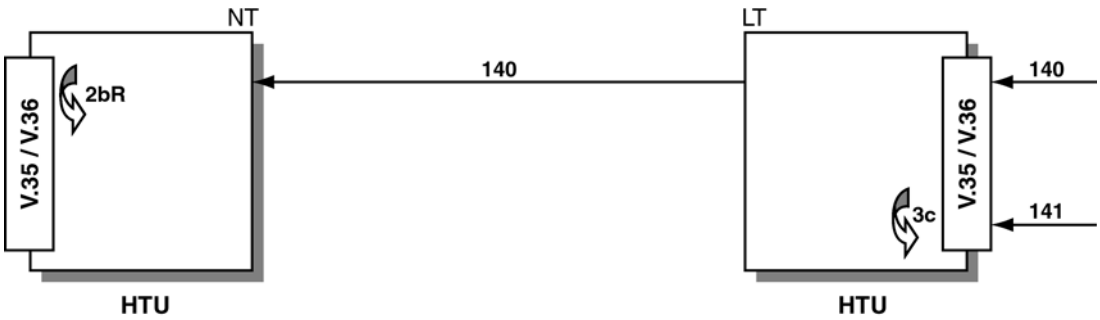


Fig. 2.44 Loopback via control line 140/141 (V.35/V.36)

Notes

- The regenerator loopback can be inserted only from the LT via the LCT
- The loopback 2bR can be inserted only from the LT in the NT
- In the add-drop mode, loopback 2b is set for the two interfaces (G.703 and data) and loopback 3c for the data interface only
- In the ‘Fractional Installation’ and ‘Partial Operation’ modes, only the loopback in the regenerator of the active path can be set

The following loopbacks can be applied to the plug-in unit using DIP switches:

- Loopback 1 or 3a respectively
- Loopback 2bR

The following loopbacks can also be applied to the desktop unit using DIP switches:

- Loopback 2b (in ‘add-drop mode’ for the two interfaces)
- Loopback 2bR
- Loopback 3c
- Loopback 3a

2.7 STU termination unit

Application

The STU termination unit is made as

- a plug-in unit or as
- a desktop device.

Fig. 2.45 shows the STU motherboard of the plug-in unit.

This chapter describes which settings are to be made for the STU. The interface modules are described in chapter "2.19 Interface- and submodules".

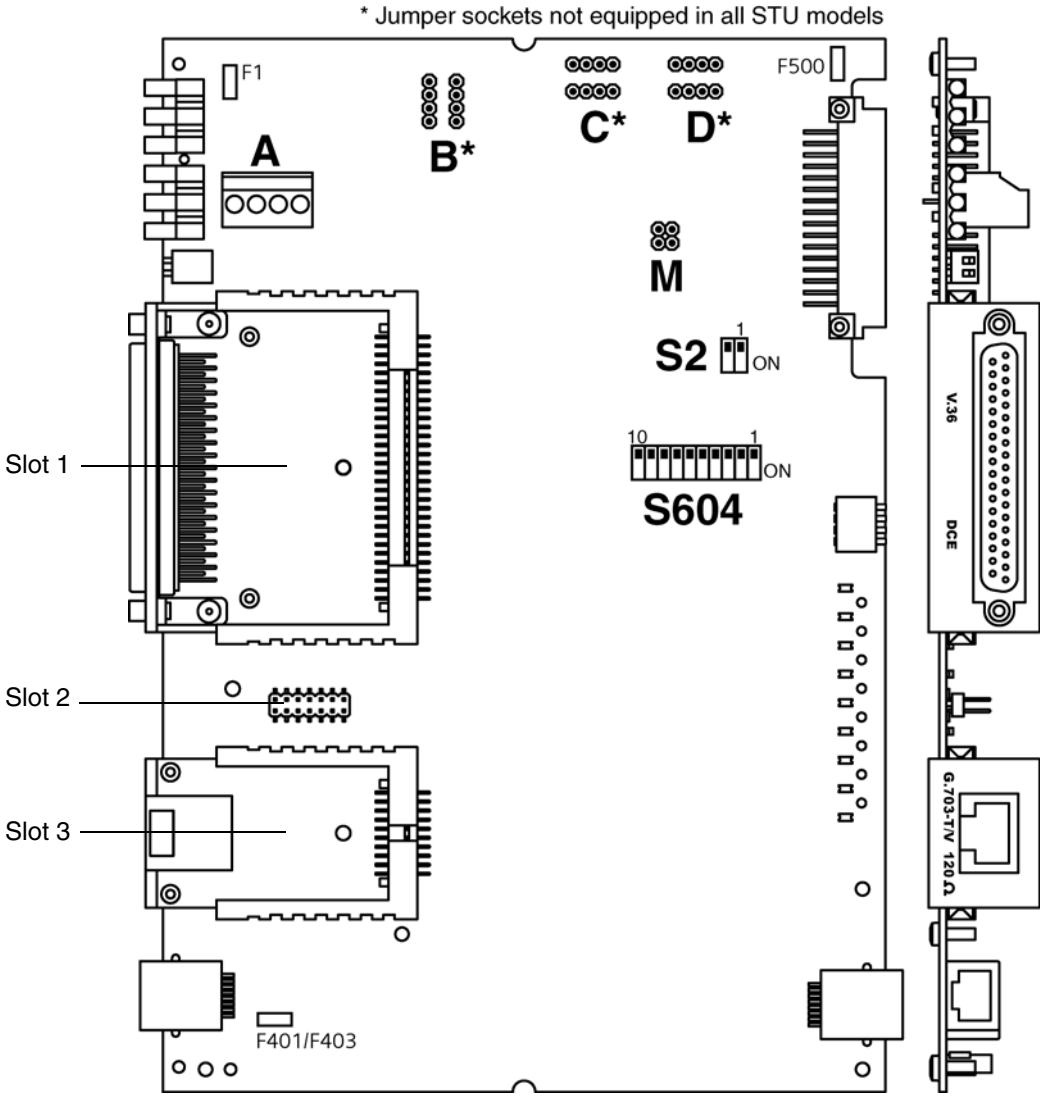


Fig. 2.45 STU motherboard

2.7.1 Configuration of the STU via the DIP switches

Tab. 2.25 shows the possible settings of the DIP switches (S604) on the STU.

DIP-Switch	Setting	Description	
1	On	NT mode[1)]	
	Off	LT mode[2)]	
2	On	Module for data interface in DTE mode	
	Off	Module for data interface in DCE mode [1)2)]	
3	On	Configuration via the DIP switches/ no management/ special application	
	Off	Configuration via the LCT/AccessIntegrator [1)2)]	
4 [3)] 5 [3)]	On Off	Structured mode	
4 [3)] 5 [3)]	Off Off	Transparent mode [1)2)]	
4 [3)] 5 [3)]	Off On	ISDN-PRA mode	
4 [3) 4)] 5 [3) 4)]	On On	Automatic bit rate activated on the NT interface	
6 [3)]	On	AIS recognition activated	
	Off	AIS recognition deactivated [1)2)]	
7 [3)]	On	AIS insertion [1)2)]	
	Off	AIS insertion deactivated	
8 [3)]	On	External clock-in activated	
	Off	Clock-In deactivated [1)2)]	
9		**With RPS “onboard”**	**Without RPS “onboard”**
	On	Remote power supply activated [3)]	Battery supply [2)] 48 / 60 V_{DC}
	Off	Remote power supply deactivated [1)2)3)]	Main feeding [1)] 110 / 230 V_{AC}
10	On	Remotely fed with 180 V_{DC}	Not assigned
	Off	Remotely fed with 120 V_{DC} [1)2)]	Not assigned

1) Default setting, Desktop unit
2) Default setting, Plug-in unit
3) Only operable if DIP switch S604-3 is ‘ON’
4) STU(NT) only

Tab. 2.25 Configuration of the STU via the DIP switches (S604)

2.7.1.1 STU with G.703 interface

This version of the STU is fixedly equipped with a G.703 interface (RJ45 / 120 Ω). Slot 3 (Fig. 2.45) is not applicable.

Below you will find the Pin assignment (Tab. 2.26) and the configuration of the DIP switches for the RJ45 connector (2 Mbit/s) (Tab. 2.27).

Pin	Signal name	Description
1	G703_TXA	Transmit data
2	G703_TXB	Transmit data
3	Shield(T)	Ground connection for Tx line shield [1]
4	G703_RXA	Receive data
5	G703_RXB	Receive data
6	Shield(R)	Ground connection for Rx line shield [1]
7	Not assigned	
8	Not assigned	
Shield	Shield	RJ45 connector shield [1]

1) See Tab. 2.27

Tab. 2.26 Pin assignment of the RJ45 connector (2 Mbit/s)

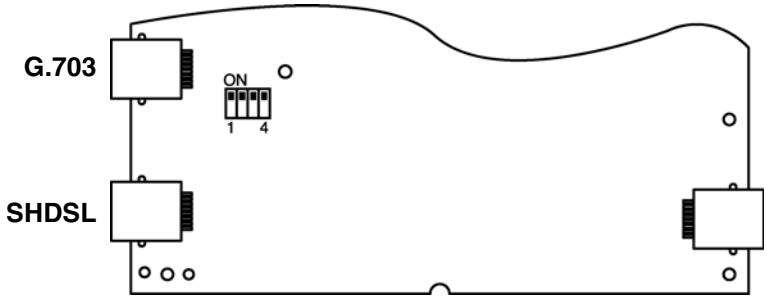


Fig. 2.46 DIP switches for the RJ45 connector (2 Mbit/s) of the STU

Switch				Description
1	2	3	4	
X	OFF	OFF	X	Shield (RJ45) not connected to the ground [2]
X	OFF	ON	X	Shield (RJ45) connected via capacitor to the ground [2]
X	ON [1]	X	X	Shield (RJ45) connected to the ground [2]
ON [1]	X	X	X	Tx shield connected to the ground
OFF	X	X	X	Tx shield connected via capacitor to the ground

Tab. 2.27 Configuration des RJ45 connector (2 Mbit/s)

Switch				Description
1	2	3	4	
X	X	X	ON [1]	Rx shield connected to the ground
X	X	X	OFF	Rx shield connected via capacitor to the ground

1) Default settings

2) From board status 9, the connector (RJ45) is always grounded

Tab. 2.27 Configuration des RJ45 connector (2 Mbit/s)

2.7.2 Power supply to the STU

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

Power supply to the desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})
- Remotely fed via SHDSL interface
- Redundant power feeding (Local power supply and remotely fed)

Power supply modes

Tab. 2.28 shows you the various power supply modes and the required power adapters therefore:

	Plug-in		Desktop	
	without RPS	with RPS	without RPS	with RPS
Local power supply with 110 / 230 V_{AC}	–	–	X	SNP-A03T-S
Local power supply with 48 / 60 V_{DC}	X	X	X	X
Remotely fed via SHDSL interface	X [1]	–	1)	–
Redundant power feeding (local power supply AC and remotely fed)	–	–	NTU	–
Redundant power feeding (local power supply AC and DC)	–	–	LT25W	LT25W

1) Power via remote device
X Direct power supply without power adapter required
SNP-A03T-S Power adapter SNP-A03T-S
LT25W Power adapter LT25W required
NTU Power adapter NTU required
– Not possible

Tab. 2.28 Power supply modes

You use jumpers to select the type of supply, see chapter 2.7.4. Fig. 2.47 shows the terminals to which the supply cables are assigned.

Modifications to the type of supply and grounding may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply after it has been installed. To do this you must reset the DIP switch S604-9 as detailed in chapter 2.7.1:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Reset the DIP switch S604-9 on ‘ON’ (Battery supply)
5. Remove the power cord connector or replace the existing power cord with a new battery cable
6. Close the casing
7. Screw the screws on the bottom of the unit into the casing

Modules that are configured for DC supply may never be connected to 110 / 230 V_{AC} supply directly.

Converting from local supply to remotely fed

For converting the desktop unit from local supply to remotely fed proceed as follows:

1. Disconnect the power cord and also disconnect all interface cables
2. Interrupt the SHDSL link
3. Release the screws on the bottom of the unit
4. Open the casing by removing the top of the unit
5. Take the module out of the casing and lay the pc board on a flat surface
6. Remove the power cord (**Warning:** You must not bend the board)
7. Change the jumpers as detailed in chapter 2.7.4
8. Reset the DIP switch S604-9 on ‘ON’ (Battery supply)
9. Before closing an older casing, ensure that the two board clamps are inserted
10. Screw the screws on the bottom of the unit into the casing

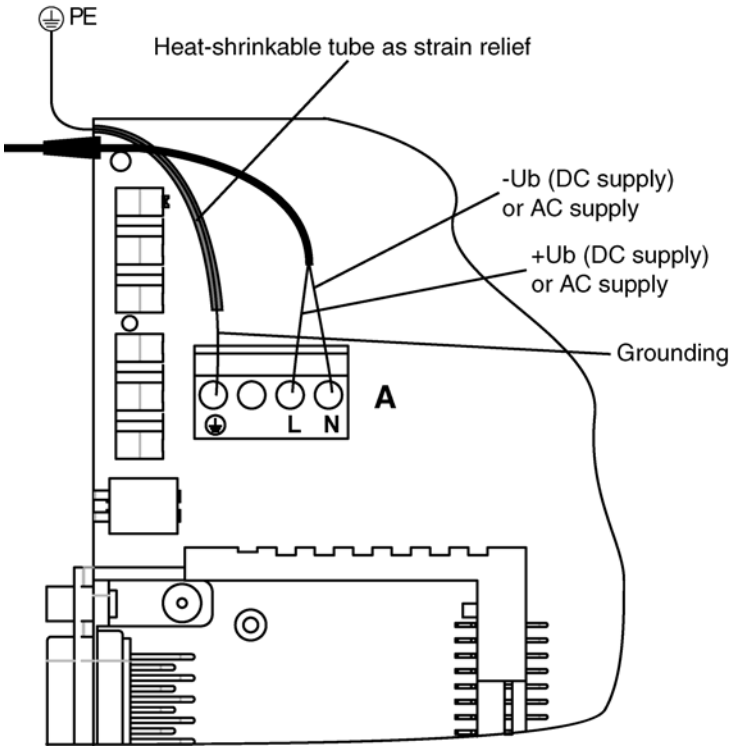


Fig. 2.47 Terminal block (A) for the supply via the cable

The cable for external grounding is connected to terminal block A and fed out through the cable feed-through hole (Fig. 2.48). The connection is made in the same way as the connection for the power supply described above.

The cable for external grounding can be ordered in connectorized form.

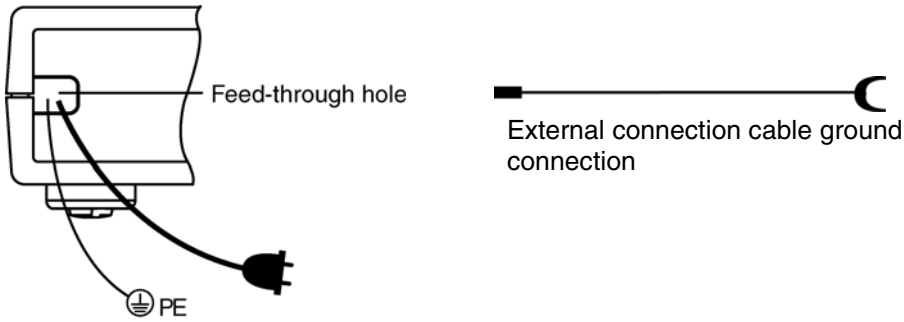


Fig. 2.48 External grounding of desktop unit

⚠ If remote power supply > 120 V_{DC} is applied, grounding is mandatory due to safety reasons. In this application the battery feeding must be grounded too.

2.7.2.1 STU grounding concept

Subrack

The subrack must always be grounded.

Desktop devices

For the following applications the STU desktop devices **must** be grounded over a cable of at least 0,75 mm^2:

- Desktop device receiving remote feed with a remote feed voltage of >120 V_{DC} → Grounding is done over terminal (Fig. 2.47) or, if there is no other option at the screen connector of the RJ45 SHDSL connector (Fig. 2.49)
- Desktop device supplying remote feed with remote feed voltage of >120 V_{DC} → Grounding is done over terminal (Fig. 2.47)

⚠ For >120 V_{DC} remote feed earthing is urgently required and must exist as described in chapter 2.7.2. If there is no other chance, the desktop device remotely fed with 180 V_{DC} can also be earthed over the SHDSL connector (Fig. 2.49).

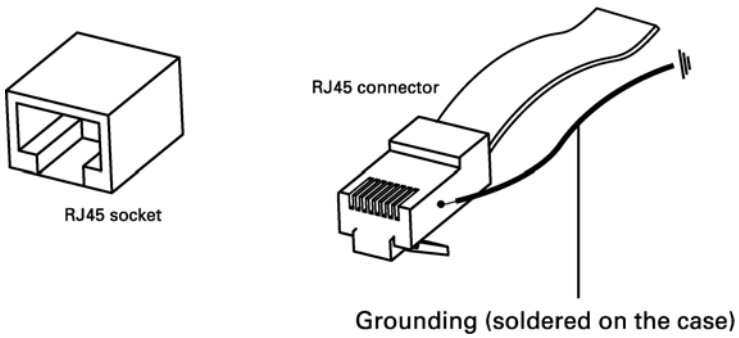


Fig. 2.49 Grounding of SHDSL connector

2.7.2.2 Fuses F1; F401/F403; F500

The basic modules are equipped with the following fuses (the equipping depends on using the basic modules as a plug-in unit or as a desktop device):

Type of fuse	Equipped on...
F1 - 250 V / 1,25 AT	Desktop device
F500 - 120 V / 1 AT	Plug-in unit
F403 - 120 V / 1 AT	Desktop device and plug-in unit [1)]
F401	Not assigned

1) from board status 9: F403 - 250 V / 1,25 AT

Tab. 2.29 The usage of fuse types

The fuses have a protecting function and should be replaced only by fuses with exactly the same electrical specifications. When a fuse burns, a device damage should be considered.

2.7.3 Power modes of STU needing external power adapter

Following desktop configurations require an external power adapter for local power feeding with 230 V_{AC}:

- STU desktop equipped with an RPS module
- STU desktop, remotely fed and redundant power feeding with local AC power
- STU desktop, local AC power feeding and redundant power feeding with local DC power

This chapter explains the different applications and procedures for connecting the power adapters to the desktop units.

Desktop power adapter SNP-A03T-S

STU desktops equipped with an RPS module have to be powered by DC. If 110 / 230 V_{AC} powering is needed, the power adapter SNP-A03T-S has to be used, which generates 48 V_{DC} on the far side.

It is also possible to use a backup battery for redundant power feeding of the LT25W. Therefore the power adapter has to be modified as described in section “Redundant battery connection LT25W“ (Fig. 2.50).

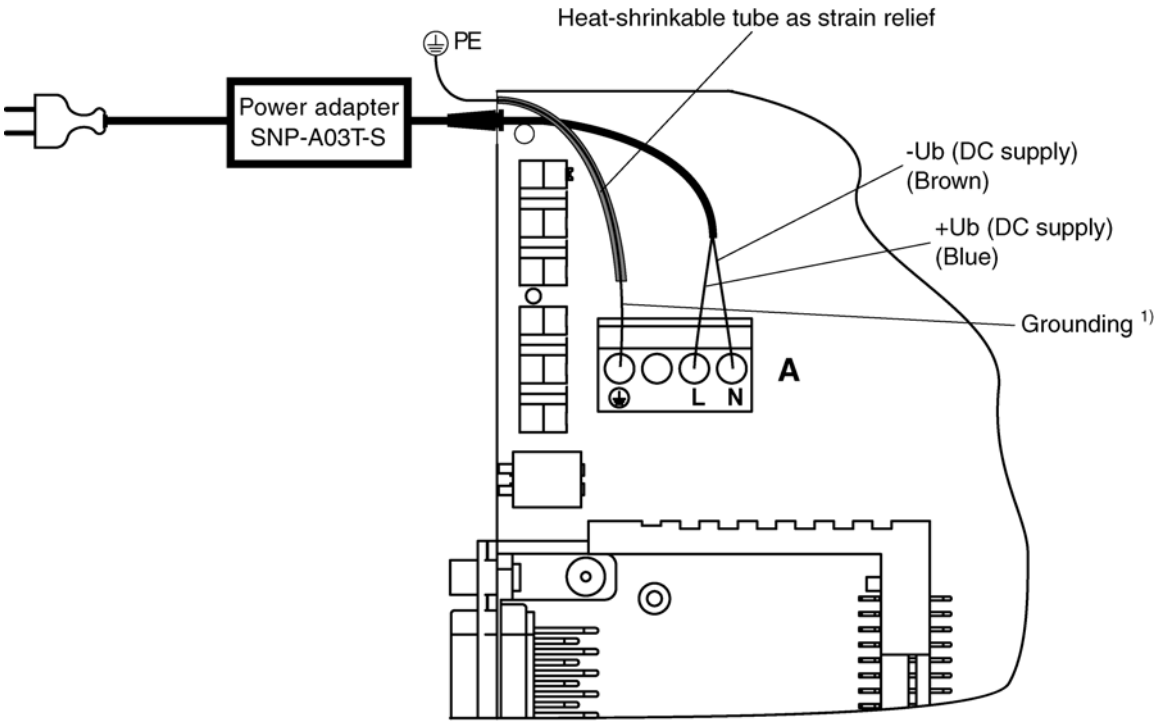
Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Connecting desktop power adapter SNP-A03T-S

For connecting desktop power adapter SNP-A03T-S, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.7.4, Fig. 2.54 to local feeding (48 V_{DC}). If you are using a desktop model without RPS you must set jumper S604-9 on “ON”.
7. Connect the desktop power adapter according to Fig. 2.50 (**Warning**: You must not bend the board)
8. Insert the module into the casing

9. Route the cable through the feed-through hole on the back of the unit
10. Before closing an older casing, ensure that the two board clamps are inserted
11. Screw the screws on the bottom of the unit into the casing



1) With remote power supply (> 120 V) grounding is a mandatory requirement

Fig. 2.50 Connecting desktop power adapter SNP-A03T-S

Redundant battery connection LT25W

In order to provide desktop power adapter LT25W with an additional battery supply you must open the unit and connect a second cable. Proceed as follows:

1. Disconnect the net cable and also disconnect all interface cables
2. Open the power adapter by releasing the four screws on the bottom of the unit
3. Remove the bottom of the casing of the power adapter
4. Connect the supplied cable to the terminal (1) as shown in Fig. 2.51
5. Replace the cable feed-through (2) (Fig. 2.51) for a cable with the one supplied for two cables

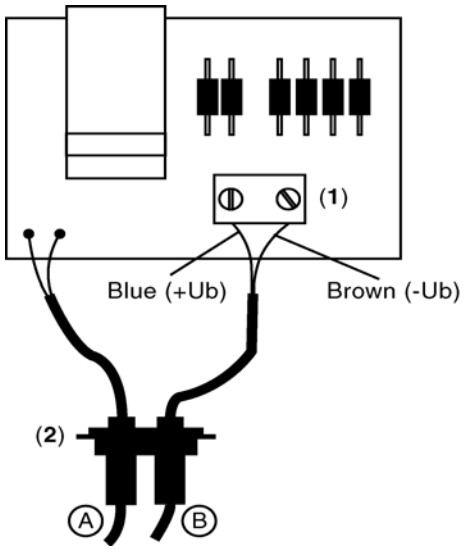


Fig. 2.51 Connecting the battery cable to desktop power adapter LT25W

6. Close the power adapter and screw the four screws into the casing
7. Connect the power adapter to the desktop unit as described above in 2 to 11
8. Connect the battery (Fig. 2.52)

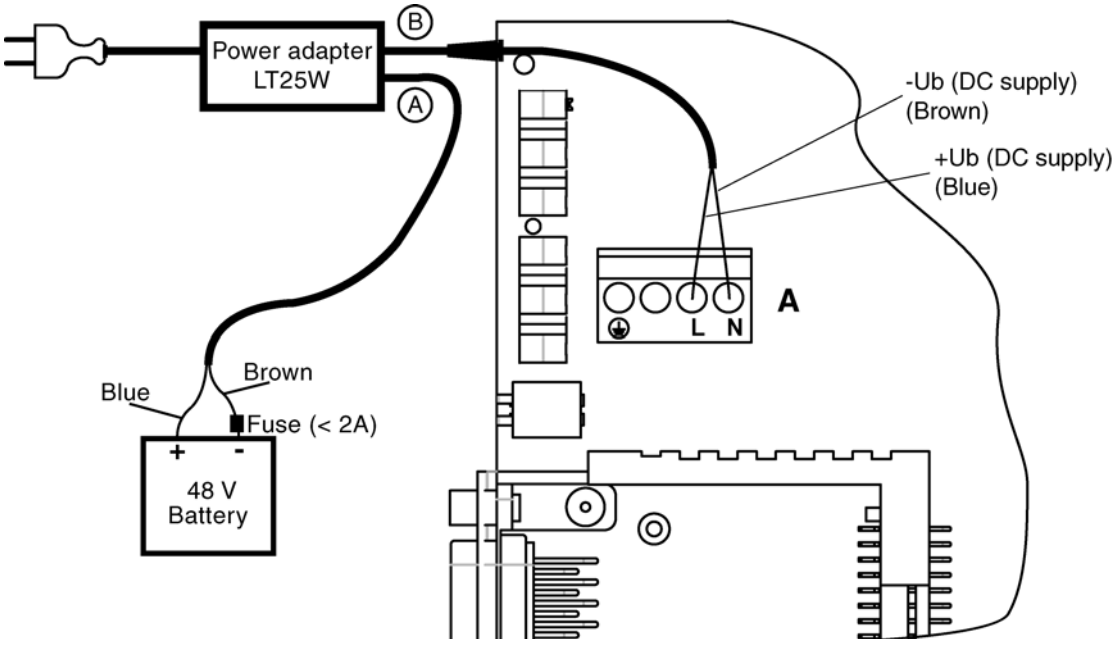


Fig. 2.52 Connecting the battery to desktop power adapter LT25W

Desktop power adapter NTU

For redundant power feeding of an STU desktop by local 230 V_{AC} and remote power the adapter NTU has to be used, which generates 120 V_{AC} on the far side. Desktop model configured for this application will normally take the power from the local source. If this fails the desktop will switch automatically to remote power.

⚠ Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

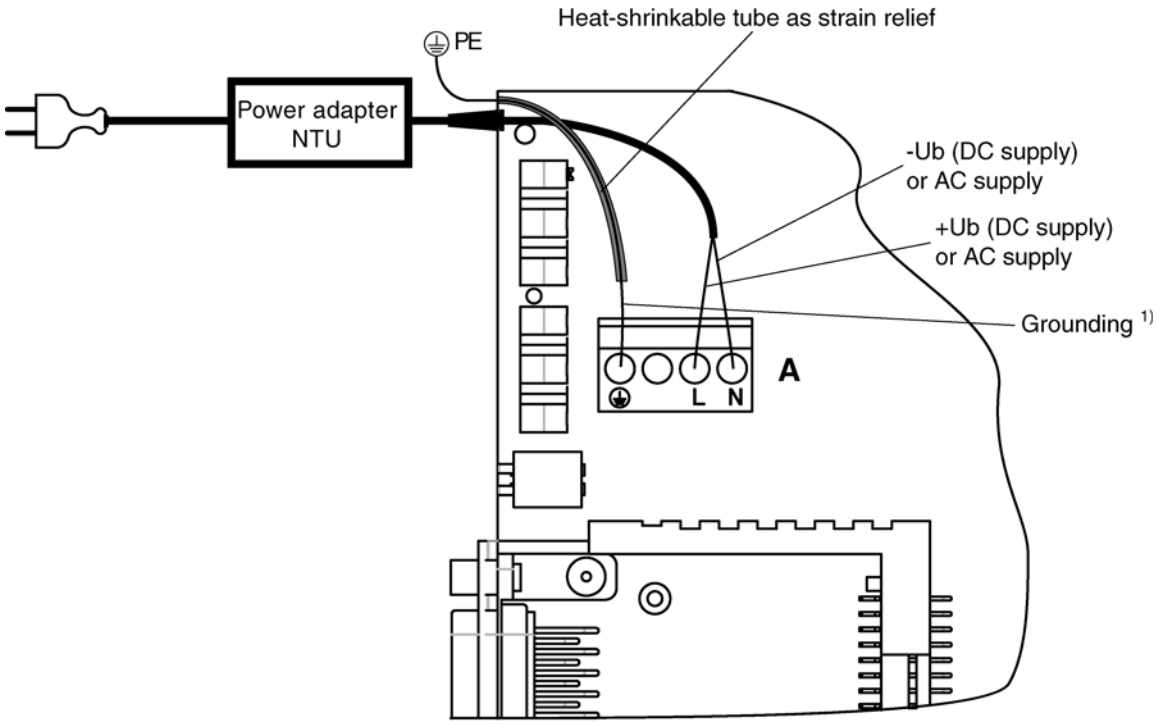


Fig. 2.53 Connecting desktop power adapter NTU

Connecting desktop power adapter NTU

For connecting desktop power adapter NTU, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.7.4, Fig. 2.56 to remote supply (additional jumpers are included with desktop unit NTU)
7. Connect the desktop power adapter according to Fig. 2.53 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Before closing the casing, ensure that the two board clamps are inserted
11. Screw the screws on the bottom of the unit into the casing

2.7.4 Set the STU power supply via jumpers

Below, you will find the individual jumper settings for the STU. The following types of use are described:;

- **STU used as a desktop unit**
  - Local AC supply
  - Local DC supply
  - Remote supply
- **STU used as a plug-in unit**
  - Local DC supply

The casing must be opened to change the jumper settings on the desktop unit. For this, the screws on the bottom of the unit must be released.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

The jumper settings for plug-in unit and desktop units are different.
Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

The jumper sockets B, C and D are not equipped in all models of the STU. The following instructions only apply if the corresponding jumper sockets are equipped on the STU.

Jumper	Meaning
B	Desktop unit local supply; AC or DC
C	Supply of the plug-in unit
D	Desktop unit supplied remotely

Tab. 2.30 Meaning of jumpers B, C and D on the STU

Locally powered STU modules with activated RPS must only be supplied with DC!

Desktop unit local supply; AC or DC

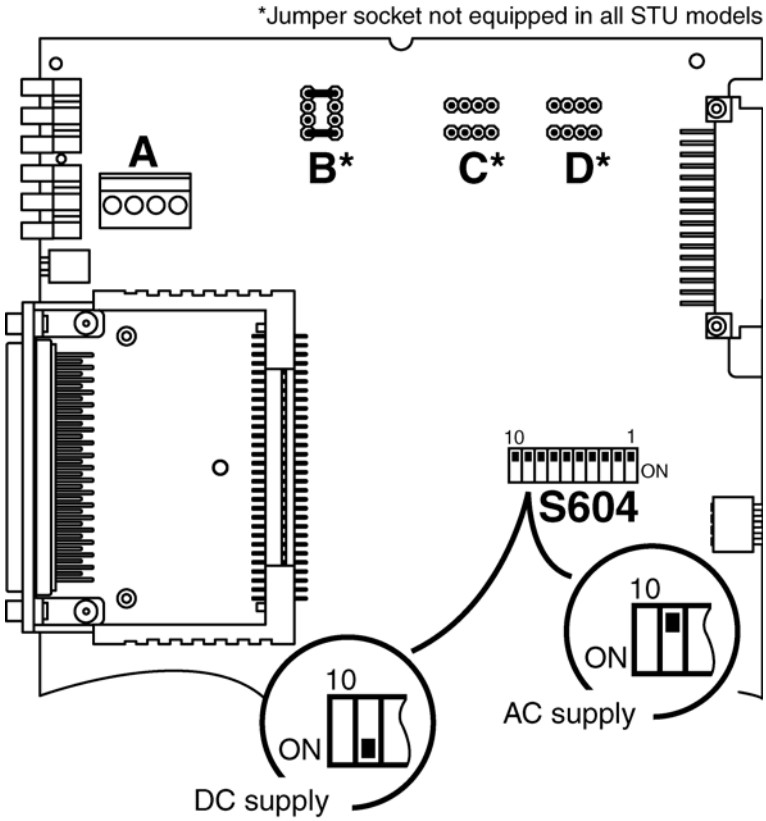


Fig. 2.54 Jumper settings: STU desktop unit local supply; AC or DC

Desktop unit supplied remotely

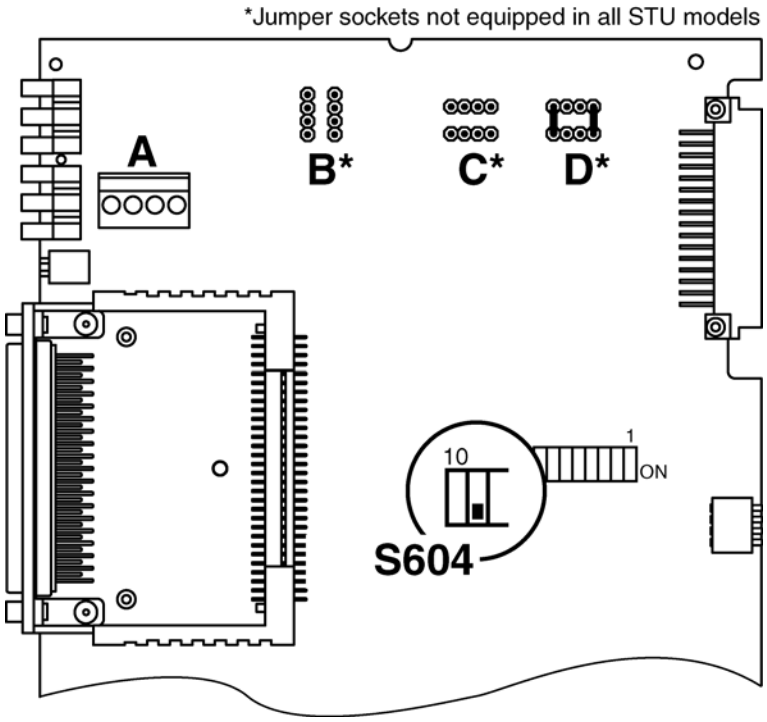


Fig. 2.55 Jumper settings: STU Desktop unit supplied remotely

Locally powered STU modules with activated RPS must only be supplied with DC!

With a remote power supply that is < 120 V, grounding is mandatory and must be present as described in chapter 2.7.2. If you have no other option, the desktop that is supplied remotely with 180 V_{AC} can also be grounded via the SHDSL connector.

Desktop unit supplied redundantly with desktop power adapter NTU

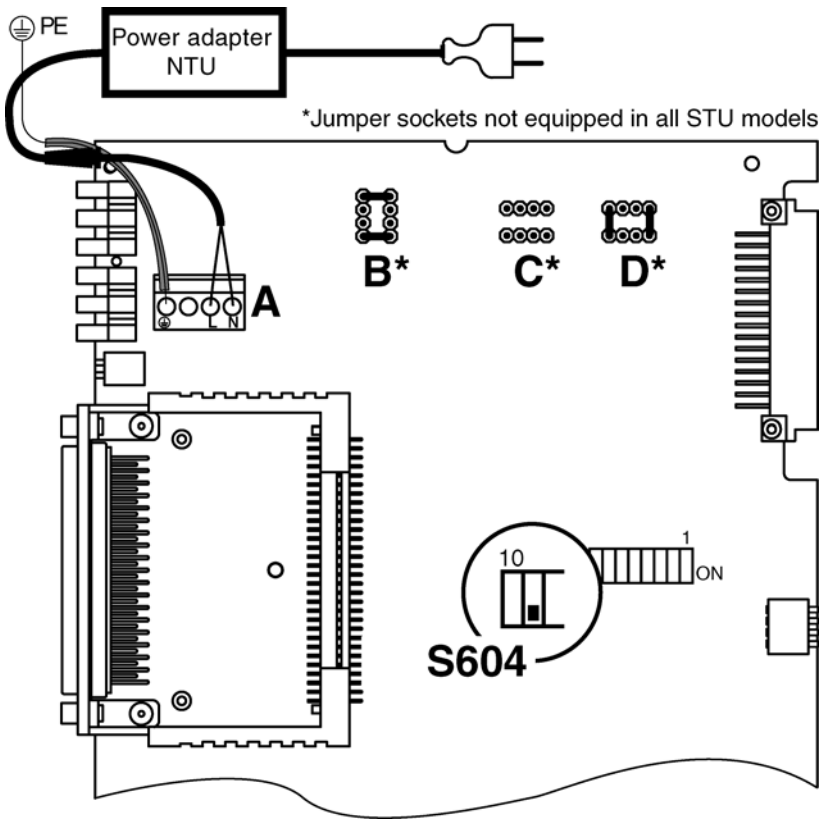


Fig. 2.56 Jumper settings: Desktop unit supplied redundantly with desktop power adapter NTU

2.7.5 STU remote feeding

Remote feeding

The STU plug-in unit can be supplied with an integrated remote power supply. This enables the remote feed of a desktop device or two regenerator.

Transmission and supply is done via the SHDSL path. The ground-free supply voltage is either 120 V_{DC} or 180 V_{DC}. The remote supply current is 50 mA or 60 mA.

i The remote power supply module (RPSII, chapter 2.19.5) cannot be used together with the STU.

Remote feed voltage 180 V_{DC}

When using the remote feed voltage of 180 V_{DC} the following preconditions must be met:

- A RFT-C circuit must be involved
- The cables must be approved for a remote feed voltage of 180 V_{DC}
- The line capacity to ground for the entire system must not exceed 14 µF.

2.7.5.1 Configuration of the DIP switches for STU remote feed

Fig. 2.57 shows you the settings for the plug-in unit to remote feed desktop device with 120 V. Fig. 2.58 shows you the settings for 180 V remote feed voltage.

The DIP switches ‘S604-10’ and ‘S2-1’ as well as Jumper M must be set regardless of using the LCT.

The remote feed is turned on/off either using the DIP switch S604-9 (if DIP switch S604-3 is “On”), see Tab. 2.25, or via the LCT (if DIP switch S604-3 is “Off”).

STU devices with RPS on board powered locally with 48 V / 60 V_{DC}.

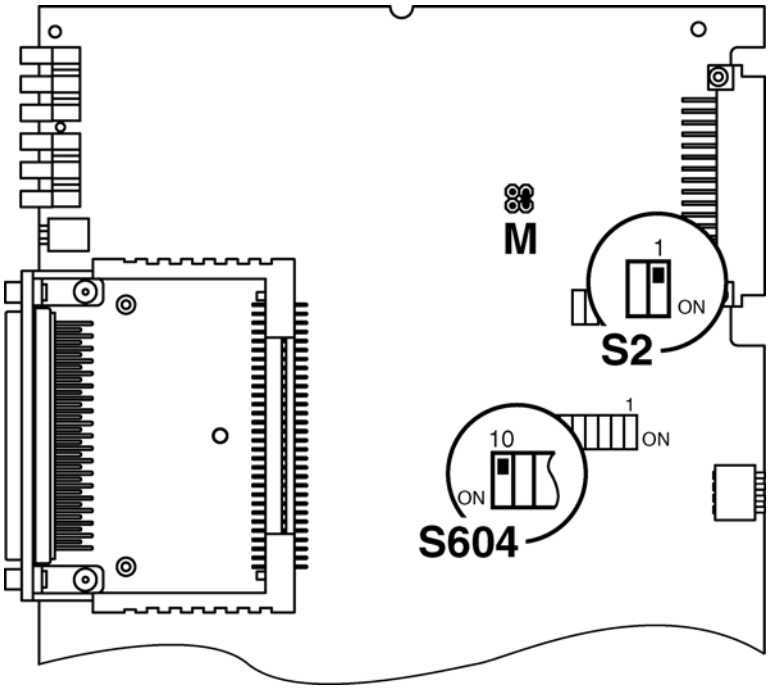


Fig. 2.57 STU remote feed voltage 120 V

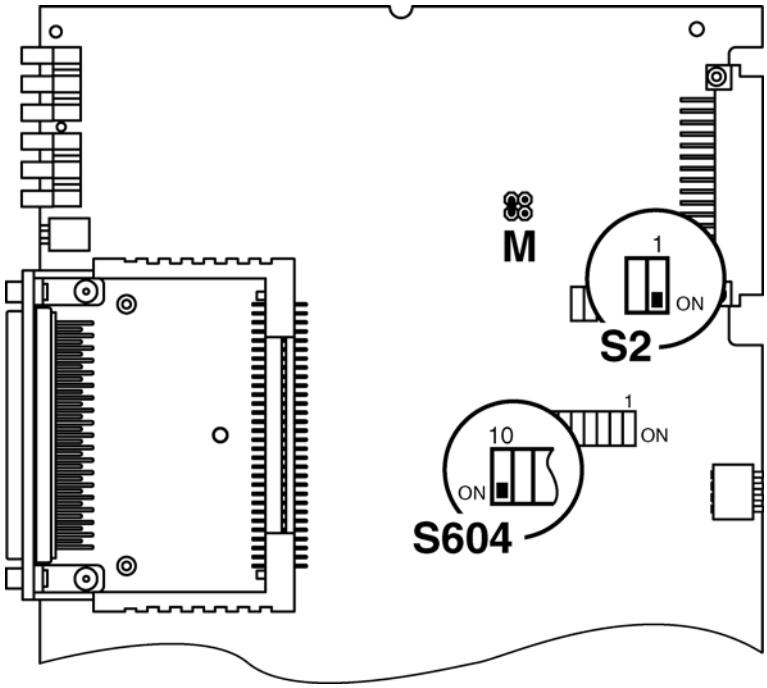


Fig. 2.58 STU remote feed voltage 180 V

Set the current limit with the DIP switch 2-2:

Switch S2-2	
Setting	**Meaning**
On	50 mA
Off	60 mA

Tab. 2.31 Current limit for STU remote feed

i The DIP switche ‘S2-2’ must be set regardless of using the LCT.

2.7.5.2 STU remote feed monitoring and alarm signalling

Monitoring circuit

A monitoring circuit controls the voltage and the current control. The settings are done using DIP switches, see chapter 2.7.5.1. For security reasons, two independent circuit parts and two independent DIP switches are needed for the settings relevant to security.

Earth leakage

The output voltage is monitored for earth leakage and is turned off in case of fault. In case of a disturbance the STU tries to reestablish the remote feed.

The STU remote feed recognizes the following states:

- Remote feeding current too deep (under current)
- Remote feeding current too high (short circuit)
- Earth leakage

Out of this states the STU generates the following alarms:

Alarm	Event	Description	Generated alarm
UCR1	Line break	Remote feeding current too deep (Under current)	Non-urgent alarm
UNBAL	Earth leakage	Protection circuit turned of because of earth leakage	Urgent alarm
OC	Short circuit	Remote feeding current too high (Over current)	Urgent alarm

Tab. 2.32 STU remote feed alarm signalling

You can test the protection circuit by, for example, setting the voltage control at 180 V_{AC} (Jumper M, DIP-Switch S604-1 “ON”) and the voltage monitoring at 120 V_{DC} (DIP-Switch S604-10 “OFF”). In this constellation the protection circuit must respond.

2.7.5.3 Configuration of the power fail recognition using DIP switches

The configuration is done using the DIP switch S604-9, see Tab. 2.25.

2.7.6 Pin assignment of the SHDSL interface

Pin assignment of the SHDSL interface

Fig. 2.59 RJ45 connector of the SHDSL interface

2.7.7 Supervision and alarm signalling of the STU

The operating mode and alarm signalling of the STU are indicated by means of LEDs on the front of the unit.

2.7.7.1 Visual signalling of the plug-in unit

When the STU is used as a plug-in unit, the front panel is equipped with six LEDs (Fig. 2.60).

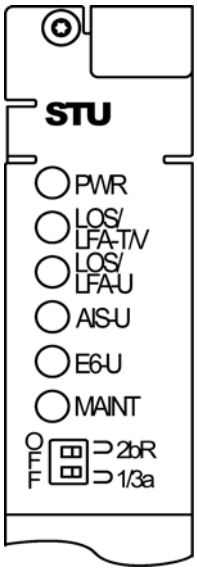


Fig. 2.60 Visual signalling of the STU plug-in unit

LED	Color	Status	
		Off	On
PWR	green	no power supply	power supply ok
LOS/LFA-T/V [1)]	red	no alarm	loss of signal/loss of frame alignment at T/V
LOS/LFA-U [1)]	red	no alarm	loss of signal/loss of frame alignment at U
AIS-U	yellow	no alarm	AIS at U
E6-U	yellow	no alarm	Block error rat >10^{-6} at U
MAINT	yellow	no maintenance function	local maintenance function active

1) Visual signalling according to Fig. 2.61

Tab. 2.33 Visual signalling of STU plug-in unit

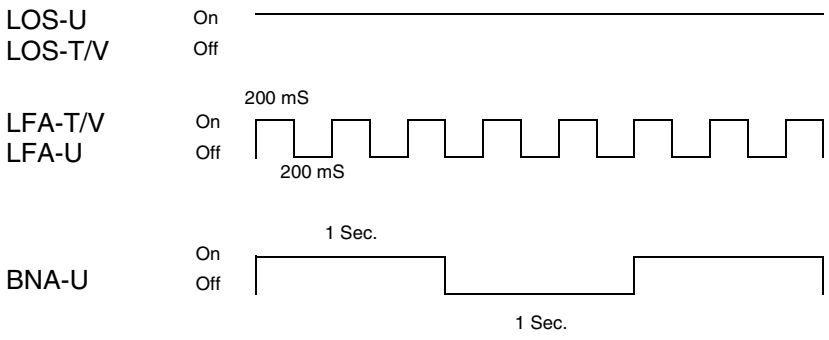


Fig. 2.61 Visual signalling LOS/LFA/BNA

2.7.7.2 Visual signalling of the desktop unit

In contrast to the plug-in unit, the desktop unit has three additional LEDs. The meaning of the LEDs is explained in Tab. 2.23.

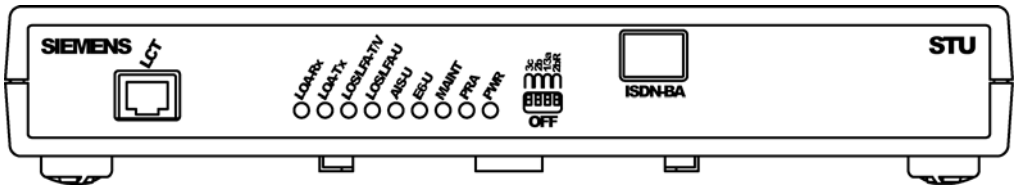


Fig. 2.62 Visual signalling of the desktop unit

LED	Color	Status	
		Off	On
LOA-Rx	yellow	no permanent 0 or 1 (data interface; line 104/receive data)	permanent 0 or 1
LOA-Tx	yellow	no permanent 0 or 1 (data interface; line 103/transmit data)	permanent 0 or 1
LOS/LFA-T/V [1)]	red	no alarm	loss of signal/loss of frame alignment at T/V
LOS/LFA-U [1)]	red	no alarm	loss of signal/loss of frame alignment at U
AIS-U	yellow	no alarm	AIS at U
E6-U	yellow	no alarm	Block error rare >10^{-6} at U
MAINT	yellow	no maintenance function	Local maintenance function active
PRA	green	no ISDN-PRA operation	PRA operation
PWR	green	no power supply	Power supply ok

1) Visual signalling according to Fig. 2.61

Tab. 2.34 Visual signalling of the desktop unit

2.7.8 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator or
- using DIP switches on the modules or
- using control lines 140/141 (V.35/V36).

The procedure for inserting loopbacks by means of management software can be found in the user manual of ULAF+ [2] or AccessIntegrator [6].

The various loopbacks are shown in Fig. 2.41 to Fig. 2.44. The names of the individual loopbacks are explained in Tab. 2.24.

Loopback 2b can be inserted locally at the NT or remotely at the LT (loopback 2bR) using DIP switches.

Loopback	Meaning / effect
Loopback 1	U-interface - direction V-interface (LT)
Loopback 2b [1)]	U-interface direction - local - in the digital unit
Loopback 2bR [1)]	U-interface direction - remote - in the digital unit
Loopback 3a [1)]	DTE1/DTE2-interface direction - in the termination unit
Loopback 3c	DTE2-interface direction - at the subscriber interface

1) Loopbacks are transparent

Tab. 2.35 Designation of the loopbacks on the STU

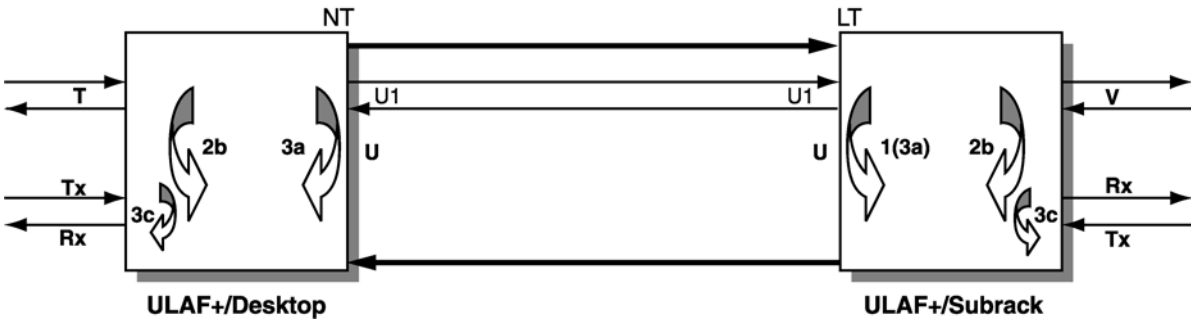


Fig. 2.63 'Access Network' loopback concept

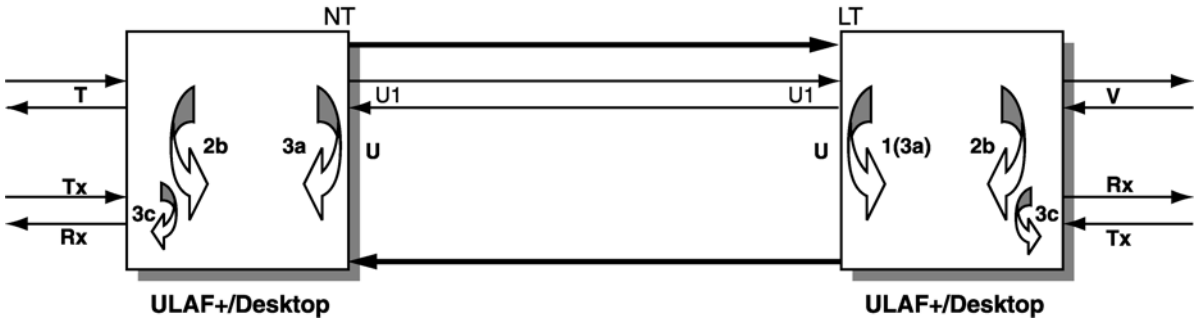


Fig. 2.64 'Campus Network' loopback concept

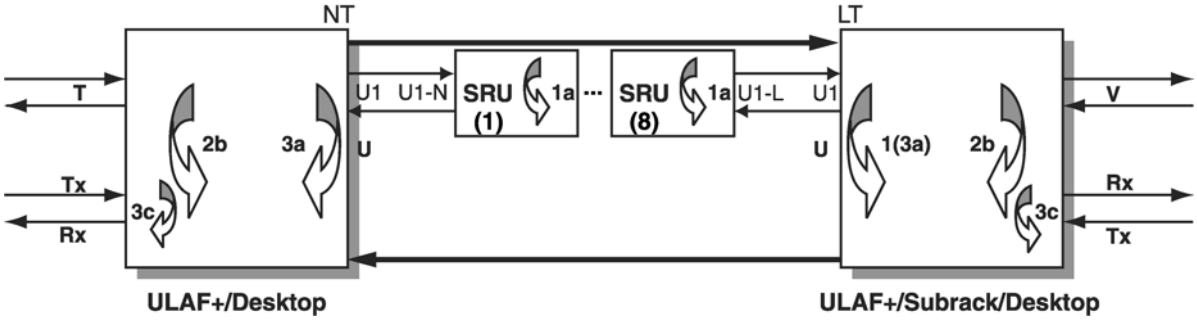


Fig. 2.65 Regenerator loopback concept

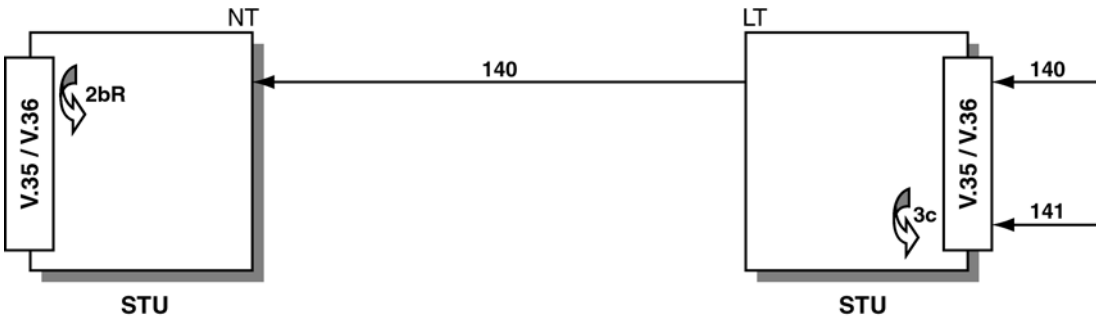


Fig. 2.66 Loopback via control line 140/141 (V.35/V.36)

Notes

- In the add-drop mode, loopback 2b is set for the two interfaces (G.703 and data) and loopback 3c for the data interface only
- The loopback 2bR can be inserted only from the LT in the NT

The following loopbacks can be applied to the plug-in unit using DIP switches:

- Loopback 1 or 3a respectively
- Loopback 2bR

The following loopbacks can also be applied to the desktop unit using DIP switches:

- Loopback 2b (in ‘add-drop mode’ for the two interfaces)
- Loopback 2bR
- Loopback 3c
- Loopback 3a

2.8 STU termination unit with G.703 64 kbit/s (codirectional)

Termination unit STU with G.703 64 kbit/s interface (codirectional) largely corresponds to termination unit STU with G.703 2 Mbit/s interface. This chapter describes the differences between the units in respect of the G.703 interface. For any further STU information, see chapter 2.7.

Application

The STU termination unit is made as

- a plug-in unit or as
- a desktop device.

Fig. 2.67 shows the STU motherboard of the plug-in unit.

This variant of the STU unit cannot be expanded with additional data interfaces. The G.703 64 kbit/s codirectional interface is permanently soldered to the main board.

The desktop unit can be additionally expanded with the module for the alarm and clock interface.

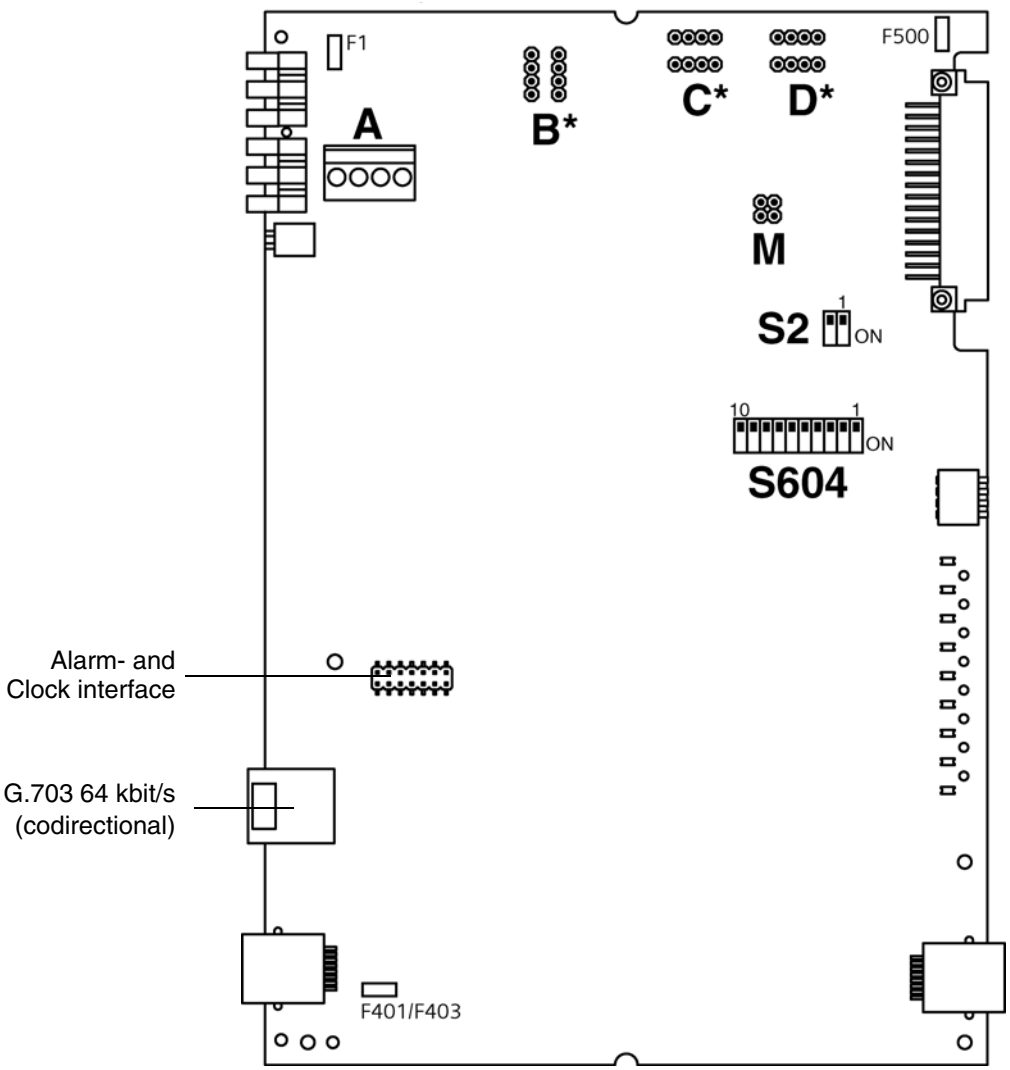


Fig. 2.67 STU (G.703 64 kbit/s) motherboard

2.8.1 Configuration of the STU via the DIP switches

Tab. 2.36 shows the possible settings of the DIP switches (S604) on the STU (G.703 64 kbit/s).

DIP-Switch	Setting	Description
1	On	NT mode[1)]
	Off	LT mode[2)]
2	Off	Not assigned
3	On	Configuration via the DIP switches
	Off	Configuration via the LCT/AccessIntegrator [1)2)]
4 [3)] 5 [3)]	On Off	Structured mode
4 [3)] 5 [3)]	Off Off	Transparent mode [1)2)]
6 [3)]	On	AIS recognition activated at U interface
	Off	AIS recognition deactivated at U interface [1)2)]
7	Off	Not assigned
8 [3)]	On	External clock-in activated
	Off	Clock-In deactivated [1)2)]
9	On	Battery supply [2)] 48 / 60 V_{DC}
	Off	Main feeding [1)] 110 / 230 V_{AC}
10	Off	Not assigned

1) Default setting, Desktop unit

2) Default setting, Plug-in unit

3) Only operable if DIP switch S604-3 is ‘ON’

Tab. 2.36 Configuration of the STU (G.703 64 kbit/s) via the DIP switches (S604)

2.8.1.1 G.703 64 kbit/s (codirectional) interface

The G.703 64 kbit/s interface is soldered on the main board and implemented as RJ45 / 120 Ω connector.

Below you will find the Pin assignment (Tab. 2.37) and the configuration of the DIP switches for the RJ45 connector (2 Mbit/s) (Tab. 2.38).

Pin	Signal name	Description
1	G703_TXA	Transmit data
2	G703_TXB	Transmit data
3	Shield(T)	Ground connection for Tx line shield [1)]
4	G703_RXA	Receive data
5	G703_RXB	Receive data
6	Shield(R)	Ground connection for Rx line shield [1)]
7	Not assigned	
8	Not assigned	
Shield	Shield	RJ45 connector shield [1)]

1) See Tab. 2.38

Tab. 2.37 Pin assignment of the RJ45 connector (2 Mbit/s)

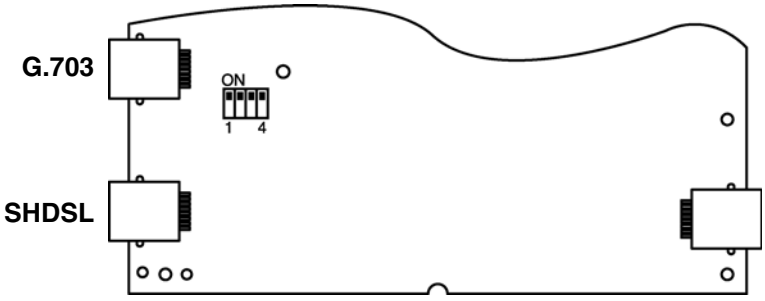


Fig. 2.68 DIP switches for the RJ45 connector

Switch				Description
1	2	3	4	
X	OFF	OFF	X	Shield (RJ45) not connected to the ground [2)]
X	OFF	ON	X	Shield (RJ45) connected via capacitor to the ground [2)]
X	ON [1)]	ON [1)]	X	Shield (RJ45) connected to the ground [2)]
ON [1)]	X	X	X	Tx shield not connected to the ground
OFF	X	X	X	Tx shield connected via capacitor to the ground

Tab. 2.38 Configuration des RJ45 connector (2 Mbit/s)

Switch				Description
1	2	3	4	
X	X	X	ON [1]	Rx shield connected to the ground
X	X	X	OFF	Rx shield connected via capacitor to the ground

1) Default settings

2) From board status 9, the the connector (RJ45) is always grounded

Tab. 2.38 Configuration des RJ45 connector (2 Mbit/s)

2.8.2 Power supply to the STU (G.703 64 kbit/s)

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

Power supply to the desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})

Power supply modes

Tab. 2.39 shows you the various power supply modes and the required power adapters therefore:

	Plug-in	Desktop
Local power supply with 110 / 230 V_{AC}	–	X
Local power supply with 48 / 60 V_{DC}	X	X
Redundant power feeding (local power supply AC and DC)	–	LT25W

Tab. 2.39 Power supply modes

You use jumpers to select the type of supply, see chapter 2.7.4. Fig. 2.47 shows the terminals to which the supply cables are assigned.

Modifications to the type of supply and grounding may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply after it has been installed. To do this you must reset the DIP switch S604-9 as detailed in chapter 2.7.1:

2.8.2.1 STU (G.703 64 kbit/s) grounding concept)

The STU grounding concept is described in chapter 2.7.2.1.

2.8.2.2 Fuses F1; F401/F403; F500

You find more information about the fuses in chapter 2.7.2.2.

2.8.3 Power modes of STU (G.703 64 kbit/s) needing external power adapter

Desktop units which you wish to operate locally with AC and redundantly with local DC power require an external power supply unit (LT25W or SNP-A03T-S). For further information, see chapter 2.7.3.

2.8.4 Set the STU power supply via jumpers

The jumper settings for the STU (G.703 64 kbit/s) is described in chapter 2.7.4.

2.8.5 Pin assignment of the SHDSL interface

The pin assignmeent of the SHDSL interface is described in chapter 2.7.6.

2.8.6 Supervision and alarm signalling of the STU

The operating mode and alarm signalling of the STU (G.703 64 kbit/s) are indicated by means of LEDs on the front of the unit.

2.8.6.1 Visual signalling of the plug-in unit

When the STU(G.703 64 kbit/s) is used as a plug-in unit, the front panel is equipped with six LEDs (Fig. 2.69).

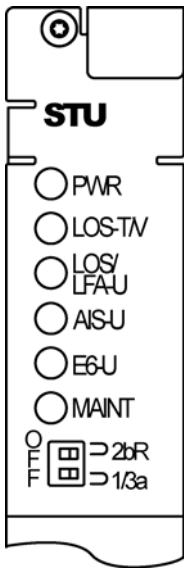


Fig. 2.69 Visual signalling of the STU plug-in unit

LED	Color	Status	
		Off	On
PWR	green	no power supply	power supply ok
LOS-T/V [1)]	red	no alarm	loss of signal at T/V
LOS/LFA-U [1)]	red	no alarm	loss of signal/loss of frame alignment at U
AIS-U	yellow	no alarm	AIS at U
E6-U	yellow	no alarm	Block error rat >10^{-6} at U
MAINT	yellow	no maintenance function	local maintenance function active

1) Visual signalling according to Fig. 2.70

Tab. 2.40 Visual signalling of STU plug-in unit

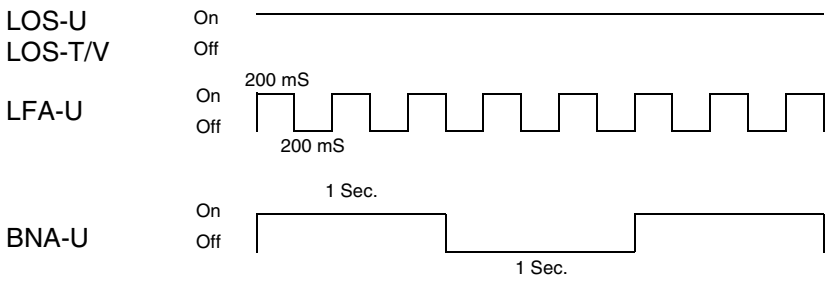


Fig. 2.70 Visual signalling LOS/LFA/BNA

2.8.6.2 Visual signalling of the desktop unit

In contrast to the plug-in unit, the desktop unit has three additional LEDs. The meaning of the LEDs is explained in Tab. 2.41.

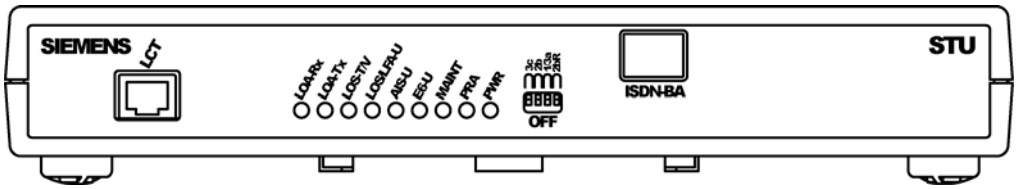


Fig. 2.71 Visual signalling of the desktop unit

LED	Color	Status	
		Off	On
LOA-Rx	yellow	always off - LED without function	
LOA-Tx	yellow	always off - LED without function	
LOS-T/V [1)]	red	no alarm	loss of signal at T/V
LOS/LFA-U [1)]	red	no alarm	loss of signal/loss of frame alignment at U
AIS-U	yellow	no alarm	AIS at U
E6-U	yellow	no alarm	Block error rare >10^{-6} at U
MAINT	yellow	no maintenance function	Local maintenance function active
PRA	green	no ISDN-PRA operation	PRA operation
PWR	green	no power supply	Power supply ok

1) Visual signalling according to Fig. 2.70

Tab. 2.41 Visual signalling of the desktop unit

2.8.7 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free. You find more information about inserting loopbacks in chapter 2.7.8.

2.9 STU2 termination unit

Application

The STU2 termination unit is made as

- a plug-in unit or as
- a desktop device.

Fig. 2.72 shows the STU2 motherboard of the plug-in unit.

This chapter describes which settings are to be made for the STU2. The interface modules are described in chapter "2.19 Interface- and submodules".

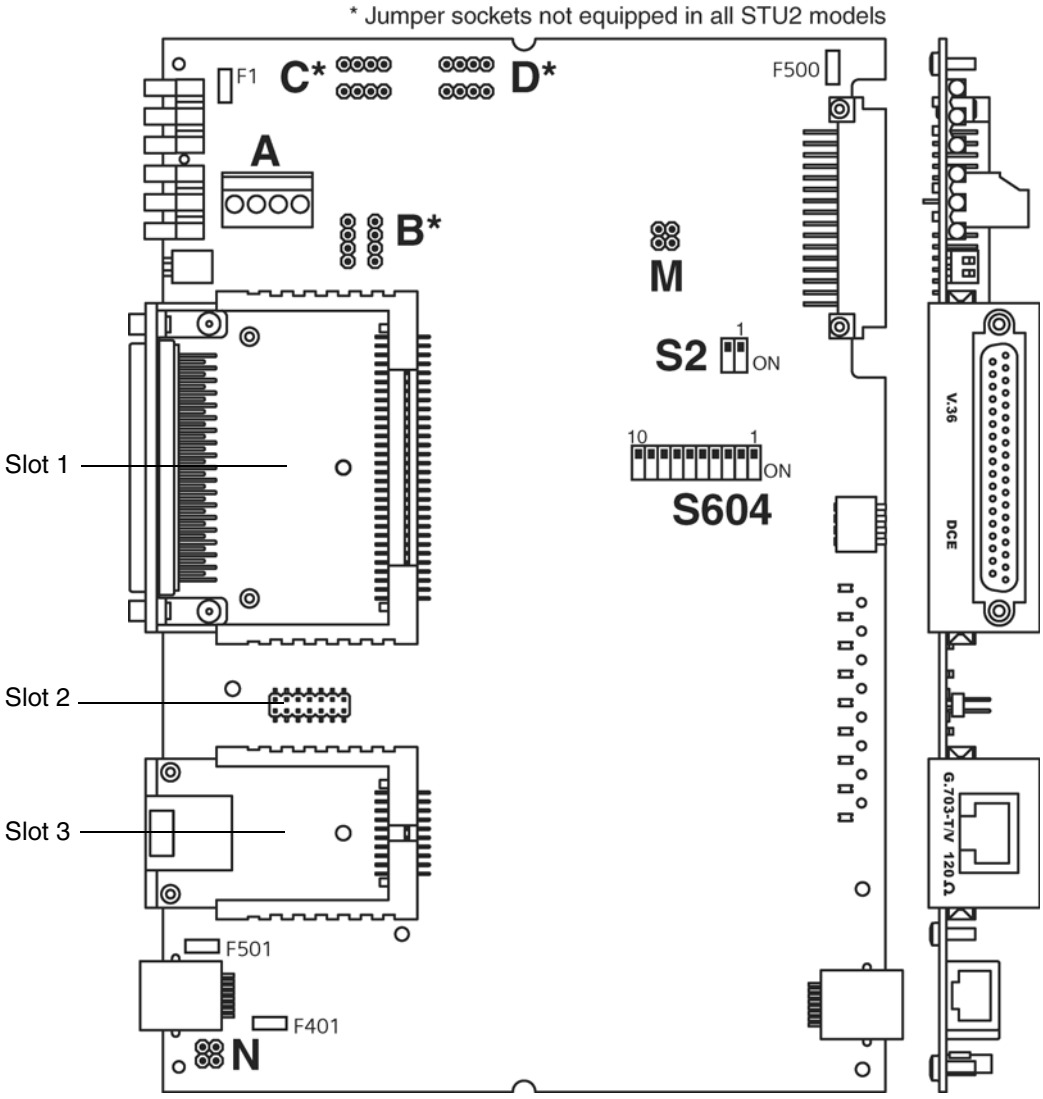


Fig. 2.72 STU2 motherboard

2.9.1 Configuration of the STU2 via the DIP switches

Tab. 2.42 shows the possible settings of the DIP switches (S604) on the STU2.

DIP-Switch	Setting	Description	
1	On	NT mode[1)]	
	Off	LT mode[2)]	
2	On	Module for data interface in DTE mode	
	Off	Module for data interface in DCE mode [1)2)]	
3	On	Configuration via the DIP switches	
	Off	Configuration via the LCT/AccessIntegrator [1)2)]	
4 [3)] 5 [3)]	On Off	Structured mode	
4 [3)] 5 [3)]	Off Off	Transparent mode [1)2)]	
4 [3)] 5 [3)]	Off On	ISDN-PRA mode	
6 [3)]	On	AIS recognition activated	
	Off	AIS recognition deactivated [1)2)]	
7 [3)]	On	AIS insertion [1)2)]	
	Off	AIS insertion deactivated	
8 [3)]	On	External clock-in activated	
	Off	Clock-In deactivated [1)2)]	
9		**With RPS “onboard”**	**Without RPS “onboard”**
	On	Remote power supply activated [3)]	Battery supply [2)] 48 / 60 V_{DC}
	Off	Remote power supply deactivated [1)2)3)]	Main feeding [1)] 110 / 230 V_{AC}
10	On	Remotely fed with 180 V_{DC}	Not assigned
	Off	Remotely fed with 120 V_{DC} [1)2)]	Not assigned

1) Default setting, Desktop unit

2) Default setting, Plug-in unit

3) Only operable if DIP switch S604-3 is ‘ON’

Tab. 2.42 Configuration of the STU2 via the DIP switches (S604)

2.9.2 Power supply to the STU2

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

Power supply to the desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})
- Remotely fed via SHDSL interface
- Redundant power feeding (Local power supply and remotely fed)

Power supply modes

Tab. 2.43 shows you the various power supply modes and the required power adapters therefore:

	Plug-in		Desktop	
	without RPS	with RPS	without RPS	with RPS
Local power supply with 110 / 230 V_{AC}	–	–	X	SNP-A03T-S
Local power supply with 48 / 60 V_{DC}	X	X	X	X
Remotely fed via SHDSL interface	X 1)	–	1)	–
Redundant power feeding (local power supply AC and remotely fed)	–	–	NTU	–
Redundant power feeding (local power supply AC and DC)	–	–	LT25W	LT25W

1) Power via remote device
X Direct power supply without power adapter required
SNP-A03T-S Power adapter SNP-A03T-S
LT25W Power adapter LT25W required
NTU Power adapter NTU required
– Not possible

Tab. 2.43 Power supply modes

You use jumpers to select the type of supply, see chapter 2.9.4. Fig. 2.73 shows the terminals to which the supply cables are assigned.

Modifications to the type of supply and grounding may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply after it has been installed. To do this you must reset the DIP switch S604-9 as detailed in chapter 2.9.1:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Reset the DIP switch S604-9 on ‘ON’ (Battery supply)
5. Remove the power cord connector or replace the existing power cord with a new battery cable
6. Close the casing

7. Screw the screws on the bottom of the unit into the casing

Modules that are configured for DC supply may never be connected to 110 / 230 V_{AC} supply directly.

Converting from local supply to remotely fed

For converting the desktop unit from local supply to remotely fed proceed as follows:

1. Disconnect the power cord and also disconnect all interface cables
2. Interrupt the SHDSL link
3. Release the screws on the bottom of the unit
4. Open the casing by removing the top of the unit
5. Take the module out of the casing and lay the pc board on a flat surface
6. Remove the power cord (**Warning:** You must not bend the board)
7. Change the jumpers as detailed in chapter 2.9.4
8. Reset the DIP switch S604-9 on ‘ON’ (Battery supply)
9. Before closing an older casing, ensure that the two board clamps are inserted
10. Screw the screws on the bottom of the unit into the casing

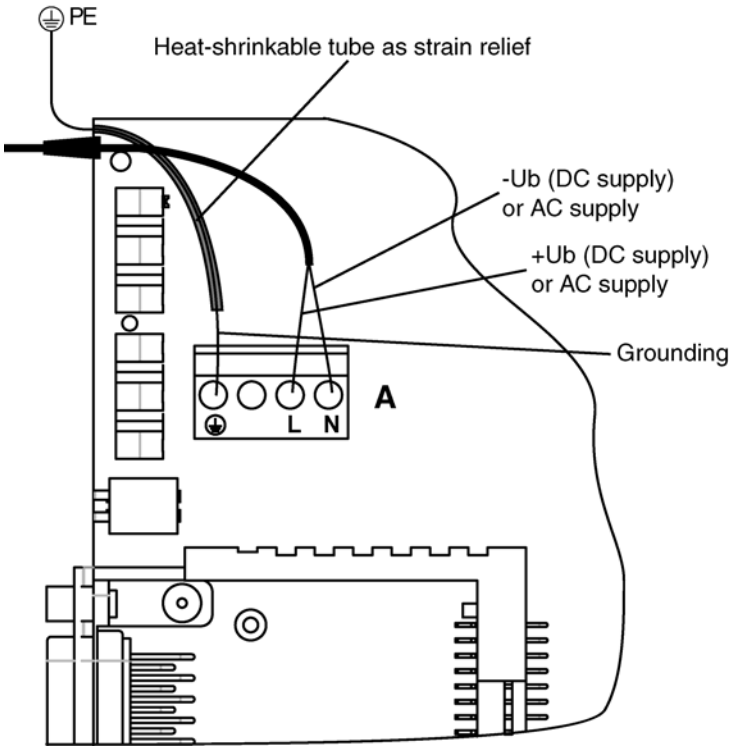


Fig. 2.73 Terminal block (A) for the supply via the cable

The cable for external grounding is connected to terminal block A and fed out through the cable feed-through hole (Fig. 2.74). The connection is made in the same way as the connection for the power supply described above.

The cable for external grounding can be ordered in connectorized form.

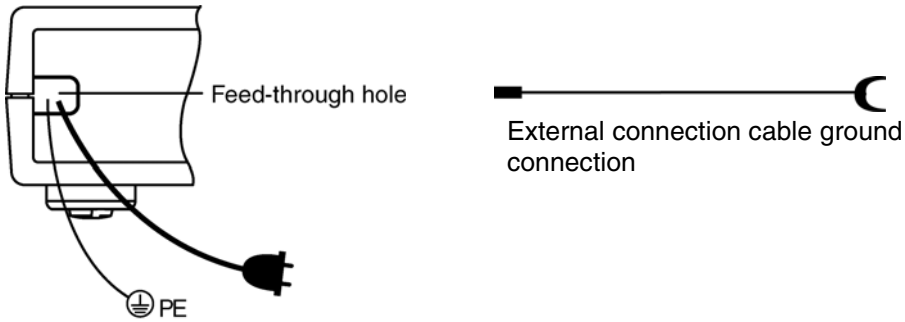


Fig. 2.74 External grounding of desktop unit

If remote power supply > 120 V is applied, grounding is mandatory due to safety reasons.

2.9.2.1 STU2 grounding concept

Subrack

The subrack must always be grounded.

Desktop devices

For the following applications the STU2 desktop devices **must** be grounded over a cable of at least 0,75 mm^2:

- Desktop device receiving remote feed with a remote feed voltage of >120 V_{DC} → Grounding is done over terminal (Fig. 2.73) or, if there is no other option at the screen connector of the RJ45 SHDSL connector (Fig. 2.75)
- Desktop device supplying remote feed with remote feed voltage of >120 V_{DC} → Grounding is done over terminal (Fig. 2.73)

For >120 V_{DC} remote feed earthing is urgently required and must exist as described in chapter 2.9.2. If there is no other chance, the desktop device remotely fed with 180 V can also be earthed over the SHDSL connector (Fig. 2.75).

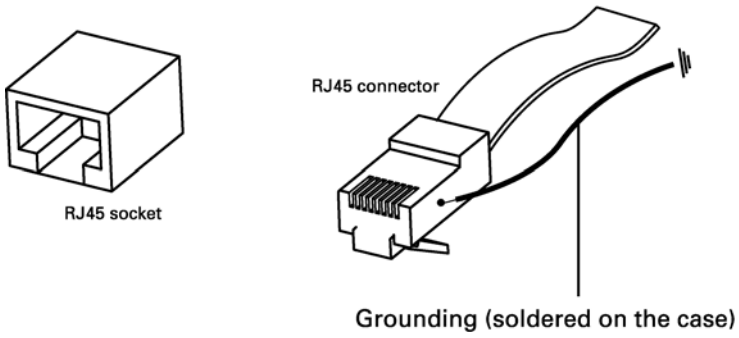


Fig. 2.75 Grounding of SHDSL connector

2.9.2.2 Fuses F1; F401/F403; F500

The basic modules are equipped with the following fuses (the equipping depends on using the basic modules as a plug-in unit or as a desktop device):

Type of fuse	Equipped on...
F1 - 250 V / 1,25 AT	Desktop device
F500 - 120 V / 1 AT	Plug-in unit
F401/501 - 120 V / 1 AT	Desktop device and plug-in unit

Tab. 2.44 The usage of fuse types

The fuses have a protecting function and should be replaced only by fuses with exactly the same electrical specifications. When a fuse burns, a device damage should be considered.

2.9.3 Power modes of STU2 needing external power adapter

Following desktop configurations require an external power adapter for local power feeding with 230 V_{AC}:

- STU2 desktop equipped with an RPS module
- STU2 desktop, remotely fed and redundant power feeding with local AC power
- STU2 desktop, local AC power feeding and redundant power feeding with local DC power

This chapter explains the different applications and procedures for connecting the power adapters to the desktop units.

Desktop power adapter SNP-A03T-S

STU2 desktops equipped with an RPS module have to be powered by DC. If 110 V / 230 V_{AC} powering is needed, the power adapter SNP-A03T-S has to be used, which generates 48 V_{DC} on the far side.

It is also possible to use a backup battery for redundant power feeding of the LT25W. Therefore the power adapter has to be modified as described in section “Redundant battery connection LT25W“ (Fig. 2.78).

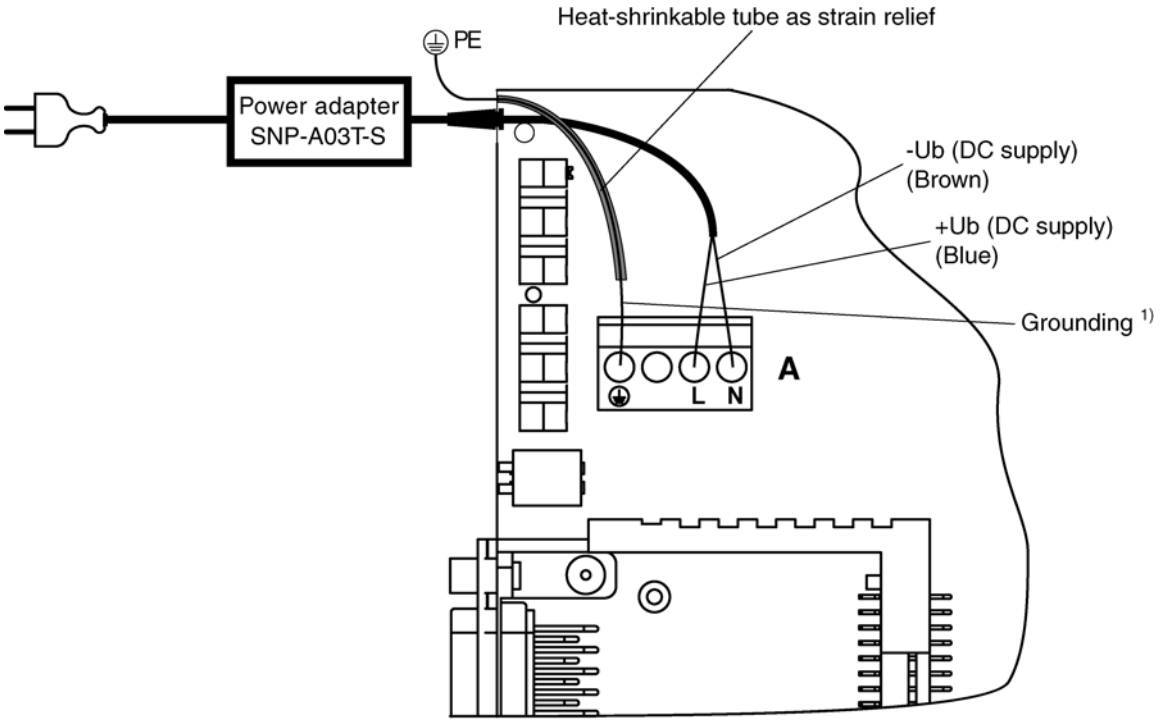
Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Connecting desktop power adapter SNP-A03T-S

For connecting desktop power adapter SNP-A03T-S, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.9.4, Fig. 2.80 to battery supply (48 V_{DC}). If you are using a desktop you must set jumper S604-9 “ON”
7. Connect the desktop power adapter according to Fig. 2.76 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Before closing an older casing, ensure that the two board clamps are inserted

11. Screw the screws on the bottom of the unit into the casing



1) With remote power supply (> 120 V) grounding is a mandatory requirement

Fig. 2.76 Connecting desktop power adapter SNP-A03T-S

Redundant battery connection LT25W

In order to provide desktop power adapter LT25W with an additional battery supply you must open the unit and connect a second cable. Proceed as follows:

1. Disconnect the net cable and also disconnect all interface cables
2. Open the power adapter by releasing the four screws on the bottom of the unit
3. Remove the bottom of the casing of the power adapter
4. Connect the supplied cable to the terminal (1) as shown in Fig. 2.77
5. Replace the cable feed-through (2) (Fig. 2.77) for a cable with the one supplied for two cables

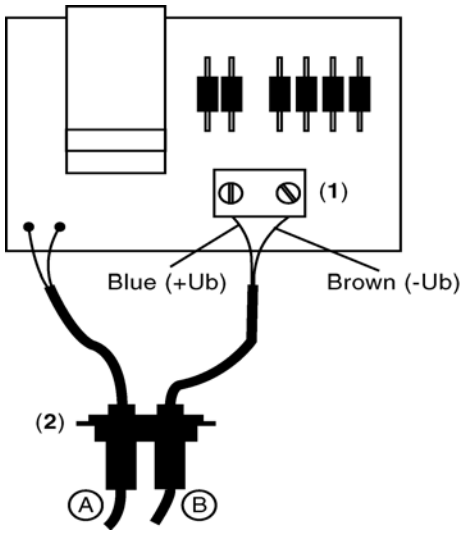


Fig. 2.77 Connecting the battery cable to desktop power adapter LT25W

6. Close the power adapter and screw the four screws into the casing
7. Connect the power adapter to the desktop unit as described above in 2 to 11
8. Connect the battery (Fig. 2.78)

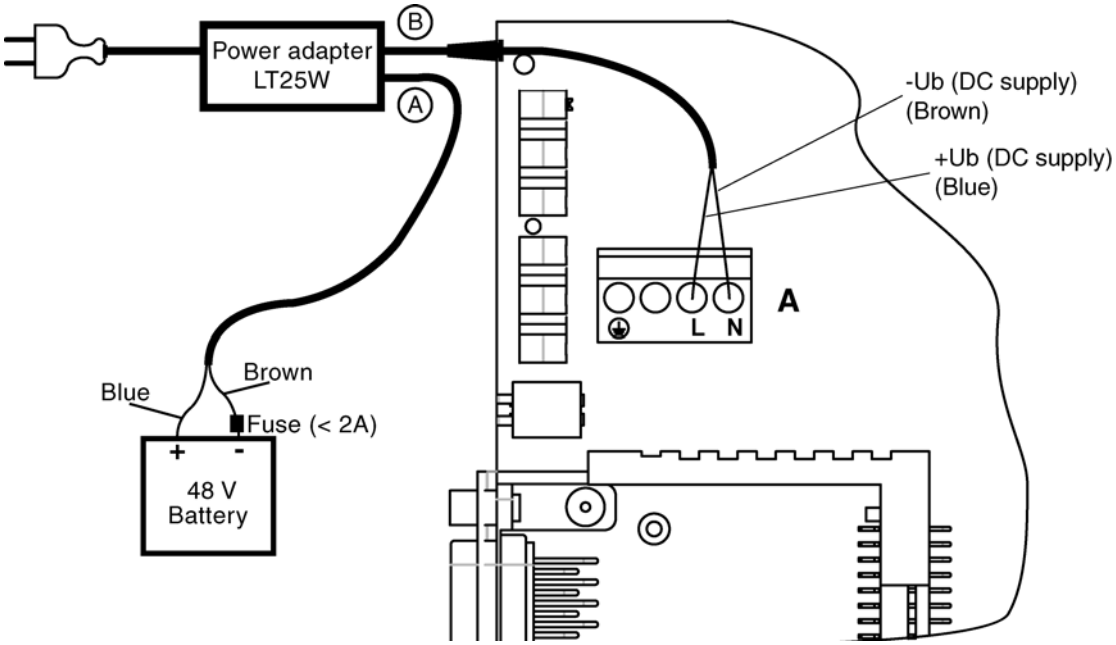


Fig. 2.78 Connecting the battery to desktop power adapter LT25W

Desktop power adapter NTU

For redundant power feeding of an STU2 desktop by local 110 / 230 V_{AC} and remote power the adapter NTU has to be used, which generates 120 V_{AC} on the far side. Desktop configured for this application will normally take the power from the local source. If this fails the desktop will switch automatically to remote power.

⚠ Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

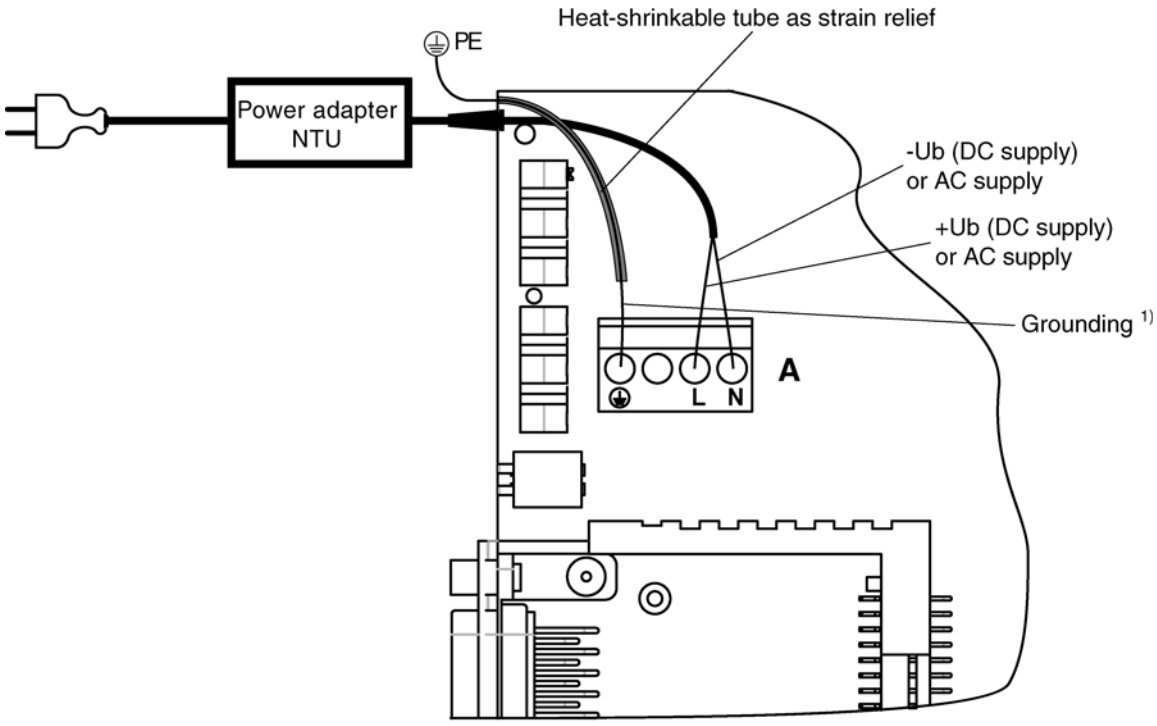


Fig. 2.79 Connecting desktop power adapter NTU

Connecting desktop power adapter NTU

For connecting desktop power adapter NTU, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.9.4, Fig. 2.82 to remote supply (additional jumpers are included with desktop unit NTU)
7. Connect the desktop power adapter according to Fig. 2.79 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Before closing an older casing, ensure that the two board clamps are inserted
11. Screw the screws on the bottom of the unit into the casing

2.9.4 Set the STU2 power supply via jumpers

Below, you will find the individual jumper settings for the STU2. The following types of use are described:;

- **STU2 used as a desktop unit**
  - Local AC supply
  - Local DC supply
  - Remote supply
- **STU2 used as a plug-in unit**
  - Local DC supply

The casing must be opened to change the jumper settings on the desktop unit. For this, the screws on the bottom of the unit must be released.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

The jumper settings for plug-in unit and desktop units are different.
Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

The jumper sockets B, C and D are not equipped in all models of the STU2. The following instructions only apply if the corresponding jumper sockets are equipped on the STU2.

Jumper	Meaning
B	Desktop unit local supply; AC or DC
C	Supply of the plug-in unit
D	Desktop unit supplied remotely

Tab. 2.45 Meaning of jumpers B, C and D on the STU2

Desktop unit local supply; AC or DC

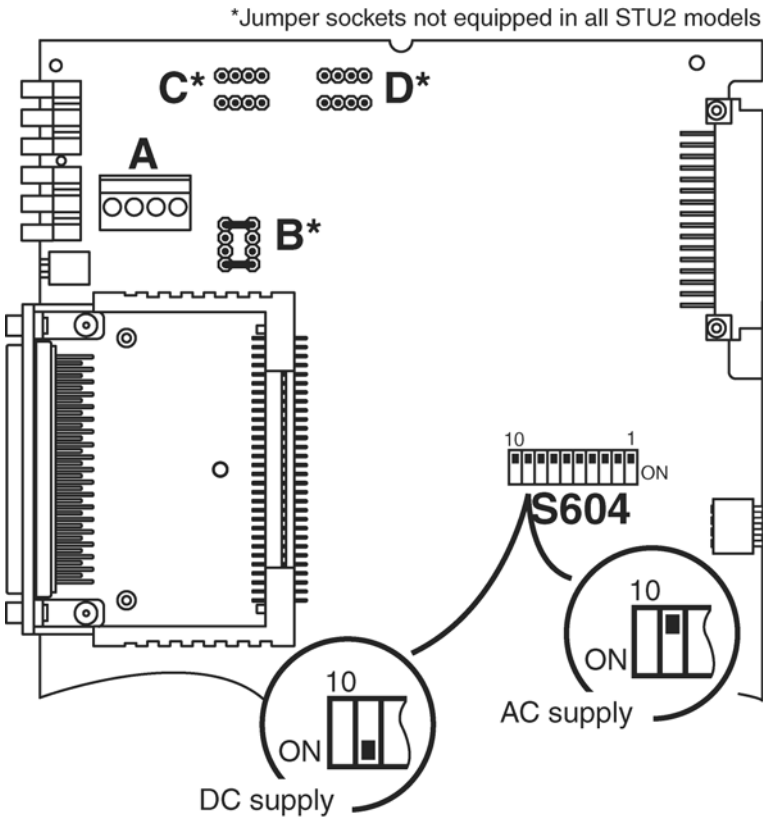


Fig. 2.80 Jumper settings: STU2 desktop unit local supply; AC or DC

Desktop unit supplied remotely

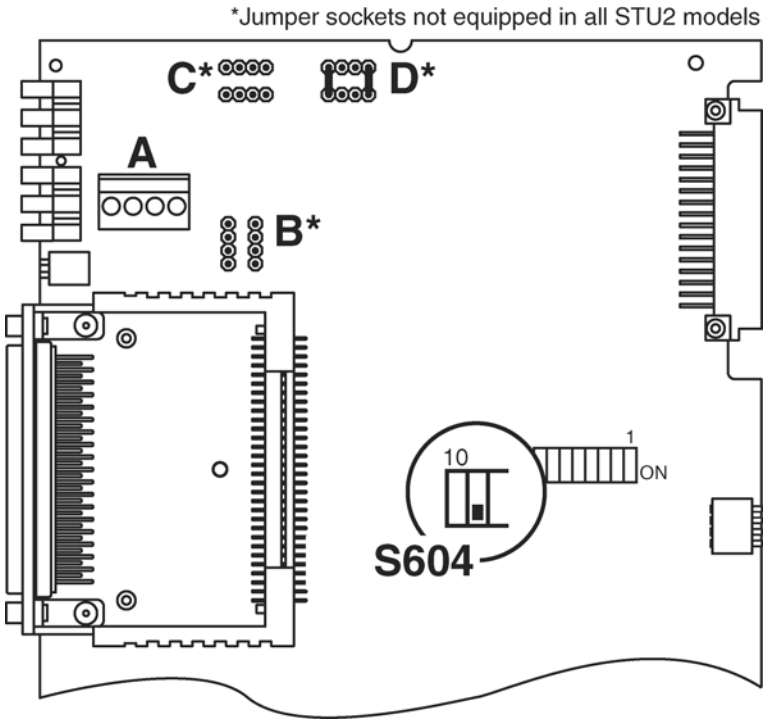


Fig. 2.81 Jumper settings: STU2 Desktop unit supplied remotely

With a remote power supply that is < 120 V, grounding is mandatory and must be present as described in chapter 2.9.2. If you have no other option, the desktop that is supplied remotely with 180 V_{AC} can also be grounded via the SHDSL connector.

Desktop unit supplied redundantly with the desktop power adapter NTU

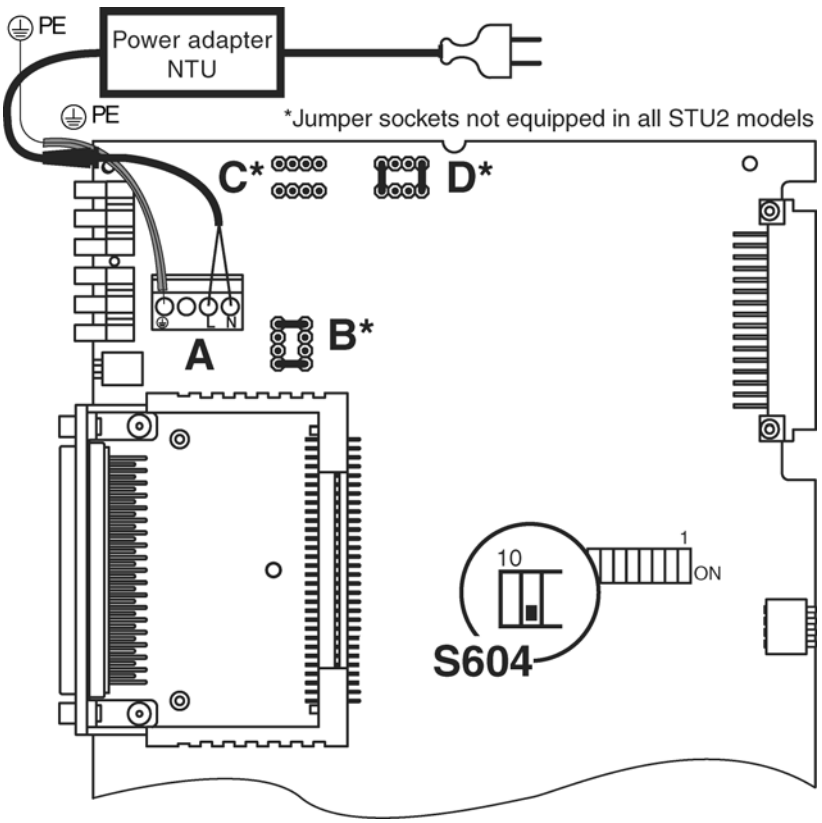


Fig. 2.82 Jumper settings: Desktop unit supplied redundantly with the desktop power adapter NTU

2.9.5 STU2 remote feeding

Remote feeding

The STU2 plug-in unit can be supplied with an integrated remote power supply. This enables the remote feed of a desktop device or up to four regenerator (two SRU's of each wire pair).

Transmission and supply is via the SHDSL path. The ground-free supply voltage is either 120 V_{DC} or 180 V_{DC}. The remote supply current is 50 mA or 60 mA.

i You can only supply remotely powered desktop units with 40 – 72 V_{DC}.

i The remote power supply module (RPSII, chapter 2.19.5) cannot be used together with the STU2.

Remote feed voltage 180 V_{DC}

When using the remote feed voltage of 180 V_{DC} the following preconditions must be met:

- A RFT-C circuit must be involved
- The cables must be approved for a remote feed voltage of 180 V_{DC}
- The line capacity to ground for the entire system must not exceed 14 µF

2.9.5.1 Configuration of the DIP switches for STU2 remote feed

Fig. 2.83 shows you the settings for the plug-in unit to remote feed desktop device with 120 V. Fig. 2.84 shows you the settings for 180 V remote feed voltage.

Set the current limit with the DIP switch S2:

Switch S2-2	
Setting	**Meaning**
On	50 mA
Off	60 mA

Tab. 2.46 Current limit for STU2 remote feed

The DIP switches ‘S604-10’, ‘S2-1’ and ‘S2-2’ as well as Jumper M must be set regardless of using the LCT.

The remote feed is turned on/off either using the DIP switch S604-9 (if DIP switch S604-3 is “On”), see Tab. 2.42, or via the LCT (if DIP switch S604-3 is “Off”).

STU2 devices with RPS on board can be supplied neither remotely nor with 110 / 230 V_{AC}.

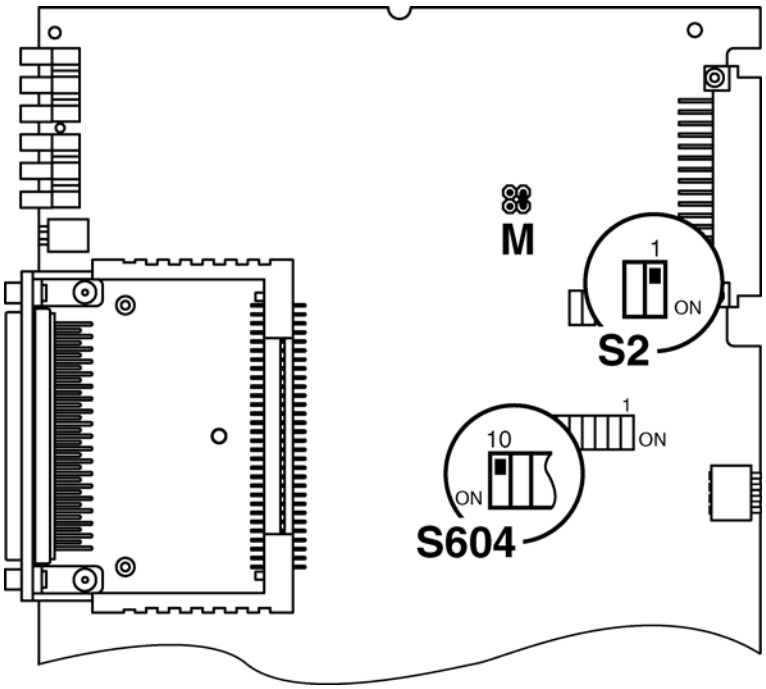


Fig. 2.83 STU2 remote feed voltage 120 V

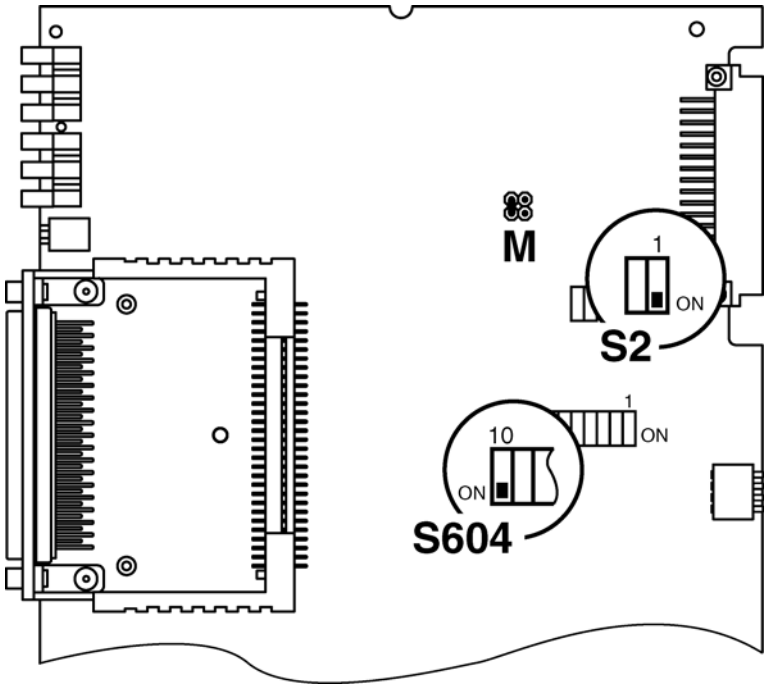


Fig. 2.84 STU2 remote feed voltage 180 V

2.9.5.2 STU2 remote feed monitoring and alarm signalling

Monitoring circuit

A monitoring circuit controls the voltage and the current control. The settings are done using DIP switches, see chapter 2.9.5.1. For security reasons, two independent circuit parts and two independent DIP switches are needed for the settings relevant to security.

Earth leakage

The output voltage is monitored for earth leakage and is turned off in case of fault. In case of a disturbance the STU2 tries to reestablish the remote feed.

The STU2 remote feed recognizes the following states:

- Remote feeding current too deep (line interruption)
- Remote feeding current too high (short circuit)
- Earth leakage

Out of this states the STU2 generates the following alarms:

Alarm	Event	Description	Generated alarm
UCR1; UCR2; UCR1+2	Line break	Remote feeding current too deep (line interruption)	Non-urgent alarm
UNBAL	Earth leakage	Protection circuit turned of because of earth leakage	Urgent alarm
OC	Short circuit	Remote feeding current too high (short circuit)	Urgent alarm

Tab. 2.47 STU2 remote feed alarm signalling

You can test the protection circuit by, for example, setting the voltage control at 180 V_{AC} (Jumper M, DIP switch S604-1 “ON”) and the voltage monitoring at 120 V_{DC} (DIP switch S604-10 “OFF”). In this constellation the protection circuit must respond.

2.9.5.3 Configuration of the power fail recognition using DIP switches

The configuration is done using the DIP switch S604-9, see Tab. 2.42.

2.9.6 Configuration of the STU2 for single wire pair mode

You can operate the STU2 with just one wire pair. Special firmware is required for this mode of operation and in the as-delivered state this is stored in the passive bank. For single wire pair operation you must swap the firmware into the active bank (see ULAF+ User Manual (UMN [2])). The functionality is identical in this mode to that of the STU.

Jumper settings

So that you can operate the STU2 in single wire pair mode together with an STU, you must set jumper “N” as shown in Fig. 2.85.

Changing the jumper from Pin 3 to Pin 5 on the STU2 restults in a “Tip/Ring Reversal” on the line. If the STU2 is used together with the STU in single wire pair operation, a “Tip/Ring Reversal” is therefore always indicated in the LCT.

i

When the STU2 is used in single wire pair mode in conjunction with the STU only the path used may be wired. Otherwise a module which supplies the distant station with its remote power feed signals an “Under Current Alarm” (UCR1).

In single wire pair mode the active wire pair is applied to Pins 3,4 or to Pins 4,5. The position of jumper “N” governs which Pins are used.

If you use the STU2 in single wire pair mode on both sides (LT and NT), jumper “N” must be plugged into the same position on both modules. The actual jumper setting is not pre-specified here.

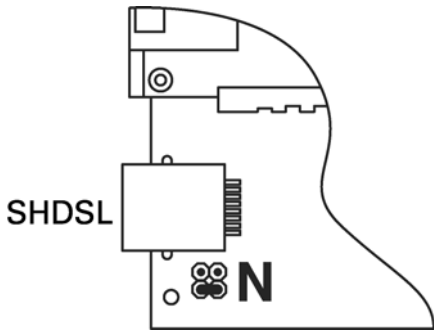


Fig. 2.85 Jumper “N” for single wire pair mode of the STU2

2.9.7 Pin assignment of the SHDSL interface

Pin assignment of the SHDSL interface

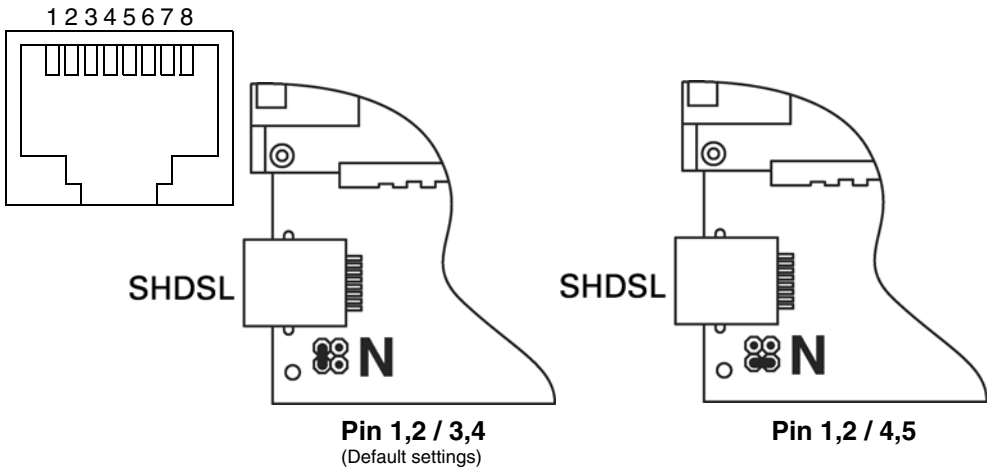


Fig. 2.86 RJ45 connector of the SHDSL interface

i In single wire pair mode the active wire pair is applied to Pins 3,4 or to Pins 4,5. The position of jumper N governs which Pins are used.

2.9.8 Supervision and alarm signalling of the STU2

The operating mode and alarm signalling of the STU2 are indicated by means of LEDs on the front of the unit.

Pin assignment	Signal	Description
1	SHDSLA_1	Bi-directional SHDSL signal, SHDSL interface - Wire pair 1
2	SHDSLB_1	
3	SHDSLA_2	Bi-directional SHDSL signal, SHDSL interface - Wire pair 2 [1)]
4	SHDSLB_2	
4	SHDSLA_2	Bi-directional SHDSL signal, SHDSL interface - Wire pair 2 [1)]
5	SHDSLB_2	
6, 7, 8	– –	– –
Housing	Ground	Circuit ground

1) Depends on Jumper “N” (Fig. 2.86)

Tab. 2.48 Pin assignment of the SHDSL interface

2.9.8.1 Visual signalling of the plug-in unit

When the STU2 is used as a plug-in unit, the front panel is equipped with six LEDs (Fig. 2.87).

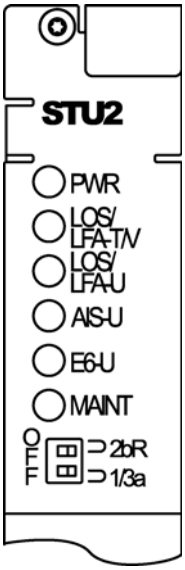


Fig. 2.87 Visual signalling of the STU2 plug-in unit

LED	Color	Status	
		Off	On
PWR	green	no power supply	power supply ok
LOS/LFA-T/V [1)]	red	no alarm	loss of signal/loss of frame alignment at T/V
LOS/LFA-U [1)]	red	no alarm	loss of signal/loss of frame alignment at U
AIS-U	yellow	no alarm	AIS at U
E6-U	yellow	no alarm	Block error rat >10^{-6} at U
MAINT	yellow	no maintenance function	local maintenance function active

1) Visual signalling according to Fig. 2.88

Tab. 2.49 Visual signalling of STU2 plug-in unit

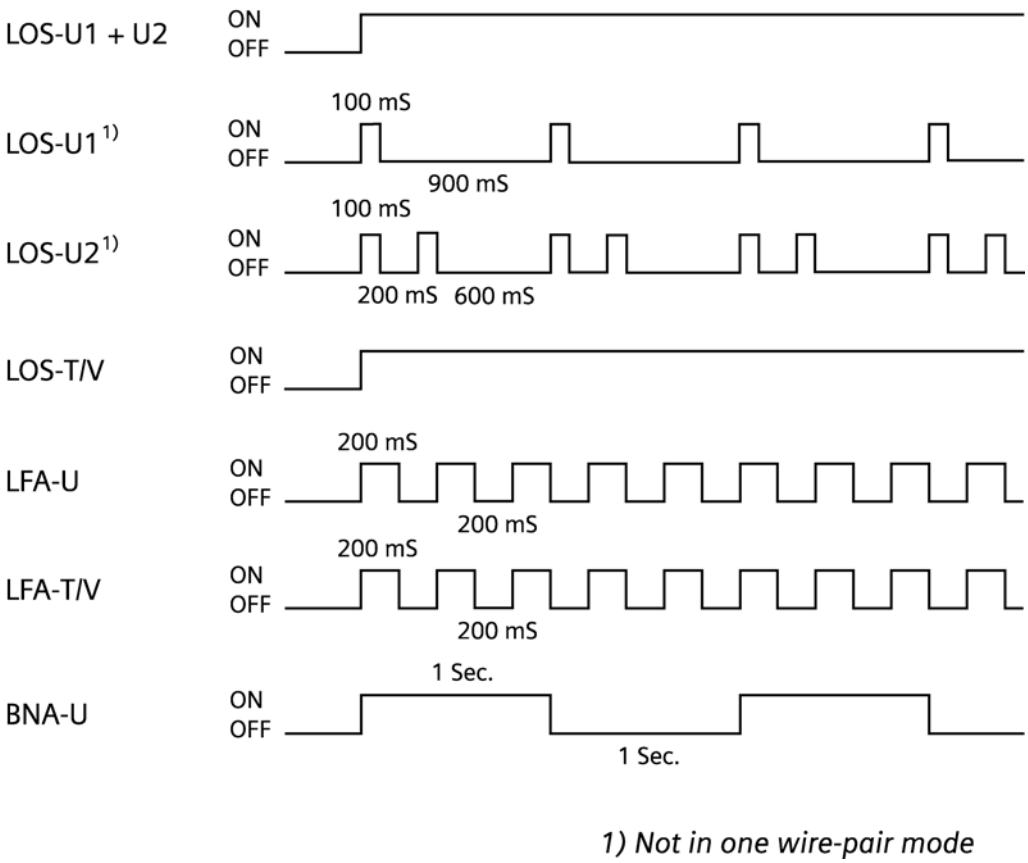


Fig. 2.88 Visual signalling LOS/LFA/BNA of the STU2

2.9.8.2 Visual signalling of the desktop unit

In contrast to the plug-in unit, the desktop unit has three additional LEDs. The meaning of the LEDs is explained in Tab. 2.50.

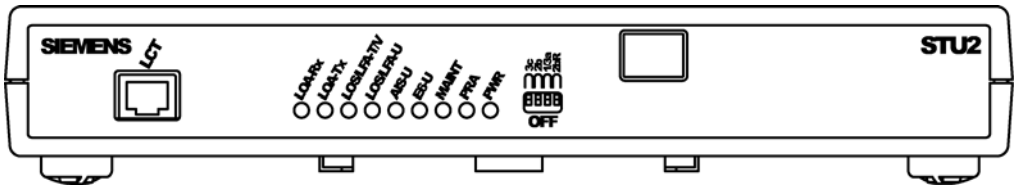


Fig. 2.89 Visual signalling of the desktop unit

LED	Color	Status	
		Off	On
LOA-Rx	yellow	no permanent 0 or 1 (data interface; line 104/receive data)	permanent 0 or 1
LOA-Tx	yellow	no permanent 0 or 1 (data interface; line 103/transmit data)	permanent 0 or 1
LOS/LFA-T/V [1)]	red	no alarm	loss of signal/loss of frame alignment at T/V
LOS/LFA-U [1)]	red	no alarm	loss of signal/loss of frame alignment at U
AIS-U	yellow	no alarm	AIS at U
E6-U	yellow	no alarm	Block error rare >10^{-6} at U
MAINT	yellow	no maintenance function	Local maintenance function active
PRA	green	no ISDN-PRA operation	PRA operation
PWR	green	no power supply	Power supply ok

1) Visual signalling according to Fig. 2.88

Tab. 2.50 Visual signalling of the desktop unit

2.9.9 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator or
- using DIP switches on the modules or
- using control lines 140/141 (V.35/V36).

The procedure for inserting loopbacks by means of management software can be found in the user manual of ULAF+ [2] or AccessIntegrator [6].

The various loopbacks are shown in Fig. 2.91 to Fig. 2.93. The names of the individual loopbacks are explained in Tab. 2.51.

Loopback 2b can be inserted locally at the NT or remotely at the LT (loopback 2bR) using DIP switches.

Loopback	Meaning / effect
Loopback 1	U-interface - direction V-interface (LT)
Loopback 2b [1)]	U-interface direction - local - in the digital unit
Loopback 2bR [1)]	U-interface direction - remote - in the digital unit
Loopback 3a [1)]	DTE1/DTE2-interface direction - in the termination unit
Loopback 3c	DTE2-interface direction - at the subscriber interface

1) Loopbacks are transparent

Tab. 2.51 Designation of the loopbacks on the STU2

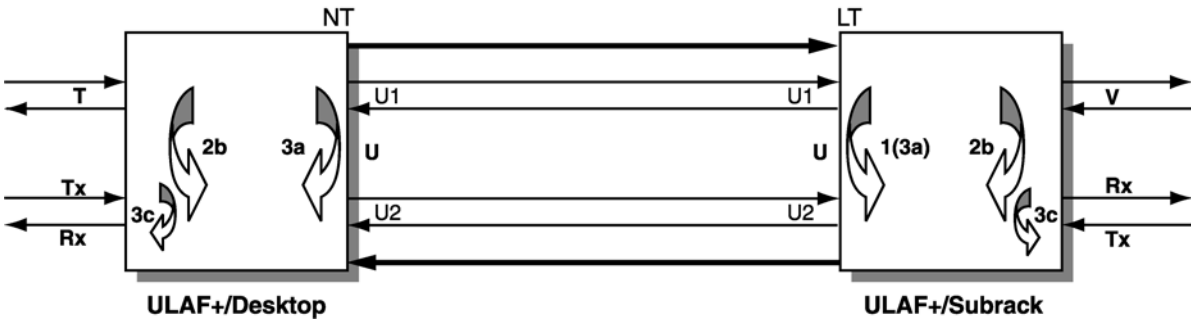


Fig. 2.90 'Access Network' loopback concept

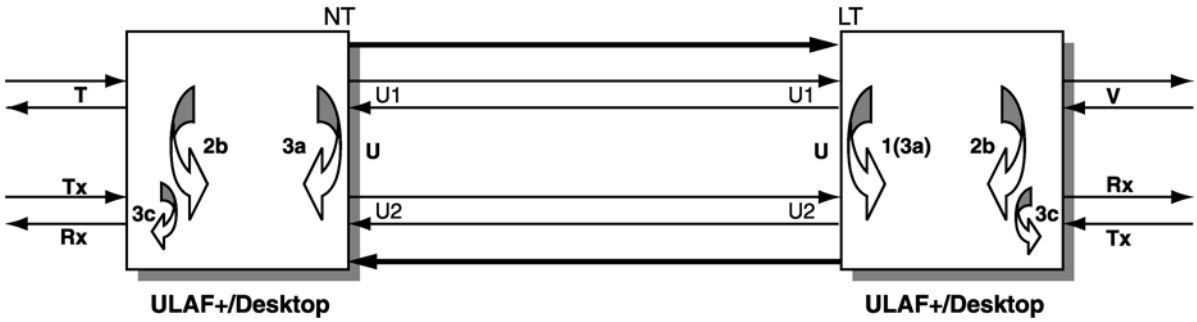


Fig. 2.91 'Campus Network' loopback concept

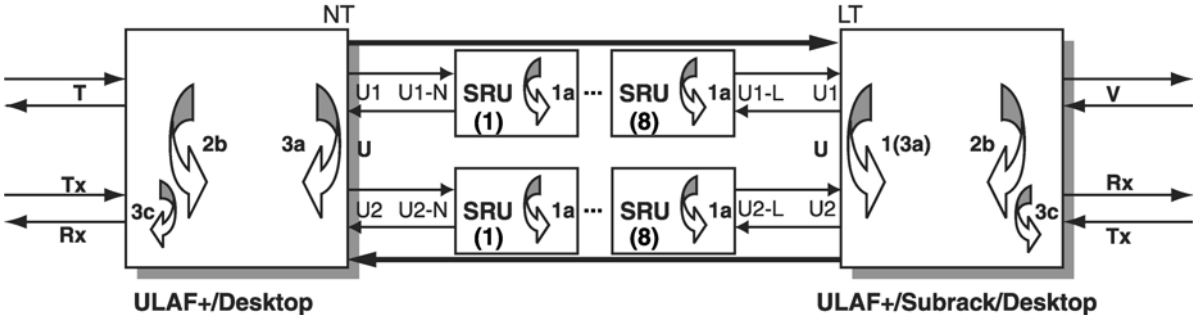


Fig. 2.92 Regenerator loopback concept

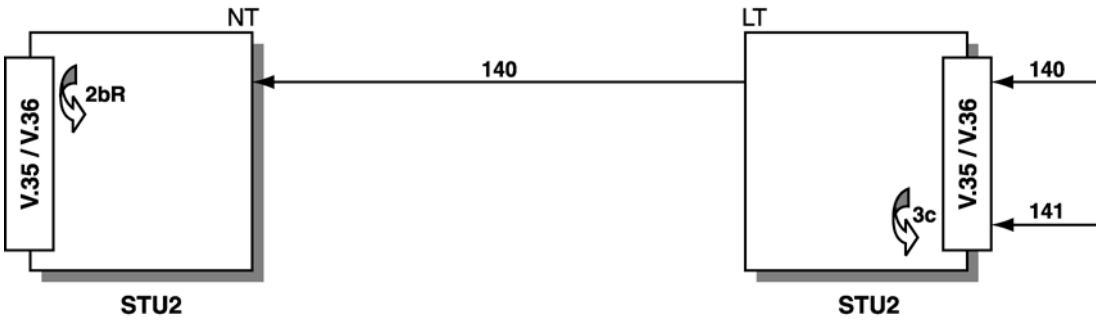


Fig. 2.93 Loopback via control line 140/141 (V.35/V.36)

Notes

- In the add-drop mode, loopback 2b is set for the two interfaces (G.703 and data) and loopback 3c for the data interface only
- The loopback 2bR can be inserted only from the LT in the NT

The following loopbacks can be applied to the plug-in unit using DIP switches:

- Loopback 1 or 3a respectively
- Loopback 2bR

The following loopbacks can also be applied to the desktop unit using DIP switches:

- Loopback 2b (in ‘add-drop mode’ for the two interfaces)
- Loopback 2bR
- Loopback 3c
- Loopback 3a

2.10 BSTU termination unit

Application

The BSTU termination unit is available in different variants. The graphics shown in this document may differ from your BSTU.

The following variants are available:

- Plug-in unit or desktop device,
- one or two SHDSL interfaces,
- X.21 interface onboard,
- slot for data inteface modules,
- Ethernet interface onboard,
- Remote power supply (RPS) onboard,
- slot for Clock- and Alarm module.

This chapter will describes which settings you have to be made for the BSTU.

Fig. 2.94 shows you the BSTU for the desktop device.

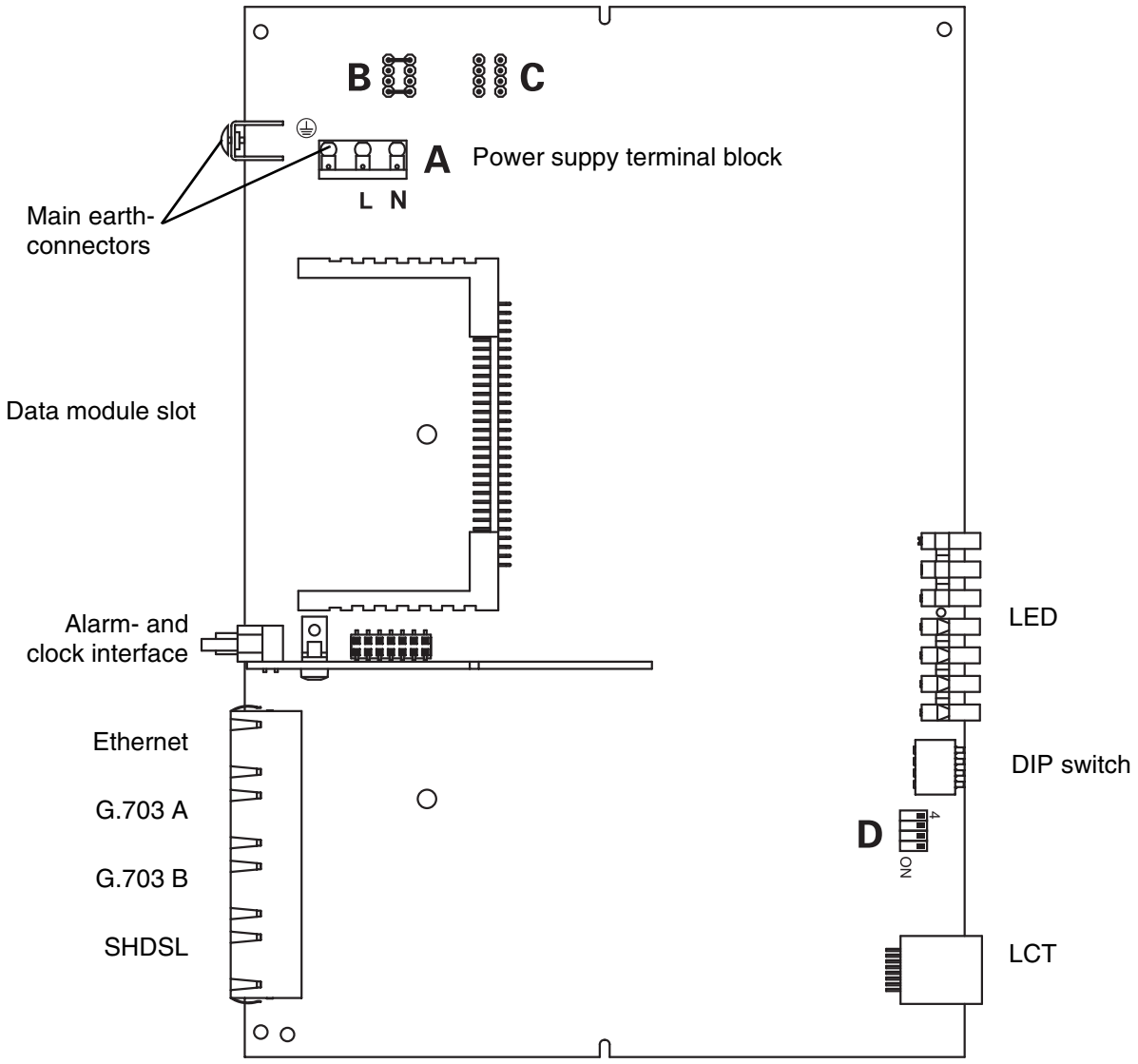


Fig. 2.94 BSTU desktop unit

2.10.1 Modes of operation of the BSTU

In conjunction with another BSTU the following operating modes are possible:

- 1x 1 wire pair mode
- 1x 2 wire pairs mode
- 2x 1 wire pair mode

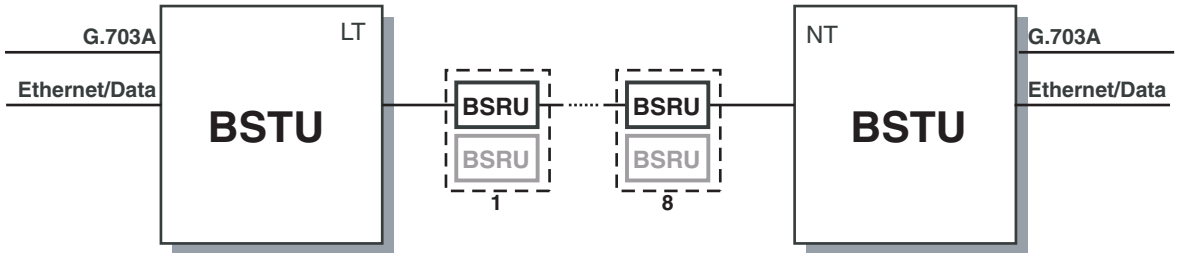


Fig. 2.95 Operating mode: BSTU(LT) – BSTU(NT); 1x 1 wire pair

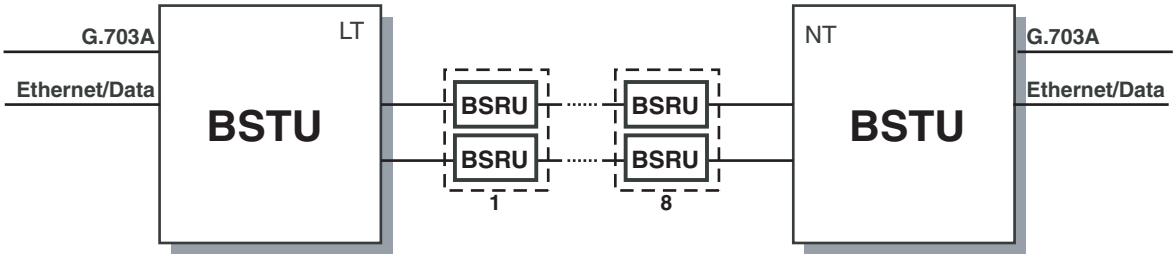


Fig. 2.96 Operating mode: BSTU(LT) – BSTU(NT); 1x 2 wire pair

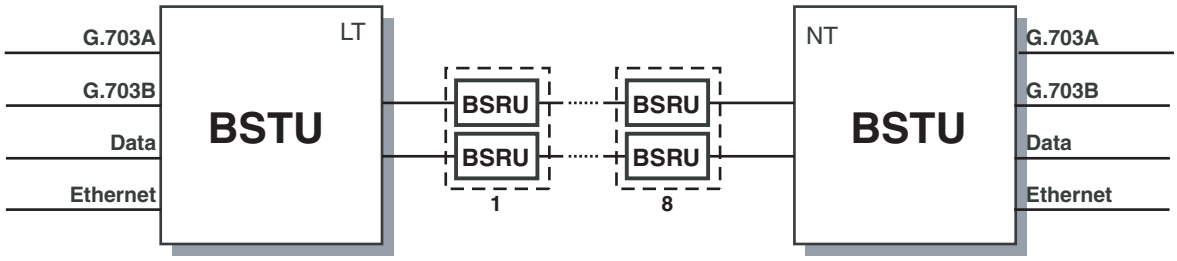


Fig. 2.97 Operating mode: BSTU(LT) – BSTU(NT); 2x 1 wire pairs

On a QSTU – BSTU link the following operating modes are possible:

- 4x 1 wire pair mode
- 2x 2 wire pairs mode
- 2x 1 wire pair mode

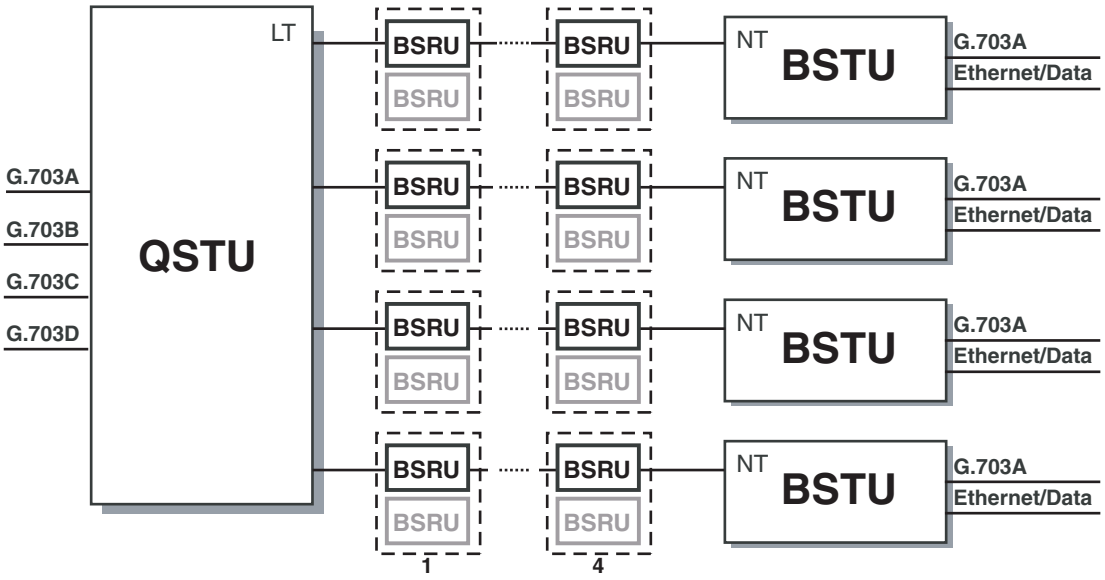


Fig. 2.98 Operating mode: QSTU(LT) – 4x BSTU(NT); 4x 1 wire pair

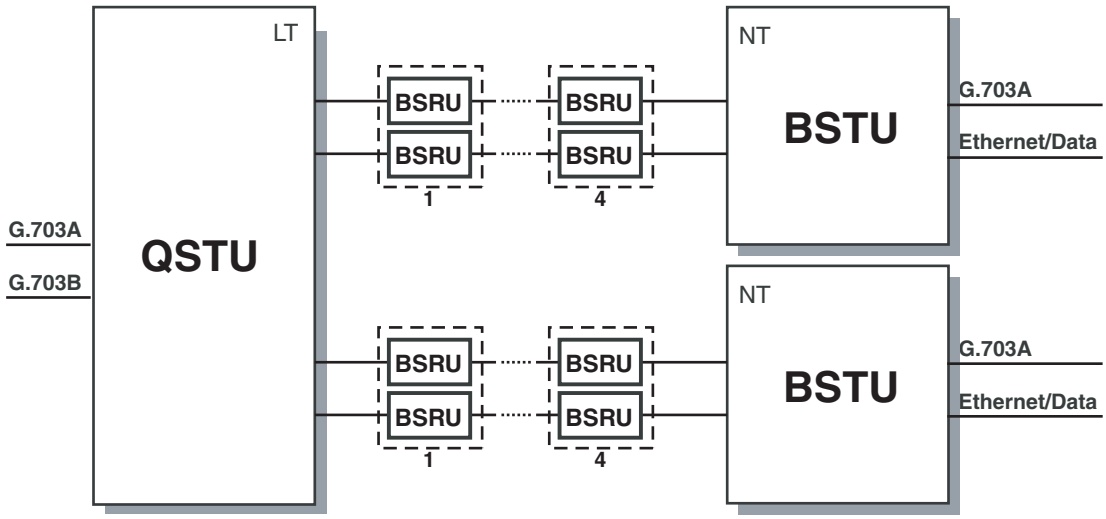


Fig. 2.99 Operating mode: QSTU(LT) – 2x BSTU(NT); 2x 2 wire pairs

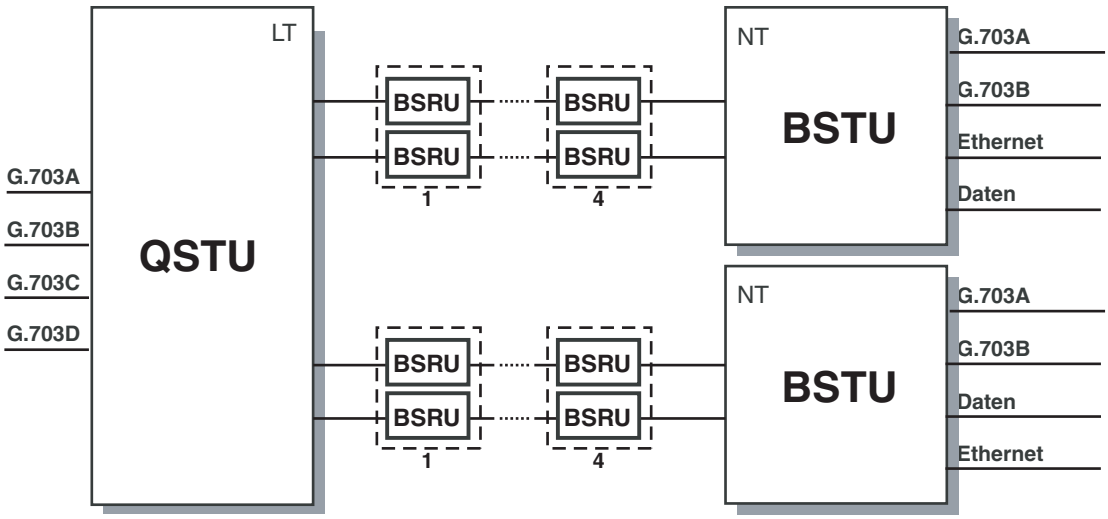


Fig. 2.100 Operating mode: QSTU(LT) – 2x BSTU(NT); 4x 1 wire pair

i In QSTU – BSTU interconnections, the QSTU must always be used on the LT side. The QSTU must have the firmware id 633 at least, enabling it to be used in conjunction with the BSTU. For further information, please refer to the ULAF+ User Manual [2].

2.10.2 Configuration of the BSTU via the DIP switches

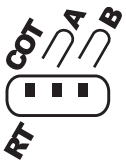
Use the DIP switches on the front panel of the BSTU to set the operating mode (Tab. 2.52), respective inserting the loopbacks (chapter 2.10.10).

DIP Switch	Description
RT / COT	NT mode[1] / LT mode[2]
⊃ A	COT: loopback 2bR; RT: loopback 3a inserted on system A
⊃ B	COT: loopback 2bR; RT: loopback 3a inserted on system B

1) Default setting, Desktop unit

2) Default setting, Plug-in unit

Tab. 2.52 Frontpanel DIP switches of the BSTU



DIP switches of the desktop unit

DIP switches of the plug-in unit

Please find more information about the loopbacks of the BSTU in chapter 2.10.10.

2.10.3 Fuses

The units are equipped with the following fuses, depending on the variant:

Type of fuse	
F1 - F4	250 V / 1,25 AT
F5	250 V / 1.25 AT
F6/F7	125 V / 1 AT
F8	125 V / 2 AT

Tab. 2.53 Usage of fuse types

The fuses have protective functions and may only be replaced by identical fuse types. If a fuse fails the device may also have been damaged.

2.10.4 Power supply to the BSTU plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC}).

2.10.5 Power supply to the BSTU desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 - 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC})
- Remotely fed via SHDSL interfaces
- Redundant power feeding (Local power supply and remotely fed)

Power supply modes

Tab. 2.54 shows you the various power supply modes for the BSTU desktop units. The table also shows you the required power adapters therefore:

Power supply	Variants without RPS	Variants with RPS
Local power supply with 110 / 230 V_{AC}	X	SNP-A03T-S
Local power supply with 48 / 60 V_{DC}	X	X
Remotely fed via SHDSL interfaces	1)	–
Redundant power feeding (local power supply AC and remotely fed)	NTU	–
Redundant power feeding (local power supply AC and DC)	LT25W	LT25W

1) Power via remote device
X Direct power supply without power adapter required
SNP-A03T-S Power adapter SNP-A03T-S required
LT25W Power adapter LT25W required (230 V_{AC} on primary side)
NTU Power adapter NTU required (230 V_{AC} on primary side)
– Not possible

Tab. 2.54 Power supply modes

You use jumpers to select the type of supply. The housing must be opened so that you can change the jumper settings with the desktop unit. The screws on the underside of the unit must be unscrewed to open it.

Before opening the desktop unit you must turn off the power and pull out the interface plug. The settings may only be made by trained personnel.

Only drawn-in jumpers may be set. Other combinations are not permitted and can be dangerous for the installer or user (electric shock or fire).
Jumper sockets B and C are not equipped in all models of the BSTU. The following instructions only apply if the corresponding jumper sockets are equipped on the BSTU.

2.10.5.1 Local power supply (110 / 230 V_{AC}) for the desktop unit without RPS

Fig. 2.101 shows you the jumper setting for the local AC supply for the desktop unit without RPS.

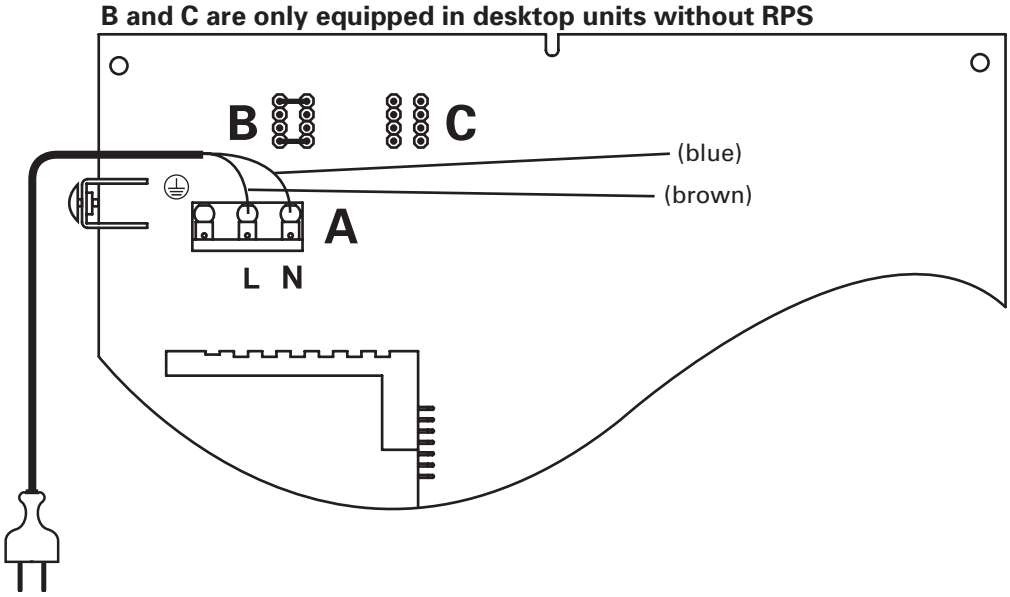


Fig. 2.101 Local power supply with 110 / 230 V_{AC} (modules without RPS)

2.10.5.2 Local power supply (230 V_{AC}) for the desktop unit with RPS

Fig. 2.102 shows you the desktop unit variants with RPS. The 230 V_{AC} supply is provided by the SNP-A03T-S desktop mains supply, which generates 60 V_{DC} secondary voltage.

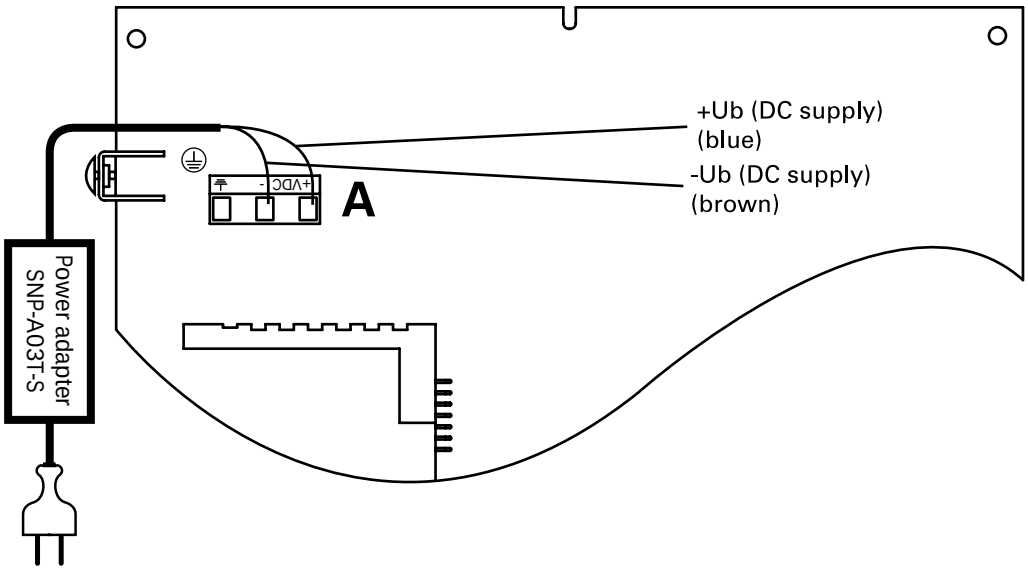


Fig. 2.102 Local power supply with 230 V_{AC} (modules with RPS)

2.10.5.3 Local power supply (48 / 60 V_{DC}) for the desktop unit without RPS

With the local power supply with 48 / 60 V_{DC} you connect the desktop unit to an appropriate power supply source.

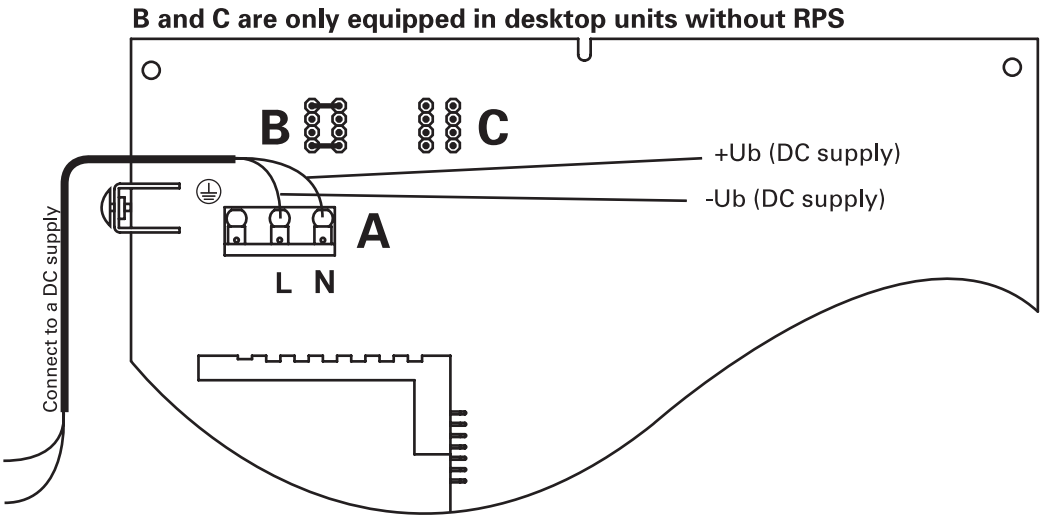


Fig. 2.103 Local power supply with 48 / 60 V_{DC} (modules without RPS)

i A powerfail alarm is displayed with the 48 V/60 V_{DC} power supply. To prevent this activate the powerfail suppression in the LCT, see ULAF+ User Manual [2].

2.10.5.4 Local power supply (48 / 60 V_{DC}) for the desktop unit with RPS

Fig. 2.104 shows you the desktop unit variants with RPS. With the local power supply with 48 / 60 V_{DC} you connect the desktop unit to an appropriate power supply source.

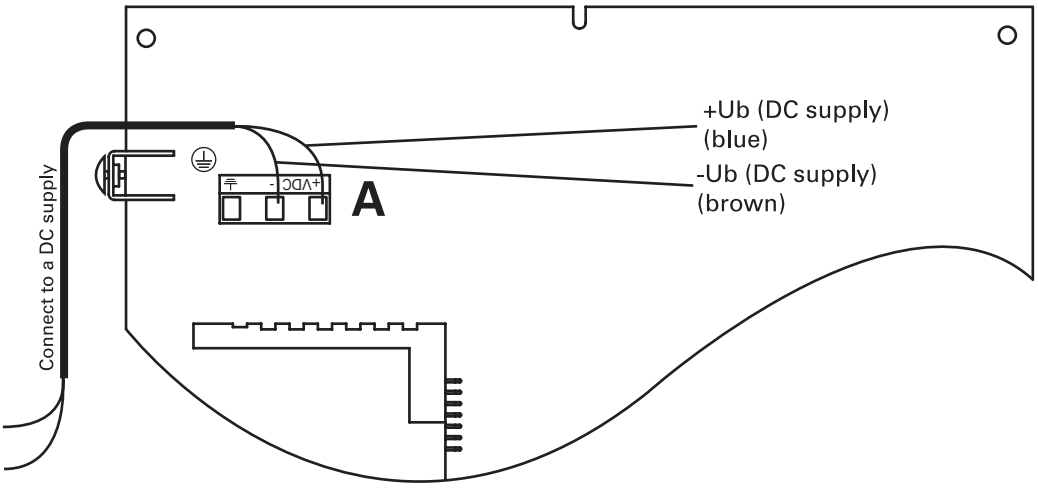


Fig. 2.104 Local power supply with 48 / 60 V_{DC} (modules with RPS)

2.10.5.5 Remote power supply via SHDSL interface

Fig. 2.105 shows the jumper setting for the remote power-supplied desktop unit.

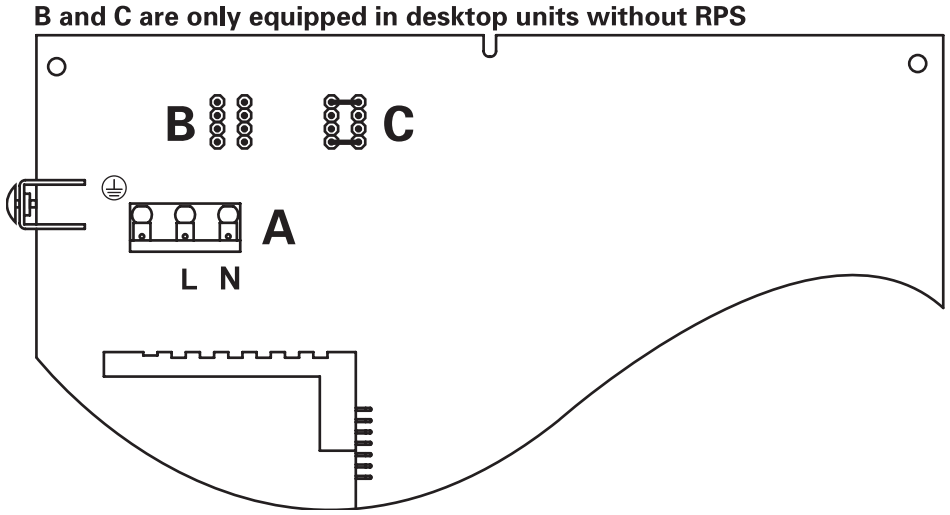


Fig. 2.105 Remote power supply via SHDSL interface (moduleswithout RPS)

- The BSTU desktop unit can be remote power-supplied with 120 V_{DC} or 180 V_{DC}. With remote supply voltages > 120 V_{DC} the desktop unit earthing is mandatory. You will find more information about the grounding concept of the BSTU in chapter 2.10.7

- Remote power-supplying BSTU desktop units may not be remotely supplied.

2.10.5.6 Redundant desktop unit power supply without RPS (local AC- and remote power supply)

For a redundant power supply of the BSTU desktop unit with local 230 V_{AC} and remotely supplied via the SHDSL path you require the NTU desktop unit, which generates 120 V_{DC} secondary voltage. The desktop unit configured for redundant power supply normally draws the feed via the local power supply. With a failure of the local power supply the desktop unit changes automatically and without interruption to the remote supply.

B and C are only equipped in desktop units without RPS

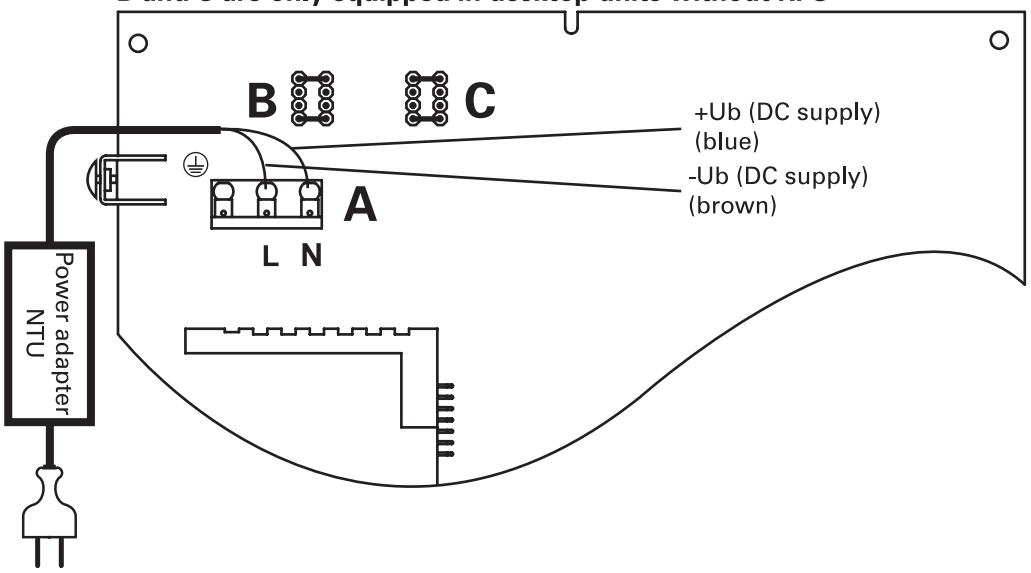


Fig. 2.106 Redundant power supply (Local AC- and remote power supply, modules without RPS)

i In this mode of operation the remote supply must be set to 120 V_{DC}.

! The two additionally required jumpers are included with the power adapter NTU. Jumpers at the two positions (B and C) may only be set in this mode of operation.

2.10.5.7 Redundant power supply of the desktop units (Local AC- and DC-power supply)

A redundant, local power supply is possible with connection of an external DC supply (e.g. backup batteries) to the LT25W desktop power adapter. To provide the LT25W desktop power adapter supply with an additional battery feed you must open it and connect a second cable. The cable is included with the LT25W.

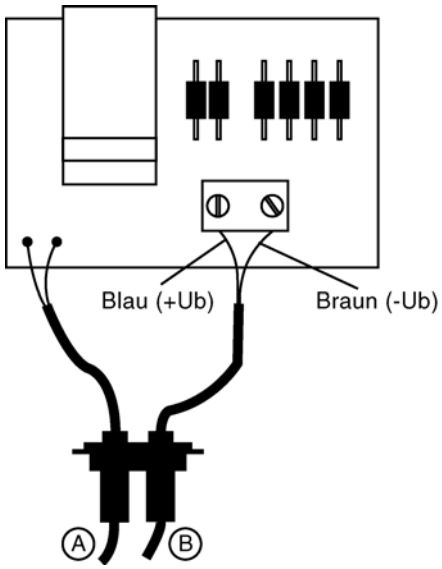


Fig. 2.107 Connecting the battery cable to desktop power adapter LT25W

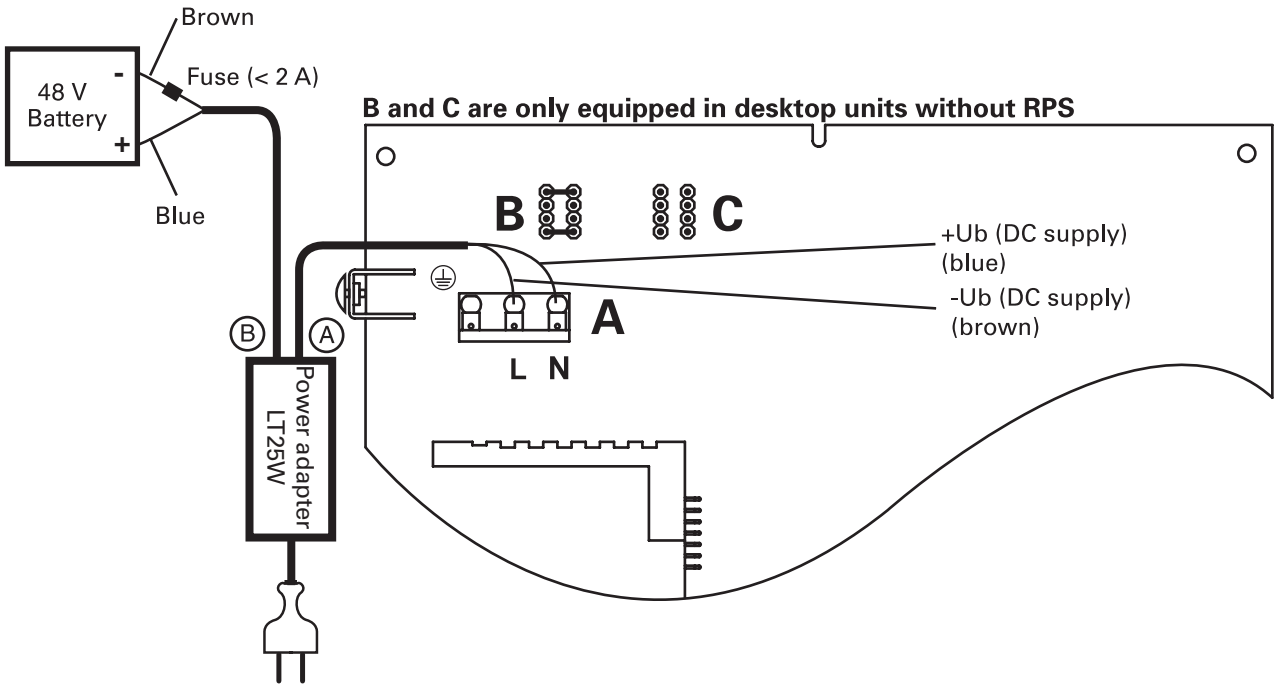


Fig. 2.108 Connecting the battery to desktop power adapter LT25W (modules without RPS)

i A powerfail alarm is displayed with the 48 V/60 V_{DC} power supply. To prevent this activate the powerfail suppression in the LCT, see ULAF+ User Manual [2].

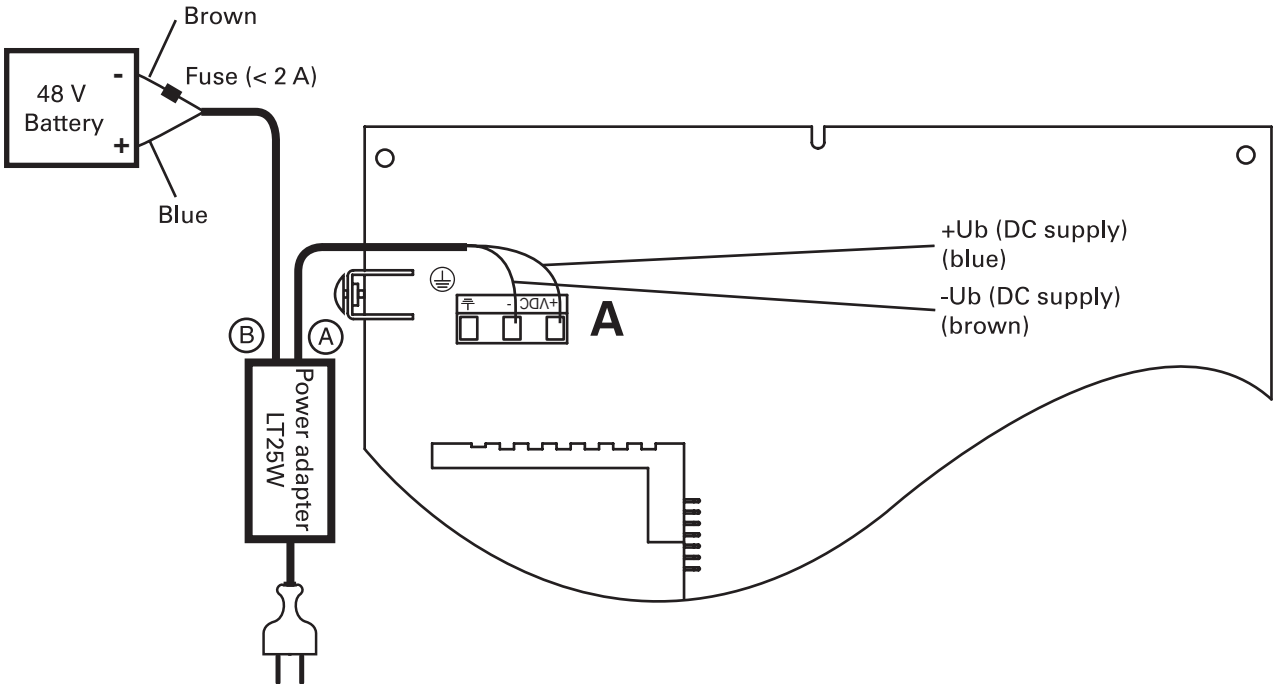


Fig. 2.109 Connecting the battery to desktop power adapter LT25W (modules with RPS)

2.10.6 BSTU remote feeding

Remote feeding

The BSTU unit can be supplied as a variant with integrated remote power supply. This enables the remote supply for desktop units and regenerators.

Transmission and supply is via the SHDSL path. The ground-free supply voltage is either 120 V_{DC} or 180 V_{DC}. The remote supply current is 50 mA or 60 mA.

Remote voltage 180 V_{DC}

When using the remote feed voltage of 180 V_{DC} the following preconditions must be met:

- A RFT-C circuit must be involved
- The cables must be approved for a remote feed voltage of 180 V_{DC}
- The line capacity to ground for the entire system must not exceed 14 µF

2.10.6.1 Configuration of the DIP switch of the BSTU for remote feed

The 50 mA/60 mA current limit control is configured in the LCT. You will find more information in the ULAF+ User Manual [2].

The supply voltage is configured using the DIP switch.

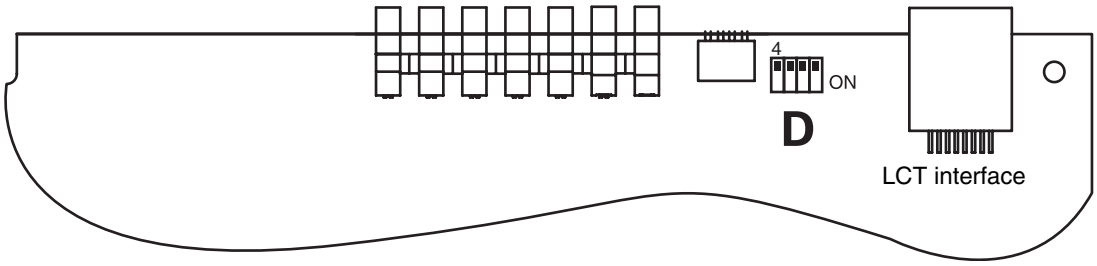


Fig. 2.110 Configuration of the DIP switch (D) for remote feed

DIP switch	Setting		Description
	ON	OFF	
1	– –	– –	– –
2	PSD test mode	– –[1)]	SHDSL retraining
3	– –	– –	– –
4	180 V_{DC}	120 V_{DC} [1)]	Remote feed

1) Default setting

Tab. 2.55 Configuration of the remote feed

With remote supply voltages > 120 V_{DC} the BSTU desktop units must be earthed. For more information see chapter "2.10.7 Grounding concept".

2.10.6.2 BSTU remote feed monitoring and alarm signalling

Monitoring circuit

A monitoring circuit controls the voltage and the current control.

The BSTU remote feed recognizes the following states for each wire pair:

- Remote feeding current too deep (line interruption)
- Remote feeding current too high (short circuit)
- Earth leakage of a wire (Unbalance)

Out of this states the BSTU generates the following alarms:

Alarm	Event	Description
UC 1/2	Line break - wire pair 1/2	Remote feeding current to deep (Under Current)
OC 1/2	Short circuit/overload - wire pair 1/2	Remote feeding to high (Over Current)
UNBAL 1/2	Unbalanced - wire pair 1/2	Earth leakage of a wire (Unbalanced)
DEF	Hardware defect	Failure of current or voltage control

Tab. 2.56 BSTU remote feed alarm signalling

2.10.7 Grounding concept

Subrack

The subrack must always be grounded (see chapter 2.3.4).

Desktop unit

For the following applications the BSTU desktop unit must be grounded over a cable of at least 0,75 mm^2:

- Desktop unit receiving remote feed with a remote feed voltage of >120 V_{DC}
  → Grounding is done over the main earth terminal (Fig. 2.94)
- Desktop unit supplying remote feed with remote feed voltage of >120 V_{DC}
  Grounding is done over the main earth terminal (Fig. 2.94)

With remote power supply with >120 V_{DC} earthing is mandatory. The symbol ⧈ on the type label must also be made invisible (e.g. covering with adhesive paper).
If desktop units are connected without earth it must be ensured that the remote supply voltage is ≤ 120 V_{DC}.

2.10.8 Pin assignment of the interfaces

The SHDSL, the two G.703 and the Ethernet interface are accessible on a 4-piece socket board.

Not all connections are wired. This depends on the BSTU equipped variant.

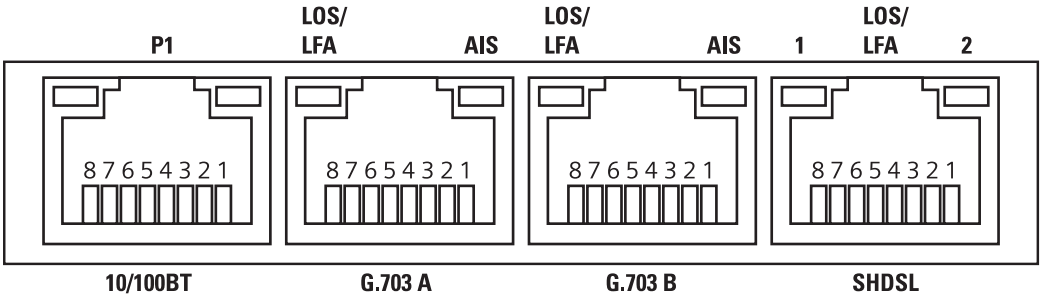


Fig. 2.111 Pin assignment of the interfaces

Pin assignment of the SHDSL interface

The Pin assignment is according to a twisted standard LAN cable.

Pin assignment	Signal	Description
1	SHDSL2a	SHDSL interface wire pair 2
2	SHDSL2b	
4	SHDSL1a	SHDSL interface wire pair 1
5	SHDSL1b	
3, 6, 7, 8	– –	Not connected

Tab. 2.57 Pin assignment of the SHDSL interface

Pin assignment of the G.703 interface

The impedance of the G.703 interface is 75 Ω or 120 Ω. The configuration is performed in the ULAF+ LCT. You will find more information in the ULAF+ User Manual [2]. An adapter cable (BNC ↔ RJ45), which enables the asymmetrical mode of operation (PIN 2 and 5 earthed), is available for operation with 75 Ω.

Pin assignment	Signal		Description
	120 Ω	75 Ω	
1	TxA	TxA	Transmited data
2	TxB	TxB	
3	Shield	Shield	Shield transmited data, Circuit ground
4	RxA	RxA	Received data
5	RxB	RxB	
6	Shield	Shield	Shield received data, Circuit ground
7	--	--	--
8	--	--	--
Casing	Shield	Shield	Overall ground, Circuit ground

Tab. 2.58 Pin assignment of the G.703 interface

Pin assignment of the Ethernet interface

Pin assignment	Signal	Description
1	TxP	Transmited data
2	TxM	
3	RxP	Received data
4	--	Pin 4 and 5 over 75 Ω connected to circuit ground
5	--	
6	RxM	Received data
7	--	Pin 7 and 8 over 75 Ω connected to circuit ground
8	--	
Casing	Shield	Overall ground on circuit ground

Tab. 2.59 Pin assignment of the Ethernet interface

Pin assignment of the LCT interface

Pin assignment	Name	Description
3	RxD	Receive signal
4	TxD	Transmit signal
5	GND	Ground connection

Tab. 2.60 RS232-Schnittstelle für das LCT

i The pins 1, 2, 6, 7 and 8 must not be connected.

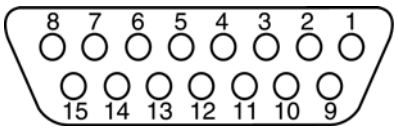
An adapter cable is available for connecting the LCT interface to the RS232 interface of your PC.

The transmission rate is 9600 Baud. The data format of the interface is as follows:

- 8 data bits
- 1 start bit
- 1 stop bit
- No parity
- No handshake

Pin assignment of the X.21 interface

The X.21 DCE interface uses an ISO Standard 4903 connector (Sub-D 15 f).



(Front view)

Fig. 2.112 X.21 DCE interface

Pin	Signal name	DTE ↔ DCE	Description
1	Schirm		Shield[1)]
2	T(a)	→	Transmit data
3	C(a)	→	Control line
4	R(a)	←	Receive data
5	I(a)	←	Indication signal
6	S(a)	←	Signal element timing
7	X(a)	→	DTE signal element timing
8	SG		Signal ground
9	T(b)	→	Transmit data
10	C(b)	→	Control line
11	R(b)	←	Receive data
12	I(b)	←	Indication signal
13	S(b)	←	Signal element timing
14	X(b)	→	DTE signal element timing
15	NC		Not assigned

1) See Tab. 2.62

Tab. 2.61 Pin assignment of the X.21 interface

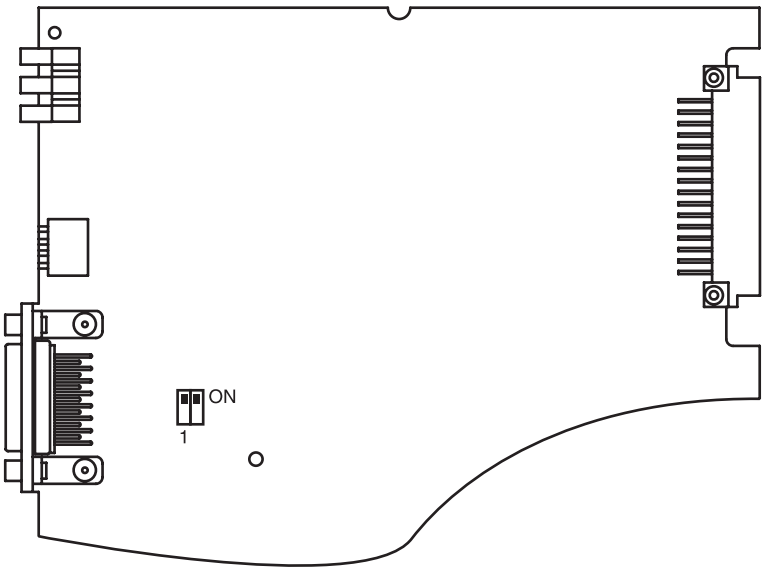


Fig. 2.113 DIP switches of the X.21 interface

DIP switch	Settings	Description
1	ON [1)]	Must always be 'ON'
2	ON [1)] OFF	Shield (Pin 1) connected with low-impedance to ground Shield (Pin 1) connected by capacitor to ground

1) Auslieferzustand

Tab. 2.62 DIP switches of the X.21 interface

2.10.9 Supervision and alarm signalling of the BSTU

The operating mode and alarm signalling of the BSTU are indicated by means of LEDs on the front side of the unit, with the desktop unit also displayed on the rear.

2.10.9.1 Visual signalling of the plug-in unit

The visual signaling of the BSTU is made using LEDs on the front (Fig. 2.114).

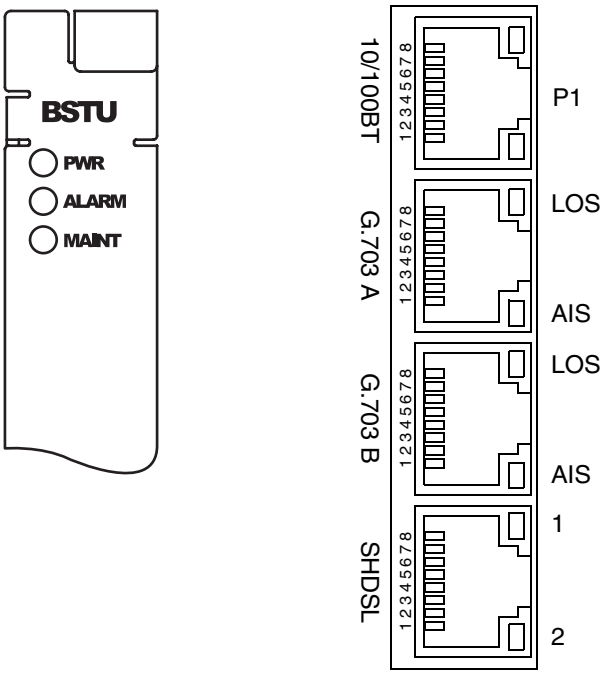


Fig. 2.114 Visual signalling of the plug-in unit

LED	Color	Status	
		Off	On
PWR	green	no power supply	Power supply o.k.
Alarm	red	no alarm	Urgent alarm [2)]
	yellow	no alarm	Non-urgent alarm [2)]
MAINT	yellow	no maintenance function	**on:** Maintenance active, Traps deactivated, BERT activated, System deactivated **blinking:** Firmware on LT and NT are not compatible or configuration is not supported by NT
LFA/LOS-T/V (G.703 A)	red	no alarm	**on:** LOS **blinking:** LFA [1)]
LFA/LOS-T/V (G.703 B)	red	no alarm	**on:** LOS **blinking:** LFA [1)]
AIS (G.703 A)	yellow	no alarm	AIS
AIS (G.703 B)	yellow	no alarm	AIS
1 (SHDSL interface 1)	red	no alarm	**on:** LOS **blinking:** LFA,LOSW, Training [1)]
2 (SHDSL interface 2)	red	no alarm	**on:** LOS **blinking:** LFA,LOSW, Training [1)]

Tab. 2.63 Visual signalling of the BSTU plug-in unit

LED	Color	Status	
		Off	On
10/100BT (P1)	yellow	Half Duplex	**on:** Full Duplex **blinking:** Collision with Half Duplex
10/100BT (P1)	green	No connection / no traffic	**on:** Link Up **blinking:** Traffic

1) Visual signalling according to Fig. 2.115

2) Alarm messages (Urgent/Non-urgent alarm) depend on configuration made with the LCT

Tab. 2.63 Visual signalling of the BSTU plug-in unit

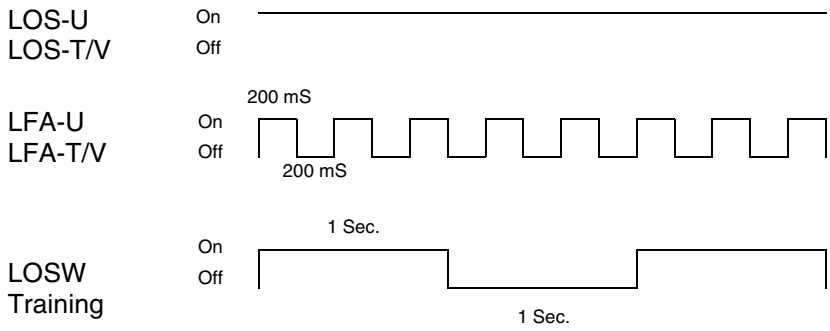


Fig. 2.115 Visual signalling of the BSTU

2.10.9.2 Visual signalling of the desktop unit

LEDs for visual signaling are fitted on the front of the desktop unit. The connection plug board on the rear of the desktop unit is also equipped with LEDs and signals the identical states as with the plug-in unit. The meaning of the LEDs is described in Tab. 2.63.

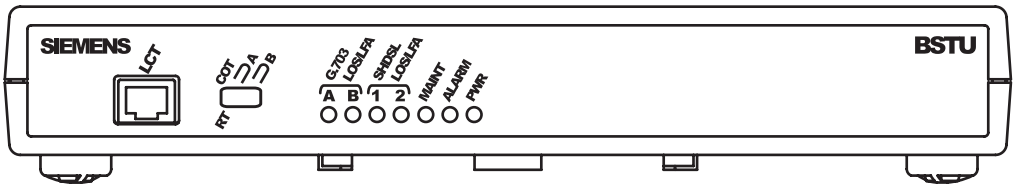


Fig. 2.116 Visual signalling of the desktop unit

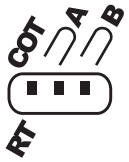
2.10.10 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator or
- using DIP switches on the modulesn.

The procedure for inserting loopbacks by means of management software can be found in the User Manual of ULAF+ [2] or AccessIntegrator [6].



DIP switches on the desktop unit

DIP switches on the plug-in unit

Setting	Description
⊃ A	COT: Loopback 2bR on system A; RT: Loopback 3a on system A
⊃ B	COT: Loopback 2bR on system B; RT: Loopback 3a on system B

Tab. 2.64 Inserted loopbacks via DIP switch

The 2bR loopback is the 2b loopback on the RT. The 2bR loopback is activated by the COT. With the DIP switch all 2b loops are always inserted at the same time.

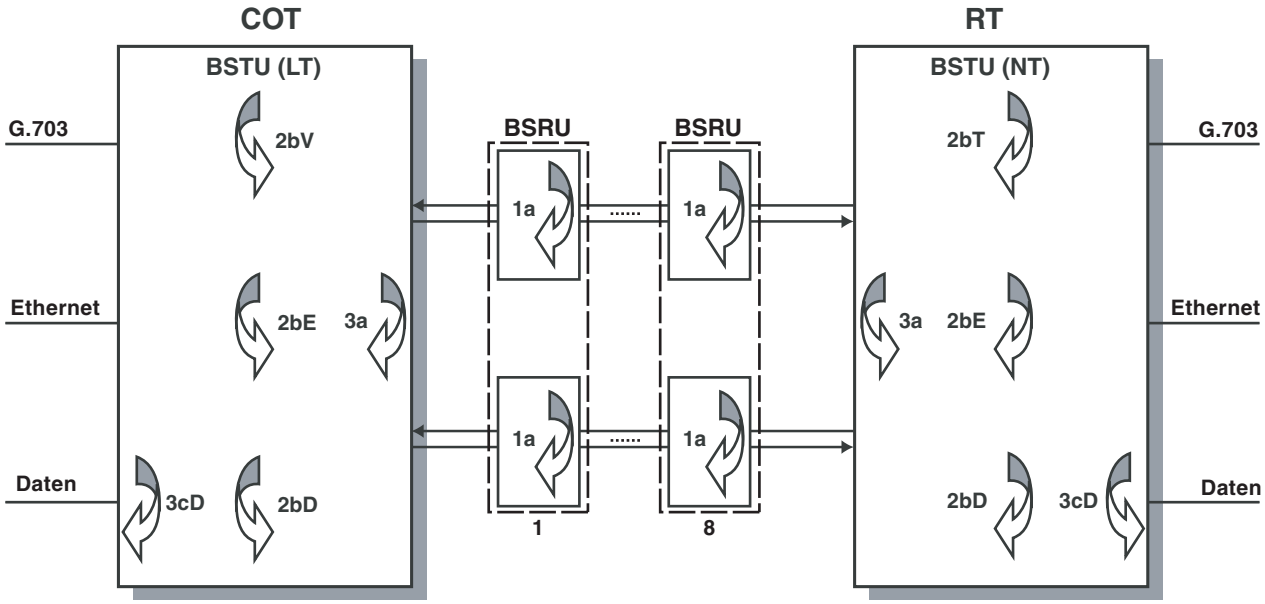


Fig. 2.117 Example of loopbacks of the BSTU (2 wire pairs mode)

Find detailed information about loopbacks of the BSTU in the ULAF+ User Manual [2].

2.11 QSTU termination unit

Application

The QSTU termination unit is made as

- a plug-in unit and as
- a desktop device.

Fig. 2.118 shows the QSTU motherboard of the plug-in unit. The mounting of the desktop device variant differs from the plug-in unit variant.

This chapter describes which settings are to be made for the QSTU. The alarm and clock module is described in chapter "2.19 Interface- and submodules".

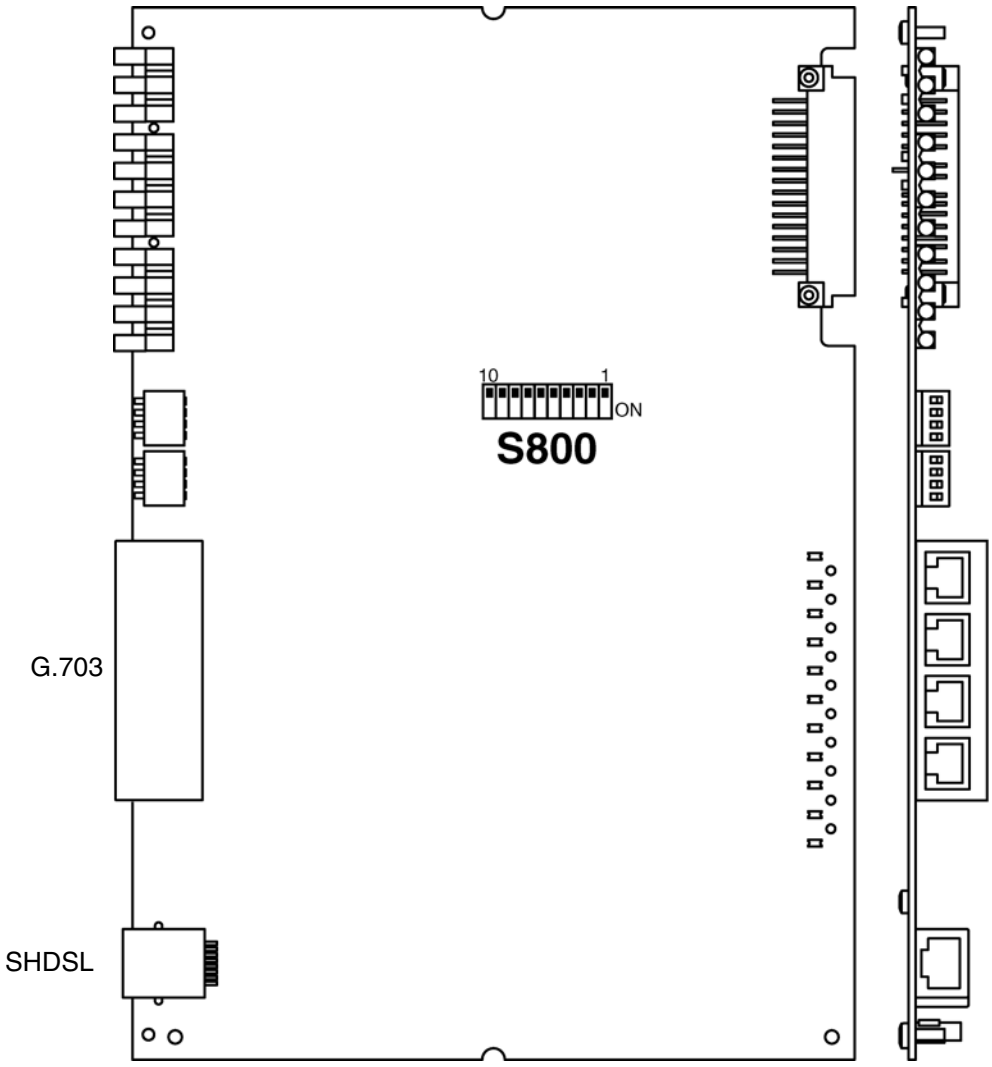


Fig. 2.118 QSTU motherboard

2.11.1 Operating modes and configuration of the QSTU via DIP switches

This chapter provides you with an overview of the QSTU modes of operation in conjunction with the ULAF+ SHDSL termination units. This chapter also lists the corresponding DIP switch configurations.

The following table shows the possible QSTU modes of operation, the necessary firmware ID and the regenerator that can be used.

Operating modes	Fw-Id	Regenerator	max. Regenerator steps
QSTU and STU/STU2/QSTU (chapter 2.11.1.1)	333	SRU	2
QSTU and STU4/GTU4 (chapter 2.11.1.2)	349	SRU	2
QSTU and BSTU/QSTU (chapter 2.11.1.3)	633	BSRU	4
QSTU and BSTU4 (chapter 2.11.1.4)	649	BSRU	4

Tab. 2.65 Operating modes of the QSTU

2.11.1.1 Operating mode: QSTU in conjunction with STU / STU2 / QSTU / SRU

You can use the QSTU in conjunction with a QSTU/STU/STU2/SRU.

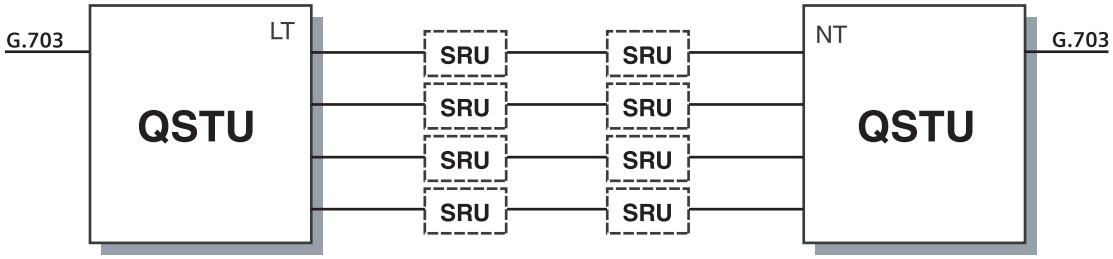


Fig. 2.119 Operating mode: QSTU(LT) – QSTU(NT); 1x 4 wire pairs

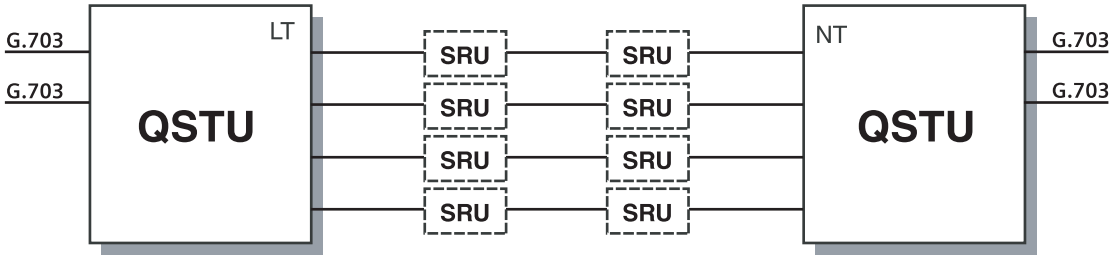


Fig. 2.120 Operating mode: QSTU(LT) – QSTU(NT); 2x 2 wire pairs

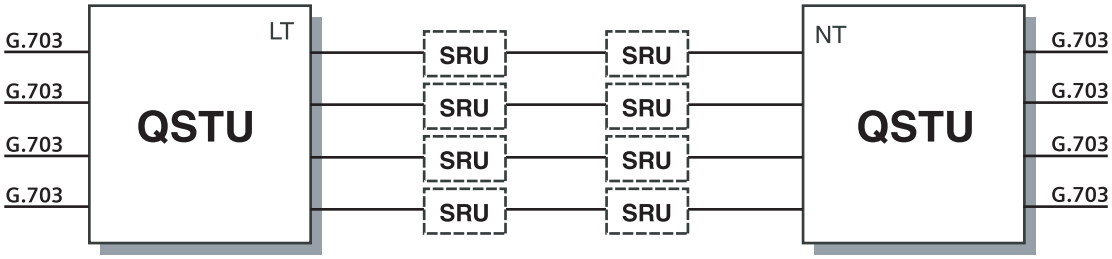


Fig. 2.121 Operating mode: QSTU(LT) – QSTU(NT); 4x 1 wire pair

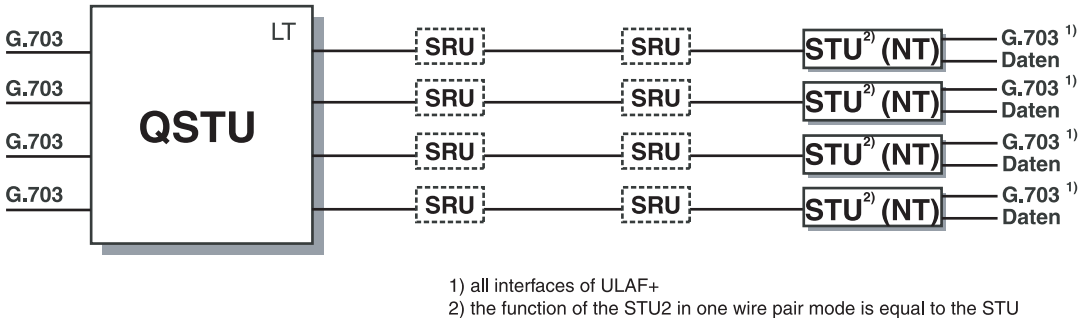


Fig. 2.122 Operating mode: QSTU(LT) – (4x) STU(NT); 4x 1 wire pair

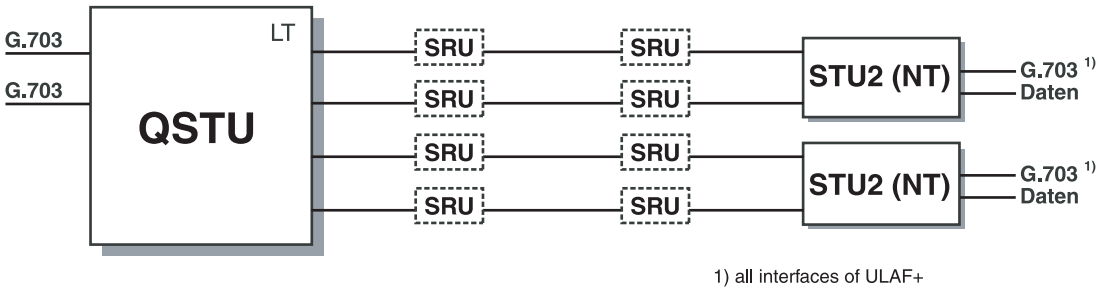


Fig. 2.123 Operating mode: QSTU(LT) – (2x) STU2(NT); 2x 2 Adernpaarbetrieb

i In conjunction with the STU, STU2 or STU2s, the QSTU must always be used on the LT side. The QSTU on the NT side is only suitable with a QSTU on the LT side.

i A maximum of 2 regenerators (SRU) can be put into cascade for each wire pair.

Configuration of the QSTU via DIP switches

Tab. 2.66 shows the possible settings of the DIP switches (S800) on the QSTU.

DIP switch	Setting	Description	
1	On	NT mode[1)]	
	Off	LT mode[2)]	
		Operating mode	
2 [3)] 8 [3)]	On On	1 x 4 wire pairs (see chapter 2.11.1.1)	
2 [3)] 8 [3)]	On Off	2 x 2 wire pairs (see chapter 2.11.1.1)	
2 [3)] 8 [3)]	Off Off	4 x 1 wire pair (see chapter 2.11.1.1) [1)2)]	
3	On	Configuration via the DIP switches	
	Off	Configuration via the LCT/AccessIntegrator [1)2)]	
4 [3)] 5 [3)]	On Off	Structured mode	
4 [3)] 5 [3)]	Off Off	Transparent mode [1)2)]	
4 [3)] 5 [3)]	Off On	ISDN-PRA mode	
6 [3)]	On	AIS recognition activated	
	Off	AIS recognition deactivated [1)2)]	
7 [3)]	On	AIS insertion [1)2)]	
	Off	AIS insertion deactivated	
		With RPS “onboard”	**Without RPS “onboard”**
9	On	Remote power supply activated [3)]	Battery supply [2)] 48 / 60 V_{DC}
	Off	Remote power supply deactivated [1)2)3)]	Main feeding [1)] 110 / 230 V_{AC}
10	On	50 mA / 120 V_{DC}	Not assigned
	Off	60 mA / 120 V_{DC} [1)2)]	Not assigned

1) Default setting, Desktop unit

2) Default setting, Plug-in unit

3) Only operable if DIP switch S800-3 is ‘ON’

Tab. 2.66 Configuration of the QSTU via the DIP switches (STU, STU2)

2.11.1.2 Operating mode: QSTU in conjunction with the STU4 / GTU4 / SRU

You can use the QSTU in conjunction with a STU4/SRU (chapter 2.12), or a GTU4 (2.14).

i In QSTU - STU4 or QSTU - GTU4 connections the QSTU must always be used at the LT side. The QSTU must have the firmware ID 349 so that it can be used together with the STU4 or GTU4. For further information, please refer to the ULAF+ User Manual [2].

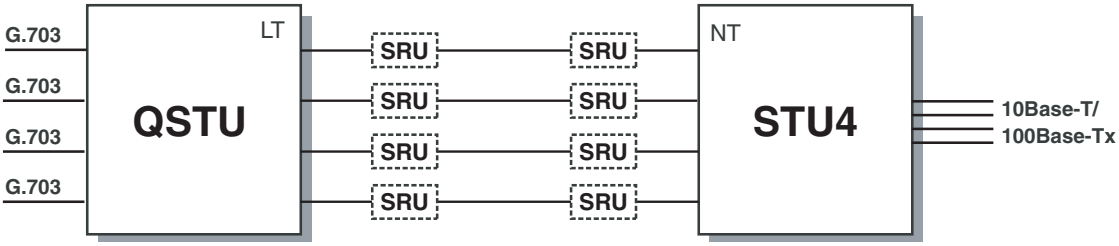


Fig. 2.124 Operating mode: QSTU(LT) – STU4(NT); 4x 1 wire pair

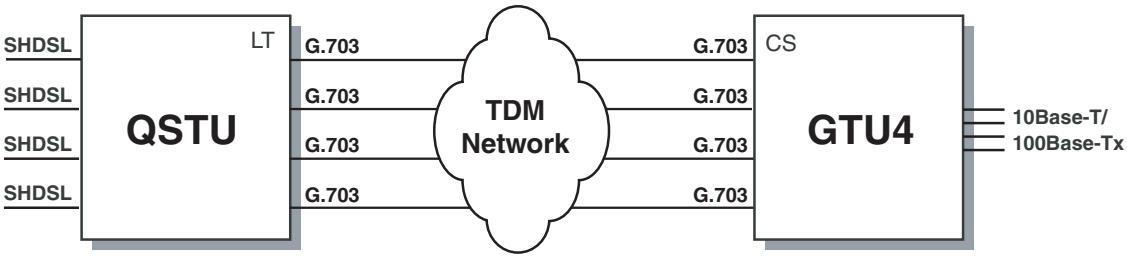


Fig. 2.125 Operating mode: QSTU(LT) – GTU4(CS); 1, 2, 3, 4 wire pair(s)

Configuration of the QSTU via DIP switches

Tab. 2.67 shows the possible settings of the DIP switches (S800) on the QSTU.

DIP switch	Setting	Description	
1	Off [1]	Not assigned	
2	Off [1]	Not assigned	
3	Off [1]	Not assigned	
4	Off [1]	Not assigned	
5	Off [1]	Not assigned	
6	Off [1]	Not assigned	
7	Off [1]	Not assigned	
8	Off [1]	Not assigned	
9	Off [1]	Not assigned	
10		**with RPS “onboard”**	**without RPS “onboard”**
	On	50 mA / 120 V_{DC}	Not assigned
	Off [1]	60 mA / 120 V_{DC}	Not assigned

1) Default setting plug-in unit and desktop unit

Tab. 2.67 Configuration of the QSTU using DIP switches for operation with a STU4

All the other options can be configured by means of LCT. For further information, please refer to the ULAF+ User Manual [2].

2.11.1.3 Operating mode: QSTU in conjunction with BSTU / QSTU / BSRU

You can use the QSTU in conjunction with another QSTU or BSTU/BSRU (chapter 2.10).

i

In QSTU - BSTU connections the QSTU must always be used at the LT side. The QSTU must have the firmware ID 633 so that it can be used together with the BSTU/BSRU. For further information, please refer to the ULAF+ User Manual [2].

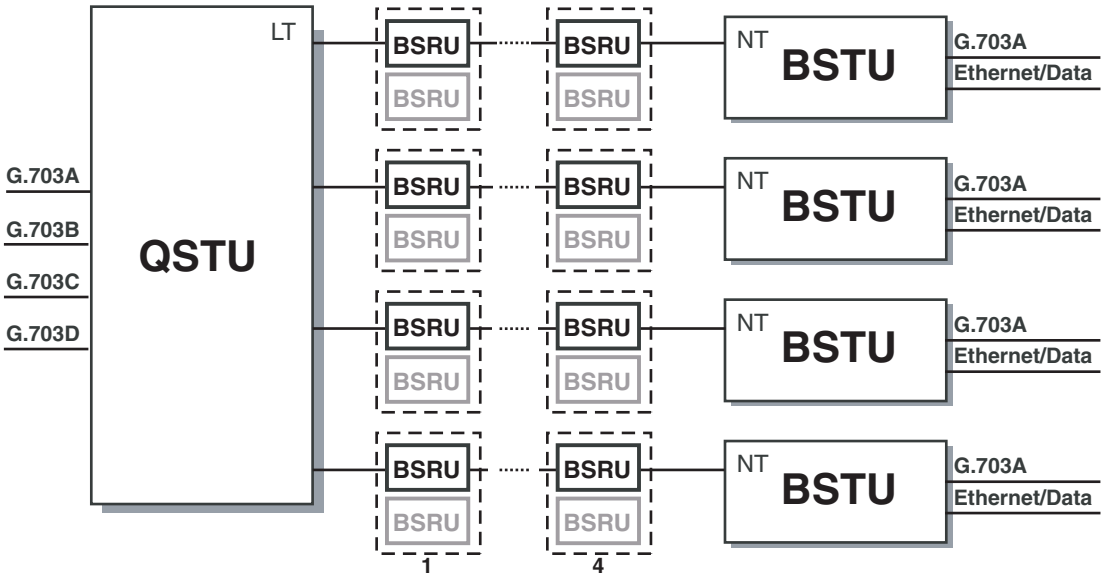


Fig. 2.126 Operating mode: QSTU(LT) – 4x BSTU(NT); 4x 1 wire pair

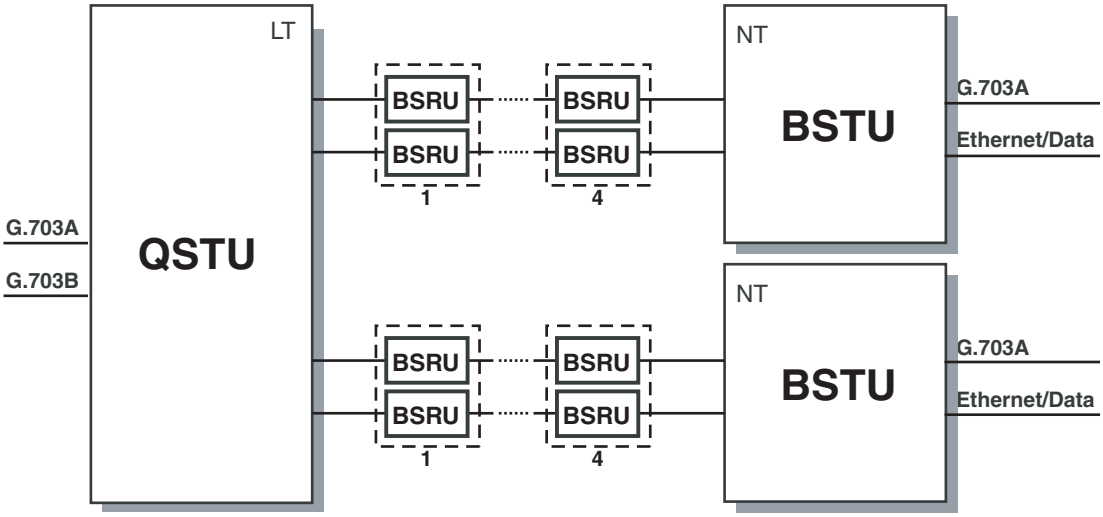


Fig. 2.127 Operating mode: QSTU(LT) – 2x BSTU(NT); 2x 2 wire pairs

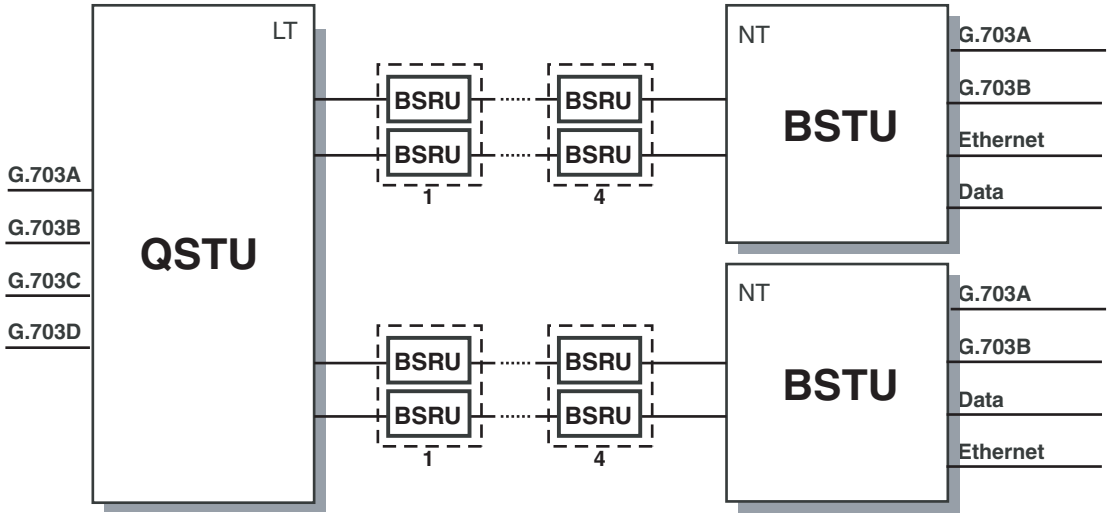


Fig. 2.128 Operating mode: QSTU(LT) – 2x BSTU(NT); 4x 1 wire pair

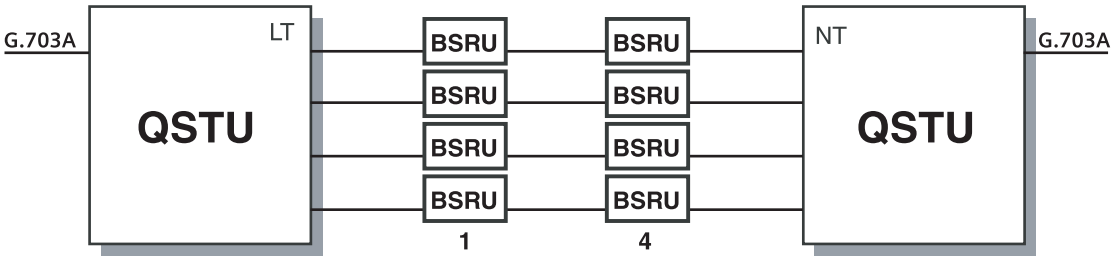


Fig. 2.129 Operating mode: QSTU(LT) – QSTU(NT); 1x 4 wire pairs

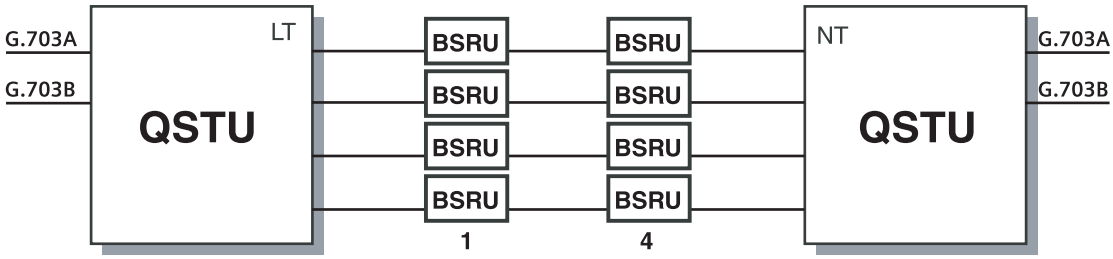


Fig. 2.130 Operating mode: QSTU(LT) – QSTU(NT); 2x 2 wire pairs

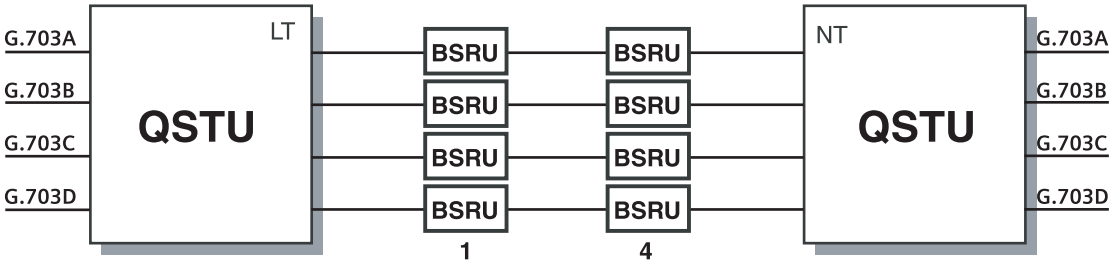


Fig. 2.131 Operating mode: QSTU(LT) – QSTU(NT); 4x 1 wire pair

Configuration of the QSTU via DIP switches

Tab. 2.68 shows the possible settings of the DIP switches (S800) on the QSTU.

DIP switch	Setting	Description	
1	On [1)]	NT mode	
	Off [2)]	LT mode	
2	On	PSD test mode (SHDSL re-training)	
	Off [1)2)]	Normal mode	
3	Off [1)2)]	Not assigned	
4	Off [1)2)]	Not assigned	
5	Off [1)2)]	Not assigned	
6	Off [1)2)]	Not assigned	
7	Off [1)2)]	Not assigned	
8	Off [1)2)]	Not assigned	
9	Off [1)2)]	Not assigned	
10		**With RPS “onboard”**	**Without RPs “onboard”**
	On	50 mA / 120 V_{DC}	Not assigned
	Off [1)2)]	60 mA / 120 V_{DC}	Not assigned

1) Default setting desktop unit

2) Default setting plug-in unit

Tab. 2.68 Configuration of the QSTU using DIP switches for operation with a BSTU

All the other options can be configured by means of LCT. For further information, please refer to the ULAF+ User Manual [2].

2.11.1.4 Operating mode: QSTU in conjunction with the BSTU4 / BSRU

You can use the QSTU in conjunction with a BSTU4/BSRU (chapter 2.13).

i In QSTU - BSTU4 connections the QSTU must always be used at the LT side. The QSTU must have the firmware ID 649 so that it can be used together with the BSTU4. For further information, please refer to the ULAF+ User Manual [2].

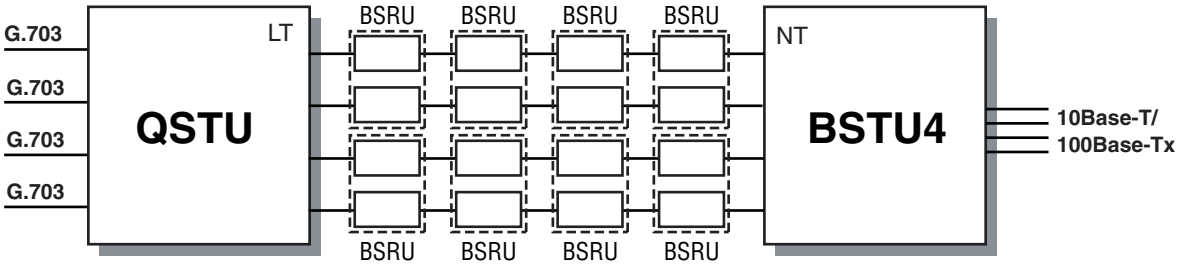


Fig. 2.132 Operating mode: QSTU(LT) – BSTU4(NT); 4x 1 wire pair

Configuration of the QSTU via DIP switches

Tab. 2.69 shows the possible settings of the DIP switches (S800) on the QSTU.

DIP switch	Setting	Description	
1	Off [1]	Not assigned	
2	Off [1]	Not assigned	
3	Off [1]	Not assigned	
4	Off [1]	Not assigned	
5	Off [1]	Not assigned	
6	Off [1]	Not assigned	
7	Off [1]	Not assigned	
8	Off [1]	Not assigned	
9	Off [1]	Not assigned	
10		**with RPS “onboard”**	**without RPS “onboard”**
	On	50 mA / 120 V_{DC}	Not assigned
	Off [1]	60 mA / 120 V_{DC}	Not assigned

1) Default setting plug-in unit and desktop unit

Tab. 2.69 Configuration of the QSTU using DIP switches for operation with a BSTU4

All the other options can be configured by means of LCT. For further information, please refer to the ULAF+ User Manual [2].

2.11.2 Power supply to the QSTU

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

Power supply to the desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})
- Remotely fed via SHDSL interface
- Redundant power feeding (Local power supply and remotely fed)

Power supply modes

Tab. 2.43 shows you the various power supply modes and the required power adapters therefore:

	Plug-in		Desktop
	without RPS	with RPS	without RPS
Local power supply with 110 / 230 V_{AC}	–	–	X
Local power supply with 48 / 60 V_{DC}	X	X	X
Remotely fed via SHDSL interface	–	–	1)
Redundant power feeding (local power supply AC and remotely fed)	–	–	NTU
Redundant power feeding (local power supply AC and DC)	–	–	LT25W

1) Power via remote device
X Direct power supply without power adapter required
LT25W Power adapter LT25W required
NTU Power adapter NTU required
– Not possible

Tab. 2.70 Power supply modes

You use jumpers to select the type of supply, see chapter 2.11.4. Fig. 2.133 shows the terminals to which the supply cables are assigned.

Modifications to the type of supply and grounding may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply after it has been installed. To do this you must reset the DIP switch S800-9 as detailed in chapter 2.11.3:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Reset the DIP switch S604-9 on ‘ON’ (Battery supply)
5. Remove the power cord connector or replace the existing power cord with a new battery cable
6. Close the casing

7. Screw the screws on the bottom of the unit into the casing

Modules that are configured for DC supply may never be connected to 110 / 230 V_{AC} supply directly.

Converting from local supply to remotely fed

For converting the desktop unit from local supply to remotely fed proceed as follows:

1. Disconnect the power cord and also disconnect all interface cables
2. Interrupt the SHDSL link
3. Release the screws on the bottom of the unit
4. Open the casing by removing the top of the unit
5. Take the module out of the casing and lay the pc board on a flat surface
6. Remove the power cord, see Fig. 2.133 (**Warning:** You must not bend the board)
7. Change the jumpers as detailed in chapter 2.11.4
8. Reset the DIP switch S604-9 on 'ON' (Battery supply)
9. Screw the screws on the bottom of the unit into the casing

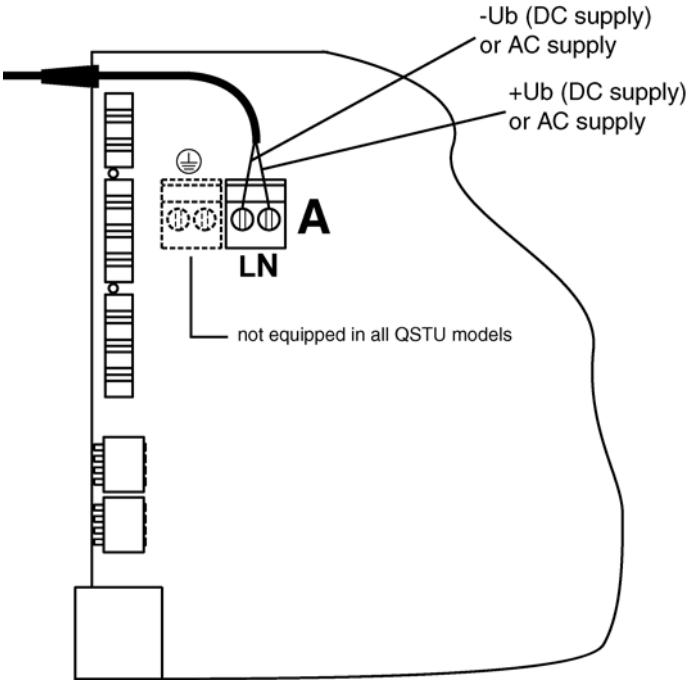


Fig. 2.133 Terminal block (A) for the supply via the cable

2.11.3 Power modes of QSTU needing external power adapter

Following desktop configurations require an external power adapter for local power feeding with 110 / 230 V_{AC}:

- QSTU desktop, remotely fed and redundant power feeding with local AC power
- QSTU desktop, local AC power feeding and redundant power feeding with local DC power

This chapter explains the different applications and procedures for connecting the power adapters to the desktop units.

Desktop power adapter SNP-A03T-S

QSTU desktops equipped with an RPS module have to be powered by DC. If 230 V_{AC} powering is needed, the power adapter SNP-A03T-S has to be used, which generates 48 V_{DC} on the far side.

It is also possible to use a backup battery for redundant power feeding of the LT25W. Therefore the power adapter has to be modified as described in section “Redundant battery connection LT25W“ (Fig. 2.136).

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Connecting desktop power adapter SNP-A03T-S

For connecting desktop power adapter SNP-A03T-S, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.11.2, Fig. 2.138 to battery supply (48 V_{DC}). If you are using a desktop you must set jumper S604-9 “ON”
7. Connect the desktop power adapter according to Fig. 2.134 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Screw the screws on the bottom of the unit into the casing

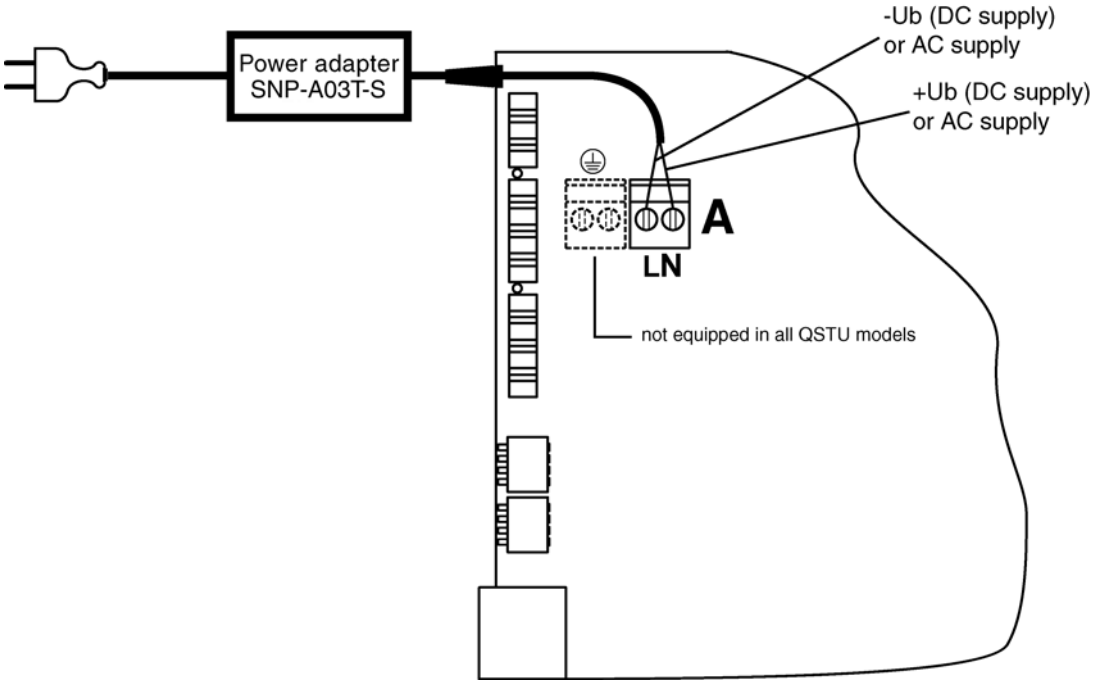


Fig. 2.134 Connecting desktop power adapter SNP-A03T-S

Redundant battery connection LT25W

In order to provide desktop power adapter LT25W with an additional battery supply you must open the unit and connect a second cable. Proceed as follows:

1. Disconnect the net cable and also disconnect all interface cables
2. Open the power adapter by releasing the four screws on the bottom of the unit
3. Remove the bottom of the casing of the power adapter
4. Connect the supplied cable to the terminal (1) as shown in Fig. 2.135
5. Replace the cable feed-through (2) (Fig. 2.135) for a cable with the one supplied for two cables

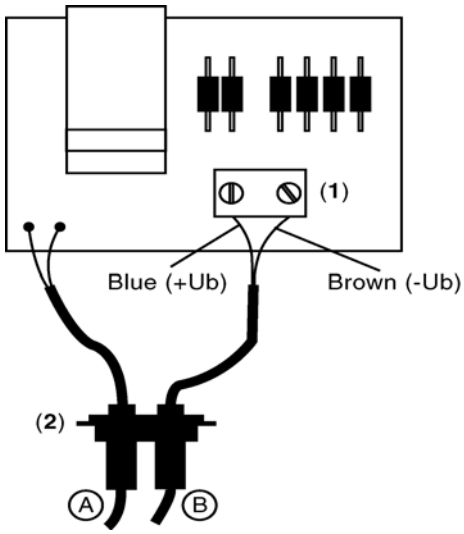


Fig. 2.135 Connecting the battery cable to desktop power adapter LT25W

6. Close the power adapter and screw the four screws into the casing
7. Connect the power adapter to the desktop unit as described above in 2 to 11
8. Connect the battery (Fig. 2.136)

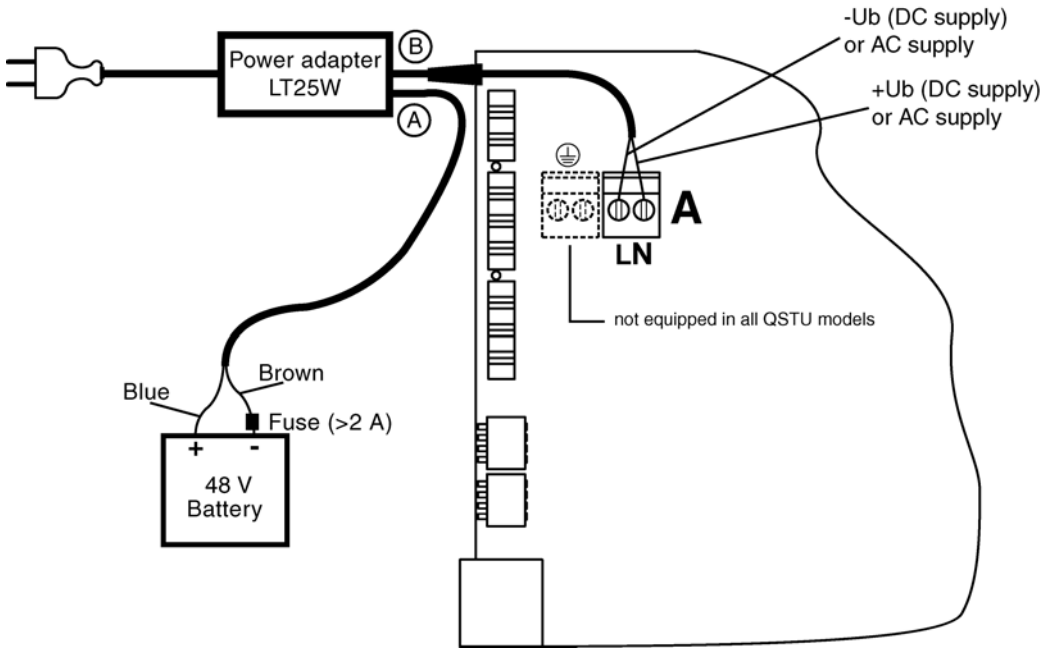


Fig. 2.136 Connecting the battery to desktop power adapter LT25W

Desktop power adapter NTU

For redundant power feeding of a QSTU desktop by local 110 / 230 V_{AC} and remote power the adapter NTU has to be used, which generates 120 V_{DC} on the far side. Desktop configured for this application will normally take the power from the local source. If this fails the desktop will switch automatically to remote power.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

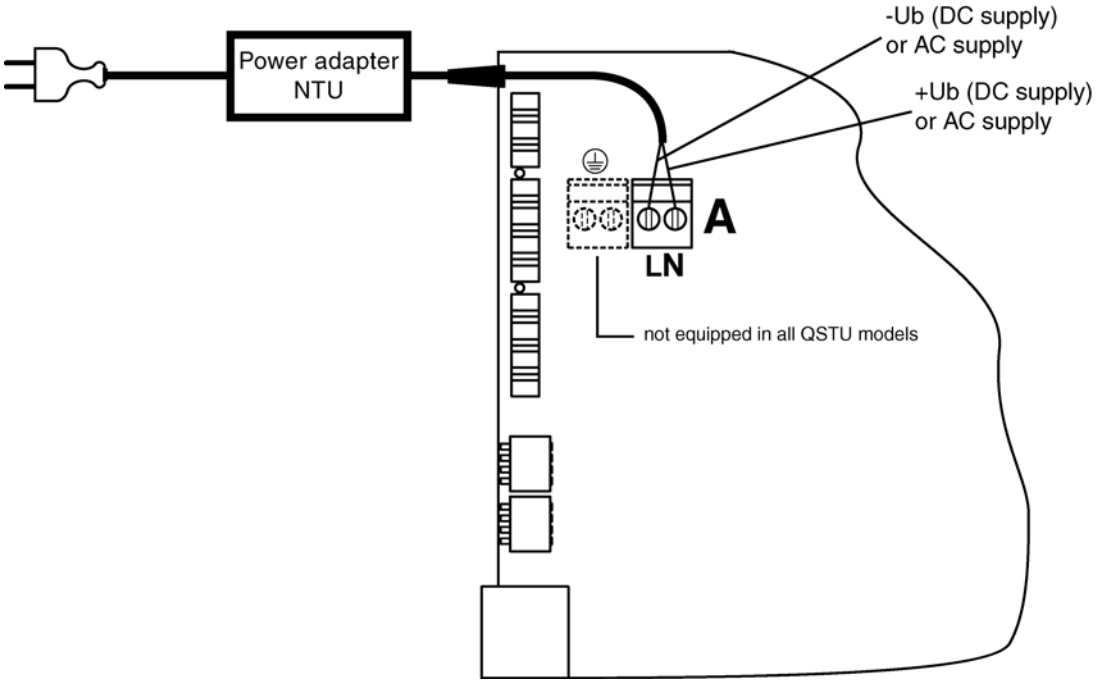


Fig. 2.137 Connecting desktop power adapter NTU

Connecting desktop power adapter NTU

For connecting desktop power adapter NTU, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.11.4, Fig. 2.140 to remote supply (additional jumpers are included with desktop unit NTU)
7. Connect the desktop power adapter according to Fig. 2.137 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Screw the screws on the bottom of the unit into the casing

2.11.4 Set the QSTU power supply via jumpers

Below, you will find the individual jumper settings for the QSTU. The jumper is only available for desktop units. The following types of use are described:

- Locac supply AC or DC
- Remote supply
- Redundant power supply using the power adapter NTU

The casing must be opened to change the jumper settings on the desktop unit. For this, the screws on the bottom of the unit must be released.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

The jumper sockets B and C are not equipped in all models of the QSTU. The following instructions only apply if the corresponding jumper sockets are equipped on the QSTU.

Jumper	Meaning
B	QSTU desktop unit local supply; AC or DC
C	QSTU desktop unit supplied remotely
B / C	QSTU desktop unit supplied redundant using the power adapter NTU

Tab. 2.71 Meaning of jumpers B and C on the QSTU desktop units

Desktop unit local supply; AC or DC

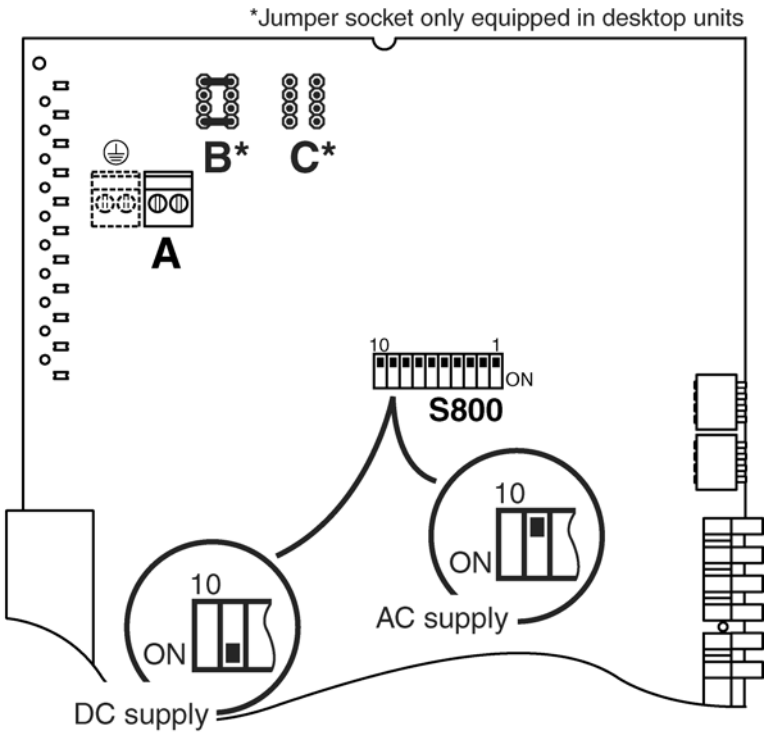


Fig. 2.138 Jumper settings: QSTU desktop unit local supply; AC or DC

i With the QSTU with firmware ID 333 (QSTU with STU, STU2, SRU) you configure the powerfail detection with the S800 DIP switch. With the QSTU with firmware ID 349/633 this configuration is performed with the LCT.

Desktop unit supplied remotely

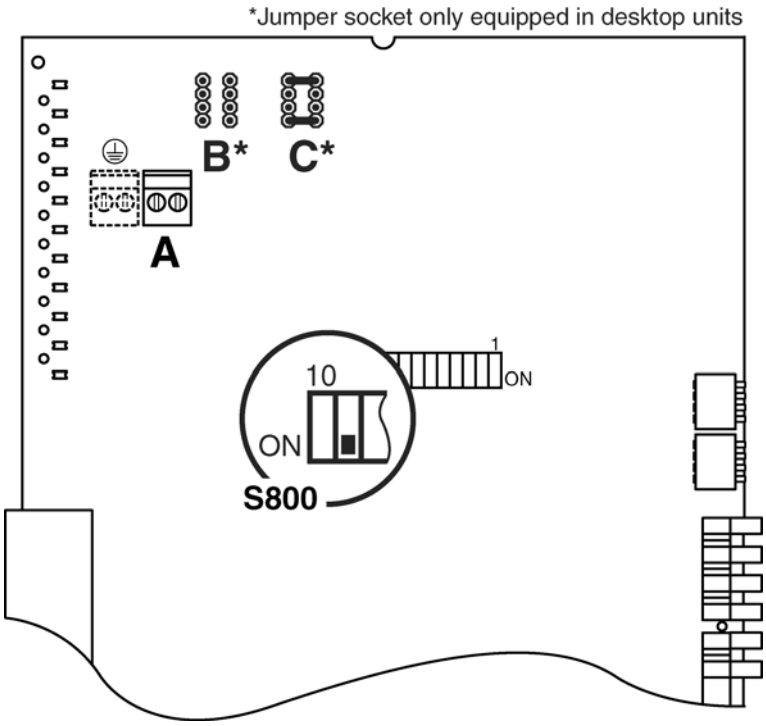


Fig. 2.139 Jumper settings: QSTU desktop unit supplied remotely

i

With the QSTU with firmware ID 333 (QSTU with STU, STU2, SRU) you configure the powerfail detection with the S800 DIP switch. With the QSTU with firmware ID 349/633 this configuration is performed with the LCT.

Desktop unit supplied redundantly with the desktop power adapter NTU

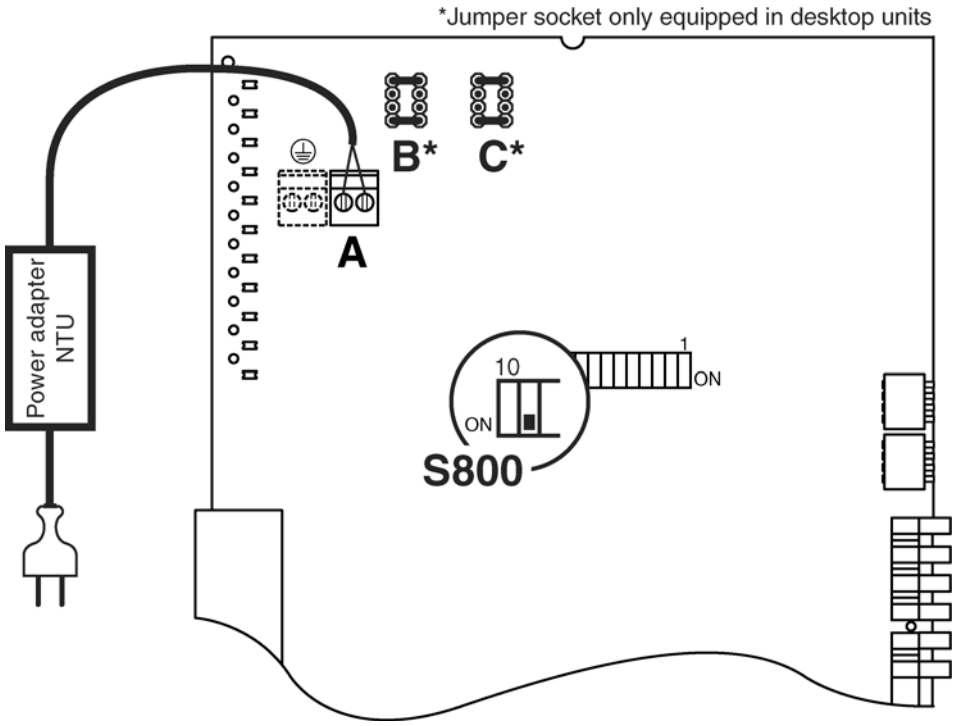


Fig. 2.140 Jumper settings: Desktop unit supplied redundantly with the desktop power adapter NTU

i With the QSTU with firmware ID 333 (QSTU with STU, STU2, SRU) you configure the powerfail detection with the S800 DIP switch. With the QSTU with firmware ID 349/633 this configuration is performed with the LCT.

2.11.5 QSTU remote feeding

Remote feeding

The QSTU plug-in unit is available with an integrated remote power supply. This allows to remote feeding

- any desktop units
  and/or
- SHDSL regenerators (SRU, BSRU).

Transmission and supply is via the SHDSL path. The ground-free supply voltage is either 120 V_{DC} or 180 V_{DC}. The remote supply current is 50 mA or 60 mA.

2.11.5.1 Configuration of the DIP switches for QSTU remote feed

Set the current limit with the DIP switch S800-10:

Switch S800-10	
Setting	**Meaning**
On	50 mA
Off	60 mA

Tab. 2.72 Current limit for QSTU remote feed

i The DIP switches ‘S800-10’. Configuration by using the LCT is not possible.

The remote feed is turned on/off either using the DIP switch S800-9 (if DIP switch S800-3 is “On”), see Tab. 2.66, or via the LCT (if DIP switch S800-3 is “Off”).

i DIP switch configuration is only possible with applications of the QSTU with the STU/STU2/QSTU/SRU and firmware ID 333.

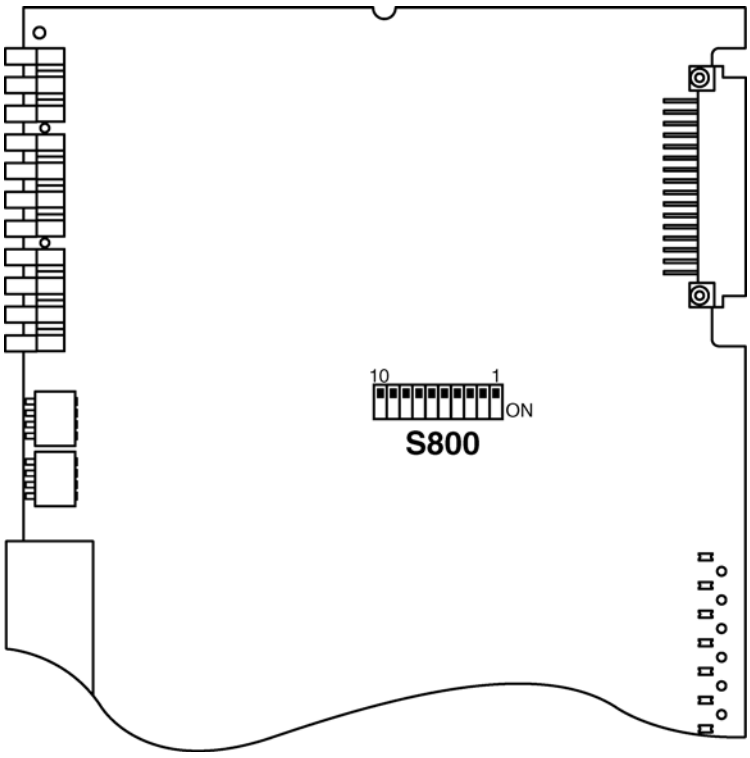


Fig. 2.141 DIP switch S800 to confiure remote feeding

i Before connecting or disconnecting cables to/from the SHDSL interfaces of the QSTU you must first turn off the remote supply of the corresponding systems. Otherwise bit errors can occur on the other systems of the corresponding QSTU.

2.11.5.2 QSTU remote feed monitoring and alarm signalling

Monitoring circuit

A monitoring circuit controls the voltage and the current control. The settings are done using DIP switches, see chapter 2.11.5.1.

The QSTU remote feed recognizes the following states:

- Remote feeding current too deep (line interruption)
- Remote feeding current too high (short circuit)

Out of this states the QSTU generates the following alarms:

Alarm	Event	Description
UC1/2/3/4	Line break	Remote feeding current too deep (Under current)
OC1/2/3/4	Short circuit	Remote feeding current too high (Over current)

Tab. 2.73 QSTU remote feed alarm signalling

2.11.5.3 Configuration of the power fail recognition using DIP switches

The configuration is done using the DIP switch S800-9, see Tab. 2.70.

2.11.6 Pin assignment of the SHDSL interface

Pin assignment of the SHDSL interface

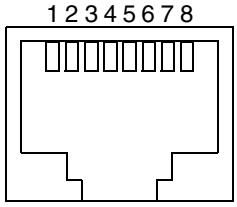


Fig. 2.142 Pin assignment of the SHDSL interface

The Pin assignment is according to a twisted standard LAN cable.

Pin assignment	Signal	Description
1	SHDSLA_2	SHDSL interface - wire pair 2
2	SHDSLB_2	
4	SHDSLA_1	SHDSL interface - wire pair 1
5	SHDSLB_1	
3	SHDSLA_3	SHDSL interface - wire pair 3
6	SHDSLB_3	
7	SHDSLA_4	SHDSL interface - wire pair 4
8	SHDSLB_4	
Casing	Ground	Ground

Tab. 2.74 Pin assignment of the SHDSL interface

Operating mode	System A	System B	System C	System D
1 Wire pair	Wire pair 1	Wire pair 2	Wire pair 3	Wire pair 4
2 Wire pairs	Wire pair 1 + 2	Wire pair 3 + 4	–	–
4 Wire pairs	Wire pair 1 + 2 + 3 + 4	–	–	–

Tab. 2.75 System assignment of the SHDSL interface

2.11.7 Pin assignment of the 2 Mbit/s interfaces(G.703)

The four G.703 interfaces are assembled to a RJ45 connector strip. The impedance is 120 Ω symetrical.

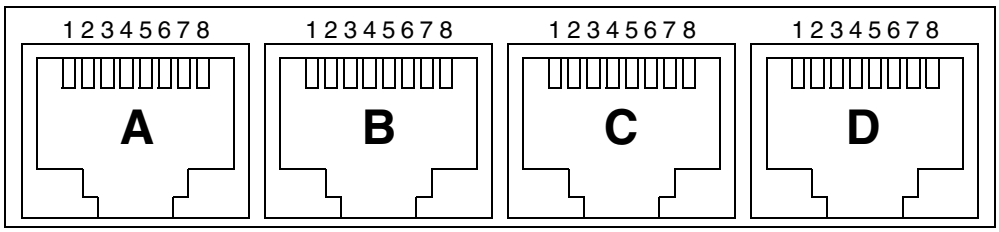


Fig. 2.143 Pin assignment of the G.703 interfaces

Pin assignment	Signal	Description
1A...D	TxA	Transmited data
2A...D	TxB	
3A...D	Shield	Tranmited shield data
4A...D	RxA	Received data
5A...D	RxB	
6A...D	Shield	Received shield data
7A...D	--	--
8A...D	--	--
Casing	Shield	Overall ground

Tab. 2.76 Pin assignment of the G.703 interfaces

2.11.8 Supervision and alarm signalling of the QSTU

The operating mode and alarm signalling of the QSTU are indicated by means of LEDs on the front of the unit.

2.11.8.1 Visual signalling of the plug-in unit

When the QSTU is used as a plug-in unit, the front panel is equipped with eleven LEDs (Fig. 2.144).

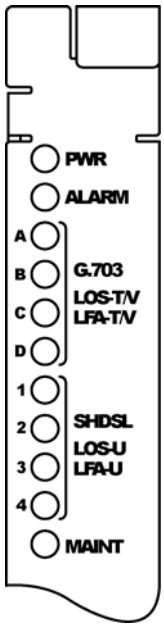


Fig. 2.144 Visual signalling of the QSTU plug-in unit

LED	Colour	Status	
		off	on
PWR	green	no power supply	Power supply o.k.
Alarm	red	no alarm	Urgent alarm [2]
	yellow	no alarm	Non-urgent alarm[2]
LOS/LFA-T/V A[1]	red	no alarm	loss of signal/loss of frame alignment at G.703 A
LOS/LFA-T/V B[1]	red	no alarm	loss of signal/loss of frame alignment at G.703 B
LOS/LFA-T/V C[1]	red	no alarm	loss of signal/loss of frame alignment at G.703 C
LOS/LFA-T/V D[1]	red	no alarm	loss of signal/loss of frame alignment at G.703 D
LOS/LFA-U 1[1]	red	no alarm	loss of signal/loss of frame alignment at, Training [3]
LOS/LFA-U 2[1]	red	no alarm	loss of signal/loss of frame alignment at, Training [3]
LOS/LFA-U 3[1]	red	no alarm	loss of signal/loss of frame alignment at, Training [3]
LOS/LFA-U 4[1]	red	no alarm	loss of signal/loss of frame alignment at, Training [3]
MAINT	yellow	no maintenance function	**on:** Loopback active, traps deactivated, BERT activated, layer 2 switch test mode activated **blinking 1:** Firmware on LT and NT are not compatible or configuration is not supported by NT

1) Visual signalling according to Fig. 2.145

2) Alarm message depends on configuration made with the LCT

3) The continous blinking LED shows the non-successful “Training” of the link

Tab. 2.77 Visual signalling of QSTU plug-in unit

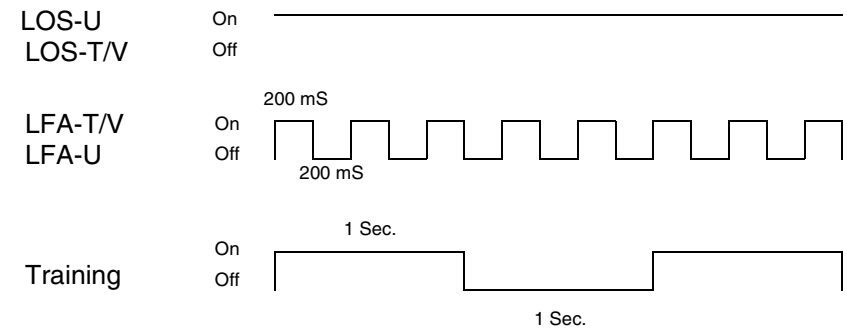


Fig. 2.145 Visual signalling LOS/LFA/Training of the QSTU

2.11.8.2 Visual signalling of the desktop unit

The visual signalling of the desktop unit is equal those of the the plug-in unit. The meaning of the LEDs is explained in Tab. 2.77.

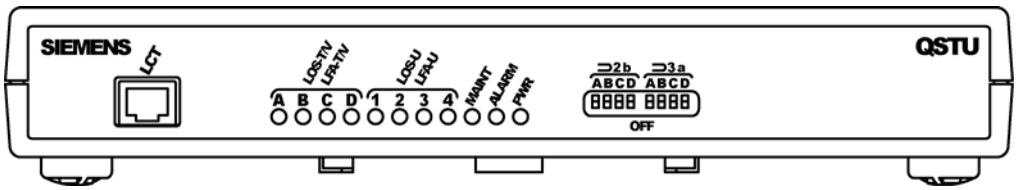


Fig. 2.146 Visual signalling of the desktop unit

2.11.9 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

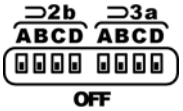
- using software via the LCT/AccessIntegrator or
- using DIP switches on the modules.

The procedure for inserting loopbacks by means of management software can be found in the user manual of ULAF+ [2] or AccessIntegrator [6].

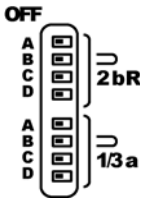
Loopback 2b can be inserted locally at the NT or remotely at the LT (loopback 2bR) using DIP switches.

The following loopbacks can be inserted by using DIP switches:

- Loopback 3a
- Loopback 2bR (LT)
- Loopback 2b (NT)



DIP switches of the desktop unit



DIP switches of the plug-in unit

Loopback	DIP switch	Loopback on the...	Description
LT			
2bR A [1)2)]	2bR A	NT	Loop 2b Remote, G.703 System A
2bR B [2)]	2bR B	NT	Loop 2b Remote, G.703 System B
2bR C	2bR C	NT	Loop 2b Remote, G.703 System C
2bR D	2bR D	NT	Loop 2b Remote, G.703 System D
3a A [1)2)]	3a A	LT	Loop 3a, SHDSL, System A [3)]
3a B [2)]	3a B	LT	Loop 3a, SHDSL, System B [3)]
3a C	3a C	LT	Loop 3a, SHDSL, System C [3)]
3a D	3a D	LT	Loop 3a, SHDSL, System D [3)]
NT			
2b A [1)2)]	2b A	NT	Loop 2b, G.703, System A
2b B [2)]	2b B	NT	Loop 2b, G.703, System B
2b C	2b C	NT	Loop 2b, G.703, System C
2b D	2b D	NT	Loop 2b, G.703, System D
3a A [1)2)]	3a A	NT	Loop 3a, SHDSL, System A [3)]
3a B [2)]	3a B	NT	Loop 3a, SHDSL, System B [3)]
3a C	3a C	NT	Loop 3a, SHDSL, System C [3)]
3a D	3a D	NT	Loop 3a, SHDSL, System D [3)]

1) Only this DIP switches are active in ‘1x 4 wire pairs’ mode

2) Only this DIP switches are active in ‘2x 2 wire pairs’ mode

3) Loopback 3a applies simultaneously for all SHDSL interfaces assigned to the G.703 systems.

Tab. 2.78 Loopback on the QSTU

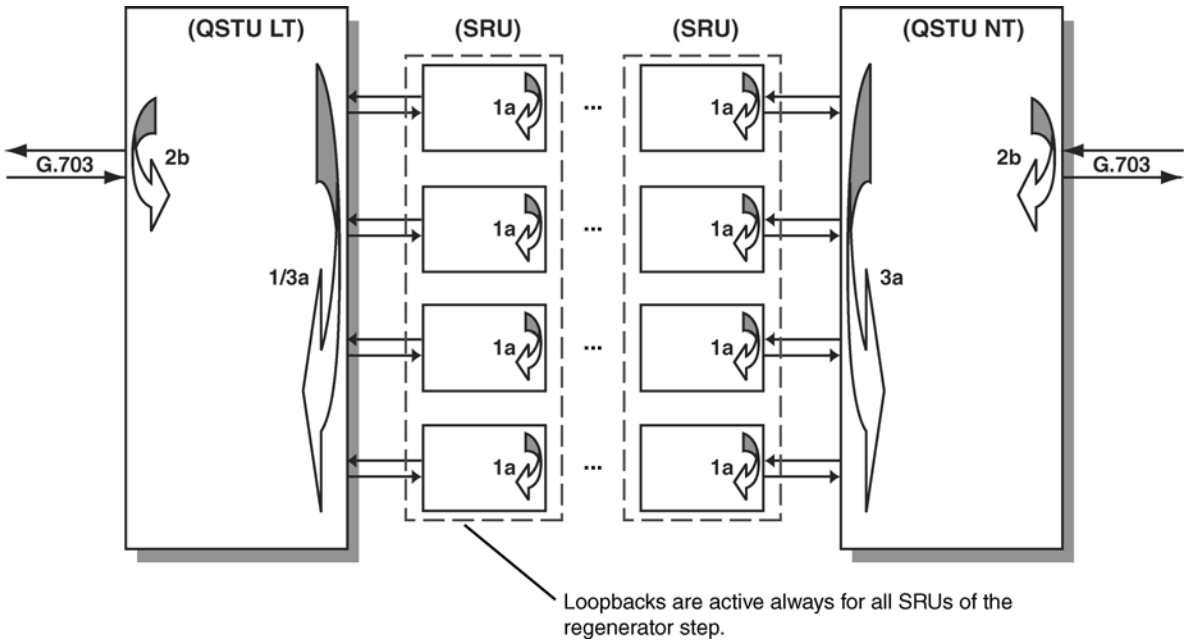
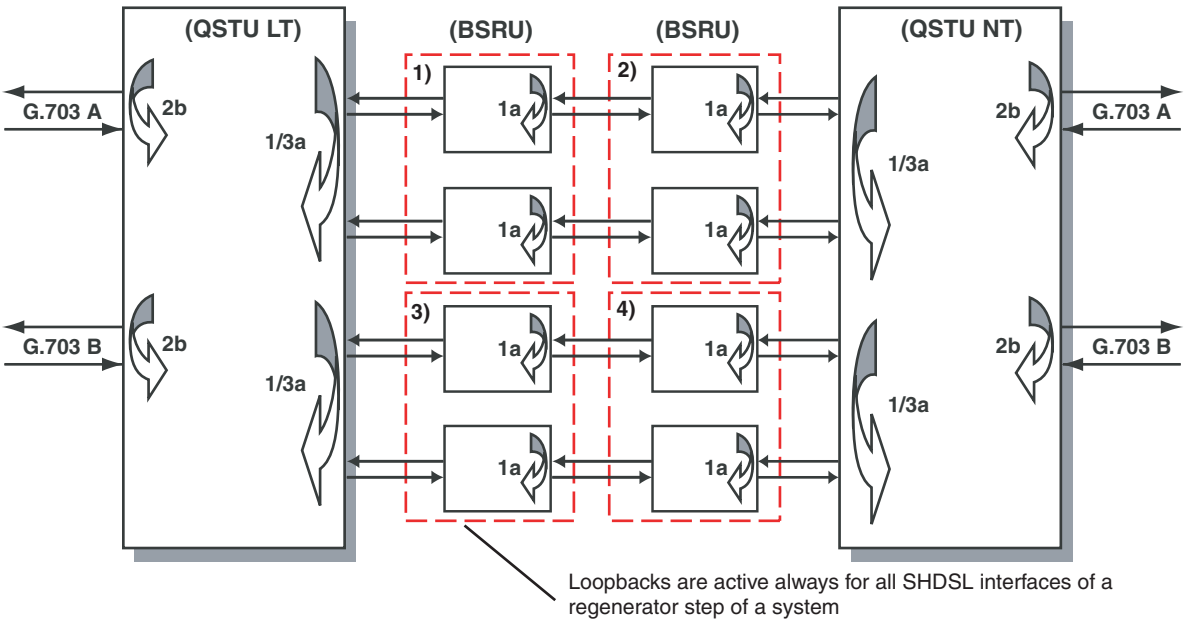


Fig. 2.147 Example of the loopbacks of the QSTU (4x 1 wire pairs mode)



1) Step 1 system A **2) Step 2 system A**
3) Step 1 system B **4) Step 2 system B**

Fig. 2.148 Example of the loopbacks of the QSTU with a BSTU (2x 2 wire pairs mode)

Find detailed information about loopbacks of the BSTU in the ULAF+ User Manual [2].

2.12 STU4 termination unit

Application

The STU4 termination unit is made as

- a plug-in unit and as
- a desktop device.

Fig. 2.149 shows the STU4 motherboard of the plug-in unit. The mounting of the desktop device variant differs from the plug-in unit variant.

This chapter describes which settings are to be made for the STU4.

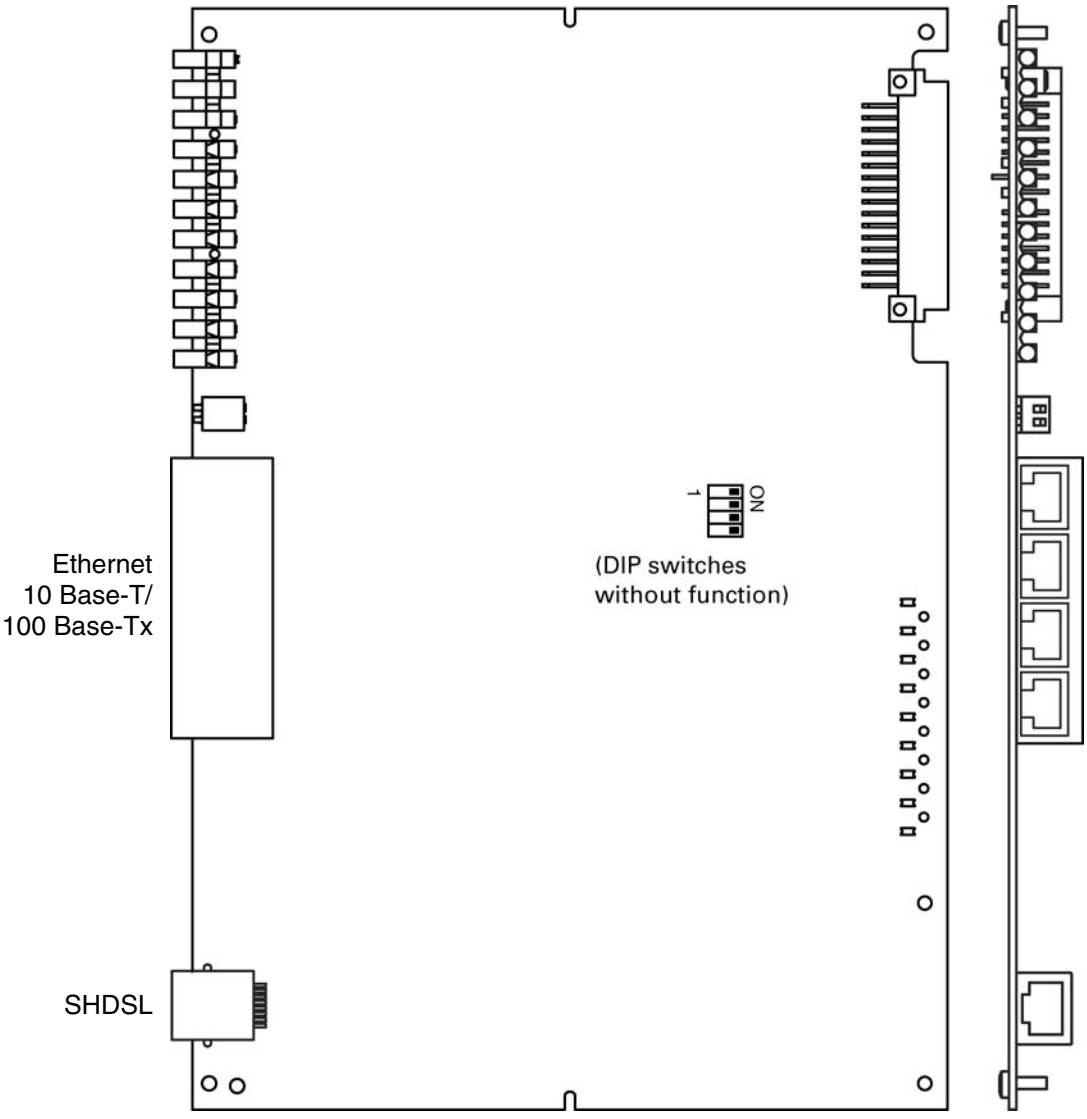


Fig. 2.149 STU4 motherboard

2.12.1 Operating modes of the STU4

The following operating modes are supported by the STU4:

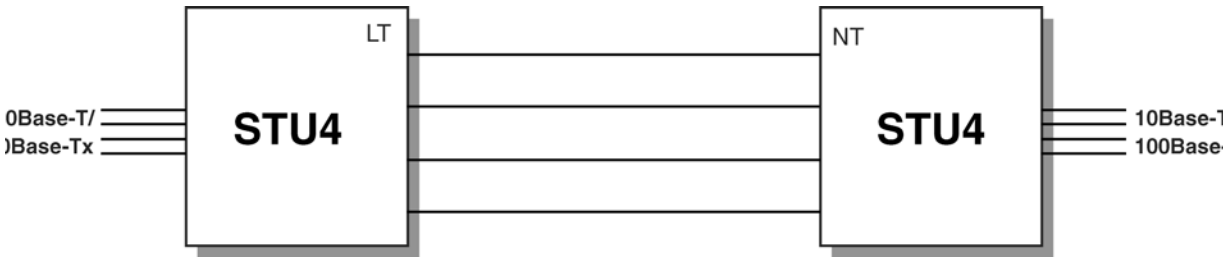


Fig. 2.150 STU4(LT) – STU4(NT) (1, 2, 3, 4 wire pairs mode)

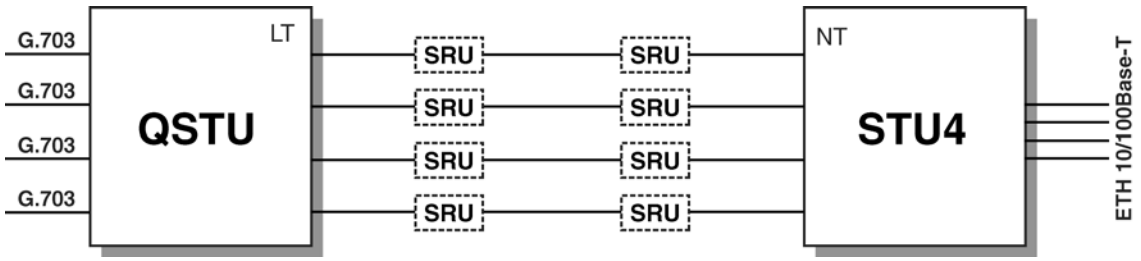


Fig. 2.151 QSTU(LT) – STU4(NT) (1, 2, 3, 4 wire pairs mode)

i In QSTU - STU4 interconnections, the QSTU must always be used on the LT side. The QSTU must have a specific firmware version (Fw-ID 3.49) enabling it to be used in conjunction with the STU4. For further information, please refer to the ULAF+ User Manual [2].

2.12.2 Configuration of the STU4 via the DIP switches

Use the DIP-Switches on the front panel to set the operating mode (Tab. 2.79), respective inserting the loopbacks (chapter 2.12.11).

Setting	Description
RT	NT mode[1)]
COT	LT mode[2)]
⊃	MCS test loop inserted

1) Default setting, Desktop unit
2) Default setting, Plug-in unit

Tab. 2.79 Front-panel DIP switch of the STU4

2.12.3 Fuses F9; F10; F1/F3/F5/F7

The basic modules are equipped with the following fuses (the equipping depends on using the basic module as a plug-in unit or as a desktop device):

Type of fuse	Equipped on...
F9 - 250 V / 1,25 AT	Desktop device
F10 - 125 V / 2 AT	Plug-in unit
F1/F3/F5/F7 - 250 V /1,25 AT	Desktop device and plug-in unit

Tab. 2.80 Usage of fuse types

The fuses have a protected function and should be replaced only by fuses exactly the same electrical specifications.

2.12.4 Power supply to the STU4

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

Power supply to the desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})
- Remotely fed via SHDSL interface
- Redundant power feeding (Local power supply and remotely fed)

Power supply modes

Tab. 2.81 shows you the various power supply modes and the required power adapters therefore:

	Plug-in		Desktop
	without RPS	with RPS	without RPS
Local power supply with 110 / 230 V_{AC}	–	–	X
Local power supply with 48 / 60 V_{DC}	X	X	X
Remotely fed via SHDSL interface	–	–	1)
Redundant power feeding (local power supply AC and remotely fed)	–	–	NTU
Redundant power feeding (local power supply AC and DC)	–	–	LT25W

1) Power via remote device
X Direct power supply without power adapter required
LT25W Power adapter LT25W required
NTU Power adapter NTU required
– Not possible

Tab. 2.81 Power supply modes

You use jumpers to select the type of supply, see chapter 2.12.6. Fig. 2.152 shows the terminals to which the supply cables are assigned.

Modifications to the type of supply and grounding may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply after it has been installed. To do this you must reset the DIP switch S800-9 as detailed in chapter 2.9.1:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Remove the power cord connector or replace the existing power cord with a new battery cable
5. Close the casing
6. Screw the screws on the bottom of the unit into the casing

Modules that are configured for DC supply may never be connected to 110 / 230 V_{AC} supply directly.

Converting from local supply to remotely fed

For converting the desktop unit from local supply to remotely fed proceed as follows:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cord (**Warning:** You must not bend the board)
6. Change the jumpers as detailed in chapter 2.12.6
7. Screw the screws on the bottom of the unit into the casing

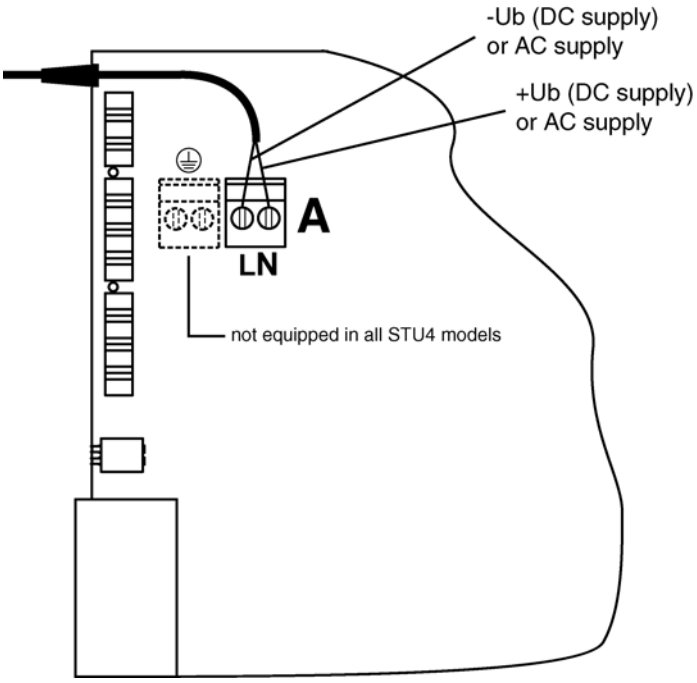


Fig. 2.152 Terminal block (A) for the supply via the cable

2.12.5 Power modes of STU4 needing external power adapter

Following desktop configurations require an external power adapter for local power feeding with 110 / 230 V_{AC}:

- STU4 desktop, remotely fed and redundant power feeding with local AC power
- STU4 desktop, local AC power feeding and redundant power feeding with local DC power

This chapter explains the different applications and procedures for connecting the power adapters to the desktop units.

Desktop power adapter SNP-A03T-S

STU4 desktops equipped with an RPS module have to be powered by DC. If 230 V_{AC} powering is needed, the power adapter SNP-A03T-S has to be used, which generates 48 V_{DC} on the far side.

It is also possible to use a backup battery for redundant power feeding of the LT25W. Therefore the power adapter has to be modified as described in section "Redundant battery connection LT25W" (Fig. 2.155).

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Connecting desktop power adapter SNP-A03T-S

For connecting desktop power adapter LT25W, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.12.6, Fig. 2.157 to battery supply (48 V_{DC}). If you are using a desktop you must set jumper S604-9 "ON"
7. Connect the desktop power adapter according to Fig. 2.153 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Screw the screws on the bottom of the unit into the casing

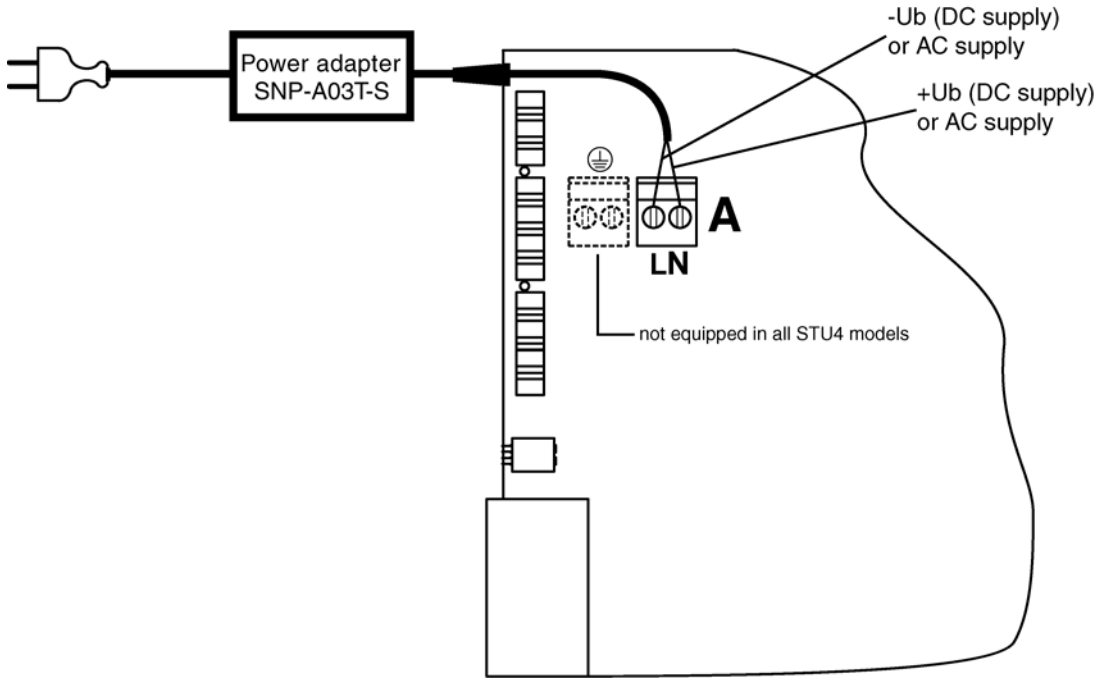


Fig. 2.153 Connecting desktop power adapter SNP-A03T-S

Redundant battery connection LT25W

In order to provide desktop power adapter LT25W with an additional battery supply you must open the unit and connect a second cable. Proceed as follows:

1. Disconnect the net cable and also disconnect all interface cables
2. Open the power adapter by releasing the four screws on the bottom of the unit
3. Remove the bottom of the casing of the power adapter
4. Connect the supplied cable to the terminal (1) as shown in Fig. 2.154
5. Replace the cable feed-through (2) (Fig. 2.154) for a cable with the one supplied for two cables

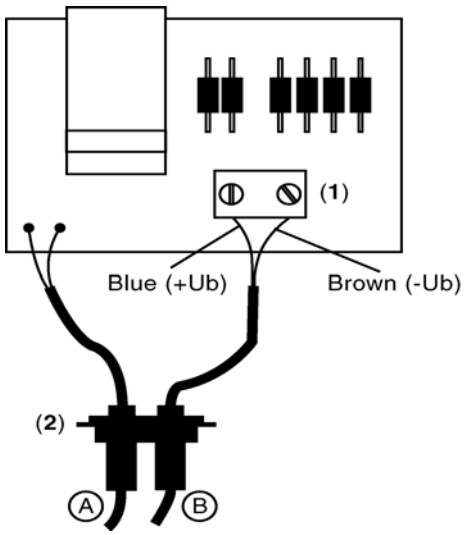


Fig. 2.154 Connecting the battery cable to desktop power adapter LT25W

6. Close the power adapter and screw the four screws into the casing
7. Connect the power adapter to the desktop unit as described above in 2 to 11
8. Connect the battery (Fig. 2.155)

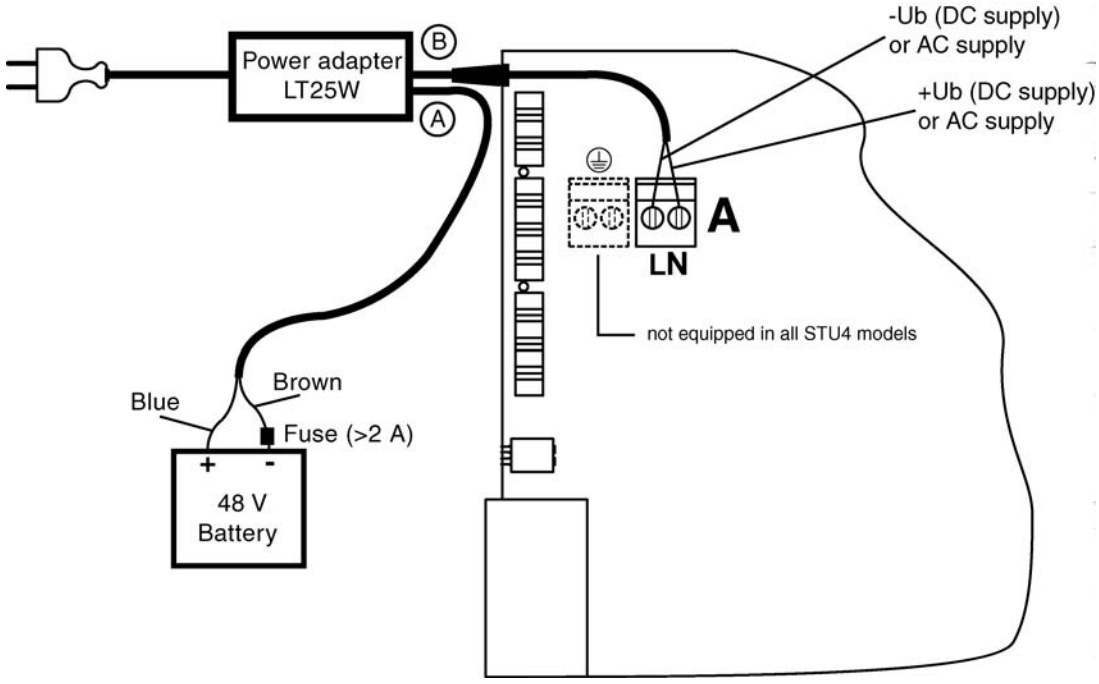


Fig. 2.155 Connecting the battery to desktop power adapter LT25W

Desktop power adapter NTU

For redundant power feeding of a STU4 desktop by local 110 / 230 V_{AC} and remote power the adapter NTU has to be used, which generates 120 V_{DC} on the far side. Desktop configured for this application will normally take the power from the local source. If this fails the desktop will switch automatically to remote power.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

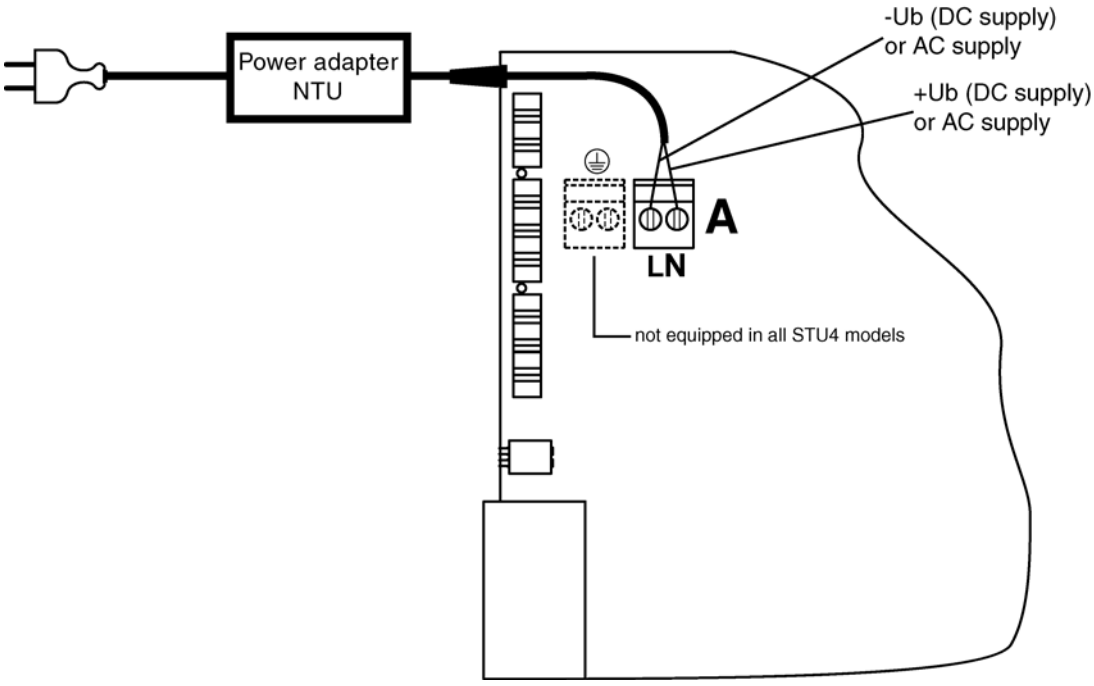


Fig. 2.156 Connecting desktop power adapter NTU

Connecting desktop power adapter NTU

For connecting desktop power adapter NTU, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.12.6, Fig. 2.159 to remote supply (additional jumpers are included with desktop unit NTU)
7. Connect the desktop power adapter according to Fig. 2.156 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Screw the screws on the bottom of the unit into the casing

2.12.6 Set the STU4 power supply via jumpers

Below, you will find the individual jumper settings for the STU4. The jumper is only available for desktop units. The following types of use are described:

- Locac supply AC or DC
- Remote supply
- Redundant power supply using the power adapter NTU

The casing must be opened to change the jumper settings on the desktop unit. For this, the screws on the bottom of the unit must be released.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

The jumper sockets B and C are not equipped in all models of the STU4. The following instructions only apply if the corresponding jumper sockets are equipped on the STU4.

Jumper	Meaning
B	STU4 desktop unit local supply; AC or DC
C	STU4 desktop unit supplied remotely
B / C	STU4 desktop unit supplied redundant using the power adapter NTU

Tab. 2.82 Meaning of jumpers B and C on the STU4 desktop units

Desktop unit local supply; AC or DC

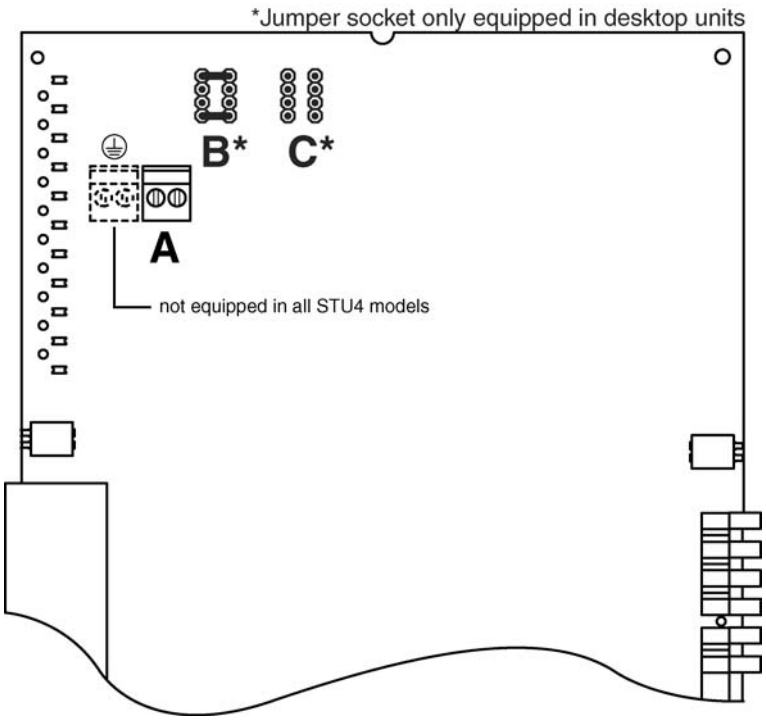


Fig. 2.157 Jumper settings: STU4 desktop unit local supply; AC or DC

Desktop unit supplied remotely

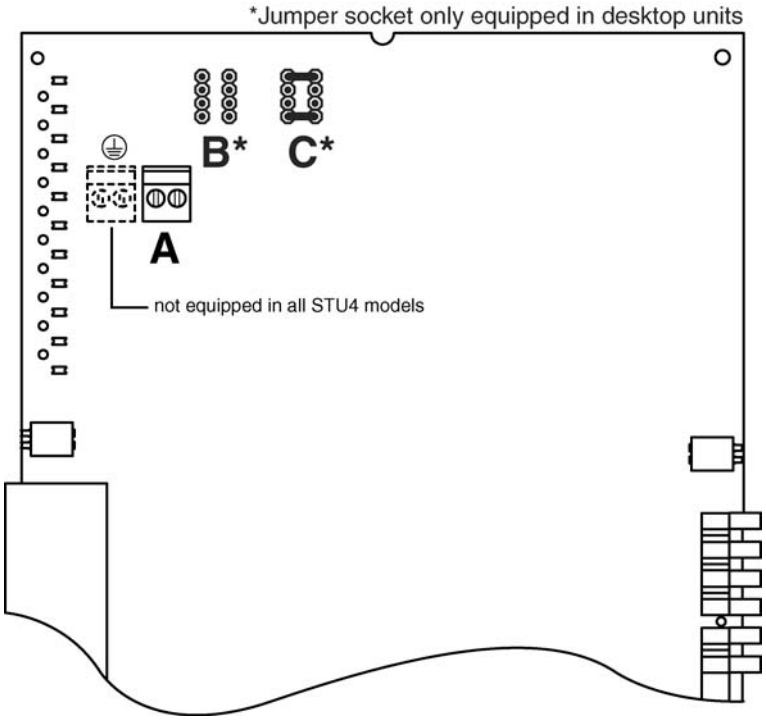


Fig. 2.158 Jumper settings: STU4 desktop unit supplied remotely

Desktop unit supplied redundantly with the desktop power adapter

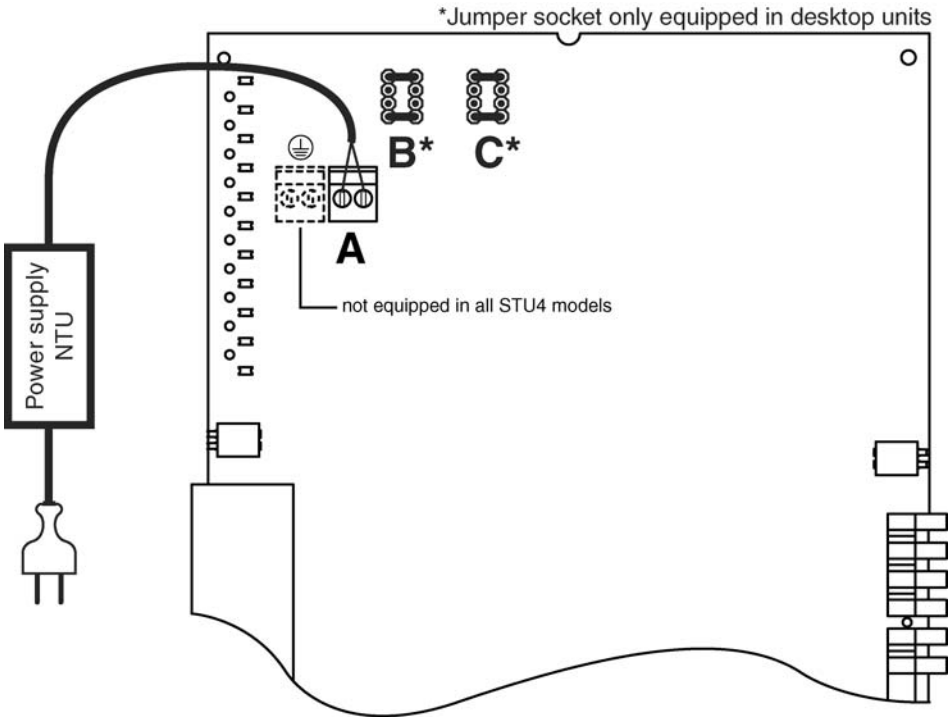


Fig. 2.159 Jumper settings: Desktop unit supplied redundantly with the desktop power adapter NTU

2.12.7 STU4 remote feeding

Remote feeding

The STU4 plug-in unit is available with an integrated remote power supply. This allows to remote feeding any desktop units.

Transmission and supply is via the SHDSL path. The ground-free supply voltage is 120 V_{DC}. The remote supply current is 50 mA or 60 mA.

2.12.7.1 Configuration of the STU4 remote feeding

50 mA/60 mA current limiting can be activated and configured by means of LCT. For further information, please refer to the ULAF+ User Manual [2].

2.12.7.2 STU4 remote feed monitoring and alarm signalling

Monitoring circuit

A monitoring circuit checks the voltage and current regulation. The LCT is used for setting.

The STU4 remote feed recognizes the following states:

- Remote feeding current too deep (line interruption)
- Remote feeding current too high (short circuit)

Out of this states the STU4 generates the following alarms:

Alarm	Event	Description
UC1/2/3/4	Line break	Remote feed current too deep (Under current)
OC1/2/3/4	Short circuit	Remote feed current too high (Over current)

Tab. 2.83 STU4 remote feed alarm signalling

2.12.7.3 Configuration of the power fail recognition

The configuration is done using the LCT. You find more information in the ULAF+ User Manual [2].

2.12.8 Pin assignment of the SHDSL interface

Pin assignment of the SHDSL interface

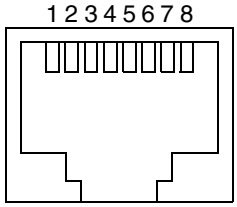


Fig. 2.160 Pin assignment of the SHDSL interface

The Pin assignment is according to a twisted standard LAN cable.

Pin assignment	Signal	Description
1	SHDSLA_2	Bidirectional SHDSL signal, Loop 2
2	SHDSLB_2	
4	SHDSLA_1	Bidirectional SHDSL signal, Loop 1
5	SHDSLB_1	
3	SHDSLA_3	Bidirectional SHDSL signal, Loop 3
6	SHDSLB_3	
7	SHDSLA_4	Bidirectional SHDSL signal, Loop 4
8	SHDSLB_4	
Casing	Ground	Ground

Tab. 2.84 Pin assignment of the SHDSL interface

2.12.9 Pin assignment of the Ethernet interfaces(10Base-T/100Base-Tx)

The four Ethernet interfaces are assembled to a RJ45 connector strip.

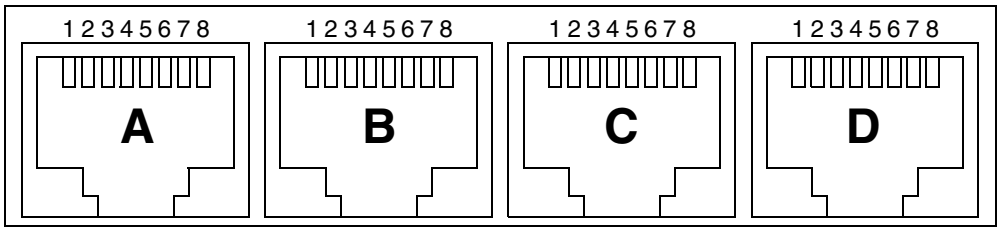


Fig. 2.161 Pin assignment of the Ethernet interfaces

Pin assignment	Signal	Description
1	TxP	Transmited data
2	TxM	
3	RxP	Tranmited data
4	--	Pin 4 and 5 over 75 Ω connected to circuit ground
5	--	
6	RxM	Received data
7	--	Pin 7 and 8 over 75 Ω connected to circuit ground
8	--	
Casing	Shield	Overall ground

Tab. 2.85 Pin assignment of the Ethernet interfaces

If required, send and receive data can be automatically transposed by the Ethernet Switch.

2.12.10 Supervision and alarm signalling of the STU4

STU4 operating status and monitoring are indicated by LEDs on the front panel. In addition to these LEDs, the Ethernet interfaces each have 2 LEDs (yellow/green) for visual alarm signalling.

2.12.10.1 Visual signalling of the plug-in unit

When the STU4 is used as a plug-in unit, the front panel is equipped with eleven LEDs (Fig. 2.162).

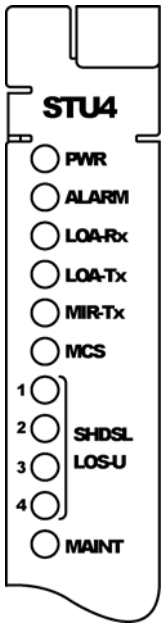


Fig. 2.162 Visual signalling of the STU4 plug-in unit

LED	Colour	Status	
		off	on
PWR	green	no power supply	Power supply o.k.
Alarm	red	no alarm	Urgend alarm [2)]
	yellow	no alarm	Non-urgent alarm [2)]
LOA-Rx	yellow	no alarm	No WAN activity in receive direction
LOA-Tx	yellow	no alarm	No WAN activity in transmit direction
MIR-Tx	yellow	no alarm	WAN capacity in transmit direction at limit
MCS	red	no alarm	**on:** all paths inoperative **blinking:** one or more paths inoperative
SHDSL LOS-U 1[1)]	red	no alarm	**on:** LOS **blinking:** LOSW, Training
SHDSL LOS-U 2[1)]	red	no alarm	**on:** LOS **blinking:** LOSW, Training
SHDSL LOS-U 3[1)]	red	no alarm	**on:** LOS **blinking:** LOSW, Training

Tab. 2.86 Visual signalling of the STU4 plug-in unit

LED	Colour	Status	
		off	on
SHDSL LOS-U 4[1)]	red	no alarm	**on:** LOS **blinking:** LOSW, Training
MAINT	yellow	no status message	**on:** Loopback active, traps deactivated, BERT activated, layer 2 switch test mode activated **blinking 1:** Firmware on LT and NT are not compatible or configuration is not supported by NT

1) Visual signalling according to Fig. 2.163

2) Alarm message depends on configuration made with the LCT

Tab. 2.86 Visual signalling of the STU4 plug-in unit

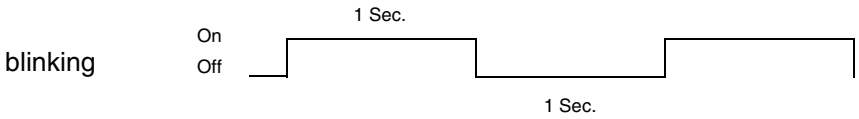


Fig. 2.163 Visual signalling LOS/LFA/Training of the STU4

Visual signalling of the Ethernet interface

A green and a yellow LED are incorporated in the female connectors of the four Ethernet interfaces.

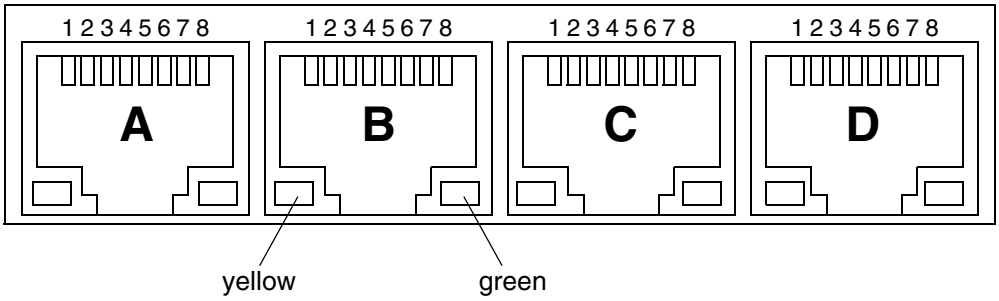


Fig. 2.164 Visual signalling of the Ethernet interface

LED	LED mode 10Base-T
Yellow	**Off:** Half Duplex **On**: Full Duplex **blinking**: Collision with Half Duplex
Green	**Off:** No connection / No Traffic **On**: Link Up **blinking**: Traffic

Tab. 2.87 Visual signalling of the Ethernet interface

2.12.10.2 Visual signalling of the desktop unit

The visual signalling of the desktop unit is equal those of the the plug-in unit. The meaning of the LEDs is explained in Tab. 2.86.

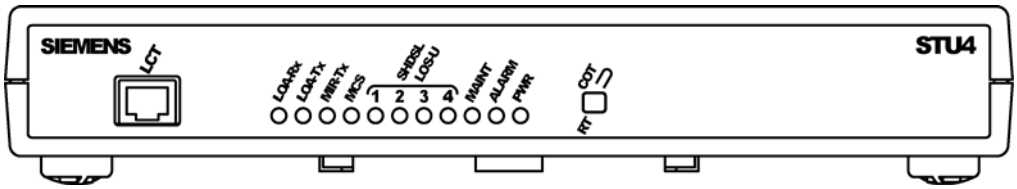


Fig. 2.165 Visual signalling of the desktop unit

2.12.11 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator or
- using DIP switches on the modules.

The procedure for inserting loopbacks by means of management software can be found in the user manual of ULAF+ [2] or AccessIntegrator [6].

Loopback ⊃ can be inserted locally at the NT or remotely at the LT using DIP switches.

DIP switches of the desktop unit

DIP switches of the plug-in unit

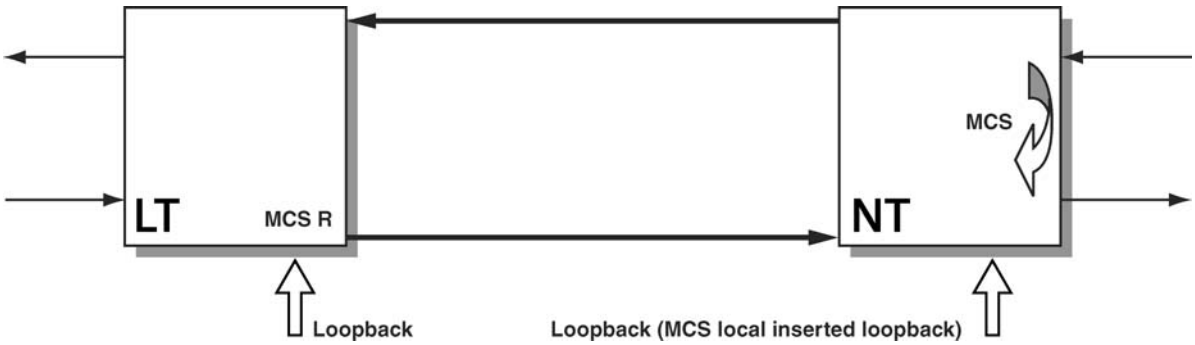


Fig. 2.166 Examples of loopbacks of the STU4

Find detailed information about the loopbacks of the STU4 in the ULAF+ User Manual [2].

2.13 BSTU4 termination unit

Application

The BSTU4 termination unit is made as

- a plug-in unit and as
- a desktop device.

Fig. 2.167 shows the BSTU4 motherboard of the plug-in unit.

This chapter describes which settings are to be made for the BSTU4.

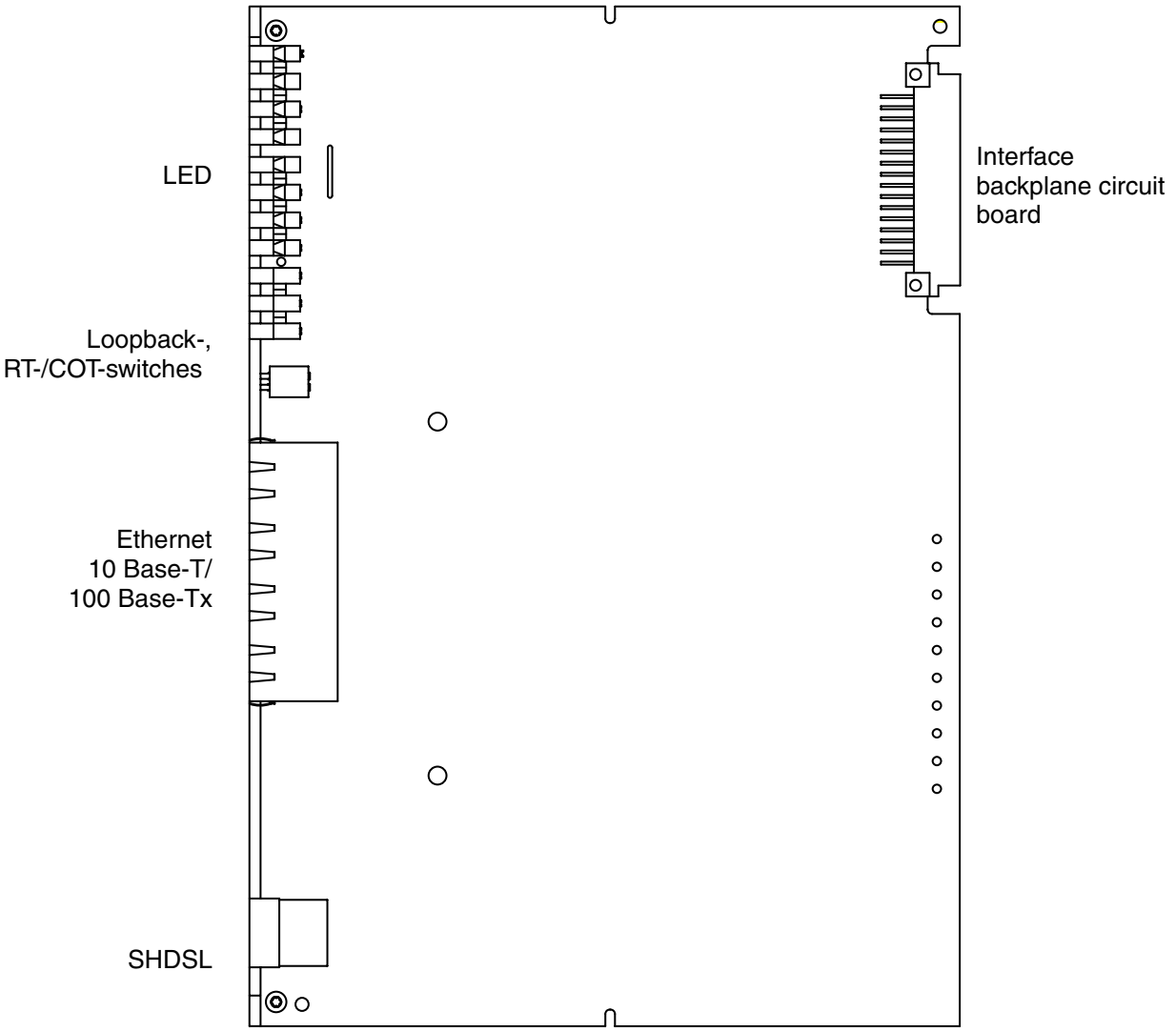


Fig. 2.167 BSTU4 motherboard

2.13.1 Operating modes of the BSTU4

The following operating modes are supported by the BSTU4:

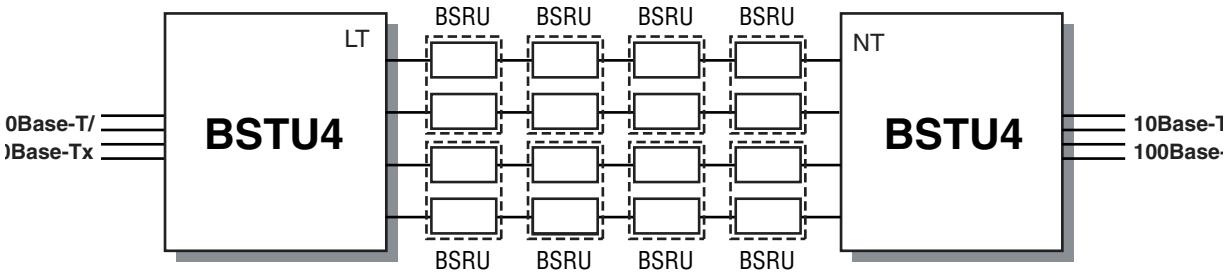


Fig. 2.168 BSTU4(LT) – BSTU4(NT) (1, 2, 3, 4 wire pairs mode)

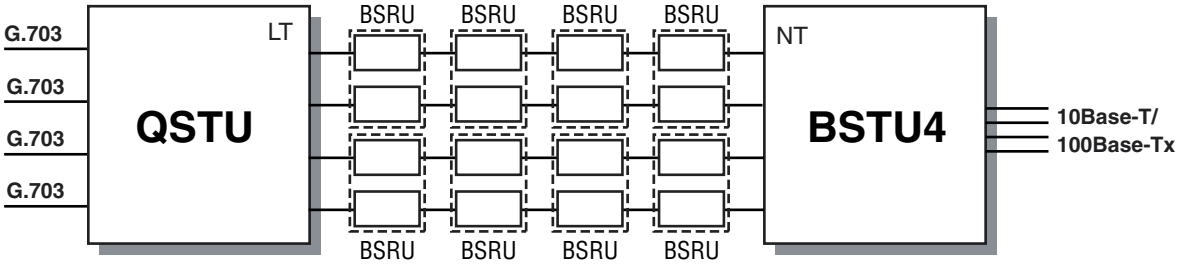


Fig. 2.169 QSTU(LT) – BSTU4(NT) (1, 2, 3, 4 wire pairs mode)

i In QSTU - BSTU4 connections, the QSTU must always be used on the LT side. The QSTU must have a specific firmware version (Fw-ID 6.49) enabling it to be used in conjunction with the BSTU4. For further information, please refer to the ULAF+ User Manual [2].

2.13.2 Configuration of the BSTU4 via the DIP switches

Use the DIP-Switches on the front panel to set the operating mode (Tab. 2.88), respective inserting the loopbacks (chapter 2.13.11).

Setting	Description
RT	NT mode[1)]
COT	LT mode[2)]
⊃	MCS test loop inserted

1) Default setting, Desktop unit
2) Default setting, Plug-in unit

Tab. 2.88 Front-panel DIP switch of the BSTU4

2.13.3 Fuses F1; F2; F4; F5; F6-F12,F14

The basic modules are equipped with the following fuses (the equipping depends on using the basic module as a plug-in unit or as a desktop device):

Type of fuse	Equipped on...
F1: 250 V / 1,25 AT	Desktop device
F2; F4: 125 V / 2 AT	Desktop device with RPS
F5: 125 V / 2 AT	Plug-in unit
F6-F12, F14: 250 V /1,25 AT	Desktop device and plug-in unit

Tab. 2.89 Usage of fuse types

The fuses have a protected function and should be replaced only by fuses exactly the same electrical specifications.

2.13.4 Power supply to the BSTU4

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

Power supply to the desktop unit without RPS

The following options are available for power supply to the desktop unit without RPS:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})
- Remotely fed via SHDSL interface (max. 120 V_{DC})
- Redundant power feeding (Local power supply and remotely fed / local power supply with AC and DC supply)

Power supply to the desktop unit with RPS

The following options are available for power supply to the desktop unit with RPS:

- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})
- Local power supply with 110 V_{AC} / 230 V_{AC} via power adapter SNP-A08T-S

Simultaneous connection to 110 V_{AC} and 230 V_{AC} is not permitted as the device would be irreparably damaged.

Power supply modes

Tab. 2.90 shows you the various power supply modes for the BSTU4 and the required power adapters therefore:

	Plug-in		Desktop	
	without RPS	with RPS	without RPS	with RPS
Local power supply with 110 / 230 V_{AC}	–	–	X	SNP-A08T-S
Local power supply with 48 / 60 V_{DC}	X	X	X	X
Remotely fed via SHDSL interface	–	–	1)	–
Redundant power feeding (local power supply AC and remotely fed)	–	–	NTU	–

Tab. 2.90 Power supply modes

	Plug-in		Desktop	
	without RPS	with RPS	without RPS	with RPS
Redundant power feeding (local power supply AC and DC)	–	–	LT25W	SNP-A08T-S

1) Power via remote device
X Direct power supply without power adapter required
SNP-A08T-S Power adapter SNP-A08T-S required
LT25W Power adapter LT25W required
NTU Power adapter NTU required
– Not possible

Tab. 2.90 Power supply modes

2.13.4.1 Power supply to the desktop unit without remote power supply (RPS)

Tab. 2.90 shows you the various power supply modes for the BSTU4.

You use jumpers to select the type of supply of the desktop unit without RPS, see chapter 2.13.5. Fig. 2.170 shows the terminals to which the supply cables are assigned.

Modifications to the type of supply and grounding may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply after it has been installed. To do this proceed as follow:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Remove the power cord connector or replace the existing power cord with a new battery cable
5. Close the casing
6. Screw the screws on the bottom of the unit into the casing

You can configure powerfail suppression by using the NMS. For further information, please refer to the ULAF+ User Manual [2].

Converting from local supply to remotely fed

For converting the desktop unit from local supply to remotely fed proceed as follows:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cord (**Warning:** You must not bend the board)
6. Change the jumpers as detailed in chapter 2.13.5
7. Screw the screws on the bottom of the unit into the casing

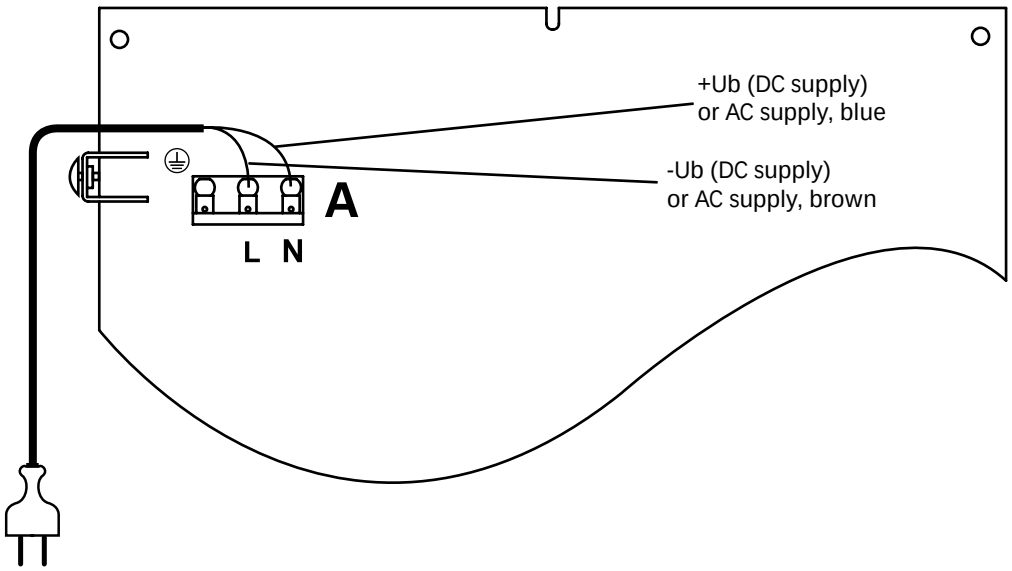


Fig. 2.170 Terminal block (A) for the supply via the cable

Following desktop configurations require an external power adapter for local power feeding with 110 / 230 V_{AC}:

- Redundant power feeding (local power supply and remotely fed)
- Redundant power feeding (local power supply with AC and DC power)

This chapter explains the different applications and procedures for connecting the power adapters to the desktop units.

Desktop power adapter NTU

For redundant power feeding of a BSTU4 desktop by local 110 / 230 V_{AC} and remote power the adapter NTU has to be used, which generates 120 V_{DC} on the far side. Desktop configured for this application will normally take the power from the local source. If this fails the desktop will switch automatically to remote power.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

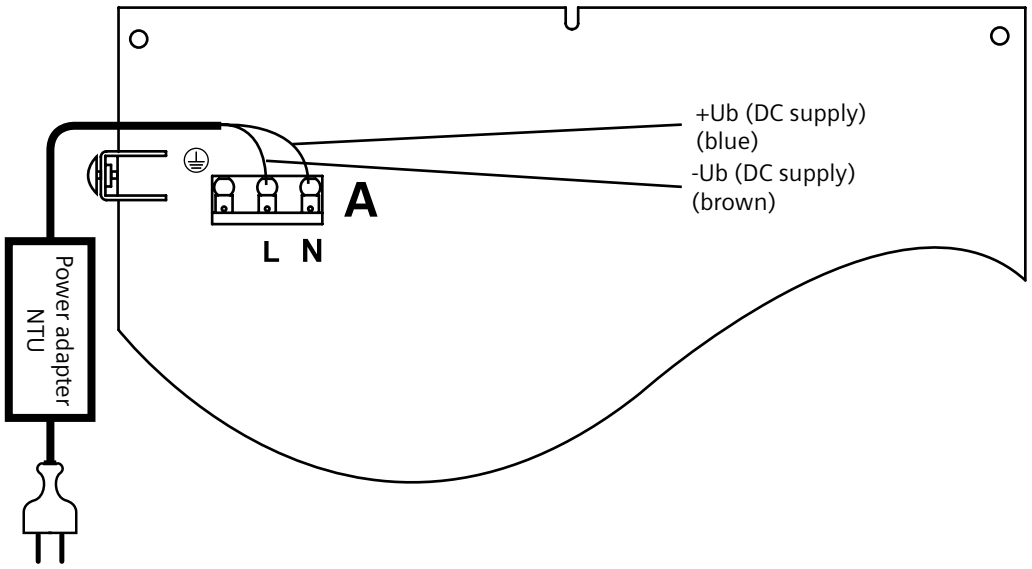


Fig. 2.171 Connecting desktop power adapter NTU

Connecting desktop power adapter NTU

For connecting desktop power adapter NTU, proceed as follows:

1. Interrupt the power supply at the desktop unit
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Set the jumpers according to Chapter 2.13.5, Fig. 2.179 to remote supply (additional jumpers are included with desktop unit NTU)
7. Connect the desktop power adapter according to Fig. 2.171 (**Warning**: You must not bend the board)
8. Insert the module into the casing
9. Route the cable through the feed-through hole on the back of the unit
10. Screw the screws on the bottom of the unit into the casing

Redundant battery connection LT25W

In order to provide desktop power adapter LT25W with an additional battery supply you must open the unit and connect a second cable. Proceed as follows:

1. Disconnect the net cable and also disconnect all interface cables
2. Open the power adapter by releasing the four screws on the bottom of the unit
3. Remove the bottom of the casing of the power adapter
4. Connect the supplied cable to the terminal (1) as shown in Fig. 2.172
5. Replace the cable feed-through (2) (Fig. 2.172) for a cable with the one supplied for two cables

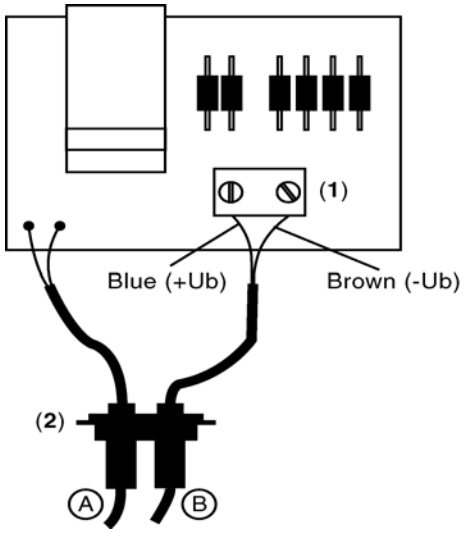


Fig. 2.172 Connecting the battery cable to desktop power adapter LT25W

6. Close the power adapter and screw the four screws into the casing
7. Connect the power adapter to the desktop unit as described above in 2 to 8
8. Connect the battery (Fig. 2.173)

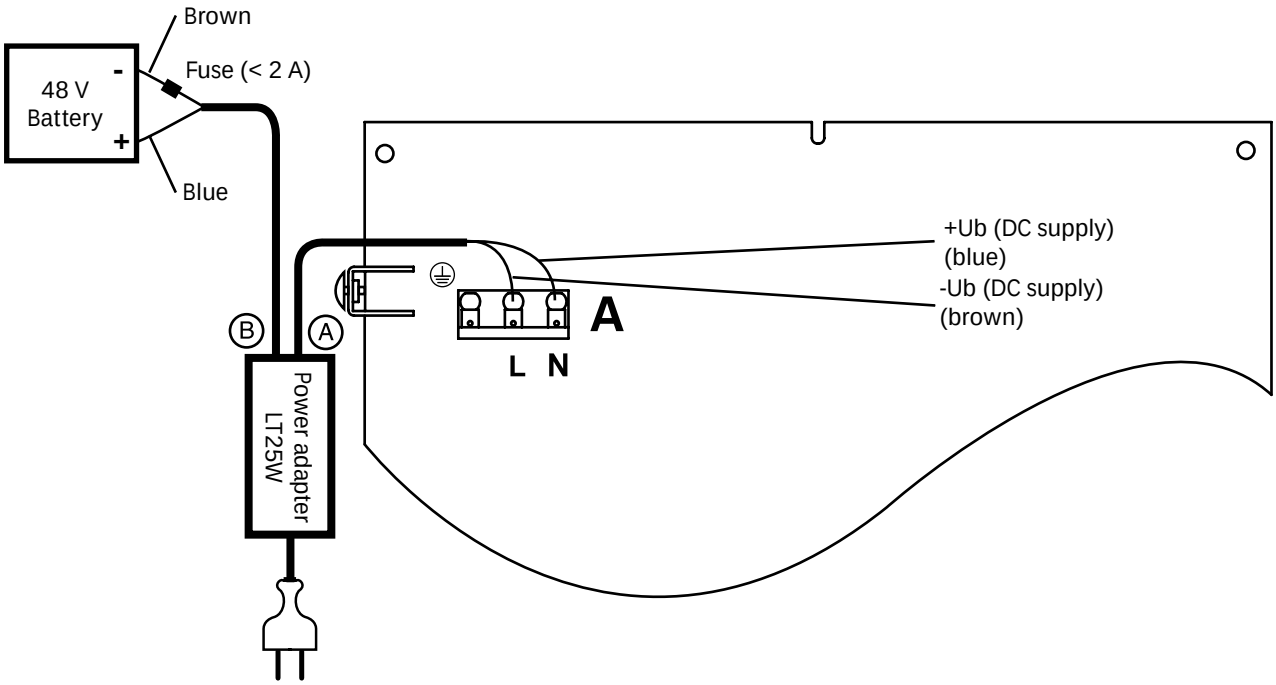


Fig. 2.173 Connecting the battery to desktop power adapter LT25W

2.13.4.2 Power supply to the desktop unit with remote power supply (RPS)

Tab. 2.90 shows you the various power supply modes for the BSTU4.

i The BSTU4 desktop unit with remote power supply is not equipped with any jumper sockets. There is no configuration required.

Fig. 2.174 shows you the desktop unit with RPS. When a local 48/60 VDC power supply is used, connect the desktop device to one of the following power sources:

- 110 / 230 V_{AC} power adapter SNP-A08T-S
- 48 / 60 V_{DC} battery connector to terminal block (A)
- 48 / 60 V_{DC} battery connector with battery cable C107-A124-C734

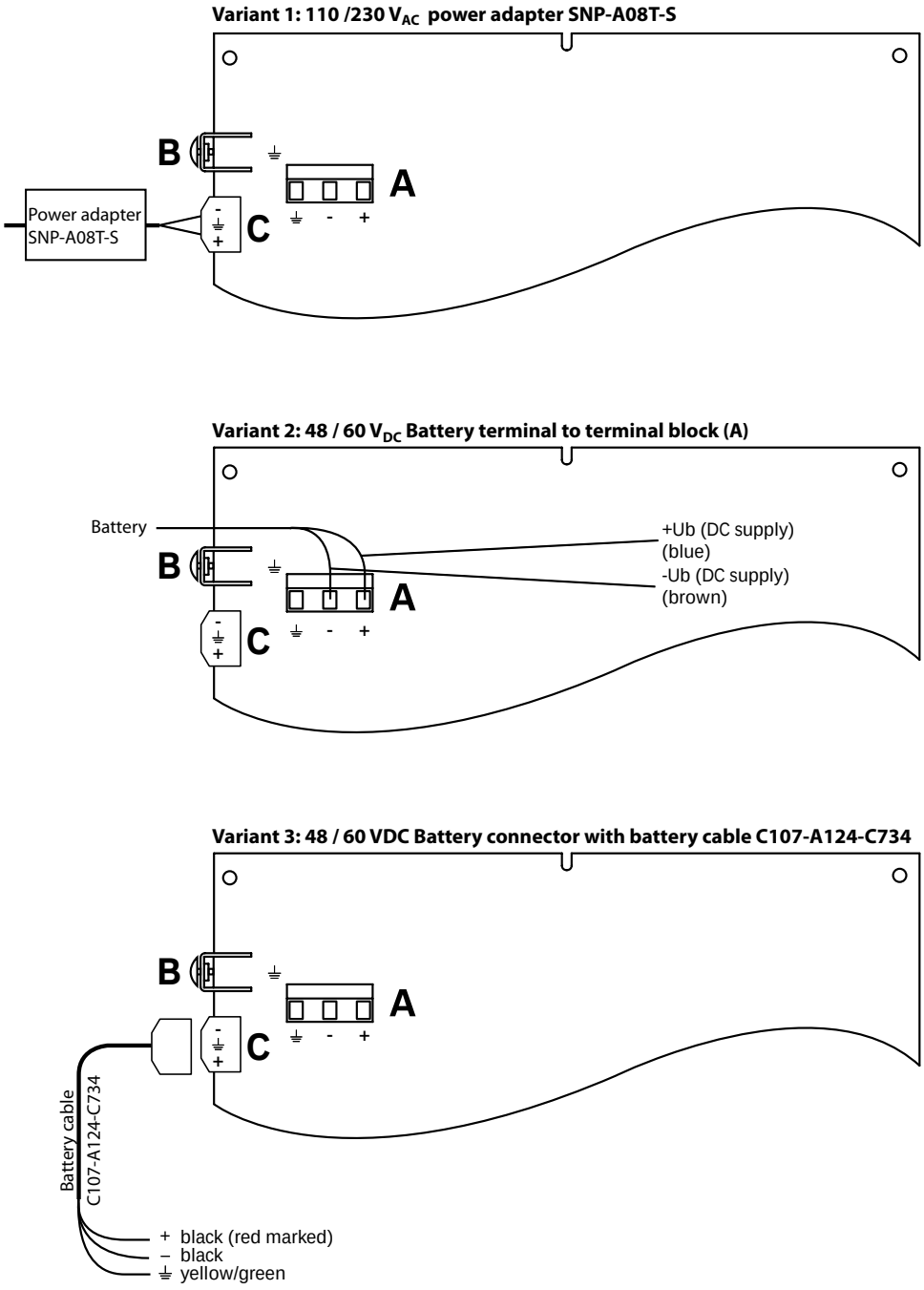


Fig. 2.174 Power supply of the desktop unit with RPS

The following combinations are available for redundant supply of the desktop device with RPS:

- Variant 1 with Variant 2 (Battery and power adapter SNP-A08T-S) (Fig. 2.175)

- Variant 1 with Variant 3 (Battery cable to terminal block (A) und battery cable C107-A124-C734)

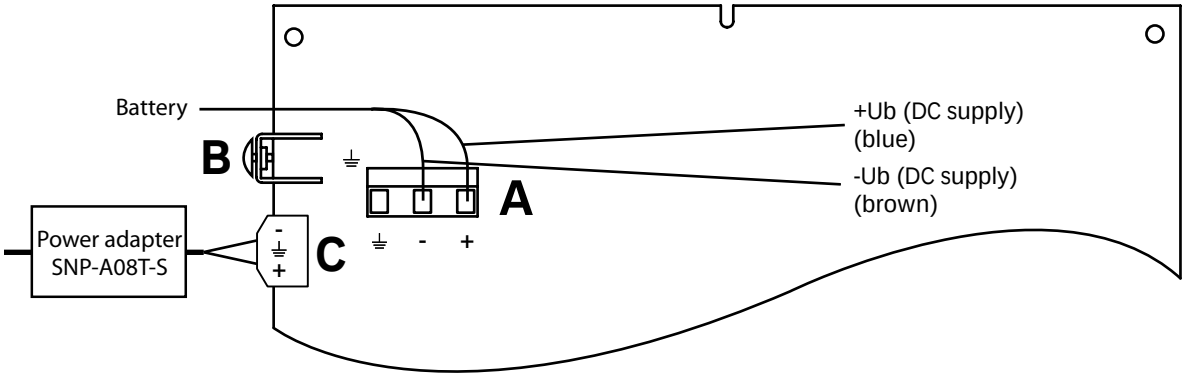


Fig. 2.175 Redundant power feeding with battery and power adapter SNP-A08T-S

Grounding of the desktop unit with RPS

The desktop unit with RPS can be grounded

- using the terminal block (A),
- using the separate grounding terminal (B), or
- at the center terminal of the connector (C) (see Fig. 2.174).

All three are implemented with the battery cable (C107-A124-C734). If the power adapter SNP-A08T-S is used, the desktop device is automatically connected to network protective ground.

i The desktop device has a function ground but not a protective ground.

2.13.5 Set the BSTU4 power supply via jumpers

Below, you will find the individual jumper settings for the BSTU4. The jumper is only available for desktop units. The following types of use are described:

- Locac supply AC or DC
- Remote supply
- Redundant power supply using the power adapter NTU

The casing must be opened to change the jumper settings on the desktop unit. For this, the screws on the bottom of the unit must be released.

⚠ Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

⚠ Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

The jumper sockets B and C are not equipped in all models of the BSTU4. The following instructions only apply if the corresponding jumper sockets are equipped on the BSTU4.

Jumper	Meaning
B	BSTU4 desktop unit local supply; AC or DC
C	BSTU4 desktop unit supplied remotely
B / C	BSTU4 desktop unit supplied redundant using the power adapter NTU

Tab. 2.91 Meaning of jumpers B and C on the BSTU4 desktop units

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The grounding of the BSTU4 desktop can be made both via terminal block (A) and via the pressure clamp (D, Fig. 2.177) on the rear panel of the device.
A grounding because of safety regulations is not mandatory.

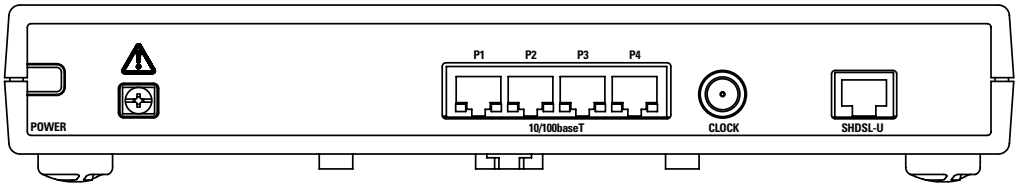

Fig. 2.176 Rear panel of the BSTU4 desktop with pressure clamp for grounding

Desktop unit local supply; AC or DC

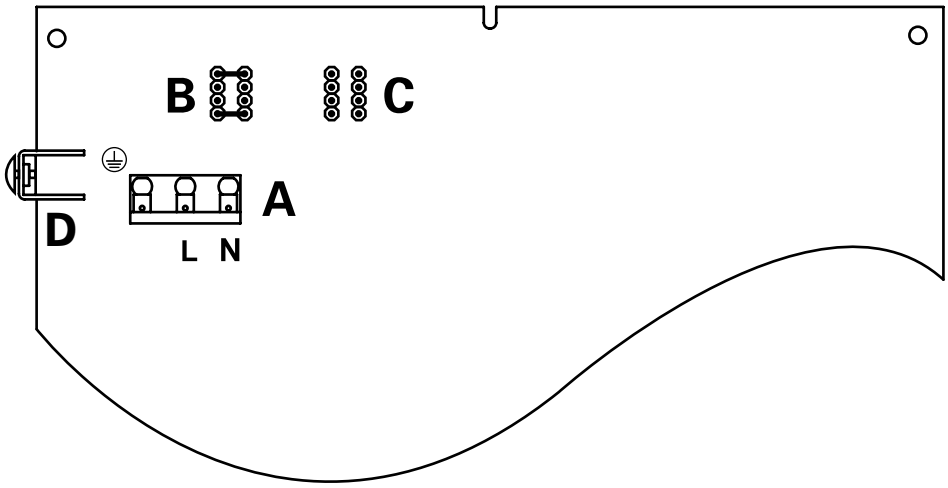

Fig. 2.177 Jumper settings: BSTU4 desktop unit local supply; AC or DC

Desktop unit supplied remotely

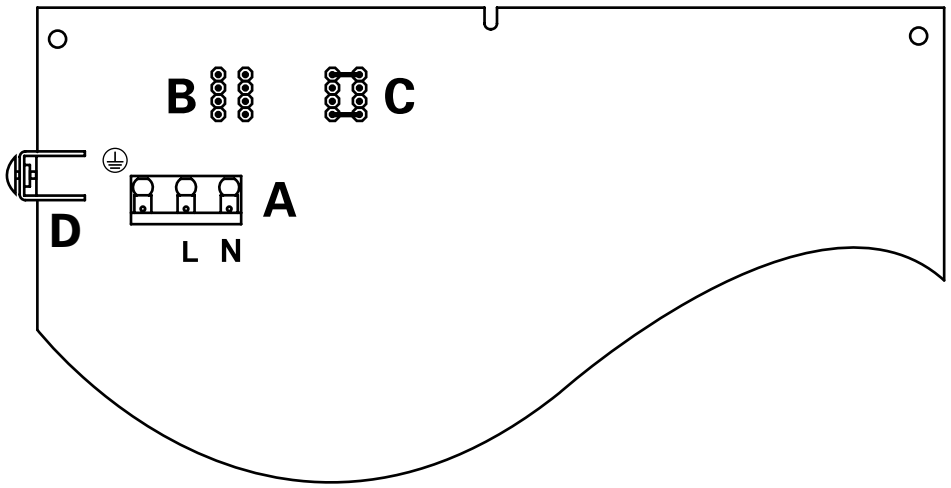

Fig. 2.178 Jumper settings: BSTU4 desktop unit supplied remotely

Desktop unit supplied redundantly with the desktop power adapter

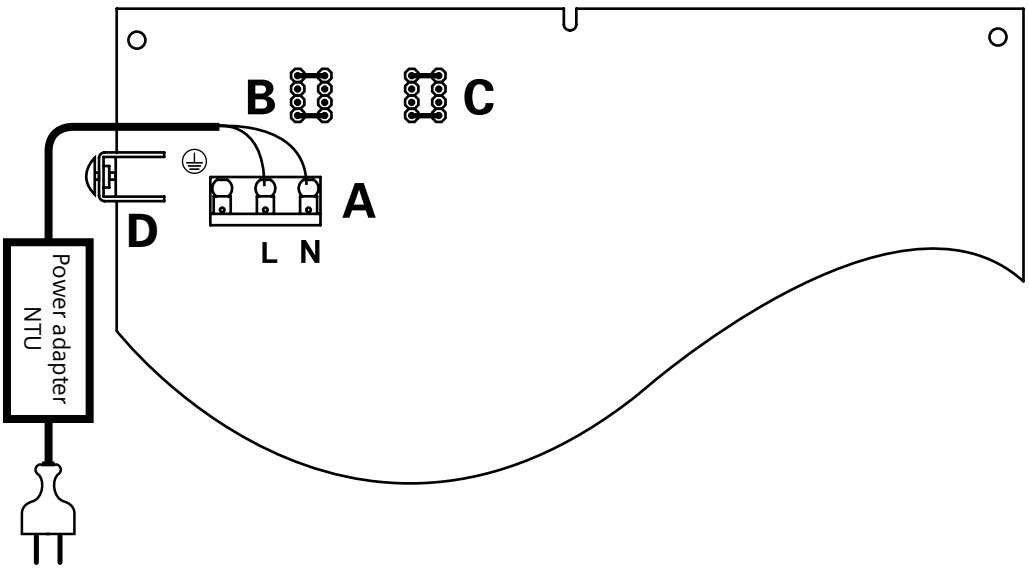

Fig. 2.179 Jumper settings: Desktop unit supplied redundantly (local with AC or remote powered) with the desktop power adapter NTU

Additional jumpers are included with the power adapter NTU.

2.13.6 BSTU4 remote feeding

Remote feeding

The BSTU4 plug-in unit is available with an integrated remote power supply. This allows to remote feeding any desktop units.

Transmission and supply is via the SHDSL path. The ground-free supply voltage is 120 V_{DC}. The remote supply current is 50 mA or 60 mA.

2.13.6.1 Configuration of the BSTU4 remote feeding

The remote feeding can be activated and configured by means of LCT. For further information, please refer to the ULAF+ User Manual [2].

2.13.6.2 BSTU4 remote feed monitoring and alarm signalling

Monitoring circuit

A monitoring circuit checks the voltage and current regulation. The LCT is used for setting.

The BSTU4 remote feed recognizes the following states:

- Remote feeding current too deep (line interruption)
- Remote feeding current too high (short circuit)

Out of this states the BSTU4 generates the following alarms:

Alarm	Event	Description
UC1/2/3/4	Line break - wire pairs 1/2/3/4	Remote feed current too deep (Under current)
OC1/2/3/4	Short circuit/overload - wire pairs 1/2/3/4	Remote feed current too high (Over current)

Tab. 2.92 BSTU4 remote feed alarm signalling

2.13.6.3 Configuration of the power fail recognition

In case of failure of the supply voltage (230 V_{AC}), the BSTU4 on the NT side will send a message to the BSTU4(LT). The configuration is done using the LCT. You find more information in the ULAF+ User Manual [2].

2.13.7 Pin assignment of the SHDSL interface

Pin assignment of the SHDSL interface

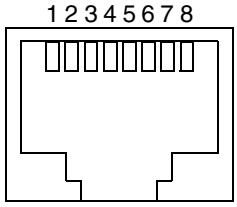

Fig. 2.180 Pin assignment of the SHDSL interface

The Pin assignment is according to a twisted standard LAN cable.

Pin assignment	Signal	Description
1	SHDSLA_2	SHDSL interface - wire pair 2
2	SHDSLB_2	
4	SHDSLA_1	SHDSL interface - wire pair 1
5	SHDSLB_1	
3	SHDSLA_3	SHDSL interface - wire pair 3
6	SHDSLB_3	

Tab. 2.93 Pin assignment of the SHDSL interface

Pin assignment	Signal	Description
7	SHDSLA_4	SHDSL interface - wire pair 4
8	SHDSLB_4	
Casing	Ground	Ground

Tab. 2.93 Pin assignment of the SHDSL interface

2.13.8 Pin assignment of the Ethernet interfaces(10Base-T/100Base-Tx)

The four Ethernet interfaces are assembled to a RJ45 connector strip. You will find the pin assignment of the Ethernet interfaces Fig. 2.181 in and Tab. 2.94.

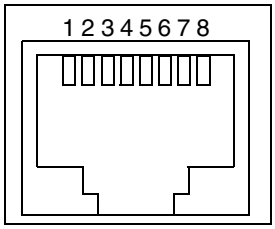

Fig. 2.181 Pin assignment of the Ethernet interfaces

Pin assignment	Signal	Description
1	TxP	Transmited data
2	TxM	
3	RxP	Tranmited data
4	--	Pin 4 and 5 over 75 Ω connected to circuit ground
5	--	
6	RxM	Received data
7	--	Pin 7 and 8 over 75 Ω connected to circuit ground
8	--	
Casing	Shield	Overall ground

Tab. 2.94 Pin assignment of the Ethernet interfaces

If required, send and receive data can be automatically transposed by the Ethernet Switch.

2.13.9 Clock Interface

The BSTU4(LT) is equipped with a clock in connector, the BSTU4(NT) with a clock out connector. The impedance of the clock input is 75 R Ω (BNC connector).

2.13.10 Supervision and alarm signalling of the BSTU4

BSTU4 operating status and monitoring are indicated by LEDs on the front panel. In addition to these LEDs, the Ethernet interfaces each have 2 LEDs (yellow/green) for visual alarm signalling.

2.13.10.1 Visual signalling of the plug-in unit

When the BSTU4 is used as a plug-in unit, the front panel is equipped with eleven LEDs (Fig. 2.182).

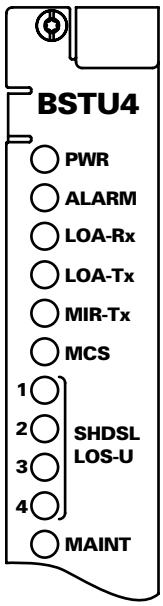

Fig. 2.182 Visual signalling of the BSTU4 plug-in unit

LED	Colour	Status	
		off	on
PWR	green	no power supply	Power supply o.k.
Alarm	red	no alarm	Urgend alarm [2]
	yellow	no alarm	Non-urgent alarm [2]
LOA-Rx	yellow	no alarm	No WAN activity in receive direction
LOA-Tx	yellow	no alarm	No WAN activity in transmit direction
MIR-Tx	yellow	no alarm	WAN capacity in transmit direction at limit
MCS	red	no alarm	**on:** all paths inoperative **blinking:** one or more paths inoperative
SHDSL LOS-U 1[1]	red	no alarm	**on:** LOS **blinking:** LOSW, Training
SHDSL LOS-U 2[1]	red	no alarm	**on:** LOS **blinking:** LOSW, Training
SHDSL LOS-U 3[1]	red	no alarm	**on:** LOS **blinking:** LOSW, Training

Tab. 2.95 Visual signalling of the BSTU4 plug-in unit

LED	Colour	Status	
		off	on
SHDSL LOS-U 4[1)]	red	no alarm	**on:** LOS **blinking:** LOSW, Training
MAINT	yellow	no status message	**on:** Loopback active, traps deactivated, BERT activated, layer 2 switch test mode activated **blinking 1:** Firmware on LT and NT are not compatible or configuration is not supported by NT

1) Visual signalling according to Fig. 2.183

2) Alarm message depends on configuration made with the LCT

Tab. 2.95 Visual signalling of the BSTU4 plug-in unit

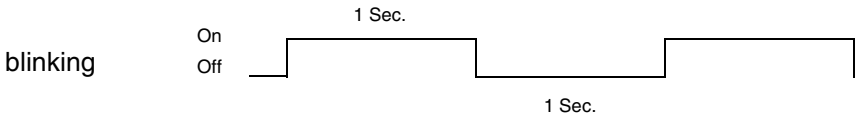

Fig. 2.183 Visual signalling LOS/LFA/Training of the BSTU4

Visual signalling of the Ethernet interface

A green and a yellow LED are incorporated in the female connectors of the four Ethernet interfaces.

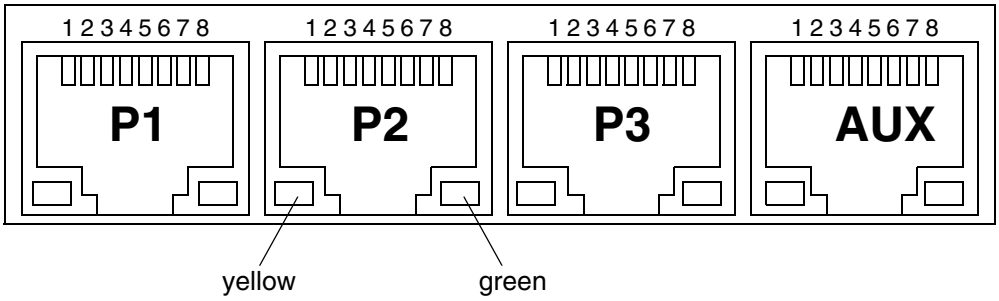

Fig. 2.184 Visual signalling of the Ethernet interface

LED	LED mode 10/100Base-Tx
Yellow	**Off:** Half Duplex **On**: Full Duplex **blinking**: Collision with Half Duplex
Green	**Off:** No connection / No Traffic **On**: Link Up **blinking**: Traffic

Tab. 2.96 Visual signalling of the Ethernet interface

2.13.10.2 Visual signalling of the desktop unit

The visual signalling of the desktop unit is equal those of the the plug-in unit. The meaning of the LEDs is explained in Tab. 2.86.

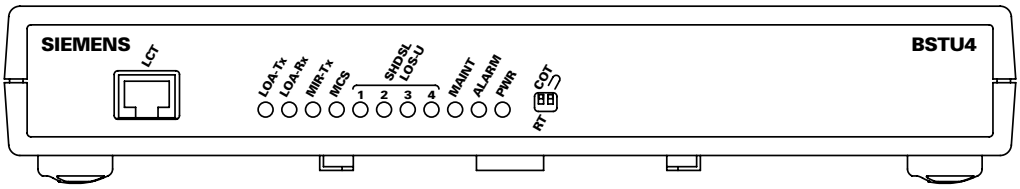

Fig. 2.185 Visual signalling of the desktop unit

Visual signalling of the Ethernet interface

A green and a yellow LED are incorporated in the female connectors of the four Ethernet interfaces on the rear of the desktop unit.

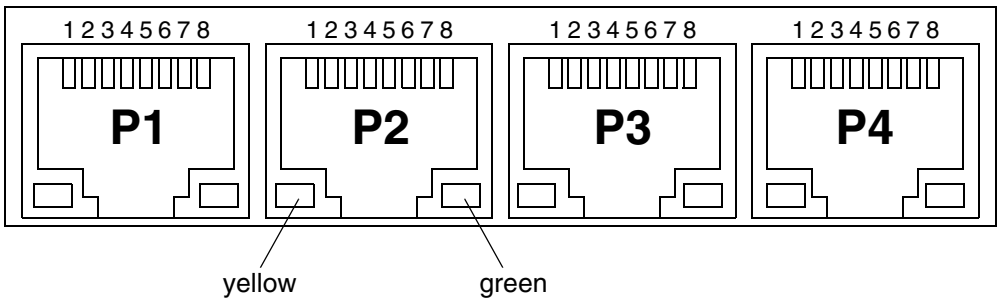

Fig. 2.186 Visual signalling of the Ethernet interface

2.13.11 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator or
- using DIP switches on the modules.

The procedure for inserting loopbacks by means of management software can be found in the user manual of ULAF+ [2] or AccessIntegrator [6].

Loopback ⊃ can be inserted locally at the NT or remotely at the LT using DIP switches.

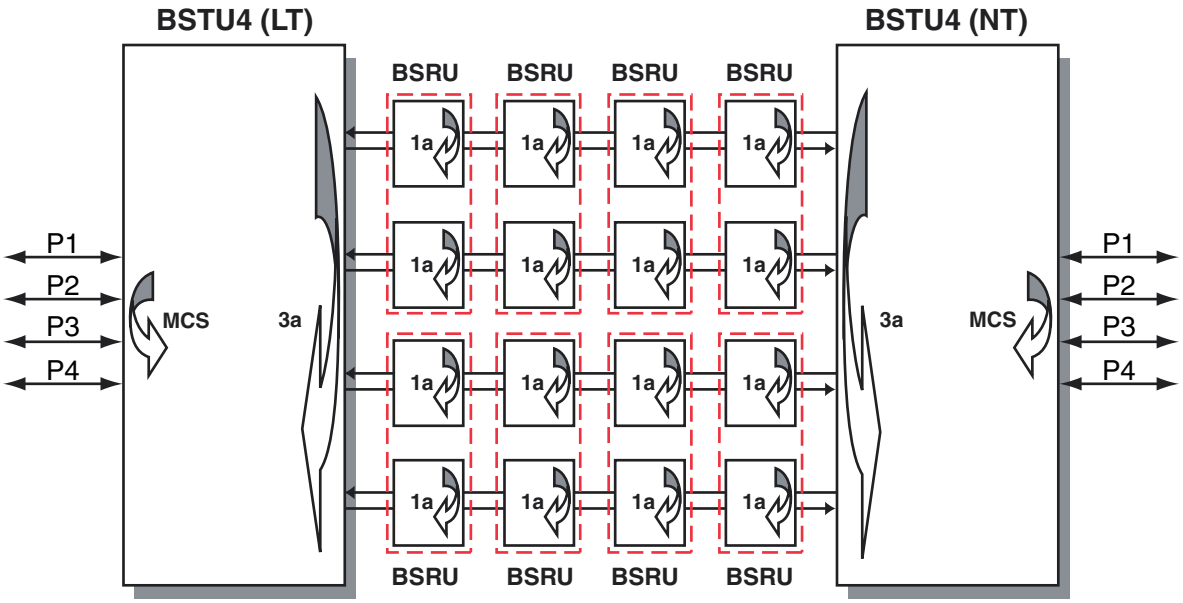

Fig. 2.187 Examples of loopbacks of the BSTU4

Find detailed information about the loopbacks of the BSTU4 in the ULAF+ User Manual [2].

2.14 Ethernet over TDM Inverse Multiplexer GTU4

Application

The “Ethernet over TDM Inverse Multiplexer” GTU4 is availabe as

- plug-in unit and as
- desktop unit.

Fig. 2.188 shows the GTU4 motherboard of the plug-in unit. The mounting of the desktop device variant differs from the plug-in unit variant.

This chapter describes which settings are to be made for the GTU4.

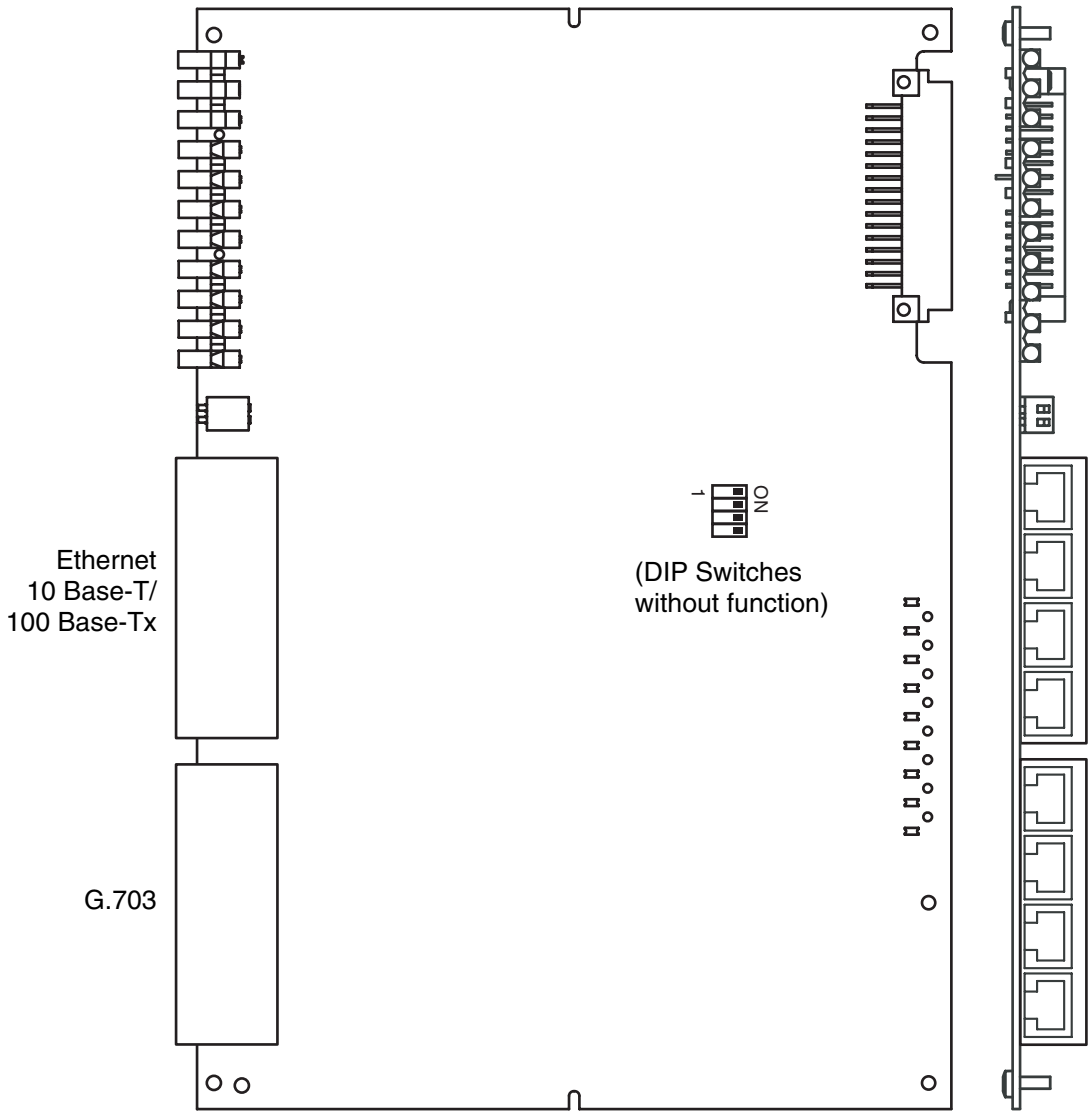

Fig. 2.188 GTU4 motherboard

2.14.1 Operating modes of the GTU4

The following operating modes are supported by the GTU4:

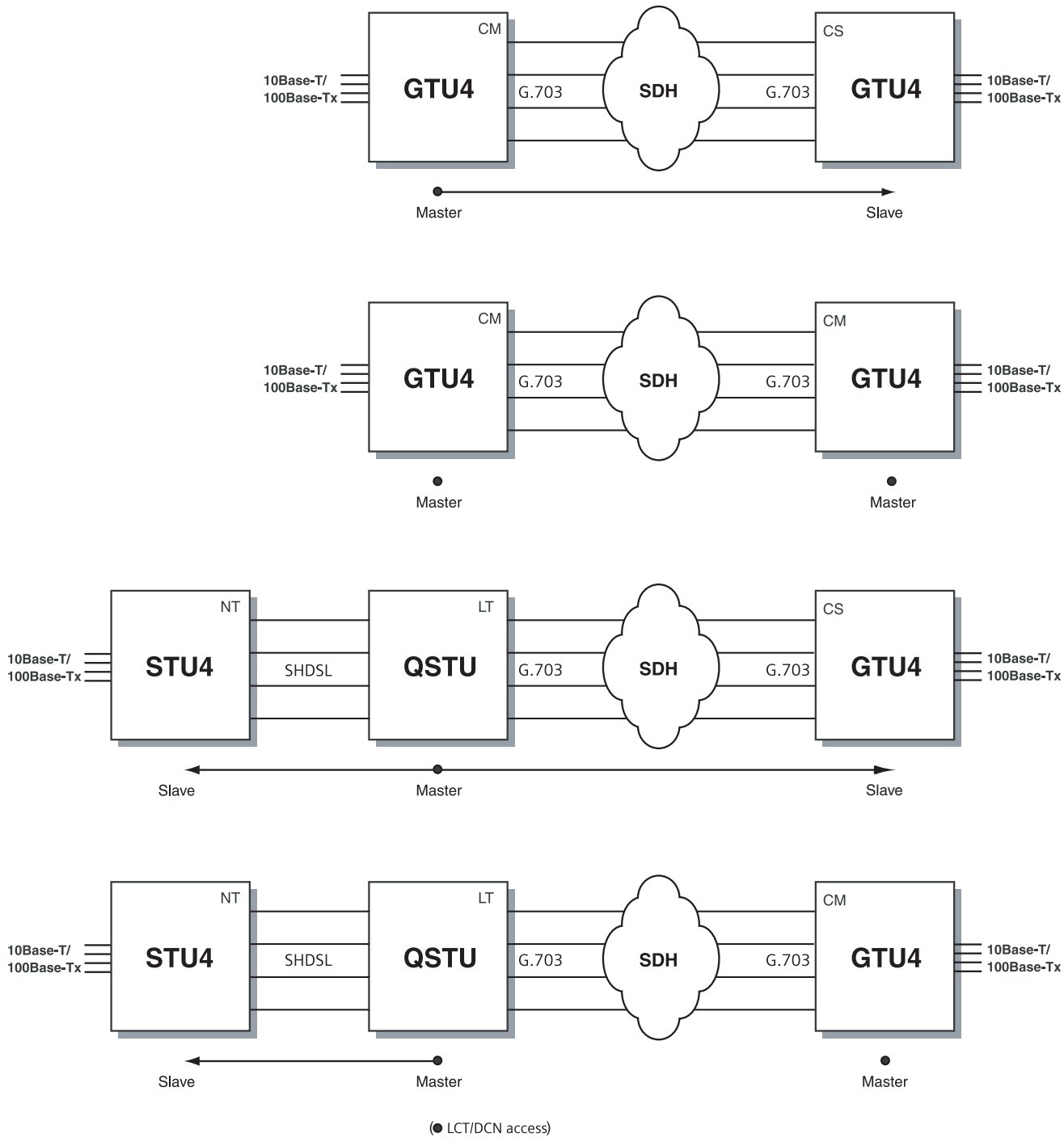

Fig. 2.189 Operating modes of the GTU4

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In QSTU - GTU4 interconnections, the QSTU must always be used on the LT side. The QSTU must have a specific firmware version (Fw-ID 3.49) enabling it to be used in conjunction with the GTU4. For further information, please refer to the ULAF+ User Manual [2].

2.14.2 Configuration of the GTU4 via the DIP switches

Use the DIP-Switches on the front panel to set the operating mode (Tab. 2.97), respective inserting the loopbacks (chapter 2.14.11).

Setting	Description
CM	Configured as Master [1)]
CS	Configured as Slave
⊃	MCS test loop inserted

1) Default setting

Tab. 2.97 Front-panel DIP switch of the GTU4

2.14.3 Fuses F9; F10

The basic modules are equipped with the following fuses (the equipping depends on using the basic module as a plug-in unit or as a desktop device):

Type of fuse	Equipped on...
F9 - 250 V / 1,25 AT	Desktop device
F10 - 125 V / 1 AT	Plug-in unit

Tab. 2.98 Usage of fuse tpyes

The fuses have a protected function and should be replaced only by fuses exactly the same electrical specifications.

2.14.4 Power supply to the GTU4

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC}).

Power supply to the desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})

Modifications to the type of supply and grounding may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply after it has been installed. Proceed as follows:

1. Disconnect the power cord and also disconnect all interface cables
2. Release the screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Remove the power cord connector or replace the existing power cord with a new battery cable
5. Close the casing
6. Screw the screws on the bottom of the unit into the casing

The configuration is done using the LCT. You find more information in the ULAF+ User Manual [2].

2.14.5 Power modes of GTU4 needing external power adapter and redundant battery

This chapter explains the procedures for connecting the power adapters and the batteries to the desktop units.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Redundant battery connection LT25W

In order to provide desktop power adapter LT25W with an additional battery supply you must open the unit and connect a second cable. Proceed as follows:

1. Disconnect the net cable and also disconnect all interface cables
2. Open the power adapter by releasing the four screws on the bottom of the unit
3. Remove the bottom of the casing of the power adapter
4. Connect the supplied cable to the terminal (1) as shown in Fig. 2.190
5. Replace the cable feed-through (2) (Fig. 2.190) for a cable with the one supplied for two cables

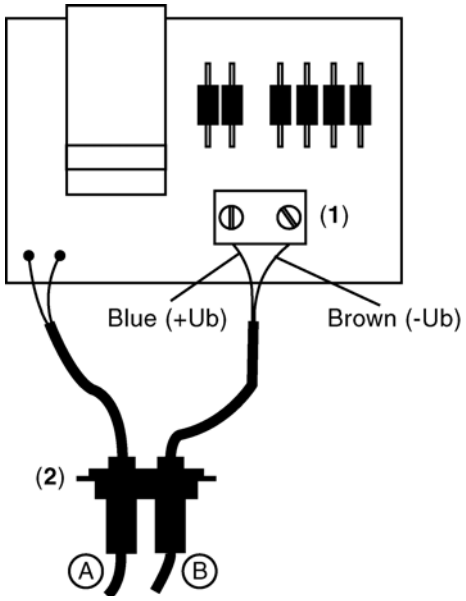


Fig. 2.190 Connecting the battery cable to desktop power adapter LT25W

6. Close the power adapter and screw the four screws into the casing

To connect the power adapter LT25W to the GTU4 proceed as follows:

1. Disconnect the net cable and also disconnect all interface cables of the GTU4
2. Open the power adapter by releasing the four screws on the bottom of the unit
3. Open the casing by removing the top of the unit
4. Take the module out of the casing and lay the pc board on a flat surface
5. Remove the power cable (**Warning:** You must not bend the board)
6. Connect the desktop power adapter according to Fig. 2.191 (**Warning**: You must not bend the board)
7. Insert the module into the casing
8. Route the cable through the feed-through hole on the back of the unit
9. Screw the screws on the bottom of the unit into the casing

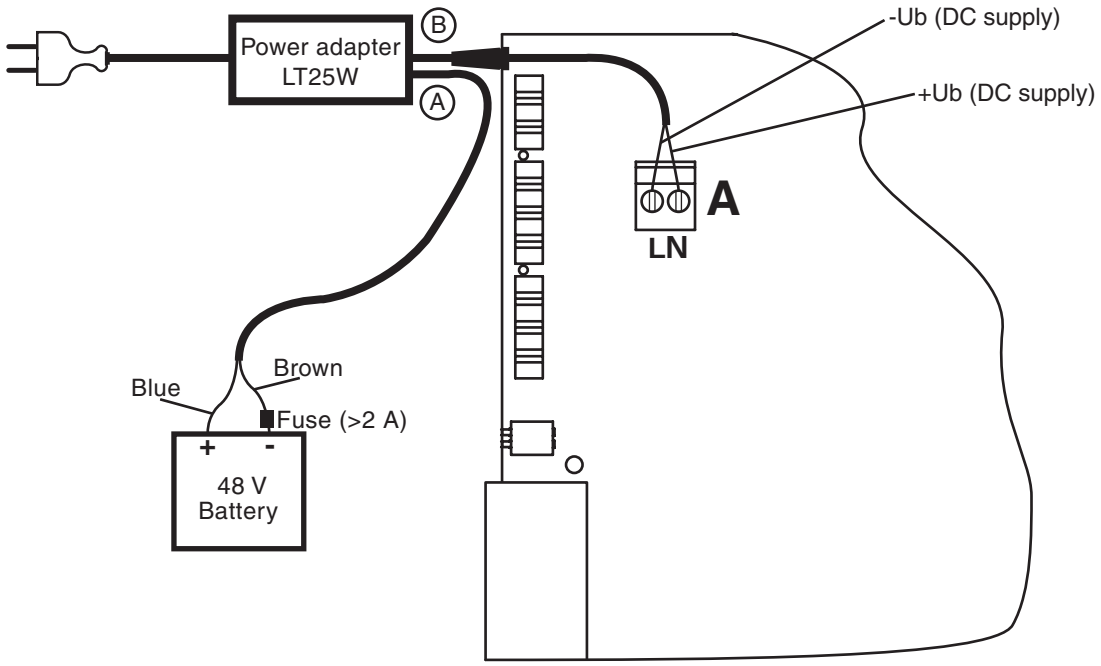


Fig. 2.191 Connecting desktop power adapter LT25W

2.14.6 Configuration of the power fail recognition

The configuration is done using the LCT. You find more information in the ULAF+ User Manual [2].

2.14.7 Pin assignment of the 2 Mbit/s interface (G.703)

Pin assignment of the G.703 interface

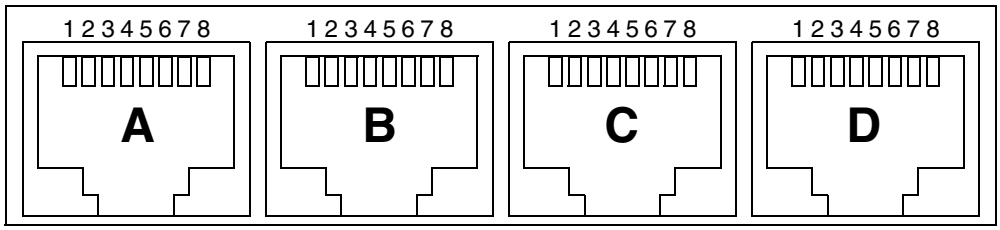


Fig. 2.192 Pin assignment of the G.703 interface

Pin assignment	Signal	Description
1A ... D	TxA	Transmit data
2A ... D	TxB	
3A ... D	Shield	Shield transmit data
4A ... D	RxA	Receive data
5A ... D	RxB	
6A ... D	Shield	Shield receive data
7A ... D	– –	– –
8A ... D	– –	– –
Casing	Ground	Overall ground

Tab. 2.99 Pin assignment of the G.703 interface

2.14.8 Configuring the G.703 interface impedance

The configuration is done using the ULAF+ LCT. You find more information in the ULAF+ User Manual [2].

An adapter cable (RJ45 on 2x BNC) may be obtained for applications with 75 Ω.

2.14.9 Pin assignment of the Ethernet interfaces(10Base-T/100Base-Tx)

The four Ethernet interfaces are assembled to a RJ45 connector strip.

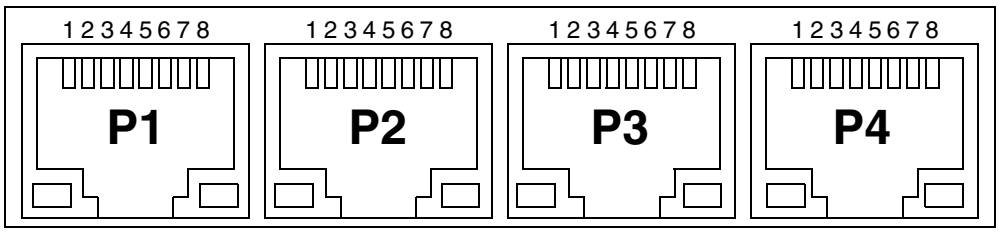


Fig. 2.193 Pin assignment of the Ethernet interfaces

Pin assignment	Signal	Description
1	TxP	Transmit data
2	TxM	
3	RxP	Receive data
4	--	Pin 4 and 5 via 75 Ω connected to ground
5	--	
6	RxM	Receive data
7	--	Pin 7 and 8 via 75 Ω connected to ground
8	--	
Casing	Shield	Overall ground

Tab. 2.100 Pin assignment of the Ethernet interfaces

If required, send and receive data can be automatically transposed by the Ethernet Switch.

2.14.10 Supervision and alarm signalling of the GTU4

GTU4 operating status and monitoring are indicated by LEDs on the front panel. In addition to these LEDs, the Ethernet interfaces each have 2 LEDs (yellow/green) for visual alarm signalling.

2.14.10.1 Visual signalling of the plug-in unit

When the GTU4 is used as plug-in unit, the front panel is equipped with eleven LEDs (Fig. 2.194).

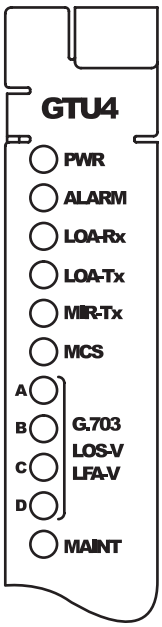


Fig. 2.194 Visual signalling of the GTU4 plug-in unit

LED	Colour	Status	
		off	on
PWR	green	no power supply	Power supply o.k.
Alarm	red	no alarm	Urgent alarm [2]
	yellow	no alarm	Non-urgent alarm [2]
LOA-Rx	yellow	no alarm	No WAN activity in receive direction
LOA-Tx	yellow	no alarm	No WAN activity in transmit direction
MIR-Tx	yellow	no alarm	WAN capacity in transmit direction
MCS	red	no alarm	**on:** all paths inoperative **blinking 1:** one or more paths inoperative
LOS/LFA-VA[1]	red	no alarm	Loss of signal, loss of frame alignment at V, Training [3]
LOS/LFA-VB[1]	red	no alarm	Loss of signal, loss of frame alignment at V, Training [3]
LOS/LFA-VC[1]	red	no alarm	Loss of signal, loss of frame alignment at V, Training [3]

Tab. 2.101 Visual signalling of the GTU4 plug-in unit

LED	Colour	Status	
		off	on
LOS/LFA-VD[1)]	red	no alarm	Loss of signal, loss of frame alignment at V, Training [3)]
MAINT	yellow	no status message	Maintenance active, Traps deactivated, BERT active, Layer 2 Switch Test Mode activated

1) Visual signalling according to Fig. 2.195
2) Alarm messages depend on configuration made with the LCT

Tab. 2.101 Visual signalling of the GTU4 plug-in unit

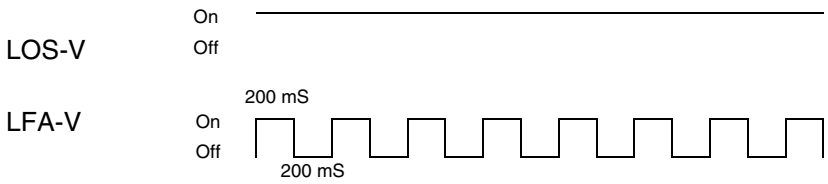


Fig. 2.195 Visual signalling LOS/LFA/Training of the GTU4 LEDs

Visual signalling of the Ethernet interface

A green an a yellow LED are incorporated in the female connectors of the four Ethernet interfaces.

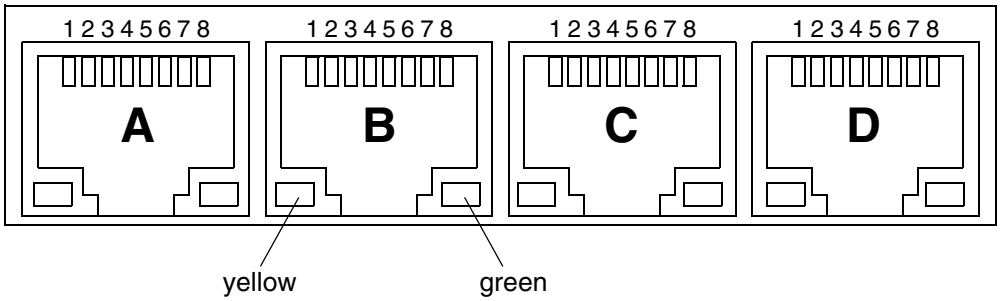


Fig. 2.196 Visual signalling of the Ethernet interfaces

LED	LED mode 10/100Base-Tx
yellow	**Off:** Half Duplex **On**: Full Duplex **blinking**: Collision with Half Duplex
green	**Off:** No connection/ no Traffic **On**: Link Up **blinking**: Traffic

Tab. 2.102 Visual signalling of the Ethernet interface

2.14.10.2 Visual signalling of the desktop unit

The visual signalling of the desktop unit is equal those of the plug-in unit. The meaning of the LEDs is explained Tab. 2.86.

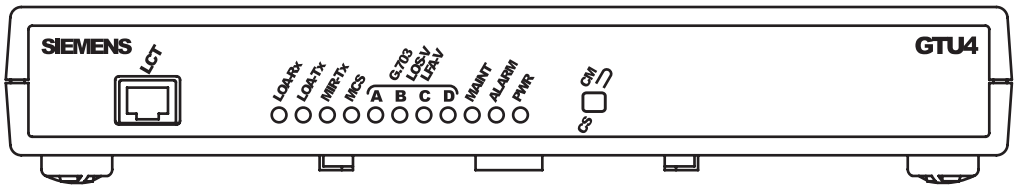


Fig. 2.197 Visual signalling of the desktop unit

2.14.11 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator or
- using DIP switches on the modules.

The procedure for inserting loopbacks by means of management software an be found in the user manual of ULAF+ [2], or AccessIntegrator [6].

Loopback ⊃ can be inserted locally at the NT or remotely at the LT using DIP switches.

DIP switches of the desktop unit

DIP switches of the plug-in unit

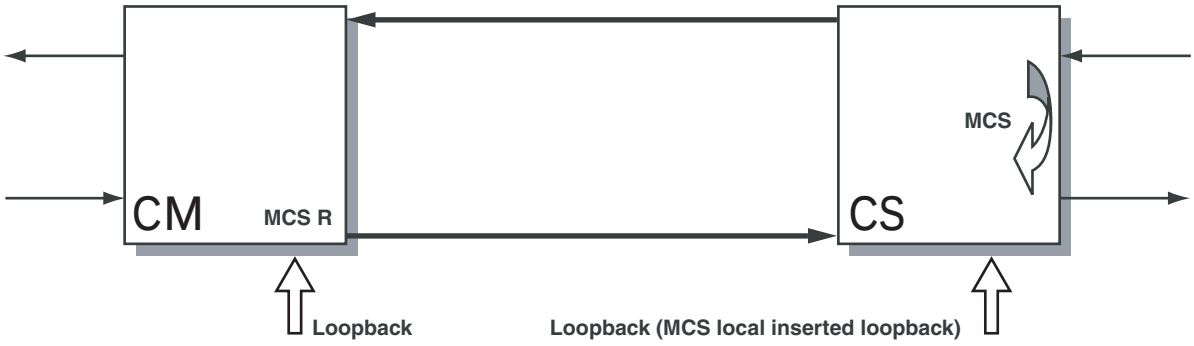


Fig. 2.198 Loopbacks of the GTU4

Find detailed information about the loopbacks of the GTU4 in the ULAF+ User Manual [2].

2.15 Long Reach termination unit LR-DSTU

This chapter describes installation of the Long Reach termination unit LR-DSTU as well as the relevant LR-SRU regenerator.

The Long Reach termination unit is made as

- a plug-in unit, used in the ULAF+ subrack or as
- a desktop device.

You can find more information about the ULAF+ subracks in chapter 2.2 (The ULAF+ subrack (S3105-B128-A210)) or in chapter 2.3 (The ULAF+ subrack (S3105-B128-C210 / -C211)).

i The ULAF+ subrack (S3105-B128-A210) can only be equipped with a maximum of 8 LR-DSTU plug-in units. If you use QSTU and LR-DSTU plug-in units in the same subrack, the maximum number of 8 plug-in units may not be exceeded either.
Use of the LR-DSTU does not support cascading of ULAF+ subracks.

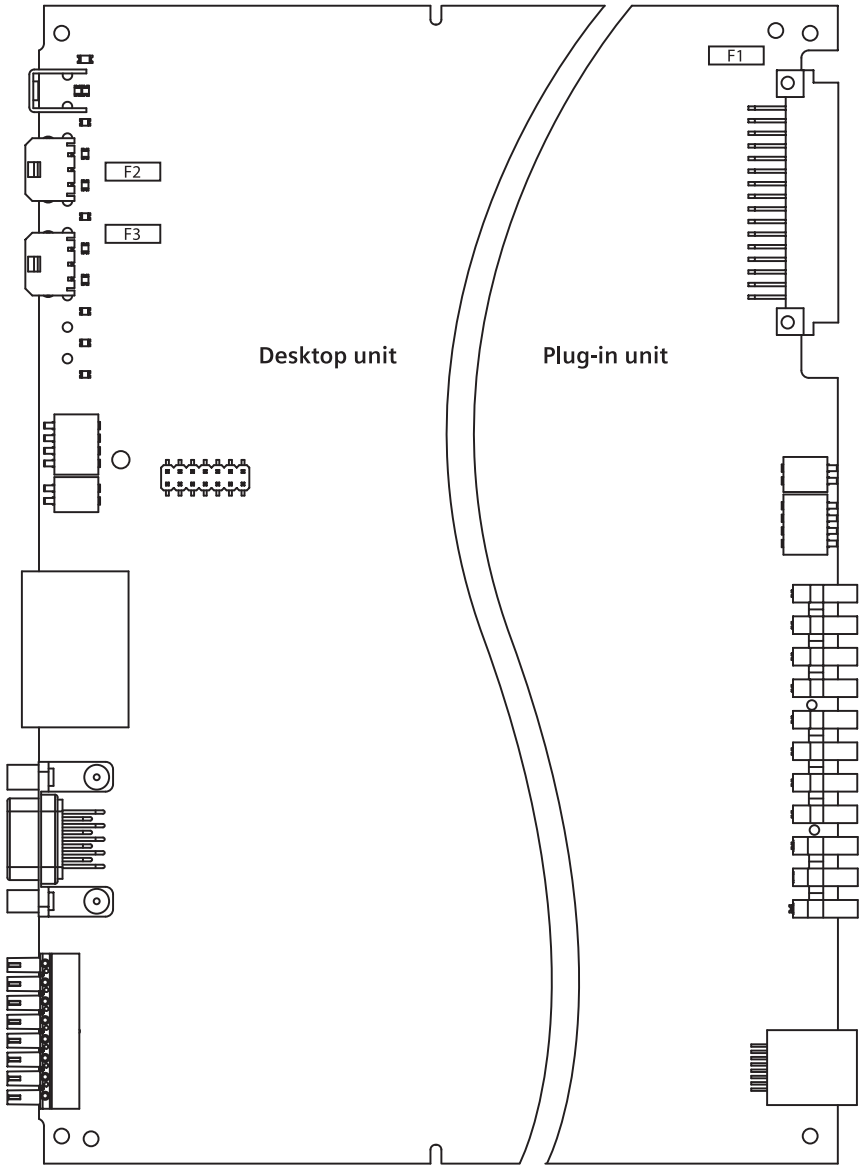


Fig. 2.199 Module of the LR-DSTU (Plug-in and desktop unit)

2.15.1 Configuration of the LR-DSTU via DIP switches

Use the DIP switches on the front panel

- to inserting loopbacks to check for possible transmission errors (see chapter 2.15.6),
- to set the operating mode (RT or COT) and
- define which of the service channels of the two LR-SHDSL systems on the interface will be routed.

Setting	Description
RT	NT mode[1)]
COT	LT mode[2)]

1) Default setting Desktop unit

2) Default setting Plug-in unit

Tab. 2.103 Frontpanel DIP switch of the LR-DSTU

2.15.2 Power supply to the LR-DSTU

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})

Power supply to the desktop unit

Power to the desktop unit is supplied locally via an external power adapter. The input voltage is nominal 48 V_{DC} / 60 V_{DC}. The desktop unit is equipped for a redundant feed with two supply connections.

2.15.2.1 LR-DSTU grounding concept

Subrack

The subrack must always be grounded.

Desktop unit

The desktop unit is earthed as standard via the external power supply that is also supplied. With feed to the desktop unit using a battery, the earth is made via the 3-pin plug or via the earth component on the desktop unit.

2.15.2.2 Fuses

The basic modules are equipped with the following fuses (the equipping depends on using the basic module as a plug-in unit or as a desktop device):

Type of fuse	Equipped on...
F1 - 2AT/125 V (Littlefuse R45002.MRL or equivalent)	Plug-in unit
F2; F3 - 2AT/125 V (Littlefuse R45002.MRL or equivalent)	Desktop device

Tab. 2.104 Usage of fuse types

The fuses have a protected function and should be replaced only by fuses exactly the same electrical specifications.

2.15.3 Pin assignment of the interfaces

This chapter describes the Pin assignment of the interfaces of the plug-in unit and the desktop device. The Pin assignment of the LR-SRUs is described in chapter 2.15.7.2.

SHDSL interface

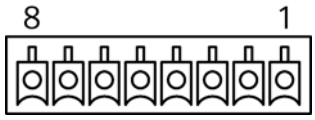


Fig. 2.200 SHDSL interface (Plug-in unit and Desktop device)

Pin	System	Beschreibung
1	System B	Tx output - Wire b
2	System B	Tx output - Wire a
3	System B	Rx input - Wire b
4	System B	Rx input - Wire a
5	System A	Rx input - Wire b
6	System A	Rx input - Wire a
7	System A	Tx output - Wire b
8	System A	Tx output - Wire a

Tab. 2.105 SHDSL interface (Plug-in unit and Desktop device)

Service interface

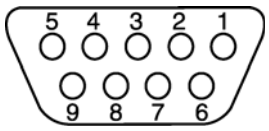


Fig. 2.201 Service interface (RS232)

Pin	Description	
	RS232	Voice
1	Not assigned	CLK (256 kHz clock)
2	RxD (output)	PCM_Rx (Receive data)
3	TxD (input)	PCM_Tx (Transmit data)
4	Not assigned	TDET_O (Telefon set detector output)
5	GND (Erde)	GND (Ground)
6	Not assigned	SYNC (8 kHz Sync)
7	Not assigned	SPK_CTRL (Press-to-talk-button output)
8	Not assigned	TDET_I (Telefonset
9	Not assigned	3V (3 V Power)

Tab. 2.106 Service interface (RS232; 9-pole, D-Sub, female)

LCT interface

The transmission rate is 9600 Baud. The data format of the interfaces is as follows:

- 8 data bits
- 1 start bit
- 1 stop bit
- No parity
- No handshake

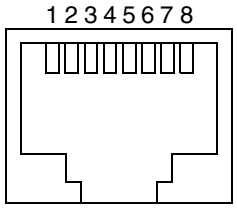


Fig. 2.202 Interface connector for LCT

Pin	Name	Beschreibung
3	RxD_LI	Receive signal
4	TxD_LI	Transmit signal
5	GND_LI	Ground

Tab. 2.107 Interface connector for LCT

i

The Pins 1, 2, 6, 7 and 8 must not be connected.

An adapter cable is available for connecting the LCT interface to the RS232 interface of your PC.

G.703 interface

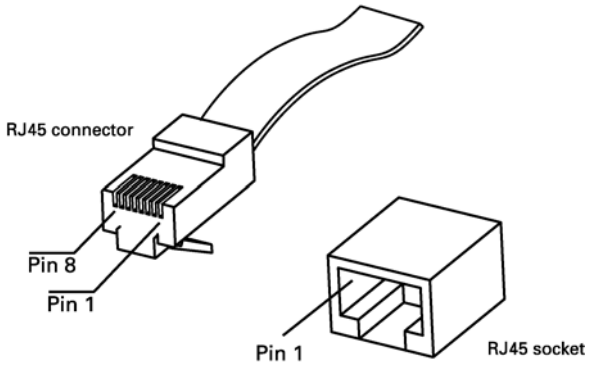


Fig. 2.203 RJ45 connector of the 2 Mbit/s interface

Pin	Signalname	Description
1	G703_TXA	Transmit signal
2	G703_TXB	Transmit signal
3	Shield(T)	Grounding shield Tx
4	G703_RXA	Receive signal
5	G703_RXB	Receive signal
6	Shield(R)	Grounding shield Tx
7	Not assigned	– –
8	Not assigned	– –
Shield	Shield	Shield RJ45 connector

Tab. 2.108 RJ45 connector of the 2 Mbit/s interface

Power connector (Desktop only)

Fig. 2.204 Power connector (Desktop device only)

Pin	Description
1	PUB (plus pole of the power supply)
2	GND
3	MUB (minus pole of the power supply)

Tab. 2.109 Power connector (Desktop device only)

2.15.4 Supervision and alarm signalling of the LR-DSTU

Operation mode and supervision of the LR-DSTU is dispalyed via LEDS on the front panel.

2.15.4.1 Visual signalling of the plug-in unit

When the LR-DSTU is used as plug-in unit in the subrack, the front panel is equipped with 11 LEDs.

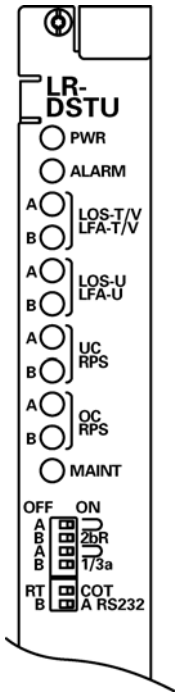


Fig. 2.205 Visual signalling of the plug-in unit

LED	Color	Status		
		OFF	ON	Blinking
PWR	green	no power supply	Power supply o.k.	– –
Alarm	red	no alarm	Urgent alarm	– –
	yellow	no alarm	Non-urgent alarm	– –
LOS/LFA-T/V (A)	red	no alarm	No signal at G.703 interface (A)	G.704 Loss of frame at G.703 interface (A)
LOS/LFA-T/V (B)	red	no alarm	No signal at G.703 interface (B)	G.704 Loss of frame at G.703 interface (B)
LOS/LFA-U (A)	red	no alarm	No signal at U interface (A)	Startup up the link (A),
LOS/LFA-U (B)	red	no alarm	No signal at U interface (B)	Startup up the link (B)
UC/RPS (A)	red	no alarm	Line breaking (A)	– –
UC/RPS (B)	red	no alarm	Line breaking (B)	– –
OC/RPS (A)	red	no alarm	Short circuit (A)	Unbalanced (remote power supply) (A) or external voltage [1)]

Tab. 2.110 Visual signalling of the plug-in unit LR-DSTU

LED	Color	Status		
		OFF	ON	Blinking
OC/RPS (B)	red	no alarm	Short circuit (B)	Unbalanced (remote power supply) (B) or external voltage[1)]
MAINT	yellow	no maintenance funciton	Local maintenance function active (e.g. loopback active, Traps deactivated, BERT deactivated)	– –

1) Visual signalling see Fig. 2.206

Tab. 2.110 Visual signalling of the plug-in unit LR-DSTU

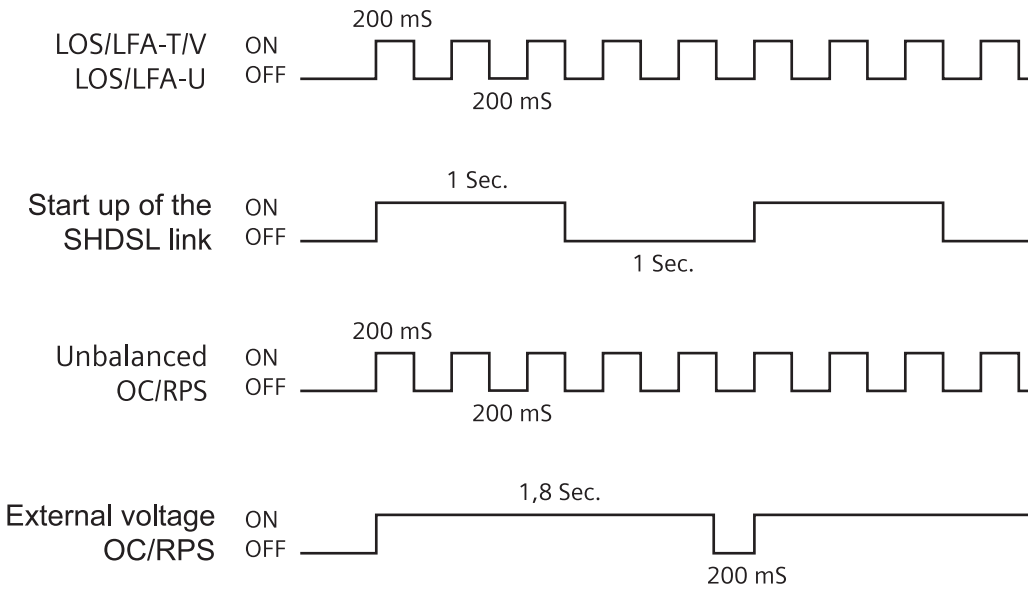


Fig. 2.206 Visual signalling of the LR-DSTU

2.15.4.2 Visual signalling of the desktop unit

The visual signalling of the desktop device is equal to the plug-in unit. The meaning of the LED is described Tab. 2.77.

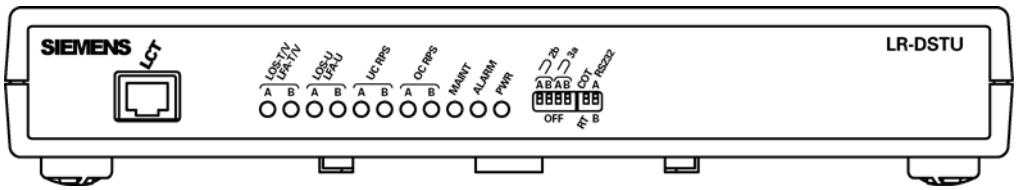


Fig. 2.207 Visual signalling of the desktop unit

2.15.5 LR-DSTU remote power supply

Remote power supply

The LR-DSTU module ist equipped with an integrated remote power supply. Up to 12 Long Reach SHDSL regnerators can be remote powered. A maximum of 6 regenerators per system can be remote powered from COT side or from RT side.

Transmission and supply is via SHDSL path. The earth-free supply voltage is 290 V_{DC} symmetric to "ground"; the remote feeding current is max. 50 mA.

Remote voltage 290 V_{DC}

When using the remote feed voltage of 290 V_{DC} the following preconditions must be met:

- A RFT-C circuit must be involved
- The cables must be approved for a remote feed voltage of 290 V_{DC}
- The line capacity to ground for the entire system must not exceed 14 µF

2.15.5.1 Monitoring and supervision of the LR-DSTU remote power supply

Earth fault

The output voltage is monitored for earth fault and switched off if an error occurs. The LR-DSTU tries to restore the remote power supply if a fault occurs.

The LR-DSTU remote power supply detects the following errors per system:

Alarm	Event	Description
UC A/B	Line break	Remote current feeding too deep (line interruption)
OC A/B	Short circuit	Remote current feeding to high (short circuit)
UNBAL	Earth leakage	Protection circuit switched off because of earth leakage
RCM	Remote Power Configuration Mismatch	No termination of the remote power supply of the LR-SRUs

Tab. 2.111 LR-DSTU remote feed alarm signalling

2.15.6 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT (from COT side only) or
- using DIP switches on the front side of the plug-in unit or the desktop device.

The procedure for inserting loopbacks by meaning of management software can be found in the User Manual of ULAF+ [2].

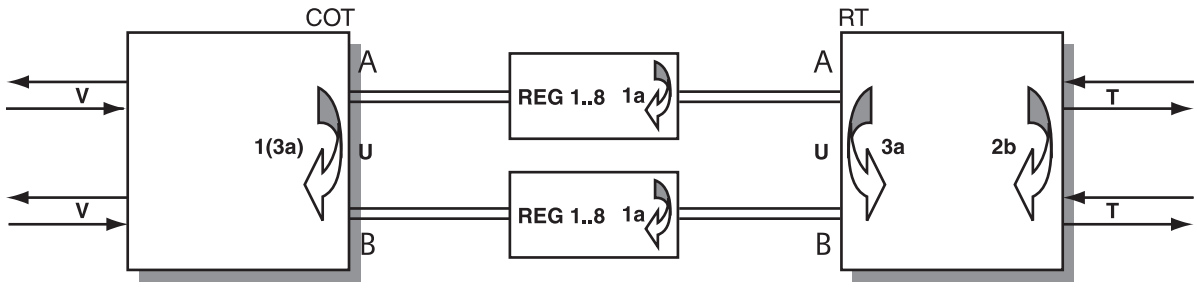


Fig. 2.208 Loopback concept of the LR-DSTU transmission unit

2.15.7 Long Reach Regenerator LR-SRU

If the SHDSL performance is not sufficient, you can bridge longer lines using LR-SRUs.

The module is housed in a metal casing. A splash water-proof (IP65) plastic casing is available for shaft and outdoor installation.

2.15.7.1 Configuration of the remote power supply via DIP switches

You can use up to 8 LR-SRUs per system when using wiht the LR-DSTU. The power for the regenerators is fed form the LR-DSTU via the integrated remote power supply. An LR-DSTU can remotely supply a maximum of 6 LR-DSTUs. If you are using more than 6 LR-SRUs per system, the regenerators must be powered from the COT-side as welll as from the RT-side.

The last LR-SRU must be terminated using DIP switches ("OFF" position), regardless of whether you remotely feed the regenerators from just one side or from both sides. Two adjacent LR-SRUs must therefore always be terminated. If this is not the case, an 'external voltage' fault arises. The line segment in between is remote supply/voltage-free.

Below are two examples for configuration using DIP switches:

- with use of 4 LR-SRUs per system (Fig. 2.210) and
- with use of 8LR-SRUs per system (Fig. 2.211).

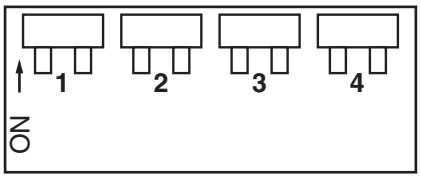


Fig. 2.209 DIP switches of the LR-SRUs

i Upon configuration all DIP switches are switched together in all cases.

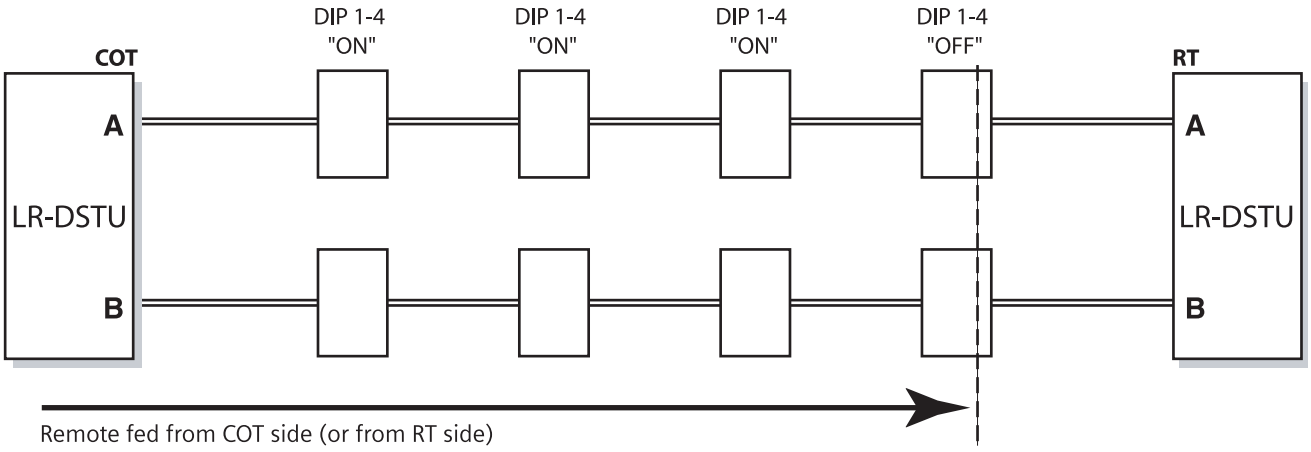


Fig. 2.210 Possible configuration of the remote power supply with use of 4 LR-SRUs

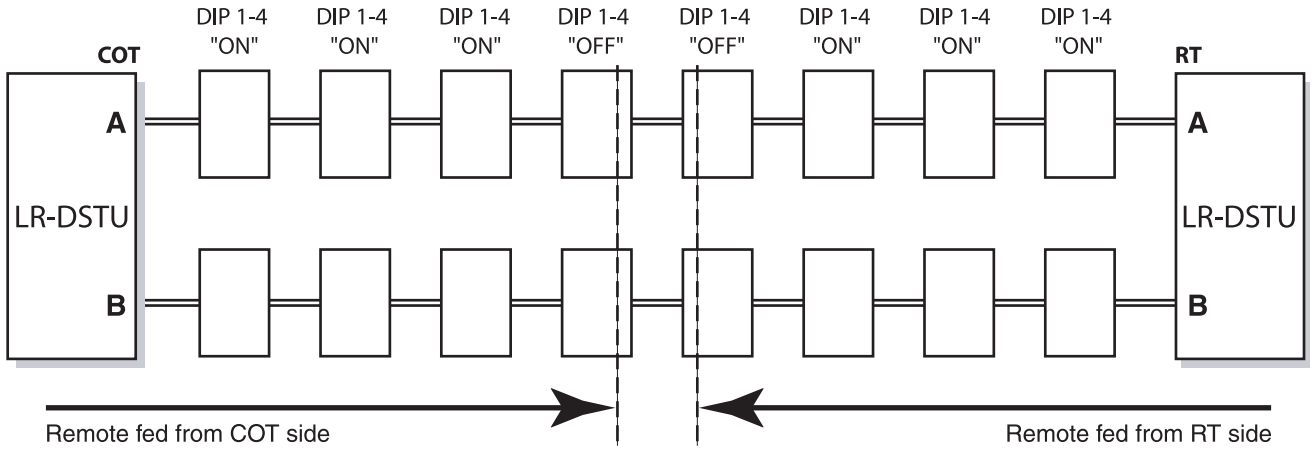


Fig. 2.211 Possible configuration of the remote power supply with use of 8 LR-SRUs

Tips for using remote power supply

With remote power supply of the LR-SRU you should observe the following points:

- Whenever possible you should supply the LR-SRU remotely from the COT side. If the connection fails you will then have more options for locating the fault.
- If the remote power supply is made from both the COT and the RT side, you should divide the LR-SRUs equally on the two LR-DSTUs. The LR-DSTUs will consequently be more or less equally loaded.

2.15.7.2 Pin assignment of the SHDSL interface

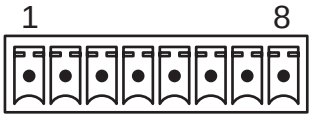


Fig. 2.212 SHDSL interface of the regenerator

Pin	Description
1	COT-Rx (input) wire a
2	COT-Rx (input) wire b
3	RT-Rx (input) wire a
4	RT-Rx (input) wire b
5	COT-Tx (output) wire a
6	COT-Tx (output) wire b
7	RT-Tx (output) wire a
8	RT-Tx (output) wire b

Tab. 2.112 SHDSL interface (Regenerator)

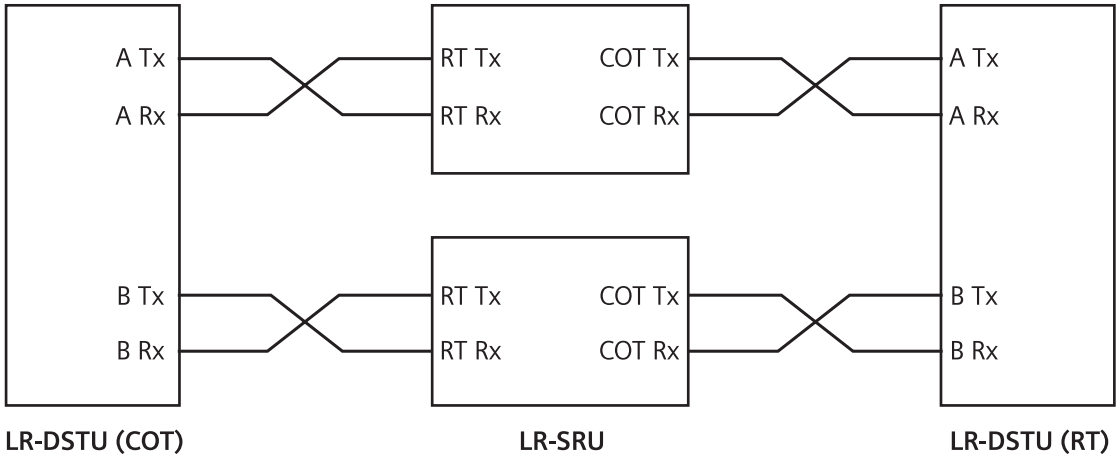


Fig. 2.213 Wiring of the LR-SRUs

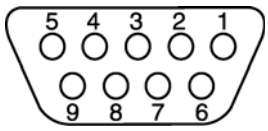


Fig. 2.214 Service interface (RS232; 9-pole D-Sub, female)

Pin	Description	
	RS232	Voice
1	Not assigned	CLK (256 kHz clock)
2	RxD (output)	PCM_Rx (Receive data)
3	TxD (input)	PCM_Tx (Transmit data)
4	Not assigned	TDET_O (Telefon set detector output)
5	GND (Erde)	GND (Ground)
6	Not assigned	SYNC (8 kHz Sync)
7	Not assigned	SPK_CTRL (Press-to-talk-button output)
8	Not assigned	TDET_I (Telefonset)
9	Not assigned	3V (3 V Power)

Tab. 2.113 Service interface (RS232; 9-pole, D-Sub, female)

The transmission rate is 56’300 Baud. The data format of the interfaces is as follows:
- 8 data bits
- 1 start bit
- 1 stop bit
- No parity

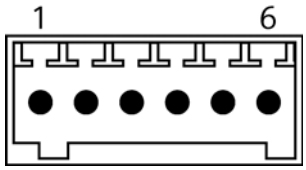


Fig. 2.215 Alarm interface

Pin	Description
1	Ground
2	Alarm input 3
3	Ground
4	Alarm input 2
5	Ground
6	Alarm input 1

Tab. 2.114 Alarm interface

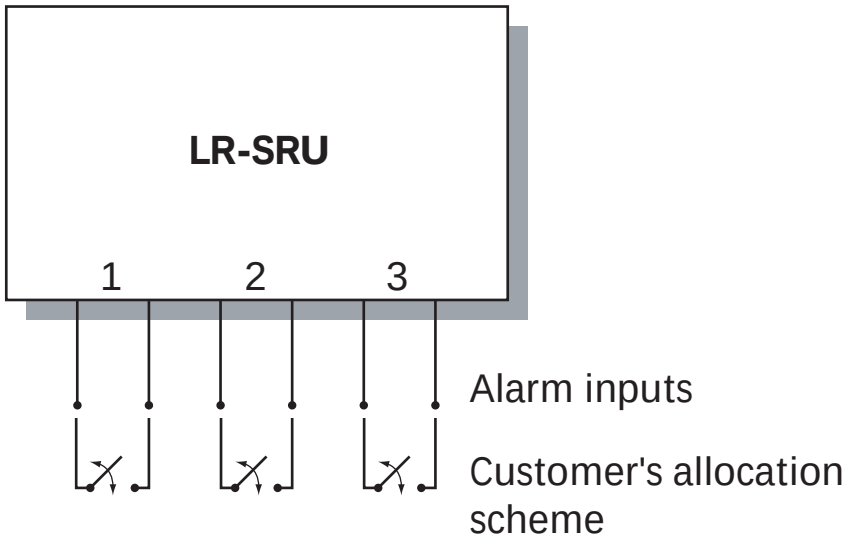


Fig. 2.216 Alarm inputs

With the "No Alarm" status the alarm input is connected with the earth; the contact is opened if an alarm occurs.

2.15.7.3 Monitoring and signalling

The function of the SHDSL regenerators is monitored by the LR-DSTU (COT). Possible malfunctions are indicated by the LCT.

Loopbacks and CRC6 checksums are used for fault localization.

Loopbacks are activated on the regenerator from the LCT. The control command for activating the loopbacks is activated using the SHDSL overhead channel.

Please find more information about the loopbacks in the ULAF+ User Manual [2].

2.16 OTU termination unit

Application

The OTU termination unit can be used as a plug-in unit or as a desktop unit. This chapter describes which settings are to be made for the OTU. The interface modules are described in chapter 2.19.

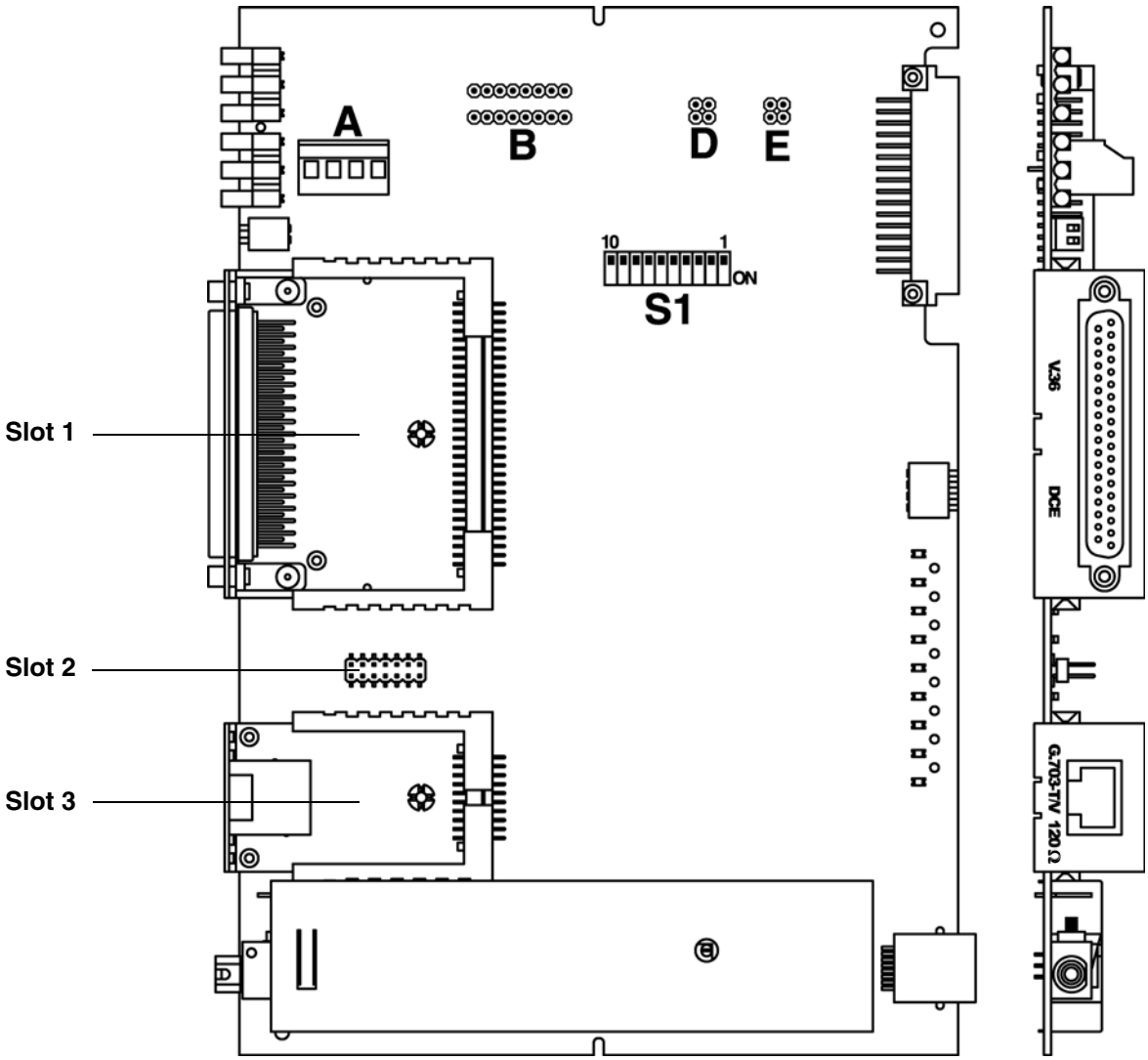


Fig. 2.217 OTU motherboard

When using the optical transmission module note the instructions on protection against laser radiation, see chapter "1.3 Notes on protection against laser radiation" and chapter "2.16.2 Installing the optical waveguide".

2.16.1 Configuration of the OTU via the DIP switches

Tab. 2.115 shows the possible settings of the DIP switches (S1) on the OTU.

DIP switch	Setting	Description
1	On	NT mode[1)]
	Off	LT mode[2)]
2[4)]	On	Module for data interface in DTE mode
	Off	Module for data interface in DCE mode [1)2)]
3	On	Configuration via the DIP switches[1)2)]
	Off	Configuration via the LCT/AccessIntegrator [1)2)]
4 5	On Off	Structured mode
4 5	Off Off	Transparent mode[1)2)]
4 5	Off On	ISDN-PRA mode
6	On	AIS recognition activated
	Off	AIS recognition deactivated[1)2)]
7	On	AIS insertion[1)2)]
	Off	AIS insertion deactivated
8	On	External clock-in activated
	Off	Clock-in deactivated[1)2)]
9	--	Not assigned
10	--	Not assigned

1) Default setting, desktop unit
2) Default setting, plug-in unit
3) Only operable if DIP switch 3 is ‘ON’
4) OTU Firmware 2.0 or higher

Tab. 2.115 Configuration of the OTU using the DIP switches

2.16.2 Installing the optical waveguide

The optical single mode fiber is connected using a FC/PC connector. Before installation clean the faces of the FO connector carefully. The faces can be cleaned with a section of paper towel cut to size and alcohol (e.g. ethanol or isopropanol). During installation take care that the FC/PC connector is seated correctly.

If the port is not being used, it should always be covered immediately with the protective dust cap.

2.16.3 Power supply to the OTU

Power supply to the plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

Power supply to the desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95- 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC}).

You use jumpers to select the type of supply, see chapter 2.16.4. Fig. 2.23 shows the terminals to which the supply cables are assigned.

Modifications to the type of supply may only be made by trained personnel.

Converting from AC to DC supply

You can convert the desktop unit from AC to DC supply after it has been installed. To do this you must remove the power cord connector and reset the jumpers as detailed in chapter 2.16.4. The upgrade process is described in chapter 2.6.2.

2.16.4 Set the OTU power supply via jumpers

Below, you will find the individual jumper settings for the OTUs. The following types of use are described

- **OTU used as a desktop unit**
  - Local AC supply
  - Local DC supply
- **Use as a plug-in unit**
  - Local DC supply

The casing must be opened to change the jumper settings on the desktop unit. For this, the screws on the bottom of the unit must be released.

Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

The jumper settings for plug-in units and desktop units are different. An OTU which is configured as a plug-in unit may not be used with the same settings as the desktop unit. Likewise an OTU with its jumpers set for use as a desktop unit must be reconfigured before being used as a plug-in unit.
Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or user (electric shock or fire).

Jumper	Meaning
B	Select the supply
D	Select the voltage range
E	Select the power-fail alarm mode

Tab. 2.116 Meaning of jumpers B, D, and E on the OTU

Desktop unit local supply; AC

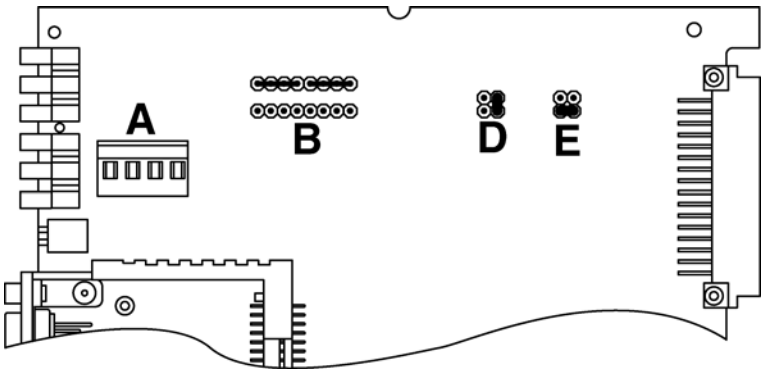


Fig. 2.218 Jumper settings: OTU Desktop unit local supply; AC

Desktop unit, local supply; DC

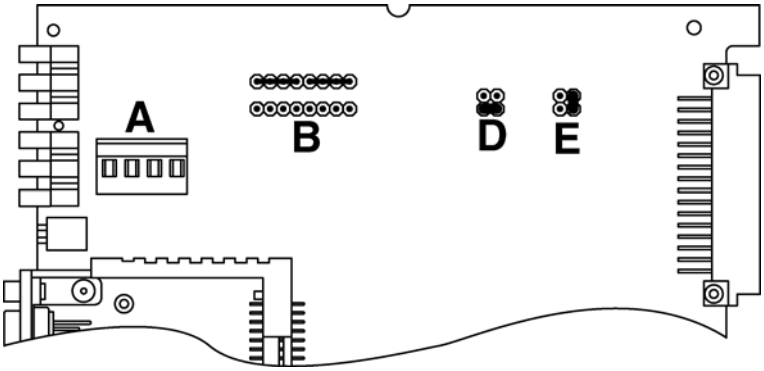


Fig. 2.219 Jumper settings: OTU Desktop unit, local supply; DC

Plug-in unit

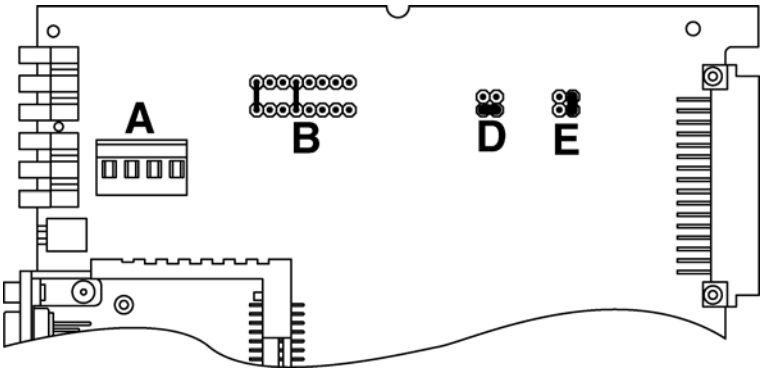


Fig. 2.220 Jumper settings: OTU plug-in unit

2.16.5 Conversion of the OTU: plug-in unit - Desktop unit

The optical termination unit OTU can, like the HTU termination unit, be swapped from the plug-in unit to the desktop unit and vice versa. You will find the procedures for conversion in chapter 2.6.6.

The conversion of the HTU from a plug-in unit to a desktop unit may only be made by trained personnel.

The jumper settings for the plug-in units are not identical to those of the desktop units. When a plug-in unit is converted to a desktop unit the jumpers must be set correctly. Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or to the user (electric shock or fire).

2.16.6 Supervision and alarm signalling of the OTU

Monitoring and alarm signalling for the OTU are the same as the procedures used for the HTU termination unit, see chapter 2.6.7.

2.16.7 Fault location by inserting loopbacks

By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data must be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator
- using DIP switches on the modules or
- using control lines 140/141 (V.35/V36).

The procedure for inserting loopbacks by means of management software can be found in the user manual of ULAF+ [2] or AccessIntegratro .

The various loopbacks are shown in Fig. 2.41 to Fig. 2.44. The names of the individual loopbacks are explained in Tab. 2.24.

Loopback 2b can be inserted locally at the NT or remotely at the LT (loopback 2bR) using DIP-switches.

Loopback	Meaning/effect
Loopback 1	U-interface - V-interface direction (LT)
Loopback 2b [1)]	U-interface direction - local - in the digital unit
Loopback 2bR [1)]	U-interface direction - remote - in the digital unit
Loopback 3a [1)]	T- / data-interface direction - in the termination unit
Loopback 3c	Data-interface direction - at the subscriber interface

1) Loopbacks are transparent

Tab. 2.117 Designation of the loopbacks on the OTU

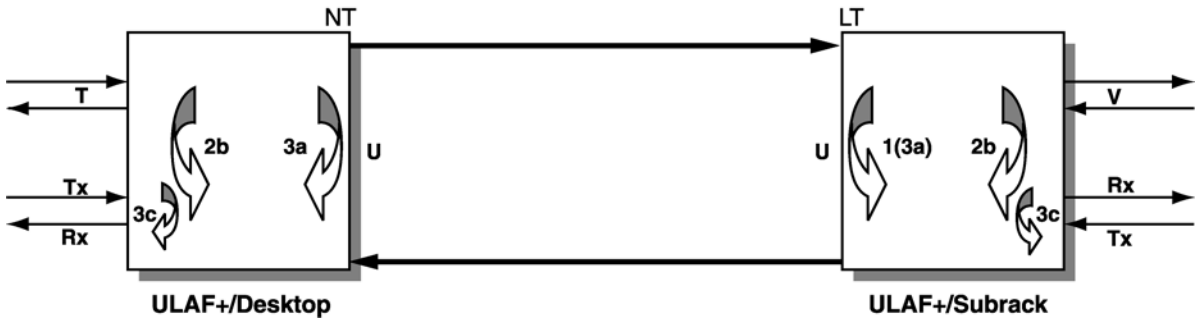


Fig. 2.221 “Access Network’ loopback concept

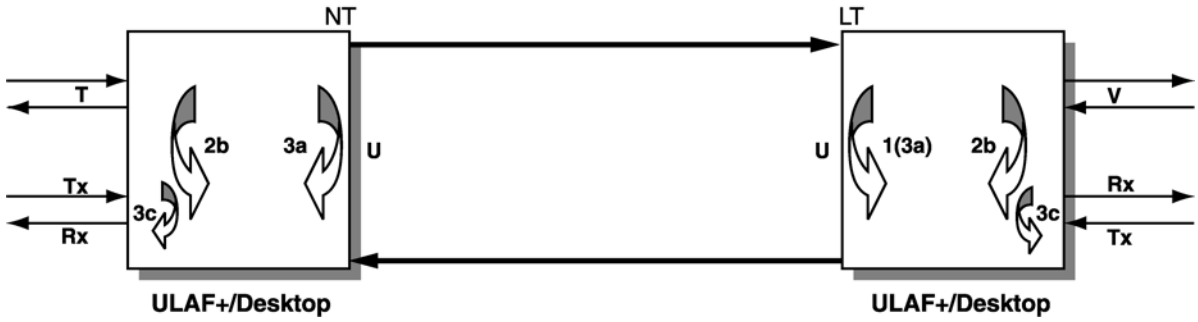


Fig. 2.222 ‘Campus Network’ loopback concept

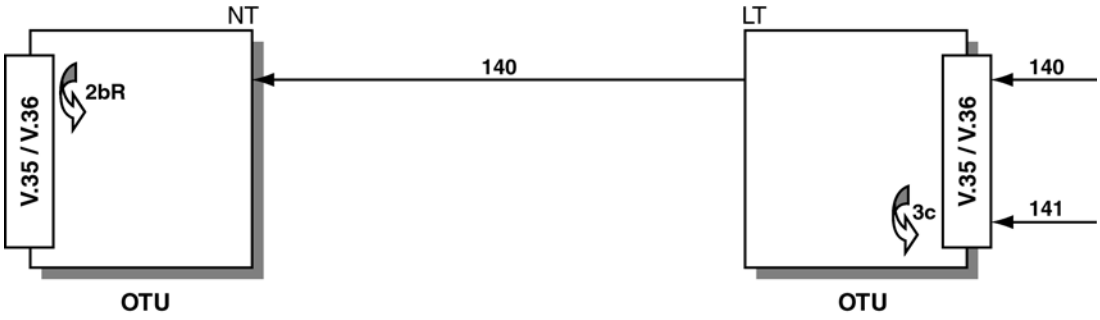


Fig. 2.223 Loopback via control line 140/141 (V.35/V.36)

Notes

- The regenerator loopback can be inserted only from the LT via the LCT
- The loopback 2bR can be inserted only from the LT in the NT

The following loopbacks can be applied to the plug-in unit using DIP switches:

- Loopback 1 or 3a respectively
- Loopback 2bR

The following loopbacks can also be applied to the desktop unit using DIP switches:

- Loopback 2b (in ‘add-drop mode’ for the two interfaces)
- Loopback 2bR
- Loopback 3c
- Loopback 3a

2.17 BOTU/QOTU termination unit

Application

The BOTU termination unit is available in different variants. The graphics shown in this document may differ from your BOTU.

The following variants of the BOTU are available:

- Plug-in unit (4 x G.703; 4 x Ethernet; 1+1 SFP module slot)
- Desktop unit (1x G.703; Data module slot; 1+1 SFP module slot)
- Desktop unit (4 x G.703; 4 x Ethernet; 1+1 SFP module slot)

The following variant of the QOTU is available:

- Plug-in unit (4 x G.703; 4 SFP module slot)

QOTU and BOTU have the same firmware.

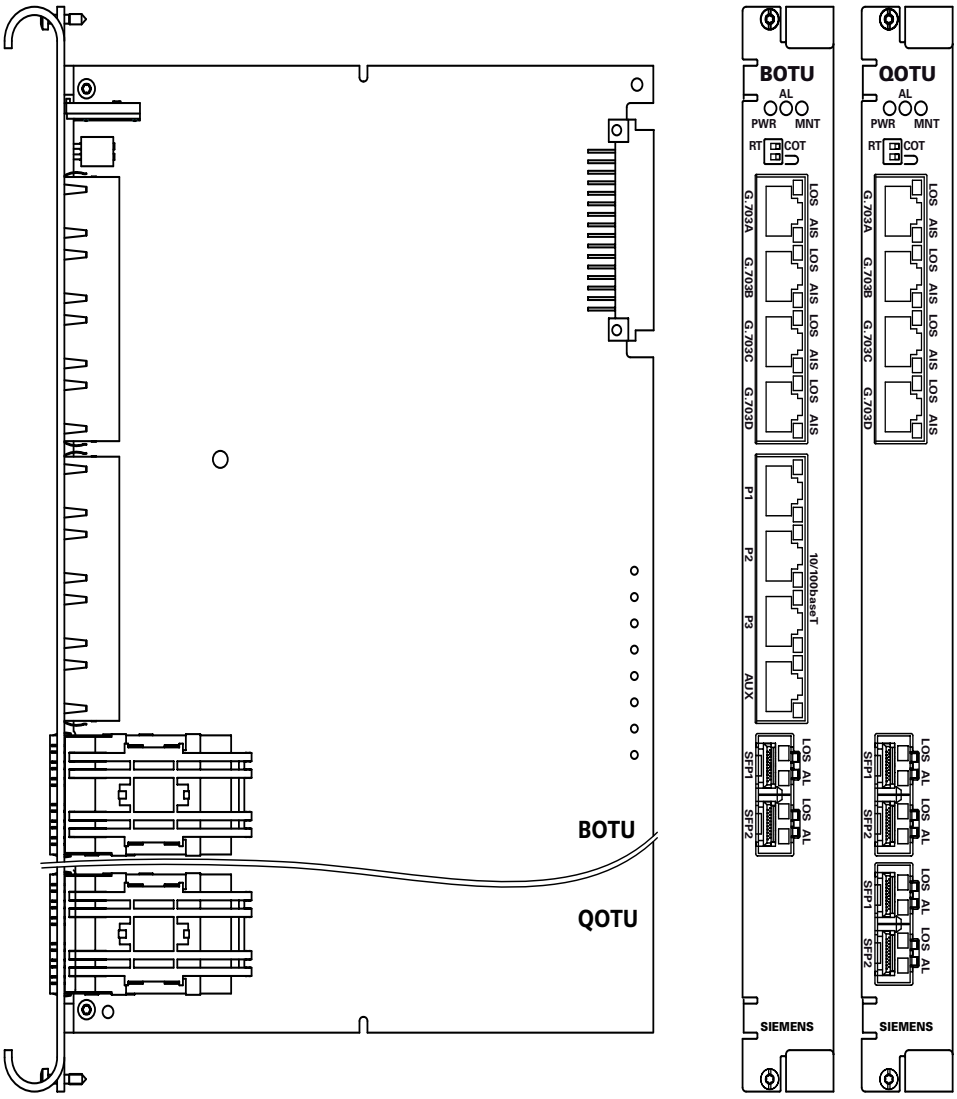


Fig. 2.224 BOTU and QOTU plug-in unit

i If the optical transmission module is used, please read the 'Notes on protection' (chapter 1.3) and 'Assembly of the SFP modules' (section 2.17.3).
The BOTU/QOTU can be fitted with various SFP modules. Correct functioning is guaranteed only if SFP modules approved for this product are used.

2.17.1 Modes of operation of the BOTU

In conjunction with another BOTU the following operating modes are possible:

- BOTU (4x G.703; Ethernet) (LT) – BOTU (4x G.703; Ethernet) (NT)
- BOTU (4x G.703; Ethernet) (LT) – BOTU (1x G.703; Data module slot) (NT)
- BOTU (1x G.703; Data module slot) (LT) – BOTU (1x G.703; Data module slot) (NT)

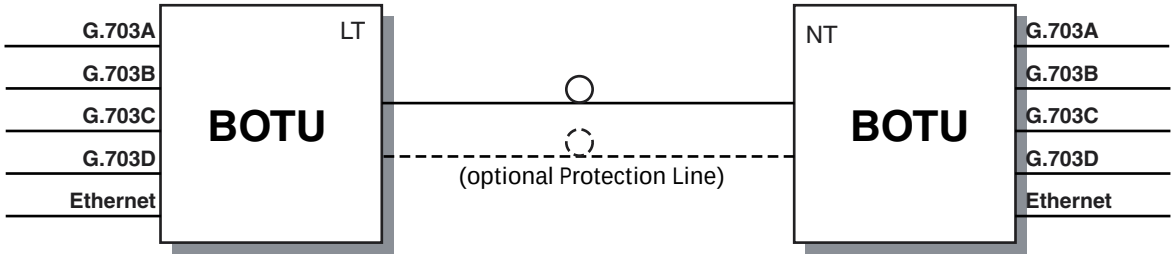


Fig. 2.225 Operating mode: BOTU (4x G.703; Ethernet) (LT) – BOTU (4x G.703; Ethernet) (NT)

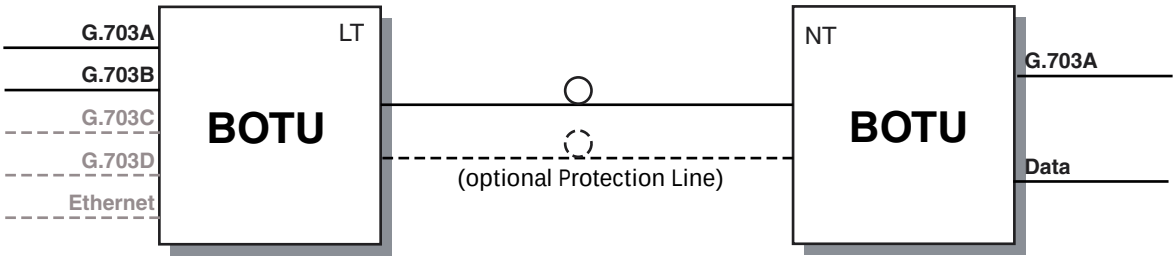


Fig. 2.226 Operating mode: BOTU (4x G.703; Ethernet) (LT) – BOTU (1x G.703; Data module slot) (NT)

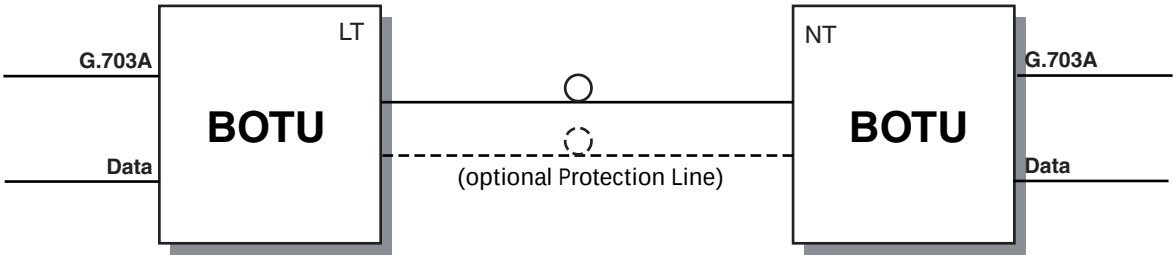


Fig. 2.227 Operating mode: BOTU (1x G.703; Data module slot) (LT) – BOTU (1x G.703; Data module slot) (NT)

On a QOTU – BOTU link the following operating mode is possible:

- QOTU (4x G.703) (LT) – BOTU (1x G.703; Data module slot) (NT)

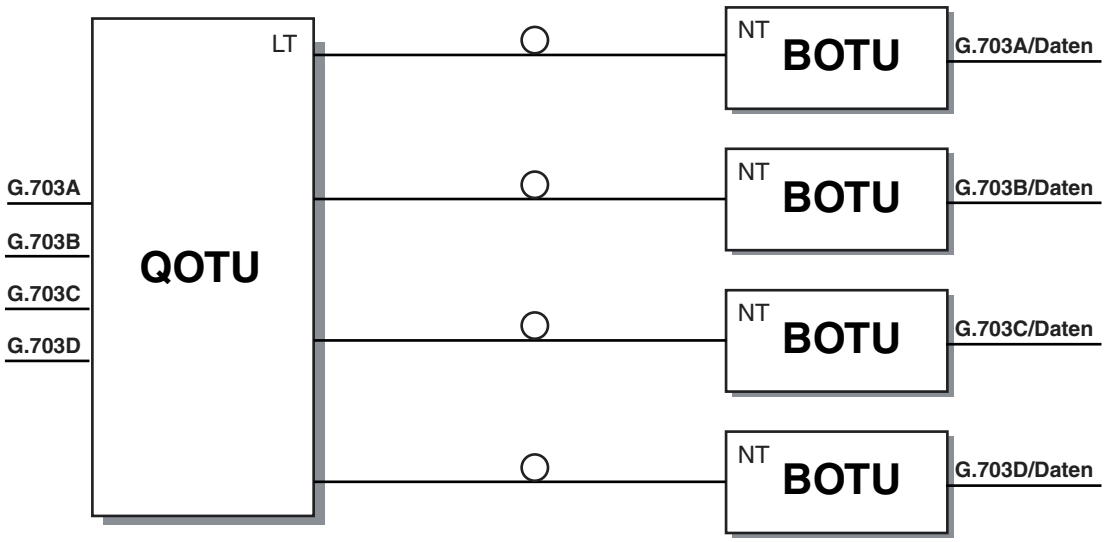


Fig. 2.228 Operating mode: QOTU(LT) – 4x BOTU (1x G.703; Data module slot) (NT)

i In QOTU – BOTU interconnections, the QOTU must always be used on the LT side.

2.17.2 Configuration of the BOTU/QOTU via the DIP switches

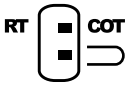
Use the DIP switches on the front panel of the BOTU/QOTU to set the operating mode (Tab. 2.118), respective inserting loopbacks (chapter 2.17.10).

DIP switch	Description
RT / COT	NT mode[1] / LT mode[2]
⊃	Inserting loopbacks (see chapter 2.17.10)

1) Default setting, desktop unit
2) Default setting, plug-in unit

Tab. 2.118 Front panel DIP switches of the BOTU

DIP switches of the desktop unit



DIP switches of the plug-in unit

2.17.3 Assembly of the SFP modules

Appropriate slots are provided for the SFP modules at the front of the plug-in unit and at the rear of the desktop device. SFP modules can be hot-swapped.

i If connections are not used, the optical interfaces should immediately be covered with a dust protection cap.

2.17.4 Fuses

The units are equipped with the following fuses, depending on the variant:

Type of fuse		
F5	250 V / 1.25 AT	Desktop unit
F8	125 V / 2 AT	Plug-in unit

Tab. 2.119 Usage of fuses types

⚠ The fuses have protective functions and may only be replaced by identical fuse types. If a fuse fails the device may also have been damaged.

2.17.5 Power supply to the BOTU/QOTU plug-in unit

Power is supplied to the plug-in unit via the subrack backplane. The input voltage is nominal 48 V or 60 V (valid range40 – 72 V_{DC}).

2.17.6 Power supply to the BOTU desktop unit

The following options are available for power supply to the desktop unit:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 - 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 - 72 V_{DC})

Power supply modes

Tab. 2.120 shows you the various power supply modes for the BOTU desktop units. The table shows you the required power adapter therefore:

Power supply	Variants
Local power supply with 110 / 230 V_{AC}	X
Local power supply with 48 / 60 V_{DC}	X
Redundant power feeding (Local power supply AC- and DC)	LT25W

X Direct power supply without power adapter required

LT25W Power adapter LT25W required (230 V_{AC} on primary side)

Tab. 2.120 Power supply modes

⚠ Before opening the desktop unit you must turn off the power and pull out the interface plug. The settings may only be made by trained personnel.

2.17.6.1 Local power supply (110 / 230 V_{AC}) for the desktop unit

Fig. 2.229 shows you the connection for the local AC supply for the desktop unit.

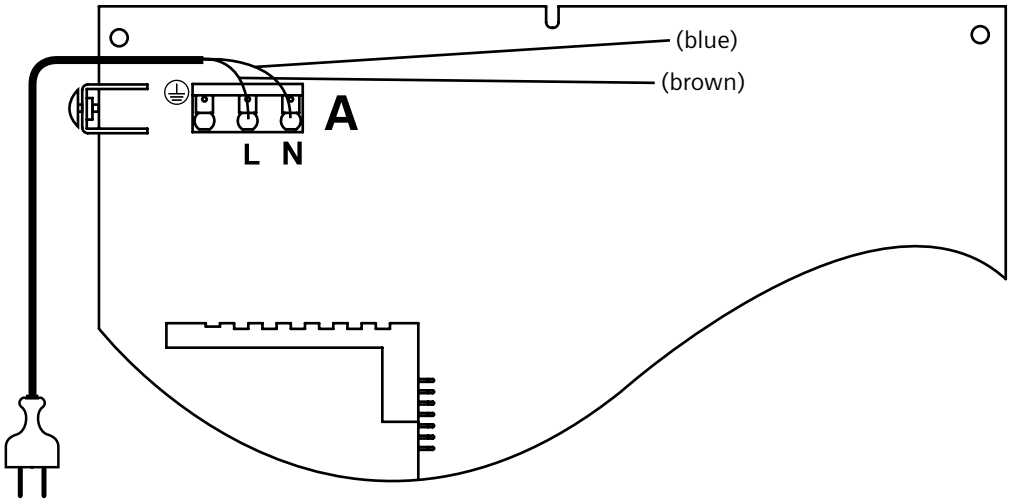


Fig. 2.229 Local power supply with 110 / 230 V_{AC}

2.17.6.2 Local power supply (48 / 60 V_{DC}) for the desktop unit

With the local power supply with 48 / 60 V_{DC} you connect the desktop unit to an appropriate power supply source.

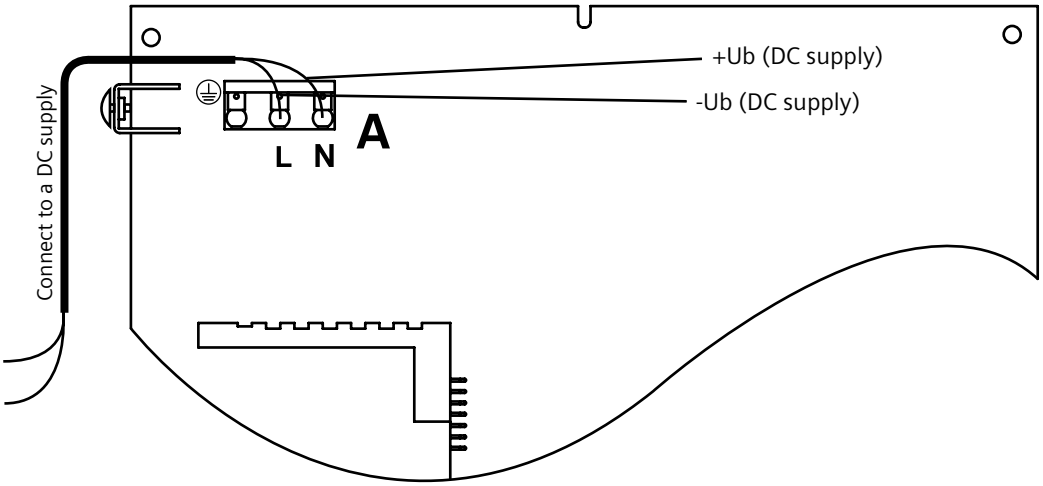


Fig. 2.230 Local power supply with 48 / 60 V_{DC}

i A powerfail alarm is displayed with the 48 V/60 V_{DC} power supply. To prefent this activate the powerfail suppression in the LCT, see ULAF+ User Manual [2].

2.17.6.3 Redundant power supply for the desktop unit (Local AC and DC supply)

A redundant, local power supply is possible with connection of an external DC supply (e.g. backup batteries) to the LT25W desktop power adapter. To provide the LT25W desktop power adapter supply with an additional battery feed you must open it and connect a second cable. The cable is included with the LT25W.

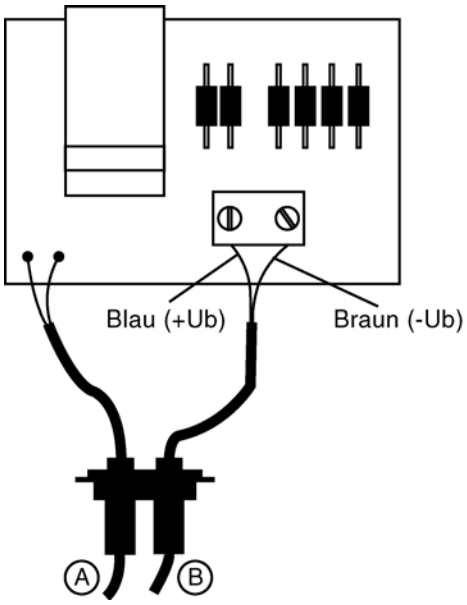


Fig. 2.231 Connecting the battery cable to desktop power adapter LT25W

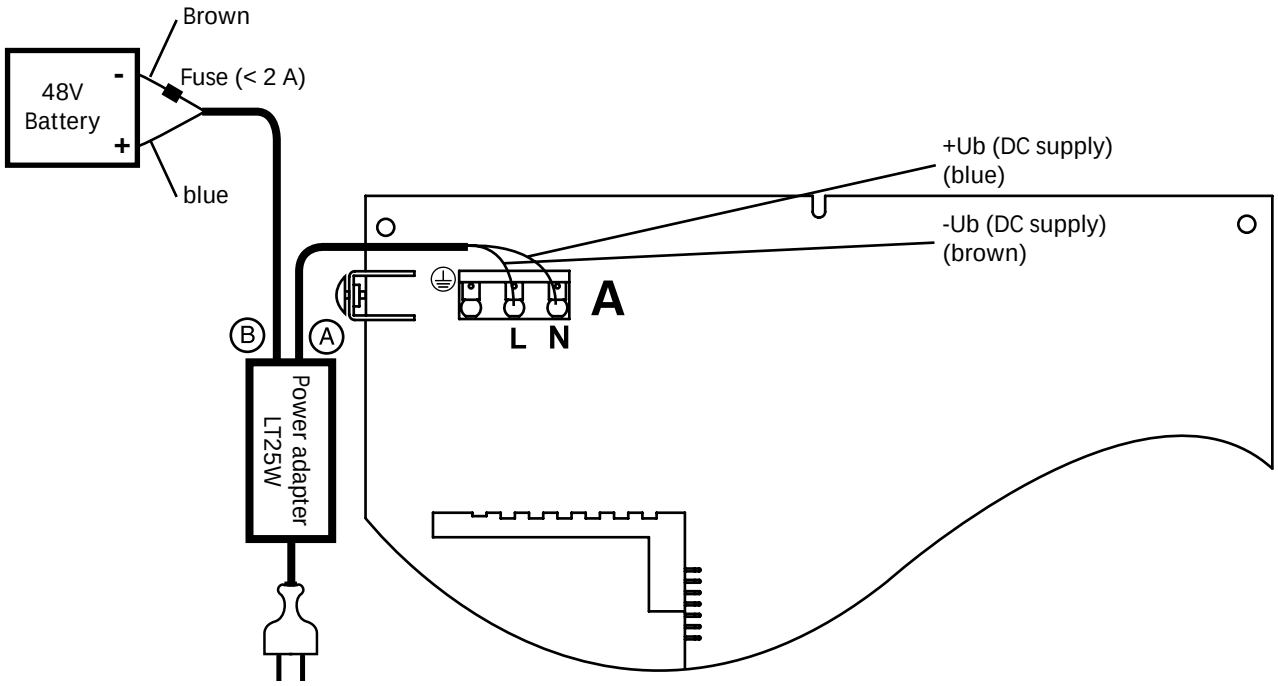


Fig. 2.232 Connecting the battery to desktop power adapter LT25W

i A powerfail alarm is displayed with the 48 V/60 V power supply. To prevent this activate the powerfail suppression in the NMS, see ULAF+ User Manual [2].

2.17.7 Clock Interface

The BOTU(LT) is equipped with a clock in connector, the BOTU(NT) with a clock out connector. The impedance of the clock input is 75 R Ω (BNC connector).

2.17.8 Pin assignment of the interfaces

The G.703 interfase is accessible on a 4-piece socket board.

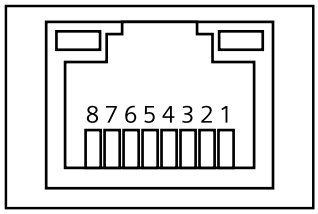


Fig. 2.233 Pin-Belegung der G.703-Schnittstelle

Pin assignment of the SHDSL interface

The impedance of the G.703 interface is 75 Ω or 120 Ω. The configuration is perfomred in the ULAF+ LCT. You will find more information in the ULAF+ User Manual [2]. An adapter cable (BNC ↔ RJ45), which enables the asymmetrical mode of operation (Pin 2 and 5 earthed), is available for operation with 75 Ω.

Pin assigment	Signal		Description
	120 Ω	75 Ω	
1	TxA	TxA	Transmited data
2	TxB	TxB	
3	Shield	Shield	Shield transmitted data, Circuit ground
4	RxA	RxA	Received data
5	RxB	RxB	
6	Shield	Shield	Shield received data, Circuit ground
7	--	--	--
8	--	--	--
Casing	Shield	Shield	Overall ground, Circuit ground

Tab. 2.121 Pin assignment of the G.703 interface

Pin assignment of the Ethernet interface

The Ethernet interface is accessible on a 4-piece socket board.

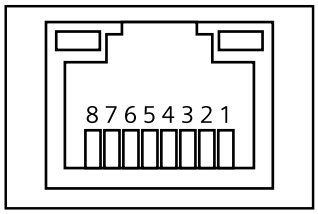


Fig. 2.234 Pin assignment of the Ethernet interface

Pin assignment	Signal	Description
1	TxP	Transmitted data
2	TxM	
3	RxP	Received data
4	--	Pin 4 and 5 over 75 Ω connected to circuit ground
5	--	
6	RxM	Received data
7	--	Pin 7 and 8 over 75 Ω connected to circuit ground
8	--	
Casing	Shield	Overall ground, Circuti ground

Tab. 2.122 Pin assignment of the G.703 interface

Pin assignment of the LCT interface

Pin	Name	Description
3	RxD	Received signal
4	TxD	Transmitted signal
5	GND	Ground connected

Tab. 2.123 RS232 interface of the LCT

i The Pins 1, 2, 6, 7 and 8 must not be connected.

An adapter cable is available for connecting the LCT interface to the RS232 interface of your PC.

The transmission rate is 9600 Baud. The data format of the interface is as follows:

- 8 data bits
- 1 start bit
- 1 stop bit
- no parity
- no hand shake

2.17.9 Supervision and alarm signalling of the BOTU/QOTU

The operating mode and alarm signalling of the BOTU/QOTU are indicated by means of LEDs on the front side of the unit, with the desktop unit also displayed on the rear.

2.17.9.1 Visual signalling of the plug-in unit

The visual signalling of the BOTU/QOTU is made using LEDs on the front.

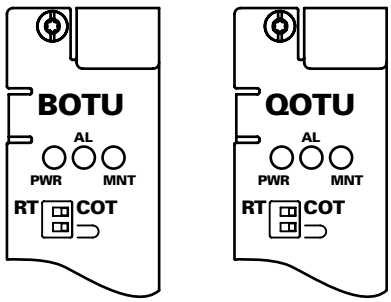


Fig. 2.235 Visual signalling of the plug-in unit

LED	Color	Status	
		Off	On
PWR (Power)	green	no power supply	Power supply o.k.
AL (Alarm)	red	no alarm	Urgent alarm[1)]
	yellow	no alarm	Non-urgent alarm[1)]
MNT (Maintenance)	yellow	no maintenance fuction	**on:** Maintencance active, Traps deactivated, BERT activated **blinking:** Firmware on LT and NT are not compatible or configuration is not supported by NT

1) Alarm messages (Urgent/Non-urgent alarm) depend on configuration made with the LCT

Tab. 2.124 Visual signalling of the plug-in unit

Visual signalling of the G.703 interface

A red and a yellow LED are incorporated in the female connectors of the four G.703.

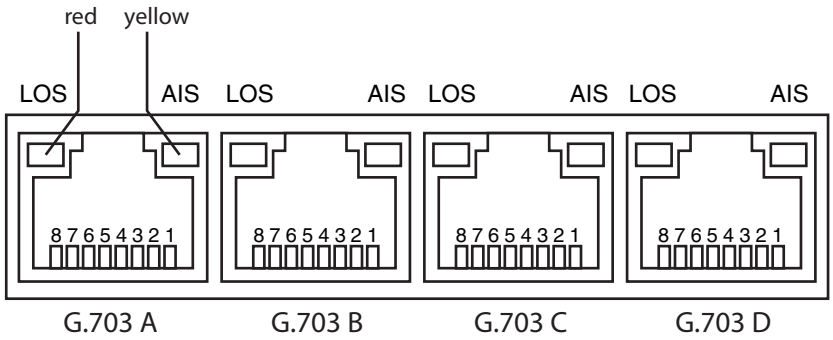


Fig. 2.236 Visual signalling of the G.703 interface

LED	Color	Status	
		Off	On
LFA/LOS-T/V (G.703 x)	red	no alarm	**on:** LOS **blinking:** LFA
AIS (G.703 x)	yellow	no alarm	AIS

Tab. 2.125 Visual signalling of the G.703 interface

Visual signalling of the Ethernet interface

A green and a yellow LED are incorporated in the female connectors of the three Ethernet interfaces. The AUX(iliary) interface is without any function.

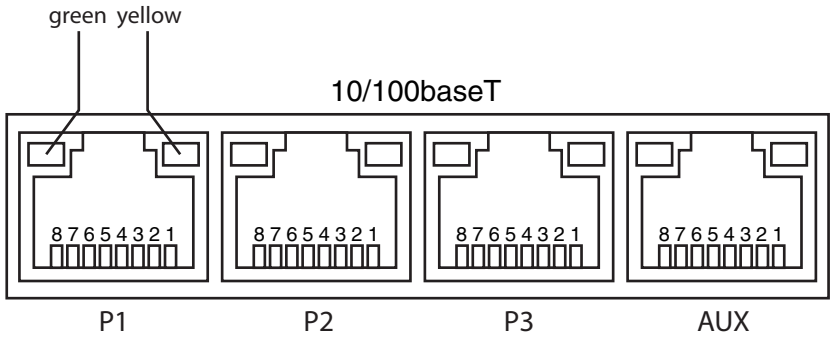


Fig. 2.237 Visual signalling of the Ethernet interface

LED	LED Mode 10/100Base-Tx
yellow	**Off:** Half Duplex **On**: Full Duplex **blinking**: Collision with Half Duplex
green	**Off:** No connection/ no Traffic **On**: Link Up **blinking**: Traffic

Tab. 2.126 Visual signalling of the Ethernet interface

Visual signalling of the SFP intefaces

The visual signalling of the SFP interfaces is made via a red an a yellow LED.

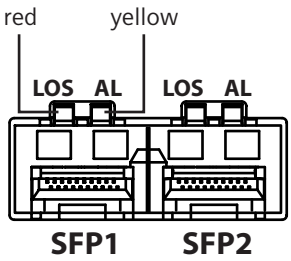


Fig. 2.238 Visual signalling of the SFP interfaces

LED	Color	Status	
		Off	Off
SFPx - LOS	red	no alarm	**on:** LOS **blinking:** LFA
SFPx - AL	yellow	no alarm	**on:** Tx Alarm / missing SFP **blinking:** Invalid SFP

Tab. 2.127 Visual signalling of the SFP interfaces

2.17.9.2 Visual signalling of the desktop unit

The visual signalling of the desktop unit is identical with the states of the plug-in unit. The meaning of the LED is described in Tab. 2.124 to Tab. 2.127.

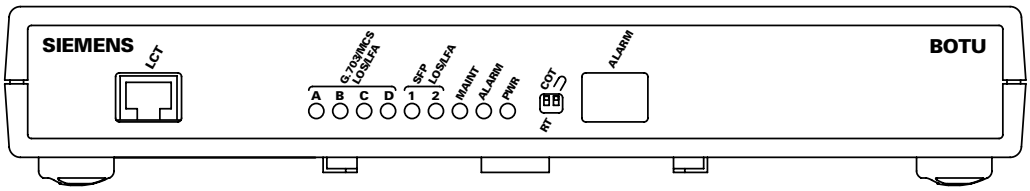


Fig. 2.239 Visual signalling of the desktop unit

Visual signalling of the G.703 interface

A red and a yellow LED are incorporated in the female connectors of the four G.703.

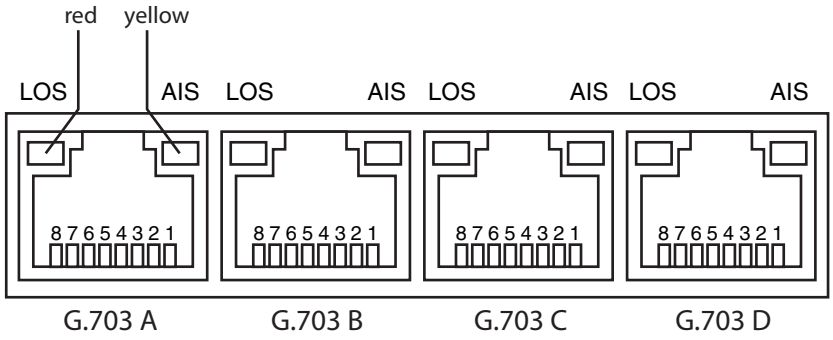


Fig. 2.240 Visual signalling of the G.703 interfaces

Visual signalling of the Ethernet interface

A green and a yellow LED are incorporated in the female connectors of the four Ethernet interfaces on the backside of the desktop unit

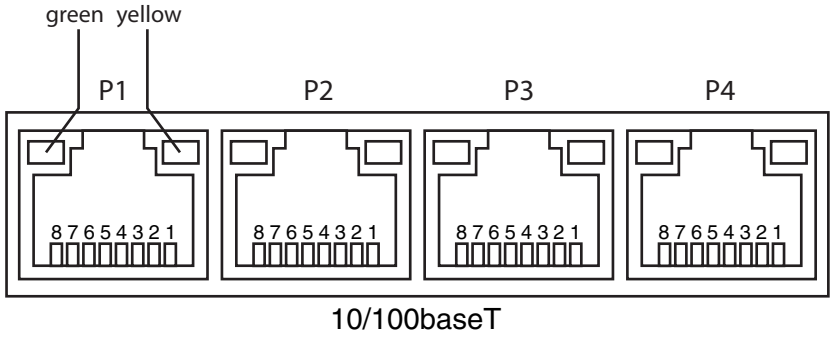


Fig. 2.241 Visual signalling of the Ethernet interfaces

2.17.10 Fault location by inserting loopbacks

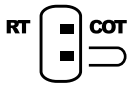
By inserting loopbacks, the path can be checked for possible transmission errors. Once the loopbacks have been inserted, the data msut be returned error-free.

Loopbacks can either be inserted

- using software via the LCT/AccessIntegrator or
- using DIP switches on the modules.

The procedure for inserting loopbacks by means of manament software can be found in the user manual of ULAF+ [2] or AccessIntegrator [6].

DIP switchs of the desktop unit



DIP switches of the plug-in unit

BOTU loopback	Loopback LT (COT) ⊃	Loopback NT (RT) ⊃
BOTU - BOTU	2bT / 2bD	3bT / 3cD
QOTU - BOTU	no function	3bT / 3cD

Tab. 2.128 Inserted loopbacks via DIP switches

The 2bT loopback is the loopback 2b on the NT. The loopback 2bT is activated by the LT. With the DIP switch all 2b loops are always inserted at the same time.

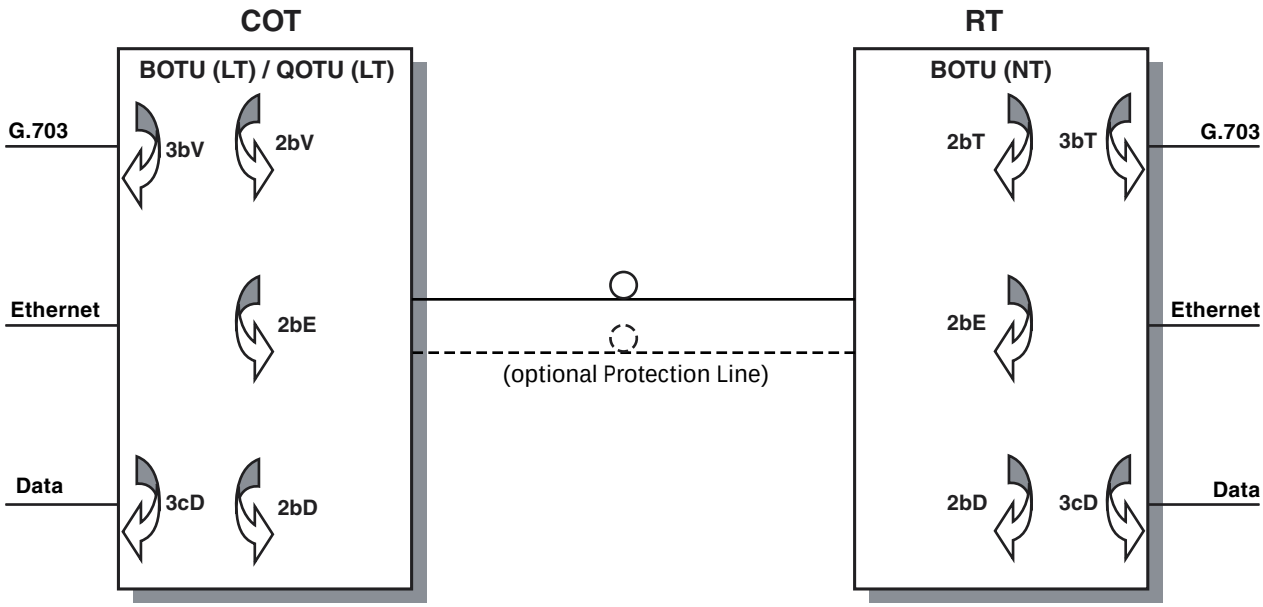


Fig. 2.242 Loopbacks of the BOTU/QOTU

Find detailed information about loopbacks of the BOTU and QOTU in the ULAF+ User Manual [6].

2.18 G.703 termination unit GTU

Application

The termination unit GTU is a 2 Mbit/s G.703 termination unit that can be used both in the subrack and in a desktop casing. This chapter describes the settings of the GTU. The interface modules are described in Chapter 2.19.

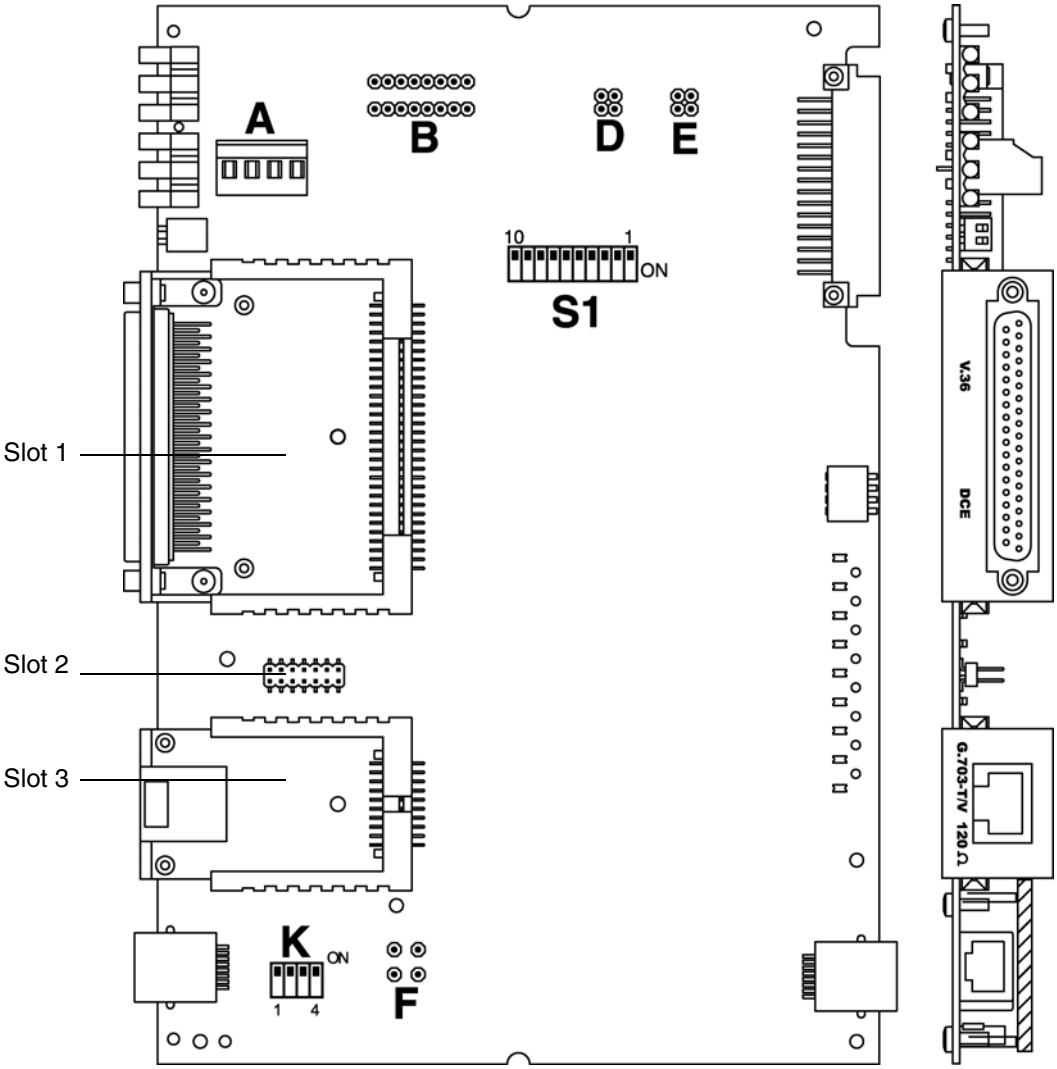


Fig. 2.243 GTU motherboard

2.18.1 Configuration of the GTU using DIP switches

Tab. 2.129 shows the possible settings of the DIP switches (S1) on the GTU.

DIP switch	Setting	Description
1	On	GTU remote [2]
	Off	GTU as Master of the GTU remote [1)2)]
2	On	Module for data interface in DTE mode
	Off	Module for data interface in DCE mode [1)]
3	On	Configuration via the DIP switches
	Off	Configuration via the LCT/AccessIntegrator [1)]
4 [3)] 5 [3)]	On Off	Structured mode
4 [3)] 5 [3)]	Off Off	Transparent mode NT1
4 [3)] 5 [3)]	Off On	NT1 [1)]
6 [3)]	On	AIS recognition activated
	Off	AIS recognition deactivated[1)]
7 [3)]	On	AIS insertion[1)]
	Off	AIS insertion deactivated
8	On	Inbandmanagement mode
	Off	Normal mode [1)]
9	On	GTU in remote mode
	Off	GTU in Normal mode [1)]
10	--	Not assigned

1) Default settings
2) Only operable if DIP switch 9 is 'On'
3) Only operable if DIP switch 3 is 'On'

Tab. 2.129 Configuration using the DIP switches

2.18.2 Power supply of the GTU

Plug-in unit

Power to the plug-in unit is supplied via the subrack backplane. The input voltage is nominal 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC}).

Desktop unit

For the power supply of the desktop unit, the options are as follows:

- Local power supply with 110 V_{AC} or 230 V_{AC} (valid range 95 – 260 V_{AC})
- Local power supply with 48 V_{DC} or 60 V_{DC} (valid range 40 – 72 V_{DC})

You can use jumpers to select the type of power supply, see chapter 2.6.4. You can see the terminal assignment for power supply from Fig. 2.23.

Changes involving the type of power supply may only be made by trained personnel.

Converting the power supply

You can convert the desktop unit from AC to DC supply after it has been installed. To do this you must remove the power cord connector and reset the jumpers as detailed in chapter 2.18.3. The upgrade process is described in chapter 2.6.2.

2.18.3 Set the GTU power supply via jumpers

Below, you will find the individual jumper settings for the GTU. The following types of use are described:

- **GTU used as a desktop unit**
  - Local AC supply
  - Local DC supply
- **GTU used as a plug-in unit**
  - Local DC supply

The casing must be opened to change the jumper settings on the desktop unit. For this, the screws on the bottom of the unit must be released.

⚠ Before you open the desktop device you must interrupt the power feed and also disconnect the interface connector. The following settings must only be carried out by trained personnel.

Jumper	Meaning
B	Select the supply
D	Select the voltage range
E	Select the power-fail alarm mode
F	Impedance of the V interface

Tab. 2.130 Jumper B, D, E and F

Desktop unit local supply; AC

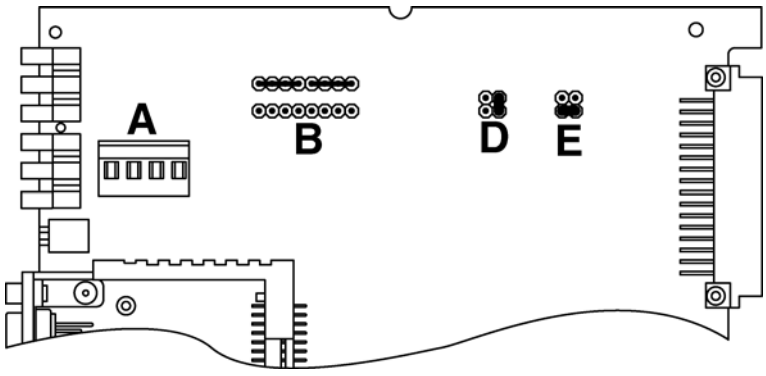


Fig. 2.244 Jumper settings on the Desktop unit, local supply; AC

Desktop unit local supply; DC

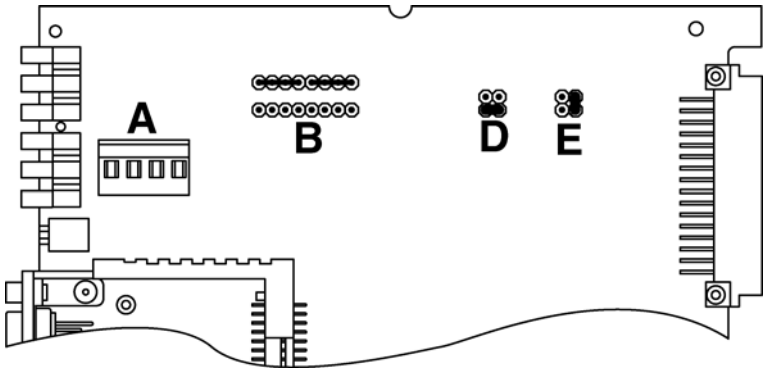


Fig. 2.245 Jumper settings on the Desktop unit, local supply; DC

Plug-in unit

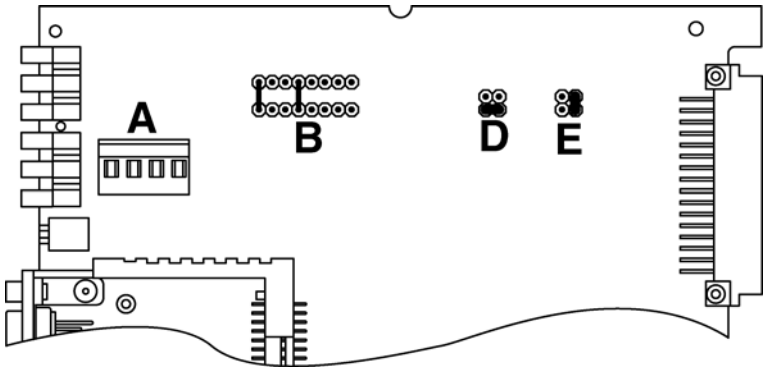


Fig. 2.246 Jumper settings on the plug-in unit

2.18.4 Grounding the V interface

Grounding the V interface is configured by means of DIP switches (K) (Fig. 2.247 and Tab. 2.131)

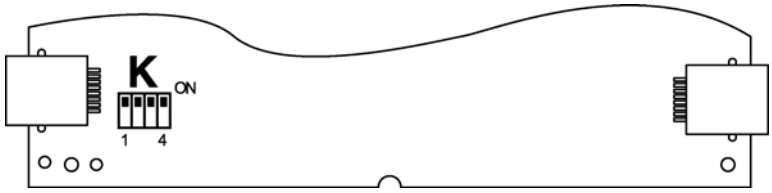


Fig. 2.247 DIP switches K

Switch				Description
S1	S2	S3	S4	
ON 1)	--	--	--	Tx shield not connected to the ground
OFF	--	--	--	Tx shield connected via capacitor to the ground
--	--	--	ON 1)	Rx shield connected to the ground
--	--	--	OFF	Rx shield connected via capacitor to the ground
--	ON 1)	ON 1)	--	Shield (RJ45) connected to the ground
--	OFF	ON	--	Shield (RJ45) connected via capacitor to the ground
--	X2)	OFF	--	Shield (RJ45) not connected to the ground

1) Default setting

2) Setting is nonessential

Tab. 2.131 Grounding the V interface

2.18.5 Setting the impedance of the V interface using jumpers

The impedance (75 Ω or 120 Ω) of the V interface is setting via jumper F (see Fig. 2.248). The pin assignment of the V interface can be found in Chapter 2.18.7.

⚠ Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

Impedance of the V interface

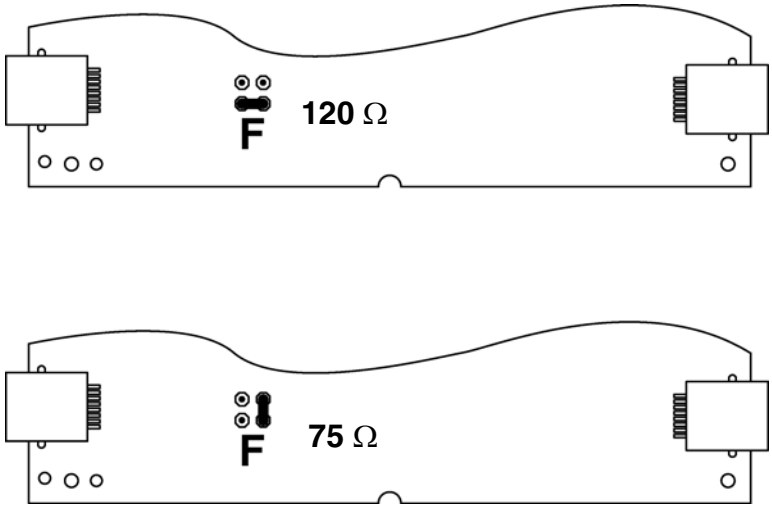


Fig. 2.248 Jumper settings for impedance of the V interface

2.18.6 Conversion of the GTU: plug-in unit - Desktop unit

The GTU can, like the HTU termination unit, be swapped from the plug-in unit to the desktop unit and vice versa. You will find the procedures for conversion in chapter 2.6.6.

Notes for the user:

Remote power supply to the GTU is not possible, accordingly the modules are not equipped with the necessary jumpers.

⚠ The conversion of the GTU from a plug-in unit into a desktop unit may only be made by trained personnel.

⚠ The jumper settings for the plug-in units are not identical to those of the desktop units. When a plug-in unit is converted to a desktop unit the jumpers must be set correctly. Only the drawn in jumpers may be set. Other combinations are not allowed and can lead to danger to the installer or the user (electric shock or fire).

2.18.7 Pin assignment of the G.703 V interface of the GTU

For the plug-in unit, the G.703 V interface is fitted on the front with an RJ45 socket, and for the desktop unit the interface is fitted on the rear with an RJ45 socket. The Pin assignment can be found in Tab. 2.132. The impedance can be selected by means of jumpers on the motherboard between 75 Ω and 120 Ω. The as-delivered condition is 120 Ω. See also “Chapter 2.18.5 - Setting the impedance of the V interface using jumpers.

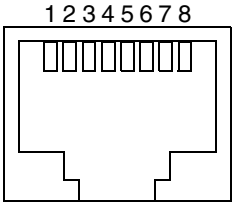


Fig. 2.249 Pin assignment

Pin	1	2	3	4	5	6	7	8
Assignment	RXA	RXA	Shield	TXA	TXA	Shield	-	-

Tab. 2.132 Pin assignment of the G.703 V interface

For the 75 Ω application, an ‘RJ45 to 2x BNC’ adapter cable is available.

2.18.8 Supervision and alarm signalling of the GTU

The operating mode and alarm signalling of the GTU are indicated by means of LEDs on the front panel.

2.18.8.1 Visual signalling of plug-in unit GTU

There are six LEDs on the front panel. The meaning of the individual LEDs is explained in Tab. 2.133.

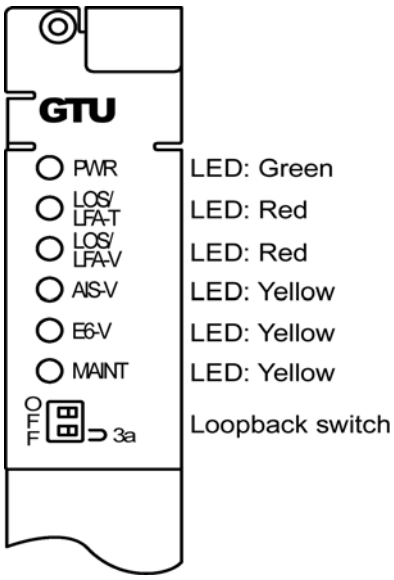


Fig. 2.250 Visual signalling of the plug-in unit

LED	Color	State	
		off	on
PWR	green	no power supply	power on
LOS/LFA-T	red	no alarm	loss of signal and loss of frame alignment at the T interface
LOS/LFA-V	red	no alarm	loss of signal and loss of frame alignment at the V interface
AIS-V	yellow	no alarm	AIS at the V interface
E6-V	yellow	no alarm	block error rate $>10^{-6}$ at the V interface
MAINT	yellow	no maintenance function	loopback 2 inserted

Tab. 2.133 Visual signalling of plug-in unit

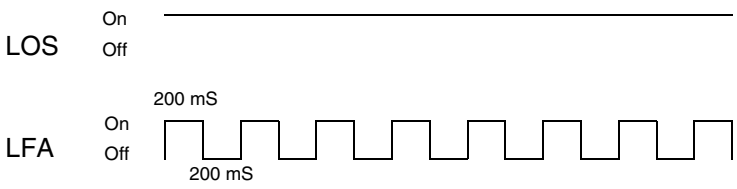


Fig. 2.251 Visual signalling LOS/LFA

2.18.8.2 Visual signalling of desktop unit GTU

There are nine LEDs on the front of the desktop unit, see Fig. 2.245. The meaning of the individual LEDs is explained in Tab. 2.134.

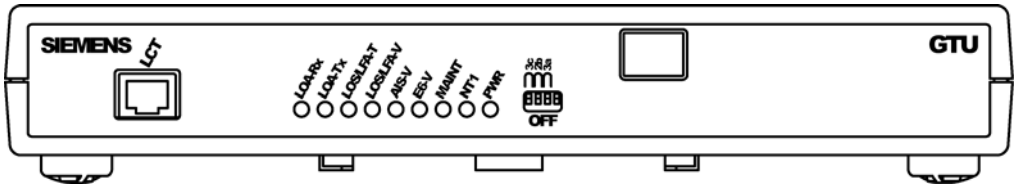


Fig. 2.252 Visual signalling of desktop unit

LED	Color	Status	
		off	on
LOA-Rx	yellow	no permanent 0 or 1 (data interface; line 104/receive data)	permanent 0 or 1
LOA-Tx	yellow	no permanent 0 or 1 (data interface; line 103/transmit data)	permanent 0 or 1
LOS/LFA-T	red	no alarm	Lights up: Loss of Signal at T interface Flashes: Loss of Frame Alignment at T interface
LOS/LFA-V	red	no alarm	Lights up: Loss of Signal at V interface Flashes: Loss of Frame Alignment at V interface
AIS-V	yellow	no alarm	Alarm Indication Signal at V interface
E6-V	yellow	no alarm	block error rate $>10^{-6}$ at V interface
MAINT	yellow	no maintenance function	maintenance function active
NT1	yellow	Transparent mode	NT1 mode
PWR	yellow	no power supply	power supply ok

Tab. 2.134 Visual signalling of desktop unit

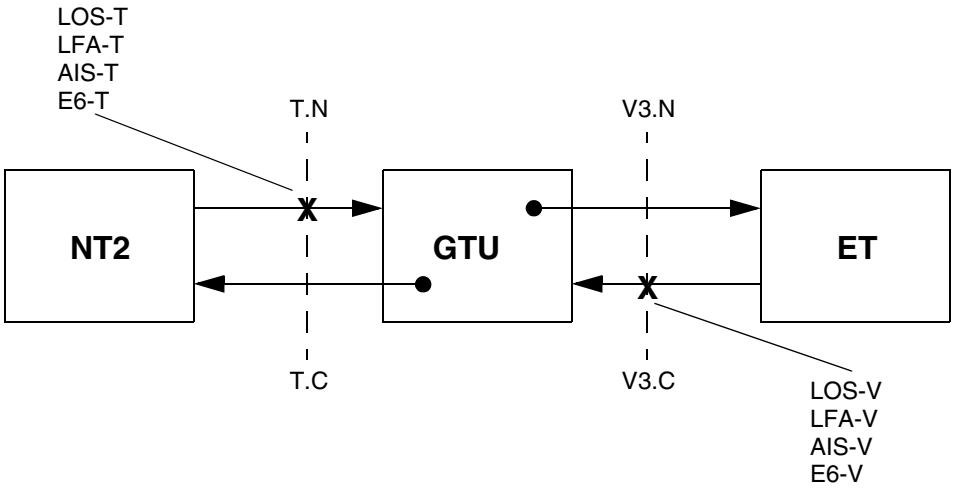


Fig. 2.253 Alarms and alarm reactions of the GTU on NT1 mode

2.18.9 Fault location by inserting loopbacks

A loopback switch is fitted to the front of the unit (Fig. 2.252). You can use this switch to insert local loopbacks. By means of loopbacks, the units of the digital connection can be tested. For this purpose, the G.703 transmission module GTU distinguishes between the two modes below:

- Transparent NT1 mode
- Data mode

2.18.9.1 Loopback in transparent NT1 mode

Loopback 2b is controlled via the commands from the ISDN exchange or the ISDN test equipment contained in the V3 interface signal. Loop 2b can also be closed manually by the locally operable switch.

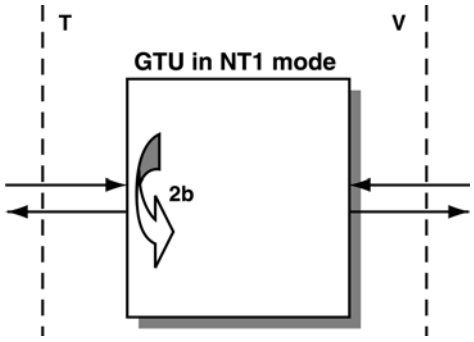


Fig. 2.254 Effect of the loopback in the transparent NT1 mode

Switch setting	Loopback
⊃2b	Loopback 2b inserted
OFF	No loopback inserted

Tab. 2.135 Loopback switch for the transparent NT1 mode

2.18.9.2 Loopback in the data mode

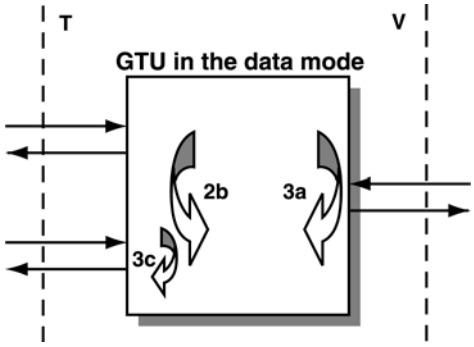


Fig. 2.255 Effect of the loopback in the data mode

Loopback	Meaning/effect
Loopback 2b [1)]	V-interface direction - local - in the digital unit
Loopback 3a [1)]	DTE1/DTE2-interface direction - in the termination unit
Loopback 3c	DTE2-interface direction - at the subscriber interface

1) Loopbacks are transparent

Tab. 2.136 Designation of the loopbacks in the data mode

2.18.9.3 Loopback in remote mode

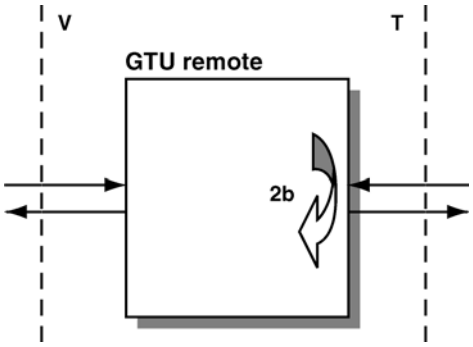


Fig. 2.256 Effect of the loopback in the remote mode

Loopback	Meaning/effect
Loopback 2b	V-interface direction

Tab. 2.137 Designation of the loopback in the remote mode

2.19 Interface- and submodules

The following table gives you an overview of the submodules that you can use with corresponding termination units.

	HTU		STU/ STU2		STU 64k		BSTU [2]		QSTU		STU4		BSTU4		GTU4		OTU		GTU		LR-DSTU	
	Plug-in unit	Desktop unit	Plug-in unit	Desktop unit	Plug-In unit	Desktop unit	Plug-In unit	Desktop unit	Plug-in unit	Desktop unit	Plug-in unit	Desktop unit	Plug-in unit	Desktop unit	Plug-in unit	Desktop unit	Plug-in unit	Desktop unit	Plug-in unit	Desktop unit	Plug-in unit	Desktop unit
G.703; RJ45	Y	Y	Y	Y	–	–	–	–	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
G.703; BNC	Y	Y	Y	Y	–	–	–	–	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
G.703; 1.6/5.6	Y	Y	Y	Y	–	–	–	–	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
G.703; Sub-D	Y	Y	Y	Y	–	–	–	–	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
Advanced Bridge	Y	Y	Y	Y	–	–	Y	Y	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
Advanced Bridge & Router	Y	Y	Y	Y	–	–	Y	Y	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
X.21	Y	Y	Y	Y	–	–	Y	Y	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
V.35 (M34 connector)	–	Y	–	Y	–	–	–	Y	–	–	–	–	–	–	–	–	–	Y	–	Y	–	–
V.35; Sub-D25	Y	Y	Y	Y	–	–	Y	Y	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
V.36	Y	Y	Y	Y	–	–	Y	Y	–	–	–	–	–	–	–	–	Y	Y	Y	Y	–	–
Alarm/clock	–	Y	–	Y	–	Y	–	3)	–	Y	–	–	–	–	–	Y	–	Y	–	Y	–	Y
RPS / RPS II	–	Y [1]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

1) It is imperative that the desktop unit is supplied with DC. The supply is either by means of battery supply or via an external desktop power supply unit.

2) Use only with equipped variant with data submodule slot.

3) Plug-in slot not available with all equipped variants.

Tab. 2.138 Use interface and submodules

2.19.1 Inserting/removing the submodules

Before removing or inserting the submodules, you must disconnect the power supply.

The modules for the 2 Mbit/s interface and the data interfaces are secured with a bolt. Before replacing a module, you must

- pull the plug-in unit out of the subrack
- open the desktop unit.

With older casings or plug-in units, you must first remove the safety bold. The module can then be pulled out. After you have replaced the submodule in older casings, you have to reinsert the safety bolt into the opening provided. For the new housings, the securing bolt must be mounted directly on the housing.

N.B.: The safety bolt must be inserted from the underside of the motherboard and should be used once only.

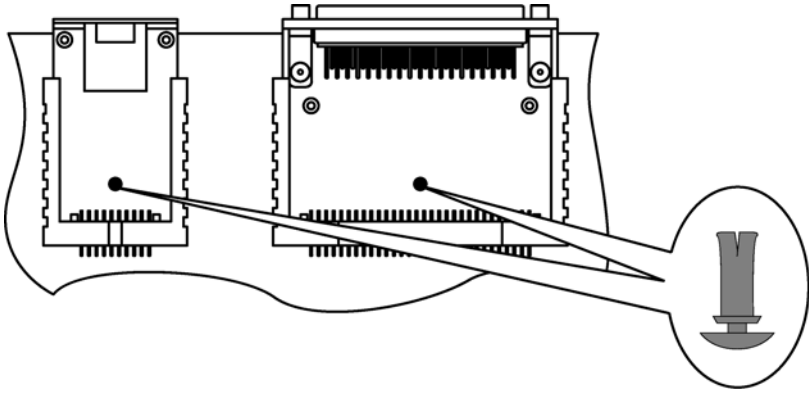


Fig. 2.257 Safety bolt for the submodules

2.19.2 Modules for the 2 Mbit/s interface

Slot 3 (see Fig. 2.21) can be equipped with the following interface submodules (see Tab. 2.136). The following chapters will explain the Pin assignment of the individual connections.

2.19.2.1 Submodule with RJ45 connector

The RJ45 connector used conforms to ISO Standard 10173.

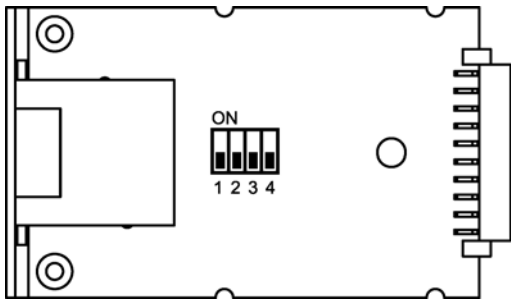


Fig. 2.258 Submodule with RJ45 connector

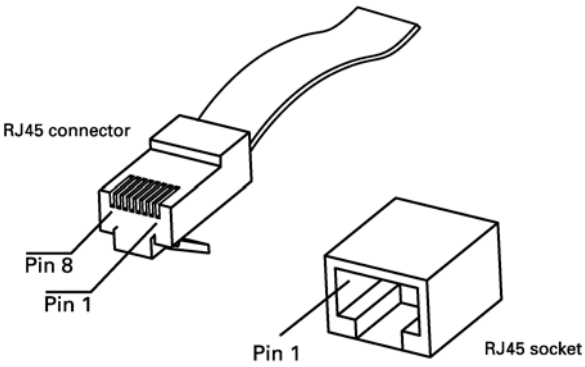


Fig. 2.259 RJ45 connector of the 2 Mbit/s interface

Pin	Signal name	Description
1	G703_TXA	Transmit data
2	G703_TXB	Transmit data
3	Shield(T)	Ground connection for Tx line shield 1)
4	G703_RXA	Receive data
5	G703_RXB	Receive data
6	Shield(R)	Ground connection for Rx line shield 1)
7	Not assigned	– –
8	Not assigned	– –
Shield	Shield	RJ45 connector shield 1)

1) See Tab. 2.140

Tab. 2.139 Pin assignment of the RJ45 connector (2 Mbit/s)

Switch				Description
S1 2)	S2 2)	S3	S4	
–	–	–	–	– –
–	–	–	–	– –
–	–	–	–	– –
–	–	ON 1)	–	Tx shield not connected to the ground
–	–	OFF	–	Tx shield connected via capacitor to the ground
–	–	–	ON 1)	Rx shield connected to the ground
–	–	–	OFF	Rx shield connected via capacitor to the ground

1) Default settings

2) No function. The connector RJ45 is always linked to ground

Tab. 2.140 Configuration des RJ45 connector (2 Mbit/s)

2.19.2.2 Submodule with BNC connector

This submodule is equipped with two 75 Ω coaxial connectors.

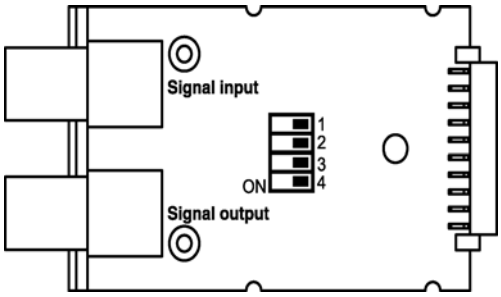


Fig. 2.260 Submodule with BNC connector

The table below explains the individual DIP switch settings:

Switch				Description
1	2	3	4	
OFF	OFF	–	–	Tx shield not connected to the ground
OFF	ON [1)]	–	–	Tx shield connected by capacitor to the ground
ON [1)]	–	–	–	Tx shield connected to the ground
–	–	OFF	OFF	Rx shield not connected to the ground
–	–	ON [1)]	OFF	Rx shield connected by capacitor to the ground
–	–	–	ON [1)]	Rx shield connected to the ground

1) Default settings

Tab. 2.141 Configuration of the BNC connections

2.19.2.3 Submodule with 1.6/5.6 connector

Layout and function of submodules with 1.6/5.6 connectors correspond to those of a submodule with a BNC connector, see chapter 2.19.2.2.

2.19.2.4 Submodule with Sub-D connector (9 pole)

This submodule is equipped with a Sub-D connector (G.703; 120 Ω).

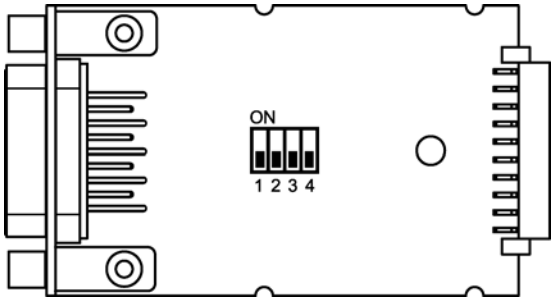
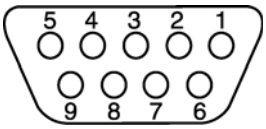


Fig. 2.261 Submodule G.703; Sub-D

The Pin assignment of the G.703, Sub-D interface (Fig. 2.262) can be found in Tab. 2.142, the configuration of the DIP switches is explained in Tab. 2.143.



(Front view)

Fig. 2.262 G.703; Sub-D interface

Pin	Signal name	Description
1	G703_TXA	Transmit data
2	Shield(T)	Ground connection for Tx line shield 1)
3	Not assigned	
4	Shield(R)	Ground connection for Rx line shield 1)
5	G703_RXA	Receive data
6	G703_TXB	Transmit data
7	Not assigned	– –
8	Not assigned	– –
9	G703_RxB	Receive data
Shield	Shield	Sub-D connector shield1)

1) See Tab. 2.143

Tab. 2.142 Pin assignment of the Sub-D connector (2 Mbit/s)

Switch				Description
S1 [2]	S2 [2]	S3	S4	
–	–	–	–	– –
–	–	–	–	– –
–	–	–	–	Shield (Sub-D) connected to the ground
–	–	ON [1]	–	Tx shield not connected to the ground
–	–	OFF	–	Tx shield connected via capacitor to the ground
–	–	–	ON [1]	Rx shield connected to the ground
–	–	–	OFF	Rx shield connected via capacitor to the ground

1) Default settings

2) No function. The connecor (D-Sub) is always linked to ground

Tab. 2.143 Configuration of the Sub-D connector (2 Mbit/s)

2.19.3 Modules for the data interface

Slot 1 (see Fig. 2.21) can be equipped with different submodules as shown in Tab. 2.136. The following chapters explain the Pin assignments of the individual connectors.

The ULAF+ table sets are configured as per EN 60950-1 Class II.
It is recommended that all interface connections (e.g. routers) be set up first, and only thereafter the ULAF+ table set connected to the 230 Volt network (avoids damage resulting from electr. discharges).

2.19.3.1 X.21 interface with Sub-D 15 pole

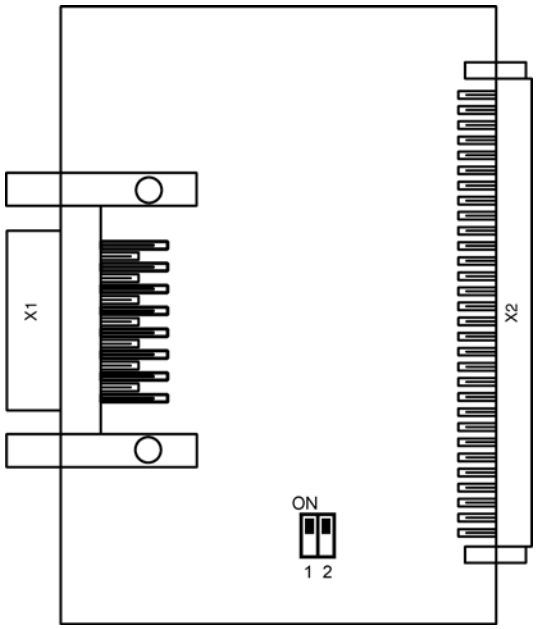
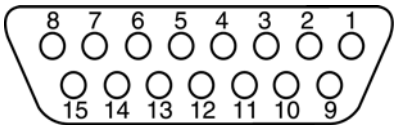


Fig. 2.263 X.21 submodule

The X.21 interface uses an ISO Standard 4903 15-Pin connector.



(Front view)

Fig. 2.264 X.21 interface

If neither the ULAF+ desktop unit nor the terminal equipment is grounded, you have to connect first the terminal equipment and then to switch on the ULAF+ desktop unit.

Pin	Signal name	DTE ↔ DCE	Description
1	Shield		Shield[1)]
2	T(a)	→	Transmit data
3	C(a)	→	Control line
4	R(a)	←	Receive data
5	I(a)	←	Indication signal
6	S(a)	←	Signal element timing
7	X(a)	→	DTE signal element timing
8	SG		Signal ground
9	T(b)	→	Transmit data
10	C(b)	→	Control line
11	R(b)	←	Receive data
12	I(b)	←	Indication signal
13	S(b)	←	Signal element timing
14	X(b)	→	DTE signal element timing
15	NC		Not assigned

1) See Tab. 2.146

Tab. 2.144 Pin assignment of the X.21 interface

DCE/DTE mode

The Pin assignment conforms to the X.21 Standard in the DCE mode. X.21 in the DTE mode can be implemented with the V.36 submodule and a corresponding adapter cable (Tab. 2.145).

xTU (V.36) Pin		DCE (X.21) Pin
6	↔	2
24	↔	9
4	↔	4
22	↔	11
1	↔	1
19 / 20	↔	8
17	↔	6
35	↔	13

Tab. 2.145 Adapter cable V.36 - X.21

DIP switch	Setting	Description
1	ON [1)]	Must always be 'ON'
2	ON [1)]	Shield (Pin 1) connected with low-impedance to ground
	OFF	Shield (Pin 1) connected by capacitor to ground

1) Default settings

Tab. 2.146 DIP switches of the X.21 interface module

2.19.3.2 V.35 interface with connector ISO 2593

This submodule can only be used in the desktop unit.

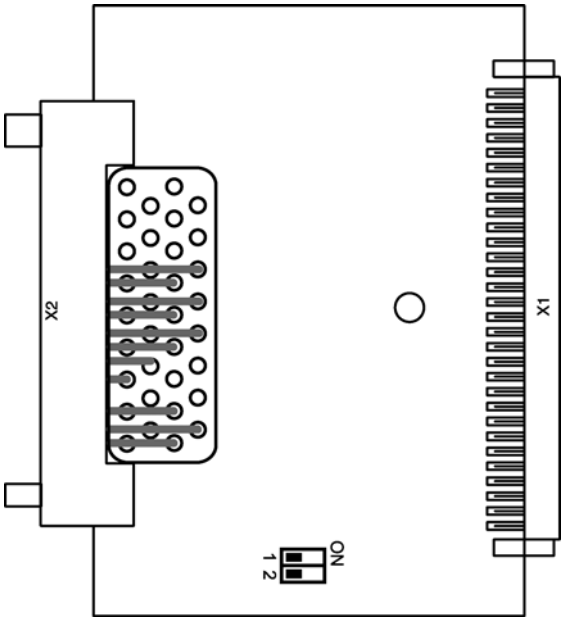
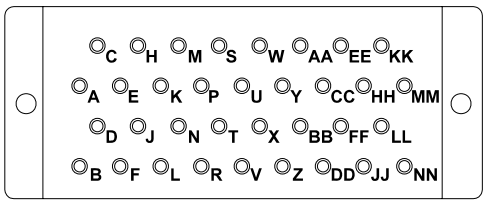


Fig. 2.265 V.35 submodule with connector ISO 2593

If neither the ULAF+ desktop unit nor the terminal equipment is grounded, you have to connect first the terminal equipment and then to switch on the ULAF+ desktop unit.

The V.35 interface of the desktop unit uses an ISO Standard 2593 connector. Tab. 2.147 shows the Pin assignment of the V.35 interface.



(Front view)

Fig. 2.266 V.35 DCE interface for the desktop unit

Pin	Signal name			DTE ↔ DCE	Description
	EIA	DIN	ITU-T		
A	Shield	E1	101		Shield[1)]
B	SG	E2	102		Signal ground
P	TxD(a)	D1(a)	103(a)	→	Transmitted data
S	TxD(b)	D1(b)	103(b)	→	Transmitted data
R	RxD(a)	D2(a)	104(a)	←	Received data
T	RxD(b)	D2(b)	104(b)	←	Received data

Tab. 2.147 Pin assignment of the V.35 interface with connector ISO 2593

Pin	Signal name			DTE ↔ DCE	Description
	EIA	DIN	ITU-T		
C	RTS	S2	105	→	Request to send
D	CTS	M2	106	←	Clear to send
E	DSR	M1	107	←	Data set ready
F	DCD	M5	109	←	Receive signal level
U	SCTE(a)	T1(a)	113(a)	→	Transmitter signal-element timing
W	SCTE(b)	T1(b)	113(b)	→	Transmitter signal-element timing
Y	TxC(a)	T2(a)	114(a)	←	Transmitter signal-element timing
AA	TxC(b)	T2(b)	114(b)	←	Transmitter signal-element timing
V	RxC(a)	T4(a)	115(a)	←	Receiver signal-element timing
X	RxC(b)	T4(b)	115(b)	←	Receiver signal-element timing
N	RL	PS2	140	→	Remote loopback (2bR)
L	LL	PS3	141	→	Local loopback (3cDxL)

1) See Tab. 2.148

Tab. 2.147 Pin assignment of the V.35 interface with connector ISO 2593

DIP switch	Setting	Description
1	ON [1)]	Must always be ‘ON’
2 (Signal 101)	ON [1)] OFF	Shield (Pin A) connected with low-impedance to ground Shield (Pin A) connected by capacitor to ground

1) Default settings

Tab. 2.148 DIP switches of the V.35 interface module

DTE/DCE mode

The Pin assignment conforms to the V.35 Standard in the DCE mode. V.35 in the DTE mode can be implemented with a corresponding adapter cable (Tab. 2.149).

xTU (V.35) Pin		DCE (V.35) Pin
R	↔	P
T	↔	S
P	↔	R
S	↔	T
F	↔	C
A	↔	A
B	↔	B
U	↔	AA
W	↔	Y

Tab. 2.149 Adapter cable V.35 - V.35

2.19.3.3 V.35 interface with connector Sub-D 25 Pin

This submodule is equipped with a Sub-D 25 Pin connector. Tab. 2.150 shows the Pin assignment of this connector.

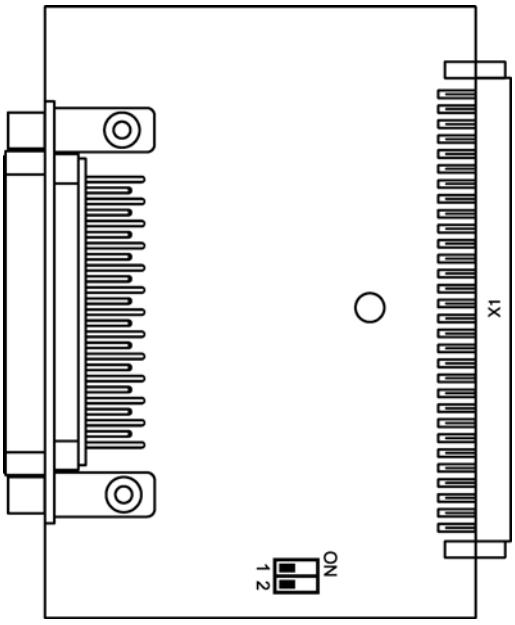
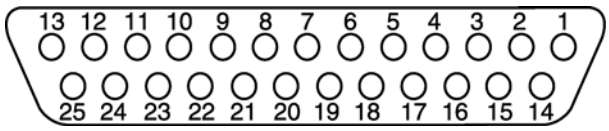


Fig. 2.267 V.35 submodule with connector Sub-D 25 Pin



(Front view)

Fig. 2.268 V.35 interface (Sub-D 25 Pin)

If neither the ULAF+ desktop unit nor the terminal equipment is grounded, you have to connect first the terminal equipment and then to switch on the ULAF+ desktop unit.

Pin	Signal name			DTE ↔ DCE	Description
	EIA	DIN	ITU-T		
1	Shield	E1	101	--	Shield[1)]
2	TxD(a)	D1(a)	103(a)	→	Transmitted data
3	RxD(a)	D2(a)	104(a)	←	Received data
4	TxD(b)	D1(b)	103(b)	→	Transmitted data
5	RxD(b)	D2(b)	104(b)	←	Received data
6	DSR	M1	107	←	Data set ready
7	SG	E2	102	--	Ground
8	DCD	M5	109	←	Receive signal level
9	RTS	S2	105	→	Ready to send
10	CTS	M2	106	←	Clear to send
14	TxC(a)	T2(a)	114(a)	←	Transmitter signal-element timing
15	TxC(b)	T2(b)	114(b)	←	Transmitter signal-element timing
16	RxC(b)	T4(b)	115(b)	←	Receiver signal-element timing
17	RxC(a)	T4(a)	115(a)	←	Receiver signal-element timing
18	LL	PS3	141	→	Local loopback(3cDxL)
21	RL	PS2	140	→	Remote loopback (2bR)
24	SCTE(a)	T1(a)	113(a)	→	Transmitter signal-element timing
25	SCTE(b)	T1(b)	113(b)	→	Transmitter signal-element timing

1) See Tab. 2.148

Tab. 2.150 Pin assignment of the V.35 interface with Sub-D 25 Pin

DCE/DTE mode

The Pin assignment conforms to the V.35 standard in DCE mode. V.35 in DTE mode can be implemented with a corresponding adapter cable (Tab. 2.151).

xTU (V.35) Pin		DCE (V.35) Pin
3	↔	2
5	↔	4
2	↔	3
4	↔	5
8	↔	9
1	↔	1
7	↔	7
24	↔	15
25	↔	14

Tab. 2.151 Adapter cable

DIP switch	Setting	Description
1	ON [1)]	Must always be 'ON'
2 (Signal 101)	ON [1)] OFF	Shield (Pin 1) connected with low-impedance to ground Shield (Pin 1) connected by capacitor to ground

1) Default settings

Tab. 2.152 DIP switches of the V.35 interface module

2.19.3.4 V.36 interface with connector Sub-D 37 Pin

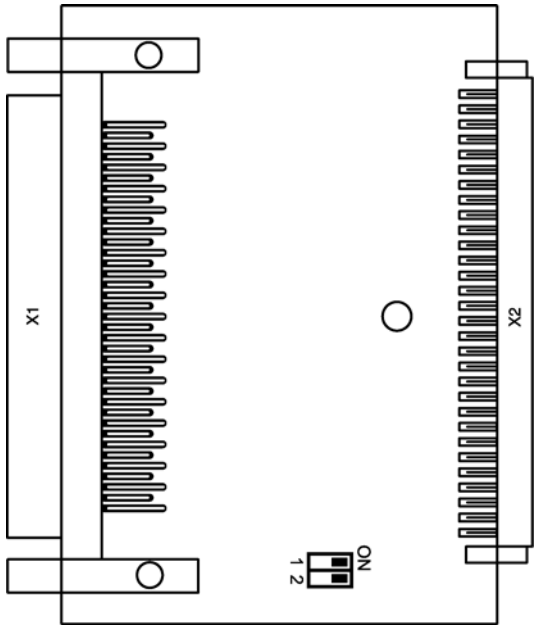


Fig. 2.269 V.36 submodule with Sub-D 37 Pin

For the V.36 interface, a 37-Pin D-sub connector is used both for the plug-in unit and the desktop unit. The connector conforms to ISO Standard 4902.

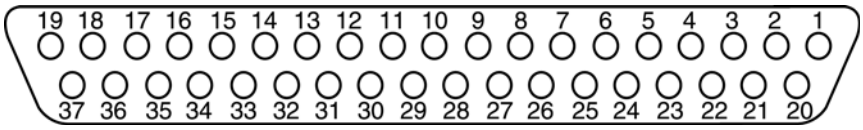


Fig. 2.270 V.36 interface

If neither the ULAF+ desktop unit nor the terminal equipment is grounded, you have to connect first the terminal equipment and then to switch on the ULAF+ desktop unit.

Pin	Signal name			DTE ↔ DCE	Description
	EIA	DIN	ITU-T		
1	Shield	E1	101		Shield[1)]
4	TxD(a)	D1(a)	103(a)	→	Transmitted data
5	TxC(a)	T2(a)	114(a)	←	Transmitter signal-element timing
6	RxD(a)	D2(a)	104(a)	←	Received data
7	RTS(a)	S2(a)	105(a)	→	Request to send
8	RxC(a)	T4(a)	115(a)	←	Receiver signal-element timing
9	CTS(a)	M2(a)	106(a)	←	Clear to send
10	LL	PS3	141	→	Local loopback (3cDxL)

Tab. 2.153 Pin assignment of the V.36 interface

Pin	Signal name			DTE ↔ DCE	Description
	EIA	DIN	ITU-T		
11	DSR(a)	M1(a)	107(a)	←	Data set ready
13	DCD(a)	M5(a)	109(a)	←	Receive signal level
14	RL	PS2	140	→	Remote loopback (2bR)
17	SCTE(a)	T1(a)	113(a)	→	Transmitter signal-element timing
19	SG	E2	102(c)		Signal ground
20	SG		102(b)	←	Signal ground
22	TxD(b)	D1(b)	103(b)	→	Transmitted data
23	TxC(b)	T2(b)	114(b)	←	Transmitter signal-element timing
24	RxD(b)	D2(b)	104(b)	←	Received data
25	RTS(b)	S2(b)	105(b)	→	Ready to send
26	RxC(b)	T4(b)	115(b)	←	Receiver signal-element timing
27	CTS(b)	M2(b)	106(b)	←	Clear to send
29	DSR(b)	M1(b)	107(b)	←	Data set ready
31	DCD(b)	M5(b)	109(b)	←	Received signal level
35	SCTE(b)	T1(b)	113(b)	→	Transmitter signal-element timing
37			102(a)	→	DTE signal ground

1) See Tab. 2.155

Tab. 2.153 Pin assignment of the V.36 interface

DCE/DTE mode

The Pin assignment conforms to the V.36 Standard in the DCE mode. V.36 in the DTE mode can be implemented with a corresponding adapter cable (Tab. 2.154).

xTU (V.36) Pin		DCE (V.36) Pin
6	↔	4
24	↔	22
4	↔	6
22	↔	24
13	↔	7
31	↔	25
1	↔	1
19 / 20	↔	19 / 20
17	↔	5
35	↔	23

Tab. 2.154 Adapter cable V.36 - V.36

DIP switch	Setting	Description
1	ON [1)]	Must always be 'ON'
2 (Signal 101)	ON [1)] OFF	Shield (Pin 1) connected with low-impedance to ground Shield (Pin 1) connected by capacitor to ground

1) Default settings

Tab. 2.155 DIP switches of the V.36 interface module

2.19.3.5 Advanced Bridge Module and the Advanced Bridge & Router Module

The submodule is available either as 'Advanced Bridge & Router Module' or as ' Advanced Bridge Module'. Externally, both modules are identical apart from the inscription.

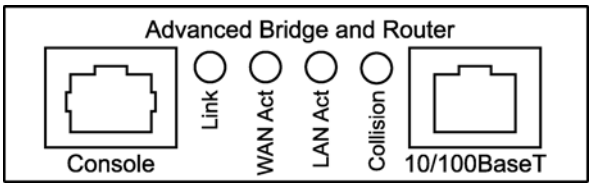


Fig. 2.271 Advanced Bridge & Router module

Visual signalling

There are four LEDs on the front:

LED	Color	Description
Link	Green	Connection to the link correct
WAN Act	Green	Data transmission active
LAN Act	Green	Data transmission active
Collision	Yellow	Collision detected

Tab. 2.156 Visual signalling of the Advanced Bridge Module and the Advanced Bridge & Router Module

Pin assignment

Below you will find the Pin assignment of the 10/100Base-T interface as well as the Pin assignment of the console connector.

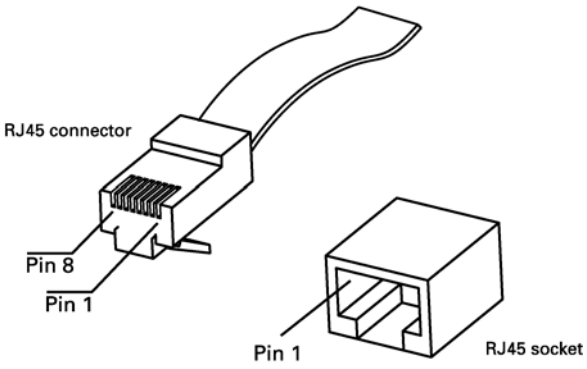


Fig. 2.272 10Base-T interface

Pin	Signal name	Description
1	Tx+	Transmit data
2	Tx-	Transmit data
3	Rx+	Receive data
4	Not assigned	
5	Not assigned	
6	Rx-	Receive data
7	Not assigned	
8	Not assigned	
Shield	Circuit ground (for STP cable)	

Tab. 2.157 Pin assignment of the 10/100Base-T interface

Pin	Signal name	Description
3	RxD	Receive signal
4	TxD	Transmit signal
5	GND	Ground connection

Tab. 2.158 Pin assignment of the console connector

For further information please refer the User Manual [3] of the ‘ULAF+ Advanced Bridge & Router Module’.

2.19.3.6 Submodule with Ethernet interface (10Base-T)

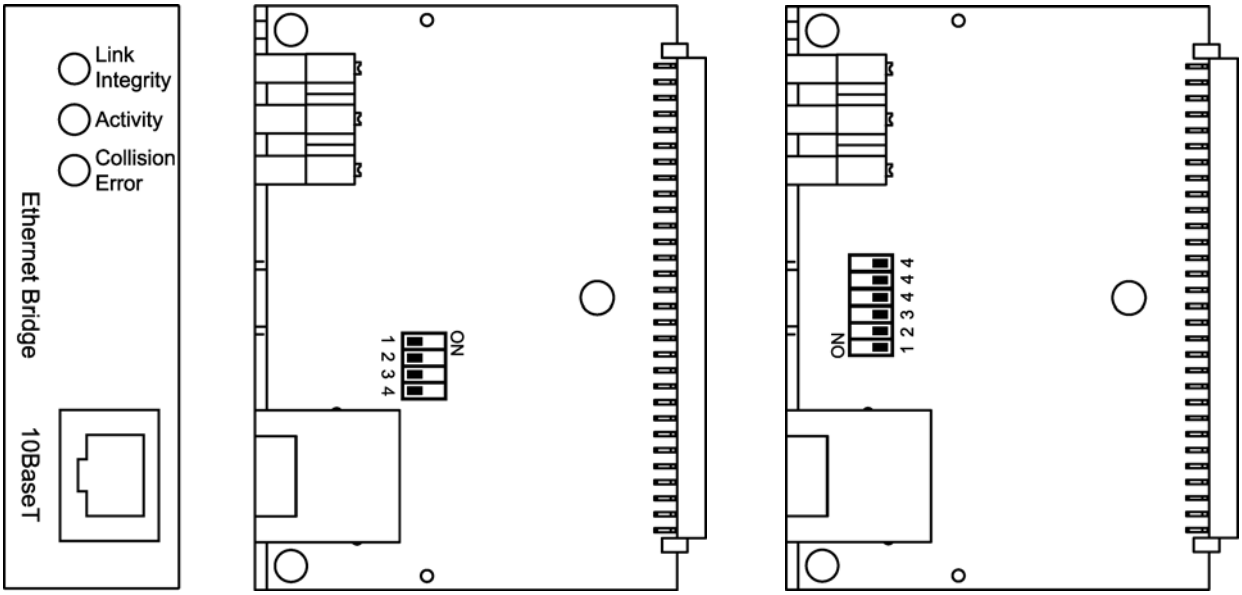


Fig. 2.273 Submodule with Ethernet interface (10Base-T)

Visual signalling

There are three LEDs on the front:

LED	Color	Description
Link Integrity	Green	Connection to the LAN correct
Activity	Green	Data transmission active
Collision Error	Red	Collision: 2 subscribers transmitting simultaneously Error: Buffer overflow, error in transmission

Tab. 2.159 Visual signalling of the submodule with Ethernet interface (10Base-T)

Pin assignment

Below is the Pin assignment of the 10Base-T interface.

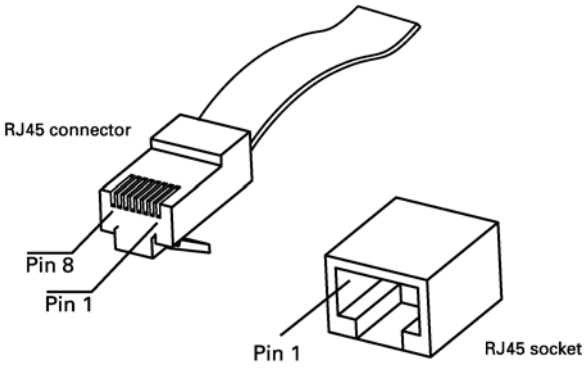


Fig. 2.274 10Base-T interface

Pin	Signal name	Description
1	Tx+	Transmit data
2	Tx-	Transmit data
3	Rx+	Receive data
4	Not assigned	
5	Not assigned	
6	Rx-	Receive data
7	Not assigned	
8	Not assigned	
Shield	Circuit ground (for STP cable)	

Tab. 2.160 Pin assignment of the Ethernet interface (10Base-T)

The submodule can be operated with both STP (shielded twisted pair) and UTP cables (unshielded twisted pair).

‘VLAN Tagging’ By extending the standard Ethernet frame with up to 4 additional address bytes, virtual LAN segments can be created (VLAN). This is called ‘tagging’ (according to IEEE 802.3ac). The submodule does not support those enlarged frames. Only standard Ethernet frame according to IEEE 802.3 are supported.

You must use the Advanced Bridge Module (chapter 2.19.3.5) for networks with VLAN Tagging.

Configuration The submodules are configured via DIP switches (Fig. 2.273 and Tab. 2.161 and Tab. 2.162).

DIP-Switch	ON	OFF
1	Half Duplex	Full Duplex [1)]
2	Compression on	Compression off [1)]
3	Filter on [1)]	Filter off
4	Normal	Auto-Link [1)]

1) Default settings

Tab. 2.161 Configuration of the submodule S3118-Q357-A1

DIP-Switch	ON	OFF
1	Half Duplex	Full Duplex 1)
2	Compression on	Compression off 1)
3	Filter on 1)	Filter off
4	Fix	Auto-Link 1)
5 2)	Twisted	Normal-Link 1)
6	SMA1K-Mode 1)	ULAF+ Mode

1) Default settings
2) Only if DIP-Switch 4 on 'ON'

Tab. 2.162 Configuration of the submodule S3118-Q357-B1

Explanation of possible submodule settings

Full/half duplex (DIP switch 1)

Either full or half duplex can be selected. Unlike full duplex, half duplex cannot send and receive at the same time therefore the transmission capacity is lower. For this reason, full duplex is the normal case.

Link integrity (Tx/Rx) (DIP switch 3, 4,5)

The wiring of Tx and Rx is determined automatically in the 'Auto Link' setting. This is polled periodically until the 'Link Integrity' signal is reported. If the module is installed but not connected, it is advisable to set the switch to normal (S3118-Q357-A1) or fix (S3118-Q357-B1).

Compression (DIP switch 2)

The 10Base-T submodule has 'Tinygram Compression'. This procedure is used to increase the throughput via a LAN. Applicable Ethernet packages must have a minimum length of 64 bytes. If the information to be transmitted is too little, the package is replenished with so-called 'Padding bytes' to the required length of 64 bytes. With enabled 'Tinygram Compression', the inserted 'Padding bytes' are removed and again added at the other end for transmission via the WAN.

Filter (DIP switch 3)

A bridge follows the entire data traffic on the connected LAN and learns from the sender addresses which hosts can be reached on the connected LAN. It saves these addresses in a table.

In each package that the bridge receives on the LAN, it checks whether or not the destination address exists in your address table. If this is the case, it rejects the package, otherwise it is transmitted via the WAN. This process is called filtering. As a result, the data traffic via the WAN is reduced to that which is necessary.

Submodule S3118-Q357-B1

ULAF+ mode (DIP switch 6)

For ULAF+ mode (compatible with S3118-Q357-A1) the LAN packets are packed into HDLC-like frames:

FLAG	LAN-Frame	FCS	FLAG

SMA1K mode (DIP switch 6)

For SMA1K mode (compatible with the bridge function of the SMA1K) an additional address and control byte are inserted:

FLAG	Adresse	Control	LAN-Frame	FCS	FLAG

2.19.4 Module for the clock and alarm interface

The module for the clock and alarm interface is inserted into slot 2 (see Fig. 2.21). The module for the clock and alarm interface can only be used in the desktop unit.

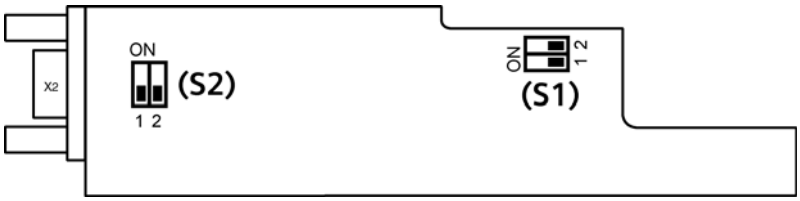


Fig. 2.275 Submodule for the clock and alarm interface

Urgent and non-urgent alarms are indicated via two floating alarm contacts on the clock and alarm interface module. They are connected via a 9-Pin mini sub-D connector on the back of the desktop unit. The clock input/output is operated at 75 Ω.

The module for the clock and alarm interface can be used only when the HTU or OTU is used as a desktop unit.

A maximum of 60 V_{DC} or 42.4 V_{AC} peak value may be switched with the standard contacts. The highest permissible current load of the contacts is 1.0 A (either pulsed current or constant current).

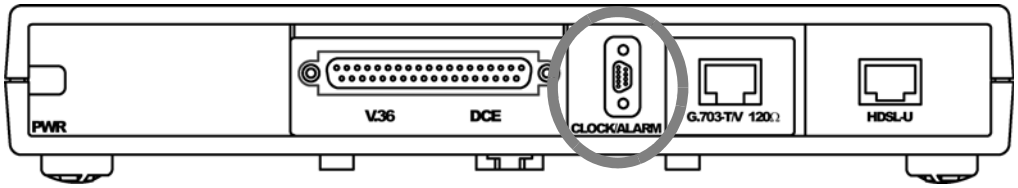


Fig. 2.276 Rear view of the desktop unit with clock and alarm module

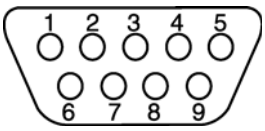


Fig. 2.277 Pin assignment of the clock and alarm interface

Alarm	Pin	Description
	2	Clock in / clock out [1)]
	3	Clock in / clock out
Non-urgent alarm contact	4	Connected to Pin 5 with no alarm
	5	
	6	Connected to Pin 5 for an alarm
Urgent alarm contact	7	Connected to Pin 8 for an alarm
	8	
	9	Connected to Pin 8 with no alarm

1) Ground if asymmetrical

Tab. 2.163 Alarm contacts of the clock and alarm interface

A matching mini sub-D connector is supplied for the clock and alarm module. When fitting the connector, care has to be taken that the Pins protrude by approximately 3 mm, see Fig. 2.278.

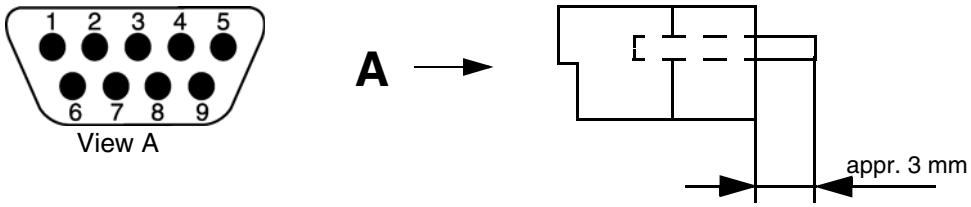


Fig. 2.278 Counter connector for the clock and alarm interface

The connector can be crimped or soldered.

When fitting, handcrimp pliers (type: CCTR-MDS) with a “B crimp” crimp profile and a “AWG 26/28” connector cross-section are required.

The contacts are designated as follows:

- Male contact: CET-MDS-P
- Female contact: CET-MDS-S

i MDSM female contacts can no longer be dismantled.

2.19.4.1 DIP switch settings for the clock and alarm interface

Switch S1 - 1 Setting	Switch S1 - 2 Setting	Meaning
ON	ON	Clock in (high sensitivity)
OFF	ON	Clock in (low sensitivity) [1]
ON	OFF	Clock out [2]

1) Recommended mode

2) Default settings

Tab. 2.164 DIP switches of the clock and alarm interface (S1)

Switch S2 - 1		Switch S2 - 2	
Setting	Meaning	Setting	Meaning
ON	Asymmetrical, Pin 2 grounded	ON	Shield grounded with low impedance [1]
OFF	Symmetrical	OFF	– –

1) Default setting

Tab. 2.165 DIP switches of the clock and alarm interface (S2)

2.19.5 Remote power supply module (RPS)

The remote power supply module (RPS) can be used both on the plug-in unit and in the desktop unit. When used in the desktop unit it must either have a DC supply or an AC supply from an external desktop power adapter. The module is connected on top of the HDSL-part of the plug-in unit (slot 4, see Fig. 2.21).

i When the remote power supply module is used in the subrack (16+1 slots), the slot on the right-hand side next to the HTU can no longer be used. However, RPS II (variant 2) does not occupy an additional slot.

i The remote power supply module RPS cannot be used together with the STU/STU2/QSTU

With one remote power supply module, two regenerators or one desktop unit can be supplied remotely. Transmission and supply is via the HDSL path. The ground-free supply voltage is either 120 V_{DC} or 180 V_{DC} and the remote supply current 50 mA or 60 mA per wire pair. The remote supply voltage of 120 V_{DC} conforms to the safety requirements for TNV circuits according to EN60950. The settings are made via DIP switches, see chapter 2.19.5.1.

2.19.5.1 Configuration of the DIP switches for the RPS

DIP-Switch		Setting		Description
RPS (S3118-Q381-A1)	RPS II (S3118-Q381-B1)	ON	OFF	
2	S2-2	60 mA	50 mA	Current supervision 2)
4	S2-4	50 mA	60 mA	Current stabilization 2)
5	S1-1	180 V	120 V	Voltage supervision
6	S1-2	180 V	120 V	Voltage stabilization
–	S2-3	ON	OFF	Short-circuit to ground supervision 1)

1) Must be at 180 V 'ON' for safety reasons
2) See Chapter 2.19.5.2

Tab. 2.166 Configuration of the DIP switches of the RPS

i The DIP switches for supervision and appropriate stabilization must be set to the same value.

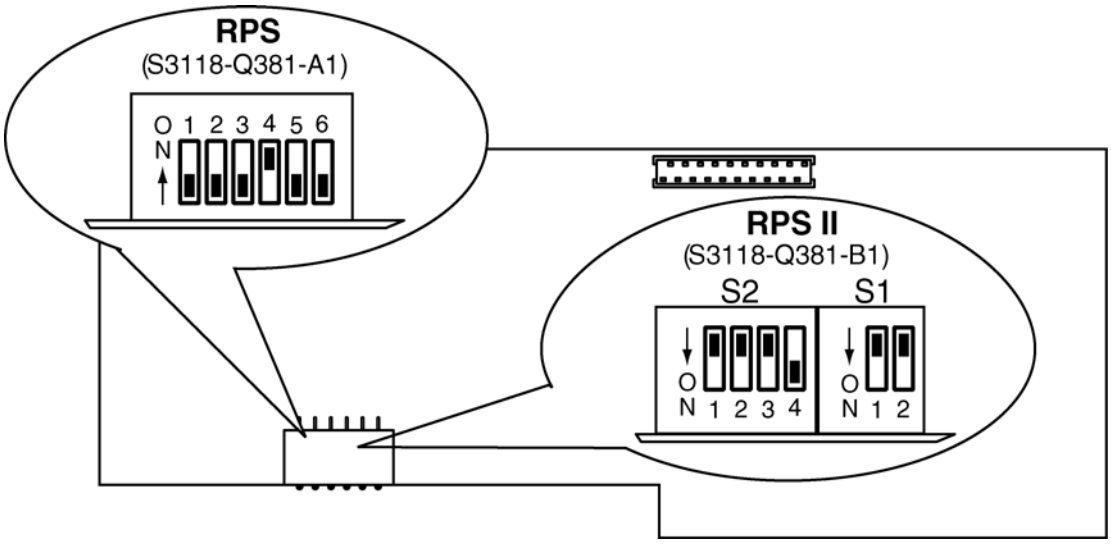


Fig. 2.279 DIP switches of the RPS

2.19.5.2 Supervision and alarm signalling of the RPS

Supervisory circuit

A supervisory circuit stabilizes the voltage and the current. The setting is made via DIP switches, see chapter 2.19.5.1. For safety reasons, two separate switching units and therefore also two DIP switches are required for each setting.

Short-circuit to ground

The output voltage is supervised for a short-circuit to ground and short-circuited in case of faults. When a fault occurs the HTU tries to restart the RPS.

The RPS identifies the following signals:

- Current <10 mA on the 1st wire pair
- Current <10 mA on the 2nd wire pair
- Output voltage >95% of the nominal value
- Short-circuit to ground

The RPS generates the following alarms from these signals:

Event	Description	Generated alarm
Line interruption	No current on wire pair 1 or 2	Non-urgent alarm
Short-circuit to ground	Protection circuit has disconnected because of short-circuit to ground	Urgent alarm
Protection circuit	Protection circuit has disconnected for another reason	Urgent alarm

Tab. 2.167 Alarm signalling of the RPS

The protection circuits can be tested by for example setting the voltage stabilization to 180 V (S1-2 = ON) and the voltage supervision to 120 V (S1-1 = OFF). The protection circuit has to signal the alarm in this arrangement.

2.19.5.3 Maximum line capacity

For safety reasons, for the 180 V setting, line capacity a to b must be < 200 F and a or b to ground < 10 F.

Typical telephone cables have approximately 40 F/km line capacity. Therefore, this requirement is always adhered to for cable lengths < 20 km.

2.20 The HDSL regenerator

If the connection length between two HDSL units exceeds the maximum line attenuation, an HDSL regenerator (REG) can be used.

The module is housed in a plastic casing. The outside of the enclosure incorporates guide channels to accommodate the cable sleeve. Pin protection is installed on the connector side.

A separate regenerator is used for each HDSL wire pair. The remote power supply submodule provides the supply

- on the HTU in the ULAF+ subrack or
- on the HTU in the desktop unit.

The HDSL regenerator may only be fed remotely with 120 V_{DC} and can only be used in connection with the HTU.

2.20.1 Configuration of the HDSL regenerator

No hardware settings are to be made on the HDSL regenerator.

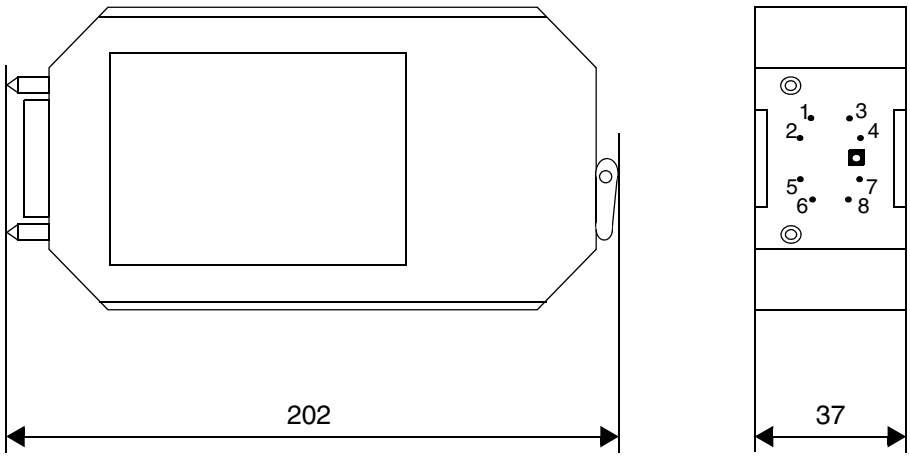


Fig. 2.280 HDSL-Regenerator (REG)

2.20.2 Pin assignment on the HDSL regenerator

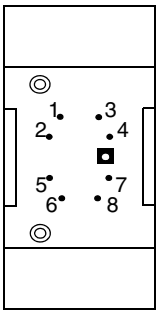


Fig. 2.281 Pin assignment on the HDSL regenerator

Pin	Description
7	U, Wire b direction NT
8	U, Wire a, direction NT
5	U, Wire b, direction LT
6	U, Wire a, direction LT
1, 2, 3, 4	Not used

Tab. 2.168 Pin assignment of the HDSL regenerator

As an accessory, a special plug-in device for housing two regenerators can be obtained. The Pin assignment for this housing can be seen in chapter 2.23.

2.20.3 Supervision and alarm signalling

The function of the HDSL regenerator is supervised by the HTU on the exchange side. Possible malfunctions are indicated by the LCT/AccessIntegrator.

Loopbacks and CRC6 checksums can be used for fault location.

Loopbacks are initiated on the regenerator by the LCT or the TMN. The control command to activate the loops is initiated by means of the HDSL overhead channel.

More detailed information about applying the loops to the regenerator can be found in the ULAF+ User Manual [2].

2.21 The SHDSL regenerator SRU

If the connection length between two SHDSL units exceeds the maximum line attenuation, an SHDSL regenerator (SRU) can be used.

The module is housed in a plastic casing. The outside of the enclosure incorporates guide channels to accommodate the cable sleeve. Pin protection is installed on the connector side.

A separate regenerator is used for each SHDSL wire pair. The remote power supply submodule provides the supply

- on the STU/STU2/QSTU in the ULAF+ subrack or
- on the STU/STU2/QSTU in the desktop unit.

The range for local power feeding of SHDSL regenerators (SRU) must be within 40 V – 120 V_{DC} and the range for remote power feeding (RPS) within 40 V – 180 V_{DC}. Power-through feed is forbidden for local supply.
For remote power supplies > 120 V_{DC} no local supply may be connected.

When the STU is equipped with SHDSL regenerator (SRU) the STU must have firmware version 3.02 or higher.

In conjunction with the QSTU a maximum of 2, in conjunction with the STU/STU2 a maximum fo 8 SHSDL regenerators can be cascaded.

2.21.1 Configuration of the SHDSL regenerator

Below, you will find the individual settings for the SRU. The following types of use are described:

- Settings for local feeding (Fig. 2.282)
- Settings settings for remote feeding(Fig. 2.283)
- Settings for handoff the remote feeding to the next SHDSL regenerator (Fig. 2.284)

For changing the jumper settings you must open the housing of the SRU. Therefore you have to bend apart the upper and the lower side of the housing at the connector's side. Now you can pull out the printed circuit board.

Changing the settings of the SHDSL regenerator must only be carried out by trained personnel. See also chapter 1.5.2 'Product safety'.

Local feeding

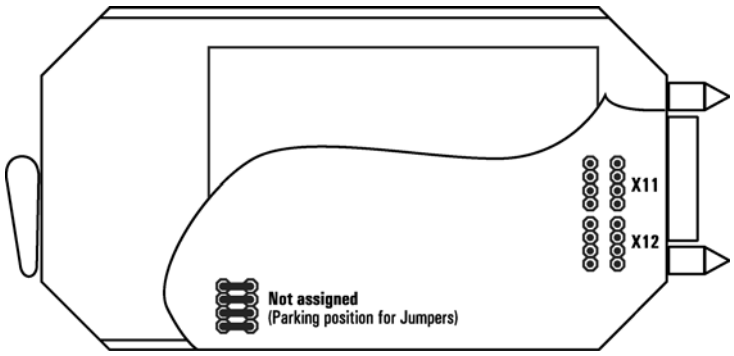


Fig. 2.282 Jumper settings for the SRU: Local feeding

Locally fed regenerators **may not** configured for handoff the remote feeding to the next SHDSL regenerator.

Remote feeding
(Default setting)

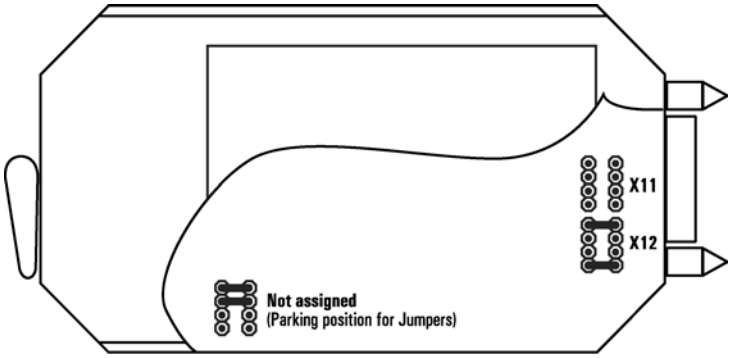


Fig. 2.283 Jumper settings for the SRU: Remote feeding

Handoff the remote feeding

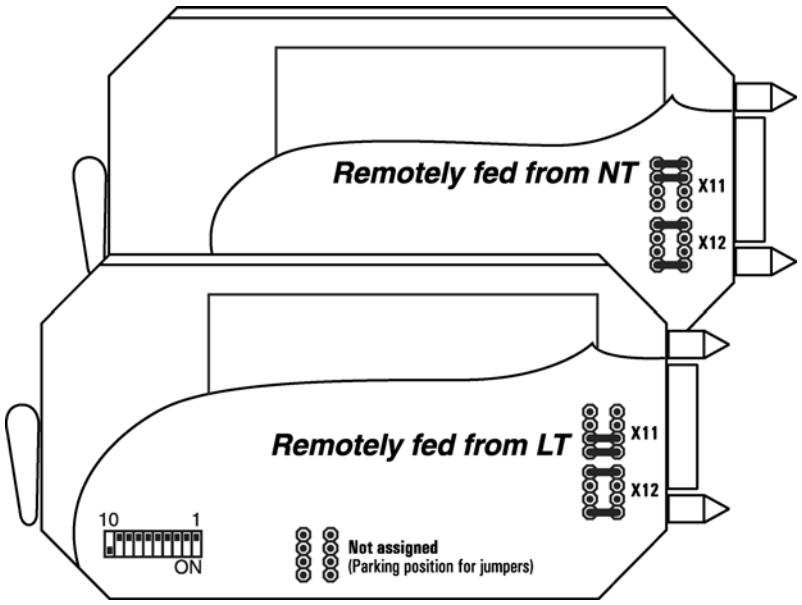


Fig. 2.284 Jumper settings for the SRU: Handoff the remote feeding

In addition to the jumper settings DIP switch 10 must be set on ‘ON’ (Fig. 2.284), whatever the direction (LT or NT) for handoff the remote feeding is configured.

Regenerators configured for handoff the remote feeding to the next SHDSL regenerator **may not** feed with locally power.

2.21.2 Pin assignment on the SHDSL regenerator

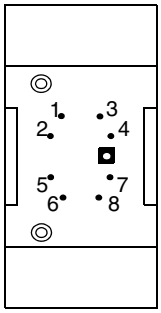


Fig. 2.285 Pin assignment on the SHDSL regenerator

Pin	Description
7	U, Wire b direction NT
8	U, Wire a, direction NT
5	U, Wire b, direction LT
6	U, Wire a, direction LT
1, 2	Local feeding (regardless of polarity)
3, 4	Ground of the surge arrester

Tab. 2.169 Pin assignment of the SHDSL regenerator

As an accessory, a special plug-in device for housing two regenerators can be obtained. The Pin assignment for this housing can be seen in chapter 2.23.

2.21.3 Supervision and alarm signalling

The function of the SHDSL regenerator is supervised by the STU/STU2/QSTU on the exchange side. Possible malfunctions are indicated by the LCT/AccessIntegrator.

Loopbacks and CRC6 checksums can be used for fault location.

Loopbacks are initiated on the regenerator by the LCT or the TMN. The control command to activate the loops is initiated by means of the SHDSL overhead channel.

More detailed information about applying the loops to the regenerator can be found in the ULAF+ User Manual [2].

2.22 The SHDSL regenerator BSRU

The 2-wire pair BSRU regenerator can be used for bridging large distances that exceed the SHDSL performance values.

The module is housed in plastic casing. The outside of the enclosure incorporates guide channels to accommodate teh cable sleeve. You will find application examples for the regenerator in chapter 2.10.1.

i In QSTU – BSTU applications you can cascade a maximum of 4 SHDSL regenerators; in BSTU – BSTU applications the maximum is 8.

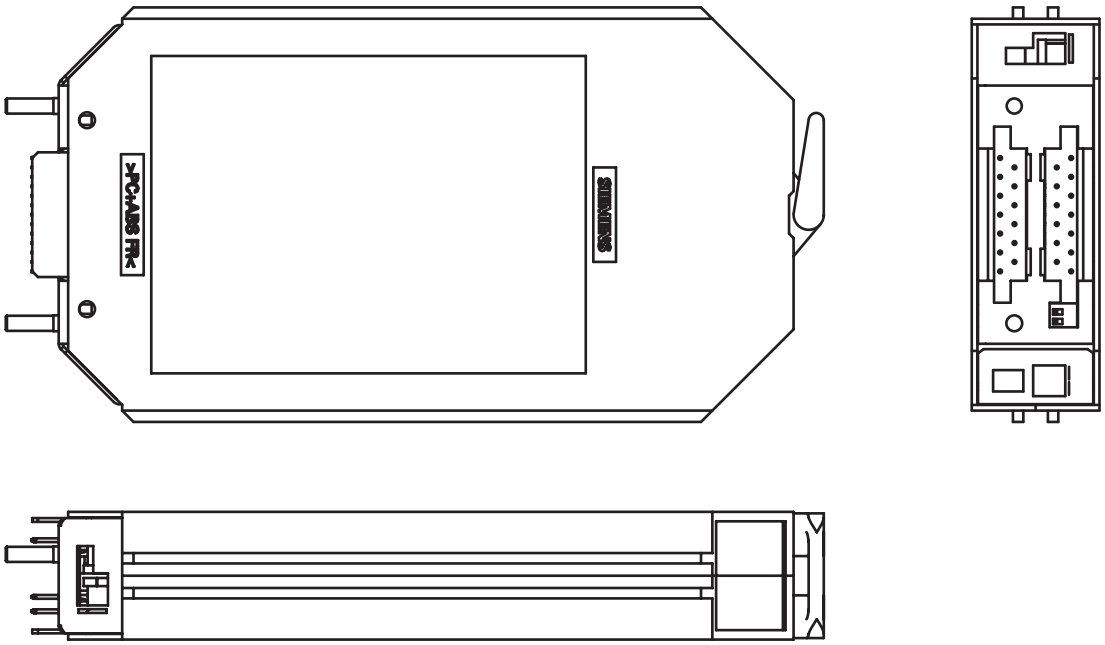


Fig. 2.286 SHDSL regenerator BSRU

The mechanics and pin assignment of the BSRU are compatible with the HDB3-ZWR (intermediate regenerator) in accordance with the Deutsche Telekom standard.

2.22.1 Configuration of the SHDSL regenerators BSRU

All BSRU control elements are externally accessible.

Various DIP switches are arranged on the front of the regenerator. The individual settings are explained below.

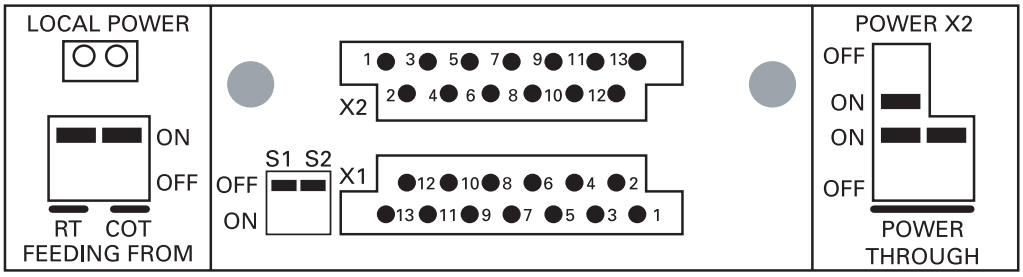


Fig. 2.287 Configuration of the BSRU

DIP switches	Setting	Description
FEEDING FROM (RT)	ON	Power supply from the NT side
	OFF 1)	Power supply from the LT side or local supply
FEEDING FROM (COT)	ON 1)	Power supply from the LT side
	OFF	Power supply from the NT side or local supply
POWER X2	ON	Local power feeding via X2 (Pin 6/8)
	OFF 1)	X2 (Pin 6/8) isolated (no local power supply)
POWER THROUGH	ON 2)	Passing on the remote power supply
	OFF 1) 2)	No passing on the remote power supply
Switch S1	– –	Not assigned
Switch S2	ON 1)	2. wire pair activated
	OFF	2. wire pair deactivated

1) Default setting

2) Both switches must be set to either ON or OFF

Tab. 2.170 Power supply configuration

2.22.2 Power supply of the BSRU

The following options for the BSRU power supply are available:

- Remote power supply from the LT or NT side,
- Local via the X2 plug or remote supply via a separate wire pair,
- Local via separate cable terminals (LOCAL POWER).

The max. remote supply voltage is 180 V_{DC}, the max. local supply is 120 V_{DC}. The local supply voltage is 40 V_{DC} – 120 V_{DC}.

A local power supply may not be connected with remote supply voltages >120 V_{DC}.

Four examples of BSRU applications are provided below:

- Remote power supply of the BSRUs from the LT side:

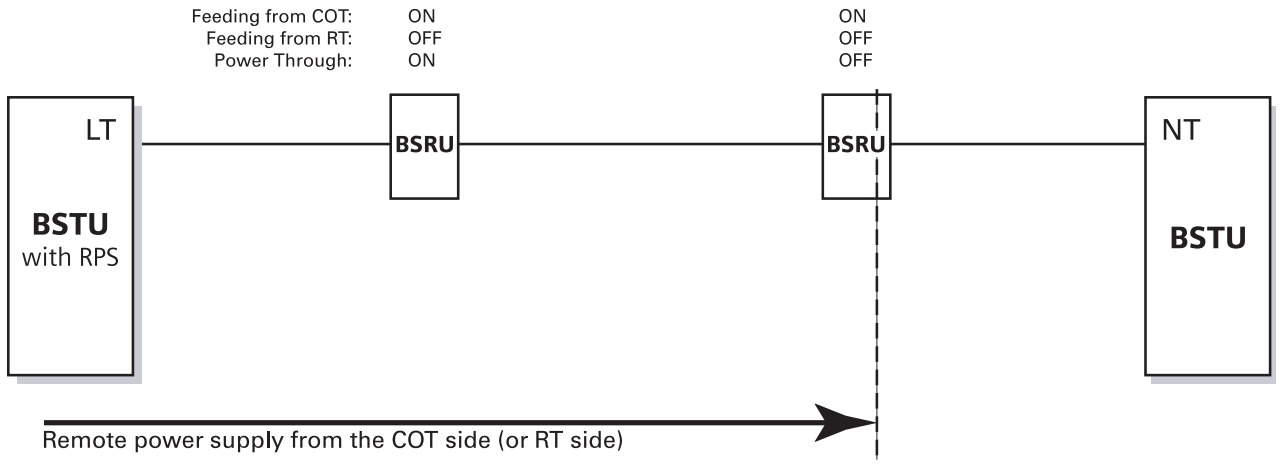


Fig. 2.288 Configuration example: Remote power supply of the BSRUs from the LT

- Remote power supply of the BSRU and the NT

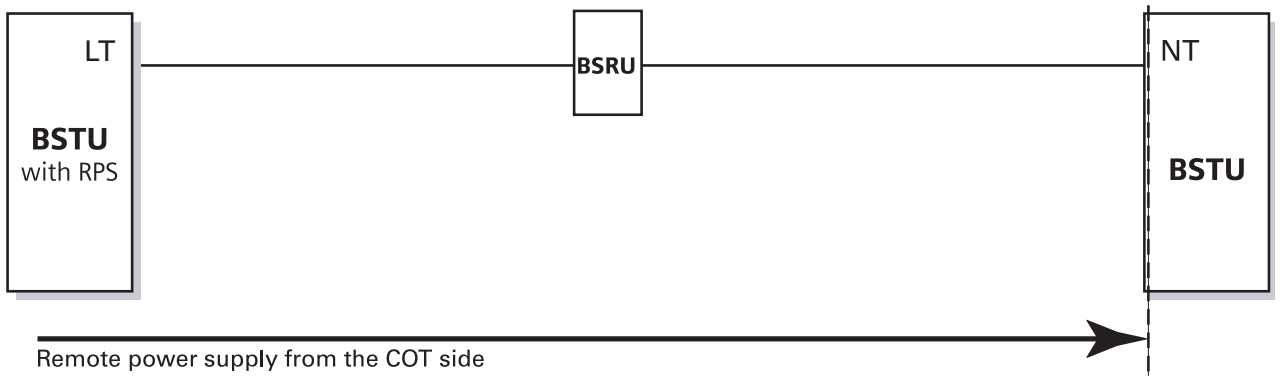


Fig. 2.289 Configuration example: Remote power supply of the BSRU and the NT

- Remote power supply of the BSRU from the LT- and NT- side

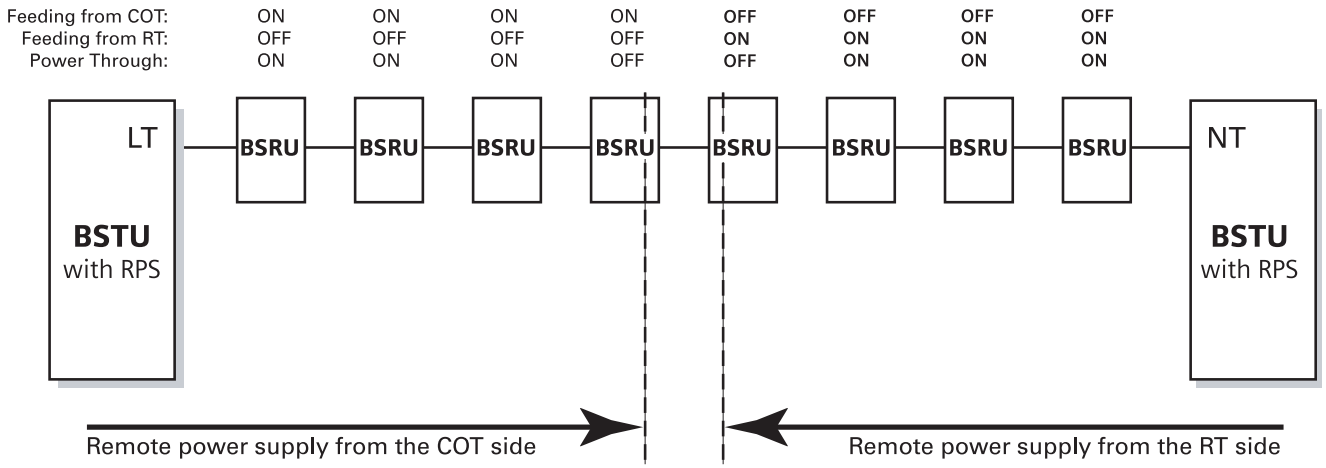
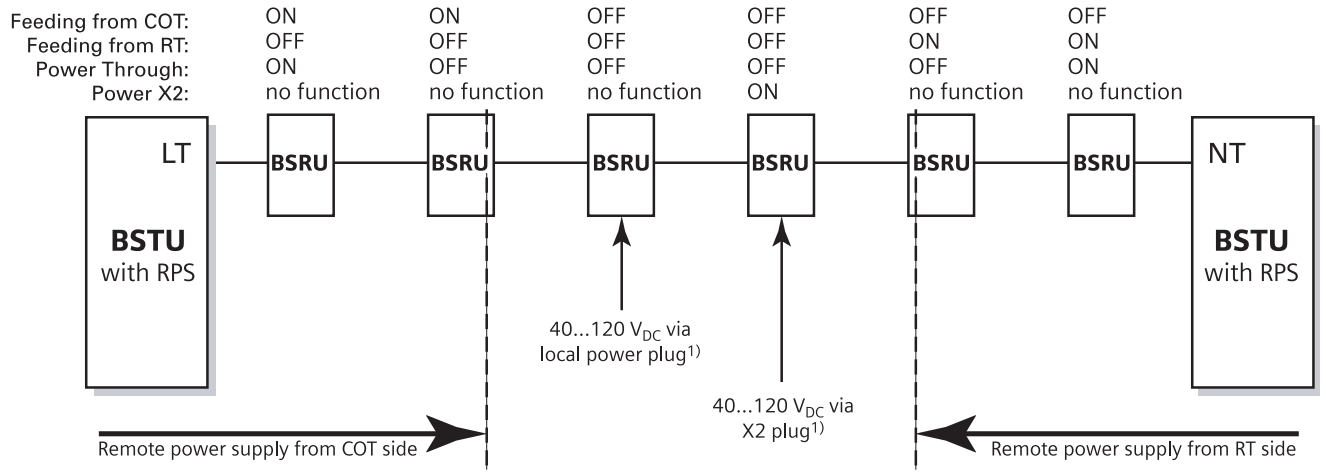


Fig. 2.290 Configuration example: Remote power supply of the BSRUs from the LT- and NT-side with remote power supply 180 V_{DC}

- Remote power supply and local power supply of the BSRUs combined



1) Both local power supplies (via X2 plug and local power) can also combined for the "redundant local power supply" operating state.

Fig. 2.291 Configuration example: Remote power supply and local power supply of the BSRUs combined

2.22.3 Pin assignment of the SHDSL interface

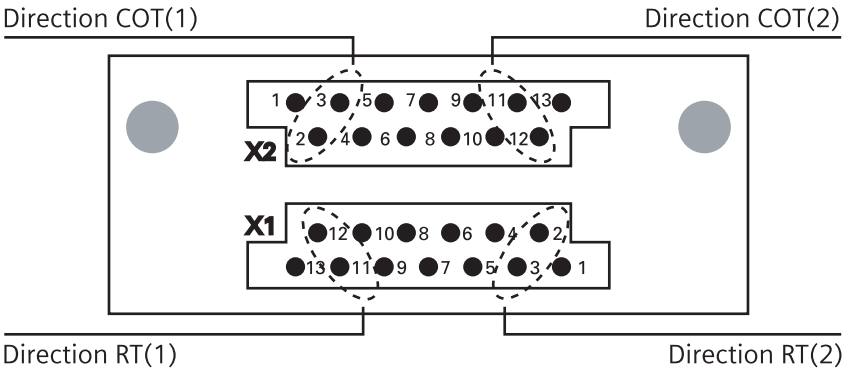


Fig. 2.292 SHDSL interface

Pin	Signal	Description
X1/2	SHDSL2a	SHDSL system 2, direction RT Wire pair 2
X1/3	SHDSL2b	
X1/7 GND	– –	Circuit ground
X1/11	SHDSL1b	SHDSL system 1, direction RT Wire pair 1
X1/12	SHDSL1a	
X2/2	SHDSL1a	SHDSL system 1, direction COT Wire pair 1
X2/3	SHDSL1b	
X2/6	– –	Power supply (polarity not important)
X2/7 GND_PROT	– –	Overvoltage protection earth
X2/8	– –	Power supply (polarity not important)
X2/11	SHDSL2b	SHDSL system 2, direction COT Wire pair 2
X2/12	SHDSL2a	

Tab. 2.171 Pin assignment of the SHDSL interface

As an accessory, a special plug-in device for housing two regenerators can be obtained. The Pin assignment for this housing can be seen in chapter 2.23.

2.22.4 Grounding of the BSRU

The regenerator must be operated with an earth.

i The two earth connections, GND and GND_PROT, are not internally connected with one another; the two connections must be connected with earth.

2.22.5 Supervision and alarm signalling

The function of the SHDSL regenerator is supervised by teh termination unit on the exchange side. Possible malfunctions are indicated by the LCT/AccessIntegrator.

Loopbacks and CRC6 checksums can be used for fault location.

Loobacks are initated on the regenerator by teh LCT or TMN.

More detailed information about applying the loops to the regenerator can be found in the ULAF+ User Manual [2].

2.23 Housing for xDSL regenerators

A special push-in component ('Housing for 2 Regenerators') for housing two regenerators is available. The pin-assignment for this housing unit is shown in Tab. 2.172.

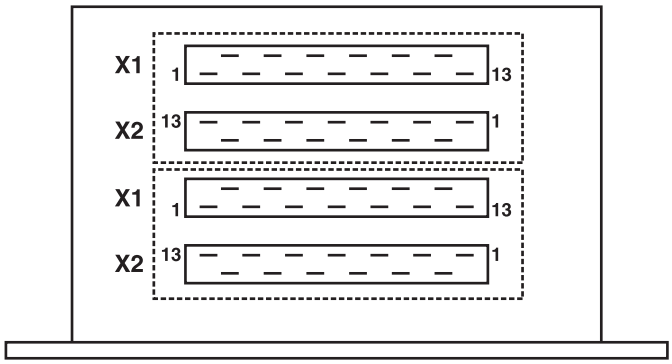


Fig. 2.293 Pin-assignment of the housing for two regenerators

PIN	HDSL-REG	SHDSL-SRU	SHDSL-BSRU
X1/2	– –	Grounding	Wire pair 2, Wire a → NT
X1/3	– –		Wire pair 2, Wire b → NT
X1/7	– –	– –	Circuit ground
X1/11	Wire b → NT	Wire b → NT	Wire pair 1, Wire b → NT
X1/12	Wire a → NT	Wire a → NT	Wire pair 1, Wire a → NT
X2/2	Wire a → LT	Wire a → LT	Wire pair 1, Wire a → LT
X2/3	Wire b → LT	Wire b → LT	Wire pair 1, Wire b → LT
X2/6	– –	– –	Local power supply (polarity not important)
X2/7	– –	– –	Overvoltage protection earth
X2/8	– –	– –	Local power supply (polarity not important)
X2/11	– –	Local power supply (polarity not important)	Wire pair 2, Wire b → LT
X2/12	– –		Wire pair 2, Wire a → LT

Tab. 2.172 Pin assigment of the housing

2.24 Installation of the LCT software

This chapter describes installation of the LCT software. More details about the Access-Integrator can be found in the corresponding documentation, see chapter "3 References".

2.24.1 System requirements

The user interface of the LCT software is optimized for the 12.1” monitor of laptops. The following minimum system requirements must be met:

- PC with 486/66 MHz processor
- 32 MB RAM
- 1.44 MB disk drive or CD drive
- A serial port
- Windows 98, Windows ME, Windows NT or Windows 2000

2.24.2 Installation of the software

To install the software, proceed as follows:

1. Create a new directory on your hard disk
2. Insert the floppy disk or CD into the corresponding drive
3. Copy the ‘PFG_LCT.exe’ file to the newly created directory

The LCT software can then be started by double-clicking on the ‘PFG_LCT.exe’ file.

More detailed information about the LCT can be found in the ULAF+ User Manual [2].

2.24.3 Establish the communication via TCP (optional)

2.24.3.1 Installation of a Port Server

Vefore a port server (or something similar) can be connected to a LAN, it must be configured with a terminal over the serial interface. The subsequent configuration is then normally carried out via Telnet or with a terminal. A general overview of a few products is shown below. Please refer to the relevant manufacturer documentation for more detailed information on installing the products used.

i The following information only provides a brief introduction. If your poert server has later firmware installed, the installation may differ.

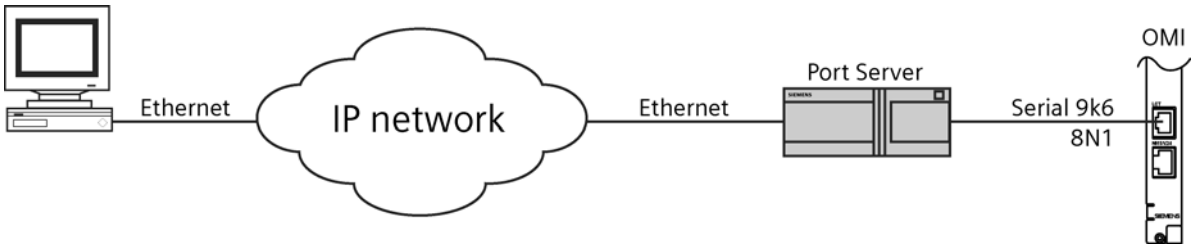


Fig. 2.294 LCT connected to an OMI via Port Server

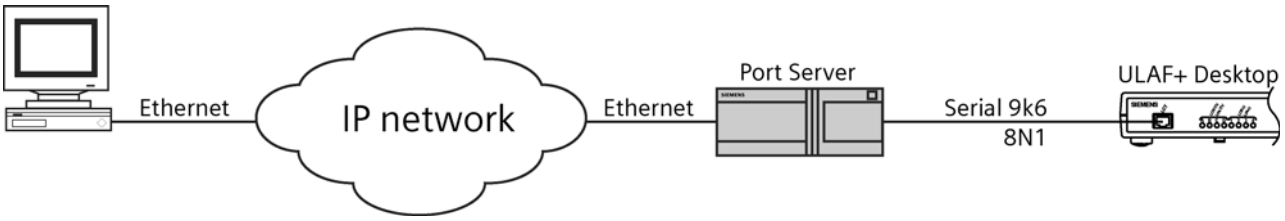


Fig. 2.295 LCT connected to a Desktop via Port Server

Fig. 2.296 LCT connected to an OMI SNMP

i It is not possible to access the ULAF+ network element with more than one LCT session simultaneously.

2.24.3.2 Configure a Digi Port Server

For port servers that have not been configured:

- Connection setup via terminal (9600, 8N1) to Port 1

For port servers that have been configured:

- Use a Telnet session for the connection
  or
- Reset the port server to its delivery state and then start the connection via the terminal.
  Make the reset as follows:
  – Hold both arrow keys down
  – Switch the port server off (Power-off)
  – Switch the port server back on (Power-on)
  – As soon as 'AC' is displayed, release the arrow keys
  Please refer to the manufacturer documentation for details on resetting the settings.

Login to the port server with *login name* `root` and *password* `dbps`.

```
#>set config ip=<ip address>
#>set config myname=<host name>
#>set config gateway=<default gateway>
#>set config submask=<subnet mask>

#>set ports dev=prn range=1-<x>    (<x> = 8 oder 16)
#>set login message=1 range=17-17  (not supported by older models)
#>set login message=2 range=17-17  (not supported by older models)

#>set flow aixon=off ixon=off ixoff=off ixany=off range=1-<x>
#>set line parity=N range=1-<x>
#>exit
```

2.24.3.3 Configure the Cisco 25xx Router Family (IOS Version 11.2)

With first-time installation, connect the terminal (9600, 8N2) with the console interface (CON) and start the router. If you wish to reset the router to the factory setting before installation, tpye

```
>enable
#write erase
```

and then you must restart the router. Answer the following questions after the restart:

```
Would you like to enter the initial configuration dialog [yes]
First would you like to see the currrent interface summary [no]
Enter host name [<host name of device>]                    (select a device name)
Enter enable secret [<choose a password>]                  (This password is requested
                                                           if you use the enable com-
                                                           mand)
Enter enable password [<choose another password>[          (Password must differ from
                                                           the above one)
Enter virtual line password [<choose any password>]        (Can be identical to one of the
                                                           above passwords)
Configure SNMP Network Management [no]
Configure IP [yes]
```

Configure IGRP routing [**no**]	(If you need the function, consult the manufacturer documentation)
Configure RIP routing [**no**]	(If you need the function, consult the manufacturer documentation)
Configure Async lines [**yes**]	
Async line speed [**9600**]	
Configure for HW flow control [**no**]	
Configure for modems [**yes**]	
Configure for default chat script [**no**]	
Configure for dial-in IP SLIP-PPP [**no**]	
Configure interface Ethernet0	
Is this interface in use [**yes**]	
Configure IP on this interface [**yes**]	
IP address for this interface [<**IP address**>]	(Select an IP address)
Number of bits in subnet field [<**subnet-mask length**>]	(Only the length of the affective subnetwork mask, i.e. without the standard network mask)
Configure interface Serial0	
Is this interface in use [no]	(If you need the function, consult the manufacturer documentation)
Configure interface Serial1	
Is this interface in use [**no**]	(If you need the function, consult the manufacturer documentation)
Use this configuration [**yes**]	

After you have completed all of the above settings, you have to configure the asynchronous connections. The same also applies for routers with which the Ethernet interfaces are already configured. Cisco router have an asynchronous auxiliary port (AUX). Models ‘2509’ and ‘2511’ have 8 or 16 asynchronous connections. Proceed as follows to confiugre these connections:

```
>enable
#
```

Configuration of the asynchronuous interfaces (AUX):

```
#configure terminal
(config)#line aux 0
(config-line)#parity none
(config-line)#stopbits 1
(config-line)#modem DTR-active
(config-line)#transport input telnet
(config-line)#transport output telnet
(config-line)#transport prefer telnet
(config-line)#flowcontrol none
```

```
(config-line)#no exec
(config-line)#exit
(config)#interface Async ?                    (Shows the available interfaces. Note the highest number!)
(config)#interface Async <highest number>     (If no asynchronous connections are available, the number is normally 1, for a router with 8 connections it is 9 and with 16 connections 17)
(config-if)#async mode interactive
(config-if)#exit
(config)#exit
```

Configuration of the asynchronuous interfaces:

```
#configure terminal

(config)#line tty 1 <x>                       (x = 8 or 16)
(config-line)#parity none
(config-line)#stopbits 1
(config-line)#modem DTR-active
(config-line)#transport input telnet
(config-line)#transport output telnet
(config-line)#transport prefer telnet
(config-line)#flowcontrol none
(config-line)#no exec
(config-line)#exit
```

You have to carry out the following steps manually for each of the 8 or 16 interfaces:

```
(config)#interface Async <x>                  (ascending from 1 to 8 or 16
(config-if)#async mode interactive
(config-if)#exit
```

End the configuration with

```
(config)#exit
```

i Newer Cisco models use ports 200x for communication via Telnet so you may have to assign a port number in the area of, for example, 4000 to the serial port for the “RAW TCP” required by the LCT.

2.24.3.4 Configure the DCB SS01 Port Server

Proceed as follows to configure the DCB SS01 port server:

1. Set DIP switch 1 to ON and DIP switch 2 to OFF (configuration mode)
2. Set up the connection between the terminal (9600, 8N1) and serial interface

3. Connect the power supply
   A menu appears after the startup
   The menu is sometimes not shown correctly. These menus are printed in supplied manual and provide you with aid in this situation.

i The examples shown apply for SS01 firmware versions 1.0 and 1.1. If you use a later firmware, look up the changed values in the supplied manual.

4. To continue with the configuration press a key after the copyright message is shown.
5. Take over the following values:

`Main menu:` **`1`**	
`IP menu:` **`1 <ip address>`**	
`IP menu:` **`3 <default gateway/router address>`**	
`IP menu:` **`4 <subnet mask>`**	
`IP menu:` **`0`**	
`Main menu:` **`3`**	
`Serial menu:` **`1 0`**	(No Flow Control)
`Serial menu:` **`2 <x>`**	(You will find the equivalent number for 9600 in the supplied manual)
`Serial menu:` **`3 0`**	(No Parity)
`Serial menu:` **`4 1`**	(8 Data bits)
`Serial menu:` **`5 0`**	(1 Stop bit)
`Serial menu:` **`0`**	
`Main menu:` **`4`**	
`Setup menu:` **`6 0`**	
`Setup menu:` **`7 0`**	
`Setup menu:` **`0`**	
`Main menu:` **`7`**	

   The port server configuration is now completed.
6. Set the DIP switches 1 and 2 to ON (server operation)
7. Connect the port server to the network and the ULAF+ network elements to allow you to access the network elements from the LCT.

2.24.3.5 Configure the Chase IOLAN+ Port Server

Set up the connection between the terminal (9600, 8N1) and port server interface 1. If necessary you can reset the port server to the factory setting. To do this press the 'Reset' button during startup. After the connection is set up, a menu appears on the terminal. Select the 'Reset' item in the 'Option' menu. Mark 'Reset all settings to factory default'. Select 'q' to restart the server. You can now login via the terminal on port 1.

```
password: iolan
> set term vt100
```

A menu appears If not, proceed as follows:

1. Press the 'Return' button
2. Select the 'Admin' mode
3. If a password is required, type 'iolan'
4. Select 'Server'
5. Configure the following options as described below (Change only this options!).

Name: <**hostname**>	(Host name of the port server)
IP Address: <**ip addr**>	(IP address of the port server)
Subnet mask: <**netmask**>	(Subnet maske of the port server)
CR to initiate: [**No**]	
Lock: [**Disabled**]	
SNAP encoding: [**Disabled**]	
Domain name: <**domain name**>	(Domäin name of the port server)
Ethernet interface: [**Twisted**]	(If you are not using a twisted pair cable type BNC or AUI)

6. Click on the 'Return' button and select 'Save & Exit'
7. Select 'Port' and type an enter for 'Port number' the value 1
8. Check the settings below and if there is any fault correct it as described:

```
Hardware                Flow Control              Keys
Speed       [9600]      Flow Control   [None]     Hot      [^@]
Parity      [None]      Input flow     [Disabled] Quit     [^@]
Bit         [8]         Output flow    [Disabled] Del      [^@]
Stop        [1]                                   Echo     [^@]
Break       [Disabled]  IP Adresses               Intr     [^@]
Monitor DSR [No]        [                [Telnet] Kill     [^@]
Monitor DCD [No]        [                [Telnet] Sess     [^@]
User         [          Options                   Access
]                       Keepalive        [No]     Access          [Remote]
Terminal type [vt100]   Rlogin/Telnet    [Telnet] Authentication  [None]
TERM         [          Debub options    [No]     Mode            [Raw]
]                       Map CR to CR LF  [No]     Connection      [None]
Video pages  [0]        Hex Data         [No]     Host            [        ]
CLI/Menu     [CLI]      Secure           [No]     Remote Port     [0]
Reset Term   [No]       MOTD             [No]     Local Port      [10001]
```

9. Click on the 'Return' button and select '`Save & Exit`'
10. If you cannot make any input, select '`Quit`' and click then on the 'Return' button, select now '`CLI`'

```
>set admin
password> iolan
ADMIN>copy 1 2 3 4 5 6 7 8
```

(This command copies the settings from port 1 to port 2 - 8. If you use a port server with 4 or 16 interfaces this command must be made for each port)

```
ADMIN>reboot
```

After you have made all the settings you can shut down the connection between the terminal and port 1. you can now make further changes to the port server configuration via Telnet.

2.24.3.6 Configure the EtherQuinx / Cobox port server

When configuring the EtherQuinx / Cobox port server you must first set the IP address of the port server. To do this you have to login as user '`root`'. you set both the IP address and the hardware address with the `arp` command. You will find the hardware address (e.g. `00 20 4A 02 xx xx`) on the underside of the port server casing.

1. Enter the IP address into the ARP table:

   ```
   arp -s <ip-address> 00:20:4A:02:xx:xx
   ```

   (You will find the values for `xx` on the label affixed to the underside of the port server casing)

2. Change the IP address of the port server:

   ```
   telnet <ip-address> 1
   ```

   (The connection will not be set up, but the IP address will be taken over.)

3. Login on the port server:

   ```
   telnet <ip-address> 9999
   ```

4. Make the following settings
5. Delete the IP address from the ARP table:

   ```
   arp -d <ip-address>
   ```

After setting the IP address you can configure the port server. To do this open a Telnet session with port 9999, without using the ARP table. This is only needed for firsttime installation.

Make the following settings after logging in to the port server for a clean configuration:

```
Change Setup (0 Basics, 1 or 2 for Channel, 8 exit, 9 save and
exit) ? 0
Ethernet Interface (179) xxx.(52) xxx.(13) xxx.(123) xxx
Set Gateway Address ? Y
Gateway IP Address (000) xxx.(000) xxx.(000) xxx.(000) xxx
```

Ask your administrator as to the bits used by your subnetwork. This information is required for the IP address and the network mask:

```
Netmask: Number of Bits for Host Part ? <x>
Change telnet config password ? N
```

The next thing you have to do is configure the two interfaces. You must do this in two consecutive steps, where interface 1 is configured first and then interface 2.

```
Change Setup (0 Basic, 1 or 2 for Channel, 8 exit, 9 save and exit)
? 1 (or 2)
```

	Interface 1	Interface 2	
Baudrate	**9600**	**9600**	
I/F Mode	**4C**	**4C**	
Flow	**0**	**0**	
Port No	**10001**	**10002**	(Attention: Different values!)
Connect Mode	**C0**	**C0**	
Remote IP Address	**0.0.0.0**	**0.0.0.0**	
Remote Port	**0**	**0**	
DisConnMode	**0**	**0**	
Flush Mode	**44**	**44**	
DisConnTime	**0:0**	**0:0**	
SendChar1	**0**	**0**	
SendChar2	**0**	**0**	

Save the configuration and restart the port server:

```
Change Setup (0 Basics, 1 or 2 for Channel, 8 exit, 9 save and
exit) ? 8
```

2.24.3.7 Lantronix ETSxP

This chapter describes installing the Lnatronix ETSxP port server. The first-time installation is made with a terminal over the serial interface. you can make further installations via Telnet:

```
>telnet <ip-addr>
```

or

```
>telnet <ip-addr> 7000
```

Proceed as follows to login via Telnet. The login via serial line may differ from this description:

```
Login password> access
```
(not echoed)

```
Username>usr
Local_10>su
```

```
Password>system
```
(not echoed)

```
Local_10>>
```

After login the configuration can be made:

```
>define ports all command completion enabled
```

`>define server ipaddress <your ip address>`	(IP address)
`>define server subnet <your netmask>`	(Net mask)
`>define server domain "<your domain>"`	(Domain)
`>define server gateway <your default router>`	(Default Router)
`>define server name "<your host name>"`	(Host name of the port server)
`>define server identification "<your host name>"`	(Host name of port servers)

```
>define server broadcast disabled
>define server announcements disabled
>define server incoming telnet
>define server incoming password
>define server silentboot enabled
>define server lock disabled
```

```
>purge ipsecurity all
>define ipsecurity 255.255.255.255 incoming disabled outgoing
disabled slip disabled printing disabled
```

Settings for each LCT PC connected to the port server:

```
>define ipsecurity <pc ip address> incoming enabled
```

```
>purge snmp all
>define snmp community "public" access read
>define snmp community "ulaf2" access read
>define snmp community "ulafplus" access read

>define protocols ip enabled
>define protocols ip tcpkeepalive enabled
>define protocols lat disabled
>define protocols mop disabled
>define protocols appletalk disabled
>define protocols netware disabled
>define protocols lanmanager disabled

>define logging none

>define ports all access remote
>define ports all character size 8
>define ports all stop 1
>define ports all parity none
>define ports all speed 9600
>define ports all modem control dis
>define ports all flow none
>define ports all broadcast disabled
>define ports all loss notification disabled
>define ports all verification disabled
>define ports all type hardcopy
>define ports all termtype none
>define ports all interrupts disabled
>define ports all autobaud disabled
>define ports all password enabled

>initialize delay 0
%Info: Server reset scheduled - delay = 0 minute
>LOGOUT
Exiting the Lantronix ETS8P
```

2.24.4 Command line parameter (optional)

You can start the LCT optional via command line parameter:

```
Pfg_Lct.exe -c[A/M] -i[COM/TCP] -a[x/a.b.c.d:p] -s[#] -
u[A/M]:<password>:
```

Following parameters are allowed:

`-h`	Online help	
`-c[A/M]`	Connection type [automatical/Manual]	
`-i[COM/TCP]`	Interface type	
`-a[x/a.b.c.d:P]`	Adsress	
	x	Number of the serial interface
	a.b.c.d:p	IP address and port number
`-s[#]`	Slot number	
`-u[A/M]:>password>:`	User right [Admin/Maintenance]	

3 References

[1] ULAF+ Technical Description (TED)
SIEMENS Switzerland Ltd
A3118-X300-H100-*-7618

[2] ULAF+ User Manual (UMN)
SIEMENS Switzerland Ltd
A3118-X300-H100-*-7619

[3] ULAF+ User Manual (UMN) - Advanced Bridge & Router Module
SIEMENS Switzerland Ltd
A3118-X359-A1-*-7619

[4] AccessIntegrator Installation Manual(IMN)
SIEMENS Switzerland Ltd
A50010-T3-U100-*-76D1

[5] AccessIntegrator Administration Manual(ADMN)
SIEMENS Switzerland Ltd
A50010-T3U100-*-7671

[6] AccessIntegrator User Manual (OMN)
SIEMENS Switzerland Ltd
A50010-T3-U100-*-7619

[7] ITU-T Recommendation G.703 - Physical/Electrical characteristics of hierarchical digital interfaces

[8] ITU-T Recommendation G.704 - Synchronous frame structures uses at 1544, 6312, 2048, 8488 and 44 736 kbitu/s hierarchical levels

[9] ITU-T Recommendation G.706 - Frame alignment and cyclic redundancy check (CRC) procedures relating to basic frame structures defined in recommendation G.704

[10] ITU-T Recommendation G.821 - Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an integrated services digital network

[11] ITU-T Recommendation G.826 - Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate

[12] ITU-T Recommendation G.991.1 - High-bit-rate Digital Subscriber Line (HDSL) Transceivers

[13] ITU-T Recommendation G.991.2 - Single-Pair High-Speed Digital Subscriber Line (SHDSL) Transceivers

[14] ITU-T Recommendation I.431 - Primary Rate User-Network Interface - Layer 1 Specification

[15] ITU-T Recommendation K.17 - Protection against Interference; Tests on power-fed repeaters using solid-state devices in order to check the arrangements for protection from external interference

[16] ITU-T Recommendation K.20 - Protection against Interference; Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents

[17] ITU-T Recommendation K.21 - Protection against Interference; Resistibility of subscribers' terminals to overvoltages and overcurrents

[18] ITU-T Recommendation K.50 - Safe limits of operating voltages and currents for telecommunication systems powered over the network

[19] ITU-T Recommendation K.51 - Safety criteria for telecommunication equipment

[20] ETSI ETS 300 011 - Integrated Services Digital Network (ISDN); Primary Rate User Network Interface (UNI); Part 1: Layer 1 specification

[21] ETSI ETS 300 233 - Integrated Services Digital Network (ISDN); Access digital section for ISDN primary rate

[22] ETSI ETS 300 386 - Equipment Engineering (EE); Public telecommunication network equipment Electro-Magnetic Compatibility (EMC) requirements; Part 1: Product family overview, compliance criteria and test levels

[23] ETSI TS 101 135 - Transmission and Multiplexing (TM); High bit-rate digital Subscriber Line (HDSL) transmission system on metallic local lines; HDSL core specification and applications for combined ISDN-BA and 2048 kbit/s transmission

[24] ETSI TS 101 524 - Symmetric single pair high bit rate digital subscriber line (SDSL) transmission system on metallic local lines

[25] IEEE Standards Association 802.1 - IEEE standard for local and metropolitan area networks--Media access control (MAC) Bridges (Incorporates IEEE 802.1t-2001 and IEEE 802.1w)

[26] IEEE Standards Association 802.3 - IEEE Standard for Information technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Specific requirements--Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications

4 Abbreviations

BER	Bit Error Rate
BNA	Bandwidth not available
BOTU	Broadband Optical Termination Unit
BSRU	Broadband SHDSL Regenerator Unit
BSTU	Broadband SHDSL Termination Unit
COT	Central Office Terminal
DCE	Data Communication Equipment
DTE	Data Terminal Equipment
EMC	Electromagnetic compatibility
GTU	G.703 Termination Unit
GTU4	Ethernet über TDM Invers-Multiplexer
HDSL	High-bit-rate Digital Subscriber Line
HTU	HDSL Termination Unit
ISDN	Integrated Service Digital Network
ITU	International Telecommunication Union
LAN	Local Area Network
LCT	Local Craft Terminal
LFA	Loss of Frame Alignment
LOA	Loss of Activity
LOS	Loss of Signal
LT	Line Termination Unit (Exchange side)
MCS	Multi Channel Synchronisation
MIR	Maximum Information Rate
NT	Network Termination Unit (Network side)
OMI	Operating and Maintenance Interface
OTU	Optical Termination Unit
PRA	Primary Rate Access (ISDN)
PSD	Power Spectrum Density
QSTU	Quad SHDSL Termination Unit
REG	Regenerator
RPS	Remote Power Supply
RT	Remote Terminal
SHDSL	Single-pair High Speed Digital Subscriber Line Transceivers
SNMP	Simple Network Management Protocol
SRU	SHDSL Regenerator Unit

STP	Shielded Twisted Pair
STU	SHDSL Termination Unit
STU2	SHDSL Termination Unit (2 wire pairs)
TCM	Time Compression Multiplex
ULAF+	Universal Line Equipment Access Family
UTP	Unshielded Twisted Pair

5 Index

Numerics

A

B

C

M

O

P

Q

T

U

V