

NovaTec S20 PTI



Mounting and Installation

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- Subject to change without notice -



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1.0 Preface

Dear Customer,

Congratulations on purchasing the NovaTec S20 PTI. You have selected an Interface converter that has been developed and produced using the latest level of technology. We want to thank you for your decision.

The NovaTec S20 PTI enables you to extend the loop length of an S_0 interface. This is achieved by converting of an S_0 interface to an U interface. With this U interface you can obtain a distance up to 8 km (depending on the type of cable) or up to 24 km with repeaters. At the end of the cable you can mount an usual NTBA for the line code 2B1Q and you will get the S_0 interface back. In the basic version the NovaTec S20 PTI includes 4 line converters, which can be extended to up to 68 converters when needed.

If the PTI-US is being used, an existing U interface will be converted into a BRA S/T interface to which you can, for example, connect a PABX.

This Mounting and Installation Handbook will enable you to install the NovaTec S20 PTI to suit your technical environment. We would advise you to read this handbook carefully and to undertake the installation procedure step-by-step according the instructions.

2.0 Safety Advice

- Do not install the NovaTec S20 PTI near to heating systems such as radiators or in the vicinity of electric fields such as, for example, those generated by strip lighting and engines.
- Do not expose the NovaTec S20 PTI to dust, damp, vibrations or direct sunlight.
- Take care that no wires, nails or similar objects fall through the ventilation slits.
- The NovaTec S20 PTI cannot be used prior to proper installation.
- Never clean the housing with petrol, thinners or other solvents. Simply wipe it over with a soft, dry cloth.
- Should internal components of the system become visible following physical disturbance of the equipment, disconnect the NovaTec S20 PTI from the electricity supply **immediately**.



- The system is equipped with appropriate mains safety plug for use with a 230 volt or 115 volt input. This plug should be connected to a mains safety socket.
- The NovaTec S20 PTI can be operated using either a 230/115 volt power supply or a 48 volt DC power supply. The mains socket allocated to the NovaTec S20 PTI should be independent and for the sole use of the NovaTec S20 PTI.
- In order to prevent damage to person or property, never expose the NovaTec S20 PTI to rain or other forms of moisture.
- For safety reasons, modifications to the construction or security engineering of the NovaTec S20 PTI are forbidden unless express permission has been obtained from NovaTec Kommunikationstechnik GmbH.
- NovaTec Kommunikationstechnik GmbH will not be held liable for any damage whatsoever resulting from modifications to the equipment, especially those relating to repairs to and soldering on the electronic circuit board.
- Mounting and commissioning should only be undertaken by suitably qualified personnel (e.g. telecommunications technicians or engineers).
- Please follow the safety advice when inserting or repairing the system's Slide-in modules.
- The NovaTec S20 PTI must be earthed via an earthing cable with a minimum cross-sectional area of 2.5 mm². Should installation or operational problems occur which are not covered in this handbook please contact NovaTec Kommunikationstechnik GmbH immediately.
- To ensure trouble free usage the NovaTec S20 PTI must be installed according to this Mounting and Installation Handbook.
- Before commencing installation, satisfy yourself that the relevant electricity circuits are voltage free and properly disabled to secure against them being accidentally switched on whilst work is underway.
- If the equipment is passed on to a third party this Mounting and Installation Handbook must accompany it.



Technologiepark 9, D-33100 Paderborn

CE Mark:

The PTI meets the current requirements of the following European guidelines and their supplements:

Guideline	Name
89/336/EEC	EMC Directive
72/23/EEC	Low Voltage Directive (LVD)
93/68/EEC	CE-Marking Directive
98/13/EC	Telecommunication Terminal Equipment Directive

Conformity has been certified. The corresponding declarations and documents are deposited with the manufacturer.

Approval number:

NovaTec S20 PTI: PTL D300194L

3.0 General Information

3.1 Product Description

The NovaTec S20 PTI is a plug & play interface converter. It enables you to extend the loop length of an S₀ interface. You can obtain a distance up to 8 km (depending on the type of cable used) or up to 24 km with repeaters. By combining a PTI-SU with a PTI-US you obtain BRA interfaces capability and when repeaters are also used the range can be increased from 8 to 24 km.

3.2 Using the Handbook

This handbook is divided into chapters. The order and content of these chapters corresponds to the correct installation sequence and will lead you through the commissioning process for the NovaTec S20 PTI. For this reason, we advise you to read the chapters according to the order in which they are written and to undertake and complete the corresponding activities as they occur. Only after this should you proceed to the next chapter. If you work in this manner the mounting and commissioning of the NovaTec S20 PTI will be easily and successfully completed.

3.3 Use of Pictograms

**Note:**

Important information which you are advised to follow.

**Attention:**

Vital information which must be followed at all costs otherwise malfunction and resultant damage can occur.



4.0 Connection and Mounting

4.1 Safety Directions for Mounting

4.1.1 Mounting Site

- The mounting site should preferably be located within the office or living area close to where the PC will be located. The NovaTec S20 PTI can also be installed in the cellar or attic as well as in other frost-, dust- and heat-free rooms.
- Do not mount your NovaTec S20 PTI near to equipment with strong magnetic fields, for example, large mains transformers, machines, lifts or radio base stations for mobile phones.
- The NovaTec S20 PTI is housed in a 19“ rack. This rack should be mounted in an appropriated cabinet or shelf. The desired cabinet or shelf must have a load capacity in line with the maximum weight of the corresponding system. There are suitable cabinets available from NovaTec.
- Do not lay the communications cable parallel to power lines.
- The following regulations and master conditions (see 4.1.2) must be observed at all times.
- When marking the holes for the wall please use the supplied drill jig.
- When mounted there should be a minimum ground clearance of 50 cm between the base of the NovaTec S20 PTI and the ground.
- The NovaTec S20 PTI system rack must be installed in a 19“ housing or an 19“ cabinet, which will in the following be called a system cabinet. The system cabinet must be closed all-around, to avoid access to any part of the NovaTec S20 PTI. The connecting and display parts in front of the NovaTec S20 PTI system are permitted to be accessed by service personal only. The front encloser, especially a door, must be locked to avoid unauthorized opening.
- The system cabinet must meet the requirements of a fire enclosure in accordance to IEC 950.



- There must be a clearance of 1 HE (44 mm) above and below the NovaTec S20 PTI system rack. If there are racks installed, they are not allowed to cover more than 30% of the ventilation opening of the NovaTec S20 PTI.
- Installing the system cabinet you must take care that it cannot tip over or be moved unintentionally.
- Before changing the power supply, the system must be disconnected from the mains power supply. The power supply is not suitable for hotplug.
- After a failure of the NovaTec S20 PTI through operation of a protective device (fuse), the equipment is as long under voltage as it is connected to the mains power.
- If more than one NovaTec S20 PTI system are being in a 19" cabinet, don't connect more NovaTec S20 PTI to one multi socket-outlet than allowed by the building power supply wiring.



Cleaning

The NovaTec S20 PTI and connected terminal equipment should only be cleaned with a moistened cloth or an anti-static tissue. Ensure that no liquid enters the system.

Warning note

Your NovaTec S20 PTI is secured from the trunk line against power surges, for example lightning. Lines leaving the building must be equipped with coarse protection, for example, gas discharge elements.

Interference

Should interference occur, please contact your supplier or service technician.

4.1.2 Regulations and Master Conditions

Ventilation

Do not mount your NovaTec S20 PTI in a shallow unaired cupboard. Rising heat levels could damage the NovaTec S20 PTI.

Dust (DIN 40046 Part 47)

Do not install the NovaTec S20 PTI in a dusty location, for example, near sanding machines, circular- or band-saws.

Humidity (IEC 721 3K6)

The NovaTec S20 PTI must not be exposed to high humidity levels such as those found, for example, in washrooms, swimming pools, saunas or bathrooms.

Temperature

Your NovaTec S20 PTI should only be operated in dry rooms where the temperature remains between 0° C und 40° C. For this reason, do not install your NovaTec S20 PTI in locations subject to direct sunlight or strong cold influences.

4.1.3 Mounting Directions

Please observe your general national safety regulations for telecommunications facilities (VDE 0800 in Germany) and electric power plant and equipment (VDE 0100 in Germany).



Fitting and mounting of electronic equipment must be undertaken by an appropriately qualified specialist only. Installation and commissioning of the NovaTec S20 PTI must only be undertaken by electronics personnel who possess the qualifications required by national safety regulations.

If possible mount your NovaTec S20 PTI in the immediate vicinity of the mains electricity supply for the building and a 230V socket.



Do not plug the NovaTec S20 PTI into the mains socket until all installation work has been completed.

Please lay the communications cable to the telephone sockets according to the standard national telecommunications cable regulations.



You are advised to use the communications cable Type J-Y (St) Y 2x2x0.6 mm for connecting every item of terminal equipment.



4.2 Scope of Delivery

The complete NovaTec S20 PTI system will be delivered in one box. It contains the following components:

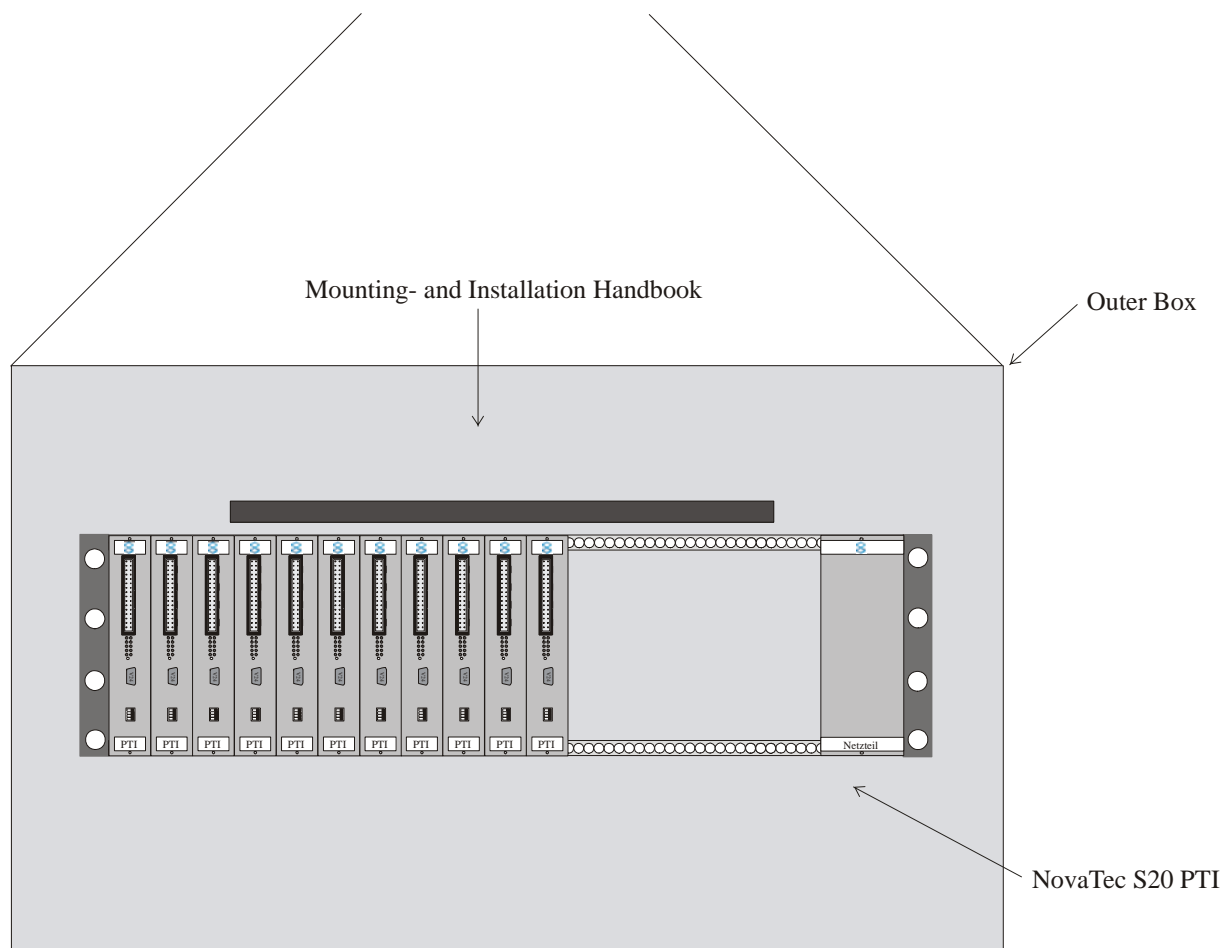
Pos.	Qty.	Item
1	1	System NovaTec S20 PTI
2	1	Mounting and Installation Handbook on CD

4.2.1 Opening the Package

The NovaTec S20 PTI is packaged and delivered in a collapsible cardboard box. On opening the box the first item you will see is this Mounting and Installation Handbook. On either side are the other components belonging to your package. Carefully take out all the components and finally lift out the NovaTec S20 PTI together with the side-cushioning. To do this it is imperative that you have a firm and secure hold as the system weighs approximately 15 kg.

4.2.2 Contents of the Package

On opening the package you will find within the cardboard box, the individual components as listed in Chapter 4.2. Please check that the contents of the cardboard box are complete.



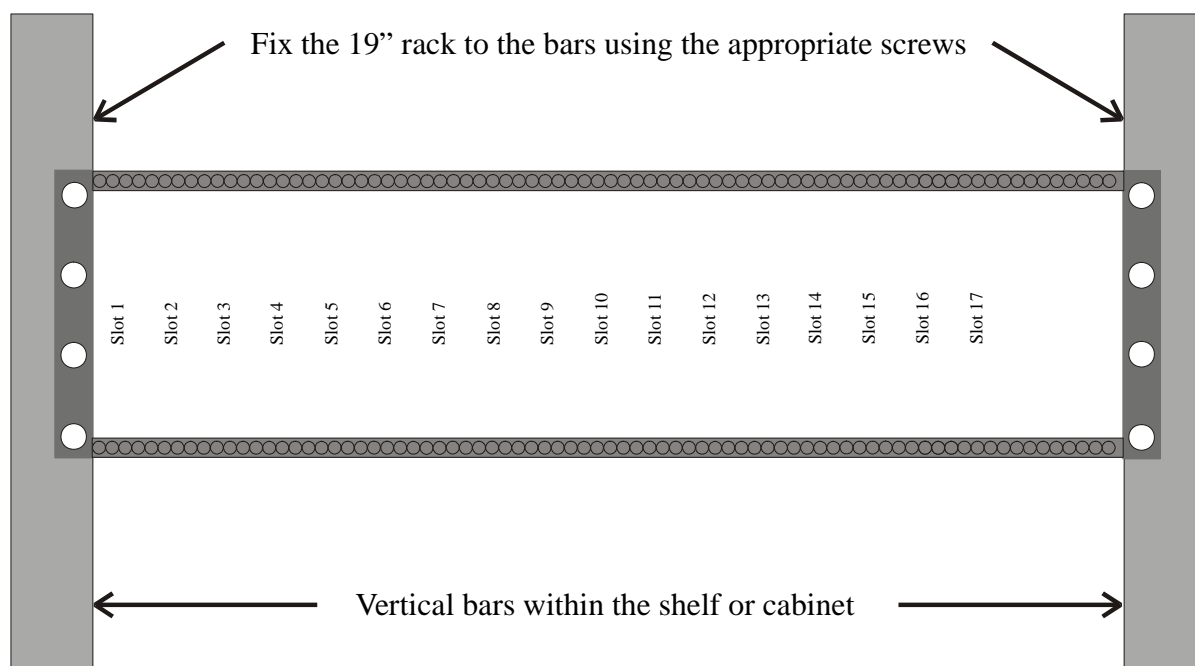
Picture 1: Contents of the package

4.3 Mounting

After the NovaTec S20 PTI has been removed from the box, select the desired location for mounting the system according to the criteria given in Chapter 4.1.1. The NovaTec S20 PTI contains a 19" rack into which the individual modules are to be inserted. Both the backplate and the mains power cable are already fitted to this rack.

4.3.1 Hanging up the 19" rack

The 19" rack should be properly mounted on a shelf or in a cabinet which contains special vertical bars with holes for the fixing screws. These bars can be purchased, marked with either metric or imperial measures. For this 19" rack you require bars with imperial measures. Insert the 19" rack into the shelf from the front and fit the appropriate screws into the holes on the vertical bars on the left and right side of the rack. After mounting check that the rack is securely seated with the shelving.

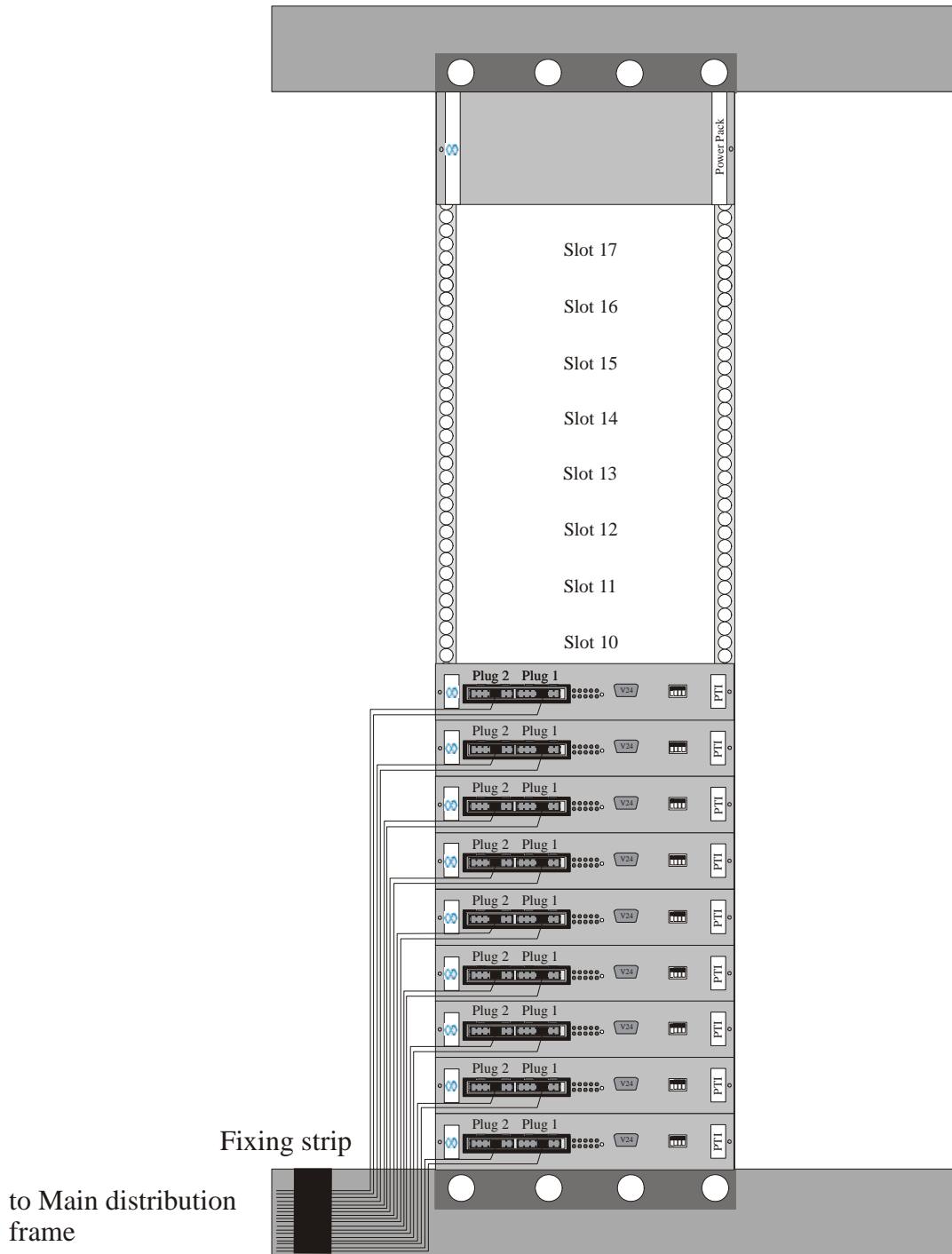


Picture 2: Mounting the 19" rack



4.4 Laying the Cabling

All connections except the mains power cable and the earth cable are connected to the NovaTec S20 PTI from the front. The mains power cable is connected from the back using the cable that has already been fitted for this purpose. All local loops and extension lines are connected via special connectors located on the front panels of each of the slide-in modules. In order to avoid overheating the system, please ensure while laying the cabling that the air circulation is not obstructed.



Picture 3: Laying the cabling to the NovaTec S20 PTI

4.4.1 Strain Relief and Positioning of the Cables

All lines that leave the system must be strain relieved at an appropriate place (see illustration in Picture 3). In the 19" System the cables are simply fixed to the frame with a cable binder. You can therefore use any place on the frame. Each of the wires for the lines for the local loops and the terminal equipment interfaces are colour coded. The meaning of each colour can be found in Chapter 4.11.



Take care that you begin with Pin 32 (Plug 2) when connecting the cabling to the trunk and terminal equipment interfaces.

4.5 Internal Structure of NovaTec S20 PTI

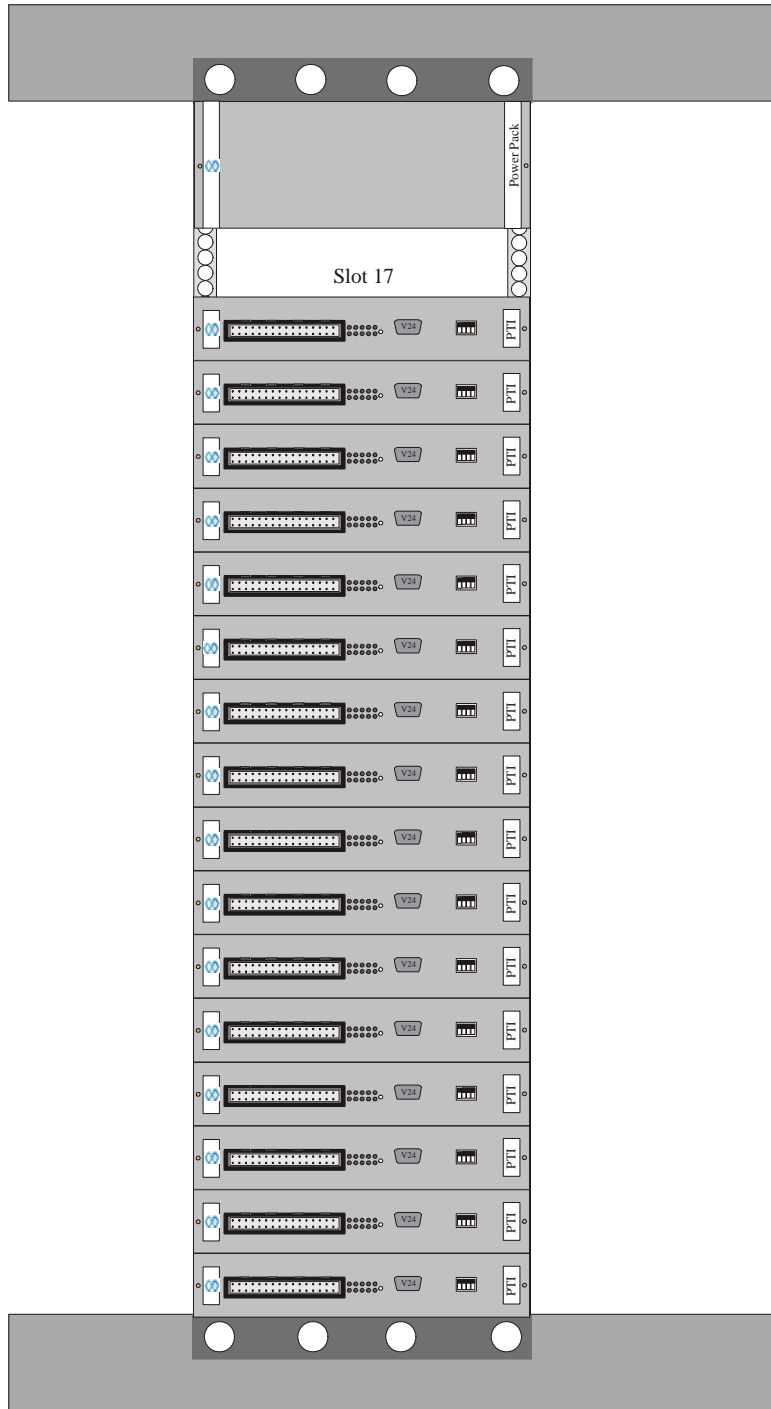
The NovaTec S20 PTI comprises several different modules. All modules can be inserted into the 19" rack and then connected together at the back of the rack. The individual slots inside the system are clearly numbered to ensure easy identification. The left slot is Slot 1. On the right next is Slot 2, and so on to Slot 17. On the right-hand side of Slot 17 is the power supply slot. This slot is double the width of the others and accommodates the transformer for the power supply for the whole rack. The slot designations (slot numbers) can be found on the back of the printed circuit board (PCB). The numbers can be seen on the back of the PCB when viewed from the insertion side of the 19" rack.

The slide-in card PTI-SU is an interface converter which converts an S_0 interface to an U_0 interface. With this U_0 interface you can obtain a distance of up to 8 km via a 2 wire line. At the end of the line you can mount a PT-US (2F3101) or an NTBA for the line code 2B1Q and you will get the S_0 interface back.

If you want to crossover a distance of more than 8 km you can use a PT-Repeater. This Repeater can be remote powered by the PTI-SU.

The ordering number of the PTI-SU without powering of the U_0 interface is 1F3201 and the ordering number of the PTI-SU with powering of the U_0 interface is 1F3201-LP.

If you work at the PTI-SU with powering of the U_0 interface (1F3201-LP) please observe the regulations for individual protection at any case as there is a power supply of 115 V in use.



Picture 4: Internal construction of the NovaTec S20 PTI



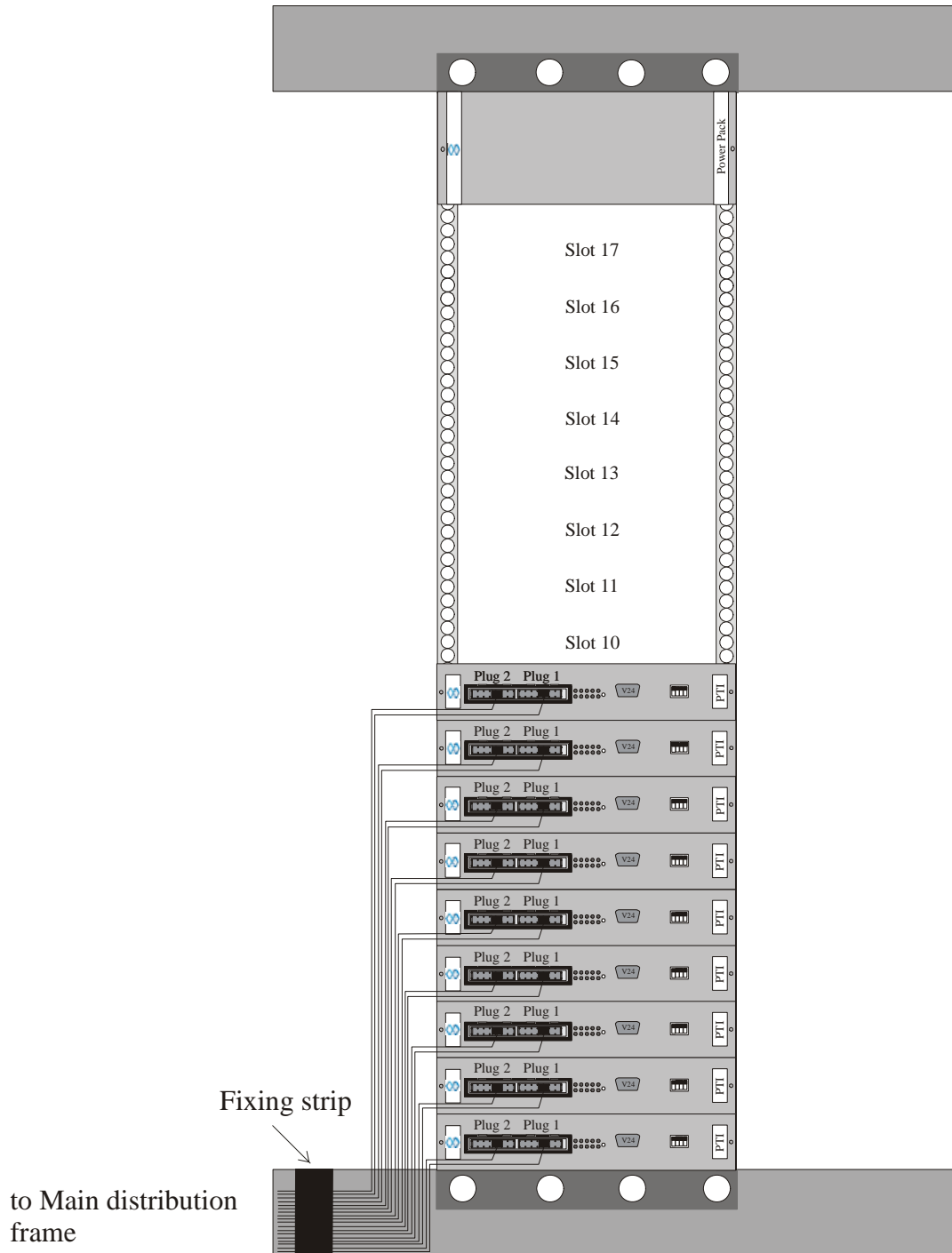
4.6 Limitations of the NovaTec S20 PTI

Conditioned by the system architecture there are limits for the configuration of the NovaTec S20 PTI. These limitations are resulting from the power supply of the modules: The PTI-SU with powering of the U_0 interface (1F3201-LP) has a much higher power input as the PTI-SU without powering of the U_0 interfaces (1F3201).

If you insert only PTI-SU without powering of the U_0 interface (1F3201) in the system you can use all the 17 slots. If you insert only PTI-SU with powering of the U_0 interface (1F3201-LP) you may only use 14 slots. A mixed configuration is possible.

4.7 NovaTec S20 PTI Connector Panel

All connections that are necessary for the NovaTec S20 PTI to operate are established via the plug-in connections on the connector panel. Therefore, only use officially authorised cables or those that we provide with the equipment. The following picture shows the connector panel of the NovaTec S20 PTI with the standard configuration.



Picture 5: NovaTec S20 PTI connector panel



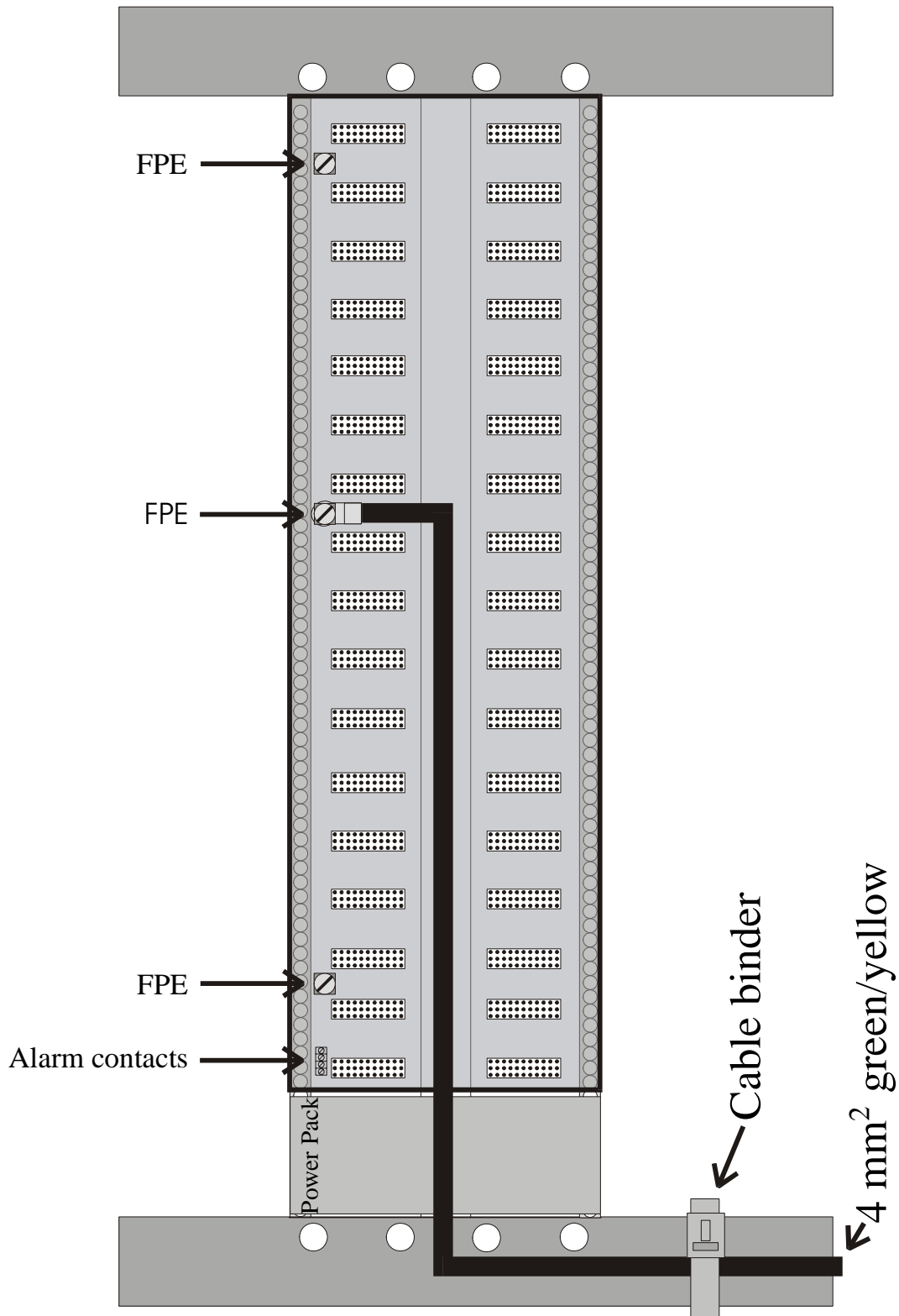
4.8 Earthing the NovaTec S20 PTI

According to the German electrical engineering authority regulations, VDE 0800 Part 2, the NovaTec S20 PTI must be earthed through a fixed connection that cannot be disconnected. You will therefore require a separate green/yellow coloured wire with a minimum diameter of 2.5 mm². This earthing wire is not supplied with the equipment.

To prepare this earthing wire you will need a copper wire with a minimum cross-sectional area of 2.5 mm² and a ring cable lug with a 5 mm drilling hole. Identify a point in the building where building services are located and the NovaTec S20 PTI can be earthed. We recommend the potential equalisation bar of your building plant. Take care that the earthing cable is securely connected to the earthing point for your building plant. Next, ascertain the required length of the earthing cable according to the desired location of the NovaTec S20 PTI. After you have cut the cable to the correct length, the ring cable lug can be connected to one end of the cable and, if required, an appropriately sized cable lug can also be fitted to the other end of the cable.

The earthing cable must be connected to the earthing point of your building services first. On the back of the NovaTec S20 PTI there are a number of screw type terminals, of which three are marked “FPE“. These are for the earth cable connections. As these screws type terminals are joined together on the back it does not matter which screw type terminal you use. After removing the screw insert the cable into screw type terminal. Than tighten the screw again. Next ensure that the earth cable is strain relieved using a cable binder at an appropriate place (e.g. in the cupboard or on the shelf). Please ensure, that your telecommunications system and all distributors are also earthed.

The following picture illustrates a correctly connected earth cable with an appropriate strain relief.



Picture 6: Connection of the earth cable to the NovaTec S20 PTI (viewed from back)



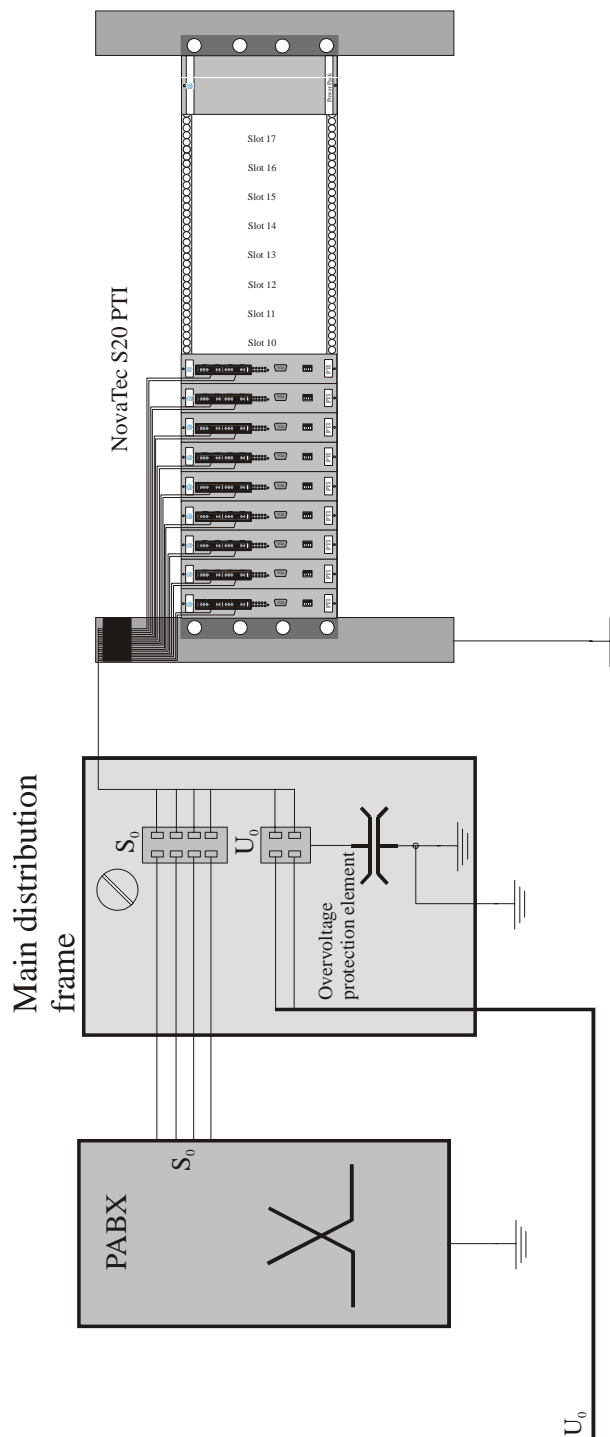
Where more than one 19" rack is used, each must be earthed separately and directly to the building's potential equalisation bar.

4.9 Connecting the NovaTec S20 PTI

All trunk and terminal equipment interfaces on the NovaTec S20 PTI must be fed through a main distribution frame. This includes all lines from the trunk or NTPMs leading to terminal equipment.



All lines leaving the building must have a coarse protection to guard against power surges due to thunderstorms.



Picture 7: Structure of line connections to the NovaTec S20 PTI



4.10 NovaTec S20 PTI Interfaces

This chapter describes the physical assembly of the NovaTec S20 PTI interfaces. Furthermore, the number of wires and their assignments are given for each type of interface.

4.10.1 The BRA Interface

The S_0 interface is a digital 4-wire interface. This 4-wire interface comprises two pairs of wires. One pair of wires realizes the datastream for the transmission direction and the other pair is dedicated to the receiving direction. The individual wires in each pair of wires are differentiated as wire A and wire B. Each S_0 interface consists of the following four wires:

Transmit A
Transmit B
Receive A
Receive B

When connecting PABX to the NovaTec S20 PTI ensure that the S_0 interface wires are not accidentally switched. Upon delivery the BRA interface is set-up to operate in point to multi-point mode. At the PT-US you must assemble the end of the line from the BRA interface with final resistors (2 x 100 Ohm). A star shape bus structure is not allowed.

4.10.2 The U interface

The U interface is a digital 2-wire interface. This interface comprises one pair of wires:

Wire A
Wire B

When connecting terminal equipment or NT-1 to the NovaTec S20 PTI it does not matter if the wires are switched.



Warning: High Voltage!
Please comply with the safety regulations when working on the powered U interface!

4.11 Pin Assignment for Connections to the NovaTec S20 PTI

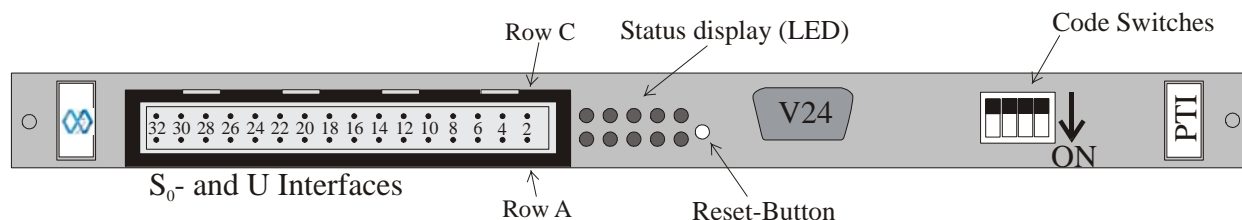
This chapter describes the signal assignment for all NovaTec S20 PTI plug connections. This information will enable you to plug all your terminal equipment into the NovaTec S20 PTI.



For directionally orientated signals the given signal direction is always described from the perspective of the NovaTec S20 PTI.

PTI-SU Pin Assignment

The contact pins in the plug are arranged in two rows (Row A and Row C) with each row providing 32 contacts. As this plug is only equipped with every second contact there are 16 contacts per row and the contacts in each row are numbered from 2 to 32. The following picture shows this in detail.



Picture 8: PTI pin assignment

V.24 interface signal assignment

Pin	Signal name	Signal direction relating to the PTI-SU
1	Unassigned	
2	Receive data	Input
3	Transmit data	Output
4	Data terminal ready	Output
5	System ground	-----
6	Data set ready	Input
7	Request to send	Output
8	Clear to send	Input
9	Unassigned	



PTI-SU, S₀ and U₀ interfaces, directionally orientated signals the given signal is always described from the perspective NovaTec S20 PTI.

Plug	Interface		Line	Signal	Line colour	Row	Contact
1	U	1	1	Wire A	white	A	2
	U			Wire B	brown	C	2
	free				green	A	4
	free				yellow	C	4
	U	2	2	Wire A	grey	A	6
	U			Wire B	pink	C	6
	free				blue	A	8
	free				red	C	8
	U	3	3	Wire A	black	A	10
	U			Wire B	violet	C	10
	free				grey/pink	A	12
	free				red/blue	C	12
	U	4	4	Wire A	white/green	A	14
	U			Wire B	brown/green	C	14
	free				white/yellow	A	16
	free				yellow/brown	C	16
2	S ₀	5	1	Transmit A	white	A	18
	S ₀			Transmit B	brown	C	18
	S ₀			Receive A	green	A	20
	S ₀			Receive B	yellow	C	20
	S ₀	6	2	Transmit A	grey	A	22
	S ₀			Transmit B	pink	C	22
	S ₀			Receive A	blue	A	24
	S ₀			Receive B	red	C	24
	S ₀	7	3	Transmit A	black	A	26
	S ₀			Transmit B	violet	C	26
	S ₀			Receive A	grey/pink	A	28
	S ₀			Receive B	red/blue	C	28
	S ₀	8	4	Transmit A	white/green	A	30
	S ₀			Transmit B	brown/green	C	30
	S ₀			Receive A	white/yellow	A	32
	S ₀			Receive B	yellow/brown	C	32

5.0 Commissioning

Before you put the NovaTec S20 PTI into operation, you should have undertaken all steps described in this handbook. This means that you have connected the earth line as well as the S_0 and U interfaces. Commissioning takes place when all connected channels at the PTI-SU are switched on with the switch on the face plate. Switch it to „On“ and insert the main plug into the designated three pin socket. The NovaTec S20 PTI is ready for use after booting for approximately 1 minute.

5.1 Status displays of the NovaTec S20 PTI

At the face plate (see page 9) the NovaTec S20 PTI has light emitting diodes which indicate the operational mode. These light emitting diodes are splitted into two functional sections. The green light emitting diodes (see picture 9) indicates operation condition of the processor (Ready LED) and the power supply on the U interfaces (Power LED). The red light emitting diodes indicates the state of layer 1 for every channel of the S_0 and U interface.

The uP LED displays by flashing that the processor is in operation. The Power LED shows by continuous shining that all switches of the coding switch are in the on position, layer 1 is ready and the remote power supply of all U interfaces (module 1F3201-LP only) is activated.

The status of layer 1 can be identified for each interface independently (see picture 9) at the two red LED's which are placed next to each other. The left LED (Picture 9: lower one) communicates the status of layer 1 for the BRA interface and the right one (Picture 9: upper one) for the U interface. When layer 1 is activated the LED's are continuous shining. In case of an error they are flashing and the Ready LED extinguishes. Is for example layer 1 of an U interface out of action the concerned U LED is flashing and the Power LED is off.

When there is for example a short-circuit at the U interface, the LED of the concerned interface and the Ready LED starts flashing.

In operation condition the uP LED flashes continuously. The Ready LED and both LED's of the activated interfaces are continuously shining. When there are one or more lines deactivated by the coding switch the belonging LED's are off.

After switching on the System, every PTI-US starts an on board diagnosis. During this procedure the system tests all internal components of the U and then all internal components of the S interfaces. Is there an error detected the concerned PTI-SU is executing a reset and then starting a new test. If the fifth trial is not succesful the test stops and a failure code appears at the LED's. Is the EPROM test negative, there will be no further test, the system stops and a failure code appears at the LED's.



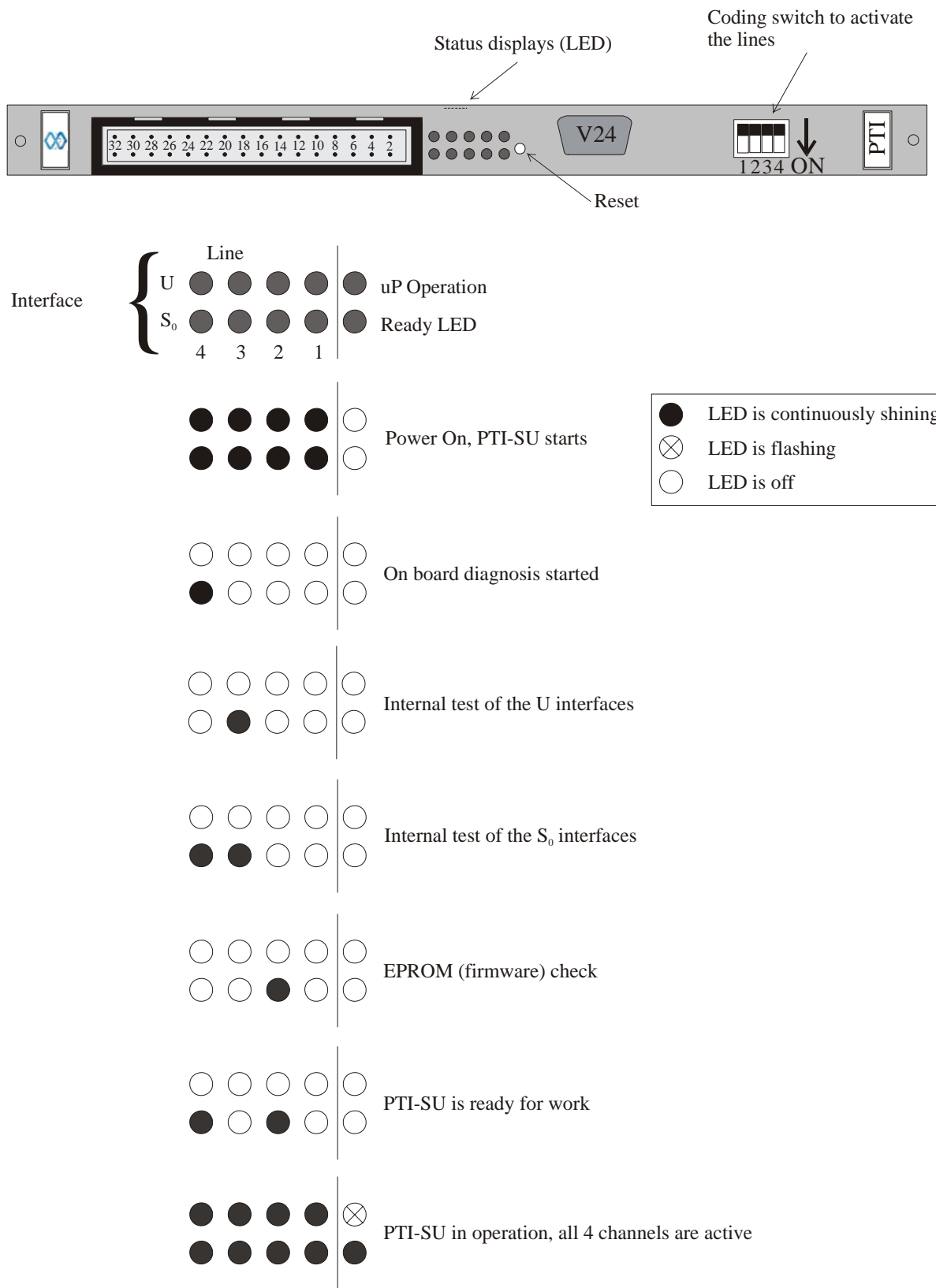
After starting the system the remote power supply of the U interfaces will be switched on after approximately 1 minute (this is only concerning the module 1F3201-LP, visible by the caution label at the front panel of the board). Is the PTI-SU inserted in a system which is actually in operation mode, the remote power supply of the U interfaces will also be activated after approximately 1 minute. But if you activate a channel after starting the system by the coding switch, the power supply of the U interface will be switched on immediately.

There is no power supply to the BRA interfaces on the PTI-US (2F3601).

To actualize the Status-Display press the Reset-Button!



Only concerning PTI-SU with power supply at the U interfaces (1F3201-LP):
The U interface is powered by an internal power supply of 115V. Observe for this reason all precautions for personal protection (switch off the system, separate the interface from the system and deactivate the interface).



Picture 9: Status displays of the PTI

6.0 Alarm Contacts

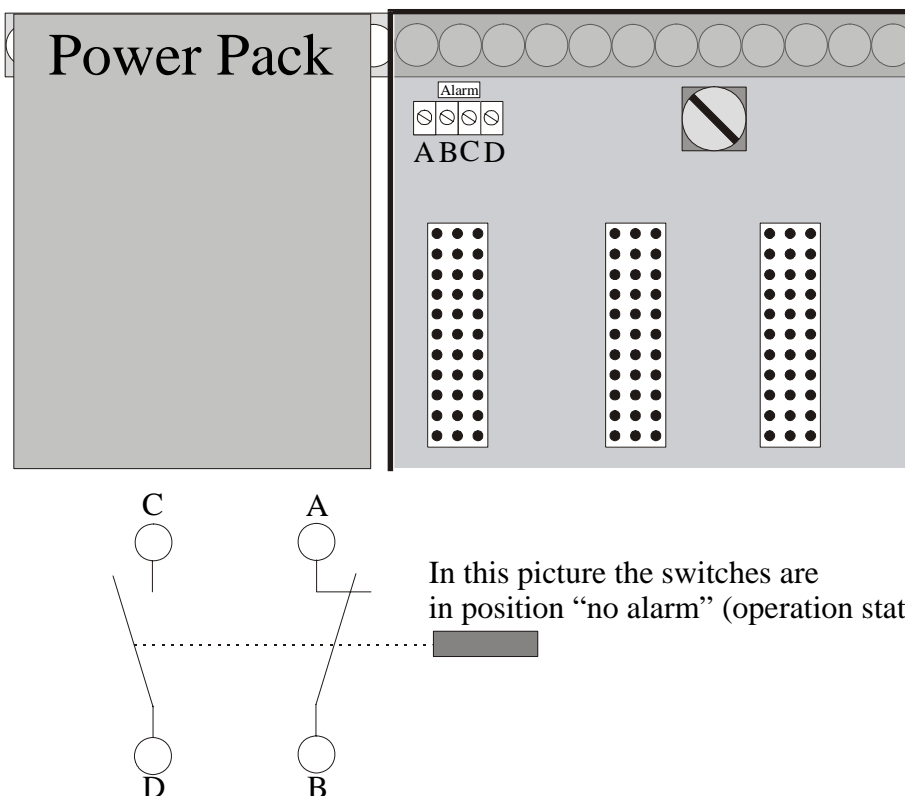
On the side rear of the backplane, you will find the terminals of the alarm contacts. This alarm contacts are switched by relays. There are a pair of relays contacts available. One contact is switched as a closer and one as an opener to the terminal. During normal operation the terminals A and B are closed and the terminals C and D opened. In a fault situation it is vice versa.

The relays contacts are specified for a maximum switching voltage of 100 V dc and a maximum switching current of 1 A. The maximum allowed switching power is 30 W.

The alarm contacts will be activated by the following reasons:

- power failor of NovaTec S20 PTI
- power failor of the U_0 interface (overload) or short circuit of the U_0 interface. (only relevant for the 1F3201-LP)
- Deactivation of the Layer one of the S_0 or U_0 interface.

After you have repaired a fault the status display will still show you the error message. To reset the display push the reset button.



Picture 10: Alarm contacts

7.0 Technical Data

Mechanical Data	
Dimensions (WxHxL)	480 mm x 265 mm x 220 mm
Weight (Housing + power pack)	min. 7 kg (15,8 kg when fully constructed)
Method of suspension	with screws in a dedicated 19" rack
Construction	Modular comprising slot-in modules and sub-modules

Electrical Data	
Power supply	230 V~ (115 V~) $\pm 10\%$, 47-400 Hz or 48 V=
Power Input	506 VA (2,2 A) at 230 V~; 483 VA (4,2 A) at 115 V~; 470 VA (9,8 A) at 48 V=
Connection	Power line with 3-pin plug (at 230 V~ and 115 V~)
Earth	Separate earth via min. 2.5 mm ² earth line
Overvoltage protection	Internal secondary protection
Interfaces	4 x ISDN-BRA, D-channel-protocol transparent and 4 x ISDN-U, 2B1Q (basic configuration) expandable to 68 x ISDN-S/T und 68 x ISDN-U
S/T-Interface	In accordance with CTR 3, TBR3, ITAAB Range: max. 220 m (passive Bus) max. 900 m (extended passive Bus) max. 1000 m (Point to Point)
U-Interface	In accordance with ANSI T1.601, CTR 3, TBR3 Supply: 0V (1F3201) / 110V $\pm 5V$, 25mA (1F3201-LP) Range: max. 8000 m using 0.6 mm diameter cable max. line attenuation 40dB/40kHz

Environmental Specifications	
Storage and Transport	-20° Celsius to +90° Celsius 0% to 95% relative humidity (not condensing)
Operation	+5° Celsius to +40° Celsius 0% to 95% relative humidity (not condensing)