

EXTRATALK II / II+ AND EXTENSION POWER DISTRIBUTION UNITS

Product Description

NOKIA

The information in this document is subject to change without notice and describes only the product and its version defined in the introduction of this document. This document is intended for the use of Nokia Telecommunications' customers only for the purposes of the agreement under which the document is submitted, and no part of it may be reproduced or transmitted in any form or means without the prior written permission of Nokia Telecommunications. The document has been prepared to be used by professional and properly trained personnel, and the customer assumes full responsibility when using it. Nokia Telecommunications welcomes customer comments as part of the process of continuous development and improvement of the documentation.

The information or statements given in this document concerning the suitability, capacity, or performance of the mentioned hardware or software products cannot be considered binding but shall be defined in the agreement made between Nokia Telecommunications and the customer. However, Nokia Telecommunications has made all reasonable efforts to ensure that the instructions contained in the document are adequate and free of material errors and omissions. Nokia Telecommunications will, if necessary, explain issues which may not be covered by the document.

Nokia Telecommunications' liability for any errors in the document is limited to the documentary correction of errors. Nokia Telecommunications **WILL NOT BE RESPONSIBLE IN ANY EVENT FOR ERRORS IN THIS DOCUMENT OR FOR ANY DAMAGES, INCIDENTAL OR CONSEQUENTIAL (INCLUDING MONETARY LOSSES)**, that might arise from the use of this document or the information in it.

This document and the product it describes are considered protected by copyright according to the applicable laws.

NOKIA logo is a registered trademark of Nokia Corporation.

Other product names mentioned in this document may be trademarks of their respective companies, and they are mentioned for identification purposes only.

Copyright © Nokia Telecommunications Oy1999. All rights reserved.

INTERNAL HISTORY PAGE**Archive**

Location: <\\ntcsrv03ca\groupdat\SiSo\Extratalk2\customer>

Filename: PDU.doc

History

Date	Version	Author	Change Note No./Notes
14 Dec 98	0.0.1	Tyrone Williams	First Draft
9 Feb 99	0.0.2	Tyrone Williams	Second Draft
2 March 99	1.0.0	Tyrone Williams	Authorised

APPROVAL PAGE

Edited/Translated by: T Williams Date: _____

Checked by: A Weeber Date: _____

Approved by: M Weckström Date: _____

CONTENTS

1.	SCOPE AND PURPOSE	5
2.	GENERAL	6
3.	PDU TECHNICAL DESCRIPTION	10
3.1.	Physical characteristics	10
3.1.1.	Dimensions	10
3.1.2.	Fixing of the PDU.....	10
3.1.3.	Material and finishing.....	11
3.2.	Electrical characteristics	11
3.2.1.	AC power.....	11
3.2.2.	DC power.....	16
3.3.	Control functions	19
3.3.1.	Introduction to the CSM module.....	19
3.3.2.	CSM module interfaces	20
3.3.3.	Rectifier interfaces.....	23
3.3.4.	Heat Management Unit interface.....	26
3.3.5.	Smoke alarm	29
3.3.6.	Door alarm	30
3.3.7.	PDU alarms.....	31
3.3.8.	Serial Port	31
3.3.9.	Alarm interface.....	33
3.3.10.	PDU extension.....	35
3.3.11.	Rectifier control.....	35
3.3.12.	CSM module operation.....	36
4.	PDU EXTENSION TECHNICAL DESCRIPTION.....	38
4.1.	Physical characteristics	38

4.1.1.	Dimensions.....	38
4.1.2.	Fixing of the PDU extension.....	38
4.1.3.	Material and finishing	38
4.2.	Electrical characteristics.....	38
4.2.1.	AC power	38
4.2.2.	DC power	41
4.2.3.	DC terminal maximum wire diameters	42
4.3.	Control Functions	43
4.3.1.	Basic PDU	43
4.3.2.	Rectifier control	44
5.	EXTENSION PDU TECHNICAL DESCRIPTION	46
6.	PDU EXTENSION FOR THE EXTENSION CABINET TECHNICAL DESCRIPTION	47
6.1.	Physical characteristics.....	47
6.1.1.	Dimensions.....	47
6.1.2.	Fixing of the extension PDU extension	47
6.1.3.	Material and finishing	47
6.2.	Electrical characteristics.....	48
6.2.1.	AC power	48
6.2.2.	DC power	48
6.3.	Control Functions	49
6.3.1.	Extension PDU.....	49
7.	EMC.....	51
8.	ENVIRONMENTAL.....	52
8.1.	High temperature.....	52
8.2.	Low temperature.....	52
8.3.	Solar radiation	52
9.	SAFETY	53

10. REFERENCES.....54

1. SCOPE AND PURPOSE

This document is a product description for the Power Distribution Units fitted to the Extratalk II / II+ and the Extratalk II / II+ extension.

The purpose of this document is to describe the function, general structure and operation of the PDU's fitted to the Extratalk II / II+ and the Extratalk II / II+ extension.

2. GENERAL

The Extratalk II / II+ Power Distribution Unit fulfils all the power requirements of the Extratalk II / II+, for both AC and DC power. The PDU incorporates a Cabinet System Management module, which controls the rectifiers, handles all the Extratalk II / II+ alarms, and controls the Heat Management Unit.

The PDU contains all the components necessary for AC distribution, as well as all the components for DC distribution. It provides circuit breakers or fuses for each single power outlet (AC or DC).

All the PDU connection points are accessible from the rear of the cabinet, with the exception of the RS232 interface and the RLE power connections. The RS232 interface is provided for connection to a PC, in order to read alarms and set the system parameters.

A PDU extension can be fitted below the PDU if desired by the customer. This PDU extension unit enables the user to connect additional rectifiers and provides for additional fusing required by the customer. The PDU extension unit does not incorporate a CSM module; its functions are controlled by the PDU.

The PDU front panel is shown in Figure 1. The PDU extension front panel is shown in Figure 2.

If an Extratalk II / II+ extension cabinet is required, the additional power control, HMU control and cabinet sensor management is managed by the PDU fitted to the Extratalk II / II+ extension. The Extratalk II / II+ extension PDU is identical to that fitted to the Extratalk II / II+. The extension PDU fulfils all the power requirements of the Extratalk II / II+ extension, for both AC and DC power. The extension PDU incorporates a CSM module, which handles all the Extratalk II / II+ extension alarms, and controls the Heat Management Unit.

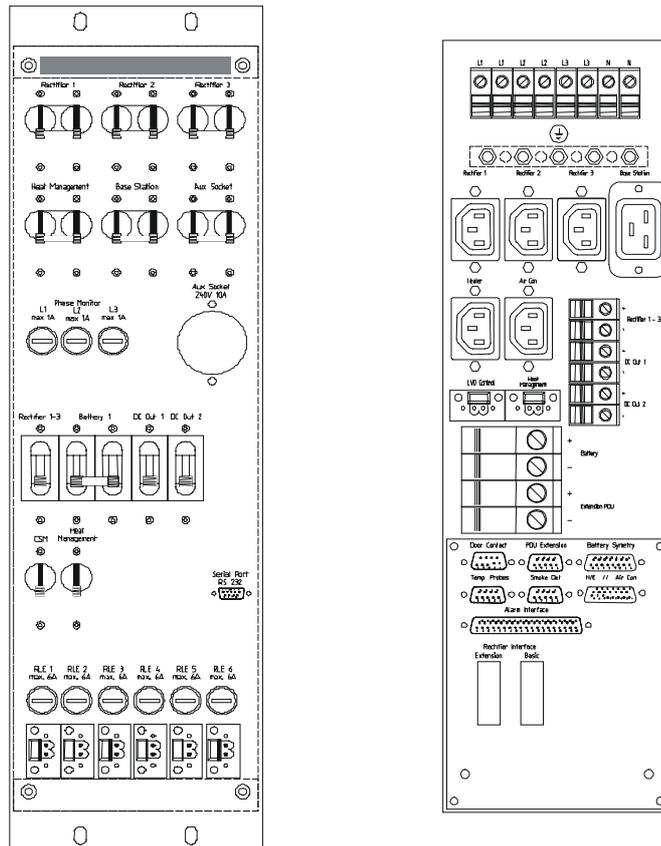
The extension PDU contains all the components necessary for AC distribution, as well as all the components for DC distribution. It provides circuit breakers or fuses for each single power outlet (AC or DC).

All the extension PDU connection points are accessible from the rear of the cabinet, with the exception of the RS232 interface and the RLE power connections. The RS232 interface is provided for connection to a PC, in order to read alarms and set the system parameters.

An PDU extension for the Extratalk II / II+ extension cabinet can be fitted below the PDU in the cabinet if desired by the customer. This PDU extension provides additional RLE power connections for customer supplied and fitted RLEs. The

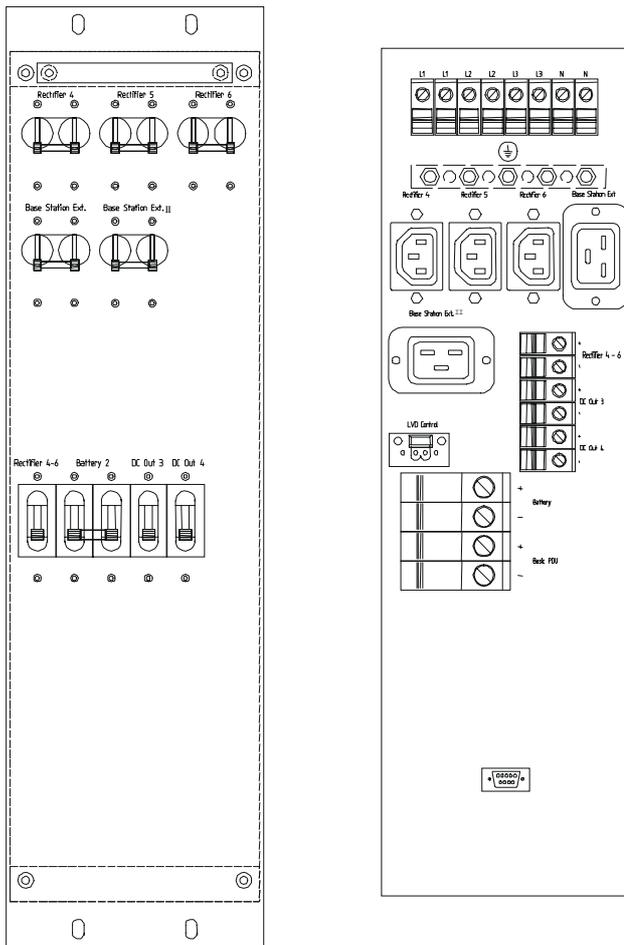
PDU extension for the extension cabinet does not incorporate a CSM module; it's functions are controlled by the Extratalk II / II+ extension PDU.

All PDU's are constructed from aluminium. They are designed to fit the support frames on the left side of the Extratalk II / II+ and extension cabinets, which are standard 19" 3HU racks.



DN98910678

Figure 1 Front and rear panel of Extratalk II / II+ PDU and extension PDU



DN98910681

Figure 2 Front and rear panel of Extratalk II / II+ PDU extension

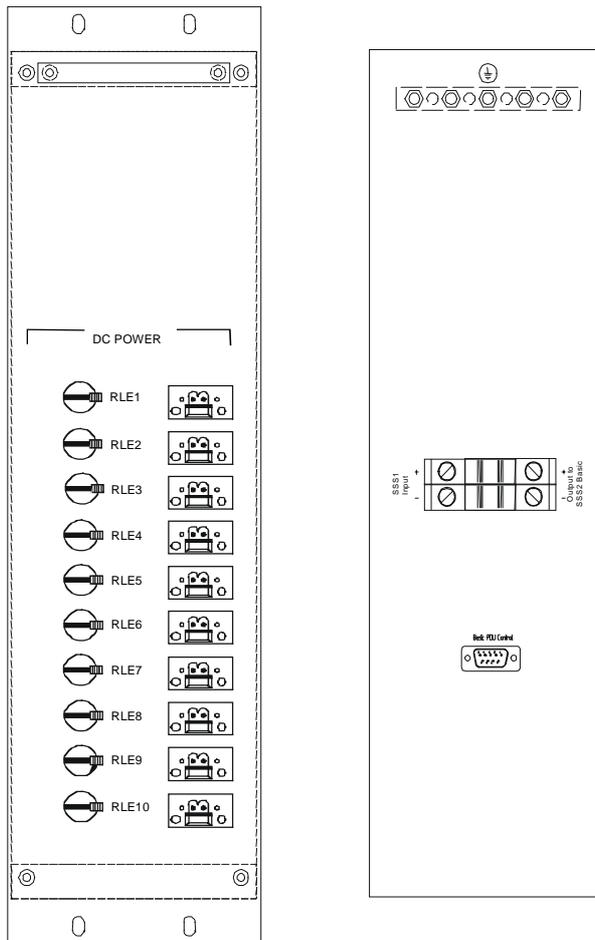


Figure 3 Front and rear panel of PDU extension for the Extratalk II / II+ extension cabinet

3. PDU TECHNICAL DESCRIPTION

3.1. Physical characteristics

3.1.1. Dimensions

The PDU is designed in accordance with standard 19" technology. It is mounted into the upper vertical 19" 3HU support frame on the left-hand side of the cabinet. The dimensions of the PDU are as follows:

Height	19" (frontplate)
Width	3 HU (frontplate)
Depth	310 mm (12.2in) (Unit body)

3.1.2. Fixing of the PDU

The PDU is fixed to the upper vertical 19" support frame on the left-hand side of the cabinet with four M6 screws, through four holes provided in the PDU front panel. The position of the holes is in accordance with standard 19" technology. The screws are fitted with plastic washers to protect the front panels from scratches.

The position of the PDU fixing holes is shown in Figure 4.

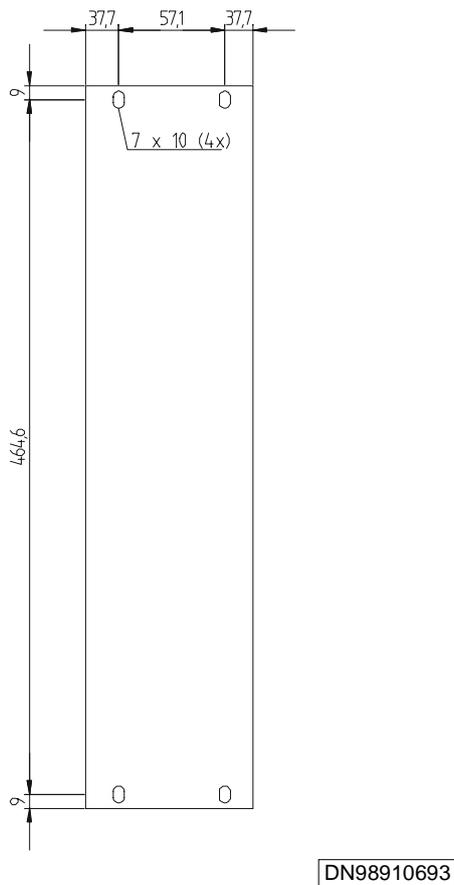


Figure 4 PDU fixing points

3.1.3. Material and finishing

The materials used in the construction of the PDU are chosen for their strength, durability and suitability for their intended task. Materials are treated with surface protection for salt spray resistance wherever necessary.

3.2. Electrical characteristics

3.2.1. AC power

The unit receives the incoming AC mains supply and distributes it to the AC loads.

3.2.1.1. Incoming mains supply

A mains disconnect switch and branch circuit protection must be fitted in the wall mounted electrical distribution box for the Extratalk II / II+.

In accordance with ETS 300 132-1, the nominal value of the supply voltage is a 3-phase supply of 230 / 240 VAC. A similar single-phase supply can be used if the mains terminals are bridged as shown in Figure 6. The power factor correction is better than 0.90. The power efficiency is greater than 0.90.

The service voltage range is (phase to neutral) 207 to 253 VAC.

The standard frequency range for the normal service voltage range above is 48 to 52 Hz. The unit can be connected to the following AC power systems:

- TN-S Power System.
- TN-C-S Power System. The Neutral and the PE need to be split in the wall distribution box.
- TT Power System. The complete site needs a separate earth, which needs to be connected to the Extratalk II / II+ PDU. The wall distribution box must contain any safety equipment additionally required (FI, FU).
- IT Power System. The unit is connected to an IT power system when the wall distribution box contains the required safety measures (isolation monitor).

The Extratalk II / II+ is capable of withstanding, without damage, voltages of up to 300Vac for 10 minutes and voltages up to 345Vac for 400ms, and is capable of correct operation when subjected to AC voltage fluctuations as follows:

Static tolerance:	+/- 10%
For <500ms with respect to the RMS value:	+/-15%
For <2ms with respect to the RMS value:	+/-40%

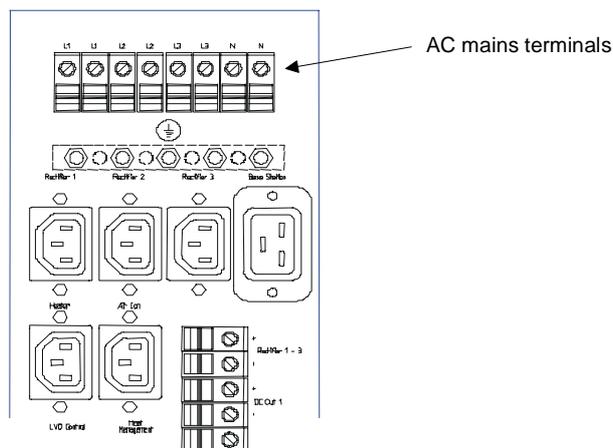
As an option, surge arrestors may be fitted inside the PDU for overvoltage protection.

If an Extratalk II / II+ extension cabinet is fitted, the AC mains supply is connected to the extension PDU, and then routed to the PDU.

3.2.1.2. AC mains interface

The PDU provides screw type terminals on the back panel in order to receive the incoming mains cable. Cable fixing is provided in the Extratalk II / II+ cabinet.

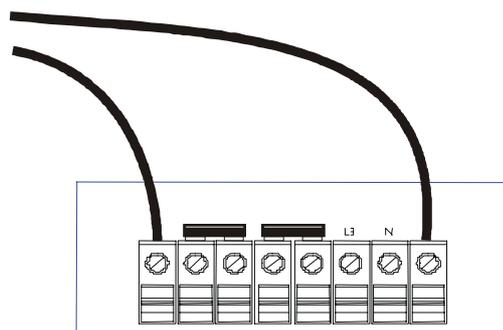
Connection points for the optional PDU extension unit are also provided.



DN98910709

Figure 5 AC mains terminals

Bridging of the mains terminals is required if the power supply is single phase, rather than 3-phase. The bridging should be carried out as shown in Figure 6.

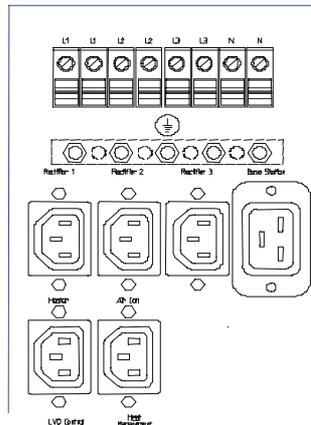


DN98910712

Figure 6 Single phase bridging

3.2.1.3. AC power distribution

The AC power supplied to the PDU is distributed to the AC outlets via circuit breakers located on the PDU front panel. If a breaker trip is detected, it is reported to the CSM module of the PDU. The location of the AC outlets is shown in Figure 7.



DN98910736

Figure 7 Location of the AC outlets

3.2.1.4. Rectifier 1

An IEC 320 outlet for the Rectifier 1 is provided on the rear panel of the PDU. An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit. A clamp is provided on the back panel of the PDU to secure the plug to the connector.

3.2.1.5. Rectifier 2

An IEC 320 outlet for the Rectifier 2 is provided on the rear panel of the PDU. An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit. A clamp is provided on the back panel of the PDU to secure the plug to the connector.

3.2.1.6. Rectifier 3

An IEC 320 outlet for the Rectifier 3 is provided on the rear panel of the PDU. An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit. A clamp is provided on the back panel of the PDU to secure the plug to the connector.

3.2.1.7. Base Station

An IEC 320 outlet for the Base Station (Heater) is provided on the rear of the PDU. An in-series connected circuit double pole breaker, with a rated current of 16A, protects the circuit. A clamp is provided on the back panel of the PDU to secure the plug to the connector.

3.2.1.8. Heater

An IEC 320 outlet for the Extratalk II / II+ heater (located in the HMU) is provided on the rear of the PDU. An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit. This double pole breaker is named Heat Management on the PDU front panel, because, when the HMU fitted is an ACU, it also protects the ACU circuit. A clamp is provided on the back panel of the PDU to secure the plug to the connector.

The heater outlet is switched on and off, by the CSM module incorporated into the PDU, depending upon the actual temperature inside the cabinet and the values programmed into the CSM. The IEC outlet is connected to a relay fitted onto the CSM relay PCB.

3.2.1.9. ACU (compressor)

An IEC 320 outlet for the ACU (compressor) is provided on the rear of the PDU. An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit. A clamp is provided on the back panel of the PDU to secure the plug to the connector. This breaker is named Heat Management on the PDU front panel, because it also protects the heater circuit. A clamp is provided on the back panel of the PDU to secure the plug to the connector.

The ACU outlet is switched on and off, by the CSM module incorporated into the PDU, depending upon the actual temperature inside the cabinet and the values programmed into the CSM. The IEC outlet is connected to a relay fitted onto the CSM relay PCB.

3.2.1.10. Maintenance socket

A socket is fitted to the front panel of the PDU for maintenance purposes. The standard of socket is determined by the nationality of the site location, unless otherwise stated by the customer.

The maintenance socket is fitted to the PDU prior to its delivery to the customer.

An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit.

3.2.1.11. AC terminal maximum wire diameters

Table 1 shows the maximum diameter of wire which can be connected to the AC terminals. It is important that a sufficient diameter of cable is used in order to carry the required current.

Table 1 AC maximum wire cross sections

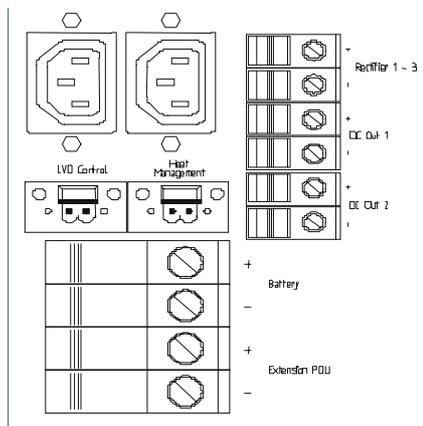
Connection Point	cross section multi stranded wire	cross section fine stranded wire
AC Input Terminals	16 mm ² AWG 6	10 mm ² AWG 6
IEC 320 Outlets	limited by the connector used	limited by the connector used

3.2.2. DC power

The PDU receives DC power from the rectifiers and distributes it to the DC loads. Connection points for the PDU extension unit, which provides additional DC distribution, are provided.

3.2.2.1. Incoming DC

The PDU provides screw type terminals on the back panel in order to receive the incoming DC from the rectifiers, as shown in Figure 8.



DN98910748

Figure 8 Location of the DC terminals

The unit receives positive and negative lines from a maximum of three rectifiers.

The rectifier input is protected by an in-series connected circuit breaker, in the negative line, located on the PDU front panel. The circuit breaker is rated at 70A.

3.2.2.2. DC power distribution

The incoming DC Power is distributed to screw terminals via circuit breakers. If a breaker trip is detected, it is reported to the CSM module of the PDU. The PDU contains the following DC outlets:

3.2.2.3. DC output 1

Two feed-through screw terminals for the BTS are provided on the rear panel of the PDU. The circuit is protected by an in-series connected circuit breaker with a rated current of 70A.

If an Extratalk II / II+ extension is fitted, DC output 1 connects to the DC inputs of the Extratalk II / II+ extension PDU.

3.2.2.4. DC output 2

Two feed-through screw terminals for the BTS are provided on the rear panel of the PDU. The circuit is protected by an in-series connected circuit breaker with a rated current of 70A.

3.2.2.5. Heat Management Unit

A two pin connector for the HMU is provided on the rear panel of the PDU. The circuit is protected by an in-series connected circuit breaker with a rated current of 6A.

3.2.2.6. Battery

Two feed-through screw terminals for the battery are provided on the rear of the PDU. An in-series connected circuit double pole breaker, with a rated current of 100A, protects the circuit.

In case of battery operation and battery voltage decreasing below the value programmed in the CSM module of the PDU, this circuit is disconnected using a LVD, by means of a signal from the CSM module of the PDU

3.2.2.7. PDU extension

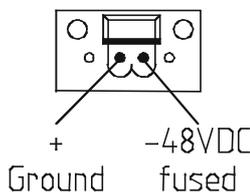
Two feed-through screw terminals for the optional PDU extension are provided on the rear panel of the PDU. The circuit needs no protection. These terminals are directly connected to the DC busbars in the PDU.

3.2.2.8. Radio Link Equipment

Six Phoenix DFK MSTB 2,5 two pin connectors are provided on the front panel of the PDU for feeding the RLE with DC power, as shown in Figure 9 and Figure 10. The RLE 1 to RLE 5 circuits are protected by an in-series connected fuse, with a rated current of 3A. It is possible to upgrade this protection to 6A. RLE 6 circuit is protected by an in-series connected circuit breaker or fuse, with a rated current of 6A.

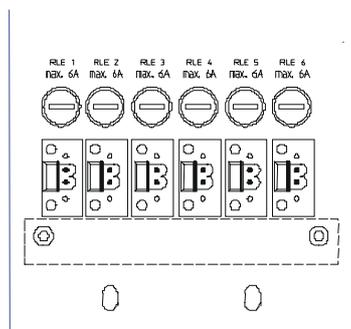
Special cable clamps on the terminals are provided to secure the plugs.

Customer equipment other than RLEs, such as LTEs, can also be fed using these connectors.



DN98910857

Figure 9 RLE connector pin assignment



DN98910884

Figure 10 Location of the DC outlets for RLE

3.2.2.9. DC terminal maximum wire diameters

Table 2 shows the maximum and minimum diameters of wire which can be connected to the DC terminals. It is important that a sufficient diameter of cable is used in order to carry the required current:

Table 2 DC maximum wire cross sections

Connection Point	cross section multi stranded wire	Cross section fine stranded wire
DC Input Terminals Rectifiers	16 mm ² AWG 6	10 mm ² AWG 6
DC Terminals DC OUT 1 / 2	16 mm ² AWG 6	10 mm ² AWG 6
DC Terminals Heat Exchanger / RLE	2,5 mm ² AWG 12	2,5 mm ² AWG 12
DC Terminals Battery	35 mm ² AWG 2	25 mm ² AWG 2
DC Terminals Extension	35 mm ² AWG 2	25 mm ² AWG 2

3.3. Control functions

3.3.1. Introduction to the CSM module

The PDU houses the Cabinet System Management (CSM) module. The CSM module provides all the necessary monitoring and control required for Extratalk II / II+ battery & power management, climatic control and alarm sensor reporting, as shown in Table 3.

The basic operation of the CSM module is to control the voltage level output by the rectifiers dependent on battery temperature and battery charge state. Also, the CSM module monitors the internal cabinet temperature and controls the HMU fitted.

In addition to the above, the CSM module monitors the cabinet alarms input, and outputs alarms to the BTS, via the RS232 interface.

The CSM module monitors sensors located within the Extratalk II / II+ cabinet, and acts upon these to control the necessary functions.

The CSM module can be programmed either during production or updated at site using a lap top with a flash loader and application programme loaded. Versions are available to enable the CSM module to be configured remotely.

Table 3 BTS Alarm and Control Interface

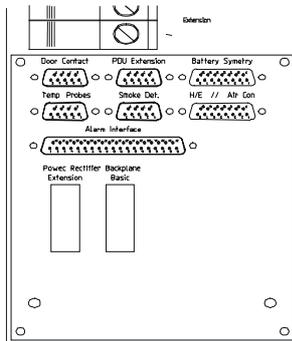
Signal	Direction	Function
LBW_Alarm	To BTS	This signal is active when the Battery Supply voltage falls below the user programmable level (7996).
C_C_Alarm	To BTS	This signal is active when a failure in the Climatic Control Module has been detected (7874).
Smoke_Alarm	To BTS	This signal is active when the cabinet smoke alarm has been triggered (7882).
Rectifier_Alarm	To BTS	This signal is active when a failure in one or more of the rectifiers is detected (7997).
Door_Alarm	To BTS	This signal is active when the cabinet door is opened (7870).
AC_Alarm	To BTS	This signal is active when an AC supply failure is detected (7995).
Low_Temp_Alarm	To BTS	This signal is active when the cabinet temperature falls below the user programmable level (7873).
High_Temp_Alarm	To BTS	This signal is active when the cabinet temperature rises above the user programmable level (7872).
Site_Support	From BTS	This signal causes a back-up battery test.

3.3.2. CSM module interfaces

The CSM interface location is shown in Figure 11. A block diagram of the CSM module is shown in Figure 12.

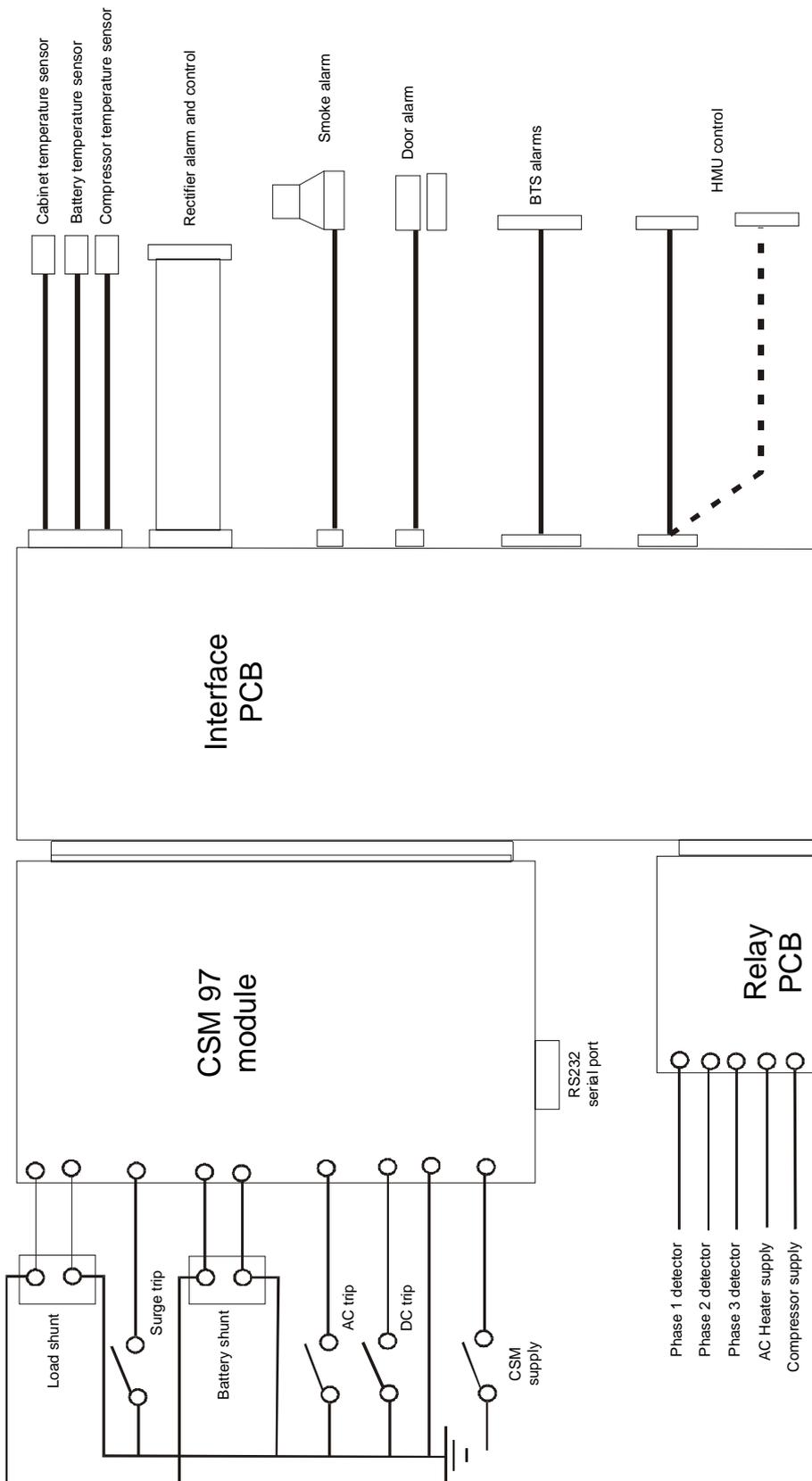
The CSM module PCB interacts with the various cabinet systems via two other interface cards, the first being the relay PCB, which interfaces via opto isolators, and the second being the interface PCB, which cross connects the CSM interfaces

with the various cabinet functions. All of these PCB modules are located within the PDU.



DN98911089

Figure 11 CSM interface location on PDU rear panel



DN98910939

Figure 12 CSM module interfaces

3.3.3. Rectifier interfaces

3.3.3.1. Basic interface

A rectifier module interface consists of six opto-isolator coupled alarm inputs, a single analogue voltage control output and a single opto-isolator coupled output for rectifier on/off control, located on the rear panel of the PDU, as shown in Figure 11. Separate interfaces are fitted for the rectifier basic backplane and the extension backplane.

A 20 way male ribbon cable connector is provided to interface to each of the rectifier backplanes. The pin assignment for both connectors is as follows:

Table 4 PDU rectifier pin assignment

Pin No.	Signal
1	± 5 V (referenced to positive) Output Voltage Adjustment
2	0 to 6 V (referenced to negative) Output Voltage Adjustment
3	NOC
4	NOC
5	NOC
6	-48VDC (reference for pin 2)
7	NOC
8	Rectifier 1 / 4 Alarm
9	Rectifier 2 / 5 Alarm
10	Rectifier 3 / 6 Alarm
11	NOC
12	NOC
13	NOC

Pin No.	Signal
14	NOC
15	NOC
16	+48VDC (reference for pin 1, 8, 9, 10,11, 12 & 13)
17	NOC
18	NOC
19	NOC
20	NOC

3.3.3.2. Temperature compensation operation

During normal operation the CSM adjusts the rectifier module voltage output by varying the control voltage according to the battery manufacturers recommended temperatures and charge rates. This value is programmable.

See section 3.3.4.5 for the battery temperature sensor location.

3.3.3.3. Current limit operation

The CSM monitors the battery charge current if the current limit is enabled. This varies the rectifier module voltage, so that the charge current is kept within the set value. The default operation is that the charge current is kept within 20% of the nominal battery capacity fitted. This function overrides the temperature compensation operation and is programmable.

3.3.3.4. Alarm interface

The CSM continuously monitors the alarms output via the rectifier. These alarms are mapped to the BTS alarm interface. Dependent on the number and type of rectifiers fitted, the CSM maps the alarms to the three charging failure alarms at the BTS alarm interface.

3.3.3.5. Low Voltage Disconnects

The CSM module outputs opto-isolated signals to the LVD contacts fitted within the PDU. The CSM module monitors the battery voltages and, in the event that the supply voltage drops below the programmed level (factory default 39V), causes those batteries to be disconnected from the load.

The batteries are not reconnected until the supply voltage is above 50V.

This interface is entirely programmable and may be changed to a time function rather than a voltage function.

3.3.3.6. Low battery warning

The CSM monitors the battery voltage, and in the event the voltage falls below the programmed limit (factory default 45V), a low battery warning alarm is output to the BTS alarm interface.

3.3.3.7. Battery symmetry measurement

A 15 pin D sub-miniature male connector is provided to allow optional measurement of battery symmetry. Pin assignments are as follows:

Table 5 PDU battery pin assignment

Pin No.	Signal
1	- pole
2	NOC
3	+ 12V
4	NOC
5	+ 24V
6	NOC
7	+ 36V
8	+ 48V
9	NOC

Pin No.	Signal
10	NOC
11	NOC
12	NOC
13	NOC
14	NOC
15	NOC

3.3.4. Heat Management Unit interface

3.3.4.1. Basic interface

The HMU interface consists of two opto-isolated PWM signals output to HMU, two opto-isolated tacho signals input from the HMU and, via the CSM relay PCB, a switched AC heater supply.

The CSM module of the PDU continuously monitors the cabinet temperature and adjusts the internal fan speed; external fan speed and AC heater enable dependent on the temperature.

A 15 pin D sub-miniature female connector is provided to interface to the HMU. Pin assignments are as follows:

Table 6 PDU HMU pin assignment

Pin No.	Signal
1	Tacho Signal Fan 1
2	Tacho Signal Fan 2
3	PWM Signal Fan 1
4	PWM Signal Fan 2
5	Compressor Safety Control

Pin No.	Signal
6	+ 5 VDC
7	Compressor Temperature
8	GND
9	-48VDC
10	NOC
11	NOC
12	NOC
13	NOC
14	NOC
15	NOC

3.3.4.2. Internal fan operation

The internal fan speed is set to 50% for temperatures below the internal fan set point temperature. When the temperature increases, the internal fan speed is increased linearly, until 100% fan speed is achieved at 10°C (50°F) above the internal fan set point temperature.

When the temperature decreases, the fan speed is reduced until the set point is reached and the fan speed maintains a constant 50% speed again.

During this time, the CSM module monitors the fan tacho output and, if the fan stops, causes a heat control unit alarm to be sent to the BTS. The CSM module will continuously try to restart the fan in the event of detecting a failure condition.

The internal fan set point temperature is programmable.

3.3.4.3. External fan operation

The external fan is turned off for temperatures below the external fan set point temperature. When the temperature increases above the external fan set point, the fan is switched on. The external fan speed is increased linearly from 50%, until

100% fan speed is achieved at 10°C (50°F) above the external fan set point temperature.

When the temperature decreases, the fan speed is reduced until the set point is reached and the fan is switched off.

The external fan set point temperature is programmable.

3.3.4.4. AC heater operation

The CSM module monitors the cabinet temperature and if it falls below a predetermined level, switches on the AC heater located within the HMU.

Once the temperature returns to above the predetermined level, the heater is switched to off.

If the temperature continues to fall to below a second a predetermined level, a low cabinet temperature alarm is generated.

The AC heater set point temperature and the low temperature alarm are programmed at a factory determined value.

3.3.4.5. Temperature sensors

A 9 pin female D sub-miniature connector is provided to interface to the temperature sensors. Pin assignments are as follows:

Table 7 PDU temperature sensor pin assignments

Pin No.	Signal
1	+5VDC
2	GND
3	NOC
4	+5VDC
5	GND
6	Cabinet Temperature Signal
7	NOC

Pin No.	Signal
8	NOC
9	Battery Temperature Signal

3.3.4.6. Low temperature alarm

The CSM module monitors the cabinet temperature and if it falls below a programmed limit (factory default 5°C (40°F)) then the alarm is output to the BTS alarm interface.

3.3.4.7. High temperature alarm

The CSM module monitors the cabinet temperature and if it rises above a programmed point (factory default 55°C (131°F)) then the alarm is output to the BTS alarm interface.

3.3.5. Smoke alarm

3.3.5.1. Basic interface

The CSM module provides a 24V switched supply to the cabinet smoke detector and monitors the alarm output from the smoke alarm. The smoke alarm is processed prior to output to the BTS alarm interface.

A 9 pin female D sub-miniature connector is provided to interface to the smoke detector. Pin assignments are as follows:

Table 8 PDU smoke detector pin assignment

Pin No.	Signal
1	NOC
2	NOC
3	Smoke Alarm Signal
4	NOC
5	NOC

Pin No.	Signal
6	NOC
7	- 24VDC
8	- 48VDC
9	NOC

3.3.5.2. Smoke alarm operation

The CSM module supplies the smoke alarm 24V supply, until such time that smoke is detected. The smoke alarm is then interrupted, thus causing the smoke alarm to be reset. This has the effect of switching the LED of the smoke alarm on and off to show correct operation of the CSM module.

If the alarm is valid then the smoke alarm is not a false alarm and is output via the BTS alarm interface.

3.3.6. Door alarm

3.3.6.1. Basic interface

The CSM module monitors the door alarm, which is a close contact to ground input. The alarm is always monitored and passes directly to the BTS alarm interface when activated, as well as the CSM module.

A 9 pin female D sub-miniature connector is provided to interface to the door contact. Pin assignments are as follows:

Table 9 PDU door alarm pin assignment

Pin No.	Signal
1	NOC
2	NOC
3	NOC
4	NOC

Pin No.	Signal
5	NOC
6	NOC
7	+48VDC
8	Door Contact Return
9	NOC

3.3.6.2. Door alarm operation

The door alarm is generated when the cabinet door is opened.

3.3.7. PDU alarms

3.3.7.1. Basic interface

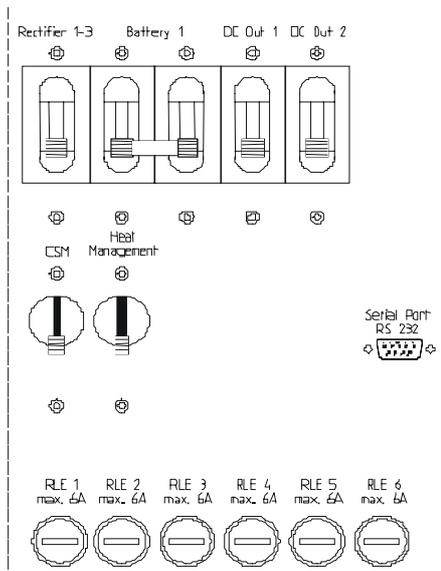
The CSM module monitors the alarms contained within the PDU. The alarms consist of the phase failure alarms (mains breakdown), AC breaker alarm, DC breaker alarm and surge arrestor trip alarm (if fitted).

3.3.7.2. Operation

All alarms are active to ground and if opened cause an alarm signal to be generated. The CSM module of the PDU monitors all alarms. As standard, only the mains breakdown alarms are mapped to the BTS alarm interface. It is possible to map all the alarms to the BTS interface if required.

3.3.8. Serial Port

A 9 pin female D sub-miniature connector is fitted on the front panel of the PDU, providing a RS232 compatible interface for connection to a PC, in order to read alarms and set the system parameters. The location of the interface is shown in Figure 13.



DN98911123

Figure 13 RS 232 Interface Location

Pin assignment is as follows:

Table 10 PDU serial port pin assignment

Pin No.	Signal
1	DCD (Data Carrier Detect)
2	RXD (Receive Data)
3	TXD (Transmit Data)
4	NOC
5	GND
6	NOC
7	RTS (Ready To Send)
8	CTS (Clear To Send)
9	RI (Ring Indicator)

3.3.9. Alarm interface

A 37 pin female D sub-miniature connector is provided at the rear of the PDU for connection of the alarm cable to the BTS. The CSM module provides all alarms currently used by the 3rd Generation BTS and is capable of upgrade by software upload to support further alarms. Pin assignments are as follows:

Table 11 PDU alarm interface pin assignment

Pin No.	Signal
1	Digital Ground
2	Door Alarm
3	Charging Failure
4	Low Battery Warning
5	Support Mode Signal (Battery Test)
6	Low Temperature Warning
7	High Temperature Warning
8	HCU Fault Support 1
9	NOC
10	Support 2 Alarm 61 out
11	Support 2 Alarm 56 out
12	Support 2 Alarm 57 out
13	Support 2 Alarm 58 out
14	NOC
15	Charging Failure
16	Smoke Alarm

Pin No.	Signal
17	Support 2 Alarm 65 out
18	AC Failure Phase 1
19	AC Failure Phase 2
20	AC Failure Phase 3
21	Charging Failure
22	Support 2 Alarm 61 in
23	Support 2 Alarm 56 in
24	Support 2 Alarm 57 in
25	Support 2 Alarm 58 in
26	Digital Ground
27	Digital Ground
28	Digital Ground
29	Digital Ground
30	Digital Ground
31	Support 2 Alarm 65 in
32	+5VDC
33	+5VDC
34	+5VDC
35	NOC

Pin No.	Signal
36	NOC
37	NOC

It is possible to configure alarm parameters either in the factory or at the site, or by an optional remote link.

3.3.10. PDU extension

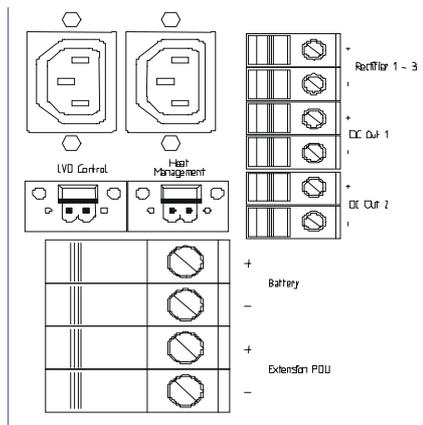
A 9 pin male D sub-miniature connector is provided at the rear of the PDU to interface to the PDU extension. Pin assignments are as follows:

Table 12 PDU to PDU extension pin assignment

Pin No.	Signal
1	DC Breaker trip 1
2	DC Breaker trip 2
3	AC Breaker trip 1
4	AC Breaker trip 2
5	Battery Shunt -
6	Battery Shunt +
7	Load Shunt -
8	Load Shunt +
9	NOC

3.3.11. Rectifier control

A two pin connector is provided on the rear panel of the PDU, as shown in Figure 14. This connector, known as LVD contact, is connected to the LVD contact connector of the extension PDU, via an LVD cable, allowing the CSM module of the PDU to interface with the PDU extension over rectifier management.



DN98910748

Figure 14 LVD control interface on the rear panel of the PDU

3.3.12. CSM module operation

3.3.12.1. Normal operation

During operation the CSM module monitors and provides the functions and controls for the interfaces as described. In the event of an alarm condition, the CSM module outputs the alarm to the BTS interface.

In the event that the AC mains fails or the rectifier module fails, the CSM module outputs the alarms to the BTS alarm interface and enters the battery backup mode of operation.

3.3.12.2. Battery backup mode operation

In this mode, the CSM module monitors the system supply voltage and when the low battery warning level is reached, outputs a low battery warning to the BTS alarm interface.

Once the system supply voltage falls below the low voltage disconnect level, the CSM module disconnects the battery supply from the load.

The supply is not reconnected until the system voltage is above 50V.

If the Extratalk II / II+ extension is fitted, the CSM module also monitors the voltage or elapsed time, and will disconnect the Extratalk II / II+ extension and its internal RLE's when a second set level is reached.

3.3.12.3.Site support mode

During normal operation the CSM continuously monitors the BTS signal to determine if a battery backup test is required.

When the signal becomes active, the rectifier module output voltage is reduced by the CSM module to below the low battery warning level. The CSM monitors the system supply voltage until the low battery warning level is reached. At this point the low battery warning level is set to the BTS, the voltage from the rectifiers is increased to the desired voltage, dependent on temperature or current limit (which ever is the lesser of the two), and normal operation is resumed.

3.3.12.4.Automated site support mode

If enabled, the CSM continuously monitors the RTC time. When the RTC time is equal to the site support time the CSM performs a site support test as described above, but does not indicate to the BTS when the low battery warning level has occurred. The discharge capacity is then stored for later retrieval and normal operation resumes.

3.3.12.5.Programme load mode

The CSM module programme may be changed at site by using a programme loader to update the site parameters or site algorithm if required. In this mode, the loader contained in OTP is executed and the new algorithm/parameters are uploaded and written to the flash loader.

The flash loader is password protected to avoid spoofing of the system.

The following parameters are programmable by the PDU:

- Temperature compensation rate
- Maximum battery charge rate
- Cabinet high temperature alarm setting
- Cabinet low temperature alarm setting
- Low battery warning level
- Low voltage disconnect

The PDU can hold up to 14 alarm status reports, which can be retrieved by the system maintainer.

4. PDU EXTENSION TECHNICAL DESCRIPTION

4.1. Physical characteristics

4.1.1. Dimensions

The PDU extension is designed in accordance with standard 19" technology. It is mounted into the lower vertical 19" 3HU support frame on the left-hand side of the cabinet. The dimensions of the PDU extension are as follows:

Height	19" (frontplate)
Width	3 HU (frontplate)
Depth	310 mm (12.2in) (Unit body)

4.1.2. Fixing of the PDU extension

The PDU is fixed to the lower vertical 19" support frame on the left-hand side of the cabinet with four M6 screws, through four holes provided in the PDU extension front panel. The position of the holes is in accordance with standard 19" technology. The screws are fitted with plastic washers to protect the front panels from scratches.

The position of the PDU extension fixing holes is the same as for the PDU shown in Figure 4.

4.1.3. Material and finishing

The materials used in the construction of the PDU extension are chosen for their strength, durability and suitability for their intended task. Materials are treated with surface protection for salt spray resistance wherever necessary.

4.2. Electrical characteristics

4.2.1. AC power

The unit receives the incoming mains supply from the basic PDU and distributes it to the AC loads.

4.2.1.1. AC mains interface

The PDU extension is fitted with screw type terminals on the rear panel in order to receive the incoming mains cable coming from the basic PDU. Cable fixing is provided in the Extratalk II / II+ cabinet.

The location of the AC mains terminals is as for the PDU shown in Figure 5.

Bridging of the mains terminals is required if the power supply is single phase, rather than 3-phase. The bridging should be carried out as for the PDU shown in Figure 6.

4.2.1.2. AC power distribution

The incoming AC power is distributed to standard IEC 320 sockets via circuit breakers fitted to the PDU extension front panel. If a breaker trip is detected, it is reported to the CSM module of the PDU. The location of the AC outlets is shown in Figure 15.

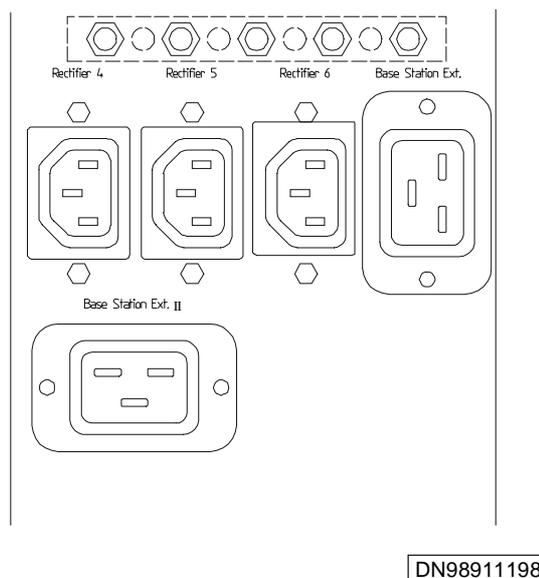


Figure 15 Location of the AC outlets

4.2.1.3. Rectifier 4

An IEC 320 outlet for the Rectifier 4 is provided on the rear panel of the PDU extension. An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit. A clamp is provided on the back panel of the PDU extension to secure the plug to the connector.

4.2.1.4. Rectifier 5

An IEC 320 outlet for the Rectifier 5 is provided on the rear panel of the PDU extension. An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit. A clamp is provided on the back panel of the PDU extension to secure the plug to the connector.

4.2.1.5. Rectifier 6

An IEC 320 outlet for the Rectifier 6 is provided on the rear panel of the PDU extension. An in-series connected circuit double pole breaker, with a rated current of 10A, protects the circuit. A clamp is provided on the back panel of the PDU extension to secure the plug to the connector.

4.2.1.6. Base Station Extension

An IEC 320 outlet for an additional BTS cabinet is provided on the rear panel of the PDU extension. The circuit is protected by an in-series connected double pole circuit breaker, with a rated current of 16A. A clamp is provided on the back panel of the PDU extension to secure the plug to the connector.

4.2.1.7. Base Station Extension II

An IEC 320 outlet for the BTS extension II is provided on the rear panel of the PDU extension. The circuit is protected by an in-series connected double pole circuit breaker, with a rated current of 16A. A clamp is provided on the back panel of the PDU extension to secure the plug to the connector.

4.2.1.8. AC terminal maximum wire diameters

The following table shows the maximum diameters of wire which can be connected to the AC terminals. It is important that a sufficient diameter of cable is used in order to carry the required current:

Table 13 AC terminal maximum wire cross sections

Connection Point	cross section multi stranded wire	cross section fine stranded wire
AC Input Terminals	16 mm ² AWG 6	10 mm ² AWG 6

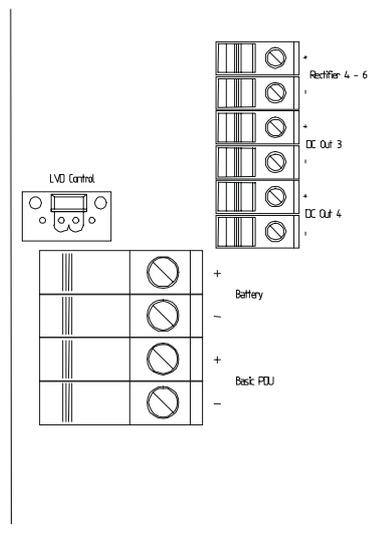
Connection Point	cross section multi stranded wire	cross section fine stranded wire
IEC 320 Outlets	limited by the connector used	limited by the connector used

4.2.2. DC power

The PDU extension receives DC power from the rectifiers and distributes it to the DC loads. A connection point to the basic PDU is provided.

4.2.2.1. Incoming DC

The PDU extension is provided with screw type terminals on the rear panel in order to receive the incoming DC from the rectifiers, as shown in Figure 16.



DN98911205

Figure 16 Location of DC terminals

The unit receives positive and negative lines from a maximum of three rectifiers.

The rectifier input is protected by an in-series connected double pole circuit breaker, in the negative line, located on the PDU extension front panel. The circuit breaker is rated at 70A. The positive lines are connected together.

4.2.2.2. DC power distribution

The incoming DC Power is distributed to screw terminals via circuit breakers. If a breaker trip is detected, it is reported to the CSM module of the basic PDU. The PDU extension contains the following DC outlets:

4.2.2.3. DC Out 3 / DC Out 4

Four feed through screw terminals for the DC Out 3 and the DC Out 4 are provided on the rear panel of the PDU extension. The circuits are protected by an in-series connected circuit breaker with a rated current of 70 A.

4.2.2.4. Battery

Four feed-through screw terminals for the battery are provided on the rear panel of the PDU extension. The circuit is protected by an in-series connected double pole circuit breaker, with a rated current of 100A.

In case of battery operation and battery voltage decreasing below the value programmed in the CSM module of the basic PDU, this circuit is disconnected using a LVD, by means of a signal from the CSM module of the basic PDU.

4.2.2.5. PDU extension

Two feed-through screw terminals for connection to the basic PDU are provided on the rear panel of the PDU extension. The circuit needs no protection. These terminals are directly connected to the DC busbars in the PDU extension. A clamp is provided to secure the plug.

4.2.3. DC terminal maximum wire diameters

The following table shows the maximum diameters of wire which can be connected to the DC terminals. It is important that a sufficient diameter of cable is used in order to carry the required current:

Table 14 DC maximum wire cross sections

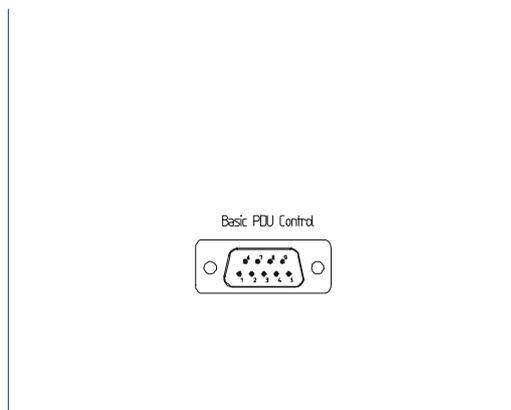
Connection Point	cross section multi stranded	cross section fine stranded
DC Input Terminals Rectifiers	16 mm ² AWG 6	10 mm ² AWG 6

Connection Point	cross section multi stranded	cross section fine stranded
DC Terminals Battery	35 mm ² AWG 2	25 mm ² AWG 2
DC Terminals Basic PDU	35 mm ² AWG 2	25 mm ² AWG 2

4.3. Control Functions

4.3.1. Basic PDU

A 9 pin female D sub-miniature connector is provided on the rear panel of the PDU extension, as shown in Figure 17, to interface to the CSM module incorporated into the basic PDU.



DN98911229

Figure 17 CSM interface on the rear panel of the PDU extension

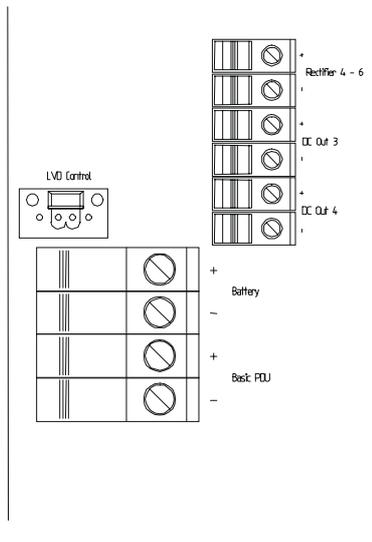
The CSM module of the PDU manages the power management and the alarm management functions of the PDU extension. Pin assignment are as follows:

Table 15 PDU extension to PDU pin assignment

Pin No.	Signal
1	DC Breaker trip 1
2	DC Breaker trip 2
3	AC Breaker trip 1
4	AC Breaker trip 2
5	NOC
6	NOC
7	Load Shunt -
8	Load Shunt +
9	NOC

4.3.2. Rectifier control

A two pin connector is provided on the rear panel of the PDU extension, as shown in Figure 18. This connector, known as LVD contact, is connected to the LVD contact connector of the basic PDU, via an LVD cable, allowing the CSM module of the basic PDU to interface with the PDU extension over rectifier management.



DN98911205

Figure 18 LVD control interface on the rear panel of the PDU extension

5. EXTENSION PDU TECHNICAL DESCRIPTION

The PDU fitted to the Extratalk II / II+ extension is identical to the Extratalk II / II+ PDU as described in section 3.

6. PDU EXTENSION FOR THE EXTENSION CABINET TECHNICAL DESCRIPTION

6.1. Physical characteristics

6.1.1. Dimensions

The PDU extension for the Extratalk II / II+ extension cabinet is designed in accordance with standard 19" technology. It is mounted into the lower vertical 19" 3HU support frame on the left-hand side of the extension cabinet. The dimensions of the extension PDU extension are as follows:

Height	19" (frontplate)
Width	3 HU (frontplate)
Depth	310 mm (12.2 in) (unit body)

6.1.2. Fixing of the extension PDU extension

The PDU extension for the extension cabinet is fixed to the lower vertical 19" support frame on the left-hand side of the cabinet with four M6 screws, through four holes provided in the extension PDU extension front panel. The position of the holes is in accordance with standard 19" technology. The screws are fitted with plastic washers to protect the front panels from scratches.

The position of the PDU extension for the extension cabinet fixing holes is the same as for the PDU shown in Figure 4.

6.1.3. Material and finishing

The materials used in the construction of the PDU extension for the extension cabinet are chosen for their strength, durability and suitability for their intended task. Materials are treated with surface protection for salt spray resistance wherever necessary.

6.2. Electrical characteristics

6.2.1. AC power

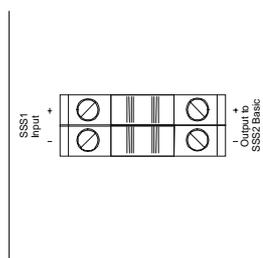
The unit does not require AC power.

6.2.2. DC power

The PDU extension for the extension cabinet receives DC power from the extension PDU. This is then distributed via DC breakers to the RLE's.

6.2.2.1. Incoming DC

The PDU extension for the extension cabinet is provided with screw type terminals on the rear panel in order to receive the incoming DC from the extension PDU, as shown in Figure 19.



DN9913359

Figure 19 Location of DC terminals

6.2.2.2. DC power distribution

Ten Phoenix DFK MSTB 2,5 two pin connectors are provided on the front panel of the PDU extension for the extension cabinet, for feeding the RLE with DC power, as shown in Figure 9 and Figure 3. The RLE 1 to RLE 9 circuits are protected by an in-series connected circuit breaker, with a rated current of 3A. The RLE 10 circuit is protected by an in-series connected circuit breaker, with a rated current of 8A.

Special cable clamps on the terminals are provided to secure the plugs.

6.2.2.3. DC terminal maximum wire diameters

The following table shows the maximum diameters of wire which can be connected to the DC input terminals. It is important that a sufficient diameter of cable is used in order to carry the required current:

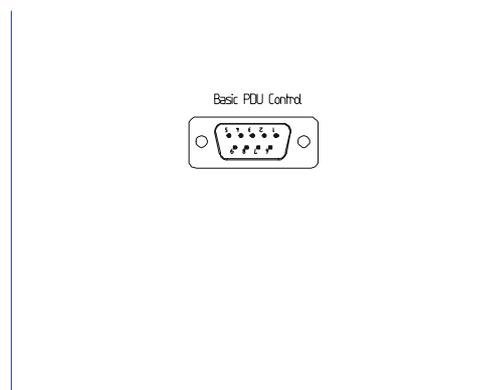
Table 16 DC maximum wire cross sections

Connection Point	cross section multi stranded	cross section fine stranded
DC Input Terminals	35 mm ² AWG 2	25 mm ² AWG 2

6.3. Control Functions

6.3.1. Extension PDU

A 9 pin female D sub-miniature connector is provided on the rear panel of the PDU extension for the extension cabinet, as shown in Figure 20, to interface to the CSM module incorporated into the extension PDU.



DN9913362

Figure 20 CSM interface on the rear panel of the PDU extension

The CSM module of the extension PDU manages the alarm management functions of the PDU extension for the extension cabinet. Pin assignment is as follows:

Table 17 PDU extension for the extension cabinet to extension PDU pin assignment

Pin No.	Signal
1	DC breaker trip 1

Pin No.	Signal
2	DC breaker trip 2
3	AC breaker trip 1
4	AC breaker trip 2
5	NOC
6	NOC
7	Load shunt -
8	Load shunt +
9	NOC

7. EMC

The Extratalk II / II+ and extension PDUs are designed to meet the performance and complied with the requirements of EMC Directive 89/336/EEC, and also Federal Communications Commission (FCC) regulations.

8. ENVIRONMENTAL

The Extratalk II / II+ and extension PDUs are compliant with the requirements of ETS 300 019-1-4 class 4.1 as specified in sections 8.1, 8.2 and 8.3.

8.1. High temperature

The Extratalk II / II+ and extension PDUs shall operate without degradation to performance when subjected to high air temperature of 40°C (104°F) for 16 hours as specified in ETS 300 019-1-4 class 4.1.

An additional test was carried out on the PDUs at high air temperatures of 50°C (122°F) for 16 hours. The PDUs operated without degradation to performance.

8.2. Low temperature

The Extratalk II / II+ and extension PDUs shall operate without degradation to performance when subjected to low air temperature of -33°C (-27.4°F) for 16 hours as specified in ETS 300 019-1-4 class 4.1.

8.3. Solar radiation

The Extratalk II / II+ and extension PDUs shall operate without degradation to performance when subjected to solar radiation energy of up to 1120W/m² when the external ambient temperature for the Extratalk II / II+ is +50°C (122°F).

9. SAFETY

The Extratalk II / II+ and extension PDUs meet EN60950, UL950 and the European Low Voltage Directive 73/23/EEC as amended by directive 93/68/EEC.

10. REFERENCES

- [1] Extratalk II Family Glossary DN9913156
- [2] Extratalk II Family Heat Management Unit Product Description DN9913195
- [3] Extratalk II Family Rectifier Module RM1100 and Backplane Product Description DN9913202
- [4] EN 60950 European Safety Standard
- [5] ETSI 300019 European Telecommunications Standard for Environments
- [6] UL 1950 Binational Standard for Safety covering UL and CSA requirements
- [7] IEC 950 International Safety Standard