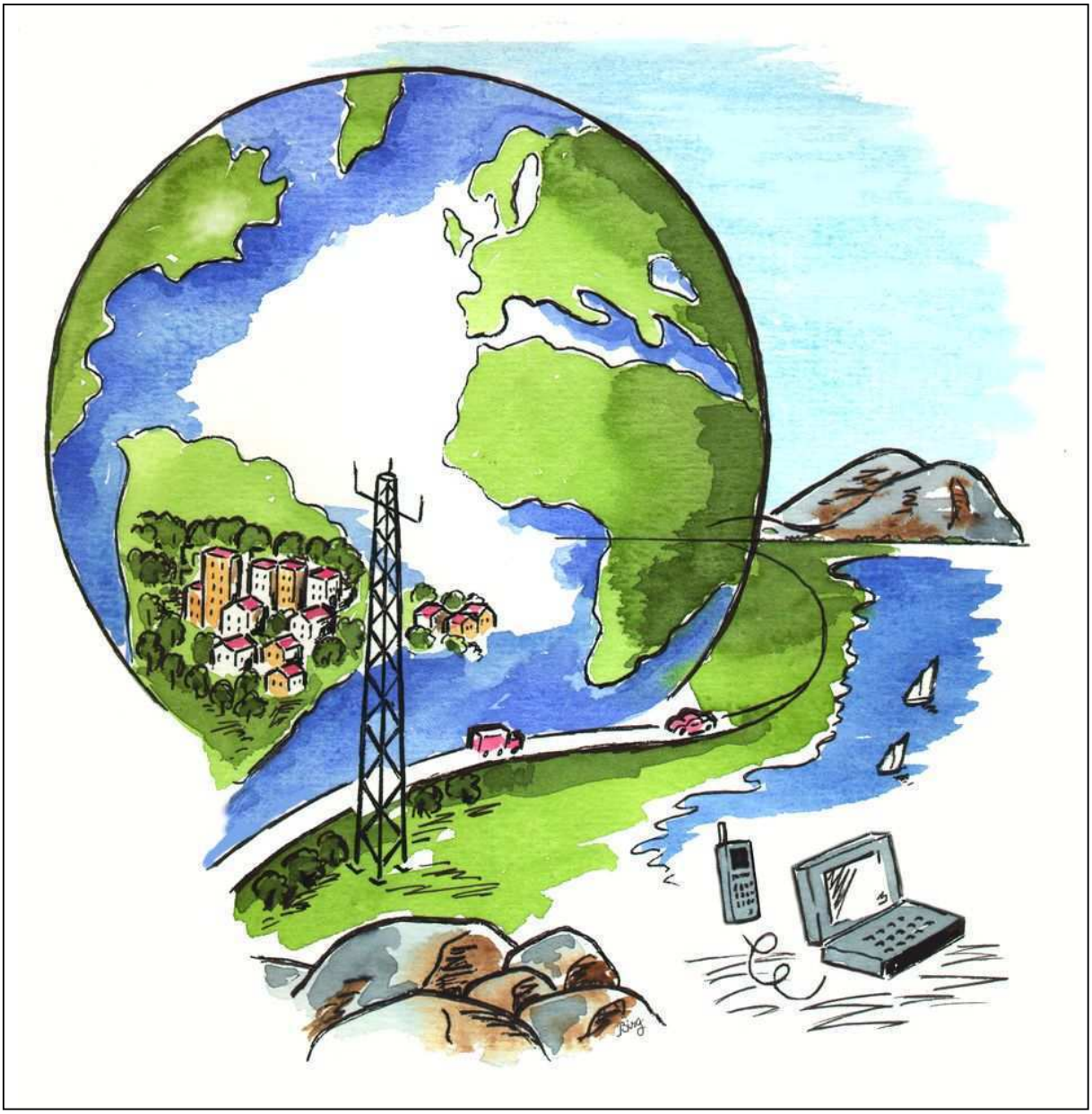

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Ericsson GSM System

RBS 2106, RBS 2206, RBS 2207
Hardware Reference Manual

ERICSSON

EN/LZT 720 0024 R7A

Doc nr: 3/001 59-EN/LZT 720 0024 Uen Rev G

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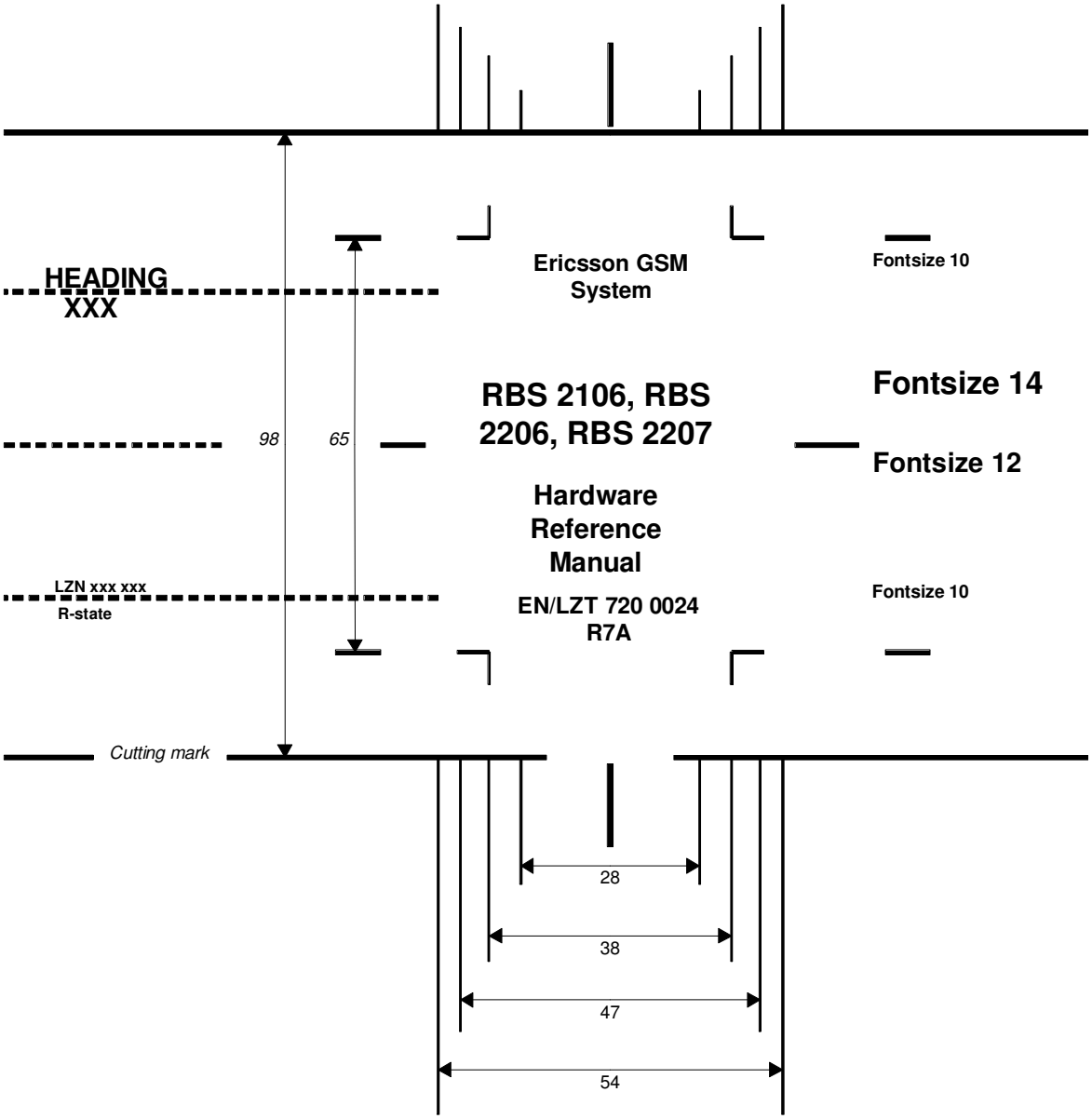

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CAPTION LIST

Document No.
001 59-EN/LZT 720 0024

RBS 2106, RBS 2206, RBS 2207 Hardware Reference Manual

Date	Rev
2004-02-13	D

Hardware Reference Manual RBS 2106, RBS 2206, RBS 2207

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Contents

1 Introduction

This Hardware Reference Manual is valid for the Ericsson GSM system.

1.1 Objectives

This manual describes the hardware for RBS 2106, RBS 2206 and RBS 2207, the Ericsson RBS 2000 Macro system based on 6 TRX and 12 TRX cabinets for GSM 800, E-GSM, P-GSM, GSM 1800 and GSM 1900. The manual is comprised of two parts; general chapters (which apply to all RBS 2000 cabinets) and product documents (which deal with specific RBS cabinets and replaceable units).

General Chapters

The general chapters, which apply to all RBS 2000 cabinets, are:

- Introduction
- RBS 2000 Product Safety Requirements
- Environmental Capabilities
- EMC Capabilities
- Glossary

Product Documents

The product documents are designed to be modular; that is, each is an independent CPI product. Updated versions of each product document can be downloaded from CPI Store and used to update the manual. The titles and product numbers are given in the table below.

Table 1 Product Documents

Title	Product Number
RBS 2106 Product Description	EN/LZT 720 0222
RBS 2206 Product Description	EN/LZT 720 0225
RBS 2207 Product Description	EN/LZT 720 0134
Radio Configurations, RBS 2106 and RBS 2206	EN/LZT 720 0318
Radio Configurations, RBS 2207	EN/LZT 720 0135
RBS 2106 Antenna Configurations	EN/LZT 720 0319

Table 1 Product Documents

Title	Product Number
RBS 2206 Antenna Configurations	EN/LZT 720 0320
RBS 2207 Antenna Configurations	EN/LZT 720 0136
ACCU-01, Description	EN/LZT 720 0229
ACCU-02, Description	EN/LZT 720 0230
ACCU-03, Description	EN/LZT 720 0484
ADM-01, Description	EN/LZT 720 0300
ASU, Description	EN/LZT 720 0232
BFU-21, Description	EN/LZT 720 0234
BFU-22, Description	EN/LZT 720 0276
CDU-F, Description	EN/LZT 720 0237
CDU-G, Description	EN/LZT 720 0236
CDU-J, Description	EN/LZT 720 0469
Combined Climate Unit, Description	EN/LZT 720 0239
CXU-10, Description	EN/LZT 720 0240
DCCU, Description	EN/LZT 720 0224
DCCU-02, Description	EN/LZT 720 0485
DC/DC Converter, Description	EN/LZT 720 0301
DC Filter for RBS 2106, Description	EN/LZT 720 0302
DC Filter-01 for RBS 2206, Description	EN/LZT 720 0241
DC Filter-04 for RBS 2207, Description	EN/LZT 720 0488
dTRU, Description	EN/LZT 720 0242
DXU-21, Description	EN/LZT 720 0244
FCU-01, Description	EN/LZT 720 0246
Heat Exchanger Climate Unit, Description	EN/LZT 720 0311
HCU, Description	EN/LZT 720 0449
IDM, Description	EN/LZT 720 0247
IDM-02, Description	EN/LZT 720 0380
PSU AC, Description	EN/LZT 720 0249
PSU DC, Description	EN/LZT 720 0248
TMA-CM, Description	EN/LZT 720 0250

1.2 Target Groups

Customers and Ericsson personnel involved in RBS activities.

1.3 RBS 2000 Library Overview

The Customer Product Information (CPI) for dTRU based RBS 2000 Macro comprises installation, test and maintenance, and reference manuals as well as spare parts catalogues.

For further information, see:

Library Overview *LZN 302 73*

1.4 Release History

Except editorial changes such as correction of spelling, grammar and layout, this manual has been revised as follows:

1.4.1 R6A to R7A

Chapters (documents) which have been added or updated for this release are listed in the table below.

Table 2 Revised or Updated Chapters (documents)

Title	New Revision No.	Reason for Revision
Environmental Capabilities	B	Added information about requirements.
EMC Capabilities	B	Added new references and removed old. Removed chapter 1.2 and 1.3.
RBS 2106 Product Description	R6A	Information about environment and TM added.
RBS 2206 Product Description	R6A	Information about hardware units, power consumtion and transmission changed.
RBS 2106 and RBS 2206 Radio Configurations, Description	R5A	Information about configurations and HCU added.

Table 2 Revised or Updated Chapters (documents)

Title	New Revision No.	Reason for Revision
RBS 2106 Antenna Configurations	R3A	Added new configurations.
RBS 2206 Antenna Configurations	R3A	Added new configurations.
ACCU-01, Description	R2A	Changed information in chapter 4.1.
ACCU-02, Description	R2A	Changed information in chapter 4.1.
ADM-01, Description	R2A	Changed information about voltage in chapter 3 and 4.1.
ASU, Description	R2A	Added information about sharing antennas.
BFU-21, Description	R2A	Changed information in chapter 1.1.
BFU-22, Description	R2A	Changed information in chapter 4.1.
CDU-F, Description	R3A	Changed information in chapter 1.1.
CDU-G, Description	R3A	Changed information in chapter 1.1.
Combined Climate Unit, Description	R2A	Added information about automatic voltage selection.
CXU-10, Description	R2A	Editorial changes.
DCCU, Description	R2A	Editorial changes.
DC/DC Converter, Description	R3A	Changed information in chapter 1.1 and removed a picture.
DC Filter for RBS 2106, Description	R2A	Added information about temperature sensor connector.
DXU-21	R3A	Added information for new DXU.
FCU-01, Description	R2A	Information about the new FCU added.
Heat Exchanger Climet Unit, Description	R2A	Changed information in about power consumtion and removed a picture.
HCU, Description	R2A	Removed information about GSM 1800 and 1900.
IDM, Description	R2A	Information added in chapter 3.
IDM-02, Description	R1B	Editorial changes.
PSU AC, Description	R2A	Removed chapter 1.2.

Table 2 Revised or Updated Chapters (documents)

Title	New Revision No.	Reason for Revision
PSU DC, Description	R2A	Removed information about voltage range.
TMA-CM, Description	R2A	Added information about dimensions.

1.4.2 R5A to R6A

Chapters (documents) which have been added or updated for this release are listed in the table below.

Table 3 Revised or Updated Chapters (documents)

Title	New Revision No.	Reason for Revision
RBS 2207 Product Description	R3A	New value for door project, 70 mm.
RBS 2106 and RBS 2206 Radio Configurations	R4A	Information about a new dTRU with internal switch added.
RBS 2207 Radio Configurations	R3A	Information about a new dTRU with internal switch added.
RBS 2207 Antenna Configurations	R2A	Information about CDU-J added.
CDU-J, Description	R1A	This chapter is new.
dTRU, Description	R2A	Information about new version of dTRU added.
ACCU-03, Description	R1A	This chapter is new.
DCCU-02, Description	R1A	This chapter is new.
DC Filter-04 for RBS 2207	R1A	This chapter is new.
DC Filter-01 for RBS 2206, Description	R2A	Removed information regarding RBS 2207.

1.4.3 R4A to R5A

P-GSM added for CDU-G.

1.4.4 R3A to R4A

Chapters (documents) which have been added or updated for this release are listed in the table below.

Table 4 Revised or updated chapters (documents)

Title	New Revision No.	Reason for Revision
RBS 2207 Product Description	R2A	This chapter is new.
RBS 2106, RBS 2206 Radio Configurations	R3A	Configurations have been added.
RBS 2207 Radio Configurations	R2A	This chapter is new.
RBS 2106 and 2206 Antenna Configurations	R2A	Configurations have been added.
RBS 2207 Antenna Configurations	R2A	This chapter is new.
IDM-02, Decription	R1A	This chapter is new.

1.4.5 R2A to R3A

Chapters (documents) which have been added or updated for this release are listed in the table below.

Table 5 Revised or Updated Chapters (documents)

Title	New Revision No.	Reason for Revision
RBS 2106 Product Description	R4A	Information has been added for the optional smoke detector. Information has been updated for cabinet weights.
RBS 2206 Product Description	R4A	Information has been added for the location of the TMA-CM, updated for the cabinet weights, and removed for the document tray..

Table 5 Revised or Updated Chapters (documents)

Title	New Revision No.	Reason for Revision
CDU-F, Description	R2A	The block diagram has been updated.
CDU-G, Description	R2A	The block diagram has been updated.
DXU-21, Description	R2A	Illustrations and the block diagram have been updated to reflect the new DXU-21 design.
HCU, Description	R1A	This chapter is new.

1.4.6 R1A to R2A

Chapters (documents) which have been added or updated for this release are listed in the table below.

Table 6 Revised or Updated Chapters (documents)

Title	New Revision No.	Reason for Revision
Radio Configurations, RBS 2106 and RBS 2206	R1A	Information has been added for CDU-G 1x4, 1x6 and 1+1+2 configurations. This chapter has been made into an independent CPI product.
RBS 2106 Antenna Configurations	R1A	Antenna connection field information has been updated for RF LMU connections. This chapter has been made into an independent CPI product.
RBS 2206 Antenna Configurations	R1A	This chapter has been made into an independent CPI product.
RBS 2106 Product Description	R3A	Information has been added for fuse requirements, ground leakage current, cable inlet measurements, acoustic dispersion, and the Heat Exchanger Climate Unit. Information has been updated for heat dissipation and RF LMU connections on the antenna connection field.

Table 6 Revised or Updated Chapters (documents)

Title	New Revision No.	Reason for Revision
RBS 2206 Product Description	R3A	Information has been added for ground leakage current and external earth fault circuit breakers. Information has been updated for fuse requirements, battery back-up, and heat dissipation.
ADM-01, Description	R1A	This chapter is new.
Combined Climate Unit, Description	R1B	The title has been changed from *RBS 2106 Climate Unit, Unit Description.*
DC/DC Converter, Description	R1A	This chapter is new.
DC Filter for RBS 2106, Description	R1A	This chapter is new.
DC Filter 01 for RBS 2206, Description	R1B	The title has been changed from *DC Filter 01, Unit Description.*
Heat Exchanger Climate Unit, Description	R1A	This chapter is new.
PSU DC, Description	R1B	Minor editorial changes have been made.

2 Product Safety Requirements RBS 2000

The purpose of this document is to specify the product safety requirements for RBS 2000.

2.1 References

73/23/EEC	Low Voltage Directive
CAN/CSA-C22.2	No 1-M94 Audio, Video and Similar Electronic Equipment
CAN/CSA-C22.2	No 950-95 Safety of Information Technology Equipment Including Electrical Business Equipment
EN 60950	Safety of Information Technology Equipment Including Electrical Business Equipment
IEC 215	Safety requirements for radio transmitting equipment
IEC 529	Classification of degrees of protection provided by enclosures (IP Code)
IEC 60950	Safety of Information Technology Equipment Including Electrical Business Equipment
UL 1419	Standard for Professional Video and Audio Equipment
UL 1950	Safety of Information Technology Equipment Including Electrical Business Equipment

2.2 Product Safety

This part of the document defines the electrical, mechanical, heat and fire safety requirements for the Radio Base Station.

General

The RBS is designed to comply with the following international standards:

- 73/23/EEC Low Voltage Directive. (To achieve this, the RBS shall conform to the standards below.)
- EN 60950 ‘‘Safety of Information Technology Equipment Including Electrical Business Equipment.’’

- The RBS fulfills the requirements in the general IEC 60950 including national differences noted in EN 60950.
- IEC 215 Safety requirements for transmitting equipment.
- The RBS shall be listed by National Recognized Testing Laboratory (NRTL).
- The RBS fullfills encapsulation class IP XX according to IEC 529.

In addition to this the product fulfills the environmental requirements.

The RBS is so designed and constructed that, under all conditions of normal use and under a likely fault condition, it protects against personal injury from electrical shock and other hazards.

The RBS is protected against serious fire originating in the equipment and mechanical hazards in the equipment, as well as mechanical hazards in the meaning of the applicable standard.

For the US the following standards are applicable:

- UL 1950 ‘‘Safety of Information Technology Equipment Including Electrical Business Equipment’’ .

For Canada the following standards are applicable:

- CAN/CSA-C22.2 No 1-M94 Audio, Video and Similar Electronic Equipment.

2.2.1 Declaration of Conformity

Tests and inspections shall be carried out according to ECMA requirements.

3 Environmental Capabilities

3.1 Scope

This chapter covers the environmental requirements for the indoor and outdoor temperature non-controlled operation conditions. The subjects are: Climatic, Biological, Chemically active substances, Mechanically active substances and Mechanical conditions.

3.2 Terminology

Definition of concepts:

Normal Operation Conditions

Environmental conditions where all units shall be able to function as specified.

Safe Function

Environmental stress above the limits for normal operation where all units shall continue to function during the stress, but performance or capacity may be reduced.

Reduction of performance or capacity shall be documented as a typical value.

When the environmental stress has dropped to normal operation conditions, function as specified shall automatically be achieved.

Safe function refers to an operation period of not more than 72 consecutive hours, and a total of not more than 15 days in one year.

Non-destruction

Environmental stress above the limits for safe function during which no function is guaranteed and performance may degrade in an unspecified manner.

When the environmental stress has dropped to normal operation conditions, no manual intervention (on site) is needed to restore full performance of the RBS.

Non-destruction refers to an operation period of not more than 96 consecutive hours, and a total of not more than 5.5 days in a 3-year period.

GSM Concepts

The GSM concepts for Normal operation and Extreme operation conditions as defined in GSM:11.20-12.3.2 are both equal to the Normal condition as defined and used in this document. This means that all RF parameters are guaranteed within the Normal condition range as defined in this document.

3.3 References

IEC 721-3-.. Classification of groups of environmental parameters and their severities.

ETSI 300 019-1-.. Classification of environmental conditions.

3.4 Transport -40°C – +70°C

3.4.1 General Conditions

The severity of the requirements is in conformity with: IEC 721-3-2 classes 2K4/2B2/2C2/2S2/2M2. and ETS 300 019-1-2 Class 2.3 "PUBLIC transportation".

These requirements are valid for equipped cabinets (excluding batteries). The values in these conditions are valid for a maximum transport time of 3 months. The time is measured from the moment the packages are leaving the shipping store, and includes storing in connection with the transport.

Note: These requirements restrict flight transportation to aircrafts with pressure cabins. As modern aircrafts have pressure cabins, these limitations are expected to be only formal.

Note: The severity levels are chosen with equipped cabinets in mind. Therefore, transport of equipment outside the cabinets can result in extremes. These extremes shall be handled by its own packing.

3.4.2 Climatic Conditions

During transportation the equipment could be exposed to extremes in temperature and humidity. The equipment must be packaged. The equipment shall be operational after being subjected to the ambient temperature and humidity stated hereafter.

The severity of these requirements are in conformity with: IEC 721-3-2 class 2K4. and ETS 300 019-1-2 Class 2.3.

Requirements

Table 7 Environmental limits during transport

Environmental Parameters	Unit	Value
Temperature	°C	-40 - +70
Relative humidity	%	5 -100
Absolute humidity	g/m^3	1 - 29
Change of temperature	°C/min	0.5
Rain intensity	mm/min	6
Change of temp	°C	-30 /+22

3.4.3 Biological Conditions

The severity of these requirements is in conformity with: IEC 721-3-2 class 2B2. and ETS 300 019-1-2 Class 2.3.

3.4.4 Chemically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-2 class 2C2. and ETS 300 019-1-2 Class 2.3.

Note: The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other is present in insignificant amounts.

3.4.5 Mechanically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-2 class 2S2. and ETS 300 019-1-2 Class 2.3.

3.4.6 Mechanical Conditions

The packing and transport method shall be chosen in order not to expose the equipment to stress beyond these limits. The equipment shall function as specified when installed after test.

The severity of these requirements is in conformity with: IEC 721-3-2 class 2M2. and ETS 300 019-1-2 Class 2.3.

Requirements

Table 8 Mechanical parameters during transport

Environmental Parameters	Unit	Value		
Vibration sinus:				
displacement	mm	3.5		
acceleration	m/s^2		10	15
frequency	Hz	2 - 9	9 - 200	200 - 500
Random ASD:	m^2/s^3		1.0	
frequency	Hz		2 - 200	
Shock:				
peak acceleration	m/s^2		100	
duration	ms		11	

3.5 Storage -25°C – +55°C

3.5.1 General Conditions

The severity of the requirements is in conformity with: IEC 721-3-1 classes 1K4/1Z2/1Z3/1Z5/1B2/1C2/1S3/1M2, and ETS 300 019-1-1 Class 1.2. "WEATHERPROTECTED, not temperature-controlled storage".

During storage the equipment must be packaged. The values in these conditions are valid for a maximum storage time of 12 months. The time refers to equipment in its outer package and stored at the consignee in a conditioned store.

3.5.2 Climatic Conditions

The equipment must be in packaged condition.

The severity of these requirements is in conformity with IEC 721-3-1 classes 1K4/1Z2/1Z3/1Z5. and ETS 300 019-1-1 class 1.2.

Requirements

Table 9 Environmental limits for storage conditions

Environmental Parameters	Unit	Value
Temperature	°C	-25 - +55
Relative humidity	%	10 - 100
Absolute humidity	g/m^3	0.5 - 29

3.5.3 Biological Conditions

The severity of these requirements is in conformity with IEC 721-3-1 class 1B2. and ETS 300 019-1-1 class 1.2.

3.5.4 Chemically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-1 class 1C2 and ETS 200 019-1-1 Class 1.2.

Note: The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other is present in insignificant amounts.

3.5.5 Mechanically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-1 class 1S3. and ETS 300 019-1-1 Class 1.2.

3.5.6 Mechanical Conditions

The packing and transport method shall be chosen in order not to expose the equipment to stress beyond these limits. The equipment shall function as specified when installed after test.

The severity of these requirements is in conformity with: IEC 721-3-1 class 1M2. and ETS 300 019-1-1 Class 1.2.

Requirements

Table 10 Mechanical parameters for storage conditions

Environmental Parameters	Unit	Value
Vibration sinus:		
displacement	mm	3.5
acceleration	m/s^2	10

Table 10 Mechanical parameters for storage conditions

Environmental Parameters	Unit	Value	
frequency	Hz	2 - 9	9 - 200
Random ASD:	m^2/s^3	1.0	
frequency	Hz	2 - 200	
Shock:			
peak acceleration	m/s^2	40	
duration	ms	22	

3.6 Handling -40°C – +70°C

3.6.1 General Conditions

This section refers to shorter periods of transport and storage in unpacked conditions. Precautions to avoid condensation before subjecting the equipment to operational conditions are necessary.

3.6.2 Climatic Conditions

During handling the equipment withstands the conditions stated in *Section 3.4.2 on page 12* in this document.

3.6.3 Biological Conditions

During Handling the equipment withstands the conditions stated in *Section 3.4.3 on page 13* in this document.

3.6.4 Chemically Active Substances

During Handling the equipment withstands the conditions stated in *Section 3.4.4 on page 13* in this document.

3.6.5 Mechanically Active Substances

During Handling the equipment withstands the conditions stated in *Section 3.4.5 on page 13* in this document.

3.6.6 Mechanical Conditions

The equipment endures stresses normal for handling, during handling the equipment withstand the conditions stated in *Section 3.4.6 on page 13* in this document.

3.7 Operation Indoor +5°C – +40°C

3.7.1 General Conditions

The severity of these requirements is in conformity with: IEC 721-3-3 classes 3K3/3Z2/3Z4/3B1/3C2(3C1)/3S2/3M1. and ETS 300 019-1-3 Class 3.1 "TEMPERATURE-controlled locations".

This clause refers to the environment which an RBS for indoor use shall endure.

Note: The different operating temperature levels according to Safe function and Non-destruction, refer to situations where the RBS is supposed to have been operating in "normal condition" mode for a certain time. Then the surrounding temperature in the compartment increases (decreases) according to these figures. Accordingly, this means that the surrounding temperature is allowed to change within the limits while the RBS still operates and has its own loss of energy.

3.7.2 Climatic Conditions

The severity of these requirements are in conformity with: IEC 721-3-3 classes 3K3/3Z2/3Z4. and ETS 300 019-1-3 Class 3.1.

Table 11 Climate limits for indoor operation

Value	Temp.	Relative humidity	Absolute humidity	Change of temp.
Normal condition	+5 - +40°C	5 - 85%	1 - 25 g/m^3	0.5°C/min
Excep-tional/Safe func-tion	+/-0 - +45°C	5 - 90%	1 - 25 g/m^3	0.5°C/min
Non Destruction	-10 - +55°C	5 - 90%	1 - 25 g/m^3	0.5°C/min

3.7.3 Biological Conditions

Requirements

There are no requirements for this condition.

3.7.4 Chemically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-3 classes /3C2(3C1)/ and ETS 300 019-1-3 Class 3.1.

Note: The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other is present in insignificant amounts.

3.7.5 Mechanically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-3 class /3S2/ and ETS 300 019-1-3 Class 3.1.

3.7.6 Mechanical Conditions

The severity of these requirements is in conformity with: IEC 721-3-3 class/1M2/ and ETS 300 019-1-3 class 3.1.

Table 12 Mechanical parameters for indoor operation

Environmental Parameters	Unit	Value	
Vibration sinus:			
displacement	mm	0.3	
acceleration	m/s^2		1
frequency	Hz	2 - 9	9 - 200
Vibration random:			
ASD	m^2/s^3	0.1 [1)]	
ASD	m^2/s^3	0.2 [2)]	
acceleration	m/s^2	3.8 [1)]	
acceleration	m/s^2	5.4 [2)]	
frequency	Hz	5 - 200	
Exposure time	min	30/direction	
Shock:			
peak acceleration	m/s^2	30 [3)]	
duration	ms	11	

[1)] Safe function

[2)] Non-destruction

[3)] This requirement belongs to the Safe function with the exemption: performance of the RBS shall be verified as ‘‘no loss of calls’’ .

Seismic Exposure

The complete equipped RBS shall be tested for seismic exposure. Deviations shall be reported.

Safe function during seismic exposure. Deviations shall be reported.

Table 13 Seismic exposure limits for indoor operation

Test frequency range	1 - 35 Hz
Required Response Spectrum	RRS
Shape of RRS	as IEC fig. 3
Number of time scale histories	1/ testing direction
Duration of time scale histories	35 s
Number of testing directions	3

If necessary there are possibilities to equip the RBS with an optional Seismic Exposure protection device.

3.8 Operation Outdoor -33°C – +40°C

This Environmental class corresponds in full to Operation Outdoor -33°C - +45°C with the exception of the upper temperature limit.

3.9 Operation Outdoor -33°C – +45°C

The severity of the requirements is in conformity with: IEC 721-3-4 classes 4K2/4Z5/4Z7/4B1/4C2(4C3)/4S2/4M5. and ETS 300 019-1-4 Class 4.1. "NON-WEATHERPROTECTED location", except for the temperature range which is extended to +45°C.

This clause refers to the environment which an RBS for outdoor non-weather protected location endures.

The figures below refer to the environment that surrounds the cabinet, and the temperature is the shaded air temperature.

3.9.1 Climatic Conditions

The severity of these requirements is in conformity with: IEC 721-3-4 classes 4K2/4Z5/4Z7. and ETS 300 019-1-4 Class 4.1. In addition to this Ericsson demands more rigorous values than stated by IEC and ETSI above.

The RBS shall be designed for a power loss of max. 48 hours. This applies both to installation and operation.

Table 14 Climate limits for outdoor operation

Value	Temp.	Relative humidity	Absolute humidity	Change of temp.(1)
Normal condition	-33 -+45°C	15 - 100%	0.26 - 25 g/m^3	0.5°C/min
Excep-tional/Safe function	(2)	15 - 100%	0.26 - 25 g/m^3	0.5°C/min
Non destruction	-40 -+60°C	15 - 100%	0.26 - 25 g/m^3	0.5°C/min

(1) Average over a 5 minutes period.
(2) It shall be verified at which temperature level the RBS pass the Exceptional/Safe function criteria e.g. sends major, critical or class 1 alarm, loss of functionality. And also that the RBS recover as specify.

3.9.2 Biological Conditions

The severity of these requirements is in conformity with: IEC 721-3-4 class /4B1/ and ETS 300 019-1-4 Class 4.1.

3.9.3 Chemically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-4 classes /4C2(4C1)/ and ETS 300 019-1-4 Class 4.1.

Note: The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other is present in insignificant amounts.

3.9.4 Mechanically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-4 class /4S2/ and ETS 300 019-1-4 Class 4.1.

3.9.5 Mechanical Conditions

The severity of these requirements is in conformity with: IEC 721-3-4 class /4M5/ and ETS 300 019-1-4 Class 4.1.

Table 15 Mechanical parameters for outdoor operation

Environmental Parameters	Unit	Value		
Vibration sinus:				
displacement	mm	0.6		
acceleration	m/s^2			2
frequency	Hz	2 - 9		9 - 200
Random:				
Frequency	Hz		5 – 200	
ASD	m^2/s^3		0.05	(1)
ASD	m^2/s^3		0.1	(2)
ASD	m^2/s^3		0.2	(3)
Exposure time	minutes		30/direc-tion	
Shock:		< 100 kg	> 100 kg	
peak acceleration	m^2/s	100	50	(4)
duration	ms	11	18	Page 21

(1) Normal condition
(2) Safe function
(3) Non-destruction
(4) These requirements belong to the Safe function with one exemption: performance of the RBS shall be verified as ‘‘no loss of calls’’ .

Seismic Exposure

The complete equipped RBS shall be tested for seismic exposure. Deviations shall be reported.

Safe function during seismic exposure. Deviations shall be reported.

Table 16 Seismic exposure limits for outdoor operation

Test frequency range	1 - 35 Hz
Required Response Spectrum	RRS
Shape of RRS	as IEC fig 3
Number of time scale histories	1/ testing direction

Table 16 Seismic exposure limits for outdoor operation

Duration of time scale histories	35 s
Number of testing directions	3

There are possibilities to equip the RBS with an optional Seismic Exposure protection device.

3.10 Operation Outdoor -33°C – +55°C

This Environmental class corresponds in full to Operation Outdoor -33°C - +45°C with the exception of the upper temperature limit.

3.11 Operation Mast-Mounted Equipment -33°C – +45°C

This Environmental class corresponds to Operation Outdoor -33°C - +45°C with the exceptions stated below.

3.11.1 General Conditions

Typical environment covered by this class are: Wall, mast and pole mounted equipment where the equipment will be exposed to the consequences from heavy wind, rain in combination with abnormal wind, reflected heat from wall structures heated by sun and or preheated air from ventilation system.

This clause refers to the environment which a RBS for outdoor non-weather protected location shall endure. The equipment must in all situations fulfil legal requirements and not become hazardous to people.

3.11.2 Climatic Conditions

Table 17 Climatic conditions for mast-mounted equipment, -33°C – +45°C

Value	**Tempera-ture**	**Relative humidity**	**Absolute humidity**	**Change of temp**.
Normal Condition	-33 – +45°C	15 – 100%	0.26 – 25 g/m³	0.5°C/min
Excep-tional/Safe function	-33 – +55°C	15 – 100%	0.26 – 25 g/m³	0.5°C/min
Non Destruction	-40 – +60°C	15 – 100%	0.26 – 25 g/m³	0.5°C/min

Table 18 Environmental parameters for mast-mounted equipment, -33°C – +45°C

Environmental parameters	Unit	Value
Change of temperature	°C/min	6 (1)
Rain intensity	mm/min	6
Air pressure	kPa	70-106
Heat radiation	W/m²	neglible
Solar radiation	W/m²	1120 (2)
Movement of air	m/s	50
Condensation		yes
Winddriven particle		yes
Water other than rain		splashing
Icing		yes

(1) The requirement belong to 'Exceptional/Safe Function' and will occur for maximum 3 minutes.
(2) Solar radiation. Based on IEC 60721-2-4 the requirement shall be verified by applying 896 W/m², for verification method see ref. /Solar/.

3.11.3 Biological Conditions

The severity of these requirements are in conformity with: IEC 60721-3-4 class /4B1/. and ETSI EN 300 019-1-4 Class 4.1

Table 19 Biological conditions for mast-mounted equipment, -33°C – +45°C

Environmental parameters	Value
Flora	Presence of mould, fungus etc.
Fauna	none

3.11.4 Chemically Active Substances

The severity of these requirements are in conformity with: IEC 60721-3-4 classes /4C2(4C1)/. and ETSI EN 300 019-1-4 Class 4.1

Table 20 Chemically active conditions for mast-mounted equipment, -33°C – +45°C

Environmental parameters	Unit	Value(1) min/max
salt mist		sea and road salt.
sulphur dioxide	cm^3/m^3	0.11 / 0.37
hydrogen sulphide	cm^3/m^3	0.11/ 0.36
chlorine	cm^3/m^3	0.034/ 0.1
Hydrogen chloride	cm^3/m^3	0.066/ 0.33
Hydrogen fluoride	cm^3/m^3	0.012/ 0.036
ammonia	cm^3/m^3	1.4 / 4.2
ozone	cm^3/m^3	0.025 / 0.05
nitrogen oxides	cm^3/m^3	0.26 / 0.52

(1) The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other are present in insignificant amounts.

3.11.5 Mechanically Active Substances

Table 21 Mechanically active substavces for mast-mounted equipment, -33°C – +45°C

Environmental parameters	Unit	Value
Sand	mg/m^3	300
Dust (suspension)	mg/m^3	5.0
Dust (sedimentation)	$mg/(m^2h)$	20

3.11.6 Mechanical Conditions

Table 22 Mechanical conditions for mast-mounted equipment, -33°C – +45°C

Environmental Parameters	Unit	Value
Vibration sinus:		
frequency	Hz	2 - 9
displace-ment	mm	3.0
frequency	Hz	9 - 200

Table 22 Mechanical conditions for mast-mounted equipment, -33°C – +45°C

Environmental Parameters		Unit	Value
	acceleration	m/s^2	0.5
Vibration random:			
	frequency	Hz	2 - 200
	ASD(1)	m^2/s^3	0.5
Shock:			
	peak acc.	m/s^2	40(2)
	duration	ms	22

(1) Normal condition

(2) The requirement belong to Exceptional/Safe function with the exemption: performance of the RBS shall be verified as 'no loss of calls'.

3.12 Operation Mast-Mounted Equipment -40°C – +55°C

In addition to the "Basic class" this class is aimed for even more exposed situation such as: areas with expected higher temperature, ice falling from structures above, mast and poles structure which will expose the equipment to higher vibration probability, drifting snow and hail.

3.12.1 Climatic Conditions

This environmental class corresponds in full to "Operation Mast-mounted Equipment -33° - +45°C" with the exception for requirement stated below.

Table 23 Climatic conditions for mast-mounted equipment, -40°C – +55°C

Value	Tempera-ture	Relative humidity	Absolute humidity	Change of temp.
Normal Condition	-40 – +55°C	5 – 100%	0.26 – 40 g/ m^3	1.0°C/min
Excep-tional/Safe function	-40 – +60°C	5 – 100%	0.26 – 40 g/ m^3	1.0°C/min
Non Destruction	-40 – +70°C	5 – 100%	0.26 – 40 g/ m^3	1.0°C/min

3.12.2 Mechanical Conditions

Table 24 Mechanical conditions for mast-mounted equipment, -40°C – +55°C

Environmental Parameters		Unit	Value	
Vibration sinus:				
	frequency	Hz	2 – 9	
	displace-ment	mm	3.0	
	frequency	Hz	9 – 200	
	acceleration	m/s^2	10	
Vibration random:				
	frequency	Hz	2 – 200	200 – 500
	ASD(1)	m^2/s^3	0.5	0.2
	Exposure time	minutes	30/direction	
Shock:				
	peak acc.	m/s^2	100(2)	
	duration	ms	11	

(1) Normal condition
(2) The requirement belong to Exceptional/Safe function with the exemption: performance of the RBS shall be verified as 'no loss of calls'.

4 EMC Capabilities

This specification covers the capabilities of the RBS 2000 in respect of EMC (ElectroMagnetic Compatibility). The capabilities include conducted and radiated emission as well as conducted and radiated immunity thresholds.

The internal EMC capabilities of RBS 2000 and spurious emission appearing on antenna ports are not covered by this chapter.

4.1 References

1 1999/5/EC, R&TTE Directive

Council directive of 9 March 1999 on radio equipment and telecommunication terminal equipment and the mutual recognition of their conformity (EMC 89/366/EEC directive is included)

2 EN 301 489-8

EMC standard for the European digital cellular telecommunication system (GSM 900 MHz and DCS 1900 MHz).

Part 8: Base station radio, ancillary equipment and repeaters meeting Phase 2, Phase 2+ GSM requirements, specific requirements.

3 EN 301 502

GSM, base station and repeaters equipment covering essential requirements under article 3.2 of the R&TTE directive (GSM 13.21).

4 Code of Federal Regulations 47, FCC part 15

Radio frequency devices.

5 ICES-003

Digital apparatus, Interface-causing equipment standard.

6 Lightning Protection

The lightning protection system for all external ports at an RBS site is designed to withstand a 10/350 µs lightning strike, and a residual current of 100 kA.

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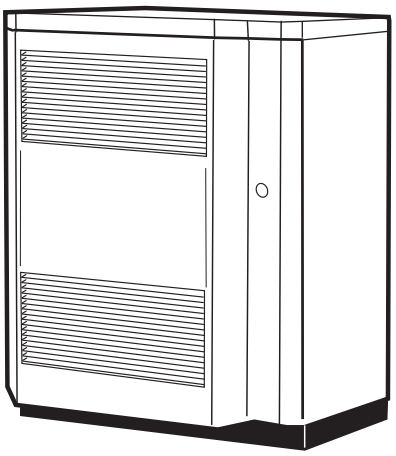
CAPTION LIST

Document No.
001 59-EN/LZT 720 0024
RBS 2106, RBS 2206, RBS 2207 Hardware Reference Manual
Date 2004-06-14
Rev F

RBS 2106

Radio Base Station
Product Description

The RBS 2106, a member of the RBS 2000 family, is a 12 Transceiver (TRX) radio base station for outdoor applications. The RBS 2106 can be configured for omni cells, or for multi-sector cells of up to three sectors.



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Contents

1 Product Overview

The RBS 2106 is a high-capacity base station. It is used for outdoor applications, with up to six double Transceiver Units (dTRU). There is space inside the cabinet for transmission equipment and battery backup.

The RBS 2106 is designed to be transported as a fully-assembled cabinet, without the exception of batteries, to the site. All units in the cabinet are easily accessible from the front of the cabinet, which means that the cabinet can be mounted against a wall.

1.1 Main Features

The RBS 2106 can support the following features:

- 12 TRXs
- Co-siting (antenna sharing) with GSM, TDMA, WCDMA systems
- Discontinuous transmission/reception
- Duplex filters
- Dynamic power regulation
- Encryption/ciphering
- EDGE
- Expansion by TG-synchronisation
- External alarms
- Frequency hopping
- Internal battery backup in three variants
- Positioning with GPS
- Power Supply System: Can be connected to 200 – 250 V AC mains supplies
- Radio configurations supported on 800, 900, 1800 and 1900 MHz
- Receiver diversity
- Transmission Interface: The following transport network interface alternatives exist:

  T1 1544 kbit/s, 100 Ω, with PCM synchronisation

  E1 2048 kbit/s, 75 Ω, with PCM synchronisation

E1 2048 kbit/s, 120 Ω, with PCM synchronisation

- Power input

1.2 Variants

The following variants are available and can be combined according to ordering information:

- Two climate systems, Combined Climate Unit or Heat Exchanger
- Two standard colours
- AC service outlet

1.3 Optional Equipment

The equipment listed below is available, but is not necessary for basic operation:

- Auxiliary Distribution Module (ADM)
- Antenna Sharing Unit (ASU)
- Base frame
- Battery backup
- Bias injector
- DC/DC converter
- DC filter
- dual duplex Tower Mounted Amplifier (ddTMA)
- Digital Cross Connector (DXX) – two card
- External Synchronization Bus (ESB)
- External alarms
- GPS (mounted externally)
- Hybrid Combiner Unit (HCU)
- Keys (Operator specific keys)
- Minilink
- Overvoltage Protection (OVP)
- Redundant Power Supply Unit (PSU)

- Smoke detector
- Sound hood
- Tower Mounted Amplifier-Control Module (TMA-CM)
- Transmission adapter (75 Ω to 120 Ω)

2 Dimensions

This section describes the RBS 2106 dimensions and colour.

Size and Weight

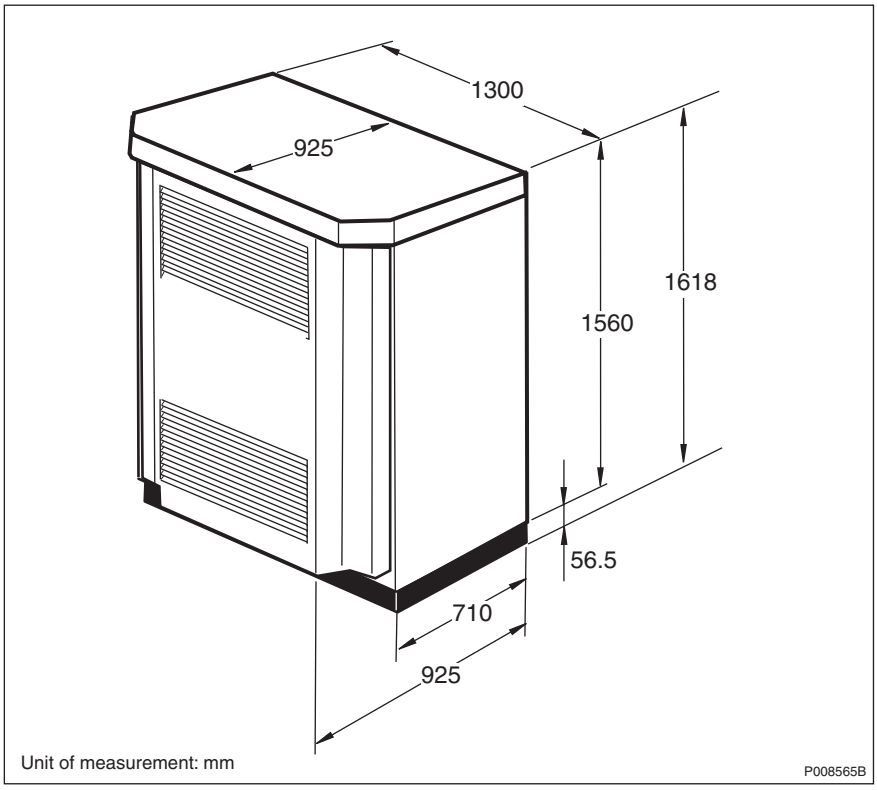

Figure 1 RBS 2106 Dimensions

Table 1 RBS 2106 Weights

Unit	Weight
Fully equipped including batteries	760 kg
Fully equipped excluding batteries	560 kg
Door with climate unit	150 kg

Surface and Colour

The RBS 2106 has a surface quality according to Ericsson standard class A3/B6.

Table 2 RBS 2106 Colours

Colour	Reference Number	Ericsson Number
Grey	RAL 7035	MZY 509 01/8119
Green	NCS 8010-G 10Y	MZY 509 01/585

3 Space Requirements

Installation and maintenance require that the door can be opened at least 90°. In practice this means that the space in front of the cabinet must be kept clear for a distance of 1300 mm, see figure below. No free space is needed at the back of the cabinet.

If the RBS is located next to another cabinet of the same depth, no adjacent space is required. If the RBS is placed next to a wall, or any object protrudes on the left side, then 175 mm clearance is required to the left of the cabinet.

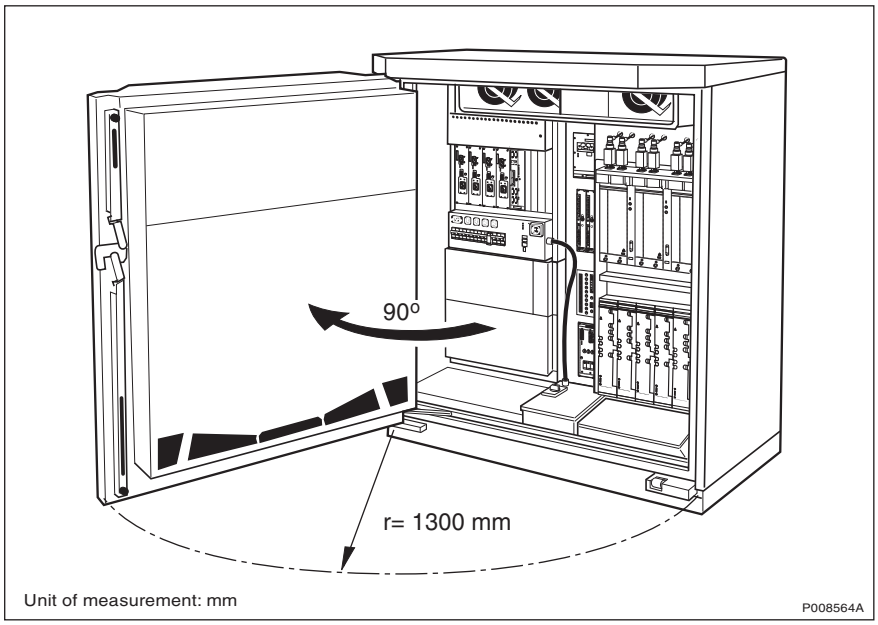

Figure 2 Door Opening Requirements

Note: All installation and maintenance work can be performed with the door open 90°.

During service a tent can be placed over the cabinet to protect the equipment from unsuitable weather conditions.

Footprint

The footprint of the RBS 2106 is 1300 mm wide and 710 mm deep. Note that the door is not included in the footprint, as it does not reach down to the ground. The installation frame of the RBS 2106 has the same bottom holing pattern as that of the RBS 2102.

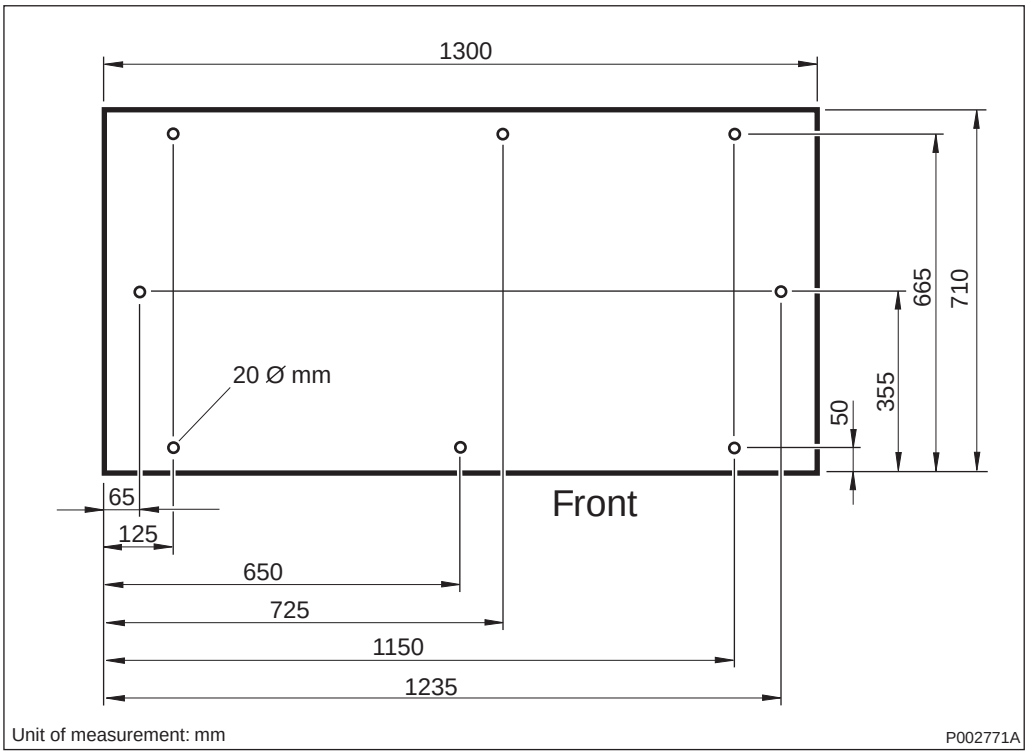

Figure 3 Base Frame and Installation Frame Holing Pattern

4 Environment

The RBS 2106 is designed to operate within the limits stated for climatic requirements listed in the table below, and to withstand ground vibrations as stated below.

4.1 Operating Environment

The operating environment and climatic specifications for the RBS 2106 are shown in the table below.

Climatic Requirements

Table 3 Climatic Requirements

Description	Temperature	Relative Humidity
Normal Conditions	-33°C to +45°C(1)	15 – 100%
Transport	-40°C to +70°C	5 – 100%
Storage	-25°C to +55°C	10 – 100%
Handling	-40°C to +70°C	5 – 100%

(1) Upper limit +40°C with the Heat Exchanger.

Acoustic Dispersion Heat Exchanger

The cabinet noise dispersion for an RBS 2106 with Heat Exchanger Climate Unit is shown in the two figures below. The figures show the noise dispersion generated by a free-standing cabinet, and by a cabinet mounted against a wall.

Note: The acoustic noise dispersion values for a free-standing cabinet and a cabinet installed against a wall were tested according to the ISO 9614-2 standard. Deviations from these values can be experienced due to the nature of materials in the environment where the cabinet is installed. Objects near the cabinet can reflect or absorb sound and thus affect acoustic dispersion.

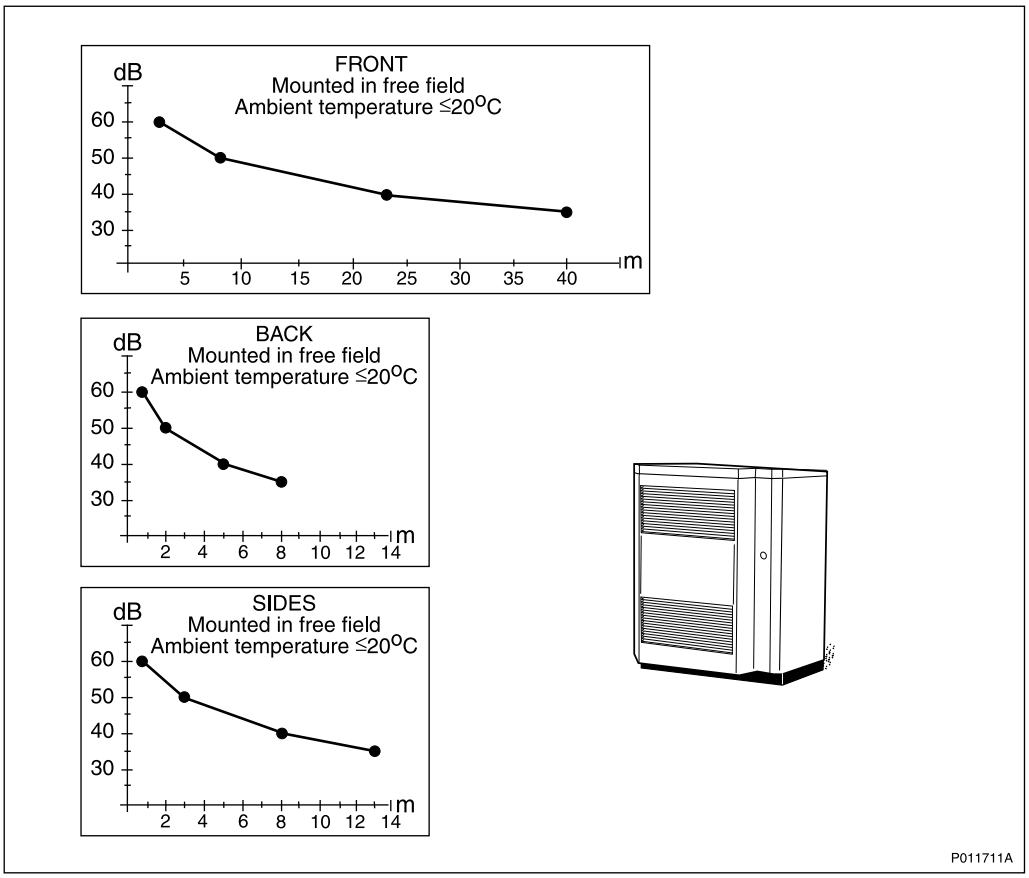

Figure 4 Acoustic Dispersion for a Free-standing RBS 2106 with Heat Exchanger Climate Unit

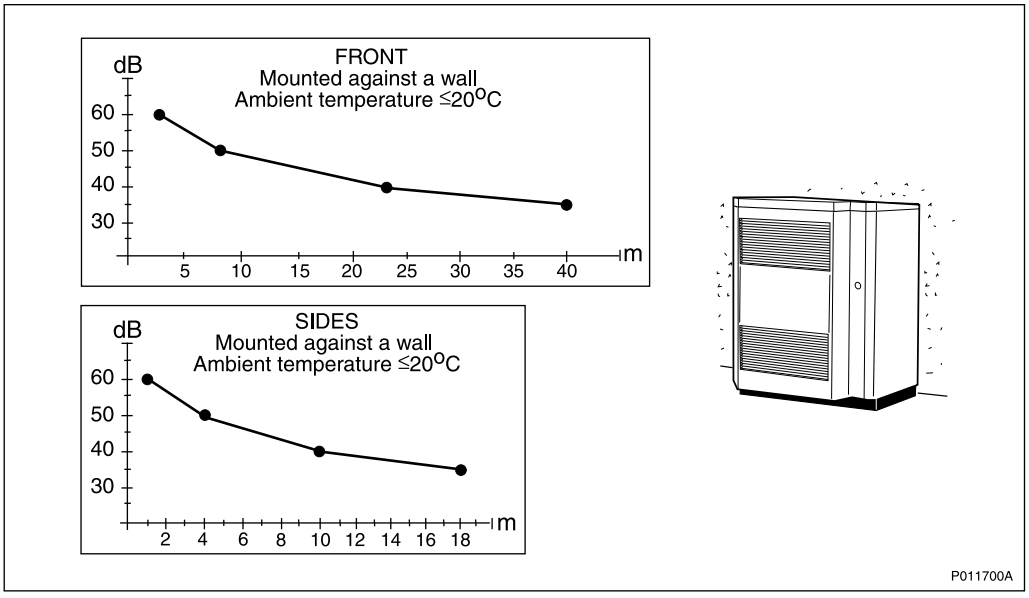

Figure 5 Acoustic Dispersion for a Wall-mounted RBS 2106 with Heat Exchanger Climate Unit

Ground Vibrations

The RBS 2106 is designed to satisfy earthquake protection according to IEC 68-2-57.

Levelling

To ensure that the cabinet is level, the floor must be level to within ±3 mm/2000 mm and the floor gradient must be within ±0.1°.

4.2 Environmental Impact

This section describes the effects that the cabinet has on the environment.

Heat Dissipation

The RBS 2106 generates an average heat load of 3000 W. The exact figure is dependent upon configuration, equipment, and site-specific conditions.

Acoustic Dispersion

The cabinet noise dispersion for an RBS 2106 with Combined Climate Unit is shown in the two figures below. The figures show the noise dispersion generated by a free-standing cabinet and by a cabinet mounted against a wall.

Note: The acoustic noise dispersion values for a free-standing cabinet and a cabinet installed against a wall were tested according to the ISO 9614-2 standard. Deviations from these values can be experienced due to the nature of materials in the environment where the cabinet is installed. Objects near the cabinet can reflect or absorb sound and thus affect acoustic dispersion.

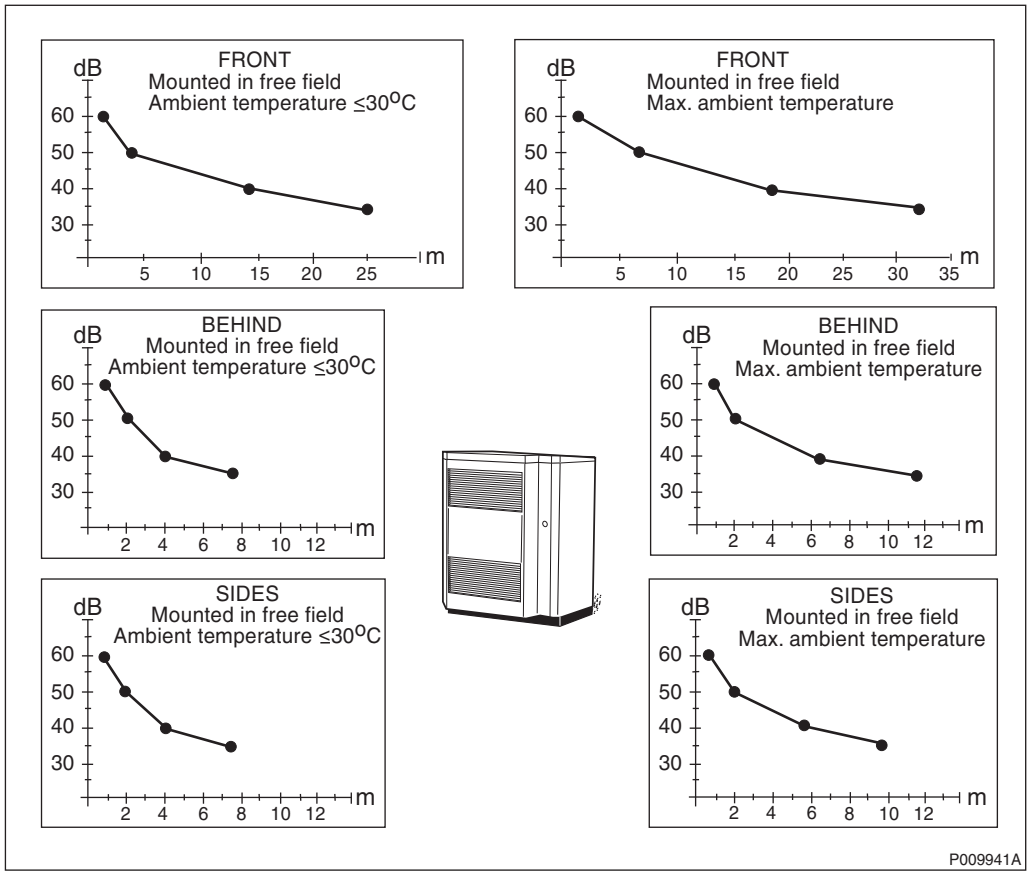

Figure 6 Acoustic Dispersion for a Free-standing RBS 2106 with Combined Climate Unit

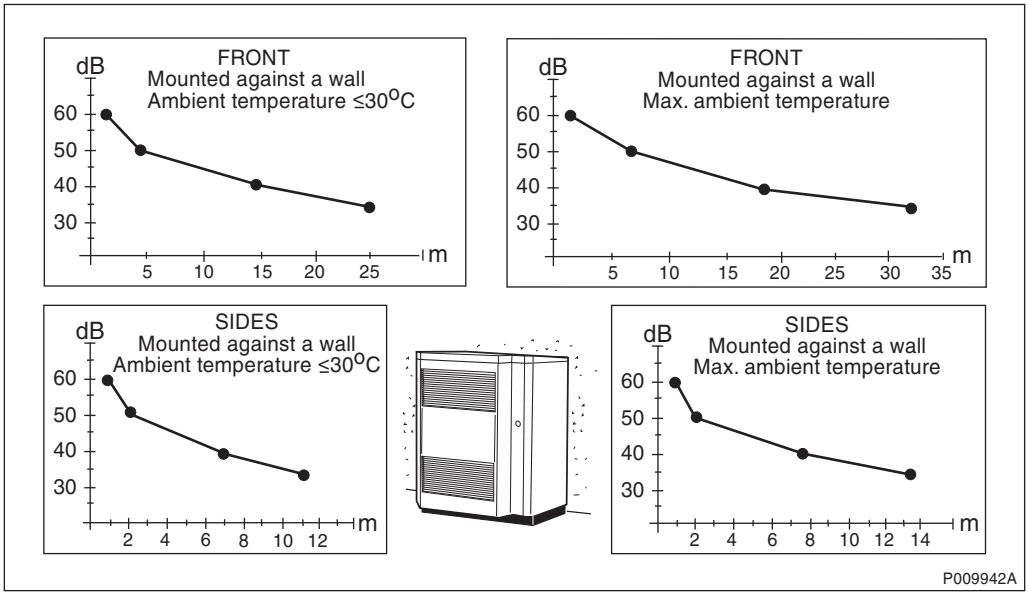

Figure 7 Acoustic Dispersion for a Wall-mounted RBS 2106 with Combined Climate Unit

4.3 Compliance Distances for Electromagnetic Exposure

The compliance distance is the minimum separation that should be kept between the antenna and a person in order to ensure that the ICNIRP RF exposure limits are not exceeded.

Note: ICNIRP, ‘‘Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)’’, International Commission on Non-Ionizing Radiation Protection, Health Physics, vol. 74, no. 4, 1998.

Ericsson has performed a free-space near-field RF exposure assessment of typical configurations of the RBS 2106 with a recommended antenna. The resulting dimensions, in metres, for a compliance boundary for both public and occupational exposure, are shown in *Table 4 on page 13*.

The compliance boundary is defined as a cylinder around the antenna, *see Figure below*. The antenna is not located at the centre of the cylinder. Instead it is located almost at the edge, facing towards the center of the cylinder. The distance between the antenna’s rear and the edge of the cylinder is the ‘‘Distance behind antenna’’. The height of the cylinder is the antenna height plus equal distances above and below the antenna. The cylinder shape overestimates the compliance distances right beside the antenna.

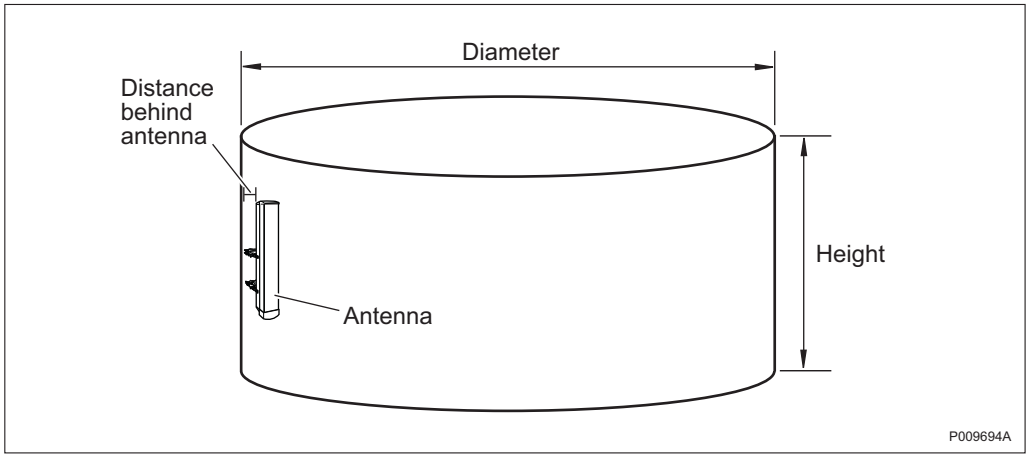

Figure 8 Compliance Boundary Cylinder

Note: *Table 4 on page 13* shows an example for a typical antenna. As the antenna field distributions will differ, complete calculations or measurements may be necessary in order to establish the compliance boundary for other configurations chosen by the customer. For further information on calculation methods, *see:*

	Radio Site Installation Engineering Manual	*EN/LZN 720 0069*

Table 4 Compliance Boundary Dimensions for the General Public (GP) and Occupational (O) Exposure for Typical Configurations

Configuration	Frequency (MHz)	Dimensions of Cylindrical Compliance Boundary in (m)					
		Diameter		Height		Distance Behind Antenna	
		GP	O	GP	O	GP	O
3x2 no hybrid	900	6	3	1.7	1.5	0.1	0.1
	1800	5	1	1.6	1.4	0.1	0.05
3x4 combined	900	6	3	1.6	1.5	0.1	0.1
	1800	5	1	1.6	1.4	0.1	0.05
3x2 TCC	900	8	4	1.9	1.6	0.1	0.1
	1800	7	2	1.6	1.5	0.1	0.1
1x12 filter combiner	900	11	5	2.3	1.6	0.1	0.1
	1800	9	4	1.8	1.6	0.1	0.1

The cylinder shape overestimates the compliance distances right beside the antenna. In reality the occupational compliance distance by the side, in line with the front of the antenna, is less than 0.1 metres for output power levels below 56 W and less than 0.3 metres for the other power levels reported here. For characteristics of an antenna recommended for typical configurations of RBS 2106, *see Table below*.

Table 5 Characteristics for a Typical Antenna (KRE 101 1916/1)

Antenna Specifications	X-pol macro RBS sector antenna
Antenna Height	1.3 m
Horizontal Half-power Beam Width	60 degrees
Vertical Half-power Beam Width	15 degrees at 900 MHz 7 degrees at 1800 MHz
Antenna Gain	14.5 dBi at 900 MHz 17 dBi at 1800 MHz
Down Tilt	0 degrees

The nominal maximum power fed to the antenna, as a function of the number of transceiver units (TRUs) per antenna and the maximum power (including tolerances and transmission loss) per TRU, for RBS 2106 at 900 MHz and 1800 MHz, are given in *Table 6 on page 14*.

Table 6 Maximum Power to Antenna for Various RBS 2106 Configurations

Configuration	Frequency (MHz)	Nominal Output Power per TRU (dBm)/(W)	Maximum Power into Antenna (1) (dBm)/(W)
3x2 no hybrid	900	45.2 / 33	47.2 / 52
	1800	44 / 25	46 / 40
3x4 combined	900	41.7 / 15	46.7 / 47
	1800	40.5 / 11	45.5 / 35
3x2 TCC	900	47.7 / 59	49.7 / 93
	1800	46.5 / 45	48.5 / 71
1x12 filter combiner	900	42.7 / 19	52.5 / 177
	1800	41.5 / 14	51.3 / 135

(1) Including power tolerance level (+2 dB) and transmission losses (-3 dB).

4.4 Materials

All Ericsson products fulfil legal, market, and Ericsson requirements regarding:

- Fire resistance of material, components, wires and cables
- Declaration of materials
- Use of restricted materials
- Recycling

Packaging Material

The packaging material is recyclable.

5 Hardware Units

A high level of availability is achieved using strict functional modularity in a system of standardised Replaceable Units (RU). A failed RU can easily be replaced by a new one.

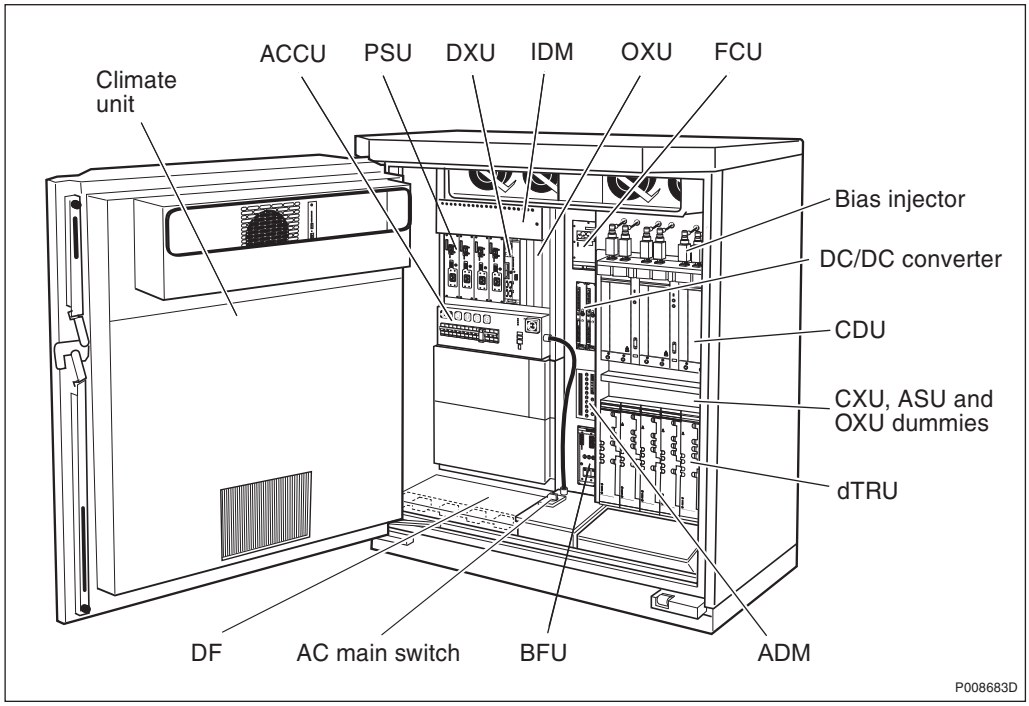

Figure 9 RBS 2106 Overview

5.1 Standard Hardware Units

This section briefly describes the standard hardware units required for function, irrespective of configuration or frequency.

ACCU-02

The AC Connection Unit (ACCU) connects, disconnects, and distributes the incoming AC power supply to the PSUs and the climate unit. It consists of two parts: a connection unit and a distribution unit.

Number of units: 1

BFU-21

The Battery Fuse Unit (BFU-21) supervises connection or disconnection of the batteries. It can also be used to provide prioritized power supply, for example to the transmission equipment.

Number of units: 1

BFU-22

The Battery Fuse Unit (BFU-22) supervises the connection or disconnection of the batteries.

Number of units: 1

Climate Unit

The climate unit maintains the internal temperature and humidity inside the cabinet. The climate unit is mounted in the door of the cabinet.

Two types of climate unit are available:

- Combined Climate Unit. This unit provides both heating and refrigeration.
- Heat Exchanger climate unit. This provides heating and cooling through forced convection. It has no refrigerating capacity; thus the cabinet cannot be cooled to a temperature lower than that of the outside (ambient) temperature.

Number of units: 1

CDU

The Combining and Distribution Unit (CDU) is the interface between the transceivers and the antenna system. All signals are filtered before transmission and after reception by means of bandpass filters. The CDU allows several dTRUs to share antennas. There are a maximum of three CDUs in one RBS 2106.

The CDU combines transmitted signals from several transceivers, and distributes the received signal to several transceivers. The CDU supports EDGE. Two different CDU types are used in the RBS 2106 to support all configurations:

- **CDU-F** is a filter combiner intended for high capacity solutions. Baseband only.
- **CDU-G** can be configured either for high capacity or for high coverage. It is a combiner that can be used for synthesizer hopping. Baseband and Synthesizer hopping only.

Number of units: 1 – 3

CXU

The task of the Configuration Switch Unit (CXU) is to cross-connect the CDU and the dTRU in the receiver path. The CXU makes it possible to expand or reconfigure a cabinet without moving or replacing any RX cables.

The RX inputs/outputs on the dTRU and the CDU are placed in such positions that they minimise the number cable types used to connect the CXU to the dTRUs and the CDUs.

The CXU is software configured.

Number of units: 1 – 2

DXU 21

The Distribution Switch Unit (DXU-21) is the central control unit for the RBS. It supports the interface to the Base Station Controller (BSC), and it collects and transmits the alarms. The DXU-21 controls the power and climate equipment for the RBS. It has a removable compact flashcard that enables replacement of a faulty DXU-21 without the need for loading RBS software from the BSC.

The DXU-21 is provided with four connections for transmission interfaces. It can handle both 2048 kbit/s (E1) and 1544 kbit/s (T1) transmission interfaces. The DXU-21 has hardware support for EDGE on 12 TRXs.

Number of units: 1

dTRU

The double Transceiver Unit (dTRU) contains two TRXs used to transmit and receive two radio carriers.

It has a built-in combiner with the option to combine two TX signals into one TX output. It is also prepared for four-branch RX diversity for further improvements in sensitivity.

One version of the dTRU supports only GMSK and the other version supports both GMSK and EDGE.

Number of units: 1 – 6

FCU

The Fan Control Unit (FCU) controls the fans in the cooling system by regulating fan speed. The FCU is controlled by the DXU.

Number of units: 1

IDM

The Internal Distribution Module (IDM) is a panel for distributing the internal +24 V DC power to the various units. Each distribution circuit in the cabinet is connected to a circuit breaker in the IDM.

Number of units: 1

PSU

The Power Supply Unit (PSU) converts 120 – 250 V to regulated +24 V DC.

Number of units: 2 – 4

5.2 Optional Hardware Units

This section describes the RBS 2106 optional hardware units.

ASU

The Antenna Sharing is a part of co-siting, that is, using another cabinet together with a GSM RBS 2106 cabinet in the same sector. The Antenna Sharing Unit (ASU) allows a TDMA (or other) cabinet and a GSM RBS 2106 cabinet to share RX antennas.

Number of units: 0 – 1

ADM

The Auxiliary Distribution Module (ADM) handles distribution and fuse connection of system voltage (+24 V DC and -48 V DC) to the transport module (TM).

Number of units: 0 – 1

Battery Backup

Batteries can be installed inside the cabinet in either of the TM/BM spaces located to the left of the BFU. An external source of battery supply can also be used through the DC filter. if this is the case, then internal batteries can not be used.

Bias injector

The bias injectors are used to provide the TMA with DC power from the TMA-CM, over the RX/TX feeder cables. The bias injector is mounted between the antenna feeder and the CDU.

Number of units: 0 – 6

DC/DC Converter

The DC/DC converter can supply -48 V DC power to transmission equipment in the TM compartment. It converts +24 V DC to -48 V DC.

Number of units: 0 – 2

DC Filter

The DC filter is the interface between a +24 V DC external power source, such as a battery, and the IDM inside the RBS.

The DC filter has the following main functions:

- ElectroMagnetic Combatibility (EMC) filtering
- Connection of +24 V DC to the cabinet
- Distribution of +24 V DC power to the IDM

ddTMA

The ddTMA is to be mast-mounted and placed close to the antenna. It improves the receiver sensitivity. The ddTMA saves feeder cables by duplexing RX and TX signals to the same cable.

Number of units per cabinet: 0 – 6

DF

The Distribution Frame (DF) is a connection and OverVoltage Protection (OVP) device for external alarms and PCM links. The DF protects equipment inside the RBS from overvoltage and overcurrent which can occur in external lines. Examples of equipment requiring OVP include transmission lines, ESBs and external alarms.

Number of units: 1

DXX

The Digital Cross Connector (DXX) is a plug-in unit which combines cross-connect, control and interface functions. It has four 2 Mbit/s interfaces complying with the G.703 standard. If the DXX option is used, then it is located in an Optional Expansion Unit (OXU) position in the DXU/ PSU subrack.

Number of units: 0 – 1

ESB

TG synchronization is the technology used to expand one RBS 2106 cabinet with another RBS cabinet in the same cell. The External Synchronization Bus (ESB) is the cable connected between the DXUs.

Number of units: 0 – 1

Gas Collecting Kit

The acid leads can be supplied with gas evaporating kit. This is to eliminate gases from the cabinet.

Number of units: 0 – 1

HCU

The HCU contains three hybrid combiners. Each hybrid combines two RF signals, delivered from the dTRU, into one.

Number of units: 0 – 1

OXU

The following Optional Expansion Unit (OXU) positions are available:

- Four spaces in the DXU/PSU subrack
- One 19-inch OXU position is available between the CXU and the dTRU subrack.

RUs which typically are located in the OXU slots include the DXX and the TMA-CM. The 19-inch position above the CXU is used for an Antenna Sharing Unit (ASU) in co-sited cabinets.

Smoke Detector

The smoke detector is an optical device. Its purpose is to detect visual smoke. When smoke enters the detector, a light beam is deflected towards a photocell and an alarm is activated.

Number of units: 0 – 1

Sound Hood

The sound hood attenuates noise from the climate unit, heat exchanger and air condition.

Number of units: 0 – 1

TMA-CM

The Tower Mounted Amplifier Control Module (TMA-CM) is used to provide ddTMA with 15 V DC power through the bias injectors. It also identifies ddTMA faults and forwards this information to the alarm module in the RBS. If a TMA-CM is used, then it is located in one of the four OXU positions in the DXU/PSU subrack.

Number of units: 0 – 2

TM

The Transport Module (TM) is a space in the cabinet reserved for transmission equipment. The RBS is type-approved with transmission equipment from Ericsson. Equipment from other manufacturers requires a new type approval for the RBS. It is the responsibility of the owner/operator to obtain the type approval. To not violate the RBS function, the following is recommended:

- Any transmission equipment installed in the TM must fulfil the requirements in the Generic EMC standards IEC61000-6-3 and IEC61000-6-2
- All in/out interfaces (signal and power), which pass the cabinet border between two different EMC zones, must be sufficiently EMC-protected (transient protection, filtering)
- Shielded cables are recommended for connection between transmission equipment and the cabinet connection field, and between transmission equipment and the DXU or DXX.

The recommended installation is shown in the figure below

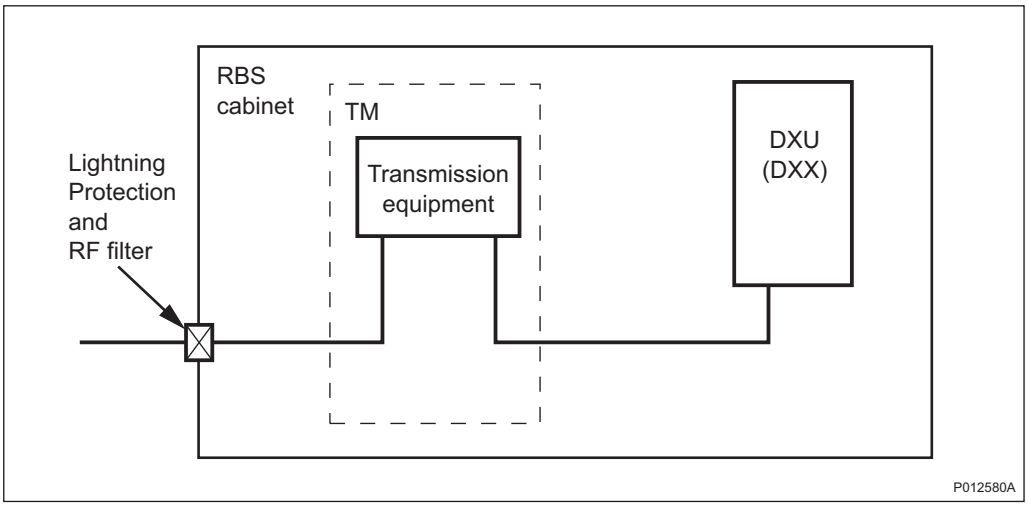

Figure 10 Recommended TM Installation

The maximum dimensions for the TM are shown in the table below.

Table 7 Maximum Dimensions

Panel Width	485 mm
Height	445 mm
Depth behind Mounting Rails	267 mm (6 HE)
Depth behind Mounting Rails	280 mm
Space in Front of Mounting Rails(1)	65 mm

(1) For cables and connectors.

Note: The TM space is based on the 19 in. standard, housing equipment.

The TM power distribution is shown in the table below.

Table 8 Power Distribution for the TM Space

Power Distribution DC	2 x 250 W at +24 V DC
Power Distribution AC	2 x 200 W at -48 V AC

Note: The maximum power distribution allowed in the TM space is 300 W.

The available airflow for cooling is 25 g/s (corresponding to approximately 80 – 85 m^3/h) at a pressure drop of 60 Pa.

Transmission Adapter

The transmission adapter converts 75 Ω coax to 120 Ω twisted pair.

6 Interfaces

This section lists all external connectors, as well as the test interface and the operator interface.

Internal connections, the test interface and the operator interface are located on some cabinet hardware units.

6.1 External Connections

All external connectors enter through the bottom of the cabinet. The approximate locations of the connection fields are shown in the figure below, to aid in planning cable inlet allowances.

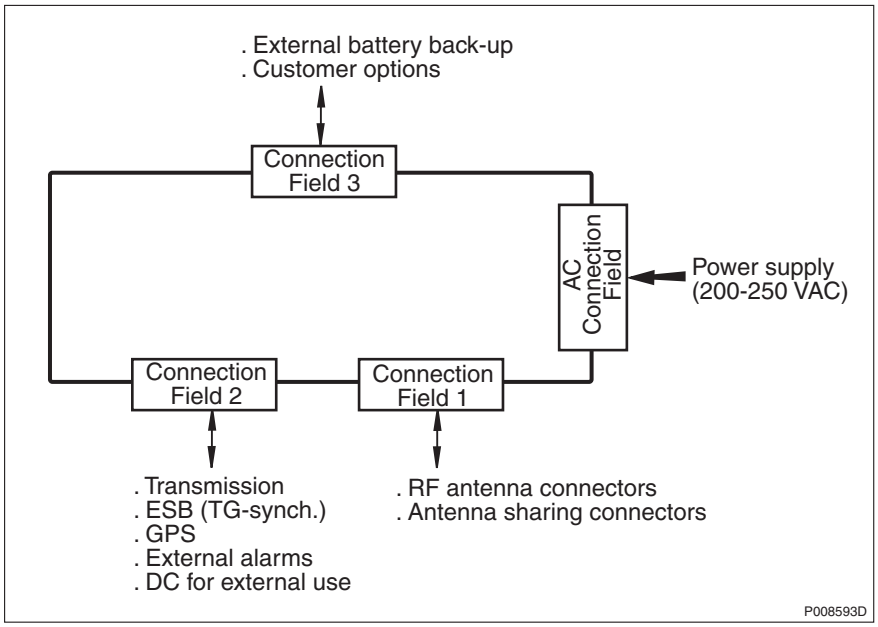

Figure 11 External Interfaces

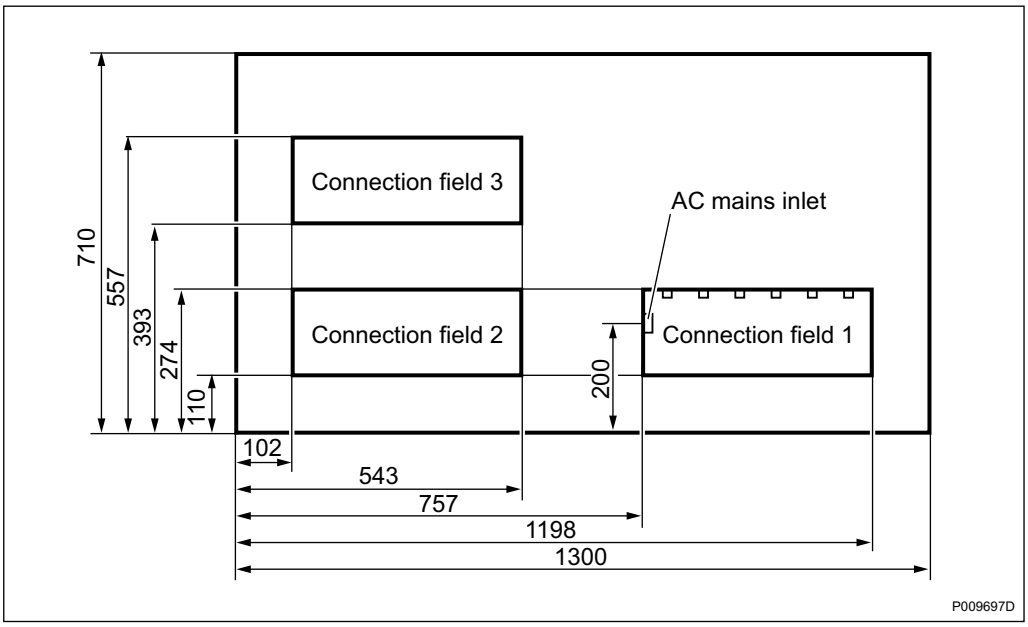

Figure 12 Cable Inlet Measurements

Table 9 Connection Field

Connection Field	Cables
1	1 x 20 mm (diameter) AC Connection
2	2 x 26 mm (diameter)
3	6 x (1 x 10 mm + 3 x 0.5 mm) (diameter)

Connections on DF

The DF is a modular construction containing six positions for overvoltage arrestors for external alarms, and OVP modules for PCM and ESB cables.

Overvoltage Arrestors for External Alarms

All voltage arrestors, for example external alarms, have space for two alarms. The cable used must be single core, with a diameter of 0.3 – 0.8 mm.

Table 10 Overvoltage Arrestors

Alarm	Connector
Alarm 1+	OVP 1, terminal 4
Alarm 1-	OVP 1, terminal 3
Alarm 2+	OVP 1, terminal 2
Alarm 2-	OVP 1, terminal 1

Table 10 Overvoltage Arrestors

Alarm	Connector
Alarm 3+	OVP 2, terminal 4
Alarm 3-	OVP 2, terminal 3
Alarm 4+	OVP 2, terminal 2
Alarm 4-	OVP 2, terminal 1
Alarm 5+	OVP 3, terminal 4
Alarm 5-	OVP 3, terminal 3
Alarm 6+	OVP 3, terminal 2
Alarm 6-	OVP 3, terminal 1
Alarm 7+	OVP 4, terminal 4
Alarm 7-	OVP 4, terminal 3
Alarm 8+	OVP 4, terminal 2
Alarm 8-	OVP 4, terminal 1

Antenna Connections

The antenna connectors are accessible from the antenna connection box in the bottom of the cabinet. The intake plate in the bottom of the cabinet is equipped with six antenna cable connectors. These connections are shown in the figure and table below.

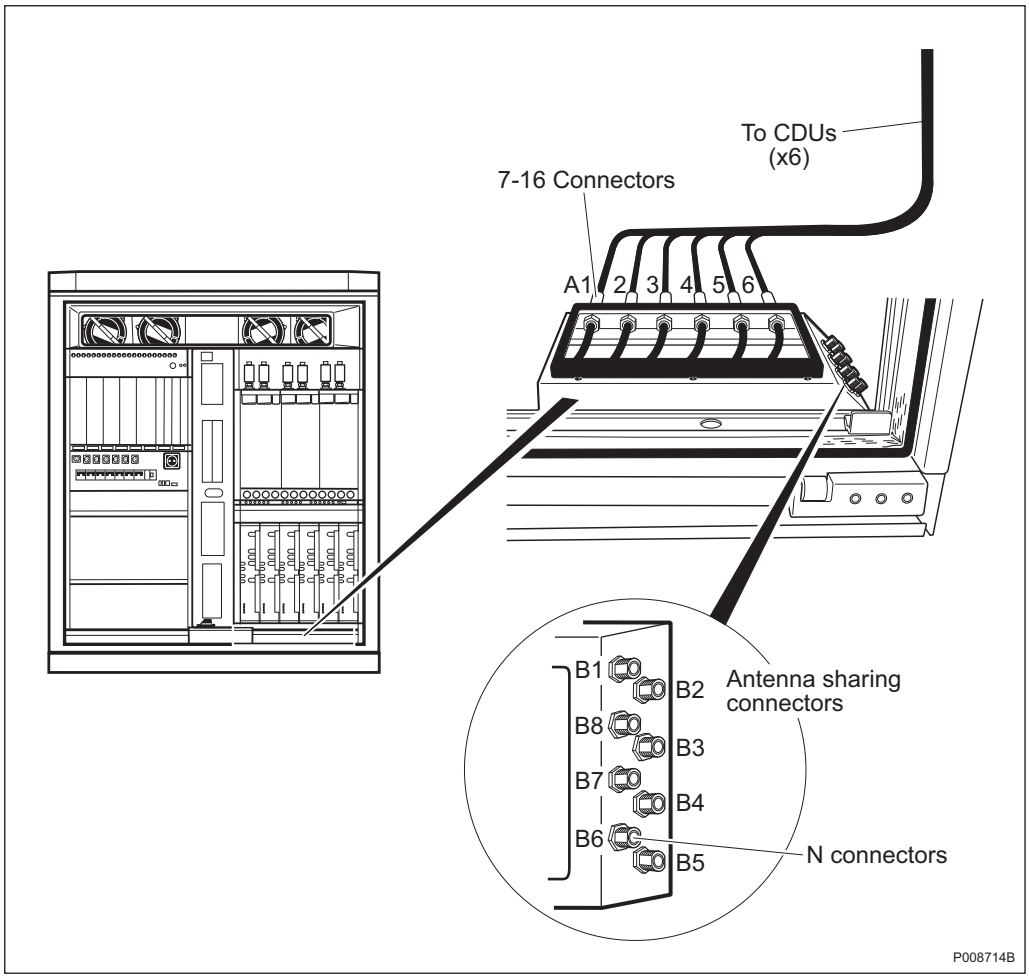

Figure 13 Antenna Connections

Table 11 Antenna Connections

Connection Number	Connection to	Type of Connector
A1 – A6	Antenna	7/16" IEC 169-4
B1 – B6	Antenna sharing	N connector IEC 169-16
B7 – B8	Optional	N connector IEC 169-16

Other External Connections

Table 12 External Connections

Connection Location	Connection to	Type of Connector
AC connection box	AC Mains connections	Screw terminal for wires 4 – 16 mm
ACCU	AC Service outlet	• IEC 83:1975 standard C 2b (Sweden, Germany and others) • IEC 83:1975 standard B2, same as BS 1363:1984 standard 13A (UK) • IEC 83:1975 standard A5-15 (USA)
Reference Earth	Earthing connection	M8 screw, 50 mm^2 stranded copper wire

External Connections to TM

Optical fiber and MiniLink radio cables are connected to the TM through connection field 3. Twisted pair cables connect to the TM through the OVP.

Transport Network to TM

The external line from the transport network interfaces to the transport module. The type and impedance of the connector can differ from operator to operator.

6.2 Test Interface

The RBS 2106 is equipped with test interfaces for the connection of external equipment.

CLU	Self test button
OMT	The Operation and Maintenace Terminal (OMT) interface is located on the front of the DXU.
System voltage test	The system voltage test port provides access to the system voltage (+24 V DC). It is located on the IDM.

6.3 Operator Interface

The Man-Machine Interface (MMI) in the RBS 2106 is comprised of indicators and buttons located on the hardware units in the cabinet.

Indicators	Description
Active cooler fan fault (Y)	A fan is faulty
Active cooler fault (Y)	The cooler is faulty
Bat disconnect	Battery disconnected
Battery mode	Indicates that the RBS is running on battery
EPC Bus Fault	Communication to superior RU is lost
External alarm	One or more supervised external alarms are active
Fan Fault	A fan is faulty
Fault	Fault detected and localised to the RU
Heater fault (Y)	The heater is faulty
H/E external fan fault (Y)	A fan is faulty
H/E internal CCU	A fan is faulty
Local mode	The RU is in local mode
Operational	The RU is operational
Power fault	AC or DC power is missing in the climate unit
RBS fault	One or more faults are detected on RUs in the RBS
RF off	No RF signal
TMA 1 – 6	The TMA is operational
Transmission OK	Signal and frame sync. OK

Buttons

Table 13 Switches and Circuit Breakers

Switch	Position	Function
Battery disconnected	BFU	Disconnects the battery supply
Test button	CLU	CLU self test
DC out	BFU	Automatic CB for DC out
DC out 1	BFU	Automatic CB for DC out 1
DC out 2	BFU	Automatic CB for DC out 2
DXU reset	DXU	Resets the DXU and all subunits
EC	BFU	Automatic CB for EC supply
Local/remote	DXU, dTRU	Changes mode between local and remote
Mains switch	ACCU	Mains switch for power supply
TMA/no TMA	ASU	Switch for TMA
TRU reset	DTRU	Resets the dTRU

7 Power System

This section provides information on the power system of the RBS 2106.

The main characteristics of the RBS 2106 power supply are:

- Only Alternating Current (AC) mains supply is used
- Battery backup is optional and can be internal or external (but not both at the same time)
- The socket of the AC service outlet is available in three variants according to national standards

The figure below provides an overview of the power distribution system within the RBS 2106.

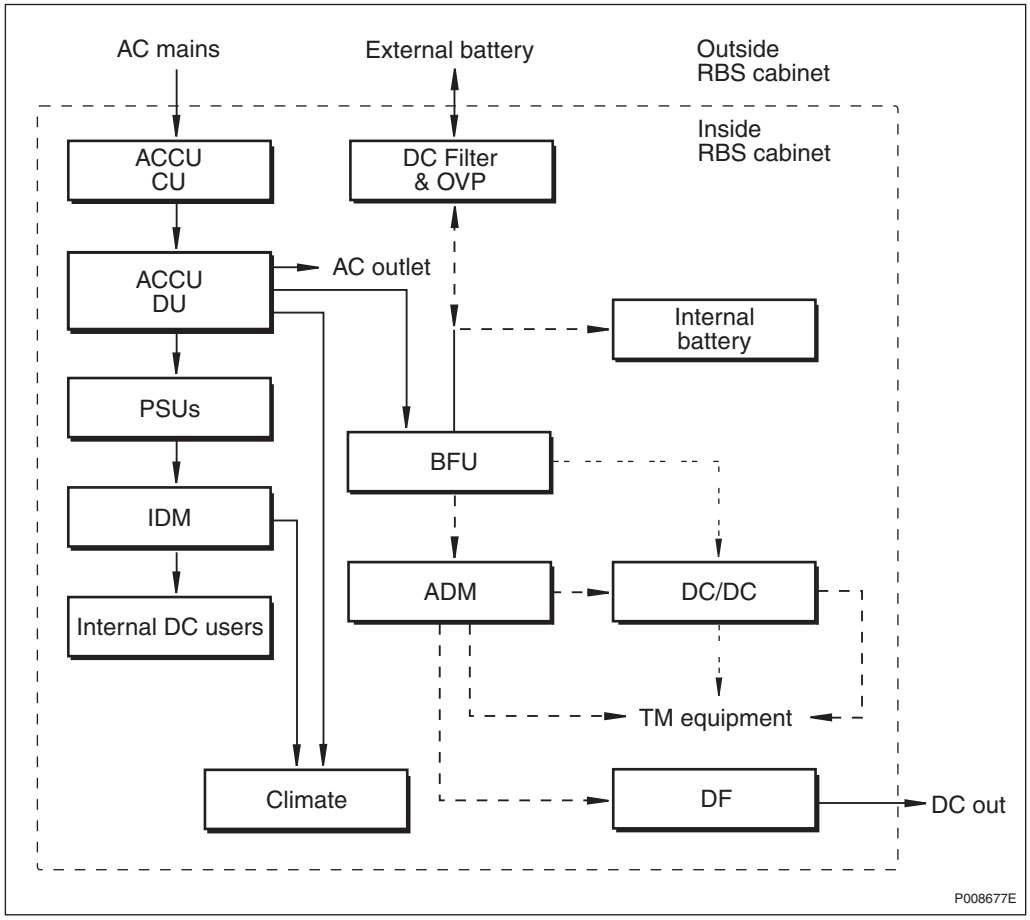

Figure 14 Power System

7.1 Power Supply

This section describes the AC mains power supply, the external earth fault circuit breakers, and the mains fuses.

AC Mains Supply Voltage

Single-phase, two-phase or three-phase AC can be used.

Table 14 Power Parameters

Nominal Voltage	200 – 250 V AC
Operating Voltage	180 – 275 V AC
Nominal Frequency	50 – 60 Hz
Operating Frequency	45 – 65 Hz
Maximum Inrush Current (total, all phases)	60 A for 10 ms (typical duration)

Table 14 Power Parameters

PSU Capacity	4 x 1200 W (4800 W total)
BFU	1 x 200 A

External Earth Fault Circuit Breakers

If external earth fault circuit (ground fault) breakers are used, then the recommended minimum trip value is 100 mA.

Mains Fuses

Table 15 Mains Fuses Recommendation

Minimum for Safe Function	Recommended for Maximum Selectivity	Maximum Allowed Fuse Rating
25 A / 40 A (1)	32 A / 50 A(2)	63 A

(1) Three-phase/Single phase.

(2) Three-phase/Single phase.

7.2 Battery Backup

Battery backup is used to power the site during mains failure and also to protect the site from short-term interruptions in the mains supply.

Internal Battery Backup

The following battery backup levels can be achieved in the cabinet:

- Full: one hour backup time
- Half: half an hour backup time

If no TM equipment is used, thene to add additional batteries in the TM compartment. The backup time will then be enhanced by 100%.

External Battery Backup

Ericsson supplies two external battery backup alternatives: the BBS or the BBU 9500. Both are connected through the DC filter.

7.3 Output Power to TM

The RBS can supply the TM with power according to the table below.

Table 16 Output Power

-48 V DC	2 x 200 W
+24 V DC	2 x 250 W
-48 V DC and +24 V DC	200 W + 250 W

Note: Power to the transport module can be distributed to up to 10 internal users through the optional RU/ADM.

7.4 Power Consumption

The power consumption is shown in the table below.

Table 17 Power Consumption

Climate System	**Power Consumption, Input Voltage >200 V AC**
Heater Plus Forced-Air Cooling Only	5570 W
Heater Plus Refrigerated Cooling	5920 W

8 Transmission

The RBS 2106 supports two transmission standards:

- T1 1.5 Mbit/s, 100 Ω, with PLM synchronisation
- E1 2 Mbit/s, 75 Ω, with PCM synchronisation
- E1 2 Mbit/s, 120 Ω, with PCM synchronisation

9 External Alarms

The RBS 2106 supports a maximum of 16 external alarms. The external alarm device can set the alarm using either an open or a closed condition.

The alarm device connected to the screw terminals must be isolated by relay contacts. A closed contact (logic zero) is required to be below 2 kΩ, and an open contact (logic one) above 100 kΩ. The current through a closed 0 W contact is 1.2 mA. The voltage between terminals with an open contact is 24 V DC.

The external alarms are defined at the installation. They are defined by using the OMT, or from the BSC using the remote OMT.

Note: An installed DC/DC Converter is hard-coded to alarm input 16 in the External Alarm Unit. Pin 16 is therefore unavailable.

Note: An installed Smoke Detector is hard-coded to alarm input 2 and 3 in the External Alarm unit. Pins 2 and 3 are therefore unavailable.

10 Standards, Regulations and Dependability

This section provides a brief overview of standards, type approval, and EMC.

10.1 Safety Standards

In accordance with the market requirements, the RBS 2106 complies with the following product safety standards:

- 73/23/EEC Low voltage directive
- IP 55 according to IEC 60529
- EN 60950 / IEC 60950
- EN 60215 / IEC 60215
- UL 1950
- CSA 22.2 No. 950

10.2 Other Standards and Regulations

Marking

The product is marked with symbols to indicate compliance with product safety standards.

Type Approval Standards

The RBS complies with the European Community and the North America market requirements regarding radio performance. The product has the CE and FCC symbols to indicate compliance with the legal requirements of the respective region.

EMC

The RBS complies with the European Community and the North America market requirements regarding EMC. The product has the CE and FCC signs to show compliance to the legal requirements in respective region.

Dependability

The RBS 2106 is designed for a technical lifetime of 25 years (24-hour operation). The following preventive maintenance conditions must be fulfilled to guarantee the availability of the RBS:

Fans	The fans must be inspected (and cleaned if necessary) every year. The lifetime is estimated to be at least 7 years.
Climate Unit	The climate unit must be regularly inspected and cleaned (the interval is approximately one year, but depends on the environmental conditions at the site).
Batteries	The batteries must be regularly inspected every year (for oxide on the pole terminals). The batteries should be replaced according to the recommendations of the battery supplier.

Vandal Resistance

The RBS 2106 fulfils Ericsson’s requirements for vandal resistance.

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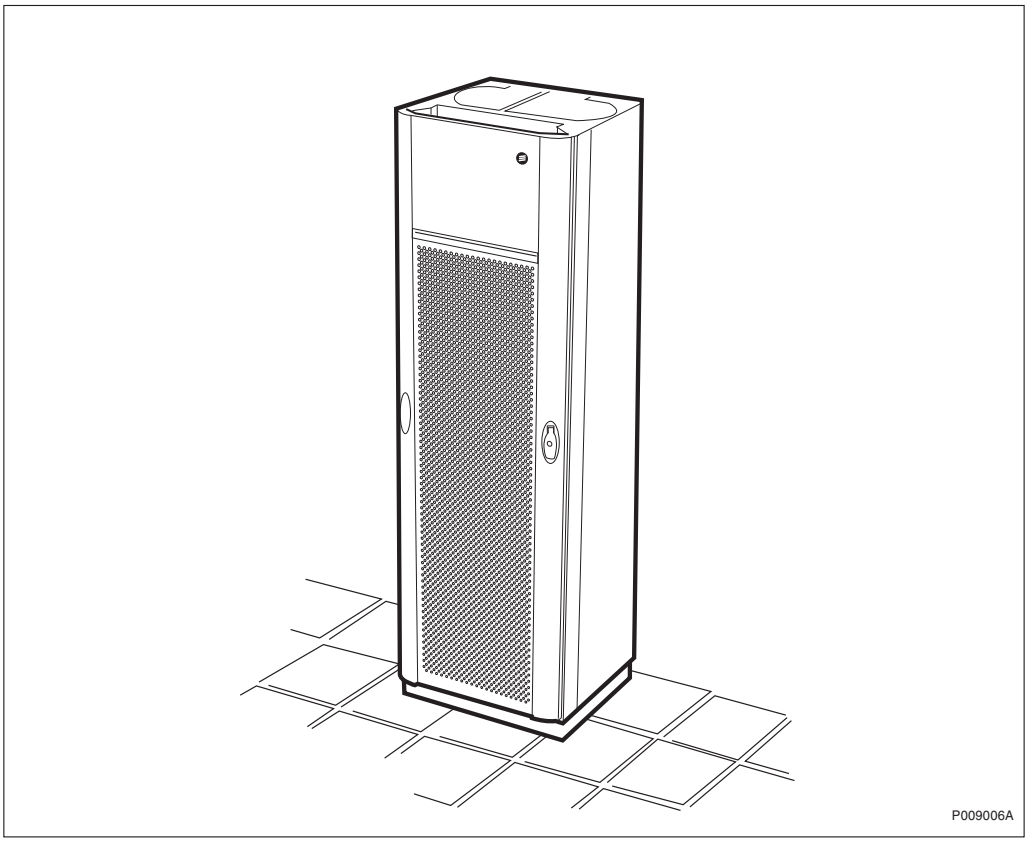
RBS 2206

Radio Base Station
Product Description

The RBS 2206, a member of the RBS 2000 family, is a 12 TRX radio base station for indoor applications. This cabinet covers the same floor areas as the RBS 2202, its predecessor, and boasts double capacity.



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Contents

1 Product Overview

The RBS 2206 is a high-capacity indoor base station. It is used for indoor applications, with up to six double TRansceiver Units (dTRU). The RBS 2206 is designed to be transported as a fully-assembled cabinet to the site. All units in the cabinet are easily accessible from the front of the cabinet, which means that the cabinets can be mounted side by side with their backs against a wall.

1.1 Main Features

The RBS 2206 supports the following features:

- 1, 2 or 3 sectors in one cabinet using Combining and Distribution Unit (CDU-F or CDU-G)
- Co-siting (antenna sharing) with GSM, TDMA or WCDMA systems
- Discontinuous transmission/reception
- Duplex filters
- Dynamic power regulation
- Encryption/ciphering
- EDGE, hardware prepared
- Expansion by TG-synchronisation
- External alarms
- Frequency hopping
- Link Access Procedures on D-channel (LAPD) concentration and LAPD multiplexing are used to make the transmission resource more efficient
- Positioning with GPS
- Radio configurations supported on 800, 900, 1800 and 1900 MHz
- Receiver diversity
- Transmission Interface: The following transport network interface alternatives exist:
  - T1 1544 kbit/s, 100 Ω, with PLM synchronisation
  - E1 2048 kbit/s, 75 Ω, with PCM synchronisation
  - E1 2048 kbit/s, 120 Ω, with PCM synchronisation
- Wide range power input 120 – 250 V AC

1.2 Variants

There are three RBS 2206 cabinet versions:

- -48 to -60 V DC
- 120 – 250 V AC (50/60 Hz) and +24 V DC
- +24 V DC, without Power Supply Unit (PSU)

1.3 Optional Equipment

The equipment listed below is available, but is not necessary for basic functionality.

- Antenna Sharing Unit (ASU)
- Battery backup, external only
- Bias injectors
- Distribution Frame (DF), externally mounted
- Distribution Module (DM)
- dual duplex Tower Mounted Amplifier (ddTMA), externally mounted
- Digital Cross Connector (DXX), transmission equipment
- External Synchronization Bus (ESB)
- Hybrid Combiner Unit (HCU)
- Redundant PSU
- Tower Mounted Amplifier-Control Module (TMA-CM)
- Transmission Adapter (TA), 75 – 120 Ω

2 Dimensions

This section describes the physical characteristics of the RBS 2206.

For dimensions, *see Figure 1 on page 6.*

Weight

Table 1 RBS 2206 Weights

Unit	Weight
RBS cabinet (1)	230 kg (507 lbs.)
Base frame	12 kg (26 lbs.)

(1) Fully equipped including base frame.

Colour

Dimensions

Table 2 RBS 2206 Colour

Colour	Reference Number
Grey	NCS 1002-R

3 Space Requirements

The following sections describes the required space and recommended floor layout.

Space above the RBS Cabinet

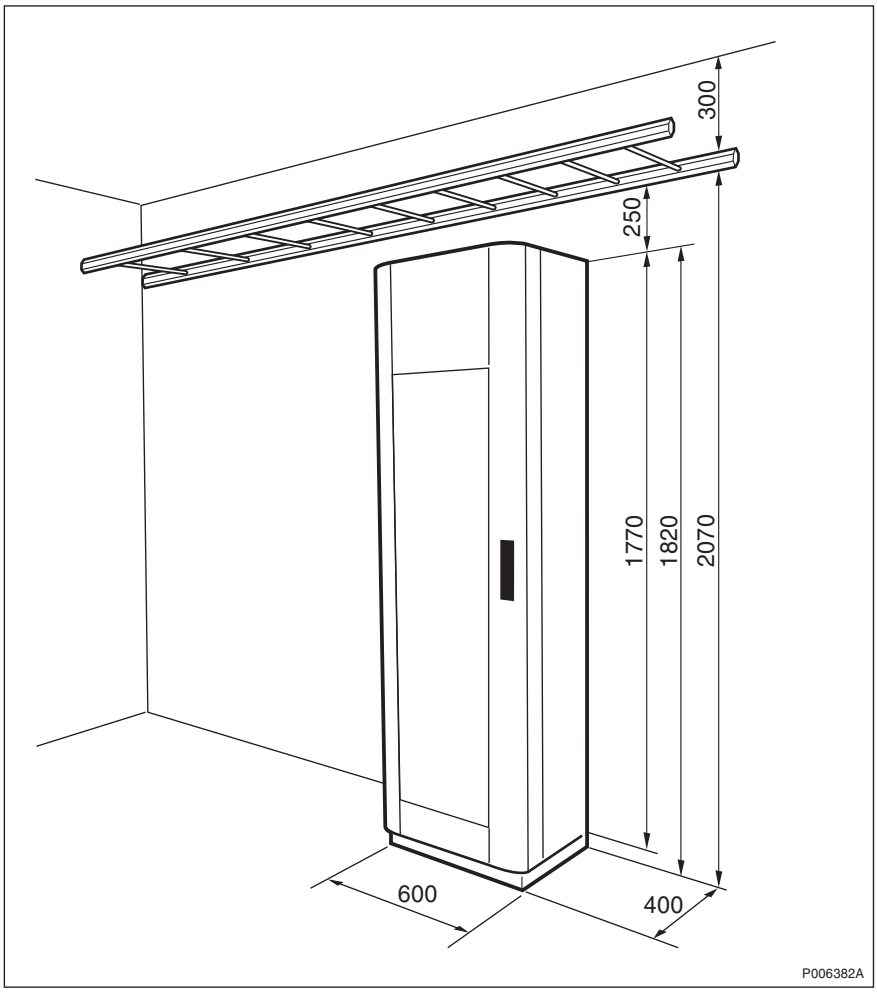

Figure 1 RBS 2206, Free Space above the Cabinet

The recommended distance between the cabinet and cable ladder is 250 mm. A shorter distance makes it difficult to exchange fans and may restrict the air flow. A space of 300 mm is recommended above the cable ladder to make cable installation work easier.

The door projects 70 mm in front of the cabinet.

Layout for RBS Cabinets

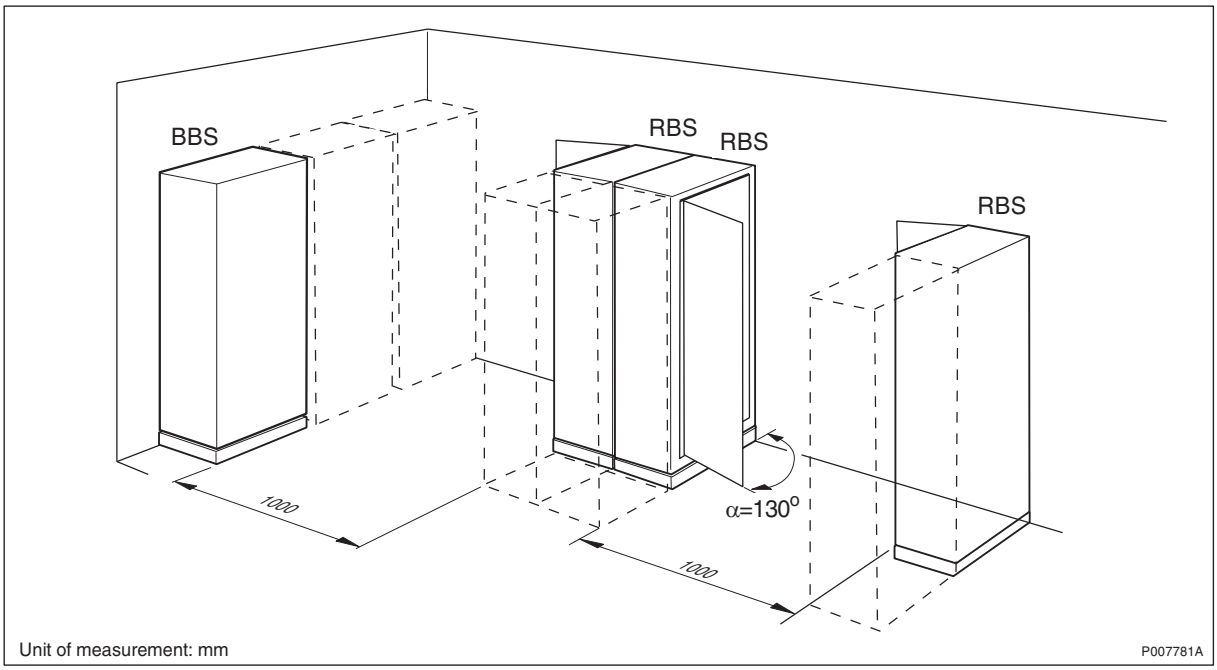

Figure 2 Floor Layout and Space Requirements

The RBS cabinets and Battery Back-up System (BBS) racks are mounted on the floor, and may be positioned against a wall, back to back, or free standing without contact with other cabinets.

Expansion cabinets and racks can be positioned to the left or to the right of the master cabinet. However, expansion to the right is recommended in order to follow the same standard globally.

For maintenance a distance of 1000 mm in front of the cabinets and racks work is recommended.

Note: Space for future expansion must be considered as indicated in the dotted line in the figure above.

Earthquake Requirements

If the RBS cabinet shall fulfil the requirements for earthquake protection, the space between wall and cabinet is to be at least 100 mm and between cabinets at least 150 mm.

Footprint

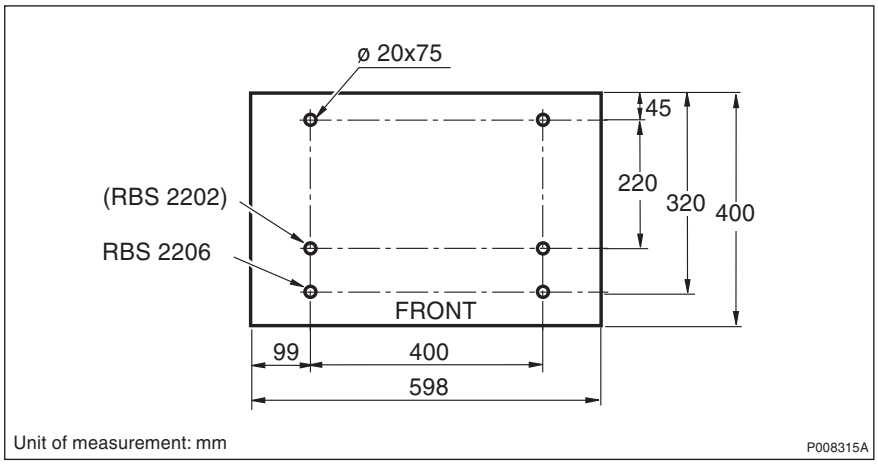

Figure 3 Hole Pattern Overview

The RBS 2206 has the same footprint as the RBS 2202 cabinet. The base frame is used as a template to mark new holes. If an RBS 2202 is being replaced by an RBS 2206, the holes for the old cabinet can be used for the new cabinet.

4 Environment

The RBS 2206 is designed to operate within limits stated for climatic requirements and also to have a limited effect on the environment.

4.1 Operating Environment

The climatic requirements for the RBS 2206 on the site are shown in the table below.

Table 3 Environmental Specifications

Environmental Parameters	**Normal Operation**(1)	**Safe Function**(2)	**Non-destructive Conditions** (3)
Temperature	+5 to +40 C°	0 to +45 C°	-10 to +55 C°
Relative Humidity	5 – 85%	5 – 90%	5 – 90%

(1) Normal operation describe the environmental conditions where all units function as specified.
(2) Environmental stress above the limits for normal operation where all units shall continue to function during the stress, but performance or capacity may be reduced. When the environmental stress has dropped to normal conditions, function as specified shall automatically be achived. Safe function refers to a period of not more than 72 consecutive hours, and a total of not more than 15 days in one year.
(3) Non-destructive conditions describe environmental stress above the limits for normal conditions with no function guaranteed and unspecified degradation. When the environmental stress has dropped to normal conditions, restoring full RBS performance requires no manual intervention on site. Non-destructive conditions refer to a period of maximum 96 consecutive hours, and a total of maximum 5.5 days in a three-year period.

Acoustic Dispersion

The cabinet noise dispersion for an RBS 2206 with four fans is shown in the two figures below. The figures show the noise dispersion generated by a free-standing cabinet and by a cabinet mounted against a wall.

Note: The acoustic noise dispersion values for a free-standing cabinet and a cabinet installed against a wall were tested according to the ISO 9614-2 standard, however deviations from these values may be experienced due to the nature of materials in the environment where the cabinet is installed. Objects may reflect or absorb sound and will affect acoustic dispersion.

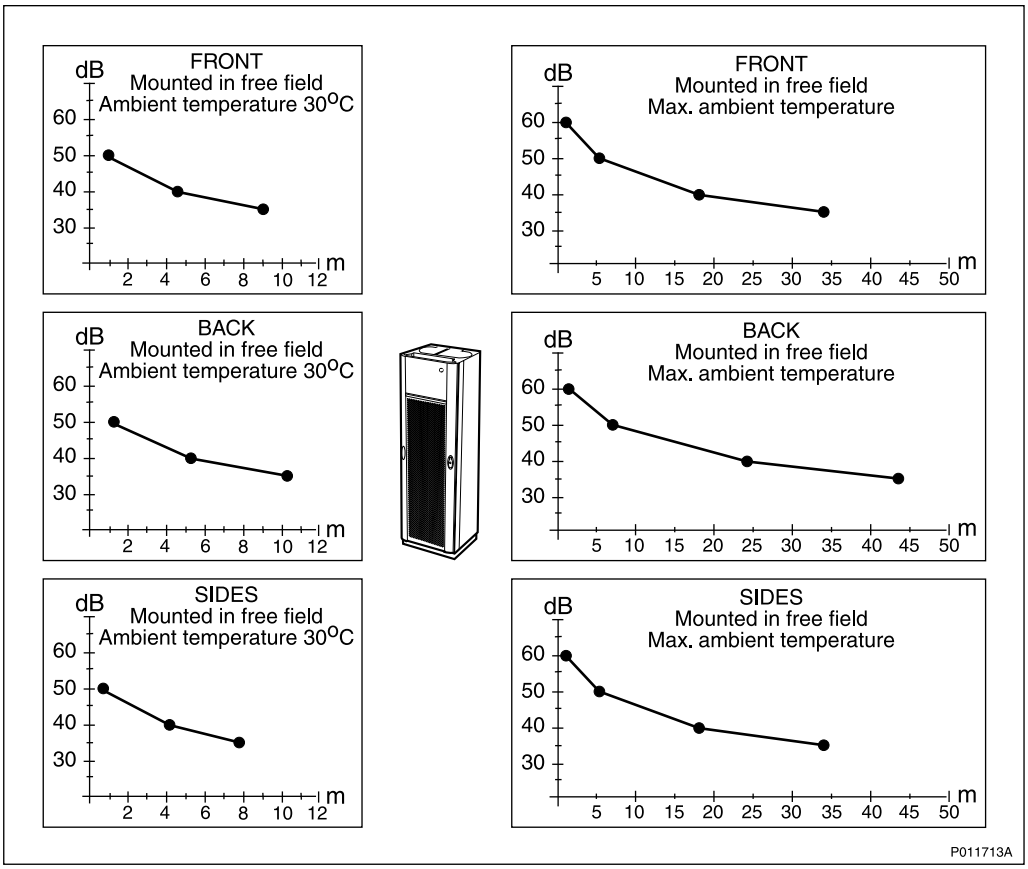

Figure 4 Acoustic Dispersion for a Free-standing RBS 2206

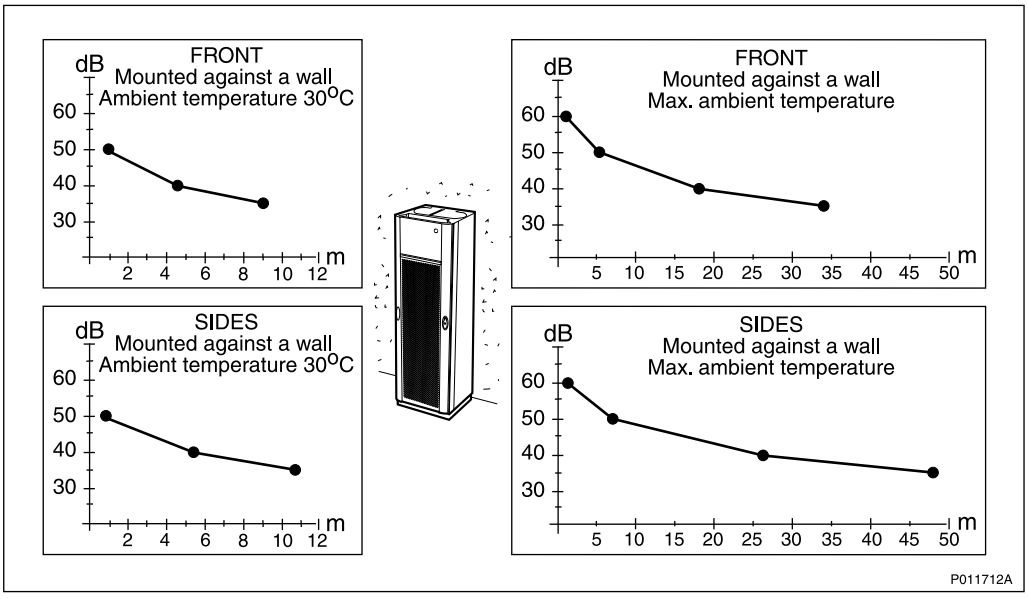

Figure 5 Acoustic Dispersion for a Wall-mounted RBS 2206

Ground Vibrations

The RBS 2206 is tested to withstand random vibrations of up to 0.15 m^2/s^3. It is also tested for single shocks up to 40 m/s^2. The cabinet is tested for seismic exposure with a test frequency of 1 – 35 Hz. Maximum test level of the Required Response Spectrum (RRS) is 50 m/s^2 within 2 – 5 Hz. The shape of RRS is defined by the ETSI standard.

Levelling

For cabinet levelling purpose, the floor must be level to within ±3 mm/2000 mm and the floor gradient be within ±0.1°.

4.2 Environmental Impact

This section describes the effects that the cabinet has on the environment.

Heat Dissipation

The RBS 2206 generates an average heat load of 1500 W. The exact figure is dependent upon confguration, equipment and site-specific conditions.

4.3 Compliance Distances for Electromagnetic Exposure

The compliance distance is the minimum separation that should be kept between the antenna and a person in order to ensure that the ICNIRP RF exposure limits are not exceeded.

Note: ICNIRP, ‘‘Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)’’, International Commission on Non-Ionizing Radiation Protection, Health Physics, vol. 74, no. 4, 1998.

Ericsson has performed a free-space near-field RF exposure assessment of typical configurations of the RBS 2206 with a recommended antenna. The resulting dimensions, in metres, for a compliance boundary for both public and occupational exposure are shown in *Table 4 on page 12*.

The compliance boundary is defined as a cylinder around the antenna, *see Figure below*. The antenna is not located at the centre of the cylinder. Instead it is located almost at the edge, facing towards the centre of the cylinder. The distance between the antenna’s rear and the edge of the cylinder is the ‘‘Distance behind antenna’’. The height of the cylinder is the antenna height plus equal distances above and below the antenna. The cylinder shape overestimates the compliance distances right beside the antenna.

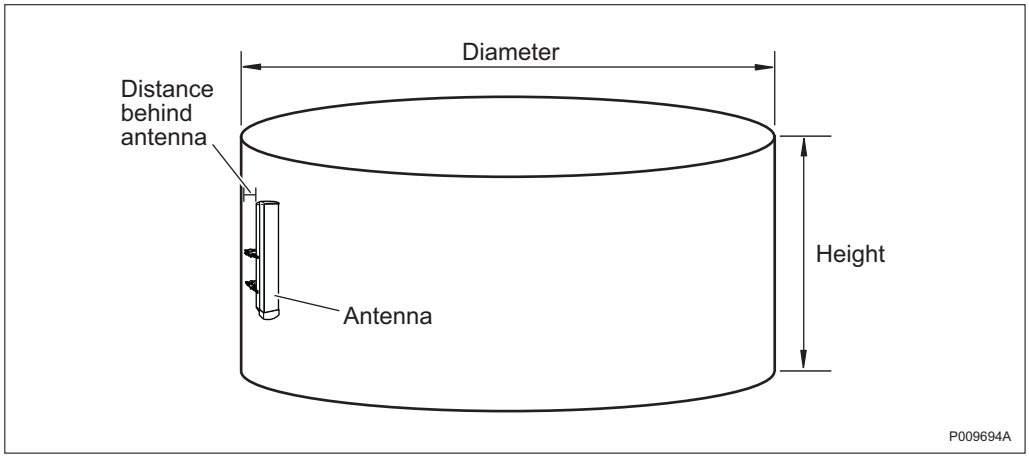

Figure 6 Compliance Boundary Cylinder

Note: *Table 4 on page 12* shows an example for a typical antenna. As the antenna field distributions will differ, complete calculations or measurements may be necessary in order to establish the compliance boundary for other configurations chosen by the customer. For further information on calculation methods, *see:*

	Radio Site Installation Engineering Manual	*EN/LZN 720 0069*

Table 4 Compliance Boundary Dimensions for the General Public (GP) and Occupational (O) Exposure for Typical Configurations

Configuration	Frequency (MHz)	Dimensions of Cylindrical Compliance Boundary in Meter (m)					
		Diameter		Height		Distance Behind Antenna	
		GP	O	GP	O	GP	O
3x2 no hybrid	900	6	3	1.7	1.5	0.1	0.1
	1800	5	1	1.6	1.4	0.1	0.05
3x4 combined	900	6	3	1.7	1.5	0.1	0.1
	1800	5	1	1.6	1.4	0.1	0.05
3x2 TCC	900	9	4	1.9	1.6	0.1	0.1
	1800	7	2	1.6	1.5	0.1	0.1
1x12 filter combiner	900	12	5	2.3	1.6	0.1	0.1
	1800	10	4	1.9	1.6	0.1	0.1

The cylinder shape overestimates the compliance distances right beside the antenna. In reality the occupational compliance distance by the side, in line with the front of the antenna, is less than 0.1 metre for output power levels below 56 W and less than 0.3 metre for the other power levels reported here. For characteristics of an antenna recommended for typical configurations of a RBS 2206, *see Table below*.

Table 5 Characteristics for a Typical Antenna (KRE 101 1916/1)

Antenna Specifications	X-pol macro RBS sector antenna
Antenna Height	1.3 m
Horizontal Half-power Beam Width	60 degrees
Vertical Half-power Beam Width	15 degrees at 900 MHz 7 degrees at 1800 MHz
Antenna Gain	14.5 dBi at 900 MHz 17 dBi at 1800 MHz
Down Tilt	0 degrees

The nominal maximum power fed to the antenna, as a function of the number of TRanciever Units (TRU) per antenna and the maximum power (including tolerances and transmission loss) per TRU, for RBS 2206 at 900 MHz and 1800 MHz, are given in *Table 6 on page 13.*

Table 6 Maximum Power to Antenna for Various RBS 2206 Configurations

Configuration	**Frequency (MHz)**	**Nominal Output Power per TRU (dBm)/(W)**	**Maximum Power into Antenna** (1) **(dBm)/(W)**
3x2 no hybrid	900	45.5 / 35	47.5 / 56
	1800	44.5 / 28	46.5 / 45
3x4 combined	900	42 / 16	47 / 50
	1800	41 / 13	46 / 40
3x2 TCC	900	48 / 63	50 / 100
	1800	47 / 50	49 / 79
1x12 filter combiner	900	43 / 20	53 / 190
	1800	42 / 16	52 / 151

(1) Including power tolerance level (+2 dB) and transmission losses (-3 dB).

4.4 Materials

All Ericsson products fulfil the legal, market and Ericsson requirements regarding:

- Fire resistance of material, components, wires and cables
- Declaration of materials
- Use of restricted material
- Recycling

Package Material

The package material is recyclable.

5 Hardware Units

A high level of availability is achieved using strict functional modularity with a system of standardised units. A failed unit can easily be replaced by a new one.

The RBS 2206 cabinet contains the radio equipment, power supply and the climate equipment (fans). All required transmission equipment and battery backup must be housed outside the cabinet.

Outside equipment is listed under optional units. Not all HW units are covered in this section, only those directly related to RBS.

5.1 Standard Hardware Units

This section briefly describes the standard hardware units required for functionality, irrespective of configuration or frequency.

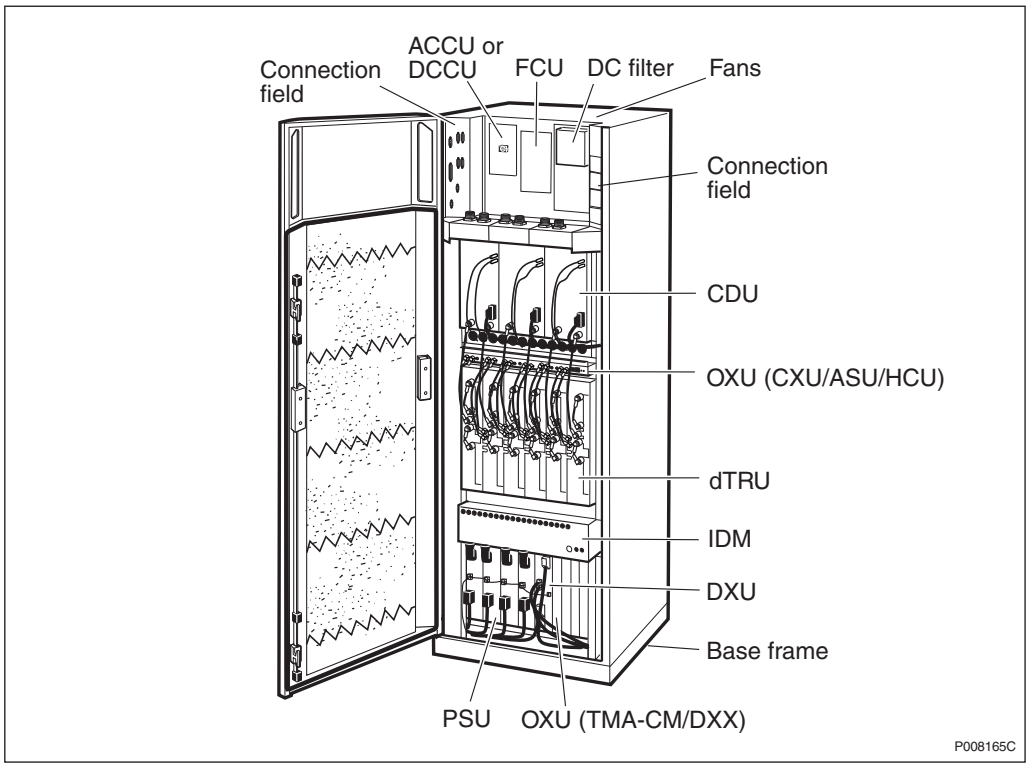

Figure 7 Standard Hardware Units

ACCU-01

The AC Connection Unit (ACCU-01) connects, disconnects, and distributes the incoming AC power supply to the PSUs and the climate unit. It consists of two parts: a Connection Unit and a Distribution Unit.

Number of units: 0 – 1.

CDU

The Combining and Distribution Unit (CDU) is the interface between the transceivers and the antenna system. All signals are filtered before transmission and after reception by means of bandpass filters. The CDU allows several dTRUs to share antennas. There are a maximum of three CDUs in one RBS 2206.

The CDU combines transmitted signals from several transceivers, and distributes the received signal to several transceivers. The CDU is hardware-prepared to support EDGE. Two different CDU types are used in the RBS 2206 to support all configurations:

- **CDU-F** is a filter combiner intended for high capacity solutions.

- **CDU-G** can be configured either for high capacity or for high coverage. It is a combiner that can be used for synthesizer hopping.

Number of units: 1 – 3

CXU

The Configuration Switch Unit (CXU) cross-connects the CDU and the dTRU in the receiver path. The CXU makes it possible to expand or reconfigure a cabinet without moving or replacing any RX cables. The RX inputs/outputs on the dTRU and the CDU are placed in such positions that they minimize the amount of cable types for connecting the CXU with the dTRUs and the CDUs. The CXU is configured by means of software.

Number of units: 0 – 1

DCCU -

The DC Connection Unit (DCCU) connects, disconnects, and distributes the incoming DC power supply to the PSUs and the climate unit. It consists of two parts: a Connection Unit and a Distribution Unit.

Number of units: 0 – 1.

dTRU

The double TRansceiver Unit (dTRU) contains two TRXs for transmission and reception of two radio carriers. It has a built-in combiner with the optional possibility of combining two TX signals into one TX output. It is also prepared for four-branch RX diversity for further improvements in sensitivity. Variants of the dTRU supports both GMSK and EDGE.

Number of units: 1 – 6

DXU-21

The Distribution Switch Unit (DXU-21) is the central control unit for the RBS. It supports the interface to the BSC, and it collects and transmits alarms. The DXU-21 controls the power and climate equipment for the RBS. It has a removable compact flashcard which makes it possible to replace a faulty DXU-21 without the need for loading RBS software from the BSC. The DXU is also provided with four ports for transmission interfaces. It can handle both 2048 kbit (E1) and 1544 kbit (T1) transmission interfaces. The DXU-21 has hardware support for EDGE on 12 TRXs.

Number of units: 1

FCU

The Fan Control Unit (FCU) controls the fans in the cooling system by regulating fan speed. The FCU is controlled by the DXU.

Number of units: 1

IDM

The Internal Distribution Module (IDM) is a panel for distributing the internal +24 V DC power to the various units. Each distribution circuit in the cabinet is connected to a circuit breaker in the IDM.

Number of units: 1

PSU

The Power Supply Unit (PSU) are available in two versions, PSU AC for connection to AC mains, or PSU DC for connection to -48 or -60 V DC power supply.

- The PSU AC converts 120 – 250 V to regulated +24 V DC
- The PSU DC converts -48 or -60 V DC to regulated +24 V DC

Number of units: 0, 2, 3, 4

DC Filter

The DC filter unit is the interface for +24 V DC power supply or battery backup.

Number of units: 1

5.2 Optional Hardware Units

This section describes the hardware units that are available as options for the cabinet.

ASU

The ASU is part of co-siting, that is, using another cabinet together with a GSM RBS 2206 cabinet in the same sector. The ASU allows a TDMA (or other) cabinet and a GSM RBS 2206 cabinet to share RX antennas.

Number of units: 0 – 1

Bias injector

The bias injector is used to provide the ddTMA with DC power, from the TMA-CM, over the RX/TX feeder cables. Six bias injectors can be connected to one TMA-CM. The bias injectors are mounted directly on the CDU antenna connectors.

Number of units: 0 – 6

BBS

The RBS 2206 can be provided with battery backup sytem (BBS) from an external cabinet, either a BBS 2000 or a BBS 2202.

ddTMA

The ddTMA is to be mast-mounted and placed close to the antenna. It improves the receiver sensitivity. The ddTMA saves feeder cables by duplexing RX and TX signals to the same cable.

Number of units: 0 – 6

DXX

A 1 or 2-card DXX plug-in unit that is a digital cross-connector. The one card version has four G.703/G.704 ports. The 2-card version has four G.703/G.704 ports and one slot for two to four additional interfaces that can be G.703/G.704 ports, HDSL, LTE or optical fibre. It is installed in an OXU position.

Number of units: 0 – 1

DF

The DF is the termination point for incoming PCM cables. Overvoltage protection for external alarm cables.

Number of units: 1

ESB

TG synchronization is the technology used to expand one RBS 2106 cabinet with another RBS cabinet in the same cell. The External Synchronization Bus (ESB) is the cable connected between the DXUs.

Number of units: 0 – 1

HCU

The HCU contains three hybrid combiners. Each hybrid combines two RF signals, delivered from two dTRUs, into one.

Number of units: 0 – 1

OXU

The following Optional Expansion Unit (OXU) positions are available:

- Four spaces in the DXU/PSU subrack
- One 19-inch OXU position is available between the CXU and the dTRU subrack.

RUs which typically are located in the OXU slots include the DXX and the TMA-CM. The 19-inch position above the CXU is used for an ASU in co-sited cabinets.

TMA-CM

The TMA-CM is used to provide up to six ddTMAs with 15 V DC power through the bias injector. It is also used to identify TMA faults and forward this information to the alarm module in the RBS. The TMA-CM is mounted in an OXU position.

Number of units per cabinet: 0 – 2

6 Interfaces

In this section all external and internal connections are listed, as well as the test interface and the operator interface.

The connection field for external connectors is located at the top of the radio cabinet inside the door. Internal connections, the test interface and operator interface are located on some hardware units.

6.1 External Connections

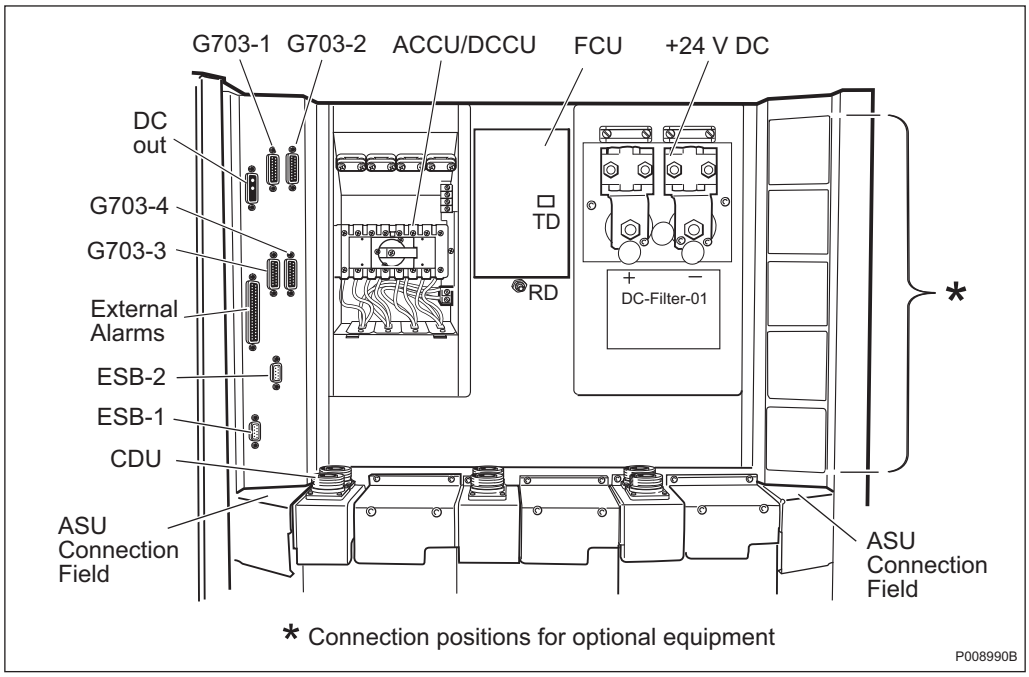

Figure 8 External Connectors (Shown Here with CDU-F)

Antenna feeders are directly connected to the CDUs. If bias injectors are used, they are connected directly to the CDU and the antenna feeder is connected to the bias injector.

Table 7 External Connections

Connection Name	Description	Connector Type
CDU	Feeder (and bias injector) connection to antennas	7-16 female connector
G703-1	Transmission Link 1	15-pin female, D-sub
G703-2	Transmission Link 2	15-pin female, D-sub
G703-3	Transmission Link 3	15-pin female, D-sub
G703-4	Transmission Link 4	15-pin female, D-sub
DC out	+24 V DC to external equipment	3-pole female, D-sub
External Alarms	External alarm inputs to DF	37-pin female, D-sub
ESB-1	ESB to co-sited cabinets	15-pin female, D-sub

Table 7 External Connections

ESB-2	ESB to co-sited cabinets	15-pin female, D-sub
FCU RD	Optical cable connector from the BBS	Opto connector
+24 V DC	DC filter	Cable clamp
Earth	Earth stud M8 to main earth cable	M8 stud
ACCU	Mains connection to PSU-AC	Screw terminal
DCCU	-48 V connection to PSU-DC	Screw terminal
ASU	Antenna sharing connections	SMA-connector
TMA-CM	Power supply the TMA with DC power	SMA-connector
DXX	Transmission link	TNC-connector
GPS	Synchronisation signal from GPS antenna	9-pin female, D-sub

6.2 Test Interface

The test interface for the RBS 2206 is on the front panel of the DXU-21 unit. The Operation and Maintenance Tool (OMT) port is used to connect the OMT to the RBS. A remote OMT can also be used from the BSC, which sends signals over the Abis interface.

6.3 Operator Interface

The Man Machine Interface (MMI) in the RBS 2206 is based on visual indicators and buttons located on the hardware units in the cabinet.

Indicators	**Description**
AC Fault	One or more phases are faulty
External Battery mode	Indicates that the RBS is running on battery
RBS fault	One or more faults are detected on RUs in the RBS
DC disconnected	Indicates that DC (system voltage) is disconnected

Indicators	Description
EPC bus fault	Indicates the state of the EPC bus
Ext alarm	One or more supervised external alarms are active
Fault	Fault detected and localised to the RU
Local mode	The RU is in local mode
Operational	The RU is operational
Transmission OK	Indicates state of transmission on ports A – D
RF off	RF not enabled

Buttons	Description
dTRU reset	Resets the dTRU
DXU reset	Resets the DXU
Local/remote mode	Changes RU mode to local or remote

7 Power System

The power system of the RBS 2206 depends on the choice of power supply and may include a number of units outside the RBS.

The RBS 2206 can be connected either to AC mains supply voltage or to DC supply voltage.

7.1 AC Mains Supply Voltage

AC mains supply voltage is connected to the cabinet using four AC cables. If the power supply does not meet the AC power requirements, then filters and stabilisers must be installed to protect the equipment and ensure proper operation.

There are two ways to connect power to the base station. They are:

- Single phase, line to neutral
- Single phase, line to line

Note: When single phase line to line is used, each PSU requires two circuit breakers or fuses.

Table 8 AC Mains Power Requirements

Voltage Range for Specified Performance (Phase Voltage)	120 – 250 V AC
Voltage Range	90 – 275 V AC (1)
Frequency	45 – 65 Hz
Inrush Current, Max.	30 A (1 – 30 ms)
Maximum AC Power	1.4 kW x 4
Non-destructive Range	0 – 275 V AC

(1) Install external filter and stabiliser if the requirement is not met.

Mains Fuses

Table 9 Mains Fuses Recommendation

Minimum for Safe Function	Recommended for Maximum Selectivity	Maximum Allowed Fuse Rating
4 x 10 A /16 A(1)	4 x 16 A	4 x 20 A

(1) For 200 – 250 V range only.

External Earth Fault Circuit Breakers

If external earth fault (ground fault) circuit breakers are used, then the recommended minimum trip value is 100 mA.

7.2 +24 V DC Supply Voltage

Table 10 DC Power Requirements

Nominal	+24 V DC
Default	+27.2 V DC
Range	+20.5 to +29.0 V DC
Non-destructive Range	+0 to +32 V DC
Inrush Current	Max. 500 A (0.1 – 10 ms)

Fuses

Table 11 +24 V DC Fuse Recommendation

Minimum for Safe Function	Recommended for Maximum Selectivity	Maximum Allowed Fuse Rating
1 x 160 A(1)	1 x 200 A	1 x 250 A

(1) May be used when no transmission and/or optional equipment is installed.

7.3 -48 to -60 V DC Supply Voltage

Table 12 DC Supply Voltage Requirements

Nominal	-48/-60 V DC
Range	-40.0 to -72.0 V DC
Non-destructive Range	+0 to -80 V DC
Inrush Current	200 A (0.1 – 5 ms)

Fuses

Table 13 -48 to -60 V DC Fuse Recommendation

Minimum for Safe Function	Recommended for Maximum Selectivity	Maximum Allowed Fuse Rating
4 x 32 A	4 x 35 A	4 x 40 A

7.4 Battery Backup

Battery backup is used to power the site during mains failure and to protect the site from short interruptions in the AC mains supply. It is available in an external cabinet.

It is possible to supply external transmission equipment from the battery cabinet. The transmission equipment is then provided with power supply longer than the RBS. In the event of mains failure, the batteries in the BBS 2000 or BBS 2202 will deliver the necessary power to the radio cabinet as well as to the transmission equipment, if used. This enables the radio system to continue operating during mains failure.

Battery backup can be delivered for 1, 2, 4, 6 or 8 hours backup time, depending on the chosen configuration of the RBS. The BBS can feed +24 V DC or -48 V DC to the TM equipment. The -48 V DC supply requires an internal DC/DC converter in the BBS. It is possible to share battery backup between an RBS 2202 and an RBS 2206.

7.5 Power Consumption

The power consumption figures shown in the table below are for dimensioning cables and fuses. The figures in the table have been rounded off.

Table 14 Higher Power Consumption

RBS 2206 Cabinet (Fully Equipped)	**Power Supply Voltage**		
	120 – 250 V AC	+24 V DC	-48 V DC
Maximum Power Consumption	3.2 / 5.7 kW(1)	2.7 kW	3.2 kW

(1) Power consumption during maximum battery charging.

The RBS can supply transmission equipment with +24 V DC. The maximum power output is 250 W.

8 Transmission

The RBS 2206 is normally connected to a DF for transmission (PCM lines). Four PCM cables are connected to the ports on the front of the DXU. The RBS 2206 supports two transmission standards:

- T1 1.5 Mbit/s, 100 Ω, with PLM synchronisation
- E1 2 Mbit/s, 75 Ω, with PCM synchronisation
- E1 2 Mbit/s, 120 Ω, with PCM synchronisation

PCM Overvoltage Module

This module contains overvoltage protection for the PCM lines. If the PCM lines are terminated in equipment outside the RBS equipment room, these lines must be protected by OverVoltage Protectors (OVP) in the DF.

Optional Transmission Equipment

The cabinet can be connected to optional transmission equipment that is mounted externally. The optional transmission equipment used is:

- Transmission adapter (not connected to DF) with BNC connector
- DXX (installed in the OXU)
- Mini-link
- Mini DXC (installed in the OXU)

- TMR 9202

The connectors used for this are:

- PCM cables
- +24 V DC cables
- Blank panels for connectors to the OXU

9 External Alarms

The RBS 2206 supports a maximum of 16 external alarms. The external alarm device can set the alarm using either an open or a closed condition.

The alarm device connected to the screw terminals should be isolated relay contacts. A closed contact (logic zero) is required to be below 2 kΩ, and an open contact (logic one) above 100 kΩ. The current through a closed 0 W contact is 1.2 mA. The voltage between terminals with an open contact is 24 V DC.

The external alarms are defined at the installation. They are defined by using the OMT or from the BSC using the remote OMT.

Note: An installed DC/DC Converter is hard-coded to alarm input 16 in the External Alarm Unit. Pin 16 is therefore unavailable.

Note: An installed Smoke detector is hard-coded to alarm input 2 and 3 in the External Alarm unit. Pins 2 and 3 are therefore unavailable.

10 Standards, Regulations and Dependability

This section provides a brief overview of standards, type approval, and EMC.

10.1 Safety Standards

In accordance with the market requirements, the RBS 2206 complies with the following product safety standards:

- 73/23/EEC Low voltage directive
- IP 20 according to IEC/EN 60529
- FCC rules, part 68
- EN 60950 / IEC 60950
- EN 60215 / IEC 60215
- UL 1950 / CSA C22.2 No.950

10.2 Other Standards and Regulations

Marking

The product is marked with symbols to indicate compliance with product safety standards.

Type Approval Standards

The RBS complies with the European Community and the North America market requirements regarding radio performance. The product has the CE and FCC symbols to indicate compliance with the legal requirements of the respective region.

EMC

The RBS complies with the European Community and the North America market requirements regarding EMC. The product has the CE and FCC signs to show compliance to the legal requirements in each respective region.

Dependability

The RBS 2206 is designed for a technical lifetime of 25 years (24-hour operation). The following preventive maintenance conditions must be fulfilled to guarantee the availability of the RBS:

Fans	The fans must be inspected (and cleaned if necessary) every year. The lifetime is estimated to at least 7 years.
Air filters	The air filters must be regularly inspected and cleaned (the interval depends on the environmental conditions at the site).

Vandal Resistance

Unauthorised access is not possible without damaging the unit.

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