Exhibit 8 Manual

Ericsson GSM System

RBS 2101, RBS 2102
RBS 2103, RBS 2202

Hardware Reference Manual

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EN/LZT 720 0023 R3B

Ericsson GSM System

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RBS 2101, RBS 2102, RBS 2103, RBS 2202 Hardware Reference Manual

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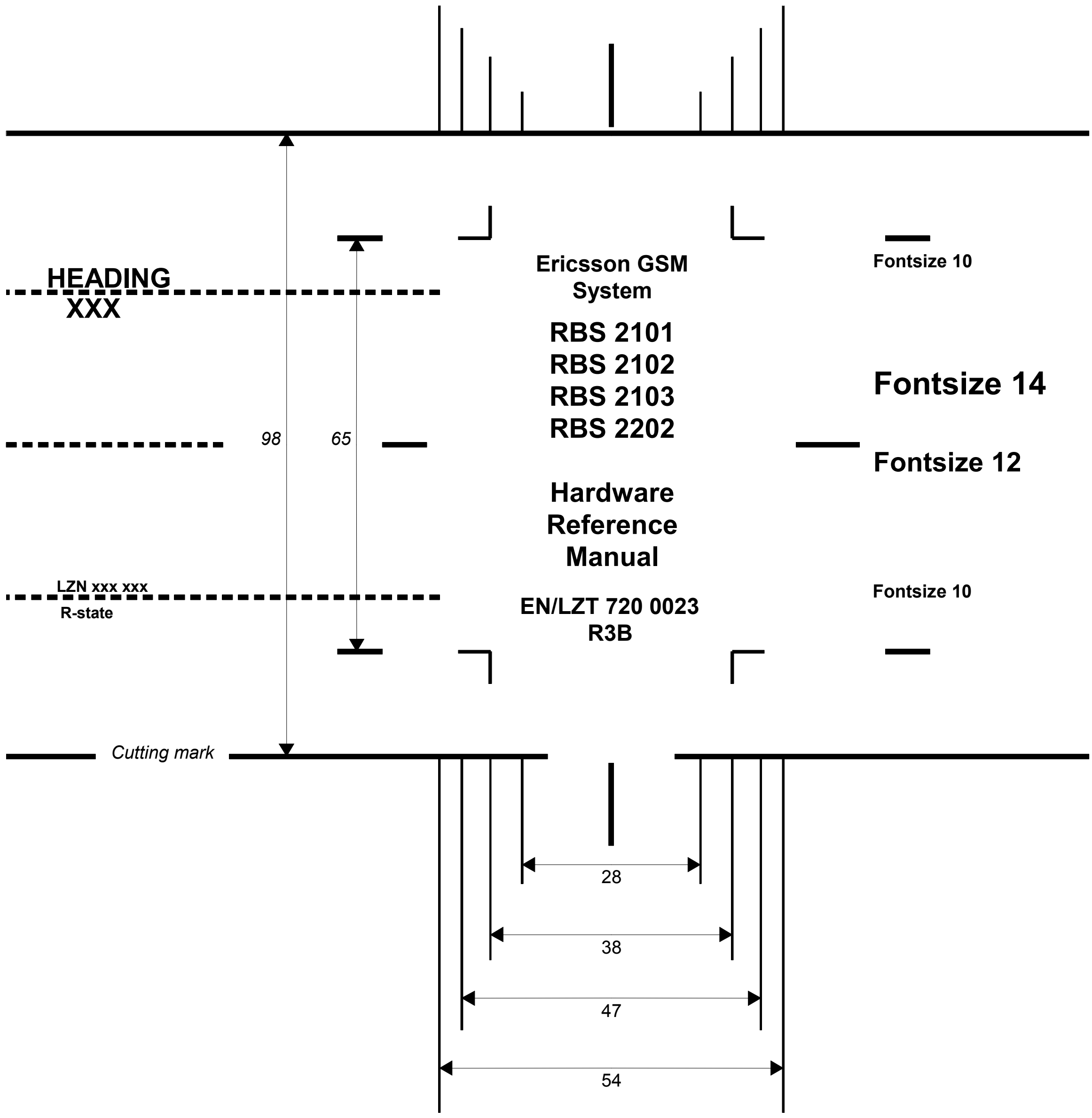
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RBS 2101, RBS 2102, RBS 2103 and RBS 2202 Hardware Reference Manual

EN/LZT 720 0023 Uen R3B

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Contents

1 Introduction

This RBS 2101, RBS 2102, RBS 2103 and RBS 2202 Hardware Reference Manual provides descriptions of the RBS cabinets, the hardware units, and antenna and radio configuration information for Ericsson GSM systems.

1.1 Objectives

The manual is an overview of the hardware for the RBS 2101, RBS 2102, RBS 2103 and RBS 2202 base stations for GSM 900, GSM 1800 and GSM 1900.

General Chapters

The general chapters are the following:

- Introduction
- Product safety requirements
- Environmental capabilities
- Climate protection
- EMC capabilities
- Glossary (chapter 20).

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 2101 Product Description	EN/LZT 720 0219
RBS 2102 Product Description	EN/LZT 720 0220
RBS 2103 Product Description	EN/LZT 720 0221
RBS 2202 Product Description	EN/LZT 720 0223
Radio Configurations	EN/LZT 720 0341
RBS 2202 Antenna Configurations	EN/LZT 720 0342

Table 1 Product Documents

Title	Product Number
ACCU, Description	EN/LZT 720 0231
BFU, Description	EN/LZT 720 0233
CDU-A, Description	EN/LZT 720 0235
CDU-C, Description	EN/LZT 720 0277
CDU-C+, Description	EN/LZT 720 0278
CDU-D, Description	EN/LZT 720 0279
DXU, Description	EN/LZT 720 0243
DXU-21A, Description	EN/LZT 720 0244
ECU, Description	EN/LZT 720 0245
PSU –48 V, Description	EN/LZT 720 0281
PSU 230 V, Description	EN/LZT 720 0282
sTRU, Description	EN/LZT 720 0349
TRU, Description	EN/LZT 720 0251
V3 Climate Unit for RBS 2102, Description	EN/LZT 720 0280

1.2 Target Group

The target group for this manual is all personnel who work with engineering, installation, test, and maintenance of RBS 2000 products, requiring information on hardware products and configurations.

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

1.4.1 R1A

This is the first release of this manual. The information in this manual replaces the hardware descriptions and configuration information previously included in the RBS 2101, RBS 2102, RBS 2103 and RBS 2202 Reference Manual, EN/LZT 720 0001.

1.4.2 R1A to R2A

In the second release of the manual, the following changes have been made:

Chapter 1, Introduction

Section 1.4, ‘‘How to Order CPI’’, has been removed. This information can now be found elsewhere.

RBS 2101, Product Description

The main features of the RBS now also includes TG synchronization, GPS synchronization and EDGE. Several sections have been updated.

RBS 2102, Product Description

The main features of the RBS now also includes TG synchronization, GPS synchronization and EDGE. Several sections have been updated.

RBS 2202, Product Description

The main features of the RBS now also includes TG synchronization, GPS synchronization and EDGE. Several sections have been updated.

DXU-21, Description

The descriptions of DXU-21 and DXU-21A have been combined into one description document.

sTRU, Description

Available versions are specified in a new section, 1.2 ‘‘Variants’’.

1.4.3 R2A to R3A

The following changes have been made:

Chapter 5, EMC Capabilities

This chapter has been updated.

sTRU, Single Transceiver Unit Description

The figures have been updated and now include a newer version of the sTRU.

1.4.4 R3A to R3B

The following changes have been made:

Combining and Distribution Unit

Figure Block Diagram for CDU-C+ updated.

2 Product Safety Requirements RBS 2000

The purpose of this document is to specify the product safety requirements for the RBS 2000 series. For the latest revision of each standard, please refer to 52/1056-HRB 105 102/1. Other standards, not mentioned below, may also be applicable for each RBS or subassembly, and are also used during the verification and certification process.

2.1 References

Table 2 Standards and Other Reference Documents

Standard or Document Name	**Title**
1999/5/EC R&TTE Directive	Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity
73/23/EEC Low Voltage Directive (LVD)	Council Directive of 19 February 1973 on the harmonization of the laws of Member States relating to Electrical Equipment designed for use with certain voltage limits
ANSI/UL 60950-1 CAN/CSA-C22.2 No. 60950-1-03 IEC 60950 Ed.3.0 (1999)[(1)] IEC 60950-1 Ed.1.0 (2001) EN 60950-1:2001	Information technology equipment – Safety – Part 1: General requirements.
CAN/CSA-C22.2 No. 94-M91 (R2001)	Special Purpose Enclosures
CAN/CSA-C22.2 No. 0.4-04	Bonding of Electrical Equipment
EN 60215 IEC 60215	Safety requirements for radio transmitting equipment
EN 60825-1 IEC 60825-1	Safety of laser products – Part 1: Equipment classification, requirements and user's guide
EN 50272-2	Safety requirements for secondary batteries and battery installation. Stationary batteries
EN 60529:1992	Specifications for degrees of protection provided by enclosures (IP code)

Table 2 Standards and Other Reference Documents

IEC 60529	Degrees of protection provided by enclosures (IP Code)
UL 467	Standard for Grounding and Bonding Equipment
UL 2054	Standard for Household and Commercial Batteries
UL 50	Standard for Enclosures for Electrical Equipment
CB Bulletin	National deviations from IEC standards
52/1056-HRB 105 102/1	Product Safety and EMF requirements RBS system

(1) Used for countries that have not yet accepted the latest edition of IEC 60950, for example, Japan and China.

2.2 Product Safety

This section of the document defines the electrical, mechanical, heat, and fire safety requirements for the RBS 2000 series. The standards mentioned in Section 2.1 References on page 5 are used to show compliance with the national and international requirements stated below:

General

The RBS 2000 series is designed to comply with the following international standards:

Europe

1999/5/EC R&TTE Directive	Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity
73/23/EEC Low Voltage Directive (LVD)	Council Directive of 19 February 1973 on the harmonization of the laws of Member States relating to Electrical Equipment designed for use with certain voltage limits

USA and Canada

NRTL listing	The RBS must be listed by an NRTL (Nationally Recognized Testing Laboratory)

Other Requirements

As well as fulfilling general environmental requirements, outdoor versions of the RBS 2000 series must also conform with or exceed the specifications of encapsulation class IP55, as specified in EC/EN 60529, and NEMA class Type 3R as specified in UL 50 (USA) and CAN/CSA-22.2 No. 94 (Canada).

The RBS 2000 series is designed and constructed so that, both under normal operating conditions and during fault conditions, it provides a degree of protection against personal injury caused by electrical shock and other hazards, for example heat, chemical, and radiation.

The RBS 2000 series is also protected against serious equipment fire breaking out and mechanical hazards, including those defined in the applicable standards.

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 3 Environmental limits during transport

Environmental Parameters	Unit	Value
Temperature Relative humidity	°C %	-40 - +70 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 4 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 5 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 6 Mechanical parameters for storage conditions

Environmental Parameters	Unit	Value	
Vibration sinus:			
displacement	mm	3.5	
acceleration	m/s^2		10
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 10* in this document.

3.6.3 Biological Conditions

During Handling the equipment withstands the conditions stated in *Section 3.4.3 on page 11* in this document.

3.6.4 Chemically Active Substances

During Handling the equipment withstands the conditions stated in *Section 3.4.4 on page 11* in this document.

3.6.5 Mechanically Active Substances

During Handling the equipment withstands the conditions stated in *Section 3.4.5 on page 11* 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 11* 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 7 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 function	+/-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 8 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 9 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 10 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	-33 - +50°C	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.

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 11 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 19

(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 12 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
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 13 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/m^3	0.5°C/min
Excep-tional/Safe function	-33 – +55°C	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

Table 14 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/m^2	neglible
Solar radiation	W/m^2	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/m^2, 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 15 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 16 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 17 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 18 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
	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 19 Climatic conditions for mast-mounted equipment, -40°C – +55°C

Value	Temperature	Relative humidity	Absolute humidity	Change of temp.
Normal Condition	-40 – +55°C	5 – 100%	0.26 – 40 g/m³	1.0°C/min
Exceptional/Safe function	-40 – +60°C	5 – 100%	0.26 – 40 g/m³	1.0°C/min
Non Destruction	-40 – +70°C	5 – 100%	0.26 – 40 g/m³	1.0°C/min

3.12.2 Mechanical Conditions

Table 20 Mechanical conditions for mast-mounted equipment, -40°C – +55°C

Environmental Parameters		Unit	Value	
Vibration sinus:				
	frequency	Hz	2 – 9	
	displacement	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 Climate Protection

Climate Protection systems have the following functions:

- Supervises and maintains the internal temperature and humidity within allowed ranges for the units in the RBS
- Controls the connection and disconnection of power, at start (or restart) of the RBS and at extreme internal temperature.

The external temperature range for each RBS type is product-specific. For a full understanding of the climate protection system's capacity, this document should be read in conjunction with the relevant product specification.

The Climate Protection of an RBS can be maintained with one or a combination of the functions described in this chapter.

4.1 Terms

External	Outside the RBS cabinet
Internal	Inside the RBS cabinet
Temperature	Refers to shaded air temperature in this chapter
Normal range	+5 °C to +45 °C internal temperature
Normal operation	Internal temperature range which is within 5 °C to 10 °C of the safe range in both high and low limits
Specified external Normal Condition range	Stated in each relevant product chapter
Normal Condition, safe function and non-destruction	Defined within the context of Enviromental Capability
User	In this chapter, any unit that needs power from the cabinet power system in order to function.

4.2 Functions

This section describes the major functions of the climate protection system.

4.2.1 Climate Control by Air Conditioning

Description

This function maintains the internal temperature by an internally circulated air system (separated from the external environment). The internally circulated air will pass through an active cooling unit which has the capacity to lower the internal air temperature below the external environmental temperature.

Operational Conditions

This function requires AC power and an internal temperature above 0 °C.

4.2.2 Climate Control by Heat Exchanging

Description

This function maintains the internal temperature by an internally circulated air system (separated from the external environment). The internally circulated air will pass through a heat exchanger which cools down the internal air to a temperature just above the external environmental temperature.

Operational Conditions

This function is available when the system voltage is present and the internal temperature is above 0 °C.

4.2.3 Climate Control by Forced Air

Description

This function maintains the internal temperature by filtering external air and forcing it through or past the units. By continuously replacing the warmed air with air of a lower temperature and using controlled air speed, the internal temperature will be kept within working range.

Operational Conditions

This function is available when the system voltage is present and the internal temperature is above 0 °C.

4.2.4 Heating

Description

The heating function uses a combination consisting of a heating element and fans to force the heated air through the RBS air channel system. The heating function controls the internal temperature to above the normal operation low limit.

Operational Conditions

This function is available with low internal temperature and AC power.

The function is only used in products specified for external temperature ranges whose lower limit is below +5 °C.

4.2.5 Climate Supervision

The internal temperature and humidity of the air in the RBS are measured by sensors and kept within working ranges.

The following parameters are measured:

- The internal temperature outside the normal range.
- The internal temperature outside the safe function range.
- The internal relative humidity raised above the upper limit for safe function, *see note below.*

  Note: The humidity function is not needed for RBSs designed for indoor use according to ETSI 3.1.

Administration

- The internal temperature in the RBS cabinet is readable.
- The internal realative humidity in the RBS is readable. *See note below.*

Note: The humidity function is not needed for RBSs designed for indoor use according to ETSI 3.1.

4.2.6 Reliability

The cooling Climate Protection is available when the temperature is within the specified external normal condition range. Alarm reporting and administration are available within the safe function range.

The Heating function is available when the temperature is above the specified external normal condition low limit and up to an internal temperature of +5 °C. Alarm reporting and administration are available within the safe function range.

4.2.7 Power Connection

At start and restart of the RBS, the connection of the RBS power system to the incoming AC mains and the connection of the users to the DC power in the RBS depends on the current internal temperature.

When starting or restarting the RBS, actions are first taken to free the internal surfaces from condensation.

There are a number of startup scenarios, based on the internal temperature at the moment of startup:

- The internal temperature is within the safe function range.
  - The RBS power system and the user are connected.
- The internal temperature is below the lower limit for safe function low limit.
  - The internal temperature is increased by heating to above the lower limit for safe function. Then the power system and the users are connected.
- The internal temperature is above the upper limit for safe function.
  - The RBS power system is connected but the users are not. However, as soon as the internal temperature falls below the upper limit for safe function, the users are connected.

4.2.8 Power Disconnection

The users are disconnected from the DC power when the internal temperature falls below the lower limit for safe function.

The users are reconnected to the DC power when the internal temperature has risen to a temperature which is 5°C above the lower limit for safe function.

5 EMC Capabilities

This specification covers the Electromagnetic Compatibility (EMC) capabilities of the RBS 2000 series, including both conducted and radiated immunity thresholds and emissions. It does not cover the internal EMC capabilities of the RBS 2000 series or spurious antenna port emissions.

5.1 References

1 1999/5/EC, R&TTE Directive

Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity

2 EN 301 489-1 V1.4.1 2002

EMC standard for radio equipment and services; Part 1: Common technical requirements.

3 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.

4 EN 301 502

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

5 Code of Federal Regulations 47, FCC part 15

Radio frequency devices.

6 ICES-003

Digital apparatus, Interference-causing equipment standard.

7 Lightning Protection

The lightning protection system in the RBS is designed to withstand high transient current and voltage impulses caused by the RBS being subjected to lightning directly striking the top of the RBS radio mast. The total lightning current intercepted at the RBS mast is selected as: 100 kA peak and 10/350 µs waveform, in accordance with protection level 3 of IEC standard 61312–1.

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CAPTION LIST

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RBS 2101, RBS 2102, RBS 2103 and RBS 2202 Hardware Reference Manual	
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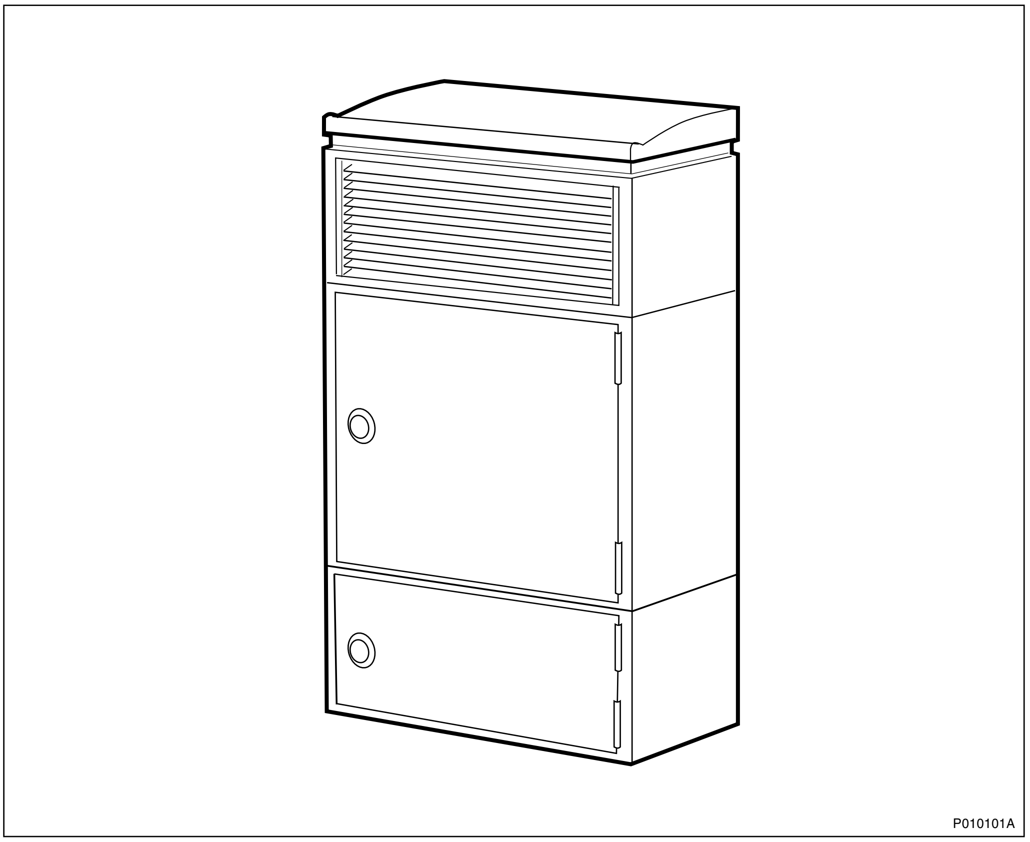
RBS 2101

Macro Outdoor

Product Description

The RBS 2101 is an outdoor macro RBS and is a member of the RBS 2000 family. The RBS 2101 contains two transceivers.



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Contents

1 Product Overview

The RBS 2101 is a fully integrated outdoor macro RBS that can be ground or roof mounted. The RBS 2101 can be configured in as an omni-cell or in multi-sector configurations.

1.1 Main Features

The RBS 2101 supports the following features of the RBS 2000 family:

- Frequency hopping
- Receiver diversity
- Duplex filtering
- Dynamic power regulation
- Discontinuous transmission
- Encryption
- Master – Extension configuration
- TG Synchronization, requires DXU-11 or DXU-21A
- GPS Synchronization, requires DXU-21A
- EDGE, requires DXU-21A and EDGE sTRU(s)
- Frequencies:
  - GSM 900
  - GSM 1800
  - GSM 1900
- Transmission alternatives:
  - T1 - 1.5 Mbit/s, 100 Ω, with internal synchronisation
  - E1 - 2.0 Mbit/s, 75 Ω, with PCM synchronisation
  - E1 - 2.0 Mbit/s, 120 Ω, with PCM synchronisation

1.2 Variants

The following AC power service outlets are available:

- IEC 83:1975 standard C 2b (Sweden, Germany, and others)

- IEC 83:1975 standard B2 (United Kingdom)
- IEC 83:1975 standard A5-15 (United States)

1.3 Optional Equipment

The RBS 2101 is available with the following optional equipment:

- Base frame
- Battery back-up (3 minutes back-up time)
- Battery Fuse Unit (BFU)
- DC/DC converter (+24V DC to -48V DC for TM power supply)
- Distance spacer (for mounting TM in base)
- dual duplex TMA (ddTMA)
- External battery back-up connection
- External Synchronisation Bus (ESB) cable for master – slave configuration connection
- Lifting eyes
- Lock handle
- Mounting base temporary cover
- Overvoltage Protection module (OVP)
- System voltage Distribution Module (DM)
- Tower Mounted Amplifier (TMA)
- Wall mount fixture
- GPS Receiver

2 Dimensions

This section describes the physical characteristics of the RBS 2101; size and weight, as well as colour.

Size and Weight

The size and weight of the RBS 2101 are provided in the figure and table below.

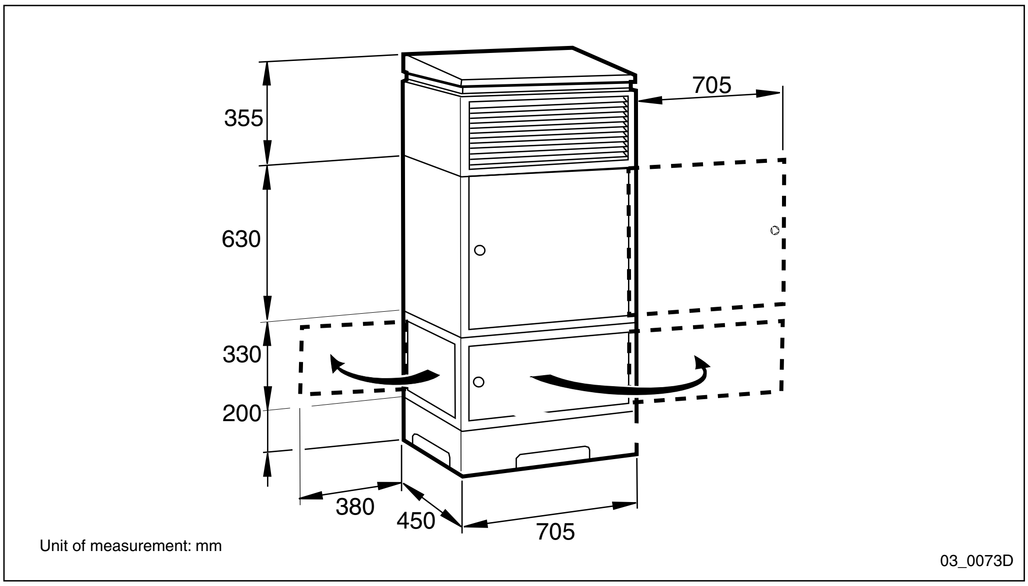

Figure 1 Dimensions

Table 1 Weight

Unit	Weight
Climate sub-cabinet with heat exchanger	51 kg
Climate sub-cabinet with air conditioner	57 kg
Radio sub-cabinet	98 kg
Mounting base	47 kg
Equipped cabinet with heat exchanger	196 kg
Equipped cabinet with air conditioner	202 kg

Surface and Colour

The RBS 2101 has a surface quality according to Ericsson standard class A3.

The RBS 2101 cabinet is available in the following colours:

Table 2 Colours

Cabinet colour	NCS/RAL
Green	NCS S8010–G 10Y
Grey	RAL 7035

3 Space Requirements

RBS 2101 installations require a minimum spacing for proper airflow and to provide a sufficient working area.

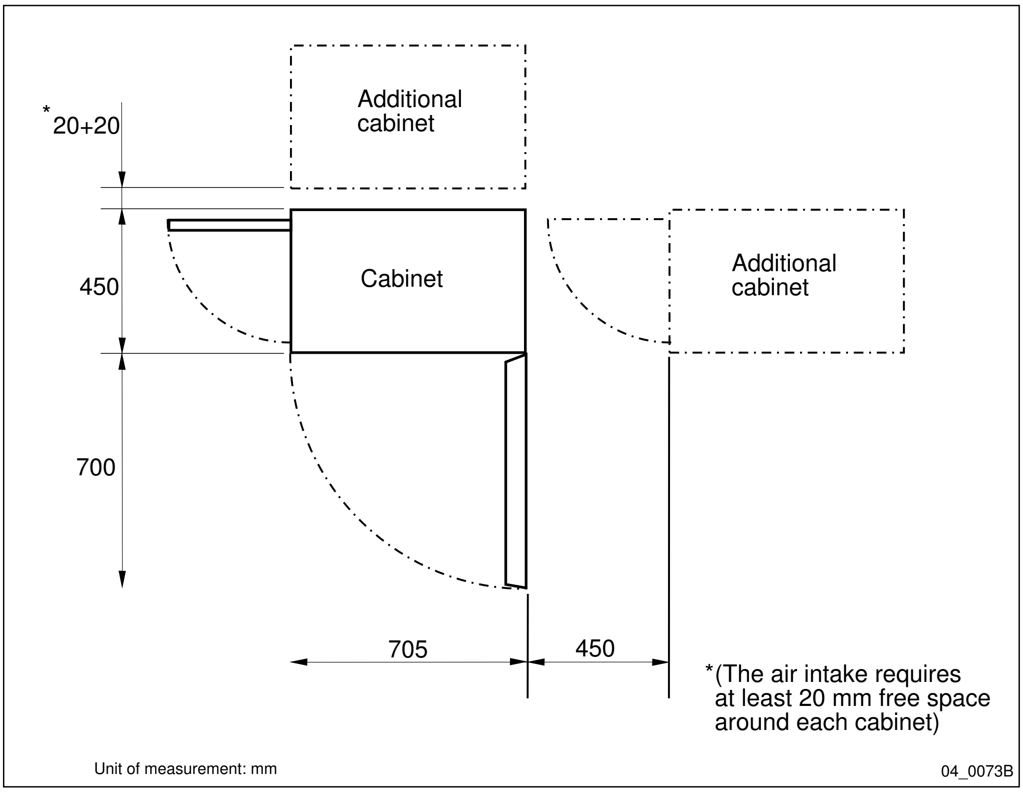

Figure 2 Space Requirements with Extension Cabinets

To enable proper airflow through the climate unit, the rear side of the RBS 2101 must not be mounted closer than 20 mm to a wall or 40 mm to an adjacent cabinet. Space for future expansion must be considered when installing units.

4 Environment

This section provides an overview of the operating environment, environmental impact, and materials used in the RBS 2101.

4.1 Operating Environment

The operating environment and climatic specifications for the RBS 2101 are shown in the table below.

Table 3 Environmental Specifications

Description	Specification
Operating temperature (with heat exchanger)	–33°C to +40°C
Operating temperature (with air conditioner)	–33°C to +45°C
Storage temperature	–25°C to +55°C (Complies with ETS 1.2 in ETS 300 019–1–1 and IEC 721–3–1)
Transport temperature (non-destructive conditions not to exceed 96 hours or 5.5 days in a three-year period)	-40°C to +70°C (Complies with ETS class 2.3 in Public Transportation in ETS 300 019–1–2 and IEC 721–3–2)
Relative humidity	15% to 100%
Vibration	< 0.2 G

IP Classification

The cabinet complies with IP-55 per IEC 60529.

4.2 Environmental Impact

This section describes the cabinet's environmental impact.

Table 4 Acoustic Noise and Heat Dissipation

Description	Specification
Acoustic noise	60 dBA (full traffic)40 dBA (50% load)(1)
Heat dissipation	1000 W

(1) The acoustic noise dispersion values were measured in a test environment 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.

4.3 Materials

All Ericsson products fulfil the legal, market, and Ericsson requirements.

5 Hardware Units

This section describes the standard and optional hardware units for the RBS 2101 in the following areas of the RBS:

- Radio sub-cabinet
- Mounting base
- Climate sub-cabinet

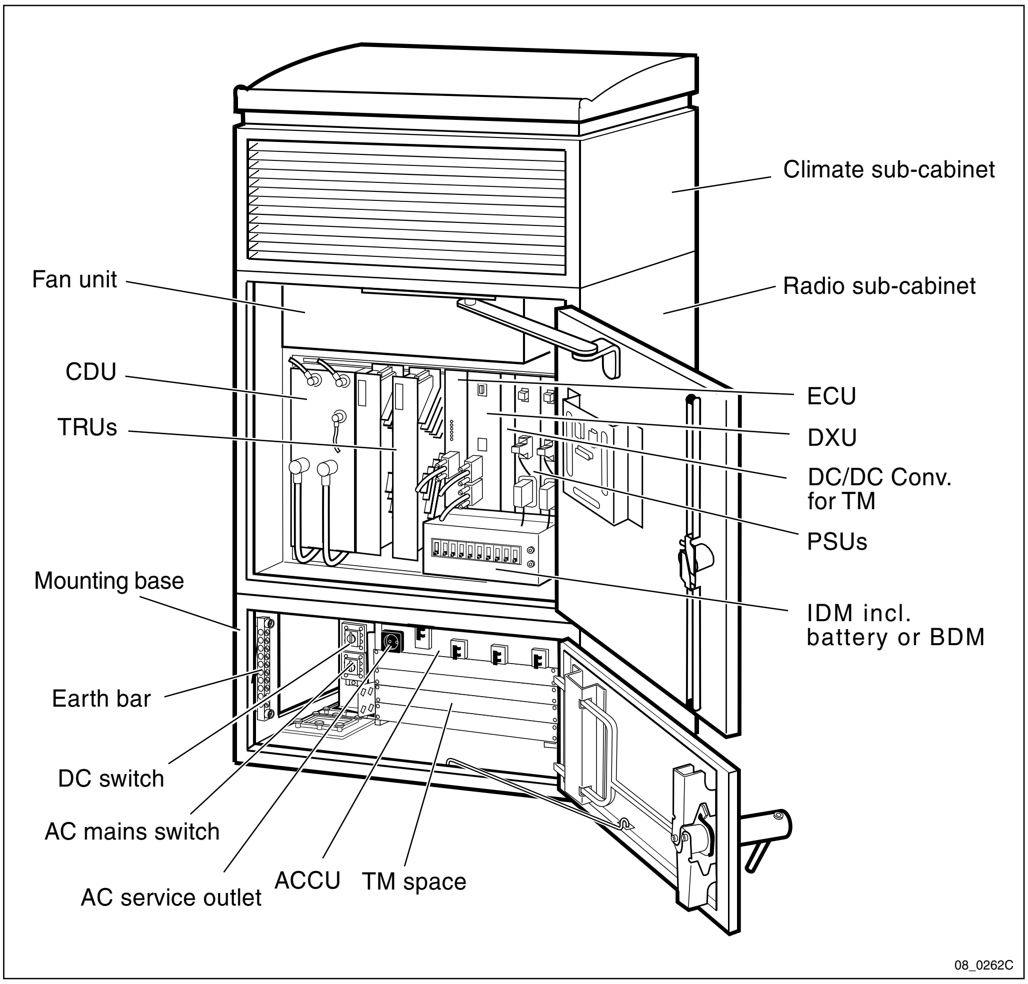

Figure 3 Standard Hardware Units

5.1 Radio Sub-cabinet

The radio sub-cabinet contains the radio equipment for the RBS. The hardware units located in the radio sub-cabinet include the following:

CDU - Combining and Distribution Unit

The CDU is the interface between the transceivers and the antennas. Common functions include TX combining, RX preamplifier and distribution, antenna system supervision, and Tower Mounted Antenna (TMA) support.

Number of units: 1.

DXU - Distribution Switch Unit

The DXU is the central control unit for the RBS. Common functions include distribution switching, BSC interface, timing, external alarm collection, local bus control, and interface switching.

Number of units: (0) – 1.

Note: In a master-extension configuration, the DXU is used only in the master cabinet.

ECU - Energy Control Unit

The ECU controls and supervises the power equipment and the climate control equipment. The ECU also monitors the cabinet temperature.

Number of units: 1.

IDM - Internal Distribution Module

The IDM provides distribution and fusing for the +24V DC system voltage.

Number of units: 1.

PSU - Power Supply Unit

The PSU converts the incoming AC mains voltage into regulated DC voltage.

Number of units: 1 – 2.

TRU - Transmitter and Receiver Unit

The TRU is the transmitter/receiver unit for the RBS. The TRU broadcasts and receives Radio Frequency (RF) signals to and from the mobile station. Each TRU can service several mobile units simultaneously.

Number of units: 1 – 2.

5.2 Mounting Base

The RBS 2101 mounting base contains the primary voltage and power control components for the RBS. The standard hardware units located in the mounting base include the following:

ACCU - AC Connection Unit

The ACCU provides the fusing and circuit breakers for the AC mains supply. The ACCU also provides and AC service outlet for test instruments. The AC mains switch located on the ACCU disconnects the RBS from the AC mains supply.

Number of units: 1.

BIAS-IC - Bias Injector

The BIAS-IC provides DC power from the Control Module (CM) to the Tower Mounted Amplifier (TMA). Up to two bias injectors can be connected to one CM.

Number of units: 0 – 2.

CM - Control Module

The CM provides +15 V DC power to the TMAs. The CM also identifies TMA faults and provides the fault information to the RBS alarm module

Number of units: 0 – 1.

EACU - External Alarm Connection Unit

The EACU provides a connection for any external alarms.

Number of units: 0 – 1.

TM – Transport Module

The Transport Module (TM) is a space in the mounting base reserved for transmission equipment. Power and climate control are provided to the TM by the mounting base.

Number of units: 1.

5.3 Climate Sub-cabinet

The RBS 2101 is provided with either an Air Conditioner Climate Unit or a Heat Exchanger Climate Unit.

AC – Air Conditioner Climate Unit

The AC is a compressor and condensor cooling system that cools the RBS sub-cabinets.

A heater is included in this climate unit to provide the RBS with heat during cold climate conditions.

Number of units: 0 – 1.

Heat Exchanger Climate Unit

The Heat Exchanger Climate Unit consists of a recuperator with one fan for the internal circuit and one for the external circuit.

A heater is included in this climate unit to provide the RBS with heat during cold climate conditions.

Number of units: 0 – 1.

5.4 Optional Hardware Units

DC/DC Converter

The DC/DC converter provides -48 V DC power for the TM.

Note: If no DC/DC converter is used, a dummy panel has to be installed.

Number of units: 0 – 1.

ddTMA - dual duplex TMA

The ddTMA is mounted close to the antennas. It amplifies the receiver signal and combines it with the transmitter signal. The combined signal is transmitted on a single feeder between the ddTMA and CDU. A bias injector is required for power.

Number of units: 0 – 2.

OVP – Overvoltage Protection module

The OVP protects the RBS equipment from overvoltage and overcurrent which may occur in external lines.

Number of units: 0 – 1.

TMA - Tower Mounted Amplifier

The TMA is mounted near the antennas and compensates for signal loss in the receiver antenna cables. The unit is enclosed in a weatherproof box and operates on +15 V DC power.

Number of units: 0 – 2.

6 Interfaces

In this section all external connections are listed, and the test and operator interfaces are described.

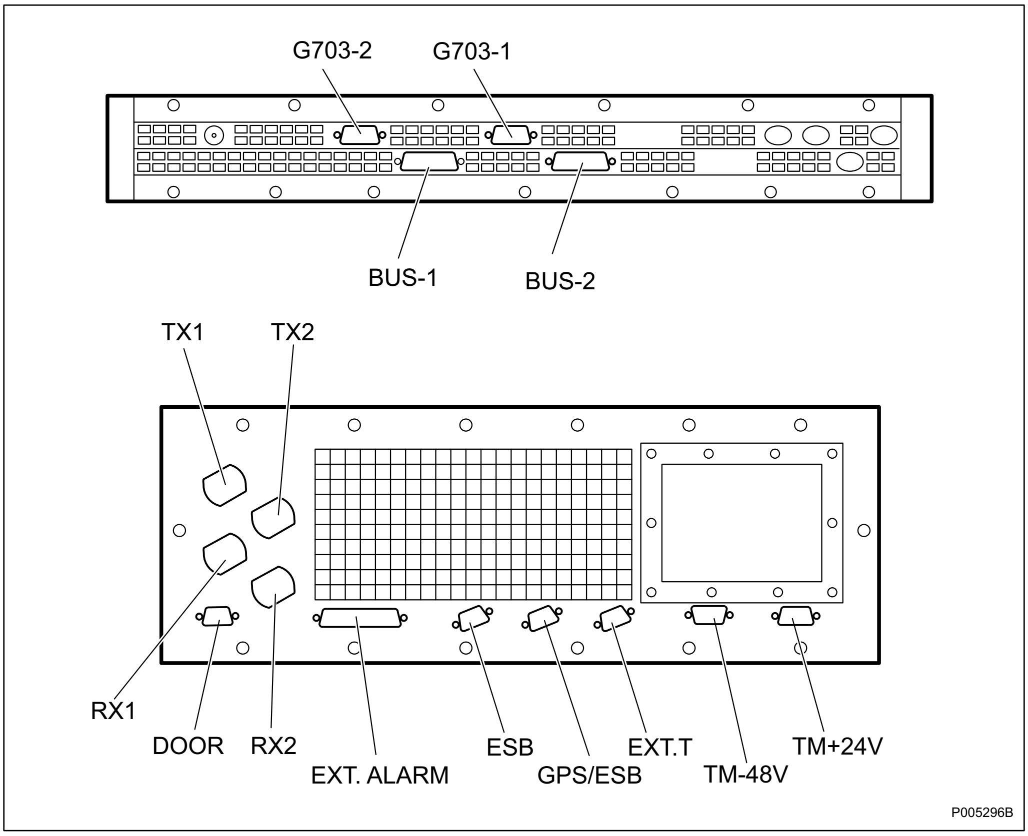

Figure 4 RBS 2101 Interfaces

6.1 External Connections

External connections provided by the RBS 2101 include the following:

- Transmission
- Antenna
- AC mains
- Earth
- External alarms

Table 5 External Cable Connectors

Connector Name	Description
Bus-1	Local bus connector for extension cabinet
Bus-2	Y-link connection for EDGE sTRUs in extension cabinet
Door	Alarm sensor connector for door alarm
Ext.Alarm	External alarm connector
Ext.T	External temperature sensor alarm connector
G.703–1	Transmission interface port
G.703–2	Transmission interface port
GPS/ESB	GPS synchronization or ESB connection for TG synchronization
RX1	Receiver antenna port 1
RX2	Receiver antenna port 2
TM-48V	Transport Module connector for -48 V power connection
TM+24V	Transport Module connector for +24 V power connection
TX1	Transmitter antenna port 1
TX2	Transmitter antenna port 2
ESB	ESB connection for TG synchronization

6.2 Test Interface

The OMT connector provides an interface for the Operation and Maintenance Terminal. The OMT provides a graphical user interface (GUI) and is used to verify that the Installation Database (IDB) is installed and contains the correct equipment configuration information. The OMT can be used to perform the following:

- Display software version
- Create or modify the IDB
- Define external alarms
- Modify or display O&M parameters
- Define PCM interface
- Define TMA parameters
- Monitor and display fault status

6.3 Operator interface

The Man Machine Interface (MMI) in the RBS 2101 is comprised of optical indicators, buttons and switches on units in the cabinet. The information here is general. For a more detailed description of the indicators, buttons and switches on the various RUs in the cabinet, *see the respective units' description in this manual.*

Optical Indicators

Several units in the RBS have optical indicators that show the operational status of the unit. The indicators reflect faults, mode change and operation.

Buttons and Switches

Buttons and switches can be found on several RUs. The table below takes into account only the buttons on the DXU and TRUs.

Table 6 Buttons

Button	Description
TRU reset	Resets the TRU
DXU reset	Resets the DXU
Local/remote mode	Changes the mode between local and remote. On the TRU this applies to the TRU only, on the DXU this applies to the whole RBS.
Test call	Not used

Barcode

The barcode for product identification is readable without disrupting RBS function.

7 Power System

The RBS 2101 power system consists of the 115/230 V AC supply voltage inputs, internal DC power supply, and the battery back-up system.

7.1 Power Supply

The RBS 2101 operates on 115 V AC or 230 V AC. The mains voltage is selected by a switch located in the power termination box.

Note: A lockable mains disconnect switch must be provided close to the RBS 2101 to facilitate maintenance and repair activities.

7.2 Operating Voltage

The RBS 2101 operating voltage is shown in the table below.

Table 7 Operating Voltage

Voltage	Tolerance	Frequency
200 – 240 V AC (single phase)	± 10%	50 Hz
120/240 V AC (single phase)	± 8%	60 Hz

7.3 Power Consumption

The power consumption of the cabinet is shown in the table below.

Table 8 Power Consumption

Operation	Power consumption	
	230 V AC	**208 V AC**
Normal (operation with peak load and all time slots occupied)	1000 W	1000 W
Maximum	2100 W	2100 W

8 Transmission

The RBS 2101 is connected to a transmission interface G.703, type E1 (2 Mbits/s) or T1 (1.5 Mbits/s). For E1 interfaces, 75 Ω coaxial or 120 Ω twisted pair cables are used. For T1 interfaces, 100 Ω twisted pair cables are used.

9 External Alarms

The RBS 2101 can be connected to a maximum of 8 external alarms via the EACU in the mounting base.

10 Product Approval

This section describes product approval for Europe and North America.

10.1 Europe

The RBS complies to European Community directive R&TTE 1999/5/EC. This means that the RBS fulfills legal requirements regarding product safety, EMC (Electromagnetic Compatibility) and Radio.

The RBS has a CE mark to show compliance to the above.

10.2 North America

The RBS complies to the North American legal requirements regarding product safety, EMC, (Electromagnetic Compatibility) and Radio.

To show compliance to this the RBS has a Listing mark for product safety and FCC/IC labels for EMC (Electromagnetic Compatibility) and Radio.

11 Dependability

The RBS 2101 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:

Batteries: The batteries must be regularly inspected every year (oxide on the pole terminals). The batteries should be replaced according to the recommendations of the battery supplier.

12 Vandal Resistance

The RBS 2101 fulfils Ericsson’s requirements for vandal resistance.

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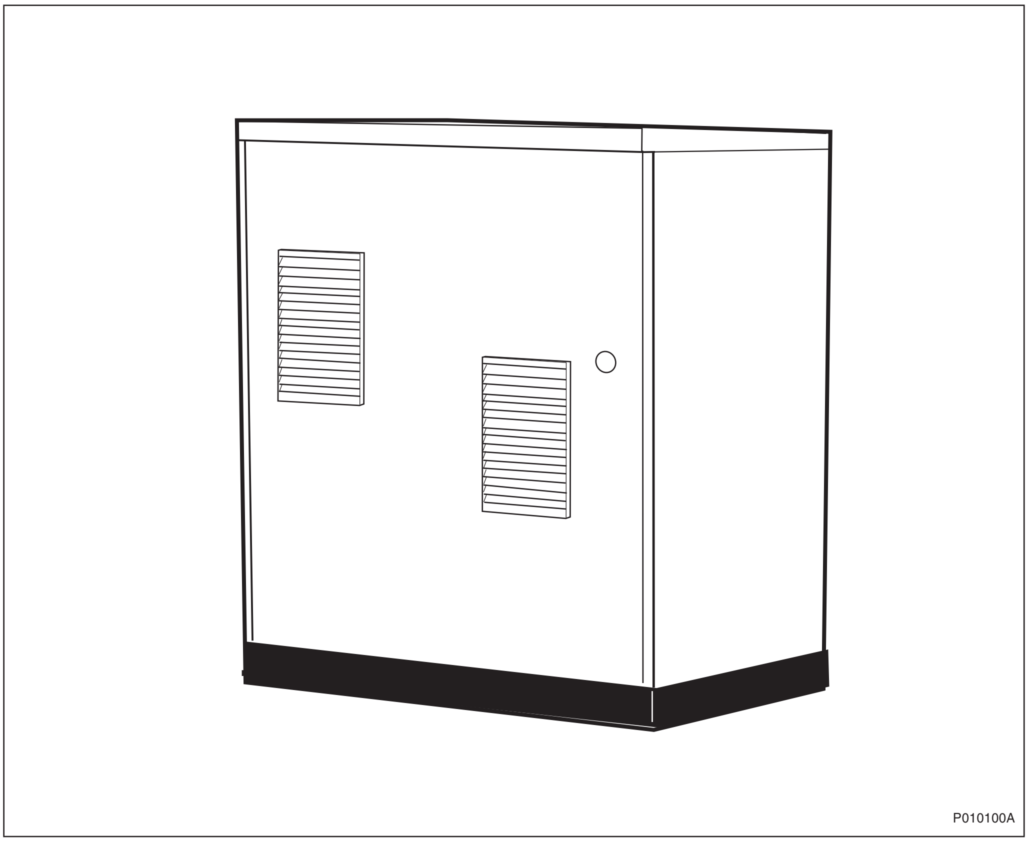
RBS 2102

Macro Outdoor RBS

Product Description

The RBS 2102 is a fully integrated outdoor RBS and is a member of the RBS 2000 family. The RBS 2102 contains up to six Transceiver Units (TRUs).



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Contents

1 Product Overview

The RBS 2102 is a fully integrated outdoor macro RBS that can be ground or roof mounted. It provides a durable, vandal resistant and weatherproof enclosure. The RBS 2102 can be configured in an omni-cell or multi-sector configuration.

1.1 Main Features

The RBS 2102 supports the following features of the RBS 2000 family:

- Frequency hopping
- Receiver diversity
- Duplex filtering
- Dynamic power regulation
- Discontinuous transmission/reception
- Encryption/ciphering
- Master – Extension configuration
- Frequencies:
  - GSM 900
  - GSM 1800
  - GSM 1900
- Transmission alternatives:
  - T1 - 1.5 Mbit/s, 100 Ω, with internal synchronisation
  - E1 - 2.0 Mbit/s, 75 Ω, with PCM synchronisation
  - E1 - 2.0 Mbit/s, 120 Ω, with PCM synchronisation
- EDGE, requires DXU-21A and EDGE sTRU(s)
- GPS Synchronization, requires DXU-21A
- TG-synchronization, requires DXU-11 or DXU-21A

1.2 Optional Equipment

The RBS 2102 is available with the following optional equipment:

- Base frame

- Battery back-up (internal/external)
- Bias injector
- Control Module (CM)
- DC/DC converter
- dual duplex TMA (ddTMA)
- DXX
- External alarms
- External Synchronisation Bus (ESB) cable for master – slave configuration connection
- GPS
- Lifting eyes
- Lock handle
- Mini DXC
- Overvoltage Protection module (OVP)
- System voltage Distribution Module (DM)
- Tower Mounted Amplifier (TMA)

1.3 Variants

The RBS is available in grey or green colour.

2 Dimensions

This section describes the physical characteristics of the RBS 2101; size and weight, as well as colour.

Size and Weight

The RBS 2102 dimensions are provided in the figure and table below.

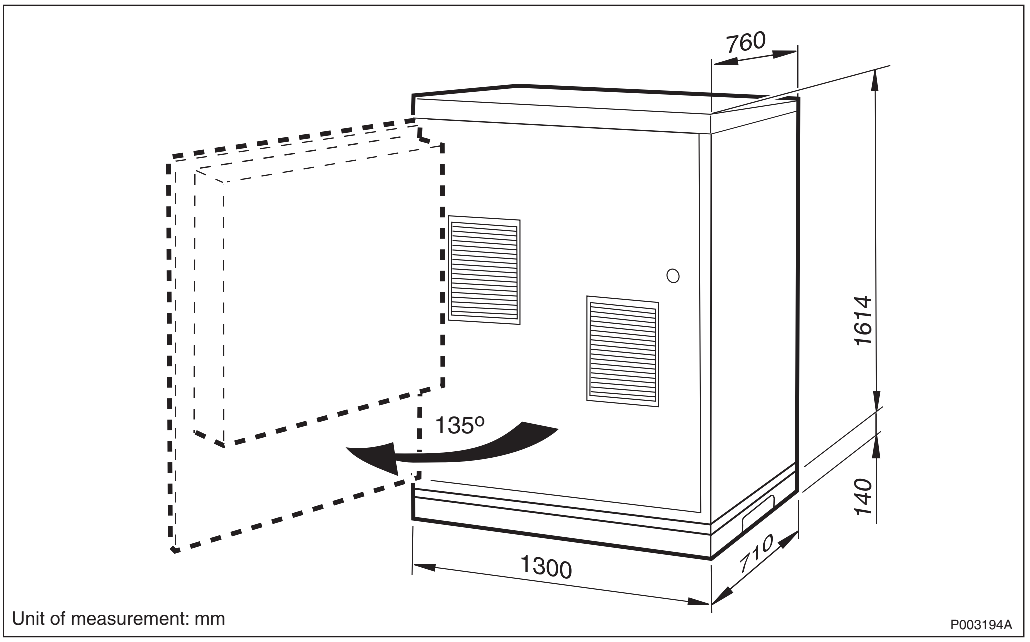

Figure 1 Dimensions

Table 1 Weight

Unit	Weight
RBS 2102 fully equipped	480 kg
Batteries	70 kg
Total	550 kg

Surface and Colour

The RBS 2102 has a surface quality according to Ericsson standard class A3/B6.

The RBS 2102 cabinet is available in the following colours:

Table 2 Cabinet Colour

Cabinet colour	NCS/RAL
Green	NCS S8010-G10Y
Grey	RAL 7035

3 Space Requirements

RBS 2102 installations require a minimum spacing for proper airflow and to provide a sufficient working area. Minimum space requirements when using extension cabinets are shown in the figure below.

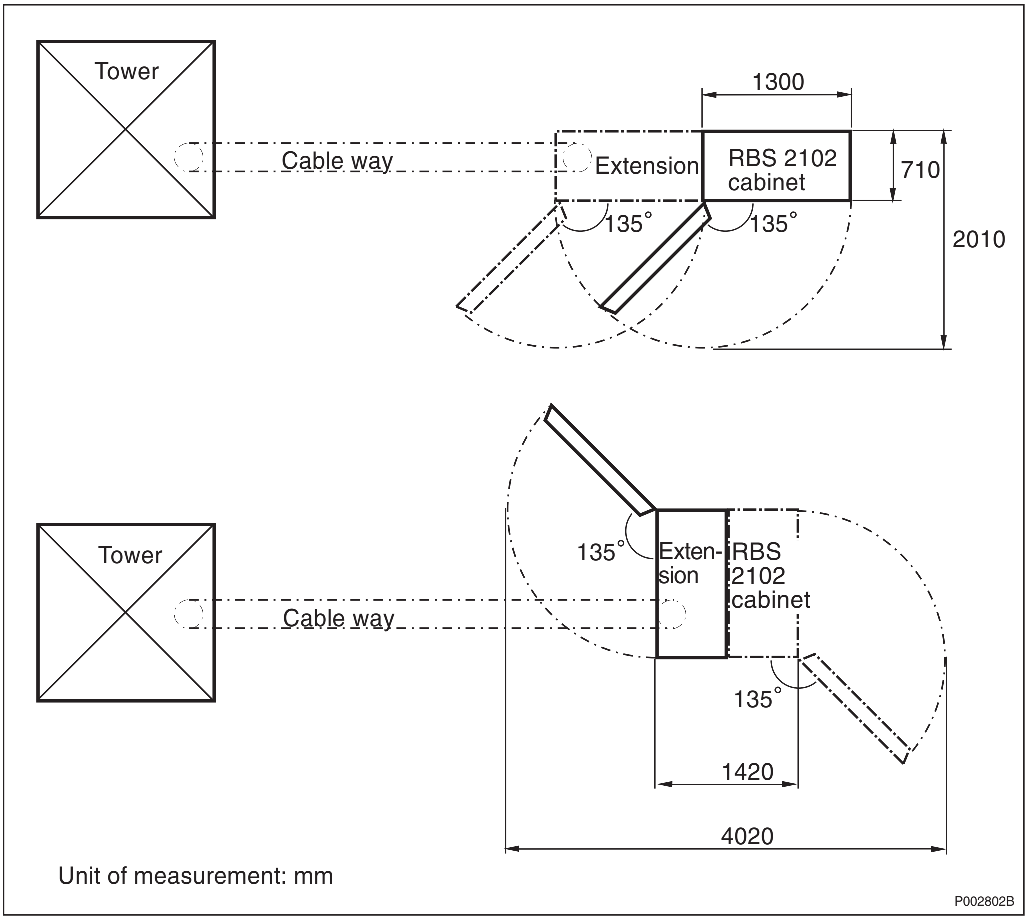

Figure 2 Minimum Space Requirements with Extension Cabinets

Minimum space requirements when using battery cabinets are shown in the figure below.

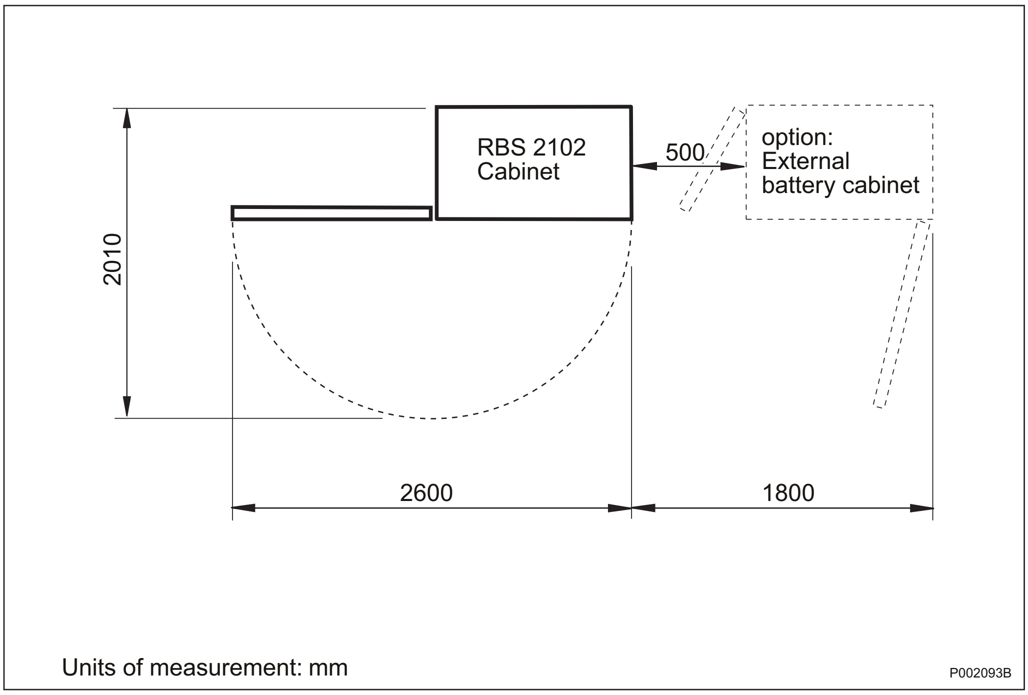

Figure 3 Minimum Space Requirements with Battery Cabinet

Footprint

The footprint of the RBS 2102 is 1300 mm wide and 710 mm deep. The installation frame of the RBS 2102 has the same bottom holing pattern as that of the RBS 2106.

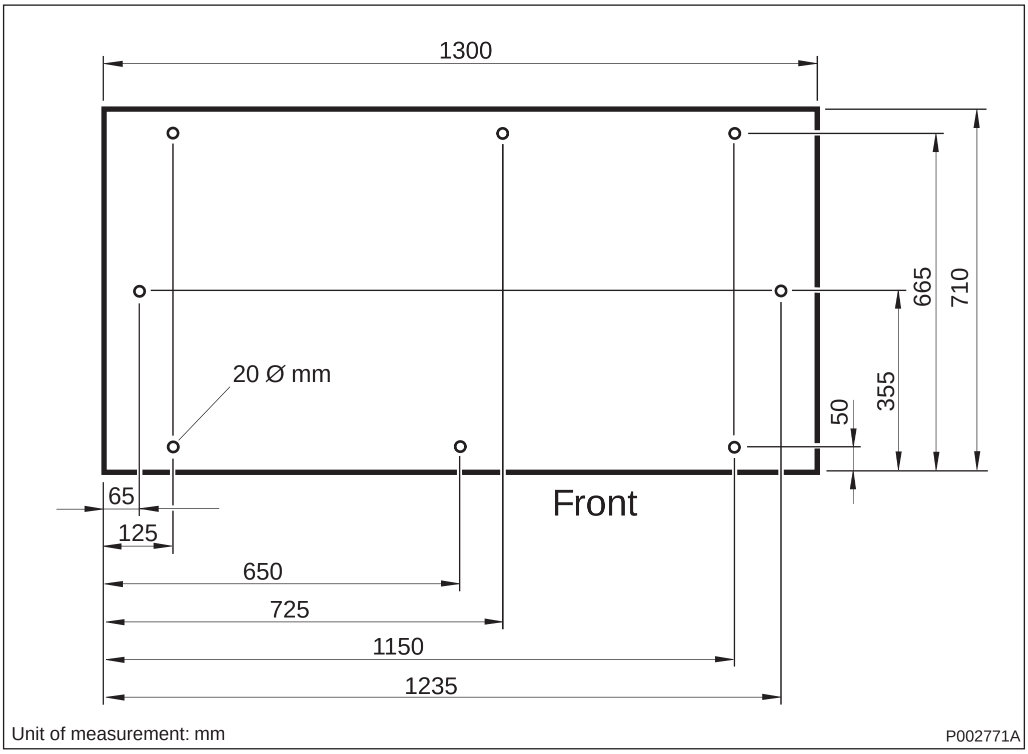

Figure 4 Base Frame and Installation Frame Holing Pattern

4 Environment

This section provides an overview of the operating environment, environmental impact, and materials used in the RBS 2102.

4.1 Operating Environment

The operating environment and climatic specifications for the RBS 2102 are shown in the table below.

Climatic Requirements

Table 3 Environmental Specifications

Description	Temperature	Relative humidity	ETSI standard
Normal operation	–33°C to +45°C(1)	15 – 100%	300 019-1-4 class 4.1
Transport	-40°C to +70°C	5 – 100%	300 019-1-2 class 2.3

Table 3 Environmental Specifications

Description	Temperature	Relative humidity	ETSI standard
Storage	–25°C to +55°C	10 – 100%	300 019-1-1 class 1.2
Handling	-40°C to +70°C	5 – 100%	

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

IP-classification

The cabinet complies with IP-55 per IEC 60529.

Ground Vibrations

The RBS 2102 is designed to fulfill earthquake protection according to IEC 68–2–57.

Levelling

In order to level the cabinet, the floor must be levelled to within ±3 mm/2000 mm and the floor gradient be within ±0.1°.

4.2 Environmental Impact

This section describes the cabinet's environmental impact. Acoustic noise and heat dissipation information are given in the table below.

Table 4 Environmental Impact

Description	Specification
Acoustic noise	65 dBA (full traffic)(1)
Heat dissipation	2500 W max (at 45°C fully equipped)

(1) The acoustic noise dispersion value was measured in a test environment according to the ISO 9614-2 standard, however deviations from this value 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.

4.3 Compliance Distances for Electromagnetic Exposure

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

Ericsson has performed a free-space near-field RF exposure assessment of typical configurations of the RBS 2102 with a recommended antenna. The resulting dimensions, in metres, for a compliance boundary for both general public and occupational exposure are shown in Table 5 on page 11.

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 in 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 a certain distance above and below the antenna. The cylinder shape overestimates the compliance distances right beside the antenna.

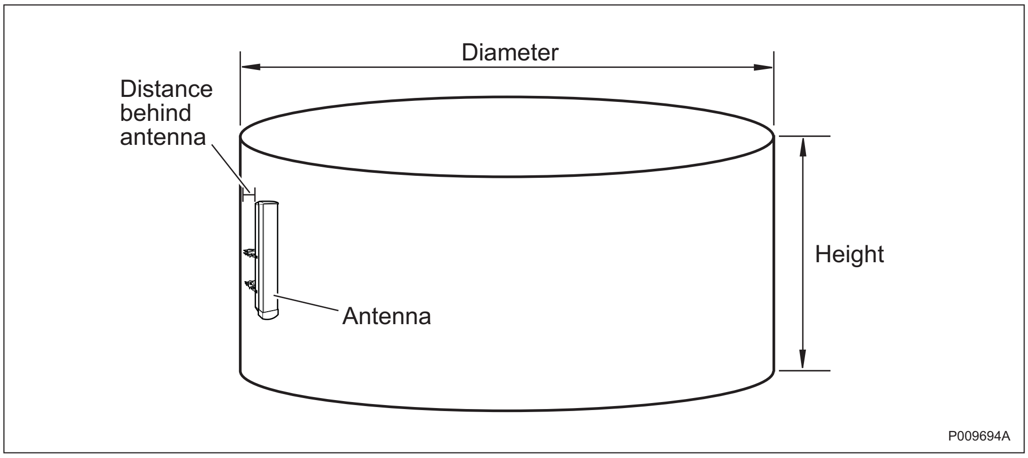

Figure 5 Compliance Boundary Cylinder

Note: Table 5 on page 11 shows an example for a typical antenna. As the antenna field distributions will differ for different, 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 5 Compliance Boundary Dimensions for the General Public (GP) and Occupational (O) Exposure for Typical Configurations

		Dimensions of Cylindircal Compliance Boundary (m)					
		Diameter		Height		Distance behind antenna	
Configu-ration	**Fre-quency (MHz)**	**GP**	**O**	**GP**	**O**	**GP**	**O**
A:3x2	900	6	3	1.6	1.4	0.1	0.1
A:3x2	1800	5	1	1.5	1.3	0.1	0.05
C+:1x6	900	7	3	1.7	1.4	0.1	0.1
C+:1x6	1800	5	1	1.6	1.4	0.1	0.05

Compliance distances to the side of the antenna for occupational exposure are below 0.1 m for all configurations above.

For characteristics of an antenna recommended for typical configurations of an RBS 2102, *see the table below.*

Table 6 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 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 2102 at 900 MHz and 1800 MHz, are given in *the table below.*

Table 7 Maximum Power to Antenna for Various RBS 2102 Configurations

Configuration	**Frequency (MHz)**	**Nominal output power per TRU (dBm)/(W)**	**Maximum power into antenna(1) (dBm)/(W)**
A:3x2	E-GSM 900	44.5 / 28.1	46.5 / 44.7
A:3x2	GSM 1800	41 / 12.6	45.5 / 35.5
C+:1x6	E-GSM 900	43.5 / 22.4	47.8 / 60.3
C+:1x6	GSM 1800	40 / 10	46.8 / 47.9

(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.

5 Hardware Units

This section describes the standard and optional hardware units for the RBS 2102.

5.1 Standard Hardware Units

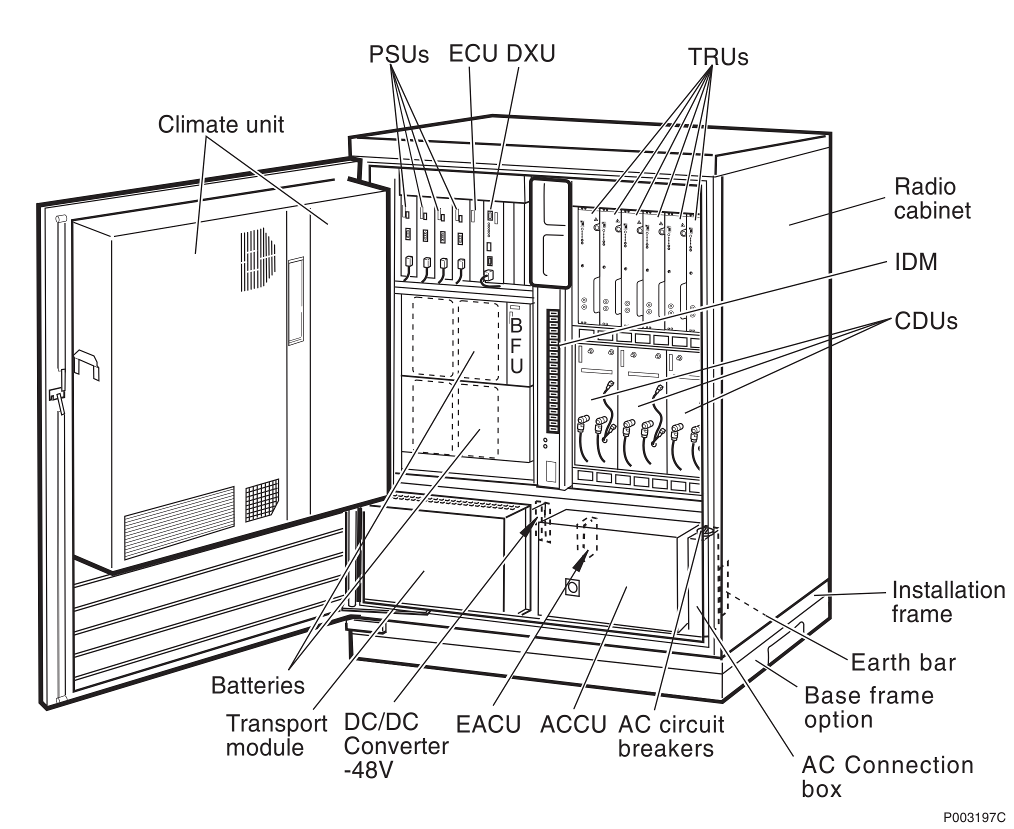

Figure 6 Standard Hardware Units

ACCU - AC Connection Unit

The ACCU provides the supervision and circuit breakers for the AC mains supply. The ACCU also provides and AC service outlet for test instruments. The AC mains switch located on the ACCU disconnects the RBS from the AC mains supply.

Number of units: 1.

BFU – Battery Fuse Unit

The BFU provides a battery circuit breaker for one battery and connects the battery to the +24 V DC busbar.

Number of units: 0 – 2.

CDU - Combining and Distribution Unit

The CDU is the interface between the transceivers and the antennas. Common functions include TX combining, RX preamplifier and distribution, antenna system supervision, and Tower Mounted Antenna (TMA) support.

Number of units: 1 – 3.

Combined Climate Unit

The Combined Climate Unit maintains climate protection by a combination of air conditioning, heat exchanging and heating. The units will operate in different modes depending on the internal temperature of the cabinet. The climate protection maintains the internal temperature within the working range.

Number of units: 1.

DC/DC Converter

The DC/DC converter provides -48 V DC power for the TM.

Number of units: 0 – 2.

DXU - Distribution Switch Unit

The DXU is the central control unit for the RBS. Common functions include distribution switching, BSC interface, timing, external alarm collection, local bus control, and interface switching.

Number of units: (0) – 1.

Note: In a master-extension configuration, the DXU is used only in the master cabinet.

ECU - Energy Control Unit

The ECU controls and supervises the power equipment and the climate control equipment. The ECU also monitors the cabinet temperature.

Number of units: 1.

IDM - Internal Distribution Module

The IDM provides distribution and fusing for the +24V DC system voltage.

Number of units: 1.

PSU - Power Supply Unit

The PSU converts the incoming AC mains voltage into regulated DC voltage.

Number of units: 1 – 4.

TRU - Transmitter and Receiver Unit

The TRU is the transmitter/receiver unit for the RBS. The TRU broadcasts and receives Radio Frequency (RF) signals to and from the mobile station. Each TRU can service several mobile units simultaneously.

Number of units: 1 – 6.

5.2 Optional Hardware Units

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

Batteries

The RBS 2102 can be equipped with two battery blocks to supply back-up power in the event of mains failure.

Number of units: 0 – 2.

Bias injector

The bias injectors are used to provide the TMA with DC power from the TMA-CM, over the RX/TX feeder cables.

Number of units: 0 – 6.

ddTMA - dual duplex TMA

The ddTMA is mounted close to the antennas and amplifies the receiver signal and combines it with the transmitter signal. The combined signal is transmitted on a single feeder between the ddTMA and CDU. A bias injector is required for power.

Number of units: 0 – 6.

DXX – Digital Cross Connector

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, it is located in an Optional Expansion Unit (OXU) position in the DXU/PSU subrack.

Number of units: 0 – 1.

Mini DXC

The Mini DXC is a cross-connect unit that provides five G.703/G.704 ports. It is installed in the OXU.

Number of units: 0 – 1.

OVP - Overvoltage Protection module

The OVP protects the RBS equipment from overvoltage and overcurrent which may occur in external lines.

Number of units: 0 – 2.

TM - Transport Module

The Transport Module (TM) is a space in the cabinet reserved for transmission equipment.

TMA - Tower Mounted Amplifier

The TMA is mounted near the antennas and compensates for signal loss in the receiver antenna cables. The unit is enclosed in a weatherproof box and operates on +15 V DC power.

Number of units: 0 – 6.

TMA-CM - Tower Mounted Amplifier Control Module

The 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.

6 Interfaces

In this section all external connections are listed, and the test and operator interfaces are described.

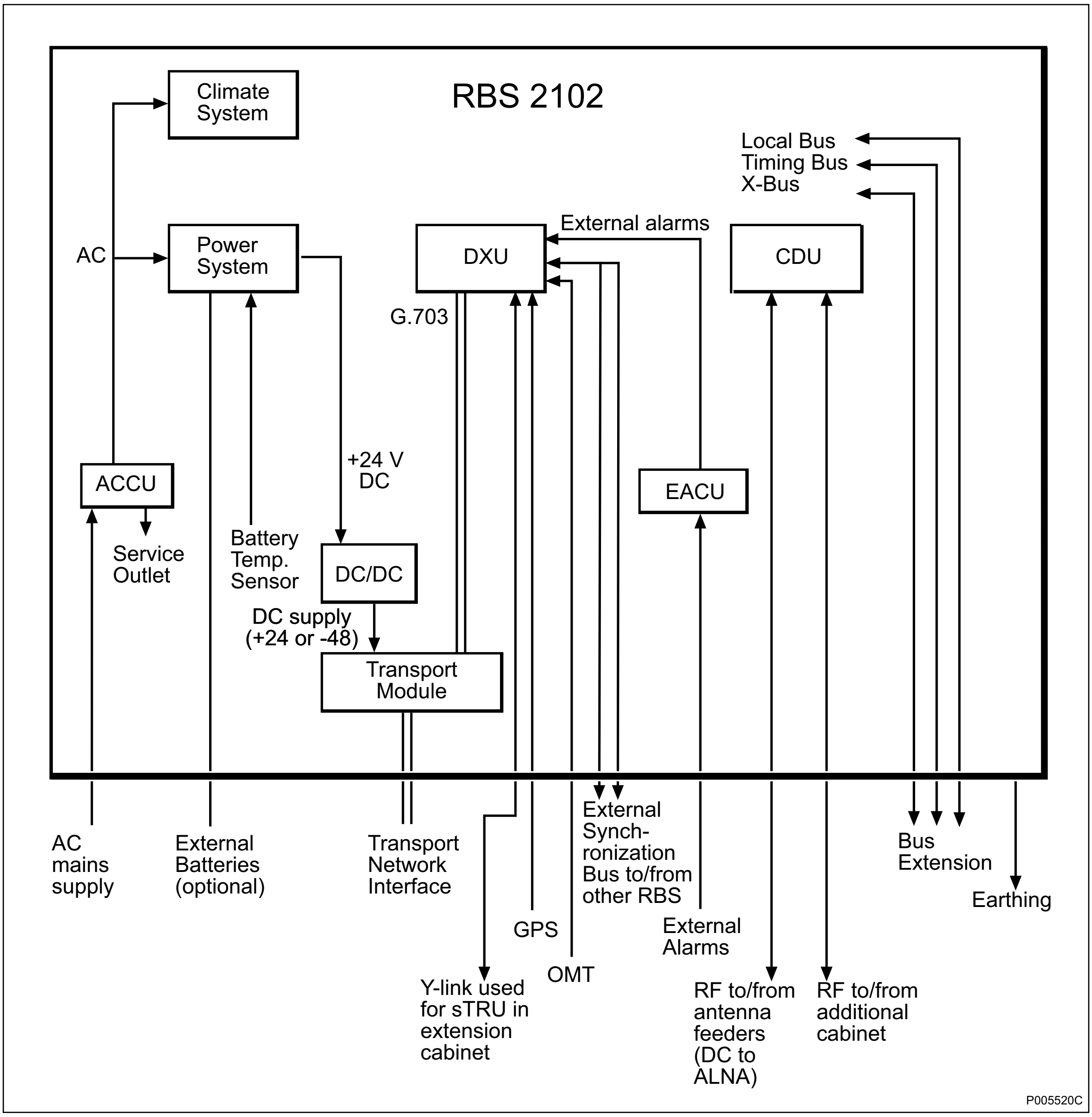

Figure 7 RBS 2102 Interfaces

6.1 External Connections

External connections provided by the RBS 2102 include the following:

- Transmission
- AC mains
- Antennas

- Earth
- External alarms

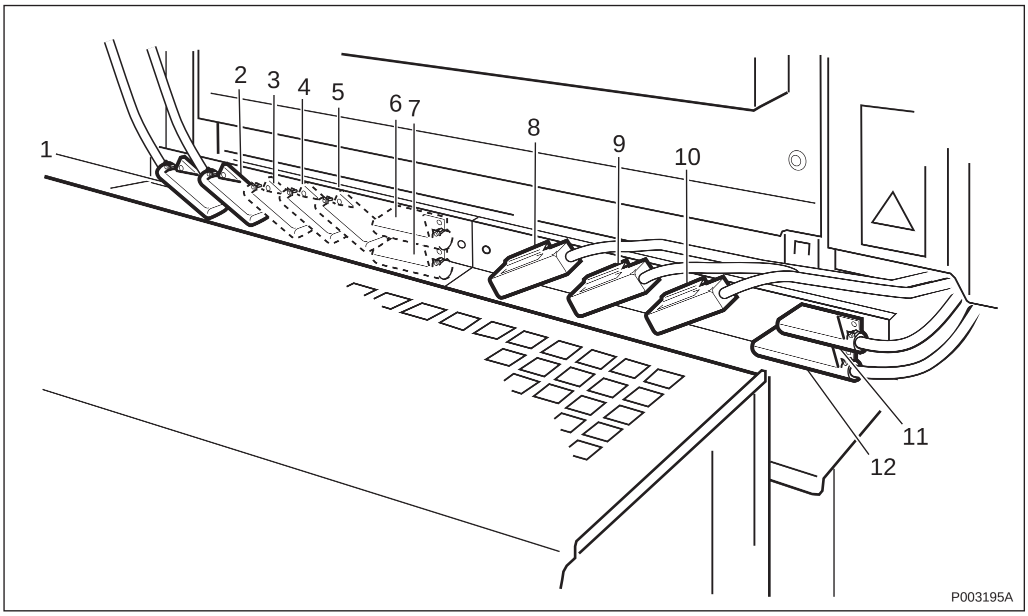

Figure 8 External Cable Connectors

Connection Field in a Master Cabinet upgraded to EDGE, if an Extension Cabinet connection is required.

Table 8 External Cable Connectors

Connector Number	Description
1	G.703–1 (Abis 1)
2	G.703–2 (Abis 2)
3 – 5	PCM spare
6 – 7	TG sync spare
8	External temperature sensor
9	GPS Synchronization
10	+24 V DC to TM
11	Bus connector to extension cabinet
12	External alarm

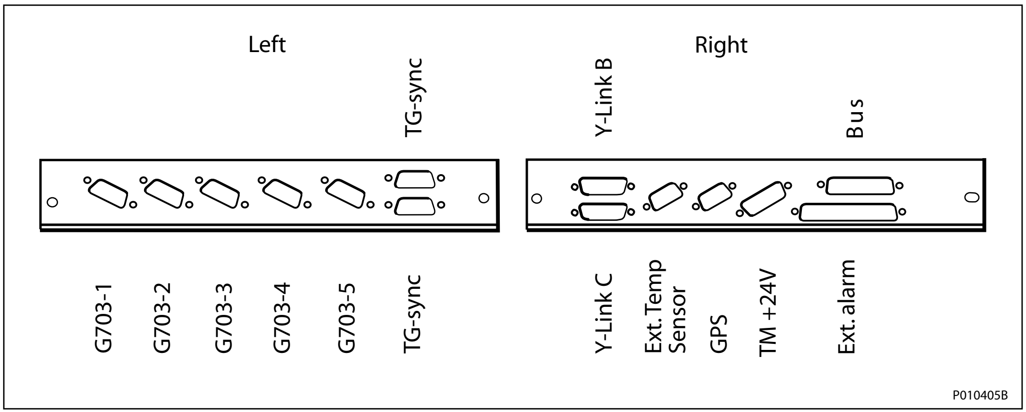

Figure 9 External Cable Connectors (upgraded cabinet)

AC Mains

The AC mains cable is connected to the termination block in the AC mains connection box in the RBS.

Antenna Connectors

There are 12 antenna connectors in the sub-cabinet in the RBS, four connectors on each connector plate.

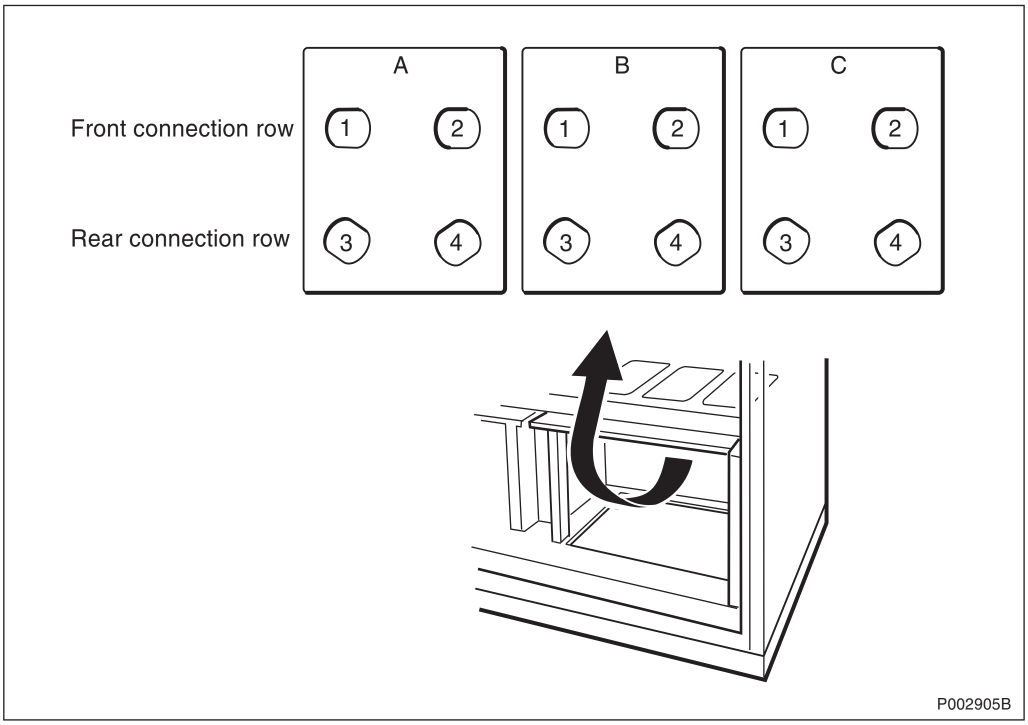

Figure 10 Antenna Cable Connectors

Earth Connection

The RBS is provided with an earth bar for connecting the site earth cable. The earth bar is located behind the ACCU.

External Alarms

External alarms are connected to the RBS 2102 at the transmission connection field, *see Figure 8 on page 18 and Table 8 on page 18.*

6.2 Test Interface

The OMT connector provides an interface for the Operation and Maintenance Terminal. The OMT provides a graphical user interface (GUI) and is used to verify that the Installation Database (IDB) is installed and contains the correct equipment configuration information. The OMT can be used to perform the following:

- Display software version
- Create or modify the IDB
- Define external alarms
- Modify or display O&M parameters
- Define PCM interface
- Define TMA parameters
- Monitor and display fault status

6.3 Operator Interface

The Man Machine Interface (MMI) in the RBS 2102 is comprised of optical indicators, buttons and switches on units in the cabinet. The information here is general. For a more detailed description of the indicators, buttons and switches on the various RUs in the cabinet, *see the respective units' description in this manual.*

Optical Indicators

Several units in the RBS have optical indicators that show the operational status of the unit. The indicators reflect faults, mode change and operation.

Buttons and Switches

Buttons and switches can be found on several RUs. The table below takes into account only the buttons on the DXU and TRUs.

Table 9 Buttons

Button	Description
TRU reset	Resets the TRU
DXU reset	Resets the DXU
Local/remote mode	Changes the mode between local and remote. On the TRU this applies to the TRU only, on the DXU this applies to the whole RBS.
Test call	Not used

Barcode

The barcode for product identification is readable without disrupting RBS function.

7 Power System

The RBS 2102 power system consists of the supply voltage inputs, internal DC power supply, and the battery back-up system.

7.1 Power Supply

The RBS 2102 operates on AC. The mains voltage is selected by strappings located in the power connection box and in the climate unit.

Note: A lockable mains disconnect switch must be provided close to the RBS 2102 to facilitate maintenance and repair activities.

7.2 Operating Voltage

The RBS 2102 operating voltages are shown in the table below.

Table 10 Operating Voltage

Nominal Voltage	Tolerance	Frequency
200 V AC 208 V AC 230 V AC 240 V AC (1 – 3 phases)	± 10%	50 – 60 Hz

7.3 Power Consumption

The power consumption of the cabinet is shown in the table below.

Table 11 Power Consumption

Operation	Power consumption
Normal (operation with peak load and all time slots occupied)	3490 W
Maximum	6840 W

8 Transmission

The RBS 2102 is connected to a transmission interface G.703, type E1 (2 Mbits/s) or T1 (1.5 Mbits/s). For E1 interfaces, 75 Ω coaxial or 120 Ω twisted pair cables are used. For T1 interfaces, 100 Ω twisted pair cables are used.

9 External Alarms

The RBS 2102 can be connected to a maximum of 16 external alarms.

10 Product Approval

This section describes product approval for Europe and North America.

10.1 Europe

The RBS complies to European Community directive R&TTE 1999/5/EC. This means that the RBS fulfills legal requirements regarding product safety, EMC (Electromagnetic Compatibility) and Radio.

The RBS has a CE mark to show compliance to the above.

10.2 North America

The RBS complies to the North American legal requirements regarding product safety, EMC, (Electromagnetic Compatibility) and Radio.

To show compliance to this the RBS has a Listing mark for product safety and FCC/IC labels for EMC (Electromagnetic Compatibility) and Radio.

11 Dependability

The RBS 2102 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:

Batteries: The batteries must be regularly inspected every year (oxide on the pole terminals). The batteries should be replaced according to the recommendations of the battery supplier.

12 Vandal Resistance

The RBS 2102 fulfils Ericsson's requirements for vandal resistance.

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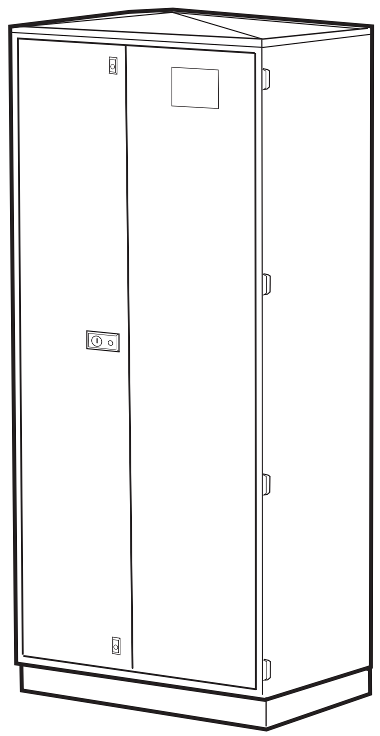
RBS 2103

Macro Outdoor

Product Description

The RBS 2103 is an outdoor macro RBS and is a member of the RBS 2000 family. The RBS 2103 contains six transceivers.



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Contents

1 Product Overview

The RBS 2103 is a fully integrated outdoor macro RBS that can be ground or roof mounted. The cabinet provides a durable, vandal resistant and weatherproof enclsure. The RBS 2103 can be configured in as an omni-cell or in multi-sector configurations.

1.1 Main Features

The RBS 2103 supports the following features of the RBS 2000 family:

- Frequency hopping
- Receiver diversity
- Duplex filtering
- Dynamic power regulation
- Discontinuous transmission
- Encryption
- Master – Extension configuration
- Frequencies:
  - GSM 900
  - GSM 1800
  - GSM 1900
- Transmission alternatives:
  - T1 - 1.5 Mbit/s, 100 Ω, with internal synchronisation
  - E1 - 2.0 Mbit/s, 75 Ω, with PCM synchronisation
  - E1 - 2.0 Mbit/s, 120 Ω, with PCM synchronisation

1.2 Optional Equipment

The RBS 2103 is available with the following optional equipment:

- Base frame
- Battery back-up (1 hour back-up time)
- Battery Fuse Unit
- DC/DC converter (+24V DC to -48V DC for TM power supply)

- Distance spacer (for mounting TM in base)
- dual duplex TMA (ddTMA)
- External battery back-up connection
- External Synchronisation Bus (ESB) cable for master – extension configuration connection
- Lifting eyes
- Lock handle
- Mounting base temporary cover
- Overvoltage Protection module (OVP)
- System voltage Distribution Module (DM)
- Tower Mounted Amplifier (TMA)
- Wall mount fixture

2 Dimensions

This section describes the physical characteristic of the RBS 2103: size and weight, as well as colour.

Size and Weight

Size and weight of the RBS 2103 are provided in the figure and table below.

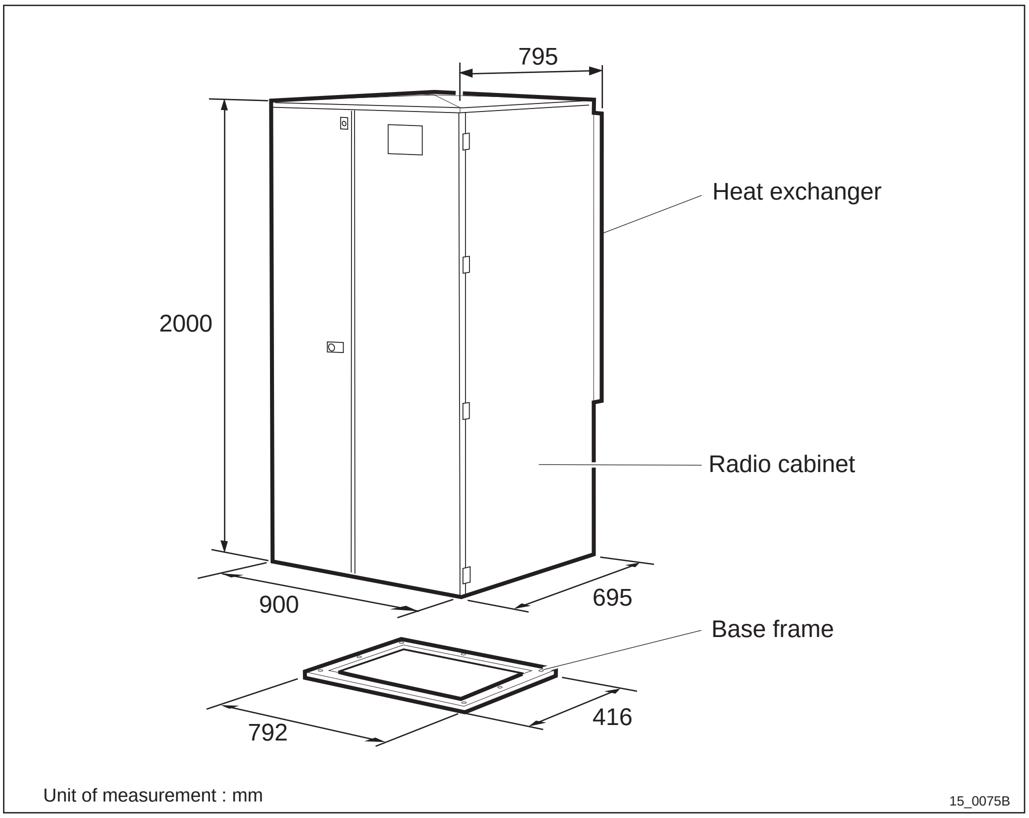

Figure 1 Dimensions

Table 1 Weight

Unit	Weight
RBS 2103 including batteries	575 kg

Surface and Colour

The RBS 2103 cabinet is available in the following colours:

Table 2 Colours

Cabinet colour	**NCS/RAL**
Green	NCS S8010–G 10Y
Grey	RAL 7035

3 Space Requirements

RBS 2103 installations require a minimum spacing for proper airflow and to provide a sufficient working area.

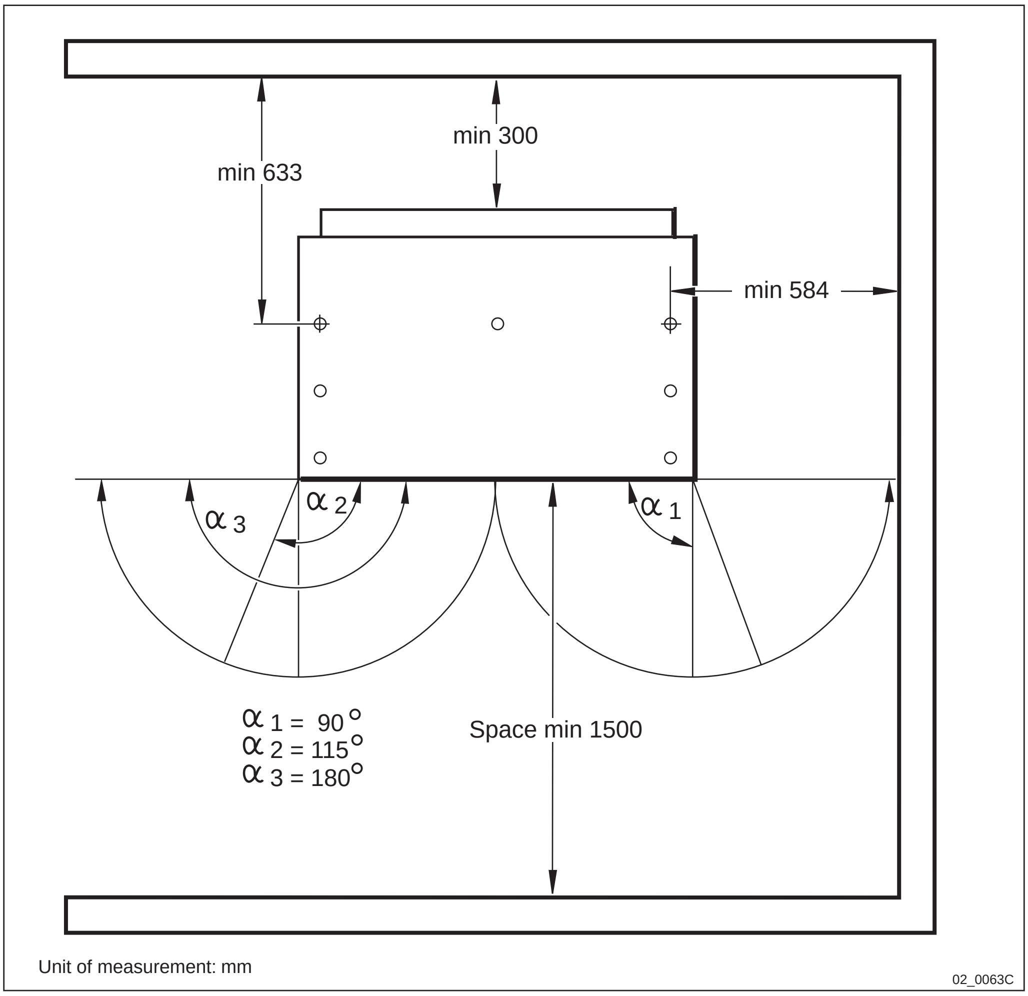

Figure 2 Space Requirements

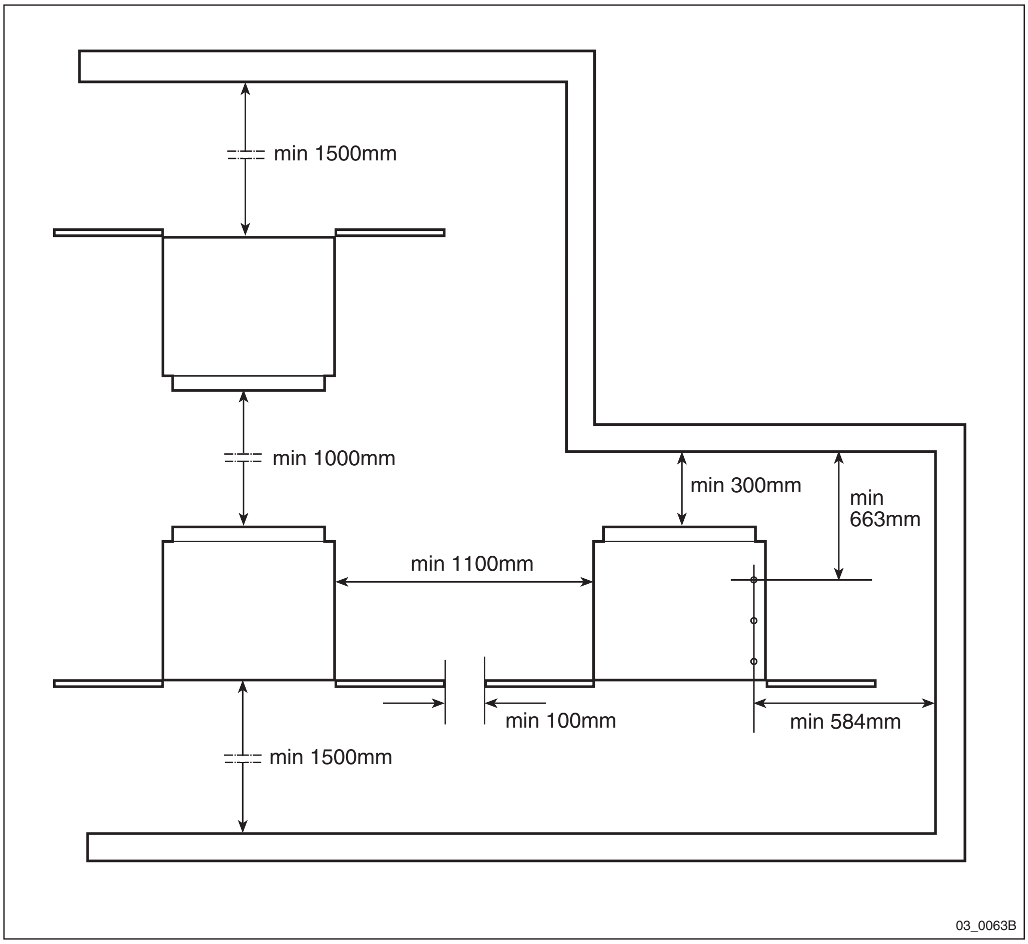

Figure 3 Space Requirements for Master and Extension Cabinets

4 Environment

This section provides an overview of the operating environment, environmental impact, and materials used in the RBS 2103.

4.1 Operating Environment

The operating environment and climatic specifications for the RBS 2103 are shown in the table below

Table 3 Environmental Specifications

Description	Specification
Operating temperature	–30°C to +33°C
Storage temperature	–25°C to +55°C (Complies with ETS 1.2 in ETS 300 019–1–1 and IEC 721–3–1)
Transport temperature (non-destructive conditions not to exceed 96 hours or 5.5 days in a three-year period)	-40°C to +70°C (Complies with ETS class 2.3 in Public Transportation in ETS 300 019–1–2 and IEC 721–3–2)
Relative humidity	15% to 100%
Ingression	Complies with IP-55 per IEC 60529
Acceleration	2 m/s^2
Operational frequency	9 – 200 Hz

4.2 Environmental Impact

This section describes the cabinet's environmental impact.

Table 4 Acoustic Noise and Heat Dissipation

Description	Specification
Acoustic noise	58 dBA (full traffic)(1)
Heat dissipation	1650 W

(1) The acoustic noise dispersion value was measured in a test environment according to the ISO 9614-2 standard, however deviations from this value 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.

4.3 Materials

All Ericsson products fulfil the legal, market, and Ericsson requirements.

5 Hardware Units

This section describes the standard and optional hardware units for the RBS 2103.

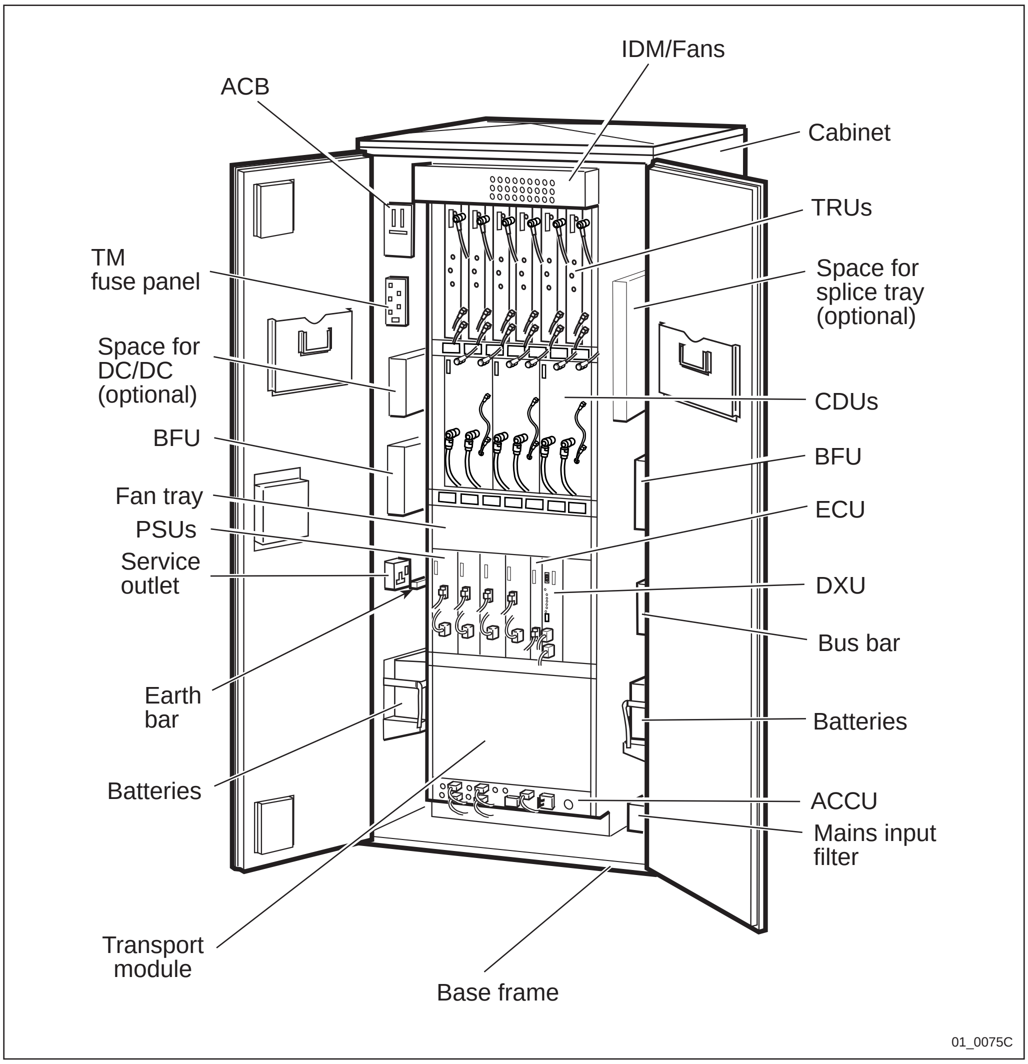

Figure 4 Standard Hardware Units

5.1 Standard Hardware

ACCU - AC Connection Unit

The ACCU provides the fusing and circuit breakers for the AC mains supply. The ACCU also provides and AC service outlet for test instruments. The AC mains switch located on the ACCU disconnects the RBS from the AC mains supply.

Number of units: 1.

ACB – Alarm Collection Board

The ACB is the connection point in the cabinet for external alarms that are connected to the EACU outside the cabinet.

Number of units: 1.

BFU – Battery Fuse Unit

The BFU provides a battery circuit breaker for one battery and connects the battery to the +24 V DC busbar. The BFU also supplies +24 V DC to the ECU.

Number of units: 0 – 2.

CDU - Combining and Distribution Unit

The CDU is the interface between the transceivers and the antennas. Common functions include TX combining, RX preamplifier and distribution, antenna system supervision, and Tower Mounted Antenna (TMA) support.

Number of units: 1 – 3.

DXU - Distribution Switch Unit

The DXU is the central control unit for the RBS. Common functions include distribution switching, BSC interface, timing, external alarm collection, local bus control, and interface switching.

Note: In a master-extension configuration, The DXU is used only in the master cabinet.

Number of units: 0 – 1.

ECU - Energy Control Unit

The ECU controls and supervises the power equipment and the climate control equipment. The ECU also monitors the cabinet temperature.

Number of units: 1.

IDM - Internal Distribution Module

The IDM provides distribution and fusing for the +24V DC system voltage.

Number of units: 1.

PSU - Power Supply Unit

The PSU converts the incoming AC mains voltage into regulated DC voltage.

Number of units: 1 – 4.

TRU - Transmitter and Receiver Unit

The TRU is the transmitter/receiver unit for the RBS. The TRU broadcasts and receives Radio Frequency (RF) signals to and from the mobile station. Each TRU can service several mobile units simultaneously.

Number of units: 1 – 6.

5.2 Optional Hardware Units

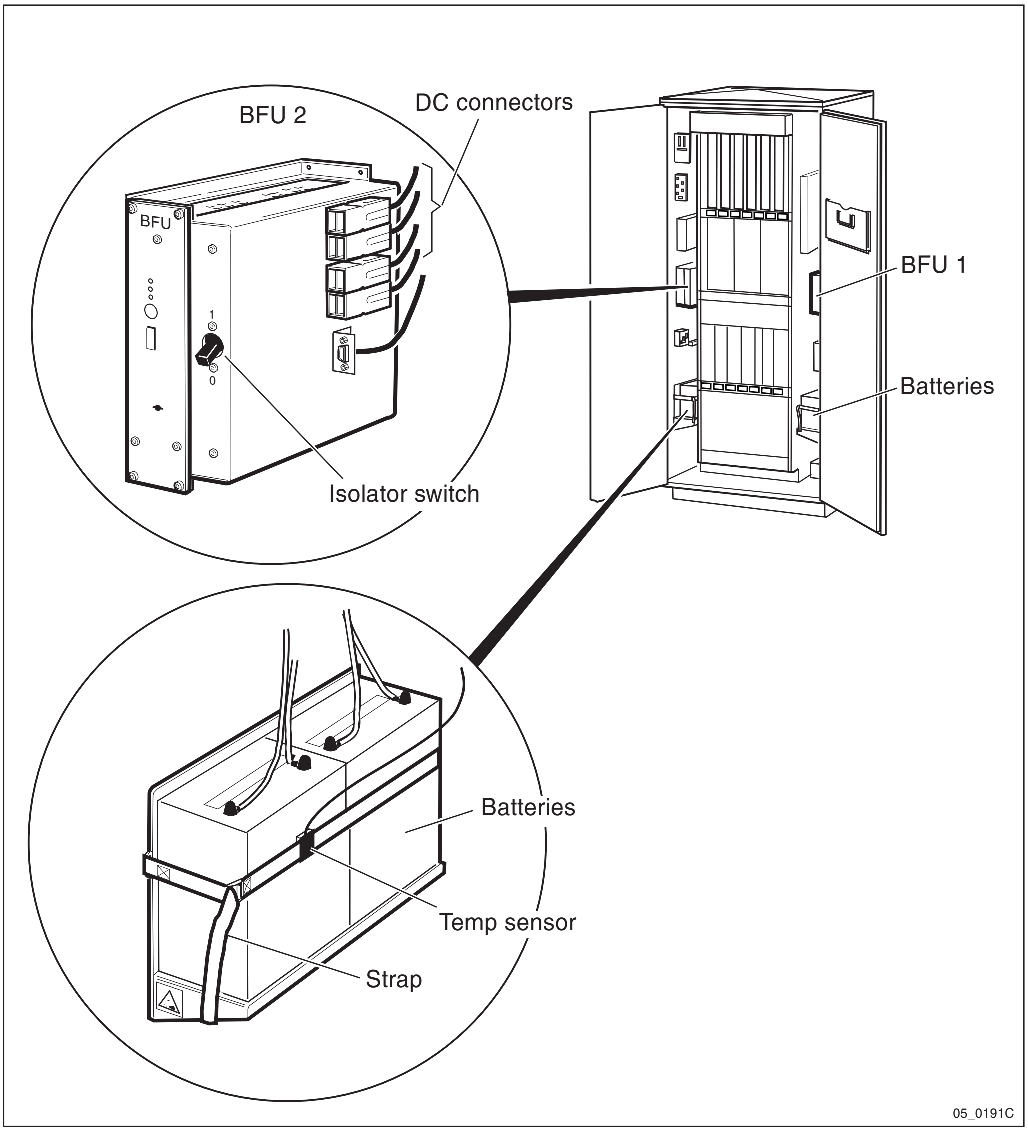

Figure 5 Optional Hardware Units

Batteries

The RBS 2103 can be equipped with two battery blocks to supply back-up power in the event of mains failure.

BIAS-IC - Bias Injector

The BIAS-IC provides DC power from the Control Module (CM) to the Tower Mounted Amplifier (TMA). Up to two bias injectors can be connected to one CM.

CM - Control Module

The CM provides +15 V DC power to the TMAs. The CM also identifies TMA faults and provides the fault information to the RBS alarm module

Number of units: 0 – 1.

EACU - External Alarm Connection Unit

The EACU provides a connection for any external alarms.

Number of units: 1.

TM – Transport Module space

The mounting base also provides mountings, power, and climate control for a TM.

Number of units: 1.

5.3 Heat Exchanger Climate Unit

The Heat Exchanger Climate Unit consists of a heater and a recuperator with one fan for the internal circuit and one for the external circuit.

Number of units: 1.

5.4 Optional Hardware Units

DC/DC Converter

The DC/DC converter provides +24 V DC to -48 V DC power for the TM.

Number of units: 0 – 2.

ddTMA - dual duplex TMA

The ddTMA is mounted close to the antennas and amplifies the receiver signal and combines it with the transmitter signal. The combined signal is transmitted on a single feeder between the ddTMA and CDU. A bias injector is required for power

Number of units: 1 – 6.

OVP – Overvoltage Protection module

The OVP protects the RBS equipment and external signal interface from overvoltage and overcurrent.

Number of units: 0 – 2.

TMA - Tower Mounted Amplifier

The TMA is mounted near the antennas and compensates for signal loss in the receiver antenna cables. The unit is enclosed in a weatherproof box and operates on +15 V DC power.

Number of units: 1 – 6.

6 Interfaces

In this section all external connections are listed, and the test and operator interfaces are described.

6.1 External Connections

External connections provided by the RBS 2103 include the following:

- Transmission
- Antenna
- AC mains
- OMT
- External alarms
- Earth

Table 5 External Cable Connectors

Connector Name	Description
Bus-1	Local bus connector for extension cable
Bus-2	Local bus connector for extension cable
Door	Alarm sensor connector for door alarm
Ext.Alarm	External alarm connector
Ext.T	External temperature sensor alarm connector
G.703–1	Transmission interface port
G.703–2	Transmission interface port
RS232	
RX1	Receiver antenna port 1
RX2	Receiver antenna port 2
TM-48V	Transport Module connector for -48 V power connection
TM+24V	Transport Module connector for +24 V power connection
TX1	Transmitter antenna port 1
TX2	Transmitter antenna port 2

6.2 Test Interface

The OMT connector provides an interface for the Operation and Maintenance Terminal. The OMT provides a graphical user interface (GUI) and is used to verify that the Installation Database (IDB) is installed and contains the correct equipment configuration information. The OMT can be used to perform the following:

- Display software version
- Create or modify the IDB
- Define external alarms
- Modify or display O&M parameters
- Define PCM interface
- Define TMA parameters
- Monitor and display fault status

6.3 Operator interface

The Man Machine Interface (MMI) in the RBS 2103 is comprised of optical indicators, buttons and switches on units in the cabinet. The information here is general. For a more detailed description of the indicators, buttons and switches on the various RUs in the cabinet, *see the respective units' description in this manual.*

Optical Indicators

Several units in the RBS have optical indicators that indicate the operational status of the unit. The indicators indicate faults, mode change and operation.

Buttons and Switches

Buttons and switches can be found on several RUs. The table below only takes the buttons on the DXU and TRUs into account.

Table 6 Buttons

Button	Description
TRU reset	Resets the TRU
DXU reset	Resets the DXU
Local/remote mode	Changes the mode between local and remote. On the TRU this applies to the TRU only, on the DXU this applies to the whole RBS.
Test call	Initiates the test function

Barcode

The barcode for product identification is readable without disrupting RBS function.

7 Power System

The RBS 2103 power system consists of the 115/230 V AC supply voltage inputs, internal DC power supply, and the battery back-up system.

7.1 Power Supply

The RBS 2103 operates on 115 V AC or 230 V AC. The mains voltage is selected by a switch loacted in the power termination box.

Note: A lockable mains disconnect switch must be provided close to the RBS 2103 to facilitate maintenance and repair activities.

7.2 Operating Voltage

The RBS 2103 operating voltage is shown in the table below.

Table 7 Operating Voltage

Voltage	Tolerance	Frequency
200 – 240 V AC (single phase)	± 10%	50 Hz
120/240 V AC (single phase)	± 8%	60 Hz

7.3 Power Consumption

The power consumption of the cabinet is shown in the table below.

Table 8 Power Consumption

Operation	Power consumption	
	230 V AC	**208 V AC**
Normal - (operation with peak load and all time slots occupied)	1650 W	1650 W
Maximum	3400 W	3400 W

8 Transmission

The RBS 2103 is connected to a transmission interface G.703, type E1 (2 Mbits/s) or T1 (1.5 Mbits/s). For E1 interfaces, 75 Ω coaxial or 120 Ω twisted pair cables are used. For T1 interfaces, 100 Ω twisted pair cables are used.

9 External Alarms

The RBS 2103 can be connected to a maximum of 8 external alarms via the EACU in the mounting base.

10 Standards, Type Approvals, and Dependability

In this section a brief overview over standards, type approval and electromagnetic compatibility are stated.

10.1 Safety Standards

In accordance to the market requirements, the RBS 2103 complies with the following product safety standards:

- 73/23/EEC Low voltage directive
- IP 55 according to IEC 529
- FCC Rules, part 68
- EN 60950 / IEC 60950
- EN 60215 / IEC 60215
- UL 1950
- CSA 22.2 No. 950–M89
- FCC rules, part 68

10.2 Other Standard and Regulations

Marking

The product is marked with signs to show 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 signs to show compliance to the legal requirements in respective region.

Electromagnetic Compatibility (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.

10.3 Dependability

The RBS 2103 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:

Batteries: The Batteries must be regularly inspected every year (oxide on the pole terminals). The batteries should be replaced according to the recommendations of the battery supplier.

Vandal Resistanc

The RBS 2103 fulfils Ericsson’s requirements for vandal resistance.

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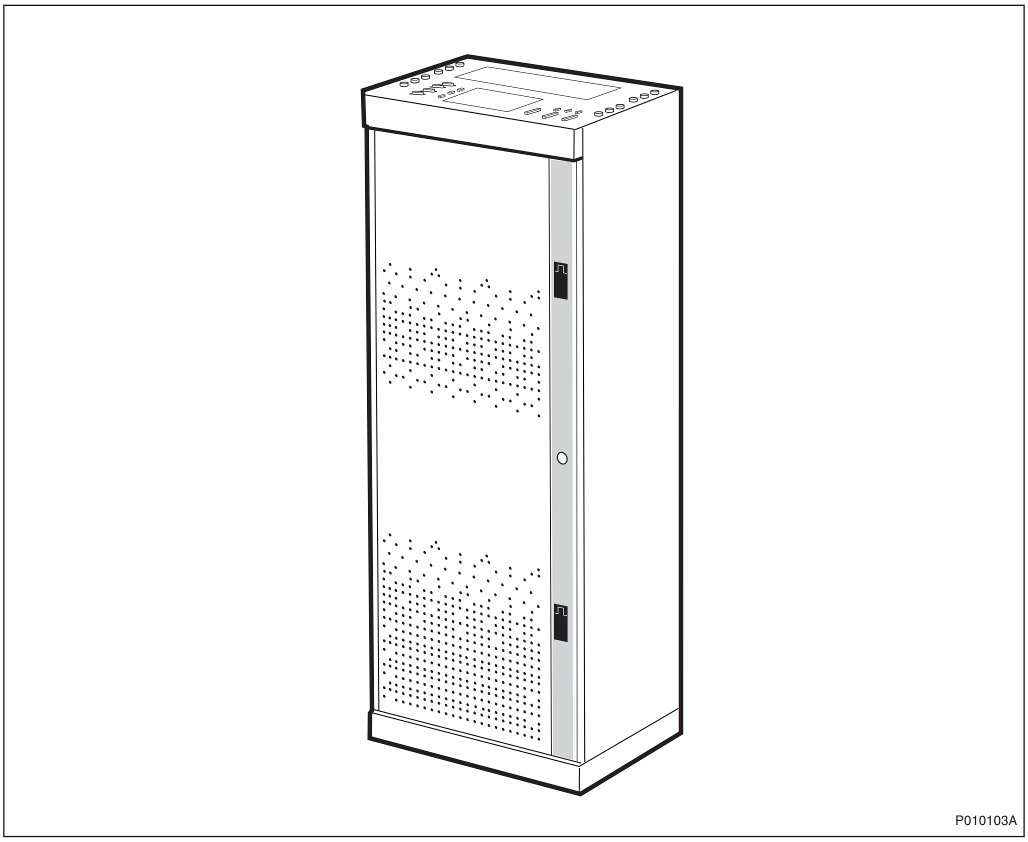
RBS 2202

Macro Indoor RBS

Product Description

The RBS 2202 is an indoor macro Radio Base Station (RBS) and is a member of the RBS 2000 family. The RBS 2202 contains up to six transceivers.



ERICSSON

Contents

1 Product Overview

The RBS 2202 is a fully integrated radio base station and can be installed in any indoor environment. The RBS 2202 can be configured as an omni-cell or in multi-sector configurations.

1.1 Main Features

The RBS 2202 supports the following features of the RBS 2000 family:

- Frequency hopping
- Receiver diversity
- Duplex filtering
- Dynamic power regulation
- Discontinuous transmission/reception
- Encryption/ciphering
- Master – Extension configuration
- Frequencies:
  - GSM 900
  - GSM 1800
  - GSM 1900
- Transmission alternatives:
  - T1 - 1.5 Mbit/s, 100 Ω, with internal synchronisation
  - T1 - 1.5 Mbit/s, 100 Ω, with PCM synchronisation
  - E1 - 2.0 Mbit/s, 75 Ω, with PCM synchronisation
  - E1 - 2.0 Mbit/s, 120 Ω, with PCM synchronisation
- EDGE, requires DXU-21A and EDGE sTRU(s)
- GPS Synchronization, requires DXU-21A
- TG-synchronization, requires DXU-11 or DXU-21A

1.2 Variants

There are two versions of the RBS 2202 for different power supply alternatives:

- 230 – 240 V AC, 50 – 60 Hz
- -48 to -60 V DC
- +24 V DC

1.3 Optional Equipment

The RBS 2202 is available with the following optional equipment:

- Battery back-up
- Bias injector
- Control Module (CM)
- dual duplex TMA (ddTMA)
- DXX
- External Synchronisation Bus (ESB) cable for master – slave configuration connection
- GPS
- Lifting eyes
- Mini DXC
- Overvoltage Protection (OVP)
- System voltage distribution module (DM)
- Tower Mounted Amplifier (TMA)

2 Dimensions

This section describes the physical characteristics of the RBS 2202; size and weight, as well as colour.

Size and Weight

Table 1 Size and Weight

Height	Width	Depth	Weight (with base frame)
1775 mm(1)	600 mm	400 mm	<200 kg

(1) Height with cowl is 1910 mm.

Surface and Colour

The RBS 2202 cabinet is available in the following colour:

Table 2 Colour

Cabinet colour	NCS/RAL
White	NCS 1002-R

The RBS 2202 has a surface quality according to Ericsson standard class A3.

3 Space Requirements

RBS 2202 installations require a minimum spacing for proper airflow and to provide a sufficient working area. Space requirements in relation to a cable ladder are shown in the figure below.

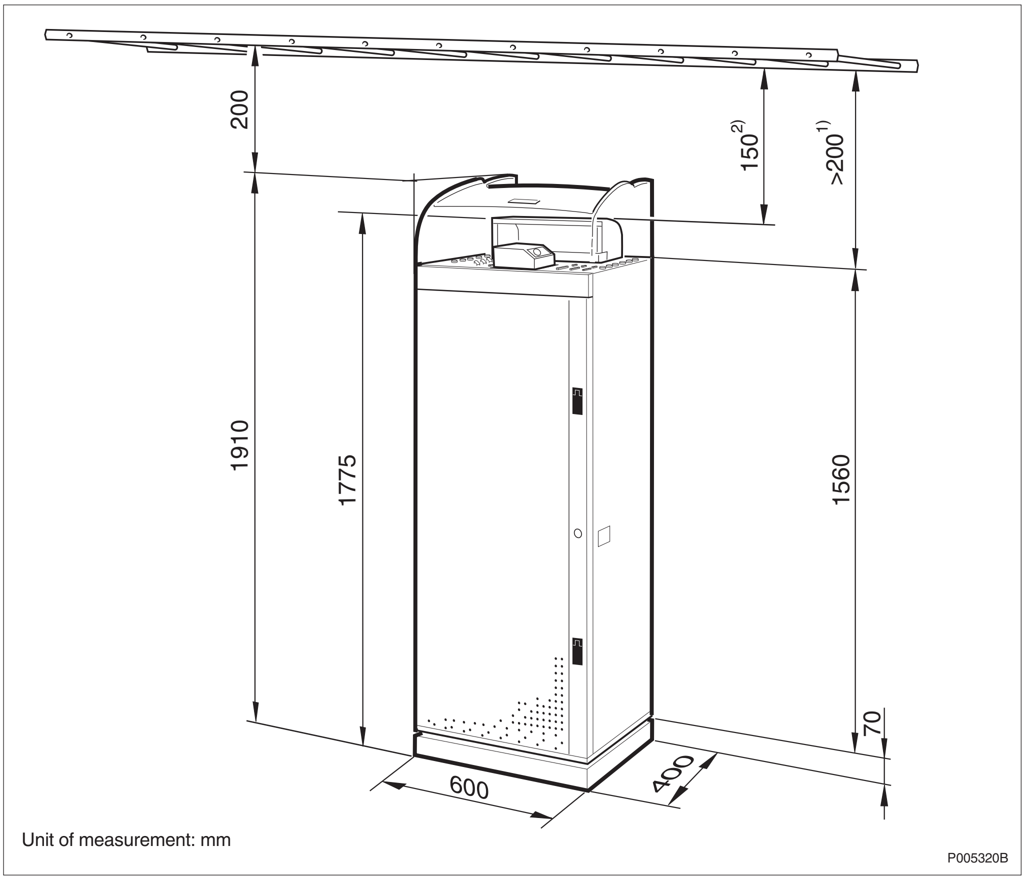


Figure 1 Space Requirements in Relation to Cable Ladder

Space requirements in relation to additional equipment are shown in the figure below.

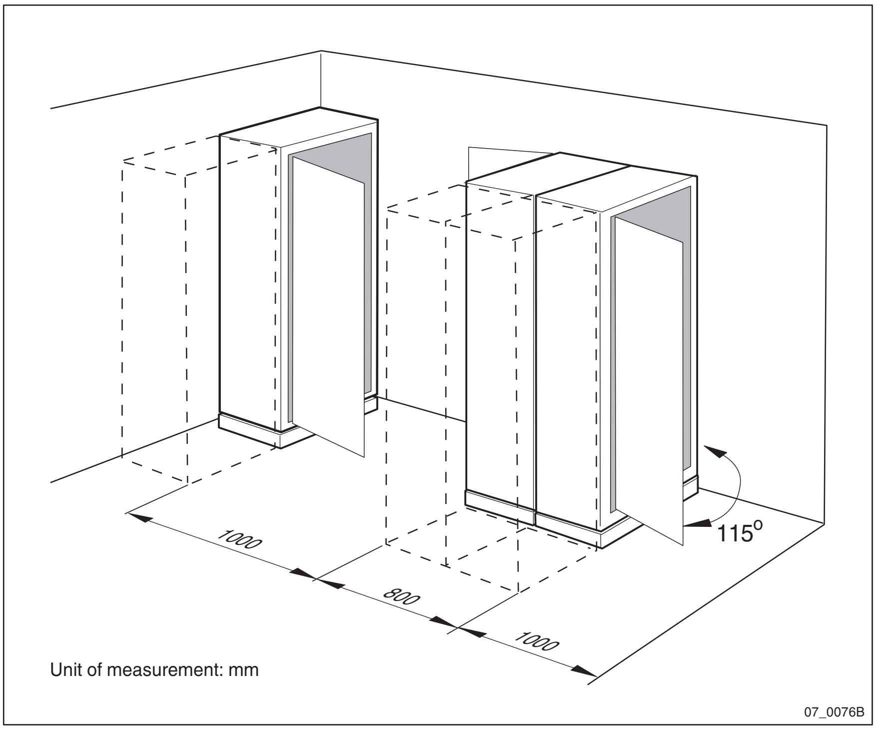


Figure 2 Space Requirements in Relation to Additional Equipment

Footprint

The footprint of the RBS 2202 is 598 mm wide and 400 mm deep. The installation frame of the RBS 2202 has the same bottom holing pattern as that of the RBS 2206.

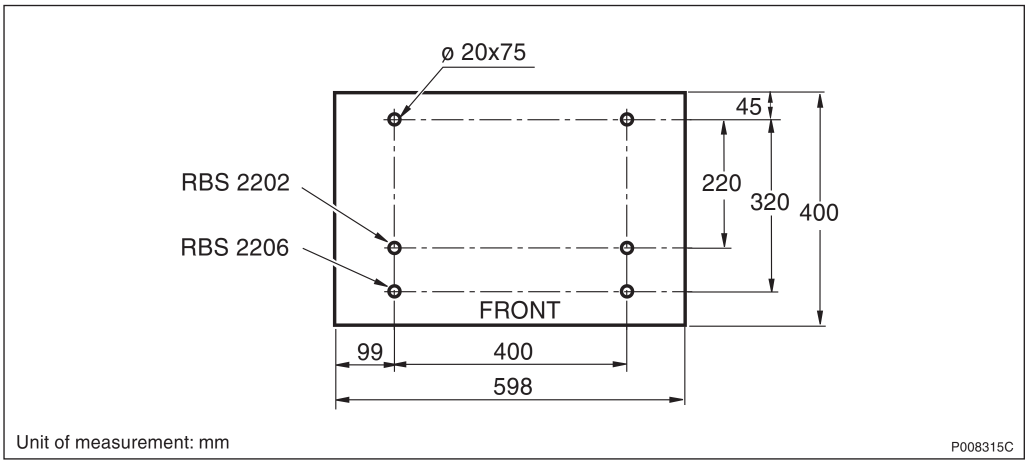


Figure 3 Base Frame and Installation Frame Holing Pattern

4 Environment

This section provides an overview of the operating environment, environmental impact, and materials used in the RBS 2202.

4.1 Operating Environment

The operating environment and climatic specifications for the RBS 2202 are shown in the table below.

Table 3 Environmental Specifications

Description	Temperature	Relative Humidity	ETSI Standard
Normal operation	+5° C to +40° C	5% to 85%	300 19-1-3 class 3.1
Transport(1)	-40°C to +70°	5% to 85%	

(1) Non-destructive conditions not to exceed 96 hours or 5.5 days in a three-year period.

4.2 Environmental Impact

This section describes the cabinet’s environmental impact.

Table 4 Environmental Impact

Description	Specification
Acoustical noise	63 dBA (full traffic)(1)
Heat dissipation	1400 W at 40°C

(1) The acoustic noise dispersion value was measured in a test environment according to the ISO 9614-2 standard, however deviations from this value 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.

4.3 Compliance Distances for Electromagnetic Exposure

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

Ericsson has performed a free-space near-field RF exposure assessment of typical configurations of the RBS 2202 with a recommended antenna. The resulting dimensions, in metres, for a compliance boundary for both general public and occupational exposure are shown in Table 5 on page 10.

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 in 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 a certain distance above and below the antenna. The cylinder shape overestimates the compliance distances right beside the antenna.

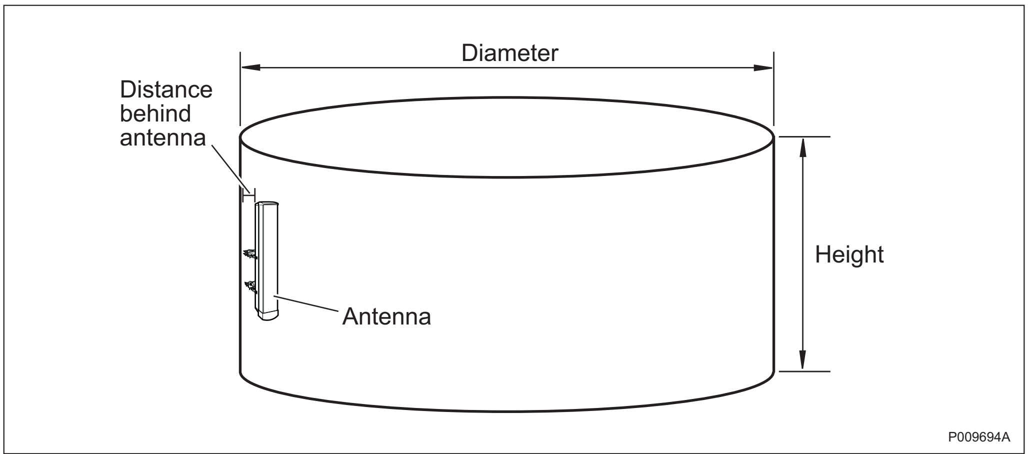


Figure 4 Compliance Boundary Cylinder

Note: Table 5 on page 10 shows an example for a typical antenna. As the antenna field distributions will differ for different, 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 5 Compliance Boundary Dimensions for the General Public (GP) and Occupational (O) Exposure for Typical Configurations

		Dimensions of Cylindircal Compliance Boundary (m)					
		Diameter		**Height**		**Distance behind antenna**	
Configu-ration	**Fre-quency (MHz)**	**GP**	**O**	**GP**	**O**	**GP**	**O**
A:3x2	900	6	3	1.6	1.4	0.1	0.1
A:3x2	1800	5	1	1.5	1.3	0.1	0.05
C+:1x6	900	7	3	1.7	1.4	0.1	0.1
C+:1x6	1800	5	1	1.6	1.4	0.1	0.05

Compliance distances to the side of the antenna for occupational exposure are below 0.1 m for all configurations above.

For characteristics of an antenna recommended for typical configurations of an RBS 2202, *see the table below.*

Table 6 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 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 2202 at 900 MHz and 1800 MHz, are given in *the table below.*

Table 7 Maximum Power to Antenna for Various RBS 2202 Configurations

Configuration	**Frequency (MHz)**	**Nominal output power per TRU (dBm)/(W)**	**Maximum power into antenna**(1) **(dBm)/(W)**
A:3x2	E-GSM 900	44.5 / 28.1	46.5 / 44.7
A:3x2	GSM 1800	41 / 12.6	45.5 / 35.5
C+:1x6	E-GSM 900	43.5 / 22.4	47.8 / 60.3
C+:1x6	GSM 1800	40 / 10	46.8 / 47.9

(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.

5 Hardware Units

This section describes the standard and optional hardware units for the RBS 2202.

5.1 Standard Hardware Units

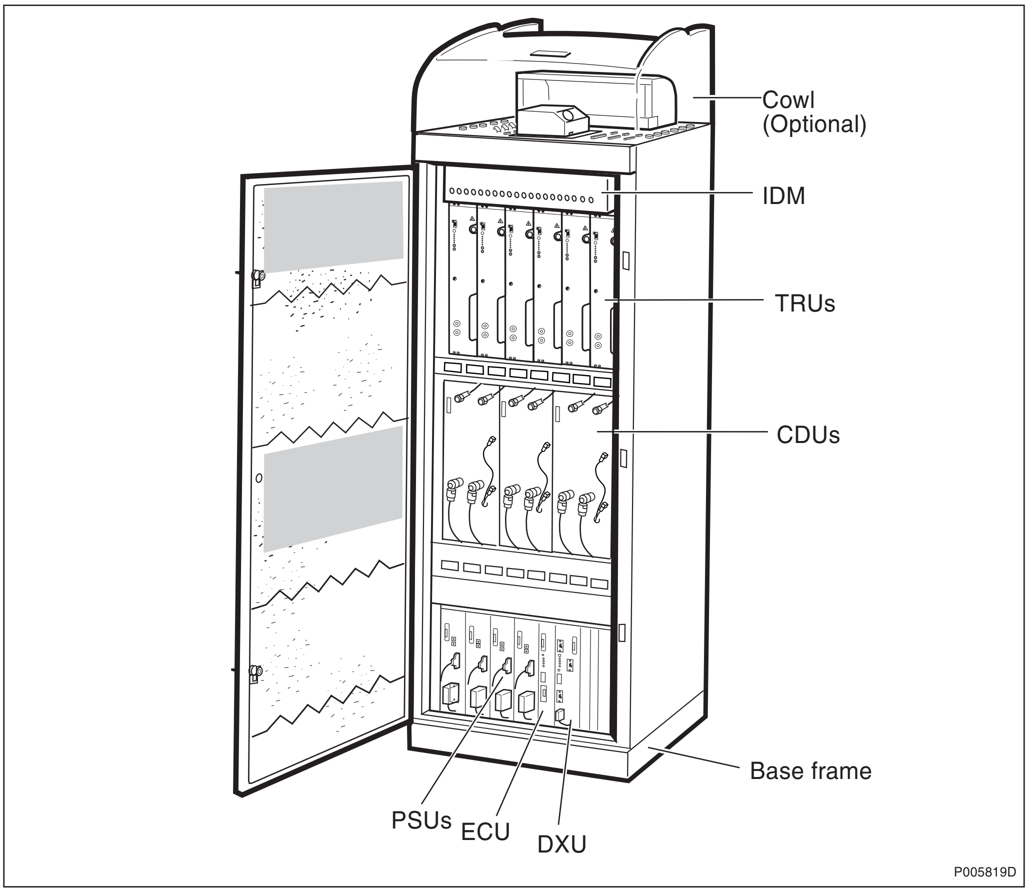


Figure 5 Standard Hardware Units

CDU - Combining and Distribution Unit

The CDU is the interface between the transceivers and the antennas. Common functions include TX combining, RX preamplifier and distribution, antenna system supervision, and Tower Mounted Antenna (TMA) support.

Number of units: 1 – 3.

DXU - Distribution Switch Unit

The DXU is the central control unit for the RBS. Common functions include distribution switching, BSC interface, timing, external alarm collection, local bus control, and interface switching.

Number of units: (0) – 1.

Note: In a master-extension configuration, the DXU is used only in the master cabinet.

ECU - Energy Control Unit

The ECU controls and supervises the power equipment and the climate control equipment. The ECU also monitors the cabinet temperature.

Number of units: 1.

IDM - Internal Distribution Module

The IDM provides distribution and fusing for the +24V DC system voltage.

Number of units: 1.

PSU - Power Supply Unit

The PSU converts the incoming AC mains voltage into regulated DC voltage.

Number of units: 0 – 4.

TRU - Transmitter and Receiver Unit

The TRU is the transmitter/receiver unit for the RBS. The TRU broadcasts and receives Radio Frequency (RF) signals to and from the mobile station. Each TRU can service several mobile units simultaneously.

Number of units: 1 – 6.

5.2 Optional Hardware Units

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

Bias Injector

The bias injectors are used to provide the TMA with DC power from the TMA-CM, over the RX/TX feeder cables.

Number of units: 0 – 6.

DXX — Digital Cross Connector

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

Number of units: 0 – 1.

Mini DXC

The Mini DXC is a cross-connect unit that provides five G.703/G.704 ports. It is installed in the OXU.

Number of units: 0 – 1.

TMA - Tower Mounted Amplifier

The TMA is mounted near the antennas and compensates for signal loss in the receiver antenna cables. The unit is enclosed in a weatherproof box and operates on +15 V DC power.

Number of units: 0 – 6.

ddTMA - dual duplex TMA

The ddTMA is mounted close to the antennas. It amplifies the receiver signal and combines it with the transmitter signal. The combined signal is transmitted on a single feeder between the ddTMA and CDU. A bias injector is required for power.

Number of units: 0 – 6.

6 Interfaces

In this section all external connections are listed, and the test and operator interfaces are described.

6.1 External Connections

External connections provided by the RBS 2202 include the following:

- Antenna interfaces
- AC mains interface
- Earth interface
- External alarms
- Transmission interfaces

These are shown in *Figure 6 on page 15, Table 8 on page 15 and Table 9 on page 16.*

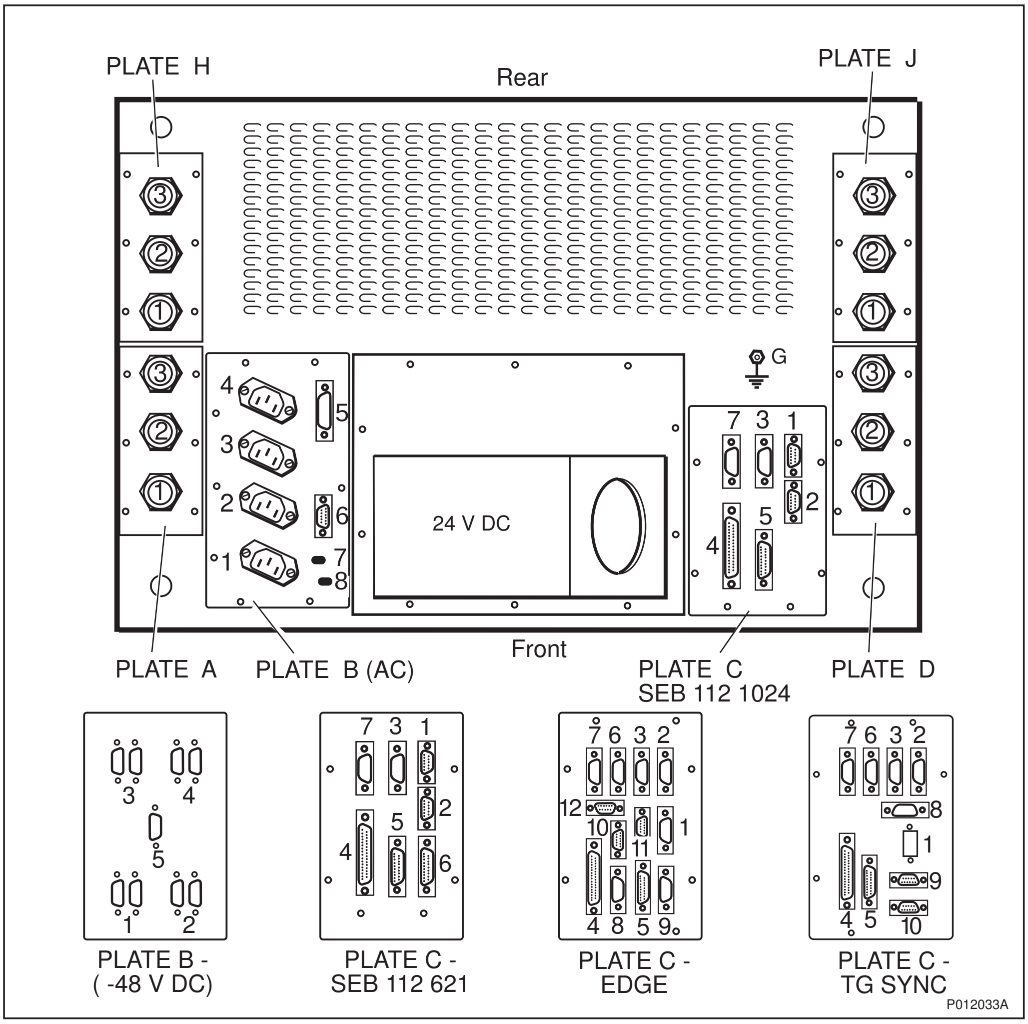


Figure 6 External Cable Connectors

Table 8 External Cable Connectors

Connector Plate	Connector Number	Description
A, D, H and J	1 – 3	Antenna connectors
B (230 V AC version)	1 – 4	AC connectors
	5	+ 24 V DC out
	6	RS232
	7 and 8	Opto cable connectors

Table 8 External Cable Connectors

Connector Plate	Connector Number	Description
B (-48 V DC version)	1 – 4	-48 V DC connector to -48 V Distribution Box
	5	+24 V DC out
C	1	RS232/1
	2	RS232/2
	3	Transmission
	4	External alarm connector
	5	Bus to extension cabinet
	6	Bus or transmission
	7	Transmission
	8	Transmission
	9 and 10	External Synchronization Bus connector
G		Earth

Table 9 External Cable Connectors – EDGE Upgrade

Connector Plate	Connector Number	Description
A, D, H and J	1 – 3	Antenna connectors
B (230 V AC version)	1 – 4	AC connectors
	5	+ 24 V DC out
	6	RS232
	7 and 8	Opto cable connectors
B (-48 V DC version)	1 – 4	-48 V DC connector to -48 V Distribution Box
	5	+24 V DC out

Table 9 External Cable Connectors – EDGE Upgrade

Connector Plate	Connector Number	Description
C	1	Transmission line 5
	2	Transmission line 4
	3	Transmission line 3
	4	External alarms
	5	XTL-bus to Extension Cabinet
	6	Transmission line 2
	7	Transmission line 1
	8	Y-link to Extension Cabinet (sTRU 1–3)
	9	Y-link to Extension Cabinet (sTRU 4–6)
	10	External Synch Bus (TG sync)
	11	External Synch Bus (TG sync)
	12	GPS Connection
G		Earth

6.2 Test Interface

The OMT connector provides an interface for the Operation and Maintenance Terminal. The OMT provides a graphical user interface (GUI) and is used to verify that the Installation Database (IDB) is installed and contains the correct equipment configuration information. The OMT can be used to perform the following:

- Display software version
- Create or modify the IDB
- Define external alarms
- Modify or display O&M parameters
- Define PCM interface
- Define TMA parameters
- Monitor and display fault status

6.3 Operator Interface

The Man Machine Interface (MMI) in the RBS 2202 is comprised of optical indicators, buttons and switches on units in the cabinet. The information here is general. For a more detailed description of the indicators, buttons and switches on the various RUs in the cabinet, *see the respective units' description in this manual.*

Optical Indicators

Several unit in the RBS have optical indicators that show the operational status of the unit. The indicators reflect faults, mode change and operation.

Buttons and Switches

Buttons and switches can be found on several RUs. The table below takes into account only the buttons on the DXU and TRUs.

Table 10 Buttons

Button	Description
TRU reset	Resets the TRU
DXU reset	Resets the DXU
Local/remote mode	Changes the mode between local and remote. On the TRU this applies to the TRU only, on the DXU this applies to the whole RBS.
Test call	Not used

Barcode

The barcode for product identification is readable without disrupting RBS function.

7 Power System

The RBS 2202 power system consists of the 200 – 240 V AC supply voltage inputs, internal DC power supply, and an optional battery back-up system.

7.1 Power Supply

The RBS 2202 operates on 200 – 240 V AC, -48 to -60 V, or +24 V DC.

Note: A lockable mains disconnect switch must be provided close to the RBS 2202 to facilitate maintenance and repair activities.

7.2 Operating Voltage

The RBS 2202 operating voltage is shown in the table below.

Table 11 Operating Voltage

Voltage	Tolerance	Frequency
200 – 240 V AC (single phase)	180 – 264 V AC	50 – 60 Hz
-48 V DC/-60 V DC	-40 to -72 V DC	N/A
+24 V DC	20.5 – 29 V DC	N/A

7.3 Power Consumption

The power consumption of the cabinet is shown in the table below.

Table 12 Power Consumption

Operation	Power consumption (VA)
Normal (operation with peak load and all time slots occupied)	2400
Maximum	3200

8 Transmission

The RBS 2202 is connected to a transmission interface G.703, type E1 (2 Mbits/s) or T1 (1.5 Mbits/s). For E1 interfaces, 75 Ω coaxial or 120 Ω twisted pair cables are used. For T1 interfaces, 100 Ω twisted pair cables are used.

9 External Alarms

The RBS 2202 can be connected to a maximum of 16 external alarms.

10 Product Approval

This section describes product approval for Europe and North America.

10.1 Europe

The RBS complies with the European Community directive R&TTE 1999/5/EC. This means that the RBS fulfills legal requirements regarding product safety, EMC (Electromagnetic Compatibility) and Radio.

The RBS has a CE mark to show compliance with the above.

10.2 North America

The RBS complies with the North American legal requirements regarding product safety, EMC (Electromagnetic Compatibility) and Radio.

To show compliance with this the RBS has a Listing mark for product safety and FCC/IC labels for EMC (Electromagnetic Compatibility) and Radio.

11 Dependability

The RBS 2202 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:

Batteries: The batteries must be regularly inspected every year (oxide on the pole terminals). The batteries should be replaced according to the recommendations of the battery supplier.

12 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

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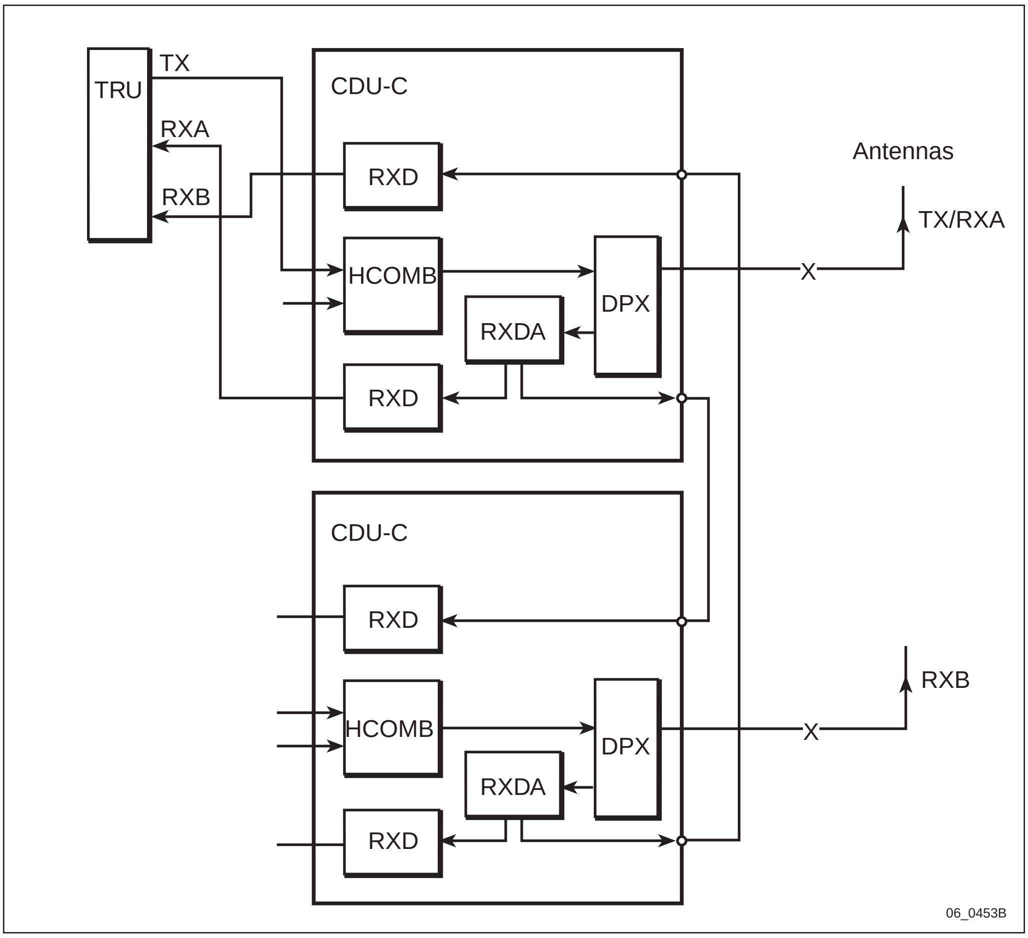
RBS 2101, RBS 2102, RBS 2103 RBS 2202

Radio Configurations

Description

This document describes the radio configurations for RBS 2101, RBS 2102, RBS 2103 and RBS 2202.



Contents

1 Introduction

This document describes the radio configurations for RBS 2102, RBS 2102, RBS 2103 and RBS 2202. The following types of radio configurations are described:

- Basic configurations, *see Section 5 Basic Configurations on page 7*
- Site equipment configurations, *see Section 6 Site Equipment Configurations on page 49*

2 References

/GSM:05.05/ GSM Requirements 05.05 phase 2; version 4.13.0. Additional numeric characters designate chapter number.

/GSM:05.08/ GSM Requirements 05.08 phase 2; version 4.15.0. Additional numeric characters designate chapter number.

3 Definitions

Tower Mounted Amplifier (TMA) The TMA compensates for signal loss in the receiver antenna cables, reduces system noise and improves uplink sensitivity. The TMA can consist of a duplex filter. Duplex is the function that allows communication in two directions (sending and receiving) on one channel. The TMA used for 12 TRX products is Dual Duplex TMA (ddTMA). Some configurations can use a TMA designed for reception only (rTMA).

Antenna Reference Point The antenna reference point is the point where the radio signal crosses the RBS border, that is, the connector for the antenna feeder. For an example of the antenna reference point when TMA is used, *see Figure 1 on page 4.*

Note: The TMA is inside the RBS border.

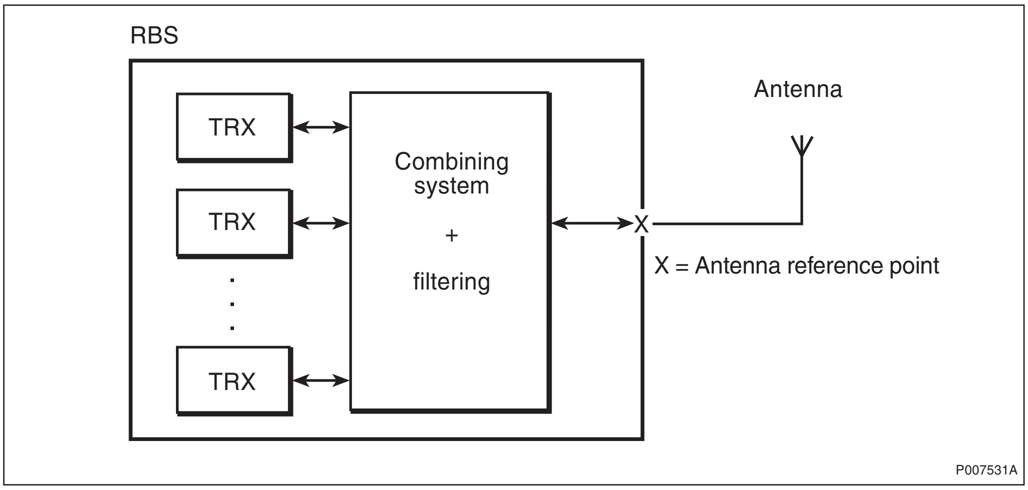


Figure 1 Antenna Reference Point

Antenna System The antenna system is constituted by all RF transmission and reception antennas, directed to cover the same area or multi-casting configurations.

Base Transceiver Station (BTS) A BTS is a unit operating on a set of frequencies in one cell.

Basic Configuration A basic configuration is a specified set of transceivers, CDUs, and in some cases, TMAs, connected to one antenna system.

A basic configuration can be multiplied or used in combination with other basic configurations to build the needed site equipment.

Variations of a basic configuration may exist, differing in cable lengths. This depends on factors such as implementation in different cabinets.

Radio Base Station (RBS) An RBS is all equipment in an Ericsson base station, and may be comprised of several BTSs. Each RBS has one DXU, controlling a maximum of twelve TRUs.

Site Cell Configuration (SCC) The SCC is a geographical concept describing how an area around one RBS site is divided into radio traffic areas. The following types of site are defined:

- Omni-site

  Radio coverage in one 360 degree sector, that is in one area, using one BTS.

- 2-sector site

  Radio coverage in two sectors, that is two distinct areas, using two BTSs.

- 3-sector site

  Radio coverage in three sectors, that is three distinct areas, using three BTSs.

3.1 Cabinet Types

RBS 2101	Outdoor cabinet with maximum 2 TRUs per cabinet
RBS 2102	Outdoor cabinet with maximum 6 TRUs per cabinet
RBS 2103	Outdoor cabinet with maximum 6TRUs per cabinet
RBS 2202	Indoor cabinet with maximum 6 TRUs per cabinet

3.2 Configurations Identity

The figure below shows how a basic configuration identity is constructed.

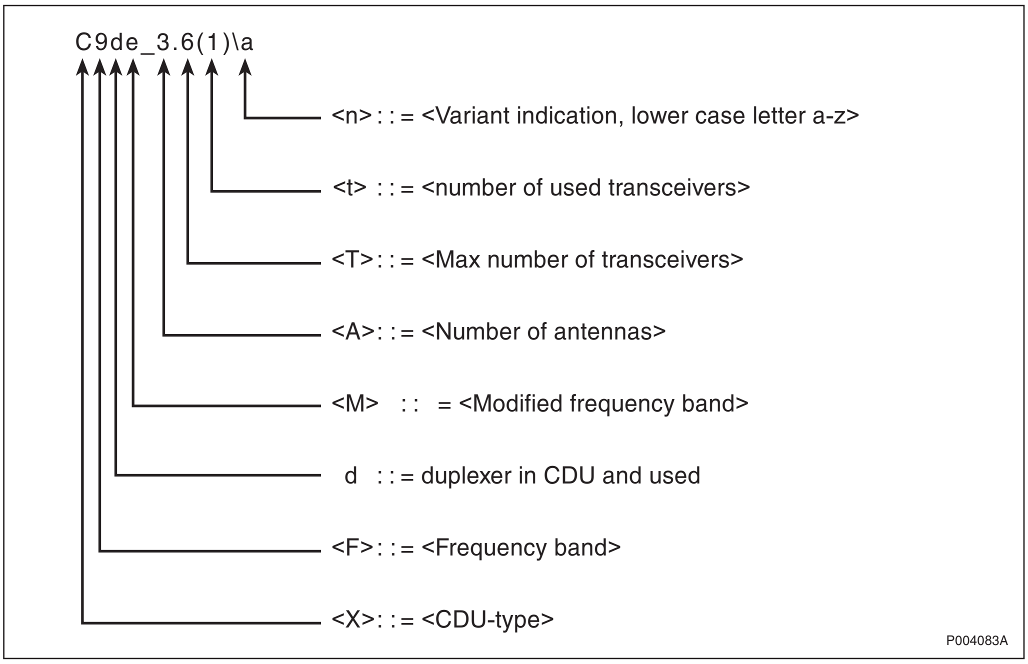


Figure 2 Basic Configuration Identity

4 Frequency Bands

GSM 800	Uplink: 824 – 849 MHz
	Downlink: 869 – 894MHz
P-GSM 900	Uplink: 890 – 915 MHz
	Downlink: 935 – 960 MHz
E-GSM 900	Uplink: 880 – 915 MHz
	Downlink: 925 – 960 MHz
GSM 1800	Uplink: 1710 – 1785 MHz
	Downlink: 1805 – 1880 MHz
GSM 1900	Uplink: 1850 – 1910 MHz
	Downlink: 1930 – 1990 MHz

5 Basic Configurations

This section shows functional views of radio signal paths for various configurations. Only components necessary to illustrate the configuration are shown.

In some configurations, the radio signal paths can differ depending on where in the cabinet the basic configuration is used. The figures show fully-equipped cabinets with two or three BTSs, that is two or three basic configurations are shown in the same figure. These are different physical implementations of the same basic configuration, not different configurations. The second BTS is drawn with dotted lines to show how an SCC in a fully-equipped cabinet is connected.

The basic configurations meet the GSM requirements, except where otherwise stated.

5.1 CDU-A Configurations

This section describes the basic configurations for CDU-A, which are the following:

- A9d_2.2, *see Section 5.1.1 on page 8*
- A18d_2.2 and A19_2.2, *see Section 5.1.2 on page 9*
- A18_4.2, *see Section 5.1.3 on page 10*

5.1.1 Basic Configuration A9d_2.2

The basic configuration A9d_2.2 is shown in the figure below.

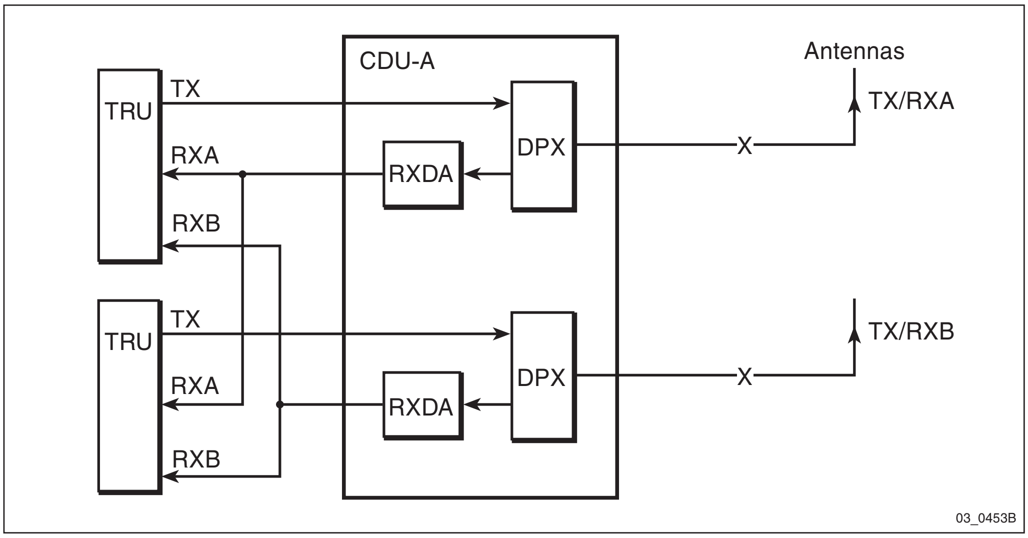


Figure 3 Basic Configuration A9d_2.2

Characteristics A9d_2.2

Number of CDUs	1
Frequency band	P-GSM 900
Max. number of TRUs	2
Number of feeders	2
Number of antennas	2
Antenna configuration	TX/RX + TX/RX

5.1.2 Basic Configurations A18d_2.2 and A19_2.2

The basic configurations A18d_2.2 and A19_2.2 are shown in the figure below.

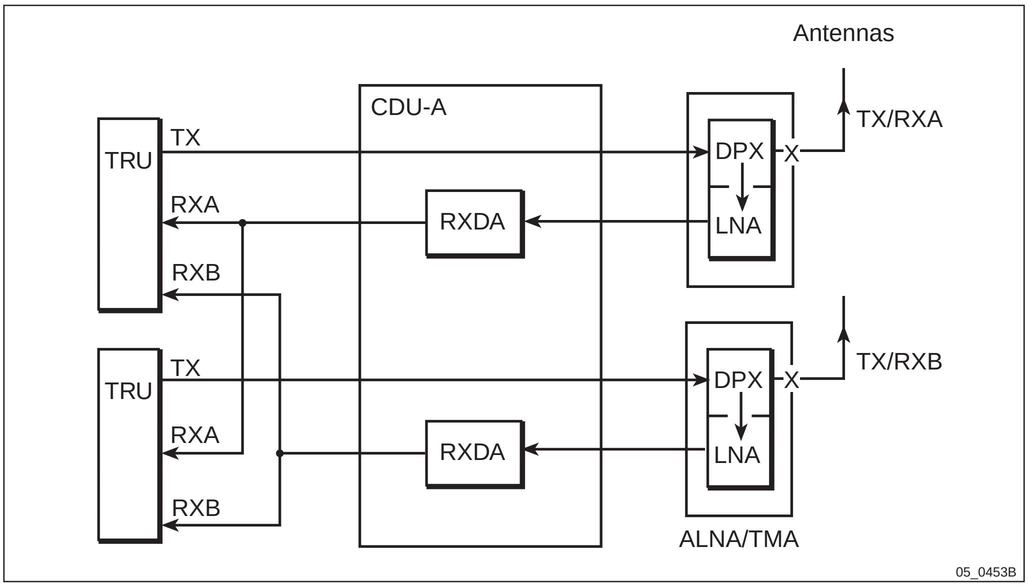


Figure 4 Basic Configurations A18_2.2 and A19_2.2

Characteristics A18_2.2 and A19_2.2

Number of CDUs	1
Number of ALNAs/TMAs	2
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	2
Number of feeders	4
Number of antennas	2
Antenna configuration	TX/RX + TX/RX

5.1.3 Basic Configuration A18_4.2

The basic configuration A18_4.2 is shown in the figure below.

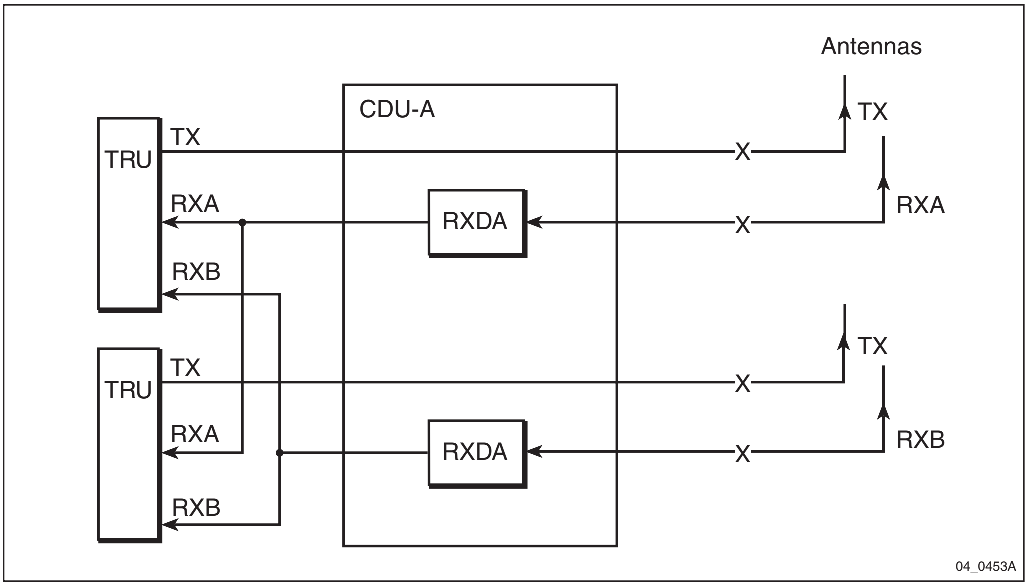


Figure 5 Basic Configuration A18_4.2

Characteristics A18_4.2

Number of CDUs	1
Frequency band	GSM 1800
Max. number of TRUs	2
Number of feeders	4
Number of antennas	4
Antenna configuration	TX + RX + TX + RX

5.2 CDU-C Configurations

This section describes the basic configurations for CDU-C, which are the following:

- C9d_2.1, *see Section 5.2.1 on page 12*
- C9d_2.1\a, *see Section 5.2.2 on page 13*
- C9d_2.4, *see Section 5.2.3 on page 14*
- C9d_3.6, *see Section 5.2.4 on page 15*
- C18_2.1 and C19_2.1, *see Section 5.2.5 on page 17*
- C18_2.1\a and C19_2.1\a, *see Section 5.2.6 on page 18*
- C18_2.4 and C19_2.4, *see Section 5.2.7 on page 19*
- C18_3.1 and C19_3.1, *see Section 5.2.8 on page 20*
- C18_3.1\a and C19_3.1\a, *see Section 5.2.9 on page 21*
- C18_3.6 and C19_3.6, *see Section 5.2.10 on page 22*
- C18_4.4 and C19_4.4, *see Section 5.2.11 on page 24*
- C18_5.6 and C19_5.6, *see Section 5.2.12 on page 25*

5.2.1 Basic Configuration C9d_2.1

The basic configuration C9d_2.1 is shown in the figure below.

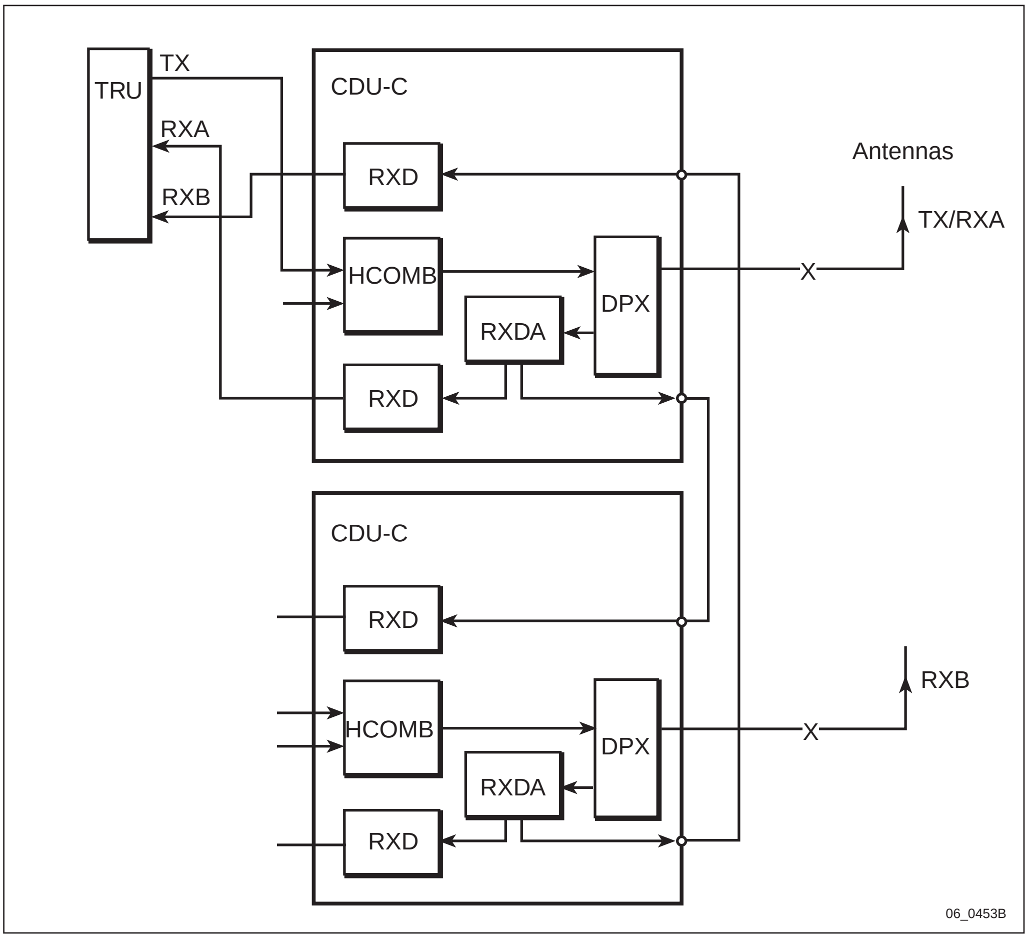


Figure 6 Basic Configuration C9d_2.1

Characteristics C9d_2.1

Number of CDUs	2
Frequency band	P-GSM 900
Max. number of TRUs	1
Number of feeders	2
Number of antennas	2
Antenna configuration	TX/RX + RX

5.2.2 Basic Configuration C9d_2.1\a

The basic configuration C9d_2.1\a is shown in the figure below.

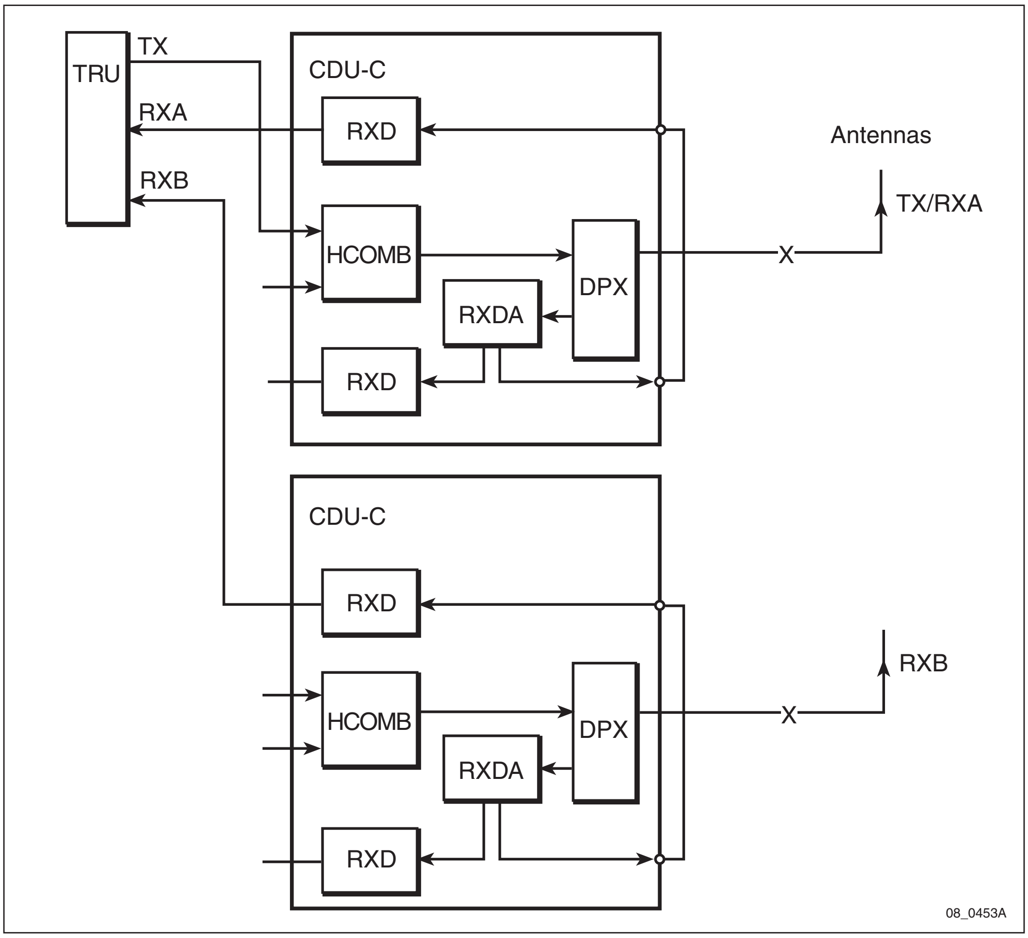


Figure 7 Basic Configuration C9d_2.1\a

Characteristics C9d_2.1\a

Number of CDUs	2
Frequency band	P-GSM 900
Max. number of TRUs	1
Number of feeders	2
Number of antennas	2
Antenna configuration	TX/RX + RX

5.2.3 Basic Configuration C9d_2.4

The basic configuration C9d_2.4 is shown in the figure below.

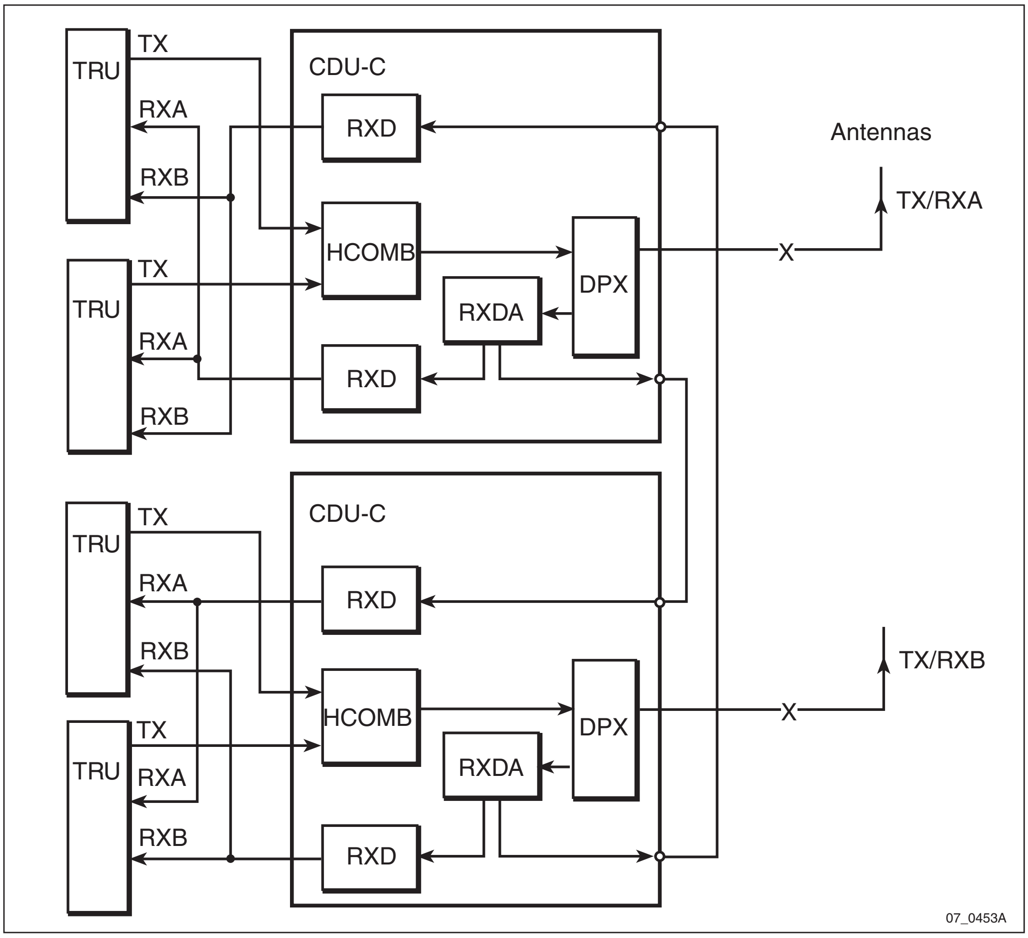


Figure 8 Basic Configuration C9d_2.4

Characteristics C9d_2.4

Number of CDUs	2
Frequency band	P-GSM 900
Max. number of TRUs	4
Number of feeders	2
Number of antennas	2
Antenna configuration	TX/RX + TX/RX

5.2.4 Basic Configuration C9d_3.6

The basic configuration C9d_3.6 is shown in the figure below.

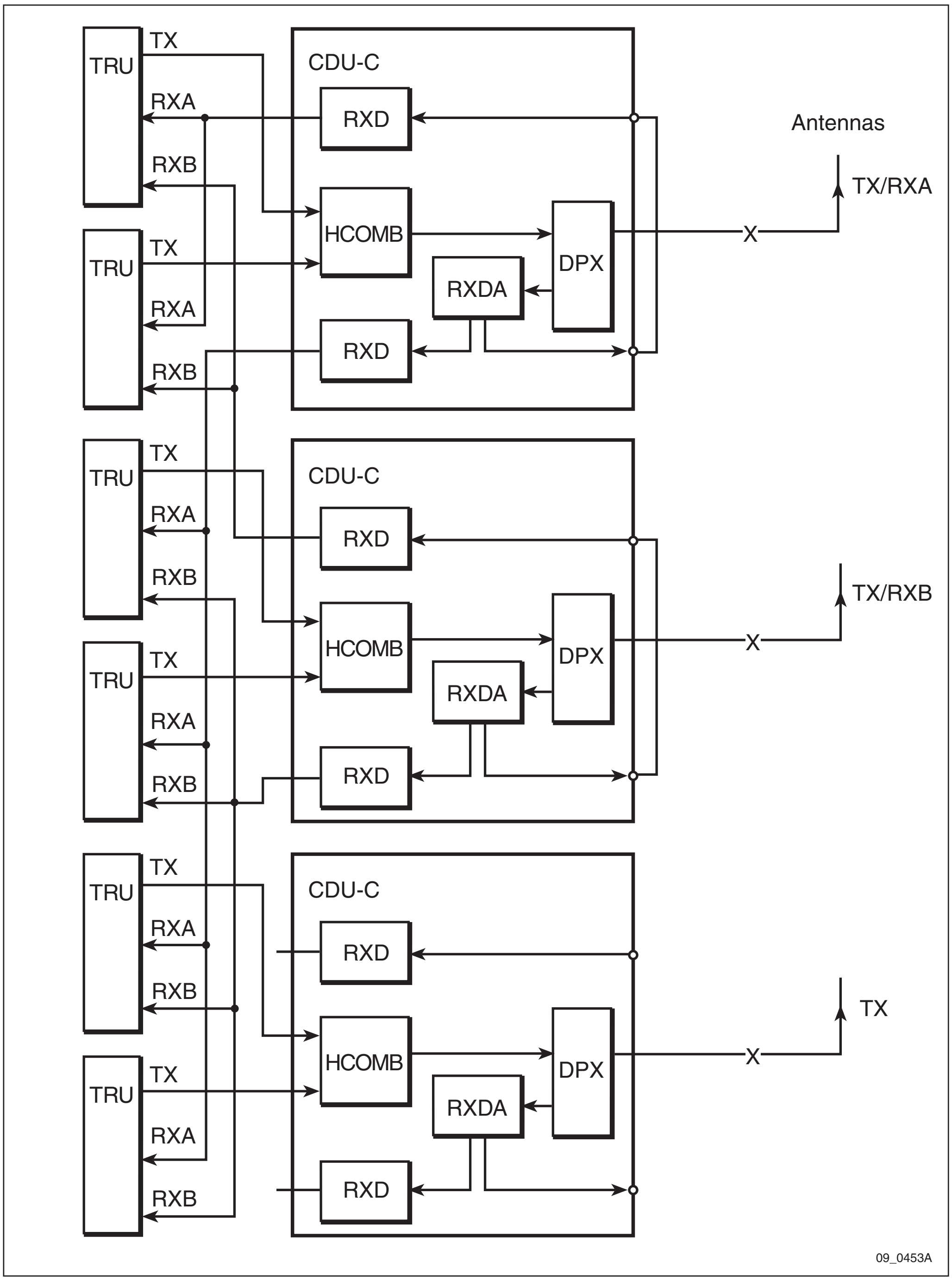


Figure 9 Basic Configuration C9d_3.6

Characteristics C9d_3.6

Number of CDUs	3
Frequency band	GSM 900
Max. number of TRUs	6
Number of feeders	3
Number of antennas	3
Antenna configuration	TX/RX + TX/RX + TX

5.2.5 Basic Configurations C18_2.1 and C19_2.1

The basic configurations C18_2.1 and C19_2.1 are shown in the figure below.

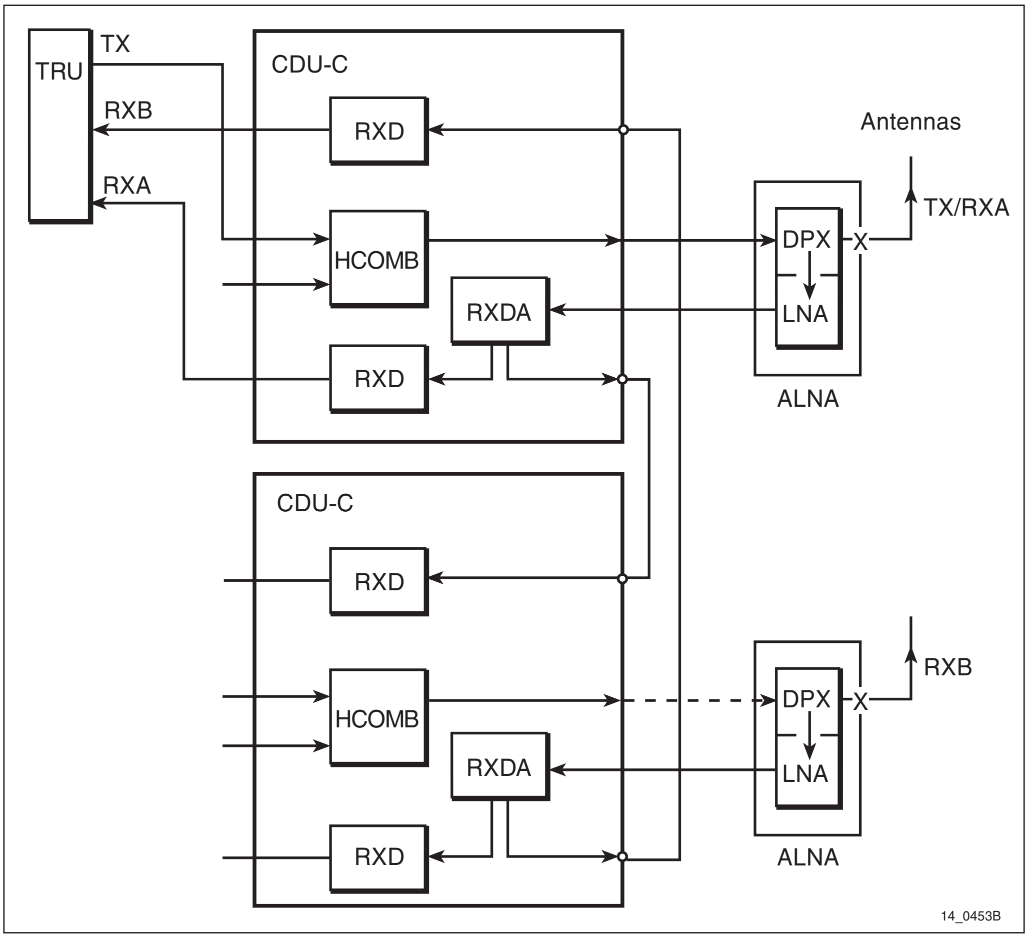


Figure 10 Basic Configurations C18_2.1 and C19_2.1

Characteristics C18_2.1 and C19_2.1

Number of CDUs	2
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	1
Number of feeders	3 (4 if prepared for upgrading)
Number of antennas	2
Antenna configuration	TX/RX + RX
Number of ALNAs/TMAs	2

5.2.6 Basic Configurations C18_2.1\a and C19_2.1\a

The basic configurations C18_2.1\a and C19_2.1\a are shown in the figure below.

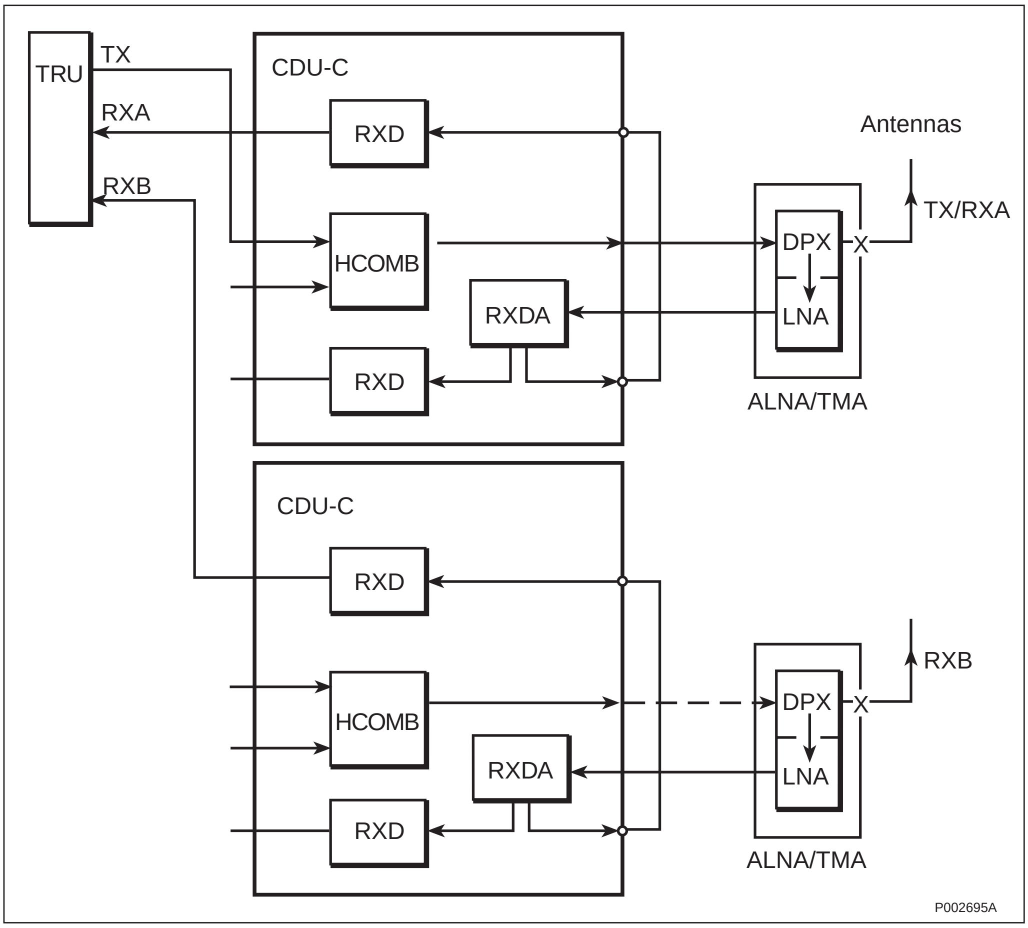


Figure 11 Basic Configurations C18_2.1\a and C19_2.1\a

Characteristics C18_2.1\a and C19_2.1\a

Number of CDUs	2	
Frequency band	GSM 1800 or GSM 1900	
Max. number of TRUs	1	
Number of feeders	3 (4 if prepared for upgrading)	
Number of antennas	2	
Antenna configuration	TX/RX + RX	
Number of ALNAs/TMAs	2	2

5.2.7 Basic Configurations C18_2.4 and C19_2.4

The basic configurations C18_2.4 and C19_2.4 are shown in the figure below.

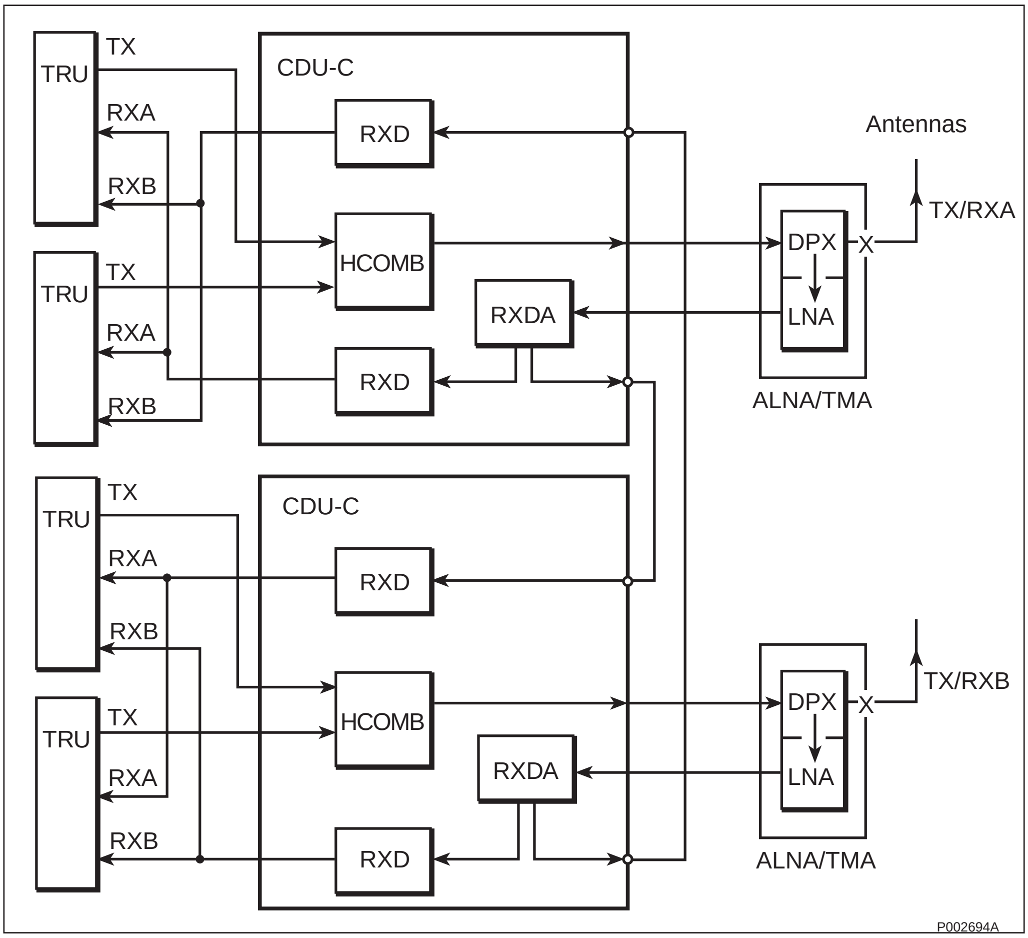


Figure 12 Basic Configurations C18_2.4 and C19_2.4

Characteristics C18_2.4 and C19_2.4

Number of CDUs	2
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	4
Number of feeders	4
Number of antennas	2
Antenna configuration	TX/RX + TX/RX
Number of ALNAs/TMAs	2

5.2.8 Basic Configurations C18_3.1 and C19_3.1

The basic configurations C18_3.1 and C19_3.1 are shown in the figure below.

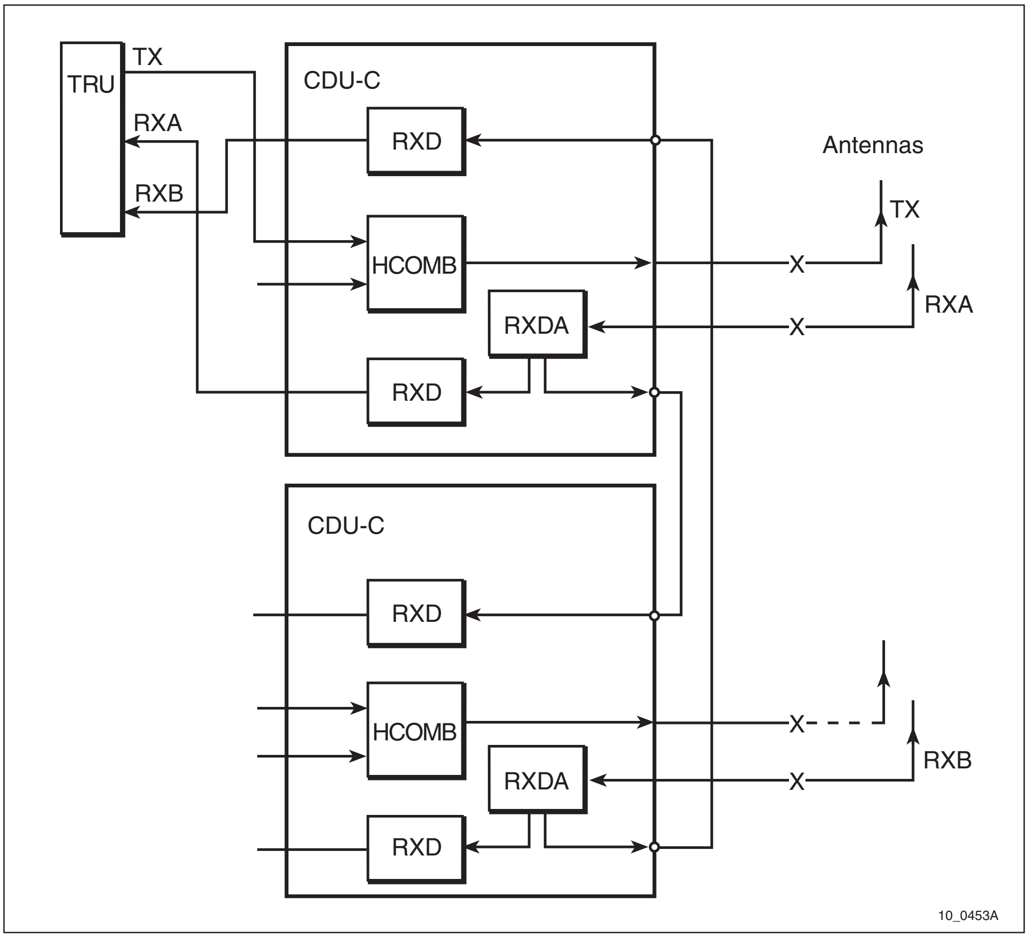


Figure 13 Basic Configurations C18_3.1 and C19_3.1

Characteristics C18_3.1 and C19_3.1

Number of CDUs	2
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	1
Number of feeders	3 (4 if prepared for upgrading)
Number of antennas	3 (4 if prepared for upgrading)
Antenna configuration	TX + RX + RX

5.2.9 Basic Configurations C18_3.1\a and C19_3.1\a

The basic configurations C18_3.1\a and C19_3.1\a are shown in the figure below.

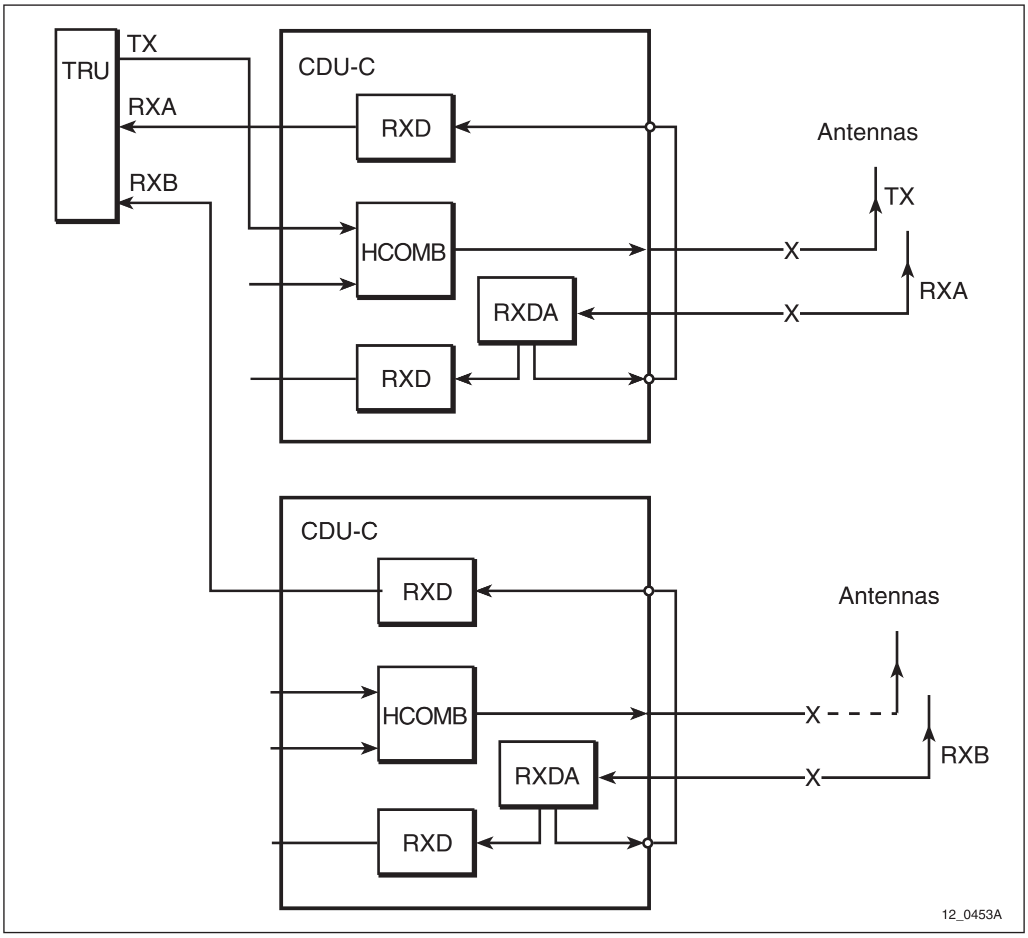


Figure 14 Basic Configurations C18_3.1\a and C19_3.1\a

Characteristics C18_3.1\a and C19_3.1\a

Number of CDUs	2
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	1
Number of feeders	3 (4 if prepared for upgrading)
Number of antennas	3 (4 if prepared for upgrading)
Antenna configuration	TX + RX + RX

5.2.10 Basic Configurations C18_3.6 and C19_3.6

The basic configurations C18_3.6 and C19_3.6 are shown in the figure below.

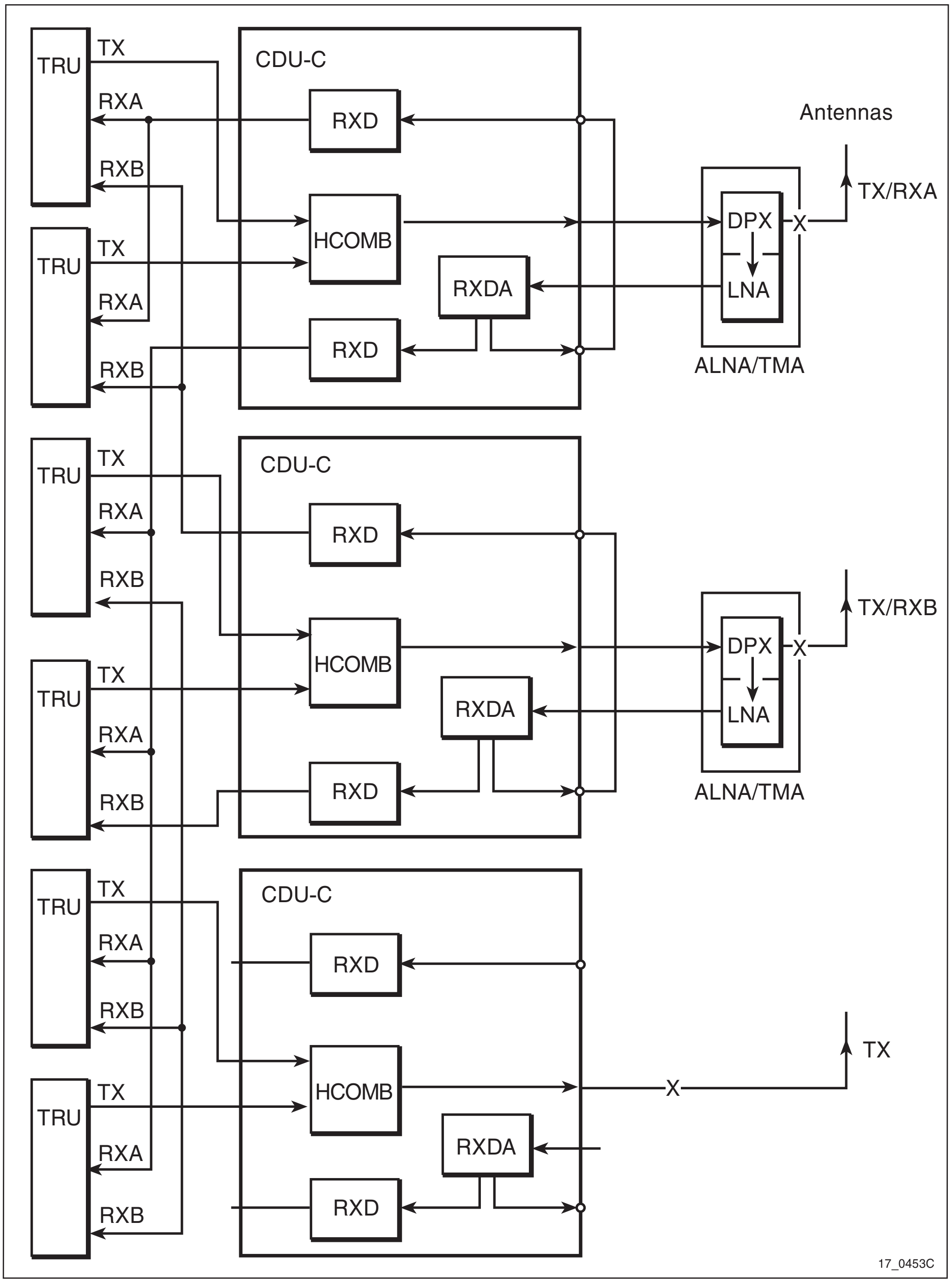


Figure 15 Basic Configurations C18_3.6 and C19_3.6

Characteristics C18_3.6 and C19_3.6

Number of CDUs	3
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	6
Number of feeders	5
Number of antennas	3
Antenna configuration	TX/RX + TX/RX + TX
Number of ALNAs/TMAs	2

5.2.11 Basic Configurations C18_4.4 and C19_4.4

The basic configurations C18_4.4 and C19_4.4 are shown in the figure below.

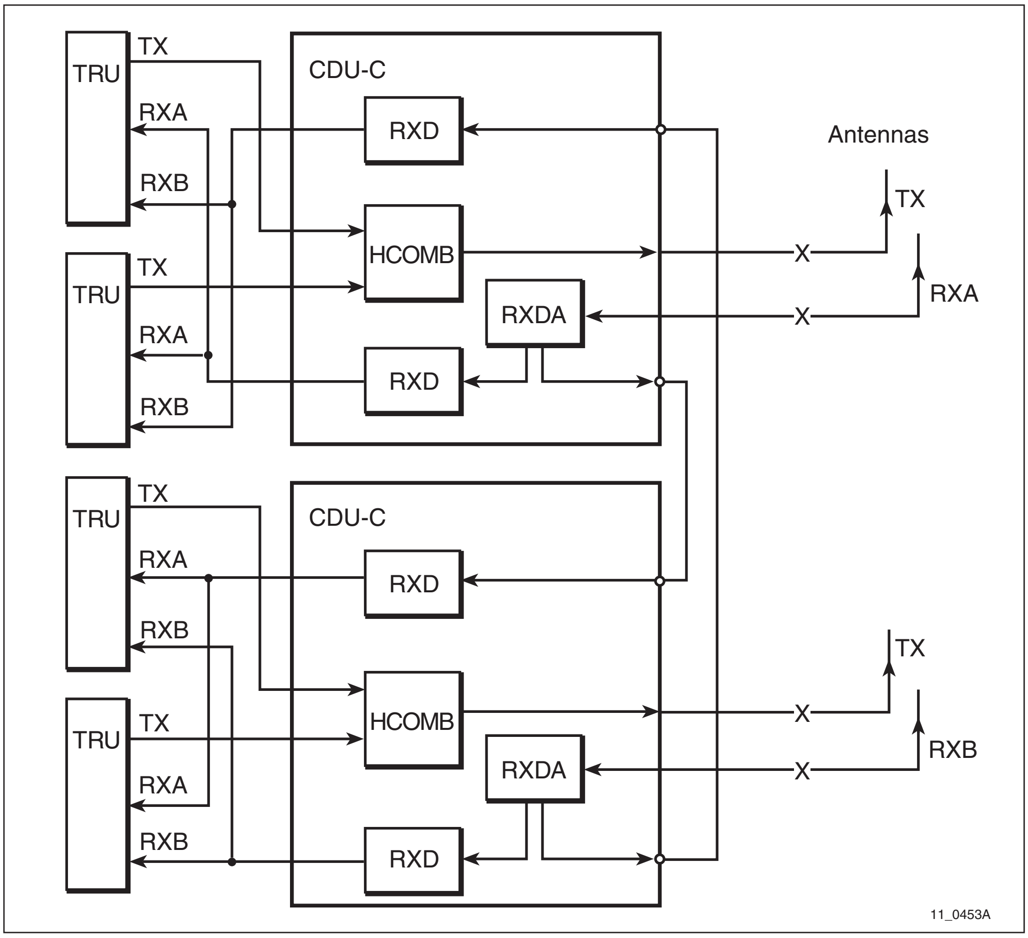


Figure 16 Basic Configurations C18_4.4 and C19_4.4

Characteristics C18_4.4 and C19_4.4

Number of CDUs	2
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	4
Number of feeders	4
Number of antennas	4
Antenna configuration	TX + RX + TX + RX

5.2.12 Basic Configurations C18_5.6 and C19_5.6

The basic configurations C18_5.6 and C19_5.6 are shown in the figure below.

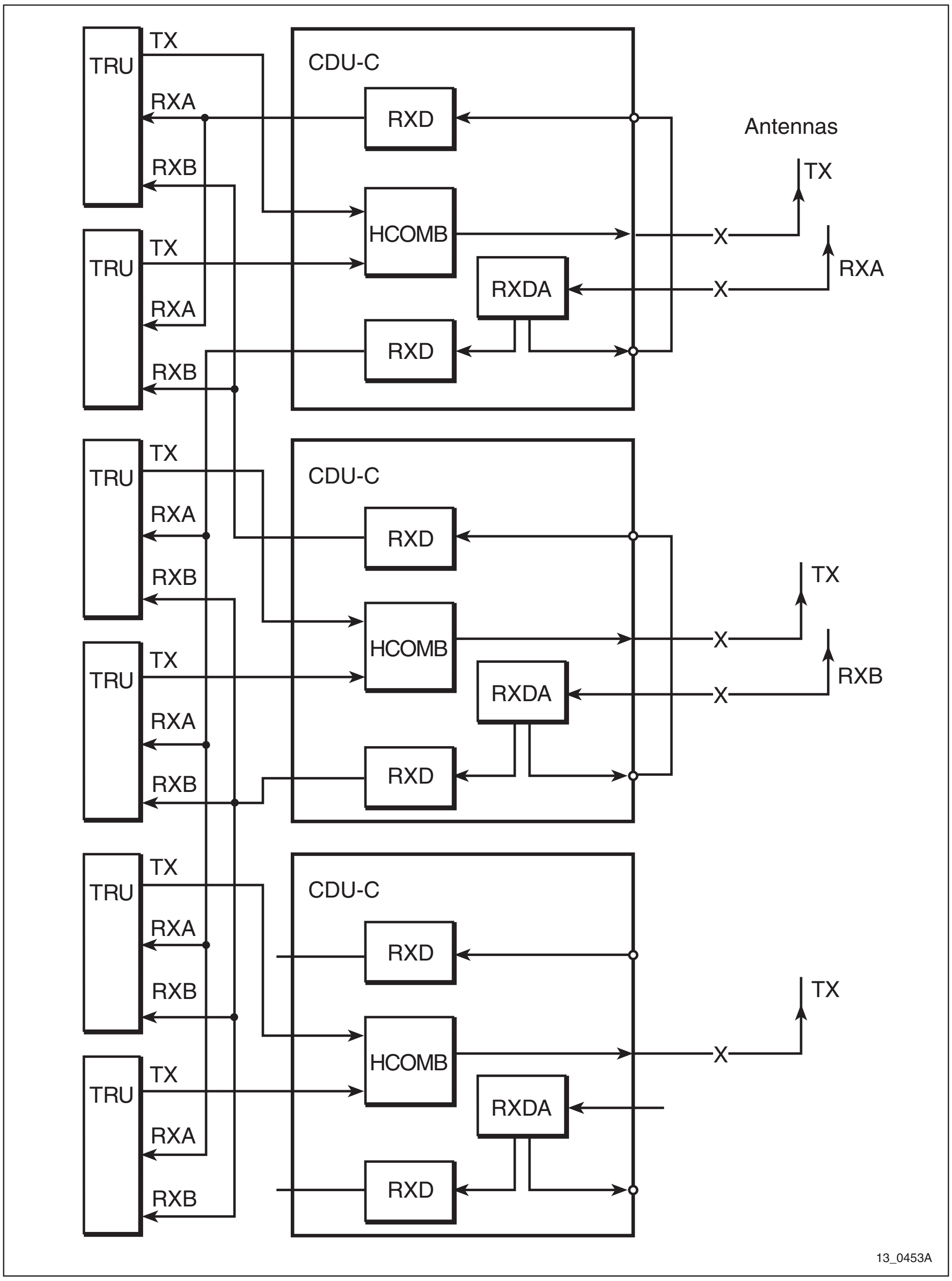


Figure 17 Basic Configurations C18_5.6 and C19_5.6

Characteristics C18_5.6 and C19_5.6

Number of CDUs	3
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	6
Number of feeders	5
Number of antennas	5
Antenna configuration	TX + RX + TX + RX + TX

5.3 CDU-C+ Configurations

This section describes the basic configurations for CDU-C+, which are the following:

- C+9d_2.2, C+18d_2.2 and C+19d_2.2, *see Section 5.3.1 on page 28*
- C+9d_2.4, C+18d_2.4 and C+19d_2.4, *see Section 5.3.2 on page 29*
- C+9d_3.6, C+18d_3.6 and C+19d_3.6, *see Section 5.3.3 on page 30*
- C+18d_2.2 and C+19d_2.2 with ALNA/TMA, *see Section 5.3.4 on page 33*
- C+18d_2.4 and C+19d_2.4 with ALNA/TMA, *see Section 5.3.5 on page 34*
- C+18d_3.6 and C+19d_3.6 with ALNA/TMA, *see Section 5.3.6 on page 35*

5.3.1 Basic Configurations C+9d_2.2, C+18d_2.2 and C+19d_2.2

The basic configurations C+9d_2.2, C+18d_2.2 and C+19d_2.2 are shown in the figure below.

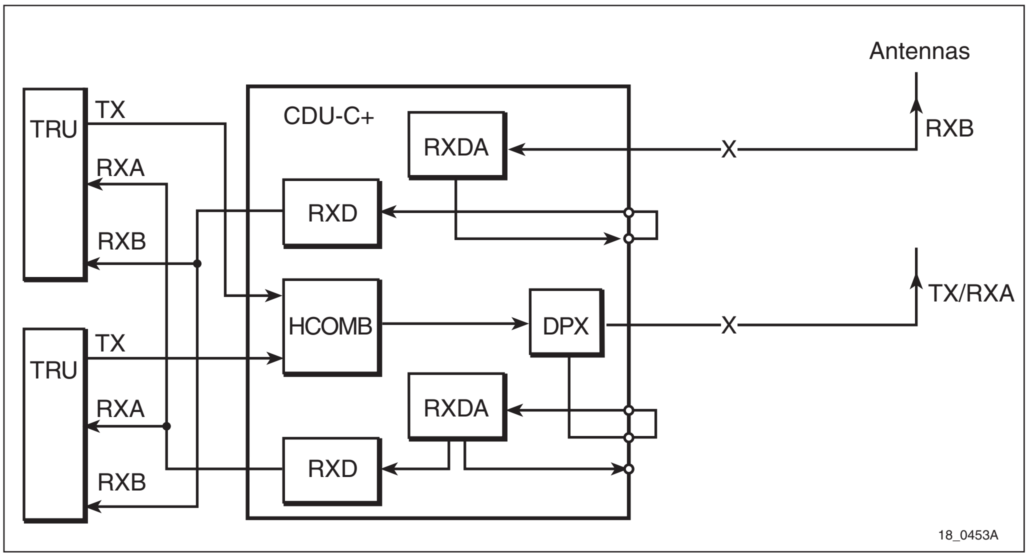


Figure 18 Basic Configurations C+9d_2.2, C+18d_2.2 and C+19d_2.2

Characteristics C+9d_2.2, C+18d_2.2 and C+19d_2.2

Number of CDUs	1
Frequency band	P-GSM 900, GSM 1800 or GSM 1900
Max. number of TRUs	2
Number of feeders	2
Number of antennas	2
Antenna configuration	TX/RX + RX

5.3.2 Basic Configurations C+9d_2.4, C+18d_2.4 and C+19d_2.4

The basic configurations C+9d_2.4, C+18d_2.4 and C+19d_2.4 are shown in the figure below.

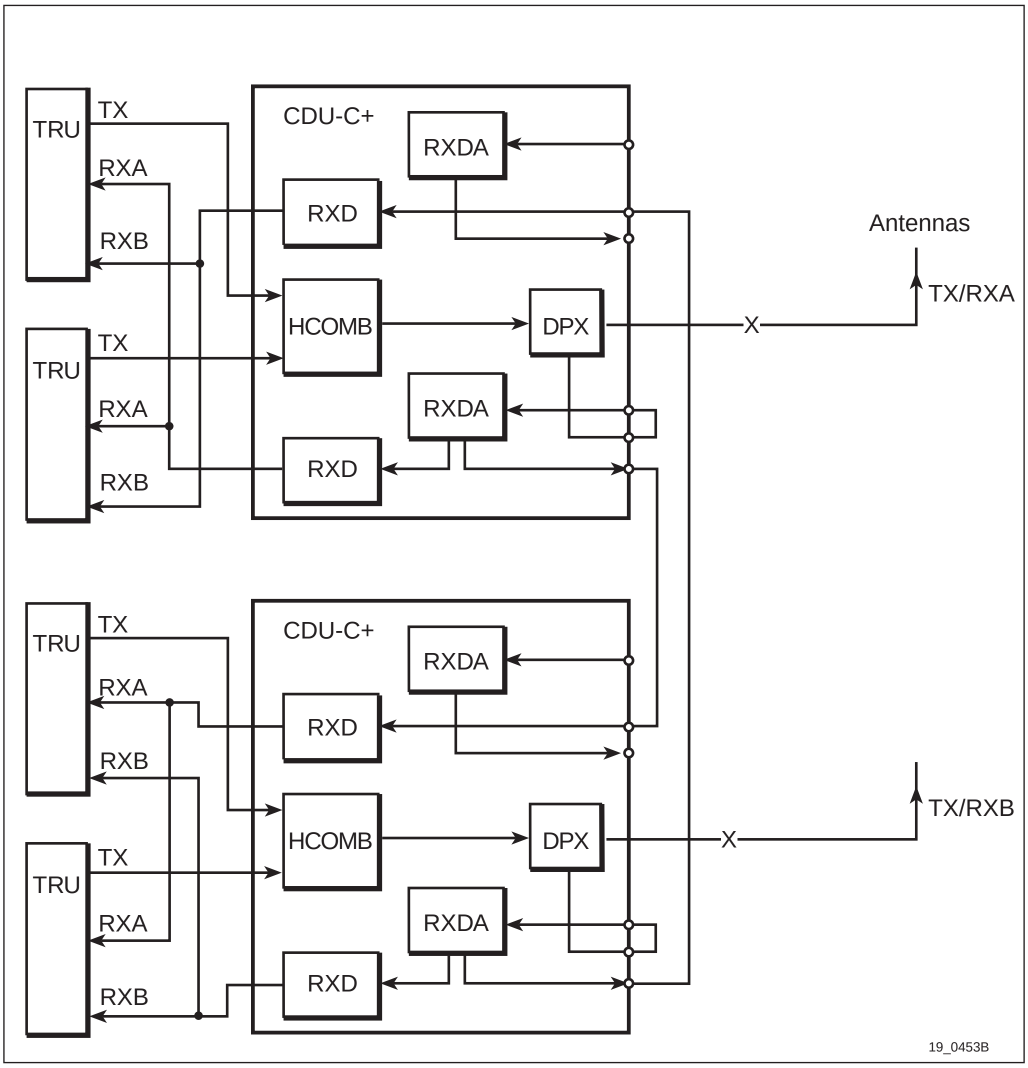


Figure 19 Basic Configurations C+9d_2.4, C+18d_2.4 and C+19d_2.4

Characteristics C+9d_2.4, C+18d_2.4 and C+19d_2.4

Number of CDUs	2
Frequency band	P-GSM 900, GSM 1800 or GSM 1900
Max. number of TRUs	4
Number of feeders	2
Number of antennas	2
Antenna configuration	TX/RX + TX/RX

5.3.3 Basic Configurations C+9d_3.6, C+18d_3.6 and C+19d_3.6

The basic configurations C+9d_3.6, C+18d_3.6 and C+19d_3.6 are shown in the figure below.

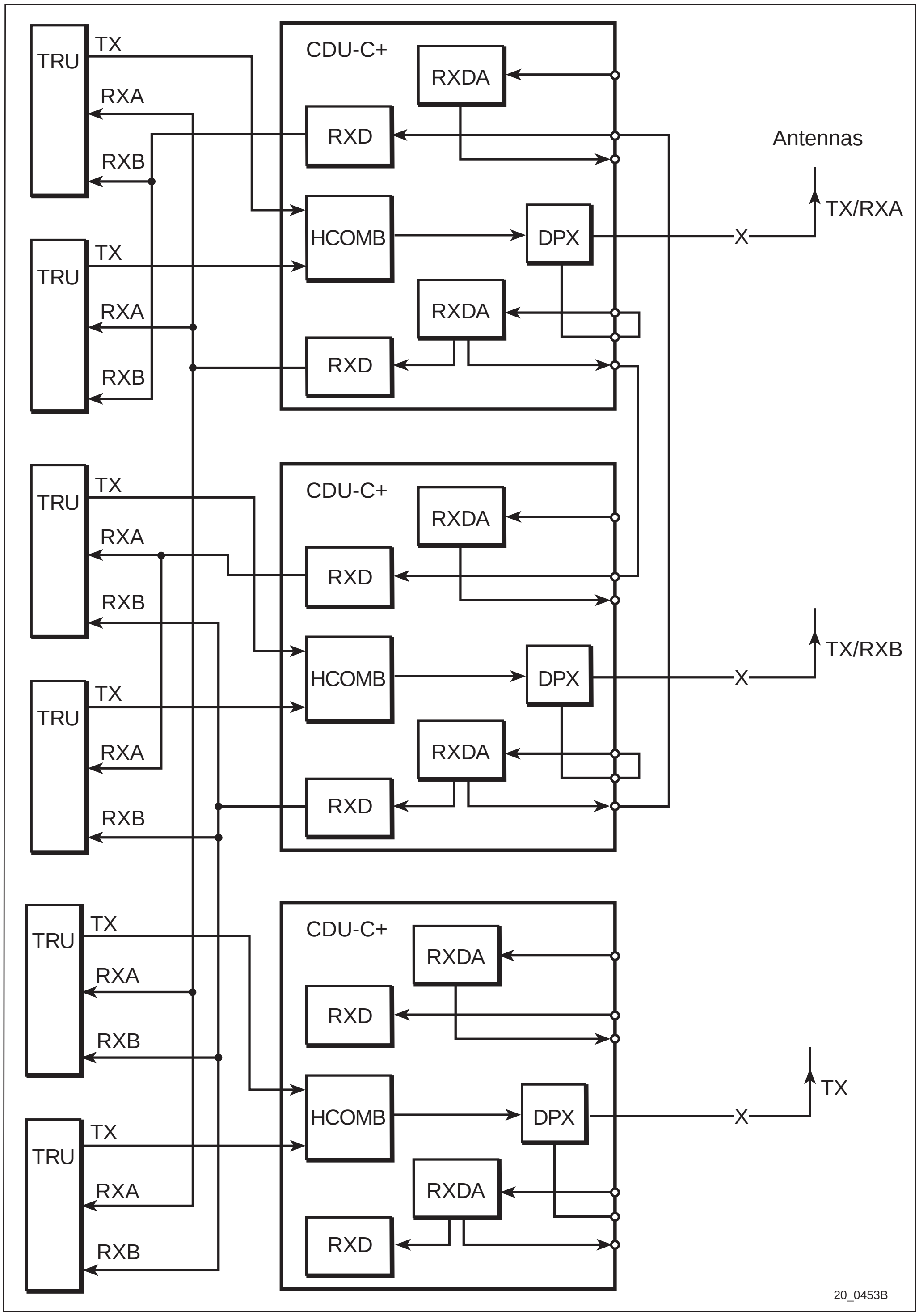


Figure 20 Basic Configurations C+9d_3.6, C+18d_3.6 and C+19d_3.6

Characteristics C+9d_3.6, C+18d_3.6 and C+19d_3.6

Number of CDUs	3
Frequency band	P-GSM 900, GSM 1800 or GSM 1900
Max. number of TRUs	6
Number of feeders	3
Number of antennas	3
Antenna configuration	TX/RX + TX/RX + TX

5.3.4 Basic Configurations C+18d_2.2 and C+19d_2.2 with ALNA/TMA

The basic configurations C+18d_2.2 and C+19d_2.2 with ALNA/TMA are shown in the figure below.

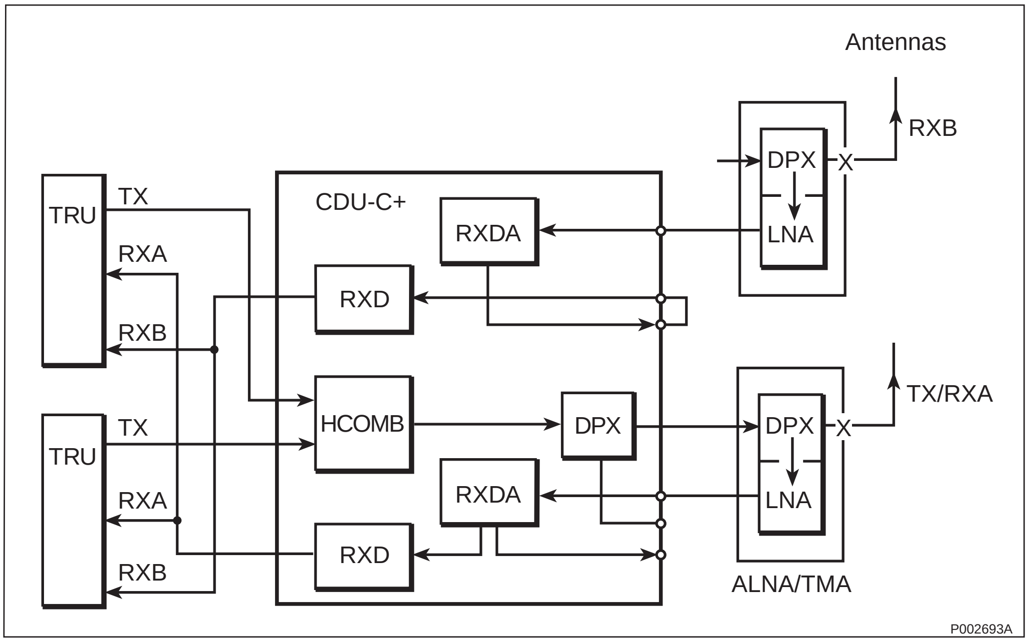


Figure 21 Basic Configurations C+18_2.2 and C+19_2.2 with ALNA/TMA

Characteristics C+18_2.2 and C+19_2.2 with ALNA/TMA

Number of CDUs	1
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	2
Number of feeders	3
Number of antennas	2
Antenna configuration	TX/RX + RX
Number of ALNAs/TMAs	2

5.3.5 Basic Configurations C+18d_2.4 and C+19d_2.4 with ALNA/TMA

The basic configurations C+18d_2.4 and C+19d_2.4 with ALNA/TMA are shown in the figure below.

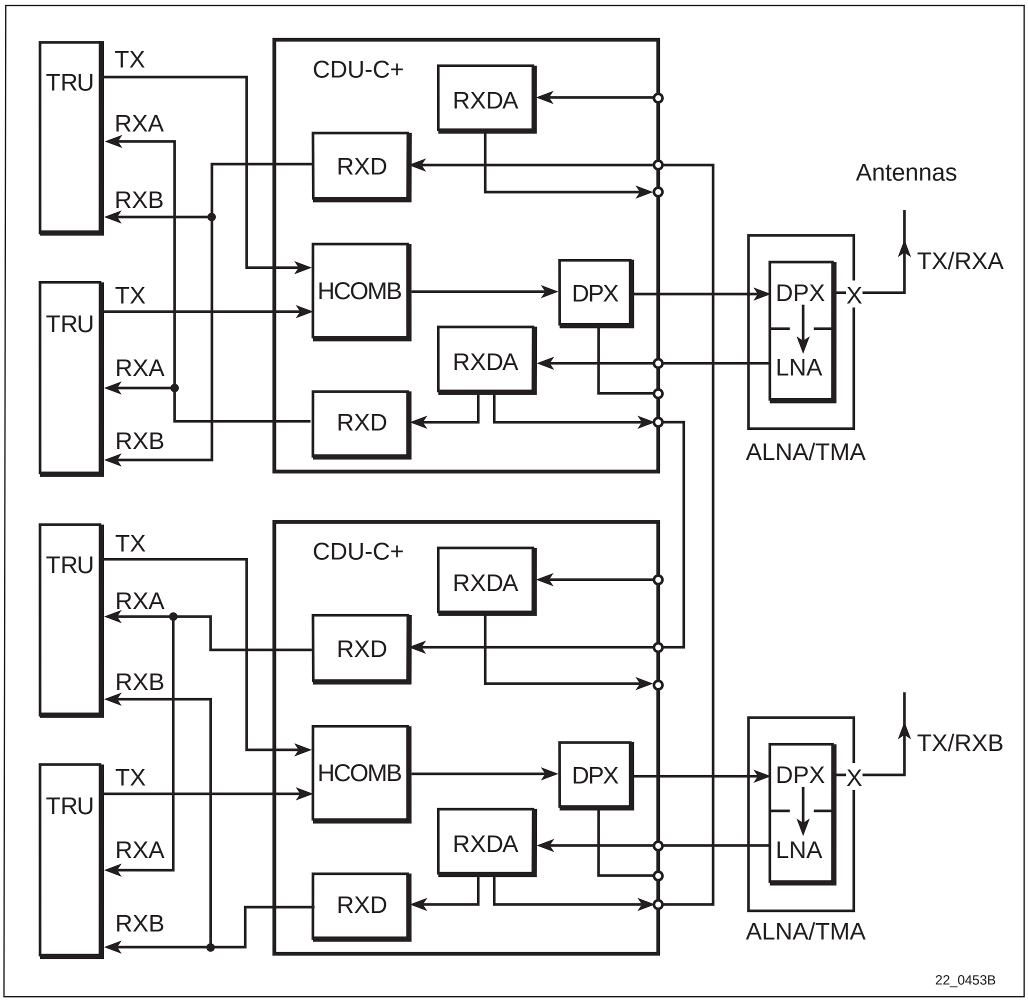


Figure 22 Basic Configurations C+18_2.4 and C+19_2.4 with ALNA/TMA

Characteristics C+18_2.4 and C+19_2.4 with ALNA/TMA

Number of CDUs	2
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	4
Number of feeders	4
Number of antennas	2
Antenna configuration	TX/RX + TX/RX
Number of ALNAs/TMAs	2

5.3.6 Basic Configurations C+18d_3.6 and C+19d_3.6 with ALNA/TMA

The basic configurations C+18d_3.6 and C+19d_3.6 with ALNA/TMA are shown in the figure below.

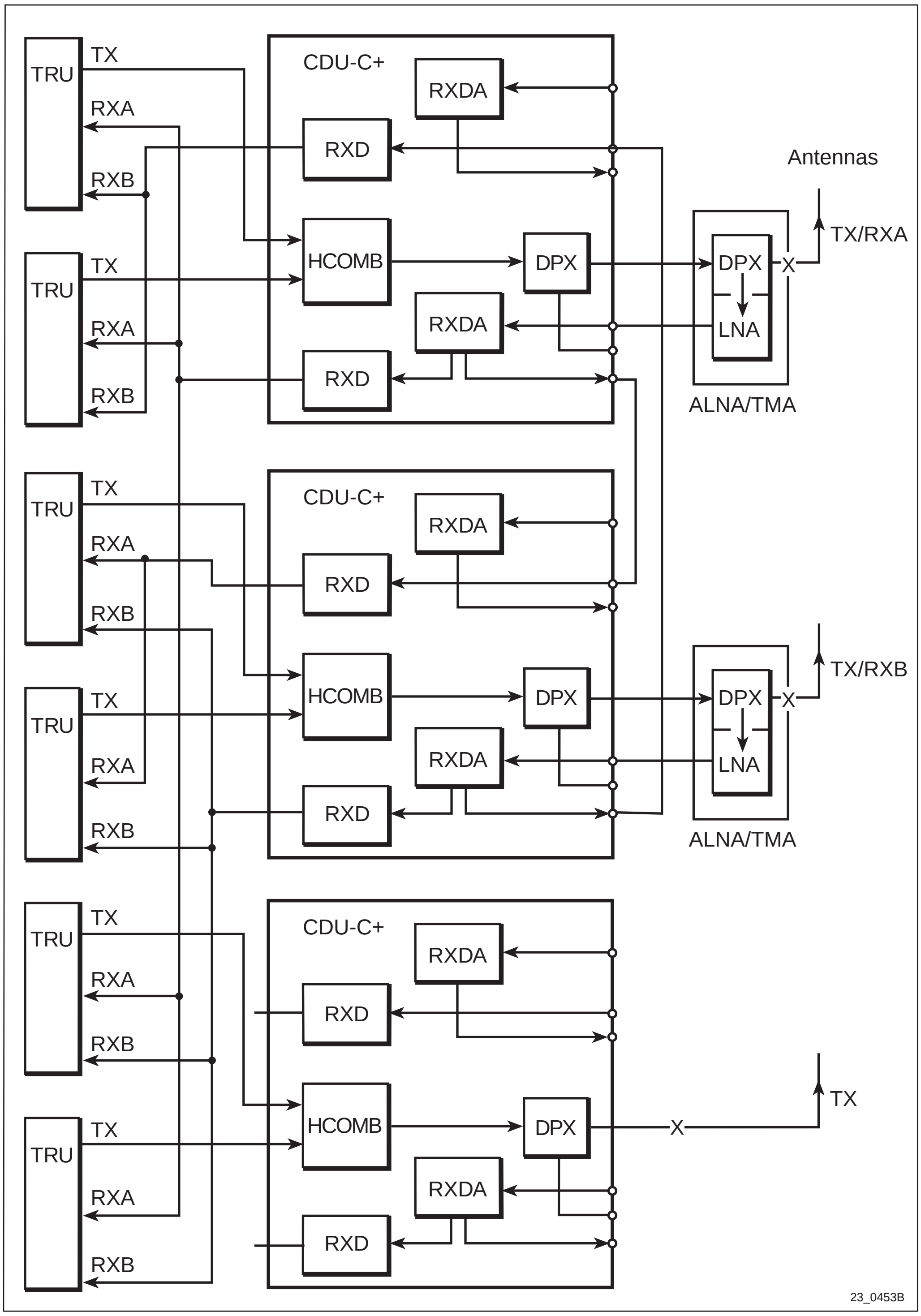


Figure 23 Basic Configurations C+18_3.6 and C+19_3.6 with ALNA/TMA

Characteristics C+18_3.6 and C+19_3.6 with ALNA/TMA

Number of CDUs	3
Frequency band	GSM 1800 or GSM 1900
Max. number of TRUs	6
Number of feeders	5
Number of antennas	3
Antenna configuration	TX/RX + TX/RX + TX
Number of ALNAs/TMAs	2

5.4 CDU-D Configurations

This section describes the basic configurations for CDU-D, which are the following:

- D18_2.6, *see Section 5.4.1 on page 39*
- D9de_2.6 and D18d_2.6, *see Section 5.4.2 on page 41*
- D18_2.12, *see Section 5.4.3 on page 42*
- D9de_2.12 and D18d_2.12, *see Section 5.4.4 on page 44*
- D9e_3.6, *see Section 5.4.5 on page 47*

5.4.1 Basic Configuration D18_2.6

The basic configuration D18_2.6 is shown in the figure below.

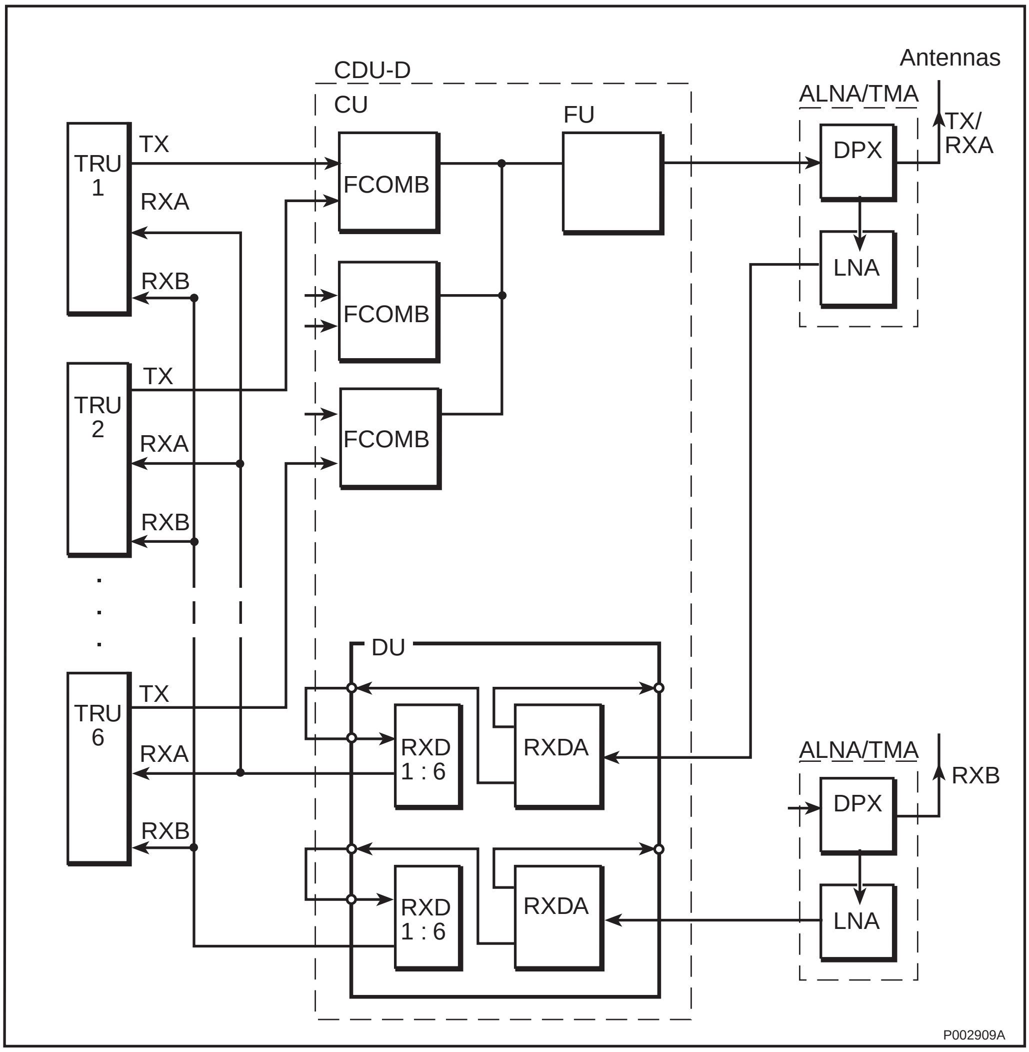


Figure 24 Basic Configurations D18_2.6

Characteristics D18_2.6

Number of units	3 CU18
	1 DU18
	1 FU18
Frequency band	GSM 1800
Max. number of TRUs	6
Number of feeders	3
Number of antennas	2
Antenna configuration	TX/RX + RX
Number of ALNAs/TMAs	2

5.4.2 Basic Configurations D9de_2.6 and D18d_2.6

The basic configurations D9de_2.6 and D18d_2.6 are shown in the figure below.

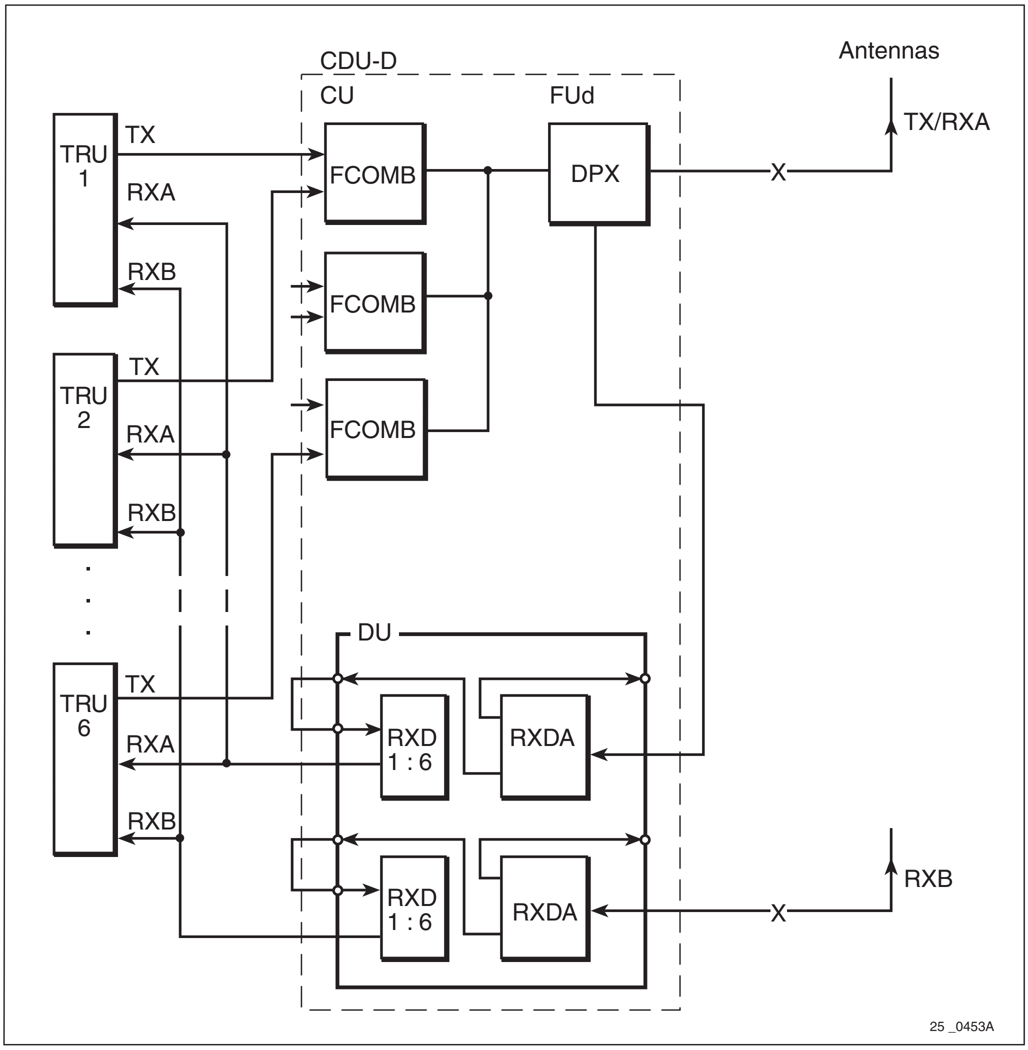


Figure 25 Basic Configurations D9de_2.6 and D18d_2.6

Characteristics	D9de_2.6	D18d_2.6
Number of units	3 CU9e	3 CU18
	1 DU9e	1 DU18
	1 FUd9e	1 FUd18
Frequency band	P-GSM 900	GSM 1800
Max. number of TRUs	6	6
Number of feeders	2	2
Number of antennas	2	2
Antenna configuration	TX/RX + TX/RX + TX	
Co-siting is optional at E-GSM		

5.4.3 Basic Configuration D18_2.12

The basic configuration D18_2.12 is shown in the figure below.

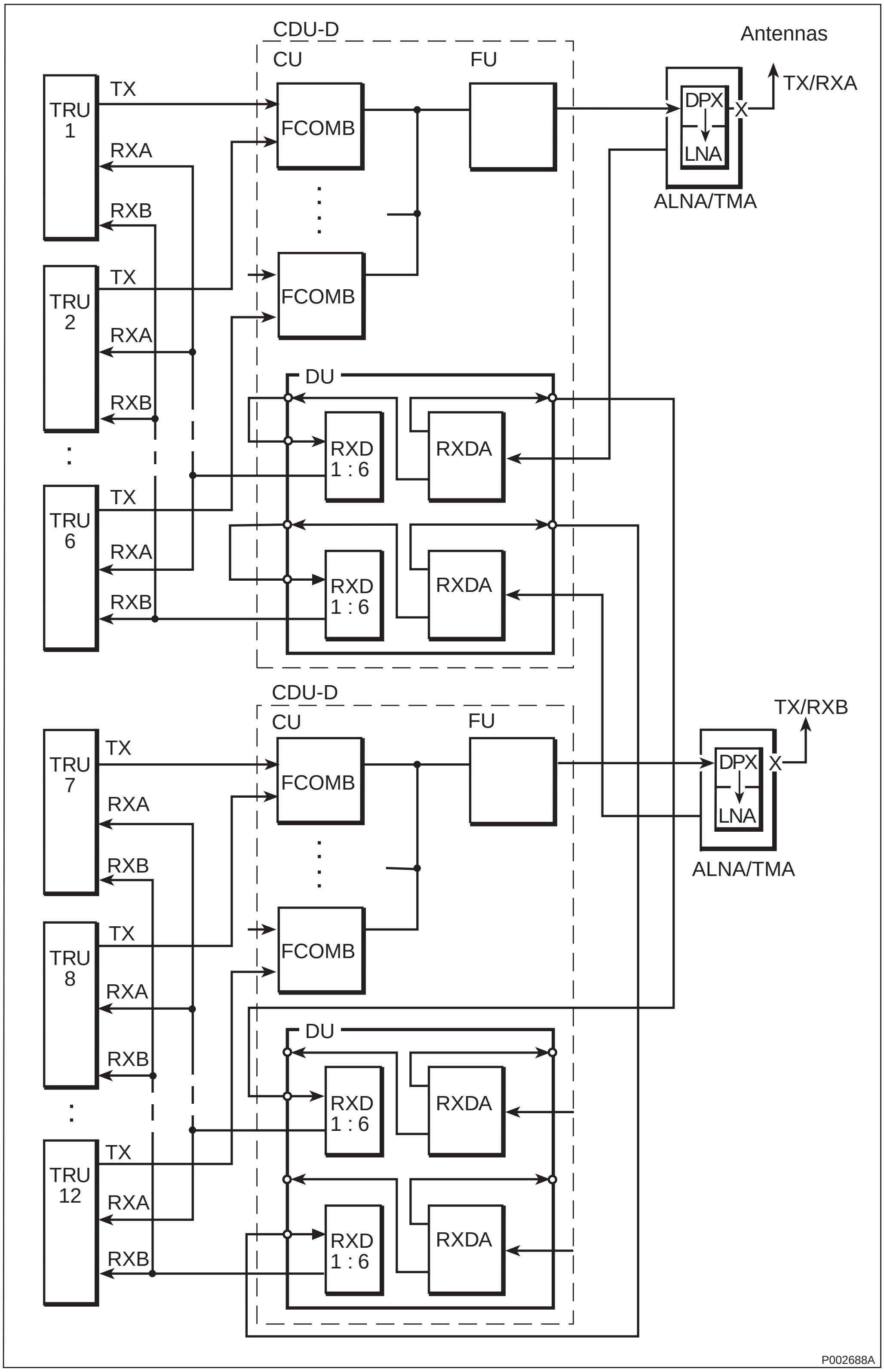


Figure 26 Basic Configurations D18_2.12

Characteristics D18_2.12

Number of units	6 CU18
	2 DU18
	2 FU18
Frequency band	GSM 1800
Max. number of TRUs	12
Number of feeders	4
Number of antennas	2
Antenna configuration	TX/RX + TX/RX
Number of ALNAs/TMAs	2

5.4.4 Basic Configurations D9de_2.12 and D18d_2.12

The basic configurations D9de_2.12 and D18d_2.12 are shown in the figure below.

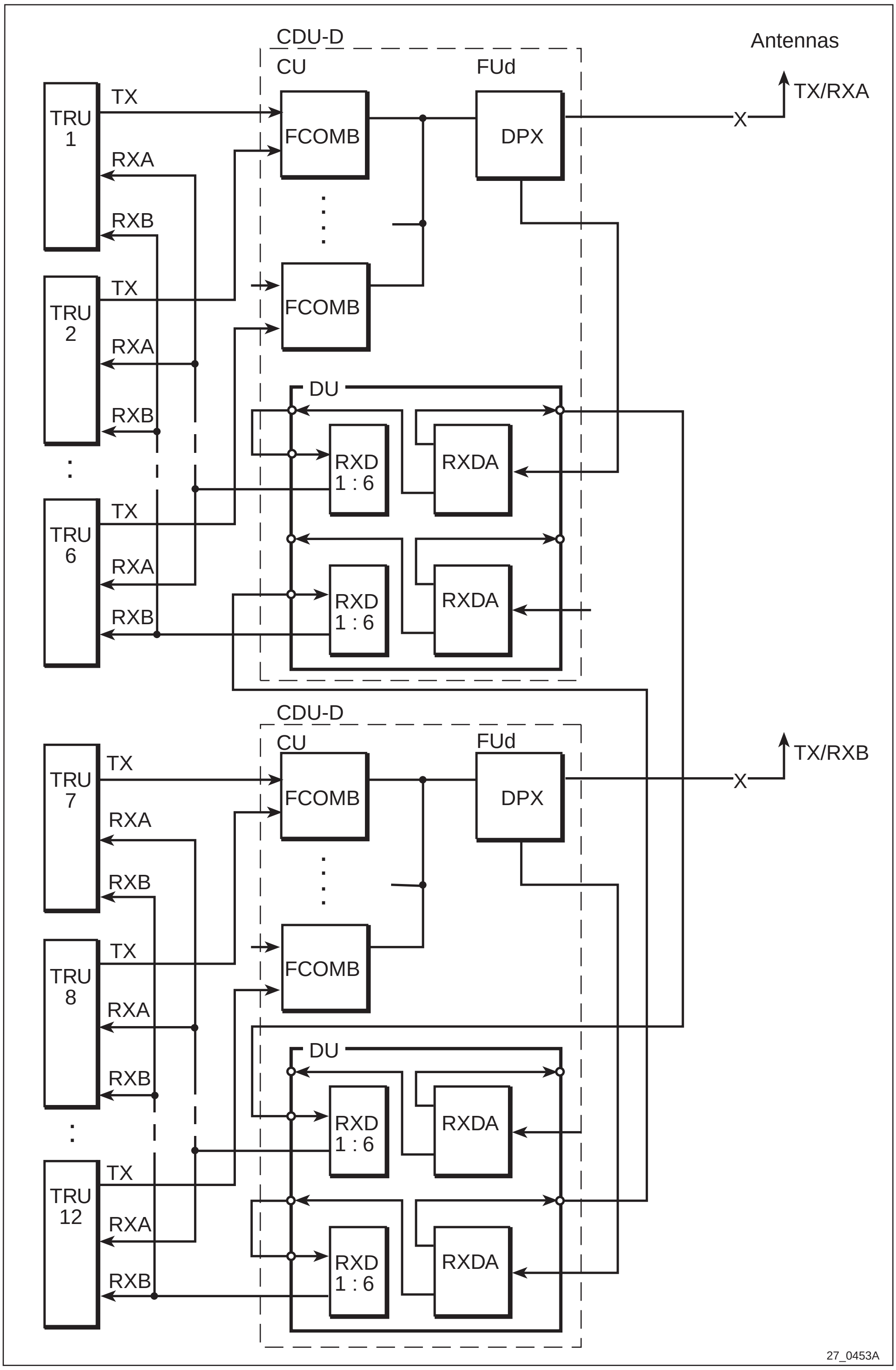


Figure 27 Basic Configurations D9de_2.12 and D18d_2.12

Characteristics	**D9de_2.12**	**D18d_2.12**
Number of units	6 CU9e	6 CU18
	2 DU9e	2 DU18
	2 FUd9e	2 FUd18
Frequency band	P-GSM 900	GSM 1800
Max. number of TRUs	12	
Number of feeders	2	2
Number of antennas	2	2
Antenna configuration	TX/RX + TX/RX	TX/RX + TX/RX
Co-siting is optional at E-GSM		

5.4.5 Basic Configuration D9e_3.6

The basic configuration D9e_3.6 is shown in the figure below.

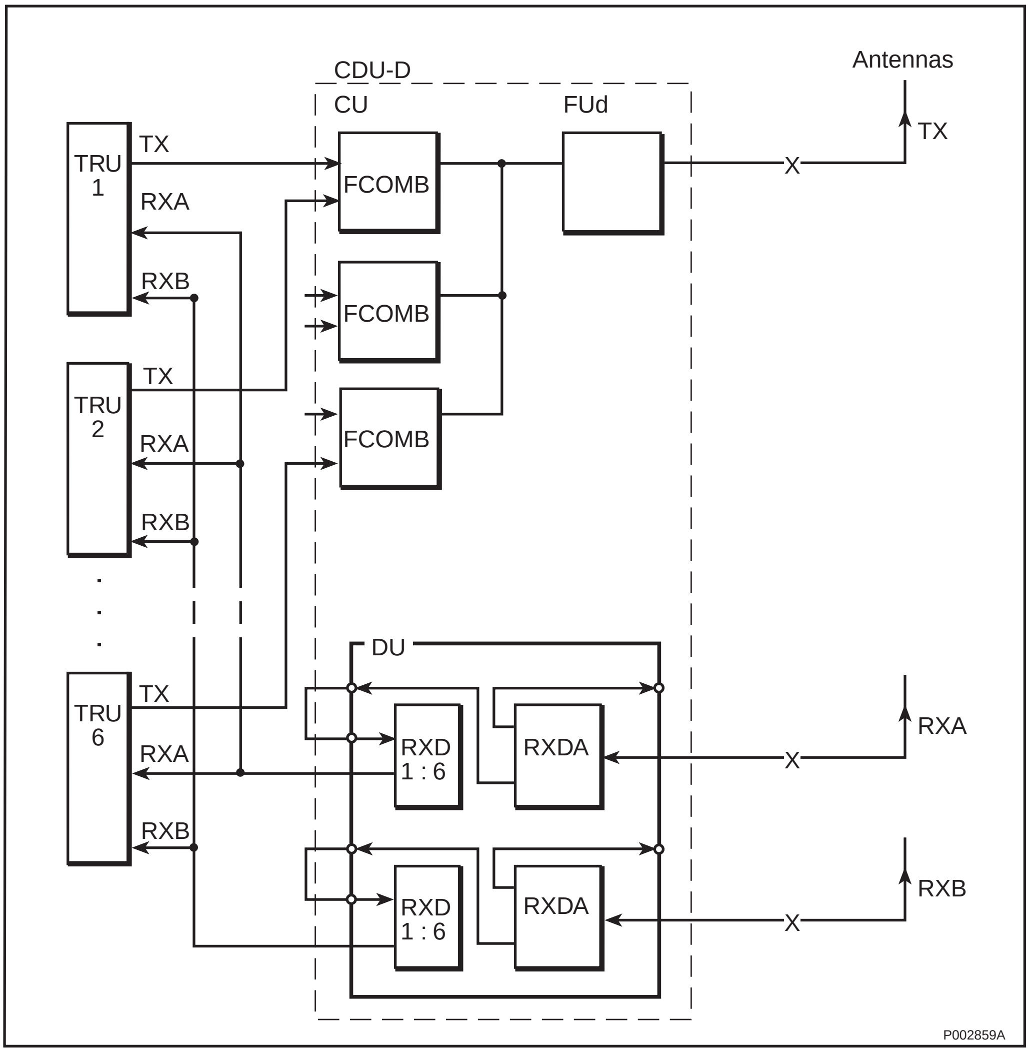


Figure 28 Basic Configuration D9e_3.6

Characteristics D9e_3.6

Number of units	3 CU9e
	1 DU9e
	1 FUd9e
Frequency band	E-GSM 900
Max. number of TRUs	6
Number of feeders	3
Number of antennas	3
Antenna configuration	TX + RX + RX

Co-siting is optional

6 Site Equipment Configurations

This section describes the site equipment configurations for RBS 2101, RBS 2102, RBS 2202, and RBS 2103. In addition, SW Power Boost configurations are described in Section 6.4 on page 68.

6.1 RBS 2101 Configurations

This section describes the site equipment configurations for RBS 2101, which consist of the following:

- CDU-A configurations, *see Section 6.1.1 on page 49*
- CDU-C, Omni configurations, *see Section 6.1.2 on page 49*
- CDU-C+ configurations, *see Section 6.1.3 on page 50*

6.1.1 CDU-A Configurations

The CDU-A configurations using one RBS 2101 cabinet are shown in the table below.

Table 1 CDU-A Configurations (One Cabinet)

SCC	Configuration	TMA	Number of Antennas	Allowed number of TRUs
1x2	A9d_2.2	no	2	0–2
	A18_2.2	M	2	0–2
	A18_4.2	no	4	0–2
	A19_2.2	M	2	0–2

M = Mandatory

6.1.2 CDU-C, Omni Configurations

The CDU-C Omni configurations for RBS 2101 are shown in the table below.

Table 2 CDU-C, Omni Configurations

SCC	**Configuration**	**No. of cabinets**	**TMA**	**Number of Antennas**	**Allowed number of TRUs Cabinet:**	
					1	**2**
1x4	C9d_2.4	2	no	2	2–4	0
	C18_2.4	2	M	2	2–4	0
	C18_4.4	2	no	4	2–4	0
	C18_2.4	2	M	2	2–4	0
	C19_4.4	2	no	4	2–4	0

M = Mandatory

6.1.3 CDU-C+ Configurations

The CDU-C+ configurations for RBS 2101 are shown in the table below.

Table 3 CDU-C+ Configurations

SCC	**Configuration**	**No of cabinets**	**TMA**	**Number of Antennas**	**Allowed number of TRUs Cabinet:**	
					1	**2**
1x2	C+9d_2.2	1	no	2	0–2	
	C+9de_2.2	1	no	2	0–2	
	C+18d_2.2	1	no	2	0–2	
	C+18_2.2	1	M	2	0–2	
	C+19d_2.2	1	no	2	0–2	
	C+19_2.2	1	M	2	0–2	
1x4	C+9d_2.4	2	no	2	1–2	1–2
	C+9de_2.4	2	no	2	1–2	1–2
	C+18d_2.4	2	no	2	1–2	1–2
	C+18_2.4	2	M	2	1–2	1–2
	C+19d_2.4	2	no	2	1–2	1–2
	C+19_2.4	2	M	2	1–2	1–2

M = Mandatory

6.2 RBS 2102, RBS 2202 Configurations

This section describes configurations for RBS 2102 and RBS 2202. All of the configurations in this section are applicable to both RBSs, except for the GSM 900/GSM 1900 dual band configurations described in Section 6.2.8 on page 62.

The site equipment configurations for RBS 2102 and RBS 2202 consist of the following:

- CDU-D configurations, *see Section 6.2.1 on page 52*
- CDU-A configurations, *see Section 6.2.2 on page 53*
- CDU-C Omni configurations, *see Section 6.2.3 on page 54*
- CDU-C 3–sector configurations, *see Section 6.2.4 on page 55*
- CDU-C+ configurations, *see Section 6.2.5 on page 56*
- Mixed CDU/basic configurations, *see Section 6.2.6 on page 58*
- GSM 900/GSM 1800 dual band configurations, *see Section 6.2.7 on page 59*
- GSM 900/GSM 1900 dual band configurations for RBS 2202 only, *see Section 6.2.8 on page 62*

6.2.1 CDU-D Configurations

The CDU-D configurations for RBS 2102 and RBS 2202 are shown in the table below.

Table 4 CDU-D Configurations

SCC	Configuration	Number of cabinets	TMA	Number of Antennas	Allowed number of TRUs Cabinet:	
					1	2
1x6	D9e_3.6	1	no	3	0–6	
	D9de_2.6	1	no	2	0–6	
	D18_2.6	1	M	2	0–6	
	D18d_2.6	1	no	2	0–6	
1x12	D9de_2.12	2	no	2	1–6	1–6
	D18_2.12	2	M	2	1–6*	0–6*
	D18d_2.12	2	no	2	1–6	1–6

M = Mandatory

* Up to 6 TRUs, this configuration can be created using only one CDU-D placed in the master cabinet.

6.2.2 CDU-A Configurations

The CDU-A configurations for RBS 2102 and RBS 2202 are shown in the table below.

Table 5 CDU-A Configurations

SCC	**Configura-tion**	**No. of cabinets**	**TMA Cell or sector:**			**Number of Antennas Cell or sector:**			**Allowed number of TRUs Cell or sector:**		
			1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
3x2	3xA9d_2.2	1	no	no	no	2	2	2	0–2	0–2	0–2
	3xA18_2.2	1	M	M	M	2	2	2	0–2	0–2	0–2
	3xA18_4.2	1	no	no	no	4	4	4	0–2	0–2	0–2
	3xA19_2.2	1	M	M	M	2	2	2	0–2	0–2	0–2
3x4	3x[2xA18_2.2]	2	M	M	M	4	4	4	0–4	0–4	0–4
	3x[2xA19_2.2]	2	M	M	M	4	4	4	0–4	0–4	0–4
	3x[2xA9d_2.2]	2	no	no	no	4	4	4	0–4	0–4	0–4

M = Mandatory

Note: SCC 1x2, 1x4, 1x6 and 2x2 can be created with a subset of the 3x2 SCC. These configurations are not presented since they are not regarded as separate configurations from a system point of view.

6.2.3 CDU-C Omni Configurations

The CDU-C Omni configurations for RBS 2102 and RBS 2202 are shown in the table below. One cabinet is used in these configurations.

Table 6 CDU-C, Omni Configurations (One Cabinet)

SCC	Configuration	TMA	Number of Antennas	Allowed number of TRUs	No. of CDUs
1x1	C9d_2.1\a	no	2	1	2
	C18_2.1\a	M	2	1	2
	C18_3.1\a	no	3	1	2
	C19_2.1\a	M	2	1	2
	C19_3.1\a	no	3	1	2
1x6	C9d_3.6	no	3	2–6	3
	C18_3.6	M	3	2–6	3
	C18_5.6	no	5	2–6	3
	C19_3.6	M	3	2–6	3
	C19_5.6	no	5	2–6	3

M = Mandatory

Note: SCC 1x4 can be created with a subset of the 1x6 SCC. These configurations are not presented since they are not regarded as separate configurations from a system point of view.

6.2.4 CDU-C 3–Sector Configurations

The CDU-C 3–sector configurations for RBS 2102 and RBS 2202 are shown in the table below. All the configurations require two cabinets.

Table 7 CDU-C 3–Sector Configurations (Two Cabinets)

SCC	Configuration	TMA Cell or sector:			Number of Antennas Cell or sector:			Allowed number of TRUs Cell or sector:		
		1	2	3	1	2	3	1	2	3
1+4+1	C9d_2.1+C9d_2.4+C9d_2.1	no	no	no	2	2	2	1	2–4	1
	C18_2.1+C18_2.4+C18_2.1	M	M	M	2	2	2	1	2–4	1
	C18_3.1+C18_4.4+C18_3.1	no	no	no	3,4	3,4	3,4	1	2–4	1
	C19_2.1+C19_2.4+C19_2.1	M	M	M	2	2	2	1	2–4	1
	C19_3.1+C19_4.4+C19_3.1	no	no	no	3,4	3,4	3,4	1	2–4	1
1+4+4	C9d_2.1+C9d_2.4+C9d_2.4	no	no	no	2	2	2	1	2–4	2–4
	C18_2.1+C18_2.4+C18_2.4	M	M	M	2	2	2	1	2–4	2–4
	C18_3.1+C18_4.4+C18_4.4	no	no	no	3,4	3,4	3,4	1	2–4	2–4
	C19_2.1+C19_2.4+C19_2.4	M	M	M	2	2	2	1	2–4	2–4
	C19_3.1+C19_4.4+C19_4.4	no	no	no	3,4	4	4	1	2–4	2–4
4+4+1	C9d_2.4+C9d_2.4+C9d_2.1	no	no	no	2	2	2	2–4	2–4	1
	C18_2.4+C18_2.4+C18_2.1	M	M	M	2	2	2	2–4	2–4	1
	C18_4.4+C18_4.4+C18_3.1	no	no	no	4	4	3,4	2–4	2–4	1
	C19_2.4+C19_2.4+C19_2.1	M	M	M	2	2	2	2–4	2–4	1
	C19_4.4+C19_4.4+C19_3.1	no	no	no	4	4	3,4	2–4	2–4	1
3x4	3xC9d_2.4	no	no	no	2	2	2	2–4	2–4	2–4
	3xC18_2.4	M	M	M	2	2	2	2–4	2–4	2–4
	3xC18_4.4	no	no	no	4	4	4	2–4	2–4	2–4
	3xC19_2.4	M	M	M	2	2	2	2–4	2–4	2–4
	3xC19_4.4	no	no	no	4	4	4	2–4	2–4	2–4

M = Mandatory

6.2.5 CDU-C+ Configurations

The CDU-C+ configurations for RBS 2102 and RBS 2202 are shown in the table below.

Note: SCC 1x2 and 2x2 can be created with a subset of the SCC 3x2, and SCC 1x4 can be created with a subset of SCC 1x6. These configurations are not presented since they are not regarded as separate configurations from a system point of view.

Table 8 CDU-C+ Configurations

SCC	Configuration	No. of cabinets	TMA (1)	Number of Antennas Cell or sector:			Allowed number of TRUs Cell or sector:		
				1	2	3	1	2	3
1x6	C+9d_3.6	1	no	2,3	N/A	N/A	0–6	N/A	N/A
	C+9de_3.6	1	no	2,3	N/A	N/A	0–6	N/A	N/A
	C+18d_3.6	1	no	2,3	N/A	N/A	0–6	N/A	N/A
	C+18_3.6	1	M	2,3	N/A	N/A	0–6	N/A	N/A
	C+19d_3.6	1	no	2,3	N/A	N/A	0–6	N/A	N/A
	C+19_3.6	1	M	2,3	N/A	N/A	0–6	N/A	N/A
3x2	3xC+9d_2.2	1	no	2	2	2	0–2	0–2	0–2
	3xC+9de_2.2	1	no	2	2	2	0–2	0–2	0–2
	3xC+18d_2.2	1	no	2	2	2	0–2	0–2	0–2
	3xC+18_2.2	1	M	2	2	2	0–2	0–2	0–2
	3xC+19d_2.2	1	no	2	2	2	0–2	0–2	0–2
	3xC+19_2.2	1	M	2	2	2	0–2	0–2	0–2
3x4	3xC+9d_2.4	2	no	2	2	2	0–4	0, 2–4	0–4
	3xC+9de_2.4	2	no	2	2	2	0–4	0, 2–4	0–4
	3xC+18d_2.4	2	no	2	2	2	0–4	0, 2–4	0–4
	3xC+18_2.4	2	M	2	2	2	0–4	0, 2–4	0–4
	3xC+19d_2.4	2	no	2	2	2	0–4	0, 2–4	0–4
	3xC+19_2.4	2	M	2	2	2	0–4	0, 2–4	0–4
2+4	C+9d_2.2+C+9d_2.4	1	no	2	2	N/A	0–2	0–4	N/A
	C+9de_2.2+C+9de_2.4	1	no	2	2	N/A	0–2	0–4	N/A
	C+18d_2.2+C+18d_2.4	1	no	2	2	N/A	0–2	0–4	N/A
	C+19d_2.2+C+19d_2.4	1	no	2	2	N/A	0–2	0–4	N/A
4+2	C+9d_2.4+C+9d_2.2	1	no	2	2	N/A	0–4	0–2	N/A
	C+9de_2.4+C+9de_2.2	1	no	2	2	N/A	0–4	0–2	N/A
	C+18d_2.4+C+18d_2.2	1	no	2	2	N/A	0–4	0–2	N/A
	C+19d_2.4+C+19d_2.2	1	no	2	2	N/A	0–4	0–2	N/A

(1) All sectors

M = Mandatory

6.2.6 Mixed CDU/Basic Configurations

The mixed CDU/basic configurations for RBS 2102 and RBS 2202 are shown in the table below.

Table 9 Mixed CDU/Basic Configurations

SCC	Configuration	TMA, all sectors	No. of Antennas	Allowed number of TRUs Cell or sector:		No. of CDU-A	No. of CDU-C
				1	2		
2+1	A9d_2.2+C9d_2.1	no	2+2	0–2	1	1	2
1+2	C9d_2.1+A9d_2.2	no	2+2	1	0–2	2	1
2+4	A9d_2.2+C9d_2.4	no	2+2	0–2	2–4	1	2
2+4	A9d_2.2+C+9d_2.4	no	2+2	0–2	0–4	1	2
2+4	A9_2.2+C+9de_2.4	no	2+2	0–2	0–4	1	2
2+4	A18_2.2+C+18_2.4	M	2+2	0–2	0–4	1	2
2+4	A19_2.2+C+19_2.4	M	2+2	0–2	0–4	1	2
4+2	C9d_2.4+A9d_2.2	no	2+2	2–4	0–2	2	1
4+2	C+9d_2.4+A9d_2.2	no	2+2	0–4	0–2	2	1
4+2	C+9de_2.4+A9d_2.2	no	2+2	0–4	0–2	2	1
4+2	C+18_2.4+A18_2.2	M	2+2	0–4	0–2	2	1
4+2	C+19_2.4+A19_2.2	M	2+2	0–4	0–2	2	1

M = Mandatory

6.2.7 GSM 900/GSM 1800 Dual Band Configurations

This section describes the GSM 900/GSM 1800 dual band configurations for RBS 2102 and RBS 2202.

Dual Band configurations with CDU-A

Dual band configurations with CDU-A using one RBS 2102 or RBS 2202 cabinet are shown in the table below.

Table 10 Dual Band Configurations with CDU-A (One Cabinet)

SCC	Configuration	TMA Cell or sector:			Number of Antennas Cell or sector:			Allowed number of TRUs Cell or sector:		
		1	2	3	1	2	3	1	2	3
1x2 | 1x2	2xA9d_2.2 + A18_2.2 (1)	no	no	M	2	2	2	0–2	0	0–2
	A9d_2.2 + A18_4.2	N/A	N/A	no	2	2	4	0–2	0	0–2

(1) Two cells are equipped in the cabinet, but three cells must be selected in the OMT.

M = Mandatory

N/A = not applicable

Note: There are always two choices to place equipment in a cabinet: GSM 900 on the left-hand side and GSM 1800 on the right-hand side, or vice versa.

Dual Band configurations with CDU-C+

Dual band configurations with CDU-C+ using one RBS 2102 or RBS 2202 cabinet are shown in the table below.

Table 11 Dual Band Configurations with CDU-C+ (One Cabinet)

SCC	Configuration	Frequency Band Cell:		TMA Cell:		No. of Antennas Cell:		Allowed no. of TRUs Cell:	
		1	2	1	2	1	2	1	2
1x2 | 1x2	2xC+9d_2.2 + C+18_2.2 (1)	900	1800	no	M	2	2	0–2	0–2
	2xC+9d_2.2 + C+18d_2.2 (1)	900	1800	no	no	2	2	0–2	0–2
	2xC+9de_2.2 + C+18_2.2 (1)	900	1800	no	M	2	2	0–2	0–2
	2xC+9de_2.2 + C+18d_2.2 (1)	900	1800	no	no	2	2	0–2	0–2
1x4 | 1x2	C+9d_2.4 + C+18_2.2	900	1800	no	M	2	2	0–4	0–2
	C+9d_2.4 + C+18d_2.2	900	1800	no	no	2	2	0–4	0–2
	C+9de_2.4 + C+18_2.2	900	1800	no	M	2	2	0–4	0–2
	C+9de_2.4 + C+18d_2.2	900	1800	no	no	2	2	0–4	0–2
	C+18_2.4 + C+9d_2.2	1800	900	M	—	2	2	0–4	0–2
	C+18d_2.4 + C+9d_2.2	1800	900	no	—	2	2	0–4	0–2
	C+18_2.4 + C+9de_2.2	1800	900	M	—	2	2	0–4	0–2
	C+18d_2.4 + C+9de_2.2	1800	900	no	—	2	2	0–4	0–2

(1) Two cells are equipped in the cabinet, but three cells must be selected in the OMT.

M = Mandatory

Note: There are always two choices to place equipment in a cabinet:
GSM 900 on the left-hand side and GSM 1800 on the right-hand side, or vice versa.

Dual Band configurations with mixed CDU types

RBS 2102 and RBS 2202 dual band configurations with mixed CDU types are shown in the table below.

Table 12 Dual Band Configurations with Mixed CDU Types

SCC	Configuration	TMA Cell or sector:			Number of Antennas Cell or sector:			Allowed number of TRUs Cell or sector:		
		1	2	3	1	2	3	1	2	3
1x2 | 1x2	2xA9d_2.2 + C+18_2.2 (1)	no	no	M	2	2	2	0–2	0	0–2
	2xA9d_2.2 + C+18d_2.2 (1)	no	no	no	2	2	2	0–2	0	0–2
	2xC+9d_2.2 + A18_2.2 (1)	no	no	M	2	2	2	0–2	0	0–2
	2xC+9de_2.2 + A18_2.2 (1)	no	no	M	2	2	2	0–2	0	0–2
	C+9d_2.2 + A18_4.2	N/A	N/A	no	2	2	4	0–2	0	0–2
	C+9de_2.2 + A18_4.2	N/A	N/A	no	2	2	4	0–2	0	0–2
1x4 | 1x2	C9d_2.4 + A18_2.2	no	M	N/A	2	2	N/A	2–4	0–2	N/A
	C9d_2.4 + A18_4.2	N/A	no	N/A	2	4	N/A	2–4	0–2	N/A
	C+9d_2.4 + A18_2.2	no	M	N/A	2	2	N/A	0–4	0–2	N/A
	C+9de_2.4 + A18_2.2	no	M	N/A	2	2	N/A	0–4	0–2	N/A
	C+9d_2.4 + A18_4.2	N/A	no	N/A	2	4	N/A	0–4	0–2	N/A
	C+9de_2.4 + A18_4.2	N/A	no	N/A	2	4	N/A	0–4	0–2	N/A
	C9d_2.4 + C+18_2.2	no	M	N/A	2	2	N/A	2–4	0–2	N/A
	C9d_2.4 + C+18d_2.2	no	no	N/A	2	2	N/A	2–4	0–2	N/A

(1) Two cells are equipped in the cabinet, but three cells must be selected in the OMT.

M = Mandatory

N/A = not applicable

Note: There are always two choices to place equipment in a cabinet: GSM 900 on the left-hand side and GSM 1800 on the right-hand side, or vice versa.

6.2.8 GSM 900/GSM 1900 Dual Band Configurations, RBS 2202 only

The configurations described in this section are applicable only for RBS 2202.

Dual Band Configurations with CDU-A

RBS 2202 dual band configurations with CDU-A are shown in the table below.

Table 13 Dual Band Configurations with CDU-A

SCC	Configuration	Frequency Band Cell or sector:			TMA Cell or sector:			No. of Antennas Cell or sector:			Allowed no.of TRUs Cell or sector:		
		1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
2x2 | 1x2	2xA9d_2.2 + A19_2.2	900	900	1900	no	no	M	2	2	2	0–2	0–2	0–2

M = Mandatory

Note: Location in the cabinet: GSM 900 configurations must be on the left-hand side, and GSM 1900 must be on the right-hand side.

Dual Band Configurations with Mixed CDU Types

RBS 2202 dual band configurations with mixed CDU types are shown in the table below.

Table 14 Dual Band Configurations with Mixed CDU Types

SCC	**Configuration**	**Frequency Band** Cell or sector:		**TMA** Cell or sector:		**No. of Antennas** Cell or sector:		**Allowed no. of TRUs** Cell or sector:	
		1	**2**	**1**	**2**	**1**	**2**	**1**	**2**
1x4 | 1x2	C+9d_2.4 | A19_2.2	900	1900	no	M	2	2	0–4	0–2
	C+9de_2.4 | A19_2.2	900	1900	no	M	2	2	0–4	0–2

M = Mandatory

Note: Location in the cabinet: GSM 900 configurations must be on the left-hand side, and GSM 1900 must be on the right-hand side.

6.3 RBS 2103 Configurations

This section describes RBS 2103 configurations. For this RBS, only 900 MHz configurations are available.

6.3.1 CDU-D Configurations

RBS 2103 configurations using CDU-D are shown in the table below.

Table 15 CDU-D Configurations

SCC	Configuration	No. of Cabinets	TMA	No. of Antennas	Allowed no. of TRUs per cabinet
1x6	D9de_2.6	1	no	2	0–6
1x12	D9de_2.12	2	no	2	1–6

6.3.2 CDU-A Configurations

RBS 2103 configurations using CDU-A are shown in the table below.

Table 16 CDU-A Configurations

<table>
<tr><th rowspan="2">SCC</th><th rowspan="2">Configuration</th><th colspan="3">TMA
Cell or sector:</th><th colspan="3">No. of Antennas
Cell or sector:</th><th colspan="3">Allowed no. of TRUs
Cell or sector:</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>1</th><th>2</th><th>3</th><th>1</th><th>2</th><th>3</th></tr>
<tr><td>3x2</td><td>3xA9d_2.2</td><td>no</td><td>no</td><td>no</td><td>2</td><td>2</td><td>2</td><td>0–2</td><td>0–2</td><td>0–2</td></tr>
</table>

Note: SCC 1x2 and 2x2 can be created with a subset of the 3x2 SCC. These configurations are not presented since they are not regarded as separate configurations from a system point of view.

6.3.3 CDU-C, Omni Configurations

CDU-C Omni configurations for RBS 2103 are shown in the table below.

Table 17 CDU-C Omni Configurations

SCC	Configuration	TMA	No. of Antennas	Allowed no. of TRUs
1x1	C9d_2.1\a	no	2	1
1x6	C9d_3.6	no	3	2–6

Note: SCC 1x4 can be created with a subset of the 1x6 SCC. These configurations are not presented since they are not regarded as separate configurations from a system point of view.

6.3.4 CDU-C, 3–Sector Configurations

CDU-C 3–sector configurations for RBS 2103 are shown in the table below. All of these configurations require two cabinets.

Table 18 CDU-C, 3–Sector Configurations (2 Cabinets)

SCC	Configuration	TMA Cell or sector:			No. of Antennas Cell or sector:			Allowed no. of TRUs Cell or sector:		
		1	2	3	1	2	3	1	2	3
1+4+1	C9d_2.1+C9d_2.4+C9d_2.1	no	no	no	2	2	2	1	2–4	1
1+4+4	C9d_2.1+C9d_2.4+C9d_2.4	no	no	no	2	2	2	1	2–4	2–4
4+4+1	C9d_2.4+C9d_2.4+C9d_2.1	no	no	no	2	2	2	2–4	2–4	1
3x4	3xC9d_2.4	no	no	no	2	2	2	2–4	2–4	2–4

6.3.5 CDU-C+ Configurations

CDU-C+ configurations for RBS 2103 are shown in the table below.

Table 19 CDU-C+ Configurations

SCC	Configuration	No. of RBS	TMA (all cells)	No. of Antennas Cell or sector:			Allowed no. of TRUs Cell or sector:		
				1	2	3	1	2	3
1x6	C+9d_3.6	1	no	2,3	—	—	0–6	—	—
	C+9de_3.6	1	no	2,3	—	—	0–6	—	—
3x2	3xC+9d_2.2	1	no	2	2	2	0–2	0–2	0–2
	3xC+9de_2.2	1	no	2	2	2	0–2	0–2	0–2
3x4	3xC+9d_2.4	2	no	2	2	2	0–4	2–4	0–4
	3xC+9de_2.4	2	no	2	2	2	0–4	2–4	0–4
2+4	C+9de_2.2+C+9de_2.4	1	no	2	2	—	0–2	0–4	—
4+2	C+9de_2.4+C+9de_2.2	1	no	2	2	—	0–4	0–2	—

Note: SCC 1x2 and 2x2 can be created with a subset of the SCC 3x2, and SCC 1x4 can be created with a subset of SCC 1x6. These configurations are not presented since they are not regarded as separate configurations from a system point of view.

6.3.6 Mixed CDU/Basic Configurations

The table below describes mixed CDU/basic configurations for RBS 2103. All of the configurations in the table require one cabinet.

Table 20 Mixed CDU/Basic Configurations (One Cabinet)

SCC	**Configuration**	**TMA (all cells)**	**No. of Antennas Cell:**		**Allowed no. of TRUs Cell:**		**No. of CDU-A**	**No. of CDU-C or C+**
			1	**2**	**1**	**2**		
2+1	A9d_2.2 + C9d_2.1	no	2	2	0–2	1	1	2
1+2	C9d_2.1 + A9d_2.2	no	2	2	1	0–2	1	2
2+4	A9d_2.2 + C9d_2.4	no	2	2	0–2	2–4	1	2
2+4	A9d_2.2 + C+9d_2.4	no	2	2	0–2	0–4	1	1
2+4	A9d_2.2 + C+9de_2.4	no	2	2	0–2	0–4	1	1
4+2	C9d_2.4 + A9d_2.2	no	2	2	2–4	0–2	1	2
4+2	C+9d_2.4 + A9d_2.2	no	2	2	0–4	0–2	1	1
4+2	C+9de_2.4 + A9d_2.2	no	2	2	0–4	0–2	1	1

6.4 SW Power Boost Configurations

This section does not include any additional site equipment configurations. The section specifies which configurations support SW Power Boost.

A minimum of two TRUs is required in an antenna system to use SW Power Boost in the antenna system. Separate TX antennas shall be used for the two transmitters in a SW Power Boost configuration

6.4.1 RBS 2101 Configurations

SW Power Boost configurations for RBS 2101 are given in the table below.

Table 21 RBS 2101 SW Power Boost Configurations

SCC	Configuration	TMA	No. of Antennas	Allowed no. of TRUs
1x2	A9d_2.2	no	2	0–2
	A18_2.2	M	2	0–2
	A19_2.2	M	2	0–2

6.4.2 RBS 2102 and RBS 2202 Configurations

SW Power Boost configurations for RBS 2102 and RBS 2202 are given in the table below.

Table 22 RBS 2102 SW Power Boost Configurations

SCC	Configuration	No. of cabinets	TMA (all cells)	Number of Antennas Cell or sector:			Allowed number of TRUs Cell or sector:		
				1	**2**	**3**	**1**	**2**	**3**
3x2	3xA9d_2.2	1	no	2	2	2	0–2	0–2	0–2
	3xA18_2.2	1	M	2	2	2	0–2	0–2	0–2
	3xA19_2.2	1	M	2	2	2	0–2	0–2	0–2
3x4	3x(2xA9d_2.2)	2	no	4	4	4	0–4	0–4	0–4
	3x(2xA18_2.2)	2	M	4	4	4	0–4	0–4	0–4
	3x(2xA19_2.2)	2	M	4	4	4	0–4	0–4	0–4

Note: SCC 1x2, 1x4, 1x6 and 2x2 can be created with a subset of the 3x2 SCC. These configurations are not presented since they are not regarded as separate configurations from a system point of view.

7 Basic Configurations with ddTMA

In the 900 MHz Frequency Band it is possible to implement a ddTMA and an external Bias-T in RBS 2101, RBS 2102 and RBS 2202 for all configurations except CDU-D configurations.

In the 1800/1900 MHz Frequency Band all configurations which support ALNA/TMA, except CDU-D, can be equipped with external suplexers and ddTMA in RBS 2101, RBS 2102 and RBS 2202. It is also possible to install only the external duplexers without ddTMA. This shall not be seen as a new configuration since the cabinet internal CDUs remain unchanged, but only external radio equipment is added.

The configurations which support ddTMA are not presented in detail for all cabinet variants or SCCs. This information can be found in the previous sections Basic Configurations.

The figures below show examples of configurations which support ddTMA and appropriate interface units for 900 MHz and 1800/1900MHz.

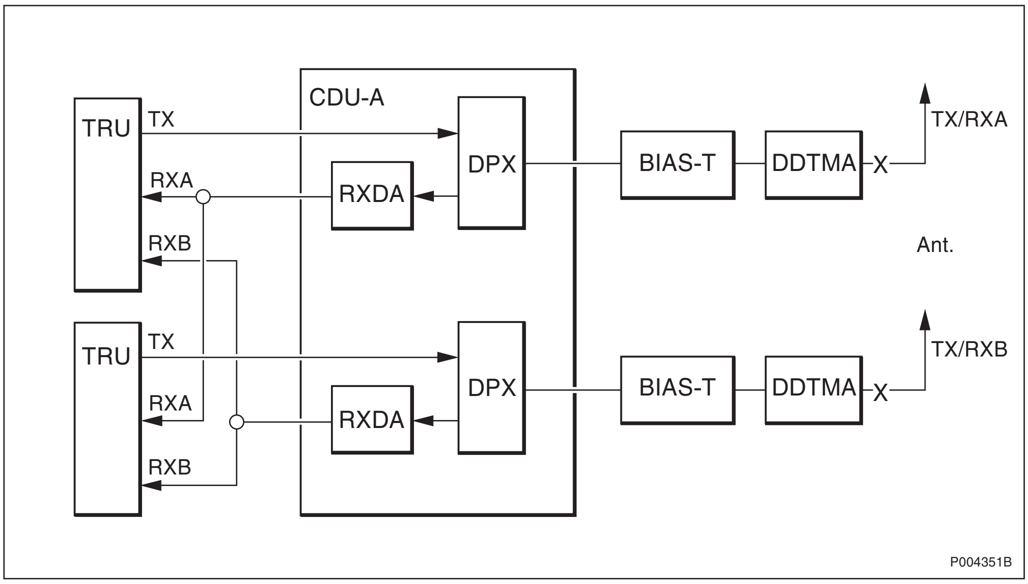


Figure 29 A9d_2.2 with Bias-T and ddTMA

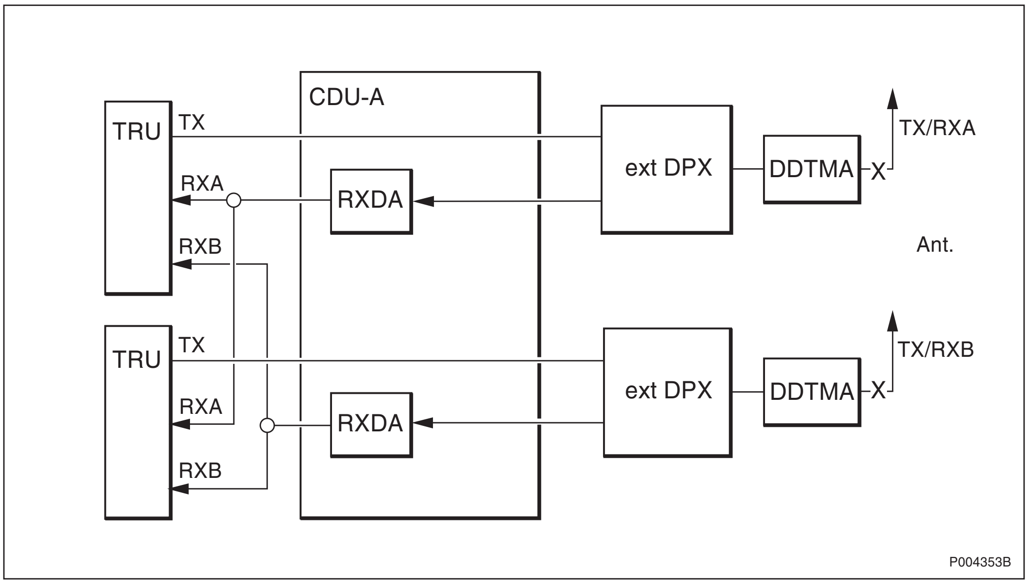


Figure 30 A18_2.2 with External Duplexers and ddTMA

Allocation of New Radio Hardware

All **SCCs,** which are exclusively based on the configurations listed in *Table 23 on page 72,* support ddTMA and the appropriate support equipment. The number of Bias-Ts, external duplexers and ddTMAs is a multiple of the equipment needed for the SCC basic configurations, listed below.

Table 23 Basic Configurations Supporting ddTMA

Configuration	Bias-T	External Duplexer	ddTMA
A9d_2.2	2	-	2
A18_2.2	-	2	2
C9d_2.1	2	-	2
C9d_2.4	2	-	2
C9d_2.1\a	2	-	2
C9d_3.6	2	-	2
C18_2.1	-	1/2*	2
C18_2.4	-	2	2
C18_2.1\a	-	1/2*	2
C18_3.6	-	2	2
C19_2.1	-	1/2*	2
C19_2.4	-	2	2
C19_2.1\a	-	1/2*	2
C19_3.6	-	2	2
C+9d_2.2	2	-	2
C+9d_2.4	2	-	2
C+9d_3.6	2	-	2
C+9de_2.2	2	-	2
C+9de_2.4	2	-	2
C+9de_3.6	2	-	2
C+18_2.2	-	1	2
C+18_2.4	-	2	2
C+18_3.6	-	2	2
C+19_2.2	-	1	2
C+19_2.4	-	2	2
C+19_3.6	-	2	2

* The marked configurations are configurable with one or two external duplexers.

Radio Performance

The output power of all GSM 900 configurations is reduced by a maximum of 0.6 dB by the ddTMA.

In addition, the Bias-T decreases the performance by a maximum of 0.2 dB in the case of P-GSM and E-GSM configurations.

In order to maintain correct RX_lev reporting from the BTS when using ddTMA in GSM 900 configurations, the feeder loss of the selected IDB has to be adjusted. The feeder loss value is the sum of the feeder loss minus the gain of the ddTMA.

If the ddTMA is limited regarding band widths, the correct band width has to be typed in through the OMT (R3+ and on) in order to maintain correct capabilities reporting.

For 1800/1900 the following applies:

If the nominal current consumption of the ddTMA exceeds 100 mA, the alarm limits of the ddTMA supervision have to be adjusted through the OMT (R3+ and on).

For 1800/1900 the following applies:

The gain in front of the cabinet is the sum of the gain of the ddTMA minus the feeder loss and the loss of the external duplexer. This value is 8dB by default. If the calculated value differs from 8dB, it has to be changed in the IDB. The loss of the external duplexer is mas. 0.6 dB.

The following table shows the allowed gain in front of the cabinet for the different CDU types to reach both sensitivity and to fulfil GSM recommendations.

Table 24 Allowed Gain in Front of Cabinet

RBS 2000 with CDU Type	**GSM Type**		
	900	**1800**	**1900**
A	6 – 7	7.5 – 8.5	7.5 – 8.5
C	6 – 7	7.5 – 8.5	7.5 – 8.5
C+	6.5 – 10	8 – 12	8 – 12

SE-16480 Stockholm
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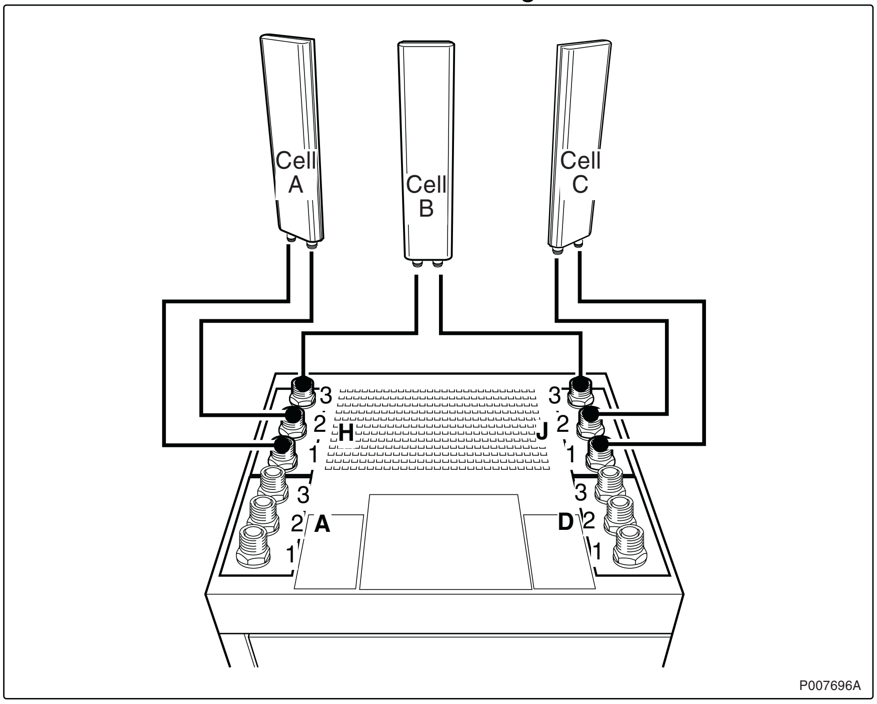
RBS 2202

Antenna Configurations

Description

This document describes antenna configurations for the RBS 2202.



ERICSSON

Contents

1 Introduction

This document describes the antenna configurations supported for RBS 2202, and the antenna connections at the RBS for each configuration.

1.1 Target Group

The target group for this information is engineering personnel involved in RBS 2202 activities.

1.2 Configuration Key

The various configurations available are described according to the following example:

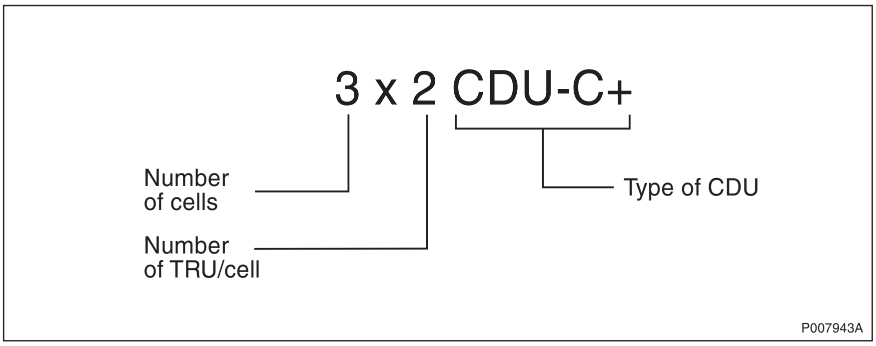


Figure 1 CDU Configuration Key

In the example above, the cabinet is configured for three cells, each using two TRUs. The total number of TRUs is thus six in this case. The CDU is type CDU-C+.

1.3 Antenna Connection Field

The RF cables between each CDU and its associated TRUs are standardized and do not normally change. Each CDU uses a set of standard RF wiring patterns for connection between each CDU and the cabinet's antenna connection field.

In the figures and tables in the sections that follow, the cabinets shown are fully equipped. Configurations consisting of a part of the fully equipped cabinet are also possible to extract from the following figures and tables.

2 Summary of Antenna Configurations

This section describes the antenna configurations which are supported for RBS 2202. The configurations are summarized in the table below.

Table 1 Summary of Antenna Configurations

GSM System	CDU Type	Configuration	*See:*
GSM 900	A	3x2, without TMA	*Section 3.1.1 on page 5*
		3x2 with ddTMA	*Section 3.2.1 on page 7*
	C+	3x2 without TMA	*Section 3.3.1 on page 9*
		3x4 without TMA	*Section 3.3.2 on page 10*
		1x6 without TMA	*Section 3.3.3 on page 11*
	D	1x6 without TMA and with duplexer	*Section 3.4.1 on page 12*
		1x6 without TMA and without duplexer	*Section 3.4.2 on page 13*
		2x12 without TMA and with duplexer	*Section 3.4.3 on page 14*
GSM 1800/1900	A	3x2 with dTMA	*Section 4.1.1 on page 15*
		3x2 with ddTMA	*Section 4.2.1 on page 17*
	C+	3x2 without TMA	*Section 4.3.1 on page 19*
		3x4 without TMA	*Section 4.3.2 on page 20*
		1x6 without TMA	*Section 4.3.3 on page 21*
		3x2 with TMA	*Section 4.4.1 on page 22*
		3x4 with TMA	*Section 4.4.2 on page 24*
		1x6 with TMA	*Section 4.4.3 on page 26*
GSM 1800	D	1x6 without TMA	*Section 5.1.1 on page 27*
		2x12 without TMA	*Section 5.1.2 on page 28*
		1x6 with TMA	*Section 5.2.1 on page 30*
		1x12 with TMA	*Section 5.2.2 on page 31*

3 GSM 900 Configurations

This section describes the GSM 900 configurations for the following CDU types:

- CDU-A
- CDU-C+
- CDU-D

3.1 CDU-A Configurations without TMA

This section describes the GSM 900 configurations without TMA which are possible using CDU-A.

3.1.1 3x2 CDU-A

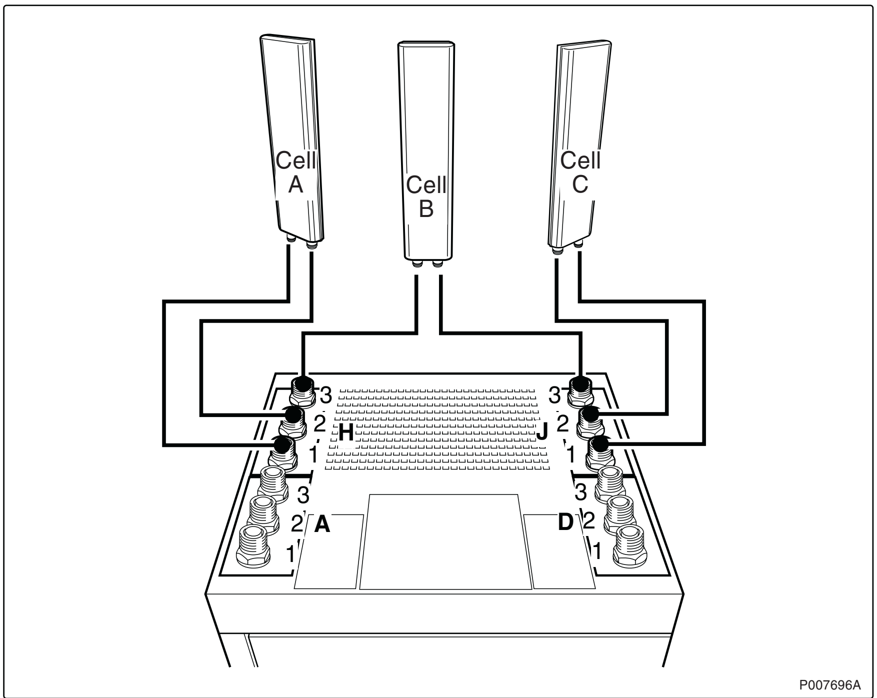


Figure 2 3x2 CDU-A

Table 2 3x2 CDU-A with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:DX1	H1	TX 1 + RX A
		A:DX2	H2	TX 2 + RX B
B	2	B:DX1	H3	TX 1 + RX A
		B:DX2	J3	TX 2 + RX B
C	3	C:DX1	J2	TX 1 + RX A
		C:DX2	J1	TX 2 + RX B

From the configuration in the figure above, the following configurations can be derived:

- 1x2 CDU-A
- 2x2 CDU-A

3.2 CDU-A Configurations with ddTMA

This section describes the GSM 900 configurations with ddTMA which are possible using CDU-A.

3.2.1 3x2 CDU-A with ddTMA

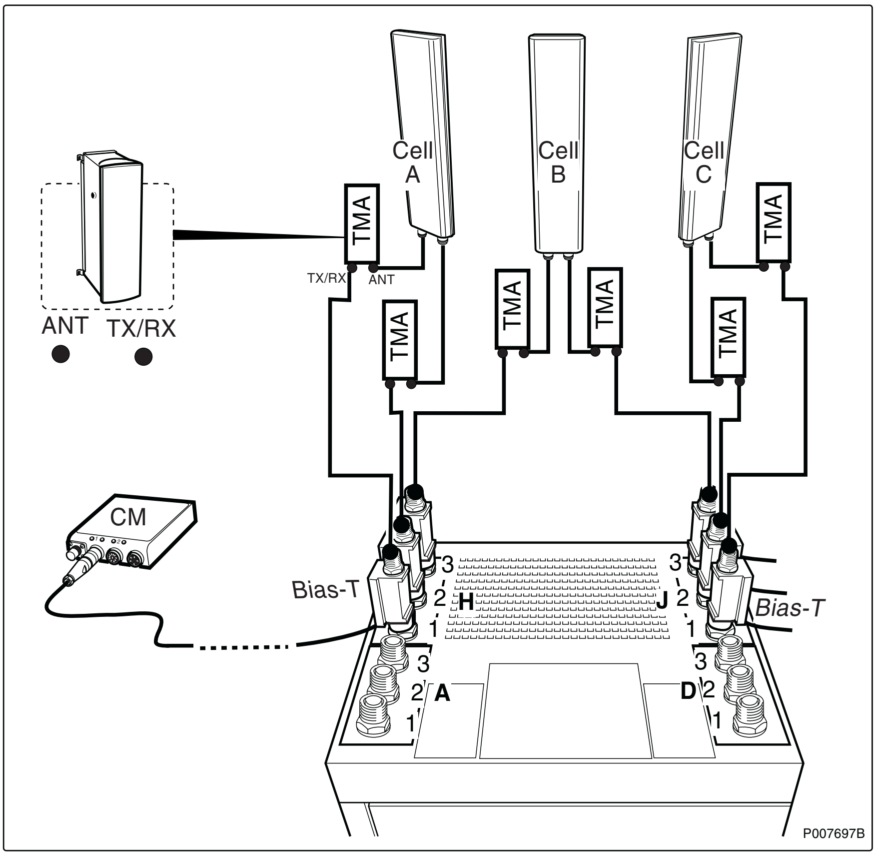


Figure 3 3x2 CDU-A with ddTMA

Table 3 3x2 CDU-A with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:DX1	H1	TX 1 + RX A
		A:DX2	H2	TX 2 + RX B
B	2	B:DX1	H3	TX 1 + RX A
		B:DX2	J3	TX 2 + RX B
C	3	C:DX1	J2	TX 1 + RX A
		C:DX2	J1	TX 2 + RX B

From this 3x2 CDU-A configuration, the following configurations can be derived:

- 1x2 CDU-A, ddTMA
- 2x2 CDU-A, ddTMA

3.3 CDU-C+ Configurations without TMA

This section describes the GSM 900 configurations without TMA which are possible using CDU-C+.

3.3.1 3x2 CDU-C+

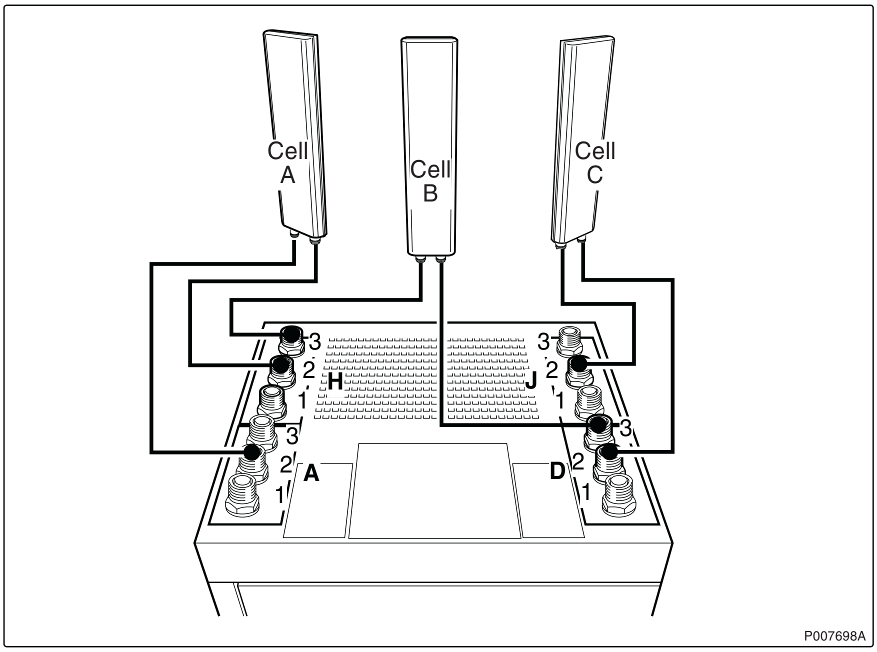


Figure 4 3x2 CDU-C+

Table 4 3x2 CDU-C+ with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:DX1	H1	TX + RX A
		A:RXB	A2	RX B
B	2	B:DX1	H3	TX + RX A
		B:RXB	D3	RX B
C	3	C:DX1	J2	TX + RX A
		C:RXB	D2	RX B

From this 3x2 CDU-C+ configuration, the following configuration can be derived:

- 1x2 CDU-C+

3.3.2 3x4 CDU-C+

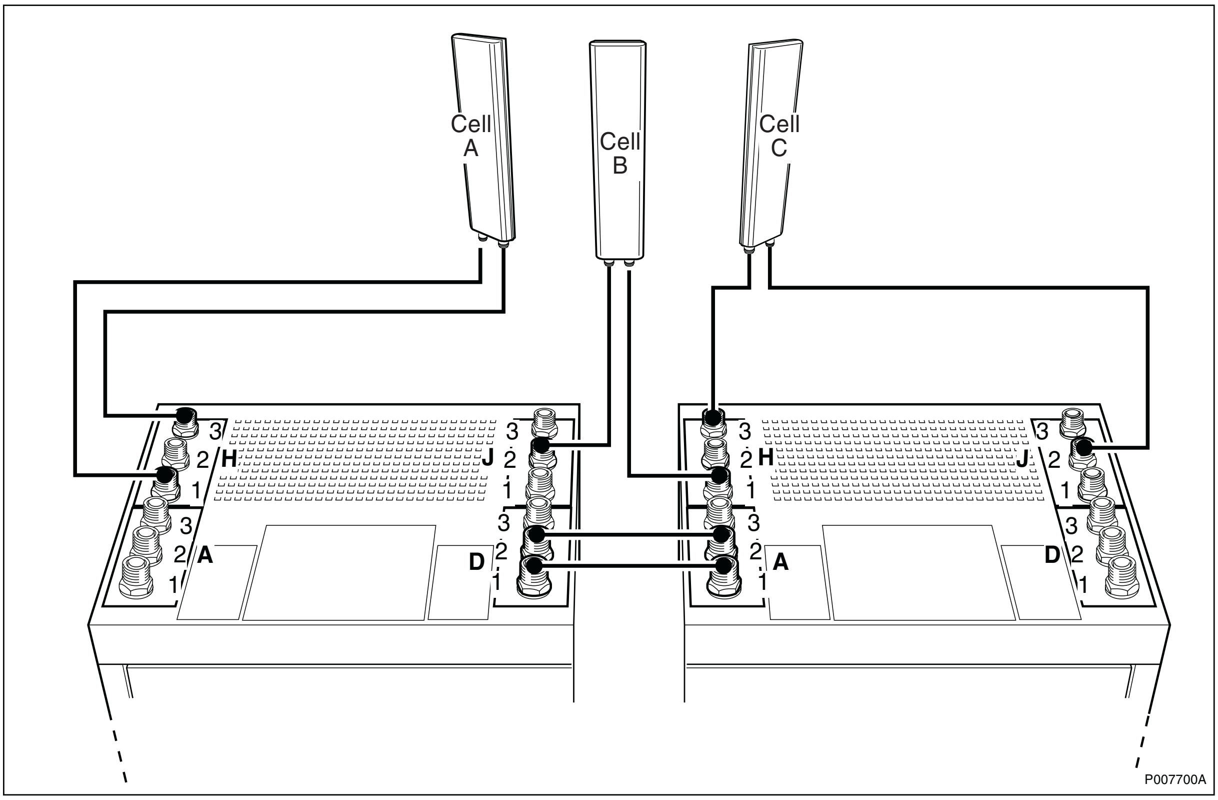


Figure 5 3x4 CDU-C+

Table 5 3x4 CDU-C+ with Duplexer

Cell	CDU	Feeder label	Connector	Signal
	Master			
A	1	A:DX1	H1	TX 1 + RX A
	2	A:DX2	H3	TX 2 + RX B
B	3	B:DX1	J2	TX 1 + RX A
	Extension			
	1	B:DX2	H1	TX 2 + RX B
C	2	C:DX1	H3	TX 1 + RX A
	3	C:DX2	J2	TX 2 + RX B

For information on connections between master and extension cabinets, *see:*

RBS 2102, RBS 2102, RBS 2103 and RBS 2202 Cabinet Reconfiguration Manual *EN/LZT 720 0048*

3.3.3 1x6 CDU-C+

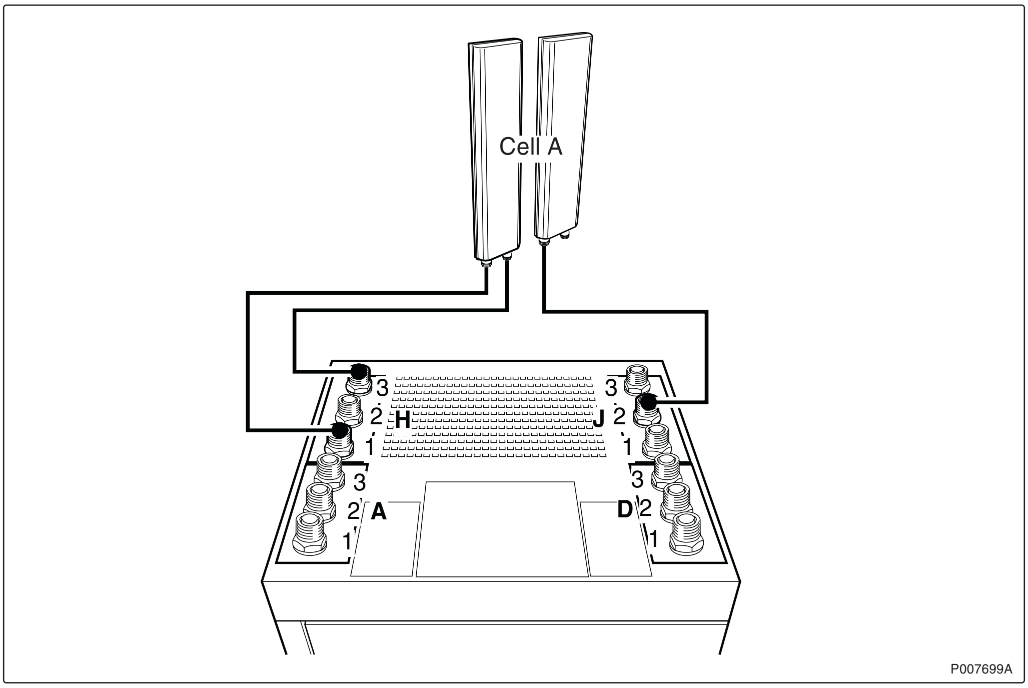


Figure 6 1x6 CDU-C+

Table 6 1x6 CDU-C+ with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:DX1	H1	TX + RX A
	2	A:DX2	H3	TX + RX B
	3	A:DX3	J2	TX

From this 1x6 CDU-C+ configuration, the following configuration can be derived:

- 1x4 CDU-C+

The following configuration requires three cabinets, each configured as in *Table 6 on page 11:*

- 3x6 CDU-C+

3.4 CDU-D Configurations without TMA

This section describes the GSM 900 configurations without TMA which are possible using CDU-D.

3.4.1 1x6 CDU-D with Duplexer

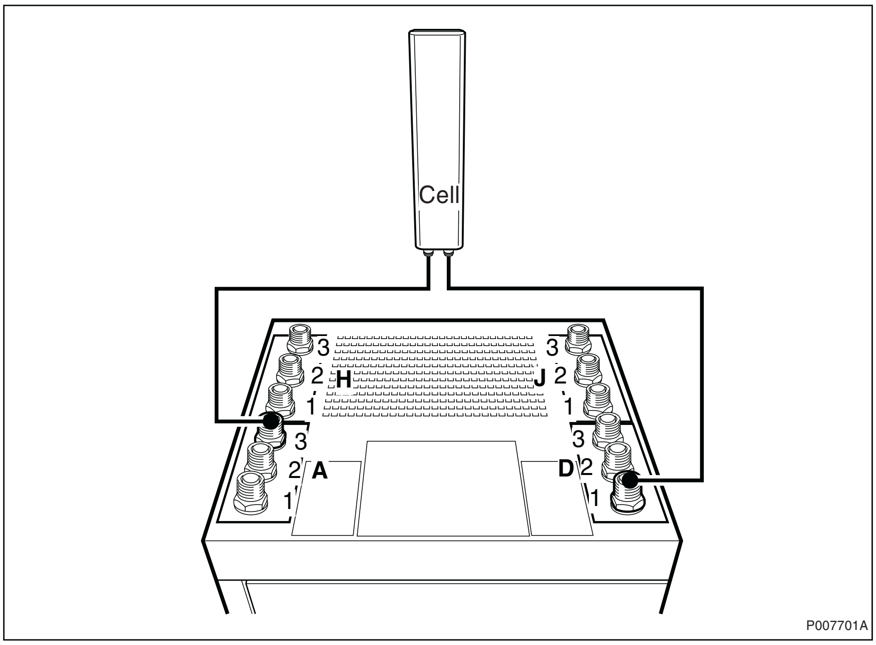


Figure 7 1x6 CDU-D

Table 7 1x6 CDU-D with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:DX1	A3	TX/RX A
		A:RXB	D1	RX B

From this 1x6 CDU-D configuration, the following configurations can be derived:

- 1x2 CDU-D
- 1x4 CDU-D

The following three-cell configurations require three cabinets, each configured as in *Table 7 on page 12.*

- 3x2 CDU-D
- 3x4 CDU-D
- 3x6 CDU-D

3.4.2 1x6 CDU-D without Duplexer

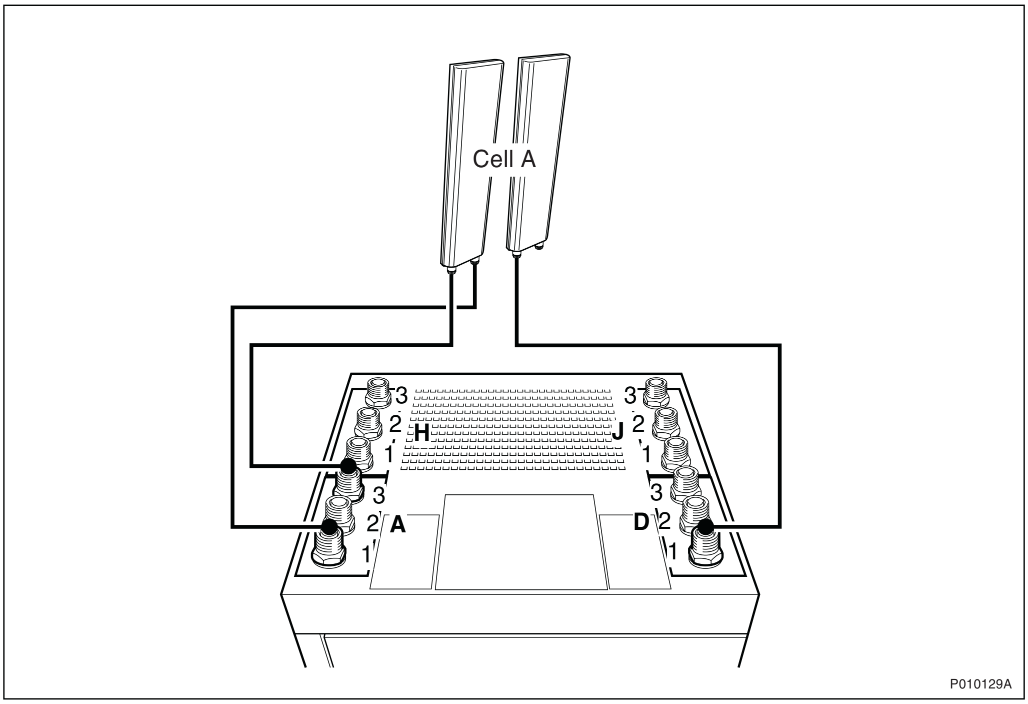


Figure 8 1x6 CDU-D without Duplexer

Table 8 1x6 CDU-D without Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:TX1	A3	TX
		A:RXA	A1	RX A
		A:RXB	D1	RX B

From this 1x6 CDU-D configuration, the following configurations can be derived:

- 1x2 CDU-D
- 1x4 CDU-D

The following three-cell configurations require three cabinets, each configured as in *Table 8 on page 13.*

- 3x2 CDU-D
- 3x4 CDU-D
- 3x6 CDU-D

3.4.3 2x12 CDU-D with Duplexer

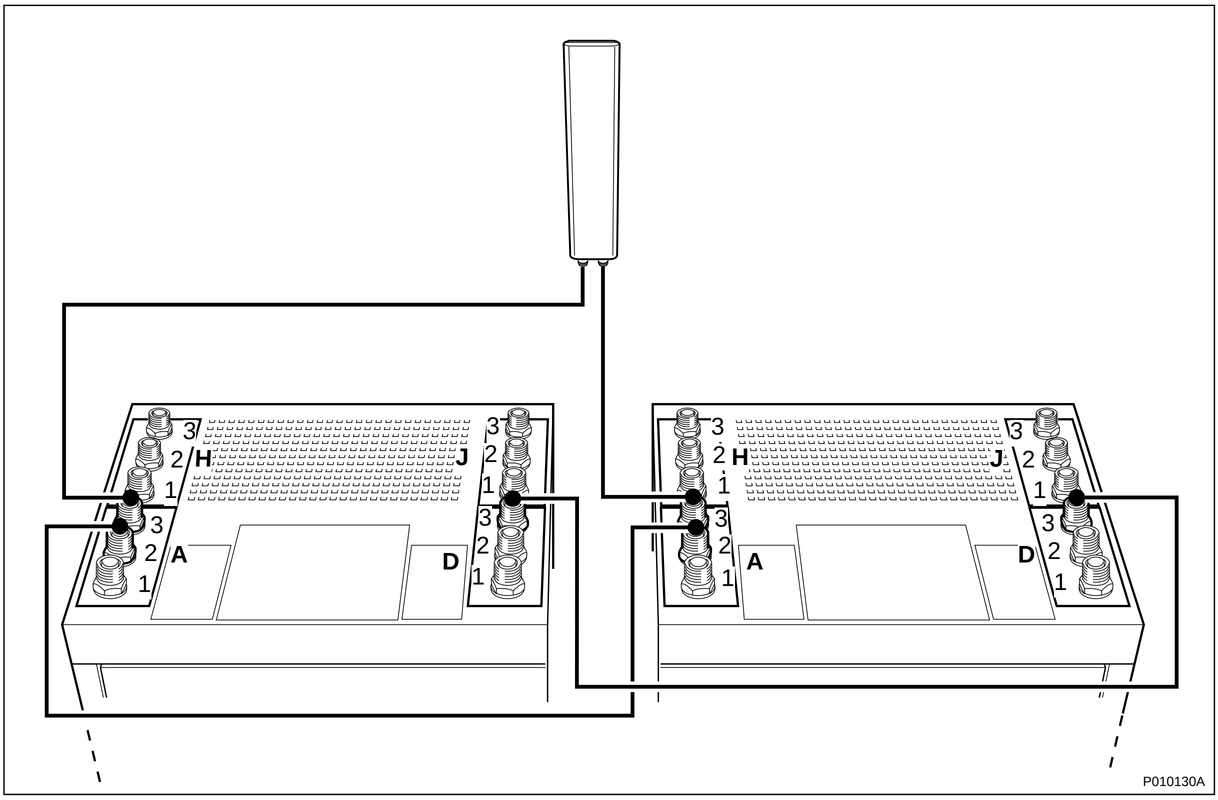


Figure 9 2x12 CDU-D with Duplexer

Table 9 2x12 CDU-D with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	Master			
	1	A:DX1	A3	TX/RX A
		—	A2	HL out A2
		—	D3	HL in B
	Extension			
	1	A:DX2	A3	TX/RX B
		—	A2	HL in A
		—	D3	HL out B2

4 GSM 1800/1900 Configurations (CDU-A and CDU-C+)

This section describes the GSM 1800 and GSM 1900 configurations for the following CDU types:

- CDU-A
- CDU-C+

4.1 CDU-A Configurations with dTMA

This section describes the GSM 1800 and GSM 1900 configurations with dTMA, which are possible using CDU-A.

4.1.1 3x2 CDU-A with dTMA

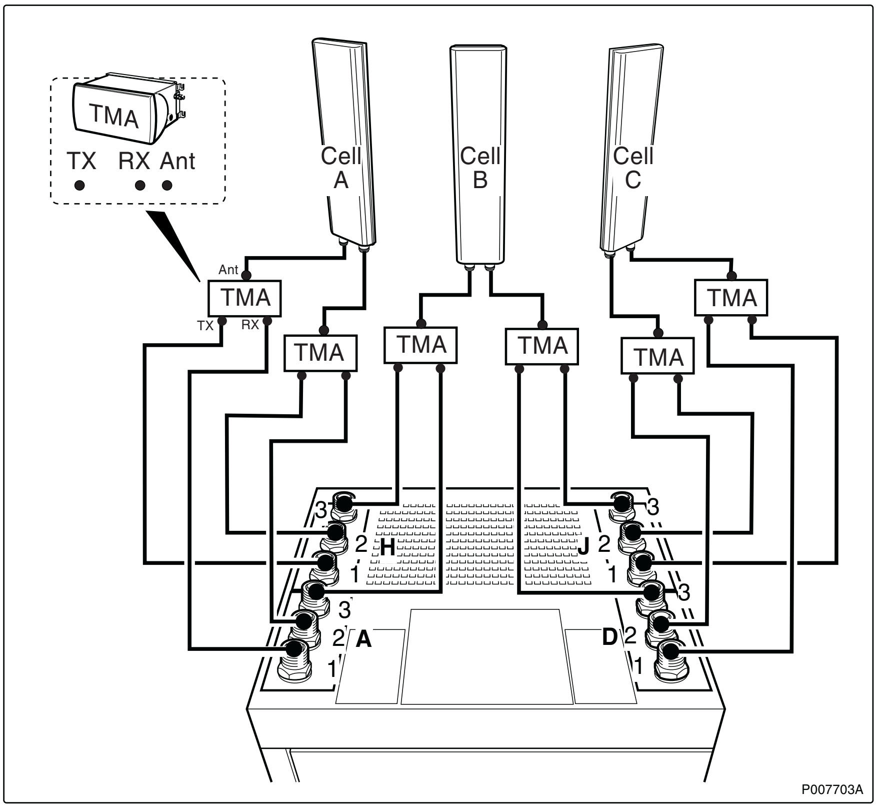


Figure 10 3x2 CDU-A dTMA

Table 10 CDU-A without Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:TX1	H1	TX 1
		A:TX2	H2	TX 2
		A:RXA	A1	RX A
		A:RXB	A2	RX B
B	2	B:TX1	H3	TX 1
		B:TX2	J3	TX 2
		B:RXA	A3	RX A
		B:RXB	D3	RX B
C	3	C:TX1	J2	TX 1
		C:TX2	J1	TX 2
		C:RXA	D2	RX A
		C:RXB	D1	RX B

From this 3x2 CDU-A configuration, the following configurations can be derived:

- 1x2 CDU-A
- 2x2 CDU-A

4.2 CDU-A Configurations with ddTMA

This section describes the GSM 1800 and GSM 1900 configurations with ddTMA, which are possible using CDU-A.

4.2.1 3x2 CDU-A with ddTMA

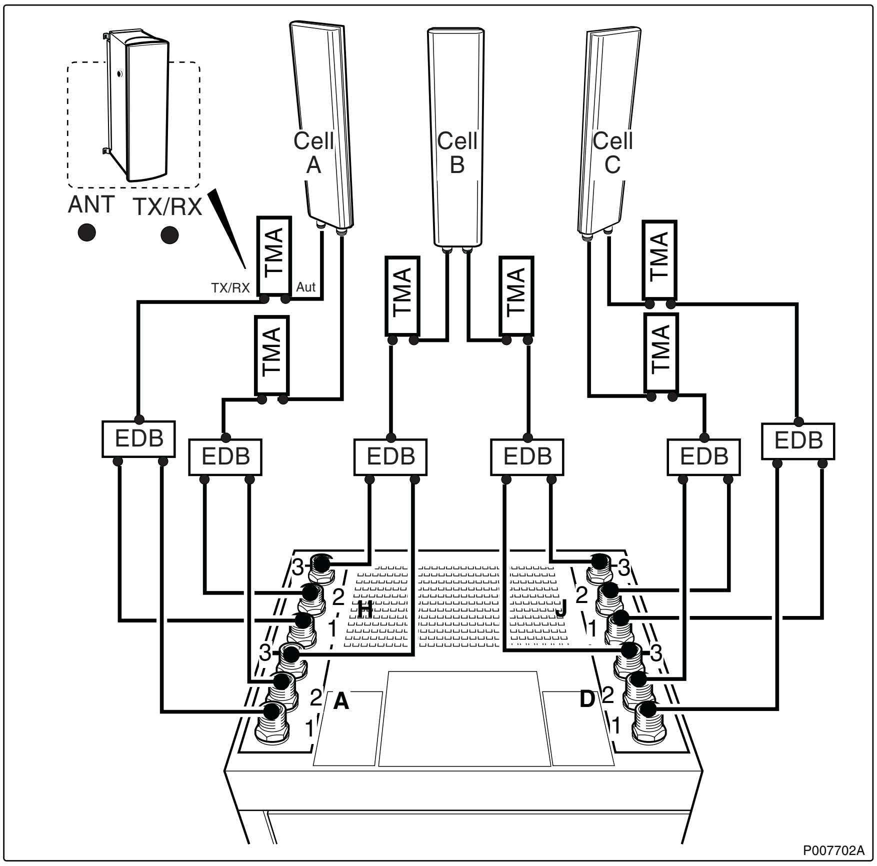


Figure 11 3x2 CDU-A ddTMA

Table 11 CDU-A without Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:TX1	H1	TX 1
		A:TX2	H1	TX 2
		A:RXA	A1	RX A
		A:RXB	A2	RX B
B	2	B:TX1	H3	TX 1
		B:TX2	J3	TX 2
		B:RXA	A3	RX A
		B:RXB	D3	RX B
C	3	C:TX1	J2	TX 1
		C:TX2	J1	TX 2
		C:RXA	D2	RX A
		C:RXB	D1	RX B

From this 3x2 CDU-A configuration, the following configurations can be derived:

- 1x2 CDU-A
- 2x2 CDU-A

4.3 CDU-C+ Configurations without TMA

This section describes the GSM 1800 and GSM 1900 configurations without TMA, which are possible using CDU-C+.

4.3.1 3x2 CDU-C+

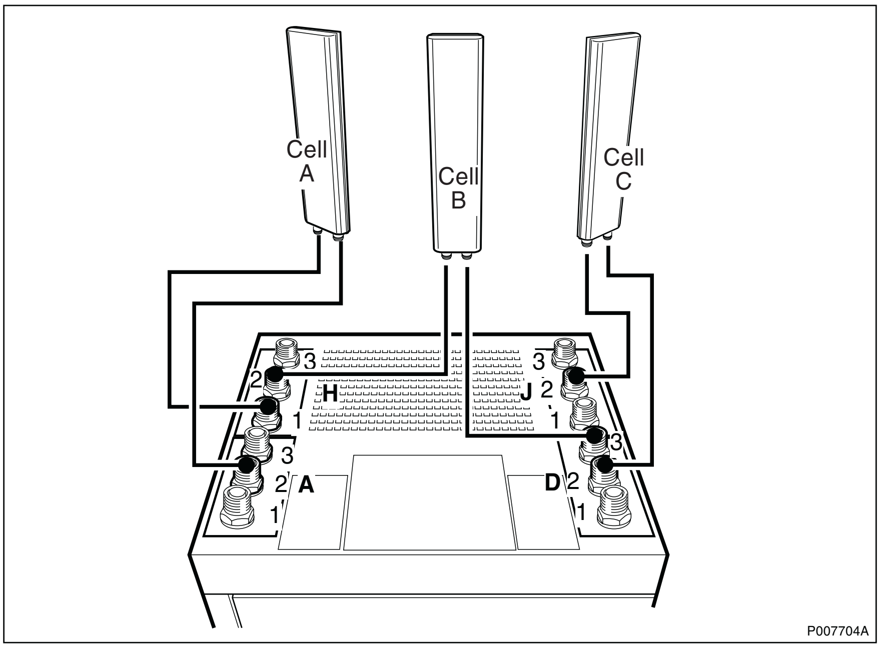


Figure 12 3x2 CDU-C+

Table 12 CDU-C+ with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:DX1	H1	TX + RX A
		A:RXB	A2	RX B
B	2	B:DX1	H3	TX + RX A
		B:RXB	D3	RX B
C	3	C:DX1	J2	TX + RX A
		C:RXB	D2	RX B

4.3.2 3x4 CDU-C+

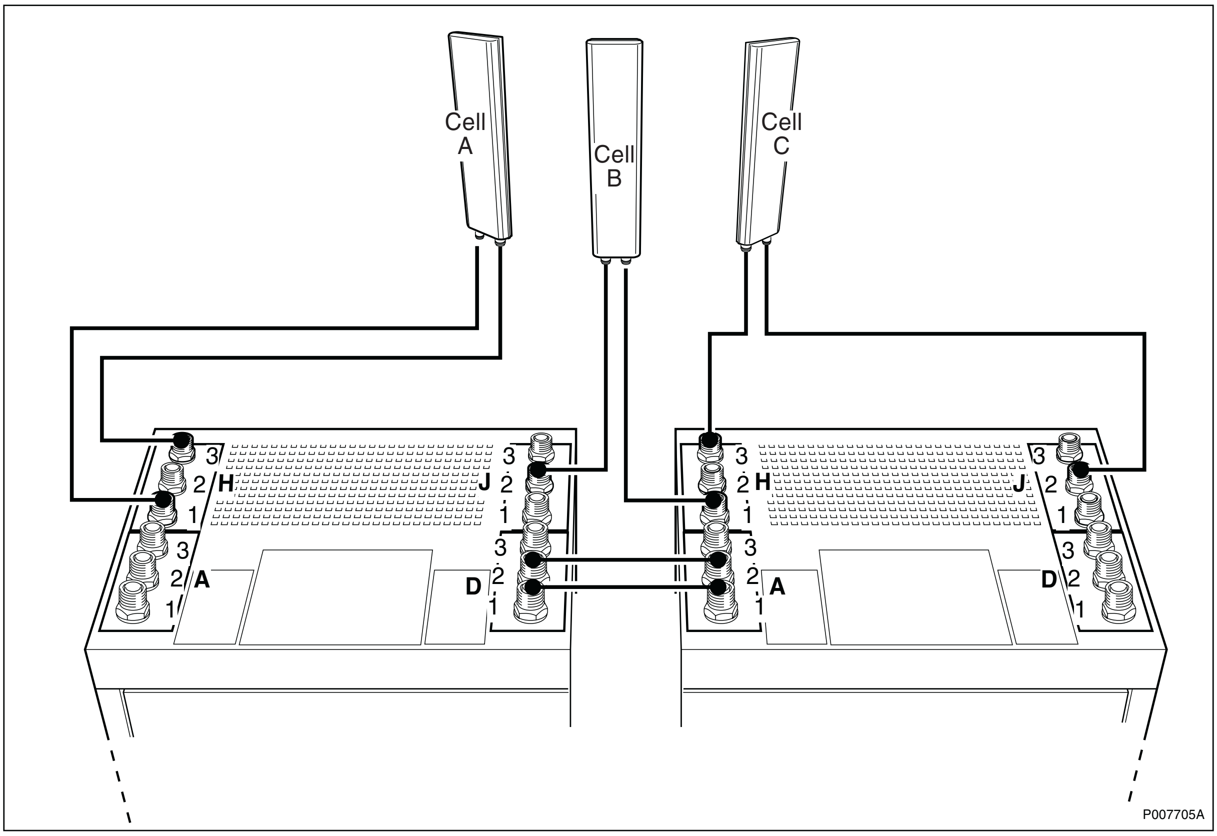


Figure 13 3x4 CDU-C+

Table 13 CDU-C+ with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	Master			
	1	A:DX1	H1	TX 1 + RX A
	2	A:DX2	H3	TX 2 + RX B
B	3	B:DX1	J2	TX 1 + RX A
	Extension			
	1	B:DX2	H1	TX 2 + RX B
C	2	C:DX1	H3	TX 1 + RX A
	3	C:DX2	J2	TX 2 + RX B

For more information about connections between master and extension cabinets, *see:*

RBS 2102, RBS 2102, RBS 2103 and RBS 2202 Cabinet Reconfiguration Manual *EN/LZT 720 0048*

4.3.3 1x6 CDU-C+

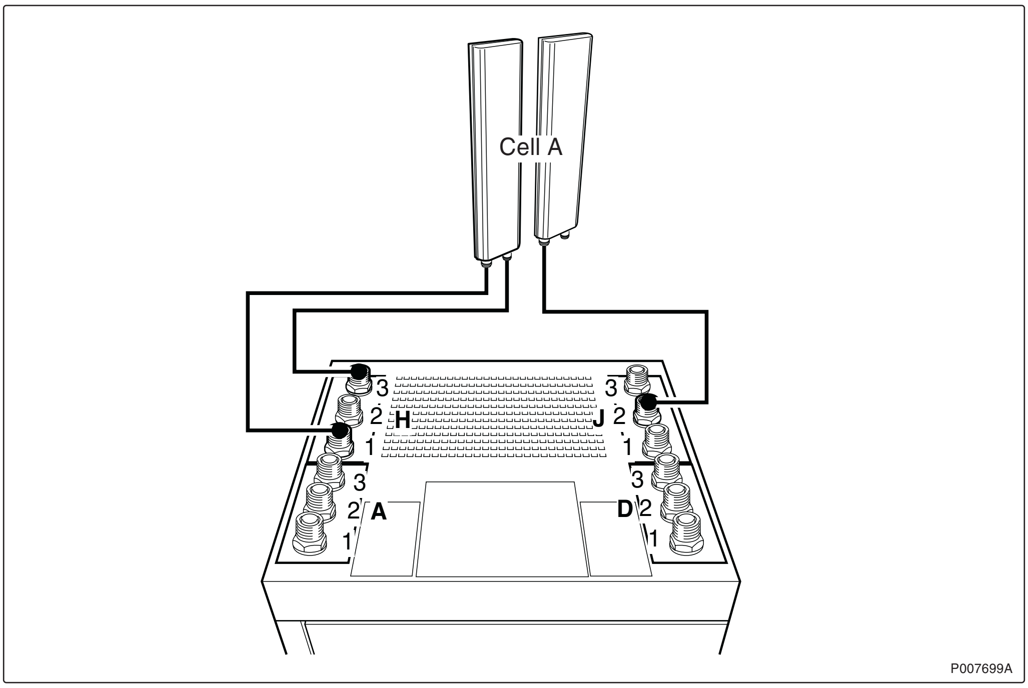


Figure 14 1x6 CDU-C+

Table 14 1x6 CDU-C+ with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	DX1	H1	TX + RX A
	2	DX2	H3	TX + RX B
	3	TX3	J2	TX

From this 1x6 CDU-C+ configuration, the following configuration can be derived:

- 1x4 CDU-C+

The following configuration requires three cabinets each configured as in *Table 14 on page 21.*

- 3x6 CDU-C+

4.4 CDU-C+ Configurations with TMA

This section describes the GSM 1800 and GSM 1900 configurations with TMA, which are possible using CDU-C+.

4.4.1 3x2 CDU-C+ without Duplexer

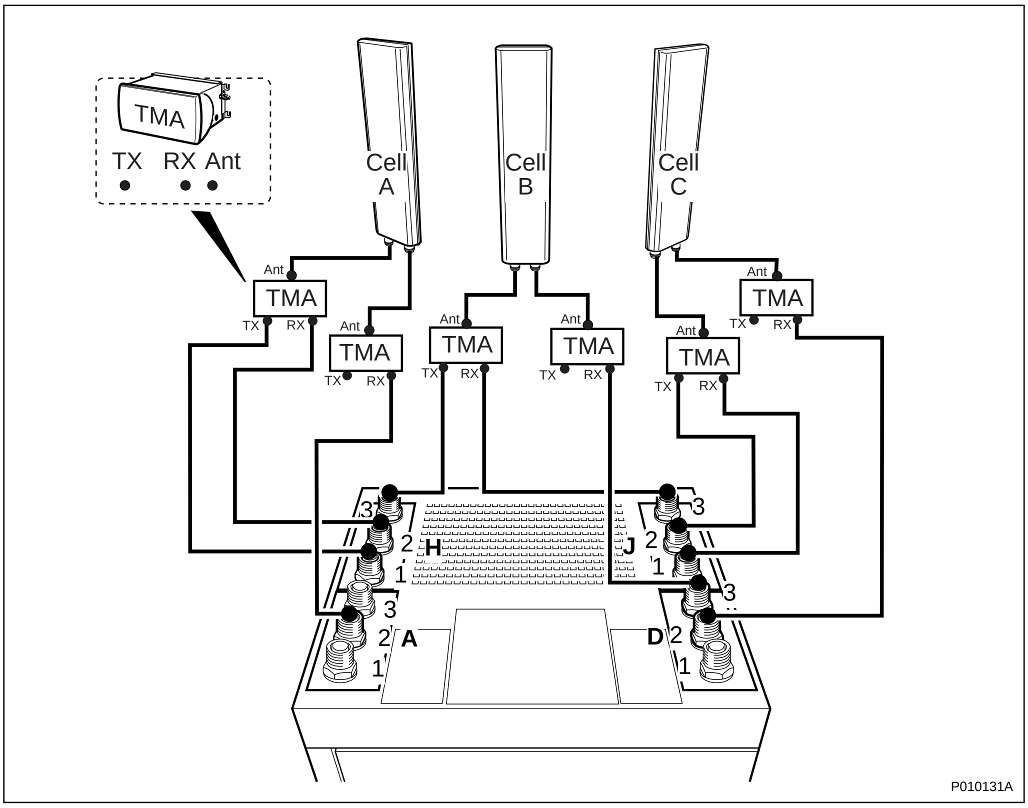


Figure 15 3x2 CDU-C+ without Duplexer

Table 15 3x2 CDU-C+ without Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:TX1	H1	TX
		A:RXA	H2	RX A
		A:RXB	A2	RX B
B	2	B:TX1	H3	TX
		B:RXA	J3	RX A
		B:RXB	D3	RX B
C	3	C:TX1	J2	TX
		C:RXA	J1	RX A
		C:RXB	D2	RX B

From this 3x2 CDU-C+ configuration, the following configurations can be derived:

- 1x2 CDU-C+
- 2x2 CDU-C+

4.4.2 3x4 CDU-C+ without Duplexer

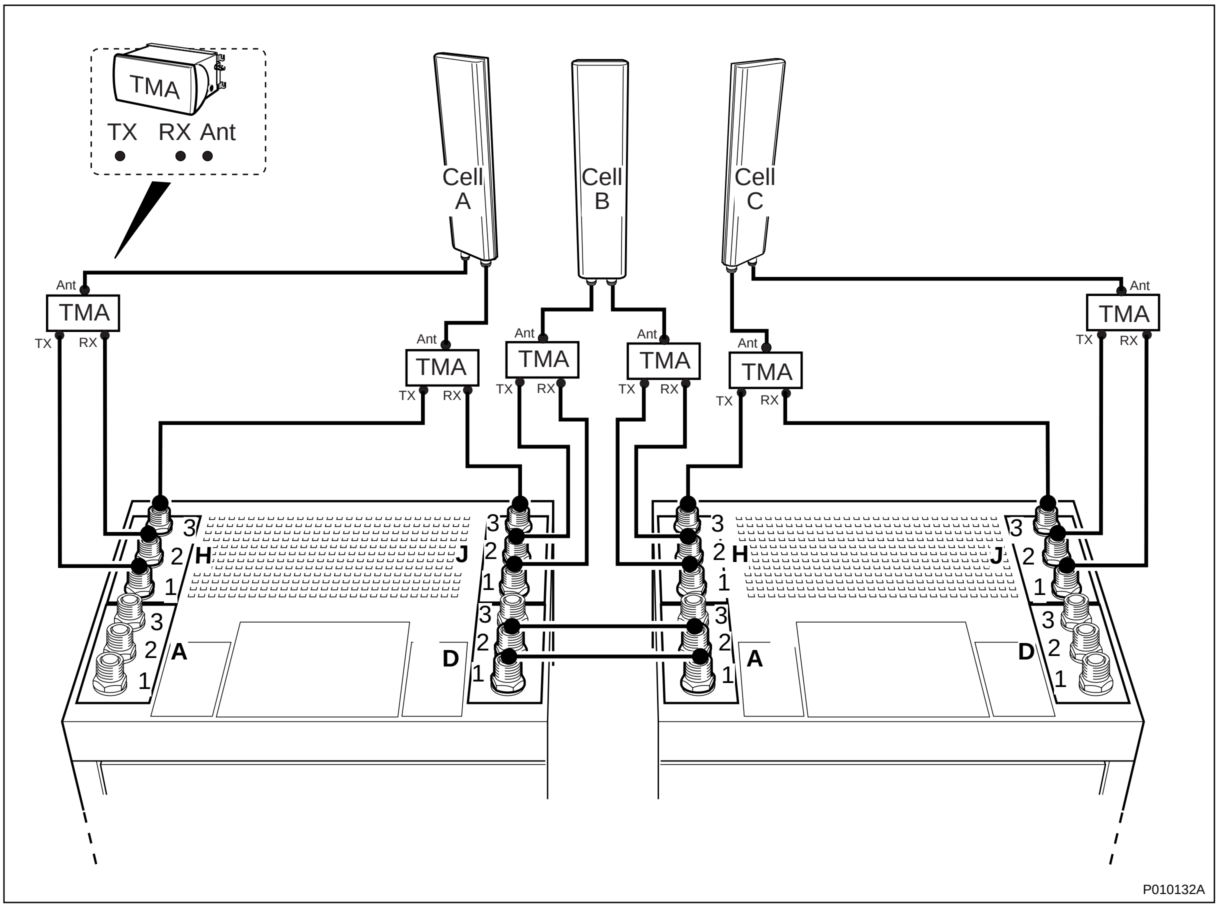


Figure 16 3x4 CDU-C+ without Duplexer

Table 16 3x4 CDU-C+ without Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	Master:			
	1	A:TX1	H1	TX 1
		A:RXA	H2	RX A
	2	A:TX2	H3	TX 2
		A:RXB	J3	RX B
B	3	B:TX1	J3	TX 1
		B:RXA	J1	RX A
	Extension:			
	1	B:TX2	H1	TX 2
		B:RXB	H2	RX B
C	2	C:TX1	H3	TX 1
		C:RXA	J3	RX A
	3	C:TX2	J2	TX 2
		C:RXB	J1	RX B

For information about connections between master and extension cabinets, *see:*

RBS 2102, RBS 2102, RBS 2103 and RBS 2202 Cabinet Reconfiguration Manual *EN/LZT 720 0048*

4.4.3 1x6 CDU-C+ without Duplexer

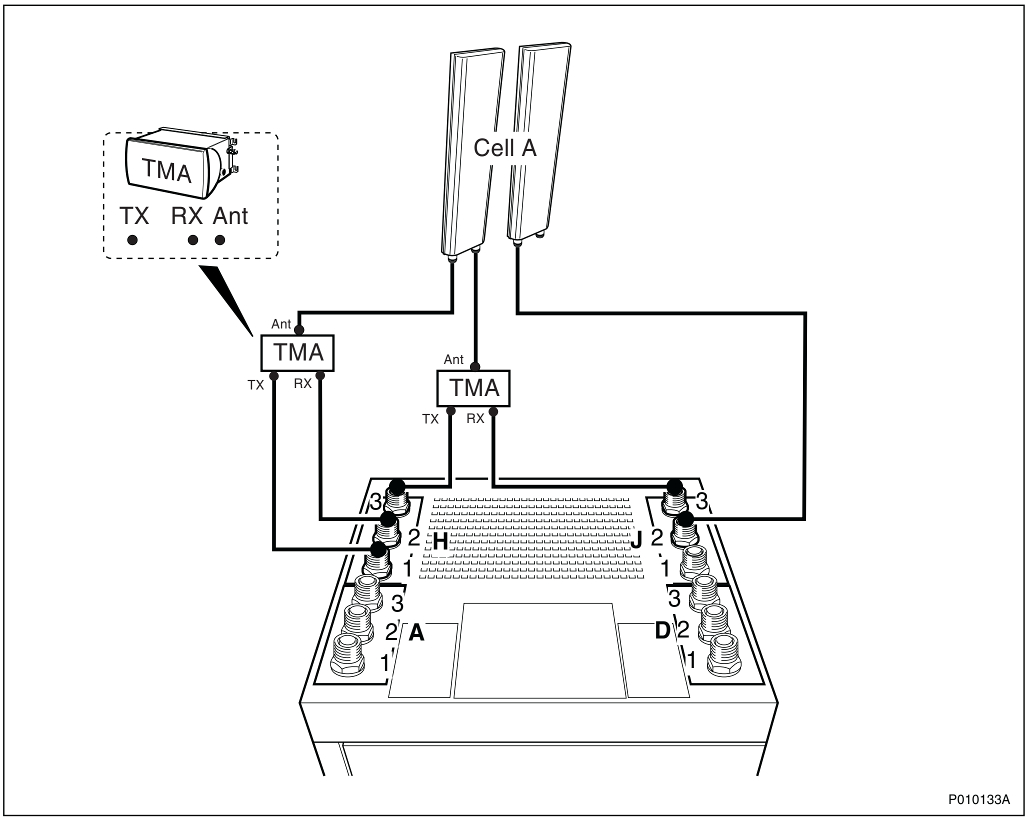


Figure 17 1X6 CDU-C+ without duplexer

Table 17 1x6 CDU-C+ without Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:TX1	H1	TX 1
		A:RXA	H2	RX A
	2	A:TX2	H3	TX 2
		A:RXB	J3	RX B
	3	A:TXB	J2	TX 3

From this 1x6 CDU-C+ configuration, the following configuration can be derived:

- 1x4 CDU-C+

The following configuration requires three cabinets, each configured as in *Table 17 on page 26:*

- 3x6 CDU-C+

5 GSM 1800 Configurations (CDU-D)

This section describes the GSM 1800 configurations for CDU-D.

5.1 CDU-D Configurations without TMA

This section describes the GSM 1800 configurations without TMA, which are possible using CDU-D.

5.1.1 1x6 CDU-D with Duplexer

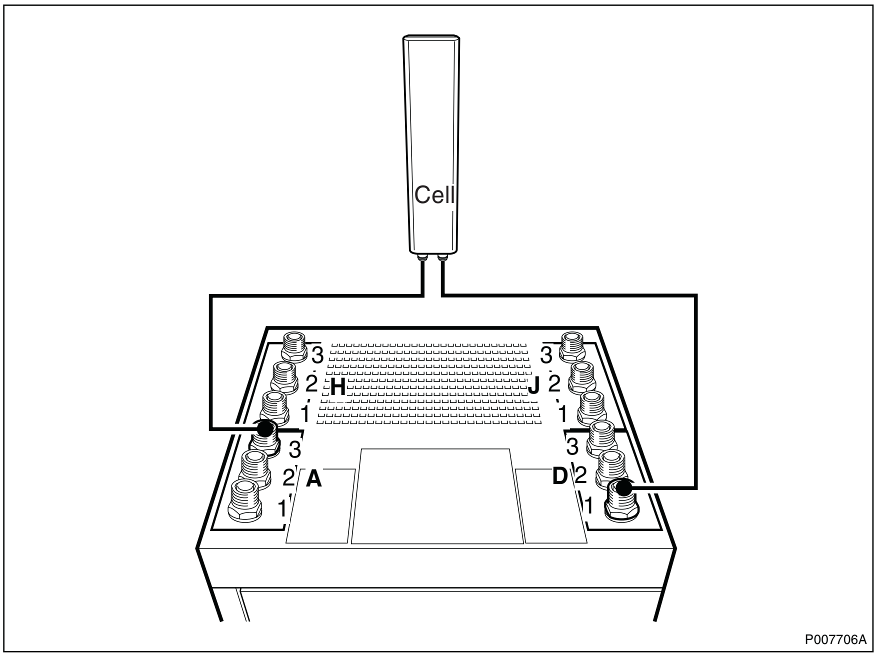


Figure 18 1x6 CDU-D

Table 18 CDU-D with Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:DX1	A3	TX/RX A
		A:RXB	D1	RX B

From this 1x6 CDU-D configuration, the following configurations can be derived:

- 1x2 CDU-D
- 1x4 CDU-D

The following three-cell configurations require three cabinets, each configured as in *Table 18 on page 27:*

- 3x2 CDU-D
- 3x4 CDU-D
- 3x6 CDU-D

5.1.2 2x12 CDU-D with Duplexer

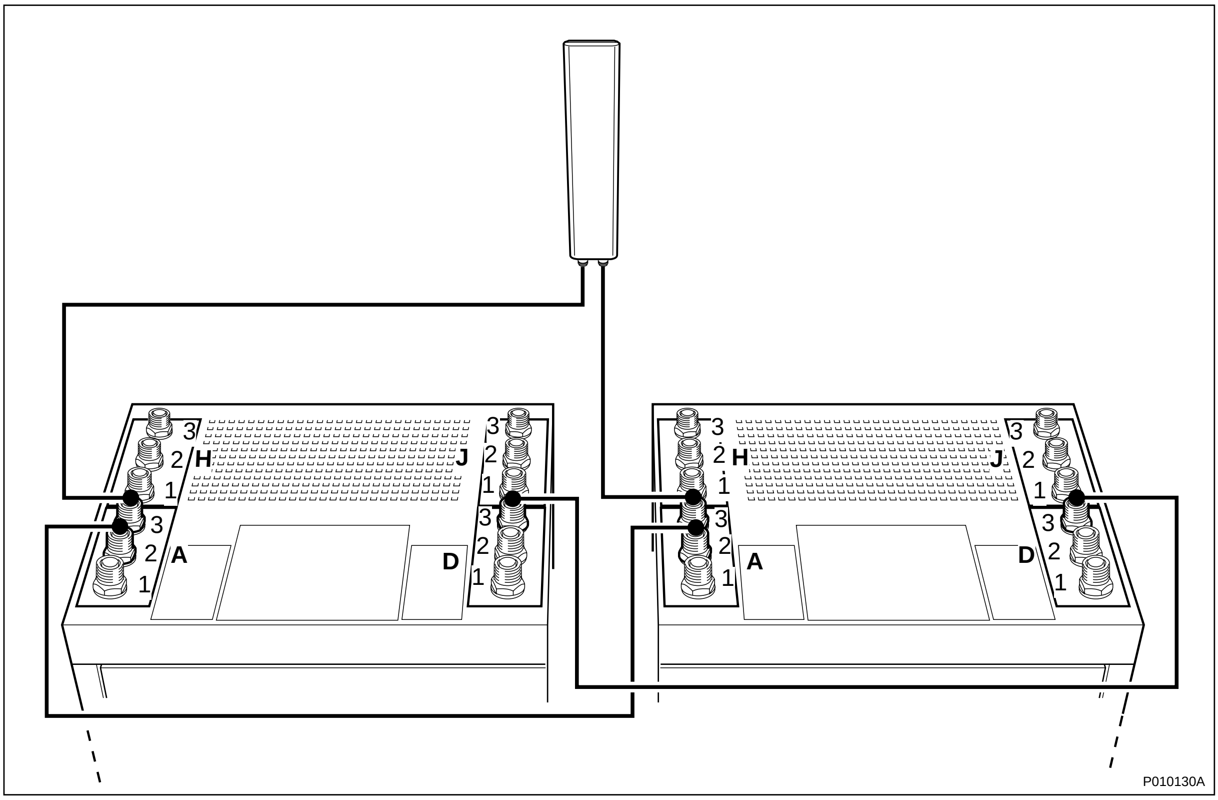


Figure 19 2x12 CDU-D with Duplexer

Table 19 2x12 CDU-D with Duplexer

Cell	CDU	Feeder label	Connector	Signal
	Master			
	1	A:DX1	A3	TX/RX A
		—	A2	HL out A2
		—	D3	HL in B
	Extension			
	1	A:DX2	A3	TX/RX B
		—	A2	HL in A
		—	D3	HL out B2

5.2 CDU-D Configurations with TMA

This section describes the GSM 1800 configurations with TMA, which are possible using CDU-D.

5.2.1 1x6 CDU-D without Duplexer

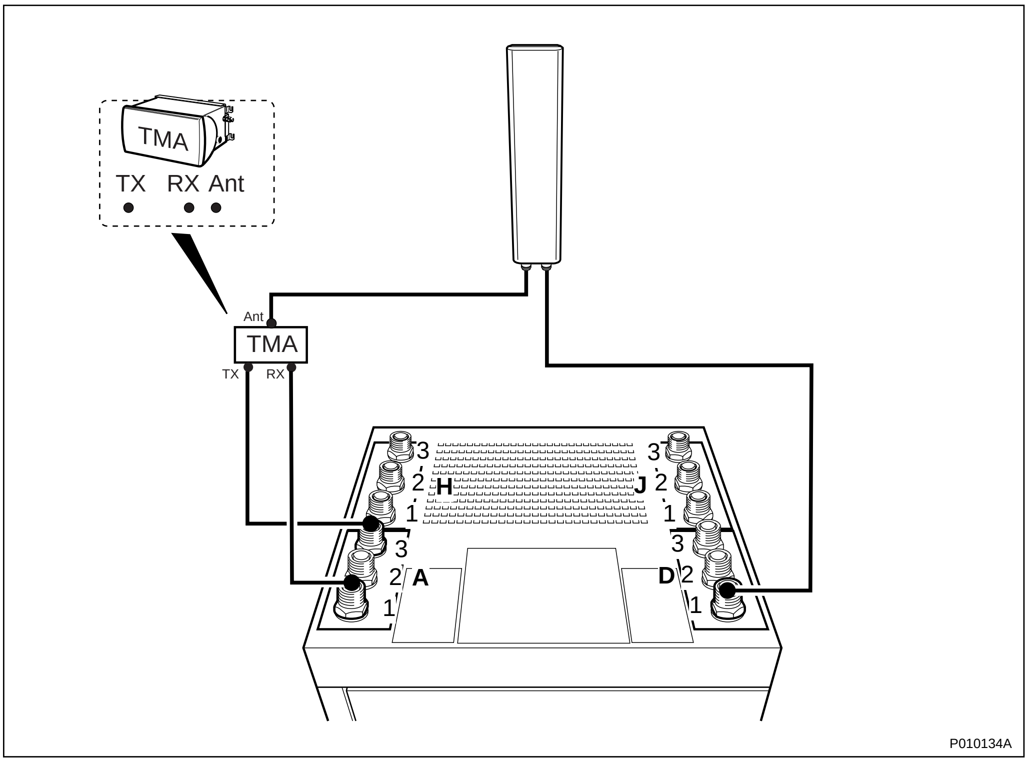


Figure 20 1x6 CDU-D without Duplexer

Table 20 1x6 CDU-D without Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	1	A:TX1	A3	TX
		A:RXA	A1	RX A
		A:RXB	D1	TX 2

From this 1x6 CDU-D configuration, the following configurations can be derived:

- 1x2 CDU-D
- 1x4 CDU-D
- 1x6 CDU-D

The following three-cell configurations require three cabinets, each configured as in *Table 20 on page 30:*

- 3x2 CDU-D
- 3x4 CDU-D
- 3x6 CDU-D

5.2.2 1x12 CDU-D without Duplexer

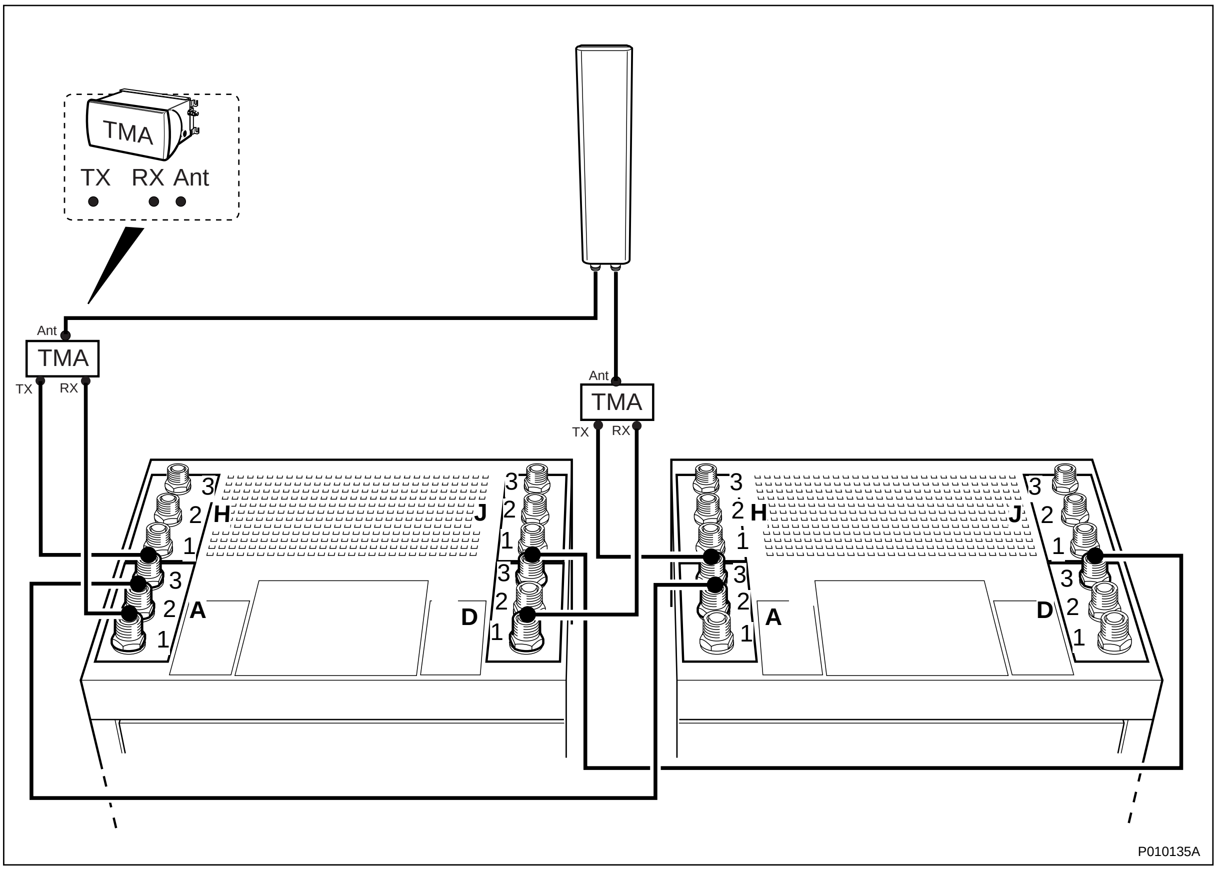


Figure 21 1x12 CDU-D without Duplexer

Table 21 1x12 CDU-D without Duplexer

Cell	CDU	Feeder label	Connector	Signal
A	Master			
	1	A:TX1	A3	TX
		A:RXA	A1	RX A
		A:RXB	D1	RX B
		—	A2	HL out A2
		—	D3	HL in B2
	Extension			
	1	A:TX2	A3	TX
		—	A2	HL in A
		—	D3	HL in B

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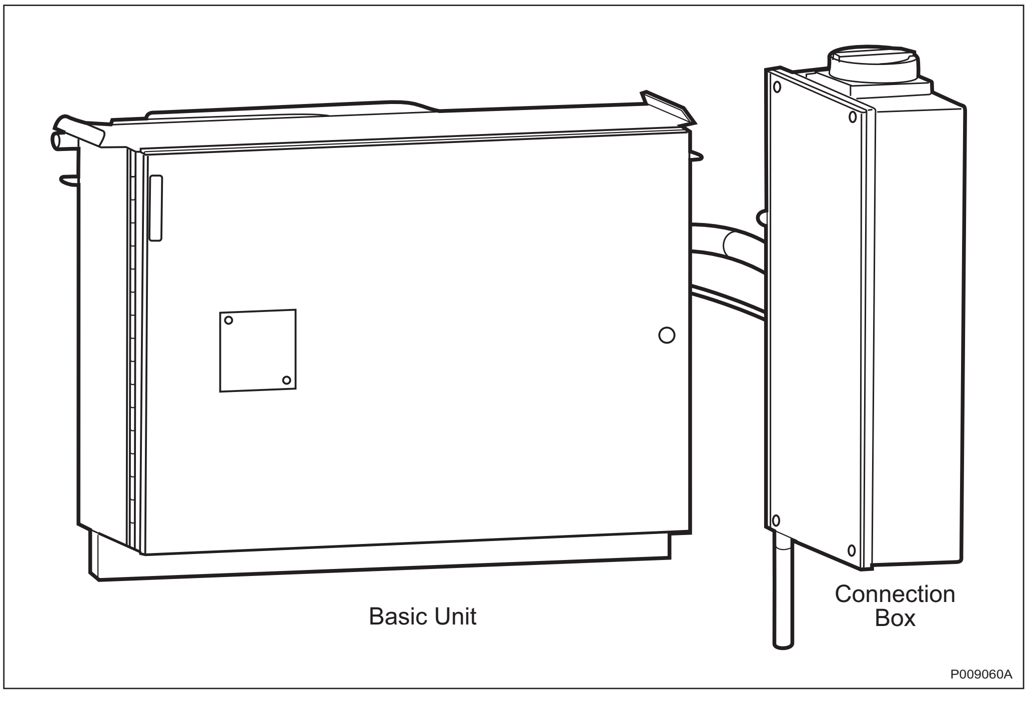
ACCU
AC Connection Unit

Unit Description

The AC Connection Unit (ACCU) distributes and supervises the AC power to the units in the RBS cabinet.



Contents

1 Product Overview

The AC Connection Unit (ACCU) for RBS 2102 distributes and supervises the AC power to the units in the RBS cabinet. The ACCU consists of two parts, the Basic Unit and the Connection Box.

1.1 Main Features

The ACCU has the following main features:

- AC connection and disconnection to the cabinet (Main Switch)
- Power line disturbance protection
- +24 V AC supply to the ECU
- Connection and disconnection of AC power, including circuit breakers, to the PSUs
- Supervision of AC mains and alarm issuing to the ECU if undervoltage
- Alarms handling from the circuit breakers and the transient protection to the ECU
- Fuse (circuit breaker) connection for the climate unit
- Service outlet

2 Dimensions

This section describes the dimensions of the Basic Unit and the Connection Box.

Basic Unit

Size and weight of the Basic Unit are shown in the table below.

Table 1 Dimensions of the Basic Unit

Height	Width	Depth	Weight
367 mm	504 mm	149 mm	12 kg

Note: Height, width and depth dimensions in the table above include the rear plate and handle.

Connection Box

Size and weight of the Connection Box are shown in the table below.

Table 2 Dimensions of the Connection Box

Height	Width	Depth	Weight
340 mm	160 mm	87 mm	5 kg

3 Function Description

This section describes the functions of the following ACCU parts:

- Basic Unit
- Connection Box

The figure below shows a block diagram of both parts in the ACCU.

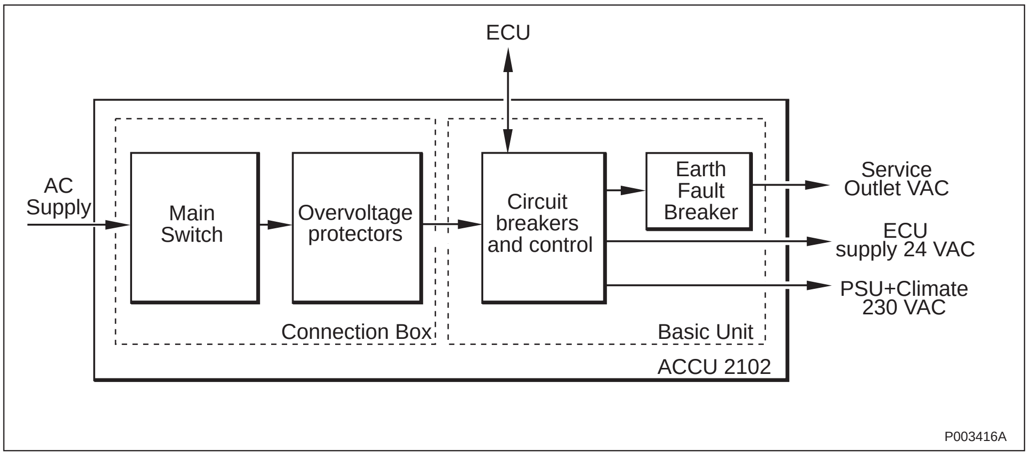


Figure 1 ACCU Block Diagram

3.1 Basic Unit

The main parts of the Basic Unit are the following:

- Five 16 A, 2-pole circuit breakers for the PSUs and climate unit
- Service outlet with a 10 A, 2-pole circuit breaker and an earth fault protector
- Printed Board Assembly (PBA) equipped with relays for operation of the AC power to the rectifiers, undervoltage detector and transformer (+24 V AC to the ECU)

3.2 Connection Box

The main parts of the Connection Box are the following:

- Terminal block for incoming AC cable
- 4-pole (line and neutral) Main Switch for connecting and disconnecting AC power to the cabinet
- Four overvoltage arrestors (OVPs)

4 Interfaces

This section describes the following ACCU interfaces:

- Power interfaces
- Operator interfaces

4.1 Power Interfaces

This section describes the following ACCU power interfaces:

- Power input
- Voltage and power output

The power connections of the Basic Unit are shown in the figure below.

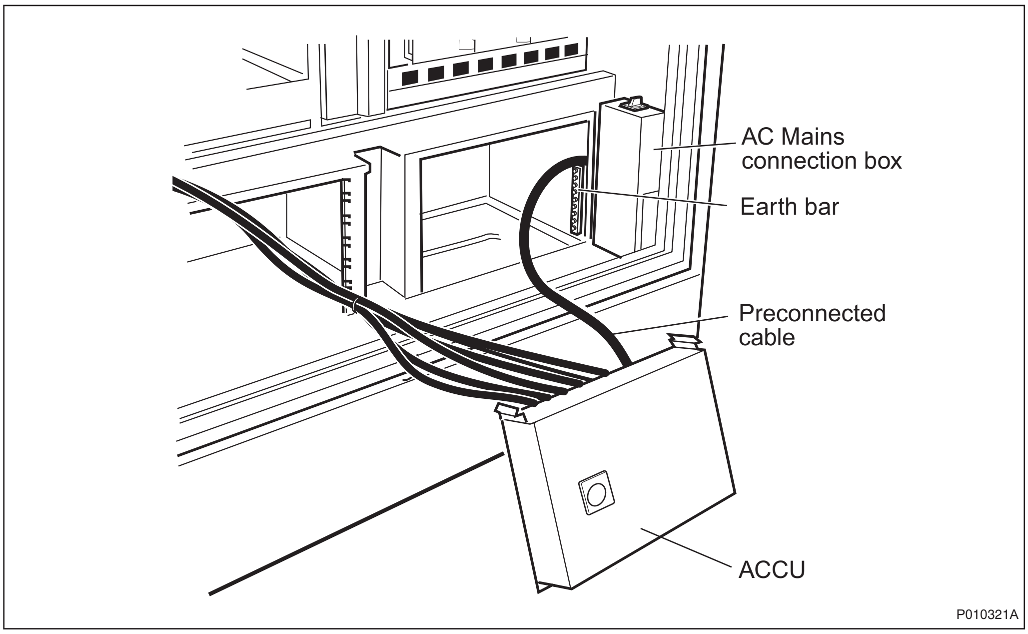


Figure 2 Power Connections for Basic Unit

The power connections of the Connection Box are shown in the figure below.

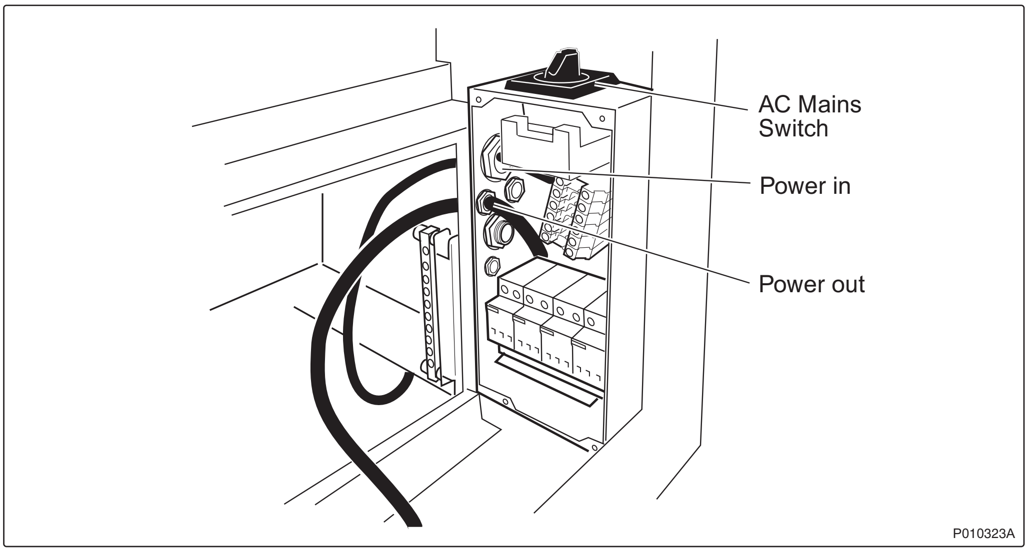


Figure 3 Power Connections for Connection Box

Power Input

This section describes the power interface, external fuse, to the ACCU.

Table 3 External Fuse

External Fuse	
Max.	**Min.**
63 A/phase	40 A/phase

Voltage and Power Output

This section describes the power interface from the ACCU. Output voltage and output power values are given in the tables below.

Table 4 Output Voltage

Output Voltage	
To internal users	200 - 250 V AC ±10%
To control unit, ECU	24 V AC
Frequency range	50 Hz ± 10% 60 Hz ± 8%

Table 5 Output Power

Output power	
To internal users (PSUs)	1136 VA x 4
To internal users, climate unit	2200 VA, 60 Hz
To service outlet AC power	1500 VA, 50 Hz
	1200 VA, 60 Hz

4.2 Operator Interfaces

The ACCU has the following operator interfaces:

- Four AC mains cables, one for each PSU
- One AC mains cable for the climate unit
- One common cable for alarms to ECU and 24 AC supply to ECU
- Earth connections: diverter to the Overvoltage Protectors (OVPs) and earth cable

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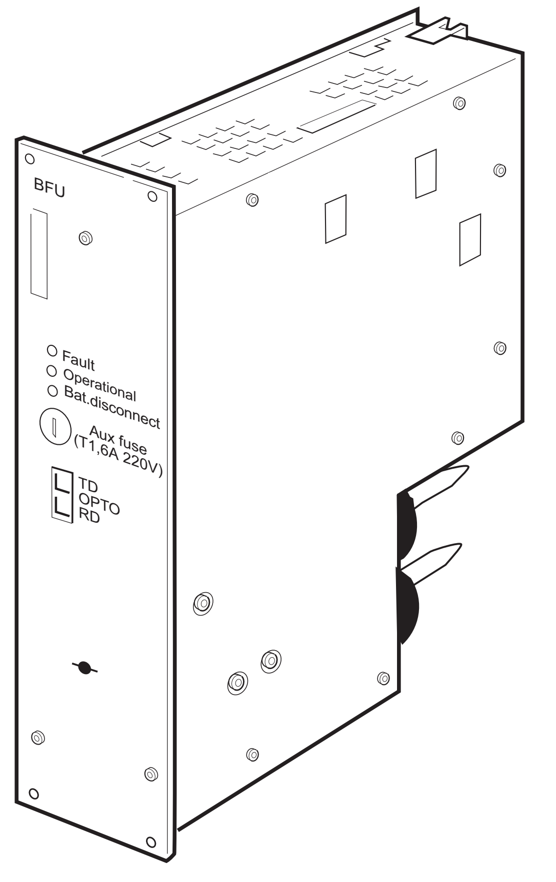
BFU

Battery Fuse Unit

Unit Description

The Battery Fuse Unit (BFU) supervises the load and temperature of the batteries, and connects and disconnects the batteries at low voltage. It also regulates the charging of the back-up batteries.



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Contents

1 Product Overview

The Battery Fuse Unit (BFU) supervises, connects and disconnects the batteries at low voltage in the following RBSs:

- RBS 2102
- RBS 2103

Due to its own default values, the BFU can operate independently from the rest of the control system in the RBS. If the communication between the ECU and the BFU fails, the BFU will still function.

1.1 Main Functions

The BFU has the following main functions:

- Communication with the ECU
- Disconnection of main load from batteries
- Alarm handling

Communication with the ECU

The BFU measures the following values and transfers them to the ECU via the opto cable:

- Battery voltage
- Battery current
- The difference between the voltage level in the batteries and the system voltage from the rectifiers
- Battery temperature (this value is used by the ECU to send information to the rectifiers to change the output level on the voltage so that the batteries can be charged in a proper way)

Disconnection of Main Load from Batteries

The BFU has a measuring function and disconnects the main load from the batteries if there is a risk of damaging the batteries due to a too-high temperature or deep discharging.

Alarm Handling

The alarms are detected in the BFU and forwarded to the ECU and to an indicator light on the front. The following alarms are detected:

Table 1 Alarms

Alarm	Description
Circuit breaker trip or Aux fuse blown	Circuit breaker tripped or Aux blown.
Communication failure	Not receiving signals from optical loop.
BFU failure	Failures on the BFU not specified above.
Battery disconnected	Contactor released.

2 Dimensions

The size and weight of the BFU are shown in the table below.

Table 2 Dimensions

Height	Width	Depth	Weight
267 mm(1)	61 mm(2)	234 mm	3.8 kg

(1) 6 HE x 44.45 mm
(2) 12 TE x 5.08 mm

3 Power Consumption and Heat Generation

This section provides information about the power consumption and heat generation of the BFU.

Table 3 Power consumption and heat generation

Max. Power Consumption	Max. Heat Generation
20 W	20 W

4 Function Description

This section describes the functions of the following BFU units:

- Auxiliary fuse (RBS 2102 only)
- Circuit Breaker (Fuse)
- Contactor
- Control and supervision circuits
- Power circuit

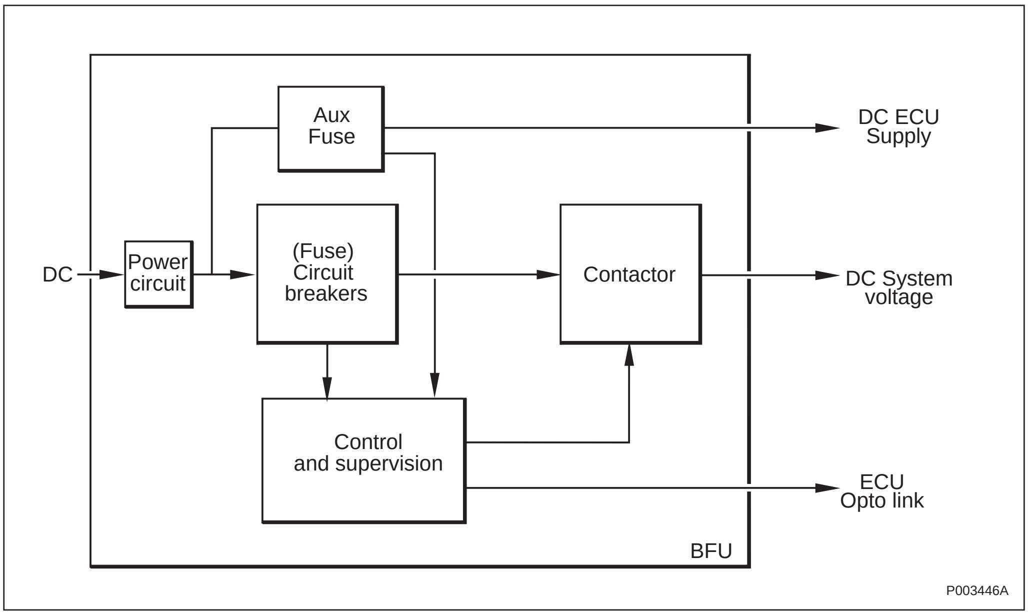

Figure 1 BFU block diagram

Auxiliary fuse When the cabinet is running on DC power the ECU is connected to a fuse marked "Aux" in the BFU.

Circuit Breaker (Fuse) Connects the batteries to the internal system voltage bar. The circuit breaker should be set in position normal.

Contactor Disconnects the batteries from the power system. The BFU, while under ECU supervision, controls the battery usage as a back-up source of DC power to the RBS and disconnects the batteries when the output DC voltage becomes too low. It also regulates the DC power supply for charging the back-up batteries.

Control and supervision The control and supervision circuits in the BFU constantly measure the temperature of the batteries and transfer the data to the ECU. If the battery temperature reaches 60° C, an alarm is sent to the ECU. If it rises above 65° C, the contactor will trip. The batteries are reconnected when the temperature falls below 55° C.

Power circuit

The high current connection between the rectifiers and the batteries. The circuit breaker lever indicates whether it has been tripped or not. The shunt enables measurement of battery current. The common negative system voltage is not controlled by the BFU and has no path through the unit. Thus only positive power is routed through the BFU.

5 Interfaces

This section describes the following BFU interfaces.

- Signal and power interface
- Operator interface

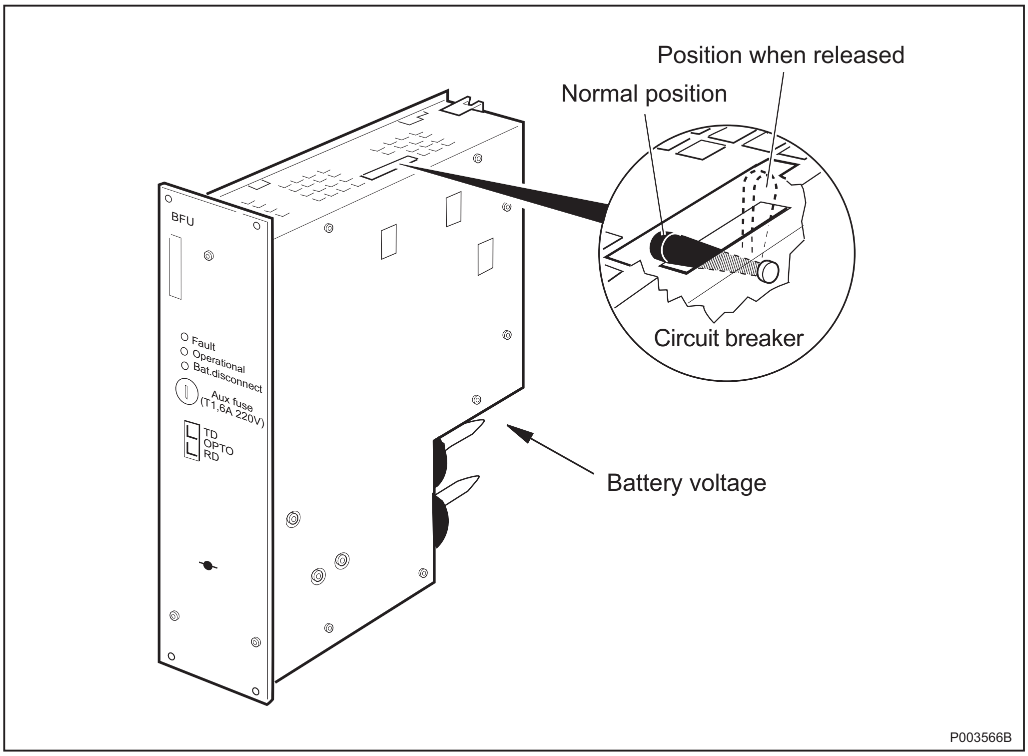

Figure 2 Interfaces

5.1 Signal and Power Interfaces

The signal and power interfaces are located on the rear of the BFU unless otherwise indicated.

Signal

A signal interface is located on the rear of the BFU for the following:

- DC control
- Temperature sensor
- ECU control

On the front panel of the BFU is an optical fibre link (Opto) for communication with the ECU.

Power

The power interfaces consist of the following:

- System voltage to the RBS
- Battery voltage (*See Figure 2 on page 7.*)

5.2 Operator Interface

This section describes the operator interface consisting of connectors, optical indicators and a circuit breaker.

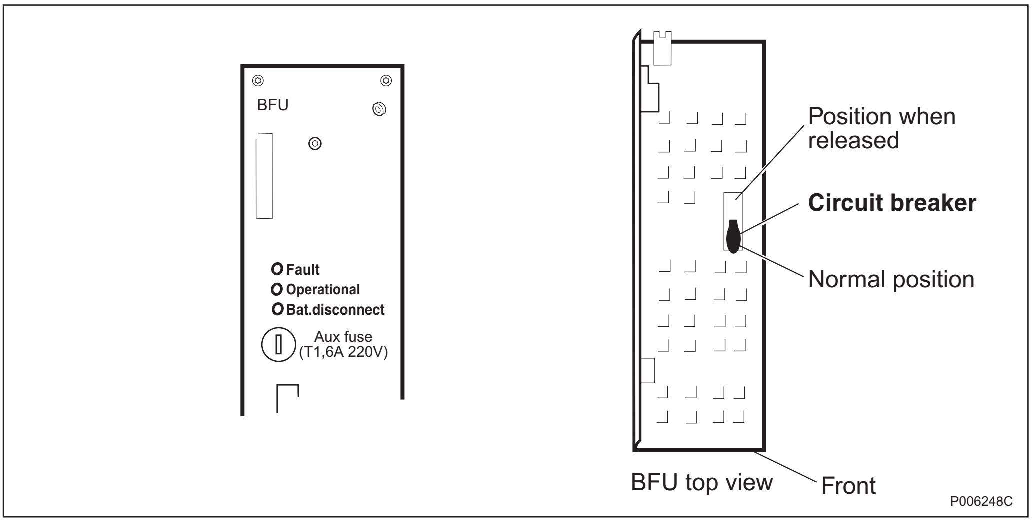

Figure 3 BFU optical indicators and circuit breaker

Connectors

The following connector is located on the front of the BFU:

- AUX fuse

Optical Indicators

This section describes the BFU optical indicators.

Table 4 BFU optical indicators

Label	Colour	Mode	Indication
Fault	Red	Off	No faults detected.
		On	One or more faults detected.
		Flashing	The unit has detected a communication fault on the power communication loop.(1)
Operational	Green	Off	BFU is not operational.
		On	BFU is operational.
		Flashing	The unit has detected a communication fault on the power communication loop.(2)
Battery disconnect	Yellow	Off	Battery is connected.
		On	Battery is disconnected.

(1) BFU revision 2 or later
(2) BFU revision 1

Circuit Breaker

Table 5 Circuit breaker

Label	Position	Description
Circuit breaker	ON(1)	Battery power to the RBS connected
	OFF(2)	Battery power from the RBS disconnected

(1) Normal position
(2) Position when released

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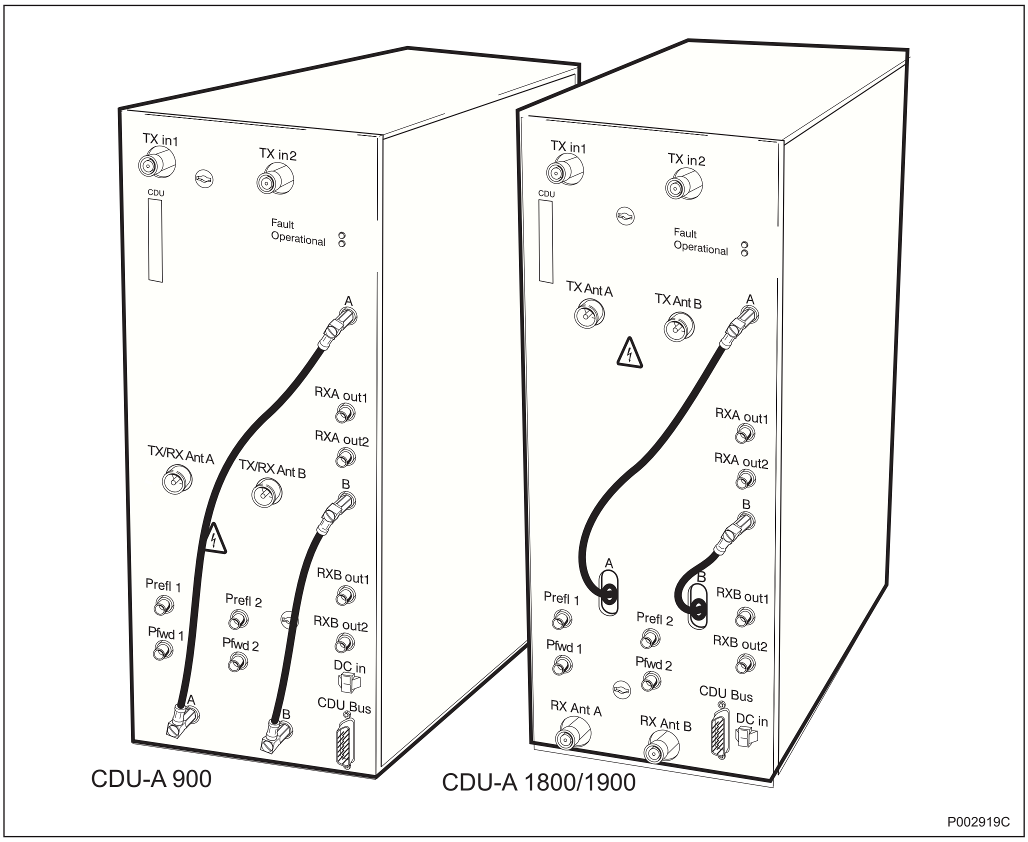
CDU-A
Combining and Distribution Unit

Unit Description

The Combining and Distribution Unit (CDU) is the interface between the transceivers and the antenna system. CDU-A is used in low-capacity cells where high coverage is required.



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Contents

1 Product Overview

This section includes a product overview of CDU-A, a combining and distribution unit used in low-capacity cells where high coverage is needed.

1.1 Main Functions

This section describes the main functions of CDU-A:

- Distribution of two independent RX antennas to two receivers
- Connection of two TXs to two antennas
- Simultaneous transmission and reception on each antenna (GSM 900 version)
- No transmitter combining
- Baseband and synthesizer frequency hopping support
- Power and supervision of an external Tower Mounted Amplifier (TMA) via the receiver (RX) antenna cables (GSM 1800 and GSM 1900 versions)

Note: TMA is optional for GSM 1800 and mandatory for GSM 1900.

1.2 Variants

CDU-A is available for:

- GSM 900
- GSM 1800
- GSM 1900

The GSM 1800 and GSM 1900 versions are identical, except for the frequency bands.

CDU-A for GSM 900 is equipped with two duplexers. CDU-A for GSM 1800 and GSM 1900 are not equipped with duplexers and therefore require separate antenna feeders for the TX and RX signals in both the A and B signal paths.

2 Dimensions

This section describes the physical dimensions of CDU-A. Size and weight are given in the table below.

Table 1 CDU-A Dimensions

Height	**Width**	**Depth**	**Weight**
400 mm	142 mm	270 mm	14 kg

3 Power Consumption and Heat Generation

This section describes power consumption and heat generation for CDU-A. The maximum power consumption and maximum heat generation for CDU-A with and without TMA are given in the table below.

Table 2 Power Consumption and Heat Generation

	Max. Power Consumption	**Max. Heat Generation**
No TMA	40 W	100 W
With TMA	120 W	300 W

4 Function Description

This section describes the functions of CDU-A.

The CDU-A can be divided into the following functional parts:

- TX part
- RX part

The figure below shows a block diagram of CDU-A (GSM 900) with duplexer.

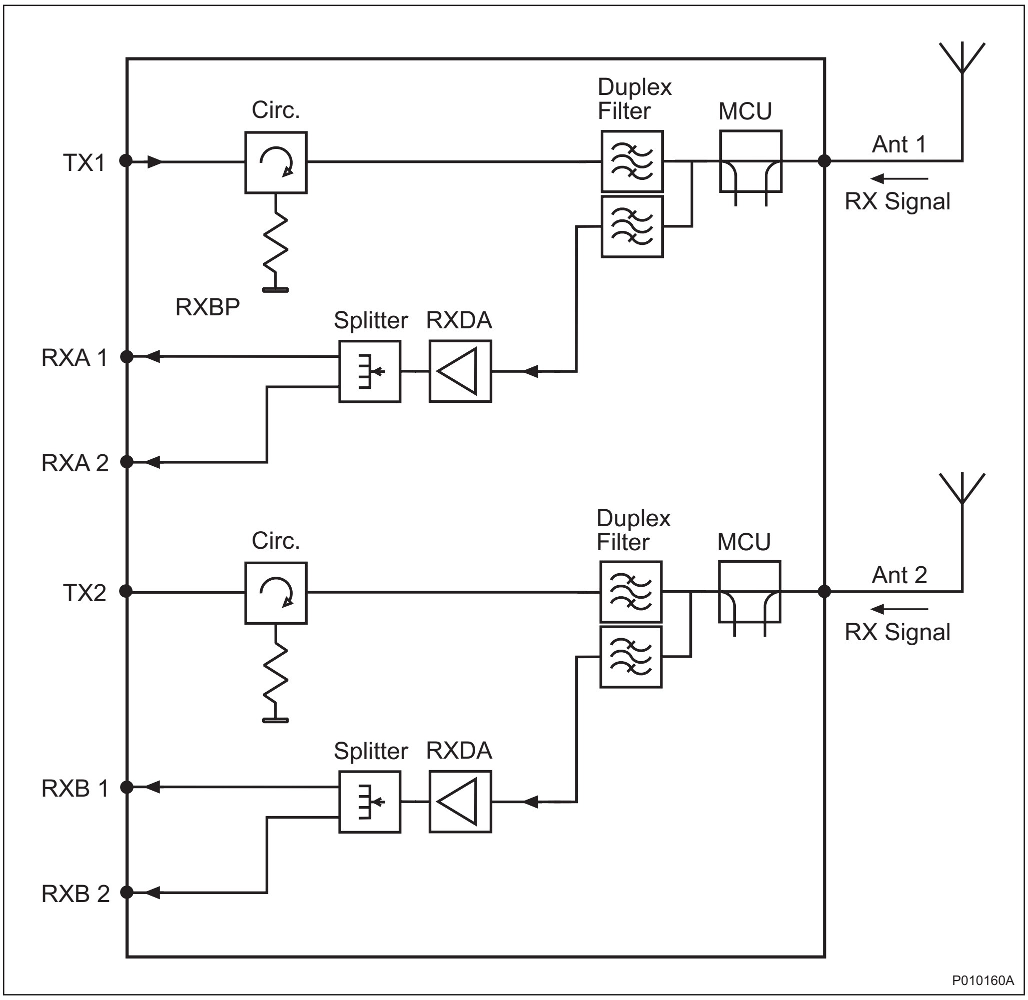

Figure 1 Block Diagram of CDU-A with Duplexer (GSM 900)

The figure below shows a block diagram of CDU-A (GSM 1800 and GSM 1900) without duplexer.

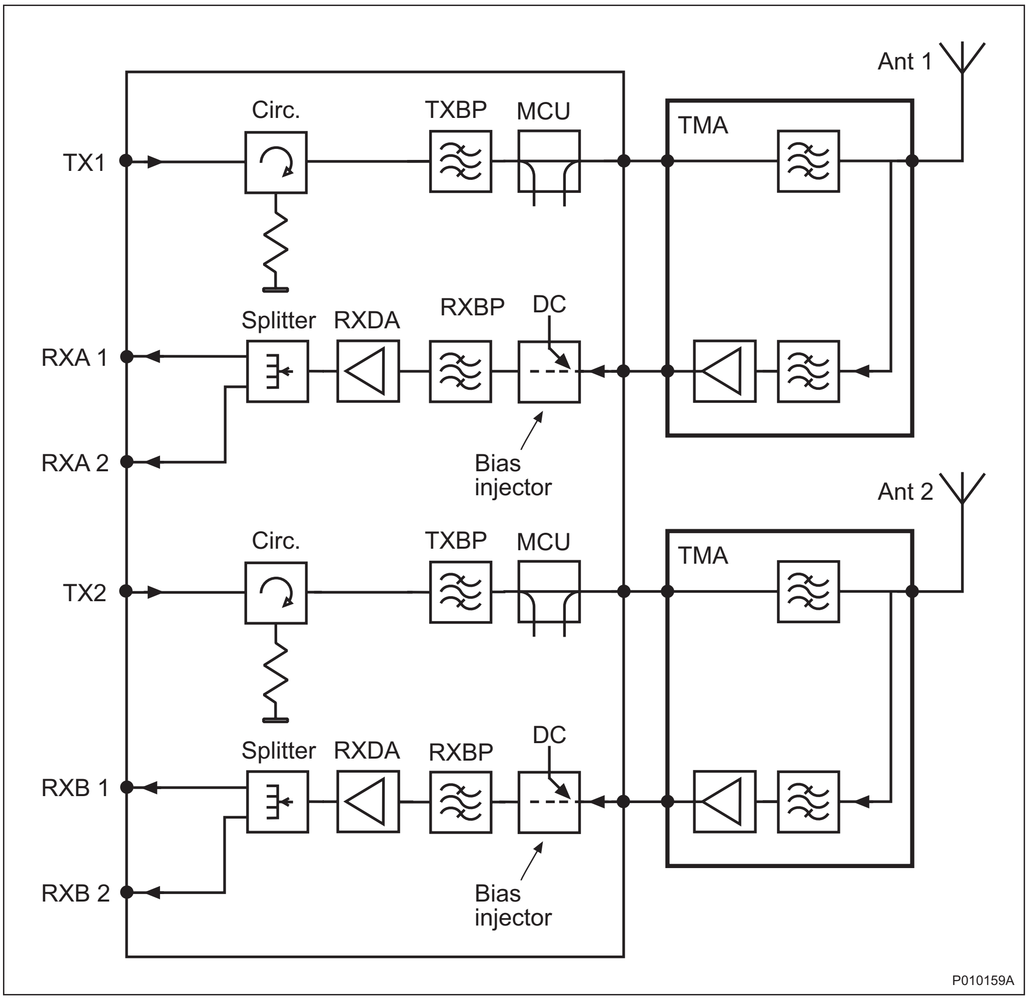

Figure 2 Block Diagram of CDU-A without Duplexer (GSM 1800 and GSM 1900)

4.1 TX Part

The TX part handles the transmission of signals from the TRUs to the antenna. The TX part for each antenna consists of:

- A circulator
- A TX Band-Pass Filter (TXBP) (GSM 1800 and GSM 1900 versions only)
- A duplex filter (duplexer) (GSM 900 version only)
- A Measurement Coupler Unit (MCU)

Circulator The circulator provides a uni-directional transmission path and protects the transmitter inputs from reflected signals.

TXBP The TXBP lets TX signals between two specified frequencies pass and removes unwanted out-of-band signals

Duplexer The duplexer allows simultaneous transmission and reception on the same antenna. It lets the TX signals pass to the antenna and lets the RX signals from the antenna pass to the RX part.

Signals of other frequencies are blocked by the filter.

MCU The MCU measures forward and reflected signal levels at the CDU output. The signals are forwarded to the TRU via cables on the front of the CDU.

4.2 RX Part

The RX part handles the transmission of signals from the antenna to the TRUs. The RX part for each antenna consists of the following units:

- A bias injector (GSM 1800 and GSM 1900 versions only)
- A duplex filter (duplexer) (GSM 900 version only)
- An RX Distribution Amplifier (RXDA)
- A splitter
- RX Band-Pass filters (RXBP)

Bias Injector The GSM 1800 and GSM 1900 versions contain two bias injectors to provide power to and supervise an optional TMA.

Duplexer *See above.*

RXDA RXDA amplifies the RX signal.

Splitter The splitter divides the signal from the RXDA into two branches.

RXBP The RXBP lets RX signals between two specified frequencies pass and removes unwanted out-of-band signals.

5 Interfaces

This section describes the following CDU-A interfaces:

- Signal and power interface
- Operator interface

These are located on the front panel, *see figure below.*

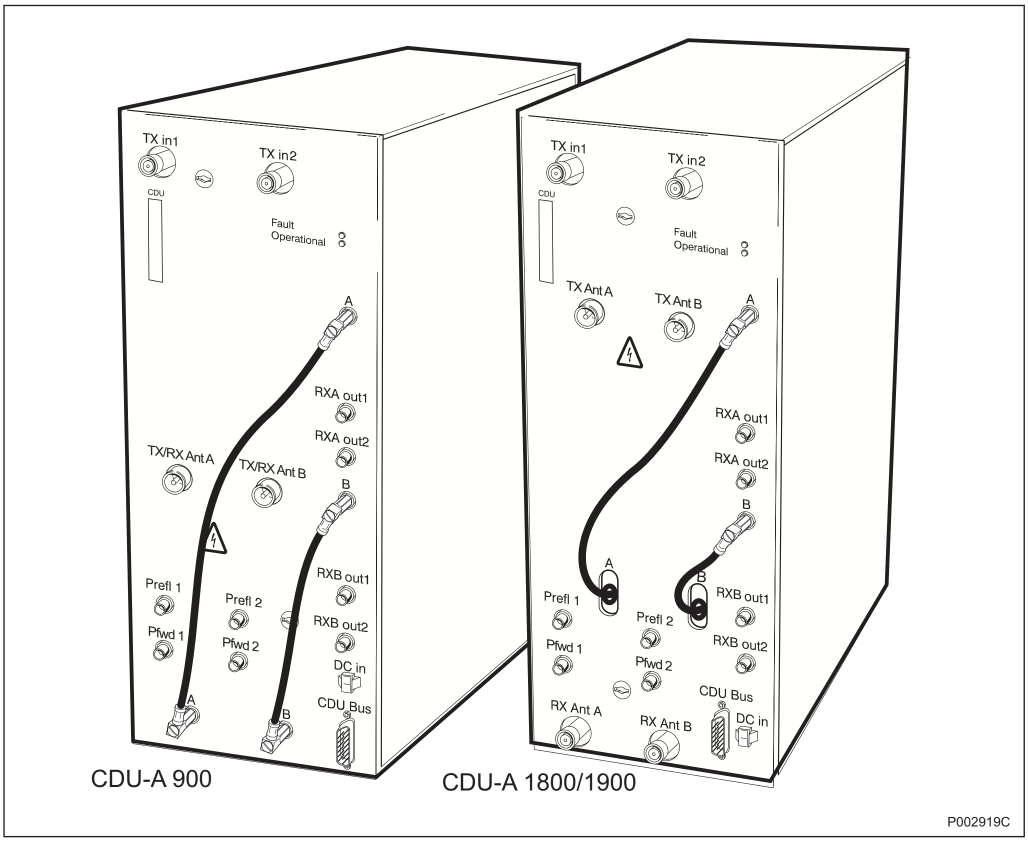

Figure 3 CDU-A Interface

5.1 Signal and Power Interface

This section describes the signal and power connections on CDU-A.

Table 3 Signal and Power Connectors

Connection	Connector Type
TX in1, TX in2	TNC female
TX Ant A, TX Ant B(1)	N female
RX Ant A, RX Ant B	N female
TX/RX Ant A, TX/RX Ant B(2)	N female
RXA out1, RXA out2	SMA female
RXB out1, RXB out2	SMA female
Prefl 1, Prefl 2	SMA female
Pfwd 1, Pfwd 2	SMA female
CDU Bus	9-pin male
D-sub DC in	2-pin male Molex Mini-Fit

(1) Only GSM 1800, GSM 1900
(2) Only GSM 900

5.2 Operator Interface

This section describes the operator interface, which consists of optical indicators located on the front panel, *see figure and table below.*

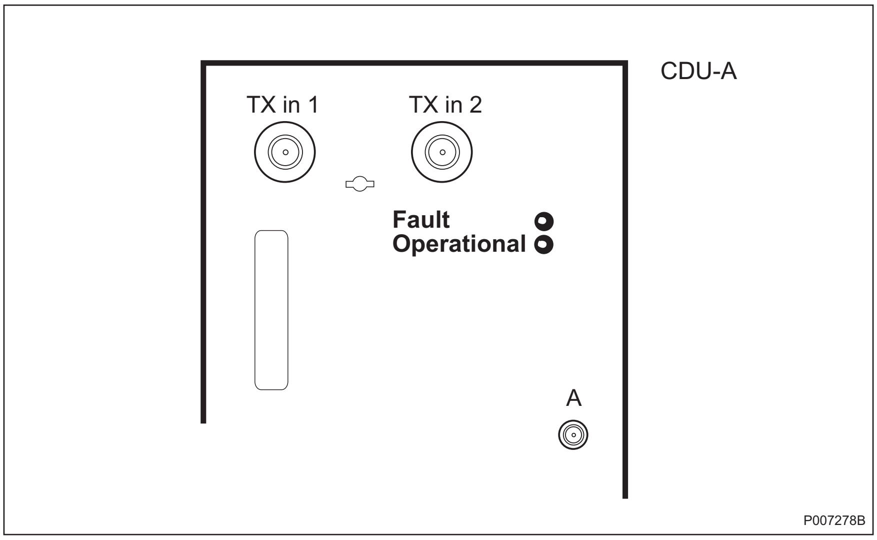

Figure 4 CDU-A Indicators

Table 4 CDU-A Indicators

Indicator	**Colour**	**Mode**	**Description**
Fault	Red	Off	No faults detected in CDU-A
		On	One or more faults detected in CDU-A
		Flashing	Loss of communication to a superior RU detected by CDU-A
Operational	Green	Off	CDU-A not operational
		On	CDU-A operational

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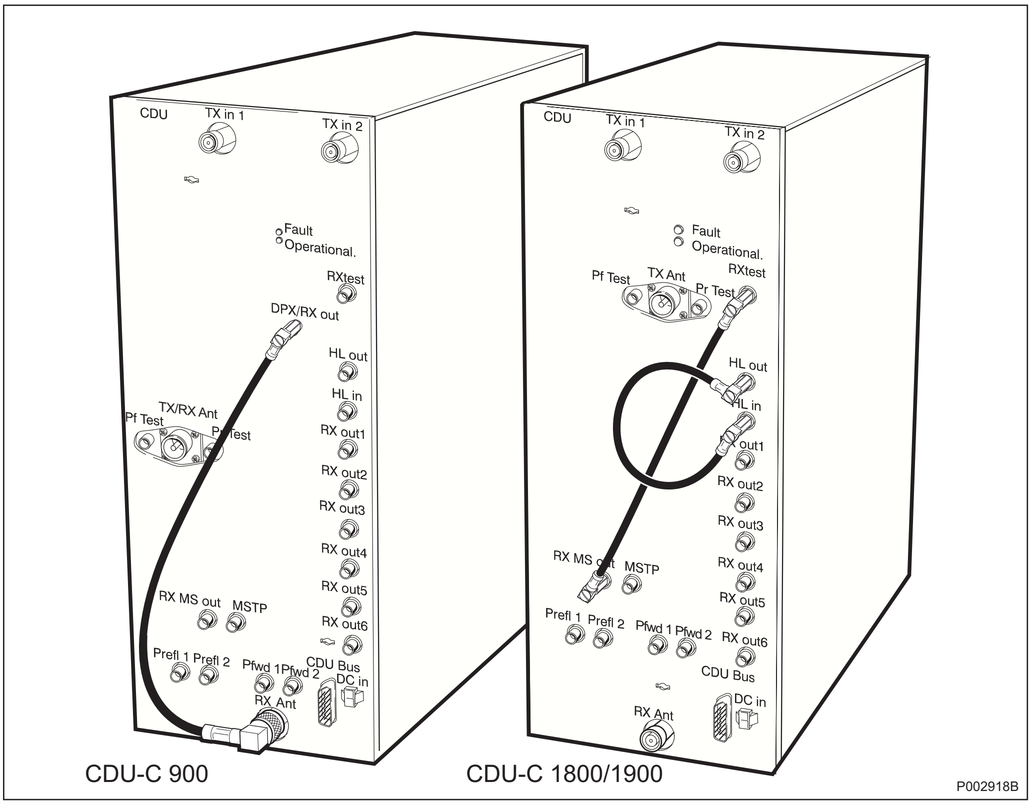
CDU-C
Combining and Distribution Unit

Unit Description

The Combining and Distribution Unit (CDU) is the interface between the transceivers and the antenna system. CDU-C is used in low-coverage cells where high capacity is required.



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Contents

1 Product Overview

This section includes a product overview of CDU-C, a combining and distribution unit used in high-capacity cells where low coverage is needed.

CDU-C+ has replaced CDU-C as a spare part.

Note: Two CDU-Cs for each sector are always used.

1.1 Main Functions

This section describes the main functions of CDU-C:

- Combining of two TX signals to one antenna
- Distribution of RX signals from one antenna to six receivers
- Simultaneous transmission and reception on one antenna (GSM 900 version)
- Diversity reception (two CDU-Cs required)
- Handling of up to six TRUs in one cell (three CDU-Cs required)
- Baseband and synthesizer frequency hopping support
- Power and supervision of an external Tower Mounted Amplifier (TMA) via the receiver (RX) antenna cables (GSM 1800 and GSM 1900 versions)

Note: TMA is optional for GSM 1800 and GSM 1900.

1.2 Variants

CDU-C is available for:

- GSM 900
- GSM 1800
- GSM 1900

The GSM 1800 and GSM 1900 versions are identical, except for the frequency bands.

CDU-C for GSM 900 is equipped with a duplexer. CDU-C for GSM 1800 and GSM 1900 are not equipped with duplexers and therefore require separate antenna feeders for the TX and RX signals in both the A and B signal paths.

2 Dimensions

This section describes the physical dimensions of CDU-C.

Table 1 CDU-C Dimensions

Height	Width	Depth	Weight
400 mm	142 mm	270 mm	12 kg

3 Power Consumption and Heat Generation

This section describes power consumption and heat generation for CDU-C.

Table 2 Power Consumption and Heat Generation

	Max. Power Consumption	Max. Heat Generation
No TMA	40 W	100 W
With TMA	55 W	100 W

4 Function Description

This section describes the functions of CDU-C. The CDU-C can be divided into the following functional parts:

- TX part
- RX part

The figure below is a block diagram of CDU-C (GSM 900) with duplexer.

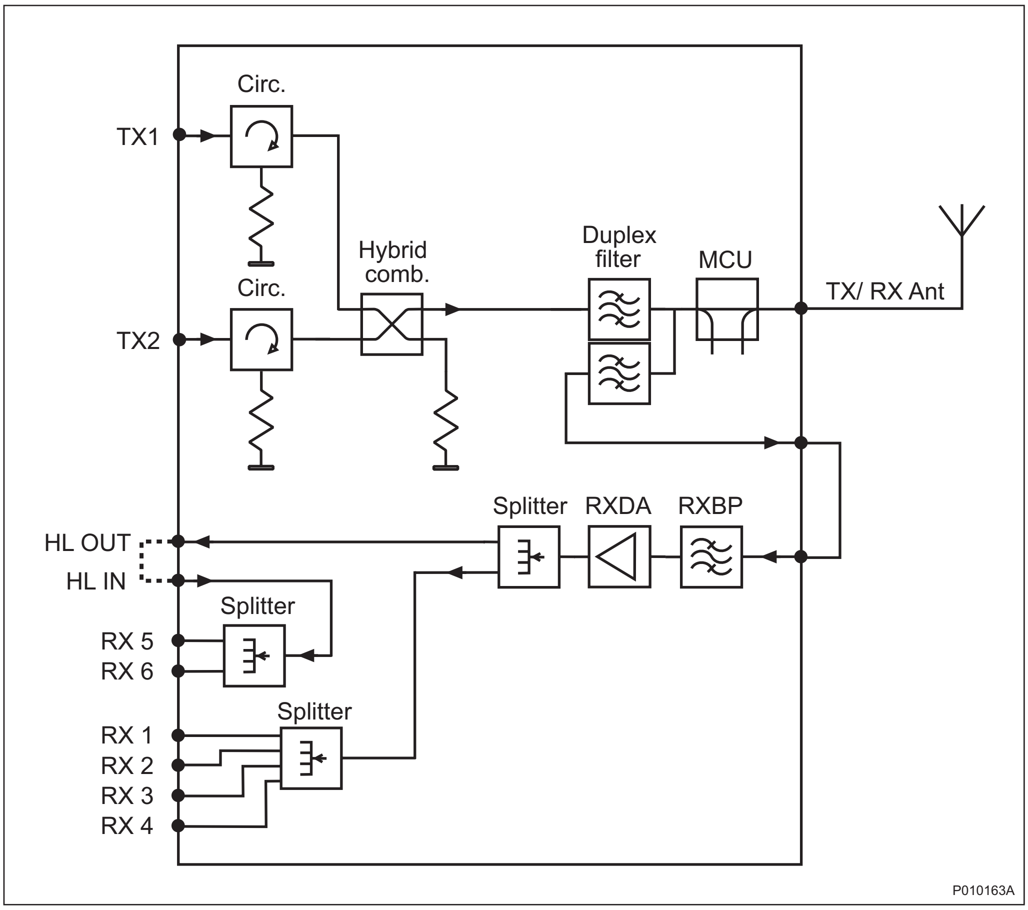

Figure 1 Block Diagram for CDU-C with Duplexer (GSM 900)

The figure below is a block diagram of CDU-C (GSM 1800 and GSM 1900) without duplexer.

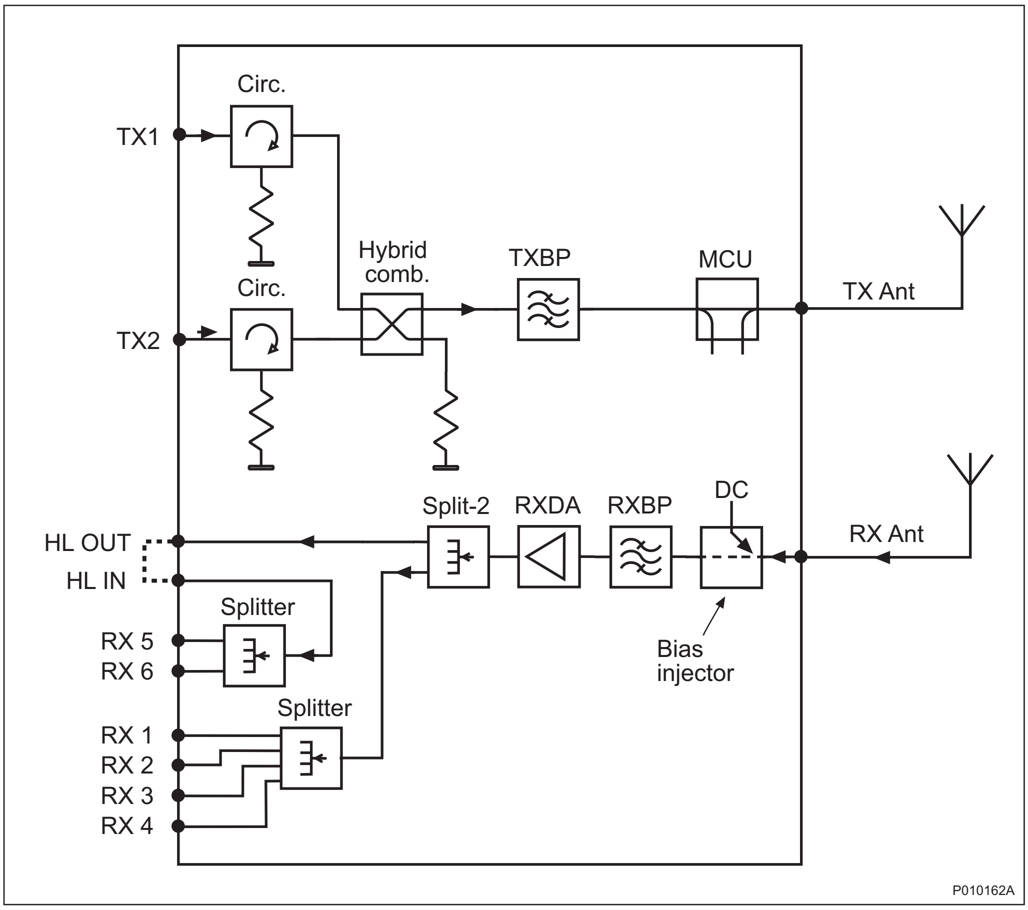

Figure 2 Block Diagram for CDU-C without Duplexer (GSM 1800 and GSM 1900)

4.1 TX Part

The TX part handles the transmission of signals from the TRUs to the antenna. The TX part consists of:

- Two circulators
- A hybrid combiner
- One TX Band-Pass filter (TXBP) (GSM1800/GSM1900 version)
- A duplex filter (duplexer) (GSM 900 version only)
- A measurement coupler unit (MCU)

Circulator The circulator provides a uni-directional transmission path and protects the transmitter inputs from reflected signals.

TXBP	The TXBP lets TX signals between two specified frequencies pass and removes unwanted out-of-band signals
Hybrid Combiner	The hybrid combiner combines two TX signals to a common output. It is a broadband combiner, but there is a 3 dB combing loss in the TX path.
Duplexer	The duplexer allows simultaneous transmission and reception on the same antenna. It lets the TX signals pass to the antenna and let the RX signals from the antenna pass to the RX part.
MCU	The MCU measures forward and reflected signal levels at the CDU output. The signals are forwarded to the TRU via cables on the front of the CDU.

4.2 RX Part

The RX part consists of two RX chains, A and B, and includes the following units:

- A duplex filter (duplexer) (GSM 900 version only)
- A bias injector (GSM 1800 and GSM 1900 versions only)
- An RX Band-Pass filter (RXBP)
- An RX Distribution Amplifier (RXDA)
- Splitters

Duplexer	*See Page 7.*
Bias Injector	The bias injector in the GSM 1800 and GSM 1900 versions provides power to and supervises an optional TMA.
RXBP	The RXBP lets RX signals between two specified frequencies pass and removes unwanted out-of-band signals.
RXDA	RXDA amplifies the RX signal for transmission to the splitter.
Splitter	The splitter divides the RX signals for distribution to the TRUs. It has no filtering or gain.

5 Interfaces

This section describes the following CDU-C interfaces:

- Signal and power interface
- Operator interface

These are shown in the figure below.

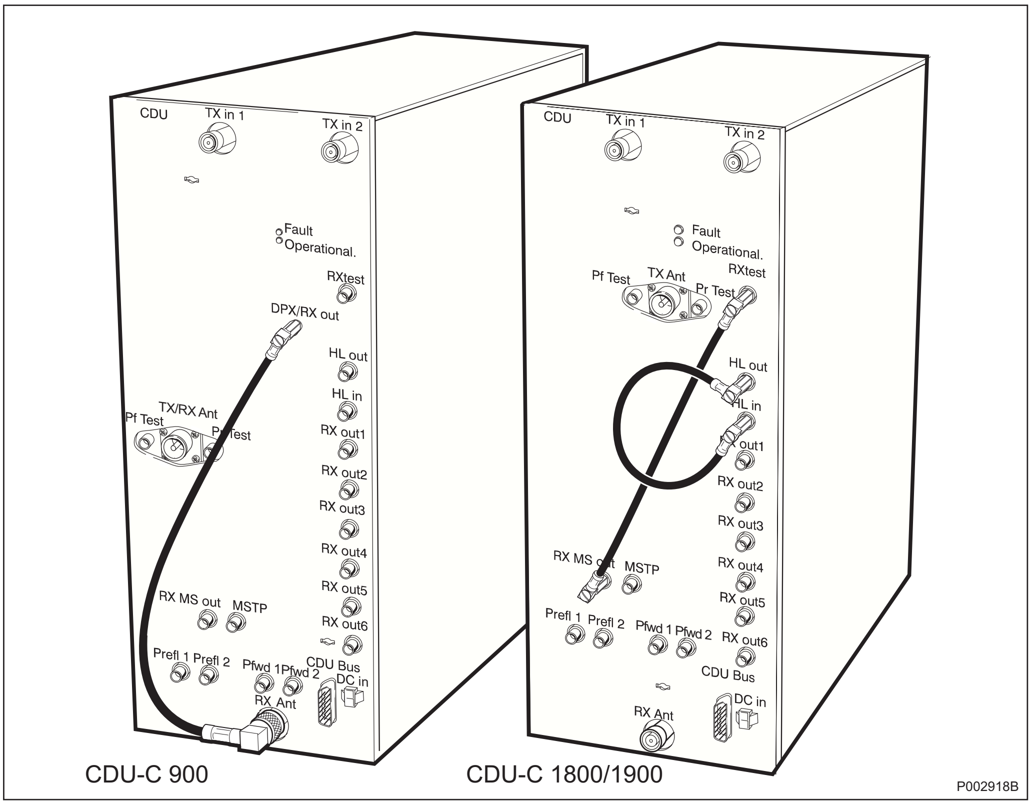

Figure 3 CDU-C Interface

5.1 Signal and Power Interface

This section describes the signal and power connections on CDU-C.

Table 3 Signal and Power Connections

Connection	Connector Type
TX in1, TX in2	TNC female
TX Ant	N female
RX Ant A, RX Ant B	N female
TX/RX Ant	N female
RX out1 – RX out6	SMA female
Prefl 1, Prefl 2	SMA female
Pfwd 1, Pfwd 2	SMA female
CDU Bus	9-pin male
D-sub DC in	2-pin male Molex Mini-Fit

5.2 Operator Interface

This section describes the operator interface, which consists of optical indicators located on the front panel, *see figure and table below.*

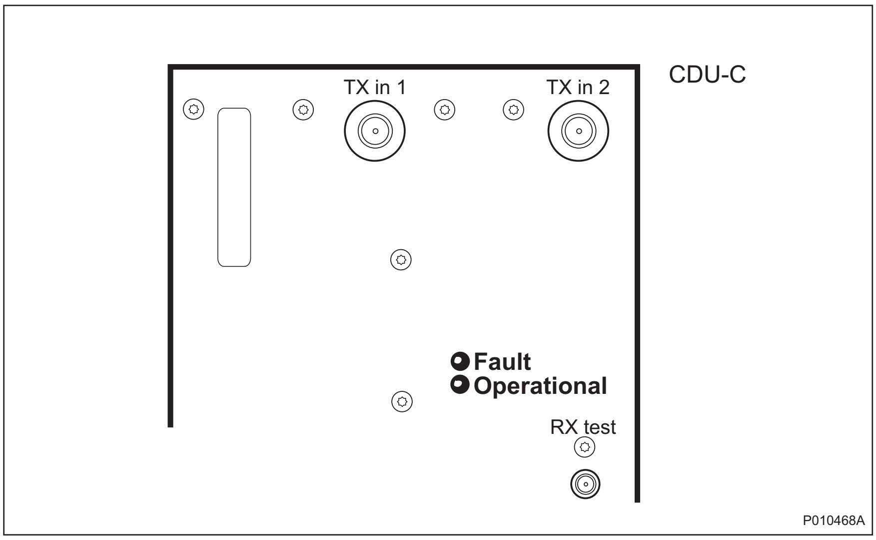

Figure 4 CDU-C Indicators

Table 4 CDU-C indicators

Indicator	Colour	Mode	Description
Fault	Red	Off	No faults detected in CDU-C
		On	One or more faults detected in CDU-C
		Flashing	Loss of communication to a superior RU
Operational	Green	Off	CDU-C not operational
		On	CDU-C operational

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Combining and Distribution Unit

CONTAINERFILE

EN/LZT 720 0278 Uen R1B

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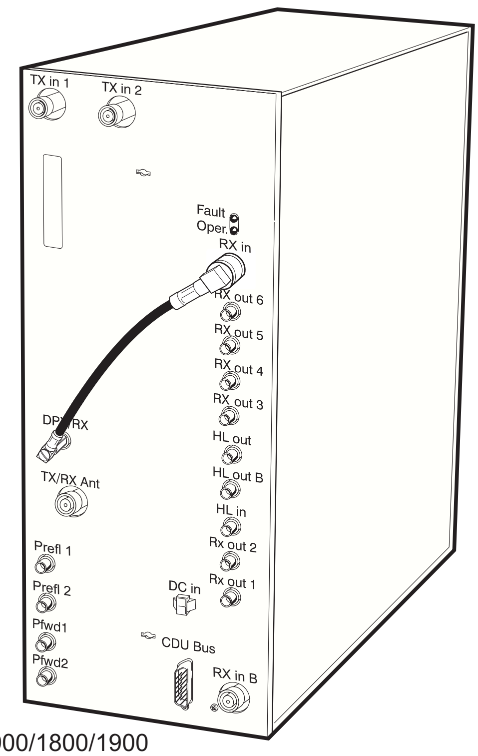
Abstract

The Combining and Distribution Unit (CDU) is the interface between the transceivers and the antenna system. CDU-C+ is used in low-coverage cells where high capacity is required.



CDU-C+ 900/1800/1900

P002920B

Contents

1 Product Overview

This section includes a product overview of CDU-C+, a combining and distribution unit used in high-capacity cells where low coverage is needed. CDU-C+ can also serve as a replacement for the older CDU-C.

One or two CDU-C+ can be used, as well as one CDU-C+ together with one CDU-C.

1.1 Main Functions

This section describes the main functions of CDU-C+:

- Combining of two TX signals to one antenna
- Distribution of two RX signals from two independent RX antennas
- An extra receiver distribution amplifier for use in small configurations
- Simultaneous transmission and reception on one antenna (GSM 900 version)
- Diversity reception (two CDU-C+s required)
- Handling of up to six TRUs in one cell (three CDU-C+s required)
- Baseband and synthesizer frequency hopping support
- Power and supervision of an external Tower Mounted Amplifier (TMA) via the RX antenna cables (GSM 1800 and GSM 1900 versions)

Note: TMA is optional for GSM 1800 and GSM 1900.

1.2 Variants

CDU-C+ is available for:

- GSM 900
- GSM 1800
- GSM 1900

All versions are identical, except for the frequency bands.

CDU-C+ is equipped with a duplexer which is bypassed when TMA is used. Separate antenna feeders for the TX and RX signals in both the A and B signal paths are then required.

2 Dimensions

This section describes the physical dimensions of CDU-C+. Size and weight are given in the table below.

Table 1 CDU-C+ Dimensions

Height	Width	Depth	Weight
400 mm	142 mm	270 mm	12 kg

3 Power Consumption and Heat Generation

This section describes power consumption and heat generation for CDU-C+.

Table 2 Power Consumption and Heat Generation

	Max. Power Consumption	Max. Heat Generation
No TMA	40 W	100 W
With TMA	55 W	100 W

4 Function Description

This section describes the functions of CDU-C+. The CDU-C+ can be divided into the following functional parts:

- TX part
- RX part

The figure below shows a block diagram of CDU-C+ (GSM 900) with duplexer.

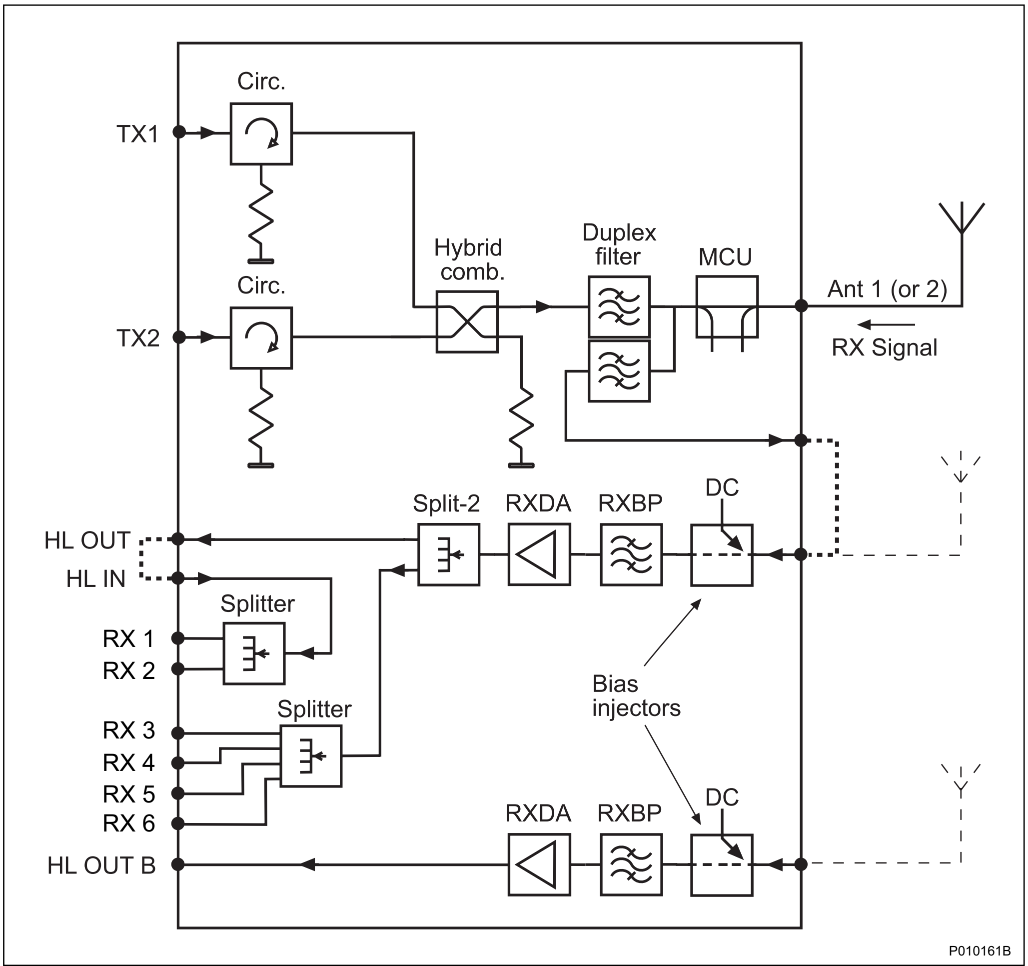


Figure 1 Block Diagram for CDU-C+ with Duplexer

The figure below shows a block diagram of CDU-C+ (GSM 1800 and GSM 1900) without duplexer.

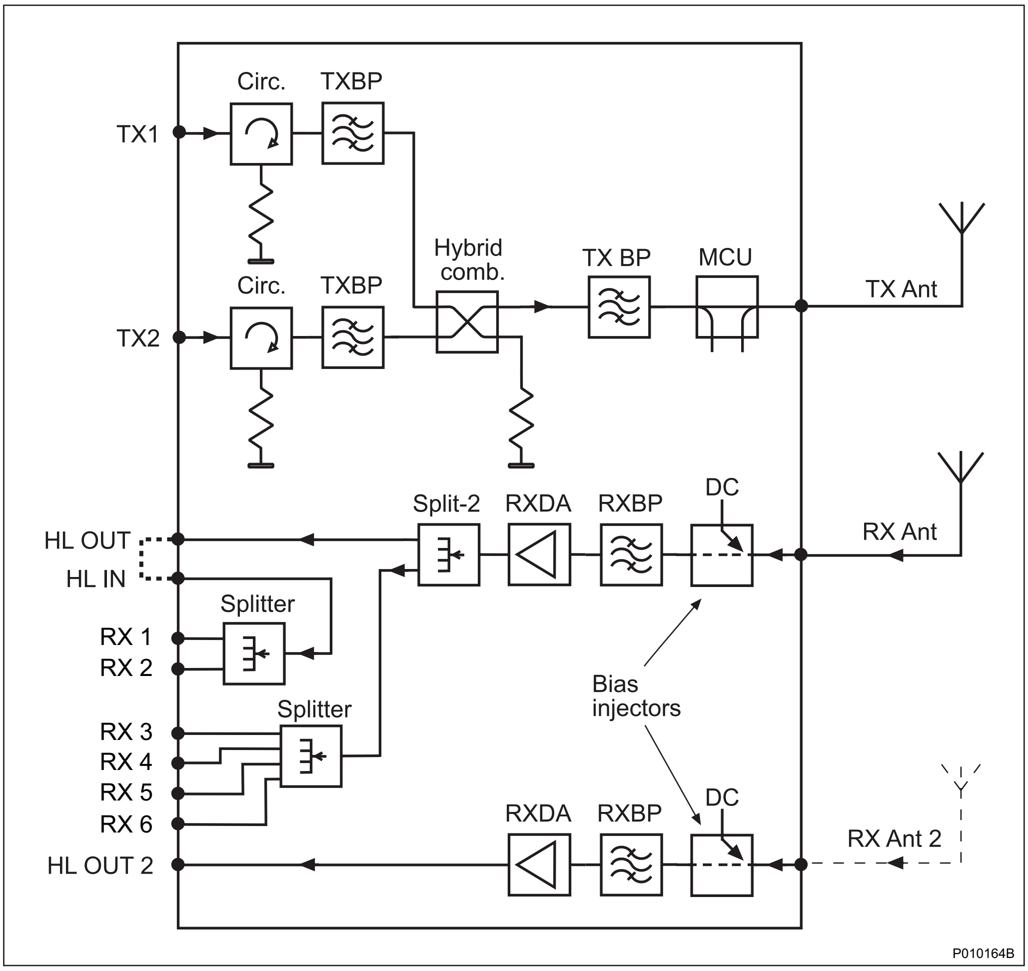


Figure 2 Block Diagram for CDU-C+ without Duplexer

4.1 TX Part

The TX part handles the transmission of signals from the TRUs to the antenna. The TX part consists of:

- Two circulators
- A hybrid combiner
- A duplex filter (duplexer)
- A measurement coupler unit (MCU)

Circulator The circulator provides a uni-directional transmission path and protects the TX inputs from reflected signals.

Hybrid Combiner The hybrid combiner combines two TX signals to a common output. It is a broadband combiner, but there is a 3 dB combing loss in the TX path.

Duplexer The duplexer allows simultaneous transmission and reception on the same antenna. It lets the TX signals pass to the antenna and lets the RX signals from the antenna to the RX part.

MCU The MCU measures forward and reflected signal levels at the CDU output. The signals are forwarded to the TRU via cables on the front of the CDU.

4.2 RX Part

There are two RX chains in CDU-C+. The RX part consists of the following:

- A duplex filter (duplexer), first path only
- A bias injector
- An RX Band-Pass filter (RXBP)
- An RX Distribution Amplifier (RXDA)
- Splitters

Duplexer *See Page 5.*

Bias Injector The bias injector provides power to and supervises an optional TMA.

RXBP The RXBP lets RX signals between two specified frequencies pass and removes unwanted out-of-band signals.

RXDA RXDA amplifies the RX signal.

Splitter The splitter divides the RX signals for transmission to the TRUs. It has no filtering or gain.

5 Interfaces

This section describes the following CDU-C+ interfaces:

- Signal and power interface
- Operator interface

These are shown in the figure below.

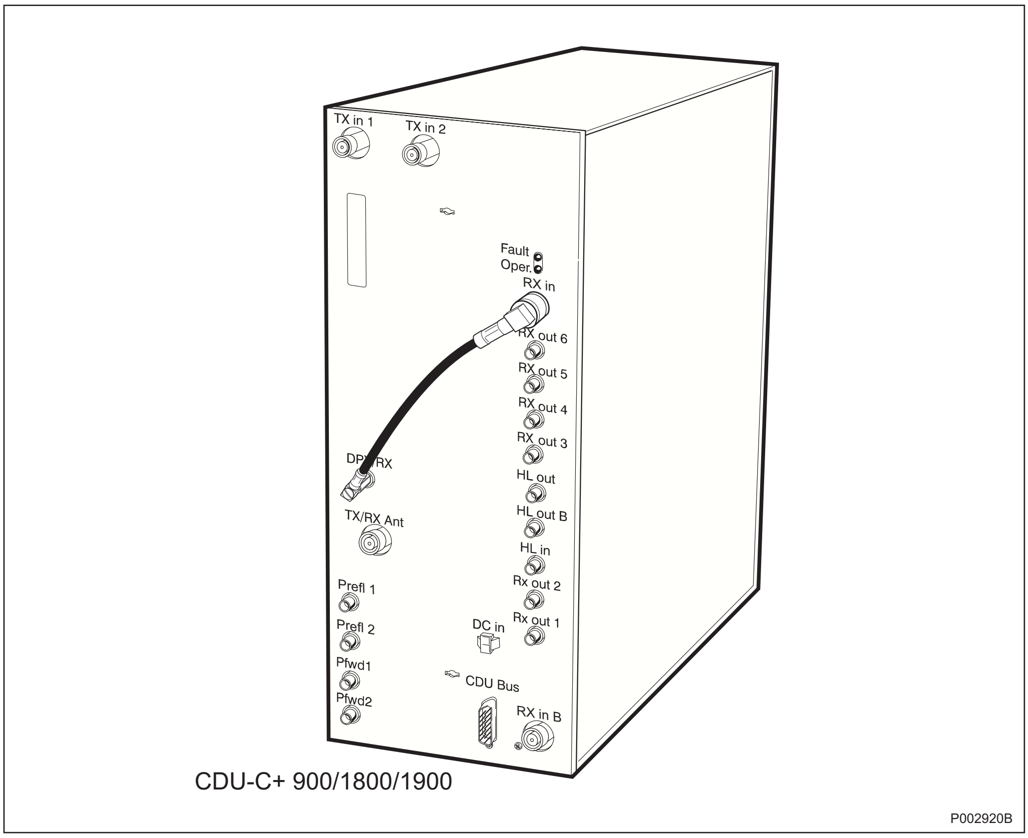


Figure 3 CDU-C+ Interface

5.1 Signal and Power Interface

This section describes the signal and power connections on CDU-C+.

Table 3 Signal and Power Connectors

Connection	Connector Type
TX in1, TX in2	TNC female
TX/RX Ant	N female
DPX/RX	SMA female
RX in, RX in B	N female
RXA out1 – 2, RXA out 3 – 6	SMA female
Prefl 1, Prefl 2	SMA female
Pfwd 1, Pfwd 2	SMA female
HL in	SMA female
HL out and HL out B	SMA female
CDU Bus	9-pin male, D-sub
DC in	2-pin male Molex Mini-Fit

5.2 Operator Interface

This section describes the operator interface, which consists of optical indicators located on the front panel, *see figure and table below.*

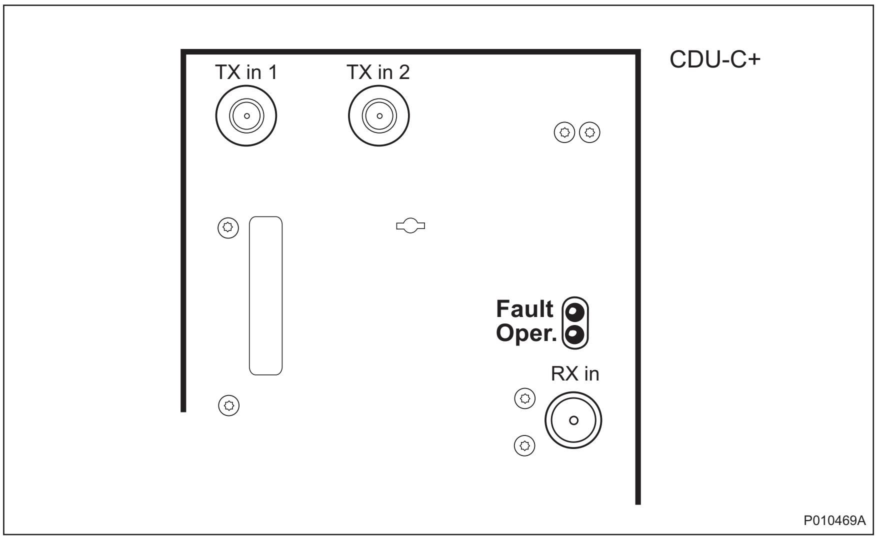


Figure 4 CDU-C+ Indicators

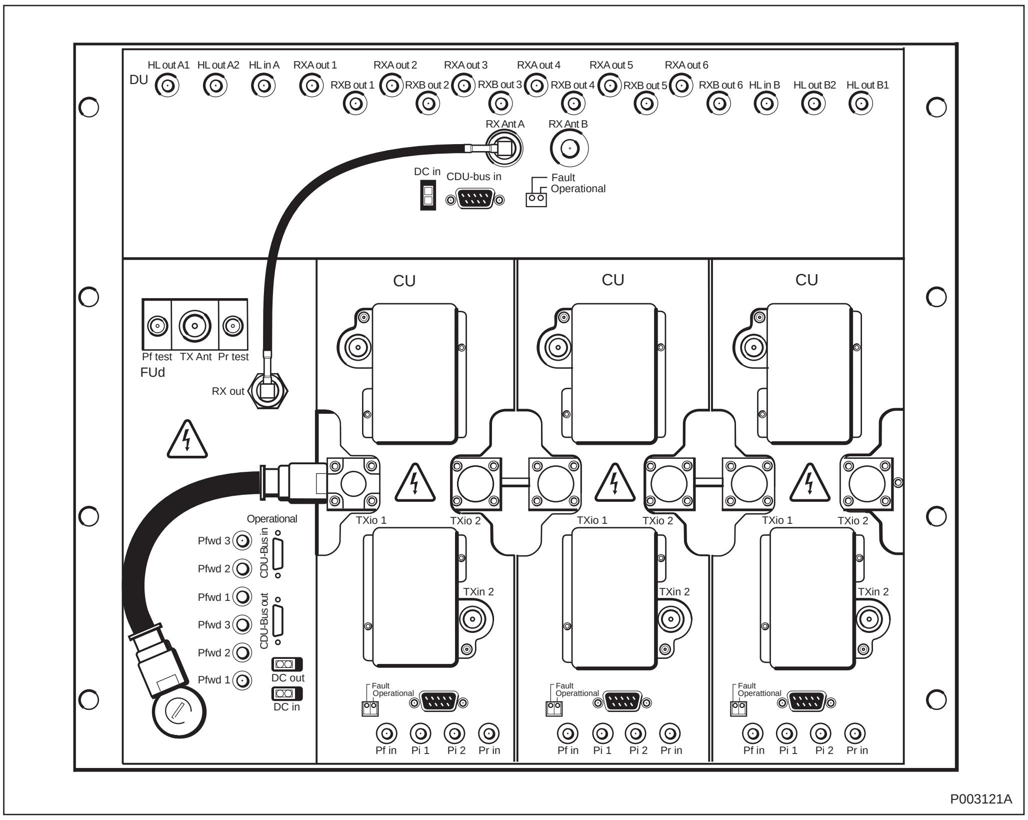
Table 4 CDU-C+ Indicators

Indicator	Colour	Mode	Description
Fault	Red	Off	No faults detected in CDU-C+
		On	One or more faults detected in CDU-C+
		Flashing	Loss of communication to a superior RU detected by CDU-C+
Operational	Green	Off	CDU-C+ not operational
		On	CDU-C+ operational

CDU-D
Combining and Distribution Unit

Unit Description

The Combining and Distribution Unit (CDU) is the interface between the transceivers and the antenna system. CDU-D is used for configurations with up to 12 TRUs connected to two antennas and provides both high capacity and high coverage.



Contents

1 Product Overview

This section includes a product overview of CDU-D, a combining and distribution unit used in high-capacity cells where high coverage is required.

1.1 Main Functions

This section describes the main functions of CDU-D:

- Combining of six TX signals to one antenna
- Distribution of two RX signals from two independent RX antennas
- Simultaneous transmission and reception on one antenna
- Automatically tuned cavity combiners operated by step motors
- Possibility of configurations with 12 TRUs connected to two antennas
- Baseband hopping support
- Power and supervision of an external Tower Mounted Amplifier (TMA) via the RX antenna cables (GSM 1800)

1.2 Variants

CDU-D is available for:

- GSM 900
- GSM 1800

CDU-D for GSM 900 is equipped with a duplexer (FUd). CDU-D for GSM 1800 can be equipped with or without a duplexer (FUd or FU). The latter version requires separate antenna feeders for the TX and RX signals, and TMA.

2 Dimensions

This section describes the physical dimensions of CDU-D. It has the physical size of three CDU-As, CDU-Cs or CDU-C+s. Dimensions and weight of CDU-D are given in the table below.

Table 1 CDU-D Dimensions

Height	Width	Depth	Weight
400 mm	483 mm	270 mm	45 kg

3 Power Consumption and Heat Generation

This section describes power consumption and heat generation for CDU-D.

Table 2 Power Consumption and Heat Generation

Max. Power Consumption	Max. Heat Generation
120 W	300 W

4 Function Description

This section describes the functions of CDU-D. The CDU-D can be divided into the following functional parts:

- TX part
- RX part

The figure below shows a block diagram of CDU-D (GSM 900/1800) with duplexer.

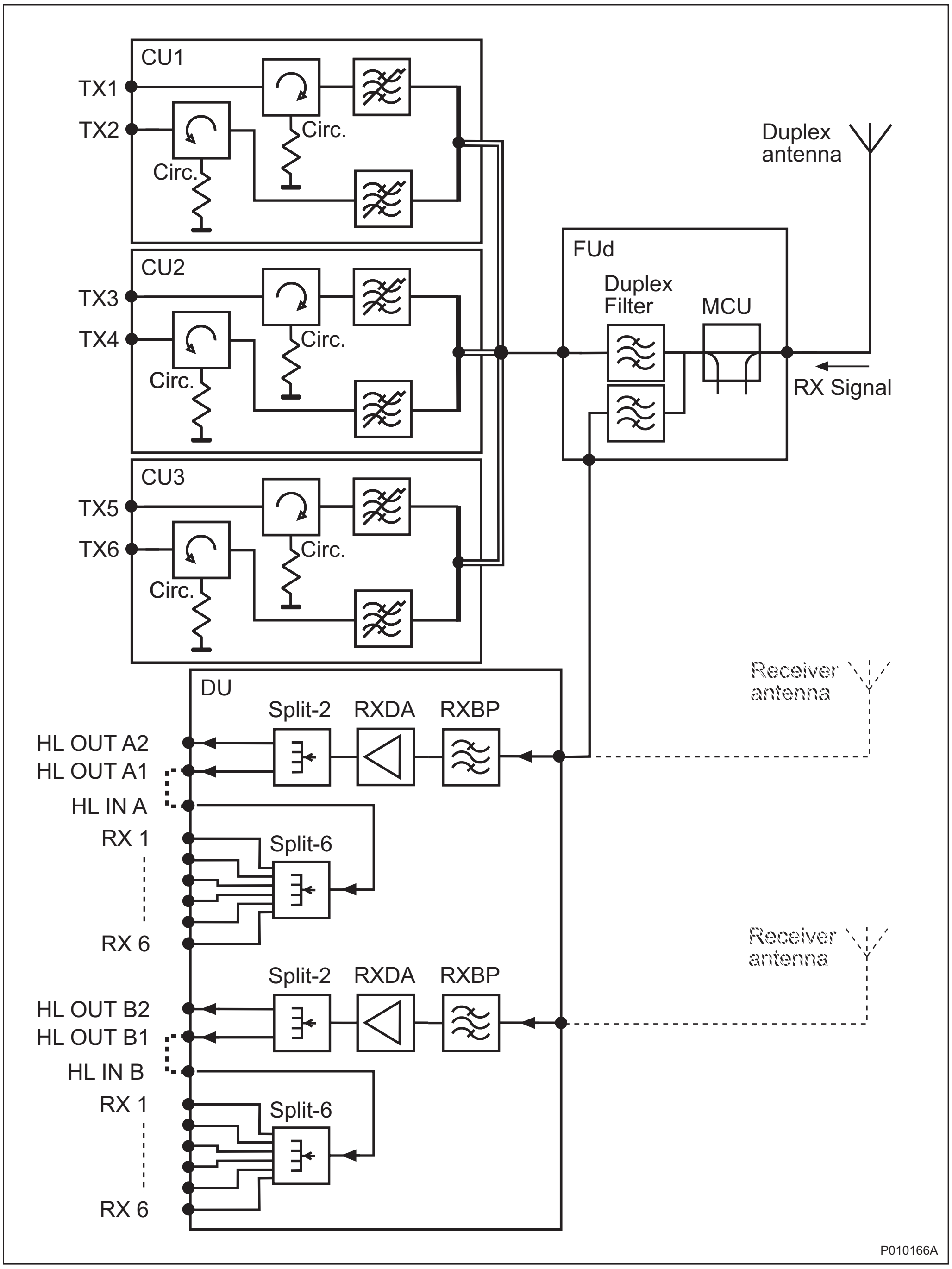


Figure 1 Block Diagram for CDU-D with Duplexer

The figure below shows a block diagram of CDU-D (GSM 1800) without duplexer.

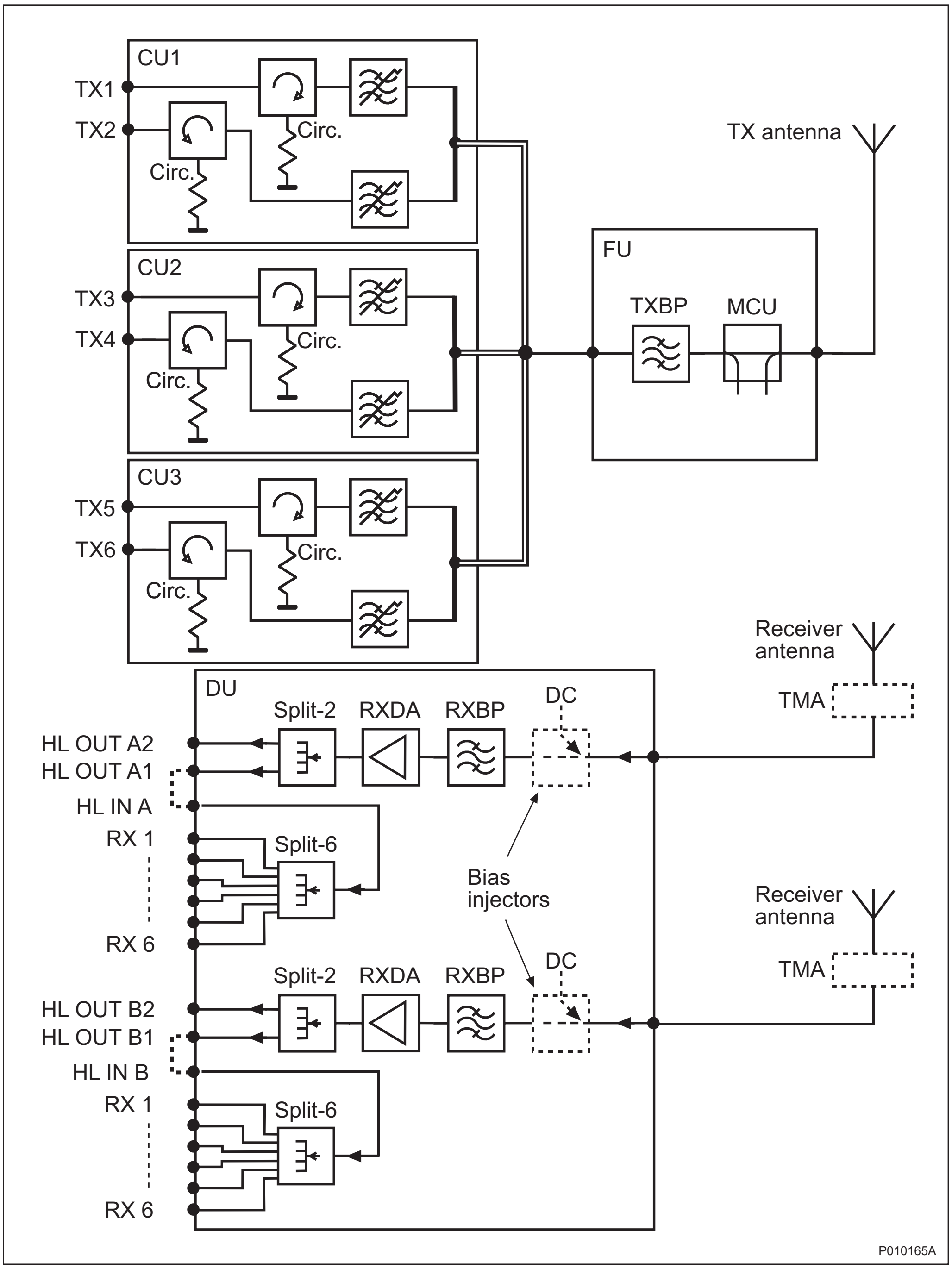


Figure 2 Block Diagram for CDU-D without Duplexer

4.1 TX Part

The TX part handles the transmission of signals from the TRUs to the antenna. The TX part consists of the following:

- Three combiner units (CU)
- A filter unit (FU or FUd)

CU

CDU-D contains three CUs. The CU combines two TX signals to a common output. Each CU consists of the following:

- Circulators
- Tuneable Band Pass filters

Circulator	The circulator provides a uni-directional transmission path and protects the transmitter inputs from reflected signals.
Tuneable Band Pass filters	The tuneable band pass filters allows through TX signals for one radio channel, and removes unwanted out-of-band signals

FU/FUd

The FU removes unwanted signals and supervises the antenna. There are two types of FUs:

- FUd (with duplexer) (GSM 900 and GSM 1800 versions)
- FU (without duplexer) (GSM 1800 version) TMA configurations

The FUd consists of the following:

- A duplex filter (duplexer) (GSM 900 and GSM 1800 versions only)
- A Measurement Coupler Unit (MCU)

The FU (GSM 1800 versions only) consists of:

- TX Band Pass filters (TXBP)
- A Measurement Coupler Unit (MCU)

Duplexer (FUd)	The duplexer allows simultaneous transmission and reception on the same antenna. It lets the TX signals pass to the antenna and distributes the RX signals to the RXDA.

TXBP (FU) The TXBP lets TX signals between two specified levels pass and removes unwanted out-of-band signals

MCU The MCU measures forward and reflected signal levels at the CDU output. The measurements are used for tuning the filters and measuring the antenna VSWR.

4.2 RX Part

The RX part consists of the following units:

- FUd (if duplexer – GSM 900 and GSM 1800 versions)
- Distribution Unit (DU)

FUd

See Page 7.

DU

The DU amplifies the RX signal and distributes it to the TRUs. The amplification and distribution functions are doubled to be able to distribute the signal from two antennas. It consists of the following units:

- Two RX Band-Pass Filters (RXBP)
- RX Distribution Amplifier (RXDA)
- Splitters
- Bias Injector

Bias Injector The bias injector provides power to and supervises an optional TMA.

RXBP The RXBP lets RX signals between two specified levels pass and removes unwanted out-of-band signals.

RXDA RXDA amplifies the RX signal.

Splitter The splitter distributes the RX signal to six RX outputs on the TRUs.

5 Interfaces

This section describes the following CDU-D interfaces:

- Signal and power interface
- Operator interface

All interfaces are located on the front panel of the CDU-D, *see figure below.*

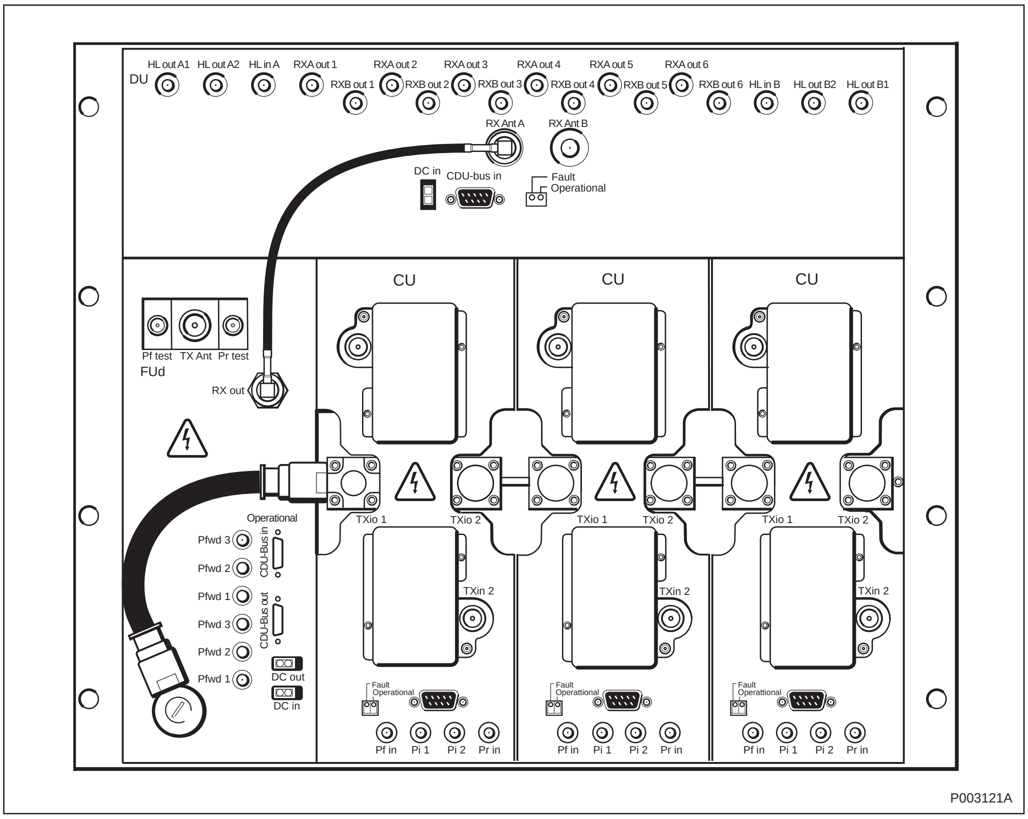


Figure 3 CDU-D Interfaces

5.1 Signal and Power Interface

This section describes the signal and power connections on CDU-D.

Table 3 Signal and Power Connectors

Unit	Connection	Connector Type
CU	TX in2	TNC female
	TXio 1, TX io2	Combining network
	Pf in, Pi1, Pi2, Pr in	SMA female
	CDU bus in	9-pin male, D-sub
FU and FUd	TX Ant	N female
	RX out	N female
	Prefl 1, Prefl 2, Prefl 3	SMA female
	Pfwd 1, Pfwd 2, Pfwd 3	SMA female
	Pf test, Pr test	SMA female
	CDU Bus in, CDU Bus out	9-pin male, D-sub
	DC in, DC out	2-pin male Molex Mini-Fit
DU	RX AntA, RX AntB	N female
	HL out A1, HL out A2, HL in A	SMA female
	HL out B1, HL out B2, HL in B	SMA female
	RXA out 1 – 6, RXB out 1 – 6	SMA female
	CDU Bus in	9-pin male, D-sub
	DC in	2-pin male Molex Mini-Fit

5.2 Operator Interface

This section describes the operator interface, which consists of optical indicators located on the front panel, *see figure and table below.*

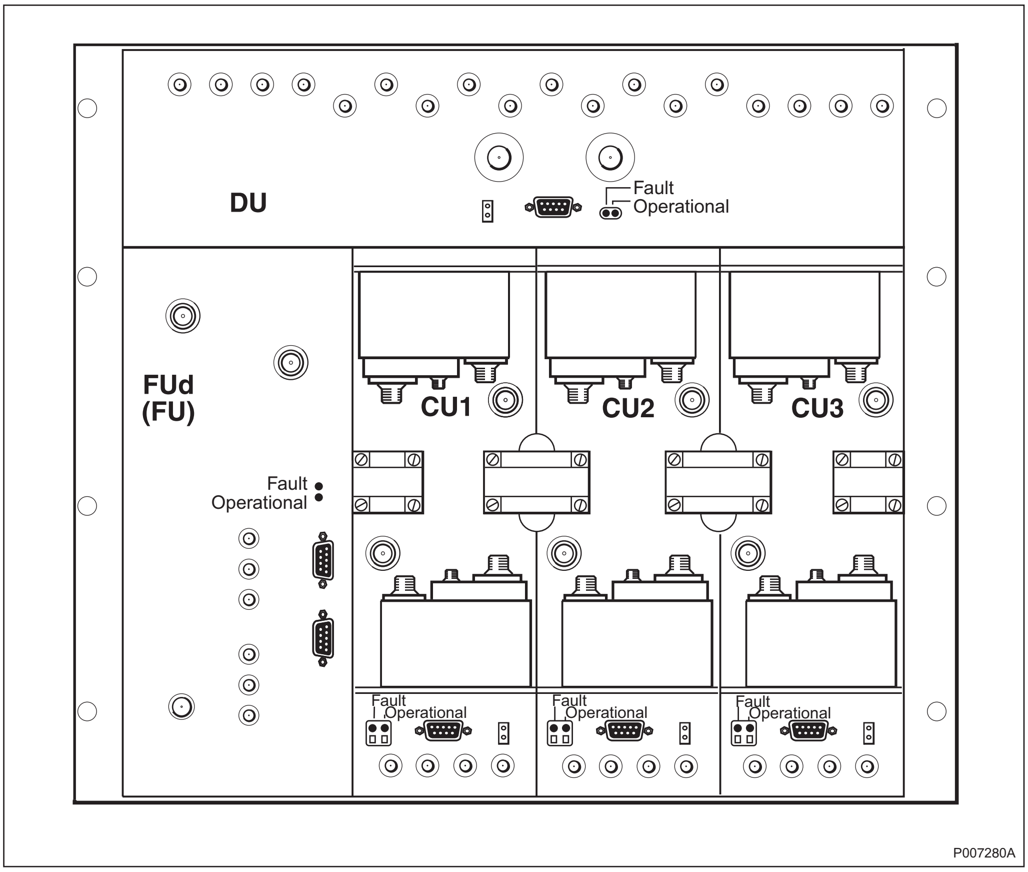


Figure 4 CDU-D Indicators

Table 4 CDU-D Indicators

Indica-tor	Colour	Mode	Description
Fault	Red	Off	No faults detected in CDU-D
		On	One or more faults detected in CDU-D
		Flashing	• IDB missing in DXU • Loss of communication to a superior RU • RBS SW missing (CU only)
Opera-tional	Green	Off	CDU-D not operational
		On	CDU-D operational
		Flashing	SW being downloaded (CU only)

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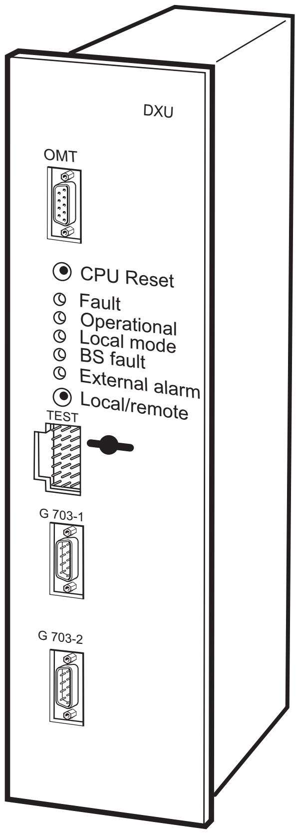
DXU
Distribution Switch Unit

Unit Description

The Distribution Switch Unit (DXU) is the central control unit of the RBS. There is one DXU per RBS. In multi-cabinet configurations, the DXU is located in the master cabinet only.



Contents

1 Product Overview

This section describes the main functions of the DXU and the following DXU variants:

- DXU-01
- DXU-03
- DXU-11

1.1 Main Functions

The DXU has the following main functions:

- Distribution Switch
- Timing Unit (a timing reference for the RBS is generated by extracting the synchronization information from the PCM link or from an internal source)
- Collection of up to 16 external alarms (product dependent)
- Multidrop
- Local bus interface RS 485 (acts as master on the bus and communicates with distributed main RUs)
- PCM interface G.703 (transmission fault supervision)
- OMT interface RS 232
- A-bis link resource management
- Control link concentration (LAPD signalling to the BSC)
- SW storage for the entire RBS in non-volatile memory
- Maintaining the Installation Database (IDB) integrated with the DXU (the IDB contains information regarding the installed HW, each RU identity, its physical position and related configuration parameters)

1.2 Variants

The three DXU models described in this document as the following:

DXU-01 With E1 (CEPT) PCM links (2 Mbit/s) without internal frequency reference

DXU-03 With T1 PCM links (1.544 Mbit/s) with internal frequency reference

DXU-11 With both E1 (CEPT) PCM links (2 Mbit/s) and T1 PCM links (1.544 Mbit/s), without internal frequency reference. E1 and T1 are selectable by a switch on the board. DXU-11 supports TG Synhronization and long haul (long haul only valid for E1/T1 120 Ω).

2 Dimensions

This section contains information about the dimensions of DXU-01, DXU-03 and DXU-11. Size and weight for each DXU variant are given in the table below.

Table 1 DXU-01, DXU-03 and DXU-11 Dimensions

Dimension	**DXU-01**	**DXU-03**	**DXU-11**
Height	267 mm	267 mm	267 mm
Width	71 mm	71 mm 14 TE x 5.08 mm	71 mm 14 TE x 5.08 mm
Depth	240 mm	240 mm	240 mm
Weight	1.0 kg	1.3 kg	1.3 kg

3 Power Consumption and Heat Generation

This section contains information about the power consumption and heat generation of the three DXU models.

Table 2 Maximum Power Consumption and Heat Generation for DXU-01, DXU-03 and DXU-11

	Max. Power Consumption		**Max. Heat Generation**
	Cold start	**Operation**	
DXU-01	15 W	20 W	20 W
DXU-03	32 W	26 W	26 W
DXU-11	15	10 W	15 W

4 Function Description

This section decribes the DXU functions. The DXU consists of the following main blocks:

- PCM part
- Central Positioning Unit (CPU)
- Central Timing Unit (CTU)
- High Level Data Link Controller (HDLC) concentrator
- TG Synchronization (only DXU-11)

The figure below shows a block diagram of the DXU.

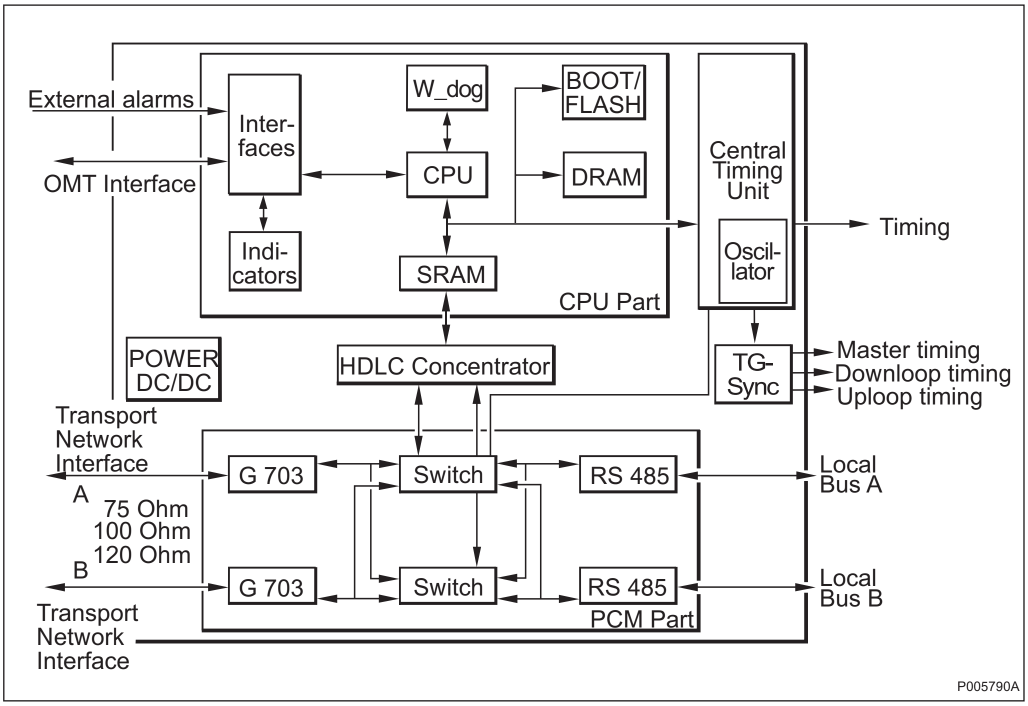


Figure 1 Block Diagram

PCM Part

The PCM part extracts time slots (TS) from the A-bis link and pass them to the TRUs over the local bus. It is possible to connect two PCM lines (ports A and B) to the DXU for increased capacity or transmission link redundancy.

The PCM-part includes the Managed Objects Interface Switch (IS) and Digital Path (DP). The IS reallocates TSs not used to another RBS, so-called multidrop (cascading) for enhanced flexibility. The multidrop function is activated during the installation phase, using the OMT.

CPU

The CPU has the following features:

- Resource management within the RBS
- RU software loading and storage
- Interface to the OMT
- Operation and maintenance
- Internal and external alarms
- Extraction of LAPD signalling information

CTU

The CTU generates stable reference pulses for the TRUs.

HDLC Concentrator (LAPD Concentration)

The HDLC concentrator has the following functions:

- Multiplexing (and demultiplexing) of up to four LAPD signalling TSs into one TS and vice versa for increased capacity of the PCM line
- Reading control channel information and distributing it to the TRUs or the CPU part

LAPD multiplexing means that the A-bis LAPD signalling links and traffic links are multiplexed on the same 64 kbit/s link. Only two PCM TSs per TRU are needed which makes LAPD multiplexing useful for sites with a small number of TRUs.

TG Synchronization

The TGSync/External Synchronization Bus (ESB) interface is used for timing and synchronization between two or several RBSs. The ESB consists of three signalling pairs.

5 Interface

This section describes the following DXU interfaces:

- Power and signal interface
- Operator interface

These are shown in the figure below.

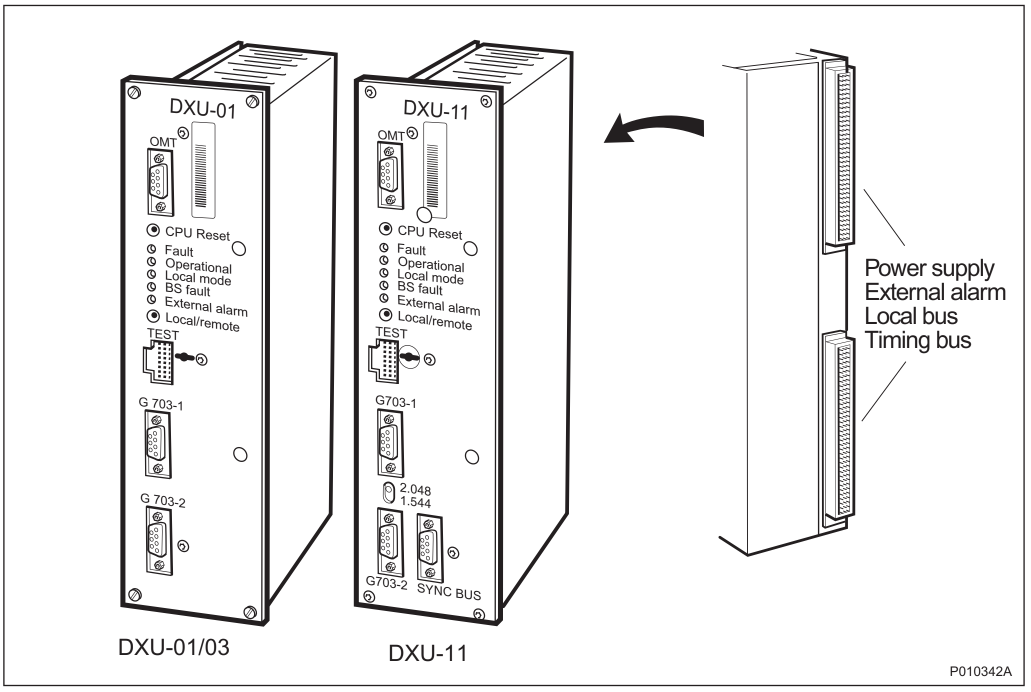


Figure 2 DXU Interfaces

5.1 Signal and Power Interface

This section describes the signal and power interfaces on the DXU. Interfaces are provided on the backplane for the following:

- Power supply
- External alarm
- Local bus
- Timing bus connectors

5.2 Operator Interface

This section describes the operator interface of the DXU, which consists of the following:

- G.703 Interface
- OMT RS 232
- Test Interface
- Indicators

G.703 Interface

The G.703 interface is used for communication with the BSC, according to the ITU - T G.703 standard. The G.703 interface for DXU-01, DXU-03 and DXU-11 are described in the table below. Two G.703 interfaces are available for DXU-11.

Table 3 G.703 Interface

	DXU-01	**DXU-03**	**DXU-11**
Interface(s)	2.048 Mbit/s 75 Ω or 120 Ω (CEPT or E1)	1.544 Mbit/s 100 Ω (T1)	2.048 Mbit/s 75 Ω or 120 Ω (CEPT or E1)
			1.544 Mbit/s 100 Ω (T1)

Both channel A and channel B are of type 9-pin male D-sub. The board has two G.703 connectors. For information about the interface pins and their functions, *see the table below.*

Table 4 G.703 Interface Pins

Pin	Function
1	Data up, hot wire, 75 W (not used for T1)
2	Data up, shield, 75 W (not used for T1)
3	Ground
4	Data down, shield, 75 W (not used for T1)
5	Data down, hot wire, 75 W (not used for T1)
6	Data up, twisted pair 100/120 W
7	Data up, twisted pair 100/120 W
8	Data down, twisted pair, 100/120 W
9	Data down, twisted pair, 100/120 W

Pin 2 and Pin 6 are connected and both may be used to connect shield from data up-coax. Pin 4 and Pin 9 are used for data down-coax.

OMT RS 232

The OMT RS 232 port is used for communication with the OMT. The OMT is connected to the DXU with a 9-pin female D-sub. The OMT connection is galvanically separated. All signals use RS 232 levels. For information about the OMT pins and their functions, *see the table below.*

Table 5 OMT Pins

Pin	Function
1	DCD, looped from DTR (Pin 4)
2	RxD, data out of DXU
3	TxD, data into DXU 4
4	DTR, looped to DCD (pin 1) and DSR (pin 6)
5	Signal ground
6	DSR, looped from DTR (pin 4)
7	RTS, looped from CTS (pin 8)
8	CTS, looped from RTS (pin 7)
9	RI not connected

Note: The connector is configured as a DCE, and thus should be connected to an IBM PC style DTE (such as a computer) with a straight cable.

Test Interface

The test interface is used for taking measurements from the RBS. The signals include

- Three TU signals (13 MHz sinus frequency reference output, 270 kHz airbus clock and airbus framesync)
- Six local bus signals (up- and down-link data for A and B channels, Clock and Framesync)
- Four pairs of G.703 signals (up- and down-link data for A and B channels)
- Internal +5 V and +3.3 V
- Reset and signal ground

The test interface is a 3 x 7 pin male connector unit. For information about the test connector pins, *see the table below.*

Table 6 Test Connector Pins

Pin	Left column	Middle column	Right column
1	G.703.2A_UP	GROUND	G.703.2A_UP
2	G.703.2A_DOWN	RESETNEG	G.703.2A_DOWN
3	G.703.1A_UP	+3.3 V	G.703.1B_UP
4	G.703.1A_DOWN	+5 V	G.703.1B_DOWN 5
5	LB.DDB(1)	LB.DUB(2)	LB.SYNC(3)
6	LB.DDA(4)	LB.DUA(5)	LB.CLK(6)
7	TU.13MHZSIN(7)	TU.270KHZ	TU.FSYNC

(1) Local Bus Data Down B
(2) Local Bus Data Up B
(3) Local Bus Synchronization
(4) Local Bus Data Down A
(5) Local Bus Data Up A
(6) Local Bus Clock
(7) Timing Unit

Indicators

The indicators which are part of the operator interface are described in the table below.

Table 7 Indicators

Indicator	Colour	Mode	Description
Fault	Red	Off	No faults detected in the DXU
		On	Fault detected in the DXU
Operational	Green	Off	DXU not operational
		On	DXU operational
		Flashing	One of the following: • SW being received • Configuration activity in progress which may take longer than 10 seconds to complete • Restart by BSC pending
Local Mode	Yellow	Off	DXU in remote mode, that is, it is controlled by the BSC
		On	DXU in local mode, that is, the DXU has no communication with the BSC
		Flashing	DXU mode change in progress, that is, a link between the BSC and RBS is being established or released
BS fault	Yellow	Off	No faults detected in the RBS
		On	One or more faults detected in the RBS
External alarm	Yellow	Off	No external alarms triggered
		On	One or more external alarms triggered

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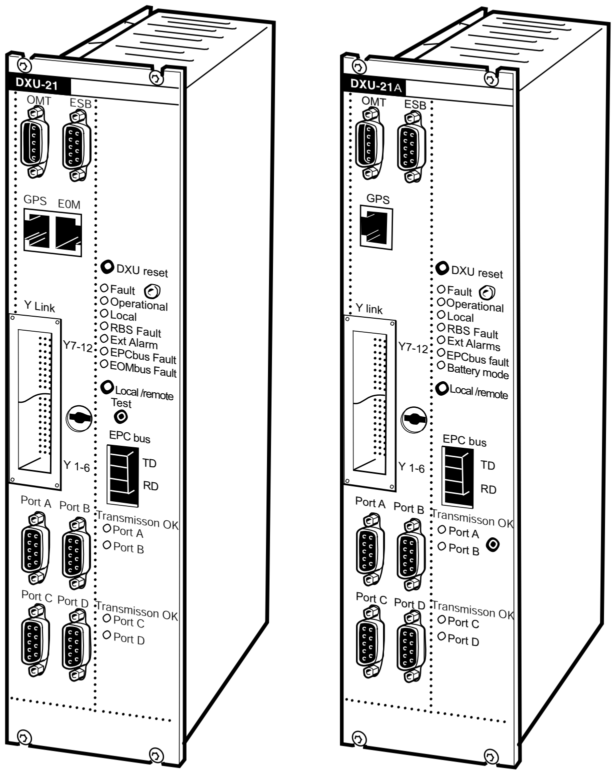
DXU-21

Distribution Switch Unit
Unit Description

The Distribution Switch Unit (DXU) is a unit, which acts as an interface between the transmission network and the transceivers. It also extracts timing information from the transmission interfaces and generates a timing reference for the RBS.



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Contents

1 Product Overview

The DXU-21 is a Replaceable Unit (RU), which acts as an interface between the transmission network and the transceivers. It also extracts timing information from the transmission interfaces and generates a timing reference for the RBS. The DXU also performs supervisory tasks. The DXU-21 transmission interface has long-haul capability and can be configured to both 1.544 Mbit/s (T1) and 2.048 Mbit/s (E1) transmission interface modes.

1.1 Main Functions

The DXU serves as the Central Main CPU node and its main functions are:

- Provides the RBS with an interface to the transport network through four E1/T1 transmission ports
- Handles incoming traffic, controls and supervises information and sends it to its destination within the RBS
- Provides frequency reference signals and timing signals for circuits within the RBS
- Stores and executes RBS SW stored on a removable flash card
- Controls climate and power systems in non-ECU equipped cabinets

1.2 Variants

The DXU exists in two variants:

- DXU-21
- DXU-21A

The DXU-21A differs from the DXU-21 in the following aspects:

- Battery Mode indicator
- No EOM port and indicator
- No 13 MHz test port

2 Dimensions

The DXU-21 has the following dimensions:

Table 1 Size and weight

Height	Width	Depth	Weight
227 mm (6 HE x 44.45 mm	71 mm (14 TE x 5.08 mm)	240 mm	2.4 kg

3 Power Consumption and Heat Generation

Table 2 Power Consumption and Heat Generation

Max power consumption	Max heat generation
20 W (typical 13 W)	20 W

4 Function Description

Electrically, the DXU-21 consists of the following main blocks:

- CPU system
- Communication switch system
- Transmission interface controller
- Power supply
- Timing system
- Miscellaneous logic
- Compact Flash Card

The relations of these main blocks are shown in the following figure.

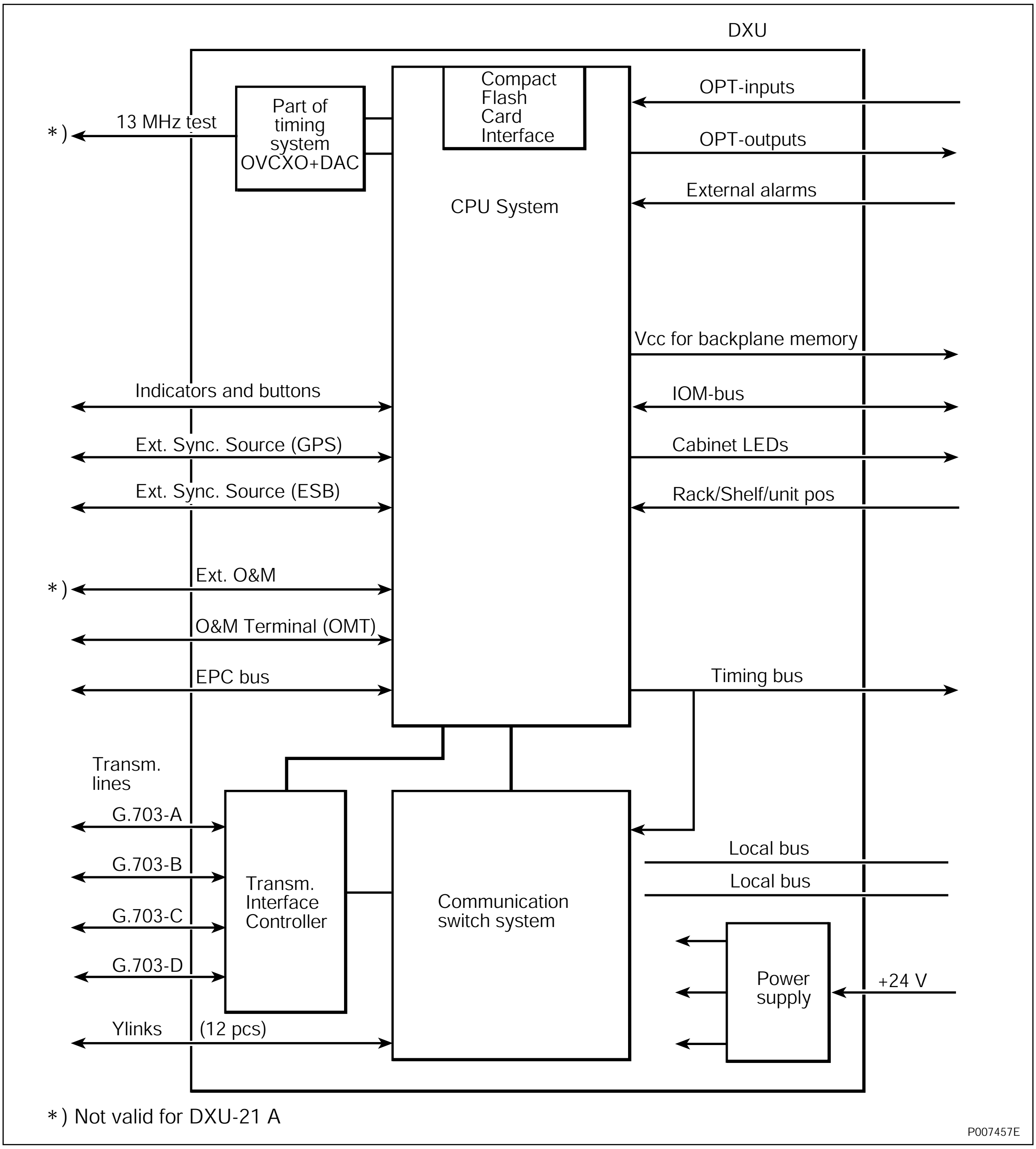

Figure 1 DXU, block diagram

4.1 CPU System

The heart of the DXU-21 is a 32-bit embedded controller with interfaces to a wide range of peripherals.

The CPU system consists of:

- I2C controller
- SDRAM memory
- FLASH memory
- CPU
- Compact Flash Card

4.2 Communication Switch System

This system block contains circuits that handle traffic between the BSC and the dTRUs.

4.3 Transmission Interface Controller

This part contains circuits for four transmission ports and the transmission interface controller, which controls the traffic for all four transmission ports.

The bit rate is SW controlled. Two speeds are available: E1 (2.048 Mbit/s) or T1 (1.544 Mbit/s).

4.4 Power Supply

The power supply delivers all the voltages necessary for the DXU-21. The input voltage, +24 V DC, is supplied through backplane connectors.

4.5 Timing System

The timing system is used to generate timing for the TRUs.

4.6 Miscellaneous Logic

This function contains the following:

- System voltage measurement
- Temperature measurement
- Power on reset

4.7 Compact Flash Card

The removable Compact Flash Card permits quick and easy change of the DXU.

5 Interfaces

This section describes the signal and power interfaces, and the operator interface, of the DXU.

5.1 Signal and Power Interfaces

Transmission Interface

The four transmission interfaces are connected to the BSC (Protocol GSM-Abis) or to cascaded base stations. In cascade mode, this interface can control an external bypass relay. Unused time slots can be through-connected to a successive base station. The communication speed in E1 interfaces is 2 Mbit/s and in T1, 1.5 Mbit/s.

External Alarm Inputs

Through this interface it is possible to connect up to 15 binary alarms (16 including one dedicated alarm). This interface is found on the upper backplane connector.

The equipment connected to the terminals should be insulated relay contacts. A closed contact (logic zero) is required to be below 2 kΩ, and an open contact (logic one) is required to be above 100 kΩ.

The current through a closed 0 contact is 1.2 mA.

The alarm contacts connected to the external alarm inputs should be insulated and have a current range above 1.2 mA. The voltage between terminals with an open contact is +24 V DC.

Local Bus

The local bus is a time slot and multidrop bus, where the DXU-21 is the master of the bus. Two identical local buses are implemented, with common frame synchronization and clock signals. The interface is accessed through the lower backplane connector. The local bus is used for TRUs.

Timing Bus

This interface is used for distribution of timing information to the TRUs through the backplane. The interface is accessed through the lower backplane connector. The timing bus is only used for TRUs.

External Sync. (Freq. Ref.)

This interface is used for connecting an external frequency reference. It uses a generic synchronization port for the synchronization information.

Optional Output

This interface enables control of up to eight devices, which can be of various types. These outputs are accessed through the upper backplane connector.

Optional Input

This interface enables connection of up to eight internal cabinet signals, such as alarms. These inputs are accessed through the upper backplane connector.

IOM Bus

This interface consists of three individual I2C ports. It is used to communicate with the CDU, CXU, TMA-CM and cabinet ID.

An I2C bus is reserved for reading a memory device which identifies the source for the system.

The interface is accessed through the lower backplane connector.

Y Links

This interface is used for communication with the dTRUs and sTRUs. The Y interface consists of 12 separate Y links.

The Y links are accessed through connectors located on the front of the DXU.

EPC Bus (Optical Cable)

This interface is used for communication with the power supply equipment in the RBS, such as PSUs and BFU.

The optical communication interface is accessible through connectors located on the front of the DXU. The connectors are marked ‘‘EPC’’.

Note: Not used in ECU-equipped cabinets.

GPS

This interface is used for interfacing an external sync./frequency source, such as GPS. It is accessed through a connector of type 8-pin RJ-45, located on the front of the DXU. The connector is marked ‘‘GPS’’.

ESB

This interface is used to synchronize several transceiver groups in the same cell, for example when one cell is built up by more than one RBS.

The interface is accessed on the front of the DXU through a D-sub 9-pin male connector marked ‘‘ESB’’.

5.2 Operator Interface

This section describes the operator interface, which consists of the OMT interface and indicators and buttons.

OMT

The OMT port is used to communicate with the Operation and Maintenance Terminal.

The OMT is connected through a 9-pin D-sub female connector.

The OMT connection is galvanically separated. All signals use RS 232 levels.

Table 3 The OMT Connector Pins and their Functions

Pin	Function
1	DCD, looped from DTR (pin 4)
2	RXD, data out of DXU
3	TXD, data into DXU
4	DTR, looped to DCD (pin 1) and DSR (pin 6)
5	Signal ground
6	DSR, looped from DTR (pin 4)
7	RTS, looped to CTS (pin 8)
8	CTS, looped from RTS (pin 7)
9	RI not connected

Indicators and Buttons

There are 11 indicators located on the front panel (as shown in the table below) and two buttons for DXU Reset and Local/remote.

Table 4 Indicators

Indicator	Colour
Fault	Red
Operational	Green
Transmission OK (port A, B, C, D)	Green (4 pcs)
Local	Yellow
RBS fault	Yellow
External alarm	Yellow
EPC bus fault	Yellow
Battery mode (only DXU-21A)	Yellow
EOM bus fault (only DXU-21)	Yellow

Table 5 Switches

Switch	Function
DXU reset	Resets the DXU
Local remote	Sets local/remote mode

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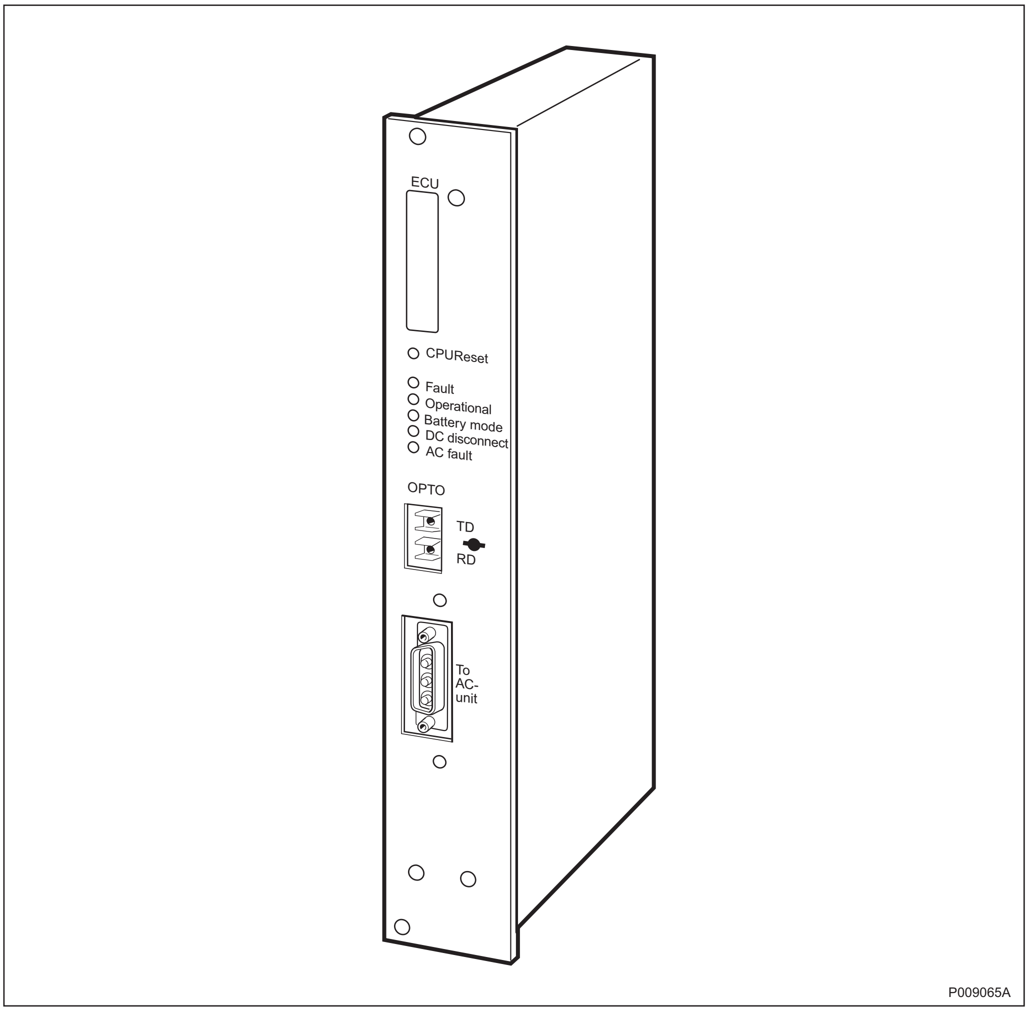
ECU
Energy Control Unit

Product Description

The Energy Control Unit (ECU) controls and supervises the power equipment and climate equipment in an RBS.



Contents

1 Product Overview

The ECU observes alarm signals from the power and climate system and protects the equipment within the RBS from conditions that could reduce lifetime and reliability. The ECU protects the equipment during power failure conditions and cold start-up.

1.1 Main Functions

The ECU has the following main functions:

- Controls power equipment (PSU, BFU, Battery and AC connection unit) and climate equipment (fans, heater, cooler, and heat exchanger).
- Ensures that the climate is within the specified range for RBS start-up.
- Handles analogue sensor signals.
- Handles communication with the DXU via the local bus.
- Handles load sharing of PSUs (PSU 230 only).
- Regulates system voltage to the optimal system voltage for the battery temperature (PSU 230 only).

2 Dimensions

This section describes the physical characteristics of the ECU. Size and weight are given in the table below.

Table 1 Dimensions

Height	**Width**	**Depth**	**Weight**
267 mm	41 mm	240 mm	1.0 kg

3 Power Consumption and Heat Generation

Figures for power consumption and heat generation are shown in the table below.

Table 2 Power Consumption and Heat Generation

Maximum Power Consumption	**Maximum Heat Generation**
15 W	15 W

4 Function Description

The ECU consists of five main blocks:

- Central Processing Unit
- I/O-block
- Power and cold start
- Local bus
- Optical interface

The relations between these five main blocks are shown in the figure below.

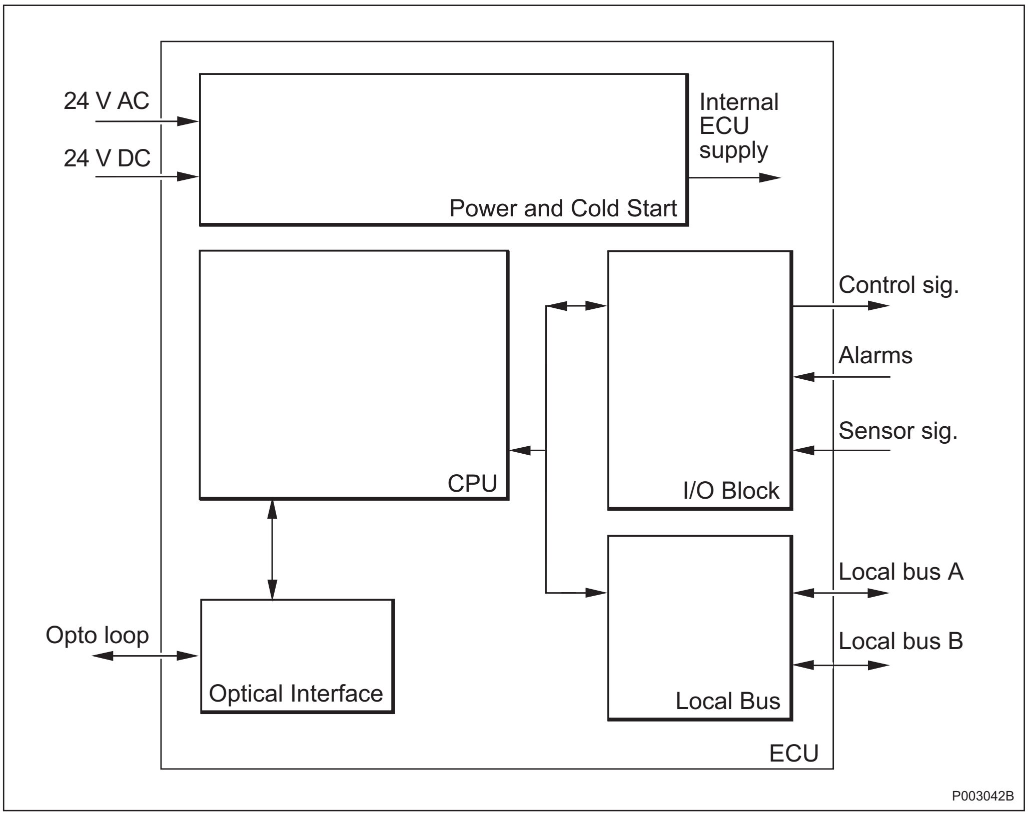


Figure 1 Block Diagram

4.1 Central Processing Unit

The CPU carries out energy and environmental management within the RBS.

4.2 I/O Block

The external signals consist of control signals, alarms and observation signals.

4.3 Power and Cold Start

This section describes the Power and Cold Start block of the ECU.

The cold start function ensures that the RBS is not started when the temperature is below + 5°C. Below + 5°C the heater is active.

The cold start gates the incoming supply voltage if the temperature is within the specified ranges.

Table 3 Cold Start Function Temperatures

Temperature	Result
< +5°C	Heater on
> +5°C	RBS power on
< -10°C	RBS power off

4.4 Local Bus

The ECU is connected to the DXU through the local bus.

4.5 Optical Interface

The opto link is used for communication with PSUs and BFUs. The opto link connectors are located on the front of the ECU.

5 Interfaces

This section describes the following interfaces on the ECU:

- Signal and power interfaces
- Operator interface

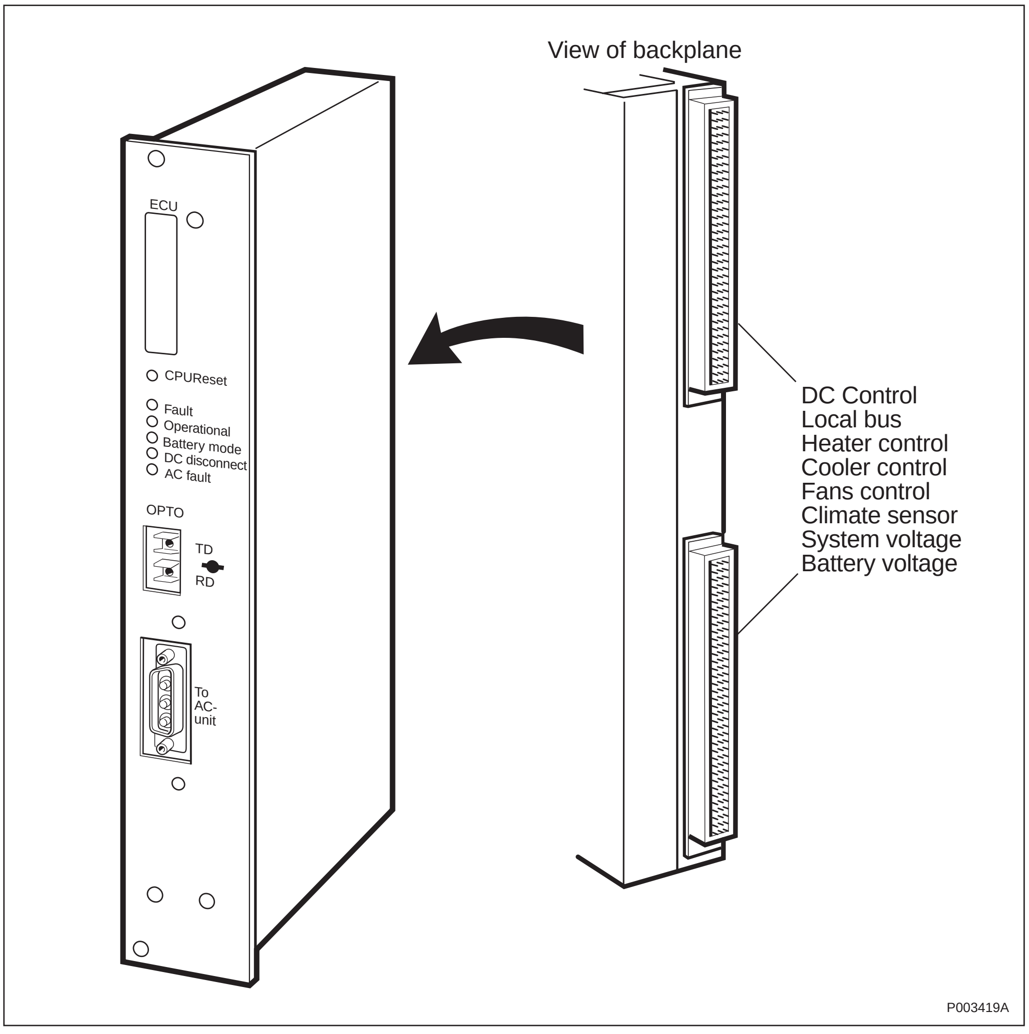


Figure 2 Interfaces

5.1 Signal and Power Interfaces

The following signal and power interfaces are available via the backplane.

- DC control
- Local bus
- Heater control

- Cooler control
- Fan control
- Climate sensor
- System voltage
- Battery voltage

Note: The ECU could be powered from either D-sub on the front panel (24 V AC) or from the backplane.

5.2 Operator Interface

This section describes the operator interface consisting of connectors, optical indicators and buttons.

Connectors

The connectors on the front of the ECU are the following:

- Power control bus (opto)
- AC Mains (transformed to low voltage)

Optical Indicators

The optical indicators in the table below are located on the front of the ECU.

Table 4 ECU Optical Indicators

Indicators	**Colour**
Fault	Red
Operational	Green
Battery mode	Yellow
DC disconnected	Yellow
AC fault	Yellow

Buttons

There is one button on the front of the ECU:

- CPU reset

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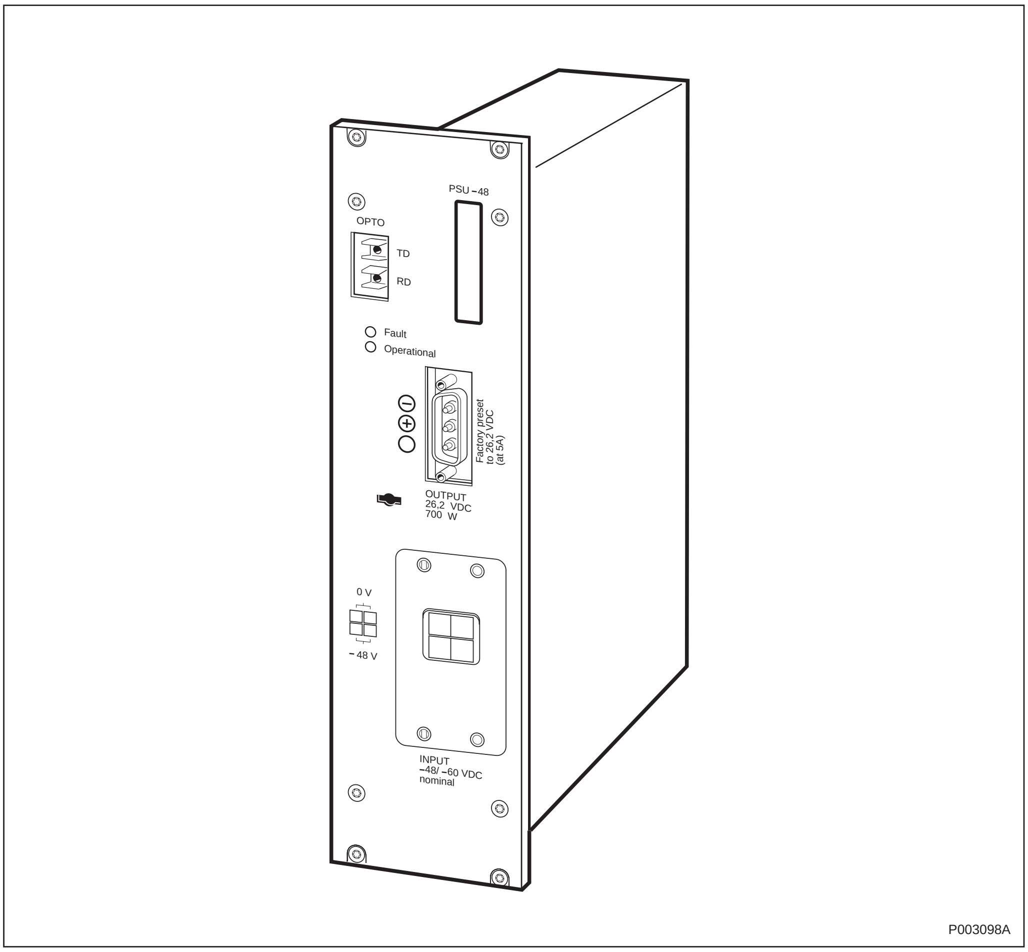
PSU -48 V

Power Supply Unit

Product Description

The Power Supply Unit (PSU) converts the incoming DC power to the regulated DC voltage required.



Contents

1 Product Overview

The PSU -48 V converts the incoming DC power to the required DC voltage.

1.1 Main Functions

The PSU -48V DC/DC converter alters the incoming -48 V to -60 V DC to the regulated DC voltage.

The PSUs are designed for single or parallel use.

2 Dimensions

This section describes the physical characteristics of the PSU -48 V. Size and weight are shown in the table below.

Table 1 Size and Weight

Height	Width	Depth	Weight
233 mm	61 mm	222 mm	3 kg

3 Power Consumption and Heat Generation

Figures for power consumption and heat generation are shown in the table below.

Table 2 Power Consumption and Heat Generation

Maximum power consumption	Maximum heat generation
795 W	95 W

4 Function Description

The PSU -48 V has the following functions:

- Communication
- Handling alarms
- Load sharing
- Output overvoltage protection
- Power limitation

The figure below shows a block diagram of the PSU -48 V.

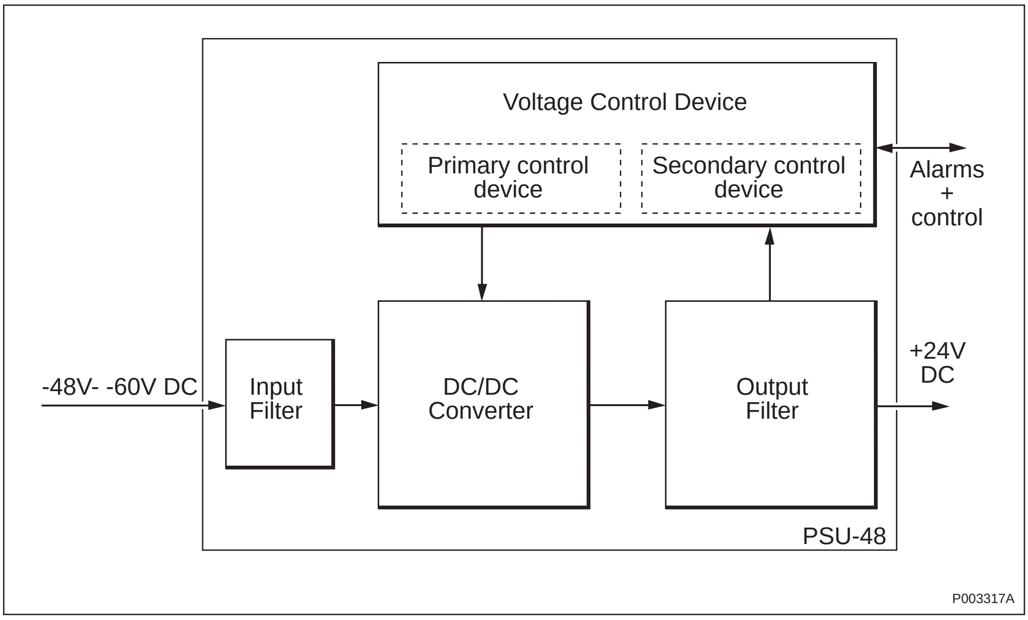


Figure 1 Block Diagram

4.1 Communication

The PSU communicates with its superior unit (ECU) through an optical interface. The PSU is controlled and supervised through this communication. In the event of communication failure, the PSU continues working with the values last received.

4.2 Handling Alarms

The following alarms are detected in the converter and are then forwarded to the ECU and to an LED on the PSU front:

Table 3 PSU Alarms

Type of alarm	Description
Overvoltage failure	The output voltage of the converter has exceeded the alarm level.
High temperature	The internal temperature of the converter has exceeded the set value.
Converter not adjustable	The converter output voltage cannot be adjusted from a superior unit.
High output power	The converter limits the power.
Input failure	A failure has been detected in the incoming DC supply.
Communication failure	Signals from optical loop are not received.
Converter failure	Converter failures other than those specified above have been detected.

4.3 Load Sharing

Load sharing is achieved by passive load sharing when using more than one PSU. Passive load sharing exploits static regulations.

4.4 Output Overvoltage Protection

The PSU has two overvoltage monitors for the output voltage. The first overvoltage level is factory set at 29.0 V. The other overvoltage monitor (30.0 V) is determined from active and passive components. When one of the overvoltage monitors is activated, the PSU will be shut down and one attempt to restart is performed.

4.5 Power Limitations

When the temperature exceeds the permissable temperature, the PSU reduces the power and an alarm is sent to the ECU. The output power is raised when the temperature drops, and the alarm is reset. When the output power of the rectifier reaches 700 W, the rectifier limits its power by reducing its ouput voltage in order to maintain a constant output power. The ouput current increases to a maximum of 32 – 34 A even in the event of short circuits. The picture below shows the typical pattern at 32 A.

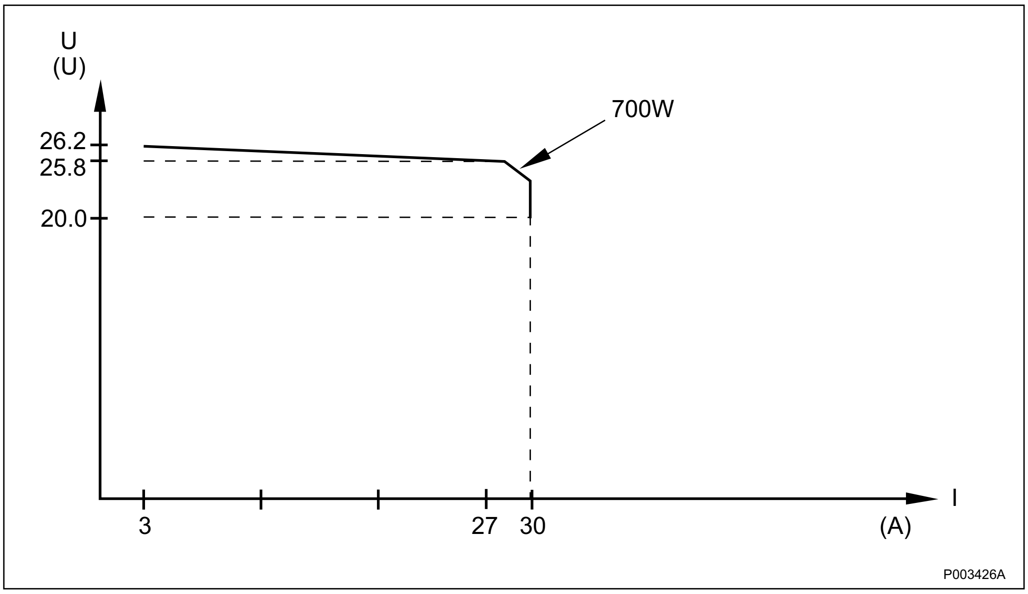


Figure 2 Power limitation

5 Interfaces

This section describes the following interfaces on the PSU:

- Power and signal interfaces
- Operator interface

All external interfaces on the PSU are located on the front panel, *see figure below.*

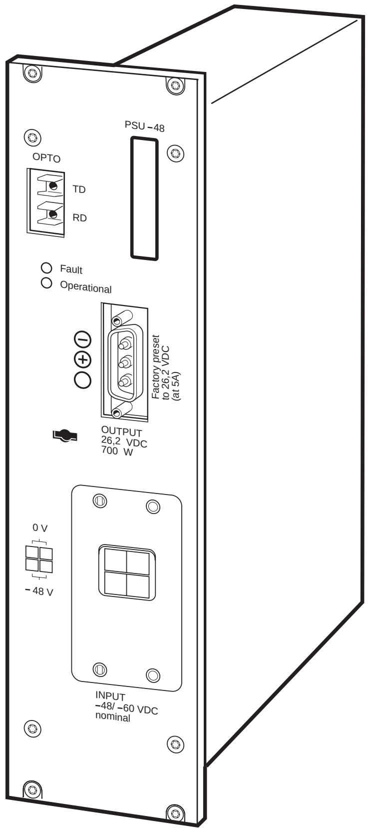


Figure 3 Interfaces

5.1 Power and Signal Interfaces

This section describes the power and signal interfaces, which consist of the following:

- Power supply
- Power Control Bus (Opto)

Power

The following power connections are located on the PSU:

- Input supply
- Output power

Characteristics of these interfaces are shown in the tables below.

Table 4 Input Data

Nominal input voltage		-48 to -60 V DC
Permitted variation input voltage		-39 to -72 V DC
Input current	Nominal	<16 A
	At U_{in} = -43.5 V DC	<25 A
Feeding circuit breaker or fuse		20 A (slow), 16 – 25 A permitted

Table 5 Output data

Nominal ouput voltage	24 V DC
Factory set value	+26.2 ± 0.4 V DC
Output power	700 W
Minimum load	3 A

Signal

The signal interface consists of an optical fibre link, called the Power Control Bus (Opto).

5.2 Operator Interface

There are two optical indicators on the front of the unit, *see table below.*

Table 6 Indicator description

Indicators	**Colour**
Fault	Red
Operational	Green

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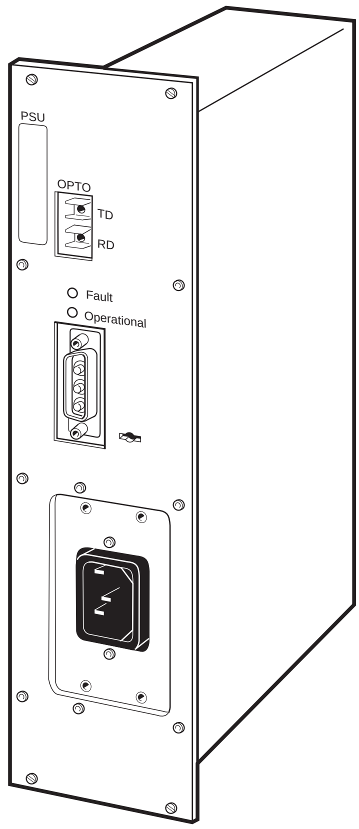
PSU 230 V
Power Supply Unit

Product Description

The Power Supply Unit (PSU) rectifies the incoming AC power to the regulated DC voltage required.



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Contents

1 Product Overview

The PSU 230 V rectifies the incoming AC power to the regulated DC voltage required.

1.1 Main Functions

The PSU 230 rectifies the incoming AC power to the regulated DC voltage required.

The PSUs are designed for single or parallel use.

2 Dimensions

This section describes the physical characteristics of the PSU. The PSU size and weight are given in the table below.

Table 1 Size and Weight

Height	Width	Depth	Weight
267 mm	61 mm	240 mm	3.6 – 4 kg

3 Power Consumption and Heat Generation

Figures for power consumption and heat generation are shown in the table below.

Table 2 Power Consumption and Heat Generation

Maximum power consumption	Maximum heat generation
795 W	95 W

4 Function Description

The PSU 230 V has the following functions:

- Communication
- Handling Alarms
- Voltage Adjustment/Load sharing
- Output Overvoltage Protection
- Power Limitations

The figure below shows a block diagram of the PSU 230 V.

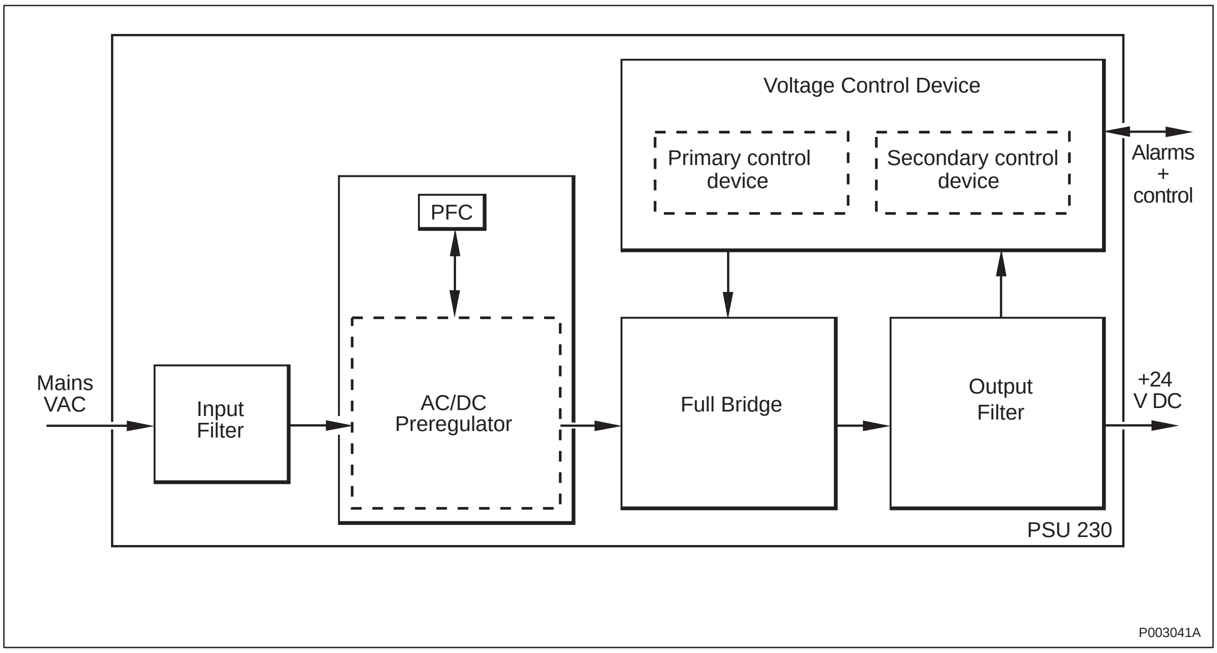

Figure 1 Block Diagram

4.1 Communication

The PSU communicates with its superior unit (ECU) through an optical interface. The PSU is controlled and supervised through this connection. In the event of communication failure, the PSU continues working with the values last received.

4.2 Handling Alarms

The following alarms are detected in the rectifier and are then forwarded to the ECU and to an LED on the PSU front:

Table 3 Alarms

Type of alarm	Type of failure
Overvoltage failure	The output voltage of the rectifier has exceeded the alarm level.
High temperature	The internal temperature of the rectifier has exceeded the set value.
Rectifier not adjustable	The rectifier output voltage cannot be adjusted from a superior unit.
High output power	The rectifier limits the power.
Mains failure	Incoming AC supply failure has been detected.
Communication failure	The PSU is not receiving signals from the optical loop.
Rectifier failure	Rectifier failures other than those specified above have been detected.

4.3 Voltage Adjustment/Load Sharing

The desired value of the output voltage of the rectifier is set by the ECU. The PSU has a default value of 27.2 V. The ECU adjusts the individual PSU voltage to maintain the required system voltage.

Load sharing is achieved by the ECU when using more than 1 PSU, load sharing of parallel PSUs is achieved by adjusting the individual voltages to each PSU in the system.

Output voltage from the PSU is adjusted (by the ECU) to between 26.2 V and 28.5 V depending on battery temperature.

4.4 Output Overvoltage Protection

The PSU has two overvoltage monitors for the output voltage of the PSU. The first overvoltage level is factory set at 29.0 V. The other overvoltage monitor (30.0 V) is determined from active and passive components. When one of the overvoltage monitors is activated, the PSU will be shut down and one attempt to restart is performed.

4.5 Power Limitations

When the temperature exceeds the permissable temperature, the PSU reduces the power and an alarm is sent to the ECU. The output power is raised when the temperature drops, and the alarm is reset. When the output power of the rectifier reaches 700 W, the rectifier limits its power by reducing its ouput voltage to maintain a constant output power. The ouput current increases to a maximum of 32 – 34 A even in the event of short circuits. The figure below shows the typical pattern at 32 A.

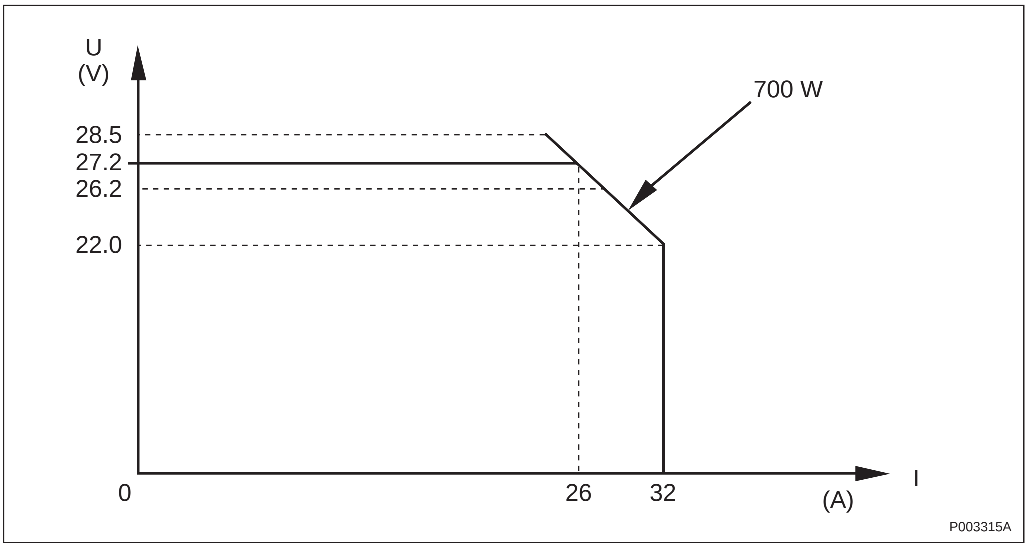

Figure 2 Power Limitation

5 Interfaces

This section describes the following interfaces on the PSU:

- Power and signal interface
- Operator interface

All interfaces on the PSU are shown in the figure below.

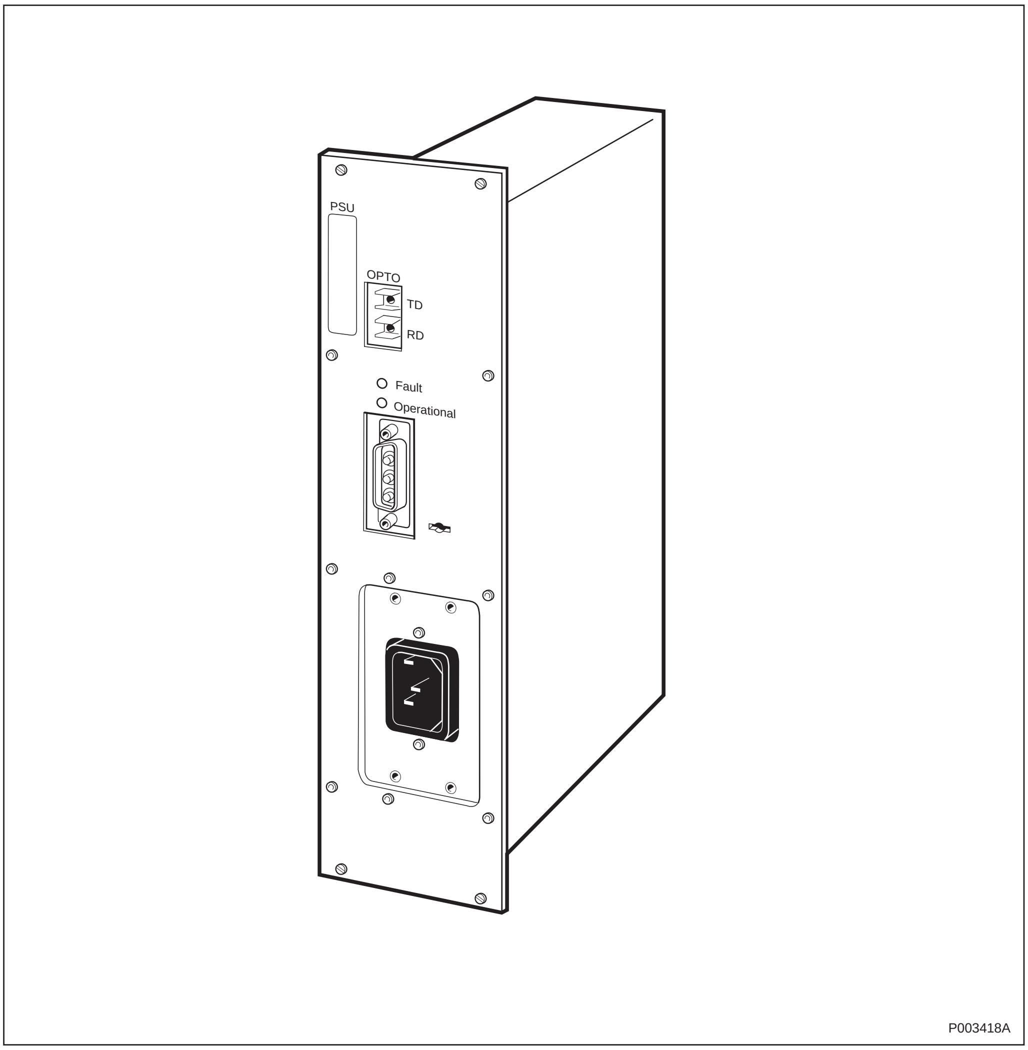

Figure 3 Interfaces

5.1 Power and Signal Interfaces

This section describes the power and signal interfaces, which consist of the following:

- Power supply
- Power Control Bus (Opto)

Power

The following power connections are located on the PSU:

- Input supply
- Output power

Characteristics of these interfaces are shown in the tables below.

Table 4 Input Data

Nominal input voltage		200 – 250 V AC
Variation input voltage		180 – 275 V AC
Frequency		45 – 65 Hz
Current		<5 A rms (at 180 V AC)
Inrush current		<6 A peak
AC protection	Internal	6.3 A
	External	10 A (slow); 6 to 16 A is permissable

Table 5 Output Data

Nominal ouput voltage	24 V DC
Present ouput voltage	27.2 ± 0.1 V DC
Voltage Range	+22 – +28 V DC
Output power	700 W
Hold-up time	>20 ms

Signal

The signal interface consists of an optical fibre link, called the Power Control Bus (Opto).

5.2 Operator Interface

There are two optical indicators on the front of the unit, *see table below.*

Table 6 Optical Indicators

Indicators	Colour
Fault	Red
Operational	Green

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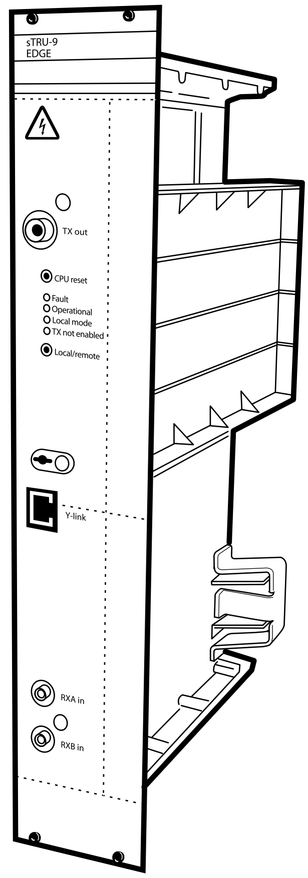
sTRU
Single Transceiver Unit
Description

The single Transceiver Unit (sTRU) is a 1-TRX replaceable unit.



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Contents

1 Product Overview

The sTRU is a 1-TRX replaceable unit. A TRX is a transmitter/receiver and signal processing unit, which transmits and receives one carrier.

The sTRU has the same dimensions and the same backplane connectors as other TRUs, but a slightly different front layout. The difference is an additional Y link connection plus removal of the “test-call” button and indicator as well as the test interface.

The sTRU has one TX connector and two RX connectors. The RX connectors are used for 2-branch diversity.

1.1 Main Functions

The sTRU has the following main functions:

- Transmits and receives one radio carrier
- Processes signals

1.2 Variants

The sTRUs are available in versions for the following frequency bands:

- GSM 900
- GSM 1800
- GSM 1900

2 Dimensions and Weight

The sTRU has the following dimensions and weight:

Table 1 Dimensions and weight

Height	Width	Depth	Weight
395 mm	69 mm	255 mm	5 kg

3 Power Consumption and Heat Generation

Table 2 Power consumption and heat generation

Max. Power Consumption	**Max. Heat Generation**
233 W	198 W

4 Function Description

The sTRU has the following function blocks:

- CPU System
- DSP System
- Radio Control System
- Radio System

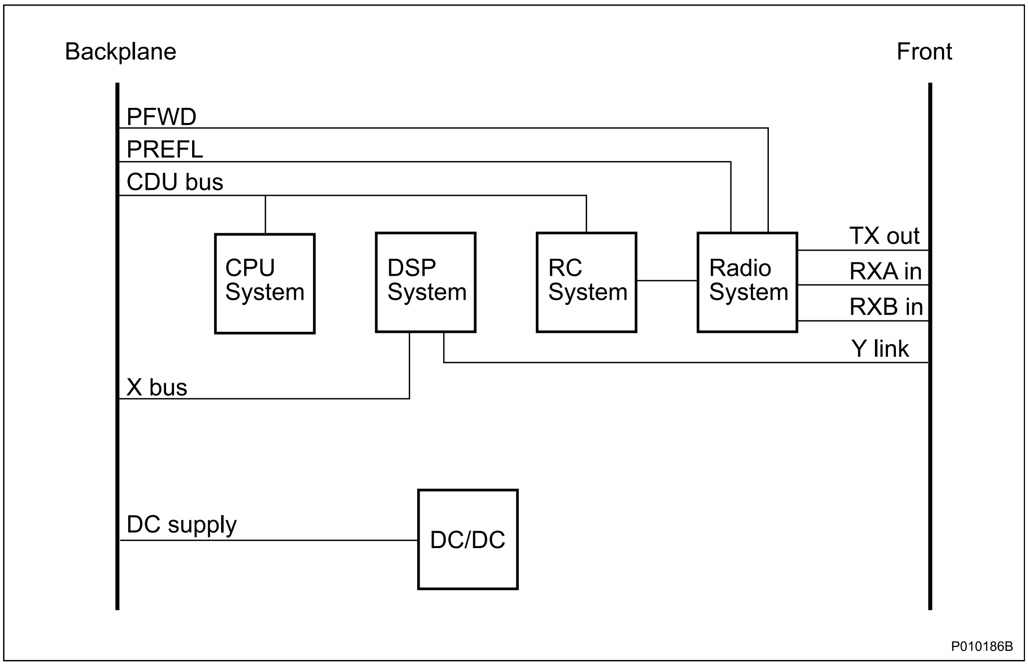

Figure 1 Block Diagram of sTRU

4.1 CPU System

The CPU System is a control unit in the sTRU. It consists of a CPU, support logic, memory and logic for handling the interfaces.

4.2 DSP System

The DSP System performs all baseband signal processing. For downlink, this includes Terrestrial Protocol Handling (TPH), encoding, ciphering and burst generation. For uplink it includes equalisation, combining, decoding, deciphering and TPH.

4.3 Radio Control System

The functions of the Radio Control System are the following:

- Synchronises and controls the different parts of the radio
- Modulises and D/A converts the data to transmit
- Filters the received radio signal with a channel selective filter
- Compensates the RX and TX delays and gain variations

The Radio Control System is seen by the rest of the RBS as the front end to the radio, which can be asked to transmit a burst of data using a selected modulation, or asked to receive a burst using a selected digital filter.

All the time critical radio control functions are performed by the Radio Control System and no computational support is required from the CPU system on real time basis.

4.4 Radio System

The Radio System contains a radio receiver, a radio transmitter and a power amplifier.

The radio receiver receives RF modulated uplink data from 1 or 2 diversity branches and sends it to the Radio Control System.

The radio transmitter generates the RF downlink signal from the modulated baseband signal. It sends the RF signal to the power amplifier. The power amplifier then amplifies the downlink RF signals.

5 Interfaces

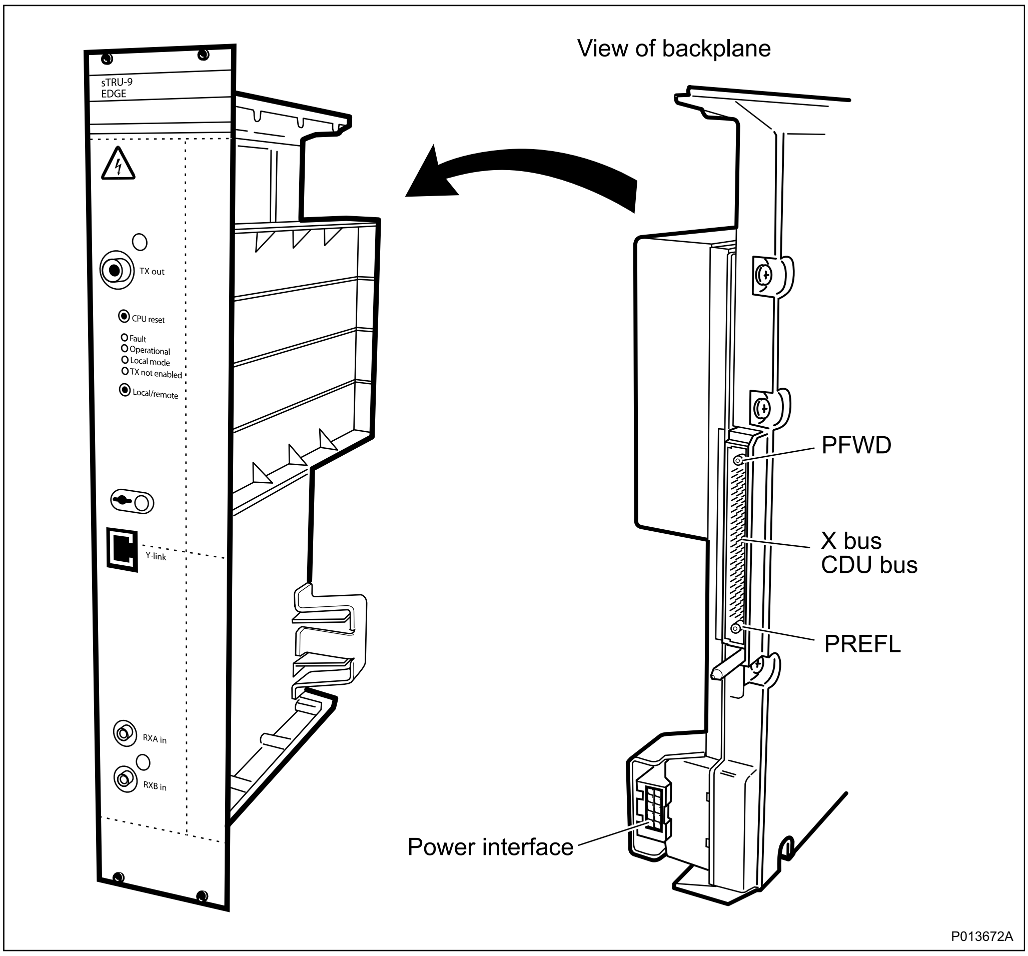

Figure 2 Interfaces on the sTRU

5.1 Connection Interfaces

The following interfaces are located on the front:

- Y link
- RXA in
- RXB in
- TX out

5.2 Signal and Power Interfaces

The following interfaces are located on the backplane:

- X bus

- PFWD
- PREFL
- CDU bus
- DC supply

5.3 Operator Interface

Table 3 Indicators

Indicator	Colour
Fault	Red
Operational	Green
Local mode	Yellow
TX not enabled	Yellow

Table 4 Switches

Switch	Function
CPU reset	Resets the CPU system
Local/remote	Local/remote mode

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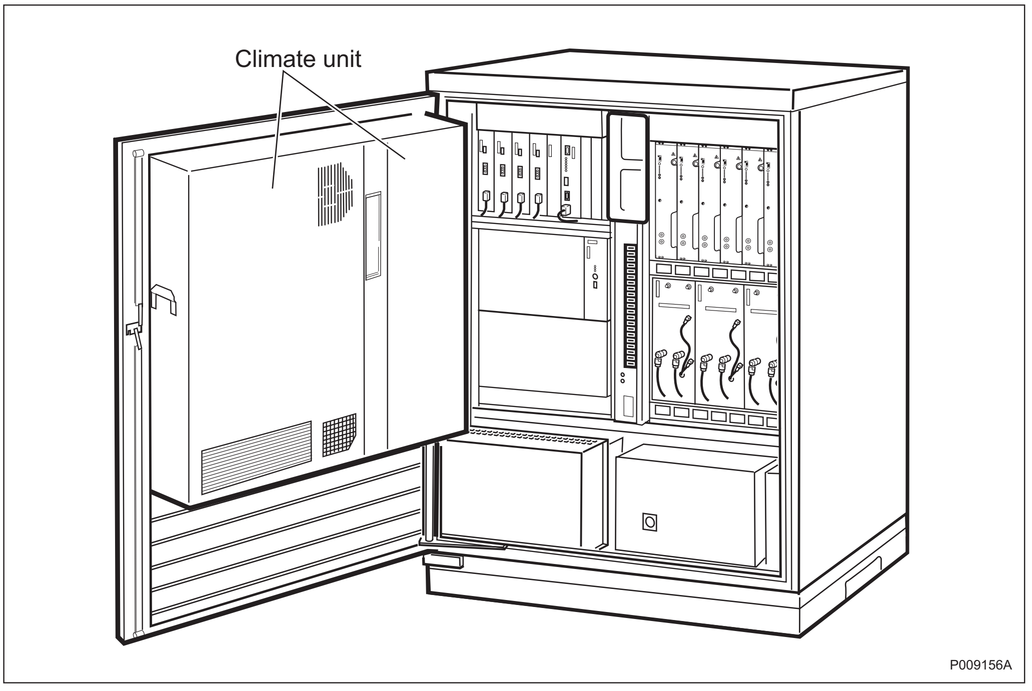
V3 Climate Unit

Climate Unit for RBS 2102

Unit Description

The V3 Climate Unit maintains the internal RBS temperature within working range.



Contents

1 Product Overview

This section describes the main features of the climate unit.

1.1 Main Features

The climate unit maintains climate protection by a combination of air conditioning, heat exchanging and heating. The units will operate in different modes depending on the internal temperature of the cabinet. The climate protection maintains the internal temperature within working range.

The climate unit is dimensioned for any combination of configuration, including full RF output power with a fully equipped cabinet and 100% traffic load.

2 Dimensions

This section contains the dimensions of the ACCU. Size and weight are shown in the table below.

Table 1 Dimensions

Width	Height	Depth	Weight
1100 mm	1000 mm	200 mm	90 kg

3 Power Consumption

This section describes the power consumption of the different units in the climate unit.

Table 2 Power Consumption

Unit	Max. Power Consumption
Heat exchanger	250 W
Air conditioner (at 230 V AC)	1100 W
Heater (at 230 V AC)	2050 W
Maximum AC (at 230 V AC)	2050 W
Maximum DC	250 W
Maximum AC starting current	25 A
Maximum DC starting current	25 A

4 Function Description

This section describes the functions of the climate unit.

The V3 Climate Unit has five units providing climate protection for the RBS:

- Heat exchanger
- Air conditioner
- Cabinet subrack fans
- Heater
- Climate Control Unit (CCU)

The figure below shows a block diagram of the first four units in the list above.

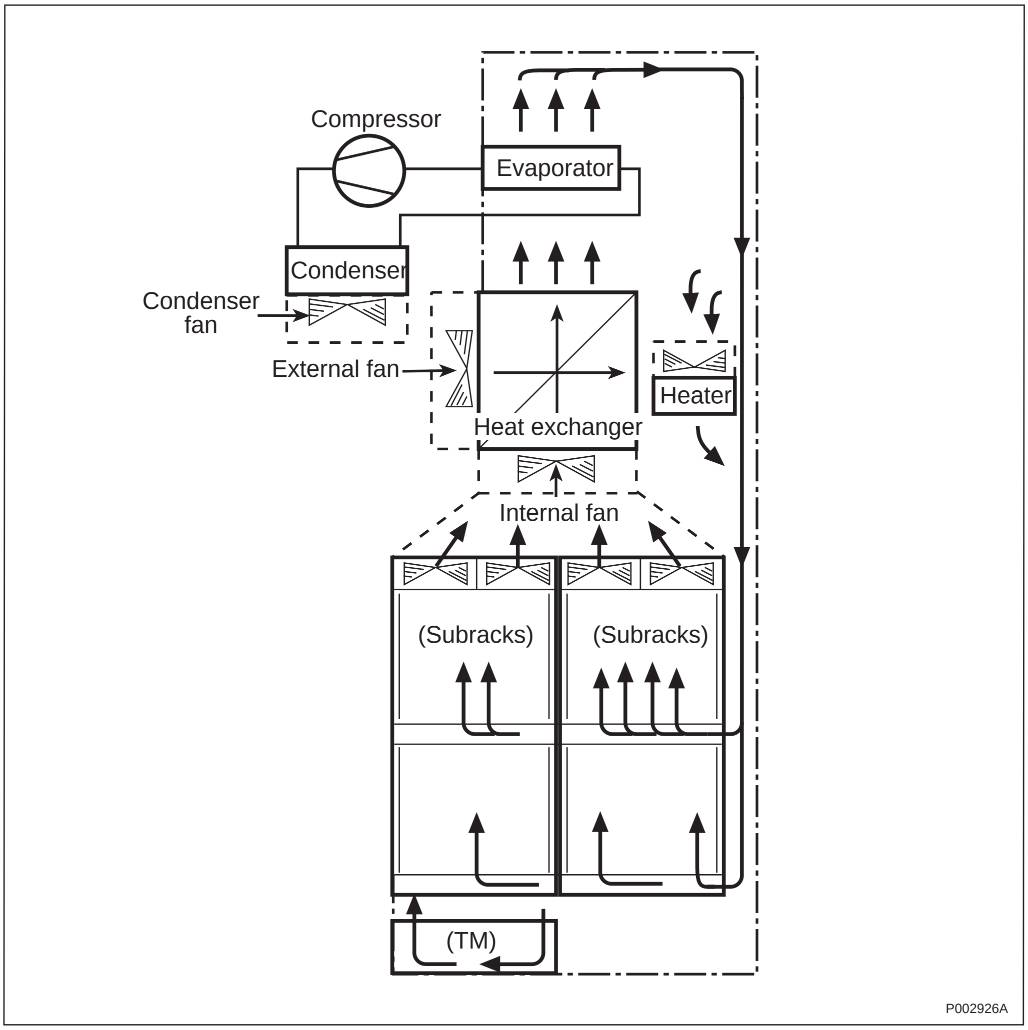


Figure 1 Block Diagram

The location of the Climate Control Unit and its control board are shown in the figure below.

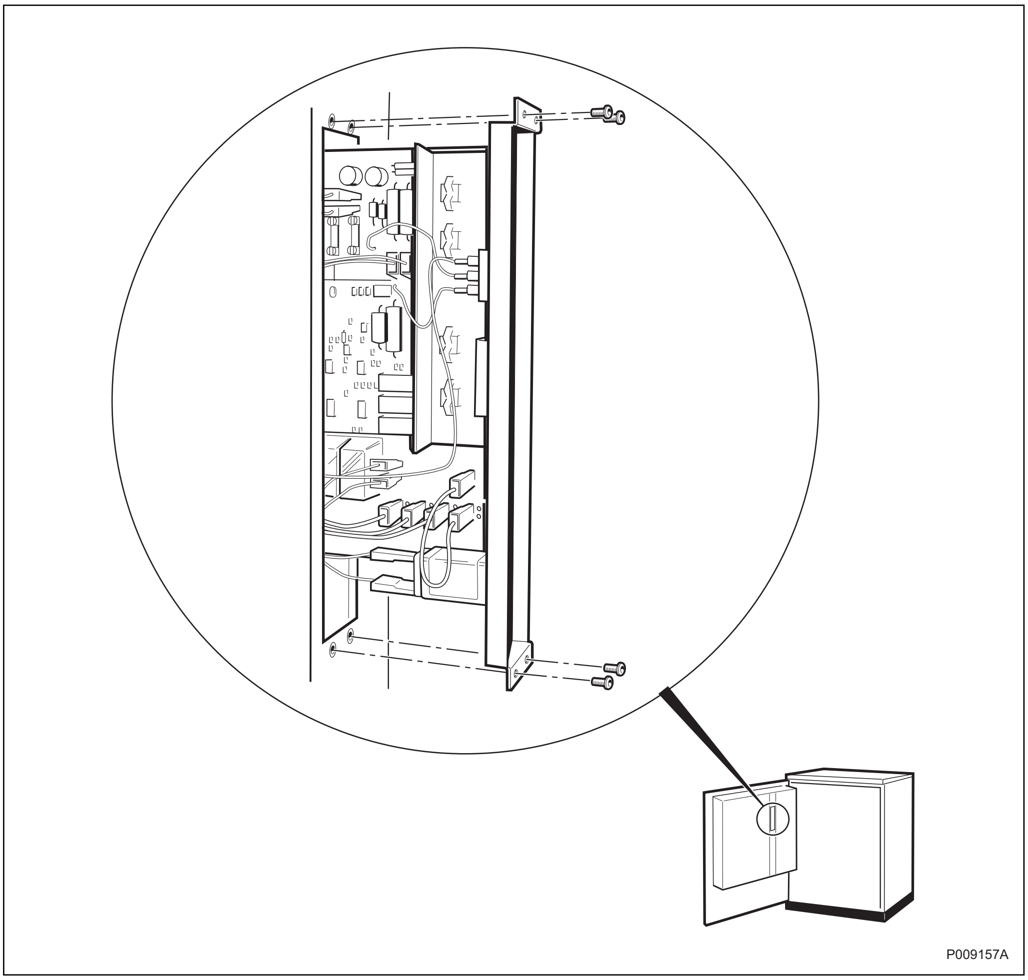


Figure 2 Climate Control Unit and Control Board

Heat exchanger The heat exchanger is a counter flow air-to-air cooling device which allows the transfer of heat from the internal RBS air flow to the external ambient air. At internal cabinet temperatures lower than 45°C, the heat exchanger is sufficient to control the internal temperature. When the internal temperature exceeds 45°C, the air conditioner must be used to remove heat from the air in the RBS.

Air Conditioner When the air conditioner is activated, the internal cabinet air is transferred by the climate unit internal fan from the RBS cabinet fans through the heat exchanger and then to the evaporator where it is cooled before being returned to the RBS.

Cabinet Subrack Fans The four cabinet subrack fans are controlled by the ECU via the FCUs, one FCU per two cabinet subrack fans. The cabinet fan speed is regulated by the ECU.

Heater The heater is comprised of a heating element and a fan with a separate airflow.

Climate Control Unit The CCU provides the following main control functions:

- Test buttons to activate the heater or the compressor for testing
- Strapping options through CCU

5 Interfaces

In this section the signal and power interfaces are described, as well as the operator interface.

5.1 Signal and Power Interfaces

There are three signal and power interfaces:

- DC Power
- AC mains power
- Control cable

5.2 Operator Interface

This section describes the operator interface, indicators and switches on the CCU on the climate unit, *see figure and table below.*

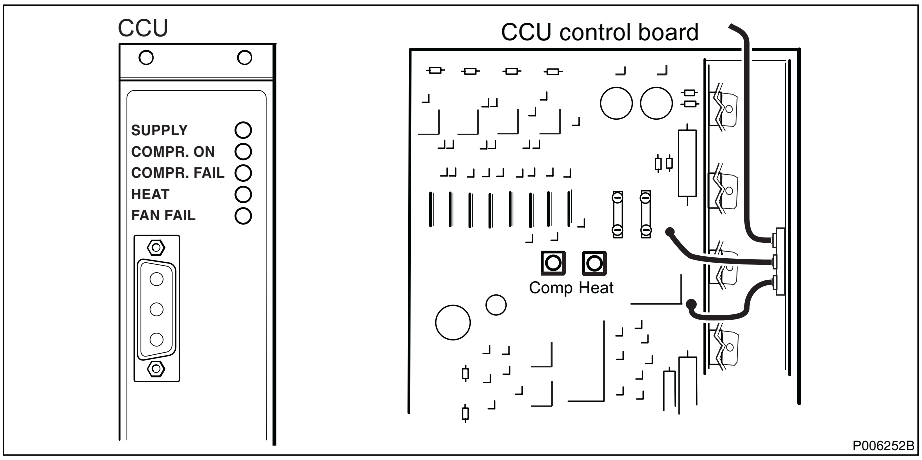


Figure 3 CCU Optical Indicators (left) and Switches (right)

Table 3 CCU Optical Indicators

Label	Colour	Mode	Indication
SUPPLY	Green	Off	There is no power to the CCU
		On	There is power to the CCU
COMPR. ON	Yellow	Off	The compressor is not operational.
		On	The compressor is operational.
COMPR. FAIL	Yellow	Off	No faults detected in the compressor.
		On	One or more faults detected in the compressor.
HEAT	Yellow	Off	The heater is not operational.
		On	The heater is operational.
FAN FAIL	Yellow	Off	No faults detected in the external or internal fans.
		On	One or more faults detected in the external or internal fans.

Table 4 CCU Switches

Label	Function
Comp	Starts and stops compressor test function.
Heat	Starts heater function.

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RBS 2000
Glossary

This document provides a glossary of terms and abbreviations used in RBS 2000 Customer Product Information (CPI).

Contents

1 Introduction

This glossary lists abbreviations and acronyms used in texts dealing with RBS 2000 cabinets. Some basic terms and acronyms needed for cross-reference are included in the list.

An arrow ⇒ is used to indicate a reference to another entry in the list.

Where there are several meanings for the same term and the terms are cabinet size dependent, this is indicated using **Macro** and **Micro** where applicable..

2 Terms and Abbreviations

1–P	One-Pair connection with echo cancellation (= two wires)
2–P	Two-Pair connection with echo cancellation (= four wires)
AAU	Active Antenna Unit
Abis	GSM interface standard defining attributes of the communication between the BSC and the BTS.
AC	Alternating Current
ACB	Alarm Collection Board
ACCU	Alternating Current Connection Unit
ACCU-CU	ACCU Connection Unit
ACCU-DU	ACCU Distribution Unit
A/D converter	Analog to Digital converter
ADM	Auxiliary Distribution Module
AFS	AMR Full-rate speech
AGW	Abis Gateway
AHR	AMR Half-rate speech
Air conditioner	One version of the climate unit (Active cooler)
AIS	Alarm Indication Signal
ALBO	Automatic Line Build Out

ALNA	Antenna Low Noise Amplifier
ALPU	Antenna Lightning Protection Unit
AMR	Adaptive Multi-Rate
AO	Application Object
ARAE	Antenna Related Auxiliary Equipment
ARFCN	Absolute Radio Frequency Channel Number
ARP	Antenna Reference Point
ARU	Active Replaceable Unit
ASIC	Application Specific Integrated Circuit
ASU	Antenna Sharing Unit
AT	Alphanumeric Terminal
ATRU	Adaptive Transceiver Unit
ATSR	Air Time Slot Resource
AU	Antenna Unit
BALUN	BALance and UNbalance transformer
Batt	Battery
BB	Battery Box
BBS	Battery Back-up System
BCCH	Broadcast Control CHannel Downlink only broadcast channel for broadcast of general information at a base station, on a base station basis.
BCS	Block Check Sequence
BDM	Battery Distribution Module The BDM is an IDM with a battery and a local processor.
BER	Bit Error Rate
BFF	Bit Fault Frequency

BFI	Bad Frame Indication
BFU	Battery Fuse Unit
Bias injector	A unit which injects DC power into the coaxial cable to feed the TMA. Isolates the DC power from the RF signal fed to the CDU.
Bm	Denotes a full-rate traffic channel
BPC	Basic Physical Channel Denotes the air interface transport vehicle formed by repetition of one time slot on one or more radio frequency channels.
BS	Base Station
BSC	Base Station Controller GSM network node for control of one or more BTSs.
BSCSim	Base Station Controller Simulator
BSS	Base Station System GSM network logical unit comprising one BSC and one or more BTSs.
BTS	Base Transceiver Station GSM network unit operating on a set of radio frequency channels in one cell.
burst	A portion of digital information, the physical content, that is transferred within the time interval of one time slot.
cabinet	The physical housing of a base station
Cascading	Connection of several cabinets by the PCM cable. Similar to serial connection.
CBCH	Cell Broadcast CHannel This is a downlink only channel used by the GSM defined SMSCB function.

CCCH Common Control CHannel

Channel combining the following common control channels:

- PCH Paging CHannel
- RACH Random Access CHannel
- AGCH Access Grant CHannel

CCU Climate Control Unit

CDU Combining and Distribution Unit

CE Conformité Européenne

cell An area of radio coverage identified by the GSM network by means of the cell identity.

CEU Coverage Extension Unit

CF Central Functions

channel The common term channel denotes the virtual connection, consisting of physical and logical channels, between BSS and MS, during a call in progress.

⇒ Logical Channel ⇒ Physical Channel

Channel Combination A physical channel on an air interface carrying a defined set of logical channels.

Channel group A channel group is a group of dedicated logical channels to a specific MS.

CM **Macro** = Control Module (for TMA)

Micro = Common Mode

CMD Digital Radio Communication Tester

CMRU Central Main Replaceable Unit.

The RBS is physically connected to the Base Station Controller (BSC) via the CMRU. There is only one CMRU in each RBS (DXU or IXU). In RBSs without DXU or IXU the whole RBS is regarded as CMRU.

Macro: CMRU = DXU

	Micro: CMRU = The whole RBS
	RBS 2308: CMRU = IXU
	RBS 2309: CMRU = IXU
	RBS 2109: CMRU = IXU
CNU	Combining Network Unit
Compr	Compressor
CON	LAPD concentrator
	LAPD concentration is used to reduce the number of required physical links between the BSC and BTS.
Config	Configuration
Co-siting	Co-siting is the operation of radio equipment from more than one mobile telephone system and/or frequency on the same site sharing common equipment.
CPI	Communication and Power Interface
CPI	Customer Product Information
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CS	Coding Scheme
CSA	Canadian Standards Association
CSES	Consecutive Severely Errored Second
CSU	**Macro** = Channel Service Unit
	Micro = Customer Service Unit
CU	Combining Unit (RU in CDU_D)
CXU	Configuration Switch Unit
DB	DataBase
DC	Direct Current
DCC	Digital Cross Connector

DCCH	Dedicated Control CHannel Dedicated control channels carry signalling data.
DCCU	DC Connection Unit
ddTMA	dual duplex Tower Mounted Amplifier
DF	Distribution Frame
DF	Disturbance Frequency
DFU	Distribution and Fuse Unit
DIP	DIgital Path The name of the function used for supervision of the connected PCM lines.
DM	Degraded Minute
DM	Distribution Module
DMRU	Distributed Main Replaceable Unit If a Main RU is subordinated to the CMRU, it is said to be distributed.
downlink	Signalling direction from the system to the MS.
DP	Digital Path
DP	Distribution Panel
DPX	Duplexer
DS1	Digital Signal level 1 (1544 kbit/s)
DSP	Digital Signal Processor
DT	Data Transcript
DTE	Data Terminal Equipment
DTF	Distance To Fault
dTMA	duplex TMA
dTRU	double TRansceiver Unit
DU	Distribution Unit (RU in CDU-D)

DUT	Device Under Test
DX	Direct Exchange
DXB	Distribution Switch Board
DXC	Digital Cross Connector
DXU	Distribution Switch Unit
DXX	Ericsson Cellular Transmission System including NMS
E1	Transmission standard, G.703, a 2048 kbit/s PCM link
E-GSM	Extended GSM
EACU	External Alarm Connection Unit
EBB	External Battery Backup
EC1	External Condition Map Class 1
EC2	External Condition Map Class 2
ECU	Energy Control Unit
EDGE	Enhanced Data rate for Global Evolution
EDGE dTRU	EDGE double TRansceiver Unit ⇒ EDGE
EDT	Electrical Down Tilt
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIRP	Effective Isotropic Radiated Power
EMC	ElectroMagnetic Compatibility
EMF	ElectroMotive Force
EMF	ElectroMagnetic Field
EMI	Electromagnetic Interference
ENV	Environmental
EOC	Embedded Operations Channel
EPC	Environmental and Power Control

ES	Errored Second
ESB	External Synchronization Bus
ESD	ElectroStatic Discharge
ESF	Extended Superframe Format
ESO	Ericsson Support Office
ETS	European Telecommunication Standard
EXT	External
FACCH	Fast Associated Control CHannel Main signalling channel in association with a TCH.
FCC	Federal Communications Commission
FCCH	Frequency Correction CHannel
FCOMB	Filter COMBiner
FCU	Fan Control Unit
FDL	Facility Data Link
FDU	Feeder Duplexer Unit
FER	Frame Erasure Ratio
FIU	Fan Interface Unit
FS	Function Specification
FSC	Field Support Centre
FU	Filter Unit (RU in CDU-D)
FUd	Filter Unit with duplexer (RU in CDU-D)
FXU	Future Expansion Unit
G01	MO model for RBS 200
G12	MO model for RBS 2000
G.703	Physical/electrical characteristics of hierarchical digital interfaces, as defined by the ITU.

G.704	Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s, as defined by the ITU.
GPRS	General Packet Radio Services
GPS	Global Positioning System
GS	General Specification
GSL	GPRS Signalling Link
GSM	Global System for Mobile communications International standard for a TDMA digital mobile communication system. Originally, GSM was an abbreviation for Group Special Mobile, which is a European mobile telecommunication interest group, established in 1982.
GSM 800	GSM system 800 MHz (generic)
GSM 900	GSM system 900 MHz (generic)
GSM 1800	GSM system 1800 MHz (generic)
GSM 1900	GSM system 1900 MHz (generic)
HCE	HDSL Central Equipment
HCOMB	Hybrid COMBiner
HDLC	High level Data Link Control
HDSL	High bit rate Digital Subscriber Line
Heat Exchanger	A version of the climate unit
HEU	Heat Exchanger Unit
HISC	Highway Splitter Combiner
HLIN	High Level IN
HLOUT	High Level OUT
HMS	Heat Management System
Hum	Humidity
HW	HardWare

HWU	HardWare Unit An HWU consists of one or more SEs. An HWU is a functional unit within the RBS. The HWU is either active (equipped with a processor) or passive (without processor).
I1A	Internal Fault Map Class 1A
I1B	Internal Fault Map Class 1B
I2A	Internal Fault Map Class 2A
IA	Immediate Assignment
IC	Integrated Circuit
ICMI	Initial Codec Mode Indicator
ID	Identity
IDB	Installation DataBase
IDM	Internal Distribution Module
IEC	International Electric Commission
IFB	Interface Board
IF Box	Interface Box
IMSI	International Mobile Subscriber Identity
INIT	Initial
INT	Internal
IOG	Input/Output Group
IOM	Internal Operation and Maintenance bus
IR	InfraRed
IS	Interface Switch
IWD	InterWork Description
IXU	Interface and Switching Unit
JTC	Joint Technical Committee

LAN	Local Area Network
LAPD	Link Access Procedures on D-channel LAPD is the data link layer (layer 2) protocol used for communication between the BSC and the BTS on the Abis interface. Abis layer 2 is sometimes used synonymously with LAPD.
LBO	Line Build Out
LED	Light Emitting Diode
LLB	Line Loop Back
LNA	Low Noise Amplifier
Local bus	The local bus offers communication between a central main RU (DXU) and distributed main RUs (TRU and ECU).
Local mode	When the RU is in Local mode, it is not communicating with the BSC.
Local/Remote switch	A switch used by the operator to order the RU to enter Local or Remote mode.
LOF	Loss Of Frame
Logical Channel	A logical channel represents a specified portion of the information carrying capacity of a physical channel. GSM defines two major categories of logical channels: • TCHs – Traffic CHannels, for speech or user data • CCHs – Control CHannels, for control signalling ⇒ Physical Channel ⇒ Channel Combination
Logical RU	A unit which can be referred to, but is not a single physical unit.
LOS	Loss Of Signal
LVD	Low Voltage Directive
LVF	Low Voltage Filter

MAC	Medium Access Controller
MADT	Mean Accumulated DownTime
magazine	A magazine is a reserved space in the cabinet, which may hold one or more RUs.
Main RU	Contains one or more processors, to which software can be downloaded from the BSC. A Main RU is either Central (CMRU) or Distributed (DMRU). A Main RU may or may not have a direct signalling link to the BSC.
MBU	Mounting Base Unit
MCB	MultiCasting Box
MHS	Modification Handling System
	Ericsson trouble report database
MMI	Man-Machine Interface
MO	Managed Object
MR	Measurement Receiver
MRT	Mean Repair Time
MS	Mobile Station
MSC	Mobile services Switching Centre
	GSM network unit for switching, routing and controlling calls to and from the Public Switched Telephone Network (PSTN) and other networks.
MSTP	Mobile Station Test Point
MTBF	Mean Time Between Failure
MTBCF	Mean Time Between Catastrophe Failure
Multidrop	Two or more RBSs connected in a chain to the same transmission system. All the relevant time slots are dropped out by each RBS. (This function is sometimes called cascading.)
NCS	National Colour System
NEBS	Network Equipment Building System

NMS	Ericsson Network Management System in DXX
Nominal Power	The nominal power is the power level defined when configuring the transceiver.
N terminal	Neutral terminal in an AC mains connection
NTU	Network Terminating Unit
OL/UL	Overlaid/Underlaid
O&M	Operation and Maintenance
	General term for activities such as configuration, utilization of channels (frequency bands), cell planning, system supervision, hardware and software maintenance, subscriber administration, and so on.
OMC	Operation and Maintenance Centre
OML	Operation and Maintenance Link
	Layer 2 communication link for operation and maintenance services on Abis.
OMT	Operation and Maintenance Terminal
	The OMT is a PC application for O&M of an RBS.
Operation	Operation is the normal, everyday running of the RBS with full functions.
OPI	OPerational Instructions
OVP	OverVoltage Protection
OXU	Space for Optional Expansion
P-GSM	Primary GSM
PA	Power Amplifier
PAM	Power Amplifier Module
Passive RU	A passive replaceable unit has a very low level of intelligence and is independent of the processor system.
PBA	Printed Board Assembly
PBC	Power and Battery Cabinet

PC	Personal Computer
PCB	Printed Circuit Board
PCH	Paging CHannel Downlink only subchannel of CCCH for system paging of MSs. ⇒ CCCH
PCM	Pulse Code Modulation
PCU	Packet Control Unit
PDCH	Packet Data Channel
PE terminal	Protective Earth terminal in an AC mains connection
PFWD	Power Forward
Physical Channel	An air interface physical channel carries one or more logical channels. A physical channel uses a combination of frequency and time division multiplexing and is defined as a sequence of radio frequency channels and time slots. ⇒ TDMA frame ⇒ Logical channel
PIB	Power Interface Board
PIN	Personal Identification Number
PLB	Payload Loop Back
PLMN	Public Land Mobile Network A network, established and operated by an administration or its licensed operator(s), for the specific purpose of providing land mobile communication services to the public. It provides communication possibilities for mobile users. For communication between mobile and fixed users, interworking with a fixed network is necessary.
PPE	Personal Protective Equipment
PREFL	Power Reflected
PSA	Power Supply Adapter

PSTN	Public Switch Telephone Network
PSU	Power Supply Unit
PWU	Power Unit
RACH	Random Access CHannel
	Uplink only subchannel of CCCH for MS request for allocation of a dedicated channel.
	⇒ CCCH
RAI	Remote Alarm Indication
RAM	Random Access Memory
RBER	Radio Bit Error Ratio
RBS	Radio Base Station
	All equipment forming one or more Ericsson base station.
	⇒ BTS
RCB	Radio Connection Box
RD	Receive Data
Remote mode	When the RU is in RU Remote mode, a link is established between the BSC and the Central Main RU (CMRU).
RF	Radio Frequency
RFCH	Radio Frequency CHannel
	A radio frequency carrier with its associated bandwidth.
RFTL	Radio Frequency Test Loop
RLC	Radio Link Control
RLC	Repair Logistic Centre
RRU	Remote Radio Unit
RSL	Radio Signalling Link
R-state	Release state

RS232	American standard for term/MODEM interconnection.
rTMA	Receiver TMA
RTN	Return
RU	Replaceable Unit
	An RU consists of one or more HWUs. An RU may be replaced by another RU of the same type. The RU is the smallest unit that can be handled on site.
RX	Receiver
RX1	Receiver antenna branch 1
RX2	Receiver antenna branch 2
RXA	Receiver antenna branch A
RXB	Receiver antenna branch B
RXBP	Receiver BandPass filter
RXD	Receiver Divider
RXDA	Receiver Divider Amplifier
RXDP	Receiver Distribution Plane
RXLEV	Measure of signal strength as defined in GSM:05.08:8.1.4
RXQUAL	Measure of signal quality as defined in GSM:05.08:8.2.4
SACCH	Slow Associated Control CHannel
SCC	Site Cell Configuration
SCH	Synchronization CHannel
SCU	Switching and Combining Unit
SDCCH	Stand alone Dedicated Control CHannel
	Main dedicated signalling channel on the air interface, mainly used for call locating and establishment.
SE	Supervised Entity
SEC	Site Extension Configuration

SES	Severely Errored Second
SF	Slip Frequency
SID	Silence Descriptor
SIG	Signalling
SIM	Subscriber Identity Module
SMS	Short Message Service (point to point) A short message, up to 160 alphanumeric characters long, can be sent to or from an MS (point to point).
SO	Service Object
SS	Swedish Standard
Sub-RU	A sub-replaceable unit is always connected to a superior Main RU. This connection is used for example for retrieval of the RU identity. A sub-RU normally does not have a processor. Note that an RU with a processor, which cannot be loaded, is classified as a sub-RU.
SVS	System Voltage Sensor
SW	SoftWare
SWR	Standing Wave Ratio
SYNC	Synchronous
T1	Transmission standard, G.703, a 1544 kbit/s PCM link
TA	Timing Advance A signal sent by the BTS to the MS which the MS uses to advance its timing of transmissions to the BTS to compensate for propagation delay.
TC	Transaction Capabilities
TCB	Transceiver Control Board
TCH	Traffic CHannel The traffic channels carry either encoded speech or user data.

TCH/F	Traffic Channel, Full-rate
TCH/H	Traffic Channel, Half-rate
TCC	Transmission Coherent Combining
TCH SIG	Traffic CHannel Signalling
TD	Transmit Data
TDMA	Time Division Multiple Access Multiplexing of several channels in a common frequency band. Each channel is assigned a certain time division, a time slot.
TDMA frame	GSM air interface time frame comprising eight time slots.
TEI	Terminal Endpoint Identifier TEI is an identification code carried by a LAPD frame as a terminal connection endpoint within a Service Access Point (SAP).
TEMS	TEst Mobile Station
TF	Timing Function
TG	Transceiver Group
TIM	Transmission Interface Module
Timing bus	The timing bus carries air timing information from the timing unit in the DXU to the TRUs.
TLS	Terrestrial Link Supervision
TM	Transport Module The Transport module is non-RBS equipment belonging to the transport network.
TMA	Tower Mounted Amplifier
TMA-CM	Tower Mounted Amplifier – Control Module
TN	Time slot Number

TN O&M	Transport Network Operation and Maintenance (in general)
TRA	Transcoder Rate Adapter The TRA Unit (TRAU) in BSC performs transcoding of speech information and rate adaptation of data information.
TRS	Transceiver System
TRU	Transceiver Unit
TRX	Transceiver (combined transmitter and receiver)
TRXC	Transceiver Controller
TS	Time Slot A 0.577 ms period (TDMA frame subunit) corresponding to 156.25 raw bits of information. The eight time slots of each TDMA frame are numbered 0...7.
TT	Total Time
TU	Timing Unit
TX	Transmitter
TXA	Transmitter Antenna A
TXB	Transmitter Antenna B
TXBP	Transmitter BandPass filter
TXU	Radio Transmitter Unit
UAS	Unavailable Seconds
UAST	UnAvailable STate supervision
UL	Underwriter Laboratories
uplink	Signalling direction from the MS to the system.
UPS	Uninterrupted Power Supply
VCO	Voltage Controlled Oscillator
VSWR	Voltage Standing Wave Ratio RF signal measure. The quotient between transmitted and reflected voltage.

X bus	The X bus carries transmit air data frames between transceivers.
Y link	The interface between the DXU and each DSP System in core based TRUs.

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