DBS3900

V100R005C00

RRU3252/RRU3256 Hardware Description

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About This Document

Purpose

This document provides reference for planning and deploying an RRU3252/RRU3256 (referred to as RRU in this document). It presents the exterior and describes the ports, functions, cable types, connector specifications, and cable connections of the RRU.

Product Version

The following table lists the product version related to this document.

Product Name	Product Version
DBS3900 LTE TDD	V100R005C00 and later versions

Intended Audience

This document is intended for:

- Base station installation engineers
- System engineers
- Site maintenance engineers

Organization

1 Change History

This chapter describes changes in the *RRU3252/RRU3256 Hardware Description*.

2 RRU Introduction

This chapter describes the RRU.

3 RRU Cables

This chapter describes RRU cables.

4 RRU Auxiliary Devices

This chapter describes remote radio unit (RRU) auxiliary devices.

Conventions

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium or low level of risk, which if not avoided, could result in minor or moderate injury.
CAUTION	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
TIP	Indicates a tip that may help you solve a problem or save time.
NOTE	Provides additional information to emphasize or supplement important points of the main text.

General Conventions

The general conventions that may be found in this document are defined as follows.

Convention	Description
Times New Roman	Normal paragraphs are in Times New Roman.
Boldface	Names of files, directories, folders, and users are in **boldface**. For example, log in as user **root**.
Italic	Book titles are in *italics*.
Courier New	Examples of information displayed on the screen are in Courier New.

Command Conventions

The command conventions that may be found in this document are defined as follows.

Convention	Description
Boldface	The keywords of a command line are in **boldface**.

Convention	Description
Italic	Command arguments are in *italics*.
[ ]	Items (keywords or arguments) in brackets [ ] are optional.
{ x | y | ... }	Optional items are grouped in braces and separated by vertical bars. One item is selected.
[x | y | ...]	Optional items are grouped in brackets and separated by vertical bars. One item is selected or no item is selected.
{ x | y | ... }*	Optional items are grouped in braces and separated by vertical bars. A minimum of one item or a maximum of all items can be selected.
[x | y | ...]*	Optional items are grouped in brackets and separated by vertical bars. Several items or no item can be selected.

GUI Conventions

The GUI conventions that may be found in this document are defined as follows.

Convention	Description
Boldface	Buttons, menus, parameters, tabs, window, and dialog titles are in **boldface**. For example, click **OK**.
>	Multi-level menus are in **boldface** and separated by the ">" signs. For example, choose **File** > **Create** > **Folder**.

Keyboard Operations

The keyboard operations that may be found in this document are defined as follows.

Format	Description
Key	Press the key. For example, press **Enter** and press **Tab**.
Key 1+Key 2	Press the keys concurrently. For example, pressing **Ctrl**+**Alt**+**A** means the three keys should be pressed concurrently.
Key 1, **Key 2**	Press the keys in turn. For example, pressing **Alt**, **A** means the two keys should be pressed in turn.

Mouse Operations

The mouse operations that may be found in this document are defined as follows.

Action	Description
Click	Select and release the primary mouse button without moving the pointer.
Double-click	Press the primary mouse button twice continuously and quickly without moving the pointer.
Drag	Press and hold the primary mouse button and move the pointer to a certain position.

Contents

1 Change History

This chapter describes changes in the *RRU3252/RRU3256 Hardware Description*.

2 RRU Introduction

About This Chapter

This chapter describes the RRU.

The RRU performs the following functions:

● Exchanges baseband data with a BBU.

● Receives RF signals from the antenna system, converts the received signals into IF signals, amplifies the IF signals, and performs analog-to-digital conversion. The TX channel filters downlink signals, performs digital-to-analog conversion, and converts IF signals into signals applicable to the TX band.

● Multiplexes RX and TX signals on the RF channel, which enables these signals to share the same antenna path. It also filters RX and TX signals.

2.1 RRU Exterior
This section describes the exterior and dimensions of an RRU.

2.2 RRU Ports
This section describes ports on the RRU panels. An RRU has a bottom panel, cabling cavity panel, and indicator panel.

2.3 RRU Indicators
This section describes six indicators on an RRU. They indicate the running status.

2.1 RRU Exterior

This section describes the exterior and dimensions of an RRU.

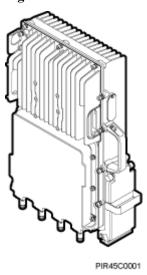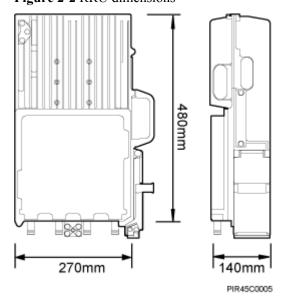Figure 2-1 shows an RRU.

Figure 2-1 RRU exterior

Figure 2-2 shows RRU dimensions.

Figure 2-2 RRU dimensions

2.2 RRU Ports

This section describes ports on the RRU panels. An RRU has a bottom panel, cabling cavity panel, and indicator panel.

Figure 2-3 shows the ports on the RRU panels.

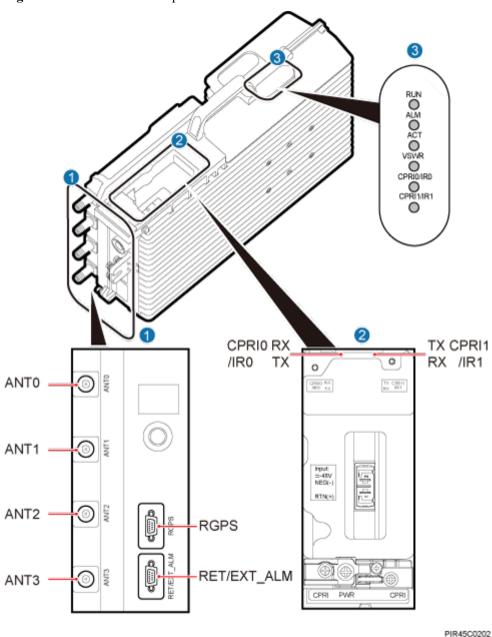Figure 2-3 Ports on the RRU panels

Table 2-1 describes ports and indicators on the RRU panels.

Table 2-1 Ports and indicators on the RRU panels

Item	Label	Description
(1) Ports at the bottom	ANT0-ANT3	TX/RX ports. ANT0 port supports RET signal transmission.
	RET/EXT_ALM	Communication port for the RET antenna or port for alarm reporting, supporting RET signal transmission
	RGPS	RGPS port, which is optional.
(2) Ports in the cabling cavity	CPRI0/IR0	Optical port
	CPRI1/IR1	
	RTN(+)	Power supply socket
	NEG(-)	
(3) Indicators	RUN	For details, see **2.3 RRU Indicators**.
	ALM	
	ACT	
	VSWR	
	CPRI0/IR0	
	CPRI1/IR1	

 NOTE

If only two RF ports are required, ANT0 and ANT1 are used by default.

The RET ports to be used are determined by the software configuration.

2.3 RRU Indicators

This section describes six indicators on an RRU. They indicate the running status.

For the specific positions of RRU indicators, see **2.2 RRU Ports**.

Table 2-2 describes RRU indicators.

Table 2-2 Indicators on the RRU

Label	Color	Status	Description
RUN	Green	Steady on	There is power supply, but the module is faulty.
		Steady off	There is no power supply, or the module is faulty.

Label	Color	Status	Description
		Blinking on for 1s and off for 1s	The module is working properly.
		Blinking on for 0.125s and off for 0.125s	Software is being loaded to the module, or the module is not started.
ALM	Red	Steady on	Alarms are generated, and the module must be replaced.
		Steady off	No alarm is generated.
		Blinking on for 1s and off for 1s	Alarms are generated. The alarms may be caused by the faults on the related modules or ports. Therefore, the necessity for module replacement is uncertain.
ACT	Green	Steady on	The module is working properly with TX channels enabled or software is being loaded without RRU running.
		Blinking on for 1s and off for 1s	The module is working properly with TX channels disabled.
VSWR	Red	Steady off	No VSWR alarm is generated.
		Steady on	A VSWR alarm is generated.
CPRI0/ IR0	Red or green	Steady green	The CPRI link is functioning properly.
		Steady red	An optical module fails to transmit or receive signals possibly because the optical module is faulty or the optical fiber cable is broken.
		Blinking red on for 1s and off for 1s	The CPRI link is out of lock possibly because of mutual lock of dual-mode clock sources or mismatched data rates over CPRI ports. (You are advised to check the system configuration to rectify the fault.)
		Steady off	The SFP module is not properly installed, or the optical module is powered off.
CPRI1/ IR1	Red or green	Steady green	The CPRI link is functioning properly.
		Steady red	An optical module fails to transmit or receive signals possibly because the optical module is faulty or the optical fiber cable is broken.

Label	Color	Status	Description
		Blinking red on for 1s and off for 1s	The CPRI link is out of lock possibly because of mutual lock of dual-mode clock sources or mismatched data rates over CPRI ports. (You are advised to check the system configuration to rectify the fault.)
		Steady off	The SFP module is not properly installed, or the optical module is powered off.

3 RRU Cables

About This Chapter

This chapter describes RRU cables.

3.10 RRU AISG Extension Cable

This section describes the remote radio unit (RRU) AISG extension cable. When the distance between an RRU and a remote control unit (RCU) is longer than 5 m, an AISG multi-wire cable is not long enough to connect the RRU and the RCU. In this case, an AISG extension cable is used to extend the AISG multi-wire cable for transmitting RS485 signals.

3.1 RRU Cable List

This section describes RRU cable connections.

Table 3-1 lists RRU cables.

Table 3-1 RRU cables

Cable	One End		The Other End	
	Connector	**Connected to...**	**Connector**	**Connected to...**
3.2 RRU PGND Cable	OT terminal (M6)	Ground terminal on the RRU	OT terminal (M8)	Ground terminal on the ground bar
3.3 RRU Power Cable	Tool-less female connector (pressfit type)	NEG(-) and RTN(+) ports on the RRU	Tool-less female connector (pressfit type)	One of RRU0 to RRU5 ports on the EPS
			OT terminal (M4)	One of LOAD0 to LOAD5 ports on the DCDU
				One of LOAD4 to LOAD9 ports on the PDU
3.5 CPRI Fiber Optic Cable	DLC connector	CPRI0/IR0 port on the RRU	DLC connector	CPRI port on the LBBP in the BBU
		CPRI1/IR1 port on the RRU		CPRI0/IR0 port on the RRU
3.8 RRU RF Jumper	Type N connector	ANT0 to ANT3 ports on the RRU	Type N connector	Antenna system
3.6 RGPS Jumper (optional)	Waterproofed DB15 connector	Remote Global Positioning System (RGPS) port at the RRU bottom	Round 12-pin connector	RGPS antenna
3.7 SFP High-Speed Cable for Cascaded RRUs (optional)	SFP20 male connector	CPRI1 port on the RRU	SFP20 male connector	CPRI0 port on the RRU

Cable	One End		The Other End	
	Connector	Connected to...	Connector	Connected to...
3.4 RRU Alarm Cable (optional)	Waterproofed DB9 male connector	RET/ EXT_ALM port on the RRU	Cord end terminal	External alarm device
3.9 RRU AISG Multi-Wire Cable (optional)	Waterproofed DB9 male connector	RET/ EXT_ALM port on the RRU	Standard AISG female connector	Standard AISG male connector on the remote control unit (RCU) or on the AISG extension cable
3.10 RRU AISG Extension Cable (optional)	Standard AISG male connector	Standard AISG female connector on the AISG multi-wire cable	Standard AISG female connector	Standard AISG male connector on the RCU
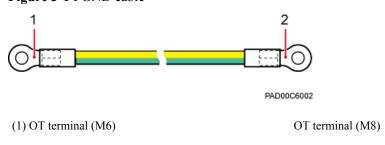
3.2 RRU PGND Cable

An RRU PGND cable connects an RRU and a ground bar, ensuring the proper grounding of the RRU.

Exterior

An RRU PGND cable is green or green and yellow, both ends of the cable are OT terminals. If the customer prepares the PGND cable, a copper-core cable with a minimum cross-sectional area of 16 mm^2 (0.025 in.^{2}) is recommended. **Figure 3-1** shows a PGND cable.

Figure 3-1 PGND cable

PAD00C6002

(1) OT terminal (M6)   OT terminal (M8)

OT terminals must be a   D cable onsite.

3.3 RRU Power Cable
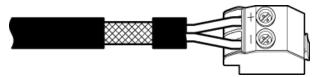
An RRU power cable is a -48 V DC shielded cable. It feeds -48 V DC power into an RRU.

Exterior

An RRU power cable has an easy power receptacle (pressfit type) connector at one end and bare wires at the other end. Proper terminals are added to the bare wires based on the connector on the external power device, as shown in **Figure 3-2**.

The cross-sectional area of an RRU power cable can be either 3.3 mm^2 (0.005 in.^{2})/5.3 mm^2 (0.008 in.^{2}) or 4 mm^2 (0.006 in.^{2})/6 mm^2 (0.009 in.^{2}). The former complies with North American standards and the latter complies with European standards.

Figure 3-2 RRU power cable

Pin Assignment

The DC power input cable is a two-wire cable. **Table 3-2** and **Table 3-3** describe the pin assignment for the wires of a DC power input cable.

Table 3-2 Pin assignment for the wires of a DC power input cable (North American standards)

Wire	Color
NEG(-)	Blue
RTN(+)	Black

Table 3-3 Pin assignment for the wires of a DC power input cable (European standards)

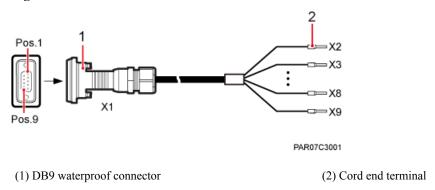| Wire	Color
NEG(-)	Blue
RTN(+)	Brown

3.4 RRU Alarm Cable

An RRU alarm cable, a shielded straight-through cable, transmits alarm signals from an external device to RRUs so that the base station can monitor the operating status of external devices.

Exterior

An alarm cable has a DB9 connector at one end and eight cord end terminals at the other end, as shown in **Figure 3-3**.

Figure 3-3 RRU alarm cable

(1) DB9 waterproof connector   (2) Cord end terminal

Pin Assignment

Table 3-4 describes the pin assignment for the wires of an RRU alarm cable.

Table 3-4 Pin assignment for the wires of an RRU alarm cable

RRU Alarm Port	Pin of the DB9 Connector	Wire Color	Wire Type	Cord End Terminal	Description
Dry contact	X1.2	White or blue	Twisted pair cable	X2	Boolean signal input 0+
	X1.4	Blue		X3	Boolean signal input 0- (GND)
	X1.7	White or orange	Twisted pair cable	X4	Boolean signal input 1+
	X1.4	Orange		X5	Boolean signal input 1- (GND)
RS485	X1.6	White or green	Twisted pair cable	X6	APM RX-
	X1.8	Green		X7	APM RX+
	X1.5	White or brown	Twisted pair cable	X8	APM TX-
	X1.3	Brown		X9	APM TX+

3.5 CPRI Fiber Optic Cable

CPRI fiber optic cables are classified into multi-mode fiber optic cables and single-mode fiber optic cables. They transmit CPRI signals.
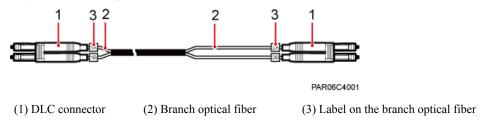
◻ **NOTE**

- An ODF can be used when the distance between a BBU and an RRU or the distance between interconnected RRUs is longer than 100 m (328.08 ft).
- A single-mode fiber optic cable connects a BBU to an ODF or connects an ODF to an RRU.

The maximum length of a CPRI fiber optic cable is 150 m (492.12 ft) When the fiber optical cable connects a BBU and an RRU. The length of a CPRI fiber optic cable is 10 m (32.81 ft) when the fiber optical cable connects two RRUs.

Exterior

Figure 3-4 shows a fiber optic cable between a BBU and an RRU or between RRUs, with a DLC connector at each end.
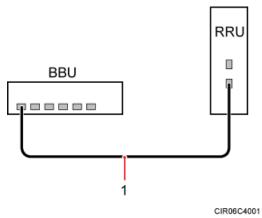
Figure 3-4 Fiber optical cable between a BBU and an RRU or between RRUs

PAR06C4001

| (1) DLC connector | (2) Branch optical fiber | (3) Label on the branch optical fiber |

When a fiber optical cable connects a BBU and an RRU, the optical fibers on the BBU side and RRU side are 0.34 m (0.013 in.) and 0.03 m (0.0012 in.) long, respectively. When a fiber optical cable connects two RRUs, the optical fibers on both RRU sides are 0.03 m (0.0012 in.) long.

Figure 3-5 shows the connections for a CPRI fiber optic cable between a BBU and an RRU.

Figure 3-5 Connections for a CPRI fiber optic cable between a BBU and an RRU

(1) CPRI fiber optic cable between a BBU and an RRU

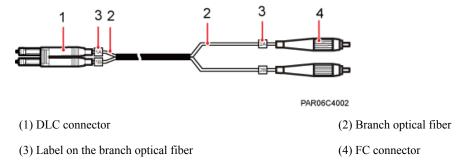**Figure 3-6** shows a single-mode fiber optic cable between a BBU and an ODF or between an ODF and an RRU, with a DLC connector at one end and an FC connector at the other end.

Figure 3-6 Single-mode fiber optic cable between a BBU and an ODF or between an ODF and an RRU

(1) DLC connector	(2) Branch optical fiber
(3) Label on the branch optical fiber	(4) FC connector

When a single-mode fiber optic cable connects a BBU and an ODF, the optical fibers on the BBU side and ODF side are 0.34 m (0.013 in.) and 0.8 m (0.031 in.) long, respectively.
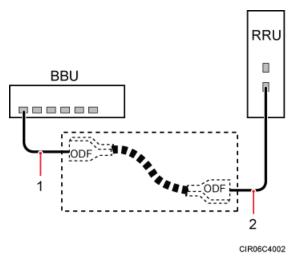
When a single-mode fiber optic cable connects an ODF and an RRU, the optical fibers on the RRU side and ODF side are 0.03 m (0.013 in.) and 0.8 m (0.031 in.) long, respectively.

Figure 3-7 shows the connections for a single-mode CPRI fiber optic cable between a BBU and an ODF or between an ODF and an RRU.

Figure 3-7 Connections for a single-mode fiber optic cable between a BBU and an ODF or between an ODF and an RRU

CIR06C4002

(1) Single-mode CPRI fiber optic cable between a BBU and an ODF

(2) Single-mode CPRI fiber optic cable between an ODF and an RRU

📖 **NOTE**

A CPRI fiber optic cable must be connected to optical modules in the CPRI ports. A multi-mode fiber optic cable and single-mode fiber optic cable are connected to multi-mode optical modules and single-mode optical modules, respectively.

Pin Assignment

Table 3-5, **Table 3-6**, and **Table 3-7** describe the labels on and recommended connections for fiber optic cables of an optical assembly.

Table 3-5 Labels on and recommended connections for optical fibers of an optical assembly between a BBU and an RRU

Label	Connected To
1A	CPRI RX port on the RRU
1B	CPRI TX port on the RRU
2A	TX port on the BBU
2B	RX port on the BBU

Table 3-6 Labels on and recommended connections for optical fibers of a fiber optic cable between RRUs

Label	Connected To
1A	CPRI RX port on RRU 1
1B	CPRI TX port on RRU 1

Label	Connected To
2A	CPRI TX port on RRU 0
2B	CPRI RX port on RRU 0

Table 3-7 Labels on and recommended connections for optical fibers of a single-mode optical assembly between a BBU and an ODF or between an ODF and an RRU

Label	Connected To
1A	RX port on the BBU or CPRI RX port on the RRU
1B	TX port on the BBU or CPRI TX port on the RRU
2A	ODF
2B	ODF

3.6 RGPS Jumper
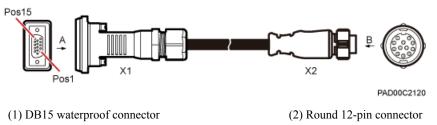
A PGPS jumper connects a RGPS antenna to an RRU.

Exterior

A RGPS jumper has a DB15 waterproof connector at one end and a round 12–pin connector at the other end, as shown in **Figure 3-8**.

Figure 3-8 RGPS jumper

(1) DB15 waterproof connector	(2) Round 12-pin connector

Pin Assignment

Table 3-8 describes the pin assignment for the wires of the RGPS jumper.

Table 3-8 Pin assignment for the wires of the RGPS jumper

X1 (Pin for the DB15 Waterproof Connector)	X2 (Pin for the Round 12-pin Connector)	Color	Type	Description
X1.1	X2.9	White and blue	Twisted pair	GND
X1.6	X2.1	Blue		+28 V
X1.14	X2.5	White and orange	Twisted pair	RXD_422+
X1.13	X2.4	Orange		RXD_422-
X1.12	X2.3	White and green	Twisted pair	TXD_422+
X1.11	X2.2	Green		TXD_422-
X1.2	X2.11	White and brown	Twisted pair	1PPS_422+
X1.7	X2.12	Brown		1PPS_422-

3.7 SFP High-Speed Cable for Cascaded RRUs

This section describes the SFP high-speed cable for cascaded RRUs. An SFP high-speed cable for cascaded RRUs connects common public radio interface (CPRI) ports between two RRUs and transmits CPRI signals between RRUs. SFP is short for small form-factor pluggable while RRU is short for remote radio unit.

Exterior

Figure 3-9 shows an SFP high-speed cable for cascaded RRUs.

Figure 3-9 SFP high-speed cable for cascaded RRUs

3.8 RRU RF Jumper

A 1/2" RRU RF jumper transmits and receives RF signals.

Exterior

An RF jumper has a Type N male connector at both ends, as shown in **Figure 3-10**.

Figure 3-10 RF jumper

(1) Type N male connector

3.9 RRU AISG Multi-Wire Cable

This section describes a remote radio unit (RRU) AISG multi-wire cable with the length of 5 m. It connects an RRU and a remote control unit (RCU) to transmit control signals from an eNodeB to the remote electrical tilt (RET) antenna. When the RRU is connected to the RET antenna, an AISG multi-wire cable transmits RS485 signals.
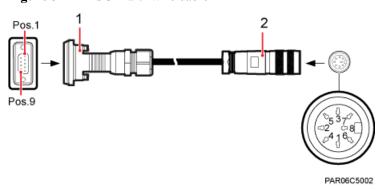
 NOTE

An RCU is a driving motor used for the phase shifter in the RET antenna. It receives control commands from an eNodeB and runs the commands to drive the stepper motor. Using a gear, the stepper motor drives the adjustable phase shifter in the antenna and changes the downtilt angle.

Exterior

An AISG multi-wire cable has a waterproofed DB9 male connector at one end and a standard AISG female connector at the other end, as shown in **Figure 3-11**.

Figure 3-11 AISG multi-wire cable

1. DB9 waterproof male connector

2. Standard AISG female connector

Pin Assignment

Table 3-9 describes the pin assignment for the core wires of an AISG multi-wire cable.

Table 3-9 Pin assignment for the core wires of an AISG multi-wire cable

| X1 End (Pin of the Waterproofed DB9 Male Connector)	X2 End (Pin of the Standard AISG Female Connector)	Color of the Core Wire	Type of the Core Wire	Description
X1.1	X2.1	White and blue	Twisted pair	+12 V
		Blue		
X1.3	X2.3	White and orange	Twisted pair	RS485 B
X1.5	X2.5	Orange		RS485 A
X1.4	X2.4	White and green	-	GND
X1.9 is connected to X1.4.	-	-	-	GND
-	X2.1 is connected to X2.6.	-	-	+12 V
-	X2.4 is connected to X2.7.	-	-	GND
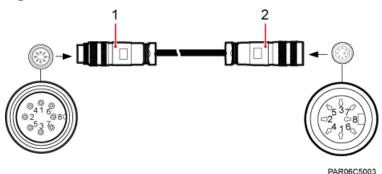
3.10 RRU AISG Extension Cable

This section describes the remote radio unit (RRU) AISG extension cable. When the distance between an RRU and a remote control unit (RCU) is longer than 5 m, an AISG multi-wire cable is not long enough to connect the RRU and the RCU. In this case, an AISG extension cable is used to extend the AISG multi-wire cable for transmitting RS485 signals.

Exterior

An AISG extension cable has a standard AISG male connector at one end and a standard AISG female connector at the other end, as shown in **Figure 3-12**.

Figure 3-12 AISG extension cable

PAR06C5003

1. Standard AISG male connector   2. Standard AISG female connector

Pin Assignment

Table 3-10 describes the pin assignment for the core wires of an AISG extension cable.

Table 3-10 Pin assignment for the core wires of an AISG extension cable

X1 End (Pin of the Standard AISG Male Connector)	X2 End (Pin of the Standard AISG Female Connector)	Color of the Core Wire	Type of the Core Wire	Description
X1.1	X2.1	White and blue	Twisted pair	+12 V
		Blue		
X1.7	X2.7	White and orange	Twisted pair	DC Return A
		Orange		
X1.3	X2.3	White and green	Twisted pair	RS485 B
X1.5	X2.5	Green		RS485 A
X1.6	X2.6	White and brown	Twisted pair	+24 V
		Brown		

4 RRU Auxiliary Devices

About This Chapter

This chapter describes remote radio unit (RRU) auxiliary devices.

4.1 IFS06
An Indoor Floor installation Support (IFS06) is used for installing indoor RRUs.

4.2 OCB
An Outdoor Cable Conversion Box (OCB) interconnects cables of different core diameters. Power cables shipped with RRUs cannot support long-distance power supply. Therefore, when power supply is far from the equipment, cables with large core diameters are used, and an OCB connects these cables and RRU power cables.
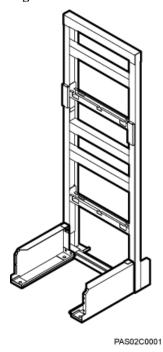
4.1 IFS06

An Indoor Floor installation Support (IFS06) is used for installing indoor RRUs.

Exterior

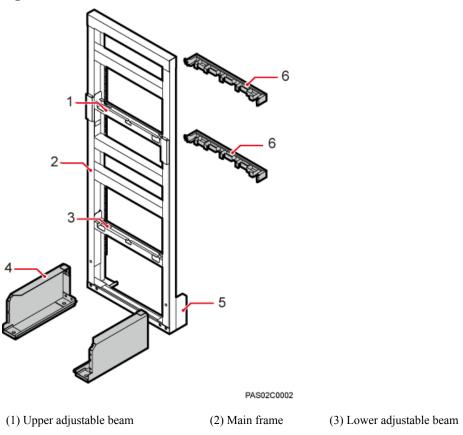**Figure 4-1** shows an IFS06.

Figure 4-1 IFS06

PAS02C0001

Function

- It can be installed on the ground.
- The upper and lower adjustable beams on an IFS06 can be moved up and down to fit for heights of RRUs.

Structure

The IFS06 consists of the main frame, cable tray, upper and lower adjustable beams, and front and rear feet, as shown in **Figure 4-2**.

Figure 4-2 IFS06 structure

PAS02C0002

(1) Upper adjustable beam	(2) Main frame	(3) Lower adjustable beam
(4) Front foot	(5) Rear foot	(6) Cable tray

Specifications

Table 4-1 describes IFS06 specifications.

Table 4-1 IFS06 specifications

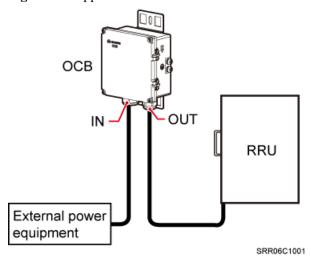| Item	Specification
Dimensions	1730 mm (79 in.) x 600 mm (23.62 in.) x 600 mm (23.62 in.) (H x W x D)
Weight	45 kg (99.23 lb)

4.2 OCB

An Outdoor Cable Conversion Box (OCB) interconnects cables of different core diameters. Power cables shipped with RRUs cannot support long-distance power supply. Therefore, when power supply is far from the equipment, cables with large core diameters are used, and an OCB connects these cables and RRU power cables.

Application Scenario of an OCB

Figure 4-3 shows the application scenario of an OCB.

Figure 4-3 Application scenario of an OCB

For details about the structure, functions, installation, and maintenance of an OCB, see the *OCB User Guide*.