Creating FCIA Configurations

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1 Overview

1.1 Overview of creating FCIA configurations

Purpose

This is an overview of how to create configurations in Nokia Flexi Cabinet for Indoor (FCIA).

The configuration pictures in these instructions show how to connect the cables for a 1+1+1/2+2+2 2UD bypass configuration in FCIA. For other configurations, see *Configuration Reference Guide.*

Before you start

- Install the cabinet and optional items if needed as instructed in *Installing Flexi Cabinet for Indoor.*
- For checking the correct torque values, see Appendix C *Torque values*.
- You can use the *Checklist for cabling the modules in cabinet installation* as a connection checklist.

Steps

1. Install the modules.

See the following instructions:

- *Installing transmission sub-module*
- *Installing modules in FCIA*
- If you are installing any optional modules, see instructions in:
  - *Installing Flexi Power Module (FPMA) in FCIA*
  - *Installing Flexi Power DC/DC Module 24V (FPDA) in cabinets*

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- *Installing Wideband Combiner Sub-module (EWxA)*
- *Installing Flexi System External Alarm (FSEB)* in *Installing Flexi Cabinet for Indoor (FCIA)*

If you are using the optional power modules, see also module installation order in *Optional power modules (FPDA and FPMA) in Flexi EDGE BTS configurations* in *Hardware Configuration Reference Guide*.

2. **Review cabinet cabling principles.**

   See *Cabling principles in FCIA installation*.

   See also Appendix A *External interfaces.*

3. **Connect external power cables.**

4. **Connect the ERxA cable.**

5. **Connect the bus cables.**

6. **Connect the internal power cables.**

7. **Connect the RF cables.**

8. **Connect the antenna jumper cables.**

9. **Connect the transmission cables.**

10. **Connect optional cables required for your configuration.**

    See
    - *Connecting Power Module (FPMA) alarm cables*
    - *Connecting external alarms cable*
    - *Connecting synchronisation cables*
    - *Connecting Q1 cable*
    - *Connecting LMP cable*
    - *Connecting LMU cables*

1.2 Cabling principles in FCIA installation

Cables are routed along the sides of the cabinet. Excess cabling should be tied to clamps.

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Caution

Route the cables for each module so that they do not interfere with installation or removal of other modules.

Caution

Do not overbend cables. The minimum bending diameter for the cables is listed in Appendix *Bending diameter for cables.*

For easier maintenance and future expansion, it is recommended that all external cables are routed on the right side and only internal bus and power cables are routed on the left side.

Table 1. Nokia Flexi EDGE BTS cable routing principles

Left side of the cabinet	• Internal power cables • Bus cables • RF cables • External 24V cables

Right side of the cabinet	• Antenna jumper cables
	• External power cables
	• Transmission cables
	• Optional cables:
	  • External alarm and control (EAC)
	  • Synchronisation
	  • Site support interface
	  • Flexi power alarm
	  • Local management port (LMP)
	  • Location management unit (LMU)

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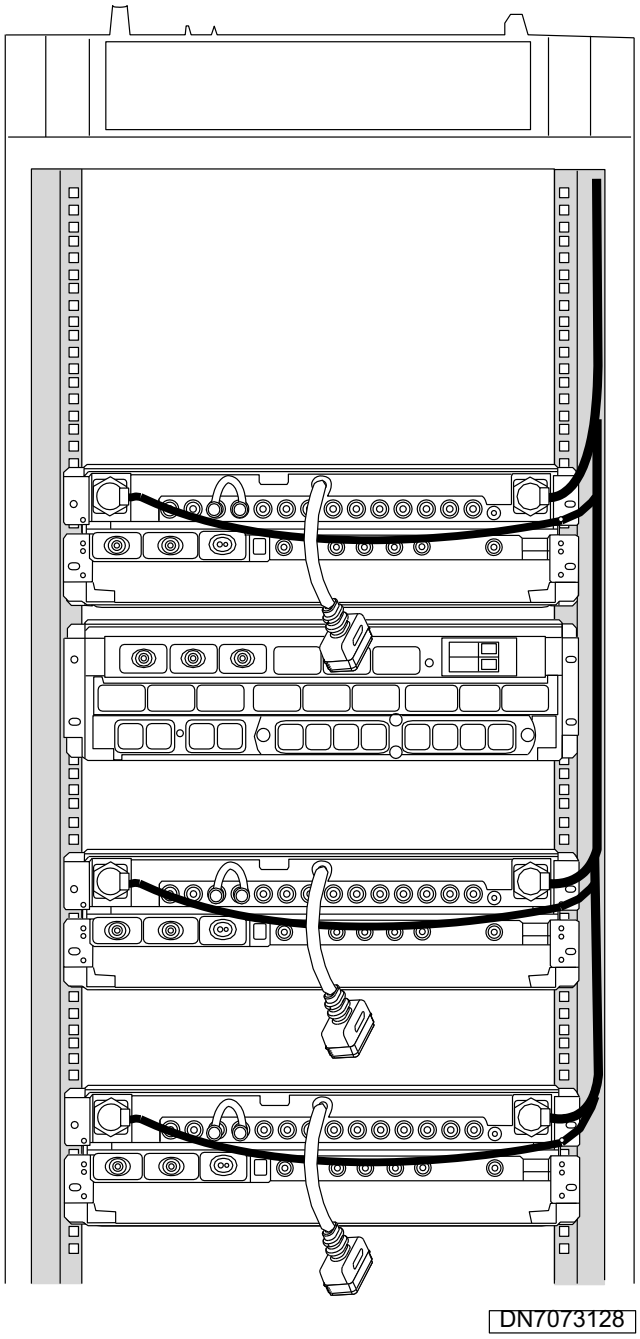

Figure 1. Example of routing the cables in FCIA

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There are slots on the sides of the cabinet core and on the cabinet roof for tying the cables. The cables are fixed with standard cable ties, except for power supply cables. The fixing of power supply cables is done with special isolating cable clamps, which are included in the site bag.

Routing external cabling of FCIA

The external cabling of the base station is routed through the roof and along the right side of the cabinet. Cables are fixed to the cabinet with cable ties.

- Route the power cable through the cable clamp, and through one of the cable entry holes.
- Route all other external cables through one of the cable entry holes.

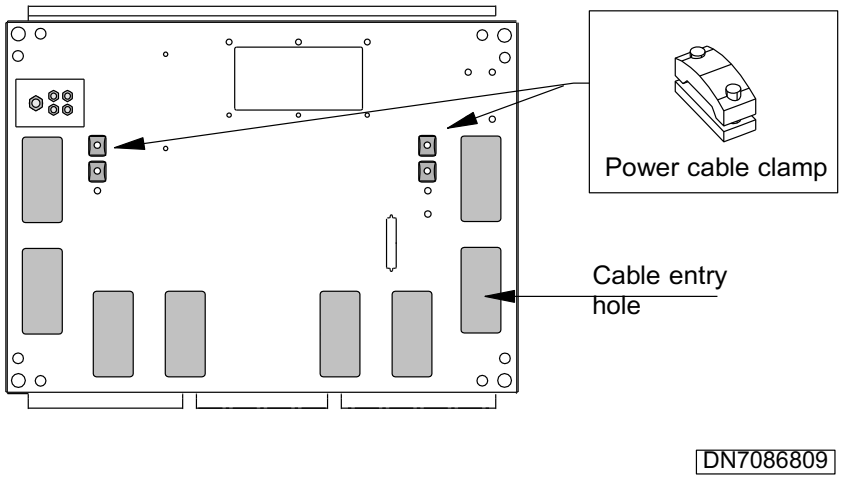

Figure 2. Cable entry holes and cable clamps in Flexi Cabinet for Indoor, FCIA (top view)

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2 Installing the modules

2.1 Installing transmission sub-module

Purpose

Transmission sub-module is installed in the System Module (ESMA). The sub-module is chosen based on the transmission requirements of each site.

Before you start

Caution

Electrostatic discharge (ESD) may damage the modules. Wear an ESD wrist strap or use a corresponding method when handling the modules.

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Summary

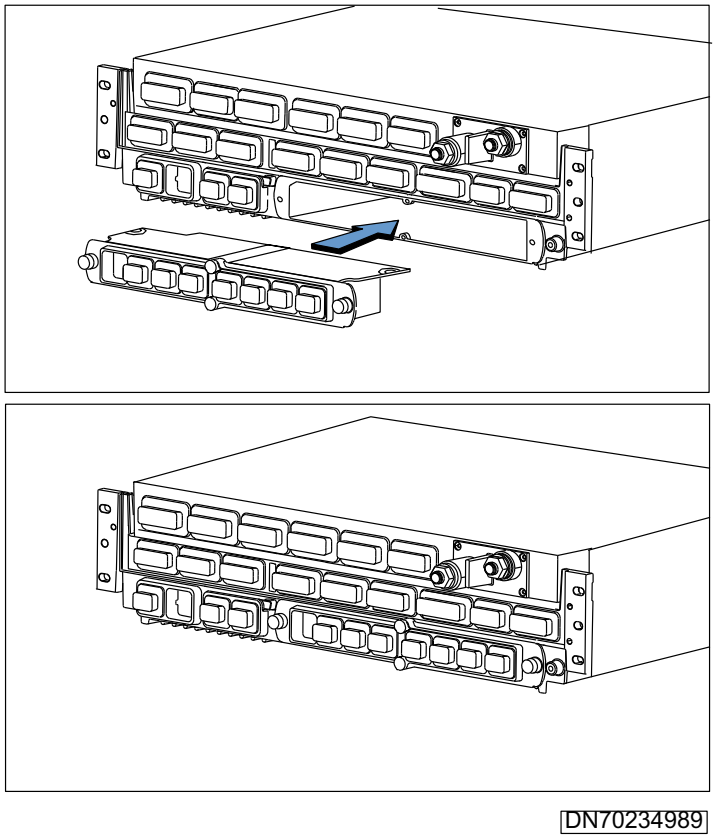

Figure 3. Installing FIPA/FIEA

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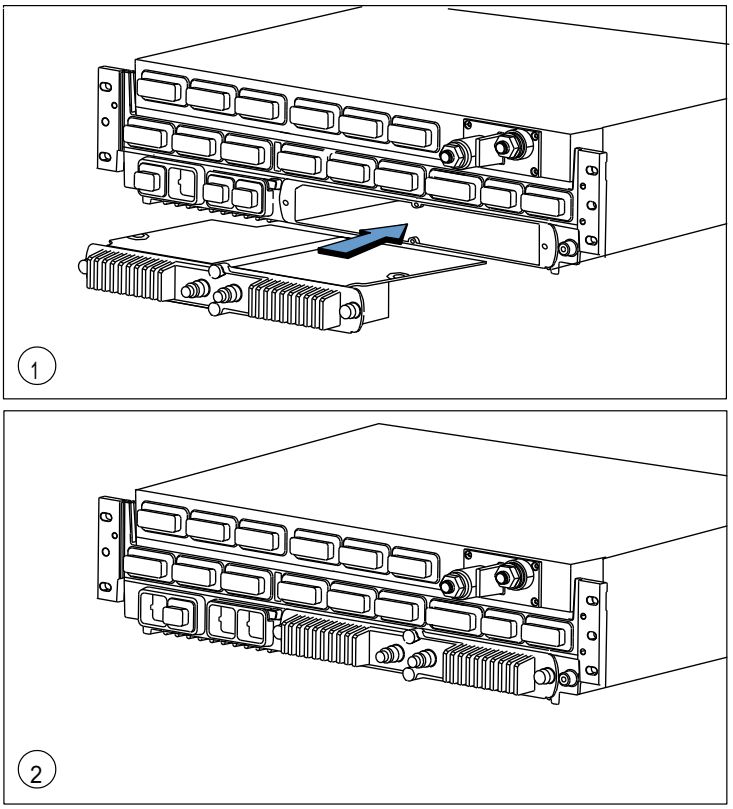

Figure 4. Installing FIFA

Steps

1. **Align the transmission sub-module in the System Module using the slots on the sides. Push the sub-module in place.**

2. **Fix the transmission sub-module with 4 x M5 screws using the TORX head screw.**

   Tighten at 2.0-2.5 Nm (1.5-1.8 ft-lb).

2.2 Installing modules in FCIA

Purpose

Nokia Flexi Cabinet for Indoor (FCIA) is delivered with installation guides on the left and right rack rails:

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- The right rail guide shows the recommended unit, cage nut and guide plate locations for GSM/EDGE 1+1+1/2+2+2 bypass configurations.
- The left rail guide shows the recommended unit, cage nut and guide plate locations for GSM/EDGE 3+3+3/4+4+4 2-Way WBC configurations.
- Both guides also have recommended unit, cage nut and guide for installing WCDMA units at the bottom of the cabinet.

Cage nuts are pre-installed in the recommended locations for 1+1+1/2+2 +2 bypass and 3+3+3/4+4+4 2-Way WBC configurations. The recommended locations are optimised for easiest possible expansion from 1+1+1/2+2+2 bypass to 8+8+8 4-Way WBC.

Before you start

Install the transmission sub-module in the System Module before installing the modules in the cabinet. For instructions, see *Installing transmission sub-module.*

Module installation order depends on the configuration. The figure below shows the installation order for a 1+1+1/2+2+2 configuration. For other configurations, see *Hardware Configuration Reference Guide.*

For a 1+1+1/2+2+2 configuration, you need the following modules:

- one System Module (ESMA)
- one transmission sub-module (FIxA)
- three Dual TRX Modules (EXxA)
- three Dual Duplexer Modules (ERxA)

Always install the Dual TRX Module (EXxA) before the Dual Duplexer Module (ERxA), and the Dual Duplexer Module directly on top of the Dual TRX Module.

Warning

Electrostatic discharge (ESD) may damage the modules. Wear an ESD wrist strap or use a corresponding method when handling the modules. The ESD wrist strap does not work before the cabinet is grounded.

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Summary

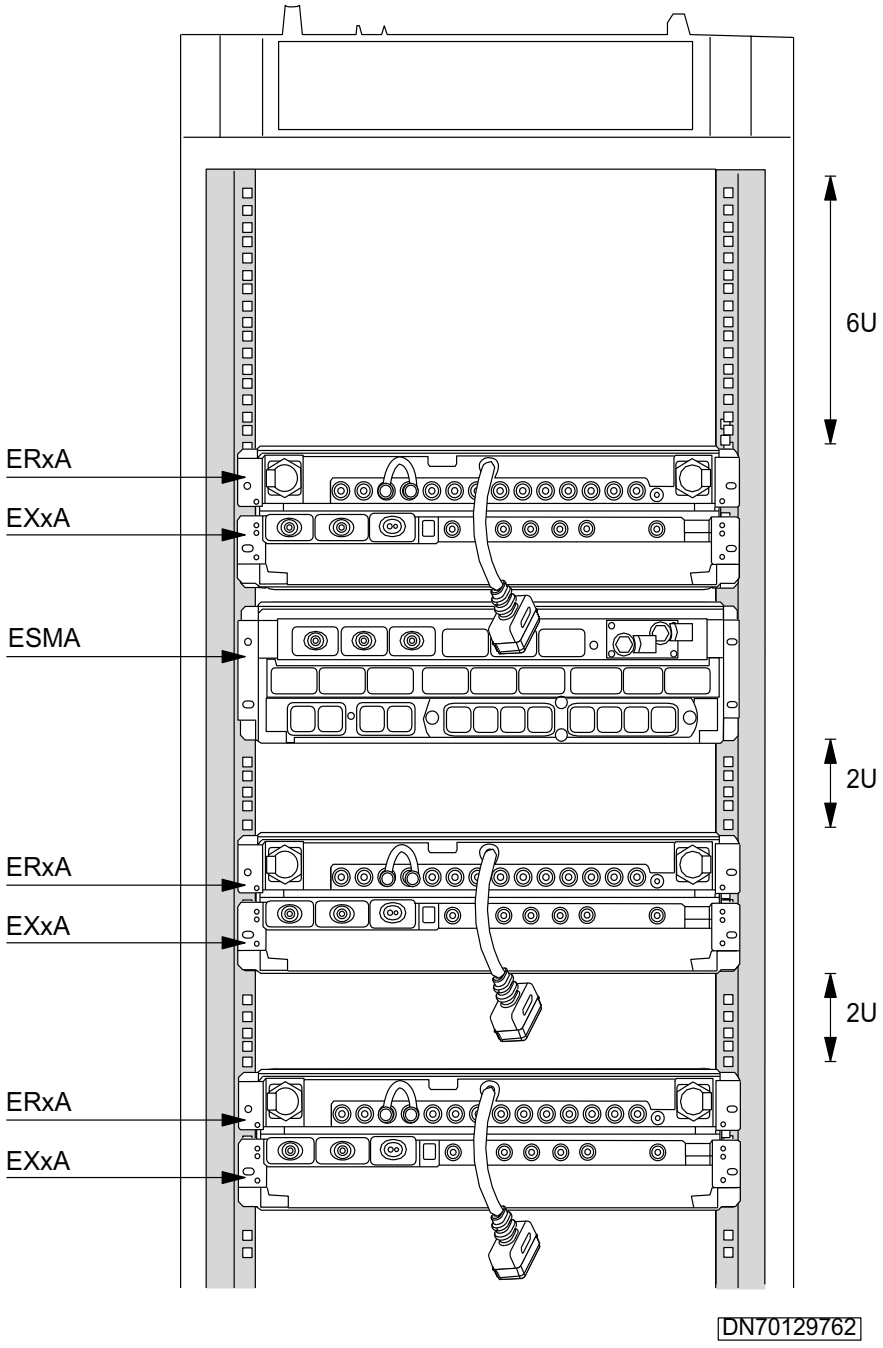

Figure 5. Module installation order in a 1+1+1/2+2+2 configuration in FCIA

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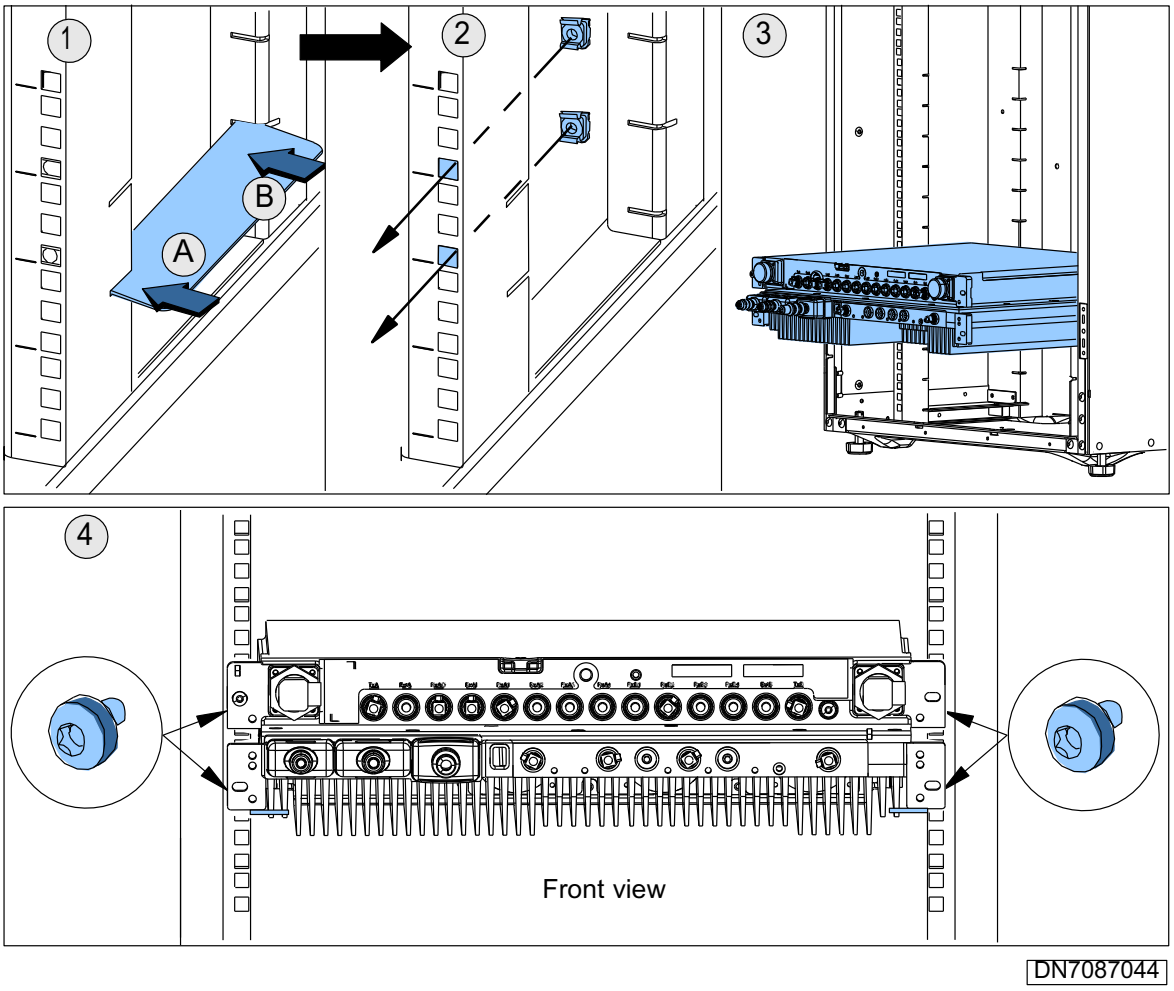

Figure 6. Summary of installing modules inside the FCIA

Steps

1. Fix the guide plates.

Push the front part of the guide plate in place first, and then the back part.

2. If the configuration is not a 1+1+1/2+2+2 bypass or 3+3+3/4+4+4 2-Way WBC, fix the cage nuts (from the site pack) inside the cabinet according to the configuration.

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For more information, see *Hardware Configuration Reference Guide.*

The cabinet has U-markings printed on the side rails in 1U increments. Check the markings to determine the starting place for module installation.

1U is 44.45 mm (1.75 in.).

! Caution

Fix the cage nuts so that the nut brackets point upwards and downwards instead of left and right.

See the correct way to fix the cage nuts in figure *Summary of installing modules inside the FCIA.*

3. **Slide the first module in.**

4. **Fix the module to the cabinet with screws.**

   For the correct torque value and bolt size, see Appendix *Torque values*.

5. **Repeat for each subsequent module.**

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3 Cabling

3.1 Connecting external power cables in FCIA installation

Purpose

Route the external power cables through the white plastic cable clamp, which is at the top of the cabinet. The System Module (ESMA) is delivered with boots for 2 or 4 AWG (25 mm^2/0.04 sq. in. or 35 mm^2/0.05 sq. in.).

Before you start

Check that

- the System Module (ESMA) is installed.
- Flexi Power Module (FPMA) or Flexi Power DC/DC 24 V Module(s) (FPDA) are installed, if 24 VDC or AC input power is used.
- the mains breaker is off.

Summary

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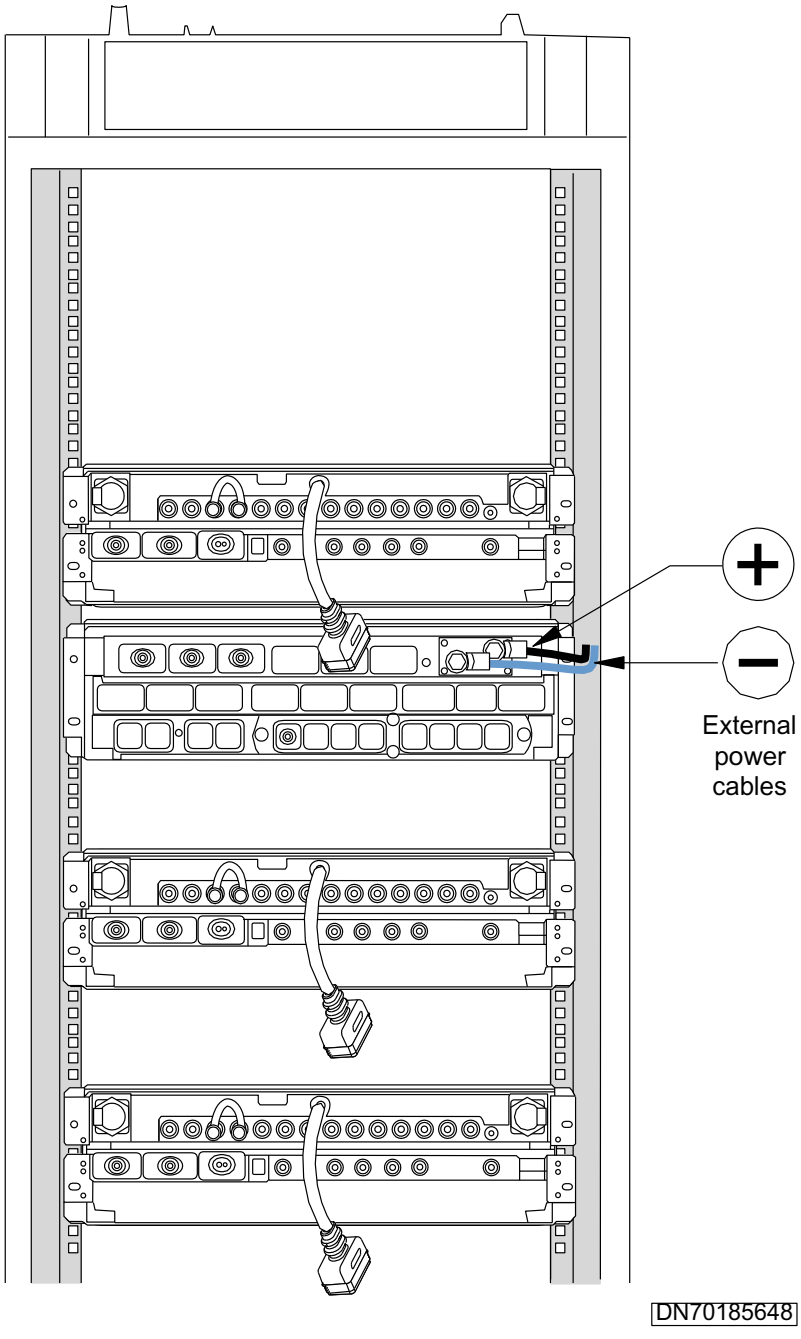

Figure 7. External power cables in 1+1+1/2+2+2 FCIA configuration

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Steps

1. **Loosen the two screws on one of the cable clamps at the top of the cabinet until there is enough room to route the power cables.**
2. **Route the power cables through the cable clamps.**
3. **Remove the black rubber boots and, using adjustable wrench, disconnect the cable lugs from the terminals.**
4. **If the external DC cables are 35 mm^2 (2 AWG), cut the rubber boots to fit the cable.**
5. **Pull each cable through a rubber boot.**
6. **Strip about 2 cm (.8 in) of insulation from the (+) and (-) DC cables.**
7. **Insert the stripped end of each cable into a cable lug and crimp.**
8. **Connect the black (+) crimped wire to the (+) black connector pole and tighten the bolt.**
9. **Connect the blue (-) crimped wire to the (-) blue connector pole and tighten the bolt.**
10. **Torque the 17 mm (0.7 in.) bolts (max 14 Nm).**
11. **Pull the black rubber boots over the lugs.**
12. **Tie-wrap any loose cabling on the side of the cabinet and tighten the cable clamp at the top of the cabinet with a T10 TORX screwdriver.**

    See Appendix *Torque values*.

Tip

Make sure that the LEDs turn on before tying down the cables.

13. **Connect the mains power.**

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3.2 Connecting the ERxA cable

Purpose

The Dual Duplexer Module (ERxA) cable is connected between the Dual Duplexer Module and the Dual TRX Module (EXxA). The cable is pre-installed in the Dual Duplexer Module.

Before you start

Caution

To avoid damage to the cable, do not lift the Dual Duplexer Module by the pre-installed cable.

Summary

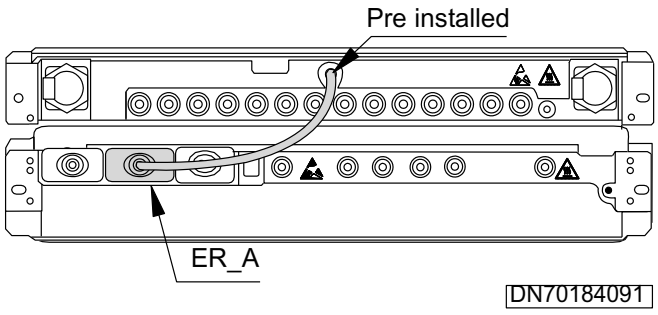

Figure 8. Dual Duplexer Module cable

Steps

1. **Remove the connector seal on the Dual TRX Module to uncover the connector.**
2. **Pull back the connector seal on the cable.**
3. **Connect the Dual Duplexer Module cable to the Dual TRX Module.**

   Push the connector seal firmly in place.
4. **Make sure that all the connector seals are properly in place.**

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3.3 Connecting bus cables in FCIA installation

Purpose

The bus cables are connected between the System Module (ESMA) and each of the Dual TRX (EXxA) Modules.

Before you start

Caution

If bus cables are looped back to the System Module, ongoing calls may be dropped or a module may freeze until the loop is removed. Do not loop bus cables back to the System Module.

Caution

Do not overbend cables. The minimum bending diameter for the cables is listed in Appendix *Bending diameter for cables.*

Summary

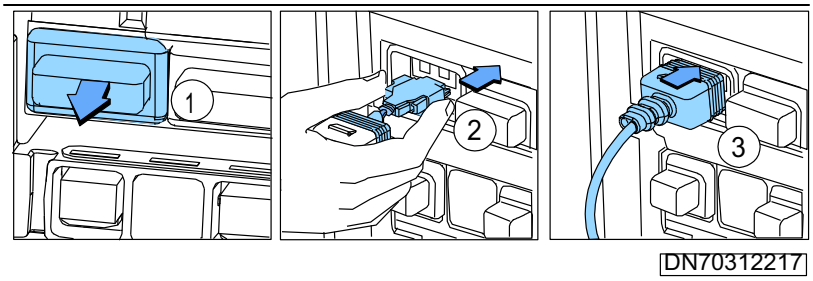

Figure 9. Principle of connecting bus cables

Table 2. Connecting bus cables

Number	*Cable*	*From - to*
1	994938	BUS – BUS1
2	994938	BUS – BUS3

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Table 2. Connecting bus cables (cont.)

3	994938	BUS – BUS5

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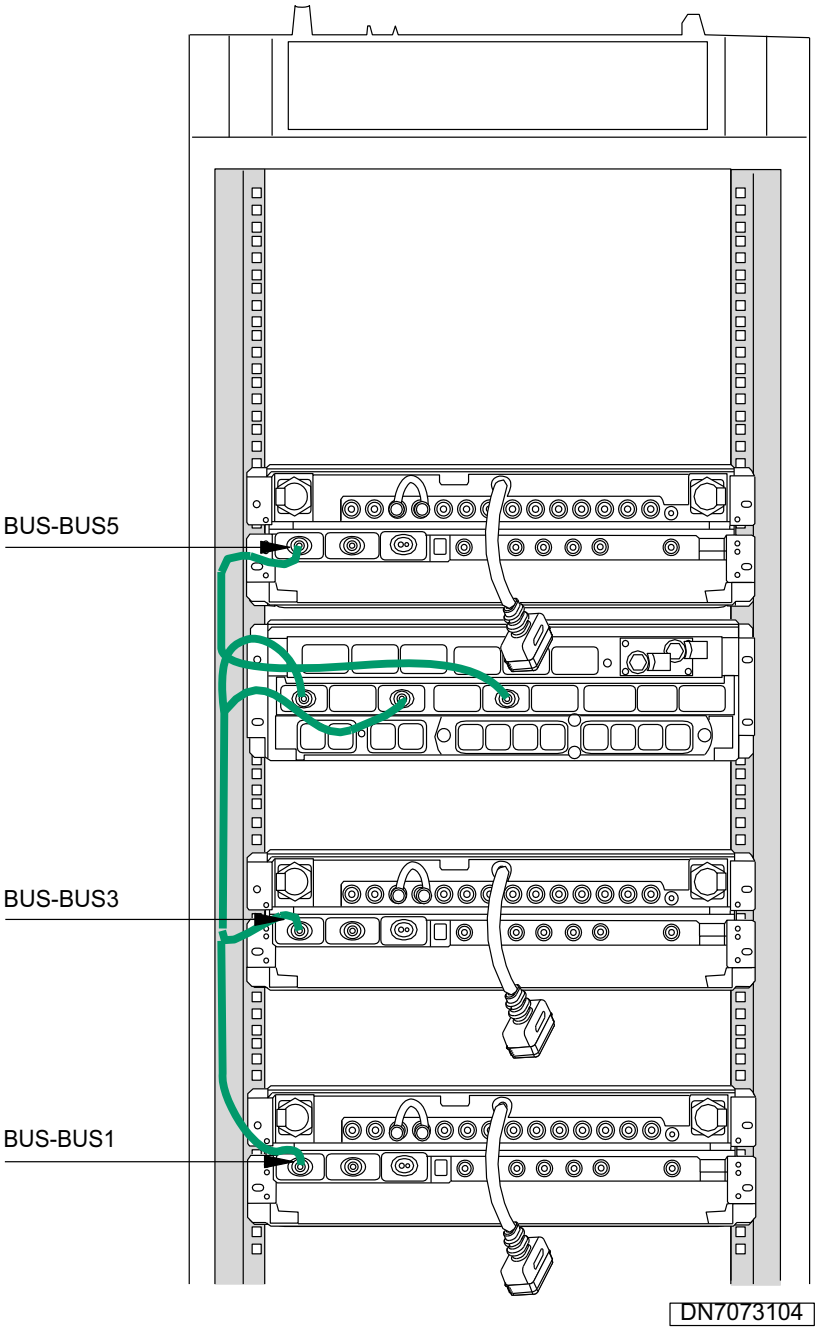

Figure 10. Bus cables in 1+1+1/2+2+2 FCIA configuration

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Steps

1. **Remove the connector seal on the module to uncover the connector.**

Tip

Use an adjustable wrench for removing the connector seal.

Store the seals for later use.

2. **Pull back the connector seal on the cable.**

3. **Connect the cable to the System Module and the other end to the Dual TRX Module.**

   Push the connector seal firmly in place.

4. **Repeat steps 1-3 for each of the Dual TRX Modules in the configuration.**

5. **Make sure that all the connector seals are properly installed.**

6. **Tie loose cabling to the cable clamps on the side of the casings.**

Tip

Make sure that the LEDs turn on before tying down the cables.

3.4 Connecting internal power cables in FCIA installation

Purpose

The internal power cables are connected between the System Module (ESMA) and each of the Dual TRX Modules (EXxA) and the optional Remote Tune Combiner Modules (ECxA), and is used to distribute power to the Dual TRX Modules or Remote Tune Combiner Modules.

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Before you start

Caution

Do not overbend cables. The minimum bending diameter for the cables is listed in Appendix *Bending diameter for cables.*

Summary

Table 3. Connecting internal power cables in 1+1+1/2+2+2 configuration

Number	*Cable*	*From - to*
1	994940	PWR – PWR1
2	994940	PWR – PWR3
3	994940	PWR – PWR5

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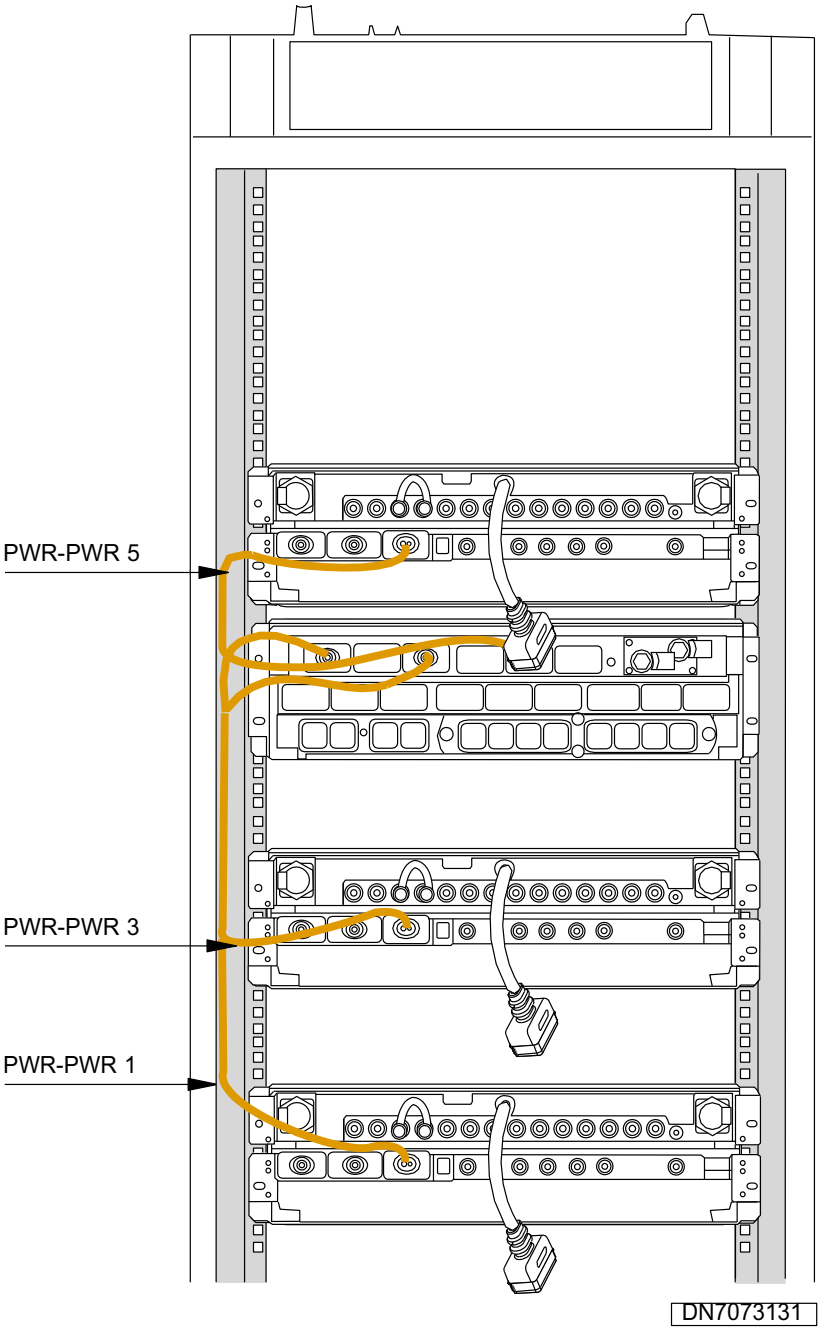

Figure 11. Internal power cables in 1+1+1/2+2+2 FCIA configuration

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Steps

1. **Remove the connector seal on the module to uncover the connector.**

Tip

Use an adjustable wrench for removing the connector seal.

Store the seals for later use.

2. **Pull back the connector seal on the cable.**

3. **Connect the cable to the System Module and the other end to the Dual TRX Module or Remote Tune Combiner Module.**

Push the connector seal firmly in place.

4. **Repeat steps 1-3 for each of the Dual TRX and Remote Tune Combiner Modules in the configuration.**

5. **Make sure that all the connector seals are properly installed.**

6. **Tie loose cabling to the cable clamps at the top of the cabinet.**

Tip

Make sure that the LEDs turn on before tying down the cables.

3.5 Connecting RF cables

Before you start

Caution

The modules will be damaged if the radio transmitter (TX) cables are connected to the radio receiver (RX) inputs. Ensure that the RF cables are connected correctly.

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TX cables have a red label, and RX cables have a blue label on the module front panel.

All RF cables going to the Wideband Combiner Sub-module (EWxA) are TX cables.

Caution

Do not overbend cables. The minimum bending diameter for the cables is listed in Appendix *Bending diameter for cables.*

Summary

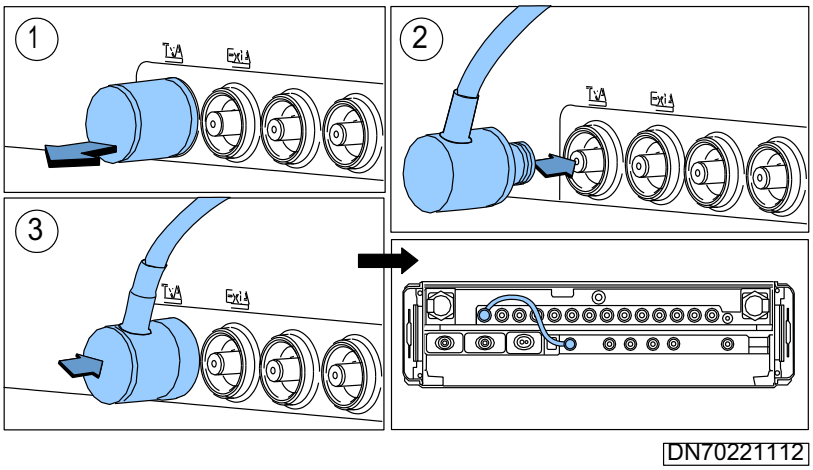

Figure 12. Connecting RF cables

Table 4. Connecting RF cables in 1+1+1/2+2+2 bypass 2UD configuration

Number	*Cable*	*From - to (ERxA - EXxA)*
1	994931	TxA-TxA
2	994931	TxB-TxB
3	994931	RxA1-RxA
4	994931	RxB1-RxB

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Table 4. Connecting RF cables in 1+1+1/2+2+2 bypass 2UD configuration (cont.)

5	994980	RXAO - RXAI (pre-installed)

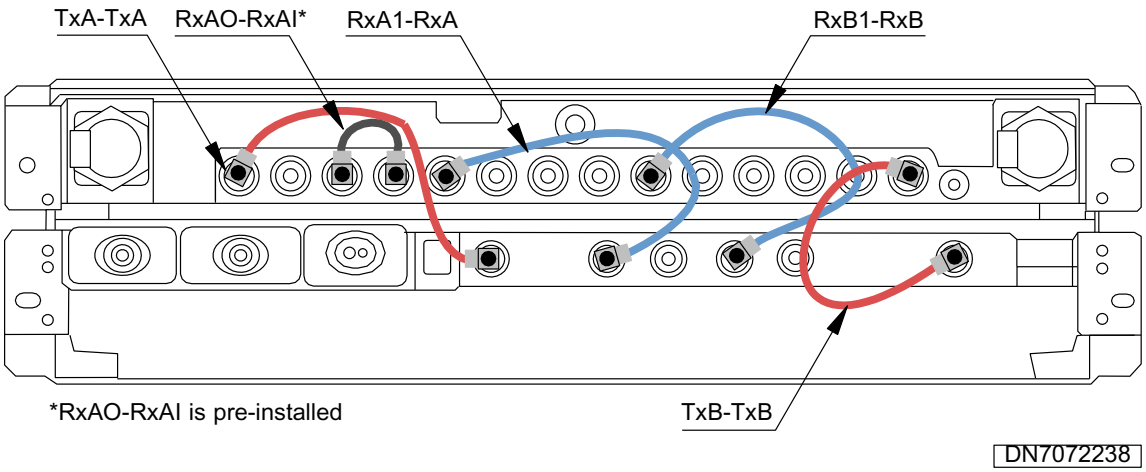

Figure 13. RF cables in 1+1+1/2+2+2 bypass 2UD configuration (one sector; all sectors have identical cabling structure)

Steps

1. Remove the seals and the caps from the RF connectors. Store the seals for later use.

Caution

Risk of damage to equipment. The caps are sealed tight to provide adequate weather protection. If the caps cannot be removed by hand, carefully remove the caps with gripping pliers and pull straight back to prevent damage to the connectors, as shown in the figure below.

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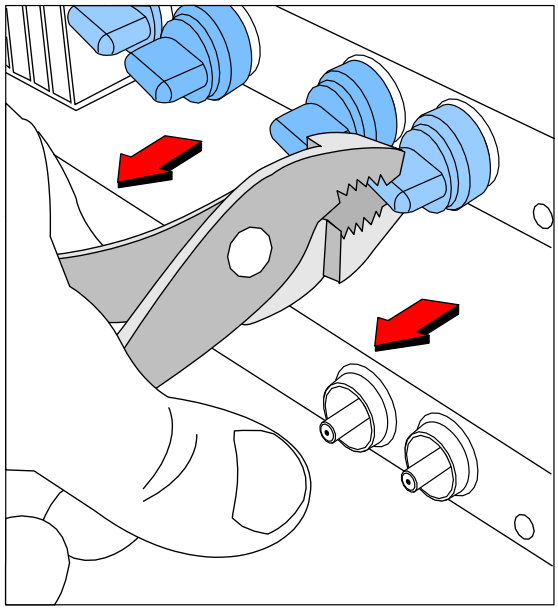

Figure 14. RF cable cap removal with pliers

2. Connect the RF cable to the connector.

Push the top of the connector until you hear a clicking sound. Do not hold the sides of the connector while pushing it.

3. Push the connector seal firmly in place.

4. Check that the pre-installed RXAO - RXAI cable on the Dual Duplexer Module is properly connected.

5. Repeat steps 1-4 for all RF cables required for your configuration.

Before continuing to the next sector, make sure that all cables are correctly installed.

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3.6 Connecting antenna jumper cables in FCIA installation

Purpose

Antenna cables are connected to the antenna connectors in the front panel of the Dual Duplexer (ERxA) and Remote Tune Combiner (ECxA) Modules. The number of cables used depends on the configuration.

Tip

Connect the antenna cables starting from the bottom.

Tip

Make sure that the LEDs turn on before tying down loose cables.

Before you start

Antenna jumper cables are not included in the Flexi EDGE BTS product delivery. Follow these guidelines when selecting antenna jumper cables:

- 1/2" or 3/8" antenna jumper cables can be used.

  1/2" antenna cable connectors can be connected directly to the module if a right angle connector is used.
- The length should be determined based on the Flexi EDGE BTS installation option (for example pole, wall, cabinet, 3rd party cabinet) and the distance of the BTS from the antenna feeder line.
- Antenna jumper cables must be IP54-rated or better.

Caution

Do not overbend cables. The minimum bending diameter for the cables is listed in Appendix *Bending diameter for cables.*

Summary

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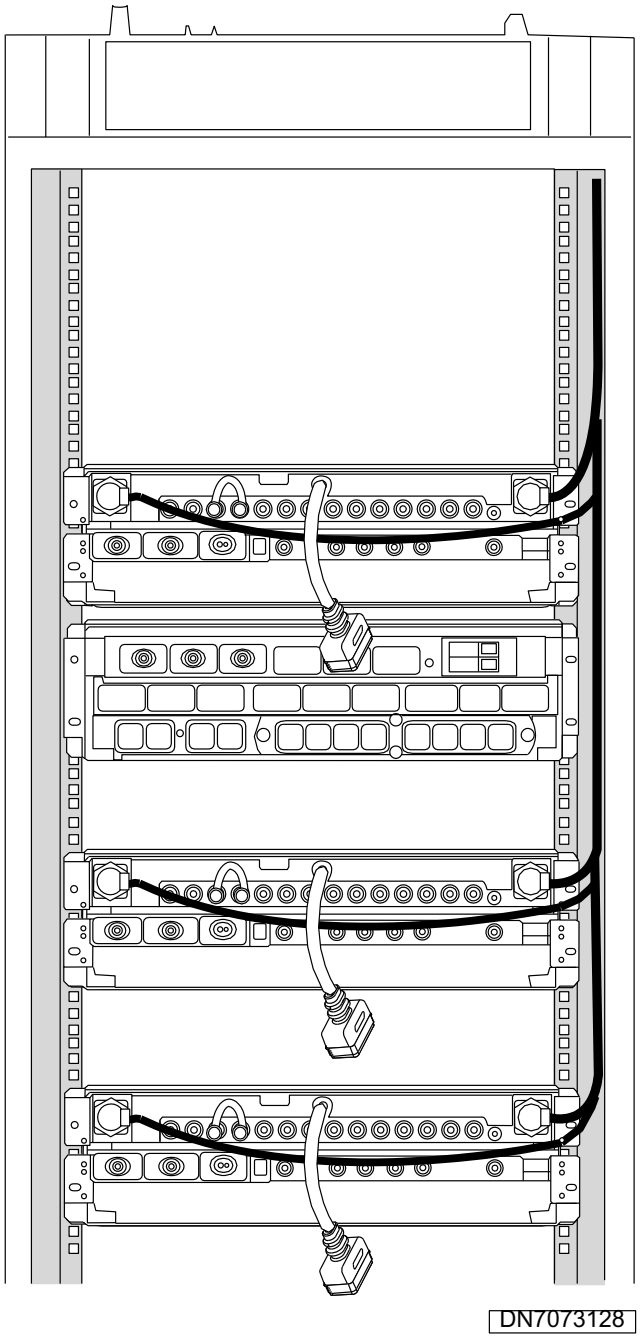

Figure 15. Antenna jumper cables in 1+1+1/2+2+2 FCIA configuration

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Steps

1. **Remove seals from the antenna connectors in the Dual Duplexer or Remote Tune Combiner Module. Store the connector seals for later use.**

   Do not remove the seals from those connectors that are not going to be used.

2. **Connect the cable to the Dual Duplexer or Remote Tune Combiner Module.**

3. **Tighten the connector with a torque wrench.**

   See Appendix *Torque values*.

4. **Repeat the previous steps for all the antenna jumper cables required for your configuration.**

5. **Make sure that all unused connectors are protected by a connector seal, and that all the connector seals are properly installed.**

3.7 Connecting transmission cables

3.7.1 Connecting transmission cables in FCIA installation

Before you start

Transmission sub-module is installed as instructed in the Installing the transmission sub-module section.

If you are using FIFA transmission sub-module, see also *Connecting FIFA transmission cables*.

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Summary

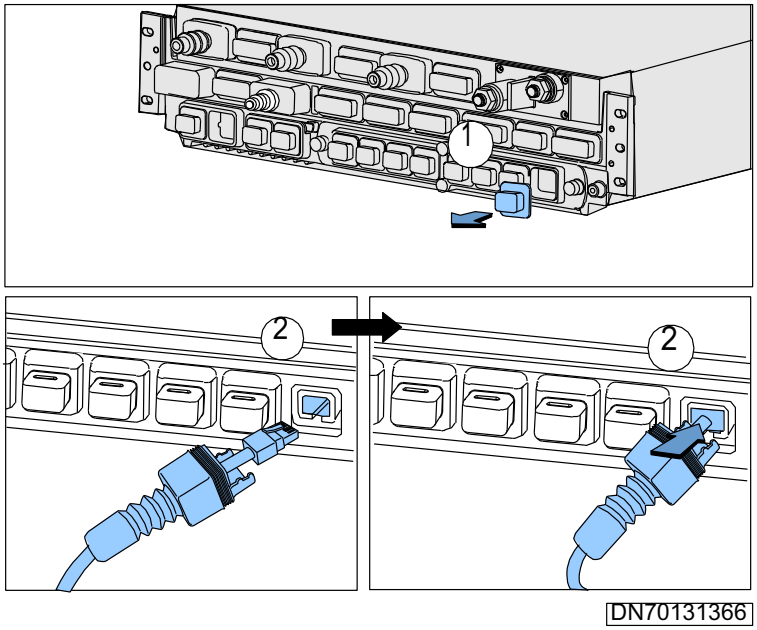

Figure 16. Principle of connecting transmission cables

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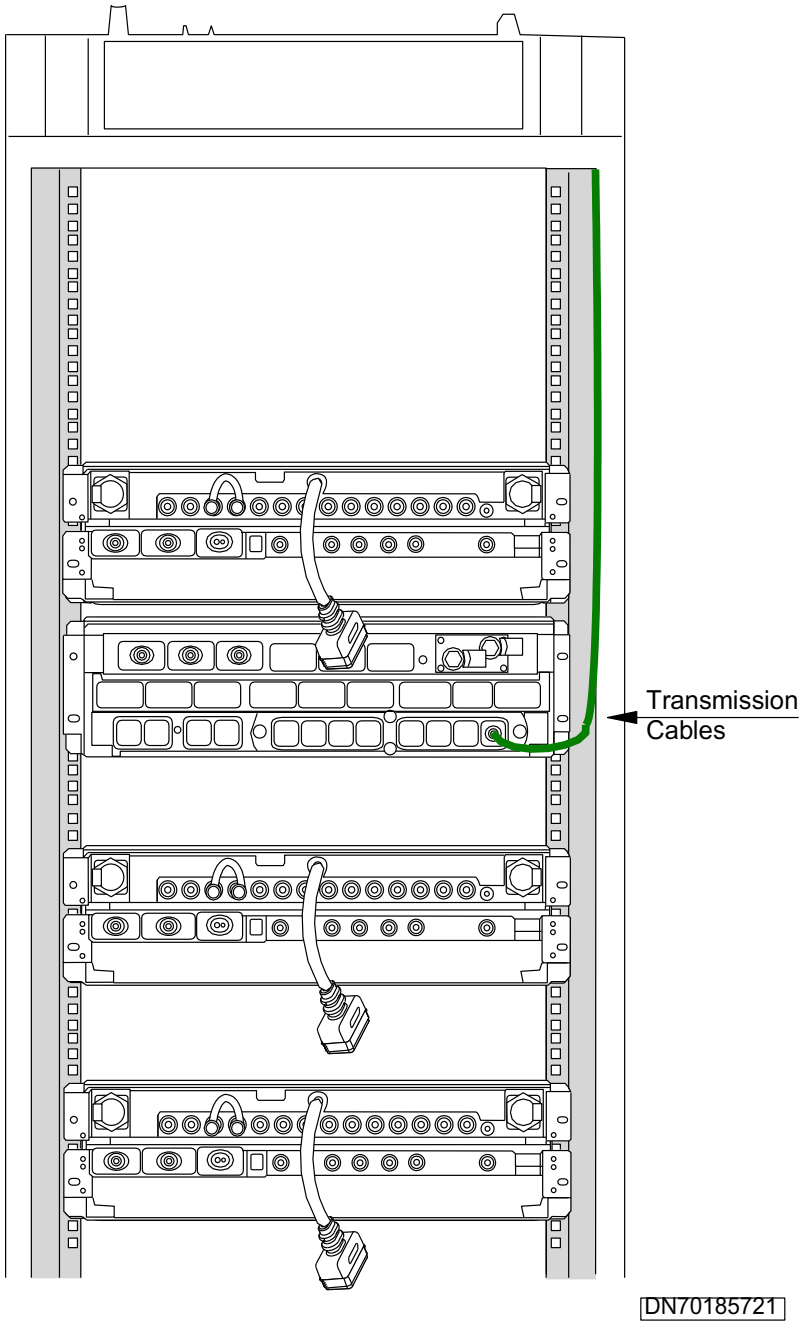

Figure 17. Transmission cables in 1+1+1/2+2+2 FCIA configuration

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Steps

1. **Remove the connector seals from those transmission sub-module connectors to which cables will be installed. Store the seals for later use.**

Tip

Use an adjustable wrench for removing the connector seal.

2. **Pull back the connector seal covering the transmission cable connector.**
3. **Connect the cable to the transmission sub-module.**
4. **Push the cable connector seal firmly in place.**
5. **Repeat steps 1-4 for all the transmission cables required for your configuration.**
6. **Make sure that all the connector seals are properly installed.**

3.7.2 Connecting FIFA transmission cables

Before you start

FIFA is installed as instructed in *Installing FIFA*.

Note that you must use a Flexbus Jumper cable to interconnect the FIFA Flexbus interface and the Flexbus cable from the outdoor unit.

Note also that the Flexbus Jumper cable must be ordered separately.

The following figure describes the principle of connecting the transmission cables. Connect the cables according to the procedure below.

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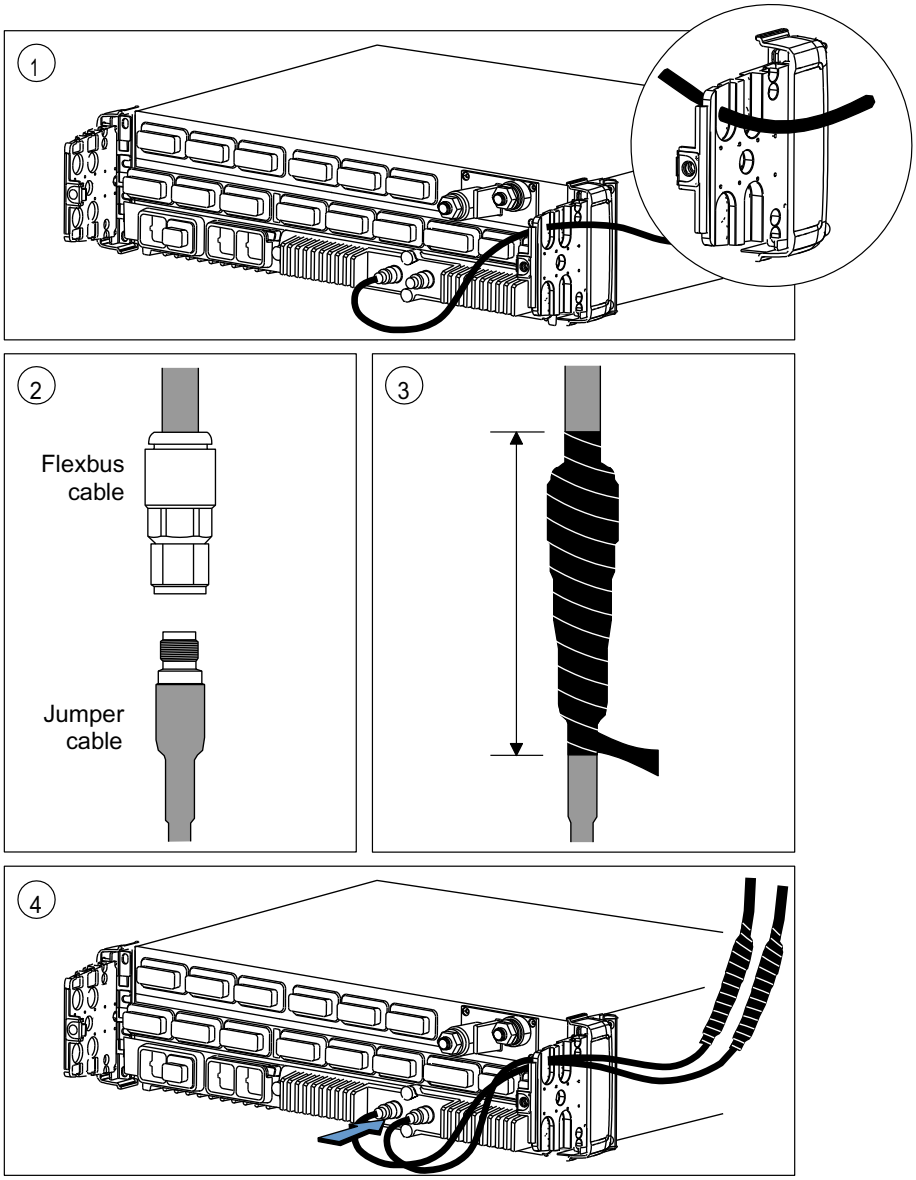

Figure 18. Connecting transmission cables

Note that when connecting BTS external cabling in outdoor site vertical installation, the cables must be routed through the lower cable entry to avoid water leakage.

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Steps

1. **Route the Flexbus Jumper cable through the cable entry and connect the Flexbus Jumper cable to FIFA, Flexbus 1 interface.**

2. **Connect the Flexbus Jumper cable to Flexbus cable (from the outdoor unit).**

3. **Add weatherproof protection tape on the Flexbus Jumper Cable and Outdoor Flexbus cable connection.**

   The weatherproof tape should overlap at least 20 mm beyond the connectors, as indicated in the Figure *Connecting transmission cables*, picture 3.

4. **If you have Flexbus 2 in use, repeat the steps and connect the Jumper cable to Flexbus 2 interface.**

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4 Optional items

4.1 Installing optional modules

4.1.1 Installing Flexi Power Module (FPMA) in FCIA

Purpose

Nokia Flexi EDGE BTS uses 48 V DC power. In a BTS site with AC feed only, a Flexi Power Module (FPMA) is required for converting the AC to DC before feeding the DC power to the System Module.

Flexi Power Module (FPMA) consists of mechanics, AC terminal and four slots for AC/DC sub-module (FPAA) or battery sub-module (FPBA).

The FPMA can include:

- two FPAAs and two FPBAs
- four FPAAs
- one FPAA and three FPBAs
- one FPAA and three free slots for expansion.

Before you start

Make sure the mains breaker is off.

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Summary

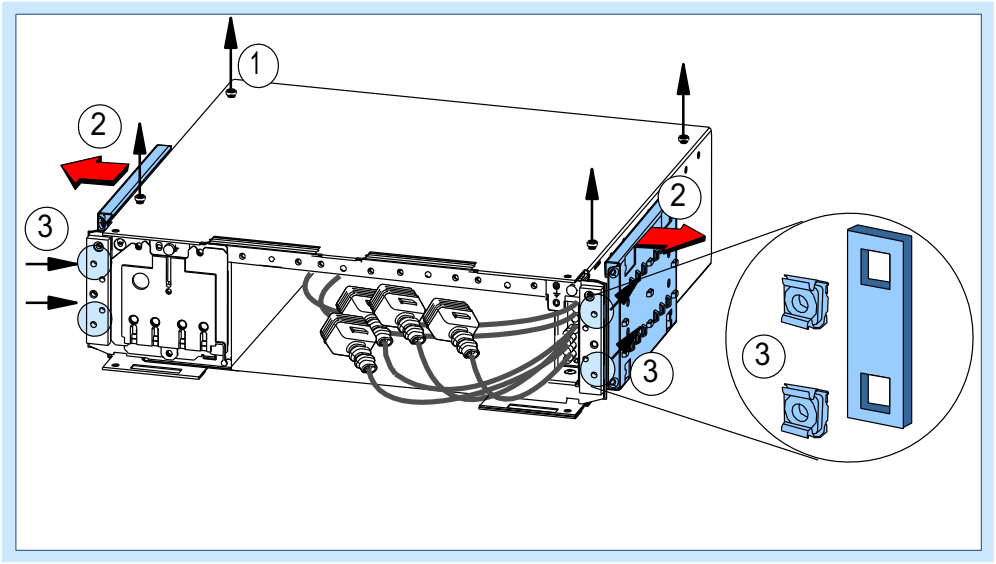

Figure 19. Installing FPMA

Steps

1. **Remove the fixing studs for the module casing.**
2. **Remove the support plate behind the cage nuts.**
3. **Detach the cage nuts from the module.**
4. **Fix the cage nuts (from the module) on the rack on the left-hand side of the cabinet.**
5. **Insert the module.**
6. **Fix with screws.**
7. **Connect the mains breaker.**

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Further information

For FPAA and FPBA installation instructions, see section Installing Flexi Power Module (FPMA) in *Creating Stack, Wall and Pole Configurations*. The sub-modules can be installed inside the FPMA before installing it into the cabinet.

4.1.2 Installing Flexi Power DC/DC Module 24V (FPDA) in cabinets

Purpose

The FPDA is an isolated 2U-high DC/DC Power Module that converts nominal 24 V DC input voltage to 48 V DC nominal output voltage. A maximum of two FPDA modules can be connected in parallel.

The FPDA is delivered with two sets of rubber boots: one set accommodates 1/0 AWG (50 mm^2) or 2 AWG (35 mm^2) for 24 V DC input; the other set accommodates 2 AWG (35 mm^2) or 4 AWG (25 mm^2) for 48 V DC output. If 50 mm^2 cables are used, you need to cut the rubber boot to fit the cable.

In FCIA and FCOA installation, the FPDA is installed directly to the rack without cable entries and plinth.

For FPDA installation locations in the cabinets, see *Optional power modules (FPDA and FPMA) in Flexi EDGE BTS configurations* in *Hardware Configuration Reference Guide*.

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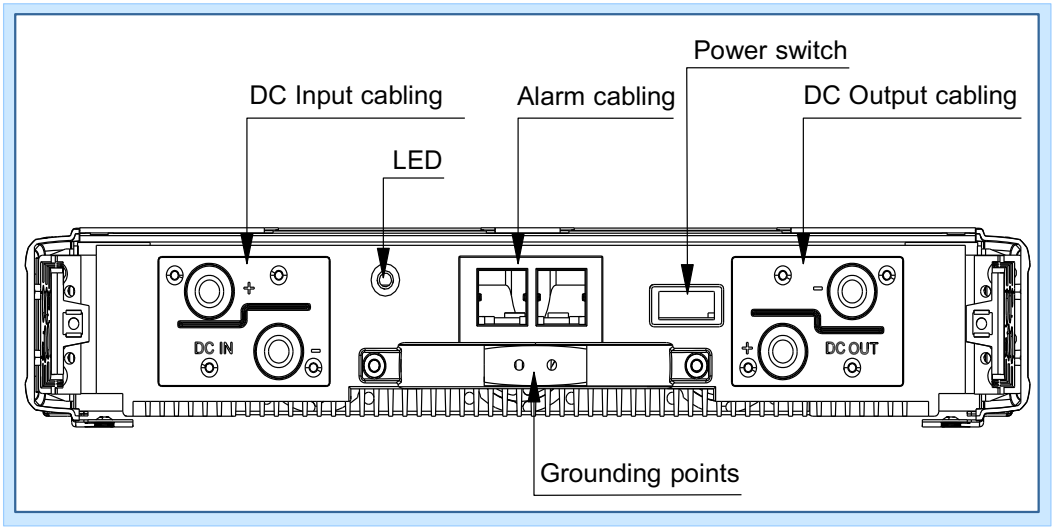

Figure 20. Front panel of the FPDA

Before you start

Make sure the mains breaker is off.

Steps

1. **Install the FPDA.**
2. **Fix the module to the cabinet with screws.**
3. **Make sure that the power switch on the front panel is in the stand-by position.**
4. **Remove the bolts and washers from the DC output terminals.**
5. **Insert the rubber boots to the DC output cables.**

   If the cable is 50 mm^2, cut the rubber boot to fit the cable.
6. **Connect the V48N- cable to the minus terminal and V48RTN+ cable to the plus terminal in the FPDA module.**
7. **Tighten the bolts.**

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See the bolt size in Appendix *Torque values*.

8. **Pull the rubber boots over the DC output terminals.**

9. **Connect the DC output cables to the System Module.**

10. **Remove one of the alarm connector seals on the front panel of the FPDA and connect the alarm cable.**

11. **Check that the power switch is still in the stand-by position.**

12. **Connect the DC input cables similarly as the DC output cables.**

    Connect the minus wire to the minus terminal and the plus wire to the plus terminal.

Note

DC input cables are not included in the delivery. The length and thickness of the DC input cables must be defined based on the distance to the 24 V DC power source. The maximum thickness of a DC input cable that can be installed to the FPDA is 50 mm²/AWG 1/0.

13. **Connect the 24 V DC supply.**

    Make sure the LED is yellow.

14. **Switch on the power by pushing the power switch on the front panel of the FPDA.**

    Make sure the LED is green.

4.1.3 Installing Wideband Combiner Sub-module (EWxA)

Purpose

The optional Wideband Combiner Sub-module (EWxA) is installed in the Dual TRX Module (EXxA).

The Wideband Combiner Sub-module can be installed on the left or right side of the slot in the Dual TRX Module. If you are using only one Wideband Combiner Sub-module, the recommended installation location is on the left side.

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Summary

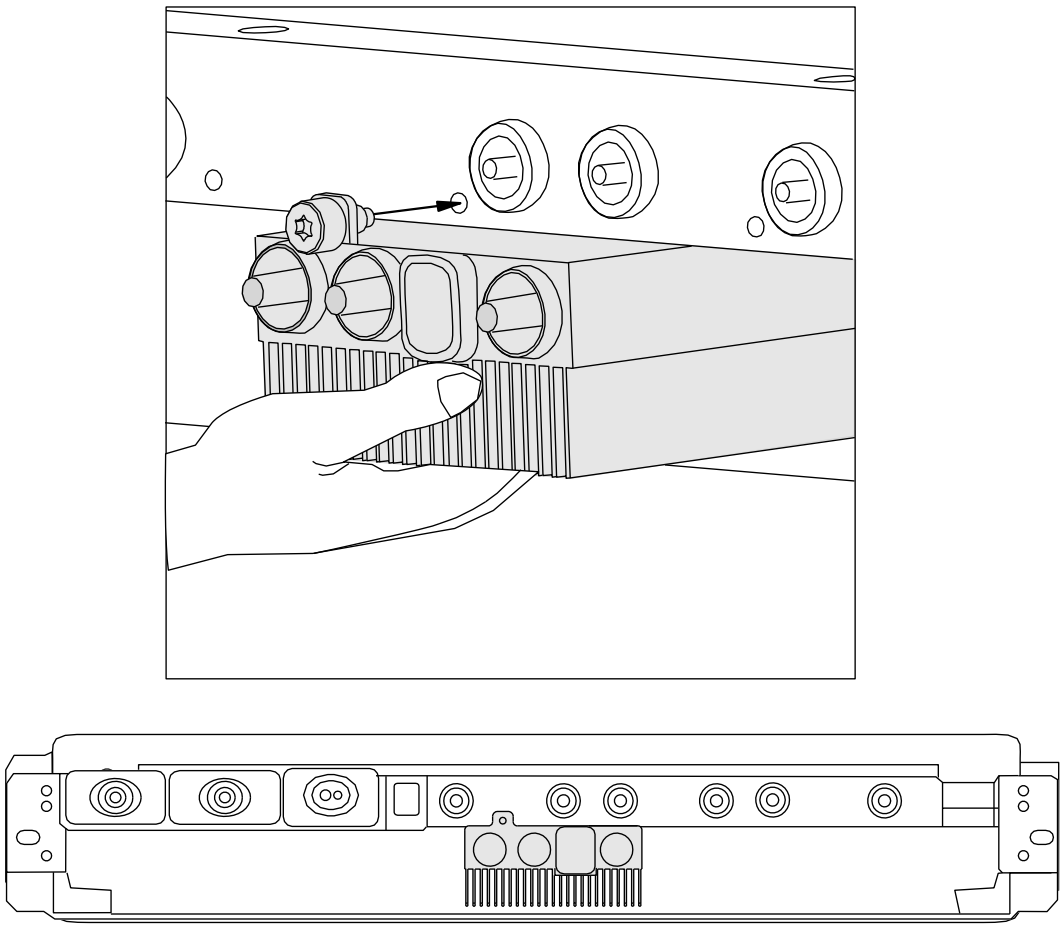

Figure 21. Installing the Wideband Combiner Sub-module

Steps

1. **Install the Wideband Combiner Sub-module in the Dual TRX Module.**

2. **Tighten the screw.**

   While tightening the screw, hold the module from below to make sure it is aligned correctly.

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4.2 Connecting optional cables

4.2.1 Connecting Power Module alarm cables

Purpose

The Power Module (FPMA) alarm cables are connected between Power Module sub-modules. For more information on the internal cabling of the FPMA, AC/DC 230V Sub-module (FPAA) and Power Battery Sub-module (FPBA), see *Installing Flexi Power Module (FPMA)*.

Caution

Incorrect cables and seals may not provide secured weather protection. In outdoor installations, including the outdoor cabinet, use only tested IP55 class outdoor cables with seals provided by Nokia. This is also recommended for indoor installations.

Steps

1. **Remove the IP seals from the alarm cable connectors in the FPAA and FPBA.**

2. **Chain the sub-modules together with the alarm cable from left to right.**

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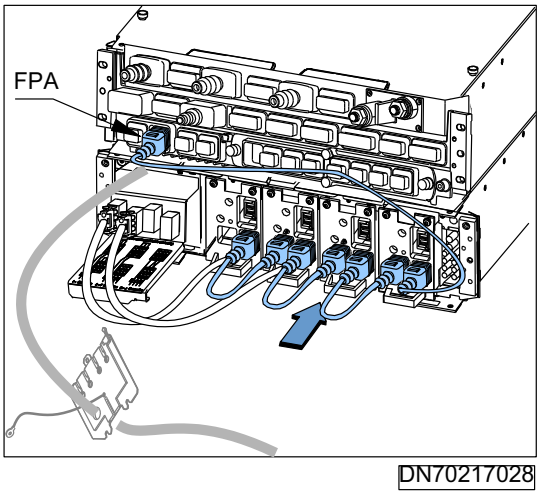

Figure 22. Connecting Power Module alarm cables

3. Connect the alarm cable from one of the sub-modules to the System Module.

The alarm cable is connected to the Site support alarms connector on the System Module.

4.2.2 Connecting external alarms cable

Before you start

The external alarms cable is optional.

Summary

Caution

Incorrect cables and seals may not provide secured weather protection. In outdoor installations, including the outdoor cabinet, use only tested IP55 class outdoor cables with seals provided by Nokia. This is also recommended for indoor installations.

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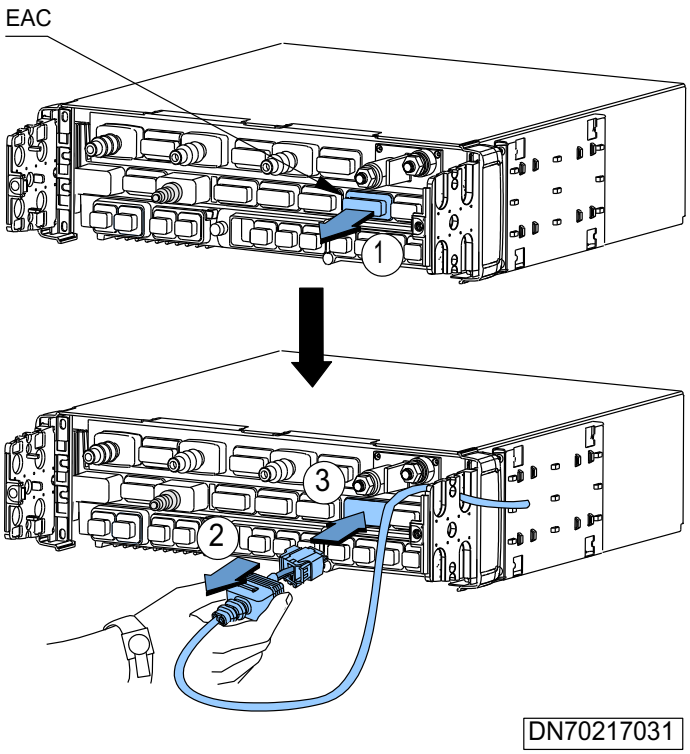
Note

When connecting BTS external cabling in wall or pole installation at an outdoor site, the cables should be routed via the lower cable entry when possible.



Note that cable entry and cable support plate are not used in cabinet installation.

Figure 23. Connecting external alarms cable

Steps

1. **Remove the connector seal from the external alarms connector in the System Module front panel.**

   Store the seal for later use.

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2. **Route the external alarms cable through the cable entry (stack, wall and pole installations).**

3. **Pull back the connector seal covering the external alarms cable connector.**

4. **Connect the cable to the external alarms connector.**

5. **Push the cable connector seal firmly in place.**

6. **Route and connect the other end of the external alarms cable to the external alarms control box or to the distribution frame.**

   See *Installing Flexi System External Alarm (FSEB)* for more details.

4.2.3 Connecting synchronisation cables

Purpose

The synchronisation (Sync OUT, Sync IN) cables are connected between the System Module and an external BTS. The synchronisation cables are also used for syncronising test equipment.

The synchronisation cables are optional.

Summary

Caution

Incorrect cables and seals may not provide secured weather protection. In outdoor installations, including the outdoor cabinet, use only tested IP55 class outdoor cables with seals provided by Nokia. This is also recommended for indoor installations.

Note

When connecting BTS external cabling in wall or pole installation at an outdoor site, the cables should be routed via the lower cable entry when possible.

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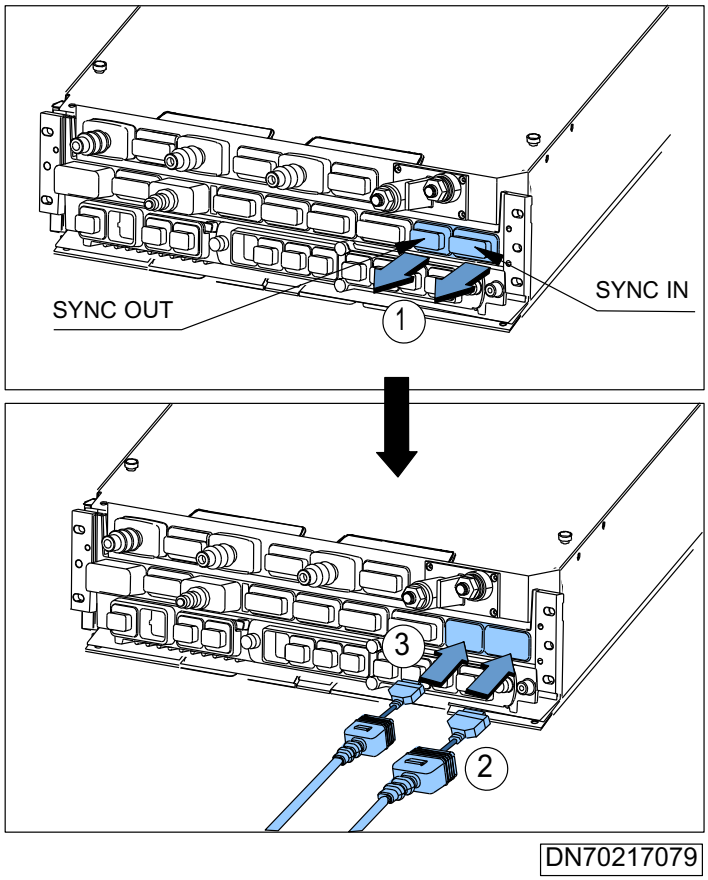

Figure 24. Connecting synchronisation cables

Steps

1. **Remove connector seals from the synchronisation connectors in the System Module front panel.**

   Store the seals for later use.

2. **If this is a stack, wall or pole installation, route the synchronisation cable through the cable entry.**

3. **Pull back the connector seal covering the synchronisation cable connector.**

4. **Connect the cable to the synchronisation connector.**

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5. **Push the cable connector seal firmly in place.**

6. **Route and connect the other end of the synchronisation cable to the external BTS.**

4.2.4 Connecting Q1 cable

Purpose

The Q1 cable is connected between the System Module and a legacy Q1 network management system. The Q1 cable is optional.

Summary

Caution

Incorrect cables and seals may not provide secured weather protection. In outdoor installations, including the outdoor cabinet, use only tested IP55 class outdoor cables with seals provided by Nokia. This is also recommended for indoor installations.

Note

When connecting BTS external cabling in wall or pole installation at an outdoor site, the cables should be routed via the lower cable entry when possible.

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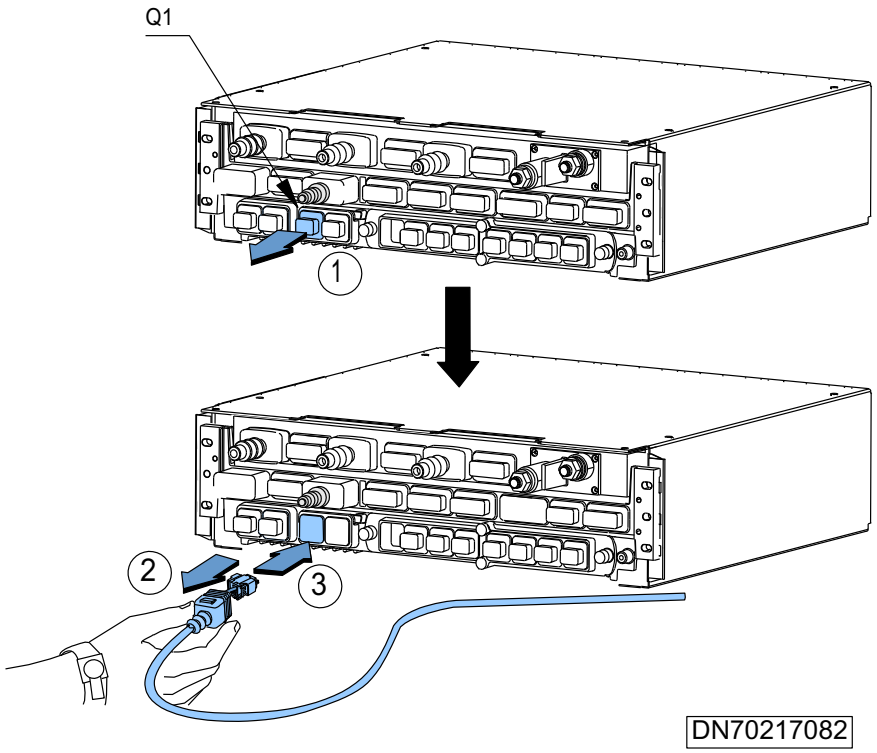

Figure 25. Connecting Q1 cable

Steps

1. **Remove the connector seal from the Q1 connector in the System Module front panel.**

   Store the seal for later use.

2. **If this is a stack, wall or pole installation, route the Q1 cable through the cable entry.**

3. **Pull back the connector seal covering the Q1 cable connector.**

4. **Connect the cable to the Q1 connector.**

5. **Push the cable connector seal firmly in place.**

6. **Route and connect the other end of the Q1 cable to the Q1 network management system.**

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4.2.5 Connecting LMP cable

Purpose

The Local management port cable (LMP) is connected between the System Module and a laptop or other computer. The cable is optional.

Summary

Caution

Incorrect cables and seals may not provide secured weather protection. In outdoor installations, including the outdoor cabinet, use only tested IP55 class outdoor cables with seals provided by Nokia. This is also recommended for indoor installations.

Note

When connecting BTS external cabling in wall or pole installation at an outdoor site, the cables should be routed via the lower cable entry when possible.

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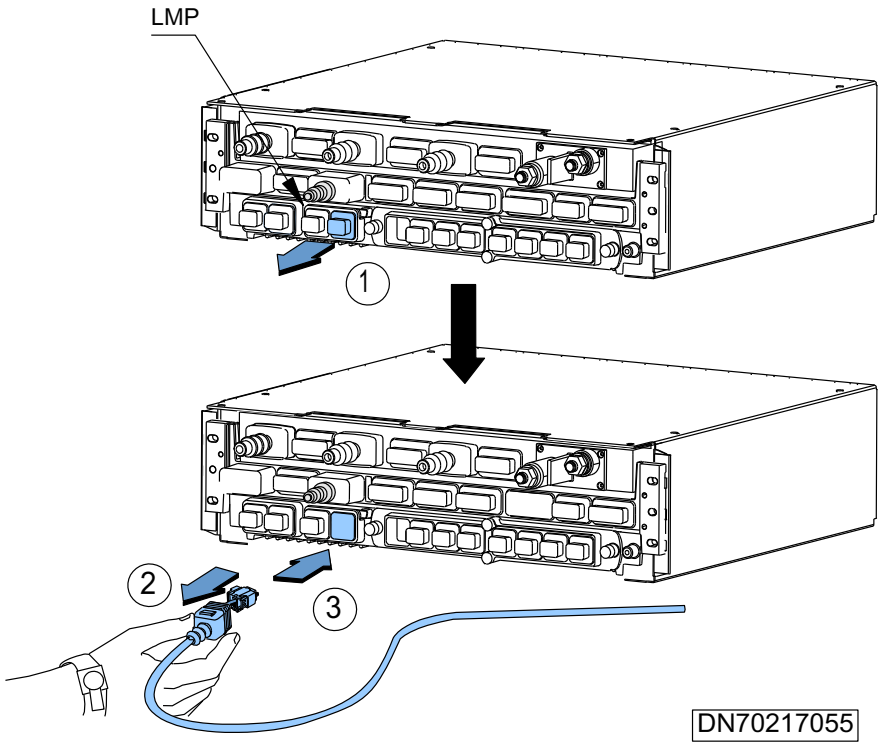

Figure 26. Connecting LMP cable

Steps

1. **Remove connector seal from the LMP connector in the System Module front panel.**

   Store the seal for later use.

2. **If this is a stack, wall or pole installation, route the LMP cable through the cable entry.**

3. **Pull back the connector seal covering the LMP cable connector.**

4. **Connect the cable to the LMP connector.**

5. **Push the cable connector seal firmly in place.**

6. **Route and connect the other end of the LMP cable to the laptop or other computer.**

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4.2.6 Connecting LMU cables

Purpose

The Location Measurement Unit (LMU) cables are connected to the SYNC IN and Q1 connectors in the System Module. For instructions on how to connect the cables at the LMU, see *LMU Product Documentation* in NOLS.

Summary

Caution

Incorrect cables and seals may not provide secured weather protection. In outdoor installations, including the outdoor cabinet, use only tested IP55 class outdoor cables with seals provided by Nokia. This is also recommended for indoor installations.

Note

When connecting BTS external cabling in wall or pole installation at an outdoor site, the cables should be routed via the lower cable entry when possible.

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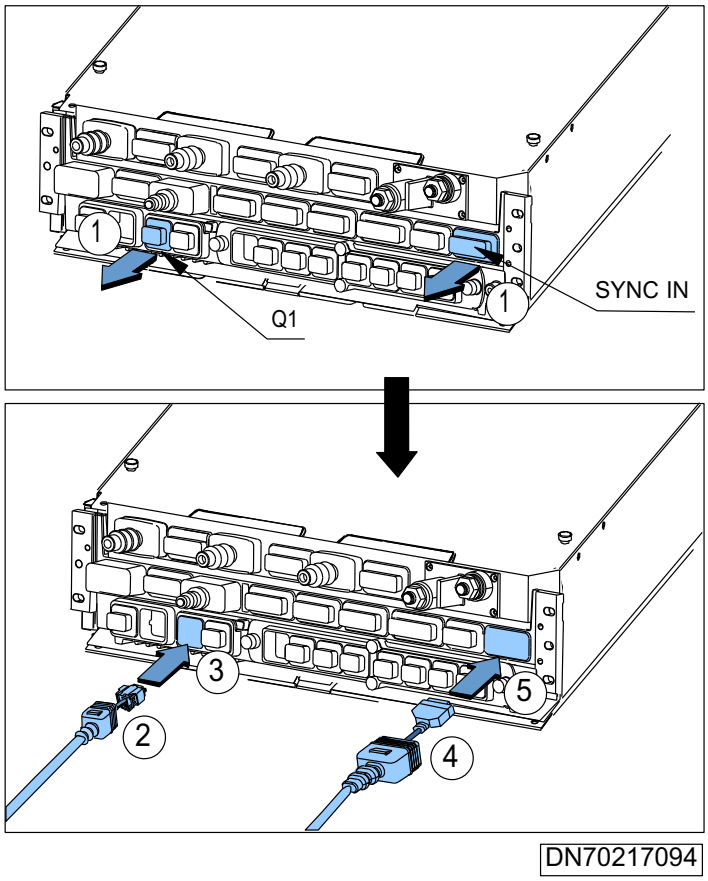

Figure 27. Connecting LMU cables

Steps

1. **Remove the connector seal from the SYNC IN and Q1 connectors in the System Module front panel.**

   Store the seals for later use.

2. **If this is a stack, wall or pole installation, route the cables through the cable entry.**

3. **Pull back the connector seals covering the cable connectors.**

4. **Connect the cables to the SYNC IN and Q1 connectors.**

5. **Push the cable connector seals firmly in place.**

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6. Route and connect the other end of the cables to the LMU.

For detailed instructions, see LMU product documentation.

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5 Checklist for cabling the modules in cabinet installation

Work phase	Checked
Modules are installed.	
External power cables are connected.	
Dual Duplexer Module cable is connected to the Dual TRX Module.	
Bus cables are connected.	
Internal power cables are connected.	
RF cables are connected.	
Antenna jumper cables are connected.	
Transmission cables and sub-modules are connected.	
Optional cables (EAC, Synchronisation, Site support interface, FPA interface, LMP, LMU cables) are connected as needed.	
Cables are routed correctly.	
Empty slots are covered with dummy panels (in FCOA installations only).	
All boots and caps are properly connected and IP-sealed.	
Only Nokia provided cables are used.	
Cabinet roof is installed if applicable (in FCOA installations only).	

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Appendix A External interfaces

A.1 System Module (ESMA) interfaces

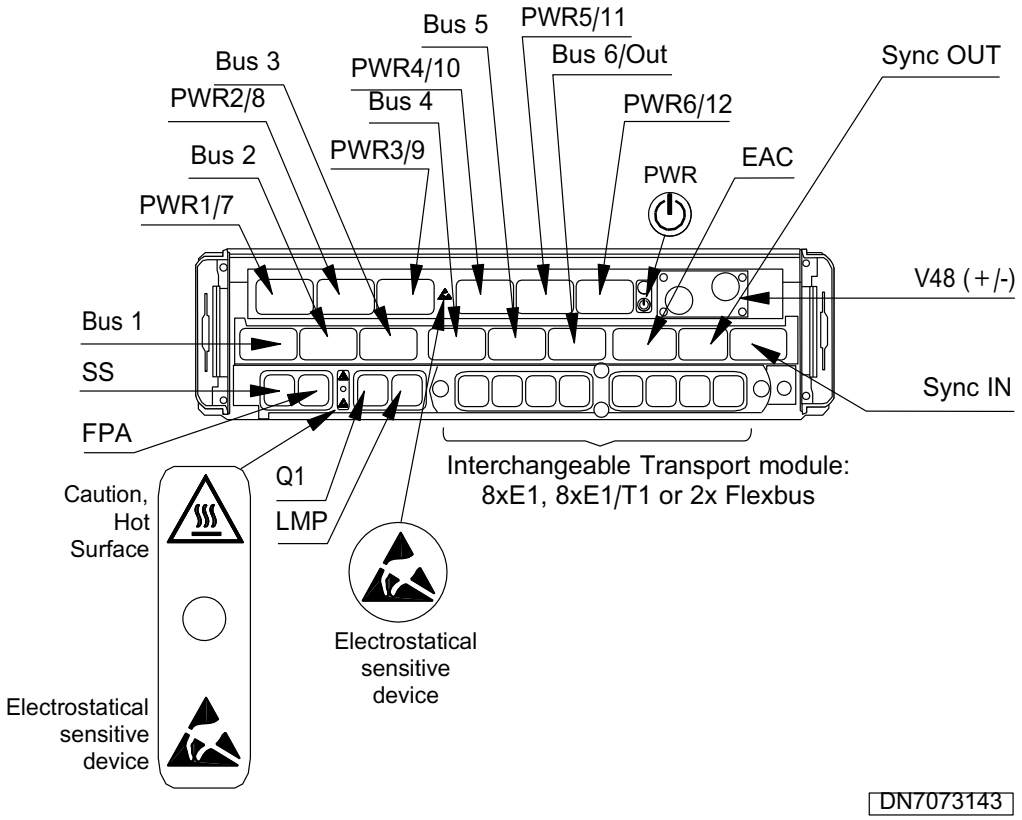

Figure 28. Nokia Flexi EDGE System Module (ESMA) front panel connectors and labels

Table 5. Nokia Flexi EDGE System Module (ESMA) front panel connectors and interfaces

Label name on module	Function	Connector type	Interface(s)
V48N (+/-)	-48 V DC input power for the base station.	M10 terminal bolts	FPMA, FPDA, site support, or other external power supply
PWR 1/7…PWR 6/12	-48 V DC output power with fuse protection to six other modules.	Multi-Beam XL	EXxA, ECxA, FCFA

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Table 5. Nokia Flexi EDGE System Module (ESMA) front panel connectors and interfaces (cont.)

Label name on module	Function	Connector type	Interface(s)
BUS 1…BUS 6/OUT	6 x Ethernet (1000 Base-T)	MDR 26 F RA	EXxA, ECxA, ESEA
EAC	External alarm and control interface	MDR 36 F RA	FSEB, FSAA, customer alarm inputs or control outputs
Sync OUT	Base station synchronisation chaining out	MDR 26 F RA	External BTS
Sync IN	Base station synchronisation chaining in	MDR 14 F RA	External BTS, LMUB
SS	Site Support alarm	RJ45	-
FPA	Flexi power alarm	RJ45 shielded	FPAA, FPBA, FPDA
Q1	Q1 management interface	RJ45 shielded	Nokia Q1 managed network elements
LMP	Local management port	RJ45 shielded	Laptop or other computer

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Transmission interface E1 sub-module (FIEA) interfaces

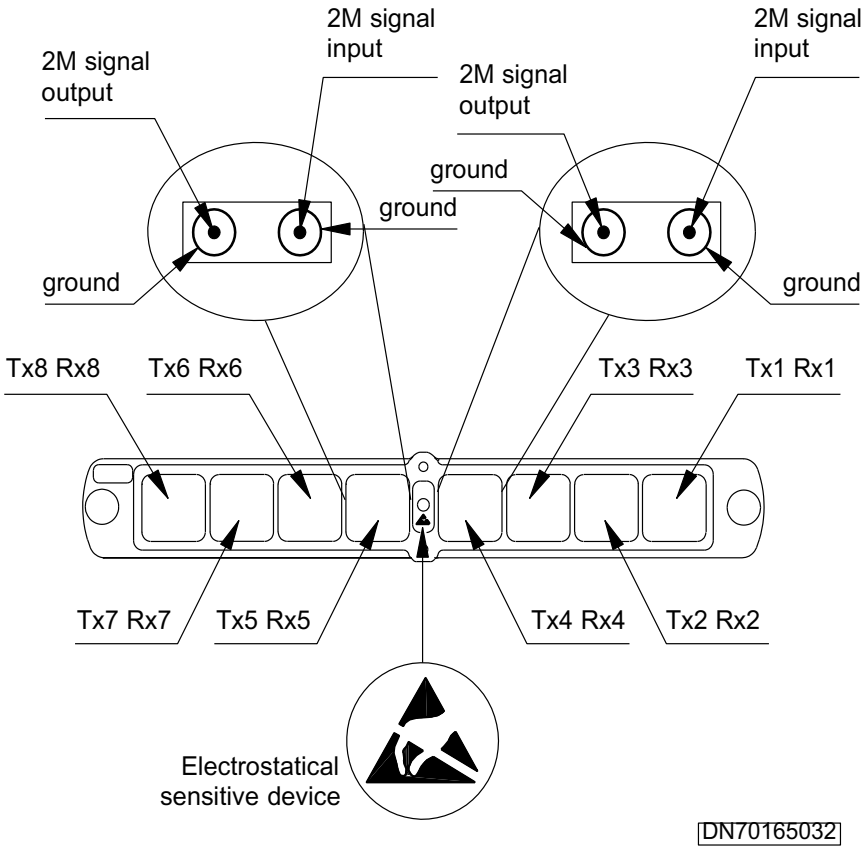

Figure 29. FIEA transmission sub-module front panel connectors and labels

Table 6. FIEA transmission sub-module front panel connectors and interfaces

Label name on module	Description	Connector type	Interface(s)
Tx1 Rx1...Tx8 Rx8	Eight Transmission (Abis) interfaces - unbalanced (coaxial) E1	SMB	External transmission equipment

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Transmission interface Flexbus sub-module (FIFA) interfaces

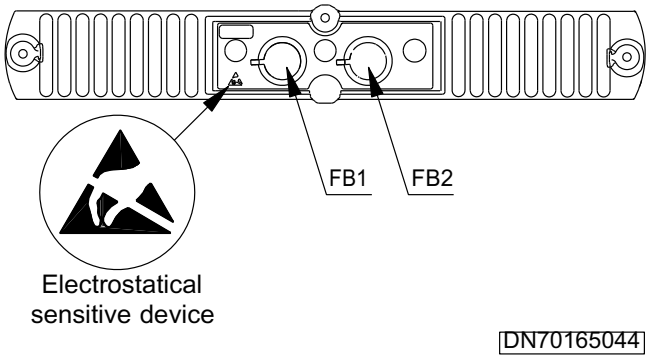

Figure 30. FIFA transmission sub-module front panel connectors and labels

Table 7. FIFA transmission sub-module front panel connectors and interfaces

Label name on module	Description	Connector type	Interface(s)
FB1, FB2	Transmission (Abis) interface - Flexbus (Nokia proprietary PDH radio)	TNC	Nokia FlexiHopper microwave radios

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Transmission interface E1/T1 sub-module (FIPA) interfaces

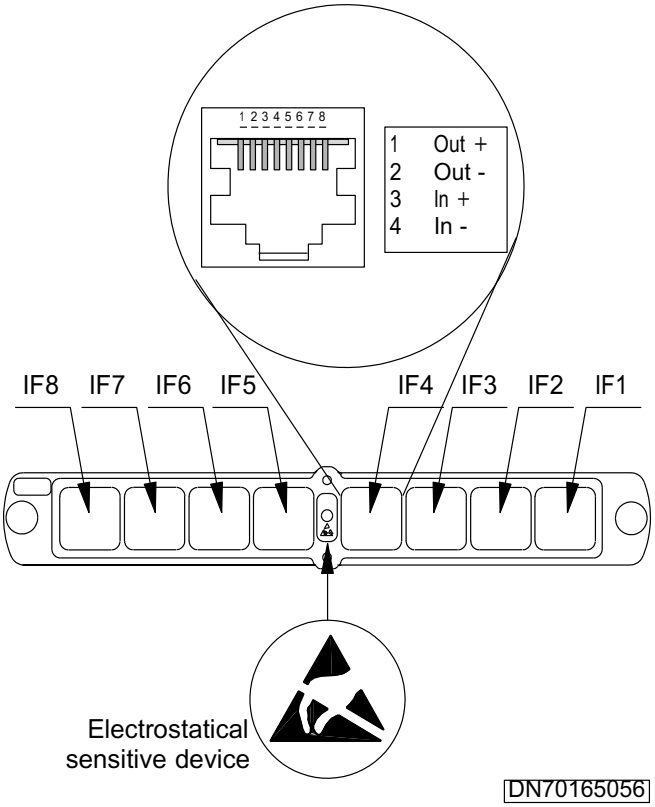

Figure 31. FIPA transmission sub-module front panel connectors and labels

Table 8. FIPA transmission sub-module front panel connectors and interfaces

Label name on module	Description	Connector type	Interface(s)
IF1 ... IF8	Eight transmission (Abis) interfaces - balanced E1/T1	RJ45 shielded	External transmission equipment

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A.2 Dual TRX Module (EXxA) interfaces

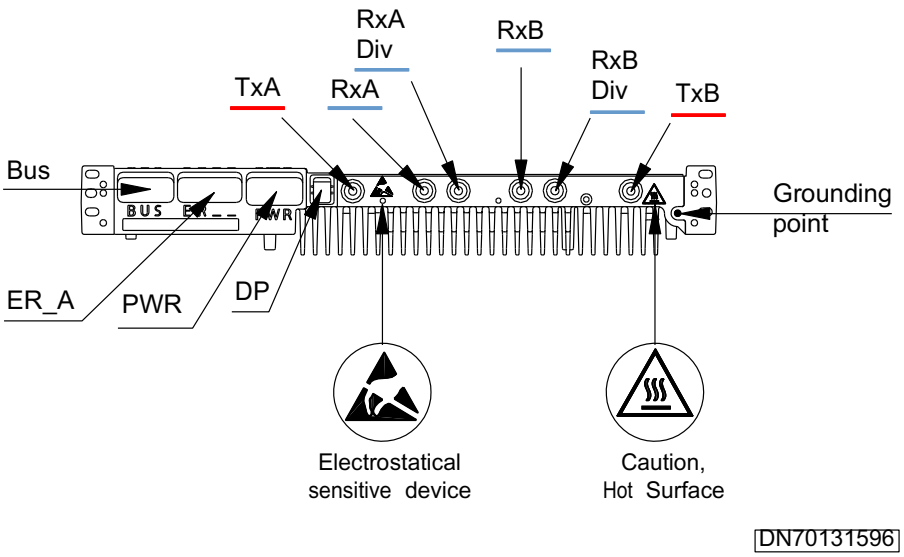

Figure 32. Nokia Flexi EDGE Dual TRX Module (EXxA) front panel connectors and labels

Table 9. Nokia Flexi EDGE Dual TRX Module (EXxA) front panel connectors, cable types and interfaces

Label name on module	Description	Connector type	Cable type	Interface(s)	Signal direction (to/from the module)
BUS	Ethernet (1000 Base-T/100 Base-TX) baseband processing of end user, hopping, synchronisation, and O&M data	MDR 26 (female)	• Bus cable, AWG30 Twinax, MDR 26 (male) • length: 1054/1554 mm (41.5/61.2 in.)	ESMA, ESEA	To and from the module
ER_A	Power and control interface for the ERxA	MDR 36 (female)	• ERxA cable, MDR 36 (male) hard-wired with other end fixed to ER_A • length: 200 mm (7.9 in.)	ERxA	To and from the module

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Table 9. Nokia Flexi EDGE Dual TRX Module (EXxA) front panel connectors, cable types and interfaces (cont.)

Label name on module	Description	Connector type	Cable type	Interface(s)	Signal direction (to/from the module)
PWR	-48 VDC input power with fuse protection	Multi-Beam XL (female)	• Power cable, 2 x AWG12, Multi-Beam XL (male) • length: 1188/2000 mm (46.8/78.7 in.)	ESMA, ESEA	To and from the module
DP	Synchronous combining of both transmitters in the module to generate one GSM/EDGE carrier capacity with increased output power	Molex Microfit (male)	• DP cable, 4 x AWG24, Molex Microfit (female) • length: 203 mm (8.0 in.)	EWxA	To and from the module
RxA, RxB (blue)	Receives a digitally modulated GSM/ EDGE RF carrier in accordance with the appropriate telecommunications standard (Rx input)	QMA (female)	• RF cable, SemiFlex 50, QMA (male) • length: 172/275/1300 mm (6.8/10.8/51.2 in.)	ERxA, ECxA	To the module
RxA Div , RxB Div (blue)	Four-way uplink receive diversity (4UD)	QMA (female)	• RF cable, SemiFlex 50, QMA (male) • length: 172/275/1300 mm (6.8/10.8/51.2 in.)	ERxA, ECxA	To the module
TxA, TxB (red)	Transmits a digitally modulated GSM/ EDGE RF carrier in accordance with the appropriate telecommunications standard (Tx output).	QMA (female)	• RF cable, SemiFlex 50, QMA (male) • length: 172/275/1300 mm (6.8/10.8/51.2 in.)	ERxA, EWxA, ECxA	From the module

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A.3 Dual Duplexer Module (ERxA) interfaces

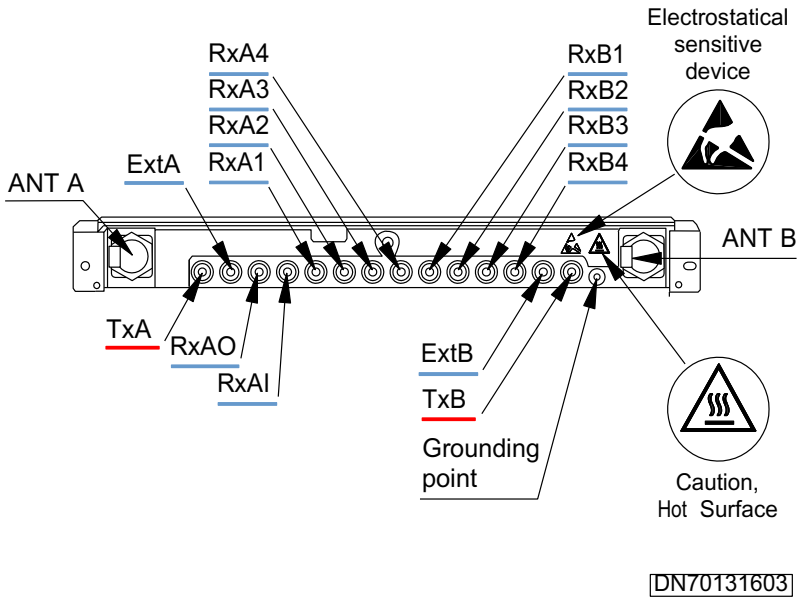

Figure 33. Nokia Flexi EDGE Dual Duplexer Module (ERxA) front panel connectors and labels

Table 10. Nokia Flexi EDGE Dual Duplexer Module (ERxA front panel connectors and interfaces

Label name on module	Description	Connector type	Interface(s)
Ant A, Ant B	Antenna interface	7/16	Antenna jumper or feeder cables
TxA, TxB (red)	2 Tx inputs	QMA	EXxA, EWxA, EWxB
ExtA, ExtB (blue)	2 external Rx outputs	QMA	External receiver
RxAO (blue)	Rx co-siting output	QMA	External BTS cabinet
RxAI (blue)	Rx co-siting input	QMA	External BTS cabinet
RxA1…RxA4 (blue) RxB1…RxB4 (blue)	8 Rx outputs	QMA	EXxA

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A.4 Wideband Combiner Sub-module (EWxx) interfaces

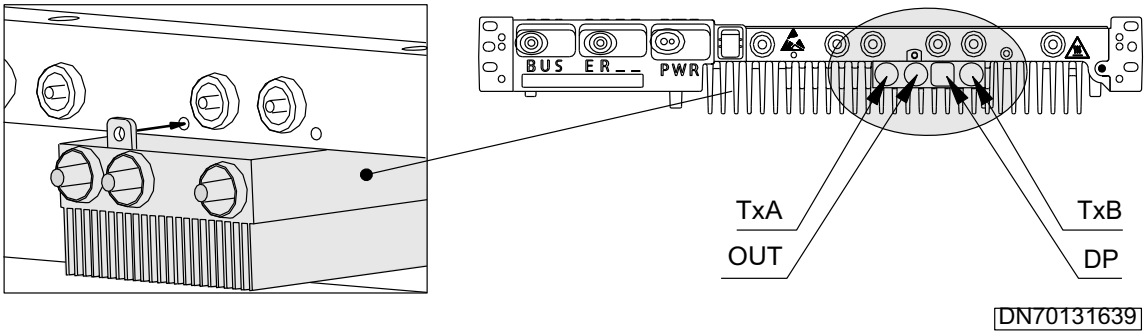

Figure 34. Nokia Flexi EDGE Wideband Combiner Sub-module (EWxA) front panel connectors

Table 11. Nokia Flexi EDGE Wideband Combiner Sub-module (EWxx) front panel connectors and interfaces

Label name on module	Description	Connector type	Interface(s)
TxA, TxB	2 Tx inputs	QMA	EXxA
DP (in EWxA only)	Synchronous combining of both transmitters in the module to generate one GSM/EDGE carrier capacity with increased output power.	4-pin Microfit	EXxA
OUT	Tx output	QMA	ERxA

Note that the EWxB does not have the DP connector as the DPTRX is not supported.

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A.5 System Extension Module (ESEA) interfaces

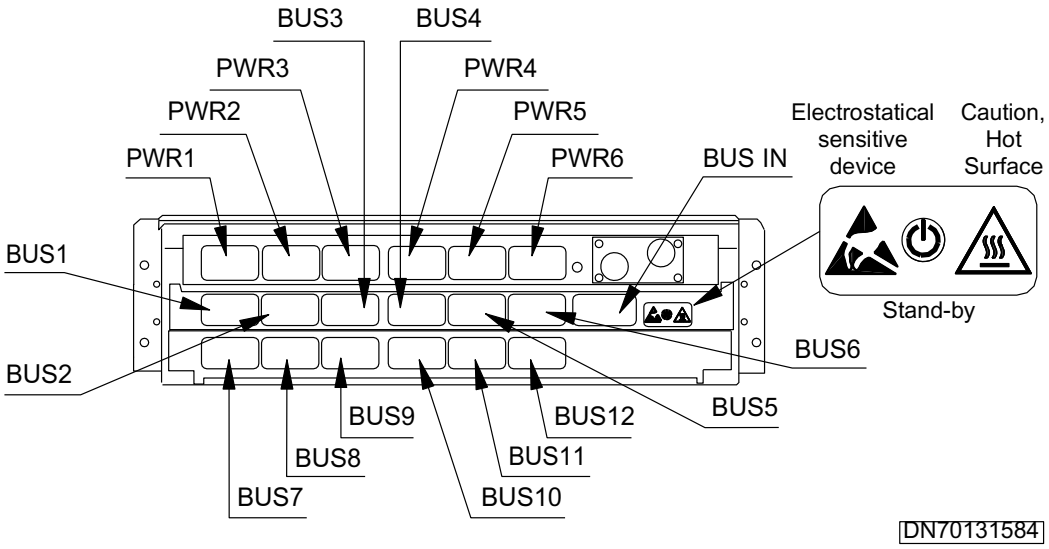

Figure 35. Nokia Flexi EDGE System Extension Module (ESEA) front panel connectors and labels

Table 12. Nokia Flexi EDGE System Extension Module (ESEA) front panel connectors and interfaces

Label name on module	Description	Connector type	Interface(s)
V48N (+/-)	-48 V DC input power for base station	M10 terminal bolts	FPMA, FPDA, site support, or other external power supply
PWR 1/7…6/12	-48 V DC output power with fuse protection to six other modules.	Multi-Beam XL	EXxA, ECxA, FCFA
BUS1...12, IN	12 x Ethernet (1000 Base-T/100 Base-TX) baseband processing of end user, hopping, synchronisation and O&M data.	MDR 26 F RA	EXxA

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A.6 Remote Tune Combiner Module (ECxA) interfaces

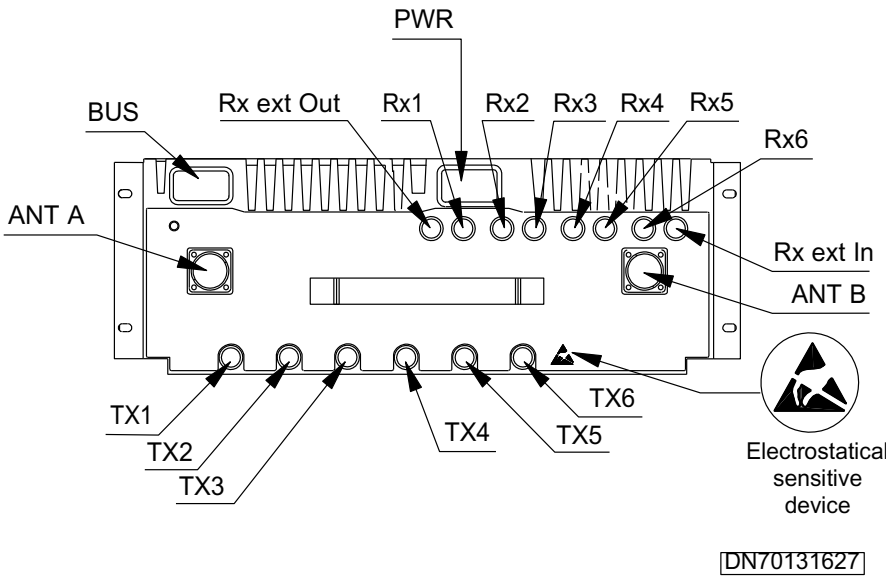

Figure 36. Nokia Flexi EDGE Remote Tune Combiner Module (ECxA) front panel connectors and labels

Table 13. Nokia Flexi EDGE Remote Tune Combiner Module (ECxA) front panel connectors and interfaces

Label name on module	Description	Connector type	Interface(s)
BUS	Ethernet (1000 Base-T/100 Base-TX) baseband processing of end user, hopping, synchronisation and O&M data.	MDR 26 F RA	ESMA, ESEA
PWR	-48 VDC input power with fuse protection.	Multi-Beam XL	ESMA, ESEA
ANT A, ANT B	Duplexer antenna interface	7/16	Antenna jumper or feeder cables
RX DIV	RX filter antenna interface	7/16	Antenna jumper or feeder cables
Rx1...Rx6	Output to EXxA RX	QMA	EXxA
Tx1...Rx6	Input from EXxA TX	QMA	EXxA
RX ext OUT	RX co-siting output	QMA	External RX or EXxA (12 RTC)

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Table 13. Nokia Flexi EDGE Remote Tune Combiner Module (ECxA) front panel connectors and interfaces (cont.)

Label name on module	Description	Connector type	Interface(s)
RX ext IN	RX co-siting input	QMA	External RX or EXxA (12 RTC)

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Appendix B Bending diameter for cables

B.1 Bending diameter for cables

The table below shows the minimum bending diameter of Nokia Flexi EDGE BTS cables.

Static bending diameter refers to the allowed bend while the cable is fixed (for example, when the cable is tied to the side of the cabinet). Dynamic bending diameter refers to the allowed bend while the cable is in motion (for example while routing the cable through the cable entry).

For the bending diameter of antenna jumper cables, refer to the cable manufacturer.

Table 14. Bending diameter of Nokia Flexi EDGE BTS cables

Cable		*Static bending diameter*	*Dynamic bending diameter*
Cable name	*Cable code*		
RF cable 172 mm (6.8 in.)	994931	30 mm (1.2 in.)	35 mm (1.4 in.)
RF cable 275 mm (10.8 in.)	994933		
RF cable 1300 mm (51.2 in.)	994936		
RF cable 71 mm (2.8 in.)	994980	18 mm (0.7 in.)	18 mm (0.7 in.)
Bus cable 1054 mm (41.5 in.)	994938	40 mm (1.6 in.)	45 mm (1.8 in.)
Bus cable 1554 mm (61.2 in.)	994939		
Power cable 1188 mm (46.8 in.)	994940	45 mm (1.8 in.)	50 mm (2.0 in.)
DP cable	994969	40 mm (1.6 in.)	45 mm (1.8 in.)
EMCA LMP cable	471370		
Sync cable for Flexi	471371		
Sync cable for UltraSite	471372		
Sync LMU cable	471377		
Q1 cable	471384		
MIBBU EPA alarm cable	471464		
Clock test cable	471521		

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Appendix C Installation tools and torque values

C.1 Installation tools for Flexi EDGE BTS

Table 15. Tools for installation

Installation tools
ESD wrist strap and cable
TORX screwdriver set: T10, T20, T25
Flathead screwdriver
Wrench: 8 mm (0.31 in.), 11 mm (0.43 in.), 13 mm (0.51 in.), 17 mm (0.67 in.), 19 mm (0.75 in.)
Folding knife
Adjustable wrench
Side cutters
Crimping tool for 25 mm^2 (4 AWG), 35 mm^2 (2 AWG), and 50 mm^2 (1/0 AWG) cables
Crimping tool for 16 mm^2 grounding cable
Torque wrench for antenna cables
Cable ties for routing cables
Tape measure
Flashlight, pocket lamp or torch
Hammer drill
Marker pen or comparable tool
Pliers
Level
Hexagon (Allen) key: 8 mm (0.31 in.). This is required for the Pole Mounting Kit (FMBB).
Allen key: 5 mm (0.20 in.)
Screwdriver slotted for power input connections
Wrench 13 mm (0.51 in.)
Torque wrench for antenna cables: Open spanner end with bended shank 32mm@25 Nm (DIN 7-16 connector)
Socket or open ended spanner set: 11 mm (0.43 in.), 13 mm (0.51 in.), 17 mm (0.67 in.), 18 mm (0.71 in.)
Open ended spanner 22 mm or tongs

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C.2 Torque values

Nokia strongly recommends that you tighten to the following torque values. These values assume the use of a lubricated bolt or fastener. Use these values unless stated otherwise.

The torque wrench is presented in the following figure.

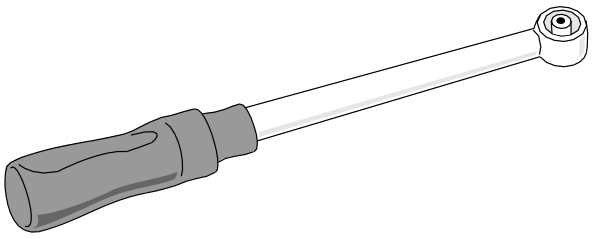

Figure 37. Torque wrench

Table 16. Torque values for the BTS

Bolt/Screw type	Size	Usage	Torque
TORX screw, thumb	M4	Transmission submodules (FIFA, FIEA, FIPA)	2.5 Nm (1.8 ft-lb)
TORX screw, thumb	M4	Wide-band Combiner Sub-module (EWxx)	2.0 - 2.5 Nm (1.5 - 1.8 ft-lb)
TORX screw, pan head	M4	Fan plate assembly	1.2 - 1.6 Nm (0.9 - 1.2 ft-lb)
TORX screw, thumb	M5	Mounting modules on rack or casings (EXxA, ERxA, ESMA, ECxA, FPDA, FPMA)	3.0 Nm (2.2 ft-lb)
TORX screw, thumb	M5	Front covers	2.0 - 2.5 Nm (1.5 - 1.8 ft-lb)
TORX screw, pan head	M5	Cable entry, module/FCIA grounding, locking casings, rear covers, FPAA, FPBA, FPMA AC terminal cover	2.0 - 2.5 Nm (1.5 - 1.8 ft-lb)
Nut	M5	FCOA grounding	3.7 Nm (2.7 ft-lb)
TORX screw, pan head	M8	FCIA grounding	8.0 - 10.0 Nm (5.9 - 7.37 ft lb)

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Table 16. Torque values for the BTS (cont.)

Bolt/Screw type	Size	Usage	Torque
Nut	M8	FCOA grounding	8.0 - 10.0 Nm (5.9 - 7.37 ft lb)
DC Power terminal nut	M10	ESMA, FPDA DC power terminals	10.0 - 14.0 Nm (7.0 ft lb - 9.8 ft lb)
Hexagon head screw	M10	Cabinet/plinth fixing (not included in Flexi EDGE delivery)	40.0 Nm (29.0 ft-lb)
Nut	M10	Cabinet/plinth fixing (not included in Flexi EDGE delivery)	40.0 Nm (29.0 ft-lb)
Hexagon head screw	M12	Cabinet/plinth fixing (not included in Flexi EDGE delivery)	49.0 Nm (36.1 ft-lb)
Nut	M12	Cabinet/plinth fixing (not included in Flexi EDGE delivery)	49.0 Nm (36.1 ft-lb)
Antenna connector	7/16"	Antenna jumper cables (not inlcuded in Flexi EDGE delivery)	25 Nm (18.5 ft lb)

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