MINI-LINK TN ETSI

AMM 2p, AMM 6p, AMM 20p

Indoor Installation Instruction

ERICSSON

Contents

1 Introduction

This manual describes how to install indoor MINI-LINK TN equipment and accessories. Installation of any outdoor parts is described in the *MINI-LINK TN, MINI-LINK HC, MINI-LINK E Outdoor Installation Manual*.

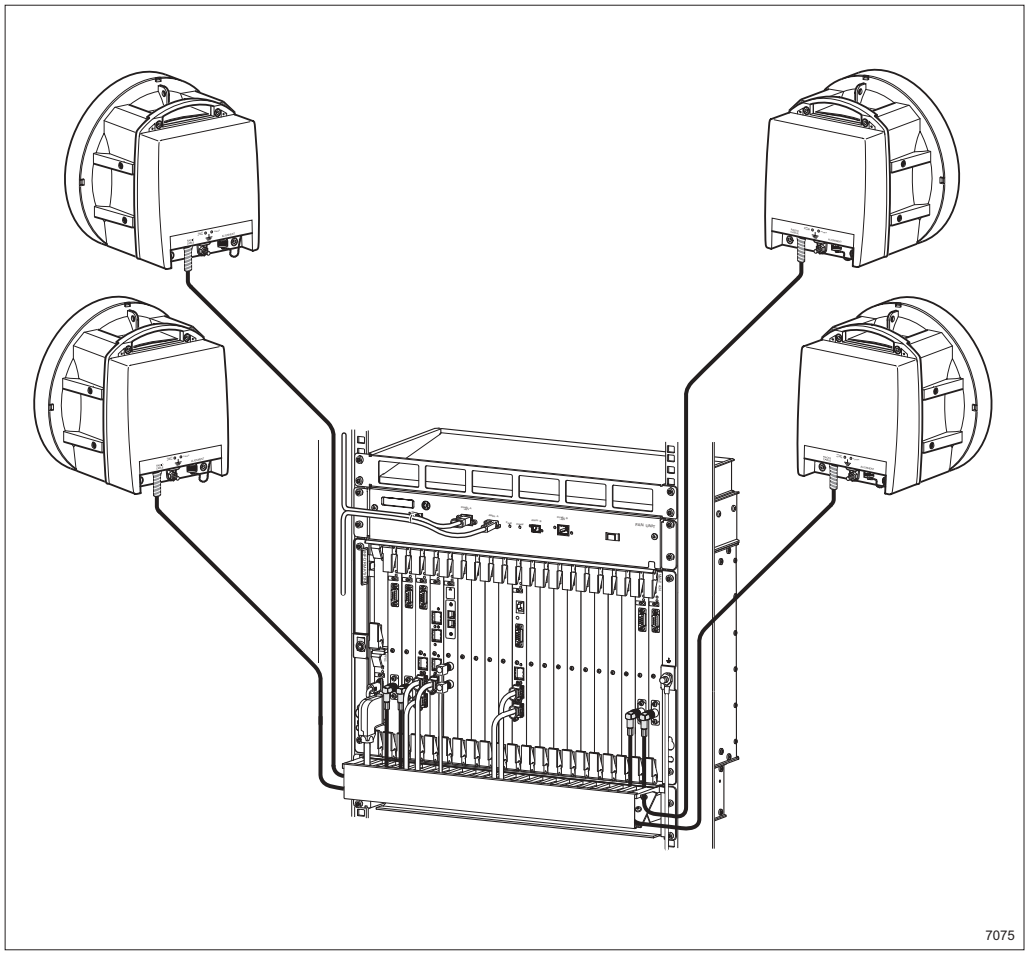

Figure 1 Example of a MINI-LINK TN configuration

MINI-LINK TN is a microwave hub solution providing advanced non-blocking traffic routing and multiplexing for multiple medium and high capacity radio terminals. It is specifically designed for sites with more than one radio direction. A system overview is given in section Section 3 on page 13.

1.1 Target Group

This manual has been written for field technicians and supervisors who work with installation of MINI-LINK equipment on site.

The personnel must be authorized and have the appropriate technical training and experience.

The field technician is expected to be experienced in radio and mobile communications, and have a good understanding of technical English or any other language in which this manual is available.

1.2 Revision Information

The following changes have been made since the last release:

- The manual has been restructured
- AMM 2p Kit has been added
- PSU DC/DC Kit references have been added
- Section 3, System Overview, has been rewritten

1.3 Related Documents

The following documents contain information related to the subject of this manual.

Table 1 Related documents

MINI-LINK TN, MINI-LINK HC, MINI-LINK E Outdoor Installation Manual	EN/LZT 712 0015
MINI-LINK E ETSI Indoor Installation Manual	EN/LZT 712 0176
MINI-LINK TN, MINI-LINK HC, MINI-LINK E ETSI Product Catalog	EN/LZT 712 0191
MINI-LINK TN ETSI Technical Description	EN/LZT 712 0211
MINI-LINK TN ETSI LCT Installation Instruction	EN/LZT 712 0199
MINI-LINK TN ETSI Online Help *A printed version is available as:* MINI-LINK TN ETSI Operation Manual	– EN/LZT 712 0177
MSM Installation Guide	EN/LZT 712 0069
MSM Online Help *A printed version is available as:* MSM User Guide	– EN/LZT 712 0193
PSU DC/DC Kit Installation Instruction	EN/LZT 712 0219

1.4 Installation Workflow

The flowchart shows the recommended installation workflow. The outdoor installation is described in the *MINI-LINK TN, MINI-LINK HC, MINI-LINK E Outdoor Installation Manual*.

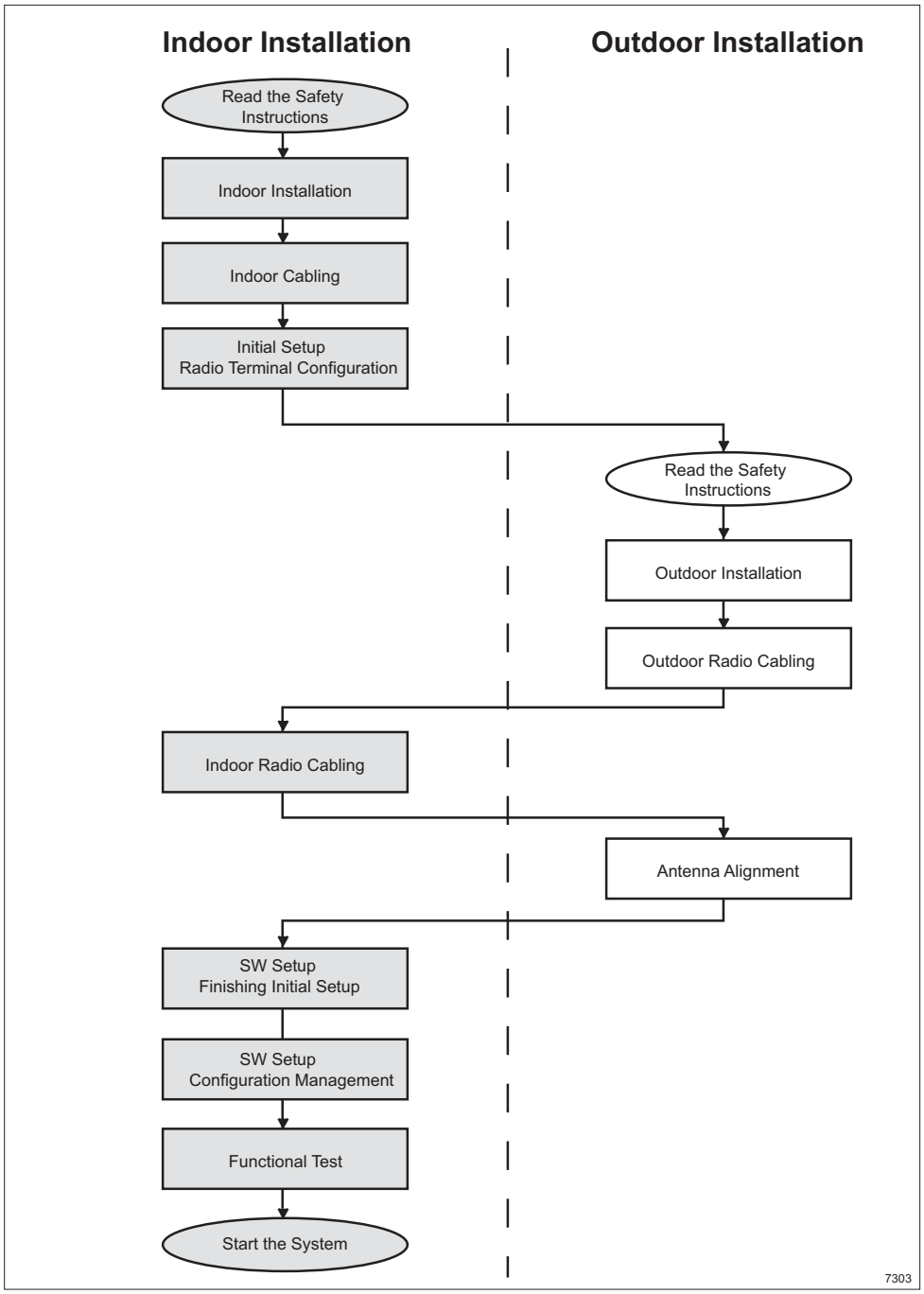

Figure 2 Installation workflow

2 Safety Instructions

2.1 Introduction

This section describes the system used for presenting safety information.

Note: Reduce the risk of accidents by studying all the instructions carefully before you start working. Should questions arise regarding the safety instructions, contact your supervisor or your local Ericsson representative.

The relevant manual (including this safety information) and specific instructions supplied by Ericsson must be followed in any work performed on Ericsson products or systems. Sufficient knowledge of English or of any other language, in which the manuals or instructions are available, is necessary to perform the tasks in the manual in a correct and safe way.

The safety information in the relevant manuals presupposes that any person performing work on Ericsson products or systems has the education, training and competence required to perform the task correctly. For certain tasks additional or special training might be required. For more precise information on the amount and content of the general and/or special training required to work on Ericsson products or systems, please contact the local Ericsson company.

Ericsson does not take any responsibility for either personal injury or damage to tangible property that is caused by work performed on Ericsson products and systems in conflict with the safety instructions set out in this manual.

2.2 Standards

2.2.1 Safety Standards for Information Technology Equipment

Equipment for the ETSI market meets the requirements according to IEC/EN 60950 and IEC/EN 60529.

2.2.2 Radiofrequency Electromagnetic Exposure

The radiofrequency (RF) electromagnetic exposure levels from MINI-LINK antennas depend on the transmitted power level, antenna diameter, frequency and distance from the antenna dish. As the antennas are highly directive the emission in other directions than the main beam axis is negligible.

2.2.2.1 Compliance Distances for Electromagnetic Exposure

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

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

Ericsson has performed RF exposure assessments of the different MINI-LINK configurations in order to determine the compliance distances in different directions and specify so-called compliance boundaries for both general public and occupational exposure.

The maximum RF exposure levels directly in front of the antennas do not exceed the limits for occupational exposure for any MINI-LINK configuration. Therefore, no occupational compliance boundary is needed.

For any MINI-LINK configuration, the maximum RF exposure levels do not exceed the general public limits outside the compliance boundary as shown in Figure 3 on page 6.

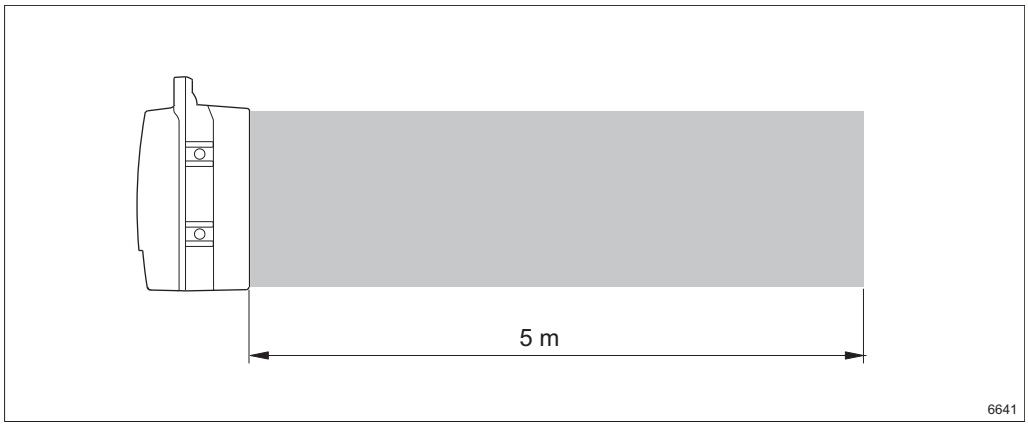

Figure 3 Compliance boundary for general public exposure

The compliance boundary is defined as a cylinder with the same diameter as the antenna and extending 5 meters from the antenna in the main beam direction.

Normal installation practice requires that the general public have no access to the area directly in front of the antenna, as any obstacle in the path will interrupt the transmission. Such practice will ensure that the general public does not have access to the volume within the compliance boundary.

Note: The compliance boundary described above has been defined to cover all MINI-LINK configurations. For many configurations, including all those with antenna diameters of 1.2 meters or more, the maximum RF exposure does not exceed the general public limits at any distance in front of the antenna. On request, Ericsson will provide RF exposure and compliance distance information for specific MINI-LINK configurations.

2.3 Safety Requirements

The safety requirements in the following sections must be followed to avoid personal injury and damage to tangible property.

It is the responsibility of the local project manager / supervisor to make certain that local regulations and the safety instructions in this manual are known and followed.

2.3.1 Installation and Maintenance Personnel

Installation and maintenance must be carried out by authorized personnel with the appropriate technical training and experience necessary to be cognizant of hazards during installation and maintenance, and of measures to minimize any danger to themselves or any other person.

2.3.2 Access to Equipment

The equipment must be installed in a restricted access location and access shall be restricted to authorized personnel. The general public shall not have access to the volume inside the compliance boundary, as shown in Figure 3 on page 6.

2.3.3 Safety Regulations

Use local safety regulations where these are mandatory. The safety instructions in this manual shall be used as a supplement to the local regulations. In case of conflict between the safety instructions in this manual and the local safety regulations, the local safety regulations shall prevail if these are mandatory. If the local regulations are not mandatory the safety instructions in this manual shall prevail.

2.3.4 Installation Hardware

Do not use any installation components (for example screws and nuts) other than what is enclosed with the equipment or recommended by Ericsson.

2.3.5 Installation Procedures and Tools

The installation procedures in this manual must be followed. Make sure that:

- working instructions are followed
- recommended tools are used
- adequate safety devices are used
- the risk of falling and falling objects is known

As a guide to identifying potentially hazardous installation steps, safety symbols as in Section 2.4 on page 8 are used throughout the manual.

2.4 Safety Symbols and Definitions

This section shows the method used for presenting safety information.

2.4.1 Danger, Warning and Caution

The following three levels, shown in order of urgency, are used.

Danger!

Danger means that an accident may occur if the safety precautions are neglected. This type of accident is likely to be fatal.

Warning!

Warning means that an accident may occur if the safety precautions are neglected. This type of accident may be fatal or can cause serious injury.

Caution!

Caution means that an accident may occur if the safety precautions are neglected. This type of accident may cause minor injury or damage to tangible property.

2.4.2 Notes

Note: Notes are used to call to the attention of the reader key points that might otherwise be overlooked.

2.4.3 Electrostatic Discharge

Figure 4 ESD symbol

The Electrostatic Discharge (ESD) symbol indicates when external ESD protection must be used to avoid possible damage to the equipment.

Electrical charges are generated by friction when a body moves, rubs against clothes, slides against a chair, when shoes rub against the floor, and when you handle ordinary plastics, etc. Such charges may remain for a considerable period of time.

Handling of Printed Board Assemblies and IC Components

Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies. The ESD wrist strap contains a resistor with an ohmic value greater than 1 M in the cable to protect the operator. The resistance value is low enough to discharge the electrostatic voltage. Never replace the cable with any other cable. The ESD wrist strap must be connected to earth.

Storing and Transporting Printed Board Assemblies and IC Components

Use the original packaging. If this is not available, use a conductive material, or a special IC carrier that either short-circuits or insulates all leads of the components.

2.5 Hazards

2.5.1 Fire

Warning!

Fire may spread to neighboring rooms. When working on a site you may have to open cable ducts, channels or access holes, thereby interfering with the fire sectioning of the building.

- Close cable ducts and fire doors as soon as possible.
- After completing the work, seal the cable ducts according to the regulations for the building.
- Minimize the amount of flammable materials.
- Avoid storing empty packaging material on the site.
- Use a powder or carbon dioxide type of fire extinguisher due to the electrical nature of the equipment on the site.

2.5.2 Laser Hazards

This section provides information on working with products that have devices that communicate through optical fibres using laser.

Note: This information only applies to products marked with the laser hazard symbol, stating the class of laser in use.

2.5.2.1 Class 1 Laser

This section provides information on working with equipment containing Class 1 laser.

Products containing a Class 1 laser, according to IEC/EN 60825, are safe to use and therefore have no requirements for cautions or warnings during operation or maintenance procedures.

2.5.3 General RF Safety Information

Caution!

Excessive RF exposure can result in potentially adverse health effects. If it is suspected that RF exposure limits may be exceeded, ensure that transmitting antennas are switched off, or reduce output power while working with, or near, antennas.

Note: RF exposure limits are specified by national and international health authorities in standards, regulations or guidelines. The limits include wide safety margins to protect from potentially harmful tissue heating.

2.5.3.1 Safety Requirements for Installation and Maintenance Personnel

It is important that all personnel working with the installation and maintenance of transmitting equipment and antennas have basic knowledge regarding RF safety. They must have been informed or trained to be observant of potential risks of RF exposure exceeding specified safety limits, and be aware of precautionary measures necessary for differing situations.

Caution!

Do not stand or work in front of an operational antenna, unless it has been verified or documented that RF exposure levels are within specified safety limits.

Caution!

Always be aware of other RF transmission antennas located close to the antenna you will be working with. If the RF exposure level is unknown, contact the equipment operator or ensure that measurements are done to verify that levels are below specified safety limits before starting work.

Caution!

Broken or disconnected RF cables can lead to exposure levels reaching, or exceeding, specified safety limits. Repair or reconnect cables before starting work.

Note: The maximum RF exposure levels directly in front of MINI-LINK antennas do not exceed the limits for occupational exposure. For more information, see Section 2.2.2 on page 5.

3 System Overview

3.1 Introduction

MINI-LINK TN provides a platform for flexible, scalable and cost-effective wireless transmission. The system offers integrated traffic routing, PDH and SDH multiplexing as well as protection mechanisms on link and network level. The software configurable traffic routing minimizes the use of cables, improves network quality and facilitates control from a remote location.

The modular system enables new interface units to be added while in operation. This hot insertion of new plug-in units and automatic software upgrade ensures that traffic is operational during replacement and functional upgrade.

Configurations range from small end sites with one single radio terminal to large hub sites where all the traffic from a number of southbound links is aggregated into one link, microwave or optical, in the northbound direction.

A Network Element (NE) comprises two parts:

- Indoor part
- Outdoor part

The indoor part is described in Section 3.2 on page 14 and the outdoor part is described in the *MINI-LINK TN, MINI-LINK HC, MINI-LINK E Outdoor Installation Manual*.

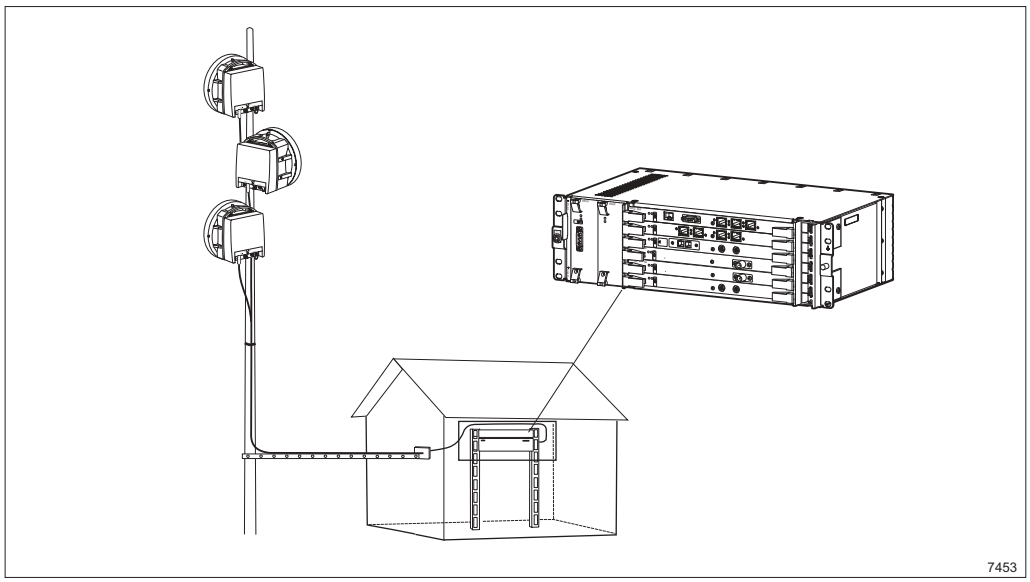

Figure 5 Indoor and outdoor parts

3.2 Indoor Part

The summary below introduces the standard types of indoor units, available in different versions further described in this section.

Access Module Magazine (AMM)	Houses the plug-in units and provides backplane interconnection of traffic, power and control signals.
Node Processor Unit (NPU)	Handles the system's main traffic and control functions. It also provides traffic and management interfaces.
Line Termination Unit (LTU)	A plug-in unit that provides PDH or SDH traffic interfaces.
Modem Unit (MMU)	The indoor part of a Radio Terminal. This plug-in unit determines the traffic capacity of the Radio Terminal.
Switch Multiplexer Unit (SMU)	Provides protection for the Radio Terminals. Alternatively it can be configured to interface MINI-LINK E equipment on the same site.
Power Filter Unit (PFU)	Filters the external power and distributes the internal power to the plug-in units via the backplane.
Fan Unit (FAU)	Provides cooling for the indoor part.

The interconnection between the outdoor part (radio units and antennas) and the indoor part is one coaxial cable per MMU carrying full duplex traffic, DC supply voltage, as well as operation and maintenance data.

3.2.1 AMM

The AMM houses the plug-in units and provides backplane interconnection of traffic, power and control signals. One plug-in unit occupies one slot in the AMM. The AMM fits into standard 19" or metric racks and cabinets. It is available in three sizes as described below.

3.2.1.1 AMM 2p

AMM 2p is suitable for end site and repeater site applications. It has two full-height slots and two half-height slots and it always houses one NPU2, one or two MMUs, and the optional LTU 12x2 and FAU4. The height of AMM 2p is 1U.

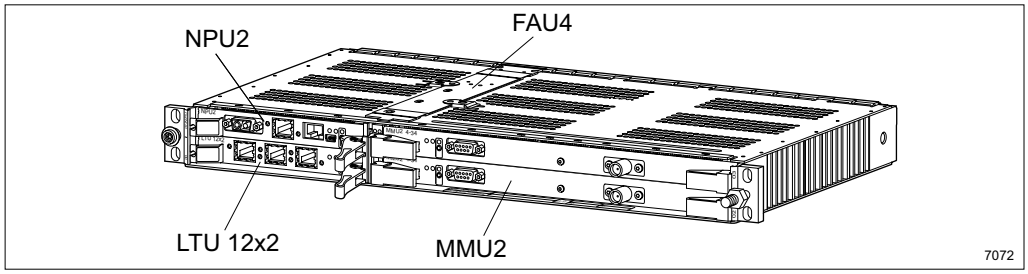

Figure 6 AMM 2p

3.2.1.2 AMM 6p

AMM 6p is suitable for medium size hub sites. It has six full-height slots and two half-height slots and it always houses one NPU 8x2, one PFU2 and one FAU2. The remaining slots are equipped with MMUs, SMUs and LTUs. The height of AMM 6p is 3U.

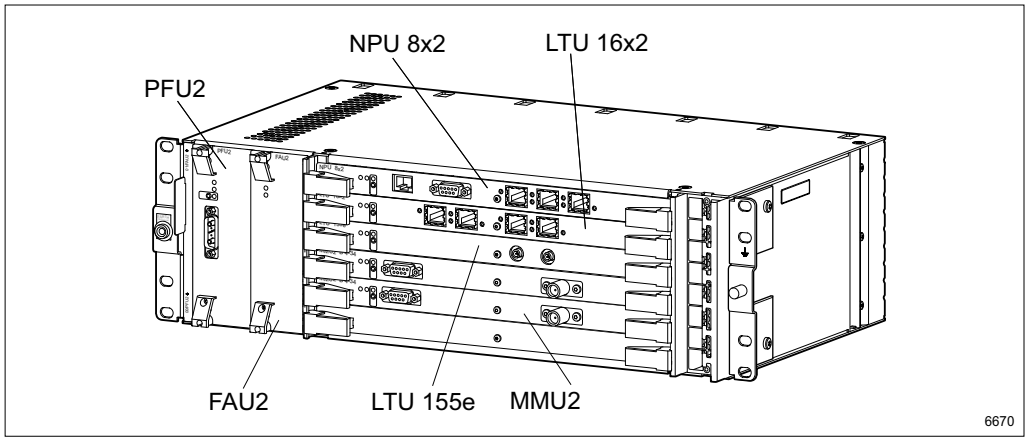

Figure 7 AMM 6p

3.2.1.3 AMM 20p

The AMM 20p is suitable for large size hub sites, for example at the intersection between the optical network and the microwave network. It has 20 full-height slots and two half-height slots and it always houses one NPU 8x2 and one PFU1. The remaining slots are equipped with MMUs, SMUs and LTUs and a PFU1 if redundant power supply is required.

A cable shelf is fitted directly underneath the AMM to enable neat handling of cables connected to the fronts of the plug-in units. An FAU1 is fitted on top of the AMM unless other forced air-cooling is provided. An air guide plate is fitted right above the FAU1. When fitted into a cabinet with fan unit, cable shelf and air guide plate, the total height of AMM 20p is 10U.

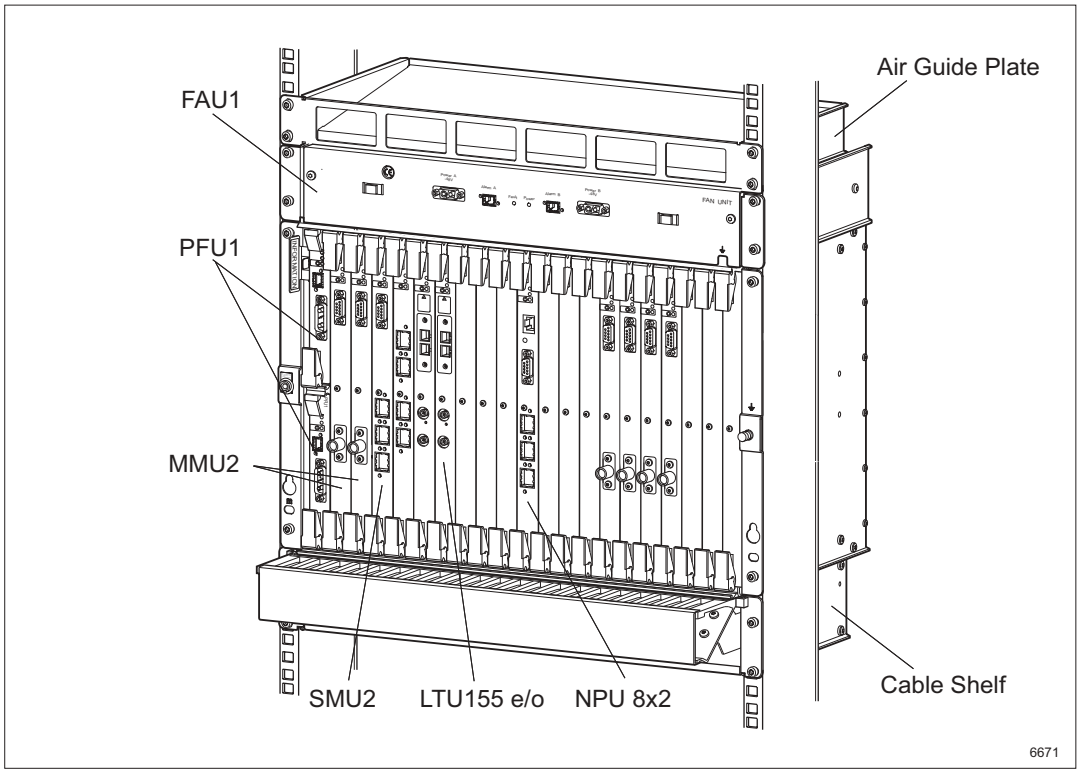

Figure 8 AMM 20p

3.2.2 NPU

The NPU holds the system's main traffic and control functions. One NPU is always required in the AMM. The NPU also provides E1, DCN and management interfaces.

3.2.2.1 NPU2

Fits in an AMM 2p. The external power supply is connected directly to the NPU2. It provides 4xE1 for traffic connection, USB interface for LCT connection and a 10/100BASE-T Ethernet interface. The Ethernet interface can be configured, using the LCT, to detect the type of cable used and be used for the optional features Ethernet Site LAN or Ethernet Traffic.

3.2.2.2 NPU 8x2

Fits in an AMM 6p and AMM 20p. It provides 8xE1 for traffic connection, 10BASE-T Ethernet interface for LCT connection, three User Input and three User Output ports.

3.2.3 LTU

The LTUs are used to connect traffic from external PDH or SDH equipment.

3.2.3.1 LTU 12x2

Fits in an AMM 2p. For sites where the four E1 interfaces on the NPU2 are insufficient, the LTU 12x2 provides 12 additional E1 interfaces.

3.2.3.2 LTU 16x2

Fits in an AMM 6p and AMM 20p. For sites where the eight E1 interfaces on the NPU 8x2 are insufficient, the LTU 16x2 provides 16 additional E1 interfaces.

3.2.3.3 LTU 155e

Fits in an AMM 6p and AMM 20p. Provides one electrical STM-1 interface.

3.2.3.4 LTU 155e/o

Fits in an AMM 6p and AMM 20p. Provides one optical or one electrical STM-1 interface.

3.2.4 MMU2

The MMU2 is the indoor part of a Radio Terminal determining the traffic capacity (4 to 34 Mbit/s). It is denoted MMU2 4–34 or similar, where in this case 4–34 implies a software configurable traffic capacity of 4 to 34 Mbit/s.

A protected (1+1) Radio Terminal requires two MMU2 units and one SMU2. Local management is mainly done using MSM, which is launched from the EEM.

3.2.5 SMU2

The SMU2 provides either 1+1 radio protection or co-siting features for MINI-LINK E equipment, depending on how the unit is configured. It has one O&M connector, one DIG SC connector (2x64 kbit/s) for IP DCN connection, and also one E1 and one E2/E3 connector for co-siting with MINI-LINK E equipment.

3.2.6 PFU

The PFU is connected to the external power supply, which is filtered and distributed to the plug-in units via the backplane.

3.2.6.1 PFU1

Fits in AMM 20p. Two PFU1 units connected to separate power supply sources provide power redundancy.

3.2.6.2 PFU2

Fits in AMM 6p.

3.2.7 FAU

The FAU provides cooling for the AMM and plug-in units and has redundant fans.

3.2.7.1 FAU1

The unit is fitted directly above the AMM 20p.

3.2.7.2 FAU2

The unit is fitted in the AMM 6p.

3.2.7.3 FAU4

The unit is fitted in the AMM 2p.

3.3 Management

Below follows a summary of the tools used to manage a MINI-LINK TN network.

3.3.1 EEM

The element management function is implemented as an Embedded Element Manager (EEM) application, accessed using a standard web browser. For local management a Local Craft Terminal (LCT) is used, that is the EEM is accessed locally by connecting a PC to the NPU, with a crossed Ethernet cable (NPU 8x2) or a USB cable (NPU2). The EEM can also be accessed over the site LAN or remotely over the DCN.

Local management of Radio Terminals is partly done with MSM, which is launched from the EEM.

3.3.2 CLI

A Command Line Interface (CLI) is provided for advanced IP router configuration and troubleshooting. It is similar to Cisco's industry standard router configuration and is accessed from a Command Prompt window using telnet.

3.3.3 MINI-LINK Manager

Remote management is typically done using MINI-LINK Manager, the network management tool for all MINI-LINK products. The EEM is launched from MINI-LINK Manager for access of a single NE.

Each NE provides an SNMP agent enabling easy integration with any other SNMP based management system.

3.3.4 MINI-LINK Connexion

This application provides a way to provision end-to-end E1 connections in a MINI-LINK TN network.

4 Preparations

This section contains information on power supply requirements, tools and equipment necessary for the indoor installation. It also gives an overview of units and accessories.

4.1 Power Supply Requirements

This section gives information on power supply requirements, fusing and cable lengths.

Note: The fuses stated are based on a fully equipped AMM.

4.1.1 Power Supply Data

Input DC Voltage: –48 V nominal (–40.5 V to –57 V including tolerances).
See marking on the units for information.

Note: If only +24 V DC is available, a PSU DC/DC Kit can be used to convert +24 V DC to –48 V DC. See separate instruction for PSU DC/DC Kit.

Caution!

The equipment must be supplied from a double/reinforced SELV source (class II).

4.1.2 Requirements for Fusing an AMM 20p Configuration with ICF1

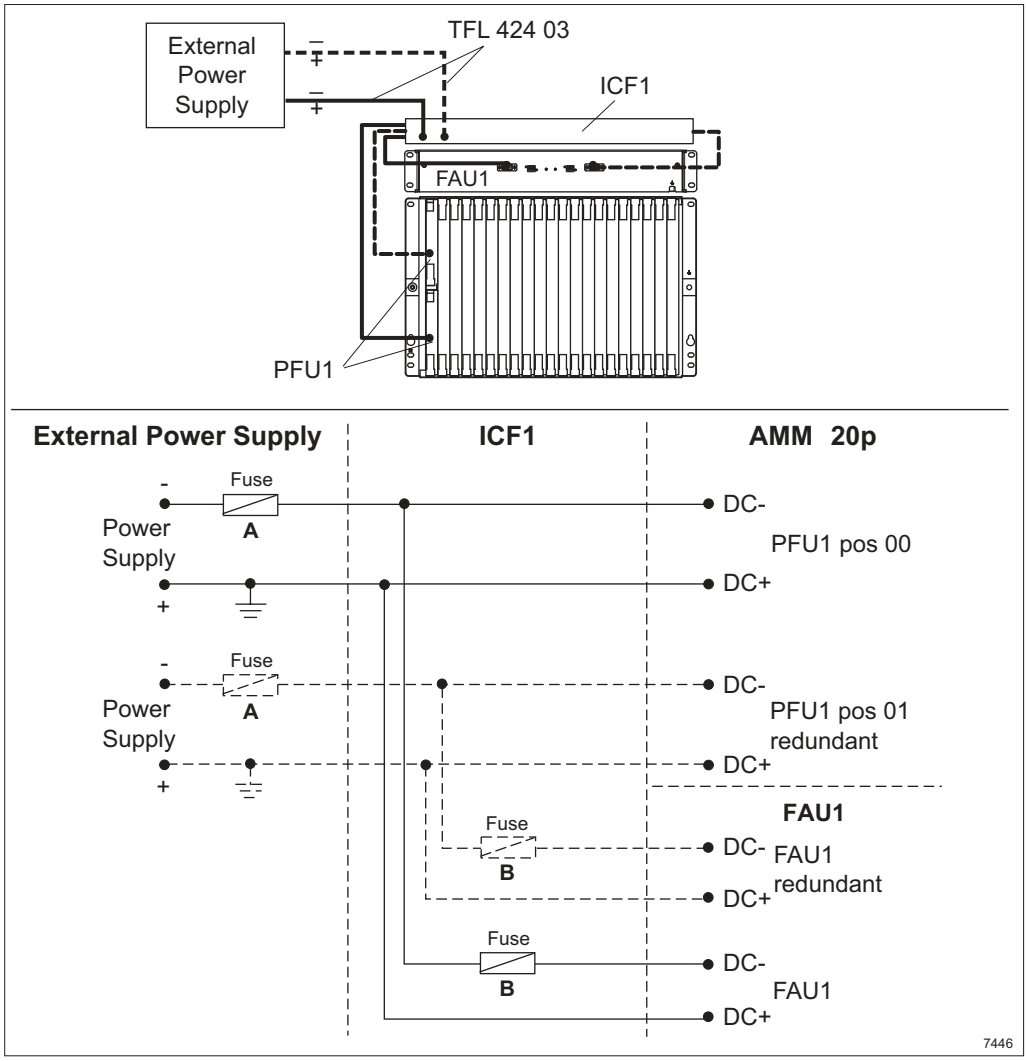

Figure 9 Fusing an AMM 20p configuration with ICF1

Note: Each power supply must have its own fuse.

4.1.2.1 Recommended Fuses and Cable Lengths

External Power Supply

- Fuse **A**: 30 A circuit breaker with electro-magnetic over-current release certified according to IEC 60934 or IEC 60947-2 for a DC voltage of minimum 80 V. Maximum length for cable TFL 424 03 is 20 meters.

ICF1

- Fuse **B**: 3.15 A minimum 100 V DC of type T with high breaking capacity according to IEC 60127, or equivalent.

4.1.3 Requirements for Fusing an AMM 20p Configuration without ICF1

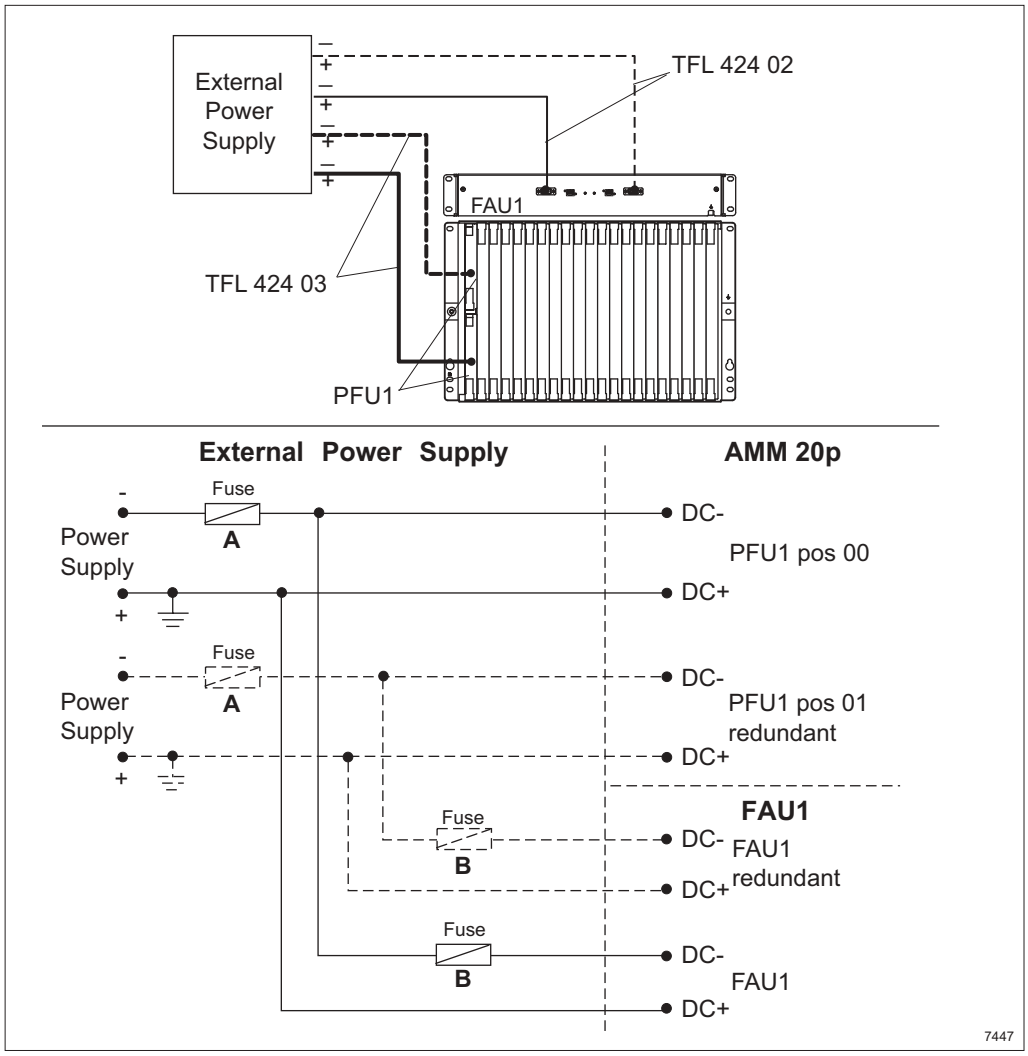

Figure 10 Fusing an AMM 20p configuration without ICF1

Note: Each power supply must have its own fuse.

4.1.3.1 Recommended Fuses and Cable Lengths

External Power Supply

- Fuse **A**: 30 A circuit breaker with electro-magnetic over-current release certified according to IEC 60934 or IEC 60947-2 for a DC voltage of minimum 80 V. Maximum length for cable TFL 424 03 is 20 meters.

- Fuse **B**: 3.15 A minimum 100 V DC of type T with high breaking capacity according to IEC 60127, or equivalent. Maximum length for cable TFL 424 02 is 20 meters

4.1.4 Requirements for Fusing an AMM 6p Configuration

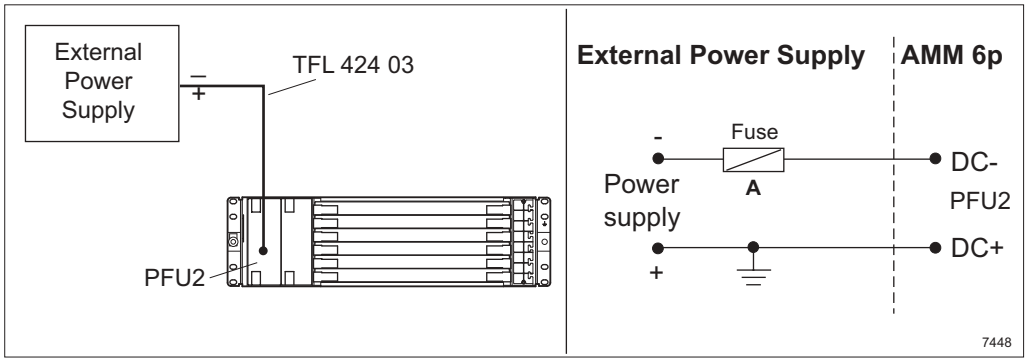

Figure 11 Fusing an AMM 6p configuration

Note: Each power supply must have its own fuse.

4.1.4.1 Recommended Fuses and Cable Lengths

External Power Supply

- Fuse **A**: 10 A circuit breaker with electro-magnetic over-current release certified according to IEC 60934 or IEC 60947-2 for a DC voltage of minimum 80 V. Maximum length for cable TFL 424 03 is 20 meters.

4.1.5 Requirements for Fusing an AMM 2p Configuration

Note: AMM 2p equipped with MMU2 can only be supplied by –48 V DC. However, future MMU releases will support +24 V DC. NPU2 and LTU 12x2 can be supplied by +24 V DC today.

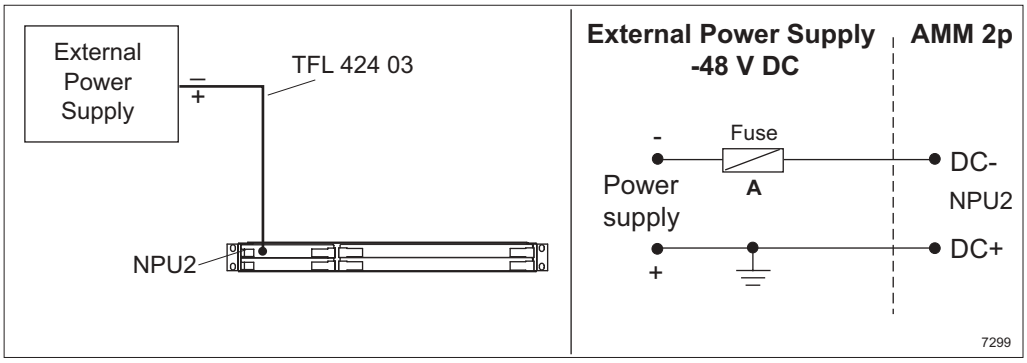

Figure 12 Fusing an AMM 2p –48 V DC configuration

Note: Each power supply must have its own fuse.

4.1.5.1 Recommended Fuses and Cable Lengths

External Power Supply

- Fuse **A**: 6 A circuit breaker with electro-magnetic over-current release certified according to IEC 60934 or IEC 60947-2 for a DC voltage of minimum 80 V. Maximum length for cable TFL 424 03 is 20 meters.

4.2 Tools and Equipment

The following tools and equipment are required for installation of the units and accessories.

4.2.1 Indoor Installation of AMM and Accessories

Table 2 Installation tools and equipment

Tools/Equipment	Dimension or Type
Metric combination wrench	13 mm
Torx screwdriver	TX 8 (M3), TX 20 (M5) and TX 30 (M6)
Antistatic bracelet	–
Cutting pliers	–
Crosshead screwdriver (Phillips or Pozidriv)	–

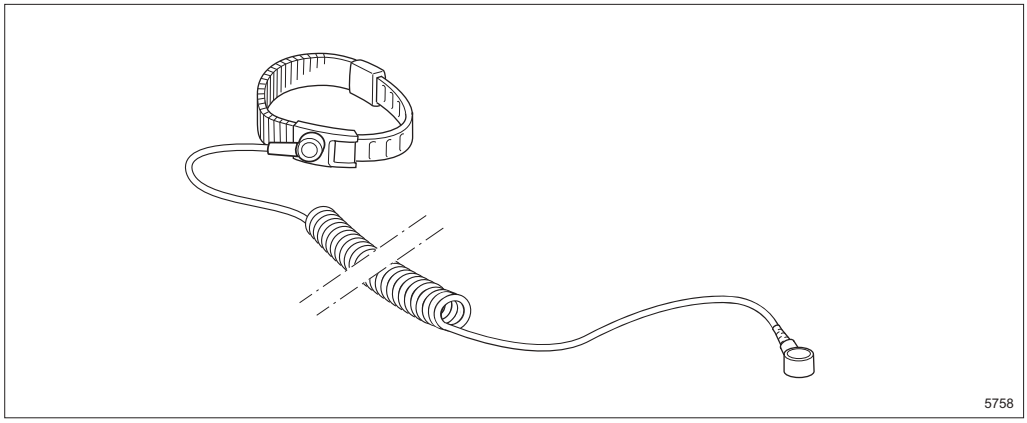

Figure 13 Antistatic bracelet

4.2.2 Indoor Cabling

Table 3 Installation tools

Tool	Dimension or Type
Torx screwdriver	TX 8 (M3)
Cutting pliers	–
Knife	–
Crosshead screwdriver (Phillips or Pozidriv)	–
Slotted screwdriver	–
DC connector crimping tool	LSD 319 80
Pin extraction tool for DC wires	LSY 141 12

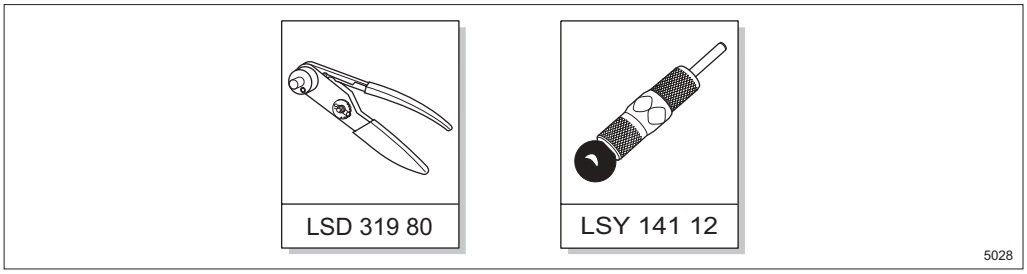

Figure 14 DC connector crimping tool and pin extraction tool for DC wires

4.2.3 Balanced Traffic Cable and Signal Cables

Table 4 Tools and equipment

Tool	Dimension or Type
Terminating tool for IDC D-sub connectors	LSD 319 83
Pin extraction tool for IDC D-sub connectors	LSY 120 10/1
Crimping tool for pair cable braid	LSD 319 85/3

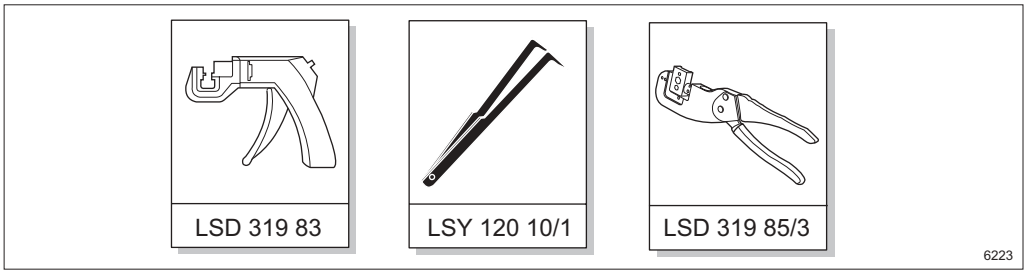

Figure 15 Additional tools for the 9-pin, 15-pin and 25-pin D-sub connectors

4.2.4 Unbalanced Traffic Cables

Table 5 Tools and equipment

Tool	Dimension or Type
Crimping tool for outer conductor	LSD 319 85/3
Crimping tool for the center conductor (SMZ)	LSD 319 86/1
Combination wrench (SMZ)	8 mm
Torque wrench (SMZ)	9 mm

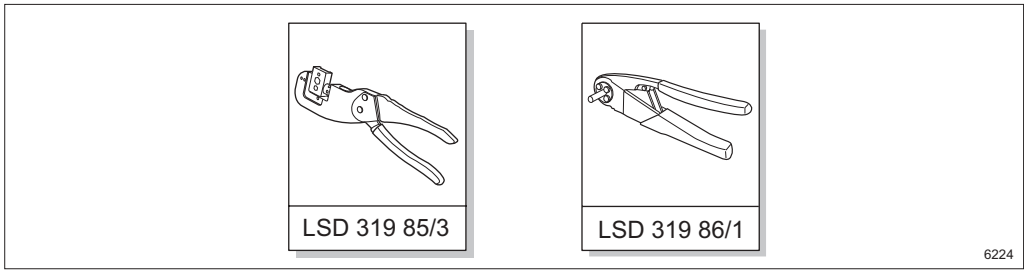

Figure 16 Additional tools for the SMZ connector

4.2.5 Initial Setup

Table 6 Tools and equipment

Tool	Dimension or type
Station radio cable	See Section 6.2 on page 56
LCT (Local Craft Terminal)	–
MINI-LINK Service Manager (MSM)	–
Ethernet cable	See Section 6.2 on page 56 or Section 8.1 on page 86
USB cable	See Section 10.1 on page 112

4.2.6 Radio Cabling

Table 7 Tools and equipment

Tool	Dimension or Type
Two metric combination wrenches	13 mm
Metric combination wrench	18 and 19 mm
Cable jacket cutter	LTX 102 17
Knife	
Cutting pliers	
Digital multimeter	

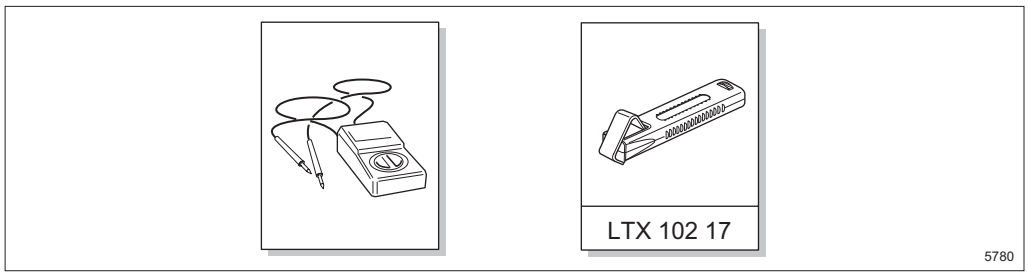

Figure 17 Digital multimeter and cable jacket cutter

Tools required for assembling and preparing the radio cable are not included in the list above. See separate instruction included with the connector kit.

4.2.7 Functional Test

See Section 16 on page 163 for the required equipment.

4.3 Identification

This section describes how to identify the units using the identification labels.

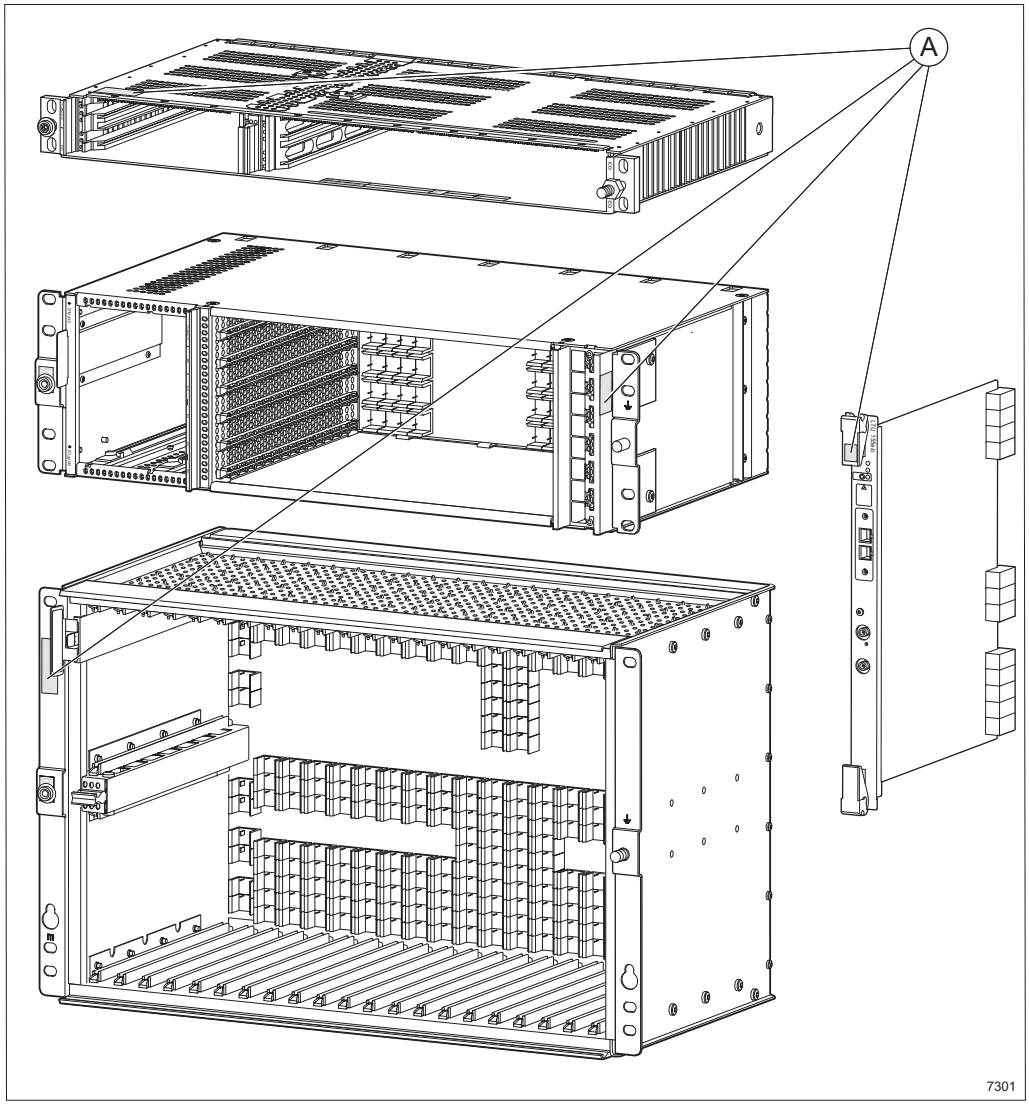

Figure 18 The identification label and its position

The label **A** on the unit is used for product identification. It contains the product number (ordering code), revision state, manufacturing date and other information. The label is positioned on the cardboard box and on the unit. Check the product numbers on the labels and compare them with the site installation documentation from the design department to make sure you have received the correct equipment.

4.4 Units and Accessories

This section gives an overview of the units used for each type of AMM, common units and accessories.

4.4.1 AMM 20p

4.4.1.1 AMM 20p-10 Kit

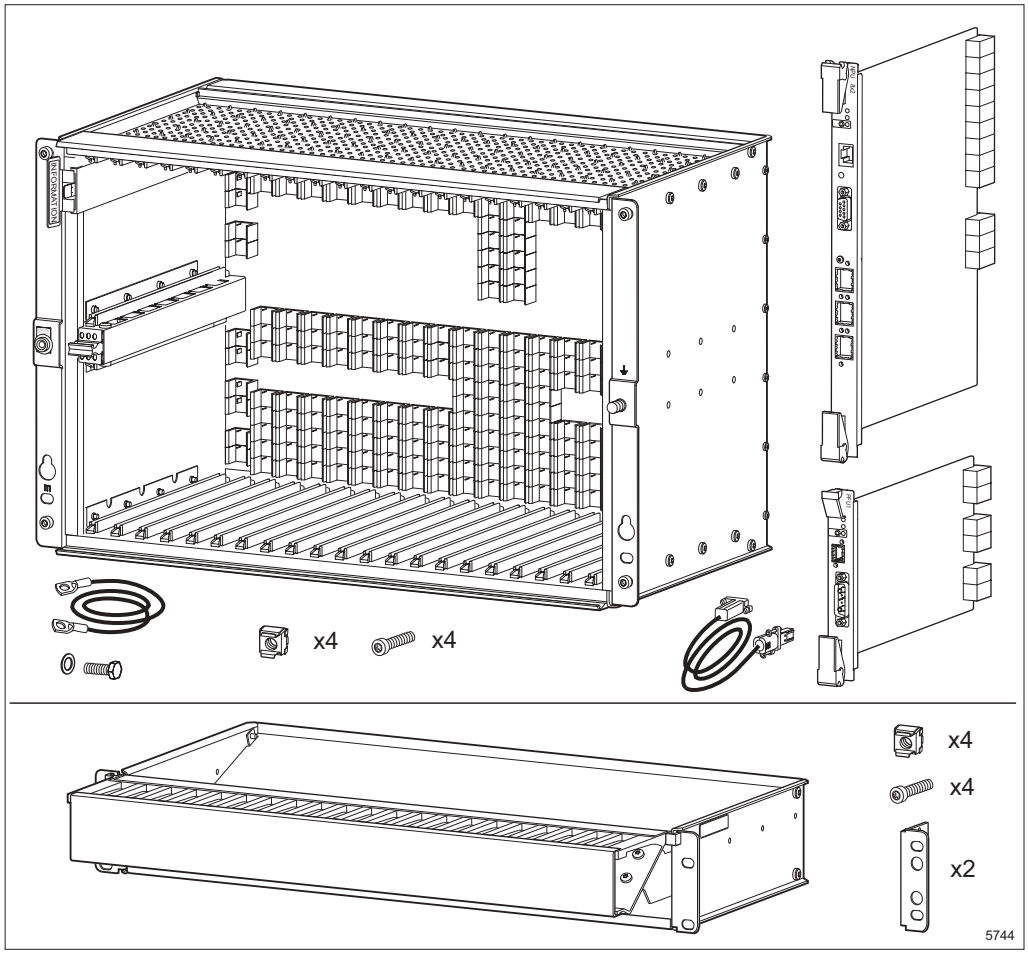

Figure 19 Items included in the AMM 20p-10 kit

The DC power supply connector kit must be ordered separately.

4.4.1.2 Fan Unit (FAU1)

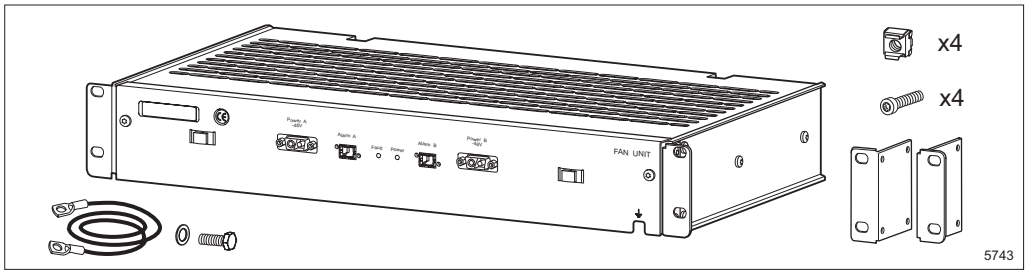

Figure 20 Items included with the fan unit

The DC power supply connector kit(s) must be ordered separately.

4.4.1.3 Air Guide Plate

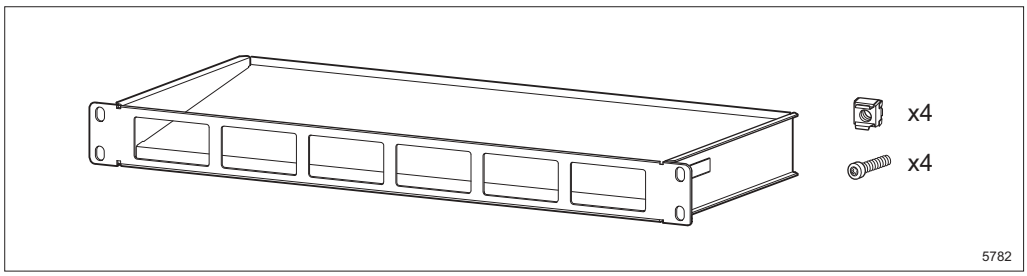

Figure 21 Items included with the air guide plate

4.4.1.4 Interface Connection Fields (ICF1)

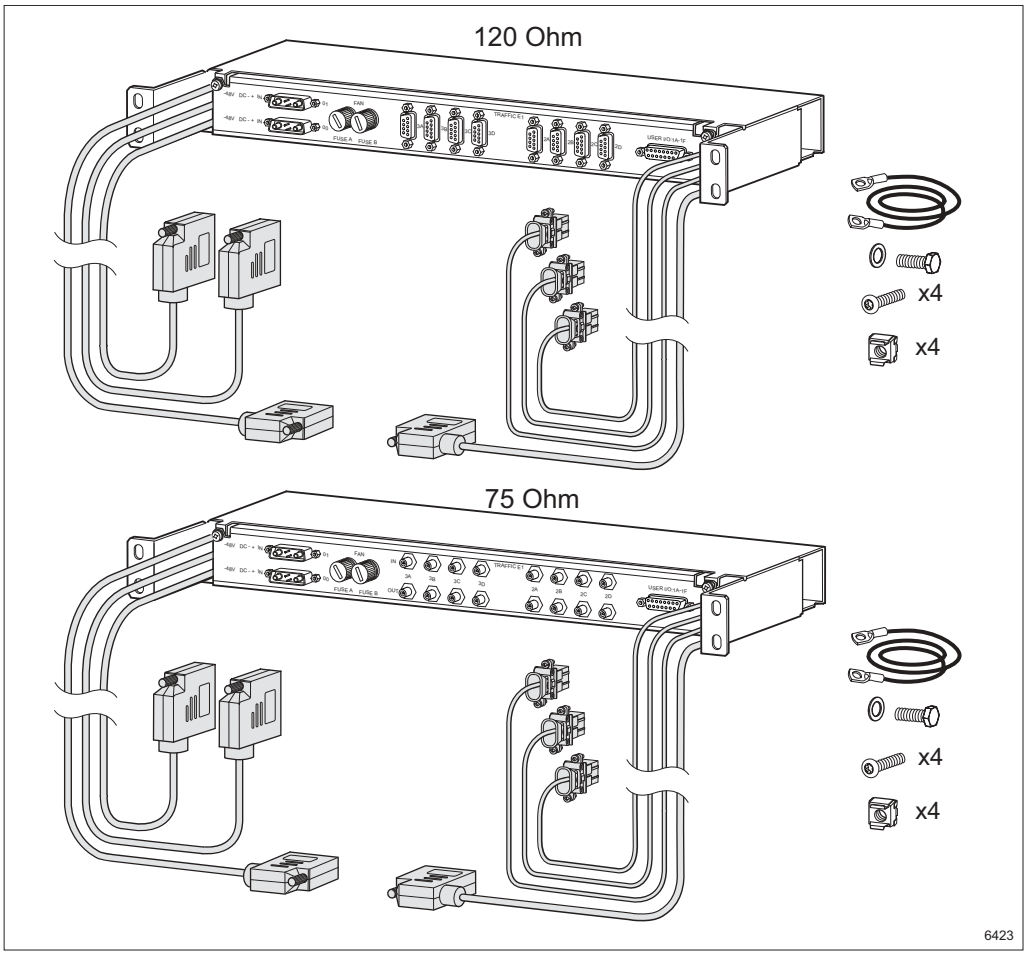

Figure 22 Items included with the Interface Connection Fields (ICF1)

Two DC power supply connector kits are included in the delivery. Power supply cables and traffic connectors (9-pin D-sub or SMZ) must be ordered separately.

4.4.2 AMM 6p

4.4.2.1 AMM 6p Kit

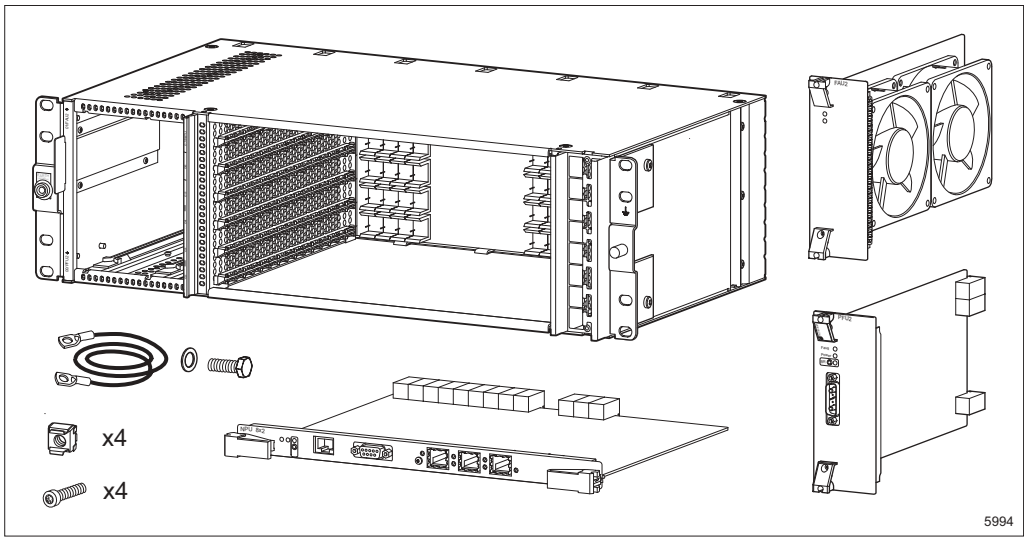

Figure 23 Items included in the AMM 6p kit

The DC power supply connector kit must be ordered separately.

4.4.2.2 Interface Connection Fields (ICF2)

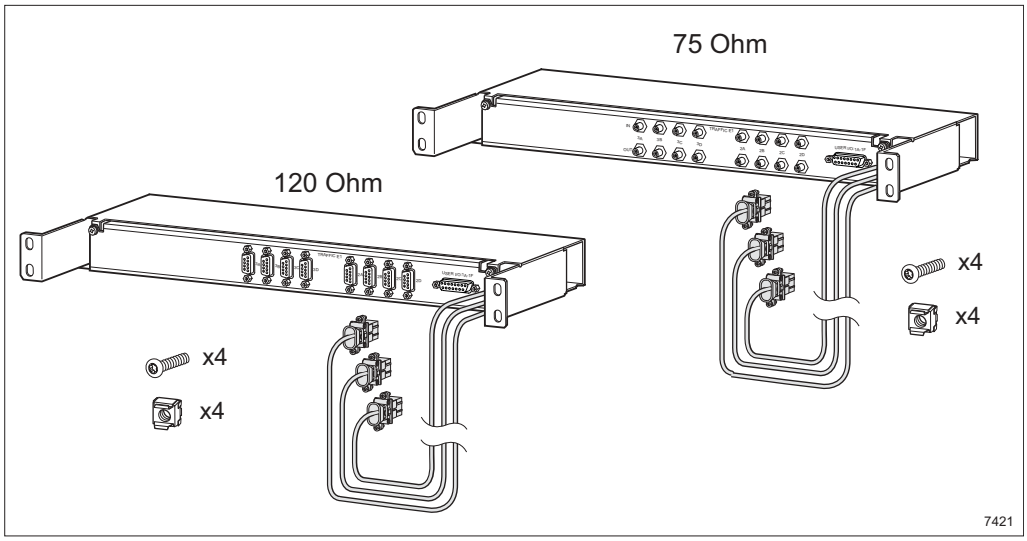

Figure 24 Items included with the Interface Connection Fields (ICF2)

Traffic connectors (9-pin D-sub or SMZ) must be ordered separately.

4.4.3 AMM 2p

4.4.3.1 AMM 2p Kit

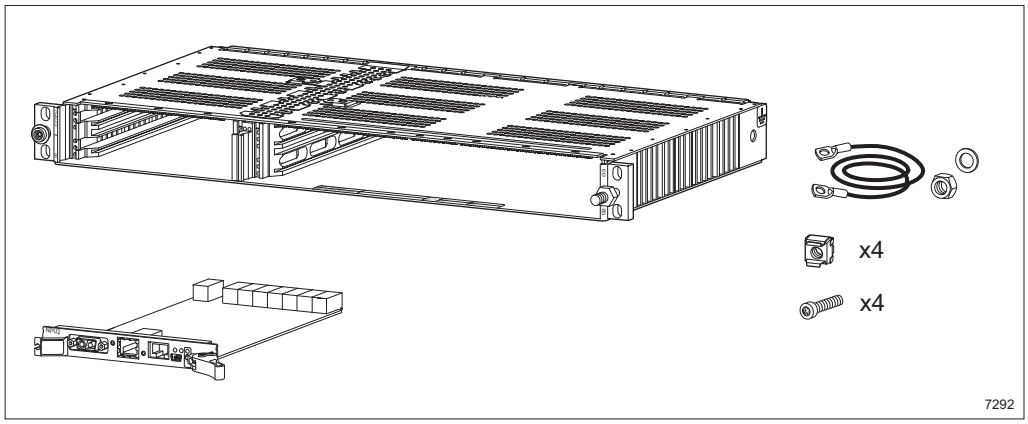

Figure 25 Items included in the AMM 2p kit

The DC power supply connector kit must be ordered separately.

4.4.3.2 Fan Unit (FAU4)

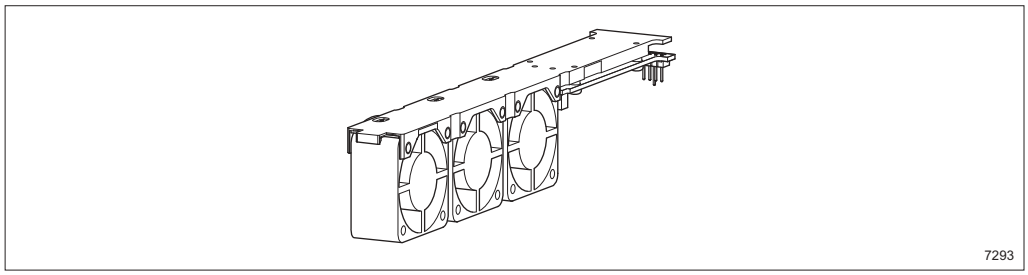

Figure 26 The fan unit (FAU4)

4.4.4 Common Units and Accessories

4.4.4.1 Plug-in Units and Dummy Units

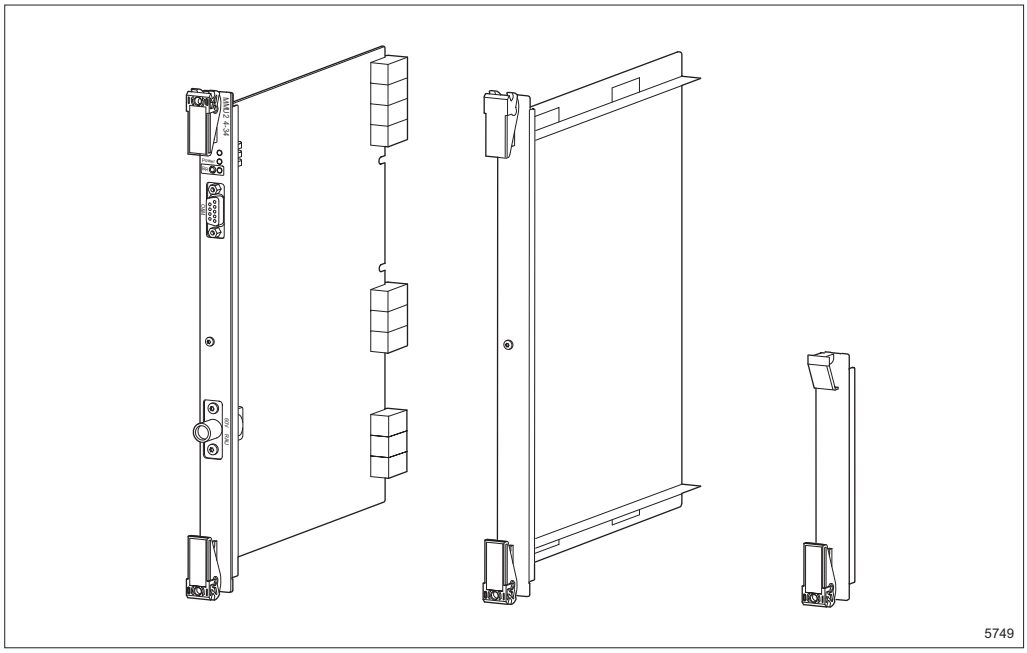

Figure 27 Example of plug-in units and dummy units

4.4.4.2 Radio Cable Panel (Optional)

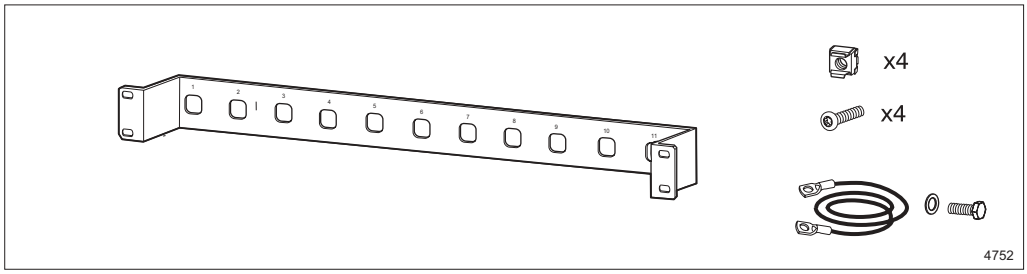

Figure 28 Items included with the radio cable panel

4.4.4.3 Interface Connection Fields (ICF 16x2)

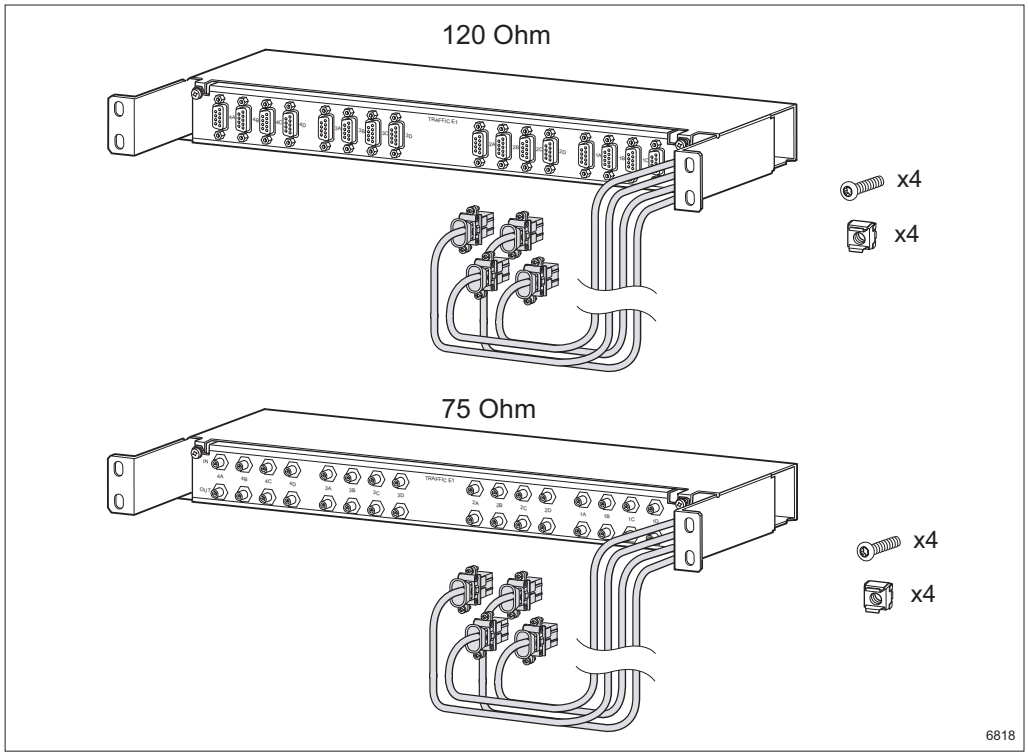

Figure 29 Items included with the Interface Connection Fields (ICF 16x2)

Traffic connectors (9-pin D-sub or SMZ) must be ordered separately.

4.4.4.4 PSU DC/DC Kit

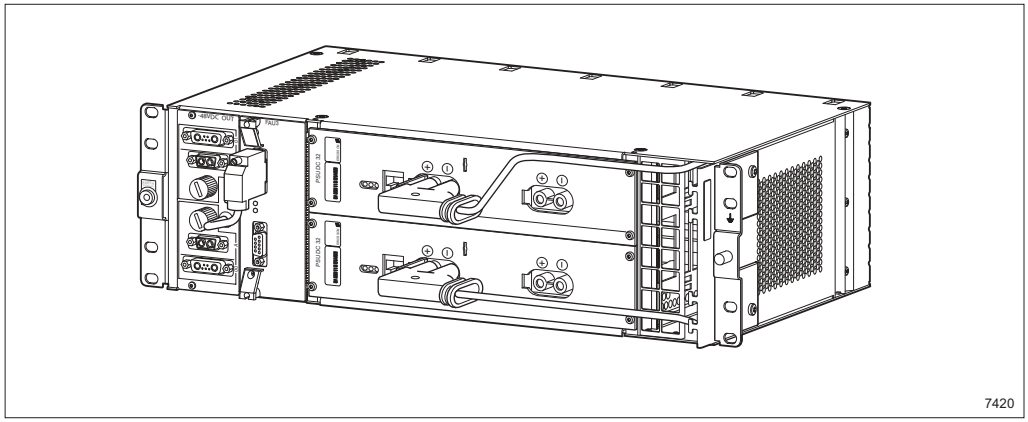

Figure 30 PSU DC/DC Kit

The Power Supply Unit (PSU) DC/DC Kit converts +24 V DC to –48 V DC and is used in AMM 6p and AMM 20p configurations. It is not described in this manual. See *PSU DC/DC Kit Installation Instruction* for information on included parts.

4.4.4.5 Radio Cable Items

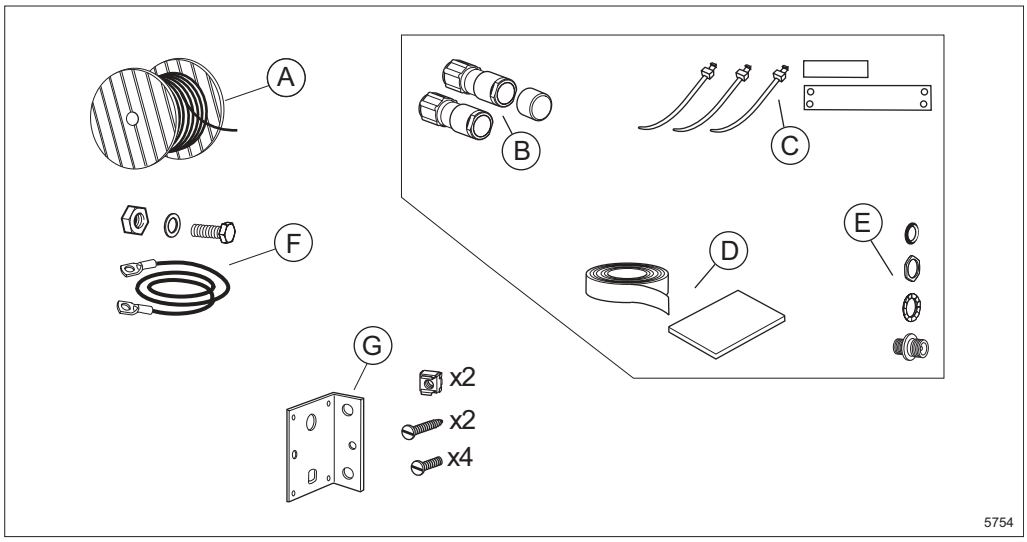

Figure 31 Required items for the radio cabling

Description

A Radio cable

B Connectors(1)

C Marking tape, marking tag and straps(1)

D Sealing compound and tape(1)

E Radio cable adapter(1)

F Earthing kit for mounting bracket

G Mounting bracket kit

(1) Included in the connector kits. The connector kit for Ø16 mm (1/2") and Ø28 mm (7/8") also contains a jumper cable.

5 Installing an AMM 20p Configuration

This section describes a recommended installation procedure for an AMM 20p configuration in a 19” rack or cabinet.

Installation Procedure

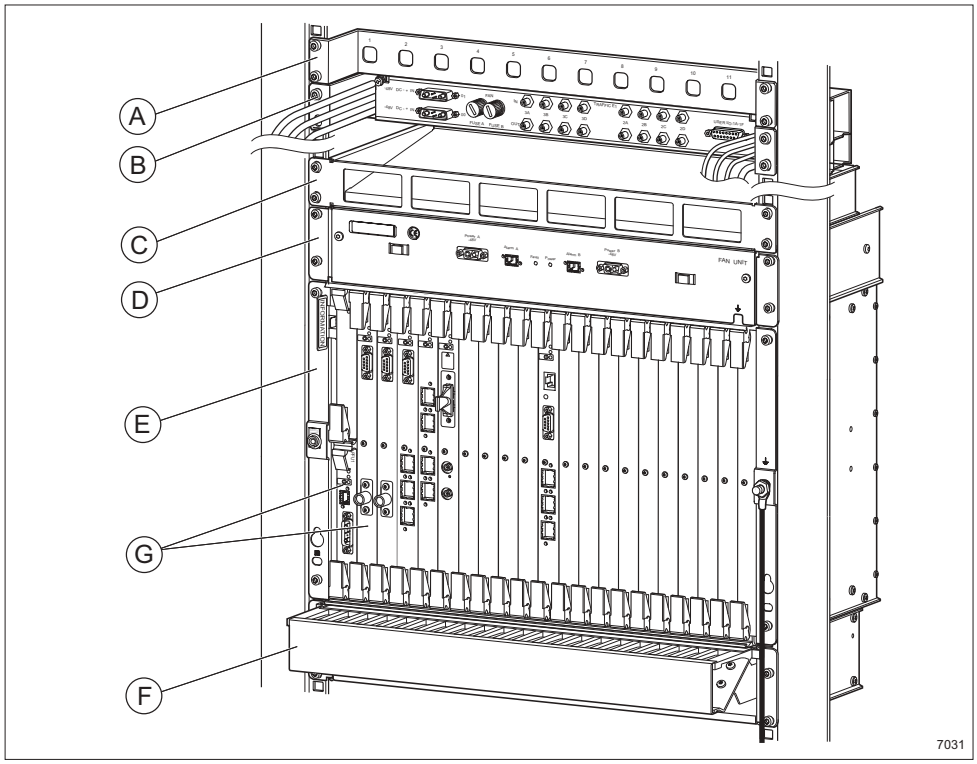

Figure 32 Overview of the indoor installation procedure for a rack or cabinet

Step 1 Make sure all required tools, units and accessories are available, see Section 4 on page 21.

Step 2 Optional: Fit the radio cable panel **A**, see Section 11.1 on page 121.

Step 3 Optional: Install the ICF **B**, see Section 11.3 on page 124.

Step 4 Fit the air guide plate **C**, see Section 5.1 on page 40.

Step 5 Install the FAU1 **D**, see Section 5.2 on page 41.

Step 6 Install the AMM **E**, see Section 5.3 on page 45.

Step 7 Fit the cable shelf **F**, see Section 5.4 on page 47.

Step 8 Insert the plug-in units **G**, see Section 5.5 on page 49.

5.1 Fitting the Air Guide Plate

This instruction describes how to fit the air guide plate. It fits into 19” and metric racks.

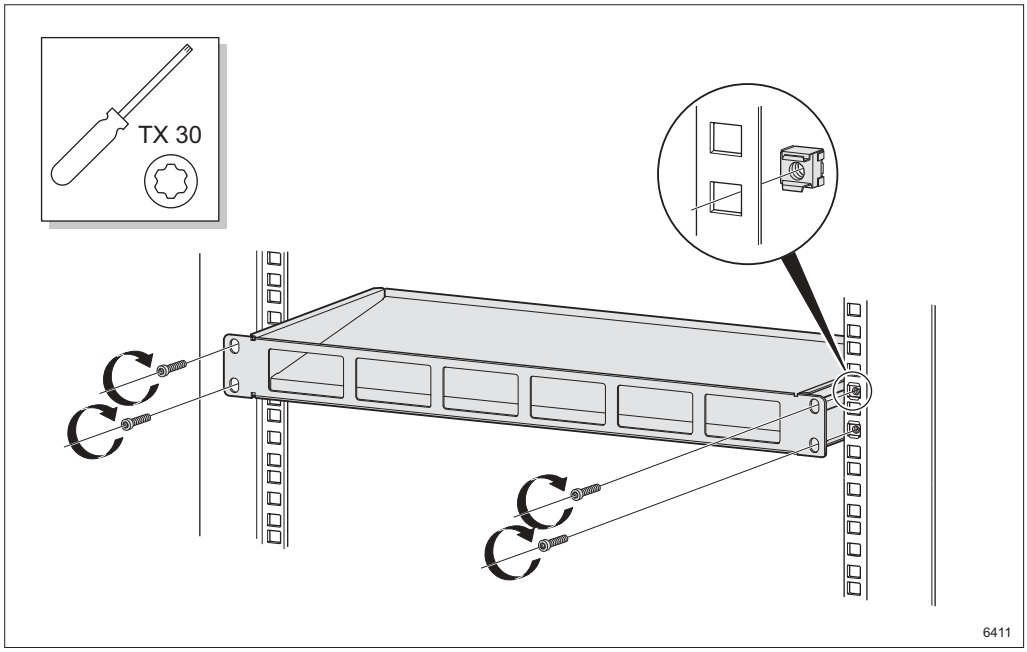

Figure 33 Fitting the air guide plate

1. Fit the four captive nuts to the rack.
2. Fit the air guide plate to the rack and tighten the screws.

5.2 Installing the Fan Unit (FAU1)

This instruction describes how to install the fan unit (FAU1) for AMM 20p. It fits into 19” and metric racks.

5.2.1 Cooling Arrangement

Caution!

Insufficient cooling may shorten the useful life of the equipment. Be sure always to use the required fan unit.

Note: No fan unit is required if the indoor location has forced cooling through the magazine with an airflow of at least 130 m^3/h and the temperature of the incoming air is less than 45°C.

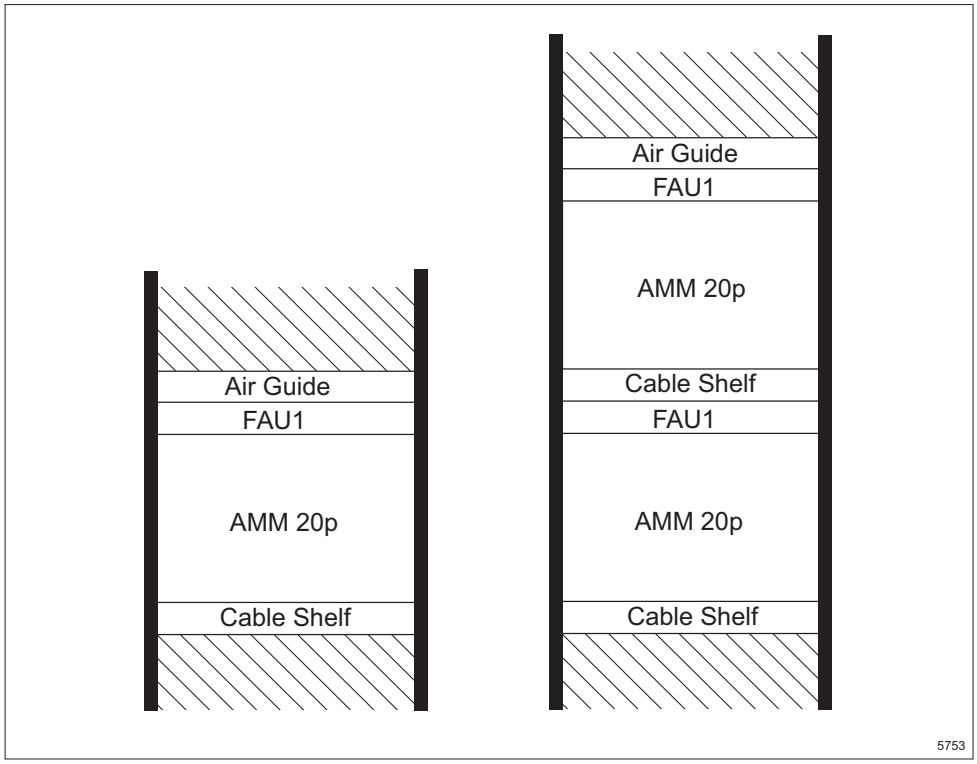

Figure 34 Cooling arrangements for AMM 20p

The FAU1 can provide cooling for one fully equipped AMM 20p and it should always be positioned directly above the AMM.

The rack should have free space around it.

5.2.2 Grounding the FAU1

Caution!

The FAU1 must be grounded.

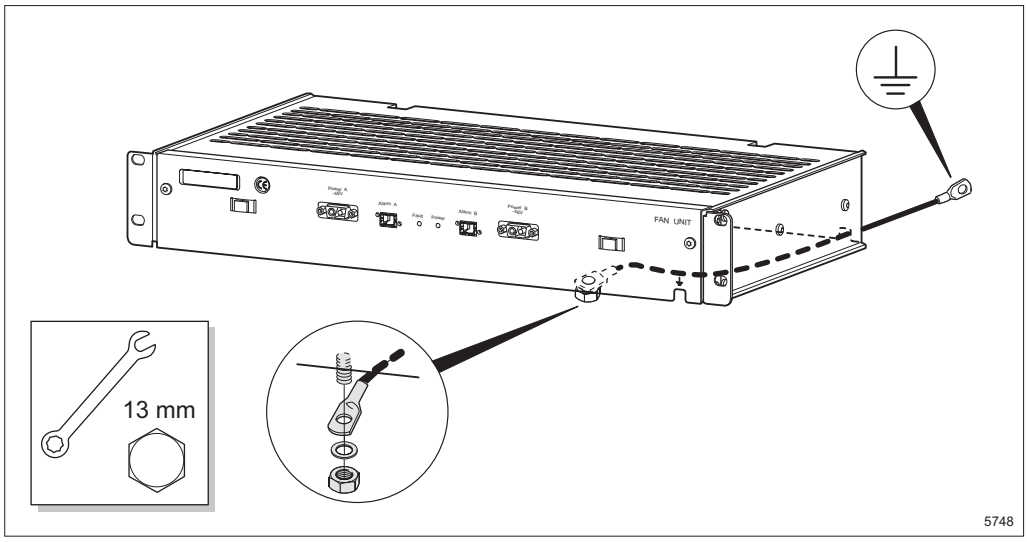

Figure 35 Fitting the earthing cable to the FAU1

1. Insert the earthing cable into the FAU1. The earthing cable can be inserted in two different ways, through a hole in the front or at the back.
2. Connect and tighten the earthing cable inside the FAU1.
3. Connect the other end of the earthing cable to protective earthing via station ground.

5.2.3 Preparing for Installation in a Metric Rack (Optional)

The FAU1 is equipped with fixing brackets for 19” rack installation on delivery. Follow the instruction below to prepare FAU1 for installation in a metric rack.

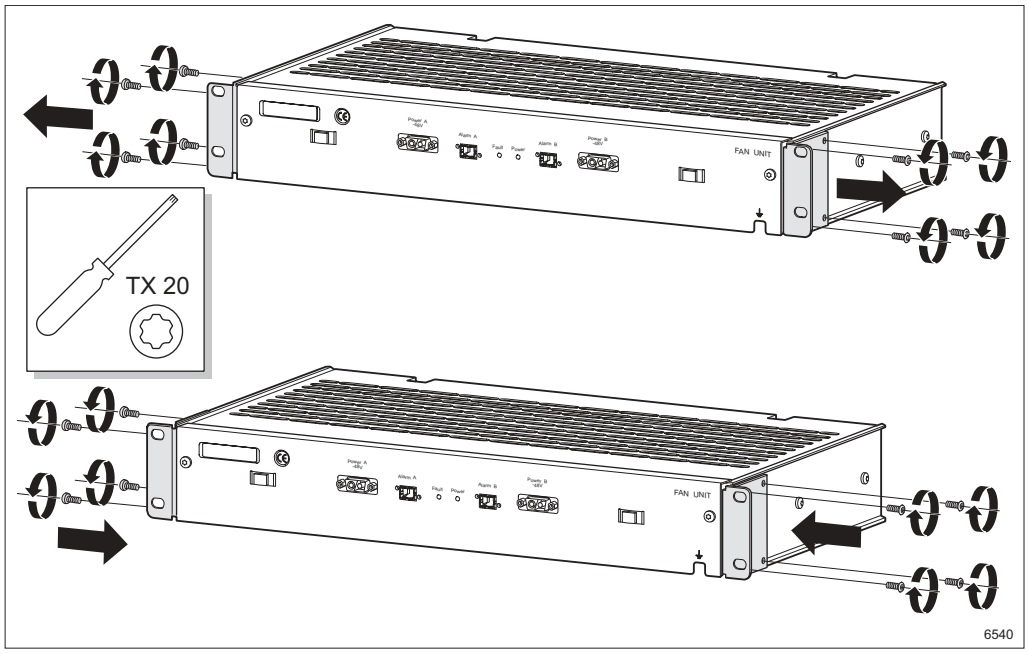

Figure 36 Replacing the 19” fixing brackets with metric fixing brackets

4. Remove the 19” fixing brackets by undoing the eight screws.

5. Fit the metric fixing brackets and tighten the screws.

   Note: There are two metric fixing brackets included, one left and one right version. Make sure to fit them as shown in Figure 36 on page 43.

5.2.4 Fitting the FAU1

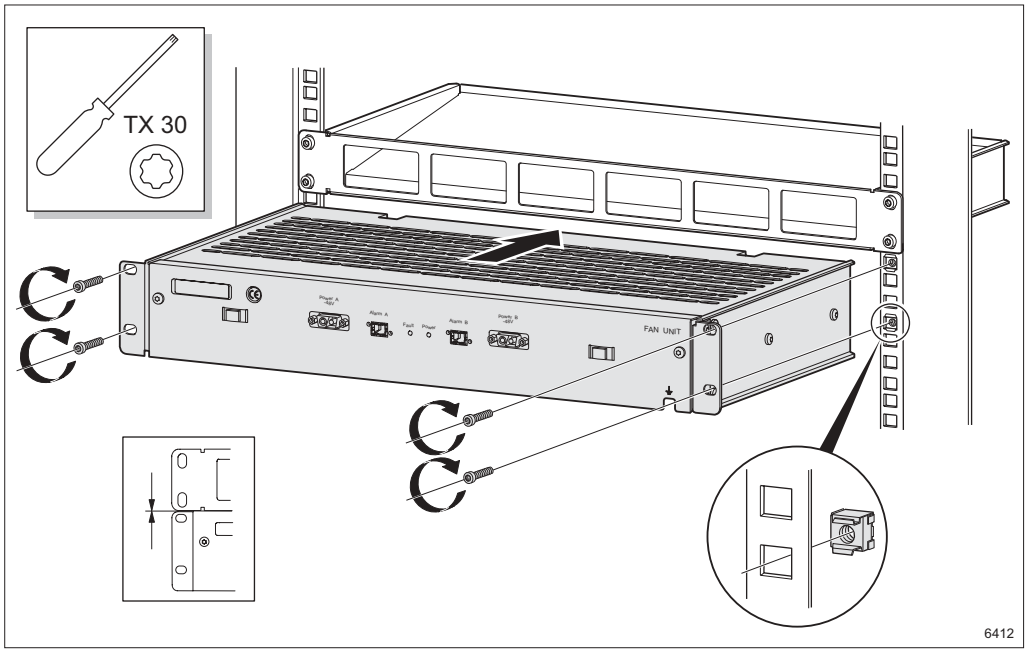

Figure 37 Fitting the FAU1

6. Fit the four captive nuts to the rack.
7. Fit the FAU1 to the rack directly under the air guide plate and tighten the screws.

5.3 Installing the AMM 20p

This instruction describes how to install the AMM 20p. It fits into 19” and metric racks.

5.3.1 Fitting the AMM 20p

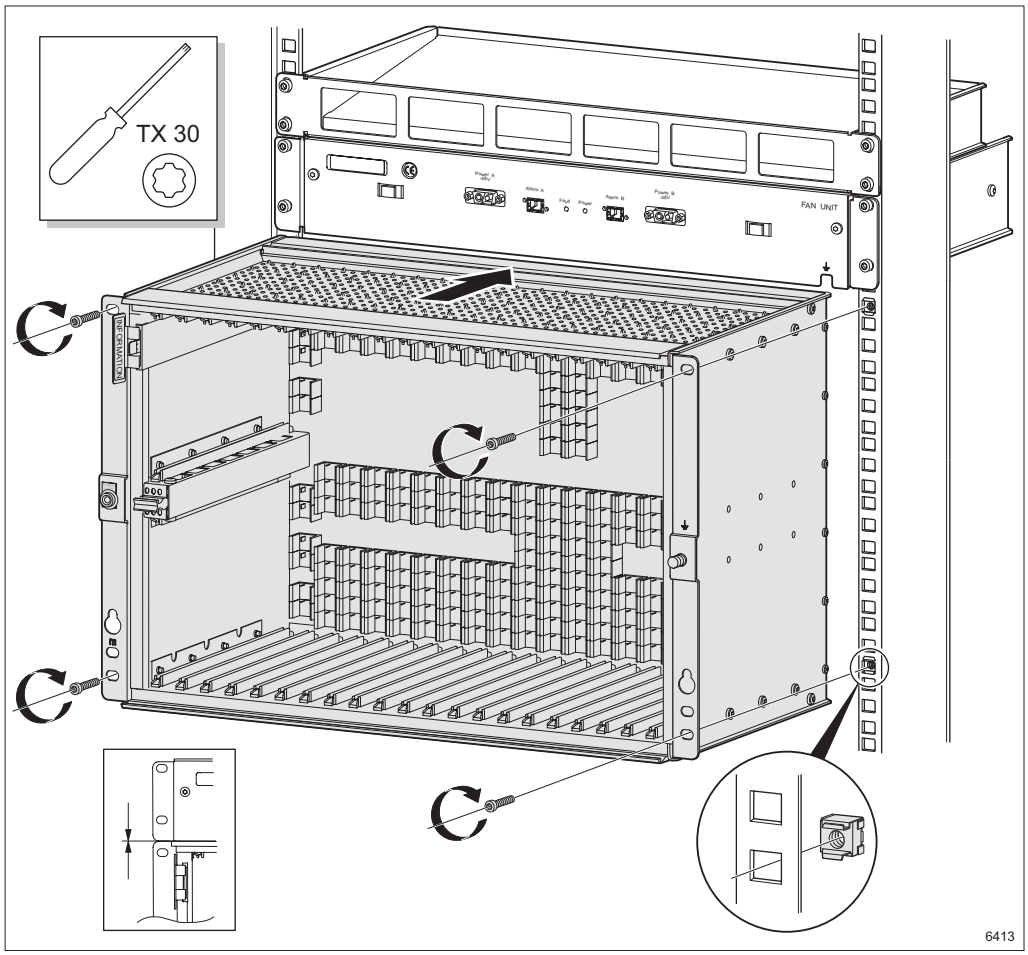

Figure 38 Fitting the AMM 20p

1. Fit the four captive nuts to the rack.
2. Fit the AMM in the rack directly under the FAU1 and tighten the screws.

5.3.2 Grounding the AMM 20p

Caution!

The AMM must be grounded.

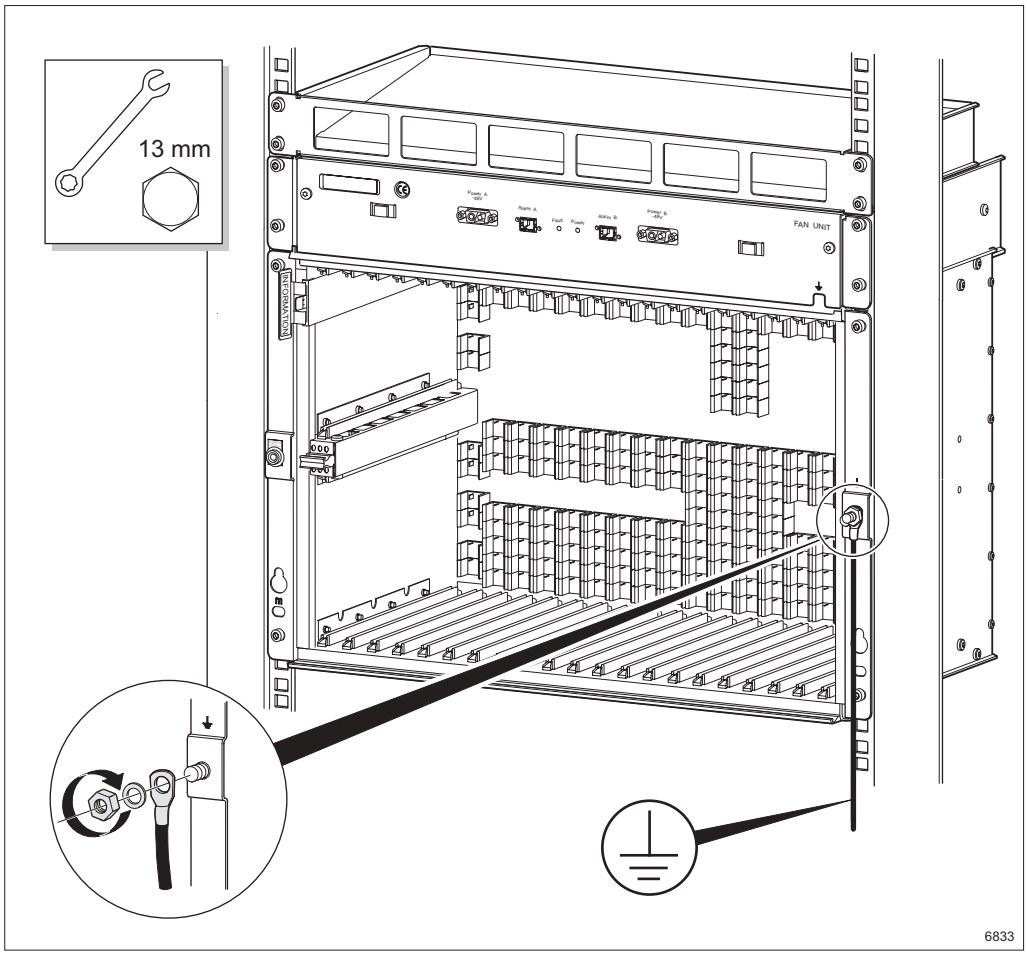

Figure 39 Grounding the AMM 20p

3. Connect and tighten the earthing cable to the AMM.
4. Connect the other end of the earthing cable to protective earthing via station ground.
5. The NPU 8x2 and PFU1 plug-in units, included in the AMM delivery, are fitted after all units are installed in the rack. See Section 5.5 on page 49 for more information.

5.4 Fitting the Cable Shelf

This instruction describes how to fit the cable shelf. It fits into 19” and metric racks.

5.4.1 Preparing for Installation in a Metric Rack (Optional)

The cable shelf is equipped with fixing brackets for 19” rack installation on delivery. Follow the instruction below to prepare it for installation in a metric rack.

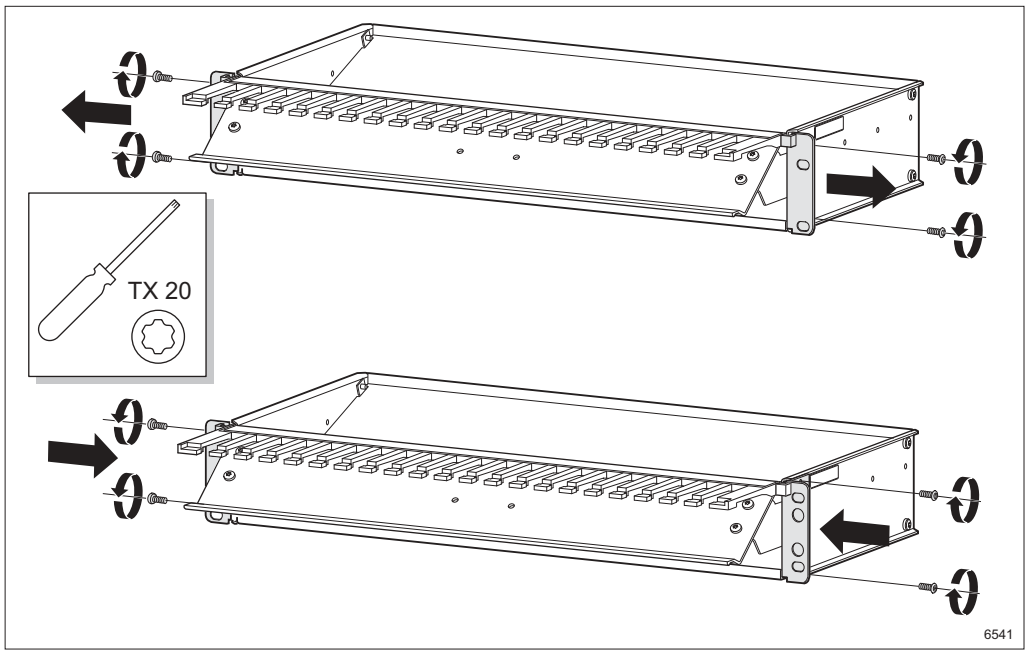

Figure 40 Replacing the 19” fixing brackets with metric fixing brackets

1. Remove the 19” fixing brackets by undoing the four screws.
2. Fit the metric fixing brackets and tighten the screws.

5.4.2 Fitting the Cable Shelf

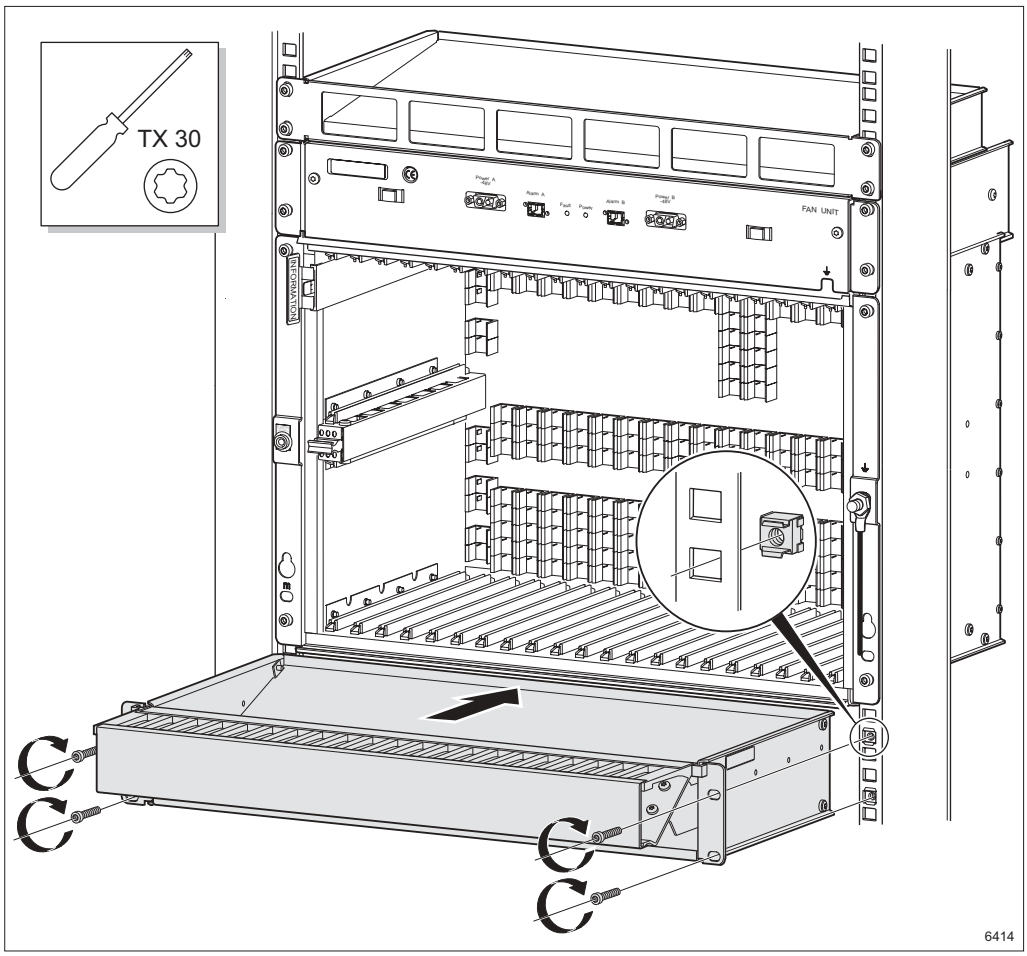

Figure 41 Fitting the cable shelf

3. Fit the four captive nuts to the rack.
4. Fit the cable shelf in the rack and tighten the screws.

5.5 Inserting and Removing the Plug-in Units

Read this section carefully before inserting or removing the plug-in units.

5.5.1 Positioning the Plug-in Units

The AMM 20p can house up to 20 full-height and 2 half-height (PFU1) plug-in units.

5.5.1.1 Common Rules and Recommendations

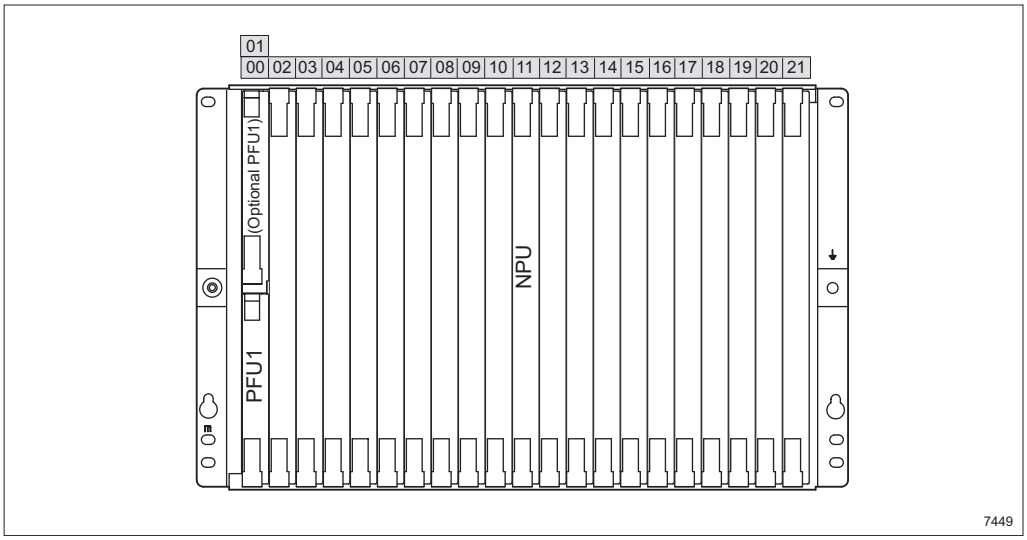

Figure 42 Basic configuration for AMM 20p

- The PFU1 must be fitted in positions 00 and 01 and we recommend you to use position 00 first to make a future upgrade easier. At least one PFU1 must be fitted.

  Note: Two PFU1s must be used if redundant power supply is required.

- An NPU 8x2 must be fitted in position 11.

- All plug-in units can be fitted in any empty slots. However, 1+1 protections put specific requirements on the positioning of the plug-in units. See Section 5.5.1.2 on page 50 and Section 5.5.1.3 on page 50.

5.5.1.2 1+1 Configurations for Radio Terminals

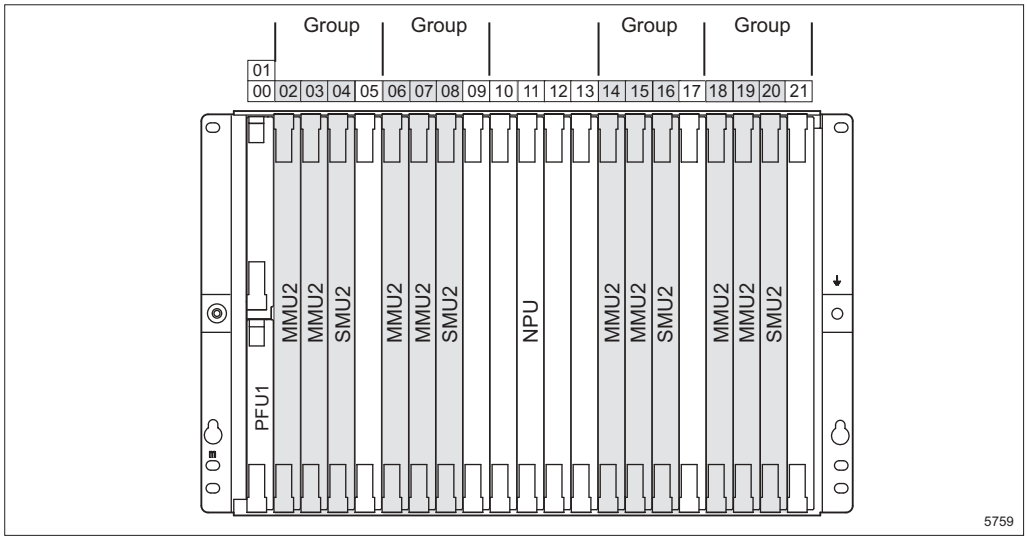

Figure 43 Positioning of the plug-in units for 1+1 configurations

The MMU2 and SMU2 units must be placed in groups for 1+1 configurations.

5.5.1.3 1+1 Configurations for LTU 155

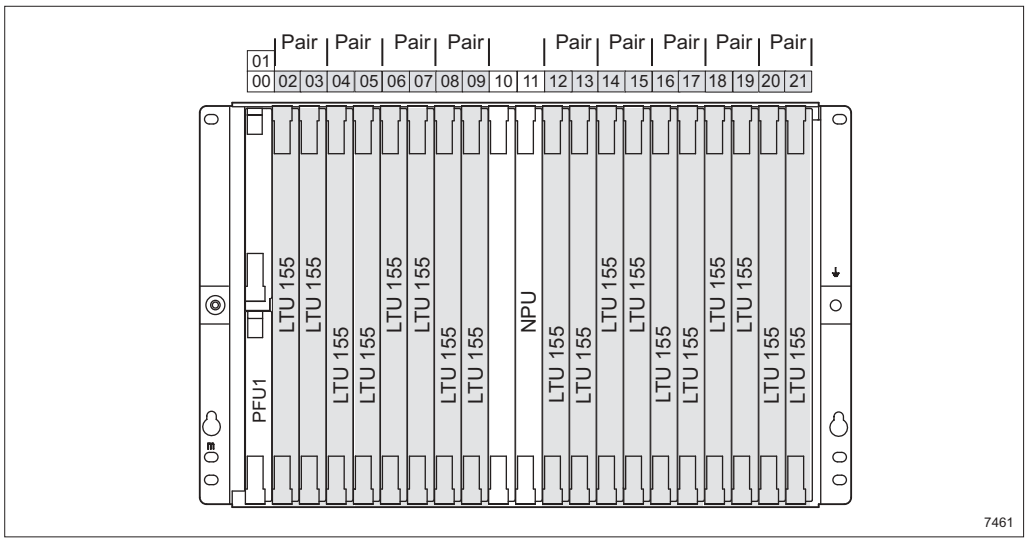

Figure 44 Positioning of the plug-in units for 1+1 configurations

Two LTU 155s must be placed in a pair starting with an even position number for a 1+1 configuration.

5.5.2 Inserting the Plug-in Units

Electrostatic Discharge (ESD) may damage the equipment. Always use an approved antistatic bracelet to avoid damage to components fitted on printed circuit boards.

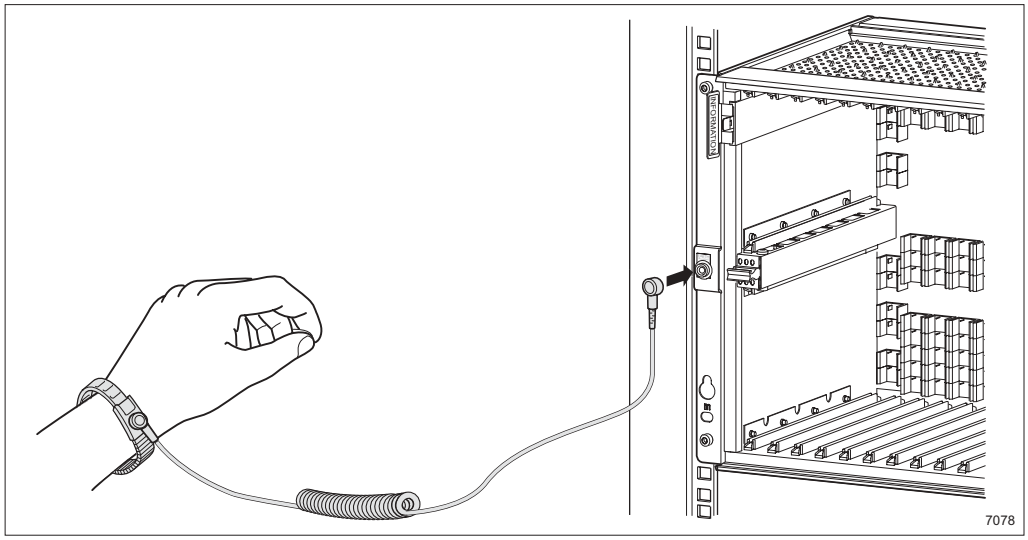

Figure 45 Attaching and connecting the antistatic bracelet

1. Attach the antistatic bracelet to the wrist and plug it into the ESD connector at the front of the magazine.

   Note: The AMM must be grounded.

2. Remove the plug-in unit from the ESD protective packaging.

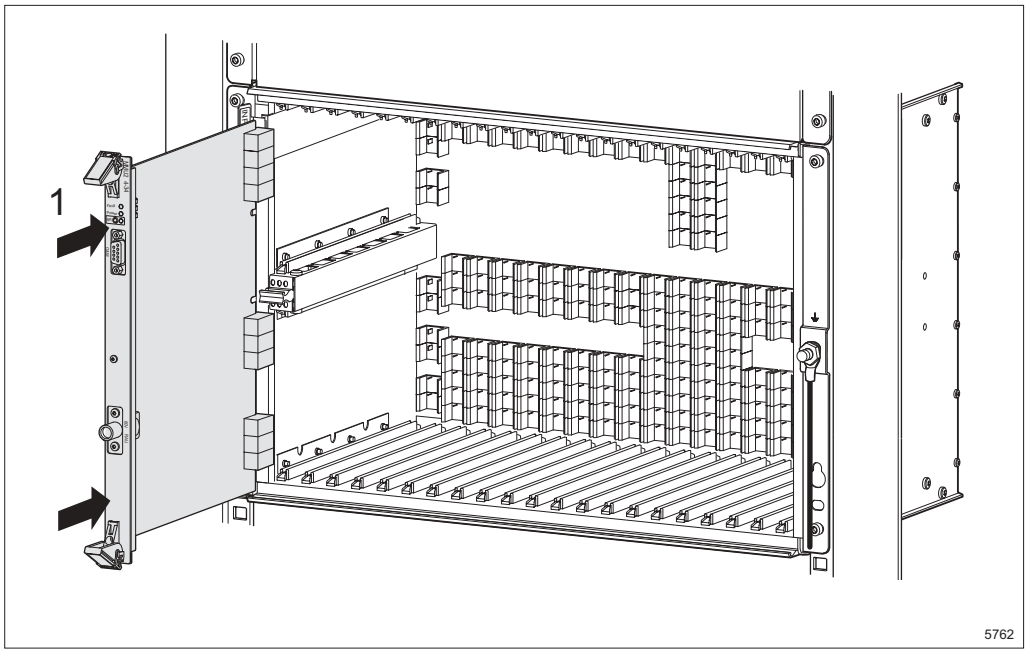

Figure 46 Inserting the plug-in unit

3. Insert the plug-in unit **1**.

   Note: Press in the plug-in unit until it connects to the back of the AMM.

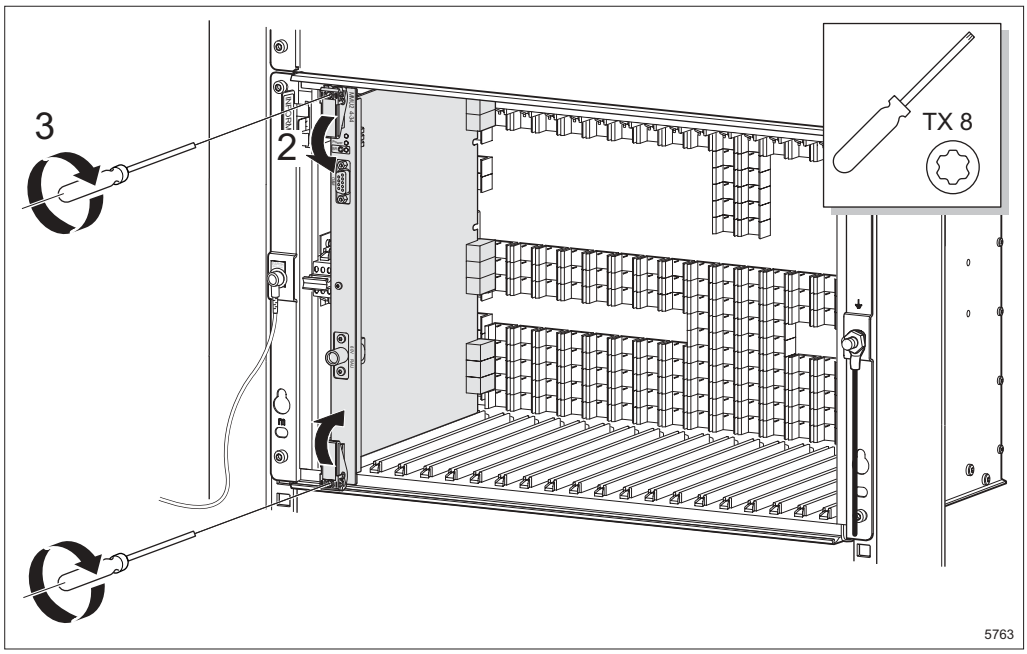

Figure 47 Locking and tightening the plug-in unit

4. Lock the plug-in unit using the two latches **2**.

5. Tighten the two screws to secure the plug-in unit **3**.

5.5.2.1 Inserting the Dummy Units

Caution!

All empty slots must be covered with dummy units to comply with EMC and cooling specifications.

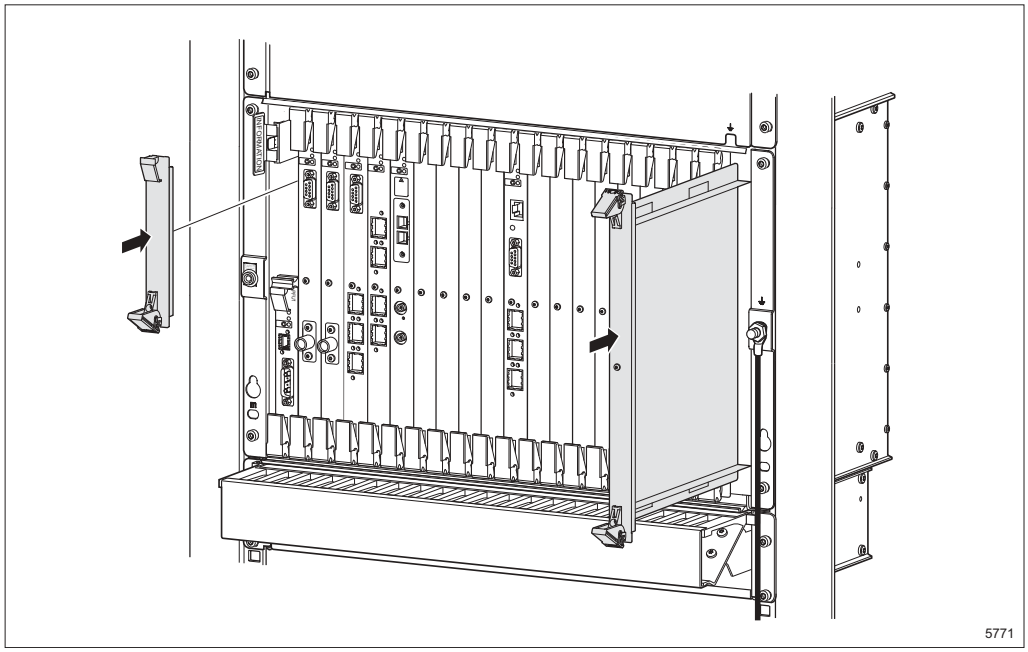

Figure 48 Fitting the dummy units

6. Insert and secure the dummy units in the same way as the plug-in units.

5.5.3 Removing the Plug-in Units

The plug-in units are removed in the reverse order.

6 Indoor Cabling for an AMM 20p Configuration

This chapter describes how to connect the pre-assembled cables to the plug-in units.

Installation Procedure

Step 1 Make sure all required tools, units and accessories are available, see Section 4 on page 21.

Step 2 Remove the front cover from the cable shelf, see Section 6.1 on page 55.

Step 3 Connect the cables to the indoor units, see Section 6.2 on page 56.

Step 4 Mark the cables, see Section 6.10 on page 71.

Step 5 Route the cables, see Section 6.11 on page 72.

Step 6 Fill out the label in the AMM, see Section 6.12 on page 74.

6.1 Removing the Front Cover from the Cable Shelf

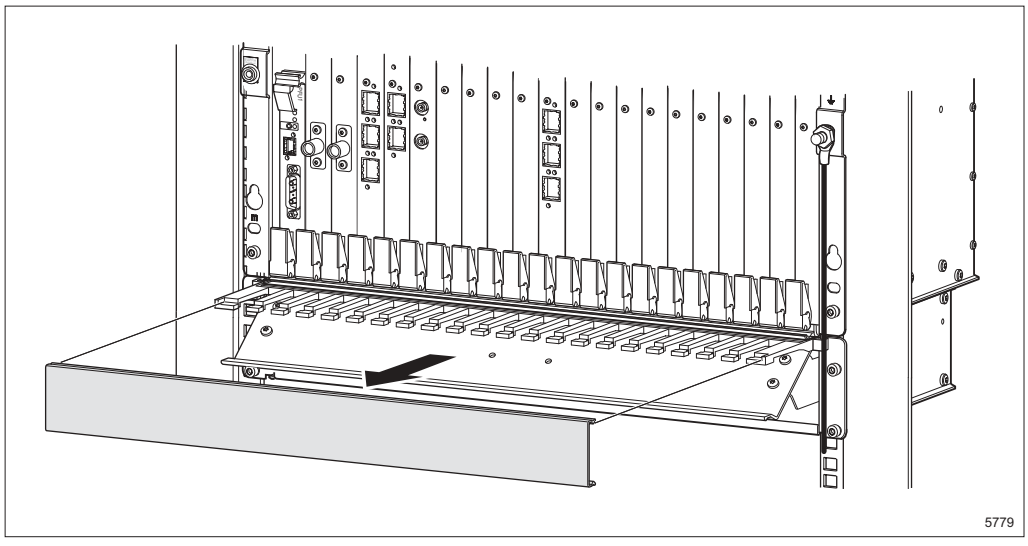

Figure 49 Removing the front cover

1. Remove the front cover from the cable shelf.

6.2 Connecting the Cables

Figure 50 on page 56 gives an overview of all cables for the indoor units and how they should be connected. The LTU 155 in the figure is an LTU 155e/o but it also applies to LTU 155e.

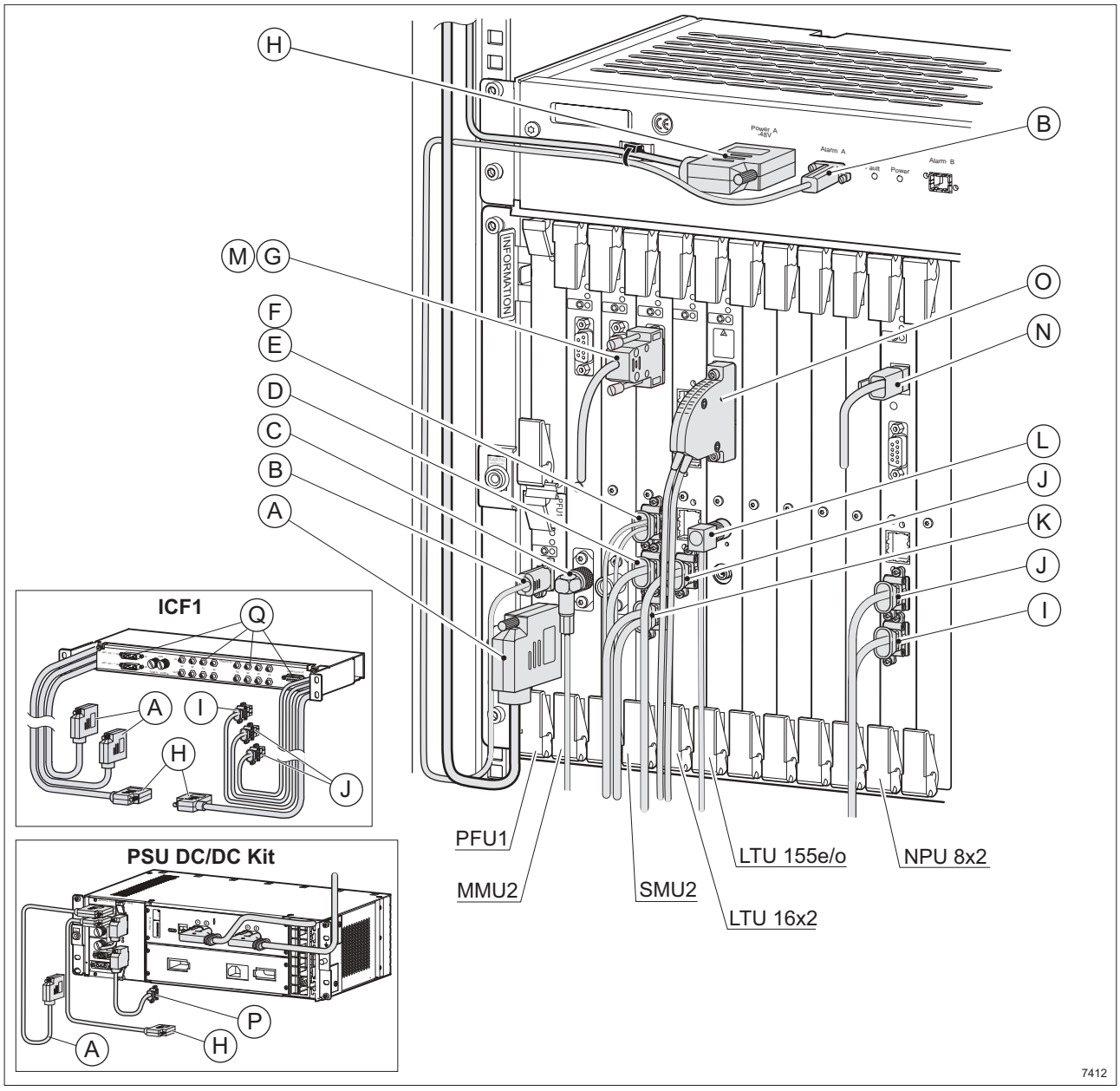

Figure 50 Overview of cables connected to the indoor units

Caution!

The cables must not be bent more than specified. See Section 6.11 on page 72 for information on minimum bending radius.

Table 8 on page 57 contains references to connection instructions for all cables. Section 19 on page 237 contains a pin connection overview for all cables.

Note: Some of the cables in the figure and table are optional.

Table 8 Overview of cables connected to the indoor units

Item	Connector	Cable	Pre-assembled	Assembly and Connection Instructions
A	0V –48V DC	DC cable	–	See Section 6.9 on page 70
		DC cable from ICF1	–	See Section 11.3.4 on page 127
		PSU-PFU DC cable	–	See separate instruction included with the PSU DC/DC Kit
B	Alarm A/B	Fan alarm cable	RPMR 102 02/1	See Section 6.8 on page 68
C	60 V RAU	Station radio cable	RPM 517 6906/1	See Section 6.7 on page 67
D	E1:2A-2B	2xE1 120 Ohm cable	RPMR 102 15/2	See Section 6.4 on page 60
E	E2:3B-3C	2xE2 75 Ohm cable	RPMR 102 19/1	See Section 6.4 on page 60
F	E3:3A	E3 75 Ohm cable	RPMR 102 14/1	
G	O&M	PC cable	RPM 517 54/2	See Section 6.4 on page 60
H	Power –48V	DC cable (FAU1)	–	See Section 6.8 on page 68
		DC cable (FAU1) from ICF1	–	See Section 11.3.4 on page 127
		PSU-FAU1 DC cable	–	See separate instruction included with the PSU DC/DC Kit

Table 8 Overview of cables connected to the indoor units

Item	Connector	Cable	Pre-assembled	Assembly and Connection Instructions
I	User I/O: 1A-1F	4xE1 120 Ohm, User I/O cable	RPMR 102 06/2	One end pre-assembled. See Section 6.3 on page 59
		User I/O cable from ICF1	–	See Section 11.3.4 on page 127
J	E1:1A-1D E1:2A-2D (E1:3A-3D) (E1:4A-4D)	4xE1 120 Ohm, User I/O cable	RPMR 102 06/2	One end pre-assembled. See Section 6.3 on page 59 and Section 6.5 on page 63
		4xE1 cables from ICF	–	See Section 11.3.4 on page 127
K	Dig SC: 1A-1B	DIG SC cable	RPMR 102 15/3	One end pre-assembled. See Section 6.4 on page 60
L	EL.(1)	STM-1 electrical cable	RPMR 102 07/1	See Section 6.6 on page 64
M	O&M	Access server cable	RPMR 102 13/1	See Section 6.4 on page 60
N	10/100Base-T	Ethernet cable	RPMR 102 11/1 (crossed) or RPMR 102 10/1 (straight)	See Section 6.3 on page 59
O	OPT.(2)	Optical fibre cables + connector casing	2 pcs TSR 311 9173/xxx + SXK 109 53	See Section 6.6 on page 64
P	Alarm	FAU3 alarm cable	–	See separate instruction included with the PSU DC/DC Kit
Q	–	E1 cable 75/120 Ohm, User I/O cable and ICF1 DC cable	–	See section Section 11.3.5 on page 128

(1) The optical and electrical cables cannot be used at the same time.

(2) The optical cable comes in various lengths and with different connectors at the users end. See MINI-LINK TN, MINI-LINK HC, MINI-LINK E Product Catalog for more information.

Note: The cables should be connected from bottom to top to make future connections easier.

6.3 Connecting to the NPU 8x2

This section describes all cable connections for NPU 8x2. Follow the instructions that apply to your configuration.

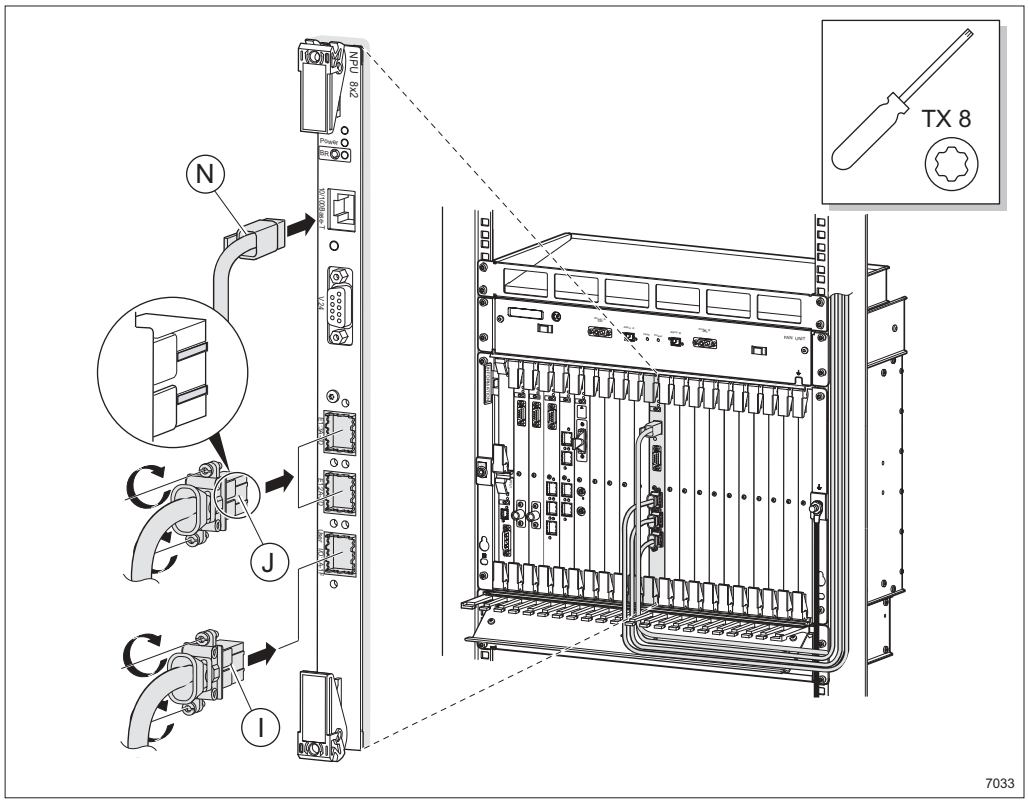

Figure 51 Connecting the 4xE1 120 Ohm, User I/O and Ethernet cables

- Connect the User I/O cable **I** (4xE1 120 Ohm, User I/O cable). See Section 19.3 on page 240 for pin connection information.
- Connect the 4xE1 120 Ohm cables **J** (4xE1 120 Ohm, User I/O cable). See Section 19.3 on page 240 for pin connection information.

Note: Make sure the connectors are entered correctly.

- Connect a straight or crossed Ethernet cable **N**. The straight version is used for connection to a site LAN and the crossed version is used for connection to a PC with LCT.
- Mark the cables, see Section 6.10 on page 71.

Note: The V.24 connector is for future use.

6.4 Connecting to the SMU2

This section describes all cable connections for SMU2. Follow the instructions that apply to your configuration.

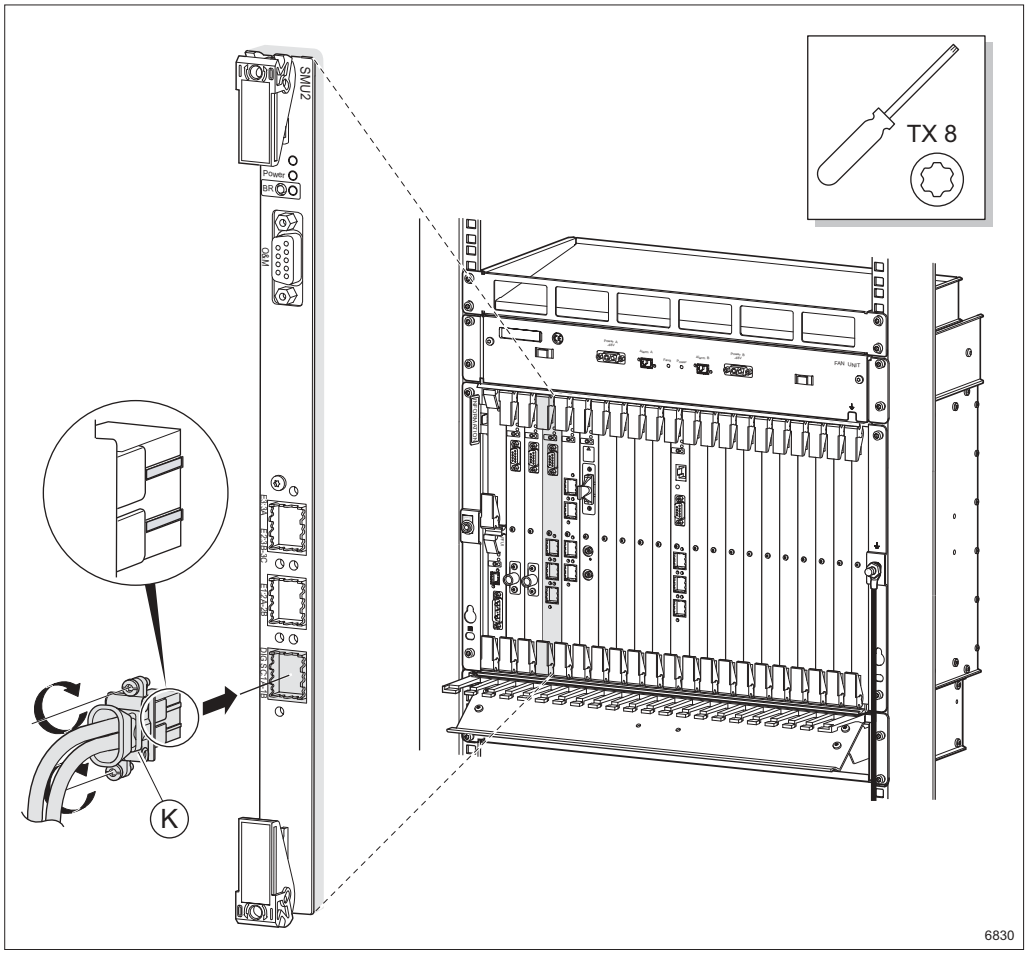

Figure 52 Connecting the DIG SC cable

- Connect the DIG SC cable **K**.

  Note: The other end of the cable is connected to MINI-LINK E (SAU). For information on how to assemble the 25-pin D-sub connectors, see Section 18.1 on page 181.

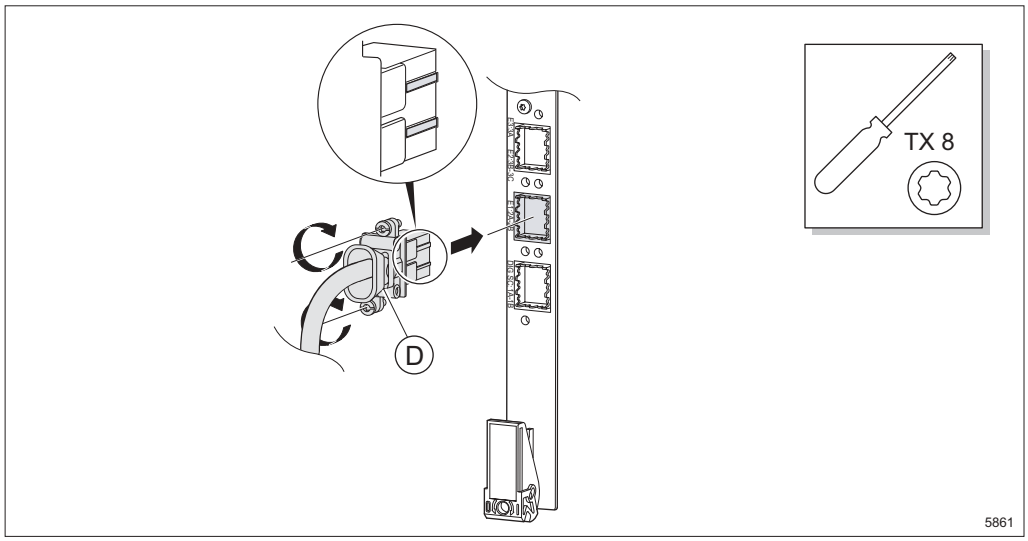

Figure 53 Connecting the 2xE1 120 Ohm cable

- Connect the 2xE1 120 Ohm cable **D**.

  Note: The other end of the cable is connected to MINI-LINK E (MMU or SMU). For information on how to connect the cables, see *MINI-LINK E ETSI Indoor Installation Manual*.

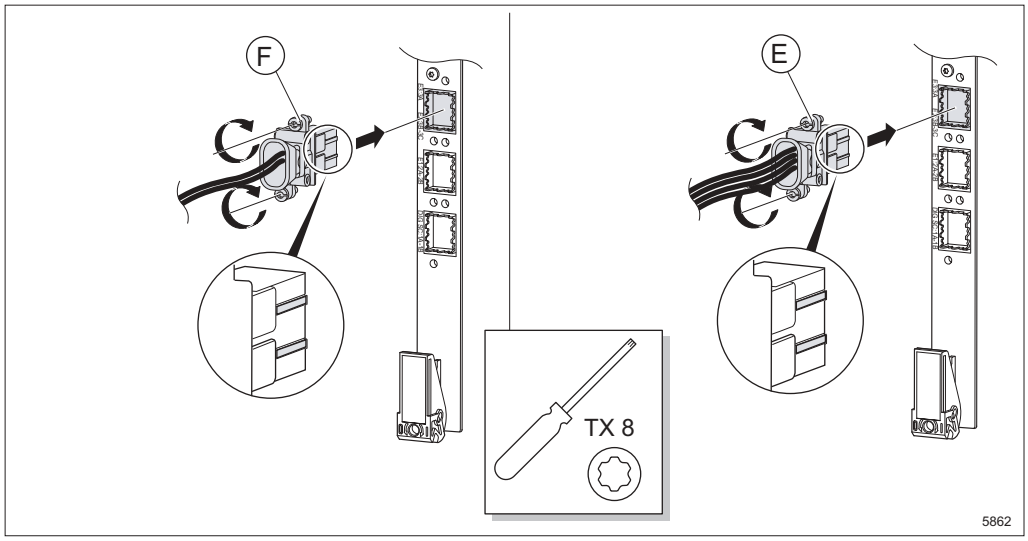

Figure 54 Connecting the E3 or 2xE2 75 Ohm cables

- Connect the E3 75 Ohm cable **F** or 2xE2 75 Ohm cable **E**.

  Note: The other end of the cable is connected to MINI-LINK E (MMU or SMU). For information on how to connect the cables, see *MINI-LINK E ETSI Indoor Installation Manual*.

Note: Make sure the connectors are entered correctly.

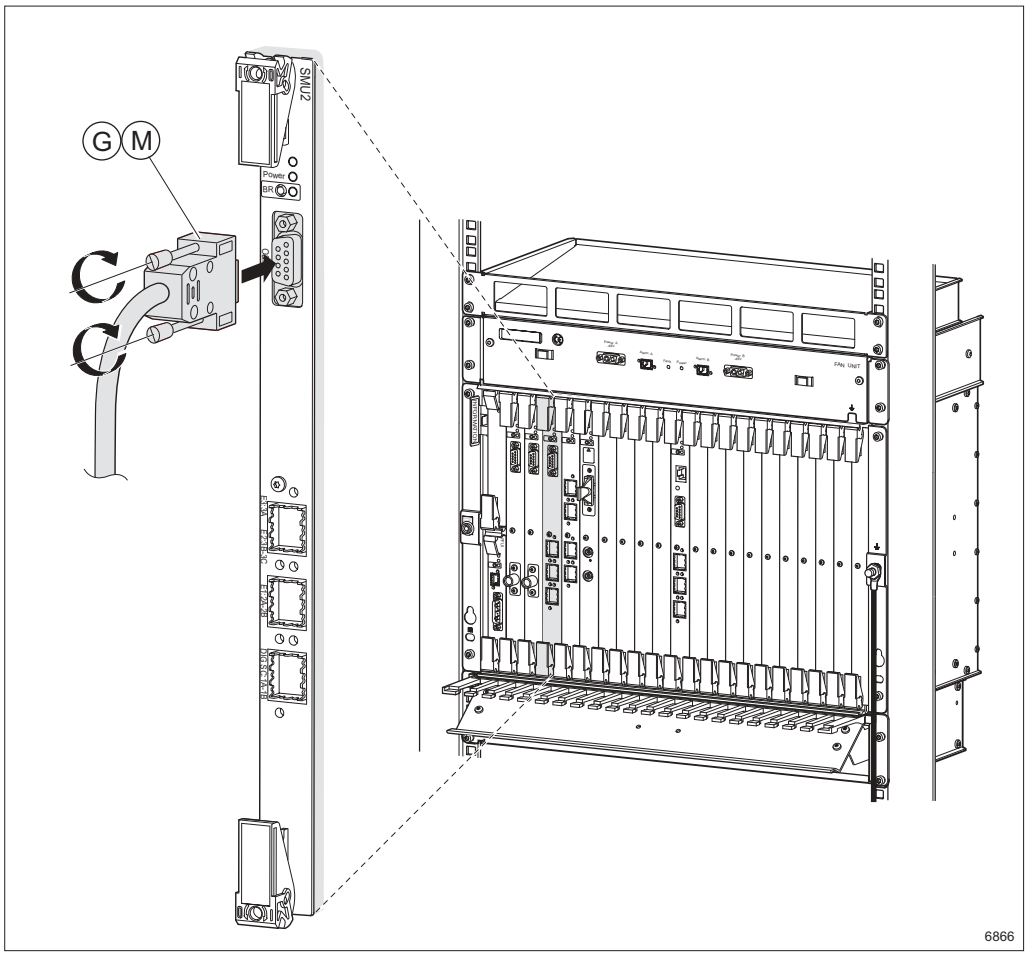

Figure 55 Connecting the access server and PC cables

- Connect the access server cable **M** or the PC cable **G**. The access server cable can be connected to any available O&M connector on MINI-LINK E equipment and the PC cable can be connected to a PC to perform a Local Upgrade (LU).

  Note: The access server functionality is only available when the SMU2 is used for cositing and the LU functionality is only available when the SMU2 is in protection (1+1) mode.

- Mark the cables, see Section 6.10 on page 71.

6.5 Connecting to the LTU 16x2

This section describes all cable connections for LTU 16x2. Follow the instructions that apply to your configuration.

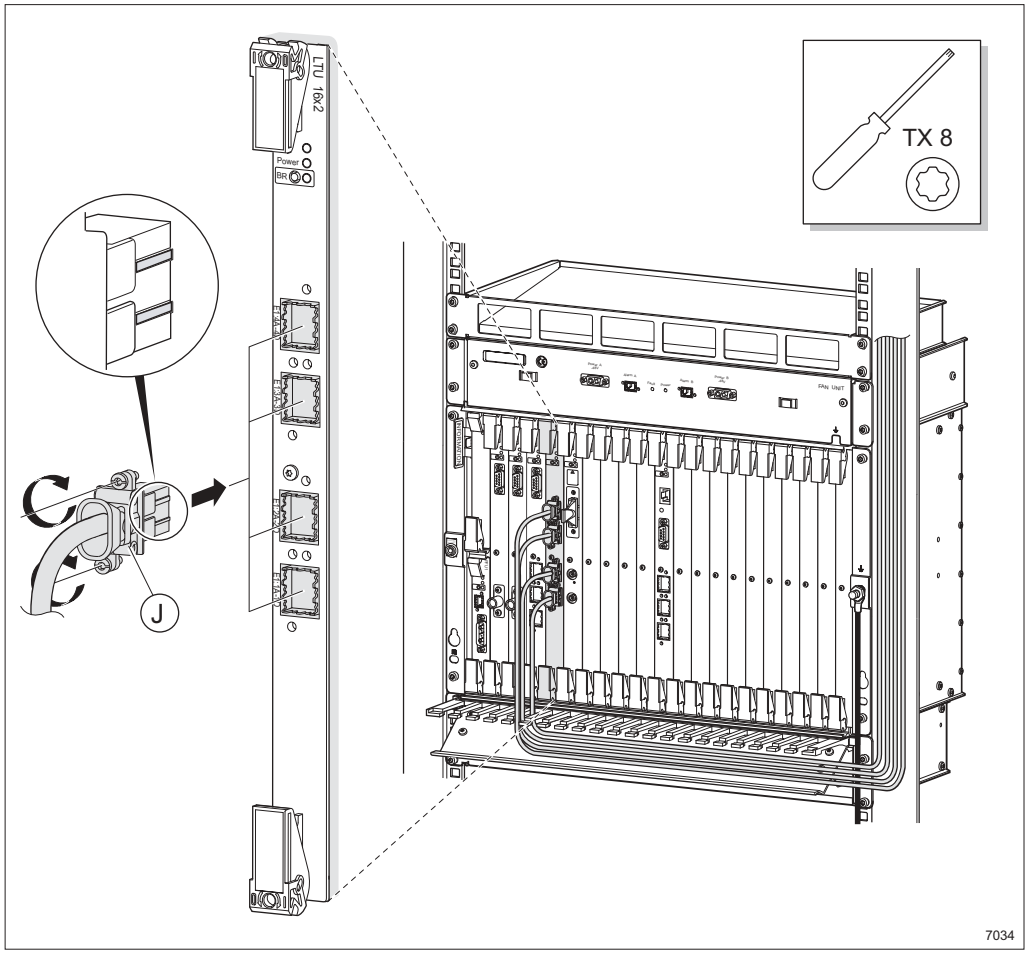

Figure 56 Connecting the 4xE1 cables

- Connect the 4xE1 120 Ohm cables **J** (4xE1 120 Ohm, User I/O cable). See Section 19.3 on page 240 for pin connection information.

Note: Make sure the connectors are entered correctly.

- Mark the cables, see Section 6.10 on page 71.

6.6 Connecting to the LTU 155e and LTU 155e/o

This section describes all cable connections for LTU 155e and LTU 155e/o. Follow the instructions that apply to your configuration.

6.6.1 Electrical Interface

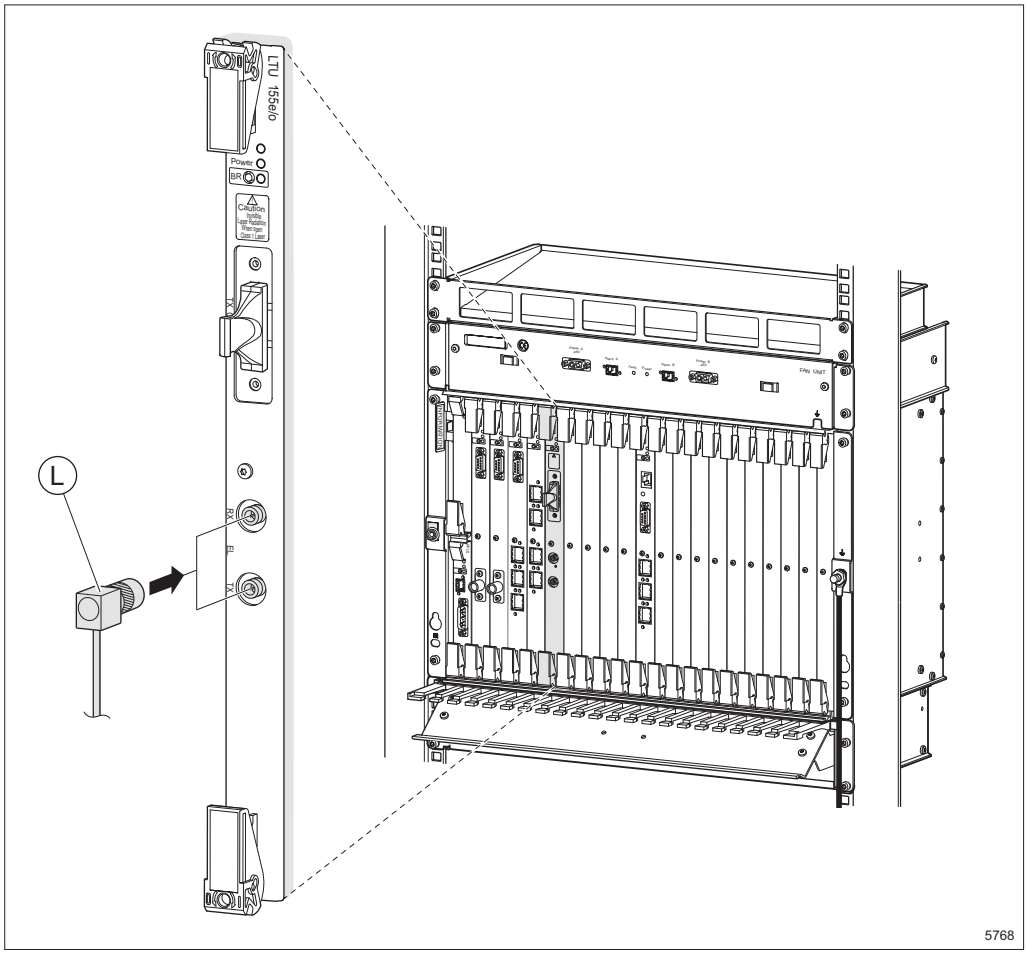

Figure 57 Connecting the STM-1 electrical cables

- Connect the STM-1 electrical cables **L**.
- Mark the cables, see Section 6.10 on page 71.

6.6.2 Optical Interface

The LTU 155e/o plug-in unit is a Class 1 laser product (IEC 60825-1). Insert optical plugs in unused connectors.

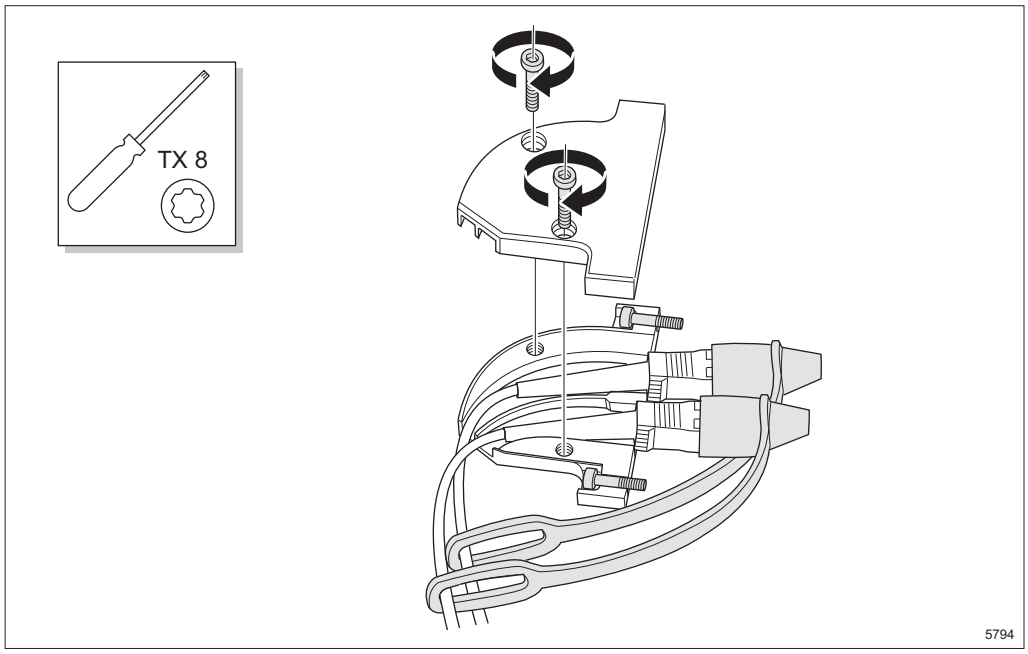

Figure 58 Inserting the optical fibre cables and assembling the connector casing

1. Open the connector casing by undoing the two screws.
2. Insert the optical fibre cables and place the two screws, used for tightening the casing to the plug-in unit, in their positions.
3. Fasten the top of the connector casing with the two screws.

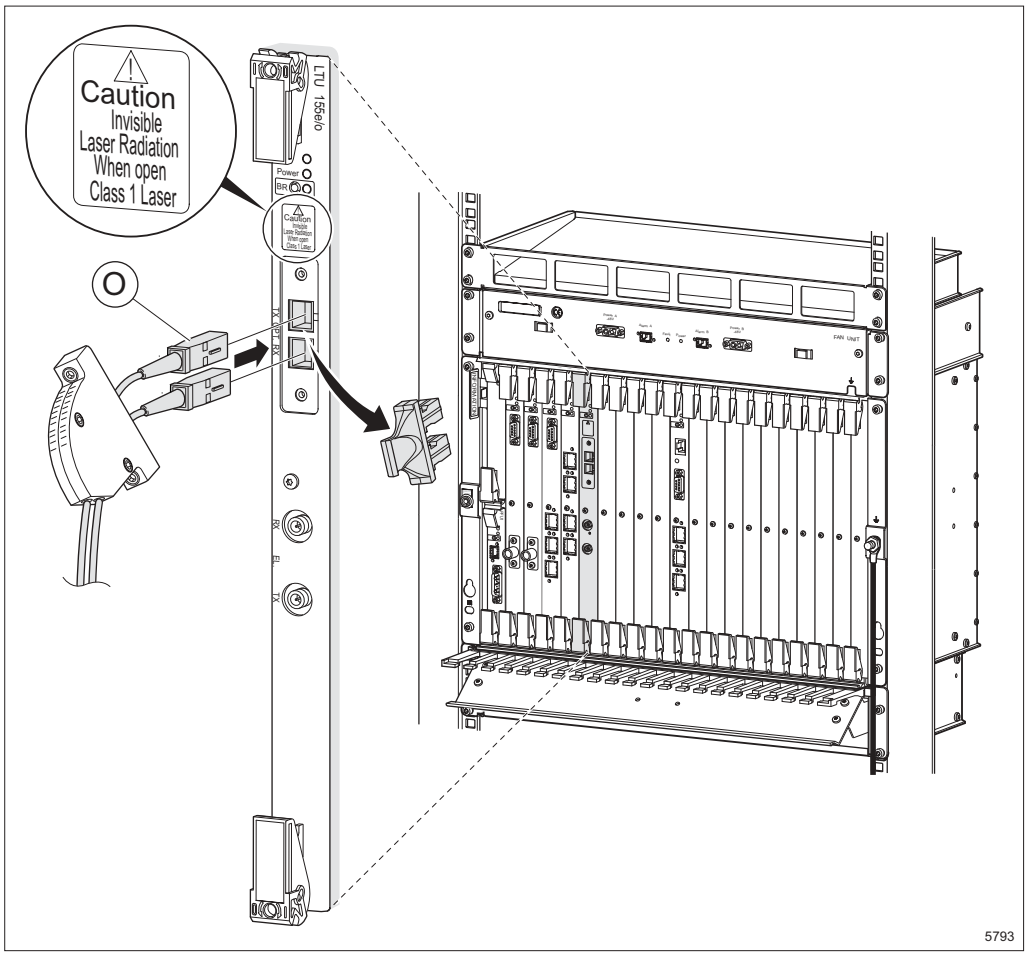

Figure 59 Connecting the optical fibre cables

4. Remove the protective end caps from the optical fibre cables and the optical plugs to the OPT. connectors.

5. Connect the cables **O**.

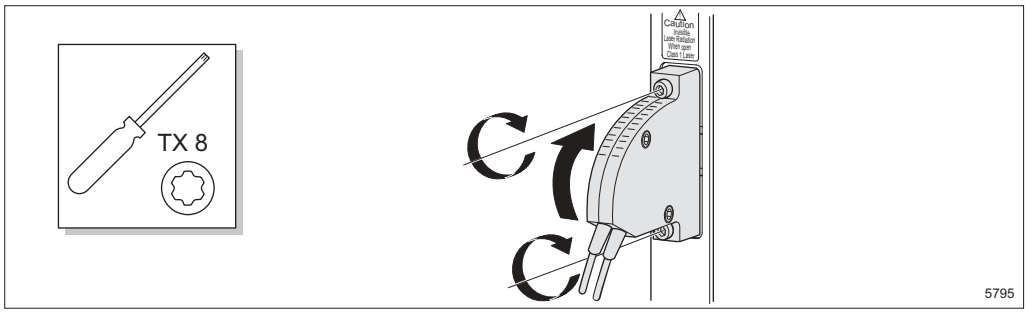

Figure 60 Fastening the connector casing

6. Fasten the connector casing to the plug-in unit.

7. Mark the cables, Section 6.10 on page 71.

6.7 Connecting to the MMU2

This section describes all cable connections for MMU2 4, MMU2 4-8, MMU2 4-16 and MMU2 4-34. Follow the instructions that apply to your configuration.

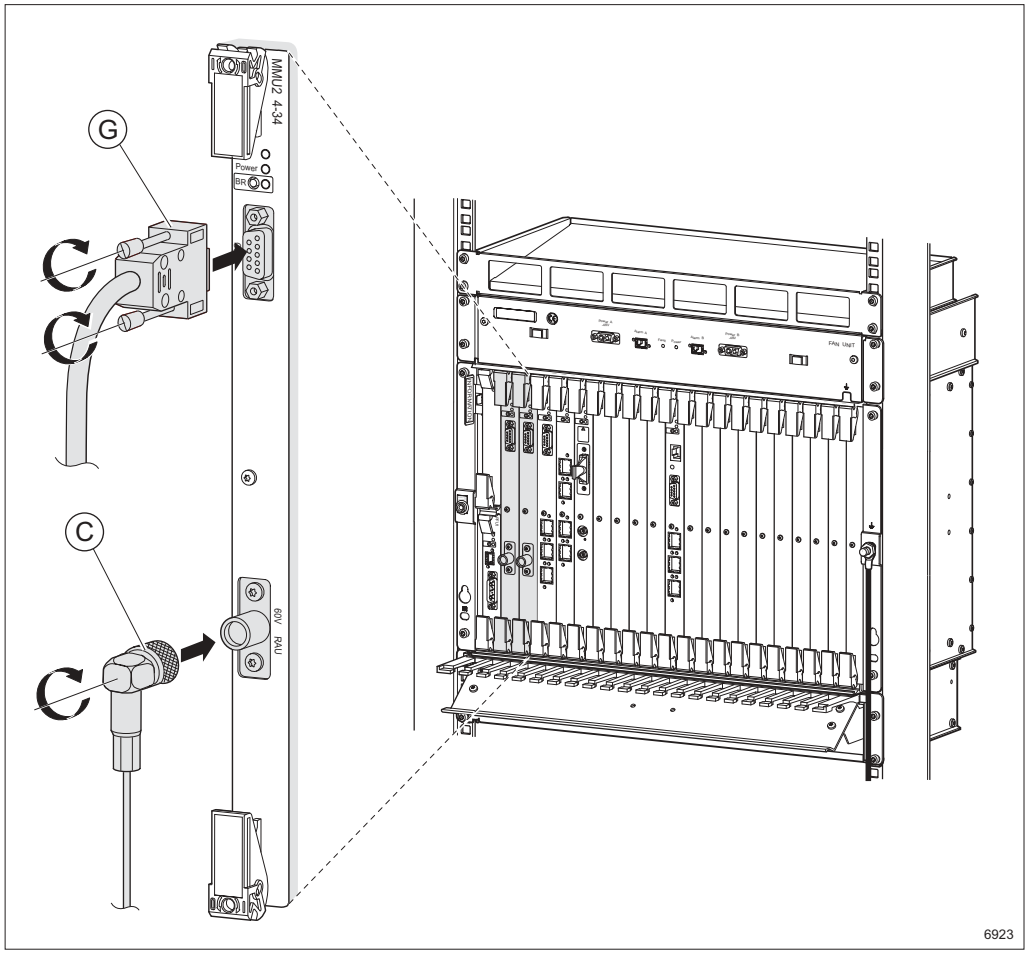

Figure 61 Connecting the station radio cable and PC cable

- Connect the station radio cable **C**.
- Connect the PC cable **G**.

  Note: The PC cable can be connected to a PC to perform a Local Upgrade (LU).

- Mark the cable, see Section 6.10 on page 71.

6.8 Connecting to the FAU1

This section describes all cable connections for FAU1. Follow the instructions that apply to your configuration.

Caution!

Make sure the power is switched off before working with the DC cable.

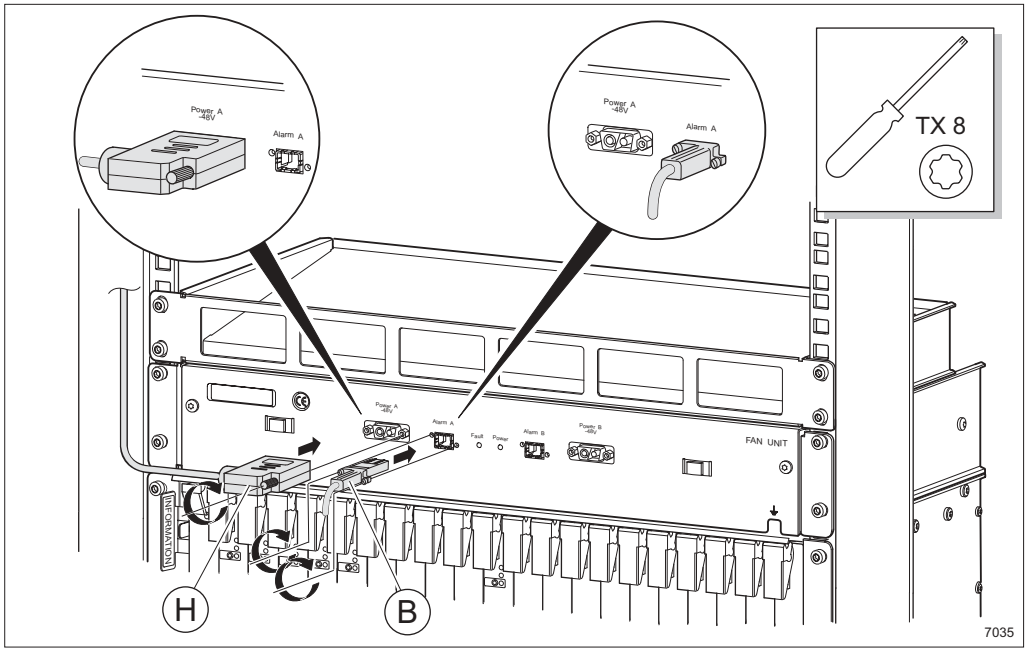

Figure 62 Connecting the DC and fan alarm cables

1. Connect the fan alarm cable **B**.
2. Assemble the DC Cable **H**. See Section 18.6 on page 221 for assembly instructions.
3. Connect the DC cable.

   Note: Make sure the power supply requirements are met before connecting the DC cable. See Section 4.1 on page 21 for information.

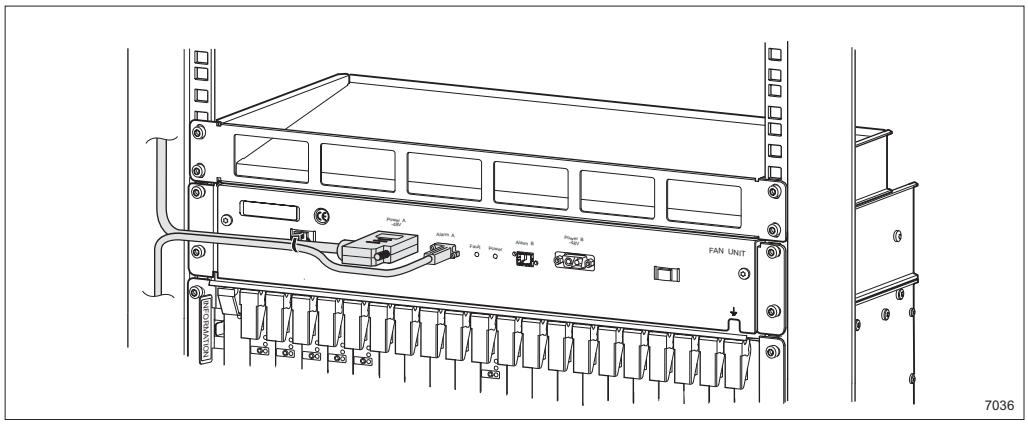

Figure 63 Strapping the cables

4. Strap the cables to the FAU1.
5. Mark the cables, see Section 6.10 on page 71.

6.9 Connecting to the PFU1

This section describes all cable connections for PFU1. Follow the instructions that apply to your configuration.

Caution!

Make sure the power is switched off before working with the DC cable.

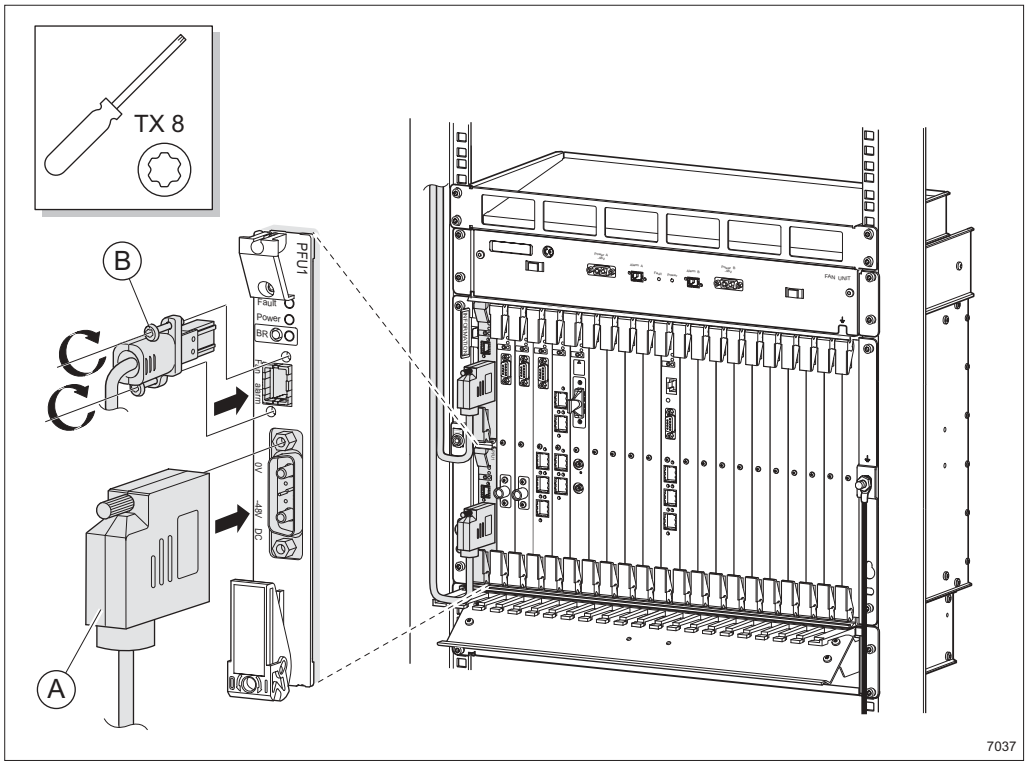

Figure 64 Connecting the DC cable and fan alarm cable

1. Assemble the DC cable. See Section 18.5 on page 213 for assembly instructions.
2. Connect the DC cable **A**.
3. Connect the fan alarm cable **B**. The other end is connected to the FAU1, see Section 6.8 on page 68.
4. Mark the cables, see Section 6.10 on page 71.
5. Connect the DC cable to the power supply source. Make sure the power supply requirements are met, see Section 4.1 on page 21 for information.

6.10 Marking the Cables

All cables should be marked using the marking kits included with the cable deliveries.

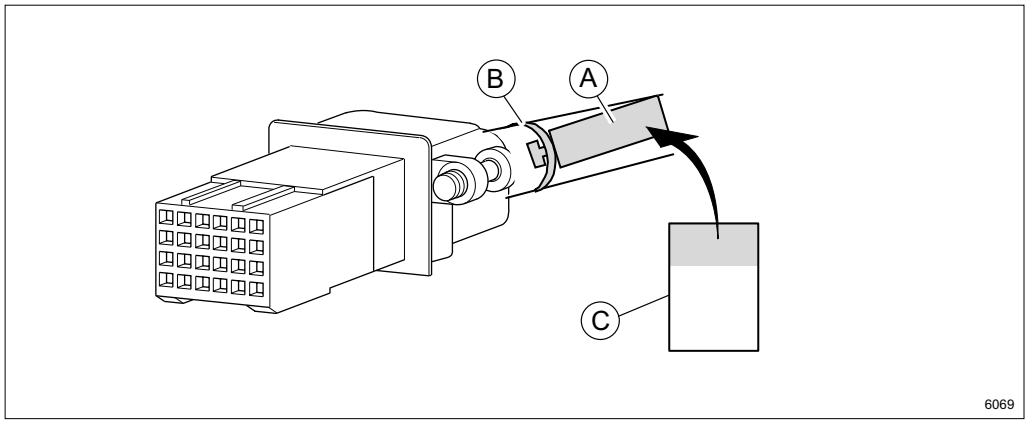

Figure 65 Example of cable marking

1. Fasten a tag **A** to the cable using a strap **B**.
2. Mark the cable by writing on the yellow part of the tape **C** and attaching it to the tag (wrapping the transparent part round the tag).

   Note: There are two tags, one for each end of the cable.

6.11 Routing the Cables

When all cables are connected they have to be routed through the guides of the cable shelf. There is one guide for each plug-in unit.

Caution!

Sharp bends may damage the cables. Do not bend the cables more than the minimum bending radius stated in Table 9 on page 72.

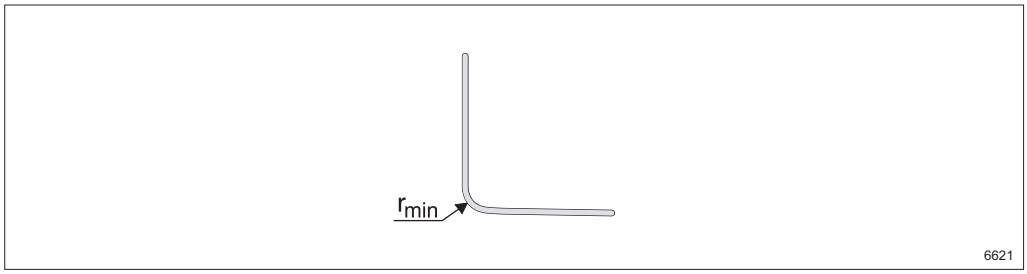

Figure 66 Minimum bending radius

Table 9 Minimum bending radius

Description	**r_{min}(mm)**
E1 120 Ohm cable	70
2xE1 120 Ohm cable	38
DIG SC cable	27
4xE1 120 Ohm, User I/O cable	50
Ethernet cable	22
2xE2 75 Ohm cable	25
E3 75 Ohm cable	20
Optical fibre cable	20
STM-1 electrical cable	20
Station radio cable	33
DC cable	100
Fan alam cable	30
DC cable (FAU1)	35

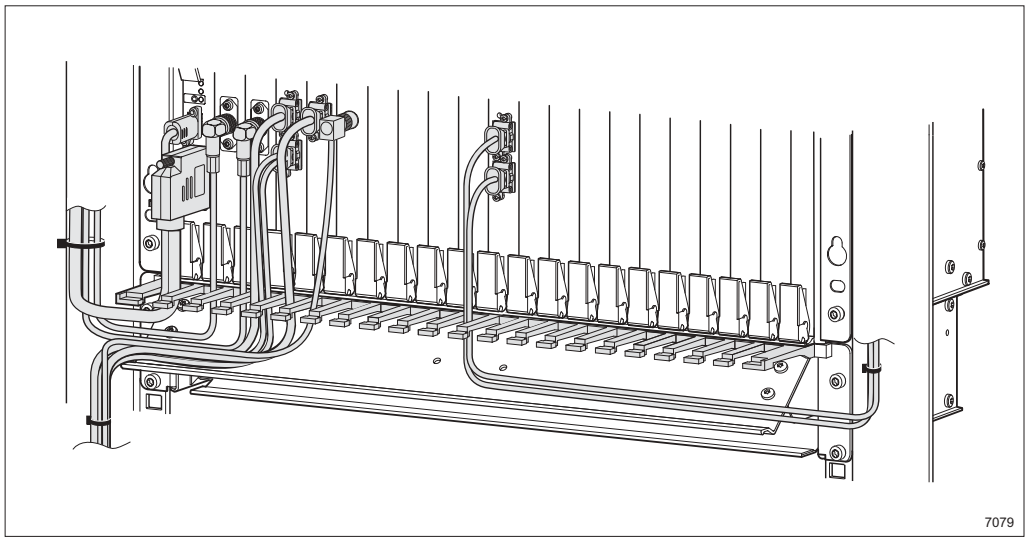

Figure 67 Routing the cables

1. Route the cables through their designated guides and bend them to either side.

2. Strap the cables.

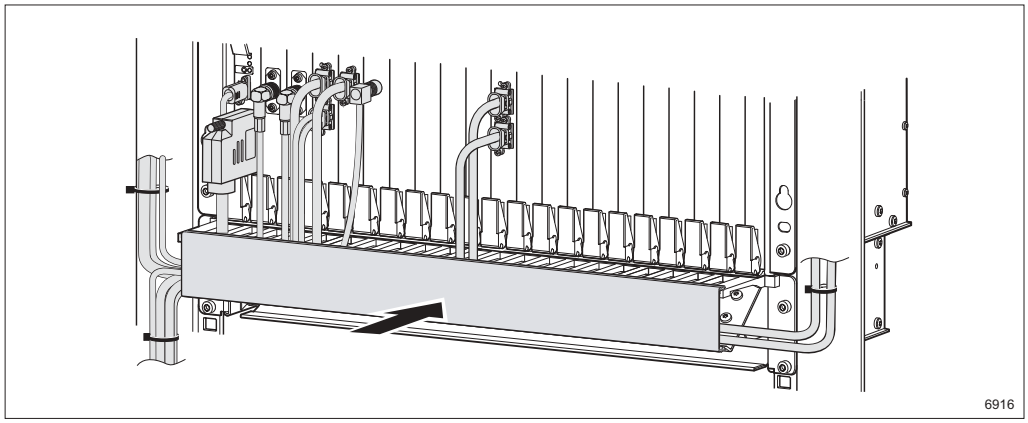

Figure 68 Fitting the front cover

3. Fit the front cover.

6.12 Labeling

Fill out the labels on both sides of the information plate.

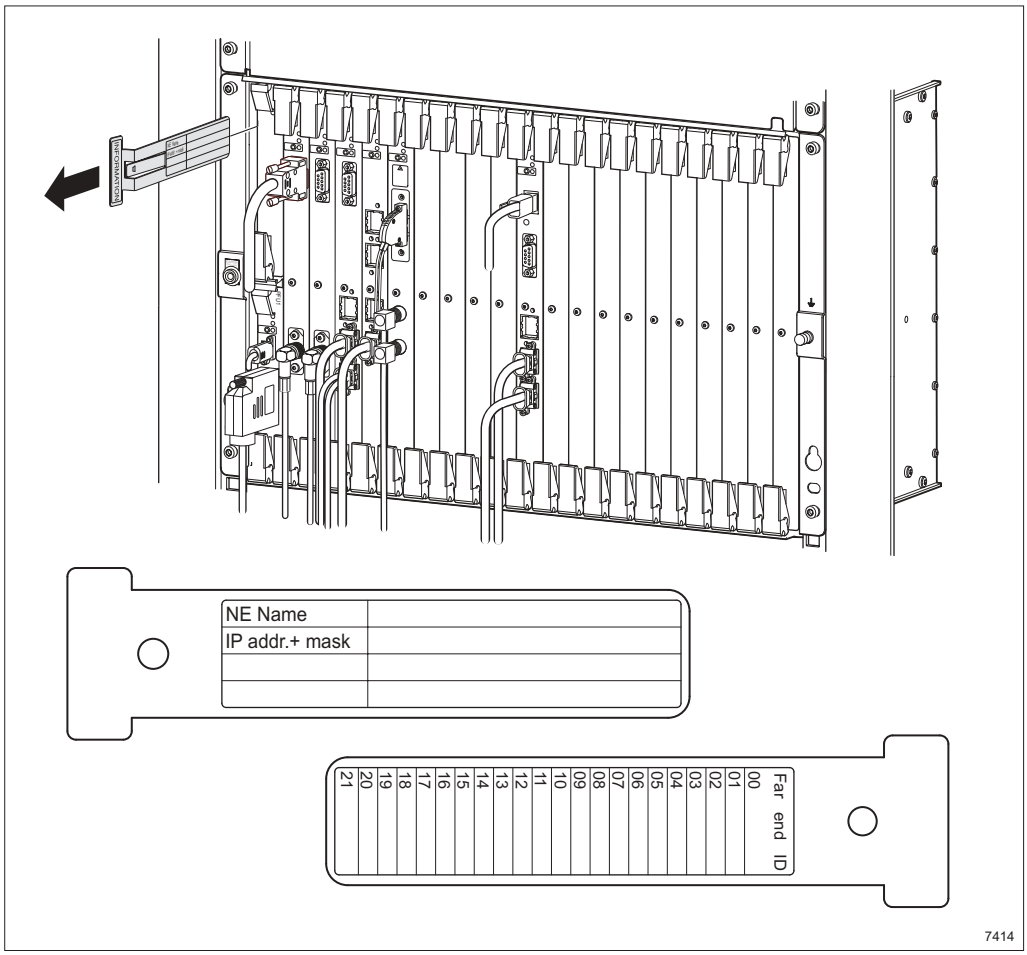

Figure 69 The information plate

NE Name	IP Address / Name
IP Address + Mask	The IP address and subnet mask of the Network Element (NE)
Far-end ID	The identity of the terminal with which the near-end terminal communicates

7 Installing an AMM 6p Configuration

This section describes a recommended installation procedure for an AMM 6p configuration in a 19” rack or cabinet.

Installation Procedure

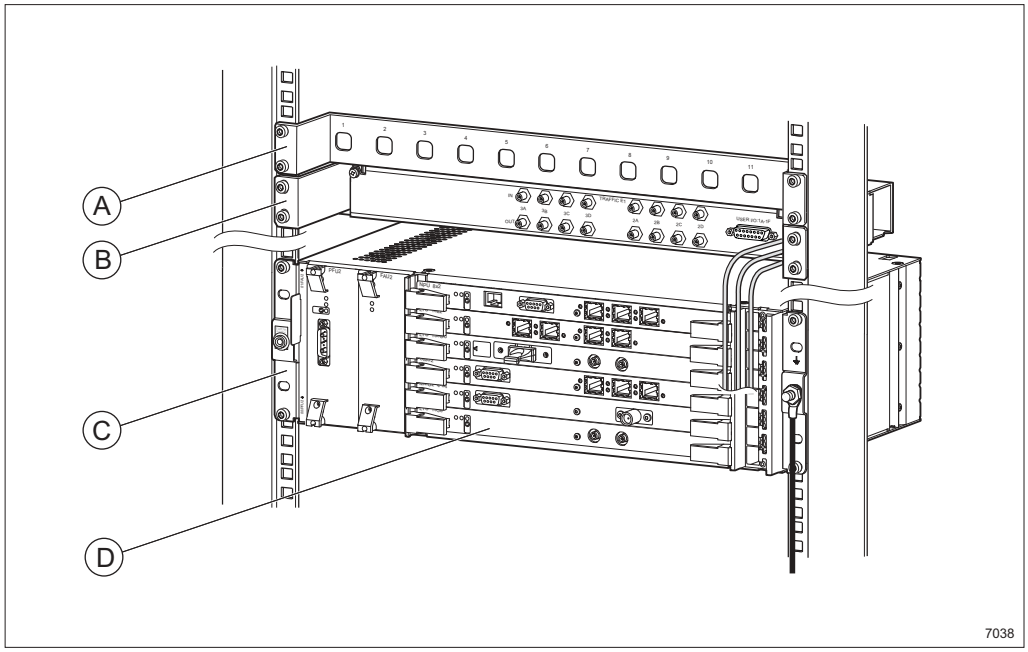

Figure 70 Overview of the indoor installation procedure for a rack or cabinet

Step 1 Make sure all required tools, units and accessories are available, see Section 4 on page 21.

Step 2 Optional: Fit the radio cable panel **A**, see Section 11.1 on page 121.

Step 3 Optional: Install the ICF2 **B**, see Section 11.3 on page 124.

Step 4 Install the AMM **C**, see Section 7.1 on page 76.

Step 5 Insert the plug-in units **D**, see Section 7.2 on page 79.

7.1 Installing the AMM 6p

This instruction describes how to install the AMM 6p. It fits into 19” and metric racks.

7.1.1 Cooling Arrangement

Caution!

Insufficient cooling may shorten the useful life of the equipment. Be sure to always follow the instructions.

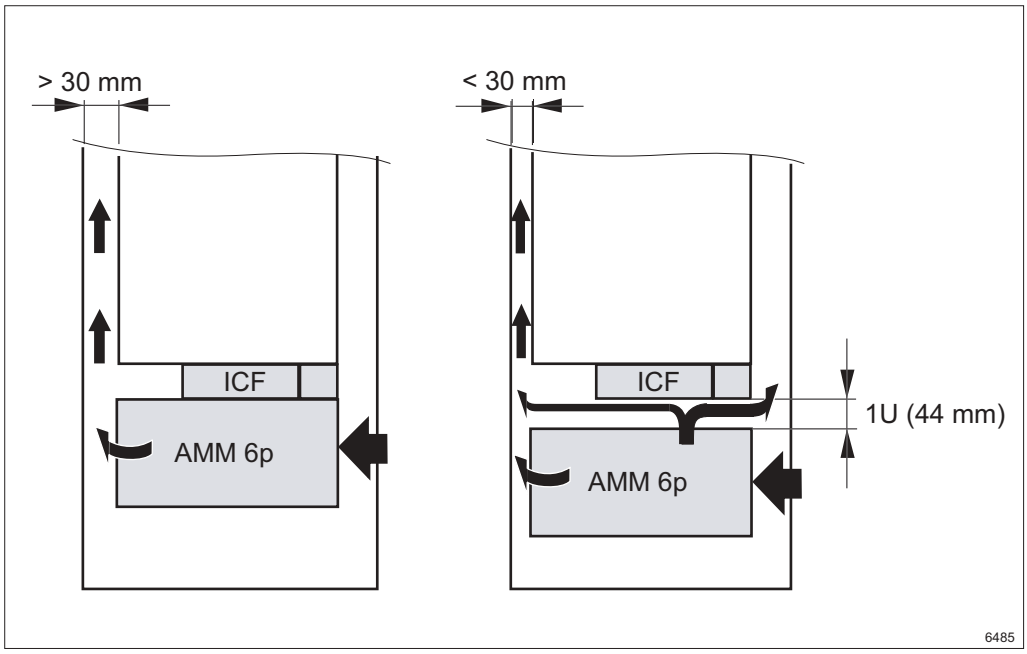

Figure 71 Cooling requirements for AMM 6p

When installed in a cabinet there must be at least 30 mm free space behind the AMM 6p for sufficient air flow. If the space is less than 30 mm, a free space of 1U should be left above the AMM 6p.

7.1.2 Fitting the AMM 6p

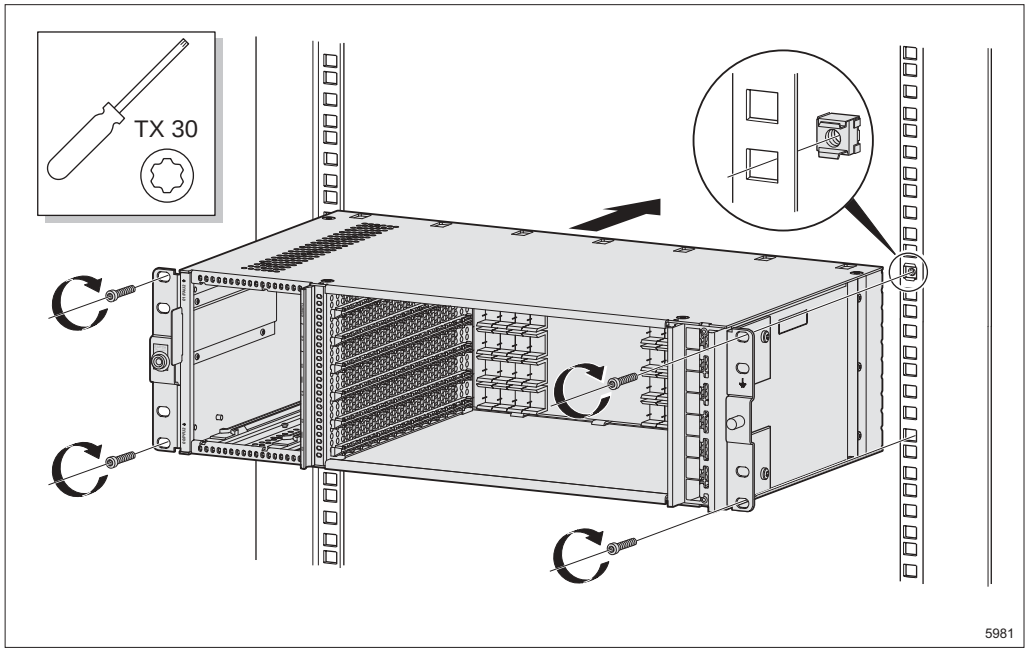

Figure 72 Fitting the AMM 6p

1. Fit the four captive nuts to the rack.
2. Fit the AMM in the rack and tighten the screws.

7.1.3 Grounding the AMM 6p

Caution!

The AMM must be grounded.

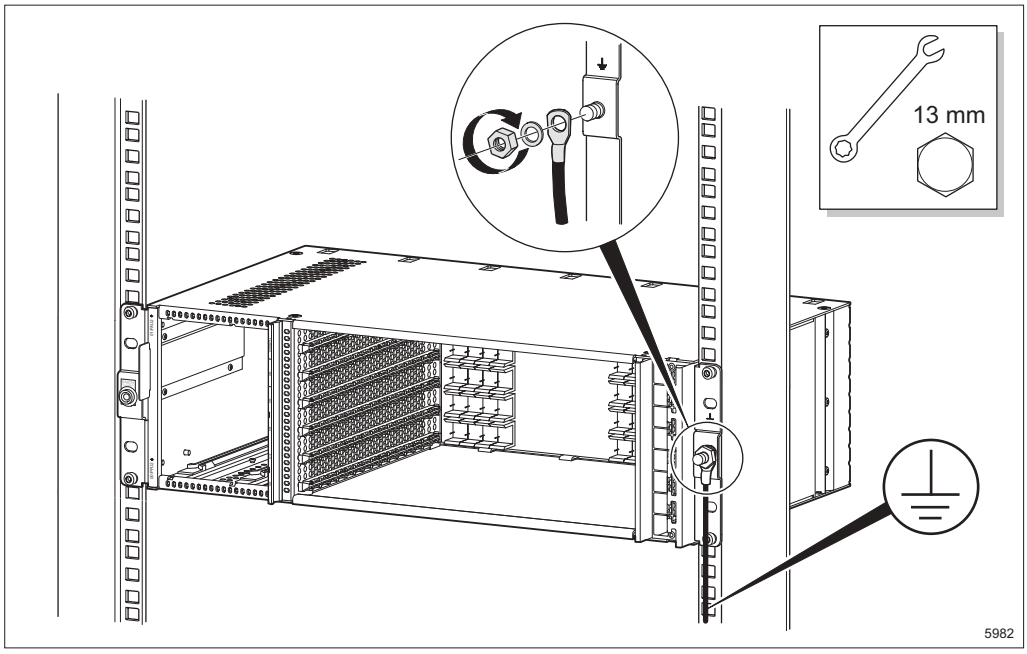

Figure 73 Grounding the AMM 6p

3. Connect and tighten the earthing cable to the AMM.
4. Connect the other end of the earthing cable to protective earthing via station ground.
5. The NPU 8x2 and PFU1 plug-in units, included in the AMM delivery, are fitted after all units are installed in the rack. See Section 7.2 on page 79 for more information.

7.2 Inserting and Removing the Plug-in Units

Read this section carefully before inserting or removing the plug-in units.

7.2.1 Positioning the Plug-in Units

The AMM 6p can house up to 6 full-height and 2 half-height (PFU2 and FAU2) plug-in units.

7.2.1.1 Common Rules and Recommendations

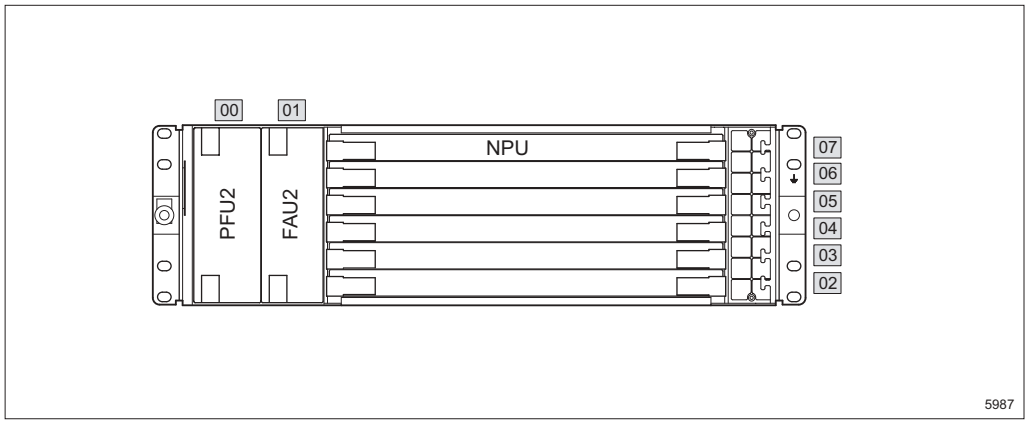

Figure 74 Basic configuration for AMM 6p

- The PFU2 must be fitted in position 00 and the FAU2 must be fitted in position 01.
- An NPU 8x2 must be fitted in position 07.
- All plug-in units can be fitted in any empty slots. However, 1+1 protections put specific requirements on the positioning of the plug-in units, see Section 7.2.1.2 on page 80 and Section 7.2.1.3 on page 80.

7.2.1.2 1+1 Configurations for Radio Terminals

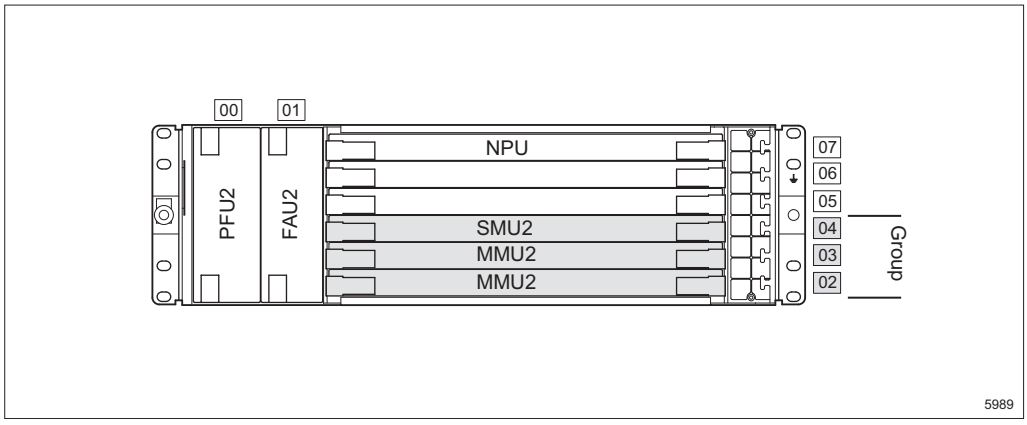

Figure 75 Positioning of the plug-in units for a 1+1 configuration

The MMU2 and SMU2 plug-in units must be placed in a group for a 1+1 configuration.

7.2.1.3 1+1 Configurations for LTU 155

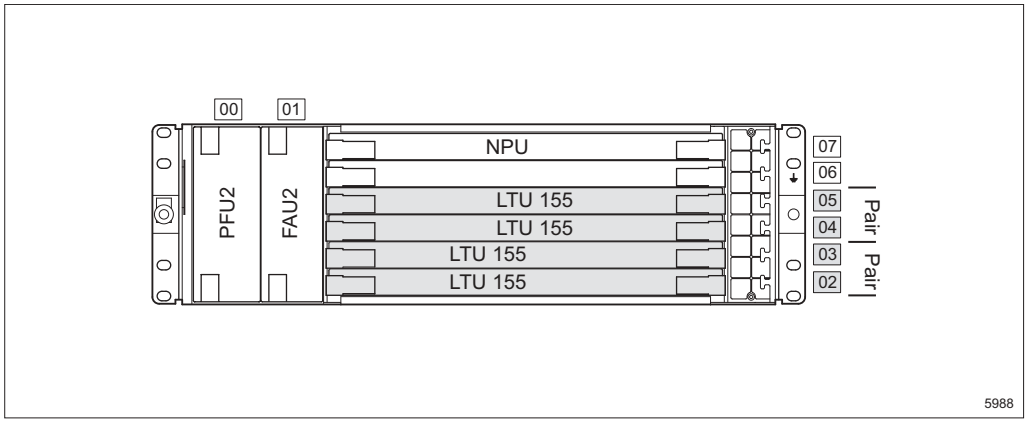

Figure 76 Positioning of the plug-in units for 1+1 configurations

Two LTU 155s must be placed in a pair starting with an even position number for a 1+1 configuration.

7.2.2 Inserting the Plug-in Units

Electrostatic Discharge (ESD) may damage the equipment. Always use an approved antistatic bracelet to avoid damage to components fitted on printed circuit boards.

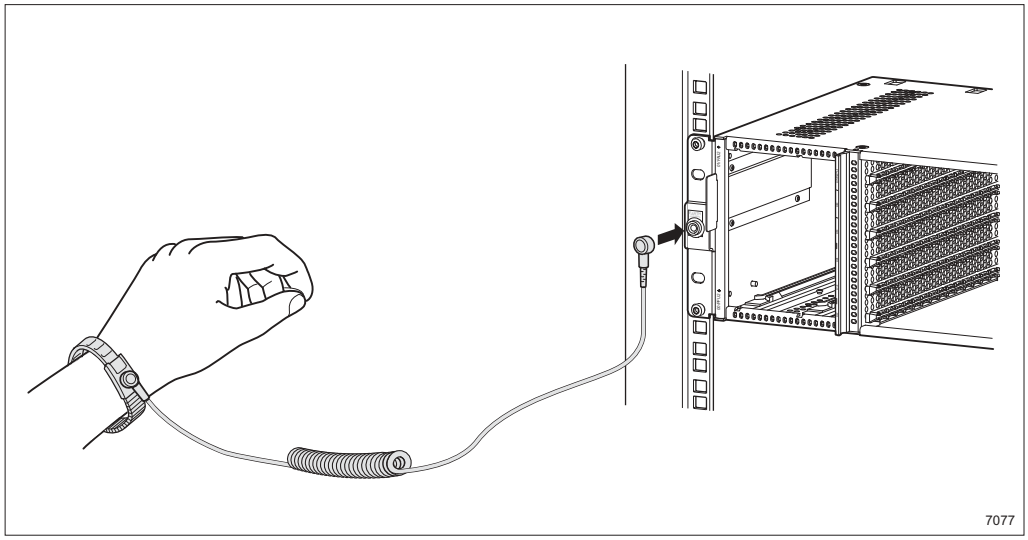

Figure 77 Attaching and connecting the antistatic bracelet

1. Attach the antistatic bracelet to the wrist and plug it into the ESD connector at the front of the magazine.

   Note: The AMM must be grounded.

2. Remove the plug-in unit from the ESD protective packaging.

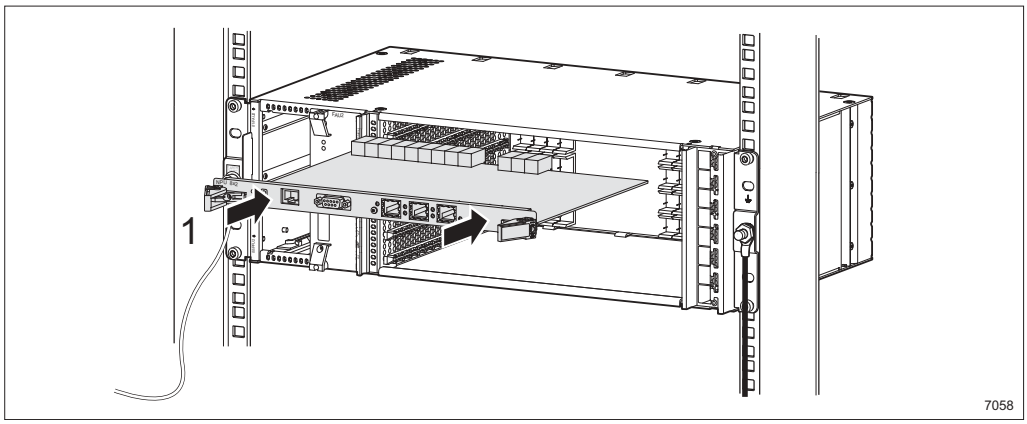

Figure 78 Inserting the plug-in unit

3. Insert the plug-in unit **1**.

   Note: Press in the plug-in unit until it connects to the back of the AMM.

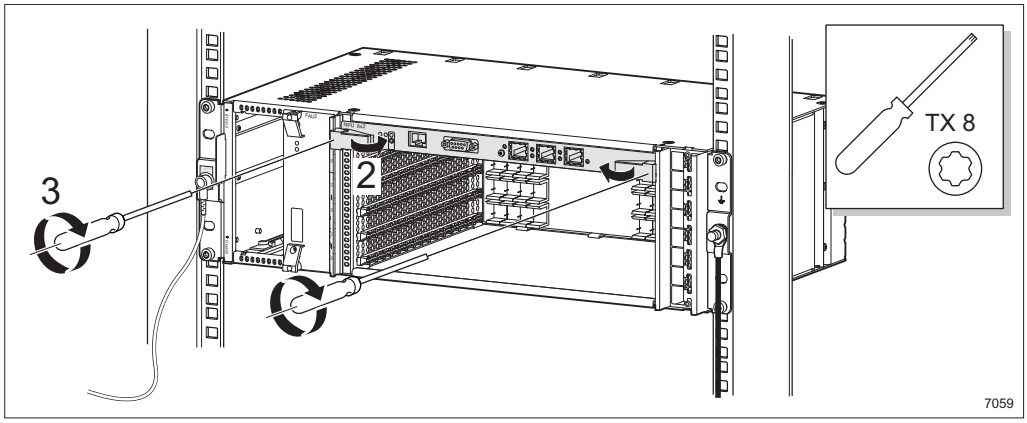

Figure 79 Locking and tightening the plug-in unit

4. Lock the plug-in unit using the two latches **2**.

5. Tighten the two screws to secure the plug-in unit **3**.

7.2.2.1 Inserting the Dummy Units

Caution!

All empty slots must be covered with dummy units to comply with EMC and cooling specifications.

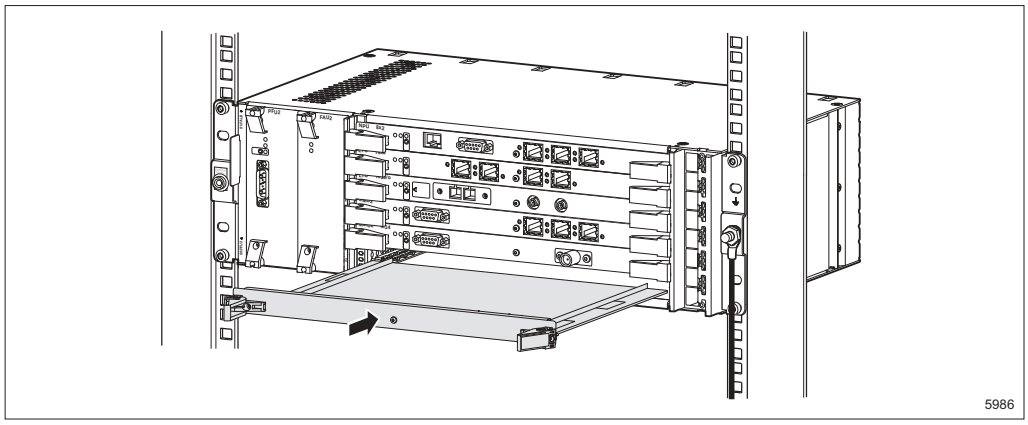

Figure 80 Fitting the dummy units

6. Insert and secure the dummy units in the same way as the plug-in units.

7.2.3 Removing the Plug-in Units

The plug-in units are removed in the reverse order.