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DXX 8100 Hardware Installation

User Manual

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References

Document No.	Document Name
EN/LZB 119 1128	DXX 8100 Managed Access System Node Technical Description
1543-ZAT 759 57/1	DXX 8110 Network Terminating Units CTU-S and CTU-512 Operating Manual
1543-ZAT 759 64	DXX 8110 Network Terminating Unit CTE-S Operating Manual

Terms and Conventions

Term	Explanation
BER	Bit error rate
DAM-connector	Power connector for PFUs
DDF	Digital distribution frame
Duplex type optical cable	Two single optical cables attached to each other from their jackets
EMC	Electromagnetic compatibility
ESD	Electrostatic discharge
FC Optical Adapter	Optical connector used in OTE-LEDs and OTE-LPs
FBU	Flexbus interface unit
FBU Manager	Used for commissioning, configuring and maintaining the DXX 8100 FBU unit
FIU19	Radio indoor unit for x-vendor FlexiHopper and x-vendor MetroHopper
MDF	Main distribution frame
Multimode fibre	Thicker core than in single mode fibre. Light rays are reflected from the edge of the core. For low distances.
x-vendor FlexiHopper	x-vendor's family of Flexbus-compatible microwave radios
ODF	Optical distribution frame
PDF	Power distribution frame
PFU	Power and fuse unit (DXX 8100)
RPS	Remote power supply
RXS-S	Single subrack
RXS-D	Double subrack
RXS-CD	Master subrack
RXS-S8	Single subrack for DXX 8140 midi
RXS-S8-TT	DXX 8140 midi tabletop
RXS-H	Double subrack for DXX 8160 A111
SC Optical Adapter	Optical connector used in STM-1-SH-13 and STM-1-LH-13
Single mode fibre	Fibre that has very thin core (~10µm). Essentially one path for the light to travel. Low attenuation.
Single type optical cable	Single optical cable with single jacket

WARNING! **This equipment may be installed and maintained by service personnel only.**

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1. INSTALLATION

1.1 Mechanical Installation

1.1.1 General

There are four types of cabinets available for the DXX 8100 system: the top and bottom cabled standard cabinets and the top and bottom cabled EMC cabinets which are all of 19” type. It is recommended to use both side plates and doors in any cabinet type. This is safe with the four-shelf (2 x RXS-D or 4 x RXS-S) configuration, the temperature measurements have been carried out at Ericsson AB. All 43U cabinets are equipped with locks.

Standard Cabinet

The standard cabinet is a 43 U high Schroff-based cabinet. It can be used in telestations where EMC class B compliance is not required. The following elements are included in the standard cabinet.

— C profiles for fastening cables

— PFU cabling for supplying power for the PFUs

— Circuit breakers (where the PFU cables are connected)

— Internal grounding bar

The direction of the cabling is normally from the top.

Top and Bottom Cabled EMC Cabinets

EMC cabinets are needed in the European Union in office environment. In telecommunications sites standard cabinets are sufficient because the DXX 8100 hardware is compliant with the EMC class A as itself. The EMC class B is recommended to be reached in office environment and it can be achieved with this Schroff-based EMC cabinet. Top and bottom cabled EMC cabinets are also Schroff-based cabinets. The main difference between them and the standard cabinet is EMC shielded doors (contact springs on them). The power input is also filtered inside the cabinet. These cabinets have the same features for fastening the cables and connecting the PFUs as the standard cabinets do.

Relay Racks

Relay racks can be used in telestations where EMC class A compliance and dust shield are not required. A relay rack includes only a frame where the subracks are installed and a base where the frame stands. This is not recommended for the DXX 8100 installations. There are product packages for grounding and power for relay racks and cabinets supplied by Ericsson AB.

1.1.2 Cabinets

1.1.2.1 Fastening Cabinets

Before starting the installation confirm the right location of the cabinet(s). The cabinet(s) should be fastened to the concrete floor using wedge anchorages. It is always recommended, with any type of cabinet, to fasten it to the floor permanently. The following instructions are valid for Schroff-based cabinets purchased from Ericsson AB. However, the same step list can be used to install any type of cabinet.

Proceed in the following way.

Step 1. Move the cabinet to the right location and remove the front and back panels from the base. There are mounting ears inside the base to which you can attach the wedge anchorages.

Step 2. Mark the places for the wedge anchorages to the floor and move the cabinet away from the installation spot. A cardboard model of the cabinet base can be made to help defining the correct spots for the wedge anchorages.

Step 3. Drill holes for the anchorages with a rock hammer and hit them to the drilled holes using a hand hammer.

Step 4. Lift the cabinet back to its location and fasten the bolts to the base. If the cabinet is of a top cabled type, install also the airflow filter, which should be installed into specific rails inside the base.

Step 5. Set the front/back plate back to its place. If the floor structure is raised, the fastening of the cabinet must be done by using other available methods. This is possible, for instance, by drilling holes to the right, marked positions and fastening the cabinet with long bolts to the raised floor.

1.1.2.2 Installing Cabinets in a Row

Standard and EMC cabinets can also be installed in a row. This is usually done when there are several cabinets in the same telestation. Cabinets are normally equipped with two side plates but when installing cabinets in a row only one plate is needed in the first and the last cabinet. The cabinet(s) between the first and the last one is/are left without side plates.

A special side-by-side kit is included with the cabinets when installation in a row is needed. The kit for the standard cabinet includes only some nuts, bolts and sleeves and a gasket. In addition to these, the kit for the EMC cabinets includes also a metallic frame that is installed between the cabinets to ensure EMC class B compliance.

For the installation, proceed in the following way.

Step 1. Define the right location to install the row of cabinets.

Step 2. Install the cabinets to the floor. It is recommended to use inserts instead of wedge anchorages when mounting the row of cabinets. Otherwise it is very hard to lift the whole row on wedge anchorages that are sticking out of the floor. This problem only occurs with the EMC cabinets. Wedge anchorages can be used with standard cabinets. For the EMC cabinets, the EMC metallic frame should be fastened before laying the cabinets on their places.

Step 3. When the cabinets are in their places, screw four bolts tightly through the special mounting ears inside the base.

Step 4. Mount four sleeves from the side-by-side kit between the panel mounts of the cabinet.

Step 5. Bolts are pushed through the sleeves and fastened with nuts.

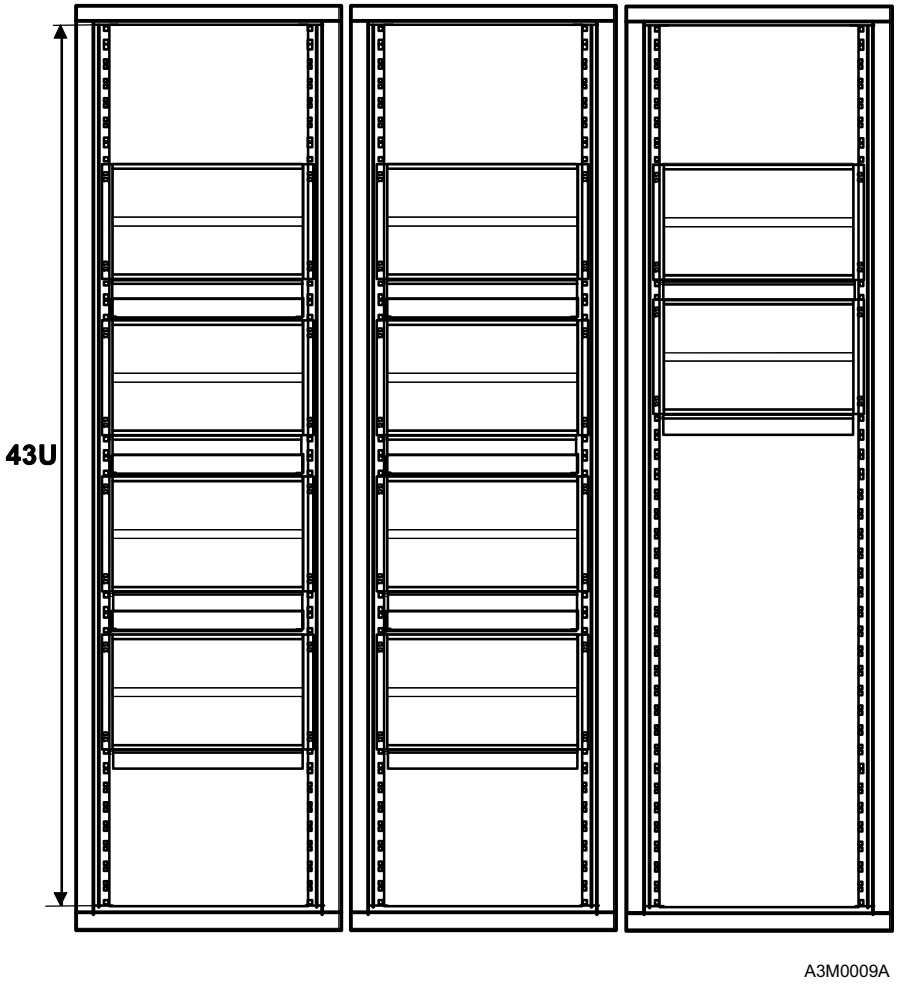

Fig. 1: Full-Size DXX 8170 Cluster Node Installed in Three 19" Cabinets

1.1.3 DXX 8150 Basic and DXX 8140 Midi Subrack Installation

1.1.3.1 General

The subracks RXS-S, RXS-D, RXS-CD and RXS-S8 are intended for installation in a 19" cabinet.

The subrack height is 266 mm (RXS-S) or 577 mm (RXS-D and RXS-CD) and its width without side mounting brackets is 447.8 mm. The subracks can be installed to a cabinet with the minimum depth of 400 mm. The recommended depth is 600 mm.

If possible, use cabinets without doors to ensure free airflow. The backside of the cabinet must be left free because of the subrack cabling. It is not allowed to connect subracks back to back because of excessive heat generation. (For the 600 mm deep cabinet refer to Chapter 1.1.3.2 and Chapter 1.1.3.3.)

Since the units are cabled from the front side, a gap of 44.45 mm or 1.75 inches must be left for a cable duct between the subracks.

The table below shows the main dimensions of different installation alternatives.

Subracks RXS-S and RXS-D (RXS-CD) Installation Dimensions

Subrack	Cabinet	Installation Width (mm)	Installation Depth (mm)	Spacing in Vertical Direction (mm)	Note
RXS-S and RXS-S8	19"	482.6	400	8U (355.6)	(a)
RXS-D and RXS-CD	19"	482.6	400	15U (666.75)	(a)

(a) An air duct should be left between the rear of the subrack and the back door of the cabinet.

At least a 2U (88.9 mm) high opening must be left at the bottom of the rack for sufficient air intake (in Fig. 2 the free space is 6U).

If several subracks are mounted in a 19" cabinet, an air deflector plate (#883200220) should be used between the subracks. The lowest subrack in the cabinet does not need the air deflector plate.

Fig. 2 shows an example of an installation in a 19" cabinet (height 43U). The minimum space of 2U (88.9 mm) is required at the bottom of the cabinet for the intake of fresh air. An air deflector plate should be installed between every subrack. An air duct (depth over 120 mm) should be left between the rear of the subrack and the back panel of the cabinet. The top and the bottom plate, the back and front doors and the base of the cabinet must be equipped with sufficient vent slots, and a minimum space of 1U (44.45 mm) is required at the top of the cabinet for the outflow of warm air.

1.1.3.2 Installation Option: 600-mm Deep Cabinets

When installing nodes to cabinets, it is very important to know how many subracks a cabinet can accommodate. The depth and width of a cabinet is 600 mm. The maximum installation options are listed below.

— 43U high cabinet (doors and side plates installed): Four shelves

— 47U high cabinet (doors and side plates installed): Five shelves

— Open frame/relay rack (no doors, side plates, top plate): Six shelves

— DXX 8160 A111 subracks with a FAN unit, regardless of the cabinet type: Six shelves

— DXX 8160 A111 subracks without a FAN unit in a 43U high cabinet (doors and side plates installed): Four shelves

— Back to back installation cannot be applied with 600 mm cabinet regardless of the height, since there will not be enough free space between the subracks

RXS-D/CD has two shelves, RXS-S one shelf and RXS-S8 or double RXS-S8 are assumed to have one shelf.

1.1.3.3 Installation Option: 800-mm Deep Cabinets

The same installations mentioned in the previous chapter can be done to 600 mm * 800 mm cabinet. The cabinet is the same but the depth is 800 mm instead of 600 mm. Back-to-back installation can be used with the 800 mm cabinet. In this case four shelves in both sides is the maximum (one shelf for single subrack and two shelves for double subrack).

There are two ways of using the 800 mm cabinet for back-to-back installation.

Open cabinet installation in which the doors and sideplates are not used requiring the following conditions.

— Maximum of 4 shelves in both sides in 600 x 800 x 43U cabinet

— Back-to-back: minimum of 200 mm between the backsides of the subrack left for airflow

— Both sides assembled according to the HW installation rules

— Room temperature must not exceed 30°C

— DXX 8160 A111 nodes must be equipped with a FAN unit

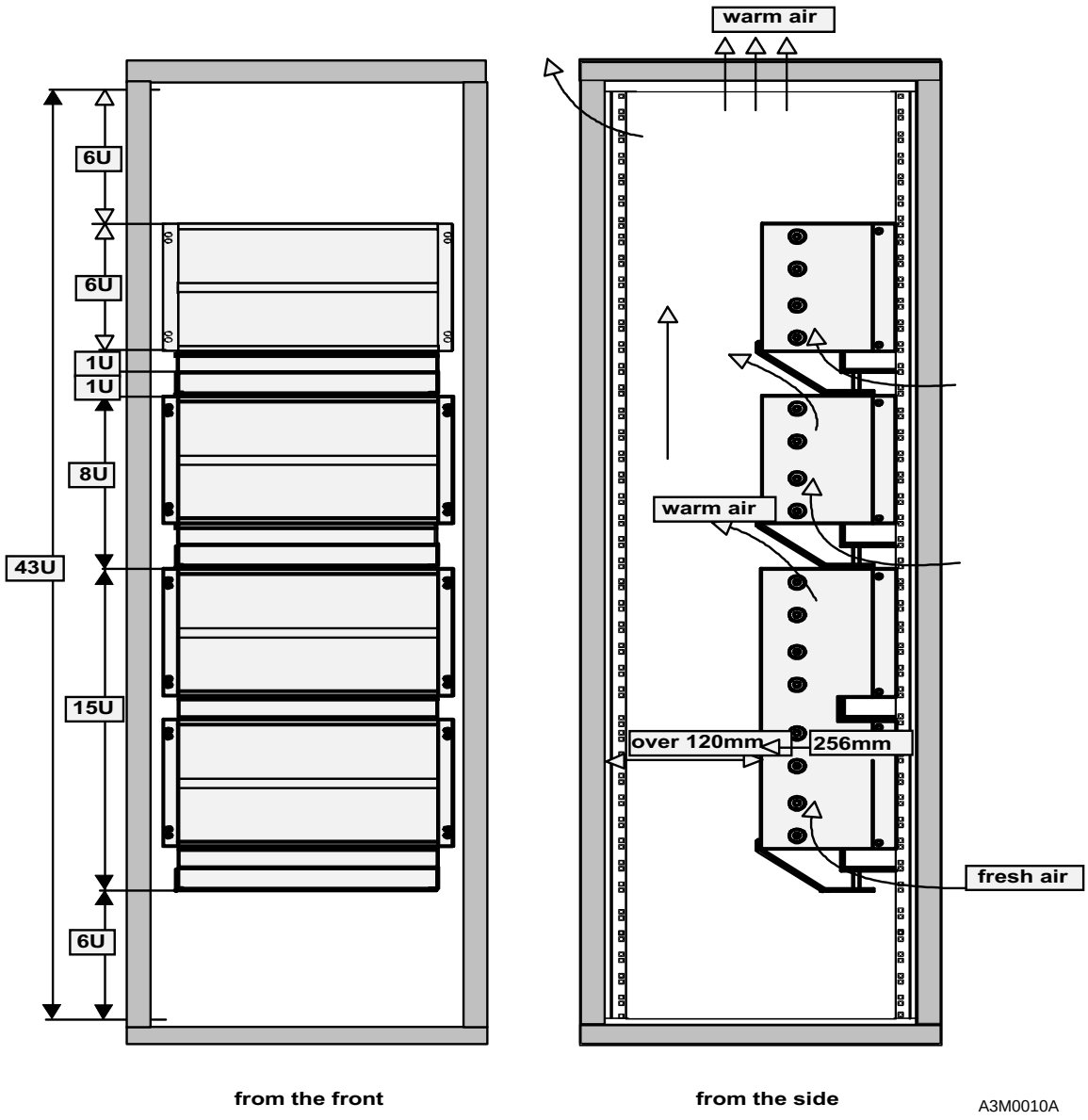

Fig. 2: RXS-S and RXS-D Subracks in a 43U High 19" Cabinet

Installation of the doors and sideplates requiring the following conditions.

— Top fans for the air suctioning

— Minimum of 200 mm between the subracks

— Guaranteed free airflow

— Both sides assembled according to HW installation manual

1.1.3.4 DXX 8150 Basic (Single and Double) Subrack Installation in a 19” Cabinet

The part numbers in the instruction below refer to Fig. 3 (DXX 8150 basic single subrack) and Fig. 4 (DXX 8150 basic double subrack).

Step 1. The subrack is installed in a 19" rack by using two 80 x 23 x 3 mm size angle profiles.

- Before fastening the angle profiles, use them to measure the correct places for cage nuts (M6-8) in cabinet (the cage nuts are used to fasten the subrack to the cabinet).
- These profiles are mounted under the M5x10 size hex recessed head screws which fasten the subrack´s front profiles to the side panels.
- Using a 4 mm Allen key, the two hex recessed head screws on one side are detached one at a time.
- The profile is mounted under the screw. The screw is tightened with fingers.
- When the profile is under both of the screws, the screws are tightened with the Allen key.
- The angle profile of the other side is mounted similarly.
- If the hex recessed heads are too high and hinder installation, M5x10 size pan head screws can be used instead of the original screws.

Step 2. The cable channel (#6) included in the installation accessories is mounted to the lower guide grating of the subrack with three M3x8 DIN965 screws.

Step 3. The air deflector plate (#5) is mounted to the rear of the subrack with four M3x8 size pan head screws and to the cable channel with two M3x8 size pan head screws and support ribs (#3).

Step 4. The subrack is grounded with a separate grounding cable (#8) which is included in the installation accessories of the subrack. The cable is attached under the mounting screw of the subrack’s lower rear profile.

- A star washer must be inserted between the conductor lug terminal and the side panel to ensure electrical continuity between the subrack and the grounding conductor.

Step 5. Lift the subrack to its place and use 4 M6x15 cage screws to fasten the subrack to the cabinet (the screws correspond to the cage nuts).

NOTE!	**The cable channel, the air deflector plate and the grounding cable are attached to the subrack before installation in the rack.**

NOTE!	**Check that the extender card that connects the upper and lower shelf to each other in the double subrack (RXS-D) is plugged in properly.**

NOTE!	**Check that there are two jumpers connected to the extension card of the double subrack lower shelf. There should be a jumper connection in the upper two pins of both pin groups. (The upper group contains seven pins, and the lower group three pins.)**

Assemble the numbered parts of the DXX 8150 basic node single subrack as described above.

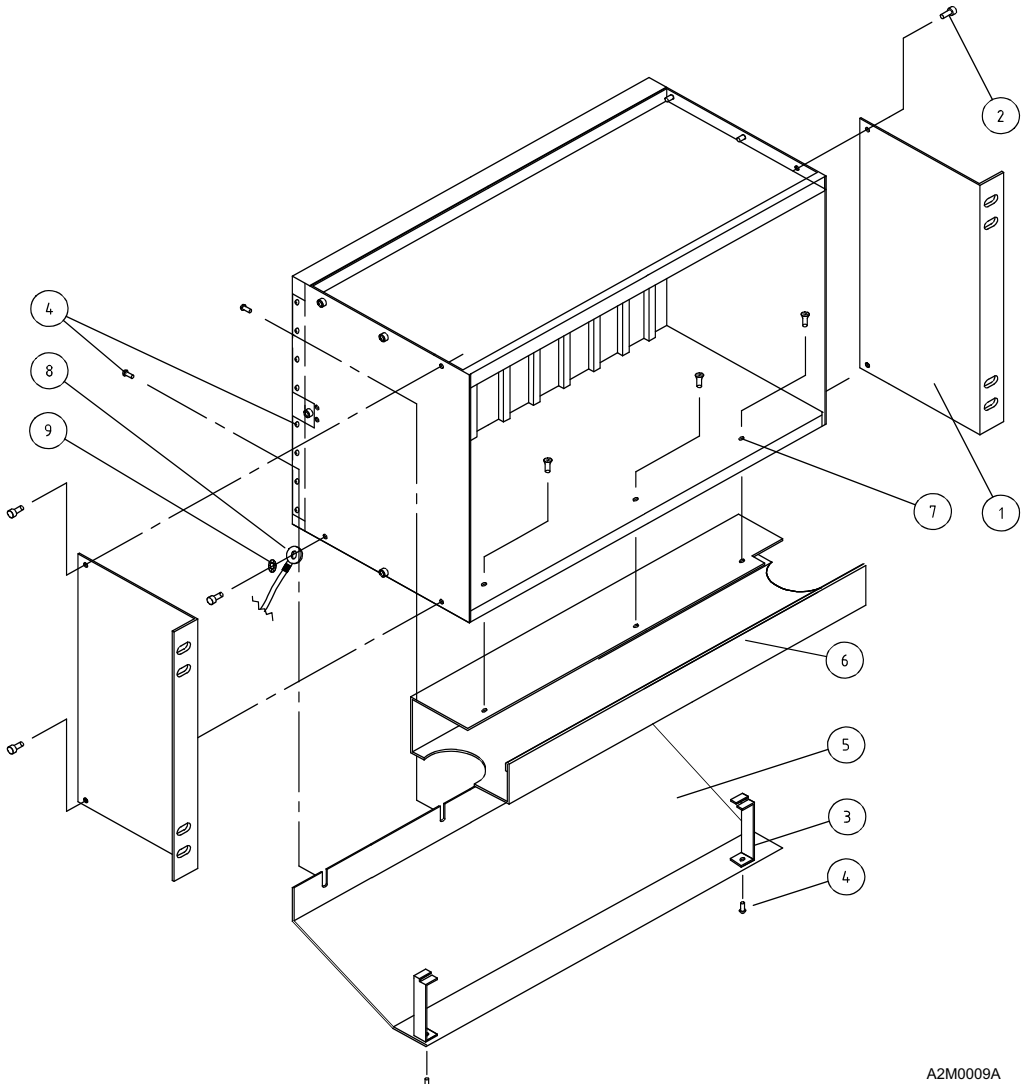

Fig. 3: Mounting 19" Cabinet Installation Accessories

Number	Title	Pcs.
1	Front mounting angle	2
2	M5x10, LK, HEX, DIN 912 (preassembled in the subrack)	-
3	Support rib	2
4	M3x8, LK, PZ, DIN 7985	6
5	Air deflector plate	1
6	Cable channel	2
7	M3x8, UK, PZ, DIN 965	3
8	Grounding cable 1.0 m	1
9	Star washer, M5, DIN 6798A	1

Assemble the numbered parts of the DXX 8150 basic node double subrack above. See the detailed instructions on the right side of the figure for a mounting suggestion for the cable channel between the upper and lower part of the DXX 8150 basic double subrack.

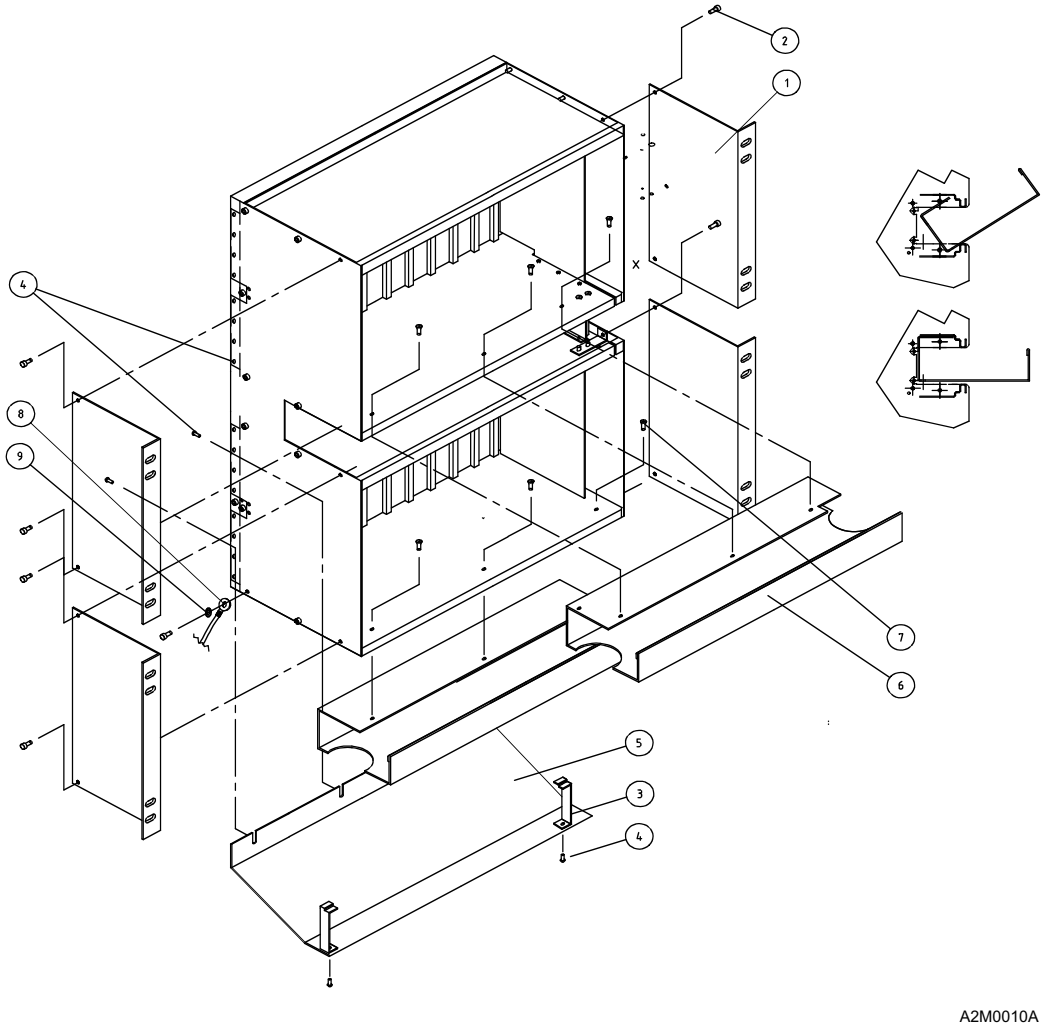

Fig. 4: Mounting 19" Double Cabinet Installation Accessories

Number	Title	Pcs.
1	Front mounting angle	4
2	M5x10, LK, HEX, DIN 912 (preassembled in the subrack)	-
3	Support rib	2
4	M3x8, LK, PZ, DIN 7985	10
5	Air deflector plate	1
6	Cable channel	2
7	M3x8, UK, PZ, DIN 965	6
8	Grounding cable 1.0 m	1
9	Star washer, M5, DIN 6798A	1

1.1.3.5 DXX 8140 Midi Single Subrack (RXS-S8) Installation in 19" Cabinet

Assemble the numbered parts of the DXX 8140 midi node single subrack in the given order. The long mounting angle can be placed on either side. The part numbers in the instructions refer to Fig. 5.

Step 1. The subrack is installed in a 19" rack by using one short (#1) and one long (#2) mounting angle.

- Before fastening the angle profiles, use them to measure the correct places for cage nuts (M6-8) in the cabinet (the cage nuts are used to fasten the subrack to the cabinet).
- Tighten the M5x10 size hex recessed head screws (#4) to the mounting angle (#1 or #2).
- If the hex recessed heads are too high and hinder installation, M5x10 size pan head screws can be used instead of the original screws.

Step 2. The cable channel (#11) included in the installation accessories is mounted to the subrack using two M3x8 DIN 965 screws.

Step 3. The air deflector plate (#10) is mounted to the rear of the subrack with two M3x8s (#9).

Step 4. The subrack is grounded with a separate grounding cable (#5) which is included in the installation accessories of the subrack. The cable is attached under the earthing nut (#7) of the subrack's rear.

- A star washer (#6) must be inserted between the conductor lug terminal and the side panel to ensure electrical continuity between the subrack and the grounding conductor.

Step 5. Lift the subrack to its place and use four M6x15 cage screws to fasten the subrack to the cabinet (the screws corresponds to the cage nuts).

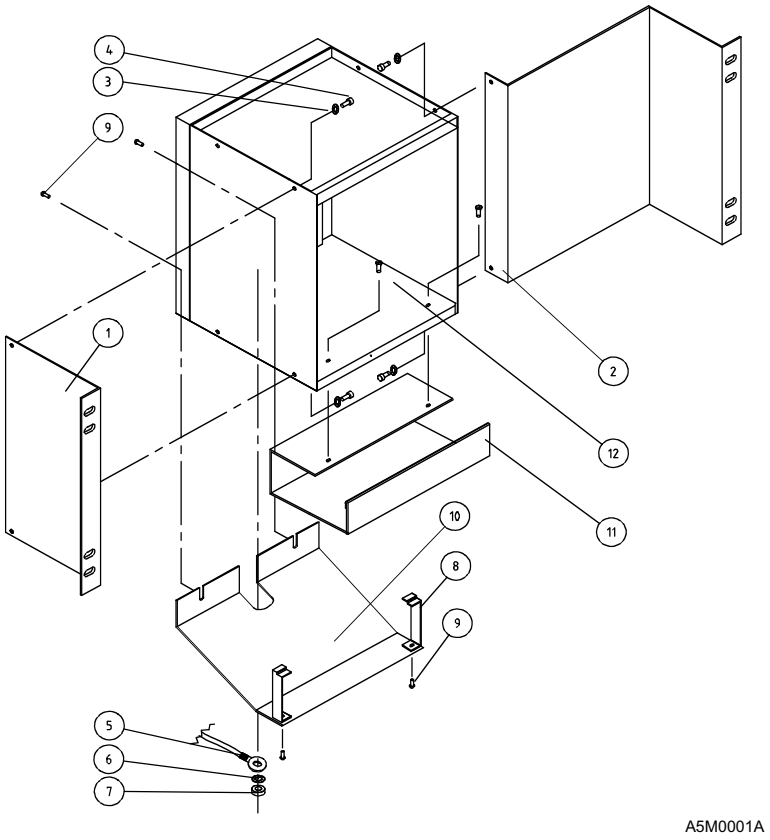

Fig. 5: DXX 8140 Midi Single Subrack Assembly and Installation

Number	Title	Pcs.
1	Front mounting angle, short	1
2	Front mounting angle, long	1
3	Star washer, M5, DIN 6798A	4
4	M5x10, LK, HEX, DIN 912	4
5	Grounding cable 1.1 m	1
6	Star washer, DIN 6798A	1
7	Nut, M6, DIN 934	1
8	Support rib	2
9	M3x8, LK, PZ, DIN 7985	4
10	Air deflector plate	1
11	Cable channel	1
12	M3x8, UK, PZ, DIN 965	2

1.1.3.6 DXX 8140 Midi Double Subrack (two RXS-S8s) Installation in a 19" Cabinet

A DXX 8140 midi node double subrack is actually formed of two RXS-S8s, DXX 8140 midi single subracks. The part numbers mentioned in the instructions below refer to Fig. 6.

Step 1. Connect the DXX 8140 midi single subracks to each other with four M5x10 size hex recessed head screws (#3) and nuts (#1). Use a star washer (#2) under the screw.

Step 2. The DXX 8140 midi double subrack is installed in a 19" rack by using two 105 x 26 x 2 mm size angle profiles for one shelf.

- Before fastening the angle profiles, use them to measure the correct places for cage nuts (M6-8) in the cabinet (the cage nuts are used to fasten the subrack to the cabinet).
- Tighten the M5x10 size hex recessed head screws (#3) to the mounting angle (#4).
- If the hex recessed heads are too high and hinder installation, M5x10 size pan head screws can be used instead of the original screws.

Step 3. The cable channel (#11) included in the installation accessories is mounted to the subrack using two M3x8 DIN 965 screws (#12).

Step 4. The air deflector plate (#10) is mounted to the rear of the subrack with two M3x8s (#9).

Step 5. The subrack is grounded with a separate grounding cable (#5) which is included in the installation accessories of the subrack. The cable is attached under the earthing nut (#7) of the subrack's rear.

- A star washer (#6) must be inserted between the conductor lug terminal and the side panel to ensure electrical continuity between the subrack and the grounding conductor.

Step 6. Lift the subrack to its place and use four M6x15 cage screws to fasten the subrack to the cabinet (the screws correspond to the cage nuts).

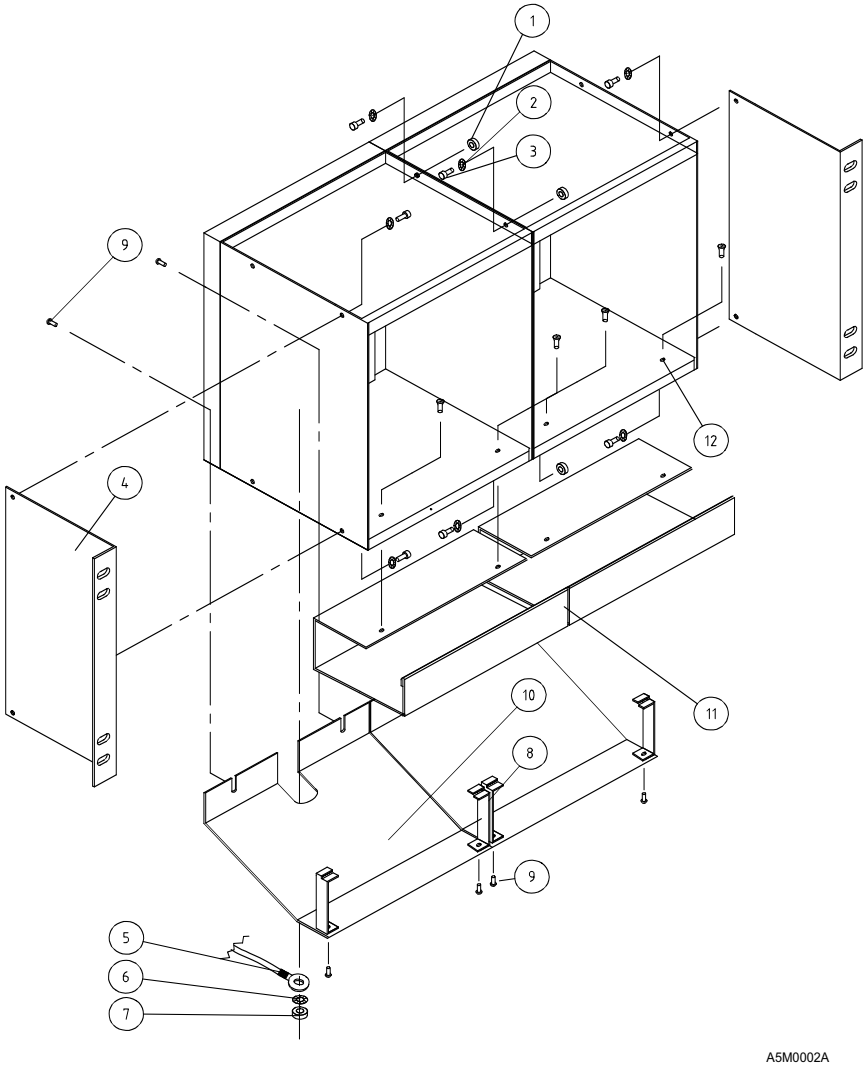

Fig. 6: DXX 8140 Midi Double Subrack Assembly and Installation

Number	Title	Pcs.
1	Nut, M5, DIN 934	4
2	Star washer, M5, DIN 6798A	8
3	M5x10, LK, HEX, DIN 912	8
4	Front mounting angle, short	2
5	Grounding cable 1.1 m	2
6	Star washer, DIN 6798A	2
7	Nut, M6, DIN 934	2
8	Support rib	4
9	M3x8, LK, PZ, DIN 7985	4
10	Air deflector plate	2
11	Cable channel	2
12	M3x8, UK, PZ, DIN 965	4

1.1.3.7 DXX 8140 Midi Node Table Top Installation Options

NOTE! **For safety reasons DXX 8140 midi node must be permanently connected to earth when using interfaces for external connections.**

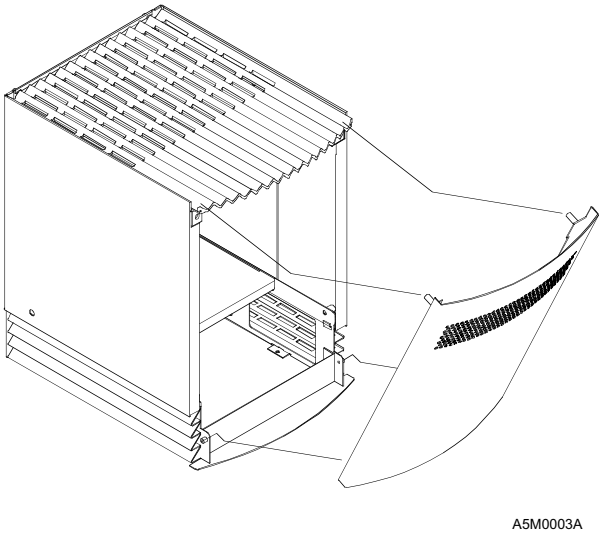

Fig. 7: How to Remove DXX 8140 Midi Node Front Cover

NOTE! **Hint: Place your fingers on the sides of DXX 8140 midi node and your thumbs on the upper edge of the front cover. Pull with your thumbs towards yourself. There are hinges at the bottom, but you can remove the door by lifting it up.**

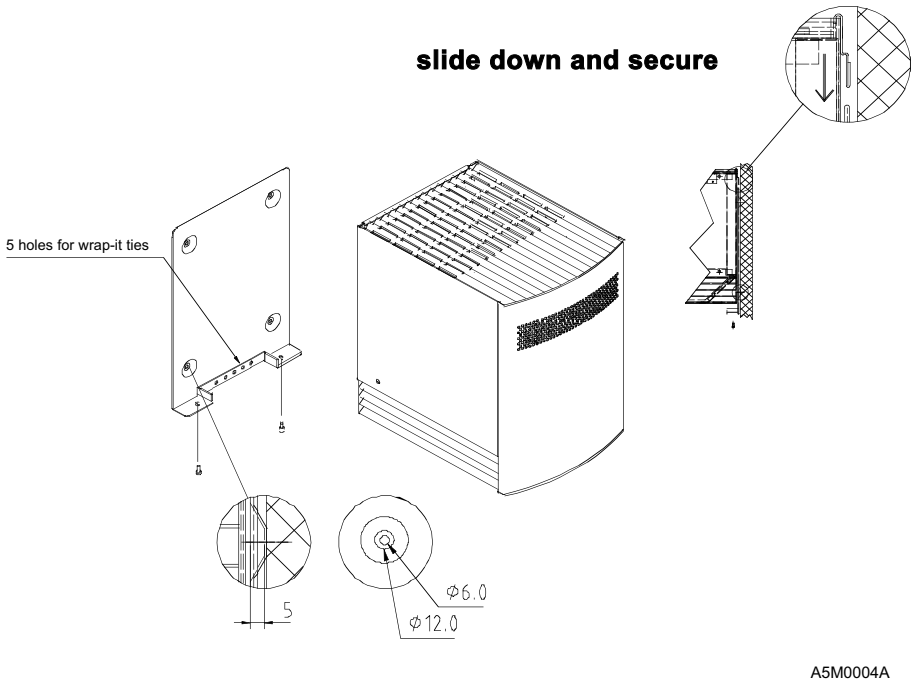

Fig. 8: Wall Installation

1.1.3.8 Unit Mechanical Installation

The units of a DXX 8100 cross-connect node have a modular structure. The design utilizes a standard base unit shown in Fig. 9. The main parts of the base unit are listed in the following.

1. Main unit with base mechanics (EMC shields) and two euro connectors, which connect the unit to the motherboard of a subrack
2. Interface modules. A typical interface unit comprises of two interface modules. A module includes its own front panel (EMC shield) without any text.
3. Unit power supply module PDF
4. Front panel assembly
5. Fastening screws for front panel
6. Fastening bar

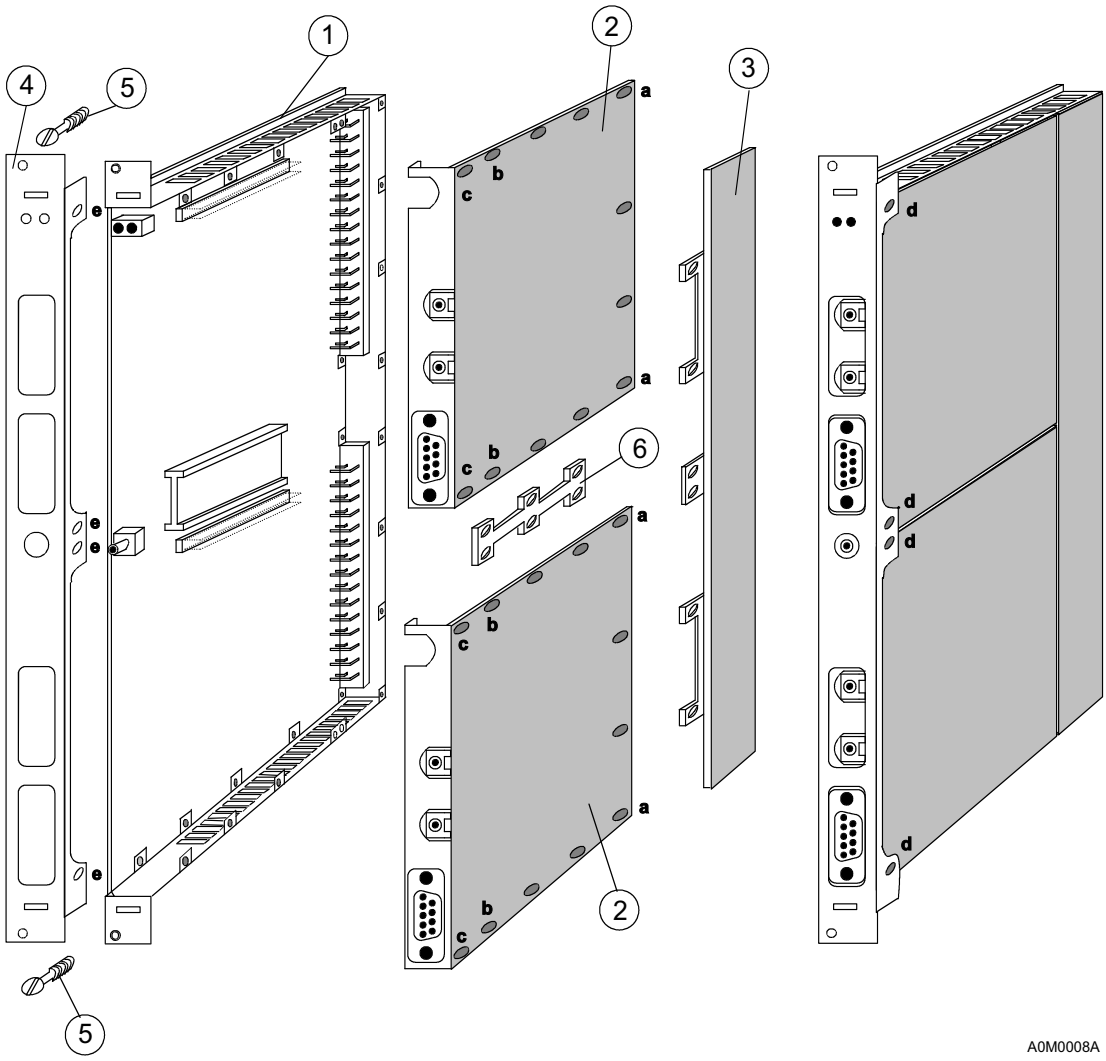

Fig. 9: Main Parts of the Base Unit

M2.5x4 (shorter) and M2.5x6 (longer) screws are delivered with the unit. The modules are fastened to the main unit with M2.5x4 screws. The front panel is fastened to the unit with M2.5x6 screws.

In most cases the power module is already fastened to the main unit in the factory.

NOTE! **When installing modules, be careful not to scratch the surface of the printed circuit boards and not to bend any components or their legs.**

Proceed as follows to assemble the interface modules and the front panel.

Step 1. Check that the strappings of the interface modules are correct for your application. For strapping instructions see the relevant technical descriptions of interface modules and units in *DXX 8100 Managed Access System Node Technical Description* (document number EN/LZB 119 1128). First take the module which you want to install to the upper module position.

- Fasten the fastening bar to the bottom of the module (the side where the components are) with three short screws.
- The screws are secured in the three holes in the middle of the module.
- Do not fasten the screws tightly yet because the bar should move a little to help the installing of the screws of the lower module.
- When the unit is ready, the bar connects the interface modules to each other and is a part of the EMC shield of the unit.
- In Fig. 9 the fastening bar can be seen in the middle of the unit between the interface modules.

Step 2. Install the upper module in the main unit.

- The pin connector of the main unit near the LED holder should go into the connector near the upper edge of the interface module.
- When connecting the interface modules to the pin connectors, do not bend the pins of the connectors.
- Check very carefully that the pins are set into the connectors in the correct position.
- Check that the screw holes of the main unit are exactly on the screw holes of the interface module.
- The gap between power module and the back edge of the interface module should be about 0.1…1.0 mm.

Step 3. Install the lower module in the main unit.

- The pin connector of the main unit near the measurement connector and the EPROM should go into the connector near the upper edge of the interface module.
- Do not bend the pins of the connectors.
- Check very carefully that the pins are set into the connectors in the correct position.
- Check that the screw holes of the main unit are exactly on the screw holes of the interface module.
- The gap between the power module and the back edge of the interface module should be about 0.1…1.0 mm.

Step 4. There are now two interface modules in the main unit. Secure the fastening screws of the modules.

- Start with the shorter (M2.5x4) screws. Secure them on the corners of the modules near the power module: in the fourth hole from power module on the upper and lower edge of the unit. (See Fig. 9, holes **a**.)
- Do not secure the screws nearest to the front edge of the unit because they are reserved for fastening the front panel. (See Fig. 9, holes **c**.)

Step 5. When tightening the screws, do not use too much force.

Step 6. Secure the fastening screws of the fastening bar on both modules.

Step 7. Secure the rest of the fastening screws starting from the left side of the unit; see Fig. 9, beginning from holes **a** towards holes **b**.

- 20 screws for the modules should be tightened now.

Step 8. Turn the unit left side up.

- There are eight holes near the front edge of the unit. Four of them are used for module screws. (see Fig. 9 and Fig. 10)
- The holes near the upper and lower edge and the two holes in the middle of the unit are for the front panel. See Fig. 9, hole **d**.
- Secure the module screws.

Step 9. The interface modules are now installed. Make sure that no loose parts are left inside the unit.

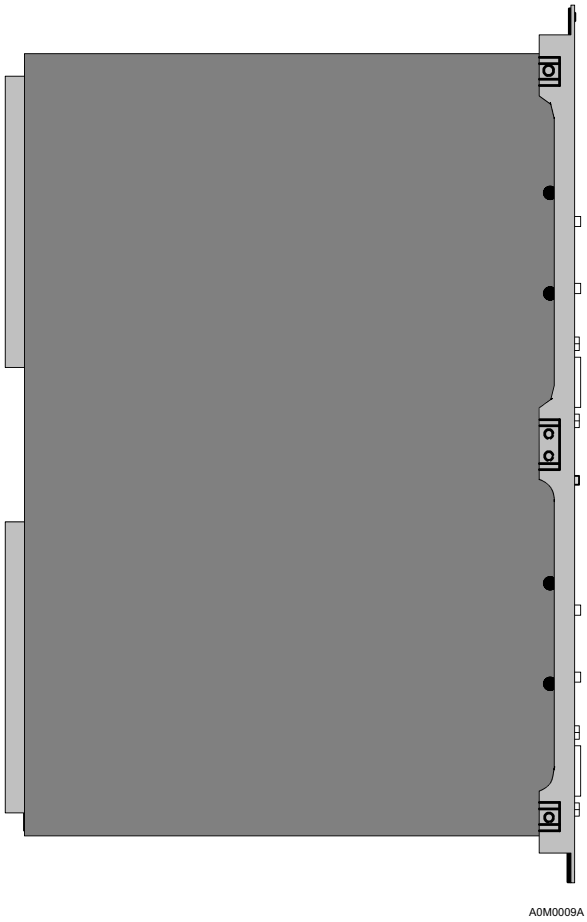

Fig. 10: Left Side of Composed Unit

On the upper edge of the front panel there is the unit type text (GMH, for example), holes for the front panel screw, holes for out-pulling hook and two round holes for LEDs.

— Install the front panel carefully on the unit.

— Take care that the LEDs come correctly through the holes.

— If the modules are installed correctly, there are no screws on the holes to fasten the front panel.

— If there are any screws in the holes reserved for the front panel (Fig. 9, hole **d**), remove them and do not use too much force to push the panel onto its place.

Step 10. Use the longer screws (M2.5x6) to secure the front panel.

— Secure four screws on both sides of the unit (eight altogether). The holes for the screws are on the upper and lower edge and in the middle of the unit. (Fig. 9, hole **d**).

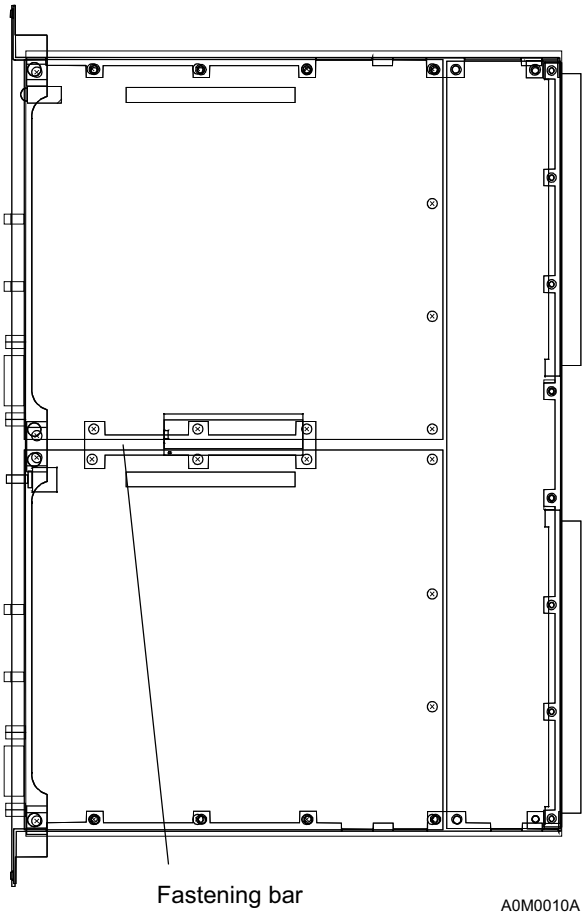

Fig. 11: Right Side of the Composed Unit

Step 11. Install the front panel screws.

— The holes for the front panel screws are on the front panel assembly and in the frame of the unit.

— The holes are the uppermost and the lowermost holes on the front panel.

— Tighten the screws to their places with your fingers. Do not use too much force or any tools to install these screws.

Step 12. An insulation strip is needed on some units. Usually it is already installed by the factory.

Step 13. The unit is now ready for use. Check that all screws are tightened and all parts and connectors are in good condition.

1.1.3.9 Front Panel Assembly

The front panel assembly is designed to meet EMC norm ETS 300 386-2:1997. It replaces the old front panel.

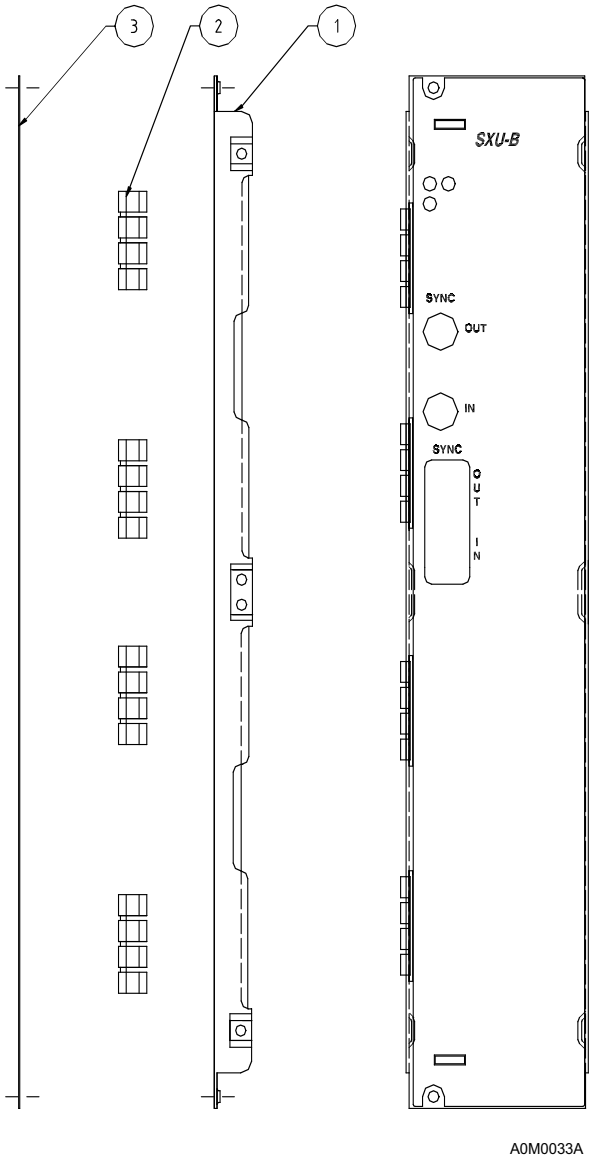

Fig. 12: Front Panel Assembly

1. Slide in the contact springs (#2) to the shield plate (#1).
2. Tighten the front plate (#3) with two M2.5x4, DIN 965 screws.
3. Fasten the front panel neck screw (#5).

1.1.3.10 Inserting Units

NOTE! **Before inserting units to the subracks, make the grounding according to the instructions in Chapter 1.2 on grounding.**

You will need at least the following items for the installation of a DXX 8150 basic or DXX 8140 midi node.

— a DXX 8150 basic single, DXX 8150 basic double or DXX 8140 midi subrack

— a fuse unit or fuse units or an AC power unit

— XCG (in DXX 8150 single or DXX 8140 midi subrack only) or SCU and SXU-A/SXU-B

Channel units can be installed at the beginning or they can be added later.

Step 1. The mechanical installation of the subrack is completed.

Step 2. All unit or module strapping options must have been prepared before the installation of the units. For further information on strapping refer to the relevant technical descriptions of the interface units and modules in *DXX 8100 Managed Access System Node Technical Description* (document number EN/LZB 119 1128). (Normally there is no need to change the strapping, since it is done in production in the test phase).

Step 3. The first step is to place the units into the subrack. Use an ESD wrist band connected to a subrack or cabinet before plugging in the units. The installation of the units to DXX 8160 A111 is explained in Chapter 1.1.4.

— The fuse or power units are placed at the left side of the subrack starting from slot #1.

— In the DXX 8150 double subrack, fuse or power units are placed on both shelves starting from slot #1 and #17.

— The SCU must go into slot #16 in a DXX 8150 single/DXX 8150 double subrack and in slot #8 in a DXX 8140 midi subrack.

— If an XCG is used instead of an SCU with SXU-A or SXU-B, it must go into slot #16 in a DXX 8150 single subrack and into slot #8 in a DXX 8140 midi subrack.

— The cross-connection units must be placed as follows.

Unit	Protection	Slot (DXX 8150 Basic Single or DXX 8150 Basic Double)	Slot (DXX 8140 Midi)
SXU-A	unprotected	15	7
SXU-B	unprotected	14	6
SXU-A	protected	15 and 14	7 and 6
SXU-B	protected	14 and 12	6 and 4

— Channel units can be inserted into free slots #2-14 or #18-32 in a DXX 8150 double subrack.

— Do not install the channel units in slots #12-13 in a DXX 8150 single/DXX 8150 double subrack or in slot #4-5 in a DXX 8140 midi subrack with an unprotected SXU-B **OR**:

in slot #14 in a DXX 8150 single/DXX 8150 double subrack or in #6 in a DXX 8140 midi subrack with an unprotected SXU-A if the protection option needs to be changed later on.

— There is one rule to remember for slot #32: No control channel can be used through the interface of the unit in slot #32. In practice, this is not a limitation because the required control channels can be implemented by using unit slots other than slot #32.

Unit cabling can be done by using the unit cabling data about the pins and the signals of the DXX 8100 units. For further information refer to the relevant technical descriptions of interface units in *DXX 8100 Managed Access System Node Technical Description* (document number EN/LZB 119 1128).

NOTE! **Unused unit positions must be covered with 5T cover plates to fulfil the EMC requirements.**

NOTE! **Insert the units in the subracks only after the subracks are installed in the cabinets. Do not transport furnished subracks!**

1.1.4 DXX 8160 A111 Subrack Installation

1.1.4.1 DXX 8160 A111 Subrack Installation in 19” Cabinet

The DXX 8160 A111 subrack RXS-H is a double subrack intended for installation in a 19” cabinet. Mechanically it is similar to the existing double subrack RXS-D used in DXX 8150 basic and 8170 cluster nodes. Different backplanes make them however incompatible. Another difference is that RXS-H is made of stainless steel in order to give more tolerance against corrosion.

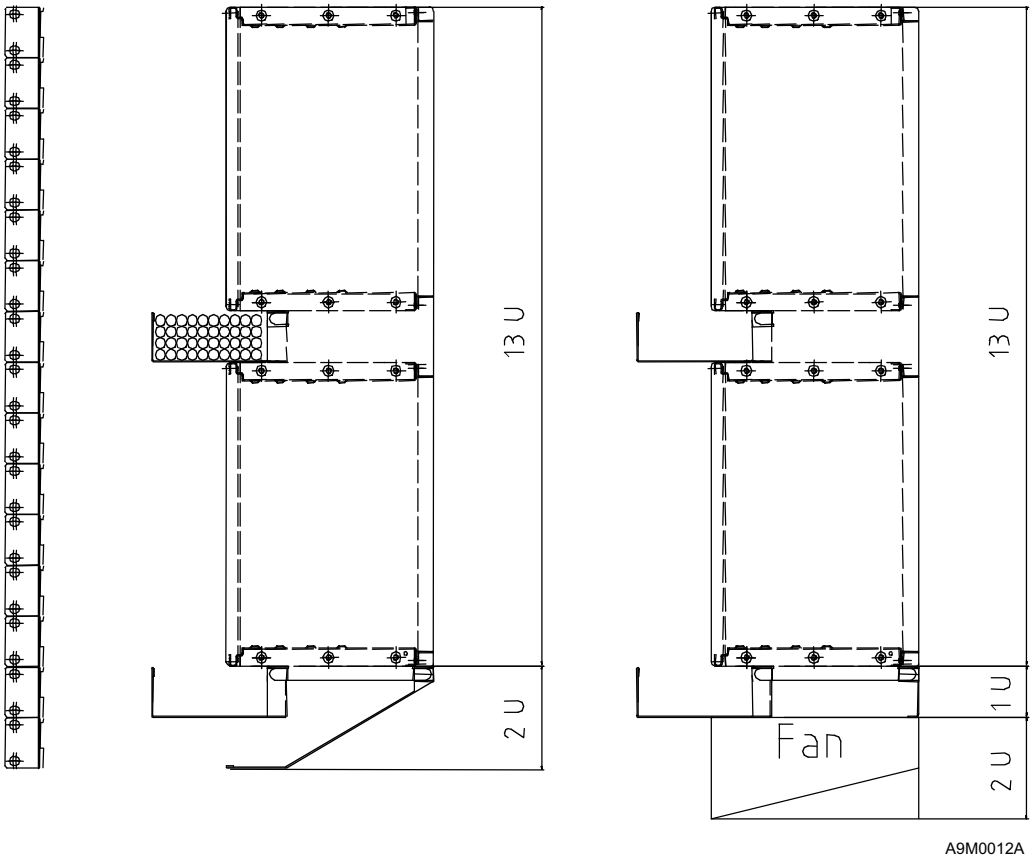

Fig. 13: Sideview of RXS-H Subrack

Fig. 13 shows the RXS-H subrack as seen from the side. The width of RXS-H makes it suitable for installation in a standard 19” cabinet. With special brackets the subrack can be installed in an ETSI cabinet as well. The total height of the subrack is 13 U + 2 U without the FAN unit and 13 U + 3U with the FAN unit. The dimensions of the subrack are 451 x 195 x 577 mm (W x D x H). Two subracks can be installed in a 43U cabinet. If two DXX 8160 A111 subracks are installed in the same cabinet, or relay rack and FAN units are used, a free space of 1U must be left between the subracks. See Fig. 14. If the FAN units are not installed, the 1U free space should not be left.

If it is known that there is a need to install a FAN unit afterwards, a 2U space should be left between the subracks.

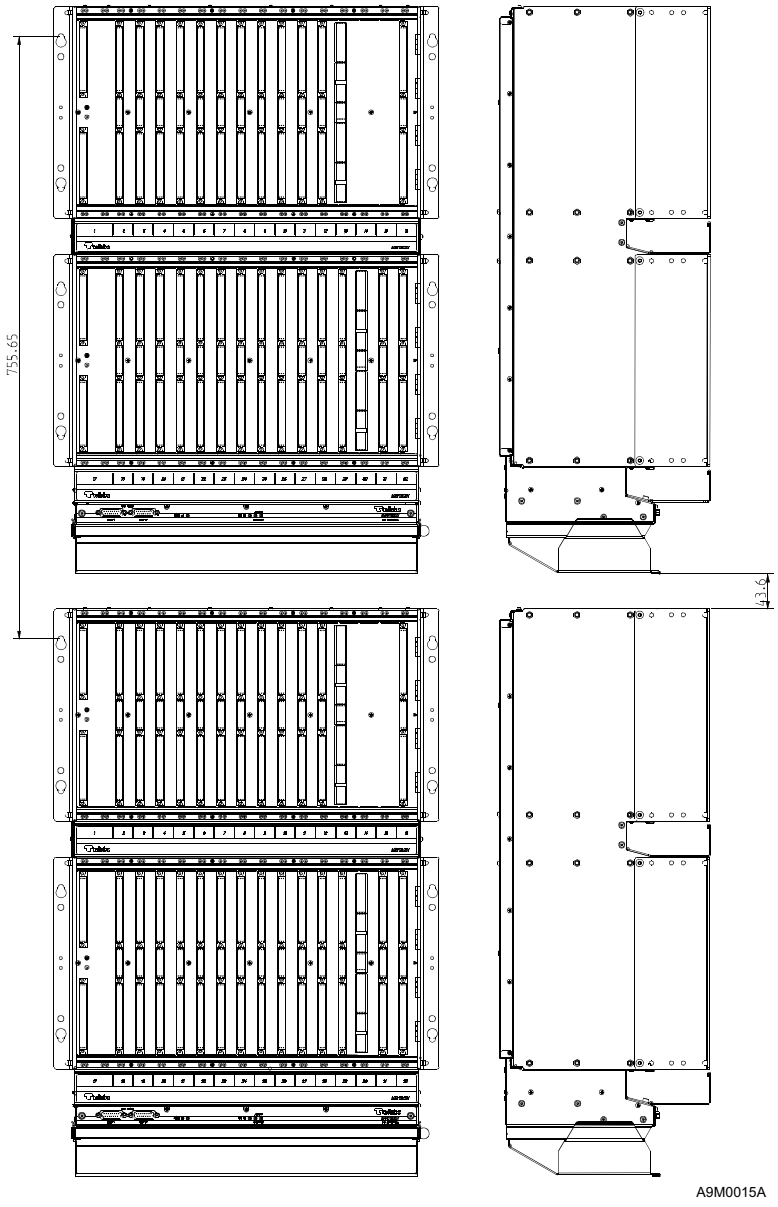

Fig. 14: 1U Free Space between Two DXX 8160 A111 Subracks with FAN Units

The FAN unit is located under the subrack. It is optional and needed only when the outside temperature is over +30°C or the power consumption of the subrack higher than 200 W. See below for the description of installing a FAN unit RKS706.

The SCU-H unit controls the speed of the fans on the basis of temperature measurement and also gets alarms if the fans are not working properly.

RXS-H Assembly

The part numbers in the instruction below refer to Fig. 15 (DXX 8160 A111 double subrack).

Step 1. The subrack is installed in a 19" cabinet by using four 19" size angle profiles.

- Before fastening the angle profiles, use them to measure the correct places for cage nuts (M6-8) in the cabinet (the cage nuts are used to fasten the subrack to the cabinet).
- These profiles are mounted under the M5x12 size hex recessed head screws, which fasten the front profiles of the subrack to the side panels.
- The profile is mounted under the screws.
- When the profile is under both screws, they are tightened with the Allen key.
- The angle profiles of the other side/shelf are mounted similarly.

Step 2. The cable channel (#4) included in the installation accessories is mounted to the lower guide grating of the subrack with three screws for cable channel.

Step 3. The air deflector plate (#8) is mounted to the rear of the subrack (pins of the deflector plate corresponding to the holes at the back of the subrack) and to the cable channel with two M4x5 size screws.

Step 4. The subrack is grounded with a separate grounding cable, which is included in the subrack's installation accessories. The cable is attached under the mounting screw of the subrack's lower rear profile.

- A star washer must be inserted between the conductor lug terminal and the side panel to ensure electrical continuity between the subrack and the grounding conductor.

Step 5. Lift the subrack to its place and use eight M6x15 cage screws to fasten the subrack to the cabinet (the screws corresponds to the cage nuts). The screws can be installed beforehand to the cage nuts and the subrack can be lifted to its place. In this case the plastic washers must be left out.

NOTE! **The cable channel, the air deflector plate and the grounding cable are attached to the subrack before installation in the rack.**

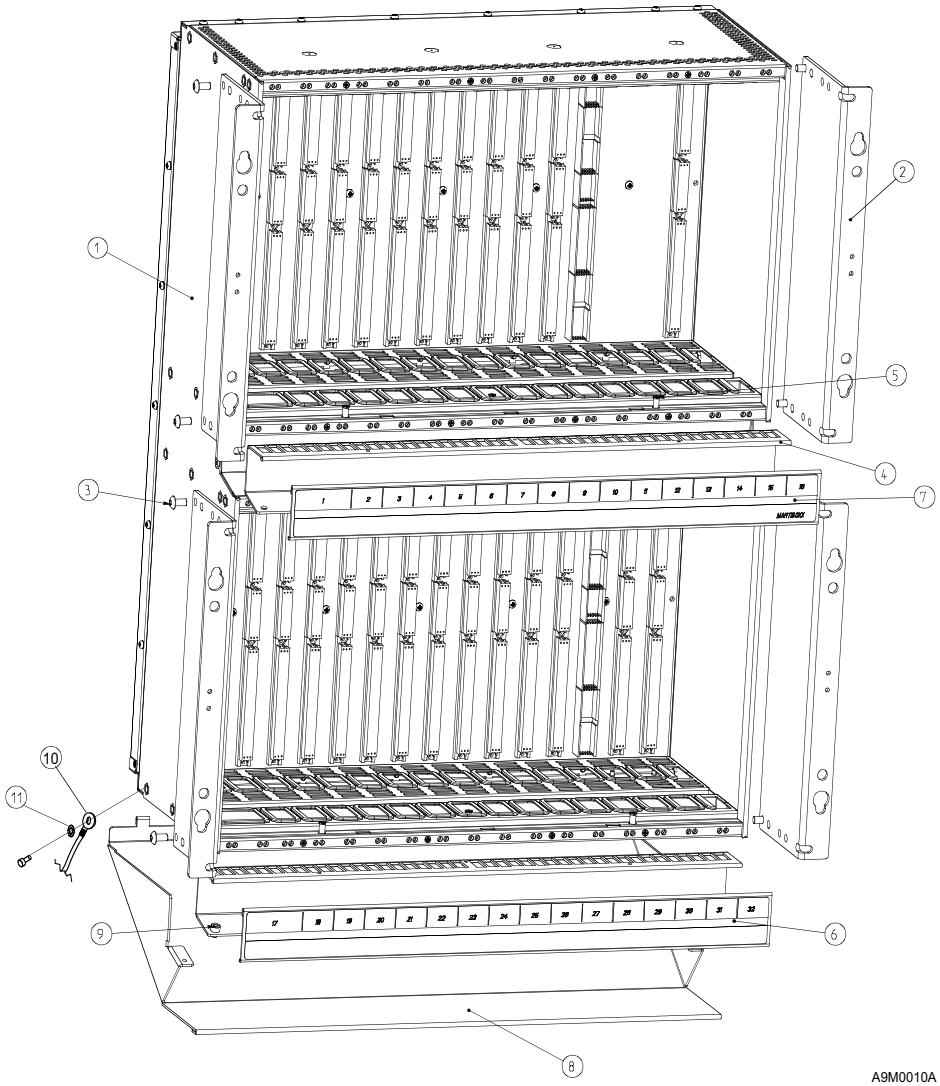

Fig. 15: Mounting 19" DXX 8160 A111 Double Rack Installation Accessories

Number	Title	Pcs.
1	Assembly subrack	1
2	Front angle 19''	4
3	ISO7380 M5x12mm A2	8
4	Cable channel	1
5	Screw for cable channel	6
6	CB.CH. Sticker (17-32)	1
7	CB.CH. Sticker (1-16)	1
8	Air deflector	1
9	DIN912 M4x5mm	2
10	Grounding cable 1.0 m	1
11	Star washer, M5, DIN6798A	1

1.1.4.2 Installation of FAN Unit RKS706

When the operating temperature is in range +5 - +30°C and the power consumption is less than or equal to 200 W, the node will be cooled by free convection. When the outside temperature is more than +30°C or the power consumption id higher than 200 W, the FAN unit RKS706 is needed. The shaded areas (dark grey area operational and light grey area exceptional temperature) in Fig. 16 show when the FAN unit is needed.

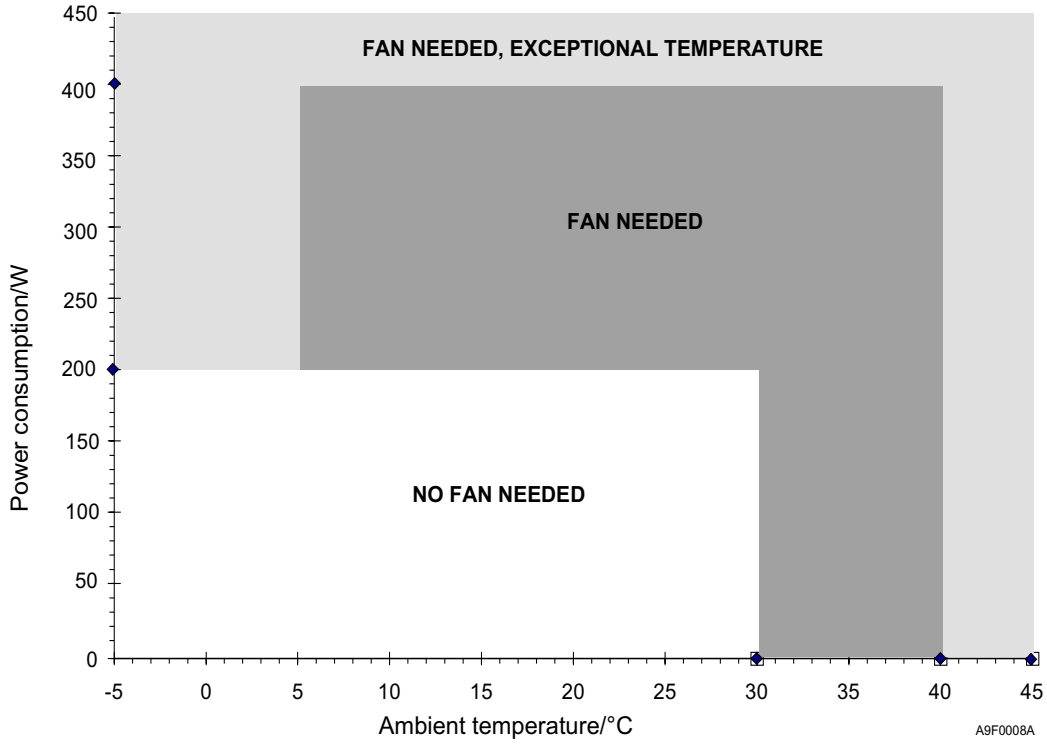

Fig. 16: Usage of FAN Unit

The unit dimensions are based on the DXX 8160 A111 mechanics. The FAN unit comprises of four fans, an air baffle and a filter element. The filter element is located between the fans and the air baffle and it can be removed while the fans are rotating. This makes it easy to change the filter cloth of the filter element whenever necessary.

NOTE! **The filter cloth should be changed/cleaned at least once a year!**

The FAN unit is electrically connected to PFU-H via cable. A 1.5-metre FAN power cable can be used to connect the FAN unit with PFU-H. The order code for the cable is PS402838117304A.

Unit size: 440 x 200 x 150 mm (W x D x H).

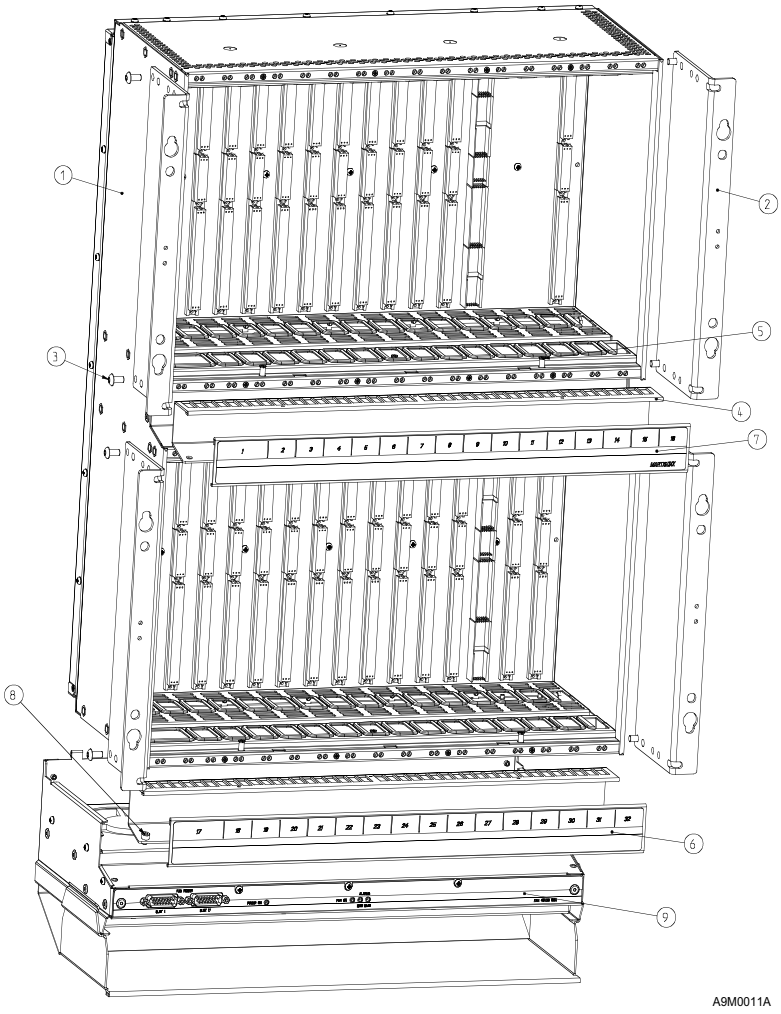

Fig. 17: Mounting 19" DXX 8160 A111 FAN Unit

Power to the FAN unit is supplied by the power supply units PFU-H through connectors on the front panel (see Fig. 18). Both connectors are identically and parallelly connected male D15 connectors. The left connector is for the PFU-H in slot 1 and the right for PFU-H in slot 17.

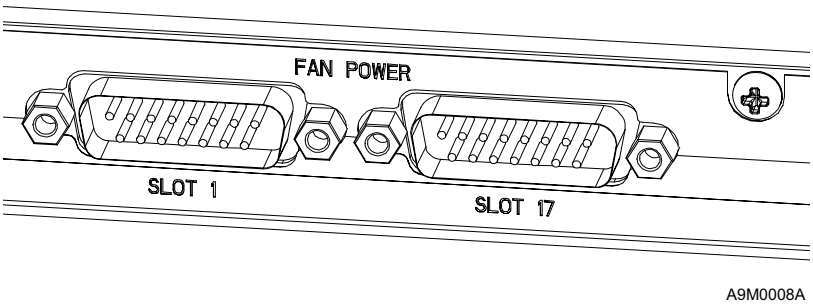

Fig. 18: Front Panel Connectors

Exception to Using FAN Unit

The following subrack equipping: DXX 8160 A111 double subrack with 2 x PFU-H, 2 x GMX, SCU-H and 16 x QMH (BTQ) can be used in the room where the ambient temperatures below 25°C **without a FAN unit**, even if such configuration consumed power 240 W. In other words, the operating conditions are as described in ETS 300 019-1-3; 1992, Class 3.1.

1.1.4.3 Inserting Units

NOTE! **Before inserting units to the subracks, make the grounding according to the instructions in Chapter 1.2 on grounding.**

NOTE! **When the node is cooled by free convection (i.e. FAN unit is not used), the power consumption of the units occupying three adjacent slots (i.e. three 5T wide units, one 10T and one 5T wide unit and so on) should not exceed 30W.**

You will need at least the following items for the installation of DXX 8160 A111.

— a DXX 8160 double subrack RXS-H

— a fuse unit PFU-H

— a control unit SCU-H

— an aggregate unit GMX

Channel units can be installed at the beginning or they can be added later.

Step 1. The mechanical installation of the subrack is completed.

Step 2. The first step is to place the units into the subrack. Use an ESD wristband connected to a subrack or cabinet before plugging in the units.

— The fuse unit PFU-H must be placed in slot #1. If power redundancy is needed, another PFU-H unit should be installed in slot #17.

— The control unit SCU-H must be placed in slot #16.

— The GMX unit must be placed in slot #13. If redundancy is needed, another GMX unit should be installed in slot #30.

— Channel units can be inserted into free slots #2-12, #18-29 and, if only one GMX is used, also in slots #31-32.

— Do not install the channel units in slot #30 in a subrack with an unprotected GMX unit.

NOTE! **Unused unit positions must be covered with 5T cover plates to fulfil the EMC requirements.**

NOTE! **Insert the units to the subracks only after the subracks are installed in the cabinets. Do not transport furnished subracks!**

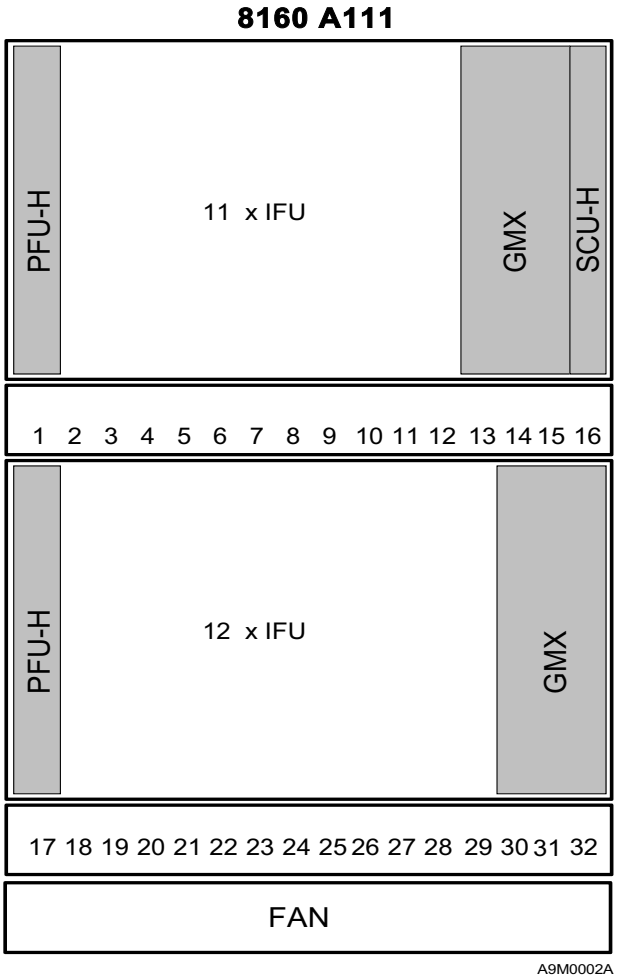

Fig. 19: Subrack with Protected Common Units

1.2 Grounding

1.2.1 General

Before switching the power on, the grounding of the cabinet/relay rack must be in order.

The central battery voltage is galvanically isolated from the secondary voltages, and it must have a positive pole earthed at the central battery side. The signal earth (equipment earth) is connected to the rack earth bar via a separate grounding cable. The grounding cable is included in the installation accessories of the subrack. Subrack mechanics (panels and EMC screens), as well as the unit mechanics (front panels, frames) are also connected to the equipment earth. The cabinet earth bar must be connected to the station earth with a separate cable (Fig. 20).

For more information on DXX 8100 grounding see Appendix A.

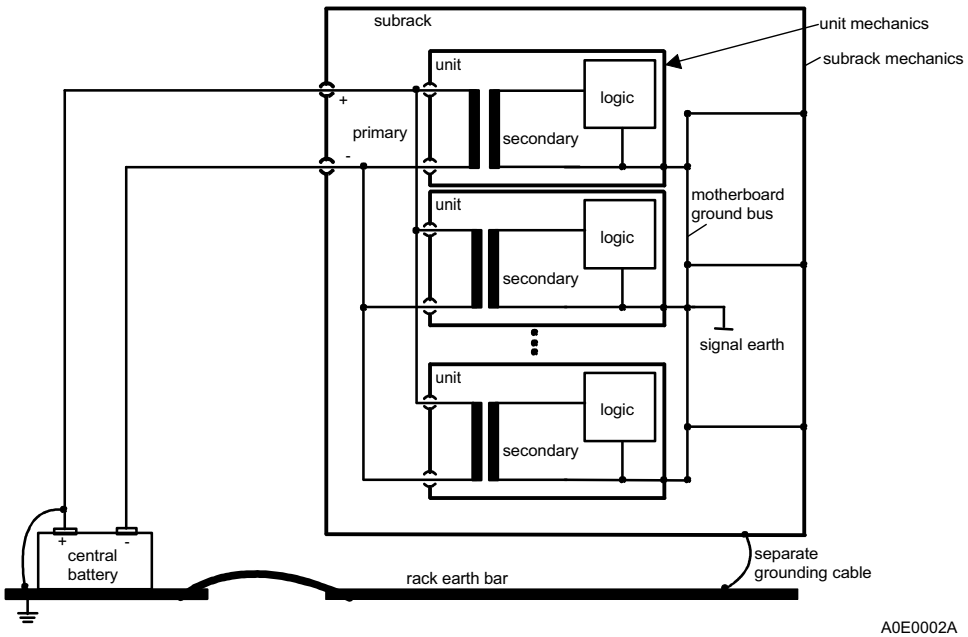

Fig. 20: Earthing in Subrack in 3-Wire System

A 6-mm^2 green/yellow cable (stranded wire Cenelec H07V-K) is sufficient for one cabinet or relay rack. Connect each cabinet to a common grounding bar by using an individual cable. **Do not connect the subracks together "in chain"**. Grounding leads must be as short as possible and there should not be too many connection points. The shorter the lead is, the better grounding can be achieved.

1.2.2 Grounding the Racks/Cabinets

It is recommended to start the grounding procedure by grounding the subracks to the racks/cabinets. Each subrack must be individually grounded.

A green/yellow grounding wire is supplied with the subracks. In a ready-made cabinet manufactured by Ericsson AB, the grounding wire has to be connected to the existing grounding bar. If there is only one frame/relay rack in use, you can use a ready-made “grounding package” from Ericsson AB.

Use a 6-mm^2 stranded wire cable (Cenelec H07V-K), if you do not have the supplied cables.

1.2.3 Grounding Accessories

Ground the accessories of cabinets/relay racks: side plates, doors, mounting frames and top and bottom plates.

NOTE! **Make sure that there is no dirt or paint on the grounding points.**

In Schroff cabinets the side plates and doors have grounding points whereas in Krone mounting panels there are no specific grounding points. The actual connection can be done under the fastening point of a frame.

The top and bottom plates are grounded directly to the grounding bar by using a 6-mm^2 green/yellow stranded cable. The doors and the side plates can be grounded to the top and bottom plates by using a 1.5-mm^2 cable. The Krone mounting panel must be directly connected to the grounding bar.

In ready-made cabinets all the accessories are already grounded.

1.2.4 Grounding the EMC Cabinet

When using an EMC cabinet, a 6-mm^2 grounding wire must be connected under a screw threaded through (inside the cabinet) the top or bottom plate according to the direction of the cabling (from the bottom or from the top). When looking at the cabinet from outside, a head pin of a screw is visible. An outer grounding cable is to be connected to this point, not inside the cabinet, to the grounding bar. If the grounding wire is directly connected to the cabinet’s grounding bar inside the cabinet (via cable entry panel), the cabinet cannot form a protection surface and outer disturbance might get into the system.

1.2.5 Grounding the Standard Cabinet

After all the subracks and accessories have been grounded, a common ground must be connected for the cabinet/relay rack. A 6-mm^2 green/yellow cable is used for this purpose. In a standard cabinet’s end it is run to the grounding bar inside the cabinet. Run the cable either to the closest grounding point or to the main grounding bar and connect both ends.

1.2.6 ESD Bonding Point

EBP stands for ESD (electro static discharge) bonding point. Each cabinet should have an EBP attached to its chassis for wrist strap. A suitable piece of equipment for this purpose is, for example, the product of Ericsson AB: 859114036 ESD package for cabinets.

1.3 Power Installation

1.3.1 General

The power installation of rack-installable DXX 8100 equipment such as DXX 8150 basic, DXX 8170 cluster, DXX 8140 midi and DXX 8160 A111 nodes is explained in this chapter.

A distributed power feeding architecture is used in the subracks. On every plug-in unit, there is a DC/DC power supply that generates the voltages needed in the plug-in unit.

In DC installations, the operating voltage is connected to PFU units and in AC installations to PAU units.

PFU and PAU units also contain relays and LEDs for PMA (prompt maintenance alarm), DMA (deferred maintenance alarm) and MEI (maintenance event information) equipment alarm indications.

DC Installations

DXX 8150 Basic, DXX 8170 Cluster and DXX 8140 Midi Nodes	**DXX 8160 A111**
a fuse unit PFU-A (input voltage range of -30…-60 V DC) or PFU-A/24 V (input voltage range of + 19…+32 V DC) is used (in slot 1 and 17)	a fuse unit PFU-H (input voltage of -40.5…-60 V DC) is used (in slot 1)
redundancy is achieved by using additionally the corresponding unit PFU-B or PFU-B/24 V (in slot 2 and 18).	redundancy is achieved by using additionally another PFU-H unit in the node (in slot 17)

AC Installations

DXX 8150 Basic, DXX 8170 Cluster and DXX 8140 Midi Nodes	**DXX 8160 A111**
a power supply unit PAU-10T or PAU-5T (nominal input voltage range 100…240 V AC)	no AC power supplies available
redundancy is achieved by placing a second PAU-10T or PAU-5T in the subrack	

NOTE!

All parts (except POTS and ISD-LT/NT interfaces, RPU and PAU units) of this equipment can be considered to be operating at Safety Extra Low Voltage (SELV) as defined in EN60950 (if the telecom lines are not imposed to overvoltages). The DXX 8100 and all mains-powered peripheral equipment must be professionally installed and continue to comply with the requirements of EN60950. PAU units must be connected to a wall socket-outlet with protective earth contact. Lithium cells are not used in this equipment.

NOTE!

Make sure that individual wires are correctly connected in power distributors!

Connecting the input voltage correctly to one PFU-H unit and with wrong polarity to the other PFU-H unit may lead to short circuiting without overcurrent protection!

NOTE! **The cabinet must be permanently connected to protective earthing before connecting the power!**

1.3.2 DC Power Installation

After the mechanical installation and grounding of the cabinets and racks, connect the power supply for DXX 8100. Before starting the actual installation, you must define both the cable runs and the DC source. The power requirement of DXX 8100 is calculated when designing the network.

The DC battery voltage is connected to the subrack via the power fuse unit, PFU.

PFU-A, PFU-B and PFU-A/24 V, PFU-B/24 V (DXX 8150 Basic, DXX 8170 Cluster and DXX 8140 Midi Nodes)

The connector shown in Fig. 21 is a D-type 2-pin power connector (male) in the lower part of the front panel. The positive pole of the battery voltage is connected to pin A1 (upper pin= and the negative pole to pin A3.

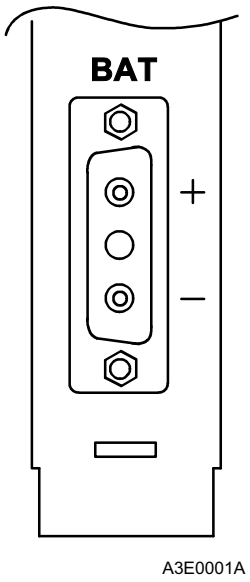

Fig. 21: DC Input Connector of Fuse Unit PFU

PFU-H (DXX 8160 A111)

The connector presented in Fig. 22 is a D-type 2-pin power connector (male and female) located in the lower part of the front panel. The positive pole of the battery voltage is connected to pin 2 (female, center contact) and the negative pole to pin 3 (male, lowest contact).

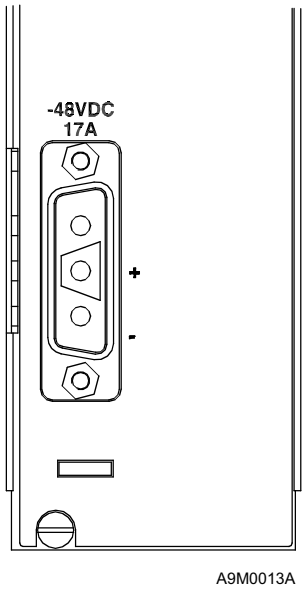

Fig. 22: D-Type Power Connector of PFU-H

Power to the cooling fan is supplied by PFU-H through a connector on the front panel. The control of the fan is also relayed through this connector. The operation of the fan is controlled by SCU-H.

1.3.2.1 DC Power Cabling

The DC input cable of PFU-A and PFU-B is advised to be provided with a circuit breaker (fuse). The PFU-A and PFU-B units are, however, provided with glass tube fuses. Depending on the input voltage and equipment configuration, the current consumption of a fully equipped subrack is typically as follows:

— 3.1…4.2 A with 48 V battery voltage (150 - 200 W)

— 5.5…5.9 A with 24 V battery voltage (133 - 140 W)

The recommended circuit breaker rating is 10 A (T). In the ready-made cabinets from Ericsson AB the fuses are of 10 A rating.

In the PFU-H unit the over current protection is realized with an integrated circuit breaker that switches the battery negative line to OFF in case of over current. Thus, additional circuit breakers are not required, if not wanted. Tripped circuit breakers are reactivated by switching the power off and on again. The switch can be locked in the ON position in order to prevent false manual tripping. The circuit breaker function is not inhibited even though the switch is locked in the ON position.

However, additional circuit breakers can be used, if wanted, e.g. if they are placed into a centralised location or if the circuit breaker breaking current is supposed to be different from that of PFU-H's. The same 10 A circuit breaker that is recommended with PFU-A and PFU-B can be used in many installations with PFU-H, if wanted.

In redundant use, the current for the subrack is quite evenly divided between the PFUs. This makes it easier for the cables and circuit breakers to carry the current to the subrack. However, the circuit breakers are selected so that one circuit breaker can carry the total current to the subrack. The cabling is designed to carry the total current in a thermal sense, too. The voltage drop can exceed the recommendation in the case, when one PFU is temporarily not functioning. However, during the low battery voltage situations, this can cause the system to switch off earlier.

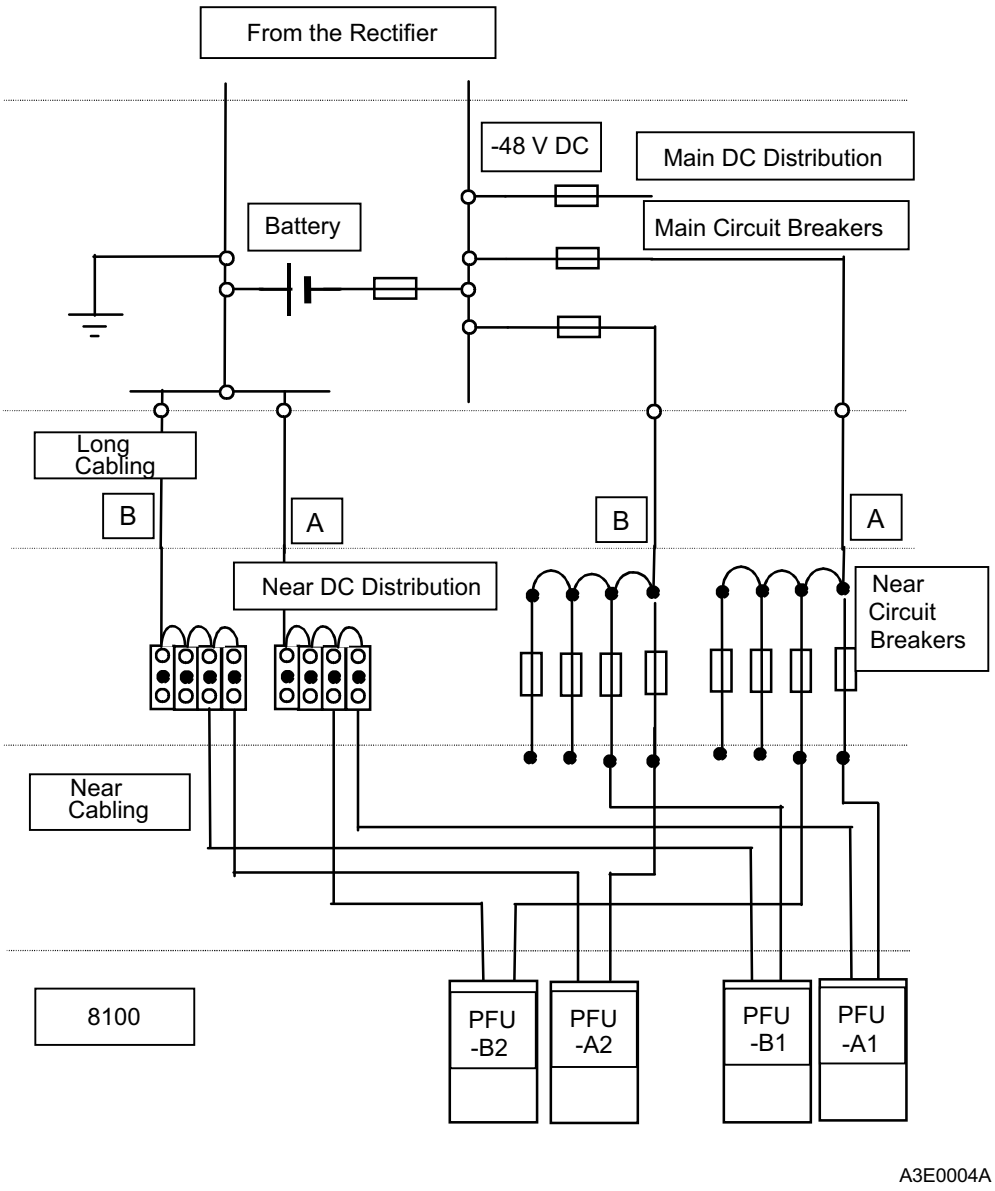

Fig. 23: General DC Cabling of DXX 8100

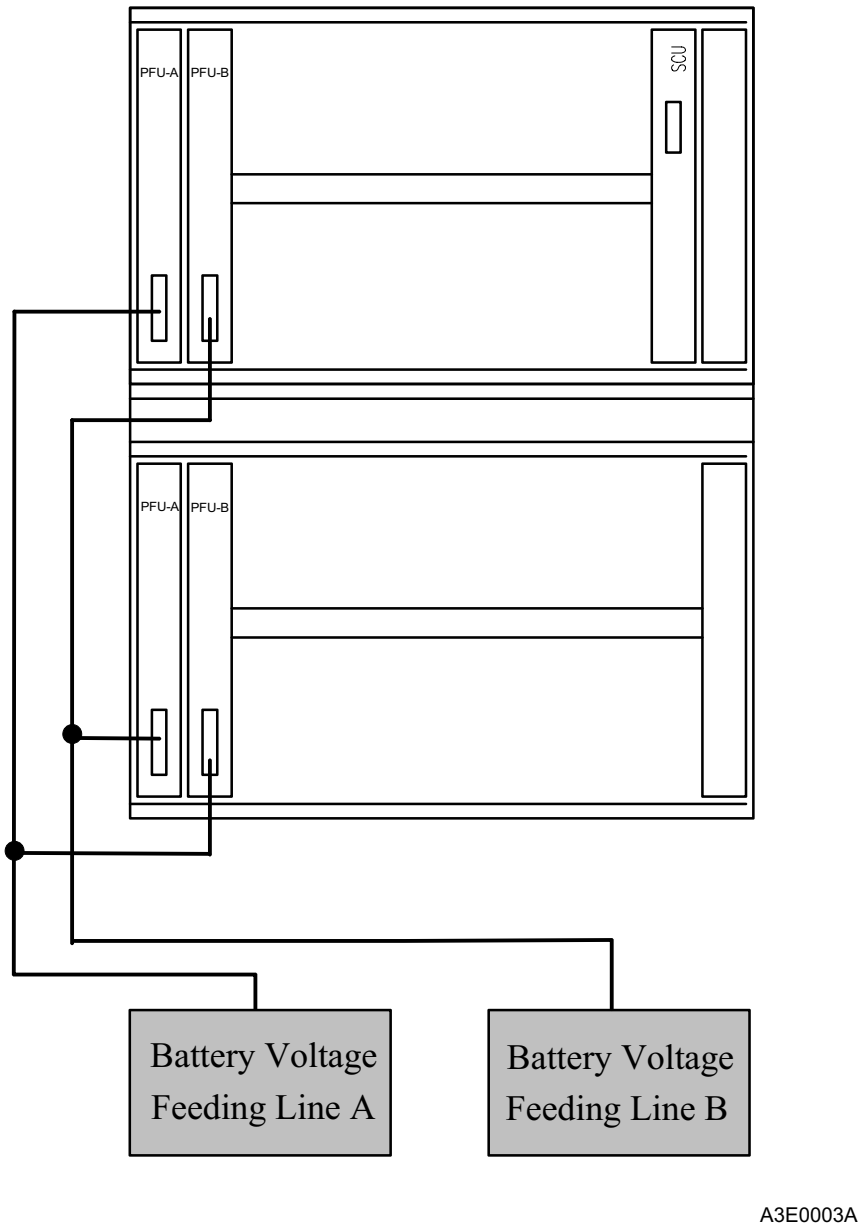

Fig. 24: Recommended Cabling When Duplicated Power Feeding is Used

Fig. 24 shows the recommended cabling when the double subrack with PFU-A and PFU-B fuse units are used with duplicated power feeding (and redundant PFU units).

Power feedings are connected so that one cable feeds the power to the PFU-A of the upper subrack and to the PFU-B of the lower subrack. The other cable feeds the power to the PFU-B of the upper subrack and to the PFU-A of the lower subrack.

This cabling arrangement ensures that power feeding is always done to one of the PFU-A units in a double subrack.

Defining the Cross-Sectional Area of the DC Power Cables

NOTE! **It is recommended that the maximum voltage drop from the batteries all the way to DXX 8100, i.e. the input connector of PFU unit, should not exceed 1 V.**

In order to define the cross-sectional area of the main power supply cables, proceed as follows.

This method is only valid for the installations in Fig. 23 and Fig. 24 above. However, this is a common way of installing DXX 8100 and the method can be adjusted, if the installation is different.

Step 1. Find out the distance between DXX 8100 and the main power distributor (PDF) near the battery (the long cabling).

Step 2. Define the maximum power consumption, P_{max} of this installation and the minimum possible value for the battery voltage, U_{min}.

- Power consumption should be calculated by adding up the power consumption of all units and their interface cards used in the subrack. The data for each unit and module is told in the *DXX 8100 Managed Access System Node Technical Description* (document number EN/LZB 119 1128).
- Power consumption can be approximated by using 300 Watts for a double subrack or 150 Watts for a single subrack or 300 Watts for DXX 8160 A111.
- Miminum possible value for the battery voltage is the lowest voltage, U_{min} with which the subrack is still fully operating (i.e. consuming the full power). This value is 30 V for PFU-A, PFU-B and PFU-A/24 V, PFU-B/24 V and 40.5 V for PFU-H.
  However, the minimum voltage might differ from the values above, if there is some other means of restricting the minimum voltage in the installation, e.g. a battery deep discharge protection device.

Step 3. Calculate the corresponding maximum current, I_{max}.

$P = U \times I$, so $I_{max} = P_{max} / U_{min}$

The values for the current are multiplied by the safety factor 1.4

$I_{max'} = I_{max} \times 1.4$

Step 4. Find out the length and cross-sectional area of the PFU cable (near cabling).

Step 5. Define the voltage drop in the PFU cable, U_{pfu}.

$U_{pfu} = R \times I$; $R = r \times L / A$, so $U_{pfu} = I \times r \times L / A$;

where I = the current to one PFU

- in redundant system $0.6 \times I_{max'}$
- in non-redundant system $1 \times I_{max}$

R = the resistance of the PFU cable

r = resistivity of copper; $r = 1.678 \times 10^{-8}\ \Omega$ m; at 20°C and its temperature coefficient is $6.8\ 10^{-3}$ / K
Thus, with 15°C temperature rise the resistivity would be $r = (1.678 \times 10^{-8} + 0.1712\ 10^{-8})\ \Omega$ m = $1.85 \times 10^{-8}\ \Omega$ m = $0.0185\ \Omega\ mm^2$ /m (this value is used below in the example)

L = 2 x the length of the PFU cable

A = cross-sectional area of the PFU cable

Step 6. Define the maximum allowable voltage drop in the "long run" cable, U_l.

$U_l = U_{tot} - U_{pfu}$; where U_{tot} = 1 V (see the previous Note!)

Step 7. Define the needed cross-sectional area of the "long run", A_l.

R = r x L / A and R = U / I, so r x L / A = U / I and thus A = r x L x I / U
and in this case $A_l = r \times L_l \times I_l / U_l$ where

L_l = 2 x the distance between DXX 8100 and the main power distributor (from Step 1)

I_l = the maximum current of 2 subrack in general installation and thus if the power consumption of the subrack is nearly equal, it is 2 x $I_{max'}$

Then find the nearest cable size, bigger than the yield of the calculation, i.e. the final cross-sectional area of the cable, A_f.

Step 8. Check the current density.

S = I / A, in this case, $S_f = I_l / A_f$

Check that the value is smaller than the value in the table below.

Nominal Cross-Sectional Area/mm^2	**Resistance / Metre in 20°C, mΩ/m**	**Allowed Current in Continuous Use/A In +30°C**	**Allowed Current in Continuous Use/A In +50°C**	**Allowed Current Density in Continuous Use A/mm^2**
2.5	7.6	32	22.7	10
4	4.71	42	29.8	10
6	3.14	54	38.3	6
10	1.82	73	51.8	6
16	1.16	98	69.6	6
25	0.743	129	91.6	4
35	0.527	158	112	4

Example of Defining the Cross-Sectional Area of the DC Power Cables

In this example, there are two double subracks in a rack with redundant PFUs.

Step 1. The distance between DXX 8100 and the main power distributor is 15 metres.

Step 2. P_{max} = 200 W and U_{min} = 40 V

Step 3. $I_{max} = P_{max} / U_{min}$ = 5 A and $I_{max'} = I_{max}$ x 1.4 = 7 A

Step 4. The length of the PFU cable = 2.5 m and cross-sectional are of the PFU cable = 2.5 mm^2

Step 5. so $U_{pfu} = I \times r \times L / A$ = 0.6 x 7 A x 0.017 (mm^2/m) x 2 x 2.5 m x 2.5 mm^2 = 0.143 V

Step 6. $U_l = U_{tot} - U_{pfu}$ = 1 V - 0.143 V = 0.857 V

Step 7. $A_l = r \times L_l \times I_l / U_l$ = 0.017 (mm^2/m) x 2 x 15 m x 2 x 7 A / 0.857 V = 8.33 mm^2

The 10-mm^2 cable is the nearest bigger cable, so it is chosen for this installation;
A_f = 10 mm^2!

Step 8. Current density, $S_f = I_l / A_f = 2 \times 7$ A/10 mm^2 = 1.4 A/mm^2 which is smaller than the value 6 A/mm^2 in the table!

Note that if the length increases the cable diameter must also increase.

Under normal conditions a 10-mm^2 cable (Cenelec H07V-K) is enough for distances under 15 metres and for two double subracks. This is the cable normally used for the DXX 8100 main power supply.

See the conductor gauge and dimension comparison table in Appendix B. The table can be used for converting the gauge (AWG) size conductors to mm^2 and vice versa.

1.3.2.2 Power Cabling in Standard Environment

In addition to the ready-made installation package for grounding, there is also a package for power installation. It can be used in 19'' relay racks and cabinets. The only required information is the number of the needed PFUs in them. There are two kinds of power packages available: one for two double subracks with redundancy or as specified.

Mechanical Assembly of Power Equipment

If you are installing a cabinet not ready-made by Ericsson AB, assemble the power package according to the criteria explained below and as defined in Fig. 25.

Install 8 pcs circuit breakers C60N 10A, 8 pcs UK16 terminal ends, 2 pcs lock plates E/UK and 2 pcs side plates D-UK 16 into the screw connector rail. Furnish with two main groups:

E/UK; 4xC60N; 4xUK16;D-UK16; 4xC60N; 4xUK16;D-UK16;E/UK.

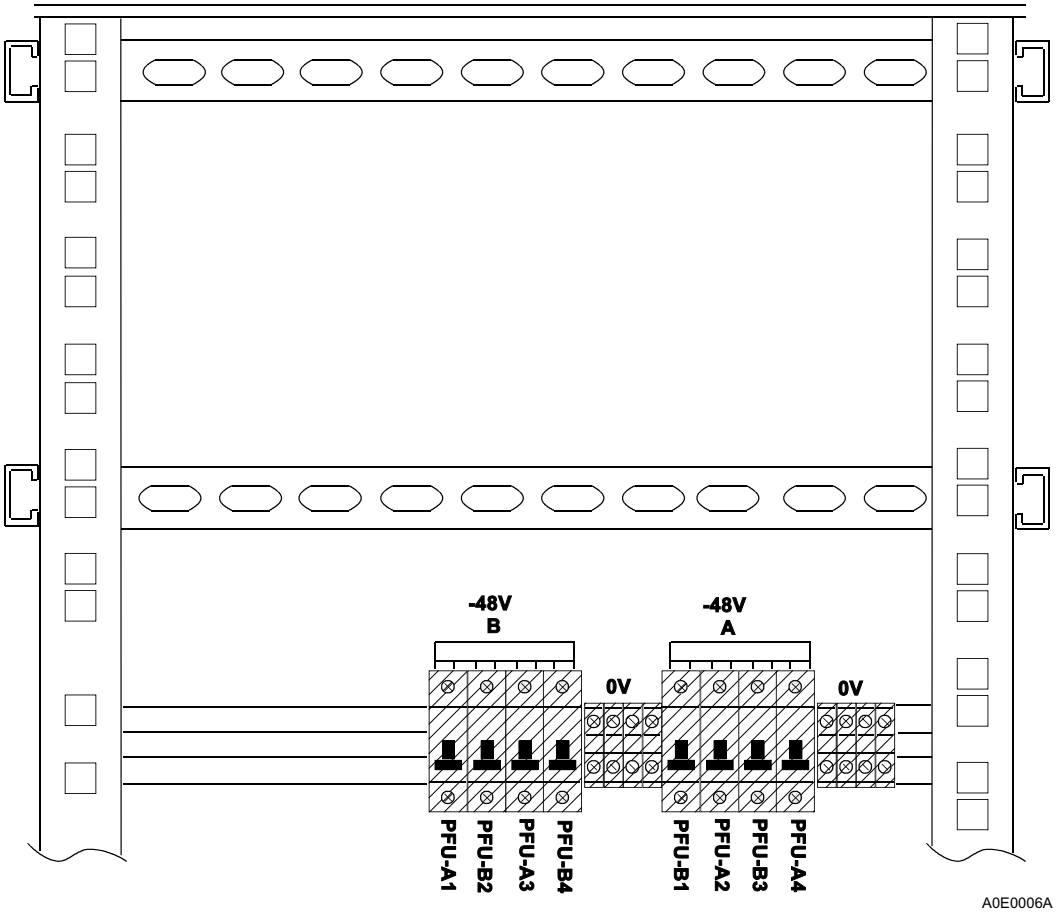

Fig. 25: Example of Circuit Breakers Situation and Connection in a Standard Cabinet

Proceed as follows.

Step 1. Fasten the power bar in the 19'' frame.

Step 2. Connect individual circuit breakers to each other with an enclosed power bar (within a circuit breaker group). Do this for both circuit breaker groups.

Terminal ends have their own kind of connecting bar (FBI) enclosed, which must be installed to connect individual terminal ends together, within each group.

In a ready-made cabinet this has already been done.

Connecting PFU Cables

In a ready-made cabinet all the cables have been marked, so it is easy to connect them to the correct PFUs. The cable used for power is DAM - open type and it is made of 2.5 mm^2 stranded wire cable (Cenelec H07V-K).

NOTE! **Before connecting the DAM-open cable, make sure that it is placed in the right position!**

Fasten all the connectors to their places and tighten the screws.

If you do not have ready-made cabinets, connect the power cables according to Fig. 25 and Fig. 26. For example, if you have two double subracks in a cabinet, connect the PFU-A in the first double subrack's upper shelf to the position PFU-A1 in a power bar and the PFU-B to the position PFU-B1 and so on. If you have a different assembly, use this same method for connecting the PFUs.

Connecting and Running Cables

When using only one power supply, the blue power cable is connected either to the circuit breaker group A or B. Similarly, the black supply cable is connected to the terminal ends of the same group. In this case the group A and B are connected together with same 10-mm^2 cable. This means that the terminal ends for group A and B are connected to each other with black lead whereas the circuit breakers are connected with blue one.

If redundant power feed is required, individual cables must be run for the both groups (A and B). When running the cables, check if possible, that they are in a different side of the cable conduit than the data cables.

Proceed as follows.

Step 1. Make sure that all the circuit breakers and the PFU switches are switched off.

Step 2. Connect the main power supply cables to the DXX 8100 end.

- Connect the blue lead to the circuit breakers (-48 V DC or 24 V DC)
- Connect the black lead to the terminal ends (0 V).

Step 3. Disconnect the main power feed during the connection by means of a circuit breaker, for example.

Step 4. Connect the main power distributor supply end.

Step 5. Make sure that all the connections are correctly done and all the screw joints are tightly fixed before switching on the circuit breaker in the mains supply end.

Step 6. Switch on the power in the main power supply end.

Step 7. Switch the circuit breakers on in the cabinets.

Step 8. Switch the PFUs on.

Step 9. If all the units are powered, switch off all the PFUs and circuit breakers in a reverse way and go on with the installation.

NOTE!

If one or several PFUs are not working, check the circuit breakers at the main supply end as well as at the cabinet's circuit breaker end.

Check for blown fuses in the PFU.

1.3.2.3 Power Cabling EMC Cabinet

Power cabling the EMC cabinet is similar to the cabling in standard environment.

It is recommended to use ready-made cabinets with power cabling, DC filtering and all the other equipment in order to avoid problems that might occur.

In EMC cabinets there is a separate lead-in connector for the power supply cabling. The connectors can be situated either at the top or bottom of the cabinet, depending on the direction of the cabling access. These connectors have labels indicating where to connect the power supply cables. From these lead-in connectors the power leads go (inside the cabinet) to the filters. This cable must be as short as possible in order to minimise interference coming with DC. The filter's task is to filter out the interference coming with DC. Otherwise the power cabling of an EMC cabinet is similar to the power cabling of a standard cabinet.

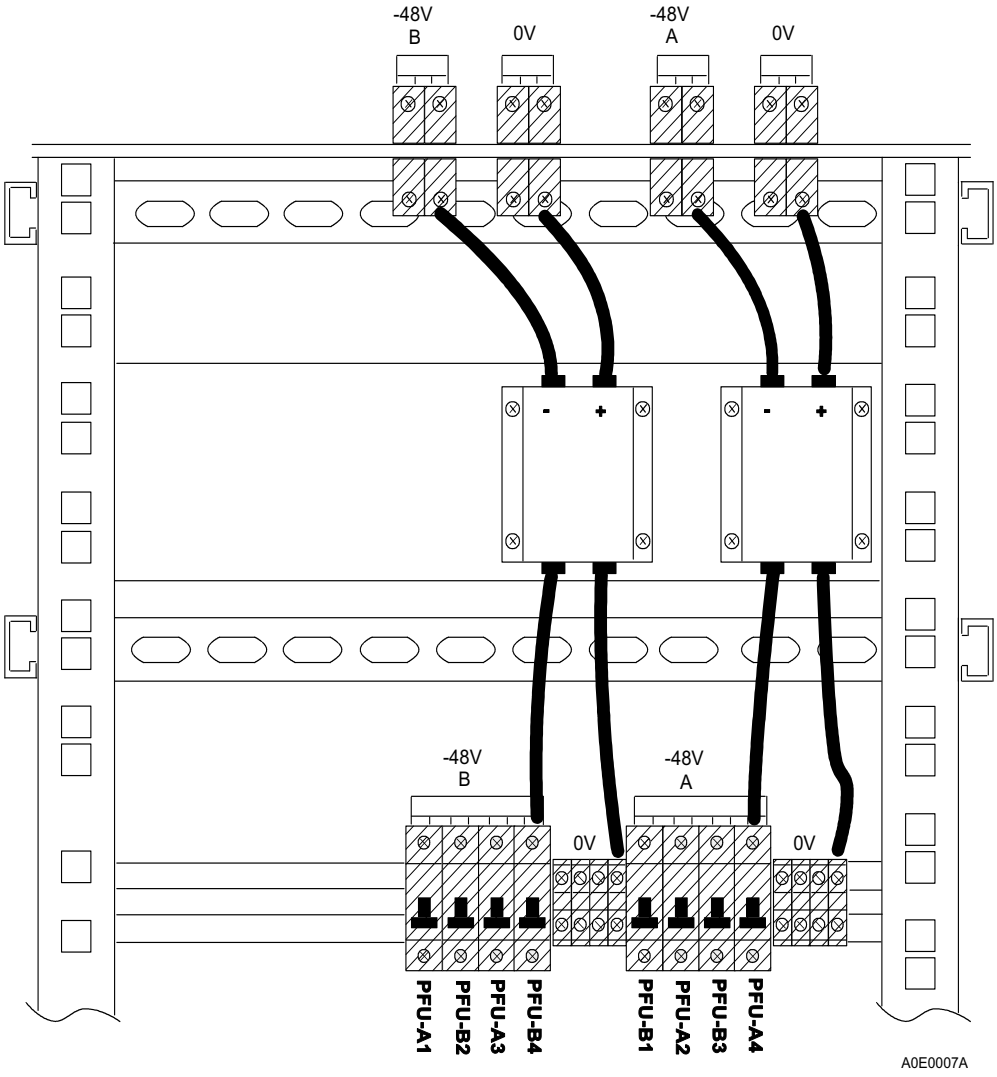

Fig. 26: Example of Circuit Breakers Situation and Connection in EMC Cabinet

1.3.3 AC Power Installation

The PAU-5T and PAU-10T installations are covered in this section. The power installation of DXX 8110 NTUs and DXX 8120 mini nodes is simple; just plug the power lead to the wall outlet.

PAU-5Ts are used in midi subracks (RXS-S8) because their power output capacity is not enough for a fully equipped single subrack (RXS-S). When using a PAU-5T in a single subrack, the power consumption of the installed units should not exceed the power output capability of PAU-5T. Power redundancy can be achieved by placing another PAU-5T (to slot 2) next to the primary one (in slot 1). PAU-5T occupies one unit slot from the subrack (5T wide).

PAU-10Ts can be used in RXS-S, RXS-D, RXS-CD, RXS-S8 and RXS-S8-TT. Power redundancy is supported. Its power output is higher than PAU-5Ts, but it occupies two slots (10T wide) instead of one slot.

1.3.3.1 Redundant AC Power Installation

When having a redundant AC power installation, for example, for a double subrack in a 43U high cabinet, four PAU-10Ts are needed. For this purpose two separate AC lines must be routed inside the cabinet. Those AC lines inside the cabinet are connected to some kind of rack mounted mains distribution boards. In this case at least 2 outlets are needed in both two distribution boards.

Those AC lines should be connected to separate circuit breakers in site mains distributor. Those circuit breakers should then be connected to different phases in site AC power system. Despite one phase failure in site AC supply, the DXX 8100 equipment remains operational.

1.4 75 Ω Installation

1.4.1 General

This section describes how to do 75 Ω cabling both in standard and EMC environments. The reason for separating these environments is the difference in the way the cabling is done.

This section also describes the installation from the G.703 interface to the 19-inch panel in the back of a cabinet and from there to the DDF (MDF). The 19-inch panel is used if a ready-made cabling package supplied by Ericsson AB is used, or if there are other reasons for using standard length ready-made cables (2 m, SMB-HDC43 male). Using standard length cables speeds up the installation, but the price of the whole cabling increases. The cabling can also be done from the IF directly to the DDF using 8-coreBT3002 coax cable.

1.4.2 Tools Needed

The tool kit for 75 Ω installation supplied by Ericsson AB consists of the following items.

— cable stripper

— centre crimp tool for type 43 connectors

— crimping tool

— special stripping tool for cable cover

— 2-way insertion/extraction tool for type 43 connectors

1.4.3 Installation when Using 19'' Panels in Back of Cabinets

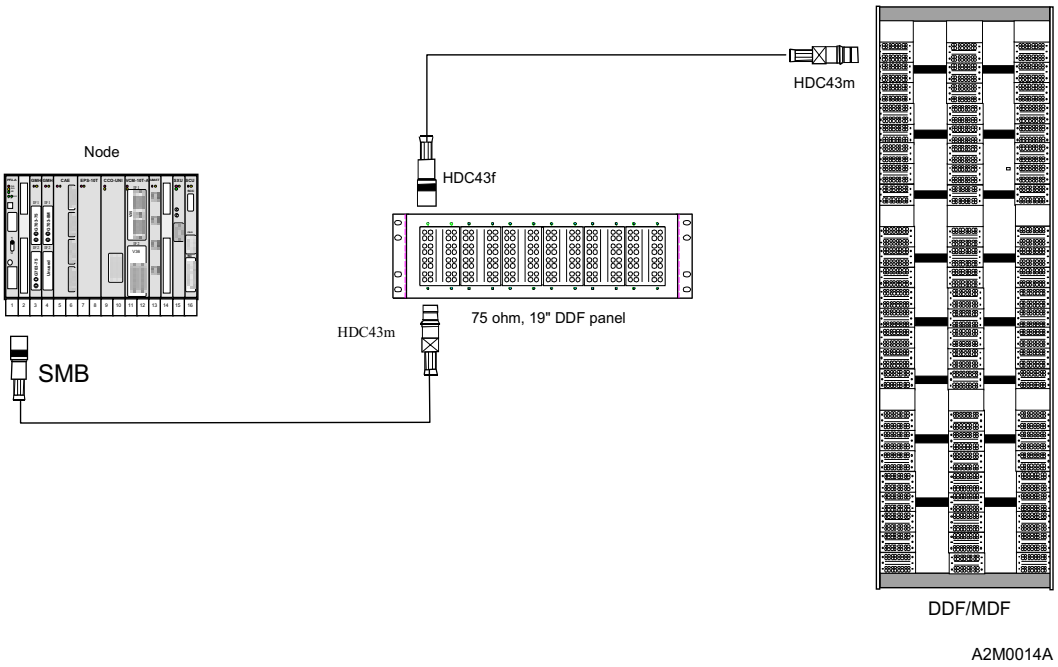

Fig. 27: Data Cabling when Using both 75 Ω, 19" DDF Panel and MDF

1.4.3.1 Mounting DDF

The 75 Ω installation can be started from installing the DDF to the floor. In telestations there might already be a DDF for type 43 connectors installed and only some additional blocks for HDC43 connectors may be needed. If the existing DDF is of a different type, 19-inch panels for type 43 blocks can be mounted on the DDF, if possible. Otherwise an additional DDF is required. One possibility is to use the existing DDF solution and to try to find suitable connectors and cables for that.

In the site survey the location for the additional DDF should also be defined, but it should be preferably placed next to the existing ones. Once the location for the DDF is decided, it can be mounted on the floor.

Proceed as follows.

Step 1. There are four holes for wedge anchorages in a DDF. Drill four holes to the floor with a rock hammer and hit the wedge anchorages to the holes using a hand hammer.

Step 2. Lift the DDF on its place and fasten the nuts tightly.

Step 3. Define the number of blocks you are going to need for the installation and mount them on the DDF with the oncoming nuts and screws.

NOTE! **One 19" panel can hold 6 type 43 blocks. Each block can hold 16 E1s, which makes 96 E1s (192 ports) altogether.**

1.4.3.2 Mounting 19" Panel

The 19-inch panel is mounted either at the back of a cabinet or in a 19'' frame which might be the customer's existing DDF solution. If the panel is going to be installed on a cabinet, the panel should be mounted at the back of the cabinet. The place can be determined freely (somewhere in the middle). Mount the blocks for HDC43 connectors to the panel with oncoming screws.

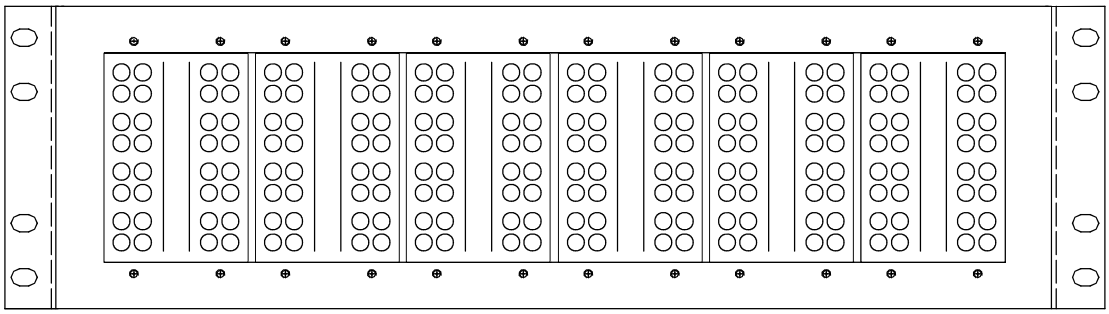

Fig. 28: 19'' Panel for HDC43 Connectors (75 Ω)

1.4.3.3 Making Coax Cables

It is recommended to have the ready-made coax cables from the IF to the 19-inch panel. Those cables are 2 metres long, made of BT3002 with SMB - HDC43 male connectors and can be supplied by Ericsson AB.

The actual stripping and crimping is described in the instruction booklet supplied together with the tool kit.

It is recommended to use straight SMB-type connectors with QMH (75 Ω) units.

1.4.3.4 Running Cables from IF to 19" Panel

The individual cables can be routed one by one when there are only a few cables coming from an IF to the 19-inch panel. If there are dozens of G.703 interfaces to be connected, it is useful to plug the SMB ends to the IF and run the whole bunch of cables to the back of the cabinet. The cable route can be freely determined. Use cable ties to tie individual cables in bunches of two and four on IF's side (with QMHs, it can be useful to use even bunches of eight). Two cables coming from unit's IF1 are tied together with the cables coming from IF2. Continue as explained until all the units in the subrack are dealt with. All the slots in the subrack can be cabled (except PFU-As, PFU-Hs, PAU-5Ts, PAU-10Ts, SCUs and SXU-As slots) for future needs. When removing a unit from the subrack the cables of the adjacent unit should not be in the way.

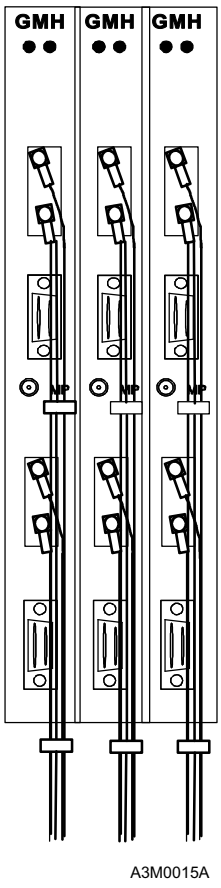

Fig. 29: Front View of Properly Cabled GMH

The plastic blocks in the 19-inch panel can be considered units as well as interfaces. Two plastic blocks correspond to one single subrack, and four blocks correspond to one double subrack. The first row of holes in the first block is "reserved" for the PFU-A, the second one for the PFU-B and so on. If both PFU-A and PFU-B are used, cables to the first and the second row of holes are not routed. Instead, G703-75 cabling is started from the third row. If you use PAU-5T, the first row is left empty. When using PAU-10T, the first two rows are left empty.

This is only one way to make the installation clearer. Another possibility is to cable all slots of the type 43 plastic blocks, without leaving any slots empty.

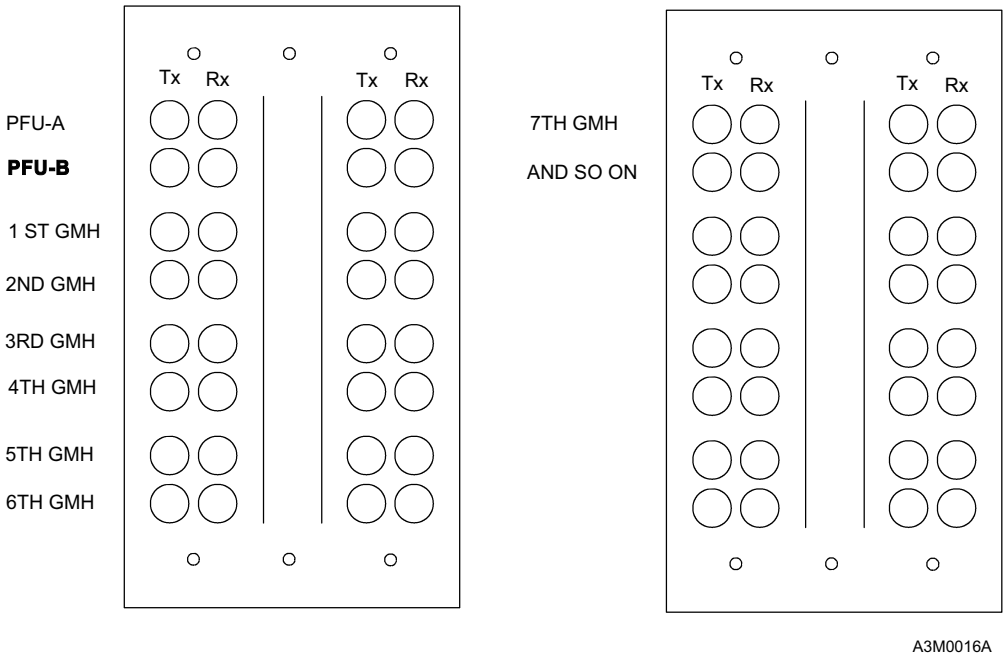

Fig. 30: Example of 75 Ω Cables Connection from IFs (19" Panel or DDF)

Plug out the SMB connectors from IFs one by one, starting from the upper interface of the first GMH. Use a digital multimeter (beeper function) to determine the right place for each cable. The other probe of the multimeter is connected to the SMB in the IF side and the other one is connected to the HDC43 connector at the 19-inch panel end.

In the case of QMHs, the type 43 blocks are filled so that one 75 Ω QMH fills two slots instead of one (GMH) in type 43 blocks.

When all the cables are plugged into the right places in the plastic blocks, the whole bunch of cables must be tied to the structures of the cabinet. Make sure that all the cables are in the right places before fastening.

1.4.3.5 Running Cables from 19" Panel to DDF

NOTE! **If using backup or 1+1 protected trunks, use a different cable route, if possible.**

So far no special requirements have been necessary for EMC. This chapter indicates the differences between the standard and EMC cabling.

You have two alternatives when doing the cabling from the 19-inch panel to the DDF.

1. Use 8-coreBT3002 cable. This way you will only have to run one cable instead of eight at a time. This 8-core cable can be ready-made (HDC43 male - HDC43 female) and in this case the length must be defined in the site survey.
2. You can have several connectors and a couple of reels of 8-core cable to do the cabling on the spot. This way the installation will take longer. The 8-core reel is usually 250 metres and all the individual cables are marked from 1 to 8 to make it easier to identify each one.

Proceed in the following way.

Step 1. Before starting the actual cabling, plan carefully how you are going to place the cables in the DDF.

Step 2. Mark all the cables starting from the 19-inch panel to the DDF in both ends. This will help you to define their correct places in the DDF.

Step 3. Run the 8-core cables one by one from the panel to the DDF. With two or more cabinets, run the cables from the panel via the joint side of cabinets (see Fig. 31). From there the cable goes through the lead-in plates to a cable duct and to the DDF. If possible, run the data cables to the other side of the duct, apart from the power cabling.

Step 4. Fasten the cables neatly to the cabinet structures with cable ties.

Step 5. Connect the panel end of the cabinet after it is routed to the correct place. The other end is connected to the predefined place in the DDF.

Step 6. Tie all the cables neatly to the DDF’s constructions (in groups and rows).

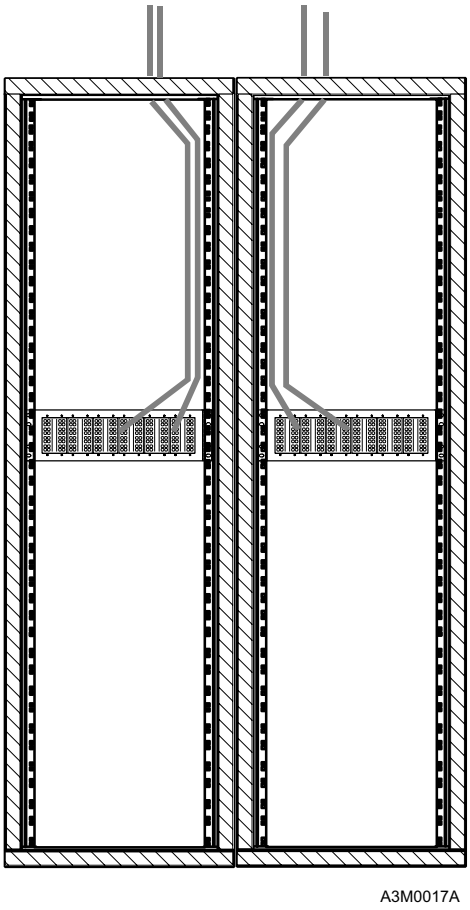

Fig. 31: Example of Running Cables out of Cabinet

In an EMC cabinet place a conducting heat shrink tube around the 8-core cable before running the cable. The tube must have a conductive cover. After the cable is in its place, move the heat shrink tube to the same spot with the lead in plates. Heat the shrink tube to this spot. Move the lead in plates around the cables and tighten the screws.

NOTE!

The cables must be in a row when going out of the cabinet and the tubes must touch each other or the lead in plates. This helps to avoid interference coming inside or possibly getting out of the cabinet.

There is a third type of 8-core cable available being quite similar to the cable defined previously. In addition it has a braid as an outer shield. Therefore, there is no need for a conducting heat shrink tube around the cable. In order to make the termination to the cable going out of the cabinet, 5 cm of a plastic cover must be peeled off for the lead-in plates. Make the connection to the lead-in plates as described in the previous section.

If you are using a single BT3002 cable coming from the cabinet, 5 cm of the cover of all individual cables must be peeled off for the lead-in plates. This has the same effect as defined in the previous section. If there is no heat shrink tube available or braided 8-core BT3002, each individual BT3002 cable must be peeled accordingly.

Finally, to complete the cabling, loop all the connections either in the 19-inch panel or DDF depending on the junction to be tested. Use specially made U-links for loopbacks. There are two kinds of U-links, with and without a testpoint.

If commissioning is to be done after installation, the loops will be done during that process.

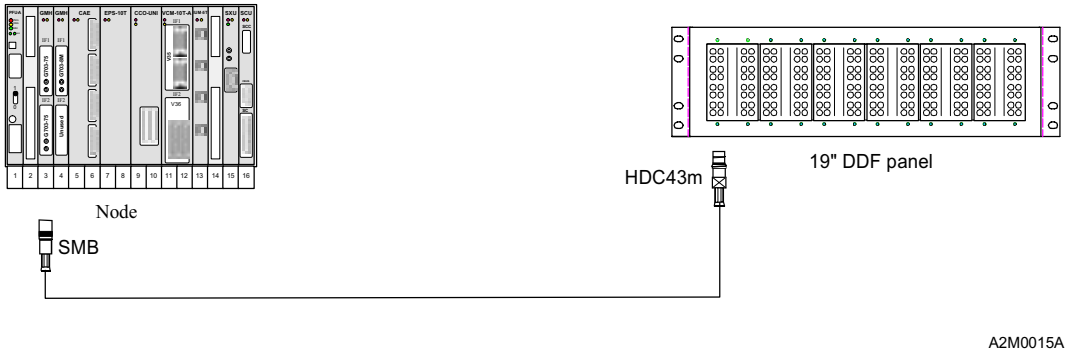

Fig. 32: Data Cabling Using 19" DDF Panel

1.4.4 Installation when Using DDF Only

If necessary, the 19-inch panels can be left out of the 75 Ω installation. Then only the main DDF is used. Firstly, this decreases installation material costs but, on the other hand, the installation is slower (8-core BT3002 cables have to be done in site) and the result is not equally flexible. 8-core cables can be ordered ready-made, but their lengths must be defined on the site survey and delivered to the correct site as well. As a result, there is a possibility that cables of different lengths are delivered to a wrong site (perhaps thousands of kilometres away from the right one). Secondly, two times less connectors (cheaper) and connection points are needed, which means that the whole cabling is more reliable and the attenuation is not so extensive.

The only difference from the installation when using a 19-inch panel is that there are no panels in the back of the cabinets and the cables are directly run from an interface to the DDF. The connector type is SMB - HDC43 male and the used cable is 8-core BT3002.

It must be defined for each particular case whether to use 19'' panels or not.

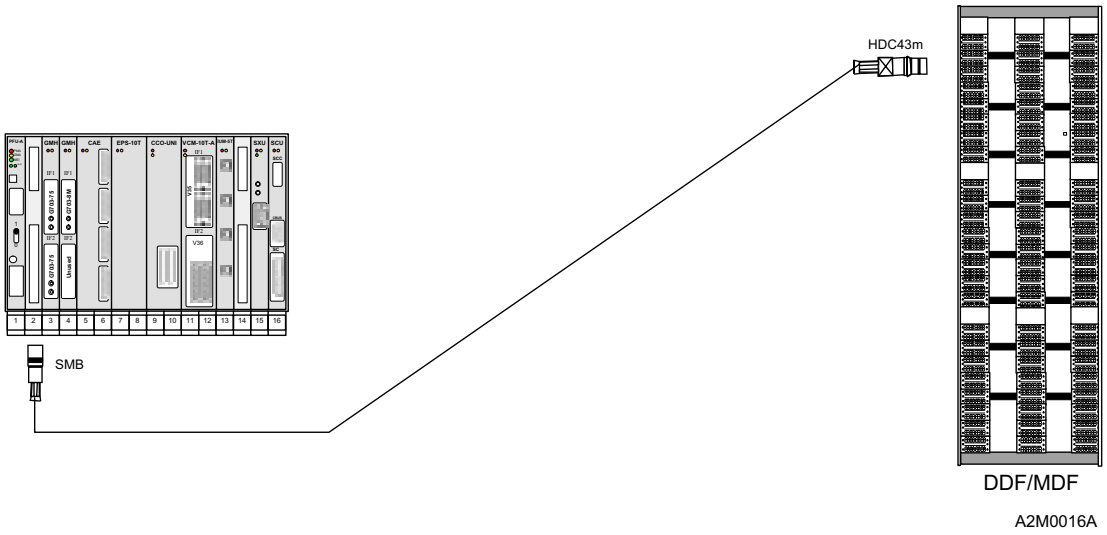

Fig. 33: Example of Data Cabling Using DDF/MDF Only

1.5 120 Ω Installation

1.5.1 General

This section describes how to do 120 Ω cabling in standard and more severe electromagnetic environments. The reason for separating these environments is that the cabling done in them differs greatly.

This section also describes the installation from the G.703 interface to the 19-inch Krone mounting panel at the back of a cabinet and from there to the DDF (MDF). The mounting panel is used if a ready-made cabling package supplied by Ericsson AB is used or if dozens of trunks are run from the interfaces to the DDF. Then it is recommended to use a 16-pair cable from the Krone mounting panel to the DDF. When there are only a couple of trunks in each cabinet/relay rack, premade cables of different length can be used (120 Ω, two pair twisted shielded pairs).

1.5.2 Tools Needed

The tool kit for 120 Ω installation supplied by Ericsson AB consists of the following items.

— LSA-Plus connection tool for Krone blocks

— special stripping tool for cable cover (EMC installation)

No other special tools are required in addition to the usual installation tools (a knife, screw drivers, etc.).

1.5.3 Installation when Using Krone Mounting Panels at Back of Cabinets

1.5.3.1 Mounting DDF

The 120 Ω installation can be started from installing the DDF to the floor. In telestations there might already be a Krone DDF installed and only some additional Krone blocks are needed. If the existing DDF is of different type, 19-inch Krone mounting panels for blocks can be mounted on the DDF, if possible. Otherwise an additional DDF is required.

In the site survey the location for the additional DDF should be defined, but it should be preferably placed next to the existing ones. Once the location for the DDF is decided, it can be mounted on the floor. It is recommended to purchase the 120 Ω DDF locally.

Proceed as follows.

1. There are four holes for wedge anchorages in a DDF. Drill four holes to the floor with a rock hammer and hit the anchorages in with a hand hammer.
2. Lift the DDF on its place and fasten the nuts tightly.
3. Define the number of Krone blocks you are going to need for the installation and mount them on the DDF on their places.

NOTE! **One Krone mounting frame can hold 15 blocks. Each block can hold 3 E1s, which makes 45 E1s altogether.**

1.5.3.2 Installing Krone Mounting Panel

The Krone mounting panel is mounted at the back of a cabinet. The place can be determined freely (somewhere in the middle). Mount the frame to the cabinet with the included screws and cage nuts.

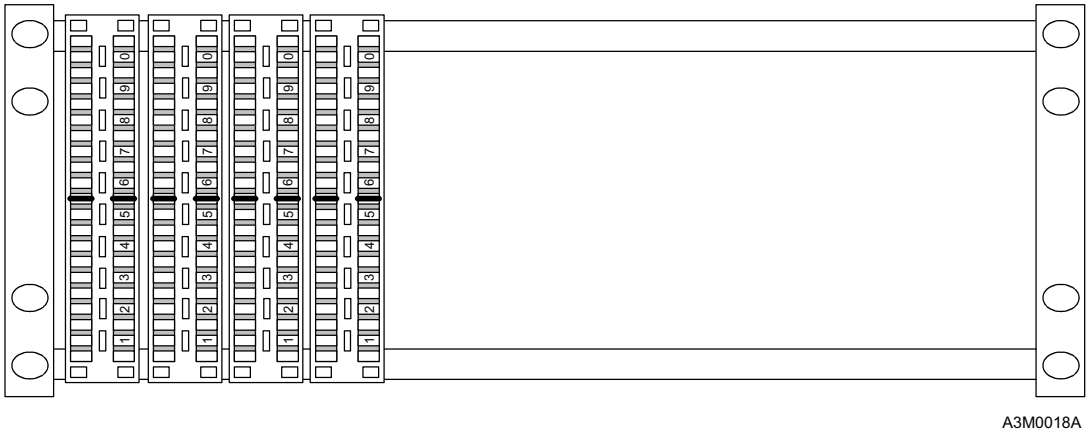

Fig. 34: 19” Panel Equipped with Krone Blocks

The panel depicted in Fig. 34 is one alternative. In the more common Krone block mounting panel all the blocks are installed vertically in three columns (5 x 3).

1.5.3.3 Finding Cables

It is recommended to have the D9male - open cables from the IF to the Krone mounting frame readily premade. Those cables are 2 metres long, made of 120 Ω 2-pair, pair twisted cable with individual pair shielding. The cable from the Krone mounting frame should have 16 pairs, also pair twisted cable with each pair individually shielded. This 16-pair cable needs no connectors, as it is terminated on Krone blocks in both ends. Both of these cables can be supplied by Ericsson AB.

1.5.3.4 Fitting "D9 Male - Open" Cables to Krone Blocks

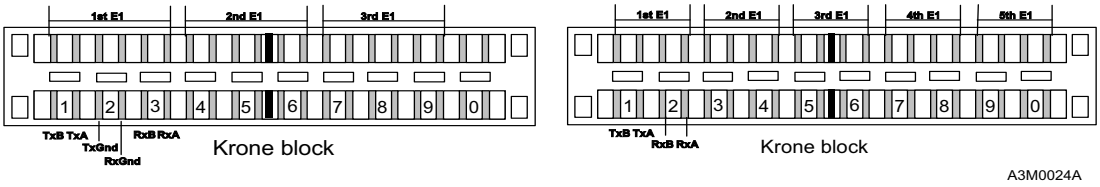

Fig. 35: Connection of 120 Ω Cable to Krone Block

Fig. 35 shows two ways of connecting E1s (T1s) to Krone blocks, one with Tx/Rx grounds and the other one without.

Each cable coming from an interface should end up at the back of the Krone block where there is a mounting ear. The pairs should be threaded through it. At the back of Krone blocks there are guides designed to keep the pairs steady, where the pairs can be fitted after going through the ear. By using a Krone LSA-Plus tool, each wire can be punched to its place.

WARNING! **Do not twist the pairs too hard!**

The table below indicates how to connect each wire.

Signal	Krone Block	D9 Connector	04KEO00002	KLVMAAM
TxA	1a	1	White (1st)	1st pairs blue
TxB	1b	2	Black (1st)	1st pairs white
TxGnd	2a	6	Drain (1st)	1st pairs drain
RxGnd	2b	9	Drain (2nd)	2nd pairs drain
RxA	3a	4	Red (2nd)	2nd pairs blue
RxB	3b	5	Black (2nd)	2nd pairs white

This diagram shows the signals, the location of all wires in Krone block and how they are connected to the D9M connector. 04KEO00002 refers to the Madison's 2-pair 120 Ω cable and its colour system whereas KLVMAAM represents 120 Ω 2-pair NK-cable and its colour system. Ericsson AB supplies mainly Madison's cable.

NOTE! **Cables can also be connected to the Krone blocks beforehand.**

1.5.3.5 Mounting Krone Blocks to DDF and Krone Mounting Panel

When all the cables are connected to the Krone blocks, the blocks can be mounted to the mounting panel(s). Cables can be connected to the blocks also after they are installed to the frame.

Proceed in the following way.

Step 1. Define the cable route.

Step 2. “Plug” the Krone block in its place.

1.5.3.6 Running Cables from Krone 19" Mounting Frame to IF

Individual cables from the mounting frame to the interfaces can be run one by one. Take the first cable from the first Krone block and run it to the IF1 of the first GMH unit. Proceed by running the second cable to the IF2 and so on. When all the cables have been run, tie the two cables coming from GMH unit’s IF1 and IF2 together with cable ties in front of the unit. Go on like this until all the units in the subrack are dealt with. All the slots in the subrack can be cabled (except PFU-As, SCUs and SXU-As slots) for future need. Usually there is need to cable only 64 Mb/2 MB = 32 IFs (which is 16 GMHs or 8 QMHs) in a subrack. 16 GMHs cannot be placed in a single subrack, instead a double subrack can accomodate such a number of GMHs. If there is a need to have 32 E1s in a single subrack, a QMH unit must be used. It is useful to cable more than 32 E1s in a subrack if only part of the time slot capacity in each E1 is used for cross-connections.

NOTE! **Make sure that no cables are in the way when removing units from the subrack!**

1.5.3.7 Running Cables from Krone Mounting Frame to DDF

NOTE! **If using backup or 1+1 protected trunks, use a different cable route for them, if possible.**

Standard Environment

In the standard environment (no EMC requirements) there are no special requirements for running the cables from the Krone mounting frame to the DDF.

Before running the cables, remember to mark them in such a way that you can identify them at both ends. The 16-pair cables can be routed one by one.

NOTE! **One 16-pair cable can hold eight IFs.**

Step 1. Run the cable via a predefined route and leave at least two metres of extra cable at both ends.

Step 2. If the power cables are in the same cable duct with data cables, run them in different sides of the duct.

Step 3. After running the needed cables, set them into their correct places.

Step 4. Peel off the extra insulation.

Step 5. Run each individual pair to their predefined place and cut the extra cable off.

Step 6. Connect the pairs to the Krone blocks as described in Chapter 1.5.3.4. The connection is made by using the LSA-Plus connecting tool "Punch Down Tool".

Severe Electromagnetic Environment

When the installation is done in a more severe electromagnetic environment than specified in EN 300 386-2:1997 clause 5.1 and Class B of EN 55022, some special features have to be considered.

— When the 16-pair cable is going out of the cabinet through the cable entry panels (supplied in the EMC cabinets of Ericsson AB), the cable screen must be terminated 360° to the lead-in plates of the cabinet.

— After the cable is actually run to its place and fastened to the cabinet structures. Some five centimetres of the cable screen must be peeled off for the cable entry panels. There is a special tool available for that purpose.

— When all the cables leaving the cabinet are dealt with, make sure that all of them are close set and the metal screen of each cable touches either the lead-in plates or other cable screen.

Connect the DDF cables end according to the instructions in Chapter 1.5.3.4. The connection is made with the Krone LSA-Plus connecting tool.

1.5.4 Installation without Krone Mounting Frame at Back of Cabinet

The type of installation without Krone mounting frame at the back of a cabinet is not recommended, for although it saves some costs, it makes the installation harder and the results are not very professional due to the fact that one interface needs 2 pairs. Using a 16-pair type cable from the interface means that the cable structure must be disassembled and the pair shielding would be visible when going out of the D9-connector shell. It is also impossible to terminate the cable to the connector shell. It looks unprofessional and besides it is impossible to terminate to the cabinet cable entry panel in the EMC environment.

The best alternative is to use 2-pair cable from the interface to the DDF. The distance between IF and DDF could be up to 30 metres and when there are numerous individual cables the whole bunch of cables will be quite thick (The thickness of 8 pcs of 2-pair cable is far more than the thickness of one 16-pair cable). A second problem when using this kind of cabling is the different lengths of individual cables for each site - there is the possibility that cables for a certain site are delivered to a wrong place. This means that ready-made cables cannot be used or there is a danger of mixing them up when using them.

This installation is preferred when only a couple of E1s are to be cabled from the DXX 8100 equipment to the DDF.

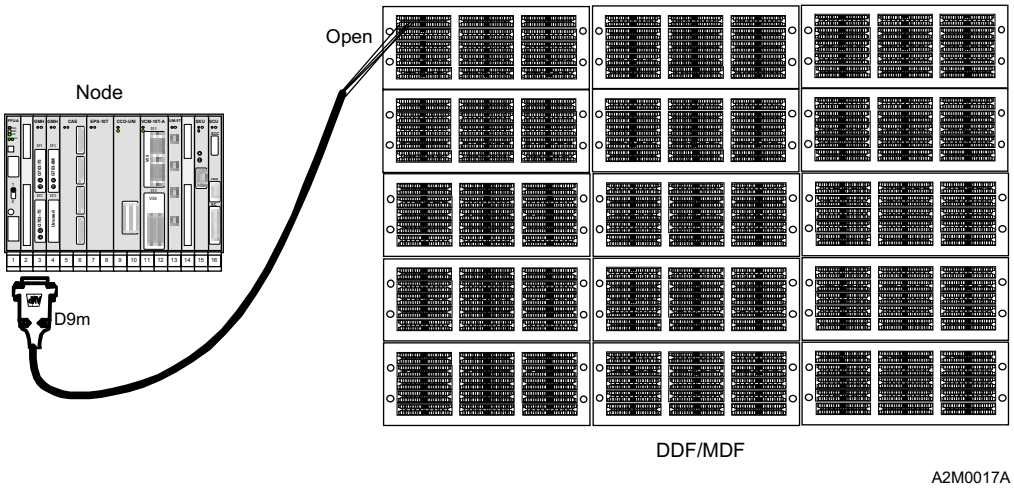

Fig. 36: 120 Ω Cabling without Krone Frame at Back of Cabinet

1.5.5 Looping All Interfaces

After the installation, all the interfaces are looped either on the Krone Mounting Frame or on the DDF depending on the cabling junction to be tested. Looping the interfaces switches off some of the alarms from G.703 interfaces and after this no alarm leds should be lit. Looping can be done even if commissioning and cabling tests are to be performed. The BER tester can be connected to the Krone blocks with a special measuring cable which has connectors that can be plugged in the middle of a separating Krone block. If the installed Krone blocks do not have the measuring feature, it is better to do the looping after commissioning.

1.6 User Access Cabling

1.6.1 General

This section defines how to make all user access cabling in DXX 8100.

User access refers both to all the data/voice interfaces and NTU line connections covering all VCM, IUM, ISDN, CCO/CCS and CAE unit interfaces.

1.6.2 Tools Needed for Twisted Pair Cabling

There is a tool kit for 120 Ω installation supplied by Ericsson AB and the same kit can be used for user access cabling as well. These tools are needed if the data cables that are going to be installed have an open end and Krone blocks are involved. The set contains the following items.

— LSA-Plus connection tool for Krone blocks

— special stripping tool for removing the plastic insulation from the cable

No other special tools are required in addition to the normal installation tools (a knife, screw drivers etc.).

1.6.3 Installation when Using Krone Mounting Frames at Back of Cabinets

1.6.3.1 Mounting DDF

The digital distribution frame (DDF) installation is described in Chapter 1.5.3.1.

NOTE! **Each Krone block can hold 10 pairs. This means that one block can hold five NTUs in four-wire mode and 10 NTUs/IUMs in two-wire mode or ten voice channels in two-wire mode.**

1.6.3.2 Installing Krone 19" Mounting Panel

The Krone 19" mounting panel installation is described in Chapter 1.5.3.2.

NOTE! **One Krone mounting frame can hold up to 15 blocks and each block can hold 10 pairs making 150 pairs altogether.**

1.6.3.3 Defining Needed Cables Connected to Krone Mounting Panel

All cables supplied by Ericsson AB with an open end/ends can be connected to Krone blocks. If a cable has connectors in both ends, it is not meant to be connected to the Krone blocks. The cables for the CAE, CCO and CCS units are of the same type. Those cables can be ready-made and they are available in different lengths. The cables for IUM-5T/10T and STUs are supplied with the corresponding units.

The Krone block can be considered an extension to the user access cables mentioned above. They are not necessarily used for cable cross-connection in DXX 8100.

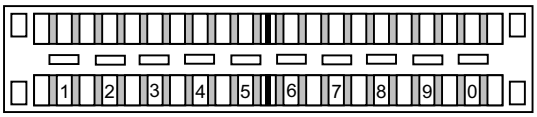

Fig. 37: Krone Block

Fitting Voice Frequency Cables to Krone Blocks

It is relatively easy to connect a ready-made D25M-open cable to the Krone block. There are ten channels connected to the cable, and one block can hold 10 pairs. This goes for CAE in two-wire mode and for CCS and CCO (not for CCO-UNI or CCS-UNI). If CAE is used in four-wire mode, the connection is the same, but there are only 5 channels connected per interface/Krone block.

CCO-UNI and CCS-UNI units use D50M-open cables which are available in solid and stranded wire type.

Cable routing from the interface can be done by using the same principles as in 120 Ω installation. As normal CAT3 100 Ω pair twisted telephone cable is used, there are no special requirements such as, for example, taking care of cable shield termination to the cabinet. Use the Krone LSA-Plus connecting tool for making the connection.

Fitting NTU Line Cables to Krone Blocks

There are several alternatives for IUM as well as for the DXX 8110 STU cables. Usually only IUM cables are connected to the Krone blocks inside the cabinet. DXX 8110 STUs are normally used in the customer premises and they are connected to a wall plug (type RJ45 or RJ12). The other end of the IUM cable is usually of RJ45, RJ12 or open type. The open type IUM - cable RJ45 - open is connected to the Krone blocks or wire wrap panels. There are no cross-connections, the cable is directly connected (in a one-to-one relation). In this way there is no need for special wiring diagrams. Use the Krone LSA-Plus connecting tool to make the connection.

One IUM cable takes one pair from a Krone block. This means that there can be 10 IUM interfaces connected to a Krone block.

When using BTE-1088/2048/4096 or BTE-320/576/1088-2W/2304, the interface end is a D9 female connector. The other open end is connected to a Krone block. BTE-4096 can only be used in 4-wire mode; there can be only 5 such BTEs connected to one Krone block. BTE-320/576/1088-2W/2304 can be used both in 2-wire and 4-wire mode.

1.6.3.4 Mounting Krone Blocks to DDF and Krone Mounting Panel

After connecting all the cables to the Krone blocks, they can be mounted to the mounting panel(s).

Proceed in the following way.

Step 1. Define the cable route.

Step 2. Plug the block into its place. The blocks can already be installed on the Krone panel too and the connection is done on the panel.

Step 3. The empty Krone blocks can be plugged to the DDF.

When possible, put the Krone Blocks with different type of cables in different rows or leave some space between the Krone blocks consisting of different types of cables (e.g., Voice, NTU line).

NOTE! **Do not mix voice frequency cables in the same Krone block with the NTU line cables because of clarity!**

Running Voice Frequency Cables from Krone Mounting Panel to IF

Individual cables coming from the mounting frame can be run one by one. Take the first cable from the first Krone block and run it to the IF1 of the first CAE unit. Proceed by running the second cable to the IF2 and so on. Once all the cables are run tie those two cables coming from CAE unit's IF1, IF2, IF3 and IF4 together with cable ties. Proceed this way until all the units in the subrack have been dealt with.

The cabling of CCO/CCS units is different, as there is only one IF (consisting of 10 channels). Nonetheless, the cable coming from the IF must be tied to the other cables, so that they will not be in the way of other units when removing them.

When cabling CCO-UNI or CCS-UNI, it is necessary to remember that both units have two output connectors. In the CCO-UNI both interfaces have 15 channels whereas in the CCS-UNI there are 16 channels in the first interface and 14 channels in the second interface.

Fasten all the cables to the cabinet structure.

Running NTU Line Cables from Krone Mounting Panel to IF

The number of NTU line cables is seldom high (less than 20). The cables can be run one by one from the IF to the Krone blocks. Take the first IUM cable in the first Krone block consisting of NTU line cables and run it on the front side of the subrack. Connect it to the first IUM's IF1. Go on like this until all the cables are connected. Fasten all the cables to the structures of the cabinet.

NOTE! **Make sure that there are no cables in the way when removing units from the subrack!**

1.6.3.5 Running Cables from Krone Mounting Panel to DDF

Running Voice Frequency Cables

The cable used for this purpose should be the same type as the ready-made D25M-open cable, which is a 10-pair 100 Ω CAT3 cable with twisted pairs. It has an aluminium foil as an outer shield. A cable similar to NK-Cables MHS 10 x 2 x 0.5 is recommended to be used with more pairs. In this case there should be more than one interface in a CAE unit connected/in use in a cabinet to make the solution more cost effective. If only a few voice interfaces exist in the subrack, it is better to run them directly to the MDF. Running the multi-pair cables can be done one by one.

Step 1. Run the cable via a predefined route and leave at least two metres extra at both ends.

Step 2. If the power cables are in the same cable duct with the data cables, run them in different sides of the duct.

Step 3. After running the needed cables, set them into their correct places.

Step 4. Peel off the extra insulation.

Step 5. Run each individual pair to the predefined place and cut the extra cable off.

Step 6. Connect the pairs to the Krone blocks as described in Chapter 1.5.3.4. The connection is made by using an LSA-Plus connecting tool "Punch Down Tool".

Running NTU Line Cables

The cable used for NTU connections should be a 2-pair 100 Ω pair twisted unshielded cable. When a cable consists of only two pairs, it is better to use a multi-pair cable that fulfils the requirements (above) for a NTU line cable used in DXX 8100. Even if there is only one IUM fully cabled (four/eight cables), it is useful to have Krone blocks between the IUM interface and the customer’s DDF. This will also be useful for future installations.

1.6.4 Installation without Krone Mounting Panel at Back of Cabinet

The type of installation without Krone mounting panel at the back of a cabinet is not recommended. Even though it saves some costs, it makes the installation harder and the results are not very professional. The following problems can be derived from using this type of cabling, although it does not necessarily mean that a Krone mounting panel must always be used.

— The distance between IF and DDF could be up to 30 metres and if there are plenty of individual cables the whole bunch of cables turns out to be very thick.

— As there are different lengths of individual cables for each site, there is the possibility that the cables for a certain site are delivered to the wrong place.

If there are already installations done in the site (e.g., the site has been in use for a longer period of time), and the length is well known it is advisable to use ready-made cables.

1.7 Optical Installation

1.7.1 General

This chapter describes how to do the cabling of optical interfaces. There are two types of optical adapters used in DXX 8100.

— FC Optical Adapter used for the optical G.703 interface, OTE-LED and OTE-LP (GMH). Also available in the STM-1 optical interfaces of GMU and GMX.

— SC Optical Adapter (GMU optical interfaces) used in GMU and GMX interfaces, STM-1-SH-13 and STM-1-LH-13 optical modules, as well as in AIU unit.

Large ODFs for the DXX 8100 equipment are not needed, if there are only a couple of optical interfaces in a node.

With 1+1 or backup trunks, use an alternative cable route, if possible.

The installation can be done either with an optical distribution frame (ODF) in each cabinet or a larger ODF where all the optical interfaces are routed.

NOTE! **Remember that the more physical connections you have on the cable path, the more extensive the attenuation becomes and, consequently, the price of the overall cabling increases dramatically.**

If you are using either STM-1-LH modules in a GMU or GMX unit, or OTE-LP modules in a GMH unit, measure the output power of the module. If it is too high, an optical attenuator must be used in order to avoid the saturation in interface inputs. The rating of the attenuator must be specified according to the optical fibre length.

1.7.2 Tools Needed

The following tools are needed in the installation of optical interfaces.

— cleaning set for optical connectors including
  — cleaning alcohol
  — some cotton sticks
  — special cleaning tissue and
  — specially made microscope for checking the cleanliness of optical connector’s ferrules (recommended).

— small container of clean pressurised air

1.7.3 Installation when Using 19" Panel at Back of Cabinet

1.7.3.1 Mounting ODF

The ODF can be of 19-inch type, mounted on the 19'' frame (it might be available as customer's ODF solution) or some other type of frame. The only purpose for the ODF is to collect the cables at one location, from which they can be distributed to the transmission equipment. The ODF can be constituted by a row of holes where to install the SC or FC adapters that connect the fibres together. After the ODF is built (no matter what type), plug in the needed adapters.

1.7.3.2 Mounting 19" Panel

The only requirement for an ODF is that it can be mounted on a 19'' frame (or ETSI frame when needed) and there are slots available for two types of optical connectors, FC and SC. It could also be useful to have a shelf for extra optical cables in the same construction, having in mind the optical cable maximum bend radius. The best way to mount the 19" frame to the cabinet is to use M6-8 cage nuts in proper places. The screws are the same as those used for fastening the DXX 8100 subracks (M6x16).

The other alternative is to use the same kind of panel used in 120 Ω installation (see Chapter 1.5). A specially designed "optical block" can be added to the same frame with Krone blocks. In this alternative, optical and Krone blocks are mixed in the same frame.

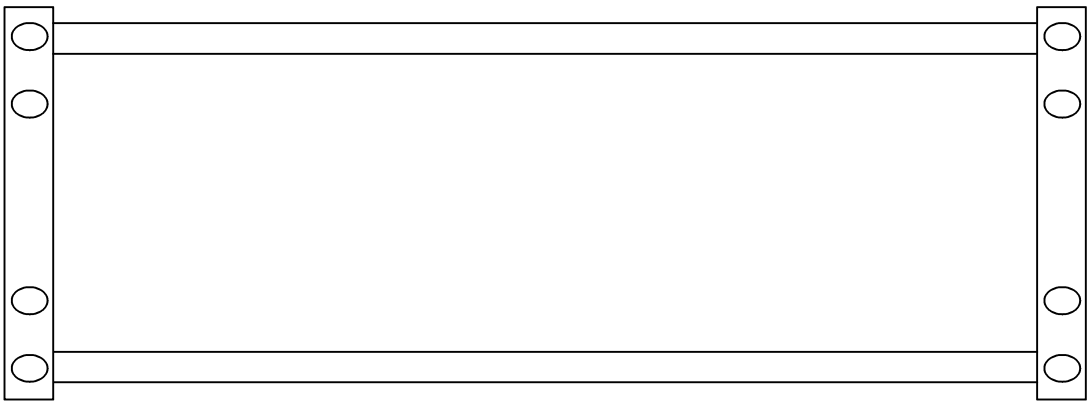

Fig. 38: 19" Panel for Krone Blocks and Optical Modules

1.7.3.3 Finding Cables

The optical connectors have to be manufactured in controlled conditions. In practical terms this means that all the cables are made in special production facilities. The making of the optical cables requires purity and carefulness when handling the optical fibre disposals (they must be properly disposed of).

To fulfil these requirements it is recommended that cables of correct length are ordered from an approved subcontractor according to the site survey. There are many different types of cables and numerous terms referring to them such as single mode cables, multi mode cables, duplex type etc.

Single mode fibre (SM 10/125 μm) is the type normally used in customer's applications. It can be identified by yellow colour.

Duplex type has two optical cables attached to each other from their jackets instead of two separate cables.

1.7.3.4 Running Cables from IF to 19" Panel

The cable coming from the interface could be of duplex type single mode fibre. The other alternative is to have two separate fibres from the interface to the 19-inch panel. Fibres can be run one by one.

CAUTION! **Do not twist, bend or otherwise mishandle the optical fibres when running them.**

1.7.3.5 Connecting Cables

To connect the cables proceed in the following way.

Step 1. Remove the plugs that cover the optical interface connectors.

- **Important:** Do not throw the plugs away, because you will need them when changing the unit or module.

Step 2. Blow some cleaned air from the container inside the IF connector to remove possible dust particles that may interfere with the normal operation of the interface.

Step 3. Before connecting the FC- or SC-type connectors, clean them with a special tissue dipped with alcohol.

Step 4. On the panel end plug in the needed SC or FC adapters (they are of female-female type) and clean them in the same way.

Step 5. Plug in the cable coming from the interface.

1.7.3.6 Running Optical Cables from 19" Panel to ODF

If you have many optical cables in each cabinet, it is advisable to purchase an optical cable that consists of several fibres with their tails. You can have, for example, eight individual fibres in one single core.

Before running the cable, both ends must be shielded (against mechanical wear) so that they will not be harmed in any occasion when laying the cable on the cable ducts. Be careful not to stretch the cable. Check that there are no sharp edges in the cable duct that may harm the optical cable.

After running the cables, take the shields as well as the covering plugs out of the optical connectors and clean the connectors according to the instructions in the previous section. Plug them into the adapters.

NOTE! **With backup or 1+1 protected trunks, use a different cable route, if possible.**

1.7.4 Installation when Using only ODF

Installation when using only ODF is the best alternative regarding the costs of installation. You only need one optical distribution frame (that might already exist in site) with free slots where to mount the optical adapters and the cables. The optical fibres will be routed from the interface directly to the ODF without any extra connections in the way. In this case, the exact lengths of the cables must be known beforehand.

The actual installation can be done following the instructions in Chapter 1.7.3.1, Chapter 1.7.3.3, Chapter 1.7.3.4, Chapter 1.7.3.5 and Chapter 1.7.3.6. Only the 19-inch panel is left out.

Another advantage in the installation of this kind is the decreased number of connection points. The whole cabling is more reliable and there is not so much attenuation on the line.

NOTE! **Each optical connector increases attenuation by 0.5 dBm.**

1.8 DXX 8170 Cluster Node Cabling

1.8.1 General

This chapter describes how to perform the intrasystem cabling of DXX 8170 cluster node. It also explains how to use the service computer when building a DXX 8170 cluster node.

1.8.2 DXX 8170 Cluster Node Installation

1.8.2.1 Master Subrack Installation

A master subrack can be installed in the following ways.

— making the physical installation

— setting the node and subrack parameters

— creating the master subrack inventory

Physical Installation

At least the following items are needed for the master subrack installation.

— DXX 8170 cluster double subrack

— fuse units

— CCU and two CXU-Ms

— two CXU-As per a slave subrack

— two CXU-Ss if signalling cross-connections

Proceed as follows.

Step 1. The mechanical installation of the subrack is performed first. For further details refer to Chapter 1.1.3.8.

Step 2. All unit or module strapping options must have been prepared before the actual installation of the units. The strapping instructions can be found in the relevant technical descriptions of units and modules in *DXX 8100 Managed Access System Node Technical Description* (document number EN/LZB 119 1128).

Step 3. Place the units into the subrack.

- The fuse units are placed on both shelves starting from the slot 1 and 17.
- CCU must go into the slot 16.
- The cross-connection units must be placed as follows.

Unit	Protection	Slot
CXU-M	protected	15 and 31
CXU-S	protected	14 and 30 (optional)

Do not place the CXU-As yet because they will be associated with slave subracks and they are not yet prepared for the cluster.

At this point there is no cabling in the master subrack. Do the cabling for the fuse units only. This information is available in the relevant tehcnical descriptions of units and modules in *Node Technical Description* (document number EN/LZB 119 1128).

NOTE! **Do not connect the master subrack to slave subracks by XC bus cables or CBUS cables yet.**

Setting Node and Subrack Parameters

Step 1. Switch the power on to the subrack and let it boot up.

Step 2. Connect a Service Computer to the SC interface of the CCU and start up the Service Computer.

Step 3. Give the following node parameters to the Service Computer before creating the node inventory.

NODE ID	unique identification of node (Note: it must be the same for all the subracks of a DXX 8170 cluster node!)
SUBRACK TYPE	double
FUSE UNIT	PFU, protected or unprotected
NODE TYPE	cluster (master)
CROSS CONNECT UNIT	CXU-M, protected

Creating Master Subrack Inventory

Step 1. Use the service computer first to check that all units are correctly in their places. This is done by drawing a picture of the subrack on the screen.

Step 2. Create Inventory operation:

- This operation defines that all existing units belong to the created node. In other words, all the existing units are registered for the subrack, their serial numbers are stored and their backup settings are stored into the non-volatile memory of the CCU.
- The node parameters, cross-connection units and their protection options are updated in accordance with the existing cross-connection units.
- All possible cross-connections are removed and all cross-connection ports are unlocked. This takes some time. Wait until you get an answer.
- Possible errors will be reported. Typical problems are inconsistency of units or incorrect placing of units - there must always be a CCU and a cross-connection unit in correct places.
- The cross-connection units reset themselves in order to make full initialization. They must be alive before any other inventory operations are possible.

Step 3. Draw the subrack again in order to check that all units are present and registered in the picture.

Step 4. The master subrack has now been installed but it is not yet a complete DXX 8170 cluster node.

1.8.2.2 Slave Subrack Installation

A slave subrack can be installed in the following ways.

— making the physical installation

— setting the node and subrack parameters

— creating the slave subrack inventory. This may have to be done up to eight times, once for each slave subrack.

NOTE! **Never connect a subrack to a running DXX 8170 cluster node before checking the slave number assignment. All the slaves of a cluster must have different numbers (slave 1... slave 8).**

Physical Installation

At least the following items are needed for slave subrack installation:

— single or double subrack

— fuse unit or fuse units

— SCU and two SXU-Cs

Channel units can be installed in the beginning or they can be added later. Remember that all interface types are not supported in a DXX 8170 cluster node.

Step 1. The mechanical installation of the subrack is performed first. For further details, refer to Chapter 1.1.3.8.

Step 2. All unit or module strapping options must have been prepared before the installation of units. For further instructions on strapping refer to the relevant technical descriptions of units and modules in *DXX 8100 Managed Access System Node Technical Description* (document number EN/LZB 119 1128).

Step 3. Place the units into the subrack.

— The fuse or power units are placed at the left side of the subrack starting from slot 1.

— In the double subrack fuse or power units are placed on both shelves starting from slot 1 and 17.

— SCU must go into slot 16.

— The cross-connection units must be placed as follows.

Unit	Protection	Slot
SXU-C	protected	15 and 14

— The channel units can be inserted into free slots 2-13 or 18-32 in a double subrack.

— There is one rule to remember for slot 32: No control channel can be used through the interface of the unit in the slot 32. In practice, this is not a limitation because the required control channels can be implemented by using any other unit slots than the slot 32.

Step 4. Unit cabling can be made by using the unit cabling data about the pins and the signals of the DXX 8100 units. For further information, refer to the relevant technical descriptions of units and modules in *DXX 8100 Managed Access System Node Technical Description* (document number EN/LZB 119 1128).

NOTE! **Do not connect the slave subrack to the master by XC-bus cables or CBUS cables yet.**

Setting Node and Subrack Parameters

Step 1. Switch the power on to the subrack and let it boot up.

Step 2. Connect a Service Computer to the SC interface of SCU and start up the Service Computer.

Step 3. Give the following node parameters to the Service Computer before creating the node inventory.

NODE ID	unique identification of node (Note: it must be the same for all the subracks of a DXX 8170 cluster node!)
SUBRACK TYPE	single or double
FUSE UNIT	PFU, protected or unprotected
NODE TYPE	cluster
	slave 1 or slave 2 or …slave 8
	Note: slave numbers must be different!
CROSS CONNECT UNIT	SXU-C, protected

Creating Slave Subrack Inventory

Step 1. Use the Service Computer first to check that all units are correctly in their places. This is done by drawing the picture of the subrack on the screen.

Step 2. Create Inventory operation:

- This operation defines that all existing units belong to the created node. In other words, all the existing units are registered for the subrack, their serial numbers are stored and their backup settings are stored into the non-volatile memory of the SCU.
- The node parameters, cross-connection units and their protection options are updated in accordance with the existing cross-connection units.
- All possible cross-connections are removed and all cross-connection ports are unlocked. It takes some time. Wait until you get an answer.
- Possible errors will be reported. Typical problems are inconsistency of units or incorrect placing of units - there must always be a SCU and a cross-connection unit in correct places.
- The cross-connection units reset themselves in order to make full initialisation. They must be alive before any other inventory operations are possible.

Step 3. Draw the subrack again in order to check that all units are present and registered in the picture.

The slave subrack has been installed but it is not yet a complete DXX 8170 cluster node.

1.8.2.3 Making DXX 8170 Cluster Node

This operation joins the master subrack and the slave subracks together as a DXX 8170 cluster node. The CCU starts the monitoring of the registered subracks and will be ready to report about missing subracks etc.

It is important that all the slaves of a cluster have different numbers (slave 1…slave 8). It does not matter which different slave numbers are used out of the subset if less than eight slaves are needed in a DXX 8170 cluster node. However, it is recommended to install the slaves in numerical order starting with slave 1.

NOTE! **Never change the slave numbers of a running DXX 8170 cluster.**

Adding Slave Subracks and Corresponding CXU-A Pairs

NOTE! **Use forced control to eliminate unnecessary changeover between the redundant cross-connection systems.**

Slave 1

Step 1. Put a pair of CXU-A units into the master subrack.

- In the upper shelf into the slot 6 for slave 1.
- In the lower shelf into the corresponding place (slot 22).

Step 2. Install the CBUS cable between the master subrack and the slave subrack.

Step 3. Install the XC-bus cable between the CXU-A unit and the SXU-C unit.

Step 4. Draw the master subrack.

Step 5. Add slave 1 to DXX 8170 cluster node by selecting **Create Inventory/Add Unit** applied to the corresponding CXU-A unit (another CXU-A unit will be added automatically).

Slave 2

Step 1. Put a pair of CXU-A units into the master subrack.

- In the upper shelf into slot 7 for slave 2
- In the lower shelf into the corresponding place (slot 23)

Step 2. Install the CBUS cable between the master subrack and the slave subrack.

Step 3. Install the XC-bus cable between the CXU-A unit and the SXU-C unit.

Step 4. Draw the master subrack.

Step 5. Add slave 2 to DXX 8170 cluster node by selecting **Create Inventory/Add Unit** applied to the corresponding CXU-A unit (another CXU-A unit will be added automatically).

Slave 8

Step 1. Put a pair of CXU-A units into the master subrack.

- In the upper shelf into the slot 13 for the slave 8
- In the lower shelf into the corresponding place (slot 29)

Step 2. Install the CBUS cable between the master subrack and the slave subrack.

Step 3. Install the XC-bus cable between the CXU-A unit and the SXU-C unit.

Step 4. Draw the master subrack.

Step 5. Add slave 8 to DXX 8170 cluster node by selecting the **Create Inventory/Add Unit** applied to the corresponding CXU-A unit (another CXU-A unit will be added automatically).

NOTE! **Release the forced control of the redundant cross-connection systems.**

DXX 8170 Cluster Node Cabling

XC-bus cables are PS402830117070 (4 m) or PS402830117080 (8 m).

Master Subrack Upper Shelf

XC-bus cables connect CXU-A to SXU-C in the slot 15 of the respective slave subrack.

CXU-A Slot	Slave Number
6	1
7	2
8	3
9	4
10	5
11	6
12	7
13	8

Master Subrack Lower Shelf (If Duplicated)

XC-bus cables connect CXU-A to SXU-C in the slot 14 of the respective slave subrack.

CXU-A Slot [(a)]	Slave Number
22 (6)	1
23 (7)	2
24 (8)	3
25 (9)	4
26 (10)	5
27 (11)	6
28 (12)	7
29 (13)	8

(a) The slot numbers 22-29 are global in the double subrack while (6-13) are local in the lower shelf

Step 1. Connect the XC-bus cables.

Step 2. Connect the CBUS cables.

- CBUS cables are PS402838117256A (1 m), PS402830117030 (2 m), PS402830117110 (4 m), PS402838117322 (6 m) and PS402830117120 (8 m).
- CBUS cables connect the CCU in the master subrack and all SCUs in the slave subracks in a chained fashion implementing the cluster control bus. Do not connect CBUS cables in a starlike fashion.

Step 3. Insert the two CBUS terminators PS402830117060 into the two ends of the bus.

Step 4. The typical DXX 8170 cluster node configuration is shown in Fig. 39.

- The two slave subracks are connected into the master subrack by XC-bus cables and CBUS cables. The cross-connect units are duplicated.

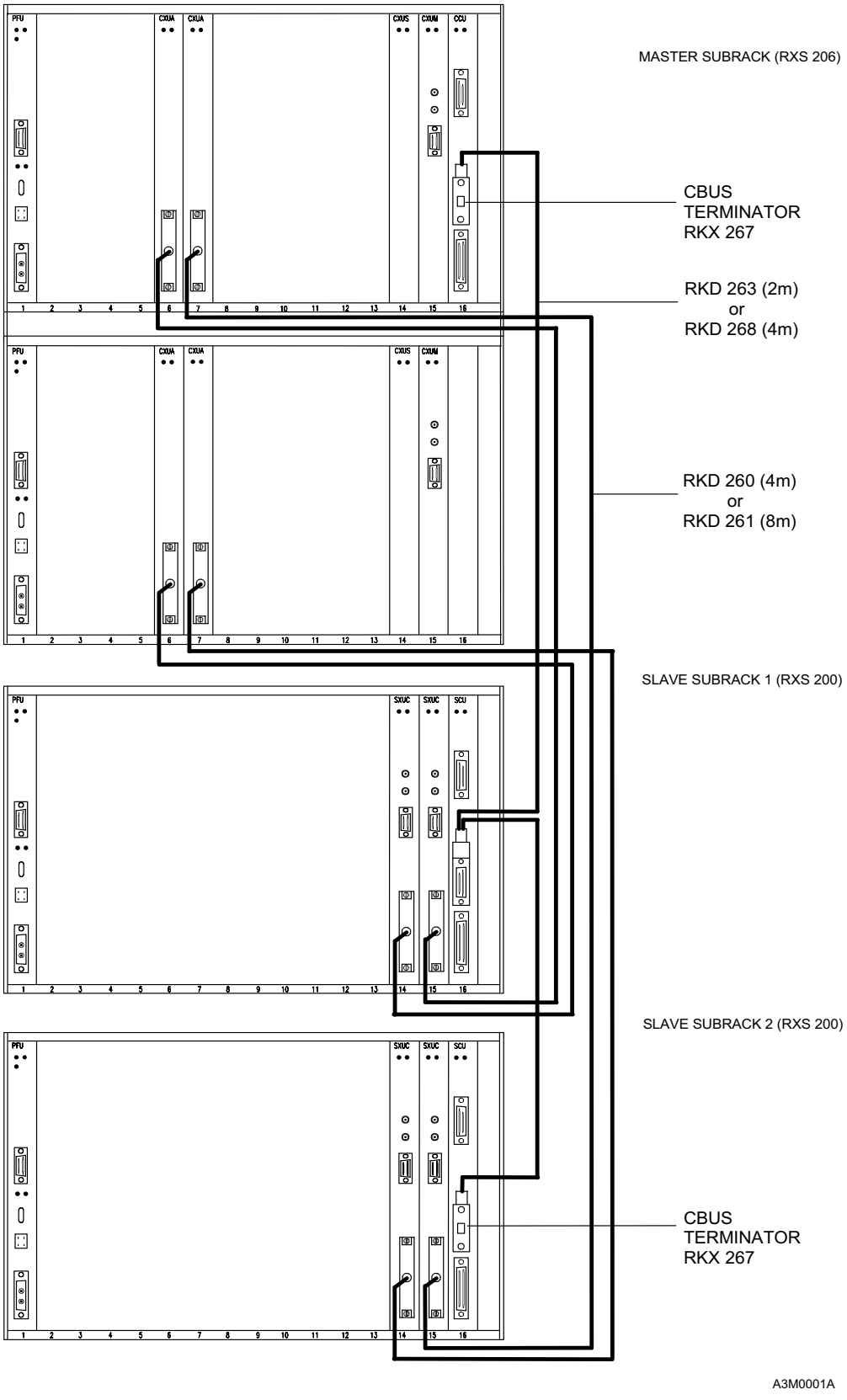

Fig. 39: Example of DXX 8170 Cluster Node Cabling

1.9 Miscellaneous Installation

1.9.1 General

The present chapter describes other necessary actions when installing DXX 8100 such as communication link, alarm and synchronization cabling and labelling.

1.9.2 Communication Link Cabling

1.9.2.1 Synchronous Communication Link

A synchronous communication link is made between the DXX Server and SCC interface situated in an SCU unit providing a 64 kbit/s link. In the DXX Server there has to be an Eicon HSI/PC or S51 extension card that provides an X.21 interface which has a D26 female type connector (contacts in three rows, mechanically the same size as the D15 connector). In the DXX 8100 end, the SCC interface has a D15 male connector. The cable for connecting the DXX Server and the SCC Interface must be of type D26 male - D15 female.

An Eicon-S94 card has a mini SCSI type connector. In EMC environment 5 cm of the cable cover must be peeled off for the cabinet's lead-in plates. From the EMC point of view the maximum length is 10 metres. Otherwise it can be up to 20 metres.

1.9.2.2 Ethernet Link

An SCU-H unit can be equipped with an optional SCP-H module that provides an Ethernet 10Base-T interface to DXX 8100 manager and a number of additional HDLC channels. Use a cross LAN cable to connect the DXX server directly to SCU-H. If SCU-H is connected through switch or hub then straight LAN cable must be used. The link speed is 50 kbit/s. The 20-metre distance limitation does not apply to the Ethernet link. The maximum length is up to 90 metres. In EMC environment an STP (shielded twisted pair) cable must be used.

1.9.2.3 Asynchronous Communication Link

The asynchronous communication link is also made between the DXX Server and DXX 8100 providing a 9.6 kbit/s link. This is mostly used as a backup and in Service Computers. The cable itself is an ordinary RS232-C cable with D9 female - D25 male connectors. In the DXX Server the cable is connected to the first serial port whereas in an SCU it is connected to the SC Interface.

In EMC environment 5 cm of the cable cover must be peeled off for the cabinet's lead-in plates. From the EMC point of view the maximum length is 10 metres. Otherwise it can be up to 20 metres.

1.9.3 Alarm Cabling

There are two types of alarm cabling that can be installed in DXX 8100. The first alternative is to have all the alarms from the PFUs to an alarm panel. PFU-As collect the alarms that appear in the corresponding subrack. The cable is of the type D9 female - Open. The cable should be of a solid wire type, if the connection to the alarm panel is of wire wrap type. Otherwise a cable with a stranded wire is correct. The pin layout can be found in the technical description of the PFU unit in *DXX 8100 Managed Access System Node Technical Description* (document number EN/LZB 119 1128).

An alarm interface can be installed in an SCU unit. You can connect, for example, a door switch to the alarm interface so that it indicates that the door is open or any other OFF/ON information. The other end of the cable is of type D9 male and the other end is according to the need.

In EMC environment 5 cm of the cable cover must be peeled off for the cabinet's lead-in plates. From the EMC point of view the maximum length is 10 metres. Otherwise it can be up to 20 metres.

1.9.4 Synchronization Cabling

In the case of synchronization cabling either 75 Ω or 120 Ω cabling can be used, depending on the requirement. In 75 Ω cabling there is a need for only one cable that is connected to the "Sync in" connector in SXU-A, SXU-B, XCG, GMX or CXU-M, depending on the used unit. The connector type is SMB and the recommended cable is BT3002. The other end is connected to a common clock source (that gives synchronization to the whole transmission system) in the customer premises. In 120 Ω installation the cable is connected to the D9 female connector in the units listed previously. The cable type is D9 male in the DXX 8100 end whereas the other end must be determined on the spot.

1.9.5 Labelling

Labelling is done after all the cabling is finished. The purpose for labelling is that all the cable routes can be determined afterwards, if needed.

One alternative is to use Brady LaserTab Markers, type ELAT-18-361-2.5 and type the labels with special printing programs and print them with Laser printers. This is useful if there are numerous cables to be marked.

The other alternative is to use a special printer which prints the labels one by one. This is not practical in a larger scale, only when printing some dozens of labels.

Label all the trunk, power and cluster cables as well as other needed cables.

1.9.6 Installing DTE Cabling

Cables with connectors at both ends are connected directly to a router, PBX or some other customer equipment. Cables are in predefined lengths. Normally customer equipment is quite close to DXX 8100. If they are in the same cabinet there are no problems. If they are in different cabinets and EMC compliance must be taken into consideration, the cable must be terminated, as it is defined for example in Chapter 1.5.3.7 on severe electromagnetic environment.

1.9.7 Installing RPU

1.9.7.1 General

The remote power supply unit RPU is a 20-channel 110 V DC unit for remotely powered equipment. RPU is mainly designed for feeding power to a network terminating unit (NTU) located in a mobile network micro base station (μBTS) site or any other remote site where it is difficult to organize voltage supply for the NTU. RPU can feed power for the following DXX 8110 network terminating units:

— DXX 8110 OTU-RP

— DXX 8110 CTE-S G.703

— DXX 8110 CTU-S G.703

RPU has 10 fixed interfaces. Each interface can provide power for two lines, i.e. the maximum number of lines is 20. RPU is fed by -48 V DC (-40…-60 V DC) battery voltage. It offers 110 V output voltage through ten pieces of D9 connectors, two channels per connector. Each output can be protected by paralleling outputs from two RPUs.

RPU is connected to the DXX 8100 managed access system via the following products:

— HCE module (HCE-2M-1P or HCE-2M-2P) of GMH unit

— HCO or SCO module of OMH unit

— HCQ module of QMH unit

The interface units can be used in DXX 8140 midi node, DXX 8150 basic node, DXX 8160 accelerator node A111 or DXX 8170 cluster node.

The power from RPU is fed via the HCE, HCO, HCQ or SCO module to the remotely powered NTU that is connected to the same HCE, HCO, HCQ or SCO module with RPU. The RPU unit can be monitored with DXX 8100 network manager via an alarm interface that is connected to an alarm interface of the SCU unit of the node. RPU does not require any configuration at the installation site.

Before connecting any equipment to RPU, make sure that it is possible to use the equipment with RPU. Check if the equipment needs any configuration (e.g. HCE and HCQ strapping changes) when used with RPU. With the HCO and SCO modules there are no strapping changes required. See the appropriate interface module description in *Node Technical Description*.

Mechanical Design

The RPU unit is housed in a 1U-high (44 mm) stainless steel case suitable for 19" cabinet mounting. Stainless steel is used to increase tolerance against corrosion. The metal casing forms an EMC shield and it should be opened by qualified personnel only. The RPU casing is designed to be quite similar to the casing of DXX 8130 micro node and it is possible to use similar assembly accessories with it. It is possible to use an air deflector (2 Us high, 89 mm) with RPU to optimise air circulation in the cabinet. If an air deflector plate is used, the total height is 3 Us (133 mm).

NOTE!

The air deflector must be used when RPU is installed above a node or other heat generating equipment. If two or more RPUs are used, a free slot of 1U must be left between each RPU.

RPU contains the following parts:

— base unit PDS 712

— unit front panel

— cover

— air deflector (option)

Fig. 40 shows the mechanical design of RPU.

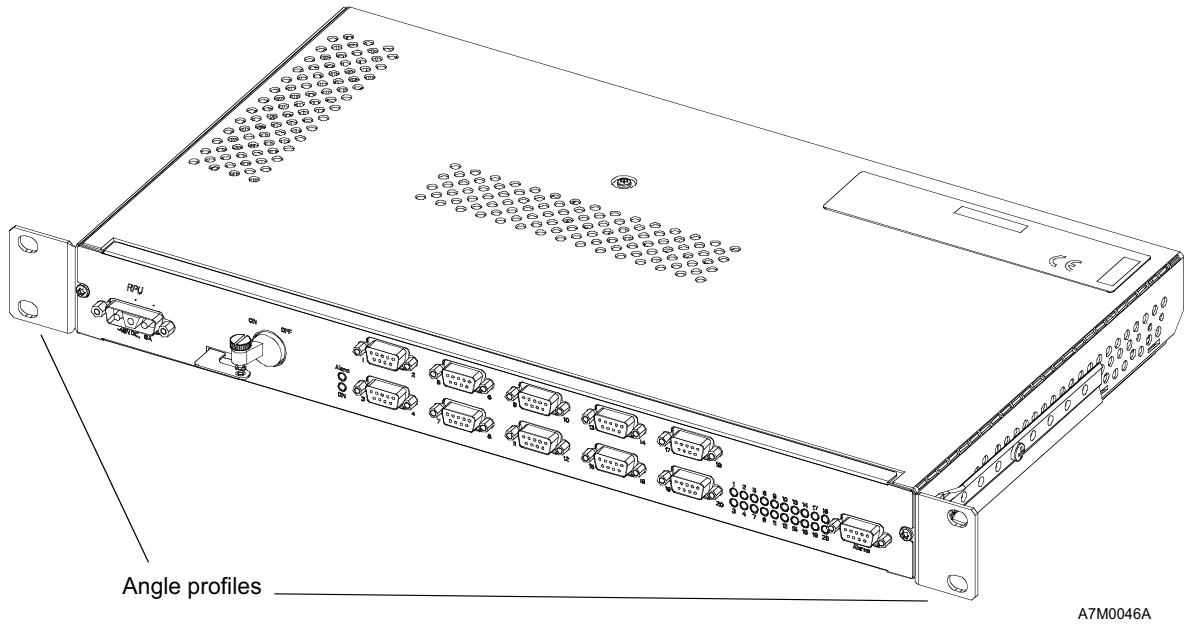

Fig. 40: Mechanical Design of RPU

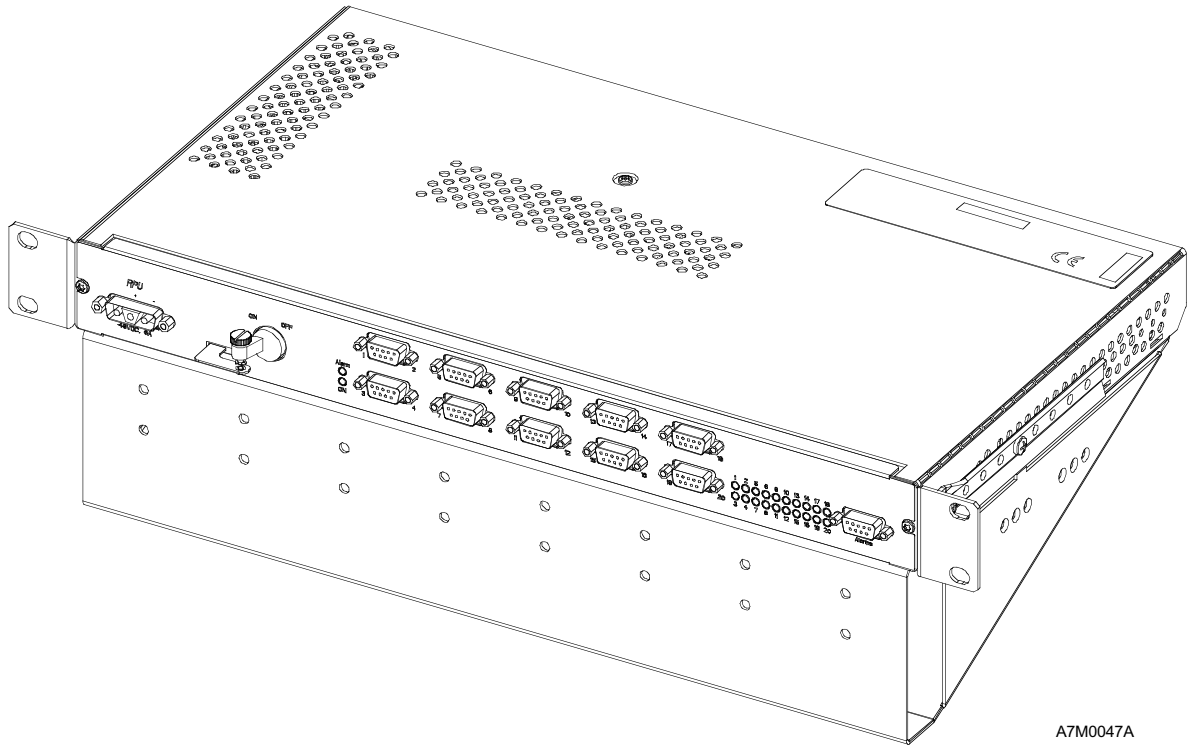

Fig. 41: Mechanical Design of RPU with Air Deflector

1.9.7.2 Installation

Installing RPU in a 19” cabinet is quite simple since the angle profiles are already installed. If an RPU is to be installed under a subrack, no air deflector plate is needed for RPU.

RPU installation to the cabinet is described below step by step. The procedure is the same whether the air deflector plate is attached to RPU or not.

Step 1. Install four cage nuts to the 19" panel mounts of the cabinet. Make sure that the holes of the 19" panel mounts correspond to the angle profiles of RPU.

Step 2. Lift RPU to its place and use cage screws to fasten RPU properly to the cabinet.

Step 3. RPU is grounded with a separate grounding cable to the main grounding bar of the cabinet. A grounding cable is delivered with RPU. The cable is attached under the earthing nut at the back of RPU. A star washer must be inserted between the conductor lug terminal and the back panel to ensure electrical continuity between RPU and the grounding conductor.

Step 4. Connect the RPU power cable to RPU (DC power input connector).

Step 5. Connect the cable(s) to the RPU, HCE, HCO, HCQ or SCO module(s) and outgoing NTU lines. The connecting of cables can be done in any order.

WARNING! **Do not touch the D connector pins (output) to avoid a 110 V shock.**

Air deflector plate installation to RPU is easy, because neither tools or additional parts are required in the installation. An air deflector plate is attached to RPU with eight small clamps. The RPU unit has fixed holes for clamps, four on the rear and two on both sides (see Fig. 42).

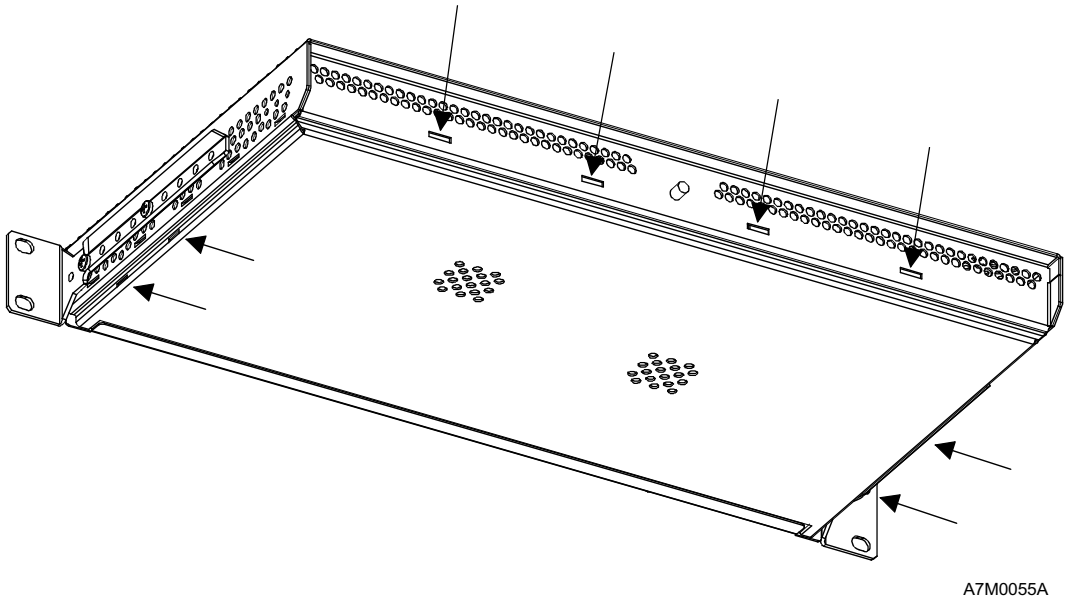

Fig. 42: Holes in RPU for Installing Air Deflector Plate

The clamps on the air deflector plate are located on the same spots as the holes are on RPU. Just direct the four clamps (at the back) of the plate to the rear of RPU and then turn the air deflector plate about 90 degrees under RPU to attach the remaining two side clamps on both sides to the corresponding holes on RPU. The clamps may be tight, but by using little force they should attach properly (see Fig. 43).

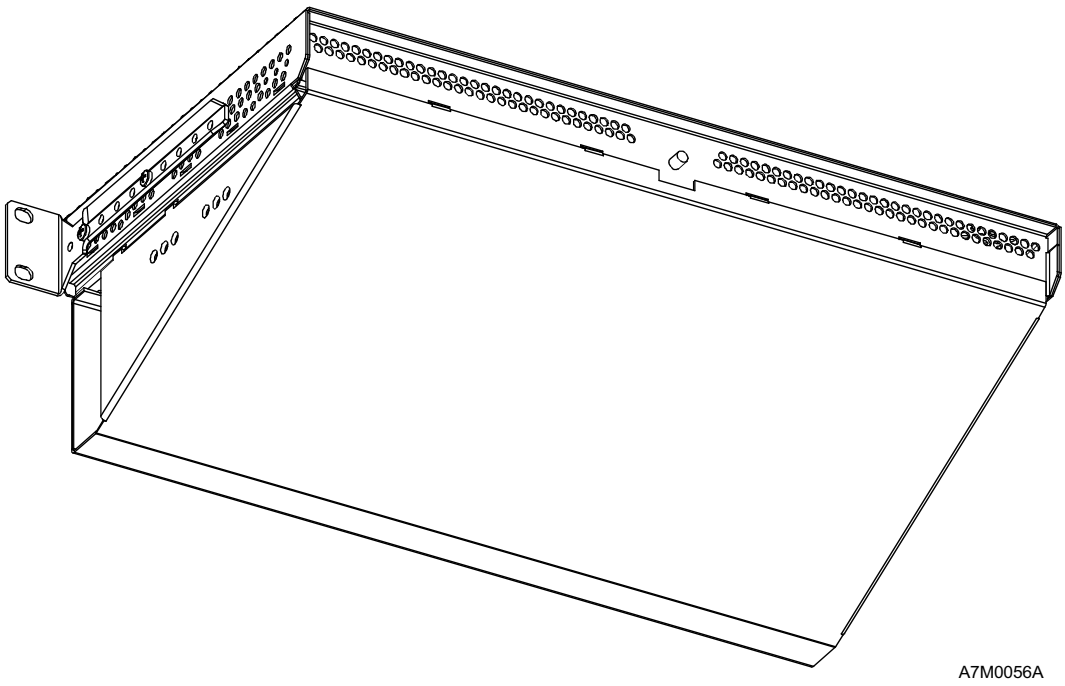

Fig. 43: RPU from below with Air Deflector Plate

1.9.7.3 Remote Power Cabling Applications

Typical Power Feed Cabling

Fig. 44 shows the typical cabling for RPU, DSL interface modules and NTUs. The possible interface modules are HCE-2M-1P, HCE-2M-2P, HCO, HCQ, HCQ+ and SCO. Ensure that the strappings are made correctly on the HCE-2M-1P, HCE-2M-2P and HCQ modules (for more information see the technical description of the product in the manual *Node Technical Description*). The possible NTUs are DXX 8110 CTE-S G.703, CTU-S G.703 and OTU-RP. This kind of a cabling scheme can also be used with remotely powered repeaters but in that case the NTU at the remote end must be locally powered.

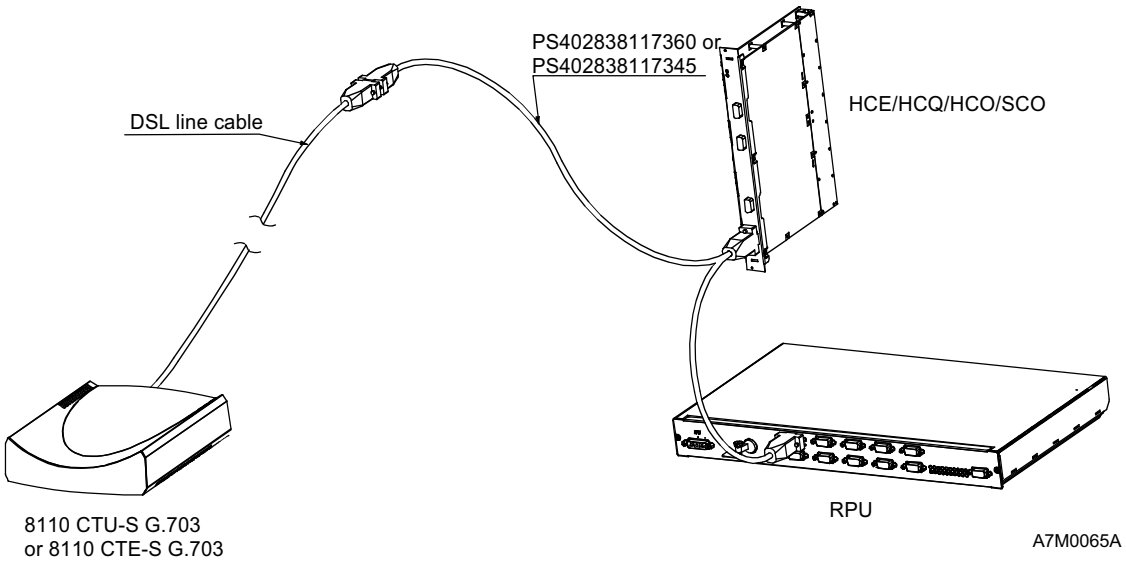

Fig. 44: Typical Remote Power Feed Cabling

Cabling for Protected RPU

Fig. 45 shows the cabling for the RPU unit when it is protected. Ensure that the strappings are made correctly on the HCE-2M-1P, HCE-2M-2P and HCQ modules (for more information see the technical description of the product in the manual *Node Technical Description*).

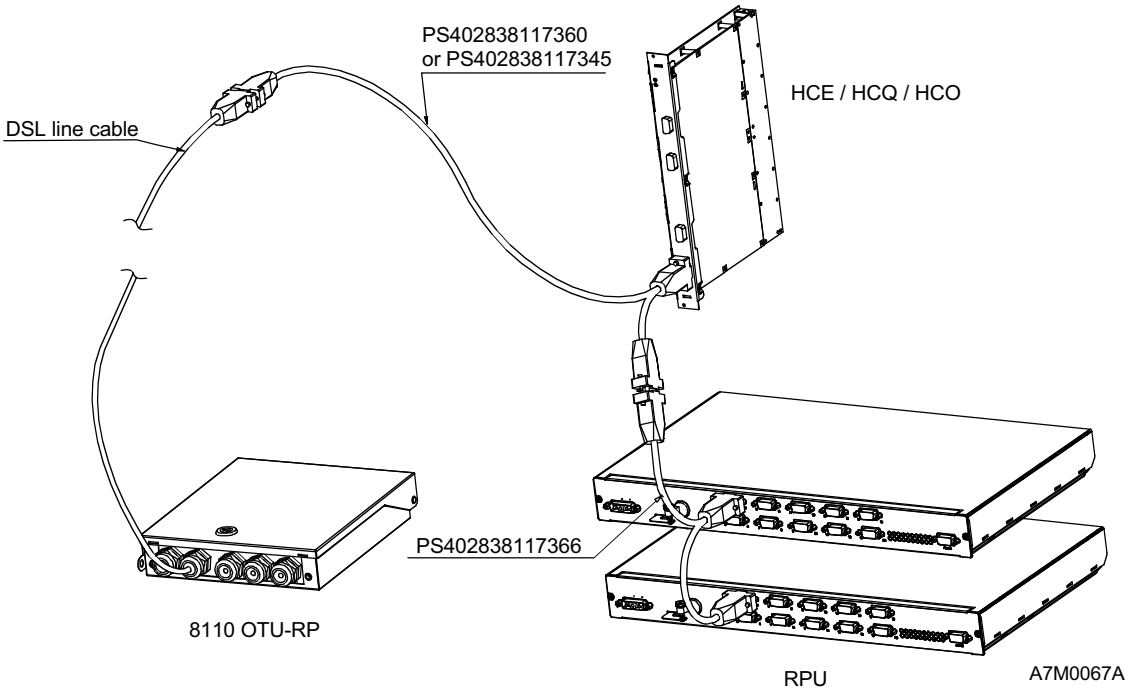

Fig. 45: Cabling with Protected RPUs

Cabling in 1-Pair DSL Applications with HCE and HCQ

Fig. 46 shows the cabling in 1-pair DSL applications with HCE and HCQ when all the power interfaces of the RPU unit are needed. Also the typical cabling presented in Fig. 44 is possible with 1-pair DSL applications, but in that case the maximum number of RPU power supply interfaces that can be used is 10. If all 20 power supply interfaces are needed to be used, the cabling presented below is applicable. Ensure that the strappings are made correctly on the HCE-2M-1P, HCE-2M-2P and HCQ modules (for more information see the technical description of the product in the manual *Node Technical Description*).

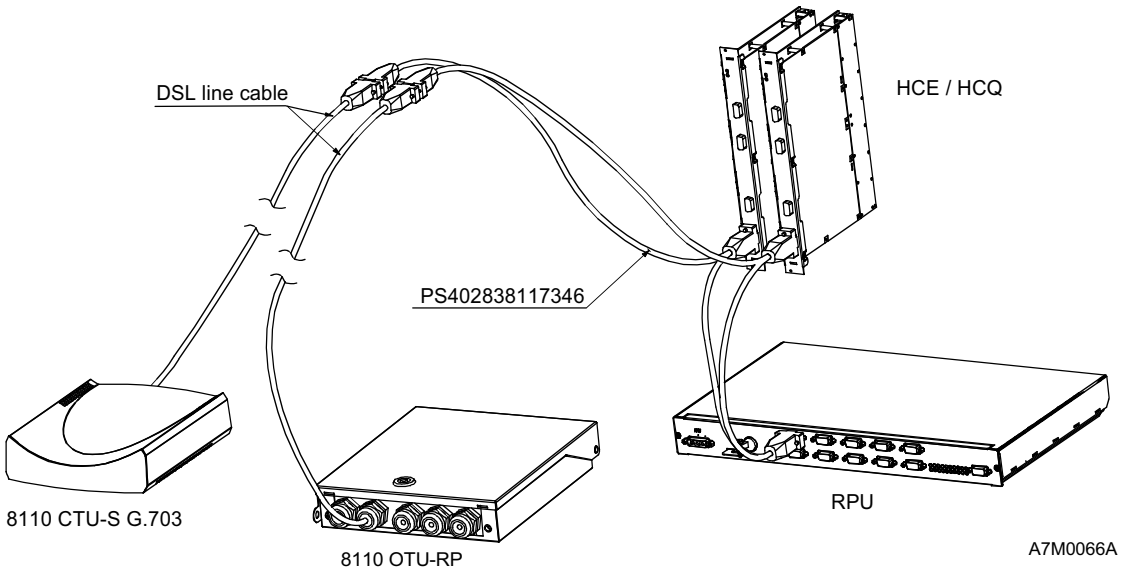

Fig. 46: Cabling in 1-Pair DSL Applications with HCE and HCQ

Cabling in 1-Pair DSL Applications with HCO and SCO

Fig. 47 shows the cabling in 1-pair DSL applications with HCO and SCO. In this case all the 20 power supply interfaces of the RPU unit can be used. The HCO and SCO modules do not have any strappings related to remote power feeding.

NOTE! **RPU feeds power to both of the modem interfaces of one D9 connector simultaneously. If two modems are connected to the same RPU cable, they both have to be remotely powered models.**

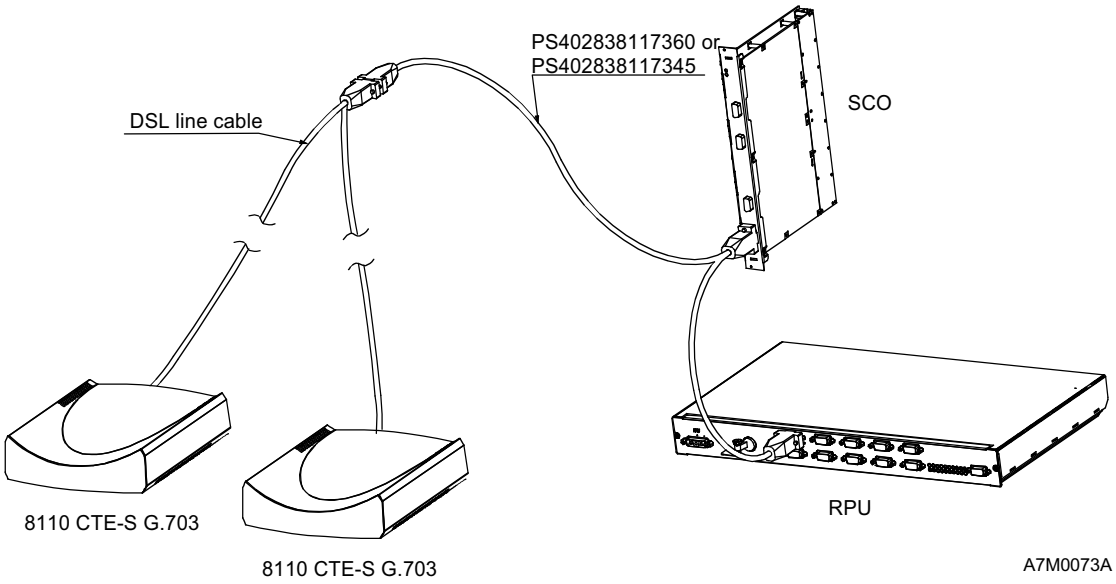

Fig. 47: Cabling in 1-Pair DSL Applications with HCO and SCO

1.9.7.4 Remote Power Feed Cables

The remote power feed cables presented in Chapter 1.9.7.3 are described below in more detail.

PS402838117345A RPU/HCE, HCQ, HCO, SCO Remote Power Cable (D9M-D9M-D9F, 2m+2m)

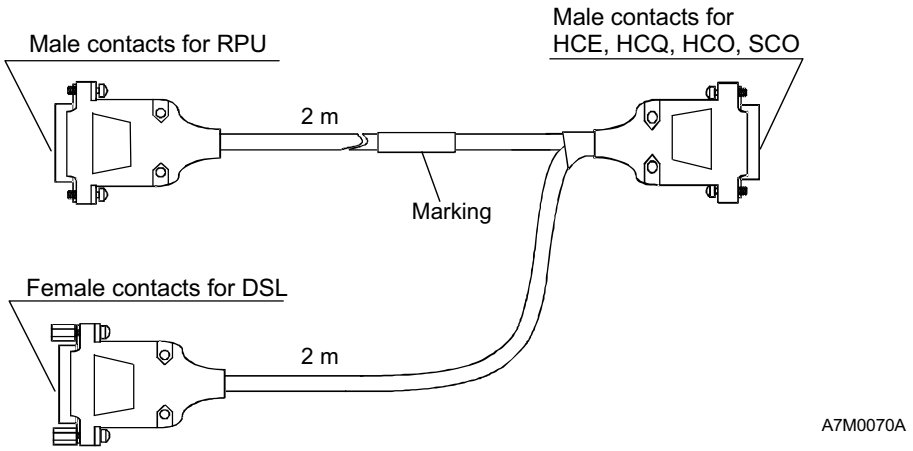

Fig. 48: RPU/HCE, HCQ, HCO, SCO Remote Power Cable (2m+2m)

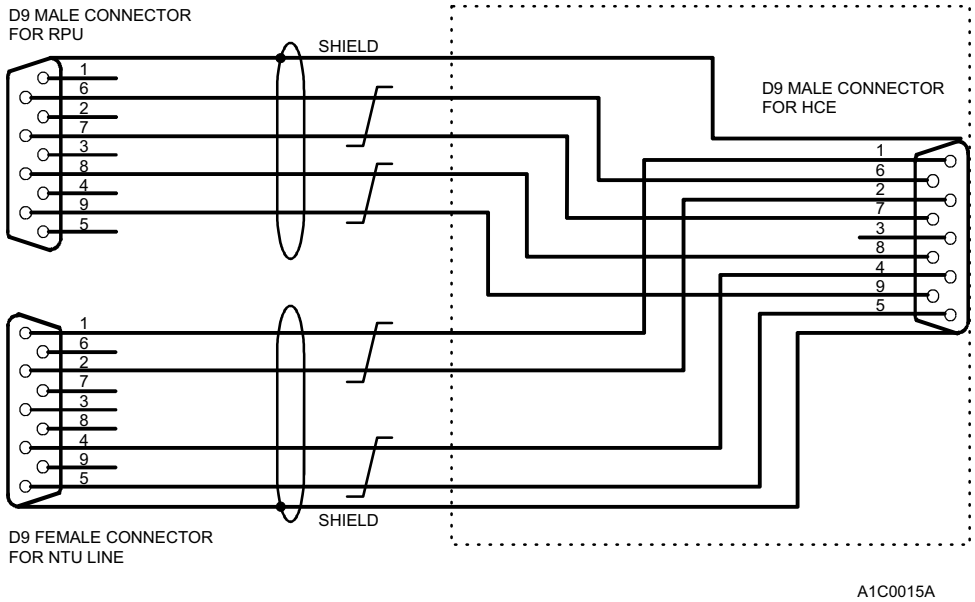

Fig. 49: Pin Assignment

PS402838117360A RPU/HCE, HCQ, HCO, SCO Remote Power Cable (D9M-D9M-D9F, 5m+2m)

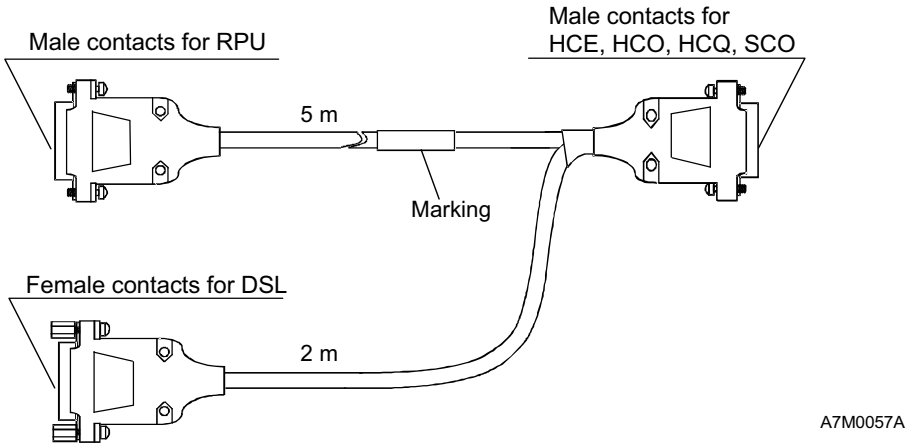

Fig. 50: RPU/HCE, HCQ, HCO, SCO Remote Power Cable (5m+2m)

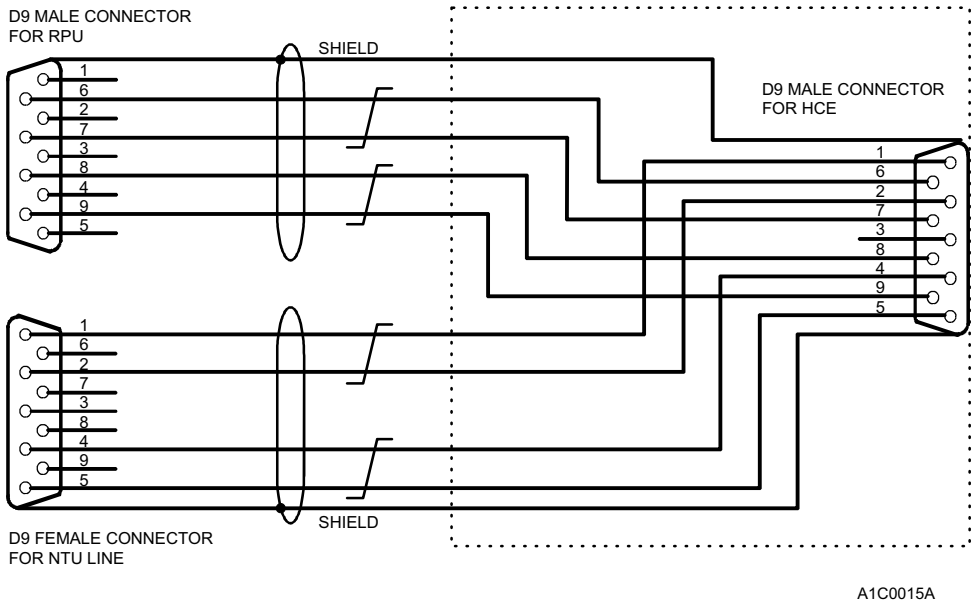

Fig. 51: Pin Assignment

PS402838117346A RPU/HCE, HCQ Remote Branch Cable (D9M-D9M-D9F, 2 x 5+2m)

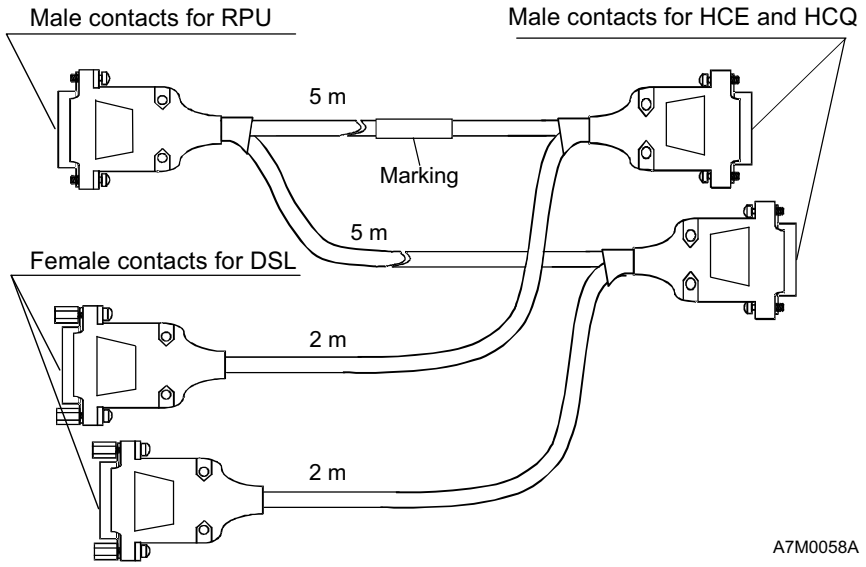

Fig. 52: RPU / HCE, HCQ Remote Branch Cable (2 x 5+2m)

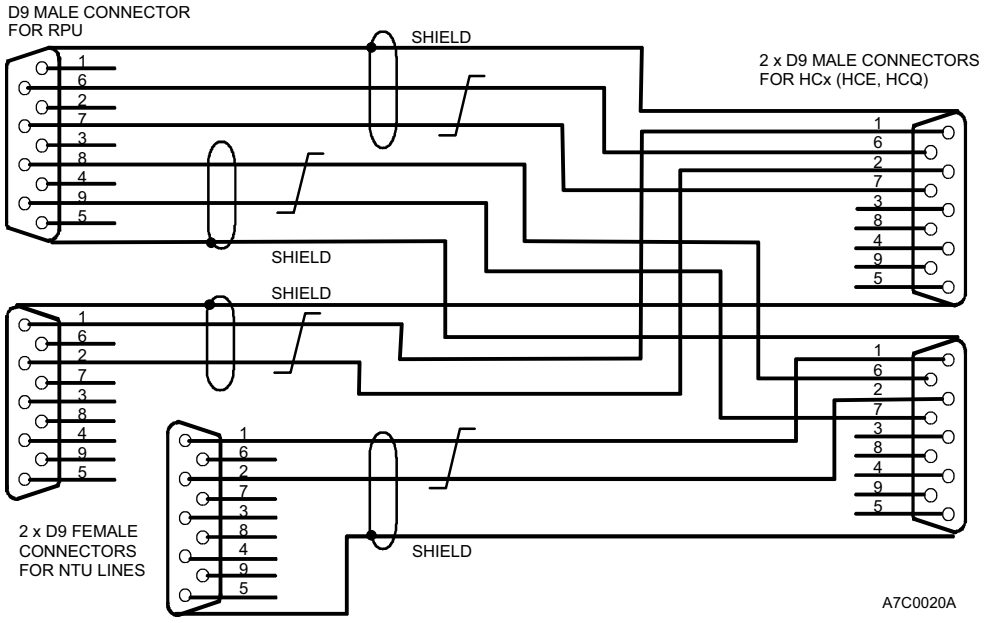

Fig. 53: Pin Assignment

PS402838117366A RPU Protection Cable (D9M-D9M-D9F, 1+2m)

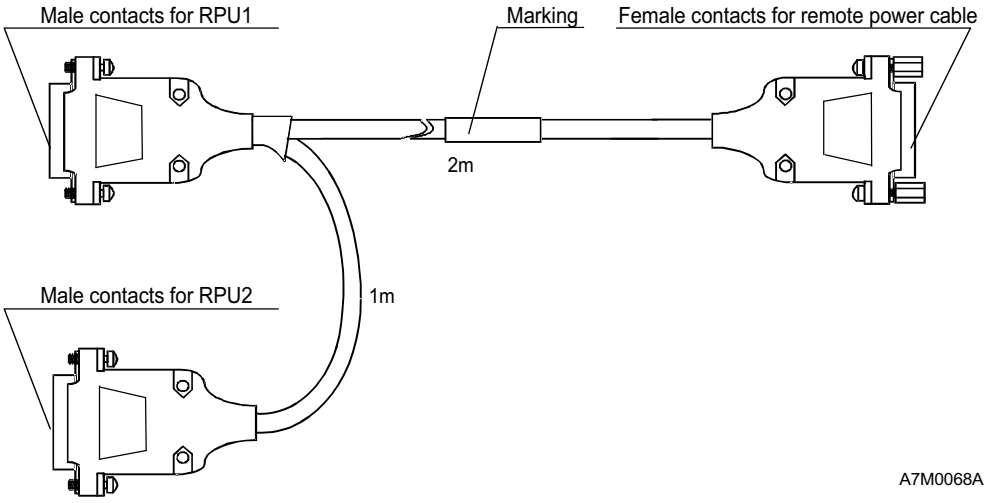

Fig. 54: RPU Protection Cable (1+2m)

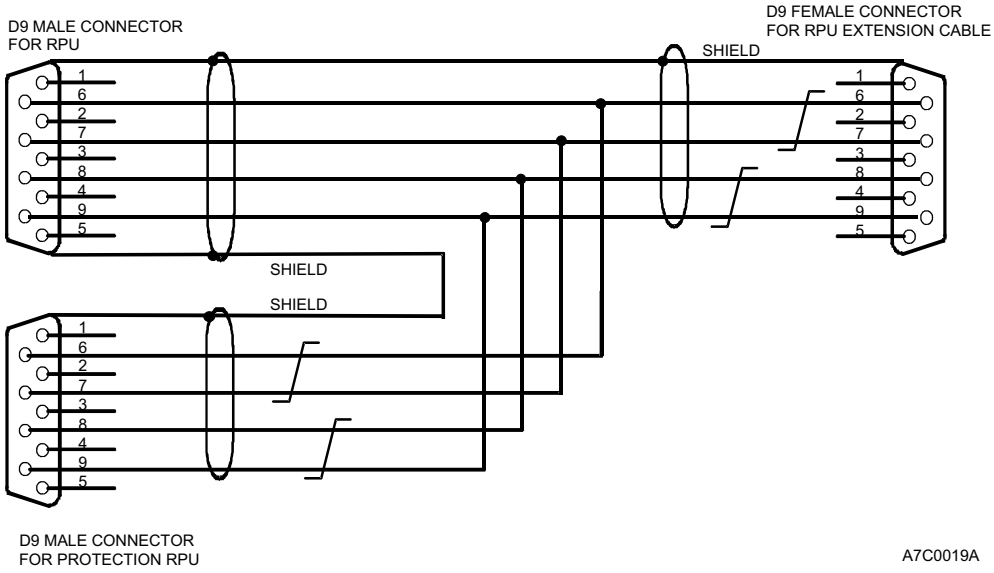

Fig. 55: Pin Assignment

PS402838117367B DSL Line Cable

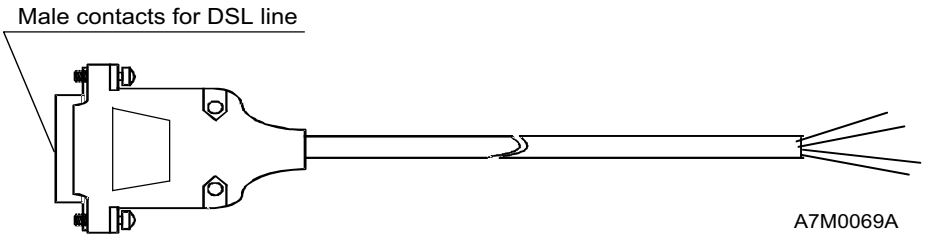

Fig. 56: DSL Line Cable

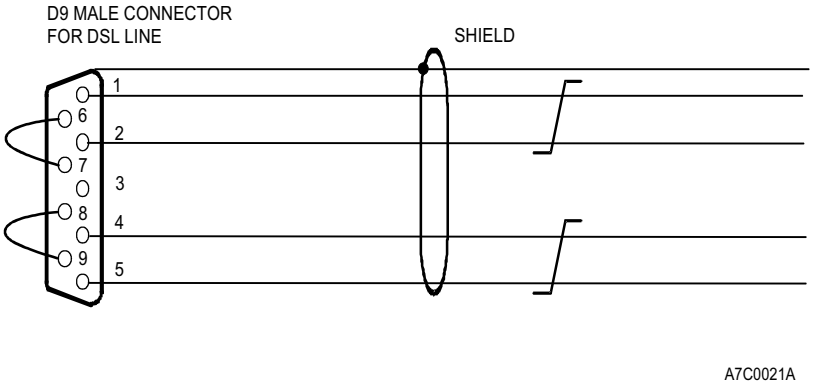

Fig. 57: Pin Assignment

1.9.8 Installing SBU

1.9.8.1 General

SBU is a high density E1 interface unit which can be equipped with one to three E1M interface modules providing up to 12 transparent 2048 kbit/s interfaces. SBU can be used in a node which has an S-bus (DXX 8160 A111).

With SBU units the DXX 8160 A111 node can accomodate 126 x E1 ports, 63 with SBU units and 63 with the existing X-bus units.

SBU transparently maps E1 signals at the physical interface using asynchronous mapping to TU-12 which are then passed to the 4/1 cross-connect in GMX. SBU does not process or supervise the n x 64 kbit/s or any other possible content within the E1.

When an SBU is furnished in DXX 8160 A111, inherent sub-network connection protection (SNC/I) is available in the DXX 8160 A111 node (also GMX connections to X-bus cannot use SNC/N).

Applications

SBU equipped with 2048 kbit/s interface modules (E1M-75/E1M-120) can be used to transport any G.703 2048 kbit/s signal through the DXX 8100 SDH access network. SBU can also be used as a remote access interface to a DXX 8100 cross-connect node.

Interfaces

The E1 interfaces in the SBU unit are used as tributary interfaces. The SBU unit allows asynchronous 2048 kbit/s connections directly through the 4/1 cross-connect of the GMX unit to the STM-1 line. This allows also timing transparent 2048 kbit/s connections in the DXX 8100 network.

The SBU unit has a maximum of three interface modules, which provide four E1 interfaces each.

Interface Module	Interface Type	Connector
E1M-75 (QTH 721)	G.703:1998 2048 kbit/s 75 Ω for SBU (four interfaces)	8 x coaxial SMB 50 Ω (four inputs and four outputs)
E1M-120 (QTH 722)	G.703:1998 2048 kbit/s 120 Ω for SBU (four interfaces)	1 x D25 female (8-pair cables)

Mechanical Design

The mechanical design of the SBU unit is based on the standard DXX 8100 system mechanics. The unit can be placed in the DXX 8160 A111 subrack according to general recommendations for subrack equipping. The unit width is 5T.

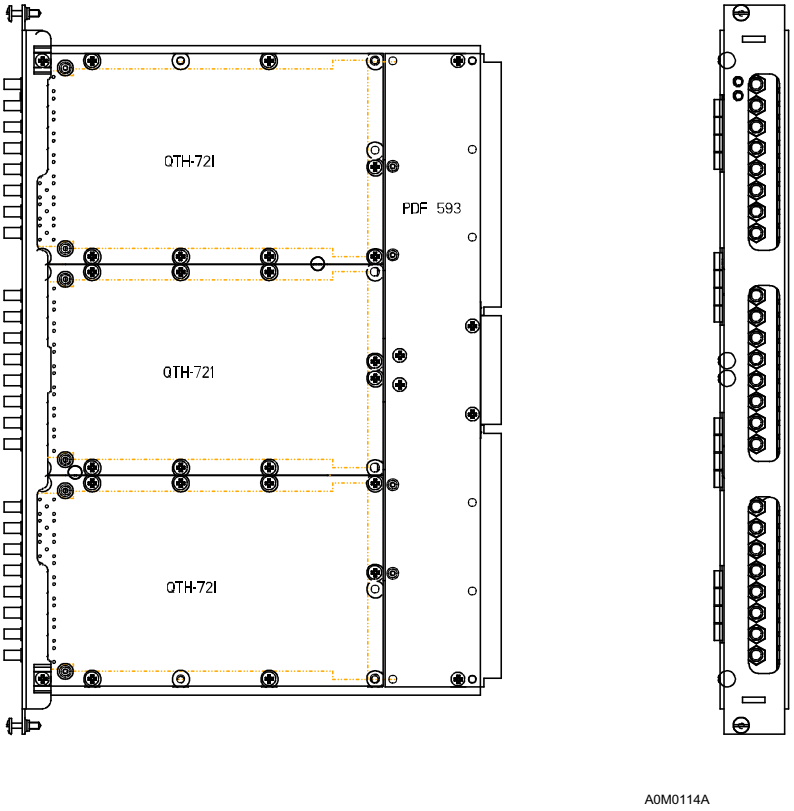

Fig. 58: SBU Unit Equipped with E1M-75

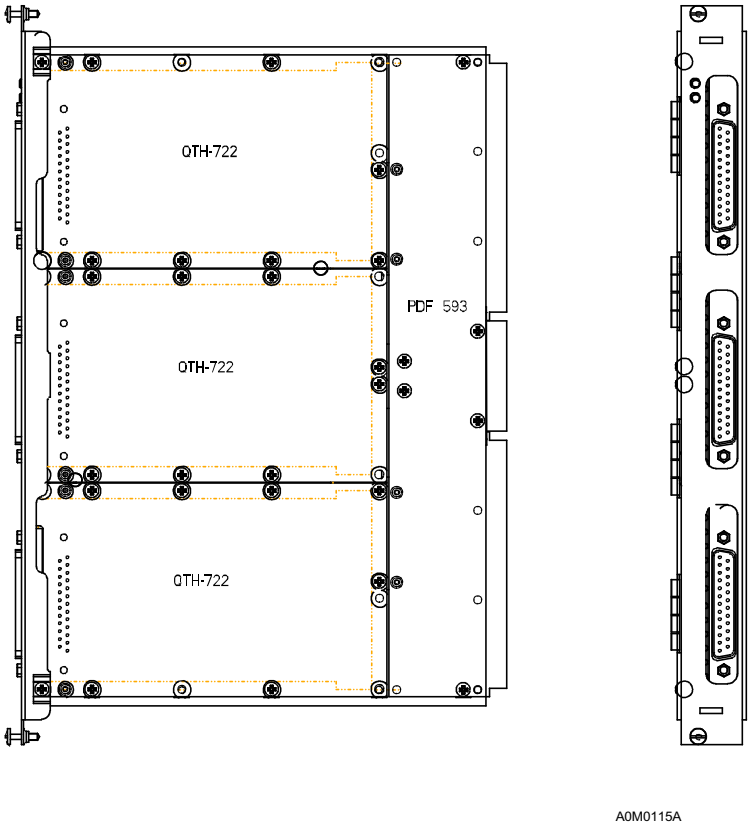

Fig. 59: SBU Unit Equipped with E1M-120

The minimum configuration of the SBU unit consists of

— UTU 720 base unit

— SCM 737 processor module

— PDF 593 (-48 V) power module

Maximum of three interface modules can be equipped with any mix of E1M-75 and E1M-120 modules.

The unit is connected to the DXX 8160 A111 subrack S-bus through connectors at the rear edge of the card. The back plane supplies the operating voltage to the unit power supply as well as the signals for the internal subrack control bus and for the data transmission processing.

1.9.8.2 Installation

It is very important to do the cabling properly as shown in the following figure. When removing a unit from the subrack, the cables of the adjacent unit should not be in the way. This is even more significant in the case of SBU with 75 Ω interfaces, since there are 12 interfaces (=24 cables).

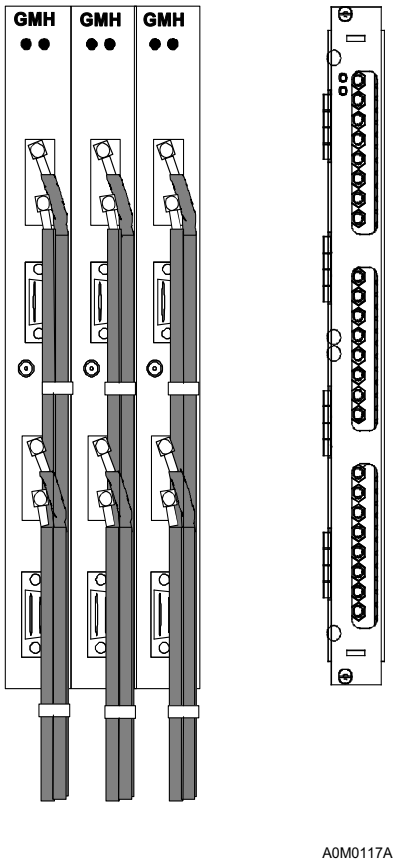

Fig. 60: Front View of a Properly Cabled GMH and SBU with 75 Ω Interfaces

APPENDIX A: GROUNDING INSTRUCTIONS FOR DXX 8100

The grounding procedure for the DXX 8100 subracks must be made in a star-like fashion, i.e. each subrack must be grounded to the cabinet grounding bar with a separate green/yellow grounding cable. The cable can be found in the accessories box of the subrack. To ground the DXX 8100 subracks proceed as follows.

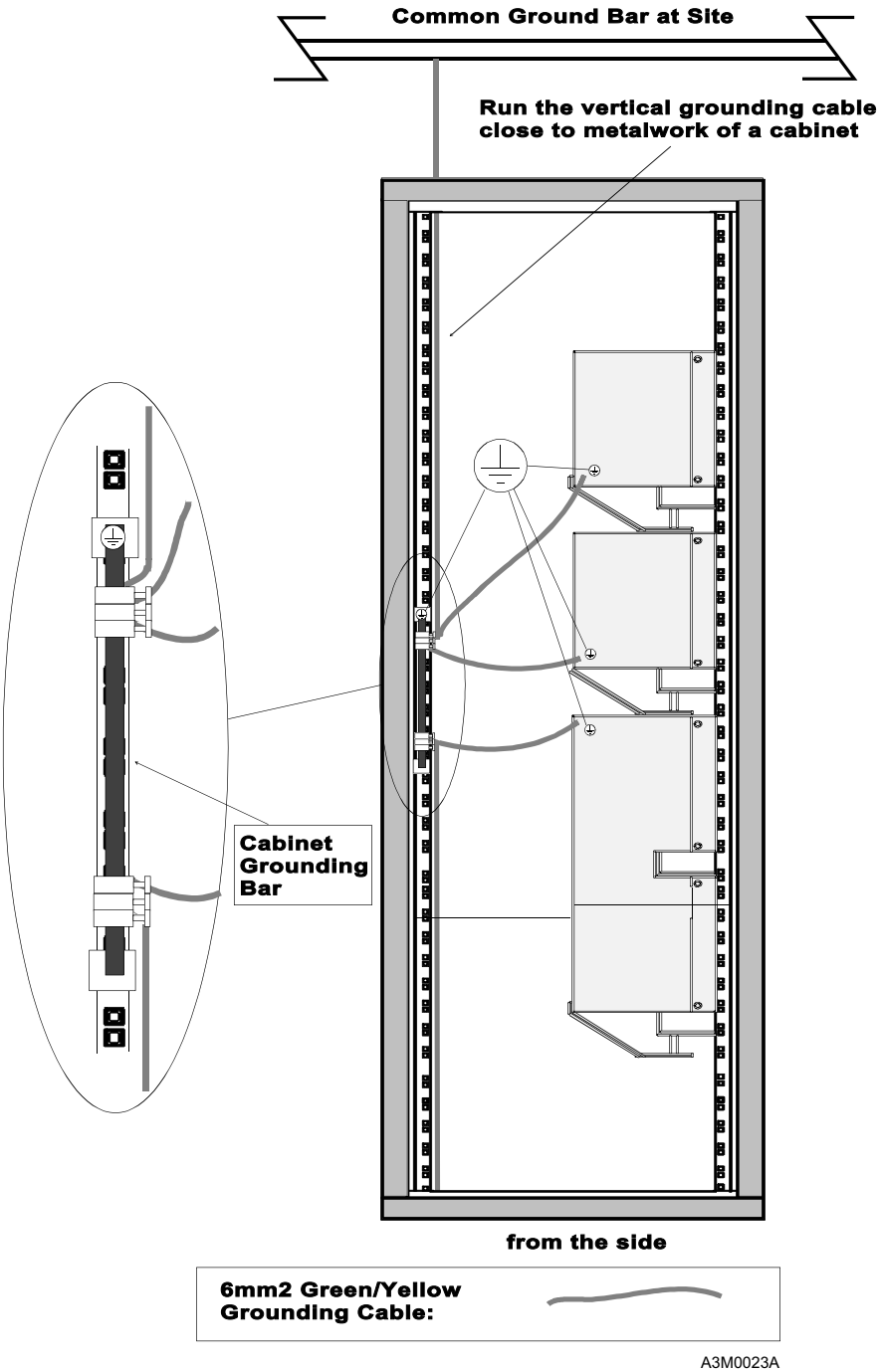

Fig. 61: DXX 8100 Grounding

Step 1. Install the cabinet grounding bar preferably to the backside of the cabinet. You can access the grounding bar from the back. If the grounding bar was not included with the cabinet, you can order one from Ericsson AB using the ordering number PS421 (Grounding Package).

Step 2. Connect the cabinet grounding bar to the common ground bar at the customer's tele site with a 6 mm^2 green/yellow grounding cable (not supplied with subracks, 20 metres supplied with the Grounding Package PS421). Make sure the cable is as short as possible.

Step 3. Fasten the green/yellow grounding cable (PS402838117313A) of the subrack under a hex socket head screw of the subrack (or in a DXX 8120 mini node, DXX 8130 micro node or DXX 8140 midi node to a specific grounding thread). Mark the spot with a grounding sticker (88TARR060).

Fig. 62: Grounding Sticker

Step 4. Run the grounding cable via the shortest path to the cabinet grounding bar. Cut the cable as short as possible. The cable does not have to be tight between the subrack and the grounding bar.

Step 5. Fasten the grounding cable to the cabinet grounding bar.

Step 6. Also ground the cabinet frame to the cabinet grounding bar.

APPENDIX B: CONDUCTOR GAUGE AND DIMENSION COMPARISON TABLE

Conductor Gauge and Dimension Comparison Table

AWG	CSA/mm^2	∅/mm
32	0.032	0.20
31	0.040	0.23
30	0.051	0.25
29	0.065	0.29
28	0.081	0.32
27	0.103	0.36
26	0.128	0.40
25	0.162	0.45
24	0.210	0.52
23	0.259	0.57
22	0.324	0.64
21	0.412	0.72
20	0.500	0.80
19	0.636	0.90
18	0.826	1.03
17	1.040	1.15
16	1.340	1.31
15	1.680	1.46
14	2.080	1.63
13	2.630	1.83
12		
11	4.130	2.29
10	5.260	2.59
9	6.600	2.90
8	8.400	3.27
7	10.600	3.67
6	13.000	4.07
5	16.800	4.62
4	21.000	5.17
3	26.200	5.78
2	33.600	6.54