7. INSTALLATION

7.1 Mechanical Installation

7.1.1 General

There are four types of cabinets available for Ericsson DXX: Standard cabinet, Top and Bottom cabled EMC cabinets, and Relay rack. They all are 19" mechanics. It is recommended to use both sideplates and doors in any type cabinet. With four-shelf configuration this is safe, the temperature measurements have been carried out in Ericsson . 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 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 PFU's,
— circuit breakers (where the PFU-cables are connected) and
— necessary grounding.
— The direction of the cabling is normally from the top.

Top and Bottom cabled EMC cabinets

EMC-cabinets are needed in European union, in office environment. In telecommunications sites standard cabinets are enough, because the Ericsson DXX hardware is compliant with EMC class A as itself. EMC class B is recommended to be reached in office environment. With this Schroff-based EMC-cabinet EMC class B can achieved. Top and Bottom cabled EMC cabinets are also Schroff-based cabinets. The main difference between them and the Standard cabinet are EMC shielded doors (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 are to be used in telestations where EMC compliance and dust shield are not required. It includes only a frame where racks are installed and a base where the frame stands. This is not recommended to be used for Ericsson DXX installations. There are product packages for grounding and power for Relay racks and cabinets supplied from Ericsson .

7.1.2 Cabinets

7.1.2.1 Fastening the Cabinets

Before starting the installation, check the site survey document (see Appendix 1) to confirm the right location where the cabinet(s) should be installed. The cabinet(s) can be fastened to the ground by using wedge anchorages for concrete floor.

Proceed in the following way:

1. Move the cabinet in 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.
2. Mark the places for the wedge anchorages on the floor and move the cabinet away from the installation point. A cardboard model of the cabinet's base can be made to help defining the correct spots for the wedge anchorages.
3. Drill holes for the anchorages with a rock hammer and knock the anchorages with a hand hammer.
4. Lift the cabinet back to its right location and fasten the bolts to the base. If the cabinet is top cabled, install also the air flow filter, which should be installed into specific rails inside the base.
5. Set the front/back plate back to their places. If the floor structure is raised, the fastening of the cabinet must be done by other available methods. One possible way is to drill holes to the right, marked positions and fasten the cabinet with long bolts to the raised floor.

7.1.2.2 Installing Cabinets on a Row

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

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

For the installation, proceed in the following way:

1. Define the right location to install the row of cabinets.
2. Install the cabinets in 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. For the EMC cabinets, the EMC metallic frame should be fastened before laying the cabinets on their places.
3. When the cabinets are in their places screw four bolts through special mounting ears inside the base tightly.
4. Mount four sleeves from the side-by-side kit between the cabinets' panel mounts.
5. Bolts are pushed through the sleeves and fastened with nuts.

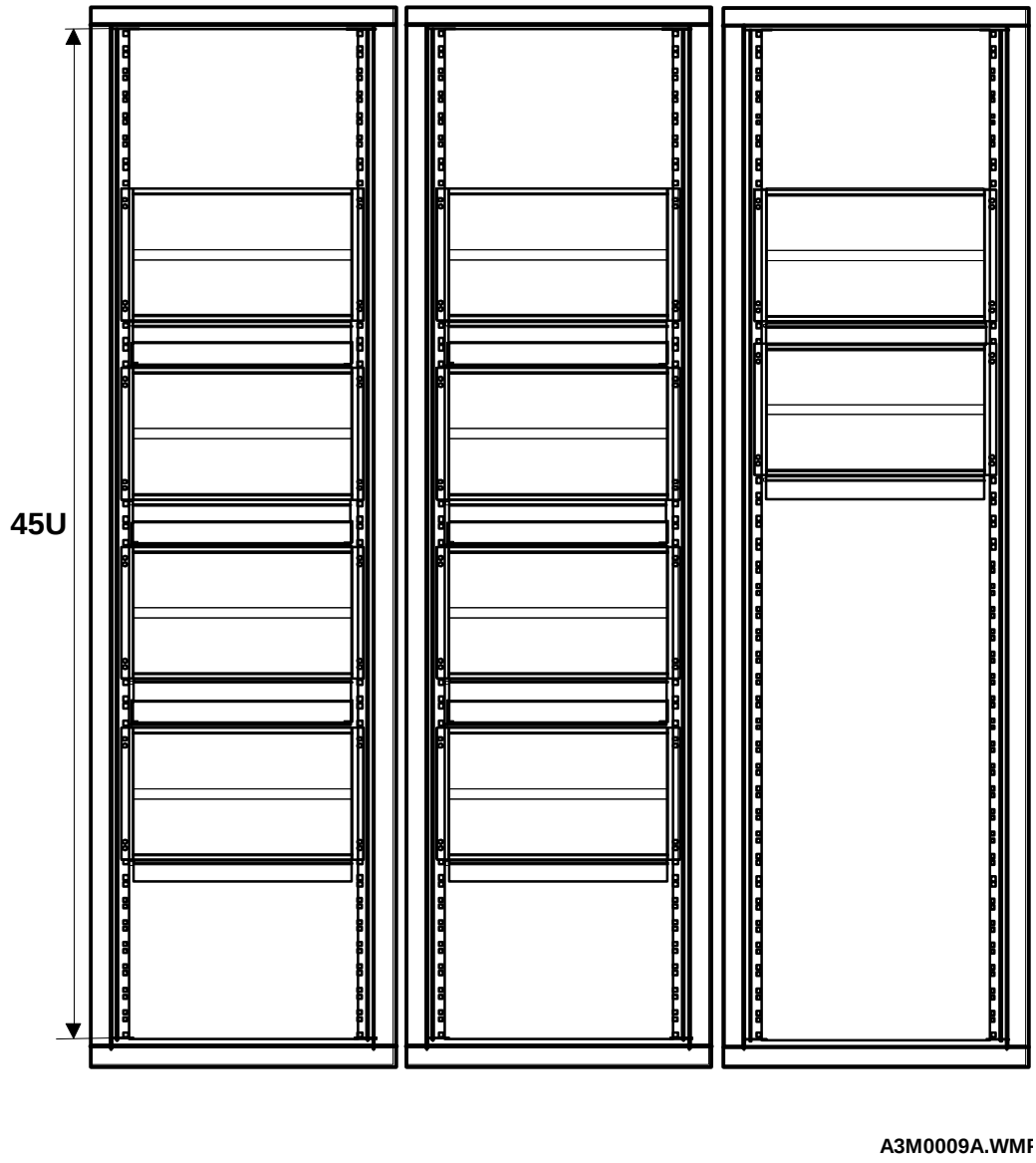


Fig. 1: Full-size Cluster Node Installed in Three 19" Racks

7.1.3 Subrack Installation

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

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 in a rack with minimum depth of 400 mm. The recommended depth is 600 mm.

Use racks without doors to ensure free airflow. The backside of the rack must be left free because of the rack's cabling. It is not allowed to connect subracks back to back because of excessive heat generation.

Since the units are cabled from the front side, a 44.45-mm gap 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	Rack	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 rack's back panel.

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

If several subracks are mounted in a 19" rack, an air deflector plate (#883200220) should be used between the subracks. The lowest subrack in the rack does not need the air deflector plate. The max. number of subracks in a rack is four: one double cluster subrack (RXS-CD) and one double subrack (RXS-D).

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

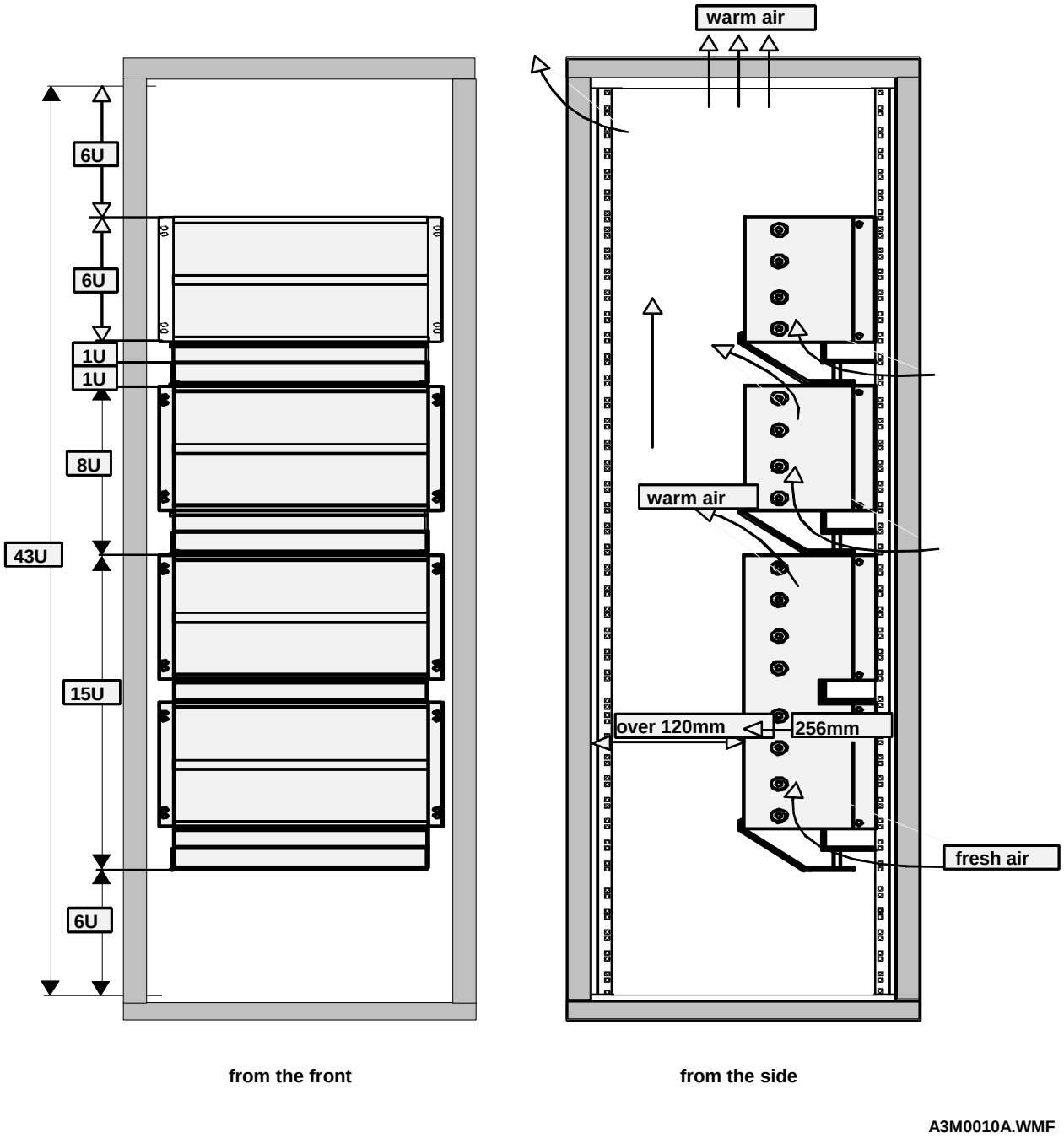


Fig. 2: RXS-S and RXS-D Subracks in a 19" Rack

7.1.3.1 Basic (Single and Double) Subrack Installation in a 19" Rack

Part numbers in the instruction below refer to Fig. 3 (Basic Single Subrack) and Fig. 4 (Basic Double Subrack).

1. The subrack is installed in a 19" rack by using two 80 x 23 x 3 mm size angle profiles.
   - 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, then 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.
2. The cable channel (#6) included in the installation accessories is mounted to the lower guide grating of the subrack with three M3 x 10 DIN965 screws.
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).
4. The subrack is grounded with a separate grounding cable (#8) 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.

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

Assemble the numbered parts of Basic Single Subrack as described above.

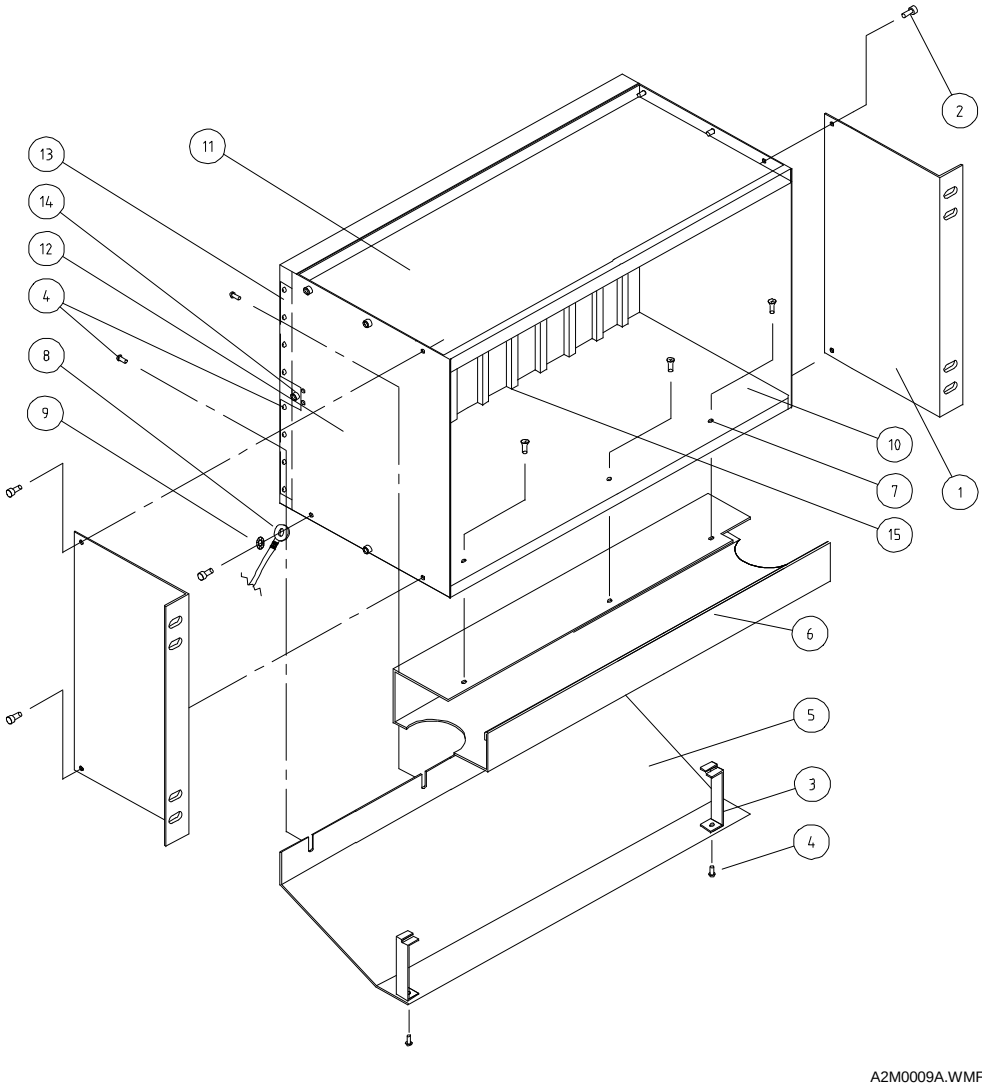


Fig. 3: Mounting of the 19" Rack Installation Accessories

Number	Title	Pcs.
1	Front mounting angle	2
2	M5x10, LK, HEX, DIN 912 (Pre-assembled 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 0.3m	1
9	Star washer, M5, DIN 6798A	1

Assemble the numbered parts of Basic Double Subrack above. See the detailed instructions on the right side of the picture for a mounting suggestion for the cable channel between the upper and lower part of the Basic Double Subrack.

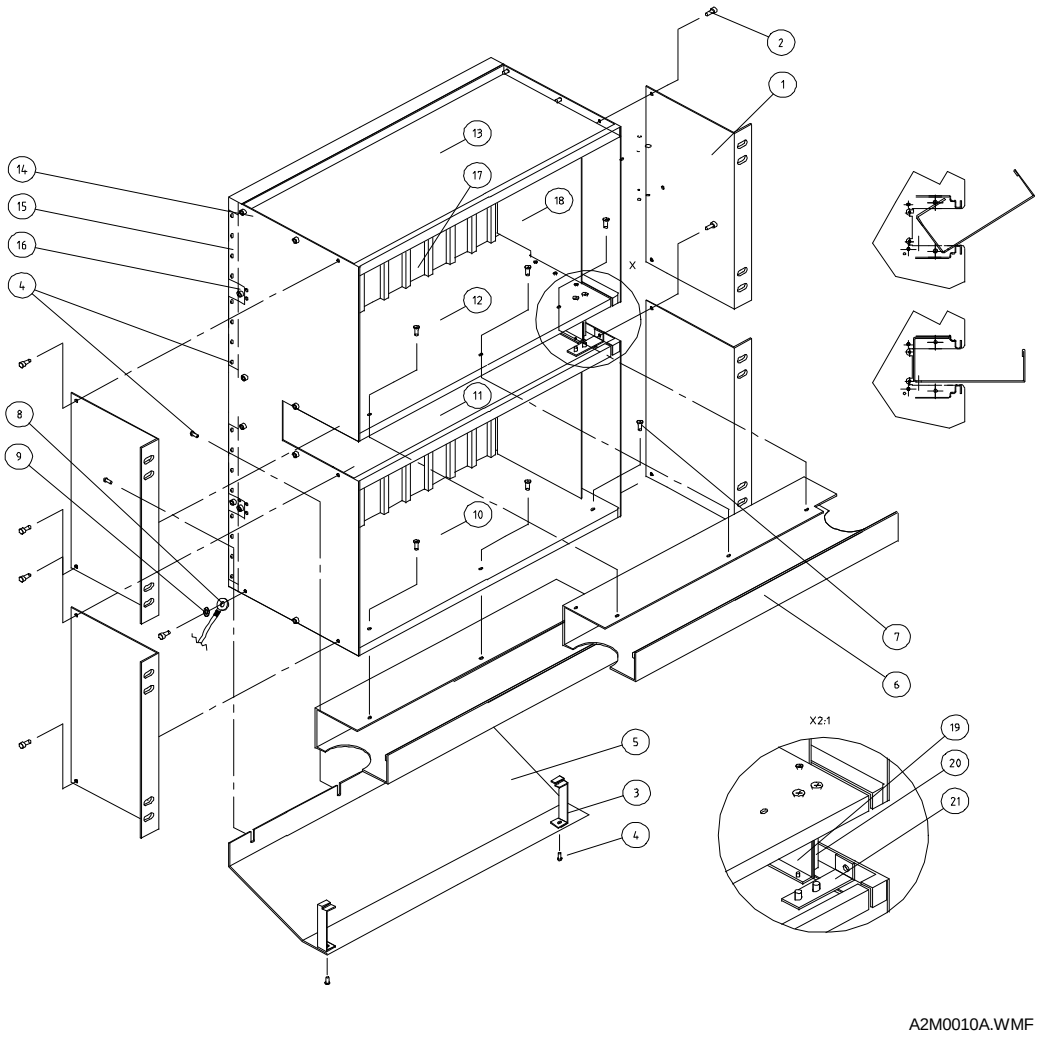


Fig. 4: Mounting of the 19" Double Rack Installation Accessories

Number	Title	Pcs.
1	Front mounting angle	4
2	M5x10, LK, HEX, DIN 912 (Pre-assembled 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 0.3m	1
9	Star washer, M5, DIN 6798A	1

7.1.3.2 Installation of a Midi Single Subrack (RXS-S8) in a 19" Rack

Assemble the numbered parts of Midi Single Subrack in the given order. The long mounting angle can be placed on either side. Part numbers in the instructions refer to Fig. 5.

1. The subrack is installed in a 19" rack by using one short (#1) and one long (#2) mounting angle.
   - 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.
2. The cable channel (#11) included in the installation accessories is mounted to subrack using 2 M3x 10 DIN 965 screws.
3. The air deflector plate (#10) is mounted to the rear of the subrack with two M3x8s (#9).
4. The subrack is grounded with a separate grounding cable (#5) which is included in the subrack's installation accessories. 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.

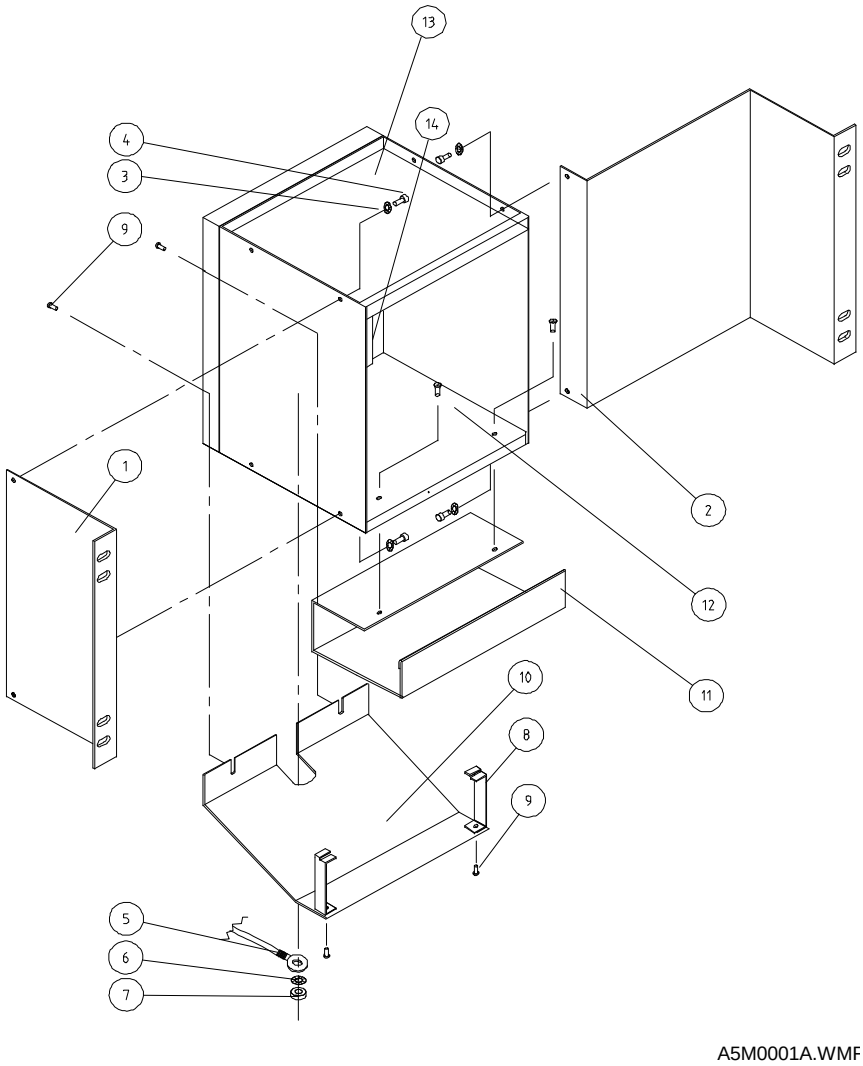


Fig. 5: Midi Single Subrack Assembly and Installation

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 1.1m	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

7.1.3.3 Installation of a Midi Double Subrack (two RXS-S8s) in a 19" Rack

A Midi Double Subrack is actually formed by two RXS-S8s, Midi Single Subracks. Part numbers mentioned in the instructions below refer to Fig. 6.

1. Connect the Midi Single Subracks together with 4 M5x10 size hex recessed head screws (#3) and nuts (#1). Use a star washer (#2) under the screw.
2. The Double Subrack is installed in a 19" rack by using two 105 x 26 x 2 mm size angle profiles for one shelf.

   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.
3. The cable channel (#11) included in the installation accessories is mounted to subrack using 2 M3x 10 DIN 965 screws (#12).
4. The air deflector plate (#10) is mounted to the rear of the subrack with two M3x8s (#9).
5. The subrack is grounded with a separate grounding cable (#5) which is included in the subrack´s installation accessories. 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.

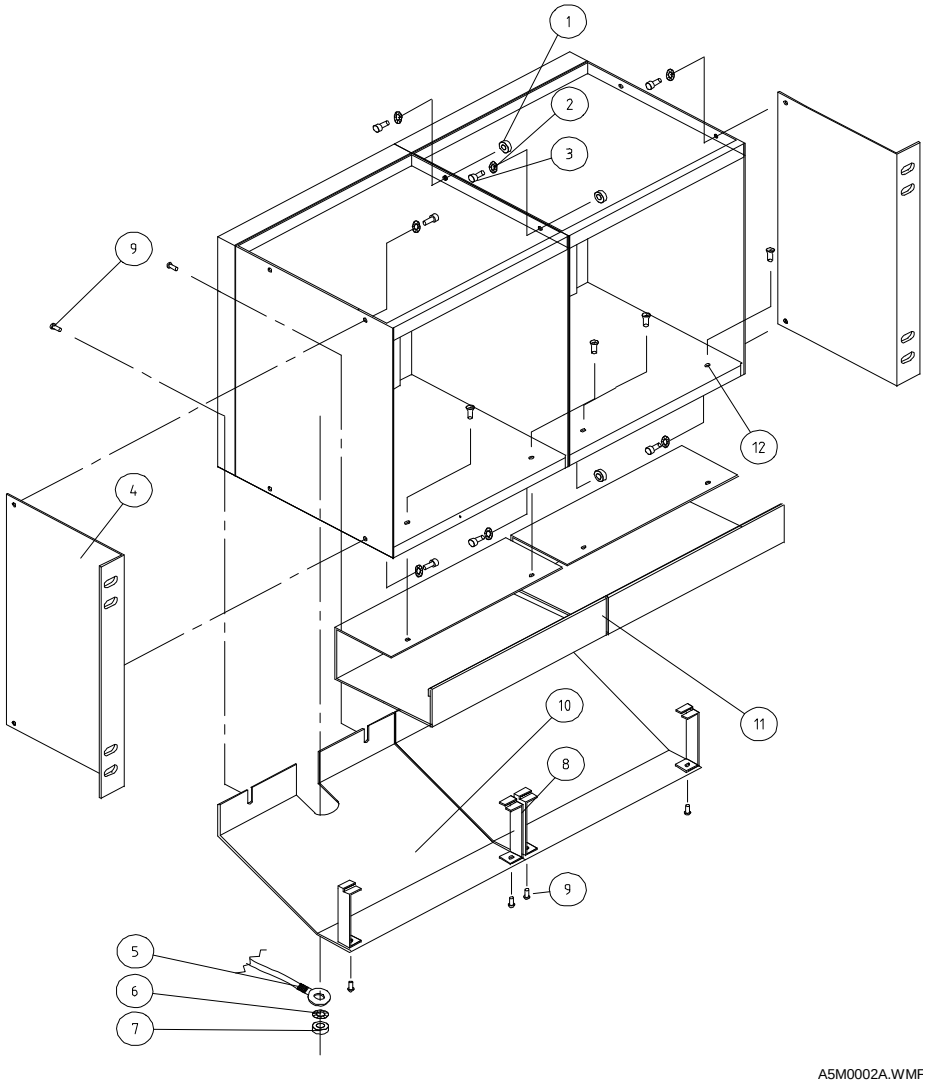


Fig. 6: Midi Double Subrack Assembly and Installation

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 1.1m	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

7.1.3.4 Unit Mechanical Installation

The units of a Ericsson DXX cross-connect node have modular structure. The design utilizes a standard base unit shown in Fig. 7. The main parts of the base unit are:

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 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.

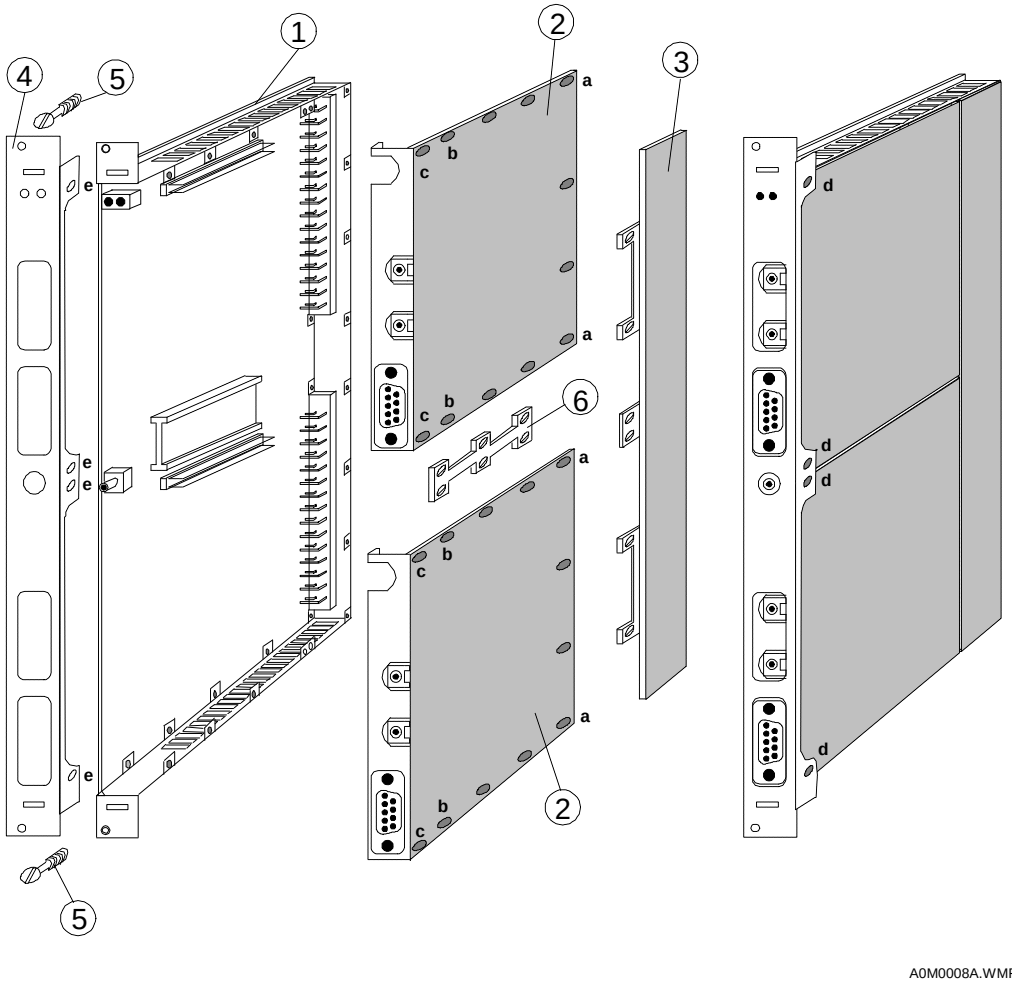


Fig. 7: Main Parts of the Base Unit

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 and 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, take care not to scratch the surface of the printed circuit boards and not to bend any components or their legs.***

The following steps are required to assemble the interface modules and front panel:

Step 1. Check that the strappings of the interface modules are correct for your application.

Step 2. 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 together and is a part of the EMC shield of the unit.
- In Fig. 7 the fastening bar can be seen in the middle of the unit between the interface modules.

Step 3. Install the upper module on 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 0.1º1.0 mm.

Step 4. Install the lower module on 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 0.1º1.0 mm.

Step 5. There are now two interface modules on 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. 7, 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. 7, holes c.)

Step 6. When tightening the screws, do not use too much force.

Step 7. Secure the fastening screws of the fastening bar on both modules.

Step 8. Secure the rest of the fastening screws starting from the left side of the unit; see Fig. 7, beginning from holes a towards holes b.

- There should be 20 srews for the modules tightened now.

Step 9. 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. 7 and Fig. 8)
- 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. 7, hole d.
- Secure the module screws.

Step 10. The interface modules are now installed. Make sure that no loose parts are left inside the unit.

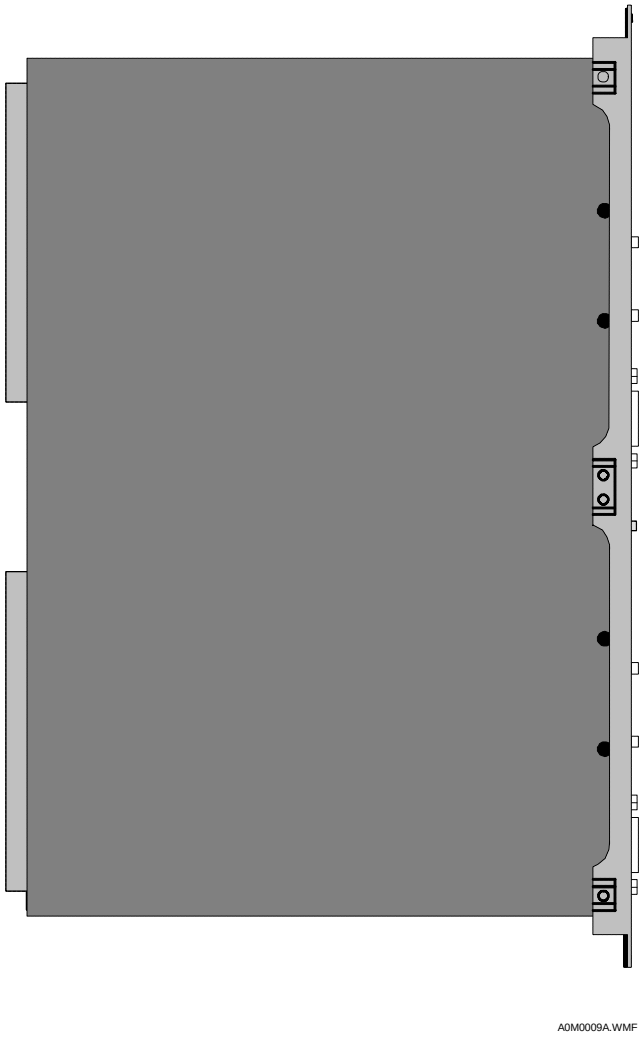


Fig. 8: Left Side of the Composed Unit

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, no screws are on the holes to fasten the front panel.
- If there are any screws in the holes reserved for the front panel (Fig. 7, hole d), remove them and do not use too much force to push the panel onto its place.

Step 11. 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. 7, hole d).

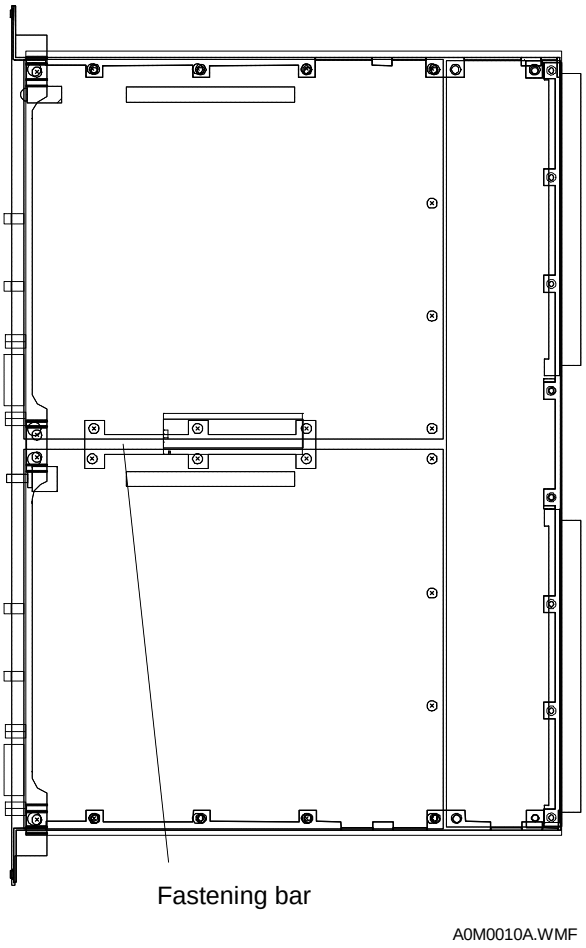


Fig. 9: Right Side of the Composed Unit

Step 12. Install the front panel screws.

— On the front panel assembly and in the frame of the unit are the holes for the front panel screws.
— The holes are the uppermost and the lowermost holes on the front panel.
— Tighten the screws with fingers to their place. Do not use too much force or any tools to install these screws.

Step 13. On some units an insulation strip is needed. Add it according to the unit manual.

Step 14. The unit is now ready for use. Check that all screws are tightened and all parts and connectors are in good condition.

7.1.3.5 Front Panel Assembly

The front panel assembly is designed to meet EMC norm ETS 300 386-1. It replaces the old front panel.

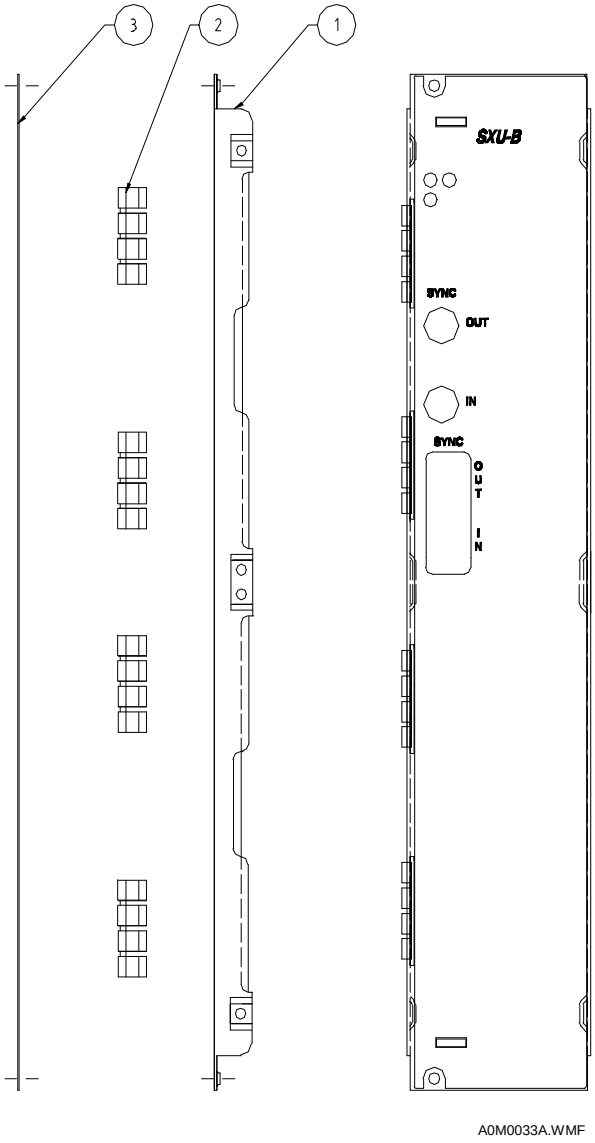


Fig. 10: Front Panel Assembly

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).

7.1.4 Plugging in the Units

NOTE! ***Before plugging the units in the subracks, make the grounding according to the instructions for* Grounding.**

You will need at least the following items for the installation of Basic/Midi Node:

— a single, double or midi subrack,

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

— XCG (in Single or Midi subrack only) or SCU and SXU-A/SXU-B.

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

1. The mechanical installation of the subrack is completed.
2. All unit or module strapping options must have been prepared before the installation of units. the strapping instructions are described in the Strapping Instructions.
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 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 the slot #1 and #17.
   - — The SCU must go into slot #16 in a single/double subrack and in slot #8 in a 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 single subrack and into slot #8 in a Midi subrack.
   - — The cross-connection units must be placed as follows:

Unit	Protection	Slot (Basic: single or double)	Slot (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 located into free slots #2-14 or #18-32 in a double subrack.
   - — Do not install the channel units in slots #12-13 in a single/double subrack or in slot #4-5 in a midi subrack with an unprotected SXU-B OR:

     in slot #14 in a single/double subrack or in #6 in a 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 made by using the unit cabling data about the pins and the signals of Ericsson DXX units. This information is available in Unit Cabling Data. ..

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

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

7.2 Grounding

7.2.1 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 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 subrack´s installation accessories. Subrack mechanics (panels and EMC screens), as well as the unit mechanics (front panels, frames) are also connected to the equipment earth. The rack earth bar can be connected to the station earth with a separate cable (Fig. 11) or via the positive battery wire (Fig. 12).

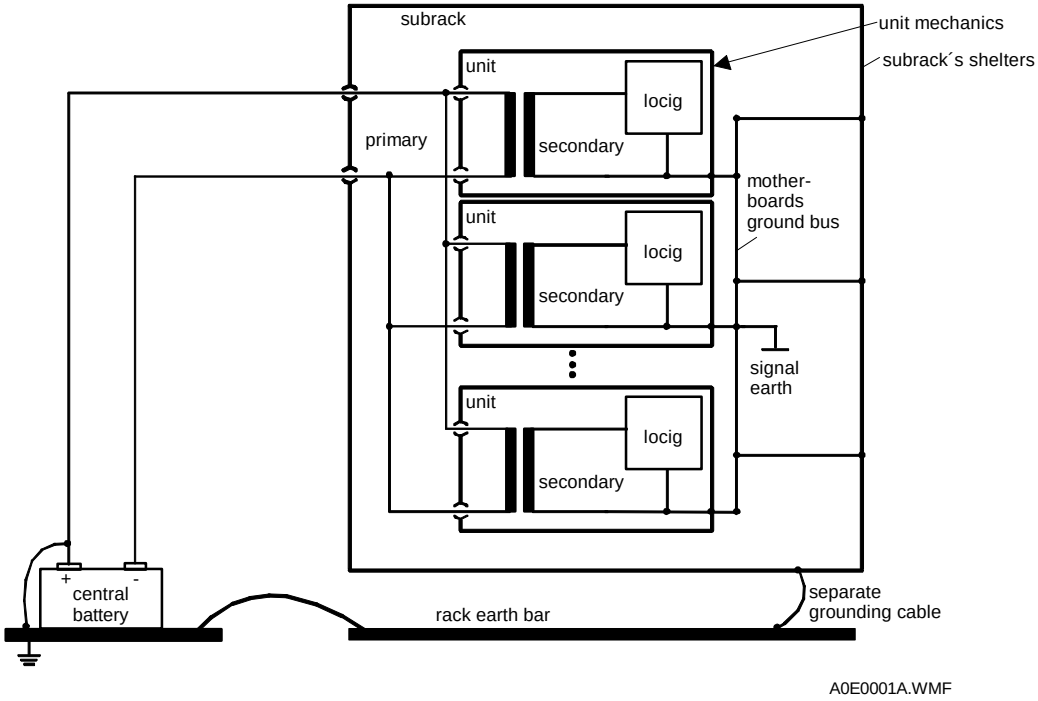


Fig. 11: Earthings in a Subrack in a 3-Wire System

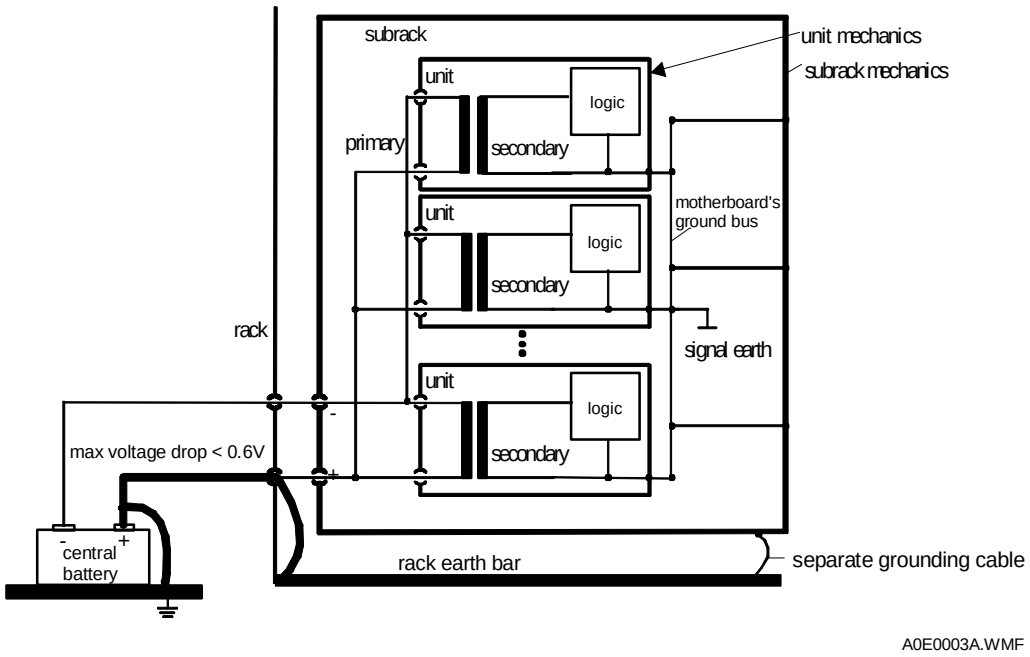


Fig. 12: Earthings in a Subrack in 2-Wire System

In 2-wire system care must be taken that the voltage drop in positive battery feeding is less than 0.6V.

A 6 mm2 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 the grounding can be achieved.

7.2.2 Grounding the Racks

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

A black grounding wire is supplied with the subracks. In ready-made cabinet manufactured by Ericsson , 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” or other grounding solution.

Use a 4 mm2 stranded wire cable (Cenelec H07V-K), if you do not have supplied cables.

7.2.3 Grounding the Accessories

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

NOTE! ***Make sure that no dirt or paint is attached to the grounding points.***

In Schroff-cabinets the sideplates 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 mm2 green/yellow stranded cable. The doors and the sideplates can be grounded to the top and bottom plates by using a 1,5 mm2 cable. The Krone Mounting Panel must be directly connected to the grounding bar.

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

7.2.4 Grounding in EMC Environment

When using an EMC cabinet, a 6mm2 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 bottom or from the top). When looking outside the cabinet, 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 lead-in ducts), outer interference might get into the cabinet.

7.2.5 Grounding the Standard Cabinet

After all the subracks and accessories have been grounded, a common ground must be connected for cabinet/relay rack. A 6 mm2 green/yellow cable is used for this purpose. In Standard cabinet’s end it is ran 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.

7.3 Power Installation

7.3.1 General

After the mechanical installation and grounding of cabinets and racks, connect the power supply for Ericsson DXX. Before starting the actual installation, you must define both the cable leads and where to get the DC from. The power requirement of Ericsson DXX is defined when designing the network.

In telestation installations a fuse unit PFU-A with input voltage range -30º-60 V or PFU-A/24 V with input voltage range +19º+32 V DC is used. An AC power supply unit PAU with 220º240 V AC input voltage can be used for installation at subscriber premises.

NOTE!

All parts on this equipment are considered to be operating at Safety Extra-Low Voltage (SELV) as defined in EN60950. The Ericsson DXX and all mains-powered peripheral equipment must be professionally installed and continue to comply with the SELV requirements of EN60950 Clause 2.3. Lithium cells are not used in this equipment.

The DC battery voltage is connected to the subrack via fuse unit PFU. The connector is a 2-pin D-connector (male) located 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. 13).

The DC input cable must be provided with a fuse. Depending on the input voltage and equipment configuration, the current consumption of a fully equipped subrack (150 VA) is 3.5º.7.5 A. The recommended fuse rating is 10 A (T). In ready-made cabinets from Ericsson , the fuses are of 10 A rating.

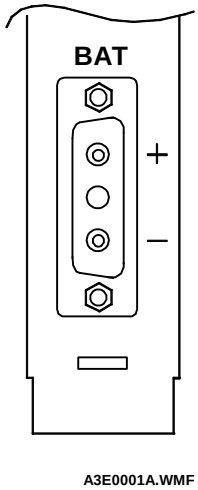


Fig. 13: DC Input Connector of Fuse Unit PFU

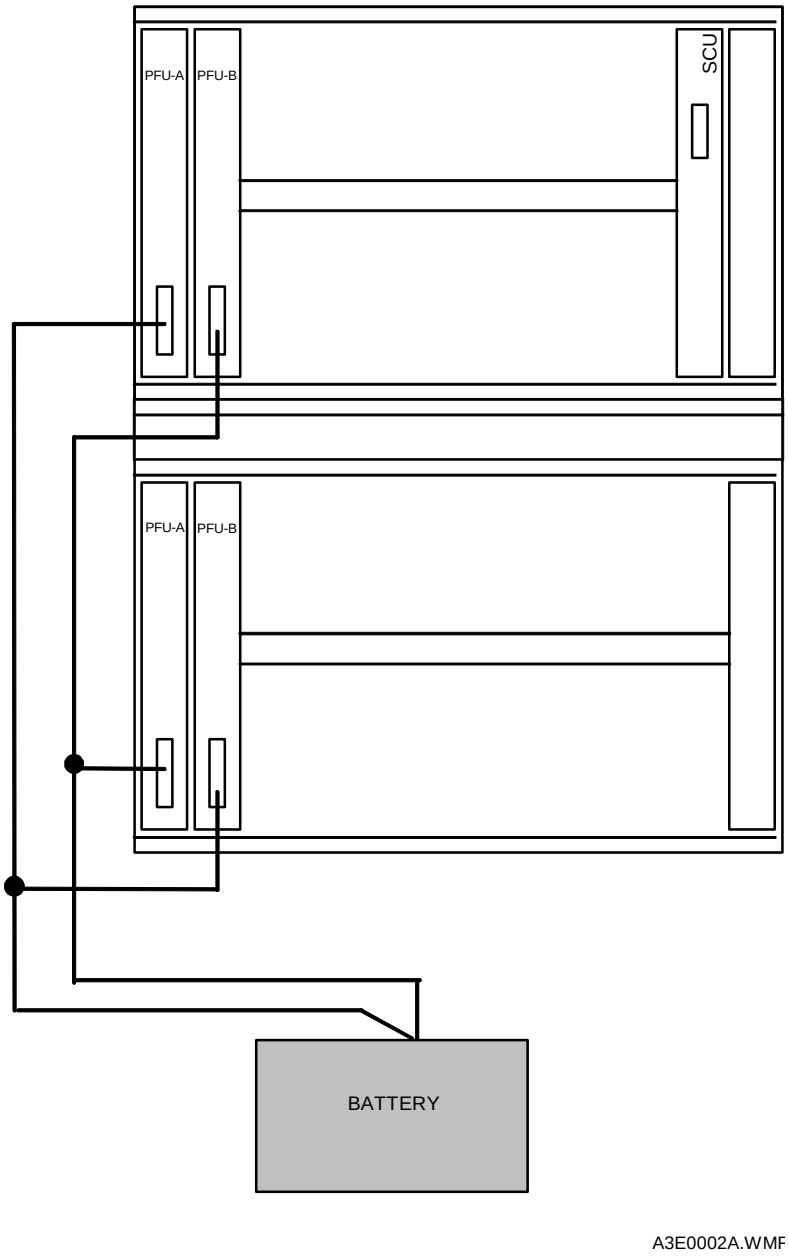


Fig. 14: Example on Cabling when Duplicated Power Feeding Is Used

Fig. 14 shows an example of cabling when the double subrack with PFU-A and PFU-B fuse units are used.

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.

7.3.2 Power Cabling in non-EMC 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 information needed is the amount of the PFUs in them. There are two kinds of power packages available: one for two double subracks with redundancy or as specified.

NOTE! ***The grounding for the cabinets must be in order before connecting the power!***

7.3.2.1 Mechanical Assembly of the Power Equipment

If you are installing a cabinet not ready-made by Ericsson , assemble the power package according to the criteria explained below and as defined in Fig. 15.

NOTE! ***This assemblage is used for two double subracks with redundant PFUs***

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.

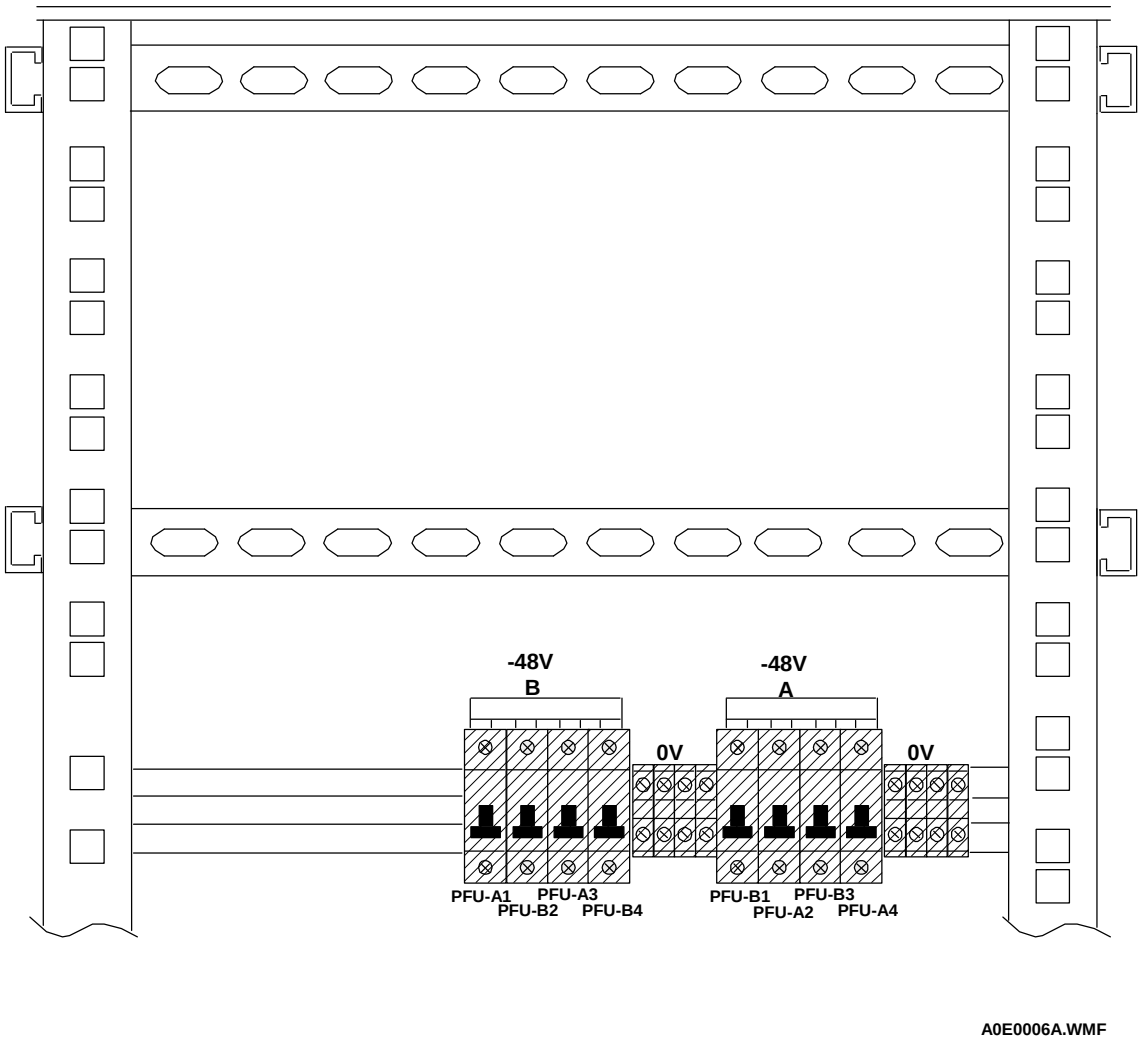


Fig. 15: Example of Circuit Breakers Situation and Connection in a Standard Cabinet.

Proceed as follows:

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

Step 2. Connect the both four circuit breakers groups together with enclosed power bar.
Terminal ends have their own kind of connecting bar enclosed, which must also be connected to its place.

In a ready-made cabinet this is already done.

7.3.2.2 Connecting the PFU-cables

In a ready-made cabinet all the cables are have been marked, so it is easy to connect them into the correct places. The cable used for power is DAM - open type and it is made of 2,5 mm2 stranded wire cable (Cenelec H07V-K).

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

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

If you do not have ready-made cabinets, connect the power cables according to Fig. 15 and Fig. 16. For example, if you have two double racks in a cabinet, connect the PFU-A in a first double rack'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 assemblage use this same method for connecting the PFU's.

7.3.2.3 Defining the Distance

In order to define the diameter of the main power supply cables, proceed as follows:

1. Measure the distance between Ericsson DXX and the main power distributor (PDF).
2. Define the assumed power requirement.
   - This can be calculated by using 300 Watts for a double subrack and 150 Watts for a single subrack. These values must be multiplied by the safety factor 1.7. The formula for defining the maximum current for a double subrack is:

     I = P X 1.7/U; I = 300 W X 1.7 / 48 V= 10.625 Amperes.
   - The voltage should also be considered in this calculation. Nominally the voltage should be -48VDC, but in real life it might be less!

Under normal conditions a 10 mm2 cable (Cenelec H07V-K) is enough for distances under 20 meters and for two double subracks. This is the cable normally used for Ericsson DXX main power supply.

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

From Appendix in the end of this document, a Conductor Gauge and Dimension Comparison Table can be found. The table can be used for converting the gauge (AWG) size conductors to mm2 and vice versa.

7.3.2.4 Connecting and Running the Cables

When using only one power supply, the blue power cable is connected either to the circuit breaker group A or B. Likewise the black supply cable is connected to the same group but to the terminal ends. In this occasion the group A and B are connected together with same 10 mm2 cable. This means that the terminal ends for group A and B are connected together with black lead as well as the circuit breakers are connected with blue one.

If redundant power feed is required there must be individual cables 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 mains supply cables to the Ericsson DXX end:

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

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

Step 4. Connect the mains 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. Connect the power in the mains supply end.

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

Step 8. Switch the PFUs on.

Step 9. If all the units get the power, 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 cabinets circuit breaker end.

Check for blown fuses in the PFU.

7.3.3 Power Cabling in EMC Environment

Power cabling in an EMC environment is similar to the cabling in non-EMC environment.

It is recommended to use ready-made cabinets with power cabling, DC-filtering and all the other equipment in order to avoid problems which 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 goes (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 non-EMC cabinet.

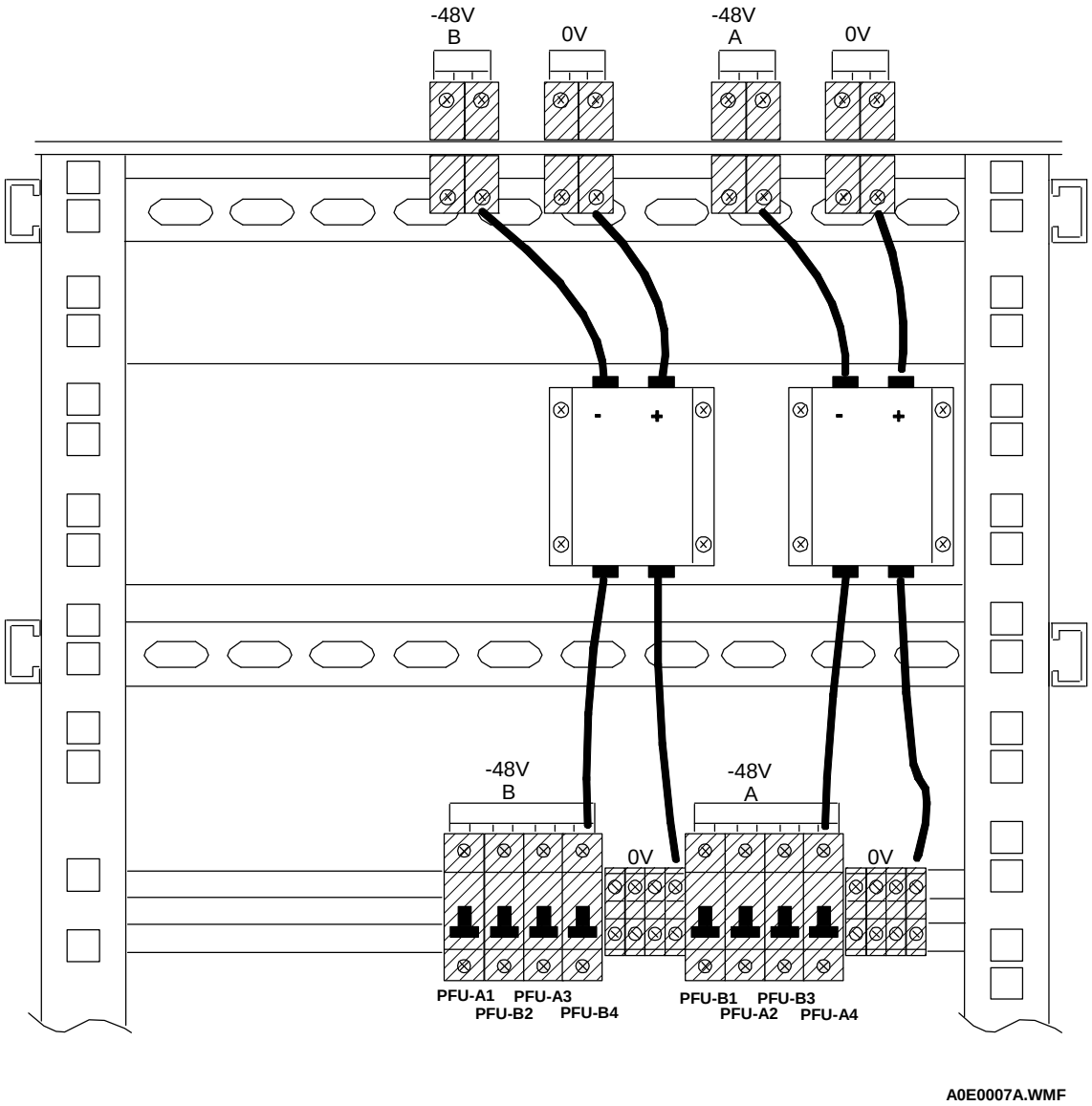


Fig. 16: Example of circuit breakers situation and connection in an EMC cabinet.

7.3.4 An Example of calculating the diameter of power cable

Supposition

Take one cabinet with two double subracks to be powered. Define the suitable diameter of power supply cable being the measured length of a cable of 20 meters.

The formulae

I=P/U, where	I: Current, A
	P: Power, W
	U: Voltage, V
q=l * z * I /Uvl, where	q: Cross sectional area of cable
	l: length of the conductor, m
	z: specific resistance, Copper=0.0185 V/A*mm2
	I: Current, A
	Uvl: allowed voltage drop (max 1.0 V), V
S=I/q, where	S: Current density
	I: Current, A
	q: Cross sectional area of cable

Take a 10 mm2 cable to make the calculation.

Step 1. Calculate the current:

I=P/U => I=300 W * 2 * 1.7 / 48 V=21.25A (1.7 is a safety factor).

In real life the voltage might differ from -48VDC. Use the real, measured value.

Step 2. Calculate the true voltage drop:

Uvl=l*z*I/q => Uvl=20m * 0.0185 V/A*mm2 * 21.25A/10 mm2 = 0.7863 V

Step 3. Check the current density from the table for 10 mm2 cable, which is 6 A/mm2. The density must be less than that. In this case it is S=l/q => S=21.25/10 mm2=2.125 A/mm2, which is less than 6 A/mm2.

Step 4. In this case 10 mm2 cable is enough.

Nominal Cross sectional area/mm2	Resistance /meter in 20×C, mW/m	Max. diameter of conductor/mm	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/mm2
2.5	7.6	3.7	32	22.7	10
4	4.71	4.5	42	29.8	10
6	3.14	5.2	54	38.3	6
10	1.82	6.6	73	51.8	6
16	1.16	8.1	98	69.6	6
25	0.743	10.2	129	91.6	4
35	0.527	11.5	158	112	4

7.4 75 Ω INSTALLATION

7.4.1 General

This section describes how to make 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 DDF (MDF). The 19 inch panel is used if a ready-made cabling package supplied by Ericsson is used or if there are other reasons for using standard length ready-made cables (2m, 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 x BT3002 Coax-cable.Tools Needed

The tool kit for 75 Ω installation supplied by Ericsson consists of

— a cable stripper,
— a centre crimp tool for Type43-connectors,
— a crimping tool,
— a special stripping tool for cable cover and
— a 2-way insertion/extraction tool.

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

7.4.2.1 Mounting the DDF

The 75 Ω installation can be started from installing the DDF to the floor. In telestations there might already be a DDF 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.

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 on the floor by using a rock hammer and knock them in with a hand hammer.

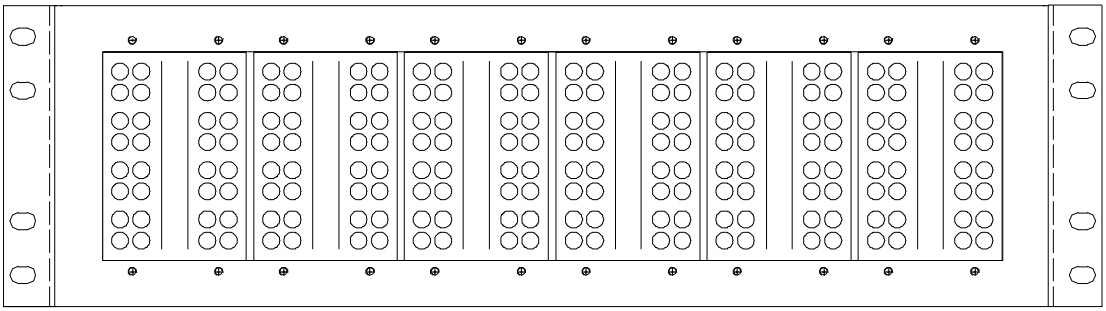
Step 2. Lift the DDF on its place and fasten the nuts tightly.

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

NOTE! **One 19 inch panel can hold 6 blocks and each block can hold 16 E1s which makes 96 E1s (192 ports) altogether.**

7.4.2.2 Mounting the 19 inch panel

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



A3M0014A.WMF

Fig. 17: A 19" Panel for HDC43 Connectors (75Ω)

7.4.2.3 Making the Coax-cables

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

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

7.4.2.4 Running the Cables from the IF to the 19“ Panel

When having only a couple of cables coming from IF to the 19 inch panel, the individual cables can be ran one by one. 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 in the back of the cabinet. The cable way can be freely determined. Use cable ties to tie individual cables in bunches of two and four on IF’s side. Two cables coming from unit’s IF1 are tied together with the cables coming from IF2. Go on like this until all the units in the subrack are handled. All the slots in the subrack can be cabled (except PFU-As, SCUs and SXU-As slots) for future need. When removing units from the subrack the cables should not be on the way!

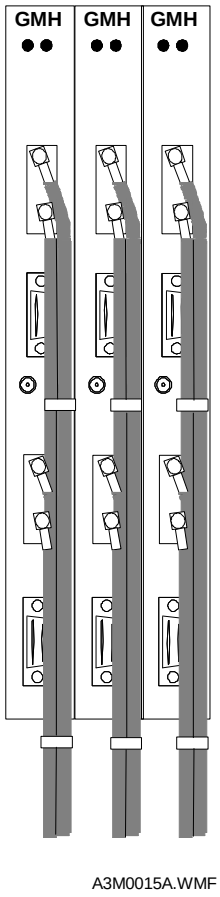


Fig. 18: Front View of a properly cabled GMH

The plastic blocks in the 19-inch panel can be considered as units and interfaces as well. 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 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 connected. Instead, cabling is started from the third row. If you use PAU, the three first rows are left empty.

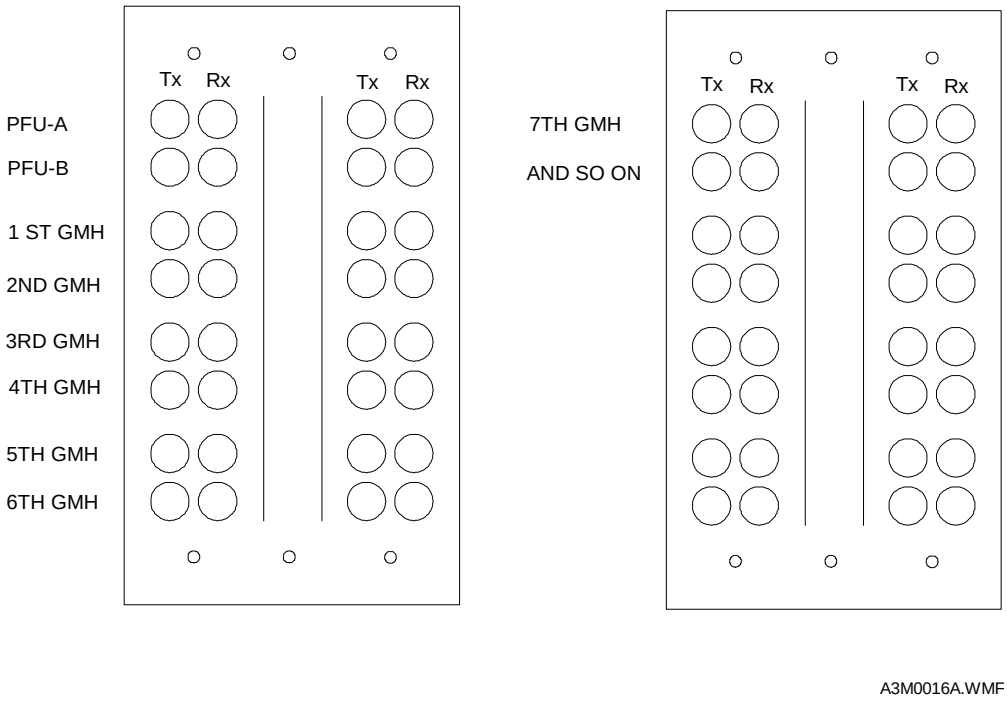


Fig. 19: Example of 75Ω Cables Connection from the IFs (19" panel or DDF)

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

When all the cables are plugged into the right places in the plastic blocks, the whole bunch of cables must be tied on a cabinet's constructions. Make sure that all the cables are in the right places before fastening!

7.4.2.5 Running the Cables from the 19 inch Panel to the DDF

NOTE! ***If using Backup or 1+1 protected trunks, use different cable way for them, if possible.***

So far no special requirements were needed for EMC. This chapter indicates the differences between standard and EMC cabling.

You have two alternatives when making the cabling from the 19 inch panel to the DDF:

1. Use 8 x BT3002 cable. This way you will only have to run one cable instead of eight at a time. This 8 x BT3002 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 x BT3002-cable to make the cables on the spot. This way the installation will take longer. The 8 x BT3002 reel is usually 250 meters 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 how you are going to place the cables in the DDF.

Step 2. Mark all the cables starting from 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 x BT3002 cables one by one from the panel to the DDF. When having two or more cabinets, run the cables from the panel via the joint side of cabinets (see Fig. 20). From there the cable goes through the lead-in plates to a cable duct and to the DDF. If possible, draw the data cables in other side of the duct, apart from the power cabling.

Step 4. Fasten the cables neatly to the cabinet’s constructions with cable ties.

Step 5. Connect the cable’s panel end after it is drawn into the right place. The other end is connected to the pre-defined place in the DDF.

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

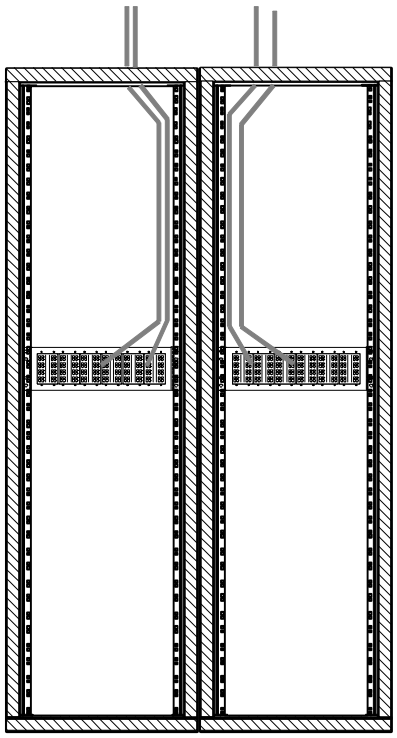


Fig. 20: How to run Cables out of the Cabinet

In an EMC environment, place a conducting heat shrink tube around the 8 x BT3002 cable before running the cable. The tube must have a conductive outside. After the cable is on 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 from the cabinet and the tubes must touch each other or the lead in plates. This helps us to avoid interference coming inside or possibly getting out of the cabinet.

There is a third type of 8 x BT3002 cable available: It is 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 leaving the cabinet, 5 cm of a plastic cover must be peeled off on lead in plates. Make the connection to the lead-in plates as it was described in previous section.

If you are using 1 x BT3002 cable coming from the cabinet, 5 cm of the cover of all individual cables must be peeled off on lead in plates. This has the same effect as it was defined in previous section. If there is no heat shrink tube available or braided 8 X BT3002, each individual BT3002 cable must be peeled like this. Then the cover for the whole BT3002 cable must be peeled off to the outside of the cabinet.

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

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

7.4.3 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. This decreases installation material costs but on the other hand slows the installation (8 x BT3002 cables have to be made on the spot). 8 x BT 3002-cables can be readily made, but their lengths must be defined on the Site Survey and delivered on correct site as well. This means that there exists the possibility that cables of different lengths are delivered to a wrong site (that could be thousands of kilometres away from the right one). The another advantage is that there is two times less connectors and connection points which means that the whole cabling is more reliable and the attenuation is not so extensive.

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

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

7.5 120Ω Installation

7.5.1 General

This section describes how to make 120 Ω cabling in standard and EMC environments. The reason for separating these environments differs greatly in the ways the cabling is done in them.

This section also describes the installation from the G.703 interface to the 19 inch Krone mounting panel in 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 is used or if dozens of trunks are drawn from the interfaces to the DDF. Then it is recommended to use 16-pair cable from the Krone mounting panel to the DDF. When having only a couple of trunks in each cabinet/relay rack, cables of individual length can be used (120 Ω, two pair twisted shielded pairs).

7.5.2 Tools needed

The tool kit for 120 Ω installation supplied by Ericsson consists of

— a LSA-Plus connection tool for Krone-blocks and
— a 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.).

7.5.3 Installation when using Krone Mounting Panels in the Back of Cabinets

7.5.3.1 Mounting the DDF

The 120 Ω installation can be started from installing the DDF to the floor. In telestations there might already be a DDF 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 120Ω DDF locally

Proceed as follows:

1. There are four holes for wedge anchorages in a DDF. Drill four holes on the floor by using a rock hammer and knock the anchorages with a hand hammer.
2. Lift the DDF on its place and fasten the nuts tightly.
3. Define how many 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 and each block can hold 3 E1's which makes 45 E1s altogether.***

7.5.3.2 Installing the 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 incoming screws.

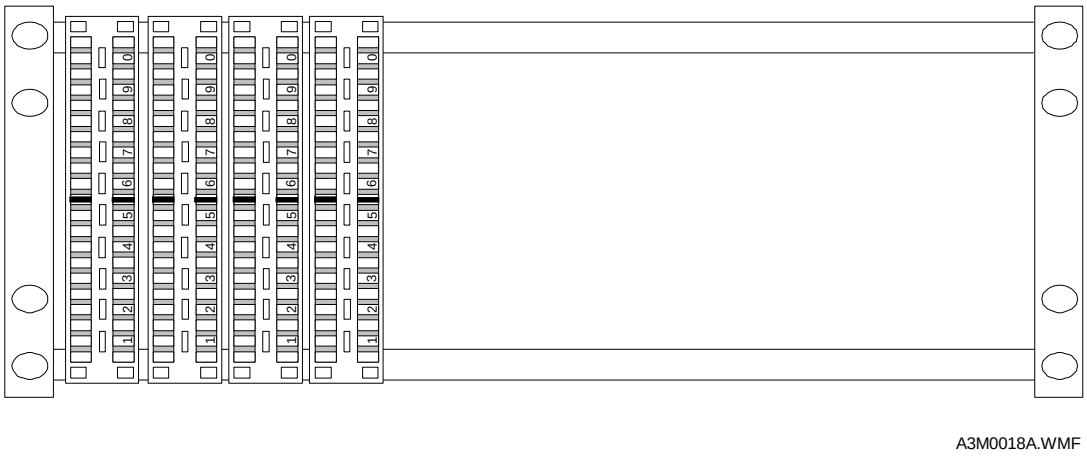


Fig. 21: 19" Panel Equipped with Krone Blocks

The panel depicted in Fig. 21 is only one alternative. In the actual Krone block Mounting Panel there are all the blocks installed vertically in three columns (5 x 3).

7.5.3.3 Making the Cables

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

7.5.3.4 Fitting the "D9 Male - OPEN" Cables to the Krone Blocks

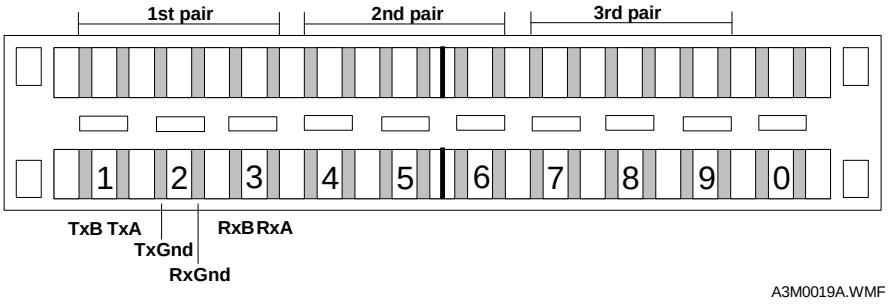


Fig. 22: Connection of 120Ω cable to a Krone block.

Fig. 22 shows that there can only be three E1s (T1s) connected to it. One "slot" in the block is left empty. It can be used for grounding the drain wires of each individual cable coming from interfaces (if needed).

Each cable coming from the 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 also small pins or guides designed to keep the pairs steady, where the pairs can be fitted when coming through the ear. By using a Krone LSA-Plus tool, each wire can be fitted 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
TxB	1a	1	White (1st)	1st pairs blue
TxA	1b	2	Black (1st)	1st pairs white
TxGnd	2a	6	Drain (1st)	1st pairs drain
RxGnd	2b	9	Drain (2nd)	2nd pairs drain
RxB	3a	4	Red (2nd)	2nd pairs blue
RxA	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 means that we are talking about Madison's 2-pair 120 Ω cable and their colour system. KLVMAAM represents Nokia's 120 Ω 2-pair cable and their colour system. Ericsson supplies only Madison's cable.

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

7.5.3.5 Mounting the Krone-blocks to the DDF and the Krone Mounting Panel

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

Proceed in the following way:

Step 1. Define the cable way

Step 2. "Plug" the block in its place.

7.5.3.6 Running the Cables from Krone Mounting Frame to the IF

The 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 first GMH unit's IF1. 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. Go on like this until all the units in the subrack are handled. All the slots in the subrack can be cabled (except PFU-As, SCUs and SXU-As slots) for future need. Usually there is only cabling for 64Mb/2 MB = 32 IFs which is 16 GMHs. This is valid only for double subrack, because you cannot put 16 GMH's into 16 slot single subrack. Double subrack can be cabled fully and in addition there can be cables installed for example for 22 GMHs = 44 E1s. This is useful if there are many connections from each node but only part of the timeslots (capacity) is used for cross-connections.

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

7.5.3.7 Running the Cables from Krone Mounting Frame to the DDF

NOTE! ***If using Backup or 1+1 protected trunks, use different cable way for them, if possible.***

Standard Environment

In standard environment (no EMC requirements) there are no special requirements about how to run the cables from Krone Mounting Frame to the DDF.

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

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

Step 1. Run the cable via pre-defined route and leave at least two extra meters of cable at both ends

Step 2. In the cable duct run the data cables in another side, apart from power cabling.

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 pre-defined place and cut the extra cable off.

Step 6. Connect the pairs to the Krone blocks as described in Chapter 7.5.3.4. The connection is made by using LSA-Plus connecting tool.

EMC Environment

When the installation is made in an EMC environment some special features have to be considered

— When the 16-pair cable is leaving the cabinet via cable lead-in holes (supplied in Ericsson ’s EMC cabinets), the cable cover must be terminated.

— After the cable is actually run to its place and fastened to the cabinet’s structure some five centimetres of cable’s cover must be peeled off on lead-in holes. There is a special tool for that purpose.

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

Connect the DDF cables end according to Chapter 7.5.3.4. The connection is made by using the Krone LSA-Plus connecting tool.

7.5.4 Installation without Krone Mounting Frame at the Back of a Cabinet

This type of installation is not recommended, for even though 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 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 from the D9-connector shell. The cable is also impossible to terminate to the connector shell. It looks unprofessional and besides it is impossible to terminate if going out from the cabinet (especially in 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 meters and when there are plenty of individual cables the whole bunch of cables could 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 exists 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 if using them. But if we count with only 2 meter D9M - open-cables, Krone Mounting Frames and reels of 16-pair cable, we do not have to take care of making cables of different lengths.

7.5.5 Looping all the Interfaces

After installation, all the interfaces are looped either on the Krone Mounting Frame or on the DDF depending on the junction to be tested. Looping the interfaces switches off some of the alarms 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 special measuring cable which has connectors that you can plug in the middle of a separating Krone-block.

7.6 User Access Cabling

7.6.1 General

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

User Access refers both to all the data/voice interfaces and modem line connections. This includes all the VCM, IUM, ISD-XX, CCO/CCS and CAE units interfaces.

7.6.2 Tools Needed for twisted pair cabling

There is a tool kit for 120Ω installation supplied by Ericsson . The same kit can be used for User Access cabling as well. It contains:

— a LSA-Plus connection tool for Krone blocks and
— a 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.).

7.6.3 Installation when using Krone Mounting Frames in Back of Cabinets

7.6.3.1 Mounting the DDF

The User Access cabling can be started from installing the DDF on the floor. In telestations there might already be a DDF for 120Ω lines and only some additional Krone blocks are needed. If the existing DDF is of different type, 19 inch Krone mounting panel for blocks can be mounted into same frame, if possible. Otherwise an additional DDF is required.

In the site survey it should be defined where to mount the additional DDF. The ideal place for it is next to the existing ones. When the place for the DDF is determined, it is mounted on the floor. There should be holes for wedge anchorages in a DDF. Drill corresponding holes on the floor by using a rock hammer and knock the anchorages with a hand hammer. Lift the DDF on its place and fasten the nuts tightly.

Define how many Krone blocks you are going to need for the installation and mount them on the DDF on their places.

NOTE!

Each Krone block can hold 10 pairs. This means that one block can hold five modems in four wire mode and 10 modems/IUMs in two wire mode, or one CCO/CCS/CAE interface.

7.6.3.2 Installing the Krone Mounting Panel

The Krone mounting panel is mounted either in the back of a cabinet or in a 19'' panel which might also be a customer's existing DDF solution. If the frame is going to be installed on a cabinet it should be mounted in the back of the cabinet. The place can be determined freely (somewhere in the middle). Mount the panel to the cabinet with oncoming screws.

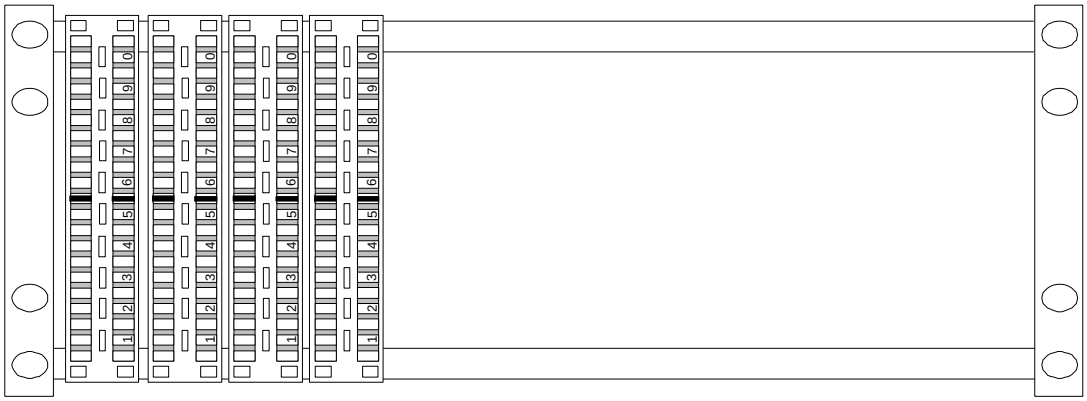


Fig. 23: 19" Panel Equipped with Krone Blocks

The panel shown in Fig. 23 is only one alternative. In the actual Krone block mounting panel all the blocks are installed vertically in three columns.

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

7.6.3.3 Defining the needed Cables connected to the Krone Mounting Panel

All the cables supplied by Ericsson with open end/ends can be connected to the 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, with the connectors and length defined by customer.

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

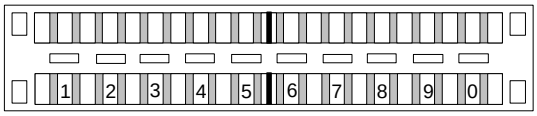


Fig. 24: Krone Block

Fitting the Voice Frequency Cables to the Krone Blocks

It is quite easy to connect ready-made D25M-open cable to the Krone block. There are ten channels connected in the cable and one block can hold 10 pairs. This goes for CAE in two wire mode and for CCS, CCO. If CAE is used in four wire mode, the connection is the same, but there are only 5 channels connected per interface/Krone block.

The cable routing from the interface can be done by using the same principles as in 120 Ω installation. Because it is a question of normal 100 Ω pair twisted telephone cable, there are no special requirements like for example taking care of terminating the cable shields to the cabinet's ground. Use Krone LSA-Plus connecting tool for making the connection.

Fitting the Modem Line Cables to the Krone Blocks

There are several alternatives for IUM as well as for STU cables. Usually only IUM cables are connected to the Krone blocks inside the cabinet. STUs are normally in the customer's premises and they are connected to a wall plug (type RJ45 or RJ12). The IUM cable's other end is usually of RJ45 or RJ12 open type. Some operators might have they own distribution panels of the RJxx type. The open type IUM - cable (RJ45 - open) is connected to the Krone blocks. 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 Krone LSA-Plus connecting tool to make the connection.

One IUM cable takes one pair from a Krone block (in 2-wire mode). This means that there can be 10 IUM interfaces connected to a Krone block. IUM can be used in 4-wire mode as well.

When using BTE-1088/-2048/-4096, the interface end is a D9 male connector. The other open end is connected to a Krone block. These interfaces uses 4-wire mode; there can be only 5 BTEs connected in one Krone block.

7.6.3.4 Mounting the Krone-Blocks to the DDF and the 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 there.

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, Modem Line).

NOTE! ***Do not mix Voice Frequency cables in the same Krone Block with Modem Line cables, because of clarity!***

7.6.3.5 Running the Voice Frequency Cables from the Krone Mounting Panel to the IF

The 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 first CAE - unit's IF1. The second cable to the IF2 and so on. Once all the cables are ran 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 handled.

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 on the way of other units when removing them.

Fasten all the cables to the cabinet structure.

7.6.3.6 Running the Modem Line Cables from the Krone Mounting Panel to the IF

The number of modem 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 a first Krone block consisting of modem 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 cabinet's structures.

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

7.6.3.7 Running the Cables from the Krone Mounting Panel to the DDF

Running the Voice Frequency Cables

The cable used for this purpose should be the same type as the ready-made D25M-open cable. It is 10-pair 100Ω cable with twisted pairs. It has an aluminium foil as an outer shield, for example Helkama 10 x 2 x 0.5., it is recommended to use a cable with more pairs, if available (otherwise the same as Helkama 10 x 2 x 0.5). Then there should be more than one interface in CAE unit connected/in use in a cabinet. Running the multi-pair cable can be done one by one.

Step 1. Run the cable via pre-defined route and leave at least two extra meters at both ends.

Step 2. In the cable duct run the data cables in another side, apart from the power cabling.

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

Step 4. Peel off the extra insulation.

Step 5. Run each individual pair to the pre-defined place and cut the extra cable off.

Step 6. Connect the pairs to the Krone blocks as described in Chapter 7.5.3.4. The connection is made by using a LSA-Plus connecting tool.

Running the Modem Line Cables

The cable used for modem connections should be 2-pair, 100Ω pair twisted unshielded cable. When a cable consists only two pairs, it is better to use multi-pair cable that fulfils the requirements (above) for a modem line cable used in Ericsson DXX. Even if there is only one IUM fully cabled (four 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.

7.6.4 Installation without Krone Mounting Panel in Back of Cabinet

This type of installation is not recommended for, 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 meters 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 a 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 advised to use ready-made cables.

7.7 Optical Installation

7.7.1 General

This chapter describes how to make the cabling of optical interfaces. There are two types of optical adapters used in Ericsson DXX:

— **FC Optical Adapter**: used for optical G.703 interface, OTE-LED and OTE-LP (GMH).
— **SC Optical Adapter**: (GMU optical interfaces) used in GMU interfaces, STM-1-SH-13 and STM-1-LH-13 optical modules, as well as in AIU unit.

Large ODFs are not normally needed, if there are only a couple of optical interfaces in a node.

If having 1+1 or backup trunks, use an alternative cable way, if possible.

The installation can de made either with an **Optical Distribution Frame** (ODF) in each cabinet or a larger ODF from which all the optical interfaces are run.

NOTE!

Remember: the more connections and connectors you have, the more extensive the attenuation on the line gets and, consequently, the price of the cables increases dramatically.

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

7.7.2 Tools Needed

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

— A cleaning set for optical connectors including
  — cleaning alcohol,
  — some cotton sticks,
  — special cleaning tissue and
  — a specially made microscope for checking the cleanliness of optical connector’s ferrules (recommended).
— A small container of clean pressurised air.

7.7.3 Installation when using a 19 inch Panel in the Back of a Cabinet

7.7.3.1 Mounting the ODF

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

7.7.3.2 Mounting the 19 inch Panel

The only requirement for an Optical Distribution Frame (ODF) is that it can be mounted on a 19'' frame and there are slots 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. The best way to do the actual mounting is to use M6-8 cage nuts and fasten them to the cabinet frame into the correct places. The screws are the same as those used for fastening the Ericsson DXX subracks (M6 x 16).

The other alternative is to use the same kind of panel used in 120Ω installation (see Chapter 0) 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.

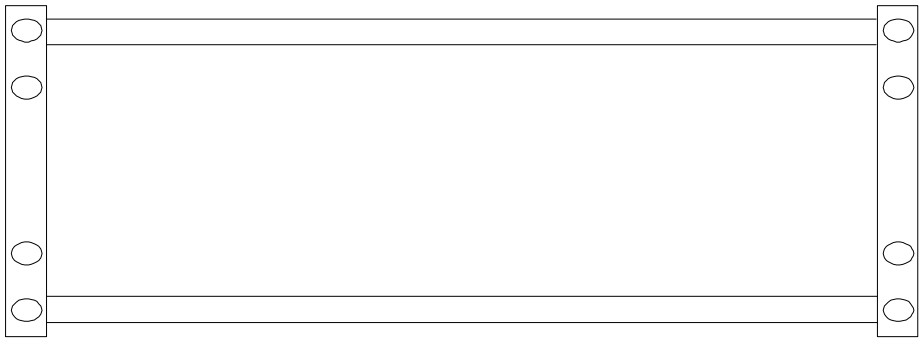


Fig. 25: 19" panel for Krone blocks and optical modules.

7.7.3.3 Making the Cables

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

To fulfil these requirements we recommend having the cables of correct length made according to the Site Survey. There are many different types of cables and as well terms to refer to them: Single mode, Multi mode cables, duplex type and so on.

Single mode fibre (SM 10/125 µm) is the type normally used in customer's applications.

Duplex type has two fibres attached to each other instead of two separate ones.

7.7.3.4 Running the Cables from IF to the 19 inch 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 or otherwise mishandle the optical fibres when running them.***

7.7.3.5 Connecting the Cables

To connect the cables proceed in the following way:

Step 1. Remove the plugs that cover the GMU or AIU SC-connectors and the OTE-LED or OTE-LP FC-connectors at the interface end.

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

Step 2. Blow some clean air 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 likewise.

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

7.7.3.6 Running the Optical Cables from the 19 inch Panel to the 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 wore) 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! ***If using Backup or 1+1 protected trunks, use different cable way for them, if possible.***

7.7.4 Installation when using only ODF

This is the best alternative from the point of view of the costs of installation. You only need one frame with plenty of slots where to mount the optical adapters and the cables. The optical fibres come from the interface directly to the ODF without any extra connections on the way. In this case, the exact lengths of the cables must be known beforehand (see Site Survey).

The actual installation can be done following the instructions in Chapter 7.7.3.1, Chapter 7.7.3.3, Chapter 7.7.3.4, Chapter 7.7.3.5 and Chapter 7.7.3.6. Only the 19 inch panel is left out.

Another advantage in this kind of installation is that there are not so many connection points: the whole cabling is more reliable and there is not so much attenuation on the line.

NOTE! ***Each optical connector increases attenuation 0.5 dB.***

On the other hand, this solution offers the disadvantage of not being compact whereas when using 19 inch panel, part of the installation can be done in the factory!

7.8 Cluster Cabling

7.8.1 General

This chapter describes how to perform Cluster Nodes inner cabling and mechanical installation (described earlier in this document). It also includes some information about service computer which is necessary in Cluster Node cabling.

7.8.2 Cluster Node Installation

7.8.2.1 Master Subrack Installation

A master subrack can be installed by:

— 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 master subrack installation:

— a cluster double subrack,
— fuse units,
— CCU and two CXU-Ms,
— two CXU-A:s per a slave subrack
— and two CXU-S:s if signalling cross-connections will be used.

Proceed as follows:

Step 1. The mechanical installation of the subrack is performed first. For further details refer to Chapter 7.1.3.4.

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 Strapping Instructions.

Step 3. Place the units into the subrack:

— The fuse units are placed at 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 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 Unit Cabling Data.

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

Step 2. Give the following node parameters to the Service Computer before creating the node inventory.

NODE ID	unique identification of node (Note: must be the same for all the subracks of a cluster!)
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 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.

Step 4. The master subrack has now been installed but it is not yet a complete Cluster Node.

For further details, refer to Ericsson DXX Manager User Manual, chapter Building the Ericsson DXX Network.

7.8.2.2 Slave Subrack Installation

A slave subrack can be installed by:

— 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 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:

— a single or double subrack,
— a fuse unit or fuse units,
— SCU and two SXU-Cs.

Channel units can be taken with at the beginning or they can be added later. Remember that all interface types are not supported in a Cluster Node.

Step 1. The mechanical installation of the subrack is performed first. Its details are explained in Chapter 7.1.3.4.

Step 2. All unit or module strapping options must have been prepared before the installation of units. All strapping instructions can be found in Strapping Instructions.

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 at 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 located 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 any 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 Ericsson DXX units. This information is available in document number 12049_XX, Unit Cabling Data.

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

Setting the Node and Subrack Parameters

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

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

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

Creating the 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 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.

The slave subrack has been installed but it is not yet a complete Cluster Node.

7.8.2.3 Making the Cluster Node

This operation joins the master subrack and the slave subracks together as a 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 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 cluster.***

Adding Slave Subracks and Corresponding CXU-A Pairs

NOTE! ***Use forced control to eliminate unnecessary change-over 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 the slave 1 to the Cluster Node by the Add Unit command 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 the slave 2 to the Cluster Node by the Add Unit command 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 the Cluster Node by the Add Unit command applied to the corresponding CXU-A unit (another CXU-A unit will be added automatically).

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

Cluster Node Cabling

XC-bus cables are RKD 260 (4 m) or RKD 261 (8 m).

Main 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

Main 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 RKD 263 (2 m) or RKD 268 (4 m).
- CBUS cables connect the CCU in the master subrack and all SCUs in the slave subracks in chained fashion implementing the cluster control bus. Do not connect CBUS cables in a starlike fashion.

Step 3. Insert the two CBUS terminators RKX 267 into the two ends of the bus.

Step 4. The typical Cluster Node configuration is shown in figure below.

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

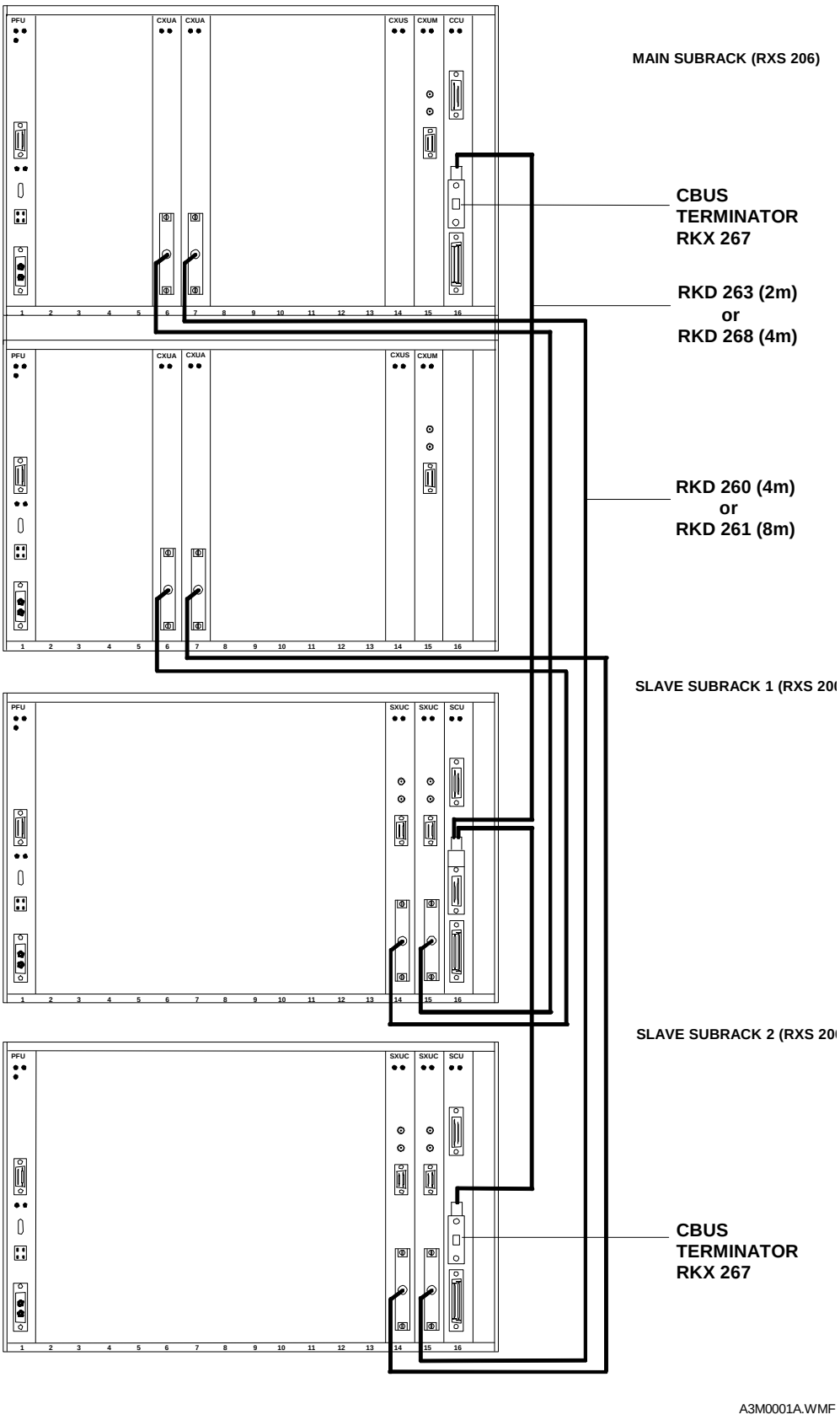


Fig. 26: Example of Cluster Node Cabling

7.9 Updating Node Installation

7.9.1 Updating of Basic Node Installation

The following operations can be done to the installation of a Basic Node without corrupting existing connections in the node:

— replacing a channel unit, a control unit or a protected cross-connection unit;
— adding/removing a channel unit or a protected cross-connection unit;
— changing an unprotected cross-connection system to protected;
— changing protected cross-connection system to unprotected;
— and updating unit software.

NOTE! ***The following operations are not possible without corrupting existing cross-connections through a node: replace unprotected cross-connection unit or create inventory or delete inventory.***

7.9.1.1 Replacing a Unit

Channel units or the SCU can be replaced one by one by simply taking an old unit out and placing a new compatible unit into the same unit slot. When a channel unit has been replaced, there must be a SCU in the subrack to give the backup setting for the new unit. When the SCU is replaced, all other units must be present to provide their backup settings for the new SCU. It is always recommended to wait until the new unit is ready for other operations.

If a channel unit has been missing when the SCU was replaced, it will remember a missing unknown unit and it will report an alarm. When the missing channel unit or its new replacement unit is available again it must be re-installed by using first remove unit operation to remove the unknown unit and then add the unit operation to add the new replacement unit. Possible circuits through the unit must be deleted before the re-installation. Insert a replacement unit immediately when an old unit has been taken out from the subrack, or at least before replacing other units.

Protected cross-connection units can be replaced one by one. Remember to wait long enough for the procedures of the information exchange between the cross-connection units and the initialisation of the new cross-connection unit.

If an unprotected cross-connection unit must be replaced, the cross-connections must be copied into a file before the replacement. The cross connection file can be copied back to the new cross-connection unit.

7.9.1.2 Adding/Removing a Unit

A new channel unit can be added whenever needed if there is a free place available.

If you want to remove a registrated channel unit from the inventory, you must delete first possible circuits which go through the channel unit. When there are no connections to the ports of the channel unit, you can just activate the remove unit operation. Physically, you can take the unit out after the acknowledgement of the remove operation.

It is possible to add or remove the second protected cross-connection unit (SXU-A in the slot 14 or SXU-B in the slot 12). These operations are described in the following Sections:

— How to Change Unprotected Cross-Connection System to Protected
— How to Change Protected Cross-Connection System to Unprotected

The first cross-connection unit (SXU-A in the slot 15 or SXU-B in the slot 14 or SCU) cannot be added or removed.

7.9.1.3 How to Change Unprotected Cross-Connection System to Protected

The following two steps are needed in order to change an unprotected cross-connection system to protected:

Step 1. Change the cross connect unit option to protected.

Step 2. Add another cross-connection unit (SXU-A into the slot 14, SXU-B into the slot 12).

— The type of the cross-connection unit must be the same as before.

NOTE! ***The order of steps 1 and 2 is important.***

7.9.1.4 How to Change Protected Cross-Connection System to Unprotected

The following two steps are needed to change a protected cross-connection system to unprotected:

Step 1. Remove the second cross-connection unit (SXU-A from slot 14, SXU-B from slot 12).

— First remove the units from the inventory and then physically from the subrack.

Step 2. Change the cross connect unit option to unprotected.

NOTE! ***The order of steps 1 and 2 is important.***

7.9.1.5 Updating Unit Software

This Section describes the general rules for updating unit software. Let's take an imaginary unit XYU and its program XYZ123 under consideration. The unit XYU and its program XYZ123 can be replaced in the following text by any existing unit and its program respectively.

The downloadable unit software is normally delivered as a binary file XYZ123_x.y on a micro floppy disk where x.y is the version of the software XYZ123. The downloadable software must be compatible with the EPROMs of the target unit. The compatibility between the target unit software and the downloadable file is defined by the two rules:

— The product codes must be the same (XYZ123).

— Two versions u.v and x.y are compatible if u = x.

If the new software XYZ123 version x.y is not compatible with the target unit software (EPROMs), the EPROMs must be changed or another downloadable file must be used.

If the new software XYZ123 version x.y is compatible with the target unit software (EPROMs), it is possible to download the new binary file XYZ123_x.y to the target unit.

The following instructions should be applied when downloading XYU software:

Step 1. Check that you have the correct downloadable software available.

Step 2. Select the correct target (node, subrack, unit).

Step 3. Check the compatibility of software versions.

Step 4. Open the Downloading window.

Step 5. Select the correct binary file XYZ123_x.y from your directory.

Step 6. Activate the downloading.

Step 7. Wait for the end of operations.

The downloading takes some minutes including erasing time, data transfer, programming time, checking and restarting time. It is recommended to check the software version after the downloading.

7.9.2 Updating of Cluster Node Installation

The following operations can be done to the installation of a Cluster Node without corrupting existing connections in the node:

- replacing a channel unit, a control unit or a protected passive cross-connection unit;
- adding/removing a channel unit or a protected passive cross-connection unit;
- changing an unprotected cross-connection system to protected;
- changing a protected cross-connection system to unprotected and updating unit software;
- and adding a signalling cross-connect unit.

NOTE!

The following operations are not possible without corrupting existing cross-connections through a node: replace unprotected cross-connection unit or create inventory or delete inventory.

7.9.2.1 Replacing a Unit

Channel units (in slave subracks) can be replaced one by one just by taking an old unit out and placing a new compatible unit into the unit slot. When a channel unit is replaced there must be the SCU of the slave subrack to give the backup setting for the new unit.

In a Cluster Node, the replacement of SCU or CCU breaks the CBUS connection to the subrack where the control unit belongs to. This is the reason to replace a control unit quickly and restore the CBUS as soon as possible. When the SCU or CCU is replaced, all the other units must be present to provide their backup settings for the new SCU or CCU. It is always recommended to wait until the new unit is ready for other operations. Be careful not to touch the CBUS cable at the very moment the changes in the time-controlled connections are being activated.

If a channel unit has been missing when SCU was replaced, then it will remember a missing unknown unit and it will report an alarm. When the missing channel unit or its new replacement unit is available again, it must be reinstalled by using first the remove unit operation to remove the unknown unit and then add the unit operation to add the new replacement unit. Possible circuits through the unit must be deleted before the reinstallation. Insert a replacement unit immediately when an old unit has been taken out from the subrack, or at least before replacing other units.

Protected cross-connection units can be replaced one by one. Remember to wait long enough for the procedures of the information exchange between the cross-connection units and the initialisation of the new cross-connection unit.

If an unprotected cross-connection unit must be replaced, the cross-connections must be copied into a file before the replacement. The cross-connection file can be copied back to the new cross-connection unit.

7.9.2.2 Adding/Removing Unit

A new channel unit can be added into the slave subrack whenever needed if there is a free place available.

If a registrated channel unit from the inventory is removed, the possible circuits which go through the channel unit must be deleted first. When there are no connections to the ports of the channel unit, the remove unit operation can be activated. Physically, the unit can be taken out after the acknowledgement of the remove operation. It is possible to add or remove the second protected cross-connection unit (SXU-C in the slot 14). These operations are described in Sections:

— How to Change Unprotected Cross-Connection System to Protected.
— How to Change Protected Cross-Connection System to Unprotected.

You cannot add or remove the first cross-connection unit (SXU-C in the slot 15).

7.9.2.3 Adding a New Slave Subrack

NOTE! ***All the slaves of a cluster must have different numbers (slave 1...slave 8).Never change the slave numbers of a running cluster.***

— Make a slave subrack installation ready before adding it to a Cluster Node (channel units can be added later).
— Use forced control to eliminate unnecessary change-over between the redundant cross-connection systems.
— Add a slave subrack and the corresponding CXU-A pairs (one of the following alternatives in accordance with the number of the new slave to add):

Slave 1

Step 1. Put a pair of CXU-A units into the master subrack:
— in the upper shelf into the slot 6 for the 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 the Cluster Node by the Add Unit command 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 the slot 7 for the 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 the Cluster Node by the Add Unit command 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 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 the Cluster Node by the Add Unit command applied to the corresponding CXU-A unit (another CXU-A unit will be added automatically)

Step 6. Release the forced control of the redundant cross-connection systems.

7.9.2.4 Removing a Slave Subrack

Step 1. Use forced control to eliminate unnecessary change-over between the redundant cross-connection systems.

Step 2. Remove a slave subrack and the corresponding CXU-A pairs:

Open the inventory window for the master subrack of the cluster.

Give the remove unit command applied to the corresponding cxu-a unit in the top shelf of the master subrack.

Remove the xc bus cable and the cbus cable.

Remove the cxu-a units from the master subrack.

Draw the master subrack.

NOTE!

Never create or delete the inventory of a slave subrack while the corresponding CXU-A unit belongs to the inventory of the master subrack because then the slave is a part of the cluster and it must have a known inventory. Channel units can be added or removed when needed.

Step 3. Release the forced control of the redundant cross-connection systems.

7.9.2.5 Adding Signalling Cross-Connection Units

Step 1. Use forced control to eliminate unnecessary change-over between the redundant cross-connection systems.

Step 2. Add signalling cross-connection units:

- Put a pair of CXU-S units into the master subrack;
- in the upper shelf into the slot 14 for the signalling connections,
- in the lower shelf into the corresponding place.
- Draw the master subrack.
- Add the CXU-S units to the master subrack by the Add Unit command.

Step 3. Release the forced control of the redundant cross-connection systems.

7.9.2.6 Removing Signalling Cross-Connection Units

Step 1. Use forced control to eliminate unnecessary change-over between the redundant cross-connection systems.

Step 2. Remove signalling cross-connection units:

- Open the inventory window for the master subrack of the cluster.
- Give the remove unit command applied to the corresponding cxu-s unit on the top shelf of the master subrack
- Remove the cxu-s units from the master subrack.
- Draw the master subrack.

Step 3. Release the forced control of the redundant cross-connection systems.

7.9.2.7 How to Change Unprotected Cross-Connection System to Protected

The following two steps are needed to change an unprotected cross-connection system to protected:

Step 1. Change the cross-connect unit option to protected.

Step 2. Add the other cross-connection unit (CXU-As, CXU-S, CXU-M) into the lower shelf of the master subrack. There must be the same unit types in the same slots of both shelves.

NOTE! ***The order of steps 1 and 2 is important.***

The CCU gives the **Faulty X-Connection System** alarm while the cross-connection system is inconsistent. This alarm should disappear when the system is complete.

7.9.2.8 How to Change Protected Cross-Connection System to Unprotected

The following two steps are needed to change a protected cross-connection system to unprotected:

Step 1. Remove all the cross-connection units (CXU-As, CXU-S, CXU-M) from the lower shelf of the master subrack.

- First remove the units from the inventory and then physically from the subrack.

Step 2. Change the cross-connect unit option to unprotected.

NOTE! ***The order of steps 1 and 2 is important.***

7.9.2.9 Updating Unit Software in Cluster Node

The rules in Chapter 7.9.1.5 can be applied here as well. However, in order to minimise unnecessary signal breaks, it is useful to apply the following instructions when downloading the software to the cross-connection units of a Cluster Node.

Step 1. Check what the number of the active cross-connection system is.

Step 2. Use forced control to eliminate unnecessary change-over between the redundant cross-connection systems.

- The active cross-connection system must be forced to be active.

Step 3. Download the program of the passive CXU-M (see Chapter 7.9.1.5).

Step 4. Download the programs of the passive SXU-Cs (see Chapter 7.9.1.5).

Step 5. Wait until the cross-connection units have initialised themselves.

Step 6. Change the activation of the redundant cross-connection systems.

Step 7. Download the program of the passive CXU-M (see Chapter 7.9.1.5).

Step 8. Download the programs of the passive SXU-Cs (see Chapter 7.9.1.5).

Step 9. Wait until the cross-connection units have initialised themselves.

Step 10. Release the forced control of the redundant cross-connection systems.

7.10 Miscellaneous Installation

7.10.1 General

The present chapter describes other actions necessary when installing Ericsson DXX such as: communication link-, alarm-, and synchronisation cabling, and labelling.

7.10.2 Communication Link Cabling

7.10.2.1 Synchronous Communication Link

Synchronous communication link is made between DXX Server and SCC interface situated in SCU unit. It provides 64 kB link. In DXX Server there has to be an Eicon HSI/PC or S51 extension card that provides X.21 interface. This interface has a D26 female type of connector. In Ericsson DXX end, 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.

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

7.10.2.2 Asynchronous Communication Link

The asynchronous communication link is also made between DXX Server and Ericsson DXX. It provides 9.6 kB 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 DXX Server the cable is connected to the first serial port. In SCU it is connected to the SC Interface.

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

7.10.3 Alarm cabling

There are two types of alarm cabling that can be installed in Ericsson DXX. The first alternative is to have all the alarms from the PFUs to a alarm panel. PFU-A's collects the alarms that exist in the corresponding subrack. The cable is of the type D9 female - Open. The cable should be solid wire type, if the connection to the alarm panel is of wire wrap type. Otherwise a cable with stranded wire is correct. The pin layout can be found from the Technical Description 1/2.

In SCU Unit an Alarm interface can be installed. 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 need.

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

7.10.4 Synchronization Cabling

In this case either 75 Ω- or 120 Ω-cabling can be used, depending on the requirement. In 75 Ω cabling there is need for only one cable that is connected to "Sync in"-connector in SXU-A, SXU-B, XCG or CXU-M, depending on the unit used. The connector type is SMB and the recommended cable is BT3002. The other end is connected to a common clock source (that gives synchronisation to the whole transmission system) in the customer's 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 Ericsson DXX end. The other end must be determined on the spot.

7.10.5 Labelling

Labelling is done after all the cabling is finished. The purpose for labelling is that all the cable ways 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 is a lot of cables to 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-, cluster- and all the other cables needed.

7.10.6 Installation of DTE Cabling

Those cables with connectors at both ends are connected directly to a router or some other customer equipment. Cables are in predefined lengths. Normally customers equipment are quite close to the Ericsson DXX. If they are in a 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 .

Appendix

Conductor Gauge and Dimension Comparison Table

AWG	CSA/mm2
32	0.032
31	0.040
30	0.051
29	0.065
28	0.081
27	0.103
26	0.128
25	0.162
24	0.210
23	0.259
22	0.324
21	0.412
20	0.500
19	0.636
18	0.826
17	1.040
16	1.340
15	1.680
14	2.080
13	2.630
12	
11	4.130
10	5.260
9	6.600
8	8.400
7	10.600
6	13.000
5	16.800
4	21.000
3	26.200
2	33.600