NOKIA

DX 200

BSC3i S10.5

Grounding of External Interface Cables

Site Documents

BSC3018_P

Contents

List of figures

Summary of changes

Changes between document issues are cumulative. Therefore, the latest document issue contains all changes made to previous issues.

Changes for Issue 4-0

Name of document changed.

Scope of document enlarged to include the principles of grounding external interface cables in STAR-IBN, MESH-IBN and MESH-BN grounding schemes.

Changes for Issue 3-1

Minor corrections.

Changes for Issue 3-0

Chapter *Grounding principles for balanced PCM cables in i-series DX 200 cabinets* added. Section *Grounding of multicoaxial cables PCM cables in i-series DX 200 cabinets* added.

Changes for Issue 2-2

No major changes, only minor errors corrected.

Changes for Issue 2-0

The second approved version. Figures and text revised for enhanced clarity; no changes in the information contained.

Changes for Issue 1-0

The first edition of this document combined and replaced two separate grounding instructions:

- DX 200 Earthing Principles of Protective Wires of PCM Trunk Circuit Cables in Symmetrical (Balanced) Connections (CAM 24481/2 en); and
- DX 200 Earthing Principles of PCM Trunk Circuit Cables in Coaxial Connections (CAM 24537 /2 en).

1 Grounding of external interface cables overview

Nokia equipment can be used on customer sites whose grounding has beeb arranged in accordance with the following grounding schemes, as described in ITU-T K.27:

- STAR-IBN (Isolated Bonding Network, Star topology)
- MESH-IBN (Isolated Bonding Network, Mesh topology)
- MESH-BN (Bonding Network, Mesh topology)

Grounding of power supply equipment

The grounding of the cabinet power supply and its feeder cables depends on the cabinet mechanics, cabinet type and power supply variant.

For detailed information on the grounding of power supply cables, see the *Installation Manual* and *Installation Site Requirements* of the network element in question.

Grounding of PCM cables

The grounding of PCM cables leaving the network element depends on the cabinet or subrack mechanics used (M92 or M98) and whether unbalanced or balanced cables are used. Each case is described in its own section.

See Section 2*Overview of the grounding principles for PCM trunk circuit cables* for further details.

1.1 Grounding of external interface cables in STAR-IBN

The main feature of star topology grounding is the use of a single grounding point per network element. The various structures and network elements of the site are isolated from each other.

A minimum isolation of 100 kΩ between IBN and CBN must be maintained.

Grounding of network elements

A cabinet row forming a network element forms one branch of the STAR-IBN grounding. Each cabinet is connected to the common grounding point of the cabinet row, which is connected to the STAR-IBN grounding bar (SPCW, or Single Point Connection Window).

If the network element is composed of several rows of cabinets, the same principle is applied as with single-row network elements. The network element must be connected to the grounding bar at a single point.

If a single cabinet row contains cabinets with AC power feed or cabinets from other vendors, The Nokia network element and these cabinets must 100 kΩ minimum isolation.

If however AC current is obtained from DC current through an inverter which is grounded to the same STAR-IBN as the Nokia network element, no special isolation is needed.

Grounding of external cables

The grounding of all external cables, with group sheaths or pair-sheaths must follow the general STAR-IBN grounding principles and avoid forming grounding loops.

Telecommunication cables

These include:

- PDH (PCM): E1, T1, JT1
- SDH: STM-0, STM-1, STM-4
- LAN: Ethernet 10/100Mbit, 1G, X25

Telecommunication interface cables are always grounded from their group sheath only from the network element end.

Cables running between two network elements on the same site must be routed through the DDF and be grounded only at the network element ends.

Grounding both ends of the pair or group sheath of a telecommunications cable is permitted if:

- Both grounding points are located in the same cabinet row and share a common grounding branch.
- The grounding points are located in separate cabinet rows, but use the same grounding branch. The area of the grounding loop formed must not exceed 3 m^2.

Except ITU-T G.703 compliant PDH/SDH connections, where the pair sheath is grounded (galvanically or capacitatively) in the transmission direction. The receiving direction is left ungrounded or is grounded capacitatively if possible.

Nokia network elements not in the same grounding branch must be separated in the DDF. In practice this means removing the pair or group sheath. If the DDF is located inside the SPCW and is grounded, it is not necessary to remove the sheaths (This arrangement minimizes the grounding loop and differences in potential.

Network elements with AC power feed or from other vendors can be isolated at their end without going through DDF. For example a special construction S-FTP-LAN cable running between a Nokia network element and a LAN Switch with an external AC power feed.

Cutting a grounding loop while retaining the EMC shielding of both ends is possible if capacitative grounding at the DDF end. In this case the capacitance must be chosen in a way to ensure the minimum 100 kΩ impedance required at 50/60Hz.

Peripheral devices

The cables connecting to peripheral devices must be grounded only at the network element end. STAR-IBN and CBN must not be connected through these cables. In practice this means either isolating the peripherals such as desktop PC, using a protective transformer or using special cables (for ex. RS232 MMI interface) in which the peripheral end of the sheath is isolated.

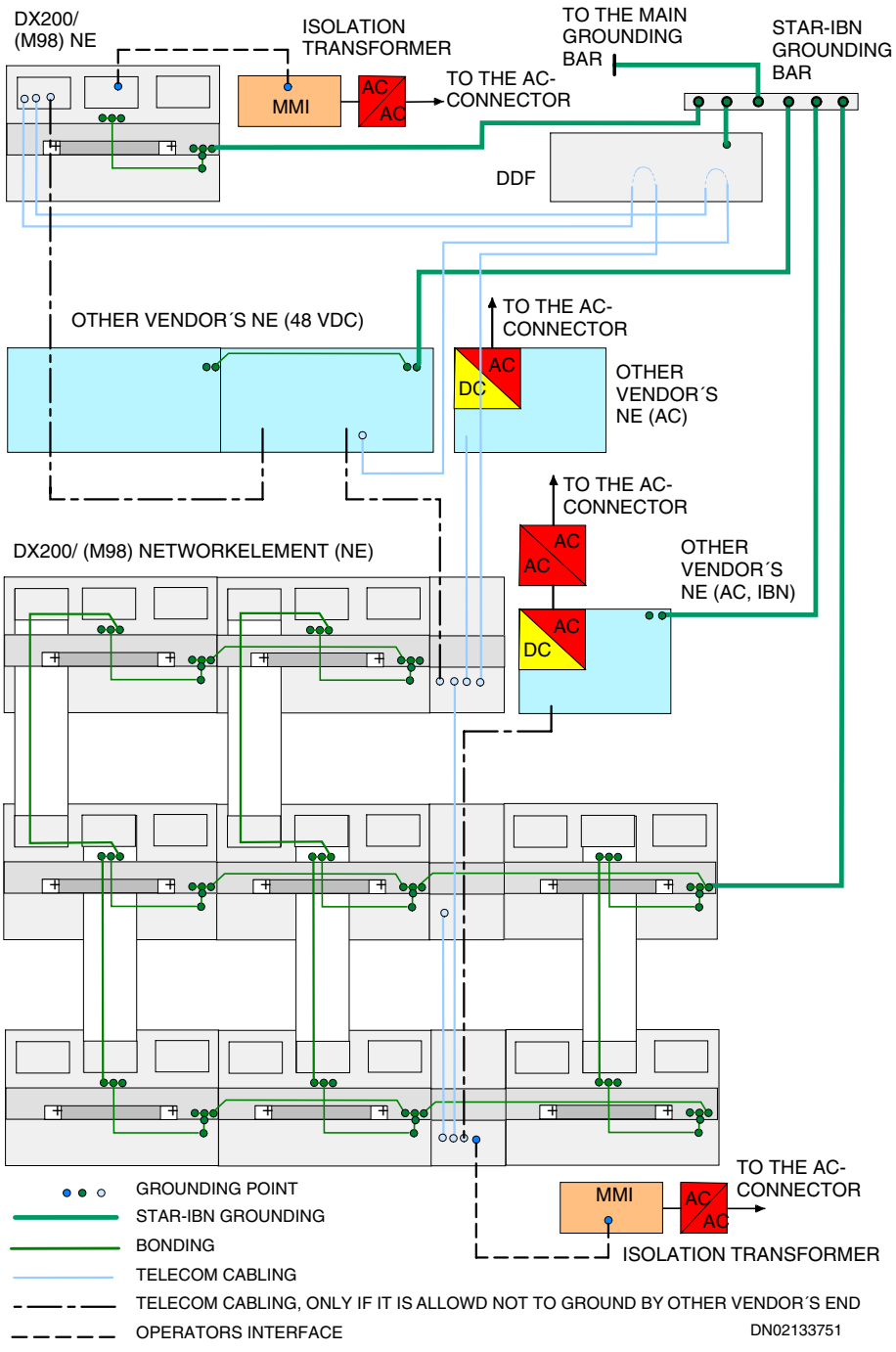


Figure 1. Grounding of network elements and external inerface cables at a STAR-IBN site.

1.2 Grounding of external interface cables in MESH-IBN

MESH-IBN follows the same principles as STAR-IBN. In large systems the use of MESH-IBN is recommended as the area of the grounding loop is practically the same as the area of a MESH loop.

Grounding of network elements

A cabinet row forming a network element forms one branch of the MESH-IBN grounding. Each cabinet is connected to the common grounding point of the cabinet row, which is connected to the MESH-IBN grounding bar (SPCW, or Single Point Connection Window).

If the network element is composed of several rows of cabinets, the cabinet rows must be connected to each other in a manner to minimize the size of the grounding loop. Thegrounding system (MESH) formed by the network element must be connected to the MESH-IBN grounding bar (SPCW) at a single point.

Network elements with AC power feed or from other vendors must not be connected to the same MESH-IBN branch as Nokia network elements.

Grounding of external cables

The grounding of all external cables, with group sheaths or pair-sheaths must follow the general MESH-IBN grounding principles and avoid forming grounding loops.

Telecommunication cables

These include:

- PDH (PCM): E1, T1, JT1
- SDH: STM-0, STM-1, STM-4
- LAN: Ethernet 10/100Mbit, 1G, X25

Telecommunication interface cables are always grounded from their group sheath only from the network element end.

Cables running between two network elements on the same site must be routed through the DDF and be grounded only at the network element ends.

Grounding both ends of the pair or group sheath of a telecommunications cable is permitted if:

- Both grounding points are located in the same cabinet row and share a common grounding branch.
- The grounding points are located in separate cabinet rows, but use the same grounding branch. The area of the grounding loop formed must not exceed 3 m^2.

Except ITU-T G.703 compliant PDH/SDH connections, where the pair sheath is grounded (galvanically or capacitatively) in the transmission direction. The receiving direction is left ungrounded or is grounded capacitatively if possible.

Nokia network elements not in the same grounding branch must be separated in the DDF. In practice this means removing the pair or group sheath. If the DDF is located inside the SPCW and is grounded, it is not necessary to remove the sheaths (This arrangement minimizes the grounding loop and differences in potential.

Network elements with AC power feed or from other vendors can be isolated at their end without going through DDF. For example a special construction S-FTP-LAN cable running between a Nokia network element and a LAN Switch with an external AC power feed.

Cutting a grounding loop while retaining the EMC shielding of both ends is possible if capacitative grounding at the DDF end. In this case the capacitance must be chosen in a way to ensure the minimum 100 kΩ impedance required at 50/60Hz.

Peripheral devices

The cables connecting to peripheral devices must be grounded only at the network element end. MESH-IBN and CBN must not be connected through these cables. In practice this means either isolating the peripherals such as desktop PC, using a protective transformer or using special cables (for ex. RS232 MMI interface) in which the peripheral end of the sheath is isolated.

1.3 Grounding of external interface cables in MESH-BN

MESH-BN is a ETS 300 253 and ITU-T K.27 compliant grounding system, often simply called ETSI-grounding.

The distinguishing feature of MESH-BN is the use of multiple grounding points attached to CBN.

MESH-BN forms a Faraday cage in which the maximum current between any two points is 1V.

Grounding of network elements

A cabinet row, or multiple cabinet rows forming a network element are attached to the MESH-BN at as many points as possible. Each cabinet must be connected at least from its positive power terminal (B0V) and its grounding point.

Network elements with AC power feed or from other vendors can be connected to the same MESH-BN as Nokia network elements.

Grounding of external cables

All external cables, including telecommunication cables and cables to peripheral devices, must be grounded at least from both ends. It is recommended that group sheaths be grounded from several points to minimize differences in potential and low-frequency RF disturbances.

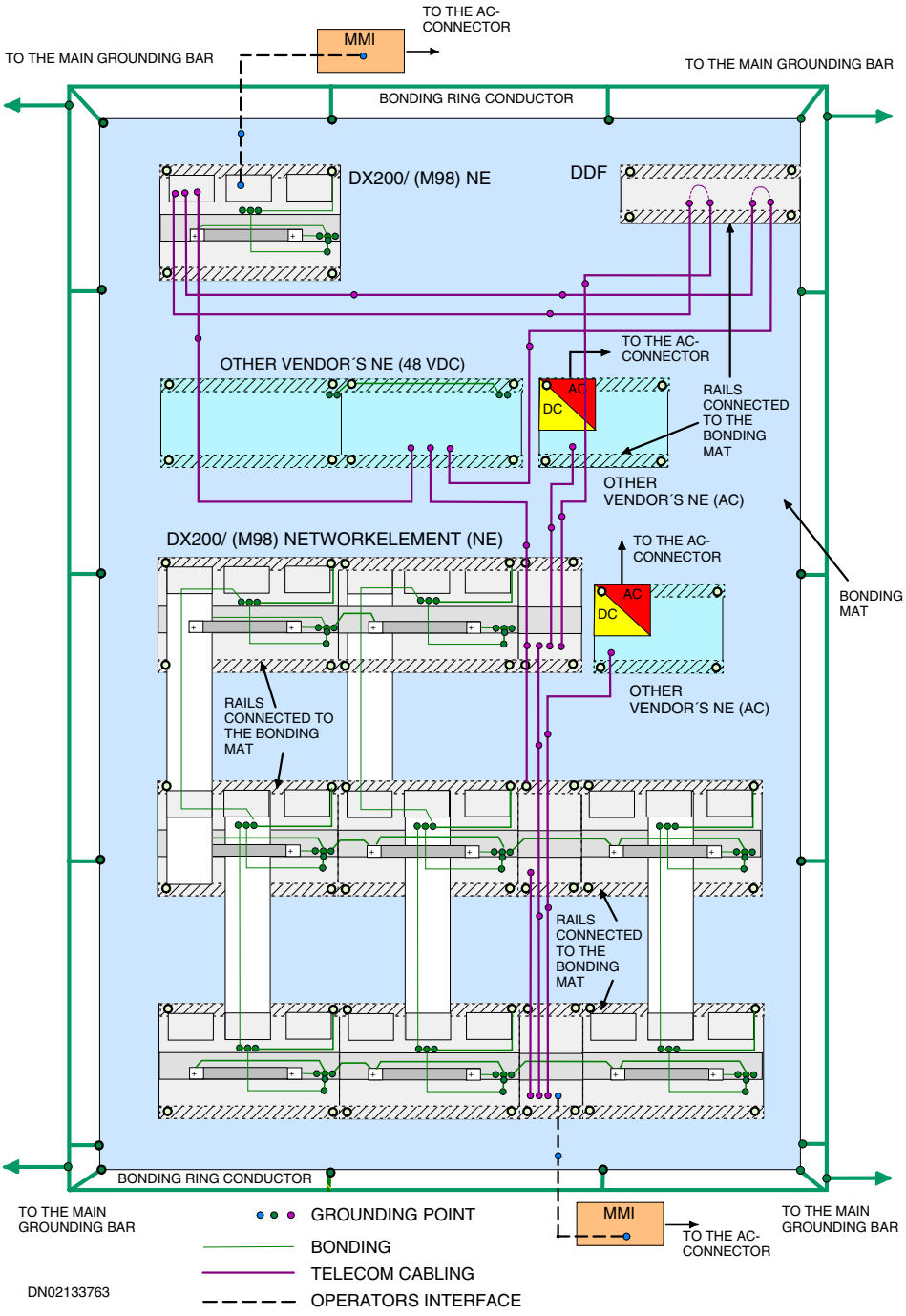


Figure 2. Grounding of network elements and external inerface cables at a MESH-BN site.

2 Overview of the grounding principles for PCM trunk circuit cables

This section describes the grounding principles for the PCM trunk cables (balanced and unbalanced) when connected to the DX200 network elements (rack - subrack mechanics) and to the i-series DX200 network elements (cabinet - cartridge mechanics) in the E1 (ETSI) environment.

The general grounding principles for the DX 200 network elements (BSC2, TCSM2, MSC, HLR, MSCi, HLRi, SGSN and SRRi) are described in the following network-element-specific manuals found in the *Site Documents*:

- *Engineering Descriptions*; grounding principles at the site,
- *Installation Manual*; detailed grounding instructions for cables; and
- *Jumper Settings of the Plug-in Units*; detailed grounding instructions for ET plug-in units, when required.

This description contains the following information:

- Introduction to grounding in the DX200 cabinets
- Grounding principles for balanced PCM trunk cables in i-series DX200 *M98* cabinets
- Grounding principles for balanced PCM trunk cables in DX200 *M92* racks
- Grounding principles for unbalanced (coaxial) PCM trunk cables

3 Introduction

This chapter describes the grounding facilities for PCM cables provided by the DX 200 equipment configured for the E1 (ETSI) environment. The subject is discussed in more detail in the *Installation Manual* and the *Engineering Descriptions* manual of the network element concerned.

Types of cables used

The E1 PCM trunk cables running to environment connect to either balanced (120 ohm) or unbalanced (75 ohm) interfaces located in the Exchange Terminal plug-in units of the exchanges. The balanced PCM connections to environment must be made using group-shielded cables containing several signal wire pairs. The i-series network elements do not accept pair-shielded cables. For unbalanced connections, we recommend the use of multicoaxial cables, even though single-coaxial cables are also acceptable (not for i-series network elements).

3.1 Grounding points for cables in the i-series DX 200 cabinets (M98 mechanics)

No extra grounding devices needed, because the station (external) cables are connected to the cabling cabinets of the ETC cabinets. The cables are group-shielded with no pair shielding.

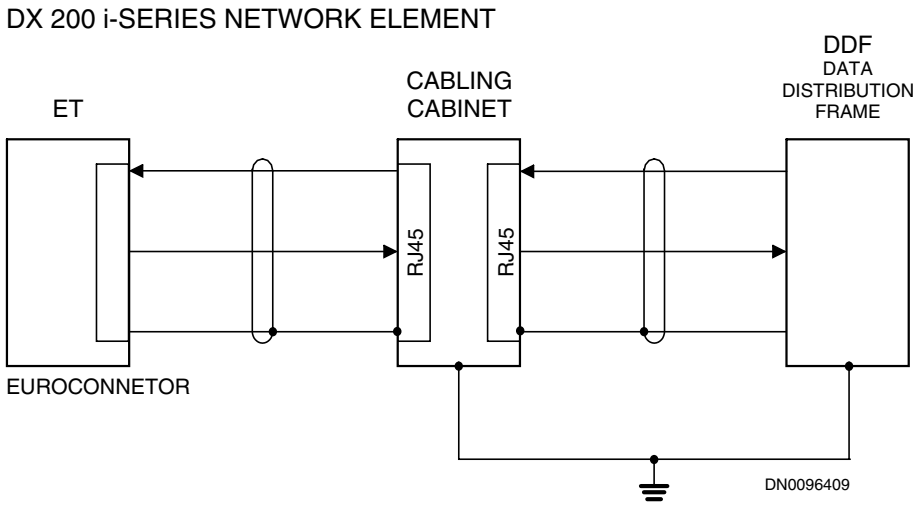


Figure 3. Principle of cabling ETs to Cabling Cabinet.

3.2 Grounding points for cables in the DX 200 racks (M92 mechanics)

There are two points in the racks of the DX 200 network elements where the PCM cables can be connected to the station ground:

- the grounding elements of the racks (also known as grounding combs); and
- the Exchange Terminal plug-in units, which have jumpers for grounding the PCMs.

The grounding elements in the racks are used for grounding the cover shields of the PCM group cables, while the jumpers of the Exchange Terminals are used for grounding the protective wires of the individual signal wire pairs. There is one exception to this rule: the protective shields of single-coaxial cables, if these are used, must be grounded at the grounding elements, *not* at the Exchange Terminals (see Section 6.3 *Grounding of single-coaxial PCM cables*).

The following section contains step-by-step instructions for grounding the shields of the group cables when they enter the racks. For information on the jumper settings of the Exchange Terminals, for grounding the individual signal wire pairs, please refer to the *Jumper Settings of the Plug-in Units* manual of the network element concerned.

Grounding the cables at the grounding elements of the racks

The cover shields of the PCM group cables and single-coaxial cables entering an equipment rack must be grounded to the frame of the rack by establishing a galvanic connection between the grounding element of the rack (known as grounding comb) and the cover shields of the group cables (aluminium or copper). Connection between the sheaths of the cables and the exchange ground is not allowed at any other point in the racks.

The grounding element is usually located at the top plate of the rack, except in the cabling racks or conduits (e.g., CCE and R2A1) used in installations on a raised floor; in these, it is placed at the bottom plate.

Grounding procedure

Insert the cables vertically between the prongs of the grounding element, following the steps below (see also Figure 4 *Grounding the aluminium/copper sheaths of PCM cables*):

1. Strip the metal sheath of each cable for the length of about 40 mm, or 1.57 in, at the point where the connection between the cable and the ggrounding element is to be established.

2. Place a conductive sealing strip (10 x 15 mm, or 0.39 in x 0.59 in) horizontally between the prongs of the comb.

3. Insert one cable vertically into each gap between the prongs of the grounding element.

4. When each gap is fitted with a cable, place another sealing strip horizontally between the prongs.

5. Insert the rest of the cables to the slots. Add a sealing strip after each layer of cables, so that each cable has a strip at both sides.

6. After all the cables have been inserted, mount the cover plate so that it presses the cables tightly against the sealing strips. If there is only a small number of cables entering the rack, add more sealing strips to achieve proper tightness.

7. Secure the cables by attaching them, with the cables in each slot collected into one bundle, to the support bracket beneath the grounding slot. Use a cable tie for fastening.

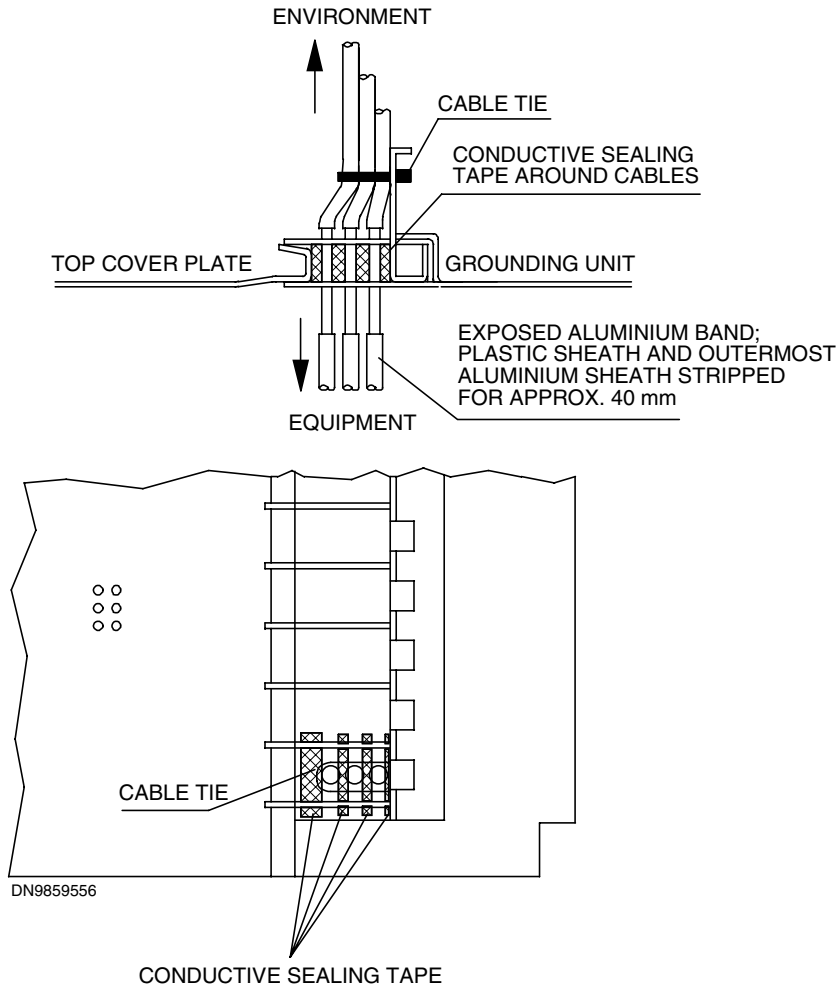


Figure 4. Grounding the aluminium/copper sheaths of PCM cables.

4 Grounding principles for balanced PCM trunk cables in i-series DX200 cabinets (M98 mechanics)

Internal cables from ETs to cabling panels

Balanced PCM connections from the ET plug-in units to the cabling cabinets are made using group-shielded cables containing signal wire pairs for one ET (one interface of ET plug-in unit). The cable type for E1 balanced interface (Euro connectors) is CPP and that for T1 balanced interface (RJ45) is CPT. Both interface types are connected to the similar CPETS cabling panels with RJ45 connectors (32 pcs). In the MSCi and Transit MSCi applicatios the ETC cabinets are provided with dedicated cabling cabinets accommodating ten CPETS or CPETC (coaxial) panels. In the HLRi and Compact MSCi applications the ETs are cabled to the CPETS or CPETC (coaxial) panels located in the main cabinet's cabling cabinet.

General

Balanced PCM connections from the cabling cabinet to environment must be made using group-shielded cables containing signal wire pairs for one ET (upper or lower connector in an ET plug-in unit). The general rules for the connections between the i-series DX 200 equipment and the partner equipment are as follows:

- Connect the cover shields of the group cables to the ground only at the grounding elements when bringing them in to the partner DX 200 racks or other partner equipment.
- Connect the protective wires of the signal wire pairs (s) to the ground only at a single point in each cabling section (not at the i-series equipment).
- When using a distribution frame:
  - Do not connect the shields of the group cables to the distribution frame at any point.
  - Do not through-connect the protective wires of the signal wire pairs (s) at the frame.
  - When connecting the twisted signal pairs (a, b) to the distribution frame, do not expose them too widely.

4.1 Typical connection options for multipair cables with group shields

4.1.1 Connection through a single distribution frame (DDF)

a) Partner equipment with group-shielded cables (i-series network element)

This is the common connection method for the i-series network elements with group-shielded cables when connected together. The i-series network elements are grounded through the cables at the cabling cabinet. The group shield (braid) of the cable is grounded to the casing of the RJ45 connector (as shown in the figure below).

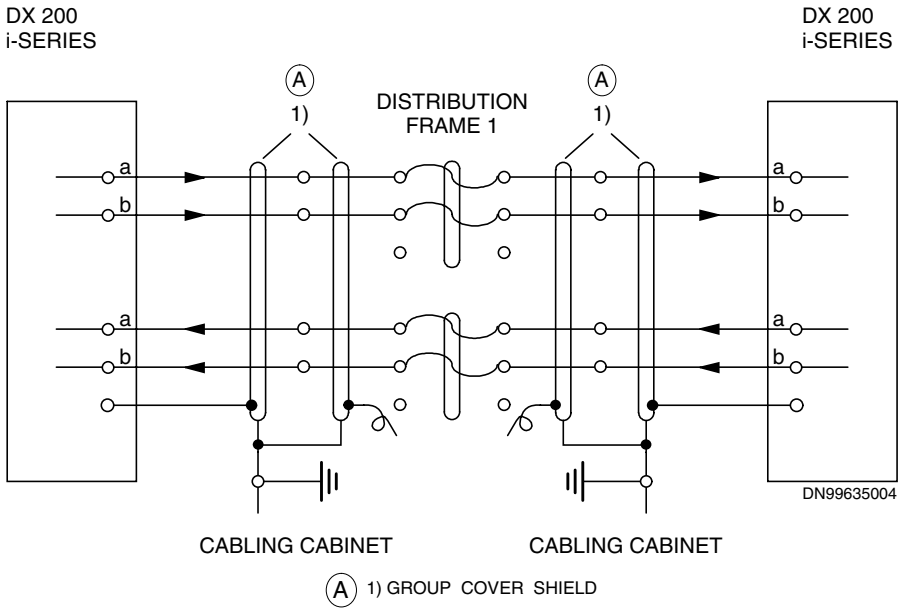


Figure 5. Connections of balanced (symmetrical) PCM cables through a single distribution frame to partner i-series equipment with group-shielded cables.

b) Partner equipment with grounding facility for pair-shield wires

This is the common connection method for the i-series network elements with group-shielded cables when connected to the network element with grounding facility for pair-shield wires. Note the following:

- The pair-shield wires are grounded to the partner equipment (which may be DX 200 equipment), but not to the distribution frame, where they are left disconnected.
- The cover shields of the group cables are grounded at the grounding element (in exactly the similar manner as the pair-shield wires).

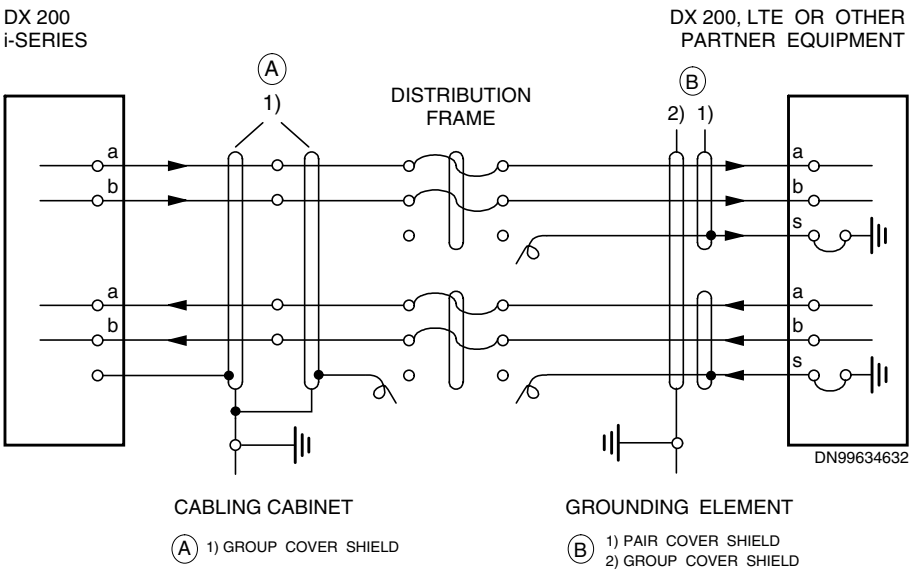


Figure 6. Connections of balanced (symmetrical) PCM cables through a single distribution frame to partner equipment with a grounding facility for pair-shield wires.

c) Partner equipment without grounding facility for pair-shield wires

When the partner equipment does not have the grounding facility for pair-shield wires, the grounding of the cables must be carried out as follows:

- The pair-shield wires are connected and grounded to the distribution frame at the partner-equipment side.
- The cover shields of the group cables are grounded to the i-series DX 200 equipment (through the cabling cabinet) and the partner equipment, but not to the distribution frame, where they are left disconnected.

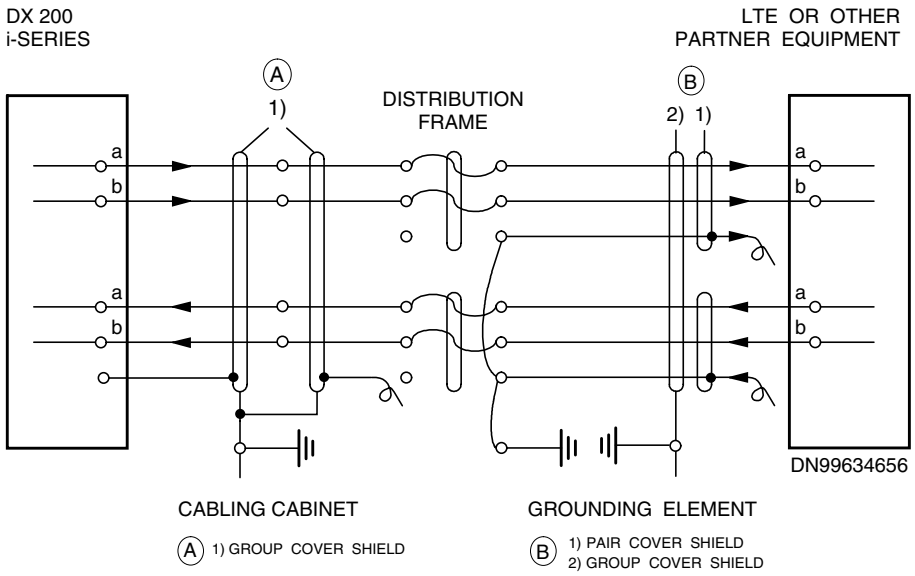


Figure 7. Connections of balanced (symmetrical) PCM cables through a single distribution frame to partner equipment with a grounding facility for pair-shield wires.

4.1.2 Connection through multiple distribution frames

This case is similar to the one presented in Figure 6 *Connections of balanced (symmetrical) PCM cables through a single distribution frame to partner equipment with a grounding facility for pair-shield wires*, except that here the connection is made through several distribution frames or other connection points. The connections between the distribution frames makes the only difference from the Figure 6 . Note the following:

- The protective wires of the signal wire pairs used for intermediate connections are connected to the distribution block and grounded at the distribution frame only at one end, while the other end is left unconnected.
- The group cover shields of the intermediate cables are connected separately to ground only at one point between the distribution frames. They are not connected to either any of the distribution frames.

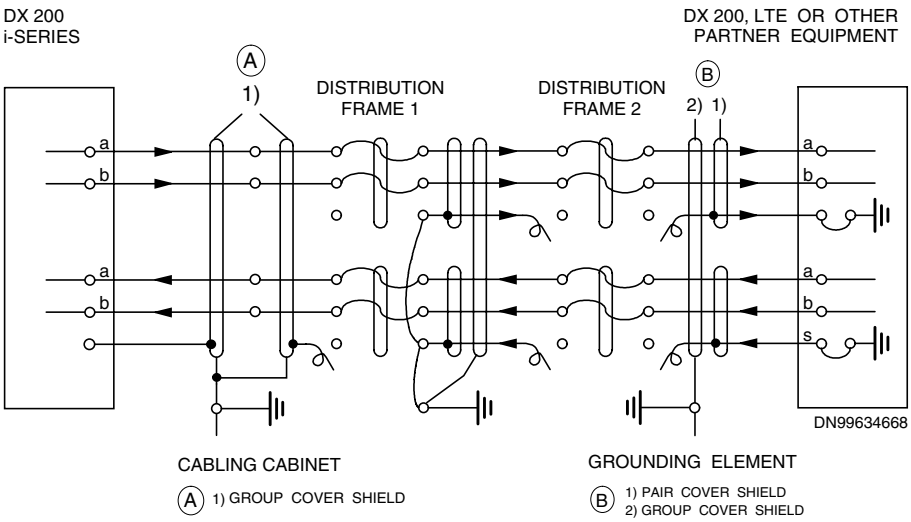


Figure 8. Connections of balanced (symmetrical) PCM cables through multiple distribution frames to partner equipment with a grounding facility for pair-shield wires.

4.1.3 Direct connections

If the i-series DX 200 equipment is directly linked to the partner equipment, i.e. without a distribution frame in between, the pair-shield wires must be left disconnected in the partner equipment (see the figures below). If the equipment do not allow disconnection by means of jumper settings (strappings), it can be made using e.g. cable connectors.

Note

In case there is any difference in the ground potentials of the i-series DX 200 and the partner equipment, the PCM cables must be routed through a distribution frame, with the cables connected as described in section *Connection through a single distribution frame*.

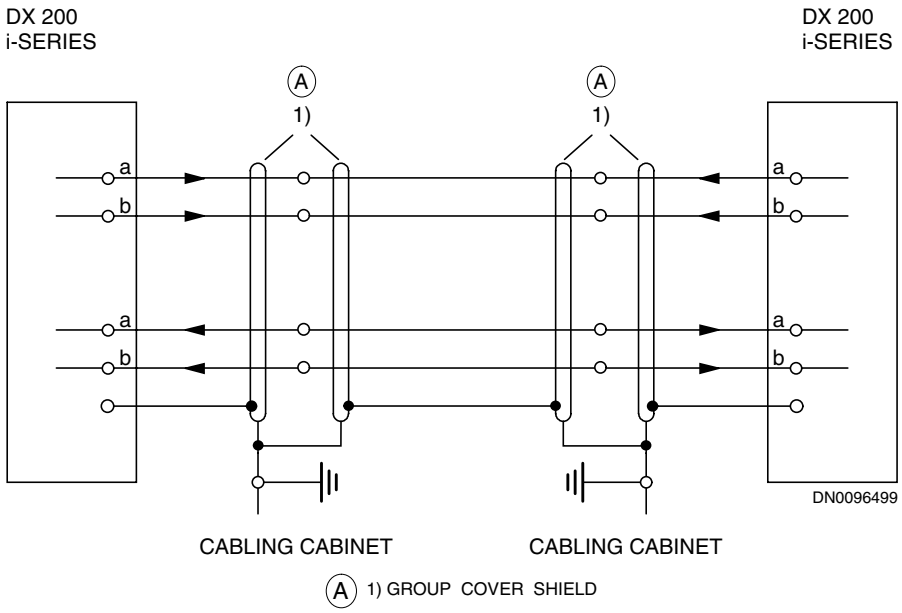


Figure 9. Direct linking of balanced (symmetrical) PCM cables. The pair-shield wires must be left disconnected either in the partner equipment (the case presented in this Figure) or in the DX 200.

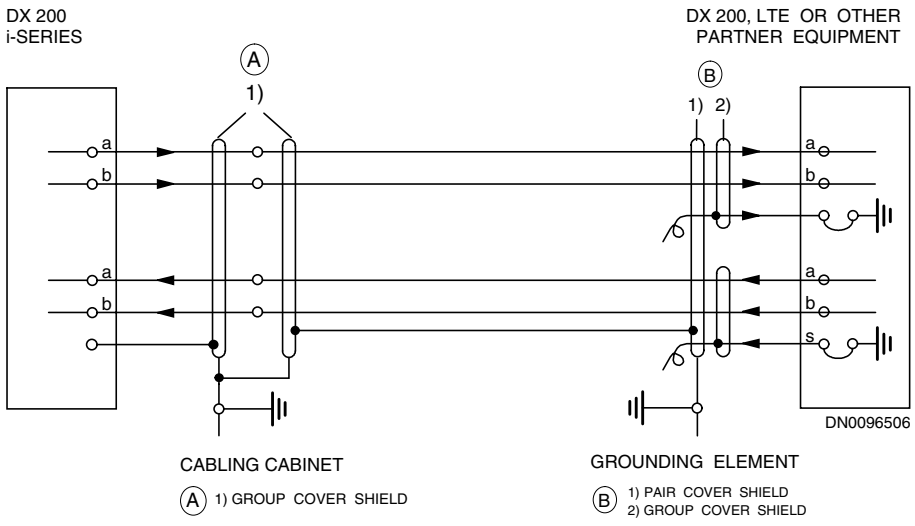


Figure 10. Direct connection using balanced (symmetrical) PCM cables. The pair-shield wires are left disconnected in the incoming direction in both the DX 200 and the partner equipment.

5 Grounding principles for balanced PCM trunk cables in DX200 racks (M92 mechanics)

General

Balanced PCM connections to environment must be made using group cover shield cables containing several signal wire pairs. Each pair (wires a and b) should be provided with a pair shiels or protective wire (s). The general rules for the connections between the DX 200 equipment and the partner equipment are as follows:

- Connect the cover shields of the group cables to the ground only at the at the grounding elements when bringing them in to the DX 200 racks or the partner equipment.
- Connect the protective wires of the signal wire pairs (s) to the ground only at a single point in each cabling section.
- When using a distribution frame:
  - Do not connect the shields of the group cables to the distribution frame at any point.
  - Do not through-connect the protective wires of the signal wire pairs (s) at the frame.
  - When connecting the twisted signal pairs (a, b) to the distribution frame, do not expose them too widely.
  - In intermediate connections, you can also link together the protective pair-specific wires of, say, 16 signal wire pairs and connect these groups to the grounding distribution block, in case the protective wires must be grounded to the block.

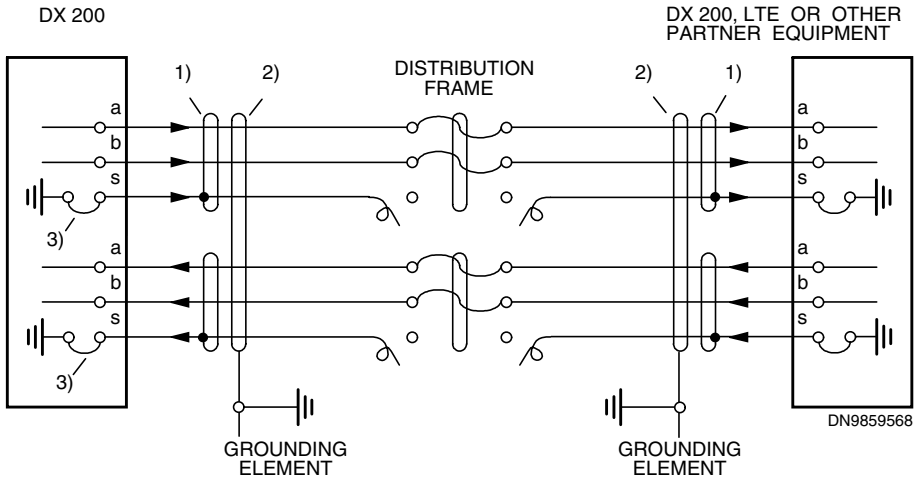
5.1 Typical connection options for pair-shield wires

5.1.1 Connection through a single distribution frame

a) Partner equipment with grounding facility for pair-shield wires

This is the most common connection method for balanced group shielded cables. Note the following:

- The pair-shield wires are grounded to the DX 200 equipment and the partner equipment, but not to the distribution frame, where they are left disconnected.
- The cover shields of the group cables are grounded in exactly the similar manner as the pair-shield wires.



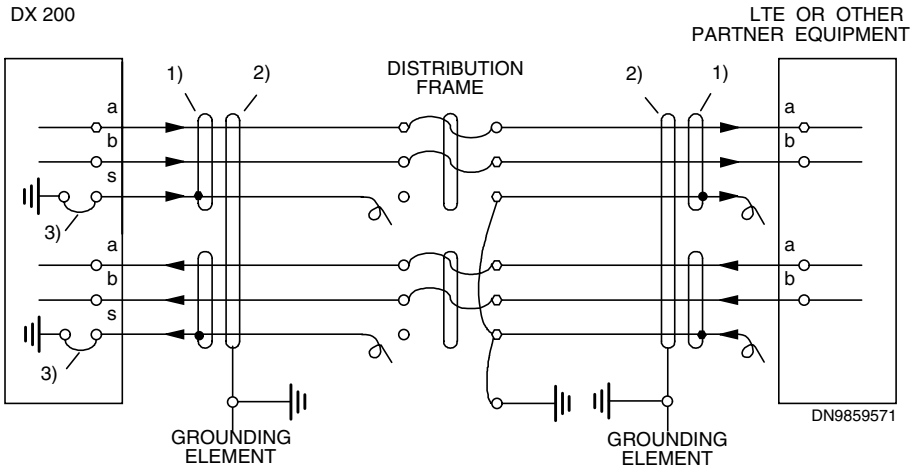
1) PAIR COVER SHIELD
2) GROUP COVER SHIELD
3) JUMPER SETTING (STRAPPING) FOR GROUNDING THE PAIR COVER SHIELD (LOCATED IN THE EXCHANGE TERMINAL PLUG-IN UNIT)

Figure 11. Connections of balanced (symmetrical) PCM cables through a single distribution frame to partner equipment with a grounding facility for pair-shield wires.

b) Partner equipment without grounding facility for pair-shield wires

When the partner equipment does not have the grounding facility for pair-shield wires, the grounding of the cables must be carried out as follows:

- The pair-shield wires are connected and grounded to the distribution frame at the partner-equipment side.
- At the DX 200-side, the the pair-shield wires are grounded to the DX 200 equipment, but not at the distribution frame, where they are left unconnected.
- The cover shields of the group cables are grounded to the DX 200 equipment and the partner equipment, but not to the distribution frame, where they are left disconnected.



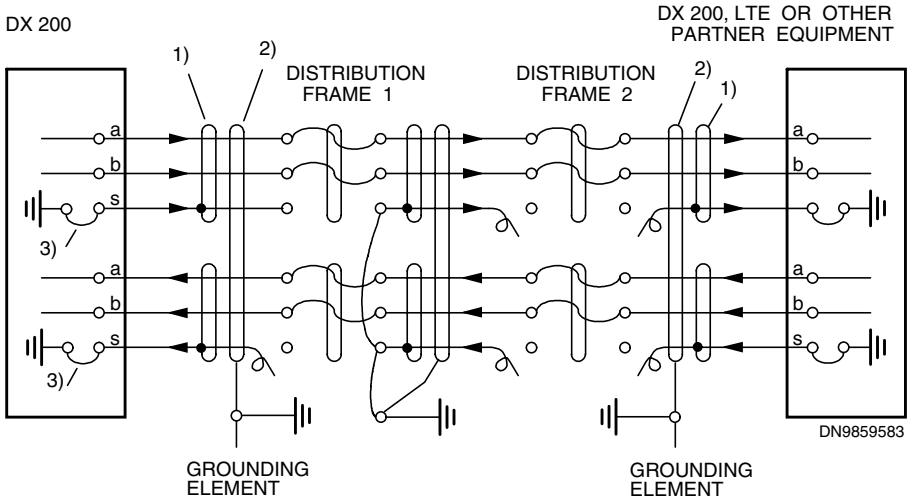
1) PAIR COVER SHIELD
2) GROUP COVER SHIELD
3) JUMPER SETTING (STRAPPING) FOR GROUNDING THE PAIR COVER SHIELD (LOCATED IN THE EXCHANGE TERMINAL PLUG-IN UNIT)

Figure 12. Connections of balanced (symmetrical) PCM cables through a single distribution frame to partner equipment without a grounding facility for pair-shield wires.

5.1.2 Connection through multiple distribution frames

This case is similar to the one presented in Figure 4 Grounding the aluminium/copper sheaths of PCM cables, except that here the connection is made through several distribution frames or other connection points. The connections between the distribution frames makes the only difference from Figure 4 . Note the following:

- The protective wires of the signal wire pairs used for intermediate connections are connected to the distribution block and grounded at the distribution frame only at one end, while the other end is left unconnected.
- The group cover shields of the intermediate cables are connected separately to ground only at one point between the distribution frames. They are not connected to either any of the distribution frames.



1) PAIR COVER SHIELD
2) GROUP COVER SHIELD
3) JUMPER SETTING (STRAPPING) FOR GROUNDING THE PAIR COVER SHIELD (LOCATED IN THE EXCHANGE TERMINAL PLUG-IN UNIT)

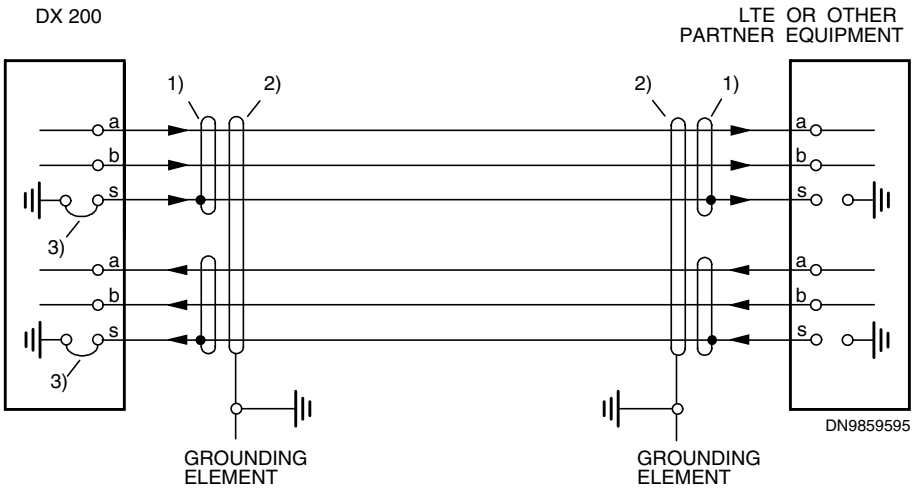
Figure 13. Connections of balanced (symmetrical) PCM cables through multiple distribution frames.

5.1.3 Direct connections

If DX 200 equipment is directly linked to the partner equipment, i.e. without a distribution frame in between, the pair-shield wires must be left disconnected either in the partner equipment or in the DX 200 equipment (see Figures below). If the equipment do not allow disconnection by means of jumper settings (strappings), it can be made using e.g. cable connectors.

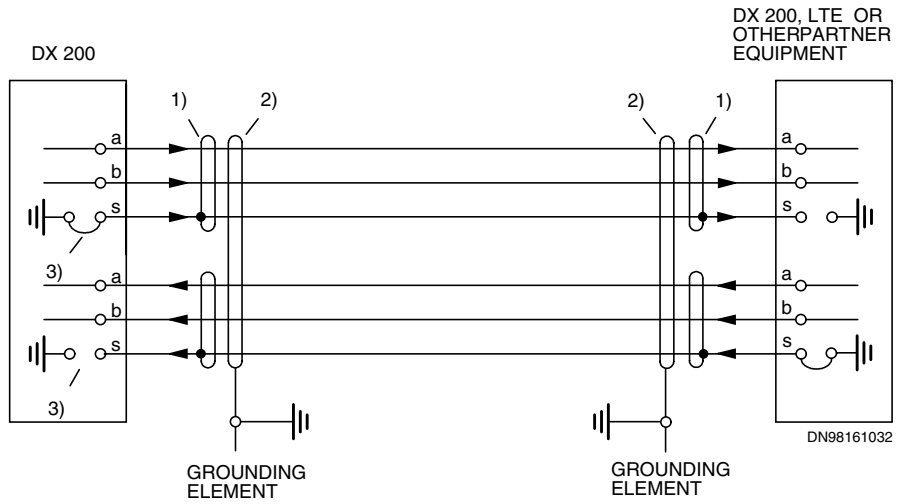
Note

In case there is any difference in the ground potentials of the DX 200 and the partner equipment, the PCM cables must be routed through a distribution frame, with the cables connected as described in section *Connection through a single distribution frame*.



1) PAIR COVER SHIELD
2) GROUP COVER SHIELD
3) JUMPER SETTING (STRAPPING) FOR GROUNDING THE PAIR COVER SHIELD (LOCATED IN THE EXCHANGE TERMINAL PLUG-IN UNIT)

Figure 14. Direct linking of balanced (symmetrical) PCM cables. The pair-shield wires must be left disconnected either in the partner equipment (the case presented in this Figure) or in the DX 200.



1) PAIR COVER SHIELD
2) GROUP COVER SHIELD
3) JUMPER SETTING (STRAPPING) FOR GROUNDING THE PAIR COVER SHIELD (LOCATED IN THE EXCHANGE TERMINAL PLUG-IN UNIT)

Figure 15. Direct connectionusing balanced (symmetrical) PCM cables. The pair-shield wires are left disconnected in the incoming direction in both the DX 200 and the partner equipment.

6 Grounding principles for unbalanced (coaxial) PCM trunk cables

General

The unbalanced PCM connections to environment can be made using multicoaxial cables (recommended), or single coaxial cables. We highly recommend the use of multicoaxial cables, i.e. group cover shield cables containing several mini-coaxial circuits, since these are easier to install than single coaxial cables. Note that for i-series network elements the connectors at the cabling cabinet are eight-connector assemblies.

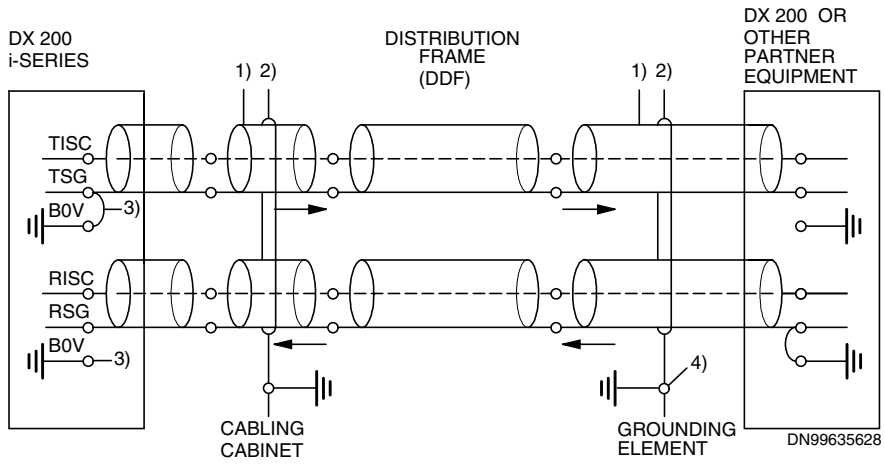
Please note the following:

- As the shields of the signal wire pairs are automatically through-connected at the distribution frame, the grounding principles presented in the figures below do not change even if a frame is not used.
- In case a distribution frame (DDF) is used, it is possible to make the intermediate connections at the frame using e.g. separate coaxial cables or jumper links, depending on the structure of the frame.

6.1 Grounding of multicoaxial PCM cables for i-series DX200 cabinets (M98 mechanics)

The basic principle for grounding multicoaxial PCM cables, presented in the figure below, is as follows:

- The cover shield of each signal wire pair is grounded only to the DX 200 or the partner equipment, not to the both simultaneously. The shields are automatically through-connected at the distribution frame, but they must not be connected to ground there.
- The cover shields of the group cables must be connected to ground only at the the grounding elements of the i-series DX 200 cabinets or the partner equipment.
- When using a distribution frame, do not connect the shields of the group cables to the distribution frame at any point.



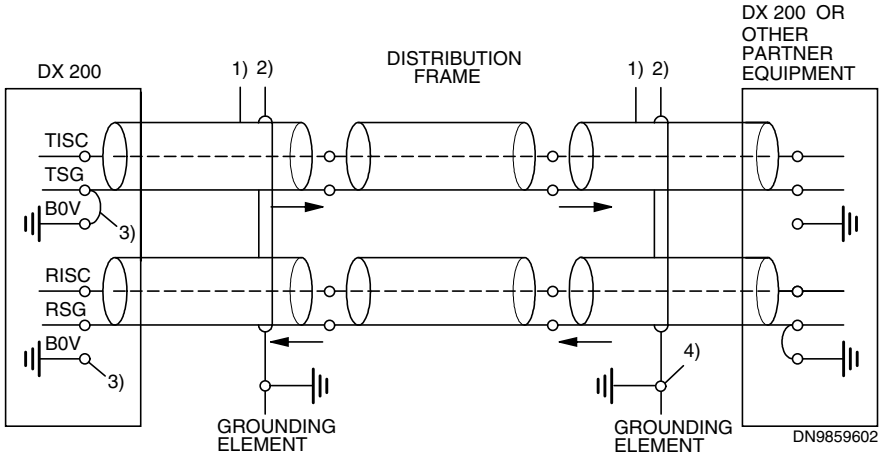
1) SHIELD OF SIGNAL WIRE
2) GROUP COVER SHIELD
3) JUMPER SETTING (STRAPPING) FOR GROUNDING THE PAIR COVER SHIELD (LOCATED IN THE EXCHANGE TERMINAL PLUG-IN UNIT)
4) PERFOMED IF NECESSARY, DEPENDING ON THE FEATURES OF THE PARTNER EQUIPMENT

Figure 16. Grounding of multicoaxial PCM cables in i-series DX200 cabinets.

6.2 Grounding of multicoaxial PCM cables in DX200 racks (M92 mechanics)

The basic principle for grounding multicoaxial PCM cables, presented in the figure below, is as follows:

- The cover shield of each signal wire pair is grounded only to the DX 200 *or* the partner equipment, not to the both simultaneously. The shields are automatically through-connected at the distribution frame, but they must not be connected to ground there.
- The cover shields of the group cables must be connected to ground only at the the grounding elements of the DX 200 racks or the partner equipment.
- When using a distribution frame, do not connect the shields of the group cables to the distribution frame at any point.



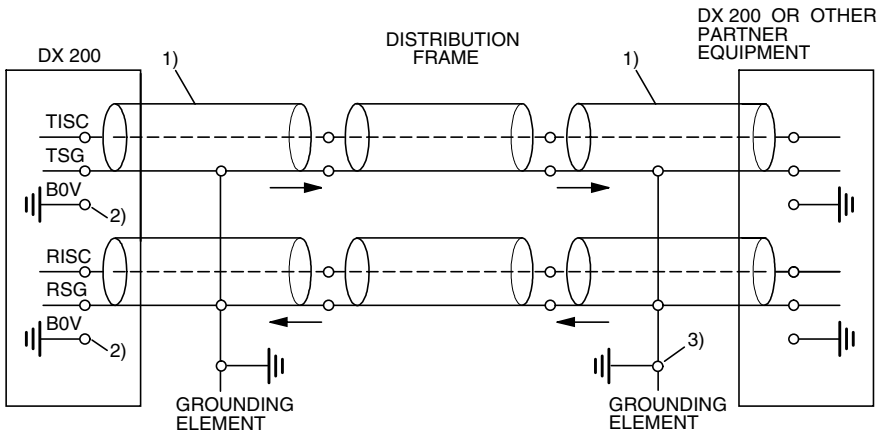
1) SHIELD OF SIGNAL WIRE
2) GROUP COVER SHIELD
3) JUMPER SETTING (STRAPPING) FOR GROUNDING THE PAIR COVER SHIELD (LOCATED IN THE EXCHANGE TERMINAL PLUG-IN UNIT)
4) PERFOMED IF NECESSARY, DEPENDING ON THE FEATURES OF THE PARTNER EQUIPMENT

Figure 17. Grounding of multicoaxial PCM cables.

6.3 Grounding of single-coaxial PCM cables in DX200 racks (M92 mechanics)

The basic principle for grounding single-coaxial PCM cables, presented in the figure below, is as follows:

- The cover shields of the signal wire pairs must grounded only to the grounding elements of the DX 200 and the partner equipment racks. They are automatically through-connected at the distribution frame, but they must not be connected to ground there.
- The jumpers (strappings) for grounding the shields of the signal wire pairs must be left unconnected at both the DX 200 and the partner equipment.



1) SHIELD OF SIGNAL WIRE
2) JUMPER SETTING (STRAPPING) FOR GROUNDING THE PAIR COVER SHIELD (LOCATED IN THE EXCHANGE TERMINAL PLUG-IN UNIT)
3) PERFOMED IF NECESSARY, DEPENDING ON THE FEATURES OF THE PARTNER EQUIPMENT

Figure 18. Grounding of single-coaxial PCM cables.