MX - Site Requirements

Contents

1 Introduction

The *MX - Site Requirements* module describes the cabinet dimensions, power requirements and environmental data for the network node. The manual specifies the requirements for the sites and the types of cables and connectors that need to be ready in time for installation.

2 MX Site Checklist

An MX site prepared according to these *Site Requirements* should have:

No	Subject	Comments
1	The Main Ground Cable AWG2 (35mm^2) installed.	_____
2	Cable ladder or similar equipment installed.	_____
3	Required -48V DC Power Supply available.	_____
4	"Modem Equipment" alternative "MUX" or "High Speed Data Network" available.	_____
5	"Modem Equipment" and the MX Cabinet using the same Ground Collection Bar.	_____
6A	A MX cabinet ground cable, minimum 16 mm^2 (AWG 4, SWG 7).	_____
7	Cable outlets in floor.	_____
8	Air inlets in floor.	_____
9	Drilled hole for fastening the MX on concrete floor.	_____
10	A concrete floor of more than 100mm [4"] thickness.	_____
11	A connection box for power supply located approximately 3m from MX cabinet.	_____

3 MX versions

There are two cabinet versions of the MX exchanges, MX/A and MX/B. They are both described in this document, although the MX/A version is discontinued.

The main visible difference between the two cabinet versions,
(please refer to Figure 1) is that the MX/B has:

- a sheet metal cover at the rear of the cabinet protecting the external cables (1)
- an air outlet on the top of the cabinet (2)

Inside the door on the right–hand side, there is a label indicating the product number, which is:

- BDEA 501 64/1 or BDEA 501 64/2 for the MX/A.
- BDEA 501 6.4/x where x=3 or higher for the MX/B without BIU
- BDEA 501 64/Bx for the MX/B with BIU installed or prepared for BIU installation

The MX/B fulfils the requirements in IEC 950/EN60950.

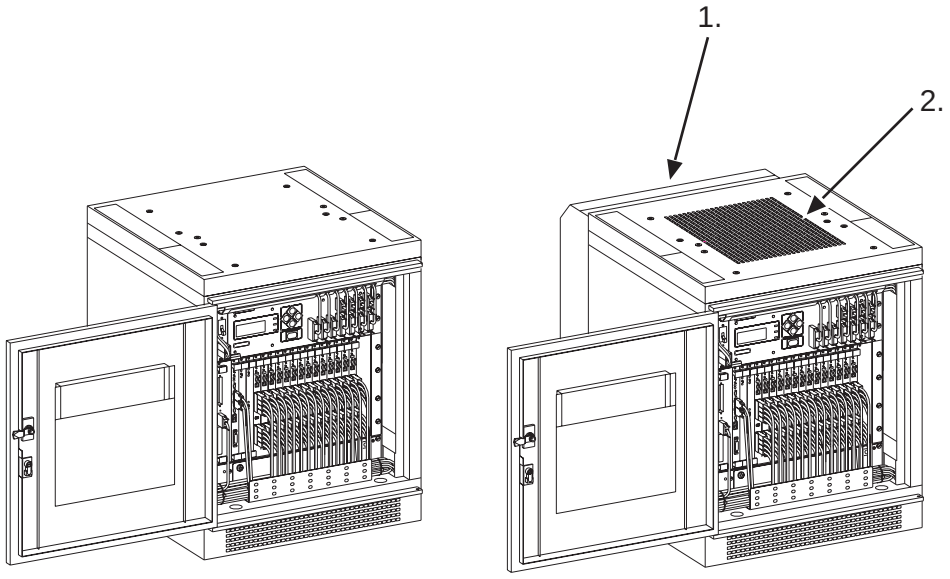


Figure 1 MX/A and MX/B cabinets

4 Scope of Delivery

4.1 Delivery

The Cabinet is normally delivered as a unit with all internal cables included.

The following cables are included in the delivery but are not installed:

- 1 power cable
- 1 NODOP cable
- 1 Console cable
- and two adapters (MX/B only)
- 1 – 112 modem Connection cables with 1 – 140 adapters (8 Connection cables and 10 adapters for each I/O–kit)

4.2 Installation

The cabinets are prepared with cable outlets for raised floors. The cables can also be run through the top of the cabinets to a cable rack.

Cabinets must be placed so that there is a free space between them and the walls as shown in Figures 2, 4 and 6.

For more information about installation, please refer to the *Installation Instructions* section in the *MX - Installation* module.

4.2.1 Installation on Raised Floor

If two or three MX cabinets are to be stacked, the lowest MX cabinet must be fixed to the raised floor and, if necessary, also to the concrete floor below the raised floor. The installation must meet the requirements of the national standards stated by the local authorities.
Equipment for fixation is not included.

4.2.2 Installation on Concrete Floor

The MX cabinet must be fixed to the concrete floor with four bolts.

The installation must meet the requirements in the national standards stated by the local authorities.
Equipment for fixation is not included.

5 Site Requirements

5.1 Environmental Requirements, MX/A

The site must fulfil the following requirements when the MX/A is in operation:

Temperature range	5 – 40 °C (41 – 104 °F)
Nominal temperature	8 – 27 °C*) (46 – 80 °F)
Max. rate of temperature increase	20 °C/h (68 °F/h)
Max. rate of temperature decrease	20 °C/h (68 °F/h)
Relative humidity of air, range	0 – 90 %
Nominal relative humidity	30 – 70 %**)

*)If the temperature is kept within this range, no alarms will be activated. Outside this temperature range, the life of the MX will be reduced.

**)Outside this humidity range, the life of the MX will be reduced.

The requirements stated above also apply when stacking the MX/A.

5.2 Environmental Requirements, MX/B

The site must fulfil the following requirements when the MX/B is in operation:

Temperature range	5 – 40 °C (41 – 104 °F)
Nominal temperature	8 – 27 °C*) (46 – 80 °F)
Max. rate of temperature increase	30 °C/h (86 °F/h)
Max. rate of temperature decrease	30 °C/h (86 °F/h)
Normal relative humidity	5 – 85 %

*)If the temperature is kept within this range, no alarms will be activated. Outside this temperature range, the life of the MX will be reduced.

The requirements stated above also apply when stacking the MX/B.

The MX/B is approved for operation in a Class 1 location (residential, commercial & light industry), according to the European Directive on EMC (no. 89/336/EEC). It is also approved according to FCC part 15 subpart B, class A.

The equipment must have an operating environment as specified in ETS 300 019–1–3, class 3.1 – Temperature–controlled locations.

5.2.1 Storage Conditions

Temperature range	(-5) – 45 °C (23 – 113 °F)
Max. rate of temperature increase	30 °C/h (86 °F/h)
Max. rate of temperature decrease	30 °C/h
Normal Relative humidity	5 – 95 %

The equipment must be stored according to the specifications in ETS 300 019–1–l, class 1.1 – Weather–protected, partly temperature–controlled storage locations.

5.2.2 Transportation

Temperature range, unventilated*)	(-25) – 70 °C (-11 – 178 °F)
Temperature range, ventilated or outdoor*)	(-25) – 40 °C (-11 – 104 °F)
Change of temperature, air/air	(-25) / 30 °C (-11 / 86 °F)
Change of temperature, air/water	40 / 5 °C (104 / 41 °F)
Max.relative humidity of air	95 %

*)The high temperature of the surface of a product may be influenced by the surrounding air and by solar radiation.

The equipment must be transported according to the specifications in ETS 300 019–1–2, class 2.1 – "Very careful transportation".

5.2.3 Lightning Protection

The lightning protection system must fulfil the requirements of the national standards. It is the responsibility of the customer to ensure that:

- the external grounding and lightning protection system at the site is adequate
- the grounding system for the equipment can easily and satisfactorily be connected to the grounding and lightning protection system of the site

5.2.4 Modem Connections

The modem connections have no surge protection. It is assumed that the modems fulfil the requirements in EN41003/FCC68, witch is meant to provide sufficient surge protection.

5.3 Measures and Units

European		British and American	
1	m	3.28	ft
0.3	m	1	ft
1	cm	0.39	in
2.54	cm	1	in
1	mm	0.039	in
25.4	mm	1	in
1	kg	2.2	lbs
0.454	kg	1	lbs

European metric system			
1	cm	10	mm
1	dm	10	cm
1	m	10	dm

5.4 MX/A on Concrete Floor

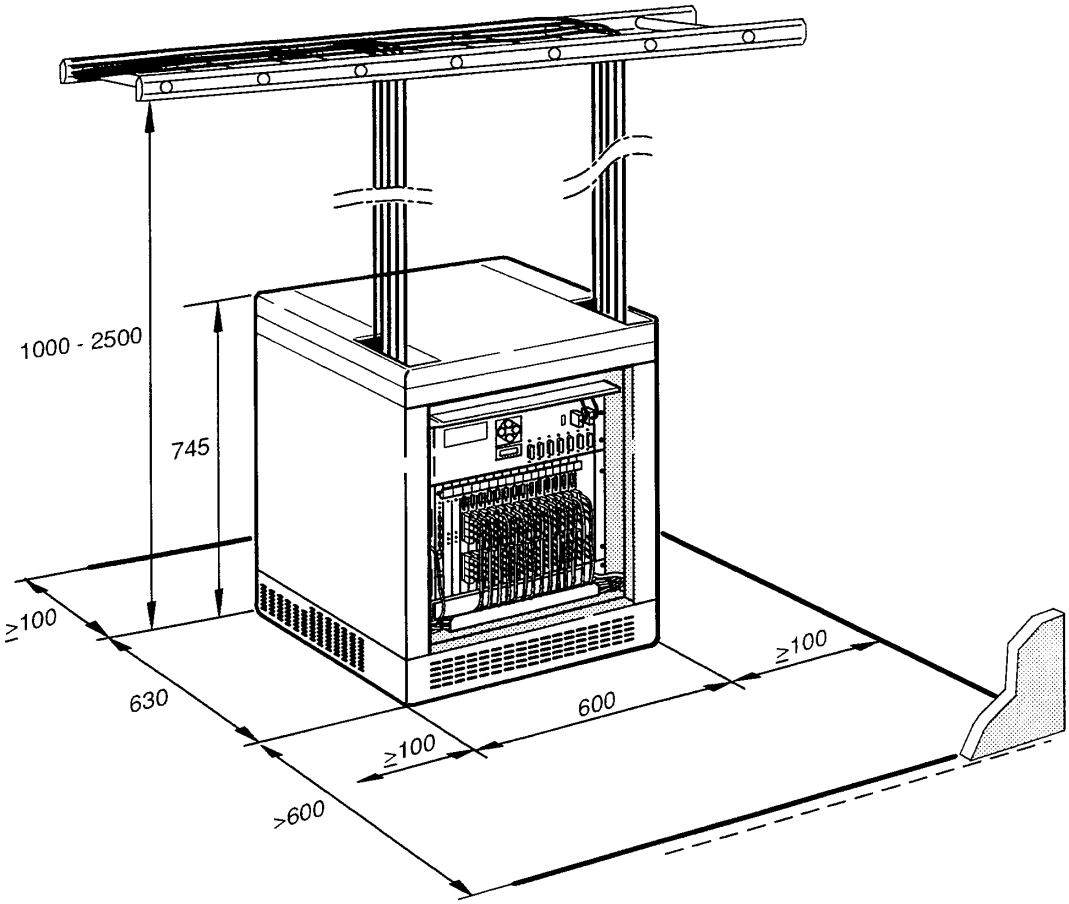


Figure 2 MX/A, dimensions and space required

Dimensions	**MX/A**
Height	745 mm [29"]
Width	600 mm [23.6"]
Depth	630 mm [24.8"]
Weight	104 kg (cables, 62 kg, not included)

Please refer to the conversion table in *5.3 Measures and Units*.

Free floor space of 100 mm [4"] or more from the near and sides of the cabinet and 600 mm [23.6"]in the front of the cabinet is required.
Cable outlets (for a maximum of 90 cables each*), found on the cabinet fronts upper and lower left– and right–hand corners, can be used for cable racks or raised floors.

*)The data and modem cables protrude 5.5–6 m [18–19.7 ft], the terminal cables 3.5 m [11.5 ft], and the power cables 4 m [13.1 ft].

Note: The thickness of the concrete floor must be more than 100 mm [4"].

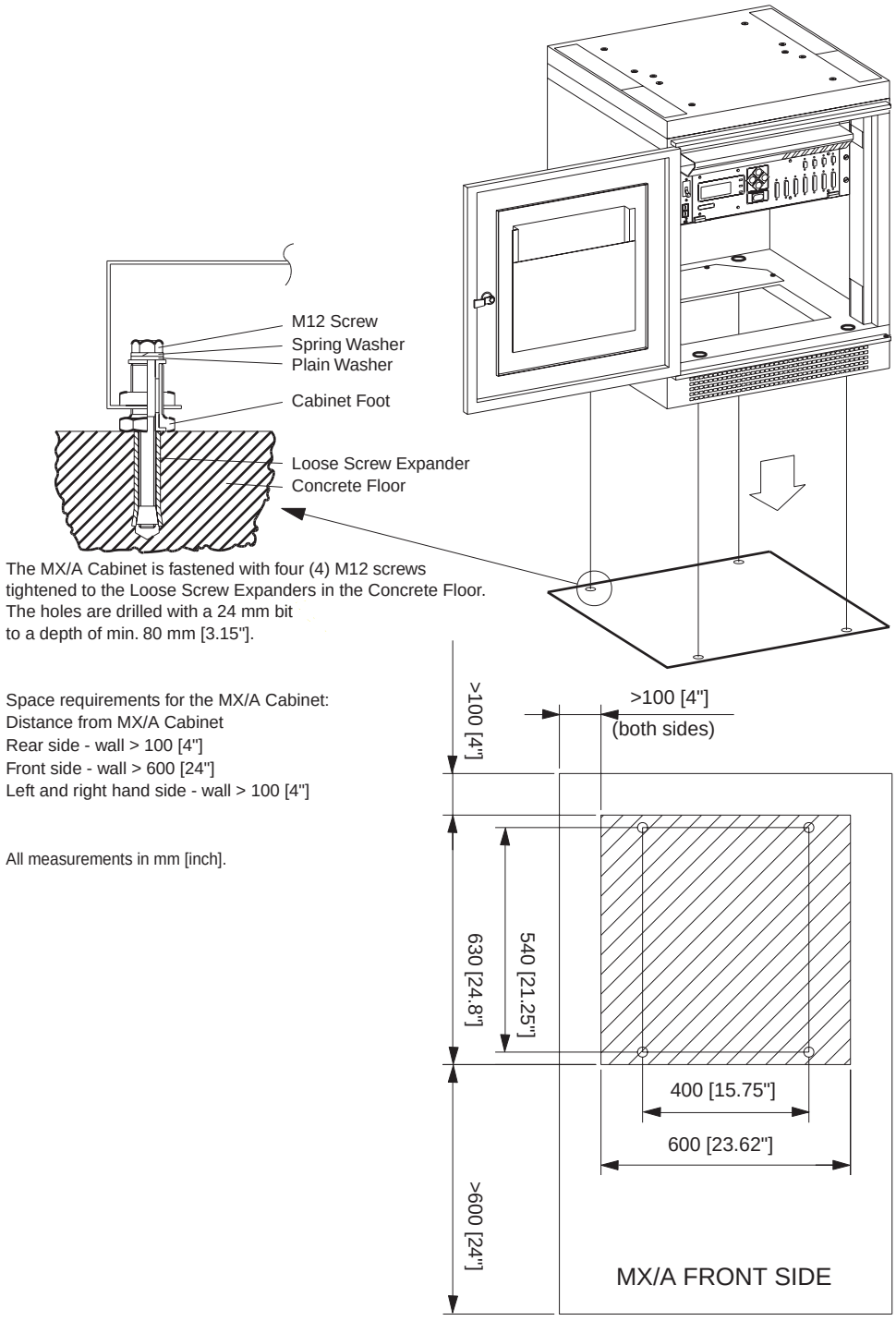


Figure 3 Installation of MX/A cabinet on concrete floor

5.5 MX/A on Raised Floor

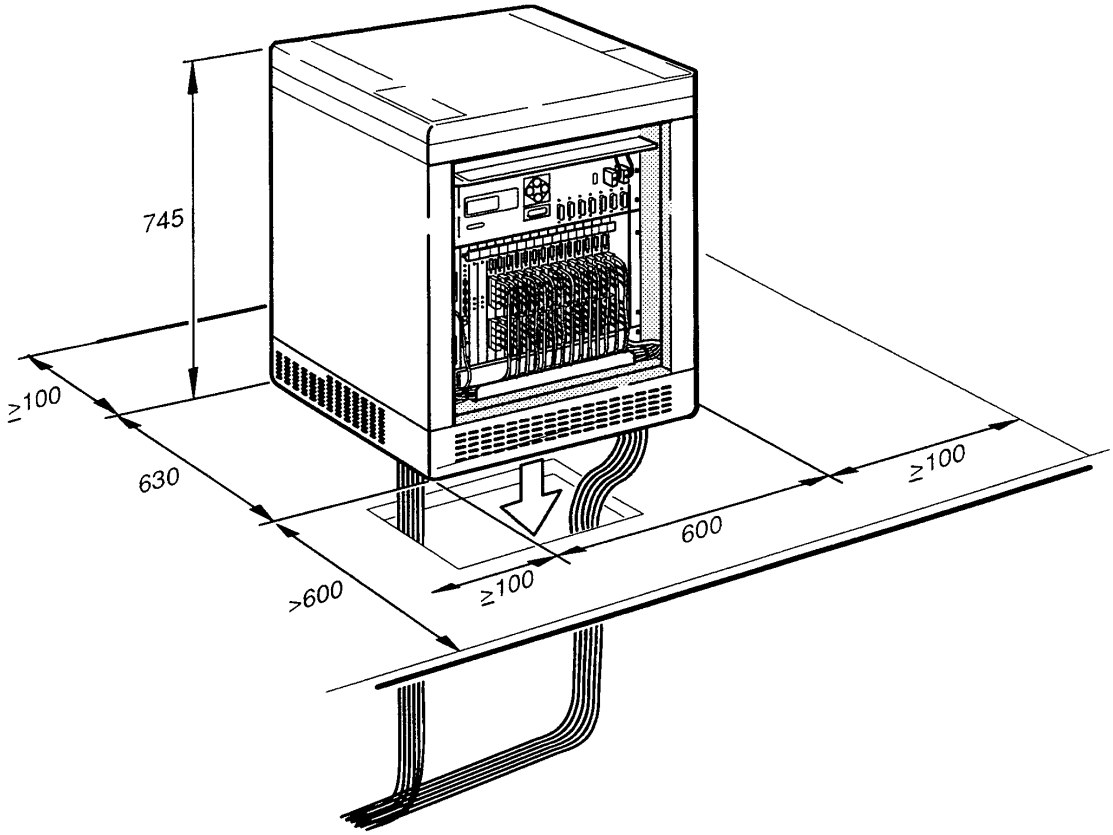
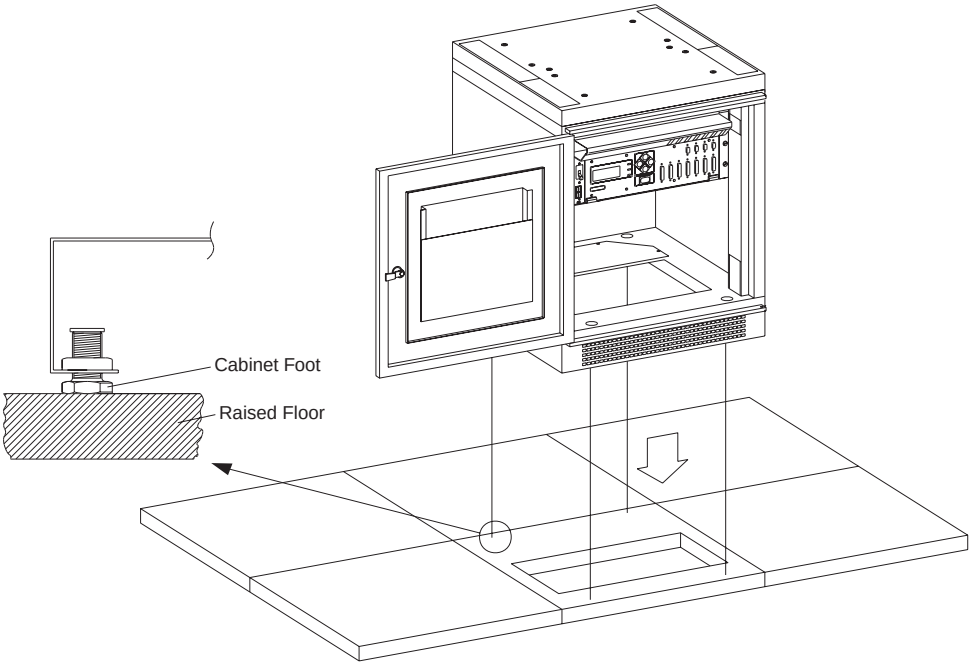


Figure 4 MX/A on raised floor. Note that a hole must be cut in the raised floor to run the cables and for ventilation purposes.

Please refer to the conversion table in *5.3 Measures and Units*.

Note: Raised floor must be fastened to the underlying floor before stacking the cabinets.



Space requirements for the MX/A Cabinet:
Distance from MX/A Cabinet:
Rear side - wall > 100 [4"]
Front side - wall > 600 [24"]
Left and right hand side - wall > 100 [4"]

All measurements in mm [inch].

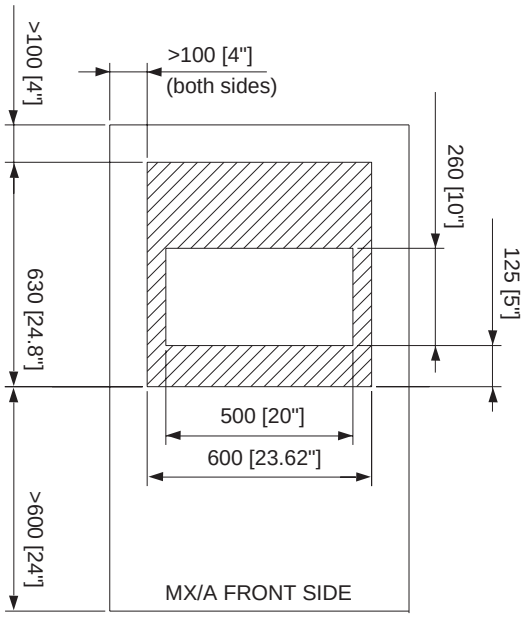


Figure 5 Installation of MX/A cabinet on raised floor

5.6 MX/B, Dimensions and Space Required.

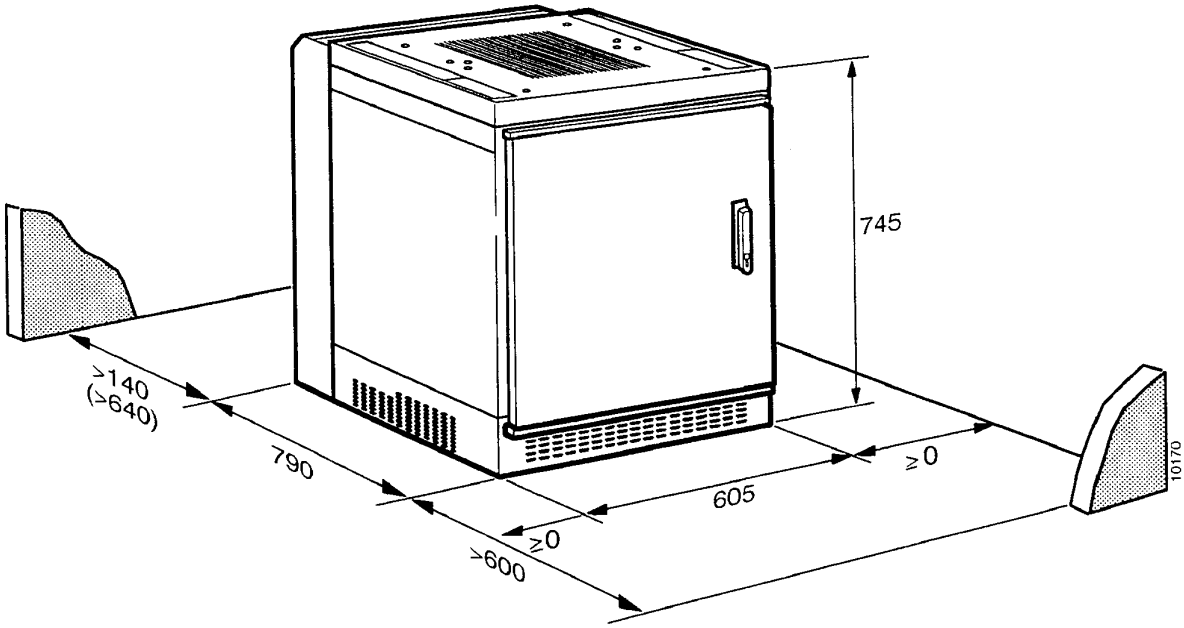


Figure 6 MX/B, front view

Dimensions	**MX/B**
Height	745 mm [29"]
Width	605 mm [23.8"]
Depth	790 mm [31.1"]
Weight	110 kg *)

Please refer to the conversion table in *5.3 Measures and Units*.

Free floor space of 140 mm [5.5"] or more from the rear of the cabinet is the minimum space needed to be able to install the cabinet and the cables. It is strongly recommended to have an additional 500 mm [20"] of free space behind the cabinet to make it easier for the installation personnel to access the Rear Connection Panel.

No space is required on either of the cabinet sides for other purpose than to accessing the Rear Connection Panel.
If the MX/B is installed on raised floor, two openings must be cut in the floor to ensure good ventilation, as well as to run the cables through the floor.
(please refer to Figure 8)
Connections for power, ground, modem cables, Console and NODOP cables as well as external alarms are positioned on the rear side of the cabinet. The power cable has a length of 5 m, while the modem, Console and NODOP cables have a length of 6 m.

*)Without any I/O–kits installed. Each I/O–kit has an approximate weight of 6 kg.

Note: The thickness of the concrete floor must be more than 100mm [4"].

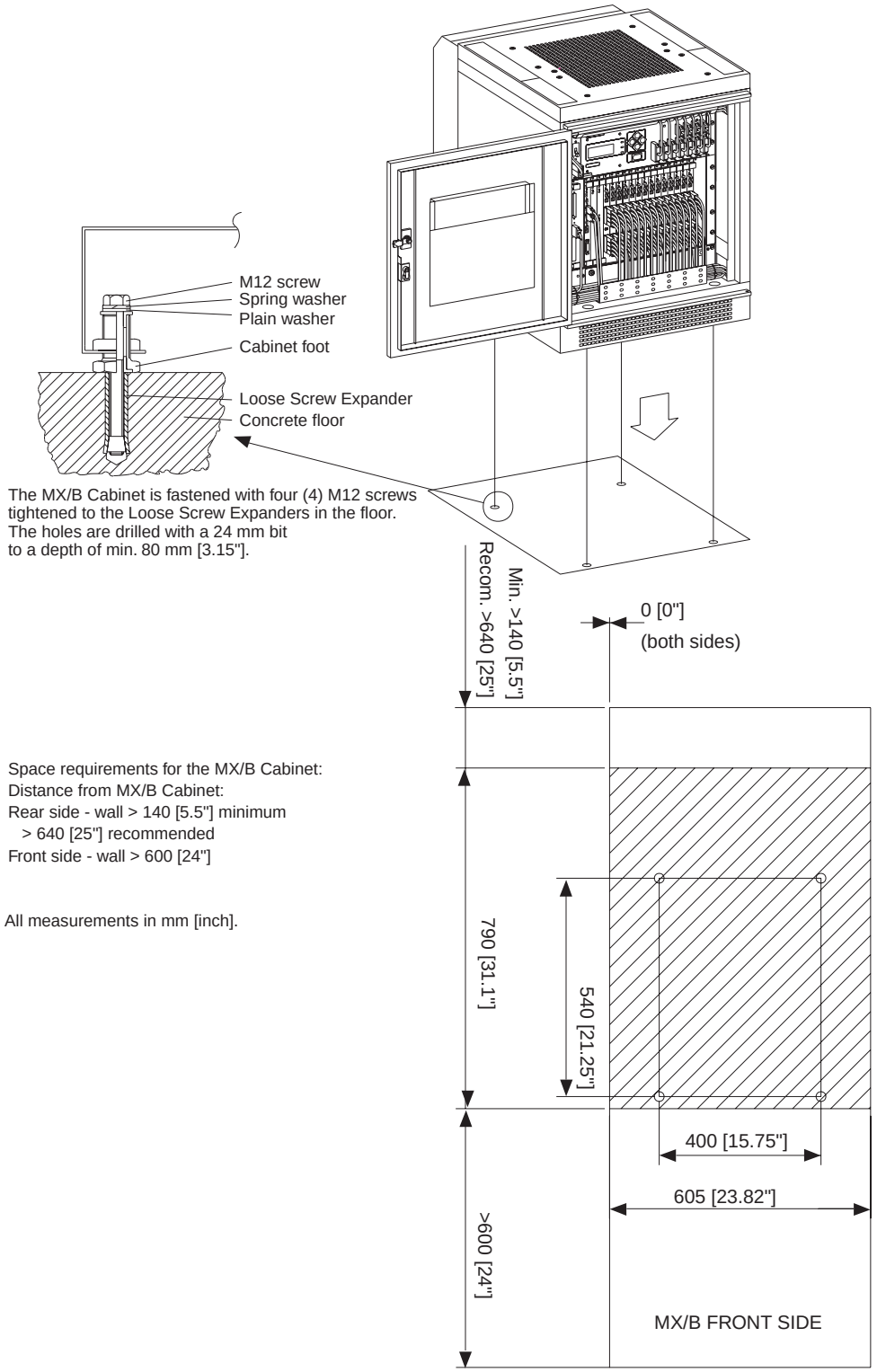


Figure 7 Installation of MX/B cabinet on concrete floor

Note: Raised floor must be fastened to the underlying floor before stacking the cabinets.

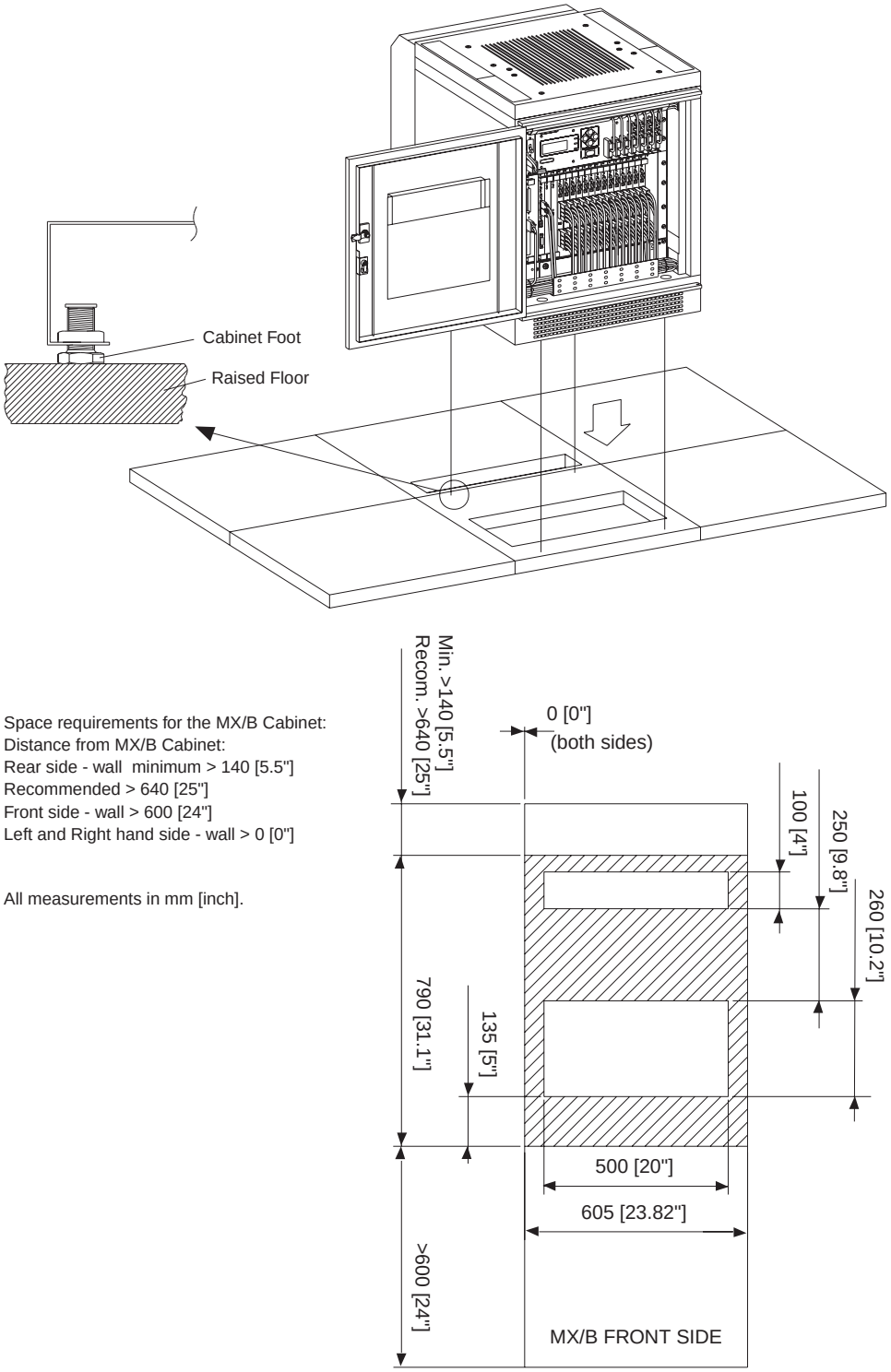


Figure 8 Installation of MX/B cabinet on raised floor

5.7 Stacking MX Cabinets with the Spacer Kit

Note: The lower cabinet must be fastened to the floor before stacking is started. If the installation is done on a raised floor, it may be necessary to fasten the cabinet to the concrete floor below the raised floor.

The *Spacer Kit* is primarily intended to be used with the MX/B version of the MX. When a second cabinet is to be stacked on top of the MX/B cabinet, a Spacer Kit *must* be used between the two cabinets to ensure correct cooling of the cabinets. It is possible to stack a maximum of three MXs on top of each other.

The Spacer Kit can also be used with the MX/A version of the MX. It makes installation and replacement of modern cables easier. It also makes it possible to stack fully equipped MXs, since all the cables from each cabinet will be run through the Spacer Kit.

5.8 MX/A on Concrete Floor Using a Spacer Kit

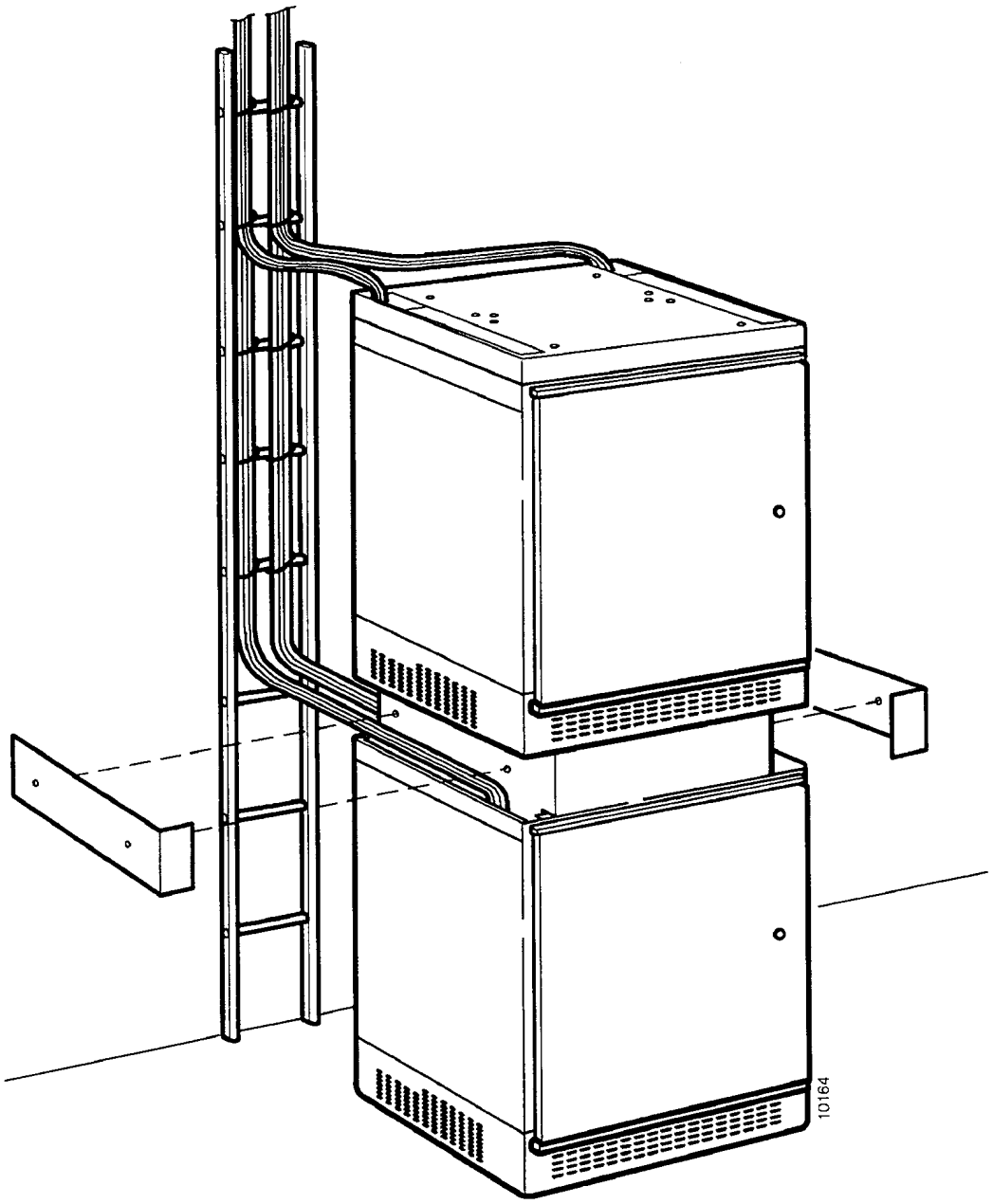


Figure 9 Installation of two MX/A on concrete floor using a Spacer Kit.

Run the cables through the Spacer cable ducts from the lower cabinet backwards to a cable rack (or similar device) behind the cabinet.

5.9 MX/A on Raised Floor Using a Spacer Kit

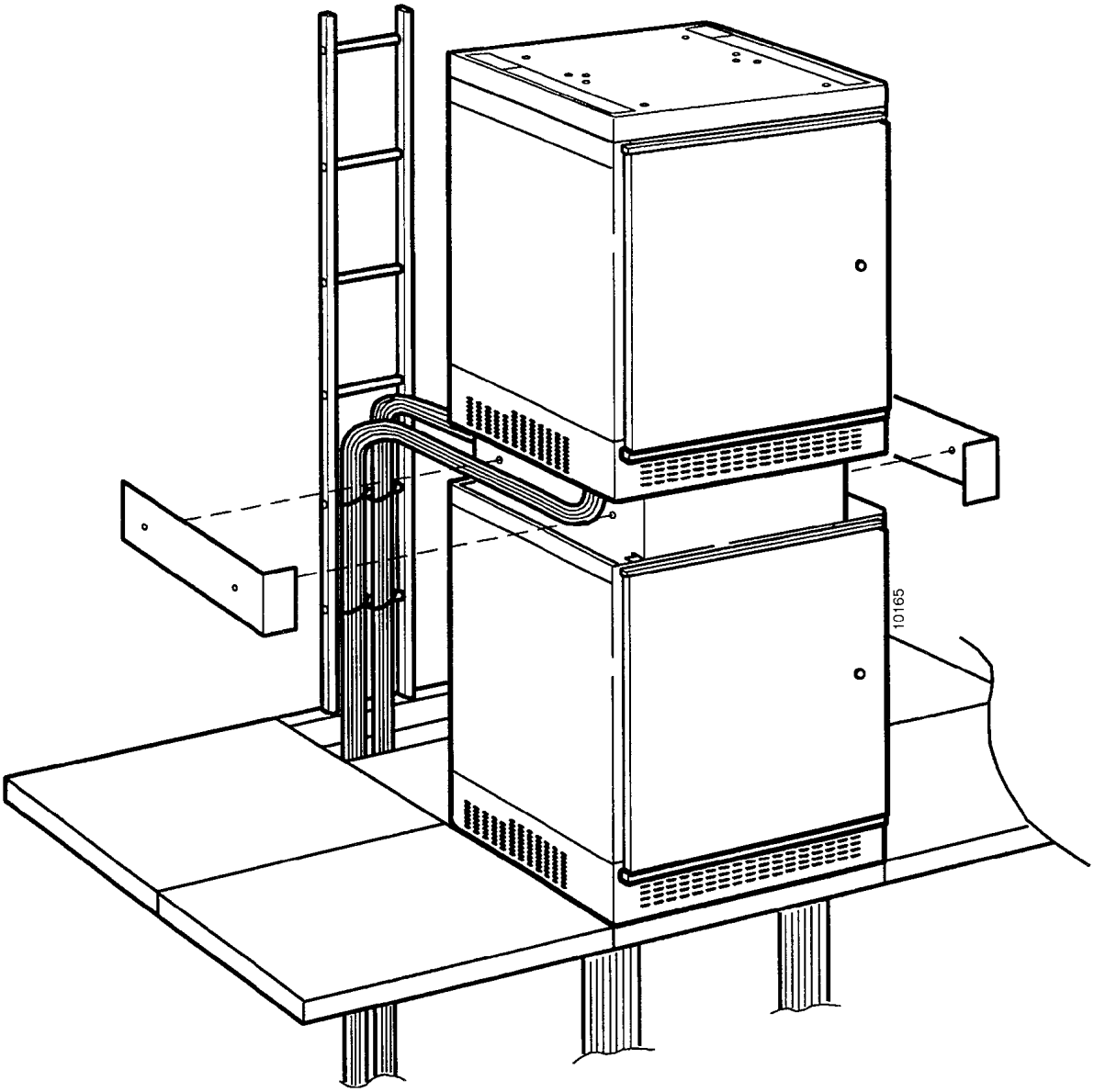


Figure 10 Installation of two MX/A on raised floor using a Spacer Kit.

Run the cables in the Spacer cable ducts from the upper cabinet backwards to a cable rack (or similar device) behind the cabinet.

5.10 MX/B on Concrete Floor Using a Spacer Kit

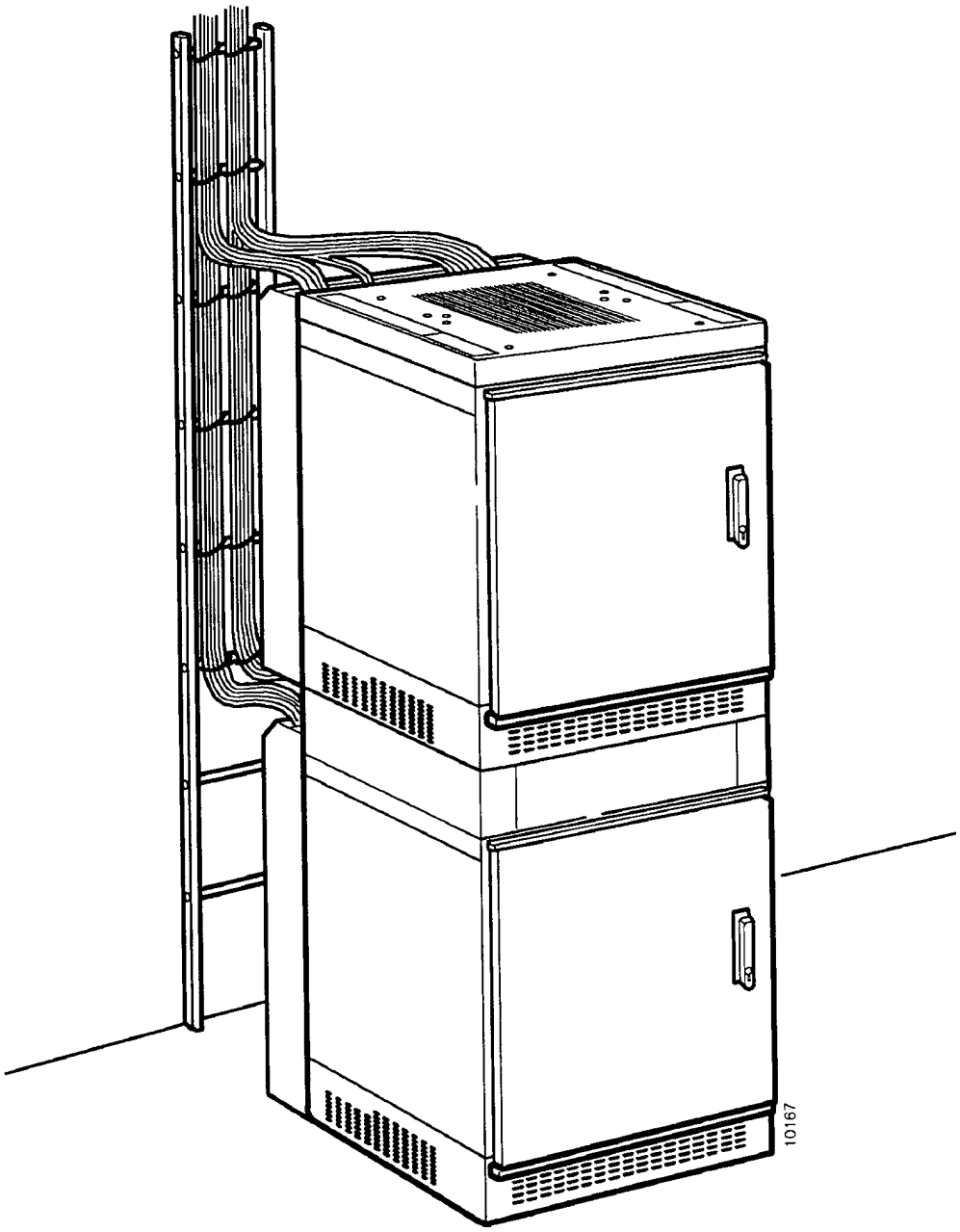


Figure 11 Installation of two MX/B on concrete floor using a Spacer Kit.

The cable ducts of the Spacer Kit will not be used. All cables will be run from the rear of the cabinets, as is normally the case. Some type of cable racks can be used to run the external cables behind the cabinet.

5.11 MX/B on Raised Floor Using a Spacer Kit

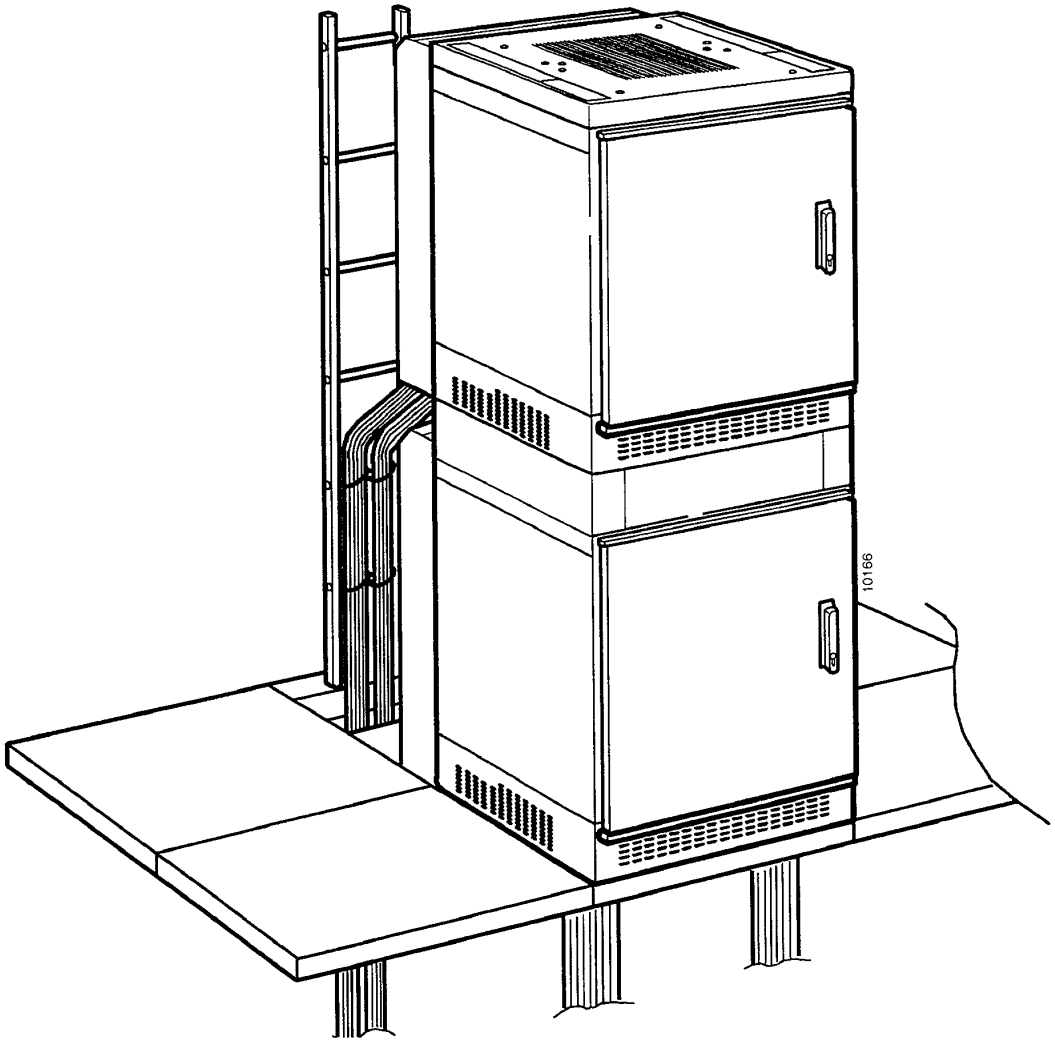


Figure 12 Installation of two MX/B on raised floor using a Spacer Kit.

5.12 MX/B on Raised Floor Using a Spacer Kit (rear view)

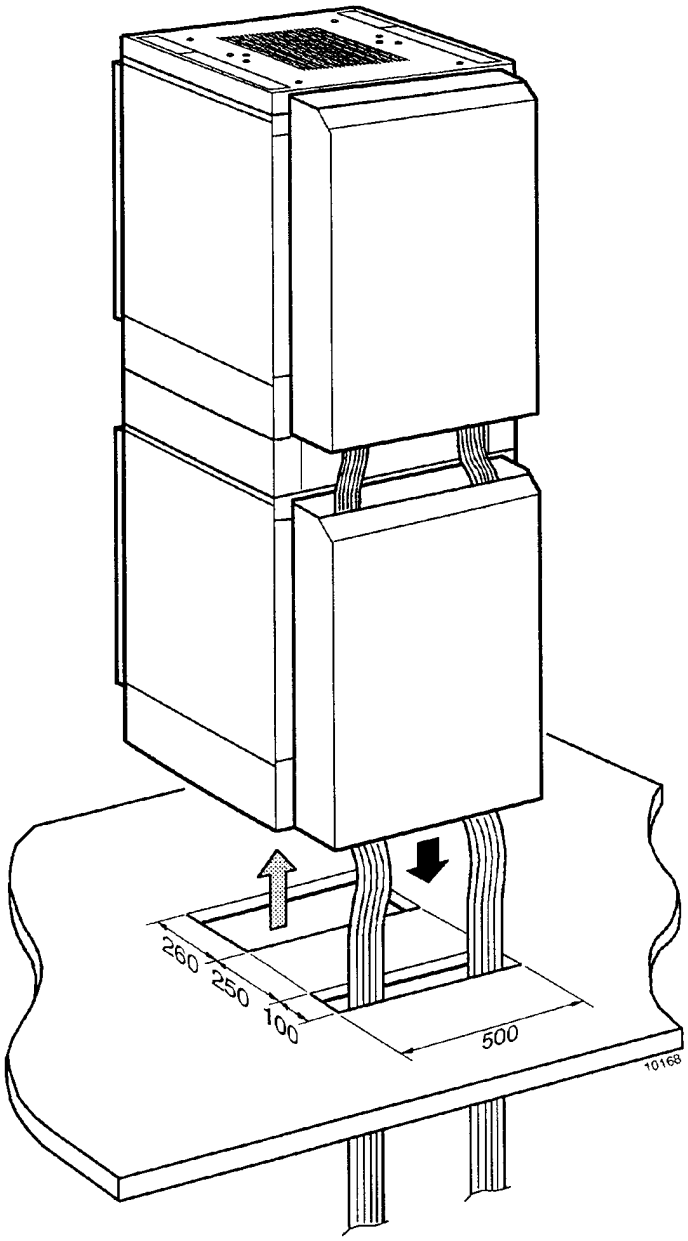


Figure 13 Two MX/B on raised floor using a Spacer Kit.

5.13 Stacking the MX, Dimensions Required

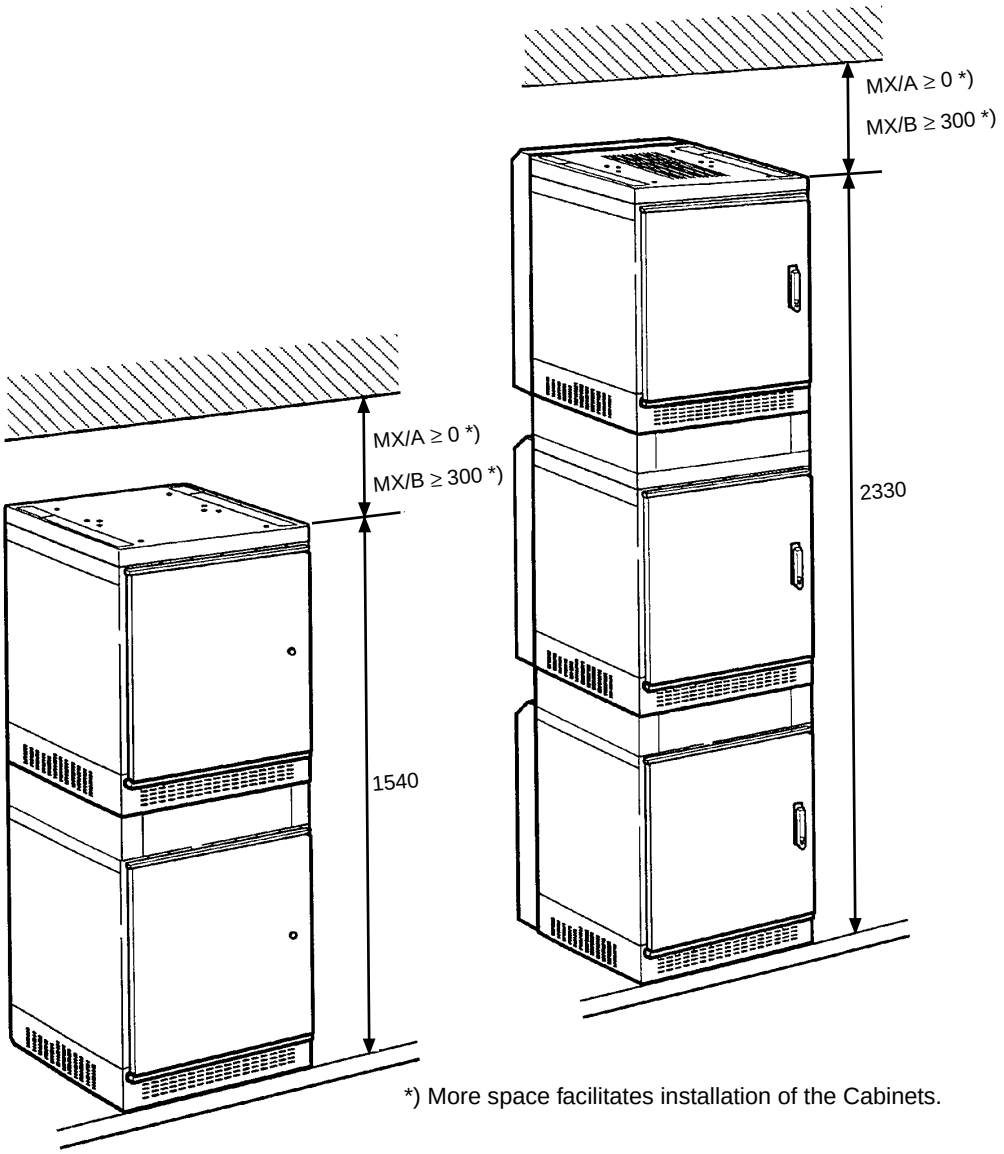


Figure 14 Height requirement for the site when MX cabinets are stacked with Spacer Kit.

6 Power Data

6.1 MX/A and MX/B

Note: All power requirement data below refer to *a single MX Cabinet.*

The MX must be supplied with -48 V DC (positive ground). The power cable, TSRA 904 61, with a length of 5 m, is included in the delivery. The customer must:

- provide a connection box for power supply, located approximately 3m from MX cabinet
- provide a power cable from the connection box to the customer's power equipment
- protect the MX with a 30 A fuse

The input voltage is internally supervised. An alarm is activated if the input voltage is out of a specific range (the alarm threshold range). If the voltage further exceeds the limits and reaches the switch–off threshold range, the station will be switched off. The supervisory function operates with the following thresholds:

DC Alarm thresholds	**Alarm**	**Alarm reset**
Low input voltage	-44.0 V*)	-48.0 V*)
High input voltage	-57.0 V*)	-56.0 V*)

DC switch–off thresholds	**Switch–off**	**Restart**
Low input voltage	-41.0 V	-51.0 V
High input voltage	-58.2 V	-57.8 V

*)Software controller default values: may be altered by the operator.

6.2 Nominal voltage

The lead batteries have a cell voltage of about 2.25 V DC. Therefore, the *nominal voltage for a 48 V battery system is approximately 54 V DC.*
The MX exchange is designed for battery back up. During the booting process, for example, the power consumption will be high. We therefore recommend the use of power supplies that can provide a voltage level equivalent to the nominal voltage level (even if no back–up batteries are used).
The equipment should be provided with an uninterruptible power supply, that is, the power source should have a battery back up or the like.
The maximum permitted noise level in the supply voltage from the power source is 300 mV RMS within the frequency range 10 Hz to 30 MHz.

Type of power cable (included in the delivery)	**Fuse**
2 x 10 mm^2 (AWG 6, SWG 8)	1 x 30 A

Power consumption

Cabinet	**Maximum input power *)**
MX/A without BIU	760 W/Cabinet
MX/A with BIU	790 W/Cabinet
MX/B without BIU	760 W/Cabinet
MX/B with BIU	790 W/Cabinet

*)Maximum power consumption occurs when the MX is fully equipped with I/O Board/20s and all the boards consume maximum power.

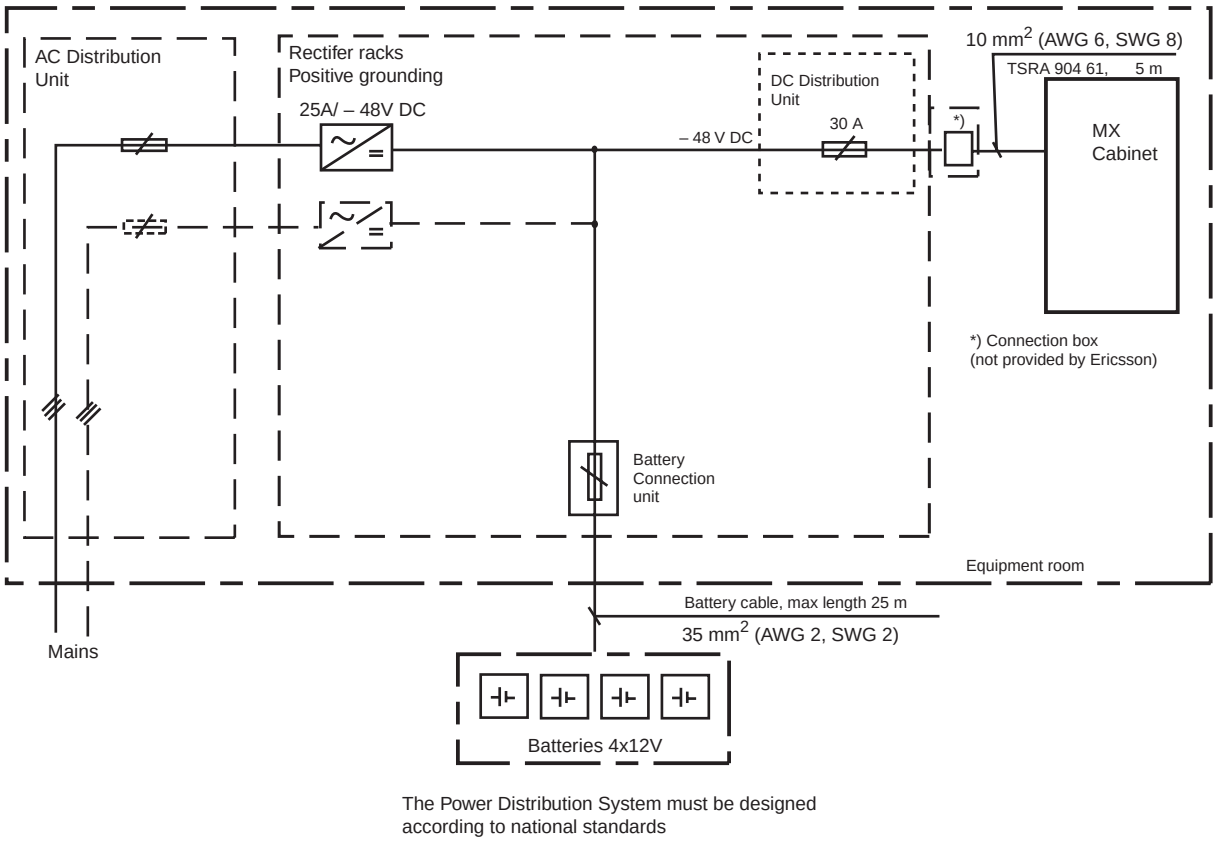


Figure 15 Power distribution -48 V DC, Mobitex Exchange MX (example)

7 Grounding

Note: The grounding cable is not included in the delivery.

Grounding must be implemented in accordance with the principles in figures 16 and 17 and according to national standards.

Each cabinet must be connected to the main ground for the site. This means that a separate ground cable, minimum 16 mm^2 (AWG 4, SWG 7), must be connected to the main ground wire, minimum 35 mm^2 (AWG 2, SWG 2), please refer to *Figure 16* and *Figure 17*. The max length of a 16 mm^2 grounding cable is 10 m. This 16 mm^2 cable must be terminated with a cable lug for an 8 mm bolt.

Grounding bolts are provided inside the cable ducts on both sides of the MX/A cabinet. The bolts are located in all four corners of the sideplates.

A grounding bolt is provided at the rear side of the MX/B for connecting the cabinet ground wire to the Station ground.

All cabinets are designed to ensure good ground connection when they are in positioned in the cabinet.

Note: If an uninsulated Station ground wire (35 mm^2) is used, the cable rack must be connected to the *ground collection bar.*

To avoid ground loops due to potential differences between equipment connected to the MX, some actions must be taken:

- all equipment connected to the MX must be grounded to the site's main ground wire
- if the installed equipment (MX, modems, etc.) uses more than one AC power supply unit, the following must be observed:
  - install an *Isolation Transformer* between the AC Distribution Unit and the Modem Cabinet
  - connect the Modem Cabinet Ground screw *to the same* Ground Collection Bar to which the MX is grounded

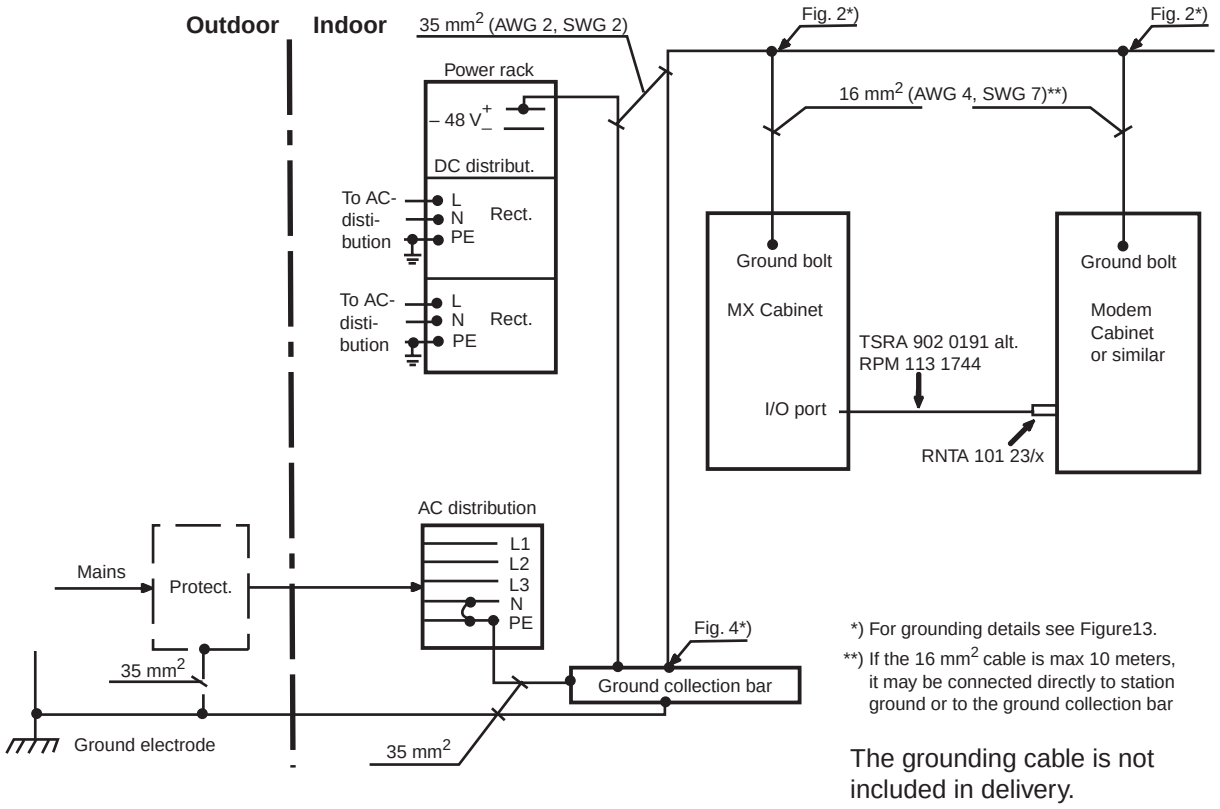


Figure 16 Grounding principle for the Mobitex Exchange (MX)

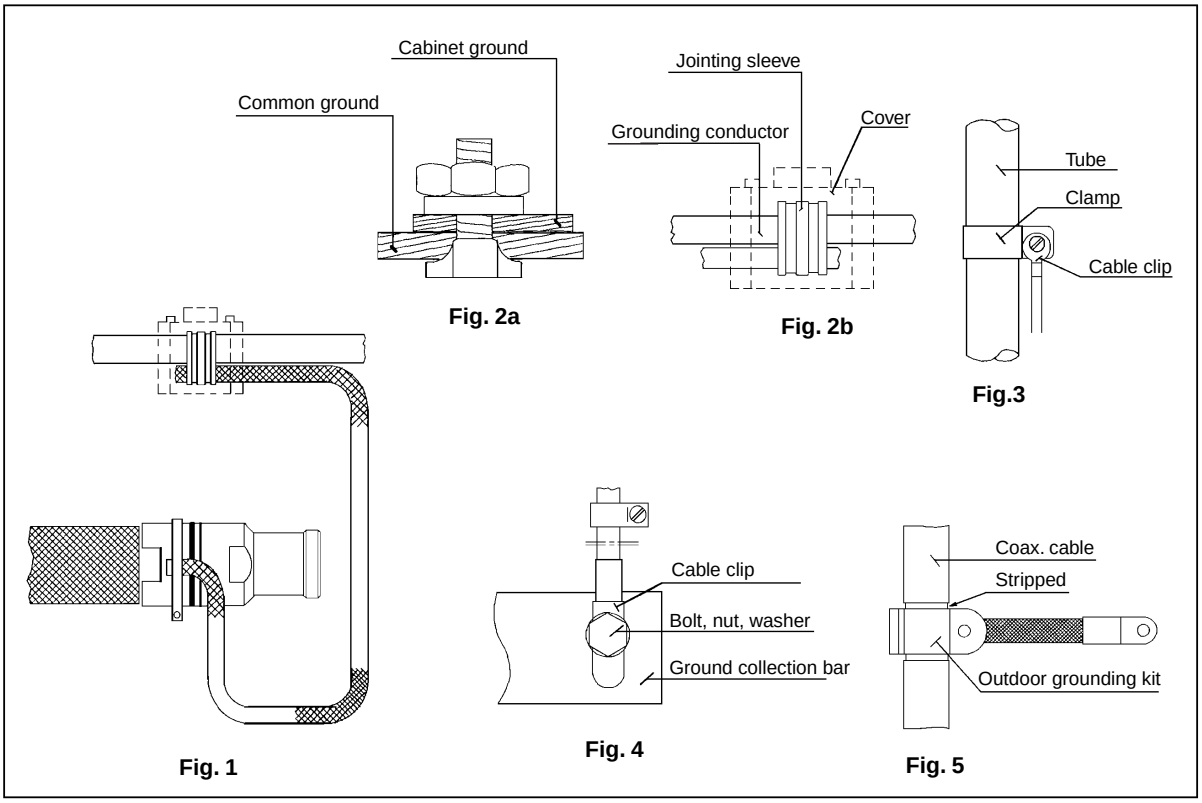


Figure 17 Grounding principles, details

8 Cables for External Connections

8.1 Connector Abbreviation

Abbreviation	Designation
Micro Dsub9 f	Micro D–sub 9–pin, female
Dsub9 f	D–sub 9–pin, female
Dsub15 f	D–sub 15–pin, female
Dsub25 m	D–sub 25–pin, male
Dsub25 f	D–sub 25–pin, female
Dsub37 m	D–sub 37–pin, male
Dsub37 f	D–sub 37–pin, female
Millipacs1 24 f	Millipacs1 24–pin, female
AUI	IEEE 802.3 "AUI Connector"

8.2 MX/A

Power Cable	TSRA 904 61 (500 cm)
Combined Connection Cable	TSRA 902 0191 (700 cm *)
Option for RS422 (CC Cable)	TSRA 902 0177 (700 cm)
Option for RS232C (CC Cable)	TSRA 902 0168 (700 cm)

*)Combined Connection Cable TSRA 902 0191 must be used together with one of the interface adapters, (please refer to *9 Adapters*).

<u>CPU Board 68040/CPU–40</u>	
TSRA 903 0363 (400 cm)	terminal (female)
TSRA 902 0171 (700 cm)	modem (male)
<u>CPU Board 68030/CPU–30</u>	
TSRA 902 0174 (400 cm)	terminal (female)
TSRA 906 106 (700 cm)	modem (male)

AUI Cable	RPM 113 1762 (300 cm *)
NCC Data	TSRA 903 442(**)

*)The interface in the AUI Cable, RPM 113 1762, meets the requirements of IEEE 802.3, "AUI connector" (AUI= Attachment Unit Interface). The AUI Cable connector may supply the Ethernet transceiver with power according to requirements in IEEE 802.3. Used if BIU is installed.
**)Included in the NCC delivery. Not used if a BIU is installed.
For more information about installation, please refer to the *MX - Installation* module.

8.3 MX/B

Power Cable	TSRA 904 61 (500 cm)
Combined Connection Cable	RPM 113 1744 (Modem Connections *)
Combined Connection Cable	RPM 113 1744 (NODOP Terminal **)
Combined Connection Cable	RPM 113 1744 (Console Terminal ***)
Combined Connection Cable	PRM 113 1750 (NCC Data ****)

*)There are a number of adapters available, which makes it possible to connect the MX/A and MX/B exchanges to various types of transmission equipment.
(please refer to *9 Adapters*).
**)Connected with adapter RNTA 101 23/7
***)Connected with adapter RNTA 101 23/6
****)Included in the NCC delivery. Not used if a BIU is installed.

For more information about installation, please refer to the *MX - Installation* module.

9 Adapters

9.1 General

The Interface Adapters listed below are used to convert a special interface into a number of standard interfaces. The adapters must be connected to one of the following cables, which are primarily used as modem connection cables for the I/O Board/20:

- TSRA 902 0191 (MX/A)
- RPM 113 1744 (MX/B)

Adapter	Interface	MX–application	Modem End
RNTA 101 23/4	RS422 Null–modem	DTE (113/114/115)	D25f
RNTA 101 23/5	RS232	DCE (113/115)	D25m
RNTA 101 23/6	RS232	DCE (114/115)	D25m
RNTA 101 23/7	RS232 Null–modem	DTE (113/115)	D25f
RNTA 101 23/8	RS530	DCE (113/115)	D25m
RNTA 101 23/9	RS530	DCE (114/115)	D25m
RNTA 101 23/10	RS530	DTE (113/115)	D25f
RNTA 101 23/11	RS449	DCE (113/115)	D37m
RNTA 101 23/12	RS449	DCE (114/115)	D37m
RNTA 101 23/13	RS449 Null–modem	DTE (113/115)	D37f

9.2 Physical Data

The adapters consist of two Dsub miniature connectors in a plastic or metal housing. There are three different adapter types:

- Dsub 25 – Dsub 25
- Dsub 25 – Dsub 37
- Dsub 37 – Dsub 37

The connectors are mounted with standard screws and nuts (UNC 4–40). The product number and Revision State are shown on one side of the adapters and the interface description on the other side.

9.3 Physical Dimensions

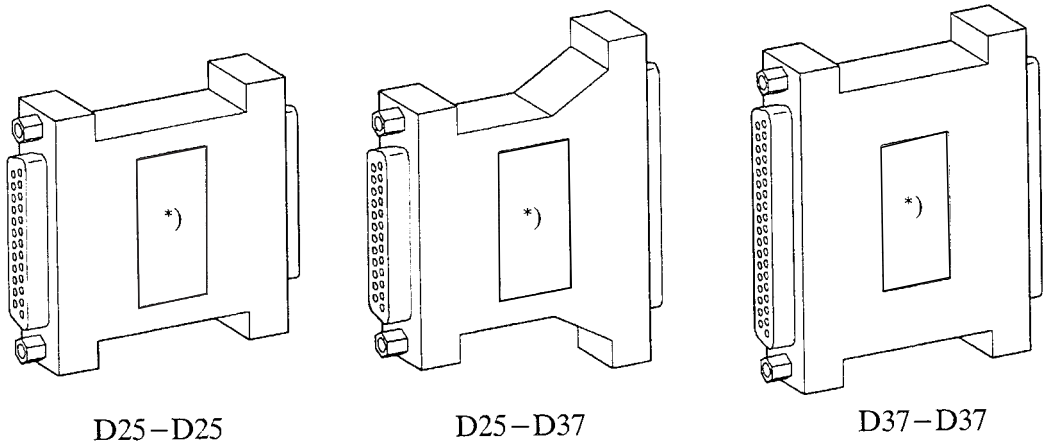


Figure 18 Overview of the Adapters

*) The adapter labels indicate
- on this side: *type of interface*
- on the opposite side: *product number, revision state*

Dimensions	**D25–D25**	**D25–D37**	**D37–D37**
Length	50–65 mm	60–70 mm	60–70 mm
Width	50–60 mm	70–75 mm	65–75 mm
Height	14–17 mm	14–17 mm	14–20 mm

The exact dimensions depend on the manufacturer.

Please refer to the conversion table in *5.3 Measures and Units*.