

MiVoice MX-ONE

Installing Boards and Cabling - Installation Instructions

Release 7.4

November 27, 2021



Notice

The information contained in this document is believed to be accurate in all respects but is not warranted by **Mitel Networks™ Corporation (MITEL®)**. The information is subject to change without notice and should not be construed in any way as a commitment by Mitel or any of its affiliates or subsidiaries. Mitel and its affiliates and subsidiaries assume no responsibility for any errors or omissions in this document. Revisions of this document or new editions of it may be issued to incorporate such changes. No part of this document can be reproduced or transmitted in any form or by any means - electronic or mechanical - for any purpose without written permission from Mitel Networks Corporation.

Trademarks

The trademarks, service marks, logos and graphics (collectively "Trademarks") appearing on Mitel's Internet sites or in its publications are registered and unregistered trademarks of Mitel Networks Corporation (MNC) or its subsidiaries (collectively "Mitel") or others. Use of the Trademarks is prohibited without the express consent from Mitel. Please contact our legal department at legal@mitel.com for additional information. For a list of the worldwide Mitel Networks Corporation registered trademarks, please refer to the website: <http://www.mitel.com/trademarks>.

®,™ Trademark of Mitel Networks Corporation
© Copyright 2021, Mitel Networks Corporation
All rights reserved

Contents

Chapter: 1	Introduction	1
	Scope	1
	Target Group	1
	Prerequisites	1
	Electrical Connections	1
	Safety	1
Chapter: 2	Installing boards	2
	ASU-II or ASU-III and ASU Lite	4
	MGU2	4
	Empty Board Positions	4
	Dummy Front	4
	Connectors and LEDs on Board Fronts	5
Chapter: 3	Cabling	12
	Connector Positions	14
	Connector Numbering	14
	Cable Labeling	15
	Product Labeling	15
	Label Sets	15
	Labeling of Cables	15
	Labeling of Internal Cables	16
	Connecting Internal Power Cables	17
	Connecting the Batteries to the AC/DC Unit	17
	Connecting the AC/DC Unit to MX-ONE	19
	Connecting to the Mitel 48V Power Cables for ABB PSU	19
	Connecting AC/DC-Unit 51305282 to Mains	20
	Connecting AC/DC to the LAN	20
	Connecting Power (-48V) to Fan Unit BFD50908/4	20
	Connecting Power to 1U Chassis 87L00032BAA-A	21
	Connecting Power to 3U Chassis 87L00039BAA-A	21
	Connecting Power (-48V) to 7U Chassis BFD76140	21

	Connecting Cables . . . . .	.22
	Extension and Trunk Line Cable Structure . . . . .	.23
	ELU33, ELU34, ELU31/4 and TLU80 Cable Structure . . . . .	.25
	TLU83 Cable Structure . . . . .	.26
	TLU76 and TLU77 Cable Structure . . . . .	.26
	ELU26 and TLU79 Cable Structure . . . . .	.27
	MGU and MGU2 Cable Structure . . . . .	.28
Chapter: 4	Connection of External Cables	29
Chapter: 5	Line Lengths	30
	Analog Extensions ELU34 . . . . .	.30
	Digital Extensions . . . . .	.31
	ELU33 . . . . .	.31
	ISDN Extensions with ELU26 . . . . .	.31
	Cordless Extensions ELU31 . . . . .	.32
	Analog External Lines, TLU80 and TLU83 . . . . .	.33
	Digital External Lines . . . . .	.33
	TLU77 . . . . .	.33
	ISDN . . . . .	.34
	Through-Connection on Power Failure or Processor Malfunction . . . . .	.35
	Call Metering . . . . .	.37
	Call Metering TLU83/2 . . . . .	.37
	Private Trunk Lines (tie lines) . . . . .	.37
Chapter: 6	Alarms	38
	Fan Unit Alarm . . . . .	.40
	Fan BFD 509 08/4 . . . . .	.40
	MX-ONE Lite, 3U unit, External Alarm . . . . .	.41
	AC/DC Unit Alarms . . . . .	.41
	For 51305282 . . . . .	.41
	AC/DC Alarm through MGU . . . . .	.43
	MiVoice MX-ONE Lite 87L00039BAA-A with Power Unit . . . . .	.43
	MiVoice MX-ONE Classic with Power Unit . . . . .	.44
	MX-ONE Battery Mounting Set . . . . .	.46

Introduction

MX-ONE is a communication solution for enterprises. MX-ONE integrates voice communication in fixed and mobile networks for public as well as private service. MX-ONE can be integrated into an existing Local Area Network (LAN) infrastructure. MX-ONE supports both IP telephony and functions found in classic circuit-switched PBXes (Private Branch Exchanges).

Scope

This document describes the MX-ONE cabling and connection in a detailed way. It is aimed for customers doing new installation. For other parts of the Installation see:

- *Installation preparation and Earthing, 19/1531-ASP11301*
- *Installation Chassis in a Cabinet, 20/1531-ASP11301*

Target Group

The target group for this document is personnel involved in installing the MX-ONE.

Prerequisites

This section lists requirements that must be fulfilled before the installation starts.

Electrical Connections

Installation procedures involving connection of power cables, batteries and earthing must be performed according to local regulations.

Safety

All personnel involved in installation must read and understand the safety instructions prior to installation, see the description document for *SAFETY*.

Installing boards

Device boards can, in the 7U chassis only be placed in the board positions 01-29 and 45-73. Not in positions 33, 37 and 41.

NOTE: It is important to firmly insert the boards, to avoid bending any back plane connectors, or it's contact pins. Press evenly on both sides of the front. Do not use the extractor (available in some boards) to press the board in. Only for the final millimeter of sliding in the board, the extractor is allowed to be used.

To remove any board, use the extractor, or use the tool LTD11702 in an available keyhole in the fronts.

Table 2.1: Boards in MX-ONE (Sheet 1 of 2)

Board	Product number	Building height	Time Slots used	Remarks
ALU2	ROF 137 5373/11	20mm	8	Alarm unit for external alarms
ASU Lite	ROF 137 6307/31	40mm	---	NOTE: With the ASU Lite 8GB (J1990 Module) board, a problem occurs with software/hardware addresses for eth0/eth1 on J1990 Module ASU-E ROF 137 6307/31 R2A and ASU-E ROF 137 6307/31 R2B. The cause of the problem is that eth0 address port is at the physical position of the eth1 port and the eth1 address port is at the physical position of the eth0 port. Mitel Server Unit, Lite. 8GB. For more information see item below.
ASU-II	ROF 137 6307/4	40mm	---	Mitel Server Unit. 16GB. For more information see item below.
ASU-III	ROF 137 6307/5	40mm	---	Mitel Server Unit with increased performance and memory (32GB) than ASU-II.
DC/DC	ROF 137 6303/1	40mm	---	Power unit for 7U chassis
ELU26	ROF 137 5321/12	0mm	8	ISDN-S digital extensions
ELU31	ROF 137 5412/4*	20mm	32	DECT extensions
ELU33	ROF 137 5062/1	20mm	32	Digital extensions
ELU34	ROF 137 5064/x	20mm	32	Analog extensions with message waiting
FTU2	ROF 137 5415/11	20mm	8	Failure Transfer Unit
MFU	ROF 137 5348/X	20mm	8	Multi frequency unit

Table 2.1: Boards in MX-ONE (Continued) (Sheet 2 of 2)

Board	Product number	Building height	Time Slots used	Remarks
MGU2	ROF 137 6304/4	20mm	---	Media Gateway Unit. For more information see item below.
TLU76	ROF 137 5338/x*	20mm	32	Digital trunk, ISDN, E1, DPNSS, CAS, SS7
TLU77	ROF 137 5387/x*	20mm	23	ISDN, T1, DPNSS, CAS depending on version
TLU79	ROF 137 5349/11*	20mm	8	ISDN-T 2B+D trunk line
TLU80 (supported board revision R2A)	ROF 137 5406/11	20mm	8	4-wire analog trunk using E&M signaling. This board is used in MX-ONE Classic (7U), MX-ONE Lite (3U) and MX-ONE Slim (1U).
TLU83	ROF 137 6305/1	20mm	8/12	Analog trunk line (loop start, ground start. CLI with FSK and DTMF)
TLU83	ROF 137 6305/2	20mm	8/12	Analog trunk line (loop start, ground start, call metering. CLI with FSK and DTMF)
TMU	ROF 137 5335/x	20mm	32	Tone and Multi part Unit. DTMF

NOTE: Secure all boards with the screws located in the extractor. Use screw driver with Torx T8.

Symptoms (only valid for ASU-Lite)

When installing a MX-ONE 7.1 or later, if only LAN0 is connected, the installation may stop without completing. If only the LAN1 interface is connected, the eth0 will be installed on LAN1. If both LAN0 and LAN1 interfaces are connected, then eth0 will be installed on LAN1 and eth1 on LAN0.

Resolution (only valid for ASU-Lite)

If you want to use only eth0, then connect the network to LAN1. If you want to use switched redundancy, that is, connect both LAN0 and LAN1, be aware that eth0 is at LAN1 and eth1 at LAN0.

To test which eth is configured to which LAN:

1. Log in using as **root** run command: `ethtool -p DEVNAME [TIME-IN-SECONDS]`.
2. Shows visible port identification (for example, blinking).
3. Enter the command `ethtool -p eth0 60`. This will enable blink on the network port LEDs.
4. Connect the cable for eth0 in the correct LAN port (LAN1).
5. Repeat the procedure for eth1.
6. Do not modify the file `/etc/udev/rules.d/70-persistent-net.rules` to resolve the problem.

ASU-II or ASU-III and ASU Lite

The ASU's has a disk bay for 2 separate SSD units, Solid state drives, (or HDD units (Hard disk drives). They are located behind a cover in the front.

NOTE: SW RAID is supported on ASU-II/ASU-III.

Close to the LED near the LAN-ports, there is a hole for performing reset/ software shout down.

The ASU's has a battery for real time clock. This battery is located just behind the board for the SATA drives connection.

NOTE: Due to the high weight of these boards, handle them with care, and hold the board only in the front. Also, be careful when inserting it into the subrack. Do not force it to avoid any bending of the board.

NOTE: If the ASU-III server is running ESXi 6.7 or later and the board is powered up without monitor connected. The only way to connect the monitor is to reboot the board and the monitor must be connected.

NOTE: If the ASU-III server is running ESXi 6.7 or later and the board is powered up without a monitor connected and a monitor needs to be connected afterwards, this will not work as no VGA signal will be available. VGA signal is only available if the monitor is connected during boot. The only way to connect the monitor in this case is to reboot the board while having the monitor connected.

With normal use and when the network is working properly it should not be necessary to have a monitor connected to the ASU-III as most tasks can be performed via a browser.

MGU2

The MGU2 board has a 20mm front and can be used in any chassis.

Close to the LED there is a hole for performing reset.

For more info see description, *Media Gateway Unit, MGU, 1/1551-ANF90136*.

Empty Board Positions

If any empty positions are left in a chassis after mounting all boards, these empty slots have to be filled with Dummy-fronts to fulfill the EMC demands. See Dummy Front.

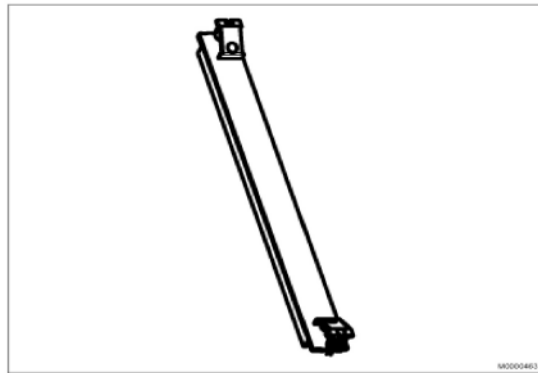
Dummy Front

This section describes the dummy front in 19" cabinets.

Dummy fronts are installed at all empty positions in the 19" chassis. New boards can be installed at these positions. Remove the dummy front at the position were the new board is to be installed and insert the new board.

NOTE: All empty board positions must be covered with dummy fronts to fulfill the EMC requirement and to be compliant with the BYB501 cooling requirements (air flow).

Figure 2.1: 20mm Dummy Front

**Table 2.2:** Dummy Front

Function	Product Number	
Front 20 mm	SXX 106 1020/35	

Connectors and LEDs on Board Fronts

This section describes the connectors and LEDs on the boards.

The indication of board status with dual color LED is:

- Steady RED: The board is in passive state
- Flashing RED: Error state
- Alternating RED/GREEN: The board is starting up or is blocked.
- Steady GREEN: The board is active.
- Flashing GREEN: The board is active and is signaling.

NOTE: DC/DC-, MGU-, TLU77- and ASU-boards deviate from above. See the figures below regarding how they differ.

Figure 2.2: TLU77, TMU, TLU76, ELU33, and ELU34 Board Fronts

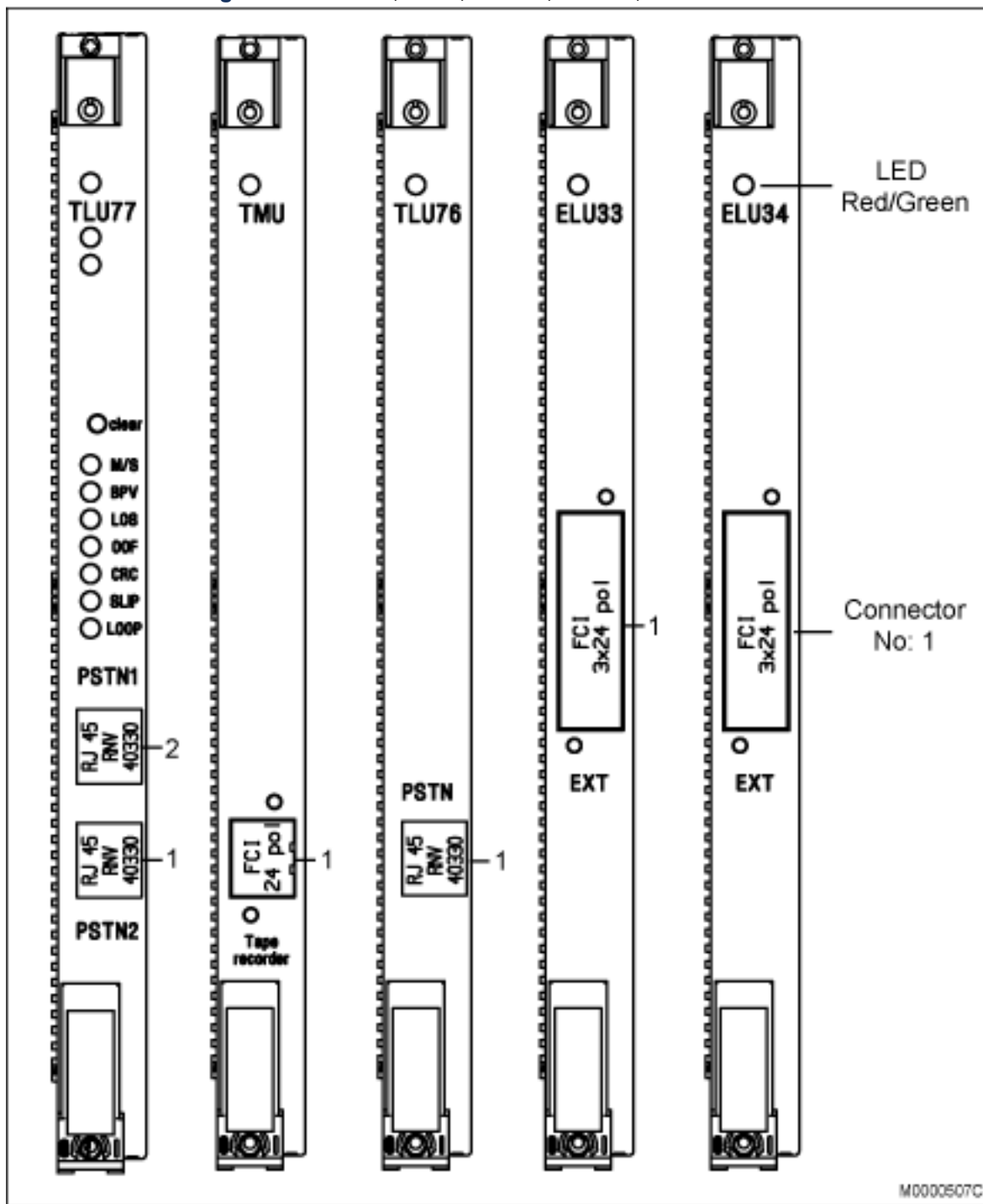
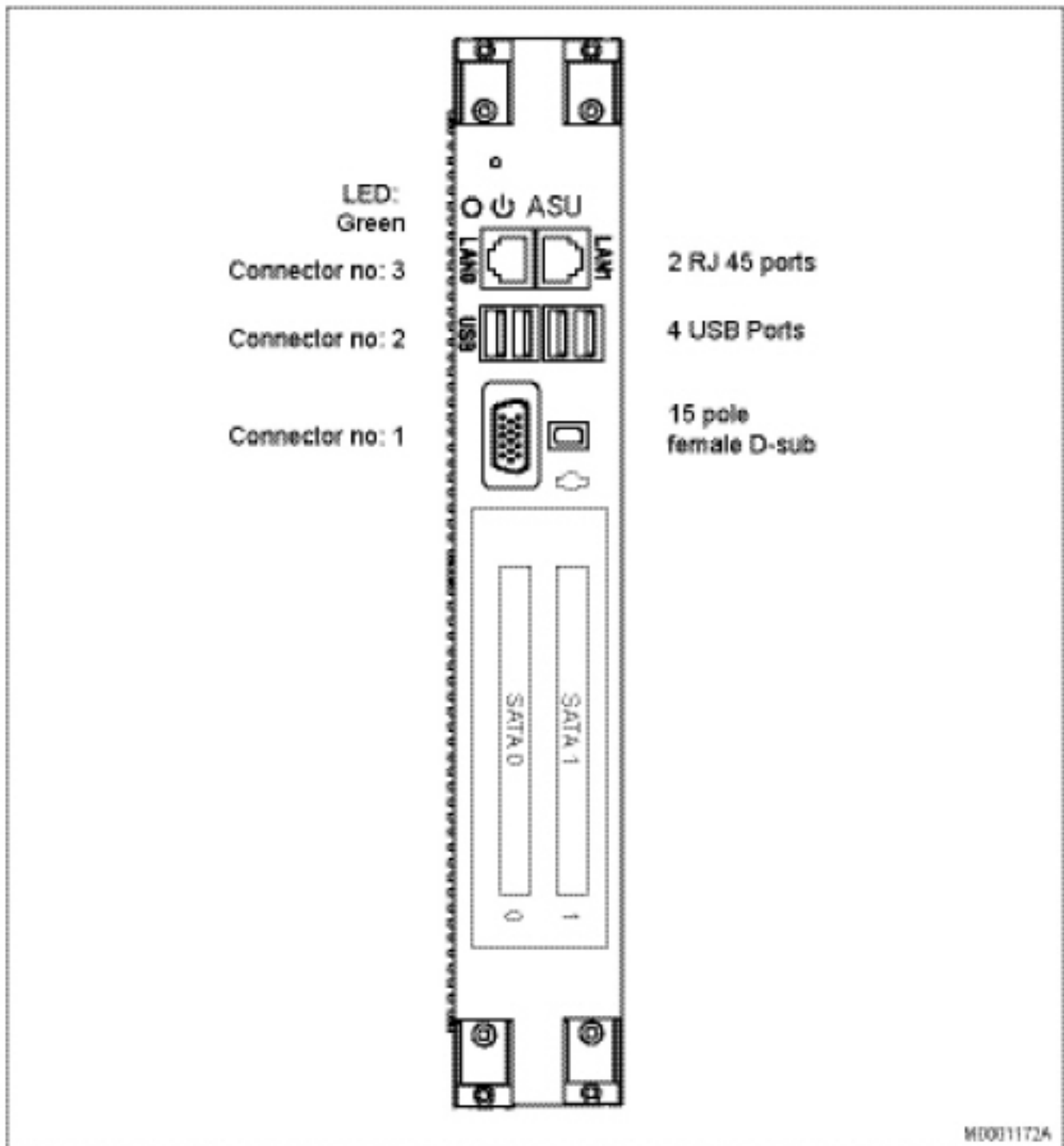


Figure 2.3: ASU Front Connectors



The SATA disks are located behind a cover. Two disks are used for RAID 1.

Figure 2.4: DC/DC Front Connectors and LEDs

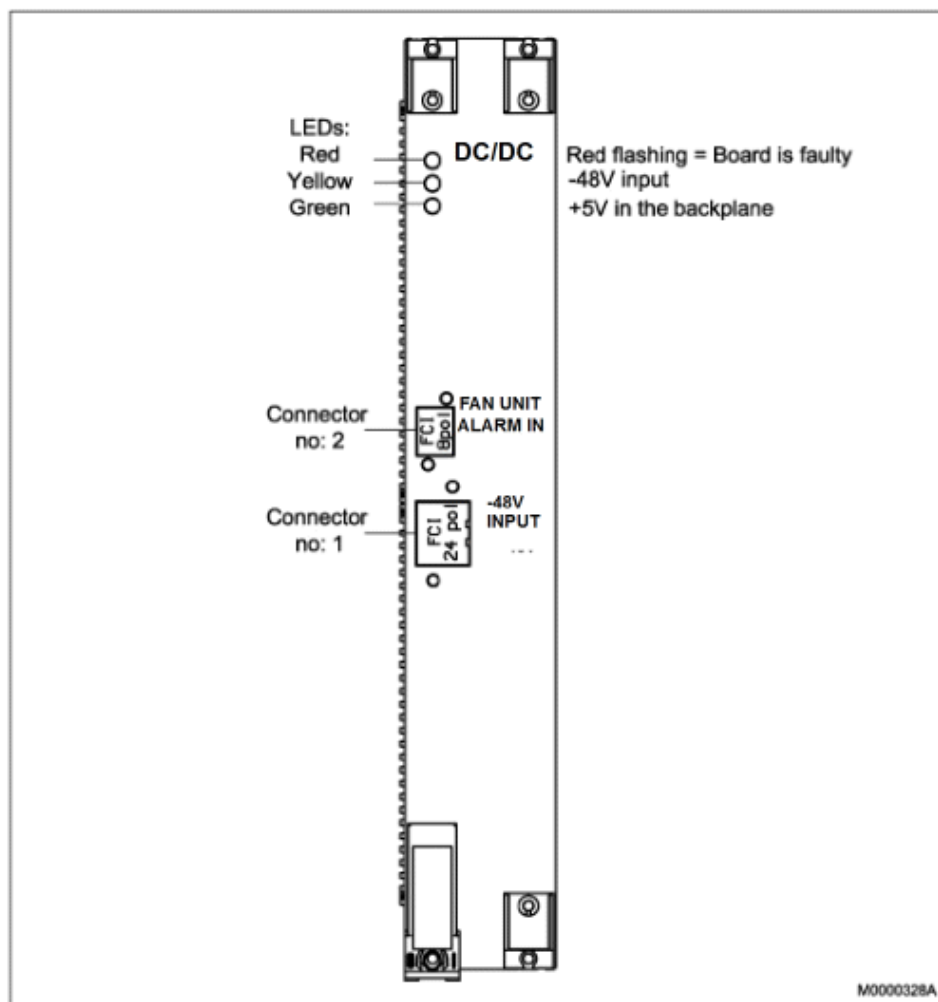
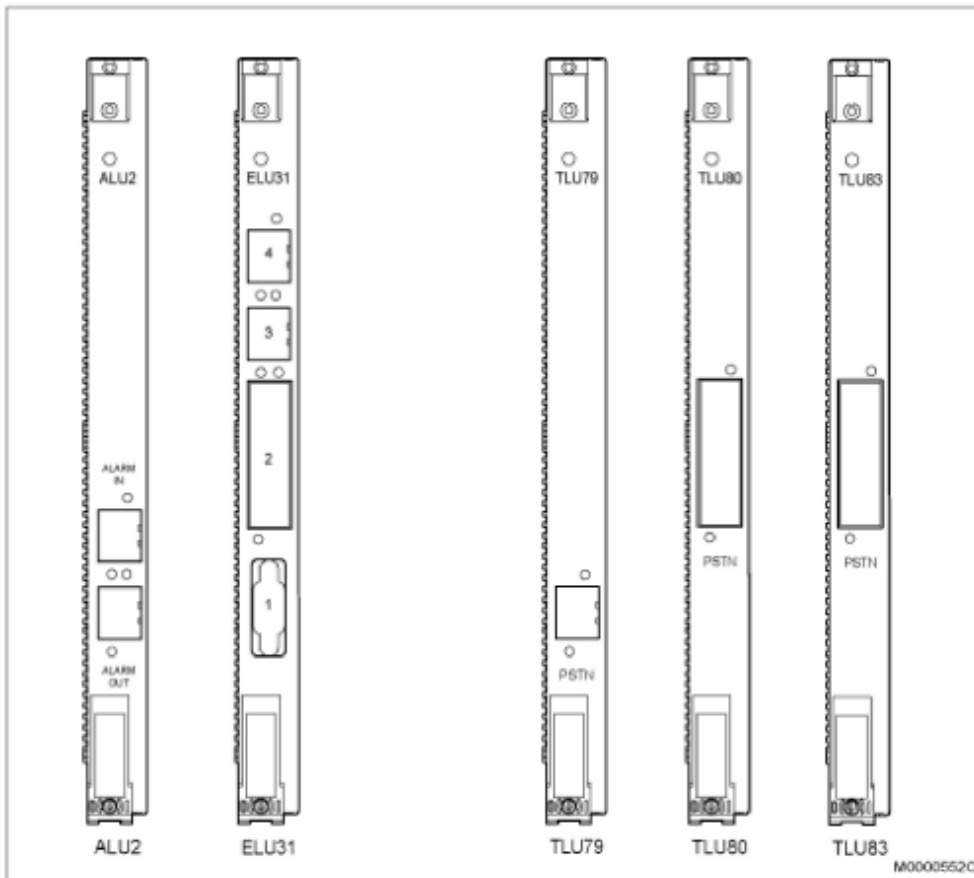


Figure 2.5: ALU2, ELU31, TLU79, TLU80 and TLU83 Fronts

NOTE: ELU26 and TLU79 has equal fronts, only different printing.

Figure 2.6: TLU77 Front Connectors and LEDs

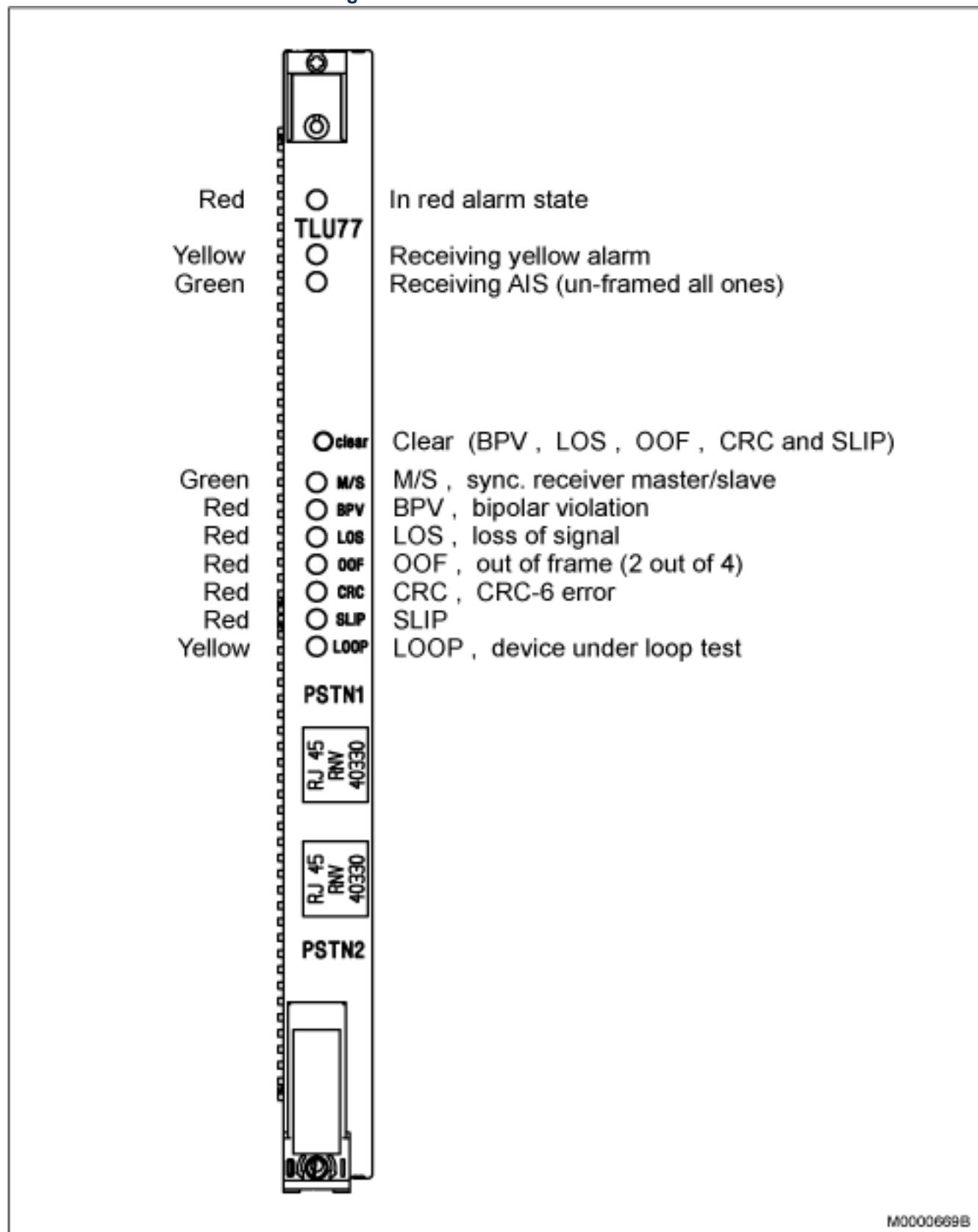
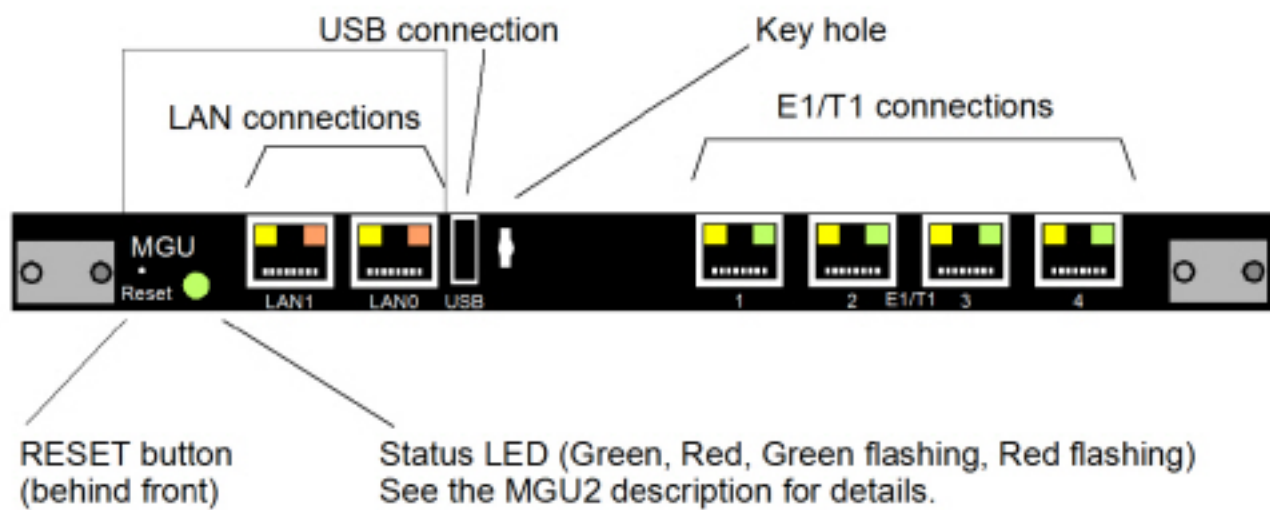


Figure 2.7: MGU2 with 20mm front



Cabling

Cabling involves both internal and external connections on site.

External cabling is the routing of cables for grounding, to power equipment and other external devices. Internal cabling is the routing of cables within a cabinet or between cabinets.

Use the fastener straps (cable tie) provided in material set 25/BYB 501/1 to fasten the cables to the rack, cable chutes, rear sides of chassis and so on. See Table Set of Cable holders (Cable tie).

Table 3.1: Cables in MX-ONE (Sheet 1 of 2)

Unit	Cable Product Number	Remarks
ALU2	TSR 491 0306/20M	to MDF
ASU-III, ASU-II and ASU Lite	61L00002AAA-A	to LAN 1Gbit, RJ45-RJ45, straight. L=2,4 meters
	TSR 482 0211/2400	to LAN, 100Mbit, RJ45-RJ45, straight. L=2,4 meters
	TRS 899 135/1	USB to V.24 adapter cable
Battery, std	61L00006CAA-A	to AC/DC. (included in cable kit 51305284)
Battery	TFL281325/4000	Between batteries for parallel connection
DC/DC-board (7U) 51305286 51305287 5 meter splitter cable to both 7U AND Fan 12 meter splitter cable to both 7U AND Fan	5 meters long to AC/DC, 48V	
	12 meters long to AC/DC, 48V	
		50006938
		50006937
TSR 491 414/32M	to MDF	ELU26
TSR 910 1054/16M, 32M	to MDF	ELU31, ELU33, ELU34
TSR 901 1226/3000, /5000, /15M	Sync-ring	ELU31
TSR 910 1059/32M	to MDF	FTU2
TSR 491 0306/20M	to MDF	MFU/11

Table 3.1: Cables in MX-ONE (Continued) (Sheet 2 of 2)

Unit	Cable Product Number	Remarks
TSR 482 0211/2400, /20M	to LAN 100Mbit or E1/T1 to E1/T1	MGU2
TSR 899 135/1	USB to V.24 adapter cable	
TSR 482 0240/7000	for E1/T1 crossover	
61L00002AAA-A	to LAN 1Gbit, RJ45-RJ45, straight. L=2,4 meters	
TSR 482 0211/2400, /20M	to MDF	TLU76
TSR 482 0211/2400, /20M	to MDF	TLU77
TSR 491 414/32M	to MDF	TLU79
TSR 910 1054/16M, /32M	to MDF	TLU80
TSR 910 1054/16M, /32M	to MDF	TLU83
TSR 491 0306/20M	to MDF	TMU/12
51305285	2 meters to AC/DC, 48V	MX-ONE Lite 3U chassis, 87L00039BAA-A
61L00007AAA-A	for Alarm connection	
51305285	2 meters to AC/DC, 48V	MX-ONE 1U chassis, 87L00032BAA-A
TSR 482 0211/20M	LAN, 100Mbit. RJ45 - RJ45, straight. L=20 meters	Network
61L00002BAA-A	LAN, 1Gbit, RJ45 - RJ45, straight. L= 20 meters	
51305286	5 meters long, -48V	Power to Fan *) and to 7U chassis
51305287	12 meters long, -48V	
50006938	5 meter splitter cable to both 7U AND Fan, -48V	
50006937	12 meter splitter cable to 7U AND Fan, -48V	
TSR 902 0274/2200 TSR 902 0277/2000 SXX 106 2097/1	Alarm cables and plug	Fan *) to alarm
50006936	Splitter 1 to 2. Used when 5 to 8 pcs of 1U/3U chassis are fed from the same power Unit.	Splitter cable for 1U and 3U chassis

*) Fan BFD50908/4

NOTE: Consider the needed cabling for network or server redundancy. For more information, see the description for *MIVoice MX-ONE*, chapter *REDUNDANCY*.

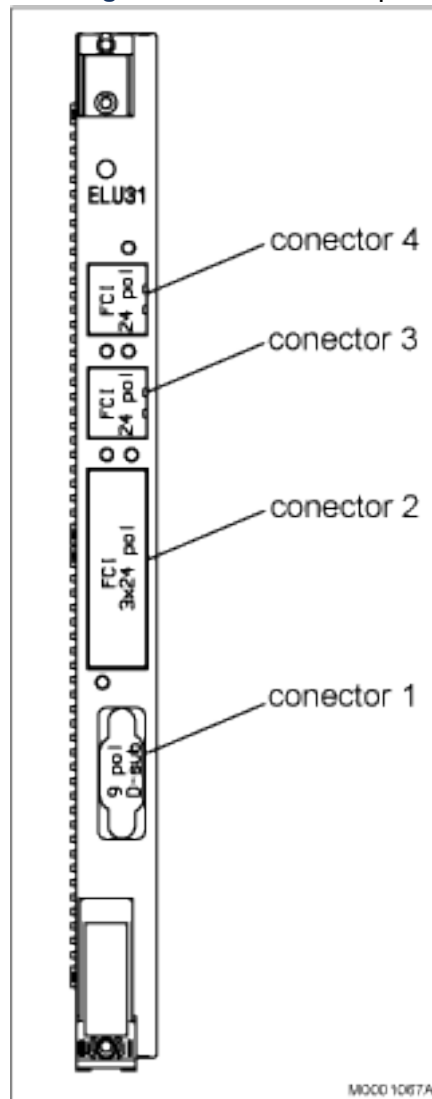
Connector Positions

Only boards with EMC shielded fronts are used in the MX-ONE subracks.

Connector Numbering

The connector positions are marked in numerical order starting from 1 for the lowest connector position, 2 for the position above it and so on.

Figure 3.1: Connectors positioning



Cable Labeling

Product Labeling

Cables have different types of product marking. See Table Cables in MX-ONE for a complete list of available cables.

Label Sets

Every MX-ONE Service Node has a label set with labels that are used to mark the cables in the MX-ONE.

Product Number	Server Number	Product Number	Server Number
SVH 277 030/1	1	SVH 277 030/5	6-10
SVH 277 030/2	2	SVH 277 030/6	11-20
SVH 277 030/3	3	SVH 277 030/7	21-40
SVH 277 030/4	4-5	SVH 277 030/8	> 40 (one for each Server)

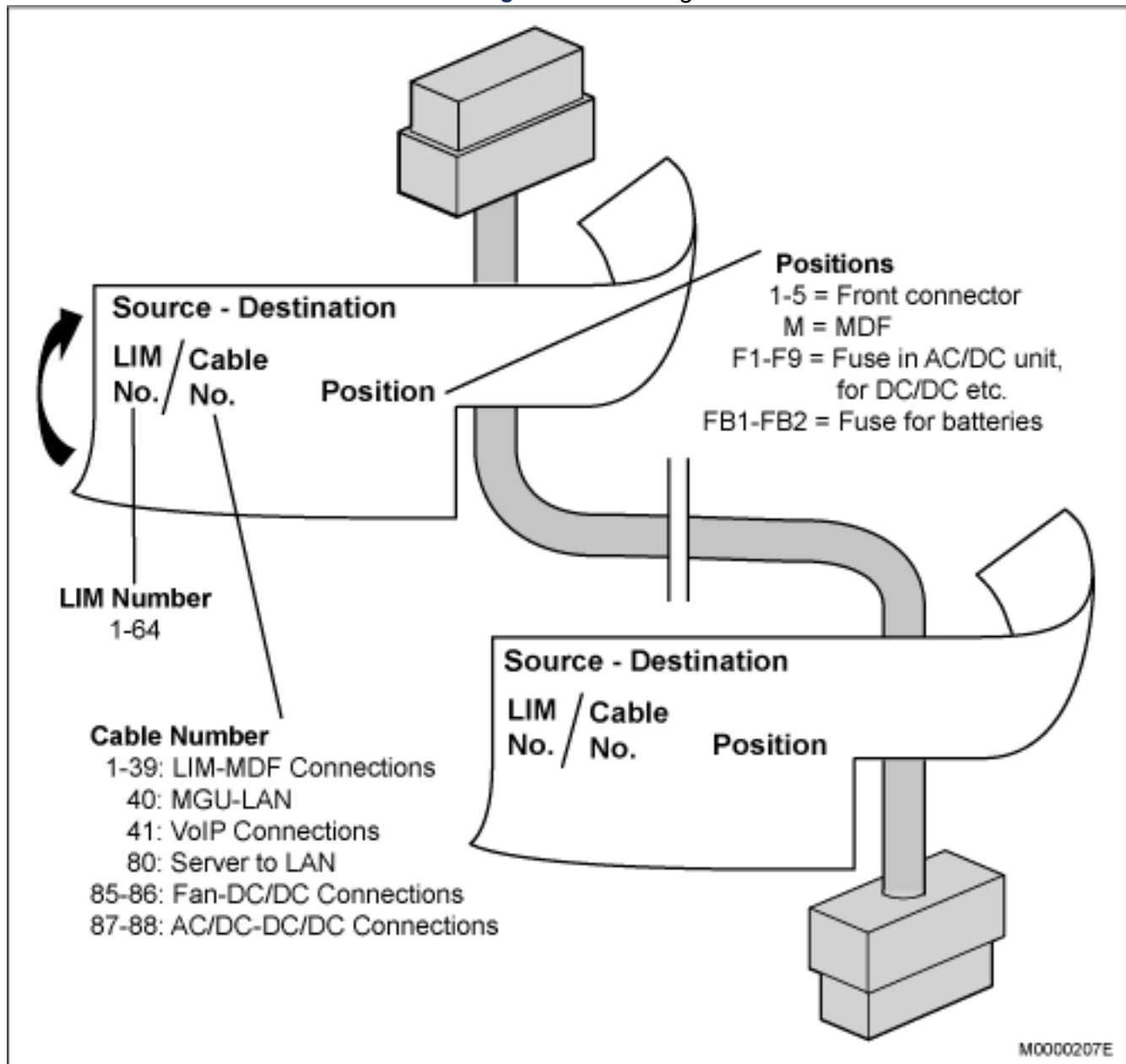
Labeling of Cables

Cables are marked with labels in both ends. The labels contain the following information:

- Cable source
- Cable destination
- Server number
- Cable number
- Position (in boards or other devices) for cable connection

For a general explanation of the information in cable labels.

Figure 3.2: Labeling Cables

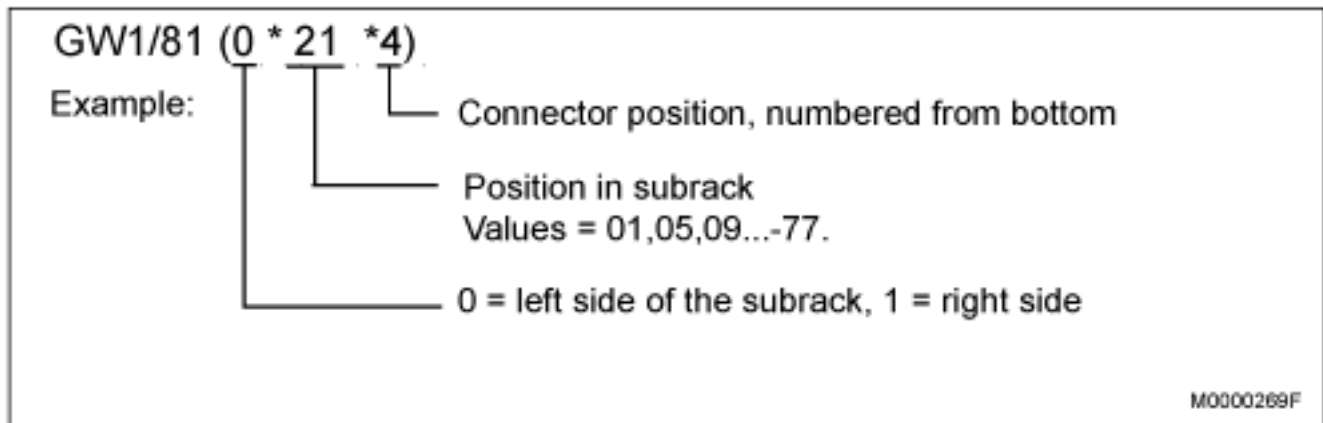


Labeling of Internal Cables

The internal cables connected to fixed positions in the exchange are already labeled at delivery. The label indicates the position of the cable's own connector as well as that of the other end.

For example: GW1/81 (0*21*4) means that for Gateway 1, cable 81 is to be placed on the left side of MGU (0= left, 1= right), board position 21 (01, 05, 09,..., 77), and at connector 4, counted from the bottom.

Figure 3.3: Labeling of cables



Connecting Internal Power Cables

For instructions on how to connect mains cable to the AC/DC unit, refer to manufacturer instructions supplied with the unit.

Refer to local regulations when working with electric power.

Connecting the Batteries to the AC/DC Unit

Work involving batteries must be carried out by personnel with appropriate technical training and experience necessary to be aware of hazards to which they can be exposed.

The battery fuse/circuit breaker is located in the power supply unit. It means that the conductor connected to the negative pole of the battery and to the battery fuse/circuit breaker is an unfused battery conductor.

It is extremely hazardous to work with unfused battery conductors.

NOTE: Before battery conductors are; connected, disconnected or installed, remove the conductor to the negative pole (A) or remove an interconnection bridge (B)

Figure 3.4: Example of Removing the Negative Battery Conductor (A) and an Interconnecting Bridge (B)

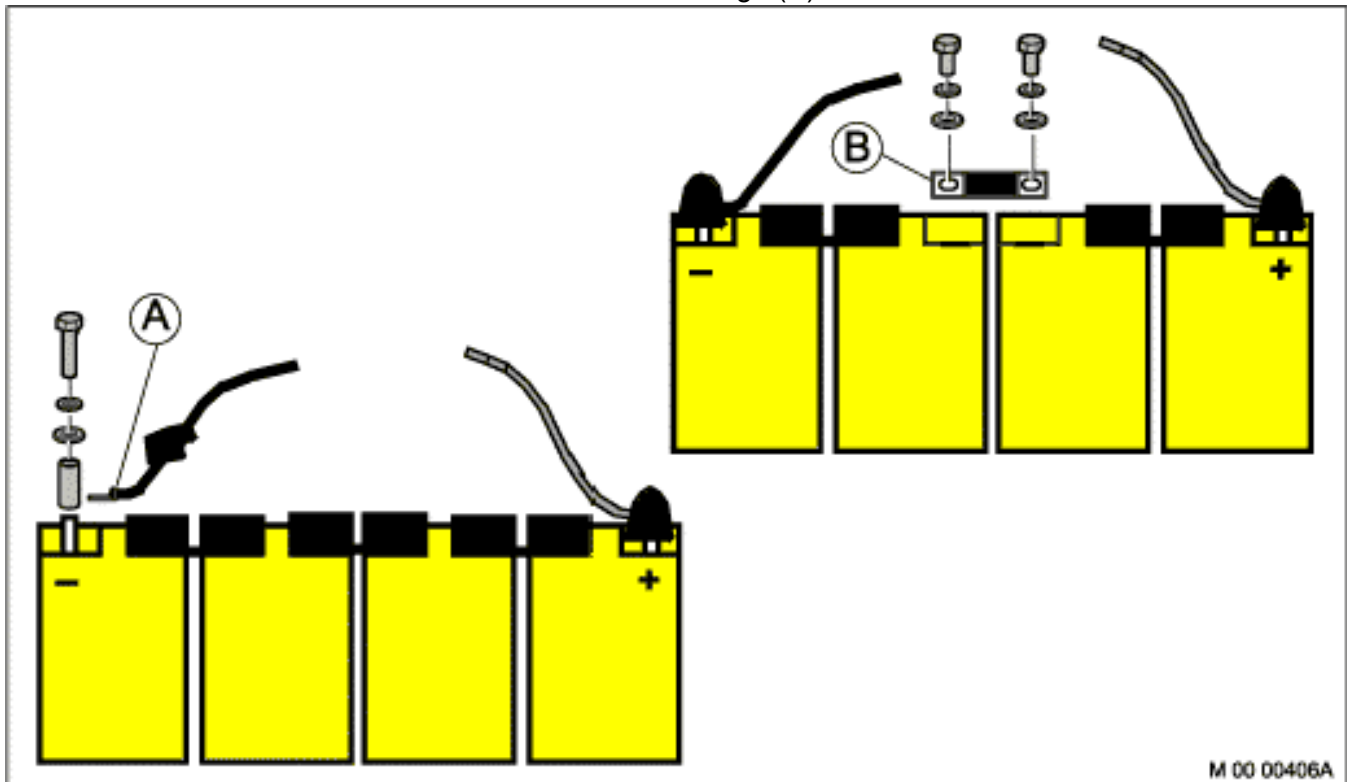
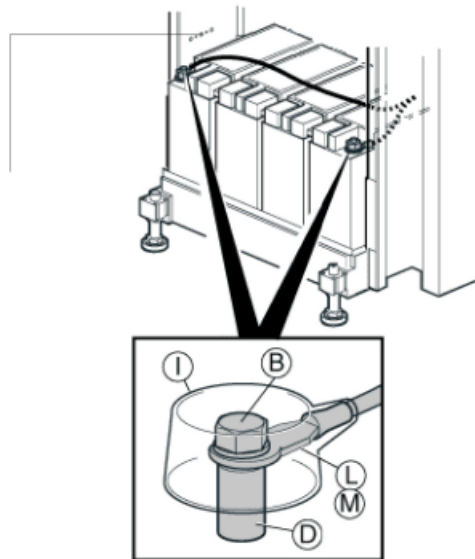


Figure 3.5: Connecting the Batteries



General battery connection:

1. Connect the cable lug (L) of the grey cable to the red plus pole (D) of the right-most battery block.
2. Fasten the screw (B) to secure the cable lug and press down the cover (I) on the red plus pole (D).
3. Connect the cable lug (M) of the black cable to the minus pole (D) of the leftmost battery block.
4. Fasten the screw (B) to secure the cable lug and press down the cover (I) on the black minus pole (D).

5. Connect the other end of the cable (blue connector) to the Power Unit. It is positioned at the rear side of the unit.

Connecting the AC/DC Unit to MX-ONE

See suppliers documentation for correct connection to the AC/DC.

When connecting cables in the AC/DC unit, always fasten nearby cables to each others and to any cable cloth or frame using fastener straps included in the 25/BYB 501/1. This to relieve the force on the connections.

Table 3.2: Set of Cable holders (Cable tie)

25/BYB 501/1 Set for cables		
Title/Function	Product Number	Quantity
HOLDER FOR STRAP	SXA 123 0411/2	40
CABLE CLAMP (STRAP)	SET 103 02	40

NOTE: Do not cut the cables. The shortest length of the cables from the AC/DC unit to the DC/DC board must be 5 meters.

Connecting to the Mitel 48V Power Cables for ABB PSU

Table 3.3: Mitel 48V Power Cables for ABB PSU

Mitel 48V Power Cables for ABB PSU		
Power Cables	Mitel P/N	ABB Description
2 m cable for 1U and 3U chassis	TSR9020279/2000	Power cable 48V 2m (Max Amper? (2x0,75mm, 4 pole connector on 1U and 3U chassis)
5 m cable for 7U chassis or Fan Unit	TSR903021/5000	Power cable 48V 5m
12 m cable for 7U chassis or Fan Unit	TSR903021/12M	Power cable 48V 12m
Splitter cable 7U DC/DC and Fan, 5 m	-	MiV MX-ONE48V7U&FanPwercble 5m (Similar to 50006937)
Splitter cable 7U DC/DC and Fan, 12 m	-	MiV MX-ONE48V7U&FanPwercble12m (Similar to 50006938)
Splitter for 1U/3U units, 20cm	-	MiV MX-ONE48VSplitterCable1to2 (Similar to 50006936)

NOTE: Do not cut the cables. The shortest length of the cables from the AC/DC unit to the DC/DC board must be 5 meters.

Connecting AC/DC-Unit 51305282 to Mains

The Power Unit have IEC connector on the rear side. Connect the mains cables and secure them to avoid power breakdown.

Connecting AC/DC to the LAN

The Power Unit 51305282 can be equipped with a communication module, the PCC Unit, 5130283. This unit communicate via the LAN. For details about functionality and configuration, see suppliers data sheet/manual.

Connecting Power (-48V) to Fan Unit BFD50908/4

Two types of cables can be used to Power the Fan Unit. Single cables or Splitter cables.

- **Single Cables:** Connect the Power to the fan unit using cable 51305286, 5 meter long or 51305287, 12 meters long, see item (1) in Fig. see Figure Single cables to the Fan Unit BFD50908/4 and to 7U chassis.
- **Splitter cables:** Connect the Power to the fan unit using cable 50006938, 5 meter long or 50006937, 12 meters long, see item (1) in Fig. see Figure Splitter Cable to the Fan Unit BFD50908/4 and to 7U chassis.

NOTE: If Alarm handling is required, cables marked with *) are also needed. For alarm cables and plugs, see MiVoice MX-ONE Classic with Power Unit.

NOTE: If only one Power cable is connected to the Fan Unit, the alarm on the Fan will be activated. This is not possible to re-configure. To avoid the alarm in the Fan, feed the Fan unit with 2pcs of Power cables or use the Splitter cables.

Figure 3.6: Single cables to the Fan Unit BFD50908/4 and to 7U chassis

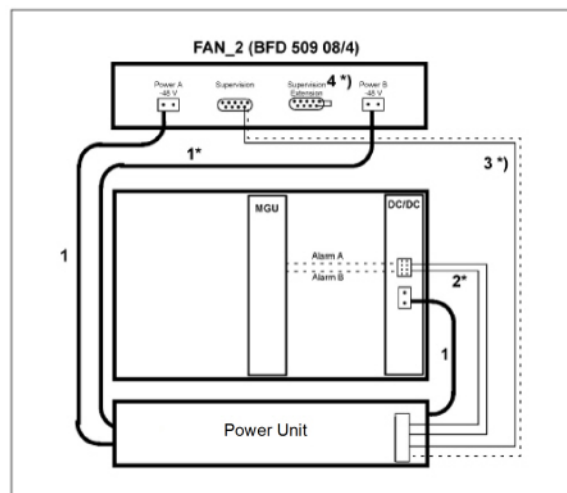
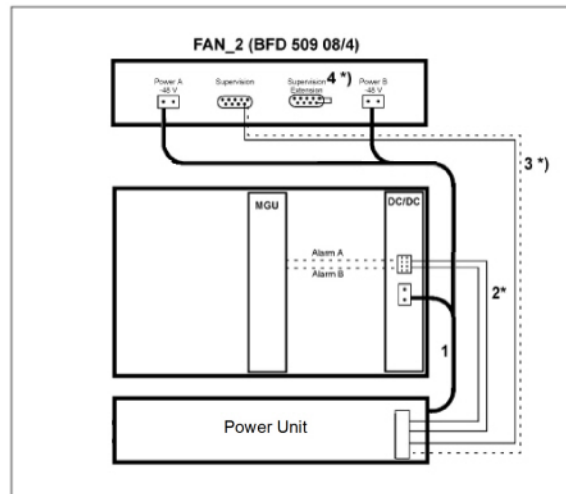


Figure 3.7: Splitter Cable to the Fan Unit BFD50908/4 and to 7U chassis

Connecting Power to 1U Chassis 87L00032BAA-A

Connect the -48V DC power to the 1U chassis using cable 51305285. The connector on the 1U chassis is located on the rear side of the chassis.

The 1U chassis can be fed also with mains power 100-240VAC. This connector is also located on the rear side.

NOTE: If more that 4 pcs of 1U chassis and/or 3U chassis are feed with -48V in one system, the power ports in the Power unit are not enough (4 ports). Then a splitter cable can be used to feed 2pcs of 1U/3U chassis per power port. This splitter cable is 50006936.

NOTE: only 2 chassis can be feed from one port in the Power Unit.

Connecting Power to 3U Chassis 87L00039BAA-A

Connect the -48V DC power to the 3U chassis using cable 51305285. The connector on the 3U chassis is located on the rear side of the chassis.

The 3U chassis can be fed also with mains power 100-240VAC. This connector is located on the rear side.

NOTE: If more that 4 pcs of 3U chassis and/or 1U chassis are feed with -48V in one system, the power ports in the Power unit are not enough (4 ports). Then a splitter cable can be used to feed 2pcs of 1U/3U chassis per power port. This splitter cable is 50006936.

NOTE: only 2 chassis can be feed from one port in the Power Unit.

Connecting Power (-48V) to 7U Chassis BFD76140

Two types of cables can be used to Power the 7U chassis. Single cables or Splitter cables.

- **Single Cables:** Connect the -48V power to the DC/DC-board using cable 51305286, 5 meter long or 51305287, 12 meters long, see item (1) in Fig. see Figure, Single cables to the Fan Unit BFD50908/4 and to 7U chassis.

- **Splitter cables:** Connect the -48V power to the DC/DC-board unit using cable 50006938, 5 meter long or 50006937, 12 meters long, see item (1) in Fig. and continue with the remaining of the cable to the Fan unit. see Figure: Splitter Cable to the Fan Unit BFD50908/4 and to 7U chassis.

Connecting Cables

Some cables are pre-connected at delivery, depending on equipment configuration ordered.

Use the figure and the table below to connect cables, or to verify that the cables are correctly connected.
For cable connections to board positions

Always verify that the cable markings correspond before connecting cables.

For a list of cables, including source and destination for every cable

Do not cut extension cables shorter than 3.5 m. This might disturb the function in the system.

Figure 3.8: Cable Connections Configure Example

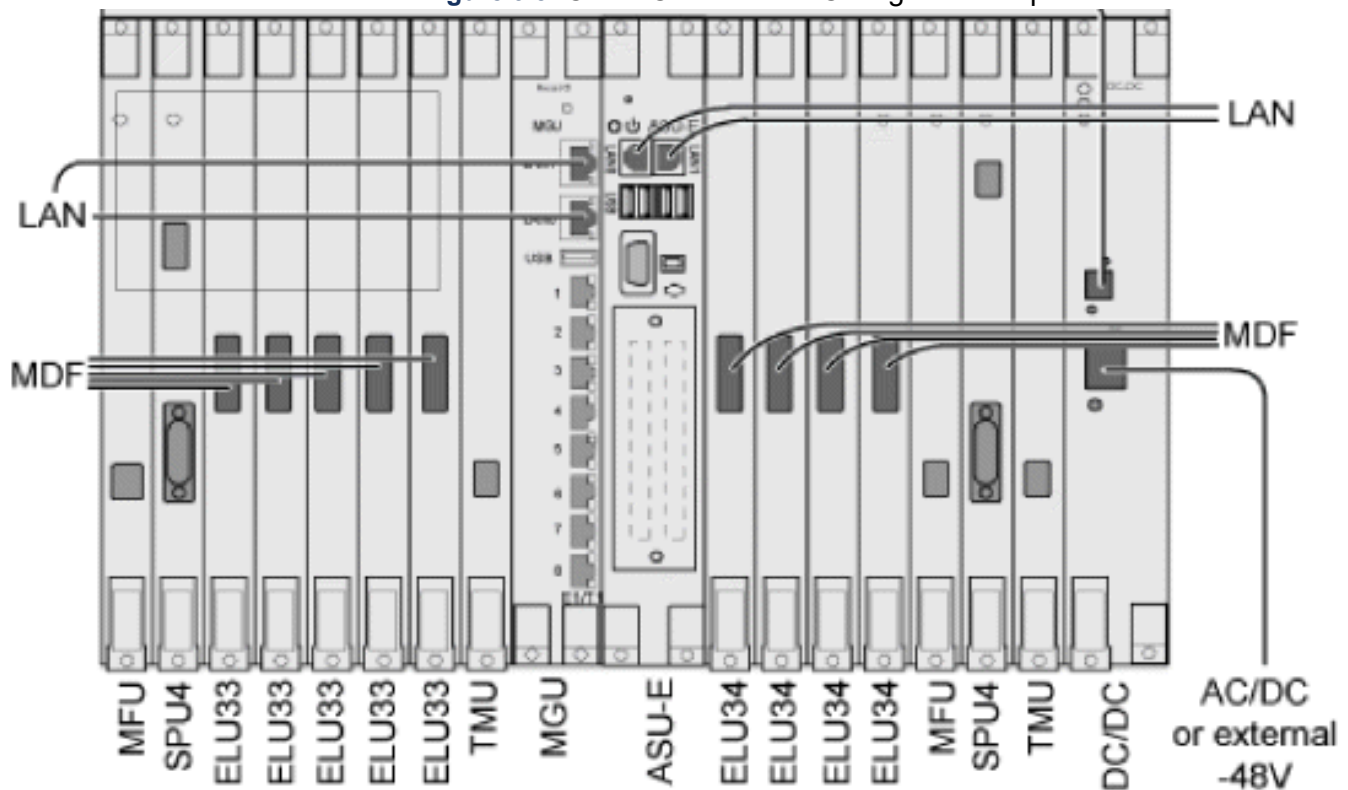
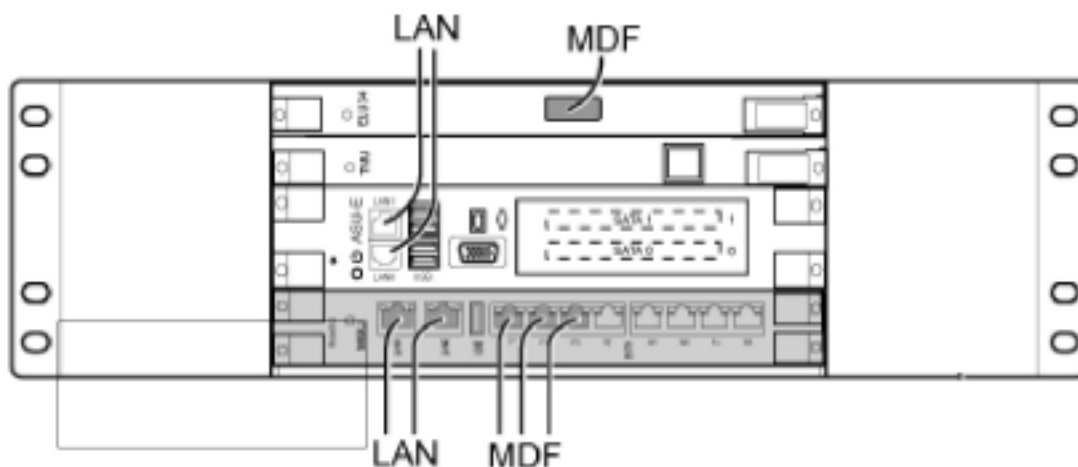


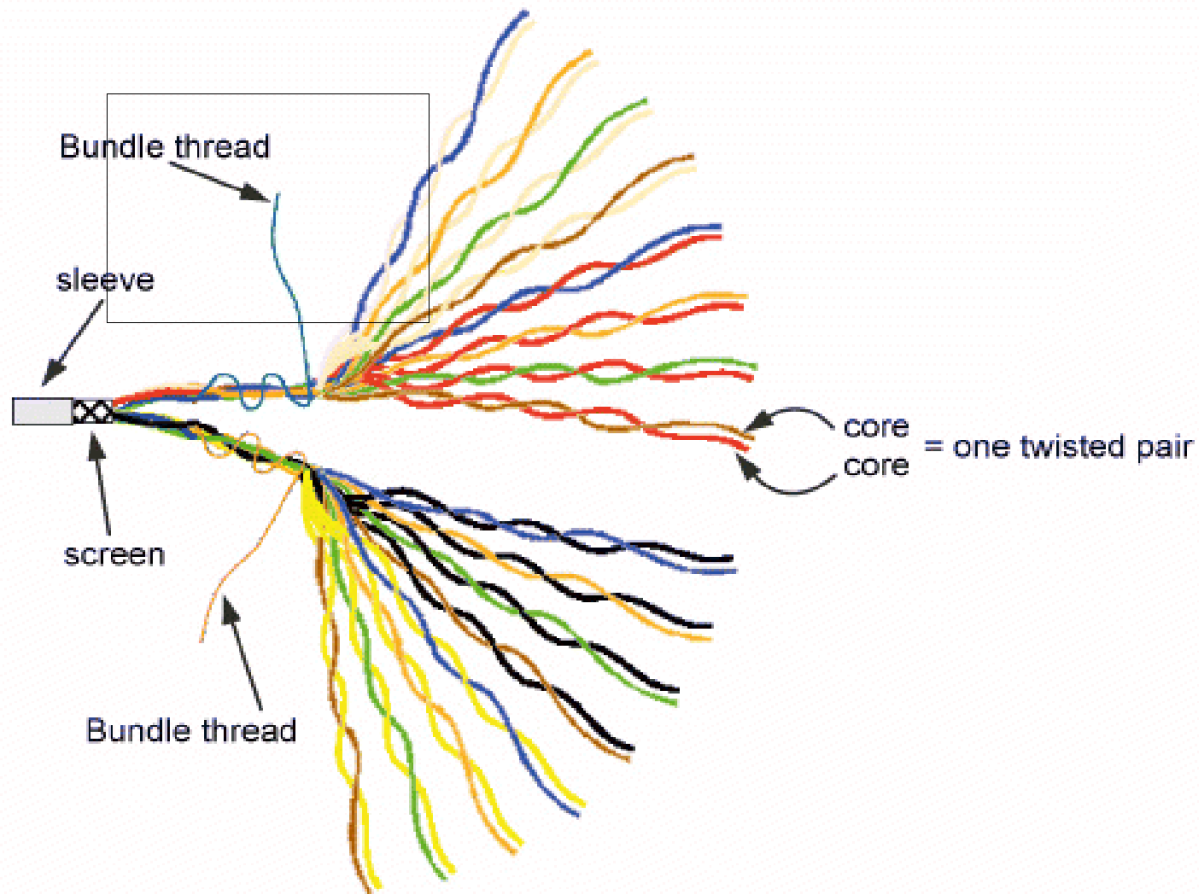
Figure 3.9: MX-ONE Lite cabling example

The MGU is connected to a server via the corporate LAN (i.e. a Switch). This is also valid when multiple gateways are connected to a server.

Extension and Trunk Line Cable Structure

The twisted pair cable used for Extension and trunk lines in the MX-ONE is delivered with 32 pairs. The cable is structured either with 8 pairs in 4 bundles, 2 blue and 2 orange bundles, or, with 16 pairs in 2 bundles, 1 blue and 1 orange. Each bundle is kept together with a bundle thread.

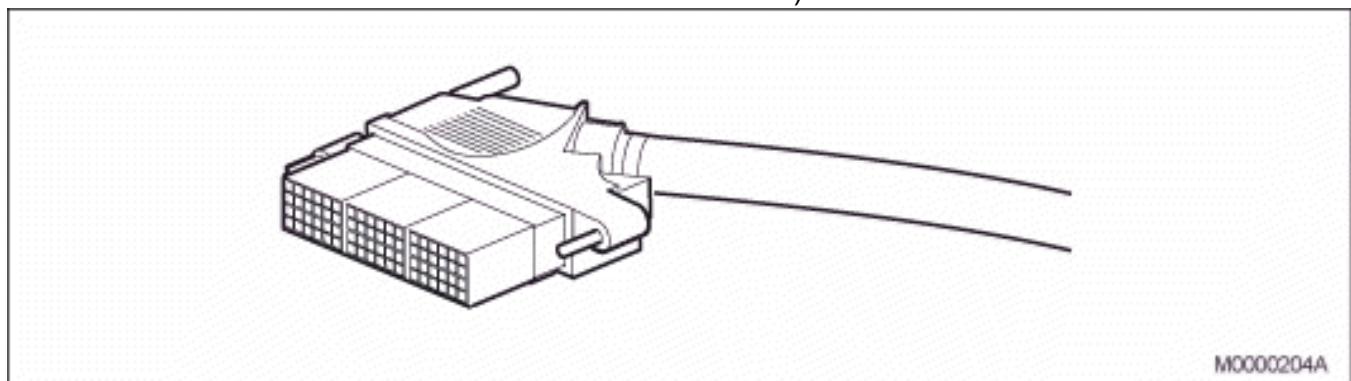
Figure 3.10: Cable Structure



The cables connected to the extension and trunk boards are connected on the other end to external telephone lines through the Main Distribution Frames (MDF). The following tables specify the color coding of the 32 pair cable used for ELU33, ELU34, and other boards, and the connection cable used for TLU76, TLU77 and ELU26, TLU79.

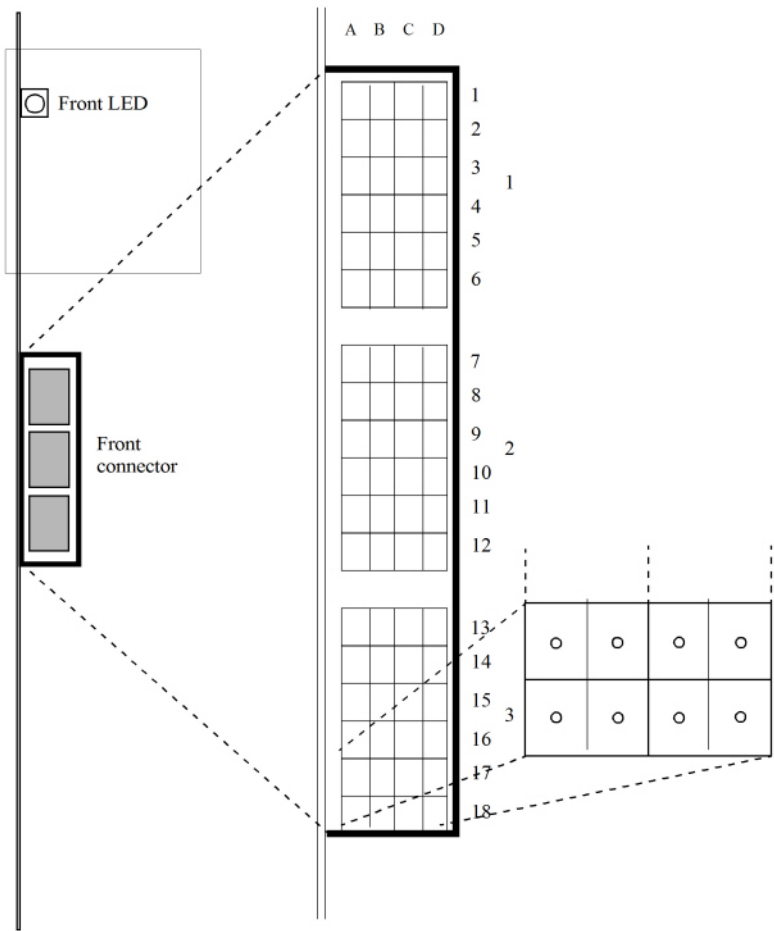
Use the tables below to connect extension and trunk cables to the MDF. Note, that the screen also shall be grounded on the MDF-side, due to the demand of Multi point earthing. See document 19/1531-ASP11301.

Figure 3.11: 32 pair cable for ELU33, ELU34, ELU31, TLU80 and TLU83 (TSR 910 1054/16M or 32M)



ELU33, ELU34, ELU31/4 and TLU80 Cable Structure

Figure 3.12: Front view



NOTE: ELU34 has to have individual 0 activated as the first individual and removed as the last individual, or else the communications with the board will fail.

Table 3.4: Color Coding in 32 Pair Cable for ELU33, ELU34 and ELU31 (Sheet 1 of 2)

Pair	Core	Color	Bund le	Conn ector		Pair	Core	Color	Bund le	Conn ector
1	a	White		D18		21	a	White		D9
	b	Blue		C18			b	Blue		C9
2	a	White		A17		22	a	White		A8
	b	Oran ge		B17			b	Oran ge		B8

Table 3.4: Color Coding in 32 Pair Cable for ELU33, ELU34 and ELU31 (Continued) (Sheet 2 of 2)

Pair	Core	Color	Bund le	Conn ector		Pair	Core	Color	Bund le	Conn ector
3	a	White		D17		23	a	White		

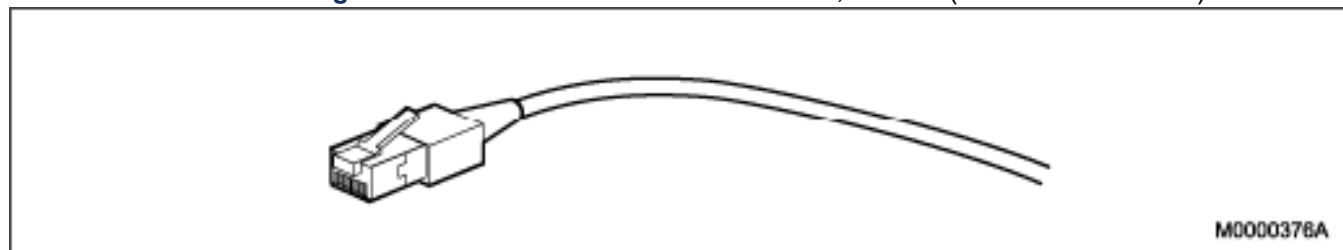
TLU83 Cable Structure

The TLU83 board uses the same type of 32 pair cable but it is organized differently. TLU83 uses 12 pairs for its 12 trunk line individuals, called TL Ind in the table below. Core **a** is used for Tip and core **b** is used for Ring in each pair. The three upper rows go to 0 V, marked GND. Connectors in rows 7 to 14 are used. The remaining 14 wire pairs are not connected and marked NC.

Table 3.5: Color Coding in 32 Pair Cable for TLU83 (TSR 910 1054/16M or 32M)

Pair/T L Ind	Core	Color	Bundl e	Conn ector		Pair/T L Ind	Core	Color	Bundl e	Conn ector
1/ NC	a	White		D18		21/ 8	a	White		D9
	b	Blue		C18			b	Blue		C9
2/ NC	a	White		A17		22/ 9	a	White		A8
	b	Orang e		B17			b	Orang e		B8
3/ NC	a	White		D17						

TLU76 and TLU77 Cable Structure

Figure 3.13: Connection Cable for TLU76, TLU77 (TSR 482 0211/xxx)**Table 3.6:** Color Coding in Cable for TLU76, TLU77 (TSR 482 0211/xxx) (Sheet 1 of 2)

Pair	Core	Color	Pinn No.	Description
1	A	Blue/White	5	Tx+
	B	Blue	4	Tx-

Table 3.6: Color Coding in Cable for TLU76, TLU77 (TSR 482 0211/xxx) (Continued) (Sheet 2 of 2)

Pair	Core	Color	Pinn No.	Description
2	A	Orange/White	1	Rx+
	B	Orange	2	Rx-
3	A	Green/White	3	Shield
	B	Green	6	Shield
4	A	Brown/White	7	NC
	B	Brown	8	NC

ELU26 and TLU79 Cable Structure

Table 3.7: Color Coding in Cable for ELU26 and TLU79 (TSR 491 414)

Pair	Core	Color	Connector	Description
1	A	White	C6	Individual 0
	B	Blue	D6	TX+, TX-
2	A	White	A6	Individual 1
	B	Orange	B6	TX+, TX-
3	A	White	C5	Individual 0
	B	Green	D5	RX+, RX-
4	A	White	A5	Individual 1
	B	Brown	B5	RX+, RX-
6	A	Red	C4	Individual 2
	B	Blue	D4	TX+, TX-
7	A	Red	A4	Individual 3
	B	Orange	B4	TX+, TX-
8	A	Red	D3	Individual 2
	B	Green	C3	RX+, RX-
9	A	Red	B3	Individual 3
	B	Brown	A3	RX+, RX-

MGU and MGU2 Cable Structure

Table 3.8: Color Coding in Cable for MGU E1/T1 connection (TSR 482 0211/xxx)

Pair	Core	Color	Pinn No.	Description
1	A	Blue/White	5	Tx+
	B	Blue	4	Tx-
2	A	Orange/White	1	Rx+
	B	Orange	2	Rx-
3	A	Green/White	3	Shield
	B	Green	6	Shield
4	A	Brown/White	7	NC
	B	Brown	8	NC

Connection of External Cables

Cabling to the MDF uses prefabricated cables.

Twisted, shielded, pair-cables are to be used for cabling between the PBX and MDF or PBX and PBX (Media Gateway - Media Gateway).

The cable length from the exchange to the MDF shall not be shorter than 3 meters (118 inches).

Line Lengths

ELU26

The following three connection alternatives are based on the usage of a 75 ohm twisted pair cable, 120 nF/km and wire 0.6 mm or a 150 ohm twisted pair cable, 30 nF/km and wire 0.6 mm or 125 ohm/km DC.

- 1000 m, point-to-point with one terminal.
- 500 m, extended passive bus with 8 terminals.
- 100 m, short passive bus with 8 terminals.

ELU31

For information see Installation Instructions for CORDLESS PHONES.

ELU33

600 m if using a twisted pair cable with wire diameter 0.4 mm.

1000 m if using a twisted pair cable with wire diameter 0.5 mm, point-to-point with one terminal.

ELU34

6000 m if using a twisted pair cable with wire diameter 0.4 mm.

9000 m if using a twisted pair cable with wire diameter 0.5 mm.

TLU76

260 m if using a 120 ohm twisted pair cable without repeater

TLU77

260 m if using a 120 ohm twisted pair cable without repeater

TLU79

see Figure Connecting TLU79 to TLU79 through MDF (8 pairs).

TLU80

7000 m if using a twisted pair cable with wire diameter 0.4 mm. 11000 m if using a twisted pair cable with wire diameter 0.5 mm.

TLU83

5000 m if using a twisted pair cable with wire diameter 0.4 mm.

8000 m if using a twisted pair cable with wire diameter 0.5 mm.

Analog Extensions ELU34

ELU34 is a 32 individuals analog extension line unit intended for normal analog telephones, with functionality for both message waiting and call metering. A parallel telephone, an extra bell or a FAX can be connected to an ELU34.

NOTE: ELU34 has to have individual 0 activated as the first individual and removed as the last individual, or else the communications with the board will fail.

NOTE: If done in the wrong order individuals will be blocked.

NOTE: An external primary protection circuit shall be used as an additional protection when outdoor lines from other buildings are connected to the board. This protection circuit must have a striking voltage higher than 280 VDC.

NOTE: A remaining high voltage may remain on the board when the board is removed from the subrack with the power still on, a so called “hotswap”. Do not touch the board component or solder points for a few minutes after the removal. To reduce the high voltage to a safe level, leave the board un-plugged in the subrack for at least 15 seconds.

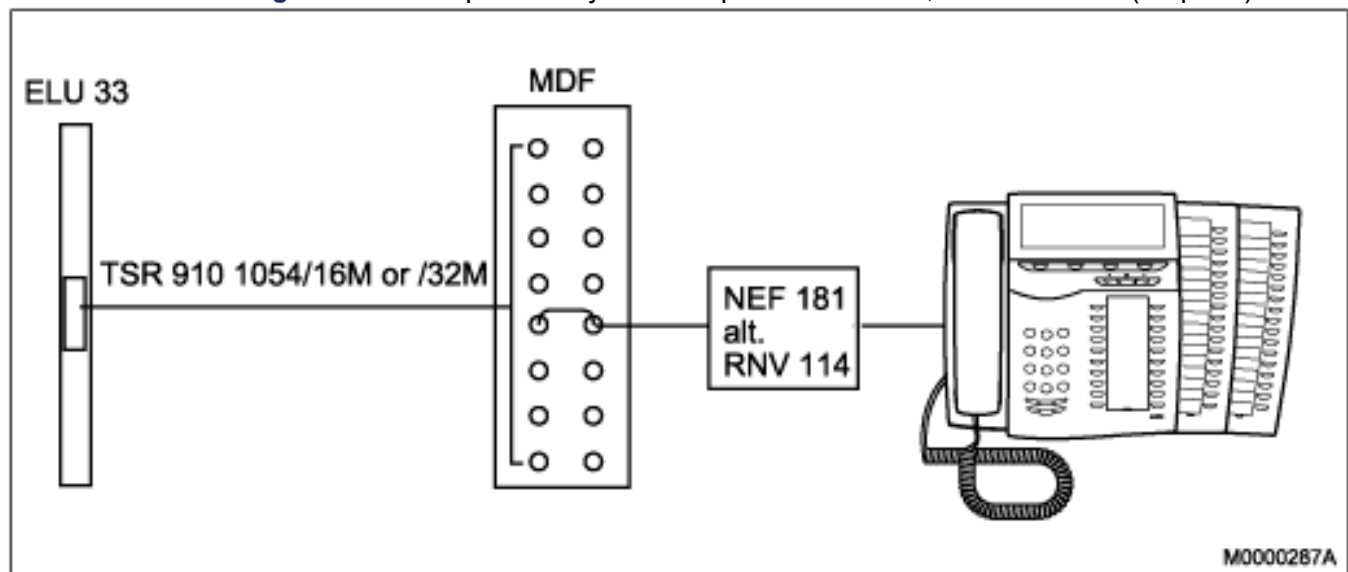
Digital Extensions

As an example, digital system telephones may have the type designations DBC 2XX connected to ELU33. Only one system telephone per line can be connected, no parallel telephone or extra bell.

NOTE: The board must not have any open cable ends.

ELU33

Figure 5.1: Example with system telephone DBC 2xx, ELU33 - MDF (32 pairs)



The installation instructions 1/LZT 102 537 and 1/LZT 102 762 show how the wires are connected to terminal block NEF 181 or RNV 114. Regarding connection of system telephone DBC 2xx:

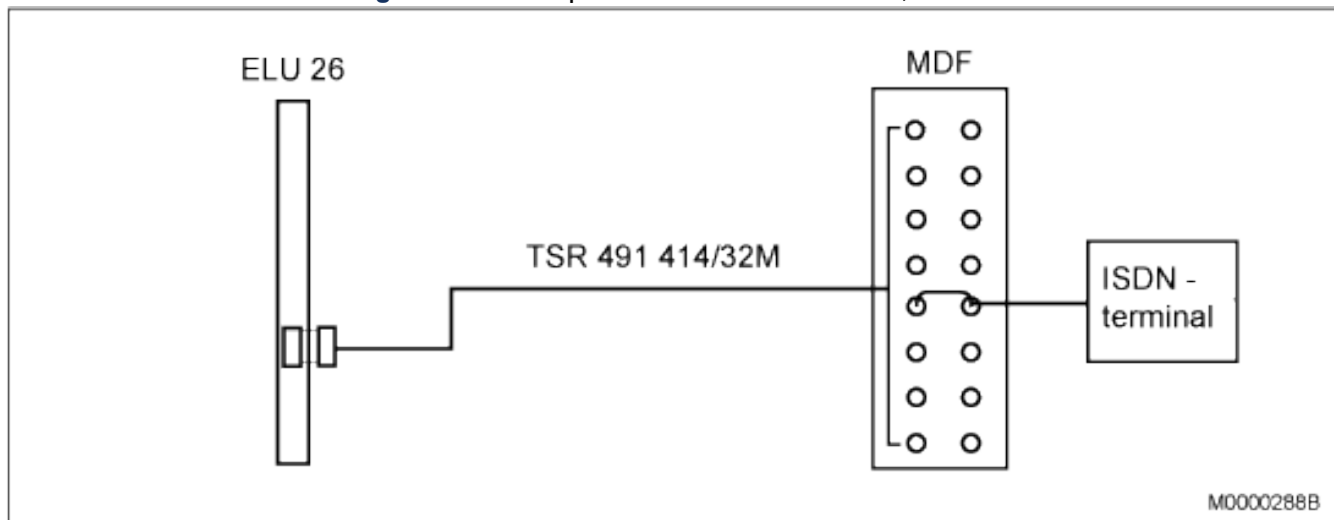
see the installation instructions for *TELEPHONE SET DBC 220 01*

see the installation instructions for *TELEPHONE SETS DBC 222 01, DBC 223 01, DBC 224 01, DBC 225 01, KEY PANEL UNIT DBY 419 01 AND OPTION UNIT DBY 420 01.*

NOTE: ELU33 has to have individual 0 activated as the first individual and removed as the last individual, or else the communications with the board will fail. If done in the wrong order individuals will be blocked.

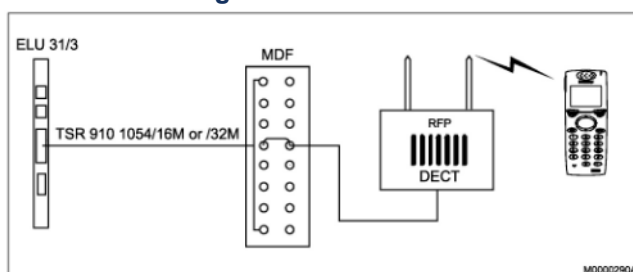
ISDN Extensions with ELU26

The ISDN-terminals are connected to the ELU26 board in the PBX through the MDF.

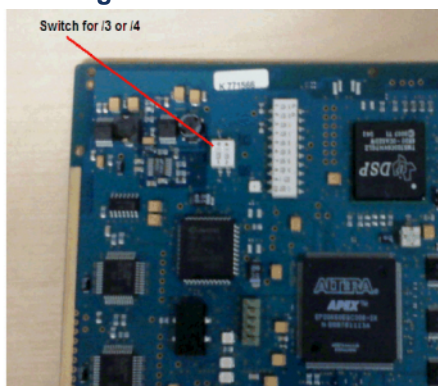
Figure 5.2: Example with an ISDN-terminal, 4-wire connection

Cordless Extensions ELU31

To the ELU31/4, radio base stations, RFPs, are to be connected, see Figure ELU31/4 MDF - RFP on page 35. For more information, see Installation Instructions for CORDLESS PHONE.

Figure 5.3: ELU31/4 MDF - RFP

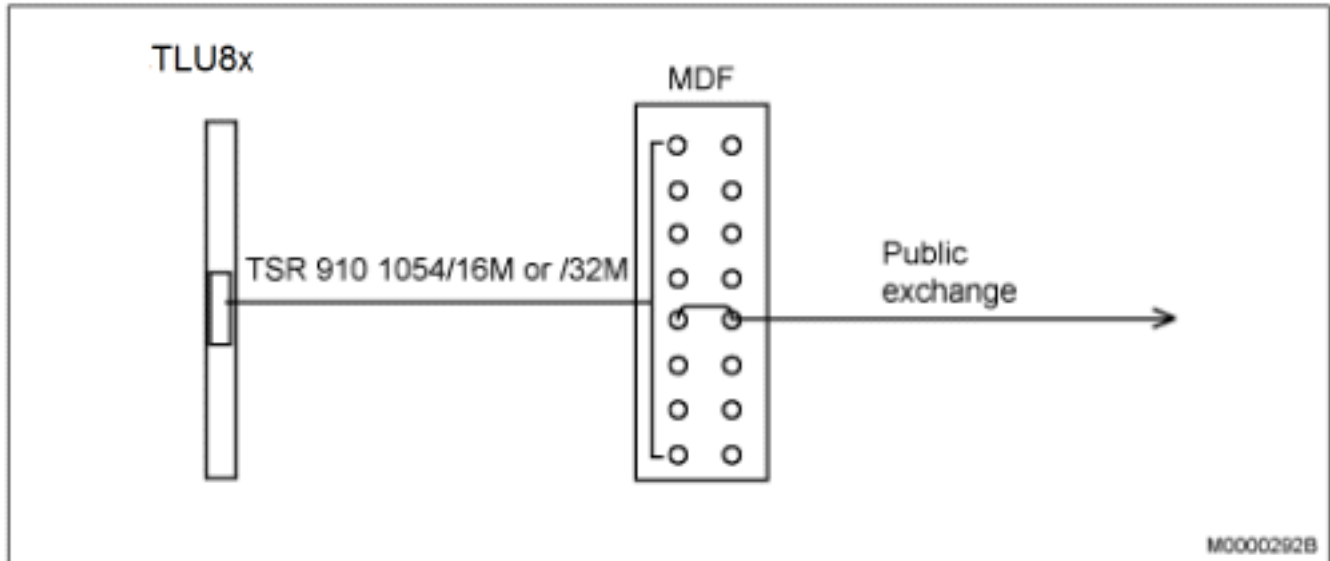
NOTE: ELU31/4 can today be used in /3 or /4 mode. Check that the switch, both poles, are in correct position.

Figure 5.4: ELU31/4 - location of switch

Analog External Lines, TLU80 and TLU83

Analog external lines are connected to analog TLU boards.

Figure 5.5: TLU8x - MDF example



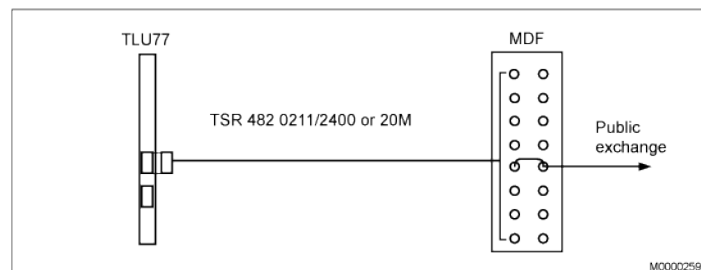
Digital External Lines

NOTE: If the ISDN T1 interface shall be connected outside the premises, it is mandatory to connect the T1 lines via a Network Terminal 1 (NT1), Channel Service Unit (CSU) or National Certified Terminal Equipment (NCTE) interface. This is essential in order to comply with US and CA regulatory safety requirements in force.

TLU77

Color coding for TLU77 with cable TSR4820211/xxx see item TLU76 and TLU77 cable structure.

Figure 5.6: TLU77, 120ohm pair cable

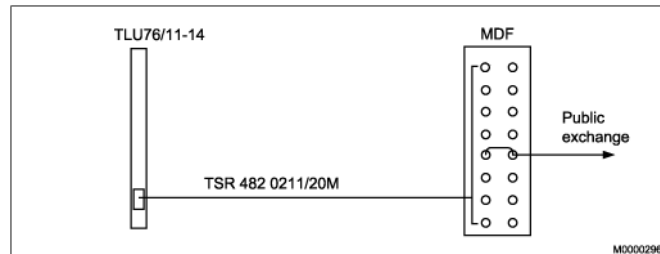


ISDN

ISDN PRI with TLU76/11

Color coding for TLU76 with cable TSR4820211/xxxx see item TLU76 and TLU77 cable structure.

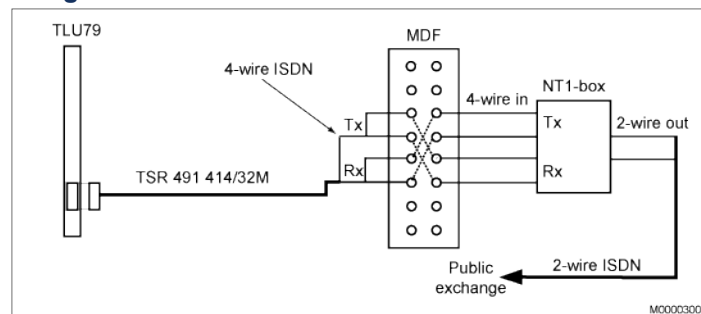
Figure 5.7: Digital external lines 120 ohm pair cable, TLU76/11 - /14



Digital external lines with TLU79 and an NT1-box, Network Terminal-box.

Color coding for TLU79 with cable TSR491414/xxx see item ELU26 and TLU79 cable structure.

Figure 5.8: 2-wire ISDN with TLU79 and an NT1-box (8 pairs)

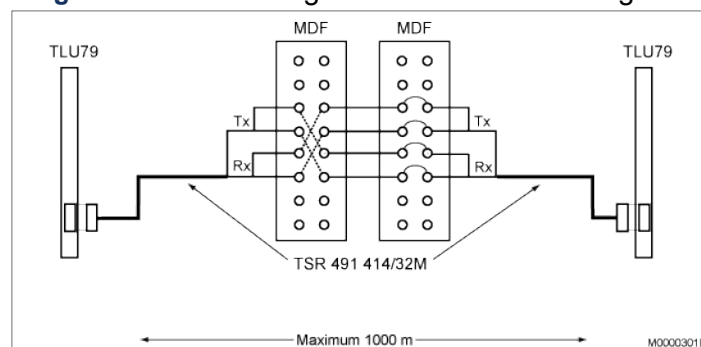


NOTE: Make sure that each individual's receive (Rx) and transmit (Tx) are properly connected between the TLU79 board and the NT1-box. Necessary corrections between the individuals can preferably be performed in the MDF.

Digital external line with TLU79 as a tie line

Color coding for TLU79 with cable TSR491414/xxx see item ELU26 and TLU79 cable structure.

Figure 5.9: Connecting TLU79 to TLU79 through MDF (8 pairs)



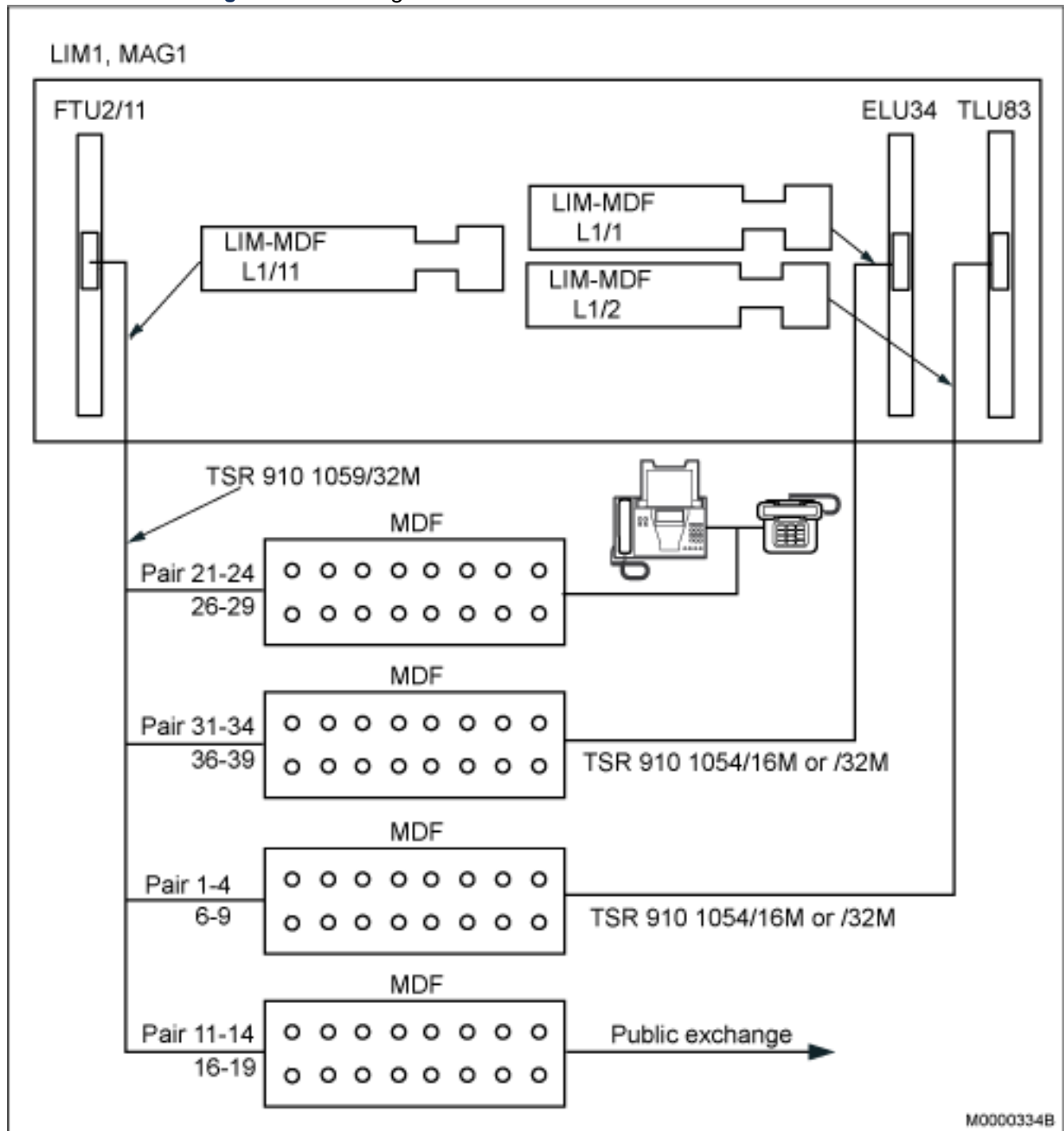
Through-Connection on Power Failure or Processor Malfunction

If the exchange is equipped with an FTU2 board, one to 32 extensions (8 per FTU2 boards) can be through-connected to the public network in the event of power failure or processor malfunction.

How to carry out the cross-connection, see the following figure.

These extensions must not be equipped with digital system telephones. If the public exchange is not capable of receiving DTMF-signals, then the extension must be equipped with a rotary dial telephone or a telephone for 10 pps (pulse generator). The connection to the public exchange must be of analog type.

Figure 5.10: Through-Connection on Power Failure or Processor Malfunction



Call Metering

Call Metering TLU83/2

The TLU83/2 is needed as this board contains the call metering hardware. The metering frequency, of 12 kHz or 16 kHz, is set when the board is activated.

Private Trunk Lines (tie lines)

The SIP tie lines can be analog, digital or H.323. See Analog External Lines, TLU80 and TLU83or/and see Digital Extensions.

Alarms

General alarms can be monitored in several ways depending on how the system is configured.

In systems with MX-ONE Lite (3U chassis), the MGU board can supervise several alarms, both external and internal in the unit. The alarm input of MX-ONE Lite connects input A and B to the backplane. The MGU boards can then be configured to supervise these alarm inputs.

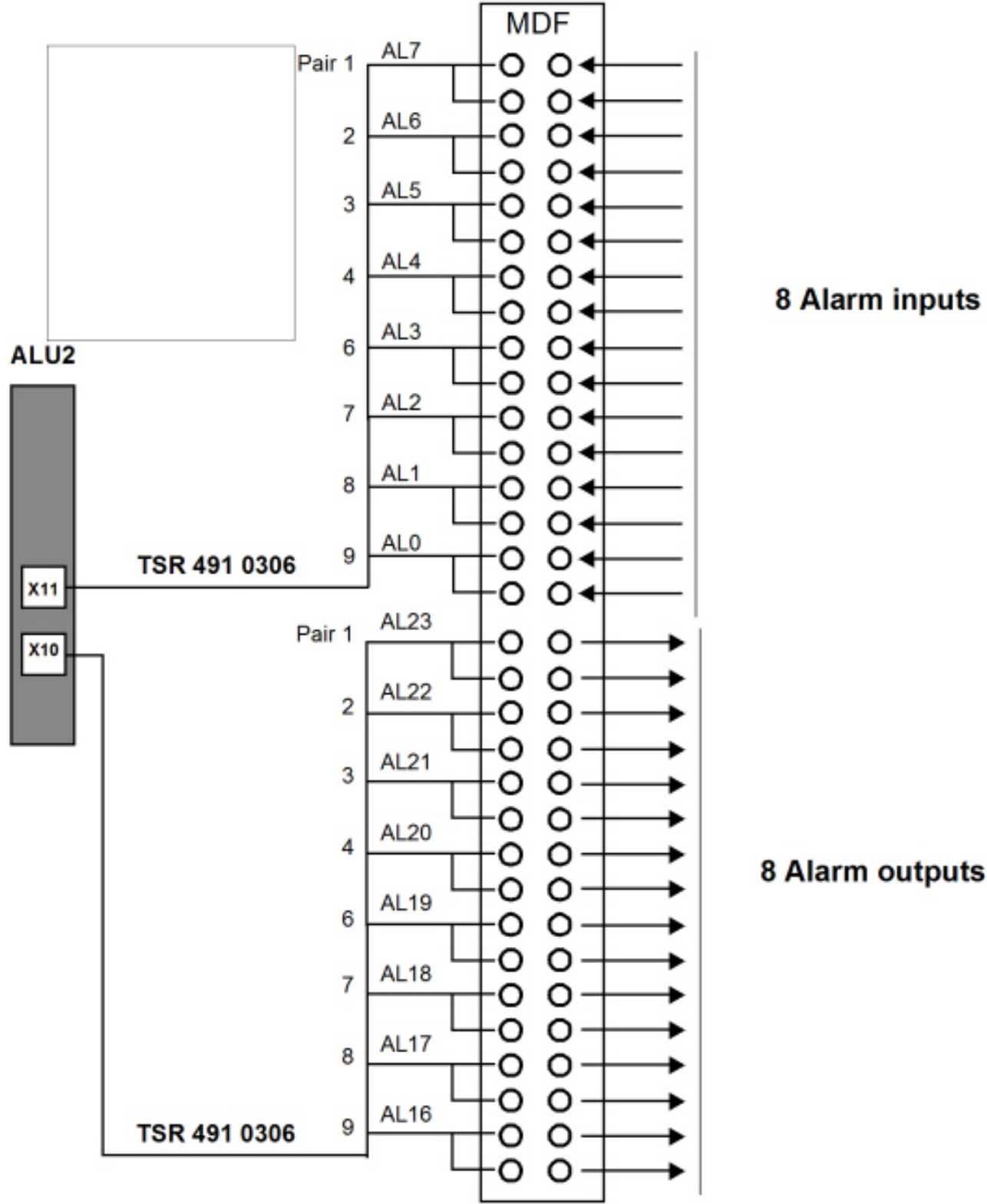
In systems with MX-ONE Classic (7U-chassis) and MGU boards, the simplest way is to use the alarm input on the DC/DC-board and configure the MGU boards to monitor Alarm A and/or Alarm B input.

When many external alarm shall be monitored or when system is not equipped with MGU boards, an ALU2 board can be used. The ALU2 board can receive up to eight different alarm signals and send out up to seven control signals. See the following figure.

If more in- or out- signals are required, the number of ALU2 boards can be increased. Alarm indications are normally transferred to the PBX operator consoles when using ALU2.

A internal power failure alarm for 5V DC is monitored by the MGU board.

Figure 6.1: ALU2 - MDF connections



Fan Unit Alarm

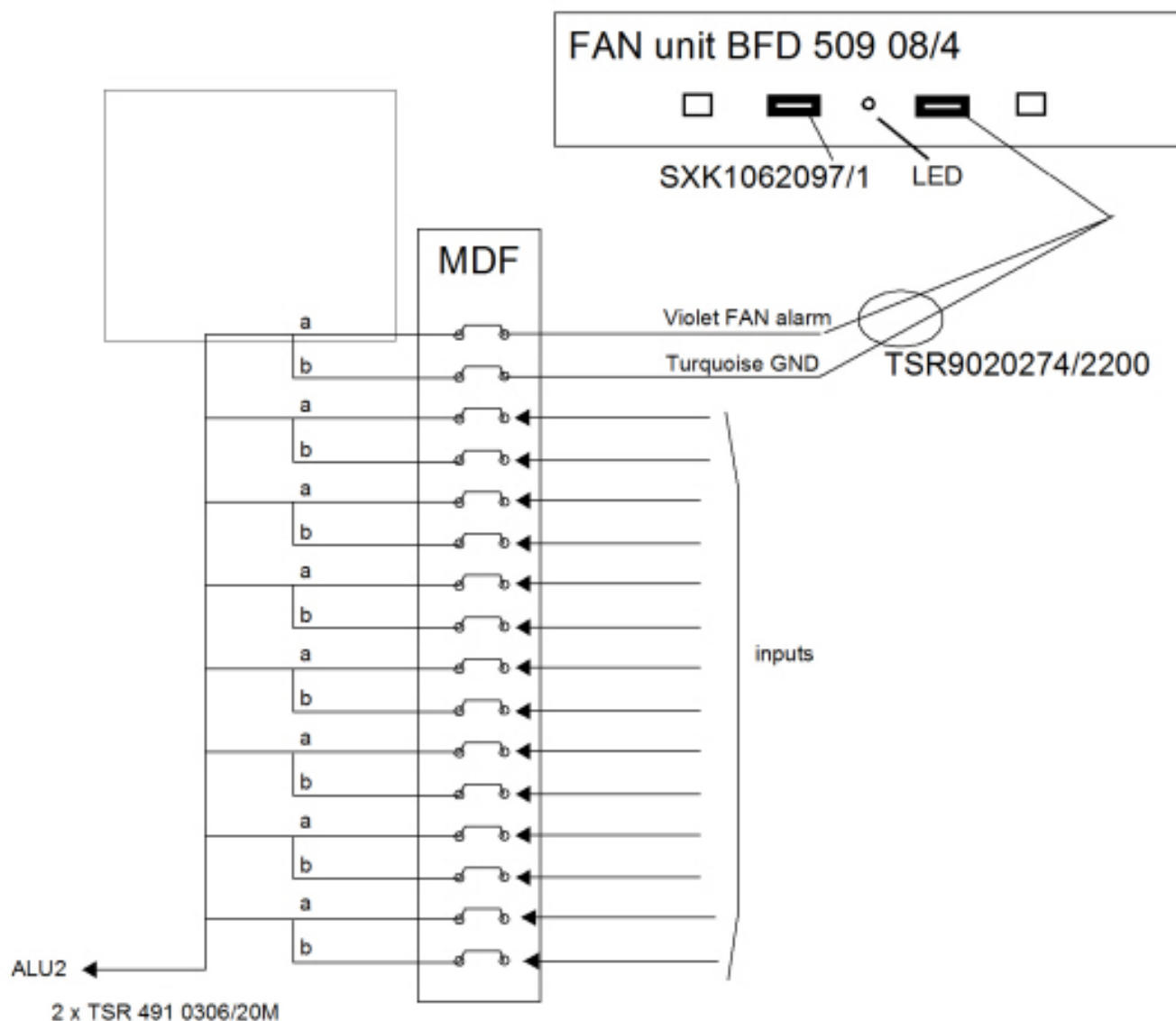
Fan BFD 509 08/4

Connect the fan alarm cable TSR902 0274/2200 to the D-sub connector on the Fan, and connect the other end to the MDF; see the following figure.

Connect the Plug, SXX 106 2097/1 in the second D-sub connector on the Fan, to receive a signal loop.

Connect the ALU2 board to the MDF according to the cabling list for the site. Use cable TSR 491 0306 or similar. For an example of connection to the ALU2 board, see the following figure.

Figure 6.2: MDF Alarms for the Fan Unit BFD 509 08/4



The Fan unit BFD 509 08/4 has the following alarm indicators:

- Yellow LED

The yellow LED is blinking when the Alarm is activated. The Alarm can be activated either by heat or lost of one of the -48V feeding.

Fan alarm_A is active when one or more of the conditions is/are:

- -48Va or -48Vb input is too low (towards 0 V) or
- the temperature is above 55 degrees C or
- the temp.sensor fails (out of range) or
- the FAN motor current is out of range or
- the FAN or motor voltage regulation fail

MX-ONE Lite, 3U unit, External Alarm

The **Alarm Input**, which is located on the rear side of the unit, has two pins, 1 and 3, which can be detected as alarms when either of them is closed to ground. To reach the connector on the backplane, remove the top cover and break out the small metal cover. Use a plier and fold back and forth until it breaks off.

Table 6.1: Rear Alarm Input 87L00039BAA-A

1	2	3	4
Alarm A (Relay)	GND	Alarm B (Relay)	GND

When any of the alarms is activated it will be detected by the MGU boards.

AC/DC Unit Alarms

The Alarms can either be connected through the ALU2-board or direct into the DC/DC-board in the 7U-chassis, or direct into the 3U-chassis.

Connect the AC/DC unit alarm relay contacts to the inputs of the ALU2 board through the MDF according to the cabling list for the site. The inputs of the ALU2 are internally tied to -48 V through serial resistors and the board can therefore detect loop or closing to 0 V. The resistance from the source to the ALU2 input should be maximum 20 kohm.

For 51305282

For information, see the documentation delivered with the product. These documents are also stored in the Alex data base in parallel with this document.

Document name: *Aspiro 1U in a 2U Enclosure, Instruction Manual PM110_6500_00* and *Quick Install Guide 100_6500_00-QR*.

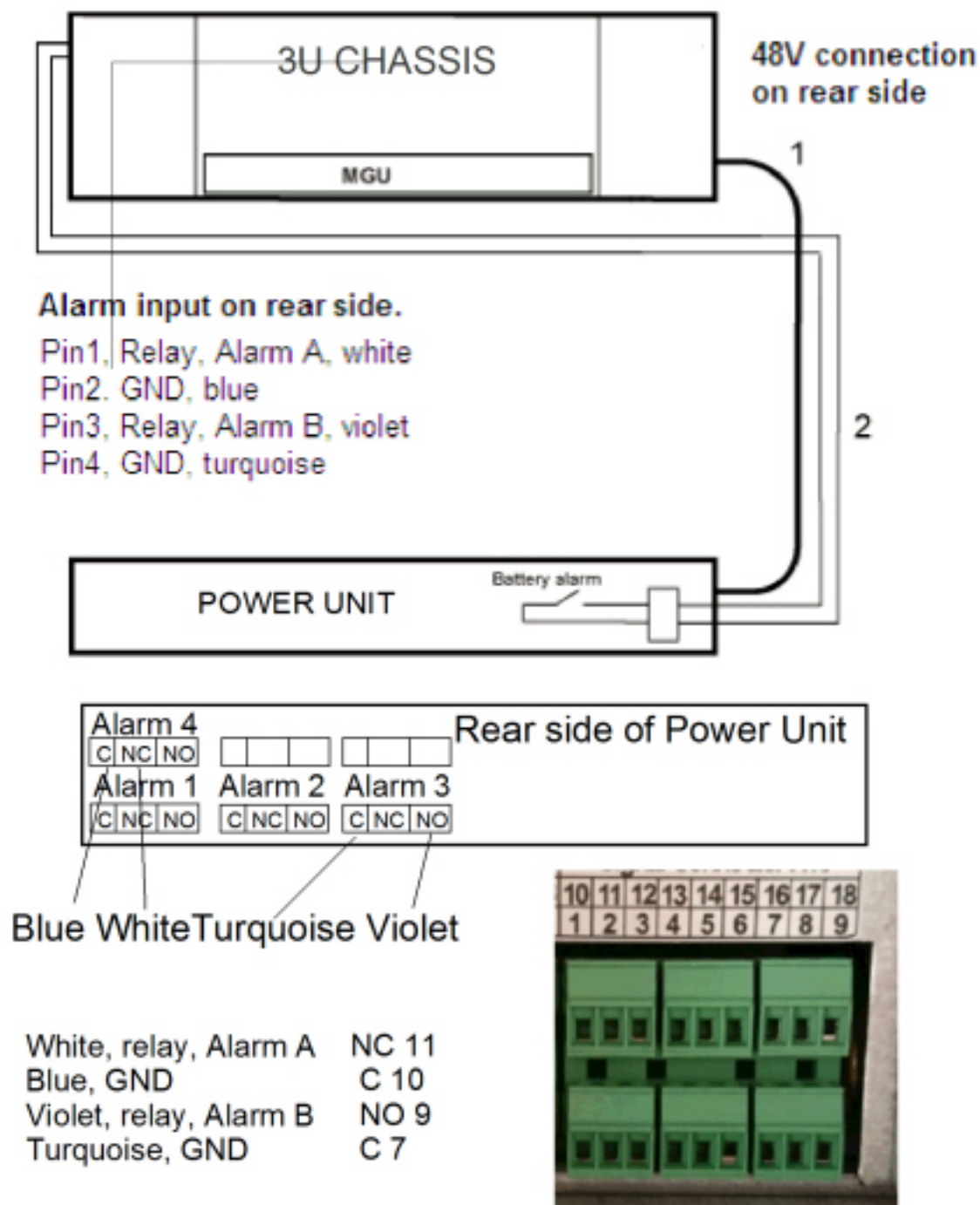
The power system has a set of ports, alarm contacts, located on the rear side, that reflect different operating conditions for the power supply, see Figure 35: MGU Power Alarm Detection in MX-ONE Lite or Figure, Power and Fan alarm in Classic chassis and Supplier Manual. Wires to the different alarm units can be fastened to the ports.

The communication with the AC/DC-unit can also be done via the PCC unit 51305283. This unit is Optional. The unit have a RJ45-connector to communicate with the LAN.

AC/DC Alarm through MGU

MiVoice MX-ONE Lite 87L00039BAA-A with Power Unit

Figure 6.3: MGU Power Alarm Detection in MX-ONE Lite



The following cables are used:

1. Power cable 51305285
2. Alarm cable 61L00007AAA-A (free end on power unit side)

The alarm cable is optional and needed when alarm handling is required.

To connect the alarm cable on the rear side of the chassis, a break-out plate has to be removed. Open the top cover and break out the plate. Use a plier and fold back and forth until it breaks off.

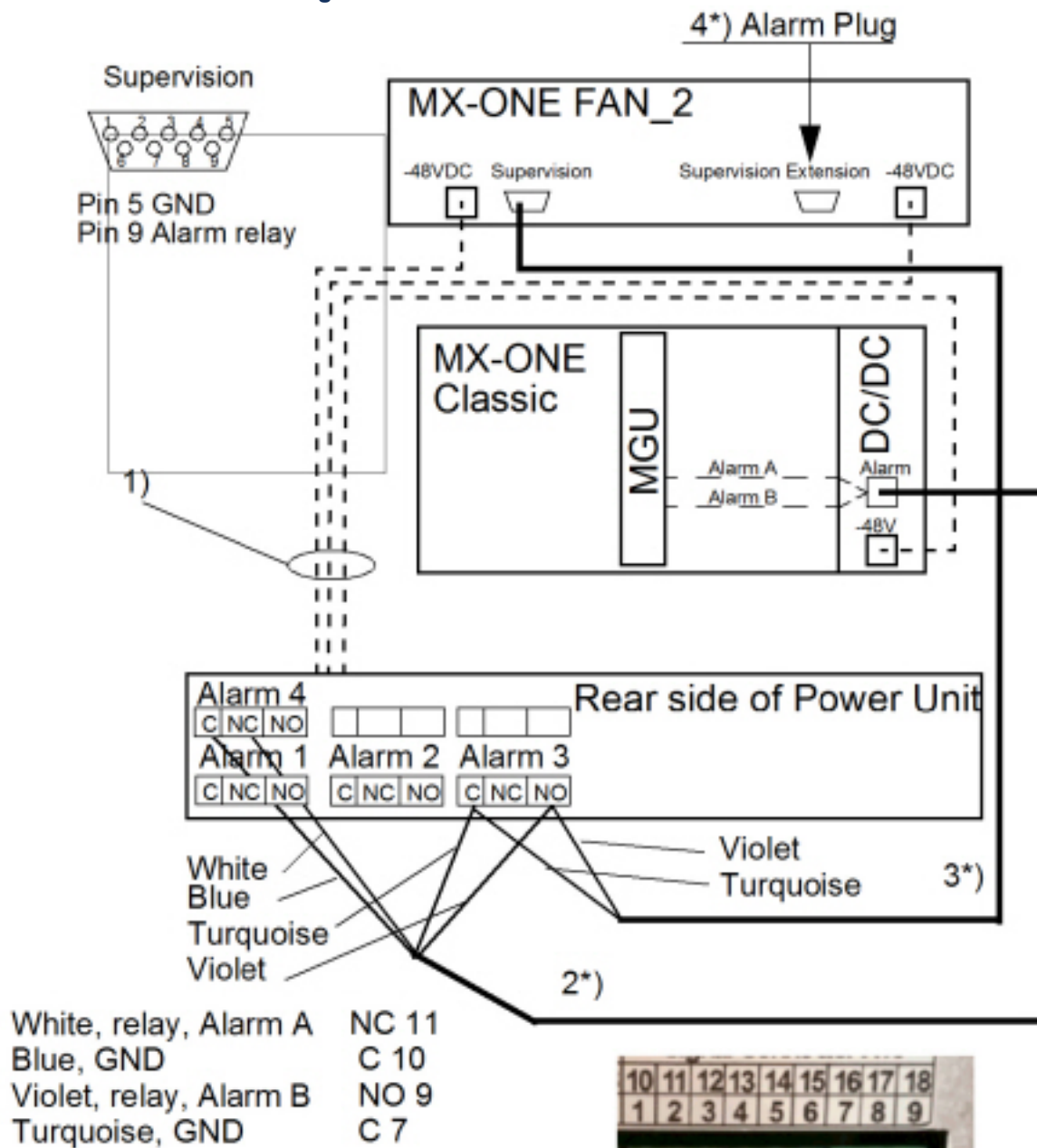
For details about the connections, see Supplier User Manual.

MiVoice MX-ONE Classic with Power Unit

Alarms from FAN_2 units and alarms from power supply, can be routed to the MX-ONE system via the ALARM inlet on either the DC/DC board if a MX-ONE Classic (7U-chassis) is used, or in the rear of a MX-ONE Lite (3U-chassis) if this is used.

The Supervision Extension port must be terminated with alarm plug SXX 106 2097/1 on the FAN_2 unit.

Figure 6.4: Power and Fan alarm in Classic chassis



The following connections are used:

1. Power cable 53105286 (87) or Power splitter cable 50006938 (37) (Note: If only one (1) Power cable 53105286 (87) are used, the FAN_2 alarm will be activated)
2. * Alarm cable TSR 902 0277/2000 (free end on power unit side)
3. * FAN_2 Alarm cable TSR 902 0274/2200 (free end on power unit side)
4. * Alarm plug SXX 106 2097/1

*) Optional cables and plug. Needed when alarm handling is required.

For details about the power connections, see Supplier User Manual.

MX-ONE Battery Mounting Set

Table 6.2: Battery Mounting Set

MX-ONE Battery Mounting Set		
Mounting Set Types	Existing (Mitel P/N)	ABB Description
Battery mounting set	NTM144265	MX HW Mounting set BKB201003 NOTE: For MX-ONE 31A and 62A, 4x12V batteries: cable from PSU to battery, not included.
Screws for rack mounting the ABB PSU	NTM144264	Mounting set 4+4 screw+nut
Shelf for 4x12V batteries (31A or 62A)	NTM144266	MX material set for battery shelf (Includes 4 screws/nuts for rack mount, includes 3 units of 10mm distances for the batteries).

