



A MITEL
PRODUCT
GUIDE

MiVoice MX-ONE

Installing Boards and Cabling - Installation Instructions

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Introduction

This chapter contains the following sections:

- [Scope](#)
- [Target Group](#)
- [Prerequisites](#)

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).

1.1 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*

1.2 Target Group

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

1.3 Prerequisites

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

1.3.1 Electrical Connections

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

1.3.2 Safety

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

Installing boards

This chapter contains the following sections:

- [ASU-II or ASU-III and ASU Lite](#)
- [MGU2](#)
- [MGU2-X](#)
- [Empty Board Positions and Dummy Fronts](#)
- [Connectors and LEDs on Board Fronts](#)
- [Fuses](#)

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 1: Boards in MX-ONE

Board	Product number	Building height	Time Slots used	Remarks
ALU2	ROF 137 5373/11	20mm	8	Alarm unit for external alarms

Board	Product number	Building height	Time Slots used	Remarks
ASU Lite	ROF 137 6307/31	40mm	---	<div>  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. </div> 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

Board	Product number	Building height	Time Slots used	Remarks
MFU	ROF 137 5348/X	20mm	8	Multi frequency unit
MGU	ROF 137 6304/1x	20mm	---	Media Gateway Unit
	ROF 137 6304/2x	20mm	---	
MGU2	ROF 137 6304/4	20mm	---	Media Gateway Unit 2. For more information see item below.
MGU2-X	ROF 137 6304/5	20mm	---	Media Gateway Unit without ISDN PRI interface
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)
	ROF 137 6305/2	20mm	8/12	Analog trunk line (loop start, ground start, call metering. CLI with FSK and DTMF)
	ROF 137 6305/3	20mm	16	Analogue both-way trunk line (loop start, ground start, FSK, and alarm).
	ROF 137 6305/4	20mm	16	Analogue both-way trunk line (loop start, ground start, FSK, and alarm).

Board	Product number	Building height	Time Slots used	Remarks
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.

2.1 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:

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.

2.2 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 information, see *Media Gateway Unit, MGU2, 2/1551-ANF90136*.

2.3 MGU2-X

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

Close to the LED there is a hole for performing reset. It is identical to MGU2 except it has no ISDN PRI interfaces.

For more information, see *Media Gateway Unit, MGU2, 2/1551-ANF90136*.

2.4 Empty Board Positions and Dummy Fronts

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 where the new board is to be installed and insert the new board.

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).

2.5 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.

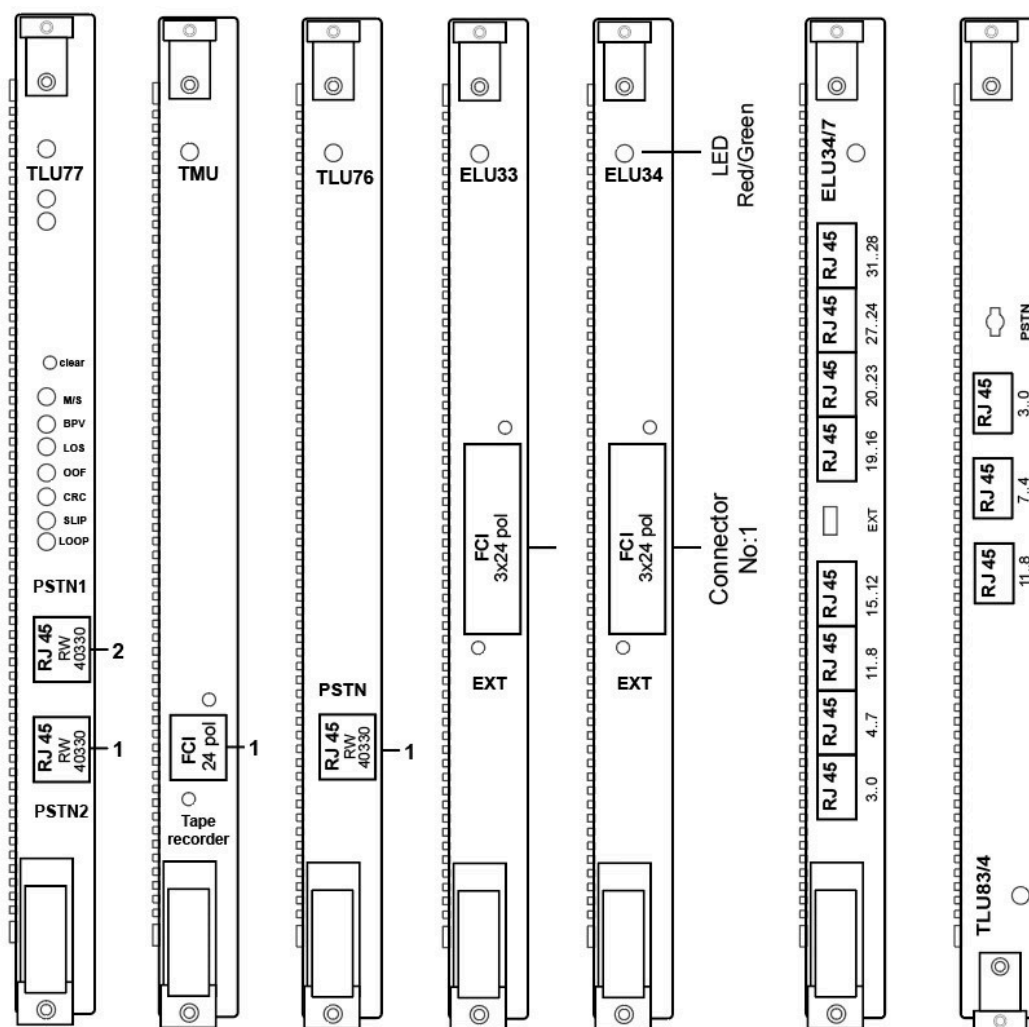


Figure 1: TLU77, TMU, TLU76, ELU33, ELU34, ELU34/7, and TLU83/4 Board Fronts

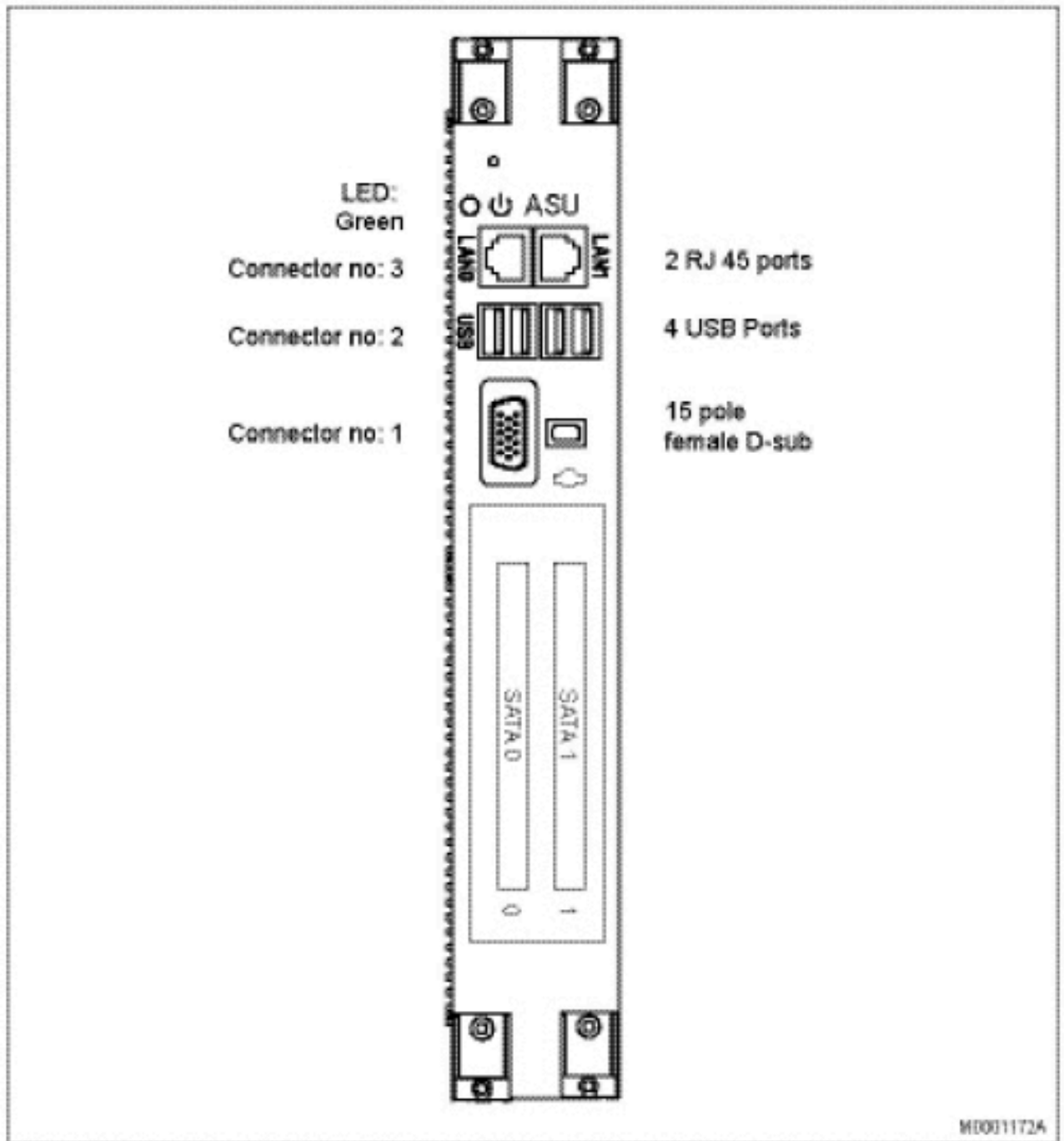


Figure 2: ASU Front Connectors

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

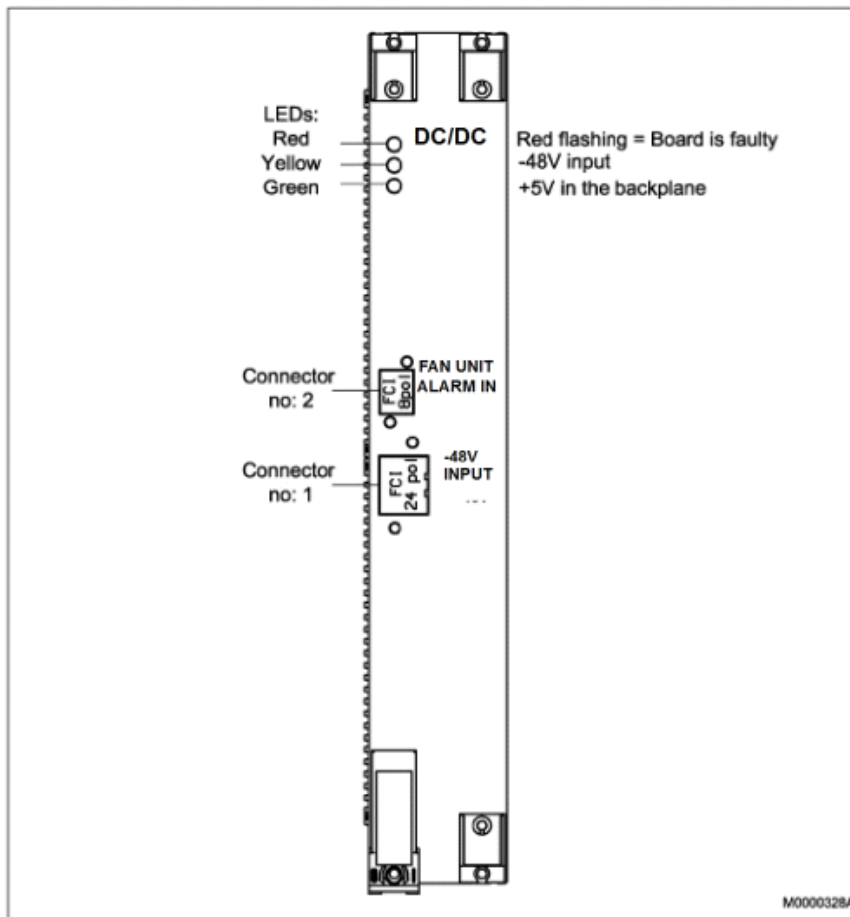


Figure 3: DC/DC Front Connectors and LEDs

ROF137 6303/R1A-R3A

The DC-converter is equipped with three LED diodes that have the following function and indications:

- Yellow diode: -48 volt input voltage is supplied to the converter.
- Green diode: +5 volt is present in the back plane.
- Red flashing diode: Board is faulty. Investigate and replace the board if necessary.

No external alarm signal is provided in the front panel or in the back plane.

ROF137 6303/R5A and higher

The DC-converter is equipped with 2 LED diodes that have the following function and indications:

- The upper green LED diode: -48 volt input voltage is supplied to the converter.
- The low green diode: +5 volt is present in the back plane.

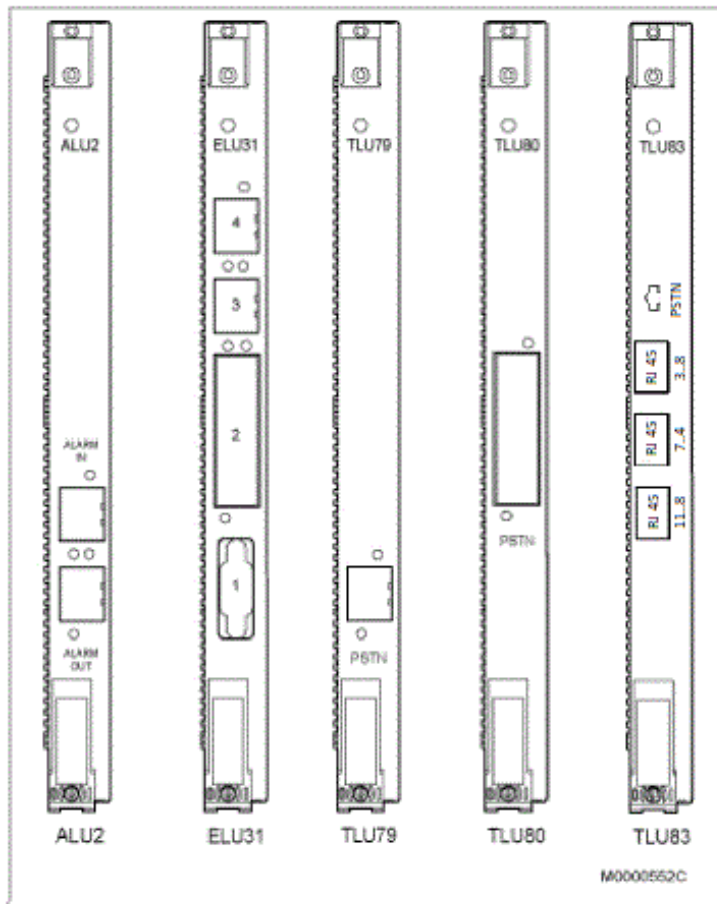


Figure 4: ALU2, ELU31, TLU79, TLU80 and TLU83 Fronts

Note:

ELU26 and TLU79 has equal fronts, only different printing.

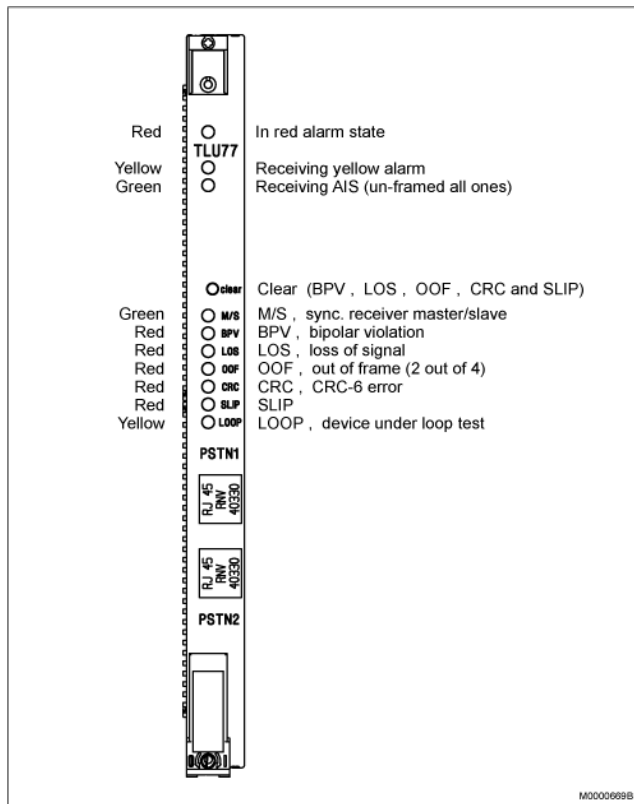


Figure 5: TLU77 Front Connectors and LEDs

- TLU83/4 board has different connectors than TLU83/1 board. It have RJ45 connectors and uses standard network cables.
- ELU34/7 board has different connectors than ELU34/6 board. It have RJ45 connectors and uses standard network cables.

The following figure depicts the front connectors for TLU83/4 board.

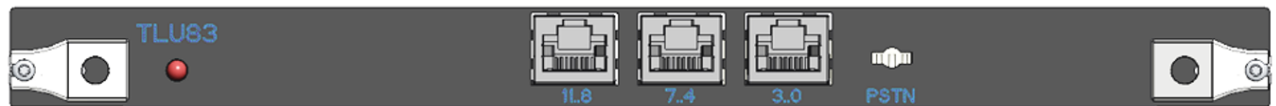


Figure 6: Front Panel (Line: 11-8, 7-4, and 3-0)

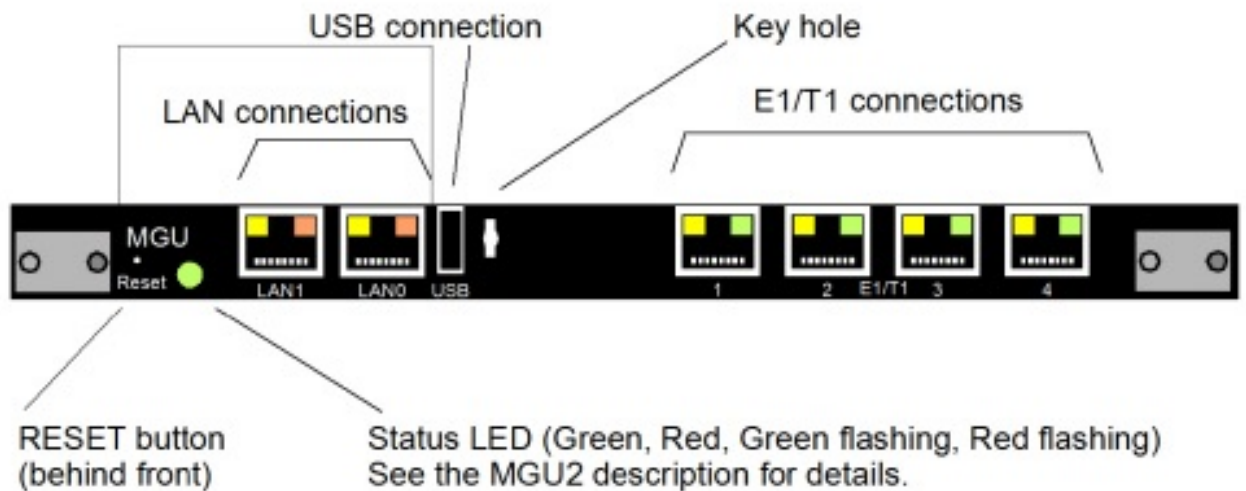


Figure 7: MGU2 with 20mm Front

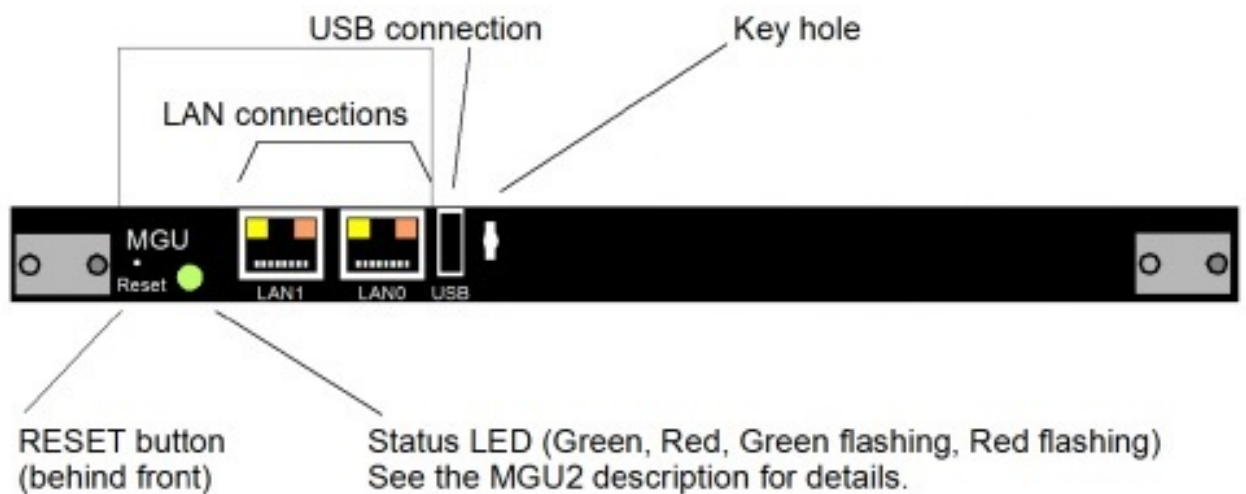


Figure 8: MGU2-X with 20mm Front

The following figure depicts the front connectors for ELU34 series board.

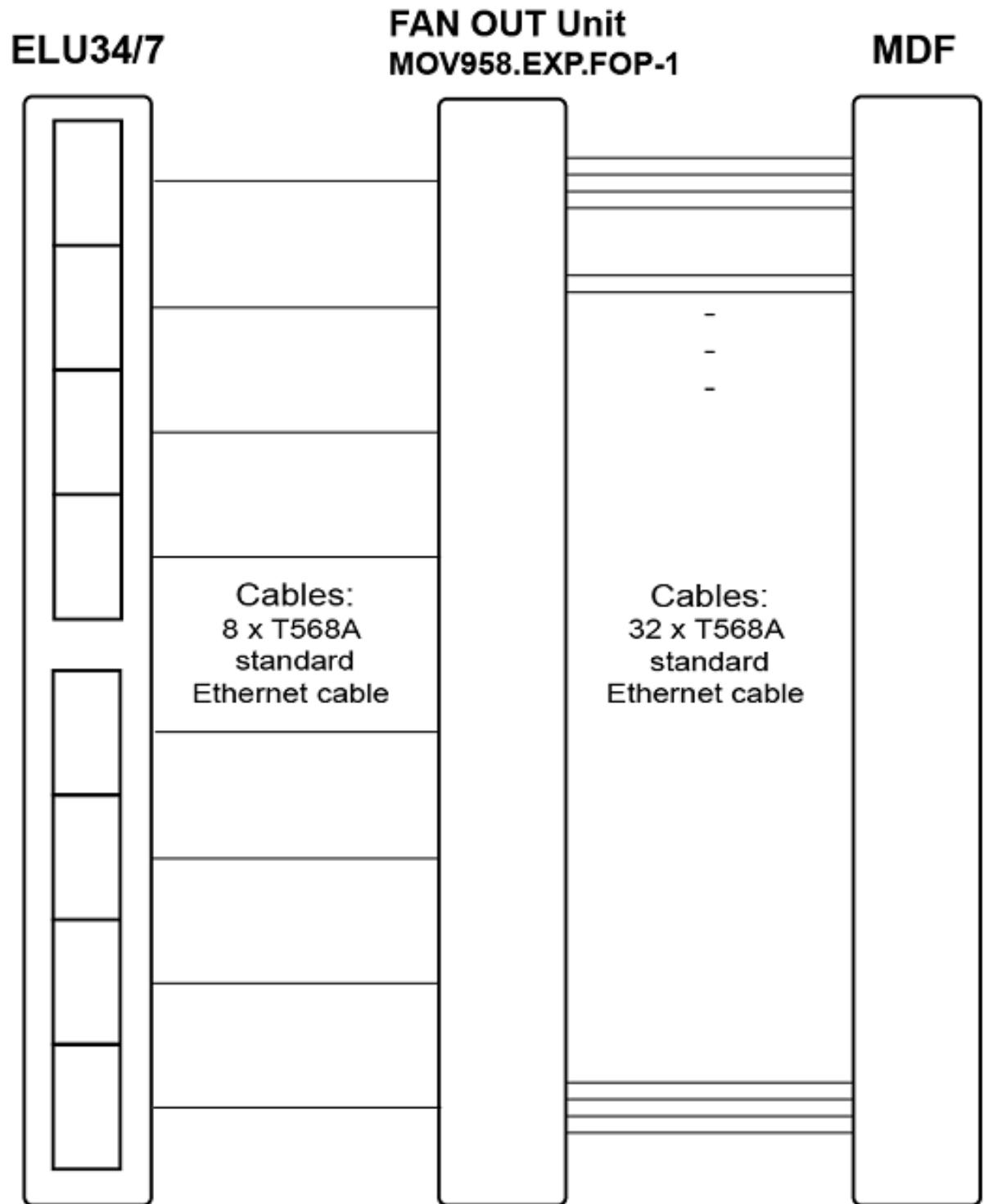


Figure 9: ELU34 Series Front

2.6 Fuses

ROF137 6303/R1B-R3A

The DC-converter is provided with fuses on the board. These fuses are aimed to protect the different sub converters and the fan power control on the board from hazardous over current.

1. F100 3 amp Output current protection for Fan power supply.
2. F200 5 amp Inrush current protection for +5 volts sub converter.
3. F201 5 amp Inrush current protection for the whole converter.
4. F202 2 amp Inrush current protection for the +/-12 volts sub converter.

All fuses are from Littlefuse series 452 and are surface mounted.

The DC-converter is also equipped with a current and over temperature control circuit for the Fan output power supply. (Q100 is an OMNI-FET from ST).

ROF137 6303/R5A and Higher

The DC-converter is provided with one fuse on the board. The fuse is aimed to protect the Fan power from hazardous over current.

This chapter contains the following sections:

- [Connector Positions](#)
- [Cable Labeling](#)
- [Connecting Internal Power Cables](#)
- [Connecting Cables](#)
- [Extension and Trunk Line Cable Structure](#)

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 2: Cables in MX-ONE

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	5 meters long to AC/DC, 48V

Unit	Cable Product Number	Remarks
	51305287	12 meters long to AC/DC, 48V
	50006938	5 meter splitter cable to both 7U AND Fan
	50006937	12 meter splitter cable to both 7U AND Fan
ELU26	TSR 491 414/32M	to MDF
ELU31, ELU33, and from ELU34/1 to ELU34/6	TSR 910 1054/16M, 32M	to MDF
ELU34/7	T568A standard Ethernet cable	to MDF
ELU31	TSR 901 1226/3000, /5000, /15M	Sync-ring
FTU2	TSR 910 1059/32M	to MDF
MFU/11	TSR 491 0306/20M	to MDF
MGU2 / MGU2-X	TSR 482 0211/2400, /20M	to LAN 100Mbit or E1/T1 to E1/T1
	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
TLU76	TSR 482 0211/2400, /20M	to MDF
TLU77	TSR 482 0211/2400, /20M	to MDF

Unit	Cable Product Number	Remarks
TLU79	TSR 491 414/32M	to MDF
TLU80	TSR 910 1054/16M, /32M	to MDF
From TLU83/1 to TLU83/3	TSR 910 1054/16M, /32M	to MDF
TLU83/4	T568A standard Ethernet cable	to MDF
TMU/12	TSR 491 0306/20M	to MDF
MX-ONE Lite 3U chassis, 87L00039BAA-A	51305285	2 meters to AC/DC, 48V
	61L00007AAA-A	for Alarm connection
MX-ONE 1U chassis, 87L00032BAA-A	51305285	2 meters to AC/DC, 48V
Network	TSR 482 0211/20M	LAN, 100MBit. RJ45 - RJ45, straight. L=20 meters
	61L00002BAA-A	LAN, 1GBit, RJ45 - RJ45, straight. L= 20 meters
Power to Fan *)and to 7U chassis	51305286	5 meters long, -48V
	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

Unit	Cable Product Number	Remarks
Fan *) to alarm	TSR 902 0274/2200 TSR 902 0277/2000 SXX 106 2097/1	Alarm cables and plug
Splitter cable for 1U and 3U chassis	50006936	Splitter 1 to 2. Used when 5 to 8 pcs of 1U/3U chassis are fed from the same power Unit.

*) 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*.

3.1 Connector Positions

Only boards with EMC shielded fronts are used in the MX-ONE subracks. The following figure depicts the sample TLU83 and ELU34/7 connector configuration.

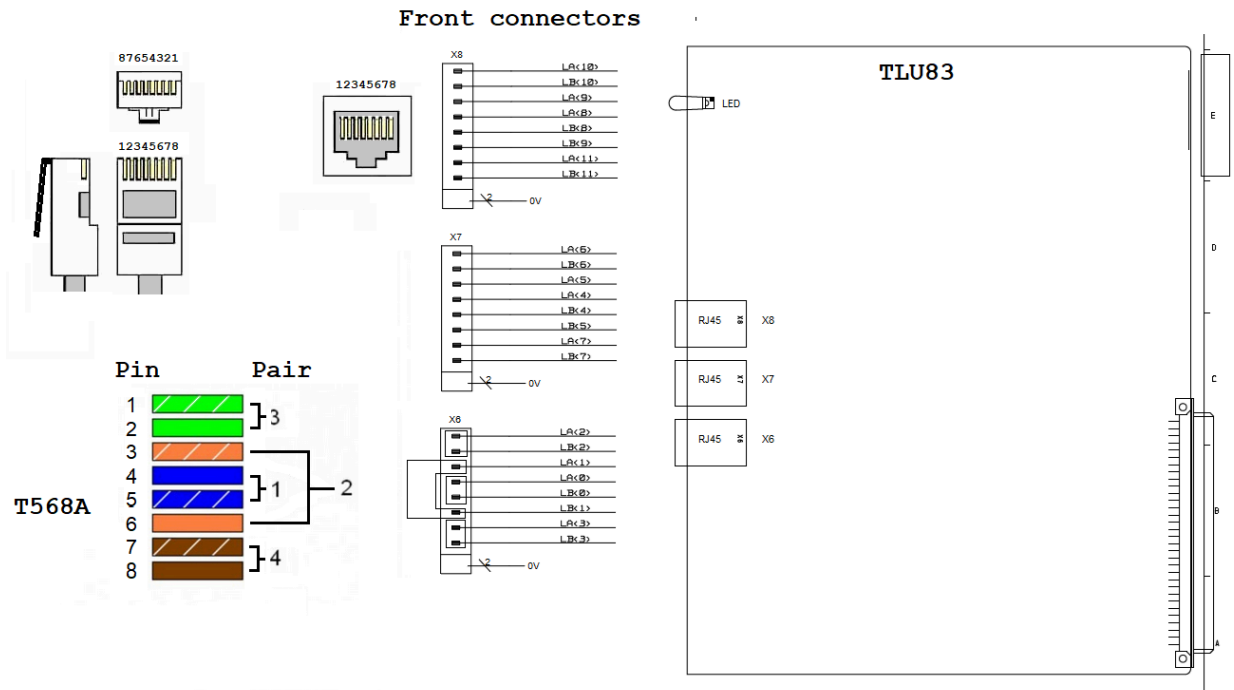


Figure 10: TLU83 Connector

3.1.1 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.

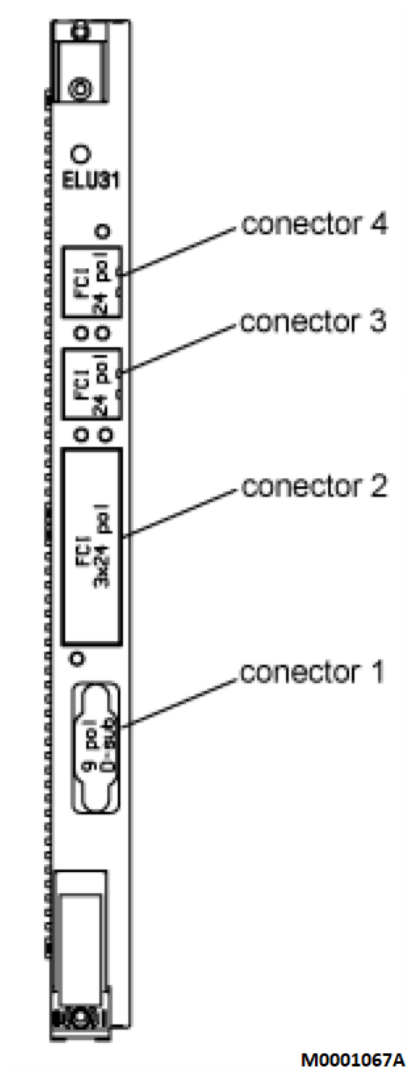


Figure 11: Connectors Positioning

The following figure depicts the RJ45 front panel connector pinout configuration for TLU83/4 board.

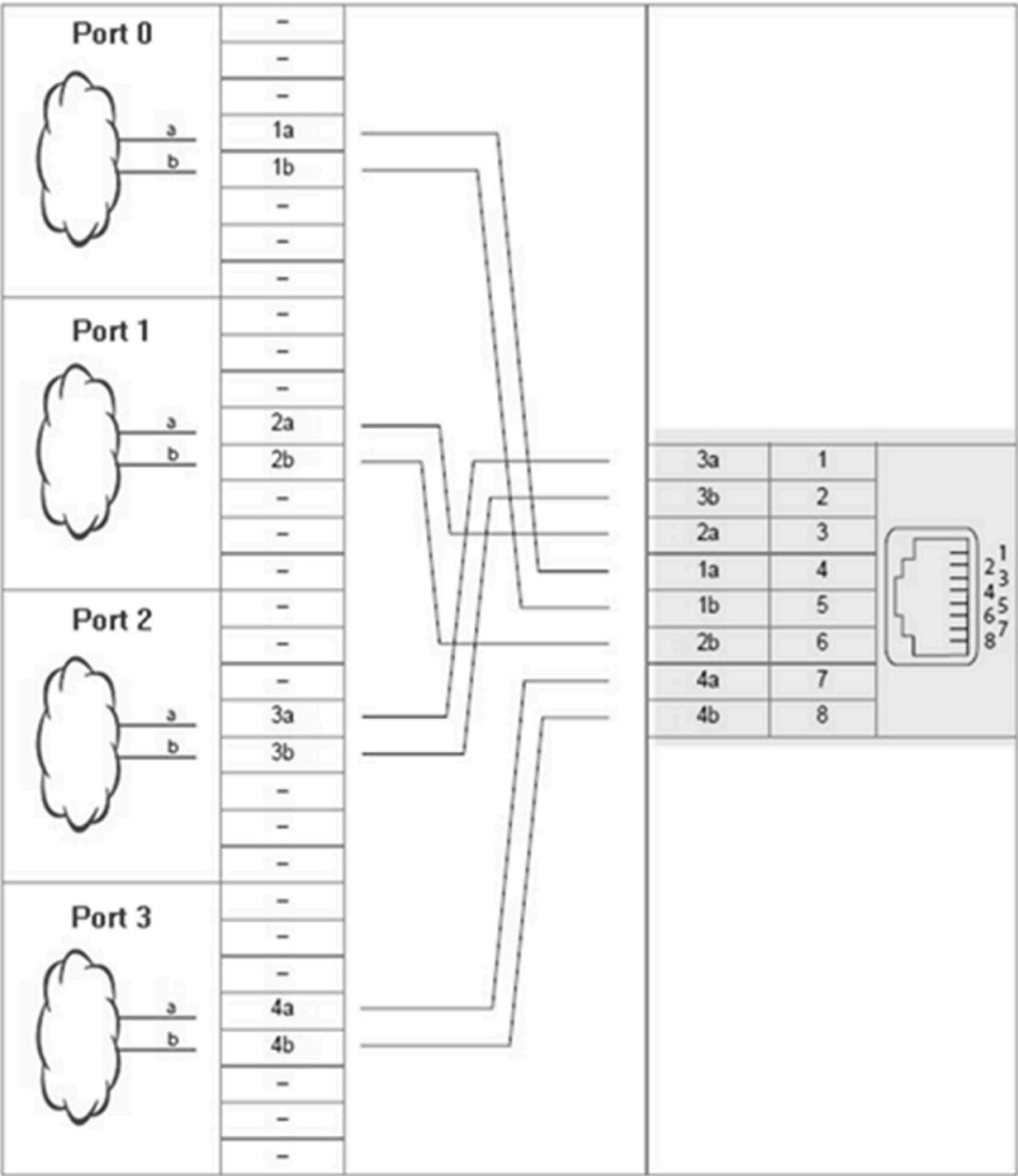


Figure 12: RJ45 Front Panel Connector Pinout (La = Tip and Lb = Ring)

3.2 Cable Labeling

Product Labeling

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

3.2.1 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)

3.2.2 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.

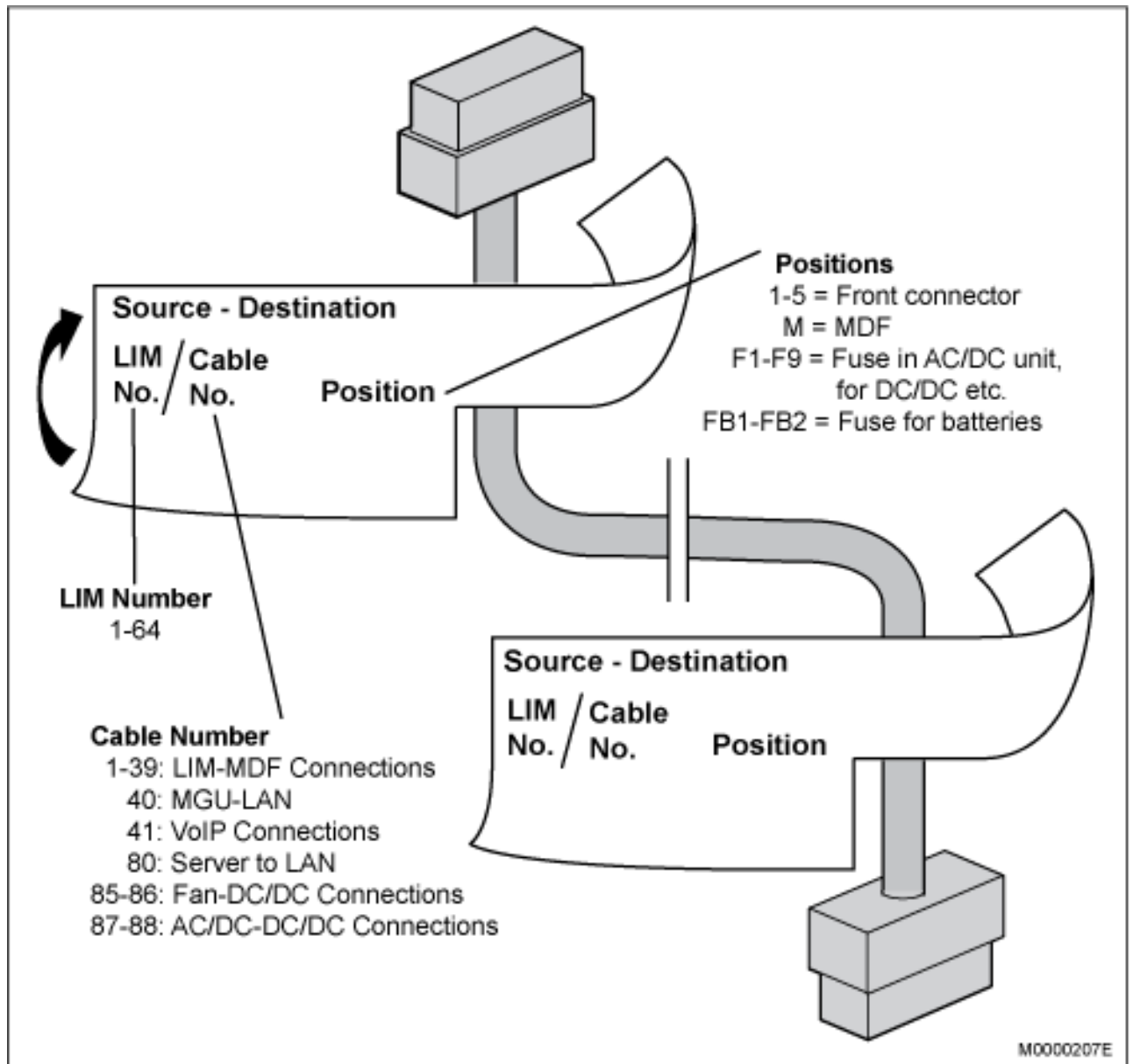


Figure 13: Labeling Cables

3.2.3 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.

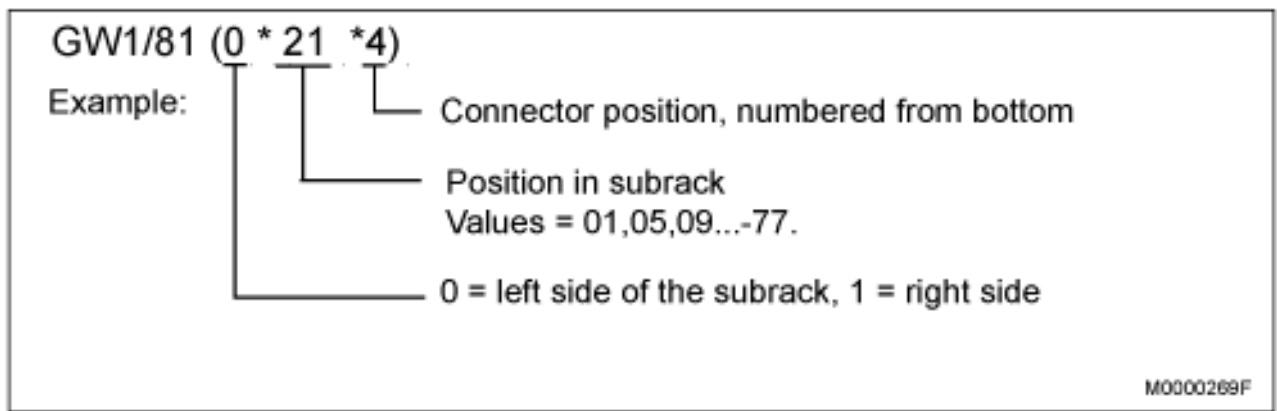


Figure 14: Labeling of cables

3.3 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.

3.3.1 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)

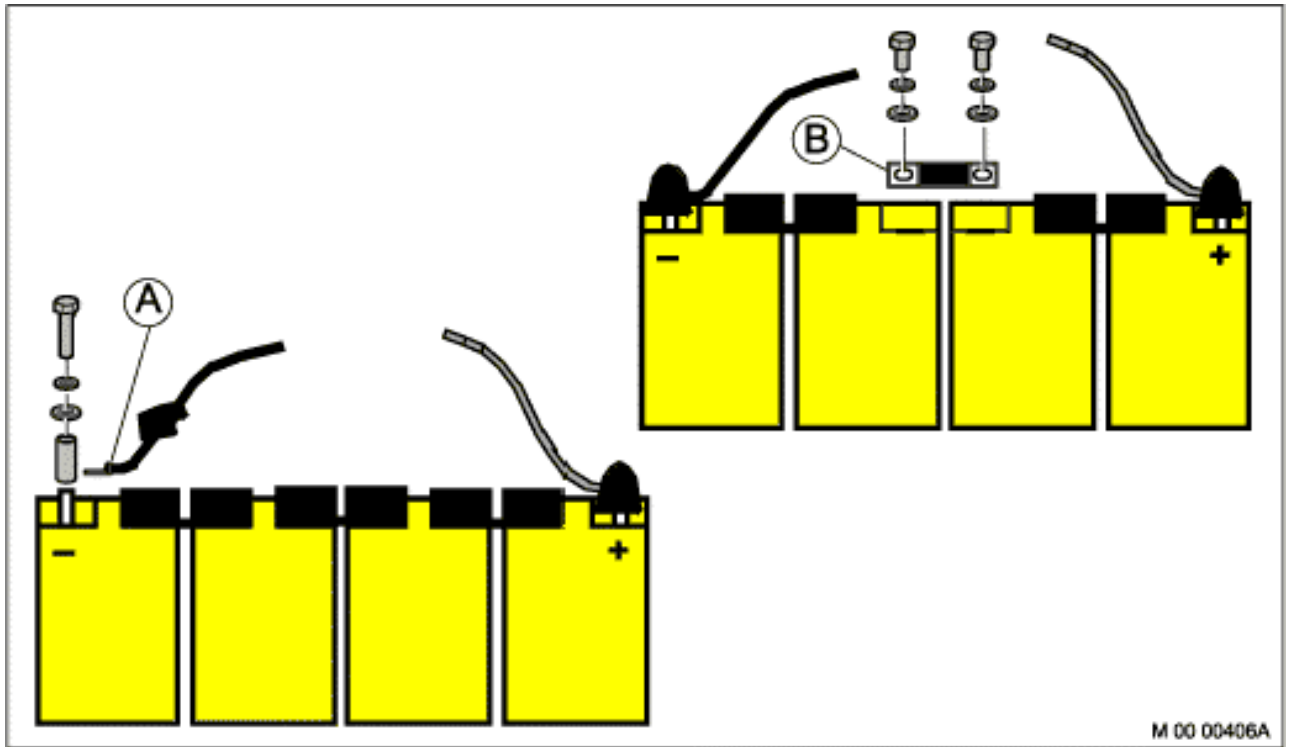


Figure 15: Example of Removing the Negative Battery Conductor (A) and an Interconnecting Bridge (B)

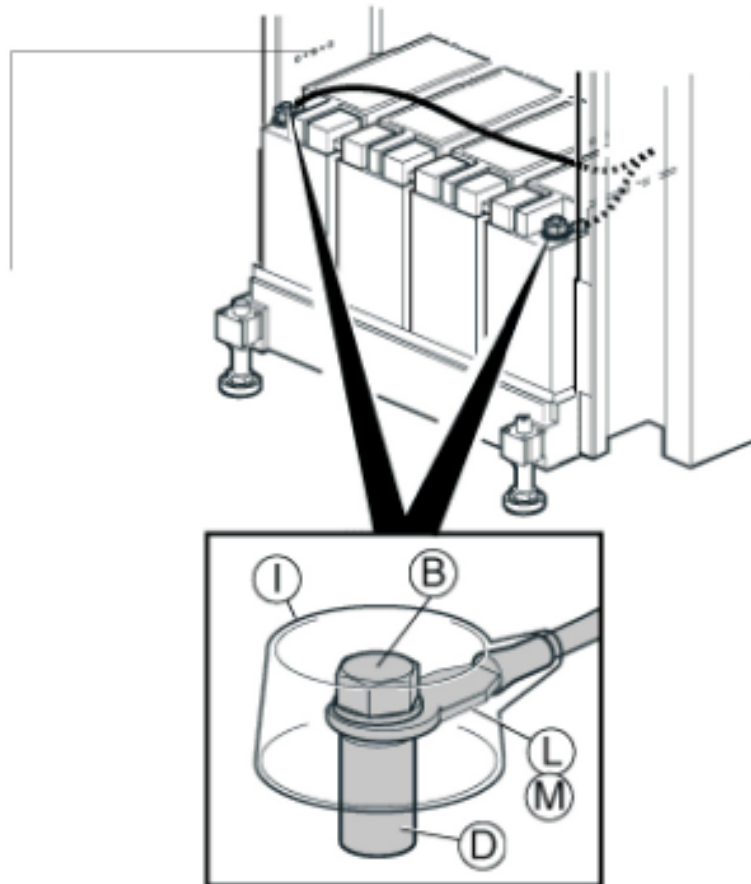


Figure 16: Connecting the Batteries

General battery connection:

1. Connect the cable lug (L) of the grey cable to the red plus pole (D) of the rightmost 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.

3.3.2 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: 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

i 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.

3.3.3 Connecting to the Mitel 48V Power Cables for ABB PSU

Table 4: 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.

3.3.4 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.

3.3.5 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.

3.3.6 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.

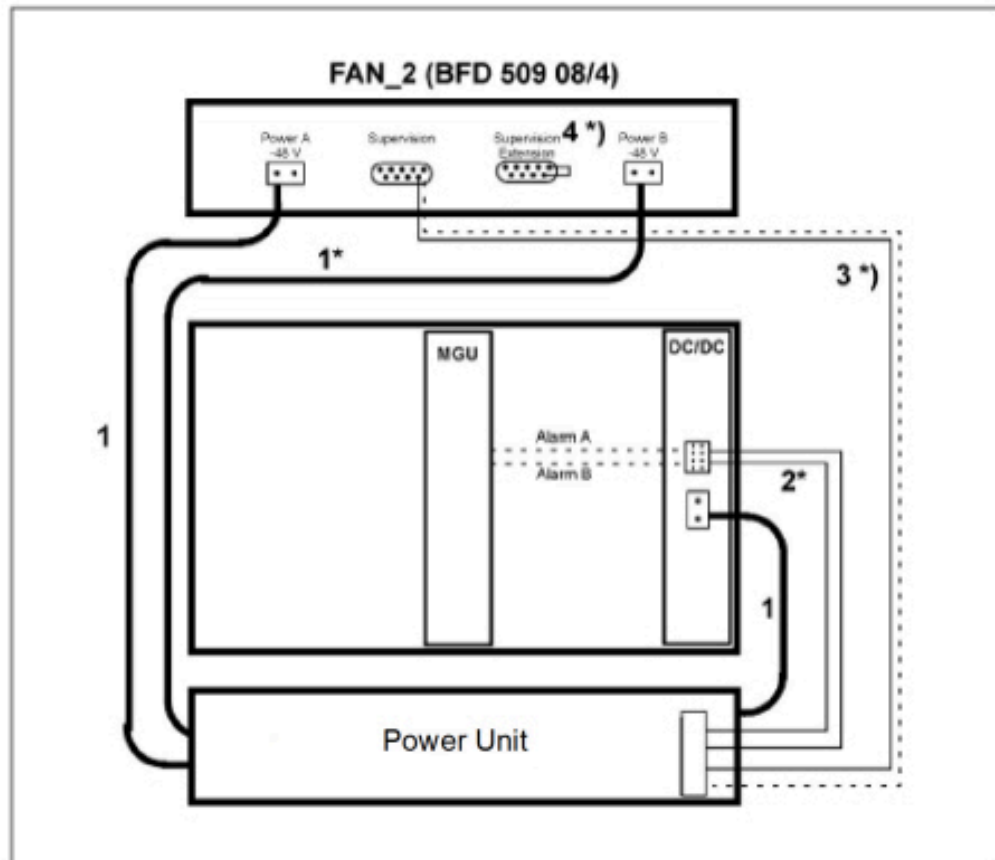


Figure 17: Single Cables to the Fan Unit BFD50908/4 and to 7U Chassis

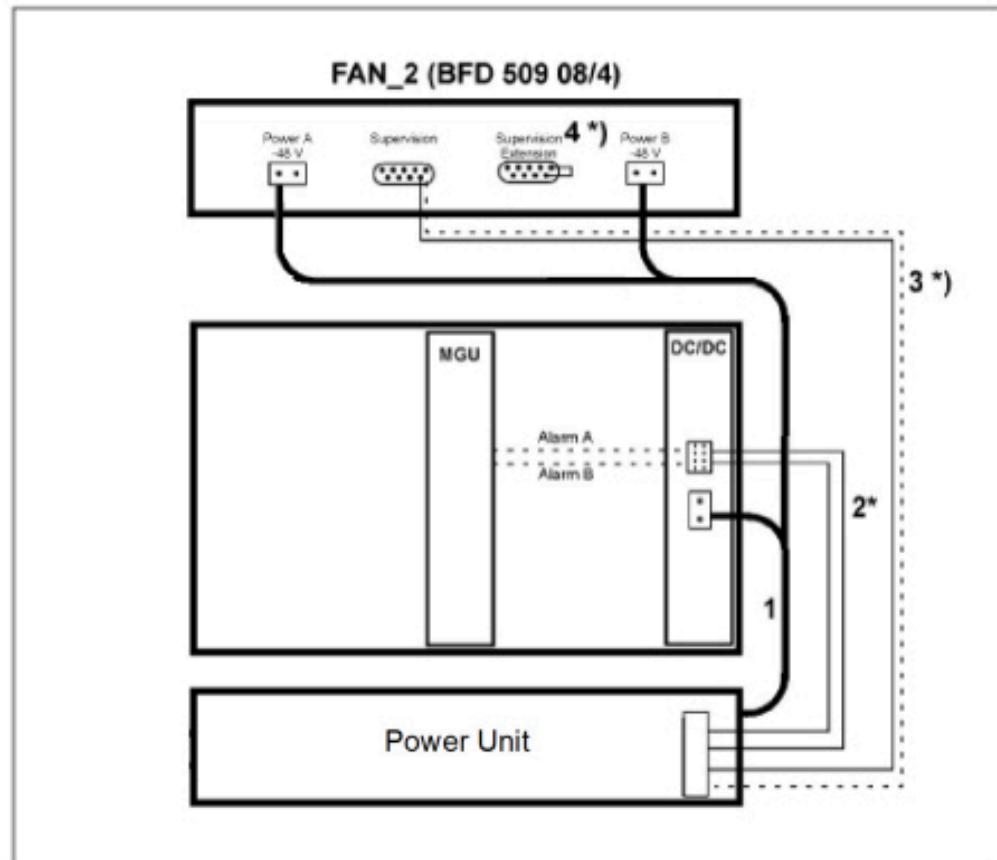


Figure 18: Splitter Cable to the Fan Unit BFD50908/4 and to 7U Chassis

3.3.7 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 than 4 pcs of 1U chassis and/or 3U chassis are fed 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.

3.3.8 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.

3.3.9 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.

3.4 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.

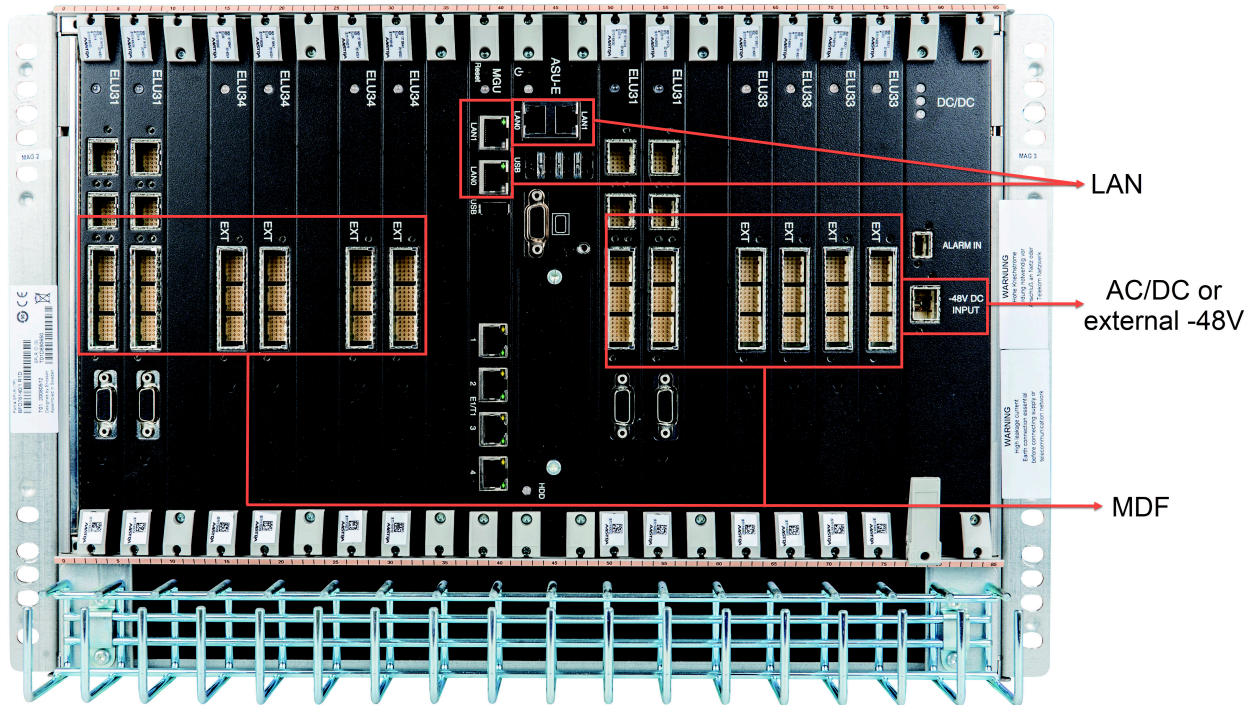


Figure 19: Cable Connections Configure Example

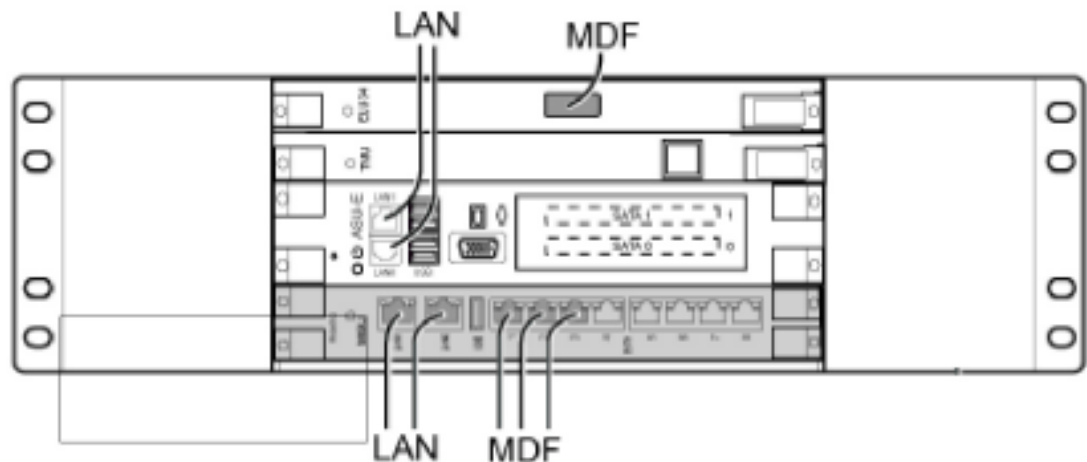


Figure 20: MX-ONE Lite Cabling Example

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

3.5 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.

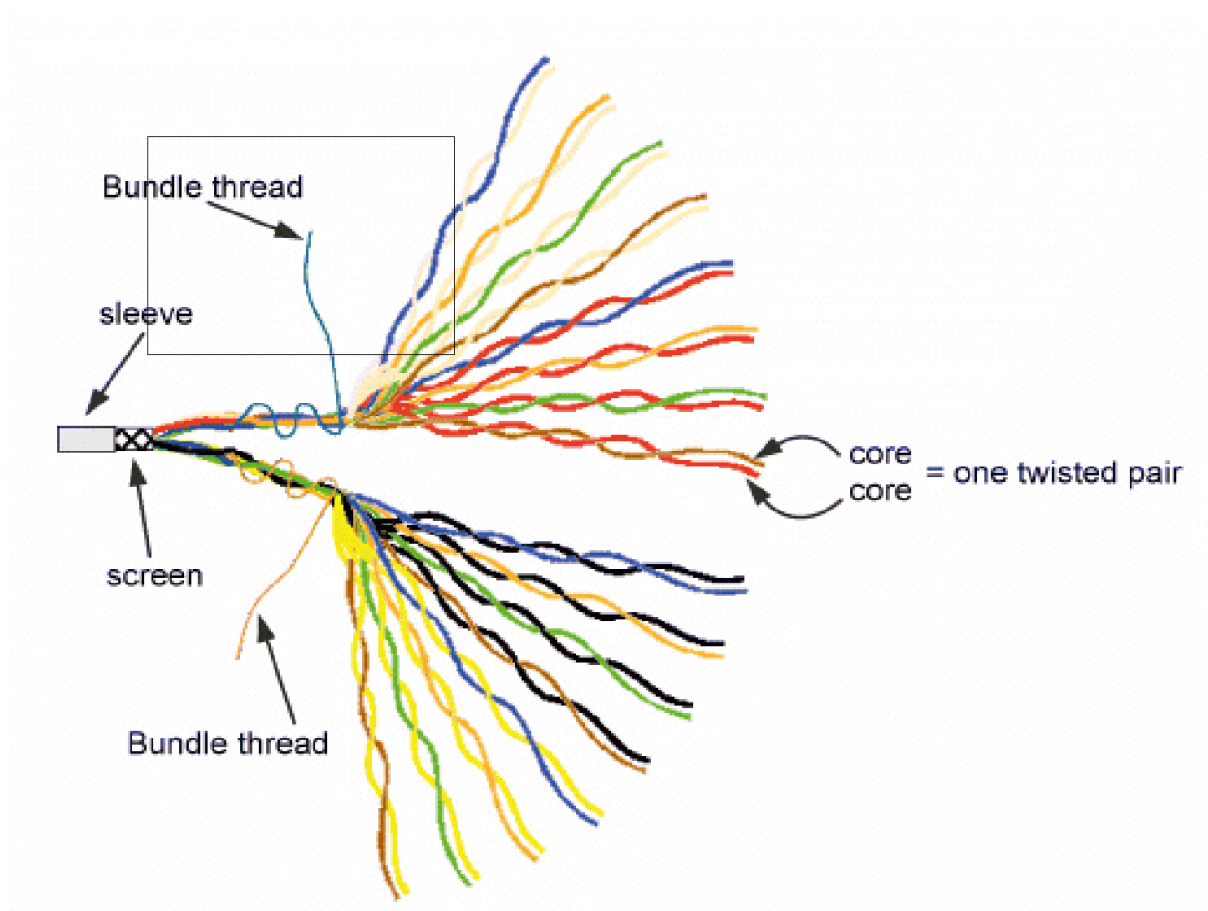


Figure 21: Cable Structure

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 and ELU26, ELU31, ELU33, from ELU34/1 to ELU34/6, and other boards, and the connection cable used for TLU76, TLU77, TLU79, TLU80, from TLU83/1 to TLU83/3.

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.

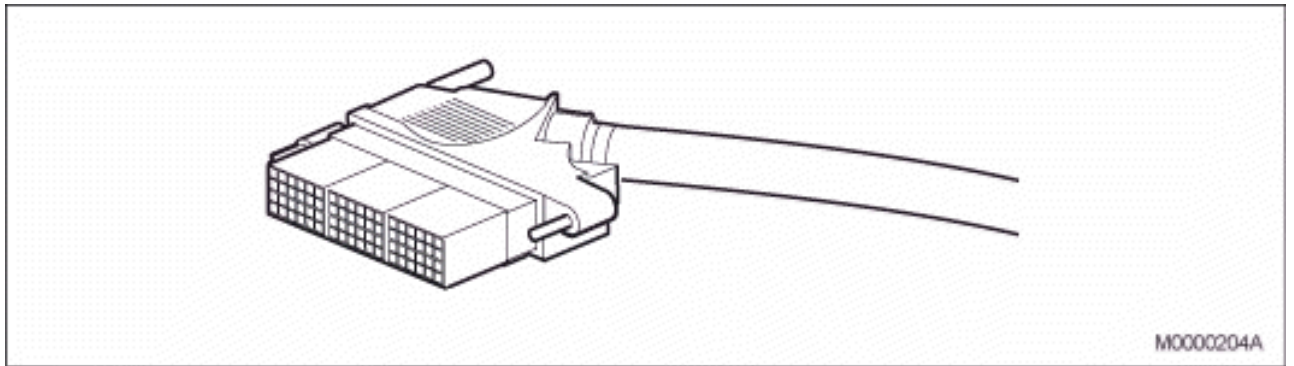


Figure 22: 32 pair cable for ELU26, ELU31, ELU33, from ELU34/1 to ELU34/6, TLU76, TLU77, TLU79, TLU80, and from TLU83/1 to TLU83/3 (TSR 910 1054/16M or 32M)

3.5.1 ELU26, ELU31, ELU33, and from ELU34/1 to ELU34/6 Cable Structure

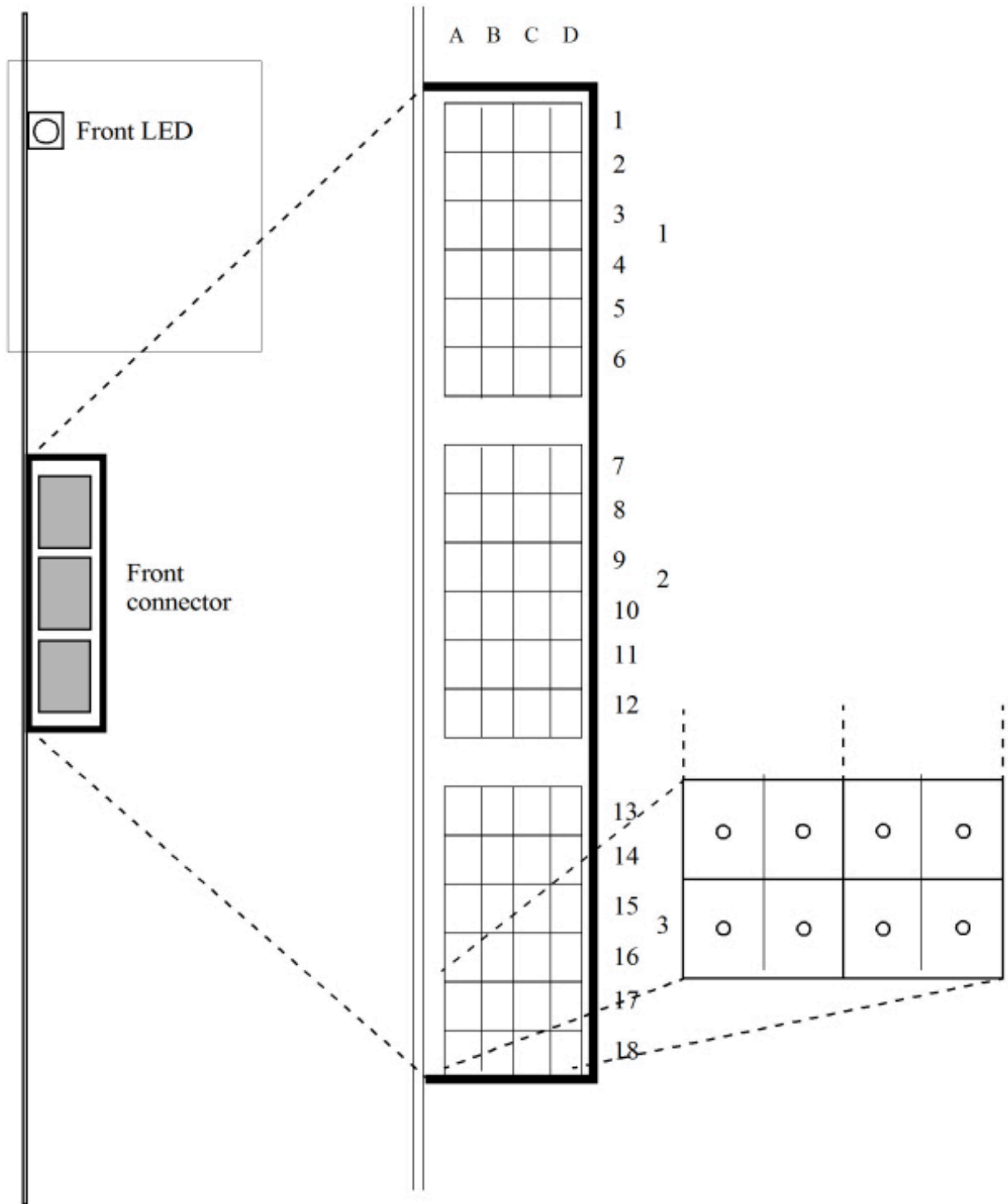


Figure 23: Front View

**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 5: Color Coding in 32 Pair Cable for ELU26, ELU31, ELU33, and from ELU34/1 to ELU34/6

Pair	Core	Color	Bundle	Connector		Pair	Core	Color	Bundle	Connector		
1	a	White	Blue	D18		21	a	White	Orange	D9		
	b	Blue		C18			b	Blue		C9		
2	a	White		A17		22	a	White		A8		
	b	Orange		B17			b	Orange		B8		
3	a	White		D17		23	a	White		D8		
	b	Green		C17			b	Green		C8		
4	a	White		A16		24	a	White		D7		
	b	Brown		B16			b	Brown		C7		
6	a	Red		D16		26	a	Red		A6		
	b	Blue		C16			b	Blue		B6		
7	a	Red		A15		27	a	Red		D6		
	b	Orange		B15			b	Orange		C6		
8	a	Red		D15		28	a	Red		A5		
	b	Green		C15			b	Green		B5		
9	a	Red		A14		29	a	Red		D5		
	b	Brown		B14			b	Brown		C5		

Pair	Core	Color	Bundle	Connector		Pair	Core	Color	Bundle	Connector
11	a	Black	Blue	D14		31	a	Black	Orange	A4
	b	Blue		C14			b	Blue		B4
12	a	Black		D13		32	a	Black		D4
	b	Orange		C13			b	Orange		C4
13	a	Black		D12		33	a	Black		A3
	b	Green		C12			b	Green		B3
14	a	Black		A11		34	a	Black		D3
	b	Brown		B11			b	Brown		C3
16	a	Yellow		D11		36	a	Yellow		A2
	b	Blue		C11			b	Blue		B2
17	a	Yellow		A10		37	a	Yellow		D2
	b	Orange		B10			b	Orange		C2
18	a	Yellow		D10		38	a	Yellow		A1
	b	Green		C10			b	Green		B1
19	a	Yellow		A9		39	a	Yellow		D1
	b	Brown		B9			b	Brown		C1

3.5.2 From TLU83/1 to TLU83/3 Cable Structure

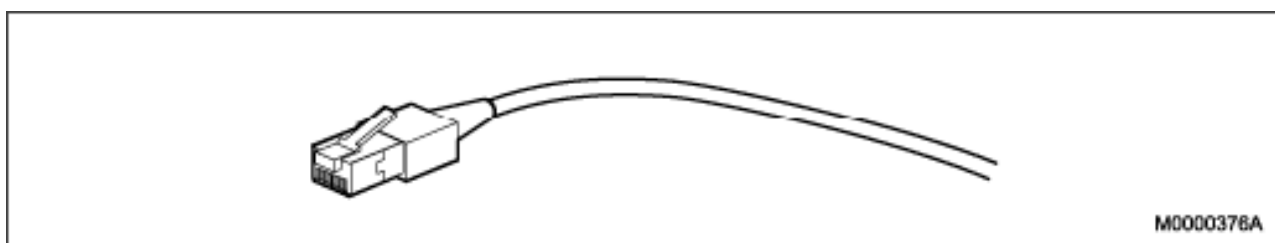
The from TLU83/1 to TLU83/3 board uses the same type of 32 pair cable but it is organized differently. From TLU83/1 to TLU83/3 uses 12 pairs for its 12 trunk line individuals, called TL Ind in the table below. Core **a** is used for Tip and core **b** is used for Ring in each pair. The three upper rows 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 6: Color Coding in 32 Pair Cable for TLU83 (TSR 910 1054/16M or 32M)

Pair/TL Ind	Core	Color	Bundle	Connector		Pair/TL Ind	Core	Color	Bundle	Connector	
1/ NC	a	White	Blue	D18		21/ 8	a	White	Orange	D9	
	b	Blue		C18			b	Blue		C9	
2/ NC	a	White		A17		22/ 9	a	White		A8	
	b	Orange		B17			b	Orange		B8	
3/ NC	a	White		D17		23/ 10	a	White		D8	
	b	Green		C17			b	Green		C8	
4/ NC	a	White		A16		24/ 11	a	White		D7	
	b	Brown		B16			b	Brown		C7	
6/ NC	a	Red		D16		26/ NC	a	Red		A6	
	b	Blue		C16			b	Blue		B6	
7/ NC	a	Red		A15		27/ NC	a	Red		D6	
	b	Orange		B15			b	Orange		C6	
8/ NC	a	Red		D15		28/ NC	a	Red		A5	
	b	Green		C15			b	Green		B5	
9/ NC	a	Red		A14		29/ NC	a	Red		D5	
	b	Brown		B14			b	Brown		C5	
11/ 0	a	Black	Blue	D14		31/ NC	a	Black	Orange	A4	
	b	Blue		C14			b	Blue		B4	

Pair/TL Ind	Core	Color	Bundle	Connector		Pair/TL Ind	Core	Color	Bundle	Connector
12/ 1	a	Black		D13		32/ NC	a	Black		D4
	b	Orange		C13			b	Orange		C4
13/ 2	a	Black		D12		33/ GND	a	Black		A3
	b	Green		C12			b	Green		B3
14/ 3	a	Black		A11		34/ GND	a	Black		D3
	b	Brown		B11			b	Brown		C3
16/ 4	a	Yellow		D11		36/ GND	a	Yellow		A2
	b	Blue		C11			b	Blue		B2
17/ 5	a	Yellow		A10		37/ GND	a	Yellow		D2
	b	Orange		B10			b	Orange		C2
18/ 6	a	Yellow		D10		38/ GND	a	Yellow		A1
	b	Green		C10			b	Green		B1
19/ 7	a	Yellow		A9		39/ GND	a	Yellow		D1
	b	Brown		B9			b	Brown		C1

3.5.3 TLU76 and TLU77 Cable Structure



M0000376A

Figure 24: Connection Cable for TLU76, TLU77 (TSR 482 0211/xxx)

Table 7: Color Coding in Cable for TLU76, TLU77 (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

3.5.4 ELU26 and TLU79 Cable Structure

Table 8: Color Coding in Cable for ELU26 and TLU79 (TSR 491 414)

Pair	Core	Color	Connector	Description
1	A	White	C6	Individual 0 TX+, TX-
	B	Blue	D6	
2	A	White	A6	Individual 1 TX+, TX-
	B	Orange	B6	

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

3.5.5 MGU and MGU2 Cable Structure

Table 9: 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+

Pair	Core	Color	Pinn No.	Description
	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

4

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

This chapter contains the following sections:

- [Analog Extensions from ELU34/1 to ELU34/7](#)
- [Digital Extensions](#)
- [Cordless Extensions ELU31](#)
- [Analog External Lines of TLU8x](#)
- [Digital External Lines](#)
- [Call Metering](#)
- [Private Trunk Lines \(tie lines\)](#)

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.

From ELU34/1 to ELU34/6

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.

ELU34/7

x000 m if using an Ethernet CAT5 twisted pair cable with a wire diameter of approximately 0.5 mm.

x000 m if using an Ethernet CAT6 twisted pair cable with a wire diameter of approximately 0.5 mm.

x000 m if using an Ethernet CAT7 twisted pair cable with a wire diameter of approximately 0.6 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

Connecting TLU79 to TLU79 through MDF (8 pairs), see [Figure 35: 2-Wire ISDN with TLU79 and an NT1-Box \(8 pairs\)](#) on page 55.

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.

From TLU83/1 to TLU83/3

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.

TLU83/4

x000 m if using an Ethernet CAT5 twisted pair cable with a wire diameter of approximately 0.5 mm.

x000 m if using an Ethernet CAT6 twisted pair cable with a wire diameter of approximately 0.5 mm.

x000 m if using an Ethernet CAT7 twisted pair cable with a wire diameter of approximately 0.6 mm.

5.1 Analog Extensions from ELU34/1 to ELU34/7

ELU34 series 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 series.

Note:

ELU34 series 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.

5.2 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.

5.2.1 ISDN Extensions with ELU26

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

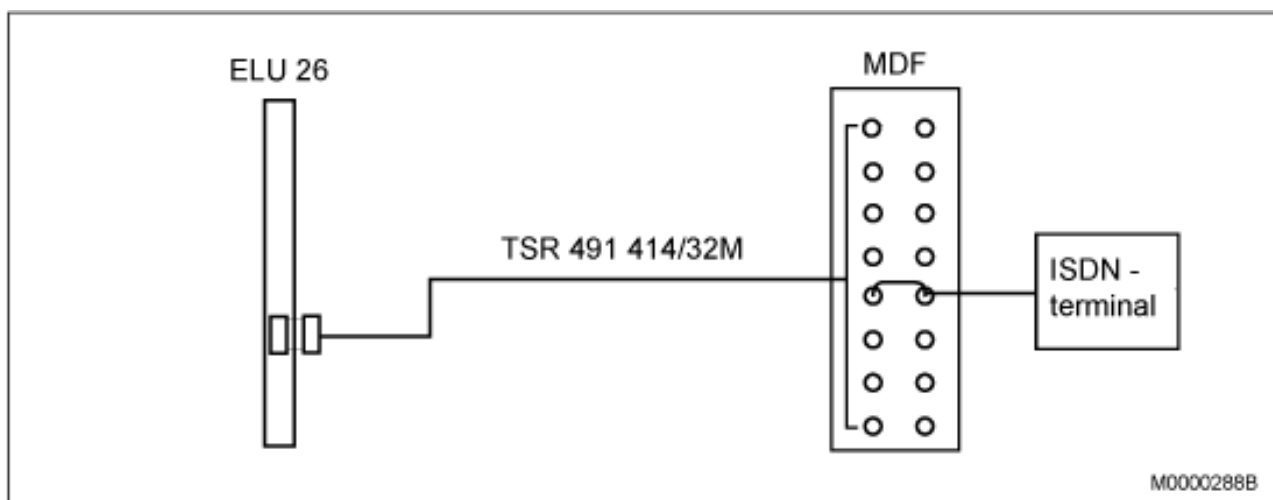


Figure 25: Example with an ISDN-Terminal, 4-Wire Connection

5.2.2 ELU33

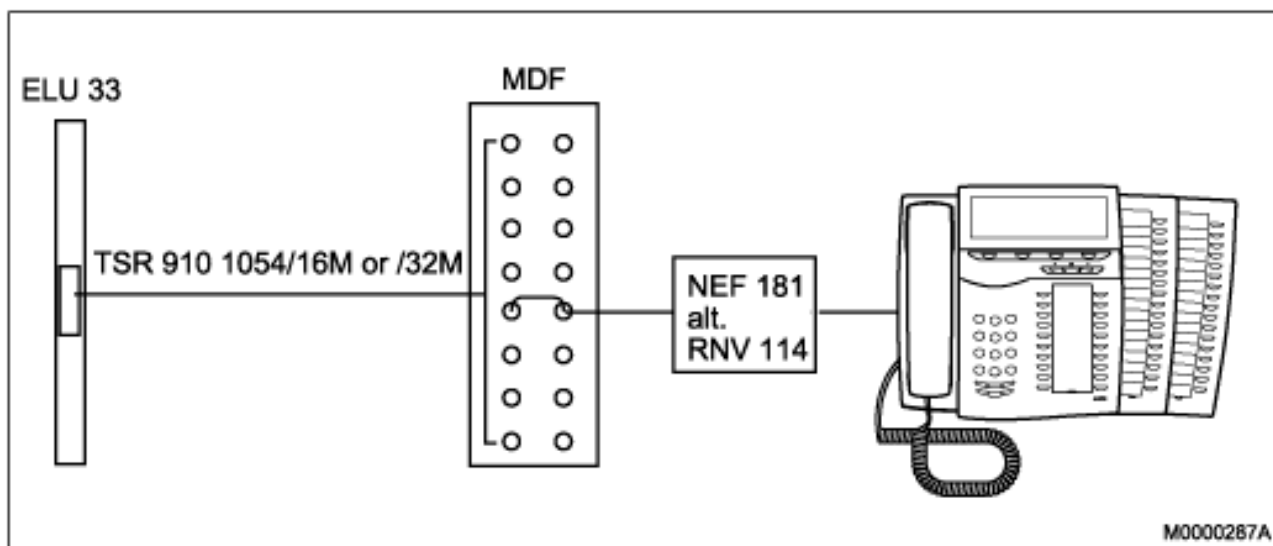


Figure 26: Example with System Telephone DBC 2xx, ELU33 - MDF (32 pairs)

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.

5.2.3 ELU34

The following figure depicts the connection between ELU34/6 (or older) board and MDF.

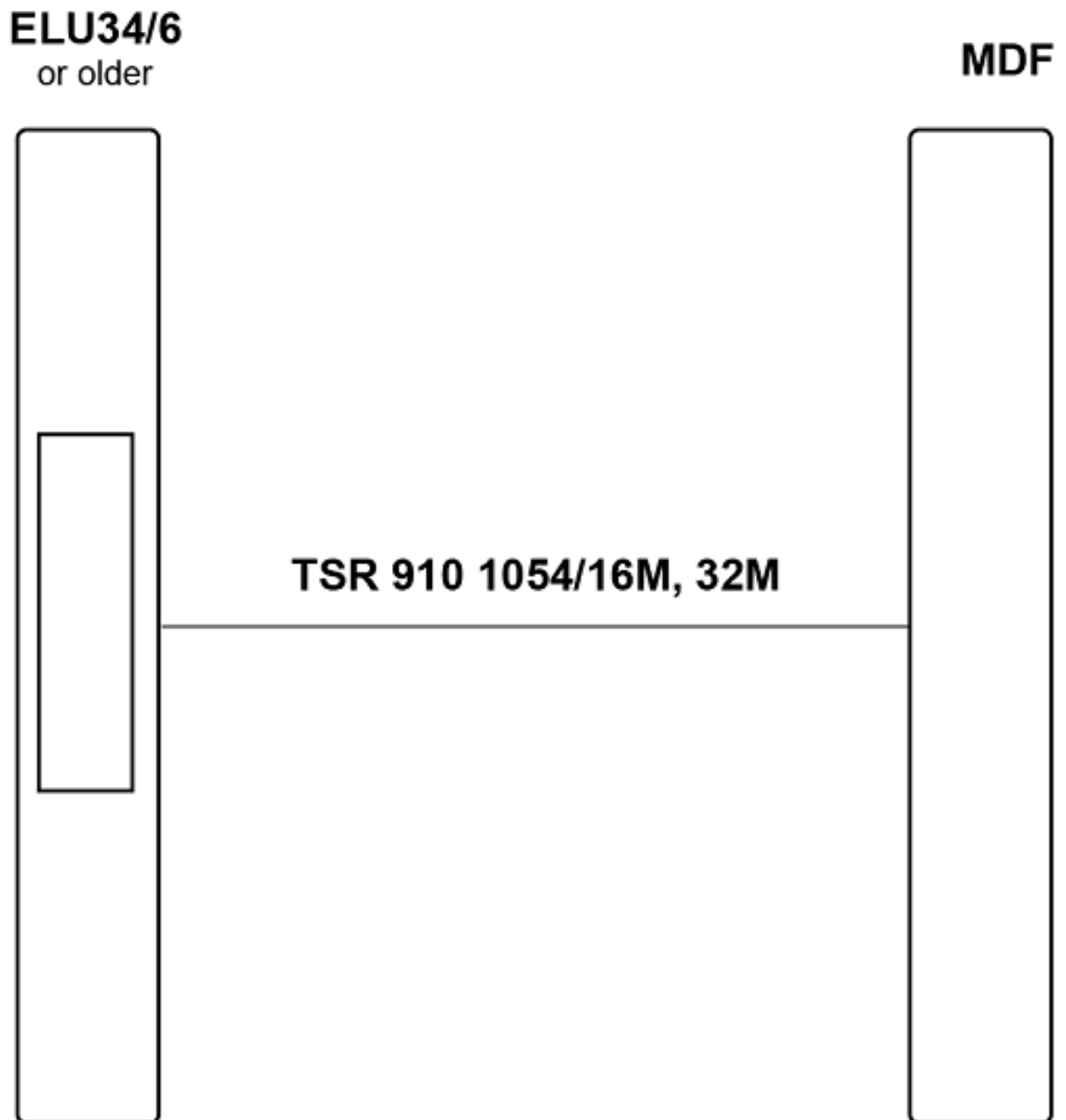


Figure 27: From ELU34/1 to ELU 34/6 Wire Connection

The following figure depicts the connection between ELU34/7 board and MDF.

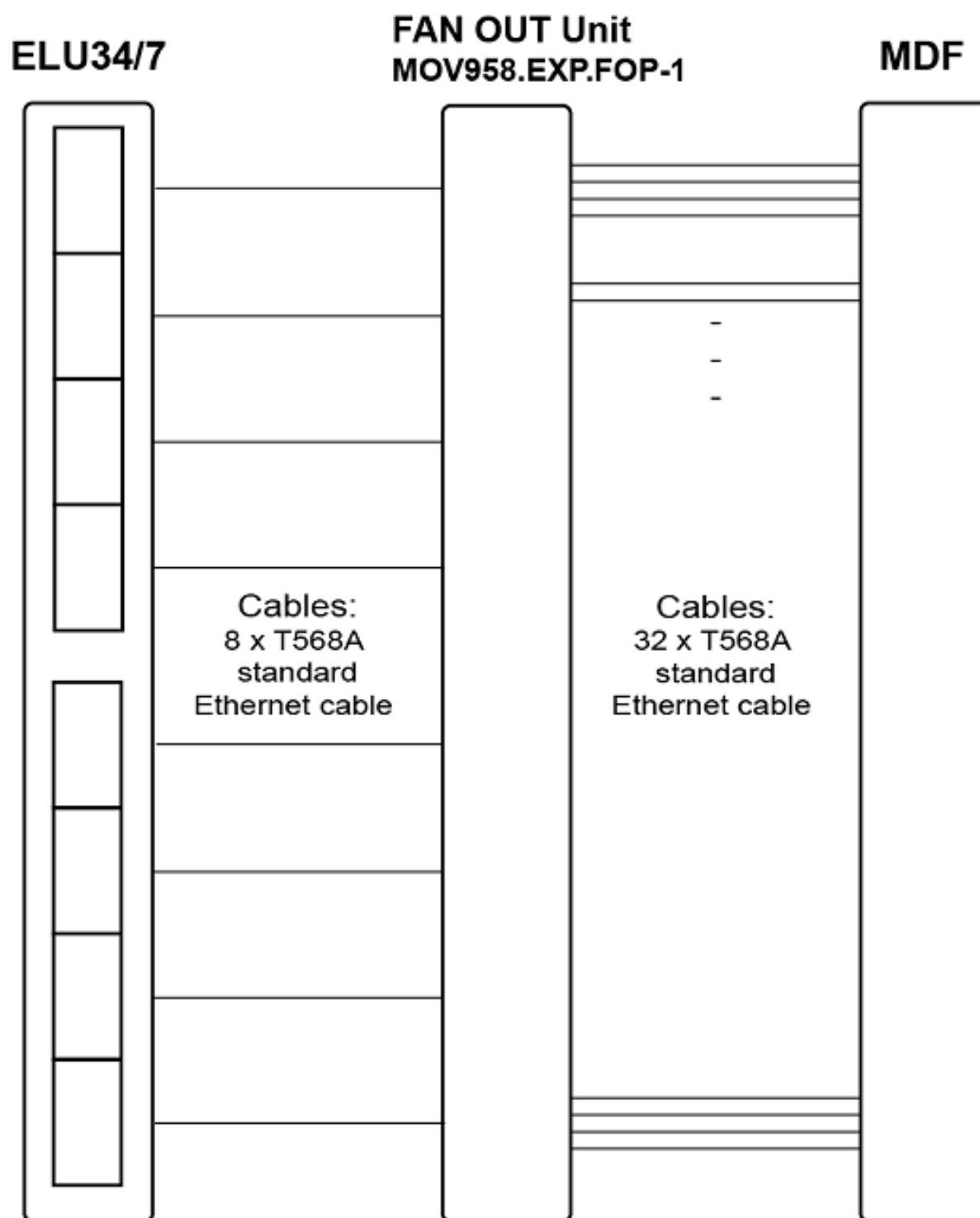


Figure 28: ELU34/7 Wire Connection

5.3 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.

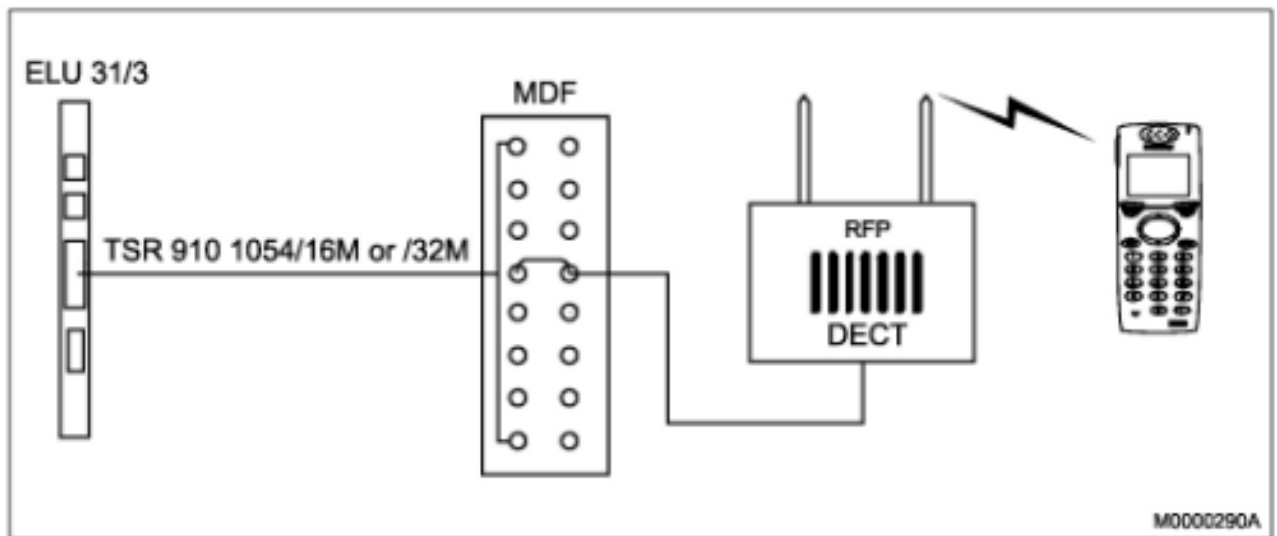


Figure 29: ELU31/4 MDF - RFP

Note:

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

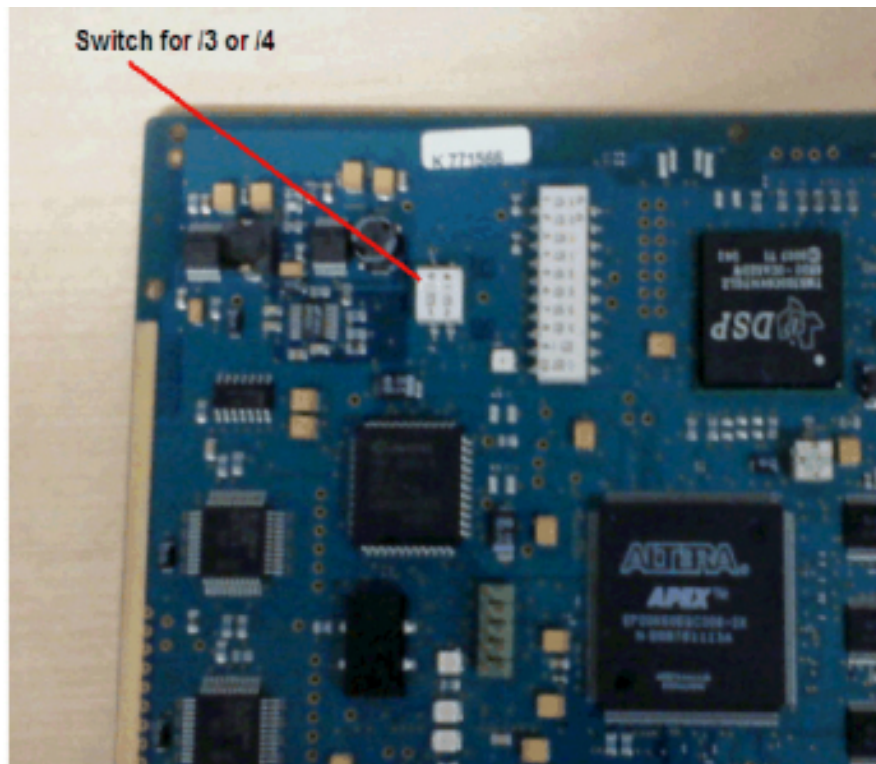


Figure 30: ELU31/4 - Location of Switch

5.4 Analog External Lines of TLU8x

Analog external lines are connected to analog TLU80 and TLU83/1 (or older) boards.

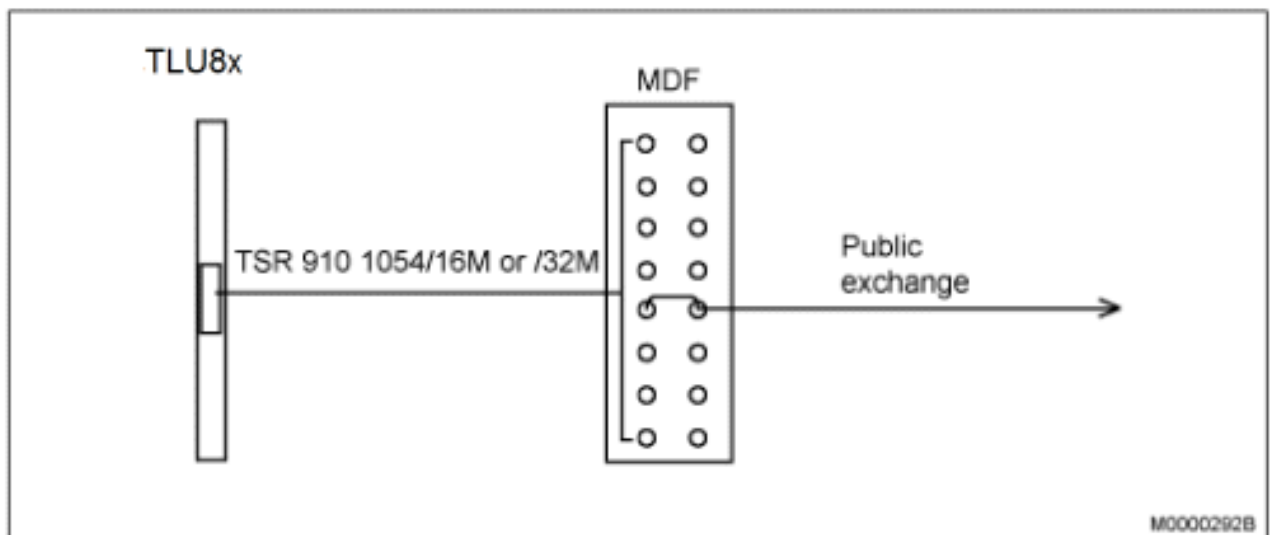


Figure 31: TLU8x - MDF Example

Analog external lines are connected to analog TLU83/4 boards.

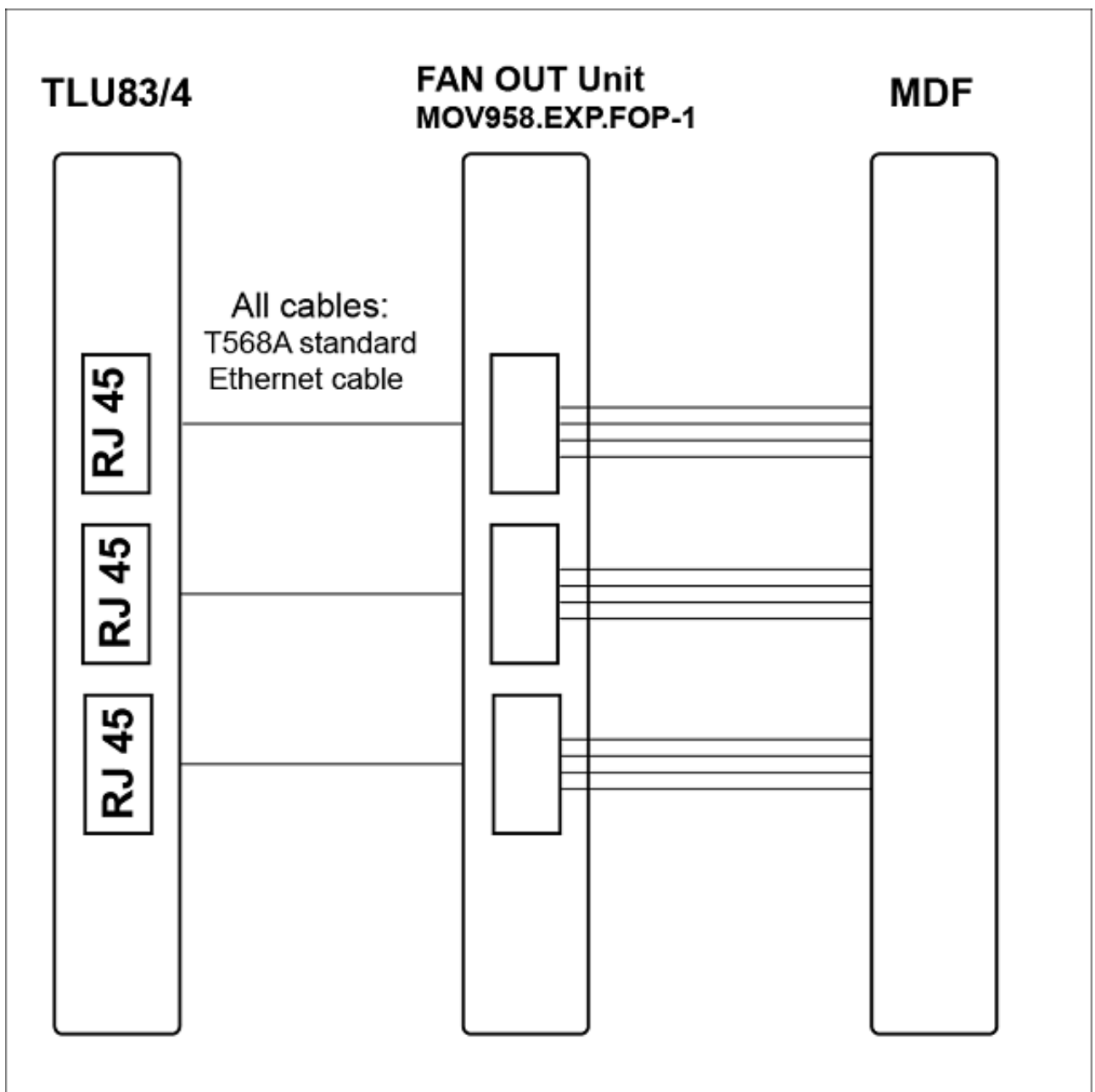


Figure 32: TLU83/4 - MDF Example

5.5 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.

5.5.1 TLU77

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

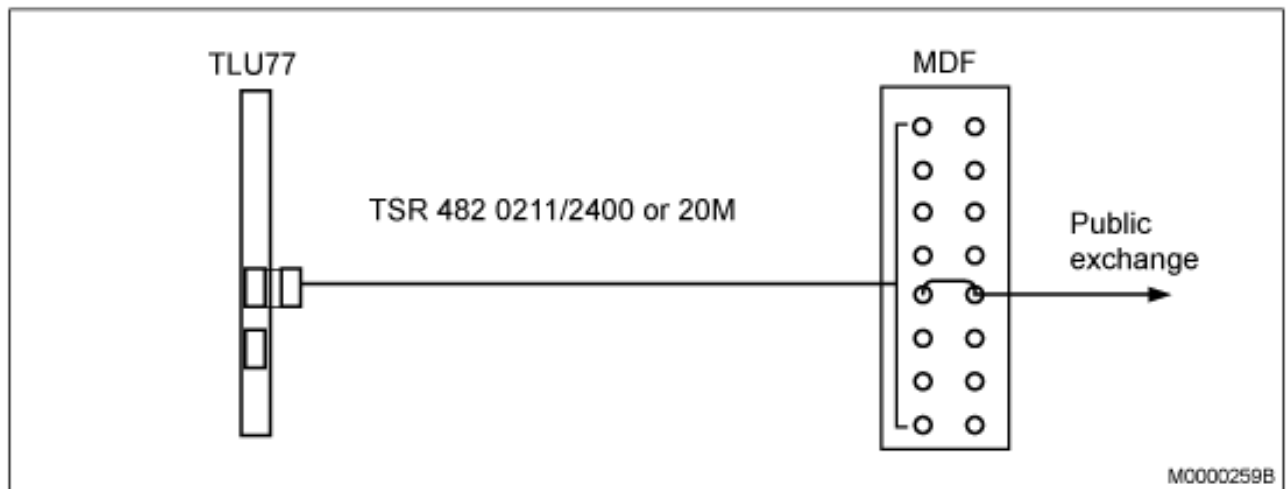


Figure 33: TLU77, 120ohm Pair Cable

5.5.2 ISDN

ISDN PRI with TLU76/11

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

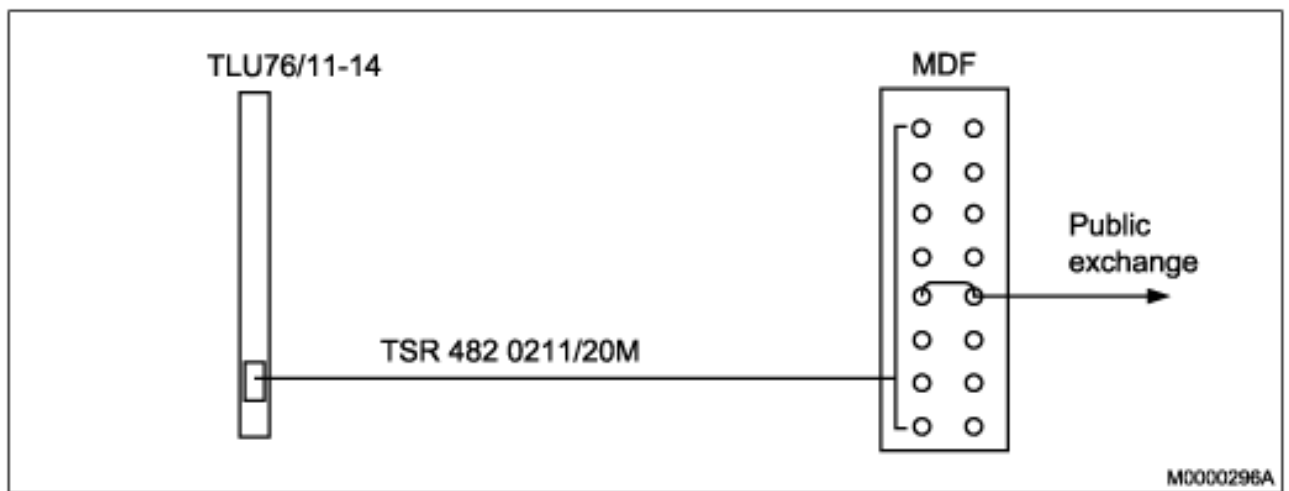


Figure 34: Digital External Lines 120 ohm Pair Cable, TLU76/11 - /14

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.

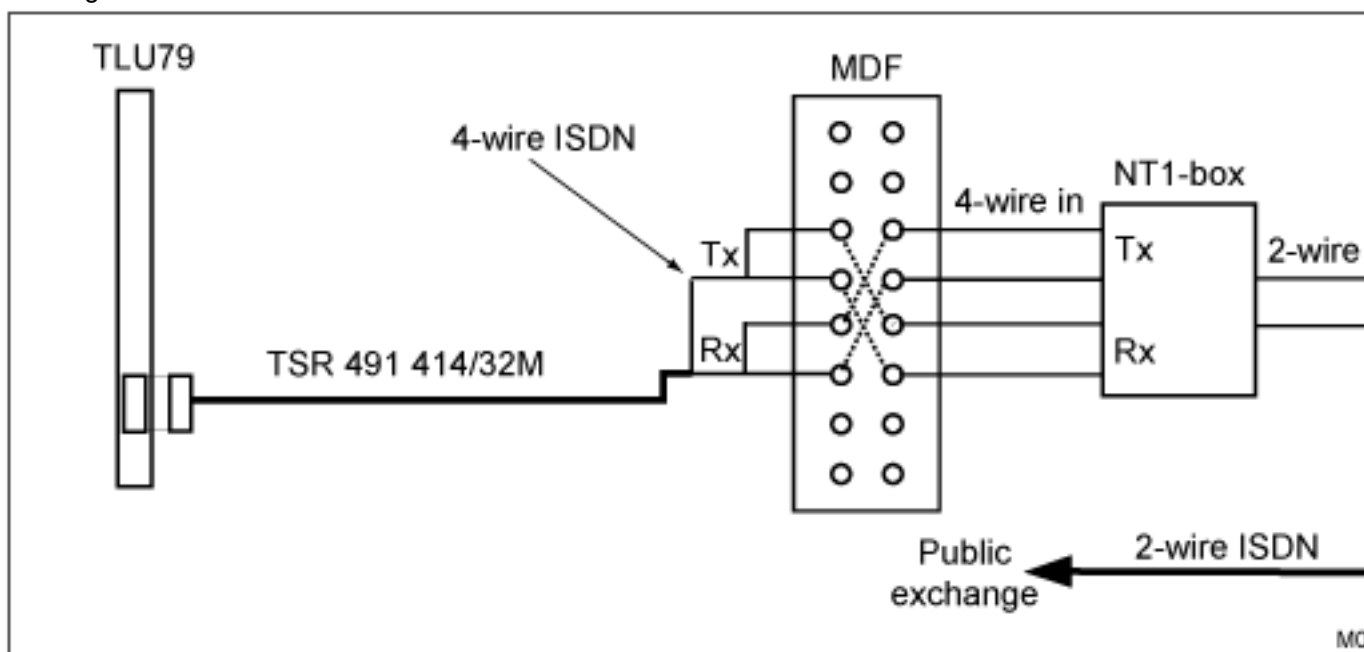


Figure 35: 2-Wire ISDN with TLU79 and an NT1-Box (8 pairs)

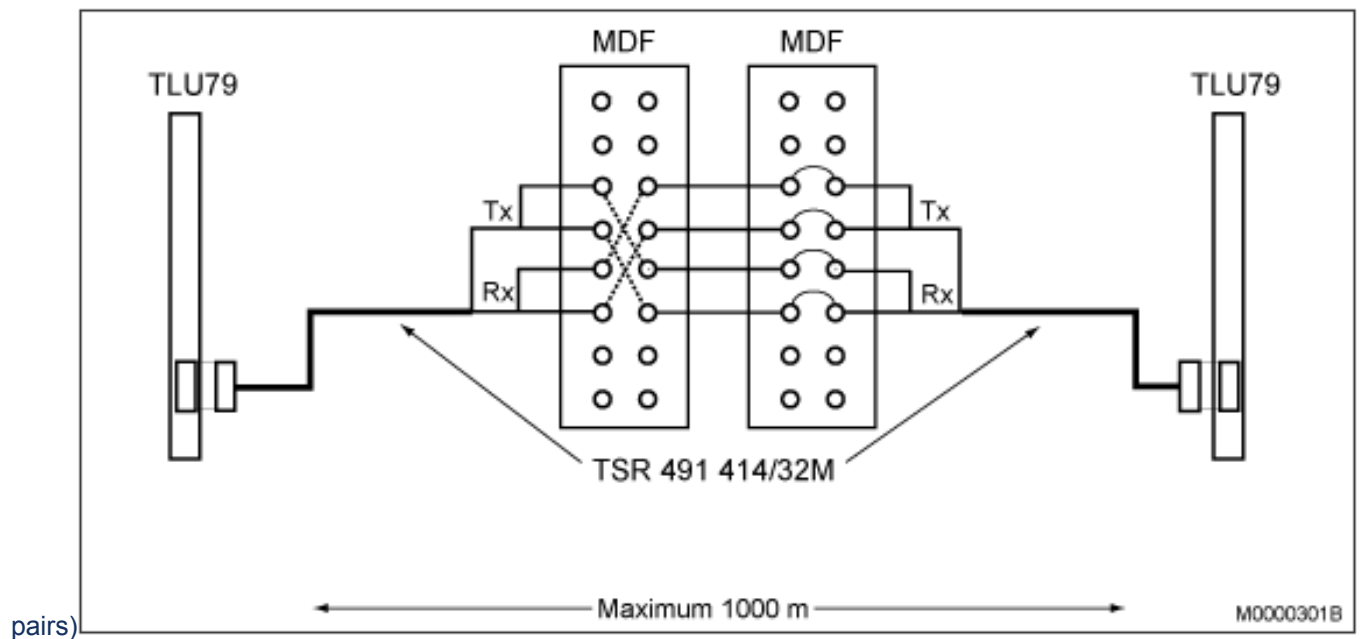
Note:

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 36: Connecting TLU79 to TLU79 Through MDF (8



5.6 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.

5.7 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.

This chapter contains the following sections:

- [Fan Unit Alarm](#)
- [MX-ONE Lite, 3U Unit, External Alarm](#)
- [AC/DC Unit Alarms](#)
- [AC/DC Alarm through MGU](#)

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.

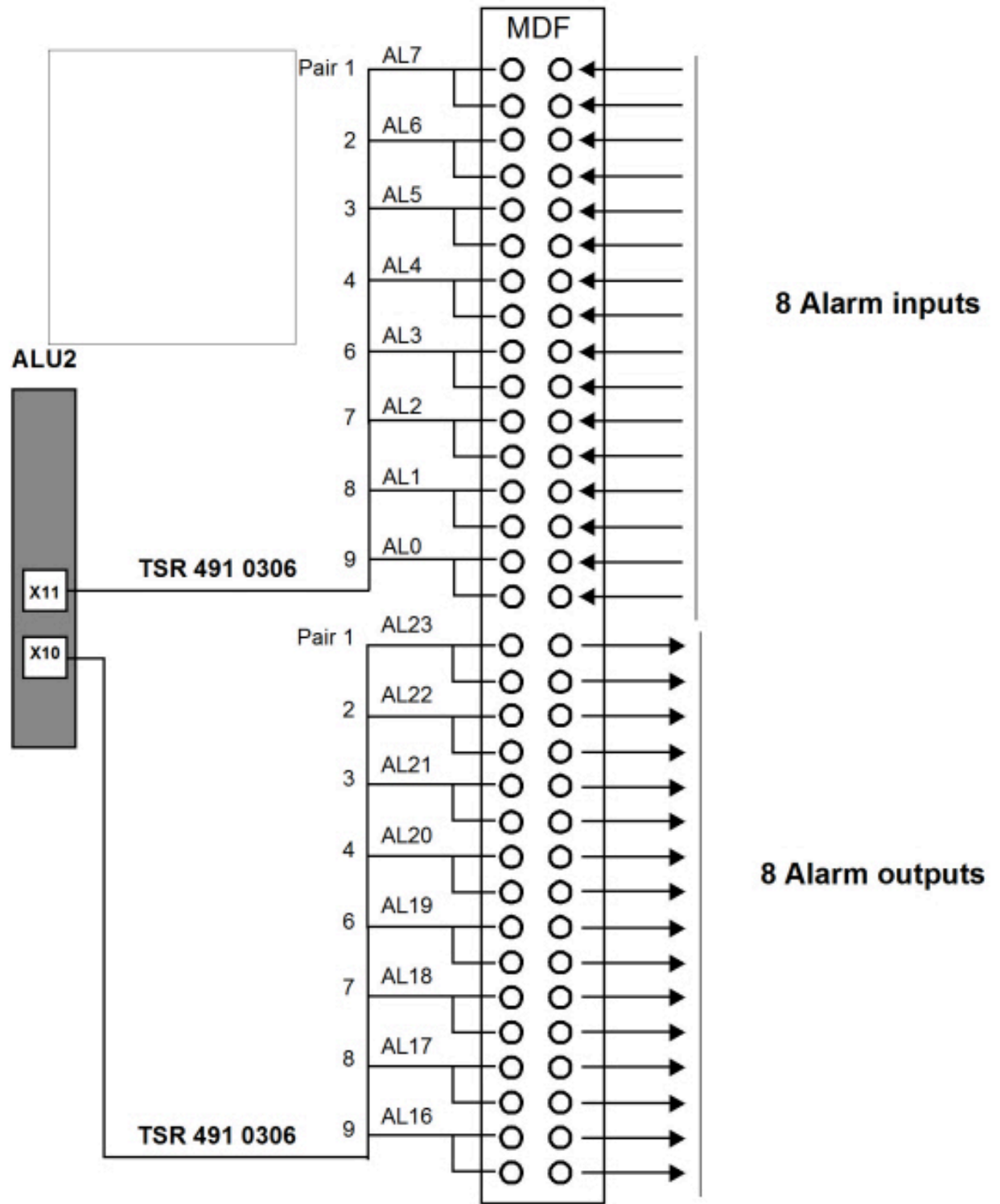


Figure 37: ALU2 - MDF Connections

6.1 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.

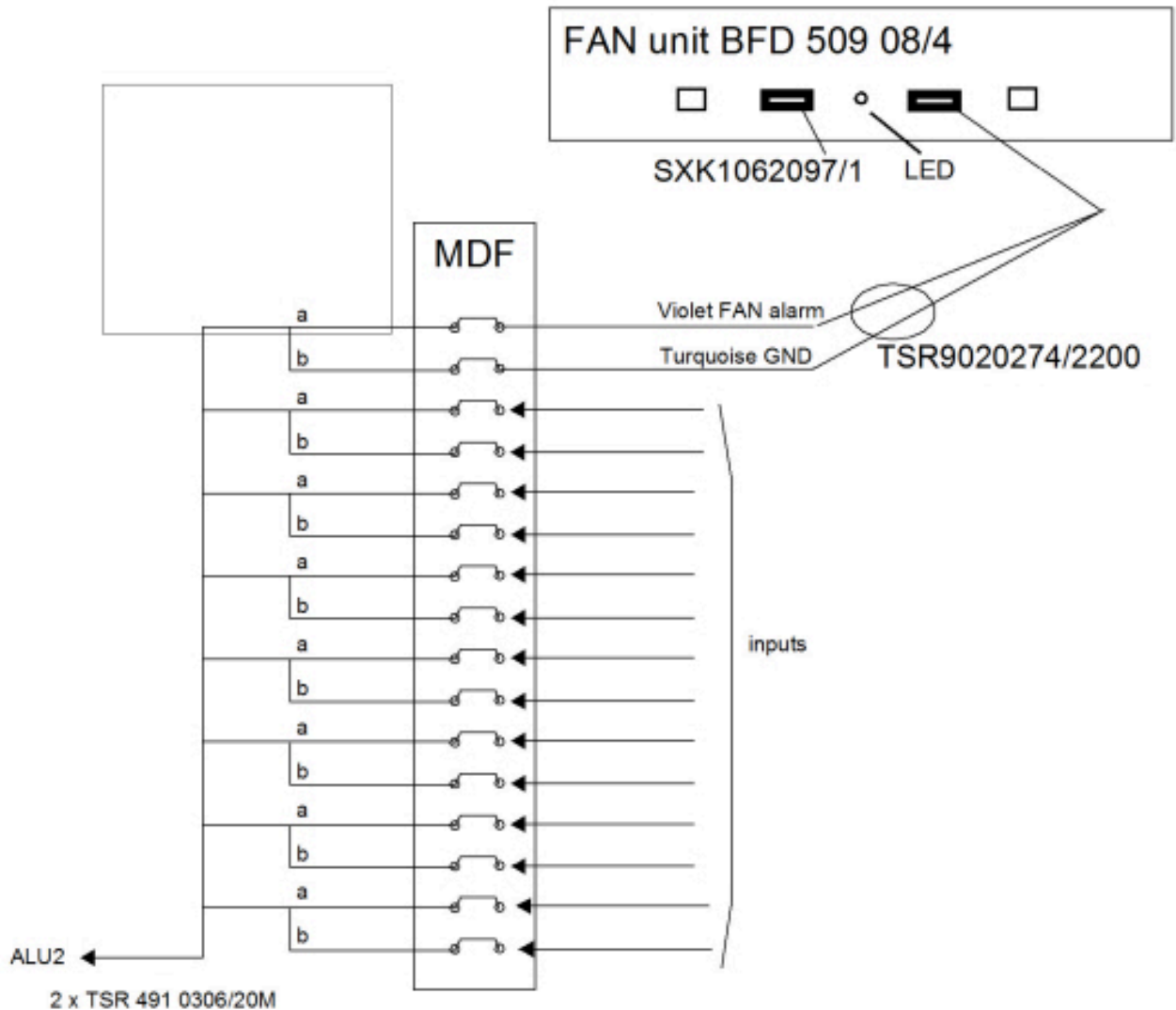


Figure 38: MDF Alarms for the Fan Unit BFD 509 08/4

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

6.2 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 10: 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.

6.3 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.

6.3.1 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.

Alarms

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.

6.4 AC/DC Alarm through MGU

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

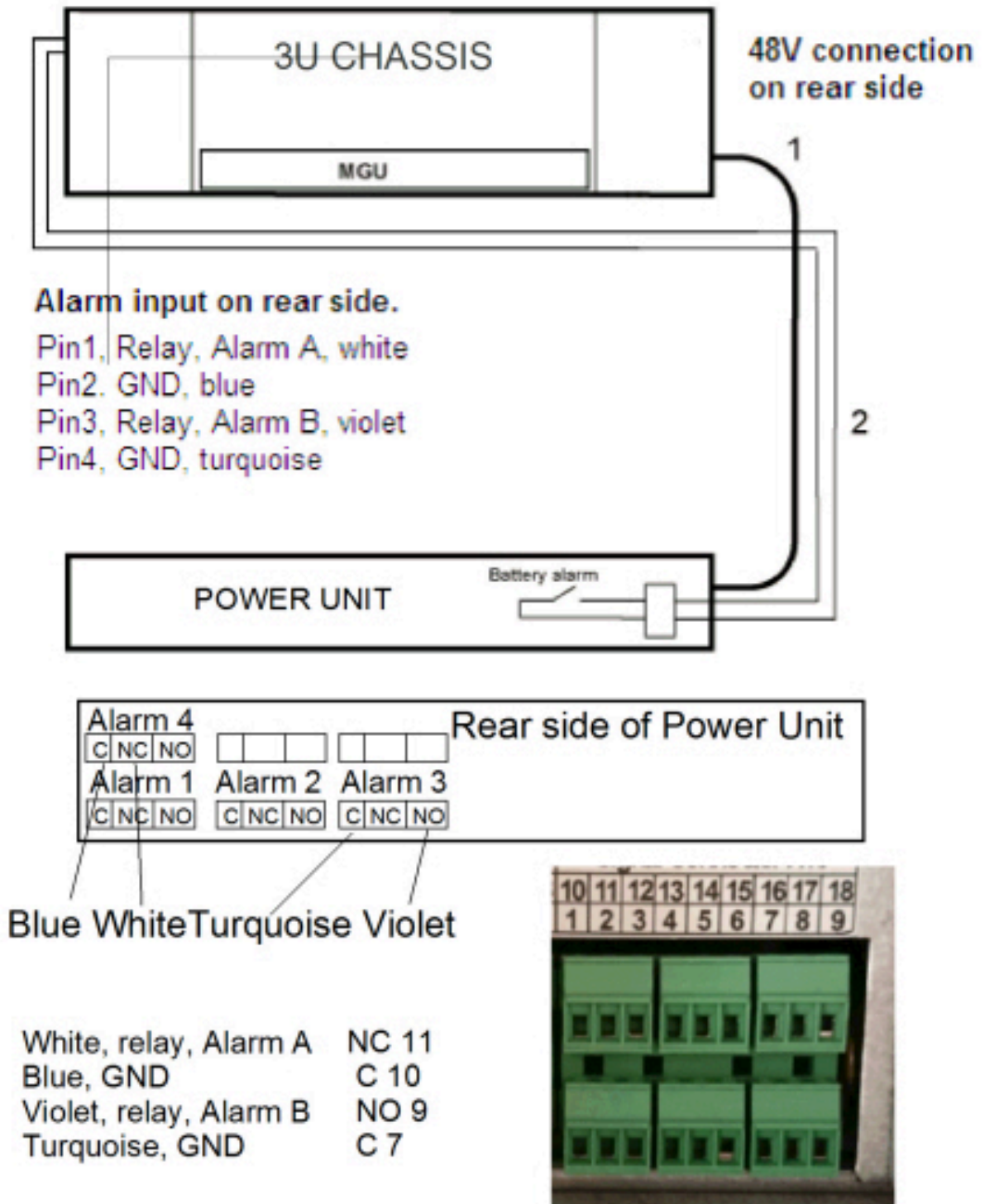


Figure 39: MGU Power Alarm Detection in MX-ONE Lite

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.

6.4.1 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 SXK 106 2097/1 on the FAN_2 unit.

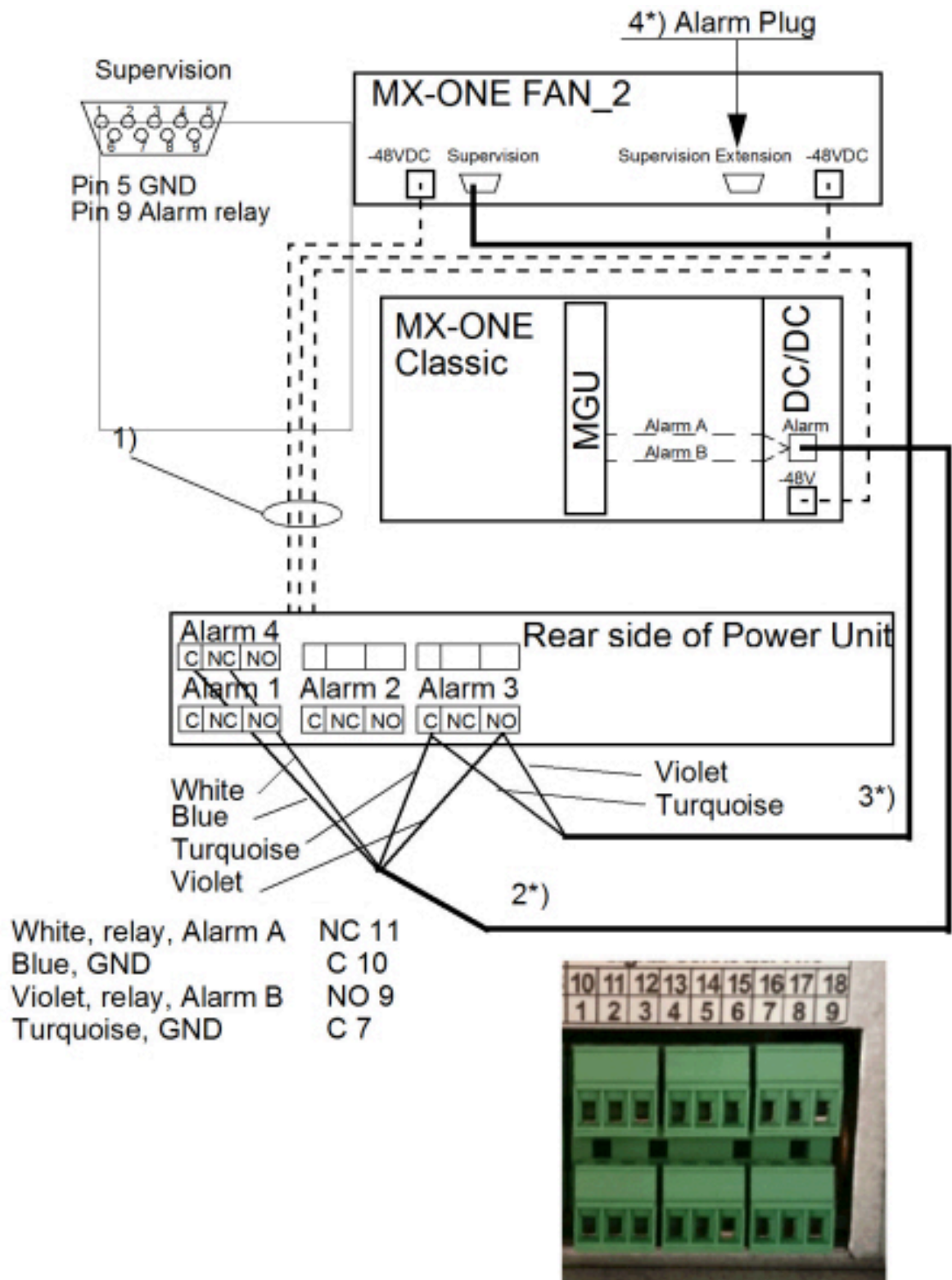


Figure 40: Power and Fan alarm in Classic chassis

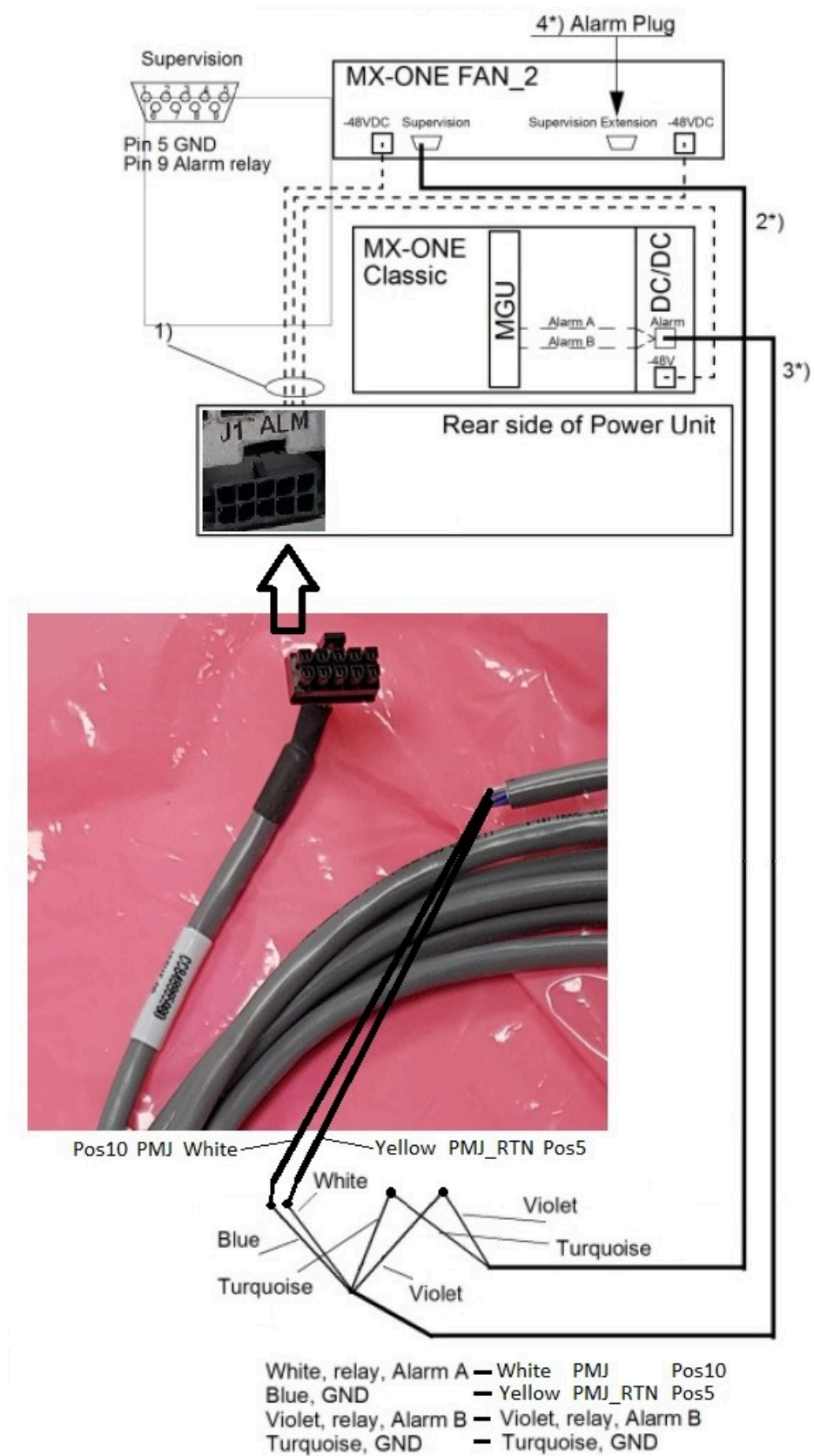


Figure 41: ABB Power Supply Unit

Information Alarm Connections

See the Slimline Power System Brochure for details.

Alarm connections are on the rear of the shelf – J1 is the Alarm Outputs and J2 is Alarm Inputs
Change alarm descriptions via LAN port (Web pages)

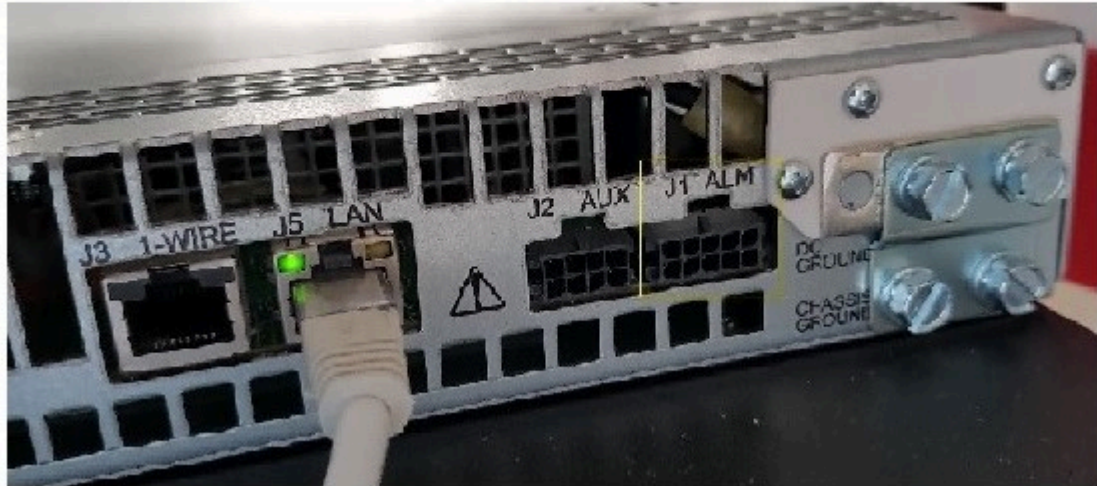


Figure 42: Information Alarm Connections

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 11: 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
		<p>i Note:</p> <p>For MX-ONE 31A and 62A, 4x12V batteries: cable from PSU to battery, not included.</p>
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).

