

TM-3000/II

Technical Description

TM-3000/II DC, 19"/ETSI/23"(TM3000/II-DC)



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1 Introduction

This manual provides an overview of the TM-3000/II chassis. For installation details, see separate I&C Manual.

1.1 Document Revision History

Table 1 Document Revision History

Revision	Date	Description of changes
A	2012-12-16	First version
B	2013-02-09	Corrected slot numbers for passive MDU8 units in chapter 4
C	2013-03-06	Added information on DC cable lengths in chapter 6
D	2013-06-12	R21 updates: Updated plug-in unit compatibility table. Added chapter on fiber management shelf. Corrected DC cable size in table 5
E	2013-11-12	R22 updates: - Updated plug-in unit compatibility table. - Added chapter of CU & TU compatibility - Updated example configuration chapter
F	2014-05-12	Removal of TM-3000 from plug-in unit compatibility table. R23 updates; New DC-filter. New fan unit.
G	2014-09-12	Updated to reflect R23.1 content Misc editorial updates and improvements.
H	2014-11-25	Updated details on new DC filter; Corrected content in upgrade kit.
I	2014-12-20	Updates to reflect R24 content plus editorial improvements. The R24 updates affects only the SW revisions in the plug-in unit compatibility matrix.
J	2015-04-20	Power consumption updates.
K	2015-06-20	Updated to reflect R25 additions.
L	2015-12-10	Updated to reflect R26 additions.
M	2016-03-16	Updated to reflect R26.1 additions.
N	2016-10-20	Updated to reflect R27.0 additions.
O	2016-12-20	Updated to reflect R28.0 additions.
P	2017-04-20	Updated to reflect R28.1 additions.
Q	2017-06-20	Updated to reflect R29.0 additions. Added information on extraction handle that is introduced on new/selected boards.
R	2017-09-20	Updated to reflect R29.1 additions.
S	2017-12-15	Updated to reflect R30.0 additions.
T	2018-04-15	Updated to reflect R30.1 additions (only release references).
U	2018-06-24	Updated to reflect R31.0, Added AC-DC-1K8, AC-DC-2K0

2 Functional Description

2.1 Introduction

The TM-3000/II chassis is the largest chassis alternative in the XTM Series. The TM-3000 chassis has a passive backplane, i.e. no traffic is transported over this interface. This gives a high level of flexibility since there are no dedicated slots (apart for the Control Unit) for certain board types.

The generic backplane enables a TM-3000/II chassis to be configured as a multi-purpose Network Element (NE). As an example, a TM-3000/II chassis can contain a direction-less ROADM function, a line amplifier function and a CWDM add/drop function. The node manager will support any combination of plug-in units such as L1, L2 and L0 boards.

A Control Unit (CU-SFP/II or CU-SFP/III) is always placed in the first slot. The control unit gives an aggregated management view of the chassis. Multiple TM-3000/II chassis can be connected in a master-slave configuration to provide a larger Network Element (NE).

The TM-3000/II chassis has a flexible mechanical solution for the shelf that supports half-height units. The standard length is 1 slot. A shelf extension kit is delivered with every chassis enabling the shelf to be extended to 2, 3, 4 or 5 slot lengths. So each chassis can easily be configured at the site. The selection of shelf length for passive units will require some analysis since it depends on what type of Network Element (NE) that is to be created and what units that are to be mounted into the card cage. See for more details.



Note

TM-3000/II requires SW release R20 or later. The CU must be of CU-SFP/II or CU-SFP/III type. See Dimensioning Guidelines for more details on restrictions.



Note

For details on the installation procedure see the I&C Manual for TM-3000/II.

2.2 TM-3000/II Sales Objects

With release R28 and later, there are two ordering codes for a complete TM-3000/II chassis:

- TM3000/II-DC. Contains CU-SFP/II
- TM3000/II-DC-CU3: Contains CU-SFP/III

TM3000/II-DC-CU3 contains the more powerful Control Unit (CU-SFP/III) that is introduced in release R28. The CU-SFP/III is to be used in parallel with the current CU-SFP/II.

The CU-SFP/III is required when these unit is part of a configuration:

- Mobile Fronthaul Access Unit (FHAU/1)
- 400G Flexponder (FXP400GOTN)
- 2x100/200G, 12x10G, 1xMPO Ethernet MuxPonder-III (EMXP440/III)
- 200G Muxponder OTN (MXP200GOTN)

These units will not be accepted by any other CU version. This CU will also be required for other configurations onwards.

The two ordering codes can be broken down into two sub components:

- TM3000/II-DC: M3000/IIENC/COMP + CU-SFP/II
- TM3000/II-DC-CU3: M3000II/ENC/COMP + CU-SFP/III

The M3000II/ENC/COMP contains the following components:

- Card cage (M3000/II/ENC)
- LAN module for internal/external DCN connections (M3000/RJ45).
- Shelf-kit enabling extension of length to 5 slots (supporting 10 half-height units (M3000/DIVKIT-2)).
- Dummy panels to cover empty board slots (M3-DU/6HE for full-height slots and M3-DU/3HE for half-height slots).
- Air-guides (ensure proper air flow (M9A-AIRSTOP/6HE and M9A-AIRSTOP/3HE)).
- Metallic cover (covering chassis front, (MEC100731-ASY)).
- Dual Fan units (FAN4A/M3000/II).
- Dual DC-filters (M3000/DC/II) with 4m DC cables (CAB100075/4M0-R and CAB100075/4M0-L). These cables will be replaced by CAB100079/4M0-L & CAB100079/4M0-R in 2016. See 100025-219_PCN_DC-cable_M3000_DC_II_R26-1.
- Ethernet cable 2m (M8A-ETNET/2M), DSUB/RJ45 converter (X2A-CAB/9), ESD wrist wrap (M9A-HAND).
- Mounting brackets 19" (pre-mounted), ETSI (MEC100525) or 23" (MEC100365) with screws and nuts.
- Screw driver (Torx 8) and board extraction tool (MEC100359).

For AC power option a separate 1U rack mounted AC/DC converter is ordered separately.

For configurations where OSC channels are needed, the required amount of SFP's must be added separately. See also *Dimensioning Guidelines* for more details and restrictions.

2.3 TM-3000/II Chassis

The TM-3000/II chassis can be divided into three parts:

- Fan area
- Card cage
- Power and external interfaces

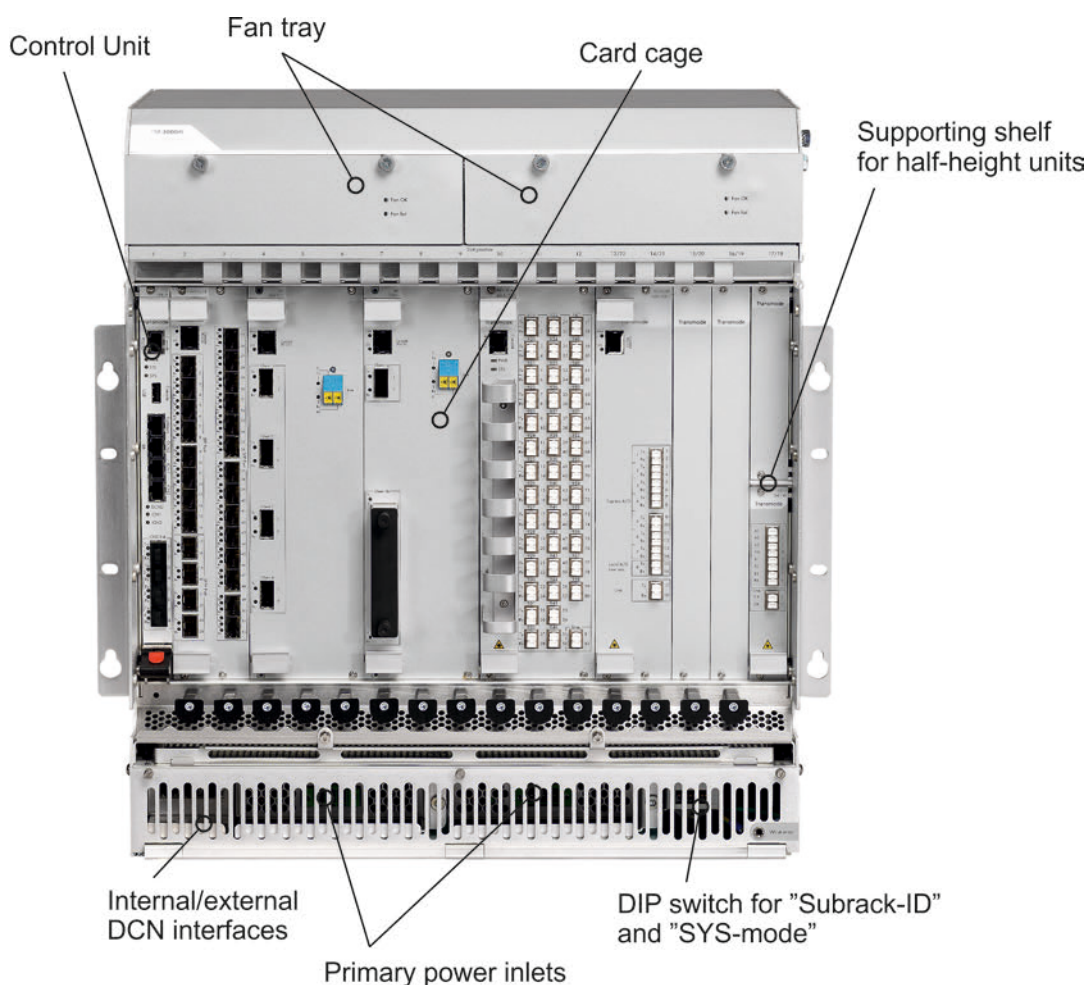


Fig. 1 TM-3000/II chassis

The Fan, Power and External Interface areas are covered with plates that are screwed to the mechanics via thumbscrews that are easy to loosen. The bottom cover plate can be flipped open via the hinges for easy access to e.g. DC-filter units.

Different mounting brackets are used when mounting the TM-3000/II into an ETSI, 19" or a 23" rack.

Multiple TM-3000/II chassis can be connected to form a one-entity NE from management perspective. See *Dimensioning Guidelines* within the System Manual for restrictions on number of chassis and other restrictions.

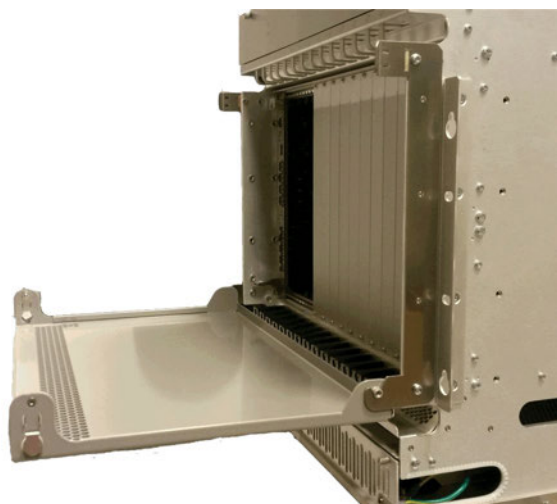


Fig. 2 Front cover

Since mid 2016 the TM-3000/II is shipped with a metallic cover (MEC100731-ASY) enabling the chassis to be delivered pre-configured with plug-in units and patch cords in place. The cover can be locked in an open position, so access to the card cage is provided without dismantling the cover.

2.4 Rack Mount

At delivery the TM-3000/II chassis is equipped with 19" mounting brackets.

For ETSI and 23" mount, a separate pair of mounting brackets is provided.

The brackets can be mounted to the chassis in two positions, one position for mounting in racks with >300mm depth and another for 300mm depth.

See section 6.2.

2.5 Fan Units

Two fan modules are placed above the card cage. These can easily be extracted and replaced by unscrewing the thumb screws and pulling the module outwards.

The fan speed is controlled by the temperature. The higher heat dissipation in the card cage, the higher speed of the fan units. If the fan speed decreases below an expected level, an alarm will be raised.

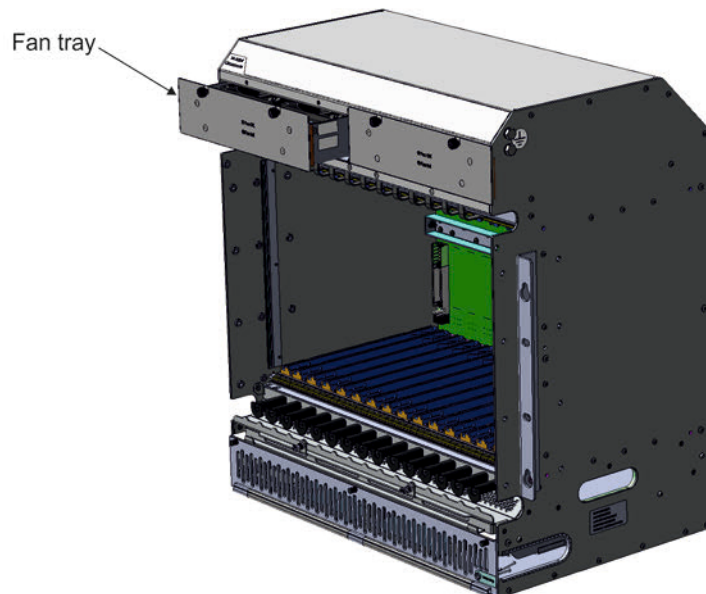


Fig. 3 Fan tray

Each fan module has two LED's to indicate status. Upon fan failure the red LED will light up. A hot-swap of the failed unit can be done.

The cooling air is taken in from the lower front, spread via a mechanical air filter to ensure an even distribution of air to all boards in the card cage. The air is taken out on the back via the angled outlet. Two TM-3000/II chassis can thus be mounted back-to-back in a rack without affecting the airflow.

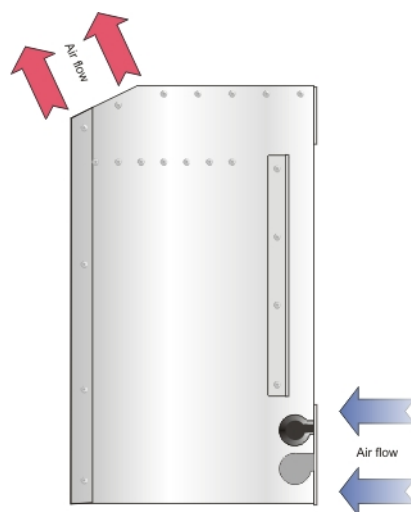


Fig. 4 Airflow through a TM-3000/II chassis

Temperature sensors on all units continuously measure the board temperature and a threshold is used to generate an alarm if the temperature exceeds the preset value. This alarm can be used as an indication that the air filter needs to be cleaned.

The acoustic noise level of TM-3000/II with R1D version of the fan unit FAN4A/M3000/II fulfils the EN300753 requirement for “Telecom room unattended” locations.

The acoustic noise level of TM-3000/II with R1E version of the fan unit FAN4A/M3000/II fulfils the EN300753 requirement for “Telecom room attended” locations.

EN300753 stipulates the Lwa level to be lower than 72dB to meet the “Telecom room attended” requirement and lower than 75dB for the “Telecom room unattended”.

NEBS makes no distinction between attended or unattended locations. The NEBS requirement stipulates a level below 78dB. However, NEBS also requires a 3dB margin to the measured value. So the measured limit is 75dB.

The measured noise level with the R1D fan version is <74dB.

The measured noise level with the R1E fan version is <72dB.



Fig. 5 Fan module FAN4A/M3000/II



Note

For slots without any plug-in boards an “air stopper” must be inserted to maintain proper air-flow. Missing “air stoppers” will render the air to flow through unused slots and thus reduce the cooling effect. Air stoppers are placed in all full-height slots at delivery and must be removed when a board is to be inserted. Note that TM-3000/II has a different air stopper design as the TM-3000 chassis. Do not mix!

It is also imperative to cover unused slots with a cover panel to maintain proper air flow securing electromagnetic interference compliance.

A failed fan module can be replaced in-service. In case of a fan module failure, a replacement should take place as soon as possible. A fully equipped chassis can operate with one fan module up to 96 hours in 35 degrees Celsius operating conditions.

2.6 Air Filter

An air filter is placed under the card cage. This filter is designed for a Pollution Degree 2 (IEC 664-1) environment and should be extracted and cleaned every second year under normal conditions. See Installation & Commissioning Manual for more details.

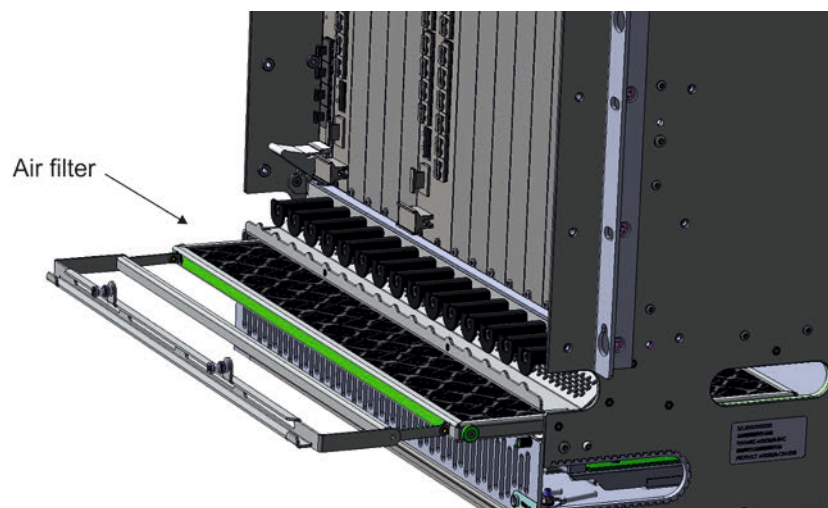


Fig. 6 Air filter

2.7 Primary power alternatives

2.7.1 DC-Power

For direct -48V DC powering, two DC power inlet modules are inserted in the two mid slots. The two modules are used to enable A & B power configurations. 2-wire and 3-wire configurations are possible.

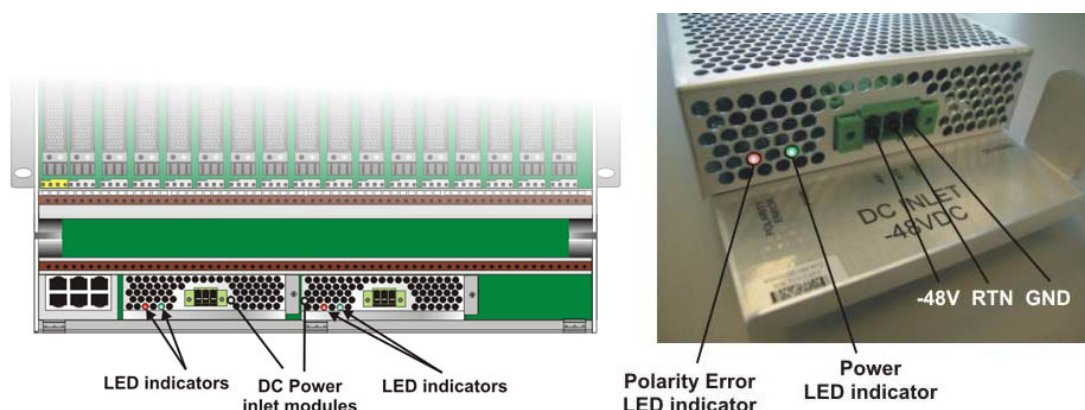


Fig. 7 DC power configuration

The DC power inlet module (see Fig. 7 DC power configuration) has a green LED indicator to indicate a functioning unit. The LED's can be seen also when the cover panel is in place. Upon failure, the green LED will be turned off and an alarm will be generated to the management system. A hot-swap replacement of the failed module can be done. The right module variant will eventually be phased out and be replaced by the left variant.

A red LED to indicate polarity error, i.e. the - 48 voltage has been wrongly connected. This is only a visual indication and will not generate any alarm to the management system.

In 2015 a more powerful DC-filter was introduced that increases to max power consumption within the card cage from 500W (M3000/DC) to 800W (M3000/DC/II).

Chassis that are equipped with M3000/DC can be upgraded to M3000/DC/II in-service, given an A+B-power configuration. Note that the fuse must be upgraded as well as the DC cable. A separate upgrade kit is provided containing all required items to perform an upgrade to the M3000/DC/II filters. See chapter 6.4.1.

The DC cable for the 800W version (M3000/DC/II) is provided in a left and right version. This is clearly indicated via red/green colors and markings. Ensure that these are mounted on the correct side.

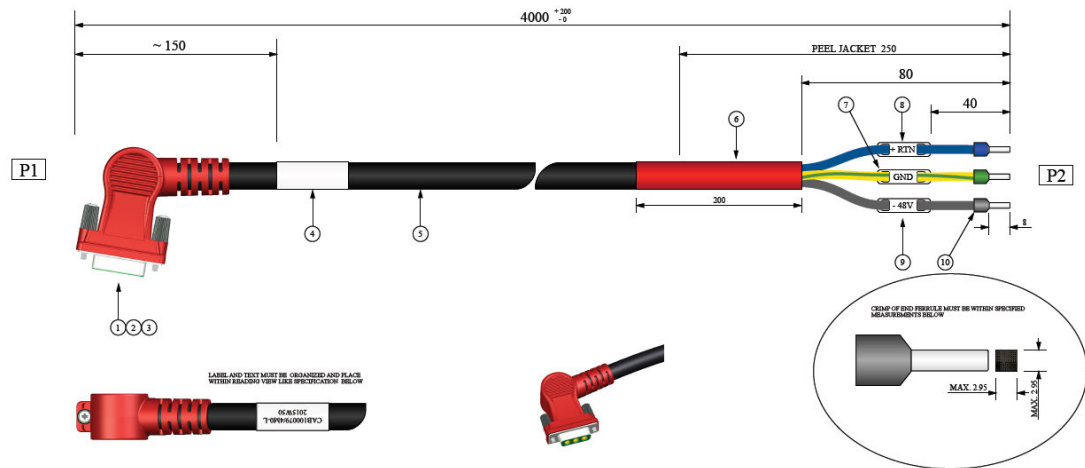


Fig. 8 DC cable for the 800W DC-filter (M3000/DC/II)

2.7.2 AC-Power

The basic configuration is always for dual DC powering. AC powering requires a separate 1U rack mounted AC/DC converter. An example of an AC/DC unit is shown in the figure below.

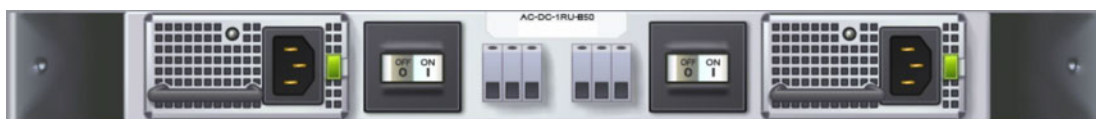


Fig. 9 External rack mounted AC/DC unit (AC-DC-1RU-850/nn)

The following power options for TM-3000/II chassis are available:

- 850W, AC-DC-1RU-850/nn
- 1.2kW, AC-DC-1RU-1K2/nn
- 1.8kW, AC-DC-1RU-1K8
- 2.0 kW, AC-DC-1RU-2K0

The 1.2k-2.0kW versions is required to match the higher power capabilities provided by the latest DC-filter (M3000/DC/II).

The 850W version matches the capabilities of the previous DC filter “M3000/DC”.

For further details and ordering data, refer to separate guides for each AC-DC unit in the Installation section of the XTM Series System Manual.

2.8 External Interfaces

A LAN module for electrical connections is placed to the far left in the chassis.

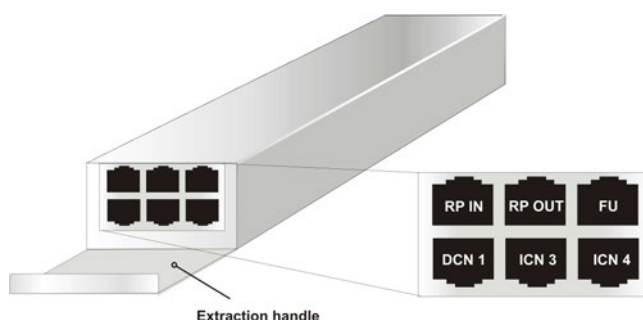


Fig. 10 LAN module

Six RJ-45 connectors are available for the following applications:

- RP IN – Remote Protection, future usage.
- RP OUT – Remote Protection, future usage.
- FU – Future Use.
- DCN 1 – Management interface to the Network Element. A LAN-connection via Ethernet interface (10Mb/s or 100Mb/s) that can be connected directly to a network manager DNA-M or via a DCN network.
- ICN 3 – Internal Communication Network, used when connecting multiple TM-3000 platforms to create a larger NE.
- ICN 4 – Internal Communication Network, used when connecting multiple TM-3000 platforms to create a larger NE.

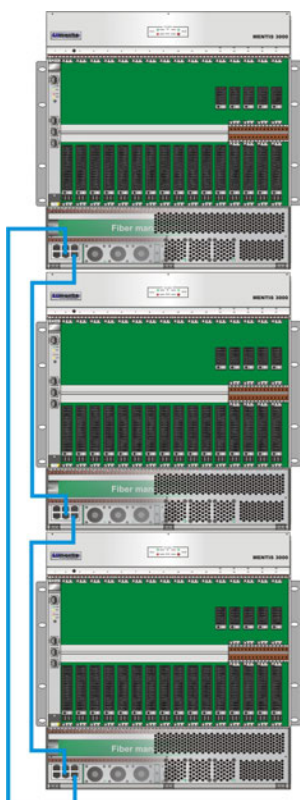


Fig. 11 Stacked TM-3000 chassis using ICN 3 & ICN 4 connections

Note the connection in-between TM-3000/II no 1 and no 3. This connection can be added to form a “ring interconnection” providing a redundant configuration.

The electrical Ethernet interfaces can be connected to its interfacing equipment with an Ethernet cable and is suitable for connection to intra-building wiring only. The maximum allowed physical length of the cable is 100 m, provided that a Cat 5e class shielded cable is used and the shield is grounded at both ends.

The TM-3000/II chassis requires the CU-SFP/II Control unit and in minimum SW release R20. An NE can be a combination of TM-3000/II and the previous TM-3000 chassis under certain conditions.

See chapter 4 *CU compatibility* for CU compatibility information.

2.9 Card Cage

The card cage has 17 slots for plug-in units. The far left slot is dedicated for a Control Unit. The card guide is coded via a yellow color.

The slot for a CU is 20mm x 262mm, Traffic Unit slot is 25mm x 262mm and the passive half-height slots are 25mm x 129mm.

The slot numbers are shown just above the card cage area.

The card cage has three card slot categories: CU-slot, Active slots and passive slots.

A supporting shelf of length 1 is mounted in slot 17 at delivery, giving two half-height slots 17 and 18. A shelf kit is included to extend the length up to five slots, giving a total of 10 half-height slots.

The pre-mounted shelf in slot 17 can be removed via a screw accessible on the outside of the chassis. The removal should thus be done before the chassis is mounted in a rack. The extension shelf modules can be mounted within the card cage and can be done in-service and with the chassis mounted in a rack.

See chapter for details on the slots can be used.

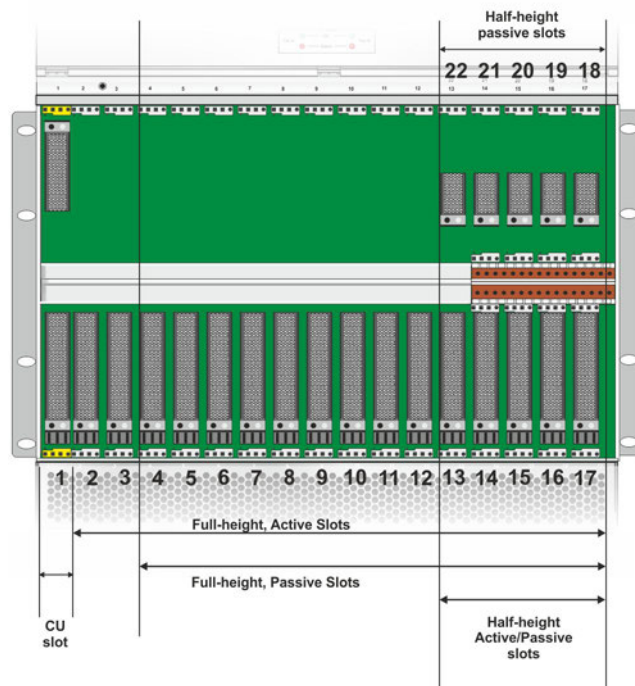


Fig. 12 Card Cage Area



Note

The chassis is always delivered with mounted cover plates covering unused slots. When installing new plug-in units, only remove the required cover plate(s) per plug-in unit at a time. Do not remove multiple cover plates first and then install all plug-in units.

2.10 Chassis Identity

Each chassis within a NE must have a unique ID number. The chassis identity is set by a DIP-switch that is located on the bottom right, beside the DC-filter. By releasing the thumbscrews and flipping the cover downwards, the DIP switch is revealed.



Fig. 13 DIP-switch

The procedure for how to set the subrack ID is described in the TM-3000/II Installation & Commissioning Guide.

2.11 Sys mode

The second part of the DIP switch is used to set the NE into a mode where a replacement CU can inherit the previous CU configuration. The procedure is described in *Spare Part and Maintenance Guide*.

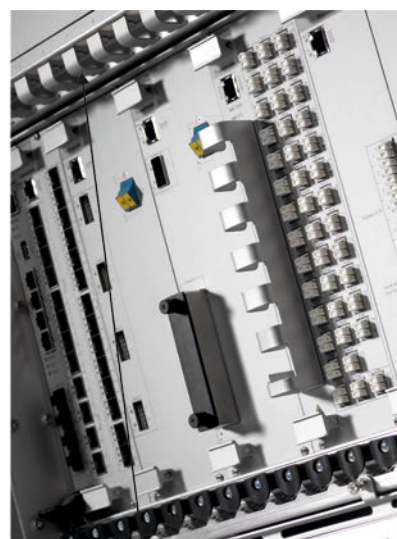
2.12 Fiber management

To ease patch cord management, a mechanical guide is placed under the card cage as well as above the card cage (see 14).



Fiber guides
in lower part
of card cage

Fiber guides
on 40ch MDU



Fiber guides
in upper part of card cage

Fig. 14 : Fiber management

This guide will ensure that the patch cords are evenly distributed within the card cage. Note that no fiber management area exist within the chassis as in the TM-3000/II chassis. Any fiber slack that cannot be handled within the card cage must be routed to a separate fiber shelf.

Additional fiber management mechanics are provided on the 40ch MDU's (e.g. MDU40/50G-EVEN and MDU40/50G-ODD). A separate cover plate (TM-FM-V01) can be added to the right of these MDU units to further support fiber management to/from the 40ch MDU units. See the Technical Description *DWDM 50Ghz MDU-40 with VOA* for more details.

2.13 Fiber management shelf

The TM-3000/II chassis has no internal fiber management shelf. Fiber slack that cannot be handled within the patch cord guides in the card cage must be handled outside the chassis in a separate fiber management shelf. The fiber management box FIB-1U/02 is a proposed option.

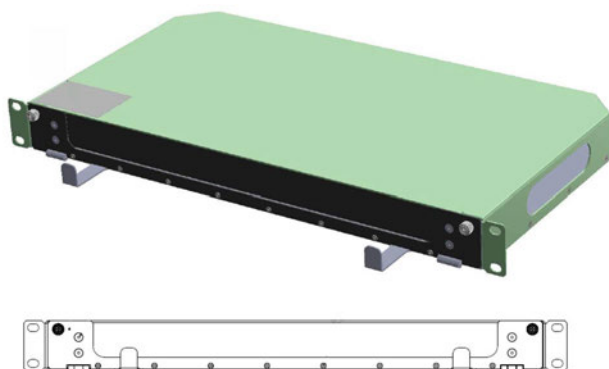


Fig. 15 Fiber management box FIB-1U/02

The fiber management box (FIB-1U/02) is shipped with mounting brackets for 19", 23" and ET-SI racks and can be used to any of the chassis options (the previous version (FIB-1U/01) has been phased out and replaced by the FIB-1U/02).

2.14 Board Extraction Tool

A special board extractor is introduced in March 2009 to ease extraction of full-sized boards.

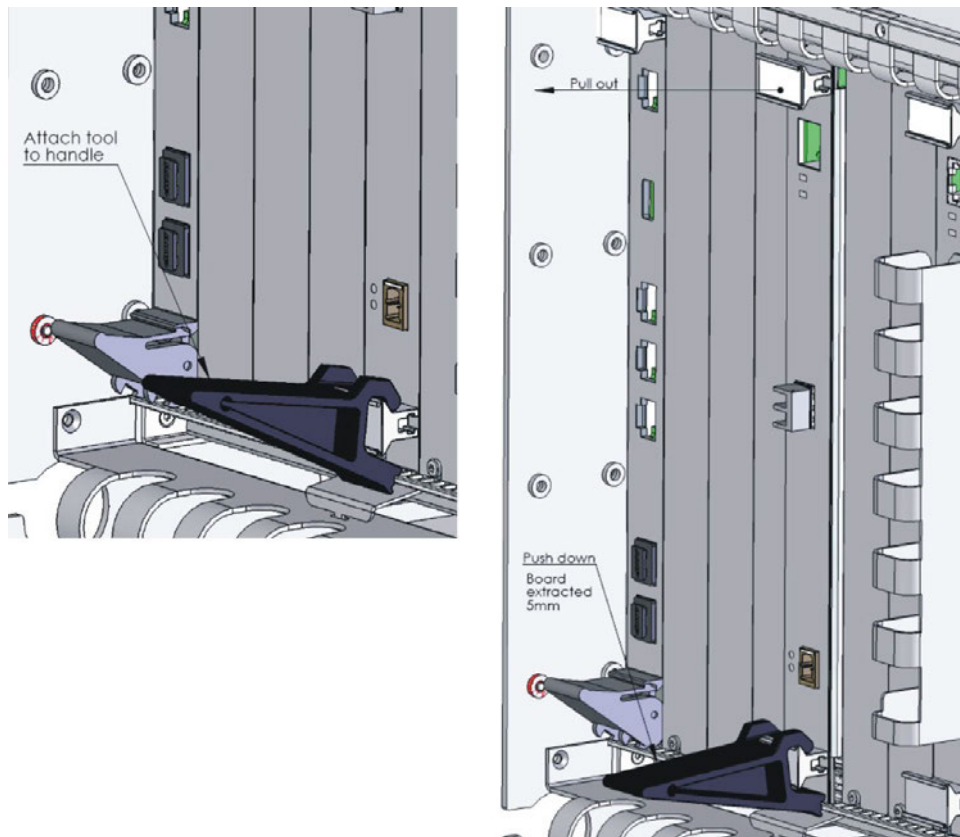


Fig. 16 Board Eject Tool (MEC100359)

2.15 Board extraction handle

To ease the extraction of a board from the card cage, a new mechanical solution has been introduced, starting from 2017. The solution comprises of a bottom lever that is to be pressed downwards upon extraction of the board. Note that the screws at top and bottom must be loosened prior to this operation (no change). A new bottom handle will also provide a better grip when fully removing the board from the card cage. The solution is introduced on new boards as well as on selected boards that are already released. See also separate Product Change Notice (100025-PCN00274).

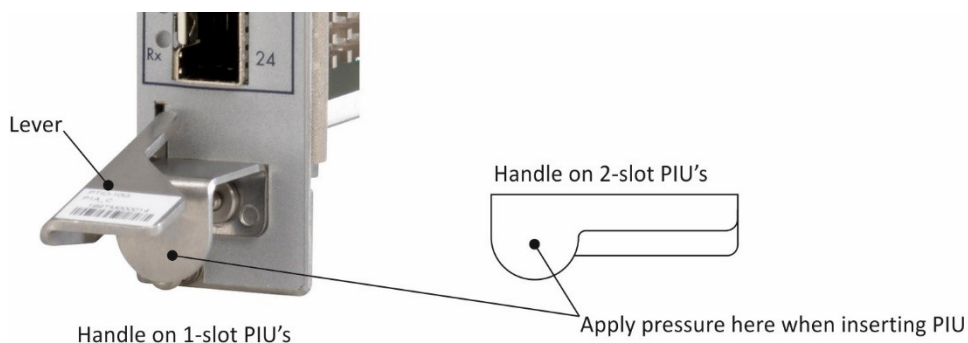


Fig. 17 Extraction handle

Note that when inserting the board into the card cage, pressure should only be applied on the upper handle and the rounded part of the bottom handle. This is of particular importance on 2- and 3-slot boards. The pressure inwards will then be aligned with the backplane connector

2.16 Remote inventory

The following chassis related inventory data can be retrieved from the TM-3000/II chassis:

- Description: TM-3000/II subrack
- HW product: M3000/II/ENC
- HW revision: e.g. "R1C"
- Serial number: e.g. "162KC000249"

- Description: DC filter
- HW product: e.g. "M3000/DC"
- HW revision: e.g. "R1H"
- Serial number: e.g. "119KM016537"

- Description: Fan
- HW product: e.g. "FAN4A/M3000/II"
- HW revision: e.g. "R1E"
- Serial number: e.g. "158KC000535"

2.17 External Alarms

The CU-SFP/II (introduced in release R18) and the CU-SFP/III (introduced in R28.0) have a separate port for “External Alarms”. Up to three dry contacts alarms can be connected via a separate break-out box (EXT-ALARM_KIT).

This kit contains a straight LAN cable and a small break-out box with screw connectors.

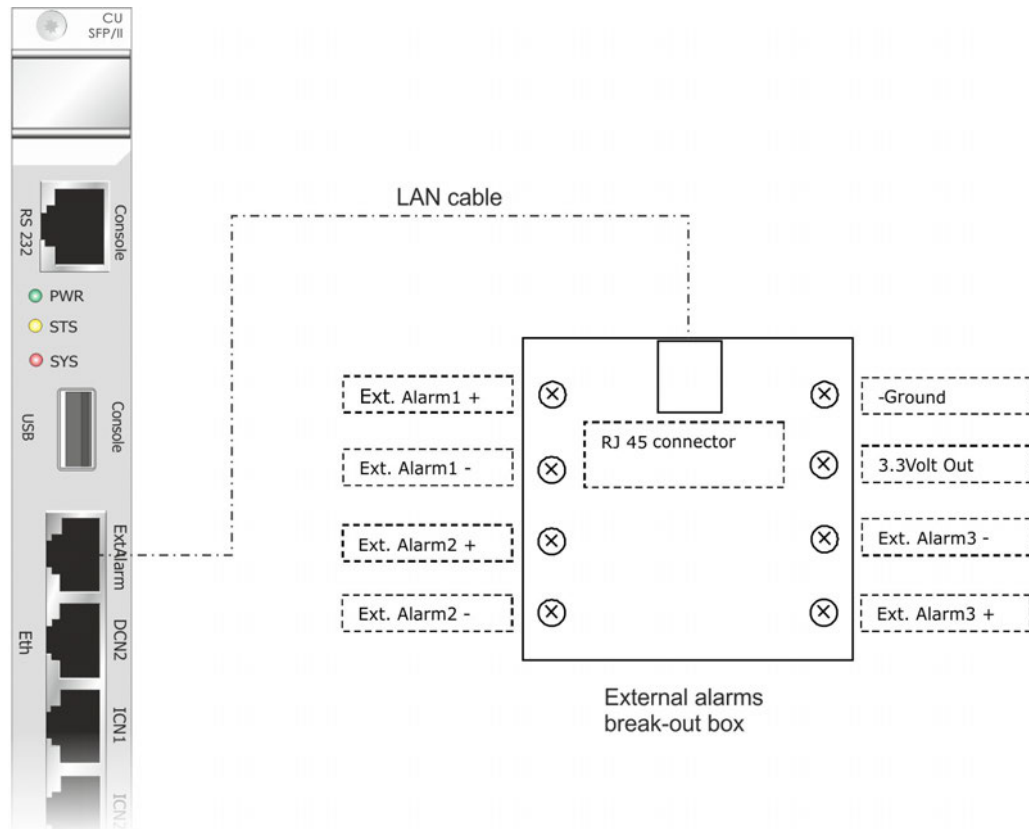


Fig. 18 External Alarms solution

The trigger inputs to the external alarms box can be either relays (dry contacts) or a voltage level. The trigger level can be set to either open/high or closed/low via the node manager ENM.

The simplest configuration is the dry contacts alternative. The External Alarm interface will provide a +3.3V feed for this configuration.

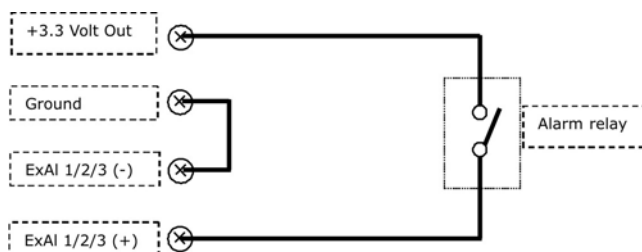


Fig. 19 Dry contacts connections

The above figure shows how each of the three alarm relays (dry contacts) or micro switches shall be connected in the break-out box. The relay input should not be used in electrically

noisy environments. Keep cables as short as possible in order not to pick up additional noise from neighboring electrical equipment.

If the external alarms are voltage driven, the figure below shows three configurations for three different voltage scenarios.

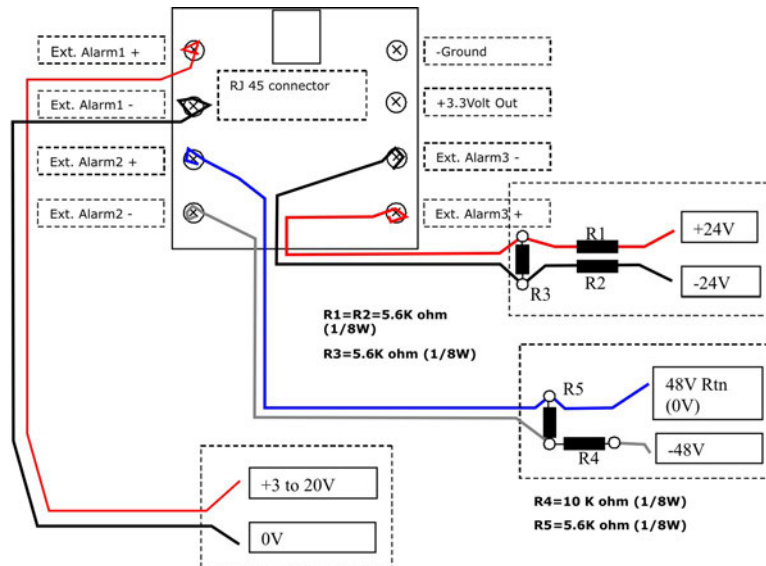


Fig. 20 Voltage connections

For voltages higher than 20V resistors must be placed at the alarm source or in the break-out box to avoid damaging the interface of the CU board or any other RJ-45 interface that the break-out box could be connected to by mistake.

The table lists what items that are included in the EXT-ALARM_KIT.

Table 2 External Alarm Kit

Part Number	Description	Qty
CAB100007/01500	RJ45 to RJ45 Straight Eth cable	1
EXT ALARM BOX	External alarm box	1

Note that this is just a "break-out" box for the RJ45 connector. You could equally cut off the connector and connect the threads directly to the detectors (dry contacts). The figure below shows how the threads in the cable are used.

Straight Ethernet cable, Pin 1 to pin 1... Pin 8 to pin 8 according to 568B

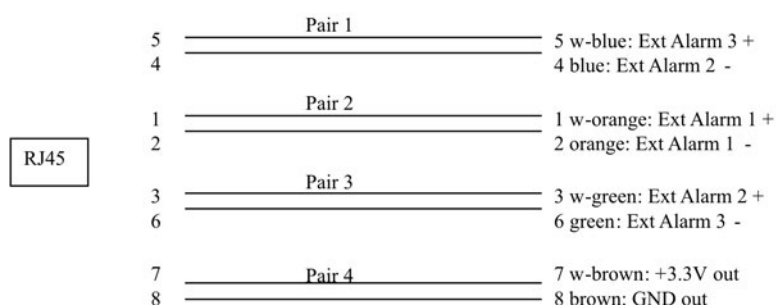


Fig. 21 Wire connections for LAN cable with RJ45 connector

3 Configuration Guidelines

This section lists guidelines and recommendations for the chassis and plug-in units.

The following high-level points should be checked;

- Control Unit: The TM-3000/II requires the CU-SFP/II or CU-SFP/III. Do not use older CU versions. See chapter 4 *CU compatibility* for details on CI compatibility.
- SW version: ENM of release R20 is required in minimum to run the TM-3000/II chassis.
- Fan units: The TM-3000/II was initially shipped with fan unit FAN4A/M3000/II of R-state R1D. From April 2014 and onwards the fan unit was FW upgraded (R-state R1E) to reduce acoustic noise level by reducing the revolution speed at room temperature. R1E complies with EN300753 "Telecom room attended" locations. R1D complies with "Telecom room unattended" locations".
- Power capabilities: Usage of high density and high power units may require a replacement of DC-filter and AC/DC converters if the card cage power consumption exceeds 500W. See chapter 3.1 *Card cage Guidelines TM-3000/II*.
- Slot usage: Some restrictions may apply on what slots that are supported. See chapter and 3.2 *Plug-in units in TM-3000/II*.

Note that a replacement of a fan unit, DC-filter and AC/DC-converters can be done in-service.

For example configurations see section .

TM-3000/II configurations are compliant with ETSI EN 300 019-1-3 class T3.1/T3.1E and NEBS level 3 (GR-63-CORE and GR-1089-CORE).

Exemptions for FXP400GOTN and EMXP440/III:

- Max environmental temperature is 45°C (113°F).
- CU-SFP/III is required.

3.1 Card cage Guidelines TM-3000/II

The maximum number of traffic units that can be inserted into the card cage is limited by the total power consumption that can be provided by used DC-filter and AC/DC converter (if AC-power is used).

Table 3 Card cage power limits

DC-filter	Direct DC	AC-DC-1RU-850/nn	AC-DC-1RU-1K2/nn	AC-DC-1RU-1K8	AC-DC-1RU-2K0
M3000/DC R1F	500W	500W	500W		
M3000/DC/II	800W	550W	800W		

See also *Dimensioning Guidelines* within the System Manual for data on power consumption. These values are for fully equipped Traffic units, i.e. with worst case transceivers and with all optical transceiver ports equipped. This is to ensure that future upgrades are not blocked due to exceeded power consumption.

The card cage has three card slot categories: CU-slot, Active slots and passive slots.

A supporting shelf of length 1 is mounted in slot 17 at delivery, giving two half-height slots 17 and 18. A shelf kit is included to extend the length up to five slots, giving a total of 10 half-height slots.

The pre-mounted shelf I slot 17 can be removed via a screw accessible on the outside of the chassis. The removal should thus be done before the chassis is mounted in a rack. The

extension shelf modules can be mounted within the card cage and can be done in-service and with the chassis mounted in a rack.

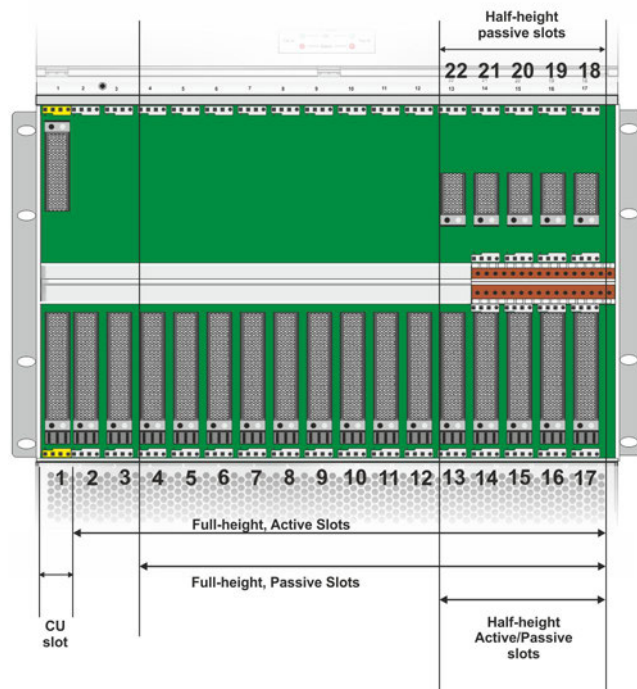


Fig. 22 Slot Categories in Card Cage

Slot 1 (full-height slot): Dedicated for a Control Unit (CU-SFP/II)

Slot 2-17 (full-height slots): Slots 2-17 can be used are for active, full-height units. Any supporting shelf in slots 13–17 must be removed to use all 16 slots for full-height units.

Slot 4-17 (full-height slots): Slots 4-17 can be used for passive, full-height units such as the 8ch MDU units. Any supporting shelf in slots 13–17 must be removed to use all 16 slots are to be used for full-height units.

Slot 13-17 (half-height slots): Slots 13-17 can be used for passive and active (e.g. PCU/2P or VOA2CH), half-eight units. The number of half-height slots is dependant on length of the supporting shelf.

Slot 18-22 (half-height slots): These slots are only available when the supporting shelf is mounted. Active half-height units shall not be inserted here.

3.2 Plug-in units in TM-3000/II

The table below lists all plug-in units supported by release R31.0 and in which chassis and slot positions they can be inserted. Note that some units have been phased out and are no longer orderable.



Note

The table does not take total power consumption into consideration. It only lists what slots that are allowed to be used for the different plug-in units. The total allowable power consumption can block a plug-in unit within a card cage, even if the slot as such is supported.

A “Type” parameter is used to identify the type of units as shown below:

Type	Description
A	Active unit, i.e. must be inserted in an active slot
P	Passive unit, i.e. must be inserted in a passive slot
FH	Full-height unit, i.e. occupies a full-height slot
HH	Half-height unit, i.e. occupies a half-height slot

The board width is also indicated in the Type parameter.

As an example: The TPQMR unit has the type **A/FH-1** meaning that the unit is an Active, Full-Height unit that requires 1 slot.

“NA” means that this unit is not supported. “EOA-A” means “End Of Availability - Announced”. The board is in end of life process. “EOA-E” means “End Of Availability - Effective”. The board is no longer orderable.

Table 4 Plug-in units TM-3000/II (Release R31.0 content)

Category	Item Name	Item ID	Type	TM-3000/II	EOA status
100G/200G line rate	200G OTN Muxponder	MXP200GOTN	A/FH-2	2-16	
	400G OTN Flexponder	FXP400GOTN	A/FH-1	2-17	
	100G Transponder OTN	TP100GOTN	A/FH-2	2-16	
	100G Transponder OTN v2	TP100GOTN/II	A/FH-2	2-16	
	100G Muxponder OTN	MXP100GOTN	A/FH-2	2-16	
Layer-1 Traffic units @40G line rate	MultiService Transponder 40G	MS-TP/40G	A/FH-3	2-15	EOA-E
	MultiService MuxPonder 40G	MS-MXP/40G	A/FH-3	2-15	EOA-E
Layer-1 Traffic units @10G line rate	Double 10Gb/s Lite Basic Unit	TPD10G-L-BU	A/FH-1	2-17	
	Hex MultiRate 16G Lite Transponder	TPMRHEX-L/16G	A/FH-1	2-17	
	10Gb/s C-band Tunable Ext Reach	TP10G/TC-ER	A/FH-1	2-17	EOA-E
	10G Hex Transponder OTN	TPHEX10GOTN	A/FH-1	2-17	
	10G C-band Tunable OTN Transponder	TP10GOTN/TC	A/FH-1	2-17	EOA-E
	OTN Muxponder 10G	MXP10GOTN	A/FH-1	2-17	
	MultiService Muxponder 10G	MS-MXP/10G	A/FH-1	2-17	
	MultiService MXP Tunable 10G ER	MS-MXP10G/TC-ER	A/FH-1	2-17	EOA-E
	9xGbE/10Gb Muxponder, BU	GBE9-MXP10G	A/FH-1	2-17	EOA-E
	9xGbE/10G FEC Muxponder	GBE9/MXP10GFEC	A/FH-1	2-17	
	Double 10Gb/s FEC Basic Unit	TPD10GBE-BU	A/FH-1	2-17	
	Quad 10G FEC Transponder 1-slot	TPQ10GFEC/I	A/FH-1	2-17	

Table 4 Plug-in units TM-3000/II (Release R31.0 content) (cont'd.)

Category	Item Name	Item ID	Type	TM-3000/II	EOA status
	Quad MultiService 10G FEC Transp	TPQ10GFEC	A/FH-2	2-16	EOA-A
	FrontHaul Muxponder 10G	FH-MXP10G	A/FH-1	2-17	
	Fronthaul Access unit	FHAU/1	A/FH-1	2-17	
	4xSTM-16/STM-64 Muxponder	4x2G5-MXP10G	A/FH-1	2-17	EOA-E
Layer-1 Traffic units @4G line rate	MultiService Muxponder	MS-MXP	A/FH-1	2-17	
	Quad MultiService Transponder	TPQMS	A/FH-1	2-17	EOA-E
	Quad MultiProtocol Transponder	TPQMP	A/FH-1	2-17	EOA-E
Layer-1 Traffic units @2.5G line rate	MultiRate 2500 DWDM Transponder V2	TPMR25-V2/xxxxx	A/FH-1	2-17	EOA-E
	Quad MultiRate xWDM Transponder	TPQMR	A/FH-1	2-17	EOA-E
	Double DGBE xWDM, Basic Unit	TPDDGBE	A/FH-1	2-17	
	10-port GFP xWDM Muxponder	GXP10/2500-SFP	A/FH-1	2-17	EOA-E
	8-port SDH xWDM Muxponder	MXP8	A/FH-1	2-17	EOA-E
	8p SDH/SONET 2,5G Muxponder v2	MXP8/II	A/FH-1	2-17	EOA-E
Layer-2	10xGbE/10GbE Ethernet Muxponder-II	GBE10-EMXP10/II	A/FH-1	2-17	
	22xGbE/10GbE Ethernet Muxponder-II	GBE22-EMXP10/II	A/FH-2	2-16	
	8x10GbE Ethernet MuxPonder-II	EMXP80G/II	A/FH-2	2-16	EOA-E
	4x10GbE Ethernet MuxPonder-II	EMXP40G/II	A/FH-1	NA	EOA-E
	8xGbE/4x10GbE Eth MuxPonder-Ile	EMXP48/IIIE	A/FH-1	2-17	
	22xGbE/4x10GbE Eth MuxPonder-Ile	EMXP62/IIIE	A/FH-2	2-16	
	12x10GbE Eth MuxPonder-Ile	EMXP120/IIIE	A/FH-2	2-16	
	1x100G/12*10G Ethernet MuxPonder-Ile	EMXP220/IIIE	A/FH-2	2-16	
	24x10GbE Ethernet MuxPonder-Ile	EMXP240/IIIE	A/FH-2	2-16	
	8xMPO Ethernet MuxPonder-III	EMXP/III	A/FH-2	2-16	
	12x10G PT-Fabric I/O Unit	PTIO-10G	A/FH-1	2-17	
	4x100G PT-Fabric I/O Unit	PTIO-100G	A/FH-1	2-17	
	2x100/200G, 12x10G, 1xMPO Ethernet MuxPonder-III	EMXP440/III	A/FH-2	2-16	
MBA	MS Access Hub 4xSTM-1/OC-3+16xEth	MXP-MBH/1	A/FH-2	2-16	EOA-E
DWDM Optical Add/drop	1ch DWDM Add-Drop Unit, AB 1ch DWDM Add-Drop Unit, BA	AD1AB/xxxxx AD1BA/xxxxx	P/HH-1	13-22	EOA-E
	2ch DWDM Add-Drop Unit, AB 2ch DWDM Add-Drop Unit, BA	AD2AB/xxxxx AD2BA/xxxxx	P/HH-1	13-22	EOA-E
	4ch DWDM Add-Drop Unit, AB 4ch DWDM Add-Drop Unit, BA	AD4AB/xxxxx AD4BA/xxxxx	P/HH-1	13-22	EOA-E

Table 4 Plug-in units TM-3000/II (Release R31.0 content) (cont'd.)

Category	Item Name	Item ID	Type	TM-3000/II	EOA status
	2ch OA DWDM Add-Drop Unit AB	AD2OAAB/xxxxx	P/HH-1	13-22	EOA-E
	2ch OA DWDM Add-Drop Unit BA	AD2OABA/xxxxx			
	1ch/2F A/D DWDM Add-Drop	AD1-2F/xxxxx	P/HH-1	13-22	
	4ch/2-fiber DWDM Add-Drop	AD4-2F/xxxxx	P/HH-1	13-22	
	4ch DWDM Add-Drop Even 50GHz	AD4/50G-E/xxx	P/HH-1	13-22	
	4ch DWDM Add-Drop Odd 50GHz	AD4/50G-O/xxxx	P/HH-1	13-22	
	2ch DWDM OADM xxx/yyy	OADM2CH/xxx	P/HH-1	13-22	
	1x5 Band Splitter Unit / EVEN 50GHz	BSU1X5/EVEN50G	P/HH-1	13-22	
	1x5 Band Splitter Unit / ODD 50GHz	BSU1X5/ODD50G	P/HH-1	13-22	
	1x2 ROADM 100GHz	1x2ROADM/100G	A/FH-1	2-17	
	1x2 ROADM 50GHz	1x2ROADM/50G	A/FH-1	2-17	
	1x4 ROADM unit F-model	1x4ROADM-F	A/FH-1	2-17	
	1x9 ROADM unit F-model	1x9ROADM-F	A/FH-1	2-17	
	1x4 ROADM 100GHz	1x4ROADM/100G	A/FH-2	2-16	
	1x8 ROADM 50GHz	1x8ROADM/50G	A/FH-2	2-16	
DWDM OpticalMux/DeMux	8ch Mux/DeMux, Extendable	MDU8-E	P/FH-1	4-17	
	8ch Mux/DeMux, Terminal	MDU8-T	P/FH-1	4-17	
	8ch Even Mux/DeMux, Extendable	MDU8-E/EVEN-C	P/FH-1	4-17	
	8ch Even Mux/DeMux, Terminal	MDU8-T/EVEN-C	P/FH-1	4-17	
	40ch MDU, even 50GHz DWDM	MDU40/50G-EVEN	A/FH-3	2-15	
	40ch MDU, odd 50GHz DWDM	MDU40/50G-ODD	A/FH-3	2-15	
	40ch MDU-Lite , even 50GHz DWDM	MDU40/50G-EVEN-L	A/FH-3	2-15	
	40ch MDU-Lite , odd 50GHz DWDM	MDU40/50G-ODD-L	A/FH-3	2-15	
	MDU-E 8ch Even 50GHz DWDM	MDU8EE919-926	P/FH-1	4-17	
	MDU-E 8ch Even 50GHz DWDM	MDU8EE927-934	P/FH-1	4-17	
	MDU-E 8ch Even 50GHz DWDM	MDU8EE935-942	P/FH-1	4-17	
	MDU-E 8ch Even 50GHz DWDM	MDU8EE943-950	P/FH-1	4-17	
	MDU-E 8ch Even 50GHz DWDM	MDU8EE951-958	P/FH-1	4-17	
	MDU-E 8ch Odd 50GHz DWDM	MDU8EO9185-9255	P/FH-1	4-17	
	MDU-E 8ch Odd 50GHz DWDM	MDU8EO9265-9335	P/FH-1	4-17	
	MDU-E 8ch Odd 50GHz DWDM	MDU8EO9345-9415	P/FH-1	4-17	
	MDU-E 8ch Odd 50GHz DWDM	MDU8EO9425-9495	P/FH-1	4-17	
	MDU-E 8ch Odd 50GHz DWDM	MDU8EO9505-9575	P/FH-1	4-17	
	16p Colorless MDU 50GHz	MDU16-CL/50G	A/FH-3	2-15	
Misc DWDM	Optical Interleaver Unit 100/200GHz	OIU-C-100/200	P/HH-1	13-22	
	Optical Interleaver Unit 50/100GHz	OIU-C-50/100	P/HH-1	13-22	
	2-port OCM	OCM/2p	A/FH-1	2-17	

Table 4 Plug-in units TM-3000/II (Release R31.0 content) (cont'd.)

Category	Item Name	Item ID	Type	TM-3000/II	EOA status
	8ch Variable Optical Attenuator – II	VOA-8CH/II	A/FH-1	2-17	EOA-E
	8ch SFP-based VOA unit	VOA-8CH/SFP	A/FH-1	2-17	
	2ch Variable Optical Attenuator	VOA-2CH	A/HH-1	13-17	
	Optical Band Unit	OBU1300/1550	P/HH-1	13-22	
	2xOptical Coupler Unit	OCU2	P/HH-1	13-22	
	4xOptical Coupler Unit	OCU4	P/HH-1	13-22	
	Optical Coupler Unit, Dual Quad	OCUDQ	P/HH-1	13-22	
	Protection Control Unit	PCU/2P	A/HH-1	13-17	
	FPU unit	FPU/1	A/FH-1	2-17	
Optical Amplifiers	Optical Line Amplifier 17dBm C-band	OA17C	A/FH-1	2-17	
	Dual Optical Line Amplifier 17/17dBm C-band	OA2-17/17CC	A/FH-1	2-17	
	Optical Line Amplifier 20dBm C-band	OA20C	A/FH-1	2-17	
	Dual Optical Line Amplifier 20/20dBm C-band	OA2-20/20CC	A/FH-1	2-17	
	Opt Low Gain Amp C-Band 20dBm	OA20C/LG	A/FH-1	2-17	
	Dual Opt Low Gain Amp C-Band 20dBm	OA2-20/20/CC/LG	A/FH-1	2-17	
	Variable Gain Opt Ampl 20dBm C-band	OA20C/VG	A/FH-1	2-17	
	Dual Var Gain Opt Ampl 20dBm C-band	OA2-20/20/CC/VG	A/FH-1	2-17	
	Opt Flat Gain Amp C-Band 10 dBm	OA10C/FG	A/FH-1	2-17	
	Variable Gain Ampl 20dBm C-band-II	OA20C/VG/II	A/FH-1	2-17	
	Dual Var Gain Ampl 20dBm C-band-II	OA2-20C/VG/II	A/FH-1	2-17	
	RAMAN/EDFA 21dBm HG	OA-RAED-21HG	A/FH-2	2-16	
	RAMAN/EDFA 20dBm LG	OA-RAED-20LG	A/FH-2	2-16	
CWDM AD-filters	1ch Add/drop CWDM (single-fiber)	ADCWDM/yyyy	P/HH-1	13-22	EOA-E
	1ch CWDM Add/drop (single-fiber)	AD1C/yyyy	P/HH-1	13-22	
	2x1ch Add/Drop CWDM (single-fiber)	AD2X1C/yyyy	P/HH-1	13-22	
	1ch/2-fiber CWDM Add-Drop	AD1C-2F/yyyy	P/HH-1	13-22	
	OSC and OTDR filter	AD1C-2F-OTDR/1510	P/HH-1	13-22	
CWDM OpticalMux/DeMux	4ch MDU CWDM, single fiber, TA 4ch MDU CWDM, single fiber, TB	MDUC4-TA/1470 MDUC4-TB/1470	P/HH-1	13-22	
	4ch MDU CWDM, single fiber, EA 4ch MDU CWDM, single fiber, EB	MDUC4-EA/1270 MDUC4-EB/1270	P/HH-1	13-22	
	8ch CWDM Mux, fiber-pair 8ch CWDM DeMux, fiber-pair	MU-2F/1470 DU-2F/1470	P/HH-1	13-22	
	4ch CWDM MDU fiber-pair Extendable	MDU4-E-2F	P/HH-1	13-22	
	4ch CWDM MDU fiber-pair Terminal	MDU4-T-2F	P/HH-1	13-22	

Table 4 Plug-in units TM-3000/II (Release R31.0 content) (cont'd.)

Category	Item Name	Item ID	Type	TM-3000/II	EOA status
iWDM-PON	Dual 21dBm Seed Light Unit	OA2-21SEED	A/FH-1	2-17	
	2-port Seed Light Coupler Unit	OCUSEED/2p	P/HH-1	13-22	

4 CU compatibility

This section clarifies the compatibility between different versions of the Control Unit and specific restrictions that apply on supported SW and HW objects.

Starting from R28 two CU versions are available, CU-SFP/II and CU-SFP/III. The CU-SFP/III is a more powerful version with higher capacity. CU-SFP/III is required when running the Mobile Fronthaul unit FHAU/1 in a chassis. The CU-SFP/III can also be required to bring down response times for network elements having large L2 configurations. The other CU-types have passed Last Time Buy, End-Of-Availability-Effective (EOA-E) and are not covered in detail. The primary reason for the limitations of the older CU versions is due to memory space. The CU-SFP/II and CU-SFP/III have more powerful processors and additional memory to cope with larger and more complex nodes. Layer-2 units are not supported by the older CU versions.

Table 5 *CU compatibility* lists the CU types that have been used and those currently in use. The “CU-type” is used in Table 6 *CU-TU Support Matrix* to show which CU-type that is required for different plug-in units.

Table 5 *CU compatibility*

CU version	Min required SW release	CU-type	Comment
CU	R1.0	A	EOA-E 2008
CUOSC/1470/1490	R1.0		EOA-E 2008
CUOSC/1510/1510	R1.0		EOA-E 2008
CU-SFP	R13.0	B	EOA-E 2015
CU-SFP/II	R18.0	C	Shipped today
CU-SFP/III	R28.0	D	Shipped today

Table 6 *CU-TU Support Matrix* covers all released plug-in units from R1.0 and up to latest release.

Some listed products are mounted in a slave chassis connected to a master chassis (TM-3000/II, TM-3000, TM-301/II or TM-301). The listed CU-type then refers to which CU that must reside in the master chassis.

Note that if a combination of a CU and TU requires two different SW releases, it is the latest release that sets the limit. As an example, a unit that requires release R13 cannot be used with a CU-SFP/II unless both run on release R18 or later.

The year stated in the EOA-E column means that the units are no longer orderable at the specified year.

Table 6 *CU-TU Support Matrix*

Type	Name	Product ID	Min req SW	EOA-E	Supported CU			
					A	B	C	D
	200G Muxponder OTN	MXP200GOTN	31.0		-	-	-	x
	2x100/200G, 12x10G, 1xMPO Ethernet MuxPonder-III	EMXP440/III	30.0		-	-	-	x
	Flexponder 400G OTN	FXP400GOTN	29.1		-	-	-	x
	100G Transponder OTN	TP100GOTN	23.0		-	-	x	x
	100G Transponder OTN v2	TP100GOTN/II	28.0		-	-	x	x
	100G Muxponder OTN	MXP100GOTN	23.1		-	-	x	x
	MultiService Transponder 40G	MS-TP/40G	20.0	2015	-	-	x	x
	MultiService MuxPonder 40G	MS-MXP/40G	20.0	2015	-	-	x	x
	MultiRate 2500 Lite DWDM Transponder LR	TPLMRLR/xxxxx	2.2	2006	x	x	x	x

Table 6 CU-TU Support Matrix (cont'd.)

Type	Name	Product ID	Min req SW	EOA-E	Supported CU			
					A	B	C	D
	10G Hex Transponder OTN	TPHEX10-GOTN	23.0		-	-	x	x
	10G C-band Tunable OTN Transponder	TP10GOTN/TC	14.0	2015	-	x	x	x
	10Gb/s C-band Tunable Ext Reach Transp	TP10G/TC-ER	13.0	2016	x	x	x	x
	Hex MultiRate 16G Lite Transponder	TPMRHEX-L/16G	23.1		-	-	x	x
	Double 10G Lite DWDM Transponder	TPD10G-L-BU	4.1		x	x	x	x
	Double 10Gb/s FEC Basic Unit	TPD10GBE-BU	8.0		x	x	x	x
	Quad 10G FEC Transponder 1-slot	TPQ10GFEC/I	21.0		-	-	x	x
	Quad MultiService 10G FEC Transp	TPQ10GFEC	17.0	2017	-	x	x	x
	Fronthaul Access unit	FHAU/1	28.0		-	-	-	x
	FrontHaul Muxponder 10G	FH-MXP10G	23.0		-	-	x	x
	MultiService Muxponder 10G	MS-MXP/10G	14.0		-	x	x	x
	9xGbE/10Gb Muxponder	GBE9-MXP10G	6.0	2016	x	x	x	x
	9xGbE/10G FEC Muxponder	GBE9/MXP10GFEC	13.0		x	x	x	x
	10xGbE/10GbE Ethernet Muxponder	GBE10-EMXP10	12.0	2010	-	x	x	x
	22xGbE/10GbE Ethernet Muxponder	GBE22-EMXP10	13.0	2010	-	x	x	x
	10xGbE/10GbE Ethernet Muxponder-II	GBE10-EMXP10/II	15.0		-	x	x	x
	22xGbE/10GbE Ethernet Muxponder-II	GBE22-EMXP10/II	15.0		-	x	x	x
	8x10GbE Ethernet MuxPonder-II	EMXP80G/II	16.0	2015	-	x	x	x
	4x10GbE Ethernet MuxPonder-II	EMXP40G/II	18.0	2015	-	x	x	x
	22xGbE/4x10GbE Eth MuxPonder-Ile	EMXP62/IIIE	21.0		-	-	x	x
	8xGbE/4x10GbE Eth MuxPonder-Ile	EMXP48/IIIE	22.0		-	-	x	x
	12x10GbE Eth MuxPonder-Ile	EMXP120/IIIE	21.0		-	-	x	x
	1x100G/12*10G Ethernet MuxPonder-Ile	EMXP220/IIIE	23.0		-	-	x	x
	24x10GbE Ethernet MuxPonder-Ile	EMXP240/IIIE	25.0		-	-	x	x
	8xMPO Ethernet MuxPonder-III	EMXP/III	27.0		-	-	x	x
	12x10G PT-Fabric I/O Unit	PTIO-10G	27.0		-	-	x	x
	4x100G PT-Fabric I/O Unit	PTIO-100G	29.0		-	-	x	x
	4x2,5G/10Gb Muxponder	4x2G5-MXP10G	10.0	2013	x	x	x	x
	OTN Muxponder 10G	MXP10GOTN	21.0		-	-	x	x
	Quad MultiRate xWDM Transponder	TPQMR	2.1	2017	x	x	x	x
	Double Dual GbE Transponder xWDM	TPDDGBE	3.1		x	x	x	x
	10-port GFP xWDM Muxponder	GXP10/2500-SFP	3.0	2013	x	x	x	x
	8-port SDH xWDM Muxponder	MXP8	2.2	2010	x	x	x	x
	8p SDH/SONET 2,5G Muxponder v2	MXP8/II	16.0	2016	x	x	x	x
	MultiService Muxponder	MS-MXP	13.0		x	x	x	x

Table 6 CU-TU Support Matrix (cont'd.)

Type	Name	Product ID	Min req SW	EOA-E	Supported CU			
					A	B	C	D
	Quad MultiService Transponder	TPQMS	13.0	2016	x	x	x	x
	Quad MultiProtocol Transponder	TPQMP	18.0	2017	-	x	x	x
	10-port SDH xWDM Muxponder	MXP028 MXP028/xxxx	1.0	2006	x	x	x	x
	6-port GbE Ethernet De-marcation Unit	EDU/6PGBE	9.1	2010	-	-	-	-
Hybrid E1/T1 & Eth	MBA Coll 16xE1/T1+4xEth 19"/ET DC	TM-MBA/2DC19ET	15.0	2018	NA	NA	NA	NA
	MBA Coll 16xE1/T1+4xEth 19"/ET AC	TM-MBA/2AC19ET	15.0	2018	NA	NA	NA	NA
	MS Access Hub 4xSTM-1/OC-3+16xEth	MXP-MBH/1	17.0	2016	-	-	x	x
Optical Add/Drop (Half-sized units)	1ch DWDM Add/Drop (single-fiber)	AD1AB/xxxxx AD1BA/xxxxx	1.0	2013	x	x	x	x
	1ch DWDM Add/Drop (single-fiber)	AD2AB/xxxxx AD2BA/xxxxx	1.0	2013	x	x	x	x
	4ch DWDM Add/Drop (single-fiber)	AD4AB/xxxxx AD4BA/xxxxx	1.0	2013	x	x	x	x
	2ch DWDM Add/Drop OA Unit (single-fiber)	AD2OAA/xxxxx AD2OABA/xxxxx	1.2	2013	x	x	x	x
	1ch/2-fiber DWDM Add-Drop (fiber-pair)	AD1-2F/xxxxx	5.0		x	x	x	x
	4ch/2-fiber DWDM Add-Drop (fiber-pair)	AD4-2F/xxxxx	6.0		x	x	x	x
	AD CWDM (single-fiber)	ADCWDM/yyyy	1.3	2013	x	x	x	x
	1ch CWDM Add/Drop (single-fiber)	AD1C/yyyy	2.1		x	x	x	x
	2x 1ch CWDM Add/Drop (single-fiber)	AD2X1C/yyyy	3.0		x	x	x	x
	1ch/2-fiber CWDM Add-Drop (fiber-pair)	AD1C-2F/xxxxx	5.0		x	x	x	x
	OSC and OTDR filter	AD1C-2F-OTDR/1510	30.0		-	-	x	x
	2ch DWDM OADM xxx/yyyy	OADM2CH/xxx	R28		-	-	x	x
	4ch DWDM Add-Drop Even 50GHz	AD4/50G-E/xxx	15.0		x	x	x	x
	1x5 Band Splitter Unit / EVEN 50GHz	BSU1X5/EVEN50G	15.0		x	x	x	x
	1x5 Band Splitter Unit / ODD 50GHz	BSU1X5/ODD50G	15.0		x	x	x	x
ROADM units (Full-sized units)	1x4 ROADM unit F-model	1x4ROADM-F	28.0		-	-	x	x
	1x9 ROADM unit F-model	1x9ROADM-F	30.0		-	-	x	x
	1x4 ROADM 100GHz	1x4ROADM/100G	13.0		x	x	x	x
	1x8 ROADM 50GHz	1x8ROADM/50G	15.0		-	x	x	x
	1x2 ROADM 100GHz	1x2ROADM/100G	17.0		-	x	x	x
	1x2 ROADM 50GHz	1x2ROADM/50G	17.0		-	x	x	x
OpticalMux/DeMux (half sized)	4ch Mux/DeMux CWDM (single-fiber)	MDUC4-TA/1470 MDUC4-TB/1470	2.1		x	x	x	x
	4ch Mux/DeMux CWDM (single-fiber)	MDUC4-EA/1270 MDUC4-EB/1270	8.0		x	x	x	x
	8ch Mux & DeMux CWDM 2-fiber (fiber-pair)	MU-2F/1470 DU-2F/1470	3.1	2012	x	x	x	x

Table 6 CU-TU Support Matrix (cont'd.)

Type	Name	Product ID	Min req SW	EOA-E	Supported CU			
					A	B	C	D
OpticalMux/DeMux (Full-sized units)	4ch CWDM Mux 2-fiber Extendable (fiber-pair)	MDU4-E-2F	5.0		x	x	x	x
	4ch CWDM Mux 2-fiber Terminal (fiber-pair)	MDU4-T-2F	5.0		x	x	x	x
	8ch Mux/DeMux, Extendable (fiber-pair)	MDU8-E	1.2		x	x	x	x
	8ch Mux/DeMux, Terminal (fiber-pair)	MDU8-T	1.2		x	x	x	x
	8ch Even Mux/DeMux, Extendable (fiber-pair)	MDU8-E/EVEN-C	4.0		x	x	x	x
	8ch Even Mux/DeMux, Terminal (fiber-pair)	MDU8-T/EVEN-C	4.0		x	x	x	x
	40ch MDU, even 50GHz DWDM	MDU40/50G-EVEN	10.0		x	x	x	x
	40ch MDU, odd 50GHz DWDM	MDU40/50G-ODD	10.0		x	x	x	x
	MDU-E 8ch Even 50GHz DWDM	MDU8EExxx-yyy	11.0		x	x	x	x
	MDU-E 8ch Odd 50GHz DWDM	MDU8EOzzzz-vvvv	11.0		x	x	x	x
	40ch MDU-Lite , even 50GHz DWDM	MDU40/50G-EVEN-L	17.0		-	x	x	x
	40ch MDU-Lite , odd 50GHz DWDM	MDU40/50G-ODD-L	17.0		-	x	x	x
	16p Colorless MDU 50GHz	MDU16-CL/50G	18.0		-	x	x	x
	Optical Amplifier 10dBm C-band	OA10C	1.2	2008	x	x	x	x
Optical Amplifier (Full-sized units)	Dual Optical Amplifier 10dBm C-band	OA2-10/10C	2.0	2008	x	x	x	x
	Opt Flat Gain Amp C-Band 10 dBm	OA10C/FG	10.0	2012	x	x	x	x
	Optical Amplifier 15dBm C-band	OA15C	2.2	2005	x	x	x	x
	Dual Optical Amplifier 15dBm C-Band	OA2-15/15C	2.2	2005	x	x	x	x
	Optical Line Amplifier 17dBm C-band	OA-17C	4.0		x	x	x	x
	Dual Optical Line Amplifier 17/17dBm C-band	OA2-17/17CC	4.0		x	x	x	x
	Optical Line Amplifier 20dBm C-band	OA-20C	6.0		x	x	x	x
	Dual Optical Line Amplifier 20/20dBm C-band	OA2-20/20CC	6.0		x	x	x	x
	Variable Gain Opt Ampl 20dBm C-band	OA20C/VG	17.0		-	x	x	x
	Dual Var Gain Opt Ampl 20dBm C-band	OA2-20/20/CC/VG	17.0		-	x	x	x
	Variable Gain Ampl 20dBm C-band-II	OA20C/VG/II	27.0		-	-	x	x
	Dual Var Gain Ampl 20dBm C-band-II	OA2-20C/VG/II	27.0		-	-	x	x
	RAMAN/EDFA 21dBm HG	OA-RAED-21HG	26.0		-	-	x	x
	RAMAN/EDFA 20dBm LG	OA-RAED-20LG	30.0		-	-	x	x
Misc	Optical Band Unit	OBU1300/1550	2.1		x	x	x	x
	2xOptical Coupler Unit	OCU2	1.0		x	x	x	x
	4xOptical Coupler Unit	OCU4	1.2		x	x	x	x
	Optical Coupler Unit, Dual Quad	OCUDQ	20.0		-	-	x	x
	Optical Interleaver Unit 100/200	OIU-C-100/200	4.0		x	x	x	x
	Optical Interleaver Unit 50/100	OIU-C-50/100	9.0		x	x	x	x

Table 6 CU-TU Support Matrix (cont'd.)

Type	Name	Product ID	Min req SW	EOA-E	Supported CU			
					A	B	C	D
	Protection Control Unit	PCU/2P	13.0		-	x	x	x
	2ch Variable Optical Attenuator	VOA/2CH	13.0		-	x	x	x
	FPU unit	FPU/1	26.0		-	-	x	x
VOA (full-sized)	8ch Voltage Controlled Attenuator unit	VOA-8CH	5.0	2008	x	x	x	x
	8ch Voltage Controlled Attenuator unit	VOA-8CH/II	11.0	2012	x	x	x	x
	8ch SFP-based VOA unit	VOA-8CH/SFP	19.0		x	x	x	x
iWDM-PON	Dual 21dBm Seed Light Unit	OA2-21SEED	20.0		-	-	x	x
	2-port Seed Light Coupler Unit	OCUSEED/2p	20.0		-	-	x	x
Rack mounted	Fiber Protection Unit	FPU-OAS2824	3.1	2006	x	x	x	x
	Fiber Protection Unit	FPU-YM235	6.0	2017	x	x	x	x
	Raman Amplifier	OAR-450C/E & /19	6.1	2017	x	x	x	x
	Power Extender C-band 26dBm	OA26C/19, /E	13.0		-	x	x	x
	TM-3000/II DC, 19"/ETSI/23"	TM3000/II-DC	20.0		-	-	x	x
	TM-2000 DC, 19"/ETSI/23"	TM2000/DC	20.0	2015	-	-	x	x
Rack mounted to be connected as AUX chassis	40ch MDU DWDM 50GHz Even	coD40ev	17.0		-	x	x	x
	40ch MDU DWDM 50GHz Even w 1310 ext	coD40eve	17.0		-	x	x	x
	40ch MDU DWDM 50GHz Odd	coD40od	17.0		-	x	x	x
	Disp Comp Unit, Fiber-based 20 km	dcDk652km20	17.0		-	x	x	x
	Disp Comp Unit, Fiber-based 40 km	dcDk652km40	17.0		-	x	x	x
	Disp Comp Unit, Fiber-based 60 km	dcDk652km60	17.0		-	x	x	x
	Disp Comp Unit, Fiber-based 80 km	dcDk652km80	17.0		-	x	x	x
	Disp Comp Unit, Fiber-based 100 km	dcDk652km100	17.0		-	x	x	x
	Disp Comp Unit, Fiber-based 120 km	dcDk652km120	17.0		-	x	x	x
	Disp Comp Mod. DFG-based 40km	dcP652km40	17.0		-	x	x	x
	Disp Comp Mod. DFG-based 60km	dcP652km60	17.0		-	x	x	x
	Disp Comp Mod. DFG-based 80km	dcP652km80	17.0		-	x	x	x
	Disp Comp Mod. DFG-based 100km	dcP652km100	17.0		-	x	x	x
	Disp Comp Mod. DFG-based 120km	dcP652km120	17.0		-	x	x	x

4.1 HW and SW compatibility

Table 7 CU compatibility

CU version	SW support	Supported HW	Supported chassis	Comment
CU-SFP/III	R28-	R1-	TM-3000, TM-3000/II, TM-301, TM-301/II	Note that some units in R29.1 and later requires this CU.
CU-SFP/II	R18-	R1-, see <i>CU-TU Support Matrix</i> .	TM-3000, TM-3000/II, TM-301, TM-301/II	Note that TM-3000/II requires R20 or later. Note that TM-301/II requires R27 or later.
CU-SFP	R13-	R1-R19	TM-3000, TM-301	

Table 7 CU compatibility (cont'd.)

CU version	SW support	Supported HW	Supported chassis	Comment
CU	R1-	R1-R19	TM-3000, TM-301	Some features and HW objects are not supported. See 6.
CUOSC/1470/1490	R1-	R1-R19	TM-3000, TM-301	Some features and HW objects are not supported. See 6.

- All HW objects introduced in R20 (and later) require the CU-SFP/II or CU-SFP/III (does not apply for transceivers that are added to a Traffic Unit introduced prior to R20).
- A NE with a CU-SFP can be upgraded to R20 (or later) given that the NE does not include HW objects that are introduced in R20 (or later).
- It is recommended to keep NE's with CU or CUOSC/1470/1490 at current HW configuration to avoid possible issues when upgrading to R20 SW (and later).

4.2 Master-Slave compatibility

A larger NE can be created by combining multiple chassis in a master-slave configuration. The table below shows which combinations that are allowed in general. Note that the older CU and CUOSC/1470/1490 will not support certain functions.

Table 8 Master-Slave Compatibility

CU in master	CU in slave	Comment
CU-SFP/III	CU CU-OSC/1470/1490 CU-SFP CU-SFP/II CU-SFP/III	See restrictions below
CU-SFP/II	CU CU-OSC/1470/1490 CU-SFP CU-SFP/II	See restrictions below
CU-SFP	CU CU-OSC/1470/1490 CU-SFP CU-SFP/II	As long as no R20 HW objects are present.
CU	CU-SFP CU-SFP/II	Max one slave chassis
CUOSC/1470/1490	CU-SFP CU-SFP/II	Max one slave chassis

If a master-slave configured NE includes R20 HW objects (or later), the following applies;

1. The master chassis must have a CU-SFP/II or CU-SFP/III.
2. The slave chassis must have a CU-SFP/II or CU-SFP/III if it contains R20 HW objects (or later).
3. The slave chassis can have a CU-SFP, CU or CU-OSC/1470/1490 if this chassis only contain HW objects from R19 or earlier.



Note

CU-SFP/III is supported as slave CU only if the master also is a CU-SFP/III.

5 Labels

The TM-3000/II chassis is marked with a Product Label and a System Label. Both are placed on the top of the chassis, on the left, front side.



Fig. 23 Labels

The Product label contains:

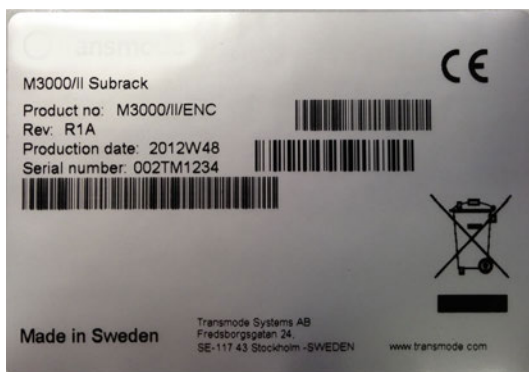


Fig. 24 Product label, example

1. Infinera logotype
2. Product number
3. Product revision
4. Barcode 128 containing: product number "space" revision
5. Production date: yearWweeknumber
6. Serial number
7. Barcode 128 containing: serial number
8. Barcode 128 containing: product number, revision, production date, serial number
9. Approval markings

This information is not accessible via the inventory function in the management system. Inventory data on CU's and Traffic Units are available via the inventory functionality.

The System Label contains:

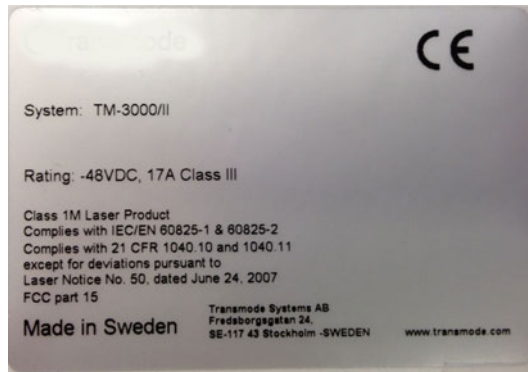


Fig. 25 System label, example

1. Infinera logotype
2. System type
3. Production date: yearWweeknumber
4. Ratings
5. Laser class
6. Compliance info
7. Approval markings

6 Technical Data

Table 9 Mechanical & Electrical Data, TM-3000/II

Parameter	Value
Height	11U / 489mm
Depth	298mm
Width (incl. mounting brackets)	442mm max
Weight	27.8kg (TM3000/II-DC)
Primary Power	DC-inlets. Redundant, Hot-swap
Cooling	Redundant fans. Hot-swap
Mounting	ETSI, 19" Type 1, 23" (default is 19" mount)
LAN/Mgmt connections	RJ45
Primary power range DC:	-40,8 to -57,6VDC Class III
Worst case power consumption and current with FAN4A, M3000/DC Note! This DC filter was included in the earlier shipments. All shipments from mid 2016 and onwards were with the M3000/DC/II.	~727W and 18A @ -ambient temperature of +55 degrees C - primary power at -40,8V - card cage at the max 500W
Nominal power consumption and current with FAN4A, M3000/DC	~570W and 12A @ -ambient temperature of +25 degrees C - primary power at -48V - card cage at the max 500W
Worst case power consumption and current with FAN4A, M3000/DC/II	~1027W and 25A @ -ambient temperature of +55 degrees C - primary power at -40,8V - card cage at the max 800W
Nominal power consumption and current with FAN4A, M3000/DC/II	~870W and 18A @ -ambient temperature of +25 degrees C - primary power at -48V - card cage at the max 800W
Max Inrush current @ -48VDC acc to ETSI 300132-2	42A when using DC/DC module M3000/DC R1E 19A when using DC/DC module M3000/DC R1F, R1G or R1H 63A DC/DC module M3000/DC/II
Primary power range AC	100-240VAC 50/60Hz, Class I
AC/DC converter	AC-DC-1RU-850/0n when using M3000/DC AC-DC-1RU-1K2/0n, AC-DC-1RU-1K8 or AC-DC-1RU-2K0 when using M3000/DC/II Rack mount Height: 1U / 44 mm 100-240VAC 50/60Hz, Class I
Operating conditions	ETSI EN 300 019-1-3 class T3.1 NEBS-3
Inventory data retrievable from management system	M3000/II/ENC: R-state and serial number Fan unit: R-state and serial number DC/DC filter: R-state and serial number
Acoustic noise	EN300753: Lwa:<74dB (Telecom room unattended requirement is <75dB) using fan FAN4A/M3000 R1D. Lwa <72dB (Telecom room attended requirement is <72dB) using fan FAN4A/M3000 R1E NEBS: Lwad <77dB with 3dB margin (limit is 78dB) using fan FAN4A/M3000 R1D. Lwad <75dB with 3dB margin using fan FAN4A/M3000 R1E

Table 10 Capacity

Parameter	Value
Number of full-height slots ¹	Up to 16
Number of half-height slots ²	Up to 10

1. Slots for Traffic Units (Transponders/Muxponders) 25mm widthm 262 mm length
 2. Slots for passive units (Add/drop filters, MDU's), 25mm width, 129mm length



The TM-3000/II chassis can mechanically be configured between to extremes:

16x “full-slots” + 0x “half-slots”

11x “full-slots” + 10x “half-slots”

6.1 Environmental conditions

Environmental operating conditions, ETSI

TM-3000/II chassis configurations support ETSI EN 300 019-1-3 T3.1/T3.1E.

ETSI EN 300 019-1-3 T3.1: Normal temperature range is +5 to +40°C (+41 to 104°F)

ETSI EN 300 019-1-3 T3.1E: Exceptional conditions temperature range is –5 to +45°C (+23 to 113°F)

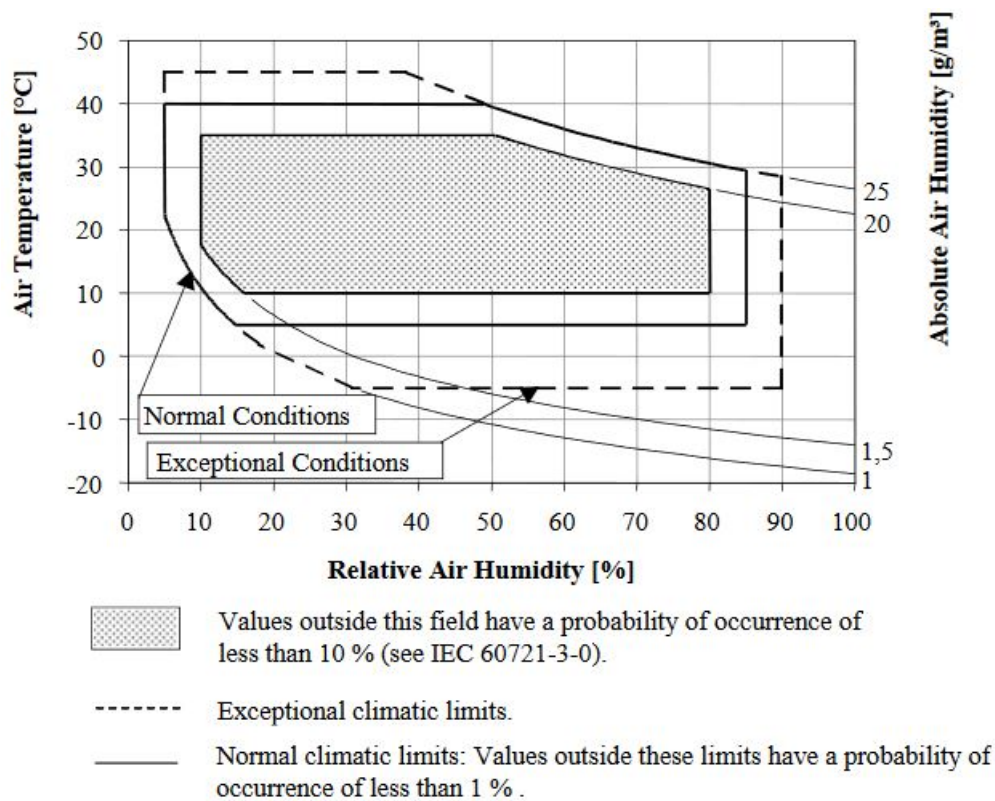


Fig. 26 Climatogram according to ETSI EN 300 019-1-3 class T3.1

Exceptional conditions may occur following the failure of the temperature controlling system. This is labeled as 3.1E in the table below, but it should be noted that there is no separate class 3.1E.

Environmental parameter		Unit	3.1	
			Normal	Exceptional (E)
a)	Low air temperature	°C	+5	-5
b)	High air temperature	°C	+40	+45
c)	Low relative humidity	% RH	5	5
d)	High relative humidity	% RH	85	90
e)	Low absolute humidity	g/m ³	1	
f)	High absolute humidity	g/m ³	25	
g)	Rate of change of temperature (see note 1)	°C/min	0,5	
h)	Low air pressure	kPa	70	
i)	High air pressure (see note 2)	kPa	106	
j)	Solar radiation	W/m ²	700	
k)	Heat radiation	W/m ²	600	
l)	Movement of the surrounding air (see note 3)	m/s	5	
m)	Conditions of condensation	none	no	
n)	Conditions of wind - driven rain, snow, hail, etc.	none	no	
o)	Conditions of water from sources other than rain	none	no	
p)	Conditions of icing	none	no	

Fig. 27 Climate parameters according to ETSI EN 300 019-1-3

NOTE 1: Averaged over a period of 5 minutes

NOTE 2: Conditions in mines are not considered

NOTE 3: A cooling system based on non-assisted convection may be disturbed by adverse movement of the surrounding air

Environmental conditions for storage, transport and operation according to NEBS Level 3 (GR-63-CORE and GR-1089-CORE)

TM-3000/II configurations support NEBS level 3 climate conditions.

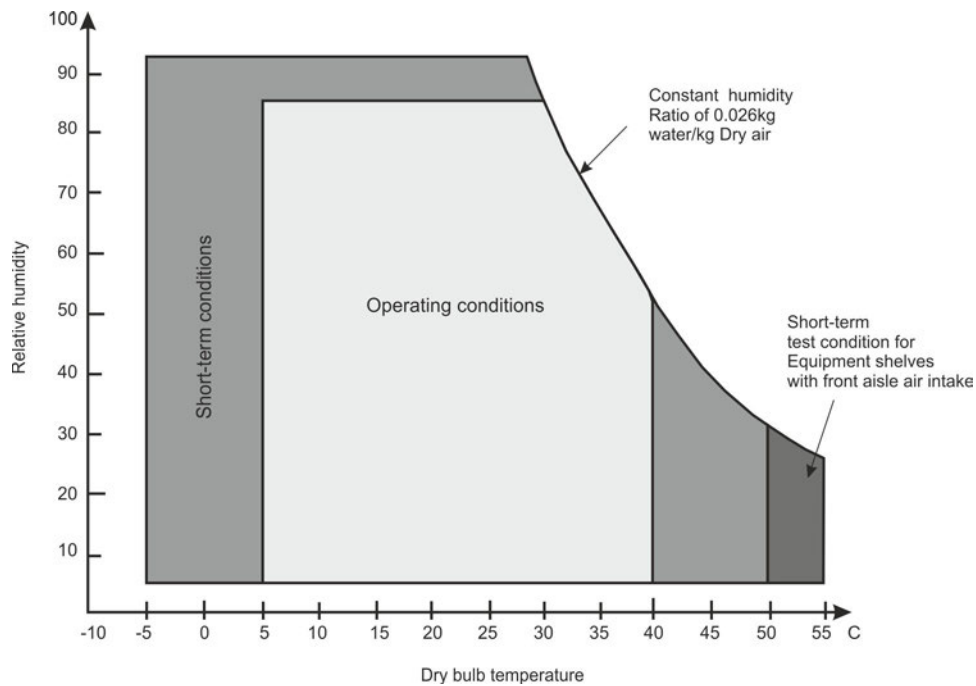


Fig. 28 Air temp and humidity conditions GR-63 CORE

Exemptions/Clarifications:

- FXP400GOTN; with the restriction of max 45°C (113°F).
- EMXP440/III; with the restriction of max 45°C (113°F).

6.2 Mechanical drawing

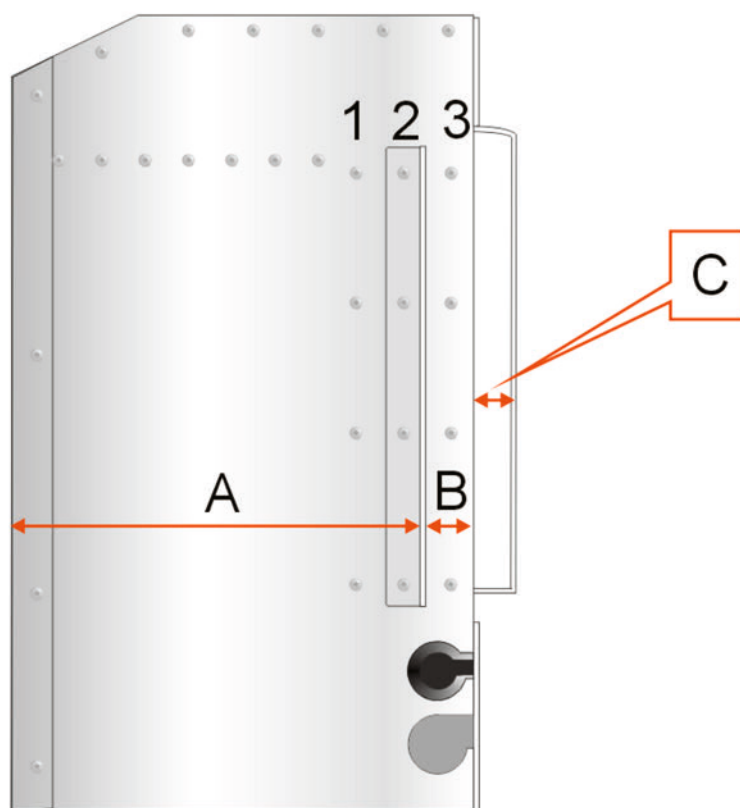


Fig. 29 : TM-3000/II dimensions, side view

Table 11 Mounting Depth

Mounting bracket position	Depth A (mm)	Depth B (mm)	Depth C(mm)
1	~225mm	~73mm	~46mm
2	~268mm	~30mm	~46mm
3	~298mm	0mm	~46mm

The chassis height is 489mm

The default placement (i.e. position at delivery) of the mounting brackets is in position 2. This is the recommended position for rack depths >300mm.

For ETSI300 mount the brackets should be placed in position 1.

Position 3 is not recommended for ETSI/19" mounts due to that the rack bars will block the fiber management holes on the chassis side.

6.3 Revision Data

A TM-3000/II chassis has an order level that includes mechanics, cables, Control Unit etc as listed in section 6.4 *Ordering Data*. The table shows revision data on “M3000/II/ENC” which is the basic card cage mechanics. Changes in this basic mechanics is reflected on the M3000/II/ENC level.

Table 12 Revision Data

Product number	Rev	Introduced Release	
M3000/II/ENC	R1B	R20.0	1st released version
	R1C	R22	Mechanical improvements to improve produceability

The revision of a M3000/II/ENC is displayed on the System Label, placed on the top of the card cage. See section 5 *Labels*.

6.4 Ordering Data

When ordering a TM-3000/II chassis, the deliverable is a “Basic NE-Equipment”. A Basic NE Equipment includes everything that is needed to create a Network Element, apart from Traffic plug-in units (Transponders/Muxponders etc) and Passive units (optical filters etc).

The TM-3000/II is delivered in DC option. If AC/DC powering is required, a separate AC/DC converter is added. The AC/DC unit includes two AC/DC converters for A+B powering.

Table 13 Ordering Data Basic Equipment

Item Name	Item code	Comment
TM-3000/II DC, 19"/ETSI/23"	TM3000/II-DC	Chassis with CU-SFP/II
TM-3000/II DC, 19"/ETSI/23" CU-SFP/III	TM3000/II-DC-CU3	Chassis with CU-SFP/III

Table 14 1.2kW AC/DC converter version

Item Name	Item code	Comment
Extern AC/DC 1RU 1k2W (A+B Pwr) EU	AC-DC-1RU-1K2/01	European plug. CEE 7/VII
Extern AC/DC 1RU 1k2W (A+B Pwr) US	AC-DC-1RU-1K2/02	US plug NEMA 5-15
Extern AC/DC 1RU 1k2W (A+B Pwr) GB	AC-DC-1RU-1K2/03	UK plug BS1363/A (C18)
Extern AC/DC 1RU 1k2W (A+B Pwr) JP	AC-DC-1RU-1K2/04	Japan plug
Extern AC/DC 1RU 1k2W (A+B Pwr) AU	AC-DC-1RU-1K2/05	Australia Plug
Extern AC/DC 1RU 1k2W (A+B Pwr) CH	AC-DC-1RU-1K2/06	Swiss plug SEV 6534-2

The rack mounted AC/DC converter AC-DC-1RU-1K2/0n is shipped with two AC cables (2.5m length) with an AC plug type corresponding to the country code.

Table 15 1.8kW AC/DC converter

Item Name	Item code	Comment
Rack mounted AC/DC PSU 1RU 1k8W (A+B Pwr)	AC-DC-1RU-1K8	Separate AC power cables must be ordered.

Table 16 2.0kW AC/DC converter

Item Name	Item code	Comment
Rack mounted AC/DC PSU 1RU 2k0W (A+B Pwr)	AC-DC-1RU-2K0	Separate AC power cables must be ordered.

If OSC channels are needed, suitable SFP's must added. See *Dimensioning Guidelines* within the system manual for more details.

At delivery the TM-3000/II chassis is configured for 15 full-height and 2 half-height plug-in units (i.e. with a shelf length of one card slot).

6.4.1 Spare Parts

The TM-3000/II chassis has the following spare part items:

Table 17 Spare parts TM-3000/II

Item name	Item code	Comment
Subrack M3000/II,DC,RJ45,Cover,Kit	M3000II/ENC/COMP	Complete kit apart from Control Unit
TM3000/II Fan Unit (Spare Part)	FAN4A/M3000/IISP	The kit contains one fan module. Two modules are used per chassis
M3000 DC filter card	M3000/DC	This is a spare part for the lower power option of the DC-filter, enabling 500W in the card cage. Two modules are used per chassis. Initial shipments of the chassis were made with this DC-filter.
M3000 DC v2 Filter Card (Spare Part)	M3000/DC/II/SP	This is a spare part of the higher power DC-filter option, enabling 800W in the card cage. The kit contains one DC-filter. Two modules are used per chassis.
M3000 DC v2 Filter Card(UpgradeKit)	M3000/DC/II/UPG	This kit shall be used when upgrading a chassis from the lower power DC-filters (500W) to the higher power DC-filters (800W). The kit contains two M3000/DC/II/SP and two DC-cables CAB100079/4M0-R and CAB100079/4M0-L of 4m length.
RJ 45 card M3000	M3000/RJ45	One per chassis
Divider_Kit_for_M3000/ENC-2	M3000/DIVKIT-2	One kit per chassis
Dummy panel 6HE inkl ovl o EMC-list	M3-DU/6HE	Full-height slot cover panel
Dummy panel 3HE inkl ovl o EMC-list	M3-DU/3HE	Half-height slot cover panel
Airfilter Spare Part TM3000/II	AIRFLT-SP3000/2	One per chassis
Airstopper 3HE 3000/II	MEC100570	Air stopper half-height slot
Airstopper 6HE 3000/II	MEC100569	Air stopper full-height slot

Table 18 Spare parts, AC/DC units

Item name	Item code	Comment
AC/DC 1RU 850W (Spare Part)	PS1A850/1	Two modules per AC-DC-1RU-850
AC/DC 1RU 1k2W (Spare Part)	PS1A1K2/1	Two modules per AC-DC-1RU-1K2
AC/DC PSU 1k8W, Spare Part	PS1A1K8/SP	Two modules per AC-DC-1RU-1K8
AC/DC PSU 2k0W, Spare Part	PS1A2K0/SP	Two modules per AC-DC-1RU-2K0

6.4.2 DC cable specification

GENERAL

Description	Properties
STYLE	UL2464
AWG	10 AWG
NUMBER OF CONDUCTORS	3C

SPECIFICATION

Description		Properties
CONDUCTOR	MATERIAL CONSTRUCTION STRANDED DIAMETER	BARE COPPER acc. to VDE 0295 IEC 0295 Class 5 105/0.254 ± 0.008 2.598 ± 0.05
INSULATION (CONDUCTORS)	COLOURS MATERIAL Nom. THICKNESS DIAMETER	BLUE, GREY, YELLOW/GREEN HDPE 10 5 °C 0.85 ± 0.1 0 4.28 ± 0.0 5
SHIELD	MATERIAL CONSTRUCTION COVERAGE	CLEAR MYLAR TAPE, Cover Min 125 % TINNED COPPER acc. to VDE 0812 IEC 60228 85 %
DRAIN WIRE	MATERIAL STRANDED DIAMETER	///
JACKET	MATERIAL Nom. THICKNESS DIAMETER	TPE 105°C SHORE 90D BLACK (RAL9004) 1.60 ± 0.01 Max. 12.70 ± 0.20
ELECTRICAL PROPERTIES	OPERATING TEMPERATURE STORAGE TEMPERATURE RATED VOLTAGE TEST VOLTAGE RATED CURRENT CONDUCTOR RESISTANCE	-40°C to +80 °C -40°C to +10 0°C 600V 5000V 55 AMP @ fixed chassis installation Max. Power transmission 15AMP Typ. 2.598 /km @20°C
MECHANICAL PROPERTIES	BENDING RADIUS TWIST RATIO	Min. 6 * CABLE DIAMETER ///
CERTIFICATE STANDARDS	FLAME TEST SMOKE DENSITY ETL AND UL HALOGEN FREE	No flame propagation acc. to IEC 60332-1-2 Flame retardant and self-extinguishing acc. to IEC 60332-3-24 Smoke density acc. to IEC 61034-2 Conform to ETL and UL approval Halogen free material acc. to IEC 60754-1
PACKING	REEL BOX	200 METER Continuous length ///
MARKING		NO MARKING

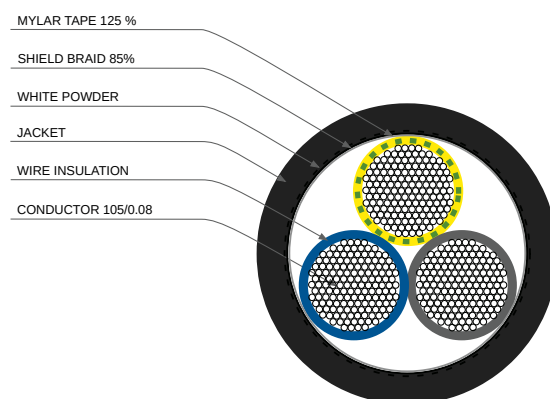


Fig. 30 Cable data on CAB100079/4M0-R and CAB100079/4M0-L