User manual
OX3 Compact optical node

Rev004

TELESTE

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Introduction

OX3 is a compact 1.2 GHz optical node for deep fiber networks. It comes in both single-fiber variants (S1-S3) as well as a dual-fiber model (S4). The downstream has Optical Level Control (OLC) and a high RF output amplifier stage. The power consumption is nevertheless low. The optical receiver/transmitter is integrated on the motherboard. Different split options are possible with the OX3K kits.

The OX3R can be remotely powered either via a dedicated F-connector at the side, or via an unused RF Out port. This allows the use of the existing coaxial network for remote powering when migrating to a fiber network. The node can also be used for remote powering of the network connected to the RF Out ports.

Installation

Plan the installation with enough clearance to install the cable and cable connectors. The node should be installed vertically so that the external cables are facing downwards. When installing the node in its final location, make certain that it has adequate ventilation on all sides. In particular, it is necessary to provide at least 150 mm of room above and below the node for air circulation.

Wall mounting

Drill two mounting holes 233 mm apart in the mounting surface. Figure 2 depicts the locations of the wall mount brackets (Pos. B). Select appropriate length mounting bolts (not supplied) and washers. Tighten the mounting bolts. The amount of torque required depends on the mounting surface.

The lid retaining socket head screws are fasten with a H5 hex nut driver. Use no more than 3 Nm torque. Before closing the lid it should be checked that:

- nothing is trapped between the lid and the case
- all case gaskets are intact and in their correct positions
- lid seats evenly on the rubber gasket

The OX3 housing should be grounded from an approved earth point to the housing ground lug (Fig. 2, Pos. A).

Coaxial connections

The OX3 node requires pin-type connectors for all RF connections. The node has spring loaded seizure assemblies on coaxial ports that provide a tight connection with precise alignment between contact points. All coaxial output ports have a standard 5/8” thread.

Suitable length for the center conductor pin is approximately 26…29 mm (Fig. 1). Any longer pins must be trimmed before inserting them into the housing. After cutting the pin, trim the sharp edges. Using connectors with center conductors pins exceeding 1.8 mm in diameter will permanently damage spring loaded seizure assemblies. Ensure that the center conductor pin is not deformed, causing destruction of the spring loaded seizure assembly.

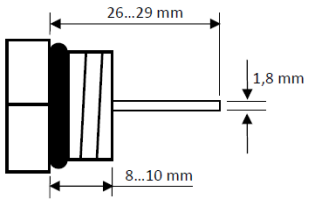


Figure 1. Centre conductor length

Powering

NOTICE: To reduce the risk of electric shock, do not remove the shielding cover of the power supply unit if it is connected. All electrical installations must be carried out by authorized and competent technicians in accordance with the national or regional electrical regulations. There are no user serviceable parts inside. Unauthorized repairs or modifications result in permanent damage to the equipment, and will void the warranty.

Common precautions:

- The OX3 node is intended for installation in restricted access locations (dedicated equipment rooms, equipment closet, or the like).
- Operate the device only on the specified supply voltage.
- The OX3 must never be operated without its shielding covers.
- The OX3 has no separate power switch, thus the coaxial cables and external power connector must be easily accessible to be able to disconnect it from the power source.
- Disconnect the power cord by the connector only. Never pull on the cable portion of the power cord.
- Do not place or drop heavy or sharp-edged objects on the power cord.
- The power must be disconnected when installing or removing the OX3.

Additional safety requirements for Norway and Sweden:

- Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system must be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).

The OX3 is available either with remote or local powering options. The power supply is integrated and cannot be replaced. The following subsections describe the different models.

OX3L with local powering (230 VAC)

The locally powered OX3L is connected to the mains voltage with its own power cord and has no fuses nor AC feed-through in its RF ports. The power supply unit is double shielded and does not require separate grounding. However, ensure that the housing of the OX3L is properly connected to the earth in order to meet safety requirements. Proper grounding will also improve protection from the effects of interference and thus increase the overall reliability of the system.

OX3R with remote powering (65 VAC, 3 use cases)

The OX3R is powered either via the dedicated F-connector at the side, or via the RF Out ports. There are 3 use cases:

Remote powering of the OX3R only (via the dedicated power connection at the side)

The OX3R can be fed via the F-female connector at the right side of the housing.

NOTICE: This F-female connector is dedicated for powering only and does NOT included RF.
Do NOT install fuses at the outputs. Close unused F-connectors by a plastic F-cap (with warning text “65V~”).

Remote powering of the OX3R only (via Out2)

When only a single RF output is in use (Out1, using the output module CXM1), the OX3R can also be powered via an F-connector at Out2.

NOTICE: Enabling remote power at Out2 is done by installing a fuse at Out2 (MINI Auto Fuse F15A/32V, BLUE).
Do NOT install a fuse at Out1.
Do NOT use the dedicated F-connector at the right side and close it by a plastic F-cap (with warning text “65V~”).

Using the OX3R for power distribution

The OX3R power bus can handle a maximum current of 7 A. In addition to the previous use case, feeding external 65VAC equipment connected to the dedicated F-connector at the side (remote powering only, no RF), from Out2 is possible as well.

Or, in addition to the first use-case, the network connected to Out1 and/or Out2 can be fed from the dedicated power connection at the side.

NOTICE: Enabling remote power at Out1 and/or Out2 is done by installing a fuse at Out1 and/or Out2 (MINI Auto Fuse F15A/32V, BLUE).
It is advised to use different type of connectors (like IEC/M14) for currents >1 A. In case an F-connector is used, it is advised to add a mark/sticker nearby the F-connector indicating the possible presence of 65V~, and close any unused F-connectors of the node by a plastic F-cap (with warning text “65V~”).

Fiber connections

The OX3 node comes with a mounted SC/APC adapters.

NOTICE: The SC/APC adapter is connected to the integrated optical module through a short length of fiber on the rear side of the bulkhead. To avoid damage to the fiber, take care not to rotate the adapter when installing or removing the fiber connector.

Fiber installation

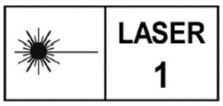
Fiber installation is a critical procedure and it should be done with carefulness. Incorrect handling of the fiber can result in damage and degraded performance.

Cleaning the fiber connectors

- For correct optical operation ensure that all optical connectors are cleaned immediately before mating, using a suitable optical connector cleaning kit.

- If a cleaning kit is not available, wipe the end of the connector using pure isopropyl alcohol (99%) and a lint-free wipe. Dry it with filtered compressed air. Wait until dry to insert the connector into the adapter.

- When fiber optic connectors are unmated, the optical fiber end faces must be protected from contamination using suitable dust caps. Contamination of fiber end faces will reduce the performance of the optical fiber and could ultimately cause failure of the system. Contamination could also damage the fiber end faces when the connectors are mated.



DANGER! Do not look into the optical connector with power applied. Laser light, visible or invisible, can seriously injure eyes or even cause blindness

Interfaces

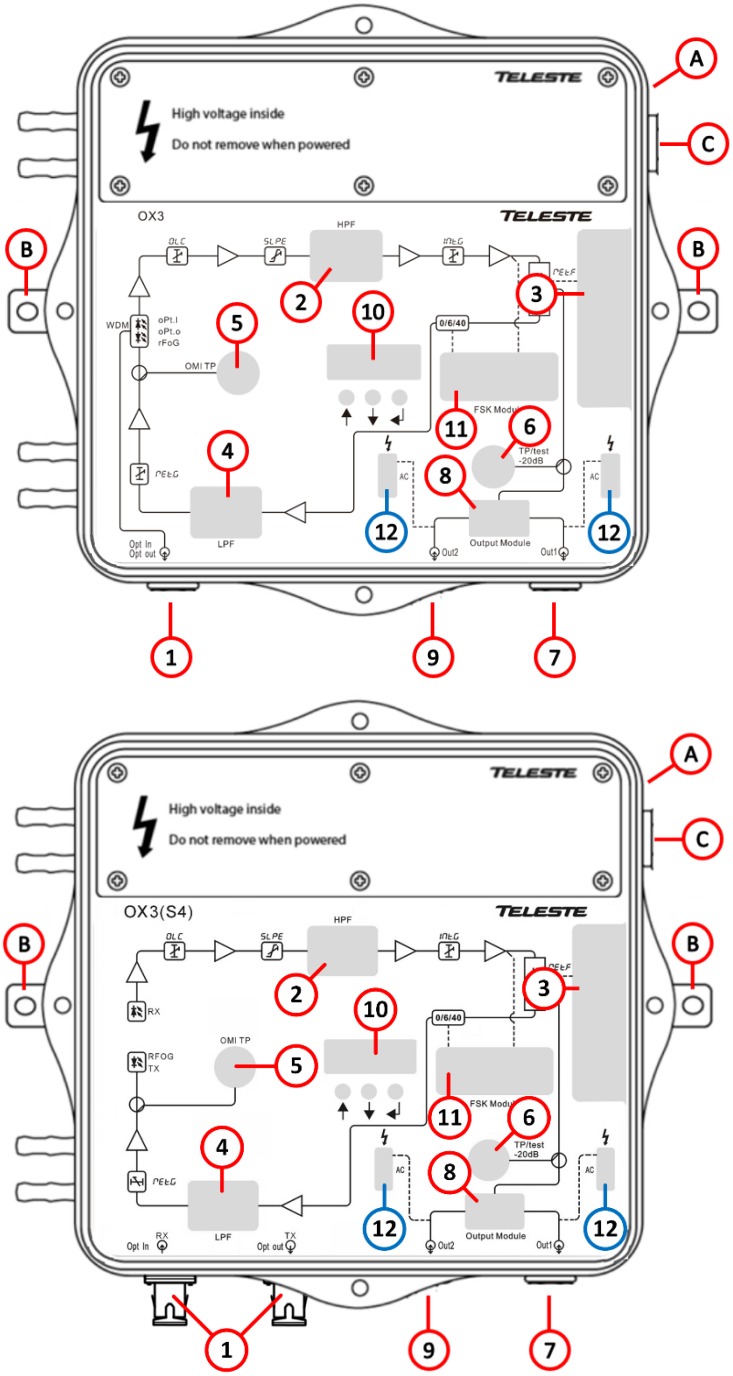


Figure 2 OX3 housing details TOP: S1-S3, BOTTOM: S4

1) Optical ports SC/APC8
2) Downstream High Pass Filter module
3) Output diplex filter module
4) Upstream Low Pass Filter module
5) OMI test point
6) Out test point -20 dB
7) Out1 port 5/8”
8) Output module CXM
9) Out2 port 5/8”
10) Local user interface
11) FSK module slot
12) Fuses (OX3R only)
A) Ground
B) Brackets
C) Remote power port 5/8” (OX3R), or mains 230VAC power cord (OX3L)

Menu and block diagram

The internal cover plate shows the block diagram and corresponding parameters in the menu structure. Use the “Up” and “Down” buttons to scroll through the menu and settings, and the “Enter” button to make the selection.

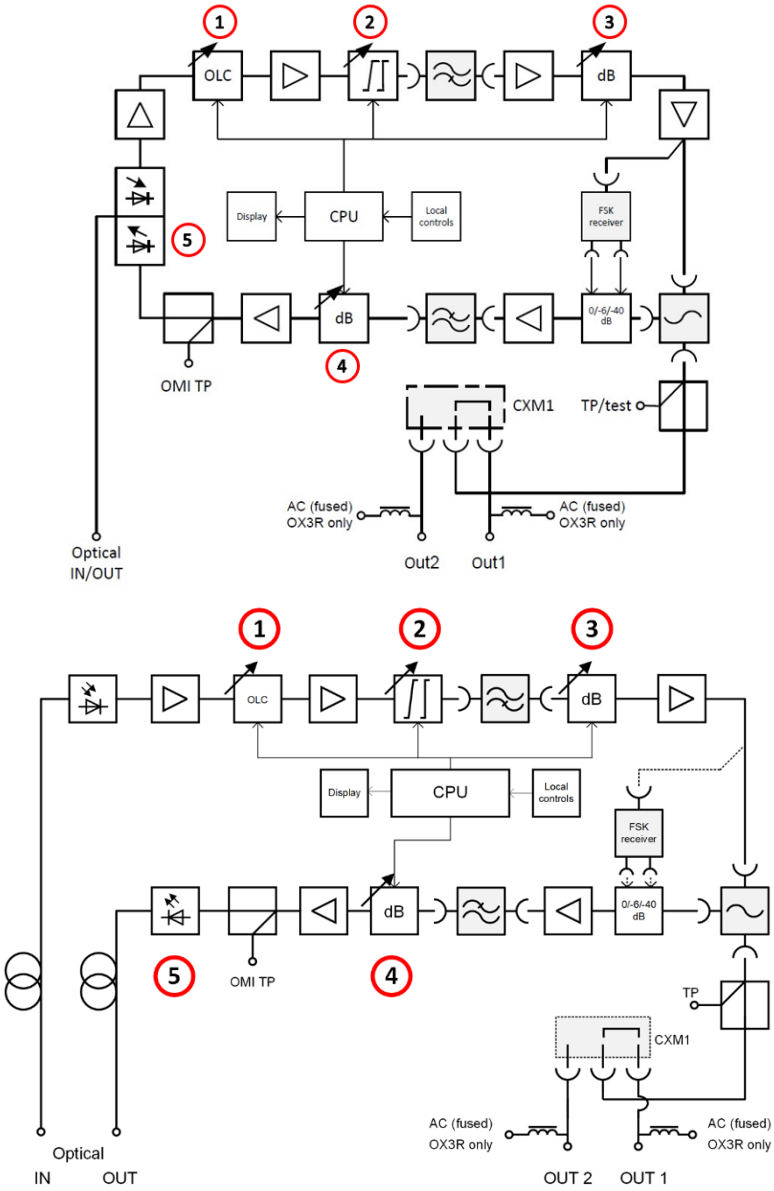


Figure 3 OX3 block diagram TOP: S1-S3, BOTTOM: S4

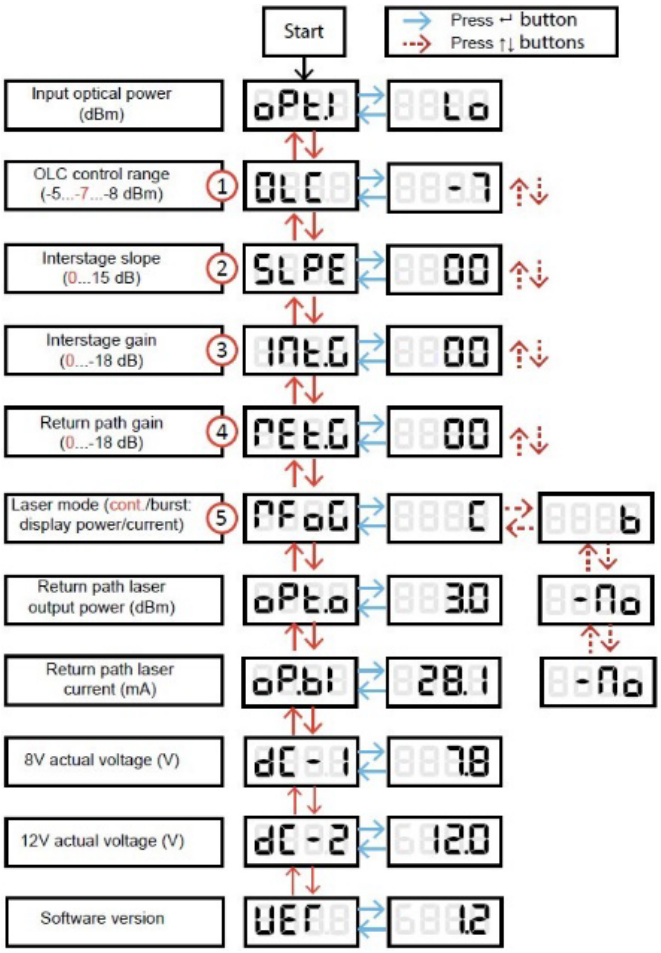


Figure 4 OX3 menu

Local user interface

The OX3 has a local user interface consisting of a 4×7-segments display and 3 buttons. This local UI is used for basic configuration. During the power-up the display indicates “00:00” till “99:99”. Pressing “Enter” button wakes up the display and activates the first menu item. If there is no button activity within ~4 minutes, the display will go into stand-by mode.

OX3K kits

OX3K kits are the diplexer/filter kits to set the frequency split in OX3. For example, kit OX3K204 contains the diplexer CXD204, an upstream low pass filter 204 MHz and a downstream high pass filter 258 MHz.

TIP: Use a screwdriver as a lever to pull the diplexer out vertically. Do it gently to avoid damage to the diplexer, the housing and case gaskets. While doing so, guide the diplexer with the other had to assure vertical extraction.

Control of the upstream ingress switches

The OX3 has ingress switches in the upstream path for -6 dB and -40 dB. They can be used to identify an ingress source in a network. There are two ways of controlling the upstream switches. Both ways require a CXT-plugin in the FSK module slot (see Fig. 2, 11).

CXT002, manual on-site control

The CXT002 is a service module for on-site field operations for local control of the ingress switches. It is used in the FSK module slot.

A lanyard is attached to the CXT002 as a visible sign that ingress switches are in use. However, the cord can also be wrapped inside the amplifier in case fault finding requires a temporary visit to another site and the lid needs to be closed in the meanwhile. Note that in that case the ingress switches are either -6 dB or -40 dB, but never 0 dB.

	Ingress switch (see OX3 spec)	LED colour
Inserting the CXT002 for the first time	-6 dB	Yellow
Pushing the button for 3 seconds disables the upstream path	-40 dB	Red
Pushing the button again for 3 seconds returns to default state	-6 dB	Yellow

CXT001, remote control

The CXT001 supports Remote Ingress Switching (RIS), allowing return path ingress switch control via forward path data link. The CXT001 uses a narrowband one-way FSK communication channel and automatically searches for and locks to a carrier of an HDM155 within the tuning range. The carrier frequency is typically 253 MHz. The carrier frequency should not be chosen between 2 adjacent QAM carriers.

Remote ingress switch control via an HDM155 RIS link

Each CXT001 has a unique MAC address, which is printed at the side and also encapsulated in a QR-code. The MAC addresses need to be added to the HDM155 database to allow remote ingress switching. See the HDM155 documentation for more details.

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European Conformity

This equipment conforms to all applicable regulations and directives of European Union and has gone through relevant conformity assessment procedures.

UK Conformity

This equipment conforms to all applicable regulations and directives of the United Kingdom and has gone through relevant conformity assessment procedures.

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