1. Product description

The optical amplifier OAD514 is designed to amplify the optical input signal and distribute through four fiber optic outputs. Device inside contains Erbium Doped Fiber Amplifier (EDFA) module and optical splitter with four outputs.

Device is equipped with web server. Web server provides diagnostics and control of the amplifier via Ethernet port using a Web browser.

The product is intended for indoor usage only.

2. Characteristics

- Four optical outputs.

- Device status indication LED.

- Safety warning LED indication when laser diode is powered on.

- Web interface for configuration and monitoring.

- SNMP agent for device monitoring and alarms.

- This device is equipped with the cooling FAN (12 V DC 1.7 W)

- Device has automatic FAN speed adjustment function.

3. Safety instructions

The amplifier must be installed in accordance with IEC 60728-11 and national safety standards.

The amplifier is powered from a 12 V power supply unit. This voltage is not dangerous to life.

The power supply unit must have a short circuit protection.

Any repairs must be made by a skilled personnel.

Do not connect the 12 V power supply unit into the mains socket until all cables of amplifier have been correctly connected. The mains socket must be easily accessible.

Disconnect the amplifier power supply by removing the power supply cable from the mains socket.

Do not expose this device to moisture or water splashes.

Avoid placing the amplifier near heat sources, e.g. central heating components or in areas of high humidity.

Keep the device away from naked flames.

If the amplifier has been stored in cold conditions for a long time, bringing it into a warm environment may cause condensation. In such cases let it warm up for at least 2 hours before plugging it into the mains.

IMPORTANT: Mounting of the module is allowed in a vertical direction only and the free flow of air through the unit must be not restricted. Always leave 10 cm of free space from the top, front and bottom of the unit to allow heat dissipation. Always leave at least 5 cm free space from fan side (see Figure 5).

Please note, that device laser diode lifetime highly depends on the ambient temperature and device cooling. Therefore it is important to keep the device temperature in safe operating temperature range.

Vers. 1.07

4. Safety of laser product

Optical amplifier module contains laser diode source. This device is rated under IEC60825-1: "Safety of Laser Products", Part 1: Equipment classification and requirements as CLASS 3R laser product.

When operating the equipment note the following:

Most fiber optic laser wavelengths are totally invisible to the eye and will cause permanent eye damage.

Never look into the end of a fiber on a powered device through a magnifying device (microscope, eye loupe, magnifying glass, etc.). Before using such devices always double check that power is disconnected or, if possible, completely disconnect the unit from any power source.

To verify the light output always use an instrument, such as an optical power meter.

Operate only with the proper optical fiber installed in the optical output connectors.

Whenever the optical connectors are empty the device should be turned off.

Before applying power always connect a fiber to the outputs of the device.

Never leave equipment with radiating bare fibers accessible - always cap the connectors.

5. Cleaning of optical connectors

The fiber ends may be damaged if contaminated connectors are inserted. The warranty does not cover some types of damage, made by the customer.

During the operation each fiber connector may be contaminated by dust or dirt. Even tiny particles of dust will affect the transmission quality. Dusty fiber optic connector will contaminate other connected optic parts. If optical reception power and output level of the receiver decrease, active fiber connection should be cleaned and maintained.

Always clean all the fiber optic connectors before setting.

Reel cleaners or prepackaged lint free wipes or swabs with alcohol are the most convenient means of cleaning optical connectors.

Fiber connectors should never be left uncovered.

Do not exceed the minimum bending radius when connecting cable to the system.
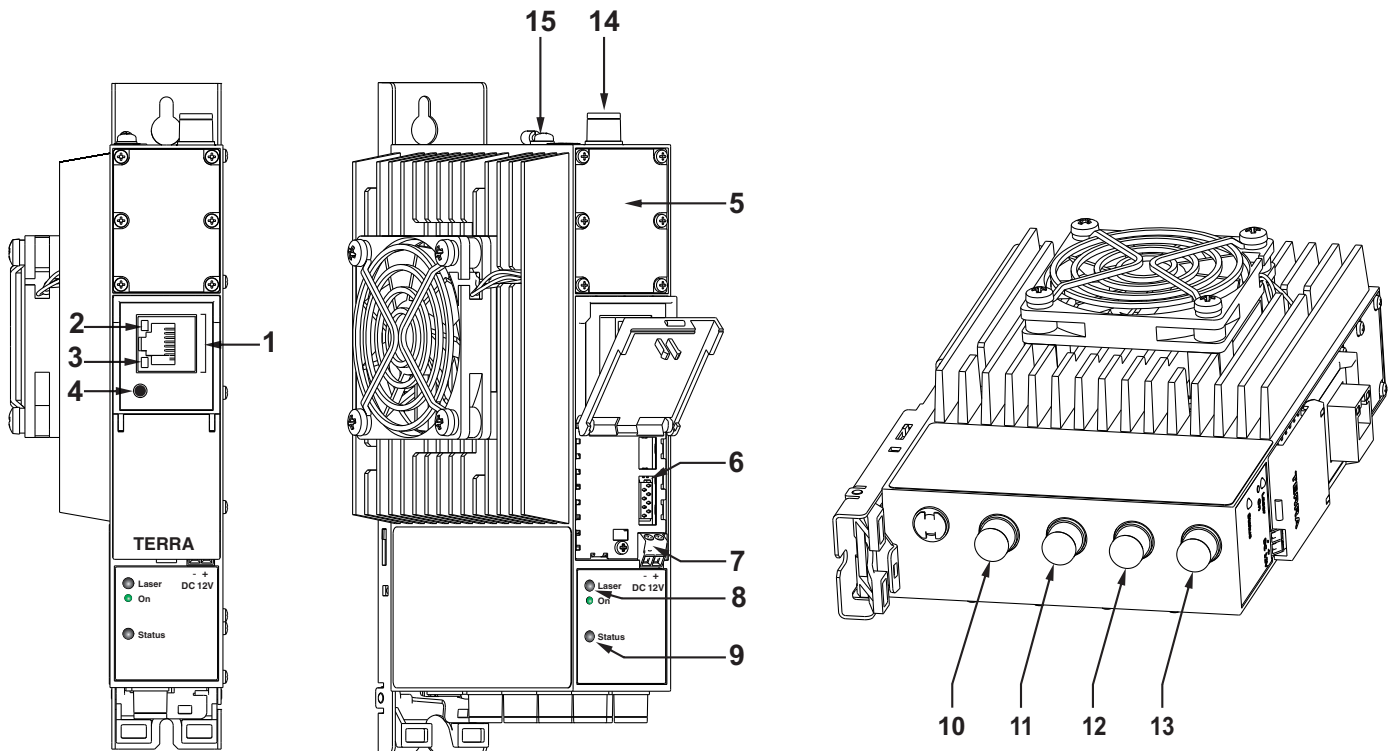
6. External view

Figure 1. External view of the amplifier

1 - **ETHERNET** - control over the Ethernet interface. RJ-45 socket

2 - ACTIVITY (yellow) indicator of the Ethernet interface

3 - LINK (green) indicator of the Ethernet interface

4 - **RESET** button:

- press this button shortly to restart the module
- press and hold this button for more than three seconds to set the default IP address of control over the Ethernet interface; administrator password will be changed to the default value as well

5 - FAN connector cover plate for easy FAN replacement

6 - power distribution bus connector

7 - 12 V DC powering input, screw terminal

8 - **LASER** - laser "**On**" safety warning LED indicator:

- green light indicates that laser diode is powered on
- no light indicates that laser diode is powered off

9 - **STATUS** - device status LED indicator:

- green light indicates that module operates normally
- red light indicates device error

10, **11**, **12**, **13** - amplifier optical outputs; FC type socket - sources of laser radiation class 3R if output is opened and laser is powered

14 - amplifier optical input; FC type socket

15 - functional grounding clamp

7. Installation instructions

Read the safety instruction first.
All settings can be changed using Web browser and Ethernet interface.
Disconnect the power supply unit from the mains before making any fiber optic cables connections.
Mount the module on DIN RAIL or individual holder.
Connect all necessary fiber optic, powering and control cables (shielded cable is recommended for Ethernet connection)
Connect power supply in to the mains.
Within 10-30 seconds of powering the amplifier will run in normal operation mode.
Comments of the Ethernet interface indicators:
• if the link with the control over Ethernet interface is established - the LINK [3] indicator glows;
• if communication via Ethernet interface is active - the ACTIVITY [2] indicator blinks.

## REQUIREMENTS FOR EXTERNAL POWER SUPPLY UNIT

• Output voltage	+12 V $\pm$ 1 V
• Output current	> 1.5 A
• Ripple at single and/or double mains frequency	< 20 mV p-p
• Ripple & noise	< 180 mV p-p
• Output connector type	pin (range 0.5...0.75 mm^2)

• Short circuit protection
• Double insulated (marked ▣)
• Meet EN 55022 class B conducted emisions requirements, measuring with grounded load

8. MOUNTING

The module or mounting bracket must be fixed with steel screws Ø 3.5-4 mm. The screws are not included in a package.
Mounting bracket on DIN rail should be connected to main potential equalization bus.

Mounting on a wall by screws	Mounting on a bracket (ordering number 01960)
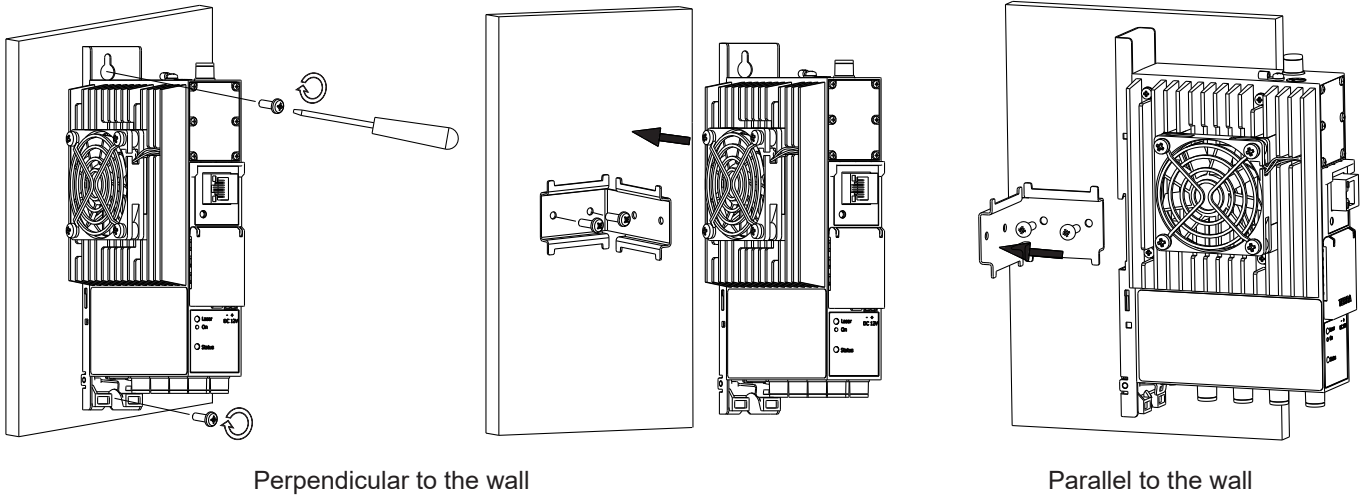
Perpendicular to the wall

Parallel to the wall
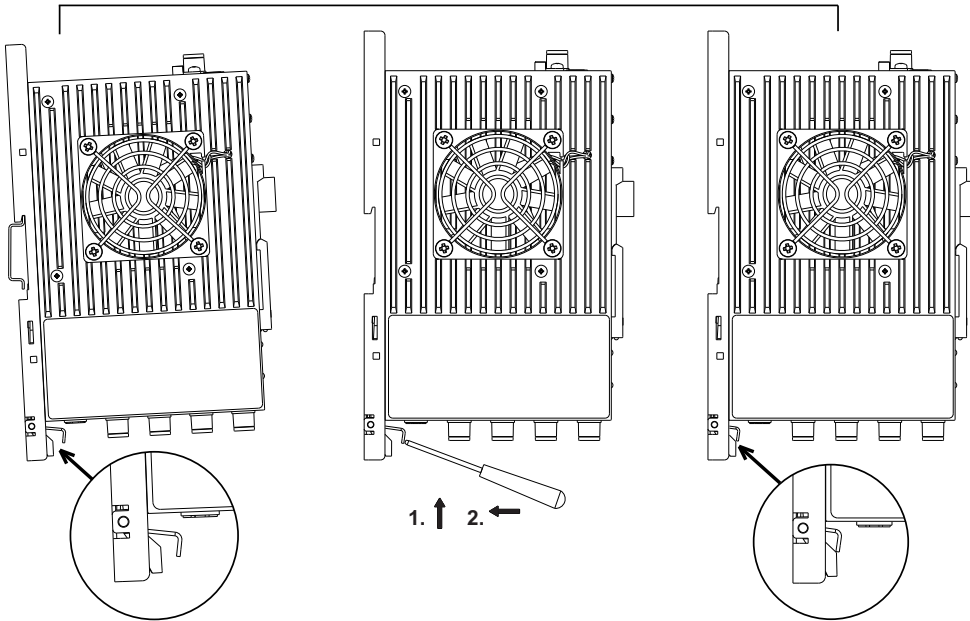
Figure 2. Mounting of the amplifier

Mounting on DIN rail
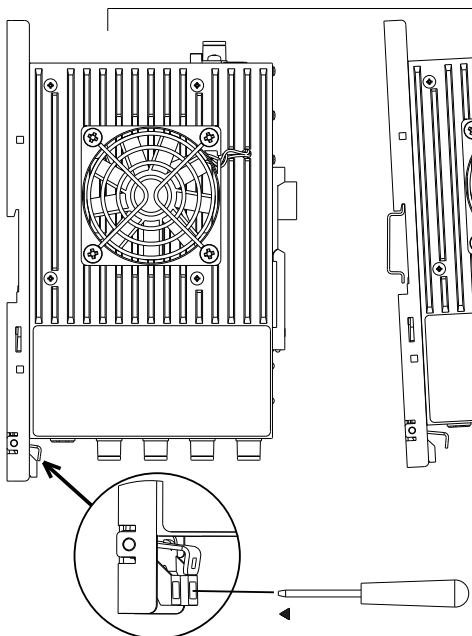

1. ↑ 2. ←

Figure 3. Mounting to DIN rail

Figure 4. Mounting from DIN rail

4

≥ 10 cm

≥ 5 cm

Amplifier must be fixed with 2 steel screws Ø 3.5-4 mm.
The screws are not included in a package.
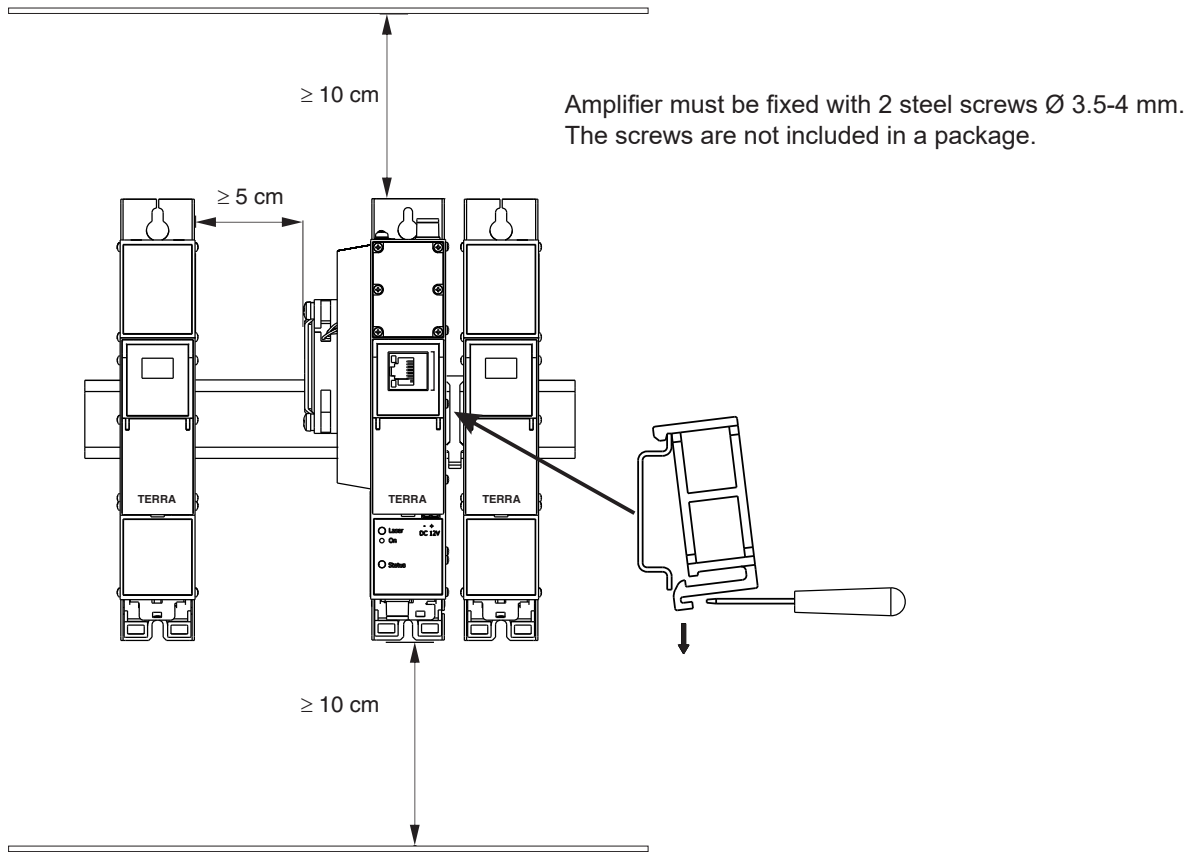
TERRA

TERRA   TERRA

≥ 10 cm

Figure 5. Spacing of modules

9. Operating

9.1 Initial configuration

All modules leave the factory with this control over Ethernet interface IP address: 192.168.1.10. In order to avoid conflicts with other IP addresses, it is necessary to perform an initial configuration in the local mode. Subsequently, it will be possible to access the module via local area network (LAN), either to change the configuration or to check the operating status.

The modules leave the factory with the following control over Ethernet interface TCP/IP configuration:

IP address of the module: **192.168.1.10**
Subnet mask: **255.255.255.0**
Default Gateway: **192.168.1.1**

To access each module, use a PC or MAC personal computer equipped with an Ethernet card and RJ-45 cable (CAT-5E or CAT-6). The IP address of the PC/MAC must be configured within the following range: 192.168.1.2 - 192.168.1.254 (do not use 192.168.1.10, since this is the IP address of the module to be configured). To start the configuration of the module, open your Web browser and type in the following direction: http://192.168.1.10. The login prompt will appear on a screen (see Figure 6.).

Figure 6. Login prompt

Access to the Web interface is protected by user name and password. The default user name and password is **admin**. Enter the user name and password and click on "**Login**" button.

Note: the default password - **admin** - can (and must) be changed as explained in section **9.6.5**.

During initial configuration you need to change the default control over Ethernet interface TCP/IP configuration as explained in section **9.4**.

The IP address of Ethernet interface reset to default value procedure is: press the "RESET" [4] button for more than 3 seconds and release it. After this operation the IP address of Ethernet interface will be set to **192.168.1.10**, user name and password set to **admin**.

9.2 General configuration

Initial program screen

The first screen that appears when the module is accessed is the "Main" window, which gives general information of the device (see Figure 7).

Figure 7. General information screen

On the top of each configuration screen you will see the main menu tabs [1]. Using it, you can switch between the different configuration menus. The tab highlighted in yellow shows which menu is active at a given moment. The "System menu" tab contains several submenus. Common elements for all configuration screens are module title [2] and login information strings [3]. The module title can be changed after pressing the "Change" button in the "Device information" table. Pressing on the "Logout" string you can logout from module control interface.

Device information table

This shows the following data of module:

"Device model": model of the device.

"Serial number": serial number of the device.

"Title": changeable device title.

"Software version": module software version number.

"Hardware version": module hardware version number.

"IP": IP address of the Ethernet interface.

"System time": current system time.

"Up time": time passed from last power-up or restart of the module.

Common status table

The following module parameters are displayed at real time:

"Supply voltage": module power voltage in Volts.

"FAN speed": cooling FAN speed in rotations per minute.

"Internal temperature": internal temperature of the module in degrees of Celsius.

"Laser temperature": laser temperature in degrees of Celsius.

"Laser current": laser diode current in milliamps.

"Input power": amplifier input optical power in dBm.

"Output power": amplifier output optical power per output. Value is in dBm.

Diagnostic information table

All module errors and comments how to eliminate these errors are displayed.

9.3 Amplifier settings

Amplifier settings menu tab contains optical amplifier module configuration table. Parameters such as amplifier operation mode or threshold values of alarms can be adjusted here.

Optical amplifier settings table

"Operation mode": switch amplifier to Automatic Power Control (APC) mode or turn amplifier off.

WARNING: this device is laser 3R class product. You must take all safety precautions as described in section "4. Safety of laser product" when switching optical amplifier to active APC mode.

"Low optical input level": the amplifier will be in shutdown mode if the optical input level is lower then this threshold value. Value is in dBm.

"Alarm temperature": module inside temperature above which module will display a warning.

"Shutdown temperature": module inside temperature above which module will turn laser diode off.

Press "Update" to change amplifier settings and wait until saving process is finished.

Figure 8. Amplifier configuration screen

9.4 IP Settings

This menu section consists of two tables related to network and time settings. The "IP settings" table is used to configure the device Ethernet connection. "Date, Time" table allows you to configure system time settings.

IP settings table

"MAC Address": the physical address of the module Ethernet network card is displayed automatically.

"IP Address": enter the IP address that you wish to assign to the module. This address must fall within the range of local network addresses.

"Subnet mask": enter the local network mask.

"Gateway": enter the IP address of the gateway. This information is required only if you want to access the module from outside of your local network, send the SNMP traps or use NTP client.

"DNS server": enter the IP address of the DNS server.

Press "Update" button to change device IP settings.

Figure 9. IP settings screen

Date and Time settings table

"System time": current system time and date.

"Time zone": local time zone. Choose value according to your location.

"Date and time source": choose automatic date and time synchronize with NTP server or manual date and time setup.

"NTP server": NTP server address or hostname which is used to update system time. This parameter is unavailable if "Manual setup" option is selected.

"Date": manually insert time in this field. This field is unavailable if "NTP server" option is selected.

"Time": manually insert date in this field. This field is unavailable if "NTP server" option is selected.

Press "Update" button to change time and date settings.

Figure 10. Time settings screen

9.5 SNMP settings

This menu tab contains the SNMP configuration table (see Figure 11).

Figure 11. SNMP configuration

Description of the "SNMP configuration" table rows:

"Read Community": community name string that is required to access the SNMP agent Read-Only parameters.

"Write Community": community name string that is required to access or modify the SNMP agent Read-Write parameters.

"Enable TRAP": SNMP traps are alerts generated by agent. Check this box to enable traps generation. The module generates traps when the diagnostic alarm events occur.

"TRAP Community": is the community string used for generating the agent traps.

"Host IP #1","Host IP #2": IP addresses of hosts with SNMP managers, where traps will be sent.

"Download MIB file": press this link to download the SNMP MIB file of the device. Save the archive on your computer and extract the archive content. Extracted MIB files are ready to use with SNMP manager software.

NOTE: please read the user guide of SNMP manager software before using SNMP.

Press "Update" button to change SNMP agent settings.

9.6 System menu

This menu tab contains the following submenu items: "Event logs", "Export parameters", "Import parameters", "Firmware upgrade", "User management", "Restore defaults", "Reset the device", "Language".

9.6.1 Event logs

Move the cursor on the "System menu" dropdown list and then click on the "Event logs" option. The event logs screen will appear.
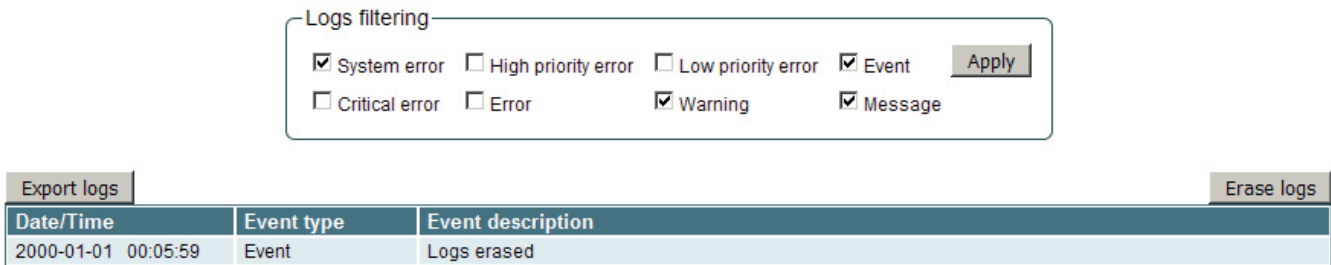
Figure 12. Event logs table

This window enables you to see a list of the logging messages of the module. The log content remains after a power loss of the module. Events in the log are sorted by time – the newest are on the top. Information events are shown in blue background, error messages are in red. After switching on the unit, the current date is set to 2000:01:01 and time to 00.00.00. When system time is synchronized with NTP server or adjusted manually, log window will show correct time and date when the event has occurred. You can filter out the desired messages by checking the corresponding "Logs filtering" checkboxes and pressing "Apply" button. All logging information is cleaned up by pressing "Erase Logs" button. You can export the module logs and download to your personal computer by pressing the "Export logs" button.

9.6.2 Export parameters

Module settings can be saved into a backup file. Inversely, the configuration data saved on an appropriate file can be restored on the module as well. Move the mouse cursor on the "System menu" dropdown list and then click on the "Export parameters" option. A window is displayed which allows you to select the action for a data file of the current module configuration. You need to select the "save file to disk" option.

9.6.3 Import parameters

Select the "Import parameters" option in the "System menu" dropdown list. The "Import parameters" window is displayed (see Figure 13).

Figure 13. Import parameters window

Click on "Click to select file" and select the file containing configuration data that you wish to restore on the module. Once you have selected the file, click on the "Upload" button at the bottom of screen. When the import process is finished, a notification window will be displayed.

9.6.4 Firmware upgrade

If you wish to update the module firmware, select "Firmware upgrade" option in the "System menu" dropdown list. The window (see figure 14) shows current firmware version that the module has at the present time. Click on the "Click to select file" button and select the firmware update file located on your computer. Selected firmware file version will be shown. When the file name is in the box, click on the "Upload" button and wait until the file upload process completes. A new firmware will be installed on the module during next device start up.

You can check for new a device firmware release by pressing on the "Check online" link. Ensure that your personal computer (not the device!) has access to Ethernet before checking for a new firmware release. If there are any new software releases, revision history will be displayed on a screen, allowing you to see the changes and download the firmware files.

NOTE: firmware update process takes about 30 seconds during device start up. Avoid power supply interruption and wait until the process completes and device starts to operate normally. Do not use firmware files that are not intended using with this particular model unit as it will damage the device.

Figure 14. Firmware upgrade window

9.6.5 User management

Select the "User management" option in the "System menu" dropdown list. The user management window is displayed (see Figure 15). This window consists of two tables: "Change password" and "User management".

Figure 15. User management window

Change password table

The "Change password" table allows you to change the password of current user. Enter the new password in the "New password" field and confirm the new password by retyping it in the "Repeat new password" field. The changes will take effect after you press the "Modify" button.

User management table

In the "User management" table you can manage users, who will be able to login into the module. Enter the new username and password in the appropriate fields, select desired role for a user and press the "Add" button to add new user or "Update" button to change the user settings.
• User role "Admin" enables the user to change all module settings and manage other users.
• Limited user role "User" enables the password change function only. It is forbidden to modify the module settings for limited user.
Press the "Remove" button to remove user from the list.

NOTE: By giving your personal password or user access account for another person, you take full responsibility for all module settings modifications made by that person or anyone else they may give the password to.

9.6.6 Restore defaults

Clicking on the "Restore defaults" submenu in the "System menu" dropdown list resets the configuration parameters of the module to the factory default values. The control over Ethernet interface IP address and Users management settings remain unchanged.

9.6.7 Reset the device

Clicking on the "Reset the device" submenu in the "System menu" dropdown list causes the module to restart.

9.6.8 Language

If you wish to change the module menu language, move cursor on the "Language" and select a desired language option in "System menu" dropdown list.

10. Technical specifications

Type	OAD514*
Operating wavelength	1528-1564 nm
Input power	-3...+10 dBm
Number of outputs	4
Power per output	13 ± 1 dBm
Noise figure	5 dB max.
Optical return loss	min. 50 dB
Status indication	LAN & LED
Supply voltage	12 V ± 1 V
Current consumption	1.2 A max.
Operating temperature range	+10 ºC ÷ + 35 ºC
Dimensions/Weight (packed)	69x198x124.5 mm/1.64 kg

* Type	Connector IN & OUT
OAD514 E	FC/UPC
OAD514 F	FC/APC
OAD514 H	SC/APC

INVISIBLE LASER RADIATION DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. Wave length 1270-1610 nm, IEC60825-1.

This product complies with the relevant clauses of the European Directive 2002/96/EC. The unit must be recycled or discarded according to applicable local and national regulations.

Equipment intended for indoor usage only.

Functional earthing. Connect to the main potential equalization.

This product is in accordance to following norms of EU: EMC norm EN50083-2, safety norm EN IEC62368-1 and RoHS norm EN50581.

This product is in accordance with CustomUnion Technical Regulations: "Electromagnetic compatibility of technical equipment" CU TR 020/2011, "On safety of low-voltage equipment" CU TR 004/2011.

This product is in accordance with safety standard AS/NZS 60065 and EMC standards of Australia.