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OAMP series

Optical Amplifiers

DRAFT VERSION

Operating Manual

Version 06-2017A

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Before starting operation of the device

HINWEIS: Read this operating manual attentively! It contains important information about installation, ambient conditions and maintenance of the device. Keep this operating manual for future use and for handover in the event of a change of owner. A PDF version of this manual is available to download on the ASTRO website (there may be a more recent version).
The ASTRO company confirms that the information in this manual was correct at the time of printing, but it reserves the right to make changes, without prior notice, to the specifications, the operation of the device and the operating manual.

Symbols and conventions used

Symbols used in these instructions

Pictograms are visual symbols with specific meanings. You will encounter the following pictograms in this installation and operating manual:

Warning about situations in which electrical voltage and non-observance of the instructions in this manual pose a risk of fatal injuries.

Warning about various dangers to health, the environment and material.

Warning about thermal damages (risk of burns).

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Warning about high laser radiation emitted from a device, connector or adapter (risk of eye damage).

Recycling symbol: indicates components or packaging materials which can be recycled (cardboard, inserts, plastic film and bags). Used batteries must be disposed of at approved recycling points. Batteries must be completely discharged before being disposed of.

This symbol indicates components which must not be disposed of with household rubbish.

Proper use

The OAMP module can only be used as an amplifier for analogue modulated TV and Data services signals in optical fibre networks.
Modification of the devices or use for any other purpose is not permitted, and will immediately void any guarantee provided by the manufacturer.

Target group of this manual

Installation and starting operation

The target group for installation and starting operation of the ASTRO optical transmission technology are qualified experts who have training enabling them to perform the work required in accordance with EN 60728-11 and EN 60065. Unqualified person are not allowed to install and start operation of the device.

Device configuration

Target group for the configuration of the ASTRO transmitters are persons who have received instructions and have training enabling them to perform a configuration. Knowledge of EN 60728-11 and EN 60065 is not necessary for configuration.

Device description

The delivery consists of the following parts:

- ☐ OAMP amplifier
- ☐ Operating manual

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Front:

[1] optical input connector (always clean patchcord before connection)
[2] optical output connector (always clean patchcord before connection)
[3] indication LEDs (power, optical input signal, laser, optical output signal)
[4] push buttons
[5] LC display for information and control
[6] key lock (laser off/on)

Back:

[7] fan
[8] RS232 (only for R & D purposes)
[9] LAN interface
[10] dual hot plug power supplies
[11] grounding connection

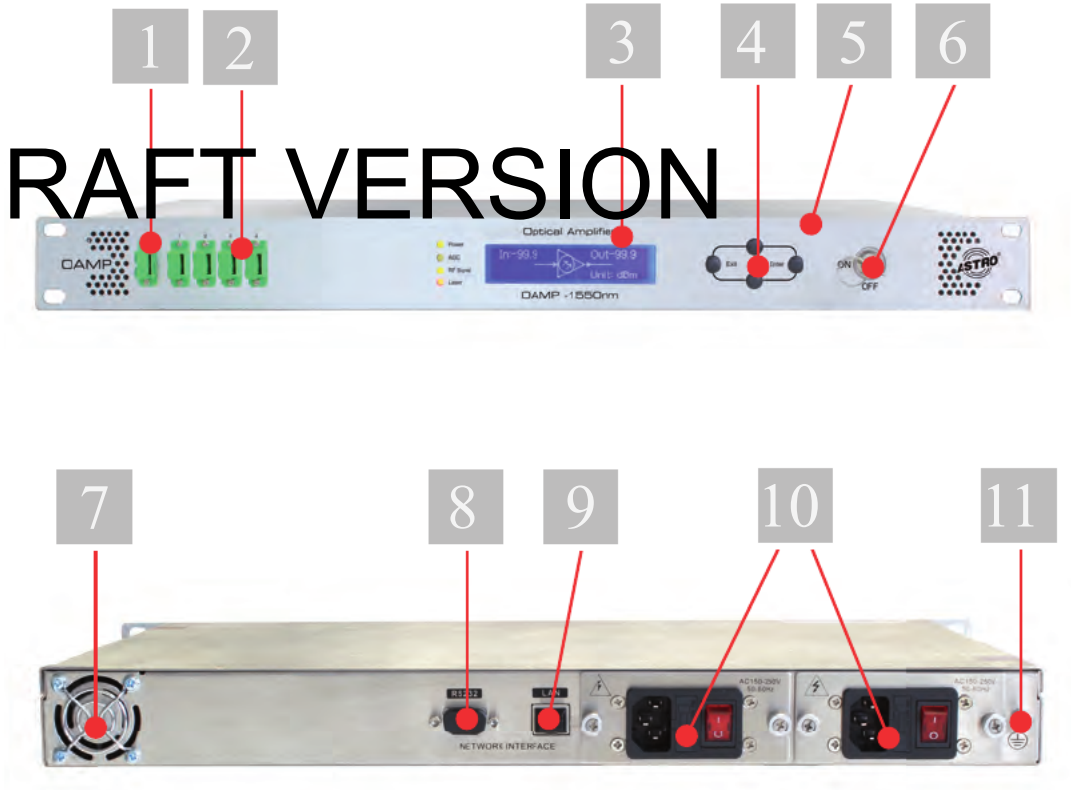

Figure 1: OAMP front and rear side

Prior to connecting/disconnecting any of the output ports, make sure that the laser is switched off either by key lock or by disconnection of the input fibre cable to avoid burn in of the optical surfaces of the connection.

LED indicators

- `Power LED:`
  yellow: only one working power supply
  green: both power supplies working in good condition
- `Input:`
  green: when optical input > -10dBm detected
  off: no optical input detected
- `Laser:`
  off: laser switched off (via keylock or via setting)
  green: laser pumps working state is normal
  flashing red: laser pump serious problem, see alarm information panel for more details
  red: laser pump not working, see alarm information panel for more details
- `Output:`
  off: output power is below +10dBm
  green: output power is > +10dBm

The device can be equipped with either AC power supplies or DC power supplies (see figure below).

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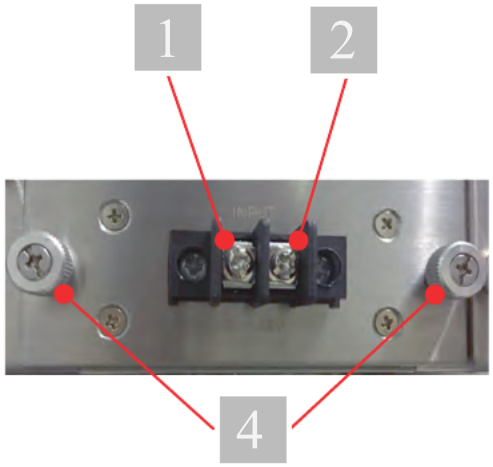
[1] power cord connection (150 - 250 VAC)
[2] fuse holder with one spare fuse inside (fuse type: T3.15 A/250 V)
[3] manual power switch
[4] to remove the hot plug power supply, first open the screws on the left and right side of the power supply unit

Figure 2: AC power supply (rear side)



[1] 0 VDC connection
[2] -48 VDC connection
[3] to remove the hot plug power supply, first open the screws on the left and right side of the power supply unit

Figure 3: DC power supply (rear side)

External breaker shall be T3.0A (time delay fuse with 3.0 Amps)

The OHPA module features a CE marking. This confirms that the product conforms to the relevant EC directives and adheres to the requirements specified therein.

Important safety information

To avoid any hazardous situations to the extent possible, you must adhere to the following safety information:

ACHTUNG: Failure to observe this safety information may result in personal injury due to electrical and thermal dangers!

Proper use

- ☐ Only use the device at the approved operating sites and in the ambient conditions allowed (as described in the following), and only for the purpose described in the section “Proper use”.

Before starting operation of the device

HINWEIS: Read this operating manual attentively! It contains important information about installation, ambient conditions and maintenance of the device. Keep this operating manual for future use and for handover in the event of a change of owner or operator. A PDF version of this manual is available to download on the ASTRO website (there may be a more recent version).

- ☐ Check the packaging and the device for transport damage immediately. Do not start operation of a device that has been damaged.
- ☐ Transporting the device by the power cable may damage the mains cable or the strain relief, and is therefore not permitted.

Danger of optical radiation

This product is laser class 1M (according IEC 60825-1 Safety of Laser Products) and therefore several safety precautions must be applied.

- ☐ Exposure to class 1M laser radiation is possible on open connectors or connected fibre patch cords. Do not view exposed fibre or connector ends when handling or maintaining optical equipment. Do not view with optical instruments into open connectors or fibre ends on switched on devices. Make sure all wherever a fibre inspection is required, that the inspected fibre or connector is completely optical radiation free.
- ☐ Due to the high optical radiation and improper handling of optical fibre connections and devices, there could be risks for the operating and service personnel. Access should be restricted to trained personnel only.
- ☐ Never look directly or with optical inspection tools into the end of a fibre which is connected to a transmitter or optical amplifier and which is in operation. If the eyes are exposed to optical radiation, which are above the acceptable maximum, this could cause permanent damage to the eye.

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Installation, operation, maintenance

- ☐ The device may only be installed and operated by qualified persons (in accordance with EN 60065) or by persons who have been instructed by qualified persons. Maintenance work may only be carried out by qualified service personnel.
- ☐ The installation site must be planned in a way that prevents children from playing with the device and its connections.
- ☐ Dangerous voltages and the threat of optical laser radiation are present within the powered on unit at all times.
- ☐ Always replace protective caps on optical connectors and patch cords when not in use to avoid dust intake. Before connecting clean connectors with lint free cloth and pure alcohol or with any professional tools for cleaning connectors and adapters. The typical connectors fitted are SC/APC 8° or LC/APC 8° (green couplers).
- ☐ The electrical connection conditions must correspond to the specifications on the device type plate.
- ☐ The ambient temperatures specified in the technical data must be complied with, even when climatic conditions change (e.g. due to sunlight). If the device overheats, the insulation used to isolate the mains voltage may be damaged.
- ☐ The device and its cable may only be operated away from radiant heat and other sources of heat.
- ☐ To avoid trapped heat, ensure there is good ventilation on all sides. Installing the device in recesses or covering the installation location, e.g. with curtains, is not permitted. Ventilation openings may not be covered.
- ☐ If the device is installed in a cabinet, ensure adequate air convection is possible to avoid exceeding the maximum ambient temperature permitted for the device.

- No objects may be placed on the device.
- The subscriber network must be earthed in accordance with EN 60728-11, and must remain earthed even when the device is removed. Furthermore, the earth connection on the device can be used. Devices within hand's reach must be integrated into the potential equalisation together. Operating the device without an earth conductor, without earthing the device or without using device potential equalisation is not permitted.
- The device does not feature protection against water and may therefore only be operated and connected in dry rooms. It must not be exposed to spraying or dripping water, to condensation, or to similar sources of moisture.
- The electrical system supplying current to the device, e.g. a house installation, must incorporate safety devices against excessive current, earth leakages and short-circuiting in accordance with EN 60950-1.
- To operate the device (protection class I), it must be connected to mains power sockets with a protective earth conductor.
- All adhere to all applicable national safety regulations and standards.
- The mains plug is used as a mains voltage disconnect unit in the event of servicing and danger, and must therefore be accessible and be able to be operated at any time. The device is operational when connected to the mains power.

- Excess mechanical loads (e.g. falling, impacts, vibrations) may damage insulation used to provide protection from mains voltage.
- High excess currents (lightning strike, surges in the power utility grid) may damage insulation used to provide protection from mains voltage.
- Do not insert any objects through the ventilation slots.
- If there is no information about intended use (e.g. operating site, ambient conditions), or the operating manual does not include the corresponding information, then you must consult the manufacturer of this device to ensure that the device may be installed. If you do not receive any information on this from the manufacturer, do not start operating the device.

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Maintenance

- The operating display only shows whether the DC current, which supplies the device components, has been disconnected. However, operating displays (on the power supply unit or the device) that are not lit up in no way indicate that the device is completely disconnected from the mains.
- Read carefully: EN 60728 - Part 1 Safety requirements: No service work during thunderstorms.

Repair

- Repairs may only be performed by the manufacturer. Improperly performed repairs may result in considerable dangers for the user.
- If malfunctions occur, the device must be disconnected from the mains and authorised experts must be consulted. The device may need to be sent to the manufacturer.

Description of performance

The optical amplifier OAMP is an Erbium Doped fibre amplifier for CATV Signals.The amplifier provides one input port and 1 to 8 output ports. The device can provide different optical fan outs and output powers. The housing style is 19” 1 HU standalone, with redundant power supplies.The wavelength of the output signal is typically around 1550nm (+/- 10nm).
Optical amplifiers are used to boost the optical signal for Broadcasting applications. The application is normally the usage within optical links for long distance, or smaller sized FTTH Networks where RF Overlay signals for CATV must to be provided.

Features

- 19“, 1-HU rack mounted 1550nm optical amplifier
- various outputs and powers from 1x13 dBm to 4x17 dBm (total 24 dBm)
- pump laser 980 nm and 1480 nm
- temperature range -5 °C - +55 °C / high reliability
- low noise figure
- outdoor version available on request with extended temperature range
- SNMP / web Interface / LCD panel
- 2 hot plug power supplies AC or DC

Applications

- HFC & FTTH Networks forward path transmission
- optical link amplification of PAL, NTSC and QAM signals for HFC & FTTH Networks

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Warranty conditions

The general terms and conditions of ASTRO Bit GmbH apply. You will find these in the current catalogue or on the Internet under “www.astro-kom.de”.

Disposal

All of our packaging material (cardboard boxes, inserts, plastic film and bags) is completely recyclable. Electronic devices must not be disposed of with household waste, but rather – according to DIRECTIVE 2012/19/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL from 4 July 2012, on waste electrical and electronic equipment – must be properly disposed of. When it is no longer of use, please bring the device for disposal to one of the public collection points for this purpose.

ASTRO Bit is a member of the Elektro system solution for the disposal of packaging materials. Our contract number is 80395.

Installing the device

To install or commission the device, please follow the steps in the sequence as mentioned below.

Mounting the device in the rack / grounding to protective earth

Mount the device in the 19” rack. Make sure that supporting bars or any shelf supports the device. Do not mount solely on the front panel.

After physical installation in the rack, connect the protective earth cable (PE) to one of the device grounding points, with an appropriate eyelet connection. 2 grounding screws on the rear side of the device are marked with the grounding symbol.

Attach power cord

Make sure that the key lock on the front is in position “off” before switching on the device. For mains power supply the power on switch is located beside the mains connector. If the power switch is not showing any light, please check the fuse next to the power switch for damage.

In case of DC Voltage connect the supply cables to the power supply. Make sure to connect the cables with the right polarity and the sufficient diameter.

Check optical input level range

Check before connecting to the device the optical level with an optical power meter. Recommended optical input power is 0dBm to +3dBm for best performance. Before connecting the optical input port, clean the patch cord to avoid dust in the optical connection.

Connect the output before switching on with key lock

To prevent a possible damage to the surface of the optical output connectors, it is recommended to connect the optical patch cords to the output before the device is turned on with the key lock.

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HINWEIS: If there is the need to connect any optical connector to the output ports, switch off the laser by any of the 3 different possibilities:

- with key lock turn to off position (preferred solution !)

- switch off the complete device at the power supply

- remove the input fibre connection, in that case the laser will switch off

Never make any optical connection on ports, where you are not sure about the optical powers. Optical powers >16 dBm may cause burn-in of the surface of the optical connection, if plugged under optical power. This connection is permanently not usable anymore, since burned connectors will have a very high attenuation.
If there is the need to test on optical output ports, make sure that the laser of the optical amplifier is off, before connection of the optical power meter. After connection established, switch on the laser again. Another method is testing after the subsequent optical splitter (normally there is a lower optical power). In any case check your optical power meter for the correct wavelength setting and make sure the optical power of the amplifier is in the correct working range of your test device.

Switching on the transmitter with key lock

If the key lock is in position off, there is no entering with the push buttons on the front possible. By pressing the „Exit“ or „Enter“ button the LED display will lighten up. In order to protect the device, there is a time-delay function to switch it on. After turning the device on with the key lock On/Off switch, the amplifier will start to operate after about 15 to 20 seconds. The delayed power on sequence is required due to safety reasons.

Check on LC Display if any alarm

To ensure that the device is running properly, it is possible to show the device menu options on the LCD panel by pressing the „Enter“ button. Under “3. Alarm status” (selected with the down button and confirmed with the „Enter“ button) the actual present alarms can be displayed. To exit the menu, press the „Exit“ button until reaching the main display.

In case of device problem

In case of any problems please contact ASTRO Bit GmbH or resend the device with the established valid RMA Procedure (RMA code/ Error description).

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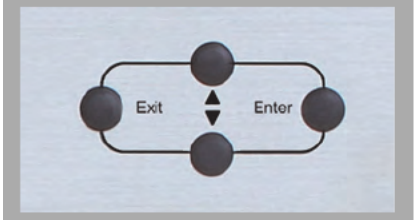

LC display and settings

Using the push buttons

When pressing the “Enter” button for short time, this will light up the display and show the different menus which are selectable with the up and down button. The selected menu can be entered by pressing “Enter”. To exit a menu you must press the “ Exit” button. To modify any value, use the up and down button and confirm the selected value by pressing “Enter”. In case the field shall not be modified, you may exit with the “ Exit” button.

up button: increase the parameter value

down button: decrease the parameter value

.

LCD panel menus

The following flow chart shows the different screens that can be seen when stepping through the different menus:

- Boot display (start screen): At power up of the device the status information about the device is shown. There is a start up delay of several seconds before the laser pump switches on.
- Display parameters: display the parameters of the device
- Set parameters: set or change the parameters of the device
- Alarm status: shows the current present alarms of the device

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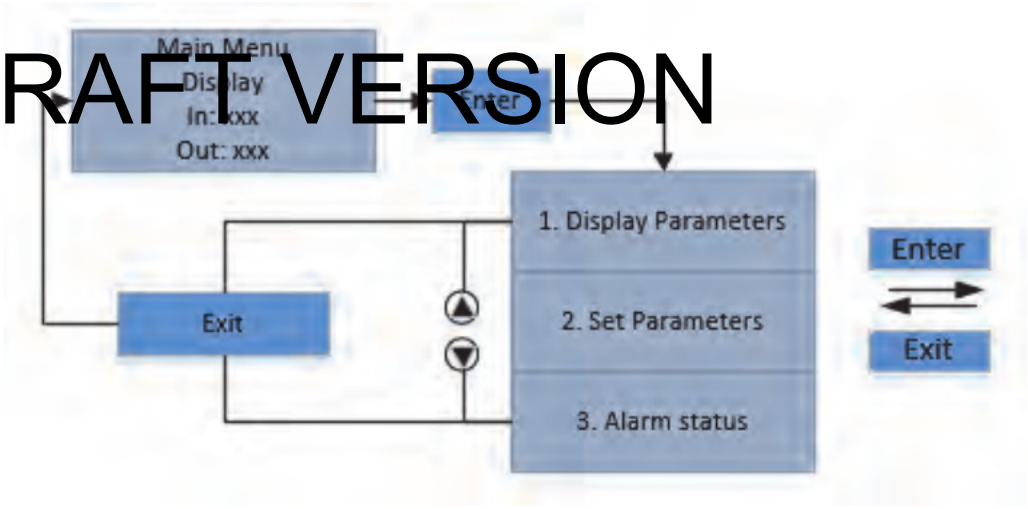

Figure 4: LCD panel

The „Display parameters“ menu

The following flow chart shows the different parameters, that can be edited via the front panel display:

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Figure 5: „Display parameters“ menu

- `Input Power:` displays the optical input power; if no optical input power is detected -99.9 dBm is displayed
- `Output Power:` displays the optical output power of the device
- `Pump 1 Power:` shows the optical power of laser pump 1
- `Pump 1 Bias:` shows the bias current of laser pump 1
- `Pump 1 Temper:` displays the temperature of laser pump 1
- `Pump 1 Cooling:` shows information about the TEC cooling current for laser pump 1
- `Pump 2 Voltage:` shows information about the voltage supply for laser pump 2
- `Pump 2 Bias:` shows the bias current of laser pump 2
- `+5 V Read:` monitoring of +5 VDC power
- `-5 V Read:` monitoring of -5 VDC power
- `Box Temp:` inner housing temperature of the device

- `Serial Number:` serial number of the device
- `IP Address:` the IP address configured for the device
- `Subnet Mask:` the configured subnet mask of the device
- `NetGateway:` the configured gateway ip address of the device
- `MAC:` the MAC address of the ethernet interface of the device
- `Trap1:` IP address of trap receiver 1
- `Trap2:` IP address of trap receiver 2
- `Software Version:` version number

The „Modify parameters“ menu

The following figure shows the menu entries. Press Enter to show up a submenu for changing the value. Press Exit to exit the menu without changing the values. All changes can be confirmed by pressing Enter. You can change the entries by using the up and down buttons.

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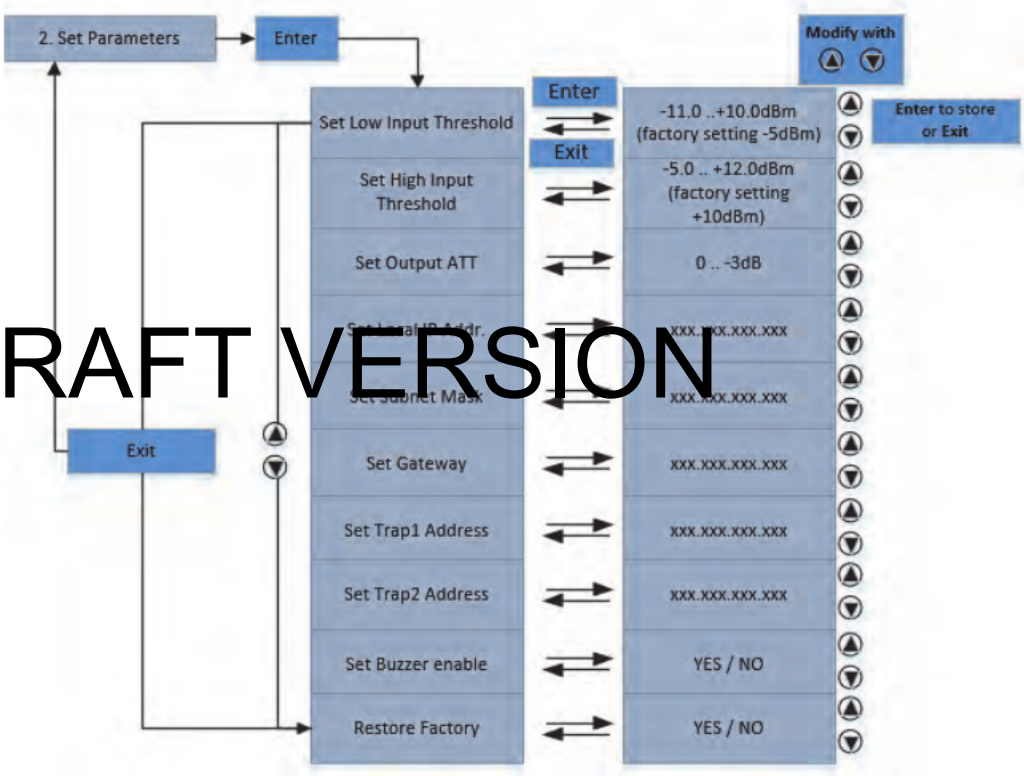

Figure 6: „Modify parameters“ menu

- `Set Low Input Threshold:` This parameter configures the low optical input alarming. Factory setting is -5 dBm . Note: Recommended optical input range is -3 ..+3dBm for best performance. (selectable values -11.0 dBm ..+10.0 dBm)
- `Set High Input Threshold:` This parameter configures the high optical input alarming. Factory setting is +10 dBm. Note: Recommended optical input range is -3 ..+3 dBm for best performance. (selectable values -5.0 dBm ..+12.0 dBm)
- `Set Output Att:` With this setting the optical output can be reduced up to 3 dB. (slectable values 0 ..-3 dB)

- `Set Local IP Address:` This parameter is the optical Amplifiers IP address for remote monitoring.
- `Set Subnet Mask:` This parameter is the device network mask.
- `Set Gateway:` This parameter is the gateway IP address.
- `Set Laser:` Switch the laser manually OFF or ON.
- `Set IP Address:` This parameter is the device IP address.
- `Set Mask:` This parameter is the device network mask.
- `Set Trap1 Address:` This parameter is the trap receiver one IP address.
- `Set Trap2 Address:` This parameter is the trap receiver two IP address.
- `Set Buzzer:` Switch on audible indication if the device shows an alarm. (ON / OFF)
- `Restore Factory:` restore factory settings

The „Alarm Status“ display

The following alarm messages are displayed:

- `Input Status:`
  LOLOW: very low optical input detected
  LOW: low optical input detected
  HIGH: high optical input power detected
  HIHIGH: very high optical input power detected
- `Output Status:`
  LOLOW: very low optical output detected
  LOW: low optical output detected
  HIGH: high optical output power detected
  HIHIGH: very high optical output power detected
- `Pump X Power:`
  LOLOW: very low power of pump x detected
  LOW: low power of pump x detected
  HIGH: high power of pump x detected
  HIHIGH: very high power of pump x detected
- `Pump X Bias:`
  LOLOW: very low bias current of pump x detected
  LOW: low bias current of pump x detected
  HIGH: high bias current of pump x detected
  HIHIGH: very high bias current of pump x detected
- `Pump X Temper:`
  LOLOW: very low temperature of pump x detected
  LOW: low temperature of pump x detected
  HIGH: high temperature of pump x detected
  HIHIGH: very high temperature of pump x detected
- `Pump X TEC:`
  LOLOW: very low cooling current of pump x detected
  LOW: low cooling current of pump x detected
  HIGH: high cooling current of pump x detected
  HIHIGH: very high cooling current of pump x detected
- `+5 V Status:`
  LOLOW: very low +5 VDC internal voltage detected
  LOW: low +5 VDC internal voltage detected
  HIGH: high +5 VDC internal voltage detected
  HIHIGH: very high +5 VDC internal voltage detected
- `-5 V Status:`
  LOLOW: very low -5 VDC internal voltage detected
  LOW: low -5 VDC internal voltage detected
  HIGH: high -5 VDC internal voltage detected
  HIHIGH: very high -5 VDC internal voltage detected

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- Device Temper:
  LOLOW: very low chassis temperature detected
  LOW: low chassis temperature detected
  HIGH: high chassis temperature detected
  HIHIGH: very high chassis temperature detected

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Configuring the device via web interface

Logging in

To login in the web interface, check first the IP address of the device. The device IP address could be set or viewed via the LCD front panel.

Connect your computer to the same IP subnet as the transmitter. With a ping test make sure that physical connection via the IP Network is obtained.
With any web browser you can type in the address line of the browser the IP address of the transmitter.

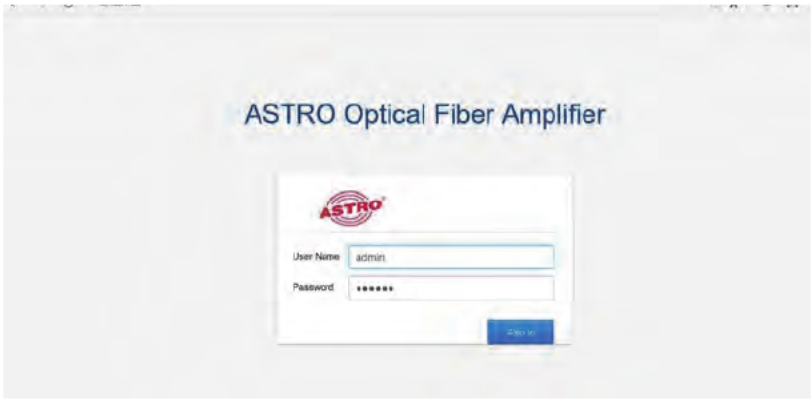

Figure 7: Login

Log in with the following data:

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User name: admin
Password: 123456

Display parameters via web interface

On the „Display Parameters“ page the device status and data will be displayed, such as:

- device indication, software version, serial number and MAC address
- optical input power and output power
- laser information (bias, cooling, temperature)
- internal voltage information for the internal DC power generation
- device temperature

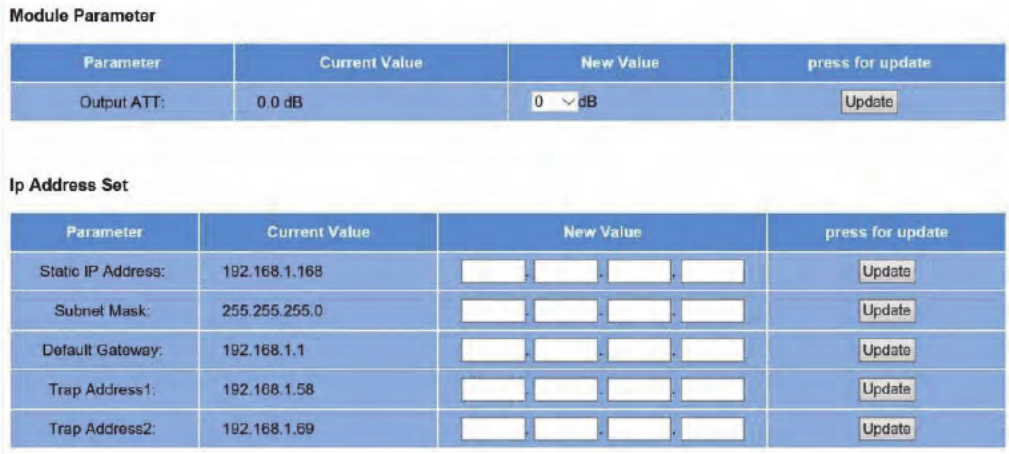
Module Parameter

Parameter	Value	Parameter	Value
Device Model:	OHPA-3219	Serial Number:	160624003904
Pump Number:	2	Input Power:	-99.9 dBm
Output Power:	-99.9 dBm	OutPut ATT:	0.0 dB
Pump1 Bias:	0 mA	Pump1 Temperature:	24.9 °C
Pump1 Cooling:	160 mA	Pump2 Bias:	0 mA
Pump2 Voltage:	2.2 V	+5V:	5.0 V
-5V:	-5.0 V	Device Temperature:	27 °C
MAC Address:	30-71-b2-43-46-f3		

Figure 8: Parameters displayed

Modify parameters via web interface

On the „Modify Parameters“ page the device setting can be changed.



Module Parameter

Parameter	Current Value	New Value	press for update
Output ATT:	0.0 dB	0 dB	Update

Ip Address Set

Parameter	Current Value	New Value	press for update
Static IP Address:	192.168.1.168	. . .	Update
Subnet Mask:	255.255.255.0	. . .	Update
Default Gateway:	192.168.1.1	. . .	Update
Trap Address1:	192.168.1.58	. . .	Update
Trap Address2:	192.168.1.69	. . .	Update

Figure 9: Modifying parameters

- `Output Att`: With this parameter the output power of the amplifier could be reduced between 0 ..3 dB in 0,5 dB steps. After changing this value only with pressing the update button the value will be saved.
- `IP Address Set`: All the device IP address settings can be changed in this menu. After changing one of the parameters by pressing the update button the value will be saved.

Active Alarms

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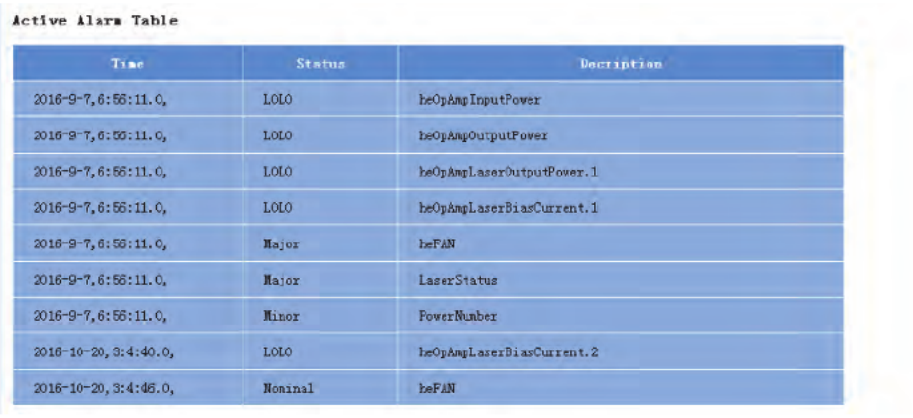
The panel “Active Alarms” shows the current pending alarms.



Active Alarm Table

Time	Status	Description
2016-9-7,6:56:11.0,	LOLO	beOpAmpInputPower
2016-9-7,6:56:11.0,	LOLO	beOpAmpOutputPower
2016-9-7,6:56:11.0,	LOLO	beOpAmpLaserOutputPower.1
2016-9-7,6:56:11.0,	LOLO	beOpAmpLaserBiasCurrent.1
2016-9-7,6:56:11.0,	Major	beFAN
2016-9-7,6:56:11.0,	Major	LaserStatus
2016-9-7,6:56:11.0,	Minor	PowerNumber
2016-10-20,3:4:40.0,	LOLO	beOpAmpLaserBiasCurrent.2
2016-10-20,3:4:46.0,	Nominal	beFAN

Figure 10: Active Alarms

Modifying the password

This panel is used to modify the user name or password. Type in the current user name and password to modify this.

Confirmation of the new password is required.

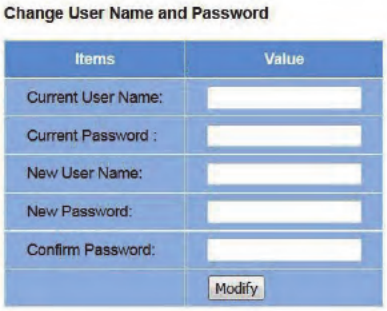


Figure 106: Modifying the password

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Troubleshooting

If the device is not functioning correctly, please perform the following checks:

- ☐ Check whether the device is connected to the required mains voltage (230 V~, 50 Hz).
- ☐ Check whether the signal cable is connected correctly, and that there are no breaks or short circuits in the connectors.

If the problem cannot be resolved, please contact the ASTRO customer service.

Maintenance and repair

*ACHTUNG: **The following safety information must be observed when performing maintenance and repair work. Failure to observe this safety information may result in personal injury due to electrical and thermal dangers!***

- ☐ The operating display only shows whether the DC current, which supplies the device components, has been disconnected from the mains voltage. If the operating display (for the power supply unit or the device) does not light up, this does not mean that the device has been fully disconnected from the mains voltage. There may still be voltages in the device that are dangerous to touch. You may therefore not open the device.
- ☐ The cover for the power supply unit is designed to prevent accidental contact with voltages that are dangerous to touch, and must not be removed.
- ☐ Read carefully: EN 60728 - Part 1 Safety requirements: No service work during thunderstorms.
- ☐ A defective device may only be repaired by the manufacturer to ensure that components with the original specification are used (e.g. power cable, fuse). Improperly performed repairs may result in considerable dangers for the user or installer. If malfunctions occur, the device must therefore be disconnected from the mains and authorised experts must be consulted. The device may need to be sent to the manufacturer.

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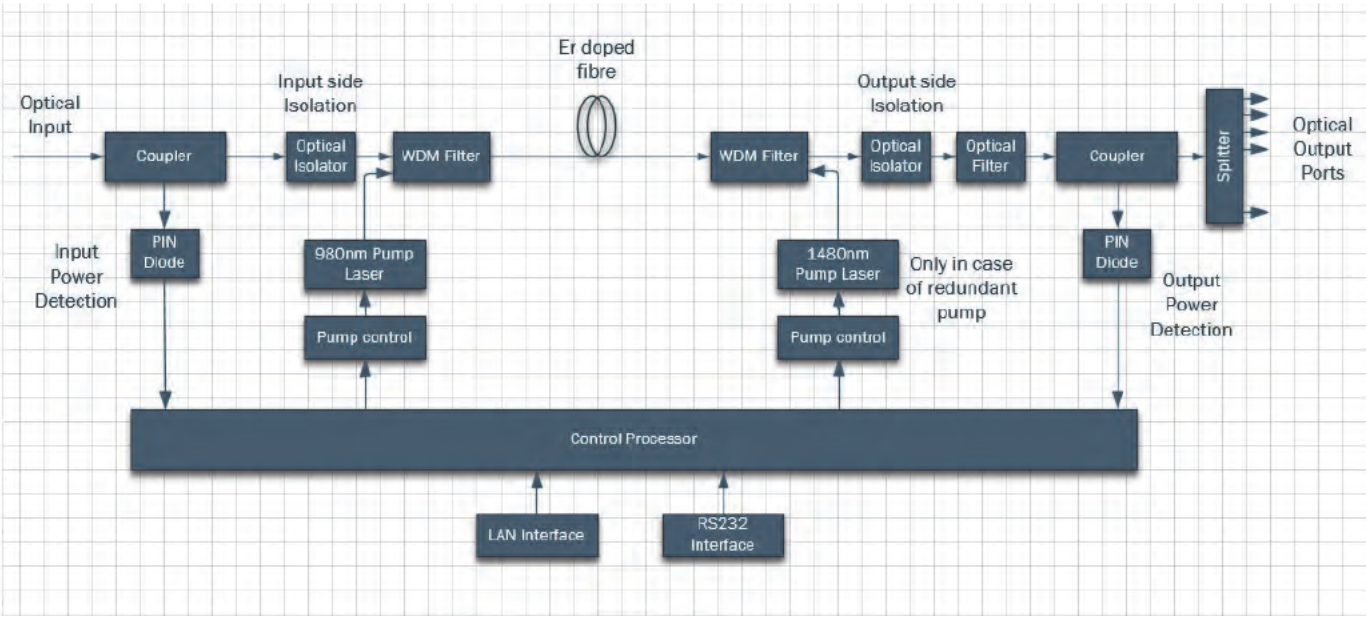
Service tasks

HINWEIS: The device must only be operated with the original power module!

Block diagram



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Technical data

Type		OAMP-113	OAMP-213	OAMP-413	OAMP-117	OAMP-217	OAMP-417	OAMP-120	OAMP-220
Order number		212 014	212 016	212 017	212 018	212 019	212 020	212 015	212 021
EAN-Code 4026187…		193089	193096	193102	193119	193126	192846	193133	193140
RF and optical characteristics									
Optical output power (Ptot)	[dBm]	+13.0 ± 0,5	+13.0 ± 0,5	+13.0 ± 0,5	+17.0 ± 0,5	+17.0 ± 0,5	+17.0 ± 0,5	+20.0 ± 0,5	+20.0 ± 0,5
Number of optical output ports		1	2	4	1	2	4	1	2
Optical input wavelength	[nm]	1550 ± 15							
Rated optical input power range	[dBm]	-3… +10							
Noise figure (Pin=0d Bm, ?=1550 nm)	[dB]	≤ 5							
Number of optical output ports		1…8							
Return loss at input	[dB]	≥ 45							
Return loss output	[dB]	≥ 45							
Optical Isolation input to output	[dB]	≥ 30							
Optical output adjustable range	[dB]	-3 ..0							
Optical connector type		SC/APC (other on request)							
Common data									
Management		SNMP and web interface							
Chassis type		1 RU, 19” rack mounted							
Power supply	[pcs]	2 hot plug / AC or DC							
AC Power supply	[VAC]	150 - 265							
DC Power supply	[VDC]	-36 .. 72 (on request)							
Power consumption	[W]	≤ 30							
Dimensions (W x H x D)	[mm]	483 x 44 x 380 (1 RU)							
Ambient temperature	[°C]	5 .. 55 (ETSI EN 300 019-2-3 Class 3.2)							

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Other types than specified above available on request

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