GOING FUTURE TODAY.

OSW-21

Optical switch

DRAFT VERSION

Operating Manual

Version 08-2017A

Contents

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 dangers (risk of burns).

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 ODMTX module can only be used for transmitting analogue modulated TV and Data services via 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.

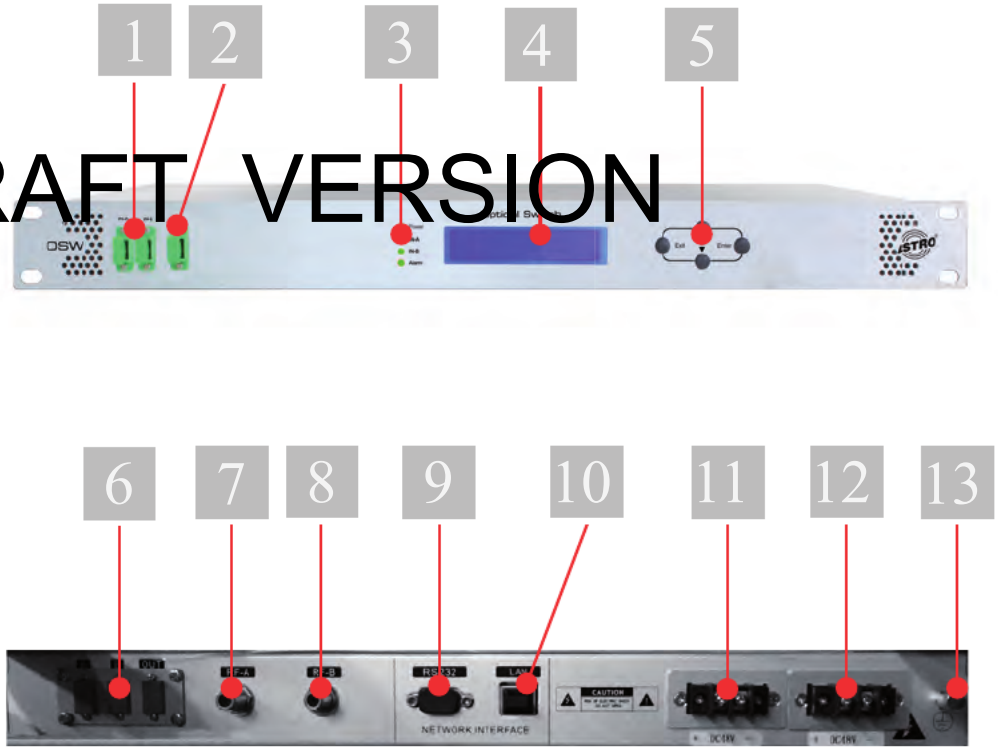
Device configuration

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:

- ☐ OSW-21 optical switch
- ☐ Operating manual



Front:
[1] optical input connectors (always clean patchcord before connection)
[2] optical output connector (always clean patchcord before connection)
[3] indication LEDs (power, AGC, RF input signal, laser)
[4] LC display for information and control
[5] push buttons

Back:

[6] cover plate for „option rear connection“
[7] RF testport for for port A
[8] RF testport for for port B
[9] RS232 (only for R & D purposes)
[10] LAN interface
[11] power supply (no hot plug)
[12] power supply (no hot plug)
[13] grounding connection

Figure 1: OSW-21 front and rear side

HINWEIS: *Don‘t connect or disconnect optical input or output connectors when optical power is > 16 dBm, unless optical power is switched off at the source!*

LED indicators

- `Power LED:`
  yellow: only one working power supply
  green: both power supplies working in good condition
- `IN A:`
  green: port A connected to output
  off: port A not connected to output
- `IN B:`
  green: port B connected to output
  off: port B not connected to output
- `Alarm:`
  green: no alarm present
  yellow/red: warning or major alarm present (see alarm panel for more details)

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

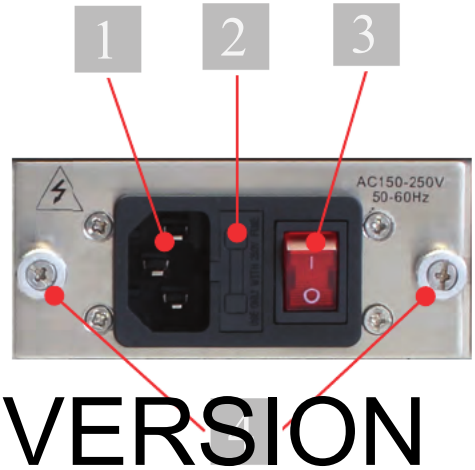


Figure 2: AC power supply (rear side)

[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

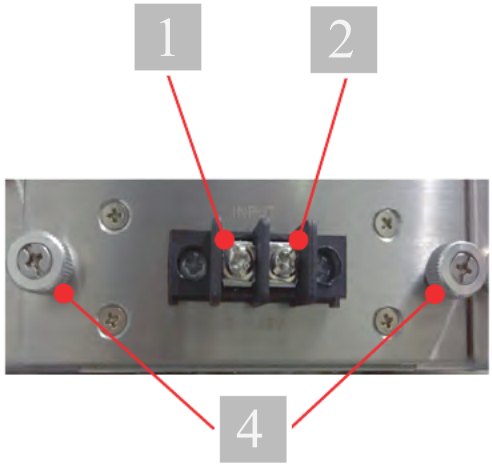


Figure 3: DC power supply (rear side)

[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

CE

The OSW-21 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.

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.

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 switch OSW-21 is used for link redundancy or equipment redundancy scenarios. Two optical inputs are linked via the optical switch to one output. The switch can be set either to port A or port B (input ports) and establish from the one or the other a connection to the output port. The input ports are monitored and an optical power threshold or RF equivalent voltage threshold can be assigned to each of the input ports.

If the switch runs in automatic mode, the threshold levels are taken in account and compared against the real received optical input level. Depending on the result of the input port sensing, the threshold levels and the port priority settings, the switch selects automatically the correct switching position. In case the priority setting is for example to port A, but this port falls below the configured threshold, the switch will select to switch at input port B, if this threshold is above the configured one. If after a while the port A threshold will be exceeded by the real optical input signal (for example the link was repaired and the signal is back to normal), the switch will fall back after the predefined fall back time to its main (priority) port A again. In the manual mode, the operator himself chooses the position of the optical switch, which is either fixed set to port A or to port B, no matter what threshold is given. If below threshold, an alarm will be present to inform the operator that the desired optical level was not reached.

In rare cases there is a need to set to the “RF content” oriented switching mode (this mode is not available in the WEB interface, it can be set only from the front panel). In this mode, the received RF signal will be taken as switching decision. The optical switch provides an optical receiver on each port to check the RF power (in fact the voltage equivalent value). The RF power can be measured and if below the user configured limit, the switch will switch to the other port. This feature will work if the optical input power is higher than +2 dBm. It is recommended to setup this feature with a good input reference signal. If the good reference signal is present (with the help of the display parameter reading) the value can be used to calculate and store it in the “RF save RF reference” (recommended with 0,1 V deducted value from the measured one).

In general, the optical switch will be used for 2 different scenarios:

- Link protection: where 2 different fibre routes will allow the outage of one of it, without interrupting the service.
- Equipment protection: where for example 2 transmitters are running in active/active mode, and if the one on the current switch position fails, the optical switch will switch to the second transmitter to ensure that the network service will not break down.

Features:

- 19“, 1 HU rack mounted optical switch for downstream link redundancy (2:1)
- monitoring of optical link powers and additional RF modulation of each link
- assignment of priority switch position to input A or input B
- automatic and manual switching mode, also content based switching mode
- user setup delay for fall back from redundant to priority port (1 .. 45 sec)
- 2 x RF testports on rear for each input
- temperature range -5 °C - +55 °C / high reliable optical switch module
- SNMP / web interface / LCD panel
- redundant power supply AC or DC (built in)

Applications:

- link redundancy protection in HFC & FTTH networks forward path transmission
- equipment redundancy protection

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.

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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.

Connection of the power cable

For mains power supply connect the power cable to the device and power on with the rear power-on switch. Internal fuse on the rear power connection panel is T2.0A/250V. If one fuse is burned, the lid can be opened and one spare fuse is inserted in the fuse chamber.
For -48 VDC power supply, make sure about the correct polarity as indicated on the power supply. External breaker to each power supply must be 2,0 A.

Connection of the optical input/output

Before connection of the optical input, be aware that connection of high optical powers > 16 dBm can damage the physical surface of a patch cord or connection. Therefore, make sure about the optical levels before connecting optical input and output ports. Even the optical switch is not powered on, the optical signal will pass through the switch’s current switching position.

Configure the optical switch to the correct setting

Configure the optical switch with the correct settings such as:

- ☐ Set the working wavelength
- ☐ Set the switching mode according the requirements (manual or automatic)
- ☐ For automatic mode set the input port thresholds and the priority port. For manual mode set the switch to the desired port A or B with the “current work port” setting.

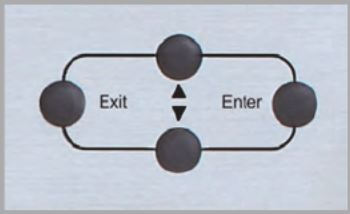
Check on LCD Display if any alarm

To ensure that the device is running properly, with the „Enter“ button it is possible to show the device menu options on the LCD panel. Under “3. Alarm status” (selected with the down key 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 not caused by settings or network parameters please contact
or resend the device with the established valid RMA procedure (RMA
code/ error description).

LC display and settings



Using the push buttons

When pressing the “Enter” button for a short time, this will light up the display and show the different menus which are selectable with the up and down keys and confirmed by pressing “Enter” again. To exit a menu, press the “ ESC” button.
To modify any value, press the up button to increase a value respectivley the down button to decrease a value. Confirm your selection by pressing the „Enter“ button. In case the field shall not be modified, exit by clicking the “ ESC” button.
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LCD panel menus

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

- `Main display`: At powering up the device, the status information about the device is shown. After power up, the current switch position is marked in a small graphical image.
- `Display parameters`: Displays parameters of the optical switch.
- `Set parameters`: Set or change the parameters of the optical switch.
- `Alarm status`: Shows the current present alarms of the optical switch.

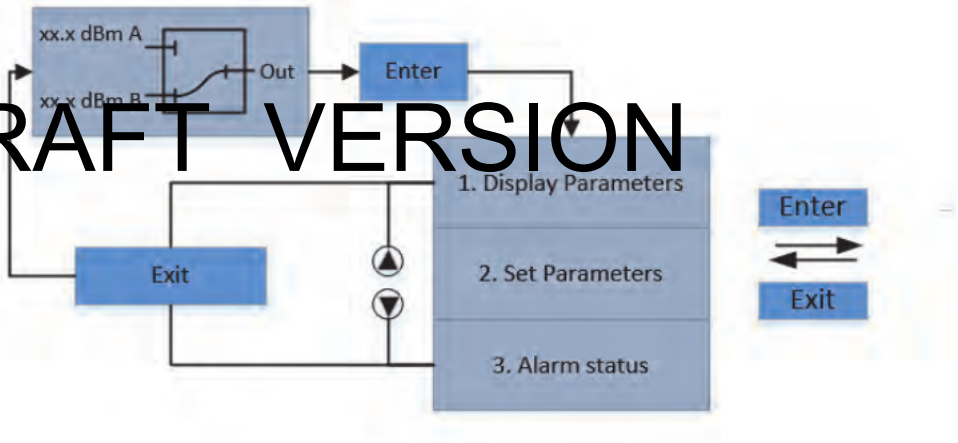


Figure 4: LCD panel

The „Display parameters“ menu

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

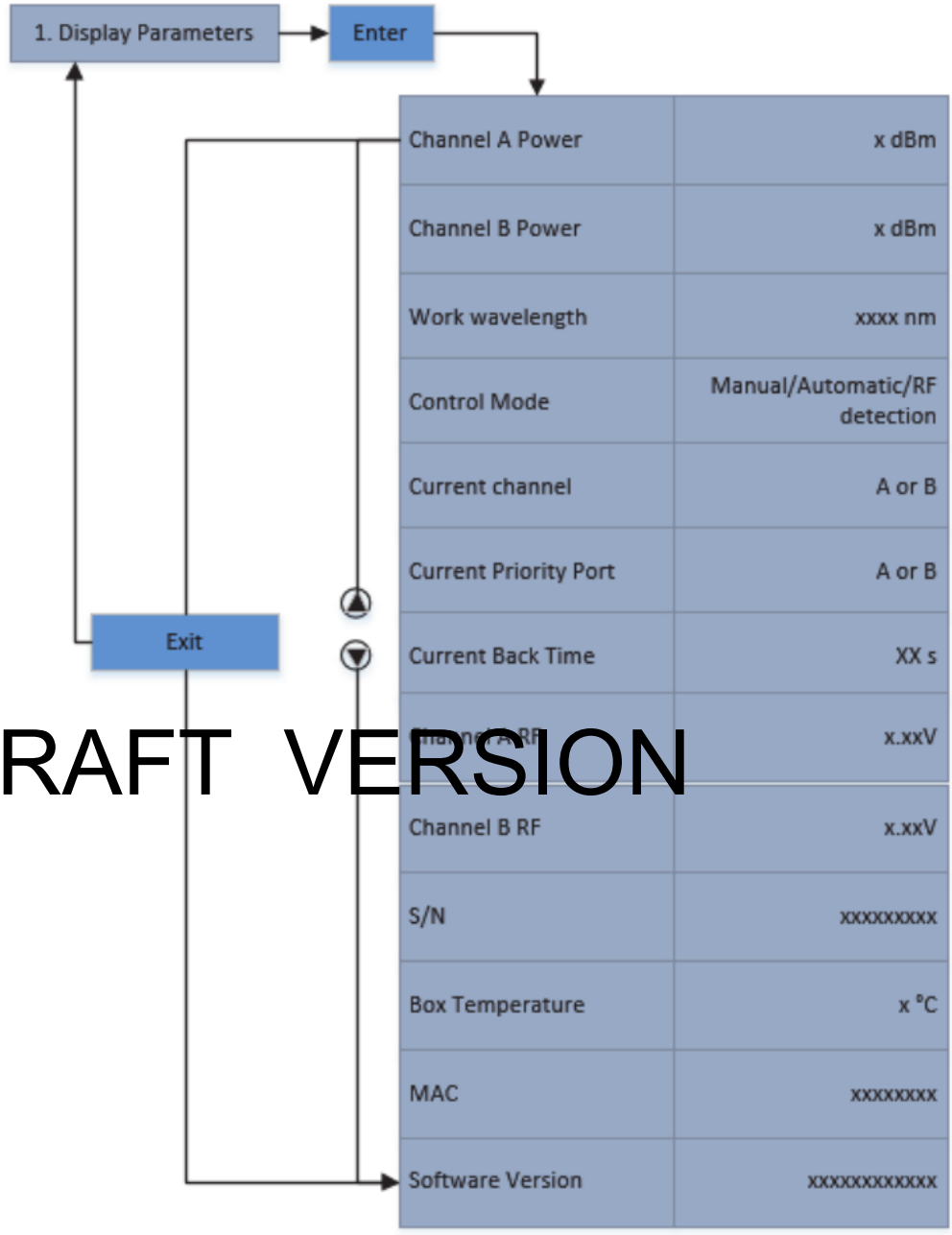


Figure 5: „Display parameters“ menu

- `Channel A power`: Displays the optical input power of Input A in dBm. If now optical input power is detected -99.9 dBm is displayed
- `Channel B power`: Displays the optical input power of Input B in dBm. If now optical input power is detected -99.9 dBm is displayed
- `Work wavelength`: Optimize the optical switch in put sensors for the correct working wavelength. Typically it is 1310nm or 1550nm.
- `Control mode`: Select the manual, automatic or the RF detection control mode. Typically automatic mode is used.
  Please note: For RF based detection the optical input level shall be higher than +2dBm to be able to detect the RF content within the optical communication.

- `Current channel:` Current switch position
- `Current priority port:` If both channels are above threshold, this is the priority position (port A or port B) for the optical switch.
- `Curent Back Time:` If the optical switch has switched to its redundant port in automatic mode, this is the time after the optical input level came back to a good value on the priority port, when the switch goes back to its nominal port.
- `Channel A RF:` This is the current equivalent RF load voltage for port A (received after a built in pin diode). It is important if the switch is in mode RF detection to decide when the level is too low and the switch will use the information for doing a switch over to the other port.
- `Channel B RF:` This is the current equivalent RF load voltage for port B (received after a built in pin diode). It is important if the switch is in mode RF detection to decide when the level is too low and the switch will use the information for doing a switch over to the other port.
- `S/N Serial Number:` Displays the serial number of the device
- `Box Temperature:` Displays the temperature inside the device
- `Mac:` Displays the MAC address of the device
- `SoftWare Ver:` Display the current software version of the device

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.

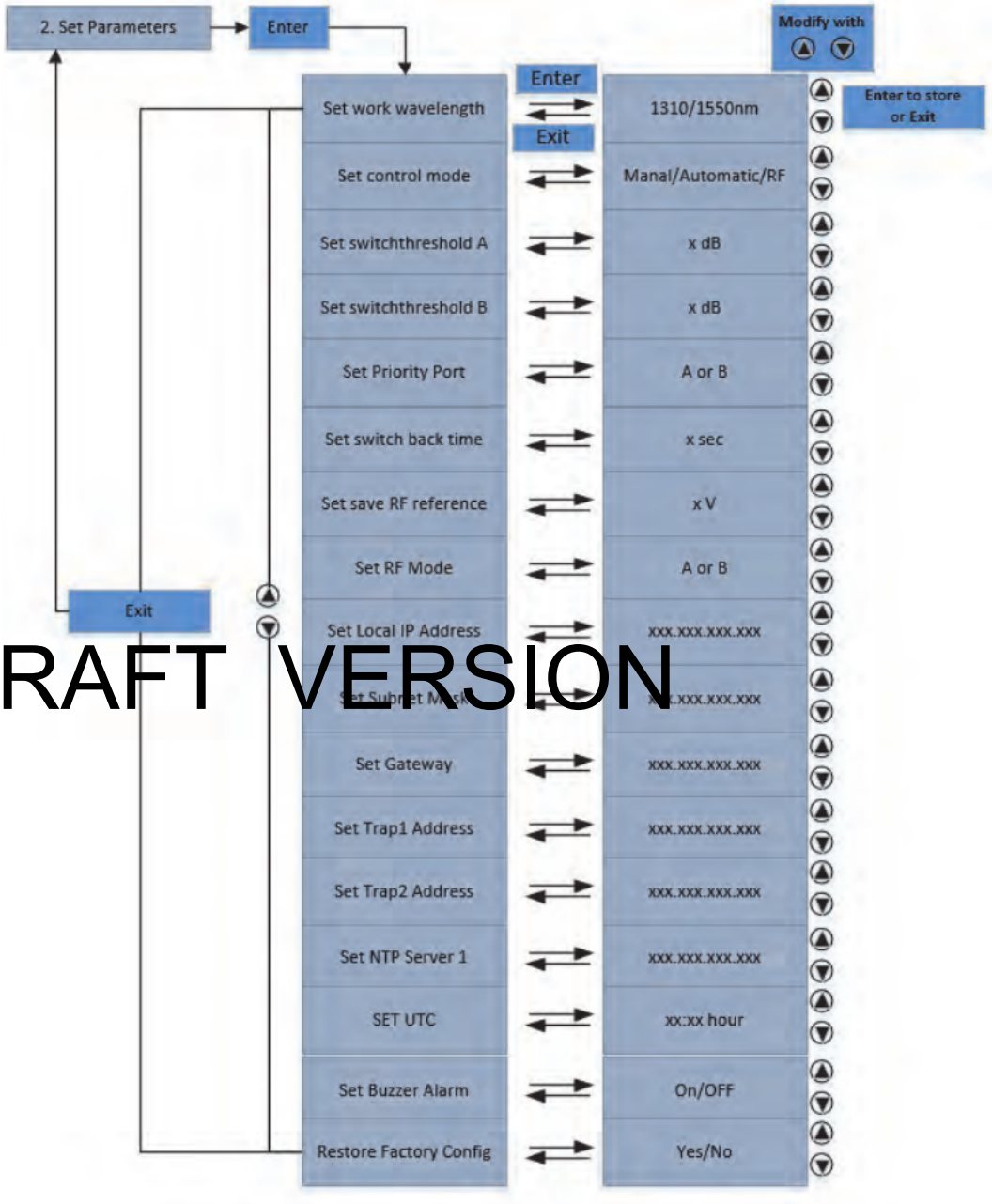


Figure 6: „Modify parameters“ menu

The „Alarm Status“ display

The following alarm messages are displayed:

- `No optical input at port A (alarm)`: Port A has not detected an optical input level
- `No optical input at port B (alarm)`: Port B has not detected an optical input level
- `Power supply (right/left) failure (warning)`: One of the redundant power supplies does not provide the supply voltage.
- `Nominal input power low (alarm)`: The nominal input power is below threshold.
- `Port A or B low power (warning)`: Low Power on port A or Port B.
- `Port has switched (alarm)`: The optical switch has switched to redundant port.
- `Nominal port RF low (alarm)`: If RF mode is switched on only.
- `Port A or B RF low (warning)`: If RF mode is switched on only.

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 device.

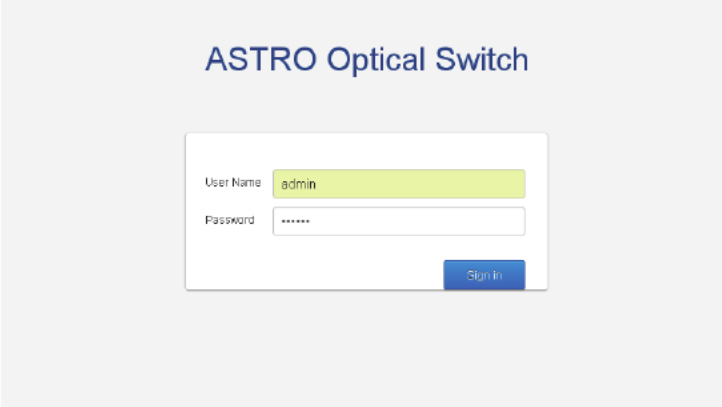


Figure 7: Login

Log in with the following data:

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, serial number and MAC address
- optical input power for channel A and channel B
- RF level (after optical sensing receiver) for channel A and channel B
- wavelength and current switch position
- switch threshold for channel A and channel B
- priority port and switch fall back time
- UTC offset (time setting)
- device temperature
- MAC address of the device

Module Parameter

Parameter	Value	Parameter	Value
Device Model:	OSW-12	Serial Number:	161000051
Channel A Power:	-13.2 dBm	Channel B Power:	17.7 dBm
Channel A RF:	0.389 V	Channel B RF:	0.444 V
Wavelength:	1550 nm	Current Work Channel:	B
Switch ThresholdA:	0.5 dBm	Switch ThresholdB:	6.8 dBm
Priority Port:	A	Switch Back Time:	10 Second
UTC Offset:	UTC +8:00	Device Temperature:	29.5 ° C
MAC Address:	aa-ac-b1-67-1f-00		

Figure 8: Parameters displayed

Modify parameters via web interface

To change the parameter, enter the Value in the “New Value” Filed and press the “Update” button. Without pressing Update, the value will not saved in non volatile memory and therefore it does not have any effect.

Parameter	Current Value	New Value	press for update
Wavelength	1550 nm	1550 nm	Update
Channel Switching Mode	Auto	Auto	Update
Current Work Channel	B	A	Update
Priority Port	A	A	Update
Switch Back Time	10 Second	Second(1~45)	Update
UTC Offset	UTC +8:00	UTC +0:00	Update
Switch ThresholdA	0.5 dBm	dBm(-15~24)	Update
Switch ThresholdB	6.8 dBm	dBm(-15~24)	Update

Ip Address Set

Parameter	Current Value	New Value	press for update
Static IP Address:	192.168.1.180	. . .	Update
Subnet Mask:	255.255.255.0	. . .	Update
Default Gateway:	192.168.1.1	. . .	Update
Trap Address1:	192.168.1.47	. . .	Update
Trap Address2:	192.168.1.123	. . .	Update
NTP Server1:	202.108.6.95	. . .	Update
NTP Server2:	210.72.145.44	. . .	Update

Figure 9: Modifying parameters

- `Wavelength:` set the working wavelength
- `Channel Switching Mode:` Set “Manual”, “Auto” (Note: “RF based” switching mode is only to be set from front panel – it is recommended for experienced users only.)
- `Current Work Channel:` used to switch in manual mode to Input A or input B
- `Priority Port:` used in automatic or RF mode to set the priority switch position
- `Switch Back Time:` Set the switch back time between 1 sec and 45 sec. This is used to switch back to priority port after the optical power is back in the good range.
- `UTC Offset:` set time offset to UTC time
- `Switch Threshold A:` Set switching threshold for channel A. If the port value falls under this threshold, the port is marked as not usable and an alarm is set. In automatic mode if the switch was on priority Port A position, then it will switch to the other Port B, in case Port B optical level is above threshold. In manual mode the user must switch manually to the other port.
- `Switch Threshold B:` Set switching threshold for channel B. If the port value falls under this threshold, the port is marked as not usable and an alarm is set. In automatic mode if the switch was on priority Port B position, then it will switch to the other Port A, in case Port A optical level is above threshold. In manual mode the user must switch manually to the other port.
- `IP Address Set:` In this area all the IP correspondent parameters are set, such as Device IP Address, Subnet mask, Gateway, Trap addresses etc.

Active alarms

This panel shows the active pending alarms of the device.

Active Alarm Table

Time	Status	Decription
2016-10-20,10:38:47	Alarm	No optical input at Port A
2016-10-20,10:38:47	Alarm	No optical input at Port B
2016-10-20,10:38:47	Minor	PowerNumber
2016-10-20,11:9:25	Warning	Port B low power
2016-10-20,11:9:44	Alarm	Port has switched
2016-10-20,11:9:49	Alarm	Nominal Port optical is too low
2016-10-20,11:15:10	Alarm	No optical input at Port A
2016-10-20,11:15:10	Alarm	No optical input at Port B
2016-10-20,11:15:19	Warning	Port B low power
2016-10-20,11:15:37	Alarm	Port has switched
2016-10-20,11:15:39	Alarm	Nominal Port optical is too low

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.

Change User Name and Password

Item	Value
Current User Name:	
Current Password :	
New User Name:	
New Password:	
Confirm Password:	
	Modify

Figure 11: Modifying the password

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

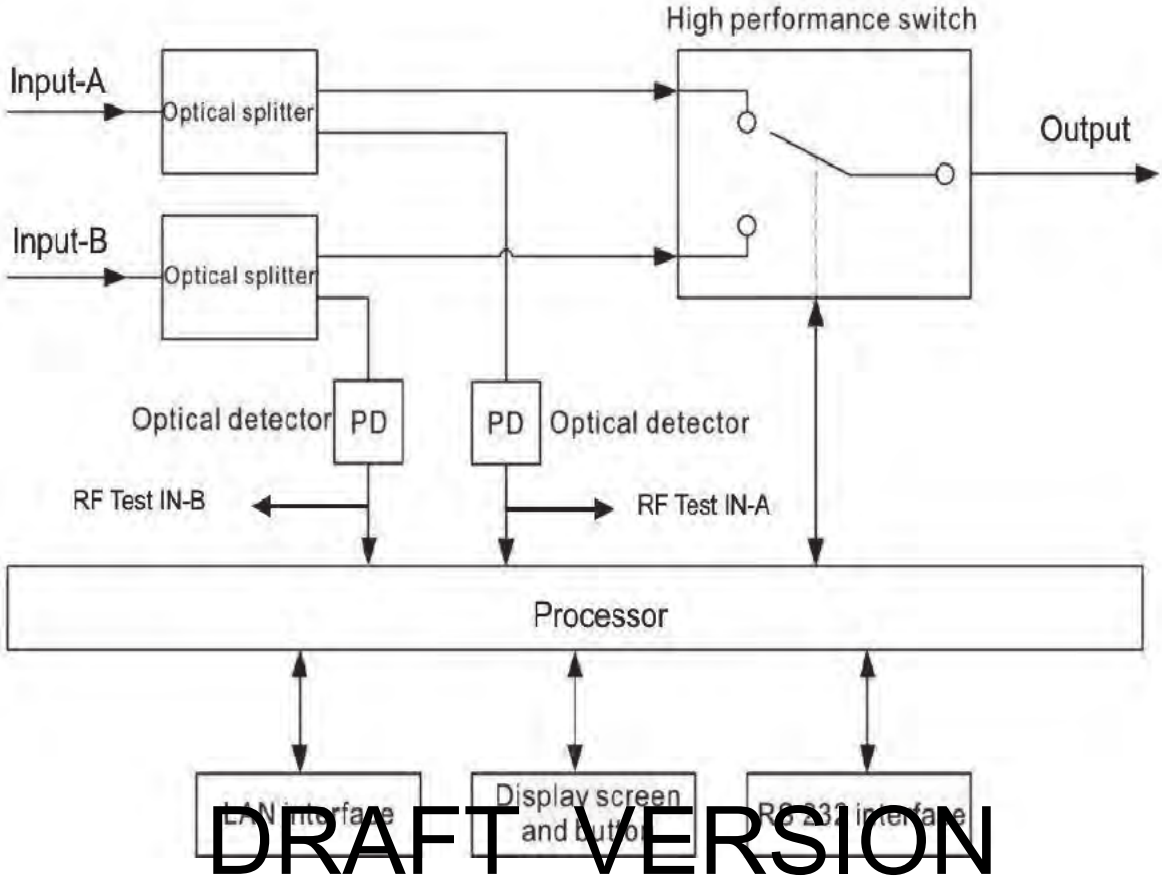
ACHTUNG: The following safety information must be observed when performing maintenance and repair work. Failure to observe this safety information may result in personal injury due to electrical and thermal dangers!

- ☐ 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.

Service tasks

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

Block diagram



Technical data

Type		OSW-21 AC	OSW-21 DC
Order number		212 041	212 042
EAN-Code		4026187194192	4026187194376
Optical parameters			
Optical input wavelength	[nm]	1260...1600	
Optical input power	[dBm]	-15...+23	
Optical range for RF signal detection	[dBm]	+2...+23	
Configurable fallback time to main port	[s]	1...45	
Number of switching cycles (life span)		> 10 millions	
Input attenuation (IL, input A or input B to output	[dB]	< 1	
Optical return loss	[dB]	> 45	
Isolation input A and input B	[dB]	> 80 typical	
Switching time	[ms]	≤ 8	
Optical connector type		SC/APC (others on request)	
Common data			
Management		SNMP and web interface	
Power supply		2 x AC	2 x DC
Supply voltage	[V]	150 - 250 (AC)	-36 - 72 (DC)
Power consumption	[W]	≤ 2	
Housing		19", 1 HU	
Dimensions (WB x H x D)	[mm]	483 x 44 x 270	
Ambient temperature	[°C]	-20 ... +55	

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ASTRO Strobel Kommunikationssysteme GmbH

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