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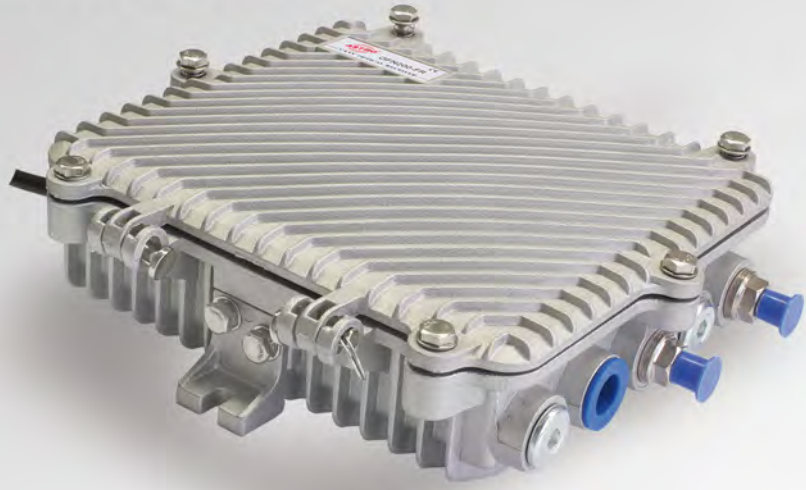
# OFN200-F
# OFN200-F RP
# OFN200-FS
# OFN200-FR
# OFN200-FR RP

Optical Fibre Nodes



# Operating Manual

Version 08-2022A

# 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 OFN200 Fibre Node 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 fibre nodes 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:

- ☐ Optical Fibre Node OFN200-F, OFN200-FS,POFN200-FR. OFN200-F RP, respectively OFN200-FR RP
- ☐ Operating Manual

OFN200-F and OFN200-FS:

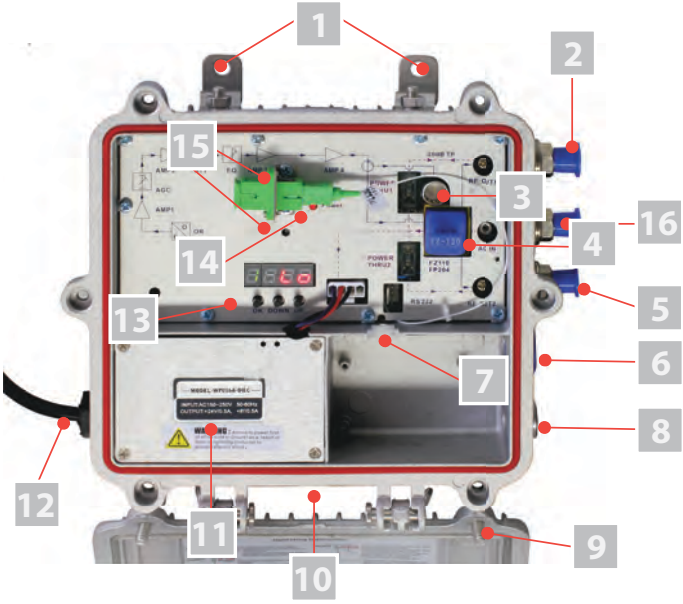



*Figure 1: Fibre Node OFN200-F RP (OFN200-FS similar)*

[1] Mounting handles
[2] RF output (F-female)
[3] Inner testport
[4] Output tap
[5] RF testport (-20 dB, F-female)
[6] Fibre entry
[7] Fibre pass to inside chamber
[8] Auxiliary insertion
[9] Lid closing with 6 screws
[10] Lower wall mounting handle with grounding points
[11] Power supply unit
[12] Power cord
[13] Mode selection (3 button configuration with LED display)
[14] Power LED
[15] Optical inputs (second input only for OFN 200 FS available)
[16] Input for remote powering 35-90 VAC

OFN200-FR:

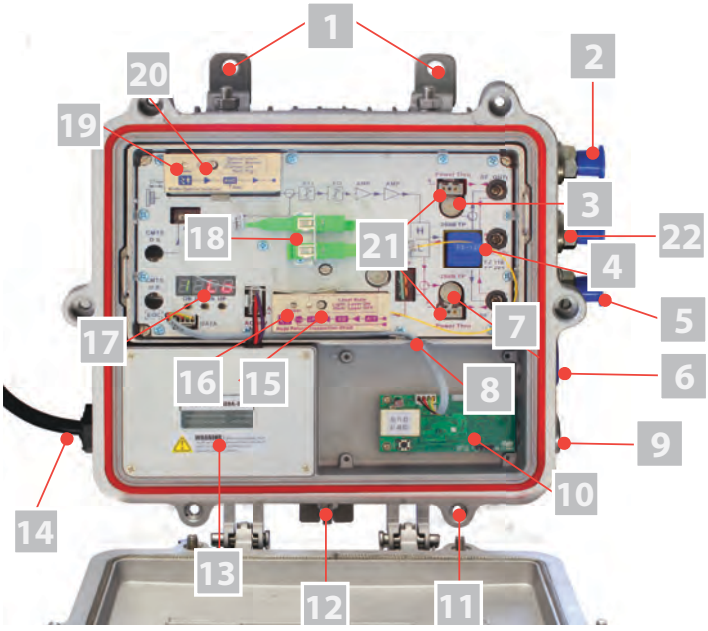



*Figure 2: Fibre Node OFN200-FR RP*

[1] Mounting handles
[2] RF output (F-female)
[3] Inner testport (forward path)
[4] Output tap
[5] RF testport (-20 dB, F-female)
[6] Fibre entry
[7] Inner testport (return path)
[8] Fibre pass to inside chamber
[9] Auxiliary insertion
[10] Web interface RJ 45 (optional)
[11] Lid closing with 6 screws
[12] Lower wall mounting handle with grounding points
[13] Power supply unit
[14] Power cord
[15] Return path laser status
[16] Return path power LED
[17] Mode selection (3 button configuration with LED display)
[18] Optical inputs
[19] Forward path power LED
[20] Optical power alarm indicator
[21] Jumpers for switching remote powering to output 2
[22] Input for remote powering 35-90 VAC

CE

The OFN200 Fibre Nodes feature a CE marking. This confirms that the products conform 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.
- To avoid damage due to overheating, the device may only be installed on vertical surfaces. The installation basis should be level and non-flammable. Operating position: Device vertical, with power cable outlet at the bottom.
- 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.

# Information about supplying power remotely

The remote power supply is achieved via the coaxial jack on the right side of the device (see figure 1, pages 6-7).

## Remote power supply via the coaxial sockets

Remote power supply via coaxial inputs or outputs is only permitted with appropriate connectors permanently mounted on the coaxial cables. The cable cross-sections and operating conditions specified in EN60728-11 must be observed.

## Precautionary measures during connection and use of fuses

The device chassis conducts GND and ground potential.

*Devices with a flat connector socket:*
The supply voltage is supplied using either the coaxial inputs or outputs or the device's flat connector socket.
If power is supplied via the flat connector socket, the fuse in the power supply unit must be inserted. The fuses in the HF section of the device can be inserted according to the application.
If power is supplied via the coaxial connectors, the corresponding remote supply fuse in the power supply unit must be removed, as the remote supply voltage would otherwise be exposed at the open flat connector socket.

*Devices with strain relief:*
Power is supplied using either the coaxial inputs or outputs or the PCB terminal block built into the power supply unit.
If power is supplied via the PCB terminal block, which is built into the power supply unit, the fuse in the power supply unit must be inserted. The fuses in the HF section of the device can be inserted according to the application.
When the device is delivered, the strain relief is sealed with a sealing washer, which can be removed after the screw cap has been removed, but only for the purpose of feeding a cable through.
If power is supplied via the coaxial connectors, the corresponding remote power supply fuse in the power supply unit can remain inserted.

## Installation instructions for remotely powered equipment

According to DIN EN 50083-1, only remote supply voltages up to 65 V AC are permissible. Voltages above 50 V AC are regarded as dangerous to touch. Therefore, they must not be accessible to laypersons and only accessible to trained electricians using tools.
If there is a rupture at any point in the shielding (outer conductor) of the coaxial cable which is conducting current, the remote supply voltage may be present on the metal housing of the device through contact with the inner conductor and the circuit (danger of electro-

cution!). Therefore, the outer conductor connection of the cable that is supplying power must never be disconnected before its inner conductor connection is disconnected. (As a precaution, always turn off the remote supply voltage.) A safe outer conductor contact should be made with great care (observe the manufacturer's instructions).

The following protective measures must be taken:

- *Equipotential bonding via the local PE connection*
  An additional connection with an earth potential must be made using a cable with at least 4 $mm^2$ of copper at the PE terminal of the device. This connection can be made to a PE rail supplied by the customer or a local earth.

If this is not possible, one of the following safety measures should be provided:

- *Equipotential bonding via the minimum cross section of the coaxial cable*
  It must be permanently ensured that the remotely powered coaxial cable has a continuous outer conductor cross section of at least 4 $mm^2$ (from the supply point onwards).
  Note: Braided cables do not usually have this cross-section!

- *Equipotential bonding via several connected cables*
  It must be ensured that at least one other connected coaxial cable is permanently connected to an earth potential along the length of its shield.

- *Equipotential bonding in the area within hand's reach*
  Equipotential bonding in the area within hand's reach of the device (i.e. a radius of 2.5 m) must be ensured. In order to achieve this, all conducting parts must be connected with the device with a copper conductor of at least 4 $mm^2$.

- *Protection against contact via insulation in enclosed operating areas*
  Remotely powered devices must be operated in enclosed operating areas. A warning sign must be provided, stating that supply voltage potential may be present on the device chassis in the event of a failure (e.g. a lightning bolt + “High voltage! In case of failure, do not touch!”). Cables leading directly to subscribers must be fitted with a galvanic outer conductor disconnector.

- *Limit the maximum remote supply voltage to 90 V AC*
  The remote supply voltage may not exceed 90 V AC.

*HINWEIS: Please keep in mind that remote suply voltage of more than 50 V is touch-sensitive and can cause health damage in case of touching. Take care to always keep the coaxial cable you use to feed the remote power with, is free of electrical voltage.*

*HINWEIS: If several devices are supplied by separate cables, the polarity must not be reversed!*

# Description of performance

The Fiber Node OFN200-FR type is forward and return path node in a die-cast housing IP65 proof. It converts optical broadband signals in range from 1100 nm to 1600 nm to RF broadband signals in the forward path in the range from 85 MHz to 1 GHz. The return path frequency can be selected depending the chosen diplex filter. The standard will be 5-65 Mhz.

The optical reception is working with an AGC (Automatic Gain Control) control circuit. The optical input level range for the AGC signal can be setup with push buttons on the front of the device (see technical specification for details). Within the AGC range, the RF output level will be kept constant. Outside the AGC range, the RF level changes 2 dBµV for 1 dB optical level change.

To adapt the required RF output level of the device, inter-stage attenuation can be electronically set up with the push button interface inside the device. For optimum performance, it is recommended to set a RF output level up to 108 dBµV per analogue PAL channel for CTB/CSO values > 60 dB according the requirements described in EN 50083-3 (measured with sinusoidal unmodulated CENELEC42 channels up to 860 Mhz, -9 dBm optical input signal, Equalizer setting = 0). Other channel loads and Equalizer settings could of course allow a higher RF level, since CENELEC 42 is the worst case for 2nd and 3rd order distortions. The maximum recommended RF level is 112 dµV per PAL channel, depending the distortion requirements, Equalizer settings and the channel plan. The theoretical maximum reachable RF output is about 116 dBµV (on a 42 PAL channel source, unmodulated, OMI 4,2 %, EQ = 0, AGC = -7 dBm).

The device allows also to set an electronically adjustable pre-emphasis (Equalizer circuit) for the signal, to compensate the coaxial loss on the high frequencies for the coax network connected on the RF output level. The pre-emphasis is working in such way that from the high to the low frequency a linear increasing attenuation will be set, meaning from high frequency to low frequency the attenuation will be a constant tilt, with maximum attenuation on the low frequency range. For example, if you set the tilt to 8 dB, then the 8 dB attenuation will affect the low frequency. On the high frequency there is the same RF level as without the Equalizer setting.

The reverse path laser is a high quality DFB Laser with 1310 nm / 0 dBm or with CWDM wavelength / + 3 dBm optical output level. Return path attenuation and also Equalization can be adjusted electronically with the configuration panel in the node, without the

need of any plug in pads. The reverse path can be configured in the burst mode, where the laser is off in normal condition and switch only on if there is a burst from a cable modem received. This is useful in terms of return path ingress problems, or if running inside a RFoG Network, where the return path can transmit over passive optical splitters, where more than one node is connected.

**Features**

- low noise optical receiver with very good performance values
- ultra-wide forward path frequency range: 45Mhz ..1 GHz
- high performance GaAs push-pull amplifier stage (max recommended RF level 112 dBµV, maximum RF output level 116 dBµV)
- attenuation and equalizer setting via onboard display with push buttons
- RF testport -20 dBm
- optical link redundancy with optional second RX/RF switch
- SNMP management option
- frequency range 1 GHz
- fibre connection inside or external
- OFN200 FS: additional RF redundancy switch and second optical input
- OFN200 FR: CWDM option in return path; return path with constant mode or burst mode selectable

# Warranty conditions

The general terms and conditions of ASTRO Strobel 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 Strobel is a member of the Elektro system solution for the disposal of packaging materials. Our contract number is 80395.

# Configuring the device

After the device is physically installed and ready for commissioning, please follow the steps in the sequence as mentioned below.

## 1.Check optical input level before connecting to the device

Make sure that the optical input level is in the correct range (minimum -9 dBm, maximum about +2 dBm) to avoid damage of the optical receiver circuit. Before connecting to the device and power on, measure the optical level with the appropriate measurement equipment. If the level is too high, use optical attenuation to reach the recommended optical input range. For the input optical wavelength, the signal shall be in the specification of the device between 1100 nm..1600 nm. For optimized noise performance (CNR) it is recommended to supply an optical input level between -3 dBm .. +1 dBm. Lower optical levels will decrease the CNR performance.

Connect the optical port for the return path.

## 2.Ground the device

Make sure that the device and also the coax cable shield is connected to protective ground before power on. This is to avoid floating potential on the cables, when connecting the coax cable.

## 3.Power on the device by plug-in the power adapter to the mains socket

## 4.Set the AGC range (mode AG)

The AGC shall be set in the required optical input level range. The lower AGC Limit could be changed from -9 dBm ..-4 dBm. The higher AGC limit is fixed to +2 dBm.

## 5.Setup the required RF level with interstage attenuator (mode A1)

The factory setting is the maximum inter-stage attenuation (15 dB) to avoid high RF level after switching on the device. Recommendation: The inter-stage attenuation shall be set to reach at the RF output an optimum level of 102 dBµV ..108 dBµV for best performance (depending on the equalizer setting and on channel load). A higher RF level could lead to a slightly lower CSO/CTB performance. The maximum RF level is in any case 112 dBµV.

### 6.Set the equalizer tilt for cable pre-equalization (mode E1)

The factory setting for the equalizer tilt is 15dB. Equalizer could be set between 0 dB and 15 dB. Higher equalizer settings values will reduce the signal on lower frequency and therefore it will allow a higher RF output level with still good distortion values. Attenuation on the lower frequencies will reduce the CSO/CTB distortion in total (less impact on 2nd order and 3rd order distortion from lower frequencies) and will lead to better performance.

### 7.Set the correct equivalent PAL channel load (mode C)

This is to enable the calculation of the RF output level (LCD display mode 3) in the correct way. Equivalent PAL channel load can be estimated with the formula:

(Number of PAL channels) + (Number FM /5)
+ (Number QAM64 /10) + (Number QAM256 /4)

### 8.Adjust the return path attenuator (mode A2, only OFN200 FR)

The return path attenuator determines how much RF Level is passed to the return path laser. This parameter affects the modulation index of the return path Ttansmitter. To adjust the return path attenuation in the correct way, the full return path loop must be taken into account:
- starting from the RF input level in the node (coaxial network of the users)
- the return path attenuation settings in the fibre node itself
- the attenuation settings and optical input level influence in the return path receiver module in the head-end
- the CMTS input RF level specification

The leveling of the fibre node must be done by trained personal.

### 9.Connect the coaxial network cable

### 10.In any case never open the device yourself, especially under power

*HINWEIS: In case of any problems please contact ASTRO Strobel Kommunikationssysteme GmbH or resend the device with the established valid RMA Procedure (RMA code/ Error description). If the device was opened by the installer/ customer, the warranty will be void.*

# Ethernet access / Remote management

***HINWEIS:*** *This feature is only available for the OFN200 FR node type!*

As an optional feature the fibre node provides a small web interface to access the most parameters via an IP network. The fibre nodes standard IP address is 192.168.1.168. If the IP connection is made to this node with a standard web browser, the user can access the web interface of the node.

## Access to the web

IP address: 192.168.1.168

User: admin

Password: lifion


*Figure 3: Login*

## Device parameters panel

In the device parameter panel (see figure below) the current information of most parameters can be reviewed and also the main parameters of the node can be changed.


*Figure 4: Device parameters*

## Common parameters panel

In this pane the nodes specific information will be displayed, such as serial number of the node, the type of the node, MAC address of the transponder module and the internal housing temperature of the node.

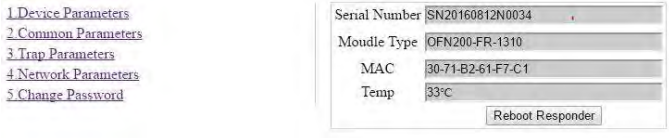



*Figure 5: Common parameters*

## Trap and network parameters panels

On this pages the SNMP Trap parameters of the device can be setup as well as the network parameters (such as IP address etc).

Trap parameters:

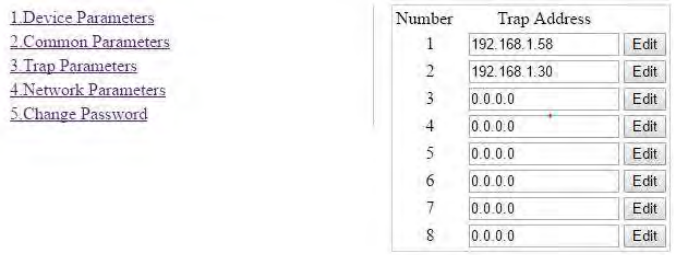



*Figure 6: Trap parameters*

Network parameters:

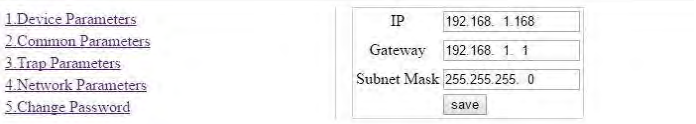



*Figure 7: Network parameters*

## Change password panel

In this panel the user can change from default password to his own password. Be careful when changing the password, since if it is lost, no access to the device can be done anymore.


*Figure 8: Change password*


# Functional display settings

When pressing the mode button for a short time, this will scroll through the different display parameters and setting parameters in a cyclic way. Pressing the up or down button for a while at the desired field will enter in configuration mode for the respective field (only for configuration fields). The LED display will start to flash or flicker to show the modification of the indicated mode field is possible now. By further pressing of the up or down button the selected parameter can be increased (arrow up) or decreased (Arrow down). The LED display will start to flash or flicker. Pressing the mode button for long again after changing the parameter, this will confirm and exit the enter mode.

„Mode“ button:
- scroll through all the mode fields (cyclic)

- confirm a changed value, exit the settings for the current mode

Arrow up button:
- increase the parameter value

- enter the configuration pressing for long until the parameter is flashing

Arrow down button:
- decrease the parameter value

- enter the configuration pressing for long until the parameter is flashing

The following table shows the different indications of the LED display:

Display indications for OFN200-F:

| Parameter Mode field (first digit) | Display | Display (D) or Config. (C) | Description | comments |
|---|---|---|---|---|
| *Mode 1* **Optical Input level** |  | D | Displays the optical input level in dBm. If low or none input level the display shows Lo | Optical input level range depends on the AGC setting range |
| *Mode 2* **Internal Voltage** |  | D | Internal power voltage value or 8VDC | This field is just for information. |
| *Mode 3* **Internal Voltage** |  | D | Internal power voltage value of 24VDC | This field is just for information. |
| *Mode E1* **Tilt setting** |  | C | Display and change the Equalizer setting for the tilt. Range: 0..15dB | Equalizer nominal value is applied on lower frequency and tilted to higher frequency to zero. |
| *Mode A1* **Attenuation setting** |  | C | Change the inter-stage attenuator to adapt the RF output level. Range: 0..15dB | Recommendation: Set RF Level in range of 108dBµV ..112dBµV for optimized performance (depending on tilt and channel load). Maximum RF Level 114dBµV |
| *Mode C* **Channel load** |  | C | Enter the equivalent total PAL channel load. **Note:** Each 10 x QAM64 channels equals 1 PAL channel, Each 4 x QAM 256 channels equals one PAL channel Each 5 x FM Channels equals one PAL channel | The RF output level will be calculated with this value. If this value is set wrong, the Mode 5 (RF Level) will not displayed correctly. |
| *Mode 5* **RF output level** |  | D | If the Mode C channel load is set correct, this will display the calculated RF Level (on high frequency where equalizer is 0) | RF output level in dBµV/ PAL Channel |
| *Mode AG* **AGC lower limit setting** |  | C | AGC range setting. The lower AGC limit could be set from -9dBm .. -7dBm. Upper AGC limit is fixed to +2dBm | Note: If the AGC range is changed for example from -9dBm to -7dBm (2dB optical increase), the RF will change to 4dB higher, which is 2x optical value. Please make sure that the RF level is not higher than 112dBµV for good performance and the max. RF level shall never exceed 114dBµV. |

*Figure 9: display indications of OFN200-F*

Additional display indications for OFN200-FS:

| Parameter Mode field | Display | Display (D) or Config. (C) | Description | comments |
|---|---|---|---|---|
| Mode CH | | D | Displays the curent chosen input port (port A or port B) | works equally in automaitc and manual mode |
| Mode F | | C | Display and change the optical threshold value in dBm where the current channel is switched to the redundant channel (-12...1 dBm) | only active in auto mode |
| Mode SI | | C | **in automatic mode: priority of input channels is selected (A, B):**<br><br>AF: if both channels are above the threshols value, port A is chosen as the standard input; if port A is beneath the threshold value, port B is auto-matically chosen as standard input<br><br>bF: if both channels are above the threshols value, port B is chosen as the standard input; if port B is beneath the threshold value, port A is auto-matically chosen as standard input<br><br>i**n manual mode (fixed input):**<br><br>A: port A is chosen, independant from threshold value<br><br>B: port B is chosen, independant from threshold value | Recommendation: Set RF Level in range of 102 dBµV ..108dBµV for optimized performance (depending on tilt and channel load). Maximum RF Level 112dBµV |

*Figure 10: display indications of OFN200-FS*

Display indications for OFN200-FR:

| Parameter Mode field (first digit) | Display | Display (D) or Config. (C) | Description | comments |
|---|---|---|---|---|
| Mode 1 Optical Input level |  | D | Displays the optical input level in dBm. If low or none input level the display shows Lo | Optical input level range depends on the AGC setting range |
| Mode 2 Internal Voltage |  | D | Internal power voltage value of 8VDC | This field is just for information. |
| Mode 3 Internal Voltage |  | D | Internal power voltage value of 24VDC | This field is just for information. |
| Mode E1 Tilt setting (forward path) |  | C | Display and change the Equalizer setting for the tilt in forward direction Range: 0..15dB | Equalizer nominal value is applied on lower frequency and tilted to higher frequency to zero. |
| Mode A1 Attenuation setting (forward path) |  | C | Change the inter-stage attenuator to adapt the RF output level in the forward path direction. Range: 0..15dB | Recommendation: Set RF Level in range of 108dBµV ..112dBµV for optimized performance (depending on tilt and channel load). Maximum RF Level 114dBµV |
| Mode C Channel load |  | C | Enter the equivalent total PAL channel load Note: Each 10 x QAM64 channels equals 1 PAL channel, Each 4 x QAM 256 channels equals one PAL channel Each 5 x FM Channels equals one PAL channel | The RF output level will be calculated with this value. If this value is set wrong, the Mode 5 (RF Level) will not displayed correctly. |
| Mode 5 RF output level |  | D | If the Mode C channel load is set correct, this will display the calculated RF Level (on high frequency where equalizer is 0). If no optical input power is detected, the RF outpt is dispayed 0.00dBµV | RF output level in dBµV/ PAL Channel |
| Mode AG AGC lower limit setting |  | C | AGC range setting. The lower AGC limit could be set from -9dBm .. -7dBm. Upper AGC limit is fixed to +2dBm | Note: If the AGC range is changed for example from -9dBm to -7dBm (2dB optical increase), the RF will change to 4dB higher, which is 2x optical value. Please make sure that the RF level is not higher than 112dBµV for good performance and the max. RF level shall never exceed 114dBµV. |
| Mode E 2 Tilt setting (return path) |  | C | Display and change the Equalizer setting for the tilt in the return path direction Range: 0..15dB | Return path equalizer standard settings is 0dBm |

*Figure 11: display indications of OFN200-FR explained*

| *Parameter Mode field (first digit)* | *Display* | *Display (D) or Config. (C)* | *Description* | *comments* |
|---|---|---|---|---|
| ***Mode A2*** **Attenuation setting (return path)** |  | C | Change the attenuation for the return path<br>Range: 0..15dB | With this parameter the RF signal for the return path can be attenuated. This will adjust the OMI for the return path. Recommended RF level range for the laser is 72 ..85dµV |
| ***Mode 6*** **Return optical output power** |  | D | This parameter displays the optical output level of the return path laser in dBm (-99. refers to no optical input) | 1310nm laser normally with 0 dBm,<br>CWDM return path with 3 dBm |
| ***Mode 7*** **Return laser Bias current in mA** |  | | This parameter shows the return path laser bias current in mA | Normal range is are around 5..50mA |
| ***Mode bC*** **Operation mode for Return Laser** |  <br>  | D | This parameter sets the operation mode for the return path laser:<br>c = continuous mode (standard HFC node)<br>b = bust mode (laser switches on when return signal reaches a certain level) | For standard operation Continuous mode is recommended |

*Figure 12: display indications of OFN200-FR*

# Troubleshooting

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

- ☐ `Device not working or LCD:`
  Check the power connection.

- ☐ `Display is dark when pressing mode key:`
  If power connection is okay, return device for repair or replacement according ASTRO RMA procedure.

- ☐ `No RF output signal:`
  - Check the optical input signal with an optical power meter.
  - Clean the patch cable and also the adapter on the device (one click cleaner or similar).
  - Check the connection of the optical cable.
  - Check the connection of the RF cable.
  - Check the internal voltage via information on display (mode 5) for +8 VDC.
  - Check the Optical input value with information on display (mode 1) for a valid range (-9 ..+2 dBm).
  - Disconnect the coaxial cable on the device. Measure the directly on the RF output port if RF signal is present. Check the coaxial cable/connector attached on the RF output and the further way of it..

- ☐ `RF Level too high or too low:`
  Commissioning according requirements with correct equalizer setting, attenuation setting and AGC range setting (mode E1, mode A1, mode AG).

- ☐ `CNR is too low:`
  - Check optical input signal, lower optical input signal will reduce CNR performance.
  - Check the optical connection, clean the adapters
  - The optical modulation index of the transmitter could be too low.
  - Total signal performance of the incoming signal could be too low.

- ☐ `The TV picture shows analogue distortion bars or for digital it shows block areas:`
  The CSO/CTB performance of the link could be too low.The RF level could be too high. Increase the inter-stage attenuation or change the equalizer and check picture quality again.

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

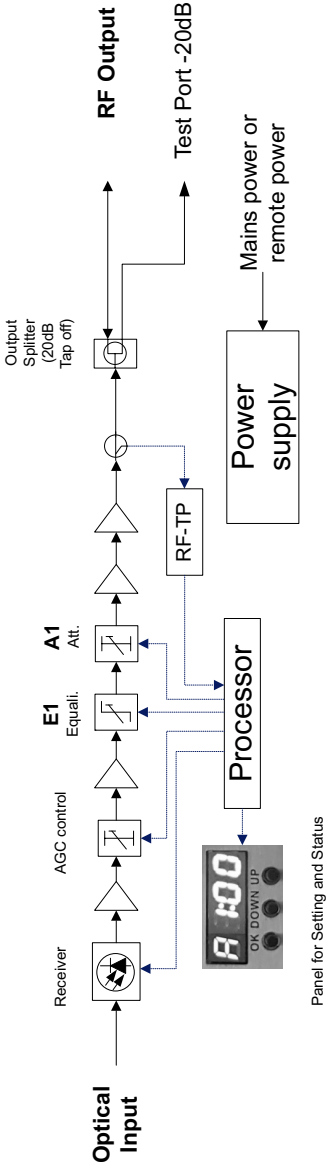
# Maintenance and repair

***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!***

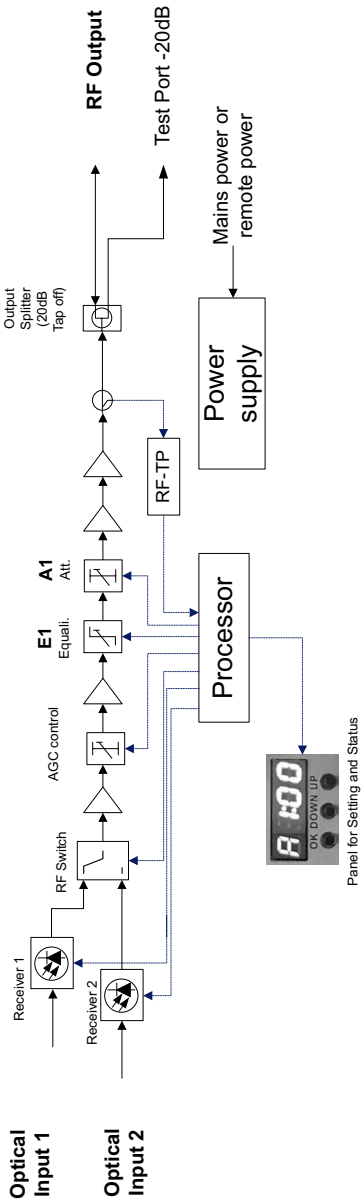
- ☐ The operating display only shows whether the DC current, which supplies the device components, has been disconnected from the mains voltage. If the operating display (for the power supply unit or the device) does not light up, this does not mean that the device has been fully disconnected from the 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.

# Block diagram

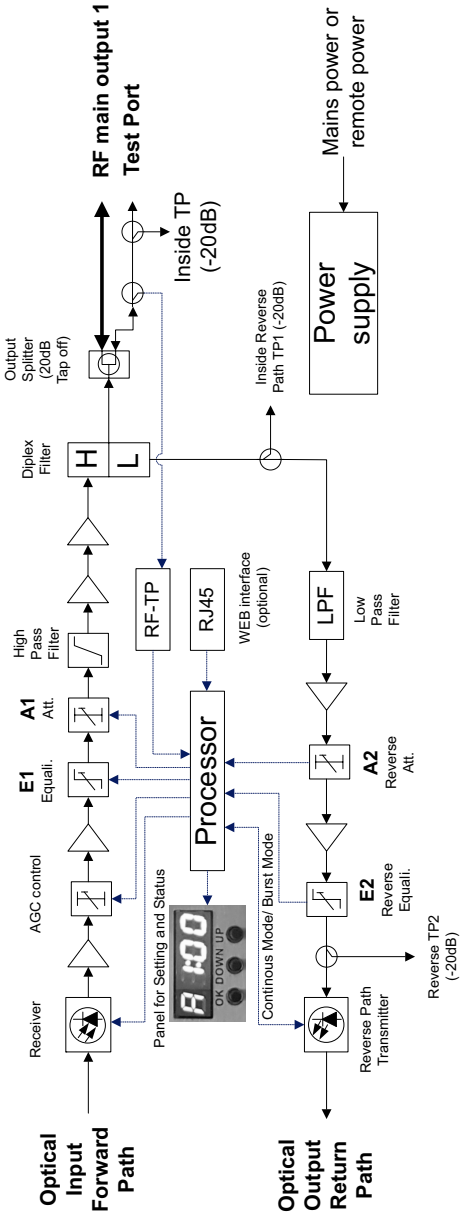
OFN200-F:



OFN200-FS:


Optical Input 1
Optical Input 2
Receiver 1
Receiver 2
RF Switch
AGC control
E1 Equali.
A1 Att.
Output Splitter (20dB Tap off)
RF-TP
Processor
Power supply
RF Output
Test Port -20dB
Mains power or remote power
OK DOWN UP
Panel for Setting and Status

OFN200-FR:


Optical Input Forward Path
Receiver
AGC control
E1 Equali.
A1 Att.
High Pass Filter
Diplex Filter
H
L
Output Splitter (20dB Tap off)
RF main output 1
Test Port
Inside TP (-20dB)
Inside Reverse Path TP1 (-20dB)
Mains power or remote power
Power supply
RF-TP
RJ45
WEB interface (optional)
Processor
Panel for Setting and Status
OK DOWN UP
Continous Mode/ Burst Mode
LPF
Low Pass Filter
A2 Reverse Att.
E2 Reverse Equali.
Reverse TP2 (-20dB)
Reverse Path Transmitter
Optical Output Return Path

# Technical data

| Type | | OFN200-F AC | OFN200-FS AC | OFN200-FR-1310 AC** |
|---|---|---|---|---|
| Order number | | 212 120 | 212 121 | 212 122 |
| EAN-Code | | 4026187192976 | 4026187192983 | 4026187192990 |
| Optical node type | | Forward path only (no pluggable return module) | Redundant forward path (with RF swich, no pluggable return module) | Forward path with pluggable return module as described below |
| **Optical characteristics** | | | | |
| Optical input wavelength | [nm] | 1100…1600 | | |
| Optical input power | [dBm] | -9… +2 | | |
| AGC range | [dB] | adjustable -9/-8/-7…+2 | | |
| Optical return loss | [dB] | > 45 | | |
| Optical connector type | | SC/APC; other on request | | |
| Fibre type | | Single mode 9/125 | | |
| **RF characteristics** | | | | |
| Frequency range | [MHz] | 45…1006 | 45…1006 | 85…1006 |
| Flatness | [dB] | ± 0,75 | | |
| RF level (OMI 3,5 %) | [dBµV] | ≥ 108 | | |
| Output return loss | [dB] | > 16 | | |
| Output Impedance | [Ω] | 75 | | |
| Electronic control EQ range | [dB] | 0…15 | | |
| Electronic control ATT range | [dB] | 0…15 | | |
| RF testpoint | [dB] | -20 | | |
| **Common data** | | | | |
| Power supply | [VAC] | Mains: 150…265 | | |
| Chassis type | | diecast housing | | |
| Power consumption | [W] | ≤ 14 | ≤ 14 | ≤ 30 |
| Dimension (L x W x H) | [mm] | 220 x 205 x 65 | | |
| Ambient temperature | [°C] | -40…+60 | | |
| **Link performance*** | | | | |
| C/N | [nm] | ≥ 51 | | |
| CTB | [dBm] | ≥ 67 | | |
| CSO | [dB] | ≥ 62 | | |
| **Return path (only OFN200-FR)** | | | | |
| Optical wavelength | [nm] | - | - | 1310 (CWDM on request) |
| Optical output power | [dBm] | - | - | 0 |
| Transmission mode | | - | - | constant or burst mode |

| | | | | |
|---|---|---|---|---|
| Optical connector type | | - | - | SC/APC; other on request |
| Fibre type | | - | - | Single mode 9/125 |
| Frequency range | [MHz] | - | - | 5-65 |
| Flatness in band | [dB] | - | - | ± 1 |
| RF input level | [dBµV] | - | - | 72 - 85 |
| Impedance | [Ω] | - | - | 75 |

*) Cenelec42, Link length 20 km @ 1550 nm, optical in 0dBm, AGC -9 dBm, RF output level 108 dBµV, EQ = 0

**) Other types than specified above available on request

| Type | | OFN200-F AC | OFN200-FS AC | OFN200-FR-1310 AC** |
|---|---|---|---|---|
| Order number | | 212 120 | 212 121 | 212 122 |
| EAN-Code | | 4026187192976 | 4026187192983 | 4026187192990 |
| Optical node type | | Forward path only (no pluggable return module) | Redundant forward path (with RF swich, no pluggable return module) | Forward path with pluggable return module as described below |
| **Optical characteristics** | | | | |
| Optical input wavelength | [nm] | 1100…1600 | | |
| Optical input power | [dBm] | -9… +2 | | |
| AGC range | [dB] | adjustable -9/-8/-7…+2 | | |
| Optical return loss | [dB] | > 45 | | |
| Optical connector type | | SC/APC; other on request | | |
| Fibre type | | Single mode 9/125 | | |
| **RF characteristics** | | | | |
| Frequency range | [MHz] | 45…1006 | 45…1006 | 85…1006 |
| Flatness | [dB] | ± 0,75 | | |
| RF level (OMI 3,5 %) | [dBµV] | ≥ 108 | | |
| Output return loss | [dB] | > 16 | | |
| Output Impedance | [Ω] | 75 | | |
| Electronic control EQ range | [dB] | 0…15 | | |
| Electronic control ATT range | [dB] | 0…15 | | |
| RF testpoint | [dB] | -20 | | |
| **Common data** | | | | |
| Power supply | [VAC] | Mains: 150…265 | | |
| Chassis type | | diecast housing | | |
| Power consumption | [W] | ≤ 14 | ≤ 14 | ≤ 30 |
| Dimension (L x W x H) | [mm] | 220 x 205 x 65 | | |
| Ambient temperature | [°C] | -40…+60 | | |
| **Link performance*** | | | | |
| C/N | [nm] | ≥ 51 | | |
| CTB | [dBm] | ≥ 67 | | |
| CSO | [dB] | ≥ 62 | | |
| **Return path (only OFN200-FR)** | | | | |
| Optical wavelength | [nm] | - | - | 1310 (CWDM on request) |
| Optical output power | [dBm] | - | - | 0 |
| Transmission mode | | - | - | constant or burst mode |

| | | | | |
|---|---|---|---|---|
| Optical connector type | | - | - | SC/APC; other on request |
| Fibre type | | - | - | Single mode 9/125 |
| Frequency range | [MHz] | - | - | 5-65 |
| Flatness in band | [dB] | - | - | ± 1 |
| RF input level | [dBµV] | - | - | 72 - 85 |
| Impedance | [Ω] | - | - | 75 |

*) Cenelec42, Link length 20 km @ 1550 nm, optical in 0dBm, AGC -9 dBm, RF output level 108 dBµV, EQ = 0

**) Other types than specified above available on request

ASTRO Strobel Kommunikationssysteme GmbH


These operating instructions have been written by:
ASTRO Strobel Kommunikationssysteme GmbH
Olefant 3, D-51427 Bergisch Gladbach (Bensberg)
Tel.: +49 2204/405-0, Fax: +49 2204/405-10
eMail: kontakt@astro.kom.de
Internet: www.astro-kom.de
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