GOING FUTURE TODAY.

ASTRO®

OFN220 FR

Optical Fibre Node

DRAFT VERSION

Operating Manual

Version 08-2021A

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 OFN220 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 62368-1 . 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 62368-1 is not necessary for configuration.

Device description

The delivery consists of the following parts:

- ☐ Optical Fibre Node OFN220 FR
- ☐ Operating Manual

OFN220 FR:

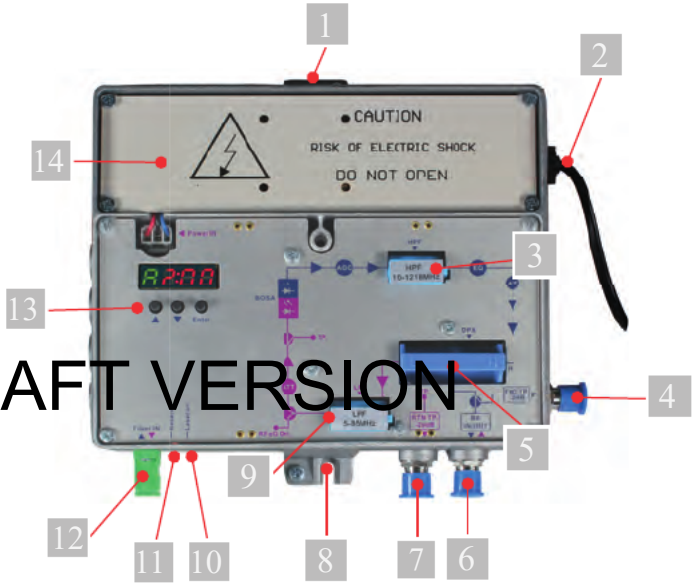

Figure 1: Fibre Node OFN220 FR

[1] Upper mounting handle with grounding point
[2] Power cord 150-265 VAC, 50-60 Hz
[3] High pass filter plugin
[4] Test port forward path -20 dB
[5] Diplex plugin
[6] RF In-/Output
[7] Reverse path RF test port
[8] Lower mounting handle with grounding point
[9] Low pass filter plugins
[10] Reverse path TX status LED
[11] Optical power indication forward receiver
[12] Optical connector for forward and reverse path (SC/APC)
[13] Mode selection (3 button configuration with LED display)
Enter button: press for 3 seconds to enter adjustment mode and long press for value confirmation; use arrow buttons for adjustment
[14] Power supply

CE

The OFN220 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 62368-1) 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.

Description of performance

The Fiber Node OFN220-FR type is a bi-directional node in a die-cast housing IP65, usable to connect DOCSIS 3.1 cable modem service and TV signals to the customers coaxial network via a single fibre connector. The fibre node has only one SC/APC optical connection for forward and reverse path optical signals, supplied on a single fibre. The forward and the reverse path transmit/receive on different wavelengths and lead to an inbuild optical WDM filter within the device, to separate the up- and downstream services.

Forward path:

It converts optical forward broadband signals (TV service and CMTS data) in the range from 1540 nm to 1560 nm to RF broad-band signals towards the customers premise in the range from 110 MHz (optional 204 MHz) to 1.218 GHz.

The optical forward reception is balanced by a built-in AGC circuit (Automatic Gain Control) control circuit, to keep the RF level in a certain optical input range constant. The optical input level range for the AGC 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 by 2 dBµV for 1dB optical level change.

To adapt the required RF output level of the device, inter-stage forward path attenuation can be electronically set up with the push button interface inside the device. For optimum performance, it is recommended to set an RF output level up to a max of 106 dBµV per QAM256 channel according to the requirements described in EN60728 Part 3.

The 106 dBµV RF level is recommended on the following channel load / parameters:

- ☐ optical forward path input level in the fibre node -2,5 dBm
- ☐ 119 x QAM256 channels between 258 -1218 MHz
- ☐ 6,9 MSym
- ☐ 0 dB slope
- ☐ TX OMI 3 % / channel

With this setup the MER is > 42,5 dB and BER < 1 x 10^{-9}.

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 forward equalization 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 adjustment.

Return path:

The return path frequency can be selected depending on the chosen diplex filter. The standard OFN220 type will use a diplex filter 85/110 Mhz for US/DS separation. Optional a diplex filter with 204/258 MHz can be supplied, used for wider upstream bandwidth for DOCSIS 3.1.
The return path laser can be tuned to 4 different sub wavelengths or so-called “channels” (= tuning to 4 different wavelengths of 0,5 nm optical spectrum distant from each other), to allow that the upstream can be combined with an ordinary optical splitter and transmitted together with the downstream on a single fibre. This wavelength tuning is required to avoid OBI (optical beat interference). OBI happens, when 2 lasers transmit on the same wavelength. Then the likelihood that the signal will be jammed is very high. With that shifting of the laser wavelength this jamming can be avoided, since every single reverse laser transmits on a certain own wavelength.

The fibre node is available with 4 different base wavelength ranges. Each can be tuned to channel 1 .. 4 (sub wavelength tuning in distance of 0,5 nm). The tuning of the sub wavelength will be accomplished with the “CH” entry in the settings menu.

Available base types of the OFN220-FR (selection of base return laser wavelength):

- ☐ Base type 1: 1450 nm -> OFN220-FR-1450 AC
- ☐ Base type 2: 1470 nm -> OFN220-FR-1470 AC
- ☐ Base type 3: 1590 nm -> OFN220-FR-1590 AC
- ☐ Base type 4: 1610 nm -> OFN220-FR-1610 AC

Total number of combined nodes in reverse direction can be 16 (4 base types x 4 sub wavelength). In the central side use of an WDM filter is required, to filter out the 1550 nm downstream from the 4 base wavelengths used for upstream, which are further on the link connected to one US optical receiver port.
The reverse path laser is a high-quality DFB Laser with either 1450/1470/1590/1610 nm and an optical output power of +3,0 dBm.

The return laser can run in either mode, which can be set with the internal push buttons / LCD display (Parameter “bC” in the settings either to “C” continuous mode or to “b” burst mode).

If the reverse path is set to burst mode, then 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.

- `Continuous mode:` In this case the upstream cannot be linked to the central side with an optical splitter. Laser is always on, even if there is no cable modem transfer.
- `Burst mode (also called RFoG mode):` This is used if the upstream will go together with the forward signal via an optical splitter. Laser is normally in off status, triggered to switch on by a transmitting cable modem.

Return path attenuation can be adjusted electronically with the configuration panel in the node (parameter A2), without the need of any plug-in pads.

Features:

- die-cast housing fibre node for DOCSIS 3.1 specification
- Automatic Gain Control: -8 dBm to -5 dBm (lower AGC range by setting), up to 0 dBm (higher AGC range)
- high RF output level usable for MDU or larger coax networks
- one fibre transmission for forward and return path
- 4 channel US wavelength shifting via setup (0,5 nm shifting from laser λ), used for OBI free transmission
- return channel base wavelength types: 1450/1470/1590/1610 nm
- return path with “OBI free” burst or “continuous” mode
- equalizer and ATT electronical adjustable
- frequency range reverse 5 ..85 MHz (or 204 MHz) / forward 110 (or 258) ..1218 MHz
- high RF output level due to GaAS power double amplifier stage
- flexible plug diplexer set for 85/110 or 204/258

- forward and separate reverse path test port
- LED indication visible from outside the housing for forward reception status
- LED indication visible from outside the housing for reverse laser activity

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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.

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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 -8 dBm, maximum about +0 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 must be in the specification of the device.
The input optical wavelength should be between 1540 and 1560 nm. For optimized noise performance (CNR) it is recommended to provide an optical input level between -3 dBm and +0 dBm.
Lower optical levels will decrease the MER performance. High optical input levels will destroy the PIN Diode.

2.Grounding the device

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

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

Assure the mains voltage is in the range of 150..265 VAC / 50 or 60 Hz.

5.Check the forward path indication LED

Right to the SC/APC optical connector, the LED for optical input signal shows either green for good optical forward path levels, or red for out of range optical forward path levels. Check the LED color after the optical fibre is connected to the node. In case of green the level matches the specification. In case of red, the level is either too low or too high and needs to be checked in detail (always clean optical connections before plugging!).

5.Set the AGC range (mode AG)

The AGC should be set within the required optical input level range. The lower AGC limit can be changed from -8 dBm .. -5 dBm. The higher AGC limit is fixed to +0 dBm. If the AGC range is changed for example from -8 dBm to -7 dBm, then the RF output is increased by 2 dBµV. This is because the increase of the lower limit allows a higher RF level and the pre-stage RF amplification does not need to keep a gain reserve to amplify from the lower RF level to the constant RF output.

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

It is recommended to set the interstage attenuator to maximum (=18 dB). Then lower the attenuation and increase the RF output level to about 106 dBµV per channel (for 119xQAM256).
A higher RF level could also work well in case there is a lower number of channels, compared to the 119 x QAM256 according EN60728 Part 3. It is always recommended to measure the MER and the BER to see the limits to the appropriate channel load.

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

The equalizer can be set between 0 dB and 15 dB. Higher equalizer settings will reduce the signal on lower frequency and therefore it will allow a higher RF output level with still good distortion values.

7.Adjust return path attenuator A2

The return path attenuator determines how much RF level is passed to the return path laser. The standard RF level is about 75 dBµV which should be applied.
This parameter affects the modulation index of the return path transmitter. To adjust the return path attenuation in the correct way, the full return path loop must be taken into account:

- the input level in the node (coaxial network of users)
- the return path attenuation settings in the fibre node itself
- the attenuation settings and the optical input level influence in the return path receiver within the head-end
- the CMTS input

HINWEIS: The leveling of the node should be done by trainded personal!

8.Adjust the return path laser‘s wavelength

The return path lasers subchannel (channel 1 to 4) can be set with the parameter CH. It is mandatory that only one base wavelength node, e.g.. 1470 nm is set to a certain channel. Meaning each fibre node type with 1470 nm gets an own channel number (1 to 4) to have a unique wavelength setting on the upstream path, since this will be combined via the splitter and then lead to the optical upstream receiver in the head-end. In that case 16 fibre nodes (4 base types, with 4 channels each) can be combined without affection of OBI by the return path lasers.

9.In case of problems with the device

On the forward receiver plug in module check the LED for power and optical input level.
If optical input level is out of good range, adjust with an optical attenuation or increase the optical level for forward path.
Please be reminded, that high optical input powers on forward path may damage the PIN receiver diode and destroy the forward functionality of the node!
For return path plug in modules check the LED for power and for laser activity. In case when the LEDs show an abnormal indication, either the return path leveling should be checked or if there is no power, check for proper plugin of the module.
In case of any problems please contact
or resend the device with
the established valid RMA procedure (RMA code/ Error description).

Functional display settings

Pressing the ▲ or ▼button, this will cyclic scroll through the different configuration or measured values of the node.

When pressing the **ENTER** button for short time, this will enter in the configuration mode on the actual selected parameter (blinking on the LCD panel will shop configuration mode active).

With the ▲ or ▼button the parameter can be changed and set to the desired value (only in case of a parameter which can configured). By pressing **ENTER** for a short time again, this will save the parameter in the internal settings and apply the changes.

Enter button:
- enter in configuration mode
- confirm a changed value
- exit the settings mode

▲ button:
- scroll through the menu upwards direction
- increase the parameter value

▼ button:
- scroll through the menu downwards direction
- decrease the parameter value

Display indications for OFN220-FR:

Sequence when pressing „UP“ arrow

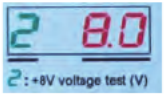
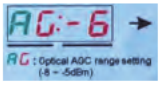
Parameter Mode field (first digit)	*Display*	*Display (D) or Config. (C)*	*Description*	*Comments*
Mode 1 **Optical Input level**		D	Displays the optical input level in dBm. If low or none input level the display shows Lo	Optical input level range depends on the AGC setting range
Mode 2 **Internal Voltage**		D	Internal power voltage value or 8 VDC	This field is just for information.
Mode 3 **Internal Voltage**		D	Internal power voltage value of 12 VDC	This field is just for information.
Mode AG **AGC lower limit setting**		C	AGC range setting. The lower AGC limit could be set from -8 dBm ..-5 dBm. Upper AGC limit is fixed to +0,0 dBm	Note: If the AGC range is changed for example from -8 dBm to-6 dBm (2 dB optical increase), the RF will change to 4dB higher level which is 2x optical value. Please make sure that the RF level is not higher than 106 dBµV(119 QAM channels) for best performance. Less number of channels will allow a higher channel RF power.
Mode E **(forward path start frequency)**		C	Depending on Diplex Filter set, the forward path starts either from 110 Mhz or from 248 MHz	Equalizer nominal value is applied on lower frequency and tilted to higher frequency to zero.
Mode E1 **(forward path equalizer)**		C	Display and change the Equalizer setting for the tilt in forward direction Range: 0..15 dB	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..15 dB	Recommendation: Set RF Level in range of 106 dBµV ..108 performance (depending on tilt and channel load).

Figure 11: display indications of OFN220-FR explained

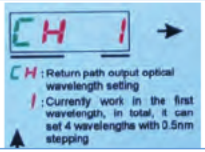
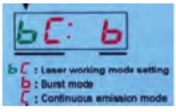
Parameter Mode field (first digit)	Display	Display (D) or Config. (C)	Description	Comments
Mode CH		C	The "CH" parameter is used to tune the return lasers wavelength. It can be adjusted from 1 .. 4	Only one fibernode connected to a splitter shall have identical base wavelength and subwavelength.
Mode 4 Transmitter output power		D	Shows the transmitter output power, if set to constant laser mode (see parameter bC). In case of RFoG burst mode it shows -99	
Mode 5 Return laser bias current in mA		D	Shows the return laser bias current in constant laser mode. In RFoG burst mode (see parameter bC) the value is not shown but just oG (RFoG mode active)	
Mode bC Operation mode for Return Laser		C	This parameter sets the operation mode for the return path laser: c = continuous mode (standard HFC node) b = bust mode or RFoG mode (laser switches on when return signal reaches a certain level)	Standard operation for this kind of node is normally that it will be run over a fiber splitter. Therefore RFoG burst mode is the standard mode for this kind of node with reverse tunable laser and one fiber connection for forward and reverse path optical signal.
Mode A2 Attenuation setting (return path)		C	Change the attenuation for the return path Range: 0..18 dB	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 75 dBµV.

Figure 12: display indications of OFN220-FR explained

Troubleshooting

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

- ☐ `Device not working or LCD is dark when pressing Enter key:`
  Check the power connection. 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 (-8 ..0 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 in forward and reverse path as well as AGC range setting (mode E1, mode A1, mode AG).

- ☐ `MER in forward path is too low:`
  - Check optical input signal; lower optical input signal will reduce MER performance (check also the indication LED next to the optical SC/APC connector, which should show a green color).
  - Check the optical connection, clean the adapters.
  - The optical modulation index of the transmitter may be too low.
  - Total signal performance of the incoming signal may be too low.

- ☐ `The TV picture shows analogue distortion bars or for digital it shows block areas:`
  The performance of the total link could be too low.
  The RF level may be too high. Increase the interstage attenuation to reduce output level or change the equalizer settings and check picture quality again.

- ☐ `Return path receiver not working:`
  In burst mode the LED next to the forward power LED shows activity if the return laser is triggered by a cable modem signal.

Make sure in RFoG mode the reverse signals from cable modems are present.
Check leveling of the return path. If in burst mode, then the return path RF level must reach a certain power to switch the laser on. The upstream RF signal power may be too low.

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

Maintenance and repair

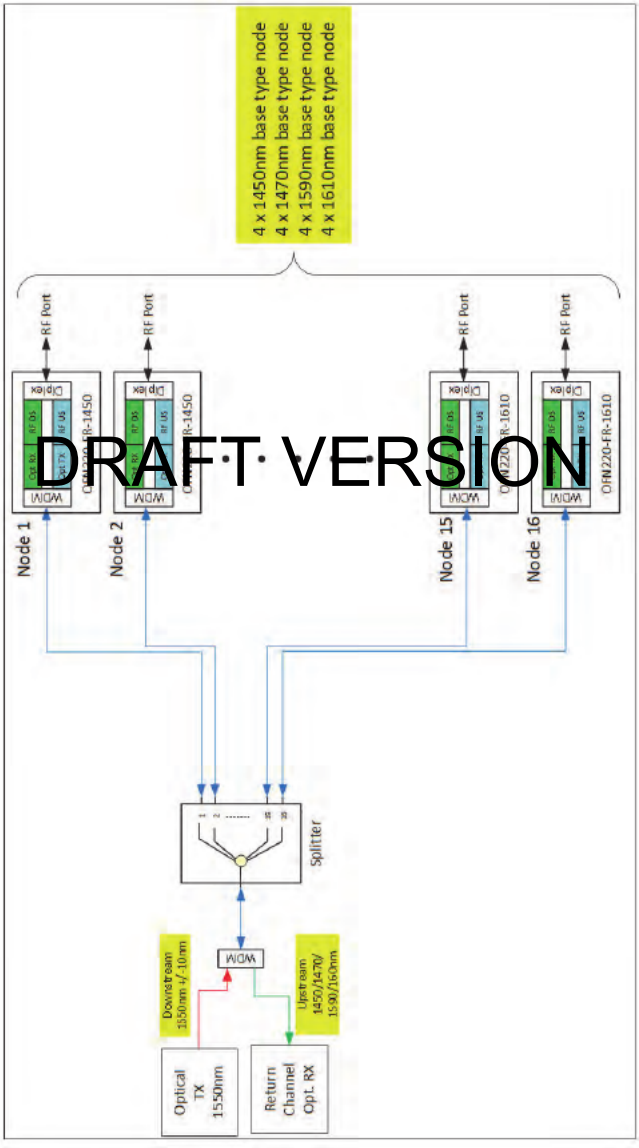
ACHTUNG: ***The following safety information must be observed when performing maintenance and repair work. Failure to observe this safety information may result in personal injury due to electrical and thermal dangers!***

- ☐ 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.

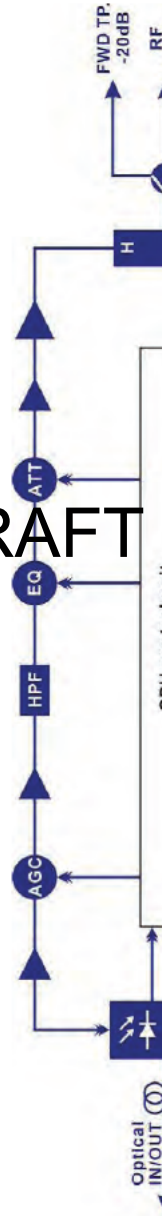
Network diagram

Connecting of 16 fiber nodes via 16-way splitter for forward and reverse path on single fibers (OBI free!). WDM in the head end is used to separate the forward (only one) and return path (multiple) wavelength.



Block diagram

OFN220-FR:



Technical data

Type		OFN220-FR-1450	OFN220-FR-1470	OFN220-FR-1590	OFN220-FR-1610
Order number		212 199	212 177	212 178	212 179
EAN-Code		4026187199197	4026187199111	4026187199128	4026187199135
Optical node type		Forward path and return path			
Optical characteristics					
Optical input wavelength	[nm]	1540…1560			
Optical input power	[dBm]	-8… 0			
AGC range	[dB]	adjustable -8/ -7 / -6 / -5…0 (default -6)			
Noise current typ.	[pa/√Hz]	≤ 5			
Optical connector type		SC/APC; other on request			
Fibre type		Single mode 9/125			
RF characteristics forward path					
Frequency range (flexible diplex filter)	[MHz]	110…1218			
Flatness (within AGC range)	[dB]	110 ..862 MHz: ±1.0; 862 ..1218 MHz: ±1.5			
Typ. RF level (MER > 42,5 dB, BER < 1E-9)	[dBµV]	106			
Interstage attenuation A1	[dB]	0…18, 1 dB steps			
Interstage equalizer E1	[Ω]	0…15, 1 dB steps			
Output Return Loss	[dB]	> 16 -1.5 dB/Oct.			
Output Impedance	[dB]	75			
RF testpoint	[dB]	-20 ± 1,0			
Optical characteristics return path					
Optical Wavelength (each wavelength base type can set to channel 1 / 2 / 3 / 4)	[nm]	1450	1470	1590	1610
Channel stepping (sub-wavelength setting)	[nm]	0,5 (4 channels to be chosen)			
Optical Power	[dBm]	+3,0 ± 1,0 (DFB Laser)			
Flatness	[dB]	±1.0			
Fibre type		Single mode 9/125			
Burst mode transmission parameters (SCTE_174_2010): - Max. Laser turn on time - Max. Laser turn off time - Laser turn on level - Laser turn off level	 [µs] [µs] [dBµV]	 ≤ 1,3 ≤ 1,6 68,0 ± 1,0			
RF characteristics return path					
Recommended RF input level / channel	[dBµV]	70 (ATT set to 0 dB / OMI 15%, with ATT to 6 dB OMI 7.5%)			

Frequency range	[MHz]	5 .. 85
Attenuator A2	[dB]	0…18, 1 dB steps
Test Port @ Return Laser	[dB]	-20
Return Loss	[dB]	> 16
Common data		
Power supply	[VAC]	Mains: 150…265 / 50-60
Surge protection RF ports		4 (EN61000-4-5, 1,2/50 µs pulse)
Chassis type		diecast housing
IP Protection class		IP 41
RF Output connector / Test connector		F-female
Power consumption	[W]	≤ 18
Weight	[kg]	1,5
Dimension (L x W x H)	[mm]	220 x 175 x 60
Ambient temperature	[°C]	-20…+55

DRAFT VERSION

ASTRO Strobel Kommunikationssysteme GmbH

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