GOING FUTURE TODAY.

ASTRO®

OFN100 F
OFN100 FW
OFN100 FS
OFN100 FR

Optical Fibre Nodes

DRAFT VERSION

Operating Manual

Version 06-2017A

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 OFN50 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.

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Device description

The delivery consists of the following parts:

- ☐ Optical Fibre Node OFN100 F, FW, FS respectively FR
- ☐ Operating Manual

[1] left mounting handle
grounding screw
[2] right mounting handle
grounding screw
[3] mains power cord
(european plug)
[4] RF output (F-female)
[5] RF testport (-20 dB, F-
[6] mode selection (3 but
configuration with displa
[7] optical return pat
(SC/APC; only OFN100
[8] optical input (SC/APC

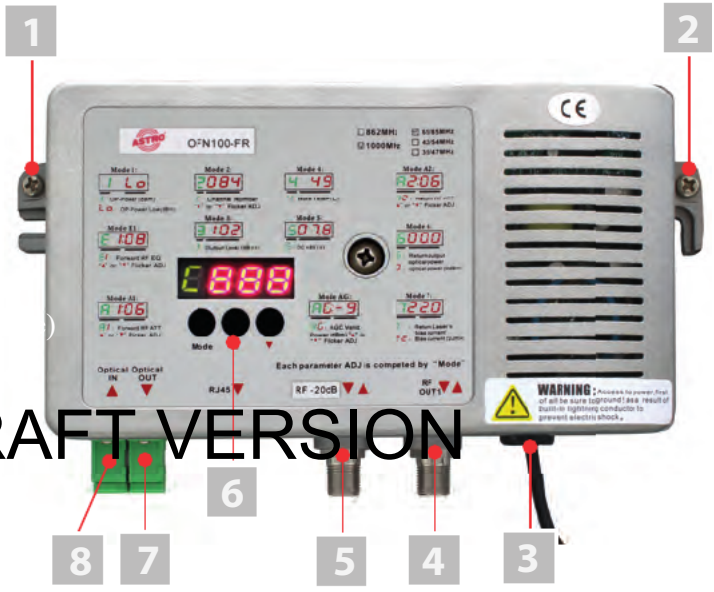


Figure 1: Fibre Node OFN100 FR (other types similar)

The OFN100 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.

Description of performance

The Fiber Nodes of the OFN100 series are cost efficient nodes. They convert optical broadband signals in the range from 1100 nm to 1600 nm to RF Broadband signals in the forward path in the range from 45 MHz (OFN100 FR 80 MHz) to 1 GHz.
The OFN100 FR type features an additional return path. The frequency can be selected depending on 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 1dB 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 outside the device. For optimum performance, it is recommended to set an RF output level up to 102 dBµV per analogue PAL channel for CTB/CSO values > 60dB 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 108dµV per PAL channel, depending the distortion requirements, Equalizer settings and the channel plan. The theoretical maximum reachable RF output is about 112 dBµV (on a 42 PAL channel source, unmodulated, OMI 4,2%, EQ=0, AGC=-9 dBm).

The device allows also to set an electronically adjustable pre-emphasis (equalizer circuit) in the forward path 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 a 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. If you set the tilt to 8 dB, the 8dB 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 of the OFN100 FR type is a high quality DFB laser with 1310 nm / 0 dBm or with CWDM wavelength / +3 dBm optical output level. Return path attenuation can be adjusted electronically with the configuration panel accessible from the outside of the node, without the need of any plugin pads. The reverse path works in constant mode.

Features

- low noise optical receiver with very good performance values
- optical AGC control circuit, AGC range to be setup by the user in the optical level range of:
  - lower AGC threshold adjustable in range of -9 dBm ..-4 dBm
  - upper AGC threshold fix to +2 dBm
- ultra-wide forward path frequency range: 45 Mhz ..1 GHz
- high performance GaAs push-pull amplifier stage (max recommended RF level 108 dBµV, maximum RF output level 112 dBµV)
- equalizer and interstage attenuation electronically adjustable for easy and fast setup
- compact design for FTTB in-house Networks
- RF testport -20 dBm
- OFN100 FS: additional RF redundancy switch and second optical input
- OFN100 FW: additional WDM filter at the input
- OFN100 FR: return path laser with 1310 nm / 0 dBm or CWDM / +3 dBm

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.

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 2)

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)

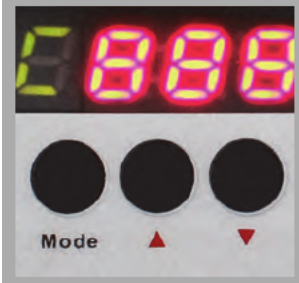
8.Adjust the return path attenuator (mode A2, only OFN100 FR)

With Mode A2 the return path attenuation can be set to meet the optimum laser RF level. Target value for one carrier is 79 dBµV. For 2 channels 3 dB less per channel is required. If there is any problem with the MER or BER, with this parameter setting the return path will be optimized to meet the requirement.

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 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.



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 OFN100 F and OFN100 FW:

Parameter Mode field	Display	Display (D) or Config . (C)	Description	comments
Mode 1		D	Displays the optical input level in dBm or if too low shows Lo for low input level	Optical i nput level range depends on the AGC setting range
Mode E1		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		C	Change the inter -stage attenuator to adapt the RF output level. Range: 0..15dB	Recommendation: Set RF Level in range of 102 dBµV ..108dBµV for optimized performance (depending on tild and channel load). Maximum RF Level 112 dBµV
Mode 2		C	Enter the equ ivalent total PAL channel load. Note: Each 10 x QAM64 channels equals 1 PAL channel, Each 5 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 1 RF Level) will not displayed correctly.
Mode 3		D	If the Mode 2 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 4		D	Working temperature of the device	This field is just for information.
Mode 5		D	Internal power voltage value	This field is just for information.
Mode AG		C	AGC range setting. The lower AGC limit could be set from -9dBm .. -4dBm. 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 level could be theoretical 4dB higher, which is 2x optical value. . Please make sure that the RF level is not higher than 108dBµV for good performance and the max. level shall not exceed 112dBµV.

Figure 2: display indications of OFN100 F and FW explained

Additional display indications for OFN100 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):** 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 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 **in manual mode (fixed input):** A: port A is chosen, independant from threshold value 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 112 dBµV

Figure 2: display indications of OFN100 FS explained

Display indications for OFN100 FR:

Parameter Mode field	Display	Display (D) or Config. (C)	Description	comments
Mode 1		D	Displays the optical input level in dBm or if too low shows Lo for low input level	Optical input level range depends on the AGC setting range
Mode E1		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		C	Change the inter-stage attenuator to adapt the RF output level. Range: 0..15dB	Recommendation: Set RF Level in range of 102dBµV ..108dBµV for optimized performance (depending on tild and channel load). Maximum RF Level 112dBµV
Mode 2		C	Enter the equivalent total PAL channel load. **Note:** Each 10 x QAM64 channels equals one 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 Mode3 (RF Level) will not displayed correctly.
Mode 3		D	If the Mode 2 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 4		D	Working temperature of the device	This field is just for information.
Mode 5		D	Internal power voltage value	This field is just for information.
Mode AG		C	AGC range setting. The lower AGC limit could be set from -9dBm .. -4dBm. 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 level could be theoretical 4dB higher, which is 2x optical value.. Please make sure that the RF level is not higher than 108dBµV for good performance and the max. level shall not exceed 112dBµV.

Figure 3: display indications of OFN100 FR explained

Mode A2	A2:06	C	Return Attenuation settings. Range 0 .. 20dB	This parameter influences the OMI of the return laser. The recommended RF level shall be in range of 75 .. 85dµV
Mode 6	6 8 0.0	D	Display the optical output power of the Return path laser	1310nm is typically 0dBm. CWDM lasers have optical powers of +3dBm
Mode 7	72 7.2	D	The laser driving current of the return path laser	This field is just for information.

Figure 4: display indications of OFN100 FR explained

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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.

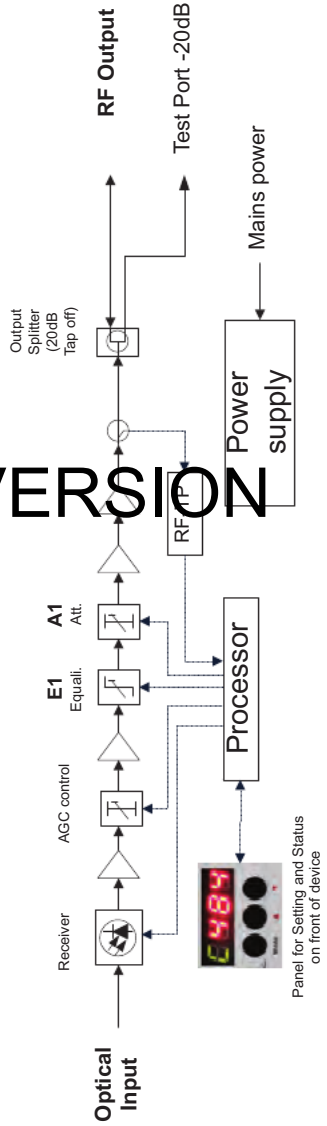
Maintenance and repair

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

OFN100 F:



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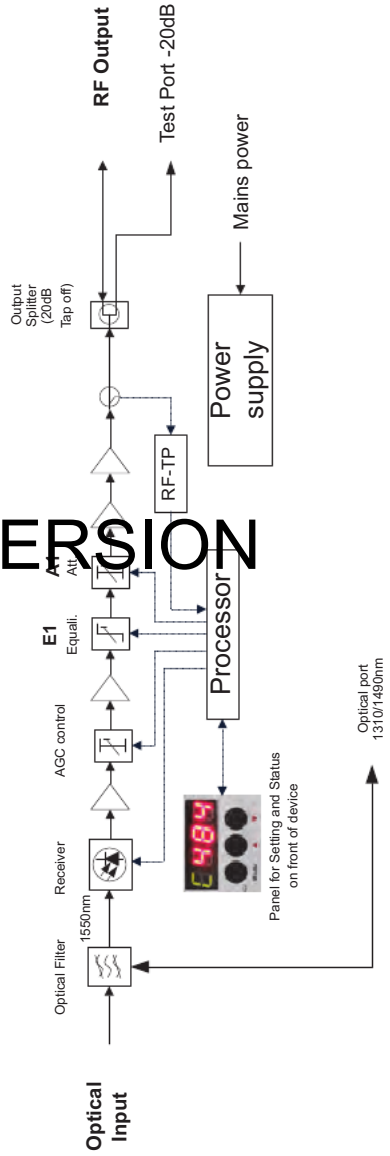

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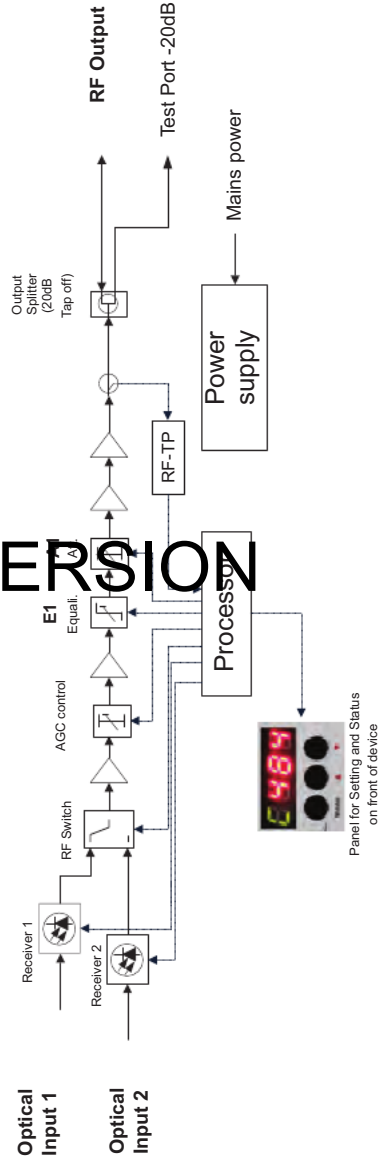

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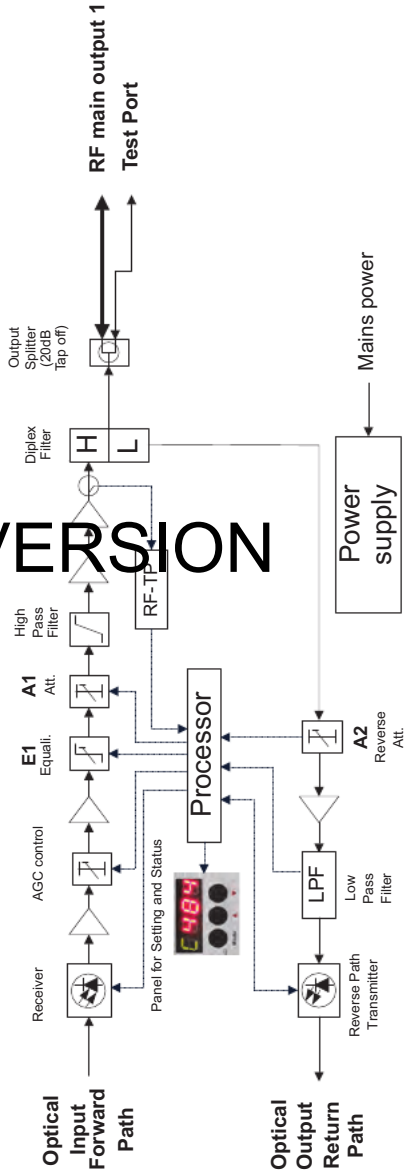

Technical data

Type		OFN100-F	OFN100-FW	OFN100-FS	OFN100-FR-1310*
Order number		212 116	212 117	212 118	212 119
EAN-Code		4026187192938	4026187192945	4026187192952	4026187192969
Optical node type		Forward path only	Forward path with WDM passthrough for G(E) PON networks	Redundant forward path	Forward path with return transmitter as described below
Optical characteristics					
Optical input wavelength for CATV	[nm]	1100…1600	1530…1610	1100…1600	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	85…1006
Flatness	[dB]	± 0,75			
RF level (OMI 3,5 %)	[dBµV]	≥ 102			
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		-20			
Common data					
Power supply	[VAC]	150…265			
Chassis type		diecast housing			
Power consumption	[W]	≤ 8	≤ 8	≤ 8	≤ 10
Dimension (L x W x H)	[mm]	190 x 110 x 52			
Ambient temperature	[°C]	-40…+60			
Relative humidity	[%]	maximum 95, non condensing			
Link performance**					
C/N	[nm]	≥ 51			
CTB	[dBm]	≥ 60			
CSO	[dB]	≥ 60			
Return path (only OFN100-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]	-	-	-	75 - 85
Impedance	[Ω]	-	-	-	75

*) other wavelengths on request

**) Cenelec42, Link length 20 km@1550 nm, optical in 0d Bm, AGC -9 dBm, RF output level 102 dBµV, EQ = 0

Other types than specified above available on request

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ASTRO Strobel Kommunikationssysteme GmbH

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These operating instructions have been written by:
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