

HDO Series

# User Manual

Teleste Corporation



**HDO907**  
**CATV fibre transmitter**

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## Introduction

HDO907 is a high performance linear directly modulated DFB laser transmitter for forward path fibre optic links in CATV and FTTx networks. It is installed into HDX installation frame. HDO907 is available on different optical output power and distortion categories to fit various performance requirements. HDO907 has two equal input sections with level and slope adjustments to support broadcast and narrowcast signal distribution. The RF isolation between the input branches is high minimising the leakage of narrowcast signals into unwanted narrowcast node segments. The power consumption has been reduced substantially but HDO907 still offers the highest level of performance and the widest variety of features. An integrated WDM filter is available as an option for applications where 1310 nm forward path and CWDM return path is transmitted in one fibre. The output power range is from +2 dBm up to +15 dBm.

**Caution!** This unit employs a laser. Due to the invisible laser radiation all necessary safety instructions must be followed during the installation and maintenance operations. In a properly closed system the normal operation of these components does not cause any radiation danger. The safety requirements for class 1M lasers are detailed in EN60825-1.

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**Parts and functions**

**Front and rear panels**

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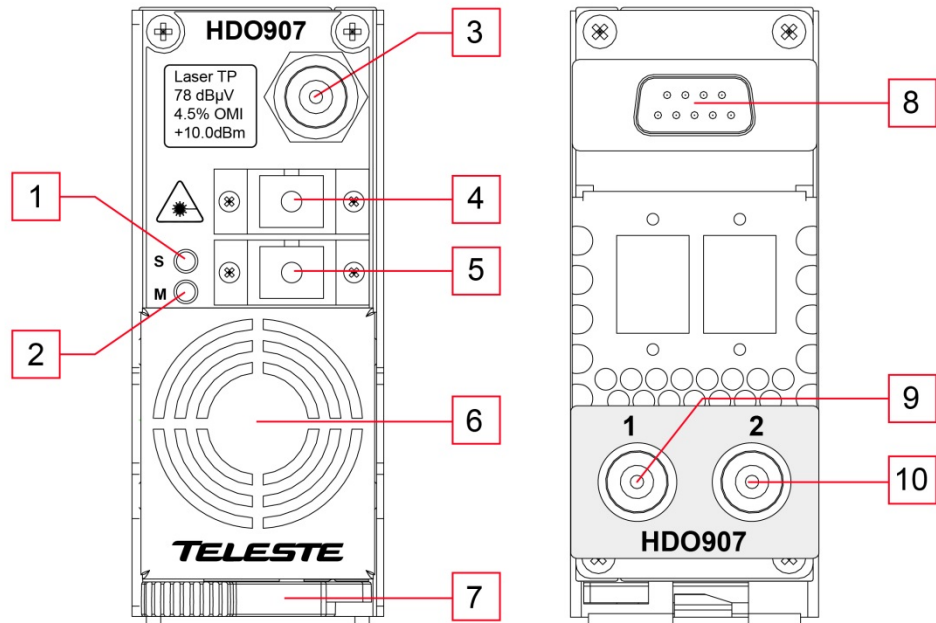


Figure 1. HDO907 with optical connectors located at the front of the module.

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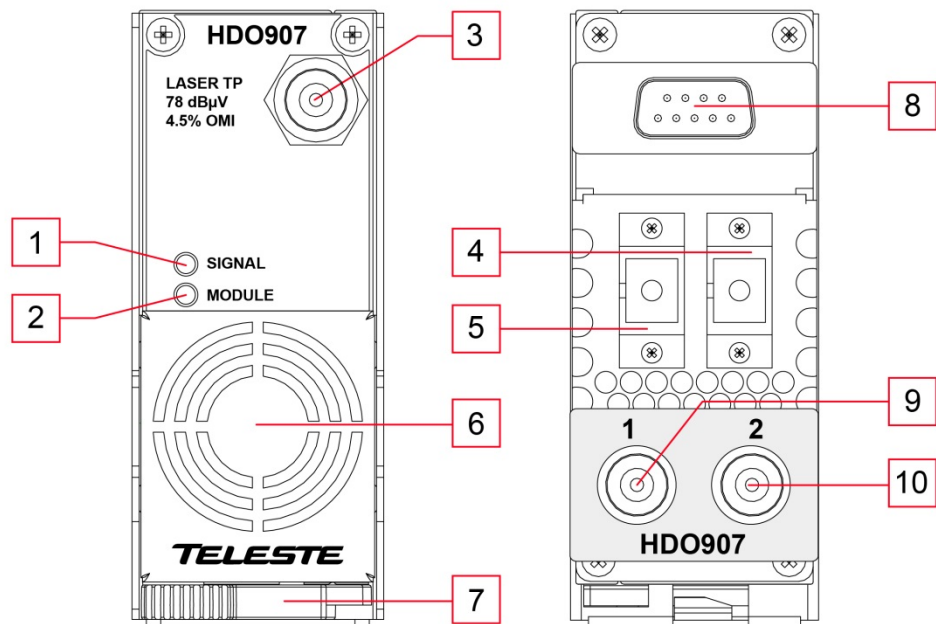


Figure 2. HDO907 with optical connectors located at the rear of the module.

**1 & 2) Indicators**

The front panel LED indicators display unit status. For more information, see the 'Indicators' chapter.

**3) RF laser test point**

The laser drive level can be measured from the RF laser test point. Drive level of 78 dB $\mu$ V corresponds to 4.5% OMI.

**4 & 5) Fibre output connector(s)**

Depending on the chosen configuration the unit is equipped with one or two fibre output connectors that can be located either on the front or on the rear panel. The fibre connector adapters' type as well as location is specified when ordering the product. If the WDM filter option is chosen there are two optical ports - 1550 nm return path output (pos. 4) and common 1310 nm forward path output/1550 nm return input (pos. 5). The block diagram can be found in the product specification in case further information on the optical ports is needed.

**6) Cooling fan**

Fan unit draws air into the module through the front panel vent. Airflow is then directed through the module and expelled from the rear panel vent.

**Caution!** Do not block the fan vents. Doing so may cause heat to build up inside the module and result interruption in signal operation. Fan speed is automatically controlled based on the internal temperature of the unit. It will always rotate and runs at full speed for a short time when the unit is powered.

**7) Module extractor handle**

The module extractor handle is a mechanical lever that allows easy extraction and removal of the module without the need for any additional tools.

**8) Module data and power connector**

The D-9 connector on the rear of the module connects to the installation frame and provides powering and HDO bus data link to the unit.

**9) RF input connector 1**

RF input connectors (F female) are located on the rear panel. If the RF connectors are left unused, they should be terminated with an appropriate termination resistor or by disabling the ports via the user interface.

**10) RF input connector 2**

RF input connectors (F female) are located on the rear panel. If the RF connectors are left unused, they should be terminated with an appropriate termination resistor or by disabling the ports via the user interface

## Installation

### Installing the module

The module can be freely positioned in any slot in the installation frame. Install the module, following these instructions carefully to avoid denting the connectors or surfaces. Do not push on the fan cover when installing the module into the chassis. With the module extractor handle in its right-hand stop position (eject position) slide the module along the guide rails into a slot, pushing it in until the extractor handle rest on the latch rail extrusion of the HDX chassis. The module's D-9 connector should now be partially mated with the back plane connector.

Move the extractor handle on the front panel to the closed position by pressing the extractor handle inwards towards the front panel until the module is fully seated in the chassis and the extractor handle locks into place.

### Removing the module

Move the extractor handle on the front panel to the eject position. Remove the module by carefully pulling it out of its slot (Figure 3).

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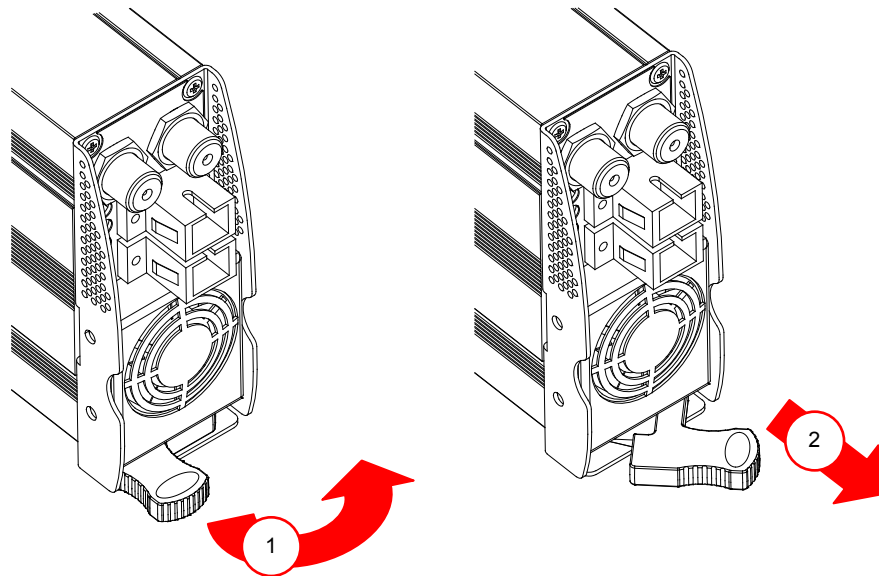


Figure 3. Removal of the module.

### Replacing the fan unit

Design of the fan unit allows it to be removed and replaced while the power is on and without interrupting the signal operation.

Working through the aperture on the side of the fan unit use a thin-bladed screwdriver and carefully prise free the fan unit from its location (Figure 4). Disconnect the wiring connector from the PCB and remove the fan.

Installation is the reverse of removal. After installation, make sure that the fan operates correctly and there are no fan-related alarms visible in the user interface.

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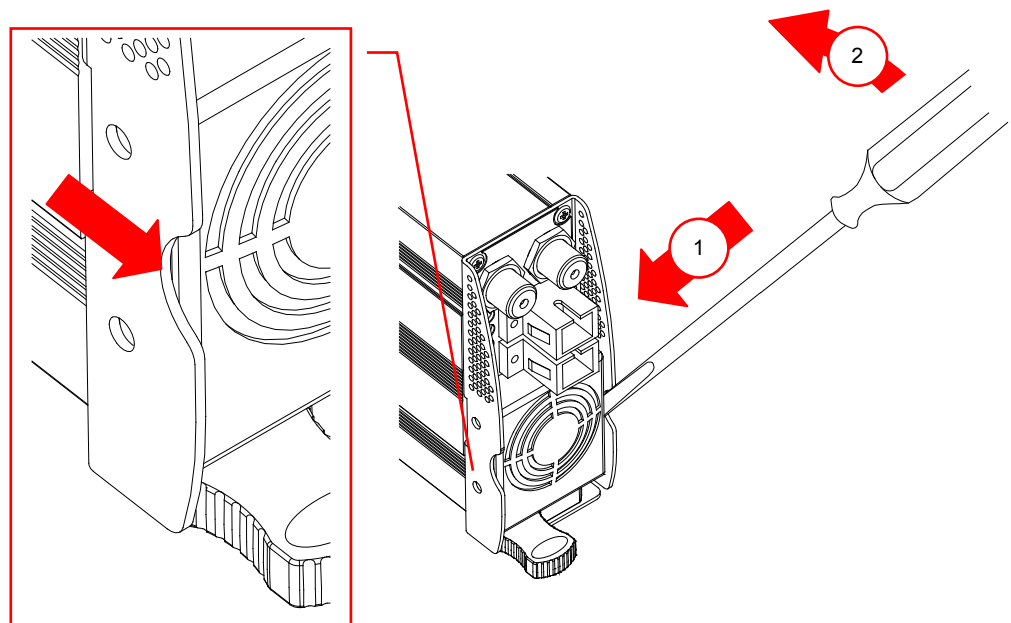


Figure 4. Removal of the fan unit.

### Cleaning the fibre connector

#### Cleaning fibre connector

- If required the fibre adapter can be detached from the front/rear panel. To prevent damage to the fibre optic cable do not pull the adapter from the panel any more than is absolutely necessary.
- Carefully clean the optical connector using a suitable optical connector cleaning kit
- If a cleaning kit is not available, wipe the end of the connector using pure isopropyl alcohol (99%) and a lint-free wipe. Dry it with filtered compressed air.

Wait until dry to insert connector into the adapter.

## Indicators

The unit has two LEDs on the front panel labelled as SIGNAL (S) and MODULE (M). These LEDs' colours reflect the unit's alarm status, i.e. what alarms are active. RF related alarms are indicated with Signal LED, others with Module LED.

If there are one or more "Major" alarms, the affected LED will be red. If there are no "Major" alarms, but one or more "Minor" alarms, the affected LED will be yellow. If there are no "Major" or "Minor" alarms, the LED will be green. Note that the "Notification" alarms do not affect LEDs.

During the power-up sequence both LEDs are yellow and fan runs at full speed.

Module LED blinks when configuration session (viewer) is open to the module.

Both LEDs blink simultaneously in red if application software cannot start.

See the 'Alarms / flags' chapter for details on alarms and LED usage.

## Software

### Establishing connection

All the needed configurations and adjustments can be carried out locally or remotely by using the CATVisor Commander software. A connection to HDO907 is possible using the following two methods:

- Remote IP connection through HDC100's Ethernet port.
- Local connection using HDX021 connection cable between a USB port of a PC and the management bus connector of the HDO compatible installation frame. **Note!** If there is a HDC100 (or other HDO bus master) connected to the bus, it cannot communicate with the HDO devices while Commander is connected to the bus. This also means that the EMS system cannot access HDO devices either. Therefore IP connection is recommended in systems equipped with HDC100.

Also SNMP monitoring and configuration is possible through HDC100 controller module.

More detailed hardware requirements and software installation instructions can be found from the **Commander User Manual** supplied with the software.

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**Alarms / flags**

All module alarms (flags) displayed in CATVisor Commander and EMS with affected LED and factory default severity settings are described in the table below.

Alarm severities (Major / Minor / Notification / Disabled) and alarm limits can be configured by the user. See the 'Monitoring' chapter for more details.

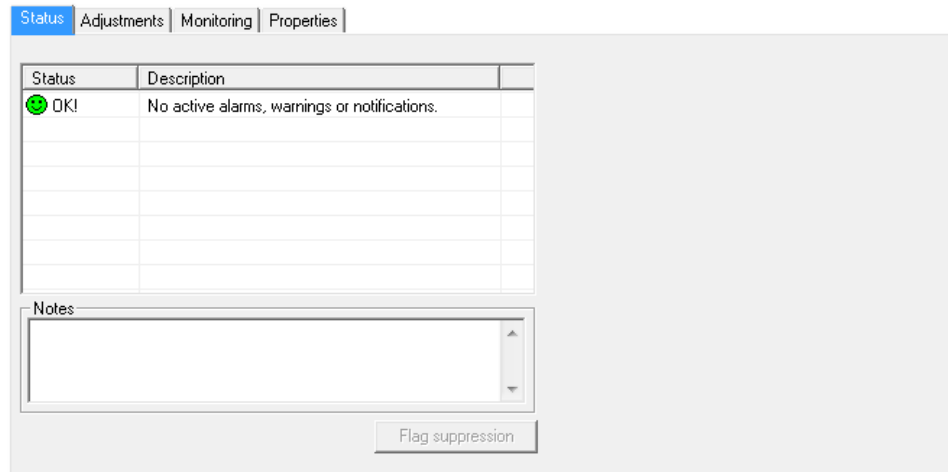
Alarm text	Description & suggested corrective action	LED	Factory default severity
Internal error	Internal error in unit prevents normal operation. If resetting the unit doesn't help, contact Teleste support.	M	Major
Fan failure	Cooling fan is not operating correctly. Check fan rotation and cabling. Replace fan if necessary.	M	Major
Settings changed	Unit's settings have been modified by user during last minute.	M	Notification
Application started	Unit was reset or rebooted during last minute.	M	Notification
RF input power high	RF input power is too high for APC to reach target OMI. Check target level setting and RF input power and adjust if necessary.	S	Major & Minor
RF input power low	RF input power is too low for APC to reach target OMI. Check RF input signal presence. Check target level setting and RF input power and adjust if necessary.	S	Major & Minor
Temperature high	Unit internal temperature is above high limit. Check ambient (fan intake) temperature and adjust if necessary.	M	Major & Minor
Temperature low	Unit internal temperature is below low limit. Check ambient (fan intake) temperature and adjust if necessary.	M	Major
Laser bias current high	Laser bias current is above high limit. Check optical output power with power meter and contact Teleste support if necessary.	M	Minor
Laser bias current low	Laser bias current is below low limit. Check optical output power with power meter and contact Teleste support if necessary.	M	Disabled
TEC current high	TEC current is above high limit. If TEC current saturates, laser temperature will increase.	M	Major & Minor
TEC current low	TEC current is below low limit. If TEC current saturates, laser temperature will decrease.	M	Major & Minor
Laser temperature high	Laser temperature is above high limit, causing laser wavelength to increase. Check unit and ambient temperatures and fan operation. Contact Teleste support if necessary.	M	Major
Laser temperature low	Laser temperature is below low limit, causing laser wavelength to decrease. Check unit and ambient temperatures and fan operation. Contact Teleste support if necessary.	M	Major
Adjustments near limit	APC/ALSC has adjusted the attenuator to closer than 1 dB to adjustment range limit. Check target level setting and RF input power and adjust if necessary.	S	Notification
Optical output power high	Optical output level is above high limit. Check laser bias current vs. initial factory value. Check optical output power with power meter and contact Teleste support if necessary.	M	Major
Optical output power low	Optical output level is below low limit. Check laser bias current vs. initial factory value. Check optical output power with power meter and contact Teleste support if necessary.	M	Major
Tuner module error	Internal error in the tuner module. If resetting the unit doesn't help, it should be sent to service.	M	Major
ALSC all pilots missing *	All pilots of an input are missing. Not generated if ALSC is switched off.	S	Major
ALSC pilot(s) missing *	One or some pilot(s) are missing, but ALSC still possible. Not generated if ALSC is switched off.	S	Notification
Spectrum out of limits *	Spectrum analyser measurement results are not within high/low limits.	S	Minor

\* Only with spectrum analyser option

## Viewer Pages

### Status

The "Status" page shows module present status and possible alarms (=“flags”).



*Figure 5. The Status page*

Each alarm is coded according to its severity:

- Red for Major (“Alarm”)
- Yellow for Minor (“Warning”)
- Blue for Notification

Alarm severities can be configured on the “Monitoring” page. For additional information see the “Alarms” chapter.

### Notes

The “Notes” field allows storing up to 100 character message into HDO907 non-volatile memory. It can be used for example as a reminder for the next service technician.

## Adjustments

The "Adjustments" page displays all HDO907 settings and measurements related to RF and optics.

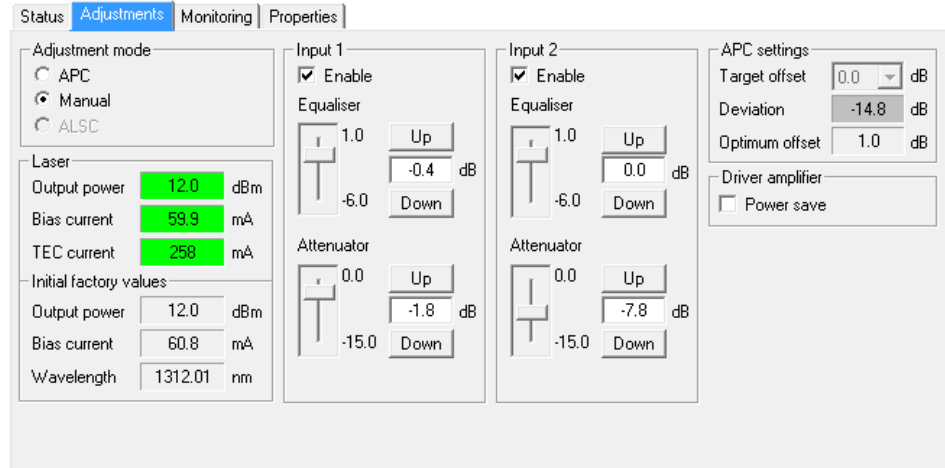


Figure 6. The Adjustments page

### Adjustment mode

The radio buttons set the method of controlling the output level:

- **APC mode** (Automatic Power Control) adjusts and maintains the total RF loading of the laser. This is done by measuring the modulating RF power and adjusting the laser drive level attenuator accordingly. This is the factory default mode.
- In **Manual mode** laser drive level attenuator is adjusted by user and there are no alarms related to levels and attenuators.
- **ALSC mode** (Automatic Level and Slope Control) adjusts and maintains the OMI% of channels. This is done by measuring the user defined RF pilot signals and adjusting the attenuators and broadcast equaliser accordingly. See the 'Pilots' chapter for more details. ALSC mode is available only with spectrum analyser option.

### Laser

The measured output power as well as laser bias current is displayed in the "Laser" frame. The background colour of the "Output power" and "Bias current" fields change to indicate alarms. A green background means legal values; red is the symbol for a major alarm and yellow for a minor alarm

To ensure sufficient cooling for the laser a TEC (Thermo Electric Cooler) is used. The current passing the TEC element is displayed in mA. Heating current is denoted with a minus sign.

### Initial factory values

Initial factory values of output power and bias current are stored into the memory of the unit. These can be compared to the present values for evaluating the lifecycle phase of the laser component.

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## Input 1 / Input 2

HDO907 inputs can be independently disabled via the checkboxes on the top of the frame. When an input is disabled an equivalent attenuator is set into the maximum value. If input 2 is disabled the unit completely shuts down the corresponding RF stage to minimise power consumption. If HDO907 is used as one input transmitter it is recommended to disable the input 2 for power saving reasons. The setting 'Input 2 disabled' is also the factory setting.

The "Equaliser" slider is used to equalise the frequency response of signals. Adjustment is done in 0.2 dB steps over a range of -6...+1 dB. The equaliser circuit can also be adjusted by typing a value into the field or using the step up/down buttons. Note that the adjustment value displays the setting of the equaliser circuit and does not directly indicate the actual slope of the transmitted signals.

The "Attenuator" is used to control the attenuation level of the input signals. The attenuation level of the input can be adjusted in 0.2 dB steps over a range of -15...0 dB. This level is adjusted with the "Attenuator" slider. Attenuation can also be adjusted by typing a value into the field or using the step up/down buttons.

When APC adjustment mode is enabled it changes "Attenuator" control field to read only and adjusts the total RF loading of the laser. Input 1 and input 2 attenuators are linked together and the difference between the attenuator values (1 and 2) is maintained during the operation in APC mode. In the case the total RF input power changes so much that one of the attenuators drifts to the low or high limit the other attenuator continues the adjustment. The difference between the attenuator values is returned when the total power recovers.

## APC settings

APC tries to maintain certain RF loading for the laser by adjusting the drive level towards the level specified in "Target offset" field. The measured adjustment error is shown in the "Deviation" field. APC circuitry tries to keep this difference close to zero.

Target offset value of 0 dB corresponds to 4.5 % OMI with 42 modulated channels. Optimum offset displays the factory measured value with which the distortion specifications are met.

## Driver amplifier

By checking the "Power save" checkbox, the transmitter will optimise power consumption of the driver amplifier circuit based on the drive level. When unchecked, the driver amplifier will be biased for max performance, regardless of loading.

Power save mode is not recommended for large channel counts, especially if analogue channels are transmitted.

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Pilots

This page is visible only with spectrum analyser option.

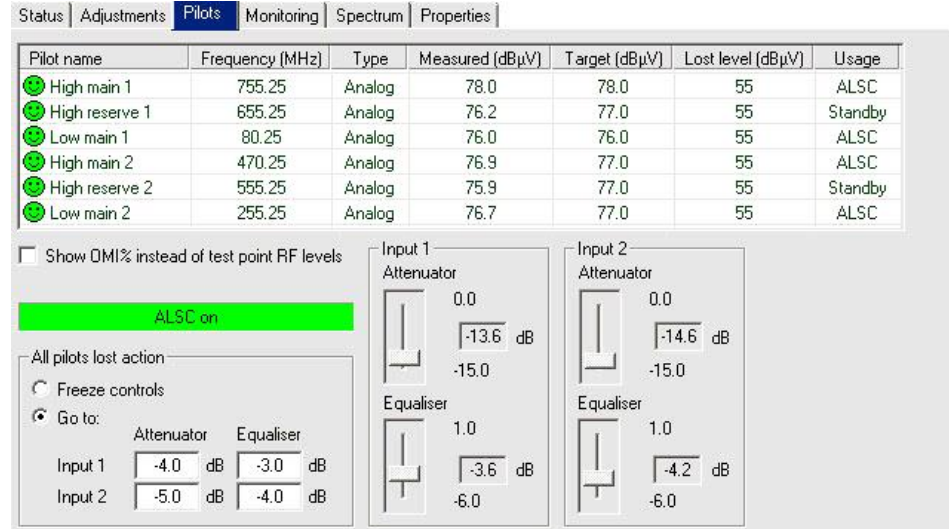


Figure 7. The Pilots page

The RF level measurement unit sequentially measures pilot levels at user defined frequencies and, if enabled, also the forward path spectrum. If ALSC adjustments are needed more priority is given to pilot measurements.

ALSC (Automatic Level and Slope Control) keeps the laser drive level stable irrespective of input signal power variations by adjusting the attenuators and equalisers of Input 1 and Input 2 independently based on the pilots. Attenuators and equalisers are adjusted in 0.2 dB steps. If controls are adjusted closer than 1.0 dB from the limit, device gives "Adjustments near limit" alarm.

If high main pilot is lost, i.e. its measured level falls below "Lost level", device uses high reserve pilot for ALSC. If any of pilots is lost (main or reserve) device gives "ALSC pilot(s) missing" alarm.




The high pilot controls the attenuator and the low pilot controls the equaliser. If both high main and high reserve pilots are lost, or low pilot is lost, device freezes the equaliser and controls the attenuator with the remaining pilot.

In the pilot table the number after a pilot name indicates which input (1 or 2) it controls. There are three pilots for both inputs. The user must make sure that the pilots marked with "1" (High main 1, High reserve 1 and Low main 1) are present in Input 1 and the pilots marked with "2" (High Main 2, High reserve 2 and Low main 2) are present in Input 2.

**Note!** The device might function even if cables are crossed (cable with pilot signals for input 1 connected to input 2 and vice versa) but the signal levels will be incorrect and cannot be adjusted.

**Pilot table**

Each pilot signal is displayed in the table with the following information:

**Pilot name:** Icon and pilot name colour coding indicates pilot status:  green for pilot OK,  red for pilot lost,  grey for pilot disabled.

**Frequency (MHz):** Pilot signal frequency, adjustable in 0.25 MHz steps.

**Type:** Detector type. The measurement detector can be individually selected for each frequency between peak detect (“Analog”) and averaging (“QAM”).

**Measured (dBµV):** Measured level of pilot signal.

**Target (dBµV):** Pilot signal target level for ALSC operation.

**Lost level (dBµV):** Limit below which the pilot is considered as lost. This should be well below "Target" for correct operation.

**Usage:** Usage status of the pilot signal. ALSC / Standby / Not used.

The pilot signal frequency, detector type, target level and lost level can be configured by double-clicking a row in pilot table. This will open a dialog box with pilot's properties that can be edited by users with at least "Service" level user rights. For others this is read-only information. "Apply" button is needed after all pilot settings have been configured.

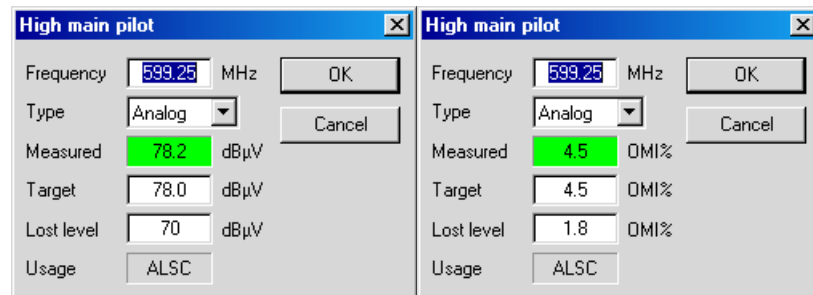


Figure 8. Pilot signal configuration dialog box (in “RF levels” and “OMI%” modes)

**OMI%**

“Show OMI% instead of test point RF levels” is the master switch of measurement units used in pilot table. Measurement results, target levels and pilot lost levels are shown either in OMI% or in dBµV that can be compared to test point levels.

**ALSC status**

The status field below the pilots table displays ALSC status:

- "ALSC on"; ALSC is enabled and works properly.
- "ALSC off"; ALSC is disabled by user.
- "Tuner module error"; Internal error in tuner module, ALSC is disabled.
- "ALSC all pilots missing"; All pilots are missing in port 1 or 2 or both.
- "ALSC pilot(s) missing"; at least one pilot (main or reserve) is missing, ALSC uses remaining pilots.

**All pilots lost action**

When all pilots are lost in one of the ports, device gives "ALSC all pilots missing" alarm and that port operates as selected by "All pilots lost action" radio buttons:

- Freeze controls: Controls will keep the values they had immediately before the pilot signals were lost.
- Go to: Controls will slowly step to user defined values in the edit fields.

If all pilots aren't lost in the other port, ALSC continues to operate in that port.

**Input 1 & 2**

Values of Input 1 and Input 2 attenuator and equaliser controls are shown here. These controls are read-only. In "ALSC" mode the Input 1 and 2 attenuator and equaliser work independently.

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**Monitoring**

The "Monitoring" page displays monitored parameters and their values as well as alarm limits, statuses and severity settings.

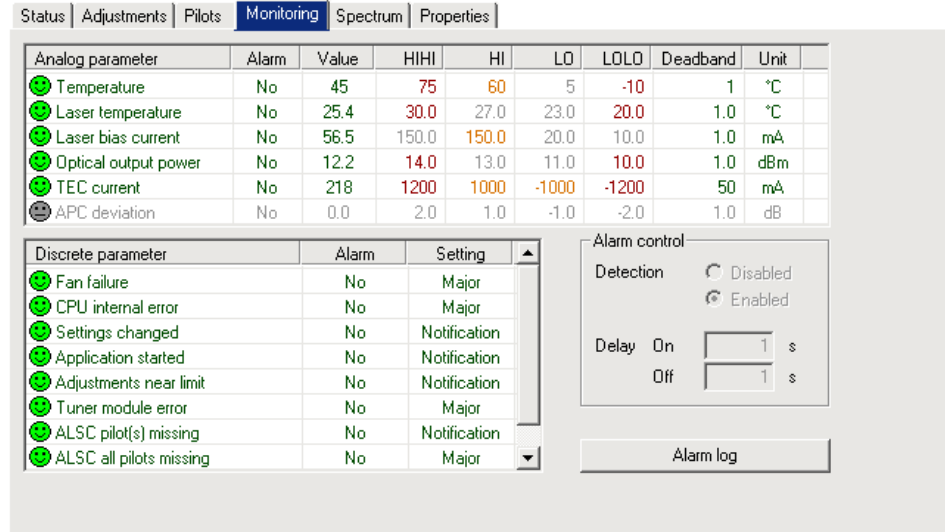


Figure 9. The Monitoring page

**Analog parameters**

Each monitored analog parameter of the unit is displayed in the upper half of the frame with following information in the list:

**Analog parameter:** Name of the monitored parameter.

**Alarm:** Alarm status of the parameter: No / Lo / Hi / LOLO / HIHI

**Value:** Current measured value.

**HIHI:** High major alarm limit

**HI:** High minor alarm limit.

**LO:** Low minor alarm limit

**LOLO:** Low major alarm limit.

**Deadband:** Specifies how much the measured value has to be on the "safe" side of alarm limit before turning off the alarm.

**Unit:** Unit of the measured parameter.

The colour of each list entry and the icon next to parameter name indicate alarm status:

- green for legal value
- red for major alarm
- yellow for minor alarm
- grey for disabled alarm

The alarm settings are user configurable by double-clicking an analog parameter. This will open a dialog box with parameter's alarm limits and deadband that can be edited by users with at least "Service" level user rights. For others this is read-only information.

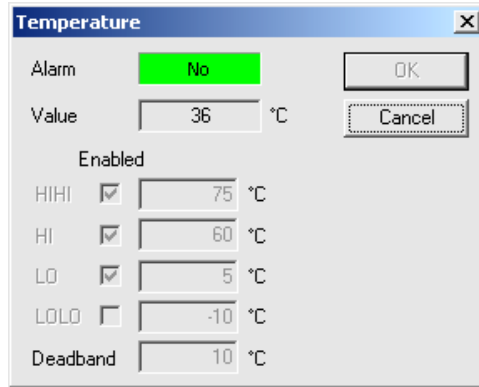


Figure 10. The analog alarm configuration dialog box

Each alarm limit can be individually enabled/disabled and configured. The alarm limits should be in decreasing order, preferably with more than "Deadband" units between each limit.

### Discrete parameters






Each monitored discrete parameter of the unit is displayed in the lower half of the frame with following information in the list:

**Discrete parameter:** Name of the monitored parameter.

**Alarm:** Alarm status of the parameter: No / Notification / Minor / Major. If the alarm is disabled, but parameter is in alarming state, "Yes" is shown.

**Setting:** Alarm severity can be configured to Major, Minor, Notification or Disabled.

The colour of each list entry and the icon next to parameter name indicate alarm status:

-  green for legal value
-  red for major alarm
-  yellow for minor alarm
-  blue for notification
-  grey for disabled alarm

The alarm severity setting is user configurable by double-clicking a discrete parameter. This will open a dialog box which can be edited by users with at least "Service" level user rights. For others this is read-only information.

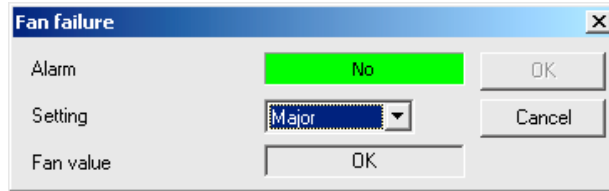


Figure 11. The discrete alarm configuration dialog box

### Alarm control

Alarm control frame provides independent on-delay and off-delay timers. The time delay feature can be used to eliminate false alarm triggering due to momentary disturbances. An alarm is only active when "Detection" is enabled and the monitored parameter has been over limit longer than "Delay On" time. Alarm goes off when the parameter has been inside limits longer than "Delay Off" time.

The settings on the "Alarm control" frame can be edited by a user with at least Service level user rights. For others this is read-only information. It is recommended not to change these values without fully understanding the effects on EMS system performance.



**Spectrum**

This page is visible only with the spectrum analyser option.

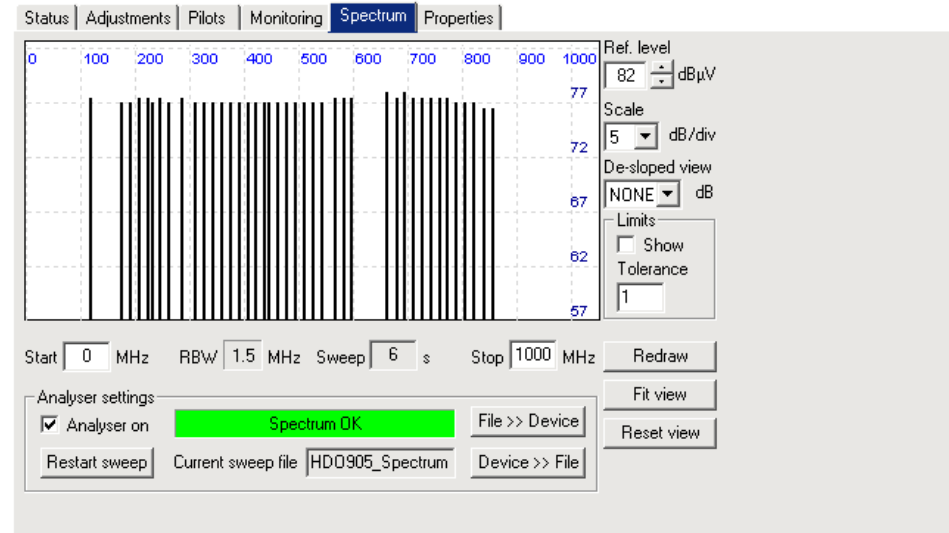


Figure 13. The Spectrum page

The "Spectrum" viewer page presents forward path level measurements in a graphical "spectrum analyser" display. Up to 100 measurement frequencies with individual PAL / QAM selection and high / low limits can be specified with a simple text file. The measurement results can also be saved back to a text file.

**Display settings**

When the viewer page is opened, the measurement results are retrieved from the device and displayed. The display is automatically scaled so that all measured frequencies are visible and the level scale is set to 10 dB/div. The display can then be zoomed or re-centered by entering new values into start and stop frequency, reference level and scale dialogs and clicking "Redraw" button. The "Fit view" button scales the display so that all measurement frequencies are visible; "Reset view" button restores full-scale display.

The RBW (resolution bandwidth) is fixed to 1.5 MHz by the hardware.

The "Sweep" field displays the last elapsed time it took to scan through the complete set of measurement frequencies.

In optical transmitter the frequency response is not sloped. The "De-sloped view" drop-down box can be used to simulate a view of a flat frequency response by reducing the level at the high end of the amplifier's response. Signal level at 862 MHz is displayed with the attenuation specified in "De-sloped view", signal level at 47 MHz is not affected at all and attenuation of the frequencies between these two are calculated using a standard coaxial cable model. The "De-sloped view" function acts only as a visual aid for making adjustments and does not affect device operation in any way.

If the graphical display is clicked with mouse the frequency, measured level, detector mode and possible high / low limit values of the clicked measurement are displayed next to the clicked point.

## Limits

The "Limits" group box has two selections. When "Show" is checked the low and high limit(s) for each measurement frequency are shown in the graphical display with blue and red triangles, respectively. If a measurement is over high limit, it will be drawn in red; if it is below low limit, in blue, otherwise in black.

The "Tolerance" field specifies how many spectrum measurements are allowed to be outside limits before the "Spectrum out of limits" alarm is generated. The default value 0 will generate the alarm even if only one value is outside limits. "Tolerance" allows fine-tuning the limit testing so that e.g. it doesn't react to one missing TV channel. The alarm is set or cleared at the end of each measurement cycle.

## Analyser settings

The "Analyser ON" checkbox is the main switch for the spectrum analyser feature. When checked, device will cyclically measure the frequencies specified in the sweep file, in addition to the standard six pilot measurements. Device typically measures more than 10 frequencies per second, depending on the amount of ALSC adjustments needed during the sweep.

The data field next to "Analyser ON" check box displays the spectrum status.

- "Spectrum OK"; Spectrum analyser is enabled
- "Spectrum analyser out of limits": Limits are defined in sweep file and more measurements than specified in the "Tolerance" field are outside limits.
- "Spectrum analyser off": Spectrum analyser is disabled.

The "Restart sweep" button clears the results table and restarts the sweep.

The "Current sweep file" field displays the filename of the last sweep file downloaded to the device. This name is derived from the first 15 characters of the file name.

The "File >> Device" and "Device >> File" buttons open a file dialog for transferring a sweep / result file to / from the device.

## Sweep and result file formats

The sweep file is a simple text file than can be edited with any text editor and most spreadsheet applications. Each line in the sweep file defines one measurement frequency, preferably in ascending order. Each line has 2-4 fields separated with tab characters and dot (.) as the decimal separator:

1. The measurement frequency in multiples of 0.25 MHz.
- 2: The detector mode as "P" or "PAL" for peak detection or "Q" or "QAM" for averaging measurement. Detector mode designation is not case sensitive.
- 3: Optional low limit in multiples of 0.5 dB $\mu$ V.
- 4: Optional high limit in multiples of 0.5 dB $\mu$ V.

Comments can be inserted at the end of the line, preceded with a tab character, or on a separate row which starts with a non-numeric character. Comments are for information only and will not be downloaded into the device and so they are lost if result table is uploaded back from device.

An example of a valid sweep file:

```
113      QAM      98.0    103.5   Channel S2
121.00   Q         101     Channel S3
126.25   P         Another comment
133.25   PAL      95
```

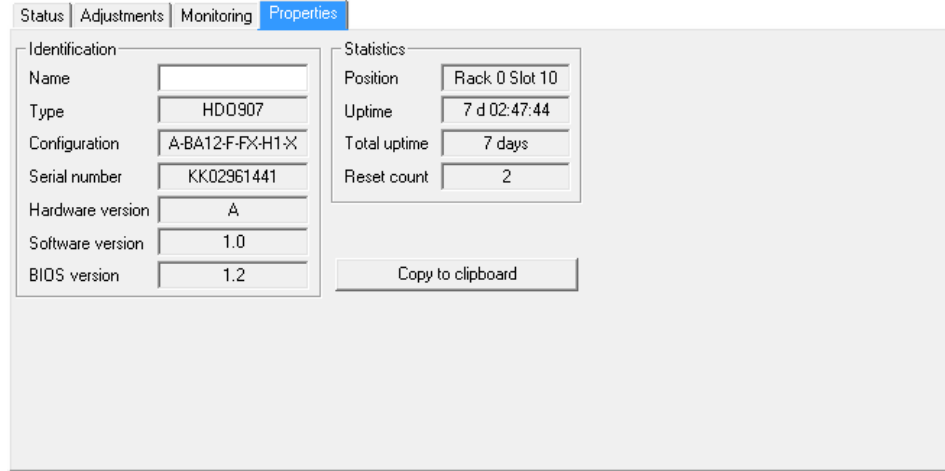
The result file format is identical to the sweep file format, except that it has a header row and a 5th column which contains the measurement results. An example of a result file produced by the above sweep file could be like this:

```
MHz      Type      LoLimit  HiLimit  dBµV
113.00   Q         98.0    103.5   100.5
121.00   Q         101     99.5
126.25   P         101
133.25   P         95      98
```

---

**Properties**

The “Properties” page displays module identification and statistics data.



*Figure 14. The Properties page*

**Identification**

The user can enter a descriptive alias name for the station into the “Name” field, such as site location etc. Alias name can contain up to 63 alphanumeric characters.

The type, configuration, serial number and hardware version of the module as well as the software information are read-only information.

**Statistics**

Each HDO device has its “Rack” and “Slot” number displayed in the “Position” field.

The “Uptime” field shows the time since the last reset / power up. The format is days, hours, minutes and seconds.

The "Total uptime" field shows the total number of full operating days of the unit.

The "Reset count" field shows the total number of unit resets.

**Copy to clipboard**

“Copy to clipboard” button copies all information on the “Properties” page onto the clipboard. This can then e.g. be pasted to an email message when contacting Teleste support.

## Legal declarations

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### WEEE Notice

This product complies with the relevant clauses of the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE). The unit must be recycled or discarded according to applicable local and national regulations.



### European Conformity

This equipment conforms to all applicable regulations and directives of European Union which concern it and has gone through relevant conformity assessment procedures.







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