LYNXTechnik AG®

Broadcast Television Equipment

Reference Manual

DVD 5480 HO

12G SDI Distribution Amplifier with 12G Single-Link <> Quad-Link (2SI) and optical/electrical Interfaces

Revision 1.6 – Dec 2020

This Manual Supports Device Revisions:	
DVD 5480 Firmware Revision	942
Control System GUI Release	8.12.0

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Contents

Warranty

LYNX Technik AG warrants that the product will be free from defects in materials and workmanship for a period of three (3) years from the date of shipment. If this product proves defective during the warranty period, LYNX Technik AG at its option will either repair the defective product without charge for parts and labor or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, the customer must notify LYNX Technik of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The customer shall be responsible for packaging and shipping the defective product to the service center designated by LYNX Technik, with shipping charges prepaid. LYNX Technik shall pay for the return of the product to the customer if the shipment is within the country which the LYNX Technik service center is located. The customer shall be responsible for payment of all shipping charges, duties, taxes and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure, or damage caused by improper use or improper or inadequate maintenance and care. LYNX Technik shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than LYNX Technik representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-LYNXTechnik AG supplies; or d) to service a product which has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty servicing the product.

THIS WARRANTY IS GIVEN BY LYNX TECHNIK WITH RESPECT TO THIS PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. LYNX TECHNIK AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. LYNX TECHNIK`S RESPONSIBILITY TO REPAIR AND REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. LYNX TECHNIK AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER LYNX TECHNIK OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Regulatory information

Europe

Declaration of Conformity

We   LYNX Technik AG
            Brunnenweg 3
            D-64331 Weiterstadt
            Germany
Declare under our sole responsibility that the product

TYPE: **DVD 5480-H/HO/TO**

To which this declaration relates is in conformity with the following
standards (environments E1-E3):
EN 55103-1 /2009
EN 55103-2 /2009
EN 60950-1 /2006
Following the provisions of 2014/30/EU and 2006/95/EC directives.

Weiterstadt, Sept 2019

Place and date of issue   Legal Signature
                                           Stefan Gnann / CEO

USA

FCC 47 Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Getting Started

Most CardModules are installed into the rack frames and system tested in the factory. If this is an upgrade part or service exchange item then the module is supplied in a padded cardboard carton which includes the CardModule, rear connection plate and mounting screws.

Packaging

The shipping carton and packaging materials provide protection for the module during transit. Please retain the shipping cartons in case the subsequent shipping of the product becomes necessary. Do not remove the module from its protective static bag unless observing adequate ESD precautions. Please see below.

ESD Warning

ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

This product is static sensitive. Please use caution and use preventative measures to prevent static discharge that could damage the module.

Preventing ESD Damage

Electrostatic discharge (ESD) damage occurs when electronic assemblies or the components are improperly handled and can result in complete or intermittent failure.

Do not handle the module unless using an ESD-preventative wrist strap and ensure that it makes good skin contact. Connect the strap to any solid grounding source such as any exposed metal on the rack chassis or any other unpainted metal surface.

Caution

Periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 MOhms.

Product Description

The DVD 5480 HO Module is a high-performance 12G SDI Distribution Amplifier with 12G single-link <> quad-link (2SI) Conversion with optical and electrical (High Density MicroBNC) interfaces.

The DVD 5480 HO module can be used in various applications depending on the user settings: 12G SDI Distribution amplifier, 12G SDI single-link to quad-link (2SI) converter (demux mode) or quad-link (2SI) to 12G SDI single-link converter (Mux mode).

The DVD 5840 HO provides four 12G SDI optical inputs and four 12G SDI optical outputs in four pairs of optical TR slots (Transmitter/Receiver, SFPs optional).
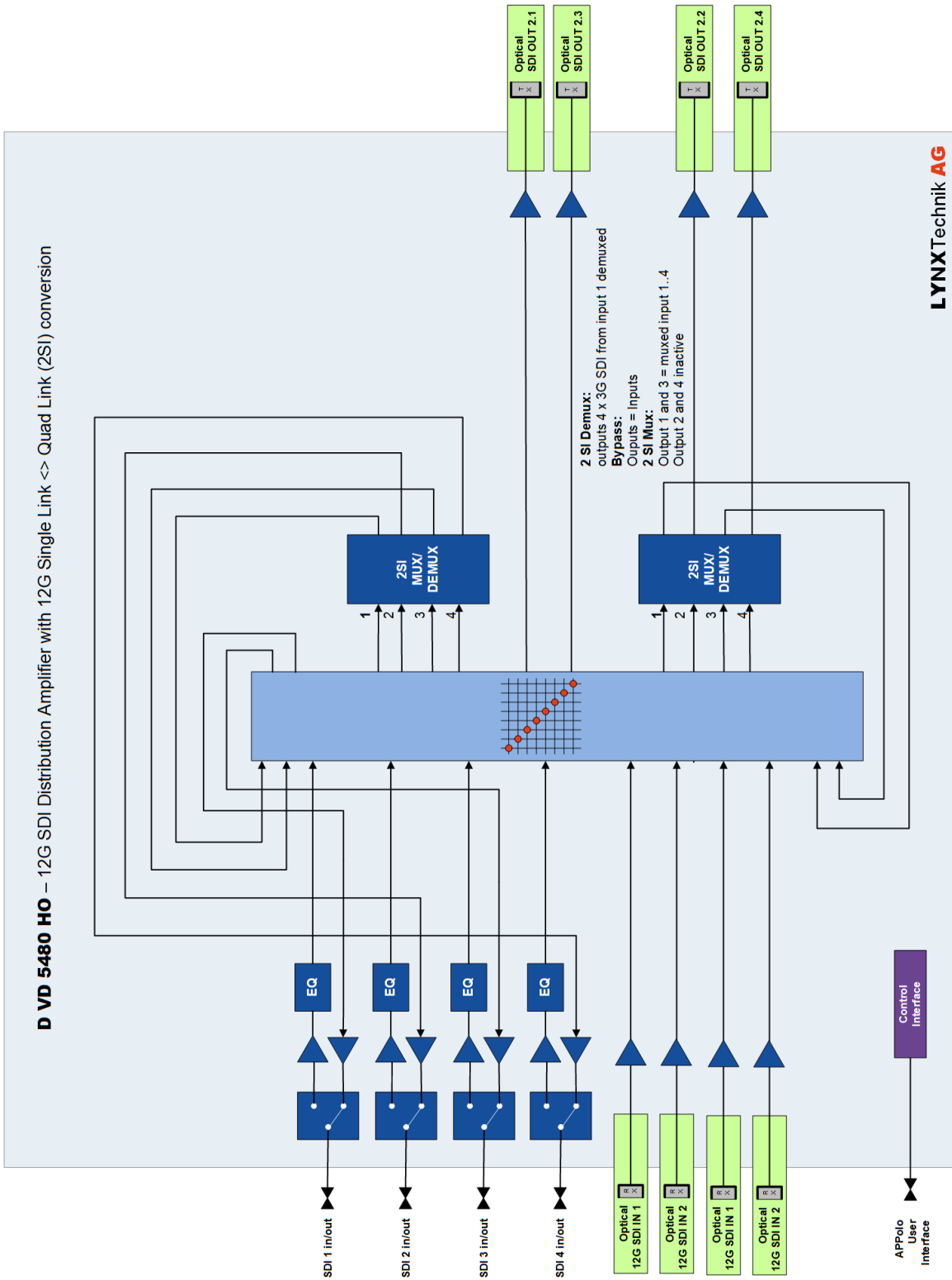
In addition, four bi-directional electrical inputs/outputs (signal flow direction can be set by the user) on High Density MicroBNCs are available for optical<>electrical conversion.

The DVD 5480 HO is part of the 5000 series of CardModules, which offer high quality, modularity and flexibility in a small form factor ideal for applications where space is at a premium.

Key Features

- Supports four 12Gbit/s SDI optical inputs and outputs each
- Provides four bidirectional, electrical inputs/outputs on High-Density MicroBNCs
- Different operation modes:
  - 12G SDI single-link Input signal can be demultiplexed to quad-link (2SI; 4x3G SDI)
  - quad-link (2SI) signal can be multiplexed to 12G SDI single-link
  - 12G SDI optical signal can be distributed to four optical outputs and four electrical outputs
  - User-selectable mixture of operation modes for multiple applications at the same time.
- Incoming and outgoing 12G SDI signals are re-clocked.
- Input presence detection with LED indication
- Microprocessor controlled with internal flash RAM for storing configuration
- Remote control, status monitoring and error reporting when used with LYNX APPolo Control System
- Hot-Swappable

Functional Diagram (Complete)

DVD 5480 HO – 12G SDI Distribution Amplifier with 12G Single Link <> Quad Link (2SI) conversion

2 SI Demux:
outputs 4 x 3G SDI from input 1 demuxed
Bypass:
Ouputs = Inputs
2 SI Mux:
Output 1 and 3 = muxed input 1..4
Output 2 and 4 inactive

Optical SDI OUT 2.1

Optical SDI OUT 2.3

Optical SDI OUT 2.2

Optical SDI OUT 2.4

2SI MUX/ DEMUX

2SI MUX/ DEMUX

EQ

EQ

EQ

EQ

Control Interface

SDI 1 in/out

SDI 2 in/out

SDI 3 in/out

SDI 4 in/out

Optical 12G SDI IN 1

Optical 12G SDI IN 2

Optical 12G SDI IN 1

Optical 12G SDI IN 2

APPolo User Interface

LYNXTechnik AG

Application 1: Distribution mode

Example 1.1: In this mode, single or multiple 12G SDI optical signals are distributed to four optical and four electrical outputs. This mode also supports fiber to 8K SDI (quad-link) conversion.
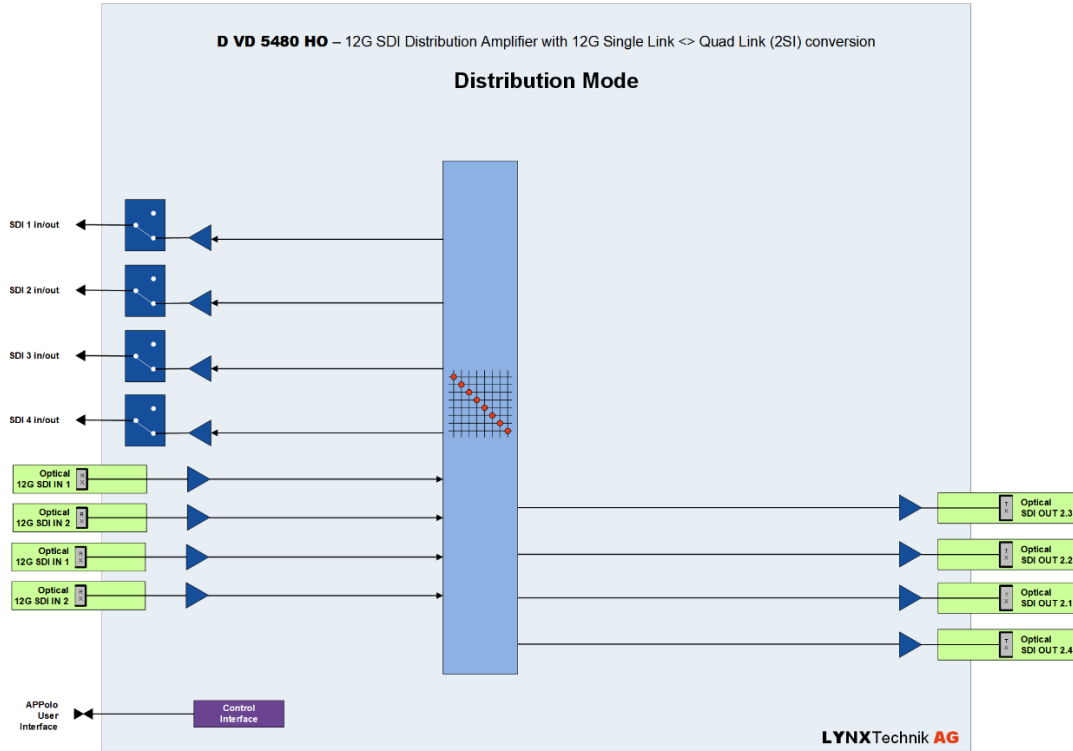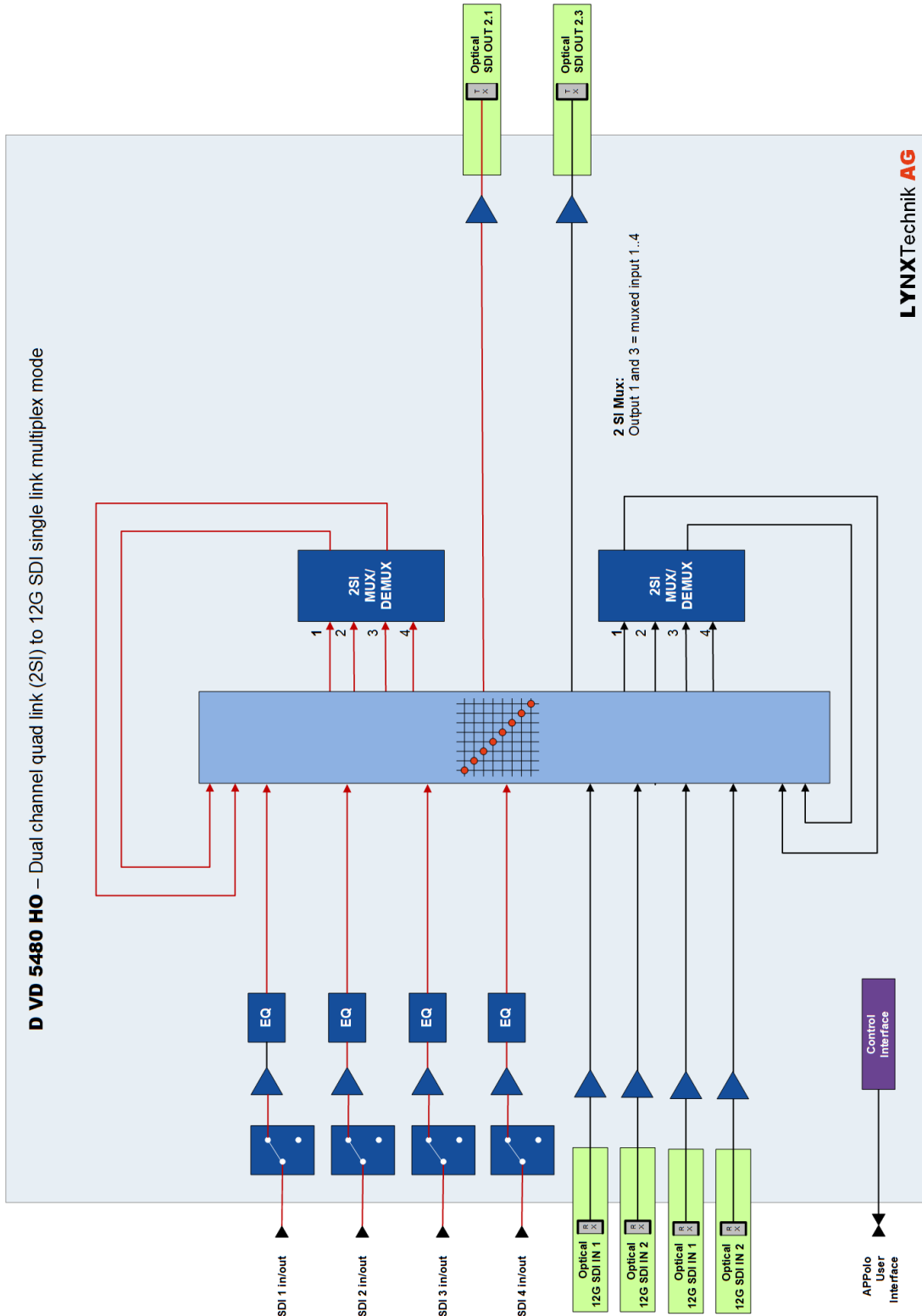

Example 1.2: In this mode, single or multiple 12G SDI electrical signals are distributed to four optical outputs. This mode also supports 8k SDI (quad-link) to fiber conversion.
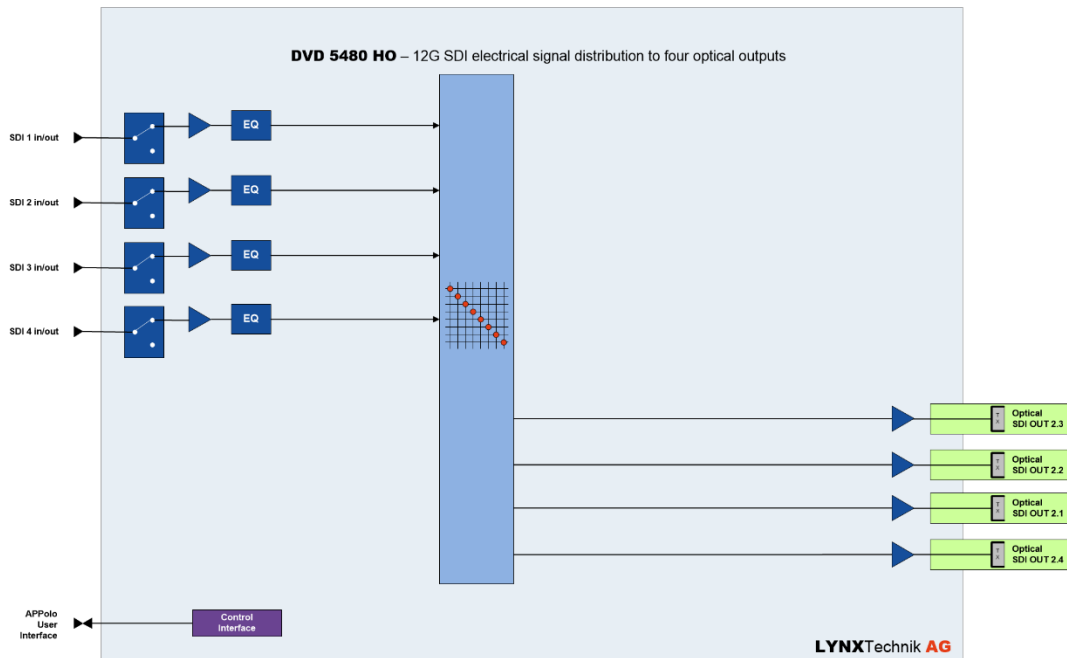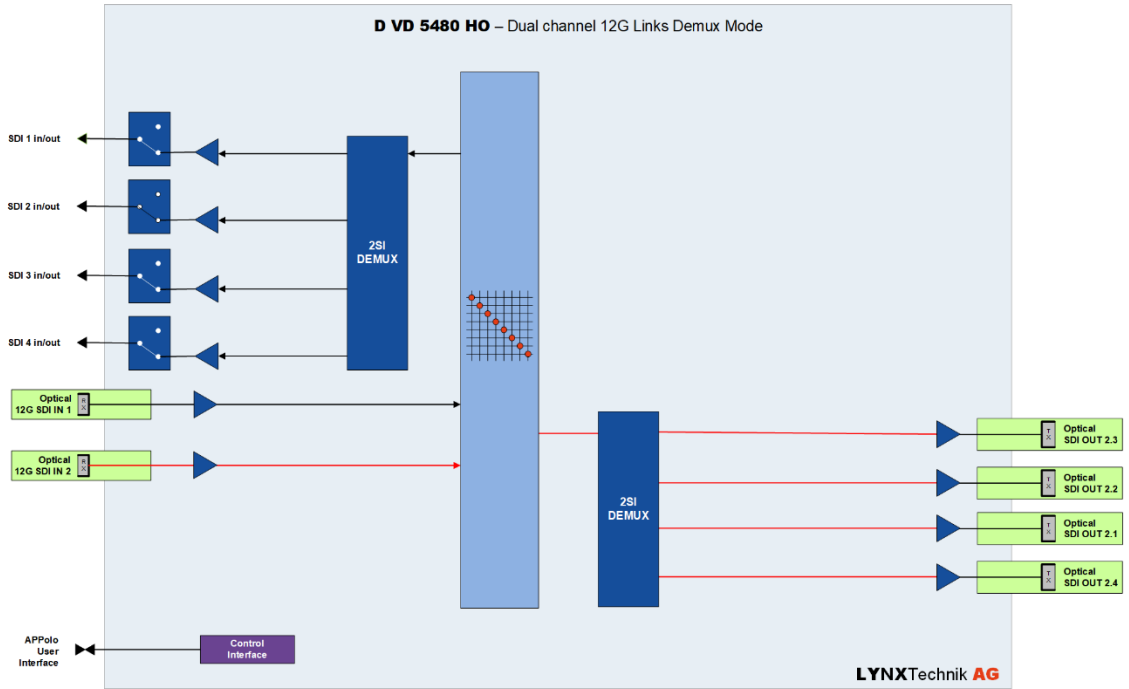
Application 2: Dual Channel Mux mode

In this mode, dual quad-link (2SI) signals over an electrical and optical inputs are multiplexed to two 12G SDI single-link optical outputs.
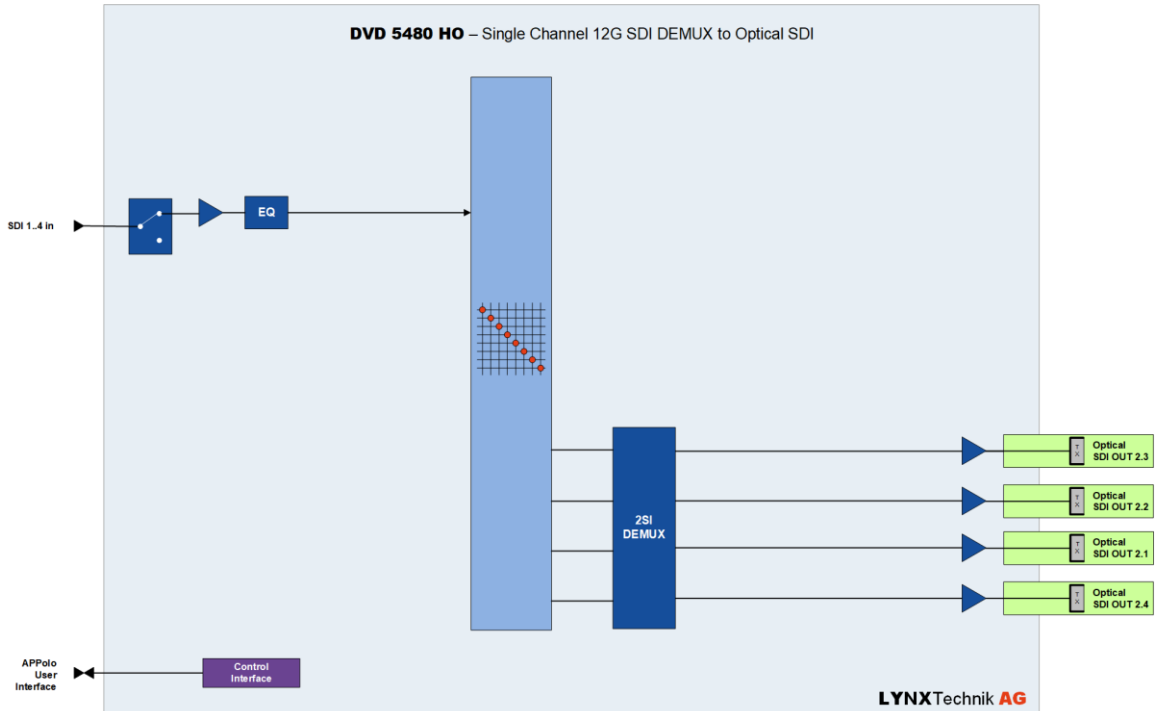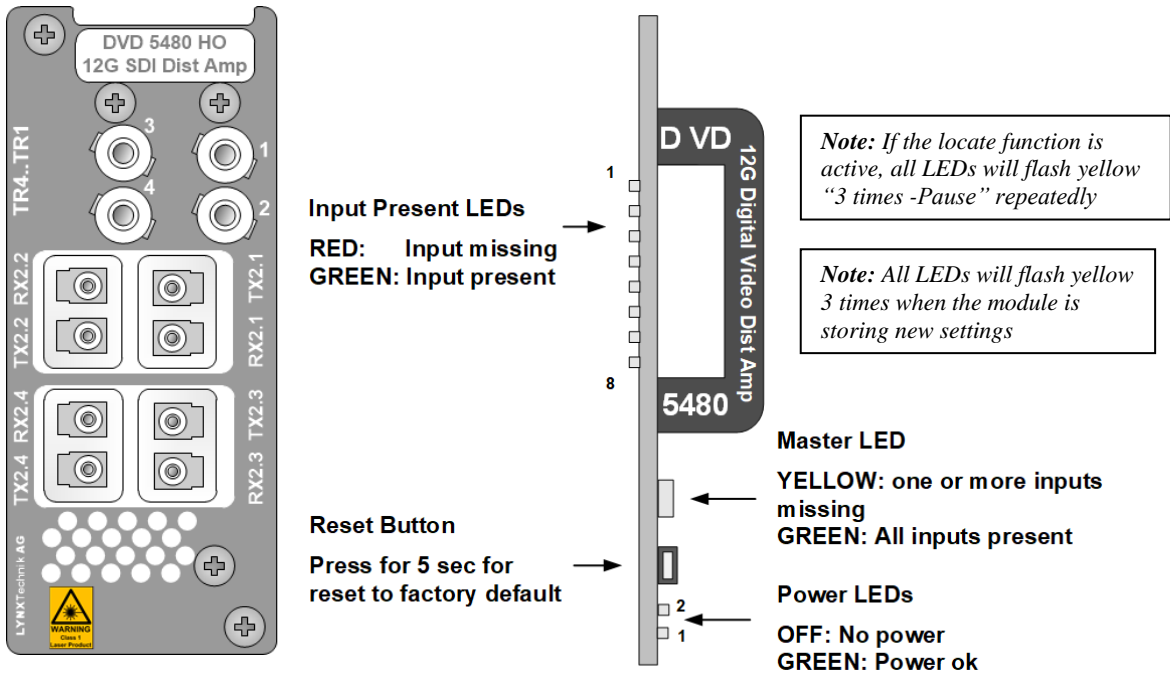
Application 3: Demux mode

Example 3.1: In this mode, dual 12G SDI optical signals are demultiplexed to quad-link (2SI) Optical and quad-link (2SI) electrical outputs.

Example 3.2: In this mode, a single 12G SDI electrical signal is demultiplexed to quad-link (2SI) Optical outputs.

Module Layout

Input Present LEDs

RED: Input missing
GREEN: Input present

Reset Button

Press for 5 sec for
reset to factory default

Note: If the locate function is active, all LEDs will flash yellow "3 times -Pause" repeatedly

Note: All LEDs will flash yellow 3 times when the module is storing new settings

Master LED

YELLOW: one or more inputs missing
GREEN: All inputs present

Power LEDs

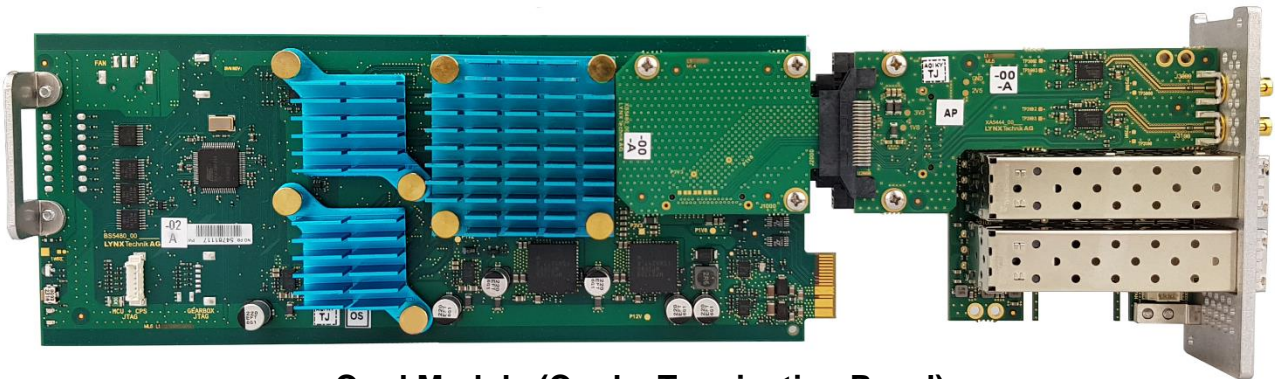OFF: No power
GREEN: Power ok

Termination Panel   **Module Front**

Card Module (Card + Termination Panel)

Connections

High Density MicroBNC

Four High Density Micro BNCs can be set as input or output for 12G SDI signals (bi-directional ports). Those Micro BNC connectors are optimized for 12G SDI / UHD Broadcast applications.

Optical Fiber

The DVD 5480 HO provides four SFP cages for optional Transmitter/Receiver (TR: OH-TR-12G -LC, OH-TX-12G-LC or OH-RX-12G-LC) SFPs.

This device has been designed for use with the single-mode fiber. Multimode fiber cables can also be used, but this will limit the maximum fiber length to approx. 300m.

! NOTE: Please take care that surfaces of fiber cables and LC connectors are always protected against scratching and dust if no fiber cables are connected. Dust and/or scratches will lead to high attenuation of the optical power transmitted.

Installation

If this module was supplied as part of a system, it is already installed in the rack enclosure. If the module was supplied as a field upgrade, please follow the installation procedure below.

NOTE *Observe static precautions when handling card.*
Please see ESD warnings on Page 6.

Each Card Module is supplied with a rear connection panel and mounting screws. Please follow the procedure below for the installation of the card module into the Series 5000 Card Frame.

NOTE. **1.** *This module should be installed in the RFR 5018 RackFrame with a Fan Front Cover to ensure sufficient airflow into the RackFrame.*

2. *A maximum number of 8 DVD 5480 HO modules can be installed in the RFR 5018 rack frame. The two slots next to the power supplies cannot be used for this module due to Fan unit installed at the bottom of Slots 1& 2, as shown below:*
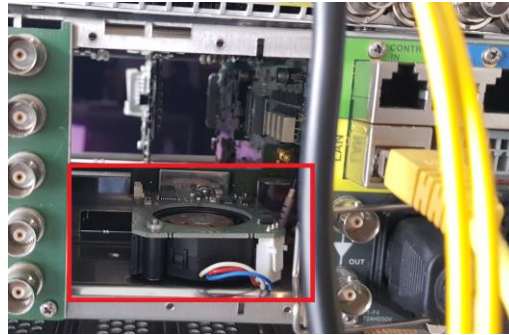
All modules except DVD 5480 HO and DVD 5480 TO/H can be installed on slot 1 & 2 due to their smaller size backplanes.

We recommend you power the RackFrame down before installing any additional modules into an existing RackFrame.

1. Select a free slot space in the card frame where the CardModule will be located.

2. Remove the blank connection panels from the rear of the rack (if fitted)

3. Install the rear connection panel using the screws supplied. Do not tighten the screws fully

4. Slide the card module into the card frame and carefully check the CardModule connects to the rear connection plate. The card should fit easily and should not require excessive force to insert - if you feel any resistance, there could be something wrong with the rear connection panel location. **Do not** try and force the connection this may damage the connectors. Remove the rear connection panel and check alignment with the CardModule.

5. Insert and remove the CardModule a few times to ensure correct alignment and then tighten the two screws to secure the rear connection plate.

6. Power up the rack and check the module LEDs and matrix display illuminate. Check the control system device tree to confirm the module is connected properly. *(It may take a few seconds for the control system to "discover" the new module)*

Control System GUI

All LYNX CardModules support a computer interface which allows setting the module parameters using a simple GUI interface. Access to all standard features *and in some cases* extended features is possible using this interface.

NOTE: Any settings made using the control system overrides any local settings made on the module. All settings are stored in internal flash ram and will survive power cycles and long-term storage.
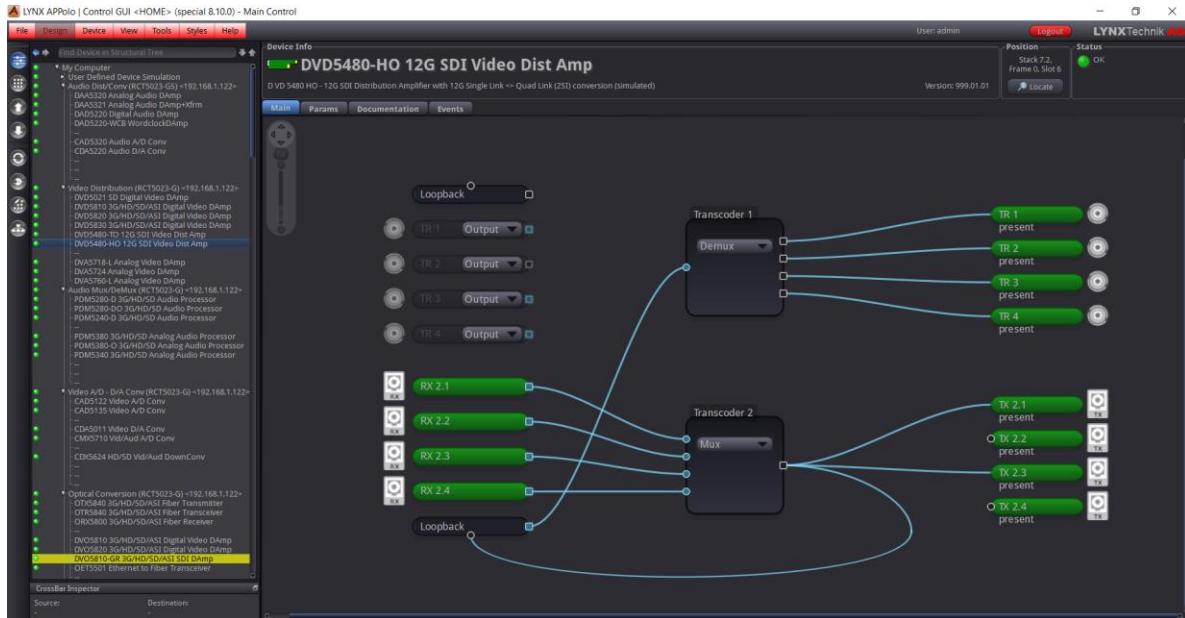
The picture above shows the complete module GUI. The "Device Info" area across the top contains information about the module including name and firmware revision. The "Position" area displays the module's position and physical location. This is useful if the device is installed as part of a larger installation.

NOTE: The Locate button (in the "Position" area) is a useful tool to quickly identify a module in larger systems. Activating "Locate" will flash the module's alarm LED in yellow color. (this does not affect the module's operation in any way). This function will be stopped automatically (timeout).

The "Error Log" at the bottom of the screen displays an individual timestamped message for any error or warning condition in the system. The same information can always be found in the APPolo Control System's textual logfiles.

The primary GUI screens and functions are described in the following sections.

Overview

The MAIN Tab (see picture below) visualizes the module's functionality. *Selections are made using onscreen drop-down selections.* The screen can be zoomed in/out using the mouse-wheel or the navigation tool in the top left corner of the screen.
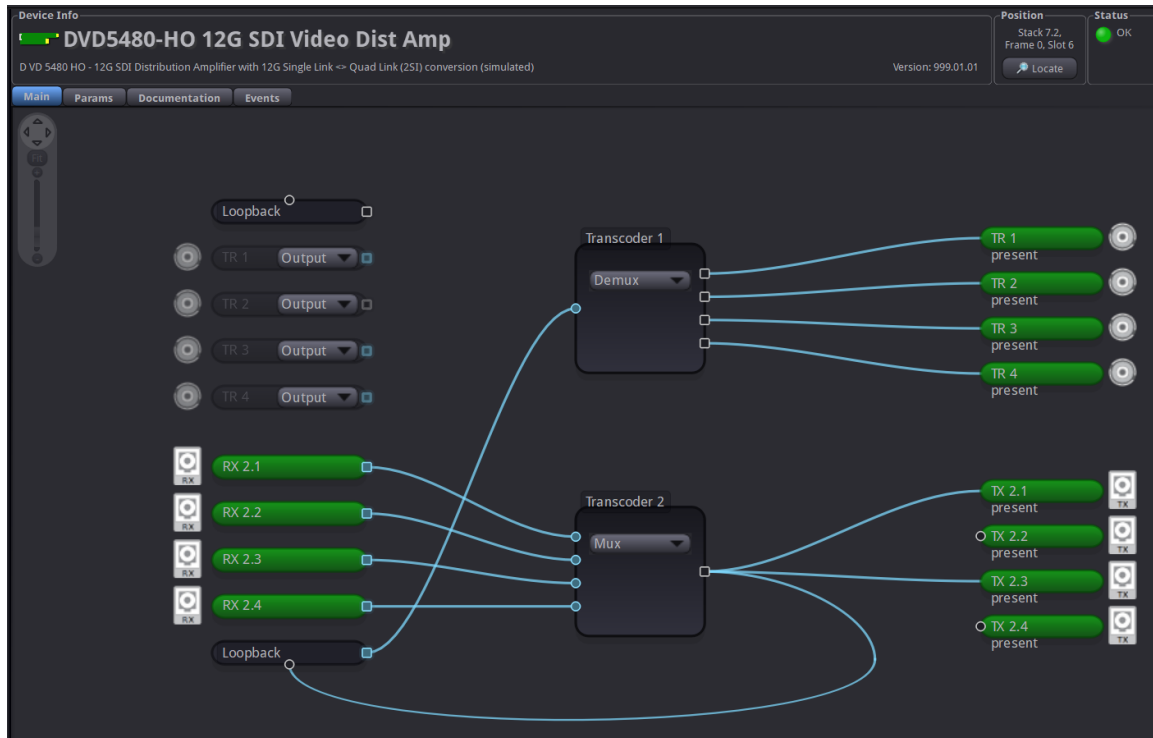

flexGUI path highlighting and signal patching

The flexGUI shows all current signal connections as lines (i.e. it does not show any signal lines that are unused dead ends). Hovering the mouse pointer over any such signal line will highlight the complete signal path that leads to this point. This illustrates clearly where the particular signal is coming from. Similarly, the downstream path is highlighted to show where this signal is going to.

To re-connect an input signal (change the routing) you can think of a signal line as a patch-cable that has to be connected to the desired source. Hovering the mouse-pointer over a flexible signal will show a handle. Grab the handle (click-and-hold) with the left mouse button and drag-and-drop it to the new desired source.

single-link to quad-link 2SI Converter

The DVD 5480 HO module has two single-link <> quad-link 2SI Converters. Those converters can be set to "Mux", "Demux" or "Bypass".
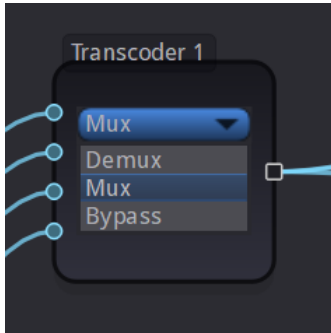
In "Mux" Mode the connected inputs (quad-link 3G 2SI) will be multiplexed to a single 12G SDI signal.

(2SI = Two Sample Interleave) signal
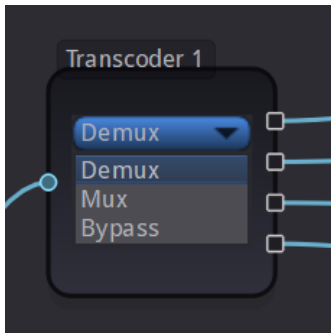
In "Demux" Mode the connected input will be demultiplexed to a quad 3G SDI (2SI = Two Sample Interleave) signal
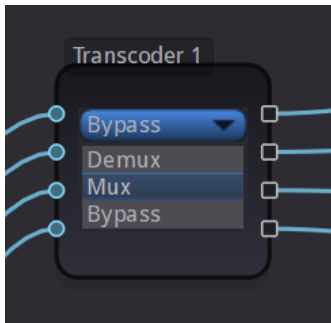
In "Bypass" Mode the connected inputs will be transparently passed to the outputs

Device Event Tab

The Events Tab is where the module alarming and error notifications are configured for the module. Any of the possible Events that the device can generate can be disabled here, which will declare such Events as irrelevant. Once an Event has been disabled in this Events-Tab, the Event will not be reported to the APPolo control system, it will not be logged in the logfiles, and it will not even influence the local LEDs of the device.

For all Events that are enabled (which is the default): as soon as the monitored condition becomes critical (e.g. input signal lost), the Event becomes ACTIVE. This change of state generates a message in the APPolo Control System. This message is stored in the APPolo Server logfile. Later, when the condition is not critical anymore (e.g. input signal present again), another message is logged in the APPolo Event System, and also saved in the logfile.

Additionally, these messages can be displayed in the APPolo GUI's Event Log (bottom part of the APPolo GUI, enabled from the "View" menu). This can, however, be disabled by removing the checkboxes from the "Log in GUI" columns (separately for "Event becomes Active" and "Event not active anymore" messages.

Similarly, an SNMP trap can be generated from the APPolo Server for any message in the APPolo Event System. Refer to the LYNX Remote Control Guide for more information on SNMP (available from https://www.lynx-technik.com/products/appolo-control/).

Parameters

The "Params" tab lists all available control parameters of the complete device. Every switch and function in any other part of the GUI is actually just a graphical control of a parameter listed on this page. There are, however, a number of parameters for more detailed control that are only accessible in this list of parameters on the "Params" tab.
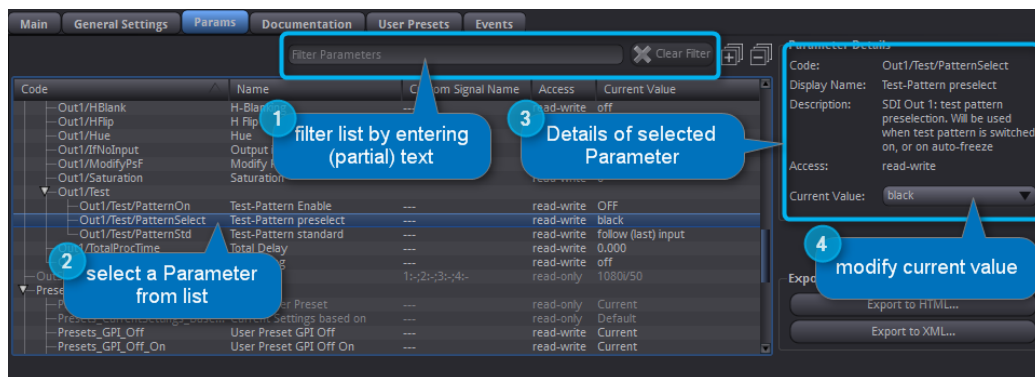
All parameters are defined by the following aspects:

- Code: This is a unique code to identify the parameter. The Code can contain the slash-character '/', to provide some structure to the total collection of parameters. The Parameter Code is always to be specified as the complete text string (i.e. including all slashes).

- Name: a human-readable short parameter name, which is used as the default text label in most parts of the GUI, as well as in any CustomControl Panel.

- Access: read-write or read-only accessibility. Note that for some parameters, the accessibility status may potentially change, depending on the current value of other parameters. E.g. the value of parameter A might be controlled automatically by default, so the accessibility of A will be displayed as "read-only". But a boolean parameter B might be provided to switch off the automatic behavior. So, when parameter B is set to MANUAL, then parameter A would dynamically change to "read-write".

- Current Value: This is the current value of the parameter. If Accessibility is "read-write" (see above), then the Current Value can be modified.

- Description: a textual explanation of the behavior of the individual parameter.

You can use the "Filter" function (located above the actual list of parameters) to show only a subset of the complete list, based on textual filtering. The filter will actually search in any part of the parameter definition, including the parameter code, the textual description and even the Current Value.

NOTE: In theory, it would be possible to manage and monitor the complete functionality of the DVD 5480 HO by accessing the relevant parameters on this tab only. All the other tabs in the GUI are only provided to provide better explanations and overview.

All Control is through Parameters

As stated above, the complete behavior of any LYNX Device can be controlled and monitored through the parameters listed on the "Params" tab. All other parts of the LYNX APPolo Control System use these Parameter to take access to any aspect of the Device.

- The LYNX CustomControl feature connects the individual elements of a custom-made Design to real device parameters by their Code.
  See https://appolo.lynx-technik.com/ -> CustomControl for details.

- The LYNX AutoControl automation rules access the individual Parameters (for both Conditions and Actions) by their Code.
  See https://appolo.lynx-technik.com/ -> AutoControl for details.

- The LYNX RemoteIF API addresses individual Parameters by Code.
  See https://appolo.lynx-technik.com/ -> RemoteControl for details.

- The LYNX SNMP Control provides one OID (numerical address in the MIB) per individual Parameters. The exact mapping of Parameter Code to OID is provided in the MIB files. See https://appolo.lynx-technik.com/ -> RemoteControl for details.

Finding the Parameter Code name for a given Parameter in the graphical GUI is made easy by clicking the Right-Mouse-Button onto the graphical control anywhere in the GUI and then selecting the "Parameter Details" option (see picture below).
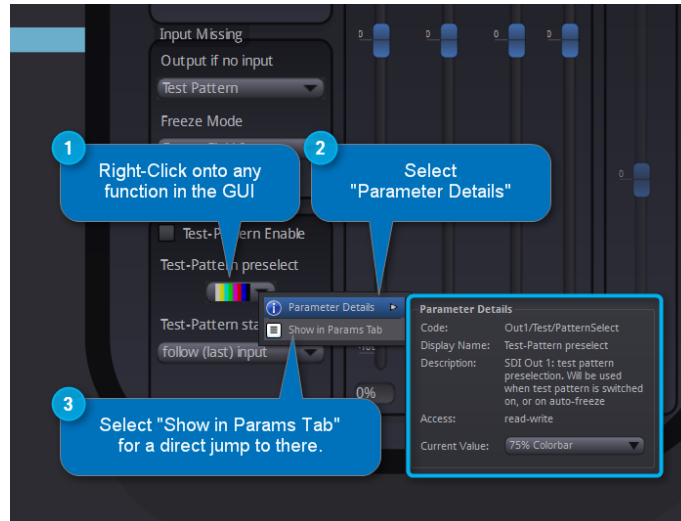
General GUI functions

There are a number of functions and commands of the LYNX APPolo Control System which are common for all LYNX devices.

A click with the Right-Mouse-Button on any module in the DeviceTree will generate the same menu that is available from the "Device" menu. This menu provides the following options:
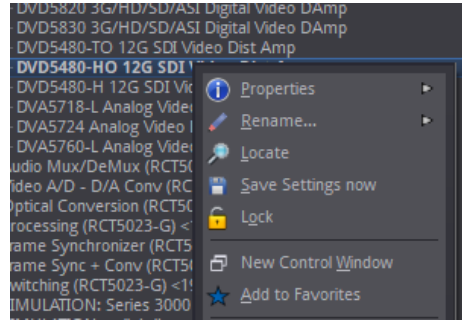
Device Properties

The first entry in the Device menu opens a sub-menu page which shows device specific properties about the selected module.
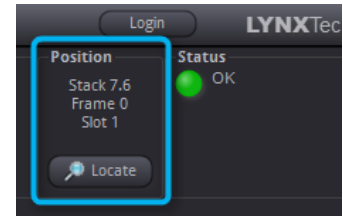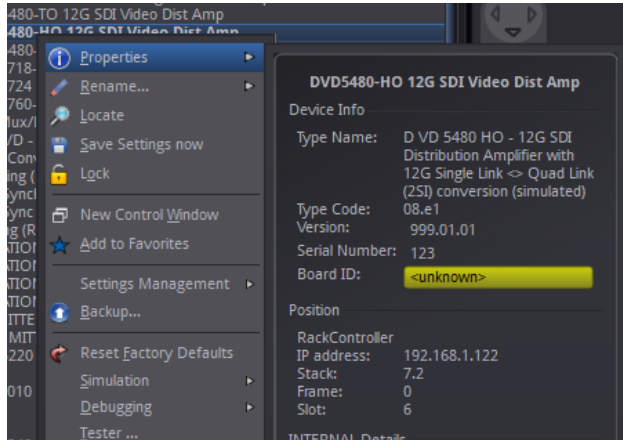
Locate

This function is useful if you need to physically locate a module in a larger system quickly (for removal or maintenance purposes) When Locate selected this will flash the module alarm LED yellow. This function does not impact normal module operation and will timeout after a short time period.

New Control Window

Selecting this option will open up a separate GUI window showing just the controls for the current module. This new window can be used to arrange multiple devices on your desktop or similar.

Rename

It is possible to rename individual items (RackFrames and individual devices) in the APPolo Device Tree. The default name of a device is the LYNX product name. This name can be modified at any time. The
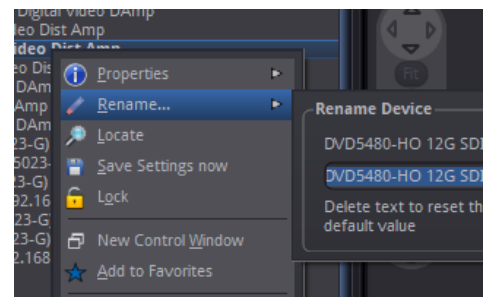
original (default) name can be restored by simply removing the custom name from that renaming field (save this as an empty name).

NOTE: The names are stored inside the flash memory of a LYNX server (if installed) or the hard disk of the connected Computer respectively.

Save Settings Now

Any modification to any parameter of a device is immediately propagated from the APPolo GUI to the hardware device (card) and made effective. The current settings are saved in a local FlashRAM of the device, so that the device will continue to work in the exact same configuration after a power-cycle. But in order to reduce the number of write-operations on the physical FlashRAM, the actual storage of a modified configuration into the FlashRAM is only executed approximately 10 seconds after the last change to any setting in the whole card. This operation is visualized on the board by all local LEDs flashing three times in yellow color.

Consequently, if you remove a card from a system BEFORE the last changes have been saved to FlashRAM, those last changes will not be available on the next power-up.

The "Save Settings Now" operation in this menu can force the current configuration of this device to be stored to the local FlashRAM now. If in doubt, this function should be executed before a device is physically removed from the system, or before electrical power is shut down.

Lock

Selecting this will lock the device to prevent from any accidental changes being made to the module's settings. The module status can be seen but all the controls will be grayed out. To unlock simply deselect the lock control from the menu.

Reset Factory Defaults

Executing this function will reset all the individual settings of all parameters of the device back to the predefined state that has been defined by the manufacturer. All custom adaptions will be lost. This operation cannot be undone.

Settings Management

The complete current configuration of one device can be copied into an internal "clipboard" and pasted onto a different device of the same type. Alternatively, the complete current configuration can be stored to a local file (as a very simple single-device backup).

Specifications

Video Input (Fiber) - optional	
Signal Type	SMPTE 297M-2006 SMPTE 292M, 424M, 2082-1
No. of inputs	4 x Receiver (OH-TR-12G-LC or OH-RX-12G-LC)
Connector	LC/PC (single mode)
Wavelength	1260nm – 1620nm (-14dBm sensitivity)

Video Input (microBNC)	
Signal Type	SMPTE 292M, 424M, 2082-1
No. of inputs	4 x on bi-directional microBNC port
Return Loss	>4dB up to 12Gbit/s

Video Outputs (Fiber) - optional	
Signal Type	SMPTE 297M-2006 SMPTE 292M, 424M, 2082-1
No. of outputs	4 x Transmitter (OH-TR-12G-LC or OH-TX-12G-LC) *
Connector	LC/PC (single mode transmit/receive – duplex connection)
Wavelength*	Standard: 1310nm
Transmission power*	Standard: 1310nm: -5dBm typ.
*CWDM options are also available	

Video Outputs (microBNC)	
Signal Type	SMPTE 292M, 424M, 2082-1
No. of outputs	4 x on bi-directional microBNC port
Connector	LC/PC (single mode transmit/receive – duplex connection)
Return Loss	>4dB up to 12Gbit/s

Performance	
Cable Length	Up to 140m at 1.485 GHz Up to 120m at 3GHz Up to 60m at 12GHz
2SI Mux/Demux	Two Converters for 12G SDI single-link to quad-link (2SI) Conversion or quad-link (2SI) to 12G SDI single-link can be activated

Electrical	
Operating Voltage	+ 12 VDC
Power Consumption	*17W including optional Fiber SFPs*
Safety	IEC 950 / EN 60950 / VDE 0805

Mechanical	
Size	283mm x 78mm
Weight	CardModule 120g, connector plate 100g

Ambient*	
Temperature	5ºC – 40ºC Maintaining Specifications
Humidity	90% maximum, non-condensing
*It is strongly recommended to operate DVD 5480 H in a Series 5000 Rack with front panel fans and to keep the front panel closed during the operation. This will protect DVD 5480 H from overheating and will avoid any signaling error due to the high temperature of the card.	

Settings and control

Control	
Remote control	Full remote control and status monitoring supported with the APPolo control system. Supported version: APPolo 8.11.0 or above
On Board Indicators / LEDs	
Input Port status	8 x LED
Master status	1 x LED
Power status	2 x LED
Supported Video Standards	
Bits / color	10 Bit / 4:2:2 (Y,Cr,Cb)
Formats: 1.5 Gbit	**720p** / 60 / 59.94 / 50 / 30 / 29.97 / 25 / 24 / 23.98 Hz **1080i** / 60 / 59.94 / 50 Hz **1080p** / 30 / 29.97 / 25 / 24 / 23.98 Hz **1080psF** / 25 / 24 / 23.98 Hz
Formats: 3.0 Gbit	**1080p** / 60 / 59.94 / 50 Hz (Level A)
Formats: 12.0 Gbit	**2160p** / 60 / 59.94 / 50 Hz

Service

Technical Support

If you are experiencing problems, or have questions please contact your local distributor, authorized dealer or reseller for more details. Please do not return products to LYNX without an RMA.

For FAQs and Technical support visit http://support.lynx-technik.com

General product information is available on http://www.lynx-technik.com

Contact Information

Please contact your local distributor; this is your local and fastest method for obtaining support and sales information.

On the LYNX homepage you will find a support section including downloads and entry to the LYNX ticket system. A knowledge base provides information about common questions there.

LYNX Technik can be contacted directly using the information below.

Address	LYNX Technik AG Brunnenweg 3 D-64331 Weiterstadt Germany
Website	www.lynx-technik.com
E-Mail	info@lynx-technik.com

LYNX Technik manufactures a complete range of high-quality modular products for broadcast and Professional markets, please contact your local representative or visit our web site for more product information.

LYNXTechnik **AG**
Broadcast Television Equipment