greenMachine®

Reference Manual

greenMachine®

titan

4K/UHD or 3G/HD/SD Quad (4) Channel SDI Video and Audio Processing Platform

Revision 2.3 – November 2024

LYNXTechnik AG®

Broadcast Television Equipment

THIS MANUAL SUPPORTS:	
titan from Revision	**833**
LynxCentraal from Revision	**1.0.0**

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.

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-LYNX Technik 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, INCIDENTIAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER LYNX TECHNIK OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

CAUTION:
The LYNX Technik Warranty policy does not cover damages caused by use of non-LYNX Technik parts and accessories. Only use LYNX Technik products with LYNX Technik parts delivered with the product or marked as compatible LYNX Technik product accessory.
Installation of parts and accessories not originally intended could result in less than optimal performance and/or injury. For in-depth service information on LYNX Technik products, refer to our website (www.lynx-technik.com). Contact your local LYNX Technik partner or dealer for ordering information.
Information contained in this publication is subject to change at any time without prior notice. Your product's appearance may vary from the diagrams contained in this or any other document.
The greenMachine titan hardware is designed to be used/installed in a horizontal position, either standing on the device feet or mounted in a RFR 6000.

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: **greenMachine titan**

To which this declaration relates is in conformity with the following standards:

EN 55103-1:2009+A1:2012 Class A
EN 61000-3-2:2006
EN 61000-3-3:1995

EN 55103-2:2009 Env. E 5

Following the provisions of 2014/30/EU.

i.V. O. R

Weiterstadt, January 2018 Oliver Berisch / QA Manager

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 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 users will be required to correct the interference at their own expense.*

Product Overview

Product Description

greenMachine adopts a three-prong approach to product definition and function. Rather than being a fixed application specific box, greenMachine is a combination of general-purpose hardware, constellation (pre-defined set of functionalities/features) for re-programmable functionality and powerful control software.

The current greenMachine titan processes four 3G/HD/SD-SDI video streams or a single 4K/UHD video input. It offers up to 12G processing support (3840 x 2160 @60 Hz) and provides the functionality to convert between single-link 4K video (12G) and quad-link 4K video (2SI; 4x3G).

The greenMachine titan hardware is a powerful general-purpose audio and video processing appliance that is custom configured using one of the pre-defined constellations, which can be purchased through the LYNX sales network. You are not limited to one constellation per greenMachine; you can switch between multiple licensed constellations to configure the machine for many different applications in your workflow.

greenMachine hardware devices are standalone processing modules with an intuitive control interface and LCD display for accessing and viewing the graphical menu. The LCD display and menu also allows you to monitor the video inputs and outputs. An entire greenMachine system is fully controlled by the powerful greenGUI® software available for Windows and Mac.

greenMachine hardware devices are extremely powerful and use the very latest high-speed programmable Xilinx technology and dual ARM processors. greenMachine and its software, APP based approach and architecture provides a future-proof solution for numerous applications from broadcast all the way to industrial-type AV uses.

Functional Diagram

The greenMachine titan has several SDI, Fiber and HDMI in- and outputs for broadcast professionals:

- 4x 3G/HD/SD SDI in/outputs for video formats up to 1080p60
- 1x 12G/6G SDI in/output for 4K video up to 2160p60
- 1x HDMI input (up to 4K)
- 1x HDMI output (up to 4K)
- 2x Optional fiber inputs and outputs (12G/6G and 3G/HD/SD respectively)
- 1x Reference sync input

Without any constellations or licenses installed, the greenMachine titan comes with input and output signal routers as shown in the functional diagram below. Basic conversion functionality from and to HDMI, SDI, and Fiber are available. Monitoring of all inputs and outputs also includes image previews

In addition, it also has separate analog and digital audio In-/outputs via 25 pin SubD und Fiber I/O. Basic conversion functionality from and to analog and digital audio is available without any constellations installed. Audio level meters are also part of the basic functionality as well as the Nova controller providing support for SNMP and custom control.

All further video and audio processing functionalities can be defined by deploying the available constellations. Please note that if a constellation is deployed without a valid license key the output will be watermarked by us (Fig.4).

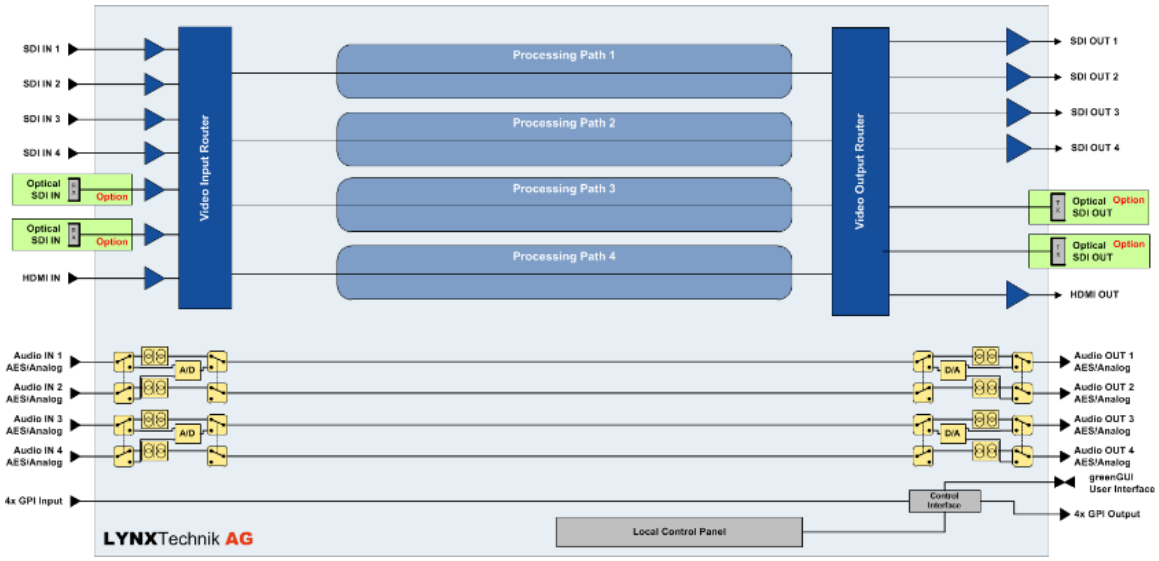


Fig.1: *Functional Diagram*

Rear Connection Panel

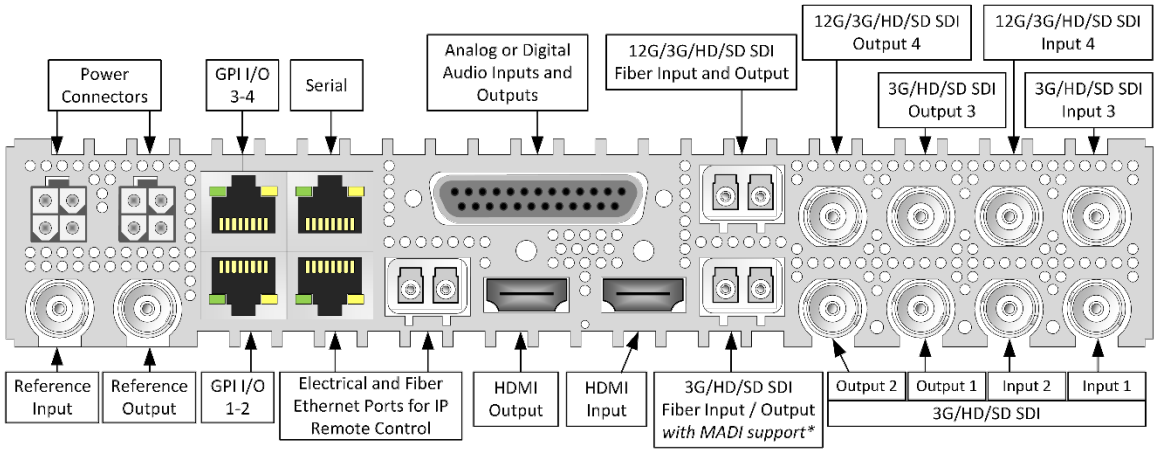


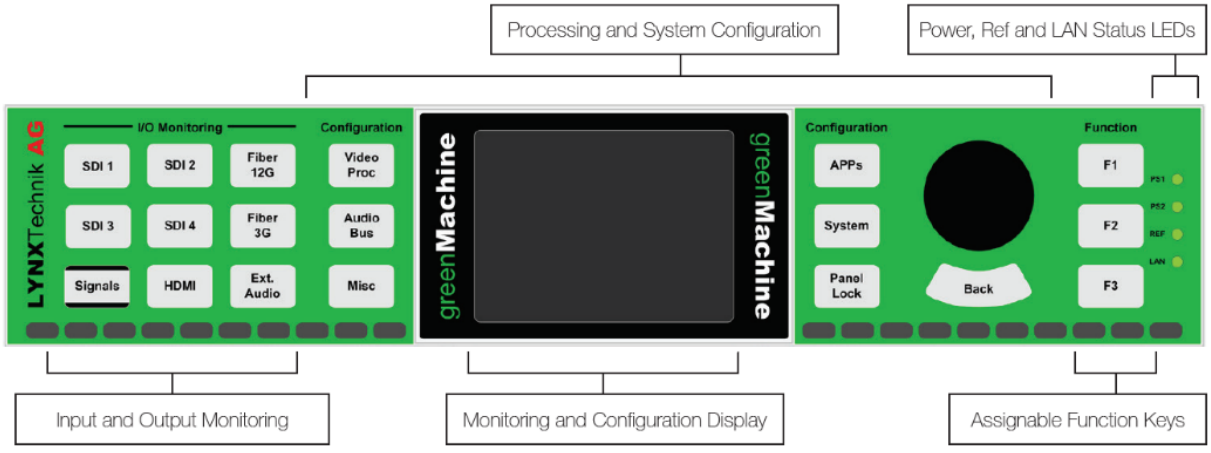
Fig.2: *Back panel description and layout*

Control Panel

The front panel serves as an on-device info panel. From here you can see at one glance:

- Which in-/output receives a signal
- What Constellation is deployed on the machine
- Switch to different settings

And more. For detailed information, please refer to the datasheet of the deployed constellation.



Customizing your greenMachine

The greenMachine titan comes standard with basic routing and audio analog to digital conversion functionalities. All further video and audio processing functionalities are defined by the deployed constellation.

Constellation

A constellation is an arrangement of different functionalities. Constellations define what video and/or audio functionality is needed on what processing path. The greenMachine titan has four 3G processing paths or one 12G processing path. When deploying a new constellation, one can choose between constellation types for 3G or 12G 4K/UHD.

There are different processing categories that the functions belong to, which are color-coded to help you identify them:

- Audio I/O is yellow
- Sync is red
- Video Converter is turquoise
- Image Proc is blue
- Generate is green
- Switching is gray
- Monitoring is cadet blue
- Global is magenta

Constellations are pre-defined in the system and are always available, e.g.:

The HDR Evie+ Constellation

This turns your greenMachine titan into the most color accurate HDR down-converter on the market; Including a quad-channel frame synchronizer with basic test generator function and video processing options, as well as full audio processing, including two Dolby E decoders and MADI input and output. Adjustable user delay is also available in.

The 4k UPXD Constellation

This constellation provides a broadcast-quality 4K/UHD up/down converter with 4x3G Quad Link (2SI) <> 12G Single Link conversion. It also includes powerful scaling capabilities that allow a versatile Region of Interest selection with adjustable user delay Additional functions include the possibility to convert metadata information as well as video/audio processing and a 4K/UHD basic test generator.

More constellations are available, and we are constantly adding new constellations, please check the LYNX homepage for more information:www.lynx-technik.com

Deployment

To give your greenMachine titan the functionality you defined in a constellation, you need to deploy this constellation onto your device(s). You can deploy any pre-defined constellation onto your greenMachine titan even if the constellation was not purchased.

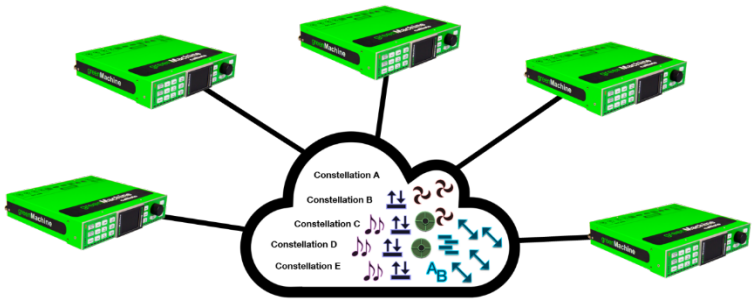
You will be able to test this constellation with your own signals including all the parameters available. If you haven't been purchased the deployed constellation, you will get watermarks on all the outputs of your greenMachine. The video watermark is shown below.

Fig.4: *Watermarked video output*

The audio channels embedded in the output video, as well as the external audio channels, will also be watermarked with a 1 kHz test tone every 20 seconds.

greenUniverse

As soon as there are at least two greenMachines in the same network, they will form a virtual cloud, which we refer to as "greenUniverse." This cloud enables the greenMachines to share and transfer information, such as your licensed Constellations or stored images/patterns in the TESTOR constellation.



When you purchase constellations, they are available for the entire greenUniverse. Purchasing a constellation from LYNX means you have purchased one instance of the constellation that can be used on any of your greenMachines at a given time. If you need to use several instances of the constellation at the same time, you will need to purchase additional constellations. If, on the other hand, you want to use a constellation at several different points in your greenUniverse and at different times, you will need only one instance of a constellation.

A simple example of this is the TESTOR constellation. Although you may need to have a generated test pattern at every output of all your greenMachines, it probably will not be necessary at the same point in time. In this case, you can share one or a few TESTOR constellations throughout your Network, deploying it at will to the greenMachines needing a generated output.

When you deploy a given Constellation to a greenMachine, the system will check if there is an available instance in the greenUniverse. If so, this instance will be assigned to this greenMachine. If not, you will get, as described above, watermarks on your outputs until you purchase the required constellation.

Control Panel Description

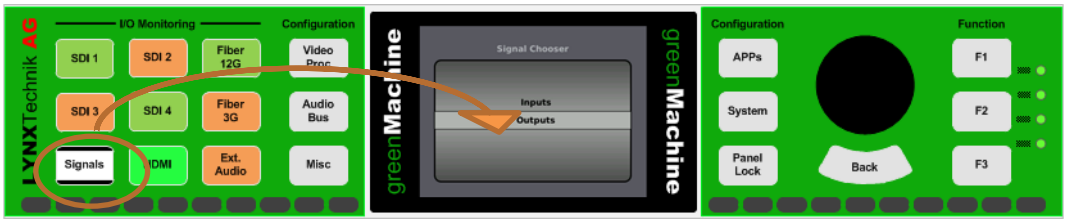
The front control panel allows the complete configuration of the module in addition to detailed monitoring features of the input and output signals. The following chapters will outline the control panel functions.

I/O Monitoring

The nine push buttons located on the left-hand side of the control panel used with the local display provide everything that is required for detailed input and/or output signal monitoring.

Signals Button

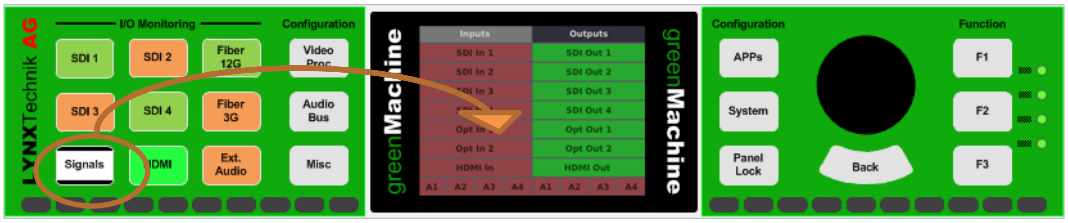
Pressing the Signals button located on the bottom left of the control panel will show the I/O Monitoring Signal Chooser to switch between Inputs and Outputs (see Detailed Signal Information as well). The Signals button will be illuminated white to indicate that it is selected.



Signals - *Chooser*

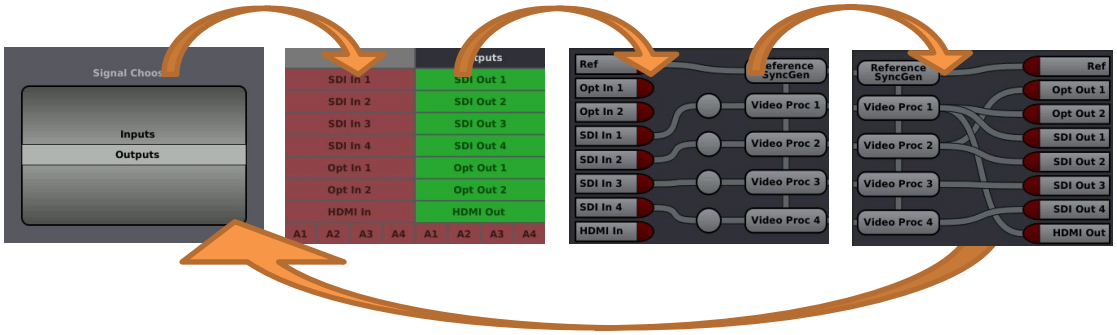
The signal buttons (e.g. SDI 1, SDI 2, SDI 3, SDI 4, 12G Fiber, 3G Fiber HDMI, etc.) now will be illuminated with colors according to the status of the selected signals (e.g. inputs).

Pressing the Signals button a second time will show the inputs and outputs overview page.



Signals - *Monitoring of all Input and Output Signals*

Pressing the Signals button a third time will show the left-hand side of a signal flow overview of the module including the status indication of the video and reference inputs and outputs. Pressing the Signals button a fourth time will pan to the right-hand side of this flow diagram.



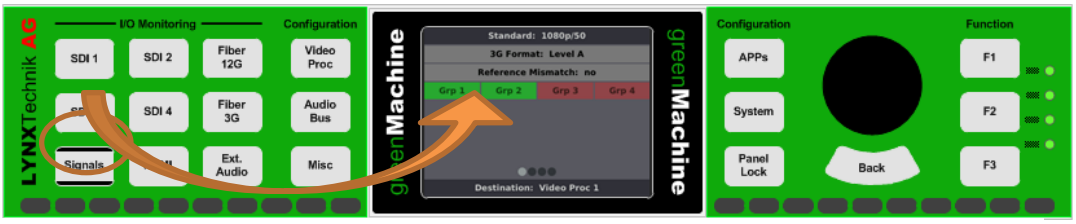
Signals *Display Navigation*

When either the left- or right-hand side of the diagram is shown in the display, the rotary push encoder can be used to pan between the left and right sides.

Pressing the Signals button when the display shows the right-hand side of the diagram page will switch back to the Signal Chooser.

Detailed Signal Information

To get detailed information for a specific input (or output) signal simply press the signal button (e.g. SDI 1) when in Inputs (or Outputs) mode (selected with Signal Chooser). The chosen signal button will be illuminated more brightly than the other ones to indicate that it is selected.



Detailed Input Monitoring

The detected input standard of the selected input will be shown at the top of the display. The bottom of the display will list which internal video processor the signal is assigned to (none, Video Proc 1 and/or 2 and/or 3 and/or 4).

Detailed Signal Information Pages

Pressing the same signal button repeatedly will toggle between different pages with more information. The following example will show the information pages for the SDI inputs.

Signal Status Overview

Depending on the type of input (i.e. electrical SDI or Fiber) this page will show details about the input format, available audio, optical input budget or similar.

Preview

The display will show a preview image of the selected input that is assigned to one of the video processors. This feature is only available for the input signal(s) assigned to one of the processors.

Audio Level Meters

The display will show audio level meters of the selected input that is assigned to one of the video processors. This feature is only available for the input signal(s) assigned to one of the processors.

Meta Data Information

The display will show the detected metadata information of the selected input that is assigned to one of the video processors. This feature is only available for the input signal(s) assigned to one of the processors.

Processing Configuration

The three buttons to the left of the display access the three processing configuration menus in the panel.

Together with the rotary push encoder and the back button, these three configuration menus are all that is required to configure the processing of the greenMachine titan.

Configuration Controls

Processing Configuration Menus

The processing configuration parameters are generally grouped to the Video Proc and the Audio Bus menus according to their respective processing functions. Settings that cannot be logically associated to any of these categories can be found in the Misc menu.

Inside the three processing configuration menus, the parameters are ordered according to the processing category they belong to. These processing categories are the same as described in the Constellation chapter: Audio I/O, Sync, Video Convert, Image Proc, Generate, Monitoring and Global, and are shown with the same color code. The picture below shows the first level of the VideoProc1 menu with all processing categories. The parameters controlling the Routers are grouped under the category I/O Config.

Inside the processing categories, the parameters are ordered according to their respective APP. Therefore, you will find in the first two levels of the configuration a direct mapping of the deployed constellation. The below picture shows the second menu (the functions) contained in the Video Convert processing category of the Video Proc 1 Menu. In this case, three functions in that category were contained in the Constellation that was deployed on that greenMachine: 3G Level A/B, Meta Data and Scaler.

Second Level of the Video Convert Menu

The structure and usage of the configuration menus work as follows:

The areas on the left and right side of the display show the active menu items. Turning the rotary push encoder will navigate between these different menu items. The inverted menu item (i.e. dark gray with white text) is currently selected. It's possible that there are more than six menu items. In this case, there will be more pages available. These are indicated by the circles at the bottom of the center part of the menu. The pale gray circle indicates which page is currently selected. To change pages, simply continue turning the rotary encoder beyond the last icon (next page) or the first icon (previous page).

There are two different shapes for the menu items. The square boxes are menus containing at least one additional menu level. When selected, the middle part of the display will show a preview of what settings and/or menus are available within this menu (see below). Pressing the encoder will enter the selected menu. Pressing the Back button below the encoder will return to the higher menu level.

Active Menu Items

Image 2: Preview of Menu Content

Image 1: Parameter Preview

The hexagon-shaped items are parameters. When one of these menu items is selected, the middle area of the display will show the type of parameter and the current setting (see picture below).

To edit the parameter, press the encoder. When in edit mode, turn the encoder. To exit the edit mode, press either the encoder or the Back button.

System Settings

The System menu contains all settings and monitoring possibilities that are not directly related to the processing.

Deploying Constellations with the Local Control Panel

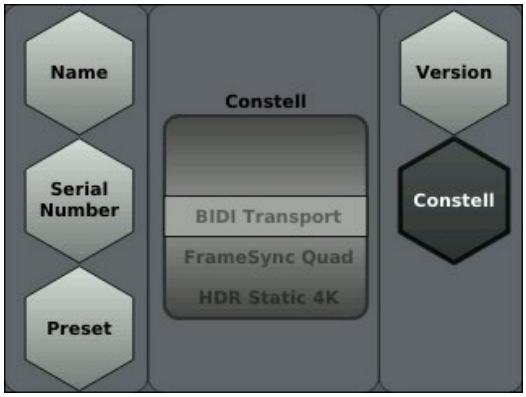
The front control panel allows the complete configuration of the module including the deployment of new constellations.

Deployment of new constellations can be done in the System menu. To select the System menu, just press the button next right to the display. Then select the General menu.

Note: *The areas on the left and right side of the display show the active menu items. Turning the rotary push encoder will navigate between these different menu items. The inverted menu item (i.e. dark gray with white text) is currently selected.*

There are two different shapes for the menu items. The square boxes are menus containing at least one additional menu level. When selected, the middle part of the display will show a preview of what settings and/or menus are available within this menu. Pressing the encoder will enter the selected menu. Pressing the Back button below the encoder will return to the higher menu level.

Please select the constellation you would like to deploy from the parameter list in the display and press the rotary button.



Note: The hexagon-shaped items are parameters. When one of these menu items is selected, the middle area of the display will show the type of parameter and the current setting.

To edit the parameter, press the encoder. When in edit mode, turn the encoder. To exit the edit mode, press either the encoder or the Back button.

IP Settings

This menu provides all settings required for the IP configuration of the greenMachine.

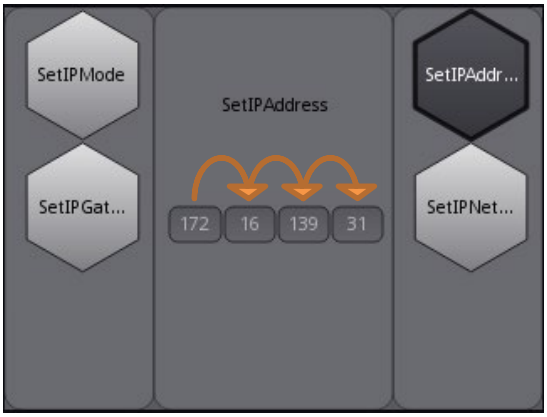


Image 3: IP Setting Adjustment

Set IP Mode

Choose between Static IP settings or DHCP. If the greenMachine is installed in a network environment where the IP addresses are allocated automatically (DHCP) the greenMachine titan can be set to DHCP mode. The default value is DHCP.

Set IP Address

This menu allows the reading (in DHCP mode) and setting of the IP address if the IP Mode is set to Static. To adjust the IP address, press the encoder and the first block of three digits can be set by turning the encoder. Press the encoder to confirm the first block and to edit the second. Repeat this procedure until you have set all four 3-digit blocks of the IP address (Image 4).

After entering the four IP address blocks, you will be asked to confirm the new IP address. Press OK to finalize the IP address settings. If you press Cancel the IP address will not be adjusted. Pressing the Back button on the panel at any time while editing the IP address will exit the edit mode and the IP address will not be adjusted.

Set Gateway

This menu allows the adjustment of the IP Gateway if the IP Mode is set to Static. This works in the same way as the setting of the IP Address.

Set Network Mask

This menu allows the adjustment of the IP Network Mask if the IP Mode is set to Static. This works in the same way as the setting of the IP Address.

NOTE: When in DHCP mode the greenMachine will wait approximately 30 seconds for a DHCP capable server to get the allocation of an IP address. If no address is allocated by a DHCP server, the device will configure itself to a zero-conf configuration:

IP address:	169.254.x.x (x.x is arbitrary)
Netmask:	255.255.0.0
Gateway:	0.0.0.0

Panel Configuration

Brightness

This menu allows the adjustment of the brightness of the display and button illumination.

Timeout

When turned on, the panel will go into snooze mode after the selected timeout. The panel will turn on again if any button is pressed.

Audio Level Meters

The Audio Level Meters menu contains all the parameters to configure the Audio Level Meters shown on the panel and in the greenGUI. These parameters include the PGM Level (red) in dB, the Test Level (yellow) in dB and the DropOff wait time in seconds. Image 5 shows the effect of the PGM Level (red) and the Test Level (yellow) on the Audio Level Meters.

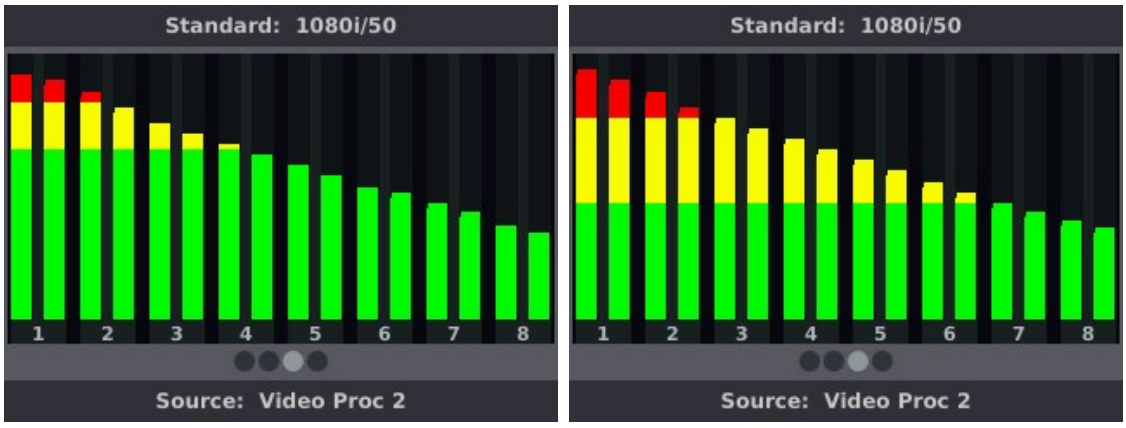


Image 4: Audio Level Meters with different PGM and Test levels

F-Key Assign

This menu provides the possibility to assign stored specific functions to the three F-Keys on the far right of the control panel (Image 6).

Once a function has been assigned to an F-Key, pressing this function button will activate this function. The available functions are:

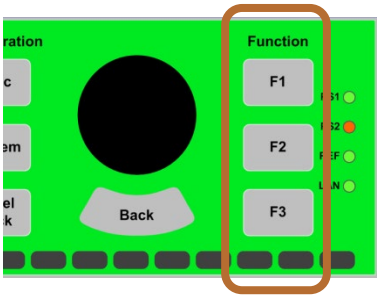


Image 5: Function Keys

Show IP Settings

This will show a screen with the detailed IP Settings of the greenMachine with the IP Mode, the IP Address, the Netmask, the Gateway as well as the MAC Address.

Show Constellation

This will show a screen with the name of the Constellation which is currently deployed on the greenMachine.

Show Demo State

This will show whether the greenMachine is working in “demo state”, i.e. with watermarks or not. If the greenMachine produces a video or audio watermarks, the missing APPs responsible for the watermarks are also summarized here.

Reset

There are two types of reset available:

Reset Proc

Using this reset will only set the processing relevant parameters back to factory default. In other words, all parameters that can be configured via the Video Proc, Audio Bus and Misc menus.

Reset Panel

This reset will set all panel settings (brightness, timeout, F-Key Assignments, and Audio Level Meter settings) back to factory default.

There is also a hard reset available between the two HDMI connectors on the back panel. Pressing this with a pin will trigger both resets, resetting all parameters of your greenMachine titan. Only the Network Settings parameter will stay unchanged.

Health Parameters

This menu provides health monitoring parameters for the greenMachine. If one of these parameters should be within a warning or critical level, the System menu button will be illuminated according to the alarm state and in addition, the parameter in question on the display menu will have a colored frame.

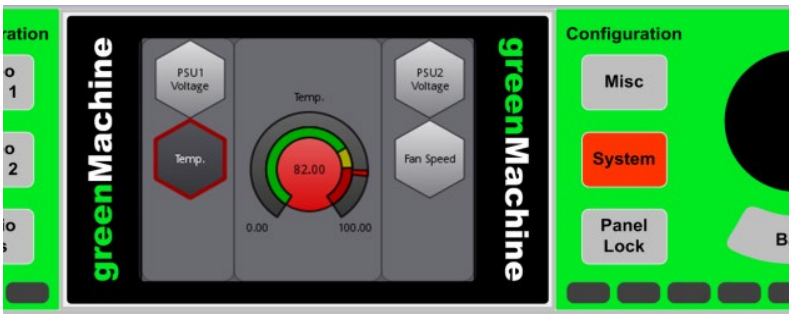


Image 6: Health Parameters

Panel Lock

The Panel Lock button at the bottom right of the display activates or de-activated the panel lock. To lock or to unlock, press and hold the button for 3 seconds.

When in lock mode, the Panel Lock button will be illuminated red and the configuration buttons will be dimmed. However, the I/O Monitoring functionality will still be available.

Power Supply Unit, LAN and Ref LEDs

The four LEDs located on the far right of the control panel provide a simple status monitoring of the power supplies, LED activity, and reference input.

PS 1&2

If a power supply is connected the LED will be green. If not, the LED will be off.

LAN

This LED will indicate if a LAN connection is established.

REF

This LED is a simple monitoring of the reference input.

Green: Valid reference detected

Yellow: Reference to video mismatch

Red: No valid reference detected

IP Remote Control

The greenMachine can be used as a stand-alone module but at the same time it can be fully controlled by the LynxCentraal Windows and Mac desktop application. In addition, the greenMachine titan can be remote controlled and/or monitored via SNMP or the LYNX IP remote control protocol through the NOVA controller function.

LynxCentraal

The LynxCentraal software is supplied as part of the greenMachine package. This can be downloaded from the LYNX website. LynxCentraal control software is a comprehensive, centralized application that provides remote control and status monitoring and event (error) reporting for all modules installed in a greenMachine system.

System Requirements

LynxCentraal is designed to run on a Windows-compatible PC or a Mac. The supported Windows platforms are Windows 7, Windows 8 and Windows 10 (recommended). The supported Mac versions are High Sierra, Catalina and Big Sur.

System Requirements	Minimum	Recommended
CPU	Core-2 CPU 1.6GHz	Quad Core CPU 2.5GHz
RAM	4 GB	8 GB
Free HDD space	1 GB	1 GB
Graphics	1280x960	1920x1080

Passive Operation

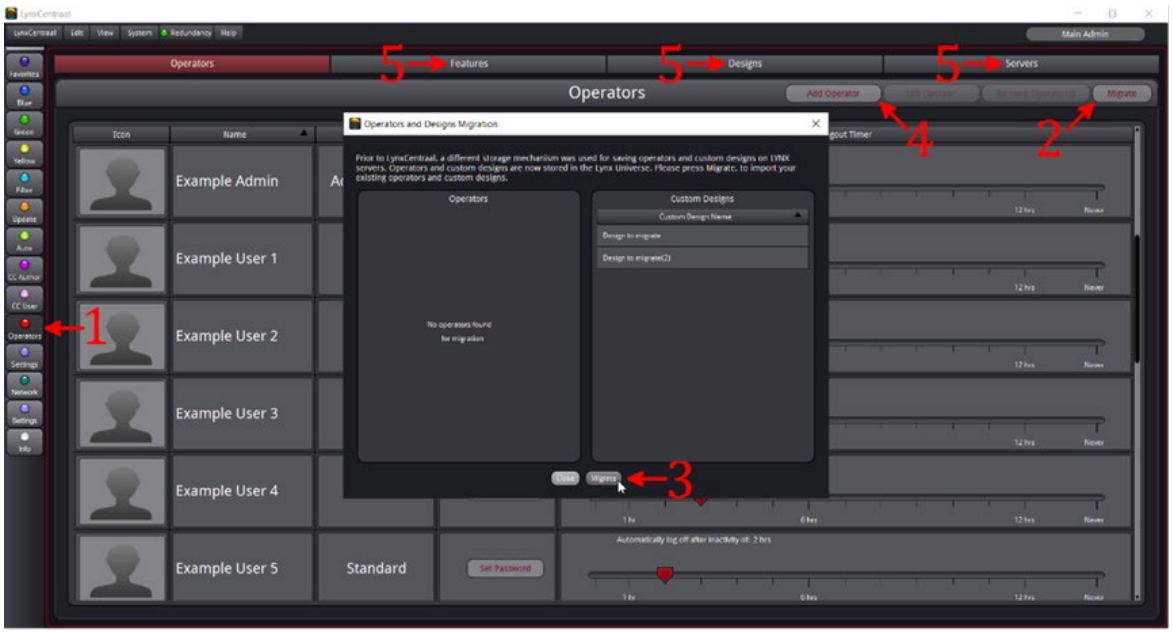
The control system software application and hardware are completely passive in nature. All settings for the modules are stored in the individual greenMachine's Flash RAM. Nothing is stored in the PC/MAC. The greenGUI software application and the local control on the greenMachine merely provide a mechanism to view and change the settings stored within the individual modules' Flash RAM.

Should a PC running the control system be shut down or a network error be encountered there will be no impact on the modules' normal operation and settings.

This passive design philosophy was deliberate as terminal equipment is typically used in critical applications where continuity of use and reliability is paramount. The passive nature essentially isolates the control system from normal operations as critical a point of failure.

Quick Start

Login as Main Admin with the default password 1main$admin



- Download the LynxCentraal from https://www.lynx-technik.com/downloads/lynxcentraal/ .
- Install LynxCentraal on a PC in the same network as your devices.
- Start the application
- Login as **Main Admin** with the default password **1main$admin**
- Select the Operator Feature Page
- Migrate existing users and designs. It is best to do this first, rather than waiting until new operators have been added. The migrate function lists all operators and designs it finds in the network, and you have a choice which ones you would like to keep.
- Add new Operators and Administrators - press *Add Operator* and set a name, initial password and operator type
- For each newly added operator, select features, designs and servers which are permitted to him or her.

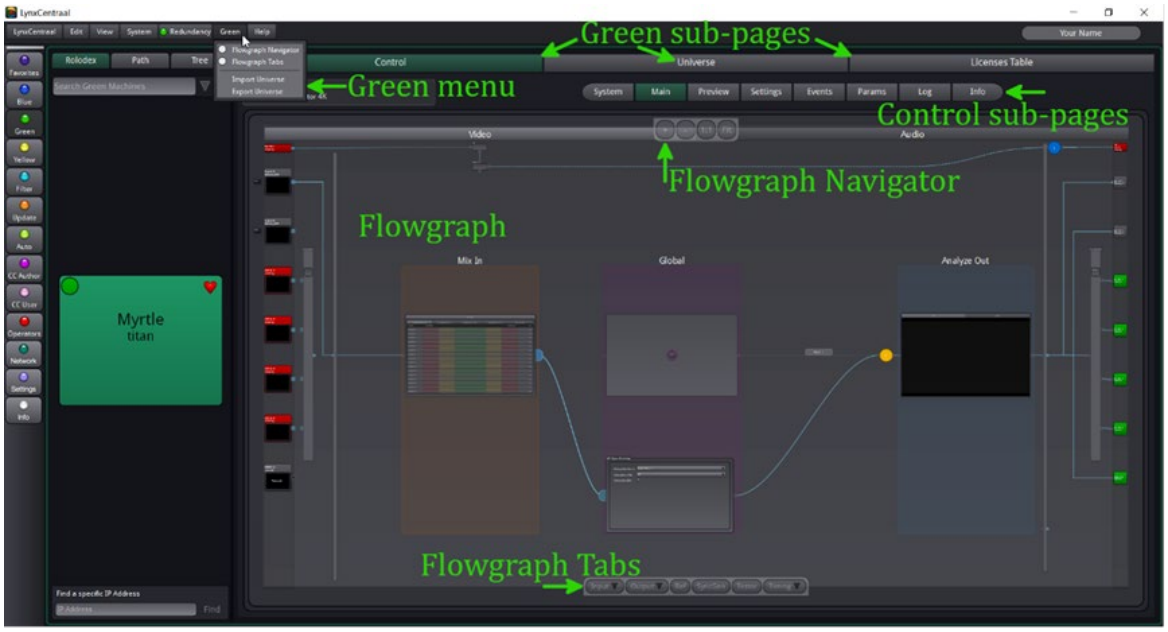
Please check the user manual for more details.

Getting Started

To connect the greenMachine titan to the LynxCentraal, make sure that the module and the computer running the LynxCentraal control software are in the same IP range (see IP Settings for more details).

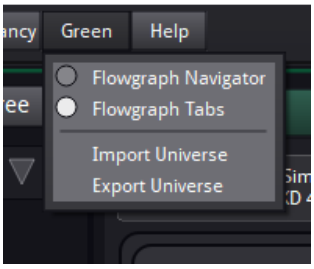
Start the LynxCentraal. The software will automatically detect all greenMachines present in your network and show them in the Rolodex (see below, item 1) on the left side of the screen. Selecting a machine in the Rolodex will cause the UI on the right to update its data and parameters.

The Green Page



Green Menu

A ***Green Menu*** *is added to the main menu bar when the green page is visible. Items specific to working with the green pages are available in the menu pulldown.*



- Flowgraph navigator
- Flowgraph tabs
- Import Universe
- Export Universe

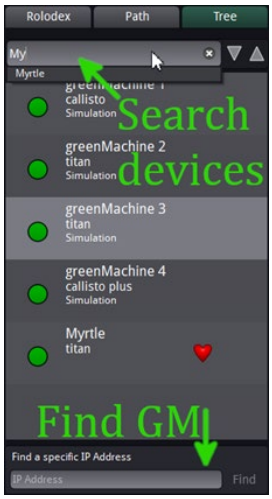
Tables

There are 3 different tables for viewing the greenMachines in your network.

- The Rolodex table
- The Path Index
- The Tree Diagram

Search

Use the search function to scan through the tables for a particular machine.



Find GreenMachine

The find function allows you to look for a machine in a different sub-net because it was not automatically discovered. Press the "Plus" button and enter the IP address of the machine you are looking for. If it is found, it will appear in the table alongside the rest of the automatically discovered machines.

Green Sub-Pages

There are three sub pages under the Green tab. These are control, universe and licences table.

Under the Universe tab you can manage the licences you own. You can easily upload them to your greenMachine by dragging and dropping them and then pressing the deploy button. You can also upload your preset in the same way.

You can manage the licences you own under the licence table tab.

Control tab is the tab that allows you to make detailed adjustments of the constellation you have installed. With the subtabs under the Control tab, you can make and monitor the detailed settings of your greenMachine as you wish. Under the Main tab you can see the video and audio tabs.

You can find a detailed description of these tabs in the LynxCentraal Manual.

Please check Lynx Centraal user manual for more details.

Supported Formats

Supported SDI I/O Formats

The module has four multi-format serial digital inputs with automatic input detection. The module will detect the following input standards and configure the input stage automatically for operation in the connected format. The supported SDI output standards are identical to the input standards.

As the synchronizer uses a single studio reference input both processing paths should be in the same input frequency range (odd or even frame rate) as the reference for normal operation.

The output format frequency (or frame rate) is determined by the connected reference signal and the output will remain fixed to this reference regardless of the connected input signals.

SDTV Formats	HDTV Formats
525 / 59.94Hz	1080i / 50Hz
625 / 50Hz	1080i / 59.94Hz
	1080i / 60Hz
3GBit/s Formats Level A	1080p / 23.98Hz
1080p / 50Hz	1080p / 24Hz
1080p / 59.94Hz	1080p / 25Hz
1080p / 60Hz	1080p / 29.97Hz
	1080p / 30Hz
3GBit/s Formats Level B Dual Link	1080psf / 23.98Hz
1080p / 50Hz	1080psf / 24Hz
1080p / 59.94Hz	1080psf / 25Hz
1080p / 60Hz	720p / 23.98Hz
	720p / 24Hz
12GBit/s Formats - Single Link	720p / 25Hz
3840 x 2160p / 50Hz	720p / 29.97Hz
3840 x 2160p / 59.94Hz	720p / 30Hz
3840 x 2160p / 60Hz	720p / 50Hz
	720p / 59.94Hz
	720p / 60Hz
12GBit/s Formats – Quad Link 2SI A / B (4 x 3GBits/s)	
3840 x 2160p / 50Hz	
3840 x 2160p / 59.94Hz	
3840 x 2160p / 60Hz	

Supported HDMI Input Formats

The module has an HDMI input with automatic input detection. The module will detect the following input standards and configure the input stage automatically for operation in the connected format.

The supported HDMI output standards are identical to the input standards. If you are using the Scaler Function four further PC Formats are supported as listed below.

SDTV Formats	HDTV Formats
525 / 59.94Hz	1080i / 50Hz
625 / 50Hz	1080i / 59.94Hz
	1080i / 60Hz
3GBit/s Formats	1080p / 23.98Hz
1080p / 50Hz	1080p / 24Hz
1080p / 59.94Hz	1080p / 25Hz
1080p / 60Hz	1080p / 29.97Hz
	1080p / 30Hz
PC Formats (with Scaler Function)	720p / 25Hz
VGA (640x480)	720p / 29.97Hz
SVGA (800x600)	720p / 30Hz
XGA (1024x768)	720p / 50Hz
WXGA (1280x768)	720p / 59.94Hz
	720p / 60Hz
4k Formats (HDMI 1.4b)	

3840 x 2160p / 50Hz 4:2:0 8bit	
3840 x 2160p / 59Hz 4:2:0 8bit	
3840 x 2160p / 60Hz 4:2:0 8bit	

As the synchronizer uses a single studio reference input both input signals should be the same input frequency range (odd or even frame rate) as the reference for normal operation.

The output format frequency (or frame rate) is determined by the connected reference signal and the output will remain fixed to this reference regardless of the connected input signals.

Supported Reference Input Formats

The module has a very flexible input reference stage which facilitates the use of either SDTV analog bi-phase sync (i.e. black burst) or HDTV analog tri-level sync.

The reference input is “cross lock” compatible so an SDTV reference can be used to frequency lock HDTV signals (and vice versa). The connected reference is auto detected, and the synchronizer automatically configures the outputs to the frame rate of the connected reference signal.

SDTV Analog Bi-Level Sync	HDTV Analog Tri-Level Sync
525 / 59.94Hz	**1080i / 50Hz**
625 / 50Hz	**1080i / 59.94Hz**
	1080i / 60Hz
HDTV Analog Tri-Level Sync	**1080p / 23.98Hz**
720p / 23.98Hz	**1080p / 24Hz**
720p / 24Hz	**1080p / 25Hz**
720p / 25Hz	**1080p / 29.97Hz**
720p / 29.97Hz	**1080p / 30Hz**
720p / 30Hz	**1080psf / 23.98Hz**
720p / 50Hz	**1080psf / 24Hz**
720p / 59.94Hz	**1080psf / 25Hz**
720p / 60Hz	

Connections

Video SDI

The greenMachine titan uses standard 75 Ohm BNC connectors for SDI connectivity. We recommend the use of high-quality video cable for digital video connections to reduce the risk of errors due to excessive cable attenuation. The maximum cable lengths the module will support are shown below.

SDTV	420m Belden 1694A (270Mbits/s)
HDTV	240m Belden 1694A (1.4Gbits/s)
3GBit/s	150m Belden 1694A
12Gbit/s	85m Belden 4794R

NOTE: Due to the compact design of the connection plate it will be necessary to use a connection tool to secure the BNC video connectors.

Video HDMI

The greenMachine titan uses type A connectors with flange for its HDMI 1.4b video input and output.

LAN

The greenMachine titan uses a standard RJ45 connection for LAN connectivity. The RJ45 connection is used to provide TCP/IP network control connectivity into a control system.

Optical Fiber

The greenMachine titan provides LC connectors for single mode fiber cables. This can be used for Video and LAN connectivity. The required SFPs must be ordered separately.

Multimode fiber cables can be used also, but this will limit the maximum fiber length to approximately 1km.

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.*

Audio

The greenMachine titan has a female Sub-D 25 connector for external audio interfacing. It has four input connections and four output connections. The connections can be configured for digital or analog audio.

Pinning

The pin layout of the connector is given in the table below.

It is recommended to use high quality screened (twisted pair) cable for the balanced audio connections. LYNX Technik provides optional audio breakout cables which will bring out all audio connections to inline XLR connectors: model number R AC MF 25-4/4, R AC M 25-8 or R AC F 25-8.

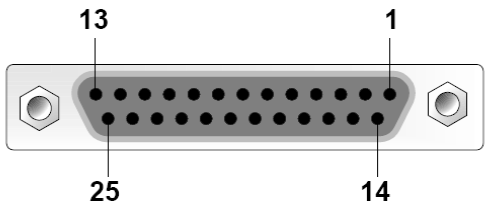


Image 7: Sub-D 25 Female Connector

Analog - Digital Configuration

The audio inputs and outputs can be configured as analog or digital interfaces. When configured as analog interfaces, a maximum of four analog audio inputs/channels and four analog audio outputs/channels are available.

When configured as digital interfaces, a maximum of four AES inputs (eight audio channels) and four AES outputs (eight audio channels) are available.

Pin Number	Connection	Pin Number	Connection
1	Audio Output 4 +	14	Audio Output 4 -
2	Audio Output 4 GND	15	Audio Output 3 +
3	Audio Output 3 -	16	Audio Output 3 GND
4	Audio Output 2 +	17	Audio Output 2 -
5	Audio Output 2 GND	18	Audio Output 1 +
6	Audio Output 1 -	19	Audio Output 1 GND
7	Audio Input 4 +	20	Audio Input 4 -
8	Audio Input 4 GND	21	Audio Input 3 +
9	Audio Input 3 -	22	Audio Input 3 GND
10	Audio Input 2 +	23	Audio Input 2 -
11	Audio Input 2 GND	24	Audio Input 1 +
12	Audio Input 1 -	25	Audio Input 1 GND
13	n.c.		

When set to analog, the full-scale level adjustments are added to the inputs and outputs.

General Purpose Interface (GPI)

The greenMachine titan provides four inputs and four outputs General Purpose Interfaces (GPI) via an RJ45 connector. The pinning of the RJ45 connector is according to TIA/EIA 568-B.

The pin layout for GPI 1-2 and GPI 3-4 are given in the table below:

RJ45 pinning for GPIO

GPI 1-2	
Pin Number	**Connection**
1	GND
2	GPI IN 2
3	GPI OUT 2
4	GPI OUT 1
5	GPI OUT 1
6	GPI OUT 2
7	GND
8	GPI IN 1

GPI 3-4	
Pin Number	**Connection**
1	GND
2	GPI IN 4
3	GPI OUT 4
4	GPI OUT 3
5	GPI OUT 3
6	GPI OUT 4
7	GND
8	GPI IN 3

The pin layout for Serial Connector is given on the next page.

RJ45 pinning for serial connectors

Mode 0: RS232 Master	
Pin Number	**Connection**
1	NC
2	NC
3	CTS
4	RX
5	RTS
6	TX
7	GND
8	NC

Mode 3: RS232 Slave	
Pin Number	**Connection**
1	NC
2	NC
3	RTS
4	TX
5	CTS
6	RX
7	GND
8	NC

Mode 2: RS485 Master	
Pin Number	**Connection**
1	GND
2	GND
3	TX_B(-)
4	RX_B(-)
5	RX_A(+)
6	TX_A(+)
7	NC
8	GND

Mode 1: RS485 Slave	
Pin Number	**Connection**
1	GND
2	GND
3	RX_B(-)
4	TX_B(-)
5	TX_A(+)
6	RX_A(+)
7	NC
8	GND

Cable Color									
	Pin	1	2	3	4	5	6	7	8
	Color	White Orange	Orange	White Green	Blue	White Blue	Green	White Brown	Brown

Power Supply Connectors DC1 and DC2 (PSU)

The greenMachine titan is equipped with two power supply connectors (DC1 and DC2) for primary and secondary power supply. Loop connecting two greenMachines is to be avoided. Do not connect and disconnect DC plugs under load. Disconnect AC power first. Refrain from the high mating cycle counts.

Timing

The greenMachine titan will automatically add processing compensation delay for the video and audio to be aligned at the output.

In addition to this, when the Timing function (depending on licensed constellation) is activated, up to 30 frames of manual delay can be added to each video processing output (15 frames for Level B Dual Link) as well as AES based audio delay (up to 1.3s).

The external audio outputs can also be manually delayed on an AES base and/or tracked to any of the video processing outputs (i.e. adding the automatic processing compensation of the respective video proc output to the audio output).

Timing function

Specifications

SDI Input	**3x SDI video on 75 Ohm BNC connector SMPTE, 292M, 424M, 259M with automatic video format and standard detection Electrical Return Loss: >15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz Automatic cable EQ (Belden 1694A cable) 420m @ 270Mbit/s, 240m @ 1.5Gbit/s, 150m @ 2.97Gbit/s**
12G SDI Input	**1x 12G SDI video on 75 Ohm BNC connector - SMPTE 292M, 424M, 259M, 2081, 2082 with automatic video format and standard detection Return Loss: same as 3G SDI; >7dB to 6GHz; >4dB to 12GHz/ Automatic cable EQ (Belden 4794R cable): 85m @ 12Gbit/s**
HDMI Input / Output	**1x 10bit HDMI 4k/UHD 1.4b**
Optical I/O (Optional)	**1x 3G SDI SFP Transceiver (SMPTE 297M - 2006) 1x 12G SDI SFP Transceiver (SMPTE 292M, 424M, 2081 2082) - no SD SDI (270MBit)**
Ethernet (LAN)	**1x 10/100/1000 BaseT RJ45 Connector**
Reference Input	**1x analog video reference on 75 Ohm BNC connector Analog bi-level (SDTV) or tri-level (HDTV) auto detect and cross lock capability**
Optical Ethernet (Optional)	**IEEE 802.3z 1000Base-X Gbit/s Ethernet over Fiber at 1 Gbit/s (125 MB/s)**
GPI I/O	**4x general purpose inputs + 4x general purpose outputs - RJ45 Connectors**
SDI Output	**3x SDI video on 75 Ohm BNC connector (SMPTE, 292M, 424M, 259M)**
	Timing jitter: < 0.2 UI @ 270Mbit/s, < 1.0 UI @ 1.5Gbit/s, < 2.0 UI @ 2.97Gbit/s Alignment jitter: < 0.2 UI @ 270Mbit/s, < 0.2 UI @ 1.5Gbit/s, < 0.3 UI @ 2.97Gbit/s Electrical Return Loss: >15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
12G SDI Output	**1x 12G SDI video on 75 Ohm BNC connector - SMPTE 292M, 424M, 259M, 2081, 2082 Return Loss: same as 3G SDI; >7dB to 6GBit/s; >4dB to 12GBit/s**
Serial Data	**EIA/ETA RS232C / RS422 /RS 485 (selectable through greenGUI) - RJ45 connector ESD protection for up to 16kV**
Reference Output	**1x analog video reference on 75 Ohm BNC connector Analog bi-level (SDTV) or tri-level (HDTV), cross lock capability**
Audio I/O	**4x input and 4x output on Sub-D 25 female connector Analog: input impedance >10k Ohm, Output Impedance 150 Ohm Analog I/O full scale level: selectable 12, 15, 18, 20, 22, 24 dBu Digital: AES3 balanced transformer isolated Digital output level: 4V peak to peak nominal**
Power	**Max. 12VDC @ 45W nominal (supports 7 - 24VDC input range) 2x power connections for redundant power supply**
Mechanical	**W: 218mm (1/2 19”), H: 44mm (1.75”), D: 225mm (8.86”) - including connectors Weight: 1,1kg (2.43lb)**
Ambient	**Temperature: 5°C to 40°C (41 F to 104 F) maintaining specification Humidity: 90% maximum, non-condensing**
Model #	**GM 6840-1 EU - (EAN# 4250479325470)**
	GM 6840-1 UK - (EAN# 4250479325487)
	GM 6840-1 US - (EAN# 4250479325494)
Includes	**greenMachine, primary power supply and AC power cord, SubD 25 audio adapter PCB and quick reference guide (Constellation license not included - purchased separately)**

Technical Support

If you have any questions or require support, please contact your local distributor for further assistance. Technical support is also available from our website:

https://support.lynx-technik.com/

Please do not return products to LYNX without an RMA. Please contact your authorized dealer or reseller for more details. More detailed product information and product updates may be available on our web site:

www.lynx-technik.com

Contact Information

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

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