DGL-8501HDMI

8 x HDMI to 4 x DVB-T/C + IP

Operation Manual

1. IMPORTANT SAFETY PRECAUTIONS INFORMATION

READ THE FOLLOWING WARNINGS BEFORE YOU USE YOUR DEVICE

WARNING

The following safety precautions must be observed to prevent fire or electric shock hazard. Safety precautions include but are not restricted to the following:

Power supply / Mains cord

- Operate the unit only within the voltage range defined as appropriate by the manufacturer.
- Occasionally check the power connector and remove dirt or dust that may have accumulated.
- Use only the mains cord that comes with your unit.
- Do not operate the unit or plug in the mains cord if it is broken, split, or damaged in any way.
- Do not place the mains cord next to heating devices. Do not pull it, place heavy objects on it or damage it in any way. Keep it out of reach of children.
- Ensure that the device is plugged in a properly grounded socket. Insufficient grounding may cause electrocution.
- Always carefully disconnect all plugs by pulling on the plug and not on the cord. Make sure the unit's power switch is turned off before removing the cord from an outlet.
- Disconnect the mains cord when the unit is not in use for long periods of time or during storms.
- Do not connect the unit to a multiple-outlet to avoid plug overheating.

Disassembling

- This unit contains parts that cannot be repaired by the user. Do not disassemble or try to repair it as this will void all warranties. Please contact the manufacturer if you experience any problems with your unit.

Water/humidity

- Do not keep the unit in a humid place or near water.
- Do not plug/unplug the unit with wet hands.

Fire

- Never place a candle or another source of fire on the unit as it may fall and start a fire.
- If the mains cord or the power connector is damaged or destroyed, or if there is a sudden loss of picture during operation, or if you notice a strange smell or there is smoke, immediately switch the unit off, disconnect the mains cord and contact the manufacturer’s technical support department.

Installation / Storage

- This unit contains high precision pieces of electronics. To ensure optimal performance and avoid damage, do not store it in any location where it may collect dirt, duct, lint, etc. Do not expose it to extreme heat or cold (e.g. in direct sunlight, near a heater or in the car during the day). Place the unit in a secure place to avoid falls.
- Before moving the unit, always unplug all cords first.
- When installing the unit, make sure that an outlet is within easy reach. In case of malfunction, switch the unit off and unplug the power cord. When the unit is not in use for a long period of time, make sure that the mains cord is disconnected.

Connectivity

- Before connecting the unit to other electronic devices, always switch off and unplug all devices.

Maintenance

- Do not spill liquids on the unit. Do not use any diluents or volatile liquid to clean the unit. Instead, use a soft slightly damp cloth and allow the unit to dry completely before using again.

Handling

- Do not poke your finger into the openings on your unit.
- Never put paper, metal parts or other objects into the openings of your unit. If you suspect that there are foreign parts in your unit, switch it off and unplug the mains cord. Contact the manufacturer’s technical support department.
- Do not step on or place heavy objects on top of the unit. To avoid hardware damage, handle all buttons, connectors and switches gently.

2. INTRO

Congratulations on purchasing the DGL8501. You now own a high quality, professional DTV headend. To get the most out of your purchase, please take the time to carefully read through this manual

3. INSTRUCTIONS

3.1 DESCRIPTION

The DGL8501 is a very powerful, all-in-one device, able to receive up to 8 independent HDMI sources and convert them in 4 x DVB-T/C RF output channels while making Gbit IP streaming **simultaneously**. It supports "pool" technology, meaning that the user is able to select any program from any of the 8 inputs and assign it to any of the 4 RF + IP outputs providing great flexibility.
The embedded web server of the DGL8501 provides a very friendly user interface as well as the ability of remote or local control of the device via Ethernet.
Its small size and it's powerful features renders the DGL8501 the ideal solution in cases went we want to distribute HDMI sources coming eg. from a STB or DVD player to a CATV installation using the DVB-T/C and IP technology.

3.2 FEATURES

- 8 x independent HDMI inputs
- 4 x RF output DVB-T/C (software selectable)
- Gbit IP streaming (up to 64xSPTS/4xMPTS)
- "Pool" technology
- MER value > 40dB
- Very clean RF spectrum
- PCR re-stamping
- Very friendly user interface
- Wall or rack mountable
- Compact size
- 5 year warranty

3.2.1 Auto-reset functions and watchdog

During the normal operation of the DGL8501 , the main CPU monitors all the internal parts in order to ensure that the device works normally. In case of an internal error or module failure, the DGL8501 immediately initiates the recovery procedure by resetting the appropriate module or the device. Finally, watchdog timers ensure that the device will be reset in case of CPU failure.

3.2.2 "Pool" technology

The DGL8501 supports "pool" technology, meaning that the user is able to select any TV or Radio program from any input and assign it to any of the 4 outputs providing great flexibility.

3.2.3 DVB-T or DVB-C compliant

The user is able to software select the modulation standard, between DVB-T and DVB-C, of the DGL8501 without the need of any firmware upgrade.

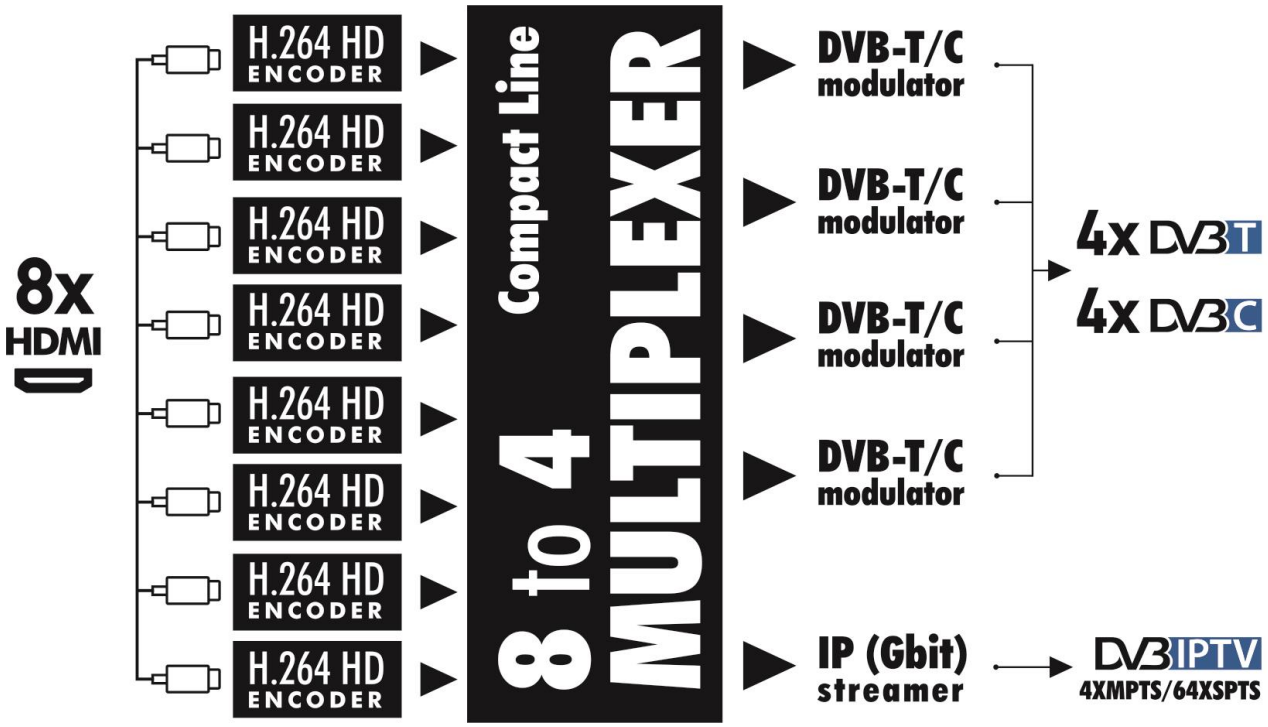
3.2.4 IP streaming

The DGL8501 is able to make IP streaming of all programs coming from the 8 x HDMI inputs simultaneously with the RF modulation using UDP or RTP protocol, multicast or unicast.
The max. output bitrate can be up to 480Mpbs in "IP only" mode.

3.2.5 Smart cooling

The DGL8501 uses "Smart Cooling" technology in which the fan increases/decreases its speed according to temperature variation. In case the temperature is lower than 25^{o} the fan stops working to expand its lifetime. In case of fan failure or over temperature (>65^{o}) the device stops working to protect itself.

3.3 BLOCK DIAGRAM



3.4 FRONT PANEL

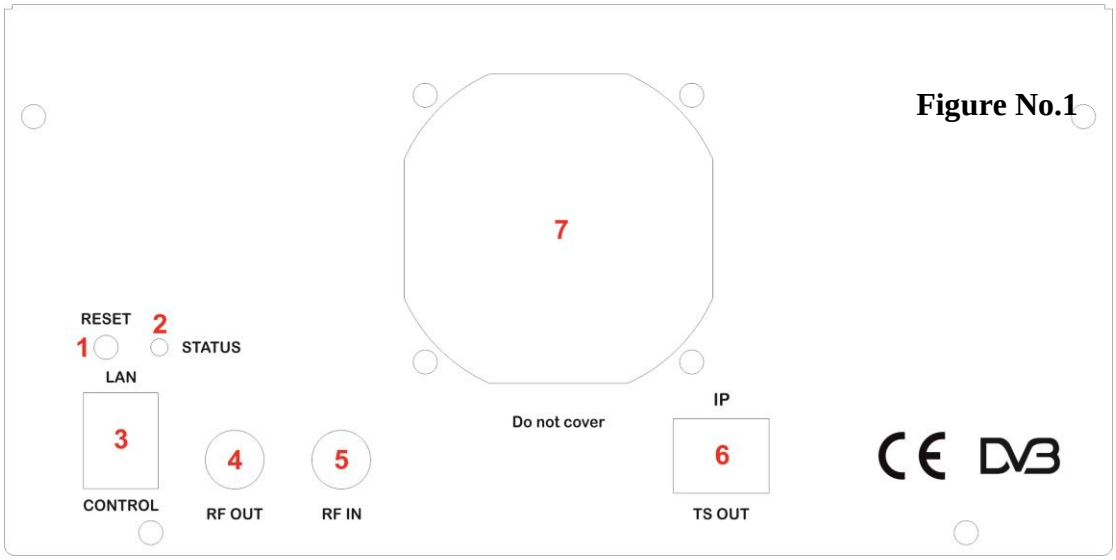
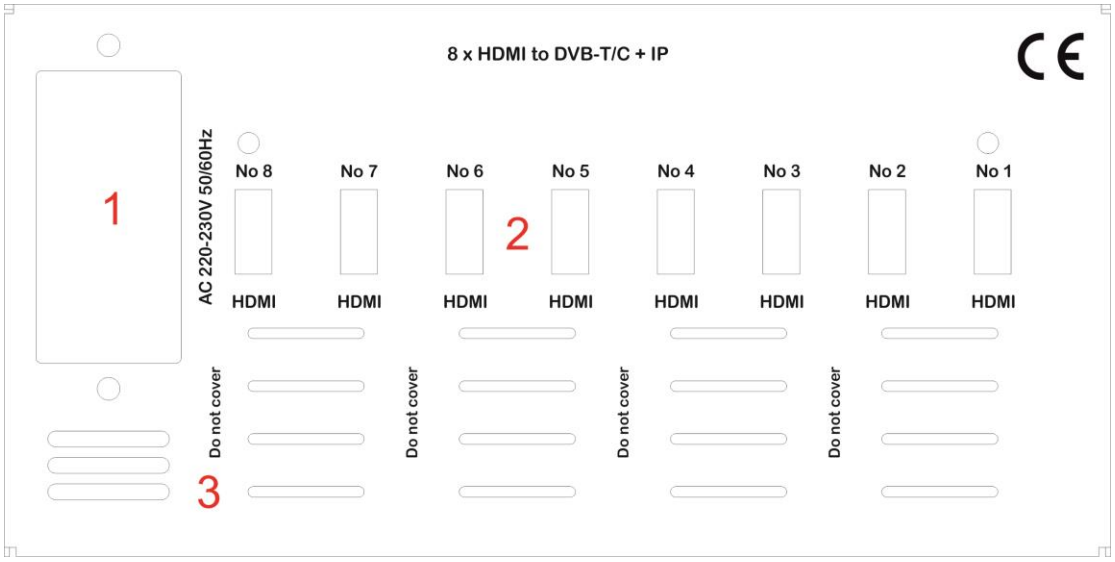


Figure No.1

1. Reset button
2. Status LED
3. IP LAN control
4. RF output
5. RF input
6. IP streaming output
7. Fan cooler

3.5 BACK PANEL



1. Power input
2. HDMI inputs
3. Air ways

4. INSTALLATION

4.1 General

The DGL8501 has a very friendly interface for programming and monitoring purposes. The user is able to gain access to the embedded webserver, by opening an Internet browser (eg. Internet Explorer, Firefox or Chrome) and type the following static IP: **192.168.1.200.**

The default username and password are the following:

Username: admin
Password: 12345

4.2 Embedded Webserver

Status

4.2.1 “General” page

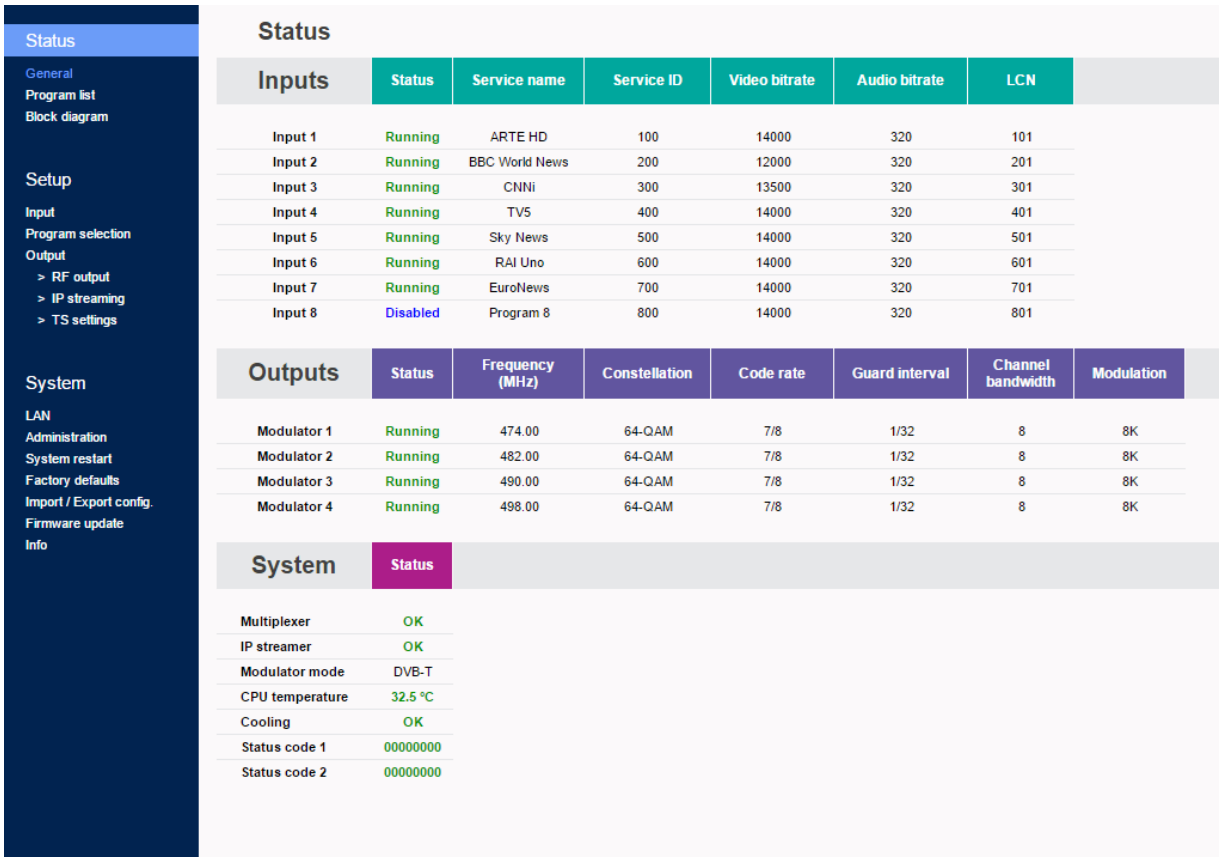


Figure No 1

Every time that the user is connected to the device, the “General” page (Figure No 1) is loaded providing a current general status information of the device.

Status - Inputs 1…8
In these fields, the user is able to see the status of each HDMI input eg. if the H.264 encoder is running or if it is in idle state, its Service name, its Service ID, video/audio PID and LCN number.

Outputs – Modulator 1…4
In these fields, the user is able to see the status of all the RF outputs of the device such as modulator's state, RF output frequencies and modulation settings.

System
This section provides general information of the device, like internal status of all device's modules, CPU temperature and fan state as well as error codes for troubleshooting purposes.

4.2.2 "Program list" page

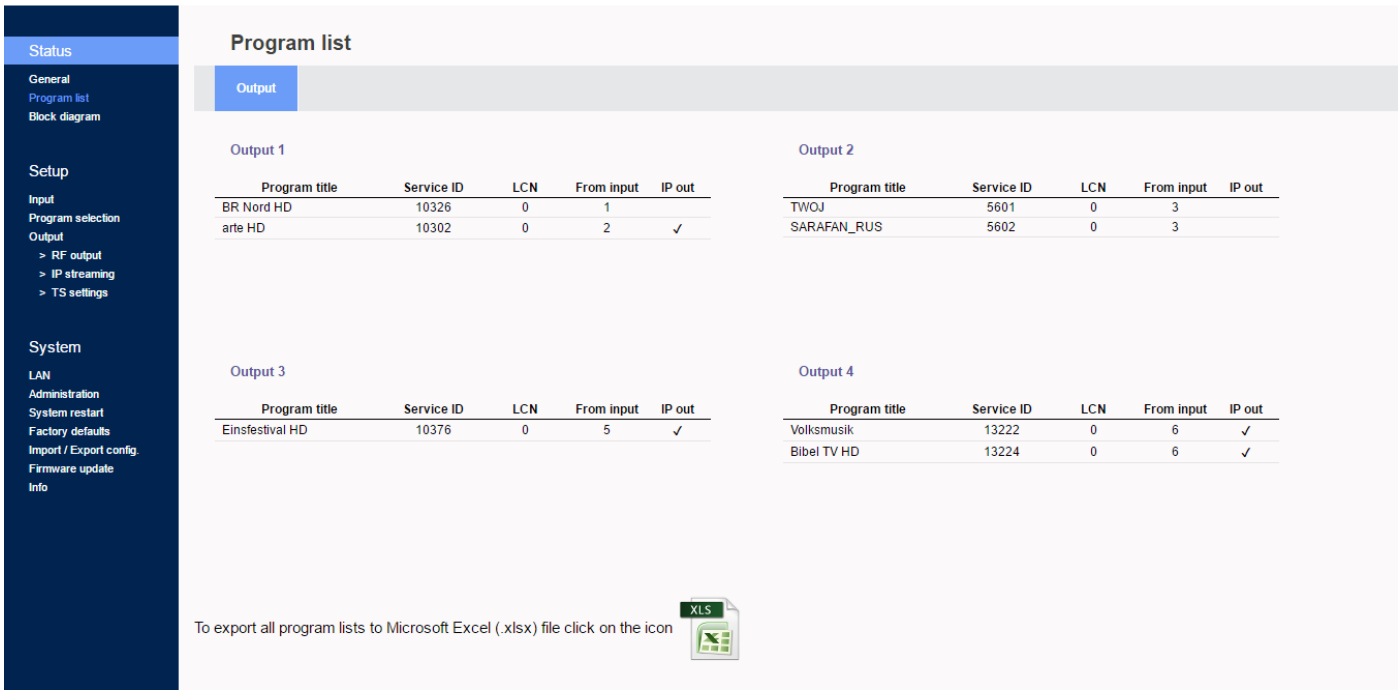


Figure No 2

In "Program list" page (Figure No 2) the DGL8501 provides information of all programs that are currently being distributed via its four RF and IP outputs.

A small √ appears under the IP column indicating that the current program is being distributed via IP too, along with the RF output.

By pressing the Excel icon at the bottom of the page, a report is generated in an Excel format document (.xlsx).

4.2.3 "Block diagram" page

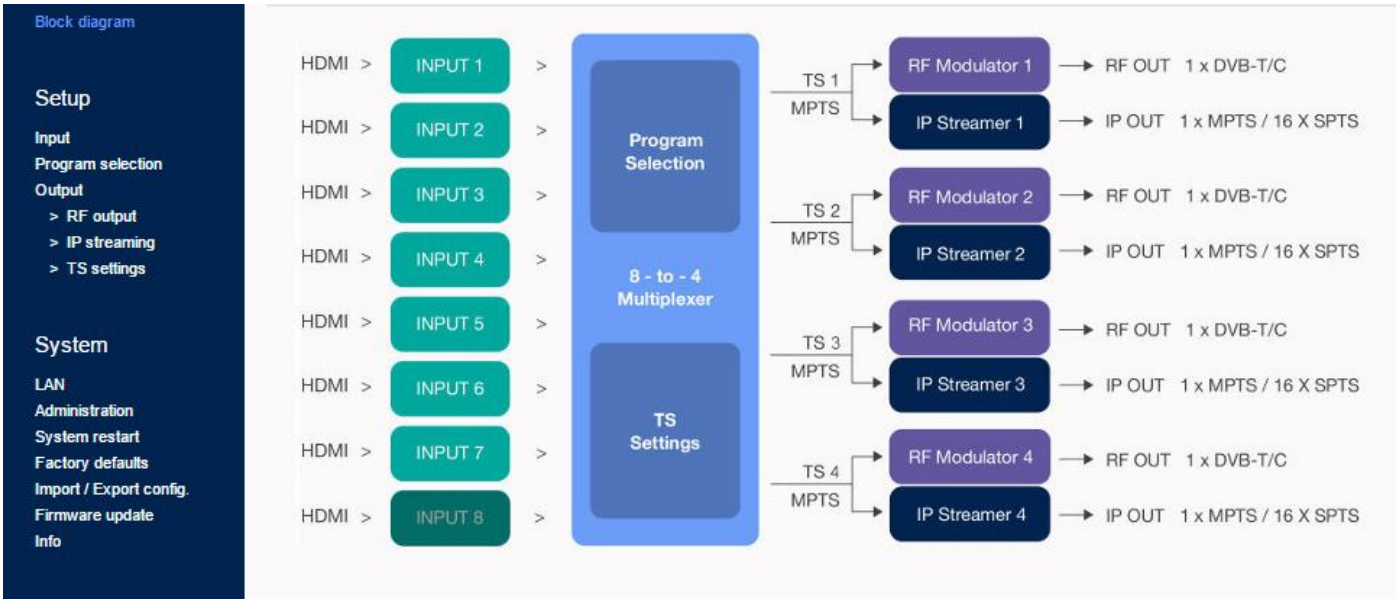


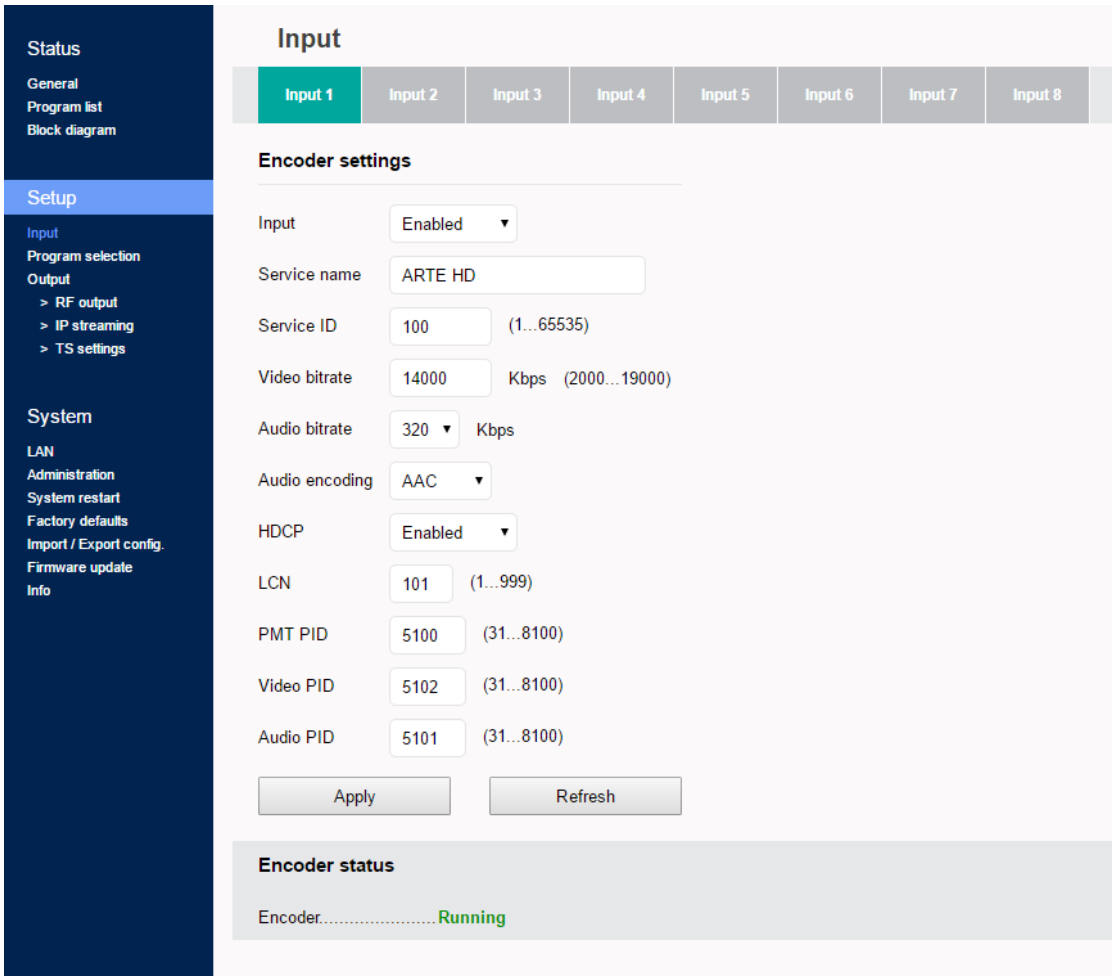
Figure No 3

The “Block diagram” page (Figure No 3) provides a general view of device’s internal modules and architecture. All icons are clickable providing the ability to the user to go directly to the setup page of all internal modules of the device. The grey icons mean that the current module is disabled.

Setup

4.2.4 “Input” page

Figure No 4



In the “Input page” (Figure No 4) the user is able to setup each HDMI input independently. There are eight tabs including all the 8 HDMI inputs. For each tuner the user needs to program the following fields:

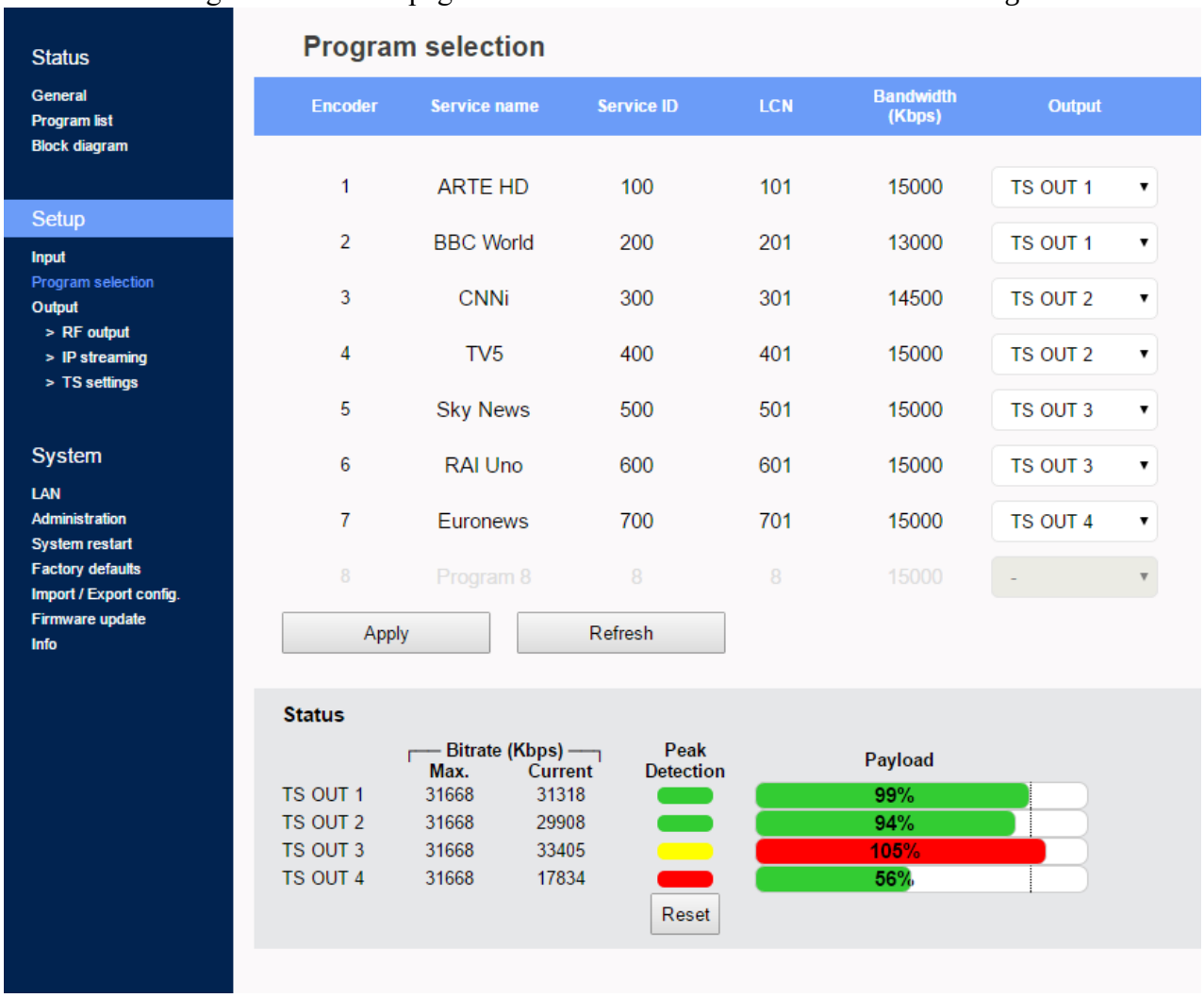
1. Input Enabled/Disabled - Enable or disable the specific HDMI input
2. Service Name – Insert the preferred service name
3. Service ID – Insert the service ID number
4. Video Bitrate – Set the video bitrate (2000-19000 Kbps)
5. Audio Bitrate – Set the audio bitrate (64,96,128,192,256,320 Kbps)
6. Audio encoding – Set the audio encoding (AAC, AC3, Mpeg2)
7. HDCP – Enable/disable the HDCP fucntion
8. LCN – Set the LCN number
9. PMT PID – Set the PMT PID
10. Video PID – Set the Video PID
11. Audio PID – Set the Audio PID

Once all settings are being written, the user must click the “Apply” button for the settings to be saved.

Encoder status

For each HDMI input the DGL8501 provides its current state eg. if it is running or if it is in idle state.

4.2.5 “Program Selection” page Figure No 5



In the “Program Selection” section (Figure No 5) the user is able to select any program from any input and assign it to any output using the “pool” technology. Usually we assign two programs per one output. This page depicts all programs coming from the 8 HDMI inputs and their settings.

For each program the DGL8501 provides the following information:

- Service Name – which is the name of the program
- Service ID – which is the Service ID number of the program
- LCN No – which is the logic channel number of the program
- Bandwidth – which is the bitrate of the program

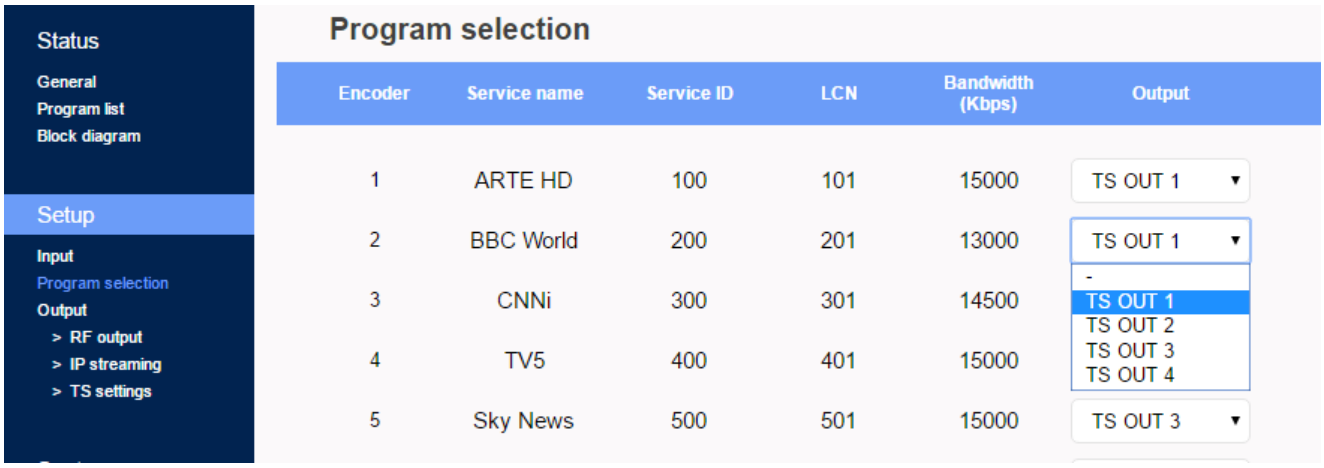


Figure No 6

Using the Drop down menu from “Output” column (Figure No 6) the user is able to assign any program to any of the four outputs. By doing the same process for each program, from all inputs the user is able to create the 4 custom multiplexes in device’s output.

Caution!
The number of programs that the DGL8501 can distribute on its output depends on the video bitrate that the user selects for each program.

For example, if we select the following DVB-T setting for the four modulators on DGL8501outputs:

- Constellation: 64 QAM
- Guard Interval: 1/32
- Code rate: 7/8
- Bandwidth: 8MHz

According to Appendix A we will have a total output bitrate of 31.67Mbps/ modulator. That means that we can select as many programs but their total bitrate must not exceed the 31.67Mbps, otherwise artifacts may occur.

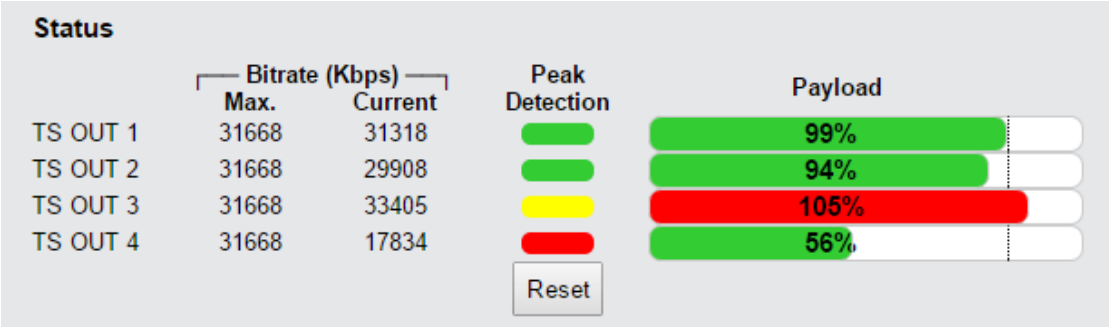


Figure No 7

The status section in (Figure No 7) provides a general idea to the user of the current payload (according to the selected programs) comparing to the max. output payload.

It is recommended that the user must not exceed the 85% from each output, since all the bitrate are variable according to their specific content.

Peak Detection mechanism

In Figure No 7, we can observe a Peak detection mechanism which inform us if there is any overflow on modulator's output bitrate with the following indications:

- Green – No overflow occurred
- Yellow – No overflow occurred but the input bitrate is close to the output bitrate
- Red – Overflow occurred. The user must decrease the input bitrate

4.2.6 “RF Output” page

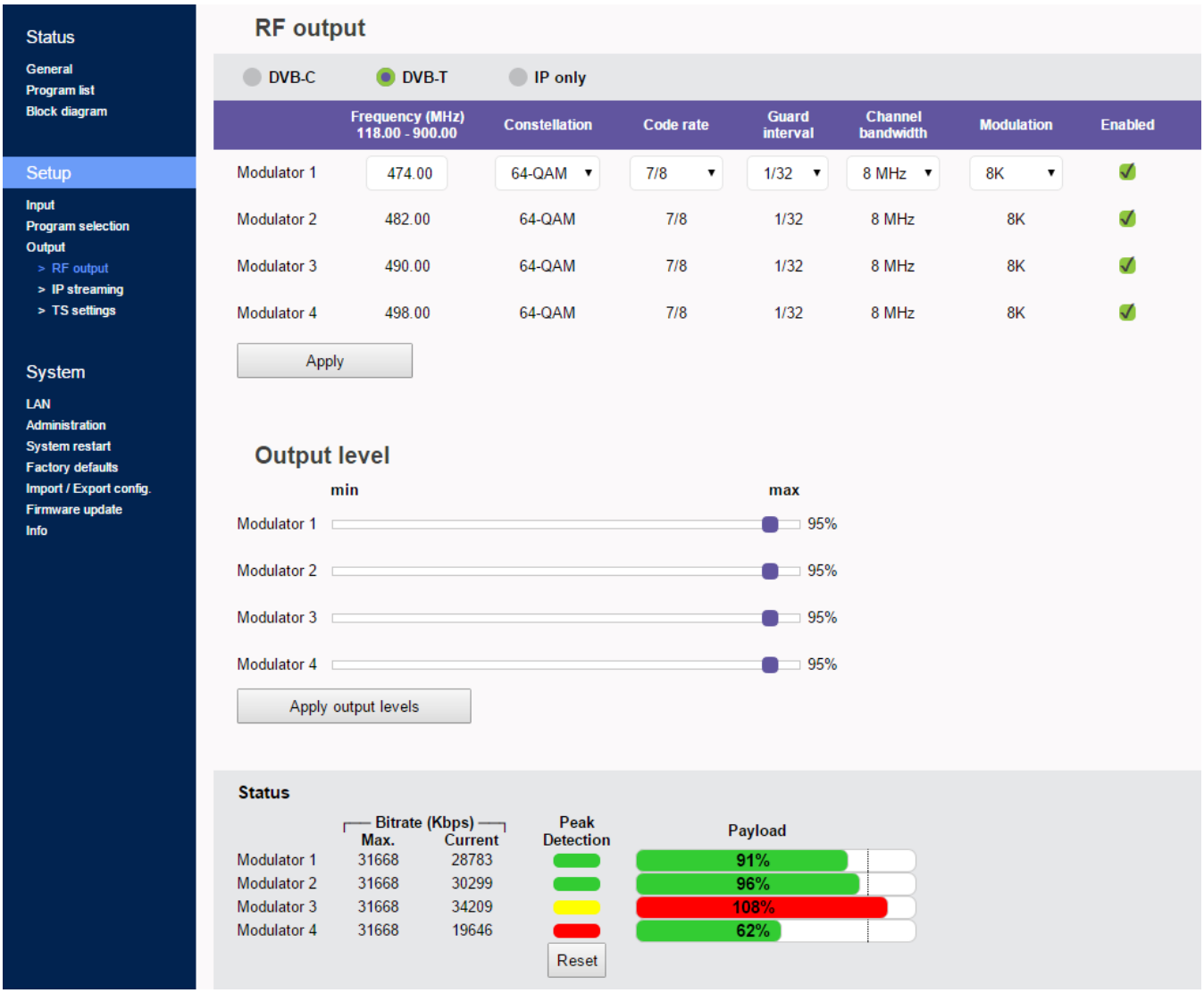
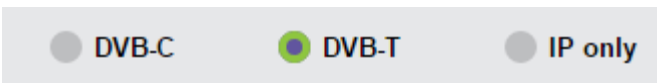


Figure No 8

In the “RF Output” page (Figure No 8) the user is able to setup the RF output settings of the DGL8501.



With the use of the radio buttons the user is able to select the mode that the DGL8501 will operate as follows:

DVB-T: 4 x modulator working in DVB-T standard + IP streaming
DVB-C: 4 x modulator working in DVB-C standard + IP streaming
IP only: All modulators are disabled, the device does IP streaming only

For each modulator in DVB-T mode the user is able to setup the following parameters:

- Frequency – The output frequency of the first modulator*
- Constellation – The constellation of the first modulator*
- Code Rate – The coder rate of the first modulator*
- Guard Interval - The guard interval of the first modulator*
- Channel Bandwidth – The channel bandwidth of the first modulator*
- Modulation – The modulation type of the first modulator*
- Enable/Disable – Enable or disable the current modulator
- Output level – Adjust the output level for each modulator from 70-90dBμV.

*All the four outputs of the DGL8501 operate in adjacent RF output channels. This means that the user setups only the first modulator and all the other three modulators have the same settings and automatically are being program in adjacent channels.

Eg. If the user sets the CH21 in UHF band on modulator No1 the other three modulators will be automatically set to CH22, CH23 and CH24, respectively.

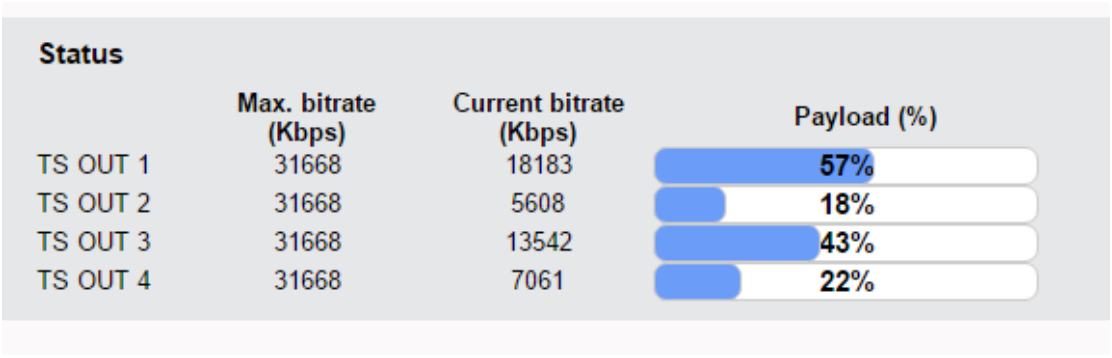


Figure No 9

The status section in (Figure No 9) provides a general idea to the user of the current payload (according to the selected programs) comparing to the max. output payload.

It is recommended that the user must not exceed the 85% from each output, since all the bitrate are variable according to their specific content.

4.2.7 “IP streaming” page

In “IP streaming” section the user is able to setup the IP streamer of the device.

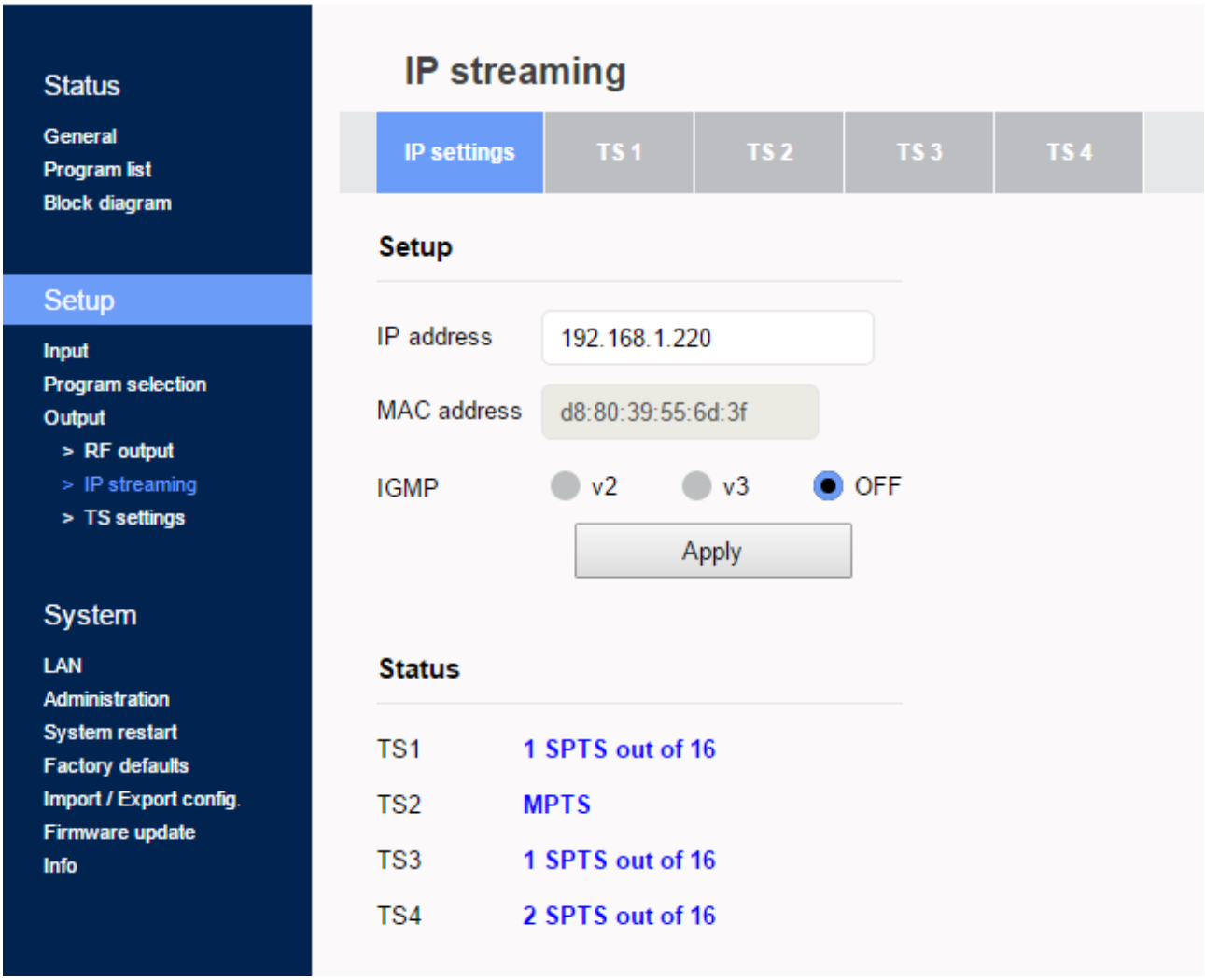


Figure No 10

In Figure No 10 we have general settings of the IP streamer as follows:

- IP address: This is the IP address of the streamer for ping purposes.
- MAC address: This is the MAC address of the streamer
- IGMP: The user is able to select IGMP v2 or v3 or disable the IGMP.

The Status section provides a general view of how many programs and in what format are currently being streamed from the device is its four outputs.

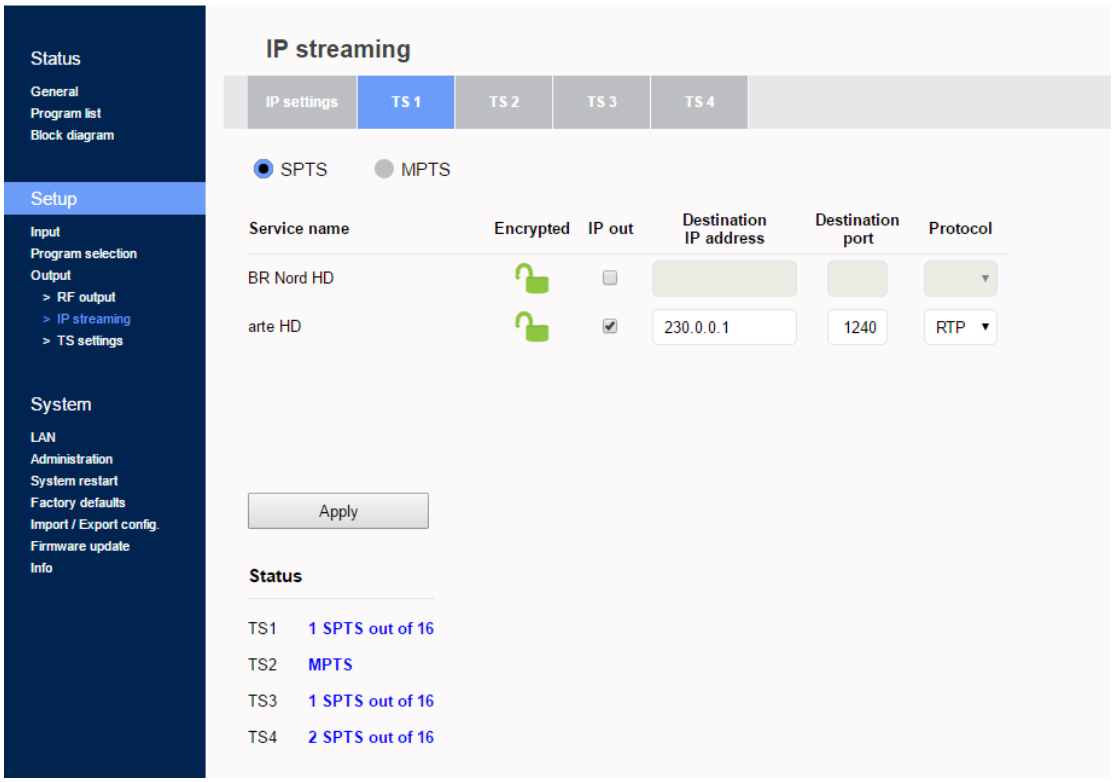


Figure No 11

In order to setup the IP address for each program there are four tabs one for each IP output of the DGL8501.

By selecting eg. the TS1 tab (Figure No 11) the user is able to setup the IP streamer for this specific output, following the steps below:

1st step: Select SPTS or MPTS streaming mode.
SPTS mode: Means that each program has its own IP
MPTS mode: Means that all the programs of the current output (eg. TS1) will be streamed in a single IP.

2nd step: For each program (in SPTS mode) or for the whole TS (in MPTS mode) the user is able to assign a multicast IP address from 224.0.0.0 to 239.255.255.255 or a unicast IP address as well as its destination port and protocol (UDP or RTP).

By repeating the above procedure for all four outputs of the DGL8501, the user is able to setup the IP streamer of the device.

4.2.6 “IP streaming” page
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4.2.8 “TS settings” page

In this section (Figure 12), the user is able to setup all the TS settings of the four multiplex in DGL8501’s output.

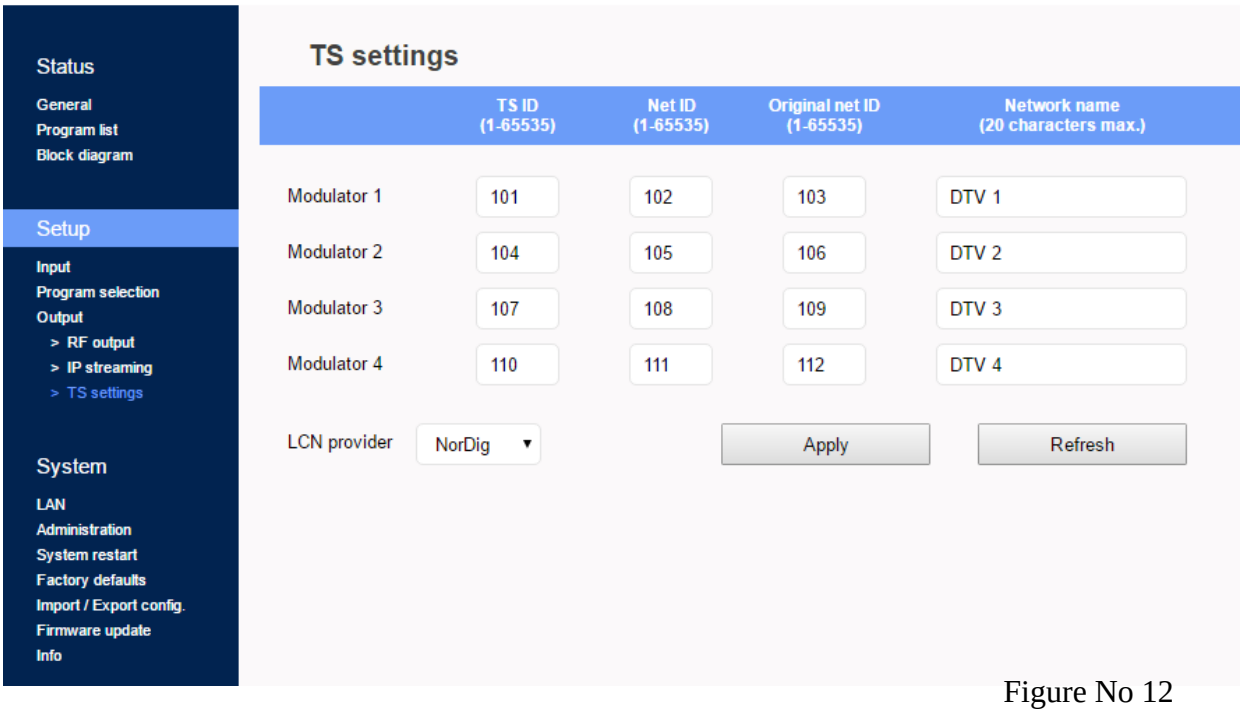


Figure No 12

For each multiplex output the user can setup the following settings:

TS ID: Which is the ID No of the specific multiplex. (1…65535)
Net ID: Which is the Net ID No of the specific multiplex. (1…65535)
Original Net ID: Which is the Org. Net ID No of the specific multiplex. (1…65535)
Network Name: Which is the network name of the specific multiplex
LCN provider: Choose the appropriate LCN provider (EACEM, ITC, Nordig, APN)

System

4.2.9 “LAN” page

In “LAN” page (Figure No 13) the user is able to setup all the parameters of the LAN control of the device as follows:

- DHCP – Enable or disable DHCP
- IP address: Set a static IP address for controlling the device
- Subnet mask: Set the specific Subnet mask
- Gateway: Set the gateway’s IP address
- Primary DNS: Set the IP address of the primary DNS
- Secondary DNS: Set the IP address of the secondary DNS
- Port: Assign the control port
- MAC address: Depicts the MAC address of the LAN control

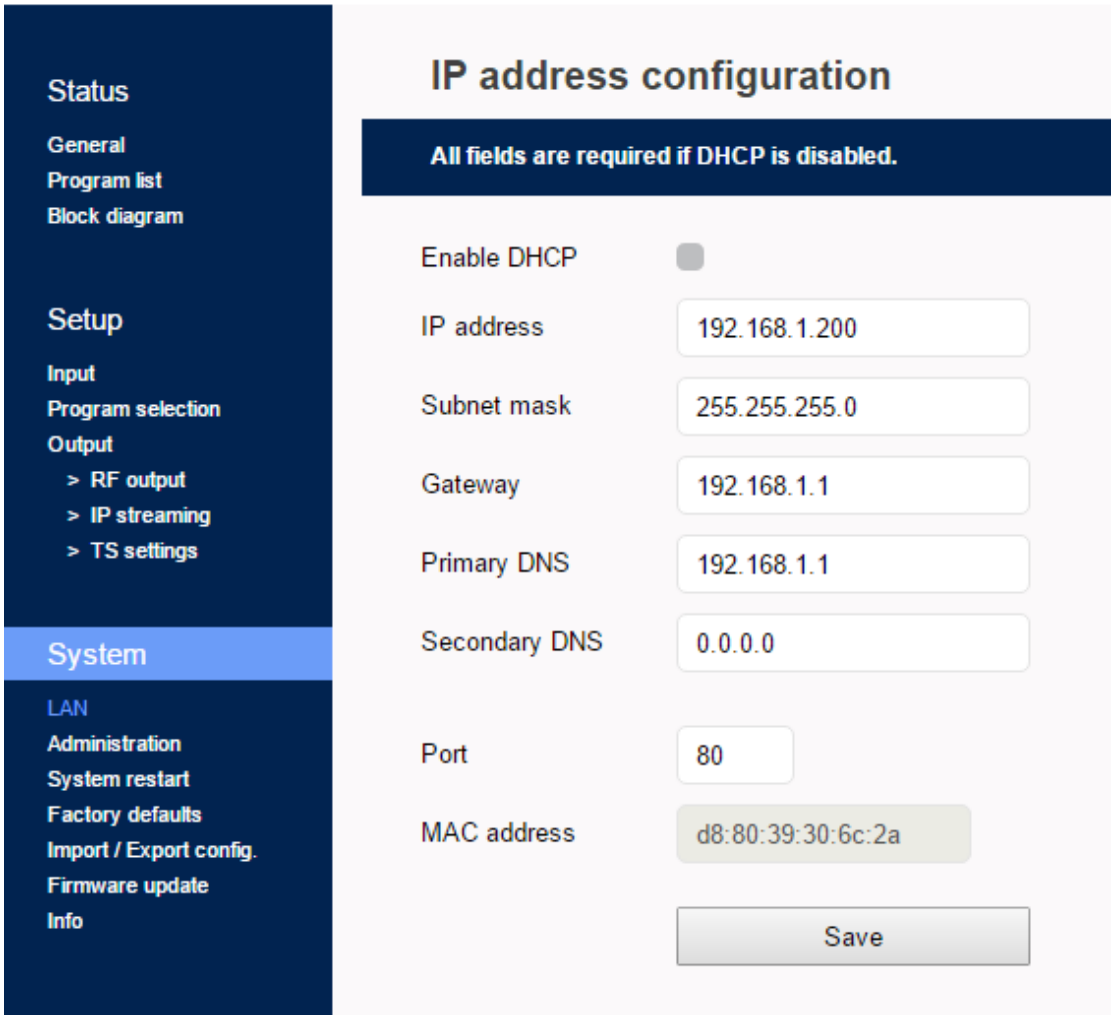


Figure No 13

4.2.10 “Administration” page

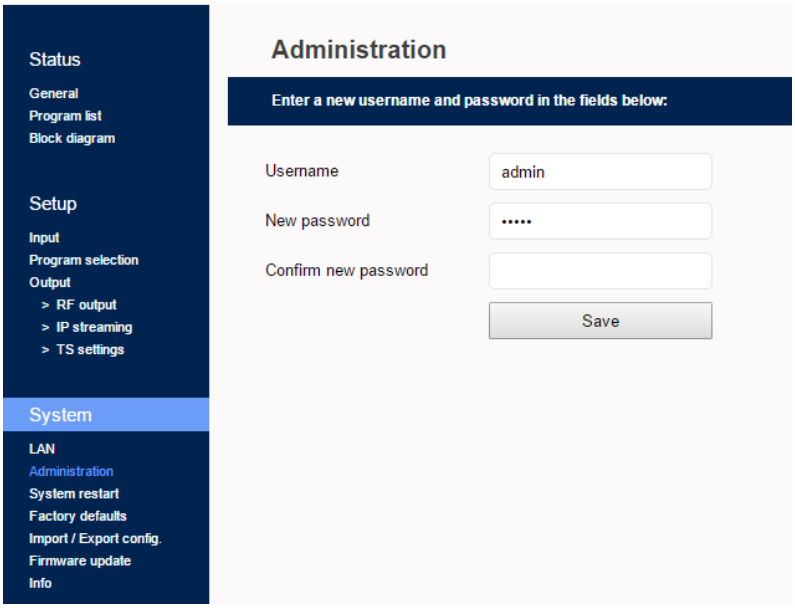


Figure No 14

In “Administration” section the user is able to change the default password of the webserver.

4.2.11 “System restart” page

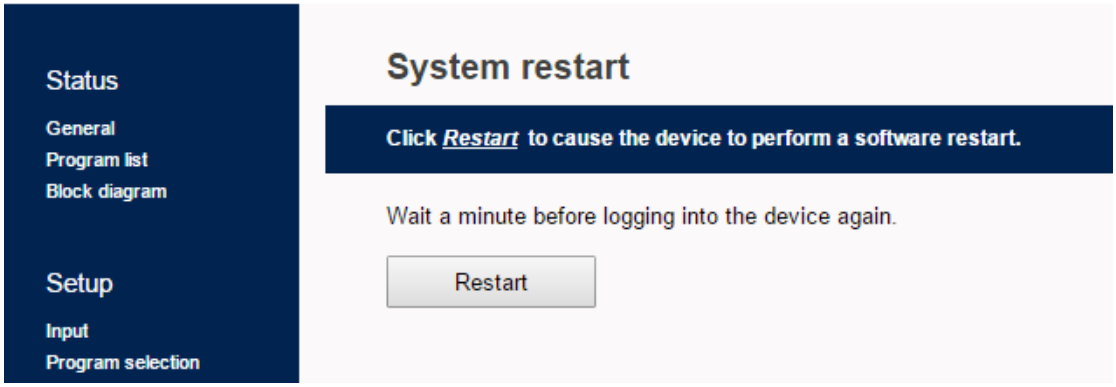


Figure No 14

In “System restart” section (Figure No 14) the user is able to apply a full reset to the device.

4.2.12 “Factory default” page

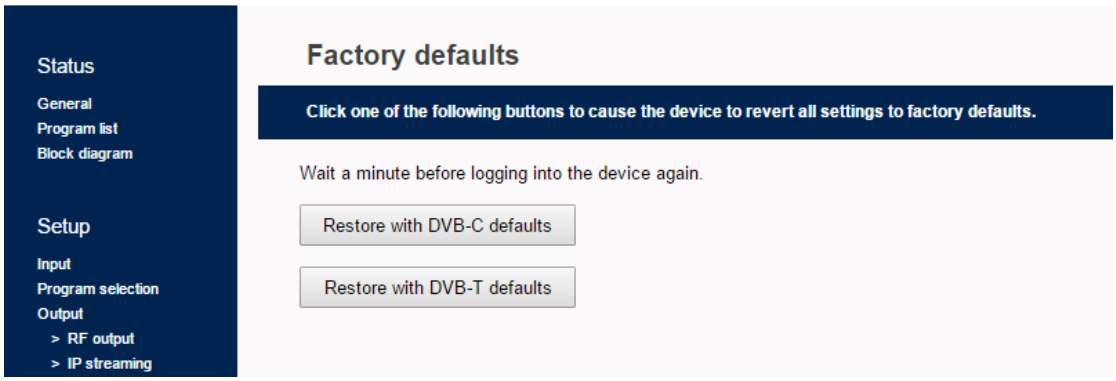


Figure No 15

In “Factory default” section (Figure No 15) the user is able to apply a factory default reset either as DVB-T or DVB-C.

4.2.13 “Import/Export Config” page

In “Import/Export Config” section (Figure No 16) the user is able to do the following:

1. Export: Save all the configuration is a specific file
2. Import: Upload a previously save configuration file.

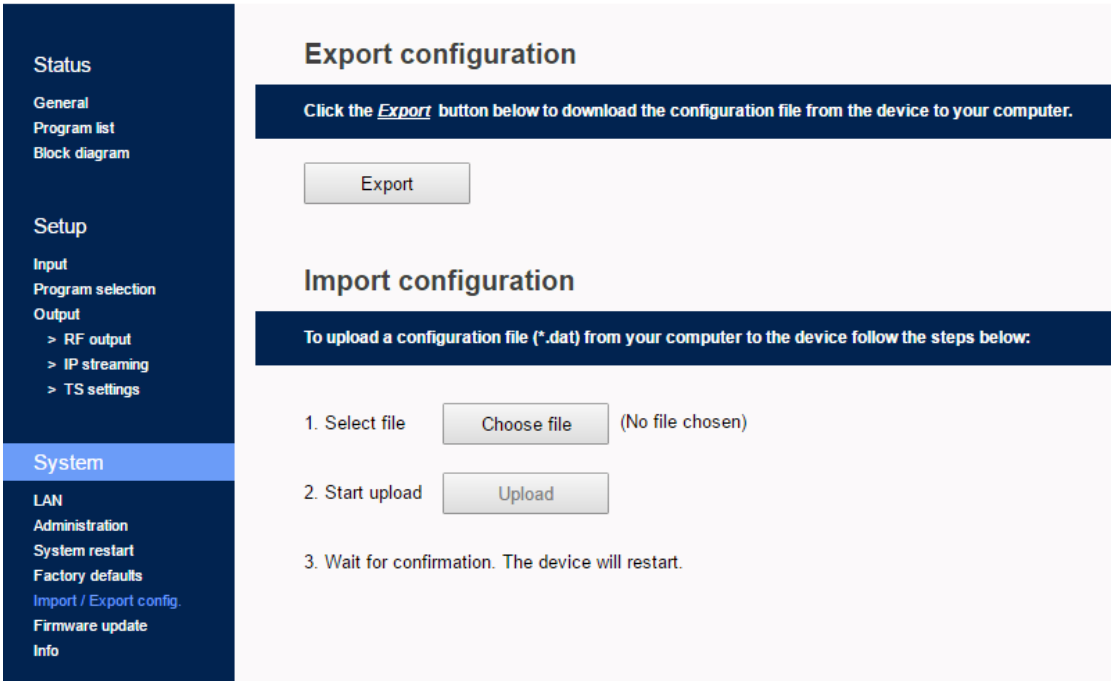


Figure No 16

4.2.13 “Firmware update” page

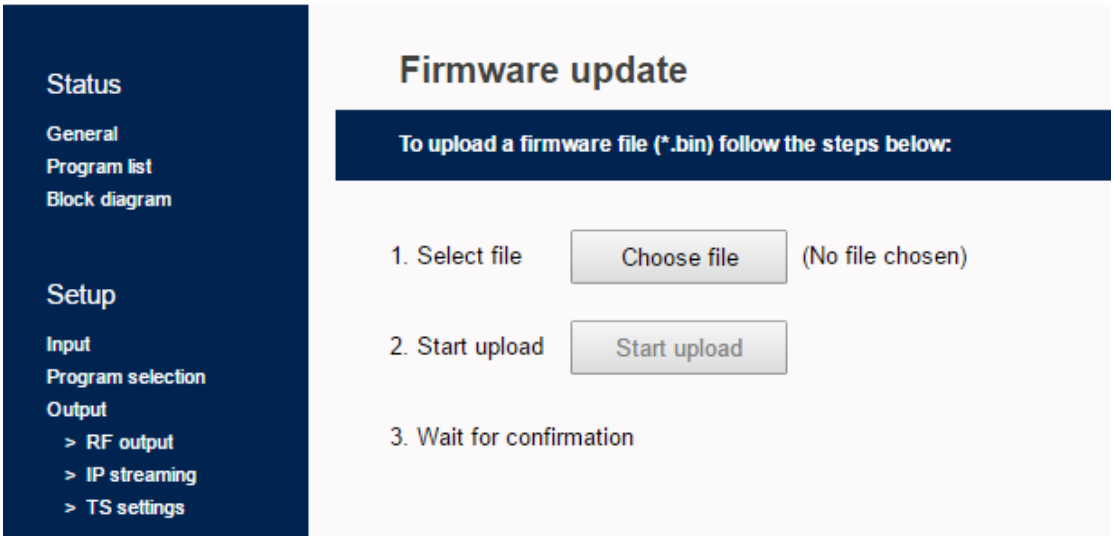


Figure No 17

In “Firmware update” (Figure No 17) section the user is able to upload a new firmware update using the appropriate file.

4.2.14 “Info” page

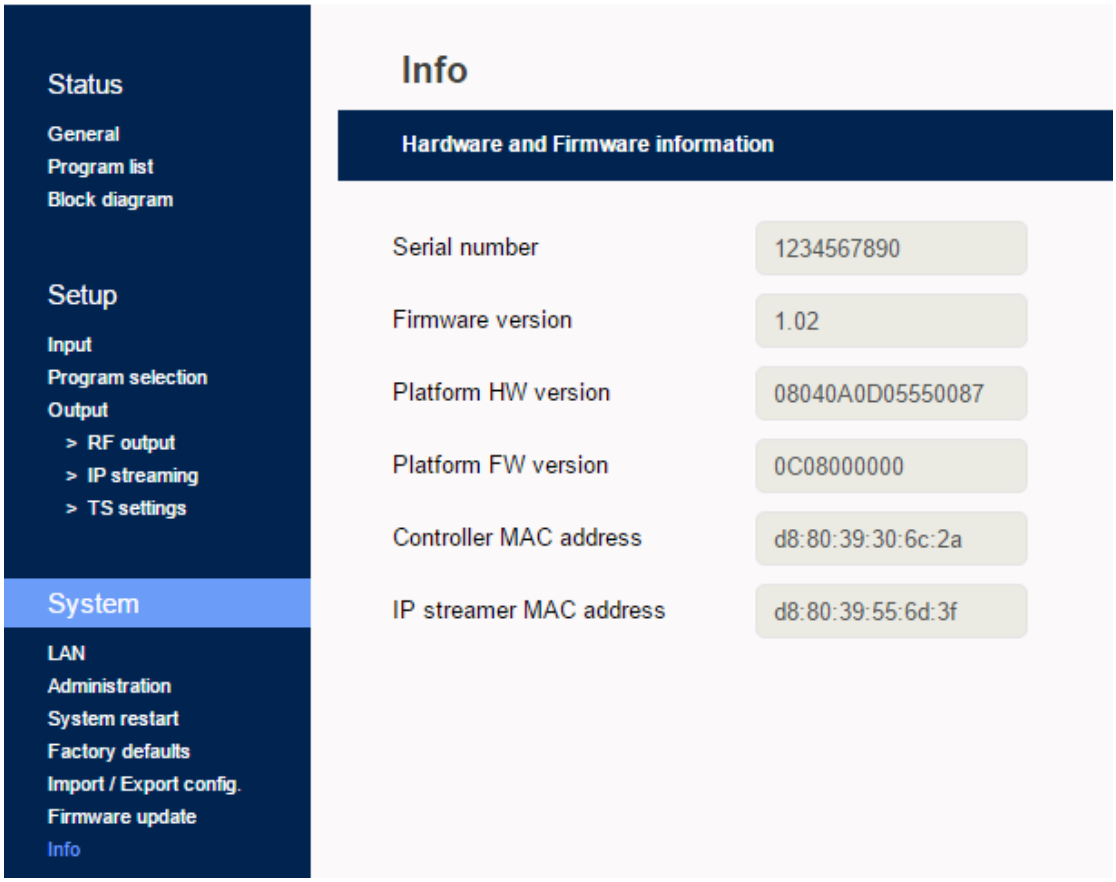


Figure No 18

In “Info” (Figure No 18) section the user is able to see the serial No of the device as well as firmware and hardware versions.

5. TECHNICAL SPECIFICATIONS

Input Specifications

HDMI Input

Type	8 x HDMI inputs
Video coding	MPEG-4 AVC/H.264
Profile	High profile 4.0
Input resolution	Up to 1920x1080 - 50/60 p & i
Output resolution	Up to 1920x1080 - 30p
HDCP support	Yes

Audio

Audio	HDMI
Standard	MPEG-1 Layer II
Audio Bit Rate	64,96,128,192,256,320 Kbps
Format	Mpeg2, AAC, AC3

H.264 encoder

Standard	MPEG-4 AVC/H.264
Bit Rate	1 – 19 Mbps adjustable
Configurable Parameters	Service Name, Service ID
LCN processing	Yes

Output Specifications

DVB-T

Bandwidth	5,6,7,8MHz
Mode	2K,8K
Constellation	QPSK,16QAM,64QAM
Guard Interval	1/4,2/3,3/4,5/6,7/8
Code Rate	1/2,2/3,3/4,5/6,7/8

DVB-C

Bandwidth	5,6,7,8MHz
Mode	2K,8K
Constellation	16QAM,32QAM,64QAM,128QAM,256QAM
Symbol Rate	1-7.2Ms/s

RF Output

Type	**4 x** RF out in adjacent channels
Output Frequencies	36…950MHz (1 Hz step)
Output Level	90dbµV
Connector	75Ω - F, female
Output Attenuator	0…-20dB
MER	>40dB
Output loop-through loss	<1dB

Transport Stream Processing

Services	User selection by service names
Automatic Regeneration	PAT,CAT,SDT,PMTs, EITs tables
NIT	Pass-through
PCR	re-stamping
LCN support	Yes

IP Streaming

IP TS Out	Yes
Protocol	UDP / RTP (Multicast/Unicast)
Speed	1Gbit (480Mbps in IP only mode)
IGMP support	Yes, v2, v3
Type	MPTS (up to 4 TS) SPTS (up to 8 HD programs)

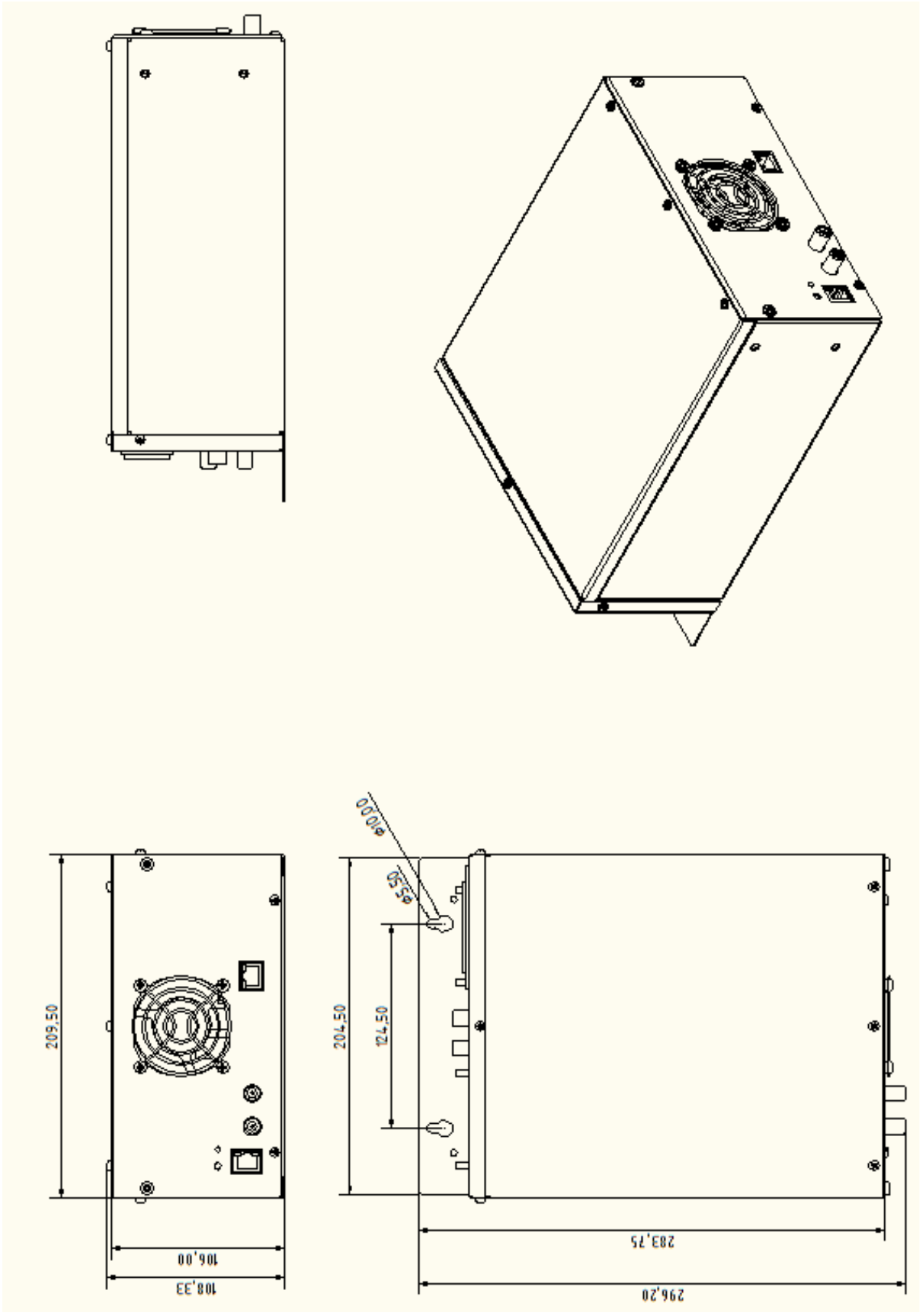
Programming Interface

Ethernet webserver	Yes, embedded webserver
Speed:	10/100 Mbps
Connector:	RJ45
Compatible browsers:	IE Edge, Firefox, Chrome

General

Power Supply:	~108 to 240 VAC 50/60Hz
Power supply consumption:	55 VA max.
Operating Temperature:	0 ºC to 40 ºC
Storage Temperature:	-10 ºC to +70 ºC
Humidity:	Up to 90%
Dimensions:	296.2 x 204,50 x 106mm
Weight:	1.7 Kg

6. DIMENSIONS



*dimensions in mm

7. QM-Products LIMITED WARRANTY

This QM-products is guaranteed against defects in workmanship and materials for a period of five (5) years beginning on the date of purchase of the product. During the applicable warranty period, Digital-Innovations BV will repair or replace at our sole option, without charge, any defective component part of the purchased unit. The unit is to be delivered packed in adequate packing AFTER an authorization for return has been received.

The owner's responsibilities are to use the instrument in accordance with its written instructions, to provide transport to and from our facilities in the event service is required, and to provide proof of purchase if requested.

Our warranty does not cover any problem resulting from:

(a) accident; abuse; neglect; shock; electrostatic discharge; heat or humidity beyond product specifications; improper installation, operation, maintenance or modification

(b) any misuse contrary to the instructions in the user manual

(c) malfunctions caused by other equipment.

WARNING!!

Our limited warranty is considered void if a product is returned with removed, damaged or tampered labels or any alterations (including removal of any component or external cover) carried out by unauthorized personnel.

OUT OF WARRANTY SERVICING

We repair and service units of our production even once the warranty has expired, if this is economically the best solution to the customer.

The mechanical and electronic spare parts are replaceable for a five-year period after production when the circuits are assembled with discrete components. When integrated circuits are used, the supply of spare parts is guaranteed up to the depletion of our stock and, depending on the possibility of procuring them on the worldwide market.

To avoid any unnecessary loss of time, it is very important that the instrument be returned to our premises accompanied by a proper delivery note, duly completed with all the required information, as per the legal dispositions currently enforced.

8. WARNINGS

Content warning

This document contains preliminary information about a product of Digital-Innovations BV. Digital-Innovations BV reserves the right to make any changes or modifications at any time without prior notice.

APPENDIX A

DVB-T bitrates(Mbit/s) for **8 MHz** bandwidth (non-hierarchical systems)

Modulation	**Coding Rate**	**Guard Interval**			
		1/4	1/8	1/16	1/32
QPSK	1/2	4.976	5.529	5.855	6.032
	2/3	6.635	7.373	7.806	8.043
	3/4	7.465	8.294	8.782	9.048
	5/6	8.294	9.216	9.758	10.053
	7/8	8.709	9.676	10.246	10.556
16-QAM	1/2	9.953	11.059	11.709	12.064
	2/3	13.271	14.745	15.612	16.086
	3/4	14.929	16.588	17.564	18.096
	5/6	16.588	18.431	19.516	20.107
	7/8	17.418	19.353	20.491	21.112
64-QAM	1/2	14.929	16.588	17.564	18.096
	2/3	19.906	22.118	23.419	24.128
	3/4	22.394	24.882	26.346	27.144
	5/6	24.882	27.647	29.273	30.160
	7/8	26.126	29.029	30.737	31.668

DVB-T bitrates(Mbit/s) for **7 MHz** bandwidth (non-hierarchical systems)

Modulation	**Coding Rate**	**Guard Interval**			
		1/4	1/8	1/16	1/32
QPSK	1/2	4.354	4.838	5.123	5.278
	2/3	5.806	6.451	6.830	7.037
	3/4	6.532	7.257	7.684	7.917
	5/6	7.257	8.064	8.538	8.797
	7/8	7.620	8.467	8.965	9.237
16-QAM	1/2	8.709	9.676	10.246	10.556
	2/3	11.612	12.902	13.661	14.075
	3/4	13.063	14.515	15.369	15.834
	5/6	14.515	16.127	17.076	17.594
	7/8	15.240	16.934	17.930	18.473
64-QAM	1/2	13.063	14.515	15.369	15.834
	2/3	17.418	19.353	20.491	21.112
	3/4	19.595	21.772	23.053	23.751
	5/6	21.772	24.191	25.614	26.390
	7/8	22.861	25.401	26.895	27.710

DVB-T bitrates(Mbit/s) for **6 MHz** bandwidth (non-hierarchical systems)

Modulation	**Coding Rate**	**Guard Interval**			
		1/4	1/8	1/16	1/32
QPSK	1/2	3.732	4.147	4.391	4.524
	2/3	4.976	5.529	5.855	6.032
	3/4	5.599	6.221	6.587	6.786
	5/6	6.221	6.912	7.318	7.540
	7/8	6.532	7.257	7.684	7.917
16-QAM	1/2	7.465	8.294	8.782	9.048
	2/3	9.953	11.059	11.709	12.064
	3/4	11.197	12.441	13.173	13.572
	5/6	12.441	13.824	14.637	15.080
	7/8	13.063	14.515	15.369	15.834
64-QAM	1/2	11.197	12.441	13.193	13.572
	2/3	14.929	16.588	17.564	18.096
	3/4	16.796	18.662	19.760	20.358
	5/6	18.662	20.735	21.995	22.620
	7/8	19.595	21.772	23.053	23.751

8. NOTES

Declaration of Conformity

Certify and declare under our sole responsibility that the following apparatus:

DGL-8501/HDMI

Conforms with the essential requirements of the EMC Directive 2004/108/EC the Safety Directive 2006/95/EC and 2001/65/EU RoHS Directive, based on the following specifications applied:

EU Harmonized Standards:
EN 55022:2010
EN 61000-3-2:2006+A1:2009+A2:2009, EN61000-3-3:2008
EN:55024:2010
EN 50083-2:2006, IEC60728-2:2010
EN 61000-4-2:2009, EN61000-4-3:2006+A1:2008+A2:2010
EN 61000-4-4:2012, EN61000-4-5:2006
EN 61000-4-6:2009, EN61000-4-8:2010, EN 61000-4-11:2004
EN 60950-1:2006+A11:2009+A1:2010+A12:2011+AC:2011

Signed
N.Gounalakis

Place: Baarle-Nassau

Dated: 16-04-2016

Managing Director

* QM-products is register brand of Digital-Innovations B.V.
**The Technical documentation is kept by the manufacturer