Kingray

Specialists in Digital TV Distribution Solutions

INSTALLATION MANUAL

MODEL: KRH100

4 x DVB-S/S2/T/T2/C to 4 x DVB-T/C

kingray.net.au

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:

- Operate the unit only within the voltage range defined.
- Occasionally check the power connector and remove dirt or dust that may have accumulated.
- Use only the power supply that comes with your unit.
- Do not operate the unit or plug in the power supply if it is broken, split, or damaged in any way.
- Do not place the power supply 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.
- Always carefully disconnect all plugs by pulling on the plug and not on the cord.
- Make sure the unit's power supply is turned off before removing it from an outlet.
- Disconnect the power supply 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 power supply 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 power supply 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 supply. When the unit is not in use for a long period of time, make sure that the power supply 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 power supply. 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 KRH100. 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 KRH100 is a very powerful, all-in-one mini headend device, able to receive up to 4 independent satellite (DVB-S/S2), terrestrial (DVB-T/T2) or cable (DVB-C) signals and convert them either in 4 x DVB-T/C RF output channels.
It supports "pool" technology, meaning that the user is able to select any program from any of the 4 inputs and assign them to any of the 4 outputs providing great flexibility. The embedded web server of the KRH100 provides a very friendly user interface as well as the ability of remote or local control of the device via LAN.

Its small size and its powerful features render the KRH100 the ideal solution in case you want to distribute FTA (Free-To-Air) TV programs coming from satellite (DVB-S/S2), terrestrial (DVB-T/T2) or cable (DVB-C) sources to a CATV installation using the DVB-T/C.

3.2 - FEATURES:

- 4 x independent multi-standard inputs DVB-S/S2/T/T2/C
- 1 x RF output containing up to 4 x DVB-T/C channels (software selectable)
- "Pool" technology
- MER value > 42dB
- PID filtering
- Redundancy mode compatible
- Custom NIT/SDT
- Local or remote control via webserver
- User friendly interface
- Wall or rack mount options
- SNMP v2
- Ultra-compact in size
- 5 Year Warranty (KRH100), 3 Year Warranty (Power Supply)

3.2.1 - AUTO-RESET FUNCTIONS AND WATCHDOG

During the normal operation of the KRH100, 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 KRH100 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 KRH100 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 output channels 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 KRH100 without the need of any firmware upgrade.

3.2.4 – CUSTOM NIT/SDT

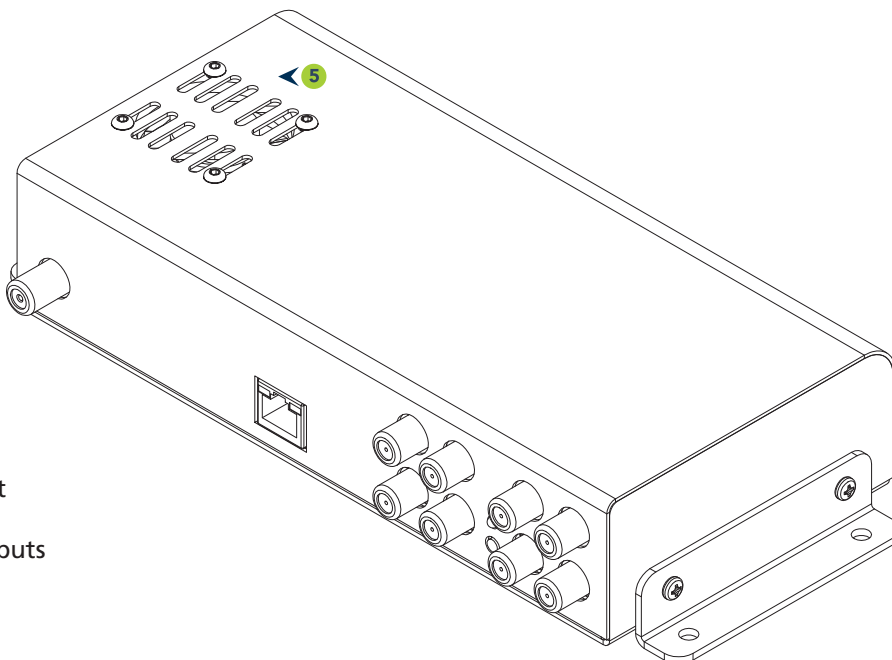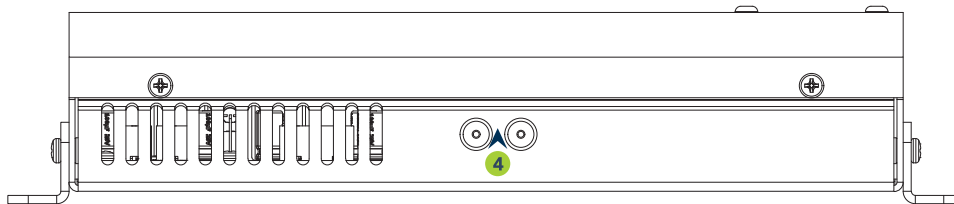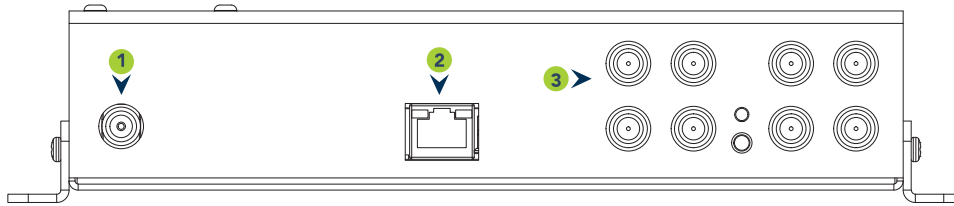Using the KRH100 the user is able to create custom NIT and SDT tables according to their needs.

3.2.5 – DUAL POWER SUPPLIES

The KRH100 is powered from one or two external power supplies of +12VDC/2.5A. In case we connect two external power supplies then they will work in redundancy mode. Thus, in case of failure of one of the two external power supplies the device will continue working without stopping.

3.3 – BLOCK DIAGRAM:

DVB-S/S2/T/T2/C ⟶

DVB-S/S2/T/T2/C ⟶

DVB-S/S2/T/T2/C ⟶ **KRH100** ⟶ **4 DVB - T/C**

DVB-S/S2/T/T2/C ⟶
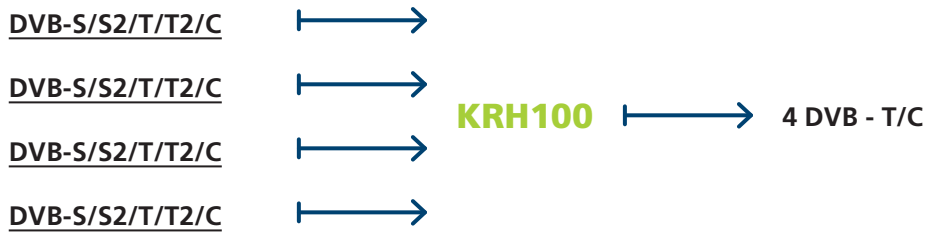
3.4 - PRODUCT DRAWING VIEWS:

1. RF Output
2. LAN Control Port
3. RF Inputs
4. Power Supply Inputs
5. Fan Cooler

4. INSTALLATION

4.1 - GENERAL

The KRH100 has a user friendly interface for programming and monitoring purposes. The user is able to gain access to the embedded webserver, by opening an Internet browser (e.g. Internet Explorer, Firefox or Chrome) and type the following static IP: 192.168.1.205.

Before logging into the device, please ensure that the properties of "Internet Protocol Version 4 (TCP/IPv4)" on your PC has been changed to "Use the following IP address", such as the image shown below.
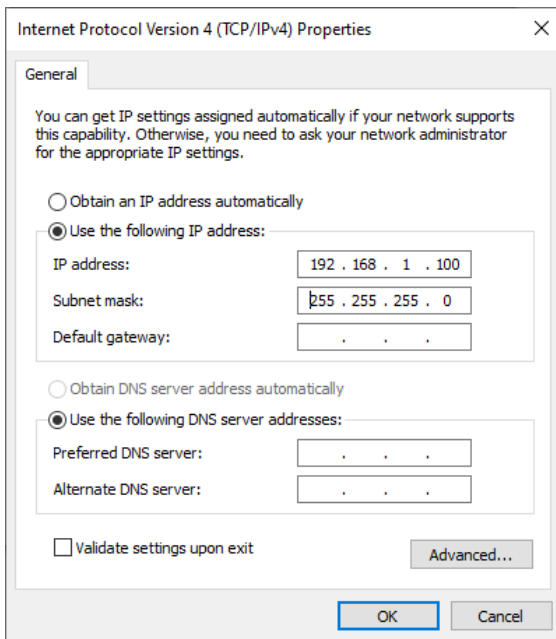
The factory default username and password are as follows:
Username: **admin**
Password: **12345**

NOTE:

After connecting to the device via your PC, the user should go to the Regional Settings (page 17) & select the region it is to be installed in prior to setting up the device.

4.2 - EMBEDDED WEBSERVER

Status

4.2.1 - "GENERAL" PAGE

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.

FIGURE No. 1

Status - Inputs 1…4
In these fields, the user is able to see the status of each tuner e.g. If it is locked / unlocked or disabled, the working mode e.g.. DVB-S/S2, DVB-T/T2 or DVB-C etc.

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

In "Program List" page (Figure No. 2) the KRH100 provides information of all programs that are currently being distributed via its four RF outputs.
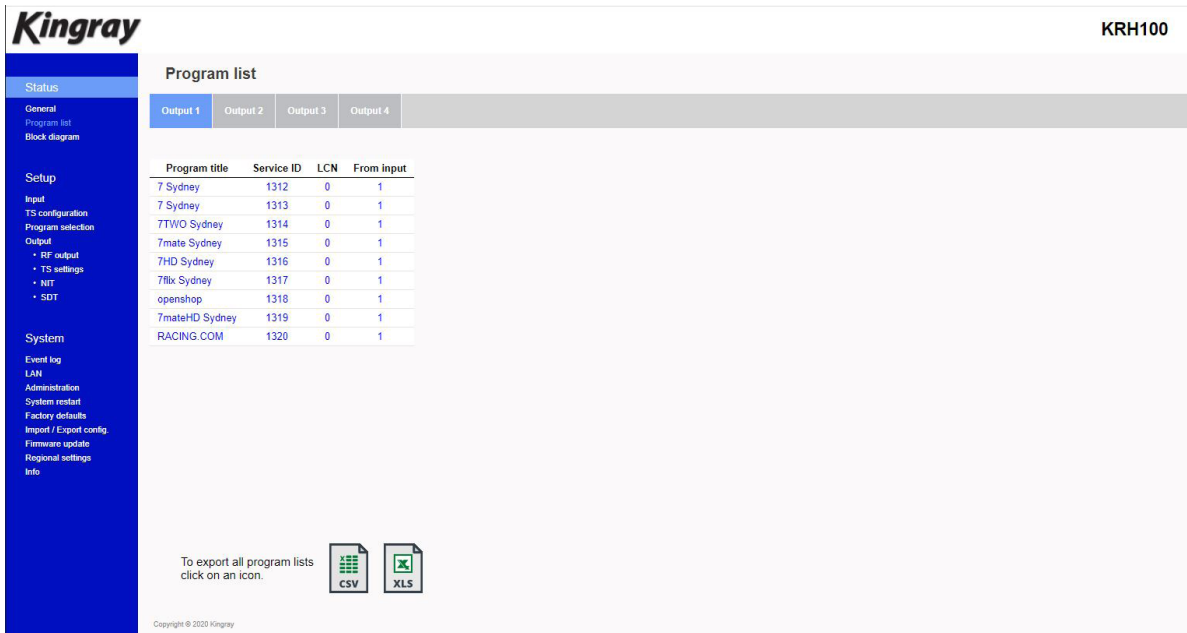

FIGURE No. 2

At the same time, the device offers the whole channel list to be exported under the follow file types:

Excel – All the program list is exported in .xlsx format
CSV – All the program list is exported in .csv format

4.2.3 - "BLOCK DIAGRAM" PAGE

The "Block Diagram" page (Figure No. 3) provides a general view of device's internal modules and architecture.
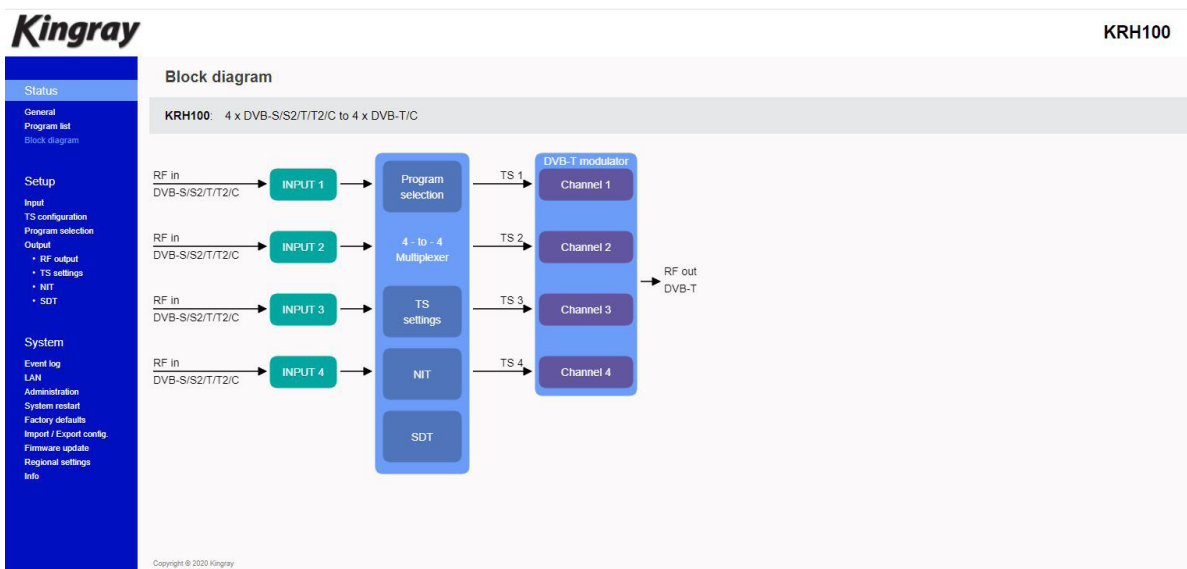

FIGURE No. 3

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.

When selecting bypass mode the information is automatically forwarded/passed through to the output, keeping all the original info like LCN, NIT, PIDS, etc.. This eliminates the requirement to customize the input section & you can go straight to the output settings.

Setup

4.2.4 - "INPUT" PAGE

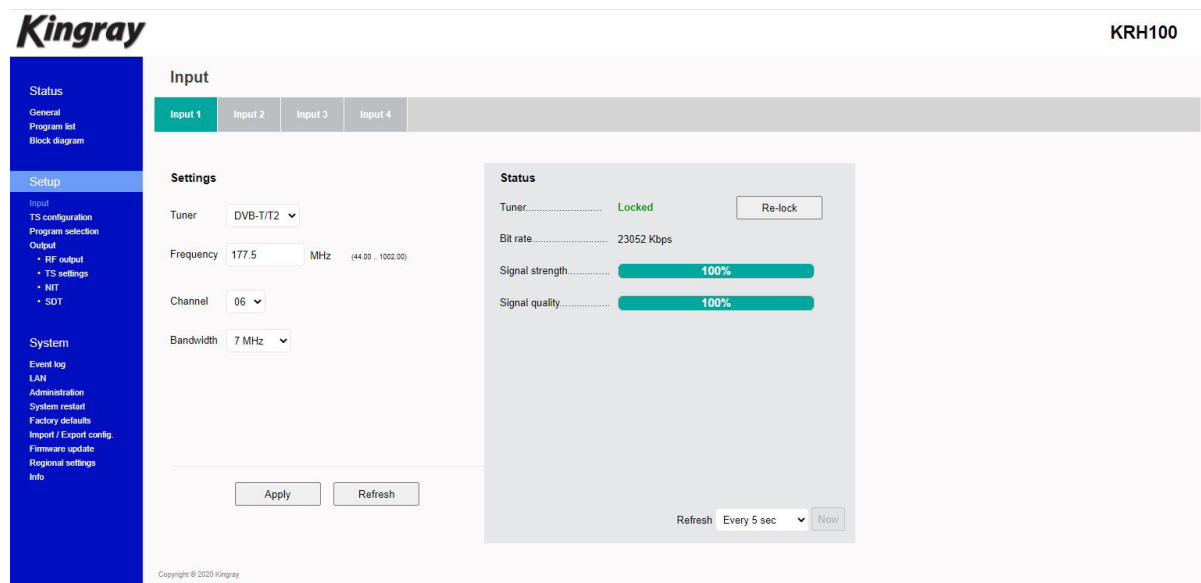In the "Input" page (Figure No. 4) the user is able to select the working mode for each input.

There are four tabs, one for each input. The user is able to select the working mode of each input as follows:

For Satellite signal reception the user must select DVB-S/S2 mode:

1. **Tuner Enabled/Disabled** – Enable or disable the specific tuner
2. **SAT or IF Frequency** – Select how to insert the SAT frequency
3. **Symbol Rate** – Insert the symbol rate
4. **LNB Voltage** – Select the LNB voltage (13V, 18V, OFF)
5. **Band** – Select the appropriate SAT band (works only if IF frequency is selected as input method)
6. **DiSEqC** – Select DiSEqC A, B, C, D

For Terrestrial signal reception the user must select DVB-T/T2 mode:

1. **Tuner Enabled/Disabled** – Enable or disable the specific tuner
2. **Frequency** – Insert the input frequency or
3. **Channel** – Instead of frequency your can add the channel number
4. **Bandwidth** – Insert the input channel bandwidth

For DVB-C mode:

1. **Tuner Enabled/Disabled** – Enable or disable the specific tuner
2. **Frequency** – Insert the input frequency
3. **Symbol Rate** – Insert the symbol rate
4. **Constellation** – Insert constellation

Once all settings have been entered, the user must click the "**Apply**" button to begin the lock process.

<u>TUNER STATUS:</u>
For each input the KRH100 provides several information such as tuner status (Locked/Unlocked), total bitrate, signal strength, quality etc.

4.2.5 - "TS CONFIGURATION" PAGE

In the "TS Configuration" page (Figure No.5) the user is able to set the input channel information to unconditionally pass through all of the program settings to the output channel by pressing the tick box (Figure No. 6).

FIGURE No. 5

FIGURE No. 6

After selection, press the "Apply" button & the press the "Yes, Apply" button to confirm & save.
Once you have done this, all heading numbers will need to be updated as well as the figure no on the pages thereafter.

4.2.6 - "PROGRAM SELECTION" PAGE

In the "Program Selection" page (Figure No. 7) the user is able to select any program from any input and assign it to any output using the "pool" technology.

FIGURE No. 7

There are 4 tabs, one for each input. Each tab depicts all the TV and Radio programs from the input that has being selected during the "Input page" processes.

When the user selects one input, the device's multiplexer does a real time analysis and depicts the program list from this specific input. For each program the KRH100 provides the following information/options:

- **Original Program Title** –   Which is the name of the program
- **Program Title** –   The ability to enter a custom name for this specific program
- **Original Service ID** –   Which is the original 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 in Kbps
- **Encrypted** –   Which depicts if the program is encrypted or not
- **Output** –   To select in which the program must be assigned
- **Output Service ID** –   The user is able to provide custom Service ID number

Each program title has a small cross at the left which can be expanded if the user will click on it.
During this procedure, all the available PIDs of this specific program are reveled (Figure No. 8).
In this case, the user is able to select/deselect which PID they want to be outputted.

FIGURE No. 8

Using the Drop-down menu from "Output" column (Figure No. 9) the user is able to assign any program to any of the four output channels. By doing the same process for each program, from all inputs the user is able to create his own custom multiplex in the output.
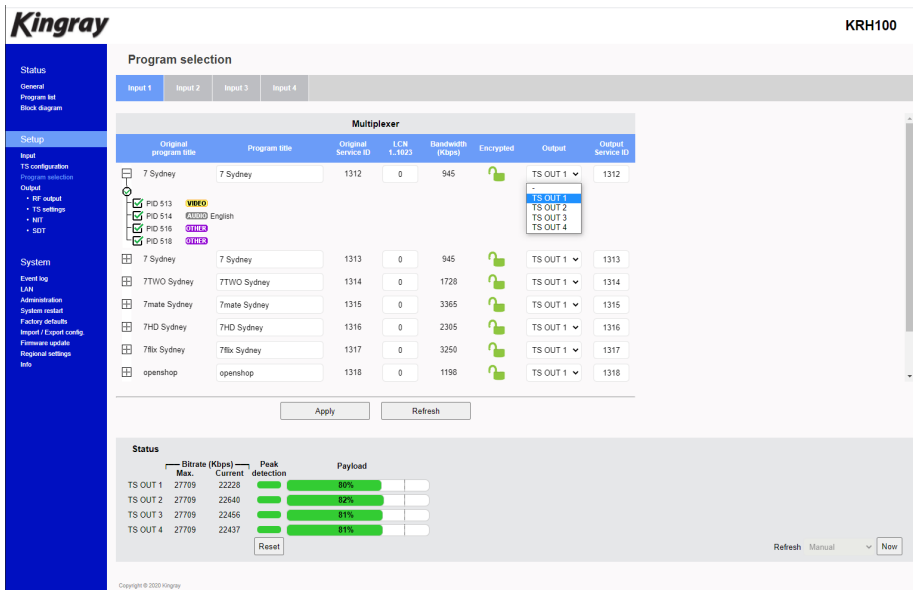

FIGURE No. 9

CAUTION:

The number of programs that the KRH100 is able to distribute depends on the resolution (SD, HD, 4K etc.), the compression (MPEG2, H.264 etc…) and in general from the total bitrate of each program.
For example, if we select the following DVB-T setting for the four modulators on KRH100 outputs:

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

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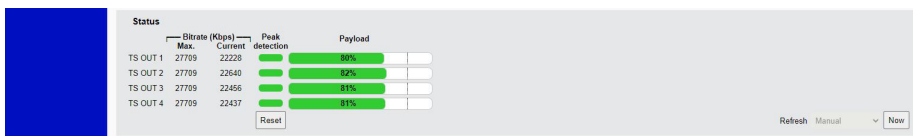

FIGURE No. 10

The status section in (Figure No. 10) provides a general idea to the user of the current payload (according to the selected programs) comparing it 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

As shown in Figure No 10 there is a colored indicator of the peak detection mechanism, for each output transport stream. This indicates if any overflow has occurred on modulator's output bitrate with the following colors:

- **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

4.2.7 - "OUTPUT" PAGE

In the "Output" page (Figure No. 11) the user is able to select the output as either DVB-T or DVB-C. The default setting is DVB-T.
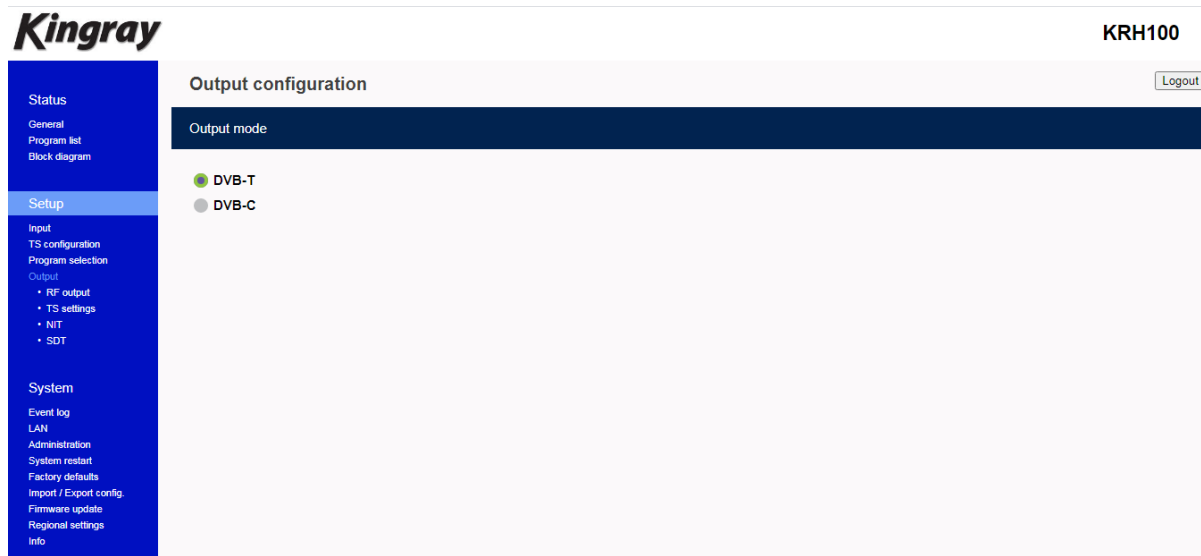
4.2.8 - "RF OUTPUT" PAGE

In the "RF Output" page (Figure No. 12) the user is able to setup the RF output settings of the KRH100.
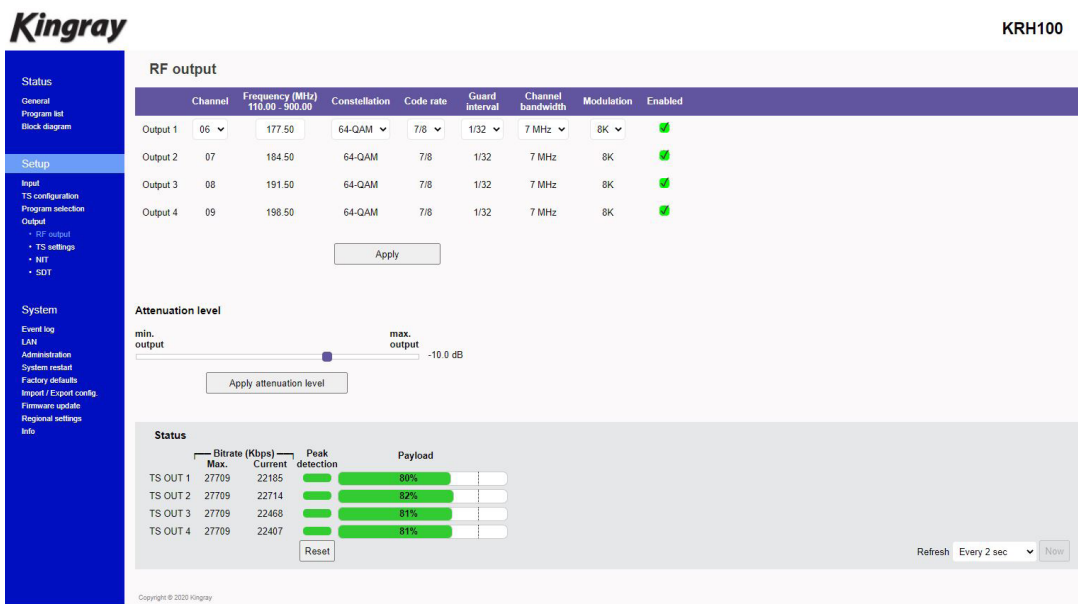
With the use of the radio buttons the user is able to select the mode that the KRH100 will operate as follows:

DVB-T: 4 x modulator working in DVB-T standard
DVB-C: 4 x modulator working in DVB-C standard

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.
- **Attenuation Level** –   The maximum output level can be attenuated by 30dB using the slide bar.

4.2.8 - "RF OUTPUT" PAGE (CONTINUED)

*All 4 output channels of the KRH100 operate as adjacent RF output channels.

This means that will only need to set up the first modulator and all the other three modulators will have the same settings and will be automatically programmed in adjacent channels.

E.g. If the user sets the CH28 in UHF band on modulator No.1 the other three modulators will be automatically set to CH29, CH30 and CH31, respectively.
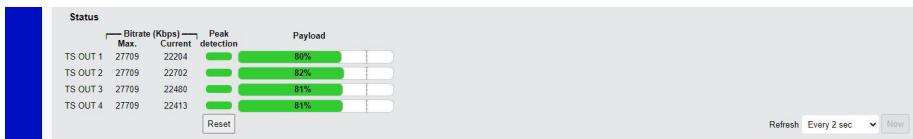

FIGURE No. 13

The status section in (Figure No. 13) 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 bitrates are variable according to their specific content.

4.2.9 - "TS SETTINGS" PAGE

In this section (Figure No.14), the user is able to setup all the TS settings of the four multiplex outputs in KRH100.
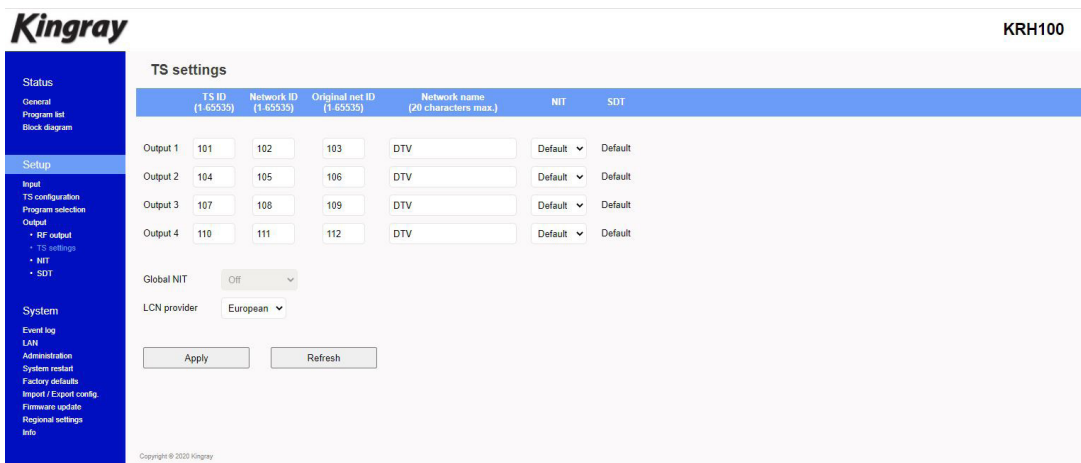

FIGURE No. 14

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
NIT:	Choose from Global, Basic, Default and Custom
LCN Provider:	Choose the appropriate LCN provider (European, NorDig v1, ITC / UK)

*For installation within Australia & New Zealand, please select NorDig v1

System

4.2.10 - "NIT" PAGE

<u>Note:</u> For use in Australia & New Zealand please select NorDig
In this section (Figure No. 15), the user is able to create custom NIT table for each of the four output channels of the device.
Moreover, this section offers the ability to export / import a NIT table.

FIGURE No. 15

4.2.11 - "SDT" PAGE

In this section (Figure No. 16), the user is able to create custom SDT table for each of the four output channels of the device. Moreover, this section offers the ability to export / import a SDT table.

FIGURE No. 16

4.2.12 - "EVENT LOG" PAGE

In "Event Log" page (Figure No. 17) the system logs all the events occurs in the device during its operation. These logs are divided in three different categories based on their priority as follow:

- **High** – Using the red color the system logs the events which are of high priority.
- **Medium** – Using the orange color the system logs the events which are of medium priority.
- **Low** – Using the red color the system logs the events which are of low priority.
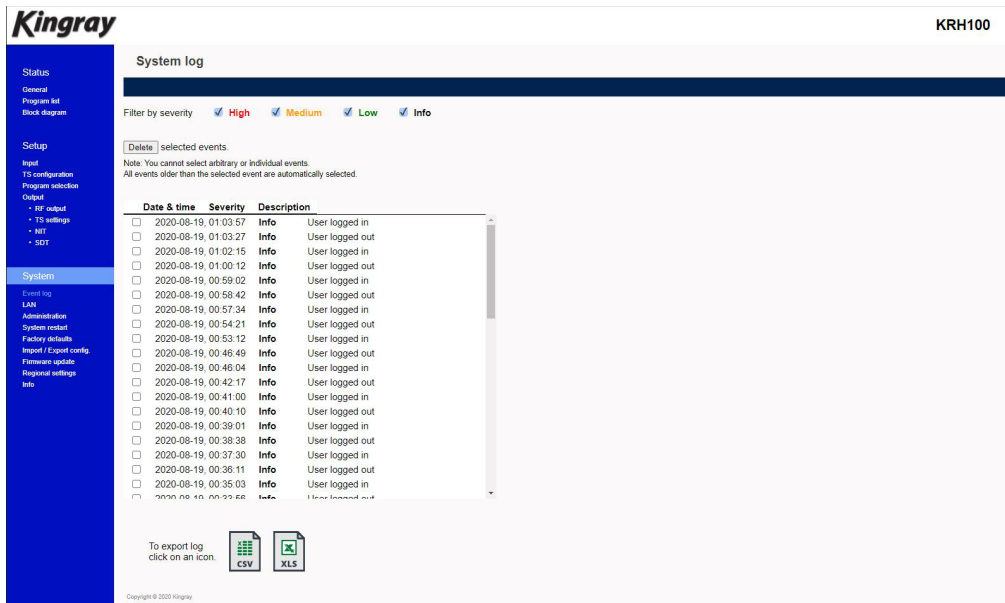
FIGURE No. 17

The user has the ability to select which kind of events to display as well as the device gives the opportunity to export these logs as follow:

- **Excel** – All the program list is exported in .xlsx format
- **CSV** – All the program list is exported in .csv format

4.2.13 - "LAN" PAGE

In "LAN" page (Figure No. 18) the user is able to setup all the parameters of the LAN control of the device as follows:
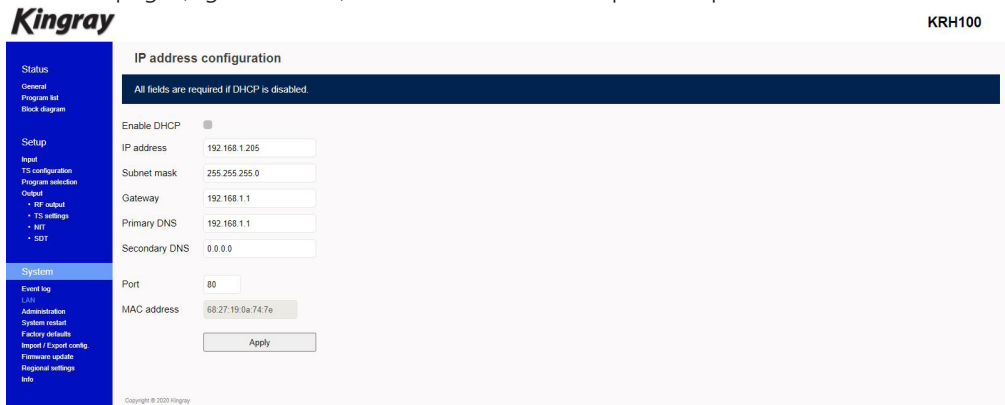
FIGURE No. 18

- **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

4.2.14 - "ADMINISTRATION" PAGE

In "Administration" section (Figure No. 19) the user is able to change the default password of the webserver.
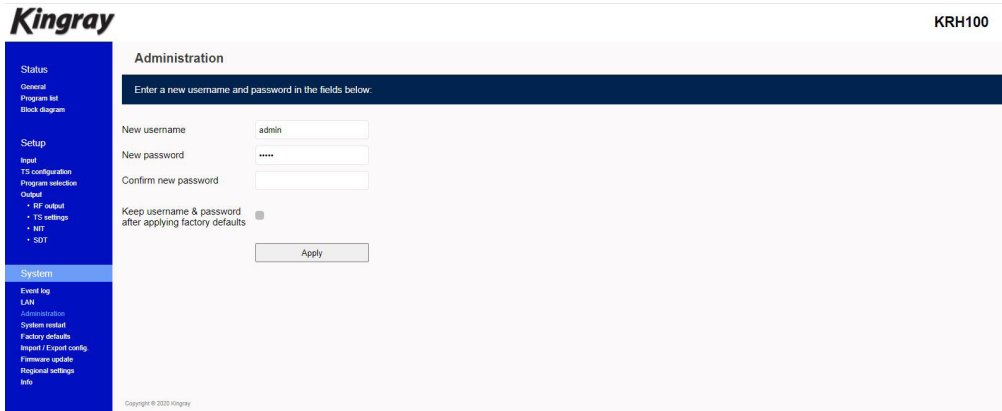
FIGURE No. 19

CAUTION:

In case of factory default procedure, the username and password will be reset unless the check box is selected "Keep username & password after applying factory defaults".

4.2.15 - "SYSTEM RESTART" PAGE

In "System Restart" section (Figure No. 20) the user is able to apply a full reset to the device.
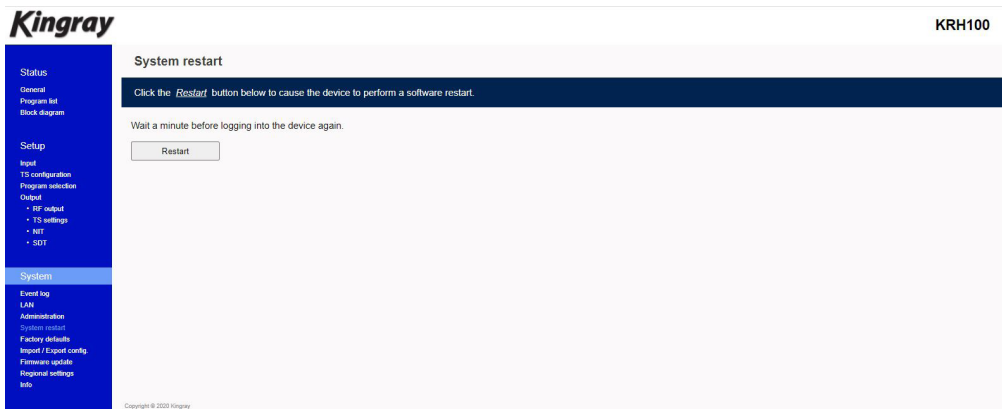
FIGURE No. 20

4.2.16 - "FACTORY DEFAULT" PAGE

In "Factory Default" section (Figure No. 21) the user is able to apply a factory default reset either as DVB-T or DVB-C.
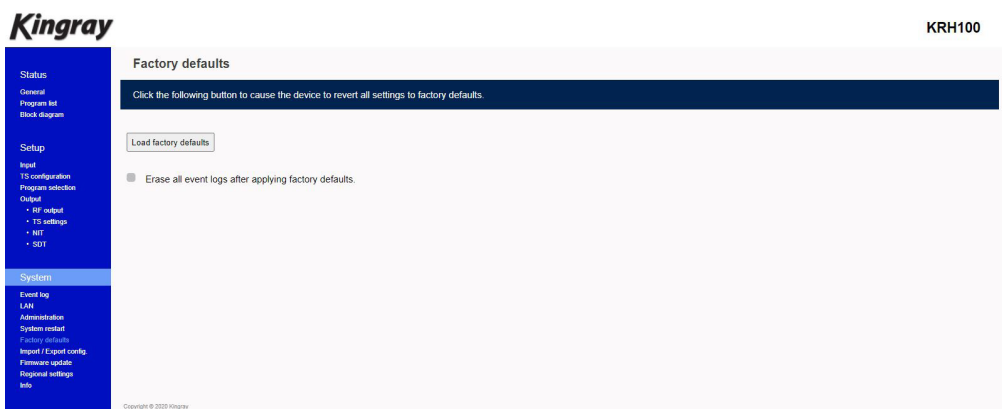
FIGURE No. 21

4.2.17 - "IMPORT/EXPORT CONFIG" PAGE

In "Import/Export Config" section (Figure No 22) the user is able to do the following:

1. Export: Save all the configuration is as specific file
2. Import: Upload a previously saved configuration file.
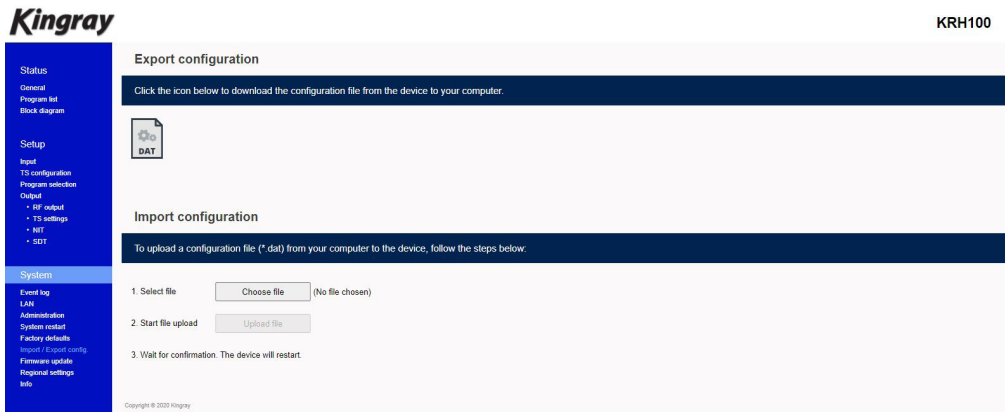
FIGURE No. 22

4.2.18 - "FIRMWARE UPDATE" PAGE

In "Firmware Update" (Figure No. 23) section the user is able to update the firmware should there be a new version available.
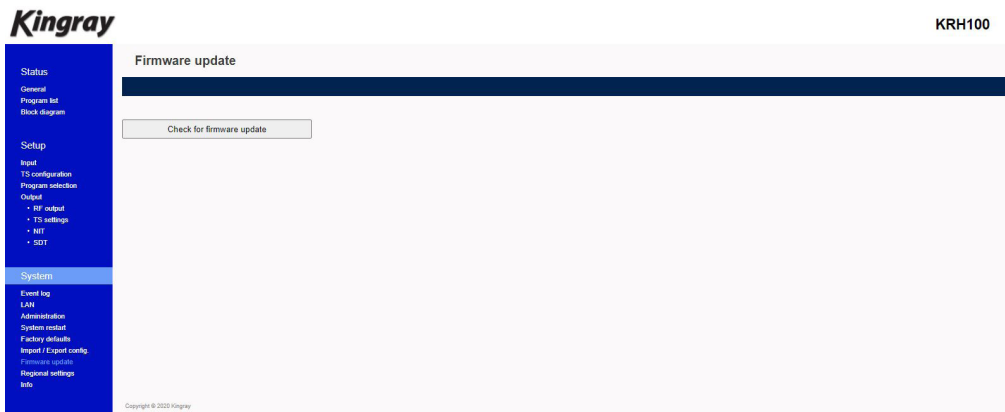
FIGURE No. 23

WARNING:

The existing configuration should not change as part of the firmware update process, however, it is always good practice to save the existing configuration prior to a firmware update.

4.2.19 - "REGIONAL SETTINGS" PAGE

In "Regional Settings" (Figure No. 24) section the user is able to select the NTP server in order for the device to receive the date and time as well as to set the timezone of their country.
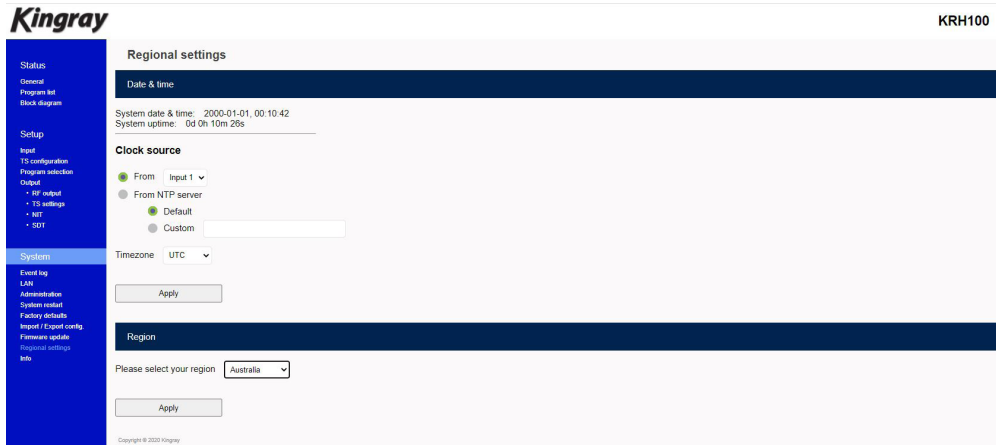
FIGURE No. 24

4.2.20 - "INFO" PAGE

In "Info" (Figure No. 25) section the user is able to see the serial number of the device as well as firmware and hardware versions.

FIGURE No. 25

5. TECHNICAL SPECIFICATIONS

INPUT SPECIFICATIONS

INPUT	Type	4 x DVB-S/S2/T/T2/C
	Frequencies	950…2150 MHz DVB-S/S2 118…900MHz DVB-T/T2/C
	Connector	75Ω - F, female

LNB	Voltage	OFF / 13V / 18V
	Current	< 400mA
	22 KHz Signal – Voltage – Frequency – DiSEqC	On / Off 0.65V ±0.35V 22 KHz ±4Hz 1.0 (Port A, B, C, D)

DVB-S	Standard	EN 300-421 V1.1.2
	Symbol Rate	1 - 55 MBaud
	Roll Off Factor	0.2, 0.25, 0.35
	Code Rate	1/2, 2/3, 3/4, 5/6, 7/8 (automatic)
	Spectral Inversion	Reverse, Non-reverse (automatic)

DVB-S2	Standard	EN 307-421 V1.2.1
	Constellation	QPSK, 8PSK (automatic)
	Symbol Rate	1 - 55 MBaud (QPSK) 1 - 45 MBaud (8PSK)
	Roll Off Factor	0.2, 0.25, 0.35 (automatic)
	Code Rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 8/10 (QPSK- automatic) 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 (8PSK- automatic)
	Spectral Inversion	Reverse, Non-reverse (automatic)

DVB-T	Standard	EN 300-744 V1.6.1
	Bandwidth	6, 7, 8 MHz
	Mode	2K, 8K
	Constellation	QPSK, 16QAM, 64QAM
	Guard Interval	1/4, 1/8, 1/16, 1/32
	Code Rate	1/2, 2/3, 3/4, 5/6, 7/8

DVB-T2 / T2 Lite	Standard	EN 302-755 V1.3.1
	Bandwidth	5, 6, 7, 8 MHz
	Mode	1K, 2K, 4K, 8K, 16K, 32K (Included extended mode)
	Constellation	QPSK, 16QAM, 64QAM, 256QAM
	Code Rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6

ITU-T J.83	Standard	Annex A(DVB-C), B(US cable),C
	Bandwidth	5, 6, 7, 8 MHz
	Mode	Automatic modulation detection
	Constellation	16QAM, 32QAM, 64QAM, 128QAM, 256QAM

OUTPUT SPECIFICATIONS

DVB-T		
	Standard	EN 300-744
	Bandwidth	5, 6, 7, 8 MHz
	Mode	2K, 8K
	Constellation	QPSK, 16QAM, 64QAM
	Guard Interval	1/4, 1/8, 1/16, 1/32
	Code Rate	1/2, 2/3, 3/4, 5/6, 7/8

ITU-T J.83		
	Standard	Annex A(DVB-C)
	Bandwidth	5, 6, 7, 8 MHz
	Mode	2K, 8K
	Constellation	16QAM, 32QAM, 64QAM, 128QAM, 256QAM
	Symbol rate	1-7.2 Ms/s

RF OUTPUT		
	Type	4 x RF out in adjacent channels
	Output Frequencies	110…950 MHz (1 Hz step)
	Output Level	90dBµV
	Connector	75Ω - F, female
	Output Attenuator	0…-20dB
	MER	>42dB
	Output Loop-through Loss	<1dB

Transport Stream Processing		
	Services	User selection by service names
	Automatic Regeneration	PAT, CAT, SDT, PMTs, EITs tables
	NIT/SDT	Pass-through, Custom, Automatic
	PCR	Re-Stamping
	LCN Support	Yes

Programming Interface		
	Ethernet Webserver	Yes, embedded webserver
	Speed	10/100 Mbps
	Connector	RJ45
	Browser Compatibility	Chrome, Firefox, Safari, Opera, Edge etc (Must support HTML v5.0)
	SNMP Support	Yes
	SNMP Version	v2.0

General		
	Power Supply	2 x +12VDC
	Power Supply Consumption	1.8A max.
	Operating Temperature	0 ℃ to 40 ℃
	Storage Temperature	-10 ℃ to +70 ℃
	Humidity	Up to 90%
	Dimensions	235 x 115 x 48 mm
	Weight	0.45 Kg

6. DIMENSIONS
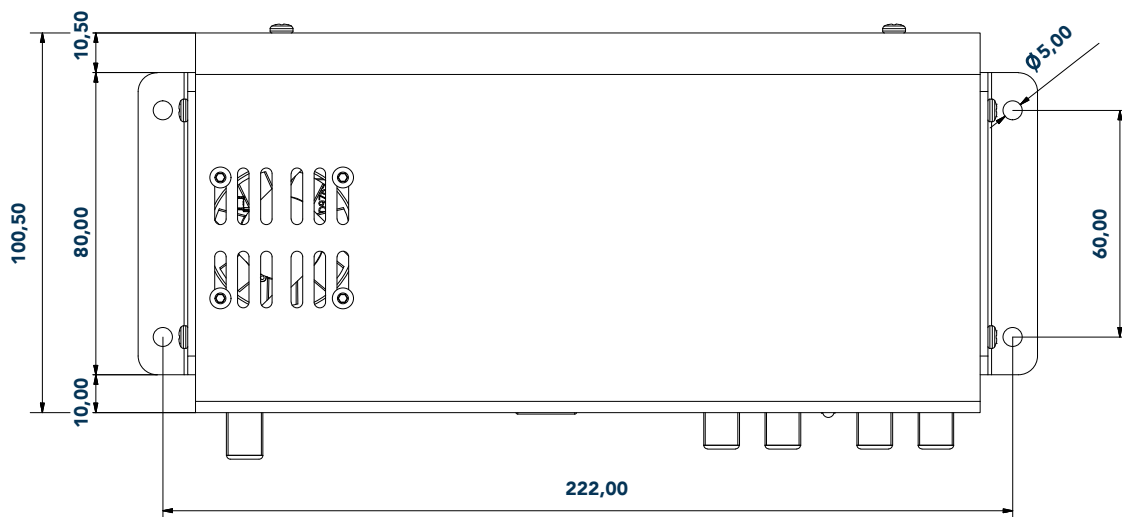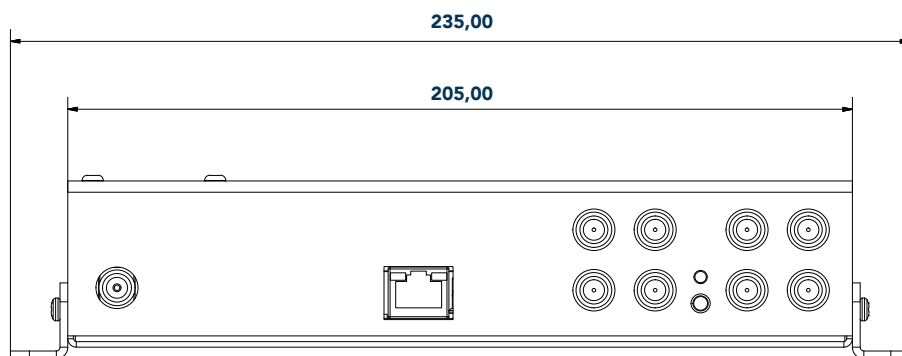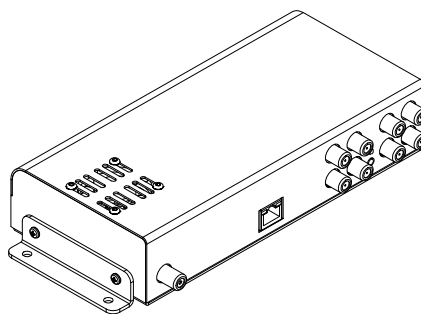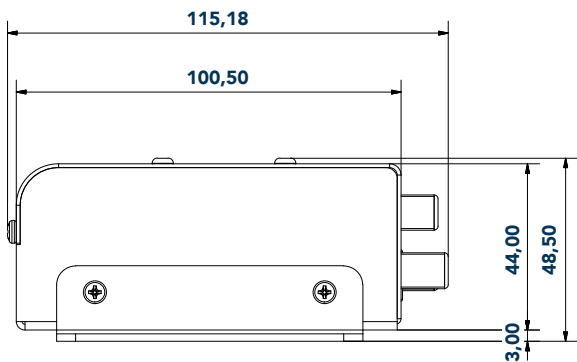
6. WARNINGS

<u>APPENDIX A</u>

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

VB-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

This warranty against defects is given by GME Pty Ltd ACN 000 346 814 (We, us, our or GME). Our contact details are set out in clause 2.7. This warranty statement only applies to products purchased in Australia. Please contact your local GME distributor for products sold outside of Australia.

Local distributor details at www.gme.net.au/export.

1. Consumer guarantees

1.1 Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

1.2 To the extent we are able, we exclude all other conditions, warranties and obligations which would otherwise be implied.

2. Warranty against defects

2.1 This warranty is in addition to and does not limit, exclude or restrict your rights under the Competition and Consumer Act 2010 (Australia) or any other mandatory protection laws that may apply.

2.2 We warrant our goods to be free from defects in materials and workmanship for the warranty period (see warranty table) from the date of original sale (or another period we agree to in writing). Subject to our obligations under clause 1.2, we will at our option, either repair or replace goods which we are satisfied are defective. We warrant any replacement parts for the remainder of the period of warranty for the goods into which they are incorporated.

2.3 To the extent permitted by law, our sole liability for breach of a condition, warranty or other obligation implied by law is limited

(a) in the case of goods we supply, to any one of the following as we decide -

(i) the replacement of the goods or the supply of equivalent goods;

(ii) the repair of the goods;

(iii) the cost of repairing the goods or of acquiring equivalent goods;

(b) in the case of services we supply, to any one of the following as we decide –

(i) the supplying of the services again;

(ii) the cost of having the services supplied again.

2.4 For repairs outside the warranty period, we warrant our repairs to be free from defects in materials and workmanship for three months from the date of the original repair. We agree to re-repair or replace (at our option) any materials or workmanship which we are satisfied are defective.

2.5 We warrant that we will perform services with reasonable care and skill and agree to investigate any complaint regarding our services made in good faith. If we are satisfied that the complaint is justified, and as our sole liability to you under this warranty (to the extent permitted at law), we agree to supply those services again at no extra charge to you.

2.6 To make a warranty claim you must before the end of the applicable warranty period (see warranty table), at your own cost, return the goods you allege are defective, provide written details of the defect, and give us an original or copy of the sales invoice or some other evidence showing details of the transaction.

2.7 Send your claim to: GME Pty Ltd. 17 Gibbon Road, Winston Hills, NSW 2153, Australia. Tel: (02) 8867 6000,

Fax: (02) 8867 6199

Email: servadmin@gme.net.au

2.8 If we determine that your goods are defective, we will pay for the cost of returning the repaired or replaced goods to you, and reimburse you for your reasonable expenses of sending your warranty claim to us.

3. What this warranty does not cover

3.1 This warranty will not apply in relation to:

(a) goods modified or altered in any way;

(b) defects and damage caused by use with non GME products;

(c) repairs performed other than by our authorised representative;

(d) defects or damage resulting from misuse, accident, impact or neglect;

(e) goods improperly installed or used in a manner contrary to the relevant instruction manual; or

(f) goods where the serial number has been removed or made illegible.

4. Warranty period

4.1 We provide a 5 year warranty on the KRH100 and 3 year warranty on power supply. No repair or replacement during the warranty period will renew or extend the warranty period past the period from original date of purchase.