MAINTENANCE AND OPERATION
INSTRUCTION MANUAL

DB4402-V2

High-Performance Dual
FM Monitoring Receiver & Radio Streamer

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Introduction

DEVA Broadcast Ltd. is an international communications and high-technology manufacturing organization, its corporate headquarters and facility located in Burgas, Bulgaria. The company serves the broadcast and corporate markets worldwide – from consumers and small businesses to the largest global organizations. It is dedicated to the research, design, development and provision of advanced products, systems and services. DEVA Broadcast launched its own brand back in 1997 and has nowadays evolved to become known as a market leader and internationally reputed manufacturer of user-friendly, cost-effective and innovative broadcast products.

Creativity and innovation are deeply woven into DEVA Broadcast corporate culture. Through successful engineering, marketing and management our team of dedicated professionals creates future-oriented solutions to improve customers' performance. You may rely that all issues communicated to our crew would be addressed accordingly. We pride ourselves on our pre and post-sales support and purchase services, which along with the outstanding quality of our radio gear have won us due respect and the market authority position.

DEVA Broadcast best-of-breed solutions have become the best sellers for our partners. The strategic partnerships which have been formed with industry leaders during all these years that we have been operating on the broadcasting market, have proved us a reliable business partner and a valuable asset, as our dealers worldwide would confirm. In constant pursuit of precision and long-term satisfaction, DEVA Broadcast enhances the reputation of our partners and clients alike. Furthermore, we have already a proven merit as a credible partner provider.

Our portfolio offers complete line of high quality and competitive products for FM and Digital Radio, Radio Networks, Telecommunication Operators and regulation authorities. For almost two decades of intensive software and hardware development, we have achieved a unique price-performance and endurance of our product lines. Our company's multitude of equipment and services is in line with the latest technologies and key trends. The most recognizable characteristics attributed to DEVA Broadcast products are their clear-cut, streamlined design, easiness of use and cost-effectiveness: simplicity of forms but multiplicity of functions.

For us there is no stage when we deem that we have reached the most satisfactory level in our work. Our engineers are in constant pursuit of new ideas and technologies to be captured in DEVA Broadcast solutions. Simultaneously, a strict control is being exercised at each step of any new development. Experience and hard work are our fundament but the continuous improving process is what we never leave aside. DEVA Broadcast participates on a regular basis in all landmark broadcasting events, not only to promote its products, but to exchange valuable know-how and experience. We are also engaged in international large-scale projects involving radio and audio solutions which makes us even more competitive on the global market.

All DEVA Broadcast products are developed and produced in accordance with the latest ISO 9001 quality control standards.

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Typographic conventions

The following table describes important conventions used in the manual.

Convention and Style	Description	Examples
Menu > Sub Menu > Menu Command	A menu item(s) and menu command that you need to click in sequence	Click ***Settings > General***
[Button]	Interface Interactive buttons	Press [OK] to save the changes
NOTE	Important notes and recommendations	**NOTE:** The notification will appear only once
"Reference Name" on Page XXX	References and links	refer to "New Connection" (see "Monitoring" on page 56)
`Example`	Used when example text is cited	Example for E-mail Notification: `Date: 04 Nov 2013, 07:31:11`

General Information

The DB4402-V2 – Dual FM Monitoring Receiver is a superb and highly practical combination between a logger and a streamer which allows you to easily and accurately monitor and store all important parameters of the FM signal while simultaneously giving you the opportunity to listen to a constant, uninterrupted audio stream. The synchronized performance of both major functions is at the core of the idea for this model, as well as the unit's major asset. You can listen to the selected audio feed at the same time as the logger campaign is running. The design of this device relies on simplicity coupled with functionality to offer customers the opportunity of a single solution to both tasks.

Providing the stable, dependable operation characterizing all DEVA products, the DB4402-V2 is fully DSP-based, with a built-in oscilloscope and an RDS/RBDS decoder with a BER meter. It also permits users to set alarms for RF, MPX, Pilot and RDS signal via email, SMS or SNMP. What is more, the TCP/IP and GSM connectivity provides easy remote control, monitoring and listening to the radio signal from any location.

The device offers a "Restore Factory Defaults" option and easy update of the firmware. It is an advanced solution giving customers a number of advantages and top all-round, multi-faceted performance as both a monitoring tool and a streaming device.

Product Features

- Fully DSP based core
- Built-in Oscilloscope allowing Left, Right and MPX display
- MPX Power measurement with data history
- Loudness meter
- RF Spectrum analyzer allowing to check the RF Carrier parameters
- MPX Spectrum analyzer for Left, Right and MPX measurements
- Selectable De-emphasis – 50µs and 75µs
- Built-in Stereo Decoder; Stereo Presence Detection
- Date & Time Settings with various formats
- LAN port for full TCP/IP remote control and monitoring
- Up to 90dBµV direct RF Antenna Input
- Adjustable alarms for RF, Deviation, Pilot and RDS signal
- Firmware update for future-proof operation
- Parameters Factory Restore Option
- FM Band 87 - 108 MHz Basic Spectrum Analyzer
- MPX, PILOT & RDS deviation meters
- LEFT and RIGHT demodulated audio level meters
- Headphones audio output
- RDS and RBDS decoder with BER meter
- Intuitive Application Interface
- Alarm dispatch via E-mail, SMS, SNMP
- Channel status reporting via SMS
- RF and RDS Measurements
- Remote Listening via optional GSM modem
- Real Time Audio Program Streaming
- Attractive price and very good price-performance ratio
- Very Intuitive Embedded WEB server for interactive supervision
- Proved and reliable hardware for 24/7/365 operating
- Easy Installation and Setup
- SNTP for automatic synchronization of the built-in clock
- Compact and Robust Aluminum Case for high RF immunity

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TECHNICAL SPECIFICATIONS

RF INPUT	
Tuning Range	User selectable, 87.1-107.9 MHz (CCIR), 65-74 MHz (OIRT), 76-95 MHz (Japan)
Tuning Step	10, 20, 50, 100 kHz
Tuner Sensitivity	30 dBµV
Antenna Port	BNC Connector, 50Ω
Internal Attenuator	0, 10, 20 and 30 dB
Dynamic range	100 dB
FM DEMOD	
IF Filter Bandwidth	50kHz to 314kHz overall; ±25kHz to ±157kHz; 15 Increments
Frequency Response	±0.1 dB, 10 Hz to 86 kHz
Dynamic range	90 dB
STEREO DECODER	
Frequency Response (L and R)	±0.1 dB, 10 Hz to 15 kHz
SNR (Stereo)	60 dB, 50 µs de-emphasis
THD	0.1%, 10 Hz to 15 kHz, 50 µs de-emphasis
Separation	50 dB, 50 Hz to 10 kHz, 50 µs de-emphasis
Crosstalk	52 dB
RDS DECODER	
Standards	European RDS CENELEC; United States RBDS NRSC
Error Correction & Counting	Yes
AF Decoding	Yes
CT (Time/Date)	Yes
PI, PTY, DI, MS	Yes
TA/TP	Yes
RT (Radio Text), RT+	Yes
PS (Program Service name)	Yes
ODA	Yes
Group Analyzer	Yes
BER Analyzer	Yes
METERING ACCURACY	
RF Level	±1 dB, 0 to 100 dBµV
Multipath	0 to 100%; accuracy - ±1%
MPX Deviation	±2 kHz, 10 to 100 kHz, 1 kHz resolution
MPX Power	±12 dBr; resolution - 0.1dBr, 10 sec. integration; accuracy - ±0.2 dBr
Pilot Level	±0.5 kHz, 1 to 12 kHz, 0.2 kHz resolution
RDS Level	±0.5 kHz, 1 to 12 kHz, 0.2 kHz resolution
Audio Level	±1 dB, +10.0 to -55.0 dB, 0.1 dB resolution

FFT SPECTRUM ANALYSIS	
Input	Composite MPX, Audio
Dynamic Range	80 dB
FFT Length	1024
Sampling Rate	256 kHz - Composite, 64 kHz - Audio
SCOPE ANALYSIS	
Input	Composite MPX, Audio
Trigger Mode	Auto, Fall
Dynamic Range	±120 kHz
Sampling Rate	256 kHz - Composite, 64 kHz - Audio
USER INTERFACE	
Web interface	Full monitoring and control; Interactive and easy to use
Indicators	6 LEDs (on front panel)
Headphone Output	1/8” (3.5mm) phone jack (on front panel)
OPERATING CONDITIONS	
Temperature	-15°C to 55°C
Humidity	< 95%, non-condensing
Altitude	0 to 5000m above sea level
EMC Immunity	6V/m
OUTPUTS	
Audio stream	Icecast/Shoutcast compatible audio stream
Alarms	E-mail, SMS, SNMP
Headphone	1/8” (3.5mm) Phone Jack
GSM Modem	15-pin Male D-Sub Connector
COMMUNICATION INTERFACES	
Ethernet 10/100 Base-T	RJ45 Connector
GSM Modem	15 pin Male D-Sub Connector
POWER SUPPLY	
Voltage	100-240V / 50-60 Hz / 25W
Connector	IEC320
SIZE AND WEIGHT	
Dimensions (W;H;D)	485 x 44 x 300 mm
Shipping Weight	540 x 115 x 300 mm / 4.5kg

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Factory Default Settings

MONITORING RECEIVER

Network Settings

IP	192.168.1.2
Gateway	192.168.1.1
Subnet Mask	255.255.255.0
DNS	192.168.1.1
DHCP	Enabled

WEB Server

HTTP Port		80
Admin	Username	user
	Password	pass
User	Username	user
	Password	pass

E-mail

E-mail 1	*blank*
E-mail 2	*blank*
Sender	*blank*
Server	*blank*
Port	25

Audio

Stream Port	5000
Name	DB4402-V2 - FM Radio Monitoring Tool
Quality	128 kbps

GSM Modem

Number 1	*blank*
Number 2	*blank*
Number 3	*blank*
Number 4	*blank*
Baudrate	9600

SNMP Settings

Agent	Enabled
Agent ID	1
Agent Port	161
Read Community	DEVA4402
Write Community	DEVA4402
Manager IP	192.168.1.1
Manager Port	162

Management Settings

Attenuator	Auto
De-emphasis	50 µs
Internet Time	Enabled
Internet Time Server	pool.ntp.org
Internet Time Server Port	123
Time Zone	UTC (+00:00)
Web session timeout	3 minutes
SNMP session timeout	1 minute

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Channel Presets Default Settings

Parameter	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6
Scheduling	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Frequency	98 kHz	98 kHz	98 kHz	98 kHz	98 kHz	98 kHz
Alarms Control	All Disabled	All Disabled	All Disabled	All Disabled	All Disabled	All Disabled
Trigger Time	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes
Release Time	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes
RF Alarm Low Threshold	40 dBµV	40 dBµV	40 dBµV	40 dBµV	40 dBµV	40 dBµV
RF Alarm High Threshold	60 dBµV	60 dBµV	60 dBµV	60 dBµV	60 dBµV	60 dBµV
MPX Alarm Low Threshold	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz
MPX Alarm High Threshold	90 kHz	90 kHz	90 kHz	90 kHz	90 kHz	90 kHz
MPX Power Alarm Low Threshold	-8 dBr	-8 dBr	-8 dBr	-8 dBr	-8 dBr	-8 dBr
MPX Power Alarm High Threshold	6 dBr	6 dBr	6 dBr	6 dBr	6 dBr	6 dBr
Left Alarm Low Threshold	-30 dB	-30 dB	-30 dB	-30 dB	-30 dB	-30 dB
Left Alarm High Threshold	3 dB	3 dB	3 dB	3 dB	3 dB	3 dB
Right Alarm Low Threshold	-30 dB	-30 dB	-30 dB	-30 dB	-30 dB	-30 dB
Right Alarm High Threshold	3 dB	3 dB	3 dB	3 dB	3 dB	3 dB
Pilot Alarm Low Threshold	5 kHz	5 kHz	5 kHz	5 kHz	5 kHz	5 kHz
Pilot Alarm High Threshold	9 kHz	9 kHz	9 kHz	9 kHz	9 kHz	9 kHz
RDS Alarm Low Threshold	2 kHz	2 kHz	2 kHz	2 kHz	2 kHz	2 kHz
RDS Alarm High Threshold	7 kHz	7 kHz	7 kHz	7 kHz	7 kHz	7 kHz
RDS Group Alarm	All Disabled	All Disabled	All Disabled	All Disabled	All Disabled	All Disabled

AUDIO STREAMER

Network Settings

IP	192.168.1.10
Gateway	192.168.1.1
Subnet Mask	255.255.255.0
DNS	192.168.1.1
DHCP	Enabled

WEB Server

HTTP Port		80
Admin	Username	user
	Password	pass
User	Username	user
	Password	pass

Audio

Stream Port	5000
Name	DB4402-V2 - FM Radio Streamer
Quality	128 kbps

GSM Modem

Number 1	*blank*
Number 2	*blank*
Number 3	*blank*
Number 4	*blank*
Baudrate	9600

SNMP Settings

Agent	Enabled
Agent ID	1
Agent Port	161
Read Community	DEVA4402
Write Community	DEVA4402
Manager IP	192.168.1.1
Manager Port	162

Management Settings

Attenuator	Auto
De-emphasis	50 µs
Internet Time	Enabled
Internet Time Server	pool.ntp.org
Internet Time Server Port	123
Time Zone	UTC (+00:00)
Web session timeout	3 minutes
SNMP session timeout	1 minute

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HOW TO RESET THE DB4402-V2 TO ITS FACTORY DEFAULTS WITHOUT HAVING ACCESS TO THE WEB INTERFACE?

1. Disconnect the power supply cable from the unit.
2. Find the RESET button on Rear panel (labeled in red on the picture), press and hold it.
3. While pressing the RESET button, connect the power supply cable to the unit and wait 10 seconds.
4. Release the RESET button and wait for the DB4402-V2 to reboot.
5. Once the reboot is complete, the DB4402-V2 will be returned to its factory default settings.
6. This procedure should be completed for each receiver if both receivers are to be returned to their factory defaults.

Safety Warning

ALWAYS OBSERVE THE SAFETY PRECAUTIONS.

Careful observance of the safety precautions will help prevent physical injury, damage of the equipment, and extend the equipment life.

- The servicing of electronic equipment should be performed only by qualified personnel;
- Before removing the covers the unit must be switched off and the mains cable unplugged;
- When the equipment is open, the power supply capacitors should be discharged using a suitable resistor;
- Never touch the wires or the electrical circuits;
- Use insulated tools only;
- Never touch the metal semiconductor. They might carry high voltages;
- For removing and installing electronic components, follow the recommendations for handling MOS components.
- Do not remove the factory sticker from the equipment. It contains information as regards the name, serial number and MAC address of the device.
- To join the equipment to the mains supply, use the power cord purchased with the equipment.

ATTENTION: The device has an internal Lithium battery for RTC timekeeping. Do not try to re-charge this battery!

NOTE: A depleted RTC battery may cause the device to start with an incorrect or random time and date. For the RTC battery replacement procedure, refer to APPENDIX "Battery Replacement Procedure" on page 76.

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Panel Indicators and Appointments

FRONT VIEW

1. Phones Output – Audio signal from the tuned frequency.
2. Power LED Indicator
3. Status
4. RX1 LAN LED Indicator. This LED can be in one of the following states:
   - Off – No User Connected, Logger is active;
   - Blinking – User is connected, Logger is inactive.
5. RX1 GSM LED Indicator. This LED can in one of the following states:
   - Off – no GSM Modem;
   - Fast Blinking – GSM Modem initialization;
   - Slow Blinking – GSM Modem present and operating.
6. RX2 LAN LED Indicator. This LED can be in one of the following states:
   - Off – No User Connected, Logger is active;
   - Blinking – User is connected, Logger is inactive.
7. RX2 GSM LED Indicator. This LED can in one of the following states:
   - Off – no GSM Modem;
   - Fast Blinking – GSM Modem initialization;
   - Slow Blinking – GSM Modem present and operating.

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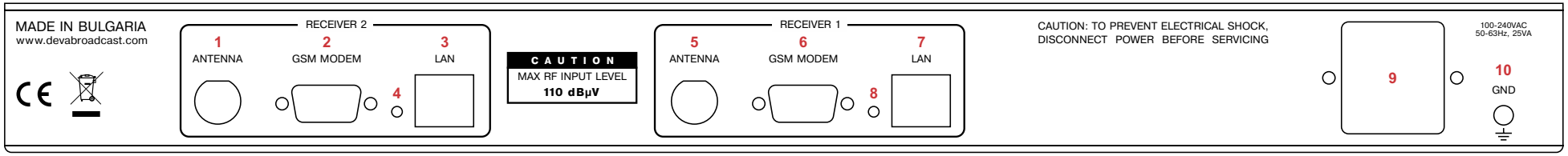
REAR VIEW



Receiver 2

1. LAN Port / Internet Input – standard RJ-45 port;
2. GSM Modem Connector - DB-15 male;
3. Antenna Input - BNC connector for FM Antenna;
4. Factory Defaults reset button.

Receiver 1

5. LAN Port / Internet Input – standard RJ-45 port;
6. GSM Modem Connector - DB-15 male;
7. Antenna Input - BNC connector for FM Antenna;
8. Factory Defaults reset button.

9. Power Supply;
10. GND

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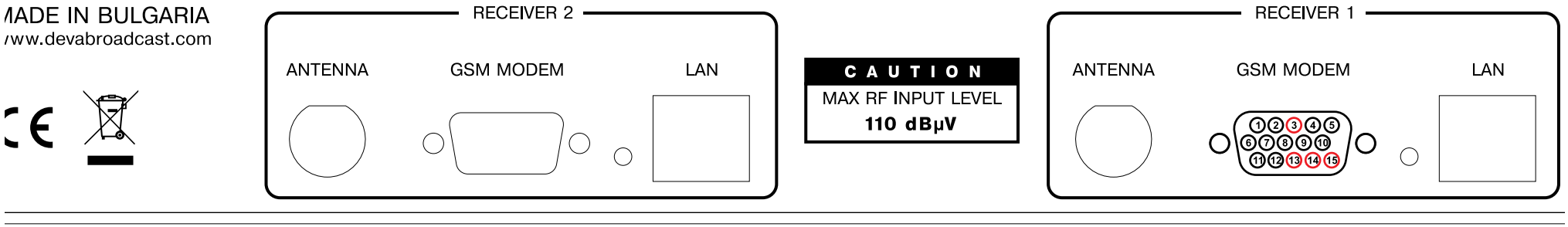
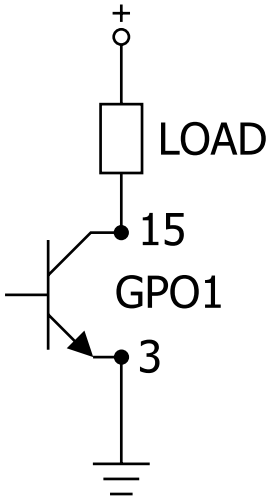
GPO CONNECTOR PINOUTS



15 - GPO1 Collector
14 - GPO2 Collector
13 - GPO3 Collector

3 - GND



Electrical Characteristics of GPO

Vec < 6V	Ic < 50mA
Vce < 45V	Pd < 150mW

Getting Started

In order for the normal operation of the DB4402-V2 to be guaranteed, you will need fulfill the following conditions:

1. Standard Ethernet 10/100M connection;
2. Correctly assigned Network configuration and device settings.

To make sure that all the conditions are fulfilled please, follow the instructions below.

CONNECTION

1. Install the unit on its operation place;
2. Using the provided power cable, connect the unit to the power supply network;
3. Connect the antenna cable to the RF antenna input connector located on the rear panel of the device;
4. Connect the DB4402-V2 to the TCP/IP network using direct network cable;
5. **IF GSM OPTION IS SUPPORTED** - Using the connection cable provided, connect the optional GSM modem. In order for better GSM network coverage to be achieved, please select proper place for the GSM antenna.

NOTE: The GSM antenna must be installed far enough from the monitoring devices. The GSM modem radiates RF signal that may cause spurious emissions that will may interfere with the accuracy of the measurements. For detailed explanation of the option, please refer to "GSM Modem Option" on page 68.

NETWORK SETTINGS

After connecting the network cable the Led 'LAN' located on the rear panel must be ON or flashing. The next and most important step for configuration is the adjustment procedure of the Network Communication. The settings shown below are Default Network Settings:

DHCP	Enabled
IP	Assigned by DHCP
Mask	Assigned by DHCP
Gateway	Assigned by DHCP
DNS	Assigned by DHCP
HTTP Port	80

NETWORK DISCOVERY

This is a network setting that defines whether your computer can see (find) other computers and devices on the network and whether other computers on the network can see your computer. By default, Windows Firewall blocks network discovery but you can enable it.

1. Open Advanced sharing settings by clicking the Start button, and then on "Control Panel". In the search box, type "network", click "Network and Sharing Center", and then, in the left pane click "Change advanced sharing settings";
2. Select your current network profile;
3. Click "Turn on network discovery", and then click save changes.

NOTE: If you're prompted for an administrator password or confirmation, type the password, provide confirmation or contact your system administrator.

If you have already enabled this function on your computer DB4402-V2 will be automatically added to the Device list section. The device will be ready for usage and no additional adjustments will be required except user name and password.

NOTE: If the port is different than the default one (80), it is necessary to specify it, for example: `http://192.168.1.2:9000`

ATTENTION: Depending on Internet Protocol Settings, the assigned IP address may not be visible outside your local network, thus the device may be accessed only within that network. Consult with your network administrator for the appropriate IP settings.

NETWORK SECURITY RECOMMENDATIONS

1. It is not recommended the DB4402-V2 to be directly connected to the Internet. This may lead to unregulated access and/or problematic operation of the device. To ensure secure connection, we recommend the device to be installed behind a router with an active firewall.
2. If remote access to the device is needed, we recommend using VPN to the router or the port of the relevant service (WEB, SNMP, Application, etc.) to be properly NAT forwarded.
3. If NAT forward is used, it is highly recommended random ports of your choice to be used. Not the standard ones (80 for WEB, 161 for SNMP, etc.).
4. Using DMZ connection is not recommended.
5. Make sure to change the standard access credentials (usernames and passwords, SNMP communities).

For detailed information as regards the recommendations listed above or need of further instructions, please contact your network administrator.

LOGIN

ATTENTION: Upon Login, the Logger campaign started on the FM Monitoring receiver will stop. It will resume once the user logs out.

The DB4402-V2 can serve two users at a time, one logged in the FM Monitoring receiver, and one logged in the FM Radio Streamer. Username and Password will be requested when entering the WEB Interface. Default values are *user* and *pass*.

Enter your credentials and press the [Login] button to continue to Main screen.

If the WEB Interface is already in use, the following message will appear:

NOTE: DB4402-V2 will Logout automatically the current session once the WEB session timeout expires. (see “Communication Settings” on page 43)

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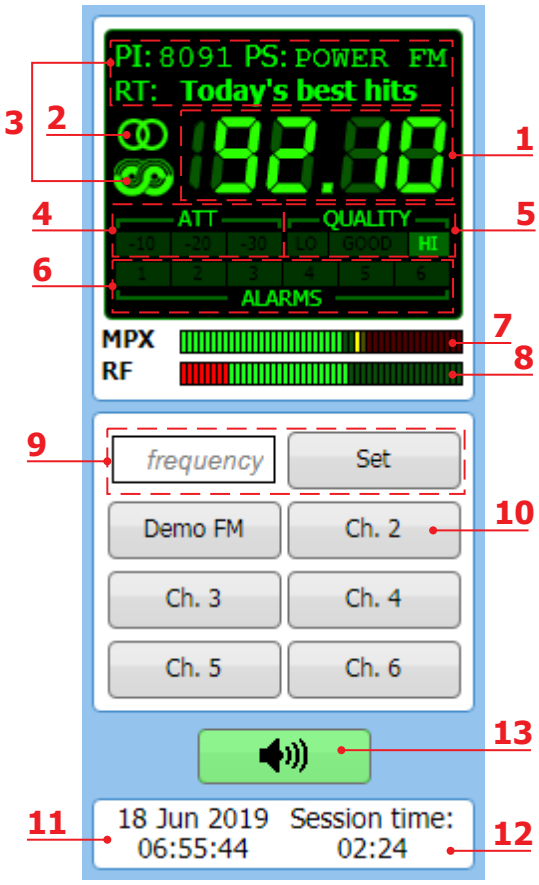
WEB Interface FM Monitoring Receiver

DEVICE CONTROL INTERFACE

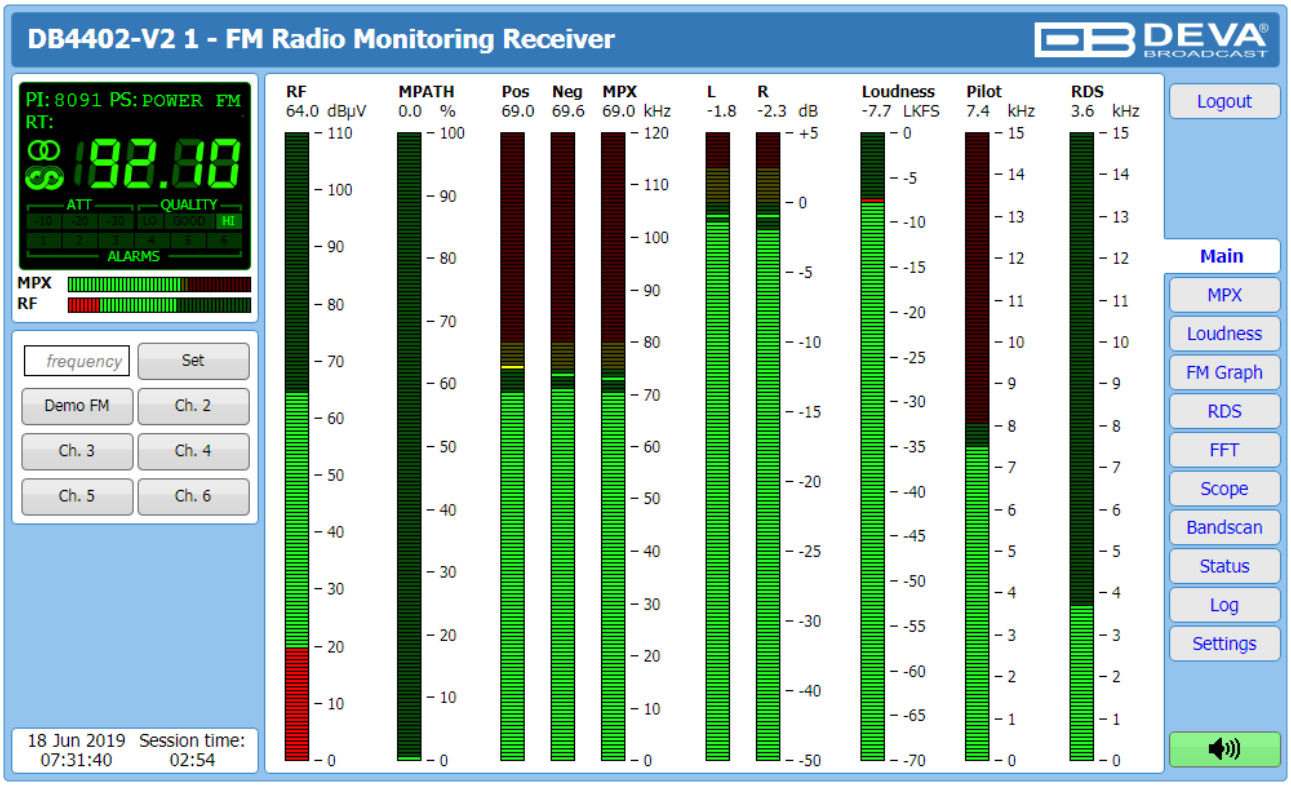
The WEB Interface is visually divided into two sections Left and Right.

- On the Right are the specific contextual readings of the currently selected menu page.
- On the Left is the so called "dashboard" of the device - General Tuner and Channel readings, functional buttons. This section of the WEB interface is constant part of each screen, hence allowing immediate tuner interactions.



1. Frequency indicator showing currently tuned frequency;
2. Stereo indicator;
3. RDS/RBDS presence indicator & information;
4. RF Attenuator Status;
5. Signal Quality indicator;
6. Channel Alarms indicator – will be lit in red when the Scheduler has detected an alarm on channel. (see "Channels settings" on page 41);
7. MPX Level indicator;
8. RF Level indicator. The red zone (low level) indicates RF level below 20 dBµV;
9. Frequency set buttons;
10. Channel Preset Buttons – when one of the buttons is pressed, the Tuner will be set to the predefined frequency. Upon hovering with the mouse over a preset button, the name of the channel will be displayed;
11. Device Time ("General Settings" on page 39);
12. Session remaining time;
13. Listen Button – Button with double usage used to Play/Stop the current audio stream (an audio device will be required).

MAIN



The Main Screen of the WEB Interface shows all the mandatory parameters represented as LED readings. You can easily select the preferred audio frequency by using the selection buttons, placed on the left part of the screen. All station presets are defined by the user.

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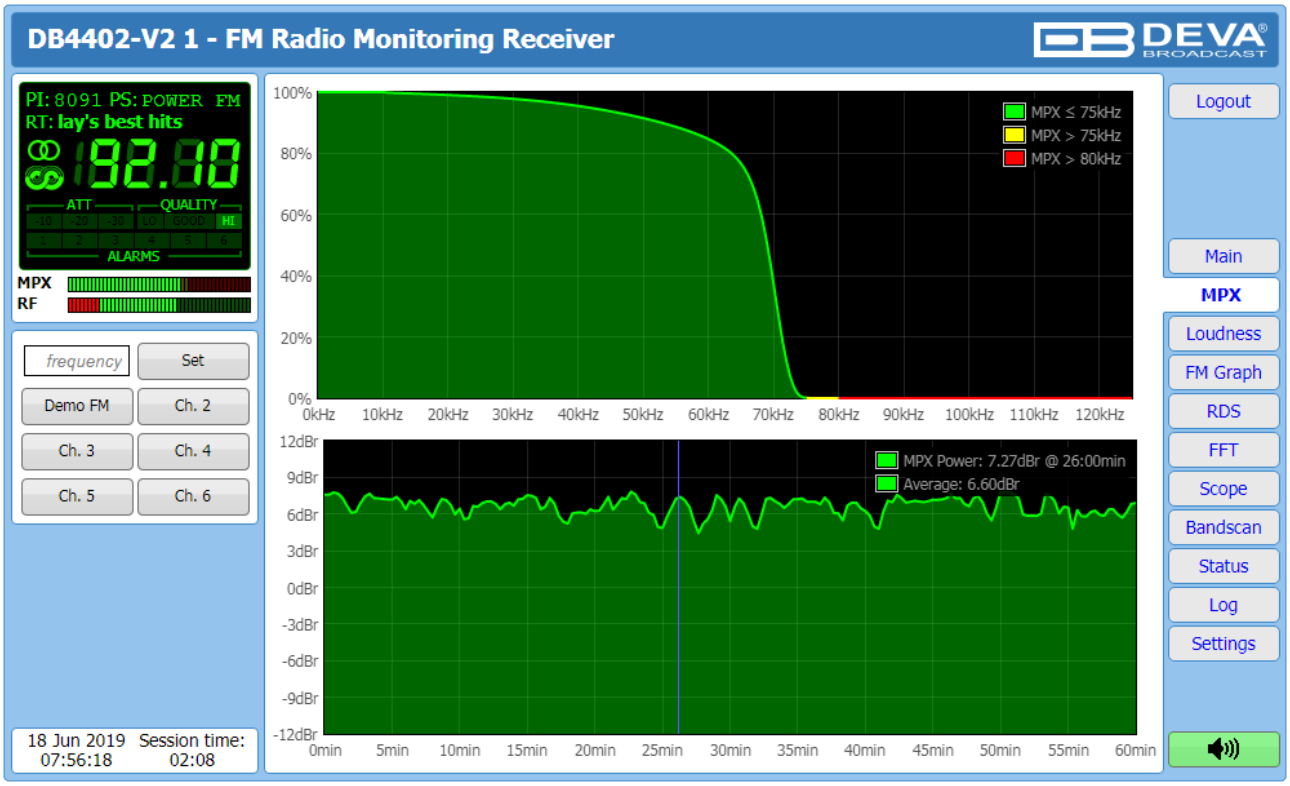
MPX

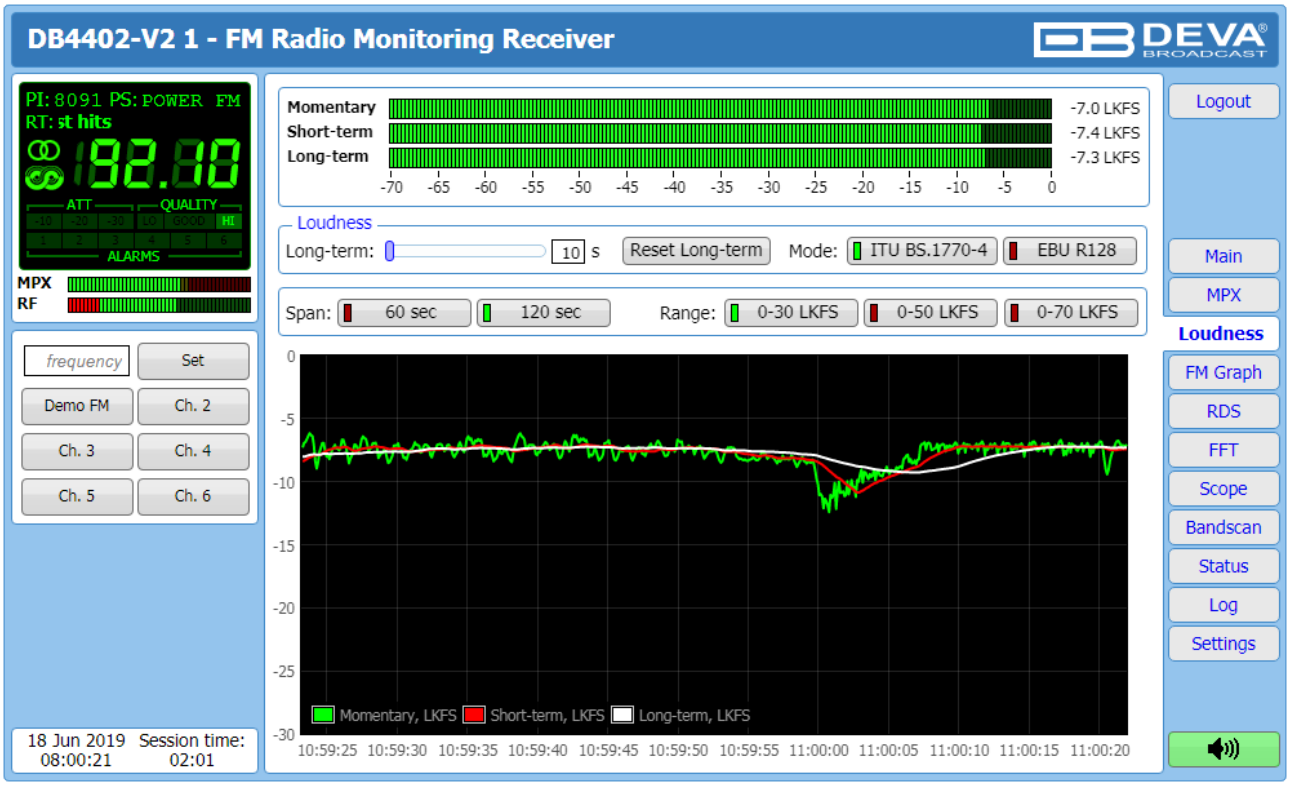


The MPX page shows the baseband MPX deviation as a function of deviation in kHz over the observation period. The graph immediately shows modulation density.

There is also a rolling 60-minute graph of the MPX power with average indicator, measured in dBr. The MPX Power is calculated continuously with an integration window of 60 seconds and a new sample every 20 seconds. Therefore, the first sample is available 60 seconds after tuning.

The rule of MPX Power provides to measure the modulation power which is seen equal to modulate signal electric power, for one minute time period and to compare it to a sinusoidal modulating signal one which deviates ±19kHz. The result, expressed in dB, must be lower or equal to zero to comply with the rule.

LOUDNESS



This page shows the average program loudness measurements as defined by ITU BS.1770-4 and EBU R128 recommendations. The following measurements are available:

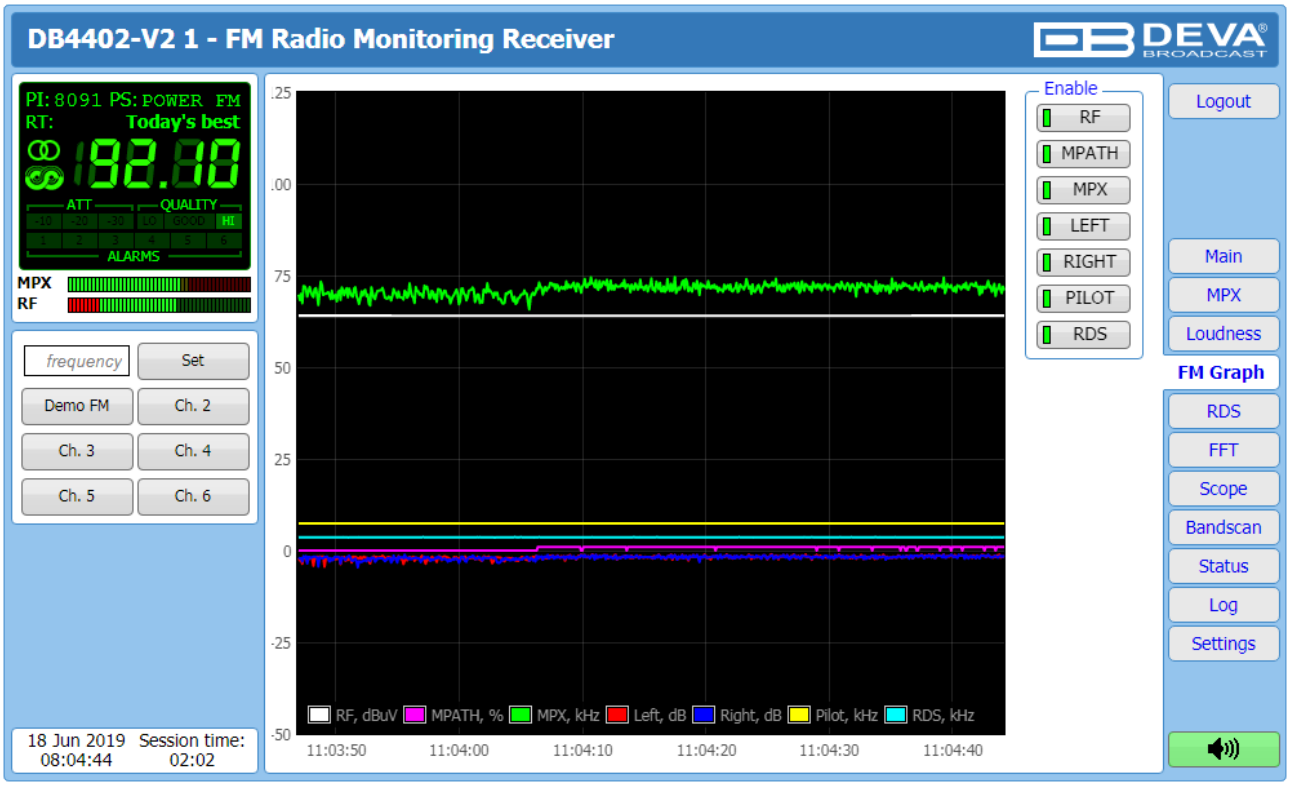
- **Momentary** – average program loudness measured over a 0.4s sliding time window, not gated;
- **Short-term** – average program loudness measured over a 3s sliding time window, not gated;
- **Long-term** – average program loudness measured over a variable sliding time window, gated as described in ITU BS.1770-4. The time window can be varied between 10s and 120s.

The page offers all the above measurements in two display forms – high refresh rate bar graphs for displaying current values and a time graph for extended visualization over time.

The user can modify the processing and appearance of the measurement using the following settings:

- **Long-term** – a slider to select the length of the Long-term loudness measurement sliding time window, from 10s to 120s;
- **[Reset Long-term]** – a button to reset Long-term measurement;
- **Mode** – select between [ITU BS.1770-4] and [EBU R128] mode;
- **Span** – select time graph time span;
- **Range** – select time graph measurement range.

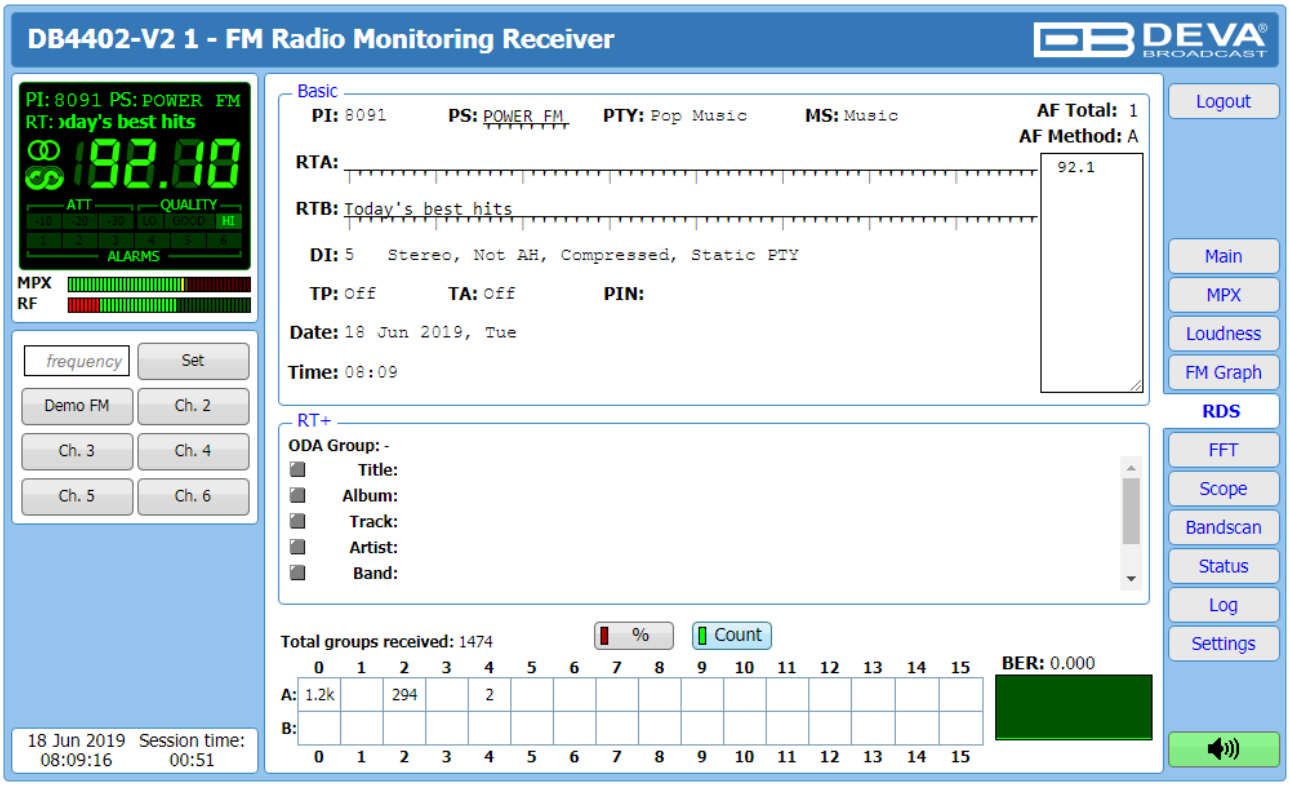
FM GRAPH



This screen represents all mandatory signals over a time span of 120 seconds. All parameters have their own color representation and measurement units, visible below the graph.

According to your needs, the signals listed in the right-hand section of the dialog window, can be visible or hidden. Click on the corresponding button in order for a parameter to be displayed/hidden. The radio frequency to be observed could be easily set by using the preset buttons, placed on the left of the screen.

RDS/RBDS



One of our core competencies lies in the RDS/RBDS. The RDS/RBDS page is very comprehensive, with a display of the RadioText (RTA and RTB), basic RDS/RBDS fields and a table of all decoded RDS/RBDS groups with a percentage measurement based on the overall RDS/RBDS data stream or group count. A very useful graph on this display is the rolling RDS/RBDS bit error rate (BER) display.

Total groups received indicator – all received groups are systematized into a table, representing the percentage/quantity of the groups in the received RDS/RBDS signal. The user selects how the "Total groups received" data should be displayed: as Percents [%] or [Count], by selecting the corresponding button.

NOTE: The bit error rate or bit error ratio (BER) is the number of bit errors divided by the total number of transferred bits during a studied time interval. Result closer or equal to 0 indicates that no bit errors are detected and vice versa result closer or equal to 1 indicates that the received transferred bits are only errors.

Basic RDS

PI/CALL (Program Identification) – The PI code is your station's 'digital address'. It is a hexadecimal code that is assigned by an appropriate broadcasting authority in most countries, but in the United States the PI code is numerically calculated from the station's call sign. We have provided a calculator utility within the DB4402-V2. An in-depth discussion of the mathematical calculation is given in RDS/RBDS Standard.;

PS (Program Service Name) – This is the station's "street name" that will appear on the receiver faceplate display. The PS can be up to eight characters in length (including spaces) and can be as simple as the station's call letters: `KWOW` or `KWOW FM`, or a slogan: `NEWSTALK` or `LIVE 95`.

PTY (Program Type) – The PTY data flag identifies the station format from a pre-defined categories. Many RDS receivers are able to seek the listener's preferred format automatically.

This means that a car radio can switch from a fading station to a stronger one that carries the same variety of music, though not the very same program, as provided by AF switching. The PTY function of RDS helps a broadcaster catch 'transient audience' share. The PTY code is not meant to change from song to song or to accommodate a top-of-the-hour newscast, however.

MS (Music/Speech Switch) – This flag simply indicates whether music or speech is the primary broadcast programming.

RT (Radio Text) – This is a 64-character block of plain text that the listener can select for visual display on the faceplate of the radio by pressing an INFO button on the receiver. This function is not available on many automobile radios for safety reasons, which has precipitated the frowned-upon practice of scrolling the PS field instead. The Radio Text can announce song titles and performers, run special promotions or contests, or broadcast sponsors' messages.

DI (Decoder Information) – This is one of several 'flags' that convey yes/no or other very basic data. This particular flag tells the receiver whether the broadcast is monaural, or is being transmitted in any of several methods of stereo or binaural broadcasting.

TP (Traffic Program Identification) – The TP flag identifies the station as one that routinely broadcasts traffic bulletins for motorists as part of its normal, everyday programming. When the TP flag is displayed on the receiver faceplate, the radio is searching for traffic announcements. The radio keeps track of TP stations offering this service to speed up the search-and-switch process.

TA (Traffic Announcement) – This is a temporary flag added to the RDS data stream only when a traffic bulletin is being aired. Some RDS car radios can be set to search for traffic bulletins among various TP stations while tuned to a listener's preferred program, or even while playing a tape or CD. As soon as any TP station broadcasts a traffic bulletin, the receiver temporarily switches-over to receive it. When the bulletin is finished, the receiver switches back to the original program, tape or CD.

List of Alternative Frequencies – A network broadcaster, or one with low-power rebroadcast transmitters (translators) to fill holes in his coverage area, can include a list of all frequencies where the identical program can be heard simultaneously. The RDS receiver (particularly the upscale car radio) constantly searches for the best signal that carries the very same program. When a better signal is found, the radio re-tunes with no noticeable interruption. The principal utility of this RDS function is with European radio networks and US stations with 'translators.'

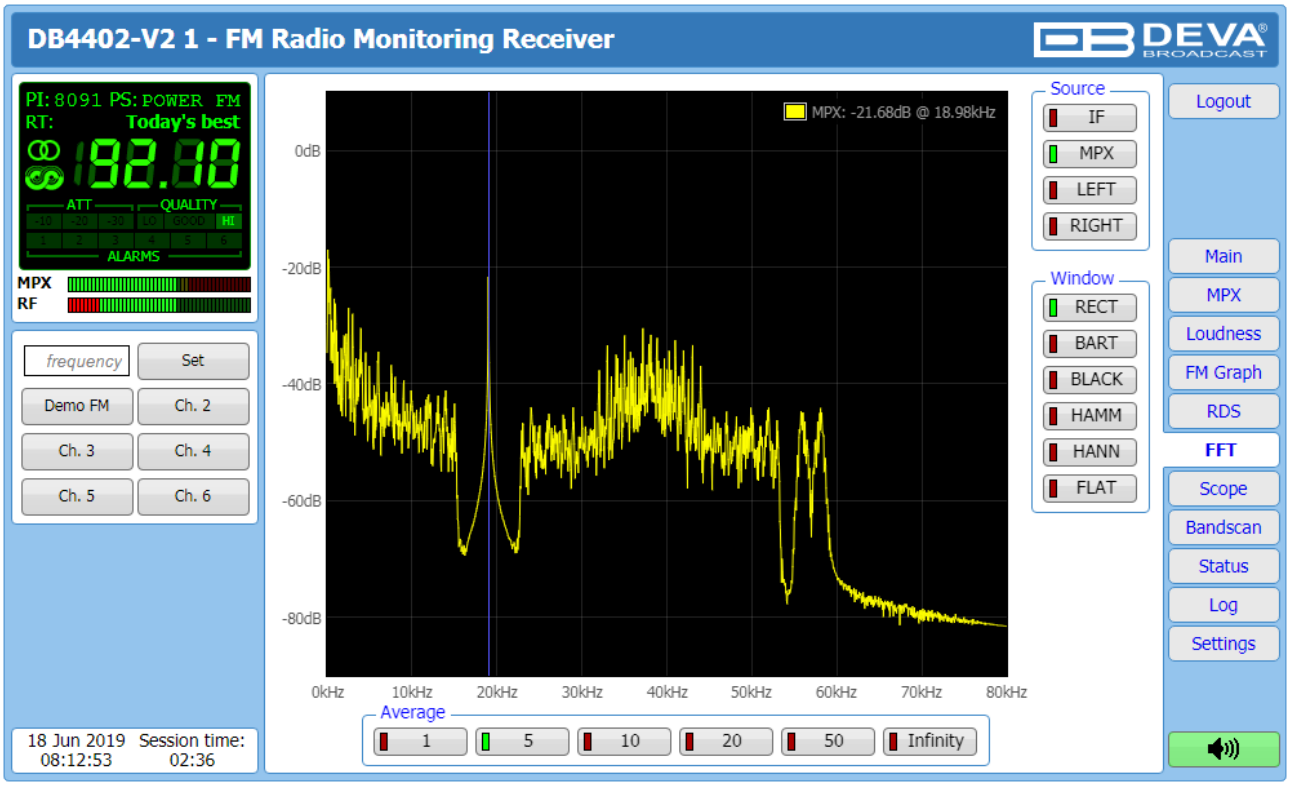
PIN - Program Item Number: The code enables the designed to use this feature receivers and recorders to respond to the preselected by the user program item(s).This feature is used via scheduled program time, to which in order to avoid ambiguity is added the day of the month.

Date and **Time** – Decoded CT information.

Radio Text +

RadioText Plus is “semantic analogue radio”. It allows the RDS feature RadioText (RT) to be read by the FM RDS receiving terminals. Based on the RDS RT messages, RT+ is completely backwards compatible with RT. The usage of RT+ allows the listener/user to derive additional benefits from the RDS Radio Text service. It enables FM RDS receivers to “read” Radio Text (to recognize designated objects and make them manageable) by user’s direct access to specific elements of the Radio Text messages. For example, that element could be programme associated metadata like Title and Artist of the currently playing song or a news headlines. This provides the listener with an “mp3-player feeling” while listening to analogue FM radio. The elements can also carry additional service messages or information about the Radio Station such as the telephone number or the web address of the Radio Station’s hotline. These objects, or more accurately RT+ information elements carried in the RDS RadioText (RT) messages, are identified by their location within the RT messages and by the class code of their content type. Once an information element is received and understood, a receiver is able to, for example, store the different RT+ information elements and the listener may then select and request a specific content type from the radio’s memory at an instant in time that suits the listener’s needs. Thus the listener is no longer forced to watch the RT information passing (scrolling) by. Moreover, RT+ offers selected RT message elements to car drivers on a static display, without risk of distracting the attention of the driver. Furthermore, RT+ is well suited for mobile phones with built-in FM receivers: telephone numbers can be directly used to initiate calls, and web addresses can be used to start browsing the web content offered by the radio programme provider. Last but not least, RT+ is also used for satellite radio broadcasting via DVB-S. It may be adopted by DRM and DAB in the future, too.

FFT



The spectrum analyzer tab is a very useful feature: It is a MPX and audio spectrum display. Initially it shows the MPX from 0-65kHz so that the readings of the currently selected source (composite MPX or stereo Left/Right) to be clearly visible. The signal source to be calculated and visualized is chosen from the Source section placed on the right part of the screen. Spectral components of the selected signal are determined on the base of Fast Fourier Transform.

The window function can be selected through the relevant menu with interactive buttons. The available windows and their features are given below. This table can be used to choose the best windowing function for each application.

Window	Best type for these Signal Types	Frequency Resolution	Spectral Leakage	Amplitude Accuracy
Rectangle	Transient & Synchronous Sampling	Best	Poor	Poor
Barlett	Random	Good	Fair	Fair
Blackman	Random or mixed	Poor	Best	Good
Hamming	Random	Good	Fair	Fair
Von Hann	Random	Good	Good	Fair
Flat-top	Sinusoids	Poor	Good	Best

The visualized Spectrum waveform is equivalent of the average value of several measurements which are defined in section “Average”. The radio frequency to be observed could be easily set by using the preset buttons, placed on the left part of the screen.

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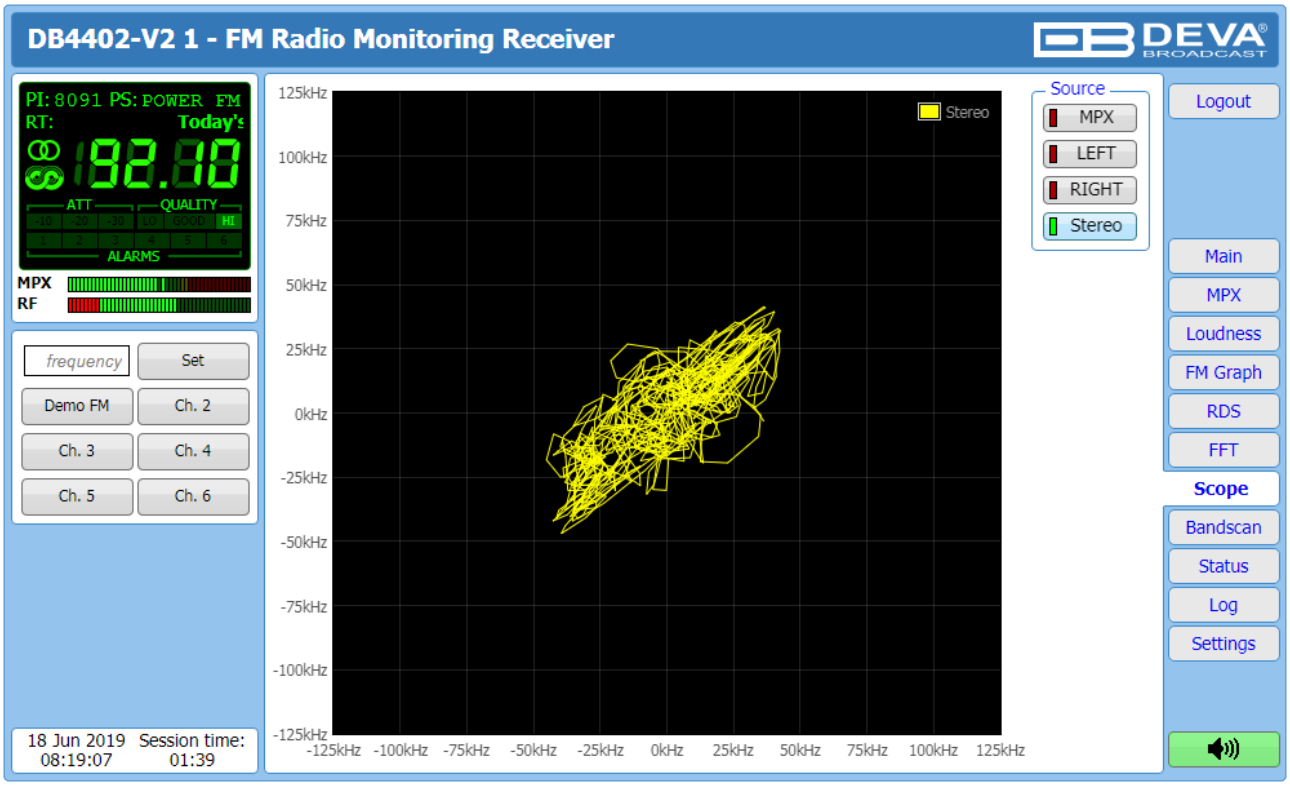
SCOPE



Scope screen represents the signals participating in the process of demodulating and stereo decoding over time. In order for the signal source to be changed, the corresponding button on the right-side of the graph should be pressed.

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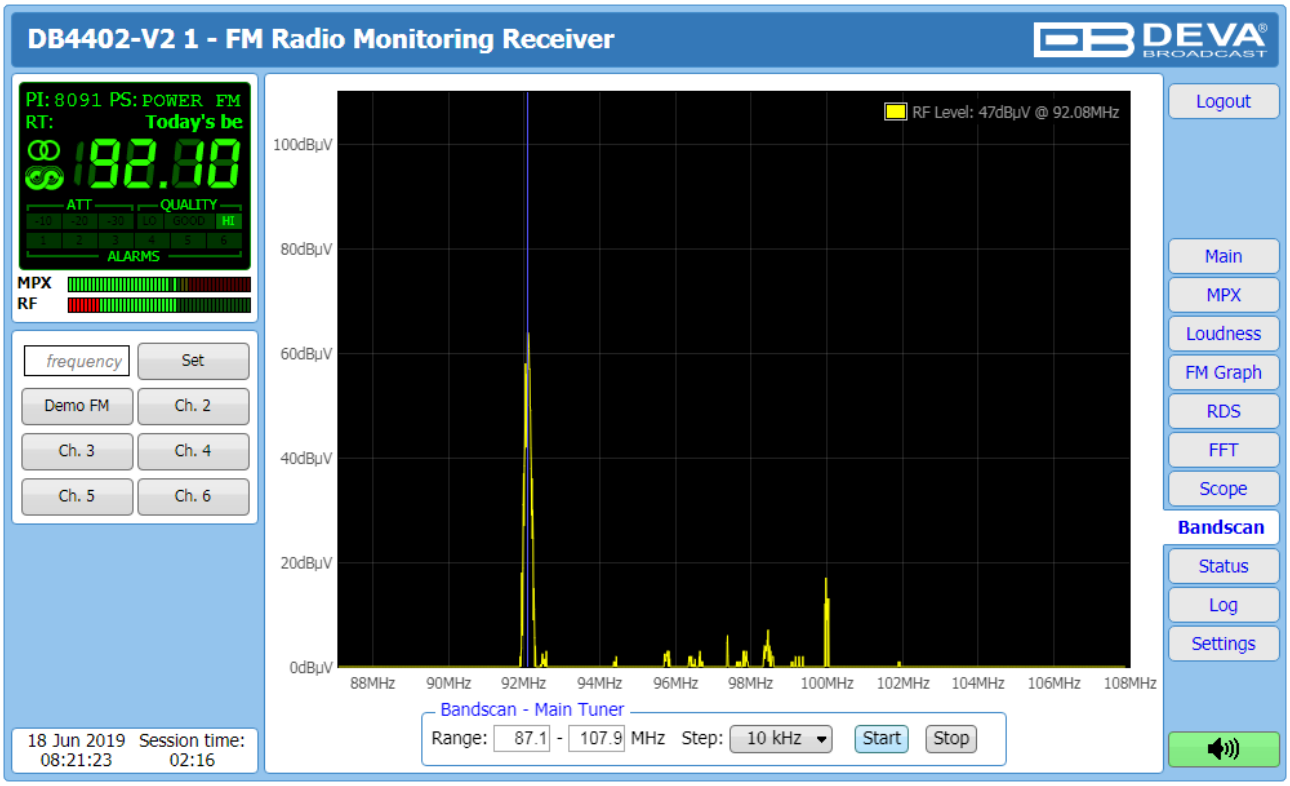
BANDSCAN



This Screen evaluates FM broadcast band congestion by sweeping the tuner across the FM band, logging every carrier and generating a spectrum display of carrier level vs. frequency.

The Bandscan application utilizes four different types of Bandscan, depending on the preferred signal frequency step. The bandscanning mode could be customized by setting low and high frequency limits of the scan. Once you have set the frequency step and low/high frequencies, the start button should be pressed in order for the Bandscan process to be initiated. The current scan could be stopped at any time by pressing the [Stop] button.

To evaluate the RF level of the specified frequency, move the vertical marker along the horizontal scale. The Values at the cross-point will be shown at the top right corner of the graph.

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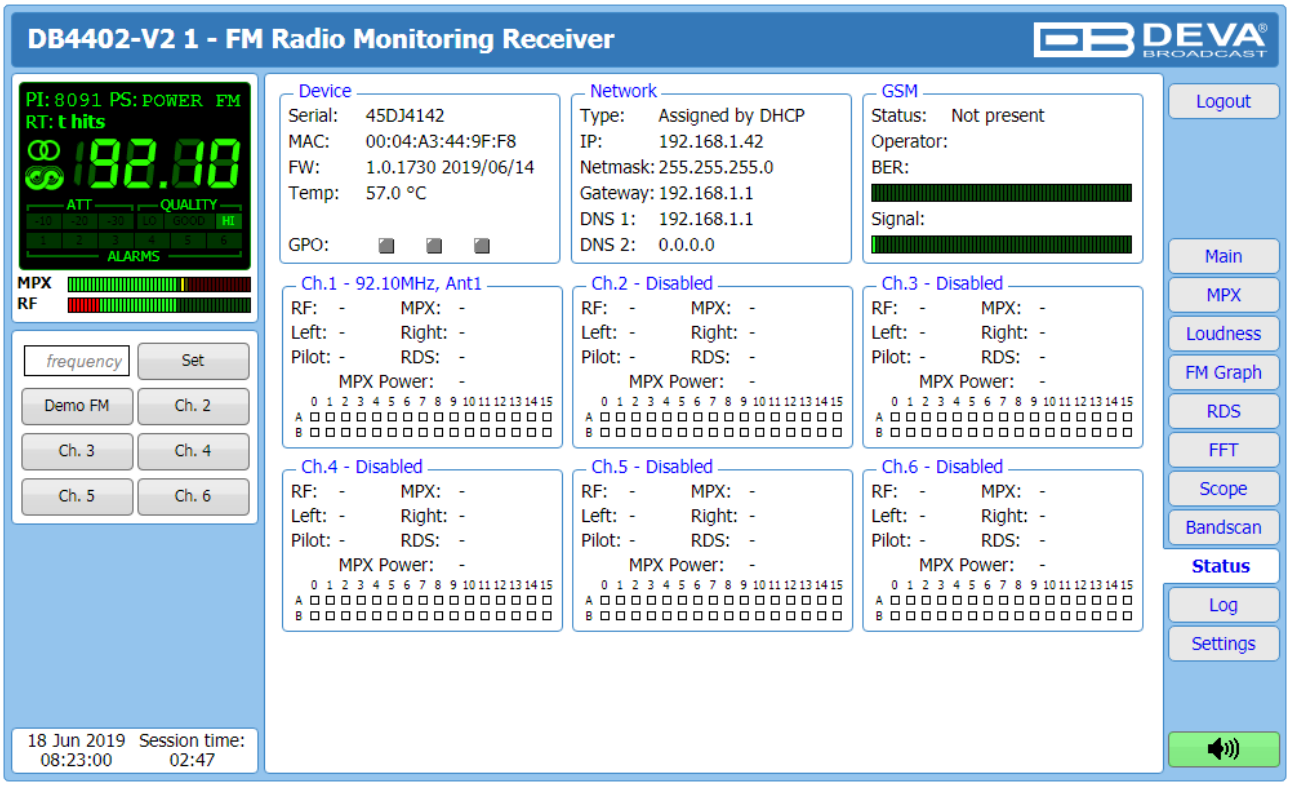
STATUS



The status tab shows the alarm status of each parameter of the preset frequencies, along with the basic device and network status (IP address, MAC, etc.). If a GSM modem is connected, the status of the modem will also be depicted in the relevant section.

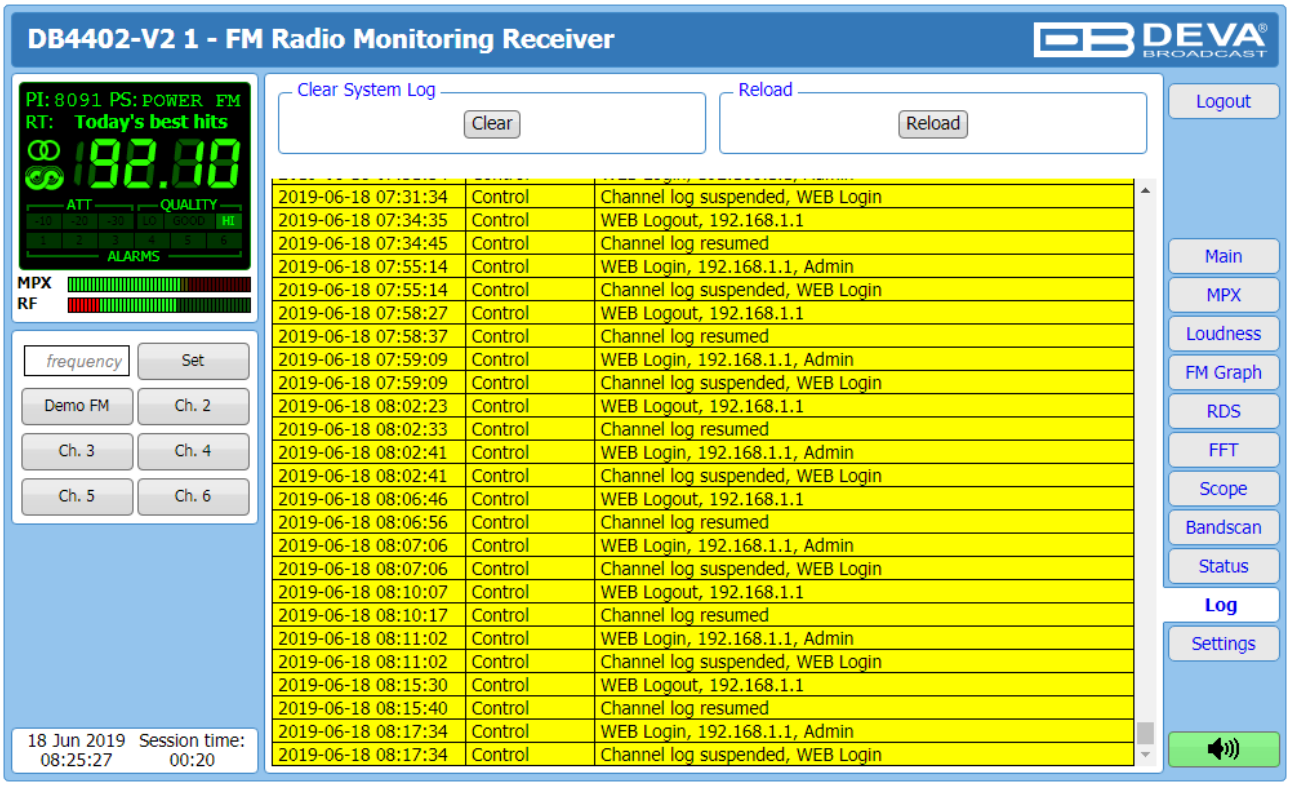
The Channel parameters (RF, MPX, Pilot etc.) have several conditions:

- In range - green OK;
- Out of range - red LOW, HIGH or LOSS;
- Signal monitoring is not enabled - n/a.

The status of the RDS/RBDS Groups Alarm is displayed on the bottom of the channels' section:

- Green - RDS/RBDS Group is received;
- Red - RDS/RBDS Group is not received and an alarm has been triggered;
- White (blank) - RDS/RBDS Group is not received and no alarm has been triggered.

LOG



Here are listed all the Device System Events. The local measurements and logs are saved in the internal device memory. All log files can be downloaded via the built-in FTP server. For information on how the connection between the DB4402-V2 and an FTP Client should be configured, please refer to “Download files via FTP” on page 74.

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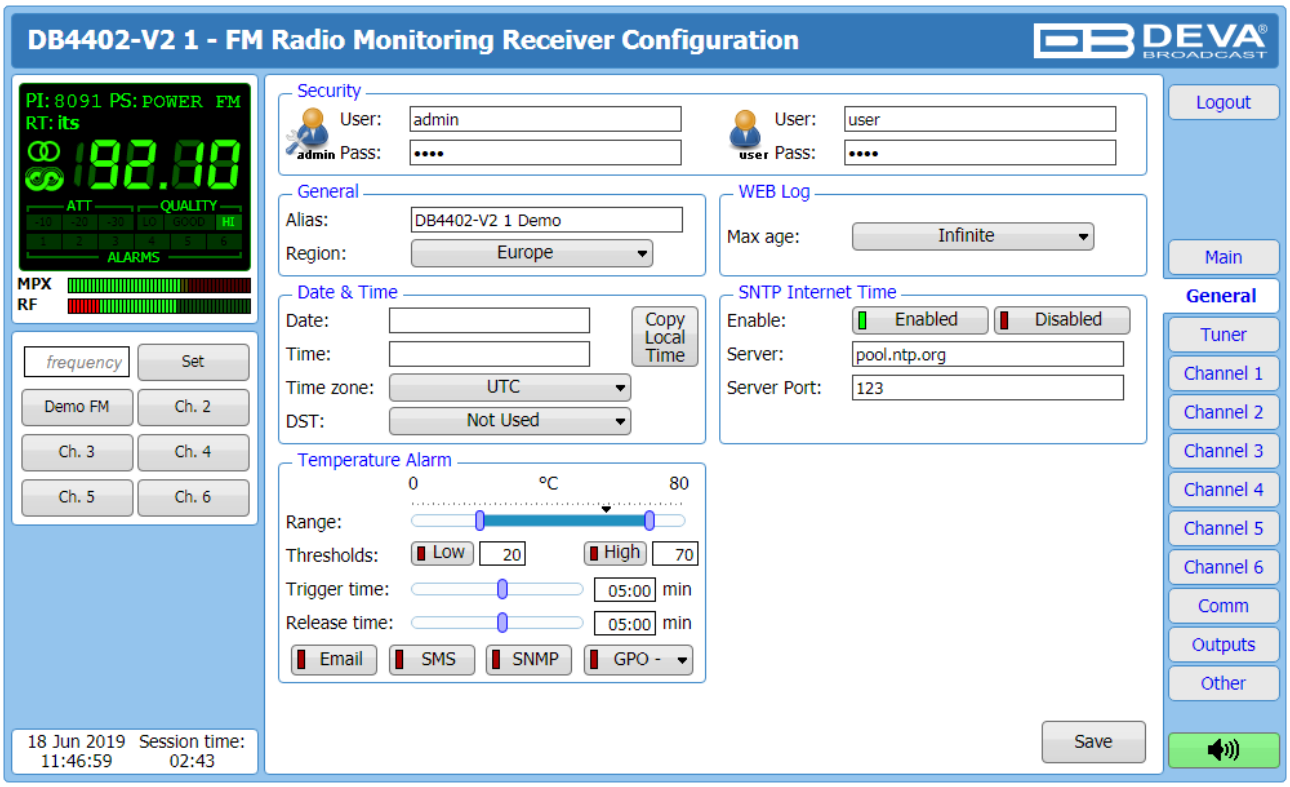
GENERAL SETTINGS



DB4402-V2 provides you with protected access to the device settings. You can choose between two types of log in.

- As an Administrator – It will give you full control over the settings of the device;
- As a User – that will allow you to just monitor the device and to choose different stations, while the Settings bar remains locked.

In order for the security of DB4402-V2 to be enhanced, a new **username** and **password** could be set from the Security section. By choice, you can change the name of the device (General section). Later on, it will be used as a title name for all WEB pages. Customizing the name will make the device more recognizable.

WEB Log – the maximum storage time of the System Log file is chosen from here. If the file is older than the specified maximum, it will be deleted.

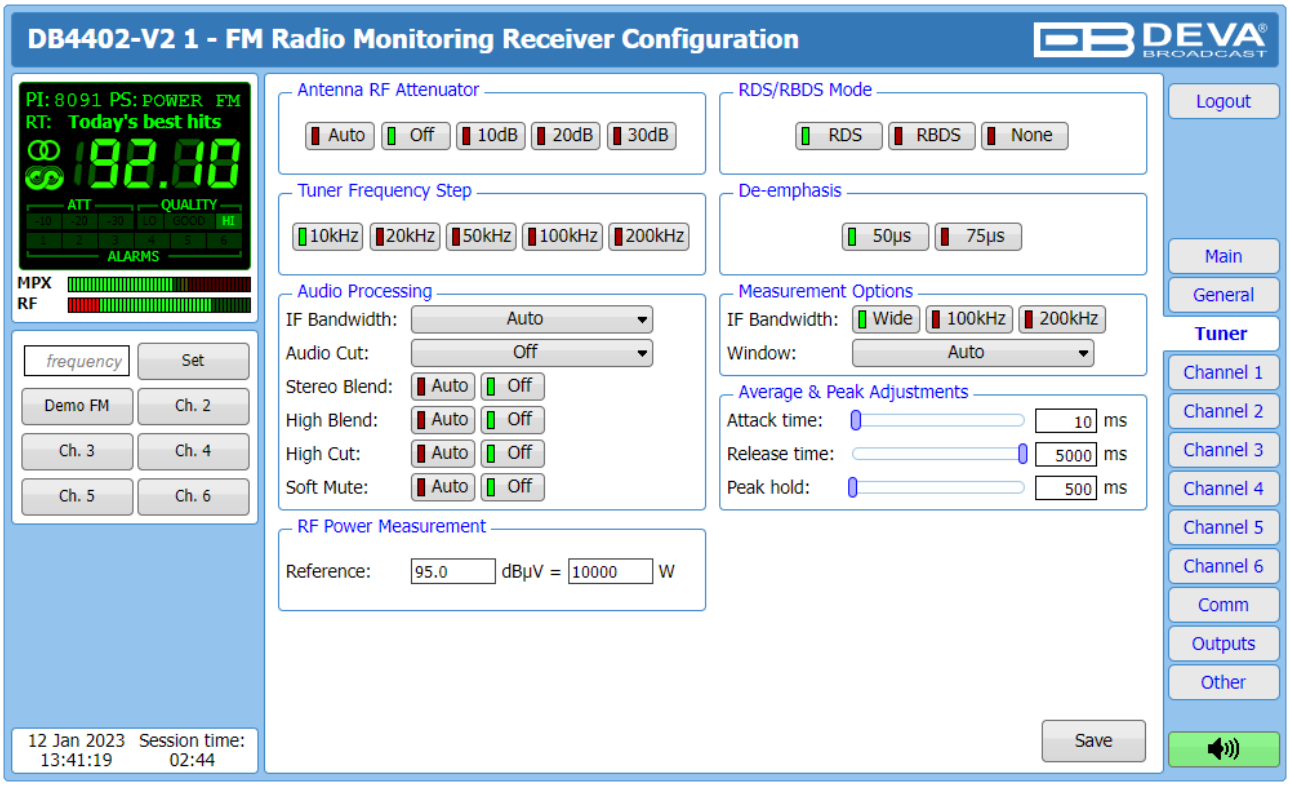
Date & Time – used for manually set the current Date and Time. [Copy Local Time] button will set the Date and Time to correspond to that of your computer.

SNTP Internet Time – Synchronizes automatically the DB4402-V2 clock to a millisecond with the Internet time server. Enable this function in order to use it. (Specifying the server closest to your location will improve the accuracy).

Temperature Alarm – Detects abnormal temperature of the equipment. Define the parameters under which a temperature alarm to be generated.

NOTE: In order for the applied settings to be used press the [Save] button, placed on the bottom right part of the screen.

TUNER SETTINGS



The Tuner Section gives full control over Tuner settings.

Antenna RF Attenuator – Allows the preferred attenuator value to be set.

Tuner Frequency Step – Allows tuner frequency step value to be set.

RDS/RBDS Mode – Depending on the client's preferences, the deviation could be measured in % [RBDS] or in kHz [RDS].

De-emphasis – User defined De-emphasis could be set, where the default values are 50 kHz Frequency Step and 50µs De-emphasis.

Audio Processing – If the IF Bandwidth is set to Auto, these settings depend on the quality of the received signal (RF Level, Multipath, and etc.). If any changes in the signal are detected, the unit will automatically adjust to the correct values.

- Stereo Blend – reduces the stereo separation if the received signal is bad;
- High Blend – applies low pass filter to the L-R audio levels;
- High Cut – applies low pass filter to the L+R audio levels;
- Soft Mute – reduces the level of the audio if the RF level is too low.

Measurement Options Section is used to adjust the Measuring signal path Filter settings. It is recommended to use Wide IF Bandwidth, but at noisy environment the narrow filter could improve the measurements.

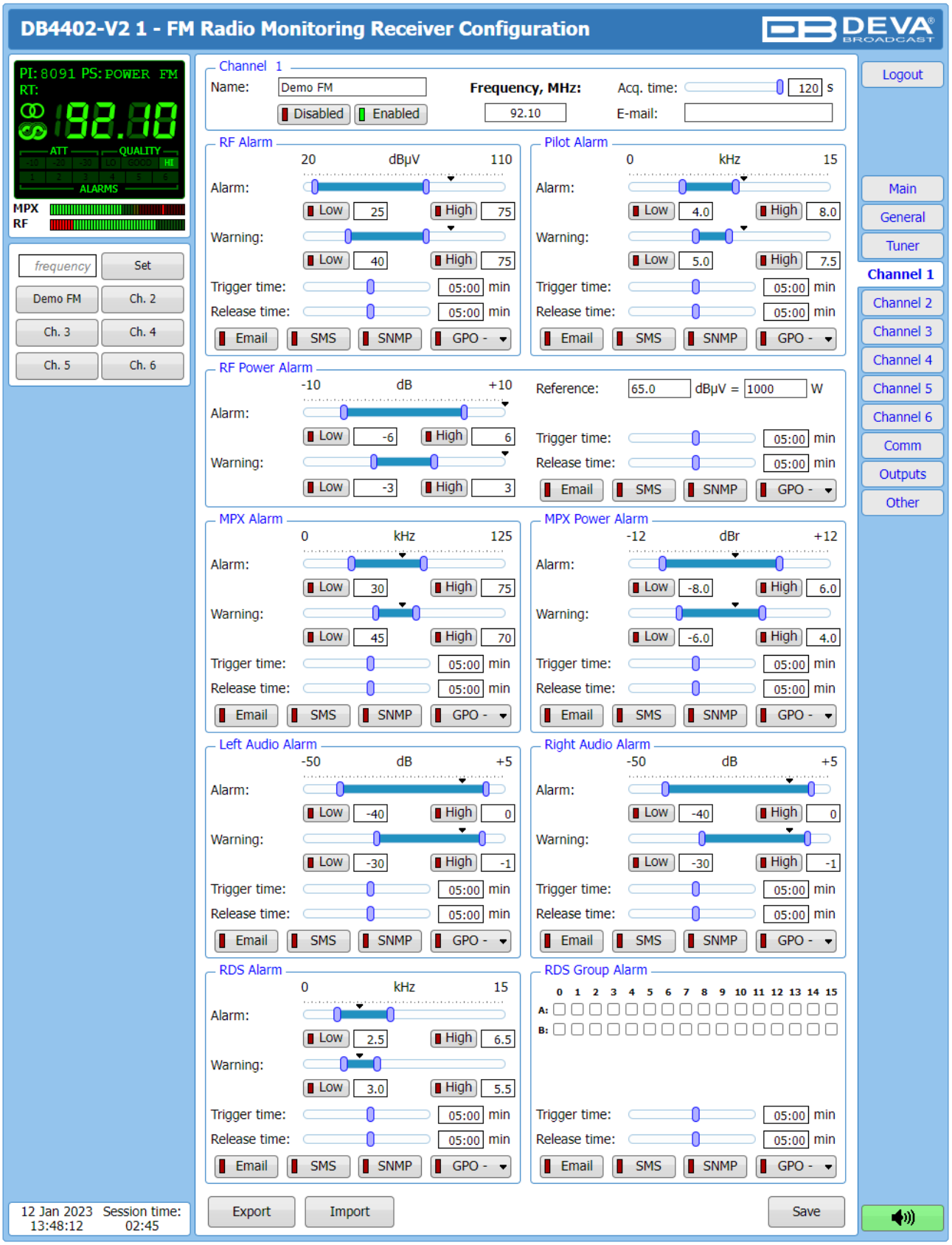
Average & Peak Adjustments Section is used for setting of the indicators response times.

- Attack time and Release time set the rate in which the indicators' level will change in response to the signal. For most of the applications (including this one), the recommended attack time is shorter than the release time.
- Peak-hold time – Permits retaining and displaying the peak value reached by the signal for a period of time predefined by the user, in milliseconds.

RF Power Measurement Section is used to define custom RF Power refernces.

NOTE: In order for the applied settings to be used press the [Save] button, placed on the bottom right part of the screen.

CHANNELS SETTINGS (CHANNELS 1 TO 6)



The DB4402-V2 can monitor up to 6 FM Stations at regular intervals and send warning and alarm notifications via E-mail, SMS, SNMP and GPO. Every Channel consists of a group of settings (explained in details below), which are used when monitoring and alerting. Each preset has its own page where it is being configured. Measurement windows can be set for each of the six

parameters: RF, RF Power, Left and Right audio levels, MPX (baseband) deviation, MPX Power, Pilot and RDS/RBDS deviation. Trigger and alarm release times can be set for each alarm.

The notification means (Email, SMS, SNMP, GPO) is set for each parameter individually. To enable the notification, press on the relevant button so that it could be illuminated in green.

Channel

- [Enabled] / [Disabled] channel monitoring and sending of warnings and alarms. If the channel is not generally enabled, the frequency will not be monitored and alarm notifications will not be received;
- Frequency – specify the frequency to be monitored;
- Name – channel alias. The same name will appear on the quick access buttons in the "dashboard";
- Acquisition time – specify the observation time for the current station (before switching to the next channel).
- E-mail – set email address that will receive warning and alarm notifications for this service only.

NOTE: When MPX Power alarm is enabled the observation time must be more than 70 seconds.

NOTE: In order to have correct Long-term loudness value logged in log file channel observation time must be more than the Long-term loudness measurement sliding time window (see "Loudness" on page 29).

Alarm

- Alarm Range – interactive slider used to adjust the Low & High thresholds at which an alarm will be generated;
- Warning Range – interactive slider used to adjust the Low & High thresholds at which a warning will be generated;
- Threshold – buttons to enable/disable alarm range limits;
- Trigger Time – waiting time before Active Alarm/Warning is generated;
- Release Time – waiting time before Idle Alarm/Warning is generated;
- RDS/RBDS Group Alarm – alarm only for selected groups will be generated.

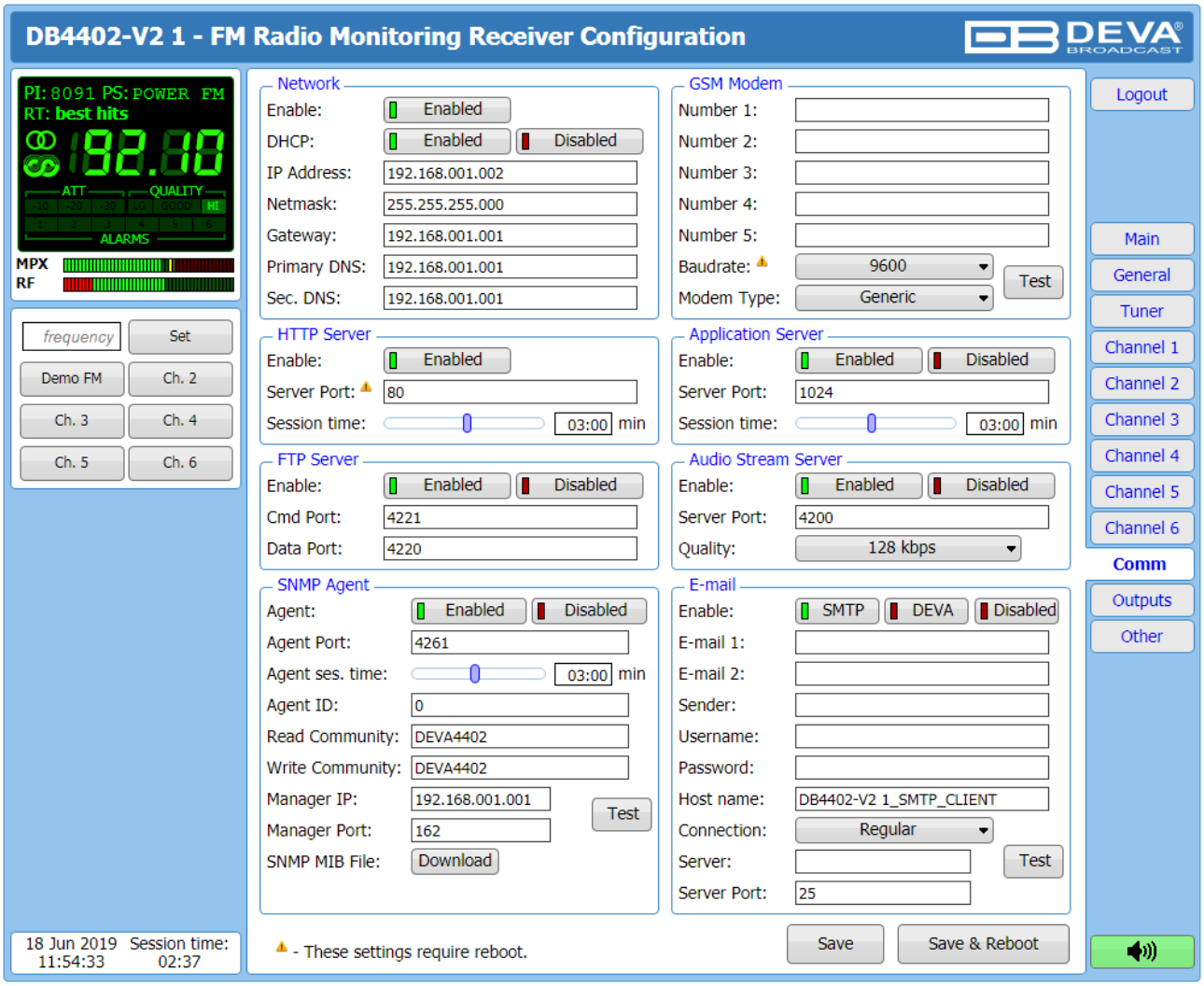
IMPORTANT NOTE: Warnings and alarms are generated only when the Logger mode is running. While there is any user interaction, warning or alarm will not be generated and send. The Logger starts running once the user logs out of the WEB interface.

Trigger and Release times define the time, which should elapse in order for the received signal to be defined as low/high/lost or restored/OK. What we recommend is the release time to be bigger than the trigger time.

NOTE: When setting Trigger and Release times, have in mind that 01:00 means 1 minute, and 00:01 means 1 second.

NOTE: In order for the applied settings to be used press the [Save] button, placed on the bottom right part of the screen.

COMMUNICATION SETTINGS



Network

The network addresses could be set manually (static IP) or automatically via a DHCP server. To set static IP, MASK, GATEWAY and DNS addresses, the DHCP should be disabled. In order for the built-in DHCP client to be activated, the function should be enabled. When the DHCP client is activated, all assigned values will be shown in the relevant fields on the Status Screen. If due to any reason, the DHCP procedure cannot be completed, DB4402-V2 will use AutoIP and will generate an IP Address.

GSM Modem

Up to five numbers for SMS control and alarm notifications could be set. Baud Rate is mandatory for the proper operation of the GSM Modem. We recommend that a test SMS to be generated (via pressing the [Test] button), once all needed settings are applied. Upon success, the SMS will be delivered to all the specified GSM numbers.

Example of Test SMS Message:

```
DB4402-V2 Test Message.
```

NOTE: The current condition of the GSM Modem could be checked in the Status Screen. For detailed explanation of the option, please refer to "GSM Modem Option" on page 68.

HTTP Server

[Enabled] the HTTP Server. Specify the Server Port and session timeout. If the [Enabled] button is not illuminated in green, the option is disabled.

FTP Server

[Enabled]/[Disabled] the FTP Server. Specify the Command and Data Ports to be used.

Audio Stream Server

[Enabled]/[Disabled] the Audio Stream Server. Then specify Port for audio Streaming, and Quality (64, 96, 128, 192 or 256 kbps). The Audio Stream could be heard using suitable audio player (Media Player, Winamp, etc.) or through the WEB interface by pressing the [Listen] button.

SNMP Agent

Agent - [Enabled]/[Disabled] the SNMP Agent.

Specify Agent ID, Agent Port, Read/Write Communities, Manager IP, Manager Port and session timeout. Agent ID is used for identification of the device among others, when an SNMP notification is being sent.

Once all needed settings are applied, use the [Test] button to generate a test notification, which upon success will be received by the SNMP Manager.

Press the [Download] button to download the latest available DB4402-V2 SNMP MIB file.

NOTE: The MIB file may vary from one firmware revision to another. Downloading this file from the device, guarantees that you have the proper MIB file.

E-mail

To use the email notification option, please make sure it is [Enabled] by pressing the relevant button. Then follow the instructions below:

1. Enter the desired alarm recipients in e-mail 1 and/or e-mail 2 fields.
2. Fill in your e-mail account settings: Sender, Username and Password, Server, SNMP port and connection type.
3. It is mandatory the type of connection with the server to be specified from Connection - Regular, Encrypted.
4. The Server port will be changed accordingly. Please note that the most commonly used port will be entered in the field. If the port that is to be used is different, change it manually to the correct value.
5. We recommend you to use the [Test] button and generate a test e-mail, which upon success will be delivered to the specified E-mail 1 and/or E-mail 2. Example of Test E-mail Message:

```
DB4402-V2 Test Message.
Please do not reply to this e-mail.
```

If you experience difficulties in the set-up, or would like to use DEVA account for sending of alarm email notifications, press the [DEVA] button option, and:

1. Complete the recipient emails (E-mail 1 and E-mail 2) only.
2. The other fields must be left blank, otherwise the email notification option will not be working.
3. We recommend you to use the [Test] button and generate a test e-mail, which upon success will be delivered to the specified E-mail 1 and/or E-mail 2. Example of Test E-mail Message:

```
DB4402-V2 Test Message.
Please do not reply to this e-mail.
```

Even though using the DEVA account eases the set-up process, we recommend user account to be used for sending of email notifications, and the DEVA account for test purposes. When using DEVA account, please note that the stable 24/7 connection depends on the mail service provider and cannot be guaranteed.

NOTE: In order for the applied settings to be used press the [Save] button, placed on the bottom right part of the screen.

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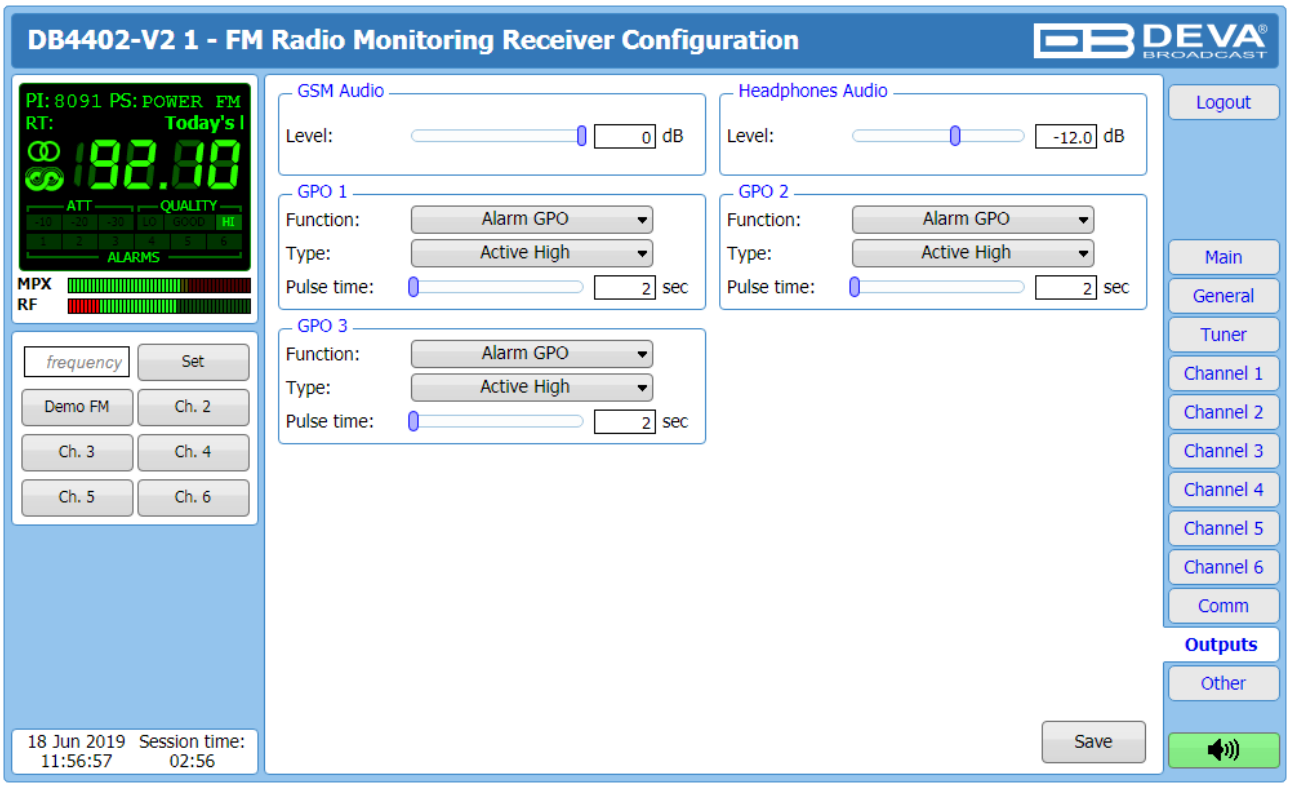
OUTPUTS SETTINGS



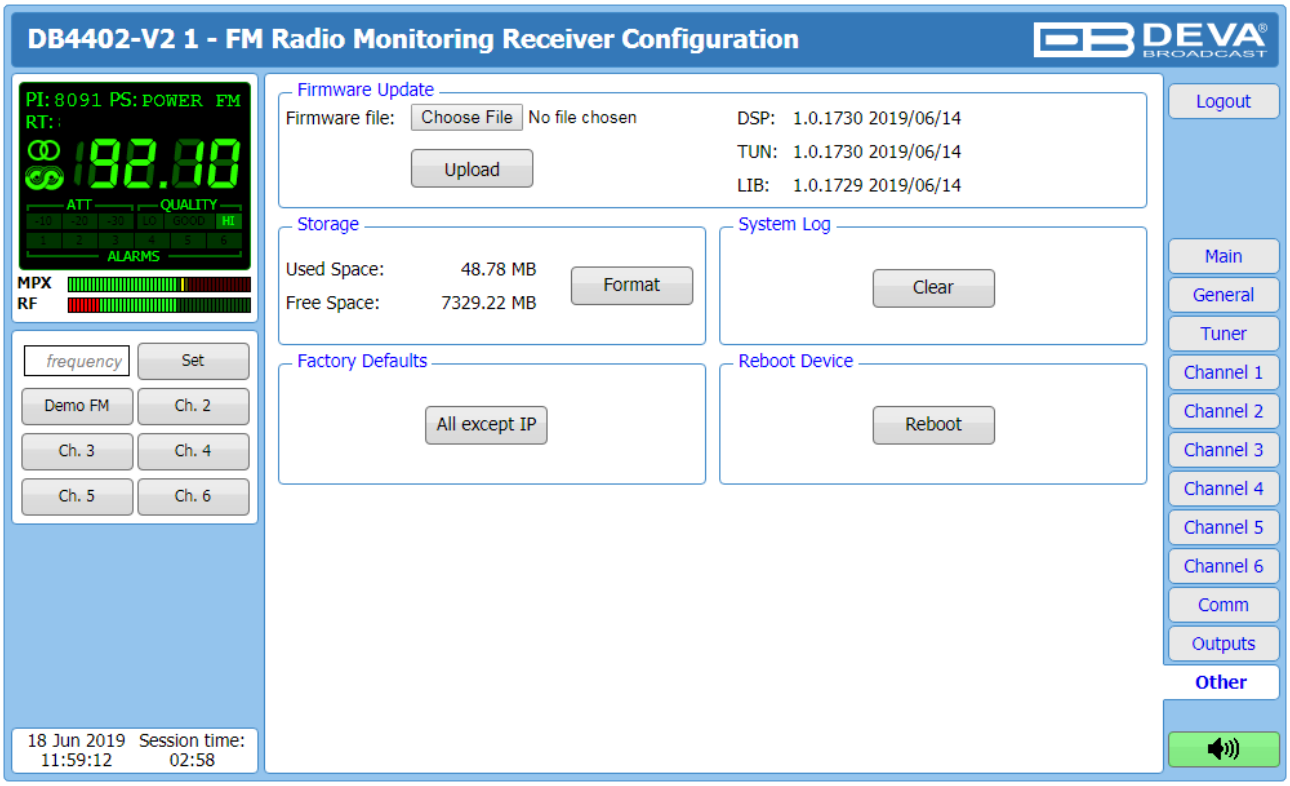
GSM Audio – interactive slider used to adjust the Level of the GSM Audio.

Headphones Audio – interactive slider used to adjust the Level of the Headphones Audio.

GPO 1, **GPO 2**, **GPO 3** – The general purpose outputs settings are applied through this page. Function, type and pulse time for each of the GPOs could be set individually. You can choose between the available functions. Type is used for specifying of the active level. When an alarm is generated the output can change the level to Active High/Low or to generate High/Low Pulse.

PLEASE NOTE that if the GPO's function is not assigned as Alarm GPO and is chosen as a preferred alarm, notifications will not be indicated, nevertheless one is being generated.

OTHER SETTINGS



Firmware Update

To update the device firmware, select the new firmware file. After having pressed the Upload button, a dialog window will appear. Confirm the firmware update and wait for the process to complete. Information on current DSP1, DSP2 and WEB version is also found in this section.

Storage

Information about the device storage space is found in this section. The entire internal storage could be deleted by pressing the [Format] button.

System Log

By pressing the [Clear] button, all records in the system log will be deleted.

Factory Defaults

[All except IP] – all settings, except for the Network settings (IP Address) will be deleted.

To restore DB4402-V2 to its Factory Defaults, press [All except IP]. A new window will appear – confirm that you want to restore the factory defaults and wait for the process to be completed. On completion of the process, the settings should have the proper default values.

Reboot

To start Rebooting of DB4402-V2, press the [Reboot] button. A dialog warning window will appear. Confirm that you want to reboot the device and wait for the process to be completed.

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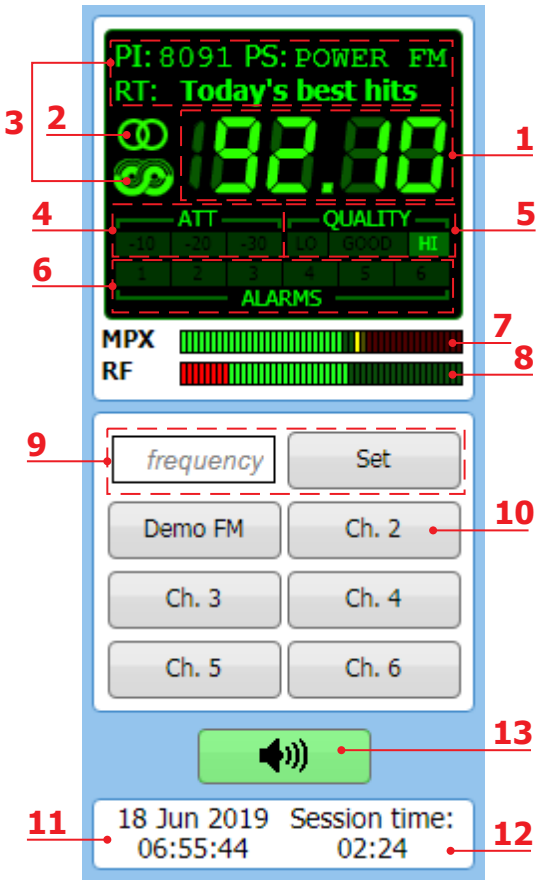
WEB Interface FM Radio Streamer

DEVICE CONTROL INTERFACE

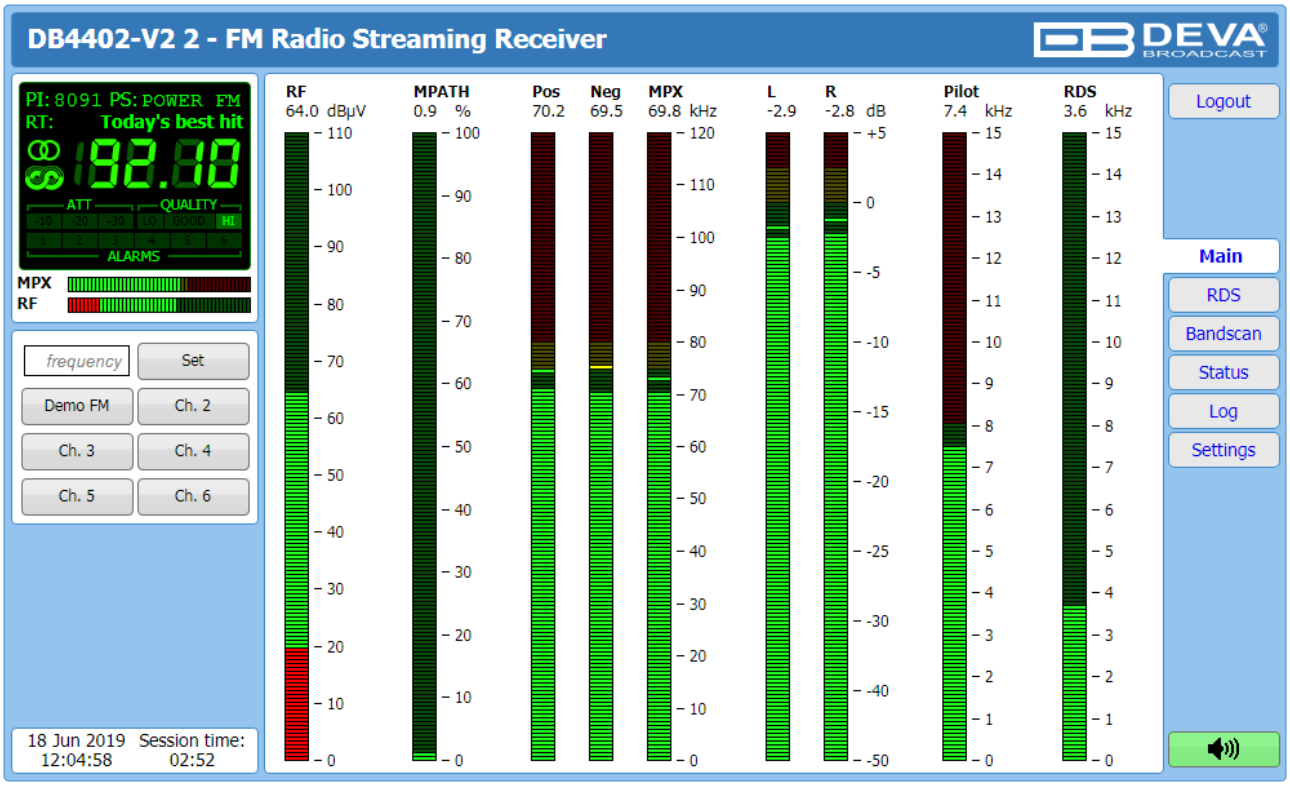
The WEB Interface is visually divided into two sections Left and Right.

- On the Right are the specific contextual readings of the currently selected menu page.
- On the Left is the so called "dashboard" of the device - General Tuner and Channel readings, functional buttons. This section of the WEB interface is constant part of each screen, hence allowing immediate tuner interactions.



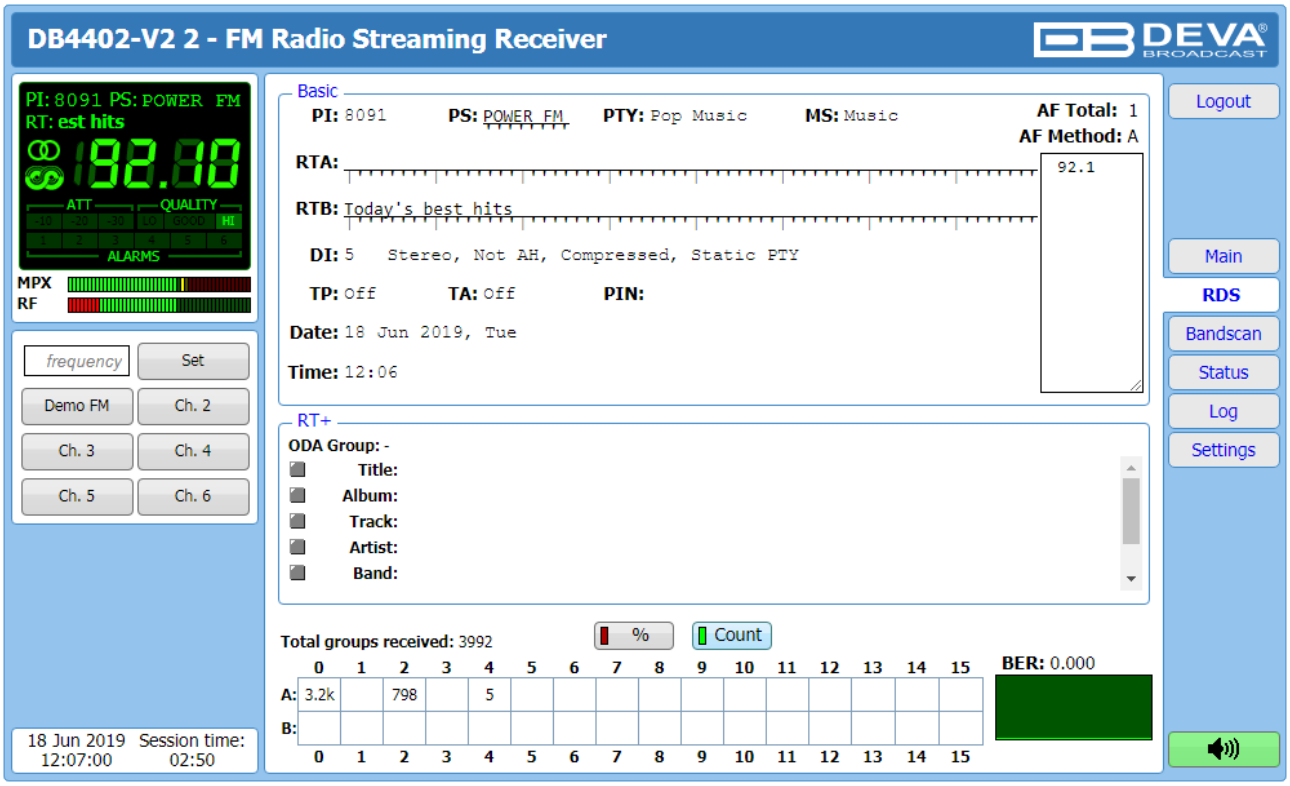
1. Frequency indicator showing currently tuned frequency;
2. Stereo indicator;
3. RDS/RBDS presence indicator & information;
4. RF Attenuator Status;
5. Signal Quality indicator;
6. Channel Alarms indicator – will be lit in red when the Scheduler has detected an alarm on channel. (see "Streamer Channels settings" on page 57);
7. MPX Level indicator;
8. RF Level indicator. The red zone (low level) indicates RF level below 20 dBµV;
9. Frequency set buttons;
10. Channel Preset Buttons – when one of the buttons is pressed, the Tuner will be set to the predefined frequency. Upon hovering with the mouse over a preset button, the name of the channel will be displayed;
11. Device Time (see "Streamer General Settings" on page 55);
12. Session remaining time;
13. Listen Button – Button with double usage used to Play/Stop the current audio stream (an audio device will be required).

MAIN



he Main Screen of the WEB Interface shows all the mandatory parameters represented as LED readings. You can easily select the preferred audio frequency by using the selection buttons, placed on the left part of the screen. All station presets are defined by the user.

RDS/RBDS



One of our core competencies lies in the RDS/RBDS. The RDS/RBDS page is very comprehensive, with a display of the RadioText (RTA and RTB), basic RDS/RBDS fields and a table of all decoded RDS/RBDS groups with a percentage measurement based on the overall RDS/RBDS data stream or group count. A very useful graph on this display is the rolling RDS/RBDS bit error rate (BER) display.

Total groups received indicator – all received groups are systematized into a table, representing the percentage/quantity of the groups in the received RDS/RBDS signal. The user selects how the "Total groups received" data should be displayed: as Percents [%] or [Count], by selecting the corresponding button.

NOTE: The bit error rate or bit error ratio (BER) is the number of bit errors divided by the total number of transferred bits during a studied time interval. Result closer or equal to 0 indicates that no bit errors are detected and vice versa result closer or equal to 1 indicates that the received transferred bits are only errors.

Basic RDS

PI/CALL (Program Identification) – The PI code is your station's 'digital address'. It is a hexadecimal code that is assigned by an appropriate broadcasting authority in most countries, but in the United States the PI code is numerically calculated from the station's call sign. We have provided a calculator utility within the DB4402-V2. An in-depth discussion of the mathematical calculation is given in RDS/RBDS Standard.;

PS (Program Service Name) – This is the station's "street name" that will appear on the receiver faceplate display. The PS can be up to eight characters in length (including spaces) and can be as simple as the station's call letters: `KWOW` or `KWOW FM`, or a slogan: `NEWSTALK` or `LIVE 95`.

PTY (Program Type) – The PTY data flag identifies the station format from a pre-defined categories. Many RDS receivers are able to seek the listener's preferred format automatically.

This means that a car radio can switch from a fading station to a stronger one that carries the same variety of music, though not the very same program, as provided by AF switching. The PTY function of RDS helps a broadcaster catch 'transient audience' share. The PTY code is not meant to change from song to song or to accommodate a top-of-the-hour newscast, however.

MS (Music/Speech Switch) – This flag simply indicates whether music or speech is the primary broadcast programming.

RT (Radio Text) – This is a 64-character block of plain text that the listener can select for visual display on the faceplate of the radio by pressing an INFO button on the receiver. This function is not available on many automobile radios for safety reasons, which has precipitated the frowned-upon practice of scrolling the PS field instead. The Radio Text can announce song titles and performers, run special promotions or contests, or broadcast sponsors' messages.

DI (Decoder Information) – This is one of several 'flags' that convey yes/no or other very basic data. This particular flag tells the receiver whether the broadcast is monaural, or is being transmitted in any of several methods of stereo or binaural broadcasting.

TP (Traffic Program Identification) – The TP flag identifies the station as one that routinely broadcasts traffic bulletins for motorists as part of its normal, everyday programming. When the TP flag is displayed on the receiver faceplate, the radio is searching for traffic announcements. The radio keeps track of TP stations offering this service to speed up the search-and-switch process.

TA (Traffic Announcement) – This is a temporary flag added to the RDS data stream only when a traffic bulletin is being aired. Some RDS car radios can be set to search for traffic bulletins among various TP stations while tuned to a listener's preferred program, or even while playing a tape or CD. As soon as any TP station broadcasts a traffic bulletin, the receiver temporarily switches-over to receive it. When the bulletin is finished, the receiver switches back to the original program, tape or CD.

List of Alternative Frequencies – A network broadcaster, or one with low-power rebroadcast transmitters (translators) to fill holes in his coverage area, can include a list of all frequencies where the identical program can be heard simultaneously. The RDS receiver (particularly the upscale car radio) constantly searches for the best signal that carries the very same program. When a better signal is found, the radio re-tunes with no noticeable interruption. The principal utility of this RDS function is with European radio networks and US stations with 'translators.'

PIN - Program Item Number: The code enables the designed to use this feature receivers and recorders to respond to the preselected by the user program item(s).This feature is used via scheduled program time, to which in order to avoid ambiguity is added the day of the month.

Date and **Time** – Decoded CT information.

Radio Text +

RadioText Plus is “semantic analogue radio”. It allows the RDS feature RadioText (RT) to be read by the FM RDS receiving terminals. Based on the RDS RT messages, RT+ is completely backwards compatible with RT. The usage of RT+ allows the listener/user to derive additional benefits from the RDS Radio Text service. It enables FM RDS receivers to “read” Radio Text (to recognize designated objects and make them manageable) by user’s direct access to specific elements of the Radio Text messages. For example, that element could be programme associated metadata like Title and Artist of the currently playing song or a news headlines. This provides the listener with an “mp3-player feeling” while listening to analogue FM radio. The elements can also carry additional service messages or information about the Radio Station such as the telephone number or the web address of the Radio Station’s hotline. These objects, or more accurately RT+ information elements carried in the RDS RadioText (RT) messages, are identified by their location within the RT messages and by the class code of their content type. Once an information element is received and understood, a receiver is able to, for example, store the different RT+ information elements and the listener may then select and request a specific content type from the radio’s memory at an instant in time that suits the listener’s needs. Thus the listener is no longer forced to watch the RT information passing (scrolling) by. Moreover, RT+ offers selected RT message elements to car drivers on a static display, without risk of distracting the attention of the driver. Furthermore, RT+ is well suited for mobile phones with built-in FM receivers: telephone numbers can be directly used to initiate calls, and web addresses can be used to start browsing the web content offered by the radio programme provider. Last but not least, RT+ is also used for satellite radio broadcasting via DVB-S. It may be adopted by DRM and DAB in the future, too.

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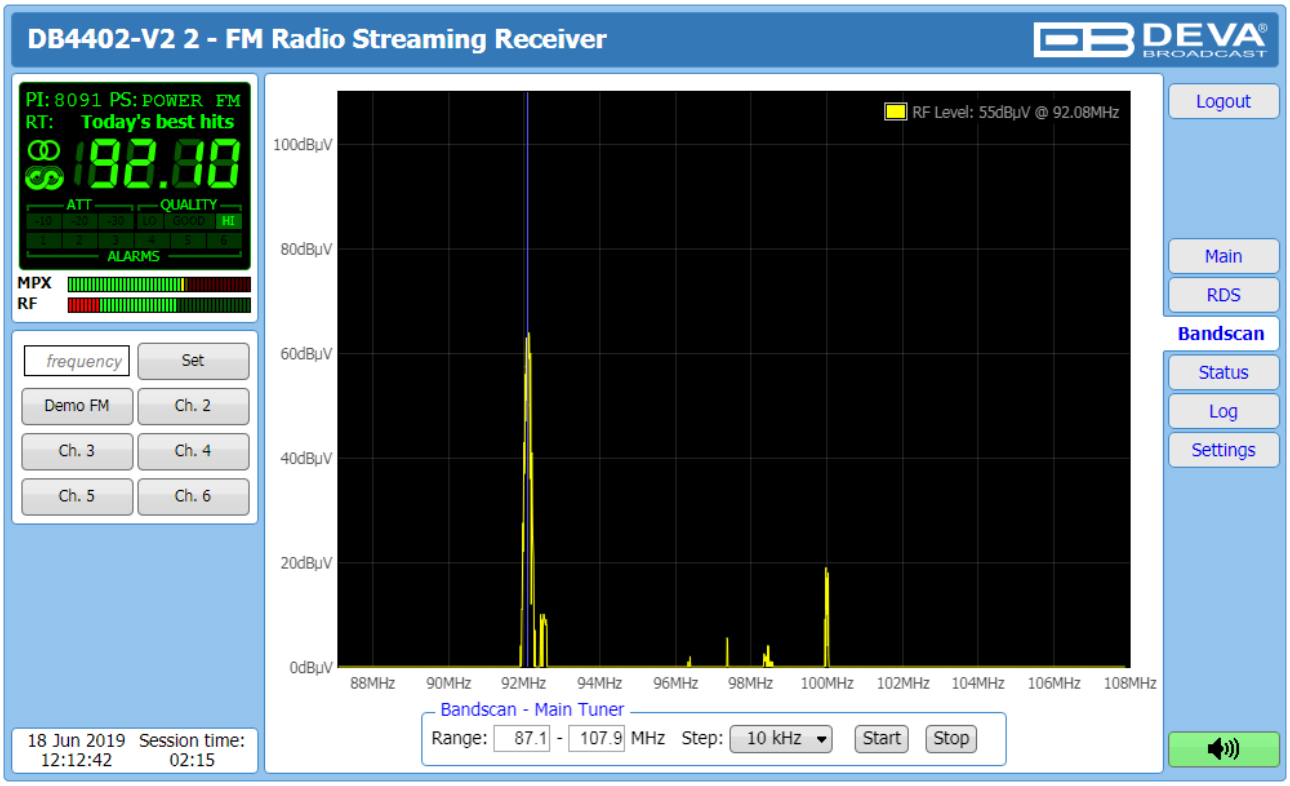
BANDSCAN

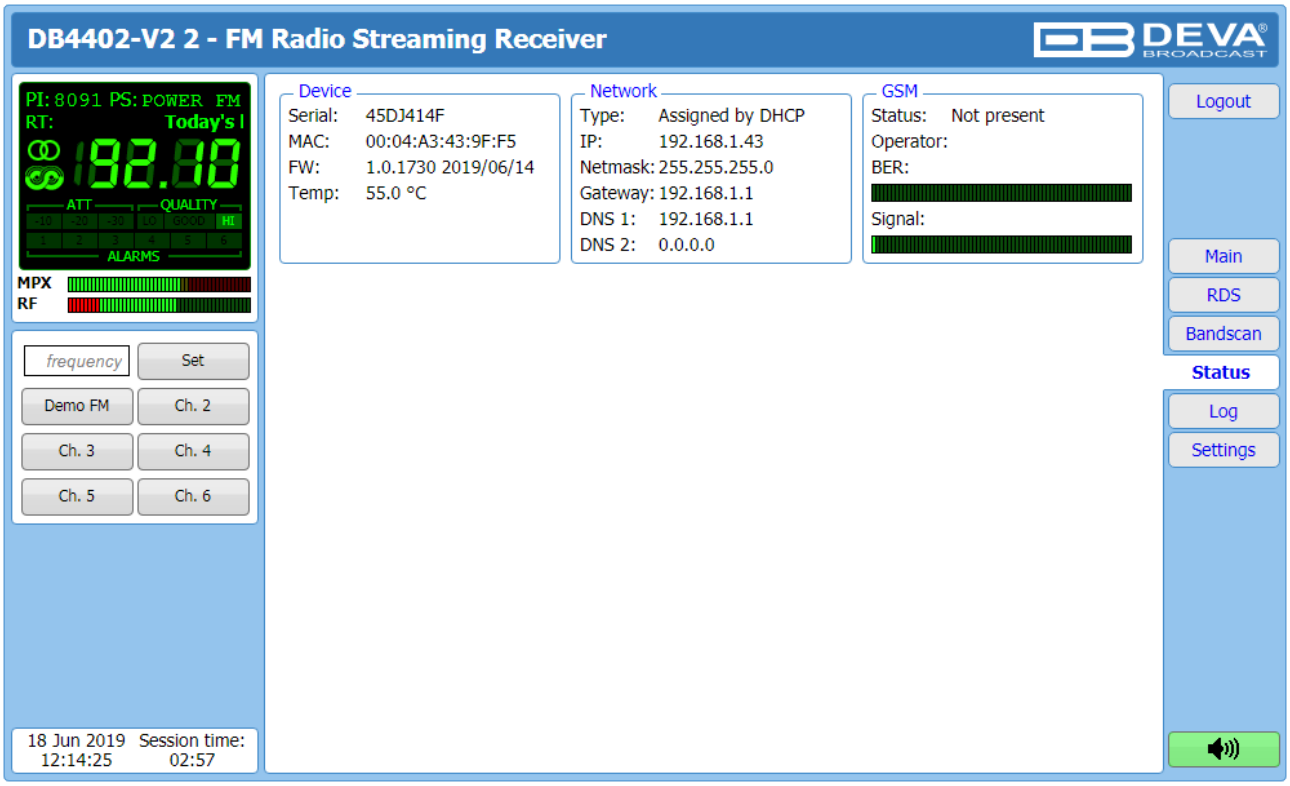


This Screen evaluates FM broadcast band congestion by sweeping the tuner across the FM band, logging every carrier and generating a spectrum display of carrier level vs. frequency.

The Bandscan application utilizes four different types of Bandscan, depending on the preferred signal frequency step. The bandscanning mode could be customized by setting low and high frequency limits of the scan. Once you have set the frequency step and low/high frequencies, the start button should be pressed in order for the Bandscan process to be initiated. The current scan could be stopped at any time by pressing the [Stop] button.

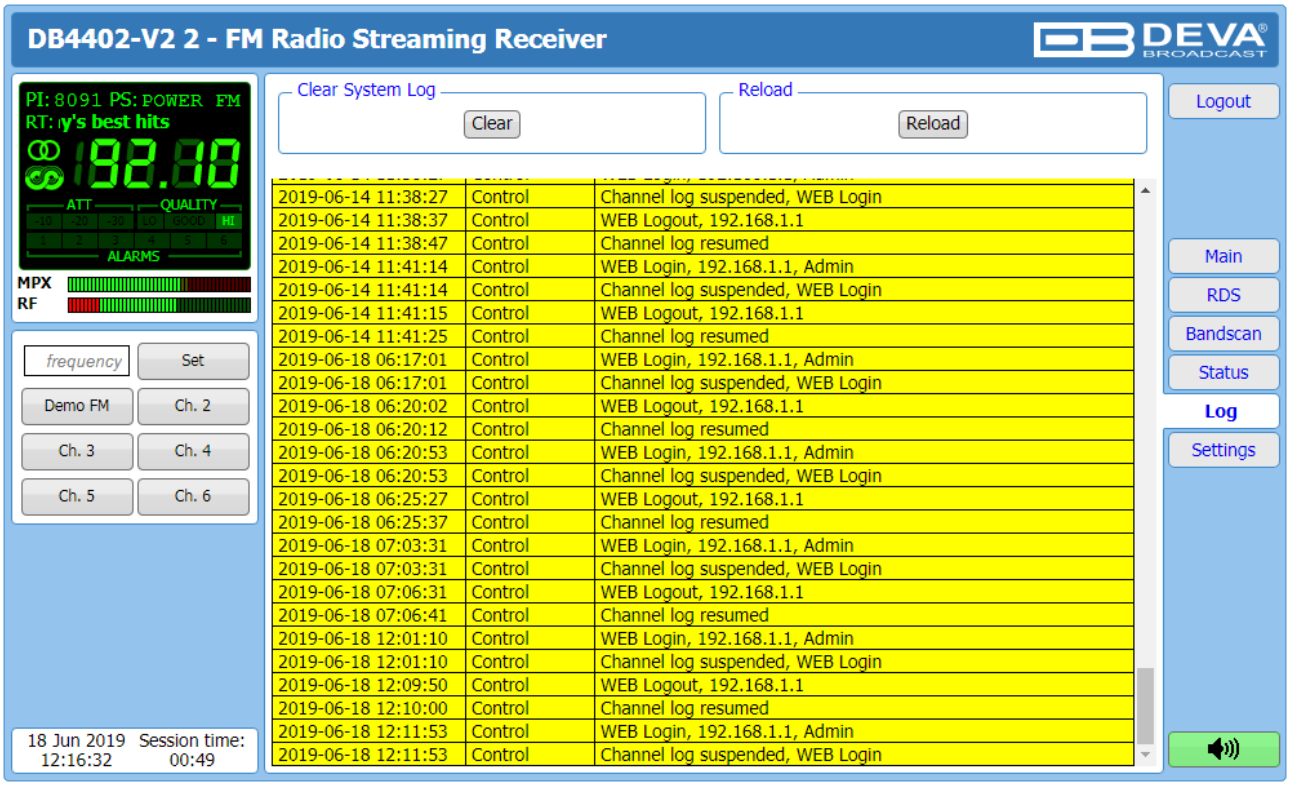
To evaluate the RF level of the specified frequency, move the vertical marker along the horizontal scale. The Values at the cross-point will be shown at the top right corner of the graph.

STATUS



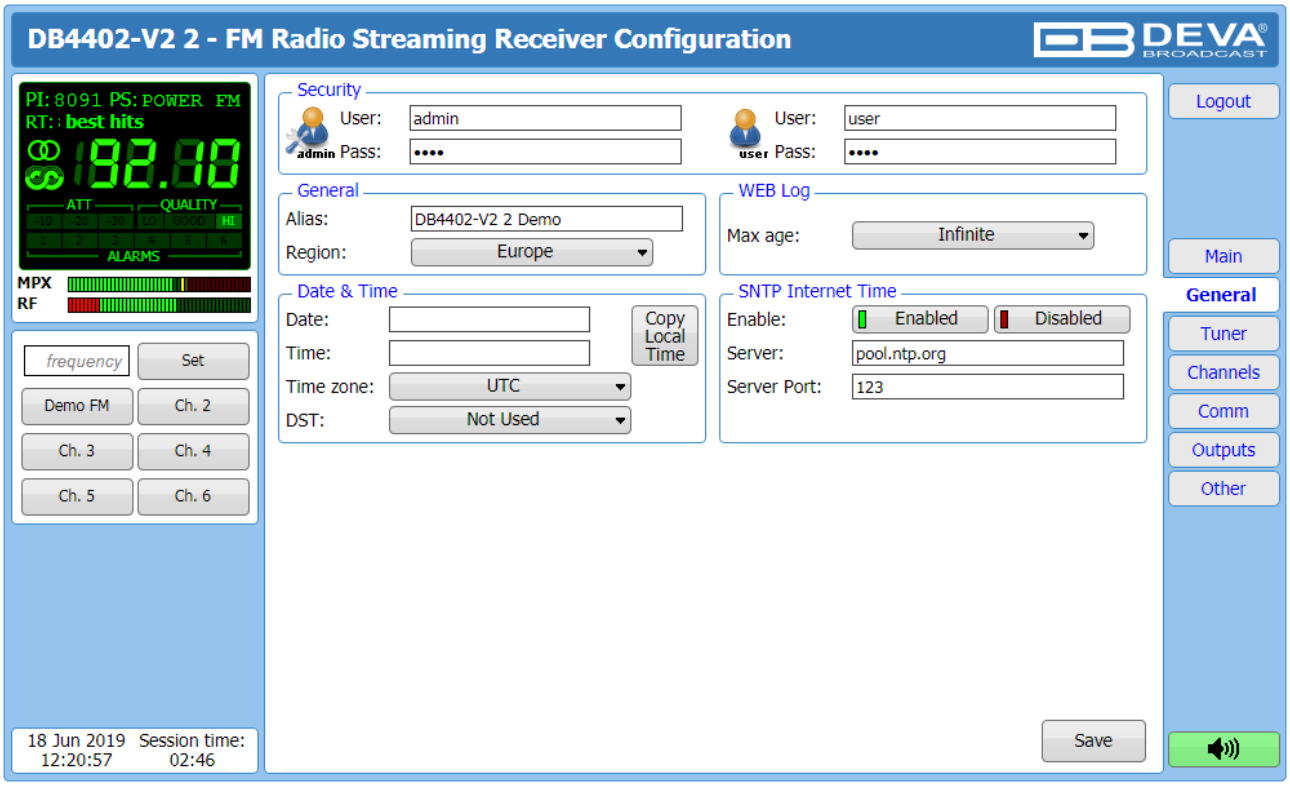
The status tab shows the alarm status of each parameter of the preset frequencies, along with the basic device and network status (IP address, MAC, etc.). If a GSM modem is connected, the status of the modem will also be depicted in the relevant section.

LOG



Here are listed all the Device System Events. The local measurements and logs are saved in the internal device memory. All log files can be downloaded via the built-in FTP server. For information on how the connection between the DB4402-V2 and an FTP Client should be configured, please refer to “Download files via FTP” on page 74.

GENERAL SETTINGS



DB4402-V2 provides you with protected access to the device settings. You can choose between two types of log in.

- As an Administrator – It will give you full control over the settings of the device;
- As a User – that will allow you to just monitor the device and to choose different stations, while the Settings bar remains locked.

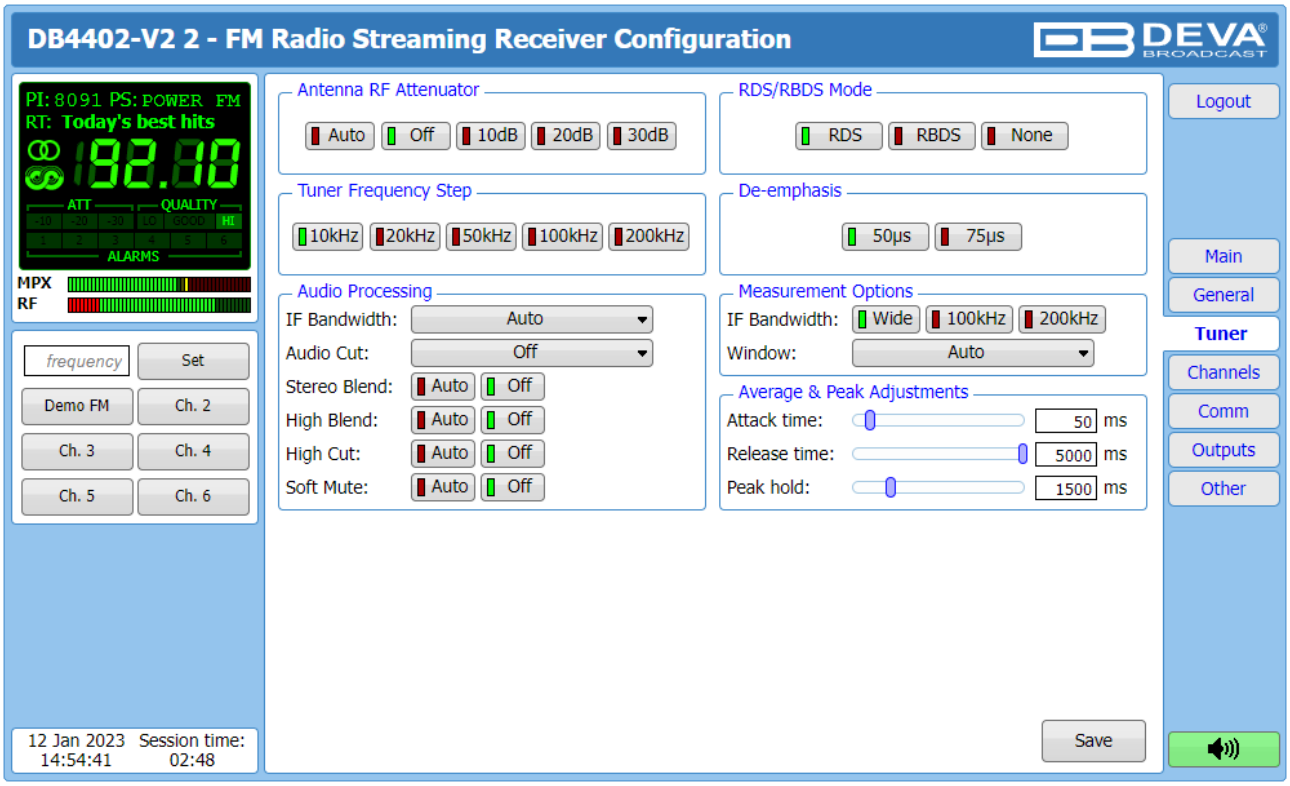
In order for the security of DB4402-V2 to be enhanced, a new **username** and **password** could be set from the Security section. By choice, you can change the name of the device (General section). Later on, it will be used as a title name for all WEB pages. Customizing the name will make the device more recognizable.

WEB Log – the maximum storage time of the System Log file is chosen from here. If the file is older than the specified maximum will be deleted.

Date & Time – used for manually set the current Date and Time. [Copy Local Time] button will set the Date and Time to correspond to that of your computer.

SNTP Internet Time – Synchronizes automatically the DB4402-V2 clock to a millisecond with the Internet time server. Enable this function in order to use it. (Specifying the server closest to your location will improve the accuracy).

TUNER SETTINGS



The Tuner Section gives full control over Tuner settings.

Antenna RF Attenuator – Allows the preferred attenuator value to be set.

Tuner Frequency Step – Allows tuner frequency step value to be set.

RDS/RBDS Mode – Depending on the client's preferences, the deviation could be measured in % [RBDS] or in kHz [RDS].

De-emphasis – User defined De-emphasis could be set, where the default values are 50 kHz Frequency Step and 50µs De-emphasis.

Audio Processing – If the IF Bandwidth is set to Auto, these settings depend on the quality of the received signal (RF Level, Multipath, and etc.). If any changes in the signal are detected, the unit will automatically adjust to the correct values.

- Stereo Blend – reduces the stereo separation if the received signal is bad;
- High Blend – applies low pass filter to the L-R audio levels;
- High Cut – applies low pass filter to the L+R audio levels;
- Soft Mute – reduces the level of the audio if the RF level is too low.

Measurement Options Section is used to adjust the Measuring signal path Filter settings. It is recommended to use Wide IF Bandwidth, but at noisy environment the narrow filter could improve the measurements.

Average & Peak Adjustments Section is used for setting of the indicators response times.

- Attack time and Release time set the rate in which the indicators' level will change in response to the signal. For most of the applications (including this one), the recommended attack time is shorter than the release time.
- Peak-hold time – Permits retaining and displaying the peak value reached by the signal for a period of time predefined by the user, in milliseconds.

NOTE: In order for the applied settings to be used press the [Save] button, placed on the bottom right part of the screen.

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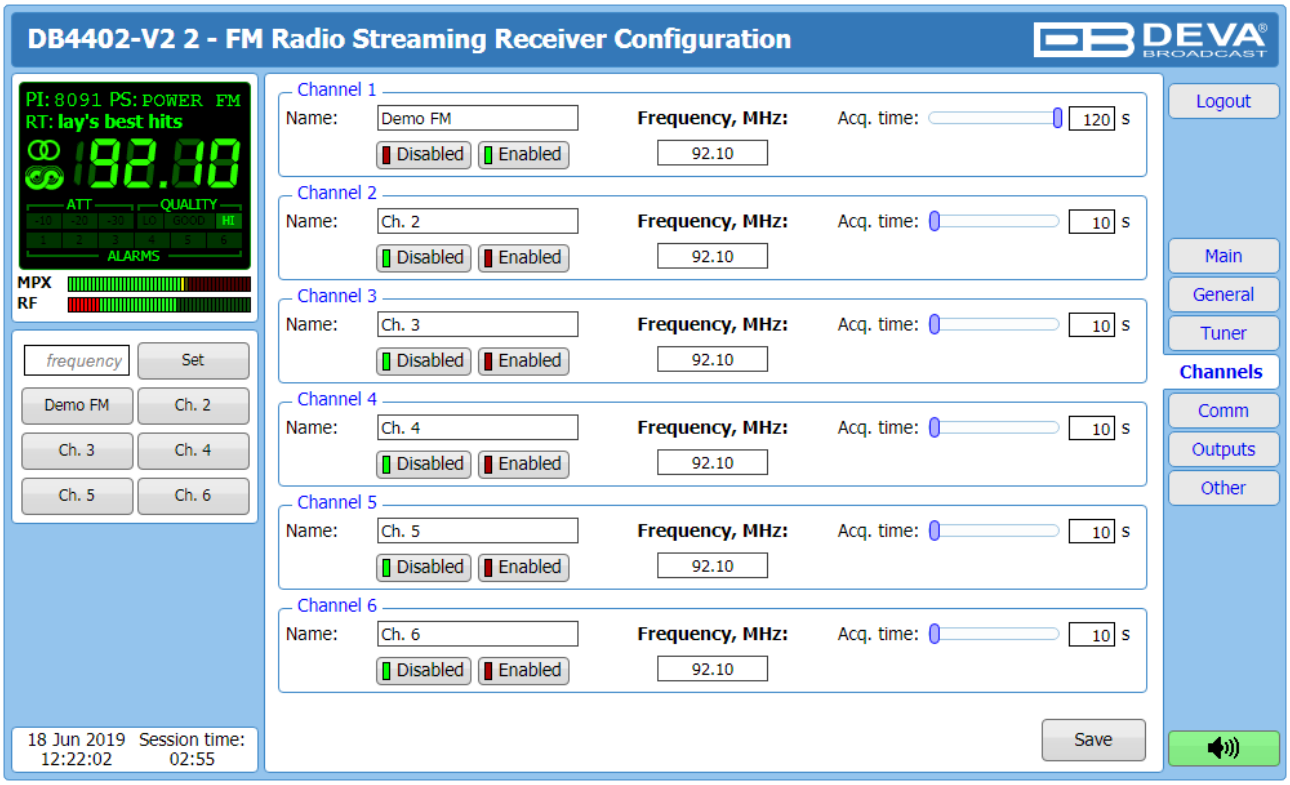
CHANNELS SETTINGS (CHANNELS 1 TO 6)



The DB4402-V2 can monitor up to 6 FM Stations at regular intervals and send warning and alarm notifications via E-mail, SMS, SNMP and GPO. Every Channel consists of a group of settings (explained in details below), which are used when monitoring and alerting. Each preset has its own page where it is being configured. Measurement windows can be set for each of the six parameters: RF, Left and Right audio levels, MPX (baseband) deviation, Pilot and RDS/RBDS deviation. Trigger and alarm release times can be set for each alarm.

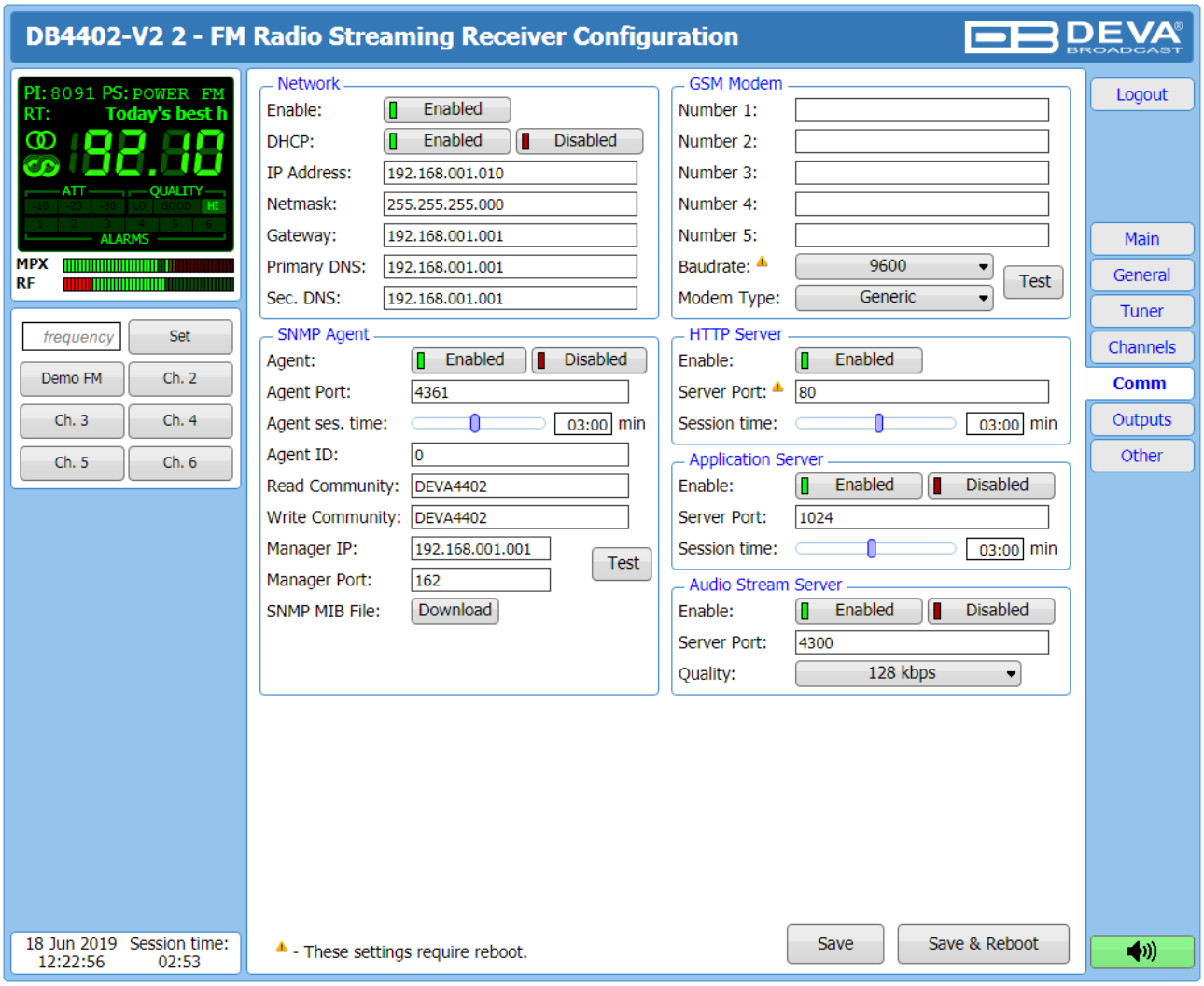
The notification means (Email, SMS, SNMP, GPO) is set for each parameter individually. To enable the notification, press on the relevant button so that it could be illuminated in green.

Channel

- [Enabled] / [Disabled] channel monitoring and sending of warnings and alarms. If the channel is not generally enabled, the frequency will not be monitored and alarm notifications will not be received;
- Frequency – specify the frequency to be monitored;
- Name – channel alias. The same name will appear on the quick access buttons in the "dashboard";
- Acquisition time – specify the observation time for the current station (before switching to the next channel).

NOTE: In order for the applied settings to be used press the [Save] button, placed on the bottom right part of the screen.

COMMUNICATION SETTINGS



Network

The network addresses could be set manually (static IP) or automatically via a DHCP server. To set static IP, MASK, GATEWAY and DNS addresses, the DHCP should be disabled. In order for the built-in DHCP client to be activated, the function should be enabled. When the DHCP client is activated, all assigned values will be shown in the relevant fields on the Status Screen. If due to any reason, the DHCP procedure cannot be completed, DB4402-V2 will use AutoIP and will generate an IP Address.

GSM Modem

Up to five numbers for SMS control and alarm notifications could be set. Baud Rate is mandatory for the proper operation of the GSM Modem. We recommend that a test SMS to be generated (via pressing the [Test] button), once all needed settings are applied. Upon success, the SMS will be delivered to all the specified GSM numbers.

Example of Test SMS Message:

```
DB4402-V2 Test Message.
```

NOTE: The current condition of the GSM Modem could be checked in the Status Screen. For detailed explanation of the option, please refer to "GSM Modem Option" on page 68.

HTTP Server

[Enabled] the HTTP Server. Specify the Server Port and session timeout. If the [Enabled] button is not illuminated in green, the option is disabled.

Audio Stream Server

[Enabled]/[Disabled] the Audio Stream Server. Then specify Port for audio Streaming, and Quality (64, 96, 128, 192 or 256 kbps). The Audio Stream could be heard using suitable audio player (Media Player, Winamp, etc.) or through the WEB interface by pressing the [Listen] button.

SNMP Agent

Agent - [Enabled]/[Disabled] the SNMP Agent.

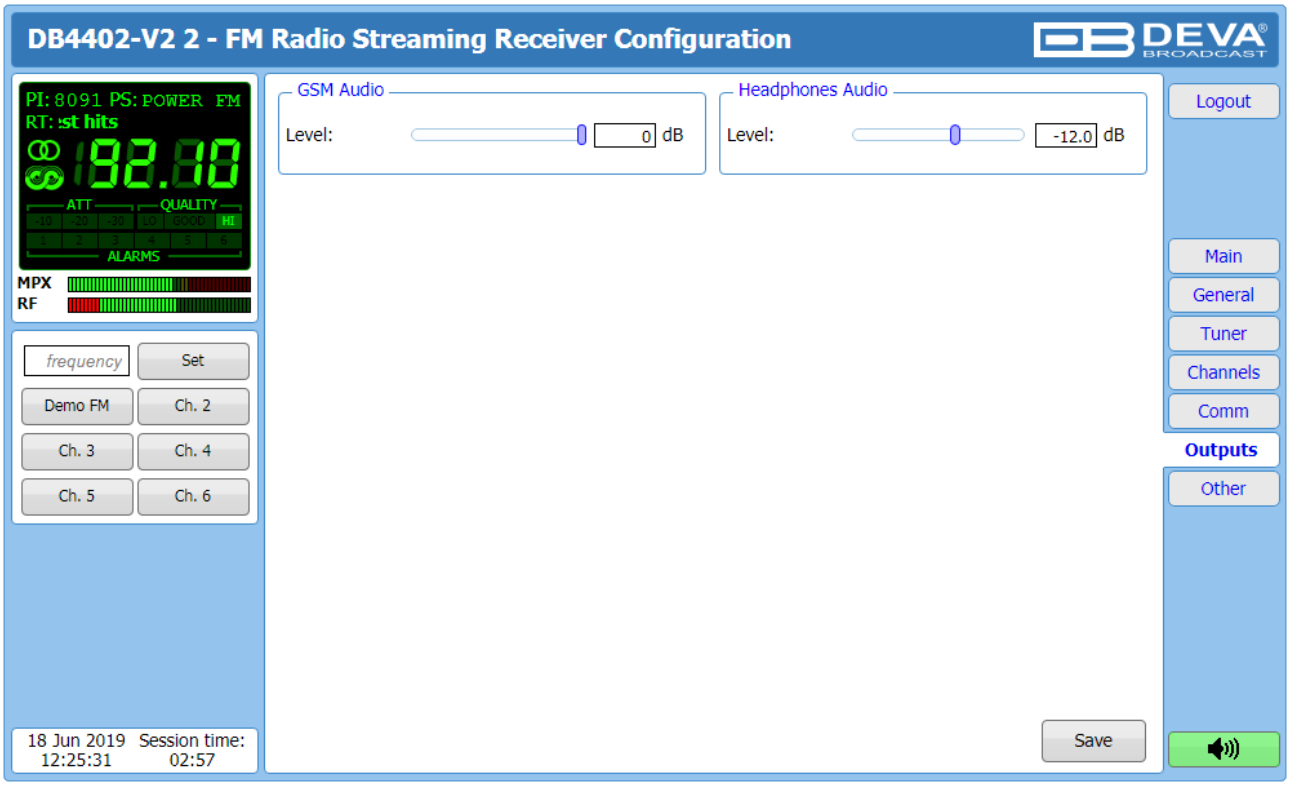
Specify Agent ID, Agent Port, Read/Write Communities, Manager IP, Manager Port and session timeout. Agent ID is used for identification of the device among others, when an SNMP notification is being sent.

Once all needed settings are applied, use the [Test] button to generate a test notification, which upon success will be received by the SNMP Manager.

Press the [Download] button to download the latest available DB4402-V2 SNMP MIB file.

NOTE: The MIB file may vary from one firmware revision to another. Downloading this file from the device, guarantees that you have the proper MIB file.

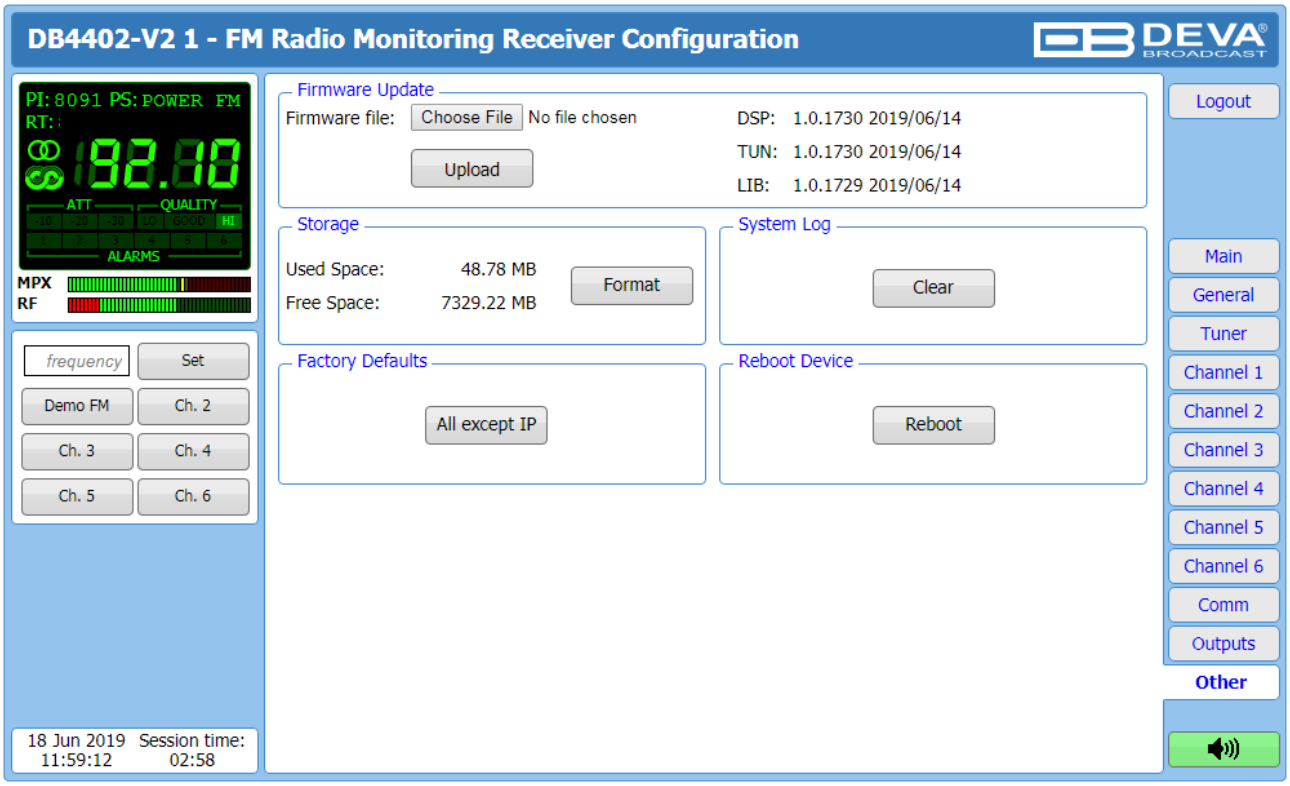
OUTPUTS SETTINGS



GSM Audio – interactive slider used to adjust the Level of the GSM Audio.

Headphones Audio – interactive slider used to adjust the Level of the Headphones Audio.

OTHER SETTINGS



Firmware Update

To update the device firmware, select the new firmware file. After having pressed the Upload button, a dialog window will appear. Confirm the firmware update and wait for the process to complete. Information on current DSP1, DSP2 and WEB version is also found in this section.

Storage

Information about the device storage space is found in this section. The entire internal storage could be deleted by pressing the [Format] button.

System Log

By pressing the [Clear] button, all records in the system log will be deleted.

Factory Defaults

[All except IP] – all settings, except for the Network settings (IP Address) will be deleted.

To restore DB4402-V2 to its Factory Defaults, press [All except IP]. A new window will appear – confirm that you want to restore the factory defaults and wait for the process to be completed. On completion of the process, the settings should have the proper default values.

Reboot

To start Rebooting of DB4402-V2, press the [Reboot] button. A dialog warning window will appear. Confirm that you want to reboot the device and wait for the process to be completed.

APPENDIX A

RDS: EUROPE VS AMERICA

The European Broadcasting Union (EBU) and its member countries originated the concept of "Radio Data" transmission. The European RDS specification, CENELEC Standard EN50067, was first published in 1984. It was revised in 1986, 1990, 1991 and 1992.

European RDS has grown in use following initial adoption of the Standard. RDS is nearly universal throughout Europe; it is almost impossible to find a European FM broadcasting station that does not carry a radio data subcarrier.

The popularity of RDS in Europe is very much in contrast with initial reluctance on the part of US broadcasters to embrace this technology. This can be ascribed to material differences in broadcasting practices.

Almost without exception, FM broadcasting in the United States is 'detached' and independent - each station originates its own programming. America's National Public Radio might be considered as an exception, though for most of the broadcast day even NPR stations originate, or at least schedule, their own programs.

Most of European broadcasting is similar to the concept of network radio that was common in the US prior to the 1950s. In Europe, a central program originator may have many transmitting facilities of modest power situated throughout the country, at several different frequencies to blanket a designated service area. The European disposition, toward lower-power transmitters can be found on the "local radio" level, as well.

The European concept of a service area equates to the US broadcaster's market. The subtle difference between these designations further characterizes broadcasting practices and ethics. RDS benefits the European broadcaster through almost an altruistic endeavor to be of service to his listeners. The US broadcaster is marketing his programming and is primarily interested in how he can create additional revenue from RDS.

THE RDS SYSTEM

RDS is a digital data channel, transmitted as a low-level subcarrier above the range of the composite stereo program signal in the FM baseband. The data transmission (baud) rate is comparatively low, yet it is quite robust because of data redundancy and effective error correction.

It is not within the scope of this Manual to cover the details of RDS subcarrier coding and modulation. For this, the reader is directed to the Specification appropriate to his location either the CENELEC EN50067 Specification for Europe or the United States NRSC Specification. Since the Manual will deal with specific implication of RDS implemented with the DB4402-V2, it is assumed that the user is familiar with the RDS concept.

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APPENDIX B.1

PTY Code Description Used in RBDS Mode – North America

PTY	Short Name	Description
1	News	News reports, either local or network in origin.
2	Information	Programming that is intended to impart advice.
3	Sports	Sports reporting, commentary, and/or live event coverage, either local or network in origin.
4	Talk	Call-in and/or interview talk shows either local or national in origin.
5	Rock	Album cuts.
6	Classic Rock	Rock oriented oldies, often mixed with hit oldies, from a decade or more ago.
7	Adult Hits	An up-tempo contemporary hits format with no hard rock and no rap.
8	Soft Rock	Album cuts with a generally soft tempo.
9	Top 40	Current hits, often encompassing a variety of rock styles.
10	Country	Country music, including contemporary and traditional styles.
11	Oldies	Popular music, usually rock, with 80% or greater non-current music.
12	Soft	A cross between adult hits and classical, primarily non-current softrock originals.
13	Nostalgia	Big-band music.
14	Jazz	Mostly instrumental, includes both traditional jazz and more modern “smooth jazz.”
15	Classical	Mostly instrumentals, usually orchestral or symphonic music.
16	Rhythm and Blues	A wide range of musical styles, often called “urban contemporary.”
17	Soft R and B	Rhythm and blues with a generally soft tempo.
18	Foreign Language	Any programming format in a language other than English.
19	Religious Music	Music programming with religious lyrics.
20	Religious Talk	Call-in shows, interview programs, etc. with a religious theme.
21	Personality	A radio show where the on-air personality is the main attraction.
22	Public	Programming that is supported by listeners and/or corporate sponsors instead of advertising.
23	College	Programming produced by a college or university radio station.
24	Spanish Talk	Call-in shows, interview programs, etc. in the Spanish language
25	Spanish Music	Music programming in the Spanish language
26	Hip-Hop	Popular music incorporating elements of rap, rhythm-and-blues, funk, and soul
27-28	Unassigned	
29	Weather	Weather forecasts or bulletins that are non-emergency in nature.
30	Emergency Test	Broadcast when testing emergency broadcast equipment or receivers. Not intended for searching or dynamic switching for consumer receivers. Receivers may, if desired, display “TEST” or “Emergency Test”.
31	Emergency	Emergency announcement made under exceptional circumstances to give warning of events causing danger of a general nature. Not to be used for searching - only used in a receiver for dynamic switching.

NOTE: These definitions can differ slightly between various language versions.

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APPENDIX B.2

PTY Code Description Used in RDS Mode – Europe, Asia

PTY	Short Name	Description
1	News	Short accounts of facts, events and publicly expressed views, reportage and actuality.
2	Current affairs	Topical program expanding or enlarging upon the news, generally in different presentation style or concept, including debate, or analysis.
3	Information	Program the purpose of which is to impart advice in the widest sense.
4	Sport	Program concerned with any aspect of sport.
5	Education	Program intended primarily to educate, of which the formal element is fundamental.
6	Drama	All radio plays and serials.
7	Culture	Programs concerned with any aspect of national or regional culture.
8	Science	Programs about the natural sciences and technology.
9	Varied	Used for mainly speech-based programs usually of light-entertainment nature, not covered by other categories. Examples include: quizzes, games, personality interviews.
10	Pop	Commercial music, which would generally be considered to be of current popular appeal, often featuring in current or recent record sales charts.
11	Rock	Contemporary modern music, usually written and performed by young musicians.
12	Easy Listening	Current contemporary music considered to be “easy-listening”, as opposed to Pop, Rock or Classical, or one of the specialized music styles, Jazz, Folk or Country. Music in this category is often but not always, vocal, and usually of short duration.
13	Light classics	Classical Musical for general, rather than specialist appreciation. Examples of music in this category are instrumental music, and vocal or choral works.
14	Serious classics	Performances of major orchestral works, symphonies, chamber music etc., and including Grand Opera.
15	Other music	Musical styles not fitting into any of the other categories. Particularly used for specialist music of which Rhythm & Blues and Reggae are examples.
16	Weather	Weather reports and forecasts and Meteorological information.
17	Finance	Stock Market reports, commerce, trading etc.
18	Children’s programs	For programs targeted at a young audience, primarily for entertainment and interest, rather than where the objective is to educate.
19	Social Affairs	Programs about people and things that influence them individually or in groups. Includes: sociology, history, geography, psychology and society.
20	Religion	Any aspect of beliefs and faiths, involving a God or Gods, the nature of existence and ethics.
21	Phone In	Involving members of the public expressing their views either by phone or at a public forum.
22	Travel	Features and programs concerned with travel to near and far destinations, package tours and travel ideas and opportunities. Not for use for Announcements about problems, delays, or roadworks affecting immediate travel where TP/TA should be used.
23	Leisure	Programs concerned with recreational activities in which the listener might participate. Examples include, Gardening, Fishing, Antique collecting, Cooking, Food & Wine etc.
24	Jazz Music	Polyphonic, syncopated music characterized by improvisation.
25	Country Music	Songs which originate from, or continue the musical tradition of the American Southern States. Characterized by a straightforward melody and narrative story line.
26	National Music	Current Popular Music of the Nation or Region in that country’s language, as opposed to International ‘Pop’ which is usually US or UK inspired and in English.
27	Oldies Music	Music from the so-called “golden age” of popular music.
28	Folk Music	Music which has its roots in the musical culture of a particular nation, usually played on acoustic instruments. The narrative or story may be based on historical events or people.
29	Documentary	Program concerned with factual matters, presented in an investigative style.
30	Alarm Test	Broadcast when testing emergency broadcast equipment or receivers. Not intended for searching or dynamic switching for consumer receivers.. Receivers may, if desired, display “TEST” or “Alarm Test”.
31	Alarm	Emergency announcement made under exceptional circumstances to give warning of events causing danger of a general nature. Not to be used for searching - only used in a receiver for dynamic switching.

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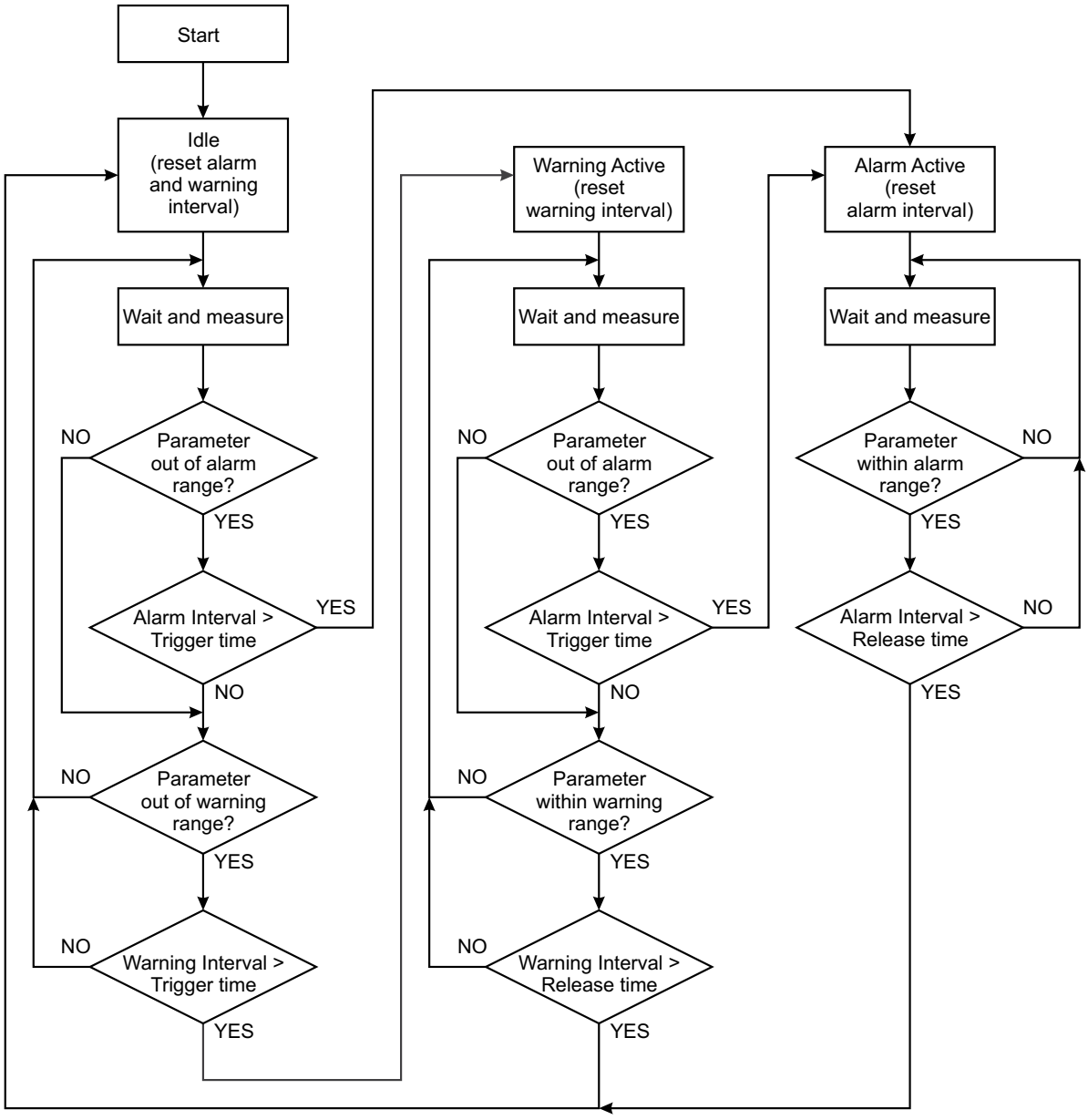
APPENDIX C

ALARM TRIGGERS

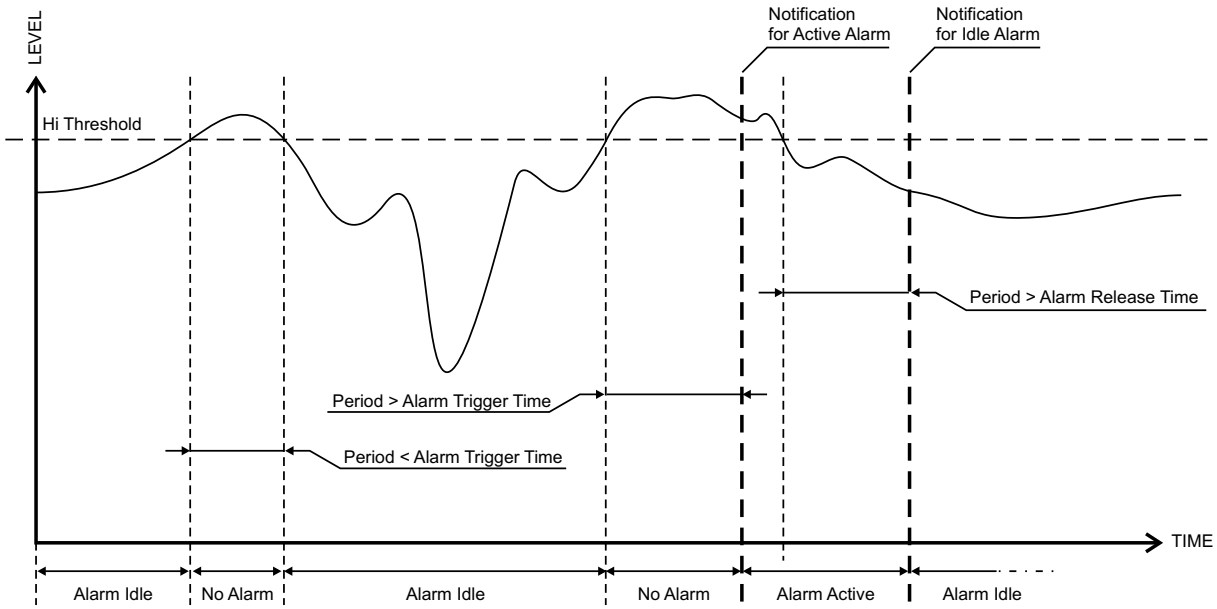
After collecting all the data, the DSP-based core compares the values measured with the predefined by the user threshold levels, for all the alarms monitored. In case that a parameter is beyond limits, the device will initiate the sending of an alarm notification via the selected communication path. All the alarm events are stored in the device's log. It is essential that, if there is a very short fault of the signal, with duration shorter than the 'alarm trigger time', the device would not trigger an alarm.

There are several Alarm Triggers for the following parameters: RF, MPX, MPX Power, Left/Right Audio, RDS Group loss, Pilot and RDS levels. An option for defining different limits for each of the parameters is present. All these values, the 'trigger time' and the 'release time have to be assigned separately for each of the alarms.



Block Diagram of Alarm Automata

When an observation event takes place, the Alarm Trigger's State will refresh, if necessary. Should we consider an instance when the Alarm Trigger is in Idle state, having in mind that an alarm is not triggered immediately when a parameter level passes beyond threshold: If the parameter level becomes stable, within Thresholds, and the Alarm Trigger Time is not elapsed, then the Alarm Trigger remains in Idle state. If the Alarm Trigger Time expires and the parameter level is still beyond limits, the Alarm Trigger would change its state to High/Low. This would result in predefined actions - Alarm Notifications (E-mail, SMS, SNMP trap) and Save a Log Record. The state will not be immediately switched into Idle when the parameter stabilizes, within Threshold levels, not up until the 'Alarm Release Time' is elapsed. Meanwhile, if the parameter crosses again any Threshold, the Alarm Trigger will remain in Active state. If the parameter remain within the Threshold levels and the Alarm Release Time expires, then the Alarm Trigger would switch into Idle state and again predefined actions would be initiated.



If the RDS Group has not been received within the Alarm Trigger Time, the state would be changed into Active. If the Active state and the Release Time have elapsed and the RDS Group is received, the state is changed to Idle. Should the RDS Group is received before the Release Time is elapsed, the state would remain Active.

IMPORTANT NOTE: When in Logger Mode, the alarm notification works as follows: if the observation time is set to 10 seconds, and during this time the RF level (for example) is below the specified threshold, but the timeout has not expired, an alarm will be generated upon the channel's next time slot if the level is still below the specified threshold and the timeout expires.

ALARM NOTIFICATIONS

The E-mail, SMS, SNMP trap Alarm Notifications contain the following information - device's Alias, date and time of Alarm triggered, channel number, frequency and information about the Alarm activation/deactivation. The basic signal parameters are also included.

Example for E-mal Notification:

```
Date: 04 Nov 2013, 07:31:11

DB4402-V2 reports ACTIVE alarm on 91.10MHz - Power FM (CH1)

Alarm: RDS > 6.5kHz

Signal parameters:
RF: 51.5dBuV
MPX Total: 89.9kHz
MPX Power: -128.0dBr
Pilot: 7.5kHz
RDS: 11.4kHz
Left: -7.2dB
Right: -8.2dB
```

Example for SMS Notification:

```
ACTIVE ALARM:CH#2
27.09.2013 09:08:34
FREQ:95.7MHz
RF:35.0dBuV *L*
MPX:60.3kHz
Left:-2.8dB
Right:-3.1dB
Pilot:7.92kHz
RDS:4.12kHz
```

NOTE: *L* for LOW (below threshold), *H* for HIGH (above threshold)

ATTENTION: Because of the SMS length limitations, only the most important parameters are included.

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APPENDIX D

GSM MODEM OPTION - FEATURES AND USAGE

The described Features and Usage of the GSM Option is compatible with following DEVA Units:
- **DB44** – Compact FM Radio Monitoring Receiver
- **DB45** – DSP-Based FM Radio Receiver and Modulation Analyzer
- **DB4004** – DSP-based FM Radio Monitoring Receiver
- **DB4005** – SDR-Based FM Radio Modulation Analyzer and Monitoring Receiver
- **DB7000** – FM Radio Re-Broadcast Receiver with Built-in IP Audio & MP3 Backup Players
- **DB7001** – DSP-based FM Radio Re-Broadcast Receiver with TCP/IP Connectivity
- **DB7007** – Advanced FM Radio Re-Broadcast Receiver with IP Audio & MP3 Backup Players
- **DB4402-V2** – High-Performance Dual FM Monitoring Receiver & Radio Streamer

The DEVA FM Monitoring receivers supports a very wide range of GSM Modems. However, we suggest the usage of the following model - Sierra Wireless AirLink. This is the modem that is provided from DEVA Broadcast if the feature has been ordered along with the DEVA Unit.

The GSM modem model is directly PIN to PIN compatible with the DEVA Unit GSM Modem's connector, and by simply using a direct cable, you will have not any troubles with the data communication and audio insertion.

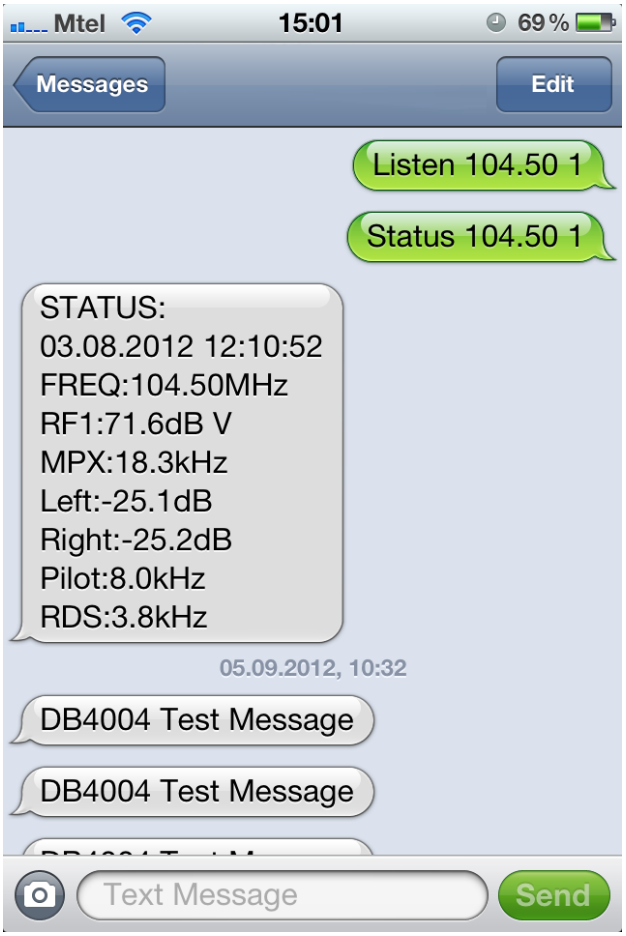
Before connecting the GSM Modem to the DEVA Unit, it is necessary to set up the parameters for normal operation. Please bear in mind that:

- GSM modem does not have an automatic detection of the baud rate (AUTOBAUD function). The most important thing is to set up the GSM Modem communication settings. The Communication speed must be 9600 bps, Data Bits: 8; Parity: None; Stop Bits:1.
- The SIM Card PIN code must be disabled in order to avoid a configuration problem of the modem. We suggest you to do this procedure using a GSM phone device of choice. This will save you a lot of time for reading the GSM Modem documentation. In case you decide to do that using the GSM Modem please refer to its User Manual for details.

IMPORTANT: Once the GSM modem is properly installed, the DEVA Unit must be pre-configured to receive messages from up to 5 authorized numbers. This can be made via the WEB interface of the DEVA Unit. Upon successful installation, a notification message will appear on the unit's LCD/OLED screen (if such is available). Using this screen you can find the best place with good GSM Network coverage for the installation of the GSM modem.

NOTE: For information, how the DEVA Unit can be accessed via the WEB Interface, please refer to the respective quick user guide for the device in question. All the documents are available at www.devabroadcast.com/downloads

SHORT MESSAGE SERVICES AVAILABLE



• By sending, a message with the command `Listen +` the desired station (for example "`Listen 101.80`"), the DEVA Unit will retrieve you a call with short record of the station that you have required.

• If you need the current information for a particular station, you can use the second command – `Status +` the desired station (for example "`Status 101.80`"). Then DEVA Unit will send you a message like the one depicted on the screen.

• The ALARM Dispatch - This is a notification that the DEVA Unit will send to you in the cases when a parameters drops below or exceeds the pre-defined threshold. In case of ALARM, the unit will send SMS to all authorized GSM numbers.

Bellow you will find examples how to use the DEVA Unit with GSM Modem features:

REMOTE AUDIO LISTENING

Type the following text and send it as SMS to the DEVA Unit's GSM number:

`Listen FFF.FF`

`FFF.FF` is the frequency to listen to.

Upon receiving your '`Listen`' request via SMS, the DEVA Unit will call you back and when you take the call will hear the audio on the frequency `FFF.FF`

IMPORTANT: Do not include leading zeroes such as "`Listen 089.90`"
Fill with trailing zeroes up to two digits after decimal symbol.
Decimal symbol must be '.' (not comma ',').
For example: "`Listen 104.50`" or "`Listen 91.55`".

REMOTE STATUS REQUEST

The DEVA Unit can send you a report with the values of the most important FM Parameters like RF level, MPX Level, Pilot Level, RDS Level, L&R Audio Level, Stereo/Mono Status and RDS PI Code at any time. Upon receiving your request via SMS, the unit's tuner will be adjusted on the requested frequency and will make measurement of all the parameters listed above. Once the procedure is completed, an SMS message will be generated and sent to the requestor's GSM. Command Example:

```
Status FFF.FF
```

`FFF.FF` is frequency to Tune.

IMPORTANT: Do not include leading zeroes such as "`Status 089.90`"
Fill with trailing zeroes up to two digits after decimal symbol.
Decimal symbol must be '.' (not comma ',')
For example: "`Status 102.55`" or "`Status 88.80`".

The DEVA Units will shortly respond back with SMS with the following content (example):

```
STATUS:
11.07.09 09:08:34
FREQ:102.50MHz
RF Level: 55.1dBuV
MPX Level: 74.1kHz
Left: -11.7dB
Right: -12.3dB
Pilot: 7.5kHz
Stereo
RDS Level: 4.1kHz
PI:824D
```

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INITIALIZATION PROCEDURE FOR SIERRA WIRELESS AIR-LINK FXT009 GSM MODEM

in regards with the following DEVA Units:
- **DB44** – Compact FM Radio Monitoring Receiver
- **DB45** – DSP-Based FM Radio Receiver and Modulation Analyzer
- **DB4004** – DSP-based FM Radio Monitoring Receiver
- **DB4005** – SDR-Based FM Radio Modulation Analyzer and Monitoring Receiver
- **DB7000** – FM Radio Re-Broadcast Receiver with Built-in IP Audio & MP3 Backup Players
- **DB7001** – DSP-based FM Radio Re-Broadcast Receiver with TCP/IP Connectivity
- **DB7007** – Advanced FM Radio Re-Broadcast Receiver with IP Audio & MP3 Backup Players
- **DB4402-V2** – High-Performance Dual FM Monitoring Receiver & Radio Streamer

1. Setting up the modem

Prior to connecting/using the GSM modem for the first time, kindly read the manufacturer's user manual. The document can be found on https://source.sierrawireless.com/resources/airlink/hardware_reference_docs/airlink_fxt_series_user_guide/

The appropriate values should be assigned via the RS232 interface of the GSM modem. A custom made cable and a terminal program of any kind should be used. The cable specifications should be as follows:

To PC DB 9 female pin		GSM modem DB 15 male pin	Note
1	–>	1	Data Carrier Detect
2	–>	6	com TX
3	–>	2	com RX
4	–>	8	DTR
5	–>	9	GND
6	–>	7	DSR
7	–>	12	RTS
8	–>	11	CTS
9	–>	13	RI

Next, the following settings should be applied to the terminal program:

Speed	115200 bps.
Flow control	hardware (CTS/RTS)
Parity	none
Data bits	8
Stop bits	1

To check the communication type the command "AT" in the terminal program and press Enter. The modem will/should respond with "OK".

Upon powering on, the modem should start working with its factory settings. To see these settings type the command "AT&V". The modem will respond with the factory default settings:

```
Q:0 V:1 S0:000 S2:043 S3:013 S4:010 S5:008
+CR:0 +CRC:0 +CMEE:0 +CBST:0,0,1
+SPEAKER:1 +ECHO:0 &C:0 &D:2 %C:0
+IPR:115200 +ICF:3,4 +IFC:2,2
```

ATTENTION: If the displayed parameters differ from one listed above, we recommend you to return the modem to its factory defaults. In order for this to happen, the command "AT&F1" should be typed.

NOTE: For further information on the AT commands, please refer to the GSM Modem complete user manual.

Once the modem is returned to its factory defaults, you can proceed with following commands:

COMMAND	DESCRIPTION	NOTE
ATE0	This command will turn Echo Off	
AT+ICF=3,4	8n1, no parity	
AT+IFC=0,0	no flow control	
AT+IPR=9600	set com speed	Change terminal speed to 9600 bps (if needed)
AT&W	save configuration	After this command turn power Off and On
AT&V	display new configuration	

NOTE: After every command, the modem should respond with "OK".

Once all changes/modifications are applied, the modem should respond with the following adjustments:

```
Q:0 V:1 S0:000 S2:043 S3:013 S4:010 S5:008
+CR:0 +CRC:0 +CMEE:0 +CBST:0,0,1
+SPEAKER:1 +ECHO:0 &C:1 &D:2 %C:0
+IPR:9600 +ICF:3,4 +IFC:0,0
```

Upon applying all the described settings, the modem should be fully compatible for operation with DEVA Unit.

2. Connecting with DEVA Unit

Communication Cable Description:

DEVA Unit port DB 15 female pin		GSM modem DB 15 male pin	Note
2	–>	2	com TX
4	–>	4	mic (+)
5	–>	5	mic (-)
6	–>	6	com RX
9	–>	9	gnd

APPENDIX E

HOW SHOULD I CONFIGURE THE CONNECTION BETWEEN MY DEVA DEVICE AND AN FTP CLIENT?

In order for a connection to be established the following setting should be applied:

1. FTP Server Settings

The built-in FTP Server has four important parameters that should be configured: Command Port, Data Port, User name and Password. These parameters are to be used in the FTP client's connection configuration. Further information on how to change the FTP Server's settings and their respective default values can be found in the device's User manual.

WE RECOMMEND the usage of FileZilla (https://filezilla-project.org). This is a widespread open source software distributed free of charge, hence available for downloading from the Internet.

NOTE: The FTP Server can manage only one connection at a time. The FTP Server works in Passive mode. Hence, the FTP Client should also be set in passive mode.

2. IP Router and Port Translation Settings

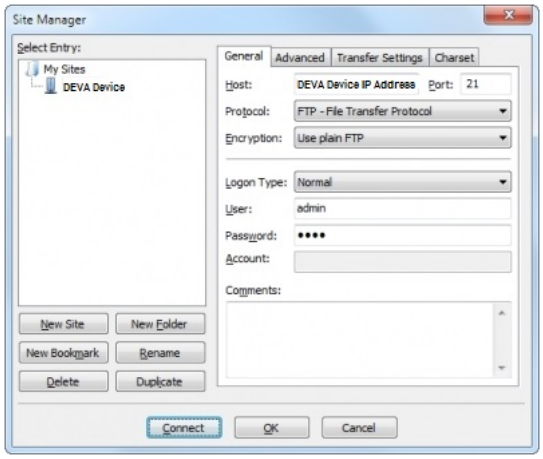
If the connection to the device is made through a Network address translation (NAT) router or firewall, the port forwarding feature of the router should be configured. The port forwarding is usually set in the firewall section of the router's menu. As each router has different port forwarding procedure, we recommend you to refer to its complete manual. To allow proper data flow through the router, the FTP Command and FTP Data ports should be open.

NOTE: The FTP port numbers to be used in the port forwarding feature configuration can be found in the device.

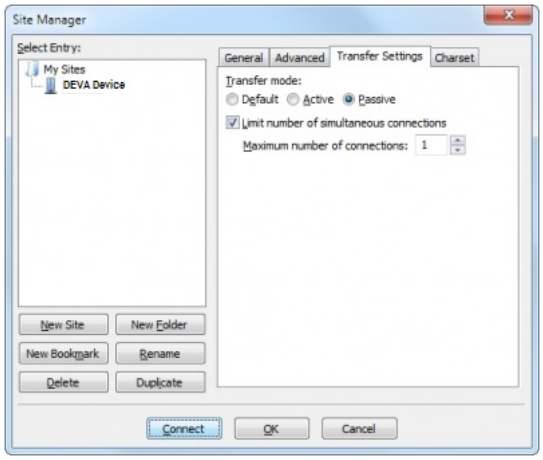
3. Example of FTP Client (FileZilla) Settings

In some cases, FileZilla's "Quick connect" feature is not able to connect with the DEVA unit. That is why we recommend the device to be assigned in the program manually.

Enter the FTP Client and go to: ***File > Site manager > New Site***. A dialog box requiring obligatory information about the device will appear. Fill in the needed information and press "OK".



Select "Transfer Settings" sub-menu and apply the settings as shown below:



APPENDIX F

BATTERY REPLACEMENT PROCEDURE

IMPORTANT: Before starting the procedure, power off and disconnect the device. Perform the battery replacement on a static-resistant work surface and follow all applicable safety precautions.

REPLACEMENT

1. Using a suitable screwdriver, remove the bolts securing the top cover to the chassis.
2. Handle the motherboard with care and avoid applying excessive force.
3. Locate the RTC battery socket on the motherboard.
4. Remove the depleted battery from the socket.
5. Insert a new **3V Lithium CR2032** battery into the battery socket. Ensure that the battery is correctly oriented and securely seated in the socket.

REASSEMBLY

1. Align the top cover with the chassis.
2. Using a suitable screwdriver, tighten the bolts securely. Do not overtighten.
3. Power on the device and verify that the time and date are displayed correctly.

VERIFICATION

If the time and date are retained correctly after the device is powered off and restarted, the RTC battery replacement has been completed successfully.

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WARRANTY TERMS AND CONDITIONS

I. TERMS OF SALE: DEVA Broadcast Ltd. products are sold with an understanding of "full satisfaction"; that is, full credit or refund will be issued for products sold as new if returned to the point of purchase within 30 days following their receipt, provided that they are returned complete and in an "as received" condition.

II. CONDITIONS OF WARRANTY: The following terms apply unless amended in writing by DEVA Broadcast Ltd.

A. The Warranty Registration Card must be completed and returned to DEVA Broadcast Ltd. within 10 days of delivery. Product registration can also be done digitally at https://www.devabroadcast.com/members/product-registration, after registering on our website, within 10 days of delivery.

B. This Warranty applies only to products sold "as new." It is extended only to the original end-user and may not be transferred or assigned without prior written approval by DEVA Broadcast Ltd.

C. This Warranty does not apply to damage caused by improper mains settings and/or power supply.

D. This Warranty does not apply to damage caused by misuse, abuse, accident or neglect. This Warranty is voided by unauthorized attempts at repair or modification, or if the serial identification label has been removed or altered.

III. TERMS OF WARRANTY: DEVA Broadcast Ltd. products are warranted to be free from defects in materials and workmanship.

A. Any discrepancies noted within TWO YEARS of the date of purchase will be repaired free of charge, or the equipment will be replaced with a new or remanufactured product at DEVA Broadcast Ltd. option.

B. Parts and labor for factory repair required after the two-year Warranty period will be billed at prevailing prices and rates.

IV. RETURNING GOODS FOR FACTORY REPAIR:

A. Equipment will not be accepted for Warranty or other repair without a Return Material Authorization (RMA) number issued by DEVA Broadcast Ltd. prior to its return. An RMA number may be obtained by placing an RMA request at https://www.devabroadcast.com/rma. The number should be prominently marked on the outside of the shipping carton.

B. Equipment must be shipped prepaid to DEVA Broadcast Ltd. Damage sustained as a result of improper packing for return to the factory is not covered under terms of the Warranty and may occasion additional charges.

V. UPDATES TO THE TERMS OF SERVICE:

For the most up-to-date, valid, and accurate terms, conditions, and product documentation, please visit the official DEVA Broadcast Ltd. website downloads section at https://www.devabroadcast.com/downloads/deva-documents. Printed documents may not reflect recent amendments. Reviewing the current online versions ensures you have the latest information.

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PRODUCT REGISTRATION CARD

• All fields are required, or warranty registration is invalid and void

Your Company Name_____

Contact_____

Address Line 1_____

Address Line 2_____

City_____

State/Province_____ ZIP/Postal Code_____

Country_____

E-mail_____ Phone_____ Fax_____

Which DEVA Broadcast Ltd. product did you purchase?_____

_____

_____

Product Serial #_____

Purchase date_____/_____/_____ Installation date_____/_____/_____

_____
Your signature*

*Signing this warranty registration form you are stating that all the information provided to DEVA Broadcast Ltd. are truth and correct. DEVA Broadcast Ltd. declines any responsibility for the provided information that could result in an immediate loss of warranty for the above specified product(s).

Privacy statement: DEVA Broadcast Ltd. will not share the personal information you provide on this card with any other parties.