



TX V2 FM Broadcast Transmitter



User Manual v1.1

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Contents

Contents.....	2
Introduction	3
Warranty	4
Safety.....	6
Front and Rear Panels	7
Display	8
Basic Setup.....	10
Examples of Use.....	11
FSK Keyer (Translators)	16
Audio Processing	16
Remote Control.....	16
In Field Software Upgrade	19
Alarms and Triggers.....	19
Logging	21
Menu Map	23
Full Parameter List.....	25
Specifications	27

Introduction

The BW Broadcast V2 is the latest development in a high specification range of FM transmitters over 15 years in the making.

Its broadband “no-tune” design allows 87.5 - 108MHz operation without requiring tuning or calibration. The inclusion of four-band DSPX audio processing means stations without a dedicated processor sound great, right out of the box. Those who already have external processing benefit from BW Broadcast’s unique dual-loop virtual VFO exciter and field proven ultra-low distortion modulator integrated into a great performing, highly stable FM transmission system.

Features such as slide-in power supplies, and unique solder-free Gold-Clamp transistors (not present on all models) make in-field maintenance simple.

A high resolution OLED screen displays RF, audio and system parameters. The control wheel and three front panel buttons allow easy navigation of the menus. Help tips for every parameter make setup simple without having to refer to the technical manual

Every V2 Transmitter features a LAN connection for Ethernet local or remote control. The LAN connection also supports SNMP, telnet, and email alerts via either SMTP or BW Broadcast’s mail server. Where a LAN connection is not available, the RS232 connection can be used.

Intelligent alarms and email alerts ensure busy engineers can manage their stations with minimal intervention. A real time clock and comprehensive logging is available for those who like to see more detailed status. Also present are 4 rear panel opto-isolated triggers that allow external equipment to control the transmitter.

It is advised that this manual is read to learn all of the advanced features of the V2 Transmitter.

Warranty

BW Broadcast warrants the mechanical and electronic components of this product to be free of defects in material and workmanship for a period of two (2) years from the original date of purchase, in accordance with the warranty regulations described below. If the product shows any defects within the specified warranty period that are not due to normal wear and tear and/or improper handling by the user, BW Broadcast shall, at its sole discretion, either repair or replace the product. If the unit has a manufacturer's fault within twenty eight (28) days then BW Broadcast will pay the freight at their discretion. If the warranty claim proves to be justified, the product will be returned to the user freight prepaid. Warranty claims other than those indicated above are expressly excluded.

Return authorisation number

To obtain warranty service, the buyer (or his authorized dealer) must call BW Broadcast during normal business hours BEFORE returning the product. All inquiries must be accompanied by a description of the problem. BW Broadcast will then issue a return authorization number.

Subsequently, the product must be returned in its original shipping carton, together with the return authorization number to the address indicated by BW Broadcast. Shipments without freight prepaid will not be accepted.

Warranty regulations

Warranty services will be furnished only if the product is accompanied by a copy of the original retail dealer's invoice. Any product deemed eligible for repair or replacement by BW Broadcast under the terms of this warranty will be repaired or replaced within 30 days of receipt of the product at BW Broadcast.

If the product needs to be modified or adapted in order to comply with applicable technical or safety standards on a national or local level, in any country which is not the country for which the product was originally developed and manufactured, this modification/adaptation shall not be considered a defect in materials or workmanship. The warranty does not cover any such modification/adaptation, irrespective of whether it was carried out properly or not. Under the terms of this warranty, BW Broadcast shall not be held responsible for any cost resulting from such a modification/adaptation.

Free inspections and maintenance/repair work are expressly excluded from this warranty, in particular, if caused by improper handling of the product by the user. This also applies to defects caused by normal wear and tear, in particular, of faders, potentiometers, keys/buttons and similar parts.

Damages/defects caused by the following conditions are not covered by this warranty:

Misuse, neglect or failure to operate the unit in compliance with the instructions given in BW Broadcast user or service manuals. Connection or operation of the unit in any way that does not comply with the technical or safety regulations applicable in the country where the product is used. Damages/defects caused by force majeure or any other condition that is beyond the control of BW Broadcast. Any repair or opening of the unit carried out by unauthorized personnel (user included) will void the warranty.

If an inspection of the product by BW Broadcast shows that the defect in question is not covered by the warranty, the inspection costs are payable by the customer.

Products which do not meet the terms of this warranty will be repaired exclusively at the buyer's expense. BW Broadcast will inform the buyer of any such circumstance. If the buyer fails to submit a written repair order within 6 weeks after notification, BW Broadcast will return the unit C.O.D. with a separate invoice for freight and packing. Such costs will also be invoiced separately when the buyer has sent in a written repair order.

Warranty transferability

This warranty is extended exclusively to the original buyer (customer of retail dealer) and is not transferable to anyone who may subsequently purchase this product. No other person (retail dealer, etc.) shall be entitled to give any warranty promise on behalf of BW Broadcast.

Claims for damages

Failure of BW Broadcast to provide proper warranty service shall not entitle the buyer to claim (consequential) damages. In no event shall the liability of BW Broadcast exceed the invoiced value of the product.

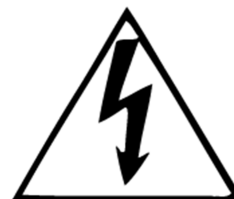
Other warranty rights and national law

This warranty does not exclude or limit the buyer's statutory rights provided by national law, in particular, any such rights against the seller that arise from a legally effective purchase contract. The warranty regulations mentioned herein are applicable unless they constitute an infringement of national warranty law.

Safety

MAINS VOLTAGE

This equipment operates from an AC power source of up to 240 volts. There are hazardous voltages present internally. **PLEASE OBSERVE CAUTION WITH THE COVER REMOVED.**



SWITCHED MODE POWER SUPPLY HAZARD

Please note that the power supply units in this equipment is of the switched mode variety and have lethal voltages present internally. The switched mode supplies are universal input fully approved type. They are non serviceable modules and should be fully replaced should they fail.

FUSES

Only use fuses with the specified voltage and current ratings as stated on the back panel. Failure to do so may increase the risk of equipment failure, shock and fire hazard.

R.F.

The R.F. power output socket contains R.F. voltages which may burn or present a shock. Please make sure that the equipment is connected to an adequately rated load or antenna system while in operation.

TOXIC HAZARD

This equipment includes R.F. components that may contain Beryllium oxide which is a highly toxic substance that could be hazardous to health if inhaled or ingested. Care should be taken when replacing or discarding such devices. Seek expert advice from the manufacturer should you physically damage a device that contains Beryllium Oxide. The main R.F. output power transistor contains Beryllium oxide.

OTHER SAFETY CONSIDERATIONS

Do not operate this equipment in the presence of flammable gases, fumes or liquids
Do not expose this equipment to rain or water.

CE CONFORMANCE

This device complies with the requirements of the 1995/5/EC Radio and Telecommunications Terminal Equipment (R&TTE). The equipment will meet or exceed the following standards: EN 60215:1996 (Safety Requirements for Radio Transmitting Equipment), EN 301 489-11 (ERM/EMC for Radio Equipment, Part 11 Specific Conditions for FM Transmitters), EN 302 018-2 ERM (Transmitting Equipment for FM Radio Broadcasting service)



The operating frequencies of this transmitter may not be harmonised in the intended countries of use. The user must obtain a license before using the product in the intended country of use. Ensure respective country licensing requirements are complied with. Limitations of use can apply in respect of operating frequency, transmitter power and/or channel spacing.

WEEE COMPLIANCE

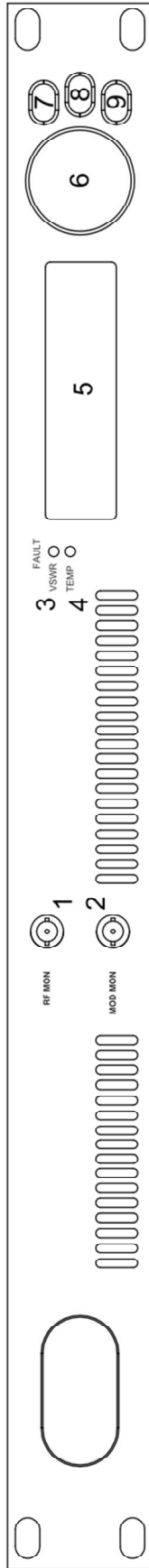
BW Broadcast Ltd is registered with Northern Compliance PCS number WEE/P3438PR/SCH and has been issued with WEE/FA0268RX as its unique producer ID by the appropriate environment agency. BW Broadcast Ltd full comply with it explicit responsibilities, subject to WEEE Collections Policy outlined in their General Terms and conditions of Sale, when it sells Electrical and Electronic Equipment (EEE) to B2B customers in the UK and EU.



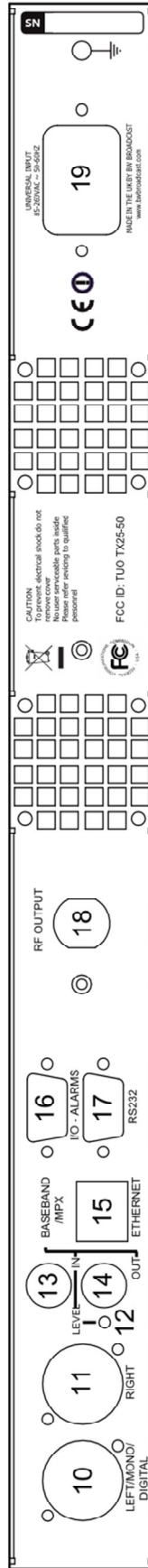
This appliance has been designed and manufactured with high quality materials and components that can be recycled and reused. Electronic appliances are liable to contain parts that are necessary in order for the system to work properly but which can become a health and environmental hazard if they are not handled and disposed of in the proper way. Consequently, please do not throw your inoperative appliance with the household waste. Having purchased this appliance it is your responsibility to dispose of this equipment appropriately.

Front and Rear Panels

Front Panel



Rear Panel

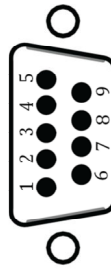


Front Panel

- 1 - RF Monitor
- 2 - Modulation Monitor
- 3 - VSWR Indicator LED
- 4 - Temp Indicator LED
- 5 - OLED Screen
- 6 - Control Wheel
- 7 - Back Button
- 8 - Help Button
- 9 - Menu Button

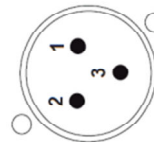
Rear Panel

- 10 - Analog Left/Digital Audio XLR Input
- 11 - Analog Right Audio XLR Input
- 12 - MPX Input Level Control
- 13 - MPX Input BNC
- 14 - MPX Output BNC
- 15 - Ethernet Jack
- 16 - Alarms/Trigger Port
- 17 - RS232/Serial Port
- 18 - RF Out Type N Connector
- 19 - IEC Mains Power Connector



I/O - Alarms

- 1 Ground
- 2 RF Mute
- 3 Alarm C
- 4 Trigger 2
- 5 Trigger 4
- 6 Alarm A
- 7 Alarm B
- 8 Trigger 1
- 9 Trigger 3

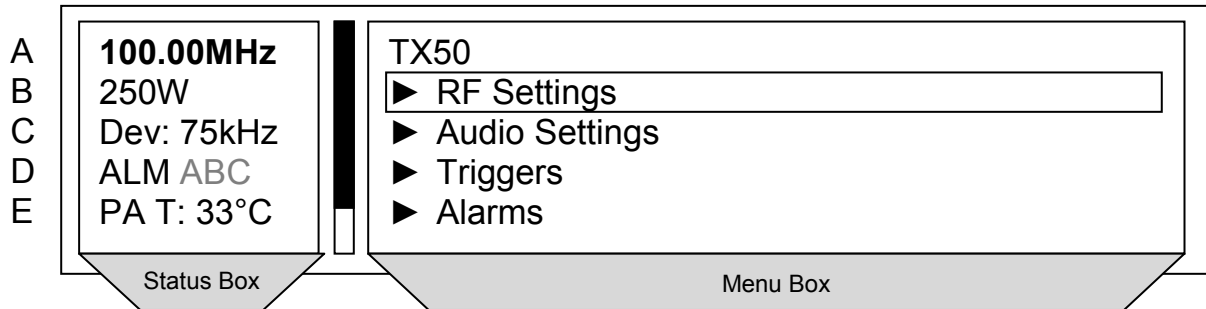


XLR Audio Connectors

- 1 Ground
- 2 Hot (+)
- 3 Cold (-)

For models with a power output of 150W and above, units are housed in 2 RU enclosures and some connectors may be in different locations. Always refer to the labels on the back of the device.

Display



Status Box

This section of the display gives real time information about the status of the transmitter

A - Frequency

The target frequency of the transmitter. When the transmitter is tuning to frequency on start-up, this will flash between full and half brightness, When the transmitter is locked, it will remain at full brightness

B - Power

The actual power of the transmitter. After the transmitter has locked on frequency, the power will ramp up to the set level. During this time the power display will flash between full and half brightness, When the power level is locked, it will remain at full brightness. If RF Mute is set either manually or automatically, this section displays "RF Mute".

C - Deviation

Shows the current peak FM deviation of the transmitter. If the deviation falls below 30kHz for 30 seconds the deviation display will flash.

D - Alarms

Indicating alarms which are set or triggered. The letters A-C indicate when an alarm is enabled and when an alarm is triggered. Each alarm has two states:

A - Greyed out - Alarm is enabled but not triggered.

A → A → **A** - Alarm is flashing - Alarm has been triggered.

For example:

Not Shown - No alarms set

ALM A - Only Alarm A is enabled

ALM ABC - All alarms are enabled

ALM ABC - Alarm A and alarm C are triggered, Alarm B is enabled

ALM ABC - All alarms are triggered.

An indication the alarms have been triggered will also be shown on the screensaver.

E - PA temperature/Power supply voltages

Displays the temperature of the Power Amplifier and the voltages of the Power amplifier power supply and of the auxiliary power supply:

PA T: 30°C - Power amplifier temperature, nominally around 50°C for an ambient temp. of 25°C

PA V: 30.6V - Voltage of power amplifier power supply, varies between 8V and 50V Dependent on power setting and model

AUX: 15.2V - Voltage of auxiliary power supply for the control system and exciter of the transmitter. Should be 15V ±0.3V

If FSK is enabled, this section will read FSK ACTIVE while the transmitter is keying as shown below:








Menu Box

This is the main section of the user interface. Navigate by rotating the control wheel and select a menu option by pushing it in. The top button (7) is the back button to move one level up in the menu structure. The middle button (8) is the help button and will give a brief description of the function of each menu item. The arrow in the menu (►) indicates the current item is a sub menu. A map of the entire menu system along with each item's help description is given in the appendix at the end of this document.

Meters

V2 Transmitters offer extensive metering with just a few clicks of the bottom menu button (9). Click the menu button to cycle through each of the 3 meters screens: RF Status, Audio Status and Config. Status. To leave the meters screen press the back button (7).

Config Status			
2013-05-19	10:05:35	Serial #:	8723
UP:	30 days,	10:05:37	Product Ver: 1.1
		FW Ver:	1.2.4
IP: 192.168.0.111		HW Ver:	1.0
HTTP Port: 80		AIO FW Ver:	1.0

Audio Status					
					Peak Dev: 75kHz
IN	AGC	LIM	OUT	MPX	Input: Analog
					Mode: Stereo

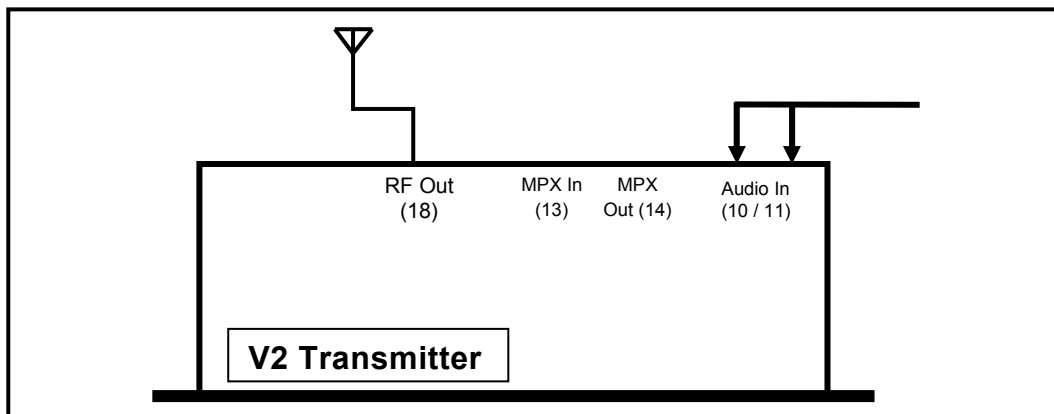
RF Status			
RF Mute:	No	Exciter Locked:	Yes
Set Power:	25W	PA Voltage:	18.9V
FWD Power:	24W	AUX Voltage:	15.1V
REV Power:	0W	PA Temp (C):	38

Basic Setup

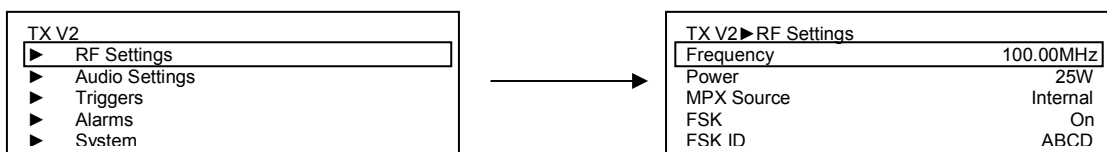
Quick Start

N.B. Never power on an FM transmitter without a suitable antenna or dummy load connected. The V2 Transmitter's protection circuitry will prevent any internal damage, but it is not advisable to run an FM transmitter without a load connected.

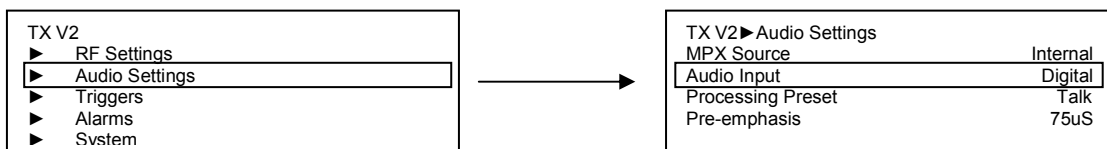
Setting up a V2 Transmitter couldn't be any easier. First connect either analogue audio to the left and right back panel connectors (10&11), digital audio AES/EBU into the left hand connector (10) or feed the MPX input (13) from an audio processor. Connect the RF output (18) to a 50Ω antenna of the correct power handling capability.



The transmitter's frequency and power are both set from the RF Settings menu:



Input selection, pre-emphasis, processing and the stereo parameters are set in the audio settings menu:



Input

Selects analog or digital input to the transmitter's built in stereo encoder/audio processor. For analog, connect to left and right XLR Inputs. For digital, connect an AES/EBU connection to the left hand XLR input.

Pre emphasis

Sets pre emphasis to off, 50µS (Europe/Japan) or 75µs (Americas).

Processing Preset

Selects the processing preset on the integrated 4-band DSPX audio processor.

Encoder

Selects the stereo generator mode, from either: Stereo, Mono L+R, Mono L, Mono R and Swap L + R.

MPX Source

Selects if the MPX source for the exciter is internal or external. If using the V2 transmitter with no external equipment (RDS, audio processor etc) then set to internal. If using any external equipment set to external. When set to internal, the MPX In and MPX Out connectors are internally connected, which routes the internal stereo generator directly to the exciter. When set to external, the internal stereo generator and audio processor is still functioning, but the MPX in and MPX out connections are not internally connected, allowing MPX signals to be routed to and/or from external equipment.

Examples of Use

In the following section, four standard usage setups are described.

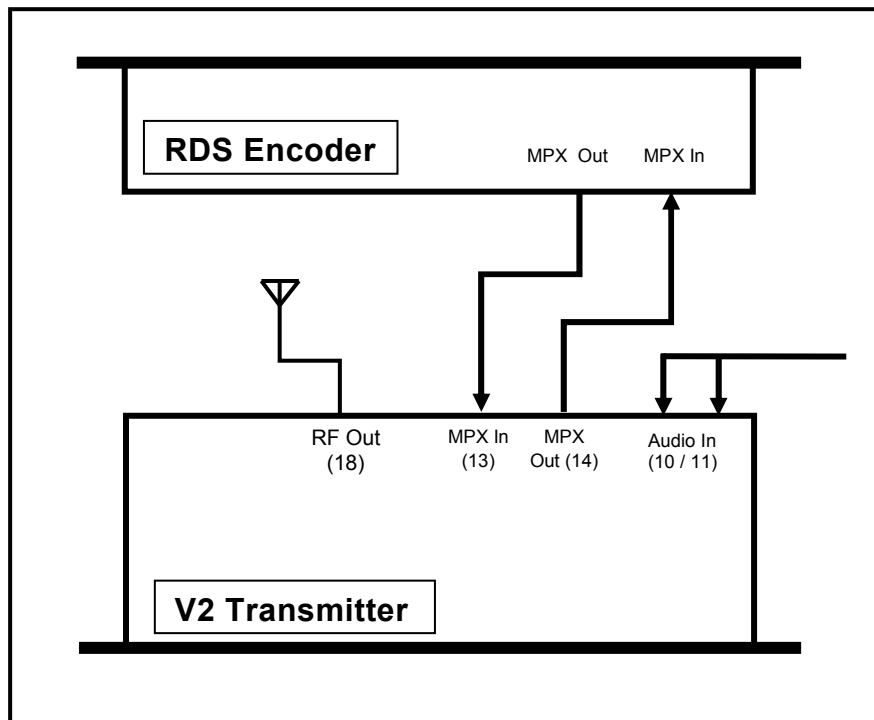
If using an external RDS encoder, see section 1: V2 Transmitter with RDS unit

If using an external audio processor, see section 2: V2 Transmitter with audio processor

If using both an RDS encoder and an audio processor without 19k Pilot out and SCA In, see section 3: V2 Transmitter with audio processor and RDS encoder (In Line Connection)

If using both an RDS encoder and an audio processor with 19k Pilot out and SCA In, see section 4: V2 Transmitter with audio processor and RDS encoder (Side Chain Connection)

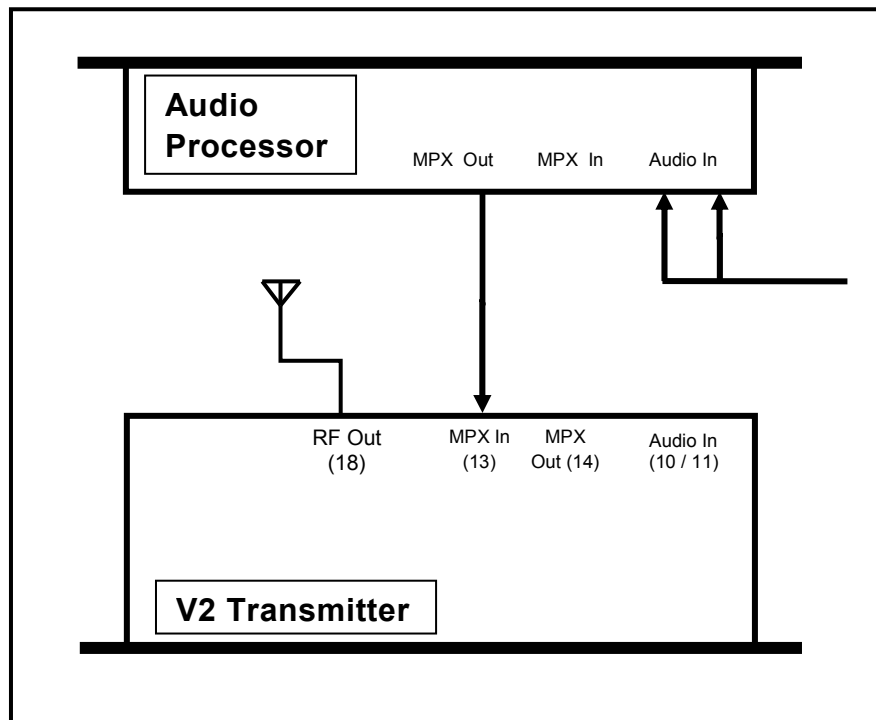
1. V2 Transmitter with an external RDS encoder and internal audio processing



1. Place a transmitter in a well ventilated space.
2. Connect the antenna to the RF output connector on the back of the transmitter.
3. Connect the left and right program audio signals to the XLR input connectors on the back of the transmitter. If using AES/EBU digital, connect this to the left audio input XLR connector.
4. Connect the Baseband/MPX output on the back of the transmitter to the MPX input of the RDS encoder.
5. Connect the MPX output of the RDS encoder to the MPX input on the back of the transmitter.
6. Plug the power cord into the power supply module on the rear panel of the transmitter.
7. In the audio settings menu, select the input source (analog/digital) and set MPX source to external.
8. Once the transmitter is operating, set the correct carrier frequency and RF power from the RF settings menu. Check reflected power is OK.
9. Check the documentation that came with your RDS encoder on how to set/check the proper RDS injection level.

In this setup, the stereo multiplex signal is generated by the transmitter. It is then fed into the RDS encoder, where it is combined with the RDS signal. This is then fed back into the exciter of the transmitter.

2. V2 Transmitter with an external audio processor

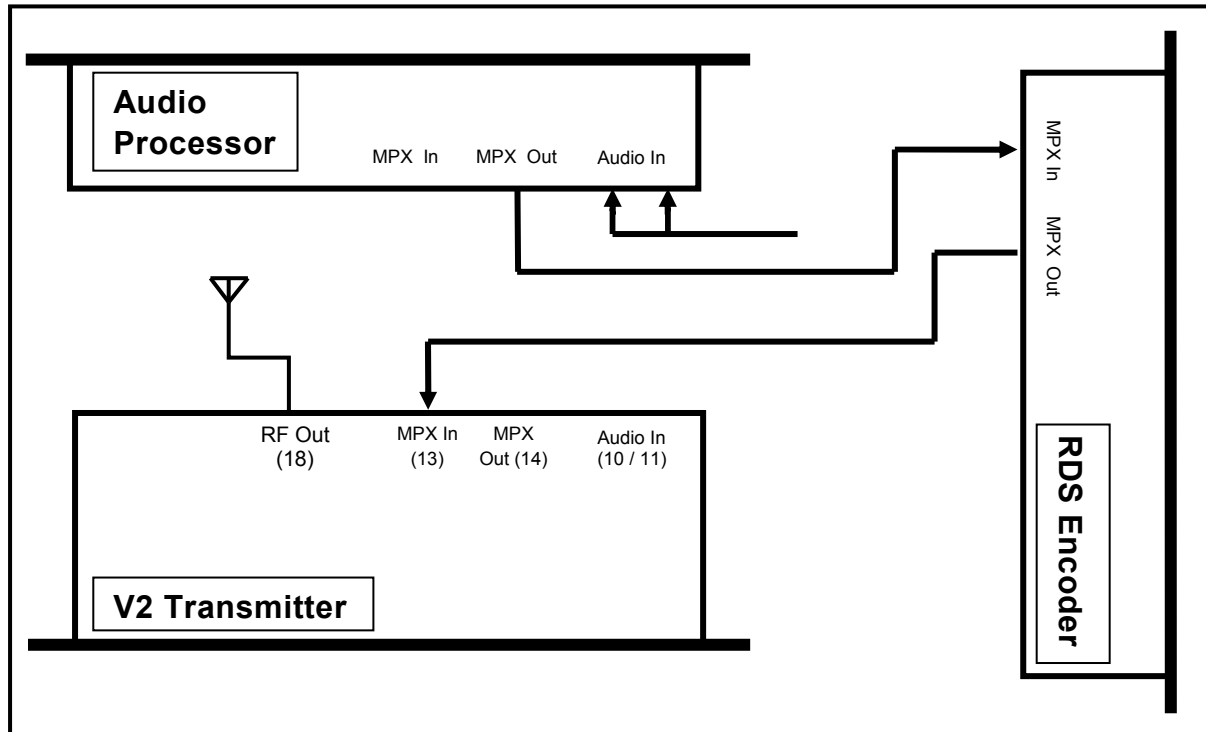


1. Place a transmitter in a well ventilated space.
2. Connect the antenna to the RF output connector on the back of the transmitter.
3. Connect the MPX output of your audio processor (or stereo generator) to the MPX input on the back of the transmitter.
4. Plug the power cord into the power supply module on the rear panel of the transmitter.
5. In the RF settings menu, set MPX source to external.
6. Once the transmitter is operating, set the correct carrier frequency and RF power from the RF settings menu. Check reflected power is OK.
7. Check the modulation level - if the modulation level is low, adjust the MPX output level on your audio processor (or stereo generator) and/or the MPX input level on the back of the transmitter. The maximum modulation should not exceed 75kHz.
8. Check the documentation that came with your audio processor on how to set/check the proper pilot injection level.

In this setup, the stereo multiplex is generated by an external stereo generator and is fed directly into the transmitter exciter of the transmitter stage. Note that the transmitter's onboard processing will have no effect on the signal in this configuration.

3. V2 Transmitter with an external audio processor and RDS

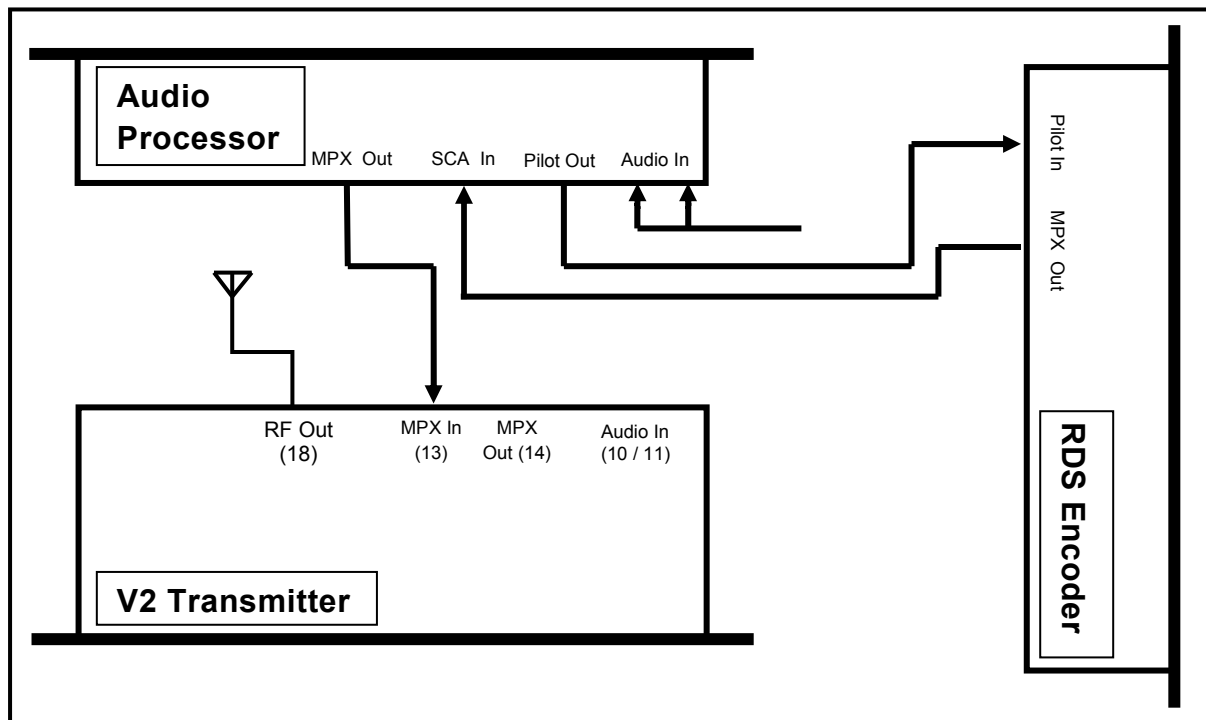
(In Line Connection)



1. Place a transmitter in a well ventilated space.
2. Connect the antenna to the RF output connector on the back of the transmitter.
3. Connect the MPX output of your audio processor (or stereo generator) to the MPX input of your RDS encoder.
4. Connect the MPX output of your RDS encoder to the MPX input on the back of the transmitter.
5. Plug the power cord into the power supply module on the rear panel of the transmitter.
6. In the RF settings menu, set MPX source to external.
7. Once the transmitter is operating, set the correct carrier frequency and power from the RF settings menu. Check reflected power is OK.
8. Check the modulation level - if the modulation level is low, adjust the MPX output level on your audio processor (or stereo generator), RDS encoder and/or the MPX input level on the back of the transmitter. The maximum modulation should not exceed 75kHz.
9. Check the documentation that came with your audio processor on how to set/check the proper pilot injection level.
10. Check the documentation that came with your RDS encoder on how to set/check the proper RDS injection level.

In this setup, the stereo multiplex is generated in the audio processor, it is then fed through the RDS encoder where the RDS subcarrier is added. It is then fed directly into the transmitter's exciter. Note that the transmitter's onboard processing will have no effect on the signal in this configuration.

4. V2 Transmitter with an external audio processor and RDS (Side Chain Connection)

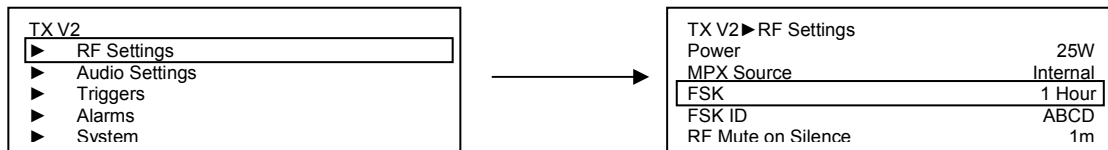


1. Place a transmitter in a well ventilated space
2. Connect the antenna to the RF output connector on the back of the transmitter.
3. Connect the MPX output of your audio processor (or stereo generator) to the MPX input on the back of the transmitter.
4. Connect the Pilot output of your audio processor (or stereo generator) to the pilot/reference input on your RDS encoder.
5. Connect the MPX output of your RDS encoder to the SCA input on your audio processor.
6. Plug the power cord into the power supply module on the rear panel of the transmitter.
7. Once the transmitter is operating, set the correct carrier frequency and power from the RF settings menu. Check reflected power is OK.
8. In the RF settings menu, set MPX source to external.
9. Check the modulation level - if the modulation level is low, adjust the MPX output level on your audio processor (or stereo generator) and/or the MPX input level on the back of the transmitter. The maximum modulation should not exceed 75kHz.
10. Check the documentation that came with your audio processor on how to set/check the proper pilot injection level.
11. Check the documentation that came with your RDS encoder on how to set/check the proper RDS injection level.

In this setup, the audio stereo multiplex is generated in the audio processor. The RDS data is fed into the audio processor where it is combined with the audio multiplex. This combined signal is fed directly into the transmitter exciter. Note that the transmitter's onboard processing will have no effect on the signal in this configuration. This is the best connection in terms of pilot and RDS subcarrier phase synchronization and MPX spectrum cleanliness.

FSK Keyer (Translators)

V2 Transmitters support automatic station identification using frequency shift keying (FSK). FSK sends a user defined ID for the transmitter using Morse code by shifting the carrier frequency up by 12.5kHz at 20 words per minute. FSK parameters are set in the RF Settings menu:



Set the FSK ID by scrolling through the characters using the control wheel (6), save each character by clicking the control wheel (6) and save the whole ID with the middle button (8). To cancel, press the back button (7).

Audio Processing

BW Broadcast's range of award winning DSPX audio processors have become known for their features, performance and value for money. Integrated within all V2 Transmitters is the 4-band DSPXmini. The 14 available factory presets are selectable from either the front panel or the various remote control options. The processing is bypassed when using an external MPX input to allow for more control when using an external processor. To set a new preset navigate to:

Audio settings → Processing Preset

Each processing preset is loaded live as the user scrolls through the menu allowing for easy comparison between the different presets.

A dedicated metering screen indicates the input levels, 4 band automatic gain control and limiters, along with audio level and MPX level meters.

Remote Control

V2 Transmitters offer many options for remote monitoring and control. All parameters available on the front panel are available remotely.

- HTTP
- RS232/Serial
- Telnet
- SNMP
- Automatic Email Alerts

Ethernet Settings

The V2 Transmitters have a built in web server which can monitor and control all transmitter parameters remotely without the need to install any software. The unit can use either static or dynamic IP addressing. All Ethernet parameters are set in

System → Ethernet

Here, IP address, Subnet mask, Gateway and two DNS addresses can be assigned for static control, or DHCP can be enabled for dynamic IP control.

Security

Telnet and http connections are protected by a password. By default user name is **admin** and the password is **pass**.

It is **strongly recommended** that the user changes this before connecting the device to an Ethernet connection. If a factory reset is performed on the device, the password will be reset to the default value of **pass**. The password is set in:

System → Users

Serial/RS232

To connect to the unit via RS232 connection, connect a standard serial cable between the transmitter and the PC, and use the following settings for the COM port:

- Baud rate - 19200bps
- Data Bits - 8
- Parity - None
- Stop Bits - 1
- Flow Control - Hardware

Once connected the following commands are available:

Command	Description
help	Displays help message
get	Gets a parameter
set	Sets a parameter
reboot	Reboots the unit
factoryReset	Restores all settings to factory default except for Ethernet settings

help

This command (without any arguments) displays a list of the commands the unit understands.

help < parameter_id >

This command displays a short description of the requested parameter. e.g.

```
TX V2> help transmitter.power
transmitter.power: Sets the output power level in watts. This parameter accepts
values from 0 to 600.
```

get < parameter_id >

This command returns the current value of the parameter requested. e.g.

```
TX V2> get transmitter.frequency
98.00MHz
```

set < parameter_id > < parameter_value >

This command sets the parameter requested to the value specified. e.g.

```
TX V2> set transmitter.power 150
OK
```

reboot

This command reboots the unit.

Please note - there will be no confirmation stage, if you send this command the unit will reboot immediately, taking your transmitter temporarily off-air.

factoryReset

This command resets all values to their default apart from the Ethernet settings of the unit.

Please note - there will be no confirmation stage, if you send this command the unit will revert all settings to factory defaults which may result in a temporary loss of signal.

All available parameters are listed in the appendix

Telnet

For text based access via a local network or the internet, Telnet can be used to connect to the unit.

On the unit, navigate to

System → Telnet

Ensure enable is set to enabled, and note the port number (23 by default).

Connect to a unit using a standard telnet client.

The IP address of the unit can be found either in the System → Ethernet menu or on the Config meters screen.

Once connected, the unit can be controlled using the same commands as RS232/Serial.

Telnet is password protected, but as with most terminal systems, no indication is given that characters have been accepted. Type the user name and password (default **admin** and **pass**) and press enter to log on to the unit.

HTTP

V2 Transmitters provide a graphical web based interface for ease of use and control. This can be accessed by navigating to the IP address of the unit in any standard web browser. After entering the login details for the unit, the user can then read and write all parameters and also perform firmware upgrades. All parameters are saved and updated dynamically as they are changed in the remote.

Email Alerts

V2 Transmitters allow the sending of emails to provide notification of an alarm or external trigger being activated. The transmitter can either send emails via a user defined SMTP server or an SMTP server hosted by BW Broadcast.

To send email, the V2 Transmitter needs to be configured with your SMTP server details:

1. Navigate to System → Email.
2.
 - a. If using your own SMTP server, set the Host and Port to that of the network SMTP server. Set the From, Username and Password fields to that of the email account to be used as the sender. Set the recipient or recipients for the emails. If sending to multiple email addresses, separate with a comma. If the SMTP server requires no authentication the Username and Password fields must be left blank. The user can set the maximum number of emails sent per day, and see the total number of emails sent so far today. If the limit is reached, the V2 Transmitter will send an email informing the user.
 - b. If you do not have access to an SMTP server, emails can be sent via a SMTP server hosted by BW Broadcast. To select this option use

send via → BW Broadcast

3. To test the server settings, navigate to

Test → Recipients

and enter the appropriate email address. Select Test and select Yes.

Once the SMTP server settings have been entered the email setting must be activated on the Alarm and Trigger menus for the V2 Transmitter to send emails on Alarm and Trigger events.

For alarms:

Alarms → Alarm [A-C] → Send e-mail **Yes**.

For triggers:

Triggers → Trigger [1-4] → Send e-mail **Yes**.

In Field Software Upgrade

V2 Transmitters support the ability to upgrade the control software in the field using the HTTP remote. Software Upgrade files can be downloaded from <http://www.bwbroadcast.com/downloads>.

To perform a software upgrade:

1. Log into the V2 Transmitter using the HTTP web remote.
2. Click System settings on the sidebar
3. Click Upload Firmware
4. Click Browse and navigate to the upgrade .bin file on the PC
5. Click Open
6. Click Upload

Alarms and Triggers

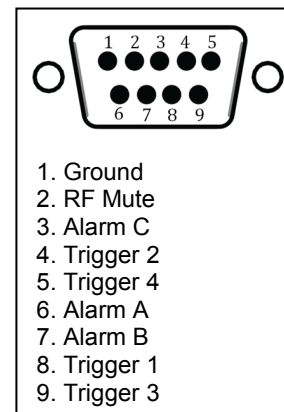
V2 Transmitters have a comprehensive monitoring and control system consisting of 3 alarms and 4 triggers. Pin 2 of the connector is hardwired to RF mute. Connecting this pin to ground will mute the transmitter. The alarms and triggers port can also be used to control the unit through a telemetry interface system.

Alarms

Alarms on the V2 Transmitter give an indication when a certain condition is met. They can be set to trigger on Modulation level, Forward power, Reverse power and PLL lock fail. Upon triggering they will toggle the relevant pin on the rear alarms and trigger connector. They will also write a notification to the RS232 and will also write to the system log.

To set an alarm:

1. Navigate to Alarms in the Main Menu
2. Select the appropriate alarm you wish to set (A-C)
3. Set Type to "Alarm"
4. Set the parameters for the alarm
 - a. Select the parameter you wish to trigger the alarm on, the available parameters are Modulation level, Forward power, Reverse power and PLL lock fail.
 - b. If Modulation level, Forward power or Reverse power are selected, set the threshold value for the alarm to trigger.
 - c. Set the pin polarity which selects whether the output pin on the rear connector is active high or active low.
 - d. Set the on/off delays which set how long the error condition must occur for before an alarm is triggered and how long the error condition must have stopped for before an alarm is un-triggered. Setting a short on delay combined with a long off delay will cause the alarm to trigger and stay high if there is an intermittent fault.
 - e. Select if the unit will send an email when the alarm is triggered. Information on email settings can be found in the Email section of the System menu.



Alarms as Analog Outputs

Alarms can be configured to report status parameters as analog voltages on the alarms pins. This setup is typically used to connect the unit to remote control equipment (also known as telemetry interfaces).

To set an alarm as analog output:

1. Navigate to Alarms in the Main Menu
2. Select the appropriate alarm you wish to set (A-C)
3. Set Type to "Analog Out"
4. In source, select the parameter that you wish to report as an analog voltage on the alarm pin

Use the following equation to translate voltage levels into parameter values:

$$\text{CurrentValue} = \frac{V_{\text{Out}} * 1.2 * \text{NominalValue}}{5}$$

Where:

“*VOut*” is the voltage on the pin in Volts

“*NominalValue*” is defined in the following table:

Parameter	NominalValue
FWD Power	For TX50 = 50 Watts For TX150 = 150 Watts ...
REV Power	Same as FWD Power
PA Volts	For TX5 = 15 Volts For TX25 = 24 Volts For TX50 = 24 Volts For TX150 or greater = 48 Volts
Aux Volts	15 Volts
Peak Mod	100 kHz
PA Temp	100 °C
*RF Mute	*This parameter does not use the above equation. Its representation is: If RF Mute = On, VOut = 5 volts If RF Mute = Off, VOut = 0 Volts

For example, if the measured Voltage level is 4.166 Volts on a TX50 reporting Forward Power, the actual current value will be:

$$\text{Power (watts)} = \frac{4.166 * 1.2 * 50}{5} = 49.992 \text{ Watts (Aprox. 50 Watts)}$$

Triggers

Triggers are used to control certain parameters on the V2 Transmitter using the relevant pins on the rear alarms and triggers connector. To fire a trigger, the pin is pulled low. If multiple triggers are fired the lowest number gets priority i.e. 1 = highest priority, 4 = lowest priority.

1. Navigate to Triggers in the Main Menu
2. Select the appropriate trigger you wish to set (1-4)
3. Set the parameters for the alarm
 - a. Enable the trigger in the menu
 - b. Set the parameter you wish to change using the trigger
 - c. Select if an email is sent when the trigger is fired
 - d. Set the message to be sent in the email when the trigger is fired.

Pin 2 of the alarms and triggers connector is hard wired to the RF Mute on the transmitter. When this pin is pulled low, the V2 Transmitter will mute the RF output.

Logging

V2 Transmitters have three methods of logging, regardless of the log location, the format is the same.

V2 Transmitters will output a list of important parameter all meter settings and alarm & trigger statuses 2 minutes after a parameter change and then at hourly intervals. These can be either received via RS232, UDP or saved to a file on the device. Each method can be enabled or disabled in the system → Log menu.

To access the logging via RS232, simply connect the device using the instructions for the RS232 remote and ensure RS232 logging is enabled in

System → Log → RS232 **Enabled**

Similarly for file logging

System → Log → File **Enabled**

To access via UDP, again ensure that UDP logging is enabled and all settings are correct in

System → Log → UDP

To access the file log, first the user must log into the device using the http remote, and then navigate to `http://[IP address of TX V2]/TX V2.log` (e.g. `http://192.168.0.131/TX V2.log`). A new log file is created every 24 hours and all files are kept for 31 days. To access a previous days log file, use `http://[IP address of TX V2]/TX V2.log.[n]` where [n] is the number of days since the log file, e.g.

`http://192.168.0.131/TX V2.log.1` is yesterday

`http://192.168.0.131/TX V2.log.2` is two days ago

`http://192.168.0.131/TX V2.log.7` is one week ago

An example section from a log file is shown below:

```
2013-04-22 11:40:06
  DTLG > M: exciter_locked = 1
  DTLG > M: peak_deviation = 75k
  DTLG > M: fwd_power = 250
  DTLG > M: rev_power = 3
  DTLG > M: pa_voltage = 30.1
  DTLG > M: aux_voltage = 15.1
  DTLG > M: pa_temp = 30.0
  DTLG > M: cpu_temp = 25.0
  DTLG > M: tx_input_1 = -38.997
```

```
DTLG > M: tx_input_r = -38.997
DTLG > M: agc1 = 0m
DTLG > M: agc2 = 0m
DTLG > M: agc3 = 0m
DTLG > M: agc4 = 0m
DTLG > M: lim1 = -5997m
DTLG > M: lim2 = -5997m
DTLG > M: lim3 = -5997m
DTLG > M: lim4 = -5997m
DTLG > M: tx_output_l = -14.000
DTLG > M: tx_output_r = -14.000
DTLG > M: tx_output_mpx = 0m
DTLG > P: transmitter.frequency = 98.00MHz
DTLG > Alarm status [3-0]: Off Off On Off
DTLG > Trigger status [3-0]: On On On On
```

Menu Map

- **RF Settings**
 - **Frequency** Sets the transmission frequency. This parameter accepts values from 87500000 to 108000000.
 - **Power** Sets the output power level in watts. This parameter accepts values from 0 to 3000.
 - **MPX Source** Selects the source for the exciter. - Internal: selects internal generator. - External: selects MPX BNC input.
 - **FSK** Sets interval between FSK messages.
 - **FSK ID** Sets the FSK text. This will be converted into Morse code. Accepts text of up to 16 characters.
 - **RF Mute on Silence** Selects the time after which the transmitter's output will be muted if the input fails.
 - **RF Mute (Manual)** Manually mutes the transmitter.
- **Audio Settings**
 - **MPX Source** Selects the source for the exciter. - Internal: selects internal generator. - External: selects MPX BNC input.
 - **Audio Input** Selects the input source.
 - **Processing Preset** Loads the audio processing preset.
 - **Pre-emphasis** Sets the pre-emphasis.
 - **Audio Mode** Selects mono or stereo.
- **Triggers**
 - **Trigger [1-4]**
 - **Enable** Enables/disables the trigger.
 - **Action** Determines the action performed upon trigger.
 - **Send e-mail** Selects if an e-mail will be sent when the alarm state changes.
 - **(ON) Message** Sets the message that will be sent when the Trigger changes to ON. Accepts text of up to 300 characters.
- **Alarms**
 - **Alarm [A-C]**
 - **Source** Selects which detector is the source for the alarm. Options are Modulation, Fwd Power, Rev Power and PLL lock fail.
 - **Modulation Threshold** Selects the threshold at which the modulation level alarm will be activated. This parameter accepts values from 1000 to 100000.
 - **Fwd Power Threshold / Rev Power Threshold** Sets the threshold at which the forward power alarm will be activated. This parameter accepts values from 0 to 2000.
 - **Pin Polarity** Selects whether the output is active high or active low.
 - **On Delay** Sets how long the error condition must occur for before an alarm is triggered. This parameter accepts values from 2 to 600.
 - **Off Delay** Sets how long the error condition must have stopped for before an alarm is un-triggered. This parameter accepts values from 2 to 600.
 - **Send e-mail** Selects if an e-mail will be sent when the alarm state changes.
- **System**
 - **Date** Sets the date of the Real Time Clock. Accepts date in format dd/mm/yy.
 - **Time** Sets the time of the Real Time Clock. Accepts time in format hh:mm.
 - **Uptime** Reports the uptime of the unit (i.e. how long has it been powered on for). Accepts text of up to 20 characters.
 - **Location** The physical location of this device (e.g., 'telephone closet, 3rd floor'). Accepts text of up to 64 characters.
 - **Contact** The contact details for the person who manages this device. Accepts text of up to 64 characters.
 - **Screen Saver** This allows the time-out before the screensaver starts to be adjusted between 15s and 30 minutes.
 - **Screen Lock** Enables/disables the screen lock code.
 - **Screen Lock Code** Sets the screen lock code. Accepts text of up to 8 characters.
 - **Users**
 - **Username** The username for the remote login. Accepts text of up to 15 characters.
 - **Password** The password for the remote login. Accepts text of up to 15 characters.
 - **Ethernet**
 - **DHCP** Sets whether the Ethernet is configured manually or by DHCP.
 - **DHCP IP** Reads back the DHCP IP address. Accepts IPv4 address in the form 123.456.789.123.
 - **DHCP SM** Reads back the DHCP subnet mask. Accepts IPv4 address in the form 123.456.789.123.
 - **DHCP GW** Reads back the DHCP gateway. Accepts IPv4 address in the form 123.456.789.123.

- **DHCP DNS 1** Reads back the DHCP Primary DNS server. Accepts IPv4 address in the form 123.456.789.123.
- **DHCP DNS 2** Reads back the DHCP Secondary DNS server. Accepts IPv4 address in the form 123.456.789.123.
- **Static IP** Sets the manual IP address. Accepts IPv4 address in the form 123.456.789.123.
- **Static SM** Sets the manual subnet mask. Accepts IPv4 address in the form 123.456.789.123.
- **Static GW** Sets the manual gateway. Accepts IPv4 address in the form 123.456.789.123.
- **Static DNS 1** Sets the manual Primary DNS server. Accepts IPv4 address in the form 123.456.789.123.
- **Static DNS 2** Sets the manual secondary DNS server. Accepts IPv4 address in the form 123.456.789.123.
- **MAC** Reads back the Ethernet MAC address.
- **E-Mail**
 - **Test**
 - **Test** Sends a test e-mail.
 - **Recipient(s)** Sets who the test email will be sent to. Multiple addresses must be separated by commas. Accepts text of up to 99 characters.
 - **Send via** Sets the method used for sending emails. For simplicity, choose BW Broadcast.
 - **From** Sets the email address of the sender. The unit will send e-mails through this address. Accepts text of up to 64 characters.
 - **Recipient(s)** Sets the recipients of the emails. Multiple addresses must be separated by commas. Accepts text of up to 99 characters.
 - **Host** Sets the IP address of the SMTP server. Accepts text of up to 64 characters.
 - **Port** Sets the port number of the SMTP server. This parameter accepts values from 1 to 1024.
 - **Username** Sets the username for SMTP authentication. Must be left blank if no authentication is required. Accepts text of up to 64 characters.
 - **Password** Sets the password for SMTP authentication. Must be left blank if no authentication is required. Accepts text of up to 64 characters.
 - **Max emails a day** Sets the maximum number of emails allowed to be sent by the unit in a single day. This parameter accepts values from 1 to 1000.
 - **Emails sent today** Reports the number of emails sent today. This parameter accepts values from 0 to 100000.
- **HTTP**
 - **Enable** Enables/disables the web server.
 - **Port** Sets the webserver TCP port. Disable HTTP to change. This parameter accepts values from 1 to 1024.
- **Telnet**
 - **Enable** Enables/disables the telnet server.
 - **Port** Sets the telnet TCP port. Disable Telnet to change. This parameter accepts values from 1 to 1024.
- **RS232**
 - **Enable** Enables/disables the RS232 remote.
 - **Baud rate** Sets the RS232 baud rate.
- **Log**
 - **RS232** Enables/disables logging to RS232.
 - **File** Enables/disables logging to file.
 - **UDP**
 - **Enable** Enables/disables logging messages to a remote UDP logging/syslog server.
 - **IP** Sets the IP address where the log messages should be sent via UDP. Accepts IPv4 address in the form 123.456.789.123.
 - **Port** Sets the port where the log messages should be sent via UDP. Disable UDP to change. This parameter accepts values from 1 to 10000.
- **About**
 - **Serial Number** Reads back serial number.
 - **Product Version** Reads back the product version.
 - **Hardware Version** Reads back the hardware version.
 - **Software Version** Reads back the software version.
 - **Control Version** Reads back the control board version.
 - **AIO FW Version** Reads back the AIO board firmware version.
- **Reboot** Reboots the unit.
- **Factory Reset** Performs a factory reset. All user presets will be lost.

Full Parameter List

- **RF Settings**
 - **Frequency** transmitter.frequency
 - **Power** transmitter.power
 - **MPX Source** mpx.source
 - **FSK** transmitter.fsk_interval
 - **FSK ID** transmitter.fsk_id
 - **RF Mute on Silence** transmitter.rf_mute.timeout
 - **RF Mute (Manual)** transmitter.rf_mute.manual_enable
- **Audio Settings**
 - **MPX Source** mpx.source
 - **Audio Input** audio.input
 - **Processing Preset** audio.processing_preset
 - **Pre-emphasis** audio.preemphasis
 - **Audio Mode** audio.stereo
- **Triggers**
 - **Trigger [n = 1-4]**
 - **Enable** trigger[n].active
 - **Action** trigger[n].action
 - **Send e-mail** trigger[n].email.active
 - **(ON) Message** trigger[n].message.on
- **Alarms**
 - **Alarm [n = A-C]**
 - **Source** alarm[n].source
 - **Modulation Threshold** alarm[n].modulation_threshold
 - **Fwd Power Threshold** alarm[n].fwd_power_threshold
 - **Rev Power Threshold** alarm[n].rev_power_threshold
 - **Pin Polarity** alarm[n].polarity
 - **On Delay** alarm[n].on_delay
 - **Off Delay** alarm[n].off_delay
 - **Send e-mail** alarm[n].email.active
- **System**
 - **Date** system.date
 - **Time** system.time
 - **Uptime** system.uptime
 - **Location** system.location
 - **Contact** system.contact
 - **Screen Saver** system.screen.timeout
 - **Screen Lock** system.screen.lock.enabled
 - **Screen Lock Code** system.screen.lock.code
 - **Users**
 - **Username** system.username.admin
 - **Password** system.password.admin
 - **Ethernet**
 - **DHCP** system.ethernet.dhcp
 - **DHCP IP** system.ethernet.dhcp.ip
 - **DHCP SM** system.ethernet.dhcp.sm
 - **DHCP GW** system.ethernet.dhcp.gw
 - **DHCP DNS 1** system.ethernet.dhcp.dns[1]
 - **DHCP DNS 2** system.ethernet.dhcp.dns[2]
 - **Static IP** system.ethernet.static.ip
 - **Static SM** system.ethernet.static.sm
 - **Static GW** system.ethernet.static.gw
 - **Static DNS 1** system.ethernet.static.dns[1]
 - **Static DNS 2** system.ethernet.static.dns[2]
 - **MAC** system.ethernet.mac
 - **E-Mail**
 - **Test**
 - **Test** email.test.send
 - **Recipient(s)** email.test.recipient
 - **Send via** email.method
 - **From** email.from
 - **Recipient(s)** email.recipient
 - **Host** smtp.host
 - **Port** smtp.port

- **Username** smtp.username
- **Password** smtp.password
- **Max emails a day** email.limit.daily
- **Emails sent today** email.counter.today
- **HTTP**
 - **Enable** system.httptd.active
 - **Port** system.httptd.port
- **Telnet**
 - **Enable** system.telnetd.active
 - **Port** system.telnetd.port
- **RS232**
 - **Enable** system.rs232d.active
 - **Baud rate** system.rs232d.baud
- **Log**
 - **RS232** system.logging.rs232.active
 - **File** system.logging.file.active
 - **UDP**
 - **Enable** system.logging.udp.active
 - **IP** system.logging.udp.ip
 - **Port** system.logging.udp.port
- **About**
 - **Serial Number** system.serial_number
 - **Product Version** system.product.version
 - **Hardware Version** system.hardware.version
 - **Software Version** system.software.version
 - **Control Version** system.control.version
 - **AIO FW Version** system.aio_fw.version
- **Reboot** system.reboot
- **Factory Reset** system.factory_reset

Specifications

Common Specifications For All Models

RF

Harmonics	better than -75 dBc
Spurious	< -90 dBc
Frequency range	87.5 - 108 MHz
Frequency steps	50 kHz
Frequency selection	User interface with display or web remote control
Frequency control type	Dual speed phase locked loop
Frequency stability	< +/- 500 Hz (fine adjustment available)
MPX input	BNC
MPX input level	MPX input level -10 dB to +10 dB (adjustable)
MPX input response	MPX input response +/- 0.3 dB, 5 Hz to 100 kHz
Modulation	Direct frequency modulation
Synchronous AM Noise	0.31% (at normal deviation)
Asynchronous AM Noise	0.18% (at centre frequency of 97.7MHz)

STEREO

Subcarrier generation	Microprocessor generated 8x over-sampled
Pilot	19 kHz +/- 1 Hz (adjustable)
Pilot generation	Microprocessor generated 16x over-sampled
Output level	+6dBu (BNC)
15 kHz filtering	≥ 80dB at 19 kHz (DSP based)
Overshoot filter clipping	DSP based
Spurious	
> 80 kHz	> -60dB
>160 kHz	> -80dB
Stereo separation	> 50dB (20Hz-15kHz)

LIMITER

Audio input levels	-10dB to +24dB for level control, DSP auto leveling
Audio input connectors	XLR balanced (RF shielded)
Input cmrr	> 60dB
Audio distortion	<0.05% at limiting 1 KHz (bypass preset)
Frequency response	20 Hz to 20 kHz +/- 0.5dB (pre-emphasis off)
Processing range	Processing control range 40dB (pre-emphasis off)
Input impedance	10 kOhm
Pre-emphasis	50 μs, 75 μs and 0 μs (off)
Process modes	Multiple presets

OTHER

User interface	3 buttons, rotary encoder and 256x64 graphics display
External control/monitor	I/O Alarms D9-type Male; RS232 D9-Type Female, Telnet and Web remote RJ45 Ethernet

Model Dependent Specifications**TX5****RF**

Power	0.05W-5.4W continuous
Connector	N-type 50 Ohm

Other

Size	482mm x 305mm x 45mm
Weight	2 kg
Voltage input	100 - 240 VAC
Current input	0.5A max
Power connector	IEC
Switched mode approvals	UL / TUV / CE
Power consumption	54W average
AC efficiency	>10%

TX50**RF**

Power	5.4W-53.5W continuous
Connector	N-type 50 Ohm

Other

Size	482mm x 305mm x 45mm
Weight	4.8 kg
Voltage input	100 - 240 VAC
Current input	1.3A max
Power connector	IEC
Switched mode approvals	UL / TUV / CE
Power consumption	133W average
AC efficiency	>40%

TX300**RF**

Power	30W-330W continuous
Connector	N-type 50 Ohm

Other

Size	485mm x 340mm x 90mm
Weight	6.8kg
Voltage input	100 - 265 VAC
Current input	4.6A max
Power connector	IEC
Switched mode approvals	UL / TUV / CE
Power consumption	460W average
AC efficiency	>65%

TX600**RF**

Power	60.5W-648W continuous
Connector	N-type 50 Ohm

Other

Size	485mm x 340mm x 90mm
Weight	9.3kg
Voltage input	100 - 265 VAC
Current input	9.2A max
Power connector	IEC
Switched mode approvals	UL / TUV / CE
Power consumption	920W average
AC efficiency	>65%

TX1000**RF**

Power	152W-1170W continuous
Connector	7/16 50 Ohm

Other

Size	490mm x 510mm x 95mm
Weight	13.4kg
Voltage input	100 - 265 VAC
Current input	15.3A max
Power connector	C19
Switched mode approvals	UL / TUV / CE
Power consumption	1530W average
AC efficiency	>65%

TX1500**RF**

Power	162W-1605W continuous
Connector	7/16 50 Ohm

Other

Size	490mm x 510mm x 95mm
Weight	13.4kg
Voltage input	100 - 265 VAC
Current input	23A max
Power connector	C19
Switched mode approvals	UL / TUV / CE
Power consumption	2300W average
AC efficiency	>65%