



User Manual

FMTX100RBRX

Transmitter with integrated Baseband (multiplex)
PLL 87.7 – 108 MHz Rebroadcast Receiver



WARNING!

This Transmitter is capable of generating extremely high RF potential. Touching internal parts, or the connected antenna system, will cause serious RF burns. Antenna systems should be installed such that exposure by any person to RF fields cannot exceed safe limits. The permitted limits vary from country to country. Expert advice should be sought about the safe installation of this transmission system.



RISK OF FIRE!

RF (Radio Frequency) energy could cause ignition of combustible surfaces during fault conditions. Installation should be left to qualified personnel. RF can cause burns to skin. Ensure antenna systems and feeder cables are not situated near, or could fall onto, any combustible surface.



WARNING!

Never operate this device without a suitable 50 ohm load connected to the RF OUTPUT socket, or without a suitably installed and matched antenna system connected. Although the output of this transmitter is protected against antenna load faults, MIS-OPERATION MAY RESULT IN DAMAGE NOT COVERED BY ANY WARRANTY.



IMPORTANT!

Correct operation of the cooling fans in this product is vital to reliable continuous operation. Schedule bi-annual maintenance checks. We strongly advise the use of a standby transmitter system for use during maintenance events or fault conditions, to prevent prolonged breaks in transmission.



IMPORTANT!

When cycling the power off, then on, ensure that the transmitter is off for at least 10 seconds before re-applying power, to allow the internal circuits time to fully reset. Failure to do so may result in no RF output (PLL failsafe mode).

Consideration should be given to fitting a suitably rated UPS if power interruptions are likely. Similarly, telemetry reset of power may be advisable for transmitters in remote areas, or having restricted access arrangements.



IMPORTANT!

Always reduce the RF Output power to minimum before changing the transmission frequency. Once the new frequency is active, slowly increase the RF output power control to provide the required power output level.

Introduction

The FMTX100RBRX is an FM broadcast transmitter with an integrated baseband PLL 87.7 – 108 MHz rebroadcast receiver integrated in a highly compact product.

At the heart of the FMTX100RBRX is a high quality PLL modulator, and the RF Power Amplifier uses the latest high-gain Enhancement Mode MOSFET device, achieving new levels of efficiency and reliability.

TTL remote monitoring and switching allows the FMTX100RBRX to be easily integrated into automated back-up applications. An audio silence alarm, plus remote RDS TA control are also provided.

Before operating

These instructions should be read in full before the transmitter is operated.

The safety and operating instructions should be retained for future reference.

All warnings on the transmitter and in the operating instructions should be adhered to.

All operation and user instructions should be followed.

Use of this device into a radiating antenna requires a valid licence from a Spectrum Management Authority in most countries.

Use of this device as part of a transmission system, or combined transmission system not specified by the manufacturer, may require further testing to ensure that it remains compliant with the essential requirements and other relevant provisions of current EU Low Voltage, EMC and Radio Equipment Directives. Approval and clearance from the Spectrum Management Authority may also be required.

Installation must adhere to safety regulations and the requirements of the relevant authorities. We recommend that at least two people are present during installation. Keep a file containing installation instructions and plans, including details of the transmission system (antennas, feeders, filters, etc) and operating instructions for all equipment at the transmission site at all times. Display posters detailing first aid treatment and treatment for electrical shock, along with telephone numbers for contacting the emergency services in the event of personal injury.

Ensure antenna system lightning strike protection is in place.

To reduce the risk of electrical shock, do not remove the cover, or any screws. There are no user serviceable parts inside; refer servicing to qualified personnel.

Do not expose this appliance to rain or moisture. The transmitter should not be used near water. Care should be taken so that objects do not fall - and liquids are not spilled - into the enclosure through openings.

To reduce the risk of fire, always replace fuses with the same type and rating.

The transmitter should be mounted into a well-ventilated standard 19 inch equipment rack, **using slide supports**. It should be situated so that its location or position does not interfere with its proper ventilation.

The transmitter should be situated away from heat sources.

The transmitter should be connected to a power supply only of the type described in the operating instructions or as marked on the unit. Precautions should be taken so that the grounding or polarisation of this appliance is not defeated.

The unit should be cleaned only as recommended by the manufacturer.

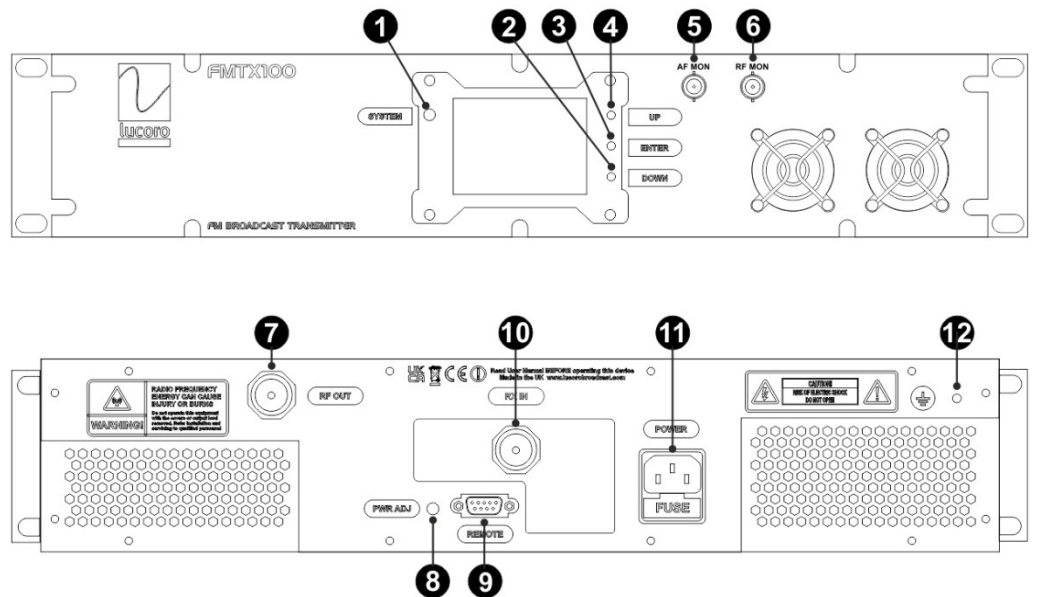
The transmitter should be serviced by qualified service personnel if it does not appear to operate normally, exhibits a marked change in performance, has been subjected to shock, damage, moisture, or if foreign objects have ingressed.

The user should not attempt to service the transmitter beyond that which is described in the Operating Instructions. All other servicing should be referred to qualified service personnel.

This appliance may become warm under normal operating conditions.

Recycle according to WEEE regulations.

Controls and Connectors



1. **SYSTEM** Status LED. Green indicates correct operation, red indicates a system error requiring urgent further investigation.
2. **DOWN** Push-button. Press this control to navigate the LCD menu.
3. **ENTER** Push-button. Press this control to navigate the LCD menu.
4. **UP** Push-button. Press this control to navigate the LCD menu.
5. **AF MON** BNC connector for monitoring of the input to the modulator (baseband MPX spectrum).
6. **RF MON** BNC connector for monitoring of the RF output. Output level will be the RF output level attenuated by approximately 40dB. Not to be used for measurement of harmonics.
7. **RF OUT** 'N' Socket. Connect a matched, pre-tested antenna system with a return loss of $>14\text{dB}$ to this socket. Ensure all parts of the feeder and antenna system are rated for 200W or above.

8. **RF ADJ** Use a suitable trimmer tool to adjust the RF output power level, (RF FWD on the display). Never set to above the 125W maximum rated output power.

9. **REMOTE** 9-pin D-sub Female. Remote control and monitor inputs and outputs are available on this connector:

Pin 1. Reflected Power Alarm. TTL logic low during normal operation. Floats high to indicate a high level of reflected power (critical antenna mis-match) has been detected.

Pin 2. Forward Power alarm. TTL logic low during normal operation. Floats high to indicate loss of RF output .

Pin 3. RX failure alarm. TTL logic low during normal operation. Floats high to indicate loss of parent station.

Pin 4. Temperature alarm. TTL logic low during normal operation. Floats high to indicate over-temperature condition has occurred.

Pin 9. RF Mute Control. Supplying between 5 and 12V this pin to (with reference to chassis ground potential) will mute the RF output. Primarily used in automated changeover systems.

Pin 6, 7, 8 GND connection, at chassis earth potential.

The above 'Open Collector' outputs are capable of operation up to 50V and sinking a current of 75mA maximum. The normally high, (ie. 'pull low' upon alarm condition) provides inherent 'power failure' or 'cable connection failure' signalling.

10. **RX IN.** 'N' Socket. Connect the receiving antenna to this input.

11. **AC POWER.** Connect a power lead with an IEC C13 connector (and a 3 amp fuse in the plug or at the distribution panel) to this socket. Two T2 amp (time delay) fuses are fitted within this connector's Fuse carrier.

12. **EARTH.** Grounding connection point (M4 stud and bolt).

Installation

Connect a suitable rated test load to the RF OUTPUT socket before connecting the unit to mains power. IMPORTANT! FAILURE TO DO SO MAY RESULT IN DAMAGE NOT COVERED BY WARRANTY.

Power-up the unit and reduce the output power (using the rear panel RF OUTPUT POWER ADJUST control) to the lowest level.

Using the front panel display and buttons, set the desired transmission frequency.

Power down the unit, wait a few seconds and, whilst pressing ENTER for 5 seconds, power up the unit. After a short while, the currently set transmission frequency will appear on the display with the rest of the display blanked-out. Use the UP and DOWN buttons to select the desired frequency. Press ENTER to store. The new frequency will flash rapidly to indicate that it is now stored. The unit will begin its boot process and, after a few seconds the display will return to normal mode, and the transmitter will begin broadcasting.

Using the front panel display and buttons, set the desired reception frequency.

Power down the unit, wait a few seconds and, whilst pressing UP and DOWN for 5 seconds, power up the unit. After a short while, the currently set receiver frequency will appear on the display, with the rest of the display blanked-out. Use the UP and DOWN buttons to select the desired frequency. Press ENTER to store. The new frequency will flash rapidly to indicate that it is now stored. The unit will begin its boot process and, after a few seconds the display will return to normal mode, and the transmitter will begin broadcasting.

The deviation level of the rebroadcast should match that of the parent station. Note that, like all rebroadcast transmissions, the level of the higher frequency subcarriers, particularly the RDS, will be slightly lower, due to IF filtering and distance fade. Most parent stations that supply relay sites have their RDS injection level set slightly higher, to compensate for this.



The optimum received signal level is 50dBu. Lower levels will may contain noise which could cause non-compliance with regulatory spectral occupancy limits. Likewise, received signal levels higher than 50dBu will over-load

the receiver's front-end circuitry, again causing non-compliance of the spectral occupancy.

NOTE: If changing the transmission frequency, upon installation, or at any time in the future, check the deviation levels using a calibrated deviation test receiver. If the level is too high or low, adjust it using the following procedure:

Disconnect power to the transmitter. Connect a suitable rated test load to the RF OUTPUT socket before re-connecting the unit to mains power. IMPORTANT! FAILURE TO DO SO MAY RESULT IN DAMAGE NOT COVERED BY WARRANTY.

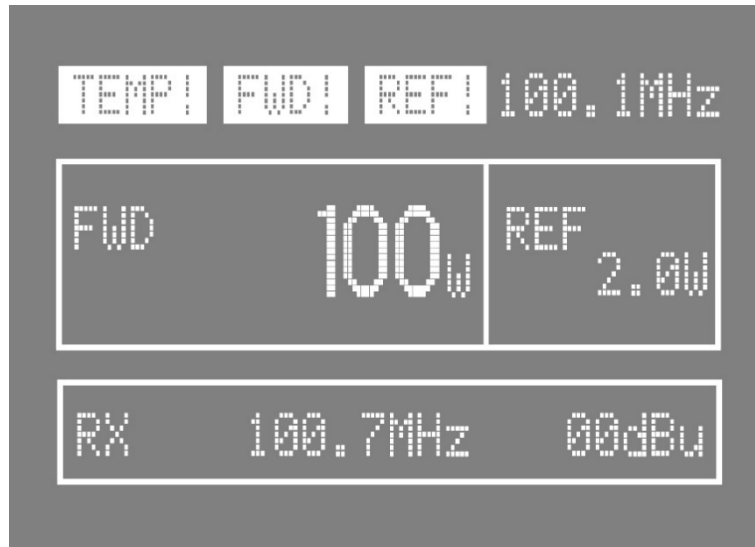
Power-up the unit and reduce the output power (using the rear panel RF OUTPUT POWER ADJUST control) to the lowest level. Disconnect the power; there are high voltages and high RF levels inside the transmitter when AC supply is applied. Remove the lid, and locate the multi-turn trimmer adjustment control labelled 'DEV' on the PCB. This can be found on the main (central) PCB. Using a suitable tool, carefully turn the control clockwise (for more deviation) or anti-clockwise (for less deviation).

Once all settings are correct, power down the unit. Disconnect the test load and connect to the antenna. Power up the unit and increase the RF Power (using the rear panel RF ADJ control) to the desired level, not exceeding 125W.

Operation

The FMTX100RBRX is designed for continuous reliable transmission, however the fans must be periodically checked for correct operation and free airflow.

The front panel display shows the transmission frequency, forward power level (**FWD**), reflected power level (**REF**), the receiver (RX) frequency, and the received signal strength level in dBu.



Correct operation is confirmed by a front panel green STATUS LED. Should this turn red, the transmission system may shut down its RF output and will, in any case, require URGENT attention.

The LCD display shows all main parameters so no further menus are provided or required (except frequency settings detailed above). During normal operation, therefore, the menu buttons do not have any function.

The following are LCD display fault indicators and their meaning:

TEMP! The system is running too hot and has shut down the RF output as a safety precaution. Check the fans for correct operation. Also check the antenna system, including all cabling (and/or filters and/or combiners where fitted) for correct operation. The FWD! indicator (see below) will also show and the standby transmission system (where used) will have activated (TTL control).

REF! The system has detected a fault in the antenna system and has shut down the RF output as a safety precaution. Check the antenna system, including all cabling (and/or filters and/or combiners where fitted) for correct operation. The FWD! indicator (see below) will also show and the standby transmission system (where used) will have activated (TTL control).

FWD! The system has detected there is no forward power. This may be due to one or both of the above symptoms, due to a PLL failure, or due to excessive power setting. The standby transmission system (where used) will have activated (TTL control).

Ensure air vents and internal air tunnels are kept free from dust during operation.

The cooling fans should be replaced after 40,000 hours of cumulative operation. This life rating is for guidance only and is subject to ideal environmental operating conditions. Replace any fan that fails or becomes slow or noisy, immediately. Replacement fan assemblies with wiring loom and mating connector are available from the manufacturer. It is recommended that replacement work must be carried out by the manufacturer or an approved agent.

EC Declaration of Conformity to R&TTE Directive 1999/5/EC

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hereby take sole responsibility to confirm that the product:

FMTX100, FMTX250
(and versions thereof with M and RBRX suffix)

which this declaration refers to, conforms to all applicable requirements of EU Directive 2014/53/EU and is CE marked accordingly:

Low Voltage Directive 2014/35/EU:

IEC 60950-1:2005/A2:2013
Safety Requirements for equipment < 600V

EMC Directive 2014/30/EU:

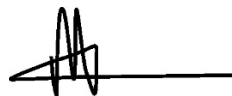
ETSI EN301 489-53 v1.1.0 (ETSI EN301 489-1 v2.1.1
ERM/EMC for Radio Equipment
Specific Conditions for FM Transmitters (Part 11)

Radio Equipment Directive 2014/53/EU:

ETSI EN302018-2 v2.1.1
Transmitting Equipment for FM Radio Broadcasting service

The following operation conditions and installation arrangements have to be presumed:

- (i) According to Operating Instruction Manual
- (ii) Connected lead lengths of 2 metres or less



M. O'Rorke, Director
September 2020

Technical Specifications

RF:

Frequency range	87.5 to 108.00MHz
Frequency stability	Better than $\pm 200\text{Hz}$
Output power	30 - 120W
Harmonic & spurious output	-75dBc typical
AM Noise	$<0.5\%$ @ $\pm 40\text{kHz}$ deviation
THD	$<0.15\%$ @ $\pm 75\text{kHz}$ deviation
RF output connector	'N' type (F)

Monitoring:

RF	BNC (F) -40dB 50 ohms
MPX	BNC (F) 1V P-P 10K ohms

Receiver:

Frequency range	87.5 – 108.0MHz
RX input connector	'N' type (F)

Power Supply:

Input AC	100V to 250V (50/60 Hz)
Consumption (maximum RF output)	250W (230V 50Hz)

Mechanical:

Size (mm)	2U 88 (H) x 482 (W) x 290 (D)
Weight	5kg
Temperature	0°C to +42°C
Humidity	95% (relative non-condensing)

We reserve the right to alter specifications without notice. E&OE.



WEEE - Waste Electrical and Electronic Equipment

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.

The crossed-out wheeled bin symbol invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

IMPORTANT!

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE WITH RESPECT TO THIS PRODUCT. Do not misconstrue any information as our recommendation to use any product, process, or equipment in conflict with any regulatory authority or patent.

Ensure compliance with all applicable safety requirements when installing or using this equipment, and operate in accordance with local laws governing the use of radio transmission equipment.

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