

## FM TRANSMITTER, BECIL MAKE, 60 WATT, TYPE CRS-FM50

Keeping in view of the requirement of Community radio station operators for indigenously developed, robust and simple FM transmitter with credible support after sales, BECIL has designed and developed 60 Watt, FM transmitter, type CRS-FM50 with in-house efforts. Considering that, CRS is being operated and maintained by NGOs belonging to Civil Society and Educational institutions, the transmitter is simple in design, easy to operate and maintain resulting in practically plug and broadcast type of equipment. However, the transmitter meets the audio and RF specification of a professional grade broadcast transmitter and complies with the ITU norms on RF emission standards. The transmitter employs in-house developed robust micro-controller based Control, monitoring and supervision system to safeguard the transmitter against abnormal operating conditions arising due to problems in abnormal ambient conditions, power supply, antenna etc. In addition to software control, hardware control also has been provided as a backup for automatic power control with fold back operation against the load variations.

Another notable feature is that, the transmitter has a built-in FM demodulator and its output is available on the back panel for monitoring and also as visual bargraph display for indicating the frequency deviation (depth of modulation). Important parameters of the transmitter can be remotely logged with time stamping on a system for monitoring the health of the transmitter. This data will be useful not only to keep a check on the performance of the transmitter, but also useful for fault diagnostics. In-house developed Windows based GUI is provided along with the transmitter for this purpose. The transmitter is completely modular in construction and hence can be easily field serviceable with ease by qualified technicians.

### ***Salient features***

1. **Power:** 60W nominal with automatic fold back depending on the load conditions.
2. **RF output impedance:** 50 ohms unbalanced, VSWR less than 1.5:1
3. **Frequency of operation:** 88 to 108MHz in 10kHz/steps. Frequency of operation to be set internally.
4. **Signal generation:** Processor based analog PLL
5. **Lock in Time From power on to any programmed frequency:** typically 4sec.
6. **Off lock attenuation:** >75 dBc (typical - 80dB)
7. **Type of modulation:** F3E/F8E, direct FM on the carrier frequency.
8. **Modulation mode:** Mono
9. **Frequency deviation:**  $\pm 75\text{kHz}=100\%$  ( $\pm 150\text{kHz}$  capability)  $\pm 1$  ppm from -5 to +45 °C
10. **RF harmonics:** Exceeds EBU/CCIR/FCC requirements  $> -70\text{dBc}$   $< -100\text{dBc}$  @  $\pm 1\text{MHz}$  min. out of carrier
11. **RF spurious:** typical -110dB
12. **Pre-emphasis:** 50/75 $\mu\text{s}$  selectable
13. **Pre-emphasis precision:** Nominal 1% (typical 0.4%)
14. **RF Power control:** Automatic power control with fold back feature depending on the load condition.
15. **Supervision and control:** Micro controller based in-built control system with backup hardware control for fool proof protection against faults to safeguard the transmitter RF components.
16. **Remote control:** USB based GUI for logging of events and analog metering parameters. For time and date stamping, on-board RTC is provided.
17. **Monitoring:** On board, built-in RF demodulator providing audio line level output for aural monitoring and bargraph display of the actual frequency deviation for visual monitoring of the modulation. Large sized LCD display for status information of the transmitter.

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### Detailed Technical specification

<b>Audio input</b>	XLR connector, balanced or unbalanced, true differential, nominal input impedance of 10 k $\Omega$ , +4 dBm @ 75kHz Deviation
<b>THD</b>	< 0.03%, 30Hz-15 kHz
<b>IMD</b>	< 0.03% measured with 1 kHz and 1.3 kHz tones, 1:1 ratio@75kHz deviation
<b>Transient IM</b>	< 0.03 % (square/sinus)
<b>Audio response</b>	$\pm$ 0.15 dB 20 Hz to 15 kHz
<b>Signal to noise ratio</b>	1. Weighted (CCIR 468/2 - Peak CCIR detector)- 75 dB / 50 $\mu$ s - 69 dB / flat; 2. Weighted (CCIR 468/2 - RMS detector) - 79dB / 50 $\mu$ s -72dB / flat; 3. Unweighted (RMS detector, meas. 20Hz-23 kHz) - 92 dB / 50 $\mu$ s - 88 dB / flat
<b>AM Synchronous</b>	(AM = 400 Hz, FM = 400 Hz $\pm$ 75 kHz Ref. = 100 % AM , RMS detector, measured (20Hz-23kHz) < -69 dB
<b>AM Asynchronous</b>	FM = no modulation, Ref. = 100 % AM, Unweighted, RMS detector, meas. 20Hz-23kHz ) < -70dB (typ. -85dB)
<b>Audio Filter</b>	> 55 dB @ 19 kHz;>45dB 19 to 50 kHz; > 50dB to 100kHz (typ.)
<b>CMRR</b>	> 45 dB typical, 25 Hz to 15kHz
<b>Analog metering display</b>	PA DC Voltage and current, RF forward power at PA and Filter output, reflected power at PA and Filter output, heat sink temperature of the PA and gate voltage
<b>LED Indication</b>	Integrated fault, VSWR fault, controller health monitoring
<b>Monitoring</b>	Provided with built in on-board FM demodulator. Standard audio line output on XLR is available for monitoring. 30 segment LED bargraph display to indicate the frequency deviation of the transmitter.
<b>LCD display</b>	Alphanumeric 2 lines x 20 characters, size : 180mm(L) * 40mm (W) * 14 mm(H)
<b>Electricals</b>	AC input: 85 to 264 V, 47 to 63 Hz, consumption approximately 120 Watts
<b>Acoustic Noise</b>	<56 dBA, 3 min @ 1 m
<b>Cooling</b>	Forced air, with internal long life brush-less ball bearing fan
<b>Environmental</b>	i. Storage temperature -20°C TO + 60°C ii. Guaranteed performance temp. 0°C TO + 40°C iii. Relative humidity (non condensing) 90%
<b>Cabinet</b>	Anodized aluminum frame. Standard 2U height cabinet with 19" rack mounting fixture. Overall dimension: 483 mm (19") W x 44 mm (1 $\frac{3}{4}$ ") H x 350 mm depth, approximate weight 4.5 KG.



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