



DVB-T MODULATOR MO-160 / MO-161



- **Two TS inputs: ASI and SPI**
- **COFDM outputs**
- **Coverage: 475 - 875 MHz MO-160
45 - 875 MHz MO-161**
- **Frequency agility (1 Hz steps)**
- **High MER (> 35 dB)**
- **6, 7 & 8 MHz channel bandwidths (user-selectable)**

DVB-T Modulator MO-160 / 161 General overview

The **MO-160 / 161** is a general purpose **DVB-T modulator** contained in a 19" 1U chassis. The unit has one ASI MPEG-2 Transport Stream input.

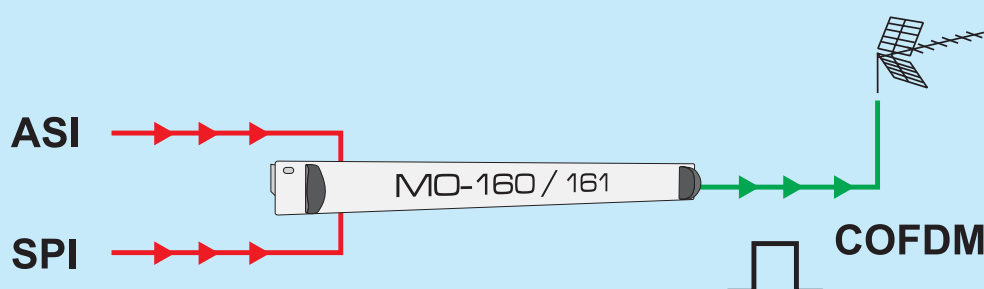
Either of these inputs can be used to modulate the COFDM signal in both **hierarchical** (one TS input) and **non-hierarchical** (two TS inputs) modes. An additional **test TS** can be generated internally in the modulator. This allows to generate compliant DVB-T signals even in the absence of a valid TS input.

The **MO-160 / 161** is able to work with any incoming bit rate as long as this is strictly lower than the value given in the DVB-T specification for the modulation parameters in use. The input TS bit rate is adapted to the useful bit rate required by the DVB-T signal by stuffing the TS with NULL packets (packet stuffing). This stuffing process alters the sequence of PCR values embedded in the TS. These values have to be re-stamped for the resultant PCR jitter to remain within the limits specified by the DVB.

In hierarchical modes, operating the **MO-160 / 161** as master has the added advantage over the slave mode of being able to use any of the three TS inputs as the HP input, LP input or both.

The modulator can be configured to generate any of the transmission modes listed in the DVB-T specification. In hierarchical modes, the HP and LP streams can be encoded with different convolutional code rates. The channel bandwidth can be set by the user to 6, 7 or 8 MHz as required by the application.

The operation of the **MO-160 / 161** is done via the front panel LCD display and controls. The modulator can be easily configured by navigating through the intuitive set of menus.



Control interface

- Pushable rotary control on the front panel with navigation key and LCD display
- Two LEDs indicating the power and synchronisation status of the equipment
- RS232 DB9 male connector

SPECIFICATIONS	MO-160 / 161
INPUTS MPEG-2 Transport Stream Operating modes Master Slave	2xDVB-ASI inputs, 75 Ω female BNC // 1xDVB-SPI input, LVDS DB-85 TS packets of length 188 or 204 bytes (automatic detection) Support for burst and continuous packet mode Input TS bit rate strictly below the value given in the DVB-T specification Automatic packet stuffing for bit rate adaptation and PCR re-stamping. Input TS bit rate constant and equal to the value given in the DVB-T document (no stuffing). Tolerance $\pm 0.1\%$
IF OUTPUT Type Frequency range Spectrum polarity Power level (average) In-band amplitude ripple In-band group delay ripple Frequency stability Out-of-band spectral characteristics¹ @ ± 3.805 MHz @ ± 4.25 MHz @ ± 5.25 MHz IQ amplitude imbalance IQ quadrature error Central carrier suppression Harmonics and spurious MER²	50 Ω BNC female connector Variable (32 to 36) MHz in steps of 1 Hz. Fixed at 36 MHz when RF output is off Selectable via front panel controls 0 dBm (107 dB μ V) fixed < 0.2 dB < 10 ns 20 ppm 0 dBc -46 dBc (2k), -56 dBc (8k) -56 dBc < 0.02% < 0.02° < -55 dBc < -60 dBc > 43 dB
RF OUTPUT Type Frequency range Spectrum polarity Power level (average) Level of harmonic and spurious Frequency stability MER SSB phase noise	50 Ω N-type female connector Adjustable between 475 and 875 MHz in 1 Hz steps (45-875 MHz for MO-161) Selectable via front panel controls -27 to -87 dBm in 1 dB steps (optional up to +6 dBm) < -50 dBc 20 ppm > 36 dB ≤ -87 dBc/Hz @ 2 kHz
DVB-T PARAMETERS IFFT size Guard intervals Code rates Symbol interleaver Constellations Hierarchical modes MFN operation TPS signalling Channel bandwidth	2k, 8k 1/4, 1/8, 1/16, 1/32 1/2, 2/3, 3/4, 5/6, 7/8 Native QPSK, 16QAM, 64QAM 16QAM and 64QAM constellations with constellation ratio $\alpha = 1, 2$ or 4 Available Cell ID 6, 7 and 8 MHz (user selectable)
PROGRAM SELECTION	Service selection without table rebuilding (PID Filtering)
REMOTE CONTROL	RS-232C interface (DB-9 male connector)
OPTIONS OP-1xx-P	+6 dBm output.

- ¹ Frequencies referred to the central frequency for an 8 MHz channel. Average levels measured using a 10 kHz bandwidth are referred to the carriers located on either side of the spectrum. Values shown are the worst case and correspond to guard intervals of 1/32.
- ² Value measured in master mode. In slave mode, the MER is greater than 38 dB for 8 MHz channels, and around 35 dB for 7 and 6 MHz.