T-MOD SERIES

MODEM radio for telemetry and SCADA systems

The T-MOD Series devices are radio modems that allow connecting distant devices using any serial protocol with an RS-232 / RS-485 port or ModBus TCP-IP protocol with an RJ-45 port. They provide robust and reliable links, and are suitable for short and long distances in all types of environments.

They are optimal for communication between PLCs, RTUs, SCADA's, etc. Each T-MOD can act as a terminal, base station or repeater, facilitating the installation and maintenance of the network. Allows you to configure point-to-point, multipoint and star networks.

KEY CONCEPTS

Long range radio communication
Available in VHF and UHF bands, with license or free band. Configurable emission power, from 100 mW to 5 W or 25 W (rack). High sensitivity and rejection of parasitic signals.

Easy installation and configuration equipment
Extremely simple configuration and testing, using the supplied T-MOD Suite application. Measurements of link quality, channel occupancy, etc. are also integrated, without the need to have radio measurement equipment.

Without attention
Allows installation in completely unattended remote locations.totalmente desantendidas.

High temperature range
T-MODs have a wide operating temperature range and can operate in harsh remote or completely unattended environments.

Different formats
Available in compact format in injected aluminum casing, suitable for DIN rail mounting or in 19-inch rack format.

Various configurations
An optional controller module available allows you to configure base stations, repeaters or terminals with redundancy and diversity.

APPLICATIONS

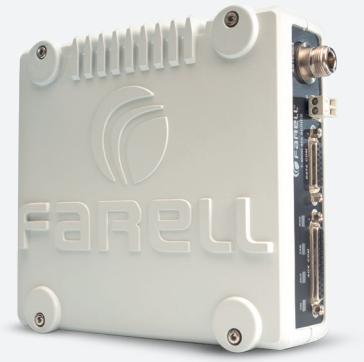
- Industrial automations.
- Electrical generation and distribution.
- Water treatment and distribution.
- Transportation of hydrocarbons, gas.
- Signage.
- Environment.
- Ports and airports.
- Railways and highways.
- Agricultural irrigation.
- Lotteries.

CHARACTERISTICS

- Narrow band of 12.5 KHz and 25 KHz.
- VHF and UHF bands up to 950 MHz.
- Free or licensed bands.
- Direct ranges of up to 50 km.
- Transparent to the protocol.
- Integrated store&forward repeater function for Modbus RTU protocol and others.
- Port speed from 1,200 to 115,200 bps.
- Point-to-point, point-multipoint and star networks.
- Integrated measurements of link quality (-dBm), power (mW), supply voltage (V), temperature (ºC), etc.
- Standards: ETS EN 300 113-2; ETS EN 301 489-5; UNE EN 60950.

T-MOD 400

- Radio channel speed at 9600 bps in radio channeling. 12.5 or 25 KHz.
- For networks with a high number of stations with maximum benefits.
- It has non-intrusive diagnosis in real time of the own network.



T-MOD C48+ / C48+ LITE

- Radio channel speed at 4800 bps in radio channeling. 12.5KHz. Narrow Band.
- Optimal compromise between speed and coverage distance.

T-MOD C24+

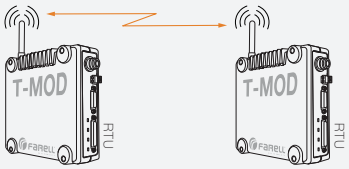
- Radio channel speed at 2400 bps in radio channeling. 12.5KHz. Narrow Band.
- Compatible with T-MOD CLASSIC for expansions or network spare parts with more than 20 years.

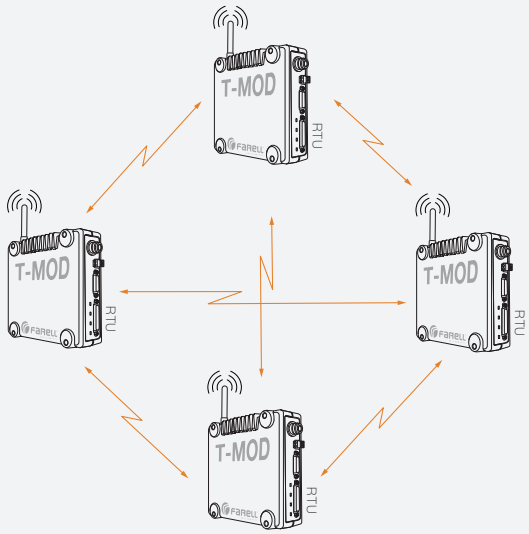
T-MOD 400 RACK

- T-MOD 400 in RACK format.
- It has several power and feeding options.
- Allows you to configure base stations, repeaters and redundant and diversity terminals.

PEER TO PEER CONNECTION

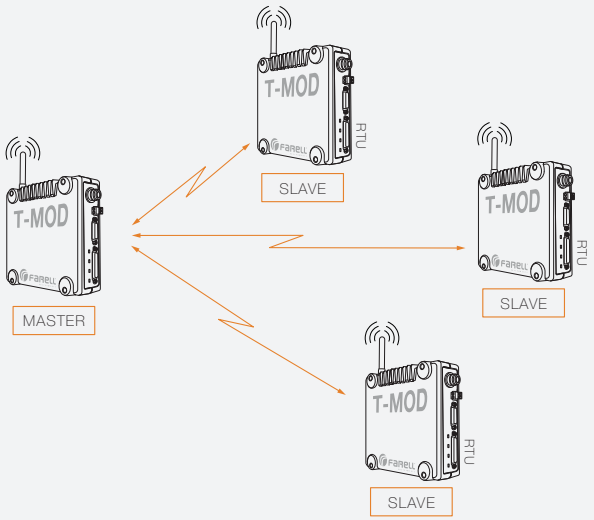
This is the basic mode. In this mode the data transmitted by one T-MOD are received by the others T-MOD from the network and vice versa. It is a network not hierarchical, with a single level. All T-MOD network must work in Peer-to-Peer mode.





POINT – MULTIPOINT CONNECTION

Data transmitted by a T-MOD in Master mode is received by all T-MODs in Slave mode on the network and data transmitted by any Slave is only received by the Master.



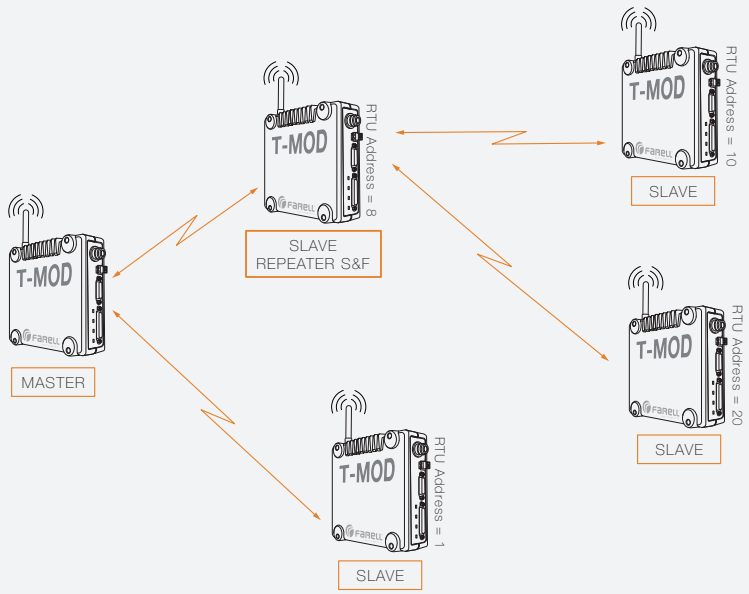
POINT-MULTIPOINT CONNECTION WITH S&F REPEATER

A T-MOD configured in this mode behaves like a T-MOD SLAVE + S&F REPEATER. Performs repeater functions without frequency change (save and forward). Each frame received via radio is stored and analyzed and if it meets certain requirements, it is rebroadcast. Like any Slave, it allows the local connection of data units on its data port.

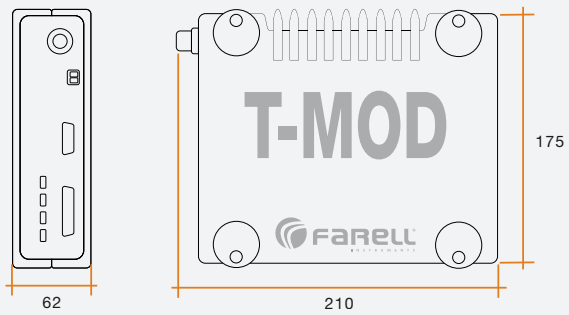
By using S&F repeater units, the radio coverage of a network can be expanded without the need for another radio channel.

Using S&F repeaters, complex networks can be created in a simple way, deciding which path to follow for each data frame until it reaches its destination.

FC-S&F repeaters are compatible with protocols based on addressing by the first character of the frame: for example Modbus RTU and many others.



DIMENSIONS (mm)



T-MOD	400	C48+	C48+ LITE	C24+
FOR DIRECT LINKS OR BY REPEATER, POINT A POINT AND MULTIPOINT	YES	YES	YES	YES
MODULATION	4 FSK 9600 bps	GMSK BT = 0,5 4800 bps	GMSK BT = 0,5 4800 bps	GMSK BT = 0,5 2400 bps
DATA PORT SPEED	1200 a 115200 bps	300 a 115200 bps	1200 a 115200 bps	300 a 115200 bps
DATA PORT INTERFACE	RS-232 & RS-485	RS-232 & RS-485	RS-232 & RS-485	RS-232 & RS-485
SERIAL PROTOCOL	Transparent	Transparent	Transparent	Transparent
FLOW CONTROL	Automatic	Automatic	Automatic	Automatic
ISOLATED DATA PORT	No	No	Sí (1500 V)	No
MODBUS TCP-IP PROTOCOL	RJ-45 (optional)	RJ-45 (optional)	RJ-45 (optional)	RJ-45 (optional)
DATA LATENCY	32 mS	25 mS	25 mS	25 mS
BANDS	VHF-UHF	VHF-UHF	VHF-UHF & 800/900 MHz	VHF-UHF
CHANNELING (NB)	12,5 KHz & 25 KHz	12,5 KHz	12,5 KHz (25 KHz)	12,5 KHz
RADIO POWER	0,1 W a 10 W ó 25 W (rack)	0,1 W a 10 W	0,5 W o 2 W	0,1 W a 10 W
ANTENNA IMPEDANCE	50 ohm	50 ohm	50 ohm	50 ohm
ANTENNA CONNECTOR	N female	N female	N female	N female
HALF-DUPLEX WITH 1 OR 2 RADIO FREQUENCIES	YES	YES	YES	YES
SENSIB. (BER = 1 X 10-6)	-107 dBm	-109 dBm	-108 dBm	-109 dBm
STABILITY	+/-1 ppm (-30 a +70 ºC)	+/-1 ppm (-30 a +70 ºC)	+/-1 ppm (-30 a +70 ºC)	+/-1 ppm (-30 a +70 ºC)
AGING	<1 ppm first year	<1 ppm first year	<1 ppm first year	<1 ppm first year
POWER SUPPLY	12 Vdc; (24/48 Vdc rack)	12 Vdc (negative mass)	12 Vdc (negative mass)	12 Vdc (negative mass)
CONSUMPTION AT 12 VDC	TX (5 W): 1600 mA TX (0,5 W): 620 mA TX (10 W): 3300 mA RX: 170 mA	TX (5 W): 1500 mA TX (0,5 W): 570 mA TX (10 W): 3300 mA RX: 170 mA	TX (2 W): 600 mA TX (0,5 W): 245 mA RX: 55 mA	TX (5 W): 1500 mA TX (0,5 W): 570 mA TX (10 W): 3 300 mA RX: 170 mA
INJECTED ALUMINUM BOX IP-57	YES	YES	YES	YES
DIMENSIONS (WIDTH X HEIGTH X DEPTH)	210 x 62 x 175mm	210 x 62 x 175mm	210 x 62 x 175mm	210 x 62 x 175mm
PANEL/DIN RAIL MOUNTING	YES	YES	YES	YES
OPERATION: -30 TO +70 °C	YES	YES	YES	YES
STORE&FORWARD REPEATER INTEGRATED (USES A SINGLE RADIO FREQUENCY)	YES	YES	YES (2W MODEL)	YES
BACK-TO-BACK REPEATER	YES	YES	YES	YES
RC4 64 BIT ENCRYPTION	YES	YES	YES	YES
TESTS AND DIAGNOSIS LOCAL AND REMOTE INTEGRATED: ECO, TX, RX, CHANNEL OCCUPANCY, ETC.	YES	YES	YES	YES
LOCAL AND REMOTE CONFIGURATION	YES	YES	YES	YES
INTEGRATED MEASURES: LINK LEVEL; TEMPERATURE; POWER SUPPLY, ETC	YES	YES	YES	YES
REDUNDANCY AND DIVERSITY IN BASE STATIONS, REPEATERS AND REMOTES	YES, VIA UNIT CSR CONTROLLER	No	No	No
NON-INTRUSIVE DIAGNOSIS IN REAL TIME ON THE NETWORK	YES	No	No	No
OPERATION COMPLETELY NEGLECTED	YES	YES	YES	YES
STANDARD: RADIO: ETS EN 300 113-2 EMC: ETS EN 301 489-5 ELECTRICAL SAFETY: UNE-EN 60950	YES	YES	YES	YES