Rack mounted telephone- and leased line modem for industrial applications

TR-36

Rack modem for industrial PSTN- and 2/4-wire leased line applications

The TR-36 is an analogue V.34 19"-rack PSTN modem as well as a industrial 2/4-wire leased line modem. V.34 provides speeds up to 33.6kbit/s on the communication line. Several features make it ideal for use in industrial applications: Password protection, dial-back security and caller ID answering are only some of this features. For redundant use, the PSTN dial backup function is useful. In case of a leased line failure, the modem will establish a dial backup link. The modem has both RS-232 and RS-485/422 interfaces allowing it to be used in many different applications. All connections are accessible from the back of the 19"-card. The TR-36 is the ideal choice for industrial dial-up and 2/4 wire leased line applications where many modems need to be installed in a small amount of space.

Configuration and diagnostics

The TR-36 is configurable via its serial interface in different ways, either via standard terminal emulation software using AT-Hayes commands or Westermo's own modem configuration software - TD-Tool. Additionally the TR-36 can be configured via its onboard DIP-switches. TD-Tool is a Windows based configuration GUI that simplifies setting up the modems, connection statistics can be viewed and configurations saved for further use. To assit in fault finding and reconfiguration of unmanned stations, the modem can be configured remotely via a PSTN connection.

Harsh industrial environment

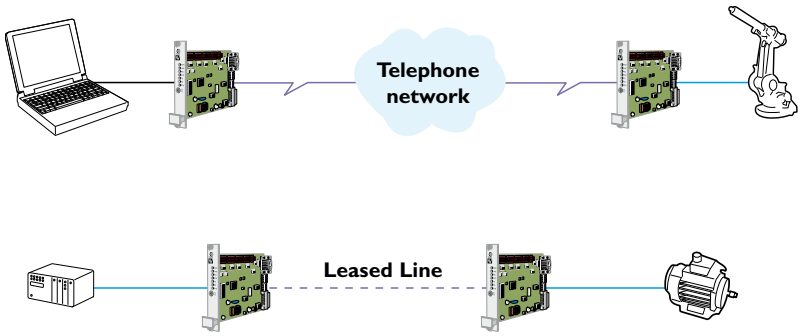
The TR-36 is designed to function reliably within industrial environments and in areas of high level interference. The modem is equipped with transient protection on the line side and a "watchdog" that monitors and automatically resets the modem in the event of a fault.

The TR-36 is designed to be mounted in Westermo's RV-07 19" rack which can hold up to 17 TR-36 modems.

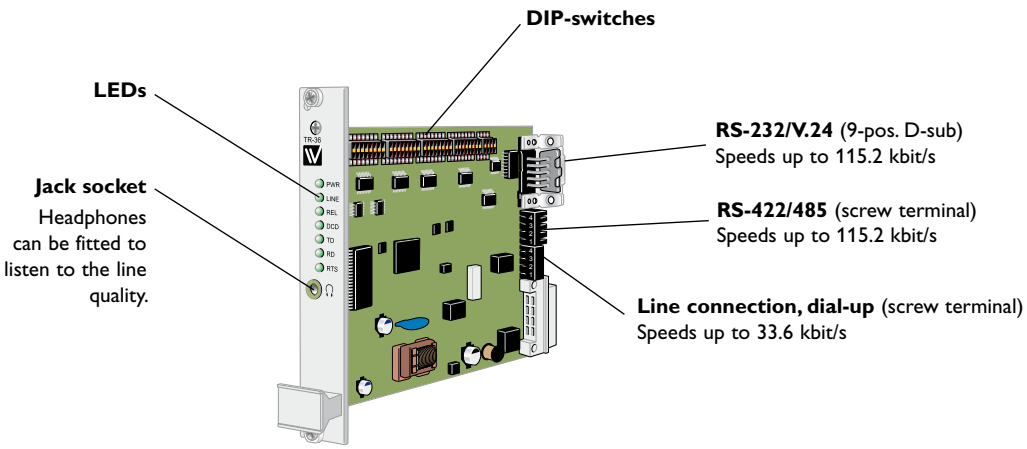
Approvals

The construction of the units has gone through extensive testing and approvals both by Westermo and approved test houses. The TR-36 is approved for use in Europe.

Application



Interfaces



Power supply on RV-07

	PS-20 HV	External 24 – 48 DC
Operating voltage	90 – 264 VAC / 99 – 300 VDC	24 – 48 VDC
Rated current	125 mA @ 16 VDC	1490 mA @ 12 VDC (fully equipped rack with 17 modems)
Rated frequency	48 – 62 Hz / DC	DC
Connection	Detachable 2 x 3-pos. screw terminal	Detachable 2-pos. screw terminal

Technical Data

Power RV-07, 17 pcs TR-36, PS-20 HV	
Power supply	110 – 250 VDC +10 / –10% 115 – 230 VAC +15 / –10%
Power consumption	500/240 mA, 50 W
Rated frequency	DC / 48 – 62 Hz
Fuse, F1	4 AS 5x 20 mm
Isolation to	All other ports 3 kV_{rms} 50 Hz 1 min
Connection	Detachable screw terminal
Shielded cable	Not required

* Direction relative this unit

Power RV-07, 17 pcs TR-36, ext 24 – 48 VDC	
Power supply	24 – 48 VDC
Power consumption	34 W
Rated frequency	DC
Isolation to	All other ports 1.5 kV_{rms} 50 Hz 1 min
Connection	Detachable screw terminal**
Shielded cable	Not required

* Direction relative this unit

** Maximum wire length to external power supply < 10 m.

Public Switched Telephone Network (PSTN)	
Electrical specification	Public Switched Telephone Network
Data rate	300 bit/s – 33.6 kbit/s
Protocol	B103, B212, V21, V22, V22B, V23C, V23 HDX, V32, V32B, V34
Protection	Installation Fault Tolerant (up to ±60 V)
Isolation to	Power port 3 kVrms 50 Hz 1 min Leased Line 2 kVrms 50 Hz 1 min RS-232 2 kVrms 50 Hz 1 min RS-485 2 kVrms 50 Hz 1 min I/O 2 kVrms 50 Hz 1 min
Connection	RJ-11C and Detachable screw terminal
Connector size	Detachable screw terminal
Shielded cable	Not required

Leased Line (LL)	
Electrical specification	2- or 4-wire Leased Line
Data rate	300 bit/s – 33.6 kbit/s
Protocol	B103, B212, V21, V22, V22B, V23C, V23 HDX, V32, V32B, V34
Transmission range	PSTN 30 dB
Budget	Leased Line max 40 dB
Protection	Installation Fault Tolerant (up to ± 60 V)
Isolation to	Power port 3 kVrms 50 Hz 1 min Leased Line 2 kVrms 50 Hz 1 min RS-232 2 kVrms 50 Hz 1 min RS-485 2 kVrms 50 Hz 1 min
Connection	Detachable screw terminal
Shielded cable	Not required

RS-422/485	
Electrical specification	EIA/TIA-485 ITU V.11 2-wire or 4-wire twisted pair
Data rate	1200 bit/s – 115.2 kbit/s
Data format	7 or 8 data bits, Odd, even or none parity, 1 or 2 stop bits, Σ 9-12 bit words
Protocol	Transparent
Retiming	Yes
Turn around time	<10 µs (half duplex)
Transmission range	1200 m, depending on data rate and cable type (EIA RS-485)
Settings	120 Ω termination and failsafe biasing 680 Ω
Protection	Installation Fault Tolerant (up to ±60 V)
Isolation to	Power port 3 kVrms 50 Hz 1 min PSTN Line 2 kVrms 50 Hz 1 min Leased Line 2 kVrms 50 Hz 1 min
Galvanic connection to	RS-232
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required*
Miscellaneous	Do not connect RS-232 and RS-422/485 simultaneously

RS-232	
Electrical specification	EIA/TIA-232
Data rate	1200 bit/s – 115.2 kbit/s
Data format	7 or 8 data bits, Odd, even or none parity, 1 or 2 stop bits, Σ 9-12 bit words
Protocol	Transparent
Retiming	Yes
Transmission range	Cable length ≤ 15 m
Isolation to	Power port 3 kVrms 50 Hz 1 min PSTN Line 2 kVrms 50 Hz 1 min Leased Line 2 kVrms 50 Hz 1 min
Connection	9-pin D-sub female (DCE) and Detachable screw terminal (DCE)
Connector size	Detachable screw terminal 0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required*
Conductive housing	Isolated to all others circuits
Miscellaneous	Do not connect RS-232 and RS-422/485 simultaneously

* Railway installation close to the rails.
For a cable located within 3 m and connected to this port, the use of shielded cable is recommended, this is to minimise the risk of interference. The cable shield should be properly connected (360°) to an earthing point within 1 m of this port. This earthing point should have a low impedance connection to the conductive enclosure of the apparatus cabinet, or similar, where the unit is built-in. This conductive enclosure should be connected to the earthing system of an installation and may be directly connected to the protective earth.

Type tests and environmental conditions

Electromagnetic Compatibility			
Phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure contact	± 6 kV
		Enclosure air	± 8 kV
RF field AM modulated	IEC 61000-4-3	Enclosure	10 V/m 80% AM (1 kHz), 80 – 1 000 MHz 20 V/m 80% AM (1 kHz), 80 – 2 000 MHz
RF field 900 MHz	ENV 50204	Enclosure	20 V/m pulse modulated 200 Hz, 900 ± 5 MHz
Fast transient	EN 61000-4-4	Signal ports	± 2 kV
		Power ports	± 2 kV
Surge	EN 61000-4-5	Signal ports unbalanced	± 2 kV line to earth, ± 2 kV line to line
		Signal ports balanced	± 2 kV line to earth, ± 1 kV line to line
		Power ports	± 2 kV line to earth, ± 2 kV line to line
RF conducted	EN 61000-4-6	Signal ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
		Power ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
Power frequency magnetic field	EN 61000-4-8	Enclosure	100 A/m, 50 Hz, 16.7 Hz & 0 Hz
Pulse magnetic field	EN 61000-4-9	Enclosure	300 A/m, 6.4 / 16 ms pulse
Voltage dips and interruption	EN 61000-4-11	AC power ports	10 & 5 000 ms, interruption 10 & 500 ms, 30% reduction 100 & 1 000 ms, 60% reduction
Mains freq. 50 Hz	EN 61000-4-16	Signal ports	100 V 50 Hz line to earth
Mains freq. 50 Hz	SS 436 15 03	Signal ports	250 V 50 Hz line to line
Voltage dips and interruption	EN 61000-4-29	DC power ports	10 & 100 ms, interruption 10 ms, 30% reduction 10 ms, 60% reduction +20% above & –20% below rated voltage
Radiated emission	EN 55022	Enclosure	Class B
Conducted emission	EN 55022	AC power ports	Class B
	EN 55022	DC power ports	Class B
Dielectric strength	EN 60950	Signal port to other isolated ports	2 kVrms 50 Hz 1 min
		Power port to other isolated ports	3 kVrms 50 Hz 1 min 2 kVrms 50 Hz 1 min (@ rated power <60 V)
Environmental			
Temperature		Operating	0 to +50°C
		Storage & Transport	–25 to +70°C
Humidity		Operating	5 to 95% relative humidity non condensing.
		Storage & Transport	5 to 95% relative humidity non condensing.
Altitude		Operating	2 000 m / 70 kPa
Reliability prediction (MTBF)	MIL-HDBK- 217F	Operating	
Service life		Operating	10 year
Packaging			
Enclosure	–	–	–
Dimension W x H x D			485 x 135 x 180 mm
Weight TR-36			0.14 kg
Weight Total (17 TR-36 + 2 PS-20)			4 kg
Degree of protection	IEC 529	Enclosure	IP 20
Cooling			Convection
Mounting			19” rack