

Advanced telephone- and leased line modem for industrial applications

TD-36 485

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

The TD-36 485 is an analogue V.34 PSTN modem as well as an industrial 2/4-wire leased line modem. V.34 provides data rates up to 33.6 kbit/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 its features. A digital input can be used to send alarm messages as text or SMS.

The inbuilt digital output can be remotely switched. 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. It is equipped with RS-232 and RS-485/422 interfaces. A Windows modem driver is supplied with the unit for PC based applications. TD-36 485 is the ideal choice for industrial dial-up and 2/4 wire leased line applications that demand the highest reliability.



Configuration and diagnostics

The TD-36 485 is configurable via its serial interface in several ways, either via standard terminal emulation software using AT-Hayes commands or the Westermo TD-tool configuration software. Additionally, the TD-36 485 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 assist in fault finding and reconfiguration of unmanned stations, the modem can be configured remotely via a PSTN connection.

Harsh industrial environment

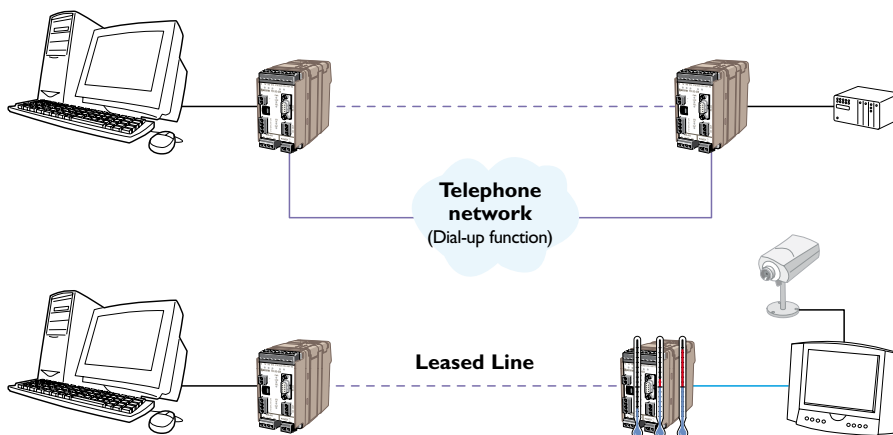
TD-36 485 is designed to function reliably within industrial environments and in areas of high-level interference. The modem is equipped with transient protection on the line side and a "watchdog" that monitors and automatically resets the modem in the event of a fault.

TD-36 485 is designed to be mounted easily on to a 35 mm DIN-rail, it has screw terminal connections, an extended temperature range from -25°C to +70°C and is tri galvanically isolated. The power supply operates over a wide input range, and can be delivered with different power supply options.

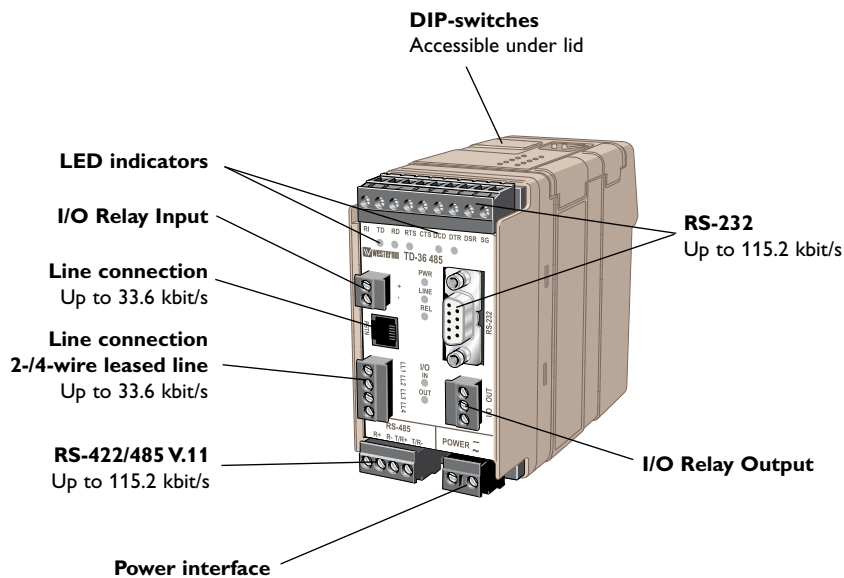
Approvals

The construction of the units has gone through extensive testing and approvals both by Westermo and approved test houses. The TD-36 485 is approved for use in Europe, as well as in USA and Canada.

Application



Interfaces



Technical Data

Power AV	
Rated voltage	20 to 250 VDC 24 to 240 VAC
Operating voltage	18 to 300 VDC 22 to 264 VAC
Rated current	125 mA @ 18 VDC 15 mA @ 110 VDC 8 mA @ 250 VDC 120 mA @ 22 VAC 35 mA @ 95 VAC 28 mA @ 240 VAC
Rated frequency	DC: – AC: 48 – 62 Hz
Inrush current I^2t	0.45 A ² s
Startup current*	0.25 A _{peak}
Polarity	Polarity independent
Isolation to	All other ports 3 kVrms 50 Hz 1 min
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm ² (AWG 24-12)
Shielded cable	Not required

Power LV	
Rated voltage	12 to 48 VDC 12 to 27 VAC
Operating voltage	10 to 60 VDC 10 to 30 VAC 48 – 62 Hz
Rated current	150 mA @ 12 VDC 70 mA @ 24 VDC 40 mA @ 48 VDC 150 mA @ 12 VAC 70 mA @ 24 VAC
Rated frequency	DC: – AC: 48 – 62 Hz
Inrush current I^2t	0.25 A ² s
Startup current*	0.30 A _{peak}
Polarity	Polarity independent
Isolation to	All other ports 3 kVrms 50 Hz 1 min
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm ² (AWG 24-12)
Shielded cable	Not required

* External supply current capability for proper startup

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 0.2 – 2.5 mm ² (AWG 24 – 12)
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 I/O 2 kVrms 50 Hz 1 min
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm ² (AWG 24 – 12)
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. 9-12 bit words
Protocol	Transparent
Retiming	Yes
Turn around time	<10 μ s (half duplex)
Transmission range	\leq 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 \pm 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 I/O 1.5 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. 9-12 bit words
Protocol	Transparent
Retiming	Yes
Transmission range	Cable length \leq 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 I/O 1.5 kVrms 50 Hz 1 min
Galvanic connection to	RS-485
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*
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.

Generic I/O interface Input	
Electrical specification	Opto isolated input
Input voltage range	0 – 60 VDC
Input current	5 mA @ 60 VDC
Input inactive	$U_{in} < 2.5\text{ V}$
Input active	$U_{in} > 5.0\text{ V}$
Transmission range	Cable length $\leq 15\text{ m}$
Connection	Detachable screw terminal (DCE)
Connector size	0.2 – 2.5 mm ² (AWG 24 – 12)
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 RS-232 2 kVrms 50 Hz 1 min RS-485 2 kVrms 50 Hz 1 min I/O output 2 kVrms 50 Hz 1 min
Shielded cable	Not required*

Generic I/O interface Relay Output	
Electrical specification	One change over contact
Switching voltage	Max 40 V AC/DC
Switching current	Max 500 mA AC/DC
Electrical endurance	5 x 10 ⁵ operations at 20 W / 20 VA Resistive load
Transmission range	Cable length $\leq 15\text{ m}$
Connection	Detachable screw terminal (DCE)
Connector size	0.2 – 2.5 mm ² (AWG 24 – 12)
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 RS-232 1.5 kVrms 50 Hz 1 min RS-485 1.5 kVrms 50 Hz 1 min I/O input 2 kVrms 50 Hz 1 min
Shielded cable	Not required*

* 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 – 1000 MHz 20 V/m 80% AM (1 kHz), 80 – 2000 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
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	100V 50 Hz line to earth
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 A
	FCC part 15		Class A
Conducted emission	EN 55022	AC power ports	Class B
	FCC part 15	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	–25 to +70°C
		Storage & Transport	–40 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
Vibration	IEC 60068-2-6	Operating	7.5 mm, 5 – 8 Hz
			2 g, 8 – 500 Hz
Shock	IEC 60068-2-27	Operating	15 g, 11 ms
Packaging			
Enclosure	UL 94	PC / ABS	Flammability class V-1
Dimension W x H x D			55 x 100 x 132 mm
Weight			0.36 kg
Degree of protection	IEC 529	Enclosure	IP 20
Cooling			Convection
Mounting			Horizontal on 35 mm DIN-rail