TD-36

6618-2201

WESTERMO

TD-36
DIN-rail Tele and Leased Line modem

TD-36 485
DIN-rail Tele and Leased Line modem
with I/O and RS-485

www.westermo.com

Legal information

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More information about Westermo can be found at the following Internet address:

http://www.westermo.com

Safety

⚠️ **Before installation:**

This modem is for restricted access area use only.

Read this manual completely and gather all information on the unit. Make sure that you understand it fully. Check that your application does not exceed the safe operating specifications for this unit.

This unit should only be installed by qualified personnel.

This unit should be built-in to an apparatus cabinet, or similar, where access is restricted to service personnel only.

The power supply wiring must be sufficiently fused, and if necessary it must be possible to disconnect manually from the power supply. Ensure compliance to national installation regulations.

This unit uses convection cooling. To avoid obstructing the airflow around the unit, follow the spacing recommendations (see Cooling section).

⚠️ **Before mounting, using or removing this unit:**

Prevent access to hazardous voltage by disconnecting the unit from power supply.

Warning! Do not open connected unit. Hazardous voltage may occur within this unit when connected to power supply or TNV circuits.

Care recommendations

Follow the care recommendations below to maintain full operation of unit and to fulfil the warranty obligations.
This unit must not be operating with removed covers or lids.
Do not attempt to disassemble the unit. There are no user serviceable parts inside.
Do not drop, knock or shake the unit, rough handling above the specification may cause damage to internal circuit boards.
Do not use harsh chemicals, cleaning solvents or strong detergents to clean the unit.
Do not paint the unit. Paint can clog the unit and prevent proper operation.
Do not expose the unit to any kind of liquids (rain, beverages, etc). The unit is not water-proof. Keep the unit within the specified humidity levels.
Do not use or store the unit in dusty, dirty areas, connectors as well as other mechanical part may be damaged.
If the unit is not working properly, contact the place of purchase, nearest Westermo distributor office or Westermo Tech support.

Maintenance

No maintenance is required, as long as the unit is used as intended within the specified conditions.

Agency approvals and standards compliance

Type	Approval / Compliance
EMC	EN 61000-6-2, Immunity industrial environm
	EN 55024, Immunity IT equipment
	EN 61000-6-3, Emission residential environments
	FCC part 15 Class B
	EN 50121-4, Railway signalling and telecommunications apparatus
	IEC 62236-4, Railway signalling and telecommunications apparatus
Safety	EN 60950-1, IT equipment
PSTN	ETSI TS103 021-1, ETSI TS103 021-2, ETSI TS103 021-3

FCC Part 15.105 Notice: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

Declaration of Conformity

Westermo Teleindustri AB

Declaration of conformity

The manufacturer   Westermo Teleindustri AB
SE-640 40 Stora Sundby, Sweden

Herewith declares that the product(s)

Type of product	Model	Art no	Installation manual
DIN-rail Tele and Leased Line modem	TD-36	**3618-0101**	6618-2201
DIN-rail Tele and Leased Line modem with I/O and RS-485	TD-36 485	**3618-0001**	6618-2201

is in conformity with the following EC directive(s).

No	Short name
89/336/EEG	Electromagnetic Compatibility (EMC)
73/23/EEG	Low Voltage Directive - LVD

References of standards applied for this EC declaration of conformity.

No	Title	Issue
EN 61000-6-2	Immunity for industrial environments	2 (2001)
EN 55024	Information technology equipment – Immunity	1 (1998)
EN 61000-6-3	Emission standard for industrial environments	1 (2001)
EN 60950	Safety of information technology equipment	6 (2000)
EN 50121-4	Railway signalling and telecommunications apparatus	
IEC 62236-4	Railway signalling and telecommunications apparatus	

The last two digits of the year in which the CE marking was affixed: 06

Herewith declares that product(s) listed above is in conformity with

No	Title	Issue
FCC part 15	Radio frequency devices	

Hans Levin
Technical Manager
7th July 2006

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
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 µs 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
	FCC part 15		Class B
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

Description

The TD-36 485 is designed to function reliably within industrial environments and in areas of high level interference. The modem has an RS-232 and RS422/485 interface supporting terminal data rates up to 115 kbit/s.

The TD-36 485 is a V.34 modem meaning that it can support bidirectional data rates of up to 33.6 kbit/s on the PSTN or leased line side. Fast connect ensures that leased lines can re-establish connections in the range of 5 seconds.

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. These functions together with remote configuration make the modem perfect for installation at unmanned sites and prevent the need of costly service trips.

The modem also has password protection, dial-back security and caller ID answering to ensure that only authorised users can communicate with the modem and any connected equipment.

The TD-36 485 also has a single digital input and output relay. The input and output can be used to trigger, or be triggered by a number of different user defined events. Both the digital input and output are galvanically isolated from the rest of the modem.

For ease of setup the modem is supported by the Westermo TD-tool configuration software but also has DIP switches to assist configuration. Drivers for Windows setup are also supplied.

- Extended temperature range –25°C to +70°C
- Data rate up to 33.6 kbit/s with Fast Connect
- Terminal rate up to 115.2 kbit/s
- 2-wire Leased Line (also 4-wire Leased Line on TD-36 485)
- V23 HDX with multidrop(also FDX on TD-36 485)
- DTR and incoming data dialling
- DIP-switch configuration
- Watchdog
- Secure call back and access
- Industrial environment transient protection on all interfaces
- Up to 11 data bits
- Tri-Galvanic isolation (interface/line/supply)
- Caller ID presentation and answering
- Remote configuration
- RS-422 / RS-485 interface (only in TD-36 485)
- Digital I/O (only in TD-36 485)
- Dial backup for PSTN and Leased Line (only in TD-36 485)

Remote configuration

The TD-36 can be configured from a remote modem. To configure a TD-36 any GSM, ISDN or PSTN modem can be used.

The modem used to configure is referred as the "local modem". To enable remote configuration, set DIP switch 2:7.

Please make sure that the remote TD-36 is connected to the PSTN network and is powered up.

- Connect the local modem to it's media (ISDN, PSTN or GSM)
- Connect the PC's com-port to the DTE interface of the local modem.
- Connect the power supply.
- Start a terminal emulation program (i.e. Windows Hyper-Terminal).
- Configure the local modem data rate and word format.

1. If the local modem is a GDW-12 a normal GSM data connection should be used.

2. If the local connection is ISDN, configure with the B channel protocol as V.110 9600 bit/s.

3. If the local connection uses some analogue modem, the modem has to be configured for V.32 modulation and an line speed of 9600 bit/s.

- Set up a connection to the remote TD-36 to be configured by using the normal dial command: ATD<No><CR>. When connected send the remote escape sequence <++++>. The called remote TD-36 will acknowledges by requesting the remote password. Enter the correct password (default: no password, just return). Next; configure the remote TD-36 using AT-commands. The password for remote configuration is defined with AT*WRAP – Remote access password.
- Configure the parameter on the remote TD-36 from your terminal program and save the settings with AT&W.
- Hang up the connection using the ATH command.

Generic I/O

The generic I/O gives the following functionality:

1. Establishing a data connection to a predefined target number

When the input is pulsed, the modem establishes a data connection to the stored predefined number. After a time (specified in the modem) without data exchange, the connection is released by an inactivity timer.

2. Sending an SMS Message to a predefined targetnumber

When the input is pulsed, the modem will send an SMS to a predefined number. The SMS Messages can handle at least 160 characters. TAP and UCP protocols are supported.

3. Sending a Text Message to a predefined targetnumber

When the input is triggered, the modem will establish a connection to the stored modem number and transfer a predefined text message. This is not an SMS message.

4. Using the remote digital output

When the input is triggered, the modem will establish a connection to the stored number of a remote TD-36 and send out a command, that pulses the remote output according to a predefined sequence.

5. Executing an AT-Command string

Pre-programmed AT command strings stored in the modem can be executed. These can (for example) be used for switching DTE communication parameters for online and offline modes by using two entries.

6. Transparent I/O

When the input is triggered, the modem will establish a connection to the stored number of a remote TD-36 and send out a command, and after a connection is established, the I/O is bi-directional.

To accept any operation ont the output from remote modems the "Remote I/O Enable" DIP switch must be set "ON"

Digital Output

The digital output gives the following functionality:

1. Output Contact

The modem has a change over relay output (SPDT-contact). This output can be controlled by a remote modem through Transparent I/O and Output service in the Generic I/O function. The output can also be programmed to follow the local DCD or DTR signals.

2. Remotely controlled

The output can be programmed to follow a remote modem data input. A remote unit can also set/reset the output as well as transferring a sequence of "set- and resets" of the output.

3. Follow DCD/Network

The output can be programmable to follow the local DCD or DTR signal.

Digital Input

The digital input gives the following functionality:

1. Static input

A static digital level trigged input high or low triggers the Generic I/O. With a level trigged input only the first entry in the Generic I/O list can be trigged by the I/O input.

The input is trigged when the selected level has been stable for t_a ms. A new trig will not occur until the input has return to the opposite state an back again.

High level trigged input timing

Low level trigged input timing
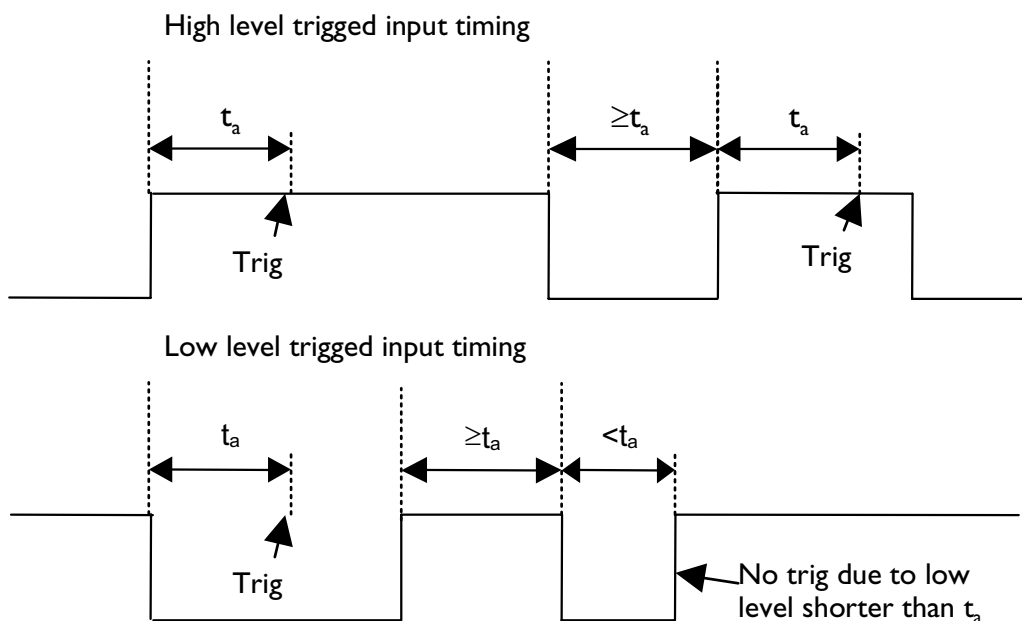
2. Pulsed Input

When input is set to edge trigged pulsed the number of pulses counted selects the entry to be trigged.

For the pulsing of an input, some timings must be kept.

The input is filtered and pulses shorter than t_a is discriminated. The time between pulses must also be kept shorter than T_p. One other restriction on T_p is that $T_p \geq 2t_a$. When time between pulses exceeds T_p the number of pulses are accumulated and an entry selected by number of pulses counted.

The parameter t_a is also used when output pulsing is selected.

The parameters t_a and T_p are programmable from 10 ms to 2550 ms.

Positive edge trigged input timing

Negativ edge trigged input timing

Number of pulses counted accumulated here
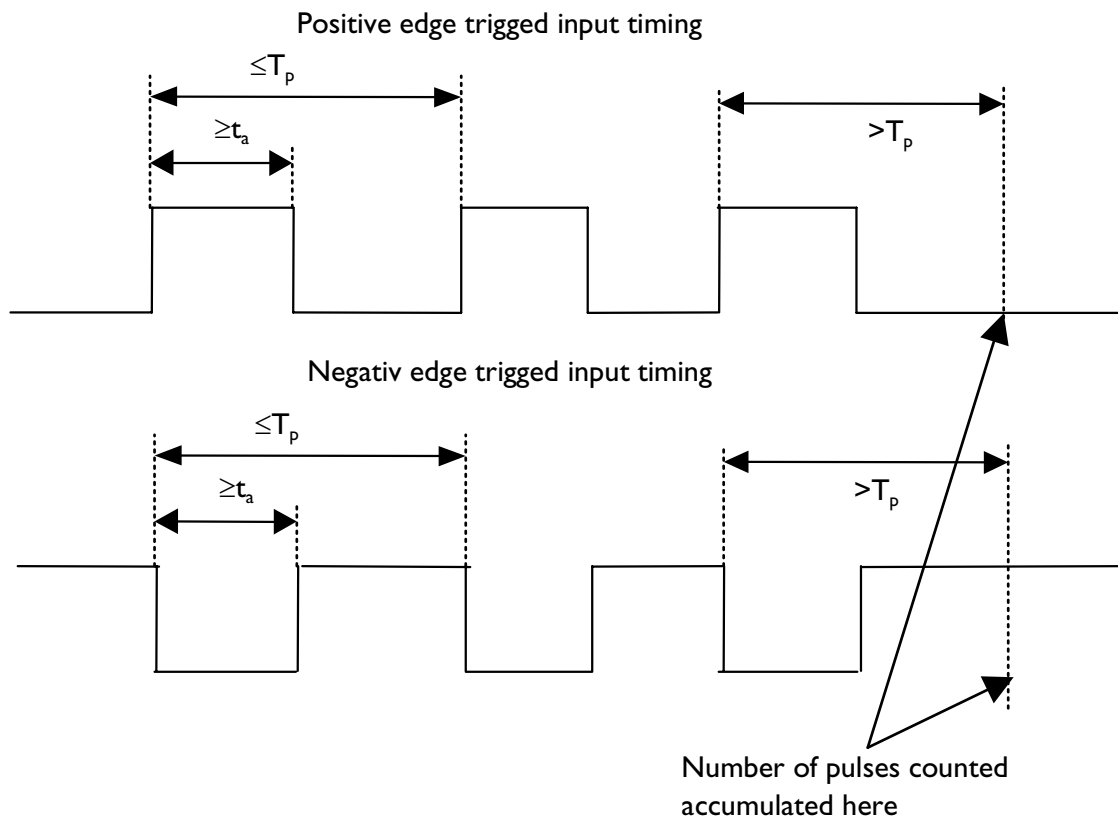
Interface specifications

Power AV	
Rated voltage	18 to 250 VDC
	22 to 240 VAC
Operating voltage	16 to 300 VDC
	20 to 264 VAC
Rated current	125 mA @ 16 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^2s
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 34 VAC
Operating voltage	10 to 60 VDC
	10 to 42 VAC
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^2s
Startup current*	0.30 A_{peak}
Polarity	Polarity independent
Isolation to	All other ports 3 kV$_{rms}$ 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	Bell103, Bell212, V.21, V.22, V.22Bis, V.23C, V.32, V.32Bis, V.34
Protection	Installation Fault Tolerant (up to ±60 V)
Isolation to	Power port 3 kV$_{rms}$ 50 Hz 1 min
	Leased Line 2 kV$_{rms}$ 50 Hz 1 min
	RS-232 2 kV$_{rms}$ 50 Hz 1 min
	RS-485 2 kV$_{rms}$ 50 Hz 1 min
	I/O 2 kV$_{rms}$ 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	Bell103, Bell212, V.21, V.22, V.22Bis, V.23C, V.32, V.32Bis, V.34
Transmission range/ Budget	PSTN 30 dB Leased Line max 40 dB
Protection	Installation Fault Tolerant (up to ± 60 V)
Isolation to	Power port 3 kV$_{rms}$ 50 Hz 1 min
	PSTN line 2 kV$_{rms}$ 50 Hz 1 min
	RS-232 2 kV$_{rms}$ 50 Hz 1 min
	RS-485 2 kV$_{rms}$ 50 Hz 1 min
	I/O 2 kV$_{rms}$ 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	1 200 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 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 kV$_{rms}$ 50 Hz 1 min PSTN line 2 kV$_{rms}$ 50 Hz 1 min Leased Line 2 kV$_{rms}$ 50 Hz 1 min I/O 1.5 kV$_{rms}$ 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	1 200 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 ≤ 15 m
Isolation to	Power port 3 kV$_{rms}$ 50 Hz 1 min PSTN line 2 kV$_{rms}$ 50 Hz 1 min Leased Line 2 kV$_{rms}$ 50 Hz 1 min I/O 1.5 kV$_{rms}$ 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 V
Input active	U_{in} >5.0 V
Transmission range	Cable length ≤ 15 m
Connection	Detachable screw terminal (DCE)
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)
Isolation to	Power port 3 kV$_{rms}$ 50 Hz 1 min
	PSTN line 2 kV$_{rms}$ 50 Hz 1 min
	Leased Line 2 kV$_{rms}$ 50 Hz 1 min
	RS-232 2 kV$_{rms}$ 50 Hz 1 min
	RS-485 2 kV$_{rms}$ 50 Hz 1 min
	I/O output 2 kV$_{rms}$ 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 ≤ 15 m
Connection	Detachable screw terminal (DCE)
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)
Isolation to	Power port 3 kV$_{rms}$ 50 Hz 1 min
	PSTN line 2 kV$_{rms}$ 50 Hz 1 min
	Leased Line 2 kV$_{rms}$ 50 Hz 1 min
	RS-232 1.5 kV$_{rms}$ 50 Hz 1 min
	RS-485 1.5 kV$_{rms}$ 50 Hz 1 min
	I/O input 2 kV$_{rms}$ 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 enclo-
  sure of the apparatus cabinet, or similar, where the unit is built-in. This conductive enclosure should be con-
  nected to the earthing system of an installation and may be directly connected to the protective earth.

RS-232 (DTE)

| Position | | Direction* | Description | D-sub |
D-sub	Screw terminal			description
No. 1	No. 4	Out	Data Carrier Detect (DCD)	
No. 2	No. 7	Out	Received Data (RD)	
No. 3	No. 8	In	Transmitted Data (TD)	
No. 4	No. 3	In	Data Terminal Ready (DTR)	
No. 5	No. 1	–	Signal Ground (SG)	
No. 6	No. 2	Out	Data Set Ready (DSR)	
No. 7	No. 6	In	Request To Send (RTS)	
No. 8	No. 5	Out	Clear To Send (CTS)	
No. 9	No. 9	Out	Ring Indicator (RI)	

* Direction relative to this unit.
NC = Not Connected

Leased Line

Position	Direction	Description	Product marking	
No. 1	In/Out	2-wire Receive/ Transmit	LL1	
No. 2	In/Out	2-wire Receive/ Transmit	LL2	

PSTN

| Position | | Direction* | Description | Product marking | | |
RJ-11C	Screw terminal**			RJ-11C	Screw terminal	
a			NC			
b		In/Out	PSTN Transmit/ Receive Disconnects from "pin c" when the modem goes Off-Hook			
c	2	In/Out	PSTN Transmit/ Receive		LL2	
d	1	In/Out	PSTN Transmit/ Receive		LL1	
e		In/Out	PSTN Transmit/ Receive Disconnects from "pin d" when the modem goes Off-Hook			
f			NC			

* Direction relative to this unit. ** The PSTN screw terminals are shared with 2-wire Leased Line
NC = Not Connected

LED Indicators
(for details see page 20)

Power

Position	Direction*	Description	Product marking
No. 1	In	AC: Neutral DC: –Voltage	$\approx$
No. 2	In	AC: Line DC: +Voltage	

* Direction relative to this unit.

RS-232 (DTE)
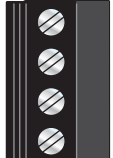
| | Position | | | |
D-sub	Screw terminal	Direction*	Description	D-sub description
No. 1	No. 4	Out	Data Carrier Detect (DCD)	
No. 2	No. 7	Out	Received Data (RD)	
No. 3	No. 8	In	Transmitted Data (TD)	
No. 4	No. 3	In	Data Terminal Ready (DTR)	
No. 5	No. 1	–	Signal Ground (SG)	
No. 6	No. 2	Out	Data Set Ready (DSR)	
No. 7	No. 6	In	Request To Send (RTS)	
No. 8	No. 5	Out	Clear To Send (CTS)	
No. 9	No. 9	Out	Ring Indicator (RI)	

NC = Not Connected

Leased Line

Position	Direction*	Description	Product marking
No. 1	Out	4-wire Transmit	LL1
	In/Out	2-wire Receive/ Transmit	
No. 2	Out	4-wireTransmit	LL2
	In/Out	2-wire Receive/ Transmit	
No. 3	In	4-wire Receive	LL3
	In/Out	2-wire Receive/ Transmit at Leased Line PSTN backup	
No. 4	In	4-wire Receive	LL4
	In/Out	2-wire Receive/ Transmit at Leased Line PSTN backup	

PSTN

| | Position | | | Product marking | |
RJ-11C	Screw terminal**	Direction*	Description	RJ-11C	Screw terminal
a			NC		
b		In/Out	PSTN Transmit/ Receive Disconnects from "pin c" when the modem goes Off-Hook		
c	2	In/Out	PSTN Transmit/ Receive		LL2
d	1	In/Out	PSTN Transmit/ Receive		LL1
e		In/Out	PSTN Transmit/ Receive Disconnects from "pin c" when the modem goes Off-Hook		
f			NC		

* Direction relative to this unit. ** The PSTN screw terminals are shared with 2-wire Leased Line
NC = Not Connected

LED Indicators
(for details see page 20)

Power

Position	Direction*	Description	Product marking
No. 1	In	AC: Neutral DC: −Voltage	≂
No. 2	In	AC: Line DC: +Voltage	

* Direction relative to this unit.

RS-422/485

Position	Direction*	Description		Product marking
No. 1	In	R+ (A') Receive	RS-422/485 4-wire	R+
No. 2	In	R− (B') Receive	RS-422/485 4-wire	R−
No. 3	Out	T+ (A) Transmit	RS-422/485 4-wire	T/R+
	In/Out	T+ (A/A') Transmit/Receive	RS-485 2-wire	
No. 4	Out	T− (B) Transmit	RS-422/485 4-wire	T/R−
	In/Out	T+ (A/A') Transmit/Receive	RS-485 2-wire	

* Direction relative to this unit

I/O Input/Relay Output

Position	Direction*	Description	Product marking	
No. 1	In	Input +	+	
No. 2	In	Input −	−	
No. 1	In/Out	Normal closed contact	NC	
No. 2	In/Out	Common contact	C	
No. 3	In/Out	Normal open contact	NO	
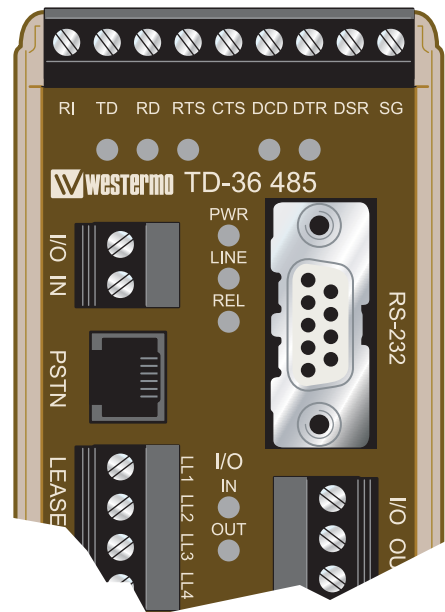
LED Indicators

LED	Status	Description
TD Transmit data	OFF	No data
	ON / FLASH	The modem receiving data on the DTE interface
RD Receive data	OFF	No data
	ON / FLASH	The modem transmitting data on the DTE interface
RTS Request to send	OFF	RTS signal is inactive
	ON	RTS signal is active
DCD Data carrier detect	OFF	DCD signal is inactive
	ON	DCD signal is active, modem has detected a carrier or the signal is set to always ON
DTR Data carrier detect	OFF	DTR signal is inactive
	ON	DTR signal is active
REL Reliable mode	OFF	Reliable mode is OFF, direct or normal mode
	ON	Reliable mode is ON
	FLASH	Reliable mode with error correction and compression
LINE	OFF	The modem is on-hook
	ON	The modem is off-hook with an established connection
	FLASH	The modem is off-hook and negotiating
PWR Power	OFF	The modem has no power
	ON	The modem is up and running
	FLASH	The modem is in the power-on selftest
Only for TD-36 485		
I/O IN	OFF	The I/O input is inactive
	ON	The I/O input is active
I/O OUT	OFF	The I/O output is inactive, C and NC connected
	ON	The I/O output is active, C and NO connected

DIP-switch settings
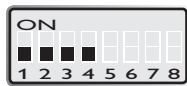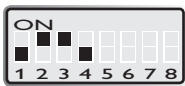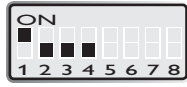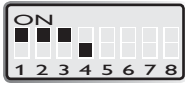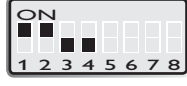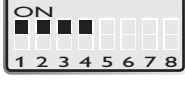
⚠️ **Before DIP-switch settings:**

Prevent damage to internal electronics from electrostatic discharges (ESD) by discharging your body to a grounding point (e.g. use of wrist strap).

NOTE DIP-switch alterations are only effective after a power on.
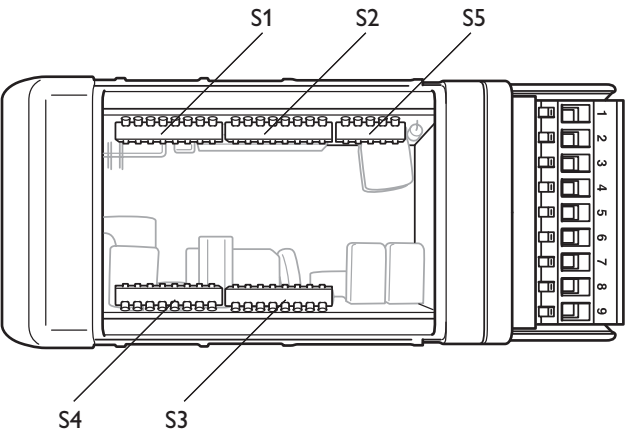
S1 DIP-switch
Selection of DTE speed

Switch setting	Speed
	Auto Baud
	300 bit/s
	600 bit/s
	1200 bit/s
	2400 bit/s
	4800 bit/s
	9600 bit/s
	19.2 kbit/s
	38.4 kbit/s
	57.6 kbit/s
	115.2 kbit/s
	Use stored values

S1 DIP-switch
Selection of DTE format
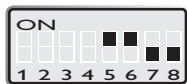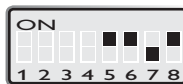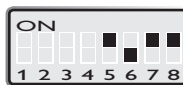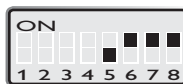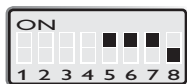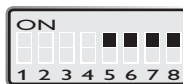
Switch	Setting
ON 1 2 3 4 5 6 7 8	7E 1S
ON 1 2 3 4 5 6 7 8	7E 2S
ON 1 2 3 4 5 6 7 8	7O 1S
ON 1 2 3 4 5 6 7 8	7O 2S
ON 1 2 3 4 5 6 7 8	8N 1S
ON 1 2 3 4 5 6 7 8	8N 2S
ON 1 2 3 4 5 6 7 8	8E 1S
ON 1 2 3 4 5 6 7 8	8E 2S
ON 1 2 3 4 5 6 7 8	8O 1S
ON 1 2 3 4 5 6 7 8	8O 2S
ON 1 2 3 4 5 6 7 8	Direct Mode 8E,8O
ON 1 2 3 4 5 6 7 8	Direct Mode 8E,8O 2S
ON 1 2 3 4 5 6 7 8	Direct Mode 7E,7O,8N
ON 1 2 3 4 5 6 7 8	Direct Mode 7E,7O,8N 2S
ON 1 2 3 4 5 6 7 8	7N 2S
ON 1 2 3 4 5 6 7 8	Use stored values

S2 DIP-switch
Leased Line Mode selection
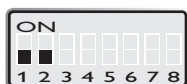
Switch	Setting
ON 1 2 3 4 5 6 7 8	Leased Line disable, PSTN enable
ON 1 2 3 4 5 6 7 8	Leased Line answering
ON 1 2 3 4 5 6 7 8	Leased Line multidrop
ON 1 2 3 4 5 6 7 8	Leased Line calling

S2 DIP-switch
DTE interface selection

Switch	Setting
ON 1 2 3 4 5 6 7 8	RS-422/485 disable, RS-232 enable
ON 1 2 3 4 5 6 7 8	RS-422/485 enable, RS-232 disable

S2 DIP-switch
RS-422/485
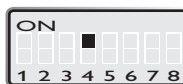
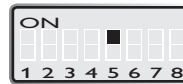| Switch	Setting
ON 1 2 3 4 5 6 7 8	RS-422/485, 2-wire
ON 1 2 3 4 5 6 7 8	RS-422/485, 4-wire

S2 DIP-switch
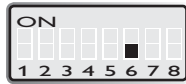## Leased Line 2/4 wire selection
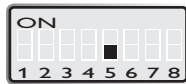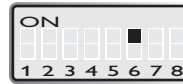
Leased Line 2-wire

Leased Line 4-wire

S2 DIP-switch
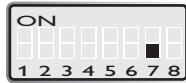## Selection PSTN backup of Leased Line
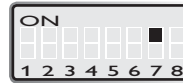
Backup of Leased Line disabled

Backup of Leased Line enabled

S2 DIP-switch
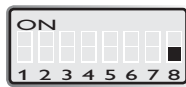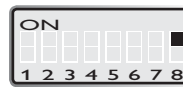## Selection of answering/calling mode for PSTN backed up Leased Line

Answering

Calling

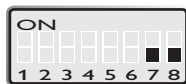## S2 DIP-switch
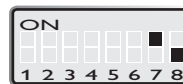## Remote configuration control

Use stored values

Remote configuration enabled

S3 DIP-switch
Multidrop Leased Line termination

Termination disabled

Termination of Receiver in 4-wire mode

Termination of Transmitter / Receiver in 2-wire mode and Transmitter in 4-wire mode

Termination of both Transmitter and Receiver in 4-wire mode

S3 DIP-switch
Flow control DTE interface

Use stored value for AT&Kn

RTS/CTS flow control enable AT&K3
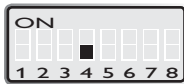
S3 DIP-switch
PLC parameter setting

Use stored values

PLC settings ATQ1E0&C1&K0&A1

S3 DIP-switch
Reliable mode setting

Use stored values

Reliable mode AT\N2 enable

Reliable mode AT\N0 disable

S3 DIP-switch
Blind dialing

Use stored values

Enable blind dialing ATX3

S3 DIP-switch
Dial abort

Use stored values

Dial abort disabled AT&A1

S4 DIP-switch
Selection of line speed and modulation

Use saved parameters defined by AT+MS

V.32bis 12000

V.21 300

V.32bis 14400

V.23 1200 hdx

V.34 19200

V.22 1200

V.34 24000

V.22bis 2400

V.34 28 800

V.32bis 4800

V.34 33600

V.32bis 7200

Automatic line speed

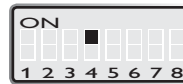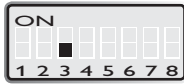V.32bis 9600

S4 DIP-switch
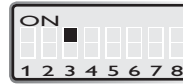## Auto retrain control

Use stored values

Auto retrain disabled AT%E0
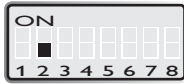
S4 DIP-switch
Data compression control

Use stored values

Data compression AT%C0 disabled

S4 DIP-switch
DCD, DTR and DSR control

Use stored values
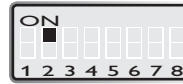
DCD and DSR always on, DTR ignored. AT&C0&D0&S0

S4 DIP-switch
Set modem to factory default
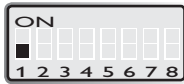
Use stored values
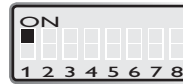
Restore factory default setting*

* Don't leave S4:1 in ON position if not intending to restore factory setting at every power on.

S5 DIP-switch
RS-422/485 termination

No termination

Termination of R in 4-wire connection

Termination of both T and R in 2-wire connection

Termination of both T and R in 4-wire connection

Factory default
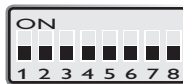
S1   S2   S3   S4   S5

RS-422/485 general advice

4-wire termination

TD-36 485

R+
R–
T+
T–

■ =Termination

R– R+ T– T+ R– R+ T– T+

Slave unit   Slave unit

B' A' B A

Slave unit

2-wire termination

TD-36 485

T+
T–

■ =Termination

T- T+   T- T+

Max 0.3 metre

Slave unit   Slave unit

B A

Slave unit
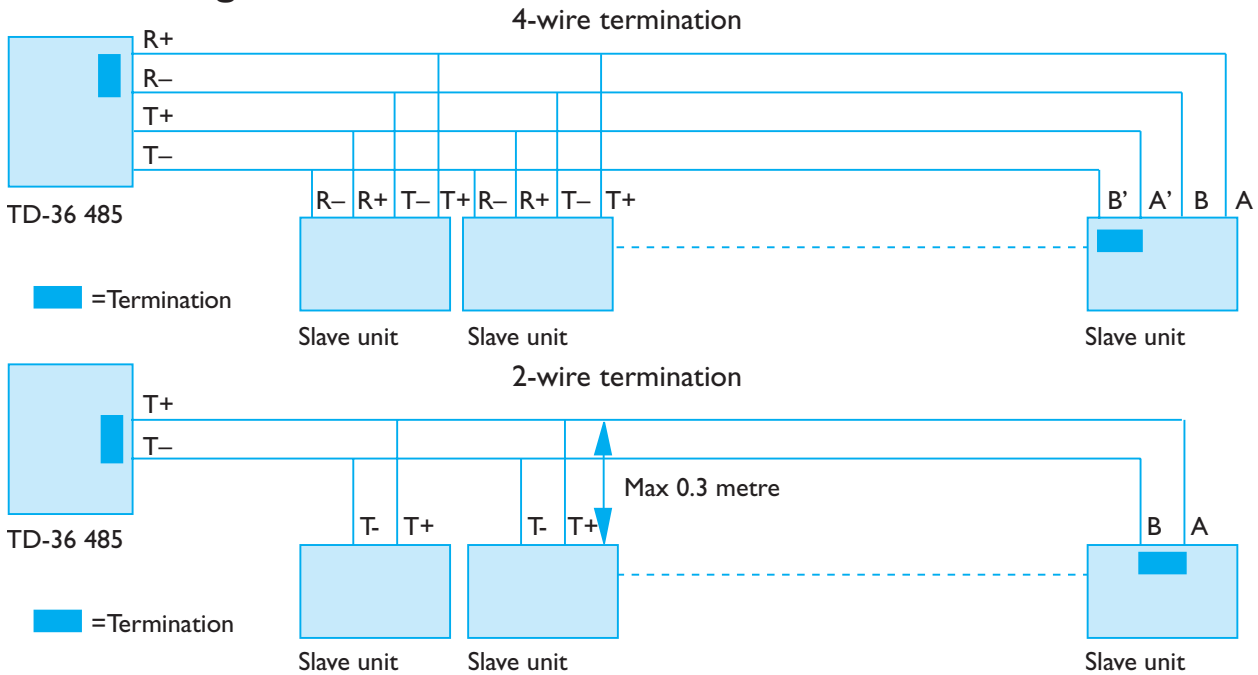
Termination recommendations

The RS-422/485 line must be terminated. In the TD-36 485, the termination is combined with fail-safe functionality. The termination is used to prevent undefined states when the bus is in tri-state condition.
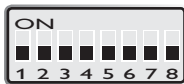
- Using 2-wire RS-485 both ends should be terminated.
- Using 4-wire RS-485 both pairs shall be terminated at both ends.
- Using 4-wire RS-422 it's only necessary to terminate the receivers.

RS-422/485 connection pins can be differently named. For some equipment brands the T+ corresponds to A, but other brands might use some other naming convention. If a unit does not work it can help to swap A and B.

Mounting

This unit should be mounted on 35 mm DIN-rail, which is horizontally mounted inside an apparatus cabinet, or similar.

Snap on mounting, see figure.
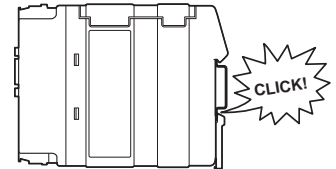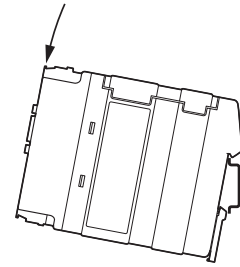
Cooling

This unit uses convection cooling. To avoid obstructing the airflow around the unit, use the following spacing rules. Minimum spacing 25 mm (1.0 inch) above /below and 10 mm (0.4 inches) left /right the unit. Spacing is recommended for the use of unit in full operating temperature range and service life.

10 mm *
(0.4 inches)

25 mm

25 mm

* Spacing (left/right) recommended for full operating temperature range
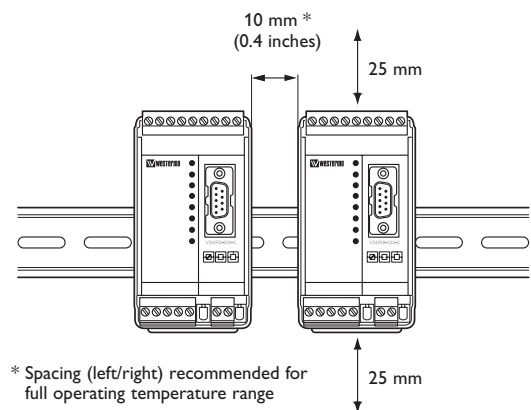
Removal

Press down the black support at the back of the unit using a screwdriver, see figure.
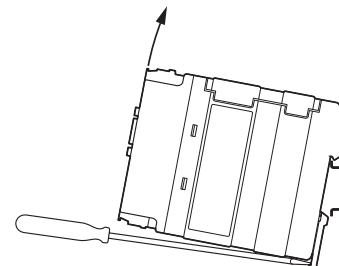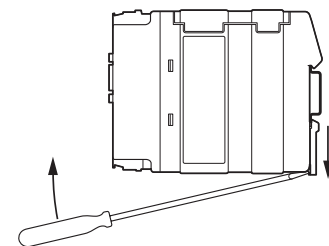
Windows configuration tool TD-Tool

The TD-Tool is a PC – application program with a graphical interface for easy configuration of the complex functions found in the TD-36.

Please refer to TD-Tool for a complete description of the functionality of the Windows program.

Configuration

The TD-36 can be configured both from the local DTE interface and remotely over the PSTN network. Whether the local or remote interface is used the configuration can be made with AT-commands or with a PC-based application configuration tool. Basic configurations can also be made with DIP switches locally.

AT-Commands

The most commonly used commands are listed below in short format.
Please refer to the document "TDW-33 and TD-36 AT-Command Guide" for a complete list of all the available AT-commands and a detailed description of the serial AT-command interface.

A – Answer a call

Syntax:
ATA

&An – Dial Abort Option

Syntax:
AT&A<n>

Parameters:
<n>
0:      Enables Abort (Default)
1:      Disable Abort

&B – DTR Dial Option

Syntax:
&B<n>

Parameters:
<n>
0:    Disable DTR/TX Hotcall (Default)
1:    Enable DTR Hotcall
2:    Enable TX Hotcall (buffered data)

&C –DCD Option

Syntax:

AT&C<n>

Parameters:

<n>

0:      DCD remains ON at all times
1:      DCD follows the state of the carrier

D and DL – Dial command

Syntax:

ATD<nb> where <nb> represents a dial string composed of dial characters and dial modifiers.

&D – DTR Control

Syntax:

AT&D<n>

Parameters:

<n>

0:      The DTR signal is ignored (Default).
1:      Modem switches from data to command mode when DTR drops.
2:      DTR drop switch causes the modem to hang up.
3:      DTR drop causes the modem to perform a soft reset.

E – Echo

Syntax:

ATE<n>

Parameters:

<n>

0:      Characters are not echoed
1:      Characters are echoed

&F – Restore Factory Configuration

Syntax:

AT&F<n>

Parameters:

<n>

0:      Restore factory configuration 0
1:      Restore factory configuration 1

H – Disconnect (Hang-Up)

Syntax:

ATH<n>

Parameters:

<n>

0:      The modem will release the line if the modem currently is on-line.
1:      If on-hook, the modem will go off-hook and enter command mode.

+ICF – Fixed DTE format

Syntax:

AT+ICF=<format>
AT+ICF=?
AT+ICF?

Parameters:

<format>:

0	Auto
4,4	7N2
5,1	7E1
5,0	7O1
3,4	8N1
2,1	8E1
2,0	8O1
4,1	7E2
4,2	7O2
1,4	8N2
1,1	8E2
1,2	8O2

+IPR – Fixed DTE rate

Syntax:
AT+IPR=<rate>
AT+IPR=?
AT+IPR?

Parameters:
<rate>: baud rates that can be used by the DCE

0	(enables autobauding)
300	
600	
1200	
2400	
4800	
9600	
19200	
38400	
57600	
115200	

&K – DTE-DCE flow control

Syntax:
AT&K<n>

Parameters:
<n>

0	Disables Flow Control (Default)
3:	Enables RTS/CTS
4:	Enables XON/XOFF
5:	Enables transparent XON/XOFF

M – Speaker Control

Syntax:

ATM<n>

Parameters:

<n>

0:      Speaker OFF
1:      Speaker is on during call estabilishment, but OFF when receiving a carrier. (Default)
2:      Speaker is always ON
3:      Speaker is off when receiving a carrier and during dialing, but on during answering.

+MS – Select Modulation

Syntax:

+MS=<carrier>,<automode>,<min_tx_rate>,<max_tx_rate>,<min_rx_rate>,<max_rx_rate>
+MS= ?
+MS ?

Parameters:

<carrier>

V21	300 bit/s
V22	1200 bit/s
V22B	1200 or 2400 bit/s
V23C	1200/75 ,75/1200 bit/s PSTN-mode dialled connections
V23HDX	1200/1200 half duplex PSTN dialled connections (TD-36 and TD-36 485 also 2 wire leased line)
V23FDX	1200/1200 bit/s full duplex 4 wire leased line (only TD-36 485)
V32	4800 or 9600 bit/s
V32B	4800, 7200, 9600, 12000 or 14400 bit/s
V34	2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 33600 bit/s
B103	300 bit/s
B212	1200 bit/s

<automode>

0:      Disable
1:      Enable

< min_xx_rate >, < max_xx_rate >

Minimum and maximum data rate depending on modulation used.

\N – Select Operating mode

Syntax:

AT\N<n>

Parameters:

<n>

0:    Selects normal speed buffered mode
1:    Selects DIRECT mode
2:    Selects reliable mode. The modem will attempt a LAPM connection and then an MNP connection. Failure to make a reliable connection results the modem hanging up.
3:    Selects reliable mode. Failure to make a reliable connection results the modem falling back to speed buffered mode.
4:    Selects LAPM error-correction mode. Failure to an LAPM error-correction connection results the modem hanging up.
5:    Selects MNP error-correction mode. Failure to an MNP error-correction connection results in the modem hanging up.

Q – Result Code Control

Syntax:

ATQ<n>

Parameters:

<n>

0:    DCE transmits result codes
1:    Result codes are suppressed and not transmitted

S0 – Automatic answer

Syntax:

ATS0=<value>

Parameters:

<value>

0-255 rings to answer on

V – Result format

Syntax:

ATV<n>

Parameters:

<n>

0	(Information responses):	<text><CR><LF>
0	(Result codes):	<numeric code><CR>
1	(Information responses):	<CR><LF><text><CR><LF>
1	(Result codes):	<CR><LF><verbose code><CR><LF>

W – Connect message control

Syntax:

ATW<n>

Parameters:

<n>

0:   Upon connection, the modem reports only the DTE speed.

1:   Upon connection, the modem reports the line speed, the error correction protocol, and the DTE speed respectively.

2:   Upon connection, the modem reports the DCE speed

&W – Store system setting

Syntax:

AT&W<n>

Parameters:

<n>

0:   Store the current configuration as profile 0

1:   Store the current configuration as profile 1

Application examples

⊞ TD-36 connected to TD-36 with DTR signal call

## Configure the units

AT&F	Set the unit to factory default
AT&W	Store default settings

Set up the connection – The dialling modem

AT&Z0=nnn	Store the number of the remote modem in the dialling TD-36
AT&S0	Set DSR signal always high (if this signal is used to trig the DTR)
AT&B1	Activates automatic DTR dialling if DTR switches from low (OFF) to high (ON)
AT&W	Save settings
Switch DTR from OFF to ON	The modem will now dial the phone number stored in the first location of the telephone number table (AT&Z0=<nnn>)

Set up the connection – The answering modem

ATA	Enter the answer command when RING comes from the network or set up ATS0=1 to auto answer on 1 RING signal (or more than 1)

NOTE: If no valid DTR signal can be provided by external application, the modems DSR signal can be used to trig the transmission. Connect the DSR signal via a relay, or other potential free contact, to the DTR signal. A 10 kohm pull down resistor should also be connected between the DTR and a signal that is always low e.g. the DCD.
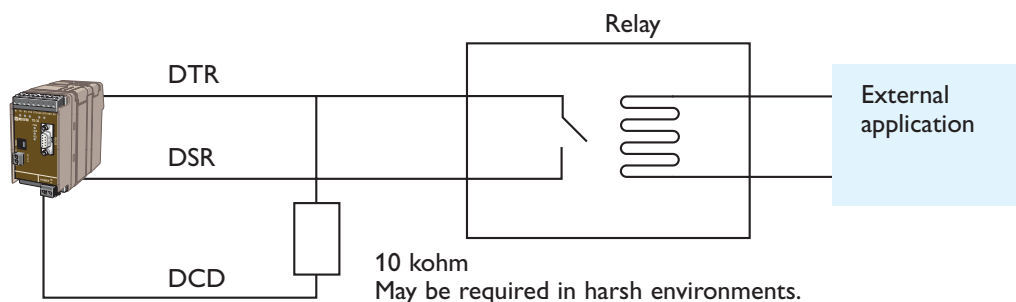
⁞ Frequently used settings for PLC-systems

Most PLC-systems and other industrial applications where modems are used require the same changes to the standard settings.

The most commonly encountered problems concern speed, parity and control signals from the connected equipment.

Speed and parity are changed with the switches under the cover in block S1. If this action does not solve the problem the modem's answering codes and possible echoing of commands might be the source of the difficulty.

Below follows a list of commands that might resolve the problems. The commands may of course be placed on one single command line if desired.

Configure the TD-36 connected to the PLC

AT&F	Set the unit to factory default.
ATV0	Gives the answering codes in short format. (digits)
ATQ1	No result codes are sent on the RS-232/V.24 connection.
ATE0	Commands that are sent from the terminal/computer etc. are not echoed back to the RS-232/V.24 connection.
AT&C1	DCD will follow the carrier on the line.
AT&K0	No handshaking.
AT&A1	Character abort option OFF.
AT&W	Store default settings.

Note: S3:5 may be used for this purpose.

⠿ Leased Line connection using 2- or 4-wire

Leased Line connections can be set up using 2-wire (or 4-wire in TD-36 485).

When renting a 4-wire line from a telephone company one pair of cables for transmission and one pair for reception are usually provided.

The maximum transmission distance depends on the attenuation of the line. The maximum value is theoretically 30 dBm. To have a good error rate it is recommended to keep the attenuation under 20 dB, which is approximately 20 km in distance. When renting lines from a telephone company a longer transmission distance is normally possible as the signals are probably transmitted over PCM-lines, i.e. fibre optic or other media with low attenuation.

To set the modem for leased line applications use the dip switches.
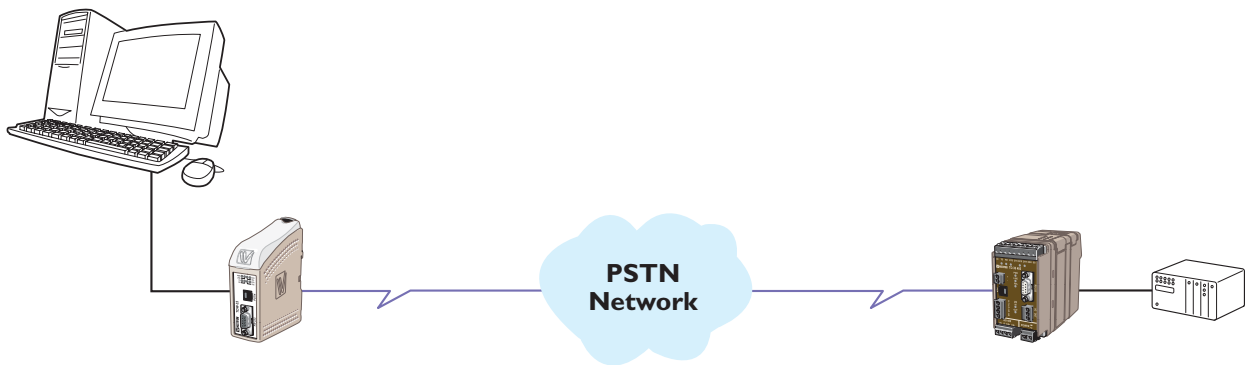
Configure the units

AT&F	Set the unit to factory default
ATQ1	No result codes are sent on the RS-232/V.24 connection.
AT&W	Store default settings
S2:1, 2 ON	Leased line calling
S2:2 ON	Leased line answering
S2:5 OFF	Leased line 2-wire
S1	Sets speed and parity for the RS-232 port.
S4	Decides line-speed. Must be set in direct mode applications.

To make switch setting active the power must be cycled OFF ON.

⠿ TD-36 – Secure Call-back

The TD-36 is connected to a PLC which one want to restrict access to. The TD-36 can support access control through the Secure Callback function. In this example password and callback to a predefined number is chosen. The modem in the calling end is here chosen to be a PSTN modem, but can be any of the PSTN, ISDN or GSM modem from the Westermo product range.

The DTE serial speed between the PLC – TD-36 and TDW-33 – PC is assumed to be 9600 8N1 but can be chosen to fit the actual system requirement.

PSTN Network

Configure the TD-36

AT&F	Set the unit to factory default
AT+IPR=9600	DTE baudrate 9600
AT+ICF=3,4	Character framing 8 data, 1 stop, parity none
ATS0=1	Auto answer after first ring
ATQ1E0&C1&K0&A1	Suitable for PLC communication
AT&W	Store default settings
AT*WCB=4	Callback enabled, Password and callback number stored in one or more positions of wcbtab
AT*WCBTAB=1,"+4670428000", "n3Y9kA6otYZu8"	**Define callback number 1** When password 1 is entered number +4670428000 will be called
AT*WCBTIME=10	Define delay time between hangup an callback The TD-36 will wait 10s after hangup to callback to allow the analogue modem to hangup

Configure the TDW-33

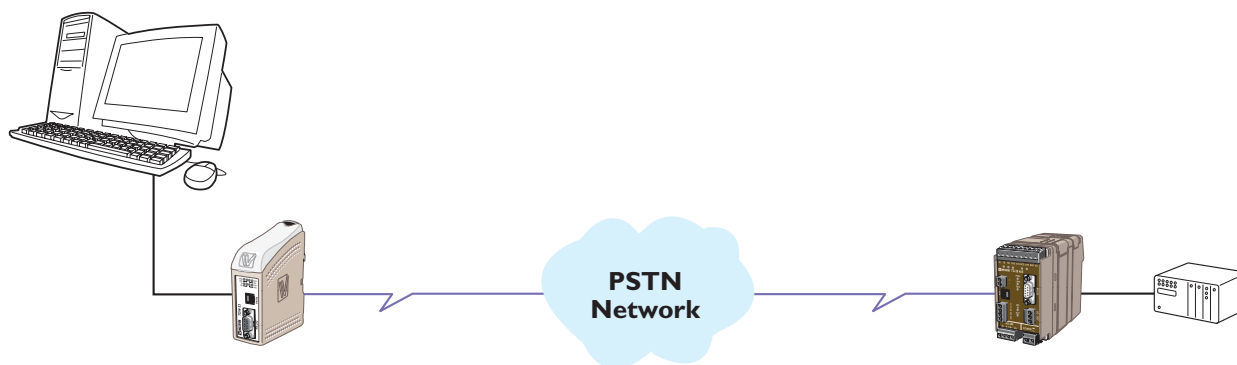| AT&F	Set the unit to factory default
AT+IPR=9600	DTE baudrate 9600
AT+ICF=3,4	Character framing 8 data, 1 stop, parity none
ATS0=1	Auto answer after first ring
AT&W	Store default settings

Set up the connection

The dialling modem TDW-33	The answering modem TD-36	Comment
ATD0705123456	TD-36 answers the call and requests to TDW-33	Dial the number to TD-36
CONNECT 9600	TD-36 verifies the password to the passwords stored and if true compare dissconnects.	Operator/system at TDW-33 enters Password: n3Y9kA6otYZu8
NO CARRIER	Wait 10 s	The connection is broken and TD-36 waits the programmed 10s for TDW-33 to disconnect
CONNECT 9600	TD-36 dials +4670428000	The number programmed corresponding to the password is dialled, preferable it's the number to the TDW-33
CONNECT 9600		Connection is established between the PC at TDW-33 and the PLC at TD-36

⠿ TD-36 – Silent answering on predefined number

The TD-36 is connected to a power meter which is remotely monitored. The TD-36 shares the PSTN line with normal telephones which is preferred not to give a ring signal when the meter is read.

The TD-36 is configured to answer calls on the Caller ID received, the valid numbers to answer is programmed into the TD-36. There exists a number of standards for sending Caller ID check which standard is used by your operator. The TD-36 supports the major implementations of Caller ID. In this example the DTMF Caller ID version is used. Note that some implementations doesn't give the possibility to make a silent answer since the Caller ID is sent between first and second ring signal.

The modem in the calling end is here chosen to be a PSTN modem, but can be any of the PSTN, ISDN or GSM modem from Westermo product range.


Configure the TD-36 connected to the power meter

AT&F	Set the unit to factory default
AT+IPR=9600	DTE baudrate 9600
AT+ICF=3,4	Character framing 8 data, 1 stop, parity none
ATS0=0	No auto answer on Ring signals
ATQ1E0&C1&K0&A1	Suitable for PLC communication
AT&W	Save settings
AT*WACCTAB=1,"016428000" AT*WACCTAB=2,"016480250"	Set the valid A-numbers for automatic answering
AT*WCID=3,3	Set Caller ID to A-number answer with DTMF coded numbers

⠿ TD-36 485 2-wire half duplex

In this application the TD-36 485 is set to communicate with a number of units with RS-485 interface.

The communication is 2 wire half duplex at 38.4 kbit/s, 8 data, parity even and 1 stop bit.
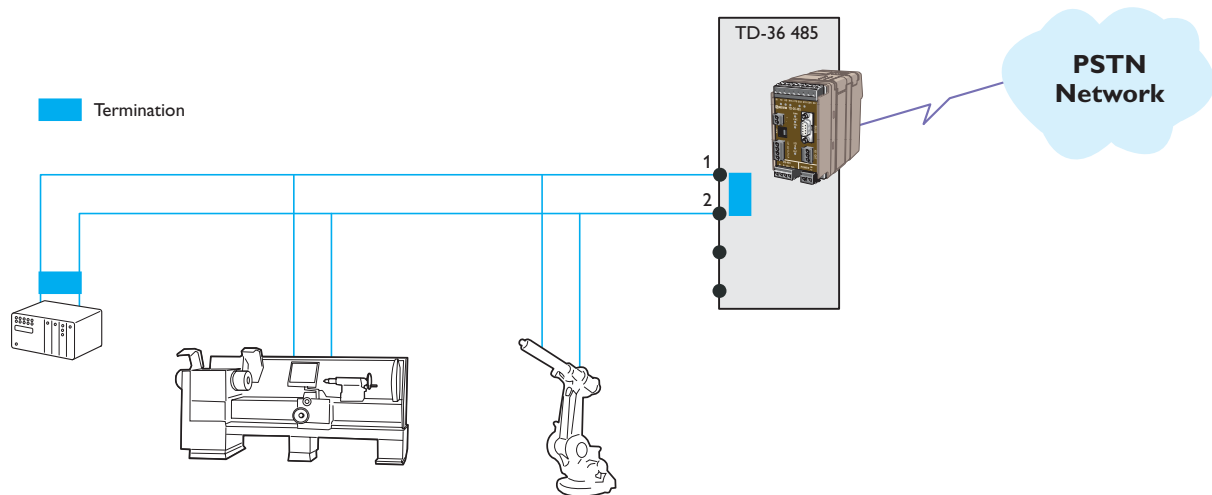
Configure the TD-36 485

AT&F	Set the unit to factory default
AT&W	Store default settings
S2:3 ON	RS-422/485 enable RS-232 disable
S2:4 OFF	Select 2-wire RS-485
S1:4 ON	38.4 kbit/s
S1:7 ON	8 data bits even parity 1 stop bit
S3:8 ON	Termination / Failsafe active

To make switch setting active the power must be cycled OFF -> ON.

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