



## **MTi 133-2**

**33 600 b/s INDUSTRIAL MODEM  
SWITCHED TELEPHONE NETWORK  
DEDICATED LINE**

**USER GUIDE**

DOC. ref. : 9010209-03

**If you have questions about the MTi 133-2 modem  
or need assistance,  
contact ETIC Telecommunications at the following address :**

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## I EC SAFETY AND CONFORMITY DECLARATIONS

<b>MANUFACTURER IDENTIFICATION</b>	
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<b>PRODUCT IDENTIFICATION</b>	
NATURE	PSTN MODEM
TYPE	V34
COMMERCIAL REFERENCES	MTI133-200EUR and variants finishing with EUR.

ETIC TELECOMMUNICATIONS declare under their entire responsibility that the products described above are in compliance with the following applicable essential requirements (especially those of Directive 1999/5/EC) :

Article 3.1a :

The protection of the health and the safety of the user : EN60950 et EN41003.

Article 3.1b :

The protection requirements with respect to electromagnetic compatibility : EN50082-2.

Article 3.3 :

Compatibility requirements with respect to networks : CTR21 and CTR15.





## II OVERVIEW

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## **II OVERVIEW**

### **1. Product overview**

The MTi 133-2 range of modems has been designed for asynchronous data transmission on the switched telephone network up to 33600 b/s or on a voice band dedicated line.

Adapted references make it possible to use the MTi133-2 in all countries around the world.

It can be delivered with the KIT 12 accessories (1 RS232 cable, 1 power supply module and 1 desktop base) in order to fix it on a desk.

Its characteristics make it well suited to the remote management and maintenance of industrial equipments :

9 to 40 or 40 to 60 VDC power supply.

DIN rail mounting for use in an electrical cabinet.

Small-sized metal case.

Excellent EMC immunity.

RS232 and RS485 (2 wires) asynchronous interfaces.

AT commands.

Relay call command to a stored number.

MODBUS and UNITELWAY call commands (MTi 133-201 only).

7 or 8 bits transmission. Parity: even or none. 1 or 2 stops (9 to 11 bits).

V42 and MNP2-4 error detection and correction.

V42b and MNP5 data compression.

## 2. Product Identification

Each product reference appears on a label stuck on the side of the modem. The tables below contain all available references of the MTi133-2 range of modems.

<b>MTi133- 2 0 ■ XXX</b>	<b>200XXX</b>	<b>201XXX</b>
<b>Power supply</b>	9 to 40 VDC	9 to 40 VDC
RS232 and RS485 interface	•	•
AT dial commands	•	•
Relay call commands	•	•
MODBUS and UNITELWAY call commands		•

XXX = EUR for european references  
 INT for international references

<b>MTi133- 2 1 ■ XXX</b>	<b>210XXX</b>	<b>211XXX</b>
<b>Power supply</b>	40 to 60 VDC	40 to 60 VDC
RS232 and RS485 interface	•	•
AT dial commands	•	•
Relay call commands	•	•
MODBUS and UNITELWAY call commands		•

XXX = EUR for european references  
 INT for international references

The MTi133-200EUR or MTi133-201EUR references are compliant with European rules.

They are delivered with an RJ11 cable. National telephone plugs are available in our catalogue.

The MTi133-200INT or MTi133-201INT international references are operational in most countries around the world.

They are delivered with an RJ11 cable. National telephone plugs are available in our catalogue.

### 3. Leds / push-buttons / connectors

6 leds permit to check the functioning state of the modem :

RD Green One or n characters are being sent to the terminal.

TD Green One or n characters are being sent to the modem.

DTR Green Lighted on when the DTR or C signals are turned ON by the data terminal.



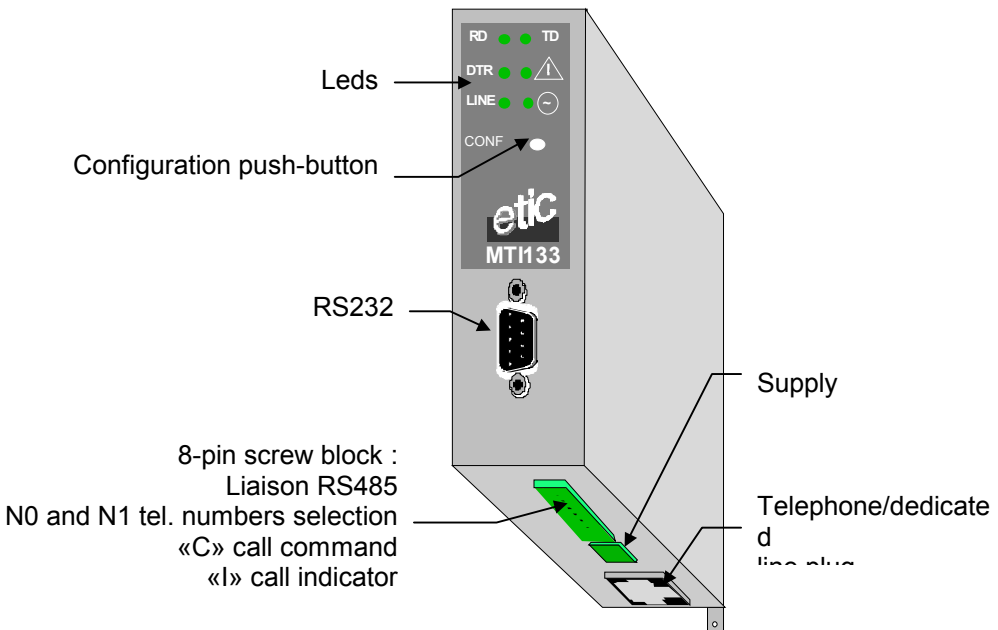
Red Flashes in case of modem fault.  
Lighted on during configuration mode.

LINE Green Flashes when a call is in progress or when the modem detects the ring signal.  
Lighted on when the modem is on-line.



Green Lighted on when the power supply is ON.

CONF Configuration push-button.



### **4. Worldwide operations**

The products whose reference finish with INT (e.g. MTi133-200INT and MTi133-201INT) are operational in most countries.

### **5. PLC compatibility**

The Mti 133 has been designed to operate with the PLCs of most worldwide manufacturers.  
The corresponding configurations and the pinouts of required cables are available on demand in application notes.

N.B.: The MTi133-1 is obviously compatible with all modern modems in trade, with PC softwares and most industrial equipments.

### **6. Configuration**

To avoid any unexpected modification to the configuration of the modem by the PLC, most parameters can only be changed by the user in the configuration mode by pushing the CONF push-button. The modification is carried out with AT commands.

### **7. Dial commands and call reception**

The MTi 133-2 provides a complete set of AT commands.  
Calls can also be initiated using 2 call digital inputs towards 4 stored numbers.  
Finally, calls can be initiated using MODBUS or UNITELWAY commands.  
In that case, the MTi 133-2 can be seen as a « slave PLC ».

### **8. RS232 and RS485 interfaces**

MTi 133-2 provides an RS232 interface on the front panel and an RS485 interface on the screw block. The data rate and frame are set in configuration mode.

---

## TECHNICAL DATA-SHEET

<b>Dimensions :</b>	H=115 x L=38 x D=96 mm
<b>Power requirements :</b>	9 to 40 or 40 to 60 DC
<b>Consumption at 24V :</b>	100 mA
<b>Operating T° range:</b>	0°C to 55°C
<b>Modulations:</b>	33 600 b/s V34 28 800 b/s V32b 14 400 b/s V32 2400 bits/s V22 bis 1200 bits/s V22 300 bits/s V21
<b>Error correction :</b>	V42 and MNP2-4
<b>Transmission level:</b>	Programmable transmission level Transmission : 0 to -15 dBm (default : -10 dBm) Reception : -6 to -43 dBm
<b>Dialing:</b>	Pulse or DTMF Q23
<b>Serial interface:</b>	RS232 150 to 115 200 b/s / RS422 RS485 (2 wires) 7 or 8 bits / 1 start bit / 1 stop bit Parity none / odd / even
<b>Configuration:</b>	AT commands
<b>Call reception:</b>	Automatic answer Call indicating digital output
<b>Dial commands:</b>	AT DTR to a stored number Relay call command to a stored number MODBUS (modem = slave) UNITELWAY (modem = slave)
<b>EMC :</b>	EN 50082-2
<b>Electrical safety :</b>	EN60950
<b>Lightning and transients :</b>	EN61000-4-5



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### **Warning !**

To avoid any risk of electric shock, the MTi133-2 must not be opened when connected to the line, the DTE or the power-supply.

### **1. Surge protection device**

The electronic board in the MTi 133-2 is equipped with telephone line surge protection devices providing the modem with a high power of resistance ; however if the modem is to be used on telephone lines exposed to large surges (sites with high risks of lightning), it is preferable to connect supplementary surge protection devices between the modem and the telephone line as well as upstream from the electrical power source.

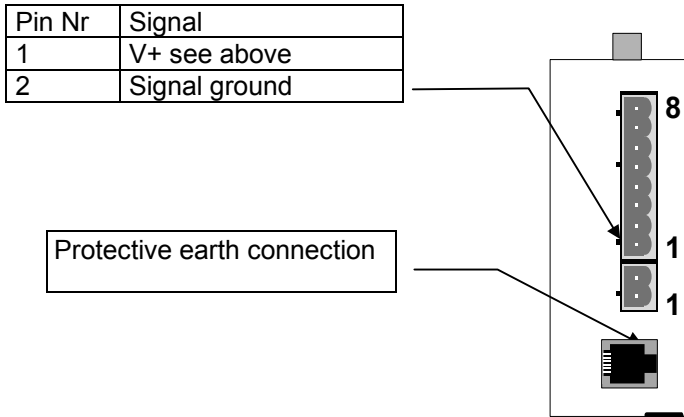
### **2. Earth connection**

The MTi133-2 is contained in a metallic case ; the user shall make sure to connect the protective earth connector (located at the bottom) to an efficient protective earth.

### **3. Fuse**

The MTi 133-2 includes an automatically resetting fuse able to protect the electrical power source against an overcurrent caused by a short circuit in the modem.

#### 4. Power-supply connection



Reference	Supply voltage range (V+)
MTI133-200XXX MTI133-201XXX	9 to 40 VDC (2.5 W consumption)
MTI133-210XXX MTI133-211XXX	40 to 60 VDC (2.5 W consumption)

## 5. RS232C data terminal connection

The 9-pin connector on the front panel allows the connection of the data terminal to the RS232 interface for configuration, « AT » call control and data transmission.

The data terminal must not be located more than ten meters away from the modem and the cable must preferably be shielded.

The RS232 interface is not insulated.

Pin Nr	Circuits		Designation	Terminal- Modem
1	CD	109	Carrier detect	←
2	RX	104	Data reception	←
3	TX	103	Data transmission	⇒
4	DTR	108	Data terminal ready	⇒
5	SG	102	Signal ground	
6	DSR	107	Data set ready	←
7	RTS	105	Request to send	⇒
8	CTS	106	Clear to send	←
9	RI	125	Incoming call (RING)	←

The **DTR signal** enables the terminal to clear the call or to inform the modem that it is connected.

In the case of the MTi133-102XXX « Low Power » model, this signal enables the terminal to switch on the modem either to command a call or to accept an incoming call (refer to OPERATIONS section).

The **DTR signal** also permits to command a call to a number stored in the modem without resorting to an AT call command (refer to OPERATIONS section).

The **DSR signal** indicates that both modems are connected.

The **CD signal** indicates that the modem has detected the carrier.

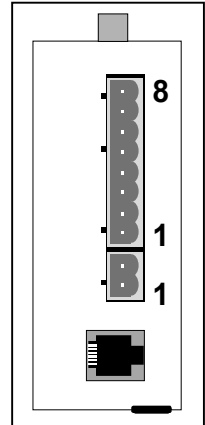
The **RI signal** indicates an incoming call.

!!! When used with FACTORY PROFILE 1, the modem will only need the RX, TX and SG signals to function.

## 6. RS485 2-wire connection to the data terminal

The RS485 interface is to be connected to the 8-pin screw block at the bottom of the modem.

8-pin screw block			
Pin Nr.	Signal	Terminal-modem	Function
1-2	<b>C</b>	⇒	Non-isolated « COMMAND » digital input Coupled to the DTR signal in the modem. Allows to filter the incoming call and to clear the call.
3-4	<b>i</b>	⇐	« INDICATION » digital output Electromecanic relay. Closed when the modem is on-line / open when off-line. Max. power consumption : 0.5 A / 24 VDC
5	<b>N0</b>	⇒	« N0 » digital input (selection of directory number)
1 and 6	<b>N1</b>	⇒	« N1 » digital input (selection of directory number)
7	B RS485		Surge-protected RS485 interface.
8	A RS485		Non-isolated.

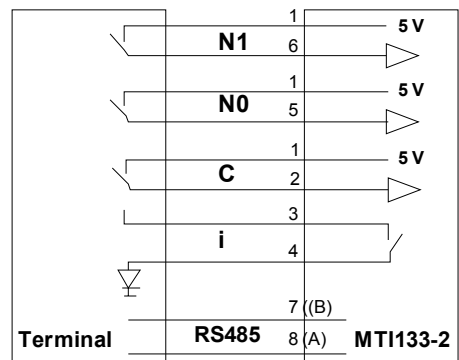


## 7. Connecting the call digital I/Os

Pin Nr 1 supplies a 5 VDC protected voltage, for the cabling of the N0, N1 and C digital inputs of the modem.

These digital inputs are protected against surges up to 15 VDC but are not isolated.

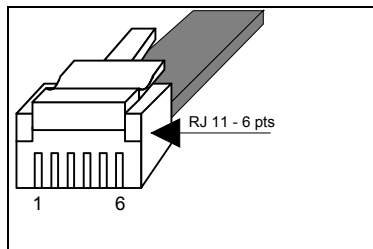
The « I » digital output of the modem is made up of the pins of a relay contact.



## 8. Telephone line connection

### 8.1. Telephone plug

Telephone plug	
Signal	Pin Nr
Line 1	3
Line 2	4



### 8.2. Country software checking

The MTi133-2 is available in different references in compliance with European and American norms.

**European references** include the « EUR » code at the end of the reference of the product.(e.g. : MTi133-200EUR).

The product is delivered with a standard RJ11 telephone cable and a national telephone plug adapted to the country's PSTN.

**International references** include the « INT » code at the end of the reference of the product.(e.g. : MTi133-200iNT).

One of their advantages is to be operational in most countries worldwide.

The product is delivered with a standard RJ11 telephone cable and a national telephone plug adapted to the country's PSTN.

!!! National telephone plugs are available for almost all countries.

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### **8.3. Usable line type**

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Whatever the reference, the modem connects to an **analog** telephone line.

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### **8.4. Installation behind a PBX**

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The automatic branch exchange (or switchboard) can be indifferently analog, or digital such as an ISDN PBX.

## **9. Dedicated line connection**

The MTI133-2 can operate on a 300-3400 Hz voice band public or private 2-wire dedicated line.

The MTI133-2 is delivered with a cable connecting to the dedicated line. At one end, this cable connects to the modem's RJ45 connector, and the other end has two free wires to connect the modem to the line.

## 10. Installation on a desk

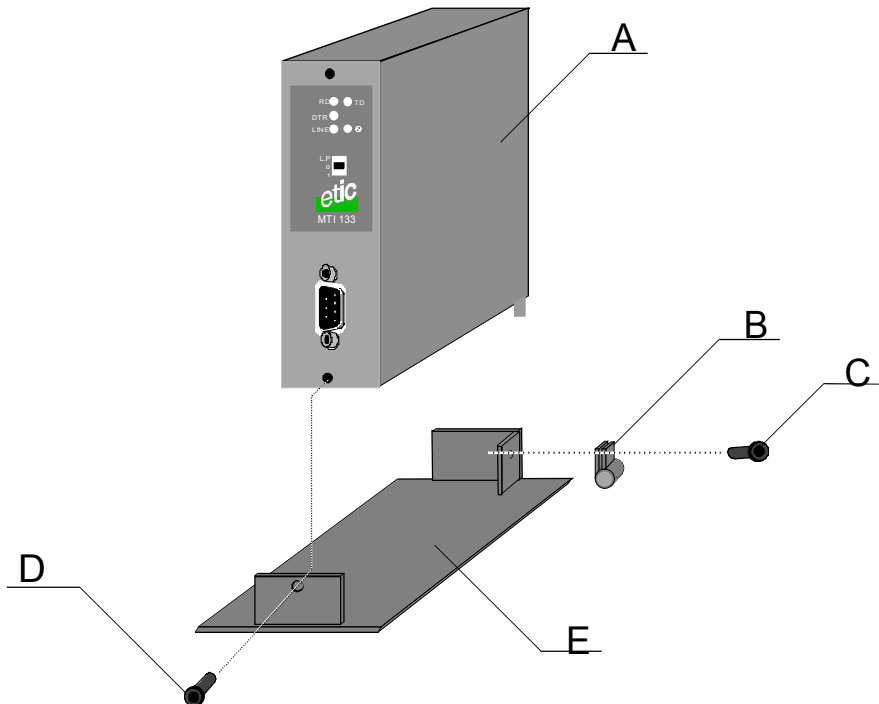
The desk kit permits an adequate use of the MT1133 on a desk, especially when it is to be connected to a PC.

The kit includes

- an RS232 normal DTE to DCE cable (pin1 to pin1, pin2 to pin2,...)
- a wall plug adaptor
- a mounting base and a hex head key

To fix the modem on the desk, connect the cables as described above, then

- Remove screw D with the hex head key,
- remove screw C and cable clip B from the mounting base E,
- thread the cables through cable clip B,
- fix the modem on the mounting base E with screw D,
- fix cable clip B on the mounting base E with screw C.



## IV CONFIGURATION

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### 1. Configuration and Operations modes

The modem provides two modes : CONFIGURATION and OPERATIONS.

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#### 1.1. Switching from Operations to Configuration mode

---

To enter configuration mode, press the CONF push-button until the red led lights on.

To quit configuration mode and enter operations mode, press and release the CONF push-button (the red led lights off).

---

#### 1.2. Configuration mode

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- **Data rate and frame on serial interface in configuration mode**

The data rate of the PC must be set at 9600 b/s and the character frame at 1 start bit / 8 bits / parity none / 1 stop bit.

- **Parameters modifications**

All parameters, data rate and character frame for operations included, can be modified using AT commands.

---

#### 1.3. Operations mode

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- **Data rate and frame on serial interface in operations mode**

The data rate and the characters frame cannot be modified in operations mode ; they are as chosen in configuration mode.

- **Parameters modifications**

No parameter modification will be accepted by the modem except the echo command (ATE) and the result codes parameters.

However, the modem will return OK to any AT configuration command without executing it.

## 2. Configuration AT commands

The modem is configured with AT commands.

Each command begins with the prefix AT followed by a suffix.

Each command (ATX..X= n..n) automatically entails the updating of the registers (Sn) which determine the modem's functioning.

Registers can be written and read.

To save the modifications, enter the AT&W command.

<b>Command</b>	<b>Syntax</b>	<b>Result code</b>
<b>Enter CONFIGURATION mode</b>	Press CONF push-button	CONF red led on
<b>Modify a parameter</b>	AT<suffix><parameter>	OK or ERROR
Example	ATE1	OK
<b>Write register n</b>	ATSn=<value>	OK or ERROR
Example	ATS0=2	OK
<b>Read register n</b>	ATSn?	<value>
Example	ATS0?	002
<b>Save</b>	AT&W	OK
<b>Quit CONFIGURATION mode</b>	Press CONF push-button	CONF led off

Commands and registers are listed in the appendix.

### 3. Parameters profiles

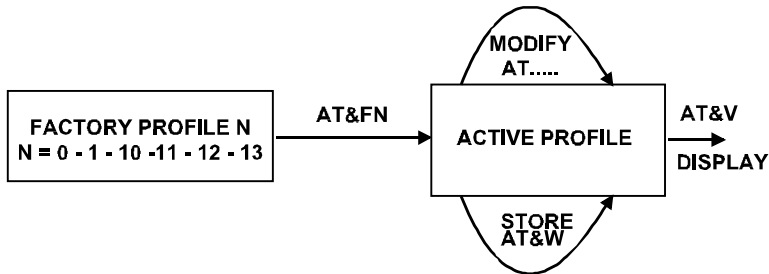
To make configuration easier, the modem stores 6 tables of parameters called « factory profile ».

Each of these profiles can be selected by sending the AT&FN (factory profile number N) command.

The selected factory profile automatically becomes the « active profile ».

The active profile can be displayed using the AT&V command.

The parameters of the active profile can be modified with AT commands and stored with the AT&W command.



**The factory profiles permit to get back to initial configuration** when uncontrolled parameter modifications have been carried out.

Factory profiles		
Profile Nr	Operations	Selection
Factory profile 0	INTERNET, FAX, office automation	AT&F0
Factory profile 1	PSTN Industrial application	AT&F1
Factory profile 10	Dedicated line 9600 b/s « caller »	AT&F10
Factory profile 11	Dedicated line 9600 b/s « called »	AT&F11
Factory profile 12	Dedicated line 19200 b/s « caller »	AT&F12
Factory profile 13	Dedicated line 19200 b/s « called »	AT&F13

## **4. Configuration**

The following steps have to be achieved :

- Step 1 : Connecting the configuration terminal (**9600 8N1**)
- Step 2 : Selecting the Factory profile
- Step 3 : Modifying the parameters if necessary
- Step 4 : Saving the modifications and leaving Configuration mode

---

### **4.1. Step 1 : Connecting the configuration terminal**

---

Use a PC equipped with WINDOWS HYPERTERMINAL terminal emulation software :

- Connect the COM port of the PC to the modem with a 9-pin normal DCE to DTE cable (pin1 to pin1, pin2 to pin2,...) (ref ETIC CAB01).
- Open the HYPERTERMINAL WINDOWS software.
- **In the PROPERTIES menu, set the serial interface's data rate and character frame at 9600 b/s – 8 bits – parity none – 1 stop (8N1)**
- Click the telephone icon to connect the hyperterminal to the modem.
- Enter CONFIGURATION mode.
- Enter AT; the modem returns OK.
- To enable the echo of characters, enter ATE1.



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## 4.2. Step 2 : Factory profile selection

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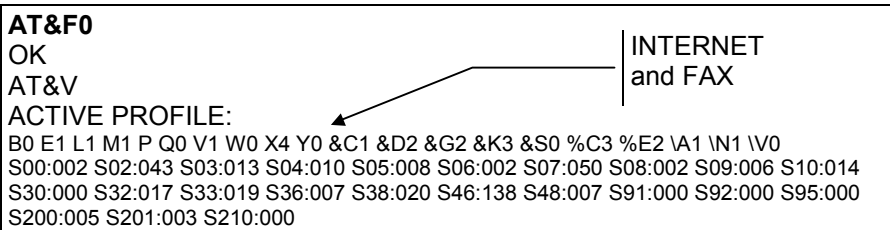
- To select factory profile Nr N,

enter AT&FN (N=0,1,10,11,12,13).

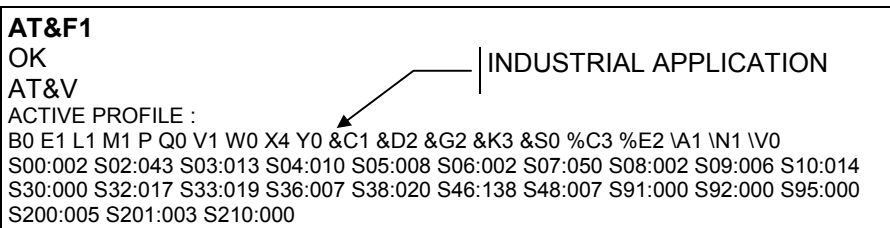
- To display the selected profile (active profile),

enter AT&V.

```
AT&F0
OK
AT&V
ACTIVE PROFILE:
BO E1 L1 M1 P Q0 V1 W0 X4 Y0 &C1 &D2 &G2 &K3 &S0 %C3 %E2 \A1 \N1 \V0
S00:002 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002 S09:006 S10:014
S30:000 S32:017 S33:019 S36:007 S38:020 S46:138 S48:007 S91:000 S92:000 S95:000
S200:005 S201:003 S210:000
```



```
AT&F1
OK
AT&V
ACTIVE PROFILE :
BO E1 L1 M1 P Q0 V1 W0 X4 Y0 &C1 &D2 &G2 &K3 &S0 %C3 %E2 \A1 \N1 \V0
S00:002 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002 S09:006 S10:014
S30:000 S32:017 S33:019 S36:007 S38:020 S46:138 S48:007 S91:000 S92:000 S95:000
S200:005 S201:003 S210:000
```



---

### **4.3. Step 3 : Parameter modifications**

---

Each parameter of the active profile can be modified with an AT command.

The table of parameters is in appendix 1.

Modifying the value of a parameter entails the use of this new value in combination with the active profile.

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### **4.4. Step 4 : Saving the active profile**

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- **To save the modifications** enter AT&W.
- **To quit configuration mode**, press and then release the push-button. The red led switches off.



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## 1. Different ways to dial

On the PSTN, the MTI133-2 interprets the following call types differently according to the models in the table below :

Reference	MTi 133-200 MTi 133-210	MTi 133-201 MTi 133-211
AT Commands	●	●
Relay call commands Call to 1 of the 4 stored Nrs	●	●
MODBUS commands		●
UNITELWAY commands		●

### 1.1. OPERATING THE MTI 133-2 BEHIND A PBX

If the MTi 133 is installed behind a switchboard (or PBX) it is preferable to insert the “W” character after the access prefix to the public network in order to instruct the modem to wait for the public dial tone.

Instead of the “W” character, one or several « , » digits (comma) can be used to cause a two-second pause replacing the waiting for the public dial tone.

**Example :** ATD0W0476042001 or ATD0,0476042001  
where 0 is the access digit to the public network.

## 2. AT commands

This paragraph describes how to operate the modem with AT commands. This description is valid for connections through RS232 or RS485 serial interfaces.

---

### 2.1. Configuring the modem

---

Before use, it is necessary to configure the modem as follows :

Select AT commands		
	Syntax	Result
Press the CONF push-button	Red led on	
Select the factory profile 1	AT&F1	OK
Choose the operations characters frame	ATS200=X	OK
Choose the operations data rate	ATS201=X	OK
Select AT commands type	ATS210=0	OK
Press the CONF push-button	Red led off	

---

### 2.2. Dial commands

---

The following AT commands are available :

Dial number <TT...T> :            ATD<TT...T >

Dial the number stored in the directory line n (n=0 to 3) ATDS=n

Clear the call:    +++ (result code OK) then ATH0

The dial command may include the following characters :

- 0-9 0 to 9 DTMF digits.
- \* The « star » digit (tone dialing only).
- # The « gate » digit (tone dialing only).
- A-D A, B, C, D DTMF digits.
- L Re-dial last number.
- P Select pulse dialing; pulse dial the numbers that follow until a T is encountered. Affects current and subsequent dialing.
- T Select tone dialing; tone dial the numbers that follow until a P is encountered.
- R The command is accepted but not acted on.
- ! Flash; the modem will go on-hook for a time defined by the value of S29.
- W Wait for dial tone. If dial tone is not detected within the time specified by S6, the modem will abort the call, return on-hook and generate an error message.
- @ Wait for silence: the modem waits for at least 5 seconds of silence in the call progress frequency band before continuing with the next dial string parameter. If the modem does not detect these 5 seconds of silence, it will terminate the call attempt with a NO ANSWER message.
- , Dial pause (comma); the modem will pause for a time specified by S8 before dialing the digits following the comma.

Once connected, the modem returns the following result codes according to the configuration carried out with the ATX command and the programming of the S95 register (refer to the table in the appendix).

Result code		Explanations	X0 **	X1	X2	X3	X4
OK	0	Command accepted	X	X	X	X	X
CONNECT	1	Connecting	X	X	X	X	X
RING	2	Ring signal	X	X	X	X	X
NO CARRIER	3	No carrier detection or loss of carrier or Nr engaged (ATX0 to 2) Or no dial tone (ATX0 and 1)	X	X	X	X	X
ERROR	4	Syntax error or unable to execute a command	X	X	X	X	X
CONNECT XXXX	5, 9 to 19, 59, 61 to 64 84, 91	The modems are connecting « XXXX » = DTE or DCE line speed *	1	X	X	X	X
CONNECT 75TX/1200RX	22	Outgoing call (e.g. :MINITEL emulation)	1	X	X	X	X
CONNECT 1200TX/75RX	23	Incoming call (e.g. : from a MINITEL)	1	X	X	X	X
NO DIAL TONE	6	No dial tone is received	3	3	X	X	X
BUSY	7	The line is engaged	3	3	3	X	X
NO ANSWER	8	Continuous ringback signal after expiration of timer S7	X	X	X	X	X
DELAYED	24	Delayed Nr	4	4	4	4	X
BLACKLISTED	32	Delayed Nr	4	4	4	4	X
COMPRESSION: CLASS 5	66	MNP5 compression *	X	X	X	X	X
COMPRESSION: V42bis	67	V42bis compression *	X	X	X	X	X
COMPRESSION: NONE	69	No compression *	X	X	X	X	X
PROTOCOL: NONE	70	No error correction protocol *	X	X	X	X	X
PROTOCOL: LAPM	77	LAPM correction protocol *	X	X	X	X	X
CARRIER XXXX	40, 44 à 58 78, 79	On-line modulation *	X	X	X	X	X

\* Refer to S95

## 2.3. « Command » and « data » modes

The interface between the terminal and the modem can be either in COMMAND or in DATA mode.

In COMMAND mode, the modem executes the AT commands sent by the terminal.

In DATA mode, the modem transmits transparently all the data on the telephone network.

- **Off-line COMMAND mode**

After being switched on, the terminal must set the DTR signal or the « C » digital input. In return, the modem sets the CTS signal. The modem enters COMMAND mode and constantly waits for an AT command (a configuration or dial command) from the data terminal or for an incoming call.

If the MT1133-2 detects a configuration command, it will execute it.

If it detects a call command or an incoming call, it will establish the connection.

\* Except if AT&D0

- **DATA mode**

Once connected to another modem through the network, the modem transmits the "CONNECT XXXX" result code to the data terminal, sets the DSR, CTS and CD signals and closes the « I » digital output.

The modem enters DATA mode : All data are transmitted by the data terminal on the telephone network and vice versa and no other AT command can be transmitted to the MT1133-2.

- **On-line command mode**

When the modem has established a connection, and has entered the data mode, it is possible to break into the data transmission in order to issue further commands to the modem in an on-line command mode.

The data terminal must issue an escape sequence of 3 repeated ASCII characters (+++ default character). This character is programmable.



If the sequence is accepted by the modem, it will answer OK (or 0) and enter the on-line command mode where it will accept AT commands again while being on-line.

The terminal can send a configuration command or clear the call by sending the ATH0 command to the modem.

At any time the modem can clear the call with the DTR or "C" signal.

## 2.4. Outgoing call

The modem is in wait for a call command **whatever the status of the DTR or C signals**.

The data terminal sends the AT dial command and the number to dial.

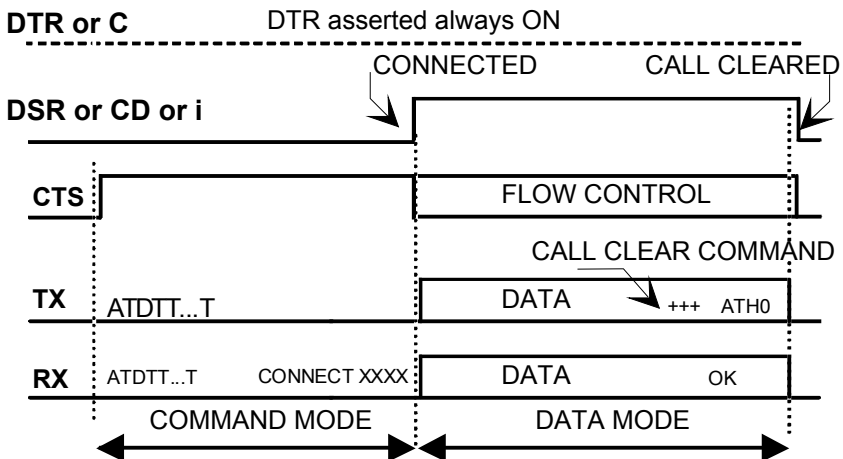
The call attempt will be terminated if the modem receives any character before the operation is over.

The MTI133-2 dials the number to call on the PSTN.

The modem must detect the carrier of the called modem and get connected before expiration of the time assigned by S6 and S7.

Once connected, the modem sends the “CONNECT” result code and sets the DSR, CTS, CD and “I” signals and manages the flow control (CTS).

**N.B. :** If AT&D2 is assigned instead of AT&D0 (as programmed in factory profile Nr 1), the modem will not accept AT dial commands until the DTR or “C” signal is activated by the terminal. In that case, the DTR or “C” signal can also be used to clear the call.



## 2.5. Incoming call



When the MTi 133-2 detects the ring signal on the line, it will send the « RING » message to the terminal and will turn on the RS232 “RI” signal.

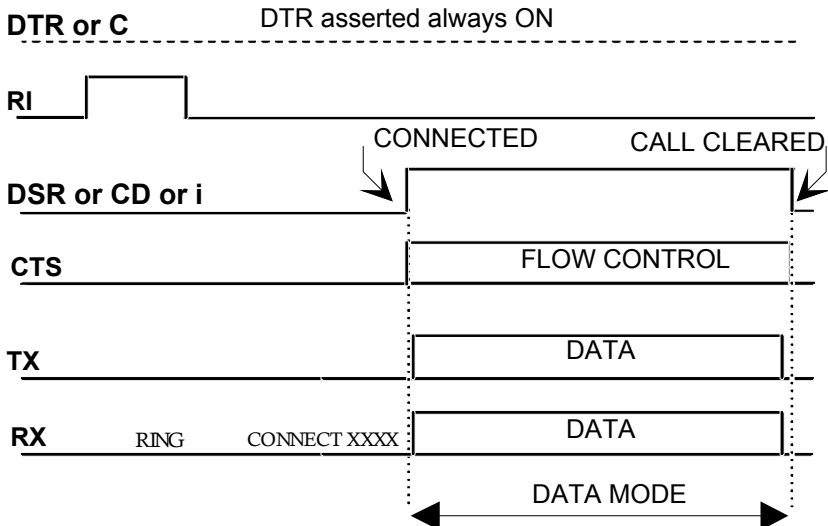
The status of the DTR (or “C”) signal is ignored.

It will automatically answer the call after 2 ring tones (SO=2) and interrupt the “RING” message.

When connected, it will send the “CONNECT XXXX” message, set the DSR, CTS and CD signals, close the digital “i” output and control the flow (CTS).

**N.B.1 :** If AT&D2 is assigned instead of AT&D0 (as programmed in factory profile Nr 1), the modem will not answer the call until the DTR or “C” signal is activated by the terminal.

**N.B.2 :** If value 0 is assigned instead of 2 in register 0 (ATS0=0) (as programmed in factory profile Nr 1), the modem will not answer the call until it receives the ATA command from the terminal.



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## **2.6. Call termination**

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### **- Call termination by the modem**

If the call is cleared by the remote PLC or equipment or due to a loss of carrier by the modem during the time set in register S10, the Mti 133-2 will clear the call and open the DSR signal.

The Mti 133-2 will also clear the call if no data is received from the line or the serial interface during a time exceeding the value set in register S30.

### **- Call termination by the data terminal**

The terminal can clear the call by switching to COMMAND mode and sending the Escape sequence +++ (result code OK) and then the ATH command.

If AT&D2 is assigned instead of AT&D0, the terminal can also clear the call with the DTR or the C signal.

### 3. Digital input dial commands

This section describes how to use the modem with digital input dial commands.

This description applies to connections for data transmission through RS232 or RS485 serial interface.

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#### 3.1. Functioning principles

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- **Outgoing call**

2 digital inputs « N0 » and « N1 » on the modem allow to select by combination (00, 01, 10, 11) one of the four numbers stored in the directory.

A « C » digital input then allows the terminal to set the call.

If N0 and N1 are not connected and the call is set through “C”, the first number in the directory is selected.

The « i » digital output informs the terminal that the connection has been established.

- **Incoming call**

The modem answers the incoming call automatically ; the « i » digital output informs the terminal that the connection has been established.

- **Call termination**

Opening the « C » digital input allows the terminal to clear the call.

### 3.2. Configuring the modem

<b>Select digital input dial commands</b>	
Enter configuration mode 9600/8 bits/ par. none /1 stop + CONF push-button	Red led on
Select factory profile Nr 1	AT&F1
Select the digital input dial commands	ATS210=1
Enter the numbers into the directory	AT&Zn=TT.....T n = 0 to 3
Check the entered numbers	AT&Zn?
Enter the serial interface character frame	ATS200=X
Enter the serial interface data rate	ATS201=X
Store the configuration	AT&W
Press and release the CONF push-button	Red led off

**N.B.** : The parameter 230 (default value = 1) must not be modified. If the value 0 was assigned to that parameter, the modem would only be able to dial the first number stored in the directory. The value 0 exists only for compatibility with older hardwares.

### 3.3. Outgoing call

The terminal selects the number to dial by using the N0 and N1 inputs.

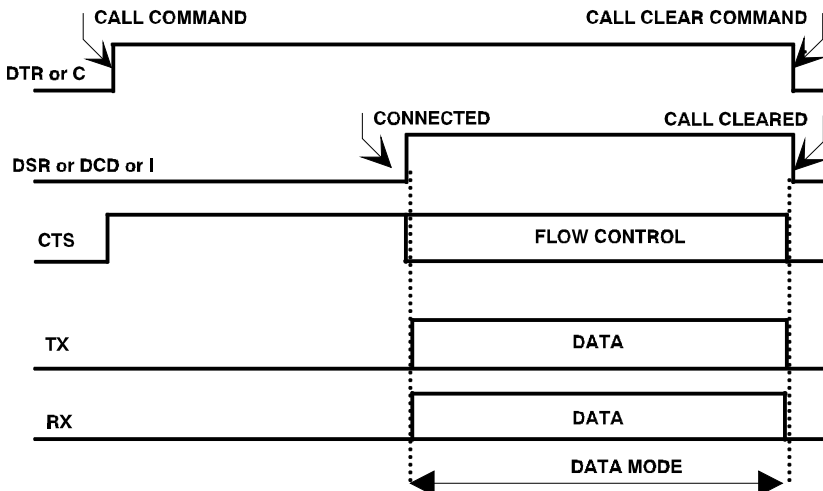
N0	N1	Directory line
0	0	0
1	0	1
0	1	2
1	1	3

The data terminal sets the DTR signal or closes the « C » digital input.

The MTI133-2 dials the stored number corresponding to the selected line in the directory.

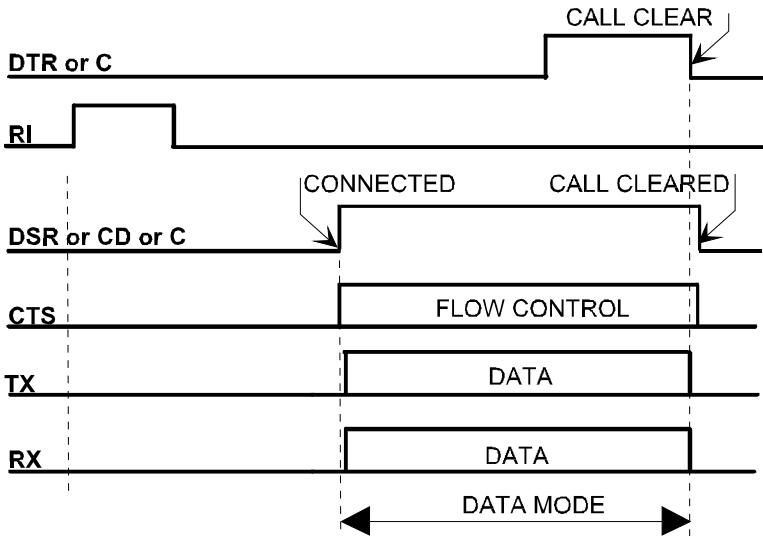
Once connected, the modem will set the CD and DSR signals and set the « I » output.

During the connection the modem does not return any message or echo.



### 3.4. Incoming call

On detecting the ring signal on the telephone line, the MTi 133-2 will set the RI signal.  
 It will automatically answer the call after 2 ring tones, whatever the status of the DTR or "C" signal.  
 When connected, it will set the DSR, CTS and CD signals, close the digital "I" output and control the data flow (CTS).  
 N.B. : If S0=0, the modem will not answer the call until the DTR or "C" signal is closed.



---

### **3.5. Call termination**

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- **Call termination by the modem**

If the call is cleared by the remote PLC or equipment or due to a loss of carrier by the modem during the time set in register S10, the Mti 133-2 will clear the call and disable the DSR and CD signals and open the “I” digital output. The Mti 133-2 will also clear the call if no data is received from the line or the serial interface during a time exceeding the value set in register S30.

- **Call termination by the data terminal**

The terminal will clear the line by disabling the DTR signal or opening C.

## **4. MODBUS and UNITELWAY dial commands**

This section only applies to MTi133-201 and 211 references.

It describes the operations to be carried out by a PLC to set a call using the MODBUS or UNITELWAY protocol.

The description applies to connections through an RS232 or RS485 interface.

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### **4.1. Functioning principles**

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The MTI 133-201 acts as a MODBUS or UNITELWAY “slave”. An address set between 000 and 255 (register 240) has to be assigned to the modem.

The MTI133-201 constantly decodes MODBUS frames received on the RS232/RS485 interface, whether off-line or connected.

The status of the DTR or “C” signal is ignored by the MTI133-201.

4 MODBUS registers permit to operate the modem from the MODBUS master.

Register	@ MODBUS or UNITEL.	R/W	Nr	Function	Value
CALL	0010H	R/W	1	Call command : <ul style="list-style-type: none"> <li>• Call clear command</li> <li>• Dial NUM number</li> <li>• Answer</li> </ul>	0000H 1000H or 0020H* 1000H or 0020H*
STW	0020H	R	1	Call status <ul style="list-style-type: none"> <li>• off-line</li> <li>• outgoing call in process</li> <li>• incoming call in process</li> <li>• connected</li> <li>• Ring</li> </ul>	0000H 0001H 0002H 0003H 0004H
LASTC	0021H	R	1	Last call diagnostic <ul style="list-style-type: none"> <li>• successful</li> <li>• not successful</li> </ul>	0000H 100xH
NUM	0050H or 0702H*	R/W	11	Nr to dial	2 ASCII-coded figures per word ended with the ASCII character NUL

\* For compatibility with the MT1100.

Function codes	
MODBUS	Functions 3 and 4 : Read N words Function 6 : Write 1 word Function 16 : Write N words
UNITELWAY	Function 4 : Read 1 word Functions 36 : Read N words Function 14 : Write 1 word Function 37 : Write N words

## 4.2. Configuring the modem

Before use, it is necessary to configure the modem as follows :

<b>Select MODBUS or UNITELWAY commands</b>	
Enter configuration mode 9600/8 bits/ par. none /1 stop + CONF push-button	Red led on
Select factory profile Nr 1	AT&F1
Select MODBUS call type	ATS210=2
Or select UNITELWAY call type	ATS210=3
Assign a MODBUS or UNITELWAY address between 001 and 255 (255 default value) to the modem	ATS240=XXX
Fix the number of authorized silence characters between two characters of the same MODBUS frame*	ATS241=X
Enter the serial interface character frame	ATS200=X
Enter the serial interface data rate	ATS201=X
Store the configuration	AT&W
Press and release the CONF push-button	Red led off

\* This number of “silence characters” will be used by the modem **receiving** from the RS232 or RS485 interface to determine the termination of a frame.

### 4.3. Outgoing call

#### - Procedure overview

Function	@	R/W	Value
Store the telephone Nr to be dialed in NUM register	NUM	W	see below
Call	CALL	W	1000
Outgoing call in process	STW	R	0001
Connected to the remote modem	STW	R	0003
Transmit data to the remote terminal			
<i>Modem off-line (The call has been cleared by the remote modem)</i>	STW	R	0000
Clear the call	CALL	W	0000
!! Wait for at least 10 seconds before setting a new call.			

#### - Storing the telephone number to dial

Each @ in the NUM register can save 2 digits.

Each telephone digit must be encoded by using the ASCII alphabet.

Example : The telephone digit «2 » is stored as 32H).

2 successive telephone digits can be stored into the same @ of the NUM register from @ 0050H or from @ 0702H.

The last digit of the telephone Nr must be followed by the ASCII NUL character (0000H).

Example : Storing phone number 04 76 04 20 01			
Function	@	R/W	Value
Store 04	NUM+0	W	3034
Store 76	NUM+1	W	3736
Store 04	NUM+2	W	3034
Store 20	NUM+3	W	3230
Store 01	NUM+4	W	3031
Store the ASCII NUL character	NUM+5	W	0000

---

#### 4.4. Incoming call

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Function	@	R/W	Value
Ring	STW	R	0004
Answer (Only if S0=0)	CALL	W	0001
Incoming call in process	STW	R	0002
Connection established	STW	R	0003
Transmit data to the remote terminal			
Clear the call	CALL	W	0000

## 5. Operations on a dedicated line

### - **Caller and called modem**

One modem must be configured as the « caller » modem and the other one as the « called » modem.

### - **Data rate on the RS232/485 interface**

The data rate on the RS232/485 interface must be lower than (or equal to) the modulation speed on line.

### - **Lowering the modulation speed on line**

Factory profiles 10 to 13 determine the modem's operating mode for 9600 to 19200 b/s transmissions (refer to the table below describing the configuration steps).

To use the modems for a transmission at a lower modulation speed, the on-line data rate must be modified with the "AT+MS" command according to the information given in the table below.

### - **RS232 cable**

Only RX, TX and GND signals are mandatory.

The DSR or I signal can be wired to indicate to the terminal that the modem is on-line.

The DTR or C signal can be used by the terminal to control the modem's connection to or disconnection from the line. Replace AT&D0 by AT&D2 in the configuration mode to install this function.

### - **RS485 cable**

Only A and B signals are mandatory.

The "I" digital output of the modem can be wired to indicate to the terminal that the modem is on-line.

The modem's "C" digital input can be used by the terminal to control the modem's connection to or disconnection from the line. Replace AT&D0 by AT&D2 in the configuration mode to install this function.

<b>Configuring the modem for leased line operations</b>	
Enter the CONFIGURATION mode 9600/ 8 bits / parity none / 1 stop + push-button	Red led on
<b>Caller Modem</b> Select factory profile 10 (9600 b/s dedicated line) Select factory profile 12 (19200 b/s dedicated line)	AT&F10 AT&F12
<b>Called Modem</b> Select factory profile 11 (9600 b/s dedicated line) Select factory profile 13 (19200 b/s dedicated line)	AT&F11 AT&F13
Lower the line modulation speed if necessary	Refer to table below
Choose the operations characters frame	ATS200=X
Choose the operations data rate	ATS201=X
Enable error correction if necessary	AT\N3
Store the configuration	AT&W
Press and release the CONF push-button	Red led off

On-line modulation speed		Command
V21	300b/s	AT+MS=0,1,300,300
V22	1200 b/s	AT+MS=1,1,1200,1200
V22bis	2400 b/s	AT+MS=2,1,2400,2400
V32	9600 b/s	AT+MS=9,1,4800,9600
V 32bis	14400 b/s	AT+MS=10,1,4800,14400
V34	19200 b/s	AT+MS=11,1,2400,33600

## 6. Frequent cases of use

This section describes the configuration and use of the MTi133-2 in several frequent cases such as the remote maintenance of PLC softwares or the remote management of automated systems.

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### 6.1. Remote maintenance of PLCs

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#### 6.1.1. Goals

- To maintain PLC softwares remotely.
- The call has to be initiated by the terminal operator.
- The PLC needs to receive calls but not to set any.
- The PLC has no other signal but the RS485 interface.

#### 6.1.2. Connecting the modems

##### - to the PLC

The PLC connects to the modem through the RS485 interface (signals 7 and 8 on the 8-pin tie-point block) or the RS232 interface (signals 2, 3 and 5 on the 9-pin screw block).

##### - to the PC

The PC connects to the modem's RS232 interface via a normal DTE to DCE 9-pin cable (pin1 to pin1, pin2 to pin2...).

#### 6.1.3. Configuring the modems

<b>Configuring the modem on the PC end</b>	
Set HYPERTERMINAL at 9600 - 8N1	
Press the configuration push-button	Red led on
Select factory profile Nr 1	AT&F1
The DTR signal clears the call	AT&D2
Enter the serial interface character frame	ATS200=X
Enter the serial interface data rate	ATS201=X
Store the configuration	AT&W
Press and release the configuration push-button	Red led off

<b>Configuring the modem on the PLC end</b>	
Set HYPERTERMINAL at 9600 - 8N1	
Press the configuration push-button	Red led on
Select factory profile Nr 2	AT&F1
Suppress all echo on the RS232 interface	ATE0
Suppress all connection message on the RS232 interface	ATQ1
Enter the serial interface character frame	ATS200=X
Enter the serial interface data rate	ATS201=X
Store the configuration	AT&W
Press and release the configuration push-button	Red led off

#### 6.1.4. PC calling PLC

##### - Course of events on the PC side

The PC operator sets the call (Hyperterminal, software of the PLC manufacturer...).

The MTI133-2 dials the number to call on the PSTN.

The connection is established.

##### - Course of events on the PLC side

After two ring tones, the modem will answer the call and connect.

##### - Clearing the call

The PC clears the call by disabling the DTR signal or by sending the +++ ATH command.

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## **6.2. Remote maintenance by manual call back**

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### **6.2.1. Goals**

To maintain PLC softwares remotely.

The call is initiated by the PLC operator who authorizes the access to the PLC thanks to a key switch preventing all intrusion.

A led on the front panel allows to check if the modems are connected or off-line.

### **6.2.2. Connecting the modems**

#### **- to the PLC**

The PLC connects to the modem through the RS485 interface (signals 7 and 8 on the 8-pin tie-point block or the RS232 interface (signals 2, 3 and 5 on the 9-pin screw block).

The key switch connects to the C digital input of the modem.

The led on the front panel connects to the I digital output of the modem (to be supplied with 24 VDC power).

#### **- to the PC**

The PC connects to the modem's RS232 interface via a normal DTE to DCE 9-pin cable (pin1 to pin1, pin2 to pin2...) (ref ETIC CAB01).

### 6.2.3. Configuring the modems

<b>Configuring the modem on the PC end</b>	
Set HYPERTERMINAL at 9600 - 8N1	
Press the configuration push-button for 3 seconds	Red led on
Select factory profile Nr 1	AT&F1
Enter the serial interface character frame	ATS200=X
Enter the serial interface data rate	ATS201=X
Store the configuration	AT&W
Press the configuration push-button	Red led off

<b>Configuring the modem on the PLC end</b>	
Set HYPERTERMINAL at 9600 - 8N1	
Press the configuration push-button for 3 seconds	Red led on
Select factory profile Nr 1	AT&F1
Forbid call answering if C is open	ATS0=0
Enter the number of the remote maintaining PC	AT&Z0=TT...T
Enter the serial interface character frame	ATS200=X
Enter the serial interface data rate	ATS201=X
Store the configuration	AT&W
Press the configuration push-button	Red led off

### 6.2.4. PLC calling PC

#### - Course of events on the PLC side

The PLC operator authorizes the remote maintenance and sets the call by turning the switch in closed position.

The MTi133-2 dials the stored number on the PSTN.

The modem will close the I digital output commanding the led on the front panel as soon as the connection is established.

#### - Course of events on the PC side

On detecting the ring signal on the telephone line, the MTi 133-2 will send a RING result code to the PC which will, in return, display the message flashing

on the screen in pace with the ring signal. Moreover the MTi 133-2 will set the RI signal.

The modems will connect, thus enabling the operator to act upon the PLC.

- **Clearing the call**

When the call is over, the operator can clear the call by opening the switch connected to the C digital input of the modem.

The PC operator can also clear the call by disabling the DTR signal or by issuing the +++ ATH command.

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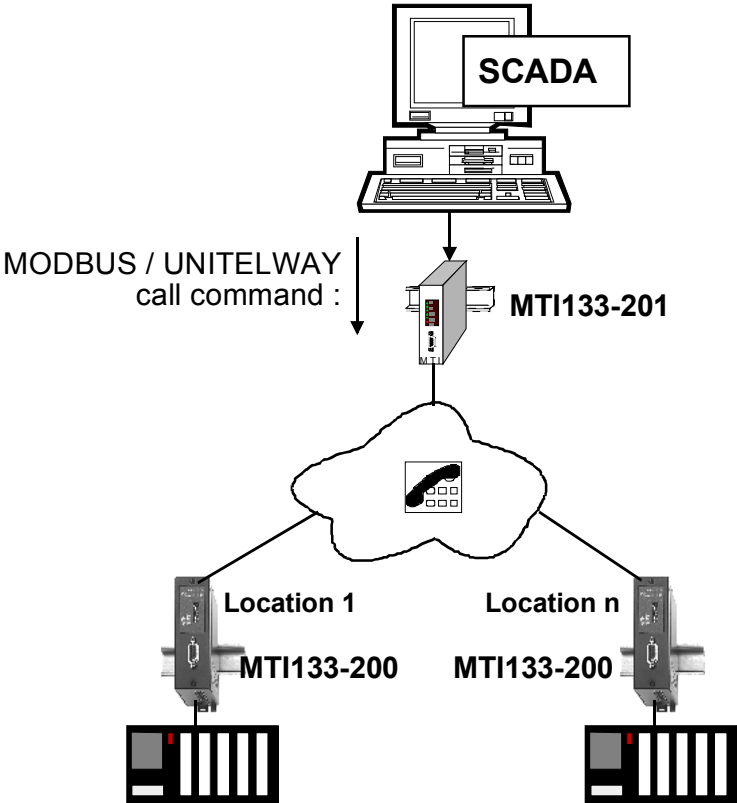
### 6.3. Remote monitoring of MODBUS or UNITELWAY remote automated systems

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#### 6.3.1. Goals

A PC equipped with a standard SCADA software, or a central PLC polling remote PLCs automatically and periodically. The protocol must be either MODBUS or UNITELWAY.

Each slave PLC must also be able to call the PC automatically.



### 6.3.2. Connecting the modems

#### - to the PLC

The modems to be used are MTI133-200 models.

The PLC connects to the modem through the RS485 interface (signals 7 and 8 on the 8-pin tie-point block or the RS232 interface (signals 2, 3 and 5 on the 9-pin screw block).

One digital output of the PLC connects to the C digital input of the modem (signals 1 and 2 on the 8-pin tie-point block).

One digital input of the PLC connects to the I digital output of the modem (signals 3 and 4 on the 8-pin tie-point block).

#### - to the PC

The modem to be used is the MTI133-201 ; it enables the monitoring software or the central PLC to SET and receive calls by using MODBUS or UNITELWAY commands.

### 6.3.3. Configuring the modems

<b>Configuring the modem on the PC end</b>	
Set HYPERTERMINAL at 9600 - 8N1	
Press the configuration push-button	Red led on
Select factory profile Nr 1	AT&F1
Enter the serial interface character frame	ATS200=X
Enter the serial interface data rate	ATS201=X
Select MODBUS or UNITELWAY commands	MODBUS :   ATS210=2 UNITELWAY : ATS210=3
Enter the MODBUS or UNITELWAY address assigned to the modem (001 to 255)	ATS240= XXX
Store the configuration	AT&W
Press and release the configuration push-button	Red led off

<b>Configuring the modem on the PLC end</b>	
Set HYPERTERMINAL at 9600 - 8N1	
Press the configuration push-button	Red led on
Select factory profile Nr 1	AT&F1
Select call type for stored number	ATS210=1
Enter the number of the remote monitoring PC	ATZ0=TT...T
Forbid call answering if C is open	ATS0=0
Enter the serial interface character frame	ATS200=X
Enter the serial interface data rate	ATS201=X
Store the configuration	AT&W
Press and release the configuration push-button	Red led off

### 6.3.4. PLC calling PC

**- Course of events on the PLC side**

The PLC initiates the call by closing the C circuit (digital output of the PLC).

The MTI133-200 dials the stored number on the PSTN.

As soon as the connection is established, the modem will close the I circuit.

**- Course of events on the PC or the central PLC side**

The PC or the central PLC periodically scans the STW status register of the MTI133-201.

When it detects an incoming call, the PC or the central PLC will command the connection if necessary, scan the STW register during the connection process and then poll the remote PLC.

**- Clearing the call**

The PC or the central PLC will clear the call by entering the 0000 value in the CALL register.

The call can also be cleared by the modem or the PLC at the other end of it.

### 6.3.5. PC calling PLC

- **Course of events on the PC side**

The SCADA software or the central PLC will command the call by issuing a MODBUS or UNITELWAY command.

The MTI133-201 dials the number to call on the PSTN.

The remote monitoring software or the central PLC will scan the STW register during the connection process and then poll the remote PLC.

- **Course of events on the PLC side**

The modem will indicate the incoming call by closing the I circuit (digital input of the PLC).

The PLC accepts the call by closing the C circuit.

- **Clearing the call**

The PLC will clear the call by opening the C circuit.



## APPENDIX

- APPENDIX 1 :       **AT commands**
- APPENDIX 2 :       **S registers**



<b>APPENDIX 1 : AT COMMANDS IN “OPERATIONS MODE”</b>	
<b>Command</b>	<b>Function</b>
ATA	<b>Answer</b> (refer to register S0)
ATDSn CrLf	<b>Dial the number stored in the directory line n</b> 0<n<3
ATDtt..t	<b>Dial command</b>
ATEn	<b>Command echo</b>
E0	Disables command echo.
E1	Enables command echo.
ATH0	<b>Disconnect command</b>
ATOn	<b>Return to on-line data mode</b>
O0	Enters the on-line data mode without a retrain.
O1	Enters the on-line data mode with a retrain.
	Returns ERROR if the modem is not connected.
ATQn	<b>Result code</b>
Q0	Enables result codes to the DTE.
Q1	Disables result codes to the DTE.
ATSnnn ?	<b>Reading of a register</b>

In “Use mode” the modem returns OK to **any other** correct AT command without executing it.

<b>APPENDIX 1 : AT COMMANDS IN “CONFIGURATION MODE”</b>	
<b>Command</b>	<b>Function</b>
ATEn	<b>Command echo</b>
E0	Disables command echo.
E1	Enables command echo.
ATIn	<b>Product identification</b>
I0	Modem reference
I3	Software version
I4	Manufacturer
ATP	<b>Pulse dialing</b>
ATQn	<b>Result code</b>
Q0	Enables result codes to the DTE.
Q1	Disables result codes to the DTE.
ATSnnn?	<b>Reading of a register</b>
ATSnnn=XX	<b>Writing of a register</b>
ATT	<b>Tone dialing</b>
ATVn	<b>Result code forms</b>
V0	Digital result codes
V1	Word result codes
ATWn	<b>Modification of « CONNECT » result codes</b>
W0	The result code only contains the data rate on the serial interface.
W1	The result code only contains the on-line data rate, the correction protocol and the data rate on the serial interface.
W2	The result code only contains the on-line data rate.
ATXn	<b>Extended result codes</b>
X0	<b>Refer to table page A7</b>
X1	
X2	
X3	
X4	
ATY	<b>Long space disconnect</b>
Y0	Disables long space disconnect
Y1	In non-error correction mode, the modem will send a long space prior to going on-hook; the modem will respond to the receipt of a long space by going on-hook.

<b>APPENDIX 1 : AT COMMANDS IN “CONFIGURATION MODE” (continued)</b>	
<b>Command</b>	<b>Function</b>
ATZn Z0 Z1	<b>Soft reset and restore profile.</b> The modem resets and restores « STORED PROFILE 0 ». The modem resets and restores « STORED PROFILE 1 ».
AT*NCn	<b>Choice of the PSTN</b> Refer to INSTALLATION section
AT&Cn &C0 &C1	<b>DCD option</b> DCD remains ON at all times. DCD follows the state of the carrier.
AT&D &D0 &D1 &D2	<b>DTR option</b> &Q0, &Q5, &Q6 : DTR is always assumed ON / permits a functioning on two wires. <b>Do not use</b> &Q0, &Q5, &Q6 : Opening DTR entails the modem to go on-hook. Automatic answer upon closing of DTR.
AT&F &F0 &F1	<b>Selects « FACTORY PROFILE 0 or 1 » as the usual configuration and saves it into the « ACTIVE PROFILE »</b> Stores « FACTORY PROFILE 0 » in the « active profile » Stores « FACTORY PROFILE 1 » in the « active profile »
AT&K &K0 &K3 &K4	<b>Flow control</b> No flow control. RTS / CTS flow control. XON / XOFF flow control.
AT&Rn &R0 &R1	<b>RTS / CTS option</b> Synchronous mode : CTS tracks the state of RTS /Asynchronous mode : CTS ON or OFF only if required by flow control. Synchronous mode : CTS always ON / Asynchronous mode : CTS ON or OFF only if required by flow control.
AT&Sn &S0 &S1	<b>DSR option</b> DSR will remain ON at all times. DRS ON when the modem is connected, OFF otherwise.
AT&V	Displays current configuration (ACTIVE PROFILE)
AT&W	Stores current configuration

<b>APPENDIX 1 :</b>		
<b>AT COMMANDS IN “CONFIGURATION MODE” (continued)</b>		
<b>Command</b>	<b>Function</b>	
At&Yn &Y0 &Y1	<b>Designate the default reset profile</b> The modem will use factory profile 0 at next power-on. The modem will use factory profile 1 at next power-on.	
At&Zn=TT...T	<b>Store telephone number</b> The modem stores the TT...T telephone number in the n line of the index. n= 0 to 3.	
AT%E %E0 %E1 %E2	<b>Enable / disable Line quality monitor and auto-retrain or fallback/fall forward</b> %E0 Disable line quality monitor and auto-retrain. %E1 Enable line quality monitor and auto-retrain. %E2 Enable fallback/fall forward in case of connection fault.	
AT+MS	AT+MS=11,1,300,33600	Automode
	AT+MS=3,0,1200,1200	V23
	AT+MS=0,0,300,300	V21
	AT+MS=1,0,1200,1200	V22
	AT+MS=2,0,2400,2400	V22bis
	AT+MS=9,0,4800,9600	V32
	AT+MS=10,0,4800,14400	V 32bis
	AT+MS=11,0,2400,33600	V34



**APPENDIX 1 :  
AT COMMANDS IN “CONFIGURATION MODE”  
(continued)**

Command	Function
<b>AT%C</b>	<b>Data compression</b>
%C0	No compression
%C1	MNP5 compression
%C2	V42 bis compression
%C3	MNP5 and V42 bis compression
<b>AT\An</b>	<b>Select maximum MNP block size</b>
\A0	64 characters
\A1	128 characters
\A2	192 characters
\A3	256 characters
<b>AT\Nn</b>	<b>On-line transmission</b>
\N0	Asynchronous on-line transmission with data buffer, without error correction
\N1	Asynchronous on-line transmission without data buffer nor error correction
\N2	Do not use
\N3	LAPM error correction transmission switching to asynchronous transmission in case of failure
\N4	LAPM error correction transmission. Disconnection in case of failure. For use on a dedicated line

<b>APPENDIX 1 : CONNECTION RESULT CODES</b>							
<b>Result code</b>		<b>Explanation</b>	<b>X0</b>	<b>X1</b>	<b>X2</b>	<b>X3</b>	<b>X4</b>
OK	0	Command accepted	X	X	X	X	X
CONNECT	1	Connection	X	X	X	X	X
RING	2	Informs of a ring signal	X	X	X	X	X
NO CARRIER	3	No detection of carrier or loss of carrier or busy line (ATX0 to 2) Or no dial tone (ATX0 and 1)	X	X	X	X	X
ERROR	4	Syntax error or impossible command	X	X	X	X	X
CONNECT XXXX	5, 9 to 19, 59, 61 to 64 84, 91	Connection of modems « XXXX » = DTE or DCE rate *	1	X	X	X	X
CONNECT 75TX/1200RX	22	Outgoing call	1	X	X	X	X
CONNECT 1200TX/75RX	23	Incoming call	1	X	X	X	X
NO DIAL TONE	6	No dial tone	3	3	X	X	X
BUSY	7	Line engaged	3	3	3	X	X
NO ANSWER	8	No answer after the period of time set by the S7 timer	X	X	X	X	X
DELAYED	24	Delayed Nr	4	4	4	4	X
BLACKLISTED	32	Blacklisted Nr	4	4	4	4	X
COMPRESSION: CLASS 5	66	MNP5 compression*	X	X	X	X	X
COMPRESSION: V42bis	67	V42bis compression*	X	X	X	X	X
COMPRESSION: NONE	69	No compression *	X	X	X	X	X
PROTOCOL: NONE	70	No error correction protocol *	X	X	X	X	X
PROTOCOL: LAPM	77	LAPM correction protocol *	X	X	X	X	X
CARRIER XXXX	40, 44 to 58 78, 79	On-line modulation *	X	X	X	X	X

**\* Refer to S95**

<b>APPENDIX 2 : S REGISTERS</b>			
Nr	Function	Factory profile	
		0	1
S0	Nr of ring tones before auto-answer S0=0 inhibited auto-answer ; the DTE must activate the DTR signal and send the ATA command.	2	2
S2	Escape character (+)	43	255
S3	Carriage return character	13	13
S4	Line feed character	10	10
S5	Backspace character	8	8
S6	Wait time for dial tone before blind dialing after W character(seconds)	4	4
S7	Wait time for carrier after dial (seconds)	50	50
S8	Pause time for dial delay when detecting the « , » modifier (seconds)	2	2
S9	Carrier detect response time (1/10 seconds)	6	6
S10	Lost carrier to hang up delay (1/10 seconds)	14	14
S11	DTMF tone duration	95	95
S12	Escape prompt delay (1/50 seconds)	50	50
S16	Loop status	0	0
S18	Sets the length of time that the modem conducts a loop or a test (seconds) after an AT&T has been issued. At the end of the delay time, the modem cancels the loop or test in progress and returns to COMMAND mode. If value 0 is assigned, the test will not terminate automatically ; the AT&T0 or ATH0 command will have to be issued.	0	0
S19 to S23	Reserved	0	0
S24	Sleep inactivity timer	0	0
S25	Delay to DTR or C OFF (1/100 s)	5	5
S26	RTS toCTS delay (1/100 s)	1	1
S29	Flash dial modifier time (1/100 s)	0	0
S30	Disconnect inactivity timer (multiples of 10 seconds) (0=disabled)	0	0
S32	Sets the value of the XON character (ASCII decimal)	17	17
S33	Sets the value of the XOFF character (ASCII decimal)	19	19
S 36	Reaction upon an LAPM failure	7	7

**APPENDIX 2 (continued) : S REGISTERS**

Nr	Function	Factory profile	
		0	1
S37	Desired line connection speed		
	S37=0 If N0 command is active, the modem connects at the last used line connection speed. If N1 command is active, the modem connects at 33600 b/s	X	
	S37=1 to 3 V21 - 300 b/s		
	S37=4 Reserved		
	S37=5 V22- 1200 b/s		
	S37=6 V22bis - 2400 b/s		
	S37=7 V23 - 1200 and 75 b/s		
	S37=8 V32bis/V32- 4800 b/s		
	S37=9 V32bis/V32- 9600 b/s		
	S37=10 V32bis - 12000 b/s		
	S37=11 V32bis - 14400 b/s		X
	S37=12 V32bis - 7200 b/s		
S38	Buffer clearing delay (seconds) before forced hang up (DTR off or ATH). Active only if an error corrected connection already exists. If value 255 is assigned, the delay will be ignored ; the forced hang up command will be executed only when no more data is received or remains to be sent.	20	20
S46	V42 bis compression	138	138
S48	Protocol type	7	7
S86	Call failure reason code	0	0
S91	Transmit attenuation level compared with 0 dbm nominal level	10	10
S95	Extended result codes	0	0
	Bit0 CONNECT result code indicates DCE speed instead of RS232 speed	0	0
	Bit1 Append ARQ to CONNECT XXXX result code in error-correction mode	0	0
	Bit2 Enable CARRIER XX result code	0	0
	Bit3 Enable PROTOCOL XXXX result code	0	0
	Bit4 Reserved	0	0
	Bit5 Enable COMPRESSION XXXX result code	0	0
	Bit 6/7 Reserved	0	0



<b>APPENDIX 2 (continued) : S REGISTERS</b>				
S200 Operations characters frame				
	0	7E1	3	8E1
	1	7O1	4	8O1
	2	7N1	5	8N1 (default value)
S201 RS232 and RS485 data rate				
	0	1200	4	19200
	1	2400	5	38400
	2	4800	6	57600
	3	9600 (default)	7	115200
S210 Dial commands type				
	0	AT commands (default)	1	Digital inputs dial commands
	2	MODBUS commands	3	UNITELWAY commands
	20	Dedicated line (caller)	21	Dedicated line (called)
S230 Relay call commands				
	0	For compatibility	1	4 call directions (default)
S240	001 to 255	MODBUS or UNITELWAY @ of the modem (default is 255)		
S241	3 to 20 ch.	Authorized Nr of silence characters between 2 characters of a same MODBUS frame		





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