

# MODEM TELEM-GSM/GPRS 3G

## User manual



**Martem AS**  
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## 1. Description

The TELEM-GSM/GPRS modem provides data communication link over GSM/GPRS networks. The unit bases on Telit HE910 module and has been designed for use in industrial data communication applications. It has several features that are not normally present in the standard GSM modems. The TELEM-GSM/GPRS modem is DIN-rail mountable, has RS-232 interface, 10 digital inputs and 1 double relay output (2 relays).

The device can be used in two modes:

- Transparent modem mode. The RS-232 port communication is transferred over GPRS channel.
- Digital I/O module mode. The digital I/O is transferred over GPRS channel using the IEC 60870-5-101 Balanced mode communication protocol. In this mode the RS-232 port is used only for testing purposes.

## 2. Features

- Designed for Industrial Applications
- Embedded TCP/IP stack
- Programmed using the Python script
- 4 bands GSM/GPRS/EDGE 850, 900, 1800, 1900 MHz
- 5 bands UMTS/HSPA 800/850, 900, AWS 1700, 1900, 2100 MHz
- Output Power:
  - 2 W on class 4 GSM 850/900 MHz
  - 1 W on class 1 GSM 1800/1900 MHz
  - 0,5 W on class E2 EDGE 850/900 MHz
  - 0,4 W on class E2 EDGE 1800/1900 MHz
  - 0,25 W on class 3 UMTS
- Galvanically isolated RS-232 port and power supply

## 3. Interfaces

- 3V UICC SIM card interface
- RF connector, external antenna port SMA/F
- Galvanically isolated (2500 V AC) RS-232 in RJ45 connector
- 1 double command digital output (1 ON and 1 OFF relay) in a DB15 F connector, 2 relays with output contacts 1A 24V DC
- Isolated 10 digital inputs in DB15 F connector. Dry contacts.
- The wetting voltage is taken from power supply, but is limited at 48 V.
- On battery version the wetting voltage is 3,8 V and the inputs are not isolated.

## 4. Indication and switches

### 4.1 State LED indication

- Red Initializing or failure
- Blinking Operating but not connected to remote server
- Green Connected to remote server

### 4.2 Network LED indication

- On No GSM network connection
- Blinking Connected to GSM network

### 4.3 DIP switch positions

- 1 Off 2 On Operation mode
- 1 On 2 Off Configuration mode

## 5. Software options

Depending on the needed of functionality the module can be equipped with three different software modifications:

- Transparent connection between RS-232 port and TCP/IP socket
- I/O module with IEC 60870-5-101 Balanced mode protocol over TCP/IP socket connection
- Battery supplied I/O module with IEC 60870-5-101 Balanced mode protocol over TCP/IP socket connection

## 6. IEC 60870-5-101 protocol on I/O software versions

The IEC 60870-5-101 communication protocol is used in digital I/O module mode.

### Common parameters:

- Balanced mode
- Link address: 1
- ASDU address: 1
- Length of link address: 1 byte
- Length of ASDU address: 2 bytes
- Length of object address: 2 bytes

**I/O object addresses:**

I/O object	Message type	Object address
Digital inputs 1...10 on Flair 3xx fault recorder connection	3	1...10
Digital inputs 1...10 on single signal connection	3	11...20
Double values of same digital inputs (2 inputs per value)	3	21...25
Phase to phase failure values on Flair 3xx fault recorder connection	3	31...35
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Digital output	45 or 46	51

**Signal strength values:**

0 - (-113) dBm or less  
1 - (-111) dBm  
2..30 - (-109)dBm..(-53)dBm / 2 dBm per step  
31 - (-51)dBm or greater  
99 - not known or not detectable

**Channel bit error rate values:**

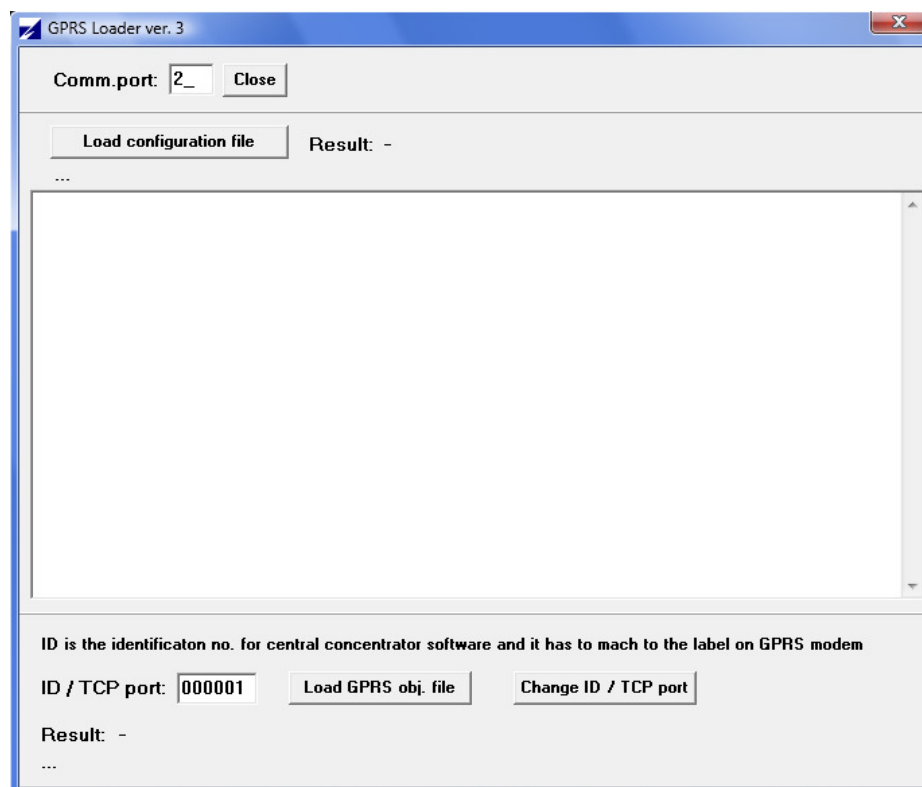
0 - less than 0.2%  
1 - 0.2% to 0.4%  
2 - 0.4% to 0.8%  
3 - 0.8% to 1.6%  
4 - 1.6% to 3.2%  
5 - 3.2% to 6.4%  
6 - 6.4% to 12.8%  
7 - more than 12.8%  
99 - not known or not detectable

**Network type values:**

0 - GPRS network  
1 - EGPRS network  
2 - WCDMA network  
3 - HSDPA network  
4 - unknown or not registered

## 7. Loading the configuration and firmware

The GPRS\_loader.exe program is used for loading the configuration and firmware.



### For establishing the communication:

- Set the DIP switches to configuration position.
- Reset the unit by interrupting the power.
- Insert the RS-232 port no. and press the “Open” button. On successful open the other buttons below will become active.

### For loading the configuration:

- Press the “Load configuration file” button for selecting the configuration file (consists of AT commands) in file selection window.
- On pressing the “Open” button in the file selection window the commands are sent to modem and the communication is showed in text window.
- The Result field will show one of the following messages:
  - Error – At least one command failed.
  - May-be OK – There are no negative answers from modem, but still the positive answers should be checked from text window.

**For loading the firmware or changing the ID (identification) code:**

- Fill in the ID field. The ID is used for identification of the GPRS modem in a server if the modem does not have the static IP address (the connection is initiated by the modem).
- Press the "Load GPRS obj. file" button for selecting the firmware file according to application.
- On pressing the "Open" button in the file selection window the firmware and the ID parameter are loaded to modem.
- For changing the identification code press the "Change ID" button (the firmware is not affected in this case).

**Finally:**

- Set the DIP switches to operation position.
- Reset the unit by interrupting the power.

**8. Pinouts****I/O interface in DB15 connector**

Pin no.	Signal
1	DI 1
2	DI 2
3	DI 3
4	DI 4
5	DI 5
6	DI 6
7	DI 7
8	DI 8
9	DI 9
10	DI 10
11	DO 1 ON
12	
13	DO 1 OFF
14	
15	Common for DI 1...10

**RS-232 interface in RJ45 connector**

Pin no.	Signal
1	-
2	-
3	GND
4	Rx →
5	Tx ←
6	GND
7	-
8	-

## 9. Battery supplied version

Modem is normally in powered off state. It wakes up on input signal activating (closing of dry contacts) and also periodically to check the communication.

The connection period is configured by AT command: ATS25=...

By default it is set to 5 days.

There are the following distinctive features:

- The supply voltage range is **6...15 VDC**
- The input contacts wetting voltage is 3,8 V and the inputs are not isolated.
- The state LED is not in use, i.e. it is always Off
- **The digital inputs have to be used as Normally Open contacts**, as the modem wakes up on input signal activating
- The activating input signal length ("On" position) is extended in hardware approximately by 10 seconds to be active until the module is powered up

This version is usually equipped with 7,2 V 13 Ah lithium battery pack, which is calculated to operate at least 5 years.

## 10. Power supply

- On standard version 10...72 VDC
- On battery supplied version **6...15 VDC**
- On standard version isolated to 2500 V AC
- Consumption < 5 W

## 11. Enclosure

- Material: Aluminium
- Dimension (WxHxD): 35x115x145
- Degree of protection: IP 31
- Weight: 380 g
- Mounting: to 35 mm DIN rail

## 12. Environmental

- Operating temperature range: - 20...+70 °C
- Operating humidity: ≤ 95% relative