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Electronic components

GCPRS200 GSM/GPRS TERMINAL

USER MANUAL

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Technology

Sagemcom

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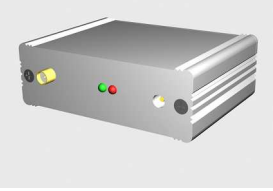
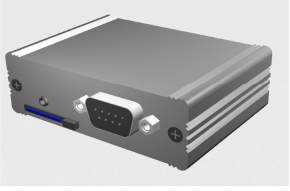
GCPR200 GSM-GPRS RS-232 TERMINAL





1. Introduction

This document describes the features, hardware and interfaces of the GCPRS200 Terminal. This GSM/GPRS modem is an easy and robust solution to M2M wireless applications.

The terminal is based on the GSM/GPRS MO200 module from the renown French manufacturer Sagem Communication (Safran group). The MO200 is a GSM, GPRS class 10 quad-band module. The MO200 complies totally with the RoHS environmental EU law.

This module is globally certified and validated for most of the GSM operators worldwide. Hence, its the perfect choice to act as: **data centre** for M2M applications (TCP/IP stack, MMS, SMS, FTP), **automotive market** (E-marking, extended temperature range) or as **audio centre** (Digital Audio Interface, fine-tuning tools).

The general features of the GCPRS200 terminal are:

Frequency Bands: Quad-band: GSM-850/EGSM-900/DCS-1800/PCS-1900 MHz
GPRS: class 10
TCP/IP Stack: supported.
Interfaces: SMA antenna connector, 9-way subD connector for serial connection, 8 way microfit connector for power supply, audio and reset, push-pull SIM card reader, 1 ON/OFF signalling LED and 1 bi-colour GSM/GPRS signalling LED.

The GCPRS200 can be remote controlled by AT commands (GSM 07.07 y 07.05) and the connection to the host controller (Data Terminal Equipment DTE) is done by means of a standard serial RS232 connection.

2. General features

The GCPRS200 supports Voice functionalities, Data, Fax, SMS and Internet connections. Its robust design is ideal for industrial applications and features easy installation and user friendly interface. It is ideal for the following applications:

- Automotive
- Machine to machine (M2M) communications
- Remote control – Telemetry
- Security

Technical features:

GSM	Quad-band GSM/GPRS (EGSM 900 /1800MHz /GSM 850 / 1900MHz) Compliant with 3GPP GSM Phase 2+
GPRS	Class 10 PBCCH Bandwidth: download up to 85,6 kbps, up load up to 42,8 kbps, Class B
Data	Data, fax, SMS, MMS and voice transmission. SMS: Text and PDU mode. TCP/IP Stack with embedded GPS drivers. SIM Application Tool Kit and USSD Extended AT commands support (07.05, 07.07, 07.10)
Module Certifications	FTA, GCF, PTCRB, FCC, E13
Output power	Class 4 (2W) @ 850/900MHz Class 1 (1W) @ 1800/1900MHz
Power supply	9 to 30 V DC
Current consumption	2 A peak during voice call (GSM standard). Consumption in stand-by mode @ 30 V. input <20mA Consumption in stand-by mode @ 12 V. input <30mA Consumption in stand-by mode @ 9 V. input <35mA Consumption in idle mode: <10mA
Audio	DAI, fine-tuning tooling Basic hands-free with eco cancellation.
GSM call	Telephony, emergency calls, Full Rate, Enhanced Full Rate and Half Rate (FR/EFR/HR/AMR) Dual Tone Multi Frequency function (DTMF)
Dimensions	80 x 71 x 24mm
Weight	125g
Working temperature	0°C to +70°C (on customer's demand it can be made with extended temperature range).

1.1 Interfaces:

The GCPRS200 terminal interfaces have 4 connectors in the front and rear panels of the metallic case. (See figure 1).

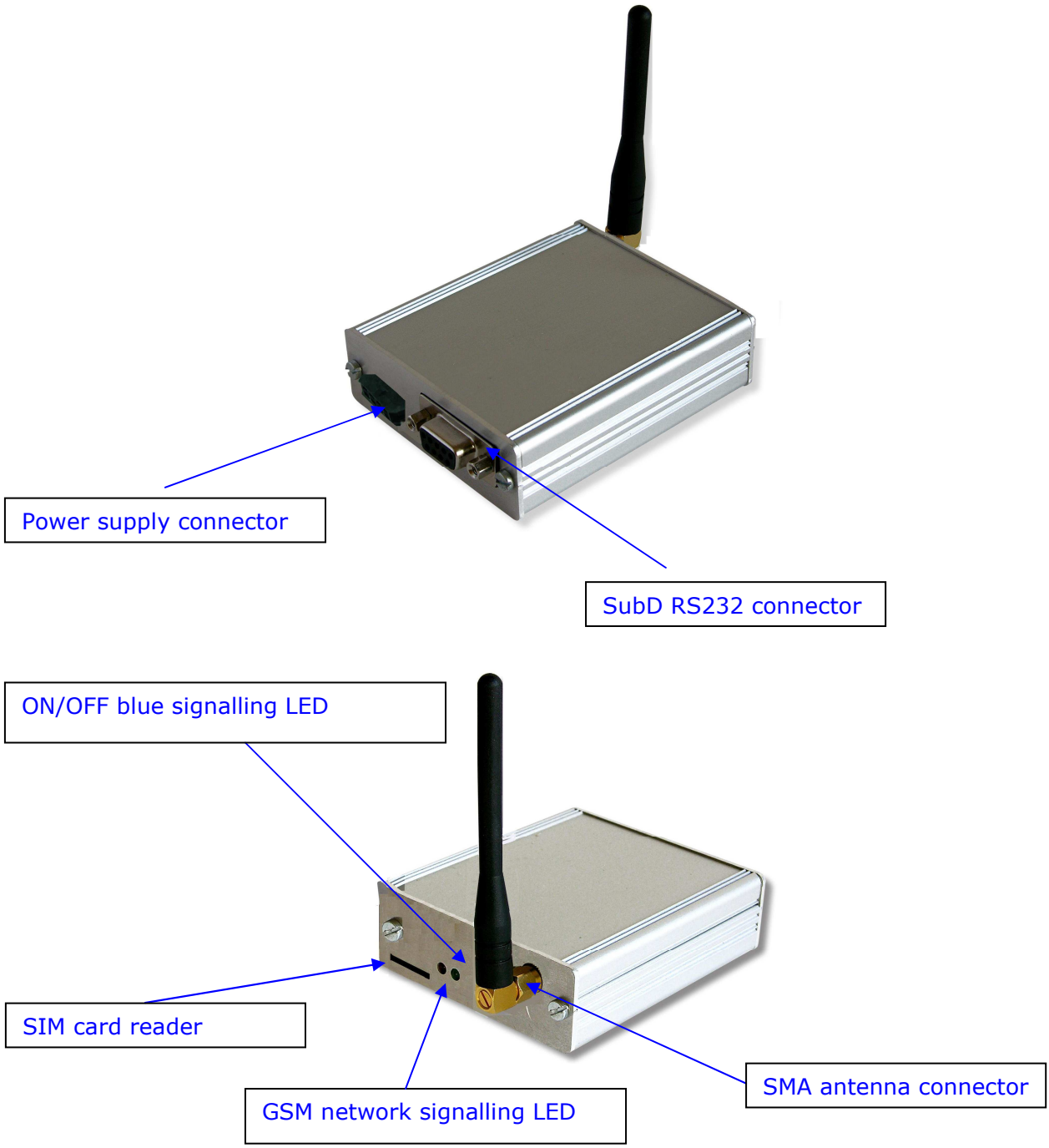


Figure 1 front and rear view of the GCPRS200 terminal.

1.2 External connectors:

Antenna:

A GSM antenna with 50 Ω SMA male plug connector must be inserted in the SMA male jack connector of the terminal. See figure 2 and figure 3.

Figure 2 SMA-male antenna connector.

Figure 3 GCPRS200 terminal SMA-female connector

IMPORTANT: Before connecting /disconnecting the antenna to the terminal, the device must be powered off.

The antenna should be placed at a distance of more than 20 cm. away from any person to guaranty safety and to avoid interference.
To get good antenna performance and minimal interference with other electronic devices, no objects should be closer than 40cm from the antenna.

Power supply:

- Power supply voltage range: 9 - 30V DC
- Nominal voltage: 12V DC
- Power supply current range: min. 1,2A @12V
- Power supply ripple: max. 120mV
- Average input current in idle mode: 8mA @ 12V
- Average input current in Tx/Rx mode: 110mA @ 12V

The power supply connector is an eight-way microfit standard connector. It is placed to the left of the SubD serial connector.
Pinout description:
- GND = ground pin (1x POWER, 1x Signal)
- Power in = 9 - 30VDC @ 1.2A min
- RESET

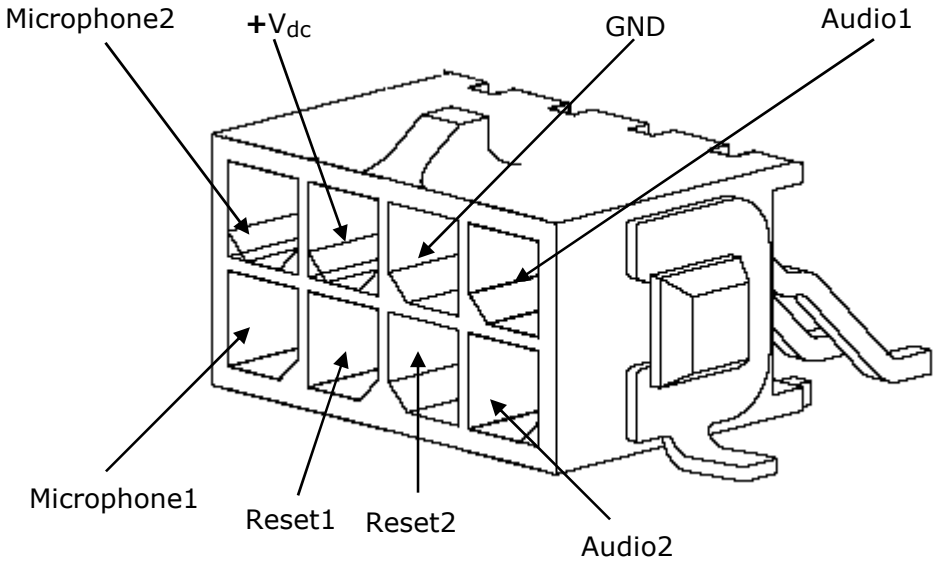


Figure 4 microfit connector pinout.

The aerial receptacle housing is shown with the Terminal and the metallic contacts to crimp the cables. See figure 5.

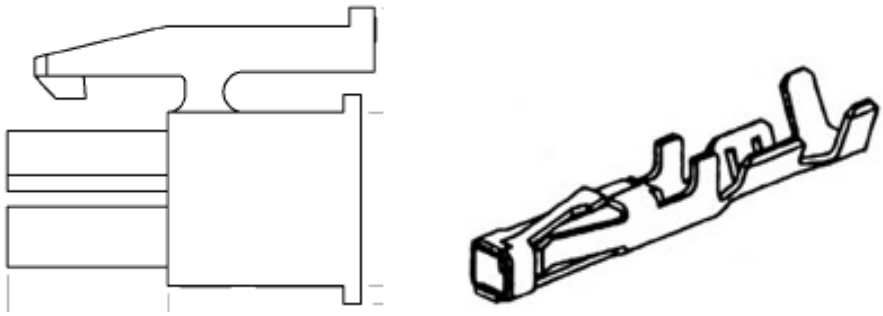
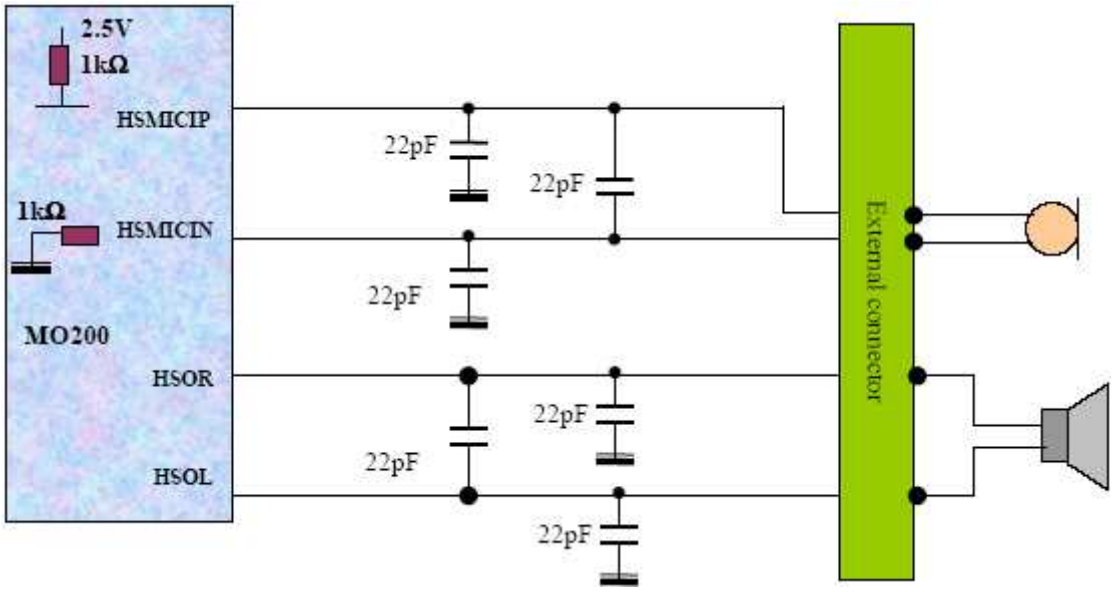


Figure 5 Receptacle housing and metallic contact for microfit connector

Audio connection

GCPRS200 terminal has audio features available using two of the pins in the 8-way microfit connector.

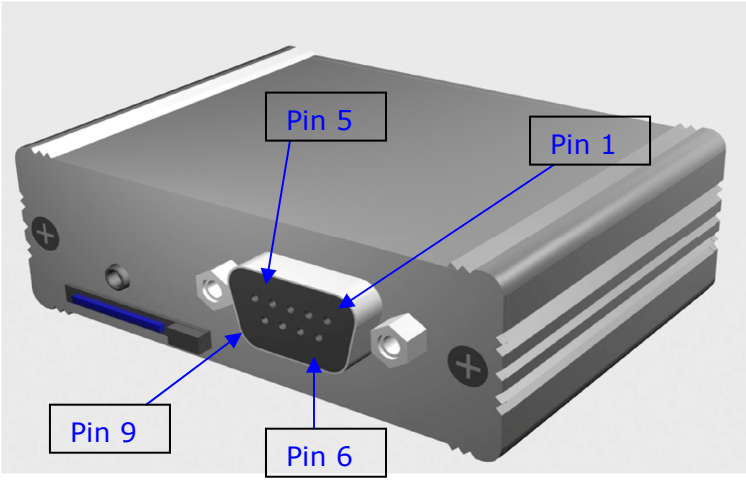
This hardware configuration allows the possibility of having mono headphones and a microphone connected to the terminal.
The internal connection of the audio is as follows:



On page 15 there is a small introduction to the audio AT commands of the terminal.

Serial RS-232 connector:

9-way sub-D female connector for RS-232 (V.24) connection.
Transmition speed from 300 up to 115.200 bit/s
Autobauding (from 300 up to 38.400 bit/s)
Short-circuit protection (to ground) in each of the outputs.

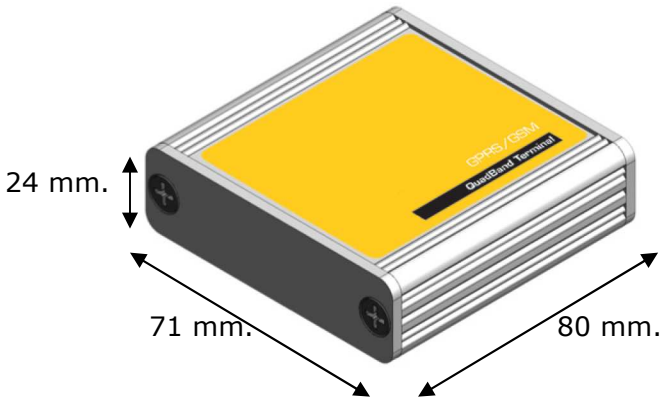


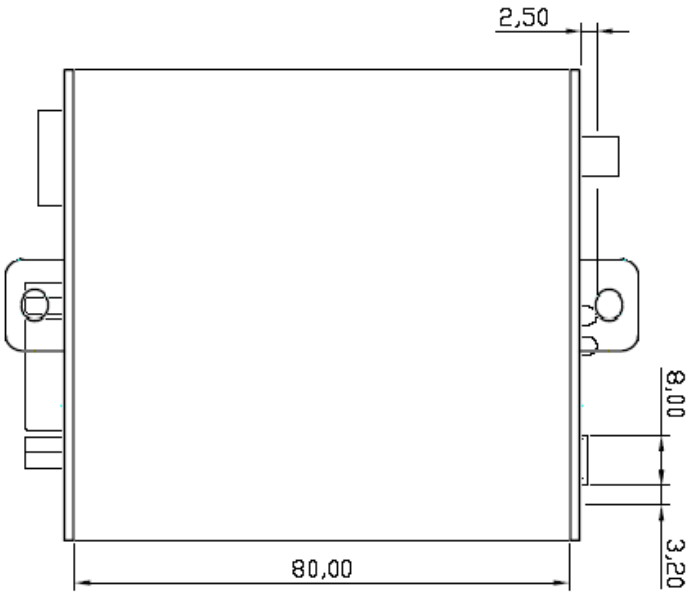
DB-9 connector Pin-out:

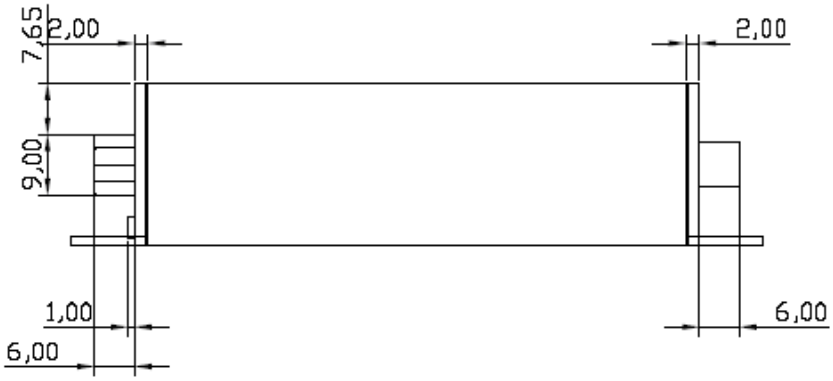
1. Received Line Signal Detector DCD
2. Received Data Rx
3. Transmitted Data Tx
4. Data Terminal Ready DTR
5. Signal Ground (Common) GND
6. DCE Ready DSR
7. Request to Send RTS
8. Clear to Send CTS
9. Ring Indicator RI

1.3 Dimensions:

80 x 71 x 24mm







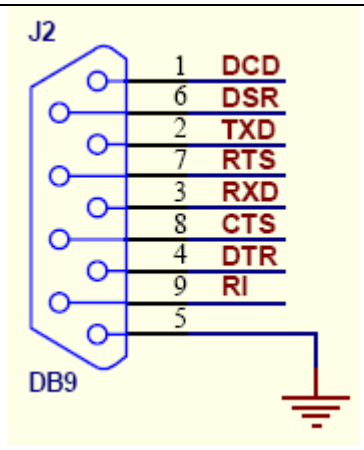
2. Installation

Important issues in the installation process must be observed:

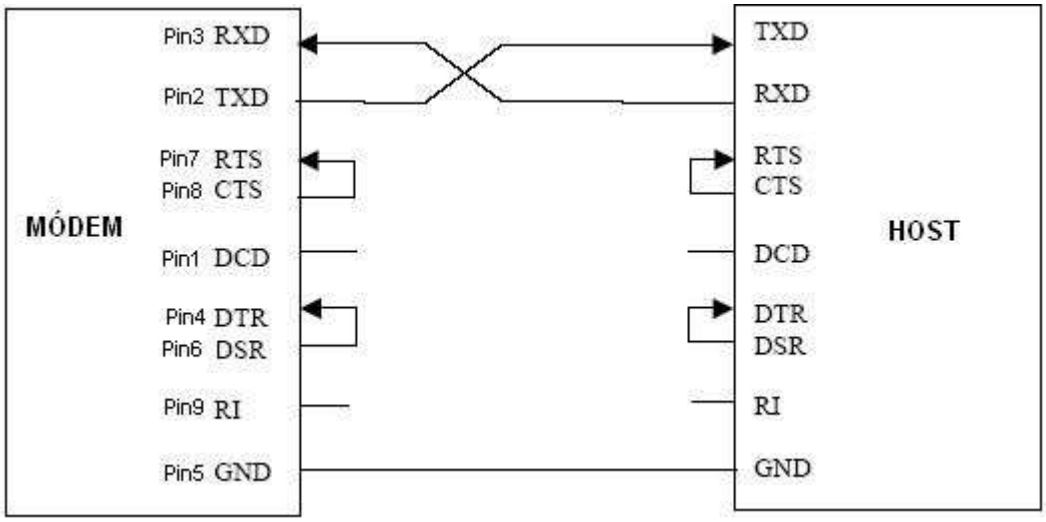
- The terminal must be installed in a dry environment and should not be exposed to direct contact of water or dust.

- The serial interface DB9 is standard; the pinout diagram is as follows. The marked signals are the minimum ones needed for a basic serial communication.

Pin DB-9	Function
1	*CD*
2	**TX**
3	**RX**
4	*DTR*
5	**GND**
6	*DSR*
7	*RTS*
8	*CTS*
9	*RI*



- In order to use this minimal configuration instead of the complete one with flow control, it is strongly recommended to carry out the following connections between the UART pins:



As the DTR is needed to be active (Low electrical level) it must be connected to the DSR once the terminal is switched on.
The RTS is also needed to be active (Low electrical level). Connect RTS with CTS once the terminal is switched on.
The DCD and RI pins can be left without connection.

- The power supply connector receives the positive electrical signal through the upper left pin and GND through the upper right (see figure 4). The receptacle housing to be connected to the terminal's microfit connector and the metallic contacts to crimp the cables are supplied within the GCPRS200.
  – **DO NOT INVERT THE POWER SUPPLY POLARITY**.

- **IT IS NECESSARY TO CANCEL THE PIN CHECK** of the SIM card to work with the terminal. This action can be done in the configuration menu of any mobile phone. The attachment to the GSM/GPRS network cannot be done unless this action is performed.

To install the terminal, carry out the following steps:

1. Insert the SIM card as shown in figure 6.

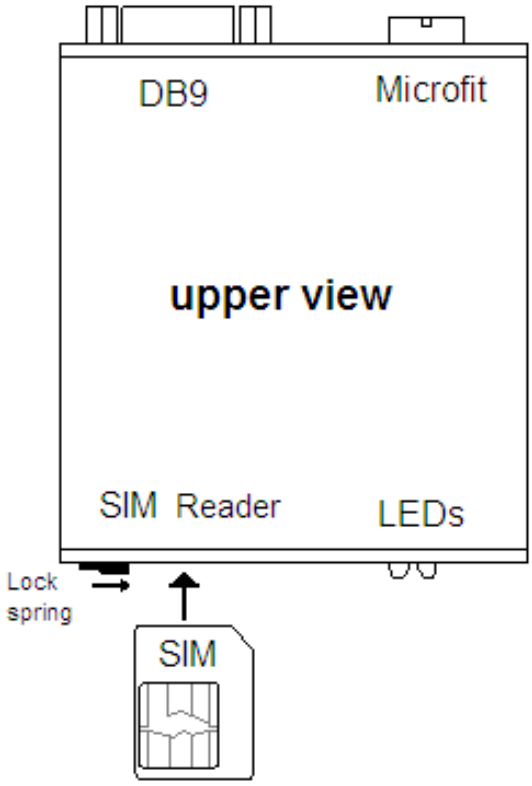


Figure 6 - Insertion of SIM card and lock, upper view of the terminal

The terminal has a Push-Pull SIM with lock spring. Do not introduce or remove the SIM card while the GCPRS200 is powered on.

To introduce the SIM card in the slot showed in figure 6 note the correct side of the card. Push in the direction shown until it locates (you will hear a"click" and the blue LED will light). Check that the metallic golden part of the SIM card is faced upwards and the notch is in the upper right corner before inserting it into the reader.

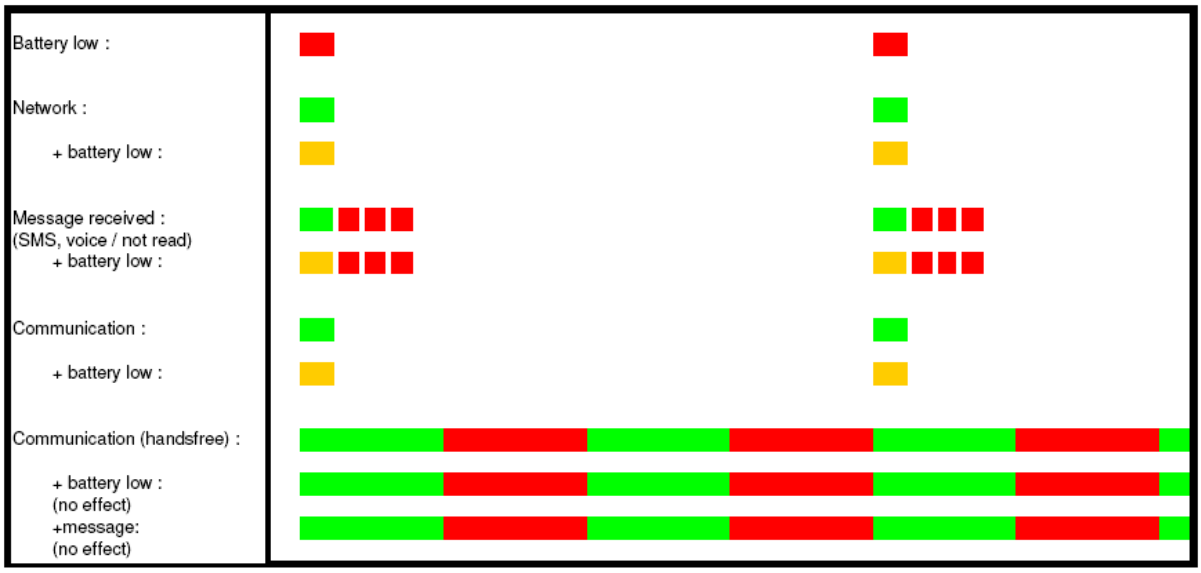
Once the card is fixed inside the reader, the security lock can be closed. Slide the spring lock to the right (in the direction of the LED).

2. Place the terminal in its final position.
3. Connect the antenna to the SMA connector of the terminal.
4. Connect the serial cable to the DB9 connector.
5. Switch on the terminal connecting the aerial receptacle to the microfit connector.
6. The blue LED should begin to light up, signalling that the terminal is switched ON.
7. After some seconds the bi-colour LED should start to flash green, indicating that the GCPRS200 is attached to the GSM network.
8. If there is an incoming SMS to be read on the SIM card's number, the bi-colour LED will emit a burst of three red flashes periodically until the message is read by means of AT commands.
9. To switch off the terminal, remove the power supply connector. To switch on again just connect the microfit connector.

3. LEDs signalling

The signalling LEDs have different behaviour depending on the status of the terminal.

1. Low battery:
   The network/battery indication consists on a 30ms flash with period of 2 s.
   The flash can take 3 colours:
   - **Green** when attached to the network and battery ok.
   - **Orange** (green + red) network attached and battery low.
   - **Red** no network and battery low.
2. Messages:
   The message received indication follows after the network/battery indication; it consists of 3 successive 20ms red flashes. It indicates the presence of a new SMS or voice mailbox.
3. Handsfree call:
   During a handsfree call (with at+vip=1 during a call), the led becomes alternately red and green for a period of 1 s. Handsfree led mode has priority over other modes (Network, Messages…).

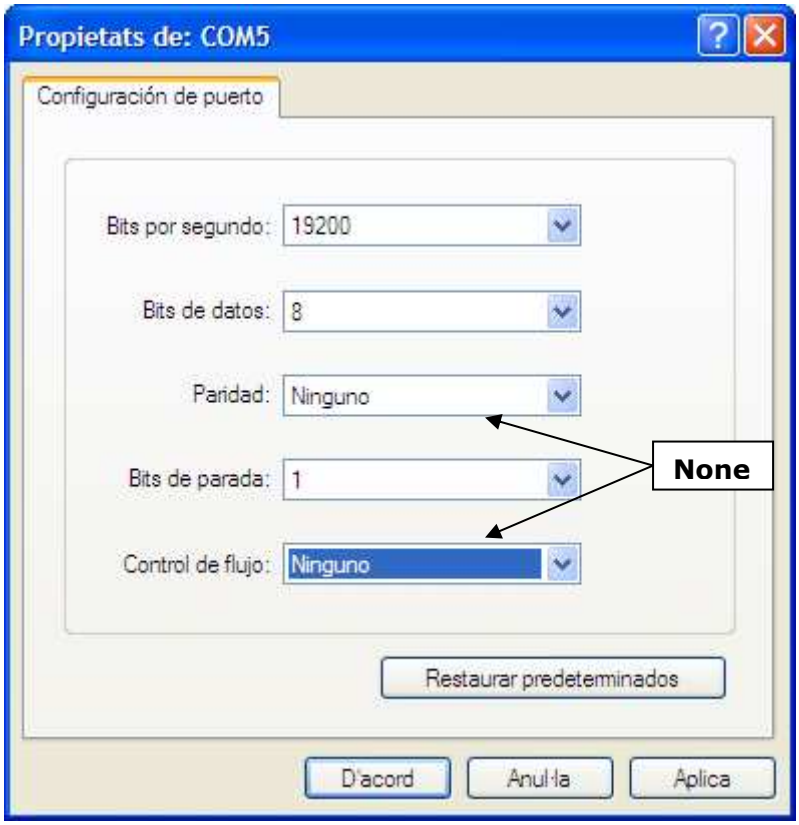


4. Product technical features

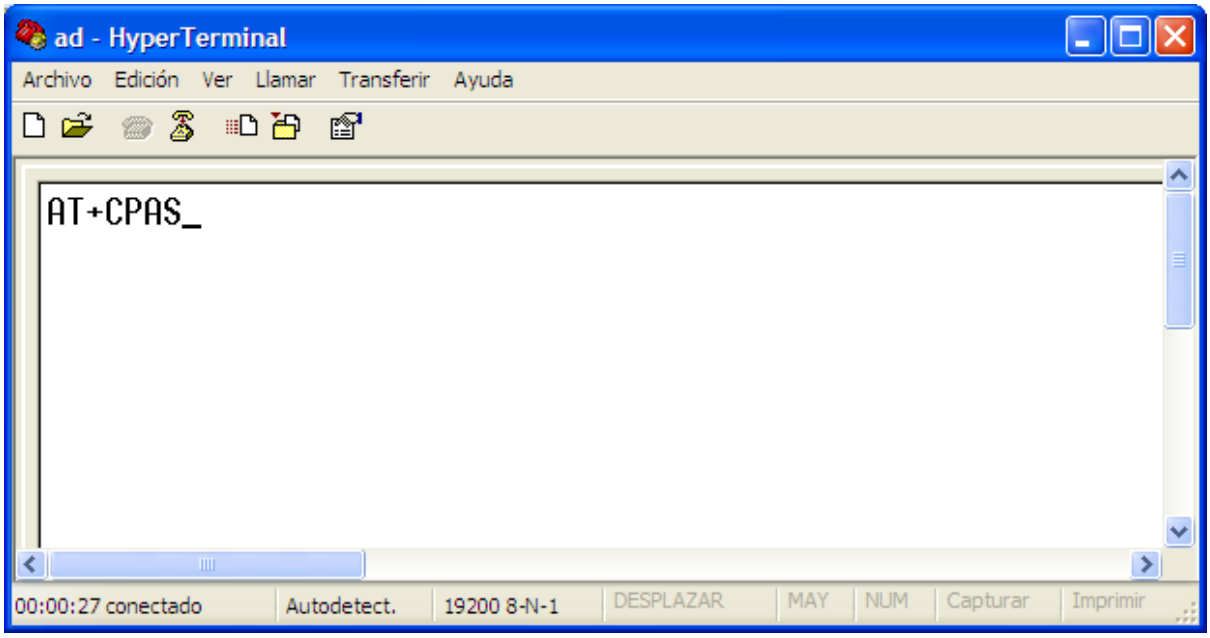
Temperature Range	0°C to +70°C (on customer's request it can be with an extended temperature range)
ESD	ESD protected < 1.5 kV
Physical dimensions	(see chapter 5)
Power supply	9 to 30Vdc
Current consumption	Off mode: 120 uA (tip.) Consumption in stand-by mode @ 30 V. input <20mA Consumption in stand-by mode @ 12 V. input <30mA Consumption in stand-by mode @ 9 V. input <35mA Consumption in idle mode: <10mA 2 A peak during voice call (GSM standard).
Frequency bands	GSM850 + EGSM900 + DCS1800 + PCS1900
Voice codes	Half Rate, Full Rate, enhanced Full Rate, Adaptative Multi Rate
Output power	Class 4 (2 W) for GSM850 / EGSM900 Class 1 (1 W) for DCS1800 / PCS1900
Supported SIM cards	3V SIM cards. To prevent damaging the SIM card, The power supply should be disconnected while the card is inserted or removed.
UART interface with flow control	Up to 115.2 Kbauds with auto bauding.
Data services	GPRS, CSD, Fax
Complementary services (via AT commands)	Incoming ID identification, hold call, call resend, Multiparty, USSD, CPHS,
GPRS	SMG 31bis, Multi slot class 10, class B terminal, PBCCH support
Certification GSM/DCS	GCF-CC GCF-CC V3.17.0
Certification PCS	NAPRD03 V3.2.1

5. Introduction to GCPRS200's AT commands

To communicate with the terminal from a personal computer software similar to the HyperTerminal is required. In this program locate the terminal in the COM port where it is connected and set up the connection as follows:



Once the connection is set up the terminal is ready to receive and answer to the AT commands.



There are some basic AT commands that are useful to check that the terminal is functioning correctly and that is attached to the GSM network.

ATI
This command gives the name of the GSM module and its firmware version (ATI3)

AT+CPAS
If the answer is [+cpas: 0] means that the module is attached to the network

AT+kbnd?
This shows the number of frequency bands it can use.

AT+CSQ
This shows the level of sensitivity of the reception signal.

At+VIP=2
This will activate the headset audio

ATD*********; (put a normal telephone number instead of *********)
To make a normal call.

To send normal SMS messages:
AT+cmgf=1
Set the text mode up

AT+cpms="ME"
To select the ME memory as the default one to store the SMS

AT+cmgs="*********" (put a mobile phone number instead of *********)
>text (ctrl+Z)
This will send the text as an SMS to the given number

For more information on the AT commands and their applications refer to the following documentation:

Getting started with AT commands in basic GSMGPRS applications - RevC1.pdf

AT Command Set for SAGEM Modules - 5625.1 014 69979 ED02.pdf

DTM MKTG - Internet connectivity as a simple modem.pdf

DTM MKTG - Internet connectivity TCP_IP introduction - indC2.pdf

Getting started with GPRS connexion.pdf

These documents can be found in the web site or by contacting our sales/technical staff.

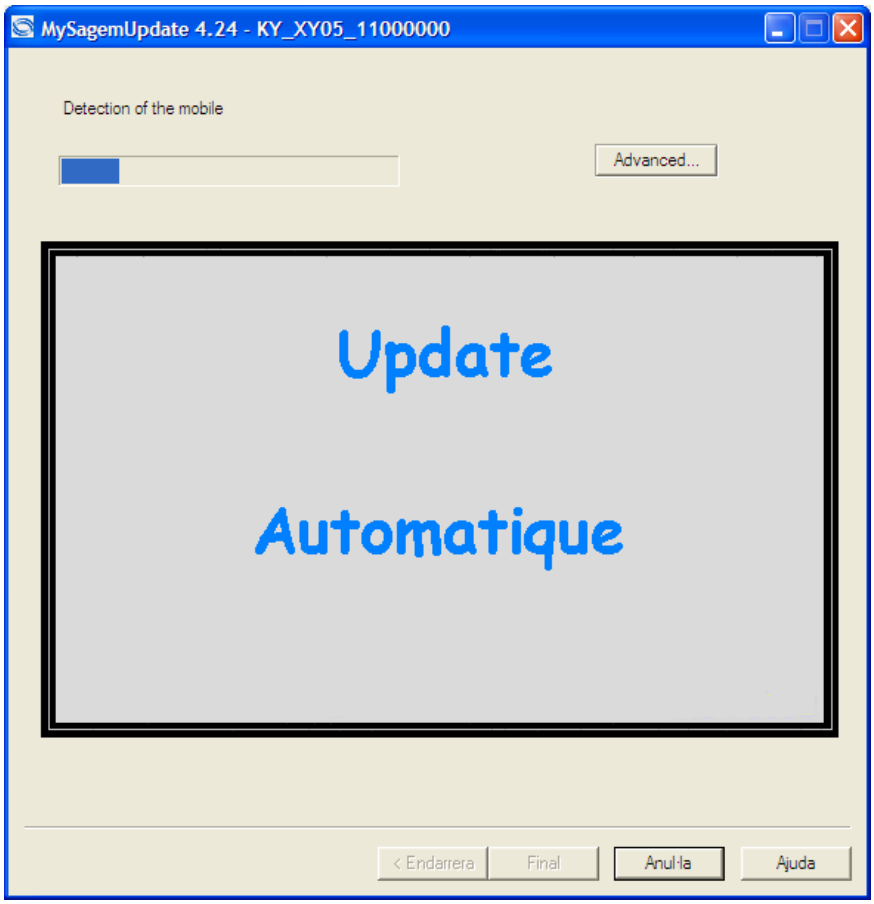
6. Firmware update process

This process is used when there a new firmware version of the GSM/GPRS module available, released by Sagem Communications. When Sagem makes an improvement on the software they launch a new firmware version. This new firmware comes within an auto-executable file.

Once you have this file on your PC it must be loaded into the module's internal memory through the serial port (DB9 connector).

Connect the serial RS232 cable to the computer where the auto-exec firmware file is located. Switch on the terminal. Double click the file and start the auto update process.

A screen like this will appear:



The terminal will be automatically detected when it is powered on and the RS232 connection is established.

Once the terminal is detected the software starts the update. This process can take several minutes to finish. Do not switch off either the module or the computer until the end of the update.

To have the GCPRS200 fully functional again a restart must be done at this point.

7. Sleep Mode behaviour

The sleep mode is a state in which the GSM/GPRS module can enter to save energy and avoid consuming too much power. In this mode the connection with the serial interface is deactivated but the module remains attached to the GSM network.

The module and terminal will automatically go into sleep mode after a period of inactivity unless there are any priority jobs in progress. (For instance: GSM network scanning).
The time to go from active mode to sleep mode if there's no activity is 30 seconds, this parameter cannot be adjusted.
The module cannot be forced to go into sleep mode - the *timer* must be accessed using the software.

5.1 Software control of the sleep mode

With the AT command "AT+KSLEEP" this functioning mode can be controlled.

AT+KSLEEP=<mngt>
Answer
OK
Parameters
<mngt>:
0: The module does not go in sleep mode if the DTR is set to high level.
1: The module decides by itself (internal timing) when it goes in sleep mode.
2: The DTE controls by hardware signals when the DCE is allowed to go in sleep mode.

Therefore the most common and easy case is to let the module go automatically to the sleep mode using the **"AT+KSLEEP=1"** command.

For more information:
AT Command Set for SAGEM Modules - SCT TMO MOD SPEC 0465 G.pdf

5.2 Avoiding the terminal to go to sleep mode

If we send the AT command "AT+KSLEEP=0" and keep the DTR with an active level (low electrical level ~0V) the module will not go into sleep mode.
Note: with some firmware versions (previous to the KY3,XT for MO200) if there is no SIM card inserted, the module will ignore the KSLEEP and will switch itself off after some minutes.

5.3 Wakening up the terminal from sleep mode

Any interruption will make the terminal wake up and with it the serial external interface. If the terminal is in sleep mode, it can be activated with the following actions which depend on the "AT+KSLEEP" parameter:
• 0 : Toggle the DTR signal to active level
• 1 : send the command "AT" (no answer returned)

Note: Any character sent through the serial port to the terminal will generate an interruption that will wake the module up. This first character is lost in the process, therefore if it is part of an AT command, this will be lost also. After 2 seconds the terminal is fully operational again.

8. Reset

The GCPRS200 terminal has two pins in the microfit connector that are called Reset1 and Reset2. These two pins allow the user to do a hardware reset of the terminal. The reset must be done using a push-switch or a transistor as shown in figure 7.

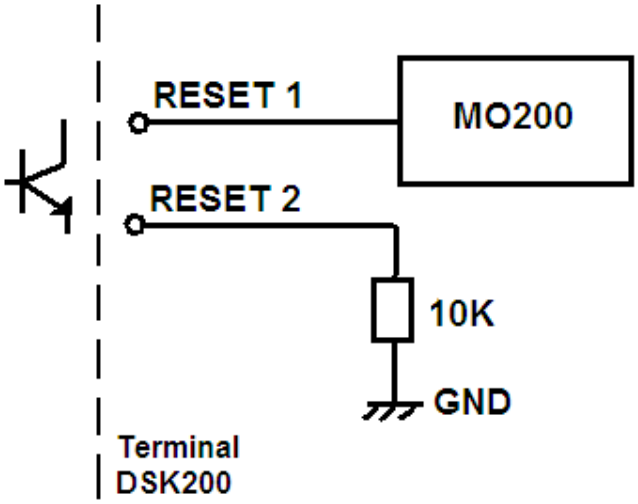


Figure 7 – Reset schematics and connection

The reset signal is active low and can be done with a short-circuit of the 2 available pins.
Reset signal from the GSM/GPRS module:
VL (V)-0.3 VBAT VH (V)-0.45 VBAT
Treset 65 ms - hysteresis system

9. Optional devices:

- Microphones, loudspeakers and handsfree kits.
- Outdoor/indoor antennas with SMA connector
- Power adapter for power supply: 230V/9V
- USB to RS-232 cable adaptor

Available devices:

Microphones and loudspeakers	GSM Antennas
	
Power adapter 230V/9V – 2A	**Handsfree kits**
	
USB - RS232 Cable adaptor	
	

These devices can be found on Electrónica web site or by asking our sales team.

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