

CMGSM-GPRS User's Manual

1. Introduction

The CMGSM-GPRS is a device designed as an add-in to FATEK PLCs. It is intended to be used for remote monitoring and control of existing applications in the PLC. Application will not need to be changed and will not be influenced. CMGSM-GPRS creates the link to serial port of the PLC, which may be used similarly like modem or Ethernet link by a PC program for monitoring or visualization (HMI). WinProLad program for PLC program remote debugging or editing must communicate via data call (CSD), it can not work well via GPRS.



Main features

- Automatic GSM connection to internet via GPRS after CMGSM is on power.
- Data connection in GSM network (CSD) for urgent PLC monitoring or configuration.
- Power 24V DC from PLC can be used for this device.
- Configuration parameters is stored in registers of the PLC.

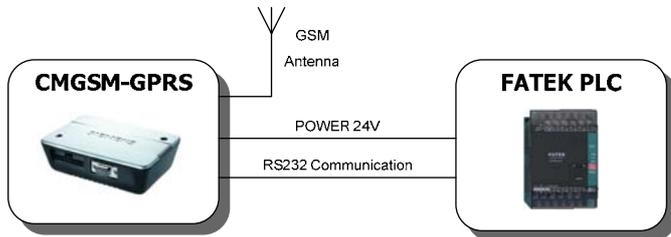
2. Content of the Delivery

- 1 pc of CMGSM-GPRS (FAC-CMGSM-GPRS)
- 1 pc of cable for power supply from PLC GSM-35-PKAB1
- 1 pc of antenna GSM-ANT12
- 1 pc of GPIO connector with start jumper GSM-65-PK2-START
- 1 pc of printed documentation
- 1 pc of RS232 cable HW-11.01.9018 (null modem cable)

Warning

FATEK PLC is not part of the delivery of this product. It is needed to order it separately. Any FATEK PLC may be use along to CMGSM-GPRS.

3. Typical Application, Installation



3.1 Configuration

Configuration in PLC is necessary. Read chapter [Configuration](#) for more.

3.2 Hardware settings

- Add to PLC board CB2x or module CM2x to get 9-pin RS232.
- Connect "RS232" cable between CMGSM and CB2x or CM2x on PLC.
- Connect GSM antenna.
- Insert SIM card (GPRS capable, ask your GSM provider)
- Connect power cable "POWER 24V" between modem and PLC. Red wire connect to "24V OUT+" and black wire to "24V OUT-"

3.3 Startup

Device status is indicated with a blue LED on CMGSM-GPRS. Valid statuses are following:

Term	Description
permanently off	No power.
600 ms on / 600 ms off	Device is not logged into GSM network. This state occurs after start of device for aprox. 30 seconds. If it remains check: <ul style="list-style-type: none"> SIM card (is inserted?, is valid?) Antenna (is connected?) Configuration (is SIM PIN correct?)
75 ms on / 3 s off	Device is logged into GSM network and is idle. (It means that no GPRS nor CSD connection is active.)
75 ms on / 75 ms off / 75 ms on / 3 s off	GPRS active, no data
500 ms on / 50 ms off	GPRS active, data transfer in progress
permanently on	CSD (data connection) in progress

4. Functions of the CMGSM-GPRS

4.1 TCP over GPRS – Primary Function

Primary function of this device is to establish and maintain TCP connection from PLC to a server. In order to achieve this goal following steps are made after power up: Establish connection to PLC on serial port. Following parameters of the serial port are used: 9600 baud, 7 data bits, EVEN parity, 1 stop bit, no hw handshake (it is default FATEK settings for all serial ports), address 01h. After power on the device will proceed steps:

- Read configuration from PLC register D3900 – D3999.
- Login to GSM network, using **PIN** from configuration.
- Attach to GPRS, using **APN**, **USER** and **PASSWD** from configuration.
- Establish and maintain TCP connection to **SERVER** on port **PORT**.

Device will try indefinitely to read configuration from PLC at the beginning. If there is no configuration in PLC or is damaged or other problem occur, device will not login into GSM network!

Supplementary functions are following.

4.2 GSM Data Connection (Data Call, CSD)

Data connection can be established only when no GPRS communication is in progress. To stop GPRS send SMS with keyword "DATA" to the device. If SMS with keyword "DATA" is recognized, current GPRS connection is temporarily (at least 5 minutes) suspended and data from the new connection is routed to PLC. Data connection is not limited by time and remains active until remote side will hang up. After end of the data connection, the GPRS is resumed automatically and primary function is restored.

There is no security mechanism against unauthorized data connection to PLC. So it is highly recommended to set security in PLC (password).

4.3 SMS Commands

Device will receive incoming command SMS and check for valid access code (ACODE parameter in configuration). If access code is valid message is searched for keywords. Only one keyword in SMS is executed.

Example of an SMS

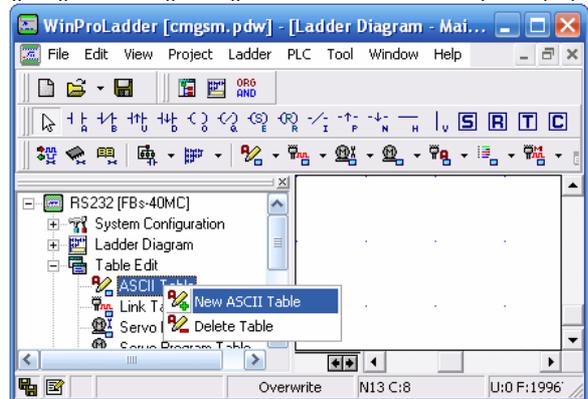
998877 DATA

Table of all keywords:

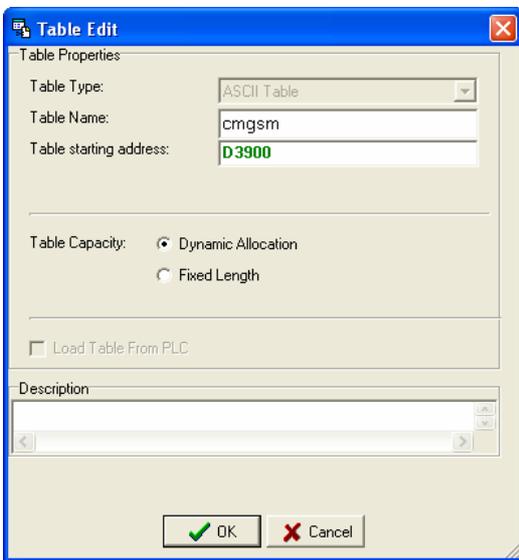
Keyword	Description
RESET	Device will respond with confirmation SMS and within 1 minute will restart itself. PLC is not affected. This command is used after change of configuration in PLC register to accept the changes by CMGSM.
DATA	Device will respond with confirmation SMS and temporarily suspend GPRS connection to enable data connection (CSD). Then waits for 5 minutes for incoming data connection (CSD). If data connection occurs, it will be connected to PLC and will remain until remote party hang up. Finally after end of CSD connection or after 5 minute timeout GPRS will be restored.
STATE	Device will respond with SMS describing its current status: <ul style="list-style-type: none"> GPRS connection: from IP:PORT, to IP:PORT CSD connection: from phone number

5. Configuration

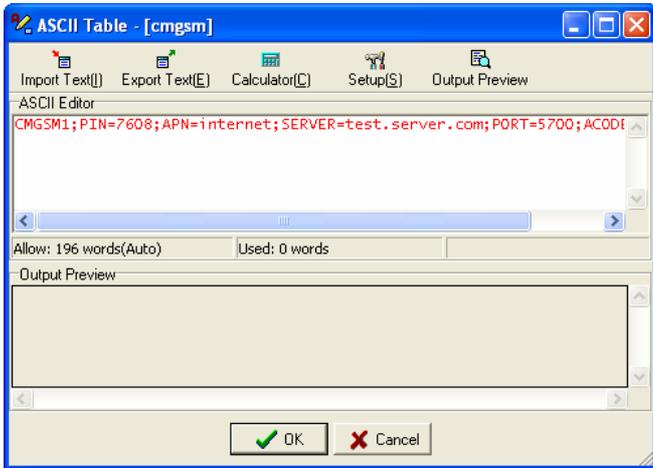
Configuration for CMGSM-GPRS is located inside PLC Fatek. Range of internal PLC registers D3900 – D3999 is used. Configuration itself is a string of characters. This string is created via WinProLad (software from PLC FATEK manufacturer), see following images. This range of registers can not be used for any other purpose!



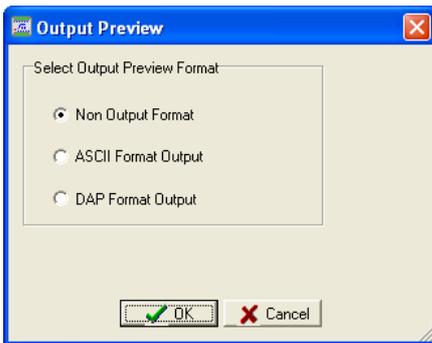
Step 1 – Right click on Table edit - ASCII Table and select "New ASCII Table"



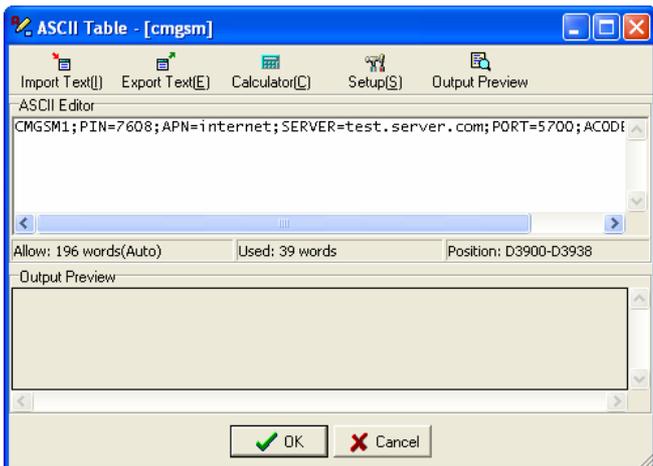
Step 2 – Enter Table Name „cmgsm“ and Table starting address „D3900“. Then click “OK”.



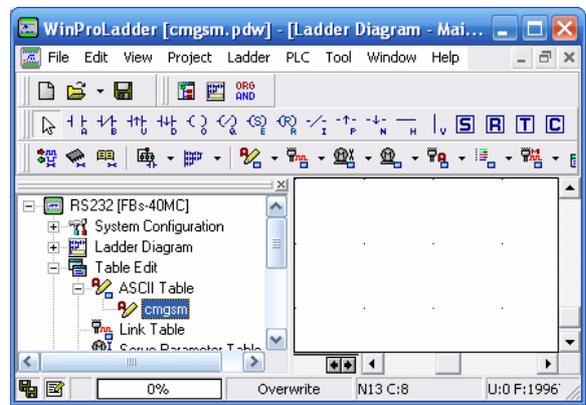
Step 3 – Enter configuration string “CMGSM1;PIN=7608;APN=internet;SERVER=test.server.com;PORT=5700;ACODE=998877;#” into field “ASCII Editor” and click on button “Output Preview”. !!! Warning: Change PIN according to your real SIM card !!!



Step 4 – Select “Non Output Format” and click “OK”.



Step 5 – Configuration string is now black. Click “OK”.



Step 6 – Result

Configuration is read after power up and only once. CMGSM-GPRS will not work at all until configuration is read. (Neither connects to GSM.)

Configuration string is very simple. For example:

```
CMGSM1;PIN=7608;APN=internet;
SERVER= test.server.com;PORT=5700;ACODE=998877;#
```

This string means:

- CMGSM1 – It is configuration for CMGSM, version 1.
- PIN=7608 – User PIN code of '7608' for SIM card in order to register into network.
- APN=internet – Access Point (APN) is needed in order to use GPRS service in GSM network. In this example APN is 'internet'.
- SERVER=test.server.com – It is a name of a server, to which CMGSM will connect. (Using TCP connection.)
- PORT=5700 – Use TCP connection to port 5700
- ACODE=998877 – Access code for SMS control is 998877

General format of is following:

```
CMGSM1;KEY1=VALUE1;KEY2=VALUE2; . . . ;#
```

Part 'CMGSM1' at the beginning of the string is mandatory. It is a stamp of validity. Acceptable keys are shown in table below. Unknown keys are ignored, no spaces are allowed inside keys or values. Order of pairs is not important. Keys are not case sensitive, values are case sensitive. Maximum length of configuration string is 200 characters. At the end of each part MUST be character ';' (semicolon), after last pair MUST be characters ';' (semicolon) and '#' (hash).

Keys in configuration string:

Key	Description	Default
PIN	PIN code for SIM card. May be omitted if SIM card does not need PIN code. But is mandatory if SIM card need PIN code.	<empty>
APN	Access Point for GPRS. Ask your GSM provider for this value.	internet
USER	User for APN. Mandatory is provider requires.	<empty>
PASSWD	Password for APN. Mandatory is provider requires.	<empty>
SERVER	Name or IP address of server, to which CMGSM-GPRS will connect. TCP connection is used. Optional.	<empty>
PORT	TCP port for connection. Optional.	5700
ACODE	Access code for SMS control. You can send SMS message in order to control CMGSM-GPRS. These SMS must begin with this ACODE. They will be ignored otherwise. Optional.	1234

If **SERVER** is omitted no GPRS connection is made and device waits for a data CSD call only.

5.1 Examples of Configuration Strings

5.1.1 SIM without PIN

Configuration string:

```
CMGSM1;APN=internet;SERVER=test.server.com;PORT=5700;
ACODE=998877;#
```

Translated for human this string says:

- CMGSM1 – It is configuration for CMGSM, version 1.
- APN=internet – Access Point (APN) is 'internet'.
- SERVER=test.server.com – Connect to 'test.server.com'
- PORT=5700 – Use TCP connection to port 5700
- ACODE=998877 – Access code for SMS control is 998877

5.1.2 Only CSD (without GPRS)

Configuration string:

```
CMGSM1;PIN=7608;#
```

Translated for human this string says:

- CMGSM1 – It is configuration for CMGSM, version 1.

- [default Access code for SMS control is 1234]

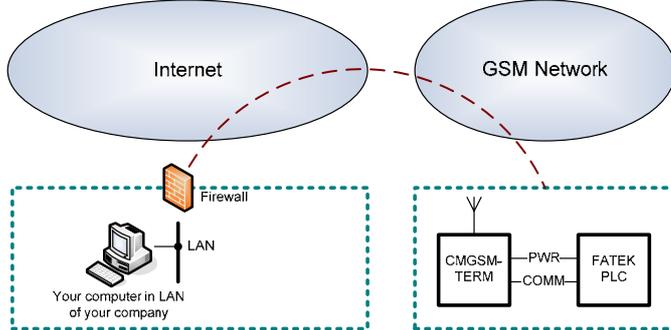
6. Usage Scenarios

6.1 Explanation of Important Terms

Term	Description
GPRS	The way how to transfer data through GSM network. It is charged according to transferred bytes (and not per minutes) and is much more suitable for remote monitoring than data connection (CSD).
TCP/IP	It is protocol which is used while communicating through GPRS. (Like Fatek protocol is used to communicate between computer and Fatek PLC).
TCP	It is one of protocols in TCP/IP family used with CMGSM. It may be imagine as a bidirectional stream of bytes through Internet and GSM network from your computer to a Fatek PLC
Firewall	It is a security device. It located between you LAN and Internet. Main purpose of the Firewall is to protect your LAN against an attack from Internet.
Port	It is a number of a service in your computer. Complete address needed to connect your computer is composed from IP address and Port number and may be seen as 11.22.33.44:5700 (IP-ADDRESS:PORT).

6.2 Simple Use

We recommend this scenario for your first step with CMGSM-GPRS.

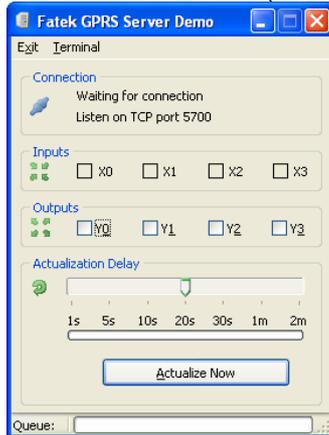


You need to prepare following items in this scenario:

- External (WAN) IP address of your firewall. Rest of the Internet sees you with this IP. Warning: it is NOT your IP address in LAN (i.e. 10.0.0.25). Your external IP address may be obtained from various WEB sites, i.e. <http://www.whatismyipaddress.com/>.
- A redirection of port 5700 from external side of your firewall to your computer.

Cooperation of your IT department will be necessary for all of these items.

We offer simple program that acts like a server. CMGSM-GPRS connects to this server. This program is only a demonstration for one connection and elements X0-X3 and Y0-Y3. It may be obtained from our WEB site (www.seapraha.cz).



Details: Program listens on TCP port 5700 for incoming connection. Port 5700 is default port where CMGSM-GPRS connects to. Program periodically queries status of inputs X0-X3 from remote station. You can change any of output Y0-Y3 by click on a check box Y0-Y1.

7. Technical Specifications

7.1 General

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Dimensions	Width	w		130		mm
	Height (without antenna)	h		90		mm
	Depth	d		38		mm
Temperature	Operational	t_a	-30		+65	°C
Antenna			SMA female			
Communication interface			standard RS232 CANON9 FEMALE			

7.2 Characteristic of the Power Supply

Power consumption in GSM modules is very random and variable. Although in the worst case (900 MHz, max. output power) the consumption is 530 mA@24 V, in most it is enough 200 mA@24 V, see following table.

Parameter	Description	Conditions	Min	Typ	Max	Unit
V_{POWER}	Operating Voltage	for one minute	8 ¹⁾	12	30	V
					33	V
I_{POWER}	Average supply current (average time 3 min.)	Power Down mode	@8V	0.45		µA
			@12V	0.50		
			@30V	0.80		
		SLEEP mode	@8V	40		mA
			@12V	29		
			@30V	18		
	IDLE mode	@8V	50		mA	
		@12V	36			
		@30V	21			
	@25°C @ worst case: GSM 900 max power level	TALK mode	@8V	277		mA
			@12V	184		
		Data GPRS 1Tx / 4Rx	@8V	260		mA
			@12V	173		
		Data GPRS 2Tx / 3Rx (Power reduction = 3dB)	@8V	77		mA
@12V			248			
Data GPRS 4Tx / 1Rx (Power reduction = 6dB)		@8V	378		mA	
		@12V	330			
$I_{POWER_P}^{2)}$	Peak supply current during transmission slot (577µs * No. of Tx every 4 fms)	Power control level for Pout max	@8V	1500		mA
			@12V	910		
t_{POWER_FALL}	Allowed power fall time without terminal reset or power down	After this time the Terminal will be reset or switched off			1	ms
			Allowed power fall time without RTC reset	Backup Battery not connected. After this time the RTC will be reset	6	

8. FAQ

- **GPRS connection can not be established** – 1) check power supply, 2) check communication with PLC Fatek, 3) check configuration, 4) check if it is possible from another computer connected to the Internet to connect to your server (may be firewall is wrong configured).
- **CSD (data) connection can not be established** – 1) check power supply, 2) check blue indication LED on device, 3) are CSD connections available on your SIM card? Ask provider, 4) check GSM signal quality on your mobile phone near the device. At least 50% signal is recommended.
- **No reply to SMS command** – 1) check power supply, 2) check blue indication LED on device, 3) check configuration (is access code correct?), 4) try to send SMS from your mobile with SIM card in the device.
- **No communication with PLC** – 1) check power supply for PLC, 2) check COM port settings in WinProlad. It MUST be 9600 7E1, address 01h.
- **Credit** – Device do not check for credit remains nor make periodic calls to keep SIM card active.
- **Communication is OK but real outputs Y0-Y3 do not reflect commands** – 1) PLC FATEK must be in *Run* mode. Use WinProlad to run the machine.
- **Communication is OK but inputs X1-X3 do not show correct value** – 1) PLC FATEK must be in *Run* mode. Use WinProlad to run the machine.
- **Manufacturer:** SEA, www.seapraha.cz
- **FATEK Manufacturer:** FATEK Corporation, www.fatek.com

9. Warranty

General warranty period is 12 months after purchase, when eventual malfunction device will be repaired free of charge in SEA company while shipping to SEA is paid by customer and SEA pays for shipping back to customer. For SW there is 24 months warranty under following conditions:

Both CPU and PC software is sold "as is". The software was created by the best software engineers in SEA and was carefully tested both in SEA and also by SEA customers using GSM applications products made in SEA. In spite of making all possible to get error free software it can happen, that the software in CPU or PC programming SW or their mutual interaction has some error under some specific conditions. If such error is found and the description of the problem including configuration file is sent by E-mail to SEA Ltd., the error is removed free of charge and SEA will send new SW by E-mail to customer.

SEA Ltd. has **NO RESPONSIBILITY** for any damage, lost, costs and any other problems direct or inducted, caused by such SW error, by eventual device malfunction from any reason or by undelivered SMS from the device.

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