FBs-CMGSM, B1-CMGSM User's Manual

1. Introduction

FBs-CMGSM and **B1-CMGSM** (**CMGSM** for short) are communication modules for FATEK PLC systems FBs-xxMC and B1-xxM. **CMGSM** uses the GSM network to transfer the data. **CMGSM** is based on the quad band GSM module **(850/900/1800/1900 MHz)**. **CMGSM** is backed up by Li-Ion accumulator.

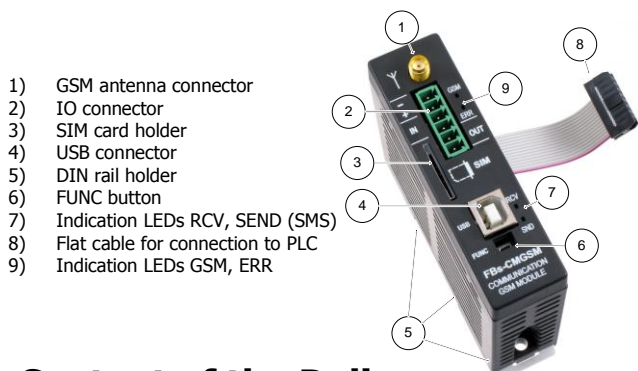CMGSM offer three different ways of communication with connected PLC.

The first one is **monitoring and remote control of PLC via SMS. CMGSM** reads periodically PLC registers containing a flag to send SMS, if the flag is set, **CMGSM** reads destination phone number and string of characters (text), sends SMS and clears the flag. If there is a SMS received by CMGSM, it is written into PLC registers including another flag "SMS received" to be processed by PLC program. At the end the PLC program clears this flag. So these operational SMS must be processed by PLC program both on SMS reception and SMS sending. Some status and event SMS are predefined in CMGSM (e.g. "Connection to PLC failure") and only the destination phone number have to be set in PLC registers.

The second way of communication with PLC via CMGSM is **dial up data transfer via GSM network (CSD).** The connection can be only incoming for CMGSM, that may be initiated from a control center for the purpose of remote system analysis and PLC software tuning and modification by WinProladder SW.

The third way of CMGSM communication over the GSM network is **GPRS data connection** using TCP/IP protocol. CMGSM opens the connection in **TCP client mode.** Any SIM card, that can provide internet connection over the GSM network, can be used. CMGSM connects to IP address and port specified in from PLC. It is important to notice, that the connection can be opened in direction from CMGSM to PC (server) only. PC cannot open a connection to CMGSM because CMGSM has no server implemented and usually does not have public IP address. GPRS has special data transfer properties (data grouping, data transfer delay 1 ... 10 seconds), which are not suitable for WinProladder SW. **WinProladder must use dial up data transfer (so called CSD) only.**

Main features

- Three ways of GSM network use – SMS, GPRS, Data Call CSD (all of them practically at the same time)
- WinProladder remote GSM dial up data transfer connection (CSD)
- One digital input IN and one digital output OUT
- Local Time and Date (NITZ) from GSM network (if available)
- USB port for module monitoring (for service purposes only)
- Firmware update via GSM available
- Li-Ion backup accumulator – min. 2 days of operation w/o charging
- Lowest level super watchdog function (Hardware Power OFF)
- FBs-CMGSM can be used directly with PLC FBs-xxMC (Port 3)
- B1-CMGSM can be used directly with PLC B1-xxM (Port 1)
- SMS functionality is fully under PLC program control
- Configuration of CMGSM means just to set several PLC registers
- No PLC program support is necessary for CSD and GPRS operation
- LEDs for indication of the CMGSM status and data flow signalization
- Unlimited number of logical and analog inputs and outputs can work with one CMGSM (PLC network)

1) GSM antenna connector
2) IO connector
3) SIM card holder
4) USB connector
5) DIN rail holder
6) FUNC button
7) Indication LEDs RCV, SEND (SMS)
8) Flat cable for connection to PLC
9) Indication LEDs GSM, ERR

2. Content of the Delivery

- 1 pc of **FAC-FBS-CMGSM** or **FAC-B1-CMGSM**
- 1 pc of antenna GSM-ANT05S
- 1 pc of 6 pin connector, pitch 3.81 mm
- 1 pc of CD with documentation

3. Typical Application, Installation
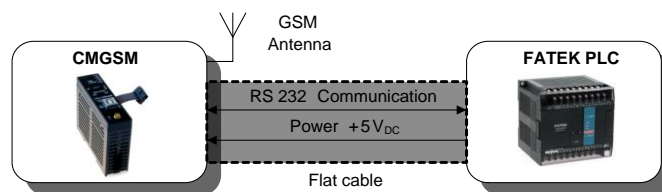
Note: FATEK PLC is not part of the delivery of this product. It is needed to order independently.

ⓘ Warning

Turn off all power supply during installation of **CMGSM** to PLC to prevent damage to equipment!

3.1 Configuration

If a SIM card does not need PIN code, no configuration for basic use is necessary. For the SIM card with PIN code the configuration in PLC is necessary. Read chapter 5.1 Configuration for more.

3.2 Hardware settings

- Switch off the power supply of PLC
- Connect GSM antenna
- Insert SIM card
- Connect the flat cable between CMGSM and PLC

3.3 Startup

Device status is indicated with blue GSM LED on the CMGSM front panel. Valid statuses are as follows:

Term	Description
permanently off	No power or STAND BY mode.
500 ms on / 500 ms off	Device is not registered to the GSM network. This state occurs after start of device for approx. 30 seconds. If it remains, check: SIM card (is inserted? is active?) Antenna (is connected?) Configuration (is the SIM PIN correct?)
10 ms on / 4 s off	Device is registered to the GSM network and is idle. (It means that no GPRS nor CSD connection is active.)
10 ms on / 2 s off	GPRS active, data transfer in progress
10 ms on / 1 s off	CSD (data connection) in progress

Expressed line is common operating state.

3.4 Front Panel

| Name	Element	Description
ANT	Connector	GSM Antenna connector
GSM	LED blue	GSM status (see the previous table)
ERR	LED red	Error
IO	Connector	IN (input), OUT (output)
FUNC	Button	Multifunction Button: DOUT2 change, RESTART, STAND BY mode.
SIM CARD	SIM card Holder	Press the SIM card to remove it from holder
USB	Connector	USB for connection to PC (for debugging purposes only)
RCV	LED yellow	Receiving SMS from GSM
SND	LED green	Sending SMS to GSM
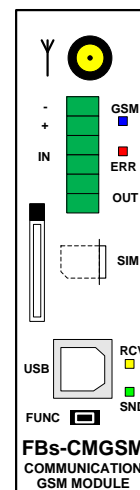
3.4.1 Pushbutton "FUNC"

Pushbutton "**FUNC**" has several functions. Short press changes the state of the output OUT (DOUT2). Long press (longer than 3 seconds) will either **RESTART** CMGSM (if CMGSM is powered by the PLC) or enter the **STAND BY MODE** (if the CMGSM is powered from the internal accumulator - PLC is either disconnected or turned off).

3.4.2 IO Connector

IO connector has 6 terminals. Terminals "+" "-"are designed to supply the input IN of internal Li-ION battery. Terminals IN ("IN1") are for digital input. Terminals OUT ("DOUT2") are for digital output.
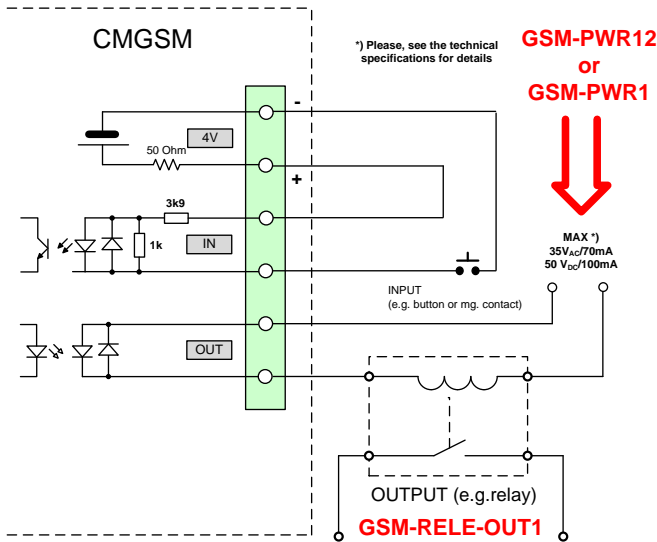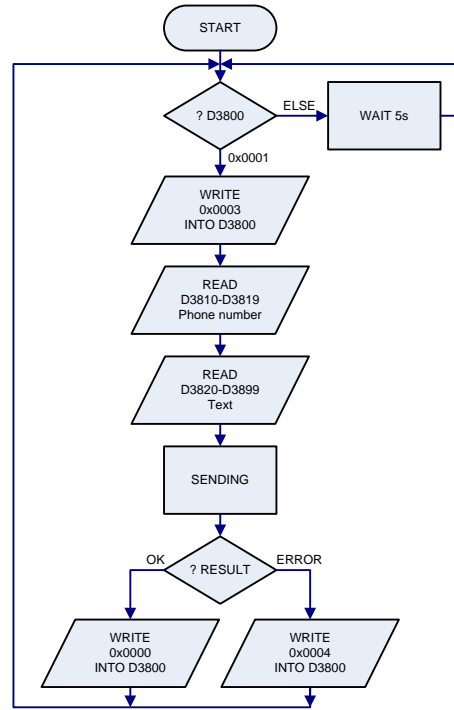
4. Function of the device

4.1 SMS

One of the primary functions of the **CMGSM** is to send and receive SMS messages. There are 2 kinds of SMS, which have different functions and purposes:

- SMS for and from PLC FATEK, see chapters 4.1.1. and 4.1.2
- Service SMS commands processed by CMGSM, see chapter 4.3

Outgoing SMS from PLC FATEK are sent by PLC program, that writes the text and destination phone number into PLC registers and orders CMGSM to send the message by write special value to another register (*SendFlag*). CMGSM sends SMS and writes result of the sending to PLC register (*SendFlag*). Incoming messages for PLC FATEK are received by CMGSM and the text and origin phone number are written into PLC registers. Subsequently in another register (*RecvFlag*) is written value, that signalizes new received SMS. PLC program analyzes the registers and deactivates flag *RecvFlag*. All the SMS structure and security features must be done by PLC program, including confirmation, that SMS was received, if required.

SMS messages, which contains characters "#!" (hash and exclamation) followed by access code, are sent and received by CMGSM itself and their function, structure and security features cannot be changed by user or PLC program. Incoming SMS of this kind are described in chapter 4.3 *Service SMS Commands* and are used to get information about CMGSM status, to reset CMGSM or to get current CMGSM configuration. Outgoing SMS of this kind are described in chapter 4.5 *Events*. Events, it is information about emergency status of CMGSM module like lost communication with PLC. These events are sent to a predefined phone number (*Master* in configuration).

4.1.1 Sending a SMS

CMGSM periodically tests the first register of the *Send Record*, standard base is D3800. The *Send Record* is an area in PLC registers which must be filled by program in PLC in order to send a SMS message. For structure of the record see the following table.

Registers	Caption	Description
D3800	SendFlag	**0x0000** – Idle **0x0001** – Command to send (written by program in PLC) **0x0003** – SMS is sending (written by CMGSM) **0x0000** – SMS sent successfully (written by CMGSM) **0x0004** – Failed while sending SMS (written by CMGSM)
D3801-D3809	ModemTime	Local Date and Time (NITZ) from GSM (if available – depends on GSM operator). DateTime from modem in PLC RTC format, refresh approx. 1 per 10 sec.
D3810-D3819	SendDestAddress	Phone number where to send the message. Length 20 characters.
D3820-D3899	SendUserData	Text of the message. Length 160 characters.

This range of registers cannot be used for any other purposes!

How does the CMGSM send a message:

Every register of *Phone number* or *Text* contains two characters. String of characters ends with special character 0x00. Examples:

- String with one character – "A": D3820 = 0x0041
- String "TEXT": D3820 = 0x4554, D3821 = 0x5458, D3822 = 0x0000
- String "HELLO": D3820 = 0x4548, D3821 = 0x4C4C, D3822 = 0x004F

If the length of a phone number is exactly 20 characters (or 160 characters of text) then the character 0x00 at the end is omitted!

Base of *Send Record* (D3800) may be changed to another D or R register via configuration key REGSEND. Only register *SendFlag* (D3800) is changed during sending a message.

Example of sending a message "WE ARE THE CHAMPIONS!" to phone "123465": (Check register D3800 – SendFlag for value 0x0000 before sending the message!)

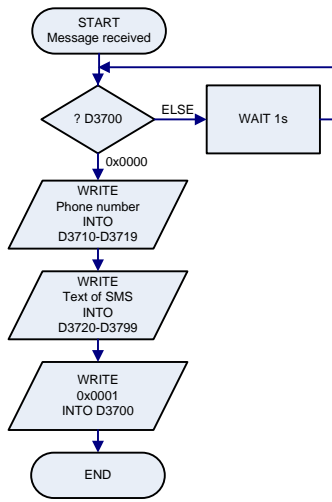| Register	Value	Description
D3810	0x3231	SendDestAddress, characters "1" and "2"
D3811	0x3433	SendDestAddress, characters "3" and "4"
D3812	0x3635	SendDestAddress, characters "5" and "6"
D3813	0x0000	End of string
D3820	0x4557	SendUserData, characters "W" and "E"
D3821	0x4120	SendUserData, characters " " (space) and "A"
D3822	0x4552	SendUserData, characters "R" and "E"
D3823	0x5420	SendUserData, characters " " (space) and "T"
D3824	0x4548	SendUserData, characters "H" and "E"
D3825	0x4320	SendUserData, characters " " (space) and "C"
D3826	0x4148	SendUserData, characters "H" and "A"
D3827	0x504D	SendUserData, characters "M" and "P"
D3828	0x4F49	SendUserData, characters "I" and "O"
D3829	0x534E	SendUserData, characters "N" and "S"
D382A	0x0021	SendUserData, characters "!" and end of string
D3800	0x0001	SendFlag: send command

4.1.2 Receiving a SMS

Incoming SMS messages are saved into registers of PLC in *Recv Record*, standard base D3700. Structure of the record is in following table.

Registers	Caption	Description
D3700	RecvFlag	**0x0000** – Idle (written by PLC program) **0x0001** – Message received (written by CMGSM)
D3710-D3719	RecvOrigAddress	Phone number of the message sender (originator). Length 20 characters.
D3720-D3799	RecvUserData	Text of the message. Length 160 characters.

This range of registers cannot be used for any other purposes!

How CMGSM stores a received message:

```
         START
    Message received
          │
          ▼
     ◇ ? D3700 ◇ ──ELSE──▶ [ WAIT 1s ]
          │                     │
       0x0000 ◀────────────────┘
          ▼
    ╱ WRITE        ╱
   ╱ Phone number ╱
  ╱ INTO         ╱
 ╱ D3710-D3719  ╱
          │
          ▼
    ╱ WRITE       ╱
   ╱ Text of SMS ╱
  ╱ INTO        ╱
 ╱ D3720-D3799 ╱
          │
          ▼
    ╱ WRITE       ╱
   ╱ 0x0001      ╱
  ╱ INTO D3700  ╱
          │
          ▼
        END
```

Every register of *Phone number* or *Text* contains two characters. String of characters ends with special character 0x00. Examples:

- String with one character – "A": D3720 = 0x0041
- String "TEXT": D3720 = 0x4554, D3721 = 0x5458, D3722 = 0x0000
- String "HELLO": D3720 = 0x4548, D3721 = 0x4C4C, D3722 = 0x004F

If length of phone number is exactly 20 characters (or 160 characters of text) the character 0x00 at the end is omitted!

CMGSM contains a queue of up to 100 SMS messages. After the queue is full all other SMS messages are discarded. If a power failure occurs all received messages in the queue are lost. Base of *Recv Record* (D3700) may be changed to another D or R register via configuration key REGRECV. No other registers are changed than the necessary ones.

Example of receiving of message "TEST MESSAGE." from phone "+420123456789":

Register	Value	Description
D3700	0x00**01**	RecvFlag: new message
D3710	0x342B	RecvOrigAddress, characters "+" and "4"
D3711	0x3032	RecvOrigAddress, characters "2" and "0"
D3712	0x3231	RecvOrigAddress, characters "1" and "2"
D3713	0x3433	RecvOrigAddress, characters "3" and "4"
D3714	0x3635	RecvOrigAddress, characters "5" and "6"
D3715	0x3837	RecvOrigAddress, characters "7" and "8"
D3716	0x0039	RecvOrigAddress, characters "9" and end of string
D3720	0x4554	RecvUserData, characters "T" and "E"
D3721	0x5453	RecvUserData, characters "S" and "T"
D3722	0x4D20	RecvUserData, characters " " (space) and "M"
D3723	0x5345	RecvUserData, characters "E" and "S"
D3724	0x4153	RecvUserData, characters "S" and "A"
D3725	0x4547	RecvUserData, characters "G" and "E"
D3726	0x002E	RecvUserData, characters "." and end of string

4.2 GSM Data Connection (Data Call, CSD)

Data connection can be established anytime, even if GPRS communication is in progress.

Warning

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

4.3 Service SMS Commands

Received SMS message with string '#!' and password at the beginning are considered to be *service SMS commands*. These messages are not forwarded to PLC, but they are processed in CMGSM. Device will check for a valid access code (ACODE parameter in configuration) and if the access code is valid, the message is searched for keywords. Only one keyword in every SMS is executed.
Example of this SMS:

```
#!1234 INFO
#!998877 CONFIG
```

Table of all keywords:

Keyword	Description
INFO STATE	Device will respond with SMS describing its current status, e.g. CMGSM: NETWORK=Vodafone CZ 77% IN1=off OUT2=off CSD=no connection GPRS=no connection PLC=connected CMGSM v8.2
RESET	Device will respond with confirmation SMS and restart itself. PLC is not affected. This command is used after change of configuration in PLC register to accept the changes by CMGSM.
CONFIG	Device will respond with current configuration. (Current configuration is a default configuration with some values changed by configuration string in PLC, see Chapter 5 – Configuration.)
FACTORY	CMGSM will respond with confirmation SMS. CMGSM will write default configuration to attached PLC and restart itself.
ON	Activate digital output OUT2
OFF	Deactivate digital output OUT2

4.4 TCP over GPRS

One of the primary functions of this device is to establish and maintain TCP connection from PLC to a server. In order to achieve this goal FBs-CMGSM has to make following steps after power up:
Establish connection to PLC via serial port. Parameters of the serial port are: 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 FBs-CMGSM will proceed steps:

- Read configuration from PLC register D3900 – D3999.
- Login to the 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**.

CMGSM will try indefinitely to read configuration from PLC at the beginning. If there is no serial communication between CMGSM and PLC device will not login into the GSM network! If there is no configuration in PLC or the configuration is damaged or other problem occurs CMGSM writes default configuration into the PLC.

GPRS can be controlled and monitored via set of registers in PLC and via configuration:

Registers	Caption	Description
D3510	GprsCommand	0=no connection (written by PLC) 1=open connection (written by PLC)
D3511	GprsState	0x00=no connection, idle 0x01=connecting 0x80=connected 0x81=disconnecting
D3512	GprsCntErr	Error counter for connection
D3516-D3517	GprsCntUp	Data counter, direction UP (= PLC⇨TCP), D3516 LSB
D3518-D3519	GprsCntDown	Data counter, direction DOWN (= TCP⇨PLC), D3518 LSB

D3520-D3523	GprsLocalIP	Local IP address if connected. "0.0.0.0" if not connected. (D3520=MSB)
		Example:
		If local IP address is 147.32.80.1, then
		  D3520 ... 0x0093 (147d)
		  D3521 ... 0x0020 (32d)
		  D3522 ... 0x0050 (80d)
		  D3523 ... 0x0001 (1d)

D3524	GprsLocalPort	Local TCP port if connected, 0 if not connected
D3525-D3528	GprsRemoteIP	Remote IP address if connected. "0.0.0.0" if not connected. (D2425=MSB)
D3529	GprsRemotePort	Remote TCP port if connected, 0 if not connected

This range of registers cannot be used for any other purposes!

GPRS diagnostic is part of Diagnostic (see chapter Diagnostic). Base of *Diag Record* (D3500) may be changed to another D or R register via configuration key REGDIAG.

4.5 Events

Device can detect special events and send a warning about them as a SMS:

- Connection to PLC failure/restore

It is needed to set parameter **MASTER** in configuration for both of these events, see chapter 5.2 Basic Parameters.

4.6 Diagnostic

Diagnostics values are written to *Diagnostic Record*, standard base D3500. Structure of the record is in following table:

Registers	Caption	Description
D3500.0	DiagCnct *1)	0=no connection to PLC, 1=connection to PLC OK
D3500.1	DiagRQueue	0=no SMS in receive queue, 1=at least one SMS in receive queue
D3500.8-15	DiagGsmReg	result of command AT+CREG: 0=not registered, not searching 1=registered, home network 2=not registered, searching 3=registration denied 5=registered, roaming
D3501.0-7	DiagSigQuality	Signal quality in percent (0-100) or 255 if unknown.
D3501.8-15	DiagSigErr	Signal BER (0-7) or 255 if unknown.
D3502	DiagAlive	CMGSM writes value 0x0001 whenever diagnostic record is refreshed (cca 6 seconds). This is intended for PLC program to check if CMGSM is alive. In this case PLC program will write a 0x0000 into this register and wait for 0x0001 here.
D3503	DiagVersion	Version of CMGSM3, in high byte is high version number, in low byte is low byte is low version number
D3504	0x0000	For future use
D3505	DiagReset	If PLC writes value **0xF3A5** to this register the CMGSM will make reset of itself.
D3506	DiagAtFlag	**0x0000** – Idle **0x0001** – Execute command in DiagAtCmd (written by program in PLC) **0x0003** – Command is about to execute (written by CMGSM) **0x0000** – Command executed successfully (written by CMGSM) **0x0004** – Exception while executing the command (written by CMGSM)
D3508-D3509	DiagUpTime	32 bit counter which is incremented whenever CMGSM updates DiagRegisters area in PLC. The counter is cleared after restart of CMGSM. The counter value indicates in a certain way how long the CMGSM is running without restart (so called Uptime).
D3510-D3529	Gprs ...	Reserved for GPRS diagnostics See chapter "TCP over GPRS" for details
D3530-D3539	DiagOperator	String with name of operator when registered. Empty string if not registered. Length 20 characters.
D3540-D3549	DiagCredit	Reserved
D3550-D3699	DiagAtCmd	Sending AT commands to modem directly. Write a command to this place and set D3506 (DiagAtFlag) to 0x0001. Command is executed and result is placed in this place (overwriting original command). In D3506 (DiagAtFlag) is signalized end of execution. The system is the same as with sending SMS.
D3801-D3809	ModemTime *2,3)	D3801 ... 0x0001=time written to PLC 0x0000=time not written, wait for 0x0001 D3802 ... seconds 0-59 D3803 ... minutes 0-59 D3804 ... hours 0-23 D3805 ... day in month 1-31 D3806 ... month 1-12 D3807 ... year 0-99 D3808 ... day in week 0-6 D3809 ... hour (MSB) + minute (LSB)

This range of registers cannot be used for any other purposes!

*1) Notation *D3500.x* means x-th bit of D3500 register. For example D3500.0 is the least significant bit in register D3500. Another example D3500.8-15 are eight most significant bits in register D3500 (high byte).
Base of *Diag Record* (D3500) may be changed to another D or R register via configuration key REGDIAG.

*2) ModemTime is available in CMGSM with sw. version 2.03 and higher.

*3) CMGSM reads out the local Time and date (NITZ) from the GSM network (if NITZ is available depends on the GMS operator) and approx. 1 per 10 seconds sends this information do PLC registers. The format of ModemTime is similar to PLC registers in RTC (Calendar).
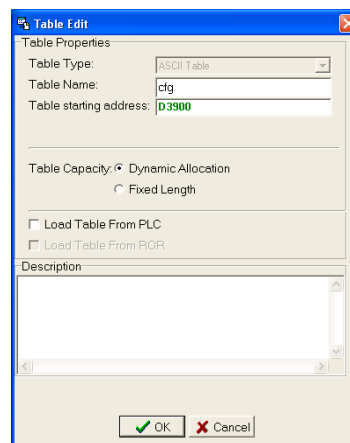
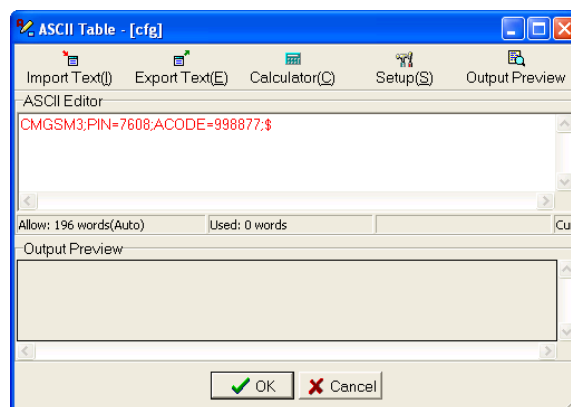# 5. Configuration

5.1 How to

Configuration for CMGSM 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 WinProladder (software from PLC FATEK manufacturer), see following images. This range of registers cannot be used for any other purposes!
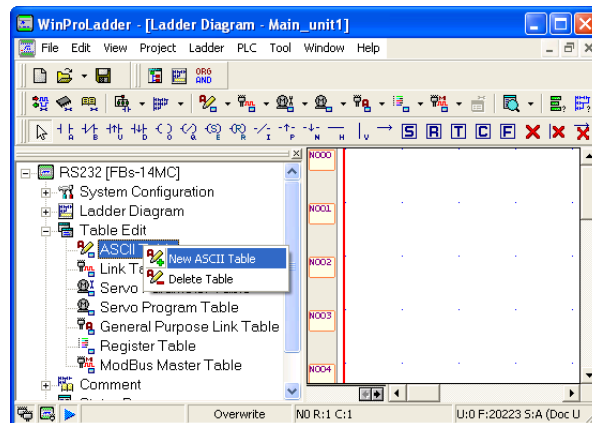
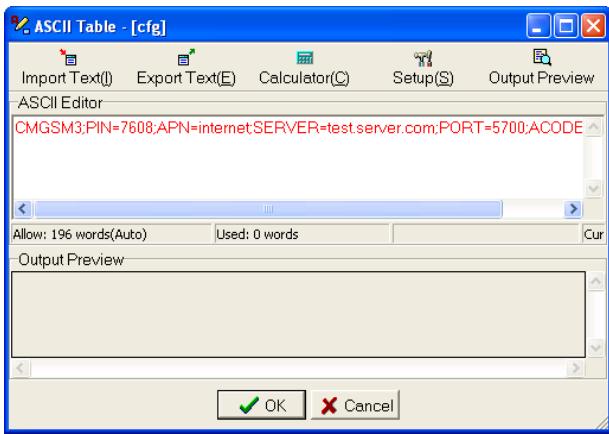**Step 1 – Right click on Table edit - ASCII Table and select "New ASCII Table"**

**Step 2 – Enter Table Name „cfg" and Table starting address „D3900". Then click "OK".**

Step 3 – Enter configuration string "CMGSM3;PIN=7608;ACODE=998877;$" into field "ASCII Editor" and click on button "Output Preview". !!! Warning: Change PIN according your real SIM card !!!
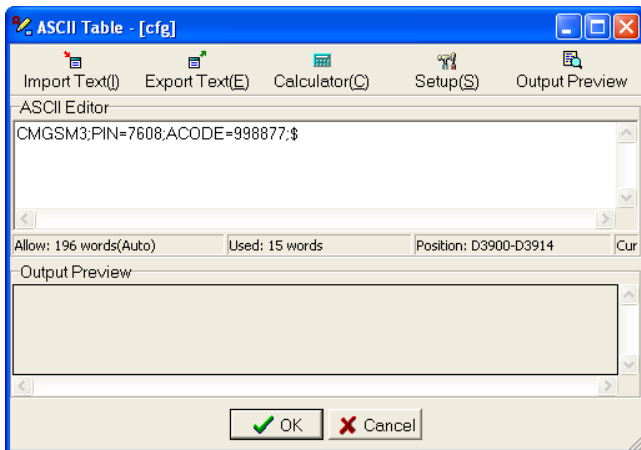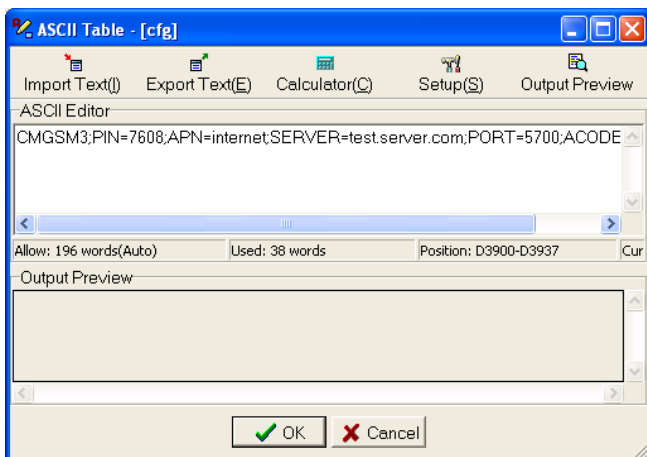
Step 3 (GPRS) – Enter configuration string "CMGSM3;PIN=7608;APN=internet;SERVER=test.server.com;PORT=5700 ;ACODE=998877;$" into field "ASCII Editor" and click on button "Output Preview". !!! Warning: Change PIN according to your real SIM card !!!
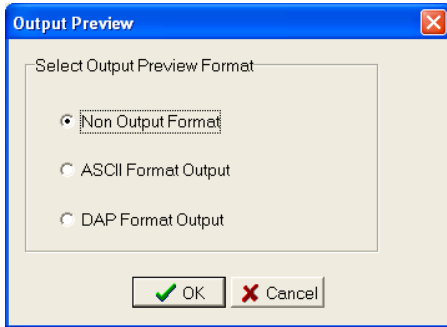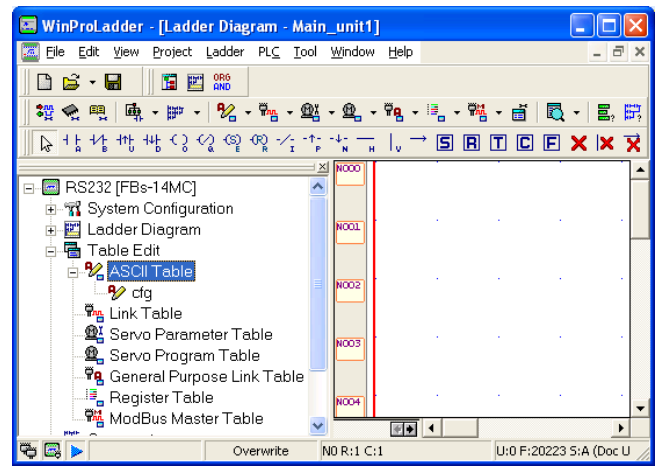

Step 4 – Select "Non Output Format" and click "OK".

Step 5 – Configuration string is now black. Click "OK".

Step 5 (GPRS) – Configuration string is now black. Click "OK".

Step 6 – Result

Configuration is read after power up and only once. If you change configuration (for example by WinProladder and second serial port), it is not read automatically. You have to restart CMGSM. CMGSM will try to log in the GSM network without PIN if no configuration in PLC is found. (In this case SIM card without PIN authorization is requested.)

Configuration string is very simple. For example:

```
CMGSM3;PIN=7608;ACODE=998877;MASTER=+420777777497;$
```

For easy understanding this string says:

- CMGSM3 – It is a configuration for CMGSM.
- PIN=7608 – PIN code of the SIM card in order to register into the GSM network.
- ACODE=998877 – Access code for *Service SMS Commands* is 998877
- MASTER=+420777777497 – Warning SMS is sent to this phone number in case of any event. For example "Connection to PLC failure." when communication between CMGSM and PLC is lost or "IN1 activated (L->H)." when digital input IN (IN1) is activated respectively "IN1 released (H->L)." when digital input IN (IN1) is deactivated.

Example of configuration string for GPRS:

```
CMGSM3;PIN=7608;APN=internet;
SERVER=test.server.com;PORT=5700;ACODE=998877;$
```

This string means:

- CMGSM3 – It is configuration for CMGSM.
- PIN=7608 – User PIN code of '7608' for SIM card in order to register into the 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 these messages is following:

```
CMGSM3;KEY1=VALUE1;KEY2=VALUE2;...[;]$
```

Part 'CMGSM3' 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 MAY be character ';' (semicolon) and MUST be character '$' (dolar).

5.2 Basic parameters

Key	Description	Default
PIN	PIN code for SIM card. It may be omitted if the SIM card does not need a PIN code. But it is mandatory if the SIM card needs the PIN code.	<empty>
ACODE	Access code for SMS control. You can send SMS message in order to control CMGSM. These SMS must begin with this ACODE. They will be ignored otherwise. Optional.	1234
MASTER	Phone number, where to send SMS about important events: Connection to PLC failure. No SMS are sent if value is empty. Only one master is possible.	<empty>

5.3 Advanced parameters

Key	Description	Default
REGSEND	First register of the *Send Record*.. It is area, where PLC writes messages to send. See 4.1.1 Sending a SMS. Only D or R registers can be used.	D3800
REGRECV	First register of the *Recv Record*. It is an area, where CMGSM writes received messages. See 4.1.2 Receive a SMS. Only D or R registers can be used.	D3700
REGDIAG	First register of the *Diagnostic Record*. It is an area, where CMGSM writes diagnostic values like operator, signal quality, … See chapter 4.4	D3500
NETRESET	This is a security feature. Value zero (0) in this parameters means security reset every week (7 days). If you do not want any security reset write -1 to this parameter.	0

5.4 GPRS parameters

Keys in configuration string:

Key	Description	Default
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 will connect. TCP connection is used. Optional.	<empty>
PORT	TCP port for connection. Optional.	5700
DNS	IP address of DNS server. Optional.	<empty>

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

5.5 Examples of Configuration Strings

5.5.1 SIM without PIN

Configuration string:

```
CMGSM3;ACODE=998877;$
```

Translated for human this string says:
- CMGSM3 – It is configuration for CMGSM.
- ACODE=998877 – Access code for *Service SMS Commands* is 998877

5.5.2 Use registers D1000-D1100 for sending SMS

Configuration string:

```
CMGSM3;PIN=7608;REGSEND=D1000;$
```

Translated for human this string says:
- CMGSM3 – It is configuration for CMGSM.
- PIN=7608 – PIN code 7608 for SIM card in order to register into network.
- REGSEND=D1000 – Begin of the *Send Record*.
- [default Access code for SMS control is 1234]

5.5.3 Only CSD (without GPRS)

Configuration string:

```
CMGSM3;PIN=7608;$
```

Translated for human this string says:
- CMGSM3 – It is configuration for CMGSM.
- [default Access code for SMS control is 1234]

5.5.4 SIM without PIN, GPRS connection

Configuration string:

```
CMGSM3;APN=internet;SERVER=test.server.com;PORT=5700;AC
ODE=998877;$
```

Translated for human this string says:
- CMGSM3 – It is configuration for CMGSM.
- 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

6. Usage scenarios for SMS

Usage examples can be found on CD with documentation or on the web pages **http://fatek.seapraha.cz/**. In category **FAC-CMGSM** are examples of programs for receiving and sending of SMS from PLC.

7. Usage Scenarios for GPRS

7.1 Explanation of Important Terms

| Term	Description
GPRS	The way how to transfer data through the 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 the Internet and the 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).

7.2 Simple Use

We recommend this scenario for your first step with CMGSM.
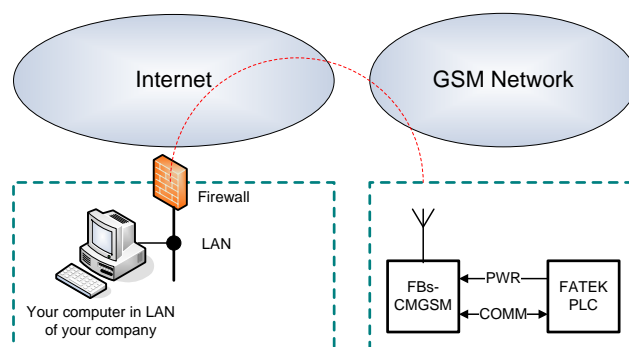
You need to prepare following items in this scenario:
- External (WAN) IP address of your firewall. Rest of the Internet sees you with this IP. Warning: it is NOT your IP address in LAN (i.e. 10.0.0.25). Your external IP address may be obtained from various WEB sites, i.e. http://www.whatismyip.com/.
- 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 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).
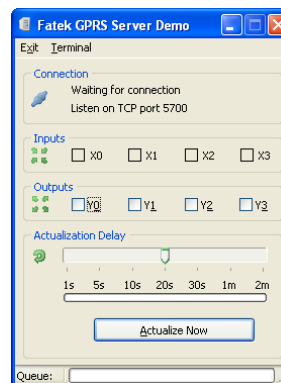
Details: Program listens on TCP port 5700 for incoming connection. Port 5700 is default port where CMGSM connects to. Program periodically queries status of inputs X0-X3 from remote station. You can change any of output Y0-Y3 by click on a check box Y0-Y1.

8. Technical Specifications

8.1 General

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Dimensions	Width	w			25		mm
	Height	h			90		mm
	Depth (without antenna)	d	FBS-CMGSM B1-CMGSM		80 55		mm mm
Fixing			DIN rail or flat panel screw fixing				
Power			5V DC / 120mA (max.) from power supply of PLC main unit				
Backup power			Internal Li-Ion accumulator for 2 days working without charging. Full capacity will be after 2 day of charging.				
Digital input DC (any polarity)	Number	-			1		-
	Voltage log H	|VIN|		3	12	30	V_{DC}
	Voltage log L	|VIN|			<4	4	V_{DC}
	Current	IIN			5		mA
Digital outputs DC, AC	Number	-			1		-
	Voltage DC	$VOUT_{DC}$			8	50	V_{DC}
	Voltage AC	$VOUT_{AC}$				35	V_{AC}
	Current DC	$IOUT_{DC}$				100	mA
	Current AC	$IOUT_{AC}$				70	mA
Temperature	Operational	t_A		-20		+45	°C
Humidity	Operational	h_A				90	%
GSM	RF power					2	W
GSM	frequencies		Worldwide 850 / 900 / 1800 / 1900				MHz
Antenna connector			SMA female GSM-ANT05S recommended				
Communication interface			Flat cable connected directly to PLC FATEK: FBs-xxMC: Port 3, (Port 4*); B1-xxM Port 1, (Port 2*)				

* PLC Port is not usable, but is not is not accessible for another expansions.

9. FAQ

- **It's not possible to reset CMGSM using FUNC button** – it's necessary to hold the button FUNC pressed at least 2 seconds.
- **CSD (GSM data) connection cannot be established** – 1) check power supply, 2) check antenna, 3) check indication LED on device and compare it with the manual, 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 Service SMS Commands** – 1) check the power supply, 2) check antenna, 3) check indication LED on CMGSM and compare to the manual (Note: LED RCV and SND are not used for Command SMS), 4) check configuration - is the access code ACODE correct? 5) Insert the SIM card from CMGSM to you mobile phone and try to send SMS and receive SMS and voice call.
- **Some special characters are not correctly transported by SMS** – Try to use so called 7 bit SMS (160 characters) and only basic ASCII characters (0-127)
- **No communication with PLC** – 1) check PLC power supply, 2) check Port3 (FBs-xxM) or Port1 (B1-xxM) settings using WinProladder. It MUST be 9600 7E1, address 01h. 3) Check that no Analog or Communication module is added to WinProladder project.
- **Is it possible to use B1-CMGSM simultaneously with Analog or Communication module?** – Not at the moment, but we prepare "Autodetection". In the future B1-CMGSM will connect to PLC through Port1 or Port2 depending on usage of Analog or Communication module.
- **GPRS connection cannot 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).
- **GPRS connection is not working during CSD connection** – This is the feature of GSM module. GPRS connection is restored automatically after CSD connection is finished.
- **Communication is OK but real outputs Y0-Y3 do not reflect commands –** 1) PLC FATEK must be in *Run* mode. Use WinProladder to run PLC.
- **Communication is OK but inputs X1-X3 do not show correct value** – 1) PLC FATEK must be in *Run* mode. Use WinProladder to run the PLC.
- **Some parameters in the FATEK configuration are not functioning –** Please check if there is no "$" character before these parameters (e.g. "CMGSM3;**$**PIN=7608; ACODE=998877;$") because CMGSM reads the configuration till the first "$" character.

10. 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.
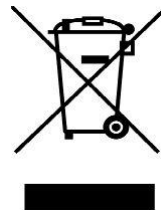
CE Declaration of conformity

in accordance with the Radio and Telecommunications Terminal Equipment Directive 1999/5/EC (R&TTE) and Directive 2011/65/EU (ROHS).

We SEA, spol. s r.o., Dolnoměcholupská 1537/21, CZ 102 00 Praha 10, Czech Republic, **ID**: 47117931 (**manufacturer**) **declare under our sole responsibility, that product** equipment for remote control and monitoring

type FBs-CMGSM and B1-CMGSM **is in conformity with the following standards:**

Health and safety:	EN 60 950-1	
EMC:	EN 61000-4-2, -3, -4, -5, -6, -8	EN 55022
radio frequency:	EN 301 511 v 9.0.2	

The last two digits of year in which the CE marking was affixed: 14

Place of issue: Praha	**Name:**	Ing. Mario Vejlupek
Date of issue: 7.8.2014	**Grade:**	**Technical** director