



COMAC CAL

**CZECH PRODUCER
AND DEVELOPER
OF MEASUREMENT
AND SENSOR TECHNOLOGY**

GSM MODULE

Ver.1.00

Installation and technical conditions

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WWW.COMACCAL.COM

Safety instructions:

Please observe the following safety instructions to ensure maximum safety for the operator and possible persons in the vicinity of the unit:

- **Do not use the unit near medical devices.**
- **Do not use the unit in a hazardous environment.**
- **Do not expose the unit to high humidity, chemicals or mechanical shocks.**
- **Always disconnect the battery from the power supply before handling the SIM card!**
- **Do not attempt to start the unit without the GSM antenna connected.**
- **Follow the instructions in this manual.**
- **Do not connect devices not approved by COMAC CAL s.r.o. to the GSM module.**

Basic information:

The unit serves as a supplement to the COMAC CAL s.r.o. flowmeters for reading information about measured values and the state of measuring devices by means of SMS messages. The unit is designed for battery operation and it sends SMS messages at predetermined time limits.

Power supply:

- 3.6V lithium batteries (manufacturer-approved only).
- Via USB cable – only for parameter setting.

Inputs:

- Analogue input 0 – 5V.
- Pulse input - potential-free contact or open collector of the transistor.
- UART serial line for reading MBUS protocol.

Operating temperature range:

- -35 – 80 °C.

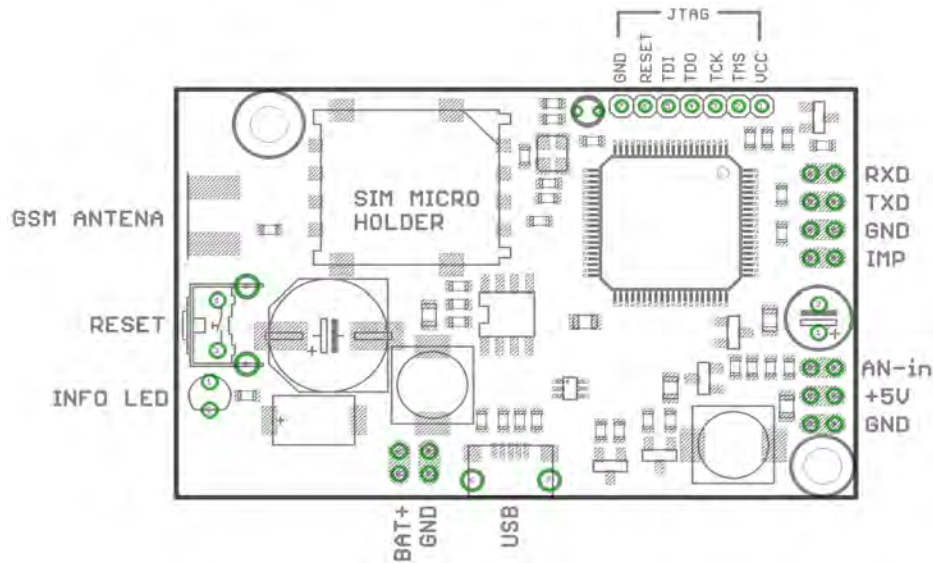
Current consumption:

- Active state: 40 – 110 mA, up to 2A in short peaks when connecting to GSM network.
- Reduced consumption (sleep): - MBUS or analogue measurement mode 1 - 3 μ A
- Pulse measurement mode approx. 30 μ A.

Opening the GSM unit

To access the internal connectors of the GSM module (power supply, SIM card slot, USB, etc.) it is necessary to open the unit by unscrewing the cylindrical cover. After locking the black plastic end cap by hand, unscrew the cylindrical aluminium cover and remove it carefully to avoid damaging the O-ring seal. This will expose the entire printed circuit board along with the battery and all connectors.

Description of the unit:



Power supply:

The unit is powered by two to three lithium batteries, which are connected by means of the connector on the flexible cable. The cable is connected to the BAT + and GND terminals. BAT + has typically 3.6V DC.

Info LED:

The LED is brought out to the front panel. If the GSM module is inactive, the LED is off. It flashes red when connecting the GSM module to the network, flashes green when connected to the network.

RESET:

The reset button is brought out to the front panel. This is a hardware reset. When pressed, the unit behaves in the same way as after the initial connection to power supply, except that variables in memory remember their original values. The unit starts after pressing even in the case of low power mode (it wakes up). After resetting or restoring the power supply, information SMS messages are always sent to phone numbers in the list.

GSM antenna:

The connector located on the front panel is designed for antennas with SMA connector. Use only four band antennas.

JTAG:

It is an interface for programming flash processor and debug program. (for service purposes only).

RXD, TXD, GND:

It is used to connect the flowmeter via MBUS.

GND, IMP:

It is used for connection of the voltage-free contact of the flowmeter with pulse output.

AN-in, +5V, GND:

It is used for connection of the flowmeter with analogue output. + 5V is used to power

USB:

The micro USB connector is used for parameter setting and firmware upgrade. Parameters and firmware upgrades can be carried out without batteries connected. However, it is not possible to read the parameters from the GSM module because it is not powered. If the batteries are connected, connect the USB cable and press the reset button. Otherwise, the USB will not be connected to the unit.

If USB is connected, the device will not switch to power saving mode unless the USB cable is disconnected!

Functions of the unit:

The unit is used to send information about measured values and flowmeter state. After power supply connection or after requested reset, the unit connects power to GSM module and reads values from the flowmeter. When the GSM module is connected to the network, an SMS is sent to the numbers in the list and the unit switches to the power saving mode (i.e. putting GSM to sleep). According to the set time program, the device wakes up and sends another SMS message with meter data and then switches to sleep mode (power saving mode). The time program is set by the user in the user program.

User program:



Starting:

Before starting the program, connect the USB cable to the unit and press the reset button. Then start the program. The program will update the list of available serial ports. If you forgot to connect the unit before starting the program, do so and click the ? button to update the list of available ports. After clicking the **auto** button, the program searches for the unit and establishes the connection automatically. After successful connection, it will write the current version of GSM module firmware in the box labelled **Device firmware** .

Help:

The program is equipped with an interactive “Tool tip” help when hovering the mouse over a control in the dialogue box, help for the given control is displayed for a few seconds. This function can be turned off by clicking the **help** button, which will change its colour to red. You can turn on this function with another click.

GSM info:

In the left part of the program window you can find basic information about the GSM module state. At the same time, the batteries must be connected, otherwise the GSM module itself is not powered and therefore the parameters cannot be read from the GSM module. The batteries need not be connected in order to load and change other functions.

By clicking the **?** next to the text box, you will get the required information:

- Device firmware – shows the firmware version in the unit. To update the firmware, see below.
- IMEI GSM device – displays the GSM module identification number, which is unique for each module (similar to a mobile phone IMEI).
- GSM signal strength – detects the GSM signal strength (range 0 - 30). If the program returns 99, this indicates an undetectable signal level. The value recommended for proper operation of the unit is in the upper half of the range (16-30). If the signal strength is less than 16, we recommend using a higher quality antenna (otherwise the GSM module may not log on to the network).
- RTC from GSM device – The GSM module is configured to read the real time for the current local time zone from the GSM network. The function is dependent on the GSM network provider and the correct reading of the time is therefore not guaranteed.
- Read credit – If a prepaid SIM card is used in the GSM unit, the amount of credit on the SIM card can be detected. Select an operator from the drop-down menu. Its CUSD code (operator's credit service number) is automatically rewritten in the box to the left of the list. If your operator is not in the list, enter the code manually into the CUSD box.

Time program:

The device can set a time schedule that determines when the device wakes up, reads values and sends them to the user via SMS. This is not the sending time interval stored as the time period until the next SMS is sent, but the calendar setting of the wake time, similar to the digital alarm clock. If you set the date of the month to 31, the SMS will not be sent in February and in months that have only 30 days. Program mode can be selected in three different variants. When you select a program, the values that are not usable for that program are disabled. (e.g. For daily intervals, it makes no sense to set the day of the month.)

- Day interval - set the SMS sending interval in hours in the drop-down menu. The first SMS is always sent at 00:00 and the next at set intervals.
- Week interval - Select the days of the week on which the SMS should be sent and the hour on which the SMS should be sent.
- Month message – it is possible to set up to 4 days of the month (together with the hour) in which the SMS is to be sent.

List of phone numbers:

On the right there is a list of phone numbers to which informational SMS can be sent. For the number to be sent, the option **info sms** must also be checked for each number in the list. Numbers, for which this option is not checked, can be used for setting some parameters by SMS in the future.

The unit does not respond to SMS from numbers not listed in this list.

To change the numbers in the list:

To make changes, first press the **load** button to load the original list values. Use the mouse and highlight the position in the list to add or overwrite the phone number. Then write in the box **new ph. Number** the desired phone number in national or international format, but without the + and zeros at the beginning of the number. By clicking on **>>>** the number is overwritten in the list at the marked location. The spaces in the phone number are unacceptable!

To delete a number from the list, highlight the number in the list that you want to delete by clicking on **delete**, you will delete it from the list. Only use this procedure for deletion! Do not overwrite the number with an invalid number or spaces!

Each change must always be saved using the red **save** button.

Selected parameters of the GSM module

Power Supply:

- Single supply voltage: 3.3V ~ 4.6V
- Typical supply voltage: 4V
- Typical power consumption in SLEEP mode: 1.3 mA@DRX=5

Frequency Bands:

- Quad-band: GSM850, GSM900, DCS1800, PCS1900
- The module can search these frequency bands automatically
- The frequency bands can be set by AT command
- Compliant to GSM Phase 2/2+

GSM Class Small MS Transmitting Power:

- Class 4 (2W) at GSM850 and GSM900
- Class 1 (1W) at DCS1800 and PCS1900

Temperature Range:

- Normal operation: -35°C ~ +80°C
- Restricted operation: -40°C ~ -35°C and +80°C ~ +85°C 1)
- Storage temperature: -45°C ~ +90°C

SMS:

- Text and PDU mode
- SMS storage: SIM card

SIM Interfaces Support:

- SIM card: 1.8V, 3V

UART Interfaces:

- UART Port

GSM/GPRS Module Series:

- M95 Hardware Design
- M95_Hardware_Design Confidential / Released 12 / 79

When the module works within this temperature range, the deviations from the GSM specification may occur. For example, the frequency error or the phase error will be increased.

SMS device message

Example of SMS message from device:

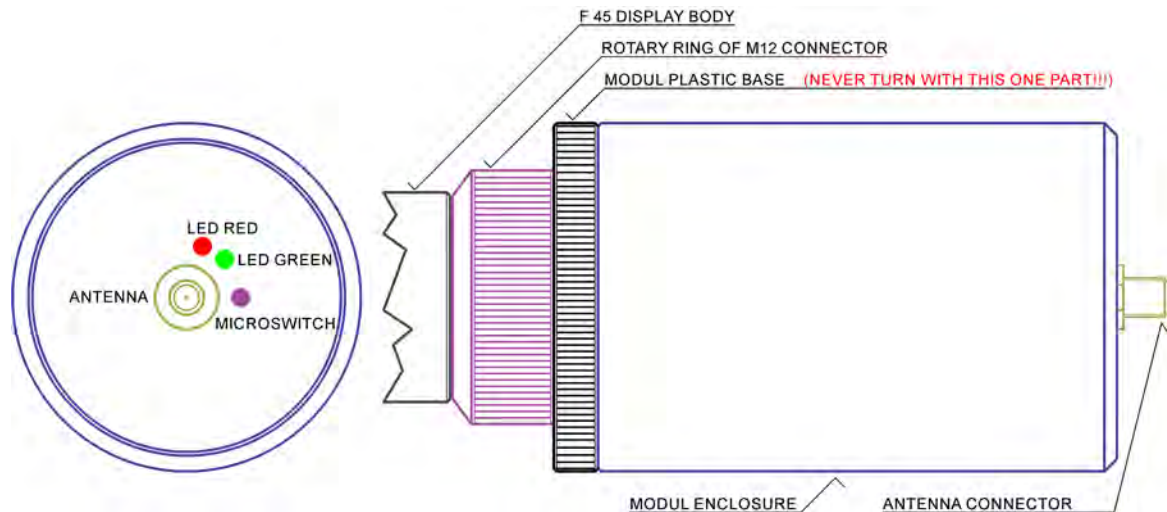
SN=38005042
V=0.0m3
V+=0.0m3
V-= 0.0m3
Q=0.0m3/h
ST=00000100

Description of SMS message:

SN	Serial number of device
V	Total volume ΣV
V+	Volume in the positive direction to the arrow on the meter label +V
V-	Volume in the negative direction to the arrow on the meter label -V
Q	Actual flow rate Q
ST	Status of device

Kód Satus ST	Popis chyby pro měřič FLOW 38	Popis chyby pro měřič FLOW 45
00000001	Add volume overflow (unreasonable increment)	Empty tube
00000010	FRAM error	Reserved
00000100	Empty tube	Reserved
00001000	Imp1 out overflow	Reserved
00010000	Current coil fault	Reserved
00100000	Imp2 out overflow	Reserved
01000000	Amp.signal limit	Reserved
10000000	Reserved	Reserved

Installation of the GSM MODULE in the FLOW 45 meter



REMOVAL AND INSTALLATION OF THE WHOLE GSM MODULE:

- 1. removal** hold the plastic module base and unscrew the GSM module by turning of the connector rotating ring counterclockwise
- 2. installation** hold the plastic base of the module, put on the connector according to the wrench, lightly push the module on the connector and screw the GSM module by turning the connector rotary ring clockwise

REMOVAL AND INSTALLATION OF ENCLOSURE OF THE GSM MODULE:

- 1. removal of enclosure** hold the plastic module base and unscrew the enclosure of the GSM module by turning the enclosure counterclockwise
- 2. installation of enclosure** hold the plastic module base and screw the enclosure of the GSM module by turning the enclosure clockwise

WARNING:

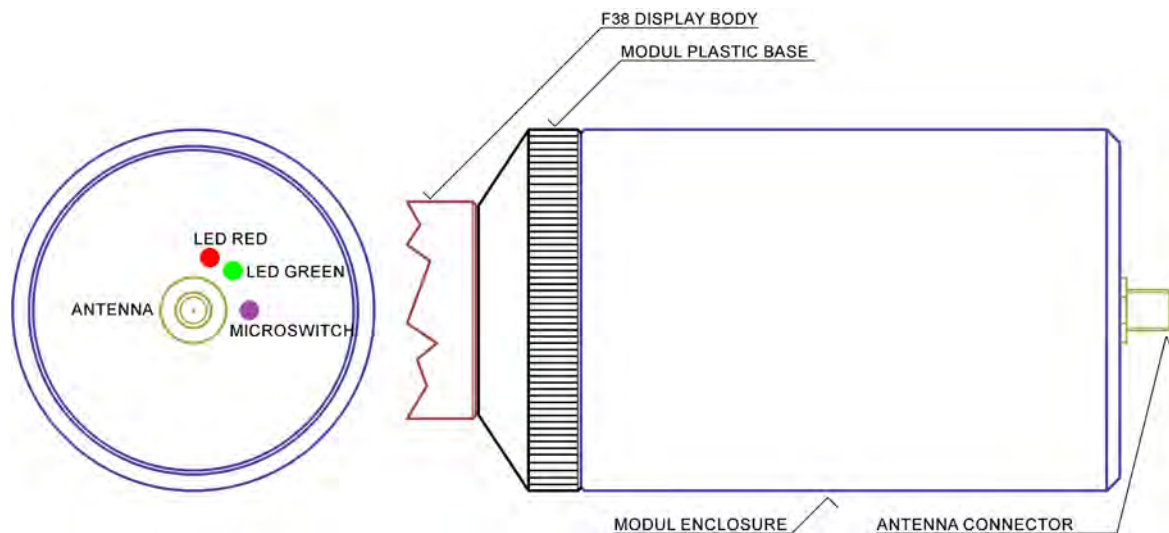
- Never turn the plastic base of the module, the M12 connector could be damaged !!
- Do not remove the antenna while the battery is connected
- Connect the battery only with the antenna screwed on
- When reassembling the enclosure care not to damage the wires from the battery by pinch between the enclosure and thread of the plastic base

Process steps:

After inserting the SIM card, screw on the antenna, connect the battery and screw on the enclosure.

IMPORTANT RECOMMENDATION : For a safer handling of the GSM module when inserting the battery and SIM card, it is recommended to remove the GSM module from the meter. This prevents possible damage to the M12 connector.

Installation of the GSM MODULE in the FLOW 38 meter



REMOVAL AND INSTALLATION OF THE WHOLE GSM MODULE:

- 1. removal** hold the plastic module base and unscrew the GSM module by turning the base together with the enclosure counterclockwise
- 2. installation** hold the plastic base of the module, put it on the thread of the gland and turn the base together with the enclosure clockwise to screw the GSM module into the stop.

REMOVAL AND INSTALLATION OF ENCLOSURE OF THE GSM MODULE:

- 1. removal of enclosure** hold the plastic module base and unscrew the enclosure of the GSM module by turning the enclosure counterclockwise
- 2. installation of enclosure** hold the plastic module base and screw the enclosure of the GSM module by turning the enclosure clockwise

Process steps:

After inserting the SIM card, screw on the antenna, connect the battery and screw on the enclosure

WARNING:

- *Disconnect the GSM module cable from the F38 electronics before removing the entire module*
- *Do not remove the antenna while the battery is connected*
- *Connect the battery only with the antenna screwed on*
- *When reassembling the enclosure care not to damage the wires from the battery by pinch between the enclosure and thread of the plastic base*