# MAG*B*1

# MAGB1 3G/GPRS/GSM Installation User Guide

**3G** GPRS GSM-SMS

**arkon**
flow systems

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# 1  FEATURES

• The MAGB1 sends the flow rate and the total volume by 3G/GPRS/GSM data at specific intervals.

• Specific interval of sending 3G/GPRS/GSM data is possible to setup, by sending an SMS.

• The SMS is sent to a specific phone number or SMS server (up to 3 phone numbers)

• The GPRS data are sent to a specific server (Arkon.Track) at a specific format using TCP port.

• Authorization is according to the unit number of MAGB1 transmitter and the SIM phone number.

• The user can send the SMS commands by a remote SMS server or a phone (5 minutes after plug in battery).

# 2   SYSTEM INFORMATION

## 2.1   Supported Bands
• Quad Band: 850/900/1800/1900 MHz

## 2.2   Environmental
• Operating temperature: -20 °C +60 °C

## 2.3   SIM Card
• 3.0V
• STK 3.1

## 2.4   SMS
• The SMS, is as defined within the GSM 850/900/1800/1900 digital mobile phone standard.
• A single short message can be up to 160 characters of ASCII text in length (7-bit coded).
• Message text can comprise words, numbers or an alphanumeric combination.

# 3  INSTALLATION

- Open the transmitter.
- Unplug the battery.
- Deactivate the SIM card PIN lock.
- Delete all SMS messages in SIM memory.
- Insert the SIM card to the 3G/GPRS/GSM Module, see picture 1.
- Plug-in the 3G/GPRS/GSM module into the transmitter (into the GPRS Module slot, see picture 3).
- Install external antenna to the 3G/GPRS/GSM Module.
- Plug-in the 3G/GPRS/GSM module battery.
- Plug-in the MAGB1 main battery

## 3.1  SIM interface

Before inserting or replacing SIM card – MAGB1 transmitter must be switched off!
Otherwise, MAGB1 transmitter, SIM card or GPRS module may get damaged!

The 3G/GPRS/GSM module incorporates a SIM interface, which conforms to the GSM 11.11 and GSM 11.12 standards that are based on the ISO/IEC 7816 standard. These standards define the electrical, signaling and protocol specifications of a GSM SIM card.

The manufacturer does not supply the SIM card, which is mandatory for a connection to the GPRS/GSM network! The SIM card may be purchased from your GSM (mobile) service provider!

## 3.2  SIM card installation

Insert the SIM card to the 3G/GPRS/GSM module according to picture bellow.
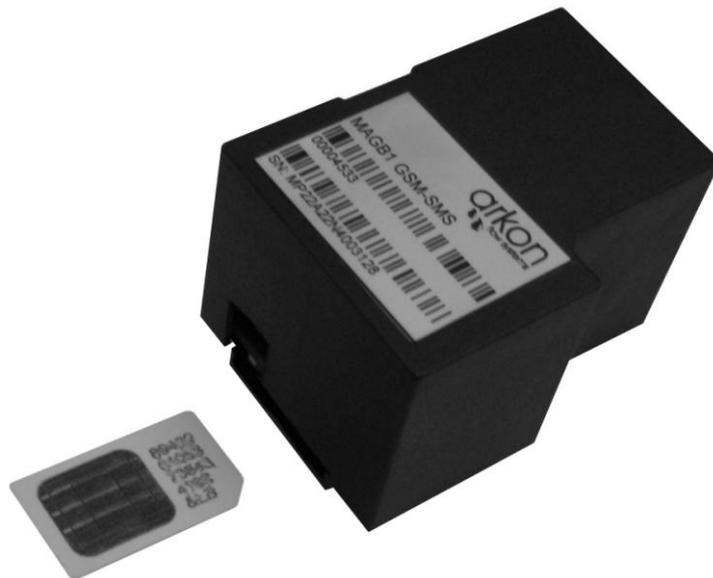


**Picture 1. SIM card installation into the 3G/GPRS/GSM Module**

### 3.3  Antenna installation

Install antenna according to pictures below.



**Picture 2. Antenna installation**

### 3.4  3G/GPRS/GSM module installation,



**Picture 3. Install 3G/GPRS/GSM Module into the transmitter**

## 3.5   3G/GPRS/GSM module battery
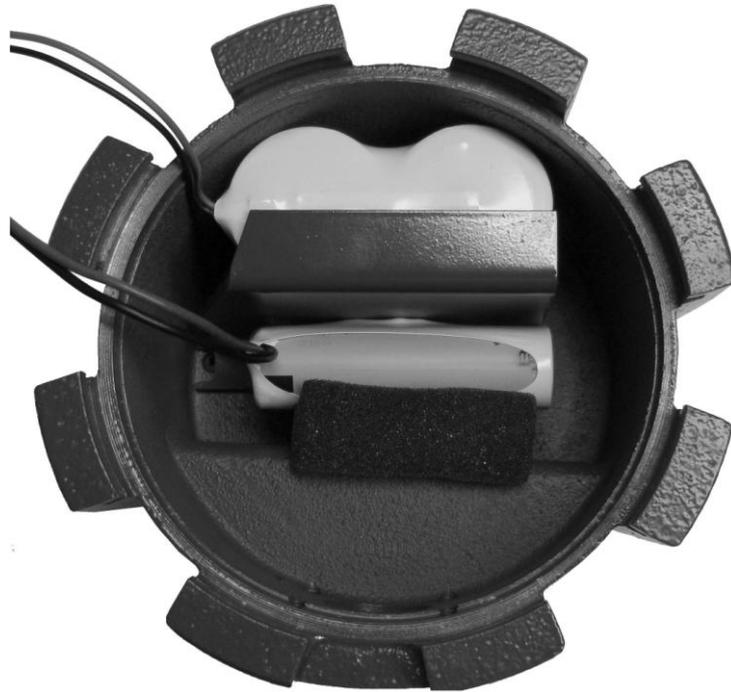


**Picture 4. Install 3G/GPRS/GSM battery (the smaller one)**



**Picture 5. Plug-in the 3G/GPRS/GSM module battery**

| | |
|---|---|
| ⚠ | Warning electrostatic sensitive device. |
| ❗ | Any connection or disconnection of any module has to be done with the battery switched off. |

# 4  SMS COMMANDS

Please note that all commands are case sensitive and have to be written in capital letters.

## 4.1  Set Phone Number

This command sets up the phone number and the 3G/GPRS/GSM module confirms the settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
SET PHONE1 UNITNO NUMBER
SET PHONE2 UNITNO NUMBER
SET PHONE3 UNITNO NUMBER

UNITNO means the unit number of MAGB1 where the query is sent.
UNITNO is used for authorization.
NUMBER means requested phone number for sending interval or  NONE erases existing phone number.
It is possible to set up to 3 phone numbers. 3G/GPRS/GSM module sends data from MAGB1 at specific intervals to all 3 phone numbers. It is possible to set up just one or two phone numbers.

| Syntax | Response example | Remarks |
|---|---|---|
| SET PHONE1 0123456 +420123456789<br>SET PHONE2 0123456 +987654321<br>SET PHONE3 0123456 NONE | PHONE1 0123456 +420123456789<br>PHONE2 0123456 +987654321<br>PHONE3 0123456 NONE | 3G/GPRS/GSM module sends data in specific intervals to all 3 phone numbers. |

| | |
|---|---|
| ❗ | All phone numbers must be in international format (for example +420123456789) |

## 4.2  Set GSM Service Center Address

This command sets up the GSM service center address and the 3G/GPRS/GSM module confirms the settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
SET GSMSERVICE UNITNO ADDRESS

UNITNO means the unit number of MAGB1 where the query is sent.
UNITNO is used for authorization.
ADDRESS means the phone number of the Service Center.

| Syntax | Response example | Remarks |
|---|---|---|
| SET GSMSERVICE 01234567 +420603052000 | GSMSERVICE 01234567 +420603052000 | This command sets the service center address. |

| | |
|---|---|
| ❗ | All phone numbers must be in international format (for example +420123456789) |

# 5 GPRS COMMANDS

Please note that all commands are case sensitive and have to be written in capital letters.

## 5.1 Set Access Point Name

This command sets the GPRS APN server name. The 3G/GPRS/GSM module confirms settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
SET APN UNITNO APN

UNITNO means the unit number of MAGB1 where the query is sent.
UNITNO is used for authorization.
APN is Access Point Name - obtained from your GPRS SIM card provider (39 characters max)

| Syntax | Response example | Remarks |
|---|---|---|
| SET APN 01234567 INTERNET.T-MOBILE.CZ | 01234567 APN SET TO INTERNET.T-MOBILE.CZ | This command sets the APN to internet.t-mobile.cz |

## 5.2 Set IP address

This command sets the GPRS IP address of Arkon.Track server. The 3G/GPRS/GSM module confirms settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
SET IP UNITNO XXX.XXX.XXX.XXX

UNITNO means the unit number of MAGB1 where the query is sent.
UNITNO is used for authorization.
xxx.xxx.xxx.xxx is the IP address of Arkon.Track server (or another server capable to process incomming data)

| Syntax | Response example | Remarks |
|---|---|---|
| SET IP 01234567 84.242.82.84 | 01234567 IP SET TO 84.242.82.84 | This command sets the IP address to 84.242.82.84 |

## 5.3 Set Port number

This command sets the GPRS TCP Port number of Arkon.Track server. The 3G/GPRS/GSM module confirms settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
SET PORT UNITNO PORTNUMBER

UNITNO means the unit number of MAGB1 where the query is sent.
UNITNO is used for authorization.
PORTNUMBER is the TCP Port number of Arkon.Track server (or another server capable to process incomming data). Port number set to 0 switches off GPRS communication.

| Syntax | Response example | Remarks |
|---|---|---|
| SET PORT 01234567 5979 | 01234567 PORT SET TO 5979 | This command sets the TCP port to 5979 |

## 5.4 Set ID number for Arkon.Track

This command sets the ID number for Arkon.Track server. The number needs to be unique. It needs to start with 2, has 6 digits. The 3G/GPRS/GSM module confirms settings immediately by SMS. This function works 15 minutes after plugging battery. This number is assigned during production!

Query:
SET ID UNITNO IDNUMBER

UNITNO means the unit number of MAGB1 where the query is sent.
UNITNO is used for authorization.
IDNUMBER is the ID of device for Arkon.Track server (or another server capable to process incomming data). It is in format 2xxxxx

| Syntax | Response example | Remarks |
|---|---|---|
| SET ID 01234567 200001 | 01234567 ID SET TO 200001 | This command sets the ID number to 200001 |

# 6 COMMON COMMANDS

Please note that all commands are case sensitive and have to be written in capital letters.

## 6.1 Set Sending Interval

This command sets up the sending interval and the 3G/GPRS/GSM module confirms the settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
SET INTERVAL UNITNO MMMM – MMMM means number of minutes for sending interval.

| Syntax | Response example | Remarks |
|---|---|---|
| SET INTERVAL 01234567 0120 | INTERVAL 01234567 0120 | 3G/GPRS/GSM module sends every 2 hours flow and totalizers to specified phone numbers / TCP port. |

## 6.2 Stop sending

This command stops the SMS/DATA sending by 3G/GPRS/GSM module. The 3G/GPRS/GSM module confirms settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
STOP SMS UNITNO

UNITNO means the unit number of MAGB1 where the query is send.
UNITNO is used for authorization.

| Syntax | Response example | Remarks |
|---|---|---|
| STOP SMS 01234567 | 0123456 SMS SENDING STOPPED | This command stops the SMS/DATA sending. |

## 6.3 Start sending

This command starts the SMS/DATA sending by 3G/GPRS/GSM module. The 3G/GPRS/GSM module confirms settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
START SMS UNITNO

UNITNO means the unit number of MAGB1 where the query is sent.
UNITNO is used for authorization.

| Syntax | Response example | Remarks |
|---|---|---|
| START SMS 01234567 | 01234567 SMS SENDING STARTED | This command starts the SMS/DATA sending. |

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## 6.4   Set All

This command sets all needed data in one command. The 3G/GPRS/GSM module confirms settings immediately by SMS. This function works 15 minutes after plugging battery.

Query:
SET ALL UNITNO SMS,INTERVAL,PHONE1,PHONE2,PHONE3,APN,IP,PORT,ID

UNITNO means the unit number of MAGB1 where the query is sent, used for authorization.
SMS Start or Stop sending (START | STOP) - *not implemented yet, still needs to be sent separately*
INTERVAL 4digits interval of sending - means number of minutes for sending interval. - *not implemented yet, still needs to be sent separately*
PHONE1 PHONE NUMBER 1 (PHONE NUMBER | NONE)
PHONE2 PHONE NUMBER 2 (PHONE NUMBER | NONE)
PHONE3 PHONE NUMBER 3 (PHONE NUMBER | NONE)
APN is Access Point Name - obtained from your GPRS SIM card provider (39 characters max)
IP xxx.xxx.xxx.xxx is the IP address of Arkon.Track server (or another server capable to process incomming data)
PORT is the TCP Port number of Arkon.Track server (or another server capable to process incomming data). Port number set to 0 switches off GPRS communication.
IDNUMBER is the ID of device for Arkon.Track server (or another server capable to process incomming data). It is in format 2xxxxx

| Syntax | Response example | Remarks |
|---|---|---|
| SET ALL 17200521 START,0120,+420123456789,NONE,NONE,INTERNET.T-MOBILE.CZ,84.242.82.84,5979,200001 | 17200521 ALL SET TO START,0120,+420123456789,NONE,NONE,INTERNET.T-MOBILE.CZ,84.242.82.84,5979,200001 | |

## 6.5   Get All

This command returns the GPRS-GSM module actual settings. This function works 15 minutes after plugging battery.
Query:
GET ALL UNITNO
Response:
UNITNO PHONE1,PHONE2,PHONE3,APN,IP,PORT,ID

UNITNO means the unit number of MAGB1 where the query is sent, used for authorization.
SMS Start or Stop sending (START | STOP)
INTERVAL 4digits interval of sending - means number of minutes for sending interval.
PHONE1 PHONE NUMBER 1 (PHONE NUMBER | NONE)
PHONE2 PHONE NUMBER 2 (PHONE NUMBER | NONE)
PHONE3 PHONE NUMBER 3 (PHONE NUMBER | NONE)
APN is Access Point Name - obtained from your GPRS SIM card provider (39 characters max)
IP xxx.xxx.xxx.xxx is the IP address of Arkon.Track server (or another server capable to process incomming data)
PORT is the TCP Port number of Arkon.Track server (or another server capable to process incomming data).
IDNUMBER is the ID of device for Arkon.Track server (or another server capable to process incomming data). It is in format 2xxxxx

| Syntax | Response example | Remarks |
|---|---|---|
| GET ALL 17200521 | 17200521 START,0120,+420123456789,NONE,NONE,INTERNET.T-MOBILE.CZ,84.242.82.84,5979,200001 | |
|  | In case of usage SMS sending - at least one phone number has to be defined. In case of GPRS usage all parameters has to be filled correctly in order for unit to send data. | |

## 6.6 Set date and time

This command sets the date and time of MAGB1, Needs to be sent as last command. This function works 15 minutes after plugging battery.

Query:
SET DATETIME UNITNO DATE TIME

UNITNO means the unit number of MAGB1 where the query is sent.
UNITNO is used for authorization.
DATE is in format YYYY-MM-DD
TIME is in format HH:MM

| Syntax | Response example | Remarks |
|---|---|---|
| SET DATETIME 01234567 2020-08-25 11:50 | DATETIME 2020-08-25 11:50 | This command sets the time and date of MAGB1 |

# 7 SMS AND DATA FORMATS

## 7.1 SMS Data format

Example data:

UNITNO 01234567 2010.05.12 16:02 FLOWRATE 12.3 M3/H TOTALPOS 254.32 M3 TOTALNEG 12.58 M3 BATT 100% GSMBATT 76%

UNITNO means the unit number of MAGB1. (01234567)
DATE AND TIME shows time and date when the sample was taken. (2010.05.12 16:02)
FLOWRATE actual flow at a time of SMS sent. (12.3 M3/H)
TOTALPOS actual value of Total+ at a time of SMS sent. (254.32 M3)
TOTALNEG actual value of Total- at a time of SMS sent. (12.58 M3)
BATT actual charge of the main flowmeter battery at a time of SMS sent. (100%)
GSMBATT actual charge of the module battery at a time of SMS sent. (76%)

## 7.2 TCP Data format

Example data:

#STB:200099;L:117;TM:1004212241;A01:88;P01:15208588;P02:1.990000;P03:13600;P04:0;P05:0.
000000;P06:0.000000;P07:100;P08:0;5A#

200099 - ID number for Arkon.Track
L:117 - Length of sent data
TM:1004212241 - Time stamp
A01:88 - GPRS module battery status in %
P01:15208588 - Serial number of the flowmeter
P02:1.990000 - Total+
P03:13600 - Actual Flow * 1000 (no sign)
P04:0 - Sign for Actual Flow (0=positive direction, 1=negative direction)
P05:0.000000 - Total-
P06:0.000000 - Reserved
P07:100 - Meter main battery
P08:0 - MAGB1 Error code (planned for future)
5A# - Checksum

# 8  EXAMPLES

## 8.1  SMS setting example

*Goal:*

*A MAGB1 flowmeter serial number 17200521, data receiving on mobile number +420739474929, sending SMS every 4 hours.*

Solution:
1. Use USB cable and SW Flowmeters to set correct time in MAGB1 flowmeter.
2. Follow Chapter 3 - Module installation in this document.
3. Observe flowmeter display for following messages appearing one after another:
      a) GSM FOUND
      b) COMMUNICATION - OK
      c) RESET - OK
      d) PIN - OK
      e) SIGNAL - XX (XX - signal strength in percentage)
      f) GSM init complete

4. Now you have1 5 minutes time window to set the 3G/GPRS/GSM module. To the phone number of SIM card that is in the flowmeter send following messages; be sure to always wait for response from the module:

    a)
    SET PHONE1 17200521 +420739474929

    Wait for confirmation SMS:
    PHONE1 17200521 +420739474929

    b)
    SET INTERVAL 17200521 0240

    Wait for confirmation SMS:
    INTERVAL 17200521 0240

    c)
    START SMS 17200521

    Wait for confirmation SMS:
    17200521 SMS SENDING STARTED

    d)
    SET DATETIME 17200521 2020-08-25 11:50
    Wait for confirmation SMS:
    DATETIME 2020-08-25 11:50

5. Wait until the 15 minutes setting interval ends. Now your module will send MAGB1 flowrate and totaliters by SMS messages to phone number +420739474929 each 4 hours.

## 8.2  GPRS setting example

*A MAGB1 flowmeter serial number 17200521, data receiving server 84.242.82.84 (Arkon.Track), port 5979, sending data every day.*

Solution:
1. Use USB cable and SW Flowmeters to set correct time in MAGB1 flowmeter.
2. Follow Chapter 3 - Module installation in this document.
3. Observe flowmeter display for following messages appearing one after another:
      a) GSM FOUND
      b) COMMUNICATION - OK
      c) RESET - OK

d) PIN - OK
e) SIGNAL - XX (XX - signal strength in percentage)
f) GSM init complete

4. Now you have 15 minutes time window to set the 3G/GPRS/GSM module. To the phone number of SIM card that is in the flowmeter send following messages; be sure to always wait for response from the module:

a)
SET APN 17200521 INTERNET.T-MOBILE.CZ

Wait for confirmation SMS:
17200521 APN SET TO INTERNET.T-MOBILE.CZ

b)
SET IP 17200521 84.242.82.84

Wait for confirmation SMS:
17200521 IP SET TO 84.242.82.84

c)
SET PORT 17200521 5979

Wait for confirmation SMS:
17200521 PORT SET TO 5979

d)
SET INTERVAL 17200521 1440

Wait for confirmation SMS:
INTERVAL 17200521 1440

e)
START SMS 17200521

Wait for confirmation SMS:
17200521 SMS SENDING STARTED

f)
SET DATETIME 17200521 2020-08-25 11:50
Wait for confirmation SMS:
DATETIME 2020-08-25 11:50

5. Wait until the 15 minutes setting interval ends. Now your module will send MAGB1 flowrate and totaliters by TCP channel to port 5979 at 84.242.82.84 each 1 day.

# 9  TROUBLESHOOTING

1. The module is not responding to setting SMS messages.
  a) Check SIM card for full memory of SMS messages - delete all of them.
  b) Check 3G/GPRS/GSM battery charge
  c) The module will respond to setting SMS messages only 5minutes after plugging the MAGB1 main battery!

2. The setting window passed away and the SMS commands are not finished.
  Simply unplug the main battery and plug it back to get new 5minutes window. Already processed SMS messages are saved in non-volatile memory.

3. The time value in MAGB1 is deleted with every battery unplugging.
  This is normal behavior of MAGB1, the time value is saved every hour into non-volatile memory. With every battery unplugging it is recommended to set time again.

# 10 FACTORY DELIVERED DEFAULT SETTINGS

## 10.1 Default settings of 3G/GPRS/GSM module

- None of the three possible phone numbers is set.
- Sending is stopped.
- Sending interval is set to 720 minutes (12 hours).
- Service center number is set by the default profile of settings stored in the SIM card, which is usually pre-set by the mobile network operator.


ERROR CODES

E0800 - GSM SMS overhang
- Too many SMS messages on the SIM card. 3G/GPRS/GSM module checks the first 15 SMS messages. To resolve this error and correct functionality of the 3G/GPRS/GSM module delete messages on the SIM card.

E0400 - GSM timeout
– 3G/GPRS/GSM module was not able to send interval

E0200 - GSM init error
– PIN code is set on your SIM card or there is no signal.