

# Operating and installation instructions

GMU191 Remote monitoring unit

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## GMU191 REMOTE MONITORING UNIT

### 1 General

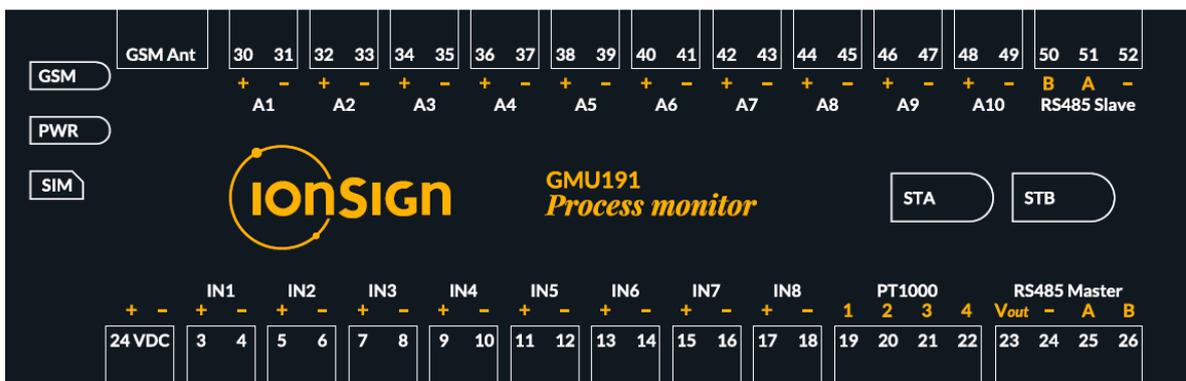
The GMU191 remote monitoring unit is designed for collecting and transmitting various types of measurement data. Data can be read from the unit's own inputs (analog mA, digital/pulse, PT1000) and meters connected to it with Modbus field bus. Data is transmitted to a server and may also be read from the Modbus slave port of the unit. After initial setup, the unit collects and transmits data spontaneously, without separate queries.

The server connection is established via GSM/3G and GPRS connection.

### 2 Introduction

#### 2.1 Setup

1. Insert the SIM card (with disabled PIN query) to the device.
2. Connect the inputs, metering, GSM antenna, and power supply to the device. (Example connection shown in the end of this document).
3. When the device is powered up, the PWR LED turns ON, STA LED is ON for a while, STA and STB LEDs blink briefly.
4. Send the SETTINGS command to the device (section 3.1). The green STA LED indicates an established server connection and an operational device.



Picture 1: Device front panel.

### 3 Commands

The GMU191 is configured with SMS commands that can be sent with any mobile phone. All commands start with the device PIN code (Note! Not the same as the SIM card PIN code). Commands and parameters are separated with spaces, lower case and upper case letters are equal.

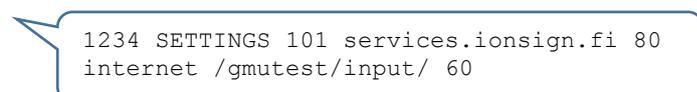
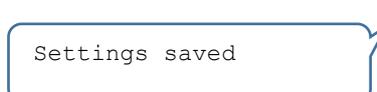
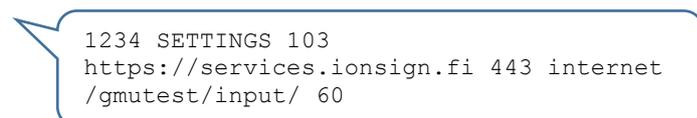
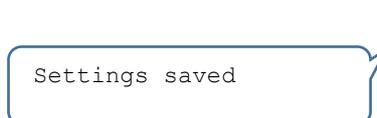
### 3.1 Settings

The Settings command is used to enter the device settings. When the settings are entered, the unit starts collecting and sending measurement data. Given without parameters, the Settings command returns the current settings.

**<PIN>\_SETTINGS\_<Device ID>\_<Server>\_<Port>\_<APN>\_<Path>\_<Interval>**

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
SETTINGS	The Settings command
<Device ID>	The unique, user defined device ID shown to the server. The range is 1 - 1 000 000.
<Server>	The address of the server where the data is to be transmitted. May be entered either as an IP address or in DNS format and may contain the protocol used.
<Port>	The port to which the server is expecting communication.
<APN>	Operator's APN for the GPRS connection.
<Path>	Input script path at the server.
<Interval>	Defines how often the device reads and transmits the measurement data. The range is 60 s – 30 000 s.

#### Example SMS:

 <pre>1234 SETTINGS 101 services.ionsign.fi 80 internet /gmutest/input/ 60</pre>	 <p>Settings saved</p>
 <pre>1234 SETTINGS 102 http://services.ionsign.fi 80 internet /gmutest/input/ 60</pre>	 <p>Settings saved</p>
 <pre>1234 SETTINGS 103 https://services.ionsign.fi 443 internet /gmutest/input/ 60</pre>	 <p>Settings saved</p>

### 3.2 Init

The Init command is used to initialize the device and restore factory settings. All measurements and settings are erased, device PIN is restored to the default value.

**<PIN>\_INIT**

### Example SMS:

1234 INIT

Device reseted, default PIN saved

## 3.3 PIN

The PIN command is used to change the device PIN. Note! Factory settings (Init command) cannot be restored without the correct PIN.

**<PIN>\_PIN\_<New PIN>**

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
PIN	The command for changing the PIN code.
<New PIN>	The new device ID. Space not allowed. The range is 0000 – 9999.

### Example SMS:

1234 PIN 0000

PIN saved

## 3.4 Interval

The Interval command is used to change the data update interval, without the need to resend a new complete Settings command. Given without parameters, the command returns the current update interval.

If the interval is between 10 – 60 minutes, and 60 is divisible by the interval, data transmission is synchronized to the next hour. Also, if the interval is above 60 minutes, and divisible by 30, data transmission is synchronized to the next hour.

**<PIN>\_INTERVAL\_<Interval>**

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
INTERVAL	The command to change the update interval.
<Interval>	The new update interval, in seconds. The range is 60 s – 30 000 s.

### Example SMS:

1234 INTERVAL 60

UPDATE: 60

### Example synchronization:

Update interval in seconds	Update interval in hours and minutes	Example of timing of sending of measurements, when the settings are made at 11:55 o'clock.
600	0h 10m	12:00 12:10 12:20 12:30 ...
720	0h 12m	12:00 12:12 12:24 12:36 ...
900	0h 15m	12:00 12:15 12:30 12:45 ...
1200	0h 20m	12:00 12:20 12:40 13:00 ...
1800	0h 30m	12:00 12:30 13:00 13:30 ...
3600	1h 0m	12:00 13:00 14:00 15:00 ...
5400	1h 30m	12:00 13:30 15:00 16:30 ...
28800	8h 0m	12:00 20:00 04:00 12:00 ...

## 3.5 Values

The Values command is used to read the device's analog measurements (A1 - A10 and PT1000).

### <PIN>\_VALUES

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
VALUES	The command to read the analog measurements.

### Example SMS:

1234 VALUES

A1: 70,5  
A2: 30,3  
A3: 12,7  
A4: 73,5  
A5: 62,9  
A6: 20,2  
A7: 71,8  
A8: 71,8  
A9: 71,8  
A10: 71,8  
PT1: 26,3

## 3.6 Modbus ID

The Modbus ID command is used to set the Modbus slave ID for the device. Given without parameters, the command returns the current Modbus slave ID.

### <PIN>\_MODBUSID\_<ID>

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
MODBUSID	The command to set the Modbus Slave ID.
<ID>	Modbus Slave ID. The range is 1 – 255.

### Example SMS:



## 3.7 Status

The Status command is used to check the status of the GPRS connection.

### <PIN>\_STATUS

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
STATUS	The Status command.

### Example SMS:



## 3.8 Operator

The Operator command is used to select the mobile operator. Given without parameters, the command applies automatic operator selection.

### <PIN>\_OPERATOR\_<Network code>

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
OPERATOR	The command to select the operator.
<Network code>	The MNC code of the selected operator. Leaving out applies automatic selection. The range is 00000 – 99999.

### Example SMS:



### 3.9 User

The User command is used to set user credentials for the GPRS connection, if required by the operator.

**<PIN> USER <UserID> <Password>**

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
USER	The command to set GPRS user credentials.
<UserID>	User ID, user name.
<Password>	Password.

Example SMS:



The diagram shows two speech bubbles representing an SMS. The left bubble contains the command: `1234 USER user secret`. The right bubble contains the response: `GPRS authentication`, `UserId: user`, and `Pswd: secret`.

### 3.10 Phone

The Phone command is used to set phone numbers for sending alarms. A memory slot is erased by leaving out the <Number> parameter. Given without parameters, the command returns a list of the stored phone numbers. Up to five phone numbers may be stored.

**<PIN> PHONE <Slot> <Number>**  
**<PIN> PHONE <Slot>**

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
PHONE	The command to store a number for sending alarms.
<Slot>	Number of the memory slot. The range is 1 – 5.
<Number>	The phone number, in international format.

Example SMS:



The diagram shows two speech bubbles representing an SMS. The left bubble contains the command: `1234 PHONE 1 +358501234567`. The right bubble contains the response: `Number saved:`, `1: +358501234567`, `2: Empty`, `3: Empty`, `4: Empty`, and `5: Empty`.

1234 PHONE 1

Number deleted:  
1: Empty  
2: Empty  
3: Empty  
4: Empty  
5: Empty

1234 PHONE

1: Empty  
2: Empty  
3: Empty  
4: Empty  
5: Empty

### 3.11 Alarm

The Alarm command is used to set the alarms. Alarms may be set up for inputs A1 - A7 and PT1000. The alarm for a given input may be removed by only entering the <Slot> parameter.

**<PIN>\_ALARM\_<Slot>\_<Input>\_<Type>\_<Limit>\_<Delay>\_<Message>**  
**<PIN>\_ALARM\_<Slot>**

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
ALARM	The command to set the alarms.
<Slot>	The number of alarm. The range is 1 – 8.
<Input>	Defines the input, which is set to alarm. Analog1 = 1, Analog2 = 2, Analog3 = 3, Analog4 = 4, Analog5 = 5, Analog6 = 6, Analog7 = 7, PT1000 = 8.
<Type>	The type of alarm: lower than = 0, higher than = 1.
<Limit>	The threshold value of alarm. The range is -30 – 100. (Decimals not allowed)
<Delay>	Defines the delay before sending the alarm. The range is 0 s – 240 s.
<Message>	Alarm message. Maximum length 30 characters, spaces not allowed.

#### Example SMS:

1234 ALARM 1 8 0 10 30 LowTemperature

Alarm Saved

1234 ALARM 1

Alarm deleted

### 3.12 Datalimit

The Datalimit command is used to limit the number of data sets in one HTTP GET message. 20 is the default value.

**<PIN>\_DATALIMIT\_<Datalimit>**

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
DATALIMIT	The command to set the number of data sets.
<Datalimit>	The number of data sets. The range is 1 – 20.

Example SMS:

1234 DATALIMIT 10

Datalimit saved

### 3.13 Feature

The Feature command is used to set optional features On or Off. One feature can be set On or Off at once. Response message include all feature states. Without parameters “Feature” command print feature states.

**<PIN>\_FEATURE\_<Number>\_<State>**

<PIN>	Device specific ID. The device only processes messages starting with the correct PIN. Default PIN is 1234.
FEATURE	The command to set features.
<Number>	Feature number. 1 = Digital input ontime counters 2 = Analog input max/min value counters
<State>	Feature state. Off = 0, On = 1.

Example SMS:

1234 FEATURE 1 1

Feature states:  
1: On  
2: Off

1234 FEATURE

Feature states:  
1: On  
2: Off

## 4 Device signals

The device has four LED indicators: PWR, GSM, STA and STB.

**PWR** indicator is ON when device is powered up.

**GSM** indicates the state of GSM/3G module. When the LED flashes twice with approximately two seconds interval, module is searching GSM/3G network. When network is found, LED flashes once with approximately two seconds interval. When LED is ON, GPRS connection is established. When LED is OFF, GSM/3G module is powered down.

**STA** indicates the state of installation. When the LED is ON, all settings are valid and a server connection is established. When factory settings are restored by the INIT command, the STA LED blinks for a while and turns off when finished. When the LED is OFF, the device has no settings.

**STB** indicates the state of Modbus master reading. The LED is OFF when Modbus master reading has not been initiated, or any read meter is not responding correctly. When the LED blinks, at least one read meter is not responding. When the LED is ON continuously, all read meters are responding correctly.

## 5 Modbus master reading

In addition to the unit's own inputs, data collection may be supplemented by reading from meters connected to the unit's Modbus master connection, or from values written to the unit's Modbus slave registers. These values are sent to the server together with the values read from the unit's own inputs. Modbus master reading settings may be given either with the server application or via the unit's Modbus slave connection.

## 6 Buffering

The unit has a buffer memory to cope with disruptions in the data transfer network. The buffer has capacity to store 13 000 measurement series, one measurement series including all of the unit's inputs and 251 Modbus registers. With a 15 minutes update interval, the buffer stores measurements for 135 days. When the network disruption ends, the unit purges the buffer and continues new data transmission automatically.

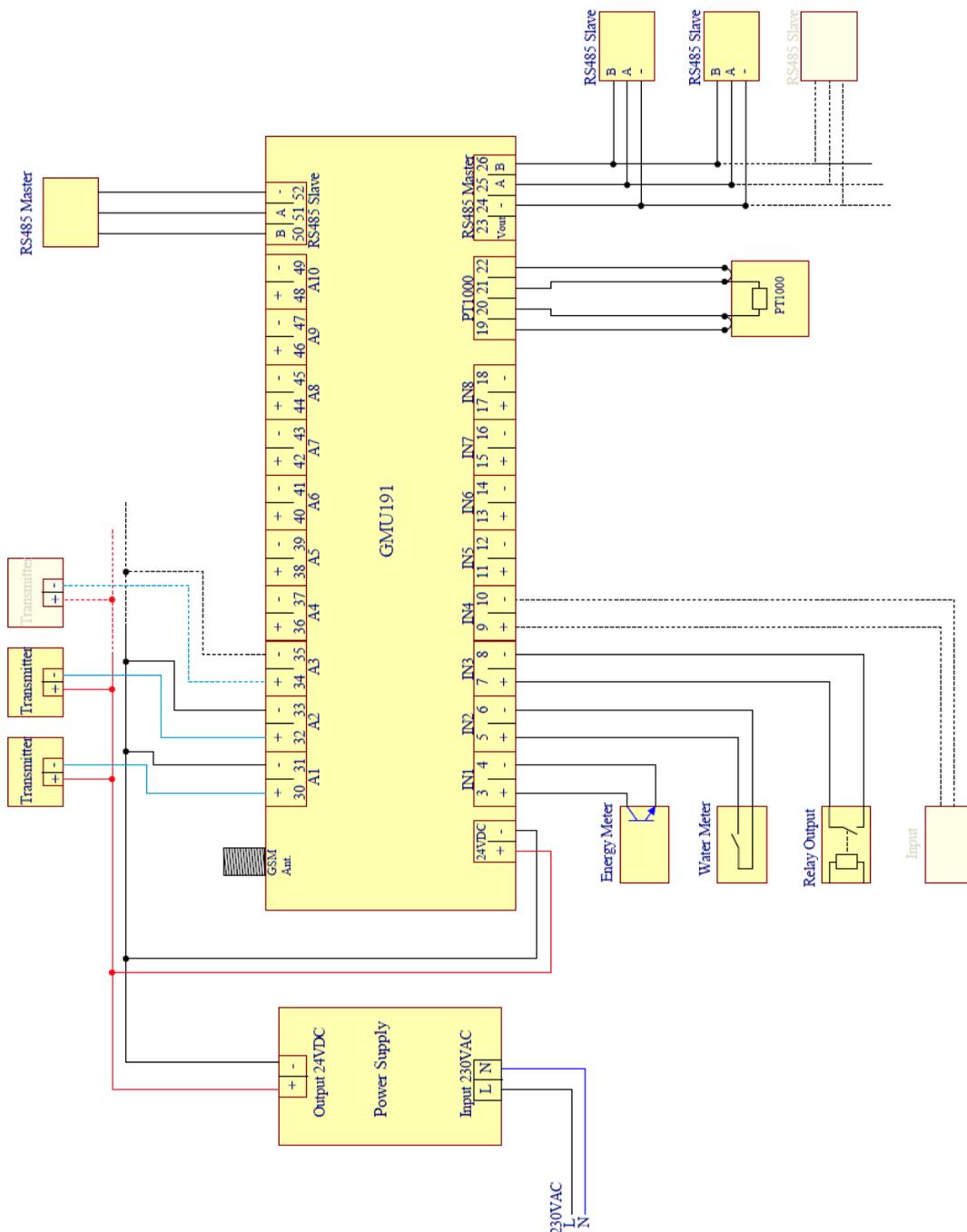
## 7 GMU191 technical specifications

- 8 open collector or relay inputs for digital inputs or collecting pulse data.
- 10 current (4 – 20 mA) or voltage (2 – 10V) inputs.
- PT1000 temperature measurement input.
- 2 RS-485 connections (Modbus master and slave).
- Operating voltage: 12...24 VDC.
- Power consumption: 100 mA.
- Real-time clock with battery backup.
- Size: WxHxD 156 x 115 x 58 mm (9 module wide DIN enclosure).
- Protection class: IP20.
- Operating temperature: -25°C...+50°C.
- RH: 5% - 95% non-condensing.
- Data storage capacity: 13 000 measurement sets (all inputs and 250 Modbus registers). With 15 minutes update interval, the buffer keeps 135 days of measurement data.
- Data communication: Internal 2G/GSM/GPRS module. Complies with the following directives and standards:
  - R&TTE Directive 1999/5/EC (Radio Equipment & Telecommunications terminal Equipment)
  - Low Voltage Directive 73/23/EEC and product safety Directive 89/336/EEC for conformity for EMC
  - GSM (Radio Spectrum). Standard: EN 301 511 and 3GPP 51.010-1
  - EMC (Electromagnetic Compatibility). Standards: EN 301 489-1 and EN 301 489-7
  - LVD (Low Voltage Directive) Standards: EN 60 950

## 8 Warranty

ionSign Oy agrees the warranty of two (2) years for devices. Warranty starts from the day when the customer has received the device and it concerns material and production defects. Warranty is not agreed for devices which are used or wired incorrectly. It is not also agreed for situations where defect is related to 3rd party actions. Things like this can be service changes by mobile network operator or changes in mobile network itself.

For devices which are broken during warranty time ionSign Oy delivers a new device for free. Alternatively device can be corrected. Broken device should be returned to supplier if required. The cost of delivery is paid by supplier. ionSign Oy is not responsible for indirect or implicit damage or possible work or travel expenses related to broken device. For warranty issues please contact to ionSign Oy by e-mail: [ionsign@ionsign.fi](mailto:ionsign@ionsign.fi) or by Tel: +358 (0)2 822 0097.



Picture 2: GMU191 circuit diagram.

For example JAMAK 2x(2+1)x0,5mm<sup>2</sup> instrumentation cable can be used between the GMU unit and the metering devices.

The open collector or relay output of a single meter is connected to the GMU unit as shown above.