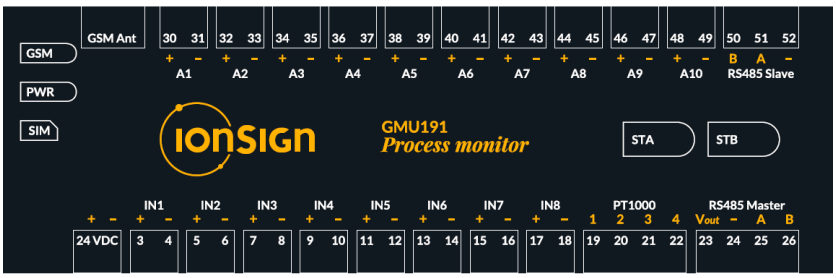
Quick Guide

GMU191 Process monitor

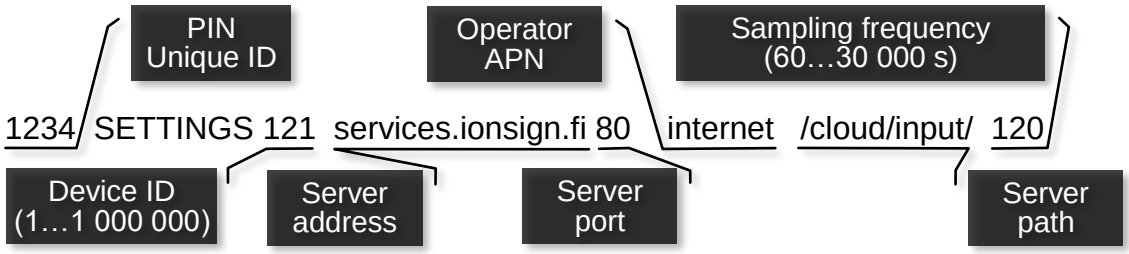
Commissioning the GMU191:

The GMU191 process monitor is designed for collecting and transmitting measuring data from device's own inputs and meters connected to it with Modbus field bus. Data is transmitted to a server and may also be read from Modbus slave port of the unit. After commission of the device, it collects and transmits data spontaneously without separate queries. The server connection is established via GPRS/3G connection.



1. Insert the SIM card to its slot. Disable PIN query e.g. with a mobile phone.
2. Connect necessary sensors, meters, Modbus devices, antenna and power supply.
3. When device is powered up PWR led turns ON, STA led flashes once and then STA and STB leds flash once simultaneously.
4. The GSM led double blinks fast when a GPRS/3G network is being looked for. GSM led blinks when a network connection is established.
5. Send the Settings SMS to the device. STA led indicates an established server connection.
6. Modbus master reading is configured on the server application (e.g. ionSign Cloud).

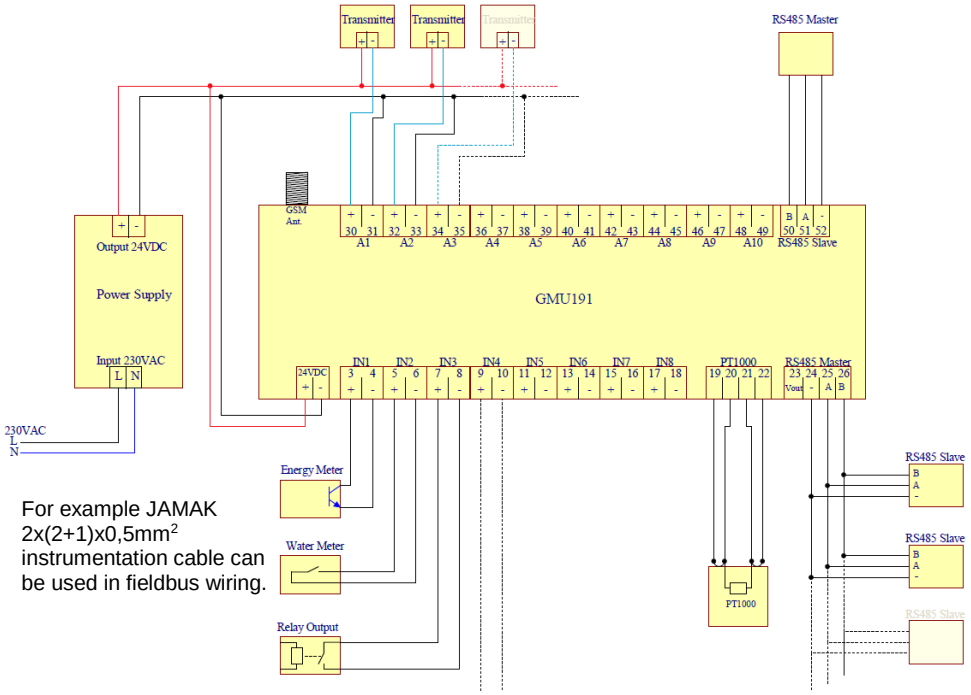
SETTINGS command starts reading and transferring data: an example



*The example command sets device **121** to collect and transfer data with two-minute intervals (**120**s) to server **services.ionsign.fi**, path **/cloud/input/** and port **80**, using **internet** as APN. The device specific PIN code **1234** precedes the actual command.*

Always establish your specific parameters for SETTINGS from your reseller. Operator APN is usually found in their web site: Search for "[your operator] APN settings".

- The device only accepts messages with a correct PIN. Required for all commands.
- Server Addresses are accepted in either IP or DNS format. Protocol may be appended to the address.
- The device replies to all SMS commands, e.g. to SETTINGS: "Settings saved".
- To all commands given without parameters, the reply SMS states the current status or active settings.
  "<PIN>_COMMAND"



For example JAMAK 2x(2+1)x0,5mm² instrumentation cable can be used in fieldbus wiring.

Operating Instructions

GMU191 Process monitor

1 Device Signals

PWR is ON	Device is powered up.
GSM double blinks	The device is searching for a GPRS/3G network.
GSM blinks	The device has found a GPRS/3G network.
GSM is ON	A GPRS/3G connection is established.
STA is ON	The device has settings and a server connection.
STA blinks	Factory settings are being restored.
STA is OFF	Factory settings have been restored.
STB is ON	All Modbus devices are responding.
STB blinks	At least one Modbus device is not responding.
STB is OFF	No Modbus device is responding or Modbus master reading has not been configured.

2 Commands

The GMU191 is configured with SMS commands. All commands start with the device PIN code (Different from the SIM's PIN!). Commands and parameters are separated with a space. Commands are not case sensitive.

MAINTENANCE command configures the communications for device management, e.g. for configuring Modbus reading or updating firmware. With no command given, the data server settings are used, given with the **SETTINGS** command.
`<PIN>_MAINTENANCE_<Address>_<Port>_<Path>_<Interval>`

<PIN>	Identifier. Default value is 1234.
<Address>	Device management server address, may be given as an IP or DNS format and can contain the protocol used.
<Port>	Port number of the server.
<Path>	Input script path of the server.
<Interval>	The number of minutes between device management communications. Value range is 1 - 60 min.

INIT command is used to initialize the device and restore factory settings. All measurements and settings are erased, default PIN is restored (1234).
`<PIN>_INIT`

The **PIN** command is used to change the device PIN code. Note that factory settings can only be restored with the correct PIN code.
`<PIN>_PIN_<New PIN>` (0000-9999, no spaces)

INTERVAL changes the interval of consecutive readings without having to resend the **SETTINGS** command. If the interval is between 10…60 minutes, and 60 is divisible by the interval, transmission is synchronized to the next full hour. Also, if the interval is over 60 minutes, and divisible by 30, transmission is synchronized to the next full hour.
`<PIN>_INTERVAL_<Interval>` (60-30 000 s)

Update interval, s	Update interval, h:min	Example of synchronization when interval is set at 11:55.
720	0h 12m	12:00 12:12 12:24 12:36 …
900	0h 15m	12:00 12:15 12:30 12:45 …
1800	0h 30m	12:00 12:30 13:00 13:30 …
5400	1h 30m	12:00 13:30 15:00 16:30 …

VALUES command returns present analog readings (a1-a10 & PT1000).
`<PIN>_VALUES`

MODBUSID command sets the Modbus slave ID for the device.
`<PIN>_MODBUSID_<ID>` (0-255)

STATUS command returns the status of the GPRS/3G connection.
`<PIN>_STATUS`

OPERATOR command selects the mobile operator.
`<PIN>_OPERATOR_<MNC>` (Operator MNC code 00000-99999)

USER command can be used to set user credentials for the APN, if the operator requires them. Command without parameters replies with current settings. 'Clear' parameter erases user settings.
`<PIN>_USER_<User name>_<Password> / <PIN>_USER_clear`

PHONE command sets phone numbers for sending alarms. A memory slot is erased by leaving out the phone number parameter. Up to five phone numbers can be stored.

`<PIN>_PHONE_<Slot>_<Number>` (Slot: 1-5, Number: international format)

ALARM command sets the alarms for inputs a1-a7 and PT1000. Giving only the Slot parameter removes the alarm.
`<PIN>_ALARM_<Slot>_<Input>_<Type>_<Limit>_<Delay>_<Message>`

<Slot>	The number of memory/alarm slot. Value range is 1-8.
<Input>	Input of the alarm. A1 = 1, A2 = 2, A3 = 3, A4 = 4, A5 = 5, A6 = 6, A7 = 7, PT1000 = 8.
<Type>	Type of the alarm. Lower = 0, Higher = 1.
<Limit>	The threshold value of the alarm. Value range is -30-100 (decimals are not allowed).
<Delay>	Delay before sending the alarm. Value range is 0 - 240 s.
<Message>	Alarm message. Maximum length 30 characters, spaces are not allowed.

SPORT command defines Modbus slave (RS485) port settings.
`<PIN>_SPORT_<Baudrate>_8_<Parity>_<Stopbits>`

<Baudrate>	Data transfer speed (9600 / 19200 / 38600).
8	Number of data bits (not modifiable).
<Parity>	Parity bit ('N'-None / 'E'-Even).
<Stopbits>	Number of stop bits (1 / 2).

MPORT command defines Modbus master (RS485) port settings.
`<PIN>_MPORT_<Baudrate>_8_<Parity>_<Stopbits>`

<Baudrate>	Data transfer speed (9600 / 19200 / 38600).
8	Number of data bits (not modifiable).
<Parity>	Parity bit ('N'-None / 'E'-Even).
<Stopbits>	Number of stop bits (1 / 2).

CHANGELIMIT command changes the sensitivity of a measurement based on the change of a given analog input.

The change-based measurement is a feature that shall be specifically activated and deactivated with the **FEATURE** command. All analog inputs are activated or deactivated together. The feature may generate a considerably large number of measurements, if the limits are tight and values in the analog inputs have a lot of variation. With the feature activated, individual analog inputs may be "deactivated" by giving a sensitivity over 100%.
`<PIN>_<Input>_CHANGELIMIT_<Changelimit>` Default value: 50 (for 0.5%)

<Input>	Analog input to set the change limit, range 1-10 for resp. A1-A10
<Changelimit>	% of measurement range, with two decimals, without the decimal separator. Range 10-100 000 for 0.10%-100%, e.g. 500 for 5.0%.

AUTH command sets the Base64 encoded string for Basic http authentication.
`<PIN>_AUTH_<Credential String>` (max 50 characters)

FEATURE command sets optional features ON or OFF. One feature can be controlled at once with the command. The reply message returns states of all features.
`<PIN>_FEATURE_<Number>_<State>`

<Number> of feature	1 = on-time counters of digital inputs 2 = min/max values of analog inputs 3 = change-based measurements of analog inputs
<State>	Off = 0, On = 1.

DATALIMIT command limits the number of data sets in one HTTP GET message.
`<PIN>_DATALIMIT_<Datalimit>` (1-20, default is 20)

3 Modbus slave

Stored measurement values can be read from Modbus slave port registers. Also some settings can be written to these registers. Device's default Modbus slave ID is 1. There is a separate instruction for using the device specific registers.

4 Modbus master reading

In addition to measurements from the device's own inputs, data can be collected from meters connected to the device's Modbus master port and with values written to the device's Modbus slave registers. These values are sent to the server together with measurements from the device's own inputs. Modbus master reading settings can be set to Modbus slave registers or they can be given with a server application.

5 Failure recovery

The device has no built-in backup power, so data is not collected nor sent during power failures. When power supply resumes however, the device assumes all prior settings and starts collecting and sending data without any need for user intervention.

For data transmission network failures, the device has a built-in local buffer for keeping collected data stored for later transmission. The buffer stores up to 13 000 data series, each consisting of its own inputs and 250 Modbus registers. With a 15 minute sampling frequency, the buffer stores data for 135 days. When the network resumes service, the device automatically flushes the buffer to the server and continues transmitting new data.

6 GMU191 technical specifications

- 8 open collector or relay inputs for digital inputs or pulse counting.
- 10 current (4-20 mA) or voltage (2-10V) metering inputs.
- PT1000 temperature measurement input.
- 2 RS485 connections (Modbus master and slave).
- Operating voltage: 12…24 VDC.
- Power consumption: 100 mA.
- Real-time clock with battery backup.
- Size: WxHxD 156 x 15 x 58 mm (9 module wide DIN enclosure).
- Protection class: IP20.
- Operational temperature range: -25°C...+50°C.
- Relative humidity: 5% - 95%, non-condensing.
- Data storage capacity: 13 000 data series (device inputs and 250 Modbus registers). With 15 minutes update interval, buffer holds 135 days of data.
- Data transmission: Internal 2G/3G/GPRS module. Complies with the following directives and standards:
  - R&TTE Directive 1999/5/EC (Radio Equipment & Telecommunications terminal Equipments)
  - 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 & EN 301 489-7
  - LVD (Low Voltage Directive) Standards: EN 60 950

7 Warranty

ionSign grants a warranty of two (2) years for all delivered devices and software services. The warranty starts on the date of the delivery and it covers material and manufacturing defects. The warranty does not cover defects caused by improper use or installation nor does it cover defects caused by factors out of ionSign's control. These would be for instance grid malfunction or service changes of network operators services. ionSign delivers a new device to replace the defected one, without cost. Alternatively, ionSign may repair the defected device. The defected device must be returned to ionSign, if required, at ionSign's cost. The warranty does not cover dismantling, installation, and introduction costs and the like. ionSign warrants that the provided software essentially manage with their designed tasks, at the time of delivery. All significant software defects are covered by the warranty. The defects will be resolved without unnecessary delay. The resolution may be an instruction to circumvent the defect. If the delivery includes third party products or services, these are only covered by the applicable warranty provided by that third party. Title to the delivered goods transfers to the client, when the invoiced price is paid in full. All immaterial rights related to devices and services remain the property of ionSign. If the service was a design assignment, the client assumes the right to use and further develop the assignment results. ionSign is eligible to use the client's name as a reference in its marketing. ionSign is not eligible to disclose the order details without prior consent. In case of a force majeure, preventing to act according to the purchase agreement, the affected party will start immediate negotiations to assess the effects of the obstacle on the scope and schedule of the purchase agreement. ionSign appropriately backs up client's data residing on its servers. In spite of this, ionSign assumes no responsibility of possible damage due to loss of data. ionSign assumes no responsibility of direct or indirect damage to property or people, nor work or travel expenses, caused by using its services or devices, unless due to gross negligence. ionSign's financial liability is always limited to the value of the delivered goods and services, unless otherwise inflicted by the Finnish law.

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