

STYLITIS-12

USER'S MANUAL



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First English edition. May 2015.

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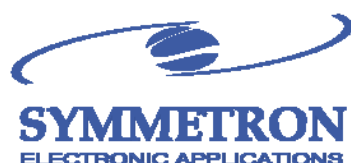
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Made in Greece.

CONVENTIONS USED IN THIS MANUAL

Symbol	Meaning
	To avoid injury of personnel and/or damage to the instrument, the operator must refer to the user's manual.
	Calls attention to a procedure or condition which, if not correctly performed could result in damage to the instrument.



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MANUFACTURER'S DECLARATION OF CONFORMITY

We, the undersigned, hereby declare that the equipment specified conforms to the below Directives and Standards.

Standards to which Conformity is declared

EMC Emissions: EN55022, EN61000-4-3

EMC Immunity: EN61000-4-2, EN61000-4-4, EN61000-4-5, EN61000-4-6

Safety: EN61010-1

Description of Equipment:

Data recording and logging instruments.

Model

Stylitis-10 data logger

Date and Place

Gerakas, Greece, 2 May 2015

Authorized signatory on behalf of the manufacturer

Nikos Hadzidakis

Title: Owner and Manager, Symmetron
N. Hadzidakis-T. Katsampakou Co.

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1. INTRODUCTION

The model Stylitis-12 data logger is a versatile, low cost and user friendly device for technical measurements, control and data storage. It provides:

- ❑ Standard connection for most widely used transducers, like thermometers, anemometers, wind direction vanes, pyranometers, switches, etc via the built-in SDI-12 interface.
- ❑ Capability to connect up to 5, pulse-output transducers, i.e. electrical energy meters, flow meters, etc.).
- ❑ A MODBUS RTU interface for connection to multimeters, and other sensors.
- ❑ User selectable time interval for average calculations.
- ❑ Internal flash memory 4 Mbyte for data storage.
- ❑ Posting measurement results on a web page.
- ❑ Programming, control and data downloading through the RS232 port, an optional GSM/GPRS modem or Ethernet adapter.

Sampling and storage continues unaffected while communicating with the user.

WORKING WITH STYLITIS

Stylitis family data loggers operate in different ways according to your application. (see fig.2):

1. As an autonomous unit with off-line data

downloading. The data logger samples the input signals and keeps the average values for each interval in the internal 4MB flash memory. The stored files are downloadable via the serial port. The connection between data logger and the PC may be via a direct link, via a modem (PSTN or GSM) or via the Ethernet network (LAN). *The unit accepts an optional external GSM modem or Ethernet adapter.* The PC must be equipped with an

RS-232 COM port, a modem or a network card respectively. The data logger is accompanied by Opton, the software required for programming, inspecting, data downloading, and decompression. Data files are arranged in ASCII text files.

2. Real Time Measurement posting to the Internet.

Using the modem or Ethernet nodule, measurements are transmitted to a cloud database. Users may view the measurements on a web browser, in table, trend or statistical form. Stored data may be exported to Excel.

This manual includes detailed operation description.

Technical support is available by phone: +30- 210-6034002, or e-mail:

support@symmetron.gr

and at: www.symmetron.gr

Fig 1: General Diagram

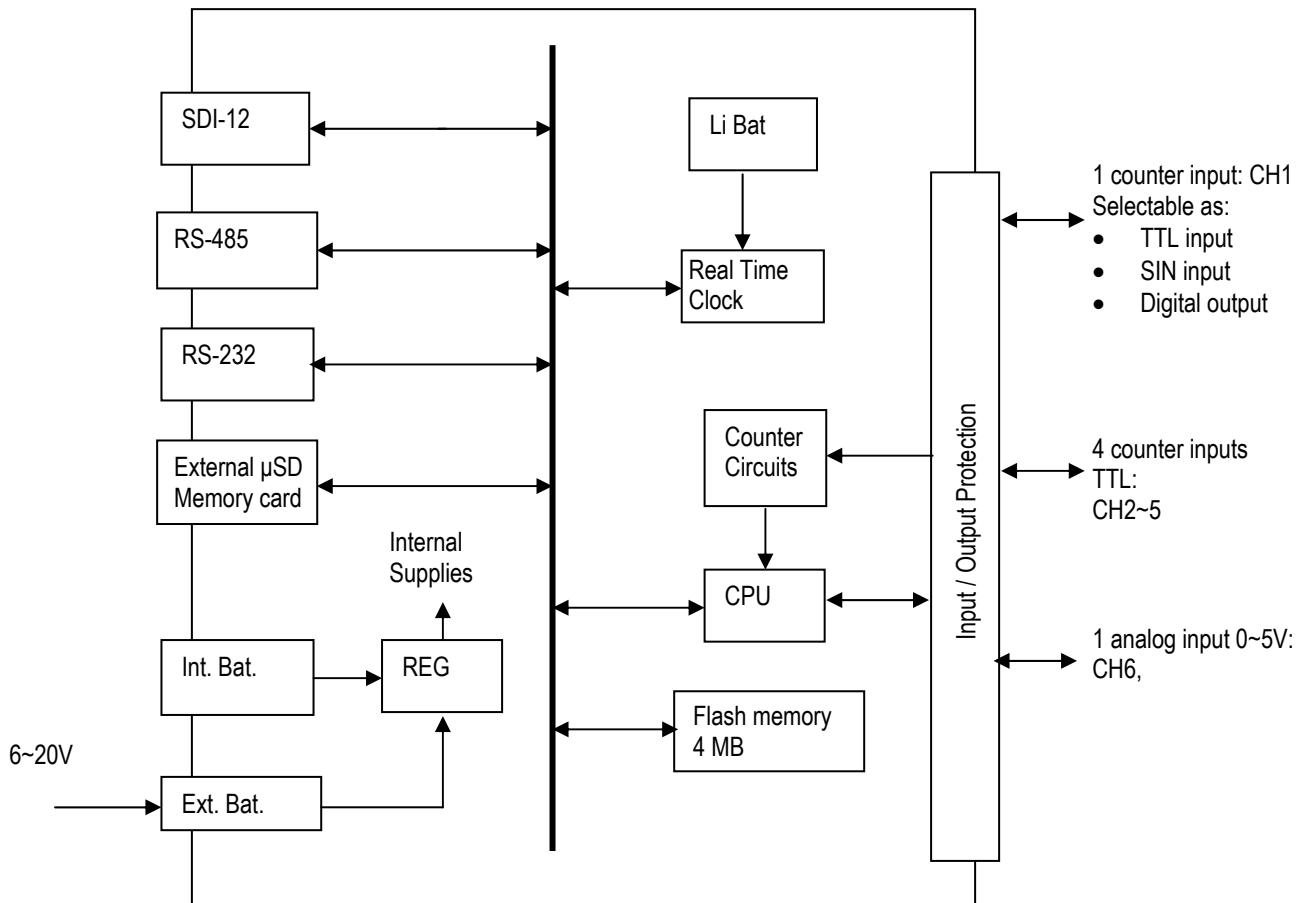
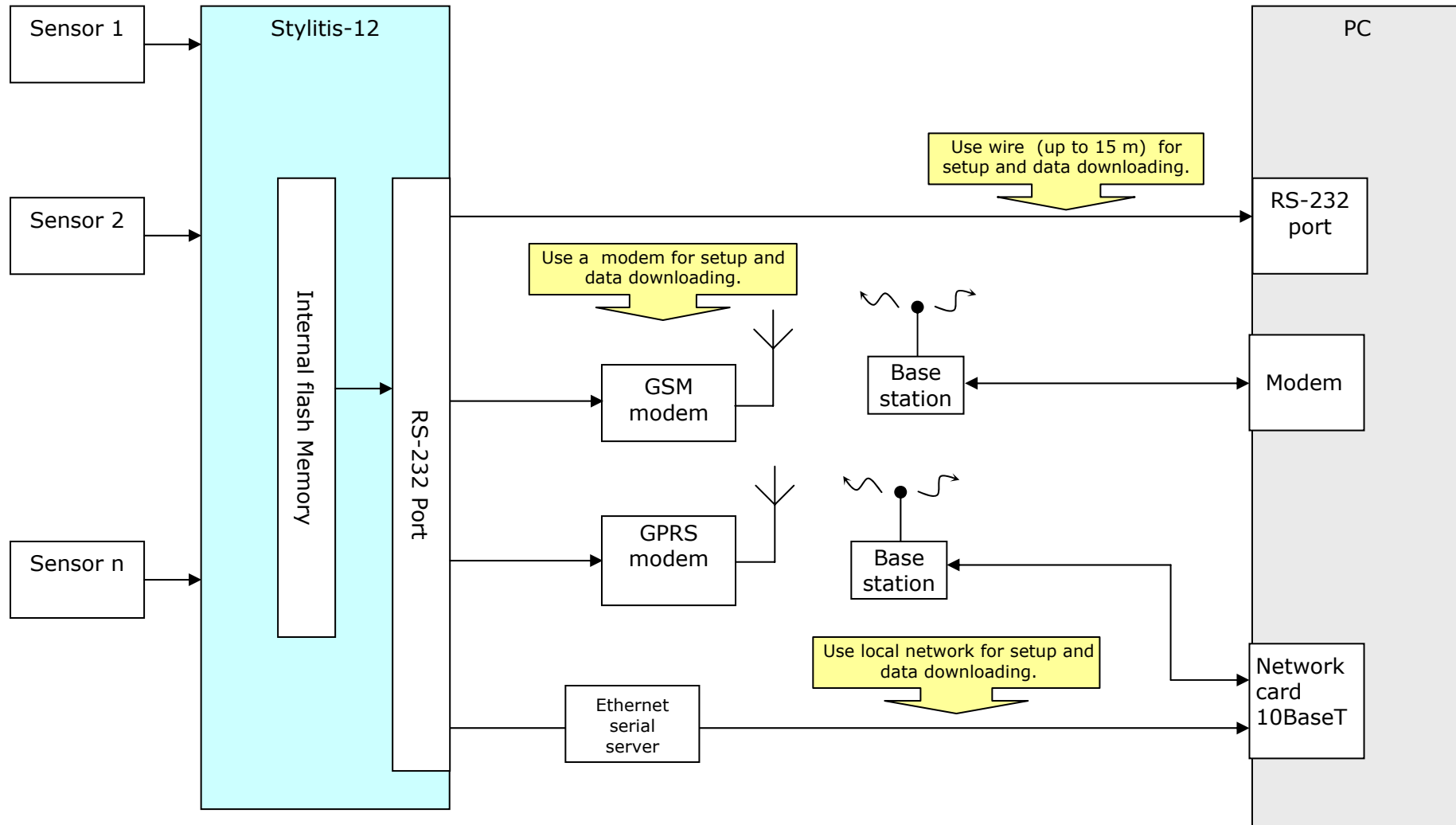


Fig. 2: Communication methods



2. OPERATION AND SAFETY

EXTERNAL DESCRIPTION.



3. USER INTERFACE

4. MEASUREMENTS

*Connection
Examples:
See Appendix A.*

Stylitis-10 is capable of directly measuring voltage, frequency and pulses.

With the proper sensors it can measure:

- ✓ Electrical energy measuring pulses
- ✓ Wind speed, wind direction. It connects with many types of anemometers and vane sensors.
- ✓ Rain height, water flow, water depth, etc
- ✓ Via MODBUS interface: AC voltage, current and power
- ✓ Via the SDi-12 interface: Solar radiation, humidity, temperature, pressure, etc.

The analog and counter sensors must output voltage (0~5V full-scale) or a frequency signal (0~5 kHz).

5. SENSOR SUPPLY OUTPUT

For 5V potentiometric vane excitation, use the Ch5 voltage output. This voltage is not accurate. This means that it can only be used for ratiometric sensors, i.e. sensors whose output is a ratio of their excitation voltage.

6. CHANNELS

A. CHANNELS 1~7

➤ DIGITAL OUTPUTS: CH1

This channel may be used as a digital programmable output, which is driven low (0) for user-programmable combinations of input channels' values. When low, the output can drive a small relay.

➤ ANALOG INPUTS: CH6

Stylitis-12 has an Analog to Digital Converter with 10 bit-resolution and 0~+5V input range.

There are 3 basic options for this input channel:

1. **NOT USED.** The channel is not stored.
2. **VOLTAGE INPUT.** A formula is applied to the measured value in order to convert it to appropriate physical units. Three user-programmable parameters, Slope2, Slope and Offset are applied to measured value x :
$$\text{Physical value} = \text{Slope} * x + \text{Offset}]$$
3. **VANE.** Measures wind direction from potentiometric sensors. The Voltage input 0V ~ 5V corresponds to 0~360 degrees, with resolution 2.8 degrees.
The vector averaging is needed for continuation from 360 deg. to 0 deg.
The offset (0~359 deg.) from north is user selectable.
E.g. if the vane alignment is 30° East the offset must be set 30, if the vane alignment is 30° West the offset must be set 330 (=360-30).

CAUTION

Do not apply
Voltage exceeding
the limit of (±20V
to system's Inputs

CAUTION

Do not apply
Voltage exceeding
the limit of ($\pm 20V$)
to system's Inputs

➤ BATTERY INPUT: CH7

There are 2 options for the Battery channel:

1. **NOT USED.** The channel is not stored.
2. **SLOPE/OFFSET.** A linear formula is applied to display battery voltage with an accuracy of $\pm 5\%$. The Slope & Offset parameters have fixed values.

➤ COUNTER INPUTS: CH1 ~ CH5

There are 5 counter input channels of 16-bit (0-65535 counts) each, channels 1 to 5.

There are 3 basic options:

1. **NOT USED.**
2. **FREQUENCY COUNTER.** A linear formula is applied. The input signal type is selectable; it can be a low voltage AC sinusoidal signal (SIN) or a pulsed positive signal (TTL). Only channel 1 can be selected as SIN. User programmable Slope2, Slope and Offset parameters are applied to the measured input frequency x :

$$\text{Physical value} = [\text{Slope} * x + \text{Offset}].$$

3. **EVENT COUNTER.** Counts-up the pulses during interval time period. The input signal type is selectable; it can be a low voltage AC sinusoidal signal (SIN) or a pulsed positive signal (TTL). Only channel 1 can be selected as SIN. User programmable Slope2, Slope and Offset parameters are applied to the measured number of pulses x :

$$\text{Physical value} = \text{Slope} * x + \text{Offset}].$$

ACCUMULATOR:

If the channel is selected as event counter, an accumulator is updated as following: At each recording interval, the events recorded by the channel are multiplied with the corresponding Slope and added to the corresponding accumulator. You can reset each accumulator via *Opton 4* software (see chapter [19.SOFTWARE](#)), via the '*Channel 1 Accumulator -> Reset*' and '*Channel 8 Accumulator -> Reset*' commands, from the '*Accumulator Status*' bar in the '*Home*' tab.

This function is useful for **measuring energy at a solar plant**.

Each channel can measure the **energy produced at an inverter's output**, by connecting an energy meter, which measures events, and by typing the appropriate Slope for the sensor. You can see the total energy produced in each channel's accumulator via *Opton 4*, with the *Get values from Logger* command, from the '*Accumulator Status*' bar in the '*Home*' tab. If you have a solar plant with **multiple inverters**, you may use both channels to perform a test for *the proper operation of your system*. The data logger can send you a *PV alarm SMS* if your system is malfunctioning. (see Chapter [18. MESSAGES \(SMS AND EMAIL\)](#)).

B. DIGITAL BUS CHANNELS (MODBUS RTU and SDI-12)

The data logger reads the specified registers for digital bus sensors, MODBUS RTU (RS-485) or SDI-12, register values once every statistical interval. The digital bus sensors (up to 22, channels 10~32) are connected to the terminal screws at the data logger lower part. The digital bus channels' parameters can be set via the *Opton* software, like the ones of the remaining channels. A digital channel may be selected as:

➤ MODBUS RTU

Only consecutive channels can be selected as MODBUS RTU, beginning from the first one (ch10). The parameters to be set are the following:

- *ADDRESS*. The sensor's address.
- *REGISTER*. The register values to be measured.

According to the measurement, this may be the first of the many consecutive register values which will be measured in the same channel.

- *REG. FORMAT*. The register values' format, eg 16-bit unsigned integers or 32-bit signed integers.
- *REG. TYPE*. The register values' type. They can be read from the sensor as they are, or with a certain scale, eg FIX1, if the value read must be multiplied with 0.1.
- *REG. ORDER*. The order of the bytes and words with which the values read appear. Besides the classic order Big Endian (high byte first, high word first), all combinations are available.
- *VALUES*. The number of the consecutive register values which will be measured in the same channel. This option has a meaning if these values concern similar measurements (eg if 3 voltages, of the 3 phases, are measured).

➤ SDI-12

Only consecutive channels can be selected as SDI-12, beginning from the first one after the MODBUS RTU channels (if any are selected). The parameters to be set are the following:

- *ADDRESS*. The sensor's address.
- *REGISTER*. The register value to be measured (the available values are 0~9). A value usually consists of many

measurements, even different ones (eg wind speed and direction).

- **VALUES.** The number of measurements of a register value which will be recorded in Stylitis-10's file, beginning from the first one.

➤ NOT USED

The remaining (last) channels, after the MODBUS RTU and the SDI-12 ones, that are not used, remain NOT USED.

7. PROGRAMMABLE DIGITAL OUTPUT

Channel CH1 may be programmed as digital output.

The output state can be either set manually HIGH or LOW or set to get its value automatically according to measured values of input channels:

For each individual output, up to 5 **conditions** may be defined.

The conditions are **ORed**, which means that it is enough to satisfy one or more conditions in order to drive the specified output Low (0).

Each condition contains one or more **requirements**. The requirements are **ANDed**, which means that all requirements in a condition must be satisfied to satisfy this condition. A requirement utilizes the measurement result of any specified input channel and compares it to user-programmed values using 4 operators: *Above*, *Below*, *Between* and *Not Between*.

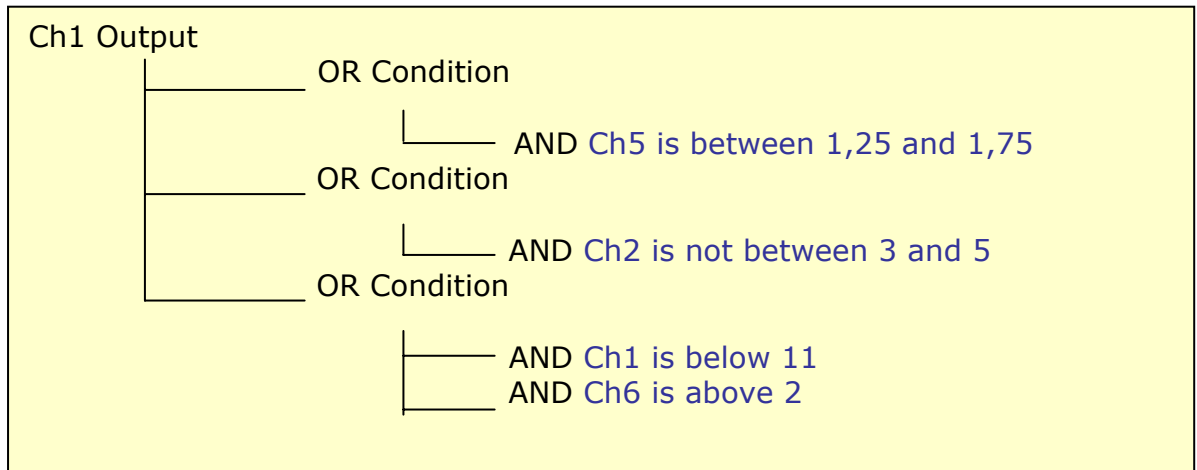
3-condition example:

1. Ch1 will be driven low whenever Ch5's value falls between 1.25 and 1.75.
2. Ch1 will be driven low whenever Ch2 falls outside the 3~5 zone.

3. Ch1 will also be driven low, if Ch1 is below 11 and, at the same time, Ch6 is above 2.

4.

Each of the 3 conditions can drive Ch8 low independently of the others. However, the requirements in the last condition must be satisfied simultaneously.



When the digital output is LOW, the switch closes and the channel is short-circuited to GROUND. In this state, it can drive a small relay.

8. DATA PROCESSING AND STORAGE

The statistical interval is user selectable from 1 second to 60 minutes. Inputs are measured per second and their values are placed in temporary storage.

Math processing is selectable: Average values only or Average, Minimum, Maximum and Standard Deviation (SDV) values.

At the end of the time interval, the values are calculated and stored simultaneously in the internal 4MB FLASH Memory.

NOTE: The *internal Flash* memory is **cyclic**, i.e. instead of getting full, it continues recording from the beginning, overwriting older files.

For security reasons, stored files have a time mark, which appears in every record and corresponds to the end of statistical interval time.

Stored data is organized in files, which are kept even without supply power. For enhanced data safety each individual record is marked with its own time stamp.

9. DATA RECORDING

During recording (acquisition on): no change of parameters is permitted.

- Upon selection of acquisition ON the following happen:

1. A new file is opened in the internal Flash memory.
2. Recording starts according to user set parameters.

- Upon selection of acquisition OFF the following happen:

1. Recording stops.
2. The file is closed.

Only when acquisition is off parameter change is permitted.

- When downloading the current file during recording:

1. The file is closed.
2. The download starts.
3. The recording is continued in a new file.

- File downloading does not disturb the recording process
- Default data download is from file currently open. Previous files can also be retrieved, as explained in the next chapter.

10. DATA RETRIEVAL

File downloading and memory erasure are done via serial commands (direct link, modem, etc.), using the accompanying Opton 4 software in the host PC (See [CHAPTER 19](#)).

Files downloaded to a PC are compressed to save memory space and speed up data transfer. The data are retrieved using the Opton 4 software. Data are decompressed to ASCII text files, suitable for further manipulation using available programs like Excel, etc.

Via the '*Download logger memory data*' from Opton 4's '*Home*' tab or from the '*Data logger*' bar of the '*Files*' tab, the following file downloading options appear:

The data you will download are recorded in the *internal Flash memory*. You may download:

1. The *most recent file*. The file is closed before it is downloaded, and a new file begins (see previous chapter).
2. One or more *older files*. You may type the **number** of a single file or a **range of files** (e.g. 1-4)

11. DATA SAFETY

Stored data in the internal FLASH memory are organized in files, which are kept even without supply power. Data files are individually accessible. Each record has its own time stamp.

12. PASSWORD

The user can activate a password to prevent logger usage by unauthorized personnel. A password may contain up to 8 alphanumeric characters and is set by the **NEW PASSWORD** command. Password protection is activated when the logger switches to Energy Save mode. Stylitis-10 becomes active after a button is pressed or a serial character is received. At this point the password is asked for. No further action can take place without first providing the correct password. Up to 4 attempts are allowed. After 4 contiguous wrong attempts the system locks up and further access is denied. Only SYMMETRON can unlock it using any serial communication method.

To deactivate the password supply an empty **NEW PASSWORD**.

13. COMMUNICATION SERIAL PORTS

DB9M socket:

- PIN 1 DCD
- PIN 2 Receive
- PIN 3 Transmit
- PIN 4 DTR
- PIN 5 Ground
- PIN 6 DSR
- PIN 7 RTS
- PIN 8 CTS

Communication settings: 9600 baud, 8 data bits, 1 stop bit, no parity bit.


The Opton software is used for communicating with the host PC. One RS-485 serial port and one SDI-12 serial port allow communication with slave sensors.

Stylitis-12 also comes with a RS-232 port for communication with a PC, Ethernet adapter or Modem. The RS-232 port is a DTE type, i.e. Stylitis-10 appears as a PC.

- A 'straight' type cable (DB9M male to DB9F female) is required for connection to an external modem or Ethernet adapter.
- **A 'null modem' cable (DB9F female to DB9F female) is required for connection to a PC.**

14. COMMUNICATION SETUP


The setup for each communication method is described in the next chapters and consists of 2 steps:


1. The first step sets up the data logger. Before you begin, connect the PC to the RS-232 serial port (see above). For modern PCs the connection can also be made via a USB to serial adapter. Από το Opton ανοίξτε ή δημιουργήστε έναν φάκελο Site για το συγκεκριμένο καταγραφικό. Click on the square red button  and select '*Local connection to the data logger*'. From the drop-down box select the COM port and click OK. Opton will open the port and search for the data logger.
2. The second step creates an Opton User Connection which is used to access the data logger.

15. ETHERNET COMMUNICATION


- Connect the PC as described in [CHAPTER 14.1.](#)
- Connect the external Symmetron Ethernet adapter to the power supply and the LAN cable to the RJ-45 socket. The yellow LED on the socket lights up if the connection. Do not connect the adapter to the PC yet.
- Wait 30-60 seconds for LAN recognition.

There are 3 communication methods:


1. ***Local connection inside your LAN.*** To communicate with a logger in your LAN:
 - SET UP THE DATA LOGGER.
 - From Option 4: Read the logger's communication setup (*'Read Communication Setup'* command from the *'Data logger online'* bar in the *'Setup'* tab) and select *'Communication Module: RS-232 or External Ethernet'* in the first line, and *'Ethernet Server operation'* in the second line (*REMOTE*). Select *'Write Setup'* to save the changes.
 - Disconnect the logger from the PC and connect it to the external Ethernet adapter. The connection requires a straight DB9M to DB9F cable.
 - CREATE A USER CONNECTION.
Click on the square red button. 
Select *'Local connection to the data logger'* and *'Select a data logger in Local Area Network'*.
From the drop-down box choose your data logger and click OK to connect.

2. ***Static IP internet connection, (via a static IP ADSL router), outside your PC's LAN.*** This means that your router has a static IP address and has been configured to forward all incoming calls on port 50001 to the logger's internal preset static IP address (NAT).
- SET UP THE DATA LOGGER.
 - From Option 4: Read the logger's communication setup ('*Read Communication Setup*' command from the '*Data logger online*' bar in the '*Setup*' tab) and select '*Communication Module: RS-232 or External Ethernet*' in the first line, and '*Ethernet Server operation*' in the second line (REMOTE). Select '*Write Setup*' to save the changes.
 - Disconnect the logger from the PC and connect it to the external Ethernet adapter. The connection requires a straight DB9M to DB9F cable.
 - CREATE A USER CONNECTION.
 - Click on the square red button. 
Select '*Remote connection to the data logger*' and '*Select a data logger in Local Area Network*'.
From the drop-down box choose your data logger and click OK to connect.
 - If the static IP you want does not appear in the drop-down box the select New Connection and click OK. In the next window, type the Router's static IP address and the IP port number (50001). Click OK to connect.
3. ***Via a dynamic IP internet connection (via Diameson server), outside your PC's LAN.*** You may connect to your logger from anywhere, even if it resides inside a LAN without static IP. For this connection method you must enter

the logger's *Serial Number and Password* (if used) in the Site Properties page.

- SET UP THE DATA LOGGER.
 - From Option 4: Read the logger's communication setup ('*Read Communication Setup*' command from the '*Data logger online*' bar in the '*Setup*' tab) and select '*Communication Module: RS-232 or External Ethernet*' in the first line. Click the second line (REMOTE) and select '*Ethernet Client operation*'.
 - Open the 'REMOTE' tree node, open the 'CLIENT' node, and type the static IP address of Diameson's server (62.38.244.17), along with the Diameson's Device Listening Port (default port number: 1023).
 - Select '*Write Setup*' to save the changes.
 - Disconnect the logger from the PC and connect it to the external Ethernet adapter. The connection requires a straight DB9M to DB9F cable.
- CREATE A USER CONNECTION.
 - Click on the square red button.  Select '*Remote connection to the data logger*' and '*Diameson connection*'. From the drop-down box ('*Diameson: Select server and User*') choose your connection and click OK to connect.
 - If the connection you want does not appear in the drop-down box, then select New Connection and click OK. In the next window, type the Diameson server IP address (default: '*1.diameson.net*') the User IP port number (default: 8100) and the User name assigned to you. Click OK to connect.

16. EXTERNAL GSM/GPRS MODEM: GSM DATA CALLS

- Two modems are required: one for the data logger and one for the PC. You may use any GSM modems.
- Connect the PC as described in [CHAPTER 14.1](#). Do not connect the modem to the PC yet.
- SET UP THE DATA LOGGER.
 - From Option 4: Read the logger's communication setup (*'Read Communication Setup'* command from the *'Data logger online'* bar in the *'Setup'* tab) and select *'Communication Module: RS-232 or External GSM/GPRS modem'* in the first line, and *'GSM (data) operation'* in the second line (REMOTE). Select *'Write Setup'* to save the changes.
 - Disconnect the logger from the PC and connect it to the external Ethernet adapter. The connection requires a straight DB9M to DB9F cable.
- SET UP THE MODEM.
 - Disconnect the modem power supply.
 - Unlock the data SIM card using any available cell phone before you put it in the logger. Push the SIM card in the modem socket until locked.
 - Connect the modem power supply. The modem indicator LED has 3 states: Flashing quickly – Searching for Network; Flashing slowly – registered on the network (idle); Continuously ON – connected in *data mode* (see next step).
 - By default, the modem is in *data mode*, i.e. waiting for answering a GSM data call. Wait until the modem indicator is flashing slowly (registered).
- CREATE A USER CONNECTION.
 - Click on the square red button. 

Select '*Remote connection to the data logger*' and '*Data connection*'.

In the next window select the PC modem COM port, type the SIM Data Call number and click OK to connect.

17. INTERNAL GSM/GPRS MODEM: GPRS CONNECTIONS

Besides the remote GSM Data connection, there is also the capability to communicate via a GPRS connection, which is charged according to the data volume, instead of the call time duration.

It is necessary to use the Symmetron external GSM/GPRS modem.

- Connect the PC as described in [CHAPTER 14.1.](#)
- Do not connect the modem to the PC yet.

There are two types of GPRS connections:


1. GPRS Client, via a dynamic IP SIM card

The first connection type is achieved via the *Diameson Gateway*, a software server, which accepts the data logger as a *client*. Diameson is provided as a service by Symmetron Company but is available for purchase.

The benefit of this method is that you can use a plain low-cost *dynamic IP* GPRS SIM card. To be able to access the Diameson server, the data logger must be registered in the Diameson database. Ask Symmetron Support for preparing your Diameson account.

For this connection method you must enter the logger's *Serial Number and Password* (if used) in the Site Properties page.


- SET UP THE DATA LOGGER.

- From Option 4: Read the logger's communication setup (*'Read Communication Setup'* command from the *'Data logger online'* bar in the *'Setup'* tab) and select *'Communication Module: RS-232 or GSM/GPRS modem'* in the first line. Click the second line (REMOTE) and select *'GPRS Client operation'*.
 - Open the *'REMOTE'* tree node, open the *'NETWORK'* node and type the settings of the SIM Card's provider (APN, USERNAME, PASSWORD).
 - Open the *'CLIENT'* node, and type the static IP address of Diameson server (62.38.244.17), along with the Diameson Device Listening Port (default port number: 1023).
 - Disconnect the logger from the PC and connect it to the external modem. The connection requires a straight DB9M to DB9F cable.
 - The data logger will try to connect to Diameson within the next minute.
- CREATE A USER CONNECTION.
 - Click on the square red button. 

Select *'Remote connection to the data logger'* and *'Diameson connection'*. From the drop-down box (*'Diameson: Select server and User'*) choose your connection and click OK to connect.
 - If the connection you want does not appear in the drop-down box, then select New Connection and click OK. In the next window, type the Diameson server IP address (default: *'1.diameson.net'*) the User IP port number (default: 8100) and the User name assigned to you. Click OK to connect.

2. GPRS Server, via a static IP SIM card.

The second method for a GPRS connection is for the data logger itself to have the role of the *server* (therefore you do not need Diameson). For this method you must use a *static IP* GPRS SIM card.

- SET UP THE DATA LOGGER.
 - From Option 4: Read the logger's communication setup ('*Read Communication Setup*' command from the '*Data logger online*' bar in the '*Setup*' tab) and select '*Communication Module: RS-232 or GSM/GPRS modem*' in the first line. Click the second line (REMOTE) and select '*GPRS Server operation*'.
 - Open the 'REMOTE' tree node, open the 'NETWORK' node and type the settings of the SIM Card's provider (APN, USERNAME, PASSWORD).
 - In the 'SERVER' node type the IP PORT, which may be any valid IP port (for example, 1023).
 - Disconnect the logger from the PC and connect it to the external modem. The connection requires a straight DB9M to DB9F cable.
 - The data logger will try to connect to Diameson within the next minute. If it succeeds, you may connect (via any computer with internet access) as a *client* to the data logger's server. Only one client may be connected at a time.
- CREATE A USER CONNECTION.
 - Click on the square red button.  Select '*Remote connection to the data logger*' and '*Ethernet connection*'. From the drop-down box ('*Select Device IP and Port*') choose your connection and click OK to connect.
 - If the static IP you want does not appear in the drop-down box, then select New Connection and click OK. In the next

window, type the SIM card static IP number and the IP port number you have chosen in the previous step.

- Click OK to connect.

NOTE: When you disconnect from the logger, not only the client (PC) is disconnected, but the data logger's server as well.

Therefore, you need to wait at least a minute, until it is registered again in the network.

18. MESSAGES (SMS AND EMAIL)

The data logger can send SMS and Emails messages and update the *Captum* database in the web, via the optional *GSM/GPRS* modem or the optional *Ethernet* adapter, according to your selections in Opton 4's Communication Setup. Specifically:

1. If you are using a *GSM/GPRS* modem or *Ethernet* adapter, you can receive *Emails*, and specifically one Email every midnight, with the data file recorded during the same day. (Actually, the files downloaded, begin from file 1, the next day file 2 will be downloaded, etc, regardless if it is the recent file or the current day's file.) The settings needed to receive emails are: Open the EMAIL node, in order to set the email parameters. Type the sender and recipient you wish, along with the smtp mailserver of the SIM card's provider, in the 'SERVER' field. If the provider requires authentication, like Cosmote in Greece, you must open the 'SERVER' node and also fill the 'AUTH USER' and 'AUTH PWD' fields, while the email's **sender** must be also a specific one. You also need authentication if you are using the mail server of the internet connection you are using: Type your email account's user name, as the Authentication User Name and as the Sender and your email account's password, as the

Authentication Password. All these parameters, for the 3 main providers in Greece, are summarized in the table of [APPENDIX C](#). Moreover, only if you are using the *GSM/GPRS* modem, open the 'REMOTE' node and then the 'NETWORK' node and type the 'APN', 'USERNAME' and 'PASSWORD' of your SIM card's provider.

2. If you are using the *GSM/GPRS* modem and you have set the logger to act as a *GPRS Server* (see Part 2 of [CHAPTER 17](#)) or to receive *GSM data calls* (see [CHAPTER 16](#)), besides the daily email, it can also send the following SMS messages, which you can enable by opening the 'SMS' node (in the 'NUMBER' field, type the mobile phone number which you wish to receive them):
 - i. *SMS output alarm messages*. With this option, when a control output changes to low (when the conditions are satisfied), you receive an SMS as an alarm. It must be noted that you will not receive another alarm (SMS or PV-see below) for an hour since the previous one.
 - ii. *SMS data message per interval*. With this option, you receive an SMS with the data values at the end of the statistic interval.
 - iii. *SMS Avg data message at midnight*. With this option, you receive an SMS every midnight, with the average of the data recorded during the entire day.
NOTE: You may also receive this message at 'GPRS Client Energy Save' mode (see NOTE of [CHAPTER 17](#)'s Part 1)
3. If you are using the *GSM/GPRS* modem and you have set the logger to act as a *GPRS Client* (see Part 1 of [CHAPTER 17](#)) or in 'GPRS Client Energy Save' mode (see NOTE of [CHAPTER 17](#)'s part 1) or the Ethernet adapter and you have set the logger to act as an *Ethernet Client* via a *dynamic IP*

internet connection (see [CHAPTER 15](#)), besides the daily email, it can send the same messages as in the previous case, if you activate them by opening the 'CAPTUM' node. In this case, instead of sending SMSs, the logger will update a web database, *Captum*. However, the *Daily SMS at midnight* can still be sent as an SMS, in case of the *GSM/GPRS* modem. Moreover, the messages will be sent to one or more email accounts which are defined in Captum. You will access your Captum data (data and alarms) and you will be able to view plots and statistics per hour, per day and per month. You will access your account, simply via a web browser, via your Captum user name, and the data logger's Serial Number and Password (for safety reasons, it is mandatory).

4. If you are using the Ethernet adapter and you have set the logger to act as an *Ethernet Server* via a *static IP internet connection* (see [CHAPTER 15](#)), you will be able to receive only the data email.

19. OPTON 4 SOFTWARE

Install Opton 4 from the accompanying CD or download it from the Symmetron site. Software upgrades are free to download.

Following the first installation, go to the '*Sites*' bar in the center of the '*Start*' tab and click SHOW ALL. The '*Sites*' tab will open. In the '*Site Folder*' bar on the left, select '+ *New Site Folder*' and choose a Windows folder to use as data storage for this specific data logger. If you use several data loggers it is recommended to repeat this procedure choosing a separate folder for each one of them.

To work with the site folder you wish, select it with a double click from the tree structure on the center part of the '*Sites*' tab. The site will open in a separate tab, which has the site's name.

SERIAL (RS-232) CONNECTION AND OTHER CONNECTIONS

In the next step, determine how the PC will get connected to the data logger. See [CHAPTER 14](#).

You may create as many connections as you wish in a specific site folder. For other connection types, see the corresponding chapter: For an **Ethernet** connection, either via a *dynamic IP* or a *static IP internet connection*, see [CHAPTER 15](#). For a **GPRS** connection, either via a *dynamic IP* or a *static IP SIM card*, see [CHAPTER 17](#). For a **GSM** data call connection, see [CHAPTER 16](#).

After connecting, you may exercise some of the Opton 4 commands, like '*Get Status from Logger*', in the '*Home*' tab, in the '*Status*' bar or '*Read Input Data*' in the '*Real Time*' tab, etc.

To change logger channel settings, go to the '*Setup*' tab and select '*Read Inputs Setup*'. Then change settings in the tree structure and click *Write Setup*. The same applies for the '*Read Communication Setup*' command. (see [CHAPTERS 15-18](#) for

communication options). The settings can be changed only when data recording is stopped (Acquisition Off). Select Acquisition On to start recording.

To get stored data, select '*Download logger memory data*' either from the center part of the '*Home*' tab or from the '*Data logger online*' bar of the '*Files*' tab. To avoid missing data you can download files while *Acquisition On*. For downloading options, see [CHAPTER 11](#).

If you want to automate data downloading, check the *Enable Scheduled Automatic Connection* box in the connection's properties and set the download time. In the *Automatic* tab select the action for each weekday. The automatic downloading is possible only after downloading and installing the **AutoConnect** software.

20. TECHNICAL CHARACTERISTICS

All accuracies stated are the **mean of 5 measurements**.

1 COUNTER INPUT (CH1), 16 bit.

- Resolution: ± 0.2 count (Hz). Accuracy: ± 0.2 count.
- Input Frequency range: 0~5 kHz.
- Input resistance: 100 k Ω . Sensitivity bipolar AC: 80 mVp-p, Unipolar TTL 1 Vp-p.
- Channel may be programmed as active-low (open-drain) output, i.e. as a switch with one end grounded. Output resistance 30 Ohms, maximum sink current 60 mA.
- Maximum external DC Voltage at connector: ± 20 V.

4 COUNTER INPUTS (CH2~5), 16 bit.

- Resolution: ± 0.2 count (Hz). Accuracy: ± 0.2 count.
- Input Frequency range: 0~5 kHz.
- Input resistance: 100 k Ω . Sensitivity: 3 Unipolar TTL Vp-p.
- Maximum external DC Voltage at connector: ± 20 V.

1 ANALOG INPUT (CH6).

- 10 bit unipolar 0~2.5V
- Accuracy $\pm 0.7\%$. Input resistance: 100 k Ω .
- Maximum external DC Voltage at connector: ± 20 V.

BATTERY VOLTAGE (CH7)

- The power supply voltage is measured.
- Resolution: 0.1 V. Accuracy: $\pm 5\%$.

MODBUS RTU PORT

Up to 22 MODBUS nodes, up to 250 word values.

SDI-12 PORT

Up to 22 SDI-12 nodes, up to 500 characters.

PROTECTION

All inputs and outputs are protected from over voltage by quick acting diodes.

SENSOR EXAMPLES

Switches, anemometers, potentiometric vanes, rain gauges, water flow, pulse meter, etc.

DATA STORAGE

INTERNAL FLASH MEMORY: size 4MB. Typical duration for storing averages for all channels, every 10 min, is about 36 months.

DATA PROCESSING

For each channel, Slope and Offset are independently programmable. Sampling: 1 Hz. Calculation and storage of $ax+b$. Selectable storage of Average only or Average, Min, Max and Standard Deviation values at selectable intervals: from 1 second to 60 minutes. In case of 1 sec interval, all samples are recorded (time series).

Dedicated wind vane algorithm for vector averaging.

Real-time clock with automatic correction of leap years.

Accuracy: ± 1 minute per month.

SERIAL PORTS

- *PROGRAMMING AND DOWNLOADING: 1 RS-232C port, 9600 baud, 8 bits, no parity, 1 stop bit. Connector DB9M (DTE). Support for direct connection with PC, modems (PSTN or GSM) and Ethernet adapters.*
- *MODBUS RTU Master for sensor connection: 1 RS-485 port. 9600 baud, 8 bits, no parity, 1 stop bit. Screw terminal connection.*
- *SDI-12 Master for sensor connection: 1 SDI-12 port, v1.3., 1200 baud, 7 bits, even parity, 1 stop bit. Screw terminal connection.*

POWER SUPPLY

EXTERNAL: 6~15V, DC/AC

CURRENT CONSUMPTION (Typical): 4.5 mA

Maximum permitted External Supply Voltage: 18V

Real-time clock operating time without any power source: 1 year

MISCELLANEOUS

BOX: small, portable

DIMENSIONS: 180x100x40mm

- *WIDTH: 53,30mm (3 στοιχεία DIN)*
- *HEIGHT: 90,20mm*
- *DEPTH: 57,50mm*

WEIGHT: 200g.

SCREW TERMINALS: 9.

OPERATIONAL/STORAGE TEMPERATURES: -30°C~ +70°C

WARRANTY: 2 years

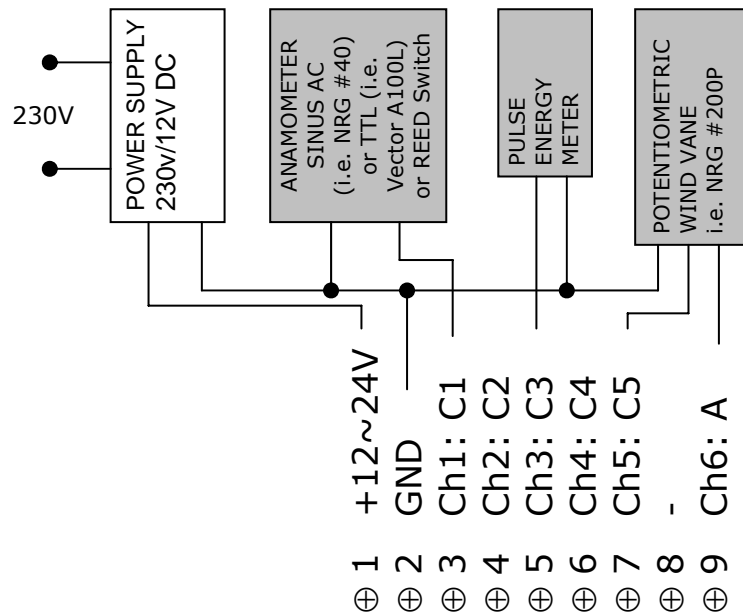
OPTIONAL:

External GSM/GPRS modem.

External Ethernet adapter.

EXAMPLES

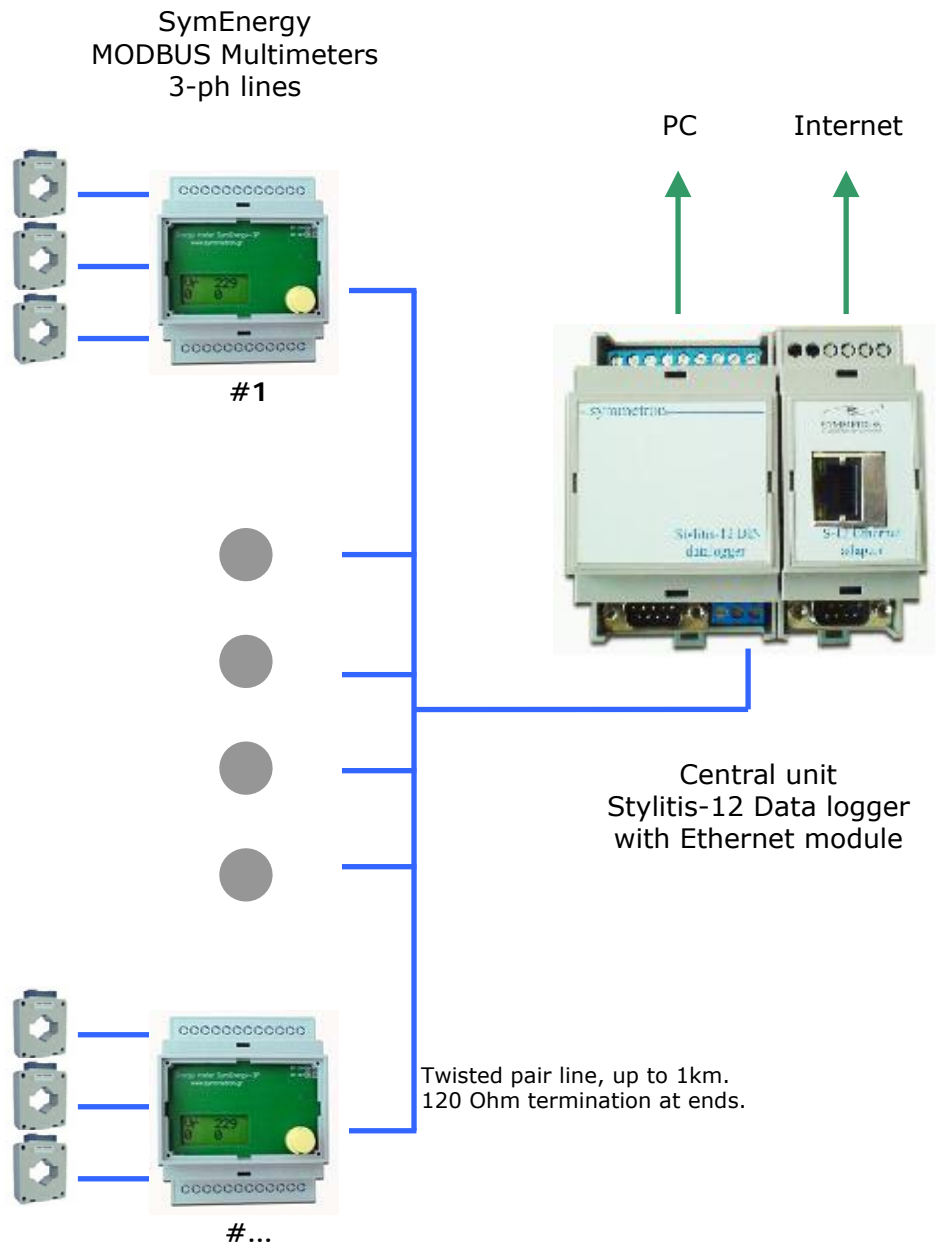
• COUNTER AND ANALOG SENSORS



⇒ Πρίζα RS-232

⊕ 10 RS-485 B-
⊕ 11 RS-485 A+
⊕ 12 SDI-12

- **MODBUS SENSORS**
- **The data logger operates as a concentrator from several sensors.**



Electricity metering diagram based on Stylitis-12 data logger.
Energy, Power, Voltage, Current, Power factor, etc.
Results in statistical intervals from 1 minute to 1 hour.
Measurements available in Internet database.

LEGEND:

Green: Remote communication
Blue: Wired MODBUS link

All commands or queries must be in CAPITAL and terminated with <CR>+<LF>. The characters are NOT echoed back. If you are using the Windows HyperTerminal utility you can set it to echo back characters.

By default Password is disabled. If enabled, this command must be the first to access Stylitis-10 remotely. If not Stylitis-10 will respond: "ENTER PASSWORD"+<CR>+<LF> to any question or command.

Host Question		Action & response	Response end
*ACQ?	√	ACQ ON, ACQ OFF	<CR>+<LF> + OK+<CR>+<LF> Or ERROR+<CR>+<LF>
*AUX?	√	AUX=2 : EXTERNAL GPRS server AUX=4 : EXTERNAL GPRS, client AUX=5 : EXTERNAL Ethernet, client AUX=6 : RS-232 or EXTERNAL GSM/Ethernet AUX=7 : EXTERNAL Ethernet, server	
*INi? (i=1...7)	√	Input I value, e.g. IN1=3.5 (9:bat)	
*INALL?	√	All input values in ascii form separated by <CR>,<LF>	
*INTERVAL?	√	Gives averaging interval in min, e.g. INTERVAL=10	
*SITE?	√	SITE=xxxxxxx (up to 8 chars)	
*BAT?	√	Battery voltage.	
*DIGOUTi?	√	Digital output value	
*DIGOUTiCOND?	√	Returns 5 masks(dw) & conditions(dw) in binary form (40Bytes total)	
*DIGOUTLEVS?	√	Returns Low comparison Level(w) & High comparison Level(w) for the 7 channels in binary form (36Bytes total)	
*TIME?	√	e.g. 18/11/15 10:50:00	
*FREEMEM?	√	----- Bytes free for ----- hours, etc.	
*INiSLOPE?	√	e.g. IN1SLOPE=0.77	
*INiOFFSET?	√	e.g. IN1OFFSET=-0.2	
*INiTYPE?	√	S/T(for ch1), T(for ch2-4) V(for ch6)	
*INiMODE?	√	C/E /N(ch1-5) , A/V/ I/O/N (ch6) , B/N(ch7)	
*INTYPES?	√	A series of input types, e.g STTTTV	
*INMODES?	√	A series of input modes, e.g CEEEEA	
*MINMAX?	√	MINMAX=ON/OFF. Enables Minimum & Maximum storage	
*NAMEi?	√	Returns channel's(i) name (up to 16 chars)	
*VERSION?	√	Returns f/w version	
*SERNO?	√	Returns SERIAL NUMBER (up to 8 chars)	
*SMSNUM?	√	Phone number to send data message per interval	
*SMSSEL?	√	SMSSEL=0: Daily Email/SMS and Interval SMS OFF SMSSEL=1: Interval SMS/ Captum update per interval ON SMSSEL=2: Daily Email ON SMSSEL=4: Daily SMS ON	
*SMSALSEL?	√	SMSALSEL=0: SMS/PV Alarms=OFF SMSALSEL=1: SMS Alarms/ Captum Email Alarms ON SMSALSEL=2: PV Alarms/ Captum Email PV Alarms ON SMSALSEL=3: SMS/ Captum Email Alarms+PV Alarms ON	

*SERVERIP?	√	IP Address of the host PC, in which Diameson Gateway is running.	
*SERVERPORT?	√	Remote IP port of the host PC, in which Diameson Gateway is running.	
*APN?	√	APN of the SIM Card's provider (needed for GPRS Connections and to send daily Emails)	
*NETID?	√	GPRS User Name of the SIM Card's provider (needed for GPRS Connections and to send daily Emails)	
*NETPW?	√	GPRS Password of the SIM Card's provider (needed for GPRS Connections and to send daily Emails)	
*EMV?	√	SMTP Email Server (needed to send daily Emails)	
*EMS?	√	Sender of the email (needed to send daily Emails)	
*EMR?	√	Recipient of the email (needed to send daily Emails)	
*EMUN?	√	Email Authentication User Name (needed to send daily Emails, in case Authentication is required by the SIM Card's provider)	
*EMPW?	√	Email Authentication Password (needed to send daily Emails, in case Authentication is required by the SIM Card's provider)	
*ACC _i ? (i=1...5)	√	Displays total energy recorded, in Channel i Accumulator (in case it is set as EVENT COUNTER)	

<u>Host Command</u>		<u>Action & response with OK,<CR>,<LF> Or ERROR,<CR>,<LF></u>
*ACQ=ON, *ACQ=OFF	√	ON: Write new file header in flash memory. Set ACQ on flag. OFF: Clear ACQ on flag, do not store in flash anymore.
*AUX=XX	√	AUX=2 : EXTERNAL GPRS server AUX=4 : EXTERNAL GPRS, client AUX=5 : EXTERNAL Ethernet, client AUX=6 : RS-232 or EXTERNAL GSM/Ethernet AUX=7 : EXTERNAL Ethernet, server
*CONT	√	Set CONTINUOUS mode
*DIGOUTi=1 or 0 or AUTO	√	Set a value to a Digital output The output state can be either set manually 1 or 0 or set to get its value automatically according to measured values of input channels.
*DIGOUTiCOND=...	√	Sends 5 masks (dw) & conditions (dw) in binary form (40Bytes total)
*DIGOUTLEVS=...	√	Sends Low comparison Level(w) & High comparison Level(w) for the 9 channels in binary form (36Bytes total)
*DOWNLOAD=n	√	Download File #n
*DOWNLOADF	√	Download current File
*ENERGYSAVE	√	Set Energy Save mode
*ERASEFLASH	√	Erase Flash Memory
*EXIT	√	Exit communication after entering with password
*INTERVAL=...	√	Set new averaging interval in min (1,2,5,10,15,30,60)
*INTERValsec=...	√	Set new averaging interval in sec (0-59)
*NEWPASSWORD=...	√	Give a new password (up to 8 characters or nothing to deselect)
*NAMEi=	√	Give a name to channel i (up to 16 chars)
*INiSLOPE=.....	√	Set appropriate input cal slope in EEPROM table. Default 1.0
*INiOFFSET=.....	√	Set appropriate input offset in EEPROM table
*MINMAX=...	√	ON: Enables Min & Max storage. OFF: Disables Min & Max storage (from v2.59).
<ul style="list-style-type: none"> INiTYPE=S/T (for ch1) T (for ch2-5) V (for ch6) 	√	Set appropriate input type in EEPROM table S: sinus input T: TTL input V: voltage input analog or digital
*INiMODE=A/V/T I/O C/E N	√	Set appropriate input mode in EEPROM table A for analog slope/offset (Channel 6 only) V for vane analog (Channel 6 only) I for digital input (Channel 6 only) O for digital output (Channel 1 only) C for counter (Channels 1-5 only) E for events (Channels 1-5 only) N for not used B only for ch7 :battery
*PASSWORD=....	√	Give password to start communication (up to 8 characters or nothing if not selected)
*SITE=.....	√	Set new Site name (up to 8 characters)
*SEROUT=....		Set a value to a Serial Port output
*TIME=dd/mm/yy, hh:mm:ss	√	Update real timer
*SMSNUM=.....	√	Set Phone number to send data message per interval (up to 20 characters)
*SMSSEL=X	√	SMSSEL=0: Daily Email/SMS and Interval SMS OFF SMSSEL=1: Interval SMS/ Captum update per interval ON SMSSEL=2: Daily Email ON SMSSEL=4: Daily SMS ON
*SMSALSEL=X	√	SMSALSEL=0: SMS/PV Alarms=OFF SMSALSEL=1: SMS Alarms/ Captum Email Alarms ON SMSALSEL=2: PV Alarms/ Captum Email PV Alarms ON SMSALSEL=3: SMS/ Captum Email Alarms+PV Alarms ON

*SERVERIP=XXX.XXX.XXX.XXX	√	Set the IP Address of the host PC, in which Diameson Gateway is running.
*SERVERPORT=...	√	Set the Remote IP port of the host PC, in which Diameson Gateway is running.
*APN=...	√	Set the APN of the SIM Card's provider (needed for GPRS Connections and to send daily Emails)
*NETID=...	√	Set the GPRS User Name of the SIM Card's provider (needed for GPRS Connections and to send daily Emails)
*NETPW=...	√	Set the GPRS Password of the SIM Card's provider (needed for GPRS Connections and to send daily Emails)
*EMV=...	√	Set the SMTP Email Server (needed to send daily Emails)
*EMS=...	√	Set the Sender of the email (needed to send daily Emails)
*EMR=...	√	Set the Recipient of the email (needed to send daily Emails)
*EMUN=...	√	Set the Email Authentication User Name (needed to send daily Emails, in case Authentication is required by the SIM Card's provider. Otherwise, leave it blank)
*EMPW=...	√	Set the Email Authentication Password (needed to send daily Emails, in case Authentication is required by the SIM Card's provider. Otherwise, leave it blank)
*DISPWR=ON/OFF	√	Activate/deactivate display of daily and total energy from the Viking 25 wind turbine (from Ch1, in case it is set as FREQUENCY COUNTER)
*CLPWR	√	Reset/clear recorded daily and total energy from the Viking 25 wind turbine (from Ch1, in case it is set as FREQUENCY COUNTER)
*SERVPW=XXXXXX	√	Set the service code needed to deactivate digital outputs and alarms. Receives exactly 6 digits <u>only</u> 1-4.
*ACCi=0 (i=1...5)	√	Reset/clear total energy recorded, in Channel i Accumulator (in case it is set as EVENT COUNTER)
*SERVOFF	√	Exits Service mode (if datalogger is in service mode)

APPENDIX C GPRS PARAMETERS FOR PROVIDERS IN GREECE

Parameter	Command	Vodafone	Wind	Cosmote
<i>APN</i>	*APN=	internet	gint.b-online.gr	internet
<i>GPRS User Name</i>	*NETID=	user	N.R.*	N.R.*
<i>GPRS Password</i>	*NETPW=	pass	N.R.*	N.R.*
<i>Mail Server</i>	*EMV=	mailgprs.vodafone.gr	smtp.windnet.gr	mail.mycosmos.gr
<i>Sender</i>	*EMS=	ANY@ [domain name]***	ANY@ [domain name]***	[Sim Card Number] @mycosmos.gr**
<i>Recipient</i>	*EMR=	ANY***	ANY***	ANY***
<i>Email Authentication User Name</i>	*EMUN=	N.R.*	N.R.*	[Sim Card Number] @mycosmos.gr (After activation)**
<i>Email Authentication Password</i>	*EMPW=	N.R.*	N.R.*	After activation**

TABLE NOTES

*Not Required. Therefore, whatever value you have inserted will not be taken into account.

**If you are sending emails via a COSMOTE SIM Card, you have to activate your email account, even if you do not wish to receive emails via this SIM Card. You must put the Card in a Cellphone and send 'OPEN' or the Greek letter 'E' via SMS to the number '54000'. Then, you will be given the account's Password. The Sender must always consist of the SIM Card's number. The 'Email User Name', by default, is the same, but you can change it, via Outlook, to the form "anyone@mycosmos.gr". Otherwise, leave the authentication User Name and Password blank (*EMUN= <ENTER>, *EMPW=<ENTER>)

*** Except for Cosmote, as the Sender, you can type anyone (even a not valid one), provided that it has a valid domain name. As recipient, you can type any valid recipient you wish.

****The Settings above apply for networks in Greece.