

• 15G0851Q1 •  
**DATA LOGGER**  
ES851

# **BASIC – ADVANCED USER MANUAL**

## **-Programming Instructions-**

Issued on 23/01/09  
R. 02  
Ver. 1.67x

*English*

- This manual is integrant and essential to the product. Carefully read the instructions contained herein as they provide important hints for use and maintenance safety.
- This device is to be used only for the purposes it has been designed to. Other uses should be considered improper and dangerous. The manufacturer is not responsible for possible damages caused by improper, erroneous and irrational uses.
- **Elettronica Santerno is responsible for the device in its original setting.**
- Any changes to the structure or operating cycle of the device must be performed or authorized by the Engineering Department of Elettronica Santerno.
- Elettronica Santerno assumes no responsibility for the consequences resulting by the use of non-original spare-parts.
- Elettronica Santerno reserves the right to make any technical changes to this manual and to the device without prior notice. If printing errors or similar are detected, the corrections will be included in the new releases of the manual.
- Elettronica Santerno is responsible for the information contained in the original version of the Italian manual.
- The information contained herein is the property of Elettronica Santerno and cannot be reproduced. Elettronica Santerno enforces its rights on the drawings and catalogues according to the law.



Elettronica Santerno S.p.A.  
Strada Statale Selice, 47 – 40026 Imola (BO) Italy  
Tel. +39 0542 489711 - Fax +39 0542 489722  
[www.elettronicasanterno.com](http://www.elettronicasanterno.com) [sales@elettronicasanterno.it](mailto:sales@elettronicasanterno.it)

## 0. TABLE OF CONTENTS

### 0.1. Chapters

|            |                                                    |           |
|------------|----------------------------------------------------|-----------|
| <b>0.</b>  | <b>TABLE OF CONTENTS .....</b>                     | <b>2</b>  |
| 0.1.       | Chapters .....                                     | 2         |
| 0.2.       | Figures .....                                      | 2         |
| 0.3.       | Tables .....                                       | 3         |
| <b>1.</b>  | <b>OVERVIEW .....</b>                              | <b>4</b>  |
| 1.1.       | Main Features .....                                | 4         |
| 1.2.       | How to Use this Manual .....                       | 4         |
| <b>2.</b>  | <b>FIRST STARTUP .....</b>                         | <b>5</b>  |
| 2.1.       | Connections .....                                  | 5         |
| 2.1.1.     | Connection to the Link Service.....                | 6         |
| 2.1.2.     | LAN Connection .....                               | 6         |
| 2.1.3.     | Connection via GSM Modem or Analog Modem .....     | 7         |
| 2.2.       | ES851 Status Display.....                          | 7         |
| 2.3.       | Setting the Routing Table .....                    | 7         |
| 2.4.       | Programming the LOGGING Function .....             | 7         |
| 2.5.       | Parameter Save.....                                | 8         |
| <b>3.</b>  | <b>MENU LIST .....</b>                             | <b>9</b>  |
| 3.1.       | Menus and Submenus .....                           | 10        |
| 3.1.1.     | Synoptic Table for M Measures.....                 | 10        |
| 3.1.2.     | Synoptic Table for P, R, I, C Parameters .....     | 10        |
| 3.2.       | List of the BASIC Measures and Parameters .....    | 12        |
| 3.3.       | List of the ADVANCED Measures and Parameters ..... | 14        |
| <b>4.</b>  | <b>DATA LOGGER MENU .....</b>                      | <b>16</b> |
| <b>5.</b>  | <b>DATA LOGGING CONSOLE MENU .....</b>             | <b>20</b> |
| <b>6.</b>  | <b>SCAN DEVICE 11-40 MENU .....</b>                | <b>29</b> |
| <b>7.</b>  | <b>UPLOAD CONSOLE MENU .....</b>                   | <b>33</b> |
| <b>8.</b>  | <b>LOG MONITOR MENU .....</b>                      | <b>34</b> |
| <b>9.</b>  | <b>EVENT MONITOR MENU .....</b>                    | <b>37</b> |
| <b>10.</b> | <b>MODBUS CONFIGURATION MENU .....</b>             | <b>40</b> |
| <b>11.</b> | <b>CONNECTION CONFIGURATION MENU .....</b>         | <b>41</b> |
| <b>12.</b> | <b>TCP/IP PROXY CONFIGURATION MENU.....</b>        | <b>45</b> |
| <b>13.</b> | <b>REAL TIME DATA MENU.....</b>                    | <b>46</b> |
| <b>14.</b> | <b>MODEM CONFIGURATION AND STATUS MENU .....</b>   | <b>47</b> |
| <b>15.</b> | <b>SMS MENU .....</b>                              | <b>48</b> |
| <b>16.</b> | <b>CLOCK/CALENDAR MENU.....</b>                    | <b>50</b> |
| <b>17.</b> | <b>ROUTING TABLE → ZONE MENU .....</b>             | <b>55</b> |
| <b>18.</b> | <b>ROUTING TABLE 1-10 MENU.....</b>                | <b>57</b> |
| <b>19.</b> | <b>DOWNLOAD CONSOLE MENU .....</b>                 | <b>59</b> |
| <b>20.</b> | <b>APPENDIX .....</b>                              | <b>60</b> |
| 20.1.      | Sunway TG (ST).....                                | 60        |
| 20.2.      | Sunway M XR (SM) .....                             | 61        |
| 20.3.      | Smart String Box (QF).....                         | 62        |
| 20.4.      | Penta Drive (PD).....                              | 63        |
| 20.5.      | Multipump Penta (PM) .....                         | 64        |
| 20.6.      | Regenerative Penta (PR) .....                      | 65        |
| 20.7.      | String Box (QS) .....                              | 66        |

### 0.2. Figures

|           |                                                              |    |
|-----------|--------------------------------------------------------------|----|
| Figure 1: | The RemoteDrive/Sunway UPLOAD Console .....                  | 33 |
| Figure 2: | SMS format. ....                                             | 48 |
| Figure 3: | DOWNLOAD Console as displayed in the RemoteDrive/Sunway..... | 59 |

### 0.3. Tables

|                                                                                        |    |
|----------------------------------------------------------------------------------------|----|
| Table 1: Default configurations of the available connections.....                      | 5  |
| Table 2: Menu List.....                                                                | 9  |
| Table 3: List of the BASIC measures and parameters.....                                | 13 |
| Table 4: List of the ADVANCED measures and parameters.....                             | 15 |
| Table 5: List of the parameters and measures in the Data Logger menu.....              | 16 |
| Table 6: List of the parameters and measures in the Data Logging Console menu.....     | 21 |
| Table 7: Bit-map of the devices boxed after SCANNING. ....                             | 27 |
| Table 8: Bit-map of the recognized devices.....                                        | 27 |
| Table 9: Bit-map of the type of logging for the connected devices.....                 | 27 |
| Table 10: Bit-map for Event 0 firing for the connected devices.....                    | 28 |
| Table 11: List of parameters and measures, Scan Device 11-40 .....                     | 29 |
| Table 12: Bit-map of the devices boxed after SCANNING. ....                            | 30 |
| Table 13: Bit-map of the recognized devices.....                                       | 31 |
| Table 14: Bit-map of the type of logging. ....                                         | 31 |
| Table 15: Bit-map of Event 0 fired for the connected devices. ....                     | 32 |
| Table 16: List of the measures in the Log Monitor menu.....                            | 34 |
| Table 17: Bit-map of the Log Status.....                                               | 35 |
| Table 18: List of the measures in the Event Monitor menu. ....                         | 37 |
| Table 19: Bit-map of the Log Status.....                                               | 37 |
| Table 20: Default settings for serial ports COM1 and COM2. ....                        | 40 |
| Table 21: Parameter in the Modbus configuration menu. ....                             | 40 |
| Table 22: List of the parameters in the TCP/IP Configuration menu.....                 | 41 |
| Table 23: List of the parameters in the TCP/IP Proxy Configuration menu.....           | 45 |
| Table 24: Parameter in the Real Time Data menu. ....                                   | 46 |
| Table 25: Parameter in the Modem Configuration menu.....                               | 47 |
| Table 26: List of the measures and parameters in the SMS menu.....                     | 48 |
| Table 27: List of the measures and parameters in the Clock/Calendar menu. ....         | 50 |
| Table 28: Conventional MODBUS addresses. ....                                          | 55 |
| Table 29: List of the measures and parameters in the Routing Table ---> ZONE menu..... | 55 |
| Table 30: List of the parameters in the Routing Table menu.....                        | 57 |

## 1. OVERVIEW

### 1.1. Main Features

ES851 Data Logger board allows logging weather variables and operating variables of a photovoltaic (industrial) plant and allows interfacing the PV plant to a supervisor computer, even a remote computer, through different connecting modes for data logging and monitoring of the devices connected to the PV plant.

Data is logged to 7 files (Log 1, Log 2, Log 3, Log 4, Log 5, Log 6, Event Log) and can be used to create a database that can be displayed and graphically represented through the RemoteDrive/Sunway software provided by Elettronica Santerno (see "How to Use this Manual" below).

ES851 Data Logger board can be handled through dedicated parameters that are divided into menus and submenus. Each menu includes programmable parameters, measures, and commands.

Data/information is exchanged through COM1 and COM2 serial ports provided with ES851, through the Ethernet socket for a LAN and the Internet, or through a modem connection.

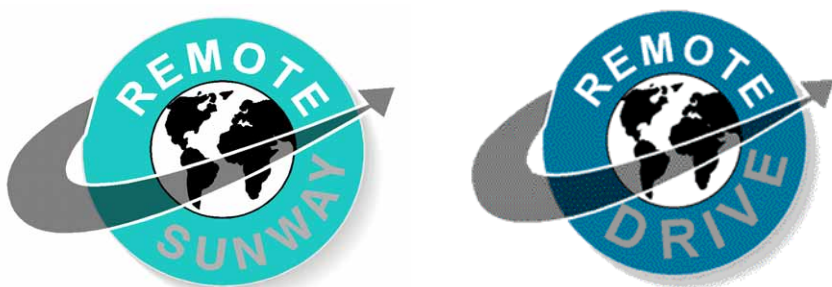
### 1.2. How to Use this Manual

This manual covers functionality and first startup of ES851 Data Logger board.

The RemoteDrive/Sunway software provided by Elettronica Santerno allows full exploitation of ES851 Data Logger functionality. The RemoteDrive/Sunway allows the following functions:

- image acquisition;
- oscilloscope functions and multifunction tester functions;
- table compiler and displayer including operation data log;
- parameter setup and data reception-transmission-storage from and to a computer;
- scan function for the automatic detection of the connected devices (up to 247 devices may be connected).

You can also create your own dedicated software. This manual provides any information concerning addressing (Address field) and scaling (Range field) for interfacing with the Data Logger.



Some of the operations above can be performed via serial link, through standard RS485 port of the inverter where ES851 is installed, or using the display/keypad unit.

This manual covers the parameter settings as displayed by the RemoteDrive/Sunway; functions implemented in the display/keypad as well are highlighted accordingly. For more details about functionality of the display/keypad, please refer to the Programming Instructions manuals relating to the inverters provided with ES851 Data Logger board.

## 2. FIRST STARTUP

This section outlines the basic setup of ES851 Data Logger board with reference to the parameterization detailed in the sections below. You can use the RemoteDrive/Sunway from a computer connected in local mode to ES851 via COM1 (which is factory set as RS232, Modbus slave).

The first startup of ES851 control board consists of two steps:

1. Connection configuration (see Connections below);
2. Configuration of the data acquisition function (see Setting the Routing Table and Programming the LOGGING Function).

### 2.1. Connections

ES851 Data Logger board can be connected to a computer in one of the following modes:

- Local mode: through COM1 and COM2 ports—RS232, RS485 or Ethernet port—for a direct LAN;
- Remote mode: through the Ethernet port or a GPRS modem, both connected via the Internet, or through an analog modem or a GSM modem for point-to-point connections.

The following sections explain how ES851 is started when using connecting modes other than the default modes, which are given in the table below.

Note that all parameters relating to ES851 connections are R parameters, which are read and acquired only after resetting ES851 Data Logger board.



**NOTE**

Configurations other than the default connections can be required when ordering the equipment.

| CONNECTION | DEFAULT CONFIGURATION          |
|------------|--------------------------------|
| COM1       | RS232 in Modbus Slave mode     |
| COM2       | RS485 in Modbus Master mode    |
| Ethernet   | Link Service with DHCP and DNS |

Table 1: Default configurations of the available connections.

## 2.1.1. CONNECTION TO THE LINK SERVICE

The connection via the Internet to the Link service is the default connecting mode. The connection to the Link service can be implemented as follows:

- 1) Using a router: in that case, no alteration to the default parameters is required;



### CAUTION

The connection to the Link service requires the DHCP in the network where ES851 Data Logger board is installed. If the DHCP is not available, disable the DHCP via parameter R450 in the TCP/IP PROXY CONFIGURATION MENU by selecting one of the options that do not require using this protocol (e.g. "5: PROXY Ethernet (No DHCP, DNS )", "6:PROXY Ethernet (No DHCP, No DNS )"), then enter the static IP address, the IP mask and the Gateway in the CONNECTION CONFIGURATION MENU.

- 2) Using a GPRS modem: in that case, the following modifications are required:

- Connect ES851 to a computer via COM1 port (RS232 Modbus RTU);
- Set parameter R450 as "2: PROXY GPRS modem" (see the "CONNECTION CONFIGURATION MENU");
- In the parameters relating to the APN (P3110-P3139), enter the APN of the provider, such as "ibox.tim.it" (see the "CONNECTION CONFIGURATION MENU");
- Set the PIN of the SIM card being used in parameter R287, which is included in the "MODEM CONFIGURATION AND STATUS MENU";
- Save the parameters you have changed (see the "Parameter Save" section);
- Reset the Data Logger so that new settings will take effect.

## 2.1.2. LAN CONNECTION



### CAUTION

The LAN administrator must reserve a STATIC IP address so that it is uniquely identified, as a dynamic control of IP addresses can change the association between the MAC address of the Data Logger and the IP address whenever the equipment is started. As a result, the address required for communication cannot be known beforehand.

- Connect ES851 to a computer via COM1 port (RS232 Modbus RTU);
- Set parameter R450 = "8: Direct Ethernet" (see the "CONNECTION CONFIGURATION MENU");
  - Save the parameters you have changed (see the "Parameter Save" section);
  - Reset the Data Logger so that new settings will take effect.

---

### 2.1.3. CONNECTION VIA GSM MODEM OR ANALOG MODEM

- Connect ES851 to a computer via COM1 port (RS232 Modbus RTU);
- In parameter R450, choose the type of modem being used by selecting “3: Direct GSM modem” or “4: Direct Analog Modem” (see the CONNECTION CONFIGURATION MENU);
- If you are using a GSM modem, enter the PIN of the SIM card in parameter R287 (see the CONNECTION CONFIGURATION MENU);
- Save the parameters you have changed (see the “Parameter Save” section);
- Reset ES851 so that new settings will take effect.

If you are using a GSM modem, you can set a mobile phone number receiving SMS when Events fire (see the SMS MENU).

---

## 2.2. ES851 Status Display

From the DATA LOGGER MENU, you can display the status of ES851, which is programmed with factory settings. In particular, the MAC address is displayed.

Make sure that no alarm trips. If so, try to reset the alarm; if the alarm persists, please contact Elettronica Santerno.

---

## 2.3. Setting the Routing Table

The routing table defines the map where the identifier of each device connected to the Data Logger through a given transmitting device matches with the virtual identifier which the connected device responds to through the Data Logger itself. In that way, the networked devices can also be connected to different apparatuses and can be controlled exactly in the same way via the Data Logger.

The Routing Table is preset for the automatic detection of the devices connected to RS485 serial link (COM2), if their identifiers have been previously set to values higher than or equal to 3. Unique identifiers are to be assigned to avoid conflicts. According to factory settings, COM2 port is already set as Master Modbus, thus allowing handling all the connected devices. Each address mapped in the table is enabled by default.

The ROUTING TABLE → ZONE MENU can be used for easier programming of ES851 controlling very complex plants.

---

## 2.4. Programming the LOGGING Function

The default LOGGING parameters have been studied by Elettronica Santerno’s technicians in respect to the variables to be monitored (see APPENDIX). As a result, no modification is required for the DATA LOGGING CONSOLE MENU.

If the number of devices connected to ES851 is limited, an **extended (C161)** LOGGING can be performed, allowing monitoring more variables than factory-set variables.

Once the type of LOGGING is selected, **activate the SCANNING** of the connected devices through I160, allowing detecting the acronym and the routing address for all the devices connected to ES851. Measure M5049 displays the status of the LOGGING commands allowing checking if they are correct.

After sending the SCAN command, ES851 performs automatic settings of the parameters for the monitoring of the device variables (BOXING).

If no LOGGING is required for some of the detected devices, they can be excluded by setting the ‘Type’ field of parameters C165-C180 and C480-C503. BOXING will be automatically performed by ES851 based on the new information.

You can now **start LOGGING** through I160. From the LOG MONITOR MENU and the EVENT MONITOR MENU, check if LOGGING is correct.

To view the logged data, follow the procedure explained in the UPLOAD CONSOLE MENU.



**NOTE**

LOGGING is to be activated as the last installation step. Any procedure for the connection configuration (see sections below) must be performed before LOGGING is activated.



**NOTE**

The type of LOGGING (extended or standard logging) can be changed for any boxed device.

To sum up, do the following to activate the LOGGING function in the "DATA LOGGING CONSOLE MENU":

- Select the type of LOGGING from parameter C161;
- Press the SCAN button;
- Activate LOGGING , I160 "ENABLE All Logs".

## **2.5. Parameter Save**

---

After entering the new settings, execute the Eeprom command "5: Save All" (see the "DATA LOGGER MENU") to keep them stored even after ES851 is reset. If you are using the RemoteDrive/Sunway software, just press the S key after changing a parameter, or send the Save All Command.

### 3. MENU LIST

The menu list and the main features of each menu are contained in Table 2 below. Each menu is then detailed on the following pages.

| MENU                           | FUNCTIONALITY                                                                          |
|--------------------------------|----------------------------------------------------------------------------------------|
| Data Logger                    | Main measures and functions of ES851                                                   |
| Data Logging Console           | Console for the main logging functions                                                 |
| Scan Device 11-40              | Console displaying the connected devices whose IDs range from 11 to 40                 |
| Upload Console                 | Console for the acquisition of stored data from ES851                                  |
| Log 1 Monitor                  | Log 1 status                                                                           |
| Log 2 Monitor                  | Log 2 status                                                                           |
| Log 3 Monitor                  | Log 3 status                                                                           |
| Log 4 Monitor                  | Log 4 status                                                                           |
| Log 5 Monitor                  | Log 5 status                                                                           |
| Log 6 Monitor                  | Log 6 status                                                                           |
| Event Monitor                  | Event status                                                                           |
| Modbus Configuration           | Serial port configuration parameters                                                   |
| TCP/IP Proxy Configuration     | Configuration parameters for TCP/IP communications with the Link server                |
| Real Time Data                 | Configuration parameters for sending real-time data                                    |
| Modem Configuration and Status | Modem configuration parameters                                                         |
| SMS                            | SMS activation console                                                                 |
| Clock/Calendar                 | Console for clock/calendar settings and display                                        |
| Routing Table → ZONE           | Zone configuration parameters                                                          |
| Routing Table 1-10             | Table for the virtual mapping of the devices connected to the Data Logger for IDs 1-10 |
| Download console               | Console for uploading files to the Data Logger                                         |

**Table 2: Menu List.**

## 3.1. Menus and Submenus

Three programming levels are available. They can be changed by setting P298 accordingly.

BASIC (factory setting): permits to view the main measures and to set parameters P298 (programming level) and allows changing basic programming;

ADVANCED: permits to access the BASIC parameters and the parameters relating to the programming of the available connections;

ENGINEERING: allows accessing all parameters.



**NOTE** This manual covers BASIC/ADVANCED parameters only.

### 3.1.1. SYNOPTIC TABLE FOR M MEASURES

(Read-only)

|                     |                 |                                                             |                                                                                                                  |
|---------------------|-----------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Mxxx</b>         | <b>Range</b>    | Device representation (integer)                             | Display on the display/keypad and the RemoteDrive/Sunway software (may be a decimal figure) plus unit of measure |
| <b>Measure Name</b> | <b>Level</b>    | Access Level (BASIC / ADVANCED )                            |                                                                                                                  |
|                     | <b>Address</b>  | Modbus address which the measure can be read from (integer) |                                                                                                                  |
|                     | <b>Function</b> | Measure description.                                        |                                                                                                                  |

### 3.1.2. SYNOPTIC TABLE FOR P, R, I, C PARAMETERS

(Read-Write)

|                       |                 |                                                                          |                                                                                                                  |
|-----------------------|-----------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Pxxx</b>           | <b>Range</b>    | Device representation (integer)                                          | Display on the display/keypad and the RemoteDrive/Sunway software (may be a decimal figure) plus unit of measure |
| <b>Parameter Name</b> | <b>Default</b>  | Parameter factory-setting (as represented for ES851 board)               | Parameter factory-setting (as displayed) plus unit of measure                                                    |
|                       | <b>Level</b>    | Access Level (BASIC / ADVANCED)                                          |                                                                                                                  |
|                       | <b>Address</b>  | ModBus address which the parameter can be read from/written to (integer) |                                                                                                                  |
|                       | <b>Function</b> | Parameter description                                                    |                                                                                                                  |



**NOTE**

**Pxxx Parameters** (Always R/W).

**Cxxx Parameters** (Read-only with LOGGING function activated; R/W with LOGGING function deactivated).

**Rxxx Parameters** Always R/W, but they activate only when the device is next powered on.

**Ixxx Inputs** These are not parameters, but inputs (the values assigned to these inputs are not stored to non-volatile memory. They are always set to 0 when the inverter is powered on).

### 3.2. List of the BASIC Measures and Parameters

| Menu                 | Parameter | FUNCTION                                   | MODBUS Address   | Default    |
|----------------------|-----------|--------------------------------------------|------------------|------------|
| 4 DATA LOGGER MENU   | P298      | Access Level                               | 298              | BASIC      |
|                      | I012      | EEPROM Command                             | 2003             | No Command |
|                      | M475      | Software Version                           | 475              | -          |
|                      | M5000     | Alarm Condition                            | 5000             | -          |
|                      | M5003     | Active Access Level                        | 5003             | -          |
|                      | M5004     | Flash Card Error                           | 5004             | -          |
|                      | M5006     | MAC Address                                | 5006, 5007, 5008 | -          |
|                      | M5199     | Latest EEPROM command not executed         | 5199             | -          |
| 8 LOG 1 MONITOR MENU | M5050     | Log 1 Length                               | 5050             | -          |
|                      | M5057     | Log 1 Status                               | 5057             | -          |
|                      | M5070a-b  | Year and Month of Activation of Log 1      | 5070             | -          |
|                      | M5071a-b  | Day and Time of Activation of Log 1        | 5071             | -          |
|                      | M5072a-b  | Minutes and Seconds of Activation of Log 1 | 5072             | -          |
| 8 LOG 2 MONITOR MENU | M5051     | Log 2 Length                               | 5051             | -          |
|                      | M5058     | Log 2 Status                               | 5058             | -          |
|                      | M5073a-b  | Year and Month of Activation of Log 2      | 5073             | -          |
|                      | M5074a-b  | Day and Time of Activation of Log 2        | 5074             | -          |
|                      | M5075a-b  | Minutes and Seconds of Activation of Log 2 | 5075             | -          |
| 8 LOG 3 MONITOR MENU | M5052     | Log 3 Length                               | 5052             | -          |
|                      | M5059     | Log 3 Status                               | 5059             | -          |
|                      | M5076a-b  | Year and Month of Activation of Log 3      | 5076             | -          |
|                      | M5077a-b  | Day and Time of Activation of Log 3        | 5077             | -          |
|                      | M5078a-b  | Minutes and Seconds of Activation of Log 3 | 5078             | -          |
| 8 LOG 4 MONITOR MENU | M5053     | Log 4 Length                               | 5053             | -          |
|                      | M5060     | Log 4 Status                               | 5060             | -          |
|                      | M5079a-b  | Year and Month of Activation of Log 4      | 5079             | -          |
|                      | M5080a-b  | Day and Time of Activation of Log 4        | 5080             | -          |
|                      | M5081a-b  | Minutes and Seconds of Activation of Log 4 | 5081             | -          |
| 8 LOG 5 MONITOR MENU | M5054     | Log 5 Length                               | 5054             | -          |
|                      | M5061     | Log 5 Status                               | 5061             | -          |
|                      | M5082a-b  | Year and Month of Activation of Log 5      | 5082             | -          |
|                      | M5083a-b  | Day and Time of Activation of Log 5        | 5083             | -          |
|                      | M5084a-b  | Minutes and Seconds of Activation of Log 5 | 5084             | -          |

|                               |                 |                                              |             |     |
|-------------------------------|-----------------|----------------------------------------------|-------------|-----|
| <b>8 LOG 6 MONITOR MENU</b>   | <b>M5055</b>    | Log 6 Length                                 | <b>5055</b> | -   |
|                               | <b>M5062</b>    | Log 6 Status                                 | <b>5062</b> | -   |
|                               | <b>M5085a-b</b> | Year and Month of Activation of Log 6        | <b>5085</b> | -   |
|                               | <b>M5086a-b</b> | Day and Time of Activation of Log 6          | <b>5086</b> | -   |
|                               | <b>M5087a-b</b> | Minutes and Seconds of Activation of Log 6   | <b>5087</b> | -   |
| <b>9 EVENT MONITOR MENU</b>   | <b>M5056</b>    | Evt Log Length                               | <b>5056</b> | -   |
|                               | <b>M5063</b>    | Evt Log Status                               | <b>5063</b> | -   |
|                               | <b>M5088a-b</b> | Year and Month of Activation of Evt Log      | <b>5088</b> | -   |
|                               | <b>M5089a-b</b> | Day and Time of Activation of Evt Log        | <b>5089</b> | -   |
|                               | <b>M5090a-b</b> | Minutes and Seconds of Activation of Evt Log | <b>5090</b> | -   |
| <b>16 CLOCK/CALENDAR MENU</b> | <b>M5010a</b>   | Year                                         | <b>5010</b> | -   |
|                               | <b>M5010b</b>   | Month                                        | <b>5010</b> | -   |
|                               | <b>M5011a</b>   | Day of the Week                              | <b>5011</b> | Mon |
|                               | <b>M5011b</b>   | Day of the Month                             | <b>5011</b> | 1   |
|                               | <b>M5012a</b>   | Hours                                        | <b>5012</b> | -   |
|                               | <b>M5012b</b>   | Minutes                                      | <b>5012</b> | -   |
|                               | <b>M5013</b>    | Seconds                                      | <b>5013</b> | -   |

Table 3: List of the BASIC measures and parameters.

### 3.3. List of the ADVANCED Measures and Parameters

| Menu                            | Parameter                          | FUNCTION                                  | MODBUS Address     | Default Setting                  |
|---------------------------------|------------------------------------|-------------------------------------------|--------------------|----------------------------------|
| 5 DATA LOGGING<br>CONSOLE MENU  | M164                               | Min. Sampling Time                        | 164                | -                                |
|                                 | P229                               | Initial SCANNING Address                  | 229                | 1                                |
|                                 | P230                               | Final SCANNING Address                    | 230                | 40                               |
|                                 | C238                               | Fast Sampling Only                        | 238                | No                               |
|                                 | C161                               | Type of Data Logging                      | 161                | Standard                         |
|                                 | C162                               | Fast Log Sampling Time                    | 162                | 60 s (1 min)                     |
|                                 | C163                               | Fast Log Sample N.                        | 163                | 1                                |
|                                 | C245                               | Fast Log Min. Variation Percent           | 245                | 0,0%                             |
|                                 | C242                               | Slow Log Sampling Time                    | 242                | 3600s (1 hour)                   |
|                                 | C243                               | Slow Log Sample N.                        | 243                | 1                                |
|                                 | C244                               | Slow Log Min. Variation Percent           | 244                | 0.0%                             |
|                                 | I160                               | Logger Command                            | 160                | No command                       |
|                                 | M5049                              | LOGGING Command Status                    | 5049               | -                                |
|                                 | M5016                              | N. of Devices Detected when SCANNING      | 5016               | -                                |
|                                 | M5017                              | Modbus ID of the Device being SCANNED     | 5017               | -                                |
|                                 | C165-a ÷ C174-a                    | ID of the Connected Device                | 165-174            | 0                                |
|                                 | C165-b ÷ C174-b                    | Type of Connected Device                  | 165-174            | No device detected               |
|                                 | M214                               | Connected Device Boxing                   | 214                | -                                |
|                                 | M215                               | Recognized Connected Device               | 215                | -                                |
|                                 | C241                               | Extended Logging for the Connected Device | 241                | Standard logging for each device |
|                                 | M512                               | Event 0 Fired for the Connected Device    | 512                | -                                |
| 6 SCAN DEVICE 11-40<br>MENU     | C175-a ÷ C180-a<br>C480-a ÷ C503-a | Connected Device ID                       | 175-180<br>480-503 | 0                                |
|                                 | C175-b ÷ C180-b<br>C480-b ÷ C503-b | Type of Connected Device                  | 175-180<br>480-503 | No device detected               |
|                                 | M204, M205                         | Boxing of the Connected Device            | 204, 205           | -                                |
|                                 | M207, M208                         | Connected Device Recognized               | 207, 208           | -                                |
|                                 | C239, C240                         | Extended Logging for the Connected Device | 239, 240           | Long standard for each device    |
|                                 | M510, M511                         | Event 0 Active for the Connected Device   | 510, 511           | -                                |
| 10 MODBUS<br>CONFIGURATION MENU | R297                               | ES851 Device Id                           | 297                | 1                                |

|                                        |               |                                           |             |                                                       |
|----------------------------------------|---------------|-------------------------------------------|-------------|-------------------------------------------------------|
| 11 CONNECTION CONFIGURATION MENU       | R450          | Type of Remote Connection                 | 450         | PROXY Ethernet (DCHP, DNS)                            |
|                                        | P272          | Type of TCP/IP Connection                 | 272         | Ethernet                                              |
|                                        | R276 ÷ R277   | IP Address                                | 276, 277    | 192.168.0.2                                           |
|                                        | R278 ÷ R279   | Network Mask                              | 278, 279    | 255.255.255.0                                         |
|                                        | R247 ÷ R248   | Gateway                                   | 247, 248    | 0.0.0.0                                               |
|                                        | M5037         | RemoteDrive/Sunway Connection Status      | 5037        | -                                                     |
| 12 TCP/IP PROXY CONFIGURATION MENU     | P3110 ÷ P3139 | APN                                       | 3110 ÷ 3139 | 'web.omnitel.it'                                      |
| 13 REAL TIME DATA MENU                 | P578          | Time Period for Sending Real-time Data    | 578         | Data Send Disabled                                    |
| 14 MODEM CONFIGURATION AND STATUS MENU | R287          | SIM card PIN                              | 287         | "0000"                                                |
| 15 SMS MENU                            | R420 ÷ R422   | Phone Number 1                            | 420 ÷ 422   | "390000000000"                                        |
|                                        | R423 ÷ R425   | Phone Number 2                            | 423 ÷ 425   | "390000000000"                                        |
|                                        | M5066         | SMS Status                                | 5066        | -                                                     |
|                                        | P3150 ÷ P3177 | Message Header                            | 3150 ÷ 3177 | -                                                     |
|                                        | P580          | SMS Mode                                  | 580         | Proxy                                                 |
|                                        | P294          | SMS Sent After Event Disappeared          | 294         | Yes                                                   |
| 16 CLOCK/CALENDAR MENU                 | P2010a        | Year To Be Changed                        | 2010        | 2000                                                  |
|                                        | P2010b        | Month To Be Changed                       | 2010        | January                                               |
|                                        | P2011a        | Day Of The Week To Be Changed             | 2011        | Mon                                                   |
|                                        | P2011b        | Day Of The Month To Be Changed            | 2011        | 1                                                     |
|                                        | P2012a        | Time (Hour) To Be Changed                 | 2012        | 0                                                     |
|                                        | P2012b        | Time (Minutes) To Be Changed              | 2012        | 0                                                     |
|                                        | I2013b        | Clock/Calendar Editing Command            | 2013        | 0                                                     |
|                                        | R3200         | Time Lag (Hours) of the Local Time Zone   | 3200        | 1                                                     |
|                                        | R3201         | Time Lag (Minutes) of the Local Time Zone | 3201        | 0                                                     |
| 17 ROUTING TABLE → ZONE                | P200          | ZONE Start ID                             | 200         | 23                                                    |
|                                        | P201          | ZONE End ID                               | 201         | 44                                                    |
|                                        | I200          | Enable Zone Command                       | 160         | -                                                     |
|                                        | M5049         | Enable Zone Status                        | 5049        | -                                                     |
| 18 ROUTING TABLE 1-10 MENU             | P00a ÷ P009a  | Medium for Virtual Address 1-10           | 0-9         | 1: ES851 Local<br>2: ES821 DPR<br>3 ÷ 9: RS485 Modbus |
|                                        | P00b ÷ P009b  | Device ID for Virtual Address 1-10        | 0-9         | 1 ÷ 10                                                |
|                                        | P00c ÷ P009c  | Virtual Address 1-10 Enable               | 0-9         | 1                                                     |

Table 4: List of the ADVANCED measures and parameters.

## 4. DATA LOGGER MENU

The Data Logger menu contains all data relating to ES851 and its basic settings. The first parameter being displayed is the MAC Address, which uniquely identifies ES851 Data Logger board.

The Data Logger menu allows changing the programming level (P298) and displaying the software version (M475) implemented in ES851. It also allows restoring default values and storing and deleting data acquired by ES851 through the EEPROM (I012) command. ES851 Data Logger board is provided with two Flash cards for data storage. Parameters are contained in the DATA FLASH; the Restore Default or Save All commands affect this portion of memory. The Restore Default command also restores the parameters relating to ES851 for the inverter where the Data Logger is installed. On the other hand, data stored when LOGGING are stored to 8-Mb FLASH CARD of ES851. As a result, any log operation (e.g. Erase Log) affects ES851 Flash Card.

M5199 indicates the latest EEPROM command that has not been executed, as well as the alarm tripped and its fault code.

| Parameter | FUNCTION                           | Access Level | MODBUS Address   |
|-----------|------------------------------------|--------------|------------------|
| P298      | Access Level                       | BASIC        | 298              |
| I012      | EEPROM Command                     | BASIC        | 2003             |
| M475      | Software Version                   | BASIC        | 475              |
| M5000     | Alarm Condition                    | BASIC        | 5000             |
| M5003     | Active Access Level                | BASIC        | 5003             |
| M5004     | Flash Card Error                   | BASIC        | 5004             |
| M5006     | MAC Address                        | BASIC        | 5006, 5007, 5008 |
| M5199     | Latest EEPROM command not executed | BASIC        | 5199             |

Table 5: List of the parameters and measures in the Data Logger menu.

### P298 Access Level

|      |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                           |
|------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| P298 | Range    | 0 ÷ 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0: Basic<br>1: Advanced<br>2: Engineering |
|      | Default  | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Basic                                     |
|      | Level    | BASIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                           |
|      | Address  | 298                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                           |
|      | Function | <p>The programming parameters for ES851 are grouped by access levels based on their functions (more or less complex functions).<br/>Some menus, or some parts of menus, are not displayed when a given access level is selected.</p> <p>When the BASIC access level is selected if the ES851 parameterization is correct, navigation is easier, as only frequently accessed parameters are displayed.</p> <p>In this manual, the Access Level is stated for each parameter.</p> |                                           |

## I012 EEPROM Command

|                |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                             |
|----------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I012           | Range    | 0, 5, 11, 30 ÷ 36, 777                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0: No Command<br>5: Save all<br>11: Restore Default<br>30: Erase Log 1<br>31: Erase Log 2<br>32: Erase Log 3<br>33: Erase Log 4<br>34: Erase Log 5<br>35: Erase Log 6<br>35: Erase Event Log<br>37: Erase All Logs<br>777: Erase Fault List |
|                |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                             |
| EEPROM Command | Default  | This is not a parameter: I012 is set to zero at power on and whenever the EEPROM command is executed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                             |
|                | Level    | BASIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                             |
|                | Address  | 2003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                             |
|                | Function | This parameter saves and restores the entire set of parameters that can be accessed by the user:<br><br><u>5: Save All</u> , The current value of the RAM parameters is stored to non-volatile memory (DATA FLASH). All parameters are saved at a time.<br><br><u>11: Restore Default</u> , Factory-set values are restored for all parameters; each factory-set value is stored to non-volatile memory (DATA FLASH).<br><br><u>30 to 35: Erase Log1,2,3,4,5,6,Event Log</u> , Erases any data in the specified log (data is stored to FLASH CARD).<br><br><u>36: Erase All Logs</u> , Erases data acquired in all logs (data is stored to FLASH CARD).<br><br><u>777: Erase Fault List</u> , Erases the fault list stored to DATA FLASH memory. |                                                                                                                                                                                                                                             |
|                |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                             |

## M475 Software Version

|      |          |                                                                   |            |
|------|----------|-------------------------------------------------------------------|------------|
| M475 | Range    | 1000÷9999                                                         | 1000 ÷9999 |
|      | Level    | BASIC                                                             |            |
|      | Address  | 475                                                               |            |
|      | Function | This measure indicates the software version implemented in ES851. |            |

### M5000 Alarm Condition

|                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                |
|-----------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M5000           | Range    | 0 ÷ 6, 99 ÷ 103                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0: No Alarm<br>1: Par Save KO<br>2: Log Write Failure<br>3: ES821 Init. Failure<br>4: RS232 Init. Failure<br>5: RS485 Init.Failure<br>6: TCP/IP Stack Init. Failure<br>99: No Flash Card<br>100: Invalid Stream<br>101: TCP/IP Socket<br>103: ES821 Clock<br>104: Modem Init.<br>105: Modem KO |
|                 | Default  | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0: No Alarm                                                                                                                                                                                                                                                                                    |
| Alarm Condition | Level    | BASIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                |
|                 | Address  | 5000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                |
|                 | Function | This measure indicates the current alarm tripped for ES851. Please contact Elettronica Santerno and state the alarm number and name.<br><br>0: No Alarm<br>1: Parameter Save Error<br>2: Log Write Error<br>3: FBS Configuration Error<br>4: Modbus RS232 Configuration Error<br>5: Modbus RS485 Configuration Error<br>6: TCP/IP Stack Configuration Error<br>99: Flash Card Missing or Inaccessible<br>100: Invalid Access to Stream<br>101: TCP/IP Socket Error<br>103: Clock 821 Error<br>104: Modem Initialization Error<br>105: Modem Off or Not Connected |                                                                                                                                                                                                                                                                                                |

### M5003 Active Access Level

|                     |          |                                                                     |                                           |
|---------------------|----------|---------------------------------------------------------------------|-------------------------------------------|
| M5003               | Range    | 0 ÷ 2                                                               | 0: Basic<br>1: Advanced<br>2: Engineering |
| Active Access Level | Level    | BASIC                                                               |                                           |
|                     | Address  | 5003                                                                |                                           |
|                     | Function | This measure indicates the access level that is currently selected. |                                           |

#### M5004 Flash Card Error

|                  |          |                                                                                                                                                                                                            |                                                                                                                                                                 |
|------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M5004            | Range    | 0 ÷ 7                                                                                                                                                                                                      | 0: No Error<br>1: Stream Full<br>2: Checksum Error<br>3: Invalid Descriptor<br>4: Invalid Stream<br>5: Chain Error<br>6: Invalid Partitioning<br>7: Stream Busy |
|                  | Level    | BASIC                                                                                                                                                                                                      |                                                                                                                                                                 |
| Flash Card Error | Address  | 5004                                                                                                                                                                                                       |                                                                                                                                                                 |
|                  | Function | The errors above concern the flash card (the memory zone where logs are stored) and its relevant operations. If an alarm trips, please contact Elettronica Santerno and mention the alarm number and name. |                                                                                                                                                                 |

#### M5006 MAC Address

|             |          |                                                                                                                               |                     |
|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------|---------------------|
| M5006       | Range    | 0 ÷ 2 <sup>48</sup>                                                                                                           | 0 ÷ 2 <sup>48</sup> |
| MAC Address | Level    | BASIC                                                                                                                         |                     |
|             | Address  | 5006, 5007, 5008                                                                                                              |                     |
|             | Function | The MAC Address is the physical address for ES851 network interface.<br>A unique MAC Address is assigned to each ES851 board. |                     |

#### M5199 Latest EEPROM Command Not Executed

|                                    |          |                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                             |
|------------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M5199                              | Range    | 0, 32773, 32779, 32798 ÷ 32805, 33545                                                                                                                                                                                                               | 0: No Command<br>5: Save all<br>11: Restore Default<br>30: Erase Log 1<br>31: Erase Log 2<br>32: Erase Log 3<br>33: Erase Log 4<br>34: Erase Log 5<br>35: Erase Log 6<br>36: Erase Event Log<br>37: Erase All Logs<br>777: Erase Fault List |
|                                    | Level    | BASIC                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                             |
| Latest EEPROM Command Not Executed | Address  | 5199                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                             |
|                                    | Function | This measure indicates the latest EEPROM command that has not been correctly executed.<br>Codification is the same as for I012, but the most significant bit is set to one, thus changing the range of values that can be assigned to this measure. |                                                                                                                                                                                                                                             |

## 5. DATA LOGGING CONSOLE MENU

This is the main operating menu. The parameters contained in this menu permit to SCAN the devices controlled by the Data Logger, to automatically program the parameters relating to the variables monitored by the device LOGGING (this function is called BOXING) and to activate/deactivate/delete the files containing LOGGING-monitored data.

The parameters specific to the variables monitored by the LOGGING (BOXING) function are automatically programmed after SCANNING (I160) and after programming certain parameters that can be modified by the user. Parameters specific to the monitored variables can be accessed only if the Engineering access level is selected. Variables that can be monitored are automatically divided into 6 groups, which are called Log1, 2, 3, 4, 5, 6.

Automatic LOGGING can be either **standard** or **extended logging** (C161). When extended logging is activated, more variables are monitored if compared to the standard logging.

According to factory setting (**standard** LOGGING for each device), each ES851 board can perform the LOGGING function for each device connected to the plant, up to max. 40 devices. The type of LOGGING can be selected for each connected device, for the optimization of the number of devices that can be boxed.

In both cases, the acquired variables are detected within a parameter set contained in a table which is unique to each device and which is stored to ES851 when factory setting is performed (see APPENDIX).

Two log groups are available: Fast Log (C162, C163, C245) and Slow Log (C242, C243, C244), which are characterized by a different factory-set sampling time of the logged variables. The parameters above allow the user to change the sample number and the minimum variation percent of a data item for its logging.

ES851 Data Logger is also capable of logging data relating to each connected inverter when one of its variables changes. Besides recording the alarms of the connected devices, ES851 records to the Event file the non-response from one of the connected devices (a non-response event is an Event 0). The parameters specific to the Event Log are inaccessible at a Basic level and are automatically BOXED along with the parameters of the other logs. Their values are stated in the tables stored during the factory setting stage (see APPENDIX).

After SCANNING, you can manually deselect some of the detected devices.

This menu views the first 10 devices that are detected from ES851 Data Logger. The setting of the next 30 devices, if detected, can be viewed and changed in the SCAN DEVICE 11-40 MENU.

After each operation on the parameters above, ES851 performs automatic BOXING based on the new stored values.

The Data Logging Console menu also includes a set of measures indicating the command status and the programming status of ES851.



### NOTE

The factory-settings of the parameters included in the Data Logging Console menu do not require any customization. You can just use the SCAN command and the Log Enable command through parameter I160.

| Parameter       | FUNCTION                                  | Access Level | MODBUS Address |
|-----------------|-------------------------------------------|--------------|----------------|
| M164            | Min. Sampling Time                        | ADVANCED     | 164            |
| P229            | Initial SCANNING Address                  | ADVANCED     | 229            |
| P230            | Final SCANNING Address                    | ADVANCED     | 230            |
| C238            | Fast Sampling Only                        | ADVANCED     | 238            |
| C161            | Type of Data Logging                      | ADVANCED     | 161            |
| C162            | Fast Log Sampling Time                    | ADVANCED     | 162            |
| C163            | Fast Log Sample N.                        | ADVANCED     | 163            |
| C245            | Fast Log Min. Variation Percent           | ADVANCED     | 245            |
| C242            | Slow Log Sampling Time                    | ADVANCED     | 242            |
| C243            | Slow Log Sample N.                        | ADVANCED     | 243            |
| C244            | Slow Log Min. Variation Percent           | ADVANCED     | 244            |
| I160            | Logger Command                            | ADVANCED     | 160            |
| M5049           | LOGGING Command Status                    | ADVANCED     | 5049           |
| M5016           | N. of Devices Detected when SCANNING      | ADVANCED     | 5016           |
| M5017           | Address of the Device being SCANNED       | ADVANCED     | 5017           |
| C165-a ÷ C174-a | ID of the Connected Device                | ADVANCED     | 165-174        |
| C165-b ÷ C174-b | Type of Connected Device                  | ADVANCED     | 165-174        |
| M214            | Connected Device Boxing                   | ADVANCED     | 214            |
| M215            | Recognized Connected Device               | ADVANCED     | 215            |
| C241            | Extended Logging for the Connected Device | ADVANCED     | 241            |
| M512            | Event 0 Fired for the Connected Device    | ADVANCED     | 512            |

Table 6: List of the parameters and measures in the Data Logging Console menu.

#### M164 Min. Sampling Time

| M164               | Range    | 1 ÷ 65535                                                                                                                                                                                                                          | 1 ÷ 65535 sec |
|--------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Min. Sampling Time | Level    | ADVANCED                                                                                                                                                                                                                           |               |
|                    | Address  | 164                                                                                                                                                                                                                                |               |
|                    | Function | Min. sampling time which is automatically detected by the LOGGING system. This is updated whenever a scanning function is performed. The sampling time (C162 and C242) cannot be set up to a value lower than the one set in M164. |               |

#### P229 Initial SCANNING Address

| P229                 | Range    | 0 ÷ 160                                                          | 0 ÷ 160 |
|----------------------|----------|------------------------------------------------------------------|---------|
| Initial SCAN Address | Default  | 23                                                               |         |
|                      | Level    | ADVANCED                                                         |         |
|                      | Address  | 229                                                              |         |
|                      | Function | The initial address for ES851 SCAN is defined in this parameter. |         |

#### P230 Final SCANNING Address

|                        |                 |                                                                    |         |
|------------------------|-----------------|--------------------------------------------------------------------|---------|
| <b>P230</b>            | <b>Range</b>    | 0 ÷ 160                                                            | 0 ÷ 160 |
| Final SCANNING Address | <b>Default</b>  | 40                                                                 |         |
|                        | <b>Level</b>    | ADVANCED                                                           |         |
|                        | <b>Address</b>  | 230                                                                |         |
|                        | <b>Function</b> | This parameter sets the max. allowable address for ES851 SCANNING. |         |

#### C238 Fast Sampling Only

|                    |                 |                                                                                                                                                                          |                 |
|--------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>C238</b>        | <b>Range</b>    | 0 ÷ 1                                                                                                                                                                    | 0: No<br>1: Yes |
| FAST Sampling Only | <b>Default</b>  | 0                                                                                                                                                                        | 0: No           |
|                    | <b>Level</b>    | ADVANCED                                                                                                                                                                 |                 |
|                    | <b>Address</b>  | 238                                                                                                                                                                      |                 |
|                    | <b>Function</b> | If this parameter is set to 1, all the variables to be monitored will be sampled in "fast" mode by ES851; this means that even the slow logs will be acquired as "fast". |                 |

#### C161 Type of Data Logging

|                      |                 |                                                                                                                                                                                                                                                                               |                                                      |
|----------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <b>C161</b>          | <b>Range</b>    | 0-1                                                                                                                                                                                                                                                                           | 0: Standard Data Logging<br>1: Extended Data Logging |
| Type of Data Logging | <b>Default</b>  | 0                                                                                                                                                                                                                                                                             | 0: Standard                                          |
|                      | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                      |                                                      |
|                      | <b>Address</b>  | 161                                                                                                                                                                                                                                                                           |                                                      |
|                      | <b>Function</b> | This parameter sets the amount of data items to be stored for each device detected in the logging network. If the Extended Data Logging is selected, a greater number of variables is acquired for the selected device; as a result, the number of devices to LOG is reduced. |                                                      |

#### C162 Fast Log Sampling Time

|                        |                 |                                                                                                                                                                                                                                                                                                                         |              |
|------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>C162</b>            | <b>Range</b>    | 1 ÷ 65535                                                                                                                                                                                                                                                                                                               | 1 ÷ 65535 s  |
| Fast Log Sampling Time | <b>Default</b>  | 60                                                                                                                                                                                                                                                                                                                      | 60 s (1 min) |
|                        | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                |              |
|                        | <b>Address</b>  | 162                                                                                                                                                                                                                                                                                                                     |              |
|                        | <b>Function</b> | This parameter sets the sampling time of data stored to fast logs.<br><b>Note:</b> The sampling time cannot be set to lower values than the value set in M164. This value is automatically computed each time scanning takes place and depends on the number of detected devices and the number of data items to store. |              |

#### C163 Fast Log Sample N.

|                    |                 |                                                                                                                                                                                               |        |
|--------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <b>C163</b>        | <b>Range</b>    | 1 ÷ 50                                                                                                                                                                                        | 1 ÷ 50 |
| Fast Log Sample N. | <b>Default</b>  | 1                                                                                                                                                                                             | 1      |
|                    | <b>Level</b>    | ADVANCED                                                                                                                                                                                      |        |
|                    | <b>Address</b>  | 163                                                                                                                                                                                           |        |
|                    | <b>Function</b> | Number of samples to acquire for the statistic computation of the data to be stored. If this parameter is set to 1, no statistic operation takes place and the sample is just stored as data. |        |

#### C245 Fast Log Min. Variation Percent

|                                    |                 |                                                                                                                                                                                                                                                |                |
|------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>C245</b>                        | <b>Range</b>    | 0 ÷ 65535                                                                                                                                                                                                                                      | 0.0 ÷ 6553.5 % |
| Fast Log Min.<br>Variation Percent | <b>Default</b>  | 0                                                                                                                                                                                                                                              | 0.0 %          |
|                                    | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                       |                |
|                                    | <b>Address</b>  | 245                                                                                                                                                                                                                                            |                |
|                                    | <b>Function</b> | Variance for the data storage to the FLASH CARD. When C245 is other than 0, logging occurs if at least one of the variables to be acquired varies from the last logging of a value percent (considered as raw data) which is higher than C245. |                |

#### C242 Slow Log Sampling Time

|                           |                 |                                                                                                                                                                                                                                                                                                                  |              |
|---------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>C242</b>               | <b>Range</b>    | 1 ÷ 65535                                                                                                                                                                                                                                                                                                        | 1 ÷ 65535 s  |
| Slow Log Sampling<br>Time | <b>Default</b>  | 3600                                                                                                                                                                                                                                                                                                             | 3600 s (1 h) |
|                           | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                         |              |
|                           | <b>Address</b>  | 242                                                                                                                                                                                                                                                                                                              |              |
|                           | <b>Function</b> | This parameter sets the sampling time of data stored to slow logs.<br>Note: The sampling time cannot be set to lower values than the value set in M164. This value is automatically computed each time scanning takes place and depends on the number of detected devices and the number of data items to store. |              |

#### C243 Slow Log Sample N.

|                    |                 |                                                                                                                                                                                           |        |
|--------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <b>C243</b>        | <b>Range</b>    | 1 ÷ 50                                                                                                                                                                                    | 1 ÷ 50 |
| Slow Log Sample N. | <b>Default</b>  | 1                                                                                                                                                                                         | 1      |
|                    | <b>Level</b>    | ADVANCED                                                                                                                                                                                  |        |
|                    | <b>Address</b>  | 243                                                                                                                                                                                       |        |
|                    | <b>Function</b> | Number of samples to acquire for the statistic computation of the data to store. If this parameter is set to 1, no statistic operation takes place and the sample is just stored as data. |        |

#### C244 Slow Log Min. Variation Percent

|                                    |                 |                                                                                                                                                                                                                                                |                |
|------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>C244</b>                        | <b>Range</b>    | 0 ÷ 65535                                                                                                                                                                                                                                      | 0.0 ÷ 6553.5 % |
| Slow Log Min.<br>Variation Percent | <b>Default</b>  | 0                                                                                                                                                                                                                                              | 0.0 %          |
|                                    | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                       |                |
|                                    | <b>Address</b>  | 244                                                                                                                                                                                                                                            |                |
|                                    | <b>Function</b> | Variance for the data storage to the FLASH CARD. When C244 is other than 0, logging occurs if at least one of the variables to be acquired varies from the last logging of a value percent (considered as raw data) which is higher than C244. |                |

## I160 Logging Command

|                        |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                           |
|------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>I160</b>            | <b>Range</b>    | 0 ÷ 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0: No command<br>1: Device SCAN<br>2: STOP Scanning<br>3: ENABLE All Logs<br>4: STOP All Logs<br>5: DISABLE All Logs<br>6: ERASE All Logs |
| <b>Logging Command</b> | <b>Default</b>  | This is not a parameter: I160 is set to zero at power on and whenever the EEPROM command is executed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                           |
|                        | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                           |
|                        | <b>Address</b>  | 160                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                           |
|                        | <b>Function</b> | <p><b>This input allows activating any LOGGING operation.</b></p> <p><b>1: Device SCAN</b>, scans the devices connected to ES851 based on the Routing Table (see relevant parameter) and BOXING.</p> <p><b>2: STOP Scanning</b>, SCANNING is suspended; no BOXING takes place.</p> <p><b>3: ENABLE All Logs</b>, LOGGING is activated.</p> <p><b>4: STOP All Logs</b>, temporary suspension of the LOGGING function, which will be automatically resumed 2 minutes later.</p> <p><b>5: DISABLE All Logs</b>, LOGGING is deactivated.</p> <p><b>6: ERASE All Logs</b>, the entire FLASH CARD dedicated to LOGGING is cleared.</p> |                                                                                                                                           |

M5049 LOGGING Command Status

|                        |          |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------|----------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M5049                  | Range    | 0 ÷ 14, 25 ÷ 31                            | 0: Command Executed<br>1: Scan Impossible, Active Logs<br>2: Scan in Progress<br>3: Logs Locked, Active Upload<br>4: Logs Locked, Logs Already Active<br>5: Stop Logs Impossible, Inactive Logs<br>6: Erase Log Impossible, Active Upload<br>7: Erase Log Impossible, Active Logs<br>8: Disable Logs Imposs., Active Upload<br>9: Disable Logs Imposs., Inactive Logs<br>10: Boxing in Progress<br>11: Scan Finished<br>12: Busy<br>13: Enable Log Impossible, Erasing<br>14: Erasing Imposs., Early Warning Active<br>25: Erase Log 1<br>26: Erase Log 2<br>27: Erase Log 3<br>28: Erase Log 4<br>29: Erase Log 5<br>30: Erase Log 6<br>31: Erase Event Log |
|                        | Level    | ADVANCED                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| LOGGING Command Status | Address  | 5049                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                        | Function | Status and result of the LOGGING commands. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

M5016 N. of Devices Detected when SCANNING

|                                      |          |                                                                                                                                                                                                                                     |        |
|--------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| M5016                                | Range    | 0 ÷ 50                                                                                                                                                                                                                              | 0 ÷ 50 |
| N. of Devices Detected when SCANNING | Level    | ADVANCED                                                                                                                                                                                                                            |        |
|                                      | Address  | 5016                                                                                                                                                                                                                                |        |
|                                      | Function | Number of devices connected to ES851 detected when SCANNING. The device number is automatically refreshed whenever a new device is detected. This measure is stored to non-volatile memory only and is cleared when ES851 is reset. |        |

#### M5017 Address of the Device being SCANNED

|                                     |                 |                                                                                                                                                     |         |
|-------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>M5017</b>                        | <b>Range</b>    | 0 ÷ 247                                                                                                                                             | 0 ÷ 247 |
| Address of the Device being SCANNED | <b>Level</b>    | ADVANCED                                                                                                                                            |         |
|                                     | <b>Address</b>  | 5017                                                                                                                                                |         |
|                                     | <b>Function</b> | Current address that ES851 board is querying while SCANNING. This measure is stored to non-volatile memory only and is cleared when ES851 is reset. |         |

#### C165a ÷ C174a ID of the Connected Device

|                            |                 |                                                                                                                                                               |         |
|----------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>C165a ÷ C174a</b>       | <b>Range</b>    | 0 ÷ 255                                                                                                                                                       | 0 ÷ 255 |
| ID of the Connected Device | <b>Default</b>  | 0                                                                                                                                                             | 0       |
|                            | <b>Level</b>    | ADVANCED                                                                                                                                                      |         |
|                            | <b>Address</b>  | 165 ÷ 174                                                                                                                                                     |         |
|                            | <b>Function</b> | The high byte of the parameters for these addresses represents the routing ID of the device detected when SCANNING.<br>(Note: This is a read-only parameter). |         |

#### C165b ÷ C174b Type of Connected Device

|                          |                 |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C165b ÷ C174b</b>     | <b>Range</b>    | 0 ÷ 100                                                                                                                                                                                                          | 0: No Device Detected<br>1: ST<br>2: SM<br>3: SG<br>4: D4<br>5: D7<br>6: AM<br>7: PV<br>8: PD<br>9: PM<br>10: PR<br>11: PT<br>12: NG<br>13: IP<br>14: DL<br>15: IK<br>16: VK<br>17: LK<br>18: AC<br>19: AS<br>20: DB<br>21: DC<br>22: IF<br>23: IP<br>24: IZ<br>25: LT<br>26: OD<br>27: PB<br>28: SF<br>29: VD<br>30: VM<br>31: VN<br>32: VT<br>33: AO<br>34: DI<br>35: DO<br>36: QF<br>....<br>100: Unknown Device |
| Type of Connected Device | <b>Default</b>  | 0                                                                                                                                                                                                                | 0: No Device Detected                                                                                                                                                                                                                                                                                                                                                                                               |
|                          | <b>Level</b>    | ADVANCED                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                          | <b>Address</b>  | 165 ÷ 174                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                          | <b>Function</b> | The low byte of these parameters represents the type of device detected when SCANNING. If one or more of these parameters are manually set to 0 after scanning, the respective devices are ignored when LOGGING. |                                                                                                                                                                                                                                                                                                                                                                                                                     |

#### M214 Connected Device Boxing

|                                |                 |                                                                                                                                                                                                                                                                                                                               |              |
|--------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>M214</b>                    | <b>Range</b>    | Bit-controlled parameter.                                                                                                                                                                                                                                                                                                     | See Table 7. |
| <b>Connected Device Boxing</b> | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                      |              |
|                                | <b>Address</b>  | 214                                                                                                                                                                                                                                                                                                                           |              |
|                                | <b>Function</b> | If the j-th bit is worth 1, this means that the corresponding device is boxed (i.e. the device will be monitored by the Data Logger as its acquired variables have been added to the log's parameters). If the j-th bit is worth 0, it has not been boxed either because logs are full or because it has not been recognized. |              |

| Modbus Address | Bits | Devices | Bit Description                                |
|----------------|------|---------|------------------------------------------------|
| 214            | 0-15 | 1-16    | If the i-th bit = 1, the i-th device is boxed. |

Table 7: Bit-map of the devices boxed after SCANNING.

#### M215 Recognized Connected Device

|                                    |                 |                                                                                                                                                                                                                                                                                                                                                                                                          |             |
|------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>M207, M208, M215</b>            | <b>Range</b>    | Bit-controlled parameter                                                                                                                                                                                                                                                                                                                                                                                 | See Table 8 |
| <b>Recognized Connected Device</b> | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                                                                                                 |             |
|                                    | <b>Address</b>  | 215                                                                                                                                                                                                                                                                                                                                                                                                      |             |
|                                    | <b>Function</b> | If the j-th bit is worth 1, this means that the corresponding device has been recognized by ES851 (i.e. it has the routing table for that device, which contains the log parameters values to be used when programming the Data Logger while BOXING; see APPENDIX). If the j-th bit is worth 0, the corresponding device has not been recognized because ES851 is not provided with the tables required. |             |

| Modbus Address | Bits | Devices | Bit Description                                     |
|----------------|------|---------|-----------------------------------------------------|
| 215            | 0-15 | 1-16    | If the i-th bit = 0, the i-th device is recognized. |

Table 8: Bit-map of the recognized devices.

#### C241 Type of Logging for the Connected Device

|                                                 |                 |                                                                                                                                                                                                                                                                                                                            |                                  |
|-------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>C239, C240, C241</b>                         | <b>Range</b>    | Bit-controlled parameter                                                                                                                                                                                                                                                                                                   | See Table 9                      |
| <b>Type of Logging for the Connected Device</b> | <b>Default</b>  | 0                                                                                                                                                                                                                                                                                                                          | Standard Logging for each device |
|                                                 | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                   |                                  |
|                                                 | <b>Address</b>  | 241                                                                                                                                                                                                                                                                                                                        |                                  |
|                                                 | <b>Function</b> | If the j-th bit is worth 1, this means that the type of logging for the connected device is "extended", otherwise, it is "standard". After SCANNING, ES851 board will assign the same value to all the devices that are recognized and boxed according to parameter C161. However, each value can be individually changed. |                                  |

| Modbus Address | Bit  | Devices | Bit Description                                                          |
|----------------|------|---------|--------------------------------------------------------------------------|
| 241            | 0-15 | 1-16    | If the i-th bit = 1, extended logging is implemented for the i-th device |

Table 9: Bit-map of the type of logging for the connected devices.

M512 Event 0 Fired for the Connected Device

|                                        |                 |                                                                                                                                                                                      |                              |
|----------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>M512</b>                            | <b>Range</b>    | Bit-controlled parameter                                                                                                                                                             | See Table 10                 |
| Event 0 Fired for the Connected Device | <b>Default</b>  | 65535                                                                                                                                                                                | Event 0 fired for any device |
|                                        | <b>Level</b>    | ADVANCED                                                                                                                                                                             |                              |
|                                        | <b>Address</b>  | 512                                                                                                                                                                                  |                              |
|                                        | <b>Function</b> | If the j-th bit is worth 1, event 0 is fired. This means that ES851 will NOT ignore this device when checking the connection status, and that this device can cause event 0 to fire. |                              |

| Modbus Address | Bits | Devices | Bit Description                                             |
|----------------|------|---------|-------------------------------------------------------------|
| 512            | 0-15 | 1-16    | If the i-th bit = 1, Event 0 for the i-th device has fired. |

Table 10: Bit-map for Event 0 firing for the connected devices.



**NOTE**

Event 0 is generated from the Data Logger when a device cannot be reached for 3 consecutive times.

## 6. SCAN DEVICE 11-40 MENU

This menu is an extension of the DATA LOGGING CONSOLE menu displaying only the first 10 detected devices. After scanning, the parameters relating to devices 11-40 are displayed.

| Parameter                          | FUNCTION                                    | Access Level | MODBUS Address     |
|------------------------------------|---------------------------------------------|--------------|--------------------|
| C175-a ÷ C180-a<br>C480-a ÷ C503-a | Connected Device ID                         | ADVANCED     | 175-180<br>480-503 |
| C175-b ÷ C180-b<br>C480-b ÷ C503-b | Type of the Connected Device                | ADVANCED     | 175-180<br>480-503 |
| M204, M205                         | Boxing of the Connected Device              | ADVANCED     | 204, 205           |
| M207, M208                         | Recognition of the Connected Device         | ADVANCED     | 207, 208           |
| C239, C240                         | Logging for the "Extended" Connected Device | ADVANCED     | 239, 240           |
| M510, M511                         | Event 0 Activated for the Connected Device  | ADVANCED     | 510, 511           |

Table 11: List of parameters and measures, Scan Device 11-40

C175a ÷ C180a, C480a ÷ C503a Connected Device ID

|                                 |               |                                                                                                                                                               |         |
|---------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| C175a ÷ C180a,<br>C480a ÷ C503a | Range         | 0 ÷ 255                                                                                                                                                       | 0 ÷ 255 |
| Connected Device ID             | Default Level | 0                                                                                                                                                             | 0       |
|                                 | Address       | 175 ÷ 180, 480 ÷ 503                                                                                                                                          |         |
|                                 | Function      | The high byte of the parameters at these addresses represents the routing ID of the device detected when SCANNING.<br>IMPORTANT: This parameter is read-only. |         |

**C175b ÷ C180b, C480b ÷ C503b Type of Connected Device**

|                                 |          |                                                                                                                                                                                                               |                       |                     |
|---------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|
| C175b ÷ C180b,<br>C480b ÷ C503b | Range    | 0 ÷ 100                                                                                                                                                                                                       | 0: No Device Detected | 19: AS              |
|                                 |          |                                                                                                                                                                                                               | 1: ST                 | 20: DB              |
|                                 |          |                                                                                                                                                                                                               | 2: SM                 | 21: DC              |
|                                 |          |                                                                                                                                                                                                               | 3: SG                 | 22: IF              |
|                                 |          |                                                                                                                                                                                                               | 4: D4                 | 23: IP              |
|                                 |          |                                                                                                                                                                                                               | 5: D7                 | 24: IZ              |
|                                 |          |                                                                                                                                                                                                               | 6: AM                 | 25: LT              |
|                                 |          |                                                                                                                                                                                                               | 7: PV                 | 26: OD              |
|                                 |          |                                                                                                                                                                                                               | 8: PD                 | 27: PB              |
|                                 |          |                                                                                                                                                                                                               | 9: PM                 | 28: SF              |
|                                 |          |                                                                                                                                                                                                               | 10: PR                | 29: VD              |
|                                 |          |                                                                                                                                                                                                               | 11: PT                | 30: VM              |
|                                 |          |                                                                                                                                                                                                               | 12: NG                | 31: VN              |
|                                 |          |                                                                                                                                                                                                               | 13: IP                | 32: VT              |
|                                 |          |                                                                                                                                                                                                               | 14: DL                | 33: AO              |
|                                 |          |                                                                                                                                                                                                               | 15: IK                | 34: DI              |
|                                 |          |                                                                                                                                                                                                               | 16: VK                | 35: DO              |
|                                 |          |                                                                                                                                                                                                               | 17: LK                | 36: QF              |
|                                 |          |                                                                                                                                                                                                               | 18: AC                | ....                |
|                                 |          |                                                                                                                                                                                                               |                       | 100: Unknown Device |
| Type of Connected Device        | Default  | 0                                                                                                                                                                                                             | 0: No Device Detected |                     |
|                                 | Level    | ADVANCED                                                                                                                                                                                                      |                       |                     |
|                                 | Address  | 175 ÷ 180, 480 ÷ 503                                                                                                                                                                                          |                       |                     |
|                                 | Function | The low byte of these parameters indicates the type of device detected when SCANNING. If one or more of these parameters are manually set to 0, the respective devices are ignored from the LOGGING function. |                       |                     |

**M204, M205 Boxing of the Connected Device**

|                                       |                 |                                                                                                                                                                                                                                                                                                                                                            |             |
|---------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>M204, M205</b>                     | <b>Range</b>    | Bit-controlled parameter                                                                                                                                                                                                                                                                                                                                   | See Table 7 |
| <b>Boxing of the Connected Device</b> | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                                                   |             |
|                                       | <b>Address</b>  | 204, 205                                                                                                                                                                                                                                                                                                                                                   |             |
|                                       | <b>Function</b> | If the j-th is worth 1, this means that the respective device has been boxed (i.e. the device will be monitored from the Data Logger, because the variables to be acquired have been entered in the log parameters). If the j-th bit is worth 0, this means that it has not been boxed either because logs are full or because it has not been recognized. |             |

| Modbus Address | Bits | Connected Devices | Bit Description                                                            |
|----------------|------|-------------------|----------------------------------------------------------------------------|
| 204            | 0-8  | 33-40             | If the i-th bit is worth 1, this means that the i-th device has been boxed |
| 205            | 0-15 | 17-32             | If the i-th bit is worth 1, this means that the i-th device has been boxed |

**Table 12: Bit-map of the devices boxed after SCANNING.**

#### M207, M208 Connected Device Recognized

| M207, M208                  | Range    | Bit-controlled parameter                                                                                                                                                                                                                                                                                                                                                                                                             | See Table 8 |
|-----------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Connected Device Recognized | Level    | ADVANCED                                                                                                                                                                                                                                                                                                                                                                                                                             |             |
|                             | Address  | 207, 208                                                                                                                                                                                                                                                                                                                                                                                                                             |             |
|                             | Function | If the j-th bit is worth 0, this means that ES851 has recognized the connected device (i.e. ES851 contains a table including a parameter set which is unique to each device. These parameters are used for programming the Data Logger when BOXING is performed; see APPENDIX). If the j-th bit is worth 1, the connected device has not been recognized because ES851 does not contain the respective table with the parameter set. |             |
|                             |          |                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |

| Modbus Address | Bits | Connected Devices | Bit Description                                                            |
|----------------|------|-------------------|----------------------------------------------------------------------------|
| 207            | 0-8  | 33-40             | If the i-th bit is worth 0, this means that the i-th device has been boxed |
| 208            | 0-15 | 17-32             | If the i-th bit is worth 0, this means that the i-th device has been boxed |

Table 13: Bit-map of the recognized devices.

#### C239, C240 Type of Logging of the Connected Device

| C239, C240                              | Range    | Bit-controlled parameter                                                                                                                                                                                                                                                                      | See Table 9                  |
|-----------------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Type of Logging of the Connected Device | Default  | 0                                                                                                                                                                                                                                                                                             | Standard log for each device |
|                                         | Level    | ADVANCED                                                                                                                                                                                                                                                                                      |                              |
|                                         | Address  | 239, 240                                                                                                                                                                                                                                                                                      |                              |
|                                         | Function | If the j-th is worth 1, this means that the type of logging for the device is "extended", otherwise it is "standard". After SCANNING, ES851 control board will assign the same value to all the devices recognized and boxed based on parameter C161. Each value can be individually changed. |                              |

| Modbus Address | Bit  | Connected Devices | Bit Description                                                                                 |
|----------------|------|-------------------|-------------------------------------------------------------------------------------------------|
| 239            | 0-8  | 33-40             | If the i-th bit is worth 1, this means that "extended" logging is performed for the i-th device |
| 240            | 0-15 | 17-32             | If the i-th bit is worth 1, this means that "extended" logging is performed for the i-th device |

Table 14: Bit-map of the type of logging.

#### M510, M511 Event 0 Fired for the Connected Device

| M510, M511                             | Range    | Bit-controlled parameter                                                                                                                                                                                                        | See Table 10                  |
|----------------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Event 0 Fired for the Connected Device | Default  | 65535                                                                                                                                                                                                                           | Event 0 fired for each device |
|                                        | Level    | ADVANCED                                                                                                                                                                                                                        |                               |
|                                        | Address  | 510, 511                                                                                                                                                                                                                        |                               |
|                                        | Function | If the j-th bit is worth 1, this means that event 0 is activated for the connected device. As a result, ES851 will NOT ignore the device when checking the connection status, so the device is likely to cause the event fired. |                               |

---

| Modbus Address | Bits | Connected Devices | Bit Description                                                    |
|----------------|------|-------------------|--------------------------------------------------------------------|
| 510            | 0-8  | 33-40             | If the i-th bit is worth 1, event "0" for the i-th event has fired |
| 511            | 0-15 | 1-16              | If the i-th bit is worth 1, event "0" for the i-th event has fired |

Table 15: Bit-map of Event 0 fired for the connected devices.

## 7. UPLOAD CONSOLE MENU

The UPLOAD function allows viewing data stored while LOGGING. Upload is possible only if you are using the RemoteDrive/Sunway. The Upload function allows viewing the logs and their sizes and allows selecting the logs to be saved to your computer.

Select logs and press the Start button; the Windows menu for file save pops up, allowing choosing the file destination. All the log filenames have the same root (chosen by the user) and are automatically distinguished by the RemoteDrive/Sunway with an acronym (1, 2, 3, 4, 5, 6, evt) added at the end of the filename. Any log can be deleted after being uploaded from the Options menu in the RemoteDrive/Sunway (see RemoteDrive/Sunway User Manual).

Logs are stored in CSV (Comma Separated Values) format; the created files are read-only file. The RemoteDrive/Sunway also allows recorded data to be graphically represented.

Do the following to activate the Upload function:

- Press the “Scan Logs” button;
- Select the logs to be saved;
- Press Start. The Windows menu for file save pops up;
- Enter the path and name for the file(s) to be saved. The RemoteDrive/Sunway will automatically add the number of the selected log to its filename.
- Once files are saved, you can use the RemoteDrive/Sunway to display and/or graphically represent them (see RemoteDrive/Sunway User Manual).

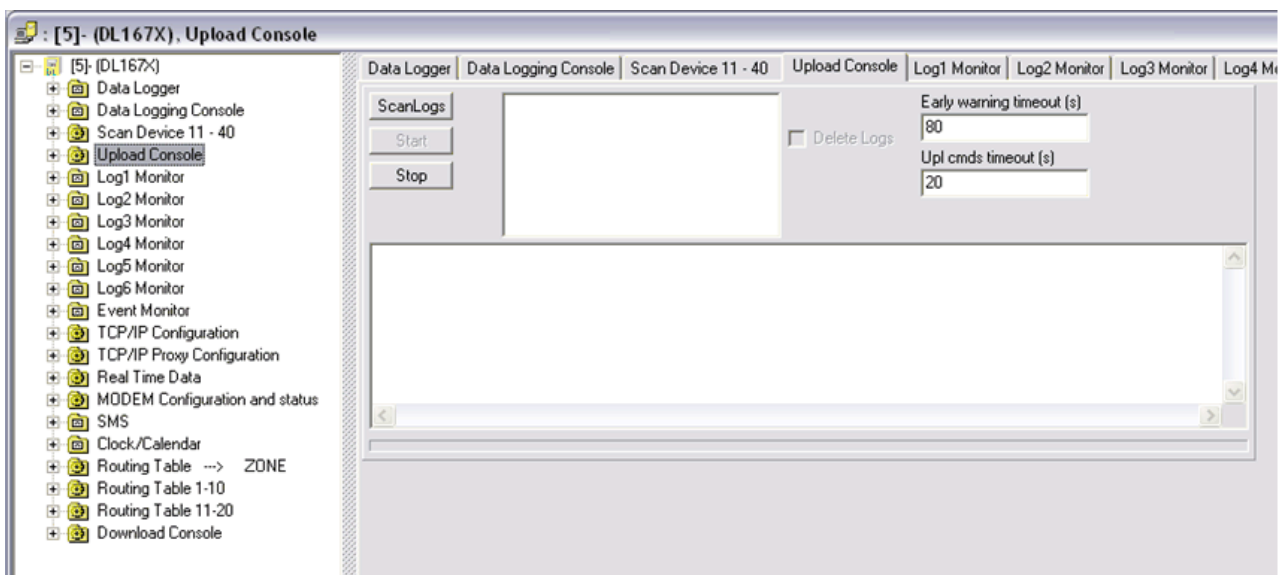


Figure 1: The RemoteDrive/Sunway UPLOAD Console.

## 8. LOG MONITOR MENU

The measures relating to the Log status are contained into 6 menus: "LOG1 MONITOR", "LOG2 MONITOR", "LOG3 MONITOR", "LOG4 MONITOR", "LOG5 MONITOR", "LOG6 MONITOR".

| Parameter                                                  | FUNCTION                                      | Access Level | MODBUS Address                     |
|------------------------------------------------------------|-----------------------------------------------|--------------|------------------------------------|
| M5050, M5051, M5052, M5053, M5054, M5055                   | Log Length                                    | BASIC        | 5050, 5051, 5052, 5053, 5054, 5055 |
| M5057, M5058, M5059, M5060, M5061, M5062                   | Log Status                                    | BASIC        | 5057, 5058, 5059, 5060, 5061, 5062 |
| M5070a-b, M5073a-b, M5076a-b, M5079a-b, M5082a-b, M5085a-b | Year and Month of Activation of the Log       | BASIC        | 5070, 5073, 5076, 5079, 5082, 5085 |
| M5071a-b, M5074a-b, M5077a-b, M5080a-b, M5083a-b, M5086a-b | Day and Time of Activation of the Log         | BASIC        | 5071, 5074, 5077, 5080, 5083, 5086 |
| M5072a-b, M5075a-b, M5078a-b, M5081a-b, M5084a-b, M5087a-b | Minutes and Seconds of Activation of the Logs | BASIC        | 5072, 5075, 5078, 5081, 5084, 5087 |

Table 16: List of the measures in the Log Monitor menu.

### M5050 (M051, M5052, M5053, M5054, M5055) Log Length

|                                                                                                    |          |                                                                    |                |
|----------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------|----------------|
| M5050 (Log 1)<br>M5051 (Log 2)<br>M5052 (Log 3)<br>M5053 (Log 4)<br>M5054 (Log 5)<br>M5055 (Log 6) | Range    | 0 ÷ 2000                                                           | 0 ÷ 2000 Kbyte |
| Log Length                                                                                         | Level    | BASIC                                                              |                |
|                                                                                                    | Address  | 5050, 5051, 5052, 5053, 5054, 5055                                 |                |
|                                                                                                    | Function | Length of the data stored to the FLASH CARD for each log (Kbytes). |                |

### M5057 (M5058, M5059, M5060, M5061, M5062) Log Status

|                                                                                                    |          |                                    |              |
|----------------------------------------------------------------------------------------------------|----------|------------------------------------|--------------|
| M5057 (Log 1)<br>M5058 (Log 2)<br>M5059 (Log 3)<br>M5060 (Log 4)<br>M5061 (Log 5)<br>M5062 (Log 6) | Range    | Bit-controlled measure             | See Table 17 |
| Log Status                                                                                         | Level    | BASIC                              |              |
|                                                                                                    | Address  | 5057, 5058, 5059, 5060, 5061, 5062 |              |
|                                                                                                    | Function | Current status of the logs.        |              |

| Bit N. | Status      | Bit N. | Status                     |
|--------|-------------|--------|----------------------------|
| 0      | Empty Log   | 4      | Locked Log                 |
| 1      | Active Log  | 9      | Wrapped Log                |
| 2      | Stopped Log | 10     | Log Data Fatally Corrupted |
| 3      | Checked Log |        |                            |

Table 17: Bit-map of the Log Status.

M5070a (M073a, M5076a, M5079a, M5082a, M5085a) Year of Activation of the Log

|                                                                                                          |          |                                    |                   |
|----------------------------------------------------------------------------------------------------------|----------|------------------------------------|-------------------|
| M5070a (Log 1)<br>M5073a (Log 2)<br>M5076a (Log 3)<br>M5079a (Log 4)<br>M5082a (Log 5)<br>M5085a (Log 6) | Range    | 0 ÷ 99                             | 2000 ÷ 2099 Years |
| Year of Activation of the Log                                                                            | Level    | BASIC                              |                   |
|                                                                                                          | Address  | 5070, 5073, 5076, 5079, 5082, 5085 |                   |
|                                                                                                          | Function | Year of activation of the log.     |                   |

M5070b (M073b, M5076b, M5079b, M5082b, M5085b, M5088b) Month of Activation of the Log

|                                                                                                          |          |                                    |                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------|----------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M5070b (Log 1)<br>M5073b (Log 2)<br>M5076b (Log 3)<br>M5079b (Log 4)<br>M5082b (Log 5)<br>M5085b (Log 6) | Range    | 1 ÷ 12                             | 1: January<br>2: February<br>3: March<br>4: April<br>5: May<br>6: June<br>7: July<br>8: August<br>9: September<br>10: October<br>11: November<br>12: December |
| Month of Activation of the Log                                                                           | Level    | BASIC                              |                                                                                                                                                               |
|                                                                                                          | Address  | 5070, 5073, 5076, 5079, 5082, 5085 |                                                                                                                                                               |
|                                                                                                          | Function | Month of activation of the log.    |                                                                                                                                                               |

M5071a (M074a, M5077a, M5080a, M5083a, M5086a) Day of Activation of the Log

|                                                                                                          |          |                                    |             |
|----------------------------------------------------------------------------------------------------------|----------|------------------------------------|-------------|
| M5071a (Log 1)<br>M5074a (Log 2)<br>M5077a (Log 3)<br>M5080a (Log 4)<br>M5083a (Log 5)<br>M5086a (Log 6) | Range    | 1 ÷ 31                             | 1 ÷ 31 Days |
| Day of Activation of the Log                                                                             | Level    | BASIC                              |             |
|                                                                                                          | Address  | 5071, 5074, 5077, 5080, 5083, 5086 |             |
|                                                                                                          | Function | Day of activation of the log.      |             |

M5071b (M074b, M5077b, M5080b, M5083b, M5086b) Time (Hours) of Activation of the Log

|                                                                                                          |          |                                                     |              |
|----------------------------------------------------------------------------------------------------------|----------|-----------------------------------------------------|--------------|
| M5071b (Log 1)<br>M5074b (Log 2)<br>M5077b (Log 3)<br>M5080b (Log 4)<br>M5083b (Log 5)<br>M5086b (Log 6) | Range    | 0 ÷ 23                                              | 0 ÷ 23 Hours |
| Time (Hours) of Activation of the Log                                                                    | Level    | BASIC                                               |              |
|                                                                                                          | Address  | 5071, 5074, 5077, 5080, 5083, 5086                  |              |
|                                                                                                          | Function | Time of activation of the log (expressed in hours). |              |

M5072a (M075a, M5078a, M5081a, M5084a, M5087a) Time (Minutes) of Activation of the Log

|                                                                                                          |          |                                                       |            |
|----------------------------------------------------------------------------------------------------------|----------|-------------------------------------------------------|------------|
| M5072a (Log 1)<br>M5075a (Log 2)<br>M5078a (Log 3)<br>M5081a (Log 4)<br>M5084a (Log 5)<br>M5087a (Log 6) | Range    | 0 ÷ 59                                                | 0 ÷ 59 min |
| Time (Minutes) of Activation of the Log                                                                  | Level    | BASIC                                                 |            |
|                                                                                                          | Address  | 5072, 5075, 5078, 5081, 5084, 5087                    |            |
|                                                                                                          | Function | Time of activation of the log (expressed in minutes). |            |

M5072b (M075b, M5078b, M5081b, M5084b, M5087b) Time (Seconds) of Activation of the Log

|                                                                                                          |          |                                                       |            |
|----------------------------------------------------------------------------------------------------------|----------|-------------------------------------------------------|------------|
| M5072b (Log 1)<br>M5075b (Log 2)<br>M5078b (Log 3)<br>M5081b (Log 4)<br>M5084b (Log 5)<br>M5087b (Log 6) | Range    | 0 ÷ 59                                                | 0 ÷ 59 sec |
| Time (Seconds) of Activation of the Log                                                                  | Level    | BASIC                                                 |            |
|                                                                                                          | Address  | 5072, 5075, 5078, 5081, 5084, 5087                    |            |
|                                                                                                          | Function | Time of activation of the log (expressed in seconds). |            |

## 9. EVENT MONITOR MENU

This menu contains the measures relating to the status of the Event Log. The Event Log records the events fired in each device controlled by the Data Logger. Unlike the logs covered in the previous section, the Event log cannot be graphically represented, but it can be viewed as a table from the RemoteDrive/Sunway software.

| Parameter | FUNCTION                                         | Access Level | MODBUS Address |
|-----------|--------------------------------------------------|--------------|----------------|
| M5056     | EVT Log Length                                   | BASIC        | 5056           |
| M5063     | EVT Log Status                                   | BASIC        | 5063           |
| M5088a-b  | Year and Month of Activation of the EVT Log      | BASIC        | 5088           |
| M5089a-b  | Day and Time of Activation of the EVT Log        | BASIC        | 5089           |
| M5090a-b  | Minutes and Seconds of Activation of the EVT Log | BASIC        | 5090           |

Table 18: List of the measures in the Event Monitor menu.

### M5056 EVT Log Length

|                |          |                                                        |                |
|----------------|----------|--------------------------------------------------------|----------------|
| M5056          | Range    | 0 ÷ 2000                                               | 0 ÷ 2000 Kbyte |
| EVT Log Length | Level    | BASIC                                                  |                |
|                | Address  | 5056                                                   |                |
|                | Function | Length in Kbytes of the data stored to the FLASH CARD. |                |

### M5063 EVT Log Status

|                |          |                        |              |
|----------------|----------|------------------------|--------------|
| M5063          | Range    | Bit-controlled measure | See Table 19 |
| EVT Log Status | Level    | BASIC                  |              |
|                | Address  | 5063                   |              |
|                | Function | Status of the EVT Log. |              |

| Bit N. | Status          | Bit N. | Status                     |
|--------|-----------------|--------|----------------------------|
| 0      | EVT Log Empty   | 4      | Locked Log                 |
| 1      | EVT Log Active  | 9      | Wrapped Log                |
| 2      | EVT Log Stopped | 10     | Log Data Fatally Corrupted |
| 3      | EVT Log Checked |        |                            |

Table 19: Bit-map of the Log Status.

#### M5088a Year of Activation of the EVT Log

|                                   |                 |                                    |             |
|-----------------------------------|-----------------|------------------------------------|-------------|
| <b>M5088a</b>                     | <b>Range</b>    | 0 ÷ 99                             | 2000 ÷ 2099 |
| Year of Activation of the EVT Log | <b>Level</b>    | BASIC                              |             |
|                                   | <b>Address</b>  | 5088                               |             |
|                                   | <b>Function</b> | Year of activation of the EVT Log. |             |

#### M5088b Month of Activation of the EVT Log

|                                    |                 |                                     |                                                                                                                                                               |
|------------------------------------|-----------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>M5088b</b>                      | <b>Range</b>    | 1 ÷ 12                              | 1: January<br>2: February<br>3: March<br>4: April<br>5: May<br>6: June<br>7: July<br>8: August<br>9: September<br>10: October<br>11: November<br>12: December |
| Month of Activation of the EVT Log | <b>Level</b>    | BASIC                               |                                                                                                                                                               |
|                                    | <b>Address</b>  | 5088                                |                                                                                                                                                               |
|                                    | <b>Function</b> | Month of activation of the EVT Log. |                                                                                                                                                               |

#### M5089a Day of Activation of the EVT Log

|                                  |                 |                                   |             |
|----------------------------------|-----------------|-----------------------------------|-------------|
| <b>M5089a</b>                    | <b>Range</b>    | 1 ÷ 31                            | 1 ÷ 31 days |
| Day of Activation of the EVT Log | <b>Level</b>    | BASIC                             |             |
|                                  | <b>Address</b>  | 5089                              |             |
|                                  | <b>Function</b> | Day of Activation of the EVT Log. |             |

#### M5089b Time of Activation of the EVT Log

|                                   |                 |                                    |              |
|-----------------------------------|-----------------|------------------------------------|--------------|
| <b>M5089b</b>                     | <b>Range</b>    | 0 ÷ 23                             | 0 ÷ 23 hours |
| Time of Activation of the EVT Log | <b>Level</b>    | BASIC                              |              |
|                                   | <b>Address</b>  | 5089                               |              |
|                                   | <b>Function</b> | Time of Activation of the EVT Log. |              |

M5090a Minutes of Activation of the EVT Log

|                                      |                 |                                       |            |
|--------------------------------------|-----------------|---------------------------------------|------------|
| <b>M5090a</b>                        | <b>Range</b>    | 0 ÷ 59                                | 0 ÷ 59 min |
| Minutes of Activation of the EVT Log | <b>Level</b>    | BASIC                                 |            |
|                                      | <b>Address</b>  | 5090                                  |            |
|                                      | <b>Function</b> | Minutes of activation of the EVT Log. |            |

M5090b Seconds of Activation of the EVT Log

|                                      |                 |                                       |            |
|--------------------------------------|-----------------|---------------------------------------|------------|
| <b>M5090b</b>                        | <b>Range</b>    | 0 ÷ 59                                | 0 ÷ 59 sec |
| Seconds of Activation of the EVT Log | <b>Level</b>    | BASIC                                 |            |
|                                      | <b>Address</b>  | 5090                                  |            |
|                                      | <b>Function</b> | Seconds of activation of the EVT log. |            |

## 10. MODBUS CONFIGURATION MENU

Two serial ports are implemented in ES851 control board. COM1 port is able to operate both as a standard RS232 port (default setting) and as a standard RS485 port, while port COM2 is a standard RS485 port.

If a different baud rate for ports COM1/COM2 is required, the ENGINEERING access level must be selected.



### CAUTION

If you need COM1 to operate as a standard RS485 port, you must state that **ONLY** when ordering the equipment, as this implies both software and hardware modifications.

The Modbus configuration by default of ports COM1 and COM2 is as follows:

| Port | Default                           |
|------|-----------------------------------|
| COM1 | Port enabled in Slave Modbus mode |
| COM2 | Port enabled in Modbus mode       |

Table 20: Default settings for serial ports COM1 and COM2.



### NOTE

You can change the configuration of Modbus COM 1 port by setting parameter R450 to one of the two values relating to serial communications, i.e. "9: Local Serial Slave" or "10: Local Serial Master".



### CAUTION

The parameters in this menu are "R" parameters; they activate only when the device is next powered on.

When multiple ES851 control boards are installed in a PV field, it can be necessary to change their addresses to avoid conflicts. To do so, parameter R297 must be changed following the procedure below.

| Parameter | FUNCTION        | Access Level | MODBUS Address |
|-----------|-----------------|--------------|----------------|
| R297      | ES851 Device ID | ADVANCED     | 297            |

Table 21: Parameter in the Modbus configuration menu.

### R297 ES851 Device ID

| R297            | Range    | 0 ÷ 247                                                                                                                                                                                         | 0 ÷ 247 |
|-----------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| ES851 Device ID | Default  | 1                                                                                                                                                                                               | 1       |
|                 | Level    | ADVANCED                                                                                                                                                                                        |         |
|                 | Address  | 297                                                                                                                                                                                             |         |
|                 | Function | This parameter allows changing the ID of ES851 control board. When multiple ES851 control boards are installed in a PV field, it can be necessary to change their addresses to avoid conflicts. |         |

Procedure for changing the address of ES851 control board:

- Enter the new address for parameter R297;
- Disconnect ES851 control board;
- Reset ES851 control board;
- Connect ES851 control board using the new address;
- Manually disable the old address. Please refer to the ROUTING TABLE 1-10 MENU.

## 11. CONNECTION CONFIGURATION MENU

Parameter R450 contained in this menu allows configuring the connections available for ES851 control board. ES851 Data Logger board supports only one TCP/IP stack that is required for the remote connections and the connections via Ethernet. So, you have to set up the type of TCP/IP connection to be used among Ethernet, analog modem, GSM modem and GPRS modem, or direct null modem.

Parameter R272 is read-only and it sets the type of the selected TCP/IP connection.

The remaining parameters are to be programmed for Ethernet (direct or proxy) connections when no DHCP is present (proxy connection) or when the DHCP is present but cannot be used (direct connection). In that case, a STATIC IP address shall be assigned to ES851.



### CAUTION

The following parameters are R parameters, which activate only after resetting ES851 control board.

| Parameter         | FUNCTION                                    | Access Level | MODBUS Address  |
|-------------------|---------------------------------------------|--------------|-----------------|
| <b>R450</b>       | Type of Connection                          | ADVANCED     | <b>450</b>      |
| <b>R272</b>       | Type of TCP/IP Connection                   | ADVANCED     | <b>272</b>      |
| <b>R276, R277</b> | IP address                                  | ADVANCED     | <b>276, 277</b> |
| <b>R278, R279</b> | Network Mask                                | ADVANCED     | <b>278, 279</b> |
| <b>R247, R248</b> | Gateway                                     | ADVANCED     | <b>247, 248</b> |
| <b>M5037</b>      | Connection Status of the RemoteDrive/Sunway | ADVANCED     | <b>5037</b>     |

Table 22: List of the parameters in the TCP/IP Configuration menu.

## R450 Type of Connection

|                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                              |
|--------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R450               | Range    | 1 ÷ 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1: Proxy Ethernet (DHCP, DNS)<br>2: Proxy GPRS modem<br>3: Direct GSM modem<br>4: Direct analog modem<br>5: Proxy Ethernet (no DHCP, DNS)<br>6: Proxy Ethernet (no DHCP, no DNS)<br>7: Proxy Ethernet (DHCP, no DNS)<br>8: Direct Ethernet<br>9: Local serial slave (COM1)<br>10: Local serial master (COM1) |
|                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                              |
|                    | Default  | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Proxy Ethernet (DHCP, DNS)                                                                                                                                                                                                                                                                                   |
|                    | Level    | ADVANCED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                              |
|                    | Address  | 450                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                              |
| Type of Connection | Function | This parameter sets the connectivity of ES851 Data Logger board. <ul style="list-style-type: none"> <li>Proxy Ethernet (DHCP, DNS): the Link service via the Internet is used for connection. The grid parameters are automatically obtained through a DHCP service, and the name of the Link server is resolved from a DNS service.</li> <li>Proxy GPRS modem: the Link service via the Internet is used for connection. The GPRS modem establishes a connection with the Internet provider, that is the entry point in the network and that provides the networking configurations required. The name of the Link server is resolved from a DNS service. In the dedicated parameters of ES851 Data Logger, enter the provider APN and the SIM card PIN.</li> <li>Direct GSM modem: the connection is established directly between the operator's computer and ES851 Data Logger (this is a point-to-point connection). This configuration ignores the setting for DHCP and DNS, as they do not affect connection. In the dedicated parameters of ES851 Data Logger, enter the SIM card PIN.</li> <li>Direct analog modem: as the direct GSM modem above, but the physical connection is established via an analog modem instead of the GSM network.</li> <li>Proxy Ethernet (no DHCP, DNS): the Link service via the Internet is used for connection. The network is configured by setting parameters P276-P277 (IP address of ES851), P278-P279 (netmask of ES851) and R247-R248 (gateway of ES851). The name of the Link server is resolved from a DNS service.</li> <li>Proxy Ethernet (no DHCP, no DNS): the Link service via the Internet is used for connection. The network is configured by setting parameters P276-P277 IP address of ES851), P278-P279 (netmask of ES851) and R247-R248 (gateway of ES851). The Link server is referred to through its IP address. The ENGINEERING access level is required.</li> <li>Direct Ethernet: direct connection using an Ethernet cable. The IP address (P276-P277), the netmask (P278-P279) and the gateway of ES851 (R247-R248) are to be manually configured.</li> <li>Local serial slave (COM1): link with a serial cable connected to COM1 port of ES851 Data Logger, which is the slave device when communicating using the Modbus protocol.</li> <li>Local serial master (COM1): link with a serial cable connected to COM1 port of ES851 Data Logger, which is the master device when communicating using the Modbus protocol.</li> </ul> |                                                                                                                                                                                                                                                                                                              |
|                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                              |

## R272 Type of TCP/IP Connection

|             |                 |                                                                                   |                                                                                            |
|-------------|-----------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| <b>R272</b> | <b>Range</b>    | 0 ÷ 5                                                                             | 0: Disabled<br>1: Ethernet<br>3: Analog Modem PPP<br>4: GSM Modem PPP<br>5: GPRS Modem PPP |
|             | <b>Level</b>    | ADVANCED                                                                          |                                                                                            |
|             | <b>Address</b>  | 272                                                                               |                                                                                            |
|             | <b>Function</b> | This parameter sets the type of TCP/IP connection. This is a read/only parameter. |                                                                                            |

## R276 IP Address High

|                 |                 |                                                                                 |               |
|-----------------|-----------------|---------------------------------------------------------------------------------|---------------|
| <b>R276</b>     | <b>Range</b>    | 0 ÷ 0xFFFF                                                                      | 0.0 ÷ 255.255 |
|                 | <b>Default</b>  | 0xC0A8                                                                          | 192.168       |
| IP Address High | <b>Level</b>    | ADVANCED                                                                        |               |
|                 | <b>Address</b>  | 276                                                                             |               |
|                 | <b>Function</b> | This parameter sets the two high bytes of the static IP address of ES851 board. |               |

## R277 IP Address Low

|                |                 |                                                                                |               |
|----------------|-----------------|--------------------------------------------------------------------------------|---------------|
| <b>R277</b>    | <b>Range</b>    | 0 ÷ 0xFFFF                                                                     | 0.0 ÷ 255.255 |
|                | <b>Default</b>  | 0x2                                                                            | 0.2           |
| IP Address Low | <b>Level</b>    | ADVANCED                                                                       |               |
|                | <b>Address</b>  | 277                                                                            |               |
|                | <b>Function</b> | This parameter sets the two low bytes of the static IP address of ES851 board. |               |

## R278 IP Mask High

|              |                 |                                                          |               |
|--------------|-----------------|----------------------------------------------------------|---------------|
| <b>R278</b>  | <b>Range</b>    | 0 ÷ 0xFFFF                                               | 0.0 ÷ 255.255 |
|              | <b>Default</b>  | 0xFFFF                                                   | 255.255       |
| IP Mask High | <b>Level</b>    | ADVANCED                                                 |               |
|              | <b>Address</b>  | 278                                                      |               |
|              | <b>Function</b> | This parameter sets the two high bytes of ES851 netmask. |               |

## R279 IP Mask Low

|             |                 |                                                         |               |
|-------------|-----------------|---------------------------------------------------------|---------------|
| <b>R279</b> | <b>Range</b>    | 0 ÷ 0xFFFF                                              | 0.0 ÷ 255.255 |
|             | <b>Default</b>  | 0xFF00                                                  | 255.0         |
| IP Mask Low | <b>Level</b>    | ADVANCED                                                |               |
|             | <b>Address</b>  | 279                                                     |               |
|             | <b>Function</b> | This parameter sets the two low bytes of ES851 netmask. |               |

#### R247 Gateway High

|                     |                 |                                                          |               |
|---------------------|-----------------|----------------------------------------------------------|---------------|
| <b>R247</b>         | <b>Range</b>    | 0 ÷ 0xFFFF                                               | 0.0 ÷ 255.255 |
| <b>Gateway High</b> | <b>Default</b>  | 0x0000                                                   | 0.0           |
|                     | <b>Level</b>    | ADVANCED                                                 |               |
|                     | <b>Address</b>  | 247                                                      |               |
|                     | <b>Function</b> | This parameter sets the two high bytes of ES851 gateway. |               |

#### R248 Gateway Low

|                    |                 |                                                         |               |
|--------------------|-----------------|---------------------------------------------------------|---------------|
| <b>R248</b>        | <b>Range</b>    | 0 ÷ 0xFFFF                                              | 0.0 ÷ 255.255 |
| <b>Gateway Low</b> | <b>Default</b>  | 0x0000                                                  | 0.0           |
|                    | <b>Level</b>    | ADVANCED                                                |               |
|                    | <b>Address</b>  | 248                                                     |               |
|                    | <b>Function</b> | This parameter sets the two low bytes of ES851 gateway. |               |

## 12. TCP/IP PROXY CONFIGURATION MENU

This menu includes some parameters and measures for the connection to the Internet via proxy server. In particular, this menu allows enabling the DHCP, writing the APN (for GPRS connections) and monitoring the DHCP status, the IP address assigned to ES851 and the IP address of the proxy server resolved by the DNS.

| Parameter     | FUNCTION | Access Level | MODBUS Address |
|---------------|----------|--------------|----------------|
| P3110 ÷ P3139 | APN      | ADVANCED     | 3110           |

Table 23: List of the parameters in the TCP/IP Proxy Configuration menu.

### P3110 ÷ P3139 APN

|               |          |                                                                      |                  |
|---------------|----------|----------------------------------------------------------------------|------------------|
| P3110 ÷ P3139 | Range    | 30-character string                                                  |                  |
| APN           | Default  | 'web.omnitel.it'                                                     | 'web.omnitel.it' |
|               | Level    | ADVANCED                                                             |                  |
|               | Address  | 3110 ÷ 3139                                                          |                  |
|               | Function | APN for GPRS connection. For TIM customers, the APN is 'IBOX.TIM.IT' |                  |

## 13. REAL TIME DATA MENU

The Real Time Data menu allows configuring ES851 Data Logger when the Link service is activated (more details are given in the REMOTE MONITORING SERVICES User Manual).

The Data Logger periodically sends the last valid record of every log to the Link server. Some status variables of the Data Logger itself are also sent to the Link server. This menu also configures the time period (in minutes) for sending real-time data to the Link server, that is used for the Realtime service of the Remote Monitoring service.

| Parameter | FUNCTION                                      | Access Level | MODBUS Address |
|-----------|-----------------------------------------------|--------------|----------------|
| P578      | Time Period (min.) for Sending Real-time Data | ADVANCED     | 578            |

Table 24: Parameter in the Real Time Data menu.

### P578 Time Period (min.) for Sending Real-time Data

|                                               |                 |                                                                                 |                     |
|-----------------------------------------------|-----------------|---------------------------------------------------------------------------------|---------------------|
| <b>P578</b>                                   | <b>Range</b>    | 5 ÷ 1440                                                                        | 5 ÷ 1440 min (24 h) |
| Time Period (min.) for Sending Real-time Data | <b>Default</b>  | 1441                                                                            | Data send disabled  |
|                                               | <b>Level</b>    | ADVANCED                                                                        |                     |
|                                               | <b>Address</b>  | 578                                                                             |                     |
|                                               | <b>Function</b> | This parameter defines the time period (in minutes) for sending real-time data. |                     |

## 14. MODEM CONFIGURATION AND STATUS MENU

Configuration parameters are required for modem connections, particularly if digital modems are used. The parameters required are the Username and Password for the PPP connection that is established with the modem connection (when using either an analog modem or a digital modem), as well as the PIN for the digital modem (both GSM and GPRS modems).

The default values for Username and Password for the PPP connection are as follows:

|          |      |
|----------|------|
| Username | 1111 |
| Password | 1234 |

These values are to be entered in the mask displayed by the system when establishing a modem connection to the Data Logger. The ENGINEERING access level is required.



### CAUTION

The parameters contained in this menu are R parameters, which activate only after resetting ES851 control board.

| Parameter | FUNCTION     | Access Level | MODBUS Address |
|-----------|--------------|--------------|----------------|
| R287      | SIM Card PIN | ADVANCED     | 287            |

Table 25: Parameter in the Modem Configuration menu.

### P287 SIM Card PIN

|                     |                 |                                                                                                                                                                                                                                                                                                                                                                 |                 |
|---------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>P287</b>         | <b>Range</b>    | 0x0 ÷ 0xFFFF                                                                                                                                                                                                                                                                                                                                                    | "0000" ÷ "FFFF" |
| <b>SIM Card PIN</b> | <b>Default</b>  | 0x0                                                                                                                                                                                                                                                                                                                                                             | "0000"          |
|                     | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                                                        |                 |
|                     | <b>Address</b>  | 287                                                                                                                                                                                                                                                                                                                                                             |                 |
|                     | <b>Function</b> | This parameter sets the four digits of the PIN of the SIM card fitted in the GSM/GPRS modem. The PIN is obtained from the hexadecimal representation of this number. Any digit higher than 9 is intended as the number terminator. The four digits can be entered via display/keypad or via serial link to the inverter where ES851 control board is installed. |                 |

## 15. SMS MENU

ES851 Data Logger board sends an SMS each time an event is stored to the EVENT Log, provided that communication via GSM modem is allowed or that the Link Service via the Internet is activated. To activate this function, in parameters R420, R421, R422 enter the mobile phone number receiving SMS. The SMS sent contains information about the event fired. SMS can be sent only if the LOGGING function is active, otherwise, events cannot be either monitored or logged. Note that the parameters contained in this menu are R parameters, which activate only after resetting ES851.



### CAUTION

The parameters contained in this menu are R parameters, which activate only after resetting ES851 control board.

Any SMS has the following format:

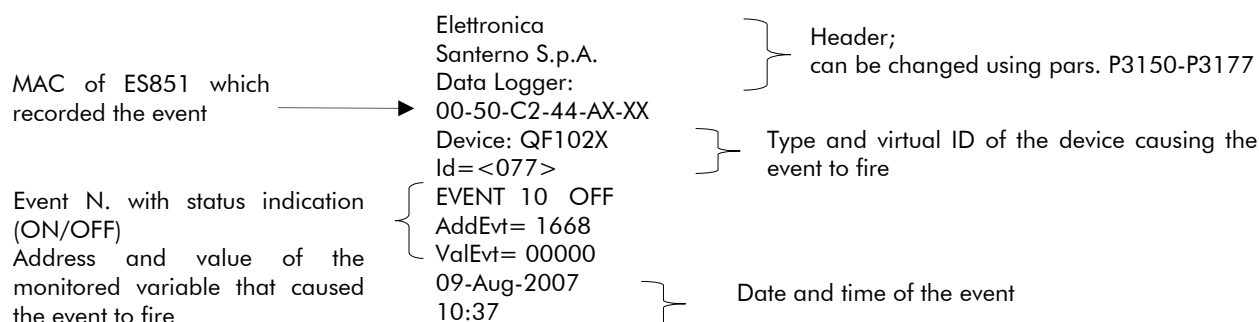


Figure 2: SMS format.



### NOTE

You can configure how to send SMS with the Link service (P580) when establishing a connection via a GPRS modem and for any other type of connection using the Link service. Please contact Elettronica Santerno to configure the SMS format.

| Parameter     | FUNCTION            | Access Level | MODBUS Address |
|---------------|---------------------|--------------|----------------|
| R420 ÷ R422   | Mobile Phone Number | ADVANCED     | 420, 421, 422  |
| M5066         | SMS Status          | ADVANCED     | 5066           |
| P3150 ÷ P3177 | SMS Header          | ADVANCED     | 3150 ÷ 3177    |
| P580          | SMS Mode            | ADVANCED     | 580            |

Table 26: List of the measures and parameters in the SMS menu.

#### R420 Mobile Phone Number

|                            |                 |                                                                                                                                                                                                                                                                                                                                                                                           |                                 |
|----------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>R420 ÷ R422</b>         | <b>Range</b>    | 0x0 ÷ 0xFFFFFFFF                                                                                                                                                                                                                                                                                                                                                                          | "000000000000" ÷ "FFFFFFFFFFFF" |
| <b>Mobile Phone Number</b> | <b>Default</b>  | 0x390000000000                                                                                                                                                                                                                                                                                                                                                                            | "390000000000"                  |
|                            | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                                                                                  |                                 |
|                            | <b>Address</b>  | 420, 421, 422                                                                                                                                                                                                                                                                                                                                                                             |                                 |
|                            | <b>Function</b> | This parameter is composed of three words and contains the mobile phone number receiving SMS sent by ES851. The mobile phone number is represented as hexadecimal digits; it is to be aligned left and any digit higher than 9 is intended as the number terminator. The first two digits are dedicated to the international code. Italy's international code is set as the default code. |                                 |

#### M5068a SMS Status

|                   |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                    |
|-------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>M5068a</b>     | <b>Range</b>    | 0 ÷ 2,4,5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0: No SMS<br>1: SMS Sent<br>2: No Digital Modem<br>3: Modem Not initialized<br>4: Modem Init KO<br>5: SMS KO<br>6: Connection Busy |
| <b>SMS Status</b> | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                    |
|                   | <b>Address</b>  | 5068                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                    |
|                   | <b>Function</b> | This measure indicates the status of the SMS function.<br><b>0: No SMS</b> , No SMS sent.<br><b>1: SMS Sent</b> , Successful SMS.<br><b>2: No Digital Modem</b> , No digital modem is connected, so the SMS function cannot be executed.<br><b>3: Modem Not Initialized</b> , The connected modem is not initialized; no SMS can be sent.<br><b>4: Modem Init KO</b> , Modem initialization failed; no SMS can be sent.<br><b>5: SMS KO</b> , SMS failed.<br><b>6: Connection Busy</b> , SMS will be sent later because the modem connection is busy. |                                                                                                                                    |

#### P3150 ÷ P3177 SMS Header

|                      |                 |                                                                                                            |  |
|----------------------|-----------------|------------------------------------------------------------------------------------------------------------|--|
| <b>P3150 ÷ P3177</b> | <b>Range</b>    | 48-character string (ASCII encoding)                                                                       |  |
| <b>SMS Header</b>    | <b>Default</b>  | Elettronica Santerno S.P.A.<br>Data Logger:                                                                |  |
|                      | <b>Level</b>    | ADVANCED                                                                                                   |  |
|                      | <b>Address</b>  | 3150 ÷ 3177                                                                                                |  |
|                      | <b>Function</b> | This parameter includes three words and the header of the SMS sent by the Data Logger when an event fires. |  |

#### P580 SMS Mode

|                 |                 |                                                                                                                                            |                               |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>P580</b>     | <b>Range</b>    | 0 ÷ 1                                                                                                                                      | 0: GSM/GPRS Modem<br>1: Proxy |
| <b>SMS Mode</b> | <b>Default</b>  | 1                                                                                                                                          | 1: Proxy                      |
|                 | <b>Level</b>    | ADVANCED                                                                                                                                   |                               |
|                 | <b>Address</b>  | 580                                                                                                                                        |                               |
|                 | <b>Function</b> | This parameter indicates if ES851 board will send SMS messages relating to the alarms tripped via a GSM/GPRS modem or via the Link server. |                               |

## 16. CLOCK/CALENDAR MENU

This menu allows updating the clock/calendar of ES851 Data Logger.

ES851 is not currently considering daylight saving time.

It displays its clock/calendar in measure parameters M5010 to M5013. To change the clock/calendar settings, execute a special command (I2013) after storing the new settings of the clock/calendar in parameters P0210 to P2012.



### CAUTION

When the Data Logger is connected to the Link Service, the date and time is automatically set up, so the parameters below must not be changed!

| Parameter | FUNCTION                                  | Access Level | MODBUS Address |
|-----------|-------------------------------------------|--------------|----------------|
| P2010a    | Year To Be Changed                        | ADVANCED     | 2010           |
| P2010b    | Month To Be Changed                       | ADVANCED     | 2010           |
| P2011a    | Day Of The Week To Be Changed             | ADVANCED     | 2011           |
| P2011b    | Day Of The Month To Be Changed            | ADVANCED     | 2011           |
| P2012a    | Time (Hour) To Be Changed                 | ADVANCED     | 2012           |
| P2012b    | Time (Minutes) To Be Changed              | ADVANCED     | 2012           |
| I2013b    | Clock/Calendar Editing Command            | ADVANCED     | 2013           |
| M5010a    | Year                                      | BASIC        | 5010           |
| M5010b    | Month                                     | BASIC        | 5010           |
| M5011a    | Day of the Week                           | BASIC        | 5011           |
| M5011b    | Day of the Month                          | BASIC        | 5011           |
| M5012a    | Hours                                     | BASIC        | 5012           |
| M5012b    | Minutes                                   | BASIC        | 5012           |
| M5013     | Seconds                                   | BASIC        | 5013           |
| P3200     | Time Lag (Hours) of the Local Time Zone   | ADVANCED     | 3200           |
| P3201     | Time Lag (Minutes) of the Local Time Zone | ADVANCED     | 3201           |

Table 27: List of the measures and parameters in the Clock/Calendar menu.

### P2010a Year To Be Changed

|                    |                 |                                                                               |                  |
|--------------------|-----------------|-------------------------------------------------------------------------------|------------------|
| <b>P2010a</b>      | <b>Range</b>    | 0 ÷ 99                                                                        | 2000 ÷ 2099 Year |
| Year To Be Changed | <b>Default</b>  | 0                                                                             | 2000             |
|                    | <b>Level</b>    | ADVANCED                                                                      |                  |
|                    | <b>Address</b>  | 2010                                                                          |                  |
|                    | <b>Function</b> | The high byte of this parameter contains the value of the year to be changed. |                  |

P2010b Month To Be Changed

|                     |                 |                                                                               |                                                                                                                                                               |
|---------------------|-----------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>P2010b</b>       | <b>Range</b>    | 1 ÷ 12                                                                        | 1: January<br>2: February<br>3: March<br>4: April<br>5: May<br>6: June<br>7: July<br>8: August<br>9: September<br>10: October<br>11: November<br>12: December |
| Month To Be Changed | <b>Default</b>  | 1                                                                             | 1: January                                                                                                                                                    |
|                     | <b>Level</b>    | ADVANCED                                                                      |                                                                                                                                                               |
|                     | <b>Address</b>  | 2010                                                                          |                                                                                                                                                               |
|                     | <b>Function</b> | The low byte of this parameter contains the value of the month to be changed. |                                                                                                                                                               |

P2011a Day of the Week To Be Changed

|                               |                 |                                                                                          |                                                                      |
|-------------------------------|-----------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>P2011a</b>                 | <b>Range</b>    | 1 ÷ 7                                                                                    | 1: Mon<br>2: Tues<br>3: Wed<br>4: Thur<br>5: Fri<br>6: Sat<br>7: Sun |
| Day of the Week To Be Changed | <b>Default</b>  | 1                                                                                        | 1: Mon                                                               |
|                               | <b>Level</b>    | ADVANCED                                                                                 |                                                                      |
|                               | <b>Address</b>  | 2011                                                                                     |                                                                      |
|                               | <b>Function</b> | The high byte of this parameter contains the value of the day of the week to be changed. |                                                                      |

P2011b Day of the Month To Be Changed

|                                |                 |                                                                                          |             |
|--------------------------------|-----------------|------------------------------------------------------------------------------------------|-------------|
| <b>P2011b</b>                  | <b>Range</b>    | 1 ÷ 31                                                                                   | 1 ÷ 31 Days |
| Day of the Month To Be Changed | <b>Default</b>  | 1                                                                                        | 1           |
|                                | <b>Level</b>    | ADVANCED                                                                                 |             |
|                                | <b>Address</b>  | 2011                                                                                     |             |
|                                | <b>Function</b> | The low byte of this parameter contains the value of the day of the month to be changed. |             |

P2012a Time (Hour) To Be Changed

|                           |                 |                                                                          |              |
|---------------------------|-----------------|--------------------------------------------------------------------------|--------------|
| <b>P2012a</b>             | <b>Range</b>    | 0 ÷ 23                                                                   | 0 ÷ 23 hours |
| Time (Hour) To Be Changed | <b>Default</b>  | 0                                                                        | 0            |
|                           | <b>Level</b>    | ADVANCED                                                                 |              |
|                           | <b>Address</b>  | 2012                                                                     |              |
|                           | <b>Function</b> | The high byte of this parameter contains the time (hours) to be changed. |              |

**P2012b Time (Minutes) To Be Changed**

|                                     |                 |                                                                                        |                |
|-------------------------------------|-----------------|----------------------------------------------------------------------------------------|----------------|
| <b>P2012b</b>                       | <b>Range</b>    | 0 ÷ 59                                                                                 | 0 ÷ 59 minutes |
| <b>Time (Minutes) To Be Changed</b> | <b>Default</b>  | 0                                                                                      | 0              |
|                                     | <b>Level</b>    | ADVANCED                                                                               |                |
|                                     | <b>Address</b>  | 2012                                                                                   |                |
|                                     | <b>Function</b> | The low byte of this parameter contains the value of the time (minutes) to be changed. |                |

**I2013 Clock/Calendar Editing Command**

|                                       |                 |                                                                                                                                                                                                                                                                                                                                                                                                                               |       |
|---------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>P2013</b>                          | <b>Range</b>    | 0 ÷ 1                                                                                                                                                                                                                                                                                                                                                                                                                         | 0 ÷ 1 |
| <b>Clock/Calendar Editing Command</b> | <b>Default</b>  | 0                                                                                                                                                                                                                                                                                                                                                                                                                             | 0     |
|                                       | <b>Level</b>    | ADVANCED                                                                                                                                                                                                                                                                                                                                                                                                                      |       |
|                                       | <b>Address</b>  | 2013                                                                                                                                                                                                                                                                                                                                                                                                                          |       |
|                                       | <b>Function</b> | <p>If this parameter is set to 1, all values set in parameters P2010 to P2012 are written and stored to the clock/calendar of ES851 and measures M5010 to M5012 are instantly changed.</p> <div>  <b>CAUTION</b> </div> <p>Unchanged parameters are also written to the clock/calendar. Make sure that unchanged parameters are correct.</p> |       |

**M5010a Year**

|               |                 |        |             |
|---------------|-----------------|--------|-------------|
| <b>M5010a</b> | <b>Range</b>    | 0 ÷ 99 | 2000 ÷ 2099 |
|               | <b>Level</b>    | BASIC  |             |
|               | <b>Address</b>  | 5010   |             |
|               | <b>Function</b> | Year.  |             |

**M5010b Month**

|               |                 |        |                                                                                                                                                               |
|---------------|-----------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>M5010b</b> | <b>Range</b>    | 1 ÷ 12 | 1: January<br>2: February<br>3: March<br>4: April<br>5: May<br>6: June<br>7: July<br>8: August<br>9: September<br>10: October<br>11: November<br>12: December |
|               | <b>Level</b>    | BASIC  |                                                                                                                                                               |
|               | <b>Address</b>  | 5010   |                                                                                                                                                               |
|               | <b>Function</b> | Month. |                                                                                                                                                               |

#### M5011a Day of the Week

|        |          |                  |                                                                      |
|--------|----------|------------------|----------------------------------------------------------------------|
| M5011a | Range    | 1 ÷ 7            | 1: Mon<br>2: Tues<br>3: Wed<br>4: Thur<br>5: Fri<br>6: Sat<br>7: Sun |
|        | Level    | BASIC            |                                                                      |
|        | Address  | 5011             |                                                                      |
|        | Function | Day of the week. |                                                                      |

#### M5011b Day of the Month

|        |          |                   |             |
|--------|----------|-------------------|-------------|
| M5011b | Range    | 1 ÷ 31            | 1 ÷ 31 Days |
|        | Level    | BASIC             |             |
|        | Address  | 5011              |             |
|        | Function | Day of the month. |             |

#### M5012a Hour

|        |          |        |              |
|--------|----------|--------|--------------|
| M5012a | Range    | 0 ÷ 23 | 0 ÷ 23 Hours |
|        | Level    | BASIC  |              |
|        | Address  | 5012   |              |
|        | Function | Hour.  |              |

#### M5012b Minutes

|        |          |          |                |
|--------|----------|----------|----------------|
| M5012b | Range    | 0 ÷ 59   | 0 ÷ 59 Minutes |
|        | Level    | BASIC    |                |
|        | Address  | 5012     |                |
|        | Function | Minutes. |                |

#### M5013 Seconds

|       |          |          |                |
|-------|----------|----------|----------------|
| M5013 | Range    | 0 ÷ 59   | 0 ÷ 59 Seconds |
|       | Level    | BASIC    |                |
|       | Address  | 5013     |                |
|       | Function | Seconds. |                |

**P3200 Time Lag (Hours) of the Local Time Zone**

|                                         |                 |                                                                                     |                |
|-----------------------------------------|-----------------|-------------------------------------------------------------------------------------|----------------|
| <b>P3200</b>                            | <b>Range</b>    | -12 ÷ 13                                                                            | -12 ÷ 13 hours |
| Time Lag (Hours) of the Local Time Zone | <b>Default</b>  | 1                                                                                   | 1 hour         |
|                                         | <b>Level</b>    | ADVANCED                                                                            |                |
|                                         | <b>Address</b>  | 3200                                                                                |                |
|                                         | <b>Function</b> | This parameter sets the time lag (in hours) based on the GMT (Greenwich Mean Time). |                |

**P3201 Time Lag (Minutes) of the Local Time Zone**

|                                           |                 |                                                                                   |            |
|-------------------------------------------|-----------------|-----------------------------------------------------------------------------------|------------|
| <b>P3201</b>                              | <b>Range</b>    | 0 ÷ 59                                                                            | 0 ÷ 59 min |
| Time Lag (Minutes) of the Local Time Zone | <b>Default</b>  | 0                                                                                 | 0 min      |
|                                           | <b>Level</b>    | ADVANCED                                                                          |            |
|                                           | <b>Address</b>  | 3201                                                                              |            |
|                                           | <b>Function</b> | Along with P3200, this parameter sets the time lag (in minutes) based on the GMT. |            |

## 17. ROUTING TABLE → ZONE MENU

The Routing Table defines the map containing matches between the ID of the devices connected to ES851 through a given medium (e.g. RS485) and the virtual ID for the device response through ES851 board. A device network is then created; devices can be connected to different media and can be detected and controlled through ES851 in the same way.

When multiple ES851 control boards are networked together, their routing tables are to be properly programmed to avoid any address conflicts. Command I200 along with parameters P200 and P201 allows dividing the routing tables between ZONES with enabled addresses and “disabled” ZONES with no need to operate on each connected device. In that way, each ES851 is allocated to ZONES whose addresses are completely separate from each other.

The function described above is used for complex PV plants. They are virtually composed of ZONES comprising one ES851 control board, the inverter where it is installed and a variable number of monitoring devices (such as Smart String Boxes or I/Os). Each ZONE is characterised by a group of addresses that is assigned to physical devices.



### NOTE

Conventionally, the Data Logger boards are assigned the smallest Modbus address within the Zone, while the inverter where the Data Logger is installed—that has a privileged connection through a dedicated medium (Dual Port RAM)—is assigned the address that comes next. See Table 27.



### CAUTION

The MODBUS CONFIGURATION explains how to change the ID of ES851 Data Logger. The Modbus ID of the Data Logger must NOT range between the values given in parameters P200 and P201. Otherwise, command I200 fails.



### NOTE

Once the address of ES851 has been changed and I200 command has been activated for the subsequent addresses, you have to set up the type of connection between ES851 Data Logger and the inverter where it is installed (ES821 DPR: Dual Port RAM). To do so, select the Engineering level; in the Routing table, change the parameter relating to the inverter address (see the ROUTING TABLE 1-10 MENU).

| ZONE | ES851 Modbus Address | Inverter Modbus Address |
|------|----------------------|-------------------------|
| 1    | 23                   | 24                      |
| 2    | 45                   | 46                      |
| 3    | 67                   | 68                      |
| 4    | 89                   | 90                      |
| 5    | 111                  | 112                     |
| 6    | 133                  | 134                     |

Table 28: Conventional MODBUS addresses.

| Parameter | FUNCTION            | Access Level | MODBUS Address |
|-----------|---------------------|--------------|----------------|
| P200      | ZONE Start ID       | ADVANCED     | 200            |
| P201      | ZONE End ID         | ADVANCED     | 201            |
| I200      | Enable Zone Command | ADVANCED     | 160            |
| M5049     | Enable Zone Status  | ADVANCED     | 5049           |

Table 29: List of the measures and parameters in the Routing Table ---> ZONE menu.

#### P200 ZONE Start ID

|                      |                 |                                                   |         |
|----------------------|-----------------|---------------------------------------------------|---------|
| <b>P200</b>          | <b>Range</b>    | 1 ÷ 160                                           | 1 ÷ 160 |
| <b>ZONE Start ID</b> | <b>Default</b>  | 23                                                | 23      |
|                      | <b>Level</b>    | ADVANCED                                          |         |
|                      | <b>Address</b>  | 200                                               |         |
|                      | <b>Function</b> | Smallest Modbus address for the device detection. |         |

#### P201 ZONE End ID

|                    |                 |                                                   |         |
|--------------------|-----------------|---------------------------------------------------|---------|
| <b>P201</b>        | <b>Range</b>    | 1 ÷ 160                                           | 1 ÷ 160 |
| <b>ZONE End ID</b> | <b>Default</b>  | 44                                                | 44      |
|                    | <b>Level</b>    | ADVANCED                                          |         |
|                    | <b>Address</b>  | 201                                               |         |
|                    | <b>Function</b> | Greatest Modbus address for the device detection. |         |

#### I200 Commands for Zone

|                          |                 |                                                                                                   |                             |
|--------------------------|-----------------|---------------------------------------------------------------------------------------------------|-----------------------------|
| <b>I200</b>              | <b>Range</b>    | 0, 7                                                                                              | 0: No cmd<br>7: Enable zone |
| <b>Commands for Zone</b> | <b>Default</b>  | This is not a parameter. This input is set to 7 at power on and whenever the command is executed. |                             |
|                          | <b>Level</b>    | ADVANCED                                                                                          |                             |
|                          | <b>Address</b>  | 160                                                                                               |                             |
|                          | <b>Function</b> | Zone enable command.                                                                              |                             |

#### M5049 Zone Executed

|                      |                 |                                                           |                                                               |
|----------------------|-----------------|-----------------------------------------------------------|---------------------------------------------------------------|
| <b>M5049</b>         | <b>Range</b>    | 0, 15 ÷ 17                                                | 0: None<br>15: Zone in progress<br>16: Zone OK<br>17: Zone KO |
| <b>Zone Executed</b> | <b>Level</b>    | ADVANCED                                                  |                                                               |
|                      | <b>Address</b>  | 5049                                                      |                                                               |
|                      | <b>Function</b> | This measure shows the status of the Zone Enable command. |                                                               |

## 18. ROUTING TABLE 1-10 MENU

This menu displays the configuration of the Routing Table from address 1 to address 10 and allows manual changes to the Routing Table.

The first two locations (Virtual Address 1 and Virtual Address 2) in the table are dedicated to ES851 board (factory presetting for Virtual Address 1) and to the inverter where ES851 is installed (Virtual Address 2). The remaining locations are free for the other devices connected to the plant.

Besides displaying the active devices, this menu also allows changing the zone configuration by individually selecting their valid Modbus addresses.



**NOTE**

The virtual addresses of the Routing Table are 160, but when the ADVANCED access level is selected, only the first 10 location of the Routing Table can be viewed. Select the ENGINEERING level to access the remaining locations.

| Parameter    | FUNCTION                           | Access Level | MODBUS Address |
|--------------|------------------------------------|--------------|----------------|
| P00a ÷ P009a | Medium for Virtual Address 1-10    | ADVANCED     | 0 -9           |
| P00b ÷ P009b | Device ID for Virtual Address 1-10 | ADVANCED     | 0 -9           |
| P00c ÷ P009c | Virtual Address 1-10 Enable        | ADVANCED     | 0 -9           |

Table 30: List of the parameters in the Routing Table menu.

**P00a ÷ P009a Medium for Virtual Address 1-10**

|                                        |                 |                                                                                                             |                                                                      |
|----------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>P00a ÷ P009a</b>                    | <b>Range</b>    | 0 ÷ 3                                                                                                       | 0: ES851 Local<br>1: ES821 DPR<br>2: RS232 Modbus<br>3: RS485 Modbus |
| <b>Medium for Virtual Address 1-10</b> | <b>Default</b>  | Virtual address 0: ES851 Local<br>Virtual address 1: ES821 DPR<br>Remaining virtual addresses: RS485 Modbus |                                                                      |
|                                        | <b>Level</b>    | ADVANCED                                                                                                    |                                                                      |
|                                        | <b>Address</b>  | 0 - 9                                                                                                       |                                                                      |
|                                        | <b>Function</b> | You can select the medium for the virtual address assigned to this parameter.                               |                                                                      |
|                                        |                 |                                                                                                             |                                                                      |

**P00b ÷ P009b Device ID for Virtual Address 1-10**

|                                           |                 |                                                                                                         |         |
|-------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------|---------|
| <b>P00b ÷ P009b</b>                       | <b>Range</b>    | 1 ÷ 247                                                                                                 | 1 ÷ 247 |
| <b>Device ID for Virtual Address 1-10</b> | <b>Default</b>  | 1                                                                                                       | 1       |
|                                           | <b>Level</b>    | ADVANCED                                                                                                |         |
|                                           | <b>Address</b>  | 0 - 9                                                                                                   |         |
|                                           | <b>Function</b> | You can set up the real address of the device mapped to the virtual address assigned to this parameter. |         |
|                                           |                 |                                                                                                         |         |

**P00c ÷ P009c Virtual Address 1-10 Enable**

|                                    |                 |                                                                                       |                                                           |
|------------------------------------|-----------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------|
|                                    | <b>Range</b>    | 0 ÷ 1                                                                                 | 0: Virtual Address Disabled<br>1: Virtual Address Enabled |
| <b>Virtual Address 1-10 Enable</b> | <b>Default</b>  | 1                                                                                     | 1: Virtual Address Disabled                               |
|                                    | <b>Level</b>    | ADVANCED                                                                              |                                                           |
|                                    | <b>Address</b>  | 0 - 9                                                                                 |                                                           |
|                                    | <b>Function</b> | You can enable or disable the map for the virtual address assigned to this parameter. |                                                           |
|                                    |                 |                                                                                       |                                                           |

## 19. DOWNLOAD CONSOLE MENU

The Download function allows downloading the configuration files of the log parameters (see APPENDIX). This function is available only when using the RemoteDrive/Sunway software. The files contained in ES851 Data Logger can be individually deleted.

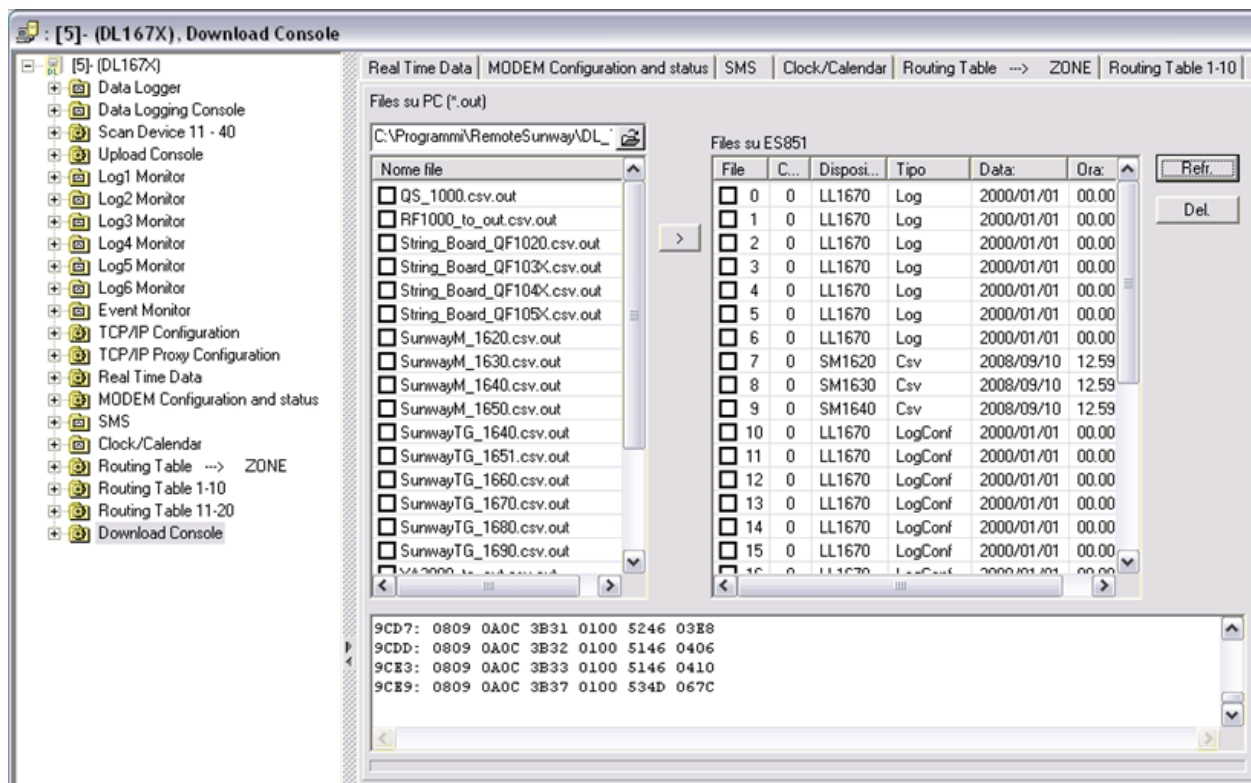


Figure 3: DOWNLOAD Console as displayed in the RemoteDrive/Sunway.

Press the Refr. button to view the files contained in ES851 Data Logger board. Each file can be individually selected and deleted by pressing the Del. button.

The file download allows configuring the DL Tables, i.e. the files allowing ES851 Data Logger to recognize each connected device. The variables to be monitored and recorded for each device can be recognized as well. The extension for the configuration files is ".out". These files can be downloaded from the download section of Elettronica Santerno's website.

To do so, point to the directory of the PC; all the available ".out" files are viewed on the left of the screen. Press the ">" button to download the selected files.

## 20. APPENDIX

The sections below include the tables containing the references of the variables monitored while LOGGING. They can vary depending on the type of device and its software version; please visit [www.elettronicasanterno.com](http://www.elettronicasanterno.com) for any updates. Updates or tables relating to new devices can be downloaded using the special function implemented in ES851 (Download Console function) that can be used with the RemoteDrive/Sunway (see the DOWNLOAD CONSOLE MENU).

LOGGING is currently available for the following products manufactured by Elettronica Santerno: Sunway TG, Sunway M XR, Smart String Box, Penta Drive, Multipump Penta, Regenerative Penta and String Box.

### 20.1. Sunway TG (ST)

#### Standard Mode

| Parameter | Modbus Address | Description                  | Type of Log |
|-----------|----------------|------------------------------|-------------|
| M013      | 1504,1505      | Energy Delivered to the Grid | SLOW Log    |
| A1-FL01   | 7712           | Last Alarm Tripped           | SLOW Log    |
| M10       | 1509           | PV Field Voltage             | FAST Log    |
| M003      | 1498           | Active Power Delivered       | FAST Log    |
| M007      | 1502           | Grid Voltage                 | FAST Log    |
| M024      | 1674           | Module Radiation             | FAST Log    |
| M089      | 1494           | Inverter Status              | FAST Log    |

#### Extended Mode – Additional Parameters

| Parameter | Modbus Address | Description          | Type of Log |
|-----------|----------------|----------------------|-------------|
| M000      | 1508           | PV-Voltage Reference | SLOW Log    |
| M19       | 1669           | Grid KO Events       | SLOW Log    |
| M20       | 1670           | Radiation KO Events  | SLOW Log    |
| M21       | 1671,1672      | Delivery Time        | FAST Log    |
| M001      | 1497           | Grid Frequency       | FAST Log    |
| M009      | 1503           | Grid Current         | FAST Log    |
| M012      | 1511           | PV Field Power       | FAST Log    |
| M025      | 1675           | Ambient Measure 2    | FAST Log    |
| M026      | 1676           | Ambient Measure 3    | FAST Log    |
| M027      | 1677           | Ambient Measure 4    | FAST Log    |

#### Event Parameters:

| Trigger Par. | Modbus Address | Description   |
|--------------|----------------|---------------|
| MOXX         | 3400           | Alarm Tripped |

| Detected Parameter | Modbus Address | Description            |
|--------------------|----------------|------------------------|
| FL01c              | 7717           | Inverter Status        |
| FL01s              | 7731           | Active Power Delivered |

## 20.2. Sunway M XR (SM)

### Standard Mode

| Parameter | Modbus Address | Description                  | Type of Log |
|-----------|----------------|------------------------------|-------------|
| M010      | 1661,1662      | Energy Delivered to the Grid | SLOW Log    |
| A1-FL01   | 7712           | Last Alarm Tripped           | SLOW Log    |
| M000      | 1650           | PV Field Voltage             | FAST Log    |
| M004      | 1654           | Grid Voltage                 | FAST Log    |
| M008      | 1658           | Active Power Delivered       | FAST Log    |
| M050      | 1739           | Inverter Status              | FAST Log    |
| M110      | 1564           | Module Radiation             | FAST Log    |

### Extended Mode – Additional Parameters

| Parameter | Modbus Address | Description          | Type of Log |
|-----------|----------------|----------------------|-------------|
| M015      | 1669           | Grid KO Events       | SLOW Log    |
| M016      | 1670           | Radiation KO Events  | SLOW Log    |
| M009      | 1659,1660      | Delivery Time        | SLOW Log    |
| M002      | 1652           | PV-Field Current     | FAST Log    |
| M005      | 1655           | Grid Frequency       | FAST Log    |
| M006      | 1656           | Grid Current         | FAST Log    |
| M111      | 1565           | Horizontal Radiation | FAST Log    |
| M112      | 1566           | Ambient Temperature  | FAST Log    |
| M113      | 1567           | Module Temperature   | FAST Log    |
| M114      | 1568           | Ambient Measure      | FAST Log    |

### Event Parameters:

| Trigger Par. | Modbus Address | Description   |
|--------------|----------------|---------------|
| MOXX         | 3400           | Alarm Tripped |

| Detected Parameter | Modbus Address | Description            |
|--------------------|----------------|------------------------|
| FL01c              | 7717           | Inverter Status        |
| FL01v              | 7735           | Active Power Delivered |

## 20.3. Smart String Box (QF)

### Standard Mode

| Parameter | Modbus Address | Description                          | Type of Log |
|-----------|----------------|--------------------------------------|-------------|
| M009      | 1659           | Average Current                      | FAST Log    |
| M010      | 1660           | Maximum Current                      | FAST Log    |
| M011      | 1661           | Minimum Current                      | FAST Log    |
| M014      | 1664           | Module Temperature                   | FAST Log    |
| M020      | 1670           | String Performance Status+ Board I/O | FAST Log    |

### Extended Mode – Additional Parameters

| Parameter | Modbus Address | Description         | Type of Log |
|-----------|----------------|---------------------|-------------|
| M001      | 1651           | String 1 Current    | FAST Log    |
| M002      | 1652           | String 2 Current    | FAST Log    |
| M003      | 1653           | String 3 Current    | FAST Log    |
| M004      | 1654           | String 4 Current    | FAST Log    |
| M005      | 1655           | String 5 Current    | FAST Log    |
| M006      | 1656           | String 6 Current    | FAST Log    |
| M007      | 1657           | String 7 Current    | FAST Log    |
| M008      | 1658           | String 8 Current    | FAST Log    |
| M015      | 1665           | Ambient Temperature | FAST Log    |

### Event Parameters:

| Trigger Par. | Modbus Address | Description                |
|--------------|----------------|----------------------------|
| M018         | 1668           | Alarm Tripped/String Theft |

| Detected Parameter | Modbus Address | Description     |
|--------------------|----------------|-----------------|
| M019               | 1669           | Strings KO      |
| M009               | 1659           | Average Current |

## 20.4. Penta Drive (PD)

### Standard Mode

| Parameter | Modbus Address | Description         | Type of Log |
|-----------|----------------|---------------------|-------------|
| M062      | 1712           | Ambient Temperature | SLOW Log    |
| M002      | 1652           | Speed Ramp Output   | FAST Log    |
| M004      | 1654           | Motor Speed         | FAST Log    |
| M006      | 1656           | Output Frequency    | FAST Log    |
| M026      | 1676           | Output Current      | FAST Log    |
| M027      | 1677           | Output Voltage      | FAST Log    |

### Extended Mode – Additional Parameters

| Parameter | Modbus Address | Description            | Type of Log |
|-----------|----------------|------------------------|-------------|
| M064      | 1714           | IGBT Temperature       | SLOW Log    |
| M028      | 1678           | Output Power           | FAST Log    |
| M031      | 1681           | Delayed Digital Inputs | FAST Log    |
| M056      | 1706           | Digital Outputs        | FAST Log    |
| M089      | 1739           | Drive Status           | FAST Log    |
| M090      | 1740           | Alarm Tripped          | FAST Log    |

## 20.5. Multipump Penta (PM)

### Standard Mode

| Parameter | Modbus Address | Description                                      | Type of Log |
|-----------|----------------|--------------------------------------------------|-------------|
| M621      | 1951, 1952     | Operating Time of Pump 1                         | SLOW Log    |
| M623      | 1953, 1954     | Operating Time of Pump 2                         | SLOW Log    |
| M625      | 1955, 1956     | Operating Time of Pump 3                         | SLOW Log    |
| M627      | 1957, 1958     | Operating Time of Pump 4                         | SLOW Log    |
| M629      | 1959, 1960     | Operating Time of Pump 5                         | SLOW Log    |
| M600      | 1551           | Available Pumps                                  | FAST Log    |
| M601      | 1552           | Pumps On                                         | FAST Log    |
| M604      | 1555           | Status of Serial Communications to Slave Devices | FAST Log    |
| M605      | 1556           | Multipump Operating Conditions                   | FAST Log    |
| M006      | 1656           | Output Frequency                                 | FAST Log    |

### Extended Mode – Additional Parameters

| Parameter | Modbus Address | Description                   | Type of Log |
|-----------|----------------|-------------------------------|-------------|
| M062      | 1712           | Ambient Temperature           | SLOW Log    |
| M018      | 1668           | PID Reference at Constant RPM | FAST Log    |
| M022      | 1672           | PID Output                    | FAST Log    |
| M020      | 1670           | PID Feedback                  | FAST Log    |
| M026      | 1676           | Output Current                | FAST Log    |
| M028      | 1678           | Output Power                  | FAST Log    |
| M031      | 1681           | Delayed Digital Inputs        | FAST Log    |
| M056      | 1706           | Delayed Digital Outputs       | FAST Log    |
| M089      | 1739           | Drive Status                  | FAST Log    |
| M090      | 1740           | Alarm Tripped                 | FAST Log    |

## 20.6. Regenerative Penta (PR)

### Standard Mode

| Parameter | Modbus Address | Description              | Type of Log |
|-----------|----------------|--------------------------|-------------|
| M562      | 1712           | Ambient Temperature      | SLOW Log    |
| M564      | 1714           | IGBT Temperature         | SLOW Log    |
| M501      | 1651           | DC-Bus Voltage           | FAST Log    |
| M502      | 1652           | Mains Voltage            | FAST Log    |
| M503      | 1653           | Drive Current            | FAST Log    |
| M504      | 1654           | Mains Frequency          | FAST Log    |
| M505      | 1655           | Active Power Delivered   | FAST Log    |
| M506      | 1656           | Reactive Power Delivered | FAST Log    |
| M508      | 1658           | Power Factor             | FAST Log    |
| M515      | 1665           | PLL Status               | FAST Log    |
| M516      | 1666           | Status of Mains 2        | FAST Log    |
| M517      | 1667           | Status of Mains 1        | FAST Log    |

### Extended Mode – Additional Parameters

| Parameter | Modbus Address | Description     | Type of Log |
|-----------|----------------|-----------------|-------------|
| M531      | 1681           | Digital Inputs  | FAST Log    |
| M556      | 1706           | Digital Outputs | FAST Log    |
| M589      | 1739           | Drive Status    | FAST Log    |
| M590      | 1740           | Alarm Tripped   | FAST Log    |

---

## 20.7. String Box (QS)

---

### Standard Mode

| Parameter | Modbus Address | Description      | Type of Log |
|-----------|----------------|------------------|-------------|
| Ist1      | 14             | String 1 Current | SLOW Log    |
| Ist1      | 14             | String 1 Current | FAST Log    |
| Ist2      | 15             | String 2 Current | FAST Log    |
| Ist3      | 16             | String 3 Current | FAST Log    |
| Ist4      | 17             | String 4 Current | FAST Log    |

### Extended Mode – Additional Parameters

| Parameter | Modbus Address | Description      | Type of Log |
|-----------|----------------|------------------|-------------|
| Ist5      | 18             | String 5 Current | FAST Log    |
| Ist6      | 19             | String 6 Current | FAST Log    |
| Ist7      | 20             | String 7 Current | FAST Log    |
| Ist8      | 21             | String 8 Current | FAST Log    |