USER MANUAL
COMBOX.M - Modular energy management data concentrator
COMBOX

COMBOX.M
MODULAR ENERGY MANAGEMENT DATA CONCENTRATOR

User manual
V1.1
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1. INFORMATION ABOUT THE DOCUMENT

1.1. DOCUMENT DATA

<table>
<thead>
<tr>
<th>Title</th>
<th>User Manual: ComBox.M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtitle</td>
<td>Modular energy management controller</td>
</tr>
<tr>
<td>Document type</td>
<td>User Manual</td>
</tr>
<tr>
<td>Version</td>
<td>V 1.1</td>
</tr>
</tbody>
</table>

1.2. DISCLAIMER

All rights to this manual and the information contained herein are the property of Solvera Lynx. Reproduction, use or disclosure to third parties without expressed permission is prohibited.

Solvera Lynx reserves the right to change the technical specifications of its products without notice in writing and urges its customers to make sure that the information they have is valid.

1.3. TECHNICAL SUPPORT

If you have technical problems or cannot find the required information in the provided documents, contact our Technical Support by e-mail using our dedicated e-mail address: helpdesk@solvera-lynx.com. Your request will be processed as soon as possible.

Solvera Lynx d.o.o.
Stegne 23A
SI-1000 Ljubljana
Slovenia
Email: info@solvera-lynx.com
Phone: +386 1 40 12 860
Fax: +386 1 40 12 861
2. MAIN ENERGY MANAGEMENT MODULE (SL-COMBOX.1)

2.4. TECHNICAL SPECIFICATIONS

- ComBox.M (SL-ComBox.1) is a high performance embedded master module based on Texas instruments AM335x CPU, designed to allow interconnections between various devices and protocols. The modular design of the ComBox.M allows users to connect various communication modules, port extenders, etc. ComBox.M features external communication to Internet over integrated Ethernet network interface or/and GSM module, integrated to digital inputs, serial interface with RS485 or RS232 with flow control, USB OTG connection.

- Power supply from internal BUS 5VDC
- Max. power consumption 5 W
- Dimensions (L x W x H) 90 x 53 x 60 mm
- Weight 40 g
- Operation temperature from -40 to 85 °C
- Ambient humidity max. 95 %, no condensation
- Mounting position vertical on DIN-rail
- Pollution degree 2
- Protection class IP 30
- Connection type: screw type connector for stranded wire 0.75 to 2.5 mm²

2.4. CONNECTION SCHEME

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>INPUT</th>
<th>CONNECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN 1</td>
<td>D1</td>
<td></td>
</tr>
<tr>
<td>PIN 2</td>
<td>D1</td>
<td></td>
</tr>
<tr>
<td>PIN 3</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>PIN 4</td>
<td>RS232-RX</td>
<td></td>
</tr>
<tr>
<td>PIN 5</td>
<td>RS232-TX</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>INPUT</th>
<th>CONNECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN 6</td>
<td>RS232-RTS</td>
<td></td>
</tr>
<tr>
<td>PIN 7</td>
<td>RS232-CTS</td>
<td></td>
</tr>
<tr>
<td>PIN 8</td>
<td>RS485-A</td>
<td></td>
</tr>
<tr>
<td>PIN 9</td>
<td>RS485-B</td>
<td></td>
</tr>
<tr>
<td>PIN 10</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>
### JUMPER 1 FOR RS485.2

<table>
<thead>
<tr>
<th></th>
<th>RS485 TERMINATION ON (DEFAULT)</th>
<th>RS485 TERMINATION OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Jumper 1 RS485 ON" /></td>
<td><img src="image" alt="Jumper 1 RS485 OFF" /></td>
</tr>
</tbody>
</table>

### JUMPER 2

<table>
<thead>
<tr>
<th></th>
<th>RS485</th>
<th>RS232</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Jumper 2 RS485" /></td>
<td><img src="image" alt="Jumper 2 RS232" /></td>
</tr>
</tbody>
</table>

### POWER(PWR) LED

<table>
<thead>
<tr>
<th>POWER(PWR) LED</th>
<th>GREEN LED: INDICATES COMBOX.M STATE</th>
<th>ON: NORMAL POWER OPERATION OFF: NO POWER SUPPLY</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Power LED" /></td>
<td><img src="image" alt="Power LED" /></td>
<td><img src="image" alt="Power LED" /></td>
</tr>
</tbody>
</table>

### STATUS LED

<table>
<thead>
<tr>
<th>STATUS LED</th>
<th>GREEN LED: INDICATES COMBOX.M OPERATION STATE</th>
<th>USER PROGRAMMABLE LED</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Status LED" /></td>
<td><img src="image" alt="Status LED" /></td>
<td><img src="image" alt="Status LED" /></td>
</tr>
</tbody>
</table>

### RESET BUTTON

<table>
<thead>
<tr>
<th>S1</th>
<th>RESET BUTTON</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Reset Button" /></td>
<td><img src="image" alt="Reset Button" /></td>
</tr>
</tbody>
</table>
3. MOUNTING INSTRUCTIONS

WARNING

- All connections, attachments, and assembling must be done while the module is not connected to the main power supply.

- Switch OFF main power
- Mount SL-COMBOX.1 module to the provided place inside an panel (DIN EN50022-35 rail)
- Mount other modules (GSM modem, SL- RS232.2, SI - RS485.2, etc.) if required. Mount each module to the DIN rail first, then attach modules through bus connectors
- Connect devices and sensor wires according to the connection scheme in the previous section
- Switch ON main power supply
- Green Power LED should turn on

Dismount in reverse order. For mounting/dismounting modules to/from DIN rail a free space of at least one module must be left on the DIN rail.
4. SERIAL COMMUNICATION MODULE: SL- RS232.2

4.1. TECHNICAL SPECIFICATIONS

- Serial ports: 2x RS232
- Power supply: 5V
- Nominal power: 0.5 W
- Integrated galvanic isolation on both ports: RS232 is isolated from LynxBus (up to 2500 Vrms for time up to 1 minute, 500 V constant peak)
- GND connection: RS232 are not separated from each other, they have common Ground

5. SERIAL COMMUNICATION MODULE: SL- RS485.2

5.1. TECHNICAL SPECIFICATIONS

- Serial ports: TOP 1xRS485, bottom 1xRS232
- Power supply: 5 V
- Nominal power: 0.6 W
- Integrated galvanic isolation on both ports: RS232 and RS485 (up to 2500 Vrms for time up to 1 minute, 500 V peak constant)
- Termination for RS485: external required
- GND connection: RS232 and RS485 separated from each other
6. POWER SUPPLY MODULE: SL-PS.1

6.1. TECHNICAL SPECIFICATIONS

- Power supply: 17-35 V (polarity protection, overcurrent protection)
- Maximum input power: 96 W
- Self consumption: 1.3 W (24 V)
- F1 fuse value (INPUT): 4 A
- F2 fuse value (24V_OUT): 1 A
- Current limit: -5 V: 2 A
  - 12 V: 0.5 A
  - 15 V: 2 A
  - 24 V: 1 A
- LED indication:

<table>
<thead>
<tr>
<th>24 V IN</th>
<th>PCB power supply is connected properly, fuse F1 conducts electric current</th>
<th>if LED is not ON, check power polarity and fuse F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>V, 12 V, 15 V, 24 V</td>
<td>State of power supplies</td>
<td>if any of LEDs are not ON, means that power supply is in short circuit or it does not work</td>
</tr>
<tr>
<td>24 OUT</td>
<td>State of 24 V OUT output clamp</td>
<td>if LED is not ON, fuse F2 burned out – output overload. If beside fuse F2, LED is not on, then 24 V is in short circuit or supply is burned out</td>
</tr>
</tbody>
</table>
6.1. TECHNICAL SPECIFICATIONS

- 2G/3F/3G Supported
- Power supply: 15 V
- Standby power: ~ 1 W
- Fuse F1: 2A (external powered)
- Jumper F1 selection for power supply:
  - pin 1-2 (External power supply)
  - pin 2-3 (power supply from SL-Bus)
- LED indication: if LED is ON, power supply is working properly
- Size of SIM card: Micro SIM
8. INSTALLATION

- Maximum of 10 modules can be attached to ComBox. Modules (SL-RS232.2 SL-RS485.2)
- SL - PS.1 Power Supply Module must be connected on far left side
- SL-COMBOX.1 Module must be connected on far right side
- Modem Modul SL - GSM.1 must be on the right side from Power Supply Module SL - PS.1
- If you have purchased Modem Modul SL - GSM.1 it should be installed on the right side from Power Supply Module SL - PS.1
- All other modules need to be connected between Power Supply Module SL - PS.1 and SL-COMBOX.1 Module

9. SETUP EXAMPLE

**WARNING**

- Make sure, that you do not connect Power Supply to the electrical source when the setup of all modules is not finished.


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Picture 7: DIN rail and modules for setup

Picture 8: Power Supply Module SL-PS.1
• Next is Modem Modul SL-GSM.1, which must be placed next to the PS.1.

• On the top side of Modem Modul SL - GSM.1, you can see jumper J1, with which you can set how power supply will be executed.

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Pins</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>1-2 pins are covered</td>
<td>The power supply is executed via an external power supply</td>
</tr>
<tr>
<td>J1</td>
<td>2-3 pins are covered (Picture 11)</td>
<td>The power supply is executed via SL-Bus (internal serial protocol) (Picture 12)</td>
</tr>
</tbody>
</table>

Next step is to select how communication on Modem Modul SL - GSM.1 will be executed (Picture 13 and 14)

<table>
<thead>
<tr>
<th>JUMPER</th>
<th>PINS</th>
<th>COMMUNICATION ON MODEM MODUL SL - GSM.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>1-2</td>
<td>Communication will be executed through SL-Bus to SL - ComBox.1</td>
</tr>
<tr>
<td>J1</td>
<td>2-3</td>
<td>Communication will go through RJ-11 on SL - RS 232.2</td>
</tr>
</tbody>
</table>
• When finished, put Modem Modul SL - GSM.1 on DIN rail and connect it to the power supply (PS.1). Next step to make is, to connect additional modules to the Power Supply Module SL - PS.1 and Modem Modul SL - GSM.1. In our case, we have 2 additional modules to connect 2x RS 232 and RS 232 + RS 485. We will start with 2x SL - RS 232.2 Module.

• Take 2x SL - RS 232.2 module and put it on the DIN rail, then connect it on Modem Modul SL - GSM.1 via SL-Bus.

• Connect next module, which in our case is RS 232 + RS 485 module. Put it on DIN rail and connect it to 2xRS 232 module via SL-Bus.
The last module in configuration is SL-COMBOX.1 Module. Take it and put it on DIN rail, then connect it to previous module SL - RS 232 + SL - RS 485 via SL-Bus. Be careful on correct jumper placement. On the top side of SL-COMBOX.1 Module you can find pin header split into two parts.

<table>
<thead>
<tr>
<th>JUMPER</th>
<th>PINS</th>
<th>COMMUNICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>1-2 are covered</td>
<td>Communication will go through RS 485</td>
</tr>
<tr>
<td>J1</td>
<td>2-3 are covered</td>
<td>Communication will go through RS 232</td>
</tr>
<tr>
<td>J1</td>
<td>4-5 are chosen</td>
<td>Termination is disabled</td>
</tr>
<tr>
<td>J1</td>
<td>5-6 are chosen</td>
<td>Termination is enabled</td>
</tr>
</tbody>
</table>

Pictures 18: Placing SL - ComBox.1 Module

Pictures 19: Pins on SL - ComBox.1 Module

Pictures 20: Pins on SL - ComBox.1 Module
• Final configuration should look like this.

Pictures 21: Final configuration of ComBox.M device

• Be careful that Power Supply Module (SL - PS.1) and Modem Modul SL - GSM.1 are put together. Also, you must be careful that SL - ComBox.1 Module is always on the of the IDIN-rail on the right side. Wiring SL - RS 232.2 and SL - RS 485.2 on ComBox. M is C-table.

10. RECOMMENDED FIELDS OF USE

• Smart Buildings
• Smart Industries
• Smart Grids
• Smart Energy

Picture 21: Energy Management System
11. EU DECLARATION OF CONFORMITY

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Solvera Lynx d.o.o.
Stegne 23A
SI-1000 Ljubljana
Slovenia

for the product:

Product: ComBox. M ww

Object of the declaration:

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:
EN 301 489-1 V1.9.2
EN 301 489-3 V1.6.1

Signed for and on behalf of: Jože Rotar, Technical Director

Place and date of issue: Ljubljana, 09.02.2018