USER MANUAL
"COMBOX.L® ATEX"
Long Range Low Power Wireless Logger For The High-Risk ATEX Conditions
COMBOX

COMBOX.L® ATEX – LONG RANGE LOW POWER WIRELESS LOGGER FOR HIGH-RISK ATEX CONDITIONS

User manual
V1.2
CONTENTS

1. Information about the document ................................................................. 4
  1.1. Document data ................................................................................. 4
  1.2. Disclaimer ......................................................................................... 4
  1.3. Technical support ............................................................................. 4
2. Product presentation .................................................................................... 5
  2.1. Description ......................................................................................... 5
  2.2. Package Content ............................................................................... 5
  2.3. Highlights ......................................................................................... 5
  2.4. Advantages ....................................................................................... 5
  2.5. ComBox.L ATEX Types .................................................................. 6
3. Technical data ............................................................................................ 7
  3.1. Dimensions ....................................................................................... 7
4. Technical data according to type: ................................................................. 8
  4.1. ComBox.L - 01 (ATEX; PULSE SENSOR) .......................................... 8
  4.2. ComBox.L - 02 (ATEX; LPG level sensor) ........................................ 9
5. Installation .................................................................................................. 10
  5.1. Notification for installation ................................................................. 10
  5.2. Hardware installation ....................................................................... 10
  5.3. Connection to NMS (Network Management Server) ....................... 12
6. Recommended fields of use ....................................................................... 13
7. Certification ............................................................................................... 14
  7.1. SIQ 17 ATEX 123X Certificate .......................................................... 14
  7.2. LoRa Certificate of Compliance ......................................................... 15
1. INFORMATION ABOUT THE DOCUMENT

1.1. DOCUMENT DATA

<table>
<thead>
<tr>
<th>Title</th>
<th>User Manual: COMBOX.L® ATEX</th>
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<tbody>
<tr>
<td>Subtitle</td>
<td>Long Range Low Power Wireless Logger for the high-risk ATEX conditions</td>
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<tr>
<td>Document type</td>
<td>User Manual</td>
</tr>
<tr>
<td>Version</td>
<td>V 1.2</td>
</tr>
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</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.

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2. PRODUCT PRESENTATION

2.1. DESCRIPTION

ComBox.L® ATEX is remote telemetry devices that send measured data to a cloud server via 868 MHz ISM band LongRange™ for Europe. It runs of two Li-SOCI2 non-rechargeable batteries, mounted on the devices’ PCB inside the IP67 enclosure. ComBox.L® exists in 2 types (-01 and -02), each for a different type of telemetry measuring device.

- 868 MHz ISM band LongRange™ for Europe
- Wide coverage range from 1,5 - 2,5 km (urban areas) to 10 km (suburban areas)
- Uses LoRa modulation under LoRaWAN™ v 1.0.1. protocol
- This is not a point to point device and can not be used in this manner

This device is designed to meet certification marking:

![Ex]

Il 2G Ex ib [ib] IIB T4 Gb

This device is designed in accordance to following standards:


2.2. PACKAGE CONTENT

- 1x device ComBox.L® ATEX
- 2x battery L1-SOCI2 LS14500EX 3,6 V
- 1x cable for counting impulses or gauge connection
- 4x screw with O-ring

2.3. HIGHLIGHTS

- ATEX Certification
- Used in Potentially Explosive Atmospheres
- Battery Powered
- Long Range
- Low Power Consumption
- Long Battery Life
- Fast and Easy Installation
- Multiple Applications (remote tank level monitoring, cathodic protection monitoring, automatic meter reading, gas cylinders stock management)

2.4. ADVANTAGES

- Functionalities: data logging, time (synchronization, remote parameterization)
- Operation with different network providers
- Standardized LoRaWAN® 1.0.1 communication
- Over the air (OTA-C) Configuration
- Data types - optional: counter (unconfirmed data type), logger (confirmed data type)
- 100 most recent measurements are saved locally in case of network failure
2.5. COMBOX.L ATEX TYPES

1. PULSE COUNTER (ComBox.L - 01 (ATEX; Pulse sensor)
Intended for connection of the potential free contact counter. It is used with a meter with a potential free contact output located inside ATEX Zone 1 and ATEX Zone 2. Pulses are aggregated in preset intervals. One meter with tamper protection can be connected to single device. This variant enables the connection of an external potential free contact counter and its tamper detection. ComBox.L -01 supplies its logical level voltage and the external sensor counter pulls it to ground. The tamper contact is normally closed and indicates the pulses on the counter input are valid. The external sensor requires no other form of power supply.

2. STATE SENSOR (ComBox.L - 02 (ATEX; LPG level sensor)
It is used with a Rochester Hall effect gauge to measure the liquefied gas level in a gas storage tanks located inside ATEX Zone 1 and ATEX Zone 2. Measurements are taken in preset intervals. External sensor requires a supply voltage and returns a ratiometric voltage level equal to the measured fuel level. The sensor itself is ATEX certified (APERGAZ 10ATEX 0124X). Sensor supply voltage is provided by ComBox.L and is limited by the internal fuse F1 (125 mA).
3. TECHNICAL DATA

1. RADIO
   • Frequency: 868 MHz
   • Modulation: LoRa
   • Max. wireless power: 14 dBm

2. INPUT
   • No. of digital inputs: 1 (potential free contact)
   • No. of analog inputs: 1 (Hall Effect Sensor)

3. POWER
   • Battery: 2x lithium-thionyl chloride (Li-SOCl2)
   • Battery Voltage: 3.6 V (nominal)
   • Battery Capacity: 2600 mAh per battery
   • Battery manufacturer: SAFT (LS14500Ex)

4. TEMPERATURE
   • Max amb. temperature: from -20 °C to +60 °C

5. HOUSING
   • Dimensions: 200 x 90 x 43 mm
   • Weight: 280 g
   • IP Protection: IP67 (IEC 60529)

3.1. DIMENSIONS

Values in millimetre
4. TECHNICAL DATA ACCORDING TO TYPE:

- ComBox.L - 01 (ATEX; Pulse sensor)
- ComBox.L - 02 (ATEX; LPG level sensor)

4.1. COMBOX.L - 01 (ATEX; PULSE SENSOR)

- 15 min measuring/sending period
- Frequency CNT 1: average of 70 Hz throughout sending period
- Min. pulse length: 5 ms

<table>
<thead>
<tr>
<th>Period</th>
<th>Autonomy @ SF7</th>
<th>Autonomy @ SF12</th>
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<tr>
<td>4 packets/hour</td>
<td>5</td>
<td>0.7</td>
</tr>
<tr>
<td>1 packet/hour</td>
<td>6.7</td>
<td>2.3</td>
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<tr>
<td>1 packet/day</td>
<td>7.5</td>
<td>6.9</td>
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</table>

<table>
<thead>
<tr>
<th>Period</th>
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<th>Autonomy @ SF12</th>
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<td>4 packets/hour</td>
<td>4.2</td>
<td>0.7</td>
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<tr>
<td>1 packet/hour</td>
<td>5.3</td>
<td>2.1</td>
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<tr>
<td>1 packet/day</td>
<td>5.8</td>
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</table>

All values in years, Max. 5% retransmissions, Temperature = 24°C
4.2. COMBOX.L - 02 (ATEX; LPG LEVEL SENSOR)

- Change of state or 1 h sending period (regarding LoRaWAN protocol limitations)
- Rochester gauge level meter

<table>
<thead>
<tr>
<th>WIRE</th>
<th>CONNECTOR</th>
</tr>
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<tbody>
<tr>
<td>BLUE</td>
<td>3V3 OUT</td>
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<tr>
<td>BROWN</td>
<td>GND</td>
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<tr>
<td>BLACK</td>
<td>Vin</td>
</tr>
<tr>
<td>WHITE</td>
<td>/</td>
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- Autonomy

<table>
<thead>
<tr>
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<tr>
<td>4 packets/hour</td>
<td>5,0</td>
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</tr>
<tr>
<td>1 packet/hour</td>
<td>6,5</td>
<td>2,3</td>
</tr>
<tr>
<td>1 packet/day</td>
<td>7,5</td>
<td>5,5</td>
</tr>
</tbody>
</table>

All values in years, Max. 5% retransmissions, Temperature = 24°C
5. INSTALLATION

5.1. NOTIFICATION FOR INSTALLATION

• Do not mount device beside any other electrical device or antenna
• The ComBox.L device must be vertically mounted, the antenna must be on top
• Before device placement you must observe nearby metal objects and possible RF interference devices
• The device should be mounted and positioned in a shortest way to the base station
• Do not place the device in a shaft which is too deep under ground

5.2. HARDWARE INSTALLATION

• On the front side of the ComBox.L - 01 ATEX - Pulse sensor (Picture 1), you can see the device specification, manufacturer, warnings and its MAC address.

• When you open the device (Picture 2. PCB), you can see the full specification of the device in the back case. The PCB is mounted in the front case. There are two buttons on the PCB. The upper left one is MODE (1) and the lower right one is RST (2) (Reset). The reset button is used for rebooting the device and resetting the counters. After the reset is asserted, the device starts registration to the network. The MODE button has no function on this device

• PCB contains two battery holders for two AA size batteries. The device is powered by two SAFT LS14500EX 3,6 V batteries. Observe the battery polarity when inserting the batteries. The positive pole is on the left side and the negative pole is on the right side, at the spring (Picture 3)
WARNING

- Interference with the device interior is permitted only when replacing batteries. Any other interference with the device is strictly prohibited.
- Batteries are standard AA size batteries, but if you insert 1.5 V alkaline batteries, the device will not work. Use ONLY SAFT LS14500EX batteries.

Picture 3. Holders for two AA size batteries

- Take the supplied cable and attached it to the input of the device. Secure the safety screw (Picture 4) to prevent cable disconnection and insure the IP rating of connector.

Picture 4. Cable Connection
• Before you close the device case, you need to check to ensure that O-ring of the case is in place. Mind the position of the safety pillars, there is only one way for the case to close correctly and comply with the IP rating (observe Pictures 5 and 6).

• Finally, secure the 4 screws. The device is now securely sealed and ready to be mounted.

**WARNING**

• Possibility of electrostatic charge accumulation. Clean with moist or electrostatic dissipative cloth.
• Do not open the enclosure if explosive atmosphere is present.
• Do not replace the batteries if explosive atmosphere is present. Use ONLY SAFT LS14500EX batteries

5.3. CONNECTION TO NMS (NETWORK MANAGEMENT SERVER)

• The device is configured in such a way that when you insert the batteries, the device automatically begins with the activation process to connect to the NMS (Network Management Server) and AMS (Application Management Server).
• Connection, registration and communication with the base station, and further on with NMS and AMS shall be proceeded according to the instructions of BS/NMS/AMS provider.
6. RECOMMENDED FIELDS OF USE

- Remote tank level monitoring
- Cathodic protection monitoring
- Automatic meter reading
- Gas cylinders stock management

Picture 7. LoRaWAN Network Structure

Picture 8. Energy Management System
7. CERTIFICATION

7.1. SIQ 17 ATEX 123X CERTIFICATE

(1) EU-TYPE EXAMINATION CERTIFICATE


(3) EU-Type Examination Certificate Number:

SIQ 17 ATEX 123 X

(4) Product:

Wireless Logger, types ComBox-L 01 and ComBox-L 02

(5) Manufacturer:

Solvena Llynx

(6) Address:

Skapje 23a, 1000 Ljubljana, Slovenia

(7) This product and any acceptable variation thereof are specified in the schedule to this certificate and the documents therein referred to.

(8) SIQ Llynx, notified body number 1234 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 21 May 2014, certifies that this product has been demonstrated by testing and evaluation to be suitable for the intended purpose of use in a potentially explosive atmosphere. The certificate is based on the inspection and testing of prototypes intended for use in a potentially explosive atmosphere given in Annex III to the Directive.

(9) The examination and test results are recorded in the confidential test report TEx123/17.

(10) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0: 2012
EN 60079-1: 2011
EN 60079-31: 2011

(11) If the sign “S” is placed after the certificate number, it indicates that the product is subject to specific conditions of use specified in the schedule to this certificate.

(12) The EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance with the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(13) The marking of the product shall include the following:

[Marking illustration]

Igor Lukar
Ljubljana, 20 September 2017

The SIQ Type Examination Certificate is valid only if signed. The certificate may be reproduced only in full and without changes.

Page 13

(14) SCHEDULE

(15) Description of Product:

Wireless Logger, types ComBox-L 01 and ComBox-L 02, is a wireless data logger that sends measured data to a cloud server via 2G SIM or 3G/4G wireless communication with suitable modulation. It is a two-layer LCCG4 low-noise amplifier, mounted on the device in the LCCG4 case, the RFI filter. On top of the enclosure is a rubber-protected antenna, and on the bottom is a MFI ceramic element in connection with the temperature measurement device.

Type:

ComBox-L 01
ComBox-L 02

Counter variant: Intended for connection of the potential free contact switch

Guard contact

Battery voltage: 3.6V (Li-ion)

Battery capacity: 2000 mAh per battery

Wireless frequency: 868 MHz / 915 MHz

Wireless modulation: LoRa

Max. wireless power: 14 dBm

IP20 cabinet protection: IEC 60529 "IP 00"

Type: ComBox-L 01
Connector J7 pin definition

1 G4AD 3 U 0 x 0,0
2 OM3 0,0
3 Ni 0x 0,0
4 OM4 0,0

1) Pin 1-10: DC 5 V (max 100 mA)

2) Pin 1-3: USB 5 V (max 100 mA)

3) Pin 1-4: DC 5 V (max 100 mA)

(16) Days of the Type Examination Certificate:

2017-03-29

Page 33

(17) Days of the EU-Type Examination Certificate:

2017-03-30

Page 34

(18) The EU-Type Examination Certificate is valid only if signed. The certificate may be reproduced only in full and without changes.

Page 34
7.2. LORA CERTIFICATE OF COMPLIANCE

The LoRa® Alliance is pleased to congratulate Solvera Lynx d.d. on the completion of the LoRaWAN™ Certification Program for the following product:

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Solvera Lynx d.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE OF DEVICE</td>
<td>Module</td>
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<tr>
<td>MODEL IDENTIFICATION</td>
<td>ComBox.L</td>
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<tr>
<td>FIRMWARE VERSION</td>
<td>V2.0.4</td>
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<td>HARDWARE VERSION</td>
<td>1.0</td>
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<td>CERTIFICATION DATE</td>
<td>October 28, 2016</td>
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<td>LoRaWAN SPECIFICATION</td>
<td>V1.0.1</td>
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<tr>
<td>Class of Operation (A, B or C)</td>
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This Certificate serves to confirm that the above mentioned product has passed all relevant tests in conjunction with the LoRaWAN™ Certification Program and is deemed compliant to it. The Manufacturer has been granted the right to use the following term and all associated logos:

LoRa® Alliance Certified

The usage of this term is limited to the described device and does not encompass any changes, firmware upgrades or subsequent versions and models after the listed test date. All usage guidelines for the LoRa® Alliance also apply to the term above.

Congratulations on your compliance to the program!

Sincerely,

Geoff Mulligan, Chair

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www.lora-alliance.org