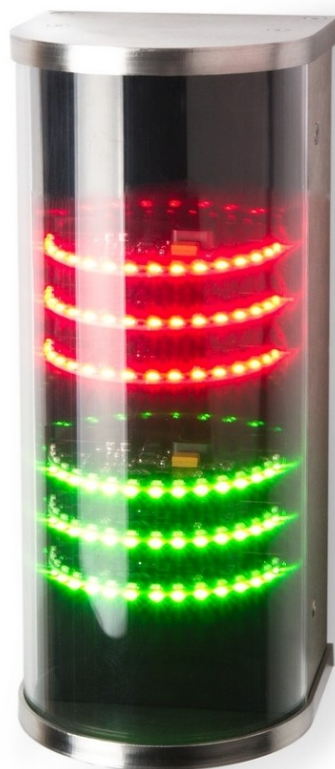




## User Manual



**Warning LED Tower with Sounder**

**LTT2 / LTT4**

**Product code: PW-091-X / PW-089-X**



Reliable and Innovative **Gas Detection & Safety Systems**

We design, manufacture, implement and support:  
**Systems for Monitoring, Detection and Reduction of gas hazards**







For more details please visit our website [www.atestgaz.pl](http://www.atestgaz.pl)

**Atest Gaz A. M. Pachole sp. j.**  
ul. Spokojna 3, 44-109 Gliwice  
Poland

tel.: +48 32 238 87 94  
fax: +48 32 234 92 71  
e-mail: [contact@atestgaz.pl](mailto:contact@atestgaz.pl)





[www.atestgaz.pl](http://www.atestgaz.pl)

**Remarks and reservations**


-  Read and understand this manual prior to connection and operation of the device. Keep the User Manual with the device for future reference.
-  The manufacturer shall not be held responsible for any errors, damage or defects caused by improper selection of suitable devices or cables, errors in installation of equipment or any misuse due to failure to understand the document content.
-  Unauthorised repairs and modifications of the device are not allowed. The manufacturer shall discard any responsibility for consequences of such actions.
-  Exposure of the device to the impact of excessive mechanical, electric or environmental factors may lead to damage of the device.
-  Operation of damaged or incomplete devices is not allowed.
-  Engineering of a Gas Safety System for any specific facilities to be safeguarded may need consideration of other requirements during the entire lifetime of the product.

**How to use this manual?**

-  The following symbols of optical indicators status are used throughout the document:


Symbol	Interpretation
	Optical indicator on
	Optical indicator flashing
	Optical indicator off
	Optical indicator status not determined (depends on other factors)

**Table 1: Optical indicators status notation**

-  Important fragments of the text are highlighted in the following way:



Pay extreme attention to information provided in such framed boxes.

-  This User Manual consists of a main text and attached appendices. The appendices are independent documents and can be used separately from this Manual. Page numbering of appendices starts anew with no relationship to page numbering of the main document and appendices may have their own tables of contents. In the right bottom corner of each page you can find the name (symbol) of any document included into the User Manual package with its revision (issue) number.

## Table of contents

<b>1</b>	<b>General information.....</b>	<b>6</b>
<b>2</b>	<b>Safety.....</b>	<b>7</b>
<b>3</b>	<b>Device design.....</b>	<b>7</b>
<b>4</b>	<b>Input-output interfaces.....</b>	<b>8</b>
4.1	Electrical interface.....	8
<b>5</b>	<b>User interface.....</b>	<b>9</b>
5.1	LTT2.....	9
5.2	LTT4.....	10
5.3	The field of the signaller own states.....	10
<b>6</b>	<b>System architectures.....</b>	<b>11</b>
6.1	Sigma.....	11
6.2	Modbus.....	11
<b>7</b>	<b>PW-091-M-X / PW-089-M-X device with Modbus interface.....</b>	<b>12</b>
7.1	Device control.....	12
7.2	Configuration.....	12
<b>8</b>	<b>Lifetime cycle.....</b>	<b>13</b>
8.1	Transportation.....	13
8.2	Installation.....	13
8.3	Connections.....	16
8.4	Device configuration.....	18
8.5	Troubleshooting.....	18
8.6	Maintenance schedule.....	18
8.7	Disposal.....	18
<b>9</b>	<b>Technical specification.....</b>	<b>19</b>
<b>10</b>	<b>Product marking.....</b>	<b>20</b>
10.1	PW-091-X (LTT2).....	20
10.2	PW-089-X (LTT4).....	21
10.3	PW-089-C-X.....	21
<b>11</b>	<b>Appendices.....</b>	<b>21</b>

## List of Tables

<b>Table 1:</b>	<b>Optical indicators status notation.....</b>	<b>3</b>
<b>Table 2:</b>	<b>Electric connections description – PW-091-S-X, PW-091-M-X, PW-089-S-X, PW-089-M-X.....</b>	<b>9</b>
<b>Table 3:</b>	<b>Electric connections description – PW-091-C-X, PW-089-C-X.....</b>	<b>9</b>
<b>Table 4:</b>	<b>Configuration example PW-091-X – meaning of the device indications.....</b>	<b>9</b>
<b>Table 5:</b>	<b>Configuration example PW-089-X – meaning of the device indications.....</b>	<b>10</b>
<b>Table 6:</b>	<b>Description of pilot LED for status indication of the LTT2 / LTT4.....</b>	<b>10</b>
<b>Table 7:</b>	<b>List of tools necessary for installation of the signaller.....</b>	<b>14</b>
<b>Table 8:</b>	<b>Technical specification.....</b>	<b>19</b>

## List of Figures

Figure 1: Location and role of the LTT2 in Gas Safety System.....	6
Figure 2: Layout of device components and its dimensions.....	8
Figure 3: Electric connections.....	8
Figure 4: Architecture with signaller PW-091-S -X / PW-089-S-X.....	11
Figure 5: Architecture with signaller PW-091-M-X / PW-089-M-X.....	11
Figure 6: Device with Modbus interface control (PW-091-M-X / PW-089-M-X).....	12
Figure 7: Installation of the device – step 1.....	14
Figure 8: Installation of the device – step 2.....	15
Figure 9: Installation of the device – step 3.....	15
Figure 10: Installation of the device – step 4.....	16
Figure 11: Installation of the device – step 5.....	16
Figure 12: Wiring of the PW-091-S-X / PW-089-S-X, PW-091-M-X / PW-089-M-X device.....	17
Figure 13: Wiring of the PW-091-C-X device.....	17
Figure 14: Wiring of the PW-089-C-X device.....	18
Figure 15: Configuration of LTT2 – version PW-091-S-X and PW-091-M-X.....	20
Figure 16: Configuration of LTT2 – version PW-091-C-X.....	20
Figure 17: Configuration of LTT4 – PW-089-S-X and PW-089-M-X versions.....	21
Figure 18: Configuration of LTT4 – PW-089-C-X version.....	21

## 1 General information

Warning LED Tower with Sounder LTT2 / LTT4 is a device dedicated to optical and acoustic signalling of the presence of hazards in the particular industrial installation.

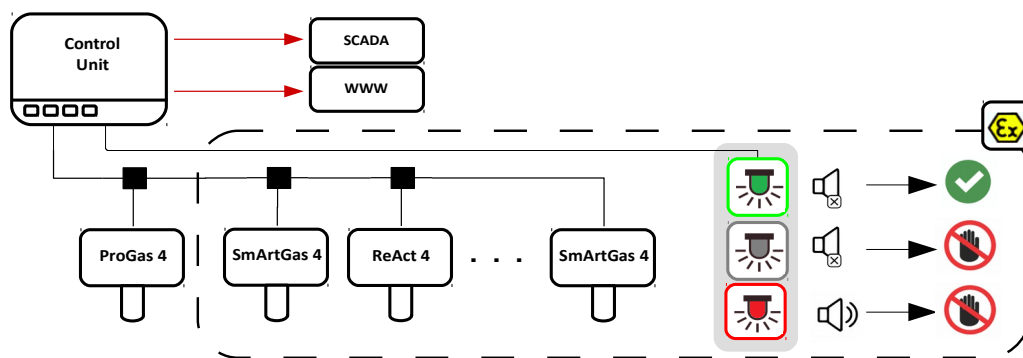
Device can be installed in Zone 2 (II3G 3D) of gas and dust hazardous areas.

Details about explosion protection are provided in the Appendix [1].

The LTT2 / LTT4 stack light includes two or four light modules with mutually independent configuration and control (see details in Section 10) furnished with extremely bright LEDs as well as one audial module (siren) with remotely controlled intensity of produced sound. Owing to such a design the LTT2 / LTT4 unit is a multi-purpose device since it is suitable for a large number of applications, e.g. to warn about specific events in various systems for gas detection, to raise alarms under emergency conditions or other safety infringements in industrial facilities.

Main features of the device:

- / two or four light segments, available in 5 different colours. Segment could be 2-coloured – see section 10,
- / continuous / intermittent (blinking) signalling,
- / flash light in red or yellow,
- / sounder:
  - one level of sound intensity (type PW-091-C-X / PW-089-C-X),
  - two level's of sound intensity (PW-091-S-X, PW-091-M-X / PW-089-S-X, PW-089-M-X),
- / signalling up to:
  - two different alarm levels – LTT2,
  - four different alarm levels – LTT4,
 with communicating the proper operational state (no failures) by the green colour (in Gas Detection& Safety Systems),
- / connections and control by on/off signals or by RS-485 (Modbus), Sigma BUS,
- / installer friendly. Mistakes and errors in connections does not result in device damage,
- / device can also easily communicate a proper operation of the connected (controlling) devices, including connection / control lines (type PW-091-S-X / PW-089-S-X and PW-091-M-X / PW-089-M-X).



**Figure 1: Location and role of the LTT2 in Gas Safety System**

## 2 Safety



All activities related to connecting signaller must be carried out while Control Unit's power supply is off.



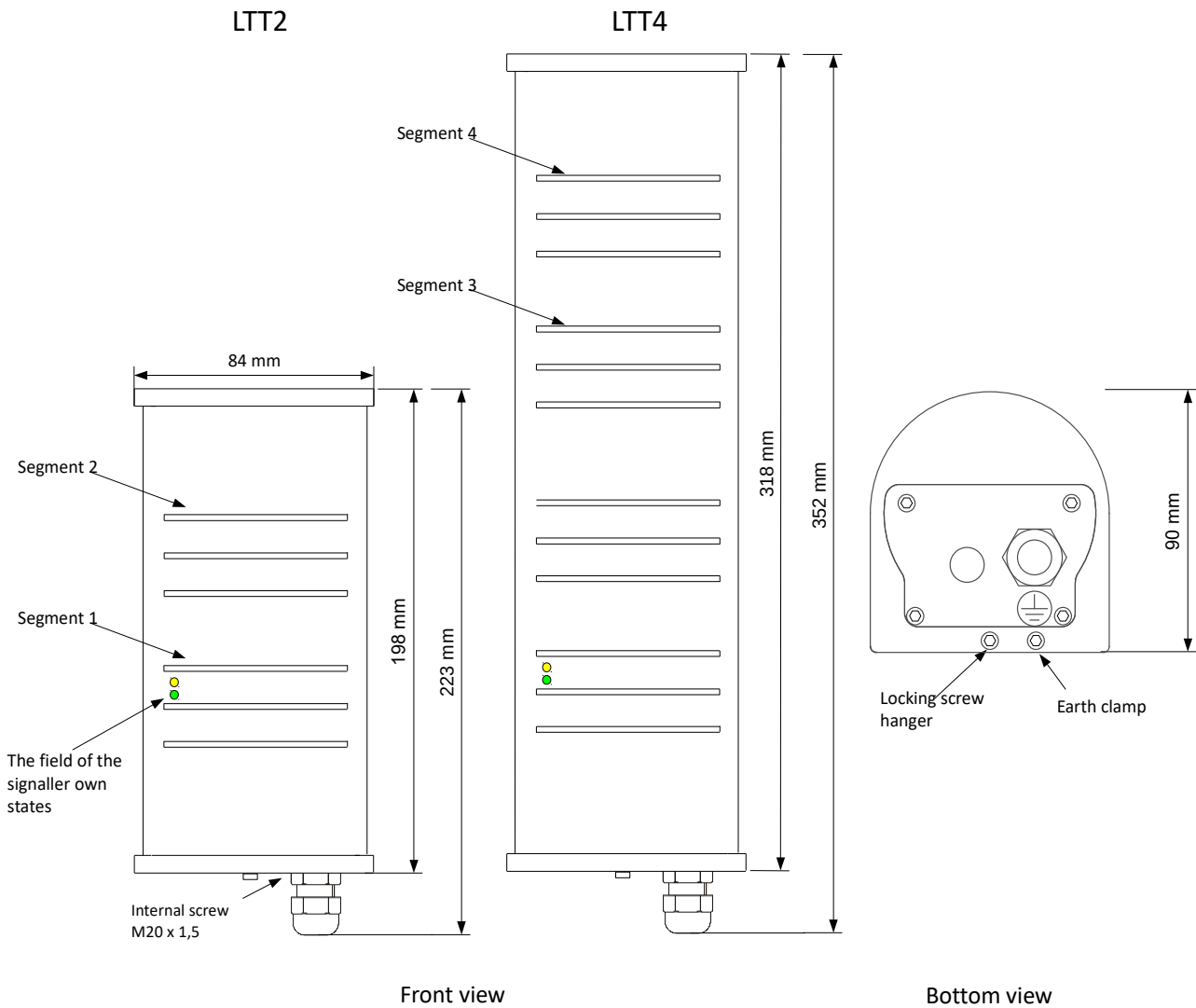
Prior to opening the device enclosure disconnect all sources of power voltage.



Do never unscrew bolts on the side wall of the enclosure. Loosening of specially marked bolts leads to loss of the enclosure tightness and warranty for the device is made null and void (see Figure 8).

## 3 Device design

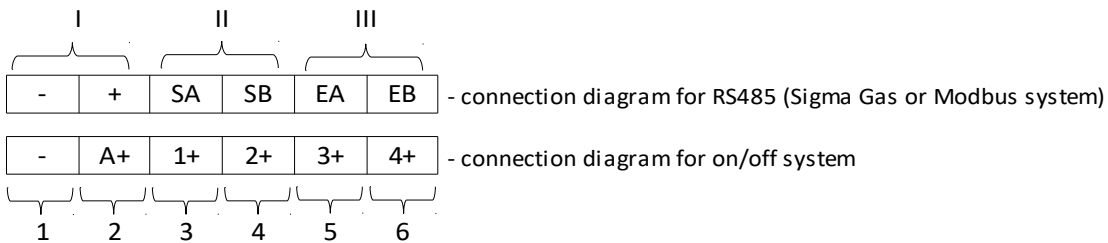
Dimension and enclosure of signaller shown below.



**Figure 2: Layout of device components and its dimensions**

## 4 Input-output interfaces

### 4.1 Electrical interface



**Figure 3: Electric connections**



No.	Name	Pin	Description
I	Power Supply		Signaller power supply port. Parameters – see section 9
		-	Negative
		+	Positive
II	SBUS		System communication port, see section 9. Used for data exchange between devices in Sigma Gas system and for signaller with Modbus interface configuration (PW-091-M-X / PW-089-M-X)
		SA	Signal line A
		SB	Signal line B
III	ExBUS		System communication port, see section 9. Used for data exchange between external systems (e.g.: SCADA, PLC) and for signaller with Modbus interface configuration (PW-091-M-X / PW-089-M-X)
		EA	Signal line A
		EB	Signal line B









**Table 2: Electric connections description – PW-091-S-X, PW-091-M-X, PW-089-S-X, PW-089-M-X**

No.	Name	Pin	Description
1		-	Negative
2		A+	Control and signalling input of the acoustic signaller. Activation of the acoustic signaller. Applying the supply voltage to the pin activates the acoustic signalling
3		1+	Control and signalling input of the 1 LED segment. Applying the supply voltage to the pin activates the optical signalling
4		2+	Control and signalling input of the 2 LED segment. Applying the supply voltage to the pin activates the optical signalling
5		3+	Control and signalling input of the 3 LED segment. Applying the supply voltage to the pin activates the optical signalling (only for PW-089-C)
6		4+	Control and signalling input of the 4 LED segment. Applying the supply voltage to the pin activates the optical signalling (only for PW-089-C)

**Table 3: Electric connections description – PW-091-C-X, PW-089-C-X**

























## 5 User interface

### 5.1 LTT2

	Segment	Operation	Failure	Alarm I	Alarm II
2	Red/blinking/flash				
1	Green/red				
-	Sounder	off	off	Reduced intensity	Full intensity





**Table 4: Configuration example PW-091-X – meaning of the device indications**

## 5.2 LTT4

Segment	Operation	Failure	Alarm I	Alarm II	Alarm III	Alarm IV
4 Red/blinking/flash						
3 Red/blinking						
2 Red						
1 Green/red						
- Sounder	off	off	Reduced intensity	Full intensity	Full intensity	Full intensity



**Table 5: Configuration example PW-089-X – meaning of the device indications**

The foregoing configuration is merely an example of the device capabilities since its design features enable versatile operation of the device with the following operation modes:

-  assigning various groups and combinations of field detectors to every single light segment (definition of monitored sub-areas)
-  assigning various warnings and alarms to light segments:
  - exceeding of alarm thresholds,
  - indication of failures affecting individual detector(s) or the entire monitoring system,
  - indication of other specific operation modes (calibration, heating up, etc.)
-  two operation modes of each light segment: solid-on (continuous) or blinking,
-  operation of the audible alarm (siren) with different intensity, depending on the status of warning /alarm signals.

## 5.3 The field of the signaller own states

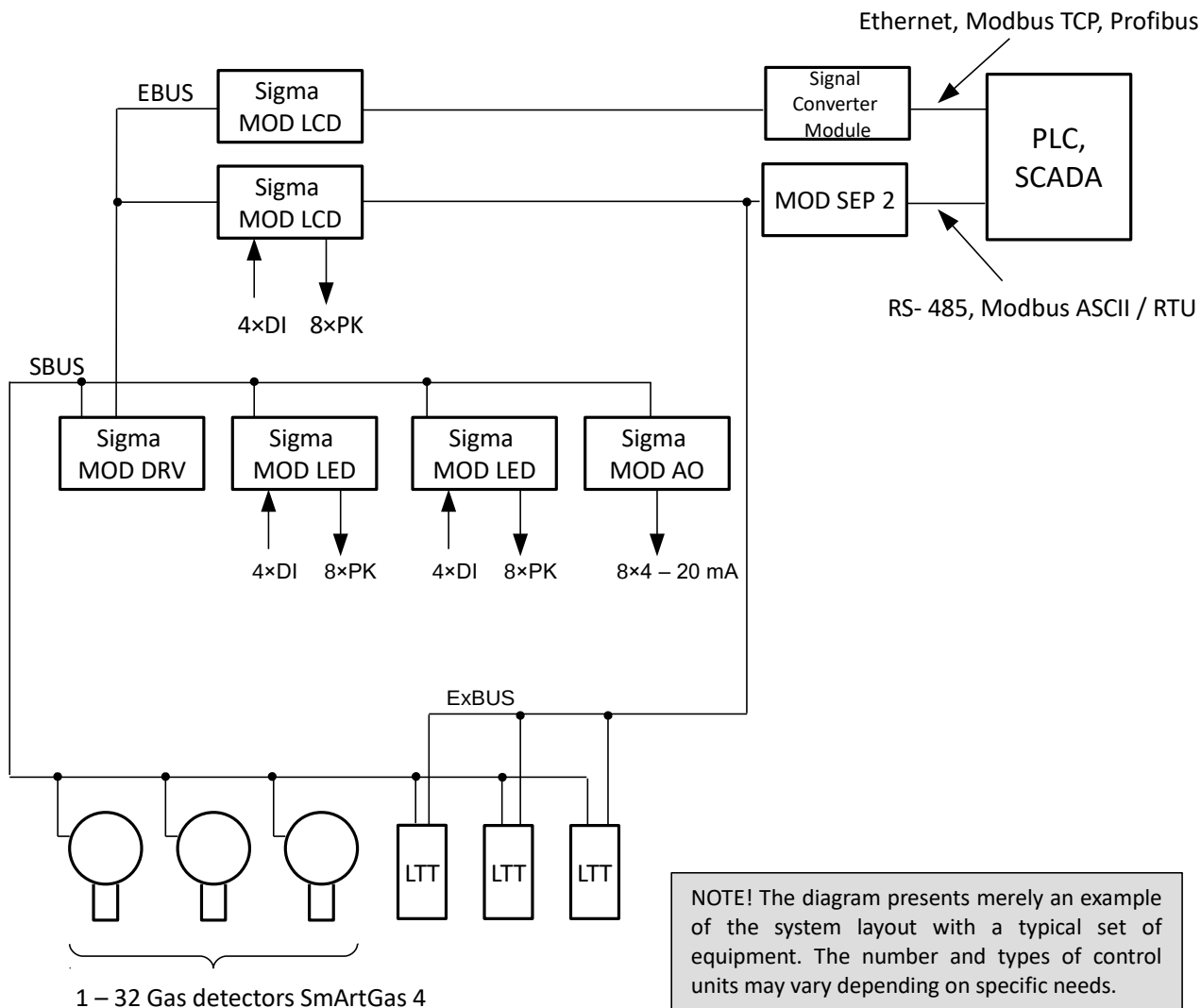
Section 1 of the signaller comprises two pilot LEDs that indicate status of the device (see Fig. 2). Operation of these LEDs for PW-091-S-X / PW-089-S-X oraz PW-091-M-X / PW-089-M-X units is described in the table below. For the PW-091-C-X / PW-089-C-X unit these LEDs are inactive.

Controls	Description
Operation (green) 	Continuous signalling – correct operation of the device
Failure (yellow) 	Continuous signalling – critical failure of the device, please contact with the manufacturer

**Table 6: Description of pilot LED for status indication of the LTT2 / LTT4**

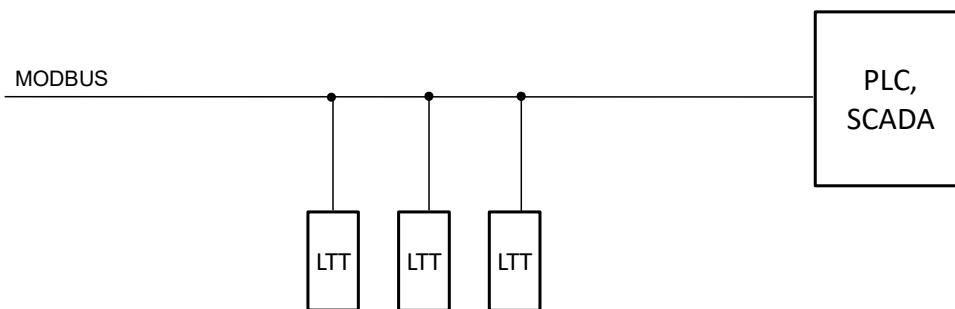
## 6 System architectures

### 6.1 Sigma



**Figure 4: Architecture with signaller PW-091-S -X / PW-089-S-X**

### 6.2 Modbus



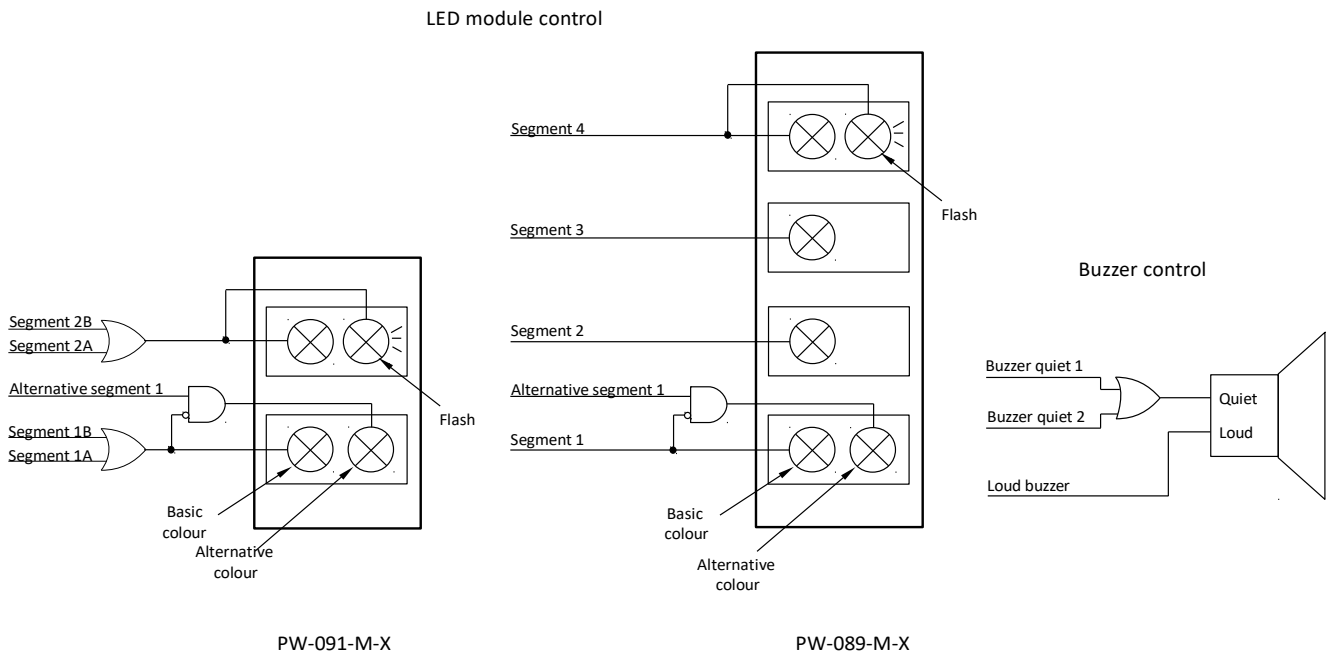
**Figure 5: Architecture with signaller PW-091-M-X / PW-089-M-X**

## 7 PW-091-M-X / PW-089-M-X device with Modbus interface

### 7.1 Device control

The device with Modbus interface is controlled via ExBUS port (see Table 2) and setting the corresponding bits in the Modbus register – see details in Appendices [2].

The signaller subsystems are turned on according to logic shown on the Figure 6.



**Figure 6: Device with Modbus interface control (PW-091-M-X / PW-089-M-X)**

### 7.2 Configuration

Configuration of the signaller with Modbus interface is done by using dedicated software (Sigma Toolbox).

This software can be downloaded from the manufacturer's website <https://www.atestgaz.pl/oprogramowanie>.



A computer with installed software should be connected to the SBUS port of the device (see Table 2). The device will be visible at address 1.

Possible parameters to be set: device address on the ExBus port, type of communication protocol and data transmission parameters (see also Table 8).

## 8 Lifetime cycle

### 8.1 Transportation

The device can be shipped in the same way as new equipment of that type. If the original package or another protecting means (e.g. corks) is unavailable the conveyed equipment must be secured against shocks, vibrations or moisture by means of adequate methods and material at the own responsibility of the sender.

The device can be conveyed under environmental conditions as described in Table 8.

### 8.2 Installation



All cable glands must be reliably tightened after installation.



The device must be installed in the working position as specified by the equipment manufacturer.



The device must be installed at locations with low probability of its mechanical damage.



The device must be installed at locations with no exposure to UV radiation (e.g. no exposure to direct sunlight).



Combining two or more wires at a single terminal is not allowed if such wires are not clamped in a common cable lug.



Do never leave spare lengths of cables inside the device. Bare wires or wires surplus may lead to a hazard of electric shock or equipment damage.



Do never leave redundant cable cores not terminated inside the device.



Incorrect routing of cables may result in impairment of the equipment immunity to electromagnetic interferences.

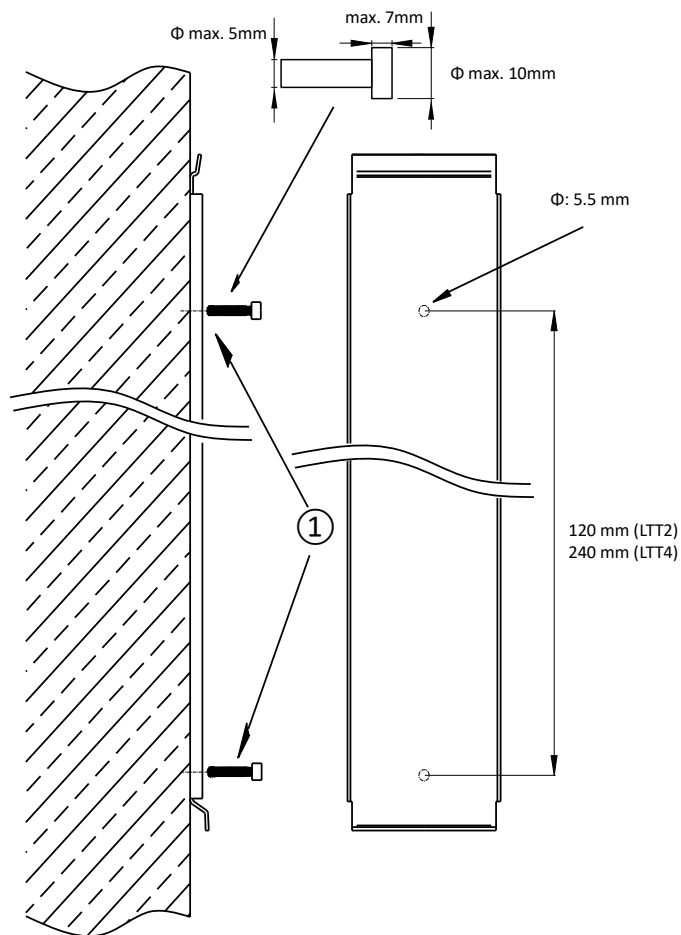
**8.2.1 List of tools necessary for installation of the signaller**

Denomination	Tool
N1	Allen socket wrench, 2.5 mm, with a ball tip
N2	Open-end flat spanner, 22 mm

**Table 7: List of tools necessary for installation of the signaller**

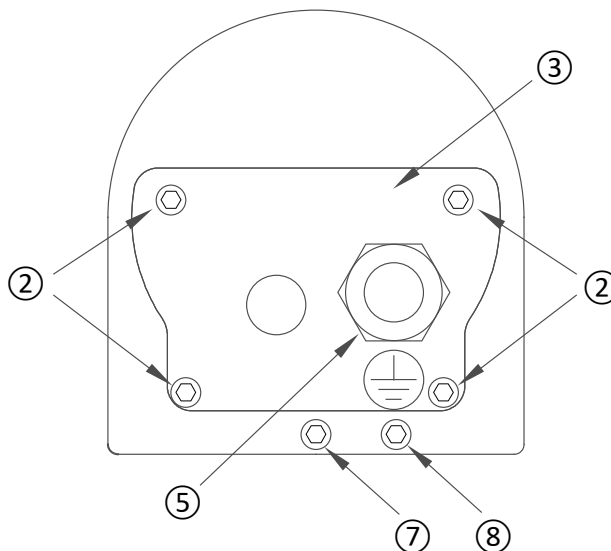
**8.2.2 Installation sequence**

The device must be mounted on a flat and vertical wall with the cable inlet looking downwards as shown in Figure 2 and then fixed by means of two bolts /screws ①. Any other position of installation is not allowed.



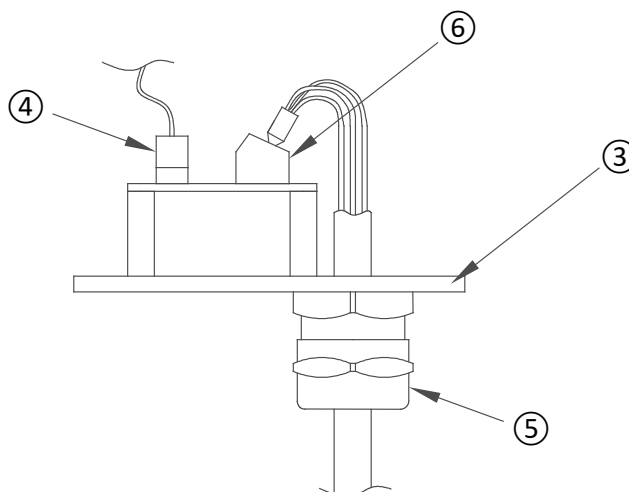
**Figure 7: Installation of the device – step 1**

To connect power voltage and control lines to the signaller use the N1 tool to loose four bolts ② that secure the cover of the cable connector ③.



**Figure 8: Installation of the device – step 2**

Then lower the cover of the cable connector, disconnect the cable connector (4) and thread the cable via the cable inlet (bushing) (5).



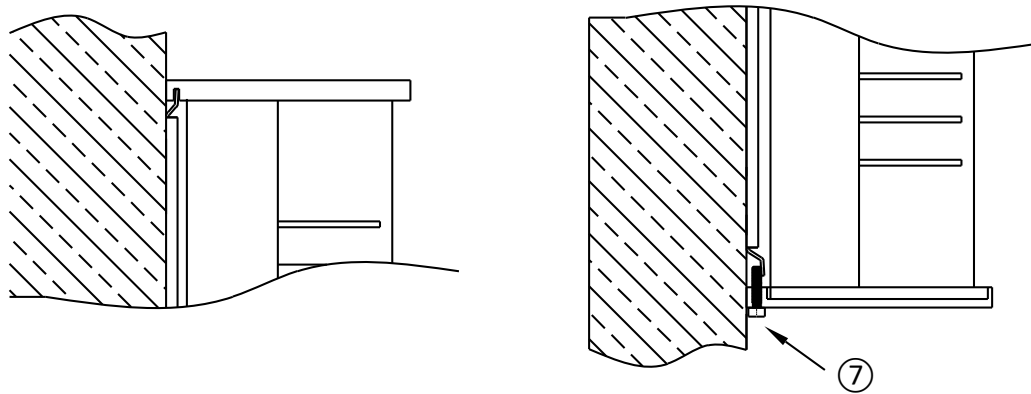
**Figure 9: Installation of the device – step 3**



Secure ends of stranded conductors with sleeves.

After having the cable cores to terminals of the terminal block (6) reconnect the connector of the cable bundle, reinstall the connector cover, tighten bolts (2) and lock the cable gland home by means of the tool N2.

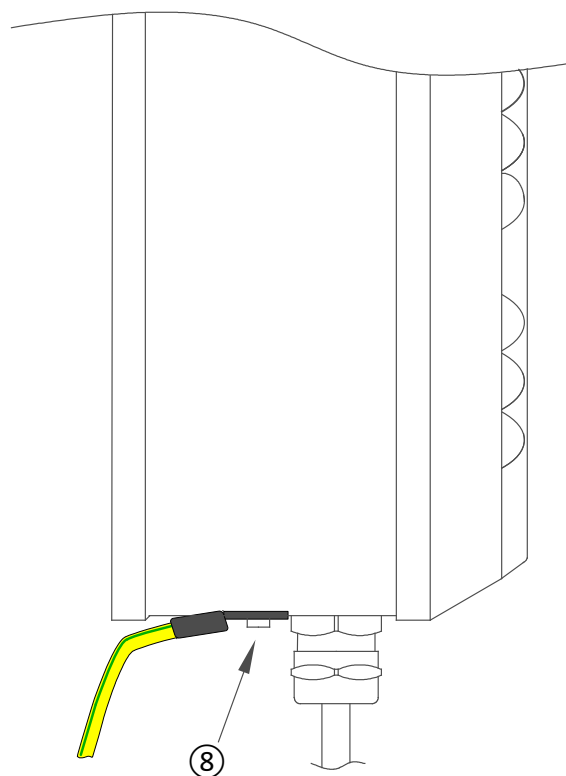
Finally, suspend the signaller on a hanger. The signaller must be installed from the top moving it downwards and the upper part of the hanger must be engaged in the top deck of the device housing.



**Figure 10: Installation of the device – step 4**

Use the N1 tool to tighten the bolt (7) to lock position of the signaller.

Connect the earthing line to the earthing terminal of the device to securely connect the device to the ground – a terminal lug is supplied together with the signaller to connect the earthing conductor with the cross-section from 0.5 to 2.0 mm<sup>2</sup>. No earthing is required when the signaller is operated outside areas with potentially explosive atmospheres (Ex zone).



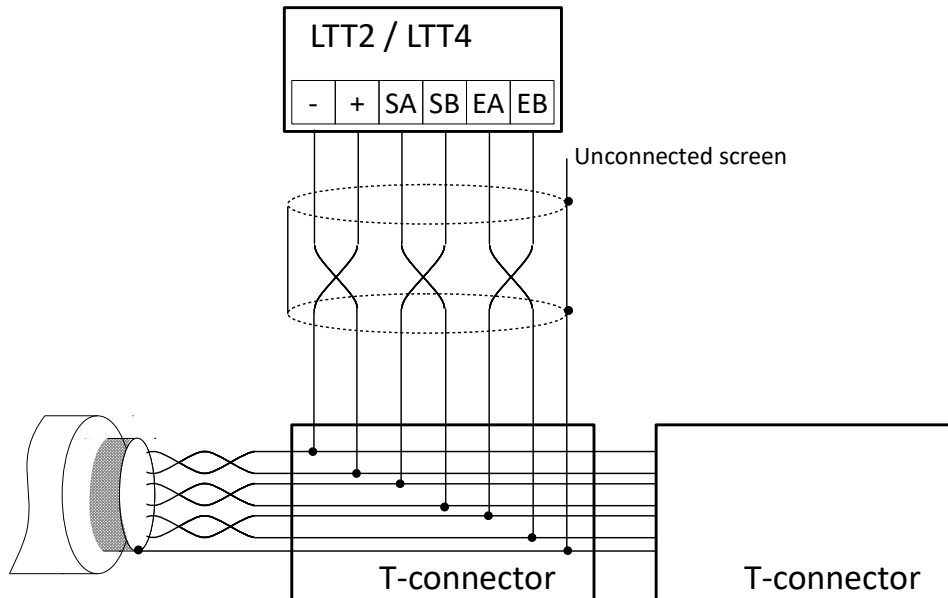
**Figure 11: Installation of the device – step 5**

### 8.3 Connections

#### 8.3.1 Version PW-091-S-X / PW-089-S-X, PW-091-M-X / PW-089-M-X

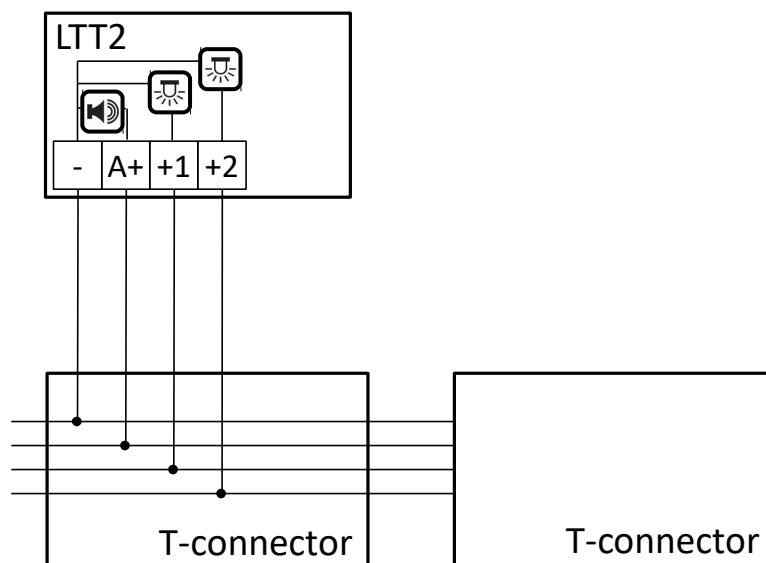
For the PW-091-S-X / PW-089-S-X and PW-091-M-X / PW-089-M-X device wiring is recommended by means of shielded twisted cables. The wiring diagram is shown on the figure below:





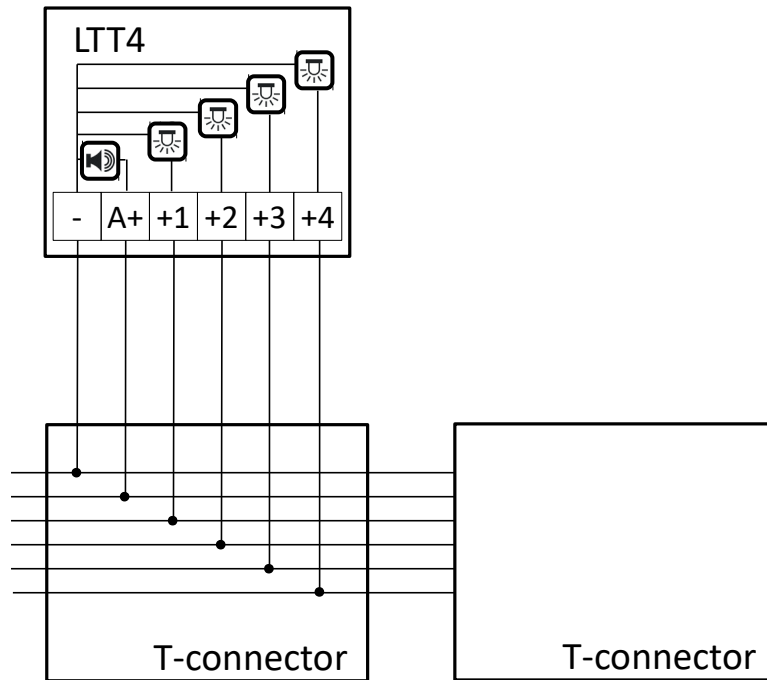
**Figure 12: Wiring of the PW-091-S-X / PW-089-S-X, PW-091-M-X / PW-089-M-X device**

**8.3.2 Version PW-091-C-X**



**Figure 13: Wiring of the PW-091-C-X device**

**8.3.3 Version PW-089-C-X**



**Figure 14: Wiring of the PW-089-C-X device**

**8.4 Device configuration**

Signaller are factory configured by their manufacturer. Configuration options are described in Section 5.

**8.5 Troubleshooting**

PW-091-S-X / PW-089-S-X and PW-091-M-X / PW-089-M-X device are furnished with self-test functions (see details in Section 5.3).

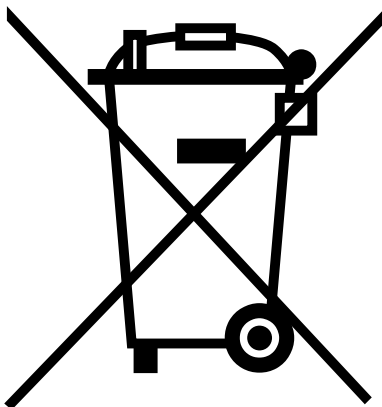
**8.6 Maintenance schedule**

**8.6.1 Maintenance**

Device must never be cleaned with agents that contain solvents, white spirit naphtha or alcohols.


The device needs no other maintenance beside cleaning external surface of the housing. These surfaces should be wiped with a soft cloth moistened with water and slight amount of a mild detergent.

**8.7 Disposal**



This symbol on a product or on its packaging indicates that the product must not be disposed of with other household waste. Instead, it is the user's responsibility to ensure disposal of waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The proper recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. Information about relevant designated collection points can be obtained from the Local Authority, waste disposal companies and in the place of purchase. The equipment can also be returned to the manufacturer.

## 9 Technical specification

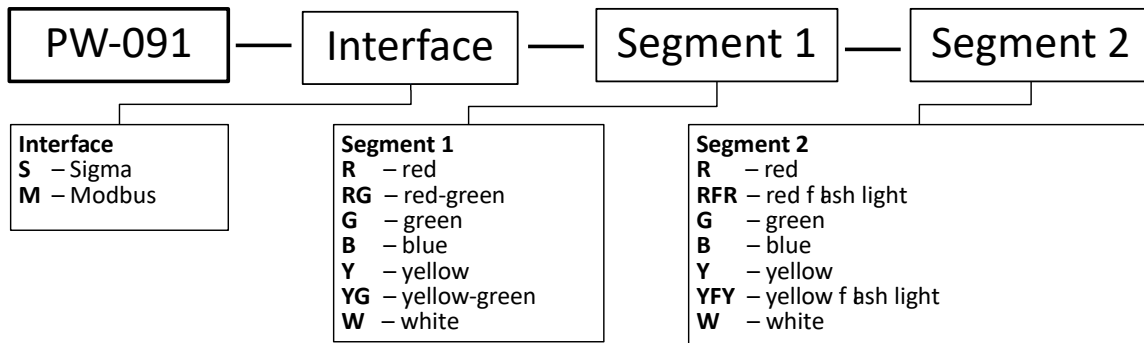
<b>Power voltage</b> <ul style="list-style-type: none"> <li>• <math>V_{CC}</math> <ul style="list-style-type: none"> <li>• PW-091-S-X / PW-089-S-X, PW-091-M-X / PW-089-M-X</li> <li>• PW-091-C-X / PW-089-C-X</li> </ul> </li> <li>• Power consumption <ul style="list-style-type: none"> <li>• PW-091-X</li> <li>• PW-089-X</li> </ul> </li> </ul>	12 – 30 V ∴ 18 – 30 V ∴  8.5 W 14 W				
<b>Environment</b> <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Humidity</li> </ul>	<table border="1"> <thead> <tr> <th>Operation</th> <th>Storage</th> </tr> </thead> <tbody> <tr> <td>-40 – 40°C 0 – 100% long term</td> <td>-40 – 40°C 0 – 100% long term</td> </tr> </tbody> </table>	Operation	Storage	-40 – 40°C 0 – 100% long term	-40 – 40°C 0 – 100% long term
Operation	Storage				
-40 – 40°C 0 – 100% long term	-40 – 40°C 0 – 100% long term				
ATEX	 II 3G Ex nA IIB T3 Gc -40 ≤ Ta ≤ 40°C				
IP	IP 65				
<b>Parameters of digital communication</b> <ul style="list-style-type: none"> <li>• Port SBUS <ul style="list-style-type: none"> <li>• Electric standard</li> <li>• Communication protocol</li> </ul> </li> <li>• Port ExBUS <ul style="list-style-type: none"> <li>• Electric standard</li> <li>• Communication protocol</li> </ul> </li> </ul>	RS-485 Sigma BUS  RS-485 Modbus ASCII, RTU, 4 800 – 115 200 bd				
<b>Parameters of control and signalling inputs</b> <ul style="list-style-type: none"> <li>• Deactivated</li> <li>• Activated</li> </ul>	0 – 1 V 18 – 30 V				
Integrated signalling equipment (optical)	LED lamps				
Integrated signalling equipment (acoustic)	Level 1: 70 dB from 1 m Level 2: 90 dB from 1 m				
<b>Modulation and flash time parameters</b> <ul style="list-style-type: none"> <li>• Period</li> <li>• Modulation</li> <li>• Flash time</li> </ul>	About 2 s About 50% About 50 ms				
Protection class	III				
Dimension	See figure 2				
Cable glands (cable diameter range)	8 – 13 mm				
Acceptable cable cores	0.08 – 1.5 mm <sup>2</sup> (cable glands 2 x 1 mm <sup>2</sup> or 2 x 0.75 mm <sup>2</sup> should be used for double wires)				
Enclosure material	Stainless steel 1.4301, polycarbonate				
Weight	<ul style="list-style-type: none"> <li>• PW-091-X: about 1 kg</li> <li>• PW-089-X: about 1.5 kg</li> </ul>				
Mounting	Dedicated wall hanger, diameter 5 mm (see section 8.2)				

**Table 8: Technical specification**

## 10 Product marking

### 10.1 PW-091-X (LTT2)

#### 10.1.1 PW-091-S-X, PW-091-M-X

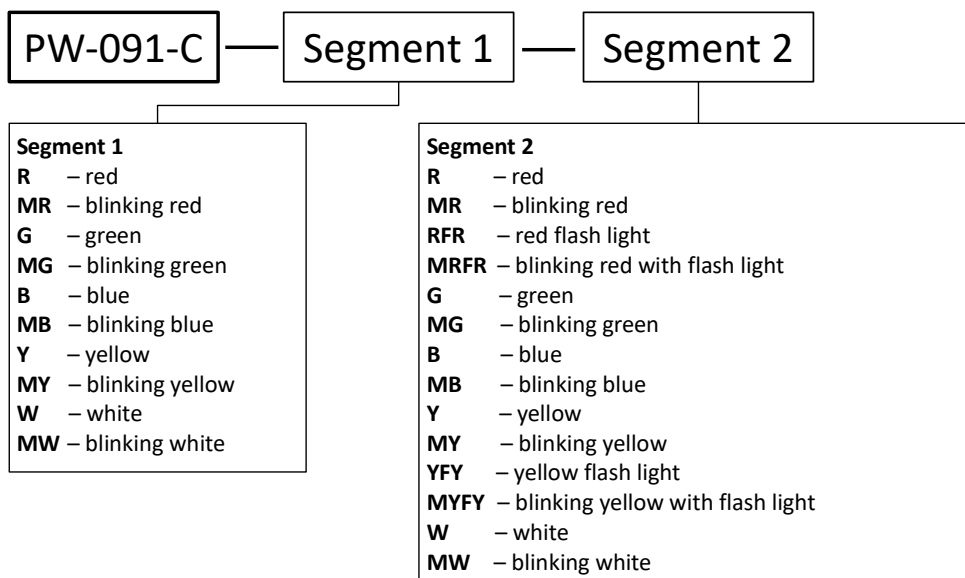


**Figure 15: Configuration of LTT2 – version PW-091-S-X and PW-091-M-X**

Example: PW-091-S-RG-YFY

Warning LED Tower with Sounder LTT2, interface Sigma, first segment – red-green, second segment – yellow with flash light.

#### 10.1.2 PW-091-C-X



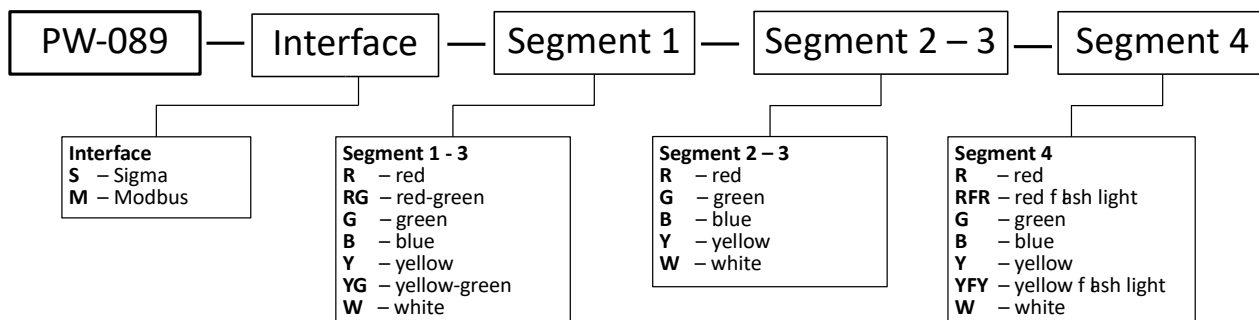
**Figure 16: Configuration of LTT2 – version PW-091-C-X**

Example: PW-091-C-MG-MYFY

Warning LED Tower with Sounder LTT2, voltage interface, first segment – blinking green, second segment – blinking yellow with flash light.

**10.2 PW-089-X (LTT4)**

**10.2.1 PW-089-S-X, PW-089-M-X**

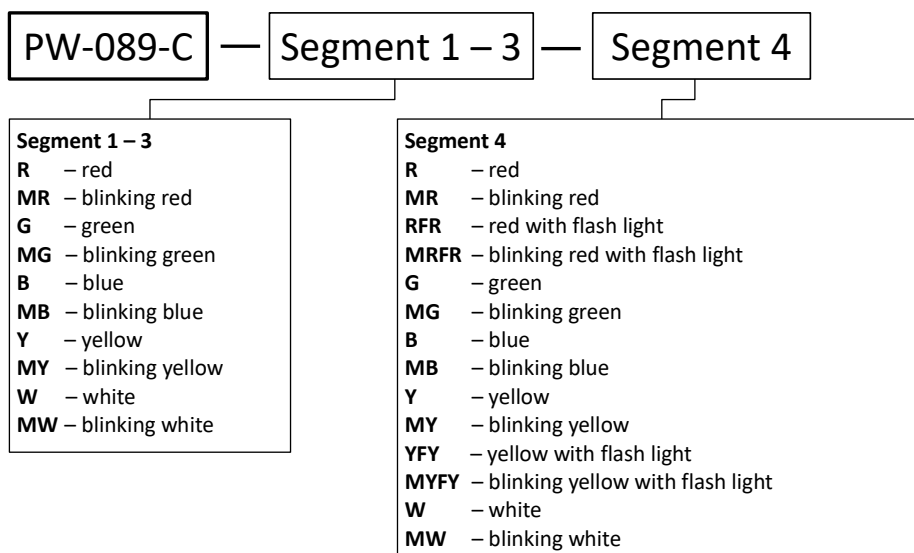


**Figure 17: Configuration of LTT4 – PW-089-S-X and PW-089-M-X versions**

Example: PW-089-S-RG-RG-RG-YFY

Warning LED Tower with Sounder LTT4, Interface Sigma, first segment – red-green, second segment – red, third segment – red, fourth segment – yellow with flash light.

**10.3 PW-089-C-X**



**Figure 18: Configuration of LTT4 – PW-089-C-X version**

Example: PW-089-C-MG-MG- MG-MYFY

Warning LED Tower with Sounder LTT4, voltage interface, first segment – blinking green, second segment – blinking green, third segment – blinking green, fourth segment – blinking yellow with flash light.

**11 Appendices**


- [1] DEZG115-ENG – EU Declaration of Conformity – LTT2 / LTT4
- [2] PU-Z-096-ENG – The memory map for the GTW functionality in LTT2 and LTT4


## EU Declaration of Conformity


Atest Gaz A. M. Pachole sp. j. declares with full responsibility, that the product:

(Product description) <b>Warning LED Tower with Sounder</b>	(Trade name) <b>LTT2 / LTT4</b>	(Type identifier or Product code) <b>PW-091-X / PW-089-X</b>
--	------------------------------------	---


complies with the following Directives and Standards:

-  in relation to Directive 2014/34/EU – on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres:


Marking	Certificate no.	Standards	Notified body
 II 3G Ex nA IIB T3 Gc	-	EN 60079-0:2012 EN 60079-15:2010	-

-  in relation to Directive 2014/30/EU – on the harmonisation of the laws of the Member States relating to electromagnetic compatibility:

- EN 50270:2015

-  In relation to directive 2011/65/EU – on the restriction of the use of certain hazardous substances in electrical and electronic equipment

- EN 50581:2012

-  other:

- EN 60529:1991

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

Purpose and scope of use: product is intended for use in gas detection systems for residential, commercial and industrial environment.

This EU Declaration of Conformity becomes not valid in case of product change or rebuild without manufacturer's permission.

Gliwice, 08.07.2020



(Name and Signature)  
Managing Director  
Aleksander Pachole

# Map of GTW functionality memory in LTT2 and LTT4

## 1 Memory map

Addresses range	Description
40001 – 40064	Status of detectors at channels 1 – 32
40065 – 40066	Condition of optical and acoustic elements
40067 – 40067	Status of signaller
40068 – 40099	Temperature in measuring head of detectors at channels 1 – 32
44001 – 44002	External DI control inputs
46001	Signaller with Modbus interface control

### 1.1 Detectors' statuses (read-only)

Channel No.	Register	Name	Description	Type
1	40001	State_A	Detector status	flags
	40002	N	Output signal (concentration)	U16 <sup>1</sup>
2	40003	State_A	Detector status	flags
	40004	N	Output signal (concentration)	U16
...	...	...	...	...
32	40063	State_A	Status Detector status	flags
	40064	N	Output signal (concentration)	U16

State\_A – status of a detector at the specific channel. Assignment of the individual bits is listed in the table below.

Bit	Flag	Description
0	Collective_W1	First warning threshold exceeded
1	Collective_W2	Second warning threshold exceeded
2	Collective_AL	Alarm threshold exceeded
3	Collective_CrFail	Collective information about a critical failure
4	Collective_NonCrFail	Collective information about a non-critical failure
5	-	Unused
6	Gas_HiHi_Range	Gas overload
7	Sensor_Lock	Sensor locked (the last measurement result is stored)
8	Calibration	Calibration mode
9	Test	Test mode
10	Warm_Up	Sensor's warm up

<sup>1</sup> U16 – unsigned 16-bit number.

Bit	Flag	Description
11	Sensor_Inhibit	Inhibit mode
12	Comm_Error	Error of communication with a detector
13	Calibration_Warning	Calibration time exceeded (non-critical error)
14	Monitoring	Measurement in progress
15	System_Stop	The system is halted

N – gas concentration. The value of 0 corresponds to zero concentration whilst the value of 1000 corresponds to the concentration equal to the measurement range of the detector.

## 1.2 Outputs status (read-only)

### 1.2.1 LTT2

Address	Name	Description	Type
40065	DO_Status	Status of optical and acoustic elements. Description of bits: 0 – status of segment 1A (counted from the bottom) 1 – status of segment 1B 2 – status of segment 2A 3 – status of segment 2B 4 – alternative colour status for segment 1 5 – silent buzzer status 1 6 – silent buzzer status 2 7 – loud buzzer status  Bit value of 1: the DI input is active Bit value of 0: the DI input is inactive	flags

### 1.2.2 LTT4

Address	Name	Description	Type
40065	DO_Status	Status of optical and acoustic elements. Description of bits: 0 – status of segment 1 (counted from the bottom) 1 – status of segment 2 2 – status of segment 3 3 – status of segment 4 4 – alternative colour status for segment 1 5 – silent buzzer status 1 6 – silent buzzer status 2 7 – loud buzzer status  Bit value of 1: the DI input is active Bit value of 0: the DI input is inactive	flags

## 1.3 Status of the control unit (read-only)

Address	Name	Description	Type
40067	CU_Status	Status of the Control Unit	flags

CU\_Status – status of control unit. Assignment of the individual bits is listed in the table below.



Bit	Flag	Description
0	System_fail	Collective flag of system failure
1	CU_fail	Failure of the control unit
2 – 15	-	Unused

#### 1.4 Temperature in measuring head of detectors (read-only)

Channel no.	Register	Name	Description	Type
1	40068	Temp.	Temperature in measuring head	S16 <sup>2</sup>
2	40069	Temp.	Temperature in measuring head	S16
...	...	...	...	...
32	40099	Temp.	Temperature in measuring head	S16

#### 1.5 External DI control inputs (read / write)

Address	Name	Description	Type / range
44001	Static_External_DI	External DI inputs – static (level controlled) Write 1 – the input value is set to active Write 0 – the input value is set to inactive Read – current status of inputs Use: source of the output activation	flags
44002	Pulse_External_DI	External DI inputs – pulse /edge controlled Write 1 – the previous status of '0': generates a single pulse at the selected input Write 1 – the previous status of '1': no action Write 0 – the input remains unaltered (the previous input value is preserved) Read – always '0' Use: temporary deactivation, latched output reset	flags

Static\_External\_DI, Pulse\_External\_DI – assignment of individual bits is listed in the table below.

Bit	Flag	Description
0	External_DI_0	Input #0
1	External_DI_1	Input #1
...	...	...
15	External_DI_15	Input #15

#### 1.6 Signaller with Modbus interface control

Address	Name	Description	Type / range
46001	Control_Reg	Signaller with Modbus interface control register	flags

Control\_Reg – assignment of individual bits is listed in the table below.

<sup>2</sup> S16 – unsigned 16-bit number.

### 1.6.1 LTT2

Bit	Flag	Description
0	Seg_1A	Segment 1A
1	Seg_1B	Segment 1B
2	Seg_2A	Segment 2A
3	Seg_2B	Segment 2B
4	Seg_1_Alt	Segment 1 – alternative colour
5	Acoustic_L_1	Quiet acoustic signalling 1
6	Acoustic_L_2	Quiet acoustic signalling 2
7	Acoustic_H	Loud acoustic signalling
8 – 15	-	Unused

### 1.6.2 LTT4

Bit	Flag	Description
0	Seg_1	Segment 1
1	Seg_2	Segment 2
2	Seg_3	Segment 3 (only for LTT4)
3	Seg_4	Segment 4 (only for LTT4)
4	Seg_1_Alt	Segment 1 – alternative colour
5	Acoustic_L_1	Quiet acoustic signalling 1
6	Acoustic_L_2	Quiet acoustic signalling 2
7	Acoustic_H	Loud acoustic signalling
8 – 15	-	Unused



