

# **User Manual**



Warning Beacon

# SOLED3

Product code: PW-081-A-X



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

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### Remarks and reservations

- Connection and operation of the device is allowed only after reading and understanding the contents of this document. Keep User's Manual with the device for future use.
- The manufacturer bears no responsibility for errors, damages and failures caused by improper selection of devices and cables, improper installation or failure to understand the contents of this document.
- Unauthorised repairs and modifications of the device are not allowed. The manufacturer bears no responsibility for the results of such interventions.
- Excessive mechanical, electrical or environmental exposure may result in damage to the device.
- Use of damaged or incomplete devices is not allowed.
- The design of the gas detection system for a protected facility may involve other requirements throughout all stages of the product life.

## How to use this manual?

Important parts of the text are marked as follows:



Pay special attention to information given in these fields.

User's Manual consists of main text and appendices. Appendices are independent documents and can exist without User's Manual. Appendices have their own page numbering independent of User's Manual page numbering. These documents can also have their own tables of contents. All documents included in the User's Manual are marked in the bottom right corner with their name (symbol) and revision (issue number).



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## **1** General information

#### 1.1 Application

The Warning Beacon SOLED3 of the PW-081 type is designed to disseminate warning signals by means of visual signals in various colours and can be installed in areas with potentially explosive atmospheres.

Owing to a redundant terminal block and presence of as many as three cable glands the warning beacon enables connection of another visual or sound warning devices to set up a chain of alerting indicators.

#### **1.2** Specification of the device

The warning beacon is designed for operation in areas with a potential hazard of gas explosion (zone 2) and /or dust explosion (zone 22).

Light-emitting modules are made up of LEDs with various colours.

Up to three colours of indication with independent control are available. The following options are possible:

- or modulated red light (blinking effect),
- continuous or modulated green light,
- continuous or modulated yellow light,
- continuous or modulated white light,
- continuous or modulated blue light,
- red flashing light of high power.
- Possibility of collaboration with a sounder (siren).

Depending on the design option the beacon can be controlled by voltage outputs or by means of a digital communication protocol.

Aluminium housing immune to weather conditions.

The number and type of LED segments used can be adapted to the needs of the application.

#### **1.3** Marking of explosion protection



#### Figure 1: Information on the rating plate of the device



No.	Description
1	Ex code for the device
2	Information about ambient temperature, power and ingress protection IP (see Chapter 9)

#### Table 1: Meaning of information provided on the rating plate

#### 1.4 Additional information related to the explosion-proof protection of the device

- / The required position for the device operation is vertical, with glass globe down (see Figure 2).
- Fquipment should not be covered by dust.
- / Defective flameproof joints must be replaced with new ones no repairs are allowed.
- / The cable inserted through the cable gland cannot be shorter than 3 meters<sup>1</sup>.

#### 1.5 Cable glands and blanking plugs

The cable gland and blanking plug are replaceable elements. To select spare ones please obey the following rules:

- ATEX certificate,
- / degree of explosion protection (Ex code) no worse than the device (see Table 15),
- øperating temperature range (see Table 15),
- appropriate mounting thread,
- / nylon gasket to secure the enclosure tightness.

#### **1.5.1** Replacement of cable glands and blanking plugs

To replace/screw the cable gland or blanking plug:

- / remove the gland/blanking plug from device (if it is screwed in),
- J apply small amount of technical vaseline on the thread of the gland/blanking plug,
- screw in a new gland/blanking plug (remember to use the appropriate torque specified by the manufacturer).

#### 1.6 Cables

When selecting cables, make sure that:

- / thermal resistance of cables must comply requirements set forth in Table 15,
  - the connection cable is of the appropriate length see Section 1.4.

<sup>1</sup> PN-EN 60079-14 standard requirement.



## 2 Safety



All activities related to connecting detectors, signallers and other system components must be carried out while control unit's power supply is off.



Despite the power supply voltage for the Gas Safety System is off, dangerous voltage may persist across terminals of the control unit. Such a voltage may come from another system controlled by the same unit, for instance ventilation, that use one output pin of the control unit.



Before painting the facility walls make sure that the device is properly secured against unintentional painting or paint splashing.



For beacons with special conditions of application pay attention to information provided in Section 7.



The power supplying cable leading to the warning beacon must be reliably fixed down its route.



The device comprises a strong source of light. Do never turn your eyes directly towards the lamp and always keep a safe distance from it.



Do your best to mount the beacon at a location where the risk of its exposure to mechanical damage is minimized.



## 3 Device design

SOLED3 Warning Beacon incorporates a light-emitting module that is made up of up to six LED segments (P1 - P6).

The LED segments consist of up to 3 lighting elements, controlled by the SO1 – SO3 signals (see Figure 4). Information on possible combinations of lighting elements can be found in Chapter 12.

It is possible to retrofit SOLED3 with an acoustic signalling device.



Figure 2: Warning beacon mechanical construction





#### Figure 3: Overall dimensions and mounting of the beacon

The warning beacon is available in two versions:

- voltage details see Section 4.1.1. Information on customized (non-standard) design is available from the manufacturer,
- / digital details see Section 4.1.2. The control logic is determined at the stage of placing the order by the customer.





Figure 4: Warning beacon internal construction

## 4 Input-output interfaces

#### 4.1 Electric interface

The beacon has a redundant (doubled) terminal block to avoid the need to use additional branching terminal boxes when more than one alerting device is to be connected in series.

#### 4.1.1 Voltage interface





No.	Pin	Description (standard configuration)		
1	+	Positive line for power supply voltage		
2	Performance         Negative line for power supply voltage			
<b>3</b> S1 Lighting element control input 1 (SO1 optical control signal – see Figure 6)		Lighting element control input 1 (SO1 optical control signal – see Figure 6)		
4 S2 Lighting element control input 2 (SO2 optical control signal – see Figure 6)		Lighting element control input 2 (SO2 optical control signal – see Figure 6)		
5	S3 Lighting element control input 3 (SO3 optical control signal – see Figure 6)			
6	S4	Sounder control input (SA acoustic control signal – see Figure 6)		



No.	No. Pin Description (standard configuration)	
7	A+	Control output for a sounder – positive line
8	A-	Control output for a sounder – negative line

#### Table 2: Electric connections description for voltage version



#### Figure 6: Standard voltage version – control logic

#### 4.1.2 Digital control





No.	Pin	Description	
1	+	Positive line for power supply voltage	
2	- Negative line for power supply voltage		
		System communication port, see Section 9. Used for data exchange between devices in Sigma Gas system.	
3	SA	Signal line A	
4	SB	Signal line B	



No.	Pin	Description		
		System communication port, see Section 9. Used for data exchange between external systems (e.g.: SCADA, PLC)		
5	EA	Signal line A		
6	EB	Signal line B		
7	A+	Control output for a sounder – positive line		
8	A-	Control output for a sounder – negative line		

#### Table 3: Electric connections description for digital version

## 5 Arrangement of alerting devices

#### 5.1 Arrangement of warning beacons



#### Figure 8: Arrangement of warning beacons

#### 5.2 Arrangement of warning beacons and sounders



#### Figure 9: Arrangement of warning beacons and sounders

### 6 Lifetime cycle

#### 6.1 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.

#### 6.2 Installation

#### 6.2.1 Deployment of devices

Deployment of devices must be determined by the system designer. Information can be found in the Guide – "Sigma Gas Safety System" (POD-070-ENG).

#### 6.2.2 Mechanical mounting of devices

Device should be mounted to horizontal element in the orientation shown in Figure 2, using two expansion plugs or M6 screws – details see Figure 3.

The device should be installed so that the rating plate ① is clearly visible (facing the fitter).

The device can be equipped with a mounting bracket (see Table 17), which allows it to be mounted on various surfaces.

#### 6.2.3 Electric network

Denomination	Tool
Open flat spanner 7 mm	N1
Allen wrench 3 mm	N2
Phillips screwdriver PH1 80 mm	N3
Open flat spanner 24 mm	N4
Minus screwdriver 3.5 mm	N5

6.2.3.1 List of tools necessary for installation of the signalling device

#### Table 4: List of necessary tools

#### 6.2.4 Installation sequence

To install the warning beacon follow the sequence below (see also Figures 10, 11, 12, 13 and 14):

- / make sure that the connected cables are disconnected from any electrical circuits and potentials,
- / make sure that during installation there is no risk of explosion or fire,
- $\checkmark$  use the N2 tool to remove the bolt with a hex socket (3), meant to lock the beacon globe,
- / undo the beacon globe,
- $\checkmark$  detach the light-emitting module (4),
- $\checkmark$  remove fixing screws of the connector plate (5) by means of the tool N3,
- ✓ use the tool N4 to loosen the cable gland (6) (the applied flameproof cable gland allows to introduce cables with diameters of a specific range. The suggested cable types are included in the Guide "Sigma Gas Safety System" (POD-070-ENG),
- I thread the cable through the gland. Use a suitable sealing sleeve for glands with adjustable diameter of tightening. For more details please refer to the manual POD-066-ENG "Cable glands used in offered devices",
- I draw cables into the terminal box,
- ✓ disconnect male plugs from female sockets on the connector plate,

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- attach cable ends to male plugs by means of the tool N5 (see marking of terminals on the connector plate),
   plate),
- / when two shielded cables are drawn into the beacon enclosure, connect the shields together by means of a suitable clamp (7),
- do never connect a shield of cables drawn into the beacon interior to any part of the device but provide reliable insulation of shields,
- f connect male plugs of cables to female sockets on the connector plate,
- / arrange the cable correctly so that it is not affected by mechanical stress, that water does not flow down it to the device see Figure 13, and that it is of the appropriate length (Section 1.4),
- reassemble the beacon by repeating previous operations in reverse order,
- tighten firmly all cable glands,
- / make sure (if necessary) that the second threaded inlet is plugged by appropriate blanking appliance,
- connect an earthing conductor with the cross-section not less than 1 mm<sup>2</sup> and ended with a fork type lug suitable for an M4 bolt to the earthing terminal 2.Use the N1 tool,
- ground connection should be protected from corrosion (e. g. a small amount of technical petroleum jelly).



Figure 10: Installation of the warning beacon – step 1





Figure 11: Installation of the warning beacon – step 2



Figure 12: Installation of the signaller – step 3



Figure 13: Routing of the power supply cable for the warning beacon





#### Figure 14: Connection using two shielded cables

On the side of the control unit, screens must be connected to ground.

According to good practice, wiring of the devices should be carried out as far as possible from the power cables / high-current cables, preferably in separate trays.



The electric circuits of the Gas Safety System is not intrinsically safe. Damage of any cable can lead to a danger.

If the connection was made with the use of multi-wire cables (commonly known as a "cord"), the ends of these connectors should be ended with clamp sleeves.

If there is a need to connect two conductors in one terminal of the device, the only allowable option is to connect them in a common clamping sleeve (see Table 15).



It is unacceptable to combine in one connector two wires which are not pinched in one cable lug.



Do not place the cable reserve in the device. Bare wires or wires surplus may create a danger of electric shock or equipment damage.



Do not leave disconnected cables inside the device.





Incorrect cable routing can lead to reducing the device's immunity from electromagnetic interference.



Unused screw terminals must be tightened home.

#### 6.3 Device configuration

Signaller are factory configured by their manufacturer.

#### 6.4 Maintenance schedule

#### 6.4.1 Scheduled inspections

Scheduled inspection must include checks of the beacon operability by separate activation of each light-emitting module.

The minimum frequency of such inspections is specified in Table 15.

#### 6.4.2 Cleaning

Remove dust and dirt from the beacon housing and glass globe with a moistened cloth as needed, depending on contamination of the ambient environment.



Do never allow deposition of contamination with the thickness more than 5 mm on the beacon surface.

#### 6.4.3 Replacement of consumables and fast wearing parts

The service life of the light-emitting module incorporated into the beacon PW-081-A-x-B depends on the ambient conditions and schedule of the device operation.

	Operating conditions of the beacon PW-081-A-x-B	Service live
•	T <sub>amblent</sub> ≤ 25°C continuous green light active during 90% of the operation time continuous red light and red flashing light active during 10% of the operation time	10 years
•	25°C ≤ T <sub>ambient</sub> ≤ 40°C continuous green light active during 90% of the operation time continuous red light + red flashing light active during 10% of the operation time	4 years
•	$25^{\circ}C \le T_{ambient} \le 40^{\circ}C$ continuous green light active during 100% of the operation time continuous red light + red flashing light active during 100% of the operation time	2 years

#### Table 5: Service live of the light emitting module with a flashing segment

After the prescribed service life of a light emitting module expires the module must be replaced or sent for repair to an authorized workshop. See Section 6.2 to get familiar with the procedure of the beacon disassembling and reassembling.



#### 6.5 Utilization



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.

## 7 Special conditions of operation



For the beacon design option PW-081-A-X-G (see Section 12) do never allow simultaneous activation of any two colours.



Total short-time consumption of electric power by all LED segments must never exceed 9.5 W (see details in Section 9).

## 8 The memory map for the GTW functionality in SOLED3

#### 8.1 Memory map

Registers range	Description
40001 – 40064	Status of detectors at channels 1 – 32
40065 – 40066	Status of optical and acoustic devices
40067 – 40067	Status of signaller
40068 – 40099	Temperature in measuring head of detectors at channels 1 – 32
44001 – 44002	External DI control inputs

#### Table 6: Memory map of SOLED3

#### 8.1.1 Statuses of detectors (read-only)

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

2 U16 – unsigned 16-bit number.



Channel No.	Register	Name	Description	Туре
32	40063	State_A	Detector status	flags
	40064	N	Output signal (concentration)	U16

#### Table 7: Statuses of detectors mapped into the beacon memory

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
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 stopped

#### Table 8: Assignment of flag bits in status registers

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.

#### 8.1.2 Status of R1 – R8 outputs and DI1 – DI4 inputs (read-only)

Register	Name	Description	Type / range
40065	DO_Status	Statuses of visual and sound warning devices. Assignment of bits:	flags
		0 – intermediate state 1 for segment 1	
		1 – intermediate state 2 for segment 1	
		2 – intermediate state 1 for segment 2	
		3 – intermediate state 2 for segment 2	
		4 – intermediate state 1 for segment 3	
		5 – intermediate state 2 for segment 3	
		6 – intermediate state 1 for the sounder output	
		7 – intermediate state 2 for the sounder output	
		8 – status (On/Off) for the light emitting segment 1	
		9 – status (On/Off) for the light emitting segment 2	
		10 – status (On/Off) for the light emitting segment 3	
		11 – status of the output for sounder control	
		Bit asserted ('1'): output active	
		Bit cleared ('0'): output inactive	

#### Table 9: Relay outputs status



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

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

#### Table 10: Control unit status

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

#### Table 11: Assignment of the bits – control unit status

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

Channel no.	Register	Name	Description	Туре
1	40068	Temp.	Temperature in measuring head	S16 <sup>3</sup>
2	40069	Temp.	Temperature in measuring head	S16
32	40099	Temp.	Temperature in measuring head	S16

#### Table 12: Information about temperatures inside specific detectors

#### 8.1.5 Control inputs ExDI (External Data Inputs – read/write)

Address	Name	Description	Type/range
44001	Static_External_DI	External Data Inputs (ExDI) shall be sensitive to static (potential) signals Writing 1 – the specific input shall be set as active Writing 0 – the specific input shall be set as inactive Reading – current status of inputs Application: source for activation of an associated output	flags
44002	Pulse_External_DI	External Data Inputs (ExDI) shall be sensitive to pulse signals (voltage transitions) Writing 1 with the previous state of 0 (rising edge): a single positive pulse shall be produced on the selected input Writing with the previous state of 1 (no transition): no effect Writing 0 with the input unchanged: no effect (the previous state of the input is preserved) Reading – always 0. Application: temporary deactivation, reset of locked status	flags

#### Table 13: Statuses of control inputs

Meaning of specific flag bits in Static\_External\_DI and Pulse\_External\_DI registers is explained in the table below.

Bit No.	Flag	Description
0	External_DI_0	Input No. 0
1	External_DI_1	Input No. 1

3 S16 – unsigned 16-bit number.



Bit No.	Flag	Description
15	External_DI_15	Input No. 15

## Table 14: Meaning of flag bits for the status register of digital inputs

## 9 Technical specification

Power supply			
Voltage Un	10 – 30 V		
<ul> <li>Power consumption Pn</li> </ul>	max 34 W (depending on the number of LED segments and acoustic signaller)		
Power consumption per module	Red and yellow segment: 2 W Green, blue and white segment: 1.25 W Flash light module: 3 W Sounder: 24 W Standby power (all light and sound warning components are off): 0.5 W For details related to special conditions of the beacon operation see Section 7		
Environment	PW-081-A-X-G	Other	
Temperature	-30– 55°C (special conditions of use see section 7)	-30 – 40°C	
Humidity	10 – 90% long term 0 – 99% short term		
ATEX	Ex - II 3G Ex dc IIC T6 Gc II 3D Ex tc IIIC T85°C Dc		
IP	IP 65		
<ul> <li>Modulation and flash time parameters</li> <li>Period</li> <li>Modulation</li> <li>Flash time</li> </ul>	About 1,5 s About 50% About 50 ms		
<ul> <li>Parameters of digital communication</li> <li>Port SBUS <ul> <li>Electric standard</li> <li>Communication protocol</li> </ul> </li> <li>Port ExBUS <ul> <li>Electric standard</li> <li>Communication protocol</li> </ul> </li> </ul>	RS-485 Sigma BUS RS-485 Modbus ASCII, RTU, 4800 – 115200 I	bod	
<ul><li>Parameters of control and signalling inputs</li><li>Deactivated</li><li>Activated</li></ul>	0 – 1 V 10 – 30 V		
Parameters of acoustic signaller outputs• Voltage• CurrentSuch as given on the power terminals (terminals 1 and 2)• maximum 0.8 A		ls (terminals 1 and 2)	
Optical signalling <ul> <li>Light intensity</li> </ul>	LED maximum 60 Cd (depending on the number of modules and their colour)		
Protection class	111		
Dimension	See figure 3		



Cable glands	
Cable diameter range	4 – 12 mm, 10 – 16 mm
	For details see POD-066-ENG "Cable glands used in offered devices"
External thread	M20 x 1.5
Acceptable cable cores	0.5 – 2.5 mm <sup>2</sup>
Enclosure material	Aluminium spray epoxy, glass globe
Weight	1.6 kg
Mandatory periodic inspection	Every 6 months (see Section 6.4.1)
Lifetime of consumables	See Table 5
Mounting	Directly to the ceiling – see Section 3 or with mounting bracket – see Table 17

#### Table 15: Technical specification

## **10** List of consumables

No.	Consumables	Lifetime	Manufacturer	Product code
{1}	Light-emitting module	From 2 to 10 years, with consideration of ambient conditions and colour of a LED module – see Table 5	Atest Gaz	PWS-051-X

#### Table 16: List of consumables

## **11** List of accessories

Product code	Description	
PW-064-WM5	WM5 Mounting Bracket	
PW-064-WM7	WM7 Mounting Bracket (ETH 12MD + SOLED3)	

### Table 17: List of accessories



## 12 Product marking



Example: PW-081-A-C-4-P-4-B

Warning Beacon SOLED3, voltage interface, with two cable glands with 4 - 12 mm diameter range (left and right side of the beacon), green and red colour of shining, red flash light.





Current information on available lighting modules can be found in the SOLED3 Warning Beacon datasheet (KK075-ENG).

## 13 Appendices

[1] DEZG103-ENG – EU Declaration of Conformity – SOLED3



# **EU Declaration of Conformity**

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

(Product description)	(Trade name)	(Type identifier or Product code)
Warning Beacon	SOLED3	PW-081

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 dc IIC T6 Gc	-	EN 60079-0:2018 EN 60079-1:2014	-
€x II 3D Ex tc IIIC T85°C Dc	-	EN 60079-31:2014	-
CE	-	EN ISO/IEC 80079-34:2020	-

- 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 IEC 63000:2018

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

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

Gliwice, 18.08.2022

ado Q. (Name and Signature)

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