



EN



Aloxy Pulse v01

Instruction manual EN

Instruction manual for the Aloxy Pulse v01

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Table of Contents

| | | |
|-----------------|---|------------------|
| <u>1</u> | <u>LEGAL INFORMATION</u> | <u>5</u> |
| <u>2</u> | <u>INTRODUCTION</u> | <u>6</u> |
| 2.1 | PURPOSE OF THIS DOCUMENTATION | 6 |
| 2.2 | PURPOSE | 6 |
| 2.3 | CHECKING THE CONSIGNMENT | 7 |
| <u>3</u> | <u>FCC COMPLIANCE</u> | <u>7</u> |
| 3.1 | MARKING LABEL | 8 |
| 3.2 | SECURITY INFORMATION | 10 |
| 3.3 | TRANSPORTATION AND STORAGE | 10 |
| 3.4 | NOTES ON WARRANTY | 10 |
| <u>4</u> | <u>SAFETY INSTRUCTIONS</u> | <u>10</u> |
| 4.1 | PRECONDITION FOR USE | 10 |
| 4.2 | WARNING SYMBOLS ON THE DEVICE | 11 |
| 4.3 | LAWS AND DIRECTIVES | 11 |
| 4.4 | CONFORMITY WITH EUROPEAN DIRECTIVES | 11 |
| 4.5 | IMPROPER DEVICE MODIFICATIONS | 11 |
| 4.6 | USE IN AREAS SUBJECT TO EXPLOSION HAZARD | 11 |
| <u>5</u> | <u>INSTALLATION AND COMMISSIONING</u> | <u>12</u> |
| 5.1 | DIMENSIONS | 13 |
| 5.2 | INSTALLING / MOUNTING | 14 |
| <u>6</u> | <u>USAGE OF THE ALOXY PULSE</u> | <u>15</u> |
| 6.1 | MOUNTING THE ALOXY PULSE TO AN INDUSTRIAL ASSET | 15 |
| <u>7</u> | <u>INSPECTIONS AND MAINTENANCE</u> | <u>22</u> |
| 7.1 | BASIC SAFETY INSTRUCTIONS | 22 |
| 7.2 | CLEANING THE ENCLOSURE | 23 |
| 7.3 | BATTERY REPLACEMENT | 23 |
| 7.4 | TO INSURE INGRESS PROTECTION IP69 | 25 |
| <u>8</u> | <u>DISPOSAL</u> | <u>26</u> |
| 8.1 | TECHNICAL SUPPORT | 26 |



Before installing, configuring or operating the Aloxy Pulse or performing any maintenance activities associated with it, read these instructions carefully!

1 Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

Signal Words

The following signal words, as defined by the ANSI Z535.6 standard, are used in this document.



DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE

NOTICE is used to address practices not related to personal injury.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of ALOXY products



WARNING

ALOXY products may only be used for the applications described in the manual and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by ALOXY. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

2 Introduction

2.1 Purpose of this documentation

This instruction manual includes specifications, installation, basic setup and configuration, and maintenance and troubleshooting information for the ALOXY Pulse.

Do not install, operate, or maintain a ALOXY Pulse without being fully trained and qualified in valve, , and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all of the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your ALOXY sales office or Local Business Partner before proceeding.

See also

<http://www.aloxy.io>

2.2 Purpose

The Aloxys Pulse is a multi-purpose industrial Internet-of-Things device and platform that enables numerous different applications. Typically, it will be attached to (industrial) assets such as valves, motors, pumps or mobile vehicles to monitor their behavior and state based on its inertial sensors.

Depending on the use-case, the Aloxys Pulse can be programmed or configured to capture signals from one of its embedded sensors, perform initial pre-processing of the measured data on its microcontroller and wirelessly transmit the resulting data over one of the supported communication networks.




For instance, by attaching the Aloxy Pulse to the hand wheel or lever of a manual valve, it can monitor the position (open or closed) of the valve in real-time. By attaching the Aloxy Pulse to rotating equipment such as a motor or ventilation unit, it can monitor vibrations or ambient temperature and in real-time send an alert when a certain threshold is exceeded.

The ALOXY Pulse is a wireless IOT sensor used for manual valve position monitoring in the following Industries:

- Chemicals
- Oil and gas
- Energy production
- Food and beverages
- Pulp and paper
- Water/waste water
- Pharmaceutical industry
- Offshore plants


2.3 Checking the consignment

1. Check the packaging and the delivered items for visible damage.
2. Report any claims for damages immediately to the shipping company.
3. Retain damaged parts for clarification.
4. Check the scope of delivery by comparing your order to the shipping documents for correctness and completeness.

 **WARNING**

Using a damaged or incomplete device
Risk of explosion in hazardous areas.

- Do not use damaged or incomplete devices.

 **WARNING**

This product is intended for a specific temperature range and other application specifications. Failure to adhere to these specifications could result in the malfunction of the product, property damage, or personal injury.

3 FCC Compliance

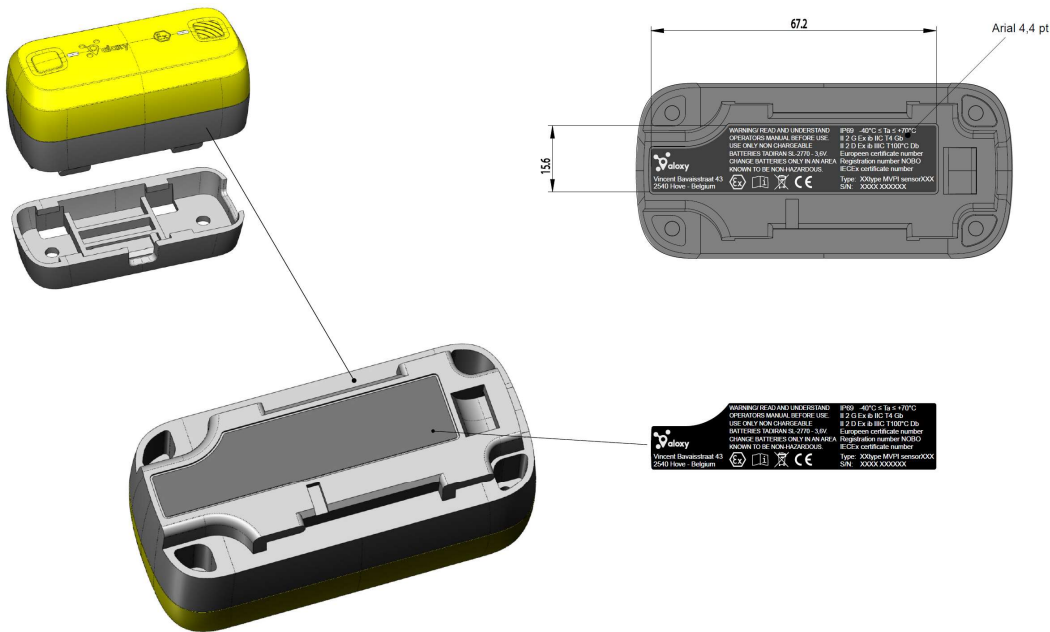
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



This product is an FCC approved device. Changes or modifications to the ALOXY Pulse that are not expressly approved by the party responsible for compliance may void your authority to operate the device.

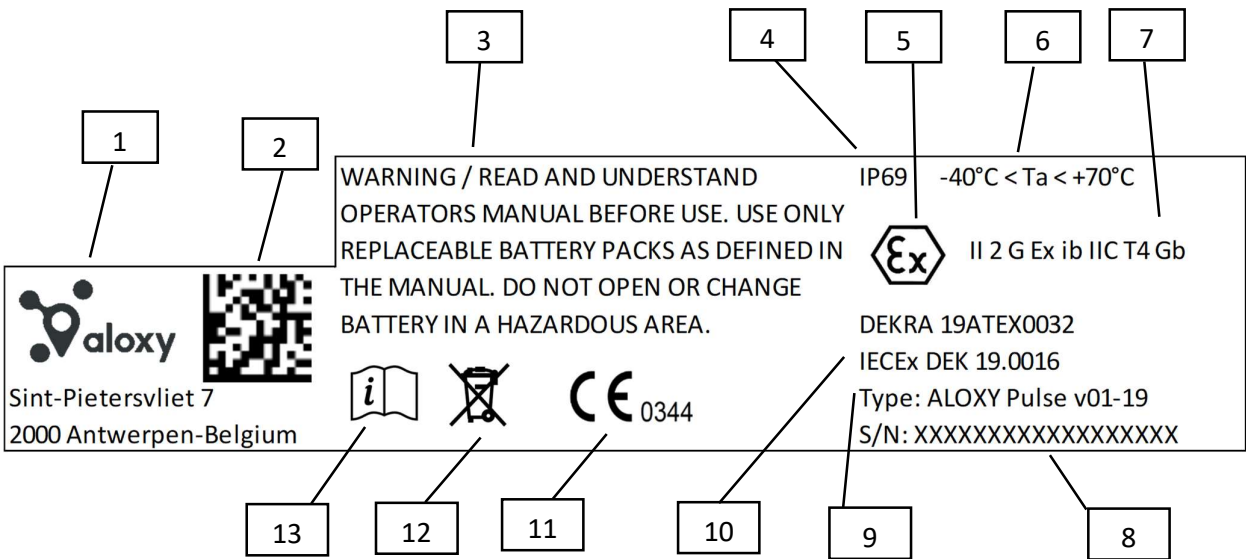
3.1 Marking label

The identification label of the Aloxy Pulse is attached to the bottom of the device:



Name plate dimensions 67,2 mm (L) x 15.6mm (W)

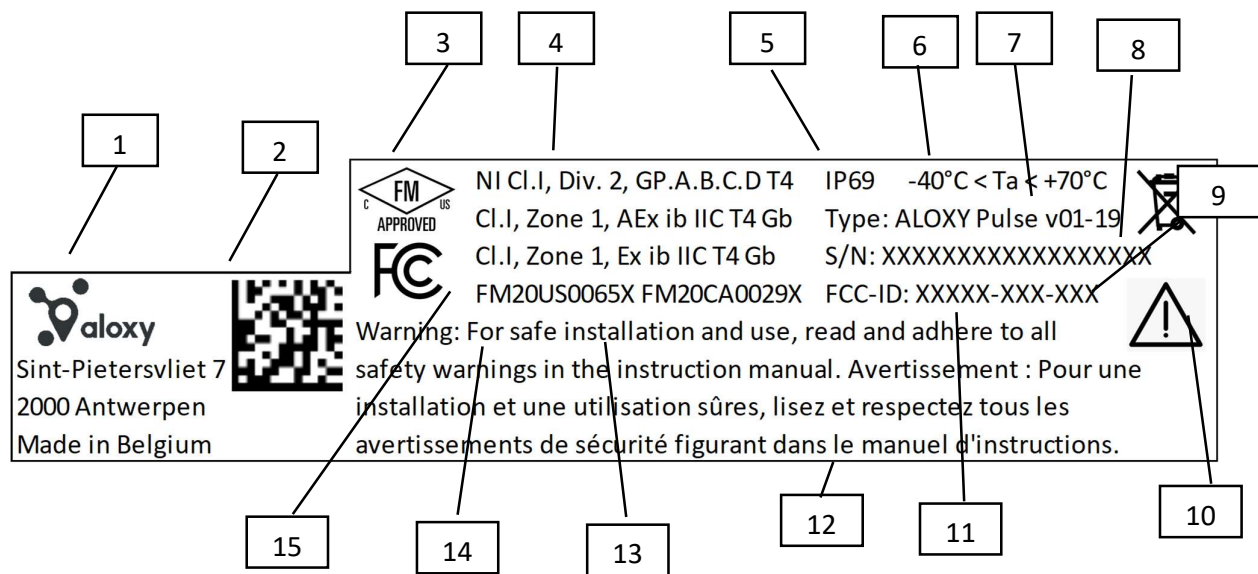
European marking label





1. Manufacturer
2. Manufacturing QR code
3. Warning
4. Protection class
5. ATEX / IECEx marking for hazardous area
6. Permitted ambient temperature for the hazardous area of the corresponding temperature class
7. ATEX/IECEx marking for hazardous area
8. Serial number (Order code)
9. Product name, type and year of manufacturing
10. Approvals
11. Conformity with country-specific directives
12. Waste instructions
13. Consult operating instructions

USA & Canada marking label



1. Manufacturer
2. Manufacturing QR code
3. Conformity with country-specific directives
4. FM / CSA marking for hazardous area
5. Protection class
6. Permitted ambient temperature for the hazardous area of the corresponding temperature class
7. Product name, type and year of manufacturing
8. Serial number (Order code)
9. Consult operating instructions
10. Waste instructions
11. Place of manufacture
12. Warning
13. Canadian Compliance Statement
14. Industry of Canada (IC No)
15. FCC ID
16. FCC statement (there is no room for this on the label)

This device complies with Part 15 class B Digital Device of the FCC rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



3.2 Security information

ALOXY provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. ALOXY products and solutions only form one element of such a concept.


Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

ALOXY products and solutions undergo continuous development to make them more secure. ALOXY strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer’s exposure to cyber threats.

3.3 Transportation and storage

To guarantee sufficient protection during transport and storage, observe the following:

- Keep the original packaging for subsequent transportation.

| |
|--|
|  CAUTION |
| Insufficient protection during storage The packaging only provides limited protection against moisture and infiltration. <ul style="list-style-type: none">• Provide additional packaging as necessary. |

3.4 Notes on warranty

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or legal relationship. The sales contract contains all obligations on the part of ALOXY as well as the complete and solely applicable warranty conditions. Any statements regarding device versions described in the manual do not create new warranties or modify the existing warranty.

The content reflects the technical status at the time of publishing. ALOXY reserves the right to make technical changes in the course of further development.



4 Safety instructions

4.1 Precondition for use

This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety. Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.



4.2 Warning symbols on the device

| |
|---|
|   |
| Consult operating instructions |

4.3 Laws and directives

Observe the test certification, provisions and laws applicable in your country during connection, assembly and operation. These include, for example:

- National Electrical Code (NEC - NFPA 70) (USA)
- Canadian Electrical Code (CEC) (Canada)

Further provisions for hazardous area applications are for example:


- EN 60079-0
- EN IEC 60079-0
- EN 60079-11

4.4 Conformity with European directives

The CE marking on the device shows conformity with the regulations of the following European guidelines:

| | |
|--|---|
| Electromagnetic compatibility EMC 2014/30/EU | Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility. |
| Atmosphère explosible ATEX 2014/34/EU | Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres. |

4.5 Improper device modifications

| |
|--|
|  WARNING |
| Improper device modifications Risk to personnel, system and environment can result from modifications to the device, particularly in hazardous areas. <ul style="list-style-type: none">• Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals. |

4.6 Use in areas subject to explosion hazard

Qualified personnel for hazardous area applications

Persons who install, connect, commission, operate, and service the device in a hazardous area must have the following specific qualifications:

- They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures, aggressive, and hazardous media.
- They are authorized, trained, or instructed in carrying out work on electrical circuits for hazardous systems.
- They are trained or instructed in maintenance and use of appropriate safety equipment according to the pertinent safety regulations.

5 Installation and commissioning

WARNING

Install the equipment as per the NEC NFPA 70



1. **Aloxy logo, Ex marking & NFC area:** The Aloxy logo indicates the area of the Aloxy Pulse device that can be scanned by an NFC reader or NFC-enabled smartphone or tablet.
2. **Left LED:** Multi-color LED light on the left-side of the device allowing to give a light signal to the user
3. **Left button:** Left push button for configuration and operation actions
4. **Top shell** of the enclosure of the Aloxy Pulse device
5. **Bottom shell** of the enclosure of the Aloxy Pulse device
6. **Mounting bracket:** Detachable bracket for easy mounting of the device to any surface
7. **Right LED:** Multi-color LED light on the right-side of the device allowing to give a light signal to the user
8. **Right button:** Right push button for configuration and operation actions. Contrary to the left button, the right button can be recognized by the wave pattern on the button.
9. **Release slot:** Slot to unlock the Aloxy Pulse sensor from the mounting bracket.



WARNING

Please observe the corresponding safety instructions when working on manual valves in use.



WARNING

Impermissible accessories and spare parts

Risk of explosion in areas subject to explosion hazard.

- Only use original accessories or original spare parts.
- Observe all relevant installation and safety instructions described in the instructions for the device or enclosed with the accessory or spare part.



WARNING

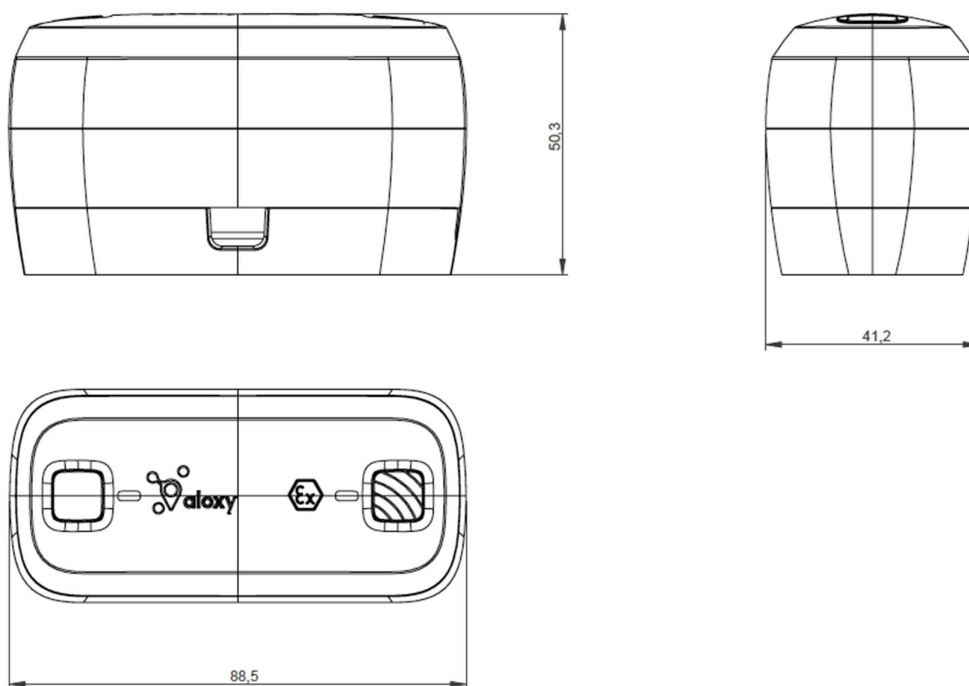
Mechanical impact energy

In order to ensure the degree of protection of the housing (IP69), protect the housing from mechanical impact energy:

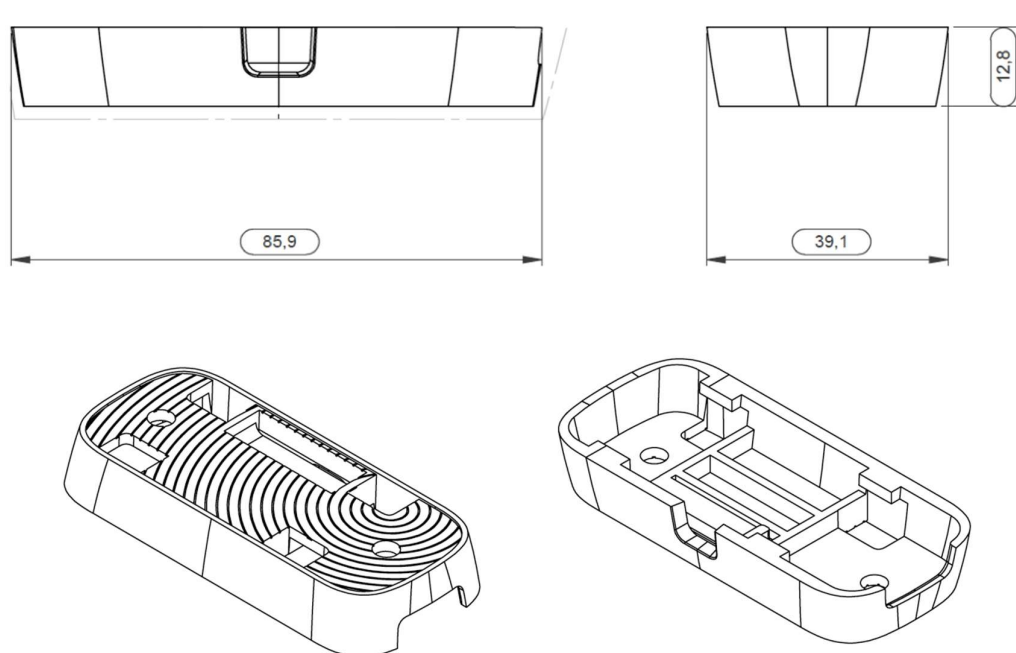
- ALOXY Pulse not greater than 2 Joule

5.1 Dimensions

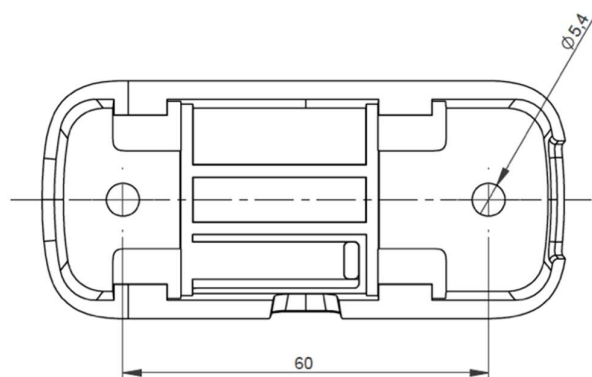
The Aloxy Pulse has the following dimensions: length 88.5mm x with 41.2mm x height 50.3mm, including the mounting bracket.



The individual mounting bracket has the following dimensions: length 85.9mm x width 39.1mm x height 12.8mm:



The screw holes in the mounting bracket have a diameter of 5.4mm and are positioned at a distance of 60mm:



5.2 Installing / mounting



WARNING

Before mounting the ALOXY Pulse:

- Always wear protective clothing, gloves, and eyewear when performing any installation procedures to avoid personal injury or property damage.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

WARNING

Loss of explosion protection

The Aloxy Pulse can only be used within a process temperature range of $-40^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}$ when mounted on pipes or machines.

CAUTION

Loss of type of protection

Damage to device if the enclosure is open or not properly closed. The type of protection specified on the nameplate or in technical data is no longer guaranteed.

- Make sure that the device is securely closed.

NOTICE

Incorrect mounting

The device can be damaged, destroyed, or its functionality impaired through improper mounting.

- Before installing ensure there is no visible damage to the device.
- Mount the device using suitable tools.

NOTICE

Torque on screws regarding plastic mounting bracket

Device damage. The maximum torque of the mounting plate must not be exceeded 1 Nm (0.73 ft lb).

6 Usage of the Aloxy Pulse

6.1 Mounting the Aloxy Pulse to an industrial asset

The Aloxy Pulse is only intended for fixed installations and NOT for portable use. Always follow EN-IEC 60079-14, local regulations and local codes of practice when using the Aloxy Pulse.

The Aloxy Pulse can be attached to any (industrial) asset using a variety of attachment methods such as bolts, straps, magnets or glue. Following procedure must be followed precisely.

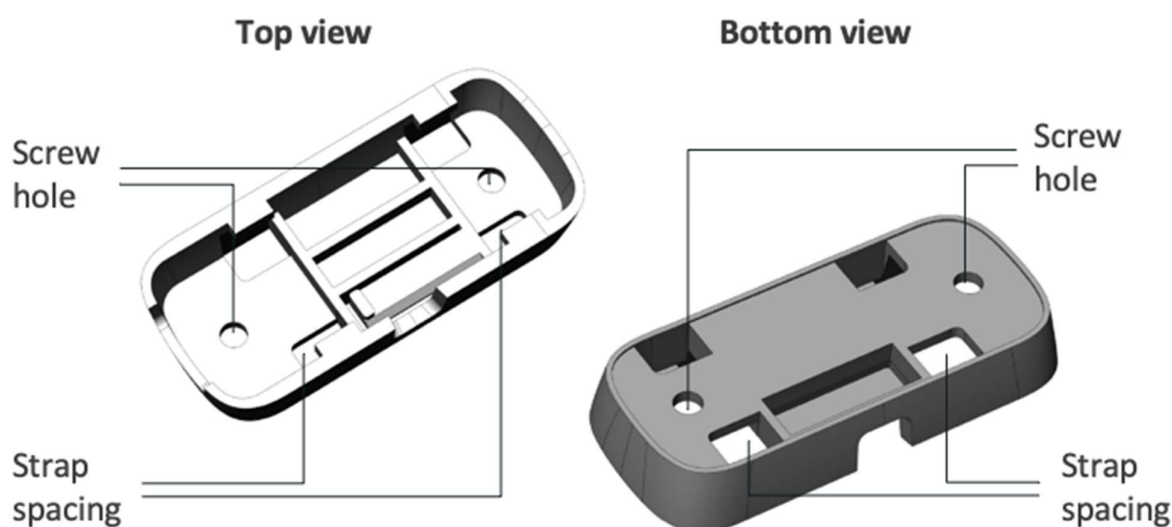
Step 1: Remove the Aloxy pulse device from the mounting bracket.

To remove the Aloxy Pulse device from its mounting bracket, put a screwdriver or similar tool in the release slot to unlock the Aloxy Pulse device from the mounting bracket. Gently pull the device to the left side while holding the mounting bracket in position and keeping the screwdriver inserted in the release slot.



Step 2: Attach the mounting bracket to the asset

Depending on the type of asset and surface, the mounting bracket offers several options to attach, either directly using plastic / metal straps, bolts / screws (M5), magnets or glue, either by using an external metal bracket in between the mounting bracket and the asset surface.



CAUTION

Before sliding the Aloxy Pulse device in its mounting bracket after installation, ensure the mounting bracket is firmly attached on the asset and does not move when putting force in any direction.

NOTICE

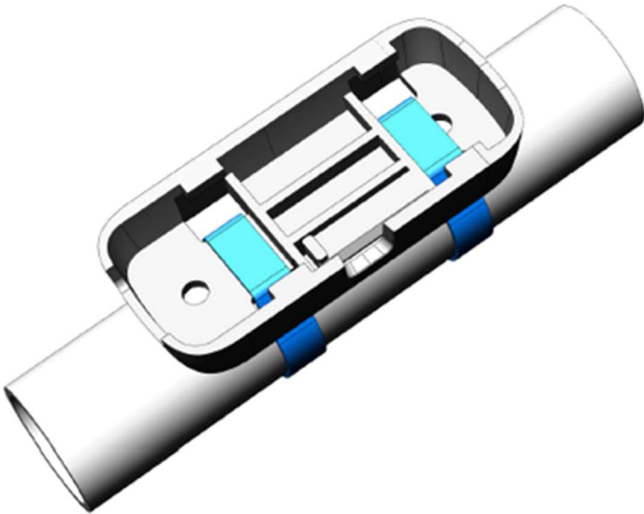
When the Aloxy Pulse should measure a certain motion, for instance the motion of the hand wheel of a manual valve to monitor the valve's position, make sure that the Aloxy Pulse device is attached to the moving part and follows the same motion as the part it is monitoring. No other motions are allowed after installing the sensor!

NOTICE

The following installation examples ensure a correct fixation of the mounting bracket to the surface of an asset. Depending on the formfactor of the asset and the use-case, certain attachment methods are more suited than others. For instance, to monitor vibration, the Aloxy Pulse should be firmly attached to the surface of the asset to follow the same vibration pattern, hence, options using glue or clips are not well suited.



A. Installation using **double straps** (metal or plastic) on a tube- or bar-shape surface:



This method ensures good, non-intrusive fixation of the ALOXY Pulse to an asset suitable for instance for movement detection and vibration monitoring. Typical applications are manual valve position monitoring by attachment to a valve lever or a spoke of the valve wheel, vibration monitoring of a tube, asset tracking, etc.


For cable tie use for instance:

ALOXY article ID: 43361.186.047

CABLE TIE PLASTIC POLYAMIDE (NYLON) 6.6 **UV-RESISTANT** 186X4.7



Tensile strength (N) 220

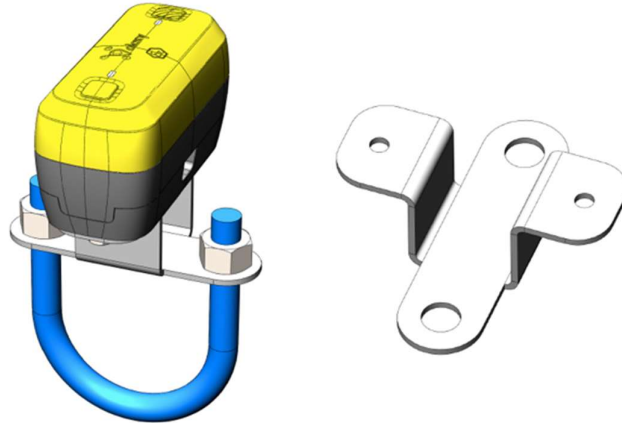
| |
|--|
|  CAUTION |
| Premature aging of the tie rap Only use tie raps that are UV resistant. |

- B. Installation using a generic **external metal U-bracket** on a U-clamp that can be attached around a tube-shape surface:

NOTICE

Device damage.

Torque on screws regarding plastic mounting bracket. The maximum torque of the mounting plate must not be exceeded 1 Nm (0.73 ft lb).



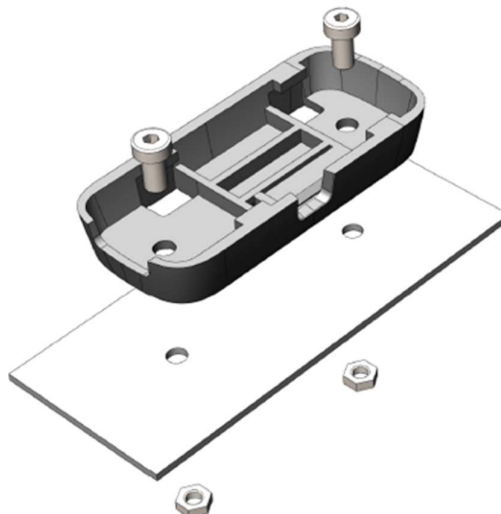
This method ensures good, non-intrusive fixation of the Aloxy Pulse to an asset suitable for instance for movement detection and vibration monitoring. Typical applications are manual valve position monitoring by attachment to a valve lever or a spoke or outer ring of the valve wheel, vibration monitoring of a tube, etc.

- C. Installation using **M5 bolts or screws** on a flat surface:

NOTICE

Device damage.

Torque on screws regarding plastic mounting bracket. The maximum torque of the mounting plate must not be exceeded 1 Nm (0.73 ft lb).



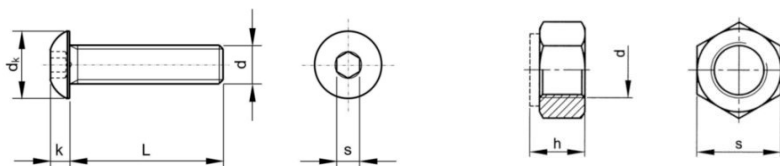


Use M5 bolts or screws with a maximum head height of 4 mm, such as hexagon socket head (DIN 7984) cap screws with low head.

This method ensures excellent, but intrusive fixation of the Aloxy Pulse to an asset suitable for instance for movement detection and vibration monitoring. Typical applications are manual valve position monitoring by attachment to a flat valve lever or a flat spoke of the valve wheel, vibration monitoring of the surface of rotating equipment, asset tracking of mobile vehicles, attachment to a wooden surface, etc.

It is best to use the following bolts and nuts:

- LOW-BULB HEAD of max SCREW WITH HEXAGON SOCKET ISO 7380-1 STAINLESS STEEL A2 M5X10
- SELF-LOCKING HEXAGON NUT WITH PLASTIC WASHER DIN 985 STAINLESS STEEL (STAINLESS STEEL) A2 M5



k (max.) 2.75 never more than 3,5mm!

D. Installation on a flat metallic surface using two magnets:



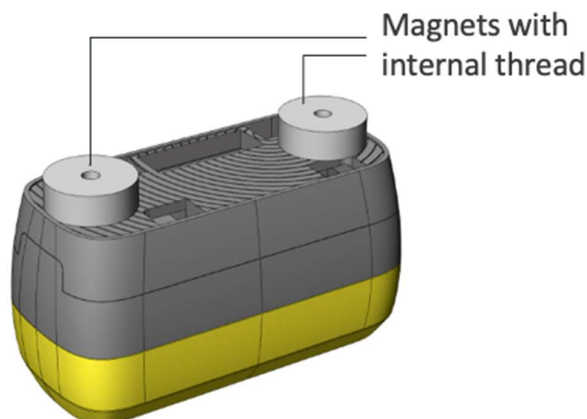
CAUTION

The magnet material has been specifically chosen to provide a long-term stable magnetic field. However, as with any magnet, care must be taken when handling the magnet assembly.

NOTICE

Device damage.

Torque on screws regarding plastic mounting bracket. The maximum torque of the mounting plate must not be exceeded 1 Nm (0.73 ft lb).





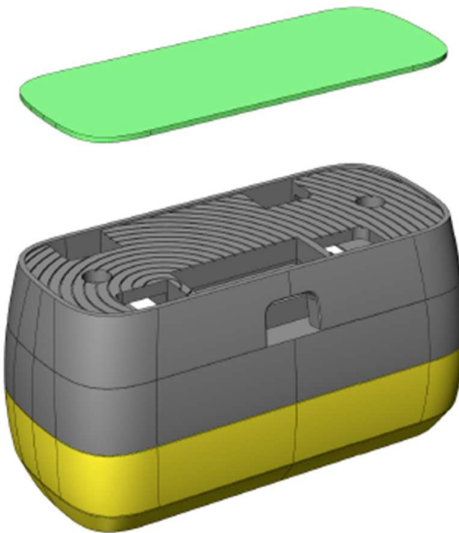
This method ensures good, non-intrusive, rather temporary fixation of the Aloxy Pulse to a flat metallic surface suitable for instance for movement detection and vibration monitoring. Typical applications are temporary vibration monitoring of a rotating equipment, temporary asset tracking, temperature monitoring around a motor, etc.

It is best to use the following magnets:

ALOXY Article ID: ITN-25 M5 magnet

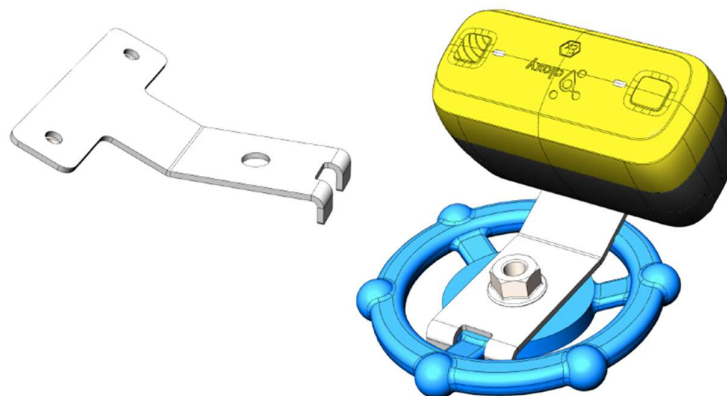
Strength ca. 14 kg (ca. 137 N)

E. Installation on a surface using double sided foam sticker:



This method ensures fair, non-intrusive fixation of the Aloxy Pulse to a flat asset surface suitable for instance for movement detection and temperature monitoring. Typical applications are asset tracking, temperature monitoring around a motor, etc.

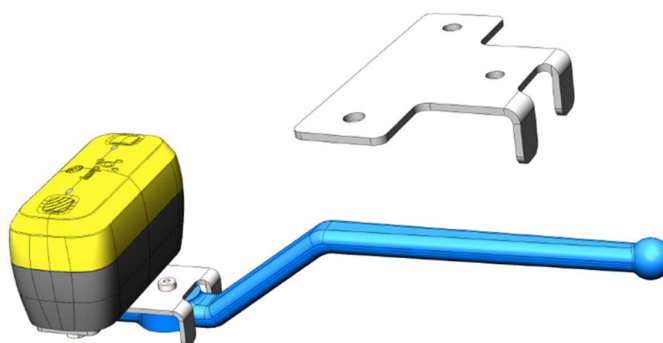
F. Installation using an external metal bracket on the spindle of a multi-turn valve:



This method ensures excellent non-intrusive attachment of the Aloxy Pulse to the handwheel of a multi-turn valve. A typical application is manual valve position monitoring of small multi-turn valves.



G. Installation using an **external metal bracket** on the spindle of a quarter-turn valve:



This method ensures excellent non-intrusive attachment of the Aloxy Pulse to the lever of a quarter-turn valve. A typical application is manual valve position monitoring of small quarter-turn valves.

Step 3: Slide the Aloxy Pulse device in its mounting bracket

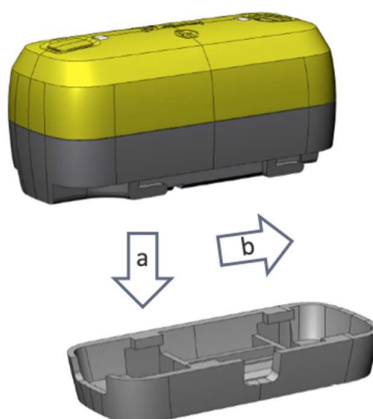


CAUTION

Before sliding the Aloxy Pulse device in its mounting bracket after installation, ensure the mounting bracket is firmly attached on the asset and does not move when putting force in any direction.

Position the Aloxy Pulse device on top of the mounting bracket slightly to the left-side so the hooks below the Aloxy Pulse device align within the mounting bracket (a).

Slide the Aloxy Pulse device to the right-side until it locks in position (b). Check that the edges of the Aloxy Pulse device perfectly align with the edges of the mounting bracket.



To remove the Aloxy Pulse device again from its mounting bracket after installation, put a screwdriver or similar tool in the release slot to unlock the Aloxy Pulse device from the mounting bracket. Gently pull the device to the left side while keeping the screwdriver in the release slot.



7 Inspections and maintenance

7.1 Basic safety instructions

DANGER

The ALOXY Pulse contains one primary lithium metal battery pack. Under normal conditions of use, the battery materials are self-contained and are not reactive as long as the batteries and power module integrity are maintained. Care should be taken to prevent mechanical, electrical, or thermal damage. DO NOT recharge, short-circuit, disassemble, heat, or expose the battery pack to water. The battery contain flammable materials and performing any of the above actions could cause them to become damaged, ignite, or explode, resulting in personal injury or property damage. Observe all warnings included with the battery pack before installing, operating, storing, or shipping the ALOXY Pulse.

The device contains high power lithium batteries designed especially for this sensor and for the conditions as foreseen on the marking label. The use of non-original batteries can cause serious injuries!

Personal injury and property damage can result from fire or explosion if the battery pack is subjected to heat above 100°C (212°F). Battery packs should be stored in a cool, dry and ventilated area; for maximum life, storage should not exceed 30°C (86°F).

WARNING

Impermissible repair of the device

- Repair must be carried out by ALOXY authorized personnel only.
- Only battery replacement is allowed

WARNING

Impermissible accessories and spare parts

Risk of explosion in areas subject to explosion hazard.

- Only use original accessories or original spare parts.
- Observe all relevant installation and safety instructions described in the instructions for the device or enclosed with the accessory or spare part.

WARNING

Loss of explosion protection

Only original parts may be used to repair the sensor. Using non-original parts may cause injury or damage. Loss of explosion protection when:

- Non-original parts are used.
- Repairs being carried out in an incompetent manner
- If the enclosure appears dented, cracked, broken or no longer in a good condition.

NOTICE

Penetration of moisture into the device

Device damage.

- Make sure when carrying out cleaning and maintenance work that no moisture penetrates the inside of the device.

7.2 Cleaning the enclosure

- Clean the outside of the enclosure with the inscriptions and the display window using a cloth moistened with water or a mild detergent.
- Do not use any aggressive cleansing agents or solvents, e.g. acetone. Plastic parts or the painted surface could be damaged. The inscriptions could become unreadable.



WARNING

Electrostatic charge

Risk of explosion in hazardous areas if electrostatic charges develop, for example, when cleaning plastic surfaces with a dry cloth.

- Prevent electrostatic charging in hazardous areas.

7.3 Battery replacement

An empty battery in the Aloxy Pulse can be replaced by a fully charged one.

USE ONLY THE FOLLOWING BATTERIES ON THE ALOXY PULSE v01:

ALOXY partnumber: T36851CCC

ALOXY partnumber: E36850CCC

To do so, the Aloxy Pulse device must be opened to access the battery compartment.

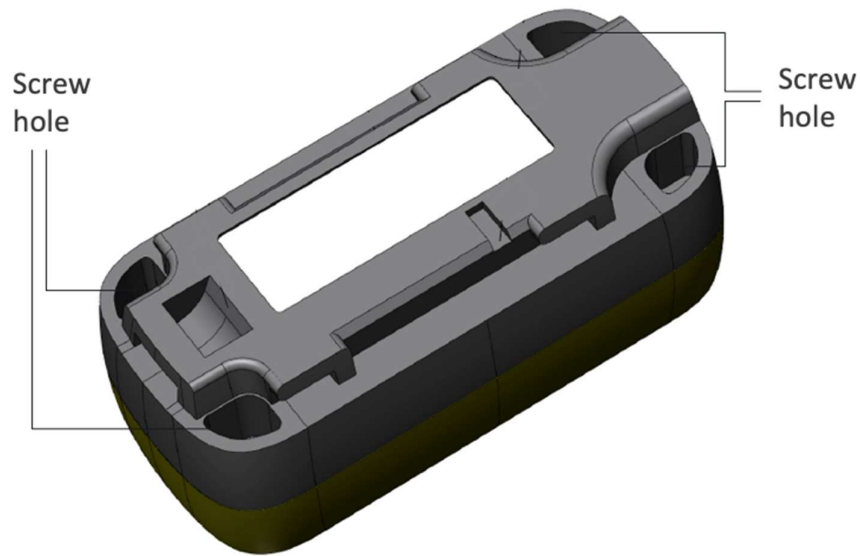
Remove the Aloxy Pulse device from its mounting bracket as described in section 6.1 (step 3) and bring it to a workshop area.



WARNING

Do not open the Aloxy Pulse in the field or within an hazardous (classified) area to replace the battery. The device can only be opened in a workshop equipped to handle electronic components.

To open the Aloxy Pulse, put the device upside-down on a workbench and remove the 4 screws counter-clockwise from the screw holes using a Torx (6-point star-shaped) T10 screwdriver.



Store the 4 screws for later use and gently lift the bottom shell from the top shell.

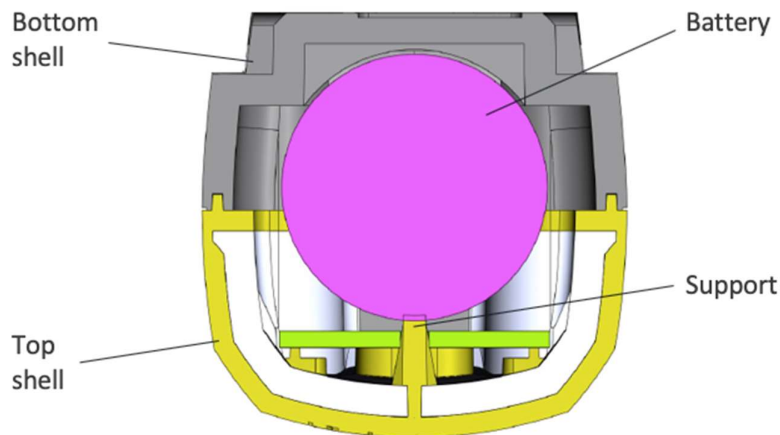


CAUTION

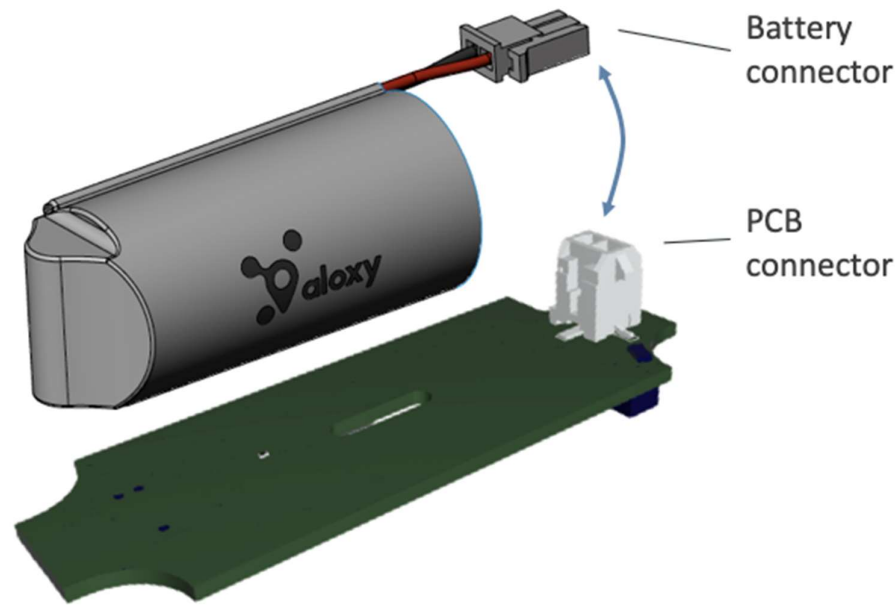
Risk of damaging the electronics

When opening the Aloxy Pulse, avoid touching the electronic circuits and the green PCB (Printed Circuit Board) to avoid damage. Always ensure you are discharged of static electricity by wearing for instance an antistatic wrist strap band.

Lift the battery from its support in the top shell.



Unplug the battery connector from the PCB (Printed Circuit Board) connector, without removing the PCB from the top shell.



Remove the battery and replace it by a new fully charged battery. Connect the battery connector from the new battery to the PCB connector.

NOTICE

Condensation in the device

Damage to device through formation of condensation if the temperature difference between transportation or storage and the mounting location exceeds 20 °C (36 °F).

- Before taking the device into operation let the device adapt for several hours in the new environment.

NOTICE

Make sure that the wire running from the battery to the PCB is positioned on top of the battery, i.e., on the opposite side of the PCB, to ensure correct operation of the Aloxy Pulse device.

Position the new battery on the support in the top shell and close the Aloxy Pulse again by repositioning the bottom shell on top. Close the device by the 4 original screws, using a calibrated torque screwdriver (with Torx T10 head) according to the table

7.4 To insure ingress protection IP69

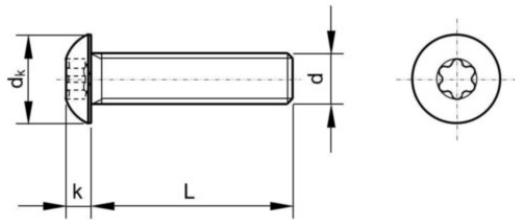


WARNING

Loss of ingress protection IP69

- Make sure that before assembly the tooth and groove is still resilient, clean and intact.
- When assembling make sure that the gasket is seated correctly before tightening the bolts.

Only use LOW-HEAD SCREW WITH T-STER ISO ≈7380-1 STAINLESS STEEL A2 M3X8



k (max.) 2.75 never more than 3,5mm!

| Steps | Force |
|--|----------------------|
| Insert the 4 screws | |
| Hand-tighten the 4 screws clockwise at | 0 Nm |
| Tighten the 4 screws in a clockwise direction at | 0,2 Nm (0.15 ft lb) |
| Tighten the 4 screws in a clockwise direction at | 0,45 Nm (0.33 ft lb) |
| Tighten the 4 screws again in a clockwise direction at | 0,45 Nm (0.33 ft lb) |

NOTICE

Device damage

The maximum torque of the gasket must not be exceeded.

Refer to the section "Technical specifications for the torque value.

- Do not exceed torque on screws regarding gasket

The Aloxy Pulse is ready for operational use and can be positioned in its mounting bracket as explained in the previous chapter (step 3).

8 Disposal



Devices described in this manual should be recycled. They may not be disposed of in the municipal waste disposal services according to the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE).

Devices can be returned to the supplier within the EC, or to a locally approved disposal service for eco-friendly recycling. Observe the specific regulations valid in your country.


8.1 Technical support

If this documentation does not provide complete answers to any technical questions you may have, contact Technical Support by addressing your questions to:

Carl.stevens@aloxys.io



9 Technical data

| Battery powerd wireless IoT sensor, Type ALOXY Pulse vXX | | | | |
|--|---|---|--|--|
| Certifications | | | | Reference |
| CE conformity | The applicable directives and applied standards with their revision levels can be found in the EU declaration of conformity on the Internet. This product complies with the following directives: ATEX Directive (2014/34/EU) Electro Magnetic Compatibility (EMC) (2014/30/EU) Radio Equipment Directive (RED) (2014/53/EU) Reduction of Hazardous Substances (RoHS) (2011/65/EU) | | | ALOXY_D_400_Declaration of Conformity ALOXY Pulse v01.docx |
| Electrical Classification | FM (Canada and USA) Intrinsically Safe resp. Non-incendive ATEX— Intrinsically Safe IECEX— Intrinsically Safe | | | NA |
| Ex | Intrinsic safety "i", "IS" for GAS zone 1 | | Temp range -40°C ≤ Ta ≤ +70°C (-40 to 158°F) | |
| ATEX / IECEX |  II 2G Ex ib IIC T4 Gb | | | DEKRA 19ATEX0032 |
| | Ex ib IIC T4 Gb | | | IECEX DEK 19.0016 |
| cFMus | Non-incendive | | | US cert # FM20US0065X Canada Cert # FM20CA0029X |
| | Class I, Division 2, T4 groups ABCD | | | |
| | Class I, Zone 1, AEx ib IIC T4 Gb | | | |
| | Class I, Zone 1, Ex ib IIC T4 Gb | | | |
| QMS | | | | 223642700-19ATEXQ0058 Iss.0-QAR19.0009-00-PQAN |
| FCC | USA | FCCID: XXXXX-XXXXXX | | Certification ongoing |
| ISED | Canada | IC: XXXXX-XXXXXX CAN ICES-X (B) / XXX-X (B) | | Certification ongoing |



| | | | | | |
|-------------------|---------------------------|-----------------|-----------------------------------|--|--|
| LoRaWAN | EU | | | | Labo De Nayer PCC-RAD-4918_ed2 PCC-RAD-5034_ed2 |
| | USA | | | | Certification ongoing |
| | Canada | | | | Certification ongoing |
| DASH7 | EU | | | | Self-certification based on D7A v1.2 towards reference stack implementation |
| | USA | | | | Certification ongoing |
| | Canada | | | | Certification ongoing |
| Compliant | | | | | Reference |
| WEEE | | | | | 2011/65/EU |
| RoHAS | | | | | 2012/19/EU |
| Enclosure | | | | | Reference |
| Mounting position | Horizontal or vertical | | | | NA |
| Demensions | L x H x W | | 88,5 x 50,3 x 41,2 mm | | NA |
| Weight | With PCB and power supply | | approx. 150gr (5.3oz) | | NA |
| | Battery | | approx. 50gr (1.8oz) | | NA |
| | | | Lithium content 2,2 gr (0.078oz) | | NA |
| Materials | Top shell | Softpart yellow | TPE yellow (conductivity 285Mohm) | | Kraiburg HTC8797/137 |
| | | Softpart black | Nylabond TE ESD | | RTP C146255B1Black |
| | | Hard part | Nylon PA6 natural | | SOLVAY Technyl C206F |
| | Bottom shell | | Nylon 6 ESD protection black | | RTP0299AX123289BLACK |
| | Mounting plate | | | | |



| | | | | |
|-------------------------|---|--------------------------|---|-------|
| PA6 general information | <p>Thermoplastics used are non-reinforced polyamide, PA</p> <p>We use the modern, semi-crystalline insulation material, polyamide, which is now an essential component in electrical engineering and electronics. It has long occupied a leading position and is authorized for use by the relevant approval authorities such as the CSA, KEMA, PTB, SEV, UL, VDE, etc. Polyamide has excellent electrical, mechanical, and chemical properties, even at high operating temperatures. Brief peak temperatures up to approximately 200°C are permitted as a result of heat aging stabilization. Depending on the type (PA 4.6, 6.6, 6.10, etc.), its melting point is in the region of 215°C to 295°C. Polyamide absorbs moisture from its surroundings, on average 2.8%. However, this moisture is not crystallization water in the plastic itself, but chemically bonded H2O groups in the molecular structure. This makes the plastic flexible and resistant to breakage, even at temperatures as low as -40°C. As per UL 94, PA has a flammability rating of V2 to V0.</p> | | | NA |
| TPE general information | <p>Main Characteristics:</p> <p>Excellent flexural fatigue resistance</p> <p>Good electrical properties</p> <p>Good tear & abrasion resistance</p> <p>Resistance to Low & High Temperatures from -50°C to +140°C</p> <p>High impact strength</p> <p>Colourability</p> <p>Recyclable</p> <p>Excellent resistance to chemicals & weathering</p> | | | NA |
| Gasket | Top shell - bottom shell | Is part of the soft part | | NA |
| Mechanical strenght | Droptest | at +20°C | A drop from 2 meters and this 5 times on each side. | ALOXY |
| | | at +80°C | | |
| | | at - 45°C | | |
| | Impact test | at +20°C | Resistant to 2 joule | ALOXY |
| | | at +80°C | | |
| | | at - 40°C | Only resistant up to -20°C. The housing will be adjusted for the next production. We will have to | ALOXY |



| | | | | |
|--------------------|-----------------------------|--|---|---|
| | | | do the tests again to see if we can lower the housing. | |
| Ingress Protection | IP65 | | Water jets. Water projected by a nozzle (6.3 mm) against enclosure from any direction shall have no harmful effects. Test duration: 1 minute per square meter for at least 3 minutes Water volume: 12.5 litres per minute Pressure: 30 kPa at distance of 3 m. | ALOXY |
| | IP68 | | 5m for 60 minutes | ALOXY |
| | IP69 | | Powerful high temperature water jets. Protected against close-range high pressure, high temperature spray downs. Specimens rotate slowly on a turntable, from 4 specific angles. Test duration: Fixture: 30 sec. in each of 4 angles (2 min. total) Water volume: 14–16 litres per minute Pressure: 8–10 MPa (80–100 bar) at distance of 0.10–0.15 m Water temperature: 80 °C | DEKRA 10/12/2019 Number 2235413.01-AOC |
| Torque | For gasket compression IP69 | | 0,45 Nm (0.33 ft lb) | NA |

| UV resistance | <p>Chamber temperature 35-45°C Black standard temperature: 65°C Intensity 0,5W/m² (340nm) Radiation dose 2,900Mj/m² Rain cycle 102:18 Test duration: After 0, 800, 1,600 and 3,200 hours exposed to UV (carousel) / weathering, the colour of the material is measured and expressed in the following scheme: L*a*b*:</p> <p>L* (Brightness): 0 = black, 100 = white a* (Colour): + = increased red, - = increased blue/green b* (Colour): + = increased yellow, - = increased blue/purple</p> <p>As the unexposed material is yellow, the value b* and L* are high. Tests show that weathering lowers b*, which is a typical reaction of the material under UV light (material tends to become yellowish with reduced “shining”), however, this effect is only minimal as the Aloxys material is already yellow. The material came from a bright colour to a more fade tone on the Greyscale of 2.5.</p> <p>After testing there is no oil bleed out, no stickiness and no blooming after 3,200 hours of aging. As expected, there appear slight surface cracks, however the material stays intact with minimal impact on the shore.</p> | | | | Tested by supplier according to DIN EN ISO 4892-2 |
|-----------------------|--|-----|----------------|--|---|
| Battery (replaceable) | | | | | Reference |
| T36851CCC | Lithium Metal battery with supercap | | 3,6V - 8500mAh | | Custom made |
| E36850CCC | Lithium Metal battery without supercap | | 3,6V - 8500mAh | | Custom made |
| E36851CCC | Lithium Metal battery with supercap | | 3,6V - 8500mAh | | Custom made |
| Authonomy | DASH7 | | 5 to 8 years | | ALOXY_MVP_001_Battery consumption |
| | LoRaWAN | SF7 | 5 to 6 years | | |

| | | | | |
|-----------------------------------|---|------|---|-------------------------------|
| | | SF9 | 4 to 5 years | |
| | | SF12 | 1 to 3 years | |
| Optimal battery temperature range | -20°C to +50°C | | | ALOXY |
| PCB | | | | Reference |
| Sensors | Accelerometer | | ±2g/±4g/±8g/±16g acceleration scales | ALOXY |
| | Gyroscoop | | full-scale angular rate range of ±125/±250/±500/±1000/±2000 DPS | |
| | Magnetometer | | dynamic range of ±50 gauss | |
| | Atmospheric pressure | | 300hPa - 1250hPa | |
| | Ambient temperature | | | |
| NFC | ISO/IEC 15693 (AFI, Application Family Identifier) | | | |
| LED's | Green | | 2X | |
| | Red | | 2X | |
| Wireless communication | | | | Reference |
| Communication protocol | DASH7 Appliance protocol v1.2 | | | D7A Specification Version 1.2 |
| | LoRaWAN class A, EU and USA | | | NA |
| Wireless Signal | 868MHz - 915MHz Maximum 10 dBm | | | NA |
| Wireless Classifications | Class A digital device, complies with part 15 of the FCC Rules Contains FCC ID: LW2RM2510 Contains IC: 2731A-RM2510 | | | NA |
| | GFSK | | | D7A Specification Version 1.2 |
| | LoRa | | | NA |
| Encryption | AES-128 authentication and encryption | | | |
| Output power | Max 10dBm | | | ALOXY |
| | DASH7 | | 500m | ALOXY |

| | | | | | |
|---|--|------|---|--|-----------|
| Communication range | LoRaWAN | SF7 | 500m | SF and distance to the gateways has a profound impact on the battery life. | |
| | | SF9 | 1 km | | |
| | | SF12 | <2 km | | |
| Frequency | DASH7 - EU | | 863-870MHz | NA | |
| | LoRaWAN - EU | | 867-870 MHz | NA | |
| | DASH7 - USA | | 902-928MHz | NA | |
| | LoRaWAN - USA | | 902-928MHz | NA | |
| Payload | DASH7 | | max 251 bytes | NA | |
| | LoRaWAN | | max 243 bytes depending on SF | NA | |
| Latency | Dash7 | | max 1 sec | NA | |
| | LoRaWAN | | up to 4 min | NA | |
| EMC | Compliance | | Europe | LDN: PCC-EMC-5002 LDN: PCC-RAD-4918 | |
| | | | | | |
| Rated condition | | | | | Reference |
| Ambient conditions | | | For use indoors and outdoors. | NA | |
| Ambient temperature | | | In hazardous areas, observe the maximum permissible ambient temperature corresponding to the temperature class. | NA | |
| Permissible ambient temperature for operation | | | Permissible ambient temperature for operation -40 to +70 °C (-40 ... +112 °F) | NA | |
| Relative humidity | | | 0 ... 100% | NA | |
| IEC 61010 Compliance | | | Meets Pollution Degree 3 | NA | |
| Altitude Rating | | | Up to 2000 meters (6562 feet) | NA | |
| Operating Temperature Limits | | | Battery Power: -40°C ≤ Ta ≤ +70°C (-40 to 158°F) | NA | |
| Vibration resistance | Harmonic oscillations (sine) according to EN 60068-2-6/10.2008 | | 3.5 mm (0.14"), 2 ... 27 Hz, 3 cycles/axle 98.1 m/s² (321.84 ft/s²), 27 ... 300 Hz, 3 cycles/axle | Pending for evaluation | |

| | | | | | |
|---|---|--|---|--|------------------------|
| | Bumping (half-sine) according to EN 60068-2-27/02.2010 | | 150 m/s ² (492 ft/s ²), 6 ms, 1000 shocks/axle | | Pending for evaluation |
| | Noise (digitally controlled) according to EN 60068-2-64/04.2009 | | 10 ... 200 Hz; 1 (m/s ²) ² /Hz (3.28 (ft/s ²) ² /Hz) 200 ... 500 Hz; 0.3 (m/s ²) ² /Hz (0.98 (ft/s ²) ² /Hz) 4 hours/axle | | Pending for evaluation |
| | Recommended range of continuous operation of the entire manual valve: | | ≤ 30 m/s ² (98.4 ft/s ²) without resonance peak | | Pending for evaluation |
| Documentation | | | | | |
| Available languages | EN | | | | |
| | | | | | |
| Safety instructions | | | | | |
| Please read the user manual carefully. | | | | | |
| It is an integral part of the described equipment and must be available at all times. | | | | | |

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

ALOXY NV

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