aloxy Pulse v01 Wireless IOT Sensor Instruction Manual

Contents

aloxy

aloxy Pulse v01 Wireless IOT Sensor

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

Introduction

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**

Purpose
The Aloxy 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 Aloxy 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

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.

Radio compliance

USA radio compliance (FCC compliance)
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

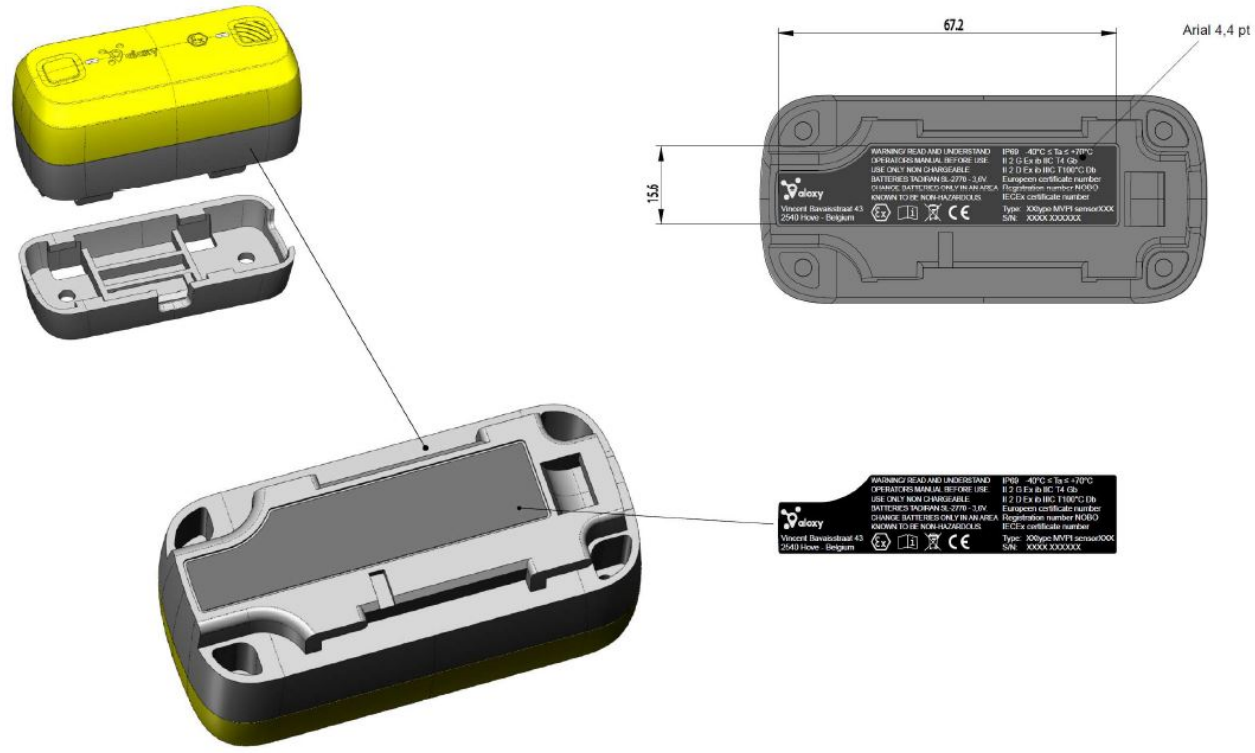
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian radio compliance

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device mustaccept any interference, including interference that may cause undesired operation of the device. English version This device complies with Industry Canada’s RSSs applicable to licence-exempt radio equipment. Operation is permitted under the following two conditions: (1) the apparatus shall not cause interference, and (2) the user of the apparatus shall accept any radio interference received, even if the interference may cause undesired operation.

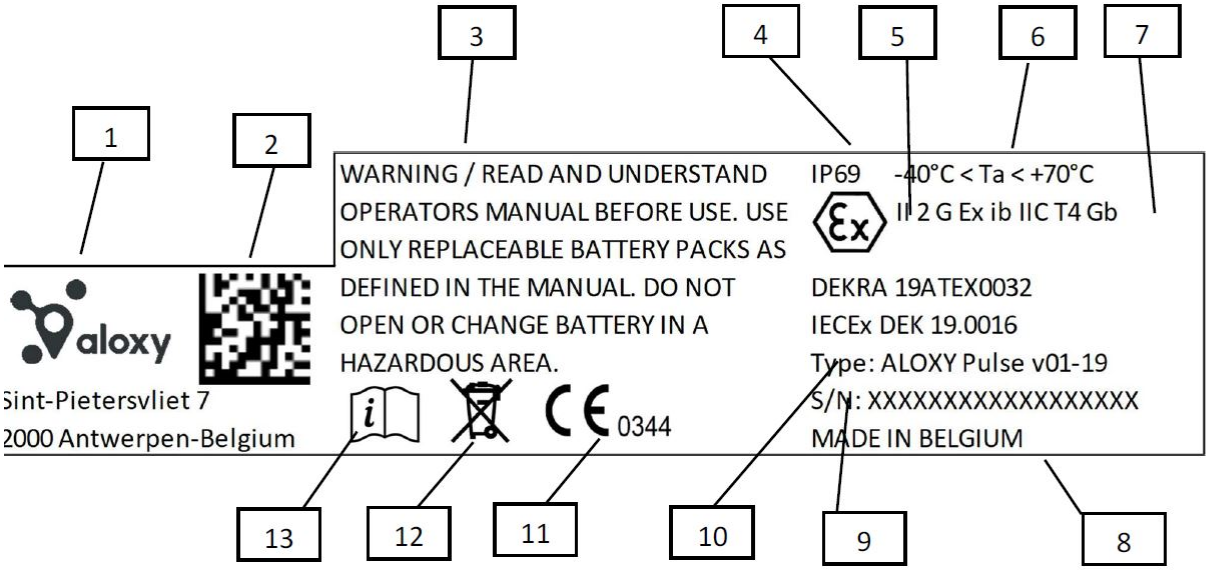
Marking label

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



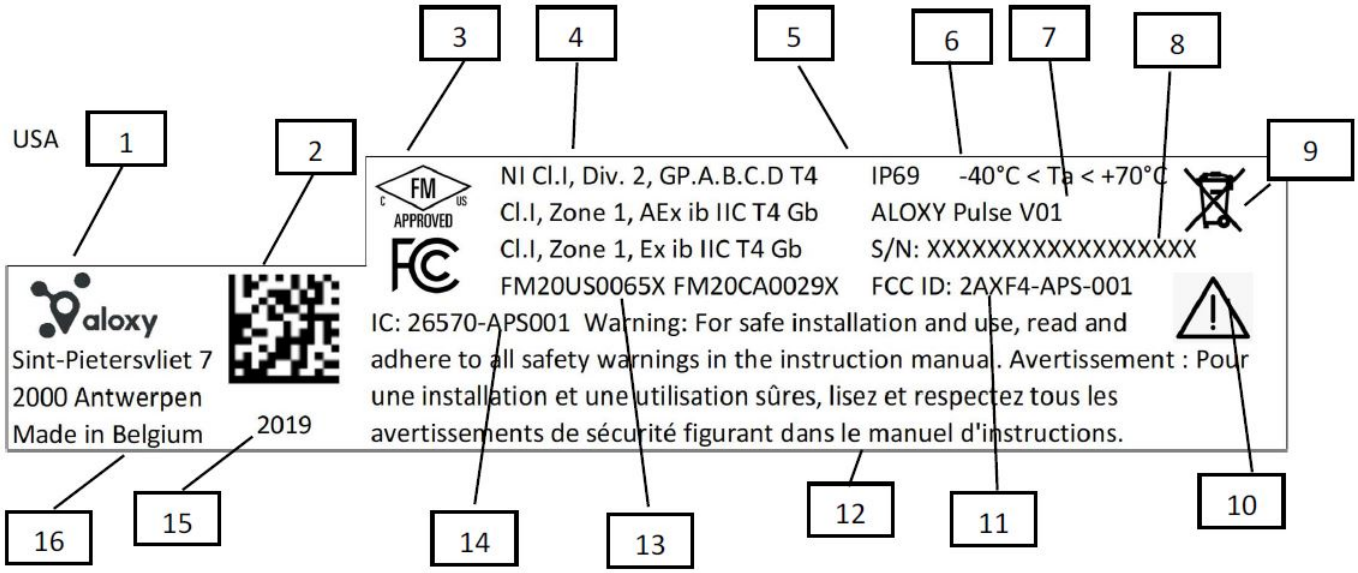
Name plate dimensions 67,2 mm (L) x 15.6mm (W)

European marking label



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

USA & Canadian marking label



1. Manufacturer
2. Manufacturing QR code
3. Conformity with country-specific cerifications (FCC, cFMus)
4. FM / CSA marking for hazardous area
5. Ingress Protection class
6. Permitted ambient temperature for the hazardous area of the corresponding temperature class
7. Product name, type and model
8. Serial number (Order code)
9. Waste instructions
10. Consult operating instructions
11. FCC ID n°
12. Warning
13. cFMus approvals cerification N°
14. ISED ID N°
15. Year of production
16. Place of manufacture
17. . FCC statement (there is no room for this on the label) see instruction manual

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.

Transportation and storage

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

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.

Safety instructions

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.

Warning symbols on the device

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

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 harmoniza tion 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 harmoniza tion of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

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.

Installation and commissioning

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.

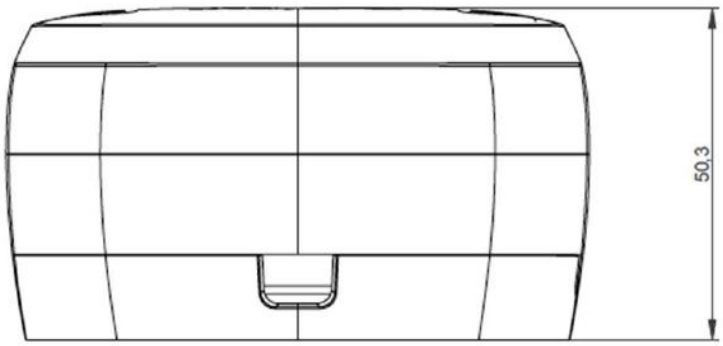
WARNING

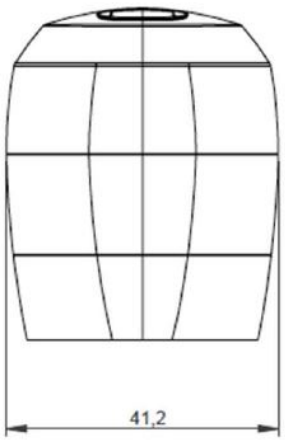
Please observe the corresponding safety instructions when working on manual valves in use. Impermissible accessories and spare parts
Risk of explosion in areas subject to explosion hazard.

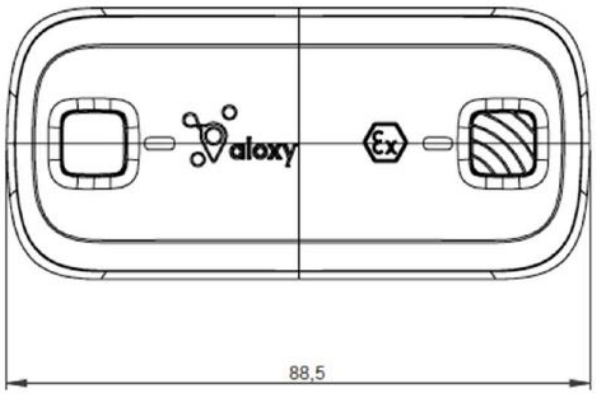
- Only use original accessories or original spare parts.
- Observe all relevant installation and safety instructions described in the instructions for the device or enclosed with the accessory or spare part.Mechanical impact energy
- In order to ensure the degree of protection of the housing (IP69), protect the housing from mechanical impact energy:

Dimensions

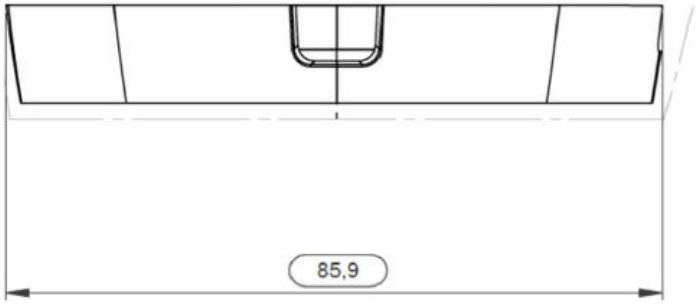
The Aloxy Pulse has the following dimensions: length 88.5mm x with 41.2mm x height 50.3mm, including the mounting bracket.

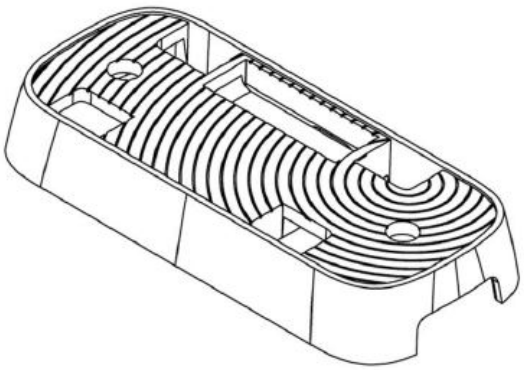


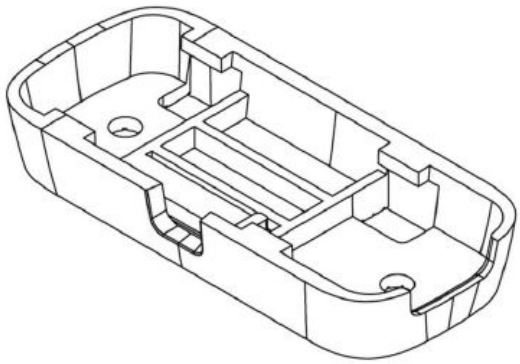




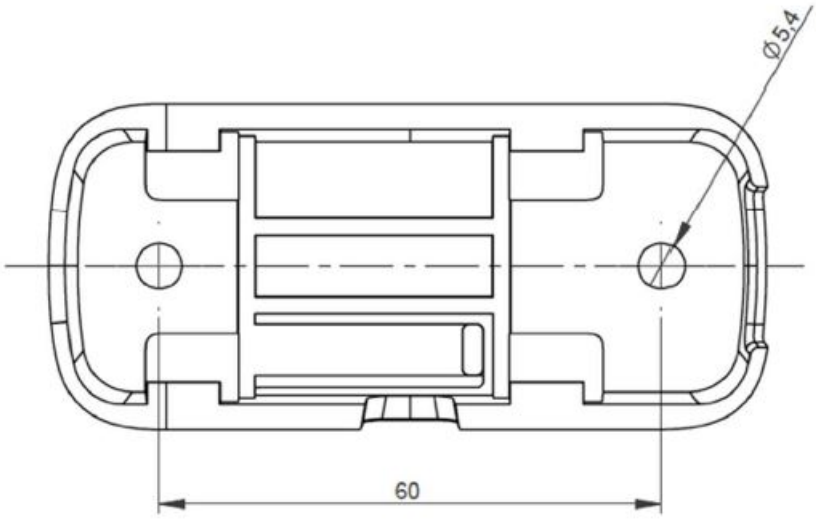
The individual mounting bracket has the following dimensions: length 85.9mm x with 39.1mm x height 12.8mm:







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



Installing/mounting

WARNING

- 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.

Loss of explosion protection
The Aloxy Pulse can only be used within a process temperature range of -40°C ≤ Ta ≤ +70°C when mounted on pipes or machines.

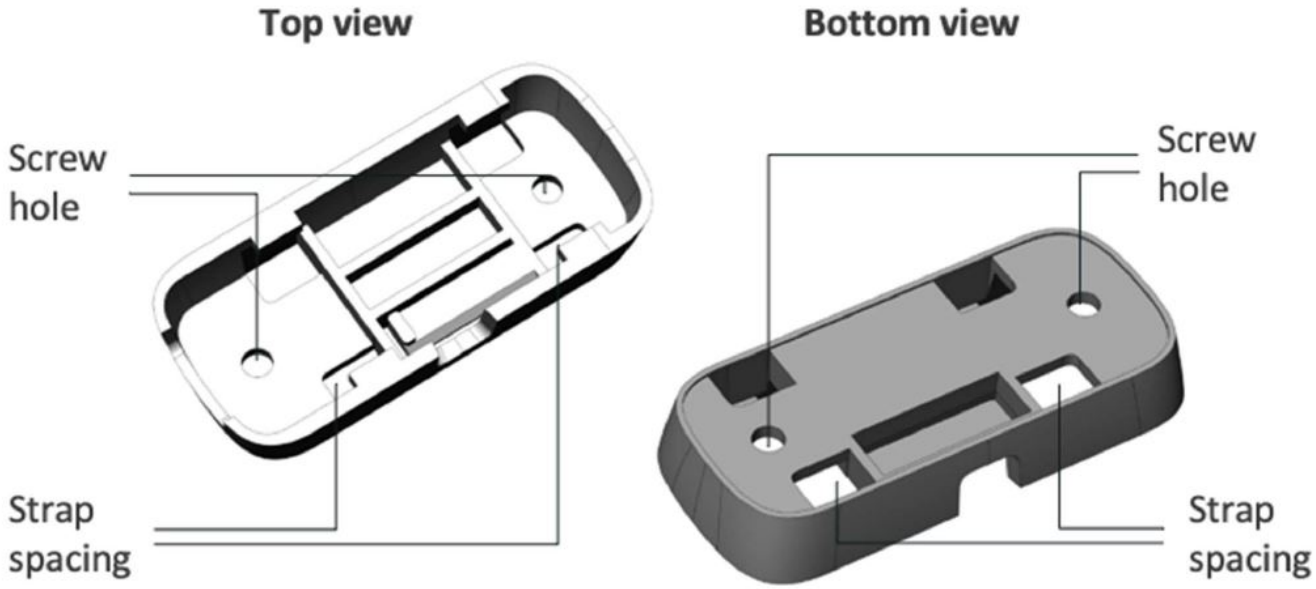
Loss of type of protection
Damage to device if the enclosure is open or not properly closed. The type of protection specified on the nameplate or in technical data is no longer guaranteed.

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

Usage of the Aloxy Pulse

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.

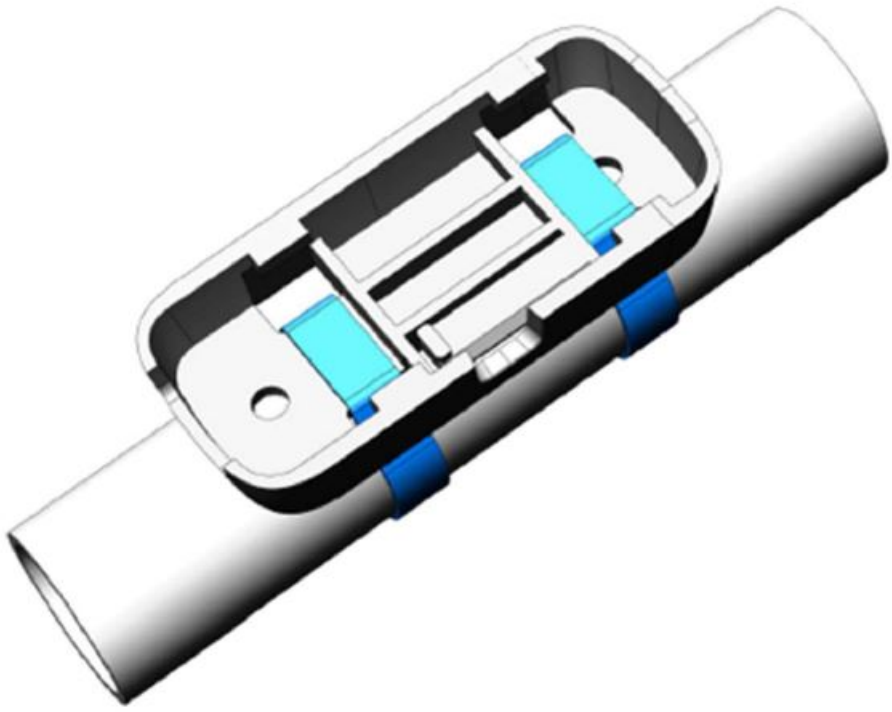
Step 2: Attach the mounting bracket to the asset
Depending on the type of asset and surface, the mounting bracket offers several options to attach, either directly using plastic / metal straps, bolts / screws (M5), magnets or glue, either by using an external metal bracket in between the mounting bracket 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.

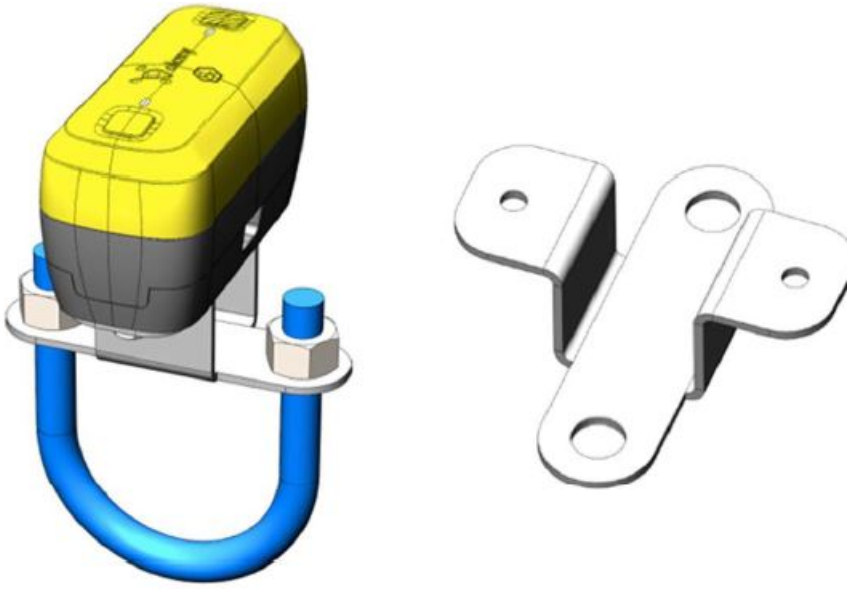
NOTICE:When the Aloxy Pulse should measure a certain motion, for instance the motion of the hand wheel of a manual valve to monitor the valve's position, make sure that the Aloxy Pulse device is attached to the moving part and follows the same motion as the part it is monitoring. No other motions are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

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



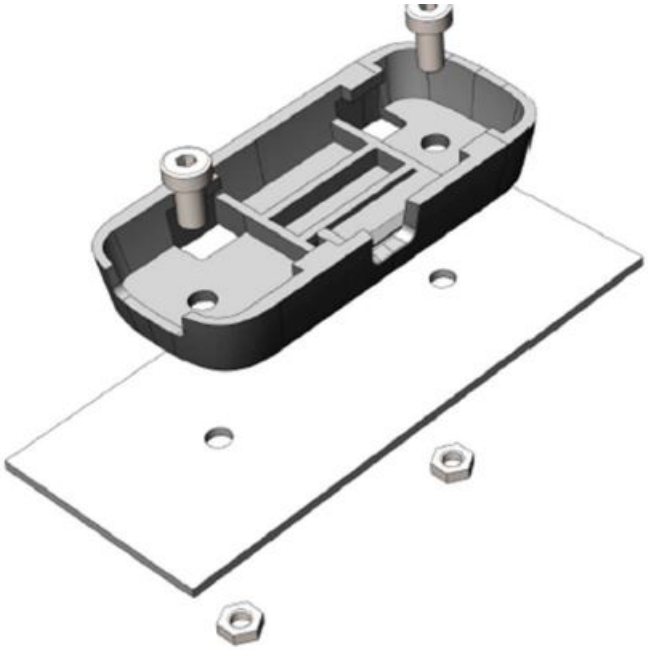
This method ensures good, non-intrusive fixation of the Aloxy Pulse to an asset suitable for instance for movement detection and vibration monitoring. Typical applications are manual valve position monitoring by attachment to a valve lever or a spoke of the valve wheel, vibration monitoring of a tube,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

Installation using a generic external metal U-bracket on a U-clamp that can beattached around a tube-shape surface:



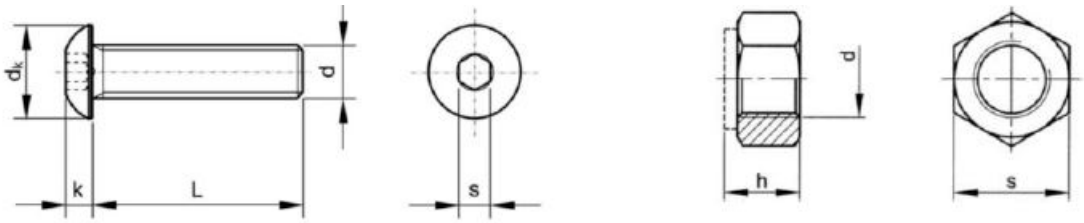
This method ensures good, non-intrusive fixation of the Aloxy Pulse to an asset suitable for instance for movement detection and vibration monitoring. Typical applications are manual valve position monitoring by attachment to a valve lever or a spoke or outer ring of the valve wheel, vibration monitoring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

Installation using M5 bolts or screws on a flat surface:



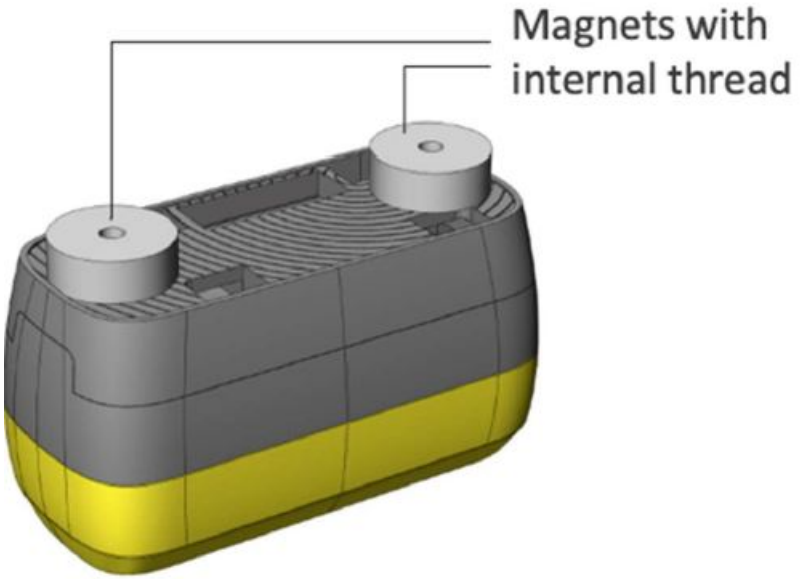
Use M5 bolts or screws with a maximum head height of 4 mm, such as hexagon socket head (DIN 7984) cap screws with low head.
This method ensures excellent, but intrusive fixation of the Aloxy Pulse to an asset suitable for instance for movement detection and vibration monitoring. Typical applications 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



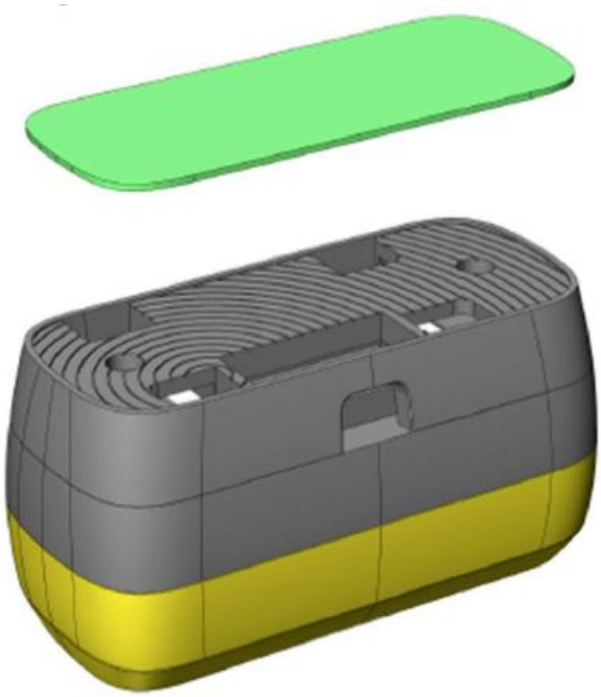
Installation on a flat metallic surface using two magnets:

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.



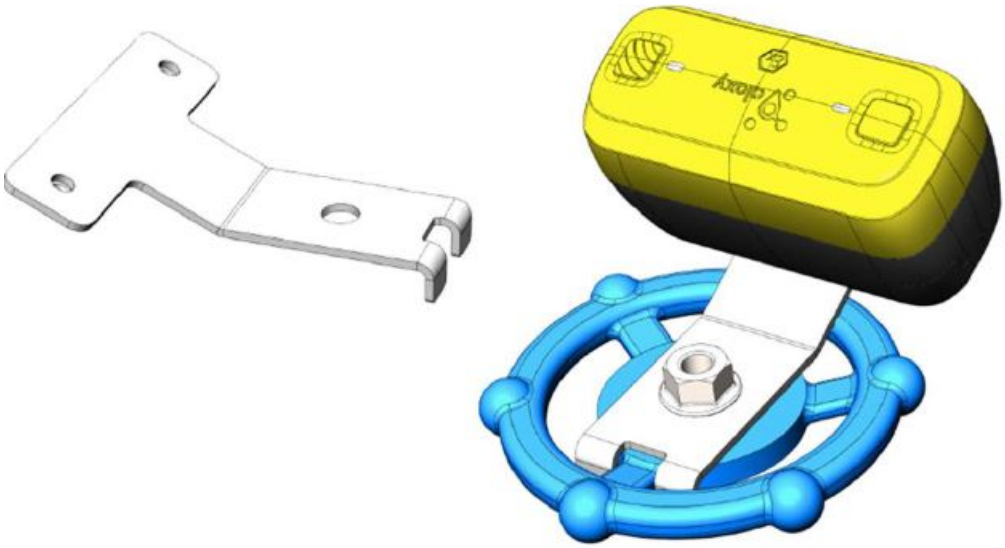
This method ensures good, non-intrusive, rather temporary fixation of the Aloxy Pulse to a flat metallic surface suitable for instance for movement detection and vibration monitoring. Typical applications are temporary vibration monitoring of a rotating equipment, temporary asset tracking, temperature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

Installation on a surface using double sided foam sticker:



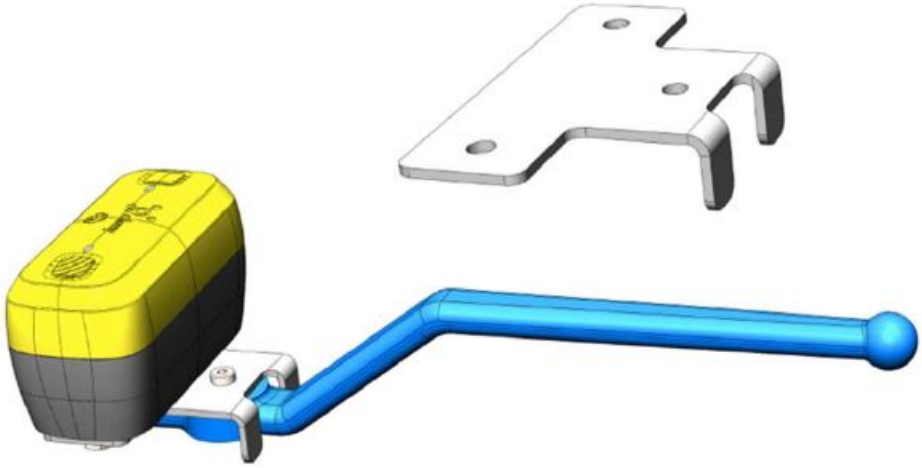
This method ensures fair, non-intrusive fixation of the Aloxy Pulse to a flat asset surface suitable for instance for movement detection and temperature monitoring. Typical applications are asset tracking, temperature monitoring around a motor, etc.

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

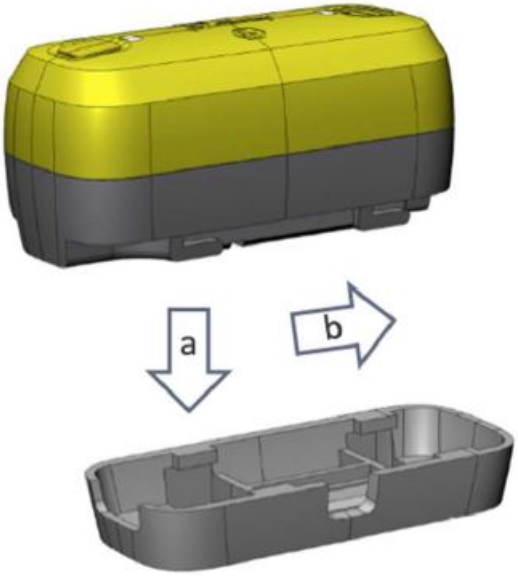


This method ensures excellent non-intrusive attachment of the Aloxy Pulse to the handwheel of a multi-turn valve. A typical application is manual valve position monitoring of small multi-turn valves.

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 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.

Inspections and maintenance

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 devise 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: Repair must be carried out by ALOXY authorized personnel only.

- Only battery replacement is allowedImpermissible 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.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:

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.

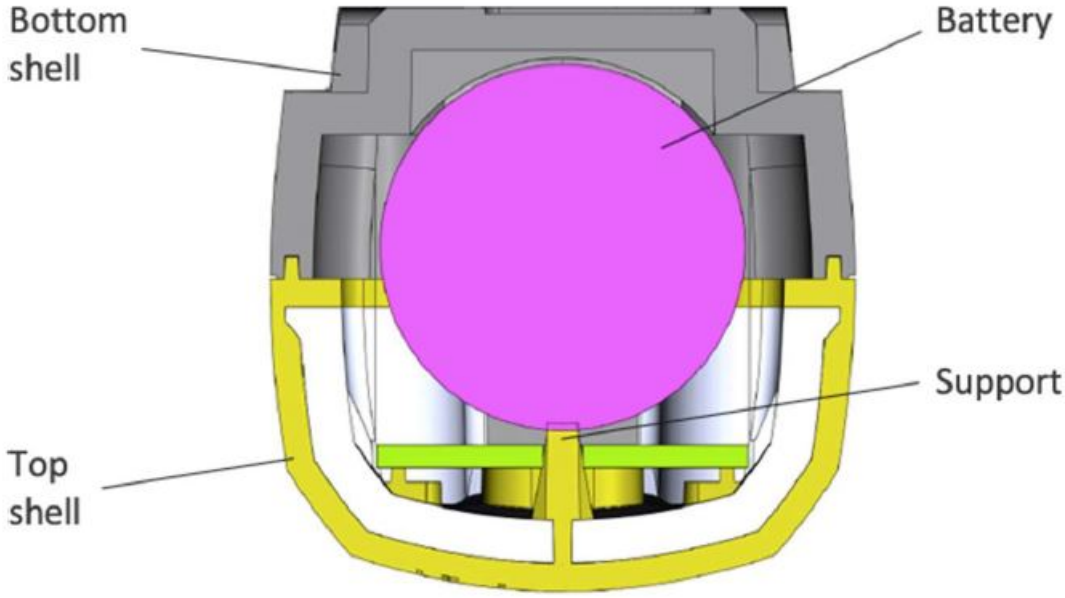
Battery replacement
To do so, the Aloxy Pulse device must be opened to access the battery compartment. Remove the Aloxy Pulse device from its mounting bracket as described in section 6.1 (step 3) and bring it to a workshop area.

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:

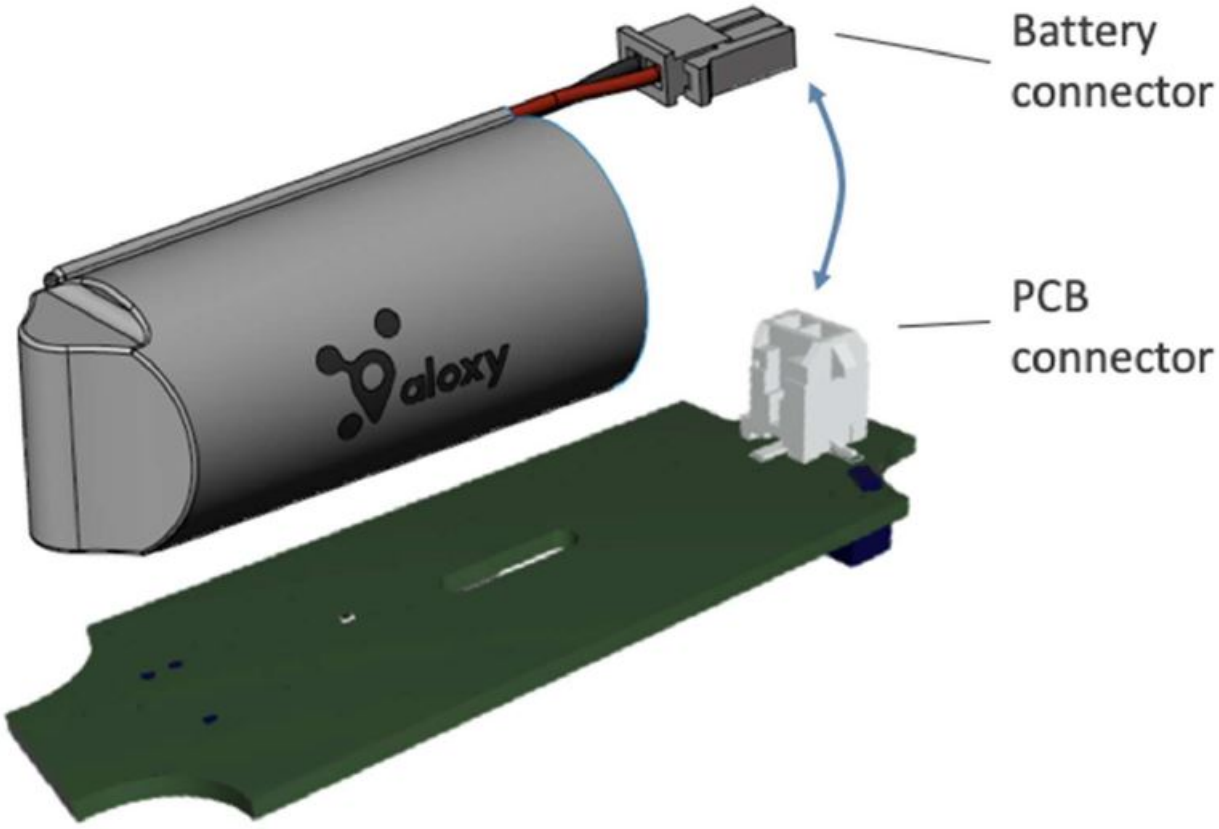
WARNING: Do not open the Aloxy Pulse in the field or within an hazardous (classified) area to replace the battery. The device can only be opened in a workshop equipped to handle electronic components. To open the Aloxy Pulse, put the device upside-down on a workbench and remove the 4 screws counter-clockwise from the screw holes using a Torx (6-point star-shaped) T10 screwdriver.

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.



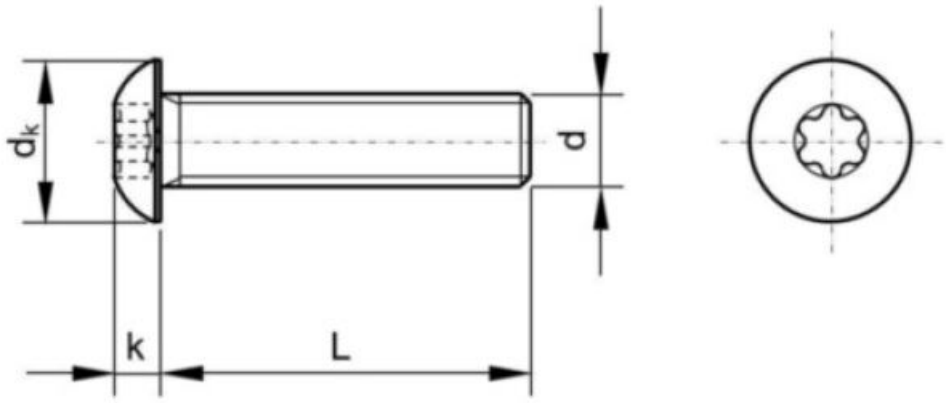
Unplug the battery connector from the PCB (Printed Circuit Board) connector, without removing the PCB from the top shell.



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.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

To insure ingress protection IP69



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

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.

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@aloxy.io**

Technical data

Battery powerd wireless IoT sensor, Type ALOXY Pulse vXX					
Certifications					**Reference**
CE conformety	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_Declaratio n 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 Class I, Division 2, T4 groups ABCD				US cert # FM20US0065X Canada Cert # FM20CA0029X
	Class I, Zone 1, AEx ib IIC T4 Gb				
	Class I, Zone 1, Ex ib IIC T4 Gb				
QMS					223642700-19ATEXQ0058 Iss.0-QAR 19.0009-00- 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 C 206F

	Bottom shell	Nylon 6 ESD protection black	RTP0299AX123289 BLACK
	Mounting plate		

PA6 general information	Thermoplastics used are non-reinforced polyamide, PA 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.			NA
TPE general information	Main Characteristics: Excellent flexural fatigue resistance Good electrical properties Good tear & abrasion resistance Resistance to Low & High Temperatures from -50°C to +140°C High impact strength Colourability Recyclable Excellent resistance to chemicals & weathering			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 low er the housing.	
Ingress Pro tection	IP65		Water jets. Water projected by a nozzle (6.3 mm) against enclosure fro m any direction shall have no harmful effects. Test duration: 1 minute per squ are 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 pre ssure, 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 (80–1 00 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	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 sche me: L*a*b*: L* (Brightness): 0 = black, 100 = white a* (Colour): + = increased red, – = increased blue/green b* (Colour): + = increased yellow, – = increased blue/purple 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 u nder UV light (material tends to become yellowish with reduced “shining”), however, this effect is only minimal as the Aloxy material is already yellow. The material came from a bright colour to a more fade tone on the Greyscal e of 2.5. 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, howev er the material stays intact with minimal impact on the shore.				Tested by supplier a ccording to DIN EN ISO 4892-2
Battery **(replaceab le)**					**Reference**
T36851CC C	Lithium Metal battery wit h supercap		3,6V – 8500mAh		Custom made
E36850CC C	Lithium Metal battery wit hout supercap		3,6V – 8500mAh		Custom made
E36851CC C	Lithium Metal battery wit h supercap		3,6V – 8500mAh		Custom made
Authonomy	DASH7		5 to 8 years		ALOXY_MVP_001_ Battery consumptio n
	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
Encription	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 profond in pact 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/s² (492 ft/s²), 6 ms, 1000 shocks/axle	Pending for evaluation
	Noise (digitally controlled) according to EN 60068-2-64/04.2009	10 … 200 Hz; 1 (m/s²)²/Hz (3.28 (ft/s²)²/Hz) 200 … 500 Hz; 0.3 (m/s²)²/Hz (0.98 (ft/s²)²/Hz) 4 hours/axle	Pending for evaluation
	Recommended range of continuous operation of the entire manual valve:	≤ 30 m/s² (98.4 ft/s²) 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.

Trademarks
All names identified by ® are registered trademarks of ALOXY NV. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner. 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.

Documents / Resources

	aloxy Pulse v01 Wireless IOT Sensor [pdf] Instruction Manual APS-001, APS001, 2AXF4-APS-001, 2AXF4APS001, Pulse v01 Wireless IOT Sensor, Wireless IOT Sensor

References

- Aloxy - End-To-End Industrial IoT Solutions