

FitMachine EX Instruction Manual

Instruction manual for the MOVUS FitMachine EX machine monitoring sensor



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Contents

1. Device Manufacturer and Design Authority..... 4

2. Certificate of Conformance 4

3. Product Description..... 5

4. Product Specification 6

5. Approvals and Certifications..... 8

6. Hazardous Environments Ratings 8

7. Conditions of Safe Use 8

8. Warnings and Cautions 10

9. Installation Requirements..... 10

10. Maintenance and Battery Replacement Requirements 10

11. Repair Requirements..... 11

12. Intended Use 11

13. Quality Statement 12

14. Mechanical Details 12

15. Related Documents 16

16. Review Of Document 16

1. Device Manufacturer and Design Authority

The Manufacturer and Design Authority for the MOVUS FitMachine EX machine monitoring sensor is:

Company: MOVUS Australia Pty Ltd

Address: 112 Bowen Street, Spring Hill Qld 4000 Australia

Telephone: 1300 031 115

Help Centre: Help Centre - <https://support.movus.com.au/hc/en-us>

Community (incl Feature requests) - <https://support.movus.com.au/hc/en-us/community/topics>

Email: support@movus.com.au

2. Certificate of Conformance

Each MOVUS FitMachine EX (Part No.: FMEX3.0) and replacement battery pack (Part No.: BAEX3.0) is supplied with a unique manufacturer's Certificate of Conformance (CoC) number. Copies of these CoCs are available on request from MOVUS at support@movus.com.au.

3. Product Description

The MOVUS FitMachine EX Ver 3.0 machine monitoring sensor is IECEx and ATEX certified for use in both gas and dust Explosive Environments. It is a battery powered, self-contained Industrial Internet of Things (IIoT) device which is approximately 90 mm diameter and 50 mm tall, with an optional mounting magnet and spacer which allows magnetic and non-magnetic attachment options. The battery pack is designed to last for 2 years, and can be replaced in the field by a Competent Person with just a Philips No. 1 screwdriver.

There are no external connections. The device communicates with the global MOVUS machine monitoring platform via the customer's WiFi network, or a MOVUS 4G cellular Gateway, and with a smartphone or tablet during on-boarding via Bluetooth.

The device is typically attached to the chosen machine (motor, pump, fan, etc.) by its magnetic base. If the mounting point surface is non-magnetic, the device can be attached using metal straps threaded through two slots between the device and the spacer.

After attachment, the device is 'on-boarded' to the MOVUS platform using either an Apple or Android-based smartphone or tablet running the MOVUS on-boarding application, which can be downloaded at no cost from the Apple Store or GooglePlay, and simply following the instructions. This initiates a virtual connection between the device and the MOVUS platform and dashboard, and allows the User to set up Administrator and User accounts to access the Dashboard.

Once on-boarded, the device will enter a calibration (or learning) mode, typically for a period of between 5 and 15 days, after which it will read the machine temperature, vibration and noise levels every 15 minutes and send this data to the MOVUS artificial intelligence (AI) algorithm, which will detect changes in these characteristics and alert nominated Users of abnormal conditions that may require maintenance intervention.

Once installed, the device needs no regular maintenance, other than occasional battery pack replacements. The MOVUS Platform allows 'over-the-air' firmware updates that will add new features as they become available.

4. Product Specification

TECHNICAL DATA SHEET

Continuous Condition Monitoring for Explosive Environments



FitMachine[®] EX

Part Number (PN): FMEX 3.0

IP66 ENCLOSURE
Fully protected from dust and submersion. Tested to "dust tight" and protected against jets of water.

INTEGRATED WIRELESS
WiFi 802.11 b/n/g
Connects to existing WiFi infrastructure or FitMachine Gateway. Bluetooth 5.0 to connect to smartphone.

MAGNET MOUNTED
Designed for rapid deployment. Magnetic mounts eliminate drilling or cutting. Rare earth magnet (32kg pull strength).

ULTRA-LOW POWER
Two year battery life under normal operating conditions (15 minute sample interval).

QR CODE
QR code with unique MAC address for pairing FitMachine and equipment. Also used to gain quick access to machine data.

PROCESSING POWER
Industry leading low power ARM Cortex M4 processor with 0.19mW / MHz.

FMEX3.0-ENG-DSH-0001-2
November 20, 2019

For additional information, contact:
support@movus.com.au

www.movus.com.au

Page 1 of 2



HEAD OFFICE
112 BOWEN STREET
SPRING HILL QLD 4000
AUSTRALIA
ACN 604 854 319

HAZARDOUS
AREA CERTIFIED



FOR IECEx CERTIFICATE, VISIT
www.iecex.com > Certificates
and Licenses >
Manufacturer > MOVUS

TECHNICAL SPECIFICATIONS



Mounting Options



Sensing Modalities For Capturing Environmental Conditions		<ul style="list-style-type: none"> Accelerometer Microphone (sound) Ambient Temperature
Wireless Communication	Network and Radio Standard Frequency WIFI and BT Low Energy (nominal) Wireless Range Max RF WIFI Power Output Max RF BT Low Energy Power Output	Network: WIFI + BT5.0, Radio: IEEE 802.11 b/g/n 2.4GHz, license-free ISM band WIFI: 75m (246ft), BT 50m (164ft) 55 mW 6.5 mW
Temperature Measurement	Measurement Range Resolution	-20°C to +60°C 0.1°C
Acoustic Sound Measurement	Frequency Range	40Hz - 40KHz
Data Processing	A/D Conversion (all) Sampling Interval	16 bit 15 mins (standard)
Power	Battery Type Estimated Battery Lifetime Recommended Storage Temperature Battery Module	2 x 3.6V AA Lithium Thionyl Chloride (LI-SOCl ₂) cell – replaceable battery 2 years (dependent on ambient temperature, device settings) +10°C to +30°C To order additional EX FM Battery Module, use MOVUS PN: BAEX 3.0
Environmental	Temperature IP Class Housing	Operation -20°C to +60°C; -4°F to +140°F IP66 rated housing for outdoor and harsh conditions PC/PBT Material: Anti-static, good chemical resistance, good impact strength, good UV resistance, good heat resistance
Vibration Measurement (overall values)	Velocity Frequency Range Detection Type	0.1 – 20mm/s DC (0Hz) – 10KHz RMS
Certifications	Radio OH&S Ex (Hazardous Areas)	ACMA, FCC, CE RoHS IECEx ICS 19.0003XX: Ex ia I Ma Ex ia II CT4 Ga EX ia II CT ₂₀₀ 1.35C Da IP66 -20C < Tamb < +60C ATEX CML 19ATEX2323X: EX I M 1 EX II GD IECEx ExTC 19.0021X: Ex ia I Ma Ex ia II CT4 Ga EX ia II CT ₂₀₀ 1.35C Da IP66 -20C < Tamb < +60C
Physical	Weight (incl. magnet) Housing Material Dimensions (excl. magnet) Mounting	0.41 kg (14.46 oz) Thermoplastic (PC/PBT) and anti-static 90mm Diameter x 50mm High (3.54 in x 1.97 in) 32kg (pull strength) magnet, slotted spacer for 2x metal mounting for straps, loop for safety lanyard

FME3.0-ENG-DSH-0001-2
November 19, 2019

For additional information, contact:
support@movus.com.au

www.movus.com.au

Page 2 of 2

5. Approvals and Certifications

The device has the following Approvals and Certifications:

- IECEx
- ATEX
- IECEx TC
- Australian ACMA radio equipment approval ('C-Tick')
- US FCC radio equipment approval
- EU EC radio equipment compliance

6. Hazardous Environments Ratings

The device has been IECEx certified as follows:

- MOVUS
- PN: FMEX3.0
- SN: nnnnnn
- Ex ia I Ma
- Ex ia IIC T4 Ga
- Ex ia IIIC T₂₀₀ 135°C Da IP66
- IECEx ICS 19.0003X
- -20°C ≤ Tamb ≤ 60°C

The device has been ATEX certified as follows:

- MOVUS FitMachine FMEX3.0
- CML 19ATEX2323X
- EX I M1
- EX II 1 GD

The device has also been IECEx ExTC certified as follows:

- Ex ia I Ma
- Ex ia IIC T4 Ga
- Ex ia IIIC T₂₀₀ 135°C Da IP66
- IECEx ExTC 19.0021X
- -20°C ≤ Tamb ≤ 60°C

7. Conditions of Safe Use

- All Special Conditions of Use listed on the Certificate must be complied with by the User. The Certificate can be viewed online at www.IECEx.com.
- The device must be used in accordance with all applicable regulations in the country of use, as well as the requirements provided in this Instruction Manual.
- This equipment is suitable for:

IECEX:

- Zones 0, 1, 2 Gas Group I, T4, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$
- Zones 0, 1, 2 Gas Group II, T4, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$
- Zones 20, 21, 22 Dust Group III, Tsurf temp 135, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$, IP66.

ATEX:

- I M1
- II 1 GD

ExTC:

- Zones 0, 1, 2 Gas Group I, T4, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$
- Zones 0, 1, 2 Gas Group II, T4, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$
- Zones 20, 21, 22 Dust Group III, Tsurf temp 135, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$, IP66.

Note: ExTC certification is required for this device to be approved for use in Queensland underground coal mines in accordance with:

“Recognised standard 01

Underground electrical equipment and electrical installations October 2018

Coal Mining Safety and Health Act 1999.”

Sensor Housing:

The equipment is housed in a two-part moulded plastic enclosure, which when properly assembled is rated at IP66.

The material used to manufacture the enclosure is:

- RTP 2099 X 134682
- Polycarbonate/PBT Alloy
- Permanently Static Dissipative
- ESD Protection
- Impact Modified
- UV Stabilized

This compound has been specifically formulated to meet the static dissipative requirements of the ATEX Directive.

Note that this plastic material has been selected for its suitability for its intended use, specifically regarding corrosion and wear resistance, electrical conductivity, mechanical strength, ageing resistance and the effects of temperature variations (within the sensor's expected operating conditions and design operating temperature range).

However, as the potential range of industrial environments in which the sensor may be installed is beyond the control of the manufacturer, it is possible that one or both of these plastic materials may be incompatible with some particular chemical environments, and it is incumbent upon the user to determine, by reference to, inter alia, the plastic manufacturer's

technical specifications, as to whether either or both of these materials is suitable for their particular environmental conditions.

Also, refer to applicable regulations in the country of use.

8. Warnings and Cautions

WARNINGS

- Use of the sensor in situations where the ambient temperature exceeds the range shown on the Certificate is not allowed and will invalidate the IECEx / ATEX Certification, and may reduce the battery life and/or damage the device.
- While all reasonable efforts have been made to select chemically inert materials for the sensor housing, it is the responsibility of the user to determine whether the particular chemical environment where the sensor is to be installed is compatible with the plastic materials referred to in Section 7 above.
- Replacement Battery: Use only MOVUS FitMachine EX replaceable battery pack model BAEX3.0.
- The use of other battery packs or cells will void the IECEx / ATEX certification of the device.
- Do not recharge, short circuit, crush, disassemble, heat above 100°C (212°F), incinerate, or expose contents to water. The lithium-thionyl chloride cells used in the FitMachine EX sensor and replacement battery pack are a fire, explosion and burn hazard.

Note:

- Individual cells are not user replaceable
- Battery module must only be replaced with an identical MOVUS item
- Spare Battery modules must be stored in a cool, dry and well ventilated location, at a temperature preferably not exceeding 30°C.

9. Installation Requirements

This equipment does not require any installation, except mounting as described.

10. Maintenance and Battery Replacement Requirements

The equipment does not require any maintenance.

Battery replacement can be carried out without removing it from the hazardous area and must be performed by a Competent Person, as follows:

- Before removing the FitMachine from its host, note the exact location, orientation and mounting method of the FitMachine so that it can be replaced in the same position using the same mounting method.
- If magnetically mounted, remove the FitMachine from the host by tilting the housing to one side to break the grip of the magnet, and draw the FitMachine away from the host. If mounted by stud or straps, unscrew the FitMachine or release the straps.
- Clean the exterior of the FitMachine using a damp cloth.
- Remove the 4 screws and washers in the base that secure the top housing to the base, and carefully separate the top housing, ensuring that the seal remains in place in the base recess.

- Inspect the top housing, base for cracks, and any visible deterioration or damage. Check the interior of the top housing for dust, and if any dust is visible clean with a damp cloth. **If any deterioration or damage is visible, the IECEx / ATEX Certification will be invalidated and the FitMachine should be re-assembled and returned to MOVUS for replacement.**
- Remove the four screws that secure the battery module to the base, and unplug the battery plug by squeezing the retaining clip and gently pulling the plug from the socket. Remove the old battery module.
- Check the base, including the potted area for dust, deterioration, cracks or other visible damage, and if any dust is visible clean with a damp cloth. Check that the information on the labels is legible. Check the seal for damage and deterioration and if undamaged replace it carefully into its recess. **If any deterioration or damage is visible, or the label is illegible, the FitMachine IECEx / ATEX Certification is invalidated and the FitMachine should be re-assembled and returned to MOVUS for replacement.**
- Remove the new battery module from its packaging, check that the part number matches the old module, plug the battery connector firmly into its socket and locate the battery module as shown in the image 'Battery Module orientation and mounting detail'.
- Using the four screws removed with the old battery module, secure the new module in the same orientation as the old module, ensuring that the battery connector and wiring is placed exactly as shown in the image.
- Carefully replace the top housing, ensuring that the seal is fully engaged in its slot and free of kinks and pinches, and secure the top housing with the four screws and washers previously removed.
- Remount the FitMachine to its original location and orientation on the host. The FitMachine will automatically begin gathering data and re-calibrating itself.
- If the FitMachine does not report (as shown on the FitMachine Dashboard Device Status page) within 2 hours after being remounted, contact MOVUS Support at: support@movus.com.au.

11.Repair Requirements

The equipment is not repairable and contains no user-serviceable parts. Do not open the equipment except for battery replacement, which must be performed by a Competent Person, as described in Section 10 above.

If the equipment fails whilst in service, return it to MOVUS for replacement under warranty.

12.Intended Use

Intended for use in explosion hazard areas as follows:

IECEx:

- Zones 0, 1, 2 Gas Group I, T4, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$
- Zones 0, 1, 2 Gas Group II, T4, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$
- Zones 20, 21, 22 Dust Group III, Tsurf temp 135, ambient temperature between $-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$, IP66.

ATEX:

- I M1

MOVUS

FitMachine EX Instruction Manual

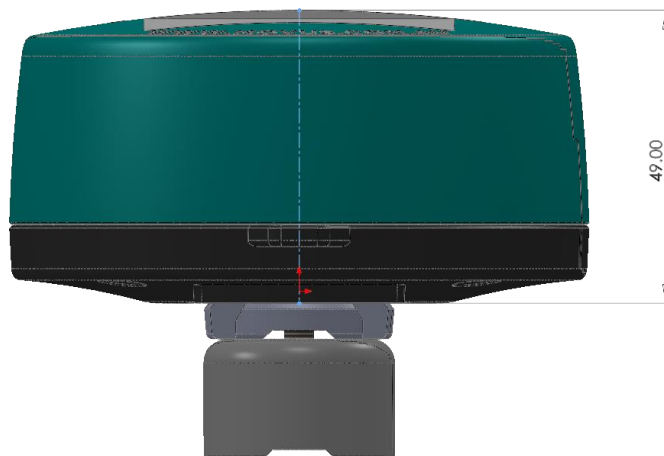
- II 1 GD

Special Conditions: Where the equipment, when installed, can potentially become dislodged and fall into moving parts or machinery, a suitable safety lanyard should be used to attach the equipment to the machinery, passing through the safety loop on the housing. The lanyard shall be installed with sufficient slack to ensure that the grip of the attachment magnet is not compromised.

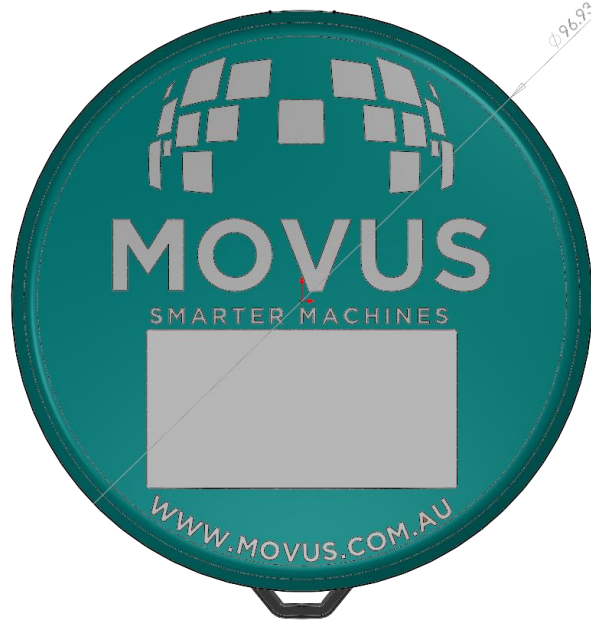
13. Quality Statement

All MOVUS EX products are manufactured under QAR No. ZA/ICS/QAR19.0003/00 in accordance with ISO9001:2015 and IECEx 80079-34:2018.

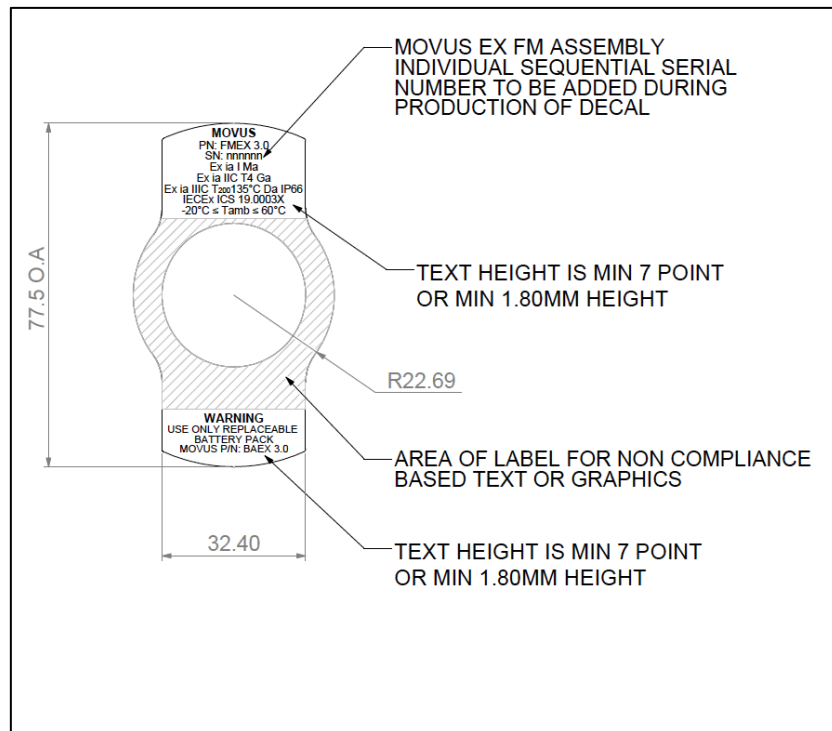
14. Mechanical Details



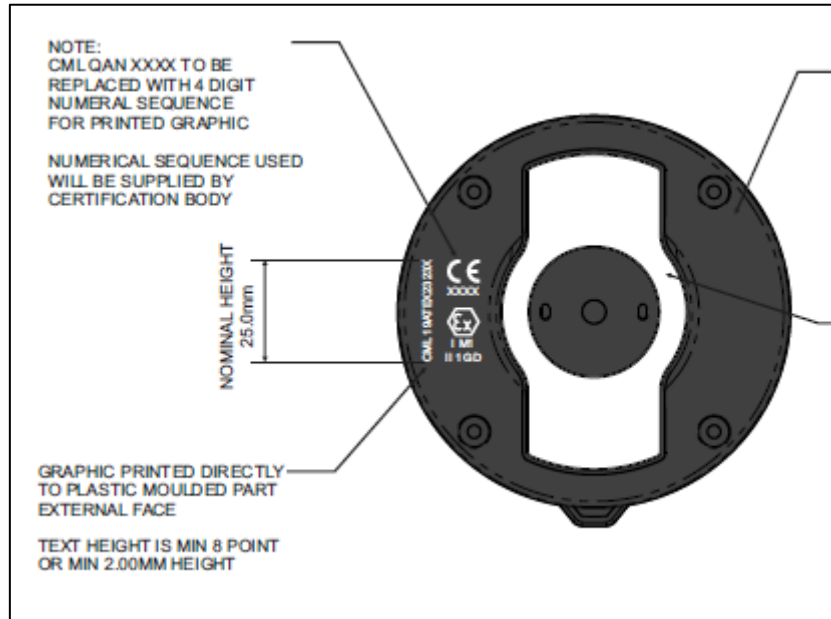
Sensor with mounting magnet – side view:



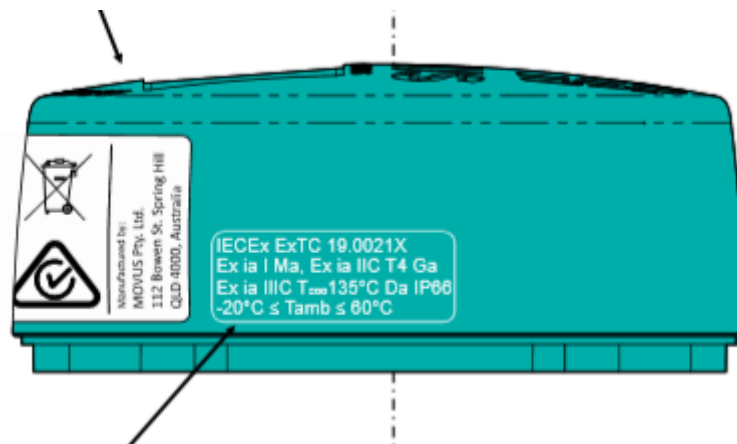
Sensor with magnet – top view



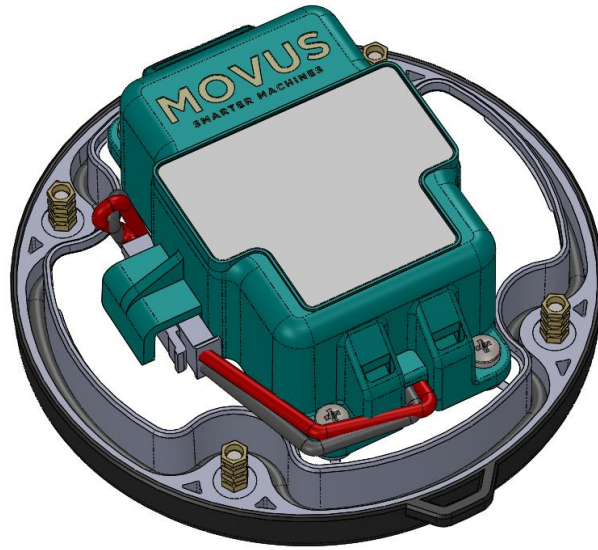
Sensor IECEX Certification Label detail



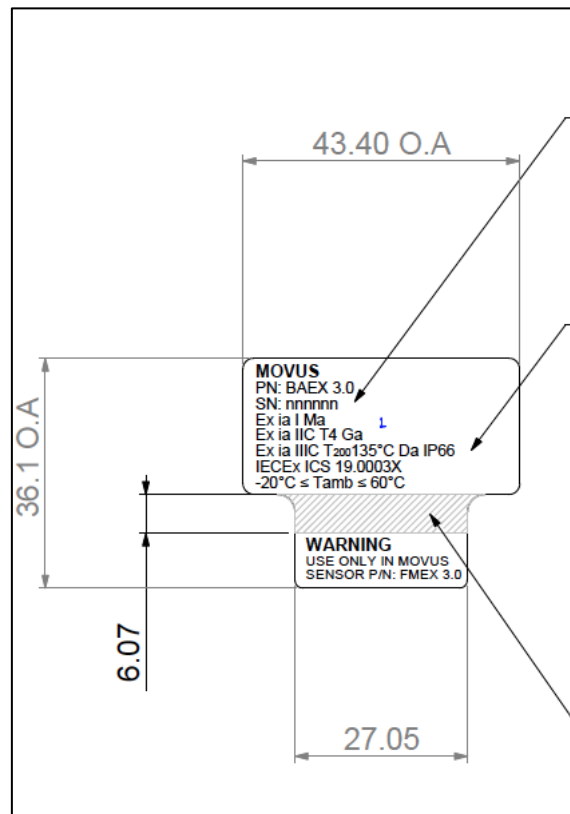
Sensor ATEX Certification Label Details



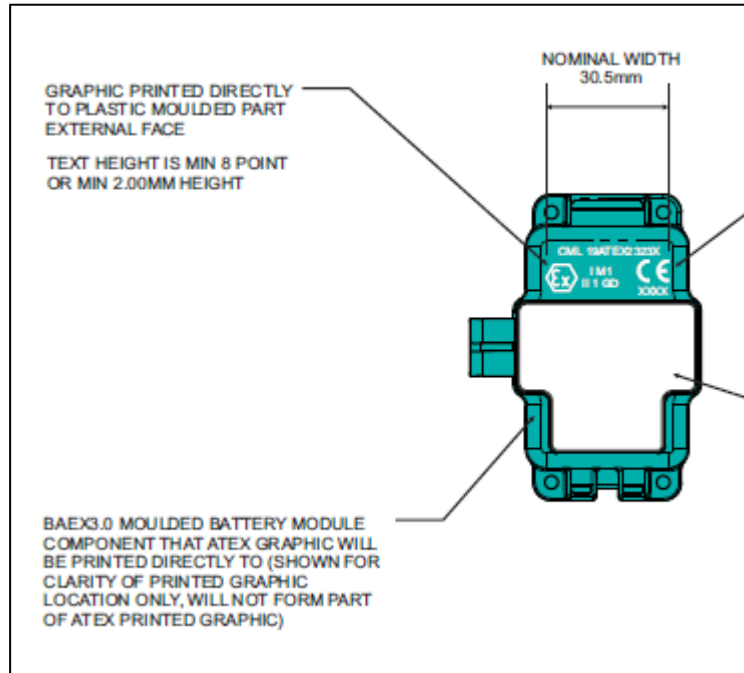
Sensor ExTC Certification Label Details



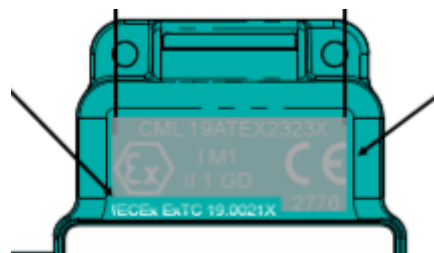
Battery Module orientation and mounting detail



Battery Module IECEx Certification Label detail



Battery Module ATEX Certification Label detail



Battery Module ExTC Certification Label detail

15.Related Documents

Nil.

16.Review Of Document

All changes to this document shall be made in accordance with the requirements of MOVUS Quality Manual and its related processes.