

CBM Predictor

User Manual



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About this Manual

This manual is a detailed *how to* reference for installing, starting up, operating, maintaining, calibrating and servicing the CBM Predictor.

Further information of the functionality of the different Predictor models will be available in the separate Predictor Information Manager (PIM) user manual(s).

Release information

Rev 1,2,3	November 2019	1 st Release and corrections
Rev 4	November 2019	1 st Release heat tracing function with external sensor
Rev 5	November 2019	2 nd Release without Product data Sheet
Rev 6	December 2019	1 st Release for Universal use
Rev 7	September 2020	correction of typo's
Rev 8	October 2020	updated EU certification
Rev 9	March 2022	Re-certification

References

The following list identifies publications that may contain information relevant to the information in this document:

Support and Contact Information:

For Europe, Asia Pacific, North and South America contact details, refer to the back page of this manual or the www.Ideationcbm.com web site.

Symbol Descriptions and Definitions

The symbols identified and defined in the following table may appear in this document

Symbol	Definition
 (symbol)	The Ex-mark means the equipment complies with the requirements of the European standards that are harmonized with the 2014/34/EU Directive (ATEX Directive, named after the French " Atmosphere Explosive")
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work data on the system being damaged or lost, or may result in the inability to properly operate the process

Telephone and Email contacts

Area	Organization	Email address
Norway and beyond	Ideation AS Tangen 12, Dusavik 4072 RANDABERG	info@ideationcbm.com

Contents

1	Introduction.....	5
1.1	CBM Predictor overview.....	5
1.2	Functional features.....	5
1.3	Physical Characteristics	6
1.4	CBM Predictor Name Plate.....	7
1.5	Safety Certification Information.....	7
2	Installation and Startup	8
2.1	Installation Site Evaluation	8
2.2	Installation of the CBM Predictor.....	8
2.2.1	General	8
2.2.2	Installation where process equipment temperature exceeds + 80°C.....	9
2.2.3	Use of External Sensors.	9
2.3	Startup Tasks	9
2.3.1	General	9
2.3.2	CBM Predictor to Gateway startup.	9
3	Calibration	10
4	Operation	10
5	Maintenance.....	10
6	Troubleshooting	10
7	Training.....	10

1 Introduction

1.1 CBM Predictor overview

The CBM Predictor is designed for usage on a variety of applications, all based upon the same electronics. The model's name on the nameplate (see fig 2) defines the specific usage of the Predictor.

Serie 100 Vibrations applications with internal sensors including POP and Leak

Model 101 PSV POP and Leak

Model 102 ESDV/PSDV valve leak

Model 103 109 Reserved for future use

Model 110 Pipe vibrations 2Hz – 500 Hz

Serie 200 Temperature measurements with external sensors

Model 201 Heat trace temperature measurements

Model 202 process medium temperature measurements

Serie 300 Pressure measurements with external sensors

Serie 400 Vibrations applications with external sensors

1.2 Functional features

CBM Predictor edge computing features such as Abnormal Condition Detection (ACD) and other features are programed for each different model according to specification, including interface to Gateway, Predictor Information Manager (PIM) and operator dashboards

All software and firmware to the CBM Predictors will be available for downloading Over The Air (OTA) from a database library on internet: www.ideationcbm.com.

Table 1- Features

Features	Standard
Communication Protocol	Blue Tooth light 5.xx
	MQTT
Human-Machine Interface (HMI)	Ideation CBM predictor PIM with dashboard
Approvals	20 ATEX 403841, IECEx DNV 21.0105
Applied Ex standards	EN 60079-0 (2018) and EN 60079-11 (2012)
RFI and RMI testing	ETSI EN 301 489-01 V2.2.3 (2019-11)
	ETSI EN 301 489-17 V3.1.1 (2017-02)
	ETSI EN 300 328 V2.2.2 (2019-07)

1.3 Physical Characteristics

As shown in Figure 1, the CBM Predictor is one unit, consisting of the electronic housing and its integral installation bracket and contains all electrical and electronic units. External process sensors are wired to the unit.

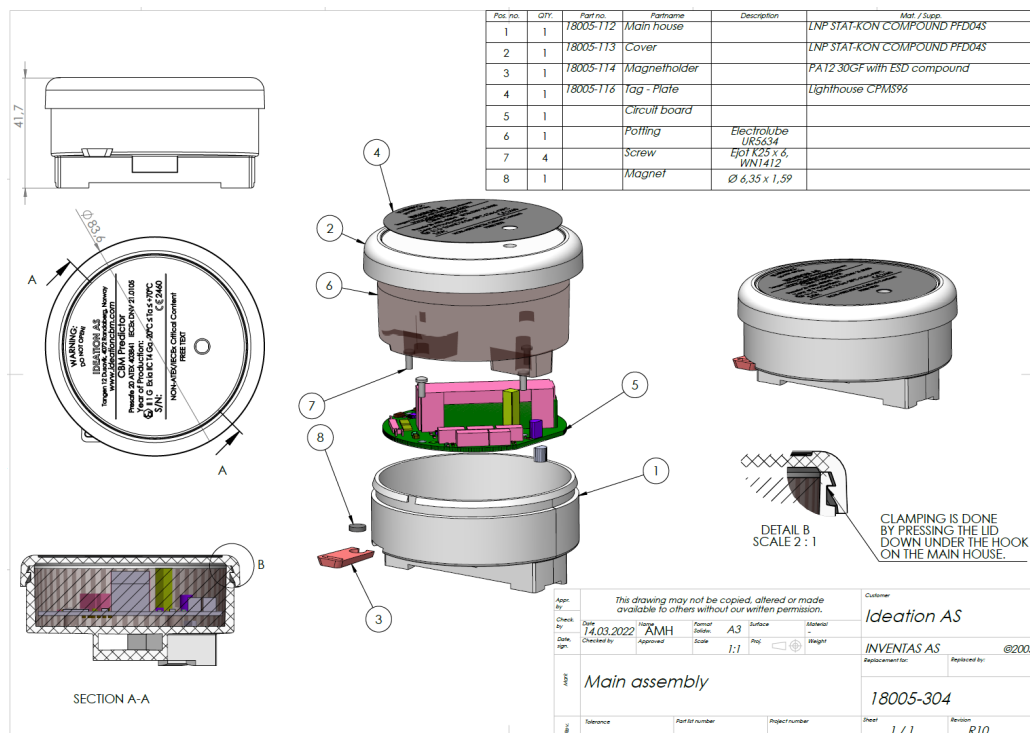


Figure 1: CBM Predictor

Important Note:

The **CBM Predictor unit shall NOT be opened** and has no physical wiring terminals. Because of the exceptional long lifetime and mounting techniques, the batteries are not to be replaced, **certainly not in dangerous zones**. Only communication access is through the integrated Blue Tooth communication protocol

1.4 CBM Predictor Name Plate

The CBM Predictor Product ID nameplate mounted on the side of the electronic housing (fig 1) lists its model number, physical configuration, tag number, certification, address and serial number (fig 2).

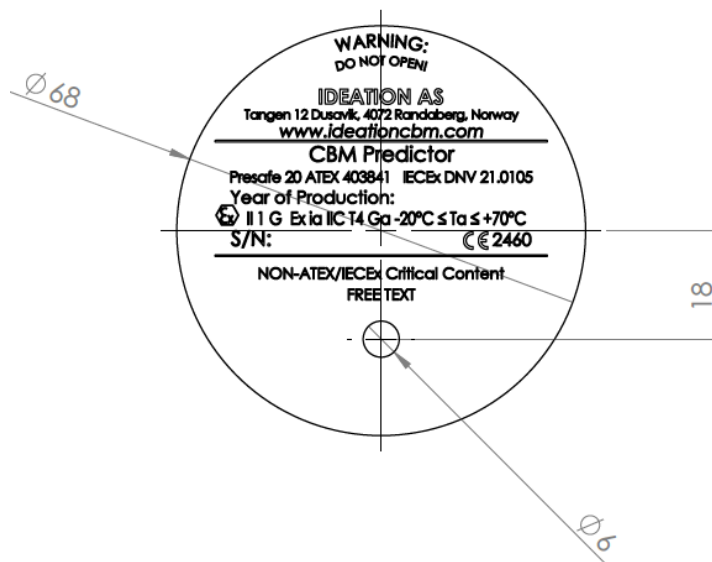


Figure 2: CBM Predictor Name plate

1.5 Safety Certification Information

The nameplate is located on top of the electronic housing, see fig 1 and 2 for exact location. The approval nameplate contains ex information, the Ex-classification and service marks.

2 Installation and Startup

2.1 Installation Site Evaluation

Evaluate the site selected for the CBM Predictor installation with respect to the process system design specifications. Some parameters that you may want to include in your site evaluation are:

- Environmental Conditions:
 - Ambient Temperature
- Potential Noise Sources:
 - Radio Frequency Interference (RFI)
 - Electromagnetic Interference (EMI)
- Vibration Sources
 - Motorized System Devices (e.g., pumps)
 - Valve Cavitation
- Process Parameters
 - Temperature

When selecting specific locations for mounting the CBM Predictor on process equipment, valves or pipes, care must be taken to ensure that the surface temperature will not exceed + 70°C at any time.

2.2 Installation of the CBM Predictor

2.2.1 General

The standard CBM Predictor unit is designed for direct installation on the process pipe, valve or PSV using standard cable binders, these are available in many materials and dimensions and need to be sourced separately. The mounting bracket is provided with a 6x18 mm hole for this purpose (see below figure 3). It is recommended to use two cable binders for this and hand tight the unit.

For specific applications, the CBM predictor comes pre-assembled on an extension (like a temperature probe or a deported vibration sensor) and will be accompanied by specific mounting instructions. These units are monolithic constructions too and filled with the same potting material for robust and safe operations.



Figure 3: standard CBM Predictor mounting

2.2.2 *Installation where process equipment temperature exceeds + 90°C*

The CBM Predictors must not be installed in areas with ambient temperature above +70°C. When CBM predictor is fitted with external sensors, this sensor must not be exposed of a temperature above +90°C.

2.2.3 *Use of External Sensors. Series 200 - 400*

When CBM Predictors is fitted with an external stainless-steel sensor, The sensor must be bounded to the electric ground structure.

2.3 Startup Tasks

2.3.1 *General*

All electric parts of the CBM Predictor are factory installed, and no field work is necessary. Start up after installation is achieved by activation of the built in Blue Tooth radio transceiver through a specially prepared startup procedure.

First step is to remove the magnet that is inserted in the housing. This will open the circuit and activate the battery by means of a reed relay.

Second step is to activate the electronics in the CBM Predictor from deep sleep mode - this is all documented in the PIM which is needed to communicate with the device. This initiation sequence takes less than a minute.

2.3.2 *CBM Predictor to Gateway startup.*

The gateway is based on the Jetro EVE Platform in WiFi or LTE-M configuration. It constantly collects alarms and exception reports from the associated predictors, temporary stores, and forwards them to the PIM. The data is protected against tampering and eavesdropping on the way up by TLS security implemented by the gateway.

The gateway is responsible for data security deployment on the predictor level (key leasing), data collecting, enc- and decryption, end-to-end QoS, RF coexistence, as well as for the remote over-the-air firmware upgrade of the associated predictors.

3 Calibration

The CBM Predictor calibration is done during Installation and setup ref chap 2. No further calibration is necessary.

4 Operation

The CBM Predictor itself has one LED indicator to indicate if it is functioning. All other operator interaction with the CBM Predictor is communicated wireless through the BLE communication interface to the PIM operator app. The PIM app comes with a specific user manual and is not further detailed in this manual.

5 Maintenance

The CBM Predictor does not require any specific maintenance at scheduled intervals. In case of detector malfunction, this is reported on the PIM operator app.

Maintenance of the CBM Predictor is limited to ensuring that encapsulation, seals and mounting are tight and secure. There are no moving parts or adjustments and hence no reason to open the field housing except to inspect for corrosion or conductive dust entry which could later affect reliable operation. The detector module itself should never be opened.

Replacing a CBM Predictor follows the exact same procedure as installation of a new one, **a broken unit is to be scrapped - not repaired**. Albeit technically possible, Ideation does not support replacing parts of the CBM predictor- including the battery.

6 Troubleshooting

Troubleshooting involves responding to error messages, primarily displayed by the PIM operator app.

Error messages that may occur are documented in the PIM documentation. If you require assistance, contact your distributor or Ideation Technical Support.

7 Training

The CBM Predictor does not require any specific training since it is less complex to use and to install than a modern smartphone. Ideation foresees however in downloadable YouTube video's available on the Ideation homepage www.ideationcbm.com.

CBM Predictor - Data Sheet

Functional Specifications

Predictor model overview

Serie 100 Vibrations applications with internal sensors including POP and Leak

Model 101	PSV POP and Leak
Model 102	ESDV/PSDV valve leak
Model 103-109	Reserved for future use
Model 110	Pipe vibrations 2Hz – 500 Hz

Serie 200 Temperature measurements with external sensors

Model 201	Heat trace temperature measurements
Model 202	process medium temperature measurements

Serie 300 Pressure measurements with external sensors

Serie 400 Vibrations applications with external sensors

Design Features

Wireless connects to wireless routers with Bluetooth® Low Energy (BLE) wireless technology
Housing with cover: LNP STAT-KON PFD04, a compound based on PA 6 resin containing Glass Fiber, Carbon Powder. Added features include Electrically Conductive, Heat Stabilized.
Ultra-low power consumption, lifetime battery
Secure field programmable

Self-Calibration

The CBM Predictor monitors the equipment continuously while in low power consumption mode and will switch to full communication mode on request, on pre set time intervals or triggered by the abnormal condition.

Physical Specifications

Environment

The complete assembly will withstand saline and humid atmosphere
Operating temperature: Minus 20 deg C to plus 70 deg C

Electrical Connections / Battery

Not replaceable, non-rechargeable, Intrinsically Safe Lithium-Thionyl Chloride battery
Eight to twelve-year battery life at reference conditions

Field Data Communication

All data communication is wireless via BLE 5 including upload of configuration data and operation system upgrades. The Device can also communicate via BLE4 with more mature handheld devices.

Materials of Construction

Housing base and housing cover
PA6 resin

Antenna

Integral in electronic circuit design

Mounting

Device to be attached directly on the equipment to be monitored or thermowell depending on the design

Saddle strap

Stainless hose clamp type to fit any diameter valve body (for PSV and SDV)

Weight - 150g

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation.

Reference environmental and electrical specification

Hazardous Locations Certificates

Explosion protection II 1G Ex ia IIC T4 Ga, T ambient -20 deg C to +70 deg C

Europa: ATEX Directive (2014/34/EU) CAM B

Applied Standard : EN 60079-0:2018; EN60079-11:2012

Certificate DNV Presafe 20 ATEX 403841, IECEx DNV 21.0105

Environmental protection

Environmental protection according to IEC standard 60529 to IP 67

Electro Magnetic Compatibility (EMC)

ETSI EN 301 489-01 V2.2.3 (2019-11)

ETSI EN 301 489-17 V3.1.1 (2017-02)

ETSI EN 300 328 V2.2.2 (2019-07)

Vibration Effect

Tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21 mm displacement peak amplitude / 60-2000 Hz 3g).

