pack:wise
digitize. manage. **match.**

# Packwise Smart Cap Ex
# **Instruction manual**

**Version:** BA_SC_Ex_V04_ENG

**Imprint**

Packwise GmbH
Antonstr. 25
01097 Dresden

phone: +49 (0) 351 8967 5090
mail: service@packwise.de

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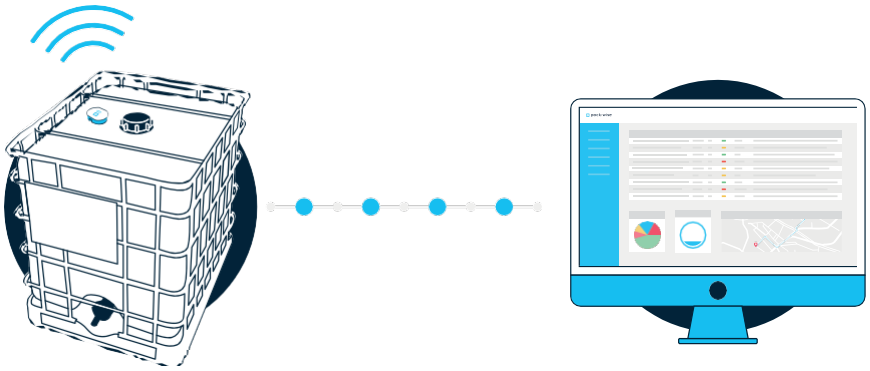
# Table of contents

# 1. General information about Packwise Smart Cap Ex

## 1.1. Performance description

The Packwise Smart Cap Ex is a battery-powered sensor for filling level and temperature measurement, as well as location and position determination of mobile and stationary liquid containers or their filling goods in the hazardous area of Zone 1 and 2.

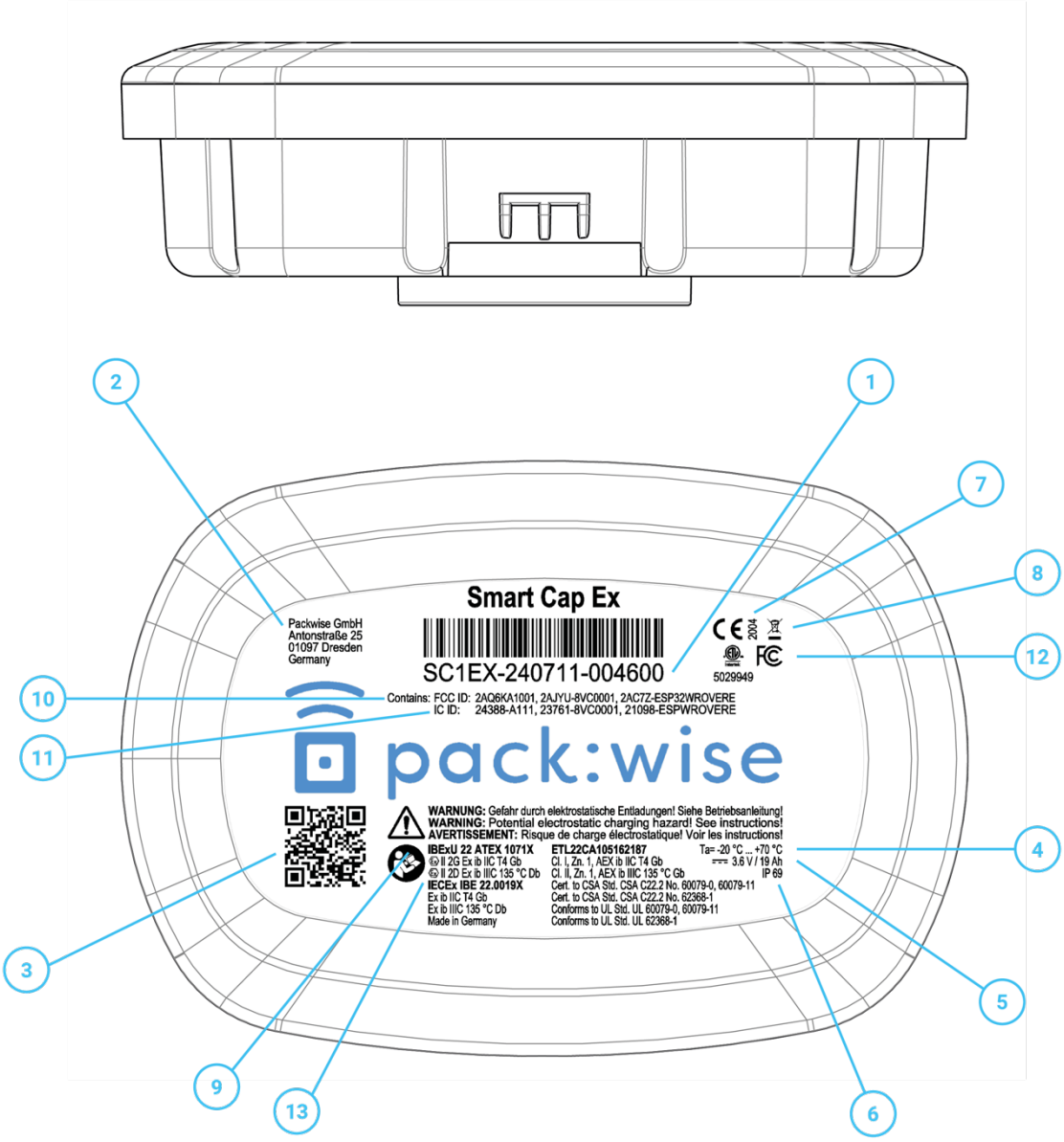


The transmission of sensor readings via mobile radio enables stand-alone use of the Packwise Smart Cap Ex for remote monitoring. The Packwise Smart Cap Ex measures and transmits the collected measurement data outside and inside buildings in the 27 EU countries and supports the cross-border use of mobile containers. Via mobile radio, the collected measurement data is encrypted and transmitted to the Packwise Cloud and displayed in the **Packwise Flow** web application.

**Packwise Flow** offers you a wide range of possibilities for optimizing and automating your processes and setting up new processes. You can access Packwise Flow at https://packwiseflow.de/login.

## 1.2. Device data on the nameplate

The nameplate shown in the figure contains exemplary device-specific information.




| No. | Explanations |
|---|---|
| 1 | Serial number of the device |
| 2 | Address of the distributor |
| 3 | QR code to call the product URL |
| 4 | Operating temperature |
| 5 | Battery data |
| 6 | IP class |
| 7 | CE marking with No. of Notified Body |
| 8 | Disposal indicator |

| | |
|---|---|
| 9 | Warnings |
| 10 | FCC IDs of integrated components |
| 11 | IC IDs of integrated components |
| 12 | FCC Logo |
| 13 | Certifications (ATEX/ IECEx marking) |

## 1.3. Modifications to the device

User modifications to the Packwise Smart Cap Ex are not permitted. If modifications are necessary, contact Packwise.

## 1.4. Operating instructions

The operating instructions and other documents are available for download at https://packwise.de/download/.

If you have any questions, please contact: service@packwise.de

# 2. Safety instructions

This chapter lists general safety instructions that apply as basic rules of conduct when handling the Packwise Smart Cap Ex.

## 2.1. Presentation of the warnings

If there are risks of danger to persons or damage to the device, these are indicated by warnings. They precede the instruction to perform an action which may result in a risk of damage.

The following warnings are used in this documentation:

**⚠ WARNING**

**Nature and source of danger**

This safety notice warns about a potentially hazardous situation that will result in serious injury or death.

**⚠ ATTENTION**

**Nature and source of danger**

This safety notice warns about a potentially dangerous situation that may result in minor or moderate injury.

**NOTE**

**Nature and source of danger**

This safety notice warns about damage to the device.

## 2.2. Intended use

The Packwise Smart Cap Ex is a battery powered sensor for filling level and temperature measurement as well as location and position determination of mobile and stationary liquid containers or their filling goods in hazardous areas of zone 1and 2.

## 2.3. Improper use

The measured values are for the user's orientation only. The measured values of the sensors are subject to various environmental influences and may deviate from the real values. Faulty measurements cannot be ruled out. The measured values are therefore not intended to trigger critical processes based on the sensor data, e.g. overflow stop. The manufacturer is not liable for damage caused by improper or non-intended use.

## 2.4. General safety instructions

Read the instructions before installation and keep them within immediate reach.

## 2.5. Safety instructions for operation

- For connection, commissioning and operation of the Packwise Smart Cap Ex, higher-level legal requirements of the country, such as valid Ex regulations as well as the safety and accident prevention regulations applicable to the respective individual case, must also be observed.
- The Packwise Smart Cap Ex may be operated in a Zone 1 and 2 hazardous area.
- The Packwise Smart Cap Ex may only be used in a technically perfect condition.
- If any damage occurs, stop using the device immediately and contact Packwise.
- The Packwise Smart Cap Ex must always be firmly attached to the container. Improper attachment can cause the Packwise Smart Cap Ex to fall off the container when moved, causing personal injury, environmental damage and property damage.
- The Smart Cap Ex may only be installed/uninstalled in the non-Ex area
- Danger due to electrostatic discharge, product may only be cleaned with a damp cloth.

## 2.6. Safety instructions for maintenance and cleaning

- Cleaning the Smart Cap Ex with a dry cloth can cause static discharge, which can lead to explosion in an explosive atmosphere. To prevent an explosion, always perform cleaning in the non-hazardous area with a clean, damp cloth.
- Avoid dust deposits ≥ 5mm on the devices
- Observe the regulations according to IEC/EN 60079-17 during maintenance and testing.
- The Smart Cap Ex must not be opened by the operator under any circumstances. In case of malfunctions, the company Packwise GmbH must be informed

## 2.7. Safety instructions for the battery used

- The battery is installed so that it is not accessible to the user.
- The battery must not be dismantled and charged.
- The battery may only be replaced by the manufacturer or a person authorized by the manufacturer.

## 2.8. Personal qualification

The Packwise Smart Cap Ex may only be handled by authorized and qualified personnel.

## 2.9. Area relevant for approval

If the Packwise Smart Cap Ex is to be used in areas where approval is required, it must be checked before use whether the device has the appropriate approval. This information can be found on the nameplate, see section "1.2. Device data on the nameplate" on page 8.

### Explosion protection marking

ATEX: IBExU22ATEX 1071X
II 2G Ex ib IIC T4 Gb
II 2D Ex ib IIIC 135°C Db

IECEx: IECEx IBE 22.0019X
Ex ib IIC T4 Gb
Ex ib IIIC 135°C Db
Class I, Zone 1, Aex ib IIC T4 Gb
Class II, Zone21, Aex ib IIIC T135 °C Db

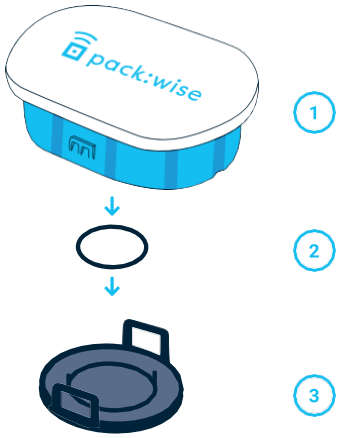
ETL: ETL22CA105162187
Cl. I, Zn. 1, AEX ib IIC T4 Gb
Cl. II, Zn. 1, AEX ib IIIC 135°C Gb

## 2.10. IT security

The Packwise Smart Cap Ex can be turned on and off with the supplied magnet. Moving the Packwise Smart Cap Ex triggers a measurement and transmission process. No further changes to the operating mode can be made on the Packwise Smart Cap Ex directly. The operating mode of the Packwise Smart Cap Ex is set via the **Packwise Flow** web application. The acquired measured values are stored and processed in encrypted form on the device. The encrypted data is transmitted to the Packwise Cloud Platform via mobile networks.

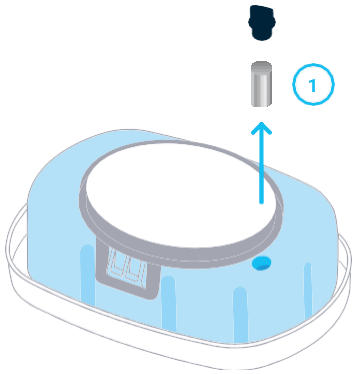
# 3. Structure and function

## 3.1. Overview




| No. | Name | Description |
|---|---|---|
| 1 | Packwise Smart Cap Ex | Consists of an IP69 protected housing containing the battery, the sensor package, the SIM card and all other relevant components. |
| 2 | O-ring | Prevents moisture from entering the gap between the Packwise Smart Cap Ex and the locking plate. |
| 3 | Locking plate with adhesive pad | Is firmly glued to the container to be monitored. |

## 3.2. Rear view




| No. | Name | Description |
|---|---|---|
| 1 | Position of the magnet and rubber stopper | By removing the magnet, the Packwise Smart Cap Ex is activated.<br>Inserting the magnet deactivates the Packwise Smart Cap Ex. |

## 3.3. Functional principle

The Packwise Smart Cap Ex measures and transmits the following parameters using an integrated sensor package:

- The **filling level** is determined by a radar sensor using *Pulsed Coherent Radar*. This method is used to determine the distance between the Smart Cap Ex and the liquid, which is converted into the filling level with a container-specific bearing chart.
- The **location** is determined by three different technologies:
  - Global Navigation Satellite System (GNSS)
  - Wi-Fi positioning
  - Cell tower triangulation
- The **movement** of the Packwise Smart Cap Ex is detected by an acceleration sensor. It detects the movement of the device in the X-, Y- and Z-axis.
- The **ambient temperature** is measured by a digital temperature sensor.

## 3.4. Transmission of measured values

Depending on the availability of the mobile technologies (GSM/ LTE, etc.), the determined values are transmitted wirelessly via the mobile network. The 2G (GSM), LTE-CAT-M1 or NB-IoT (LTE-CATNB1) standards are used. By supporting different standards, connectivity can also be ensured in remote areas and across borders in the 27 EU countries.
Detailed information on the transmission of measured values can be found in section "11.3 Connectivity (transmission of measured values)" on page 30.

## 3.5. Battery information

The battery is not accessible to the user. The operating time can be strongly influenced by the selected operating mode.
The main factors influencing the operating time are:

- the number of measurement and sending cycles.
- the type and availability of the mobile radio connection.
- the type and number of activated functionalities.
- the ambient temperature.

The battery level is determined mathematically and technically and displayed in the **Packwise Flow** web application. The determined battery level is only a guide value. You can be informed by e-mail if the battery level falls below a critical value. See also section "11.4 Battery" on page 30.

# 4. Delivery and Storage

The Packwise Smart Cap Ex is assembled when delivered. The locking plate and O-ring are packed separately with the Packwise Smart Cap Ex.

## 4.1. Scope of delivery

| Quantity | Name |
|---|---|
| 16 | Packwise Smart Cap Ex |
| 16 | Locking plate with adhesive pad |
| 16 | O-ring |
| 1 | Installation Guide with EU declaration of conformity |

## 4.2. Storage and transport conditions

- Storage temperature: -20°C bis ~+60°C
- Avoid direct sunlight
- Avoid mechanical shocks
- Store in dry, dust-free environment

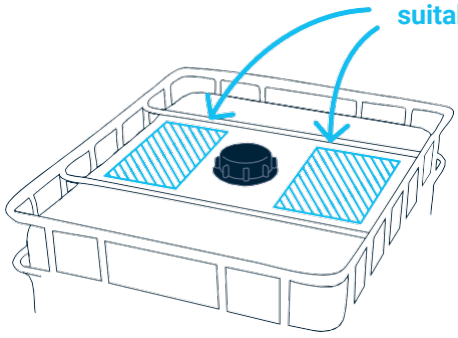
# 5. Installation and activation

The Packwise Smart Cap Ex is assembled when delivered and can be attached to the container immediately.

## 5.1. Environmental conditions

- The Packwise Smart Cap Ex may be operated in a Zone 1 and 2 hazardous area.
- Ambient temperature: -20 °C bis +70 °C.

## 5.2. Positioning the Packwise Smart Cap Ex




The Packwise Smart Cap Ex should be attached to the top of the IBC within the area marked in blue, between the edge and lid of the container, as shown in the picture.

**⚠ WARNING**

**Installation only outside the Ex area!**

The Smart Cap Ex may only be installed/deinstalled in the non-Ex area.

## 5.3. Preparing the mounting surface

Before installing the Packwise Smart Cap Ex, make sure that the chosen surface is free of dust, dirt or moisture.

**⚠ ATTENTION**

**Fastening**

The Packwise Smart Cap Ex must always be firmly attached to the container. Improper attachment can cause the Packwise Smart Cap Ex to fall off the container when moved, causing personal injury, environmental damage and property damage.

1. Clean the chosen surface with a suitable cleaning agent.
2. Dry the surface.

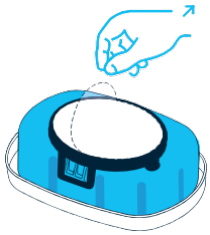
## 5.4. Attaching the Packwise Smart Cap Ex with the locking plate

**BEST PRACTICE**

To start measuring the parameters immediately after the installation, activate the Packwise Smart Cap Ex before mounting, see section "5.7. Activating the sensor and putting it into operation" on page 22.

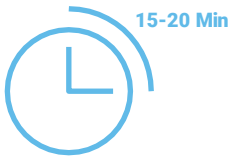
**Please note!** The Packwise Smart Cap Ex **must** be attached to the container within 1 minute after activation. After 1 minute the measurements start and the radar sensor is calibrated.

**Attach the Packwise Smart Cap Ex as shown below:**



1. Pull off the adhesive protective foil.


2. Press the Packwise Smart Cap Ex firmly onto the chosen location on the container and hold for 3 seconds.

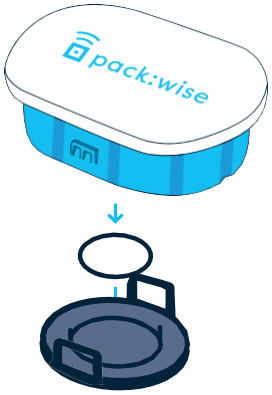



3. Wait for 15 to 20 minutes for the adhesive to dry, to prevent later detachment.

Complete adhesive strength is achieved after 24 hours. After the drying time, the locking plate is firmly fixed to the container.

## 5.5. Inserting the Packwise Smart Cap Ex on a mounted locking plate

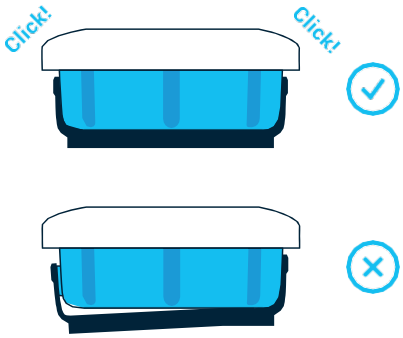
If a locking plate is already installed on the container, insert the Packwise Smart Cap Ex as shown below:




1. Insert the o-ring into the locking plate.

2. Place the Packwise Smart Cap Ex on the locking plate

   and press firmly until it snaps in.




Make sure that the sensor has snapped on both sides.

## 5.6. Detaching the Packwise Smart Cap Ex from a mounted locking plate

Carefully remove the Packwise Smart Cap Ex from the click mechanism using a flat-bladed screwdriver.

**⚠ WARNING**

**Installation only outside the hazardous area!**

The Smart Cap Ex may only be installed/uninstalled in the non-Ex area

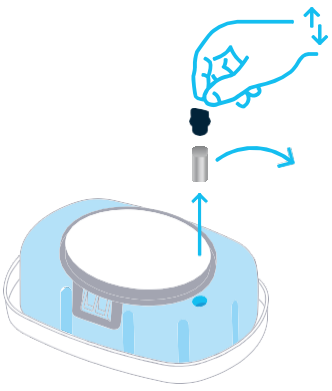
**NOTE**

**The locking clip can break off**

- Carefully remove the Packwise Smart Cap Ex from the click mechanism using a suitable tool e.g. flat-bladed screwdriver.
- Only by qualified personnel.

## 5.7. Activating the sensor and putting it into operation

To start the measurements and the data transmission, the sensor has to be activated as shown below:



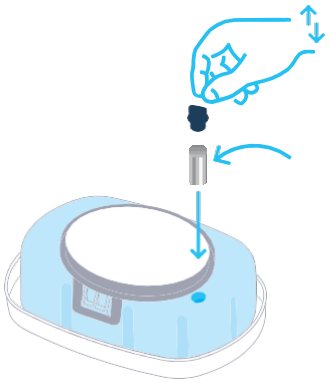
1. Remove the rubber stopper from the bottom side of the device.
2. Take out the magnet inside to activate the sensor.
3. Place back the rubber stopper.
4. Place Packwise Smart Cap Ex on the locking plate.
5. Put the magnet aside and store it so you can deactivate the device again at a later time.

**IMPORTANT**

The Packwise Smart Cap Ex **must** be attached to the container within 1 minute after activation. After 1 minute the measurements start and the radar sensor is calibrated to the environment.

## 5.8. Deactivating the sensor and putting it out of operation

Before deactivating the Packwise Smart Cap Ex, **first** contact the responsible operator to avoid possible process interruptions.



1. Take the Packwise Smart Cap Ex out of the locking plate.
2. Remove the rubber stopper from the bottom side of the device.
3. Insert the magnet.
4. Place back the rubber stopper.

The Packwise Smart Cap Ex is deactivated. The transmission of measured values is stopped.

# 6. Operation

There are no other operating options on the Packwise Smart Cap Ex directly - apart from activation and deactivation.

The adjustment of the transmission intervals as well as the activation and deactivation of functions is carried out exclusively via the web application **Packwise Flow**.

## 6.1. Measurements during operation

The Packwise Smart Cap Ex is a stand-alone solution that records parameters without the need to install any other operating equipment.

Activation of the Packwise Smart Cap Ex automatically initiates the first measurement and data transfer. The measured values appear in the **Packwise Flow** platform no later than 10 minutes after activation of the sensor.

Further measurements are automatically generated at a predefined time interval and transmitted to the **Packwise Flow** platform.

The measurement and transmission interval can be adjusted on Packwise Flow.
Note that an increased measurement and transmission interval shortens the battery life.
See section "11.4 Battery" on page 30.

If the specified values for acceleration and temperature are fallen below/exceeded a set threshold, the device automatically sends a notification regardless of the transmission interval.

## 6.2. Reading measured values

The measured values can be read in the **Packwise Flow** web application. Both current and historical data can be called up here. The transmission of the data includes the following parameters:

- Filling level
- Location
- Movement
- Temperature

# 7. Malfunctions

Malfunctions in the operation of the Packwise Smart Cap Ex cannot be diagnosed or corrected on the Packwise Smart Cap Ex. If you notice incorrect data on the **Packwise Flow** platform, check the device for correct installation.

1. Check the tight fit of the locking plate on the container.
2. Check that the Packwise Smart Cap Ex is correctly snapped onto the locking plate.

**In case of incorrect data despite correct attachment:**

1. Deactivate the Packwise Smart Cap Ex by inserting the magnet.
2. Activate the Packwise Smart Cap Ex by removing the magnet.

Contact Packwise Support or - if available - your in-house contact person for the use of the Packwise Smart Cap Ex.

# 8. Maintenance and care

The Packwise Smart Cap Ex is maintenance-free.

## 8.1. Checking Packwise Smart Cap Ex

The Packwise Smart Cap Ex and locking plates should be checked regularly for tight fit and damage. In case of damage, see section "9. Repair and shipping" on page 27.

## 8.2. Firmware-Update

A firmware update is performed by Packwise GmbH and takes place via the mobile connection. The update process is only performed with a sufficiently good GSM or LTE-Cat M1 mobile connection. The update is held back until a good connection is established. If the connection is not good enough, the operator will be asked to move the Packwise Smart Cap Ex to a location with a good connection. The current firmware version of your device is displayed on **Packwise Flow**.

**IMPORTANT**

The first temperature measurement after a firmware update can deviate strongly from the ambient temperature. The system will become stable after approx. 60 minutes.

# 9. Repair and Shipping

Repair of the Packwise Smart Cap Ex by the user is not possible and not permitted.

**⚠ WARNING**

**Fire hazard due to damaged batteries**

Visibly damaged devices must not be repaired or shipped by the user.

- Should damage occur, stop use immediately.
- Contact Packwise to discuss how to proceed further.
- Do not ship the device until you have consulted the manufacturer, see chap. "12.2. Contact data" on page 31.

For detailed information regarding returns, send an email to service@packwise.de or contact your account manager.

# 10. Deactivation and disposal

## 10.1. Deactivation

1. Remove the Packwise Smart Cap Ex from the locking plate.
2. Insert the magnet on the bottom side of the device to deactivate the measurements.
3. Remove the locking plate from the container if it is no longer needed.

## 10.2. Disposal

The Packwise Smart Cap Ex must be disposed of in an environmentally friendly manner in accordance with the applicable laws.

- The Packwise Smart Cap Ex must not be disposed of with household waste.
- Disposal is subject to the Directive 2006/66/EC of the European Parliament and of the Council on batteries and accumulators.
- Devices with batteries that cannot be removed by the end user must be handed in at a collection point for electrical devices or returned to the distributor.
- In this case, the recyclers of the electrical equipment are obliged to remove and properly dispose of the batteries and accumulators.

## 10.3. Shipping for disposal

**⚠ WARNING**

**Fire hazard due to damaged batteries.**

- Visibly damaged devices must not be shipped.
- Deliver damaged devices directly to a collection point for electrical devices.

1. Check the Packwise Smart Cap Ex for damage.
2. Always contact the manufacturer before shipping the device.

# 11. Technical data

## 11.1. Device characteristics

| Characteristics | Value |
|---|---|
| Dimensions (WxHxD) | 100 x 46 x 142 mm |
| Weight | 515 g |
| Protection class | IP69 |
| ATEX/IECEx marking | **ATEX:** **IBExU22ATEX 1071X**<br>**II 2G Ex ib IIC T4 Gb**<br>**II 2D Ex ib IIIC 135°C Db**<br><br>**IECEx:** **IECEx IBE 22.0019X**<br>**Ex ib IIC T4 Gb**<br>**Ex ib IIIC 135°C Db**<br>**Class I, Zone 1, Aex ib IIC T4 Gb**<br>**Class II, Zone21, Aex ib IIIC T135 °C Db**<br><br>**ETL:** **ETL22CA105162187**<br>**Cl. I, Zn. 1, AEX ib IIC T4 Gb**<br>**Cl. II, Zn. 1, AEX ib IIIC 135°C Gb** |

## 11.2. Ambient conditions

| Characteristics | Value |
|---|---|
| Operating temperature | -20 °C to +70 °C |
| Storage temperature | -20°C to ~+60°C |
| Relative humidity | 0 ... 95% |

## 11.3. Connectivity (transmission of measured values)

| Function | Value |
|---|---|
| Mobile connection | 2G GPRS/EDGE<br>4G LTE-M1 (LTE Cat-M1)<br>4G LTE-NB1 (NB-IoT) |
| GNSS | GPS, Glonass, BeiDou, Galileo |
| Bluetooth | 4.2 |
| WLAN | IEEE 802.11 b/g/n |
| Firmware Updates | over the Air (FOTA) |

## 11.4. Battery

| Characteristics | Value |
|---|---|
| non-rechargeable battery | Battery Primary 3.7 V lithium thionyl chloride (Li-SOCl2) battery, composed of 1 (one) "D" size cell. |
| Battery life | Battery life depends on the type of use (measurement and transmission intervals) and environmental conditions (temperature, mobile connection and humidity).<br><br>**Example:** Environmental conditions: 21°C and good GPS connection: |

| Transmission interval | Battery life in years |
|---|---|
| 1 / Day | 10,7 Years |
| 3 / Day | 4,3 Years |
| 6 / Day | 2 Years |

The Packwise Smart Cap meets the dielectric strength testing requirements as specified in Clause 10.3 of UL 60079-11 & CSA C22.2#60079-11.

# 12. Appendix

## 12.1. Order information

Packwise GmbH
Antonstr. 25,
01097 Dresden

Tel: +49 (0) 351 8967 5090
Email: service@packwise.de
Product Name: Packwise Smart Cap Ex

## 12.2. Contact data

Packwise GmbH
Antonstr. 25,
01097 Dresden

Tel: +49 (0) 351 8967 5090
Email: service@packwise.de

## 12.3. Contact and support

| | |
|---|---|
| Service | service@packwise.de |
| Support | support@packwise.de |
| Manual | https://packwise.de/download/ |

## 12.4. Declaration of Conformity

# EU-Konformitätserklärung
# EU-Declaration of Conformity

**Wir / We** Packwise GmbH
Antonstr. 25
01097 Dresden
Germany

erklären hiermit gegenüber unseren Kunden, dass das Produkt / herewith declare to our customers that the product

**Beschreibung / Description:** Smart Cap Ex / IIOT Datenverarbeitungsgerät / Information Technology Equipment

**Typenbezeichnung / Type designation:** Packwise Smart Cap Ex

die Bestimmungen folgender Richtlinien des Europäischen Parlaments und des Rates erfüllt / complies with the following European Directives of the European Parliament and of the Council

**2014/34/EU** des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen
2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres

**2014/53/EU RED** vom 16. April 2014 über die Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Funkanlagen auf dem Markt und zur Aufhebung der Richtlinie 1999/5/EG

2014/53/EU RED of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC

**2011/65/EU und 2015/863/EU RoHS** des Europäischen Parlaments und des Rates vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten

2011/65/EU and 2015/863/EU RoHS of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Die Übereinstimmung des Produktes mit den Anforderungen der Richtlinie wird durch die technische Dokumentation sowie die Einhaltung folgender Normen nachgewiesen / The technical documentation and compliance with the listed standards below prove the conformity of the product with the requirements of the directives

EN 62368-1 : 2014/AC : 2015/A11 : 2017;
EN 62311 : 2008-09;
1999/519/EC : 1999-07
EN 301 489-17 V3.2.4 : 2020
EN 301 489-1 V2.2.3 : 2019
EN 301 489-3 V2.1.1 : 2019
EN 301 489-19 V2.1.1 : 2019
EN 301 489-1 V2.2.0 : 2017
EN 301 489-52 V1.2.1: 2021
EN 301 489-1 V2.1.1 : 2017

Draft EN 305 550 V2.1.0 : 10-2017
EN 303 413 V1.2.1 : 2021
EN 301 511 V12.5.1 : 03-2017
EN 301 908-15 V15.2.1 : 2023
EN 300 328 V2.2.2:07 : 2019
EN 61000-4-2 : 2009
EN 61000-4-3 : 2006+A1 : 2008+A2 : 2010
EN IEC 60079-0:2018
EN 60079-11:2012

**CE-Zeichen erstmals angebracht im Jahr / CE marking initially affixed in the year:** 2023

Dresden, 24.01.2023

ppa. Felix Weger
Produktmanagement

Gesche Weger
Geschäftsführerin

pack:wise
digitize. manage. **match.**

Intertek
5029949

2004

Packwise GmbH
Antonstr. 25
01097 Dresden, Germany

+49 (0) 351 8967 5090
service@packwise.de
www.packwise.io