

# USER MANUAL

## smaXtec<sup>®</sup> Cow Monitoring

Version 5.0

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The smaXtec pH Plus Bolus (part of the smaXtec System) is under protection of the following patents:

WO 2011/079338 A2 (PCT/AT2010/000490)  
EP 2 519 098 (EP 10808965.7)  
AT 509 255 B1 (A 2052/2009)  
BR 112012016375-2  
CA 2 785 925 A1  
RUS 2012 132 453  
UA 2012/09263  
US 2012/0277550 A1 (13/520,101)  
ZA 2012/04642

Design Patent:

"Messvorrichtung, insbesondere zur Messung von physiologischen Daten im Körper eines Lebewesens"

"Measuring Instrument"

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D = Day

M = Month

Y = Year

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## 1. Overview of smaXtec Inside Monitoring System



WARNING: For your own safety, please read all instructions in the User Manual as well as the **Important Safety and Product Information** before using the smaXtec® System. Both documents are available for download at [www.smaxtec.com](http://www.smaxtec.com).

**smaXtec Messenger** and further information about the smaXtec System, including informational videos, are available at [www.smaxtec.com](http://www.smaxtec.com).

The **smaXtec System** comprises of:

- the **Bolus** for data measurement inside the cow
- the **smaXtec Messenger** – the software that makes all key information is available 24/7
- the **Infrastructure** that includes all of the relevant system components (wireless read-out devices and smaXtec Climate Sensors) and transmits the measurement data to the smaXtec server

We provide two solutions for you to choose from: **smaXtec Classic (Heat & Calving Detection and Health Monitoring)** and **smaXtec pH Plus (Reproduction, Health & Feed Management)**.

### smaXtec Classic Bolus



With smaXtec Classic you measure the rumen temperature and activity levels of your cows and receive information on basic health and fertility. All of the cows are fitted with a Classic Bolus enabling individual monitoring.

The **Classic Bolus** is designed to provide continuous measurement of the rumen temperature as well as the activity levels of cows. The measured data is saved in the Classic Bolus and automatically transmitted via the wireless network to the smaXtec Base Station or to a smaXtec Repeater. Due to the dimensions, use of the Classic

Bolus is not possible for cows under the age of 18 months and/or weighing less than 450 kg.

## smaXtec pH Plus



With smaXtec pH Plus you can – in addition to the functions included in smaXtec Classic – also measure rumen pH, enabling optimised feed and health management and improving the health status of your herd. A certain percentage of the herd is fitted with a pH Plus Bolus, providing measurement data which is representative for the group. The remaining animals are fitted with a Classic Bolus for individual monitoring.

The **pH Plus Bolus** is designed to provide continuous monitoring of rumen pH and temperature as well as activity levels of cows. The measured data is saved in the pH Plus Bolus and automatically transmitted via the wireless network to the smaXtec Base Station or to a smaXtec Repeater. Due to the dimensions, use of the pH Plus Bolus is not possible for cows under the age of 18 months and/or weighing less than 450 kg.

## Infrastructure

The **smaXtec Base Station** automatically receives the relevant data in real-time. The data is transmitted to the server and stored in the online database. The smaXtec Base Station automatically receives the data from the various smaXtec sensors. smaXtec Repeaters can be used to extend the network range.

The **smaXtec Repeater** is designed to extend the range of the smaXtec Base Station and is recommended for use in certain configurations in order to cover remote areas of the cow shed. It provides an easy-to-use and cost-efficient extension of the smaXtec wireless network and communication with the smaXtec Sensors.

The **smaXtec Climate Sensor** is designed to provide continuous measurement of environmental factors such as ambient temperature and humidity levels. This data is automatically transmitted via the wireless network to the smaXtec Base Station or to



a smaXtec Repeater. The number of smaXtec Climate Sensors required is dependent on the size of the barn.

## **smaXtec Messenger**

The **smaXtec Messenger** is an automatic alert messaging tool that keeps you informed about changes in a cow's state of health. Collection of data in real-time means you are kept fully informed at all times about your herd's state of health. The smaXtec Messenger sends you immediate alerts if there are significant changes in rumen pH, temperature or activity levels. The smaXtec Messenger can be accessed via PC or Laptop (<http://messenger.smaxtec.com>). An App is available for tablet or smartphone (Google Play Store, Apple App Store)

Before using the **smaXtec pH Plus Bolus** and **smaXtec Classic Bolus** for smaXtec Cow Monitoring, these devices must first be initialised as described in the enclosed Quickstart Guides and then activated in smaXtec Messenger.

## 2. System Requirements

The following items are required for operation of the smaXtec System:

- a PC/laptop with one of the following operating systems:
  - Windows 7 Home, Professional
  - Windows 8 & Windows 8.1
  - Windows 10
- access to smaXtec Messenger via your browser (Firefox, Google Chrome, etc.)
- magnet (delivered with the smaXtec Base Station)
- applicator for the smaXtec pH Plus Bolus and smaXtec Classic Bolus (inside diameter 35 mm – can be ordered directly from smaXtec).

### 3. Getting started

#### 1. Activation of the devices in the smaXtec wireless network (smaXtec Base Station, smaXtec Repeater)

To start using the smaXtec System follow the steps described in the Quickstart Guide. Start with activation of the smaXtec Base Station and/or the smaXtec Repeater by going to <https://activate.smaxtec.com> or directly in smaXtec Messenger (<https://messenger.smaxtec.com>). Before activation can start you will first need to complete your online registration. Next, mount the smaXtec Base Station and/or the smaXtec Repeater in areas where the cows tend to spend extended periods of time (e.g. milking stations, waiting areas in front of milking stations, feeding stations, etc.). Please see Chapter 6.1 for further information.

#### 2. Installation of the devices in the smaXtec wireless network (smaXtec Base Station, smaXtec Repeater)

Prior to installing the devices, please refer to the instructions in the Quickstart Guide. Mount the smaXtec Base Station and/or one/several smaXtec Repeater(s) in areas where the cows tend to spend extended periods of time (e.g. milking station, waiting areas in front of milking stations, feeding stations, etc.). For further information, please see Chapter 5.1 (smaXtec Base Station) and Chapter 5.2 (smaXtec Repeater).

#### 3.a. Initialisation/calibration of the smaXtec Classic Boluses/smaXtec pH Plus Boluses

Initialise the smaXtec Classic Boluses and/or calibrate the smaXtec pH Plus Boluses using the enclosed Quickstart Guides, which can also be downloaded at [www.smaxtec.com](http://www.smaxtec.com). Please see Chapter 4 or further information.

#### 3.b. Installation of the smaXtec Climate Sensors

Activate the smaXtec Climate Sensor by following the steps described in the Quickstart Guides provided. For further information, please see Chapter 4.2.

#### 4. Read-out of measurement data

Following correct installation of the smaXtec Base Station (and a smaXtec Repeater if required) measurement data is automatically read-out from the sensors when the cows are in range (read-out range is 10- 30 meters/32 – 96 feet).

#### 5. Working with smaXtec Messenger

Start your browser, go to <https://messenger.smaxtec.com> and log in with your email address and password. Before using smaXtec Messenger for the first time you need to register. Please ensure that you enter a valid email address at registration.



## 4. smaXtec Boluses



**Caution:** The Quickstart Guide included with the products provides a brief summary of the most important information and steps regarding initialisation, activation and proper use of smaXtec products. Please ensure you follow these steps carefully in order to make proper use of the smaXtec devices. After successful initialisation, please administer smaXtec Classic Boluses and smaXtec pH Plus Boluses to the animal within a few hours (max. 4 hours).

### 4.1. smaXtec pH Plus Bolus and smaXtec Classic Bolus

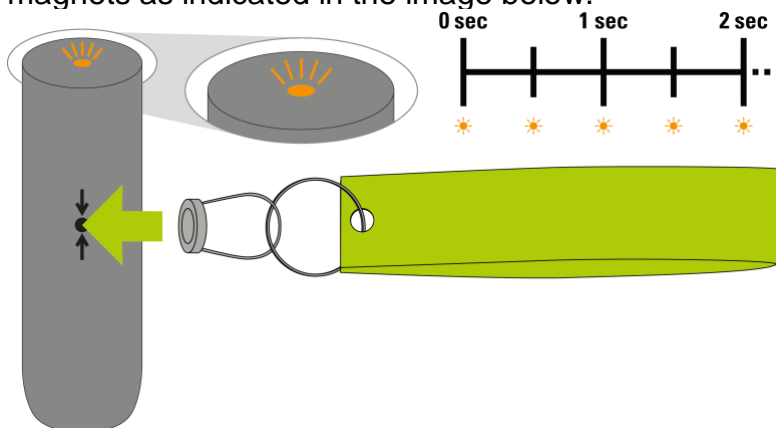
#### 4.1.1. First Steps – smaXtec Classic Bolus

Follow the steps described in the accompanying Quickstart Guide and ensure they are carried out correctly.

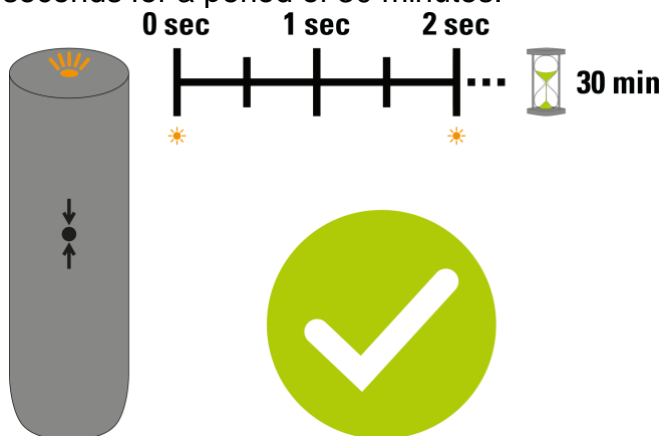
- 1) First, please remove the label from the bottom of the **smaXtec Classic Bolus**.



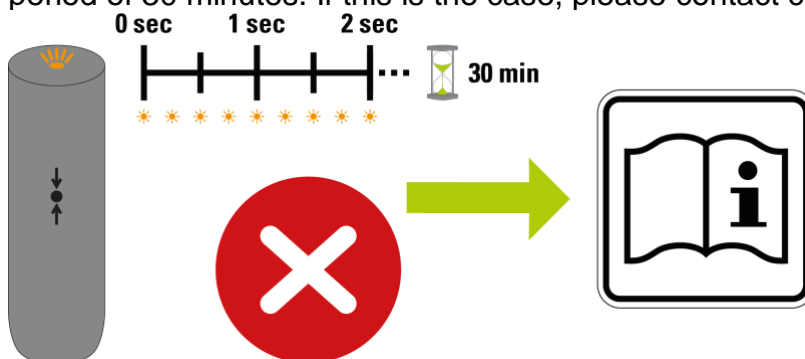
Next, activate the smaXtec Classic Bolus using the magnets provided (with the smaXtec Base Station). If the smaXtec Classic Bolus has been successfully activated, the LED on the bottom of the smaXtec Classic Bolus flashes briefly every 0.5 seconds. Please note the correct positioning of the magnets as indicated in the image below.



- 2) Initialisation of the smaXtec Classic Bolus is carried out automatically. If initialisation has been successfully completed the LED lights up every two seconds for a period of 30 minutes.



- 3) If initialisation fails, the LED flashes very rapidly (every 100 milliseconds) for a period of 30 minutes. If this is the case, please contact customer support.



- 4) After successful initialisation, the smaXtec Classic Bolus can be inserted using the smaXtec Sensor Applicator. Following selection of a suitable animal, the animal identification details should be entered in the list provided next to the serial number of the smaXtec Classic Boluses.
- 5) Activation in **smaXtec Messenger** by clicking on the + symbol on the right of the menu option “Animals”: activation of sensors is required to ensure the sensor is correctly assigned to an organisation in smaXtec Messenger.
- 6) After successful installation of the read-out device the measurement data from the smaXtec pH Plus Bolus can be accessed in smaXtec Messenger within approximately 30 minutes.

### Overview of the different LED displays

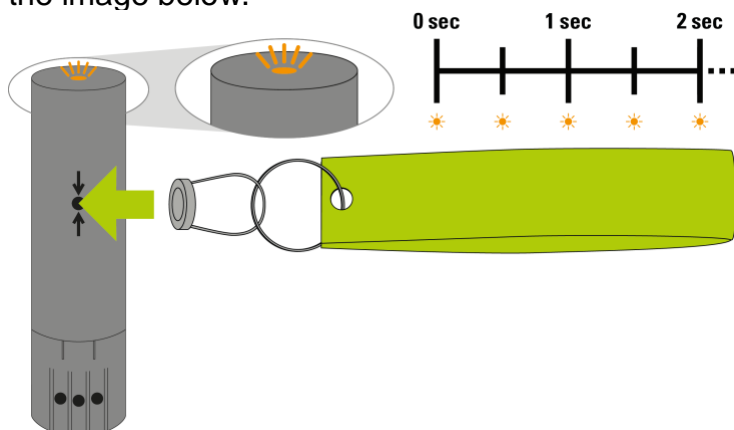
Flashes briefly every 0.5 seconds for 1 minute	Bolus is activated
Flashes every two seconds for 30 minutes	Bolus has been successfully initialised
Flashes very rapidly (every 100ms) for 30 minutes	An error occurred during initialisation

## 4.1.2. First steps – smaXtec pH Plus Bolus

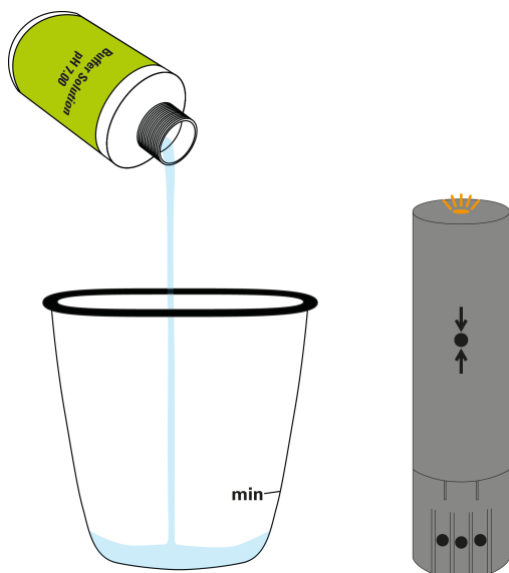
- 1) First, remove the label from the bottom of the **smaXtec pH Plus Bolus**.



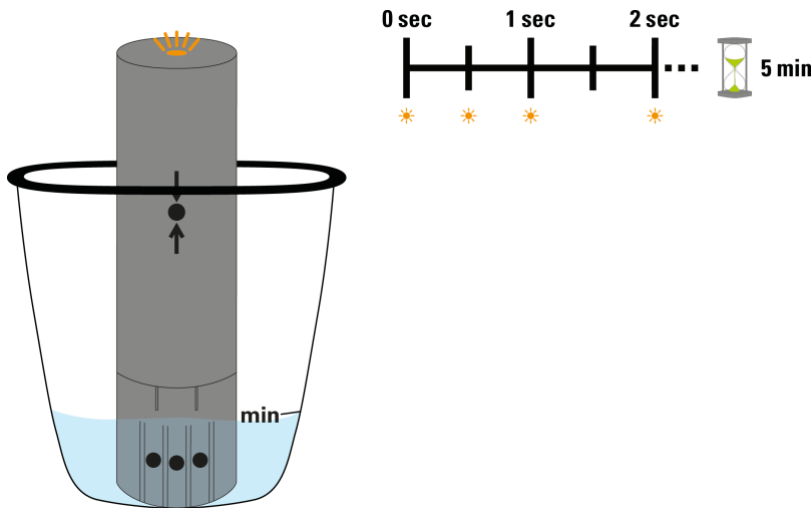
Next, activate the Sensor using the magnets provided (with the smaXtec Base Station). If the smaXtec pH Plus Bolus has been successfully activated, the LED on the bottom of the smaXtec pH Plus Bolus flashes briefly every 0.5 seconds. Please note the correct positioning of the magnets as indicated in the image below.



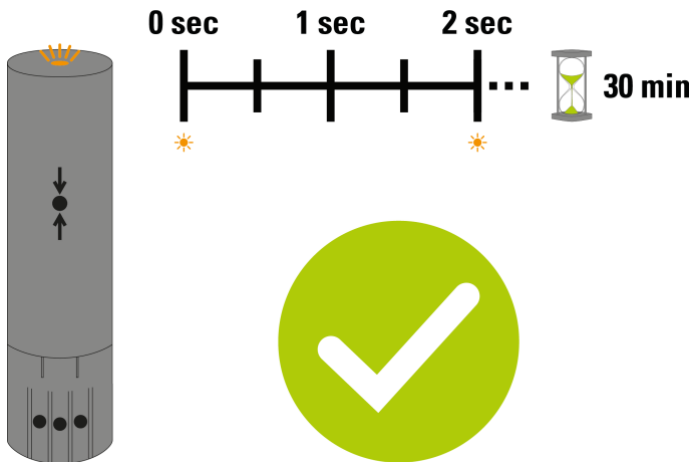
- 2) Pour the buffer solution pH 7.00 into a narrow container (please note minimum filling level) and remove the sponge from the sensor tip.



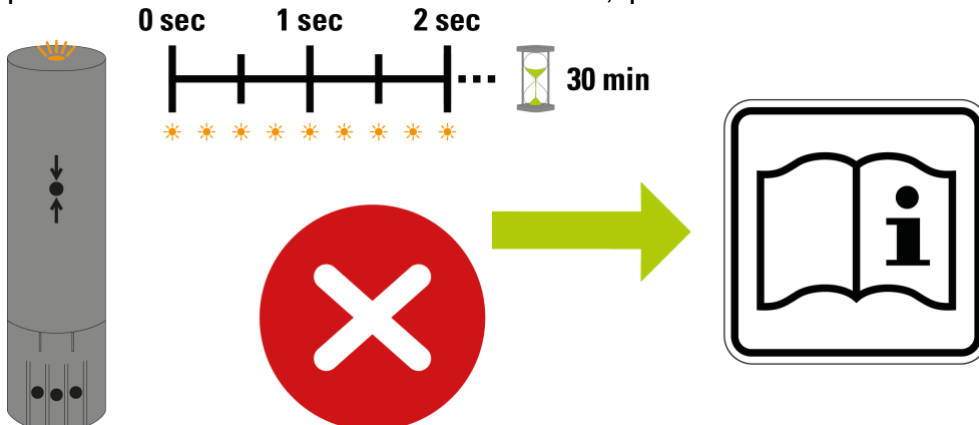
Now place the smaXtec pH Plus Bolus into the container sensor head first and gently shake it. Calibration of the smaXtec pH Plus Bolus takes at least 5 minutes. During this time the LED starts to repeatedly flash three times in succession.



3) If calibration has been successful, the LED flashes every two seconds for a period of 30 minutes.



If calibration fails, the LED flashes very rapidly (every 100 milliseconds) for a period of 30 minutes. If this is the case, please contact customer support.



- 4) After successful initialisation the smaXtec pH Plus Bolus can be inserted using the smaXtec Sensor Applicator. Following selection of a suitable animal, the animal identification details should be entered in the list provided next to the serial number of the smaXtec Sensors.
- 5) Activation in **smaXtec Messenger** by clicking on the + symbol on the right of the menu option “Animals”: activation of sensors is required to ensure the sensor is correctly assigned to an organisation in smaXtec Messenger.
- 6) After successful installation of the read-out device the measurement data from the smaXtec Sensor can be accessed in smaXtec Messenger within approximately 30 minutes.

## Overview of the different LED displays

Flashes briefly every 0.5 seconds for 1 minute	Sensor is activated
Flashes three times every two seconds for about 5 minutes	Initialisation in progress
Flashes every two seconds for 30 minutes	Sensor has been successfully initialised
Flashes very rapidly (every 100ms) for 30 minutes	An error occurred during initialisation

**Important information:** Please note that between calibration and administration the smaXtec pH Plus Bolus must be stored in the buffer solution pH 7.00 provided.

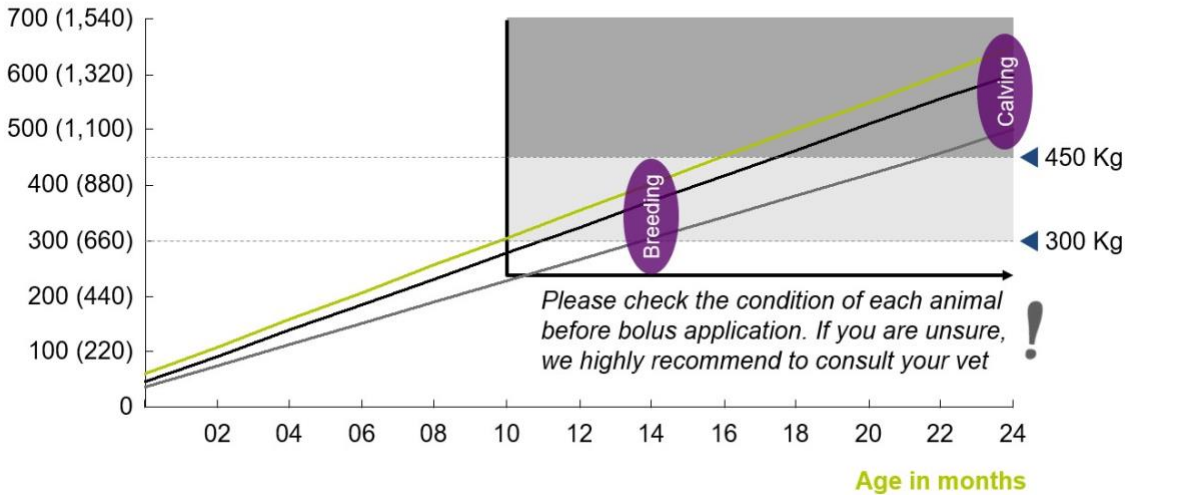
## Notes - Application



**Caution:** The smaXtec pH Plus Bolus and the smaXtec Classic Bolus are exclusively for use in cows. Under no circumstances may they be used for other animals or for humans. The minimum body weight for both sensors is 450 kg when administered by trained staff (approximately 18 months for Holstein cows) and 300 kg when administered under veterinary supervision. This graph gives more information about the age/weight of different breeds:

## Bolus application

**Body weight**  
kg (lbs)



Cows that are to be fitted with a smaXtec pH Plus Bolus or a smaXtec Classic Bolus must have an empty stomach when the sensor is applied. This means that the cow must not have eaten anything for at least 2 hours prior to application.

### Applicator for the smaXtec pH Plus Bolus and the smaXtec Classic Bolus:

The smaXtec pH Plus Bolus or the smaXtec Classic Bolus can be inserted into the animal's maw using an applicator. It is recommended that you use a smaXtec applicator. This can be ordered from your distributor or directly from smaXtec.

### Application Procedure:

#### smaXtec pH Plus Bolus

Position the smaXtec pH Plus Bolus into the applicator with the sensor tip at the head. Insert the smaXtec pH Plus Bolus into the applicator in such a way that sensor tip comes to rest at the far end of the applicator. Please ensure that the push rod of the applicator is kept flat – the push rod should not press directly on the sensor tip. This ensures that the smaXtec pH Plus Bolus is positioned sensor tip first in the cow's stomach.

Sensor shaft





Picture: application procedure

### **smaXtec Classic Bolus**

In contrast to the smaXtec Classic Bolus, the smaXtec Classic Bolus must be positioned with the sensor shaft (the bottom end) at the head of the applicator.



Picture: application procedure

With the cow's head and neck angled in an extended and straightened position you can now administer the smaXtec pH Plus Bolus or the smaXtec Classic Bolus. The front end of the applicator must extend beyond the base of the tongue before the smaXtec pH Plus Bolus or the smaXtec Classic Bolus is released. Please ensure that the cow does not eat anything for at least two hours prior to administration of the sensor. It is preferable to administer the smaXtec pH Plus Bolus or the smaXtec Classic Bolus in the morning before the first feed.



**Warning:** After insertion, the smaXtec pH Plus Bolus or the smaXtec Classic Bolus needs to settle on the floor of the reticulum as quickly as possible. For this reason, it is important to ensure that the fibrous material in the rumen is not too dense, i.e. the cow should not recently have eaten anything. It is therefore of utmost importance that your animal should have an empty stomach when the sensor is administered. Acting in accordance with the user instructions provided by smaXtec will ensure smooth operation of the measurement procedure.



**Note:** There have not been reported any adverse side effects. If you suspect adverse reactions or side effects after the sensors are inserted, do not hesitate to consult with veterinarians or veterinary technicians.



## 4.2. smaXtec Climate Sensor

The smaXtec Climate Sensor is designed to provide continuous measurement of environmental factors such as ambient temperature and humidity levels. This data is wirelessly transmitted to the smaXtec Base Station or a smaXtec Repeater. The number of smaXtec Climate Sensors required depends on the size of the cow shed.





### Scope of delivery

The smaXtec Climate Sensor package contains the following components:

- 1x smaXtec Climate Sensor
- 4x screws and 4x wall plugs for mounting
- 1x Drill template
- 1x Quickstart-Guide

### First Steps

Follow the steps described in the Quickstart Guide provided and please ensure they are carried out correctly.

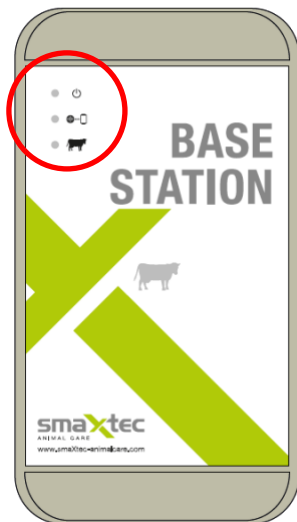
- 1) Activation in **smaXtec Messenger** – menu option “Add device”: It is necessary to activate the device so that the device can be correctly assigned to a user and used in smaXtec Messenger.
- 2) Switch on using the magnet provided (magnet is included in delivery with the smaXtec Base Station):
  - a. Switch on by holding the magnet in front of the On/Off symbol (  )
  - b. Power LED (  ) glows yellow for 1 second
  - c. Connection (takes approx. 1 second) to the smaXtec Base Station/Repeater (wireless network)
  - d. Connection OK (connected to the smaXtec Base Station/Repeater) – LED lights up green for 3 seconds
  - e. Connection NOT OK – LED flashes red 5 times: smaXtec Climate Sensor then automatically switches off → switch on again for new connection attempt

**Note – TO SWITCH OFF:** The smaXtec Climate Sensor can be switched off using the magnet. Simply hold the magnet in front of the On/Off symbol again – LED glows red for 3 seconds.

## 5. smaXtec Read-Out Devices

### 5.1. smaXtec Base Station

The smaXtec Base Station automatically receives the relevant data. The data can be transmitted via the in-house network (Ethernet cable required) or via GSM (technical standard for mobile communications).



#### Scope of delivery

The smaXtec Base Station package contains the following components:

- 1x smaXtec Base Station
- 1x magnet with tag (required for switching the sensors on)
- 1x mains adapter (with 3 m/10 ft cable)
- 4x screws and 4x wall plugs for mounting
- 1x Drill template
- 1x optional GSM antenna
- 1x Quickstart-Guide

Should any of these components be missing or damaged, please contact your smaXtec distributor or smaXtec. Please retain the box and the original packaging materials in case you need to return the product for any reason (e.g. repairs) in the future.

The smaXtec Base Station features the following status LEDs (top left):

#### **Power LED:**

- Indicates if the smaXtec Base Station is on.

#### **Link LED:**

- Indicates the status of the connection to the server.

#### **Data LED:**

- Indicates if data from smaXtec sensors is being read out.

On the right side of the smaXtec Base Station there is a GSM antenna and on the left you will find the socket for the network cable and the power supply. This is where the mains adapter (included in delivery) is connected during installation. The smaXtec Base Station must also be connected to the network via a network cable or an optional GSM antenna used.

**smaXtec Network Cable (not included in delivery scope)**

In locations where the smaXtec Base Station will be exposed to wet conditions or moisture, a special network cable is required for the connection between the smaXtec Base Station and the network socket. This ensures that the network cable remains waterproof and dustproof when plugged in. The cable must comply with norm TIA/EIA-568-B (with regard to length, bending radius etc.).



Image: Network cable (5/10/20 m | 16/32/65 ft)

The network cable can be ordered directly from smaXtec animal care or from your distributor in the following lengths: 5/10/20 m (16/32/65 ft).

**Power Supply – included mains adapter**

The smaXtec Base Station is powered via the mains adapter provided. Only use this mains adapter for installation purposes. At the end of the cable there is a specially designed plug to protect the smaXtec Base Station from water and dust. Connect the mains adapter to the socket on the left-hand side of the smaXtec Base Station and tighten the screw caps. The mains adapter itself does not conform to an IP standard with regard to protection against water, i.e. the mains adapter must not be exposed to rain or moisture.

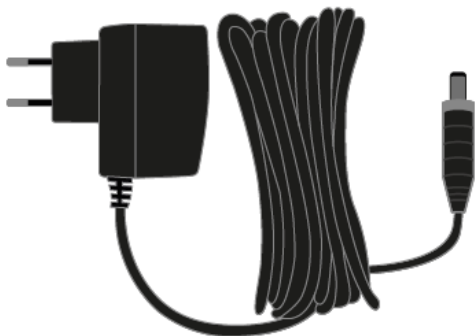


Image: Mains adapter (3 m/10 ft cable)

Specifications of the adapter:

- Manufacturer: SUNNY Computer Technology Europe, s.r.o.
- Input: 100-240 V ~, 0.5 A MAX, 50-60 Hz
- Output: 5 V --- 2.0 A

- Output power: 10 W MAX.

### 5.1.1. Installation and Start Up



**Caution:** Please observe all safety instructions concerning electrical devices and installations.

#### Note:

Following correct installation of the smaXtec Base Station including the smaXtec Repeater as required (see Quickstart Guide and in this Chapter 5.2 in this User Manual), measurement data is automatically read out from the smaXtec Sensors whenever the cows are in range (read-out range is 10 – 30 meters/ 32 - 96 feet).



**Warning:** If the smaXtec Base Station is mounted in the cow shed it is recommended that you use a special network cable to ensure proper functionality in conditions typically found in the cow shed (waterproofness of the smaXtec Base Station). This cable is available from smaXtec or from your distributor in the lengths 5/10/20 m (16/32/65 ft). It is, however, also possible to connect the smaXtec Base Station to your network with a standard network cable if the smaXtec Base Station is not located in the wet area/outdoor area of the cow shed.

The most important steps for successful installation of the smaXtec Base Station are described below:

#### 1. Before mounting the smaXtec Base Station – Activation of the smaXtec Base Station

Activation in **smaXtec Messenger** – menu item “Add devices”: device activation is required so that the device can be correctly assigned to a user and used in smaXtec Messenger.

#### 2. Choose the most suitable location for the smaXtec Base Station

Before mounting the smaXtec Base Station, please select the most suitable location as described in the Quickstart Guide. The following points must be observed and implemented:

- Suitable position: Waiting area, milking area, feeding stations, massage brushes (areas where the cows tend to spend more time)
- Power and Ethernet connection or mobile communications reception required using the optional GSM.
- Power outlet may be up to a maximum of 3 m/10 ft away as the power supply unit / adapter cable provided is 3 m/10 ft long.
- Important for the Ethernet option:
  - Waterproof network cable for the connection to the smaXtec Base Station and the network socket are available from smaXtec or from your distributor in the lengths 5/10/20 m (16/32/65 ft).

- If using a network cable you have installed yourself, please ensure a maximum length of 90 m/295 ft between the smaXtec Base Station and the network socket is not exceeded.
- If using a network cable you have installed yourself, please ensure you only use network cabling with double shielding (SSTP, SFTP)
- Mount at a minimum height of 2 m/6 ft (not within reach of cows)
- Do not mount in a closed storeroom (transmission problems)
- Close to cows (the smaXtec Base Station can read out smaXtec Sensors within a radius of 10 – 30 meters/32 - 96 ft; otherwise a smaXtec Repeater is required)
- Remember to consider locations for a smaXtec Repeater (if planned)
- An unobstructed view enables a greater range for planned smaXtec Repeaters
- Do not expose the smaXtec Base Station and mains adapter to direct sunlight or rain.

### 3. Mounting of the smaXtec Base Station

Please follow the following steps:

- Use the screws and wall plugs provided
- Lift up plastic panel
- Drill mounting holes (use the drill template provided, see Quickstart Guide)
- Wood: screws can be used on their own (2 mm (1/12“) holes can be pre-drilled)
- Walls: use wall plugs (drill a 6 mm (1/4“) hole and insert wall plug)

### 4. Connecting the mains adapter and network cable/GSM antenna

When the smaXtec Base Station has been mounted in accordance with instructions, please connect the mains adapter and the network cable/GSM antenna. Please follow the steps described below:

- To ensure dustproof and waterproof use of the smaXtec Base Station, please use the smaXtec network cable 5/10/20 m (16/32/65 ft).
- Connect the power supply unit provided with the smaXtec Base Station and plug in to a wall socket. If there is no wall socket within 3 m/10 ft then it is best to install a new one to the left of the smaXtec Base Station.
- Please note (applies to network cable and mains adapter cable):
  - It is not permitted to loop cables around the smaXtec Base Station (transmission problems).
  - If possible, the cable should lead to the smaXtec Base Station from above.

### 5. Verification of correct functionality with the help of status LEDs

Following successful completion of all steps, the status of the smaXtec Base Station can be verified with the help of the LEDs. As soon as the mains adapter is plugged in the smaXtec Base Station starts up. Following successful installation, please check the status of the LEDs (connection can take upto 10 minutes):

- smaXtec Base Station has started up: Power LED glows steady green
- connected to the internet: Link LED glows steady green

## The LEDs in detail:

### Power LED:

- Flashing yellow: Starting up
- Glowing green: Started up/OK
- Flashing red/red: Error

### Link LED:

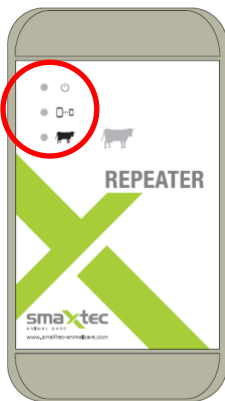
- Flashing yellow: Connecting (depending on use of Ethernet or GSM this can take upto 10 minutes)
- Glowing green: Connected to the internet
- Flashing red/red: No connection to the server (via Ethernet/GSM)

### Data LED:

- Flashing green: Data is being read out from the smaXtec Sensors

## 5.2. *smaXtec Repeater*

In certain configurations we recommend that you use a smaXtec Repeater (to ensure coverage of various areas of the cow shed). This enables an easy and low-cost extension of the smaXtec wireless network and communication with the smaXtec Sensors.



### Scope of Delivery

The smaXtec Repeater packaging contains the following items:

- 1x smaXtec Repeater
- 1x mains adapter (3 m/10 ft cable length)
- 4x screws and 4x wall plugs for mounting
- 1x Drill template
- 1x Quickstart Guide

Should one of these items be missing or damaged, please contact your smaXtec distributor or contact smaXtec directly. Please retain the box and the original packaging material in case you need to return the product for repairs at a later date.

The smaXtec Repeater has the following status LEDs (top left):

 **Power LED:**

- Indicates if the smaXtec Repeater is switched on.

 **Link LED:**

- Indicates the status of the connection in the wireless network (either to another smaXtec Repeater or to the smaXtec Base Station).

 **Data LED:**

- Indicates if data is being read out from smaXtec Sensors.

## Power supply – mains adapter supplied

The smaXtec Repeater is powered by the mains adapter provided. For installation purposes please only use this mains adapter. At the end of the cable there is a specially constructed plug, which protects the smaXtec Repeater from water and dust. Plug the connector into the socket on the left-hand side of the smaXtec Repeater and tighten the screw cap. The mains adapter itself does not conform to an IP standard with regard to protection against water, i.e. the mains adapter must not be exposed to rain or moisture.

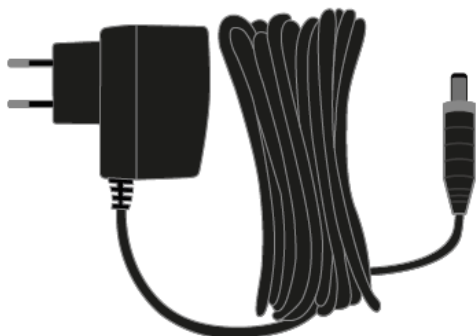


Image: Mains adapter (3 m/10 ft cable)

Specifications of the mains adapter:

- Manufacturer: SUNNY Computer Technology Europe, s.r.o.
- Input: 100-240 V ~, 0.5 A MAX, 50-60 Hz
- Output: 5 V --- 2.0 A
- Output power: 10 W MAX.

### 5.2.1. Installation and Activation



**Caution:** Please observe all safety instructions concerning electrical devices and installations.

#### **Note:**

Following correct installation of the smaXtec Repeater (see Quickstart Guide and Chapter 5.1 in this User Manual), the measurement data are automatically read out from the smaXtec Sensors whenever the cows are within range (read out range is 10 - 30 meters/32 - 96 feet).

The most important steps for successful installation of the smaXtec Repeater are described below:

#### **1. Before installation and activation of the smaXtec Repeater**

Activation in **smaXtec Messenger** – menu item “Add device”: Device activation is required to ensure the device can be correctly assigned to the user and used in smaXtec Messenger.

#### **2. Choose the most suitable location for the smaXtec Repeater**

Before mounting the smaXtec Repeater, please select the most suitable location as described in the Quickstart Guide. The following points must be observed and implemented:

- Suitable position: Waiting area, milking area, feeding stations, massage brushes (areas in which the cows spend longer periods of time)
- Power outlet must be no further than 3 m/10 ft away as the mains adapter cable provided is 3 m/10 ft long.
- Mount at a minimum height of 2 m/6 ft (not within reach of cows)
- Do not mount in a closed storeroom (transmission problems)
- Position close to the cows (the smaXtec Repeater can read out smaXtec Sensors within a radius of 10 - 30 meters/32 - 96 feet)
- An unobstructed view enables greater range for additional smaXtec Repeaters and/or to the smaXtec Base Station
- Do not expose the smaXtec Repeater and the mains adapter to direct sunlight or rain.

#### **3. Mounting of the smaXtec Repeater**

Please follow the steps below:

- Please use the screws and wall plugs provided
- Lift up plastic panel
- Drill mounting holes (please use the drill template provided, see Quickstart Guide)
- Wood: screws are sufficient (pre-drill a 2 mm (1/12“) hole)
- Walls: Use wall plugs (6 mm (1/4“) drill a hole and push in wall plug)



#### 4. Connection to mains adapter

Following proper mounting of the smaXtec Repeater please connect the mains adapter. Please follow the steps below:

- Connect the power supply provided to the smaXtec Repeater and plug in. If there is no plug socket within 3 m/10 ft then it is best to install a new one to the left of the smaXtec Repeater.
- Please note:
  - It is not permitted to loop cables around the smaXtec Repeater (transmission problems).
  - If possible, the cable should lead to the smaXtec Repeater from above

#### 5. Verification of correct functionality with the help of status LEDs

Following successful completion of all steps, the status of the smaXtec Repeater can be verified with the help of the LEDs. As soon as the mains adapter is connected the smaXtec Repeater starts up. Following successful installation, please check the status of the LEDs:

- smaXtec Repeater has started up: Power LED glows steady green
- connected to the smaXtec Base Station: Link LED glows steady green

#### The LEDs in detail:

##### Power LED:

- Glowing green: Started up/OK
- Flashing red/red: Error

##### Link LED:

- Flashing yellow: Connecting
- Glowing green: Connected to the smaXtec Base Station (either direct or via a smaXtec Repeater)
- Flashing red/red: No connection to the smaXtec Base Station (either direct or via other smaXtec Repeaters)

##### Data LED:

- Flashing green: Data being read out from smaXtec Sensors

## 6. smaXtec Software

### 6.1. smaXtec Messenger

Actionable alerts with smaXtec Messenger. Monitoring of data in real-time means that you are kept fully informed at all times about the current health status of your animals. The smaXtec Messenger sends you immediate alerts if there are significant changes in rumen pH, temperature or activity levels. The suggested actions contained in the alert messages enable a rapid and targeted response – for example by adjusting feed quantities or contacting your veterinarian.

The suggested actions and physiological data can be accessed in real-time via PC, tablet or smartphone from the smaXtec server. Where necessary you automatically receive an actionable alert message. You are kept easily updated with all relevant information. This means curves no longer have to be looked at or interpreted.



**Caution:** For display of temperature events, measurement data must be available from over a minimum of 4 days.

#### 6.1.1. Initial Steps

Start your browser, go to <https://messenger.smaxtec.com> and log in with your user name and password. Before using for the first time you need to register and set up an account for your farm. Please use a valid email address.

The most important steps for successful use of **smaXtec Messenger** are described below:

#### 1. Setting up a smaXtec Messenger user account

Start your browser, go to <https://messenger.smaxtec.com> and register with your email address and password. Please use a valid email address at registration.

#### 2. Activating a sensor

Activation in **smaXtec Messenger** – menu item „Animals“: Sensor activation is required to ensure the sensor can be correctly assigned to the user and used in smaXtec Messenger.

#### 3. Activating a device

Activation in **smaXtec Messenger** – menu item “Devices”: Device activation is required to ensure the device can be correctly assigned to the user and used in smaXtec Messenger.

#### 4. Working with smaXtec Messenger

Following successful activation of devices (smaXtec Base Station, Repeater, Sensors) you can manage your cows, view important events and manage alerts.

## Technical Details

### smaXtec pH Plus Bolus:

- Dimensions: 132 x 35 mm (length x diameter)
- Model: US-1042A (for North & South America), SX-1042A (EU & other countries)
- Internal antenna
- Internal Lithium Metal Battery
- Measurement interval: 10 min
- Measurement range (pH): pH 3 - 9
- Measurement range (temperature): 0°C - 80°C/32 – 176°F
- Measurement accuracy (pH): up to day 90 pH  $\pm 0.2$  up to day 150 pH  $\pm 0.4$
- Relative measurement accuracy (temperature at 39°C/102.2°F):  $\pm 0.05^\circ\text{C}/\pm 0.09^\circ\text{F}$
- Measurement resolution (pH): pH 0.01
- Measurement resolution (temperature): 0.01°C/0.018°F
- Activity index: 0 to 100
- Measurement duration pH measurement: 150 days (5 months)
- Battery life (temperature and activity measurement): up to 4 years
- Shelf life from date of manufacture: 18 months
- Guarantee: 50 days
- Internal measurement value memory: 50 days
- Ruminal fluid resistant – materials tested by the German Agricultural Society (Deutsche Landwirtschaftliche Gesellschaft DLG)

### smaXtec Classic Bolus:

- Dimensions: 105 x 35 mm (length x diameter)
- Model: US-1442A (for North & South America); TX-1442A (EU & other countries)
- Internal antenna
- Internal Lithium Metal battery
- Measurement interval: 10 min
- Measurement range: 0 - 50°C/32 - 122°F
- Relative measurement accuracy (at 39°C/102.2°F):  $\pm 0.05^\circ\text{C}/\pm 0.09^\circ\text{F}$
- Activity index: 0 to 100
- Battery life: up to 4 years
- Internal measurement value memory: 50 days
- Ruminal fluid resistant - materials tested by the German Agricultural Society (Deutsche Landwirtschaftliche Gesellschaft DLG)

**smaXtec Climate Sensor:**

- Dimensions: 120 x 90 x 50 mm (L x B x H)
- Model: US-5046 (for North & South America); CS-5046 (EU & other countries)
- Dustproof and waterproof plastic casing (IP 66)
- Internal antenna
- Internal Lithium Metal Battery
- Measurement interval: 10 min
- Measurement range (relative humidity): 0 - 100% RH
- Measurement range (temperature): -40 - +80°C/-40 - +176°F
- Measurement accuracy (temperature; 5 – 60°C/41 – 140°F):  $\pm 0.3$  °C/ $\pm 0.54$ °F
- Measurement accuracy (relative humidity; 20 – 80% RH):  $\pm 2\%$  RH
- Battery life: up to 5 years

**smaXtec Base Station:**

- Dimensions: 200 x 110 x 60 mm (L x B x H)
- Model: US-3046 (for North & South America); BX-3046 (EU & other countries)
- Dustproof and waterproof plastic casing (IP 66)
- Antenna for communication with smaXtec Sensors (max. distance 10-30 m/32-96 ft)
- Antenna for communication with smaXtec Repeater (max. distance between read-out stations 100 m/328 ft)
- Device available with GSM/without GSM
- Ethernet socket: for internet connection
- Supplied mains adapter: 100-240V, 2A
- Easy to mount on a wall or wooden post etc.

**smaXtec Repeater:**

- Dimensions: 160 x 90 x 50 mm (L x B x H)
- Model: US-4046 (for North & South America); RX-4046 (EU & other countries)
- Dustproof and waterproof plastic casing (IP 66)
- Antenna for communication with smaXtec Sensors (max. distance 10-30 m/32-96 ft)
- Antenna for communication with smaXtec Base Station/Repeater (max. distance between read-out stations 100 m/328 ft)
- Supplied mains adapter: 100-240V, 2A
- Easy to mount on a wall or wooden post etc.