

Membrane Monitoring System

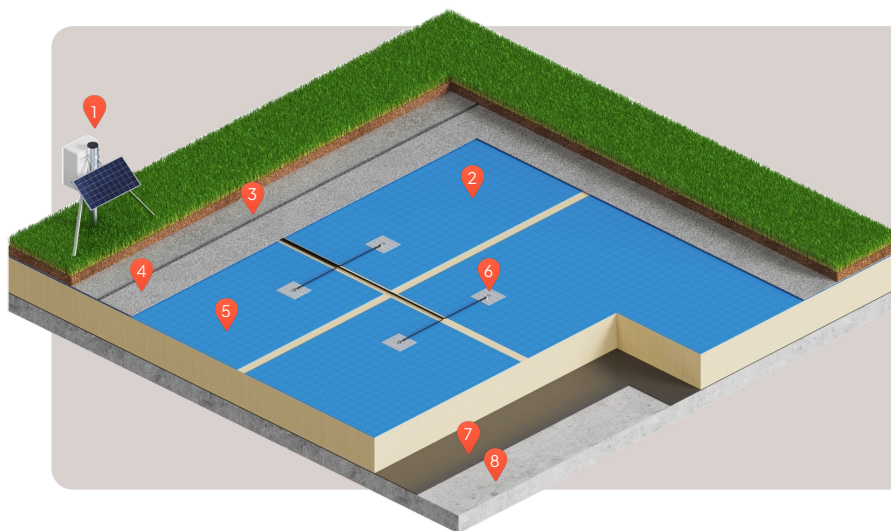
# smartex® mx-al

# smartex® mx-al

Ideal for flat roofs, green roofs and solar roofs

## Summary

smartex® mx-al is an innovative monitoring system for monitoring waterproofing membranes in building construction. In this system, the existing aluminium lamination of the thermal insulation is used as the contact layer and combined with a counter electrode above the waterproofing membrane. In this way, the waterproofing is monitored segment by segment and in real time. In the event of a leak, the system immediately reports the damage to the building operator - even before water can spread through the roof structure.



1. ProGeo® measuring unit (Solar variant)
2. Segment-by-segment location of the leak
3. Counter electrode
4. Membrane
5. Thermal insulation (aluminium-laminated)
6. smartex® connection sets
7. Vapor barrier
8. Building construction

## Features



### Leak localization

smartex® mx-al ensures reliable safety by monitoring clearly defined segments and detecting leaks at segment level. This enables targeted repairs and saves costs.



### Full surface monitoring

The smartex® mx systems measure the integrity of the waterproofing by means of the sensors and the contact layer over the entire surface. The full-surface functionality is a considerable added value compared to conventional humidity sensors.



### Real-time capable

Due to the tightly timed measurement intervals and the direct connection to the measuring unit, the data is transmitted to the monitoring portal in real time.



### Direct monitoring of the waterproofing

The smartex® mx measurement method does not measure the moisture in the roof structure, but the integrity of the waterproofing.



### Immediate leakage detection

Direct monitoring of the waterproofing guarantees immediate detection of leaks. The process therefore allows leaks to be detected before the water spreads through the structure and causes damage.



### Physical proof of tightness

Compared to conventional manual tightness testing methods or moisture measurements, a full-surface physical test of the waterproofing is carried out in wet conditions.

## System Description

smartex® mx-al is a microcontroller-controlled monitoring system for the **real-time monitoring** of waterproofing. With smartex® mx-al, the waterproofing is monitored segment by segment. Leaks that occur are immediately detected and localized by segment.

In this system, the **upper aluminium lamination** of the thermal insulation serves as the contact layer. Segmentation is carried out by removing the aluminium lamination in strips on the upper side of the insulation. In conjunction with counter electrodes on the waterproofing, each segment can be connected to the pre-assembled collector line via a ready-to-connect set with an integrated connection cable and evaluated by a measuring unit in conjunction with our **internet-based database server**.

If there is a leak in the waterproofing, a **compensating current** flows from the counter electrodes on the waterproofing over the wet surface of the waterproofing and the leak to the contact layer below the waterproofing, leading to a measurable **change in the electrical potential distribution**. Based on these changes, the **leakage event is detected** and the leakage position is calculated.

The monitoring system works with a connection to our internet-based **monitoring portal**. The data measured on site is automatically stored and evaluated there on a project-by-project basis. Furthermore, the user has access to a convenient user interface via any Internet-enabled PC. This includes automatic **alerting** in the event of an alarm with indication of the calculated leakage position, as well as in the event of faults by e-mail and/or SMS to any recipient that can be specified, **alarm management**, the display of detected **leakage events** in tabular form and as a pinpoint **representation in the supervisory plan**, the evaluation of the data as time series and location-based distributions, user and rights management and many other useful features. The connection to an existing **building management system** on site is possible.

With smartex® mx-al, the level of information about the moisture protection of the building is significantly improved. The early detection and automatic location of leaks can avoid **expensive substance losses** and make an important contribution to achieving **sustainability goals**. With smartex® mx-al, builders can be sure that their building is efficiently protected and that potential damage is detected in good time.

## Data transmission and power supply

### Power supply of the measuring unit



The power supply is via a 230V connection, battery or PV with a backup battery.

### Internet connection of the measuring unit



The measuring unit is supplied with Internet via WLAN, LAN or mobile communications.

### Offline systems



In exceptional cases, the ProGeo® systems can also be delivered in an offline mode.

## Web-based monitoring portal

-  **Alarm status**  
Check active alarms and control the condition of your roof reliably and precisely.
-  **Data analysis and visualization**  
Analyze moisture development over time series and precisely identify critical moisture penetration with clear heat maps.
-  **Documentation**  
Document all processes around the monitored object.



Suitable areas of application

Roof structures

- As an alternative to the smartex® mx-PEEL system for a metallic surface of the thermal insulation
- For electrically non-conductive waterproofing materials
- Thermal insulation with a non-metallic surface

Alternatives for other roof structures

- For thermal insulation without a metallic surface, the smartex® mx-PEEL system is used.
- For bonded and welded waterproofing membranes, the smartex® mx-va system is used

Roof use

- Flat roofs
- Green roofs
- PV roofs
- Retention roofs
- Intensively used roof area, e.g. for data centers

Other areas of application

- Floor plates
- Bridges

References – A selection of over 4000 projects



**Louvre Conservation Centre, Liévin (France)**  
The Louvre Conservation Centre in Liévin, which opened in 2019 and was designed by Rogers Stirk Harbour + Partners, is a pioneering facility for the conservation and study of the Louvre's artworks. A smartex® mx real-time monitoring system monitors the entire roof surface to ensure the safety of the collection.

- 15.450 m²
- Green roof



**Staatsbibliothek zu Berlin**  
The Senate Department for Urban Development and the Office for Architecture and Building History rely on ProGeo®: smartex® monitors the 5.270 m² roof area of the Staatsbibliothek zu Berlin.

- 5.270 m²
- Flat roof

| Object                      | DESCRIPTION                                               | AREA     | YEAR |
|-----------------------------|-----------------------------------------------------------|----------|------|
| Immeuble Victoire (FRA)     | Renovation of an office and hotel building in Paris       | 580 m²   | 2024 |
| Feuerwehrwache München      | Full-surface monitoring of the parking deck roof          | 2.000 m² | 2024 |
| University Pittsburgh (USA) | Recreation and Wellness Center                            | 3.300 m² | 2024 |
| TSO / BSO Waiblingen        | Operations and technical site of Deutsche Bahn            | 1.100 m² | 2024 |
| YTR Bus Garage              | Bus depot of York Region Transit                          | 600 m²   | 2024 |
| Logistikhalle Oberkrämer    | New construction of a logistics hall                      | 660 m²   | 2024 |
| AHS Memphis, USA            | Alliance Crisis Center for Wellbeing                      | 700 m²   | 2024 |
| BRK Wiesentheid             | Laboratory and office building for the Bavarian Red Cross | 700 m²   | 2024 |

## System Component

### Connection set



The smartex® connection set made of 1 mm galvanized sheet steel as a nail plate with 8 mm nail depth with pre-assembled LI2Y 1.5 mm<sup>2</sup> connection cables in the required length to the collector line or measuring unit in black PE insulation.

|                             |                          |
|-----------------------------|--------------------------|
| Dimensions                  | 60x100 mm                |
| Sheet thickness             | 1 mm                     |
| Nail depth                  | 8 mm                     |
| Material                    | Galvanized steel sheet   |
| Supply cable                | LI2Y 1,5 mm <sup>2</sup> |
| Max. length of supply cable | 50 m                     |
| Fastening                   | Adhesive tape            |
| Dimensions                  | 60x100 mm                |

### Measuring Unit

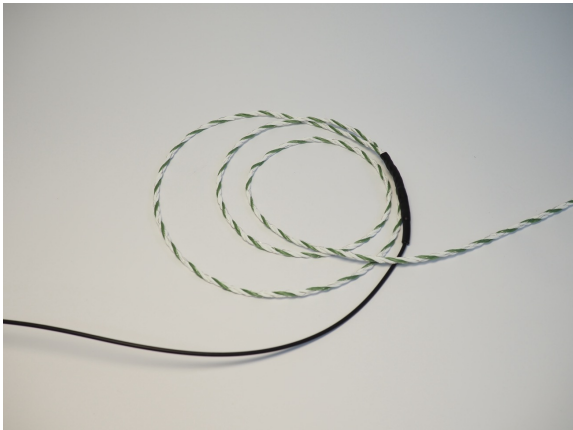


The smartex® - microBOX plus is a measurement unit designed for the automatic, program-controlled execution of measurements for smartex® monitoring systems. The data can be transferred for analysis to the ProGeo Monitoring Portal or—depending on the specific system type—can also be analyzed locally. The device is housed in an IP65-rated plastic enclosure. WLAN, LAN, or LTE data modules are available as interfaces. The 8 built-in measurement inputs can be expanded in modules of 16 measurement inputs each. The following technical specifications apply:

|                          |                    |
|--------------------------|--------------------|
| Operating Voltage        | 5V DC              |
| Max. Current consumption | 1A                 |
| Electrode outputs        | 1                  |
| Output Voltage           | 12V                |
| Electrode Inputs         | 8 (+n x 16)        |
| Input Voltage Range      | 0 - 10V DC         |
| Input Impedance          | 100k Ohm           |
| Interfaces               | WLAN, LAN, LTE     |
| Dimensions               | 250 x 180 x 110 mm |

System Component

Counter electrode



The smartex® counter electrodes are used to imprint the signal potential. At least one counter electrode is required per roof surface. In the case of larger contiguous roof areas, one counter electrode per 500 m² must be provided.

|                                      |                                           |
|--------------------------------------|-------------------------------------------|
| Number of stainless steel conductors | 6 (stranded stainless steel-plastic wire) |
| Breaking load                        | 350 kg                                    |
| Diameter                             | 6 mm                                      |
| Resistance                           | 3,87 Ω/m                                  |
| Conductor                            | 0,20 mm                                   |
| Supply line                          | Stranded wire 1.5 mm²                     |
| Sheath material of supply line       | Polyethylene (PE)                         |
| Max. length of supply line           | 500 m                                     |



**ProGeo**

Monitoring Systeme und Services GmbH & Co. KG  
Hauptstraße 2 | DE-14979 Großbeeren

**Contact**

Phone: +49 33701 22-0 | Fax: +49 33701 22-119

Email: [progeo@progeo.com](mailto:progeo@progeo.com) | Web: [www.progeo.com](http://www.progeo.com)