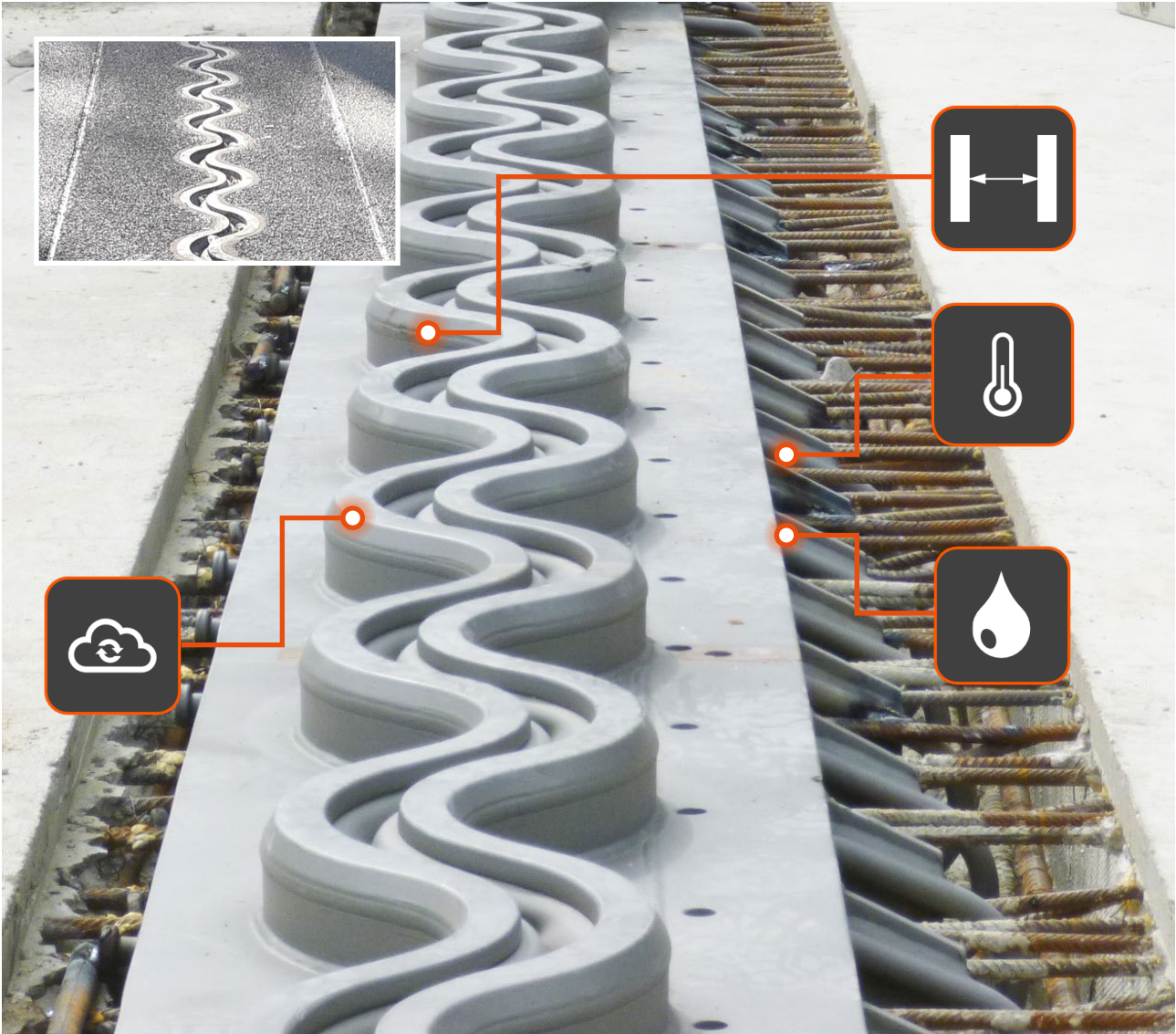







# MAURER Infrastructure Monitoring System JointSense



JointSense is an energy self-sufficient multi-sensor system for continuous monitoring of expansion joints as well as expansion joints near the end of their service life. Data from the monitoring system can be used to identify

necessary maintenance or replacement procedures with a reduction in onsite inspections. Therefore traffic restrictions are reduced to a minimum.

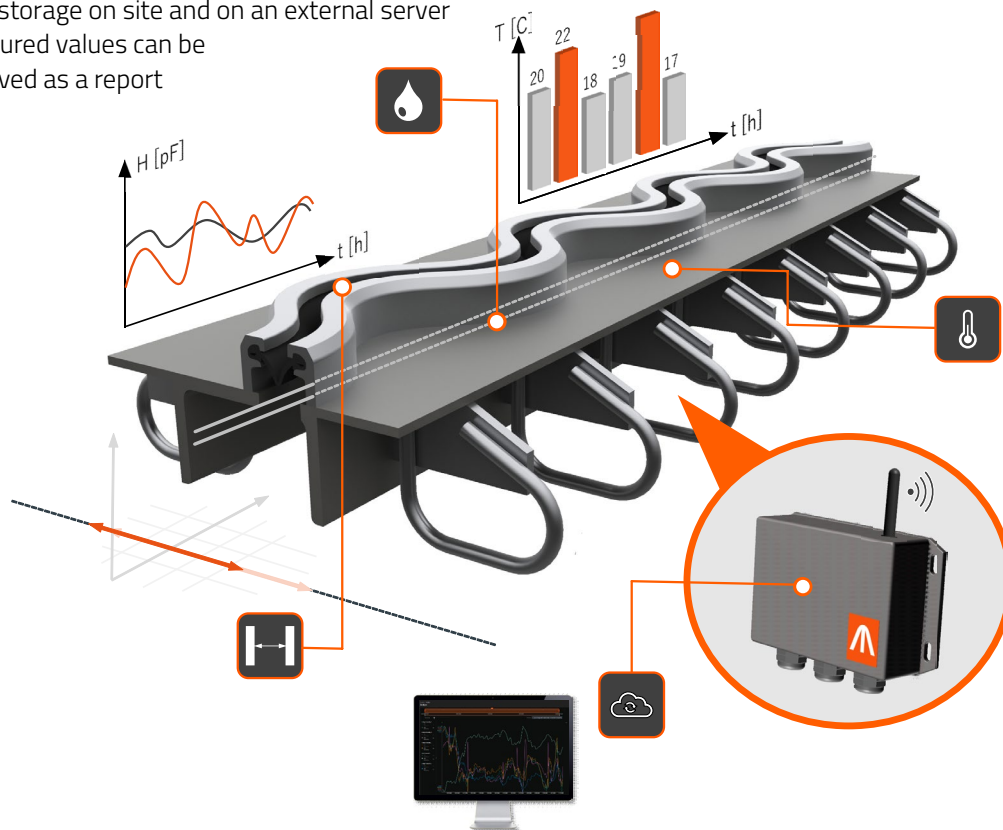
## Multi-Sensor System

	<b>Expansion joint</b>	
	<b>Moisture</b>	Detection of moisture
	<b>Movement</b>	Measures the structural gap
	<b>Temperature</b>	Measures the concrete temperature at the centre of the joint
	<b>Data management</b>	Energy self-sufficient acquisition and transmission of measured data with optional cloud connection



## Characteristics

- Very simple installation
- Continuous monitoring of all sensors with limit value triggers for structural gap and moisture
- Immediate notification when limit values are exceeded
- Variable transmission interval of one to four hours
- Battery operation with a service life of four years
- Remote monitoring with personal login
- Data storage on site and on an external server
- Measured values can be retrieved as a report



## Field of application

The JointSense system can be used with new bridge structures and rehabilitation of all types of expansion joints – modular expansion joints, finger joints, mat expansion joints, single-seal expansion joints, etc.

With single-seal or other small expansion joints, installation is usually only possible in new bridge construction since access below the joints is often limited.

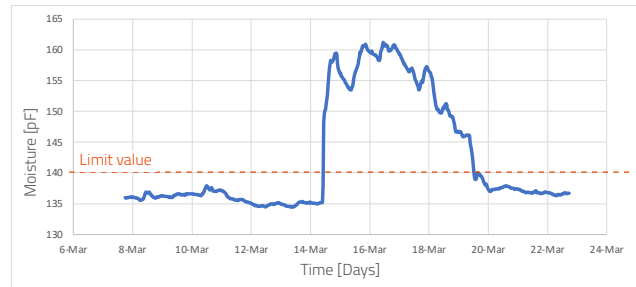
## Advantages

- Service life extension of the expansion joints
- Prevention of additional damage at the expansion joint and the structure
- Continuous condition monitoring
- Improved traffic safety
- Better planning capability of required rehabilitation measures
- No external power supply necessary
- Robust, extensively tested and field-proven system

## Moisture sensor

The moisture sensor consists of two sensor cables – see blue cables in the picture. These are fixed to the concrete below the expansion joint over the entire bridge width at

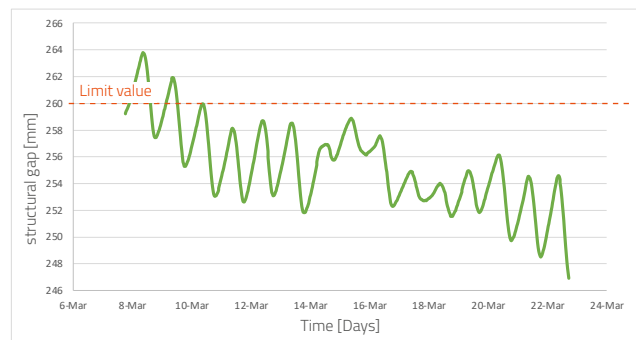
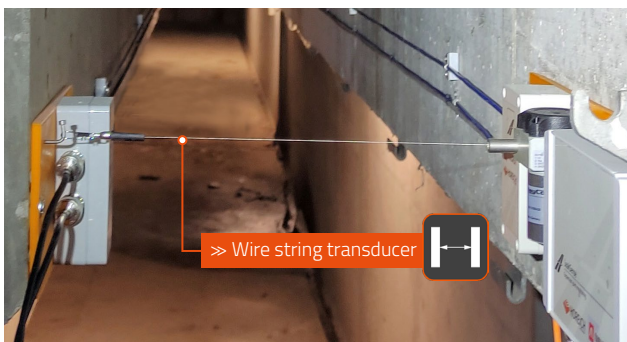
both sides of the expansion joint. In this way, any change in humidity at the structure surface below the expansion joint is reliably recorded.



## Displacement sensor

The structural gap between bridge deck and bridge abutment or between two superstructure units is recorded by a displacement sensor. Relevant information such

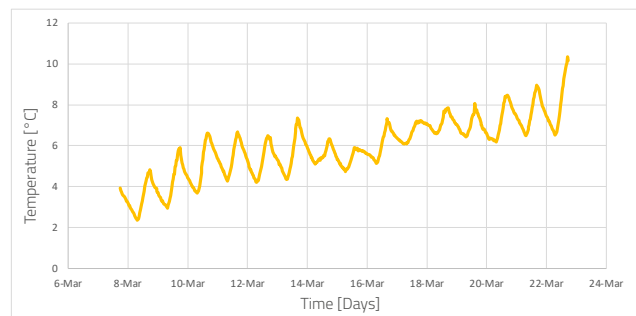
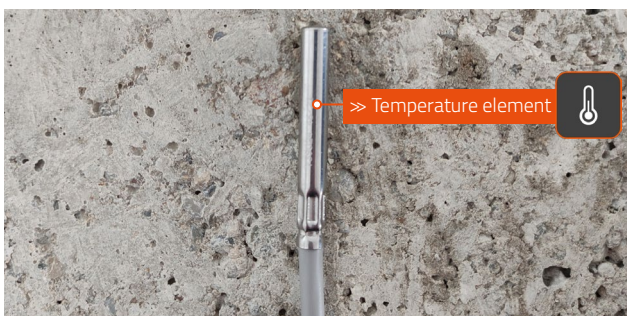
as the maximum and minimum movements, unequal movements at the abutments or a locked up bridge are thus immediately detected.



## Temperature sensor

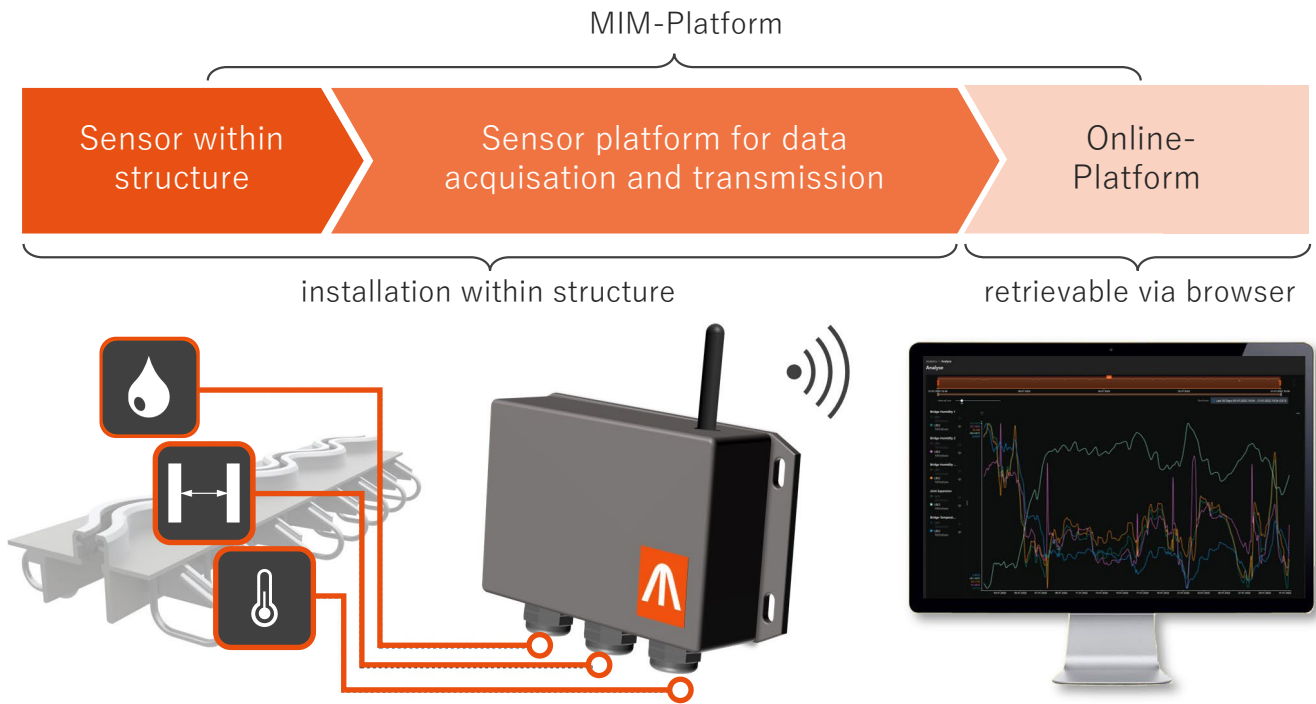
Temperature is recorded using a high-precision sensor installed in direct contact with the structure below the expansion joint at the center of the bridge. Other posi-

tions of the sensor are optional. Recording temperature is fundamentally important for assessing the condition of the structure.



## Data management with online MIM-Plattform & optional cloud

The basis for the JointSense system is the MAURER Infrastructure Monitoring Platform (MIM Platform), through which data collection is scheduled, recorded, filtered, displayed and archived.



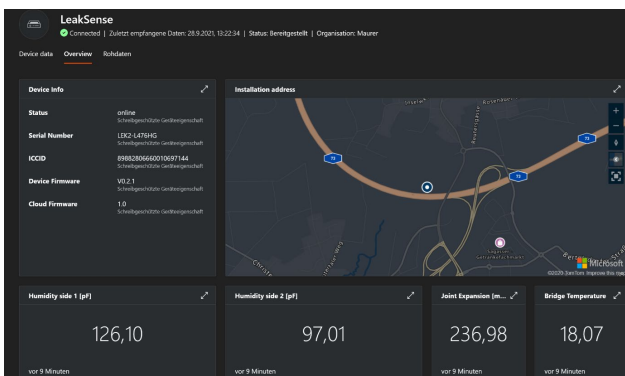
## Real time data retrieval

- Moisture measurements below the expansion joint with limit value warning via email
- Movement measurements to monitor the structural gap and record the largest structural movement
- Temperature measurement of the structure at the abutment
- Monthly report via email

## Reference

### Lauterbach Bridge in Coburg, Germany

Monitoring of an expansion joint in need of rehabilitation in close coordination with the Autobahndirektion Südbayern (motorway authority of Southern Bavaria).



## Specification, suggested tender text

### Specification position 00

Design, configuration, manufacture and supply of MAURER Infrastructure Monitoring JointSense (or equivalent) system at one expansion joint location.

Basic equipment and characteristics:

- Capacitive moisture measurement with +/-0.1 pF accuracy in the immediate vicinity of the measurement set-up below the expansion joint over the bridge width.
- Determination of the project-related limit values taking into account the relative moisture on the structure. Determination of the limit value for moisture one to two months following commissioning.
- Movement measurement of the bridge deck in the abutment in the longitudinal direction of the bridge with +/- 1 mm accuracy.
- Temperature measurement of the structural concrete (not air temperature) at the centre of the expansion joint with +/- 0.5°C accuracy.
- Data transmission interval at once least every four hours.
- Independent energy system without external power supply.
- Self-monitoring fault diagnosis (watchdog) and error message via email.
- On site data storage; if the system has no cloud access, data can only be extracted locally and manually via USB interface in CSV format.
- System must not hinder the bridge deck to movement.
- The maximum available space has to be agreed with the structural engineer. It is necessary that the device is accessible for maintenance/exchange/battery replacement.
- Attachment is made with dowel or bolted connections to the structure.
- Easy to read instruction manual.
- The housing and all connections are designed to a minimum of protection class IP67.
- Emails notifications for moisture and movement data that exceed limit values.
- Automatically generated monthly report on humidity, movement and temperature data in graphic representation.

A functionality test including online presentation of the data must be performed during commissioning and a report must be issued to the operator accordingly. In case of manual data retrieval, the report must also be transmitted to the operator.

### Specification position 01

*Option – data management and cloud storage in a cloud for a period of two years for each bridge structure*

The collected data is automatically stored in a cloud designated for this purpose for a period of two years and can be retrieved again at any time. Upon request, data storage on the cloud should be offered beyond the initial two year period.

### Specification position 02

*Option – surveillance of several monitoring systems*

Data management must be made centrally for one or several structures and can be displayed on a dashboard if a cloud connection is used. The various structures can be managed centrally on a dashboard or in a cloud.

### Specification position 03

*Option installation*

Complete installation and functionality test of the system on an abutment taking local conditions into account.