

IoT Standalone Sensor LTE Cat M1, NB-IoT, GPRS, GPS, BLE and accelerometer



Main features

- Mobile network LTE Cat M1, NB-IoT & GPRS
- Integrated with Links Field's SoftSIM
- Integration with *cloud* via MQTT
- Integration with the [TagoIO](#) platform
- BLE connection for provisioning via **Khonnnectable** app (available on [Play Store](#) and [App Store](#))
- A relay drive
- Support for extensions

- GPS with internal antenna and connector for use of external antenna
- Two RJ11 ports for connection to 1-Wire devices or dry contact sensors*

* *Event or counter mode at dry contact input.*

Overview

ITS 402 is Khomp's IoT Endpoint designed to integrate sensors of different magnitudes with your IoT solution and can be set in locations without network infrastructure. Data read by sensors connected to the Endpoint, is sent to the integrator's cloud via the LTE Cat M1 mobile network, NB-IoT or GPRS. With multiple ITS 402 Endpoints, your application can monitor a wide area, such as a metropolitan region or rural areas that have a signal from these mobile networks.

Allows the development of complete solutions for temperature monitoring of environments, as well as port opening verification (if it is connected with a contact sensor). It is the ideal device for applications in industries, laboratory clinics and agribusiness, with monitoring points that are isolated or distant from each other, where it is necessary to use the mobile network to send the data.

It counts with resources to increase the guarantee in the transmission of the data read by the sensors, and has an internal battery for contingency in case of power interruption, and can store approximately 72 hours of data if there is an outage in the mobile data network.

The ITS 402 also features a relay that can be used, for example, when a preset temperature value is detected, to trigger a connected device. With this relay, ITS 402 not only monitors, but also remotely triggers and controls applications.

It supports Links Fields' SoftSIM technology, allowing the user to choose between using a physical SIM card or a SoftSIM.

Model

ITS 402 is available in the following form:

Model	Description
ITS 402	IoT Standalone LTE Cat M1, NB-IoT, GPRS, SoftSIM, accelerometer, BLE, GPS, 2 ports and 1 Basic Indoor Relay

Using BLE allows the user to use the application **Khonnactable** (available on [Play Store](#) and [App Store](#)) to make the first settings of the device, as well as monitor the status of the sensors and connection.

SIM card setup

SIM card operability is an extremely important point for the correct functioning of the ITS line endpoints, not only on the issue of network quality and stability, but also regarding the data plan associated with the chip and its correct configuration in the system.

Network quality is a very particular characteristic of the operator (vendor) and the location where the ITS is installed. As an example, it is common to encounter situations where ITS works more stably with "carrier 1" and less stable with "carrier 2". Knowing this information, it is up to the system administrator to verify and validate the SIM card, even before the project activation.

You must correctly specify the "APN", "user", and "password" associated with the SIM card. The vendor of the SIM card you purchased must indicate the SIM card's application type, the type of network or data plan, the region, and other information on the SIM card.

Khomp has tested and approved the SIM cards noted below. When used, they must be configured according to the table:

Vendor	Model	APN	User	Password
Linksfild	M2M	lf.br	lf	lf
Arqia	IoT GO	m2m.arqia.br	arqia	arqia
Arqia	IoT Connect	iot4u.br	arqia	arqia
Arqia	Move	iot4u.br	arqia	arqia
Vivo	4G	zap.vivo.com.br	vivo	vivo
NLT *	SIM Card M2M/IoT Tripla Corte	nlt.com.br	nlt	nlt

* Homologated SIM cards based on firmware version **1.1.0.1**

Due to the great diversity of SIM card models available in the market, it is extremely important that the system administrator where the ITS is deployed confirms with the chip supplier, whether the information in the table can be used by the purchased SIM card or not. Setting the wrong APN can cause the ITS to not be operational / accessible via the mobile data network or to access it slower than it should, compromising system performance.



- There is no guarantee that ITS will work correctly when integrated with the standard SIM card of 4G mobile phone operators.
- Contact our Commercial team to get a compatible SIM card.

The APNs previously configured in ITS are merely examples. Delete this information (if they are not useful) and configure the information of the SIM cards installed in the ITS.

Technical Specifications

Modem

- Band frequencies:
 - **Cat M1 (LTE-FDD)**
 - B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B27/B28/B66/B85
 - **NB-IoT (LTE-FDD)**
 - B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B28/B66/B71/B85
 - **EGPRS**
 - 850/900/1800/1900 MHz
 - Transfer rates (**maximum**):
 - **Cat M1**
 - 588 Kbps (Down), 1119 Kbps (Up)
 - **NB-IoT**
 - 127 Kbps (Down), 158.5 Kbps (Up)
 - **NB-IoT 1**
 - 32 Kbps (Down), 70 Kbps (Up)
 - **EDGE**
 - 296 Kbps (Down), 236.8 Kbps (Up)
 - **GPRS**
 - 107 Kbps (Down), 85.6 Kbps (Up)
 - SIM card size: Nano-SIM (4FF)
 - Integrated with the SoftSIM in Links Field

Antennas

- 1 x universal omni-directional antenna LTE/GPRS
 - Gain: 5 dBi
 - Impedance: 50 Ohms
 - Maximum power: 50 W
 - Polarization: vertical
 - VSWR: 1.5:1
- 1 x antenna GPS internal
 - Precision: 10 m
- 1 x [antena GPS externa](#) (opcional)**
 - Accuracy: 17 m

Battery

- Lithium-Polymer (LiPO), 1500 mAh*

Warranties and certifications

- Complete warranty (legal + Khomp): 1 year
 - Legal warranty: 90 days
 - Khomp warranty: 9 months
- Industry certified ISO 9001

* The batteries need to be charged at least once every 4 months.

** Optional items incur additional costs at purchase.

Bluetooth Low Energy

- Version: 5.1
- Power: 4 dBm
- Maximum distance (approximate): 10 m
- **Communication**
 - Communication with server via MQTT (Message Queuing Telemetry Transport):
 - TLS version 1.2
- **Monitoring Period**
 - Sensors: minimum 60 seconds and maximum 3600 seconds.
 - GPS: minimum 60 seconds and maximum 3600 seconds
- **Physical/Environmental**
 - Internal installation (indoor)
 - 1 x Latch relay 250 VAC, 2 A
 - 2 x RJ11 1-Wire and dry contact
 - 1 x USB Micro-B (for power feed)
 - 1 x 16 pin side connector (for sensor extension provided by Khomp)
 - 1 x Connector for using the external GPS antenna
 - Front button to restore factory settings, restart or shutdown the device
 - LED BLE Connection
 - LED Network and connection with server
 - LED Mobile Network Signal Level
 - LED Sensor reading failure
 - LED Battery status
 - Wall Mounting Bracket
 - Operating Temperature: 14 °F to 140 °F
 - Operating humidity: 0–90% (not condensed)
 - Product dimensions (WxHxL):
 - without antenna: 103x78x45 mm
 - with antenna: 150x78x45 mm
 - Packaging dimensions (WxHxL): 187x113x72 mm
 - Gross weight: 285 g
 - Net weight: 150 g

- This equipment is not entitled to protection against harmful interference and may not cause interference in duly authorized systems.
- This product is not suitable for use in domestic environments, as it may cause electromagnetic interference, forcing the user to take measures to minimize such interference.

External GPS Antenna (optional)

The ITS 402 can be used in association with [External GPS Antenna](#)** (available from Khomp).

The external antenna provides improved reception of satellite navigation signals on equipment with SMA connection:

- Trackers
- Endpoints

** *Optional items incur additional costs at purchase.*

Main Features

- Accuracy: 17 m
- Central frequency: 1575,42 MHz; $\pm 1,023$ MHz
- Bandwidth: 10 MHz
- Impedance: 50 ohm
- V.S.W.R (Voltage Standing Wave Ratio): $\leq 1,5$
- Gain: 4,5 dBi, LNA of 28 dBm
- Polarization: RHCP (right-hand side circular)
- Connector: SMA
- Degree of protection: IP66 (resistant to powerful jets of water or dust)
- Operating temperature: -40 °C to +80 °C
- Dimensions (LxWxH): 38,3x35x13,5 mm
- Fastening: adhesive tape
- Cable length: 300 cm

External GPS Antenna image



IoT Modular Extensions

The ITS 402 has integration with the [IoT Modular Extensions](#) from Khomp, extending the number of applications for the device. The ITS-compatible extensions are listed below:

- [EM C104](#) → Extender for use of 4-20 mA sensors.
- [EM R102](#) → Relay and dry contact extender.
- [EM S104](#) → Extender for soil moisture and temperature monitoring.
- [EM W104](#) → Extender for reading weather sensors for environment monitoring.

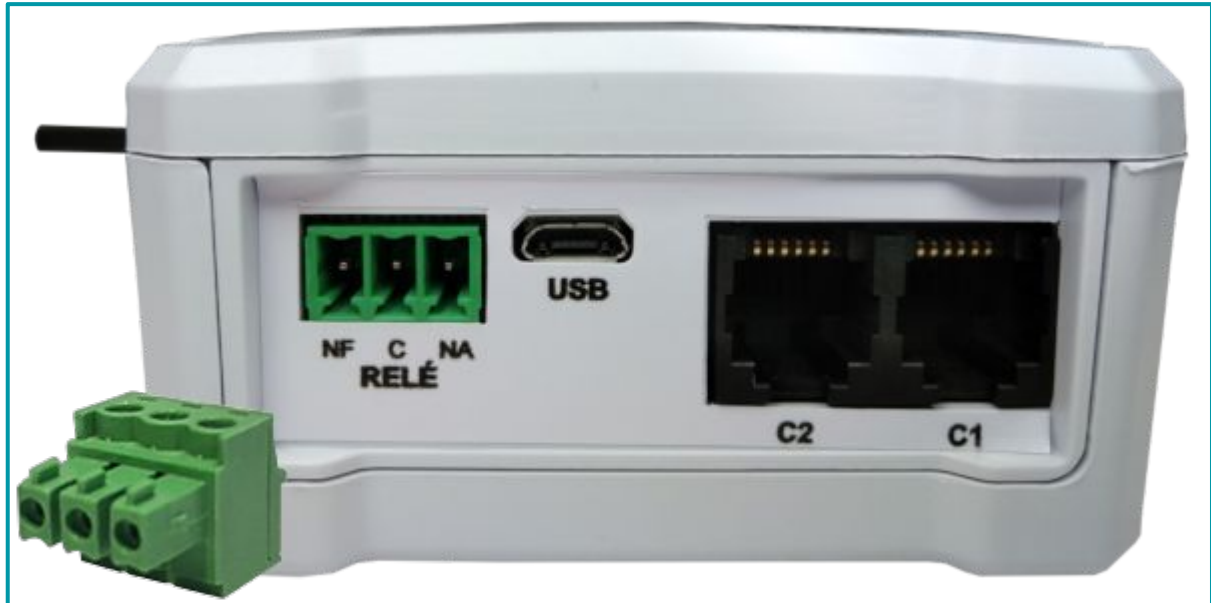


Caption: Modular extensions EM C104 and EM R102, connected in ITS 402.



Caption: Ports view of the modular extensions EM C104 and EM R102, connected in ITS 402.

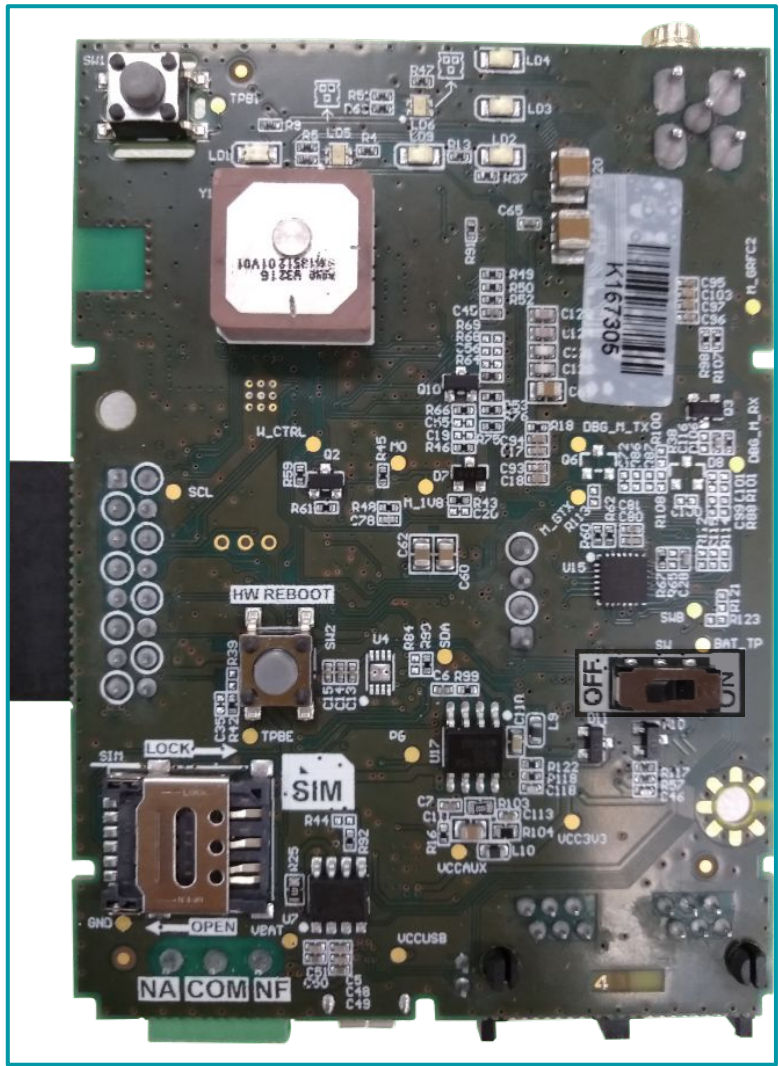
Product images



Caption: *View of side connectors.*



Caption: *Side view of the ITS 402.*



Caption: ITS 402 internal plate.



Caption: The modular extension connection is observed [EM THW 200](#) on the side of the ITS to measure temperature, humidity, brightness and noise. The ITS 402 sends the data to the cloud/MQTT server via the indoor GSM antenna.



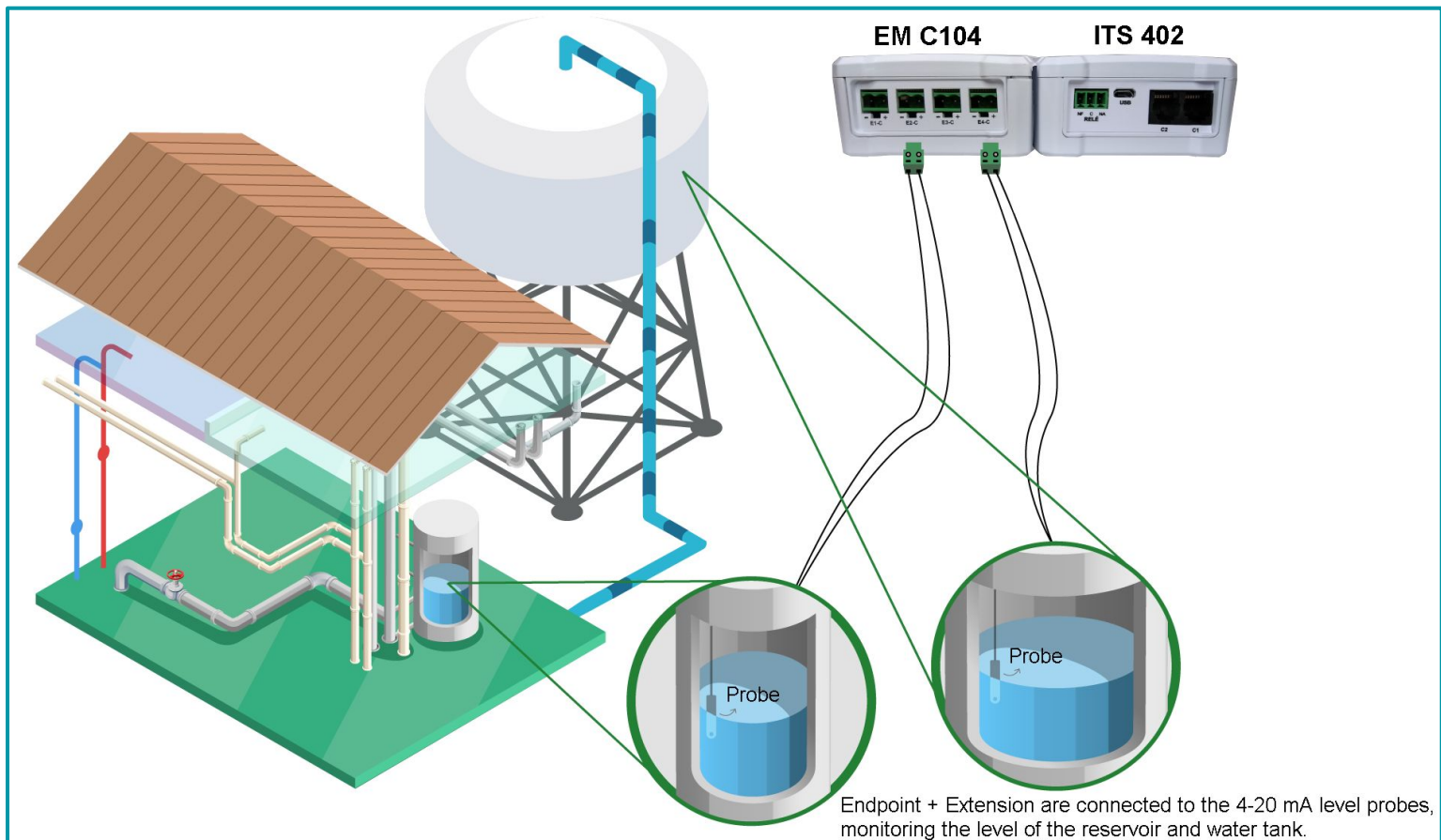
Caption: In the image beside, you can see the connection site of the modular extension. [EM THW 100](#) (Khomp product) on the side of the ITS to check temperature and humidity, via 1-Wire. The ITS 402 sends the data to the cloud/MQTT server via the indoor GSM antenna.

The image below indicates an example of the products already connected.



Application with the EM C104

In this example, ITS 402 is associated in the modular extension [EM C104](#), where the [Liquid for sensor level](#) (of 4–20 mA) allow you to check the water levels in the water tank and the reservoir.



Caption: The image above indicates the application model for monitoring the water tank and the water reservoir.

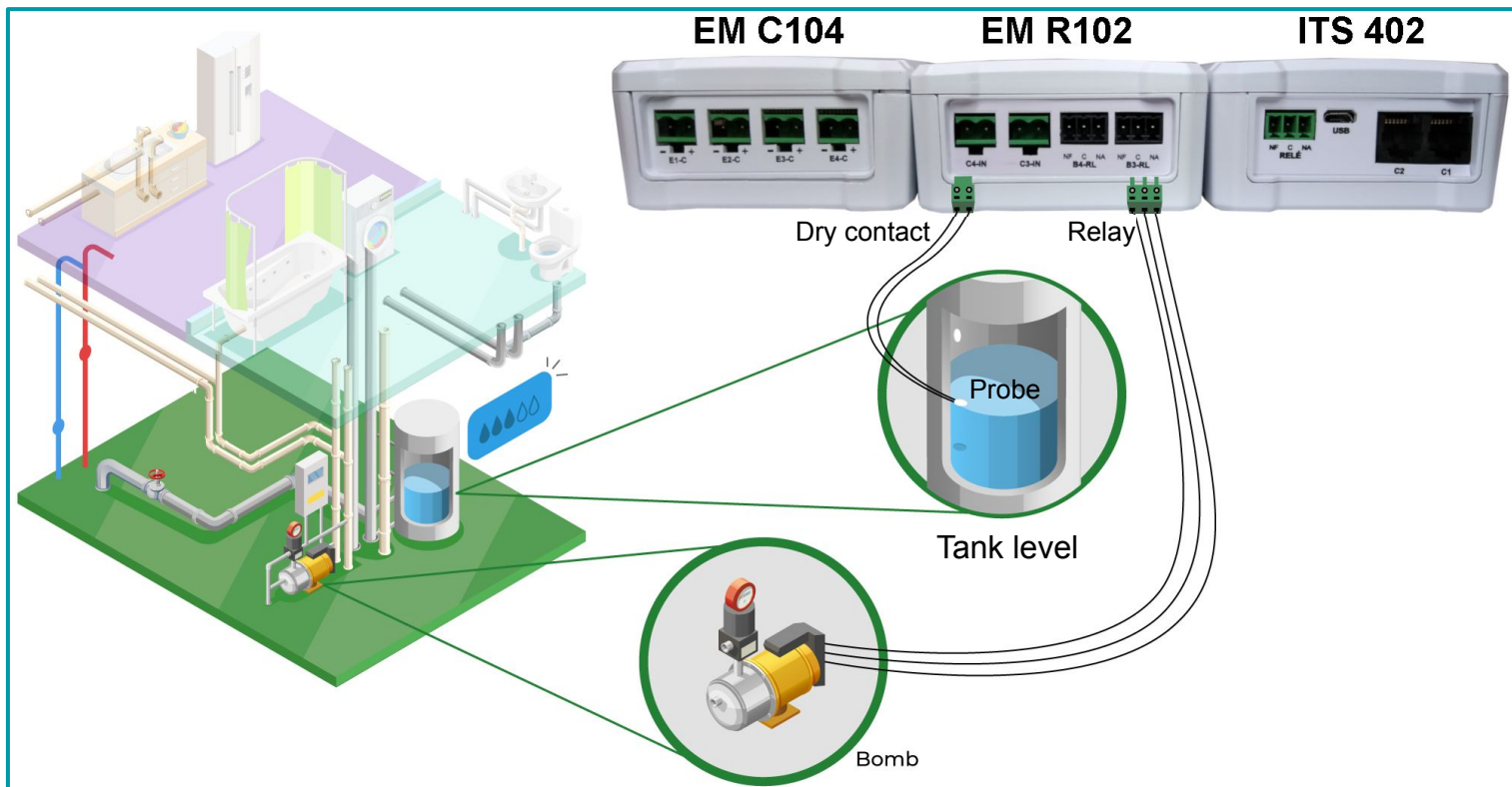
Beside, you can see the actual set of products (ITS 402 is integrated in the modular extension EM C104, connecting to the Liquid Level Sensor).

The image below indicates the location for connecting the power supply.



Application with EM R102 + EM C104

Example of ITS 402 being applied in conjunction with modular extensions [EM C104](#) and [EM R102](#), where the dry contact sensor lets you know when the water reservoir reaches a certain level, allowing one of the relays in the MS R102 to be triggered remotely to start the pump that controls the reservoir supply.



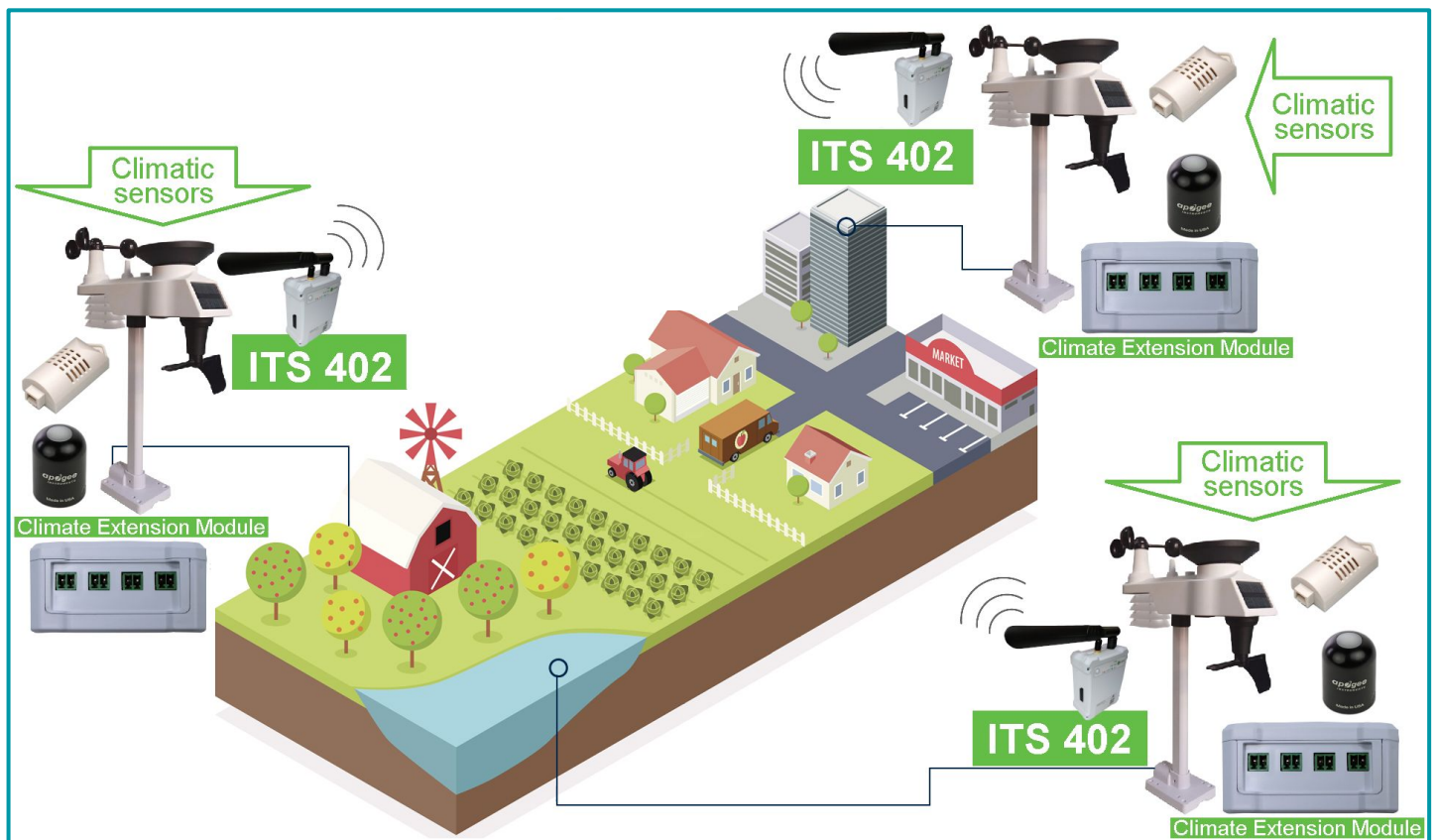
Caption: The image above indicates the application model for tank level monitoring.



Caption: The image above shows the actual product set (ITS 402 is integrated into the R102 EM modular extension). The picture beside indicates the side of the modular extension EM R102, where there is the connector for system expansion and the place for connection of the power supply.

Application with the EM S104

Application in agribusiness of ITS 402 with the modular extension [EM W104](#), allowing environment monitoring.



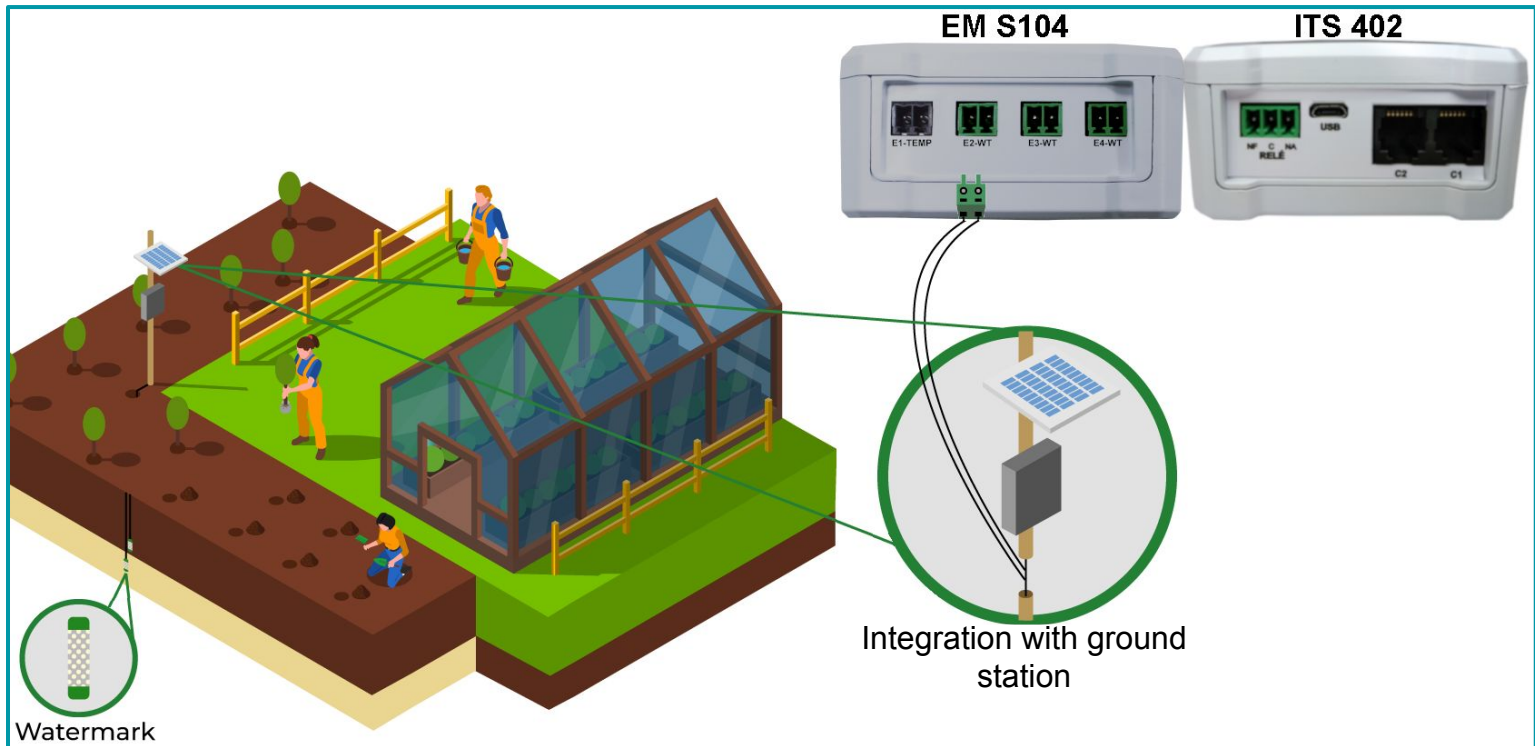
Caption: The image indicates the application model for monitoring the weather conditions in the shopping center, warehouse and lake.



Caption: The ITS 402 is integrated in the EM W104 modular extension.

Application with the EM S104

Applying ITS 402 with modular extension in agribusiness [EM S104](#), allowing the monitoring of soil temperature and humidity.



Caption: The image indicates the application model for soil moisture and temperature monitoring.

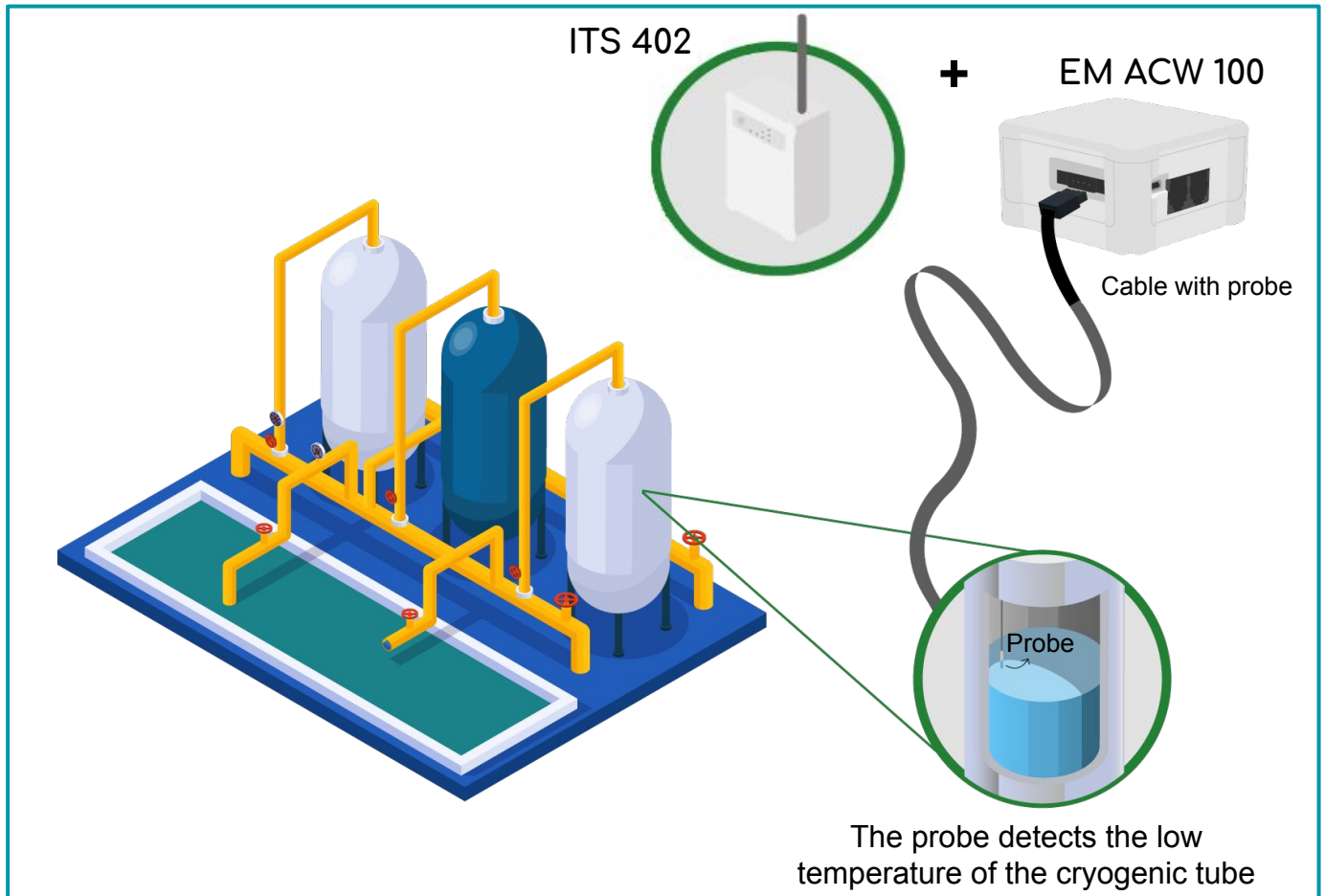


Caption: In this image, you can see the actual product set (ITS 402 is integrated in the EM S104 modular extension).

Application with high-precision temperature extender

[EM ACW 100](#) is a modular extension with a high-precision analog temperature probe converter.

The following is an example of the application of the extension associated with ITS 402, exemplifying use in high temperature industrial environments.



Caption: The image above indicates the application model for monitoring the temperature in a cryogenic tube.



Caption: In the image, we see the image of the associated ITS in the modular extension EM ACW 100.

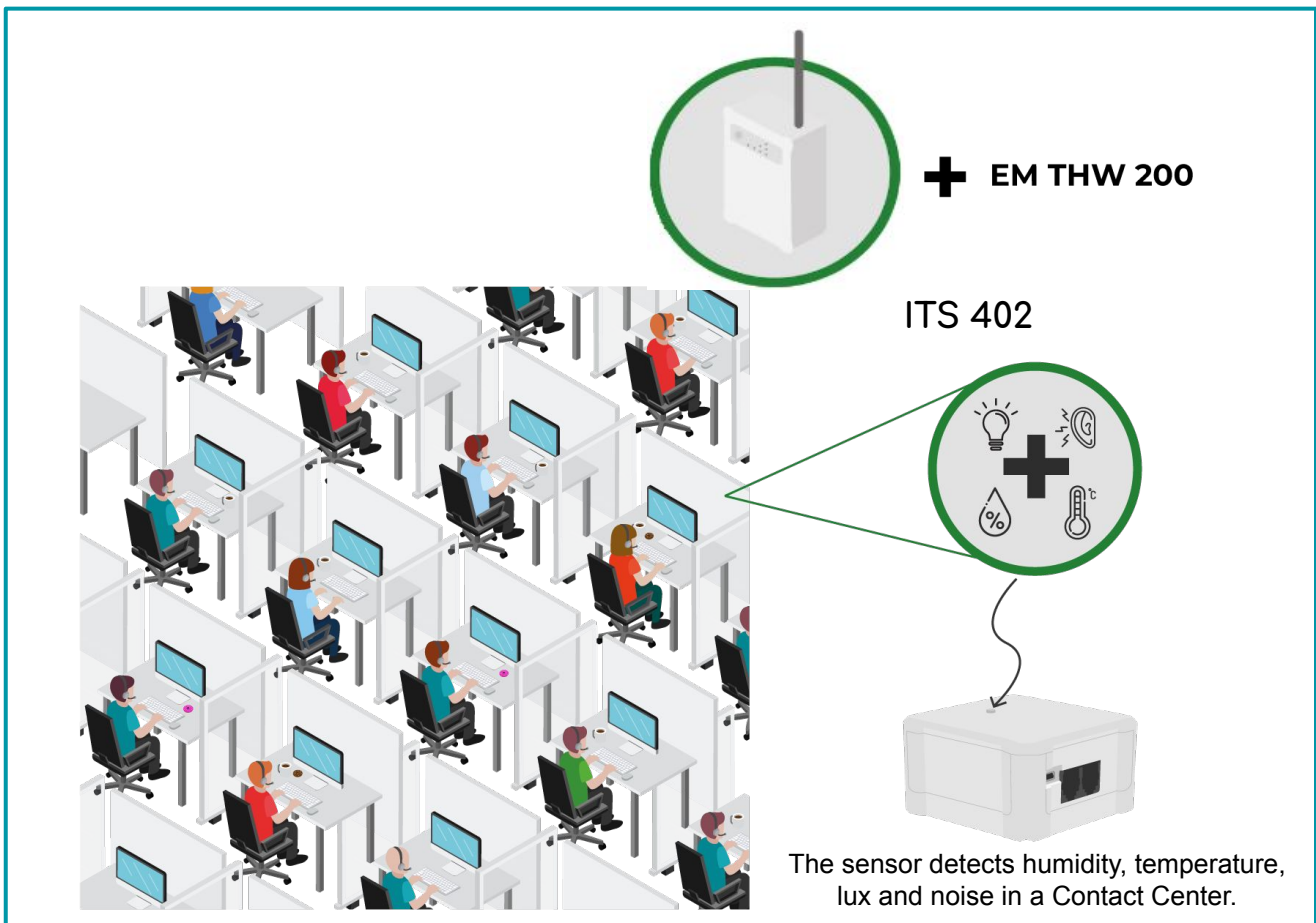
Application with moisture, luminosity, noise and temperature extender

The modular extension [EM THW 200](#) has temperature, moisture, luminosity, and noise sensors. The [EM THW 201](#) model has the same sensors, plus a high-precision analog temperature probe converter.

In this application, we can have the association of ITS 402 with the modular extension EM THW 200 in corporate environments and association with EM THW 201 for industrial environments.

Application example of ITS 402 with the modular extension EM THW 200 (call center environment)

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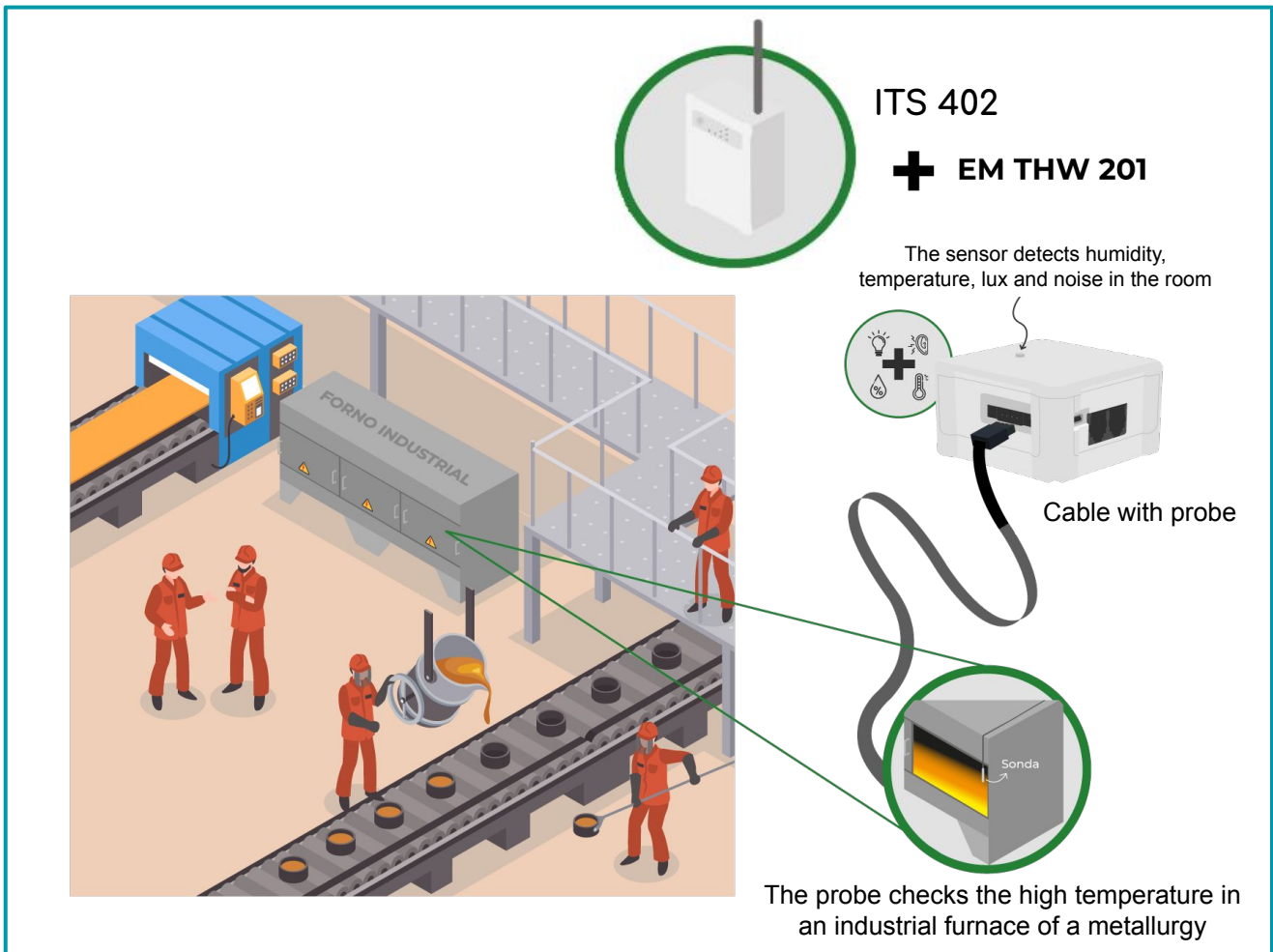


Caption: The image above indicates the application model for monitoring moisture, temperature, and noise in a Contact Center



Caption: In the image, we see the ITS associated with the modular extension EM THW 200.

ITS 402 application example with the modular extension: [EM THW 201](#) (industrial environment).



Caption: The image above indicates the application model for moisture, temperature and noise monitoring in a metal industry.



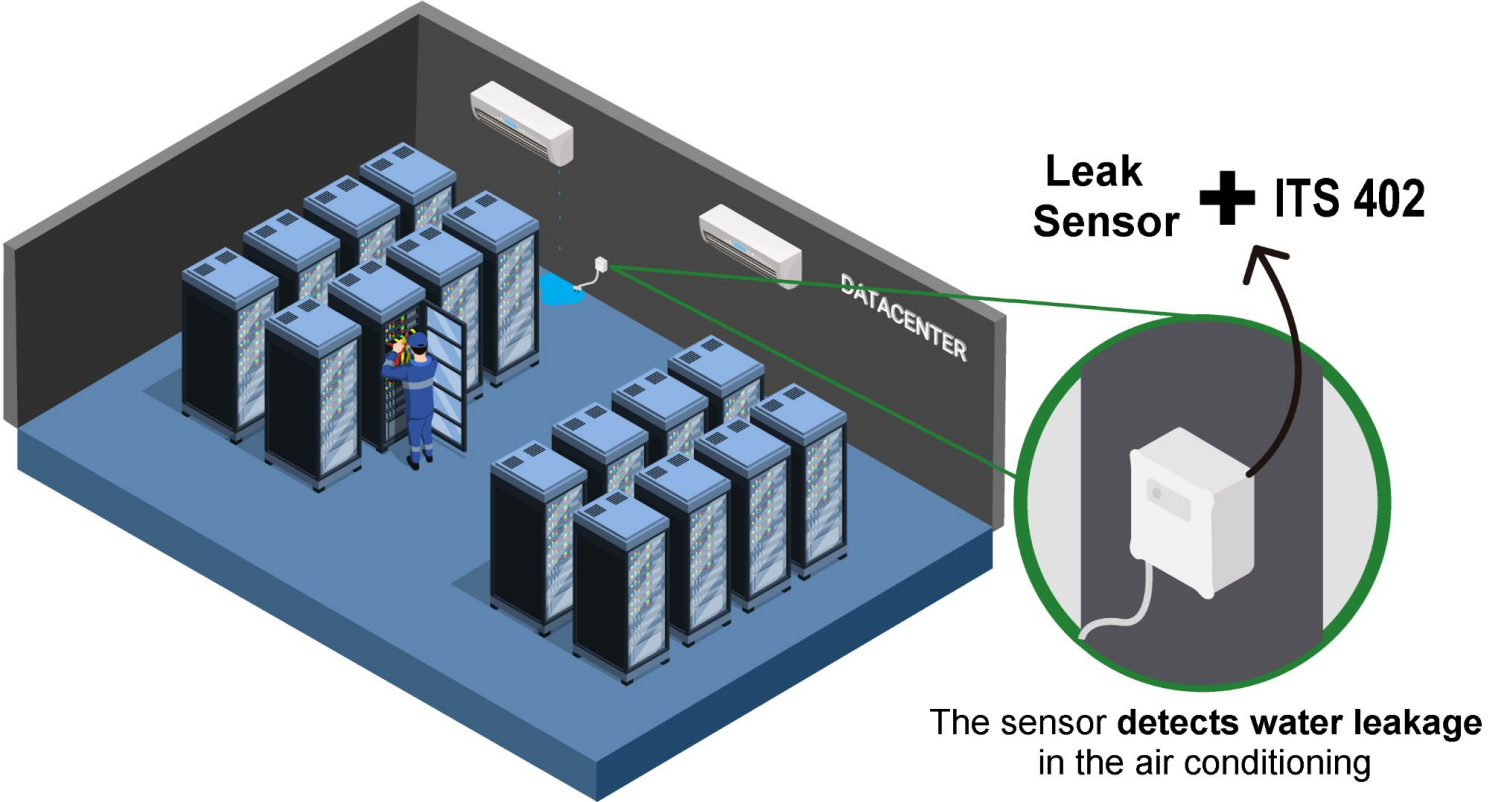
Caption: In the image, we see the ITS associated with the THW 201 EM modular extension..

Single point liquid sensor application

In this application model, the ITS 402 is used with the [single point liquid sensor](#), to check for leaks in the datacenter.

KWS 2001

Leak sensor for liquids



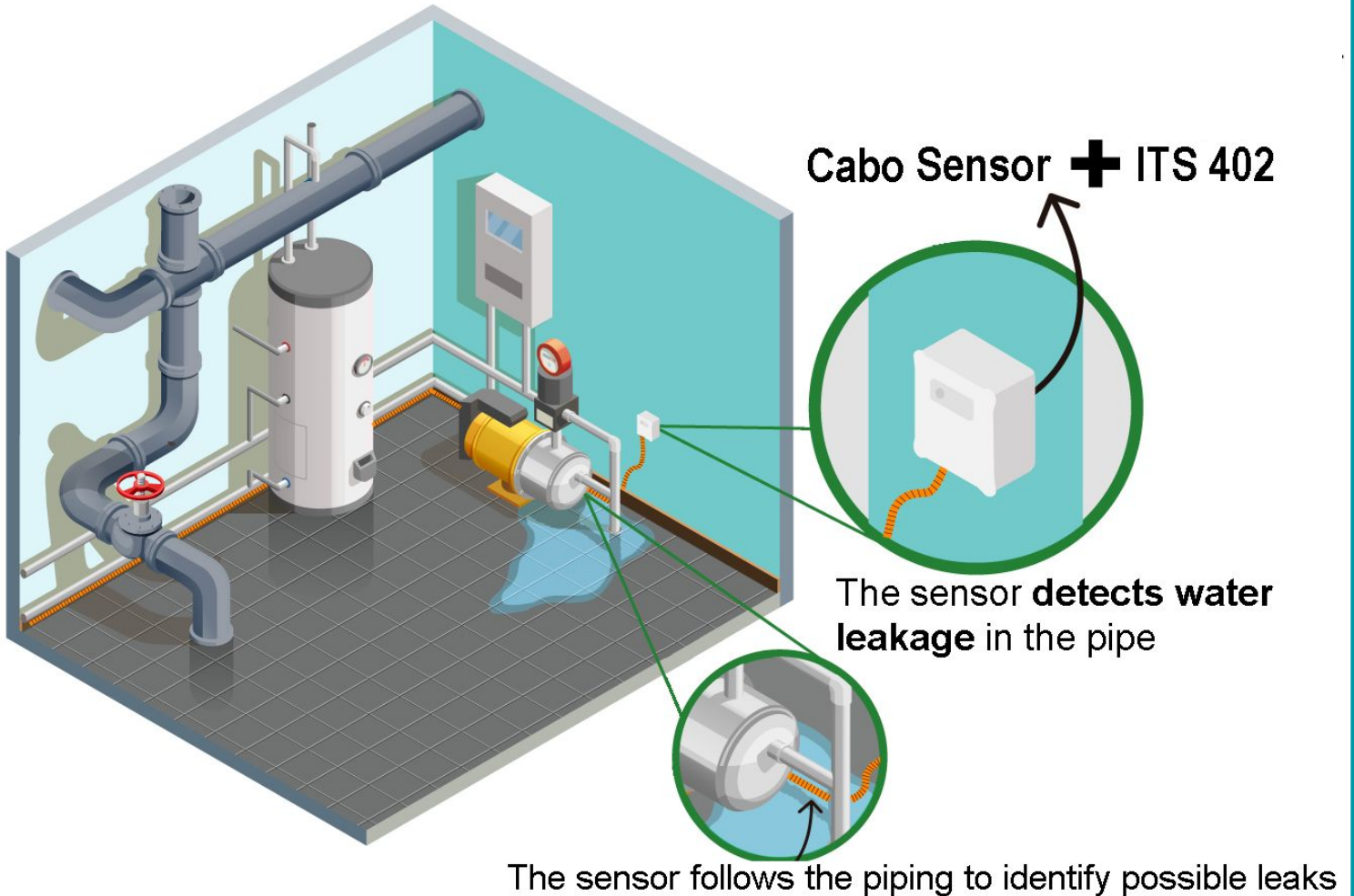
Caption: In the image, we observe the ITS associated with the [single point liquid sensor](#). This integration is ideal for monitoring locations where liquids must be detected.

Application with liquid sensor cable

In this application model, ITS 402 is used with the [liquid sensor cable](#), to check for leaks in the hydraulic pump room.

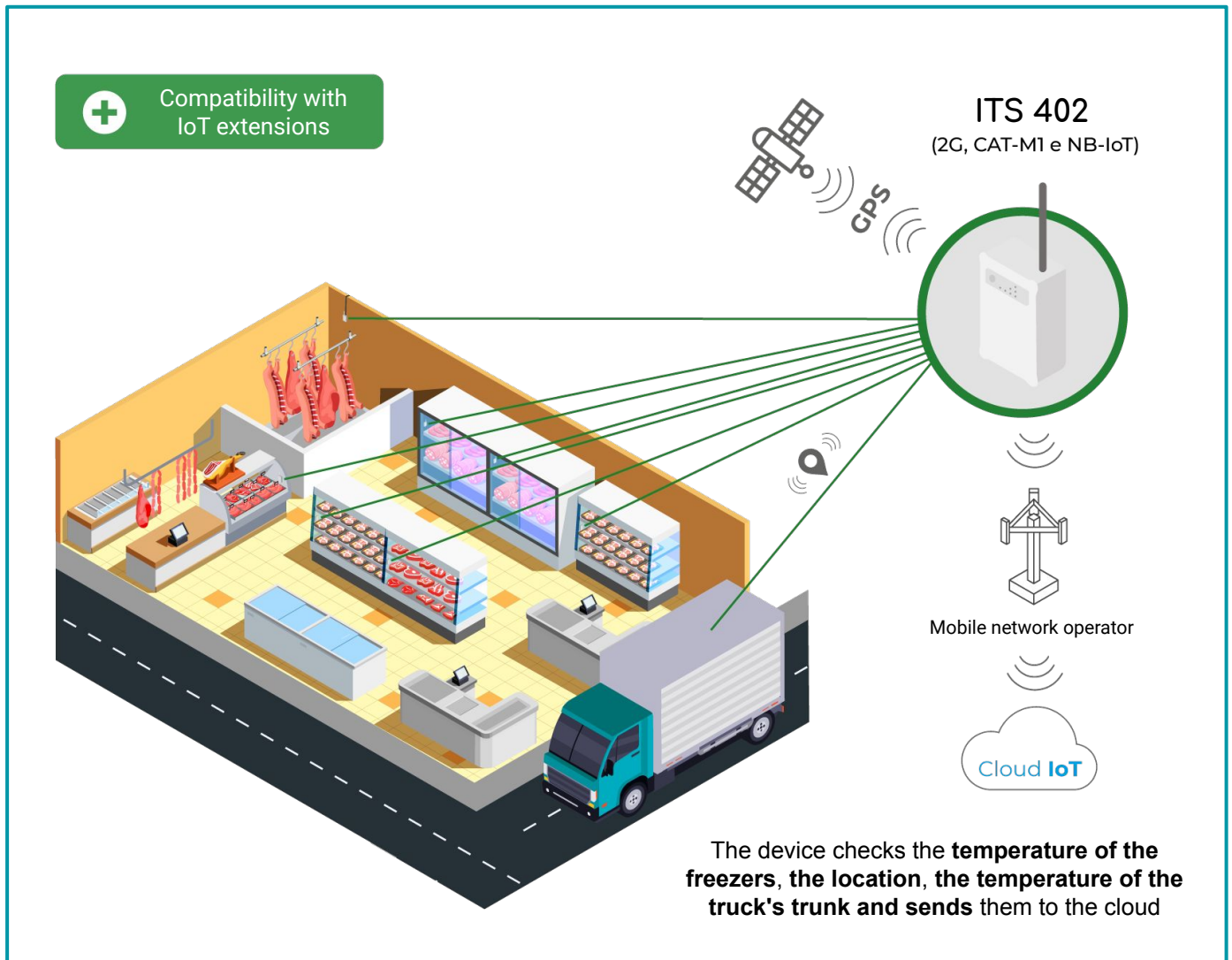
KWS 3003

Leak sensor with rope for liquids



Caption: In the image, we observe the ITS associated with the [liquid sensor cable](#). This integration is ideal for monitoring locations where liquids must be detected along a length.

Application model



Caption: In this application model, several ITS 402 with modular extensions are used to ascertain the temperatures in the butcher's freezers and the location/temperature of the truck transporting the refrigerated cargo.



Caption: In the image, we observe the ITS associated with the [External GPS Antenna](#), ideal for monitoring the delivery of goods by the carrier's truck.