



CASE STUDY

STORAGE SILOS MONITORING



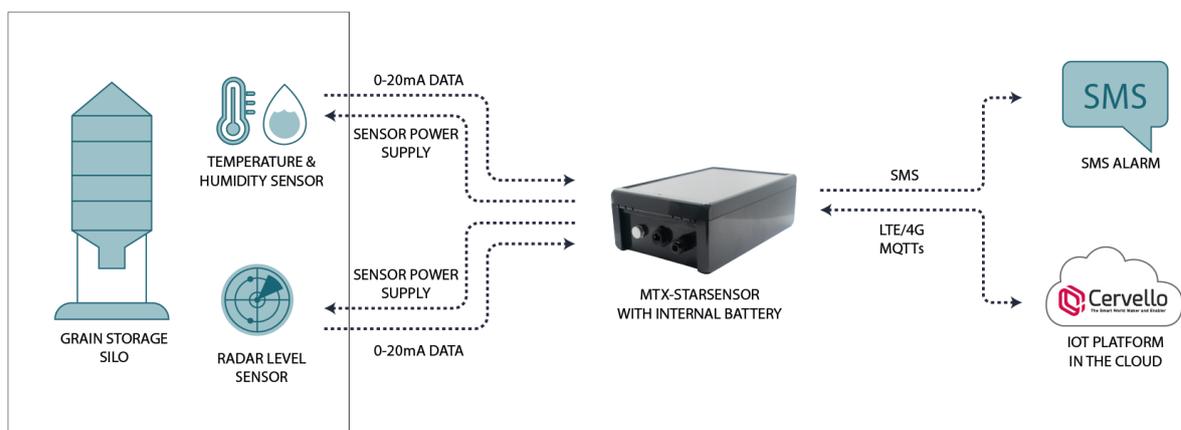
www.mtxm2m.com

Storage Silos Monitoring

In cereal and grain storage systems, the greatest financial losses are due to two basic reasons. On the one hand, due to a lack of monitoring of the temperature and humidity of the silos, which causes poor storage conditions and, therefore, the total or partial loss of the stored merchandise. And on the other hand, due to the need to know in advance and remotely the level of their content in order to program the most effective route for trucks. However, in the IIoT society, thanks to communication equipment and the correct probes or sensors, it is possible to remotely monitor the conservation characteristics of the stored product and the filling level of the silos without the need to transfer staff to the facilities and being able to receive alerts directly on our computer or even on our mobile phones.

Device: **MTX-StarSensor, 4G IoT modem for sensor monitoring, IP67, ULP and battery**

Platform: **Cervello Stem - IoT Platform**



In storage silos there are three variables that need to be monitored periodically. On the one hand, temperature and humidity guarantee the ideal storage conditions, for which the use of a temperature and humidity sensor with industrial features and analog output is proposed. On the other hand, probably the biggest challenge is when measuring the level. Ultrasound sensors commonly used in other environments to measure the level have been shown to be useless in this case study because dusty environments tend to give wrong measurements due to reflections. However, using a radar sensor, which are immune to dust and reflections, we obtain better results and more accurate measurements.

These silos, normally found in rural, agricultural or industrial environments, are usually devoid of all types of power supply, so a self-sufficient solution is essential for years both for the sensors and for the communications equipment that will receive the data and send it to the cloud, where it will be processed. Due to this, the equipment proposed for this case study is the MTX-StarSensor.

The MTX-StarSensor is an IoT modem specially designed for sensor monitoring and control solutions in different fields. Thanks to its special firmware that takes full advantage of the Ultra Low Power features and battery management, the use of the MTX-StarSensor allows to manage analog sensors without the need for an external power source for years. Its configuration allows the device to wake up in the windows that have been configured, power the analog sensor with its own batteries, obtain the measurements, turn it off again and send the data through LTE/4G before turning off again until the next window of monitoring. Thanks to this, it allows years of operation of both the modem and the sensor without the need for an additional power source. This characteristic makes it the ideal solution for monitoring solutions in remote environments such as rural, agricultural or industrial lands.

In addition, the MTX-StarSensor has sufficient data storage capacity to also allow local collection or maintenance of information in cases of lack of coverage or failure. Once the data is collected and stored, it is transformed and sent through MQTTs to the Cervello Stem IoT Platform, where it is analyzed and graphically displayed on a

dashboard to suit the final customer. Furthermore, both in Cervello and in the modem's own firmware, alarms can be configured in the event of temperature or humidity peaks that jeopardize storage conditions.

The IP67 case makes the MTX-StarSensor a robust communication device, shockproof and prepared for harsh environments loaded with heat and humidity, making it an all-terrain equipment specially prepared to provide monitoring solutions in agricultural and industrial environments.

MTX-StarSensor

4G IoT modem for sensor control with IP67, Ultra Low Power and primary batteries with 10 years autonomy

The MTX-StarSensor is an innovative and powerful solution for the most demanding monitoring applications.

The IP67 enclosure allows it to be used in any environment regardless of dust, humidity or water. Thanks to MTX-Tunnel firmware with improved Ultra Low Power and power management features, the device can handle up to 2 analog sensors for years, without the need for external power. The modem has the ability to record data, which can be stored locally or sent remotely via 4G.



MAIN FEATURES



4G/3G/2G communications



USB



RS232/485



4x GPIOs



Up to 2x 4-20mA /0-10Vdc



Up to 2x sensor power supply



Primary batteries



Ultra Low Power



IP67



4G/3G/2G serial gateway



GPIO management



Sensor management



DynDNS and No-IP



MQTT/s



Modbus & Datalogger



SMS control

● Hardware features

● MTX-Tunnel software features



CERVELLO STEM - IOT PLATFORM

FREE FOR ONE YEAR WITH MTX DEVICES*



Autoprovisioning



Alarms and Alerts



Remote Control



Real time Dashboards



Rules engine



Monitoring engine



Analytics



Remote update

*Available with compatible devices that have MTX-Tunnel or MTX-Titan

- ⚡ DC input: 7.2 to 30Vdc (36Vdc optional)
- 🌡️ Temperature range: -30° to +85°C
- 📏 Dimensions: 261x169x91mm
- 📦 Weight: 3.6kg

Datasheet subject to changes | 2020/07
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HARDWARE FEATURES

MTX-StarSensor 4G

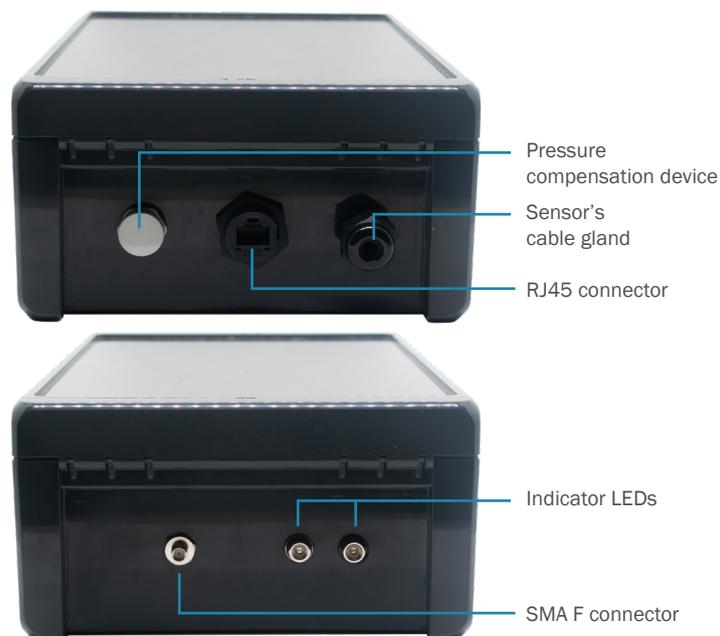
	LTE 5 Bands (700, 800, 900, 1800, 2100MHz), GSM/GPRS/EDGE: 2 Bands (900, 1800MHz)
	LTE Cat.1: DL 10.2Mbps, UL 5.2Mbps
	HSPA (3GPP release 6,7): DL 7.2Mbps, UL 5.7Mbps; HSDPA Cat.8/HSUPA Cat.6 UMTS (3GPP release 4): PS data rate 384 kbps DL, UL 384kbps
	GPRS (EU only): DL 85.6kbps, UL 85.6kbps
	SMS: text and PDU mode support

Interfaces

-  4G/3G/2G connectivity
-  USB (internal)
-  RS232
-  RS485
-  4x GPIOs (internal)
-  Tamper input
-  Up to 2x 4-20mA/0-10Vdc
-  Dual SIM card interface 1.8V and 3V
-  Operating status LEDs
-  Real Time Clock with alarm functionality
-  Primary batteries
-  Ultra Low Power

Processor

	4G
Flash	31MB
RAM	18MB
CPU	ARM11



Connectors

-  1x SMA F: 4G
-  Mini USB (internal)
-  1x RJ45: RS232, RS485 (multiplexed)
-  4x2 terminal block: power supply, RS485, tamper (internal)
-  Up to 2x 4-20mA/0-10Vdc
-  Up to 2x power output: 12, 18, 25, 32 Vdc software configurable

MTX-TUNNEL SOFTWARE FEATURES

Connectivity



4G/3G/2G serial gateways: TCP client, TCP server, UDP client/server, up to 2 simultaneous tunnel



IP connectivity mode: permanent 100% time, under request (SMS, missed call), change on a digital input, analog input out of level, serial data on RS232/RS485 port, scheduled date/hour/time

TCP Services



Web server, Telnet, SNMP, Tacacs+, NTP



Datalogger: MQTT, MQTTs, HTTP, HTTPs, FTP



Shows the status of digital and analog inputs



Change digital output level



Execute AT commands remotely: Telnet, MQTT/MQTTs, SMS, HTTP

Security



Authorized phone numbers



Firewall IP, SSL/TLS connections, encrypted config



Secure OTAP (remote FIU upgrade)



Watchdog hardware

Alarms and Control



Send SMS/MQTT alarm when the level of digital or analog input change, local configuration option



SMS can be sent to up to 10 remote users



Execute remote AT commands



Change the status of digital outputs



Customizable SMS commands

Solutions for Dynamic IP



IP session using a SMS or missed call



DynDNS and NoIP



Private DNS

Metering, Modbus, Sensors...



Local access to data option, through serial interface.



Master for modbus RTU devices, Modbus TCP slave, Modbus TCP to RTU gateway



Access to serial devices using 2G/3G/4G and GSM

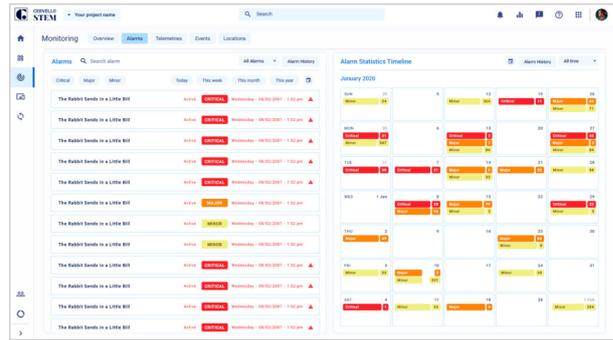
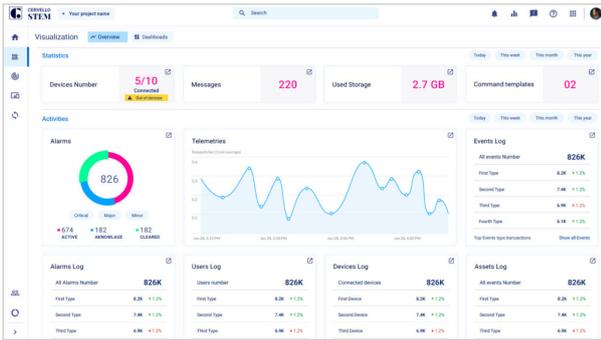


Astronomical clock



CERVELLO STEM - IOT PLATFORM

FREE FOR ONE YEAR WITH MTX DEVICES**



General Features

-  Up to unlimited devices
-  Autoprovisioning
-  Real time dashboards
-  Remote control
-  Monitoring engine
-  Alarms and alerts
-  Rules engine
-  Remote update
-  Connect engine*
-  API Keys*
-  Analytics*
-  Multi-tenant*
-  White labeling*
-  Custom admin role*

Monitor

-  Alarms, Events and Incidents
-  Tracking*

Control

-  Command template
-  OTA

Devices Inventory

-  Add single and single from template
-  Add Bulk from template and from autoprovisioning
-  Manage: Device template, Groups, Assets and Bulk actions

Connect

-  Topics*
-  Transformation*
-  Integration keys*

Visualize

-  Dashboards
-  Reports

Automate

-  Rules Engine
-  Actions
-  Triggers

Security

-  2-factor authentication
-  SSL for end user application
-  Custom admin roles*

*Upgrade required

**Available with compatible devices with MTX-Tunnel or MTX-Titan



Datasheet subject to changes | 2020/07 | MTX-StarSensor
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ORDERING INFORMATION

MTX-StarSensor [4-G]

TBD

MTX-StarSensor [4-R]

TBD

MTX-StarSensor [4-P]

TBD

MTX - StarSensor [X - Sensor]

X

4: 4G/3G/2G

Sensor

G: generic 4-20mA

P: submersible pressure

R: radar

DIMENSIONS

