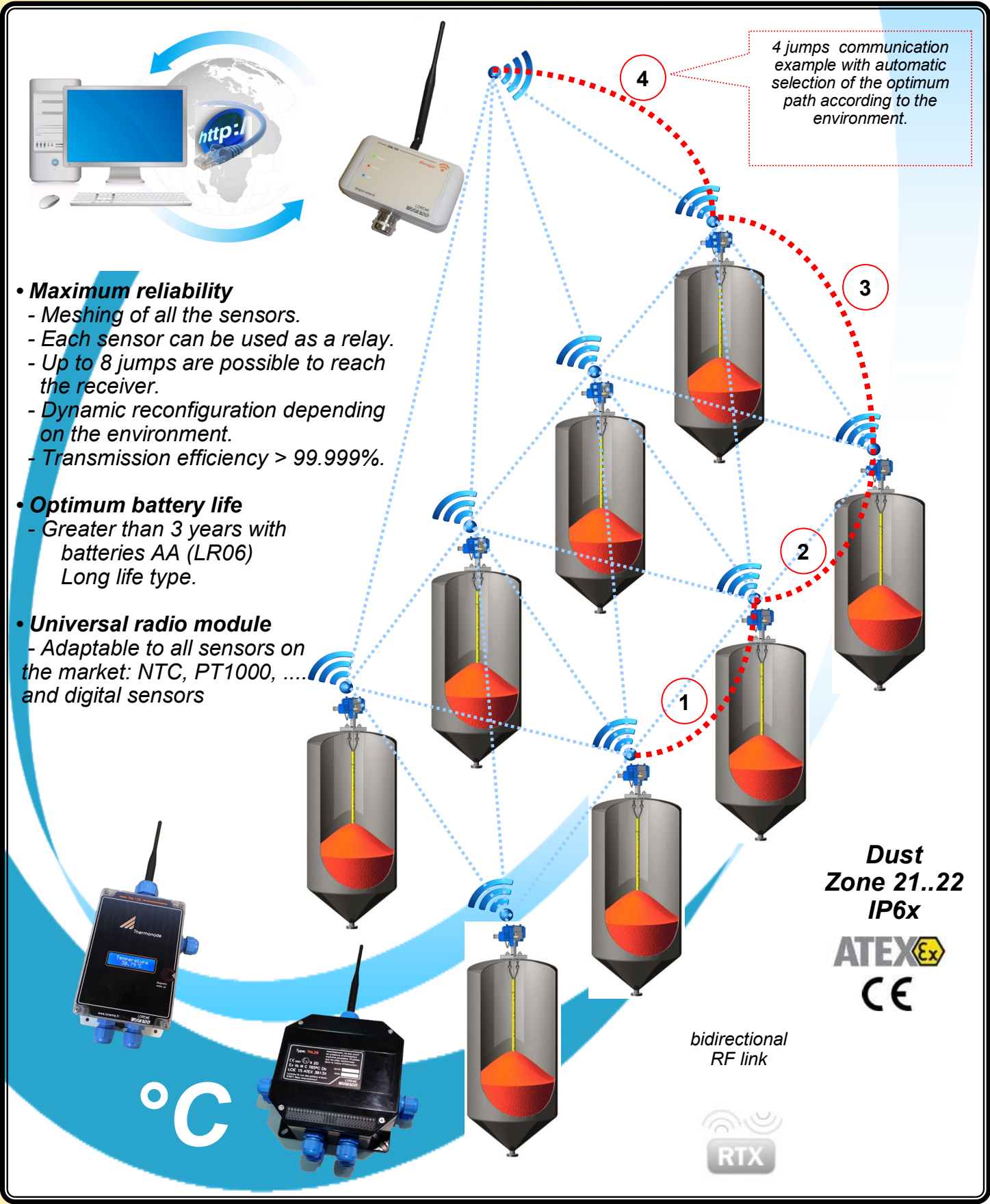


# Silogrid : Radiofrequency meshed network temperature measuring system for silo thermometry applications



- **Maximum reliability**
  - Meshing of all the sensors.
  - Each sensor can be used as a relay.
  - Up to 8 jumps are possible to reach the receiver.
  - Dynamic reconfiguration depending on the environment.
  - Transmission efficiency > 99.999%.
- **Optimum battery life**
  - Greater than 3 years with batteries AA (LR06) Long life type.
- **Universal radio module**
  - Adaptable to all sensors on the market: NTC, PT1000, .... and digital sensors

Dust Zone 21..22  
IP6x  
ATEX Ex  
CE

bidirectional RF link



# Silogrid: Radiofrequency temperature meshed network measuring system for silo thermometry applications



• **Description :** **SILOGRID** is a robust and reliable wireless network, designed for industrial disturbed environments with interference that may significantly degrade network performance.

**Silogrid** is based on a proven wireless meshed network technology - SmartMesh® Dust Networks®, it uses the 2.4 GHz unlicensed band as a transmission medium.

**Silogrid** relies on a mesh network in which all radio stations (silo sensors) form the network.

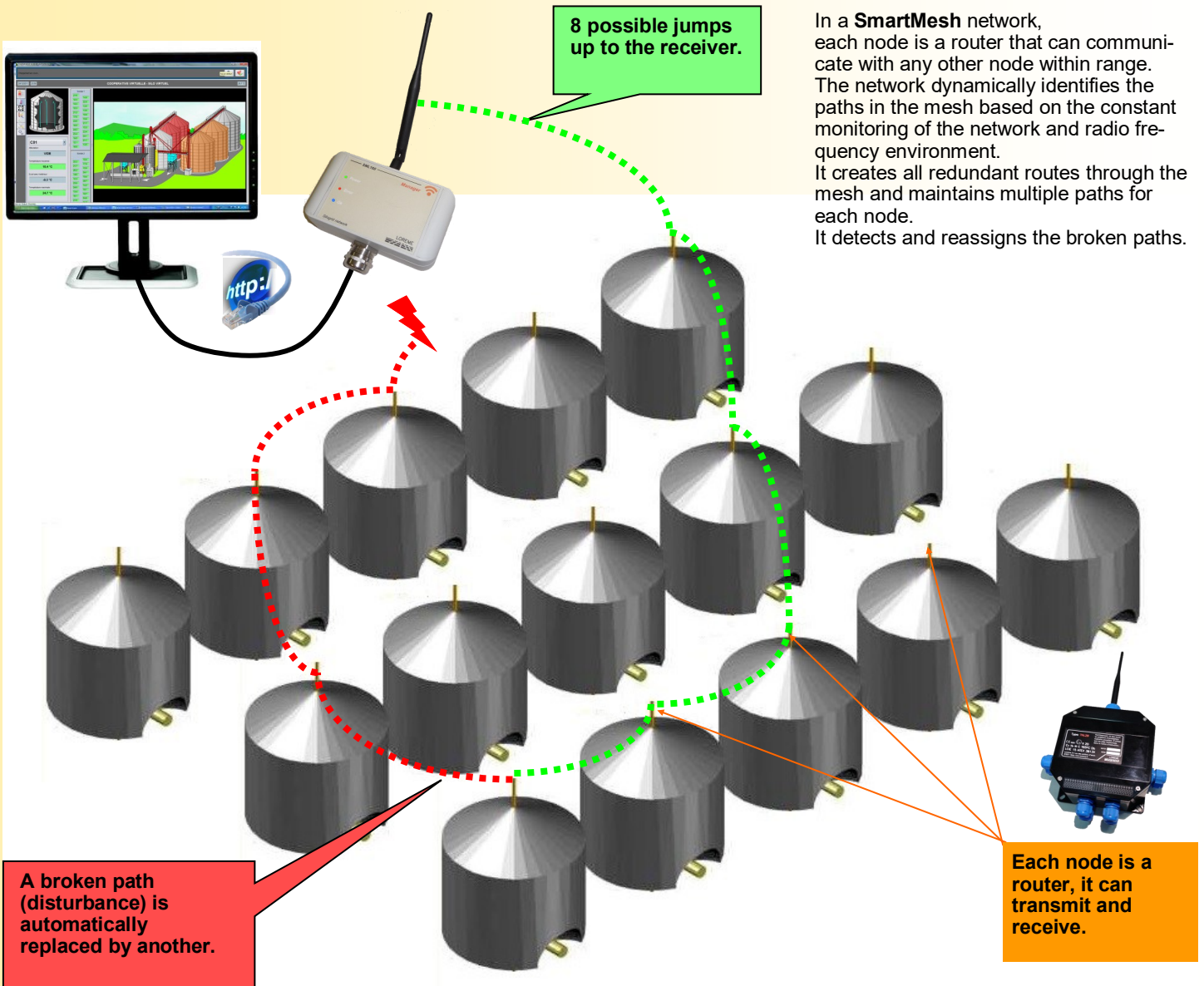
Each involved station simultaneously serves as a source signal and as a repeater.

The original transmitter sends a message to its nearest neighbor, which transmits it in its turn until the message reaches the final receiver station (the manager).

Furthermore, alternative paths are defined in the initialization phase. If the message can not be transmitted on a particular path, for example due to an obstacle or a defective receiver, the message is automatically deflected onto an alternate path. Thus, in addition to extending the range of the network, the mesh network provides redundant communication paths to improve reliability.

The communication of the wireless network is coordinated by a TDMA system (Time Division Multiple Access) that synchronizes the networks involved by time blocks of 10 ms. This creates a very reliable network (without collision) and reduces the time that a station must be active. To avoid interference, Silogrid also uses FHSS (Frequency Hopping Spread Spectrum).

The 15 channels defined in the IEEE802.15.4 standard are used in parallel, Silogrid uses FHSS to make the jump between channels. Channels in use are put on a "black" list to avoid collisions with other wireless communication systems. The combination of the synchronization every 10 ms and the 15 channels, allows up to 1500 communications per second.



In a **SmartMesh** network, each node is a router that can communicate with any other node within range. The network dynamically identifies the paths in the mesh based on the constant monitoring of the network and radio frequency environment. It creates all redundant routes through the mesh and maintains multiple paths for each node. It detects and reassigns the broken paths.

# Transmitter and repeater for SILO temperature sensor PT1000 or NTC ATEX zone 21 and 22

Type : TNL120



- **up to 24 temperature inputs per module**

Configurable : - PT1000 platinum probes.  
- NTC, PTC thermistor.  
+ Ambient temperature measurement.

- **Bidirectional RF link**

2.4 GHz band according to IEEE802.15.4.



- **Great autonomy**

> 3 years with 4 AA lithium batteries  
with a refresh rate of 5 minutes  
or 24Vdc auxiliary power supply

- **Fully compatible**

With sensors: Chopin, Serdia,  
Tripette and Renaud, JUMO, MAI, Foss.  
easily replaces these solutions:  
No multiplexing, no adjustment.

- **Upgradable**

- Incorporation of new sensors curves  
by updating the product.  
- Characterization of measuring elements  
on request (Plot of temperature curve).



The TNL120 is an autonomous and waterproof temperature acquisition station, capable to broadcast the measurements by radio link. It can be used both for new installations or as retrofit. The station is not dedicated to a particular type of sensor, but configurable depending on the installation.

**Description:**

Each TNL120 form a network node.  
The network nodes are ultra low power wireless transceivers, which sends data from temperature sensors, and transfers the data packets of neighboring nodes. Each node transmits packets to other nodes in a series of jumps that provide data to their destination. Preconfigured nodes can be added or removed from the network without disturbing the communications, creating a highly flexible and scalable system.

**Configurable measure inputs:**

- up to 24 PT1000 or NTC / PTC inputs in 2-wire with common point.
- Addition of new types of probes possible through firmware update (serial link), USB cord supplied separately.
- Ability to process sensors with embedded diodes (automatic detection of the presence and direction of diodes with measurement compensation for sensors used in multiplexed systems).

**Front face:**

- Display: 2 lines of 16 characters LCD. Display of sensor type, temperature point, default, communication status, battery voltage, Mac address.
- 3 pushbuttons under the front cover for configuration.
- Wake Up using magnetic detection (presence of a magnet) for diagnosis without opening the cover.

**Realization:**

- 4 screws projecting wall mount, Polycarbonate box.
- Powered by 4 AA batteries or auxiliary 24Vdc on terminal block.
- Sensor connection: spring terminals, conductors up to 1mm<sup>2</sup>.
- Internal electronic protected by conformal coatings.
- Protection rating: IP65
- Sensors input over 1 to 8 cable glands.
- (Allows the entry of multiple silo sensors, eg 4 sensors of 6 points).

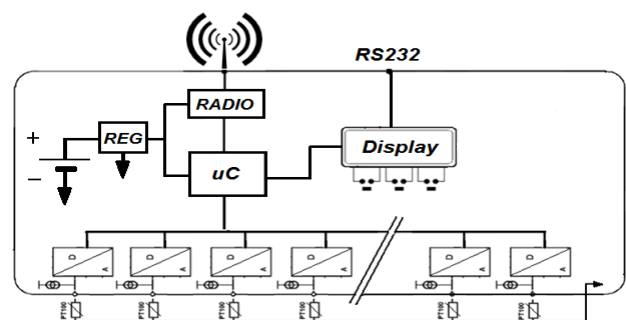
**Configuration / update:**

- The TNL120 is configured via the front panel
- The TNL120L is configured only with PC via the serial link
- The firmware upgrade is performed via the serial link (new sensors type).

**Communication:**

Synchronous 2.4 GHz RF link, synchronized wake up of the transmitters for 10 to 40 ms every 30 seconds (depending on the number of jumps).  
Allowing a significant reduction in consumption, while preserving the benefits and reliability of the bidirectional link.  
Information loss rate < 1 / 100,000 transmissions.

**Synoptic:**



Version and order code:

[Request a quote](#)

- TNL120-E-P** : Transmitter ATEX (with internal display)
- TNL120WiN-E-P** : Transmitter not ATEX (visible display)
- E** : input number 4,8,12,16,20,24 (PT 1000 / CTN / CTP)
- P** : number of input sensor cable glands  
TNL120 : 0...8 ; TNL120WiN : 0...4
- TNL120-0** : Repeater module (without sensor acquisition)
- TNL120L-E-P** : Transmitter small footprint without display  
16 inputs (PT1000 / CTN / CTP) max 3 input sensor cable glands.
- Option** /AL : cable gland for 24V auxiliary power
- /AXT Remote antenna with support. Cable 1.5 meter long
- /LL Lithium batteries. Long Life > 3 years  
(Alkaline batteries in standard)

**INPUT**

<b>Type</b>	<b>Range</b>	<b>Accuracy</b>
2 wires <b>Pt1000</b>	-50.....125 °C	+/- 1°C
2 wires <b>NTC/PTC</b>	-20.....125 °C	+/- 1°C
Accuracy in 2-wire depends on the resistance of the probe binding cable (offset correction possible)		
Measure current	< 1 mA	
Measure cycle	60 seconds	

**RF COMMUNICATION**

Bidirectional radio link at 2.4 GHz according to IEEE802.15.4 whip antenna, 1/4 wave, omnidirectional & orientable, 5 dBi gain, free field range > 200 meters. Maximum output power: 8 dBm.

**POWER SUPPLY**

6V with 4 AA Alkaline batteries, operation down to 3.2V  
Average consumption: < 100uA (1 minute refresh rate)  
Batteries life time (2000 mAh) : 20 000 hours @ 20°C  
Terminal for auxiliary power of 24Vdc /20mA (TNL120)

**ENVIRONMENT**

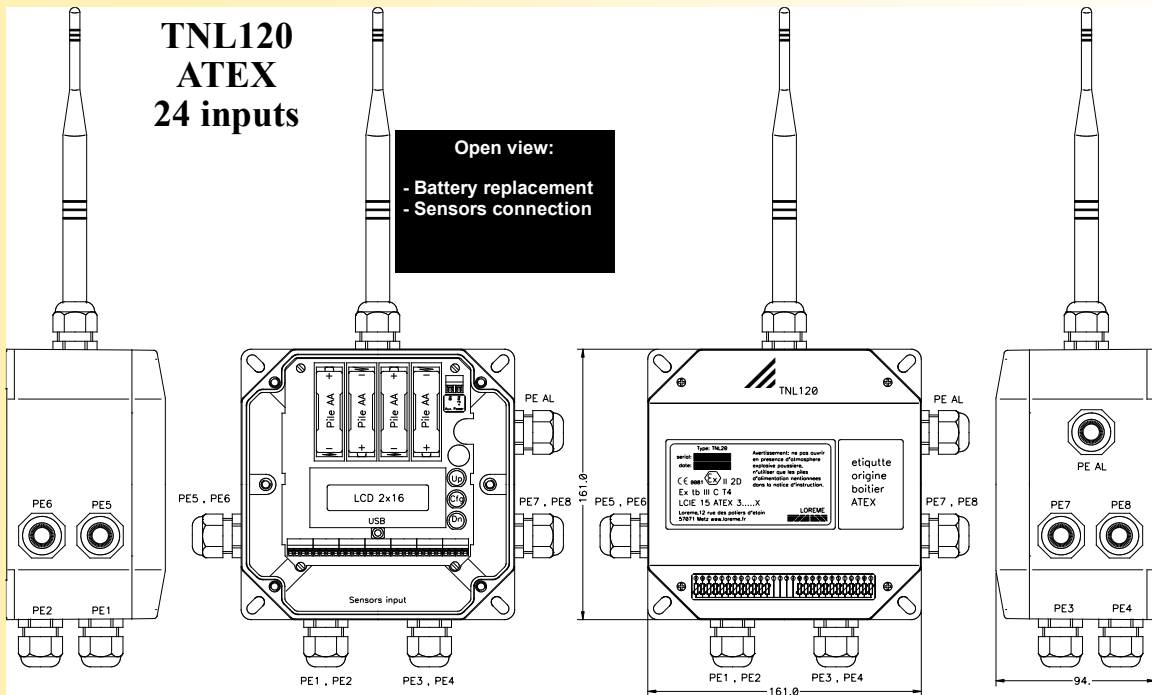
Operating temperature	-20 / 40 °C
Storage temperature	-25 / 85 °C
Influence	< 0.1 % / °C
Relative humidity	100 %
Weight	~ 500 g
Protection rating	IP65 indoor/outdoor use
MTBF (MIL HDBK 217F)	> 1000 000 Hrs @ 25°C
Life time	> 170 000 Hrs @ 30°C

**Electromagnetic compatibility 2014/30/UE / Low Voltage Directive 2014/35/UE**

Immunity standard for industrial environments EN 61000-6-2		Emission standard for industrial environments EN 61000-6-4
EN 61000-4-2 ESD	EN 61000-4-8 AC MF	EN 55011 group 1 class A
EN 61000-4-3 RF	EN 61000-4-9 pulse MF	
EN 61000-4-4 EFT	EN 61000-4-11 AC dips	
EN 61000-4-5 CWG	EN 61000-4-12 ring wave	
EN 61000-4-6 RF	EN 61000-4-29 DC dips	

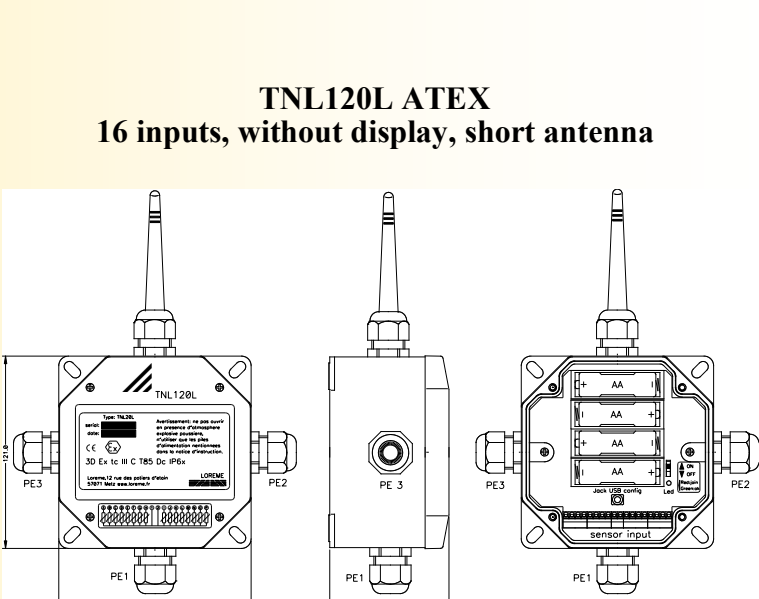
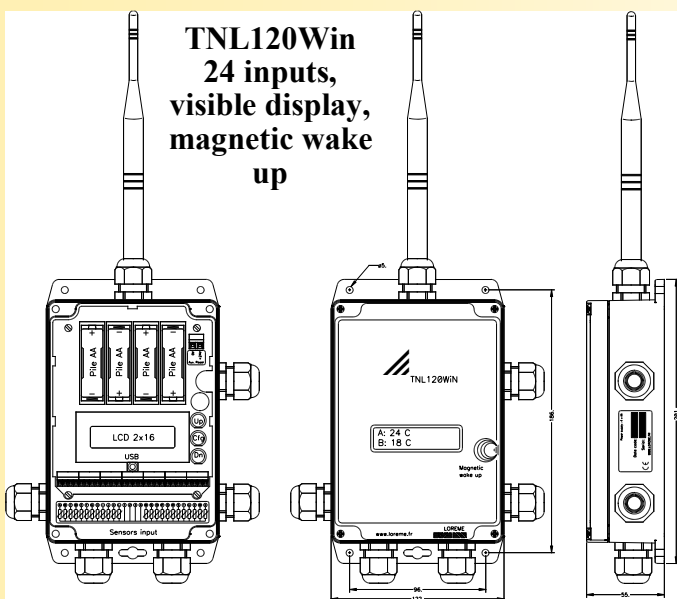


**WIRING, OUTLINE DIMENSIONS and OPEN COVER VIEW :**



option : /AXT  
remote antenna with support and 1.5 meters cable.

option must be define at the order.



# Radio link receiver hub Ethernet MODBUS-TCP output

type: SML160

# LOREME

## • Bidirectional RF link

- 2.4 GHz band according to IEEE802.15.4
- Up to 32 transmitters per receiver on one network
- Several networks can coexist
- Integrated or remote antenna

## • Communication

- Modbus TCP (Ethernet) 6 concurrent connections
- Embedded web server (viewing and configuration)

## • Power supply over Ethernet cable

- Power over Ethernet (PoE)

## • Indoor, outdoor use

- Integrated antenna
- IP66 waterproof



ethernetPoE

The SML160 is a wireless receiver with an Ethernet connection, the product centralizes all measures issued by the radio transmitters, and makes them available through a standard communication protocol (Modbus-TCP) on the Ethernet link.

### DESCRIPTION:

The hub is an integral part of the wireless mesh network, It coordinates the routing of data packets, collects measurements, network statistics and manages all data transfers, information are accessible by Ethernet on a dedicated web page.

### Operating mode:

- Two operating modes are possible:
  - 1) "installation" mode, while within range transmitters automatically join the network and declare themselves in the equipment list of the site.
  - 2) "operation" mode, while only transmitters declared in the list may join the network. (possibility to have several network on same time on a wide site). The operation mode can be changed after the commissioning. Each transmitter has a unique MAC address.
- The receiver's webpage is useful to see the measures, the network statistics (number of jump, signal quality, battery voltage) and the configuration of the network transmitters (tag, number of T° points)

### Realization:

- projecting wall mount (hinged screw cover).
- Waterproof ABS plastic housing + conformal coated electronic
- IP66 protection rating, cable gland entry
- Power supply over Ethernet (PoE).

### Front face:

- Three LEDs for a rapid diagnostic .
- One power ok blue LED.
- One "default" red LED, indicating the absence of a transmitter, a defect temperature point or a weak transmitter battery voltage.
- One "ok" green LED Indicating that the installation operates according to the configuration defined for the site.

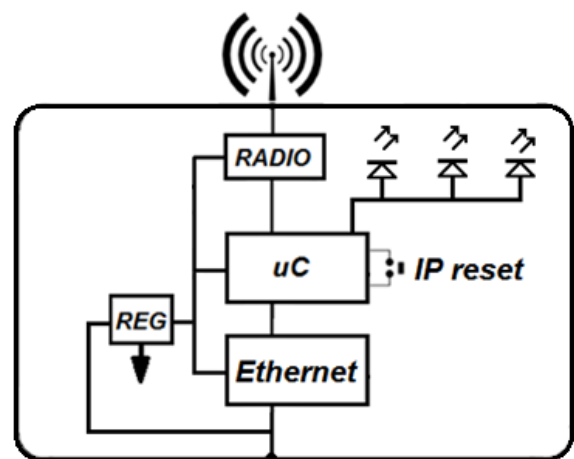
### Configuration:

- IP address: 2 solutions are possible
  - 1) via BOOTP protocol by entering the MAC address found on the inside of the product (requires a BOOTP server on the network)
  - 2) Fixed IP address, configured via the embedded Web server.
- If the IP address is unknown, an internal button is used to return to the factory IP address: 192.168.0.253 (long press, the buzzer confirms the return to the original address).

### Communication:

Ethernet 10/100 T base (RJ45 connection)  
Powered by the Switch (power over Ethernet) following IEEE802.3af  
Supported protocols: Modbus-TCP, Web server.  
Firmware update over the Ethernet link.

### Synoptic:



Version and order code:

[Request a quote](#)

**SML160-32 :** Receiver hub for 32 transmitters

option : /AXT remote antenna with 1.5m cable length

**RF COMMUNICATION**

Bidirectional radio link at 2.4 GHz according to IEEE802.15.4  
Swivel omni-directional quarter wave whip antenna,  
5 dBi gain, free field range > 200 meters.

**POWER SUPPLY**

Powered by the Switch (Power over Ethernet)  
from 36Vdc to 57Vdc according to IEEE802.3af (2 watts)

**COMMUNICATION**

Ethernet 10/100 T base (RJ45 connection).  
Protocols: Modbus-TCP, Web server.

**RECOMMENDED OPERATING CONDITIONS**

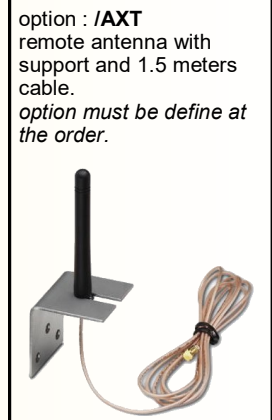
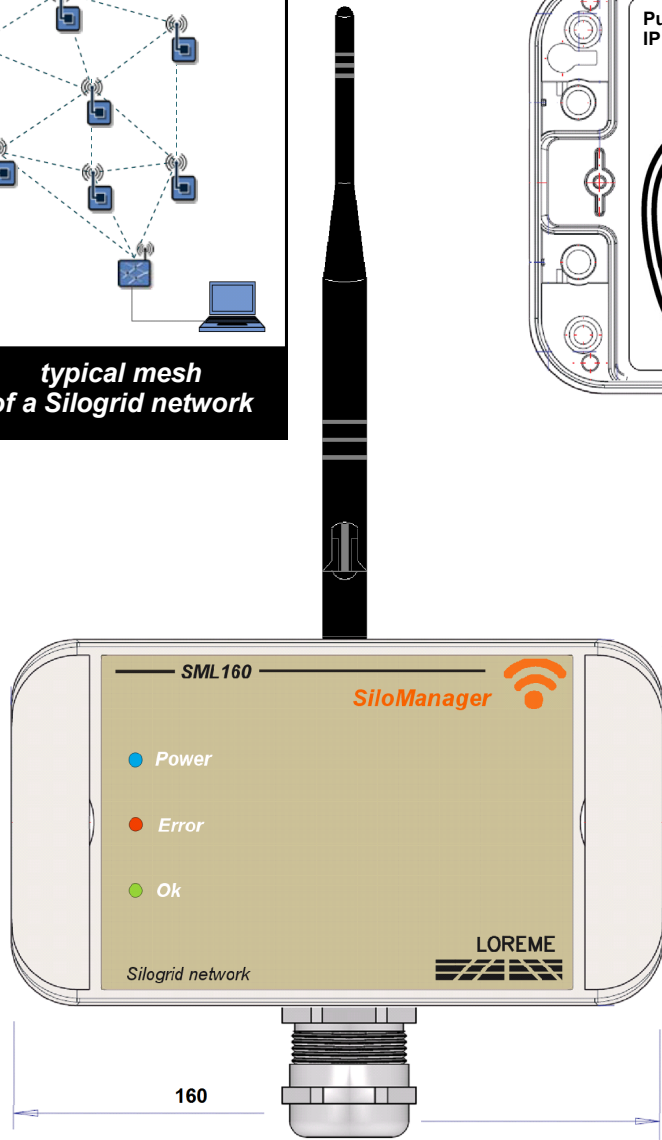
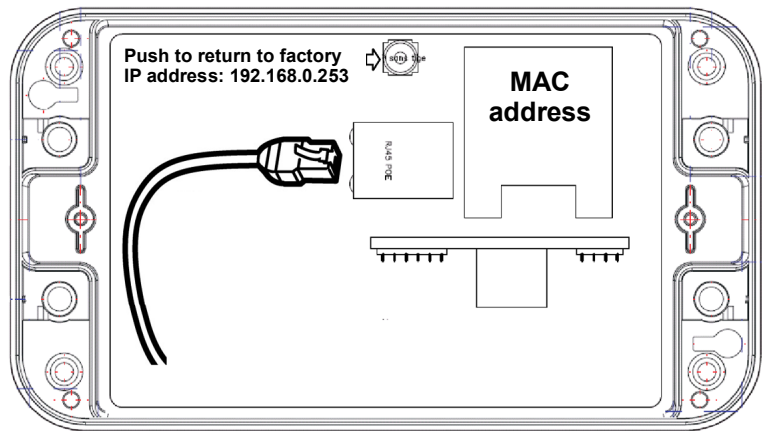
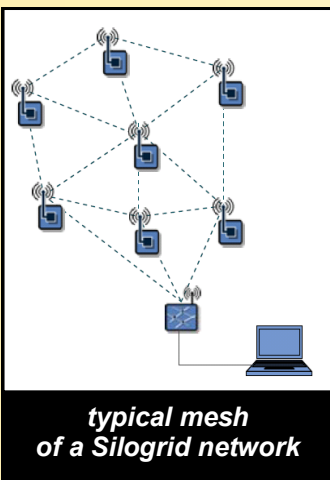
Operating temperature	-25 to 60 °C.
Storage temperature	-40 to 85 °C.
Relative humidity	100 %.
Weight	~350 g.
Protection	IP 66 indoor/outdoor use.
MTBF (MIL HDBK 217F)	> 500 000 Hrs @ 25°C.
Service life	> 170 000 Hrs @ 30°C.

*Electromagnetic compatibility 2014/30/UE / Low Voltage Directive 2014/35/UE*

Immunity standard for industrial environments EN 61000-6-2		Emission standard for industrial environments EN 61000-6-4
EN 61000-4-2 ESD	EN 61000-4-8 AC MF	EN 55011  group 1 class A
EN 61000-4-3 RF	EN 61000-4-9 pulse MF	
EN 61000-4-4 EFT	EN 61000-4-11 AC dips	
EN 61000-4-5 CWG	EN 61000-4-12 ring wave	
EN 61000-4-6 RF	EN 61000-4-29 DC dips	



**WIRING, OUTLINE DIMENSIONS and OPEN COVER VIEW :**



**Installation recommendations:**

- In preference place the receiver in the environment of the transmitters, more the number of jumps is limited, the better is the batteries life.
- Keep away as much as possible the receiver from power cables and circuits (High Voltage), the reception quality also optimizes batteries life (less reiteration).

**complementary product:**

PoE injector for power supplying the SML160 by Ethernet for Switch which do not have PoE.

reference : **AL36 PoE**  
DIN rail mounting.  
According to IEEE802.3af standard.

[http://www.loreme.fr/fichtech/AL36poe\\_eng.pdf](http://www.loreme.fr/fichtech/AL36poe_eng.pdf)

