

# Radiofrequency meshed network measuring system

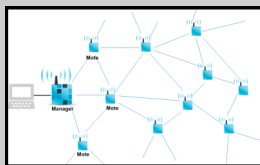
## Transmitter for 4..20mA analog signal:

TNL120-mA

**LOREME**

- **Bidirectional RF link**

2.4GHz band according to IEEE802.15.4 embedded antenna



- **optimum reliability**

Meshing of all transmitters  
Up to 8 jump possible to reach the manager  
Dynamic reconfiguration depending of environment  
Transmission efficiency > 99.999%

- **Analog input**

4...20 mA + room temperature measure

- **Great autonomy**

> 2 years with 4 standard batteries (type AA)  
for a refresh rate of 60 seconds  
or auxiliary power supply 5Vdc to 30Vdc

- **Scalable network**

- Up to 32 transmitter in one network



The TNL120mA is an autonomous and waterproof acquisition station, capable to broadcast the 4..20mA signal measurement by radio link. All transmitters form a mesh network with up to 32 stations. The measures are available via a Ethernet Modbus TCP link on manager (SML160mA).

### Description:

Each TNL120-mA form a network node. The networks node are wireless transceivers, which sends data from input current measurement and transfers data packets of neighbouring nodes. Each node transmits packets to other nodes in a series of jumps that provide data to their destination (SML160-mA).

The manager dynamically identifies the paths in the mesh, based on constant monitoring of the network and the radio environment. It creates all redundant path through the meshes, and maintains multiple paths for each node. It detects and reroutes the broken paths. Preconfigured nodes can be added or removed from the network without disturbing the communications, creating a highly flexible and scalable system.

Several networks can coexist on the same installation (each network have an unique identifier)

### Measure Input:

- 1 current input 4...20mA

### Front face / Setting / Upgrade:

- Display : LCD display, 2 lines of 16 characters, measure display, communication status, supply voltage, Mac address.  
(The display is always supply when the device is powered by auxiliary source, and shut off afters 5 seconds with the batteries)
- Parameters setting with 3 push buttons under the front face
- A firmware upgrade is possible via the serial link.

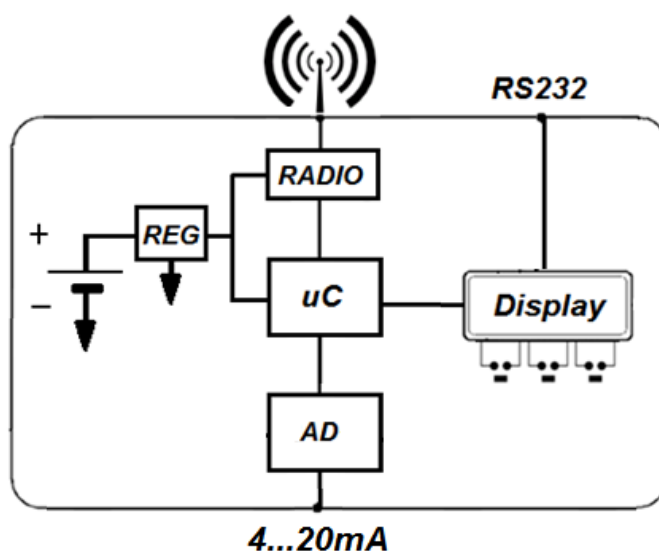
### Features:

- Waterproof box, polycarbonate, antenna input via cable gland, mounting with 4 screws.
- Power supply : 4 AA standard batteries or auxiliary 20....30Vdc on terminal blocks.
- Wiring : spring terminal blocks, 1mm<sup>2</sup> section
- conformal coating for electronic protection.
- Protection rating : IP65

### 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:

**TNL120-mA** : 4..20mA current input transceiver  
(provide with 4 x 2000 mAh alkaline batteries type AA)

Type	INPUT	
	Range	Accuracy
Current	4.....20mA	+/- 0.25%
Input impedance	100 ohms	
Measure cycle	15 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 x AA alkaline batteries, operation down to 3.2V  
Average consumption : < 100uA (1 minute refresh rate)  
batteries life time (2000 mAh) : 20 000 hrs @ 20°C

Terminal blocks for auxiliary supply 20....30Vdc < 20mA

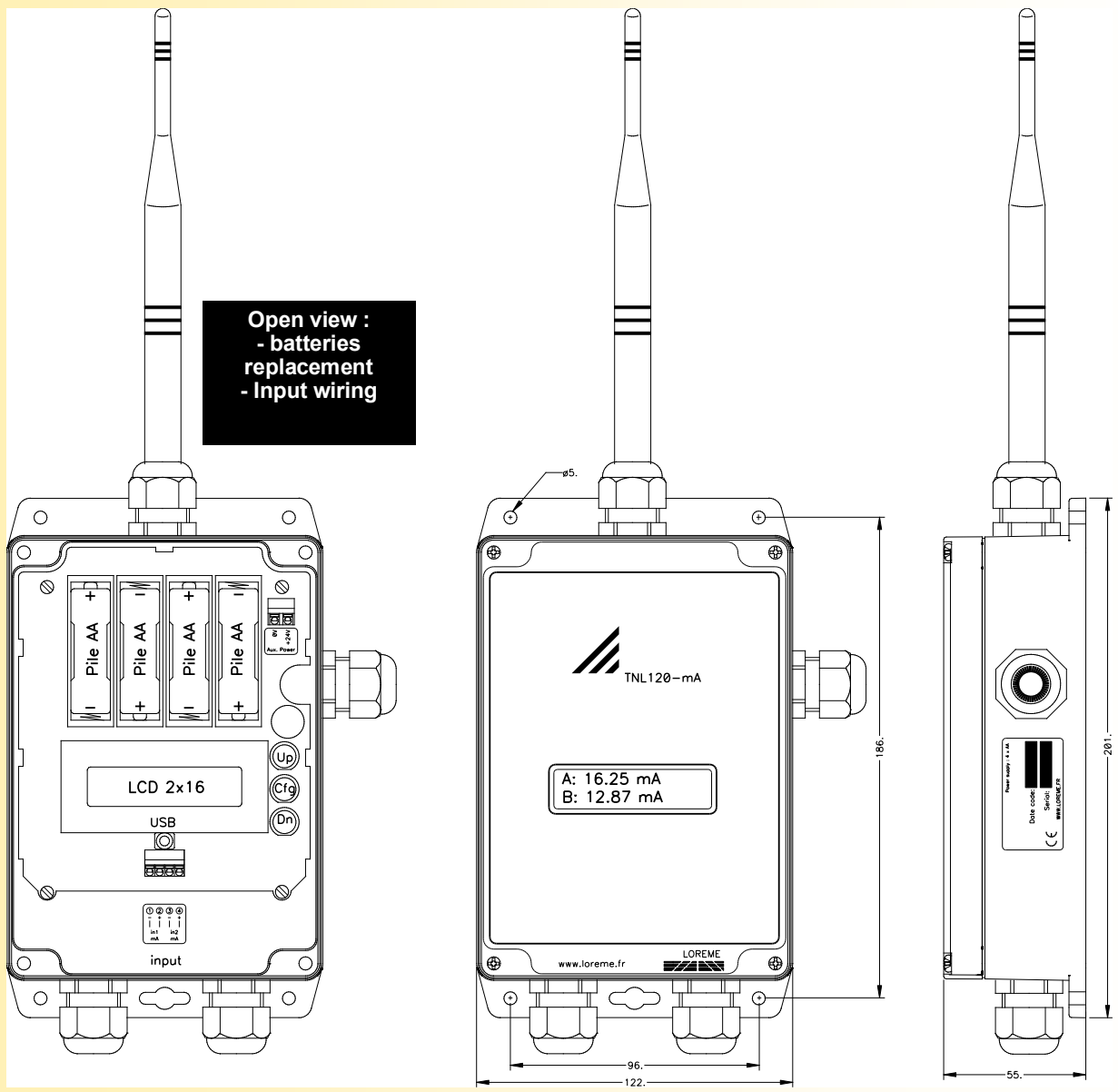
ENVIRONMENT	
Operating temperature	-20 to 50 °C
Storage temperature	-25 to 85 °C
Influence	< 0.1 % / °C
Relative humidity	100 %
Weight	~ 500 g
Protection rating	IP 65 indoor / outdoor using
MTBF (MIL HDBK 217F)	> 1000 000 Hrs @ 25°C
Life time	> 170 000 Hrs @ 30°C

**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 :**



**Open view :**  
- batteries replacement  
- Input wiring

On account of the constant technologies and standards evolution, LOREME keeps the possibility to modify the specifications of the included products without notice.

- **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



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.

**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.

**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.

**Realization:**

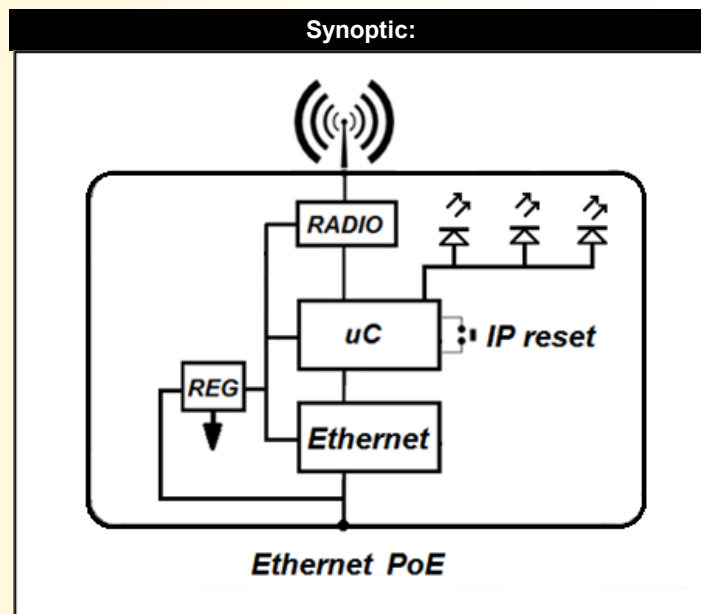
- projecting wall mount (hinged screw cover).
- Waterproof ABS plastic housing + conformal coated electronic
- IP66 protection rating, cable gland entry
- Power supply over Ethernet (PoE).

**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 default address).



Version and order code:

**SML160-mA** : Receiver / Manager for 32 transceivers network

**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**

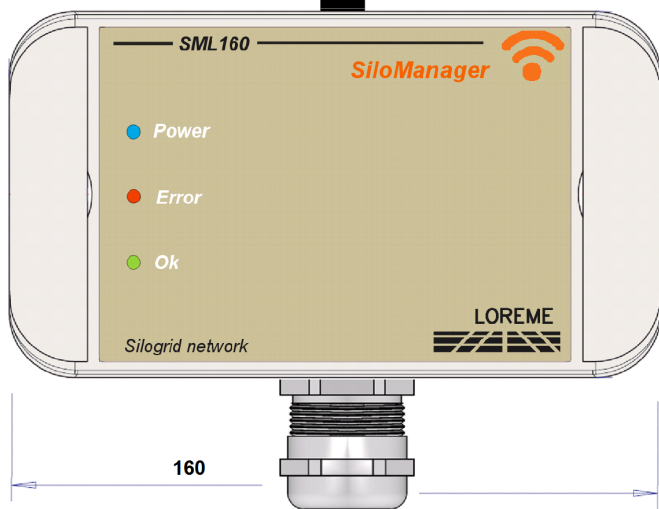
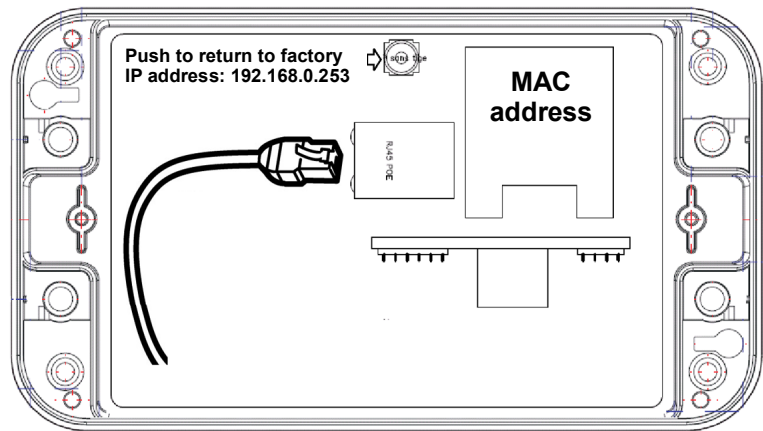
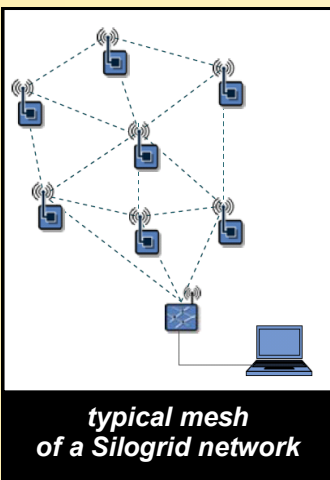
Operating temperature	-25 to 60 °C.
Storage temperature	-40 to 85 °C.
Relative humidity	100 %.
Weight	~350 g.
Protection	IP 66 indoor/outdoor use.
MTBF (MIL HDBK 217F)	> 500 000 Hrs @ 25°C.
Service life	> 170 000 Hrs @ 30°C.

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

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**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)



# Synoptic for a RF retransmission of 2 x 4..20mA inputs with optional monitoring system

