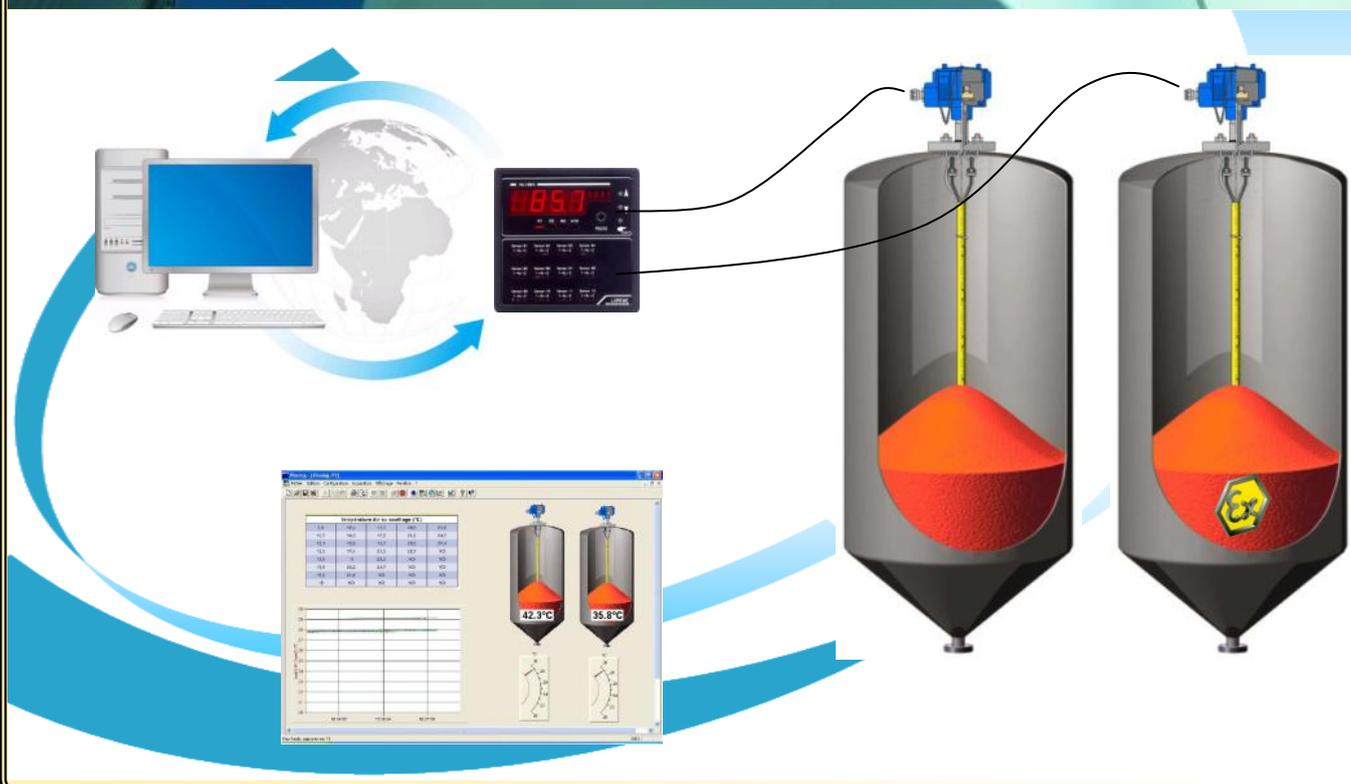


Silo thermometry

°C





- **Easy and fast mounting**

To suspend or flanged

- **Analog or numerical technology**

Standard sensitive elements RTD, NTC, PTC, or numeric addressable sensitive element allowing connection of 24 sensors by 3 wires !!
Temperature from -55°C to $+125^{\circ}\text{C}$

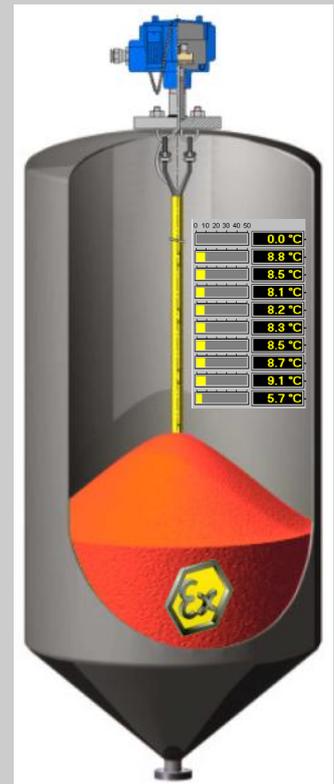
- **Polyethylene external sheath**

Very high traction strength, armed with steel wires, very low lengthening, very low adherence (pull limitation), low diameter : 14mm limiting tensile stress, waterproof IP65, food-compatible materials



- **Area 0 or Area 20 ATEX notification**

Dust explosible area
Notification: 01atex 6052x



Flexible silo probes type "SILO FLEX" are available in all lengths with up to 24 temperature points. They are declined in two versions, one with analog sensitive elements (type: RTD, NTC or PTC), the other with numerical addressable sensitive element.

1) Analog version (SILOFLEX -A)

Two wiring are possible:

Independent sensor (2 or 3 wires mounting)

With possible line length compensation
Recommended for RTD sensitive element.
3 wires mounting: 8 elements maximum.
2 wires mounting: 12 elements maximum.

Sensor with common point (only in 2 wires mounting)

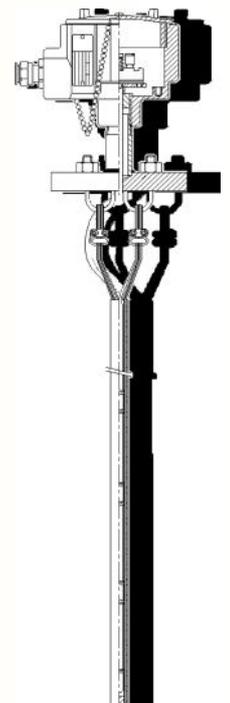
Without wire length compensation
Recommended for RTD, NTC, PTC
23 elements maximum are possible by sensor

2) Numerical version (SILOFLEX -N)

With this technology, sensitive elements are addressable silicon sensors with single serial number. All the elements are connected in parallel on a 3 wires bus simplifying the wiring and reducing implementation cost.

Data processing: LOREME recommend the acquisition stations type INL 100 and INL 100N (for numerical sensors), for exploitation of his silo probes, allowing: watching, visualization, alarm control and communication to automaton or PC (modbus or profibus protocol).

Flanged version with ATEX head



FLEXIBLE PROBE FOR SILO TEMPERATURE MEASURE

Type : SILOFLEX



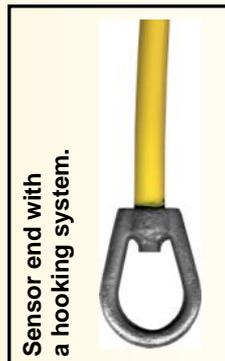
Silo sensor definition

Parameters to define by the user are :

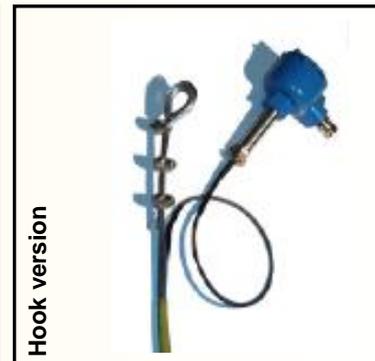
- Overall length sensor
- Fastening mode: flange (DN, PN, face type), hooking, ...
- Distribution of the measure points (equidistant distribution by default),
- Material inside silo
- Silo dimensions

Sheath characteristics

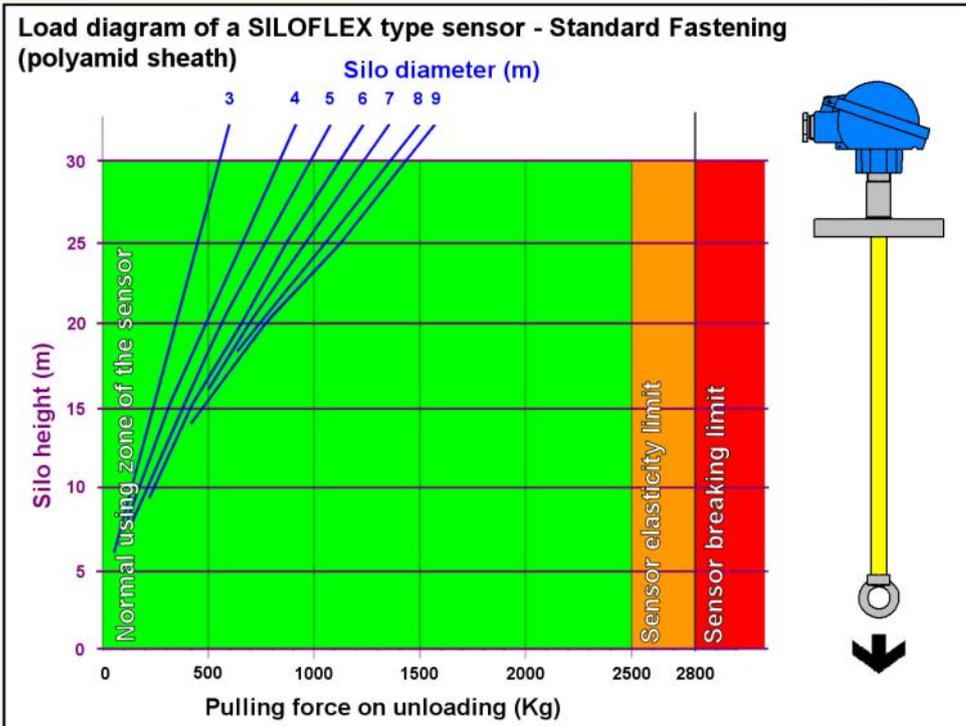
polyamide V11 matter, 14mm external diameter
 2000 kg traction resistance, 4000Kg rupture resistance
 IP65 protection, maximum temperature holding 125°C



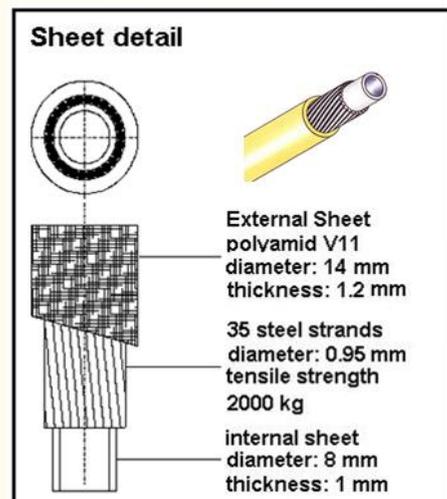
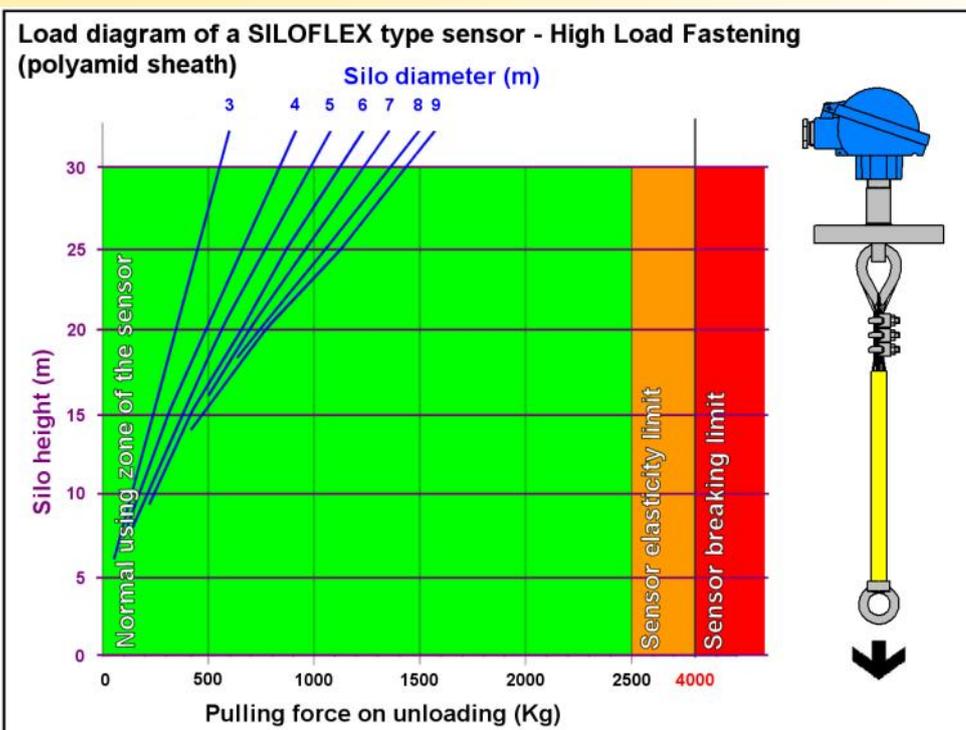
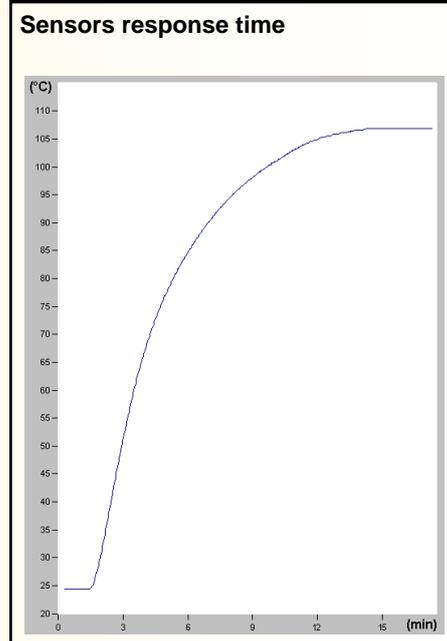
Sensor end with a hooking system.



Hook version



Load diagrams are given for grain with 750 kg/m³ average specific weight (wheat, maize, soya) for barley and colza, reduce 10% (700Kg/M³), and for sunflower, reduce 30% (450Kg/M³). Load diagrams are given with a 20% safety margin and allows including product hygrometry variations.



Analog sensors wiring (SILOFLEX-A)

Common point wiring

Standard wiring

Colors acc. DIN 47100

White
Maroon
Green
Yellow
Gris
Pink
Blue
Red
Black
Violet
Gris
Pink
Red
White
Maroon
White
Yellow
Yellow
Maroon
White
Gris
Gris
Maroon
White
Pink
Pink
Maroon
White
Blue
Maroon
Blue
White
Red
Maroon
Red

Colors acc. DEF STAN 61.12 pt1 & pt4

Red
Blue
Green
Yellow
White
Black
Maroon
Violet
Orange
Pink
Turquoise
Gris
Red
Blue
Green
Red
Yellow
Red
White
Red
Red
Black
Red
Maroon
Yellow
Blue
White
Blue
Blue
Black
Blue
Orange
Blue
Green
Blue
Gris
Blue

Colors acc. BS4737

Red
Blue
Yellow
Black
White
Green
Orange
Maroon

Digital sensors wiring (SILOFLEX-N)

Blanc	Rouge	Noir	Incolore
White	Red	Black	No Color
Data	+5V	Gnd	Terre / Earth Terminal

Operating principle of a solution based on numeric temperature sensors in Silo application.

The numeric silo probe use a communication bus called '1 wire'. The data are transmit in 1 wire and in bidirectional way. The two other wire of probe are used for power supply. Each temperature sensor have an unique 64bit identifier number and a 8bit position register (this register is define at the probe making. This register is use to define the sensor position inside the silo probe). The communication working in master / slave mode. Each silo probe are interrogated one after another through a multiplexer, the time to complete reading of a probe is approximately 25ms per temperature point. The silo probe are « plug and play » type and there are interchangeable in service, No installation procedure is needed.

Operation:

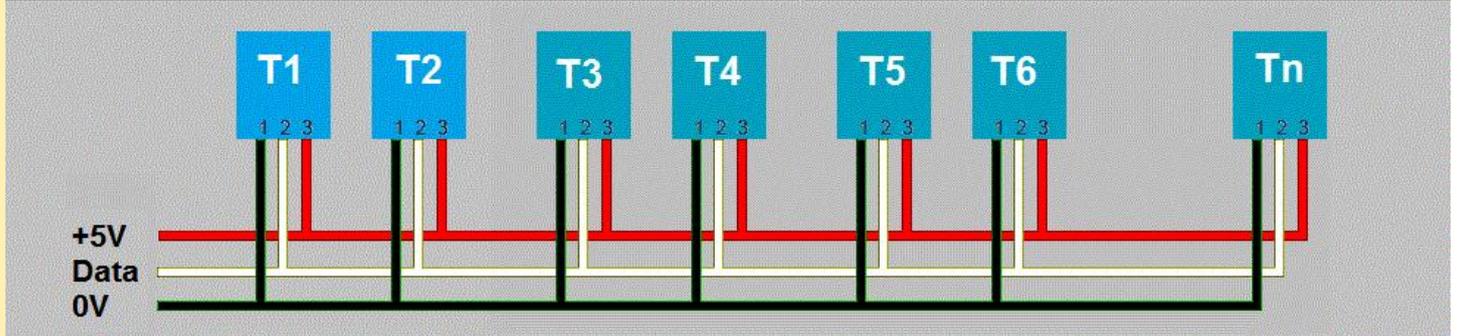
For each new silo probe reading, a specific search algorithm define the number of temperature sensors present in silo probe and verify the consistency with the configuration set in device. (detection possible point out of order during operation).

Once all points are identified, the device reads the temperature value and the position of each sensor and treat them to alarms, display, external communication,... and go to the next silo probe.

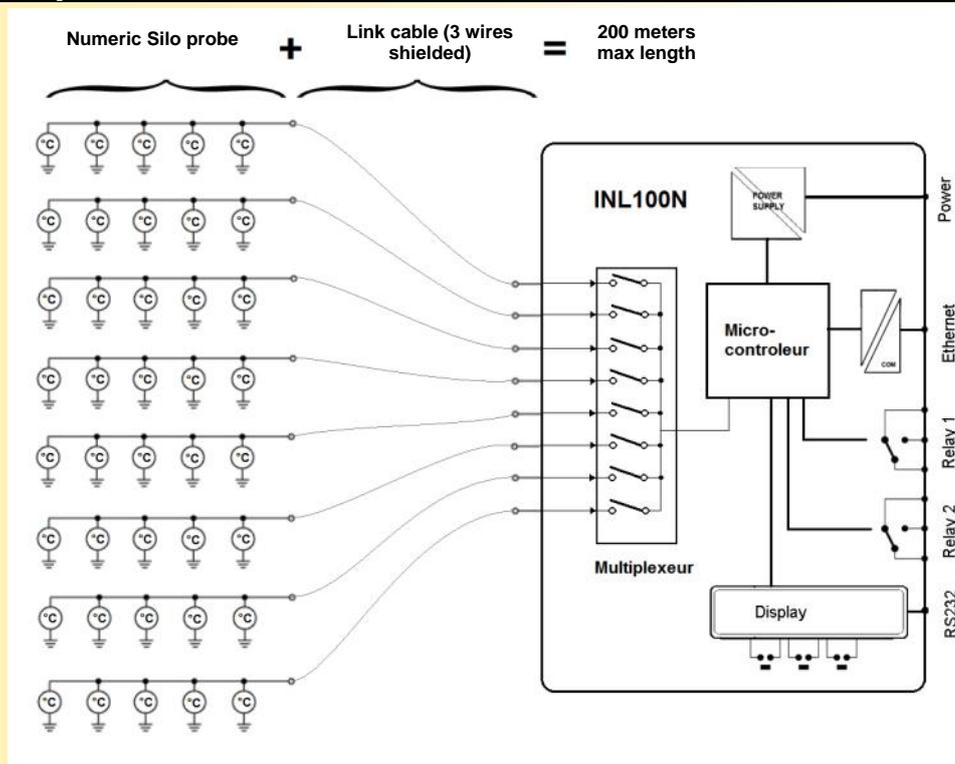
Security:

All data exchange are controlled with a checksum. A transmission error give automatically an reiteration. Each probe is fully re-initialised before each reading. This operating mode allows a perfect fiability of measure and avoids false alarms.

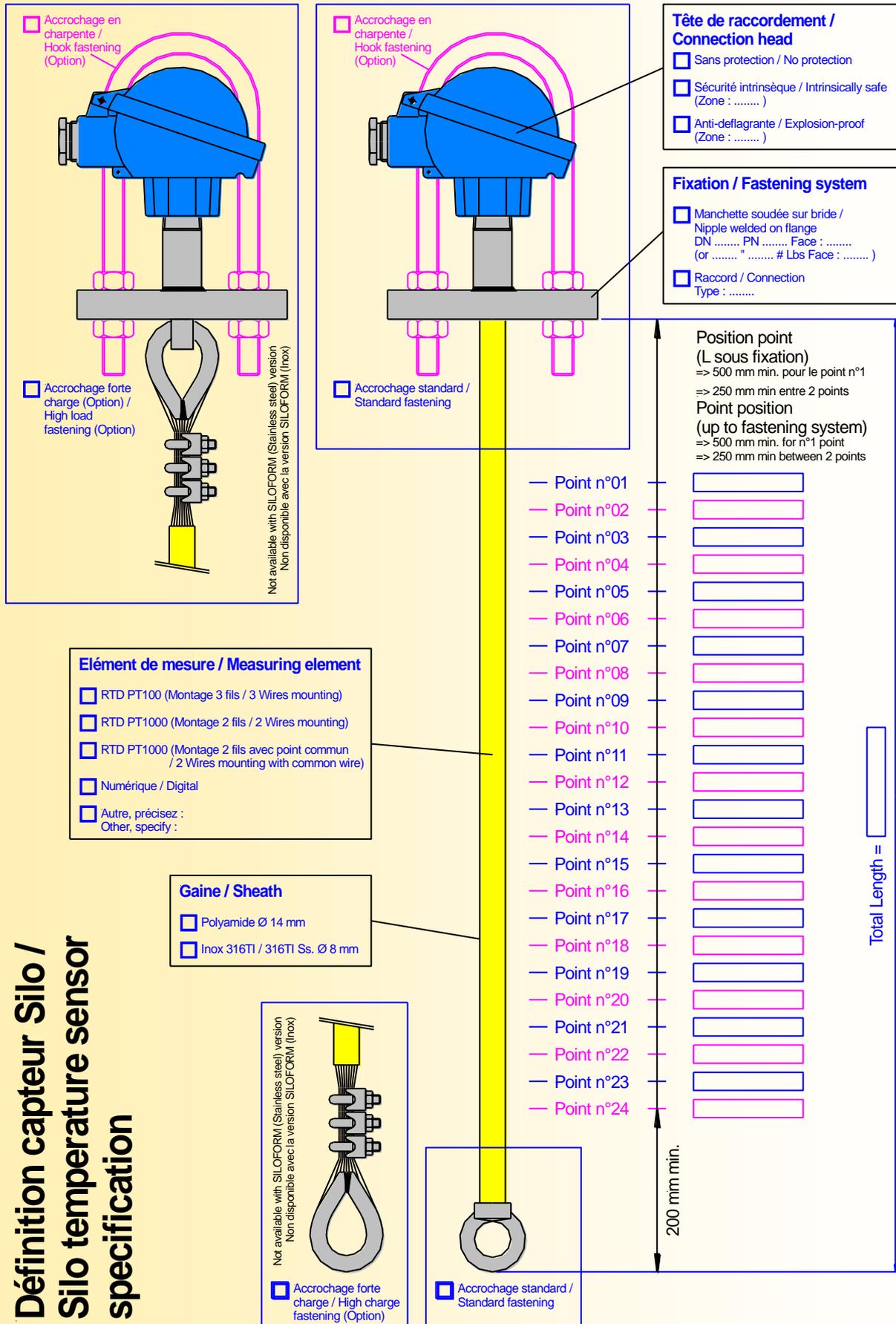
Internal constitution of a numerical Silo temperature probe



Synoptic of implementation and internal structure of a INL100N



Type : SILOFLEX



Définition capteur Silo / Silo temperature sensor specification

Temperature acquisition and monitoring station. TYPE : CML100

- **Up to 16 mesures channels for each module**

Temperature :

RTD input (PT100 , PT 1000)

Thermistor input CTN , CTP

Thermocouple input (B,E,J,K,R,S,T,...)

Process :

0..1....5....10Volts ; 0...4.....20mA

Strain gages

- **Modbus TCP Ethernet link**

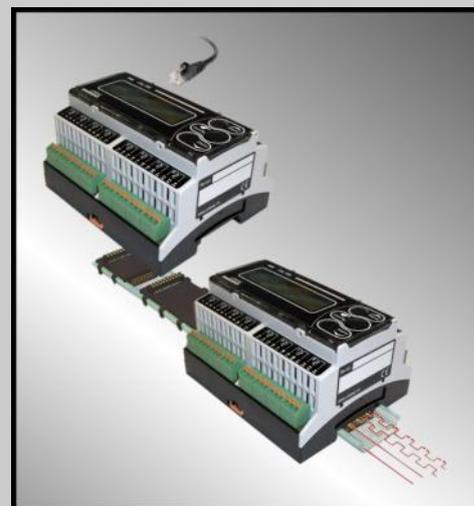
DIN rail Internal direct bus connecting ability

Option : Power over Ethernet (POE)

- **Application :**

Acquisition interface for controller or automaton

Process monitoring ...



CML100 is a monitoring station for analog signals. It permit acquisition of temperature sensors or process signals and data providing on Ethernet link (Modbus TCP protocol).

The internal Bus permit to connect multiple moduls on a single Ethernet link.

CML100 modul is a « BUS100 » system part and can be mixed with the other moduls of system.

(Digital input modul : ELL100 and Relay output modul : SRL100 ,.....)

Temperature acquisition and monitoring station. TYPE : CML36

- **Up to 14 mesures channels for each modul**

Temperature :

RTD input (PT 1000)

Thermistor input CTN , CTP

- **Power and communication bus**

DIN rail incorporated

64 module interconnection available

- **1 Modbus TCP Ethernet link**

For the entire bus

=> up to 896 mesures points

- **Application :**

Acquisition interface for controller or automaton

Process monitoring ...

Silothermometry



CML36 is compact temperature monitoring station. It permit to connect up to 64 moduls (14 channels for each device) on a single Ethernet link (Modbus TCP protocol) by an internal bus.

Measurement, acquisition and monitoring central Type : INL100 and INL150

- **Process and temperature inputs**

(mV, mA, thermocouple, PT100)

- **INL100** : 4, 8 or 12 inputs.
- **INL150** : 16, 20 or 24 inputs.
 - single configuration for each input.
 - 2 alarm threshold by input.
 - analog output (option).

- **Communication** :
 - Profibus-DP
 - Modbus
 - Modbus TCP

- **Application** :
 - acquisition interface for PLC.
 - process monitoring.



Due to its modularity this product can assume simple functions like "signal scanner with alarm management" or advanced functions up to "communicating measurement central with advanced processing function".

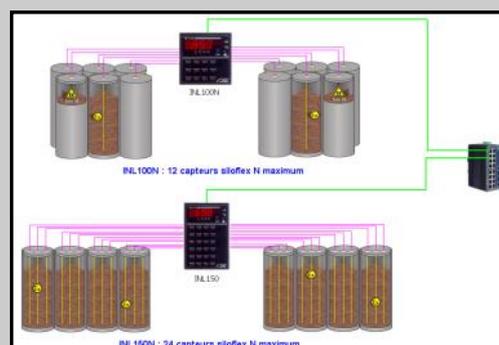
Silo temperature monitoring station INL100N and INL150N type

- **Up to 576 temperature points on a single device**
(INL150N 576 points - INL100N 288 points)

- **3 wires cable by Silo sensor**
- **Digital sensors in 3 wires network**
(-55°C to +125°C)

- **Polling time 25 mS / measure**
(576 measures in 15 seconds)

- **Accuracy: +/- 0.5 °C**
- **Output relay** (prewarning alarm, alarm and Watch dog)
- **Communication option**
 - Modbus
 - Modbus TCP (on Ethernet)
 - Profibus



INL150N is monitoring station allow assorting a large number of temperature sensors in a single device. The technology « all digital » of this set, reduce significantly the wiring and implementation costs, because of sensors inter connecting on 3 wires bus.