Commissioning and maintenance manual

THL36

REV0

Change content	Date	Indices
Initial version	20/10/09	00
EC declaration of conformity update	18/01/16	01
EU declaration of conformity / EMC consideration update	25/06/18	02
Behaviour in case of "sensor breaking"	06/02/23	03

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THL36 REV0
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1 Introduction

1.1 General Information

This manual contains necessary information for product integration to ensure the functional safety of related loops.

Other documents:
- Technical datasheet THL36 rev0
- EU declaration of conformity THL36 rev0
- Configuration handbook THL36 rev0.x

The mentioned documents are directly available on www.loreme.fr

The assembly, installation, commissioning and maintenance can only be performed by trained personnel qualified who have read and understood the instructions in this manual.

When it is not possible to correct the defects, the equipment must be decommissioned, precaution must be taken to protect against accidental use. Only the manufacturer can repair the product.

Failure to follow advices given in this manual can cause a deterioration in security features, and damage to property, environment or people.

1.2 Functions and intended uses

The THL36 provides threshold detection from a PT100 or Thermocouple temperature sensor input signal, and sensor break detection. The information is retransmitted via a dry contact.

The devices are designed, manufactured and tested according to security rules.
They should be used only for the purposes described and in compliance with environmental conditions contained in the technical data sheet : http://www.loreme.fr/fichtech/THL36.pdf

1.3 Manufacturer information

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2 Safety function and safety state

2.1 Safety function

The safety function of the device is fulfilled as long as the threshold detection function remains within +/- 2 ° C of the initial setting and the "sensor breaking" detection function is not altered.

2.2 Safety fallback position

The security fallback state is defined by the opening of the output work contact. The application must be configured to detect the opening of the contacts and considered it as "Invalid".
As a result, this state can be considered as "not dangerous".
The reaction time for all safety functions is less than 800 ms.

3 Safety Recommendation

3.1 Interfaces

The device has the following interfaces :

• safety interfaces : analog input, relay output.
• not safety or auxiliary interfaces : display, serial RS232 link (device configuration).

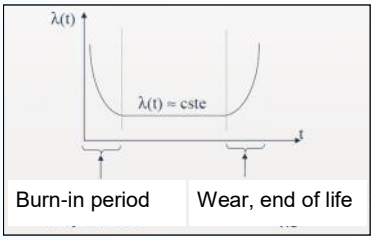
3.2 Configuration / Calibration

No recalibration is necessary, only the sensor type is to be configured and the setting of the tripping threshold is to be carried out.
The calibration is only possible by factory return, no changes should be made to the device.

3.3 Useful lifetime

Although a constant failure rate is assumed by the probabilistic estimation,
that it applies only to the useful lifetime of components.
Beyond this lifetime, the probability of failure is increasing significantly with time.
The useful lifetime is very dependent of components themselves
and operating conditions particularly the temperature,
(Electrolytic capacitors are very sensitive to temperature).

failure rate evolution



This assumption of a constant failure rate is based on the bathtub curve,
which shows the typical behavior of electronic components.
Therefore, the validity of this calculation is limited to the useful life of each component.
It is assumed that early failures are detected for a very high percentage during the burn in
and the installation period, assuming a constant failure rate during the useful life remains valid.
According to IEC 61508-2, a useful lifetime based on the feedback, must be considered.
Experience has shown that the useful lifetime is between 15 and 20 years, and may be higher if
there are no components with reduced lifetime in security function.
(Such as electrolytic capacitors, relays, flash memory, opto coupler) and if
the ambient temperature is well below 60 °C.

Note:

The useful lifetime corresponds to constant random failure rate of the device.
The effective lifetime may be higher.

User must ensure that the device is no longer necessary for the security before its disposal.

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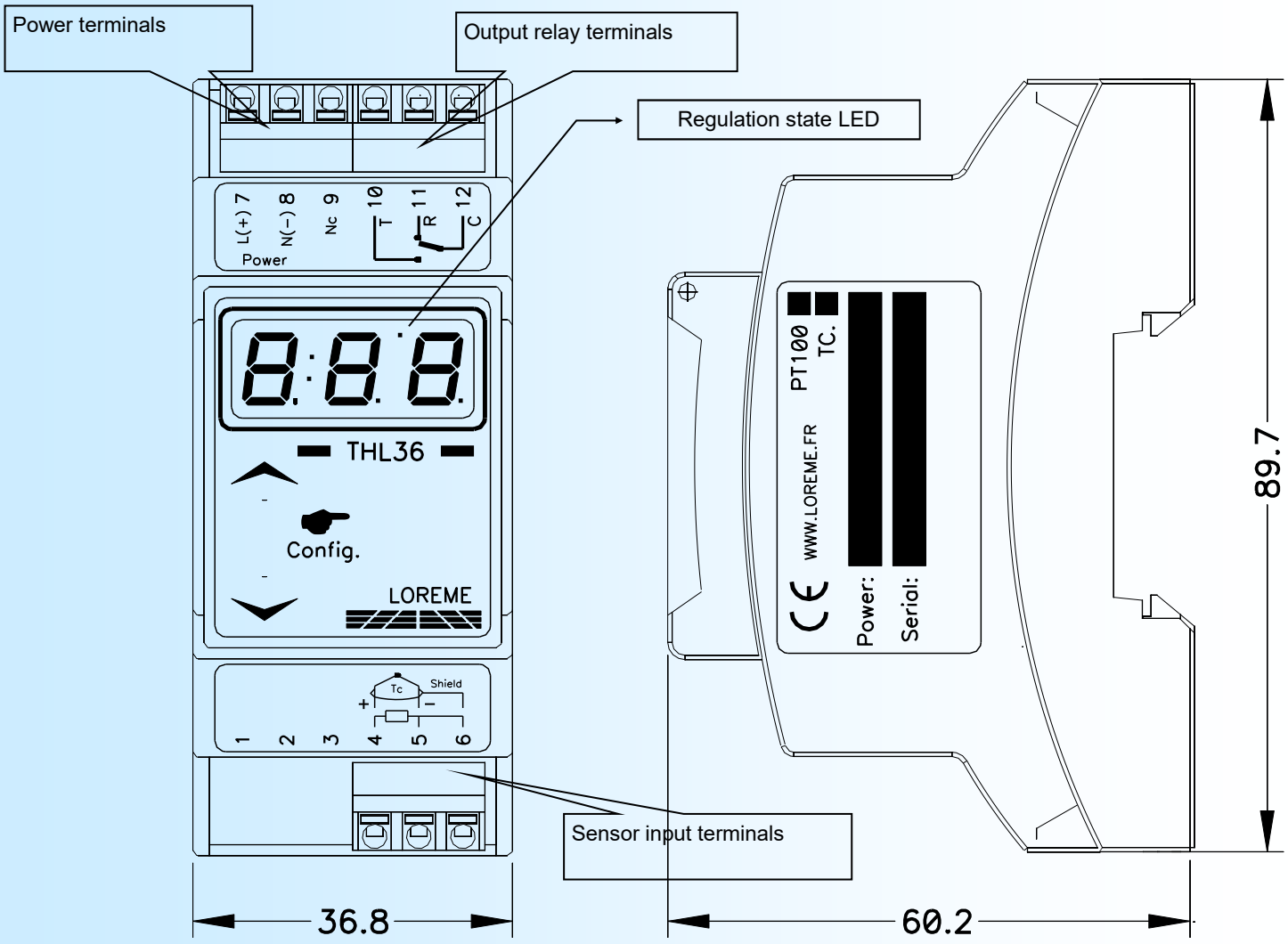
4 Installation, commissioning and replacement

Operating capacity and error reporting should be checked during commissioning (validation) see section: "**commissioning and periodic proof**" and at appropriate intervals recommended in paragraph: "**proof interval**".
Any device that does not satisfy the commissioning control must be replaced.

WARNING!
No user maintenance should be conducted, a defective device must be replaced by a new device of the same type.
For a repair return or a recalibration, it is very important that all types of equipment failures are reported to allow the company to take corrective action to prevent systematic errors.

4.1 Device description



4.2 Operation

The output relay can be activated (closed working contact) when the temperature is higher or lower than the threshold set on the front of the device (the choice must be made according to the type of security desired)

An adjustable hysteresis makes it possible to eliminate a possible beat phenomenon near the threshold.

4.3 Electrical connection and configuration

Connect the power supply to the **7 L (+)** and **8 N (-)** terminals.
The device is protected against reverse polarity.
Do not exceed the specification of the data sheet, respect the auxiliary supply voltage range.

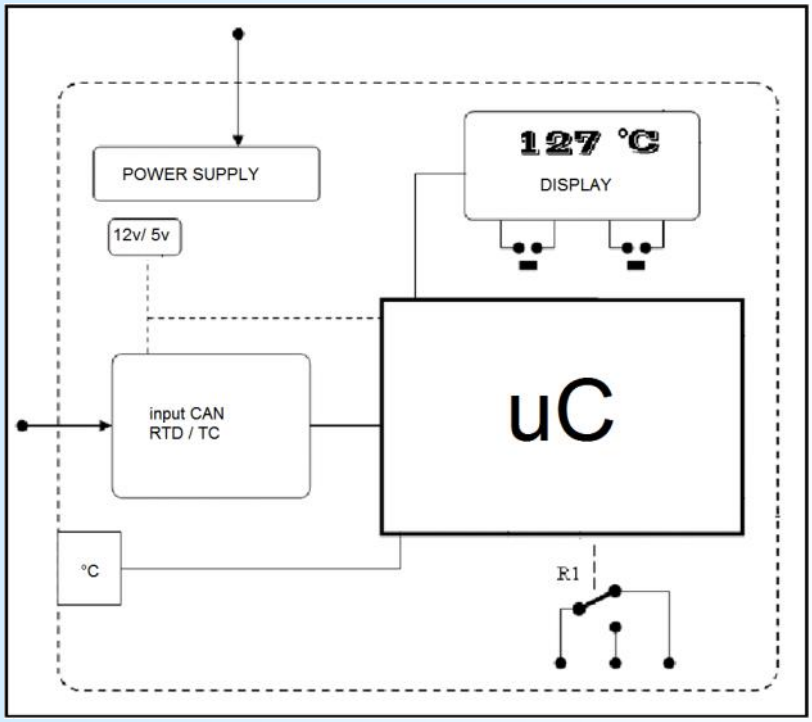
Sensor connection:

Thermocouple on terminals **4 (+)** and **5 (-)** respecting the polarity.
PT100 with 3-wire connection on terminals **4**, **5** and **6** (single wire in 4).

Attention: For the thermocouple, take care of using compensation or extension cable with the same thermocouple.
For Pt100, use a 3 or 4 wires with same section to have a good line compensation.

Connecting the relay output to terminals **10 (T)**, **11 (R)** and **12 (C)**.
Be careful not to exceed the switching specifications of the relay as this may damage the contacts.
The contacts must be used in such a way as to make the system safe on loss of the module power supply.

4.4 Internal diagram



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5 Commissioning and periodic proof

The periodic test procedure is defined by LOREME and must be followed by the end user to ensure and guarantee the device correct operation over time. Periodic testing should be performed following the procedure defined below and at the intervals defined under paragraph **"proof interval "**

5.1 control steps

Periodic proof allows detection of possible product internal failure and loop calibration.
Environmental conditions and a minimum heating time of 5 minutes must be respected.

Transmitter test of the threshold detector the signal processing chain (the system is unavailable during the test).

1. If necessary, bypass the security system and / or take appropriate provision to ensure safety during the test.

2. Inspect the device, no visible damage or contamination (oxidation).

3. Disconnect the relay outputs and connect an *ohmmeter** , leaving the sensor connected.
   (the relay is closed, the LED is on, "out of alarm" condition).

4. Disconnect the sensor providing the input signal.
   (The relay must open and the LED will be turn off, "sensor breaking" detection).

5. Connect a *simulator** at the input of the device.

6. Simulate the temperature corresponding to the value of the desired switching threshold.

   a) If the unit has never been adjusted, adjust the threshold using the keypad located under the front cover.
      (check the correct selection of the input sensor type and the relay detection type : up or down)
   b) Once the device is set, check the tripping point by varying the temperature of the simulator around the set point.
      (switching hysteresis is adjustable).
   c) During a periodic inspection, for a device already adjusted previously, a tripping point deviation of more than 2 °C must alert a hidden internal fault, it is then strongly recommended to replace the device.

7. Disconnect the simulator and reconnect the sensor to the converter input.
   (check that the relay is closed, the LED is on, "out of alarm" condition).

8. Reconnect the relay outputs and check that there is no fault on the security equipment.

9. After testing, the results should be documented and archived.

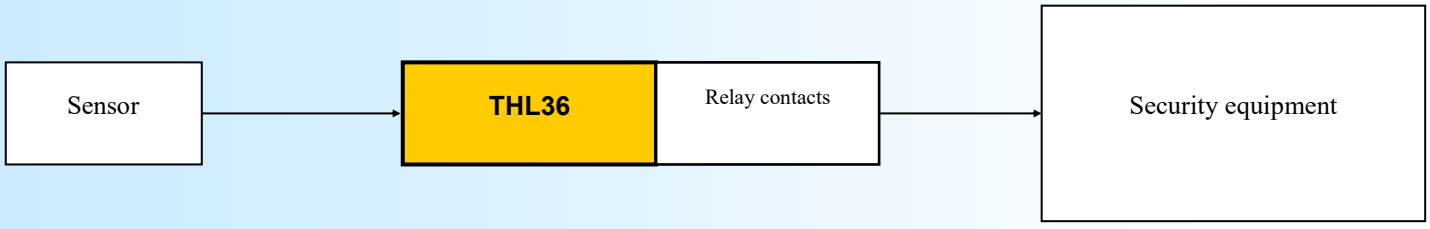
Any device that does not satisfy the control needs to be replaced.

*note *: Ohmmeter and simulator must be calibrated on a regular basis for this test*
(depending on the state of the art and best practice)

5.2 proof interval

The periodicity of the controls must not exceed 2 years under normal ambient temperature (10 °C to 35 °C).
For more severe conditions of use it is preferable to decrease the periodicity to 1 year.

Signal processing chain



TEMPERATURE PROTECTION RELAY
temperature regulator

Type: THL36

Déclaration UE de conformité / *EU declaration of conformity*

Aux exigences de protection de la directive CEM (2014/30/UE) "Compatibilité ELECTROMAGNÉTIQUE"
et aux exigences de la directive BT (2014/35/UE) "BASSE TENSION"
With requirements of directive CEM (2014/30/EU) "Electromagnetic Compatibility"
And requirements of directive BT (2014/35/EU) "LOW VOLTAGE"

LOREME déclare sous sa seule responsabilité, que le produit :
We declare under our sole responsibility, that the following product:

Désignation (FR) : Relais à seuil de température PT100/Thermocouple, Thermostat industriel
Designation (US) : Temperature protection relay, temperature regulator

Type: THL36 Révision : 0 date : 06/07/17

CE

est
conforme aux normes génériques ou spécifiques harmonisées suivantes :
Complies with the following harmonized generic or specific standards:

Test Réalisé *tested*	**Normes** ***Standards***	**Description**	**Conditions**		
Directive basse tension BT (2014/35/UE) *Low Voltage Directive BT (2014/35/EU)*					
X	NF EN 61010-1 2011	Règle de sécurité pour les appareils électriques de mesurage, de régulation et de laboratoire	*Safety requirements for electrical equipment for measurement, control, and laboratory use*		
EN 61000-6-4/A1 (2011) Compatibilité électromagnétique émission pour les environnements industriels ***Emission standard for industrial environments***			**Limites** ***Test level***		
X	EN 55011 2016	Emission rayonnée *Radiated emission*	30-230 MHz: 30 dBµV/m (à 30m) 230-1000 MHz: 37 dBµV/m (à 30m)	Groupe1 Classe A	Ok
X	EN 55011 2016	émission conduite sur l'alimentation *power supply induced emission*	0.15-0.5 MHz : 79 dBµV / 66 dBµV 0.5-30 MHz : 73 dBµV / 60 dBµV	Groupe1 Classe A	Ok
EN 61000-6-2 (2017) Compatibilité électromagnétique (CEM) Immunité pour les environnements industriels ***Immunity standard for industrial environments***			**Niveau de test** ***Test level***	Influence *Influence*	Critère *Criteria*
X	EN 61000-4-2 ESD 2009	Immunité aux décharges électrostatiques *Electrostatic discharge immunity test*	4 kV au contact 8 kV dans l'air	Sans influence *No influence*	B
X	EN 61000-4-3 2006	Immunité aux champs électromagnétiques rayonnés aux fréquences radioélectriques *Radiated Immunity*	80 à 1000 MHz 10 V/m (eff) 80% AM (1 kHz)	Sans influence *No influence*	A
X	EN 61000-4-4 EFT 2013	Immunité aux transitoires électriques rapides en salves *Electrical fast transient /burst immunity test*	2 kV crête 5 / 50 ns 5 kHz	Sans influence *No influence*	B
X	EN 61000-4-5 CWG 2014	Immunité aux ondes de chocs 1,2/50 µs. *Surge immunity test*	1.2/50 (8/20) µs 2 kV	Sans influence *No influence*	B
X	EN 61000-4-6 2014	Immunité aux perturbations conduites, induites par les champs radioélectriques *Conducted Immunity*	0.15 à 80 MHz 10 V 80% AM (1 kHz) 150 Ohms	Sans influence *No influence*	A
X	EN 61000-4-8 AC MF 2010	Immunité au champ magnétique à la fréquence du réseau *Power frequency magnetic field immunity test*	50 Hz 30 A/m (RMS)	Sans influence *No influence*	A
X	EN 61000-4-9 pulse MF 2016	Immunité au champ magnétique impulsionnel *Pulse magnetic field immunity test.*	1000 A/m peak 6,8/16 µs pulse	Sans influence *No influence*	B
X	EN 61000-4-11 AC dips 2004	Immunité aux creux de tension, coupures brèves et variations de tension en AC *Voltage dips, short interruptions and voltage variations immunity tests.*	-30 % 10 ms -60 % 100 ms -95 % 5000 ms	Sans influence *No influence*	B -> 10ms C -> 100ms
X	EN 61000-4-12 Ring wave 2007	Immunité aux ondes oscillatoires *Oscillatory waves immunity test*	2.5 kV common mode 1 kV differential mode @ 1MHz	Sans influence *No influence*	B
X	EN 61000-4-29 DC dips 2001	Immunité aux creux de tension, coupures brèves et variations de tension en DC *Voltage dips, short interruptions and voltage variations on DC input power port immunity tests*.	-30 % 10 ms -60 % 100 ms -95 % 5000 ms	Sans influence *No influence*	B -> 10ms C -> 100ms

Metz, le : 13/07/17
Signé au nom de LOREME ; M. Dominique CURULLA
Signed on behalf of LOREME
Année d'apposition du marquage CE : 2017
CE marking year

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EMC Consideration

1) Introduction

To meet its policy concerning EMC, based on the Community directives **2014/30/EU** & **2014/35/EU**, the LOREME company takes into account the standards relative to this directives from the very start of the conception of each product.
The set of tests performed on the devices, designed to work in an industrial environment, are made in accordance with **IEC 61000-6-4** and **IEC 61000-6-2** standards in order to establish the EU declaration of conformity. The devices being in certain typical configurations during the tests, it is impossible to guarantee the results in every possible configurations. To ensure optimum operation of each device, it would be judicious to comply with several recommendations of use.

2) Recommendations of use

2.1) General remarks

- Comply with the recommendations of assembly indicated in the technical sheet (direction of assembly, spacing between the devices, ...).
- Comply with the recommendations of use indicated in the technical sheet (temperature range, protection index).
- Avoid dust and excessive humidity, corrosive gas, considerable sources of heat.
- Avoid disturbed environments and disruptive phenomena or elements.
- If possible, group together the instrumentation devices in a zone separated from the power and relay circuits.
- Avoid the direct proximity with considerable power distance switches, contactors, relays, thyristor power groups, ...
- Do not get closer within fifty centimeters of a device with a transmitter (walkie-talkie) of a power of 5 W, because the latter can create a field with an intensity higher than 10 V/M for a distance fewer than 50 cm.

2.2) Power supply

- Comply with the features indicated in the technical sheet (power supply voltage, frequency, allowance of the values, stability, variations ...).
- It is better that the power supply should come from a system with section switches equipped with fuses for the instrumentation element and that the power supply line be the most direct possible from the section switch.
- Avoid using this power supply for the control of relays, of contactors, of electrogates, ...
- If the switching of thyristor statical groups, of engines, of speed variator, ... causes strong interferences on the power supply circuit, it would be necessary to put an insulation transformer especially intended for instrumentation linking the screen to earth.
- It is also important that the installation should have a good earth system and it is better that the voltage in relation to the neutral should not exceed 1V, and the resistance be inferior to 6 ohms.
- If the installation is near high frequency generators or installations of arc welding, it is better to put suitable section filters.

2.3) Inputs / Outputs

- In harsh conditions, it is advisable to use sheathed and twisted cables whose ground braid will be linked to the earth at a single point.
- It is advisable to separate the input / output lines from the power supply lines in order to avoid the coupling phenomena.
- It is also advisable to limit the lengths of data cables as much as possible.