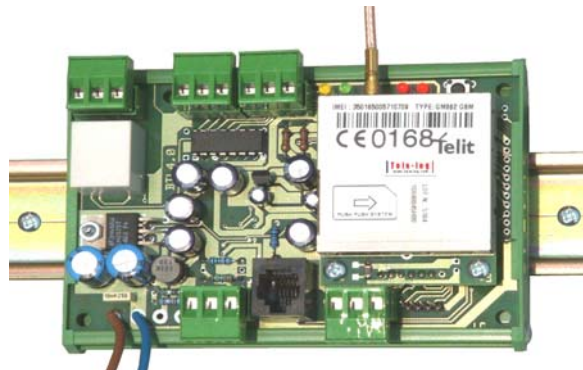


TELE-LOG "TL4"

The heating GSM remote control.

Doc v.tl4.02e sw 4.01 12/09/2005



PRESENTATION.

With reference to the previous basic versions "Tre" and "C3" the model "TL4" has been oriented to the professional user and has been customised several times. This document describes a standard version named 4.00d, suitable for the use in private apartments or even to keep the essentials of a heating plant under remote control.

The equipment is unboxed and suitable for DIN bar, seven units width.

Some special features like various types of analogue inputs will be eventually discussed in addendum.

The first output, internally equipped with a relay is now a simple thermostat whose set point is moveable via SMS or even through the optional LCD display panel.

The two further outputs are simply on-off switches remotely or locally controlled. They are the outputs 1(A) and 2(B).

The "TL4" new model has been appreciated in the professional field for centralised heating plant surveillance. The Pt100 sensor with adequately lengthened cable can measure pipe temperature up to 100C and send the essential information of the heating plant.

The high reliability and in particular: the periodic battery test, double temperature sensor and all the care we have taken to ensure uninterrupted proper working in unmanned sites make the "TL4" an excellent choice both for the second houses and for remote surveillance of large heating plants as well. All of this with simplicity and easy of use.

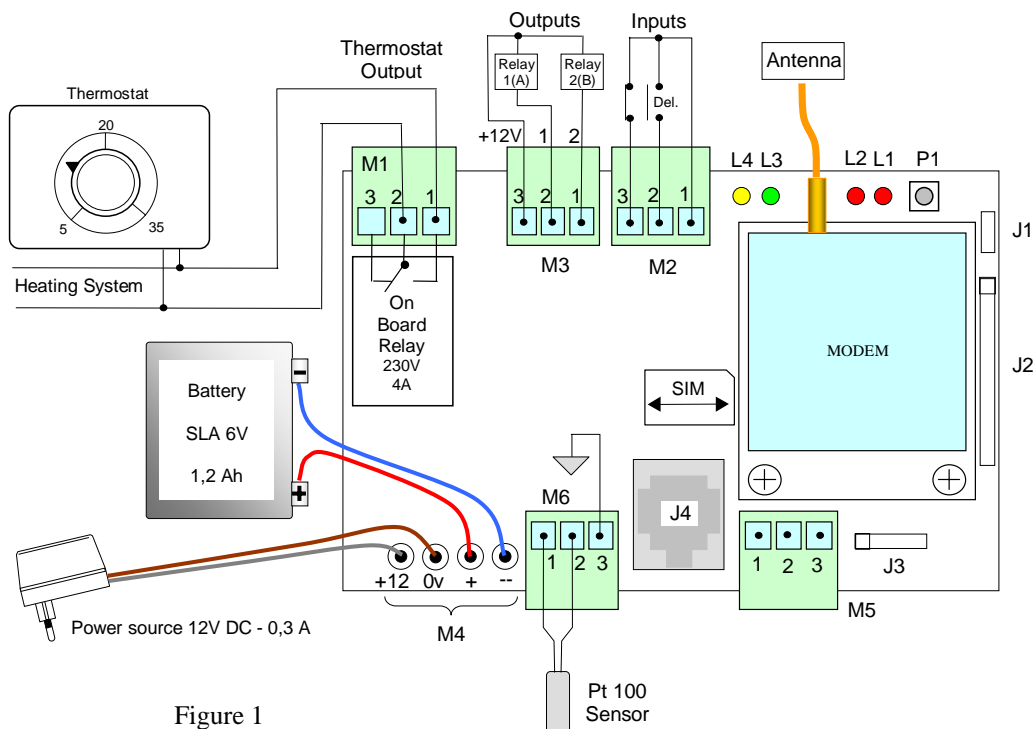


Figure 1

INSTALLATION AND USE.

For the use in the second house it is advisable to conserve the existing ambient thermostat left in PARALLEL with the output A (M 1). If left at the low antifreeze temperature it will produce an additional safety feature. The main output is actually a thermostat already equipped with internal relay. (fig. 1)

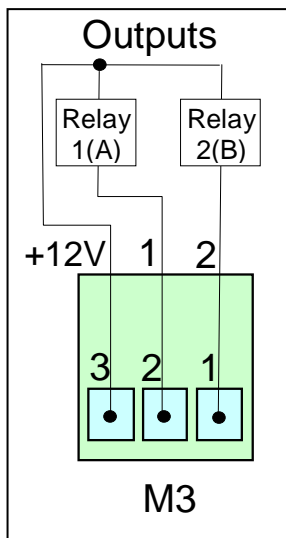


Figure 3

Outputs 1 and 2 are instead simply circuit drivers for external 12V relays whose coil current must not exceed 100mA at the points M3-2 M3-1. They can be aligned on the same mounting bar or omitted if not used. (fig. 2)

To connect the inputs you have to remember that the generic alarm at the point M2-3 is in normal condition when closed to ground and its intervention is immediate (few seconds), while the input M2-2 usually assigned to the burner malfunction, is normally open. Its intervention is deferred two minutes to prevent false alarms. (fig. 2)

The external contacts must be free of potential, the current is about 6mA with 6VDC open circuit.

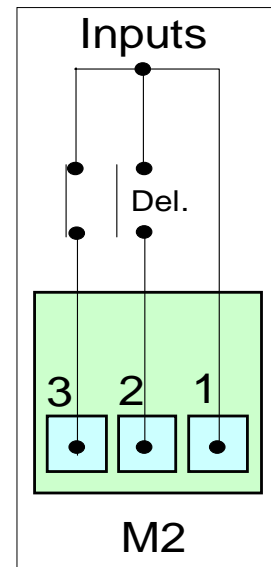


Figure 2

The requirement for the power supply is 10-16VDC (not stabilised) capable of at least 300mA current. Do not undervalue this spec or the device will not be reliable without an efficient battery connected at the point M4+/- (fig. 1)

PRELIMINARY TEST

You need a SIM enabled and active. To make it sure test the SIM on a mobile phone; make a call to it with another phone and check the call arrives regularly.

- **Important:** the "PIN CODE" must be disabled before the SIM is inserted in the equipment. This can be done through the menus of any phone.

Verify you can make a call using the SIM in your phone and, most of all, check the possibility of receiving and sending SMS.

If the SIM has been purchased expressly for the Tele-log, remember that it is not immediately active. It takes an amount of time depending by the provider.

Attention! Before to apply power insert the SIM as in picture 1. Never extract or insert the SIM with the power already applied. Then :

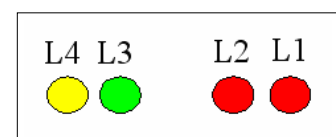
- Ensure the antenna connector is properly inserted and keep the antenna away from metal parts.
- Apply 12V power, the equipment is protected against reverse polarity.
- Connect battery wires, red to the plus black to the minus.

Beware! The reversed polarity can cause severe damage to the equipment.

The LED's will lit sequentially and the red one marked L1 will begin to show an "I" in Morse code: two short flashes.

You can immediately change the output states that have now been restored as they were at the moment of the last power off. Pushing sequentially the button P1 verify that LED L3 changes its state. Every two changes of state of L3 there will be a change of L4, allowing you to reach any combination of output states by means of a single button.

Meanwhile the red LED L1 will pass through the initialisation phases showing the letters A (dah dih) , B (dah dih dihdih), C (dah dih dah dih) and finally D (dah dihdih).



The red LED L2 will show now the GSM signal strength with a sequence of short flashes, from none to seven.

The overall sequence could take twenty or thirty seconds or even more, depending on the network.

While the main supply is missing (working with the sole battery) light intensity is reduced to save energy.

Using your self phone, make a call to the number of the SIM you've inserted in the Tele-log. The call will be rejected (no charge) and the LED L1 will suspend its blinking. Within a few seconds, normally, you will receive on your phone a message like this:

Out1=on	actual state of the output 1
Out2=off	actual state of the output 2
measured=21.4C	temperature as sensed by the Pt100.
int=22.3C	temperature from the sensor in the box.
thermst=20.0C	set value on the thermostat
f. strength=21	GSM field strength scale from 0 a 32
Al temp=6.0C	alarm temperature
batt. 6762mV 12.2mA	voltage and current measured on the battery

BASIC COMMANDS

Using the push button P1, leave the LED L3 and L4 off .

Now send, using your mobile phone, the simple message **"on"**.

You can use capital letters or not, or even other forms. No preambles, passwords or other requirements.

Here follows all the forms the tele-log can recognise for the switch-on command.

ON, ACCENDI , ACC. All of them are equivalent.

Wait the necessary time to deliver and to receive the message... The green LED L3 will lit and the correspondent output relay will be energised if connected.

Upon the reception of a SMS the device answers immediately with actual eventually modified situation.

Now try to switch off using one of the following:

OFF, SPEGNI ,SPE

RESTRICTING UNAUTHORISED ACCESS.

The device so far accepts commands coming from any mobile phone because no number has been registered yet. To limit the access to your phones only, you have to enrol one or more numbers, up to five.

These will be the only to be recognised and authorised. All the calls from any other number will be ignored and all SMS will be simply cancelled.

In order to set your numbers in the tele-log you have send a message with the following format:

N1nnnnnnnnn N2mmm....

And so on up to five numbers; the sequence in unnecessary, you can mention N5 as the first and modify one to five number in a single SMS, in any order. It is advisable to use the international prefix but not necessary if the phone is the Italian +39; it is necessary in any other case to complete with the preamble.

Your numbers must be entered without spaces, the only not numeric symbol allowable is the leading plus; double zero is not recognised instead of it.

Beware! Check the correctness of the numbers you are going to issue or you could even lock the device on unexistent numbers. Always load at least two numbers. To simply cancel a number use the form N1 or N2 or other position followed by three spaces.

No preamble +++ , SET and the like are necessary any more, as in the previous versions.

The message can comprehend up to six commands in any order.

As a reference example you can cancel the numbers in position 3 and 1 and, at the same time load the number +393331234567 at position 4 with the message:

N1□□□N43331234567 n3□□□

Please note the three spaces indicated by the little empty squares.

Whenever a number is modified the device will answer a message like this:

Tele-log.com "TI4" rev. 4.01d	model and software level .
N1=+393481234567	I° registered number
N2=+393494661224	II° registered number
N3=	III° number, empty.
N4=	IV°
N5=	V°
IMEI=350165005155194	IMEI, the same on the GSM label
BaTest=OK	battery test result
drop=-145mV	

In order to get the above mentioned message without altering the previously stored numbers you can use the command "LIST" given alone in a SMS.

SETTING THERMOSTAT TEMPERATURE.

The intervention temperature, the one below which the output relay is energised , can be set by the command T= or TH= within a command message.

If for instance you want to set the temperature at ten degrees:

T10

The symbol "=" can be substituted with a space or simply omitted. All the following examples are equivalent

t10 t=10 T 10 TH10 Therm10 thrm10 term=10

The state of output relay is not reported by any LED.

SWITCHING OUTPUTS.

Two outputs A an B can be separately set with the button P1 and by mean of SMS as well. In the latter case the commands "on" and "off", if sent so simply without specifying "what" are directed to the output 1(A) M3-2. If the commands are intended to switch a specific output or both you'll need to specify by means of one of the following forms preceded by "on" or "off".

To indicate both outputs:

tutto, tut, all , 1 e 2, 2 e 1, 1 & 2, 2 & 1 , uno e due , 1e2 2e1 1&2 2&1 , both, tout.

Only the second B:

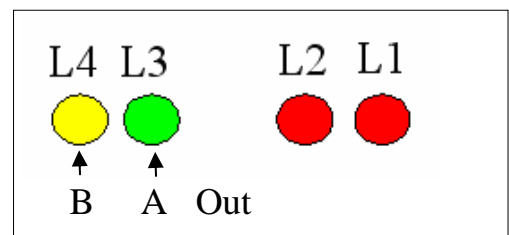
2 , due, two, deux, dui, du.

The fist A only, nothing or:

1, uno, one, un

Here some valid examples:

on, on 1, on2, on both, off, off two



The outputs allow to control for instance an emergency electric heater (not directly, a power relay is required to handle the large current), any kind of load of your choice or even a second apartment.

The LED's L3 and L4 show respectively the state of outputs A and B.

CHECKING ELECTRIC ENERGY PRESENCE.

The equipment is capable of proper working for several hours after a power loss, If the battery is still in its full efficiency, more than one day.

After ten minutes since the power drop an alarm message is sent **at the first three phone numbers** in memory.

The model “tre” does not give automatic messages upon electric power return, you can enquire it with a voice call following the urgency or relevance of the situation.

ALARMS.

The device prompts messages to the first three phone numbers (N1,N2,N3) whenever one of the following occurs:

1. Lack of energy since ten minutes.
2. Input 1 activated (closed to ground) continuously since two minutes, typically burner malfunction
3. input 2 activated (open) for five seconds, generic alarm.
4. Temperature measured below on TA, risk of **FROZEN PIPES**.
The condition must persist for three minutes, else is ignored.

The delays are to prevent false alarms.

All of the four alarm conditions are completed with a time counter expressed in hours and minutes to measure the time since the occurrence of the condition .

These counters are reported in the SMS together with the condition if actual and are reset to zero at the return to normal.

REMOTE ENQUIRY

You can get a SMS in response from “TL4” simply calling the SIM.

The response is sent only if the phone was previously enrolled or, to any phone if none has been registered yet.

The call is rejected (no voice communication takes place), the answer message is delivered typically within a few seconds.

Sometime the network does not perform the caller identification protocol; in this case you can send an empty SMS, or not containing any valid message. This message will permit the identification of the recipient. Make sure the caller number is not hidden in the calling phone.

TYPICAL MESSAGE FORMAT.

The format is common for both the cases: unsolicited or requested from the user.

The message is divided in five sections:

- Abnormal (attention) conditions
- Output states
- Measured temperatures, thermostat settings and signal strength
- Battery measurements and eventual malfunction

Example of a complete message, the five parts of it are discussed further

ALAR. since 1h 13m	open input
Out1=off	output state of relay,
Out2=on	out state of relay driver M1 1,2
measured=18.9C	measured with the Pt100 sensor
int=20.1C	measured within the box
f. strength =17	radio field strength 0 - 30
thermst=20.0C	set value on the thermostat
Al temp=3.0C	alarm temperature
batt.6770mV 00.1mA	battery measures
FF490000FF69	diagnostic information

ABNORMAL CONDITIONS

All of them , if actual, are reported as message heading together with the elapsed time since their beginning.

Examples:

Cold ! since 32m
Block! since 5m
ALAR. since 1h 13m
Lacks 230V! since 3h 12m

The abnormal conditions not actual at the moment of message delivery are not reported, that is the normal condition is not mentioned.

OUTPUTS STATE.

The outputs are three. The first is equipped with the internal relay while the second and the third comes from the connecting points 1 and 2 of M3 are connectable to external relays rated 12V 100mA max. current. Excellent are for instance some solid state relays (SSR) to control an electric heater.

The first output is intrinsically a thermostat controlled by the set value and by the sensor: T1 and Pt100

If its state is to be independent from the measured temperature you can set it outside the possible range.

If a sure off state (disabled) is desired it is possible to set the temperature below the minimum possible value -20, for instance -21. To force always on set T1=101

The setting of TA has only the effect to determine the temperature at witch the cold alarm will be sent.

The state of the outputs are signalled on the LED 3 for the A output and LED4 for B output.

MEASURED TEMPERATURES

Two sensors, one is a Pt100 ranging from -20 to 100°C. The probe can be placed at a few meters from the box simply lengthening the wires. We recommend the use of at least one square millimetre cable, twisted and shielded cable are better.

A procedure is given to compensate offset error caused by the cable resistance.

The second sensor is mounted internally (**INT=21.1C**), it has a range from -10 to 70C. It's main purpose is to compensate the battery charge for longer life and reliability. Whenever the Pt100 main sensor is not removed and reallocated away from the box the second can be used as a reference with improvement of the reliability.

GSM FIELD STRENGHT.

It is expressed in a range from 0 to 32. Values of 7 , 8 or 9 are sufficient. This indication is can be useful to locate the best position in case of scarce signal.

LOW TEMPERATURE SETTING

Minimum allowable temperature ,temperature of alarm, can be set with the command "TA=" in a similar way like "T" (thermostat) command.

If the measured temperature goes below that limit an alarm message will be sent after three minutes an after forty once more again.

BATTERY MEASURES.

Voltage and current are reported respectively in millivolts an milliamperes. With the battery fully charged the voltage can vary from 6500mV if it is hot, close to 30 degrees, and 6900mV at a few degrees. The current is reduced to a few milliamp units at end of charge. Sometimes it possible to observe a little negative current.

With main power off, a typical idle current is -40mA while the voltage slowly goes down. The internal electronics can work at five volts.

Eventual battery problems reported are:

- | | |
|----------------------------|--|
| 1. BATTERY UNCONNECTED | forgot it? Even a faulty battery can cause this error. |
| 2. CAN'T REACH FULL CHARGE | maybe an element is shorted or there has been repeated losses of power with incomplete charge, wait one more day of charge, if the problem persists, change the battery. |
| 3. INSUFFICIENT CAPACITY | Remaining capacity (not level of charge) is periodically evaluated. The battery is still probably able to withstand a few hours blackout but change it. |

TO CONTROL A CENTRALIZED HEATING

The device "TL4" has found the interest of professional operators in the building heating field. The design was primarily oriented to the single apartment or house, but with a couple of inputs and the capability to measure a pipe temperature it is fully feasible to keep a plant under control, and at very competitive cost.

The input at M2-2 is expressly delayed to manage a burner abnormal, normally open.

The input at M2-3 is immediate and can be used as a generic alarm, normally closed.

OUTPUT 2 (B) RESET PULSE

This function is intended for devices that need a pulse for any reason, The pulse has a 2 second duration upon a command:

**RES ,RESET
RIP , RIPRISTINO**

The command leaves the output in the off state, The output can be set on and off otherwise with the commands "ON" and "OFF".

After the performed command the TL4 sends back a SMS claiming "reset done".

OFFSET ADJUSTMENTS.

It is possible to correct the temperature error introduced by a the lengthened cable with a special command.

The error must be measured in advance. If you can rely on a reference thermometer, measure the temperature very close to the sensor connected at the end of the cable. Subtract it from the value reported on the SMS to obtain the error. For instance if you read 20.0C on your thermometer while the SMS reports 21.1C the error is 1.1C . Allow sufficient time to stabilise; in the same room there can be degrees of difference in different points.

We suggest to tape the thermometer to the Pt100 probe and leave them half an hour untouched before to take the readings.

Alternatively you can connect a precision 100Ohm resistor and assume the value reported in the SMS as the error.

Assuming the measured error of the example, send a message like this:

OFFSET110 or OFFSET=110

The error is to be expressed in hundredths of a degree. The value can also be negative.

The correction is not cumulative, that is it can be set only once. Further corrections will substitute the previous one and can not exceed 2.4 degrees.

CHARACTERISTICS

Dimensions	.	mm 125x80x45
Operating temperature range	.	- 10 °C ÷ +60°C
Supply	.	12V DC (10-18V)
Consumption in idle state	.	1W approx.
Consumption during battery recharge	.	5W .
Consumption during connection	.	4W .
GSM	.	EGSM 900/1800MHz
Antenna	.	INTERNAL LOOP
Temperature probe	.	Pt100 cl. A (0.15°C max error at 0°C)
Output contact rating	.	250 V a.c. / 4A
Input ratings	.	6V 6mA
External relay drivers	.	12V 100mA max
Battery	.	SLA 6V – 1,2 Ah
Main probe temp. range	.	- 20°C ÷ +100°C ± 0,5°C max error
Internal probe temp. range	.	- 10°C ÷ +70°C 1,1°C max error

Warranty/Disclaimer

The device is fully guarantee against any defective parts or malfunctions since 24 months from its demonstrable date of purchase. The battery is excluded since it can be damaged if left deeply discharged for a long time.

The equipment Tele-log model “TL4” has been designed, manufactured and tested with the maximum care and attention to its reliability but the “Zanotto applicazioni microprocessori” declines any responsibility for the damages eventually caused by the missing or erroneous performance of the device.

In particular the equipment is intended to make remotely available the measurements to the user, but it is his responsibility to use it and ascertain the service has not been suspended for any reason.

