OPERATION MANUAL

FOR DISPLAYS SERIES

DN-109AT, DN-119AT,

DN-129AT AND DN-189AT

Index

1. INTRODUCTION

The numerical displays for series **DN-109AT, DN-119AT, DN-129AT and DN-189AT (DN-1_9AT)** are industrial displays with analogue input for temperature displaying using PT-100, Thermocouple J, K or T.   All the models are manufactured in versions of 3, 4 or 5 digits, with one or two display sides.

The large digit display size **DN-109AT of 57mm, DN-119AT of 100mm, DN-129AT of 250mm and DN-189AT of 180mm** with a legible distance from 30m to 120m, is one of the main characteristics.

The colour option, only available in some models, lets you select the digit colour between red, green and yellow.

All the equipment is provided completely calibrated, with the data stored in the memory non-volatile, eliminating the use of trimming potentiometers.

2. GENERAL CHARACTERISTICS.

2.1. Electrical characteristics

2.1.1. Electrical characteristics of the DN-109 displays.

Supply Voltage...88 to 264 VAC 47 to 63Hz or 19 to 36VDC:
Consumption ....See "Display weight and power consumption."
Display ....7 segments, 57mm high + decimal point.
....Red Led colour. Viewing distance: max 30 meters.
Text (LED)...Formed by LEDs of 5mm diameter, 50mm character
....height.
Text (Vinyl) ....White vinyl. 50mm character height.
Parameter memory ....Eeprom.
Communication ....RS-232 and RS-485. Option RS-422.
Communication Protocols........................All included
Environmental Conditions.......................Operation Temperature: -20 to 60ºC.
....Storage temperature: -30ºC to 70ºC.
....Humidity: 5-95% RH non condensing.
....Maximum environmental illumination: 1000 lux.
....Sealing: IP41 or IP65.
Input signal
  Configuration.....................................Differential asymmetrical.

Digits	Resolu.	Pt100 ºC	T C "J" ºC	T C "K" ºC	T C "T" ºC
3	0.1º	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9
3	1º	-199 / +800	-50 / +760	-50 / +999	-160 / +400
4	0.1º	-199.9 / +400.0	-50.0 / +760.0	-50.0 / +999.9	-160.0 / +400.0
4	1º	-199 / +800	-50 / +760	-50 / +1370	-160 / +400
5	0.1º	-200.0 / +400.0	-50.0 / +760.0	-50.0 / +1370.0	-160.0 / +400.0
5	1º	-200 / +800	-50 / +760	-50 / +1370	-160 / +400

Digits	Resolu.	Pt100 ºF	T C "J" ºF	T C "K" ºF	T C "T" ºF
3	0.1º	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9
3	1º	-199 / +999	-58 / +999	-58 / +999	-199 / +752
4	0.1º	-199.9 / +752.0	-58.0 / +999.9	-58.0 / +999.9	-199.9 / +752.0
4	1º	-328 / +1472	-58 / +1400	-58 / +2498	-256 / +752
5	0.1º	-328.0 / +752.0	-58.0 / +1400.0	-58.0 / +2498.0	-256.0 / +752.0
5	1º	-328 / +1472	-58 / +1400	-58 / +2498	-256 / +752

Accuracy at 22° ±5°C
  Pt100 Resolution 0,1°C ....±0.1 of reading +0.3°C
  Pt100 Resolution 1°C ....±0.1 of reading +1°C
  Pt100 Resolution 0,1°F.........................±0.1 of reading +0.5°F
  Pt100 Resolution 1°F............................±0.1 of reading +1°F
  TC: J, K, T Resolution 0,1°C ....±0.4% of reading +0.6°C
  TC: J, K, T Resolution 0,1°F ....±0.4% of reading +1°F
  TC: J, K, T Resolution 1°C..................±0.4% of reading +1°C
  TC: J, K, T Resolution 1°F ....±0.4% of reading +2°F
  Temperature coefficient........................100 ppm/ °C
  Warm up time..5 minutes
Conversion method
  Tecnique..Sigma-Delta
  Resolution...16 bits
  Rate...25/ s
Display
  Over-range 3 digits dislays ....-OE/ OuE
  Over-range 4 and 5 digits dislays........-OuE / OuE
  Open wire E1

2.1.2. Electrical characteristics of the DN-119 displays.

Supply Voltage..88 to 264 VAC 47 to 63Hz or 19 to 36VDC:
Consumption ....See "Display weight and power consumption."
Display ....7 segments, 100mm high + decimal point.
....Red Led colour. Viewing distance: max 50 meters.
Text (LED)...Formed by LEDs of 5mm diameter, 65mm character
....height.
Text (Vinyl) ....White vinyl. 65mm character height.
Parameter memory ....Eeprom.
Communication ....RS-232 and RS-485. Option RS-422.
Communication Protocols.......................All included.
Environmental Conditions.......................Operation Temperature: -20 to 60ºC.
....Storage temperature: -30ºC to 70ºC.
....Humidity: 5-95% RH non condensing.
....Maximum environmental illumination: 1000 lux.
....Sealing: IP41 or IP65.
Input signal
    Configuration.....................................Differential asymmetrical.

Digits	Resolu.	Pt100 ºC	T C "J" ºC	T C "K" ºC	T C "T" ºC
3	0.1º	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9
3	1º	-199 / +800	-50 / +760	-50 / +999	-160 / +400
4	0.1º	-199.9 / +400.0	-50.0 / +760.0	-50.0 / +999.9	-160.0 / +400.0
4	1º	-199 / +800	-50 / +760	-50 / +1370	-160 / +400
5	0.1º	-200.0 / +400.0	-50.0 / +760.0	-50.0 / +1370.0	-160.0 / +400.0
5	1º	-200 / +800	-50 / +760	-50 / +1370	-160 / +400

Digits	Resolu.	Pt100 ºF	T C "J" ºF	T C "K" ºF	T C "T" ºF
3	0.1º	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9
3	1º	-199 / +999	-58 / +999	-58 / +999	-199 / +752
4	0.1º	-199.9 / +752.0	-58.0 / +999.9	-58.0 / +999.9	-199.9 / +752.0
4	1º	-328 / +1472	-58 / +1400	-58 / +2498	-256 / +752
5	0.1º	-328.0 / +752.0	-58.0 / +1400.0	-58.0 / +2498.0	-256.0 / +752.0
5	1º	-328 / +1472	-58 / +1400	-58 / +2498	-256 / +752

Accuracy at 22° ±5°C
    Pt100 Resolution 0,1°C ....±0.1 of reading +0.3°C
    Pt100 Resolution 1°C ....±0.1 of reading +1°C
    Pt100 Resolution 0,1°F.......................±0.1 of reading +0.5°F
    Pt100 Resolution 1°F..........................±0.1 of reading +1°F
    TC: J, K, T Resolution 0,1°C ....±0.4% of reading +0.6°C
    TC: J, K, T Resolution 0,1°F ....±0.4% of reading +1°F
    TC: J, K, T Resolution 1°C..................±0.4% of reading +1°C
    TC: J, K, T Resolution 1°F ....±0.4% of reading +2°F
    Temperature coefficient.......................100 ppm/ °C
    Warm up time.......................................5 minutes
Conversion method
    Tecnique..Sigma-Delta
    Resolution...16 bits
    Rate...25/ s
Display
    Over-range 3 digits dislays ....-OE/ OuE
    Over-range 4 and 5 digits dislays.......-OuE / OuE
    Open wire E1

2.1.3. Electrical characteristics of the DN-189 displays.

Supply Voltage...88 to 264 VAC 47 to 63Hz or 19 to 36VDC:
Consumption ....See "Display weight and power consumption."
Display ....7 segments, 180mm high + decimal point.
....Red Led colour. Viewing distance: max 90 meters.
Text (Vinyl) ....White vinyl.
Parameter memory....................................Eeprom.
Communication ....RS-232 and RS-485. Option RS-422.
Communication Protocols........................All included.
Environmental Conditions.......................Operation Temperature: -20 to 60ºC.
....Storage temperature: -30ºC to 70ºC.
....Humidity: 5-95% RH non condensing.
....Maximum environmental illumination: 1000 lux.
....Sealing: IP41 or IP65.
Input signal
   Configuration.....................................Differential asymmetrical.

Digits	Resolu.	Pt100 ºC	T C "J" ºC	T C "K" ºC	T C "T" ºC
3	0.1º	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9
3	1º	-199 / +800	-50 / +760	-50 / +999	-160 / +400
4	0.1º	-199.9 / +400.0	-50.0 / +760.0	-50.0 / +999.9	-160.0 / +400.0
4	1º	-199 / +800	-50 / +760	-50 / +1370	-160 / +400
5	0.1º	-200.0 / +400.0	-50.0 / +760.0	-50.0 / +1370.0	-160.0 / +400.0
5	1º	-200 / +800	-50 / +760	-50 / +1370	-160 / +400

Digits	Resolu.	Pt100 ºF	T C "J" ºF	T C "K" ºF	T C "T" ºF
3	0.1º	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9
3	1º	-199 / +999	-58 / +999	-58 / +999	-199 / +752
4	0.1º	-199.9 / +752.0	-58.0 / +999.9	-58.0 / +999.9	-199.9 / +752.0
4	1º	-328 / +1472	-58 / +1400	-58 / +2498	-256 / +752
5	0.1º	-328.0 / +752.0	-58.0 / +1400.0	-58.0 / +2498.0	-256.0 / +752.0
5	1º	-328 / +1472	-58 / +1400	-58 / +2498	-256 / +752

Accuracy at 22° ±5°C
   Pt100 Resolution 0,1°C ....±0.1 of reading +0.3°C
   Pt100 Resolution 1°C ....±0.1 of reading +1°C
   Pt100 Resolution 0,1°F.......................±0.1 of reading +0.5°F
   Pt100 Resolution 1°F...........................±0.1 of reading +1°F
   TC: J, K, T Resolution 0,1°C...............±0.4% of reading +0.6°C
   TC: J, K, T Resolution 0,1°F ....±0.4% of reading +1°F
   TC: J, K, T Resolution 1°C.................±0.4% of reading +1°C
   TC: J, K, T Resolution 1°F ....±0.4% of reading +2°F
   Temperature coefficient.......................100 ppm/ °C
   Warm up time.......................................5 minutes
Conversion method
   Tecnique...Sigma-Delta
   Resolution...16 bits
   Rate..25/ s
Display
   Over-range 3 digits dislays ....-OE/ OuE
   Over-range 4 and 5 digits dislays.......-OuE / OuE
   Open wire E1

2.1.4. Electrical characteristics of the DN-129 displays.

Supply Voltage...88 to 264 VAC 47 to 63Hz or 19 to 36VDC:
Consumption ....See "Display weight and power consumption."
Display ....7 segments, 250mm high + decimal point.
....Red Led colour. Viewing distance: max 120 meters.
Text (Vinyl) ....White vinyl.
Parameter memory....................................Eeprom.
Communication ....RS-232 and RS-485. Option RS-422.
Communication Protocols.........................All included.
Environmental Conditions........................Operation Temperature: -20 to 60ºC.
....Storage temperature: -30ºC to 70ºC.
....Humidity: 5-95% RH non condensing.
....Maximum environmental illumination: 1000 lux.
....Sealing: IP41 or IP54.
Input signal
    Configuration.....................................Differential asymmetrical.

Digits	Resolu.	Pt100 ºC	T C "J" ºC	T C "K" ºC	T C "T" ºC
3	0.1º	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9
3	1º	-199 / +800	-50 / +760	-50 / +999	-160 / +400
4	0.1º	-199.9 / +400.0	-50.0 / +760.0	-50.0 / +999.9	-160.0 / +400.0
4	1º	-199 / +800	-50 / +760	-50 / +1370	-160 / +400
5	0.1º	-200.0 / +400.0	-50.0 / +760.0	-50.0 / +1370.0	-160.0 / +400.0
5	1º	-200 / +800	-50 / +760	-50 / +1370	-160 / +400

Digits	Resolu.	Pt100 ºF	T C "J" ºF	T C "K" ºF	T C "T" ºF
3	0.1º	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9	-19.9 / +99.9
3	1º	-199 / +999	-58 / +999	-58 / +999	-199 / +752
4	0.1º	-199.9 / +752.0	-58.0 / +999.9	-58.0 / +999.9	-199.9 / +752.0
4	1º	-328 / +1472	-58 / +1400	-58 / +2498	-256 / +752
5	0.1º	-328.0 / +752.0	-58.0 / +1400.0	-58.0 / +2498.0	-256.0 / +752.0
5	1º	-328 / +1472	-58 / +1400	-58 / +2498	-256 / +752

Accuracy at 22° ±5°C
    Pt100 Resolution 0,1°C.......................±0.1 of reading +0.3°C
    Pt100 Resolution 1°C..........................±0.1 of reading +1°C
    Pt100 Resolution 0,1°F.......................±0.1 of reading +0.5°F
    Pt100 Resolution 1°F..........................±0.1 of reading +1°F
    TC: J, K, T Resolution 0,1°C...............±0.4% of reading +0.6°C
    TC: J, K, T Resolution 0,1°F..............±0.4% of reading +1°F
    TC: J, K, T Resolution 1°C.................±0.4% of reading +1°C
    TC: J, K, T Resolution 1°F.................±0.4% of reading +2°F
    Temperature coefficient.......................100 ppm/ °C
    Warm up time......................................5 minutes
Conversion method
    Tecnique..Sigma-Delta
    Resolution...16 bits
    Rate...25/ s
Display
    Over-range 3 digits dislays ....-OE/ OuE
    Over-range 4 and 5 digits dislays.......-OuE / OuE
    Open wire E1

2.2. Display weight and power consumption.

2.2.1. DN-109 weight and power consumption.

Reference	Display Weight (kg)	Power (W)	Reference	Display weight (kg)	Power (W)	Reference	Display weight (kg)	Power (W)
DN-109/3S	3,0	5,9	DN-109/3S+TL	3,0	7,9	DN-109/3S+TV	3,0	5,9
DN-109/3D	3,0	10	DN-109/3D+TL	3,0	11,7	DN-109/3D+TV	3,0	10
DN-109/4S	3,0	7,54	DN-109/4S+TL	3,5	9,6	DN-109/4S+TV	3,5	7,54
DN-109/4D	3,5	14,44	DN-109/4D+TL	3,5	15,1	DN-109/4D+TV	3,5	14,44
DN-109/5S	3,0	9,2	DN-109/5S+TL	3,5	11,2	DN-109/5S+TV	3,5	9,2
DN-109/5D	3,5	18	DN-109/5D+TL	4,5	21,7	DN-109/5D+TV	4,0	18

2.2.2. DN-119 weight and power consumption.

Reference	Display Weight (kg)	Power (W)	Reference	Display weight (kg)	Power (W)	Reference	Display weight (kg)	Power (W)
DN-119/3S	4,0	10,8	DN-119/3S+TL	4,5	13,4	DN-119/3S+TV	4,5	10,8
DN-119/3D	4,0	18	DN-119/3D+TL	5,0	20	DN-119/3D+TV	5,0	18
DN-119/4S	4,5	14	DN-119/4S+TL	5,5	16.6	DN-119/4S+TV	5,5	14
DN-119/4D	5,0	26,6	DN-119/4D+TL	5,5	31,9	DN-119/4D+TV	5,5	26,6
DN-119/5S	5,0	17	DN-119/5S+TL	5,5	19,7	DN-119/5S+TV	5,5	17
DN-119/5D	5,5	32,9	DN-119/5D+TL	6,0	38,1	DN-119/5D+TV	6,0	32,9

2.2.3. DN-189 weight and power consumption.

Reference	Display Weight (kg)	Power (W)	Reference	Display weight (kg)	Power (W)
DN-189/3S	5,0	19,4	DN-189/3S+TV	6,5	19,4
DN-189/3D	6,0	38,2	DN-189/3D+TV	8,0	38,2
DN-189/4S	6,0	25,7	DN-189/4S+TV	7,5	25,7
DN-189/4D	7,5	50,8	DN-189/4D+TV	9,0	50,8
DN-189/5S	7,0	31,8	DN-189/5S+TV	9,0	31,8
DN-189/5D	8,5	63,2	DN-189/5D+TV	10,5	63,2
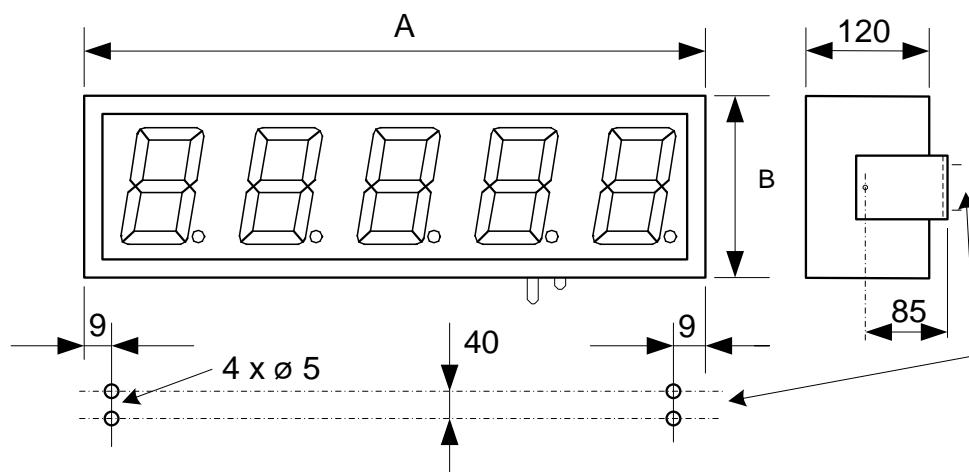
2.2.4. DN-129 weight and power consumption.

Reference	Display Weight (kg)	Power (W)	Reference	Display weight (kg)	Power (W)
DN-129/3S	8,5	20	DN-129/3S+TV	11,5	20
DN-129/3D	10,5	40	DN-129/3D+TV	13,5	40
DN-129/4S	10,5	26	DN-129/4S+TV	13,0	26
DN-129/4D	13,0	52	DN-129/4D+TV	16,0	52
DN-129/5S	12,0	32	DN-129/5S+TV	15,0	32
DN-129/5D	15,5	64	DN-129/5D+TV	18,5	64

2.3. Dimensions and mounting of the Displays
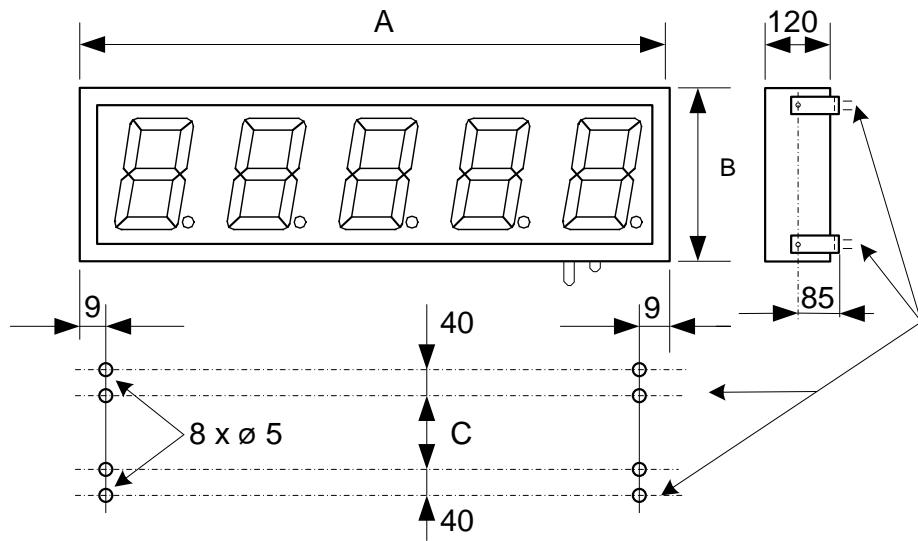
2.3.1. Dimensions and mounting of the DN-109 and DN-119

Reference	A	B	Reference	A	B
DN-109/3S	288	122	DN-109/3S+T	288	122
DN-109/4S	288	122	DN-109/4S+T	336	122
DN-109/5S	288	122	DN-109/5S+T	382	122
DN-119/3S	324	177	DN-119/3S+T	504	177
DN-119/4S	414	177	DN-119/4S+T	594	177
DN-119/5S	504	177	DN-119/5S+T	684	177

2.3.2. Dimensions and mounting of the DN-129 and DN-189

Reference	A	B	C	Reference	A	B	C
DN-189/3S	500	251	67	DN-189/3S+TV	820	251	67
DN-189/4S	660	251	67	DN-189/4S+TV	980	251	67
DN-189/5S	820	251	67	DN-189/5S+TV	1140	251	67
DN-129/3S	750	366	186	DN-129/3S+TV	1220	366	186
DN-129/4S	985	366	186	DN-129/4S+TV	1455	366	186
DN-129/5S	1220	366	186	DN-129/5S+TV	1690	366	186

3. INSTALLATION

The installation of the DN-109AT, DN-119AT, DN-129AT and DN-189AT is not particularly delicate but some important considerations must be taken into account.

The display must not be anchored to places subject to vibrations, nor should it be installed in places which generally surpass the limits specified in the display characteristics, both in terms of temperature and humidity.

The degree of protection of displays DN-109AT, DN-119AT, DN-129AT and DN-189AT is IP41, meaning that they are protected against penetration by solid foreign objects of a diameter of about 1mm and against the vertical fall of water droplets.

Displays DN-109AT, DN-119AT, DN-129AT and DN-189AT should not be installed in places with an illumination level in excess of 1000 lux. Neither should the display be placed in direct sunlight as visibility would be lost.

In the electrical installation, proximity to lines of high intensity circulation and high voltage lines must be avoided, as well as proximity to High Frequency generators and U/F converters for motors.
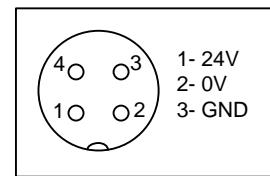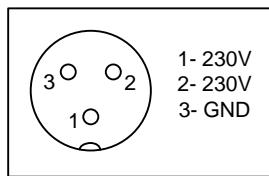
3.1. Power supply.

The power supply must be 88 to 264VAC, 47 to 63 Hz or 19 to 36VDC.
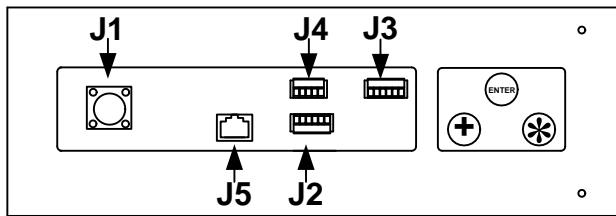
The power supply conductor section will be in line with consumption and the ground conductor will be a minimum section of 1.5m².

The power supply connector for 220VAC has 3 contacts and is situated in the lower part of the unit. Connect the power wires following the schema below

The power supply connector for 24VDC has 4 contacts and is situated in the lower part of the unit. Connect the power wires following the schema below

3.2. Position of the buttons and connectors

The signal connectors are situated in the lower part of the unit (fig. 3.1). Depending on the installed options, the unit will possess various types of connectors.

Connector **J2**: Analog inputs.
Connector **J3**: Relay output. Units with R option.
Connector **J4**: Remote keys. Displays with option K.
Connector **J5**: Ethernet. Displays with option NE.
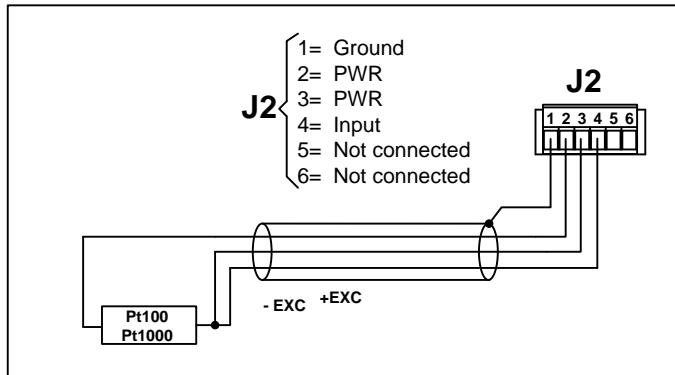
The J1 power lead connector is placed in the lower part of the unit, except in DN-109/3AT models where this is in the upper part of the unit.

The buttons for configuration of the equipment are located in the lower part. They are identified with the symbols +, * and the text «ENTER».
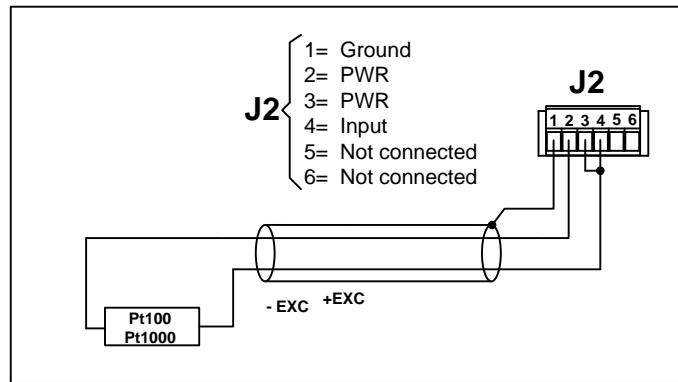
3.3. Analog inputs connection

In all the mountings, the connection of the inputs must be done using braided and insulated cable. The screen must only be connected to terminal 1 of the input connector.
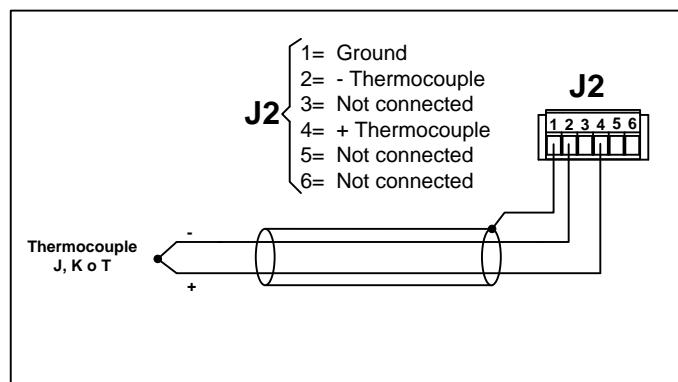
3.3.1. Pt100 and Pt1000. 3 wire connection

3.3.2. Pt100 and Pt1000. 2 wire connection
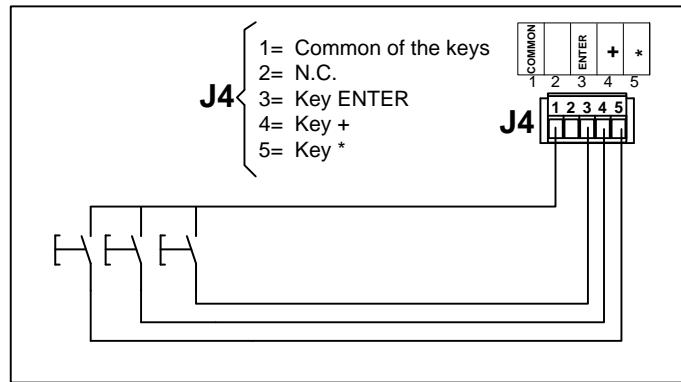
3.3.3. Thermocouple J, K or T.
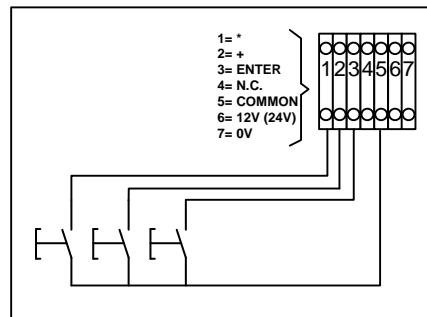
3.4. Connection of the remote keys.

The remote keys are connected as follows:

J4
1= Common of the keys
2= N.C.
3= Key ENTER
4= Key +
5= Key *

In the stainless steel box, the keys are connected through Terminal Blocks.

1= *
2= +
3= ENTER
4= N.C.
5= COMMON
6= 12V (24V)
7= 0V

4. OPERATION

4.1. Initial reset.

Before connecting the display to the network, we must ensure that all of the connections have been carried out correctly and that the display is firmly in place.

Each time we connect the display to the power supply network, an initial reset occurs which tests all of the segments comprising the display. The test consists of the sequential illumination of all of the digits with the number "8", all of the digits with the value "0", all of the decimal points are lit up and finally the version code.

4.2. Error displaying

If an error is detected during the operation, the following codes are displayed:
E1: Wire open.
-OE / OuE: Overrun on 3 digits displays.
-OuE / OuE: Overrun on 4 or 5 digit displays.

4.3. Programming parameters.

Before using the display the parameters listed below must be configured:
   The type of sensor used: Pt100, Pt1000, Thermocouple J, K o T.
   Scale used: Celsius or Fahrenheit.
   Resolution: 1 Degree or 0.1 Degree.
   Offset: To modify the display value with a fixed value. For 1 degree resolution the range is ±99°. For 0.1 degree resolution the range is ±9.9°

4.3.1. Enter to modify parameters.

In order to enter the sequence to modify the parameters, the Advance key "*" must be pressed and held for three seconds. After this, the first parameters will be displayed. The keys allow the user to move through the menu.

Advance key: Enter the parameter / Change the selected digit.

ENTER key. Validate the parameter value
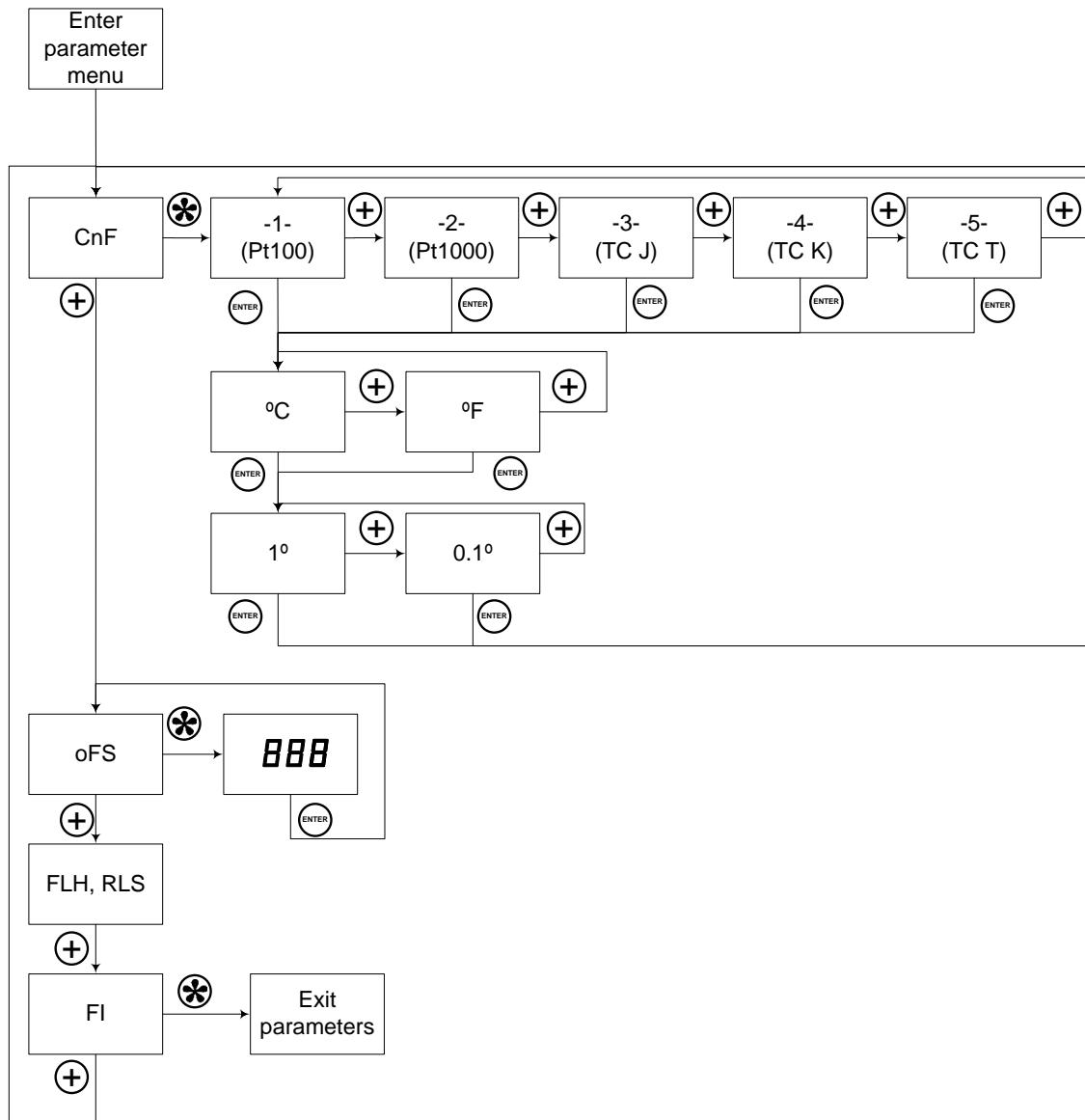
Increase key. Increase the value of the selected digit. / Change parameter.

4.3.2. Function of each parameter.

The parameters in the display are organized in 5 groups:

- Parameter CnF. Temperature sensor parameter.
- Parameter oFS. Temperature offset.
- Parameter FLH: Flashing of the digits. Only in displays without relays and colour options.
- Parameter rLS: Alarms of the display. In digits with relays and/or colour options.
- Parameter FI: Exit from menu.

The parameter map is the following.

4.3.2.1. Parameter CnF. Temperature sensor parameter

Temperature sensor menu. Upon pressing ENTER, the last type of input selected is displayed.

-1- Pt100 selected. Press ENTER to validate the value and to access the next parameter.
-2- Pt1000 selected. Press ENTER to validate the value and to access the next parameter.
-3- Thermocouple J Press ENTER to validate the value and to access the next parameter.
-4- Thermocouple K selected. Press ENTER to validate the value and to access the next parameter.
-5- Thermocouple T selected. Press ENTER to validate the value and to access the next parameter.

Once the sensor has been selected, the measurement unit must be selected

Cº. Celsius scale selected. Press ENTER to validate the value and to access the next parameter.
Fº. Fahrenheit scale selected. Press ENTER to validate the value and to access the next parameter.

Once the measurement unit has been selected, the resolution must be selected

1º. Resolution of 1 degree selected. Press ENTER to validate the value and to access the next parameter.
0.1º. Resolution of 0.1 degree selected. Press ENTER to validate the value and to access the next parameter.

4.3.2.2. Parameter oFS. Temperature offset

Offset value. After 2 seconds the last programmed value is displayed and modification is permitted. Upon pressing ENTER the value is validated and the programming of the parameters is finalized. Use the increase and displacement keys to modify the value. Upon reaching 9, it goes back to 0. The highest weight digit permits programming of the sign - (negative value)

4.3.2.3. Parameter FLH

This parameter makes the digits flash in the conditions the user programs the alarms.

The parameter "FLH" (Flash) admits the following values

0	The digits don't flash
1	The digits flash when the alarm 1 is activated
2	The digits flash when the alarm 2 is activated
3	The digits flash if any alarm is activated
4	The digits flash when both alarms are activated.

To program the alarms, see 4.3.2 "**¡Error! La autoreferencia al marcador no es válida.**"

4.4. Alarms configuration (flash, colour and relays)

The display allows the user to program 2 alarms that can be used by the flash, colour and relays functions. The trigger of the alarm can be delayed with a timer or by a hysteresis value. The activation of the alarm may be programmed so that it acts above or below the programmed setpoint.

The displays with the relay output option may generate control and alarm signals for their use by other units. The Flash function allows the digits to flash if one of the relays is activated.

The equipment that has the colour option may be programmed to display the value using colour red, green or yellow.
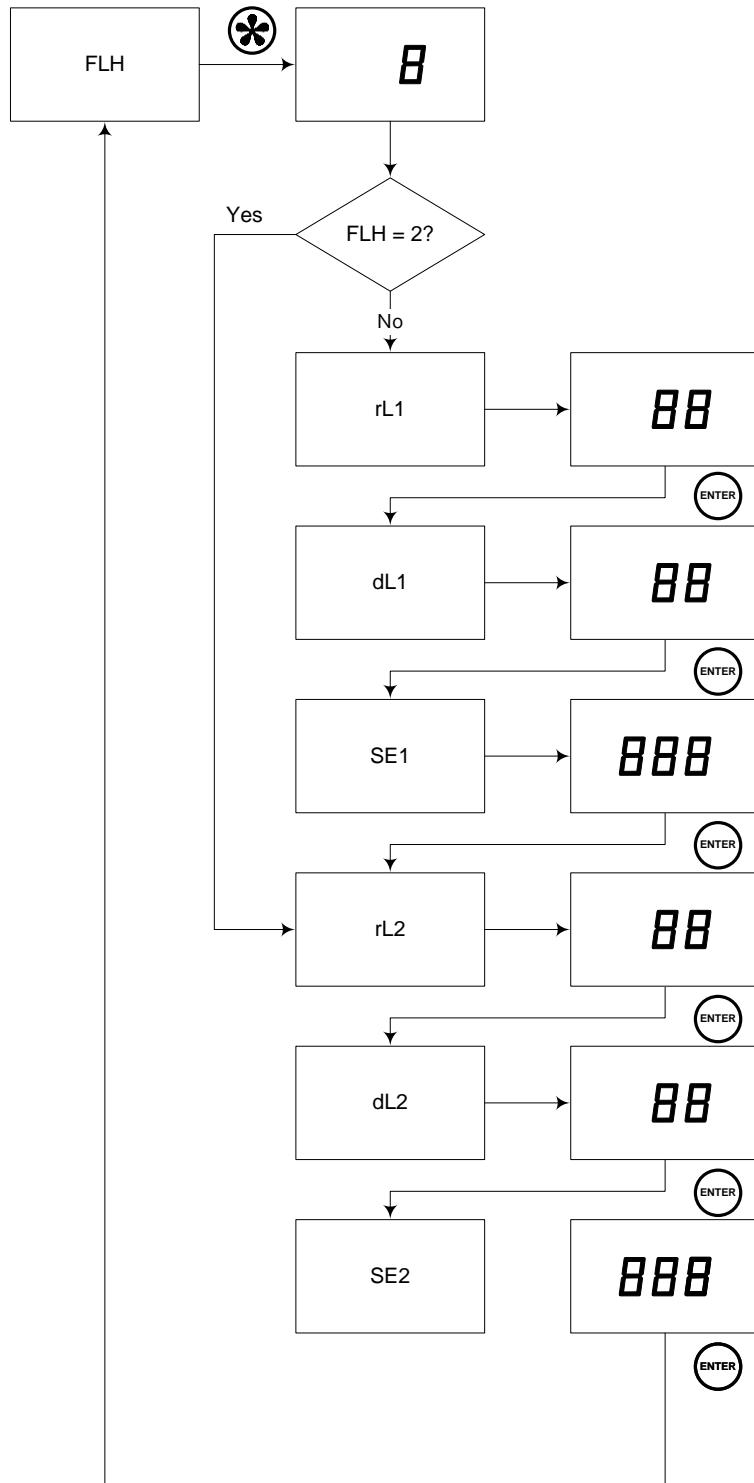
In displays with colour option, alarms may change the digits colours: Red, green or yellow.

The configuration of the alarms is accessed by two ways:
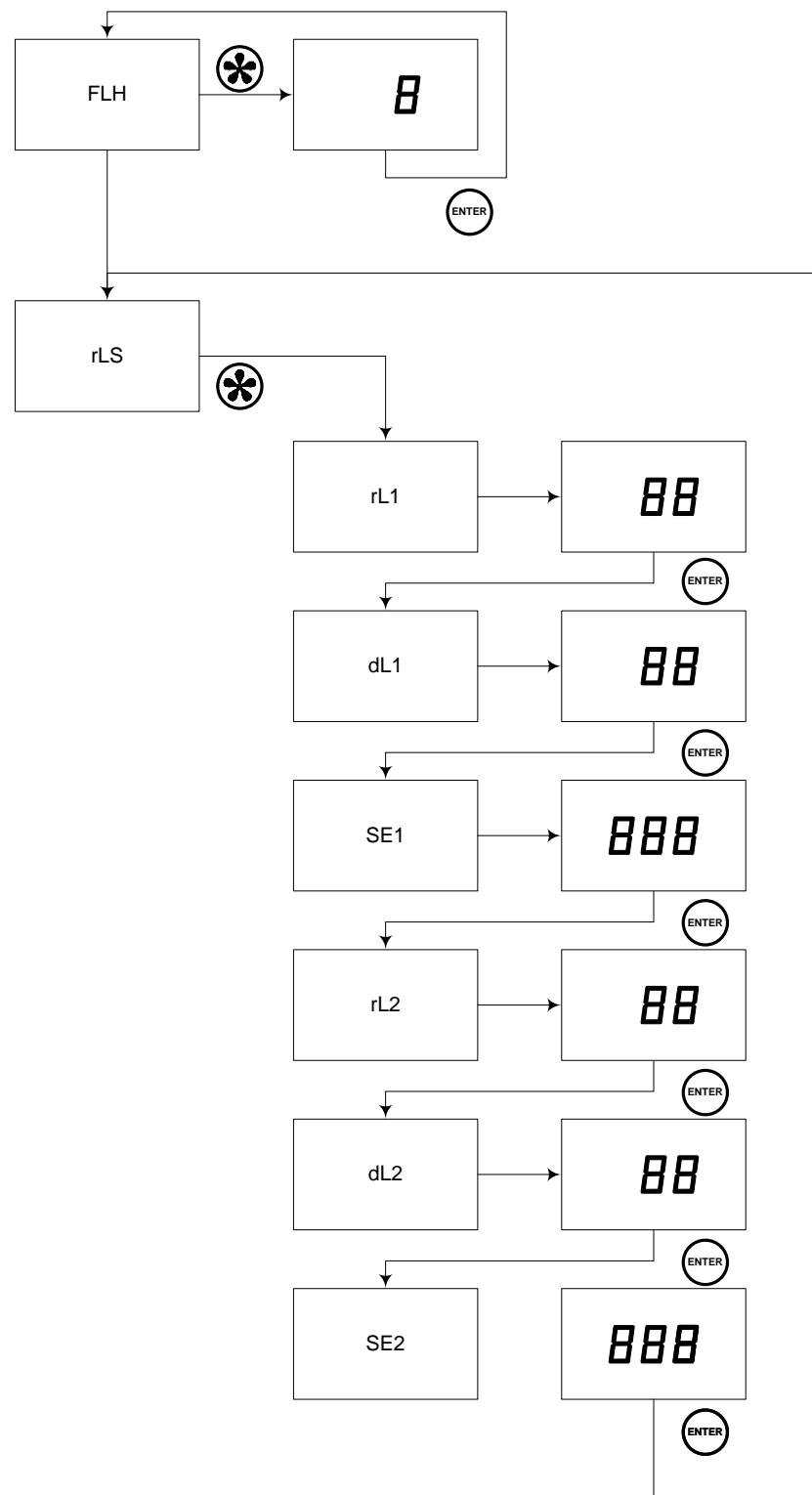
If the display has colour or relays option, the alarm configuration is accessed through the parameter rLS. Otherwise, it is accessed through the parameter FLH.

4.4.1. Parameter map of the alarms
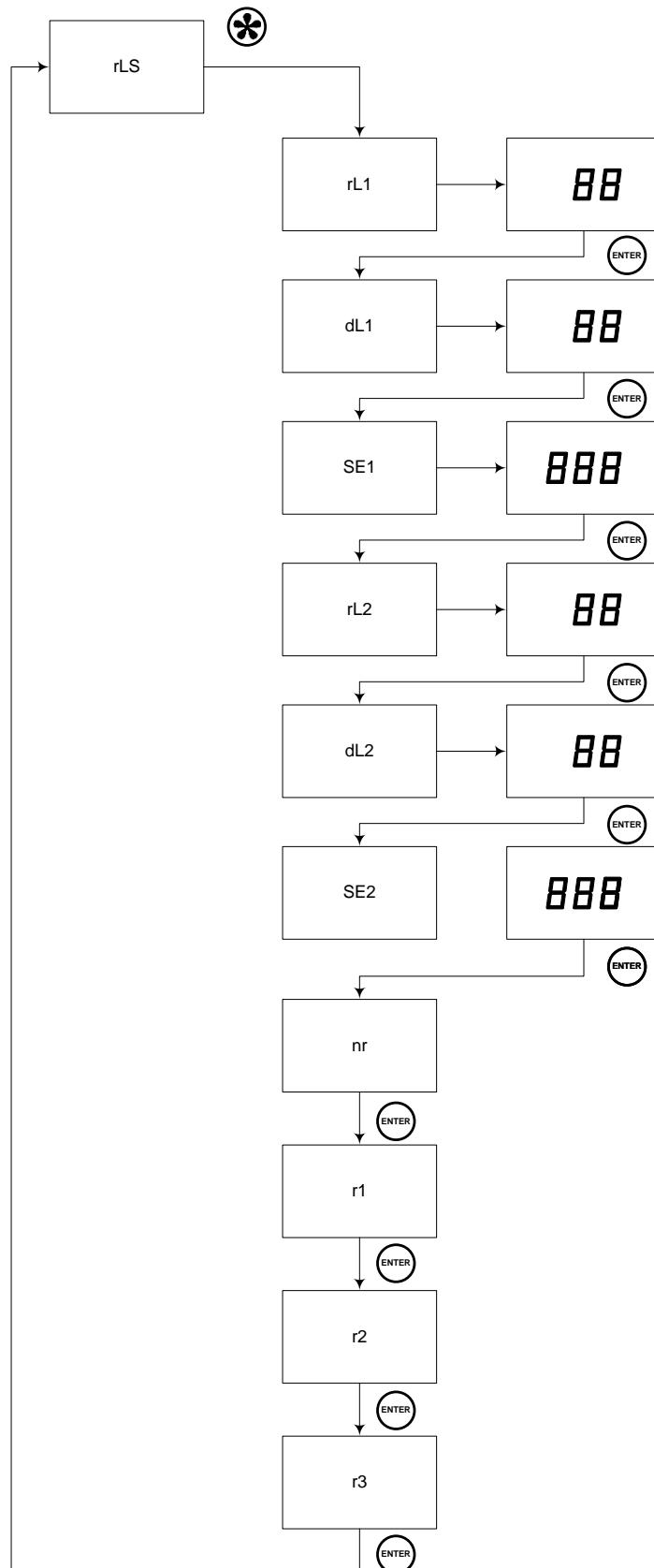
The parameter map is the following if the display does not include nor colour nor relays option

The parameter map is the following if the display includes the relay option but not the colour option.

The parameter map is the following if the display includes the colour option.

4.4.2. Parameter for defining the alarm 1

In order to configure the alarm, parameters rL1., dL1 and SE1 must be accessed.

rL1

Alarm 1 configuration. After 2 seconds, the last value programmed is displayed and permitted to be modified. Upon pressing ENTER the value is validated and the next parameter is accessed. Each one of the two digits has a distinct function.

Left digit	Control bit	Right digit	Activation
0	ON if Value > Setpoint 1	0	Delay
1	ON if Value < Setpoint 1	1	Hysteresis
2	Always OFF		

dL1

Delay time (in seconds) or hysteresis (2 less significant digits) value of alarm 1. After 2 seconds, the last value programmed is displayed and permitted to be modified. Upon pressing ENTER the value is validated and the next parameter is accessed.

SE1

Set point value of alarm 1. After 2 seconds, the last value programmed is displayed and permitted to be modified. Upon pressing ENTER the value is validated and the next parameter is accessed.

4.4.3. Parameter for defining the alarm 2

In order to configure the alarm 2, parameters rL2., dL2 and SE2 must be accessed.

rL2

Alarm 2 configuration. After 2 seconds, the last value programmed is displayed and permitted to be modified. Upon pressing ENTER the value is validated and the next parameter is accessed. Each one of the two digits has a distinct function.

Left digit	Control bit	Right digit	Activation
0	ON if Value > Setpoint 1	0	Delay
1	ON if Value < Setpoint 1	1	Hysteresis
2	Always OFF		

dL2

Delay time (in seconds) or hysteresis (2 less significant digits) value of alarm 2. After 2 seconds, the last value programmed is displayed and permitted to be modified. Upon pressing ENTER the value is validated and the next parameter is accessed.

SE2

Set point value of alarm 2. After 2 seconds, the last value programmed is displayed and permitted to be modified. Upon pressing ENTER the value is validated and the next parameter is accessed.

4.4.4. Parameters to define the colour.

To define the colour the 2 alarms are used.

The following parameters are used to define colours.

nr	Colour if internal bits are OFF. To change the colour push * key. Upon pressing + the next parameter is shown.
r1	Colour if internal bit **r1** is ON. To change the colour push * key. Upon pressing + the next parameter is shown.
r2	Colour if internal bit **r2** is ON. To change the colour push * key. Upon pressing + the next parameter is shown.
r3	Colour if internal bits **r1** and **r2** are ON. To change the colour push * key. Upon pressing + the next parameter is shown.

4.4.5. Characteristics of the relay output option.

SPDT contact.
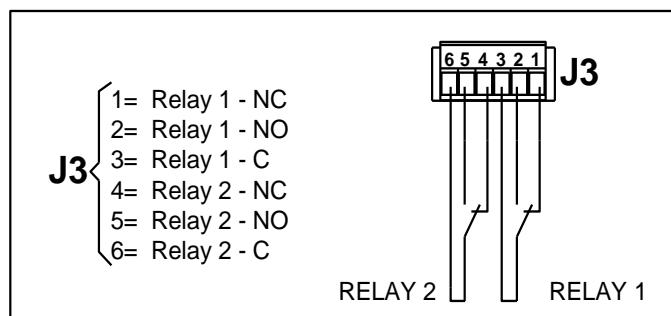
Maximum current:

Resistive load 5A

Inductive load 5A

Maximum voltage: ....60V AC/DC

4.4.6. Wiring the relay output

J3
1= Relay 1 - NC
2= Relay 1 - NO
3= Relay 1 - C
4= Relay 2 - NC
5= Relay 2 - NO
6= Relay 2 - C

6 5 4 3 2 1 J3

RELAY 2   RELAY 1

4.5. Ethernet option

Ethernet options allows a new step in this displays type because it allows to connect displays using the same LAN in the installation, syncing them through the SNTP and providing a new user interface through the Web.
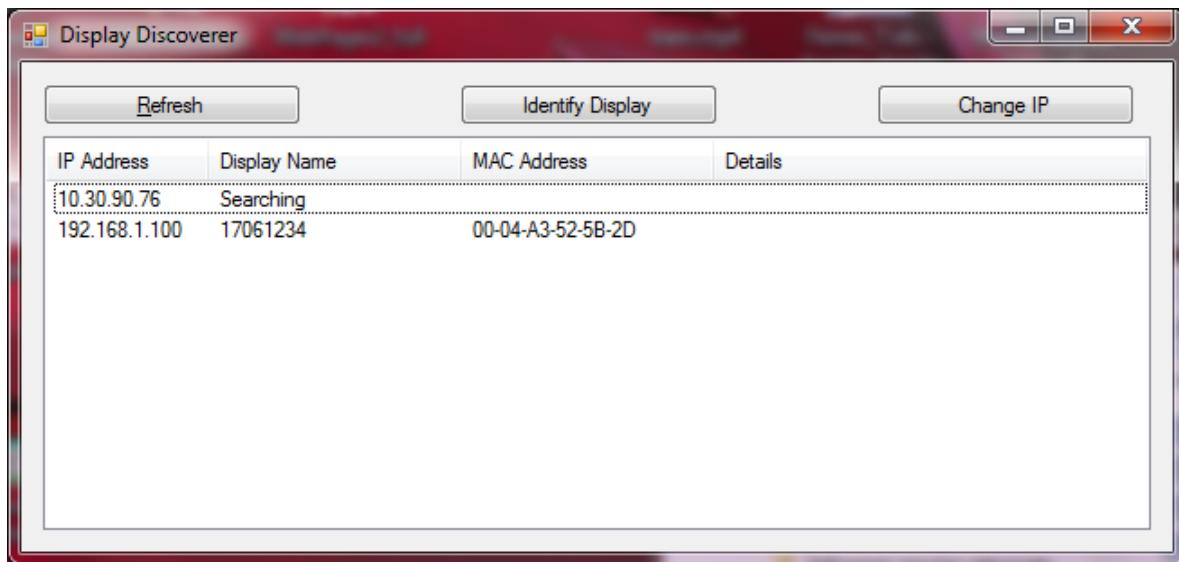
4.5.1. The first connection

There are several ways for accessing the display on the first time it's connected to the network.
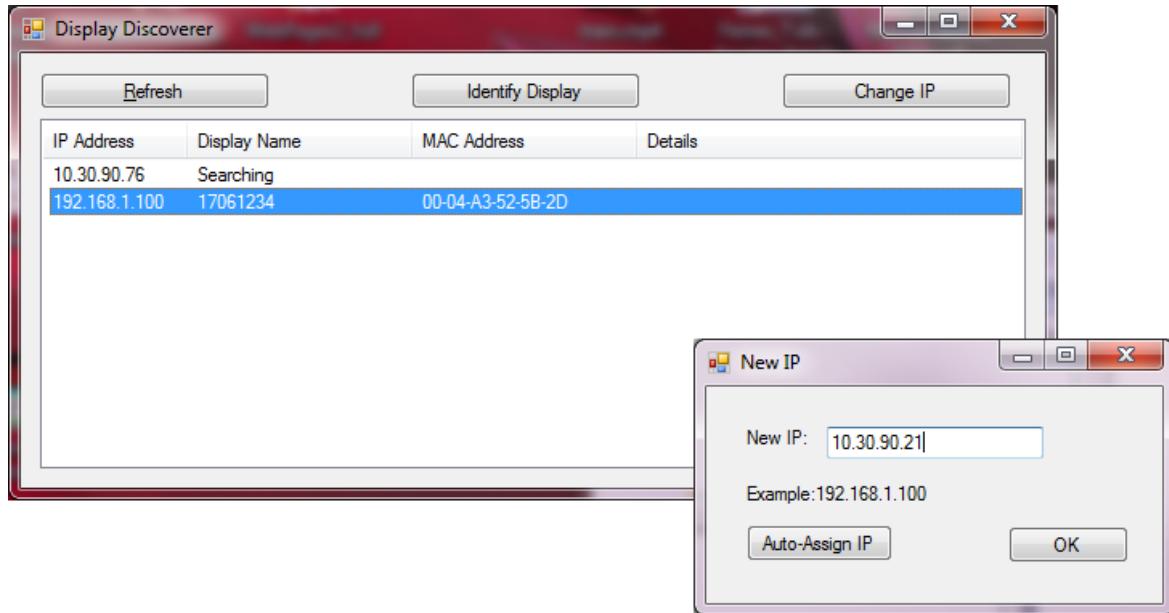
One of the ways is changing the IP address through parameters seen before

If the IP 192.168.1.100 (the default IP of the display) is in the range of your LAN, the display can be accessed typing the IP in the URL bar in your favourite browser.
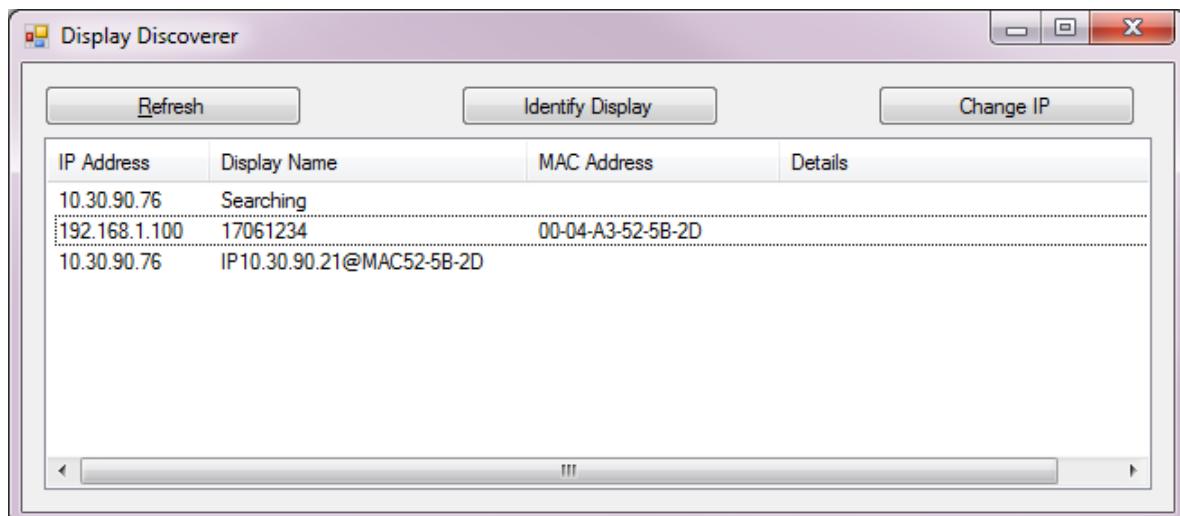
In case there is more than one display in the LAN or the default IP of the display is out of the IP range of you LAN, it is recommended to use the PC program "Display Discoverer", downloadable from the web. In this program, the displays connected to the LAN are displayed, as well as their IP addresses, their MAC addresses (all MAC are 00:04:A3:xx:xx:xx) and its name. The default name of the display is its serial number. This name can be changed in the Ethernet tab of the web server of the display. If a display is selected, by clicking "identify Display", the selected display will flash for 3 seconds.
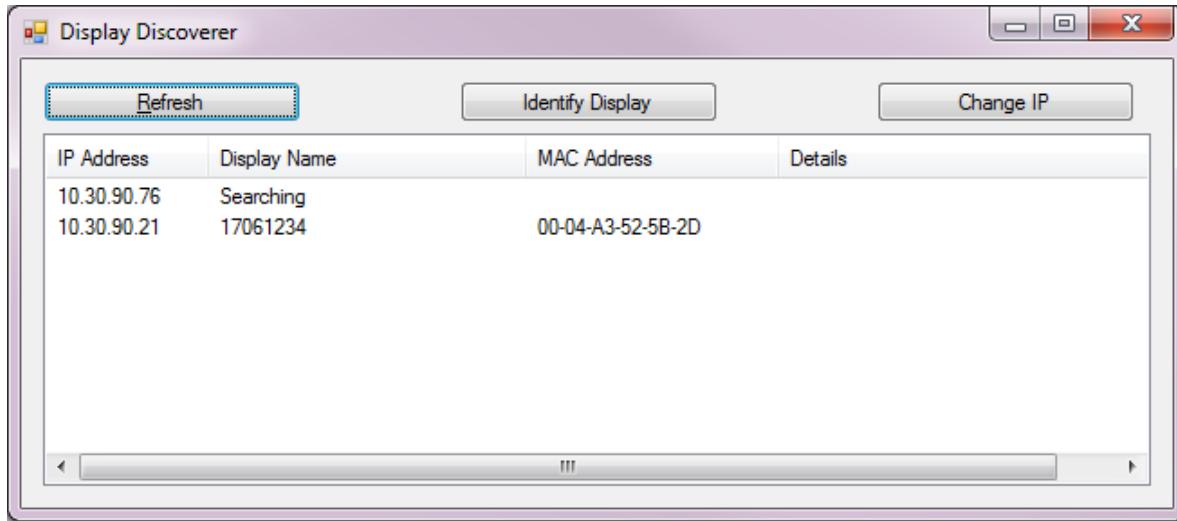

The first row shows the IP of the PC which is searching the displays and the second row a display we just have bought. As it is shown, the display has serial number 17061234 and the default IP is out of the range of the LAN. To change the IP address to a suitable one for our LAN, select the display and click the button "Change IP". When clicking this, a new window is opened where a new IP address can be tipped.

Tip the new IP and click OK. There will appear a message in the main window with the message sent to the display.

After some seconds, click the "Refresh" button. The display appears with the new IP
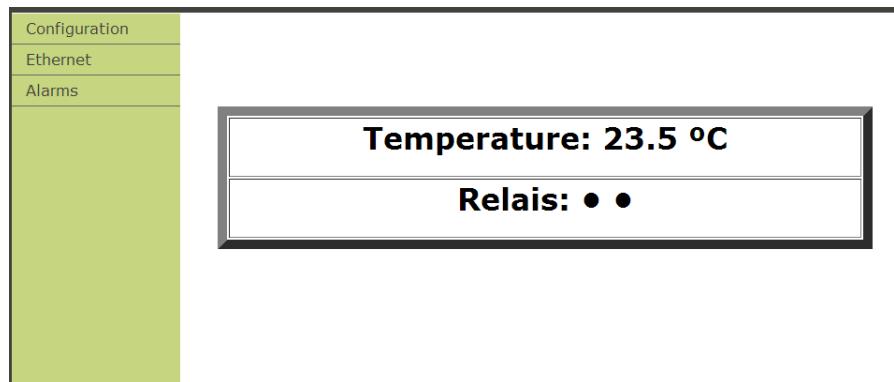
Click the display IP to open a new tab in the browser. The main page of the web server is shown.

4.5.2. User interface

Ethernet connection allows a new interface, much easier than the usual in displays. All configuration can be done through a website hosted at the display, so the user only needs a device connected to the LAN with web browser (computers, smartphones, tablets…). There is no contact with the display, which usually is in a difficult access point. The web page can be accessed remotely if the router is correctly redirected. See **¡Error! No se encuentra el origen de la referencia.** for more information.

The main page shows the value of the display, as well as the measurement name and unit (configured by the user) and the relays status (if option added). This main page is for the user to control the status of the display.

In the left menu there are three tabs: Configuration, Ethernet and alarms, accessible through user and password:
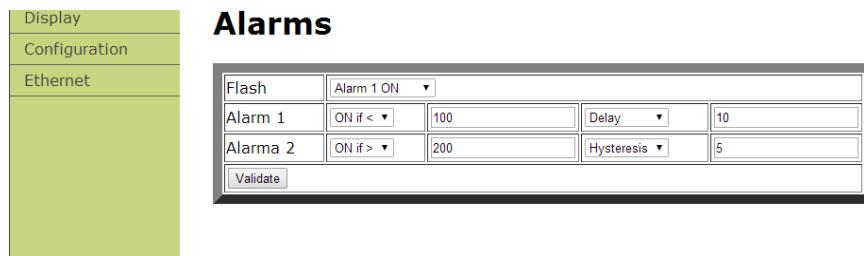
User: admin
Password: 12345678

First tab allows the user to configure the same parameters as the parameter menu in an easier and more intuitive way. Using this menu, the user selects the input (Pt100, Pt1000, thermocouple J, K or T), measurement unit (ºC or ºF), resolution and offset.
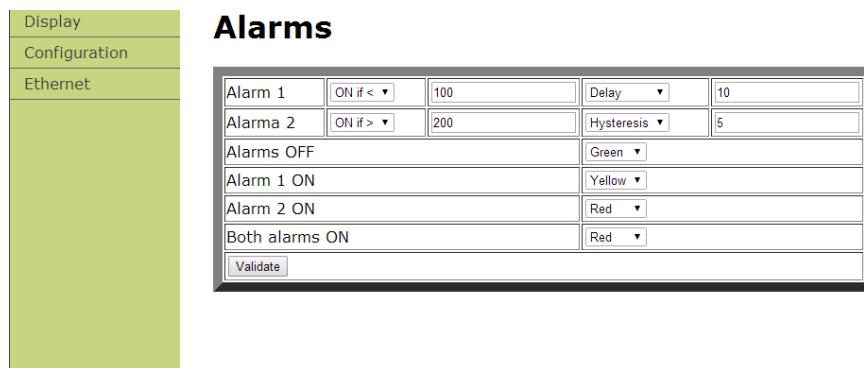
The tab "Alarms" allows the user to configure the alarms of the displays, as well as the flashing of the digits in the displays without color and the color in the displays withe that option, The relays are activated by the alarmas (relay 1 with alarm 1 and relay 2 with alarm 2). In this example, the alarm 1 will activate 10 seconds after thevalue of the display goes lower than 100 and will deactivate 10 seconds after the value of the display goes higher than 100. Alarm 2 will activate when the value of the display goes higher than 205 and will deactivate when the display goes lower than 200.
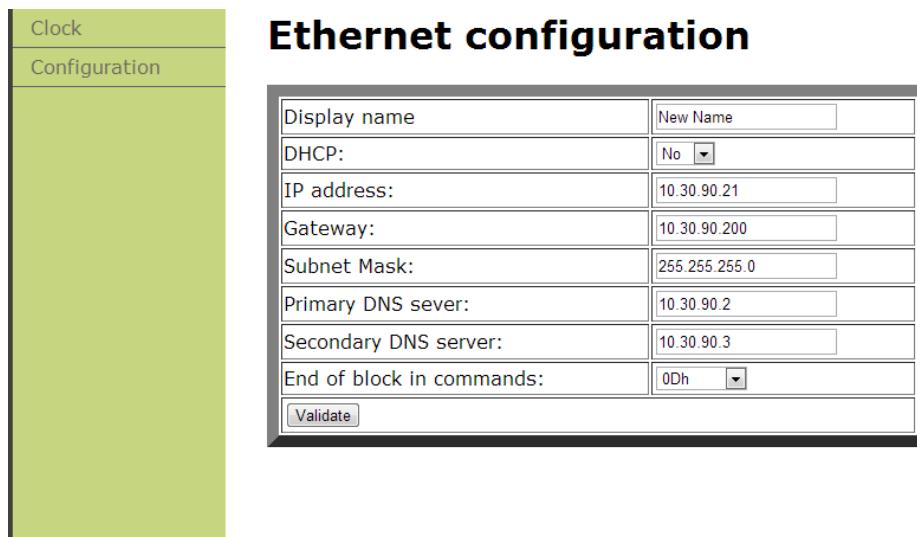
The image corresponds to a display without the color option. In this case, the digits will flash wheb the alarm 2 is activated.

The following image corresponds to a display with colour option. The colour of the display will depend of this configuration

The Ethernet tab allows configuring the network parameters of the display, including the IP address, DNS, etc. The display can use DHCP to get these parameters on its own. The name of the display can be changed according to the needs of the user. This name is used to identify and access the display throw web browser (typing the name in the URL)

Ethernet configuration

| Display name	New Name
DHCP:	No
IP address:	10.30.90.21
Gateway:	10.30.90.200
Subnet Mask:	255.255.255.0
Primary DNS sever:	10.30.90.2
Secondary DNS server:	10.30.90.3
End of block in commands:	0Dh

Validate
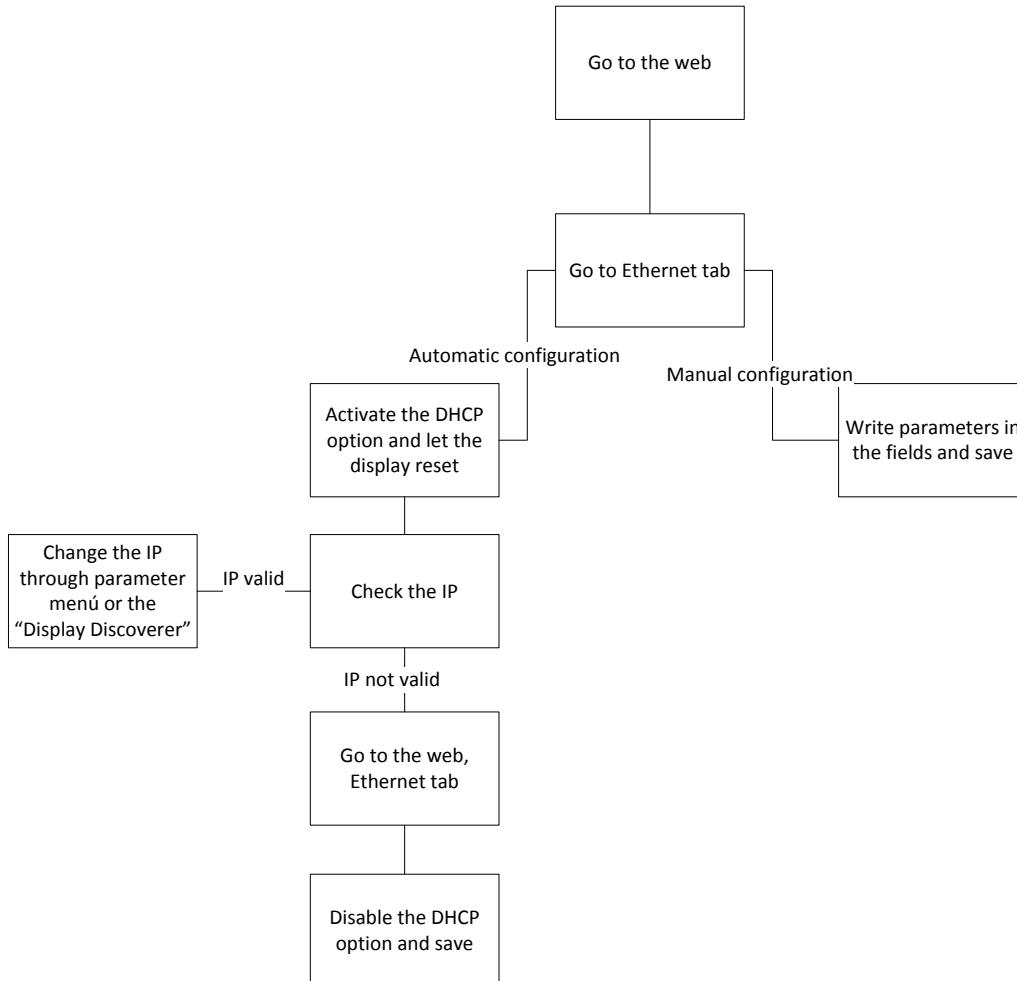
In case of failure or errors, reset the display by pressing the three keys all during a reset.

4.5.3. Ethernet parameter configuration

The Ethernet parameters, like the IP address, the Gateway, the subnet mask, etc can be configured manually or automatically through DHCP. Previously, the user must know the IP address he wants for the display. It is highly recommended to change the IP address from the default.

Once the user has accessed the Ethernet tab of the display webpage, configure the parameters manually or activate the DHCP protocol for the display to request all the network parameters automatically. When clicking the button "validate", the system saves the changes and reboots. If the parameters are put manually, the work is finished.

On the other side, the display may have changed the IP address. This IP address can be checked (and changed) through parameters or the "Display Discoverer". The DHCP can be left enabled or disabled. If the user modifies the IP address, the DHCP protocol will be disabled.

```
                            ┌──────────────┐
                            │ Go to the web│
                            └──────┬───────┘
                                   │
                            ┌──────┴───────┐
                            │Go to Ethernet│
                            │     tab      │
                            └──┬────────┬──┘
            Automatic configuration    Manual configuration
       ┌───────────────┐                        ┌──────────────┐
       │Activate the   │                        │Write         │
       │DHCP option and│                        │parameters in │
       │let the display│                        │the fields and│
       │reset          │                        │save          │
       └───────┬───────┘                        └──────────────┘
               │
┌──────────────┐      ┌──────────────┐
│Change the IP │ IP   │              │
│through       │valid │ Check the IP │
│parameter menú│──────│              │
│or the        │      └──────┬───────┘
│"Display      │         IP not valid
│Discoverer"   │      ┌──────┴───────┐
└──────────────┘      │Go to the web,│
                      │Ethernet tab  │
                      └──────┬───────┘
                      ┌──────┴───────┐
                      │Disable the   │
                      │DHCP option   │
                      │and save      │
                      └──────────────┘
```

4.5.4. Communication with commands through Ethernet

The displays can obtain the displayed value through commands. The frames are sent in ASCII (character) format. The end of block is the one defined by the user through the web page. The port the commands must be sent to is 9760.

Frame

This frame only includes the code. This does not send any data.

	Code	End of block
ACII	P A	
Hexa	50h 41h	

Response frame

	Code	Data	End of block
ASCII	R A		
Hexa	52h 41h		

Example: 123.45

	Code	Data						End of block
ASCII	R A	1	2	3	.	4	5	
Hexa	52h 41h	31h	32h	33h	2Eh	34h	35h	

Revision history

Revision J (March 2013).

Updated introduction in 4.4.

Revision K (September 2013).

Updated dimensions and weight of DN-109/3. Paragraphs 2.2.1 and 2.3.1.

Revision L (October 2013)
Moved 4.4 to 4.5.3.
Updated electrical characteristics of the 24VDC power. Paragraphs 2.1 and 3.1.
Added the "Flash" function. Paragraph 4.4.4
Updated paragraph 4.4.4

Revision M (March 2013)
Updated paragraph 3.2.
Updated images in paragraph 3.3 and 3.4.
Updated paragraph 3.4.3 and 4.4.
Deleted paragraph 4.5.

Revision N (April 2014)
Updated paragraph 4.3.2
Added paragraph 4.5

STATEMENT OF CONFORMITY $C \in$

DISEÑOS Y TECNOLOGIA, S.A.
Poligon Industrial Les Guixeres
c/ Xarol 8C
08915 BADALONA España

As the builder of the equipment of the **DITEL** brand:

Model : DN-109AT in all versions.
Model : DN-119AT in all versions.
Model : DN-129AT in all versions.
Model : DN-189AT in all versions.

We declare under our sole responsibility that the aforementioned product
complies with the following European directives:

Directive: LVD 2006/95/CEE Low Voltage Directive.
Standard UNE-EN61010-1 Security in electric equipment.

Directive: EMC 2004/108/CEE Electromagnetic Compatibility
Standard UNE-EN 61000-6-4 Generic Emission Standard. Industrial environment.
Standard UNE-EN 61000-6-2 Generic Immunity Standard. Industrial environment.
Directive 2011/65/CE: Restriction of the use of certain hazardous substances in
electrical and electronic equipment
.

Badalona, 29th January 2014

Alicia Alarcia
Directora Técnica