

**OPERATION MANUAL  
FOR DISPLAYS SERIES  
DN-109ND, DN-119ND,  
DN-129ND AND DN-189ND**

1542K03G



**TETRALEC E.I. S.L.**  
Certified company

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## 1. INTRODUCTION

The numerical displays for series **DN-109ND**, **DN-119ND**, **DN-129ND** and **DN-189ND**, are industrial displays for control by DeviceNet network. All of the units have the option of adding a symbol, in text format, of a maximum of three characters.

The selection of the parameters and the communication protocol is done using two buttons with a system of easily programmable codes.

One of its main characteristics is the large size of the characters,

**DN-109ND** of 57mm legible at 30m.

**DN-119ND** of 100 mm legible at 50m.

**DN-129ND** of 250 mm legible at 120m.

**DN-189ND** of 180 mm legible at 90m.

As with other display series, the **DN-109ND**, **DN-119ND**, **DN-129ND** and **DN-189ND** series is also available in one or two-sided versions, which provides multiple solutions and installation possibilities.

It is surface mounted, with fixtures to a wall or partition wall, or suspended by the side anchoring.

The application field of these displays is very wide in all types of industrial applications utilising the advantages of the DeviceNet network. They can be used to display Scada program values, counter values from a PLC.

The protection degree of equipments is IP41 but the following versions have IP65 protection degree.

**DN-109eND** Protection degree IP65 and luminosity for indoor use.

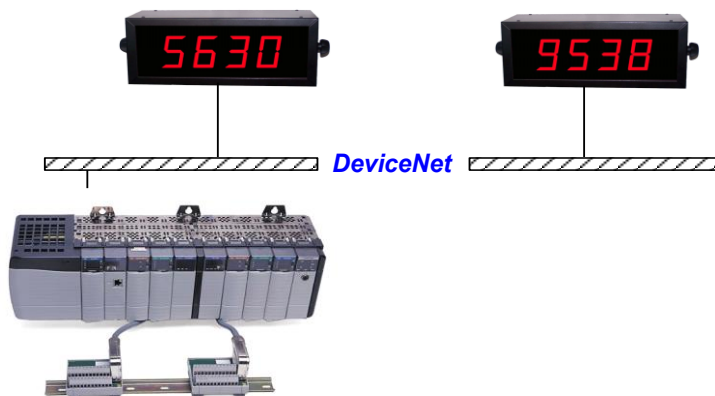
**DN-119eND** Protection degree IP65 and luminosity for indoor use.

**DN-119ehND** Protection degree IP65 and luminosity for outdoor use.

**DN-129fhND** Protection degree IP54 and luminosity for outdoor use.

**DN-189eND** Protection degree IP65 and luminosity for indoor use.

**DN-189ehND** Protection degree IP65 and luminosity for outdoor use.



## 2. GENERAL CHARACTERISTICS.

### 2.1. Electrical characteristics

#### 2.1.1. Electrical characteristics of the DN-109 displays.

<b>Supply Voltage</b> .....	88 to 264 VAC 47 to 63Hz or 19 to 36VDC:
<b>Consumption</b> .....	See "Display weight and power consumption."
<b>Display</b> .....	7 segments, 57mm high + decimal point. ..... Red Led colour. Viewing distance: max 30 meters.
<b>Text (LED)</b> .....	Formed by leds of 5mm diameter, 50mm character ..... height.
<b>Text (Vinyl)</b> .....	White vinyl. 50mm character height.
<b>Parameter memory</b> .....	Eeprom.
<b>Communication</b> .....	DeviceNet slave. ..... Autodetection baud rate. Max. 12MHz
<b>Data type</b> .....	Integer, real or ASCII code
<b>Environmental Conditions</b> .....	Operation Temperature: -20 to 60°C. ..... Storage temperature: -30°C to 70°C. ..... Humidity: 5-95% RH non condensing. ..... Maximum environmental illumination: 1000 lux. ..... Sealing: IP41 or IP65.

#### 2.1.2. Electrical characteristics of the DN-119 displays.

<b>Supply Voltage</b> .....	88 to 264 VAC 47 to 63Hz or 19 to 36VDC:
<b>Consumption</b> .....	See "Display weight and power consumption."
<b>Display</b> .....	7 segments, 100mm high + decimal point. ..... Red Led colour. Viewing distance: max 50 meters.
<b>Text (LED)</b> .....	Formed by leds of 5mm diameter, 65mm character ..... height.
<b>Text (Vinyl)</b> .....	White vinyl. 65mm character height.
<b>Parameter memory</b> .....	Eeprom.
<b>Communication</b> .....	DeviceNet slave. ..... Autodetection baud rate. Max. 12MHz
<b>Data type</b> .....	Integer, real or ASCII code
<b>Environmental Conditions</b> .....	Operation Temperature: -20 to 60°C. ..... Storage temperature: -30°C to 70°C. ..... Humidity: 5-95% RH non condensing. ..... Maximum environmental illumination: 1000 lux. ..... Sealing: IP41 or IP65.

### 2.1.3. Electrical characteristics of the DN-189 displays.

<b>Supply Voltage</b> .....	88 to 264 VAC 47 to 63Hz or 19 to 36VDC:
<b>Consumption</b> .....	See "Display weight and power consumption."
<b>Display</b> .....	7 segments, 180mm high + decimal point.
.....	Red Led colour. Viewing distance: max 90 meters.
<b>Text (Vinyl)</b> .....	White vinyl.
<b>Parameter memory</b> .....	Eeprom.
<b>Communication</b> .....	DeviceNet slave.
.....	Autodetection baud rate. Max. 12MHz
<b>Data type</b> .....	Integer, real or ASCII code
<b>Environmental Conditions</b> .....	Operation Temperature: -20 to 60°C.
.....	Storage temperature: -30°C to 70°C.
.....	Humidity: 5-95% RH non condensing.
.....	Maximum environmental illumination: 1000 lux.
.....	Sealing: IP41 or IP65.

### 2.1.4. Electrical characteristics of the DN-129 displays.

<b>Supply Voltage</b> .....	88 to 264 VAC 47 to 63Hz or 19 to 36VDC:
<b>Consumption</b> .....	See "Display weight and power consumption."
<b>Display</b> .....	7 segments, 250mm high + decimal point.
.....	Red Led colour. Viewing distance: max 120 meters.
<b>Text (Vinyl)</b> .....	White vinyl.
<b>Parameter memory</b> .....	Eeprom.
<b>Communication</b> .....	DeviceNet slave.
.....	Autodetection baud rate. Max. 12MHz
<b>Data type</b> .....	Integer, real or ASCII code
<b>Environmental Conditions</b> .....	Operation Temperature: -20 to 60°C.
.....	Storage temperature: -30°C to 70°C.
.....	Humidity: 5-95% RH non condensing.
.....	Maximum environmental illumination: 1000 lux.
.....	Sealing: IP41 or IP54.

## 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
DN-109/6S	3,5	10,7	DN-109/6S+TL	4,0	12,8	DN-109/6S+TV	4,0	10,7
DN-109/6D	4,0	20,85	DN-109/6D+TL	4,5	25	DN-109/6D+TV	4,0	20,85
DN-109/7S	4,0	12,36	DN-109/7S+TL	4,0	14,4	DN-109/7S+TV	4,0	12,36
DN-109/7D	4,5	24,1	DN-109/7D+TL	5,0	28,1	DN-109/7D+TV	5,0	24,1
DN-109/8S	4,0	14	DN-109/8S+TL	4,5	16	DN-109/8S+TV	4,5	14
DN-109/8D	5,0	27,3	DN-109/8D+TL	5,5	31,3	DN-109/8D+TV	5,5	27,3
DN-109/9S	4,5	15,7	DN-109/9S+TL	4,5	17,6	DN-109/9S+TV	4,5	15,7
DN-109/9D	5,0	30,5	DN-109/9D+TL	5,5	34,6	DN-109/9D+TV	5,5	30,5
DN-109/10S	4,5	17,2	DN-109/10S+TL	5,0	19,2	DN-109/10S+TV	5,0	17,2
DN-109/10D	5,5	33,7	DN-109/10D+TL	6,0	37,7	DN-109/10D+TV	6,0	33,7

### 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
DN-119/6S	5,5	20,2	DN-119/6S+TL	6,0	22,8	DN-119/6S+TV	6,0	20,2
DN-119/6D	6,0	39,2	DN-119/6D+TL	6,5	44,5	DN-119/6D+TV	6,5	39,2
DN-119/7S	6,0	23,3	DN-119/7S+TL	7,0	25,9	DN-119/7S+TV	7,0	23,3
DN-119/7D	3,5	25,5	DN-119/7D+TL	7,5	50,8	DN-119/7D+TV	7,5	25,5
DN-119/8S	6,5	26,4	DN-119/8S+TL	7,5	29	DN-119/8S+TV	7,5	26,4
DN-119/8D	7,0	51,6	DN-119/8D+TL	8,0	56,8	DN-119/8D+TV	8,0	51,6
DN-119/9S	7,0	29,4	DN-119/9S+TL	8,0	32	DN-119/9S+TV	8,0	29,4
DN-119/9D	7,5	57,6	DN-119/9D+TL	8,5	62,9	DN-119/9D+TV	8,5	57,6
DN-119/10S	7,5	32,5	DN-119/10S+TL	8,5	35,2	DN-119/10S+TV	8,5	32,5
DN-119/10D	8,0	64	DN-119/10D+TL	9,0	69	DN-119/10D+TV	9,0	64

**2.2.4. DN-189 weight and power consumption.**

Reference	Display Weight (kg)	Power (W)	Reference	Display weight (kg)	Power (W)
DN-189/2S	4,0	13,3	DN-189/2S+TV	5,5	13,3
DN-189/2D	4,5	25,8	DN-189/2D+TV	6,5	25,8
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
DN-189/6S	8,5	37,8	DN-189/6S+TV	10,0	37,8
DN-189/6D	10,0	75,5	DN-189/6D+TV	11,5	75,5
DN-189/7S	9,5	44	DN-189/7S+TV	11,0	44
DN-189/7D	11,0	88,1	DN-189/7D+TV	13,0	88,1
DN-189/8S	10,5	50,3	DN-189/8S+TV	12,0	50,3
DN-189/8D	12,5	100,6	DN-189/8D+TV	14,0	100,6
DN-189/9S	11,0	56,6	DN-189/9S+TV	13,0	56,6
DN-189/9D	13,5	113,2	DN-189/9D+TV	15,5	113,2
DN-189/10S	12,0	62,9	DN-189/10S+TV	14,0	62,9
DN-189/10D	15,0	125,8	DN-189/10D+TV	16,5	125,8

**2.2.5. DN-129 weight and power consumption.**

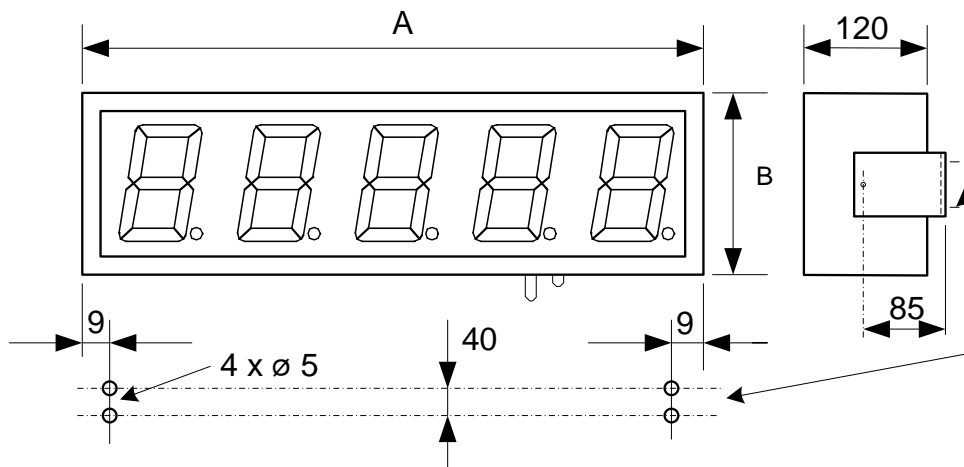
Reference	Display Weight (kg)	Power (W)	Reference	Display weight (kg)	Power (W)
DN-129/2S	6,5	13	DN-129/2S+TV	9,5	13
DN-129/2D	8,0	26	DN-129/2D+TV	11,5	26
DN-129/3S	8,5	20	DN-129/3S+TV	11,5	20
DN-129/3D	10,5	40	DN-129/3D+TV	13,5	40
DN-129/4S	10,5	26	DN-129/4S+TV	13,0	26
DN-129/4D	13,0	52	DN-129/4D+TV	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
DN-129/6S	14,0	40	DN-129/6S+TV	17,0	40
DN-129/6D	18,0	77	DN-129/6D+TV	21,0	77
DN-129/7S	16,0	45	DN-129/7S+TV	18,5	45
DN-129/7D	20,0	90	DN-129/7D+TV	23,5	90
DN-129/8S	17,5	51	DN-129/8S+TV	20,5	51
DN-129/8D	23,0	102	DN-129/8D+TV	26,0	102
DN-129/9S	19,5	58	DN-129/9S+TV	22,5	58
DN-129/9D	25,5	115	DN-129/9D+TV	28,5	115
DN-129/10S	21,5	64	DN-129/10S+TV	24,0	64
DN-129/10D	28,0	128	DN-129/10D+TV	31,0	128



## 2.3. Dimensions and mounting of the Displays

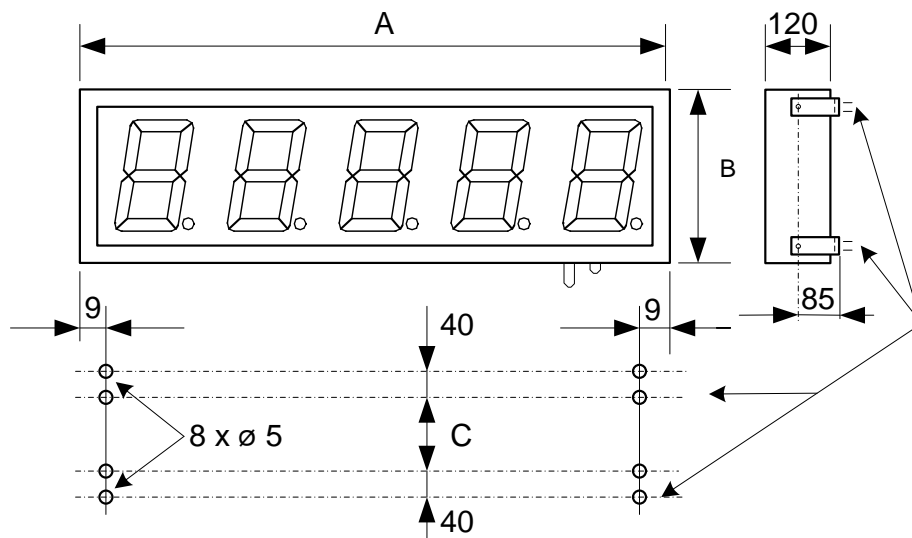
### 2.3.1. Dimensions and mounting of the DN-109 and DN-119

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-109/6S	336	122	DN-109/6S+T	430	122
DN-109/7S	382	122	DN-109/7S+T	478	122
DN-109/8S	430	122	DN-109/8S+T	526	122
DN-109/9S	478	122	DN-109/9S+T	574	122
DN-109/10S	526	122	DN-109/10S+T	622	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
DN-119/6S	594	177	DN-119/6S+T	774	177
DN-119/7S	684	177	DN-119/7S+T	864	177
DN-119/8S	774	177	DN-119/8S+T	954	177
DN-119/9S	864	177	DN-119/9S+T	1044	177
DN-119/10S	954	177	DN-119/10S+T	1134	177



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

Reference	A	B	C	Reference	A	B	C
DN-189/2S	340	251	67	DN-189/2S+TV	660	251	67
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-189/6S	980	251	67	DN-189/6S+TV	1300	251	67
DN-189/7S	1140	251	67	DN-189/7S+TV	1460	251	67
DN-189/8S	1300	251	67	DN-189/8S+TV	1620	251	67
DN-189/9S	1460	251	67	DN-189/9S+TV	1780	251	67
DN-189/10S	1620	251	67	DN-189/10S+TV	1940	251	67
DN-129/2S	515	366	186	DN-129/2S+TV	985	366	186
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
DN-129/6S	1455	366	186	DN-129/6S+TV	1925	366	186
DN-129/7S	1690	366	186	DN-129/7S+TV	2160	366	186
DN-129/8S	1925	366	186	DN-129/8S+TV	2395	366	186
DN-129/9S	2160	366	186	DN-129/9S+TV	2630	366	186
DN-129/10S	2395	366	186	DN-129/10S+TV	2865	366	186



### 3. INSTALLATION

The installation of the DN-109ND, DN-119ND, DN-129ND and DN-189ND 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-109ND, DN-119ND, DN-129ND and DN-189ND 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-109ND, DN-119ND, DN-129ND and DN-189ND 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.

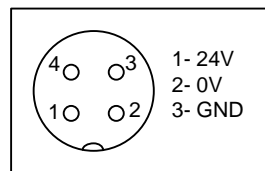
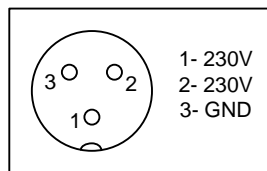
#### 3.1. Power supply.

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 1.5m<sup>2</sup>.

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



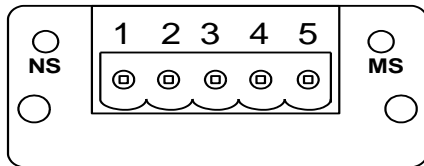
### 3.2. Connecting to the DeviceNet line

DeviceNet line connection is carried out using a connector located in the lower part of the unit.

The terminal resistances will be enabled on the ends of the network to adjust network impedance.

Power lines that may generate electrical interference will be avoided where possible on the network layout.

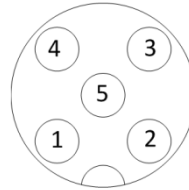
**Connector displays  
IP41**



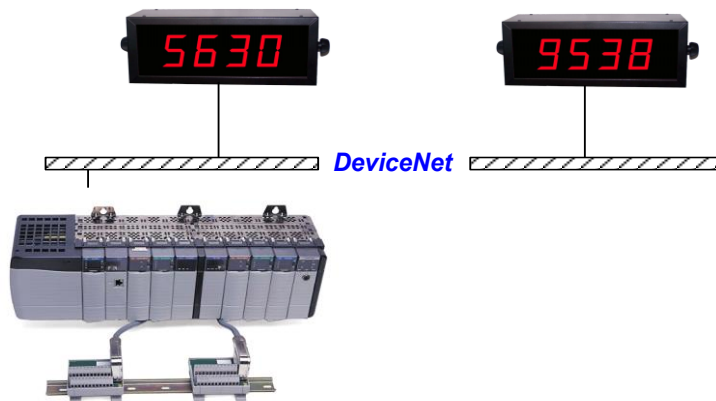
NS: Network status MS: Module status

Pin 1 = V- (GND)  
Pin 2 = CAN-L  
Pin 3 = Shield  
Pin 4 = CAN-H  
Pin 5 = V+ (24V)

**Connector displays  
IP65. Male connector.**



Pin 1 (GN)= Shield  
Pin 2 (RD)= V+ (24V)  
Pin 3 (BK)= V- (GND)  
Pin 4 (WH)= CAN-H  
Pin 5 (BU)= CAN-L



## 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.

When the DeviceNet module has been initialised correctly, the MS led will light up green. If the network is configured correctly and the display is connected to the network, the NS led will light up green.

From this point any one of the following three situations may occur:

- a) The display receives data from the Ethernet network and displays it.
- b) The display does not receive data and the time without data equals zero. Continues to show the decimal points.
- c) The display does not receive data and the time without data is not equal to zero. After a time without data it displays a dash in each digit.

### 4.2. LEDs DeviceNet module

The DeviceNet module has 2 LED to indicate the operation and status

LED NS	Network Status	LED MS	Module status
Off	Not online / No power	Off	No power
Green	Online. One or more connections established	Green	Operating in normal condition
Green flashing 1Hz	Online. No connections established	Green flashing 1Hz	Missing or incomplete configuration
Red	Network critical failure	Red	Unrecoverable failure
Red flashing 1Hz	One or more connections timeout	Red flashing 1Hz	Recoverable fault
Alternating Red/Green	Autotest	Alternating Red/Green	Autotest

In the equipments with IP65 sealing, LEDs aren't accessible. To know the status of DeviceNet module, see **parameter 5**.

### 4.3. Programming parameters.

Displays DN-109ND, DN-119ND, DN-129ND and DN-189ND can be adapted to the demands of any customer through the parameters programming. The parameters which can be configured are:

- 1- Display address.
  - 2- Data type.
  - 3- Time without receiving data.
  - 4- Decimal point position.
  - 5- DeviceNet status
    - Only displays with colour option.
  - 6- Define the internal bit r1.
  - 7- Set up the trigger level of internal bit r1.
  - 8- Define the internal bit r2.
  - 9- Set up the trigger level of internal bit r2.
  - nr- Colour if both internal bits are OFF.
  - r1- Colour if internal bit r1 is ON.
  - r2- Colour if internal bit r2 is ON
  - r3- Colour if both internal bits are ON.
- E- To exit modify parameters.

To program the parameters, the digits on the right of the display are used. The number of the parameter is indicated by the digit on the left and the decimal point flashes while the digit on the right is off.

#### **Three digits displays or more:**

The three digits on the right of the display are used to program the parameters. The third digit from the right, which has a decimal point activated, indicates the parameter number. The other two digits indicate the parameter value. The digit in flashing is the one that can be modified.

#### **Two digits displays:**

The two digits of the display are used to program the parameters. The digit of the left, which has a decimal point activated, indicates the parameter number. The digit in flashing is the one that can be modified. With the advance key "\*" it can read alternatively the parameter value or parameter number

### 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, showing the most significant digit flashing.

There are then two options:

#### 1- Modify the parameter value

By pressing the Advance key “\*”, entry is gained to modify the parameter value.

To go back to displaying the parameter number, press “\*” again.

To increase the parameter value, press the “+” key. After parameter F it returns to 1.

#### 2- Select another parameter

In order to select another parameter, the parameter number must be made to flash using the “\*” key and then the new parameter may be selected using the “+” key.

### 4.3.2. Exit modify parameters.

In order to exit the sequence for modifying parameters, parameter E must be selected. Then press “\*”.

### 4.3.3. Function of each parameter.

#### 4.3.3.1. Parameter 1: Display address.

The address range is between 0 and 63.

#### 4.3.3.2. Parameter 2: Data type.

Selects the data type used in the communication transfer.

Value	Data type
0	Decimal integer
1	Hexadecimal integer
2	String
3	Real

#### 4.3.3.3. Parameter 3: Time-out reception.

It programs a period of time to wait until receive correct data. The warning is shown once the time programmed is exceeded. Every time new data is received correctly, the time is set to 0. The code “00” (without timing) does not produce any warning.

Code	Time	Code	Time
00	No time	11	1 min.
01	2 s	12	2 min.
02	4 s	13	5 min.
03	6 s	14	10 min.
04	8 s	15	20 min.
05	10 s	16	40 min.
06	14 s	17	1 hour.
07	20 s	18	2 hours.
08	26 s	19	5 hours.
09	30 s	20	10 hours.
10	40 s	21	25 hours.

#### 4.3.3.4. Parameter 4:Decimal position

Fix the decimal position.

Frame = Integer	Frame = String	Frame = Real
0 = 000000	X	0= Automatic
1 = 00000.0	X	1 = 000000.
2 = 0000.00	X	2 = 00000.0
3 = 000.000	X	3 = 0000.00
4 = 00.0000	X	4 = 000.000
...	X	...

#### 4.3.3.5. Parameter 5: Device Net Status

To display the DeviceNet network status using the display digits.

Value = 0. Don't display the status.

Value = 1. Display the network status.

Displayed values.

-0- and -1- Initializing DeviceNet module.

-2- Module DeviceNet initalized. Waiting network operation.

When DeviceNet network is in operation status isn't displayed.

#### 4.3.3.6. Parameter 6

Display with colour option. See paragraph 4.6 "Colour configuration".

#### 4.3.3.7. Parameter 7

Display with colour option. See paragraph 4.6 "Colour configuration".

#### 4.3.3.8. Parameter 8

Display with colour option. See paragraph 4.6 "Colour configuration".

#### 4.3.3.9. Parameter 9

Display with colour option. See paragraph 4.6 "Colour configuration".

#### 4.3.3.10. Parameter nr, r1, r2, r3

Display with colour option. See paragraph 4.6 "Colour configuration".

#### 4.3.3.11. Parameter E

Exit modify parameters

Press the key "\*" to exit the option modify parameters. Before exiting the parameters are saved.

Press the key "+" until reaching the parameter to be modified to keep on modifying parameters.



#### 4.4. DeviceNet protocol.

In this paragraph, the different protocols will be explained, as well as the programming of the displays through them. The formats of values of the numbers and characters are written in this manual are:

- When telling about a hexadecimal number, this will be followed by an “h”.
- When telling about a decimal number, this will be followed by a “d”.
- When telling about a binary number, this will be followed by a “b”.
- When telling about an ASCII character, this will be explained in the context.

As an example, the X ASCII character can be explained as 58h, 88d or 1011000b, as needed in the moment. Number 15 ASCII can be seen as 31h 35h, 49d 53d or 110001d 110101d.

##### 4.4.1. Block structure:

4 double words (DW) are sent in each transmission block. Total 16 bytes. The information that the block must contain is different depending on the type of frame programmed in parameter 2. The transmission sequence is started with DW1 byte 0 and ends with DW4 byte 15.

DW1				DW2				DW3				DW4				CRC
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

##### 4.4.2. Data type = 0

Display a double integer. (DW). The value to be displayed must be entered in DW1, where 0 is the least significant byte.

Block examples for a 4 digits display.

DW1				DW2				DW3				DW4				CRC	4 digits display			
D8	06	00	00	X	X	X	X	X	X	X	X	X	X	X	X		1	7	5	2

DW1				DW2				DW3				DW4				CRC	4 digits display			
F6	00	00	00	X	X	X	X	X	X	X	X	X	X	X	X			2	4	6

##### 4.4.3. Data type = 1

Display a double integer in hexadecimal format. (DW). The value to be displayed must be entered in DW1, where 0 is the least significant byte.

Block examples for a 4 digits display.

DW1				DW2				DW3				DW4				CRC	4 digits display			
D8	06	00	00	X	X	X	X	X	X	X	X	X	X	X	X		0	6	D	8

#### 4.4.4. Data type = 2

Display a string of digits. The value to be displayed must be entered in DW1, DW2 and DW3, where the last valid byte sent will be the one to the right of the display.

Block examples for a 6 digits display. Code in ASCII hexadecimal.

DW1				DW2				DW3				DW4				CRC	6 digits display					
35h	36h	37h	38h	39h	0	0	0	0	0	0	0	0	0	0	0			5	6	7	8	9

DW1				DW2				DW3				DW4				CRC	6 digits display					
35h	36h	37h	38h	39h	31h	32h	33h	0	0	0	0	0	0	0	0		7	8	9	1	2	3

For a character or group of characters to be displayed in flashing mode, codes 08(Start) and 09(End) must be used.

Example:

On a 6-digit display to display: 123456 with digits 3 and 4 flashing.

In decimal code the following must be sent: 49d 50d 08d 51d 52d 09d 53d 54d.

In hexadecimal code the following must be sent: 31h 32h 08h 33h 34h 09h 35h 36h.

#### 4.4.5. Data type = 3

Display a real number. The value to be displayed must be entered in DW1, where 0 is the least significant byte. The real numbers must be in 4-byte IEEE format.

31	30	23	22	0
S	Exponent		Mantisa	
$N = (-1)^S \cdot 2^{(\text{Exponent}-127)} \cdot 1.\text{Mantisa}$				

DW1				DW2				DW3				DW4				CRC	6 digits display					
9Ah	99h	73h	45h	0	0	0	0	0	0	0	0	0	0	0	0		3	8	9	7.	6	0

DW1				DW2				DW3				DW4				CRC	6 digits display					
29h	9Ch	6Bh	43h	0	0	0	0	0	0	0	0	0	0	0	0			2	3	5.	6	1

#### 4.4.6. Valid characters

Numerical displays can only display numbers and some characters. All valid characters and their representation in hexadecimal format are shown below.

Character	0	1	2	3	4	5	6	7	8	9	A	b
HEXA	30h	31h	32h	33h	34h	35h	36h	37h	38h	39h	41h	42h
DEC	48d	49d	50d	51d	52d	53d	54d	55d	56d	57d	65d	66d

Character	C	c	d	E	F	H	h	i	J	L	n	o
HEXA	43h	63h	64h	45h	46h	48h	68h	69h	4Ah	4Ch	6Eh	6Fh
DEC	67d	99d	100d	69d	70d	72d	104d	105d	74d	76d	110d	111d

Character	P	r	U	u	,	.	-	-	'	-		
HEXA	50h	72h	55h	75h	20h	2Ch	2Eh	2Dh	16h	27h	28h	
DEC	80d	114d	85d	117d	32d	44d	46d	45d	22d	39d	40d	

#### 4.4.7. Colour option

In the equipments with colour option is possible to set the colour modifying the value of register DW4 in bytes 14 and 15. In byte 14 character X (88 o 58h) must be placed while in byte 15 we will place the colour code..

The valid colour codes are:

Red colour = 0

Green colour = 1

Yellow colour = 2

The value in registers DW1, DW2, DW3 and DW4 bytes 12 and 13 aren't significant.

DW1				DW2				DW3				DW4				CRC
xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	X	c	

xx = Any value

X = Character X.

c = Colour

#### 4.5. EDS module installation

The appropriate EDS module must be installed to communicate with a display. This can be obtained from the website: [www.lartet.com](http://www.lartet.com)

## 4.6. Colour configuration

The colour option allows you to modify automatically the display colour according to the present value. The possible colours are: Red, Green and Yellow.

In order to be able to manage the colour 2 internal bits are used, they change depending on display value. Eight parameters are needed to set up the levels. Four parameters are used to define the activation form and the activation level. The other four allow to define the colour according to a combination of the 2 internal bits.

### 4.6.1. Parameters to define the internal bit r1.

To set up the internal bit **r1** parameters **6** and **7** are used.

Parameter 6 is used to set up the activation form and delay or hysteresis.

Parameter 7 is used to set up the trigger level. The most significant digit allow setting up a negative value.

Parameter 6			
Left Digit	Control bit	Right Digit	Set/Reset
0	ON if Value > Parameter 7	0	No delay / No hysteresis
1	ON if Value < Parameter 7	1	Delay 1s
2	Always OFF	2	Delay 2s
		3	Delay 4s
		4	Delay 6s
		5	Delay 10s
		6	Hysteresis = 2
		7	Hysteresis = 4
		8	Hysteresis = 8
		9	Hysteresis = 12

#### 4.6.2. Parameters to define the internal bit r2.

To set up the internal bit **r2** parameters **8** and **9** are used.

Parameter 8 is used to set up the activation form and delay or hysteresis.




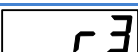
Parameter 9 is used to set up the trigger level. The most significant digit allow setting up a negative value.

Parameter 8			
Left Digit	Control bit	Right Digit	Set/Reset
0	ON if Value > Parameter 9	0	No delay / No hysteresis
1	ON if Value < Parameter 9	1	Delay 1s
2	Always OFF	2	Delay 2s
		3	Delay 4s
		4	Delay 6s
		5	Delay 10s
		6	Hysteresis = 2
		7	Hysteresis = 4
		8	Hysteresis = 8
		9	Hysteresis = 12

#### 4.6.3. Parameters to define the colour.

To define the colour the 2 internal bits (**r1** and **r2**) are used.

The following parameters are used to define colours.

	Colour if internal bits are OFF. To change the colour press * key. Upon pressing + the next parameter is shown.
	Colour if internal bit <b>r1</b> is ON. To change the colour press * key. Upon pressing + the next parameter is shown.
	Colour if internal bit <b>r2</b> is ON. To change the colour press * key. Upon pressing + the next parameter is shown.
	Colour if internal bits <b>r1</b> and <b>r2</b> are ON. To change the colour press * key. Upon pressing + the next parameter is shown.

#### 4.6.4. Work with only one colour.

To work always with only one colour set up the following parameters:

Parameter	Value
6	20
7	0
8	20
9	0
nr	colour
r1	
r2	
r3	

Red Colour = 0
Green colour = 1
Yellow colour = 2

Parameters **7** and **9** may have any value.

Parameters **nr**, **r1**, **r2** and **r3** should have the same colour.

Independently of work colour, the parameters set up always uses RED colour.

## Revision history

### **Revision C (March 2013).**

Updated introduction in 4.4.

### **Revision D (September 2013).**

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

### **Revision E (October 2013)**

Updated electrical characteristics of the 24VDC power. Paragraphs 2.1 and 3.1.

### **Revision F (May 2014)**

Statement of conformity modification.

## **STATEMENT OF CONFORMITY**



Tetralec Electronica Industrial S.L.  
c/ Severo Ochoa, 80  
Polígono Industrial Font del Radium  
08403 Granollers

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

Model : DN-109ND in all versions.

Model : DN-119ND in all versions.

Model : DN-129ND in all versions.

Model : DN-189ND 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 2014/30 UE Electromagnetic Compatibility  
Standard UNE-EN 61000-6-4 Generic Emission Standard. Industrial environment.  
Standard UNE-EN 61000-6-2 Generic Immunity Standard. Industrial environment.

Granollers, 5th February 2013