OPERATION MANUAL

FOR DN-107NE DISPLAYS

# Index

1. INTRODUCTION

The numerical displays for series **DN-107NE** are industrial displays for control by Ethernet network and can be configured for use with TCP/IP, UDP et Modbus/TCP protocols.

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

The digit height, **57mm,** allows a reading distance up to 30m, is one of the main characteristics.

ETHERNET

ETHERNET
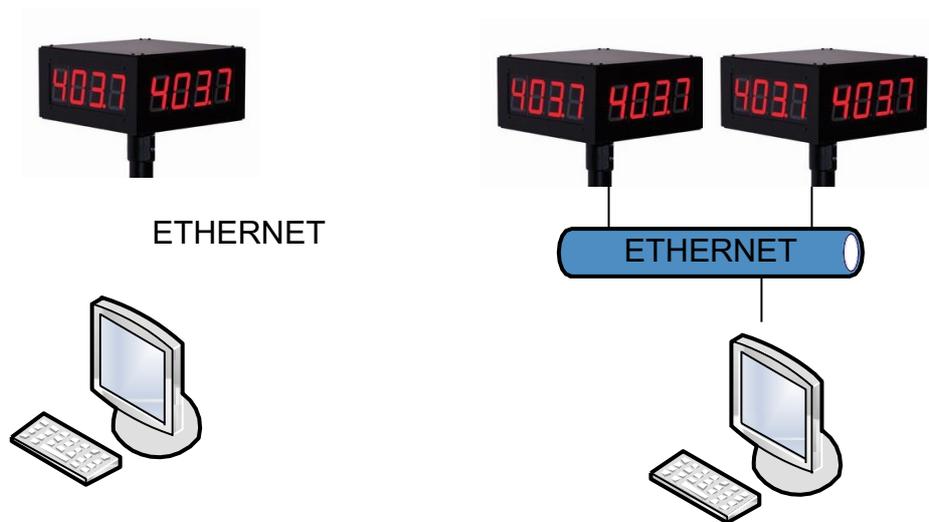
2. GENERAL CHARACTERISTICS

2.1. Electrical characteristics of the displays

2.1.1. Electrical characteristics of the DN-107/NE displays.

Supply Voltage...100 to 240 VAC 50 to 60Hz or 19 to 36VDC.
Consumption... 36Va.
Display .... 7 segments, 57mm high + decimal point.
....Red LED colour. Viewing distance: 30 meters.
Parameter memory .... Eeprom.
Communication...Ethernet 10/100. RJ-45 connector.
Communication Protocols ....TCP/IP, UDP/IP and Modbus/TCP.
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.

2.2. Dimensions and fixing of the displays

### 2.2.1. Dimensions of the displays DN-107 /3
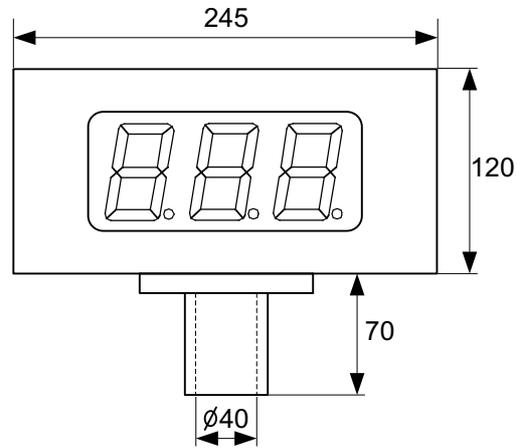
All the measurements are in millimeters

2.2.2. DN-119 weight and power consumption
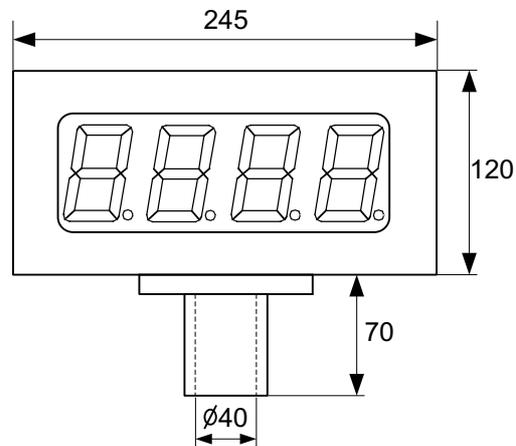
All the measurements are in millimeters

2.2.3. Fixing of the displays DN-107

Fixing plate
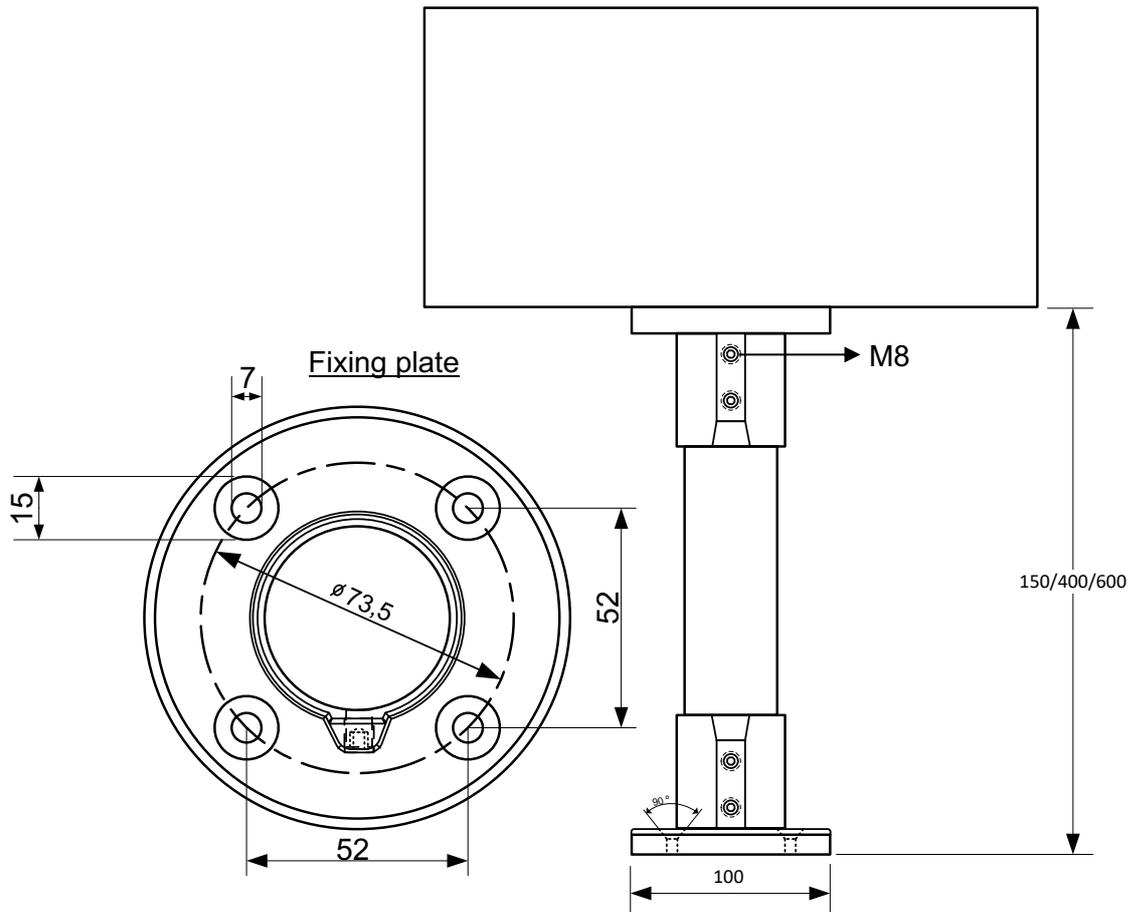
All the measurements are in millimeters

3. INSTALLATION

The installation of the DN-107NE 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-107NE**, 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-107NE** 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 100 to 240 VAC 50 to 60Hz 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 1.5mm².

The power supply connector for 220VAC has 4 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 5 contacts and is situated in the lower part of the unit. Connect the power wires following the schema below

1- L1
2- N
3- NC

1- 24V
2- 0V
3- NC
4- NC
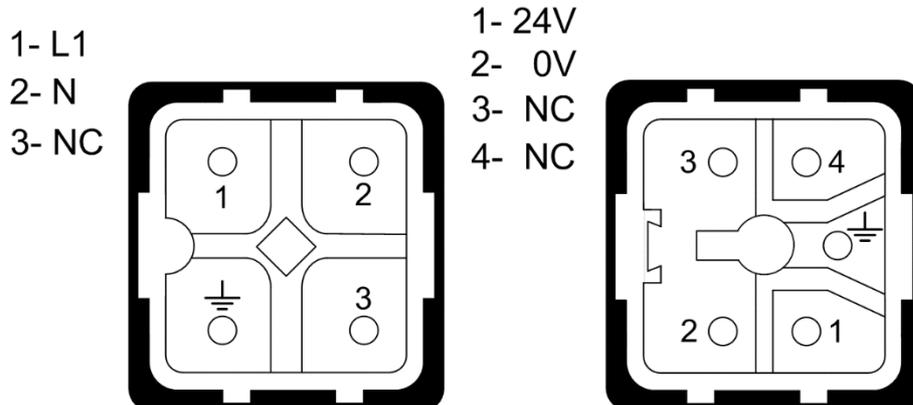
3.2. Connecting to the Ethernet line

Ethernet line connection is carried out using an RJ-45 connector located inside of the unit.

The connection between a display and a computer using an Ethernet link can be done in two ways: Direct connection using a crossover cable or connection via a switch type concentrator or hub and a category 5 100Base-T4 cable is recommended.

For direct connection between a computer and a display, a crossover cable must be used.

ETHERNET
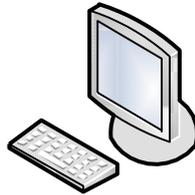
To connect various displays, a switch type concentrator or hub must be used with a port for each unit.

ETHERNET
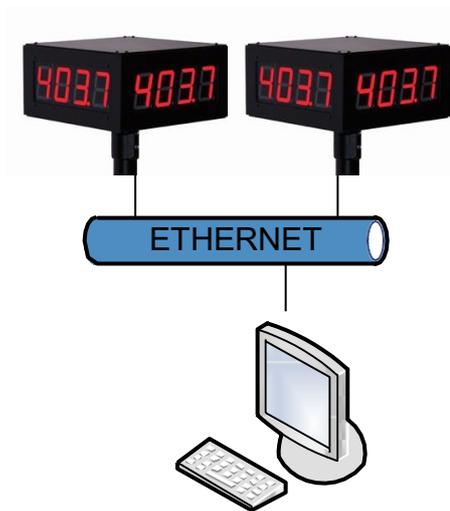
4. OPERATION

4.1. Initial start-up

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

- The display receives data from the Ethernet network and displays it.
- The display does not receive data and the time without data equals zero. Continues to show the decimal points.
- 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. Parameter programming

Displays DN-107NE can be adapted to the specifications of each client by the programming of parameters. The parameters which can be configured are:

1- Protocol.
2- End of block code.
3- Time without receiving data.
4- Response Message.
5- Unit MAC code.
6- Load the default configuration to the Ethernet port.
F- Exit modifying 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.

4.2.1. 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, with the digit flashing.

There are then two options:

1-   Modify the parameter value

By pressing the Advance key "*", the values and the parameter number correlatively can be selected.

To increase the parameter value, press the "+" key. After parameter 7 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. The number if the parameter is: The left one when the decimal dot is activated in 2 digit displays. In 3 or more digits displays the third digit starting from the right.

4.2.2. Exit modify parameters

In order to exit the sequence for modifying parameters, parameter F must be selected then press "*".

4.2.3. Function of each parameter

4.2.3.1. Parameter 1:Protocol

0 = Protocols TCP/IP and UDP/IP

1 = Protocol Modbus/TCP. Function 06h and Function 10h ASCII

2 = Protocol Modbus/TCP. Function 5h and Function 10h Word

4.2.3.2. Parameter 2:End of Block. Only TCP/IP and UDP/IP protocols

Allows for code selection to indicate that the block has been completely sent.

Value	End of block	
0	CR	0Dh
1	LF	0Ah
2	CR LF	0Dh 0Ah
3	LF CR	0Ah 0Dh
4		03h
5		02h
6	* CR	2Ah 0Dh
7		04h

4.2.3.3. Parameter 3: Time without receiving data

This parameter allows the programming of a time to warn that it is not receiving data or that the data is incorrect. The warning occurs if the programmed time is exceeded.

Each time that a communication is received correctly, the time is reset to zero. The code "00" (No time) does not trigger any warning.

To indicate that the time limit has been exceeded, a dash will be displayed on each digit.

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.

4.2.3.4. Parameter 4: Response Message. Only TCP/IP and UDP/IP protocols

For configuring the display's response message.

Value	Response message
0	Without response
1	06h + End of block
2	ACK + End of Block
3	06h
4	ACK

The end of block is the one selected in parameter 2.

If value 1 has been selected, the 06h code is sent, followed by the block selected in parameter 2

If value 2 has been selected, the ACK characters are sent followed by the block selected in parameter 2.

4.2.3.5. Parameter 5: MAC

The MAC code is a code which identifies each port which connects to an Ethernet network. It is unique to each unit and is needed to configure the port.

The MAC code is formed by 6 bytes in a hexadecimal format. The 3 bytes on the left are always the same for units DN-109NE/DN-119NE /DN-129NE/DN-189NE.

This parameter allows you to ascertain the 3 bytes on the right. In order to identify them, a decimal point is used. Byte 4 has the point of the right digit activated. Byte 5 has the point of the left digit activated. Byte 6 has both points activated.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 4
00h	20h	4Ah			
			XX.	X.X	X.X.

4.2.3.6. Parameter 6: Load the default configuration to the port

If the configuration of the port has been modified and the factory parameters cannot be reset, this parameter can be used to load them.

To load the factory parameters, value 99 must be input and the advance key "*" pressed. During the parameter loading time, the three digits are displayed flashing. When finished, parameter 6 is displayed.

4.2.3.7. Parameter F

In order to exit parameter configuration, press the key "*".

Before exit the parameters are saved.

If you wish continue modifying parameters, press the key "+" until arrive parameter wished.

4.3. Protocols

In this paragraph, the different protocols will be explained, as well as the programmation 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.

4.3.1. TCP/IP Protocol

In order to use TCP/IP and Modbus/TCP protocols, the communication port must be programmed with the default configuration. See 4.2.3.6 "Parameter 6: Load the default configuration to the port".

In order for the display to be able to accept a block, it must end with an end of block that is recognized by the display. The end of block coding which the display expects to receive can be found in 4.2.3.2 "Parameter 2:End of Block. Only TCP/IP and UDP/IP protocols"

The last character sent is displayed on the right of the display.
Local Port = 10001 must be used.

4.3.2. UDP Protocol

In order for the display to be able to accept a block, it must end with an end of block that is recognized by the display. The end of block coding which the display expects to receive can be found in 4.2.3.2 "Parameter 2:End of Block. Only TCP/IP and UDP/IP protocols"

The last character sent is displayed on the right of the display.
Local Port = 10001 must be used.

In order to use UDP protocol, the communication port must be programmed with the default configuration (See 4.2.3.6 "Parameter 6: Load the default configuration to the port".) excepting the aparts

UDP Datagram Mode
Datagram Type must be set to 01.
Active Connection
Remote Host: IP address of the computer to which it is connected.
Remote Port: Port of the computer to which it is connected.

See 4.5.1 "Configure to use the UDP/IP protocol" to learn how to make changes.

4.3.3. Modbus/TCP Protocol

End of block not necessary.

The last character sent is displayed on the right of the display.
Port 502 must be used.

The data block transmitted must have the following values:
Byte 6. Slave ID = 01h.
Byte 7. Function Code = 16(10h)
Byte 8 and 9. Start address = 00h 00h.

4.3.3.1. Function 06h.

It allows to use integers with or without sign. The address sent determines if the values are signed or unsigned.
Parameter 1 can be equal to 1 or 2. See 4.2.3.1 "Parameter 1:Protocol".
Address 40003 (02h) .... Signed integer. - 32767 to +32767
Address 40007 (06h)............Unsigned integer. 0 to 65535
In this example the identifier has the value 01C9h and the value to write is –4096.
Block to send:

Identifier	Protocol	Number of bytes	Unit	Function	Start Address	Data
01h C9h	00h 00h	00h 06h	01h	06h	00h 02h	F000h

Response from the display:

The response from the display is the same block received.

4.3.3.2. Function 10h mode Word

It allows the user to send blocks with ASCII characters to the display
Parameter 1 must have value 2. See 4.2.3.1 "Parameter 1:Protocol".
In the block, the following values must be codified:
        Unit   =   01h
        Function = 10h
It allows to use integers with or without sign. The address sent determines if the values are signed or unsigned.
Address 40003 (02h) .... Signed integer. - 2147483647 a +2147483647
Address 40007 (06h). Unsigned integer. 0 a 4294967295

The Data field must contain 3 Words. The two first fields must contain the Data and the third must contain the position of the decimal point

        Value 0001h for 00000000,0   Value 0010h for 0000,00000

        Value 0002h for 0000000,00   Value 0011h for 000,000000

        Value 0004h for 000000,000   Value 0012h for 00,0000000

        Value 0008h for 00000,0000   Value 0014h for 0,00000000

Example 3:

Identifier	Protocol	Number of bytes	Unit	Function	Start Address
01h 65h	00h 00h	00h 0Dh	01h	10h	00h 02h

Number of registers	Number of bytes	Data
00h 03h	06h	00BCh 614Eh 0002h

In this example the visualized value is: 123456,78.

Response from the display:

The response from the display is the same block received from the identifier until the number of registers.

Identifier	Protocol	Number of bytes	Unit	Function	Start Address	Number of registers
01h 65h	00h 00h	00h 0Dh	01h	10h	00h 02h	00h 03h

Example 4:

Identifier	Protocol	Number of bytes	Unit	Function	Start Address
01h 65h	00h 00h	00h 0Dh	01h	10h	00h 06h

Number of registers	Number of bytes	Data
00h 03h	06h	8761h 2C36h 0000h

In this example the visualized value is: 123456,78.

Response from the display:

The response from the display is the same block received from the identifier until the number of registers.

Identifier	Protocol	Number of bytes	Unit	Function	Start Address	Number of registers
01h 65h	00h 00h	00h 0Dh	01h	10h	00h 06h	00h 03h

4.3.3.3. Function 10h mode ASCII

It the user to send blocks with ASCII characters to the display

Parameter 1 must have value 1. See 4.2.3.1 "Parameter 1:Protocol".

In the block, the following values must be codified:

Unit = 01h

Function = 10h

Start Address = Any Address. Recommended 00h 00h.

Example 1

Identifier	Protocol	Number of bytes	Unit	Function	Start Address
00h 24h	00h 00h	00h 0Fh	01h	10h	00h 00h

Number of registers	Number of bytes	Data
00h 04h	08h	34h 36h 37h 31h 33h 30h 39h 38h

In this example the visualized value is: 46713098.

Response from the display:

The response from the display is the same block received from the identifier until the number of registers.

Identifier	Protocol	Number of bytes	Unit	Function	Start Address	Number of registers
00h 24h	00h 00h	00h 0Fh	01h	10h	00h 00h	00h 04h

Example 2

Identifier	Protocol	Number of bytes	Unit	Function	Start Address
00h 24h	00h 00h	00h 0Fh	01h	10h	00h 00h

00h 03h	06h	34h 32h 36h 38h 2Eh 33h

In this example the visualized value is: 4268,3.

4.3.4. 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	62h
DEC	48d	49d	50d	51d	52d	53d	54d	55d	56d	57d	65d	98d

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	3Dh
DEC	80d	114d	85d	117d	32d	44d	46d	45d	22d	39d	40d	61d

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

Example Protocols TCP/IP and UDP/IP:
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 + end of block.
In hexa code the following must be sent: 31h 32h 08h 33h 34h 09h 35h 36h + end of block.

Example Protocols Modbus/TCP:
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
hexa code the following must be sent: 31h 32h 08h 33h 34h 09h 35h 36h.

4.4. IP Address.

Before being able to communicate with the display an IP address must be assigned. To assign an IP address the DeviceInstaller program from Lantronix must be used, which can be downloaded free from their website: www.lantronix.com

Seleccione: Support & Resources → Get Support → Firmware.
Seleccione: DeviceInstaller

Once the program is installed and running, press the "Search" button to locate the connected displays. The display must be turned on and connected to the network.
If there are no network problems, a screen similar to this should be displayed.
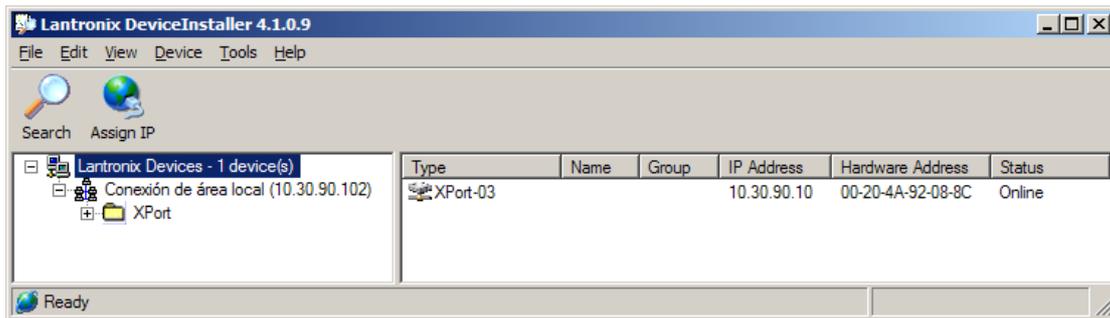
The IP address with which the equipment is supplied is: 10.30.90.10
The Hardware Address is the unit MAC code.
To assign the IP address you must first select the equipment by clicking on the XPort-03 to which you wish to assign the address. Then press Assign IP and follow the instructions.
IMPORTANT: All units are dispatched from the factory with the same IP address. Therefore to configure various units, they must be connected to the Ethernet and the address must be assigned one by one.

4.5. Modifying the port settings.

To modify the port configuration the DeviceInstaller program from Lantronix must be used, which can be downloaded free from their website: www.lantronix.com

Select: Support & Resources → Get Support → Firmware.

Select: DeviceInstaller

Once the program is installed and running, press the "Search" button to locate the connected displays. The display must be turned on and connected to the network.
If there are no network problems, the same screen for configuring an IP address should be displayed. See 4.4 "IP Address."
To access the setup, you must first select the unit clicking on the XPort-03 that you wish to modify.
Then press Web Configuration and the GO key placed at the right side of IP address.

Enter your computer User Name and Password.
To access the setup the Local Port, select **Channel1->Connection.**
You will see a screen similar to the one above.

In Local Port insert the new value and click **OK** on the bottom of the page.
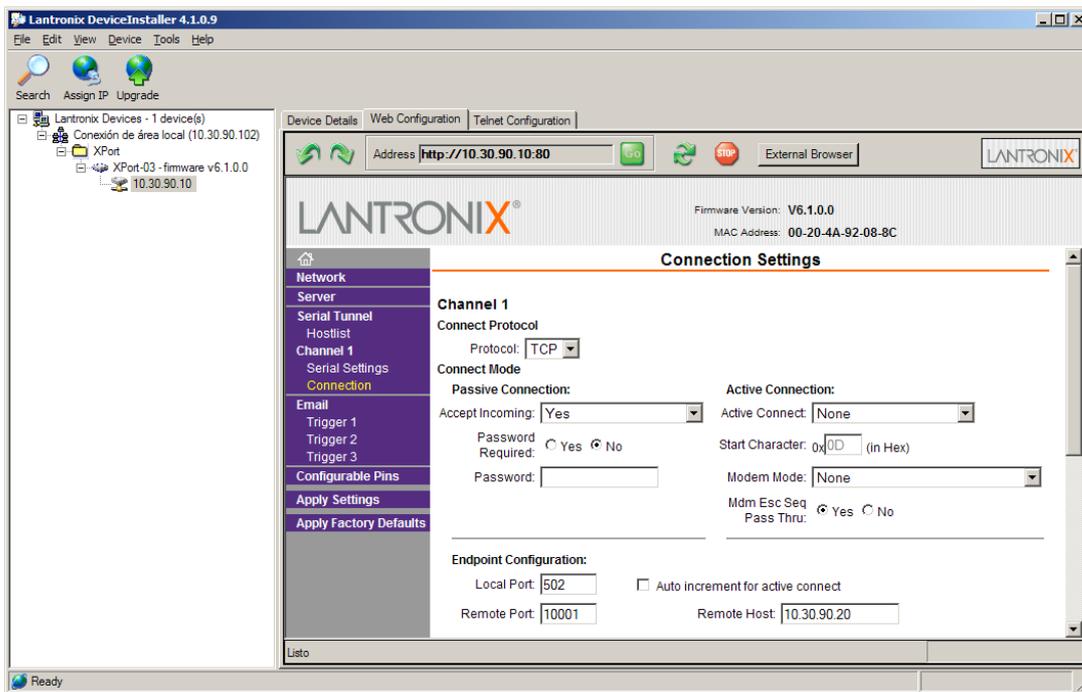
4.5.1. Configure to use the UDP/IP protocol

To access the setup the Local Port select **Channel1->Connection.**

Select the protocol: UDP in Connect Protocol.

Select **Datagram Type = 1** in Datagram Mode.

In Endpoint Configuration set:

> **Local Port** = 10001
>
> **Remote Host:** IP address of the computer to which it is connected.
>
> **Remote Port:** Port of the computer to which it is connected.

Click **OK** on the bottom of the page.

Click **Apply Settings** on the menu.

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 defining 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 **b** and **C** are used.
Parameter b is used to set up the activation form and delay or hysteresis.
Parameter C is used to set up the trigger level. The most significant digit allow setting up a negative value.

Parameter b				
Left Digit	Control bit		Right Digit	Set/Reset
0	ON if Value > Parameter C		0	No delay / No hysteresis
1	ON if Value < Parameter C		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 **d** and **E** are used.
Parameter d is used to set up the activation form and delay or hysteresis.
Parameter E is used to set up the trigger level. The most significant digit allow setting up a negative value.

Parameter d				
Left Digit	Control bit		Right Digit	Set/Reset
0	ON if Value > Parameter E		0	No delay / No hysteresis
1	ON if Value < Parameter E		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.

nr	Colour if internal bits are OFF. To change the colour press * key. Upon pressing + the next parameter is shown.
r1	Colour if internal bit **r1** is ON. To change the colour press * key. Upon pressing + the next parameter is shown.
r2	Colour if internal bit **r2** is ON. To change the colour press * key. Upon pressing + the next parameter is shown.
r3	Colour if internal bits **r1** and **r2** 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
b	20
C	0
d	20
E	0
nr	colour
r1	colour
r2	colour
r3	colour

Parameters **C** and **E** 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 E (March 2013).

Updated introduction in 4.4.
Added paragraph 4.5.1
Added paragraph 4.6.

Revision F (September 2013).

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

Revision G (October 2013)

Updated electrical characteristics of the 24VDC power. Paragraphs 2.1 and 3.1.
Updated section 4.2.3.

STATEMENT OF CONFORMITY

CE

DITEL - Diseños y Tecnología S.A.
Xarol, 6 B (Pol.Ind. Les Guixeres)
08915 Badalona ESPAÑA

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

Model: DN-107NE 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.
Directive 2011/65/CE: Restriction of the use of certain hazardous substances in
electrical and electronic equipment

Badalona, 5th February 2013

Albert Grau
Technical Director