

DN-109P, DN-119P, DN-129P and DN-189P OPERATION MANUAL



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DECLARATION OF CONFORMITY CE

1. INTRODUCTION.

The family of numeric displays **DN-109P**, **DN-119P**, **DN-129** and **DN-189P** has been designed to provide, in a single display, the following functions:

Direct BCD. Only for 3 digits displays. With 12 inputs you may codify 3 digits. Two more inputs left you to codify the dot position.

Multiplexed BCD. For displays up to 7 digits. With 8 inputs you may codify all 7 digits values and theirs dots.

Counter. For display up to 10 digits. Inputs for preset, reset, increase and decrease. Input with fast and low speed selectable. Back-up of display value if no power supply.

Tachometer. For displays of 3, 4 or 5 digits. The display value is proportional to the input frequency. Totally configurable.

Chronometer. For displays of 3, 4 or 5 digits. It lets you configure a chronometer with hours:minutes or minutes:seconds running in increment or decrement. The display has inputs for preset, reset and input for run/stop.

Binary. For displays up to 5 digits. Displays the decimal value of binary code represented by the 14 inputs. Maximum value: 16383.

The size of the digits is **57mm for DN-109P**, **100mm for DN-119P**, **250mm for DN-129P** and **180mm for DN-189P**. The viewing distance from 30m to 120m, is one of the most interesting characteristics.

Available options :

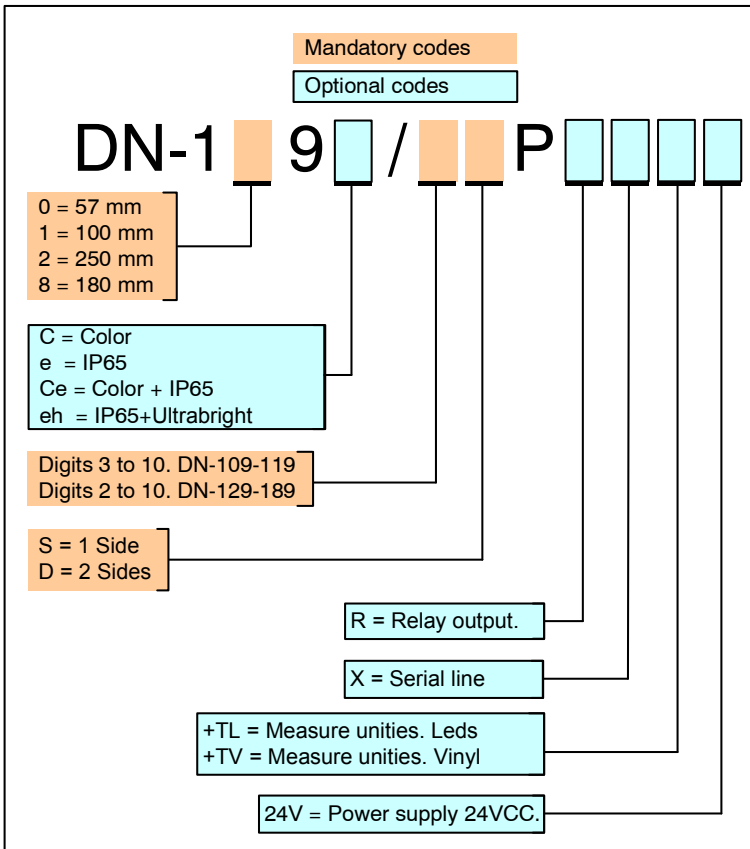
- 2 relay outputs. (**R**) Applicable in functions counter and chronometer.
- Serial line. (**X**) Lets transfer the display value to a computer with a RS-232 or RS-485. Applicable in all functions.
- Protection IP65. (**e**) Applicable to models **DN-109**, **DN-119** and **DN-189**
- Outdoor luminosity. (**h**). Applicable to models **DN-119** and **DN-189**
- Power supply 24VCC. Applicable to all models.
- Colour option: Applicable to models **DN-109** and **DN-119**.

Available models from 2 (only **DN-129P** and **DN-189P**) to 10 digits, in versions of 1 or 2 displaying sides.

Option summary table.

	IP65	Outdoor luminosity	2 Sides	Color Option	Output voltage
DN-109	YES	NO	YES	YES	12V
DN-109C	YES	NO	YES	YES	12V
DN-119	YES	YES	YES	YES	12V
DN-119C	YES	YES	YES	NO	24V
DN-119C	YES	NO	YES	YES	24V
DN-129	NO	YES	YES	NO	24V
DN-189	YES	YES	YES	NO	24V

1.1 Model reference structure



The model reference structure depends on installed options.

Some options are not available to all equipments. (Colour, IP65)

In this manual, we use **DN-109P** when refer to **DN-109** with digital inputs, independently of digits number, displaying sides and installed options.

In this manual, we use **DN-119P** when refer to **DN-119** with digital inputs, independently of digits number, displaying sides and installed options.

In this manual, we use **DN-129P** when refer to **DN-129** with digital inputs, independently of digits number, displaying sides and installed options.

In this manual, we use **DN-189P** when refer to **DN-189** with digital inputs, independently of digits number, displaying sides and installed options.

2. GENERAL SPECIFICATIONS

2.1 Display characteristics of DN-109P.

Power supply	100 VAC to 240 VAC 50/60Hz
Consumed power	1 Side = (3 x Digits number) VA.
.....	1 Side + Text = (3 x Digits number) + 3VA
.....	2 Sides = (7 x Digits number) VA
.....	2 Sides + Text = (7 x Digits number) + 7VA
Display	7 segments of 57mm height + decimal point.
.....	Red colour. Viewing distance 30 meters.
Colour option (C)	Colours Red, Green, Yellow.
Text50mm height characters made with 3mm red
.....	leds or White vinyl.
Parameters	Eeprom.
Control inputs	12 a 24V cc. PNP, NPN or Contact.
Serial line option (X)	RS-232 and RS-485. 9600 – 19200 bauds
Relay option (R)	Contact SPDT. Maximum 48V 1A.
Environmental conditions	Operating temperature: 0 to 50°C.
.....	Storage temperature: -10°C to 60°C
.....	Humidity 5-95% no condensation.
.....	Maximum environmental lighting: 1000 lux.
DN-109/P	Protection IP 41
DN-109e/P	Protection IP 65

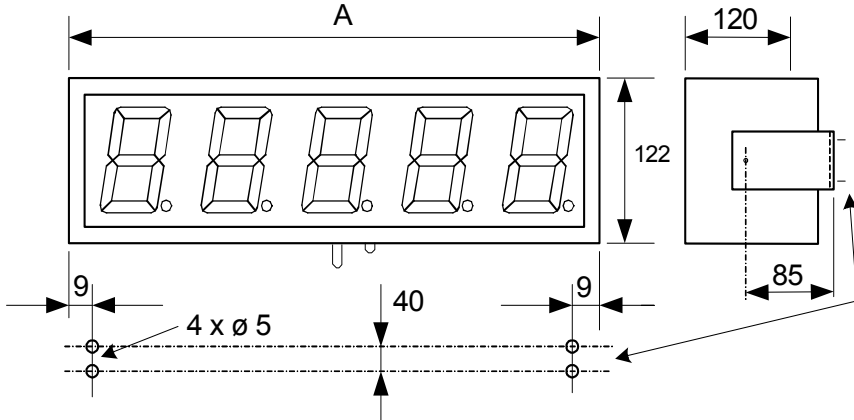
Summary table of characteristics

n = Number of digits	Protec.	Relay outputs	Serial line	Number of sides
DN-109/nSP	IP-41	NO	NO	1
DN-109/nDP	IP-41	NO	NO	2
DN-109/nSPX	IP-41	NO	YES	1
DN-109/nDPX	IP-41	NO	YES	2
DN-109/nSPR	IP-41	YES	NO	1
DN-109/nDPR	IP-41	YES	NO	2
DN-109/nSPXR	IP-41	YES	YES	1
DN-109/nDPXR	IP-41	YES	YES	2
DN-109e/nSP	IP-65	NO	NO	1
DN-109e/nDP	IP-65	NO	NO	2
DN-109e/nSPX	IP-65	NO	YES	1
DN-109e/nDPX	IP-65	NO	YES	2
DN-109e/nSPR	IP-65	YES	NO	1
DN-109e/nDPR	IP-65	YES	NO	2
DN-109e/nSPXR	IP-65	YES	YES	1
DN-109e/nDPXR	IP-65	YES	YES	2

n = Number of digits	Protec.	Relay outputs	Serial line	Number of sides
DN-109C/nSP	IP-41	NO	NO	1
DN-109C/nDP	IP-41	NO	NO	2
DN-109C/nSPX	IP-41	NO	YES	1
DN-109C/nDPX	IP-41	NO	YES	2
DN-109C/nSPR	IP-41	YES	NO	1
DN-109C/nDPR	IP-41	YES	NO	2
DN-109C/nSPXR	IP-41	YES	YES	1
DN-109C/nDPXR	IP-41	YES	YES	2
DN-109Ce/nSP	IP-65	NO	NO	1
DN-109Ce/nDP	IP-65	NO	NO	2
DN-109Ce/nSPX	IP-65	NO	YES	1
DN-109Ce/nDPX	IP-65	NO	YES	2
DN-109Ce/nSPR	IP-65	YES	NO	1
DN-109Ce/nDPR	IP-65	YES	NO	2
DN-109Ce/nSPXR	IP-65	YES	YES	1
DN-109Ce/nDPXR	IP-65	YES	YES	2

Available models from 3 to 10 digits.

2.1.1 Dimensions of displays DN-109P.



A according to digit's number

n (digit's num.)	3	4	5	6	7	8	9	10
DN-109(C)(e)/SnP	210	288	288	336	382	430	478	526
DN-109(C)(e)/SnP+T	306	384	384	432	478	526	574	622
DN-109(C)(e)/DnP	288	288	288	336	382	430	478	526
DN-109(C)(e)/DnP+T	306	384	384	432	478	526	574	622

C= Color e= IP65

2.1.2 Weight of displays DN-109P.

n (digit's num.)	3	4	5	6	7	8	9	10
DN-109(C)(e)/SnP	2 kg	2 kg	3 kg	3 kg	3 kg	3 kg	4 kg	4 kg
DN-109(C)(e)/SnP+T	3 kg	3 kg	3 kg	4 kg	4 kg	4 kg	4 kg	4 kg
DN-109(C)(e)/DnP	3 kg	2 kg	3 kg	3 kg	3 kg	3 kg	4 kg	4 kg
DN-109(C)(e)/DnP+T	3 kg	3 kg	3 kg	4 kg	4 kg	4 kg	5 kg	5 kg

C= Color e= IP65

2.2 Display characteristics of DN-119P.

Power supply	100 VAC to 240 VAC 50/60Hz
Consumed power	1 Side = (3,6 x Digits number) VA.
.....	1 Side + Text = (3,6 x Digits number) + 3VA
.....	2 Sides = (7,2 x Digits number) VA
.....	2 Sides + Text = (7,2 x Digits number) + 7VA
Display	7 segments of 100mm height + decimal point.
.....	Red colour. Seeing distance 50 meters.
Colour option (C)	Colours Red, Green, Yellow.
Text65mm height characters made with 5mm red leds or White vinyl.
Parameters	Eeprom.
Control inputs	12 a 24V cc. PNP, NPN or Contact.
Serial line option (X)	RS-232 and RS-485. 9600 – 19200 bauds
Relay option (R)	Contact SPDT. Maximum 48V 1A.
Environmental conditions	Operating temperature: 0 to 50°C.
.....	Storage temperature: -10°C to 60°C
.....	Humidity 5-95% no condensation.
DN-119P and DN-119eP	Maximum environmental lighting: 1000 lux.
DN-119ehP	Maximum environmental lighting: Outdoor use.
DN-119/P	Protection IP 41
DN-119e/P and DN-119ehP.	Protection IP 65

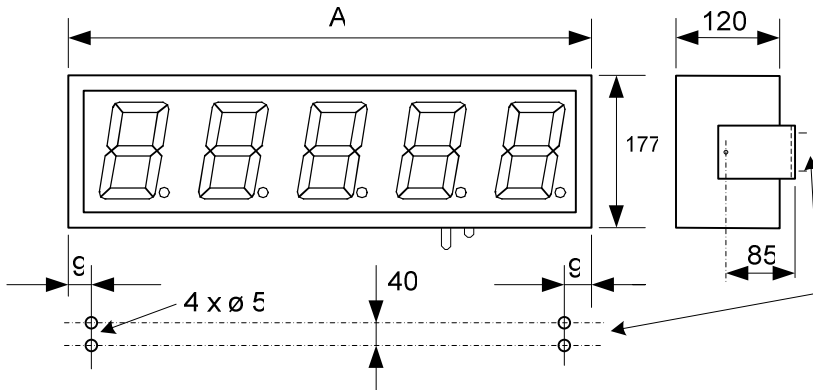
Summary table of characteristics

n = Number of digits	Protecti on	Relay outputs	Serial line	Number of sides	n = Number of digits	Protecti on	Relay outputs	Serial line	Number of sides
DN-119/nSP	IP-41	NO	NO	1	DN-119C/nSP	IP-41	NO	NO	1
DN-119/nDP	IP-41	NO	NO	2	DN-119C/nDP	IP-41	NO	NO	2
DN-119/nSPX	IP-41	NO	YES	1	DN-119C/nSPX	IP-41	NO	YES	1
DN-119/nDPX	IP-41	NO	YES	2	DN-119C/nDPX	IP-41	NO	YES	2
DN-119/nSPR	IP-41	YES	NO	1	DN-119C/nSPR	IP-41	YES	NO	1
DN-119/nDPR	IP-41	YES	NO	2	DN-119C/nDPR	IP-41	YES	NO	2
DN-119/nSPXR	IP-41	YES	YES	1	DN-119C/nSPXR	IP-41	YES	YES	1
DN-119/nDPXR	IP-41	YES	YES	2	DN-119C/nDPXR	IP-41	YES	YES	2
DN-119e(h)/nSP	IP-65	NO	NO	1	DN-119Ce/nSP	IP-65	NO	NO	1
DN-119e(h)/nDP	IP-65	NO	NO	2	DN-119Ce/nDP	IP-65	NO	NO	2
DN-119e(h)/nSPX	IP-65	NO	YES	1	DN-119Ce/nSPX	IP-65	NO	YES	1
DN-119e(h)/nDPX	IP-65	NO	YES	2	DN-119Ce/nDPX	IP-65	NO	YES	2
DN-119e(h)/nSPR	IP-65	YES	NO	1	DN-119Ce/nSPR	IP-65	YES	NO	1
DN-119e(h)/nDPR	IP-65	YES	NO	2	DN-119Ce/nDPR	IP-65	YES	NO	2
DN-119e(h)/nSPXR	IP-65	YES	YES	1	DN-119Ce/nSPXR	IP-65	YES	YES	1
DN-119e(h)/nDPXR	IP-65	YES	YES	2	DN-119Ce/nDPXR	IP-65	YES	YES	2

Available models from 3 to 10 digits.

DN-109P, DN-119P, DN-129 and DN-189P series display

2.2.1 Dimensions of displays DN-119P.



A according to digit's number

n (digit's num.)	3	4	5	6	7	8	9	10
DN-119(C)(e)(h)/SnP	324	414	504	594	684	774	864	954
DN-119(C)(e)(h)/SnP+T	504	594	684	774	864	954	1044	1134
DN-119(C)(e)(h)/DnP	324	414	504	594	684	774	864	954
DN-119(C)(e)(h)/DnP+T	504	594	684	774	864	954	1044	1134

C= Color e=IP65 h=outdoor luminosity

2.2.2 Weight of displays DN-119P.

n (digit's num.)	3	4	5	6	7	8	9	10
DN-119(C)(e)(h)/SnP	4 kg	4 kg	4,5 kg	4,5 kg	5 kg	5 kg	5,5 kg	5,5 kg
DN-119(C)(e)(h)/SnP+T	4,5 kg	4,5 kg	5 kg	5 kg	5,5 kg	5,5 kg	6 kg	6 kg
DN-119(C)(e)(h)/DnP	4 kg	4,5 kg	4,5 kg	5 kg	5,5 kg	5,5 kg	6,5 kg	6,5 kg
DN-119(C)(e)(h)/DnP+T	4,5 kg	4,5 kg	5 kg	5,5 kg	5,5 kg	6,5 kg	6,5 kg	6,5 kg

C= Color e=IP65 h=outdoor luminosity

2.3 Display characteristics of DN-129P.

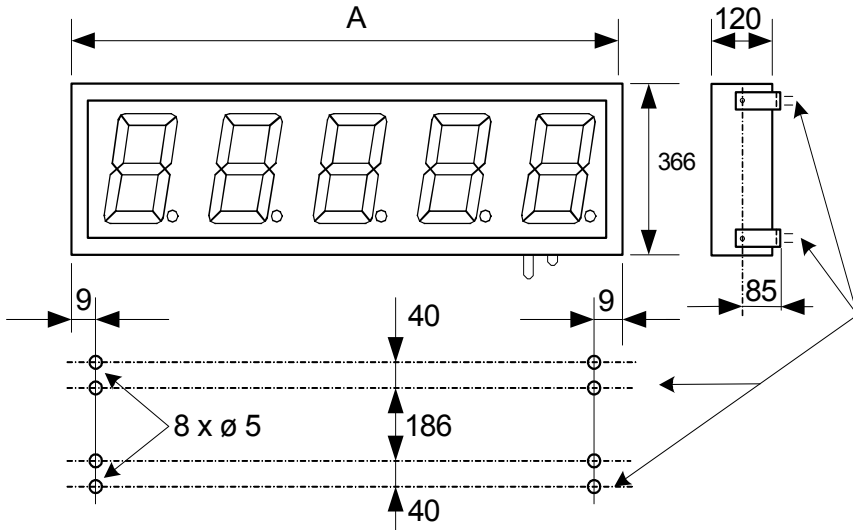
Power supply	100 VAC to 240 VAC 50/60Hz
Consumed power	1 Side = (7 x Digits number) VA.
.....	1 Side + Text = (7 x Digits number) + 7VA
.....	2 Sides = (14 x Digits number) VA
.....	2 Sides + Text = (14 x Digits number) + 14VA
Display	7 segments of 250mm height + decimal point.
.....	Red colour. Seeing distance 120 meters.
Text	White vinyl.
Parameters	Eeprom.
Control inputs	12 a 24V cc. PNP, NPN or Contact.
Serial line	RS-232 and RS-485. 9600 – 19200 bauds
Relay option	Contact SPDT. Maximum 48V 1A.
Environmental conditions	Operating temperature: 0 to 50°C.
.....	Storage temperature: -10°C to 60°C
.....	Humidity 5-95% no condensation.
.....	Maximum environmental lighting: 2000 lux.
.....	Protection IP 41

Summary table of characteristics

n = Number of digits	Protection	Relay outputs	Serial line	Number of sides
DN-129/nSP	IP-41	NO	NO	1
DN-129/nDP	IP-41	NO	NO	2
DN-129/nSPX	IP-41	NO	YES	1
DN-129/nDPX	IP-41	NO	YES	2
DN-129/nSPR	IP-41	YES	NO	1
DN-129/nDPR	IP-41	YES	NO	2
DN-129/nSPXR	IP-41	YES	YES	1
DN-129/nDPXR	IP-41	YES	YES	2

**Available models from 2 to 10 digits.
The 2 digits model can't use the tachometer function.**

2.3.1 Dimensions of displays DN-129P.



A according to digit's number

n (digit's num.)	2	3	4	5	6	7	8	9	10
DN-129/SnP	515	750	985	1220	1455	1690	1925	2160	2395
DN-129/SnP+T	985	1220	1455	1690	1925	2160	2395	2630	2865
DN-129/DnP	515	750	985	1220	1455	1690	1925	2160	2395
DN-129/DnP+T	985	1220	1455	1690	1925	2160	2395	2630	2865

2.3.2 Weight of displays DN-129P.

n (digit's num.)	2	3	4	5	6	7	8	9	10
DN-129/SnP	7 kg	9 kg	10 kg	12 kg	14 kg	16 kg	17 kg	19 kg	21 kg
DN-129/SnP+T	10 kg	12 kg	14 kg	16 kg	17 kg	19 kg	21 kg	23 kg	25 kg
DN-129/DnP	8 kg	10 kg	13 kg	15 kg	18 kg	20 kg	22 kg	24 kg	27 kg
DN-129/DnP+T	13 kg	15 kg	18 kg	20 kg	22 kg	24 kg	27 kg	29 kg	31 kg

2.4 Display characteristics of DN-189P.

Power supply	100 VAC to 240 VAC 50/60Hz
Consumed power	1 Side = (4,5 x Digits number) VA.
.....	1 Side + Text = (4,5 x Digits number)
.....	2 Sides = (8,5 x Digits number) VA
.....	2 Sides + Text = (8,5 x Digits number)
Display	7 segments of 180mm height + decimal point.
.....	Red colour. Seeing distance 90 meters.
Text	White vinyl.
Parameters	Eeprom.
Control inputs	12 a 24V cc. PNP, NPN or Contact.
Serial line	RS-232 and RS-485. 9600 – 19200 bauds
Relay option	Contact SPDT. Maximum 48V 1A.
Environmental conditions	Operating temperature: 0 to 50°C.
.....	Storage temperature: -10°C to 60°C
.....	Humidity 5-95% no condensation.
DN-189P and DN-189eP	Maximum environmental lighting: 1000 lux.
DN-189ehP	Maximum environmental lighting: Outdoor use.
DN-189/P	Protection IP 41
DN-189e/P and DN-189ehP	Protection IP 65

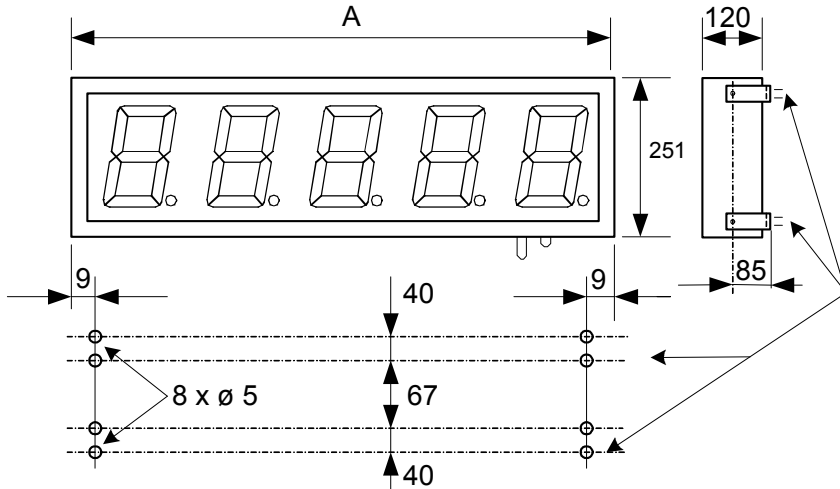
Summary table of characteristics

n = Number of digits	Protecti on	Relay outputs	Serial line	Number of sides
DN-189/nSP	IP-41	NO	NO	1
DN-189/nDP	IP-41	NO	NO	2
DN-189/nSPX	IP-41	NO	YES	1
DN-189/nDPX	IP-41	NO	YES	2
DN-189/nSPR	IP-41	YES	NO	1
DN-189/nDPR	IP-41	YES	NO	2
DN-189/nSPXR	IP-41	YES	YES	1
DN-189/nDPXR	IP-41	YES	YES	2
DN-189e(h)/nSP	IP-65	NO	NO	1
DN-189e(h)/nDP	IP-65	NO	NO	2
DN-189e(h)/nSPX	IP-65	NO	YES	1
DN-189e(h)/nDPX	IP-65	NO	YES	2
DN-189e(h)/nSPR	IP-65	YES	NO	1
DN-189e(h)/nDPR	IP-65	YES	NO	2
DN-189e(h)/nSPXR	IP-65	YES	YES	1
DN-189e(h)/nDPXR	IP-65	YES	YES	2

h= outdoor luminosity

**Available models from 2 to 10 digits.
The 2 digits model can't use the tachometer function.**

2.41 Dimensions of displays DN-189P.



A according to digit's number

n (digit's num.)	2	3	4	5	6	7	8	9	10
DN-189/SnP	340	500	660	820	980	1140	1300	1460	1620
DN-189/SnP+T	660	820	980	1140	1300	1460	1620	1780	1940
DN-189/DnP	340	500	660	820	980	1140	1300	1460	1620
DN-189/DnP+T	660	820	980	1140	1300	1460	1620	1780	1940

2.4.2 Weight of displays DN-189P.

A according to digit's number

n (digit's num.)	2	3	4	5	6	7	8	9	10
DN-189/SnP	4 kg	5 kg	6 kg	7,5 kg	8,5 kg	9,5 kg	10,5 kg	11,5 kg	12,5 kg
DN-189/SnP+T	6 kg	7 kg	8 kg	9 kg	10 kg	11 kg	12 kg	13 kg	14 kg
DN-189/DnP	5 kg	6 kg	7,5 kg	8,5 kg	10 kg	11,5 kg	12,5 kg	14 kg	15 kg
DN-189/DnP+T	7 kg	8 kg	9,5 kg	10,5 kg	12 kg	13 kg	14,5 kg	15,5 kg	17 kg

3. INSTALLATION

There are some considerations to take into account before installing **DN-1_9P**.

The displays must neither be fixed to places close to vibration nor to places which exceed the limits of temperature and humidity specified in the display characteristics.

The protection degree of **DN-1_9P** displays is IP41, which means that they are protected against the penetration of solid objects of more than 1mm diameter and against the vertical falling of drops. The protection degree of **DN-1_9e/P** and **DN-1_9eh/P** is IP65, which means that they are protected against dust and water jet.

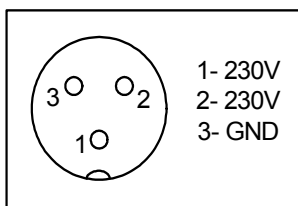
The **DN-1_9P** displays, must no be installed where the lighting level is higher than 1000 lux. They must be protected against direct sunlight.

The **DN-1_9eh/P** may work on direct sunlight.

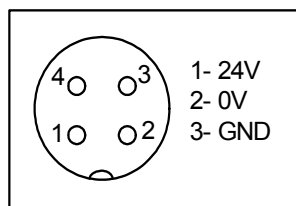
They must stay away from high frequency generators, which are frequent in soldering equipment U/F converters for motors.

3.1 Power supply.

Power supply must be **100VAC to 240VAC, 50/60 Hz** or optional **24VCC**.



3.1 Power supply 230VAC



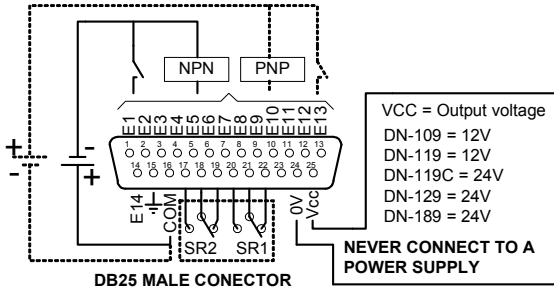
3.2 Power supply 24V CC

The section of the power supply conductors is in keeping with the consume. The earth conductor must be minimum 1.5 mm².

The supply connector is located at the bottom of the equipment. The connection must be according to figure 3.1 for 230VAC and to figure 3.2 for 24VCC.

3.2 Wiring inputs.

In all functions the inputs should be between 12 to 26Vcc, and allow PNP, NPN and Contact.



INPUT CONNECTOR DN-1_9P

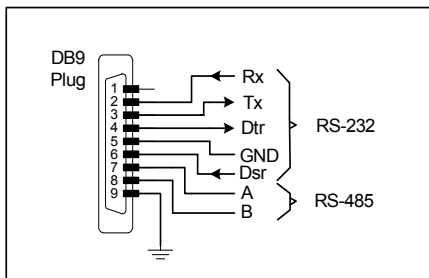
Each input has a different use depending on the function (BCD, counter, etc.). To know how to wire them see Functions (Chapter 5)

The inputs power supply have to be between 12V and 26V CC with a maximum wave of 500mV. Surpassing this values, the display could damage irreparably.

3.3 Serial line option.

The display series **DN-1_9(e)(h)PX** may be connected to RS-232 and RS-485 serial lines. Both serial lines use the same connector, DB9 type, located at the bottom of equipment.

Serial line type is selected by modifying the parameters (Parameter C.LS). The connection diagram is shown below.



4.-WORKING ORDER

4.1 First time in service.

The first time the display is put in service, the parameters should be configured to adapt it to the customer's requirements.

See: **4.2 Programming the parameters**

Before connecting the display to the mains, it must be checked that all connections have been set properly and that the display have been firmly placed.

**Displays DN-1_9eP and DN-1_9ehP:
To obtain the IP65 protection you must use the water resistant hood supplied with the display**

4.2 Initial reset.

Every time the display is connected to the mains, there is an initial reset, which check all the digits of the display turning on all the segments and the decimal points, then the version code is displayed. When this has finished, the display is ready.

4.2 Programming the parameters.

With the programming the parameters menu you may select the function you want to use, adapting the display to your specific application . Each function has different parameters.

The parameters are programmed with two buttons located at the bottom or by two pushbuttons connected to inputs 11 and 12. Input 11 (E11) is equivalent to **increase** key and input 12 (E12) is equivalent to **advance** key. The **advance** key is marked with the symbol (7->5) and the **increase** key is marked with the symbol (+). The advance key (E12) selects the parameter and the increase key (E11) modifies it. The selected digit flashes.

To **modify the parameters** push the advance key (7->5) or E12 more than 3 seconds. 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. Pushing increase (+) or E11 you select from parameter 1 to 9. To modify the selected parameter push advance (7->5). To change the parameters values use the same process, the advance key (E12) choose the parameter and the increase key (E11) modifies it.

To **exit programming**, choose parameter 9 (A in function counter) and push advance (or E12).

Inputs E11 and E12 can't be used if function direct BCD (Function = 2) or Binary (Function = 6) are programmed.

4.3.1 Parameter 1. Function.

This parameter determine the function of the display. Possible values are:

		Digits limit
01	8 bits. Multiplexed BCD. Models from 3 to 7 digits. (- / White)	10
11	8 bits. Multiplexed BCD. Models from 3 to 7 digits. (E / F)	10
02	Direct BCD.Only 3 digits models. (- / White)	3
12	Direct BCD.Only 3 digits models. (E / F)	3
03	Counter.	10
04	Chronometer.	8
14	Chronometer format HH:MM:SS	8
05	Tachometer.	5
06	Binary	5
15	Tachometer with less weight digit = 0	5
25	Tachometer with 2 less weight digits = 0	5

See what does each function do in **functions**

In 01 / 11 (8 bit multiplexed BCD) and 02 /12 (direct BCD) functions the function is the only one parameter configurable.

The chronometer function 14 is used in displays with format HH:MM or HH:MM:SS. This function lets to display the parameter number on the fourth digit.

4.3.2 Parameters of function 03 (Counter).

Parameter 2. Co: Multiplying or splitter factor, maximum frequency and preset function.

Parameter 3. P1: Value of preset 1.

Parameter 4. P2: Value of preset 2.

Parameter 5. A1: Value of alarm 1.

Parameter 6. A2: Value of alarm 2.

Parameter 7. S1: Activation and temporization conditions of output 1

Parameter 8. S2: Activation and temporization conditions of output 2

Parameter 9. FA: Value of multiplying or splitter factor

Parameter A. PU: Decimal point position.

Parameter B. So: Exit programming parameters.

In the 2 digits DN-129 and DN-189 models, only the parameter number and the first letter are shown.

Programming and meaning of each parameter.

Parameter 2 Co: This is a 2 digits parameter. The function of each digit is indicated in the following table.

Left digit	Types of working	Right digit	Automatic function
0	Multiplying factor and high frequency	0	Non activated
1	Multiplying factor and low frequency	1	Counter = Alarm 1 → Reset
2	Dividing factor and high frequency	2	Counter = Alarm 2 → Reset
3	Dividing factor and low frequency	3	Counter = Alarm 1 → Preset 1
		4	Counter = Alarm 2 → Preset 1
		5	Counter = Alarm 1 → Preset 2
		6	Counter = Alarm 2 → Preset 2

The multiplying factor permits increasing or decreasing the value of the counter with a equal or more than 1 factor. With a factor = 4, the counter increase o decrease 4 units each time that receives a impulse.

The splitter factor is similar. The counter increases 1 unit when it has received as many impulses as the factor indicates.

The maximum value of the factor is 999 in a 3 digits display, 9999 in a 4 digits, 99999 in a 5 digits and 999999 in a 6, 7, 8 or 9 digits.

The automatic function (right digit) allows to modify the value of the counter when it has a determinate value..

- 0 Counter's value not modified.
- 1 Resets the counter if it is equal to alarm 1
- 2 Resets the counter if it is equal to alarm 2
- 3 Loads preset 1 if it is equal to alarm 1
- 4 Loads preset 1 if it is equal to alarm 2
- 5 Loads preset 2 if it is equal to alarm 1
- 6 Loads preset 2 if it is equal to alarm 2

The automatic function doesn't work in high frequencies.

Parameter 3. P1: Preset 1 value. It can be from 0 to as many 9 as digits the display has.

Parameter 4. P2: Preset 2 value. It can be from 0 to as many 9 as digits the display has.

Parameter 5. A1: Alarm 1 value. It can be from 0 to as many 9 as digits the display has.

Parameter 6. A1: Alarm 2 value. It can be from 0 to as many 9 as digits the display has.

Parameter 7. S1: Activation and temporization conditions of output 1.

ONLY FOR DISPLAYS WITH RELAY OUTPUT WORKING IN LOW FREQUENCIES (see parameter 2.Co).

Permits programming the activation conditions of output 1 and the time that will be activated. This parameter has two digits. The function of each one is explained in the following table:

Left digit	SR1 output condition	Right digit	Delay output 1 (SR1) ON
0	Non activated	0	No delay
1	SR1 ON if Counter = Alarm 1	1	Delay of 0,5 s
2	SR1 ON if Counter >= Alarm 1	2	Delay of 0,8 s
3	SR1 ON if Counter = Alarm 2	3	Delay of 1 s
4	SR1 ON if Counter <= Alarm 2	4	Delay of 1,5 s
5	SR1 ON if Counter > Alarm 1	5	Delay of 2 s
6	SR1 ON if Counter < Alarm 1	6	Flashing of 0,5 s
7	SR1 ON if Counter > Alarm 2	7	Flashing of 0,8 s
8	SR1 ON if Counter < Alarm 2	8	Flashing of 1 s
9	SR1 ON if Counter = 0	9	Output always OFF
A	SR1 ON if Counter <= Alarm 1 and >= Alarm 2		
b	SR1 ON if Counter >= Alarm 1 and <= Alarm 2		

SR1 is the state of the output 1. AL1 is the value of alarm 1. AL2 is the value of alarm 2. SR1 will be activated when the activation conditions have been accomplished. SR1 will be deactivated when the time has passed or when the activation condition is not accomplished.

Parameter 8. S2: Activation and temporization conditions of output 2.

ONLY FOR DISPLAYS WITH RELAY OUTPUT WORKING IN LOW FREQUENCIES (see parameter 2.Co).

Permits programming the activation conditions of output 2 and the time that will be activated. This parameter has two digits. The function of each one is explained in the following table:

Left digit	SR2 output condition	Right digit	Delay output 2 (SR2)	ON
0	Non activated	0	No delay	
1	SR2 ON if Counter = Alarm 1	1	Delay of 0,5 s	
2	SR2 ON if Counter >= Alarm 1	2	Delay of 0,8 s	
3	SR2 ON if Counter = Alarm 2	3	Delay of 1 s	
4	SR2 ON if Counter <= Alarm 2	4	Delay of 1,5 s	
5	SR2 ON if Counter > Alarm 1	5	Delay of 2 s	
6	SR2 ON if Counter < Alarm 1	6	Flashing of 0,5 s	
7	SR2 ON if Counter > Alarm 2	7	Flashing of 0,8 s	
8	SR2 ON if Counter < Alarm 2	8	Flashing of 1 s	
9	SR2 ON if Counter = 0	9	Output always OFF	
A	SR2 ON if Counter <= Alarm 1 and >= Alarm 2			
b	SR2 ON if Counter >= Alarm 1 and <= Alarm 2			

SR2 is the state of the output 2. AL1 is the value of alarm 1. AL2 is the value of alarm 2. SR2 will be activated when the activation conditions have been accomplished. SR2 will be deactivated when the time has passed or when the activation condition is not accomplished.

Parameter 9. FA: Value of the multiplying or splitter factor. The maximum value is 999 in a 3 digits display, 9999 in a 4 digits, 99999 in a 5 digits and 999999 in a 6, 7, 8 or 9. The function of the multiplying or splitter factor is indicated in parameter 2 Co.

Parameter A. PU: Selects the decimal point position (the number of decimal digits). With a value of 0 no decimal digits will be shown.

Parameter B. So: Exits programming parameters. To exit press advance (7->5). The parameters will be saved in the memory.

See the input wiring and examples in paragraph 5.3

4.3.3 Parameters of function 04 (Chronometer).

The chronometer format and its maximum value depends on the display's digit number:

2 Digits display: DD	Maximum value: 59
3 Digits display: D.DD	Maximum value: 9.59
4 Digits display: DD.DD	Maximum value: 99.59
5 Digits display: DD-DD o DD:DD	Maximum value: 99-59
6 Digits display: DDD-DD o DDD:DD	Maximum value: 999-59
7 Digits display: DDDD-DD o DDDD:DD	Maximum value: 9999-59
8 Digits display: HH-MM-SS o HH:MM:SS	Maximum value: 99-59-59

The standard display's reference is with symbol “-” between digits. Displays with symbol “:” must be ordered HH:MM.

Displays from 2 to 7 digits may be setup to count hours/minutes or minutes/seconds.
8 Digits displays always count hours, minutes and seconds.

Parameter 2.Co:Control of Hours/Minutes or Minutes/Seconds, increase/decrease and function preset.

Parameter 3. P1: Value of preset 1.

Parameter 4. P2: Value of preset 2.

Parameter 5. A1: Value of alarm 1.

Parameter 6. A2: Value of alarm 2.

Parameter 7. S1: Activation and temporization conditions of output 1

Parameter 8. S2: Activation and temporization conditions of output 2

Parameter 9. So: Exit programming parameters.

In the 2 digits DN-129 models, only the parameter number and the first letter are shown.

Programming and function of each parameter

Left digit	Types of working	Right digit	Automatic function
0	Increase Hours/Minutes	0	Non activated
1	Decrease Hours/Minutes	1	Time = Alarm 1 → Reset
2	Inc. / Dec. Hours / Minutes -> Input 5	2	Time = Alarm 2 → Reset
3	Increase Minutes / Seconds	3	Time = Alarm 1 → Preset 1
4	Decrease Minutes / Seconds	4	Time = Alarm 2 → Preset 1
5	Inc. / Dec. Minutes / Seconds -> Input 5	5	Time = Alarm 1 → Preset 2
		6	Time = Alarm 2 → Preset 2
		7	Time = Alarm 1 → Stop
		8	Time = Alarm 2 → Stop

In types of working 2 and 5 (Inc./Dec. Hours/Min. ->input 5 and Inc./Dec. Min./Sec. ->input 5) the time is increased or decreased depending on the state of input5.

With the input 5 activated the time increase. With the input 5 deactivated the time decrease.

The automatic function (right digit) permits modifying the stopwatch.

- 0 Stopwatch's value not modified.
- 1 Resets the stopwatch if it is equal to alarm 1
- 2 Resets the stopwatch if it is equal to alarm 2
- 3 Loads preset 1 if it is equal to alarm 1
- 4 Loads preset 1 if it is equal to alarm 2
- 5 Loads preset 2 if it is equal to alarm 1
- 6 Loads preset 2 if it is equal to alarm 2
- 7 Stops the chronometer if it is equal to alarm 1
- 8 Stops the chronometer if it is equal to alarm 2

Parameter 3. P1: Preset 2 value. The maximum value is 23h:59m or 59m:59s

Parameter 4. P2: Preset 2 value. The maximum value is 23h:59m or 59m:59s

Parameter 5. A1: Alarm 1 value. The maximum value is 23h:59m or 59m:59s

Parameter 6. A1: Alarm 2 value. The maximum value is 23h:59m or 59m:59s

Parameter 7. S1: Activation and temporization conditions of output 1.

ONLY FOR DISPLAYS WITH RELAY OUTPUT WORKING IN LOW FREQUENCIES (see parameter 2.Co).

Permits programming the activation conditions of output 1 and the time that will be activated. This parameter has two digits. The function of each one is explained in the following table:

SR1 is the output1 status. AL1 is the alarm1 value. AL2 is the alarm2 value. SR1 will be set when the activation conditions have been accomplished and will remain on while the activation condition is present plus the delay programmed, 0,5s a 2 s(1 al 5).

Left digit	SR1 output condition	Right digit	Delay output 1 (SR1) ON
0	Non activated	0	No delay
1	SR1 ON if Counter = Alarm 1	1	Delay of 0,5 s
2	SR1 ON if Counter >= Alarm 1	2	Delay of 0,8 s
3	SR1 ON if Counter = Alarm 2	3	Delay of 1 s
4	SR1 ON if Counter <= Alarm 2	4	Delay of 1,5 s
5	SR1 ON if Counter > Alarm 1	5	Delay of 2 s
6	SR1 ON if Counter < Alarm 1	6	Flashing of 0,5 s
7	SR1 ON if Counter > Alarm 2	7	Flashing of 0,8 s
8	SR1 ON if Counter < Alarm 2	8	Flashing of 1 s
9	SR1 ON if Counter = 0	9	Output always OFF
A	SR1 ON if Counter <= Alarm 1 and >= Alarm 2		
b	SR1 ON if Counter >= Alarm 1 and <= Alarm 2		

Parameter 8. S2: Activation and temporization conditions of output 2.

ONLY FOR DISPLAYS WITH RELAY OUTPUT WORKING IN LOW FREQUENCIES (see parameter 2.Co).

Permits programming the activation conditions of output 2 and the time that will be activated. This parameter has two digits. The function of each one is explained in the following table:

Left digit	SR2 output condition	Right digit	Delay output 2 (SR2) ON
0	Non activated	0	No delay
1	SR2 ON if Counter = Alarm 1	1	Delay of 0,5 s
2	SR2 ON if Counter >= Alarm 1	2	Delay of 0,8 s
3	SR2 ON if Counter = Alarm 2	3	Delay of 1 s
4	SR2 ON if Counter <= Alarm 2	4	Delay of 1,5 s
5	SR2 ON if Counter > Alarm 1	5	Delay of 2 s
6	SR2 ON if Counter < Alarm 1	6	Flashing of 0,5 s
7	SR2 ON if Counter > Alarm 2	7	Flashing of 0,8 s
8	SR2 ON if Counter < Alarm 2	8	Flashing of 1 s
9	SR2 ON if Counter = 0	9	Output always OFF
A	SR2 ON if Counter <= Alarm 1 and >= Alarm 2		
b	SR2 ON if Counter >= Alarm 1 and <= Alarm 2		

Parameter 8. S2: Activation and temporization conditions of output 2.

ONLY FOR DISPLAYS WITH RELAY OUTPUT WORKING IN LOW FREQUENCIES (see parameter 2.Co).

Permits programming the activation conditions of output 2 and the time that will be activated. This parameter has two digits. The function of each one is explained in the following table:

See the input wiring and examples in paragraph 5.4

4.3.4 Parameters of function 05 (Tachometer).

Parameter 2. FE: input frequency

Parameter 3. dt: display's value.

Parameter 4.EL: updating time.

Parameter 5. LI: Limit time without impulses.

Parameter 6. Pd: number of decimals.

Parameter 7. FA: mortifying factor.

Parameter 9. So: exits programming factors.

In the 2 digits models of DN-129 and DN-189 it isn't possible to use the Tachometer function.

Programming and function of each parameter

Parameter 2. FE: input frequency.

Number of display digits	Maximum frequency	Minimum frequency
3	999	0,01
4	9999	0,001
5	15000	0,0001

The decimal point is selected with the increase key (+) after programming the frequency.

Parameter 3. dt: display's value.

Selects the number shown when the frequency is equal to the input frequency of parameter 2.

Number of display digits	Maximum value	Minimum value
3	999	0,01
4	9999	0,001
5	15000	0,0001

The decimal point is selected with the increase key (+) after programming the frequency.

Parameter 4. EL: updating time.

Selects the updating time of the display. The time is measured in tenths of seconds and the rank is between 1 and 199 (0.1s and 19.9s).

With a big updating time there will be less changes on the frequency shown by the display. If the input frequency is unstable, select a big updating time to reduce the display's changes.

Parameter 5. LI: limit time without impulses.

Adjust the maximum time between two impulses. If this time is surpassed, the display show 0.

The time is measured in seconds and the rank is between 1s and 69s

Parameter 6. Pd: number of decimals

Selects the maximum number of decimal positions. If there isn't enough space to show all the integers numbers, the number of decimal positions will automatically decrease.

The possible values are: 0, 1, 2, 3, 4 and 9. A value of 9 indicates that there will be used as many decimal positions as possible.

Example: If the number of decimal positions is 2, the display has 5 digits and the shown number is 99.99, when we increase 0.01 the new number is 100.00

Parameter 7. FA: average factor.

Selects the number of samples that are used to do an average and reduce the changes. When the input frequency has a big change and you don't wants to see it, the average factor reduce the change.

Each time that the data is updated, the new number erase the oldest. The possible values are from 0 to 9. The number of samples are the average factor multiplied 5.

Parameter 9. So: exits programming parameters.

To exit press advance (7->5). Parameters will be saved in the memory.

See the input wiring and examples in paragraph 5.5

4.3.5 Parameters of function 06 (Binary).

Parameter A. PU: Permits to select the position of decimal point that is the decimal digit number. With the value 0 no decimal point is displayed.

4.4 Parameters of serial line.

You may use the serial line to connect the displays DN-1_9PX with equipments. The parameters to configure are listed below.

- 1– Display address.
- 2– Baud rate, data bits, parity and stop bits.
- 3– Serial line type: RS-232 o RS-485.

Prior to program the parameters is a good practice to program the function parameters.

4.4.1 Parameter C.LS: Display address.

It configures the display address on network. This value is used in RS-232 and RS-485. The address range is between 0 and 99.

4.4.2 Parameter D.PS: Baud rate, data bits, parity and stop bits.

The parameters of the series line are codified in the table below:

4.4.3 Parameter E.rS: Serial line type.

Permits to select the available serial line type.

Type 1: Serial line RS-232C

Type 2: Serial line RS-485

Code	Baud rate	Data bits	Parity	Stop bits
02	9600 bauds	7 bits	No parity	1
03	19200 bauds	7 bits	No parity	1
05	9600 bauds	8 bits	No parity	1
06	19200 bauds	8 bits	No parity	1
08	9600 bauds	7 bits	Even	1
09	19200 bauds	7 bits	Even	1
11	9600 bauds	8 bits	Even	1
12	19200 bauds	8 bits	Even	1
14	9600 bauds	7 bits	Odd	1
15	19200 bauds	7 bits	Odd	1
17	9600 bauds	8 bits	Odd	1
18	19200 bauds	8 bits	Odd	1
20	9600 bauds	7 bits	No parity	2
21	19200 bauds	7 bits	No parity	2
23	9600 bauds	8 bits	No parity	2
24	19200 bauds	8 bits	No parity	2
26	9600 bauds	7 bits	Even	2
27	19200 bauds	7 bits	Even	2
29	9600 bauds	8 bits	Even	2
30	19200 bauds	8 bits	Even	2
32	9600 bauds	7 bits	Odd	2
33	19200 bauds	7 bits	Odd	2
35	9600 bauds	8 bits	Odd	2
36	19200 bauds	8 bits	Odd	2

5. FUNCTIONS AND CONTROL INPUTS

5.1 Function 1. 8 bits multiplexed BCD.

The 8 bits multiplexed BCD function allows controlling displays from 3 to 10 digits with 8 data bits. The PLCs only need 8 data bits to control a 8 bits multiplexed BCD display.

The input's power supply should be between 12V and 26V CC and can be connected to PNP, NPN and CONTACT outputs. The function of each input is:

Inputs E5, E6, E7 and E9: If the four inputs are 0, with the E1 to E4 the decimal point position is codified. If not, they codify the digit's position and E1, E2, E3 and E4 are the code of the value.

Input E8: (strobe) validate the codified data.

The digit 1 is in the right of the display.

Digit	Decimal point position										
	No point	1	2	3	4	5	6	7	8	9	10
E1	0	1	0	1	0	1	0	1	0	1	0
E2	0	0	1	1	0	0	1	1	0	0	1
E3	0	0	0	0	1	1	1	1	0	0	0
E4	0	0	0	0	0	0	0	0	1	1	1

	Point selection	Digit position selection									
		1	2	3	4	5	6	7	8	9	10
E5	0	1	0	1	0	1	0	1	0	1	0
E6	0	0	1	1	0	0	1	1	0	0	1
E7	0	0	0	0	1	1	1	1	0	0	0
E9	0	0	0	0	0	0	0	0	1	1	1

Function	Symbol	:	+	/	%	-	°										
= 01	Value	0	1	2	3	4	5	6	7	8	9	A	b	C	d	-	Space
= 11	Value	0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F
E1		0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
E2		0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
E3		0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
E4		0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Example 1: Modifying one digit

Initial display value

1	2	3	4.	5	6
---	---	---	----	---	---

To substitute number 5 by 7, must be sent>

E8	E7	E6	E5	E4	E3	E2	E1
0	0	1	0	0	1	1	1

E1-E4 Value = 7

E5-E7 2nd position of the right

This data must stable for 5ms

E8 ON (Strobe)

E8	E7	E6	E5	E4	E3	E2	E1
1	0	1	0	0	1	1	1

Minimum time 5ms

Final display value

1	2	3	4.	7	6
---	---	---	----	---	---

Example 2: Modifying the decimal point position:

Initial display value

1	2	3	4.	7	6
---	---	---	----	---	---

To display the decimal point in the value 3

E8	E7	E6	E5	E4	E3	E2	E1
0	0	0	0	0	1	0	0

E1-E4 Decimal point position

E5-E7 Modify decimal point position

This data must stable for 5ms

E8 ON (Strobe)

E8	E7	E6	E5	E4	E3	E2	E1
1	0	0	0	0	1	0	0

Minimum time 5ms

Final display value

1	2	3.	4	5	6
---	---	----	---	---	---

5.2 Function 11. 8 bits multiplexed BCD.

Function 11 acts in the same way as the function 1, except the values (1110 = E) and (1111 = F). See the table on previous page.

5.3 Function 2. Direct BCD.

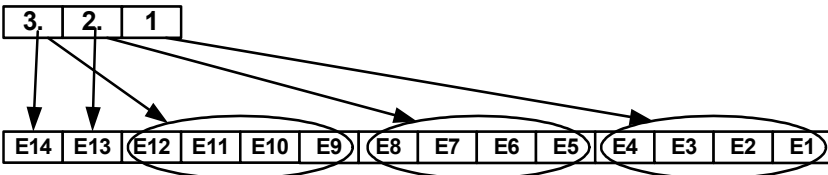
The direct BCD is only useful for 3 digits displays. The models are DN-1_9/3SP, DN-1_9/3SPR.

The BCD direct function permits control a display digit by digit with 14 inputs. Three groups of 4 inputs control the value of the digits. The other two inputs control the decimal point.

The inputs power supply should be between 12V and 26V CC and the inputs can be PNP, NPN or CONTACT.

The inputs E1-E4 control the digit 1. The one of the right.
 The inputs E5-E8 control the digit 2. The one of the center.
 The inputs E9-E12 control the digit 3. The one of the left.
 The input E13 controls the decimal point of the digit 2. Central digit.
 The input E14 controls the decimal point of the digit 3. Left digit.

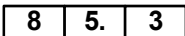
The function of each input is explained in the following table.



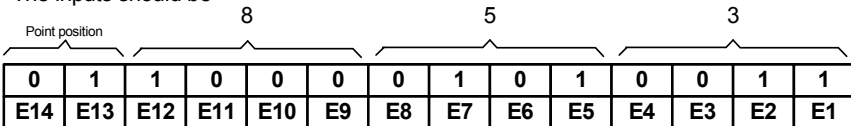
			Displayed value																	
Function= 02				0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F	
Function= 12				0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	White	
E1	E5	E9	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
E2	E6	E10	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	0	1	1
E3	E7	E11	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	1
E4	E8	E12	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

Table of values shown depending on the inputs.

Example. To show



The inputs should be



5.4 Function 12. 8 bits direct BCD.

Function 12 acts in the same way as the function 2, except the values (1110 = E) and (1111 = F). See the table on previous page.

5.5 Function 3. Counter.

The counter function permits to configure the display to work as a impulses counter. It has inputs to load presets (2), increase, decrease and Reset.

It can work with a multiplying or splitter factor.

When it work with a multiplying factor, the counter is increased or decreased the number of the factor. If the multiplying factor is 5, each impulse increase o decrease 5 units in the counter.

When it works with a splitter factor, the counter only increase when has received the number of impulses of the factor. If the splitter factor is 4, the counter will increase o decrease when has received 4 impulses.

To work with low frequencies, the counter can be configured to ignore parasite impulses like bounce contacts.

The maximum frequency is 10kHz

When it arrives to the maximum or minimum the counter flashes. A 5 digits display has a maximum value of 99999 and a minimum value of -9999.

Programming the automatic functions:

The automatic functions are programmed modifying the right's digit of the second parameter 02.Co. (see 4.3.2)

The automatic functions are only available in low frequencies

When the counter's value is equal to one of the values of the alarms, one programmed action starts.

Example:

Parameter 2 Co = 03.

Parameter 3 P1 = 75.

Parameter 5 A1 = 40.

Parameter 9 FA = 1.

The parameter 2 has been programmed to increase in one unit (parameter 9 = 1). Load the value of preset 1 (75) when the counter's value is equal to the value of alarm 1 (40).

Displays with relay :

If the display has the relay option, the relay can be configured to be activated in different situations. Each relay has an independent parameter to program. (see 4.3.2)

Example:

Parameter 7 S1 = 15

Activate output 1 during 2 seconds, when the counter's value is equal to the alarm's 1 value.

Control inputs:

The power supply of the inputs should be between 12V and 26V CC and the inputs can be PNP, NPN or CONTACT.

E1 Loads preset 1

E2 Loads preset 2

E3 Reset

E4 Increase the counter

E5 Decrease the counter.

5.6. Function 4. Chronometer.

The chronometer function permits working with the display as a stopwatch. It can be programmed to increase, decrease or increase/decrease depending on a input.

Besides of the control inputs that resets the display or loads a preset (it has two presets), it's also possible to reset de display, load a preset or stop it automatically with the alarms

Programming the automatic functions:

The automatic functions are programmed modifying the right's digit of the second parameter 02.Co. (see 4.3.2)

When the chronometer's value is equal to one of the values of the alarms, one programmed action starts.

Example:

Parameter 2 Co = 35.

Parameter 4 P2 = 15 - 30.

Parameter 5 A1 = 30 - 28.

The parameter 2 has programmed increase minutes and seconds. Load the preset 2 (15m - 30s) when the chronometer is equal to the alarm 1 value (30m - 28s)

Displays with relay:

If the display has the relay option, the relay can be configured to be activated in different situations. Each relay has an independent parameter to program. (see 4.3.2)

Example:

Parameter 7 S1 = 58

Activate output 1 if the chronometer's value is bigger than the alarm 1, the output is flashing, 1 second is On and 1 second is Off.

Combining the automatic functions (parameter 2) with the output functions (parameters 7 and 8), the display can have many applications.

Control inputs:

The power supply of the inputs should be between 12V and 26V CC and the inputs can be PNP, NPN or CONTACT.

E1 Control Run = ON / Stop = OFF.

E2 Reset

E3 Loads preset 1

E4 Loads preset 2

E5 Increase = ON / Decrease = OFF.

5.7 Function 5. Tachometer.

With the function tachometer we can measure the time that a event is repeated. Programming the input frequency and the shown value, you can get the necessary result. To correct the big changes of the input frequency that makes big changes of the display's value there are two parameters that softness the problem. The two parameters are the updating time and the average factor. (see section 4.3.3. parameters 4EL and 7FA)

The updating time is independent from the input frequency. If the input frequency is stable we can program a updating time of 0.1s to read a input frequency of 0.05Hz (1 impulse every 20s). By this way the display is updated immediately after the impulse is received. The updated data between the impulses has the same result.

To use the tachometer to count the turns in a minute (tpm), see examples in section 5.5.1.

Connexion: the input signal of the function tachometer is E6, the pin number 6 of the DB25 connector (see section 3.2). The maximum input frequency is 15kHz.

Before using the tachometer, you have to program the parameters. see section 4.3.4

Versions:

Tachometer function may be used on **DN-1_9P** with 3, 4 or 5 digits and 1 or 2 sides.

5.7.1 Examples:

Show the value of the input frequency without correction.

The input frequency is 100Hz. Variable oscillator. 5 digits display.

Parameter	Program	
2.FE	0001	1Hz input frequency
3.dl	0001	Display 1 with a 1 Hz input frequency
4.EL	001	Update value in 0.1s
5.LI	01	1s limit time without signal
6.Pd	9	Maximum number of decimals shown
7.FA	0	Without average factor

Show the value of the input frequency without correction.

The input frequency is 100Hz. A little stable oscillator. 4 digits display.

Parameter	Program	
2.FE	0001	1Hz input frequency
3.dl	0001	Display 1 with a 1 Hz input frequency
4.EL	030	Update value in 3s
5.LI	01	1s limit time without signal
6.Pd	1	Show 1 decimal
7.FA	0	Without average factor

Show the value of the input frequency multiplied by 25,7.

The input frequency is 10Hz. A little stable oscillator. 5 digits display.

Parameter	Program	
2.FE	0001	1Hz input frequency
3.dl	0025,7	Display 25,7 with a 1 Hz input frequency
4.EL	010	Update value in 1s
5.LI	01	1s limit time without signal
6.Pd	2	Show 2 decimal
7.FA	2	Average factor=2. Average of 10 samples.

Measure the rotation speed of a motor that turns round at 540 tpm and sends 8 impulses each turn. Frequency $(540/60) \times 8 = 72$.

Variable oscillator. 5 digits display.

Parameter	Program	
2.FE	00072	72Hz input frequency
3.dl	00540	Display 540 with a 1 Hz input frequency
4.EL	001	Update value in 0.1s
5.LI	01	1s limit time without signal
6.Pd	0	Without decimals
7.FA	0	Without average factor

Measure the making cadence of a machine that makes 450 pieces in an hour with a sensor that detects a piece each 8 seconds.

A little stable oscillator. 4 digits display.

Parameter	Program	
2.FE	0,125	0,125Hz input frequency = 1 piece each 8s.
3.dl	0450	Show 450 with 0.125Hz input frequency.
4.EL	020	Update value in 2s
5.LI	10	10s limit time without signal
6.Pd	0	Without decimals
7.FA	1	Average factor=1. Average of 5 samples.

Measure the making cadence of a machine that makes 16200 pieces in an hour with a sensor that detects a piece each 4.5 seconds.

A little stable oscillator. 5 digits display.

Parameter	Program	
2.FE	0004,5	4,5Hz input frequency.
3.dl	16200	Show 16200 with 4,5Hz input frequency.
4.EL	080	Update value in 8s
5.LI	02	2s limit time without signal
6.Pd	0	Without decimals
7.FA	8	Average factor=8. Average of 40 samples.

5.8 Function 15. Tachometer with the digit of less weight equal 0.

The function 15 has the same working as the function 5 but the digit of less weight is always 0.

Example: Value of the frequency without correction = 14597
 Shown value = 14590

5.9 Function 25. Tachometer with the two digits of less weight equal 0.

The function 25 has the same working as the function 5 but the two digits of less weight are always 0.

Example: Value of the frequency without correction = 14597
 Shown value = 14500

5.10 Function 6. Binary.

The function 6 permits display a 14 bits binary value in decimal format.
Value 0 is shown with all inputs OFF and value 16383 is shown with all inputs ON.

The parameter A.PU permits to configure the decimal point position.

5.11 ASCII Communications protocol.

This protocol permits easy communication with any unit that features a serial line and that can have the protocol configured, as with a computer, a PLC Omron working in RS-232 mode, etc. Another possibility is to connect various displays from the same unit on a RS-485 network.

With this protocol, the display works in slave mode, which is to say the display waits to receive a message and once received, it will show the value as long as it conforms.

The data transmission block must be as follows:

	Start	High Address	Low Address	Code to get data	End
ASCII	@	0 a 9	0 a 9	E D A B	* CR
HEXA	40	30 a 39	30 a 39	45 44 41 42	2A 0D

Start: 1 Byte. Always must start with the character @ (40 hexa).

Address : 2 Bytes. Sae as display's address. Parameter C. Value between 0 and 99.

Code : 2 Bytes. Always the characters E D A B. (45, 44, 41, 42 hexa).

End : 2 Bytes. Character of message end. Always *CR (2A0D hexa).

If the message address is equal to display's address, the displays returns the following answer block .

The answer block always is the same data block.

	Start	High Address	Low Address	Code to get data	Status relays
ASCII	@	0 a 9	0 a 9	12 digits	R R
HEXA	40	30 a 39	30 a 39	12 digits	52 52

Relay 1	Relay 2	Color code	Color	End
0 o 1	0 o 1	C	0 a 2	* CR
30 o 31	30 o 31	43	30 a 32	2A 0D

The display data values not used are replaced by the code of white space (20 hexa).

The colour and relay codes are:

Color		Relays	
Red	0	OFF	0
Green	1	ON	1
Yellow	2		

All display's models return the same block of data, regardless of the option they have installed.

Example 1: Ask data from a computer.

Display address = 08	Parameter C	8
Serial line: 9600 bauds. 8 bits. Even parity. 2 stop bits.	Parameter D	29
Serial line = RS-232C	Parameter E	1

Displays initial value

2	4	6	7
---	---	---	---

Data block form computer to display

ASCII	@	0	8	E	D	A	B	*	CR
HEXA	40	30	38	45	44	41	42	2A	0D

The display returns the following data block.

ASCII	@	0	8	E	D							
HEXA	40	30	38	45	44	20	20	20	20	20	20	20

→

2	4	.	6	R	R	1	0	C	2	*	CR
32	34	2E	36	52	52	31	30	43	32	2A	0D

5.12 COLOUR OPTION.

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.

5.12.1 Parameters to define the internal bit r1.

Except for counter and tachometer which have specific parameters.

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 to set 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

5.12.2 Parameters to define the internal bit r2.

Except for counter and tachometer which have specific parameters.

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 to set 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

5.12.3 Parameters to define the colour.

To define the colour the 2 internal bits (**r1/r2**) or (**SR1/SR2** specifics for functions counter and tachometer) are used.

The following parameters are used to define colours.



Colour if internal bits are OFF. To change the colour push 7->5 key. Upon pressing + the next parameter is shown.



Colour if internal bit **r1** or **SR1** is ON. To change the colour push 7->5 key. Upon pressing + the next parameter is shown.



Colour if internal bit **r2** or **SR2** is ON. To change the colour push 7->5 key. Upon pressing + the next parameter is shown.



Colour if internal bits **r1** and **r2** or **SR1** and **SR2** are ON. To change the colour push 7->5 key. Upon pressing + the next parameter is shown.

5.12.4 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.

5.13 Table of programmed values

USE THIS LIST TO NOTE THE PROGRAMMED PARAMETER'S VALUES.

The parameters values are different for each function.

Serial number	

Parameter	Value
1	
2	
3	
4	
5	
6	
7	
8	
9	
A	
B	
C	
D	
E	
nr	
r1	
r2	
r3	

STATEMENT OF CONFORMITY



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

As the builder of the equipment of the **LARTET** brand:
Numerical display with series connection.
Model : DN-109P in all versions.
Model : DN-119P in all versions.
Model : DN-129P in all versions.
Model : DN-189P in all versions.

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

Directive: 73/23/CEE Low Voltage Directive modified by 93/68/CEE.
Standard UNE-EN61010-1 Security in electric equipment.

Directive: 89/336/CEE Electromagnetic Compatibility Directive modified by 92/31/CEE and 93/68/CEE.
Standard UNE-EN 61000-6-4 Generic Emission Standard. Industrial environment.
Standard UNE-EN 61000-6-2 Generic Immunity Standard. Industrial environment.

Granollers, June 16, 2009

A handwritten signature in blue ink, appearing to read 'J. Bisbe', with a long horizontal stroke extending to the right.

Josep M^a Bisbe
Technical Manager