

# TECHNICAL MANUAL DC-41SRTHONE+R

Clock, thermometer, hygrometer and CO<sub>2</sub> measurement with relays and GPS option.

## Introduction to the DC-41SRTHONE+2R/+4R

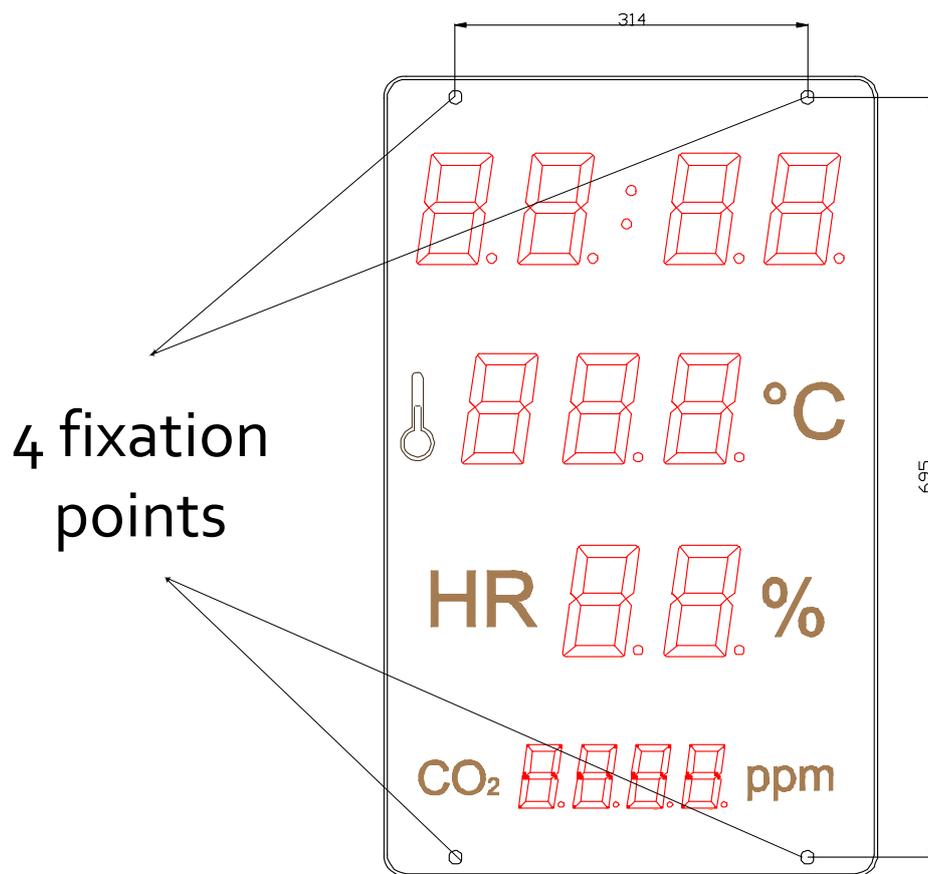
The DC-41SRTHONE+2R/+4R display is presented as an easy-to-use clock, thermometer, hygrometer and CO<sub>2</sub> measurer adjusted and calibrated at factory. The main window shows the current hour and minute, temperature with 0,1°C resolution, humidity with 1% resolution and CO<sub>2</sub> concentration with 1ppm resolution. The main window can be set to turn on and turn off at the time set by user and is adjustable in brightness. There are add-on functions depending on the display. These functions are fully compatible and can be combined with each other:

If the display includes the option +2R, it includes 2 relays with 10 alarms per relay, which are configured through the embedded web page

If the display includes the option +4R, it includes 4 relays with 10 alarms per relay, which are configured through the embedded web page

If the display includes option A, it has an integrated GPS. The antenna contains a magnet that permit to fix it to a magnetic surface. The first time the display is turn on, the quality of the GPS signal must be verified some minutes after the power-up. This is done using one of the parameters of the display (see “GPS option” in this manual).

## Installation of the DC-41SRTHONE+2R/+4R



The DC-41 SRTHONE+2R/+4R displays can be fixed to the wall in two ways:

1– Hanged. Place 2 of the supplied plug at 314mm from one to the other. Insert the screws leaving their head outside for 4mm. Hang the display using the upper-side zig-zag.

2– Screwed. Remove the methacrylate cover. Place the 4 supplied plugs at the distance showed in the drawing. Place the 2 upper screws, leaving their head outside for 4 mm. Hang the display using the upper-side zig-zag. Place the lower screws Tighten all the screws. Replace the methacrylate cover.

## Powering the display

Power supply must be from **100VAC to 240VAC, 50/60 Hz** . You must use a Schuko type plug that has grounded terminal.

In case you have to lengthen the cord, the connection must be made on the terminal located within the display.

## DC-41SRTHONE+2R/+4R characteristics.

|  |                   |  |
|--|-------------------|--|
| <b>Power supply</b> .....                      | 100 VAC a 240 VAC | 50/60Hz  |
| <b>Consumption</b> .....                       | 35VA              |  |
| <b>Consumption at minimum brightness</b> ..... | 13,2VA.           |  |
| <b>Display</b>                                 |                   |  |
| Time .....                                     | 4 digits          | 7segments 100mm height. Format HH:MM. Red LED.   |
| Temperature .....                              | 3 digits          | 7segments 100mm height. Red LED.                 |
| Humidity .....                                 | 2 digits          | 7segments 100mm height. Red LED.                 |
| CO <sub>2</sub> measure .....                  | 4 digits          | 7segments 57mm height. Red LED.                  |
| .....  |                   | Visibility 50 meters. (25mm in CO <sub>2</sub> ) |
| <b>Environmental conditions</b> .....          |                   |  |
| .....  |                   | Operating temperature: -20 to 60°C.              |
| .....  |                   | Storage temperature: -30°C to 70°C               |
| .....  |                   | Relative humidity: 5-95% non condensation.       |
| .....  |                   | Maximum environmental lighting: 1000 lux.        |
| .....  |                   | Protection IP 41.                                |
| <b>Weight</b> .....                            | 4,5 Kg.           |  |
| <b>Temperature precision</b> .....             | ±0,5°C            | at 25°C  |
| <b>Temperature resolution</b> .....            | 0,1°C             |  |
| <b>Humidity precision</b> .....                | ±3,5%             | between 30% and 70%                              |
| <b>Humidity resolution</b> .....               | 1%                |  |
| <b>CO<sub>2</sub> precision</b> .....          | ±30ppm            | or 3% of the measurement between 400 and 1250ppm |
| <b>CO<sub>2</sub> resolution</b> .....         | 1ppm              |  |

## Timed power-up of the display

This display operates in two operation modes: full-operative mode and power-saving mode. In power-saving mode the display does not show the time in order to save energy when the display is not needed. If the power-saving function is not needed and the display should always powered up, the both power-up and power-down times must be the same.

## Characteristics of the relays.

SPDT contact.  
 Maximum current:  
     Resistive load ..... 5A  
     Inductive load ..... 5A  
 Maximum voltage:..... 60V AC/DC

## Wiring the relays

The relays are connected at the back of the display using terminal blocks connecting as follows

| Relay 1         |        |               | Relay 2         |        |               | Relay 3         |        |               | Relay 4         |        |               |
|-----------------|--------|---------------|-----------------|--------|---------------|-----------------|--------|---------------|-----------------|--------|---------------|
| Normally closed | Common | Normally open |

## **Error displaying**

The only error that can appear is a temperature/humidity error. The text displayed in this case is E02 in the display. If this occurs, reboot the display.

## **GPS option**

Displays that include GPS sync with the GPS standard signal. This allows a better time sync without Ethernet connectivity

GPS antenna includes a magnet that can be fixed to a ferric surface. This antenna must be placed close to a window or in a place with “thin” roof. The most “hidden” the antenna is, the longer will take to get the GPS signal. GPS can spend up to half an hour to fix the signal if the antenna is “hidden” from the outside. The signal quality can be monitored from the web page. If, after half an hour, the GPS signal quality is lower than 20, move the antenna abroad.

## Ethernet interface

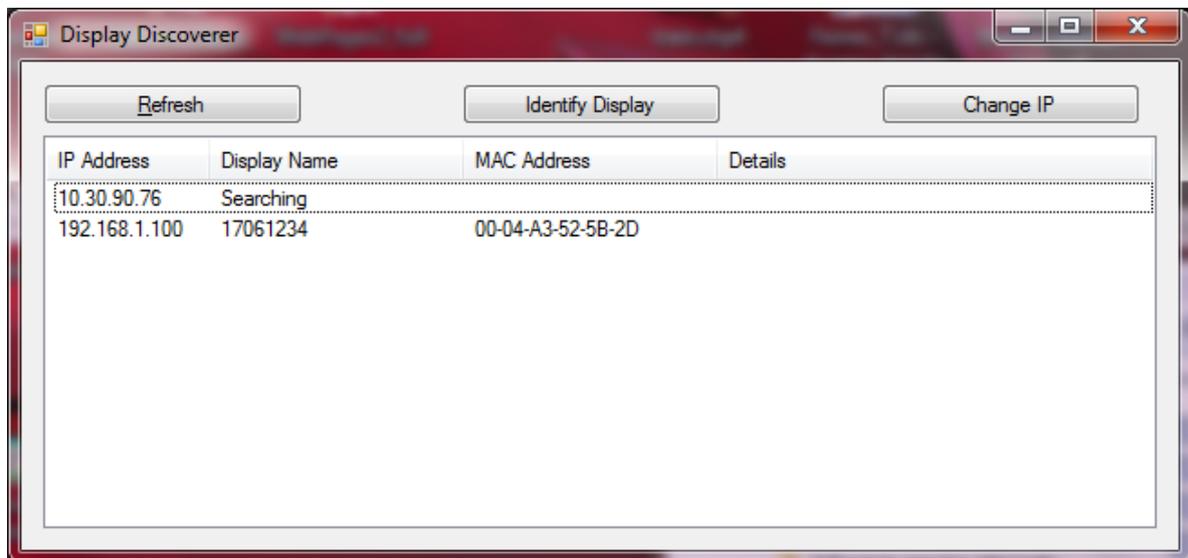
Ethernet interface allows a new step in this displays type because it allows to connect displays using the same LAN in the installation, syncing them through the SNTP and providing a new user interface through the Web.

### The first connection

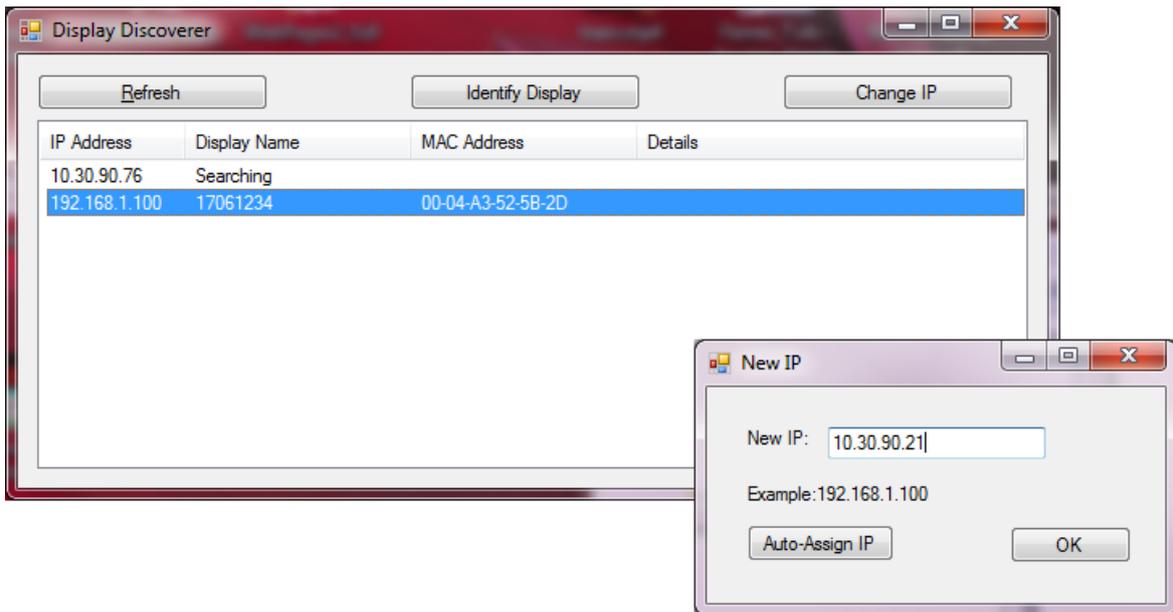
There are several ways for accessing the display on the first time it's connected to the network.

If the IP 192.168.1.100 (the default IP of the display) is in the range of your LAN, the display can be accessed typing the IP in the URL bar in your favourite browser.

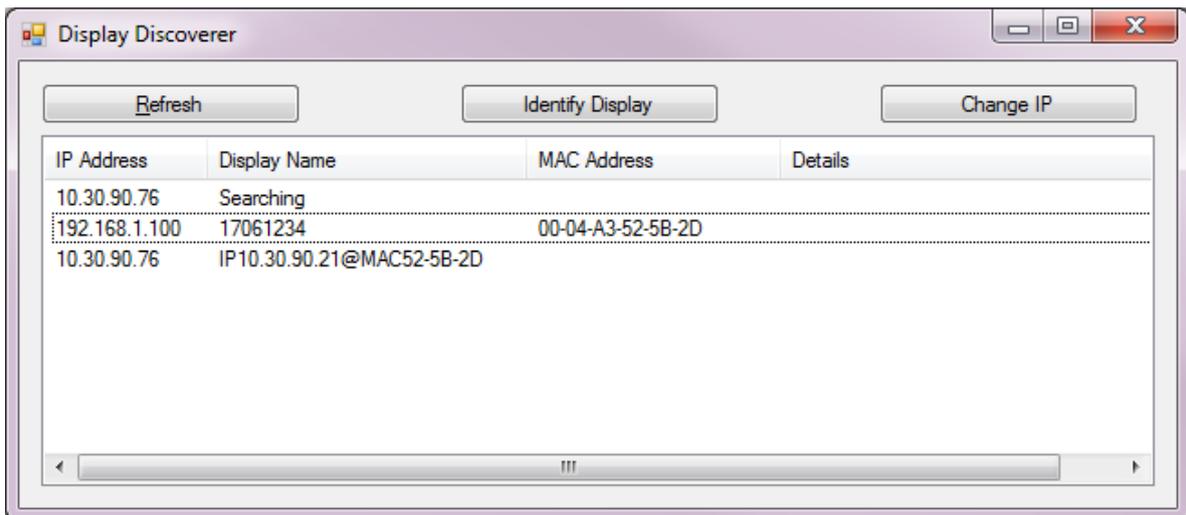
In case there is more than one display in the LAN or the default IP of the display is out of the IP range of you LAN, it is recommended to use the PC program "Display Discoverer", downloadable from the web [www.lartet.com](http://www.lartet.com). In this program, the displays connected to the LAN are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



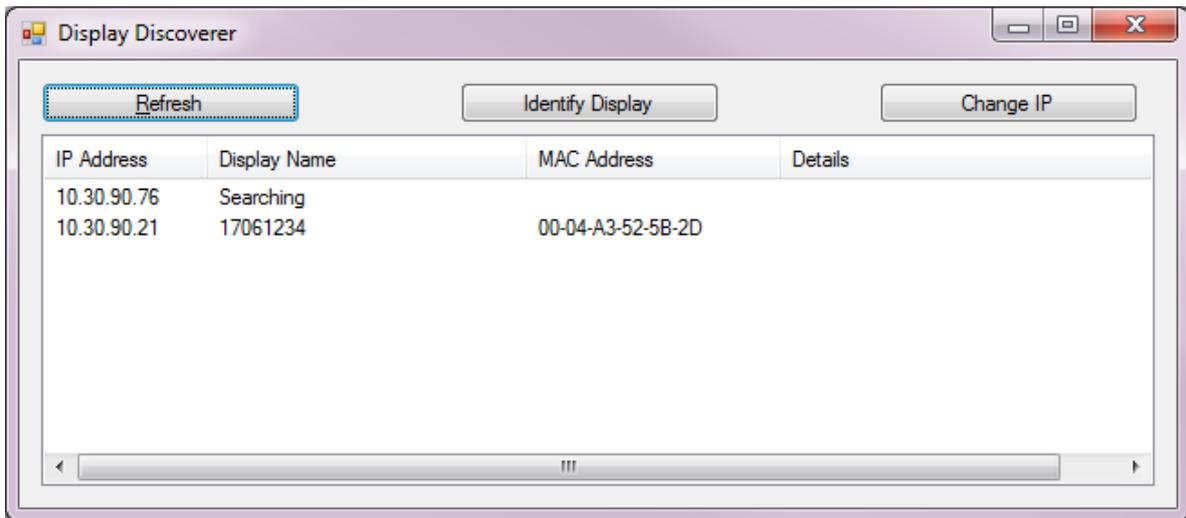
The first row shows the IP of the PC which is searching the displays and the second row a display we just have bought. As it is shown, the display has serial number 17061234 and the default IP is out of the range of the LAN. To change the IP address to a suitable one for our LAN, select the display and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



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



After some seconds, click the “Refresh” button. The display appears with the new IP

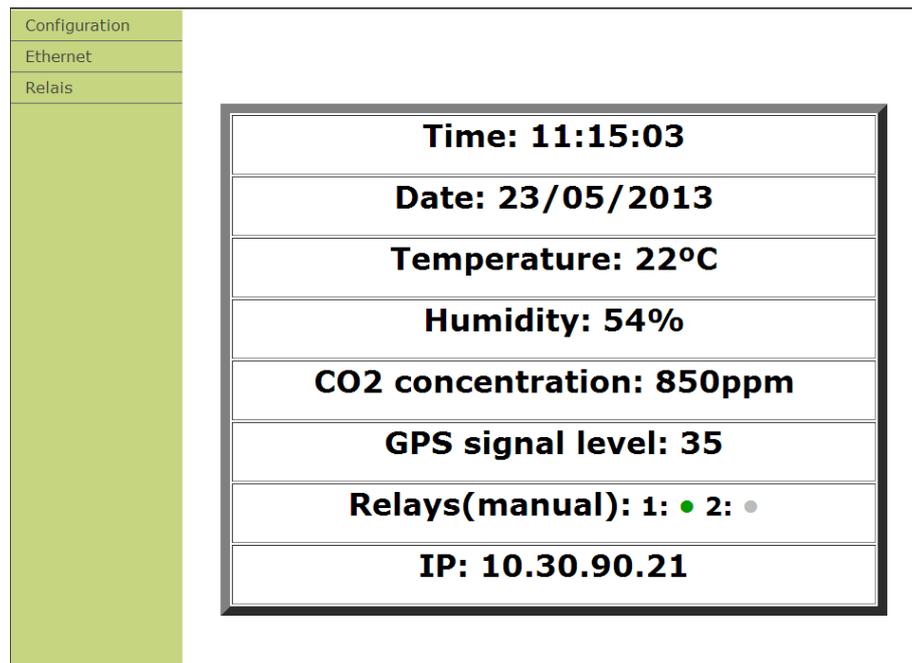


Click the display IP to open a new tab in the browser. The main page of the web server is shown.

## User interface

Ethernet connection allows a new interface, much easier than the usual in displays. All configuration can be done through a website hosted at the display, so the user only needs a device connected to the LAN with web browser (computers, smartphones, tablets...). There is no contact with the display, which usually is in a difficult access point. The web page can be accessed remotely if the router is correctly redirected. See Annex 1: View the web page remotely for more information.

The main page shows the same date and time of the display, as well as the temperature, the humidity, the CO<sub>2</sub> concentration and the GPS signal quality (if the option is included), the relays status and the display IP. This main page is for the user to control the status of the display. If the relays are un manual mode, the user can activate/deactivate the relays.



|               |
|---------------|
| Configuration |
| Ethernet      |
| Relais        |

|                                  |
|----------------------------------|
| <b>Time: 11:15:03</b>            |
| <b>Date: 23/05/2013</b>          |
| <b>Temperature: 22°C</b>         |
| <b>Humidity: 54%</b>             |
| <b>CO2 concentration: 850ppm</b> |
| <b>GPS signal level: 35</b>      |
| <b>Relays(manual): 1: ● 2: ●</b> |
| <b>IP: 10.30.90.21</b>           |

In the left menu there are three tabs: Configuration, Ethernet and relays, accessible through user and password:

|                    |
|--------------------|
| User: admin        |
| Password: 12345678 |

The configuration tab allows the user to configure the display in a fast and easy way. The parameters the user can configure are the following:

- Time: The UTC time in format HH:MM:SS.
- Date: The UTC date in format DD/MM/AAAA.
- Local time: The time deviation respecting UTC. From -11 to +12.
- Weekday.
- Auto time change: This activates or deactivates the automatic summertime/wintertime time change.
- Turn-on and turn-off time. Using these parameters, the user can configure the display to turn on and off at a configured time for energy-saving or aesthetic criteria. If both fields contain the same time, the display is never turned-off.
- Password: This field allows the user to change the password to access the “Configuration”, “Ethernet and “Relays” tabs
- Time sync origin: Using this selector, the user selects the time synchronisation origin for the display:
  - No. The display is not synchronized.
  - Display Ethernet. The display can be synchronized using as server another display of the same collection. The IP address of the server must be typed in the “Time Server” field.
  - SNTP: The display is synchronized with a SNTP server chosen by the user. The SNTP address is typed in the “Time Server” field.
- Time server: When using the SnTP or Display synchronisation, the address must be typed in this field.
- Webpage language. The webpage can be shown in Catalan, Spanish, English, French or German

|          |                        |
|----------|------------------------|
| Main     | <h2>Configuration</h2> |
| Ethernet |                        |

|                          |   |   |
|--------------------------|---|---|
| Time(UTC)                | <input type="text" value="10:45:00"/>     | <input type="button" value="Validate"/> |
| Date(UTC)                | <input type="text" value="11/07/2013"/>   | <input type="button" value="Validate"/> |
| Local Time               | <input type="text" value="+9"/>           |   |
| Weekday                  | <input type="text" value="Thursday"/>     |   |
| Auto time change         | <input type="text" value="Yes"/>          |   |
| Auto brightness          | <input type="text" value="Yes"/>          |   |
| Minimum brightness level | <input type="text" value="Minimum"/>      |   |
| Turn-on time             | <input type="text" value="12:00"/>        | <input type="button" value="Validate"/> |
| Turn-off time            | <input type="text" value="12:00"/>        | <input type="button" value="Validate"/> |
| Password                 | <input type="text" value="....."/>        | <input type="button" value="Validate"/> |
| Time sync origin         | <input type="text" value="SNTP"/>         |   |
| SNTP server              | <input type="text" value="pool.ntp.com"/> | <input type="button" value="Validate"/> |
| Webpage language         | <input type="text" value="English"/>      |   |

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

|   |  |
|---|--|
| Clock                                   |  |
| Configuration                           |  |
| <h3>Ethernet configuration</h3>         |  |
| Display name                            | <input type="text" value="New Name"/>      |
| DHCP:                                   | <input type="text" value="No"/>            |
| IP address:                             | <input type="text" value="10.30.90.21"/>   |
| Gateway:                                | <input type="text" value="10.30.90.200"/>  |
| Subnet Mask:                            | <input type="text" value="255.255.255.0"/> |
| Primary DNS sever:                      | <input type="text" value="10.30.90.2"/>    |
| Secondary DNS server:                   | <input type="text" value="10.30.90.3"/>    |
| End of block in commands:               | <input type="text" value="0Dh"/>           |
| <input type="button" value="Validate"/> |  |

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

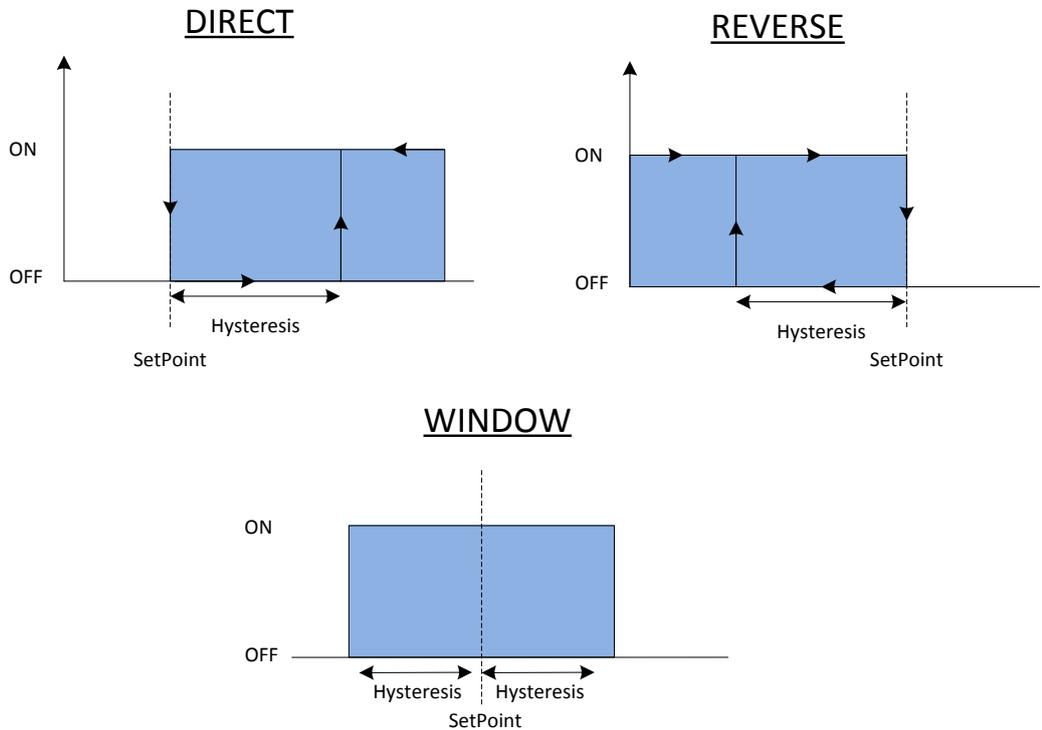
The Relays tab allows the user to configure the activation and deactivation of the relays. The first row allows the user to configure the relay the user is configuring and the operation mode.

The operation mode is:

- Manual: The relays will ignore the configuration of this tab and will be activated or deactivated at the main tab.
- Scheduled: The relays will activate and deactivate following the schedule programmed in the “Relays” tab.

Each relay has 10 alarms to configure. For each alarm, the user must specify:

- Magnitude:
  - Time: The alarm will activate/deactivate depending on the time.
  - Temperature: The alarm will activate/deactivate depending of the temperature
  - Humidity: The alarm will activate/deactivate depending of the humidity.
  - CO<sub>2</sub>: The alarm will activate/deactivate depending on the CO<sub>2</sub> value.
- Working mode:
  - Direct: When working with temperature or humidity, the relay will activate when reaching the value “SetPoint+Hysteresis” and will be activated while higher than SetPoint. When working with time, the alarm will activate.
  - Reverse: When working with temperature or humidity, the relay will activate when reaching the value “SetPoint-Hysteresis” and will be activated while lower than SetPoint. When working with time, the alarm will deactivate.
  - Window: When working with temperature or humidity, the relay will be activated while the value is SetPoint ± Hysteresis. When working with time, the alarm will activate during the seconds in field “Hysteresis/Pulse”.



- SetPoint/Time: Temperature or humidity at the one the alarm is activated. In the “Window” mode, this is the midpoint. In time mode, is the time the alarm will be executed.
- Hysteresis/Pulse: The hysteresis value. In pulse mode, the number of seconds the pulse lasts.
- Days: It allows the user to program the weekdays the alarm will be applied. If there is no one selected, the alarm will not be applied.

Validate the configuration by clicking the “Validate” button at the end of the page. The highest alarm number the more priority it has.

In the example, there are 3 alarms programmed for relay 1.

- Alarm 1 activates the relay 1 in direct mode when reaching 30°C with hysteresis 5°C from Monday to Friday
- Alarm 2 activates the relay 1 in reverse mode when reaching 20% with hysteresis 10% from Monday to Friday
- Alarm 3 activates the relay 1 at 08:00 for 30 seconds on Saturday and Sunday
- Alarm 4 is not applied since no day has been selected to apply

Main

Configuration

Ethernet

## Relays

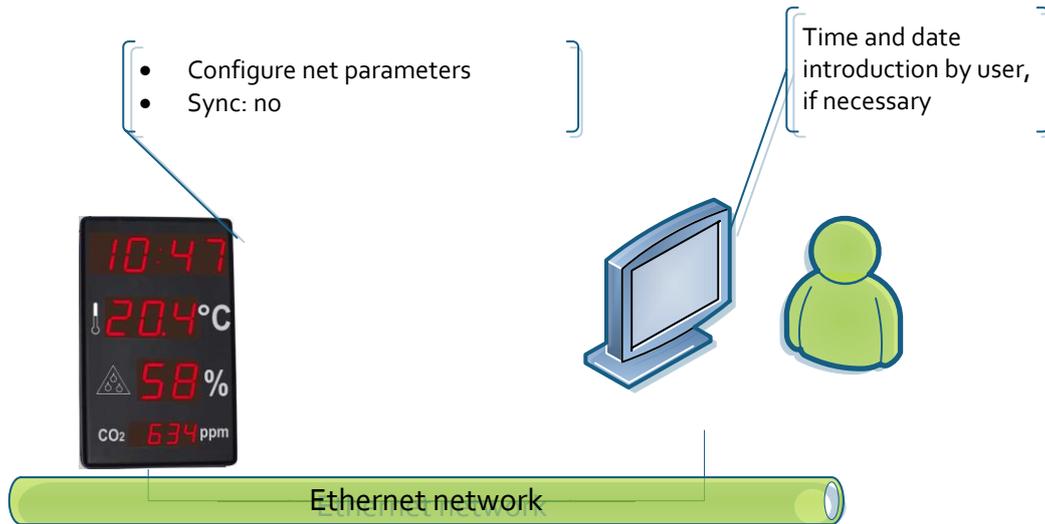
| Relay:  | Operation mode: |                      |               |                  |  |
|---------|-----------------|----------------------|---------------|------------------|--|
| 1 ▾     | Scheduled ▾     |                      |               |                  |  |
|         | Magnitude       | Mode                 | SetPoint/Time | Hysteresis/Pulse | Activation days  |
| Alarm 1 | Temperature ▾   | Direct/Activate ▾    | 30            | 5                | <input checked="" type="checkbox"/> Monday<br><input checked="" type="checkbox"/> Tuesday<br><input checked="" type="checkbox"/> Wednesday<br><input checked="" type="checkbox"/> Thursday<br><input checked="" type="checkbox"/> Friday<br><input type="checkbox"/> Saturday<br><input type="checkbox"/> Sunday |
| Alarm 2 | Humidity ▾      | Reverse/Deactivate ▾ | 20            | 10               | <input checked="" type="checkbox"/> Monday<br><input checked="" type="checkbox"/> Tuesday<br><input checked="" type="checkbox"/> Wednesday<br><input checked="" type="checkbox"/> Thursday<br><input checked="" type="checkbox"/> Friday<br><input type="checkbox"/> Saturday<br><input type="checkbox"/> Sunday |
| Alarm 3 | Time ▾          | Window/Pulse ▾       | 08:00         | 20               | <input type="checkbox"/> Monday<br><input type="checkbox"/> Tuesday<br><input type="checkbox"/> Wednesday<br><input type="checkbox"/> Thursday<br><input type="checkbox"/> Friday<br><input checked="" type="checkbox"/> Saturday<br><input checked="" type="checkbox"/> Sunday                                  |
| Alarm 3 | Humidity ▾      | Reverse/Deactivate ▾ | 20            | 10               | <input type="checkbox"/> Monday<br><input type="checkbox"/> Tuesday<br><input type="checkbox"/> Wednesday<br><input type="checkbox"/> Thursday<br><input type="checkbox"/> Friday<br><input type="checkbox"/> Saturday<br><input type="checkbox"/> Sunday  |

## Ethernet network

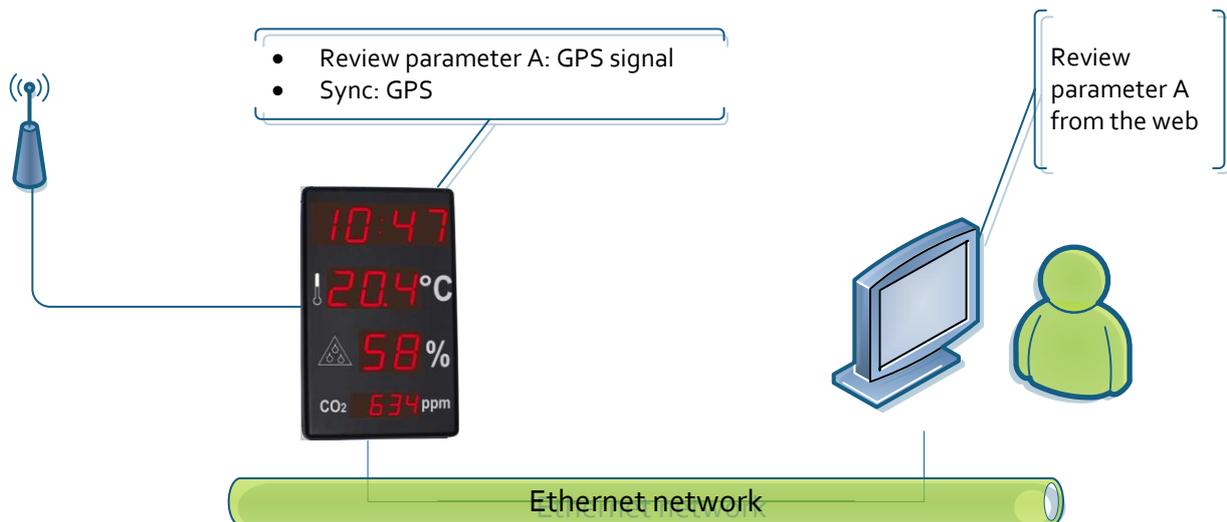
Many Ethernet networks can be configured to sync one or more displays. The possible networks are shown below, as well as the main actions/parameters (seen from the webpage) the user must configure. Other parameters don't care.

## Networks with one display

### One display

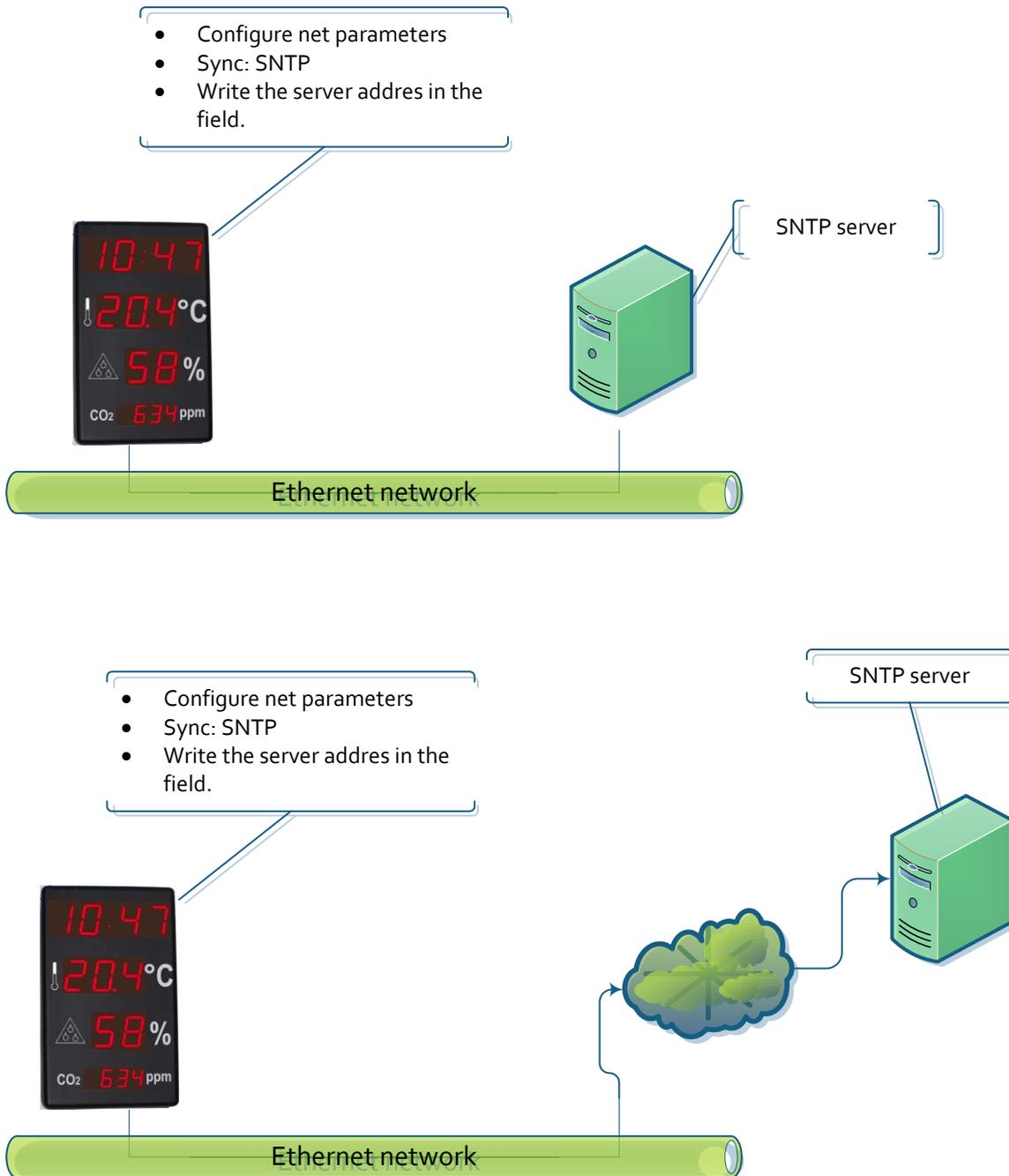


### One display with GPS



## One display. SNTP sync

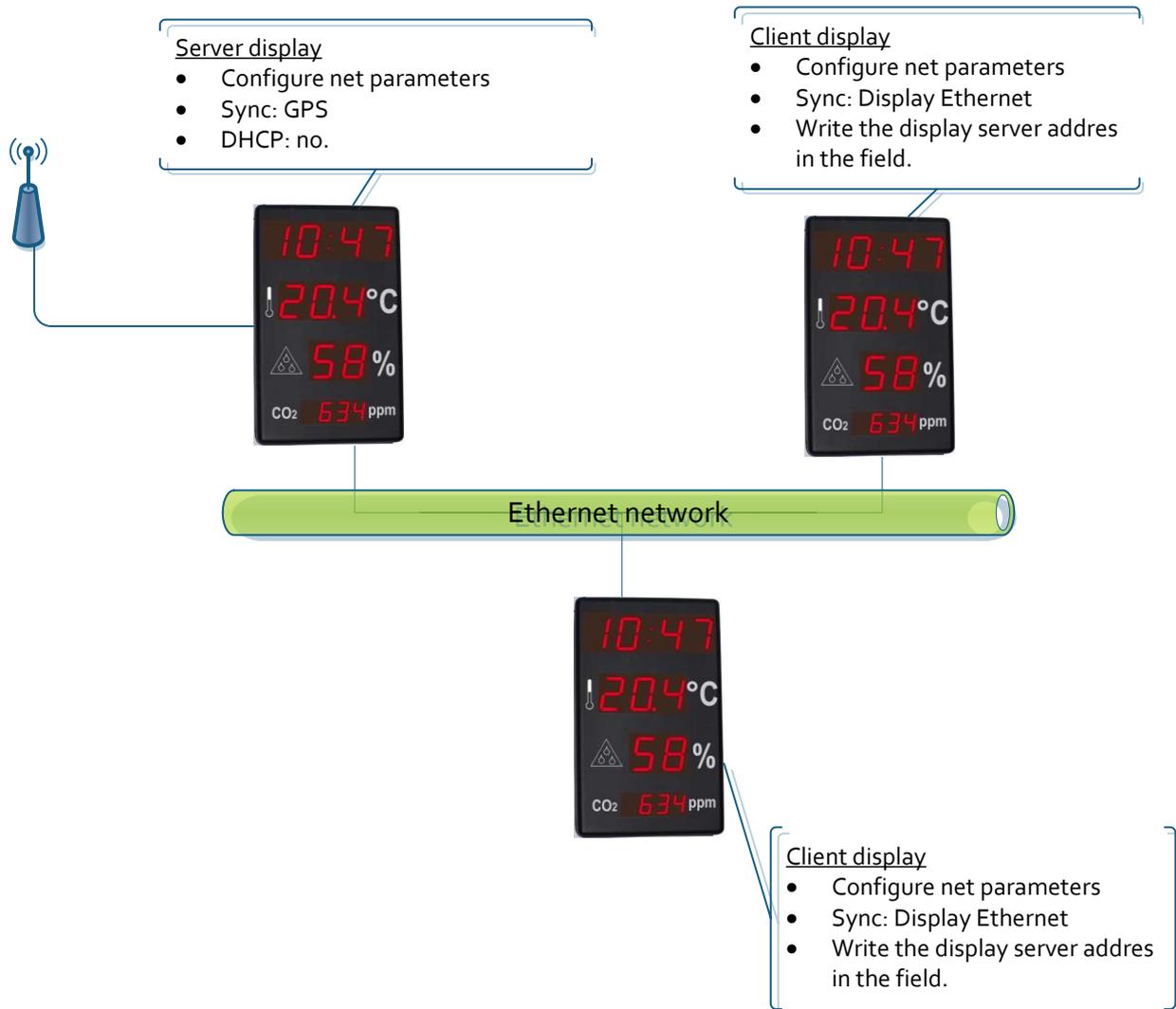
There are two options. Both are configured the same way.



## Nets with more than one display

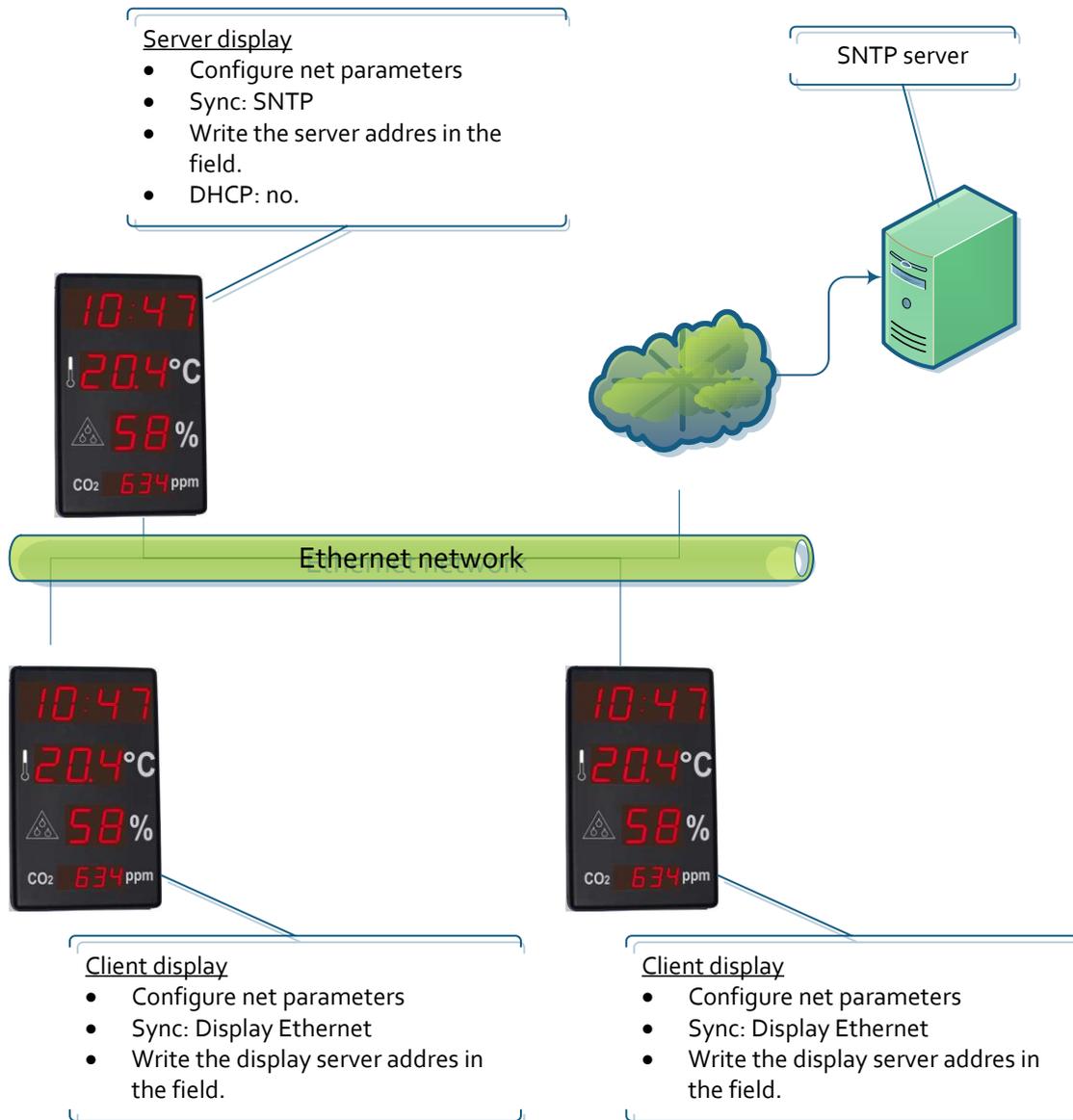
### Sync through a display with GPS

The server display syncs itself with the GPS and others sync with the server display.



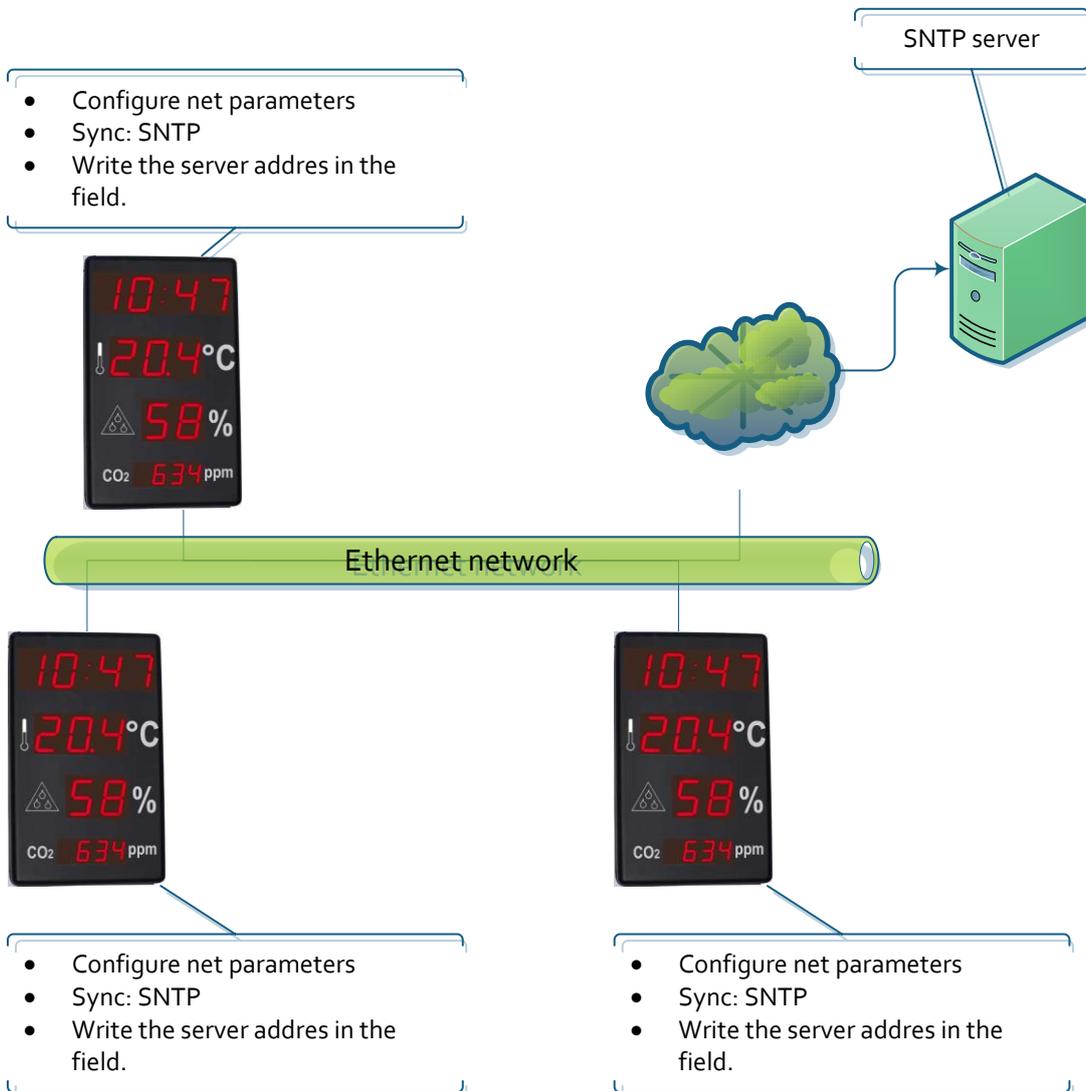
**Sync through SNTP. Only one display connects to the SNTP server.**

This works for both cases: connecting to a local SNTP server or a cloud SNTP server. Only one display is connected to the SNTP server and serves the time to the other displays



## Sync through SNTP. All displays connect to the SNTP server

This works for both cases: connecting to a local SNTP server or a cloud SNTP server. All displays update from the SNTP server specified.



## Communication with commands through Ethernet

The displays can obtain the displayed parameters through commands, as well as force the display time through TCP/IP commands. In this case, the display must be configured for not to sync another way or the sync will rewrite the programmed time. The frames are sent in ASCII (character) format. The end of block is the one defined by the user through the web page. The port the commands must be sent to is 9760.

The following frames can be sent

| Command                           | Code | Data | End of block |
|-----------------------------------|------|------|--------------|
| Display time request              | P H  |      |              |
| Display temperature request       | P T  |      |              |
| Display humidity request          | P U  |      |              |
| Displayed CO <sub>2</sub> request | P C  |      |              |
| Time programming                  | F H  |      |              |

## Display time request

### Frame

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

|              | Code    | End of block |
|--------------|---------|--------------|
| <b>ASCII</b> | P H     |              |
| <b>Hexa</b>  | 50h 48h |              |

### Response frame

|              | Code    | Data |       |      |       |      |        |        | End of block |
|--------------|---------|------|-------|------|-------|------|--------|--------|--------------|
|              | Code    | Day  | Month | Year | Space | Hour | Minute | Second | End of block |
| <b>ASCII</b> | R H     | DD   | MM    | AA   |       | HH   | MM     | SS     |              |
| <b>Hexa</b>  | 52h 48h |      |       |      | 20h   |      |        |        |              |

Example: 13:06:00 16/05/2013

|              | Code    | Data    |         |         |       |         |         |         | End of block |
|--------------|---------|---------|---------|---------|-------|---------|---------|---------|--------------|
|              | Code    | Day     | Month   | Year    | Space | Hour    | Minute  | Second  | End of block |
| <b>ASCII</b> | R H     | 16      | 05      | 13      |       | 13      | 16      | 00      |              |
| <b>Hexa</b>  | 52h 48h | 31h 36h | 30h 35h | 31h 33h | 20h   | 31h 33h | 31h 36h | 30h 30h |              |

## Display temperature request

### Frame

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

|              | Code    | End of block |
|--------------|---------|--------------|
| <b>ASCII</b> | P T     |              |
| <b>Hexa</b>  | 50h 54h |              |

### Response frame

|              | Code    | Data |   |     |   | End of block |
|--------------|---------|------|---|-----|---|--------------|
| <b>ASCII</b> | R T     | T    | T | .   | T |              |
| <b>Hexa</b>  | 52h 54h |      |   | 2Eh |   |              |

Example: Temperature=17.2°C

|              | Code    | Data |     |     |     | End of block |
|--------------|---------|------|-----|-----|-----|--------------|
| <b>ASCII</b> | R T     | 1    | 7   | .   | 2   |              |
| <b>Hexa</b>  | 52h 54h | 31h  | 37h | 2Eh | 32h |              |

## Display humidity request

### Frame

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

|              | Code    | End of block |
|--------------|---------|--------------|
| <b>ASCII</b> | P U     |              |
| <b>Hexa</b>  | 50h 54h |              |

### Response frame

|              | Code    | Data |   | End of block |
|--------------|---------|------|---|--------------|
| <b>ASCII</b> | R U     | H    | H |              |
| <b>Hexa</b>  | 52h 54h |      |   |              |

Example: Humidity=60%

|              | Code    | Data |     | End of block |
|--------------|---------|------|-----|--------------|
| <b>ASCII</b> | R U     | 6    | 0   |              |
| <b>Hexa</b>  | 52h 54h | 36h  | 30h |              |

## Displayed CO<sub>2</sub> concentration request

### Frame

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

|              | Code    | End of block |
|--------------|---------|--------------|
| <b>ASCII</b> | P C     |              |
| <b>Hexa</b>  | 50h 43h |              |

### Response frame

|              | Code    | Data |   |   |   | End of block |
|--------------|---------|------|---|---|---|--------------|
| <b>ASCII</b> | R C     | C    | C | C | C |              |
| <b>Hexa</b>  | 52h 43h |      |   |   |   |              |

Example: CO<sub>2</sub> concentration=728ppm

|              | Code    | Data |     |     |     | End of block |
|--------------|---------|------|-----|-----|-----|--------------|
| <b>ASCII</b> | R U     | 0    | 7   | 2   | 8   |              |
| <b>Hexa</b>  | 52h 54h | 30h  | 37h | 32h | 38h |              |

## Time programming

### Frame

|              | Code    | Data |       |      |       |      |        |        | End of block |
|--------------|---------|------|-------|------|-------|------|--------|--------|--------------|
|              | Code    | Day  | Month | Year | Space | Hour | Minute | Second | End of block |
| <b>ASCII</b> | F H     | DD   | MM    | AA   |       | HH   | MM     | SS     |              |
| <b>Hexa</b>  | 46h 48h |      |       |      | 20h   |      |        |        |              |

Example: 13:06:00 16/05/2013

|              | Code    | Data    |         |         |       |         |         |         | End of block |
|--------------|---------|---------|---------|---------|-------|---------|---------|---------|--------------|
|              | Code    | Day     | Month   | Year    | Space | Hour    | Minute  | Second  | End of block |
| <b>ASCII</b> | F H     | 16      | 05      | 13      |       | 13      | 16      | 00      |              |
| <b>Hexa</b>  | 46h 48h | 31h 36h | 30h 35h | 31h 33h | 20h   | 31h 33h | 31h 36h | 30h 30h |              |

## Annex 1: View the web page remotely

The web page of the display is accessible remotely if the router is correctly configured. This is done redirecting an input from the router to the display.

User has to enter to the router configuration webpage, in the port redirection tab

A new port must be added

- External Start Port: This is the port the user is connecting from the Internet. It is recommended to be greater than 10000.
- External Final Port: The same port as the start port.
- Internal Start Port: The port the user enters wants to enter the display. In this case, the port is 80, which is the standard web page access.
- IP address: The LAN IP of the display

### Port redirection configuration

| Server name | External Start Port | External Final Port | Protocol | Internal Start Port | Internal Final Port | Server IP address |
|-------------|---------------------|---------------------|----------|---------------------|---------------------|-------------------|
| Display     | 10021               | 10021               | TCP      | 80                  | 80                  | 192.168.1.100     |

Once the router is configured, the user can access the display from outside the LAN. This is accessed through the browser URL, writing "ExternalIP:ExternalPort". As an example: 212.170.48.90:10021 or http:\\212.170.48.90:10021

## STATEMENT OF CONFORMITY



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

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

Model : DC-41SRTHO in all versions.

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

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

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

Badalona, 29th January 2014

A handwritten signature in black ink, appearing to read 'Alicia Alarcia', is centered below the date.

Alicia Alarcia  
Technical Director