

# TECHNICAL MANUAL DC-41SRTHO

Clock, thermometer, hygrometer and CO<sub>2</sub> measurement with  
GPS, RS-485 and Ethernet.

## Introduction to the DC-41SRTHO

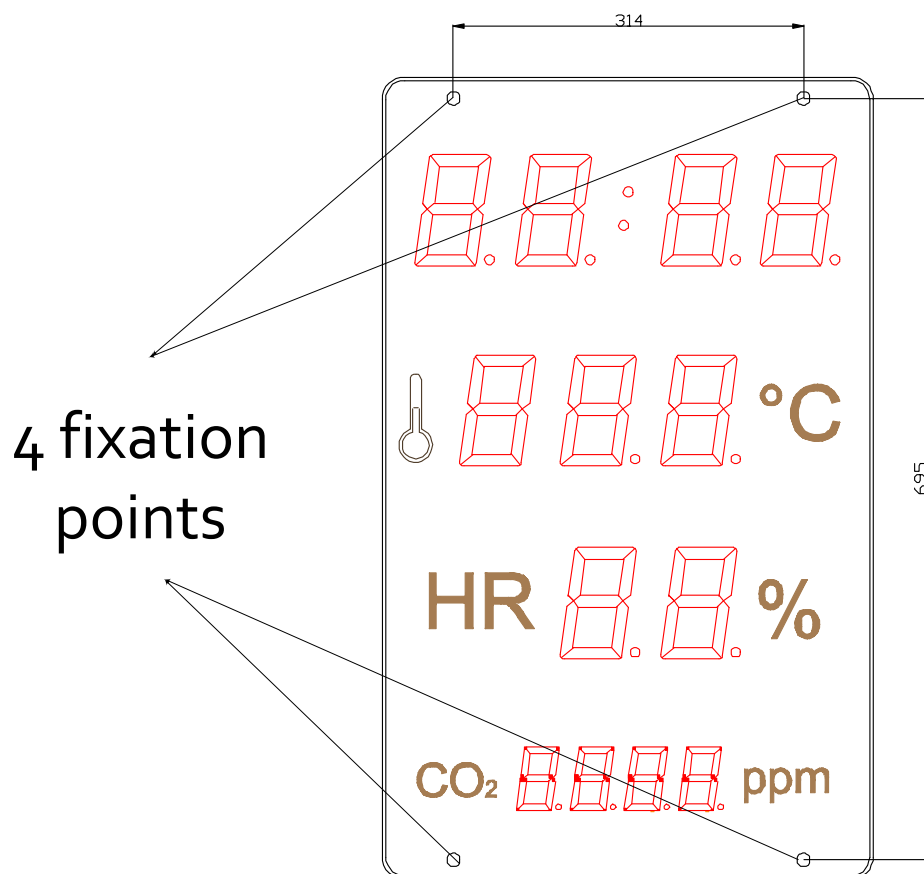
The DC-41SRTHO display is presented as an easy-to-use clock, thermometer, hygrometer and CO<sub>2</sub> measurer adjusted and calibrated at factory. The main window shows the current hour and minute, temperature with 0,1°C resolution, humidity with 1% resolution and CO<sub>2</sub> concentration with 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 (see “Parameters of the display” in this manual). 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 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).

If the display includes option NE (Ethernet connectivity), this display hosts a web site where the user can see the status of the display and configure it. This function allows the display to be used as a server for other displays to synchronize the hour through the Ethernet, as well as updating its time and date through a SNTP server. User can configure and request the time through TCP/IP commands. The default IP is 192.165.1.100. See “Ethernet option” in this manual for more information.

If the display includes option X (RS-485 connectivity), this display can be configured as a RS.485 server/client. This means that the display can connect with other displays to sync between them, as well as the user communication through commands. If the display also includes the Ethernet option, the display can work as a bridge between both options. See “RS-485 option” for more information

## Installation of the DC-41SRTHO



The DC-41 SRTHO 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-41SRTHO 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: -20°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 typ                                       | ±2,5 MAX                                       |
| <b>Temperature resolution</b> .....            | 0,1°C  |  |
| <b>Humidity precision</b> .....                | ±4,5%  | between 20% and 80%                            |
| <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   |  |
| <b>Sensor cable length</b> .....               | 2 meters.  |  |

## 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.

## Parameters of the display

There are three keys on the back side of the display. These keys are used to access and navigate through the menu of the display. The identification of the keys is



Advance key. Access parameter/switch digits.



Enter key. Validate parameter.



Increase key. Increase the value of the selected digit.

## Error displaying

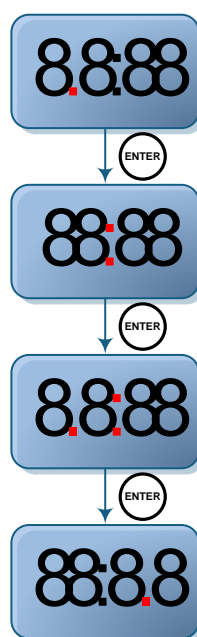
The only error that can appear is a temperature/humidity error. The text displayed in this case is E02 in the display. If this occurs, reboot the display.

## Changing the time

In case the user wants to change the time, the Advance key must be pressed for three seconds. Using the Advance (to change digit) and the Increase (to increase the value of the digit) keys the present time can be changed. To leave the menu, press the Advance key past the digit corresponding to the units of the minute. If the time has changed, the seconds are changed to 0 when leaving the menu. Take in consideration that the time displayed in the menu must be UTC time. In case the display is configured to sync using the GPS or the SNTP connection, the time inserted by the user will be overwritten.

## Modify parameters

If the user presses the Advance key for 6 seconds the parameter menu is displayed. In all cases the number the user is modifying is the one that flashes. The complete diagram of the parameters can be found in annex 1. In order to make configuration easy for the user, when changing a parameter, a point is turned on. This point changes depending on the sub-parameter (if it exists) the user is in.



Parameters are detailed below:

**Parameter 1: Date configuration:** This parameter configures the date, as well as the wintertime/summertime automatic switchover configuration. When entering this parameter, the day can be changed using the Increase and Advance key. To switch to month configuration, press the Enter key. Navigation here is the same as before. Once set the month, press the Enter key to switch to year configuration. Navigation here is the same as before. Once set the year, press the Enter key to switch to the following parameter, which has two parts:

Left digit: wintertime/summertime automatic switchover configuration

0 - Automatic switchover disabled. Time offset must be changed increasing or reducing value in parameter 3, leaving as the internal time, the UTC time.

1 - Automatic switchover enabled.

Right Digit: Weekday.

It allows to configure the present weekday, where 1 is Monday and 7 is Sunday

**Parameter 3: Time offset:** This parameter allows the user to configure its time zone, as well as changing the time offset in summertime/wintertime when configuring it manually, or for personal purposes; always counting that internal time count of the clock is GMT. First digit shows an upper hyphen when adding time and a hyphen when subtracting

**Parameter 4: Display configuration:** This parameter configures other functionalities of the display, as the brightness and the sync options.

Brightness configuration consists of two parts:

Left digit. Manual or automatic control of brightness

0 - Automatic control of brightness depending on the room light.

1 - Manual control of brightness. Fixed brightness depending on the right digit.

Right digit. Brightness level.

The functionality of this digit depends on the left digit:

*Automatic mode* – Selection of the minimum brightness of the display when the room is in darkness. Minimum brightness is 1 and maximum is 5. With light, the display adapts to the amount of light in the room.

*Manual mode* - Selection of the brightness level. 1 is minimum and 5 is maximum brightness

The second parameter (Accessed through the Enter key once selected the brightness configuration) configures the time sync depending on the capabilities and the user desires. If the user selects a sync not allowed by capabilities, the display will not sync. For example, a display without Ethernet connection, selecting SNTP sync will have no effect. Options are:

0. Do not sync.
1. Sync with another display through Ethernet.
2. Sync through SNTP.
3. Sync with another display through RS-485.
4. Sync through GPS.

**Parameter 5: Display power-up time:** This parameter configures the time the display changes from power-save mode to full-operative mode. When accessing in this parameter, the hour the display changes to full-operative mode is shown. When the Enter key is pressed, the minutes are shown. To go back to the parameter menu, press the Enter key again.

**Parameter 6: Display power-down time:** This parameter configures the time the display changes from full-operative mode to power-save mode. When accessing in this parameter, the hour the display changes to power-save mode is shown. When the Enter key is pressed, the minutes are shown. To go back to the parameter menu, press the Enter key again.

**Parameter 7: Website language.** This parameter is shown if the display includes Ethernet option.

- 0 - Catalan
- 1 - Spanish
- 2 - English
- 3 - French
- 4 - German

**Parameter 8: Display IP.** This parameter is shown if the display includes Ethernet option. This parameter allows the user to change the IP address of the display. Access this parameter pressing the Advance key. Once inside, the first number of the IP address is shown. Modify it using the Increase and Advance keys and validate it using the Enter key. Do the same with the other 3 numbers of the IP address. To identify each number, think that the first number is shown without decimal point. Next numbers appear with decimal points, shifting left each number.

**Parameter 9: RS-485 configuration.** This parameter is shown if the display includes RS-485 option:  
Access this parameter pressing the Advance key. Change the code according to the desired configuration.

| Code | Baud Rate   | Data bits | Parity    | Stop bits |
|------|-------------|-----------|-----------|-----------|
| 01   | 4800 Bauds  | 7 bits    | No parity | 1         |
| 02   | 9600 Bauds  | 7 bits    | No parity | 1         |
| 03   | 19200 Bauds | 7 bits    | No parity | 1         |
| 04   | 4800 Bauds  | 8 bits    | No parity | 1         |
| 05   | 9600 Bauds  | 8 bits    | No parity | 1         |
| 06   | 19200 Bauds | 8 bits    | No parity | 1         |
| 07   | 4800 Bauds  | 7 bits    | Even      | 1         |
| 08   | 9600 Bauds  | 7 bits    | Even      | 1         |
| 09   | 19200 Bauds | 7 bits    | Even      | 1         |
| 10   | 4800 Bauds  | 8 bits    | Even      | 1         |
| 11   | 9600 Bauds  | 8 bits    | Even      | 1         |
| 12   | 19200 Bauds | 8 bits    | Even      | 1         |
| 13   | 4800 Bauds  | 7 bits    | Odd       | 1         |
| 14   | 9600 Bauds  | 7 bits    | Odd       | 1         |
| 15   | 19200 Bauds | 7 bits    | Odd       | 1         |
| 16   | 4800 Bauds  | 8 bits    | Odd       | 1         |
| 17   | 9600 Bauds  | 8 bits    | Odd       | 1         |
| 18   | 19200 Bauds | 8 bits    | Odd       | 1         |
| 19   | 4800 Bauds  | 7 bits    | No parity | 2         |
| 20   | 9600 Bauds  | 7 bits    | No parity | 2         |
| 21   | 19200 Bauds | 7 bits    | No parity | 2         |
| 22   | 4800 Bauds  | 8 bits    | No parity | 2         |
| 23   | 9600 Bauds  | 8 bits    | No parity | 2         |
| 24   | 19200 Bauds | 8 bits    | No parity | 2         |
| 25   | 4800 Bauds  | 7 bits    | Even      | 2         |
| 26   | 9600 Bauds  | 7 bits    | Even      | 2         |
| 27   | 19200 Bauds | 7 bits    | Even      | 2         |
| 28   | 4800 Bauds  | 8 bits    | Even      | 2         |
| 29   | 9600 Bauds  | 8 bits    | Even      | 2         |
| 30   | 19200 Bauds | 8 bits    | Even      | 2         |
| 31   | 4800 Bauds  | 7 bits    | Odd       | 2         |
| 32   | 9600 Bauds  | 7 bits    | Odd       | 2         |
| 33   | 19200 Bauds | 7 bits    | Odd       | 2         |
| 34   | 4800 Bauds  | 8 bits    | Odd       | 2         |
| 35   | 9600 Bauds  | 8 bits    | Odd       | 2         |
| 36   | 19200 Bauds | 8 bits    | Odd       | 2         |

Once the serial line is configured, press the Enter key to modify the display address. This must be between 01 and 99. If the user presses the Enter key again, the End of Block can be modified. This can be:

| Code | End of block |
|------|--------------|
| 0    | 0Dh          |
| 1    | 0Ah          |
| 2    | 0Dh 0Ah      |
| 3    | 0Ah 0Dh      |
| 4    | 2Ah 0Dh      |
| 5    | 02h          |
| 6    | 03h          |
| 7    | 04h          |

Press the Enter key to go back to the menu.

**Parameter A: GPS signal level:** This parameter is only seen if the display includes GPS function. This parameter shows the quality of the GPS signal arriving to the antenna. Its maximum value is 50 and it must be over 20. If this occurs, the antenna must be moved closer to a window to get more signals.

**Parameter J: Maintenance parameter:** This parameter is used in factory and must not be modified.

**Parameter P: Exit menu:** Press Advance key to leave menu.

### 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. If, after half an hour, the A parameter is lower than 20, move the antenna abroad.

The important parameters user must take in account are:

- Parameter 4.2: To sync through GPS, this parameter must be 4.
- Parameter A: This parameter shows the GPS signal quality.

## Ethernet option

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

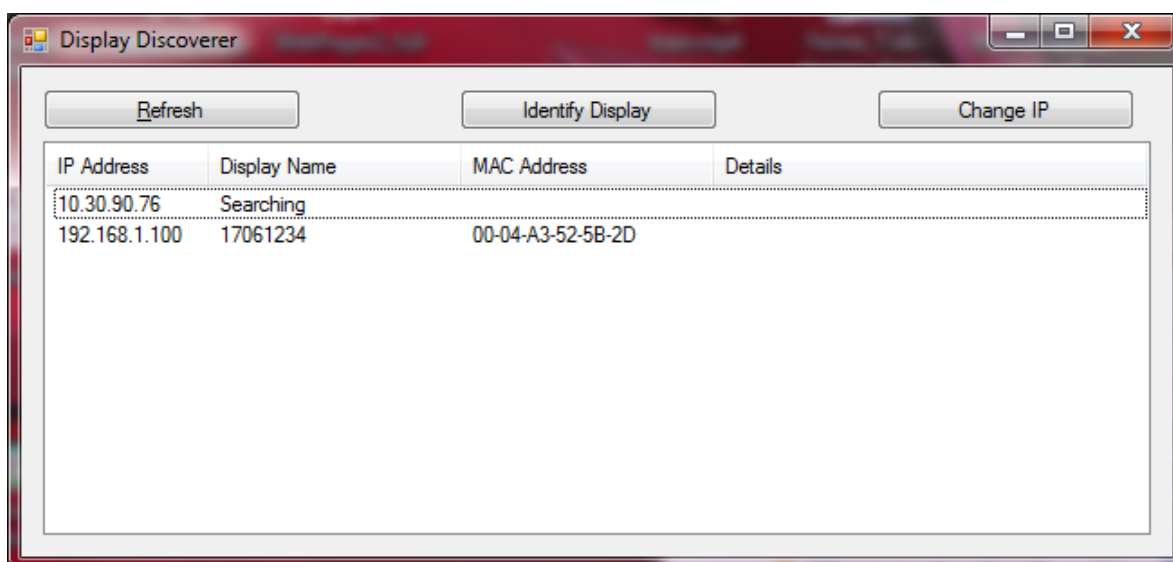
### The first connection

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

One of the ways is changing the IP address through parameters seen before

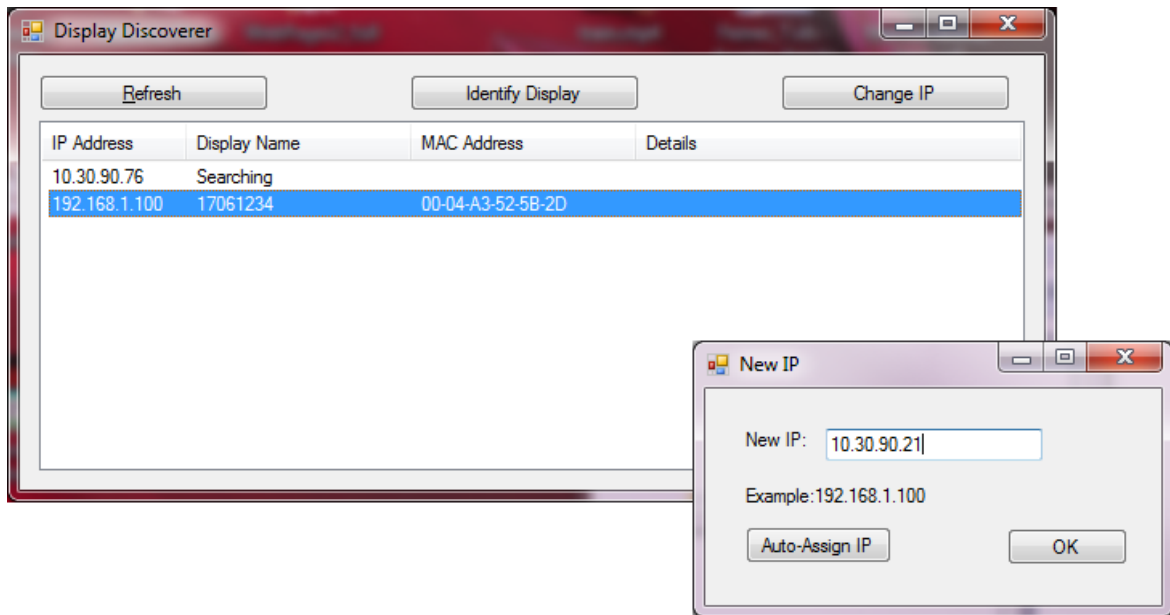
If the IP 192.168.1.100 (the default IP of the display) is in the range of your LAN, the display can be accessed typing the IP in the URL bar in your favourite browser.

In case there is more than one display in the LAN or the default IP of the display is out of the IP range of you LAN, it is recommended to use the PC program "Display Discoverer", downloadable from the web [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.

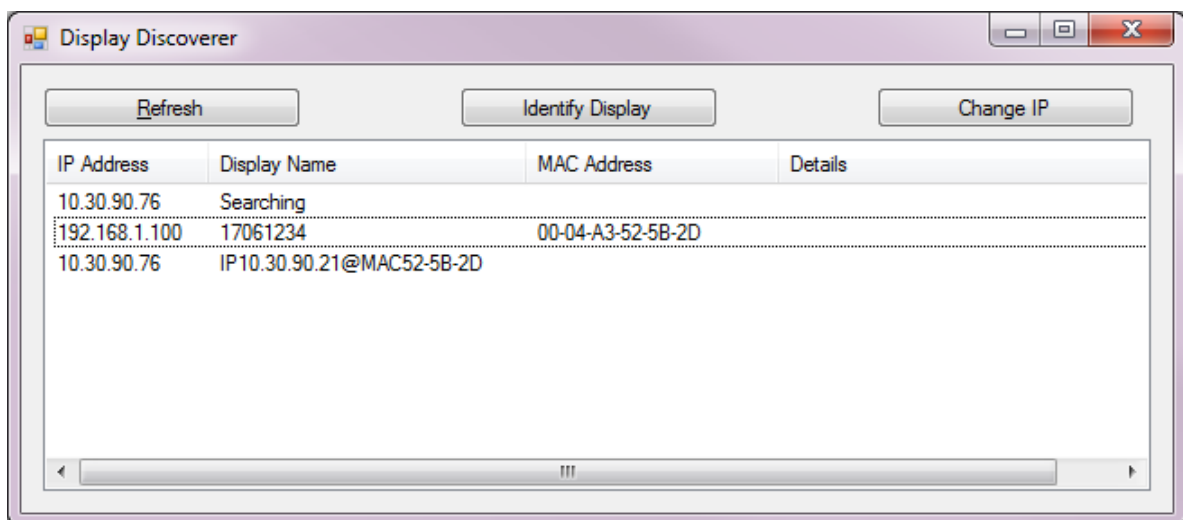


The first row shows the IP of the PC which is searching the displays and the second row a display we just have bought. As it is shown, the display has serial number 17061234 and the default IP is out of the range of the LAN. To change the IP address to a suitable one for our LAN, select the display and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

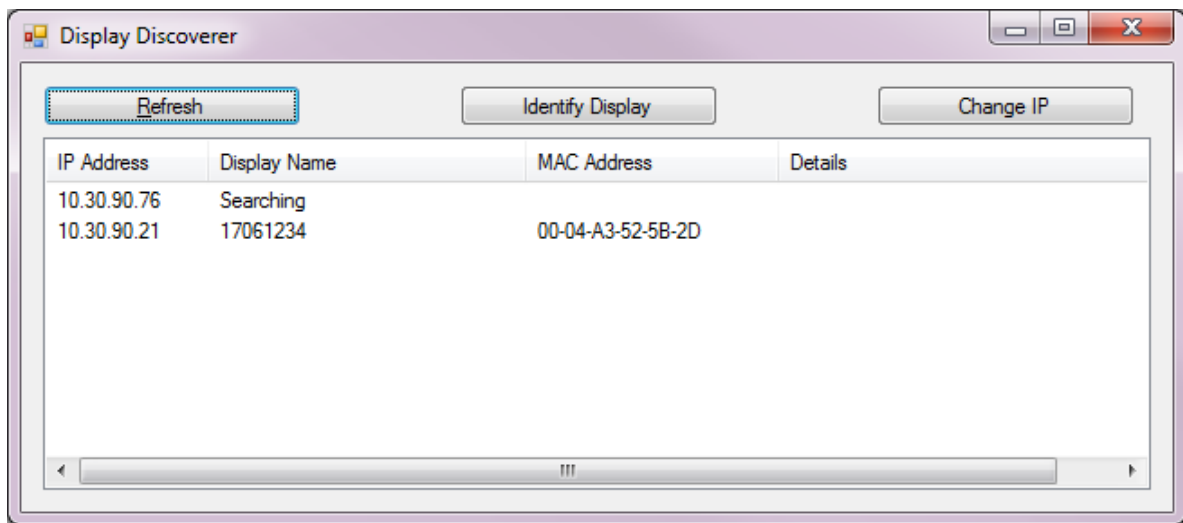




Tip the new IP and click OK. There will appear a message in the main window with the message sent to the display.



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 2: 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) and the display IP. This main page is for the user to control the status of the display.

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

|                                  |
|----------------------------------|
| <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>IP: 10.30.90.21</b>           |

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

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

First tab allows the user to configure the same parameters as the parameter menu in an easier and more intuitive way. When the user configures the display to sync through SNTP or another display, the server must be written in the field.

|                          |  |              |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
|--------------------------|--|--------------|----------|----------|-----------|------------|----------|------------|----|--|---------|----------|--|------------------|-----|--|-----------------|-----|--|--------------------------|---------|--|--------------|-------|----------|---------------|-------|----------|----------|-------|----------|------------------|------|--|-------------|--------------|----------|------------------|---------|--|
| Main                     | <h2>Configuration</h2> <table border="1"> <tr> <td>Time(UTC)</td> <td>10:45:00</td> <td>Validate</td> </tr> <tr> <td>Date(UTC)</td> <td>11/07/2013</td> <td>Validate</td> </tr> <tr> <td>Local Time</td> <td>+9</td> <td></td> </tr> <tr> <td>Weekday</td> <td>Thursday</td> <td></td> </tr> <tr> <td>Auto time change</td> <td>Yes</td> <td></td> </tr> <tr> <td>Auto brightness</td> <td>Yes</td> <td></td> </tr> <tr> <td>Minimum brightness level</td> <td>Minimum</td> <td></td> </tr> <tr> <td>Turn-on time</td> <td>12:00</td> <td>Validate</td> </tr> <tr> <td>Turn-off time</td> <td>12:00</td> <td>Validate</td> </tr> <tr> <td>Password</td> <td>.....</td> <td>Validate</td> </tr> <tr> <td>Time sync origin</td> <td>SNTP</td> <td></td> </tr> <tr> <td>SNTP server</td> <td>pool.ntp.com</td> <td>Validate</td> </tr> <tr> <td>Webpage language</td> <td>English</td> <td></td> </tr> </table> | Time(UTC)    | 10:45:00 | Validate | Date(UTC) | 11/07/2013 | Validate | Local Time | +9 |  | Weekday | Thursday |  | Auto time change | Yes |  | Auto brightness | Yes |  | Minimum brightness level | Minimum |  | Turn-on time | 12:00 | Validate | Turn-off time | 12:00 | Validate | Password | ..... | Validate | Time sync origin | SNTP |  | SNTP server | pool.ntp.com | Validate | Webpage language | English |  |
| Time(UTC)                |  | 10:45:00     | Validate |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Date(UTC)                |  | 11/07/2013   | Validate |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Local Time               |  | +9           |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Weekday                  |  | Thursday     |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Auto time change         |  | Yes          |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Auto brightness          |  | Yes          |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Minimum brightness level |  | Minimum      |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Turn-on time             |  | 12:00        | Validate |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Turn-off time            |  | 12:00        | Validate |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Password                 |  | .....        | Validate |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Time sync origin         |  | SNTP         |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| SNTP server              |  | pool.ntp.com | Validate |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Webpage language         |  | English      |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |
| Ethernet                 |  |              |          |          |           |            |          |            |    |  |         |          |  |                  |     |  |                 |     |  |                          |         |  |              |       |          |               |       |          |          |       |          |                  |      |  |             |              |          |                  |         |  |

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 throw web browser (typing the name in the URL)

|                           |   |               |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
|---------------------------|---|---------------|----------|-------|----|-------------|-------------|----------|--------------|--------------|---------------|--------------------|------------|-----------------------|------------|---------------------------|-----|----------|--|
| Clock                     | <h2>Ethernet configuration</h2> <table border="1"> <tr> <td>Display name</td> <td>New Name</td> </tr> <tr> <td>DHCP:</td> <td>No</td> </tr> <tr> <td>IP address:</td> <td>10.30.90.21</td> </tr> <tr> <td>Gateway:</td> <td>10.30.90.200</td> </tr> <tr> <td>Subnet Mask:</td> <td>255.255.255.0</td> </tr> <tr> <td>Primary DNS sever:</td> <td>10.30.90.2</td> </tr> <tr> <td>Secondary DNS server:</td> <td>10.30.90.3</td> </tr> <tr> <td>End of block in commands:</td> <td>0Dh</td> </tr> <tr> <td colspan="2">Validate</td> </tr> </table> | Display name  | New Name | DHCP: | No | IP address: | 10.30.90.21 | Gateway: | 10.30.90.200 | Subnet Mask: | 255.255.255.0 | Primary DNS sever: | 10.30.90.2 | Secondary DNS server: | 10.30.90.3 | End of block in commands: | 0Dh | Validate |  |
| Display name              |   | New Name      |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| DHCP:                     |   | No            |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| IP address:               |   | 10.30.90.21   |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| Gateway:                  |   | 10.30.90.200  |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| Subnet Mask:              |   | 255.255.255.0 |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| Primary DNS sever:        |   | 10.30.90.2    |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| Secondary DNS server:     |   | 10.30.90.3    |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| End of block in commands: |   | 0Dh           |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| Validate                  |   |               |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |
| Configuration             |   |               |          |       |    |             |             |          |              |              |               |                    |            |                       |            |                           |     |          |  |

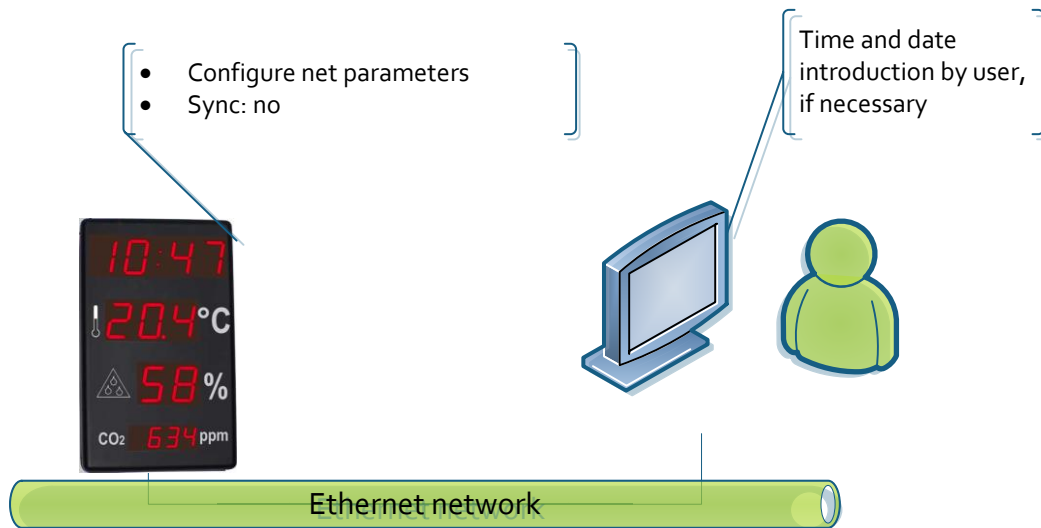
In case of failure or errors, reset the display by pressing the three keys all during a reset.

## Ethernet network

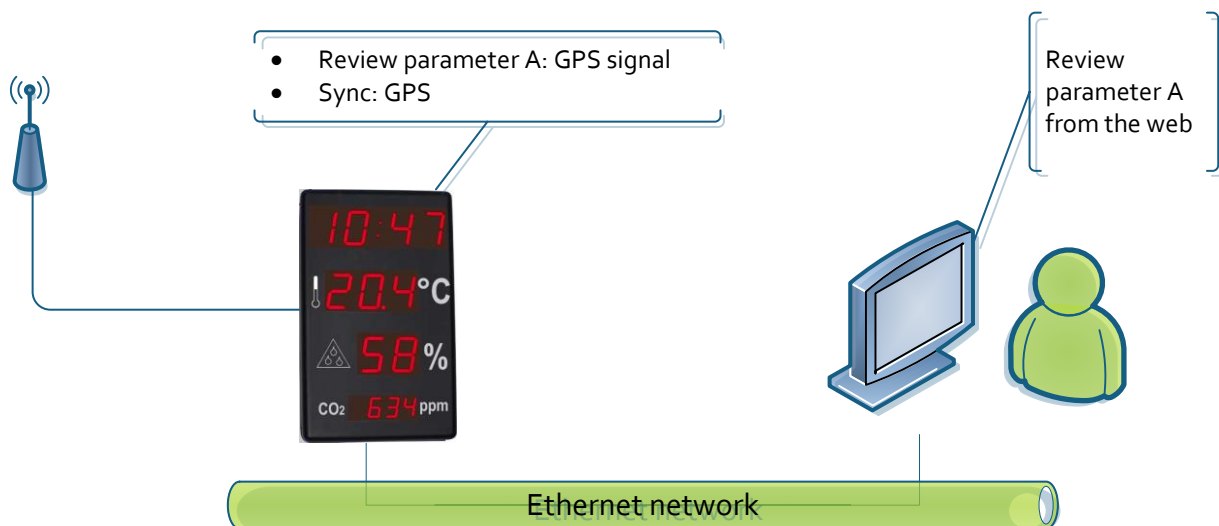
Many Ethernet networks can be configured to sync one or more displays. The possible networks are shown below, as well as the main actions/parameters (seen from the webpage) the user must configure. Other parameters don't care.

### Networks with one display

#### One display

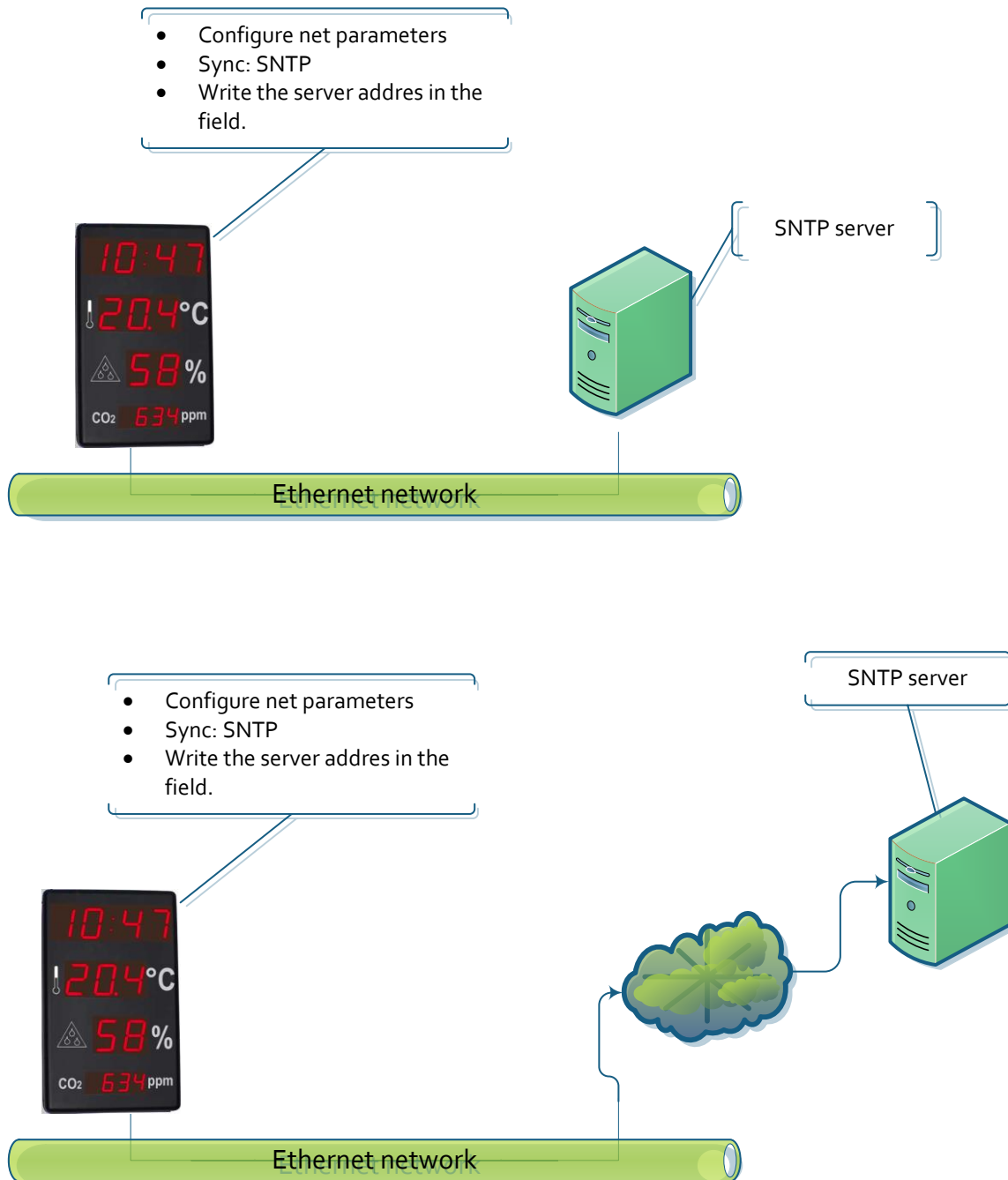


#### One display with GPS



## One display. SNTP sync

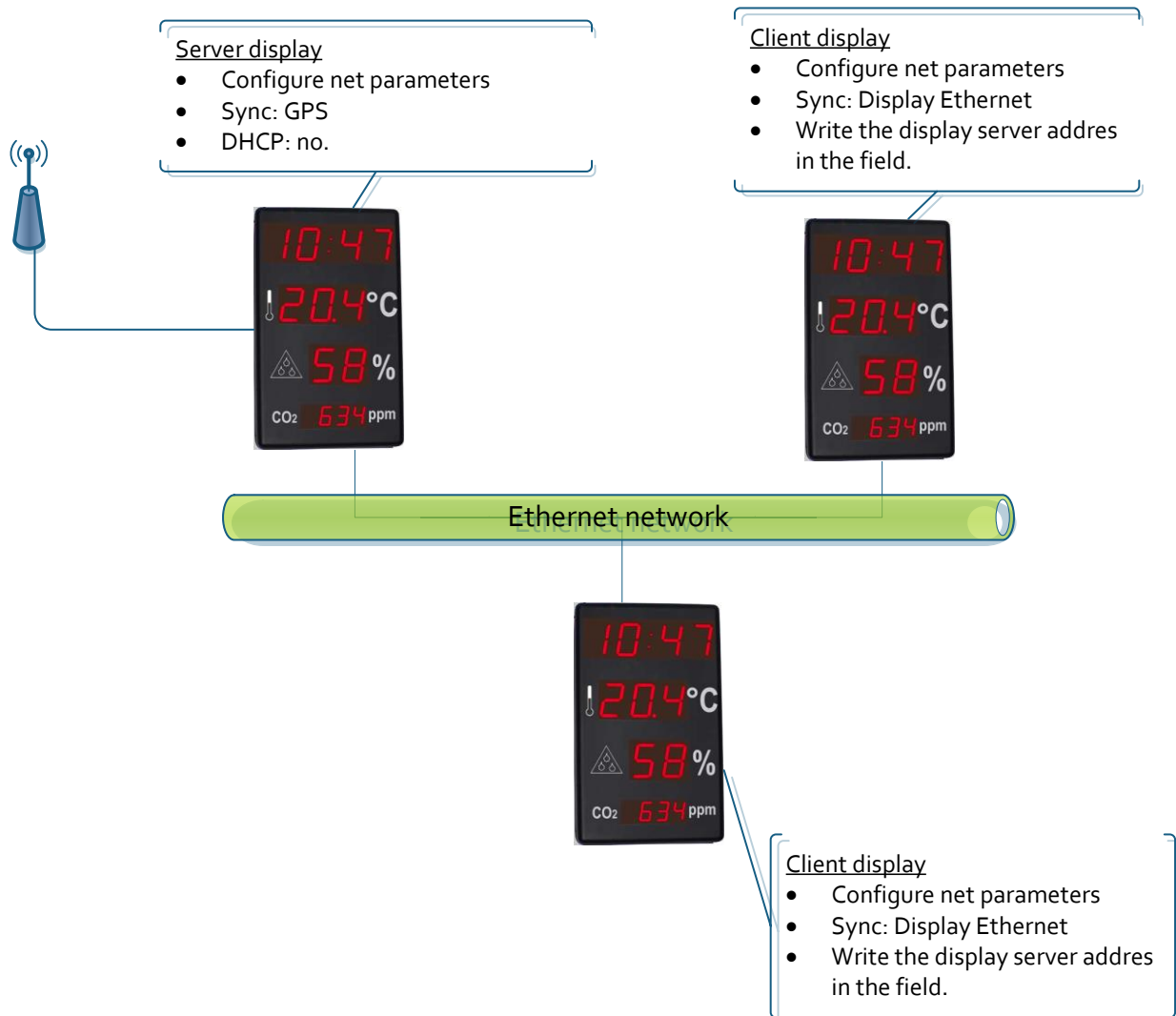
There are two options. Both are configured the same way.



## Nets with more than one display

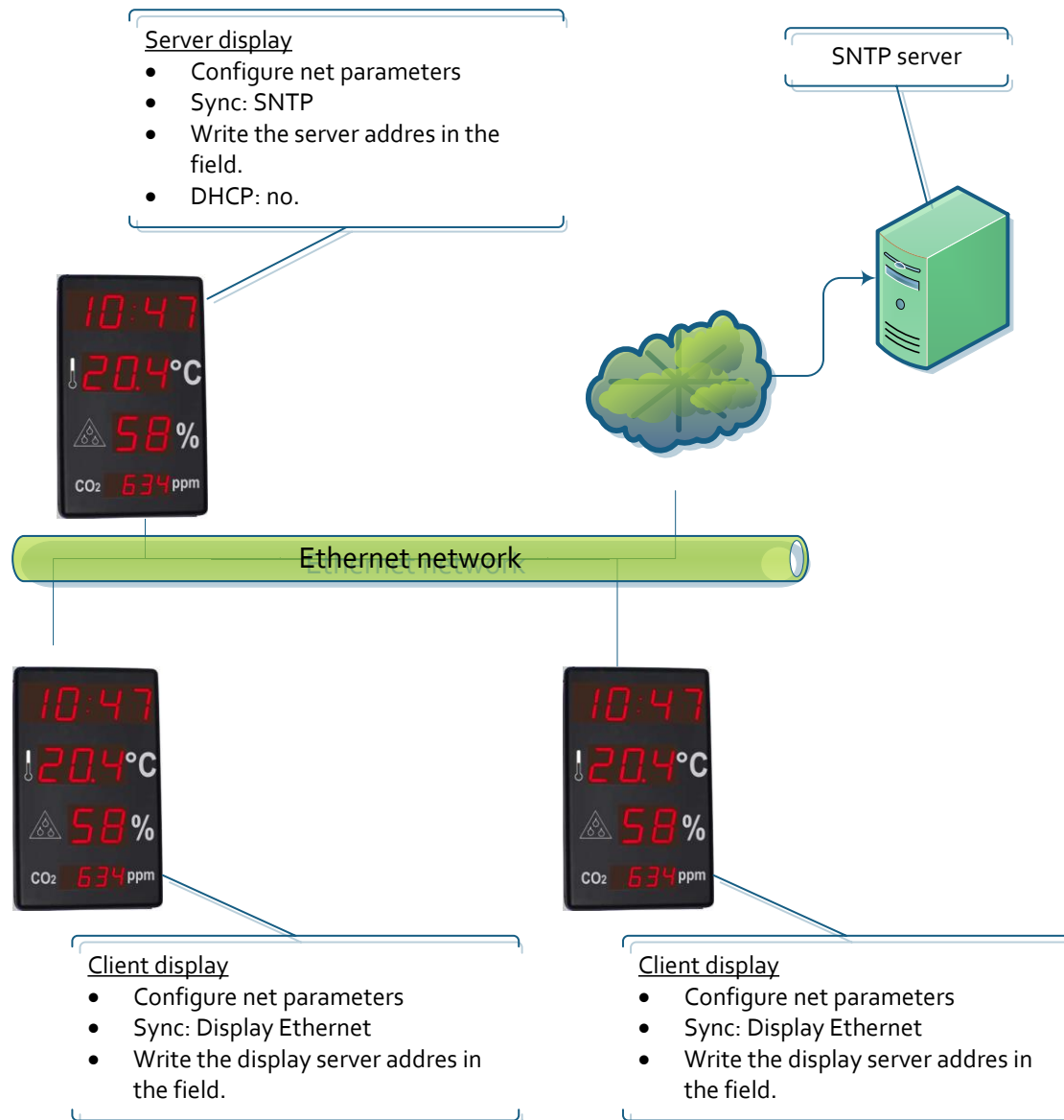
### Sync through a display with GPS

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.

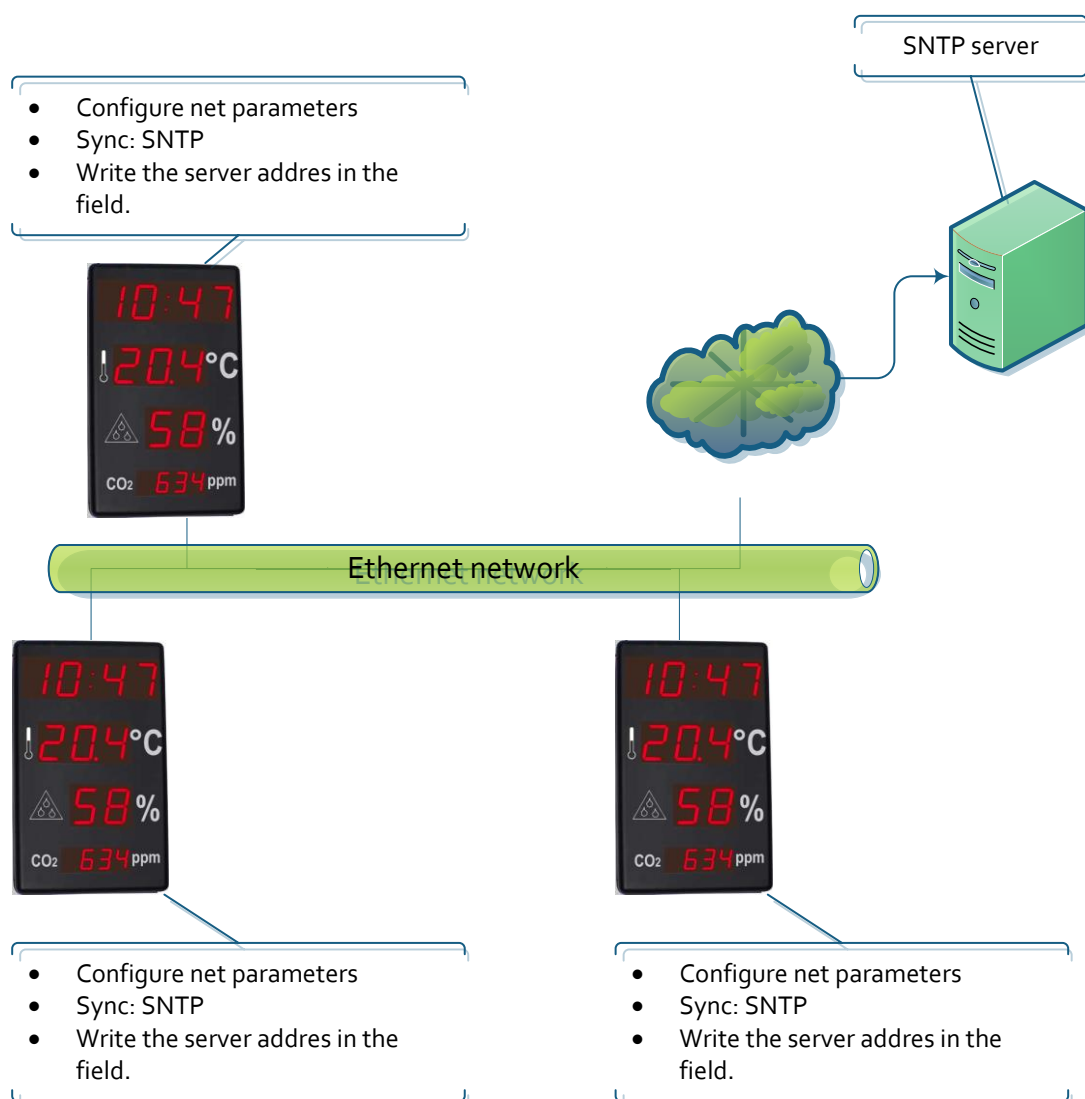
This works for both cases: connecting to a local SNTP server or a cloud SNTP server. Only one display is connected to the SNTP server and serves the time to the other displays





## 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 |
|-------|---------|--------------|
| ASCII | P H     |              |
| Hexa  | 50h 48h |              |

### Response frame

|       | Code    | Data |       |      |       |      |        |        | End of block |
|-------|---------|------|-------|------|-------|------|--------|--------|--------------|
|       | Code    | Day  | Month | Year | Space | Hour | Minute | Second | End of block |
| ASCII | R H     | DD   | MM    | AA   |       | HH   | MM     | SS     |              |
| Hexa  | 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 |
| ASCII | R H     | 16      | 05      | 13      |       | 13      | 16      | 00      |              |
| Hexa  | 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 |              |

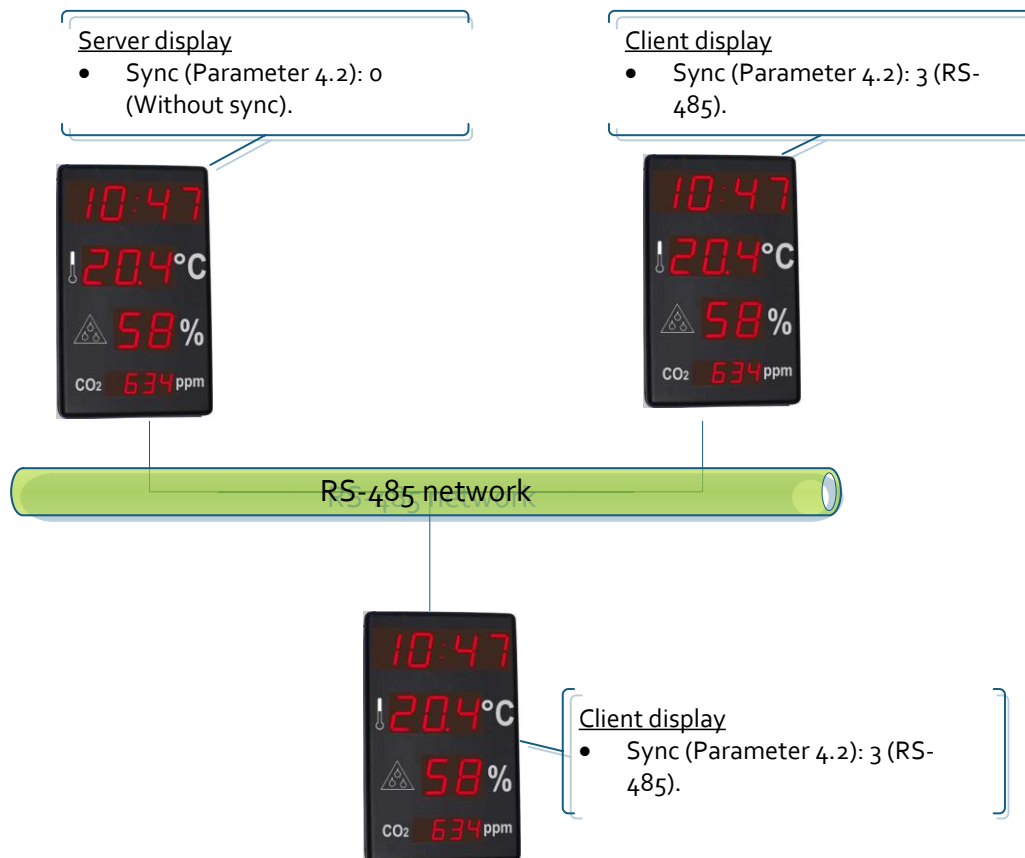
## RS-485 option

The RS-485 allows the user to create a network for the displays to be synchronized. One display must be configured as a server and the others will configure with it. The parameter 9.1 (RS-485 configuration) must be the same for all.

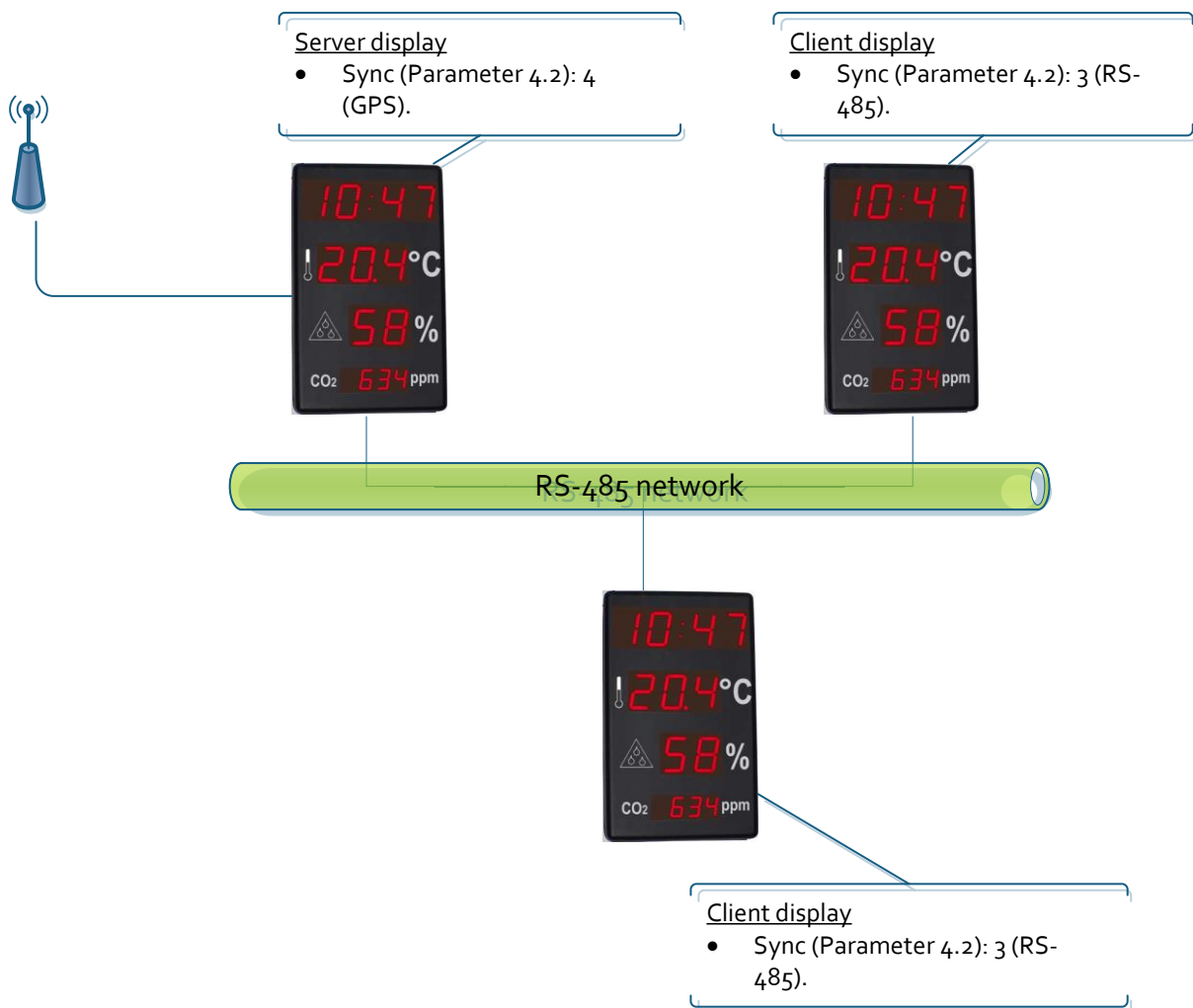
### RS-485 network

There are many configurations possible, only with RS-485 or combining different options this displays offer. The following networks are the most usual, but the user can create new ones.

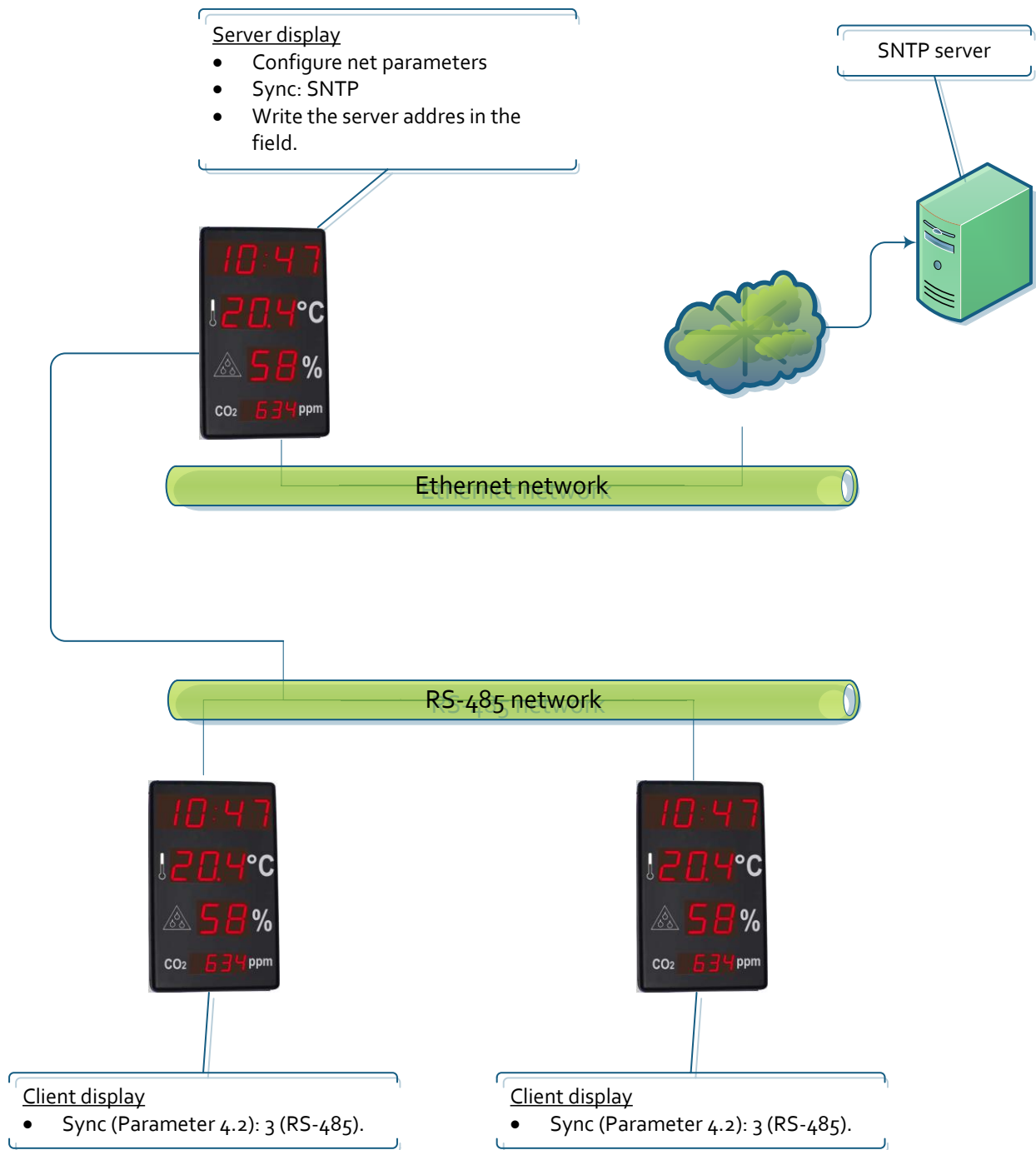
#### Sync through one display without more options.



## Sync through a display with GPS



## Sync through a display with Ethernet connected to a SNTP server.



## Communication with commands through RS-485

The displays can obtain the displayed parameters through commands, as well as force the display time through RS-485 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 user in parameter 9.3

The following frames can be sent

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

## Display time request

### Frame

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

|       | Code    | Address | End of block |
|-------|---------|---------|--------------|
| ASCII | P H     | H L     |              |
| Hexa  | 50h 48h |         |              |

Example: Request time from the display in address 03.

|       | Code    | Address | End of block |
|-------|---------|---------|--------------|
| ASCII | P H     | 03      |              |
| Hexa  | 50h 48h | 30h 33h |              |

### Response frame

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

Example: Response from the frame sent in the example before. Time is 13:16:00 16/05/2013

|       | Code    | Address | Data    |         |         |       |         |         |         | End of block |
|-------|---------|---------|---------|---------|---------|-------|---------|---------|---------|--------------|
|       | Code    | Address | Day     | Month   | Year    | Space | Hour    | Minute  | Second  | End of block |
| ASCII | R H     | 03      | 16      | 05      | 13      |       | 13      | 16      | 00      |              |
| Hexa  | 52h 48h | 30h 33h | 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    | Address | End of block |
|--------------|---------|---------|--------------|
| <b>ASCII</b> | P T     | H L     |              |
| <b>Hexa</b>  | 50h 54h |         |              |

Example: Request temperature from the display in address 03

|              | Code    | Address | End of block |
|--------------|---------|---------|--------------|
| <b>ASCII</b> | P T     | 03      |              |
| <b>Hexa</b>  | 50h 54h | 30h 33h |              |

### Response frame

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

Example: Response from the frame sent in the example before. Temperature=17.2°C

|              | Code    | Address | Data |     |     |     | End of block |
|--------------|---------|---------|------|-----|-----|-----|--------------|
| <b>ASCII</b> | R T     | 03      | 1    | 7   | .   | 2   |              |
| <b>Hexa</b>  | 52h 54h | 30h 33h | 31h  | 37h | 2Eh | 32h |              |

## Display humidity request

### Frame

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

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

Example: Request temperature from the display in address 03

|              | Code    | Address | End of block |
|--------------|---------|---------|--------------|
| <b>ASCII</b> | P U     | 03      |              |
| <b>Hexa</b>  | 50h 54h | 30h 33h |              |

### Response frame

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

Example: Response from the frame sent in the example before. Humidity=60%

|              | Code    | Address | Data    | End of block |
|--------------|---------|---------|---------|--------------|
| <b>ASCII</b> | R U     | 03      | 6 0     |              |
| <b>Hexa</b>  | 52h 54h | 30h 33h | 36h 30h |              |

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

### Frame

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

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

Example: Request CO<sub>2</sub> concentration from the display in address 03

|              | Code    | Address | End of block |
|--------------|---------|---------|--------------|
| <b>ASCII</b> | P C     | 03      |              |
| <b>Hexa</b>  | 50h 43h | 30h 33h |              |

### Response frame

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

Example: Response from the frame sent in the example before. CO<sub>2</sub> concentration=728ppm

|              | Code    | Address | Data |     |     |     | End of block |
|--------------|---------|---------|------|-----|-----|-----|--------------|
| <b>ASCII</b> | R U     | 03      | 0    | 7   | 2   | 8   |              |
| <b>Hexa</b>  | 52h 54h | 30h 33h | 30h  | 37h | 32h | 38h |              |

## Time programming

### Frame

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

Example: Send 13:16:00 16/05/2013 to the display at address 03.

|              | Code    | Address | Data    |         |         |       |         |         |         | End of block |
|--------------|---------|---------|---------|---------|---------|-------|---------|---------|---------|--------------|
|              | Code    | Address | Day     | Month   | Year    | Space | Hour    | Minute  | Second  | End of block |
| <b>ASCII</b> | F H     | 03      | 16      | 05      | 13      |       | 13      | 16      | 00      |              |
| <b>Hexa</b>  | 46h 48h | 30h 33h | 31h 36h | 30h 35h | 31h 33h | 20h   | 31h 33h | 31h 36h | 30h 30h |              |

## Annex 2: 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**



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

As the builder of the equipment of the **LARTET** 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 2014/30 UE Electromagnetic Compatibility  
Standard UNE-EN 61000-6-4 Generic Emission Standard. Industrial environment.  
Standard UNE-EN 61000-6-2 Generic Immunity Standard. Industrial environment.  
Directive 2011/65/CE: Restriction of the use of certain hazardous substances in electrical and electronic equipment

Granollers, 29th January 2014