TECHNICAL MANUAL DC-10SRNE+R

Clock with GPS and Ethernet with relay alarms

### Introduction to the DC-10SRNE+2R/+4R

The DC-10SRNE+2R/+4R display is presented as an easy-to use clock adjusted and calibrated at factory. The main window shows the current time in HH:MM format. The main window can be set to turn on and turn off at the time set by user and is adjustable in brightness. In all cases, the display never turns off. 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 contents 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 the embedded web page (see "GPS option" in this manual).

Installation of the DC-10SRNE+2R/+4R

4 fixation points
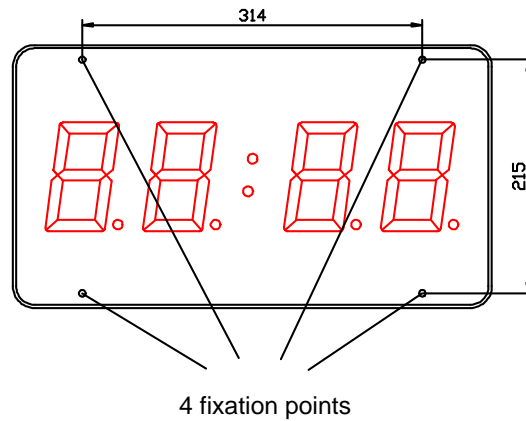
The DC-10 SRNE+2R/+4R displays can be fixed to the wall in two ways:

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-10SRNE+2R/+4R characteristics.

Power supply .... 100 VAC a 240 VAC   50/60Hz
Consumption... 35VA
Consumption at minimum brightness....... 13,2VA.
Display .... 4 digits 7segments 100mm height + two central dots. Red LED.
.... Visibility 50 meters.
Environmental conditions .... Operating temperature: -20 to 60ºC.
.... Storage temperature: -30ºC to 70ºC
.... Relative humidity: 5-95% non condensation.
.... Maximum environmental lighting: 1000 lux.
.... Protection IP 41.
Weight.. .4,5 Kg.

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	Normally closed	Common	Normally open	Normally closed	Common	Normally open	Normally closed	Common	Normally open

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.

Ethernet

Ethernet 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. 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.
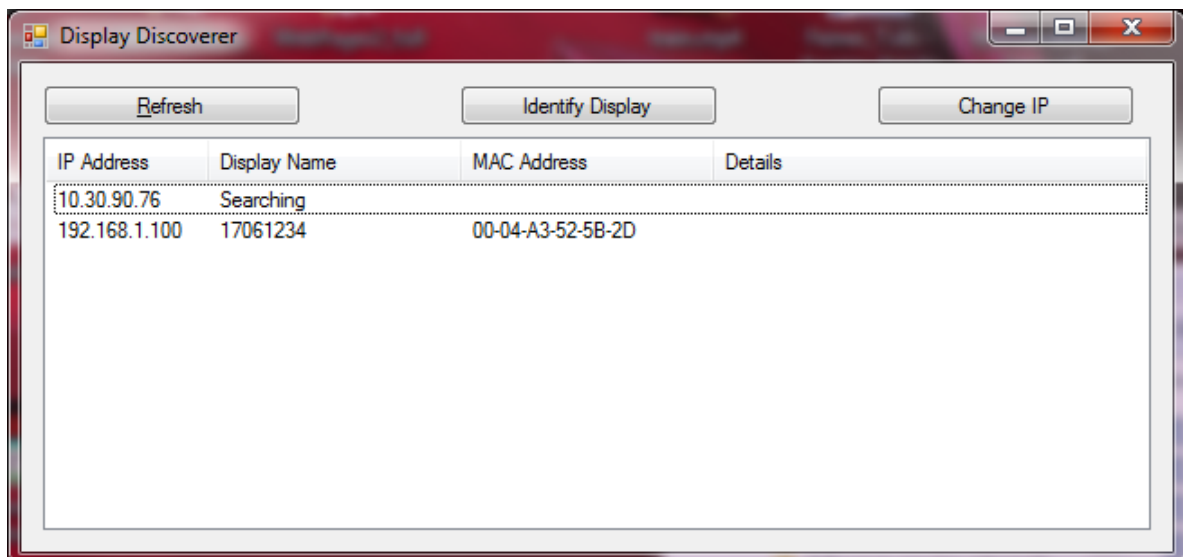

The first row shows the IP of the PC which is searching the displays and the second row a display we just have bought. As it is shown, the display has serial number 17061234 and the default IP is out of the range of the LAN. To change the IP address to a suitable one for our LAN, select the display and click the button "Change IP". When clicking this, a new window is opened where a new IP address can be tipped.
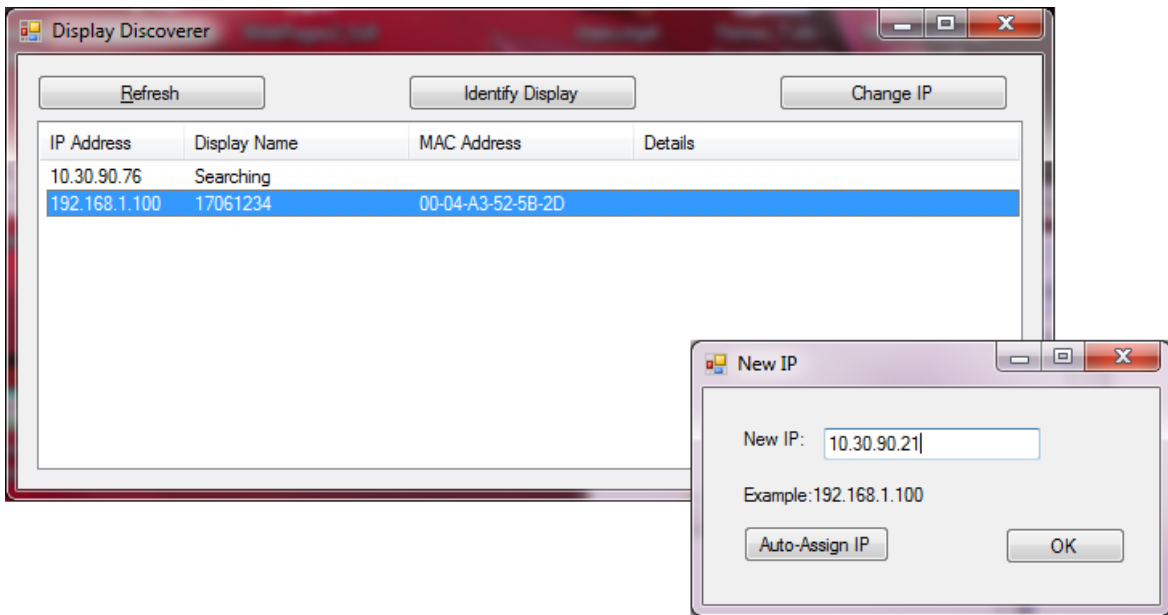
Tip the new IP and click OK. There will appear a message in the main window with the message sent to the display.
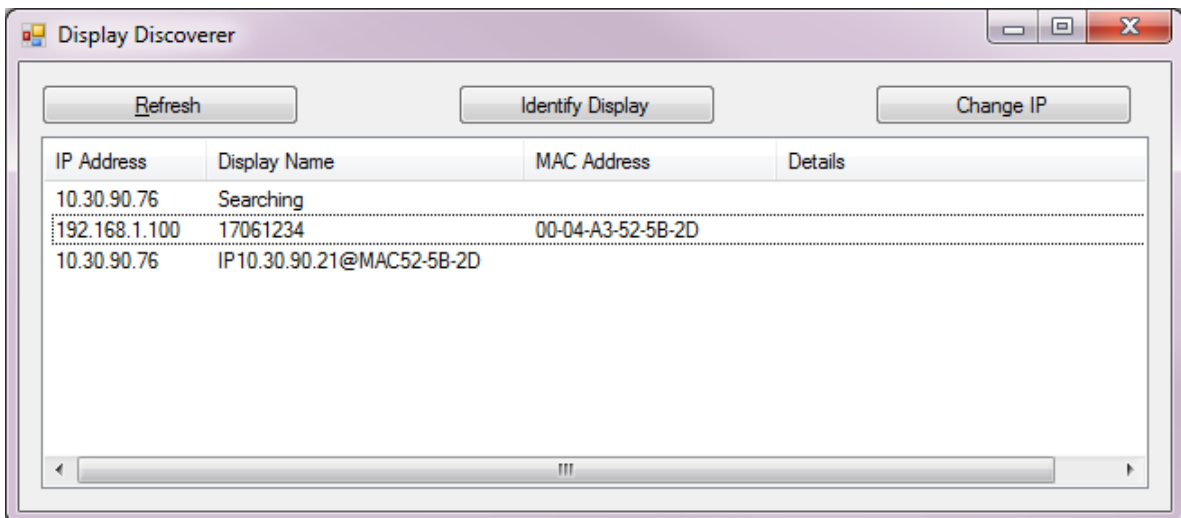
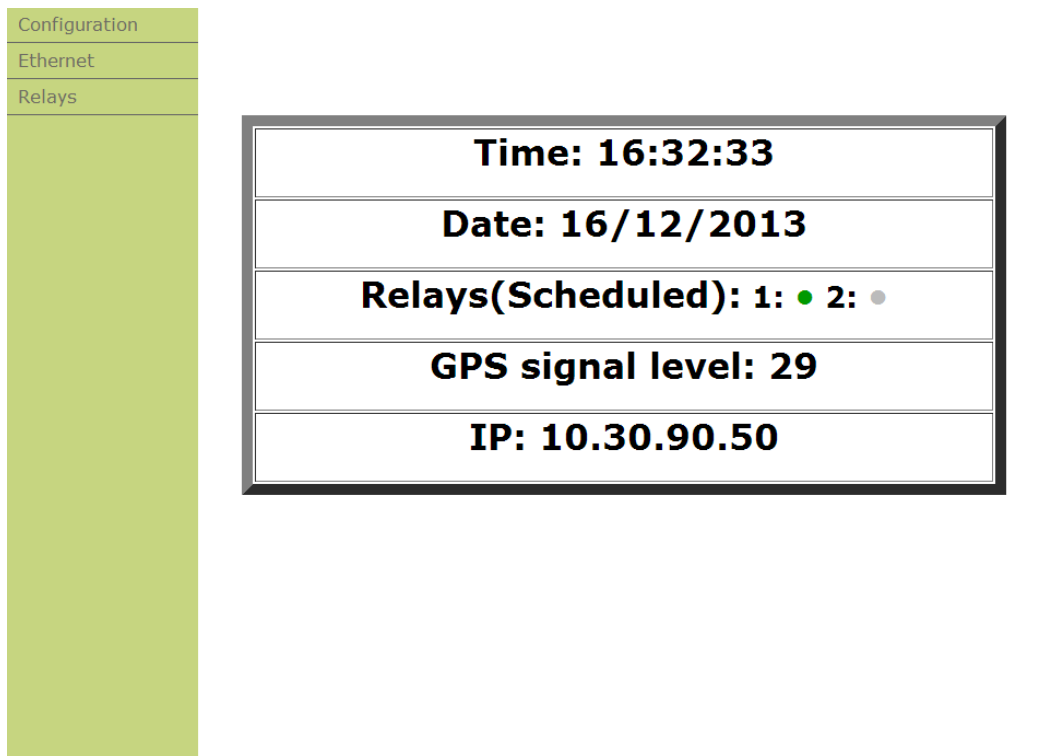After some seconds, click the "Refresh" button. The display appears with the new IP
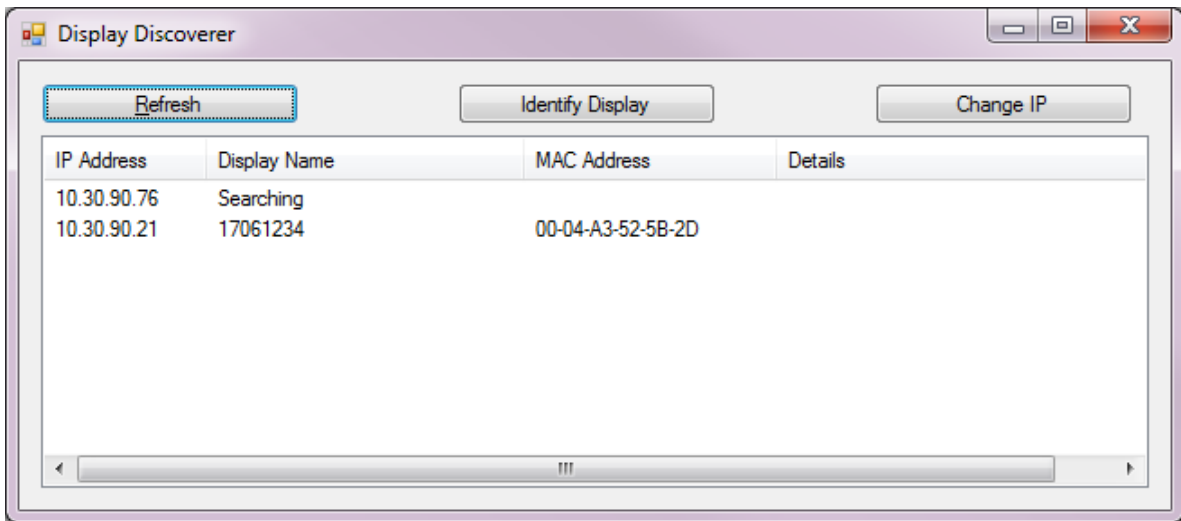
Click the display IP to open a new tab in the browser. The main page of the web server is shown.

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 **¡Error! No se encuentra el origen de la referencia.** for more information.

The main page shows the same date and time of the display, as well as the relays state, the GPS signal quality (if the option is included) and the display IP. If the relays are on manual mode, they can be activated or deactivated just clicking on the green/grey dots. In the following image, the relay 1 is activated and the relay 2 is deactivated

Configuration
Ethernet
Relays

Time: 16:32:33

Date: 16/12/2013

Relays(Scheduled): 1: ● 2: ●

GPS signal level: 29

IP: 10.30.90.50

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.
- Auto brightness: If it is activated, the display automatically fits to the brightness of the room. If it is activated, the following parameter is "minimum brightness level", which configures the brightness of the display when it's dark. If this parameter is deactivated, the following parameter is "Brightness level". Using this parameter, the user can adapt the brightness of the display to its needs.
- Minimum brightness level: configures the brightness of the display when it's dark.
- Brightness level: Using this parameter, the user can adapt the brightness of the display to its needs.
- 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.
  - GPS. The display is synchronized using its GPS.
- Time server: When using the SnTP or Display synchronisation, the address must be tipped in this field.
- Webpage language. The webpage can be shown in Catalan, Spanish, English, French or German

Configuration

| Main |
| Ethernet |

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	

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)

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 configurate the activation and deactivation of the relays. The first row allows the user to configurate:

- Relay number: Using this selector, the user ca choose to configurate relay 1 or 2. Changing this selector does not overwrite the configuration of the other relays.
- Operation mode:
    - 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 configurate. For each alarm, the user must specify:
- Mode: This indicates the action the relay will perform at the programmed time.
    - Activate: The relay will activate at the programmed time. It will stay activated until another alarm deactivates the relay.
    - Deactivate: The relay will deactivate at the programmed time.
    - Duration: The relay will activate at the programmed time during the programmed seconds.
- Time: The time the relay will perform the selected action.
- Duration: The duration of the alarm. It only applies if mode "Duration" is selected
- 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.

In the example, there are 3 alarms programmed for relay 1.
- Alarm 1 activates the relay 1 at 8 AM from Monday to Friday.
- Alarm 2 deactivates the relay 1 at 6 PM from Monday to Friday.
- Alarm 3 activates the relay 1 for 35 seconds at 10 AM on Saturdays and Sundays.
- Alarm 4 is not applied since no day has been selected to apply

| Clock |
| Configuration |
| Ethernet |

Relays

Relay number: 1 ▾		Operation Mode: Scheduled ▾		
Alarm 1	Activate ▾	Time: 08:00	N/A: 00	● Monday ● Tuesday ● Wednesday ● Thursday ● Friday ○ Saturday ○ Sunday
Alarm 2	Deactivate ▾	Time: 18:00	N/A: 00	● Monday ● Tuesday ● Wednesday ● Thursday ● Friday ○ Saturday ○ Sunday
Alarm 3	Duration(s) ▾	Time: 10:00	Duration(s): 35	○ Monday ○ Tuesday ○ Wednesday ○ Thursday ○ Friday ● Saturday ● Sunday
Alarm 4	Activate ▾	Time: 00:00	N/A: 00	○ Monday ○ Tuesday ○ Wednesday ○ Thursday ○ Friday ○ Saturday ○ Sunday

Ethernet parameter configuration

The Ethernet parameters, like the IP address, the Gateway, the subnet mask, etc can be configured manually or automatically through DHCP. Previously, the user must know the IP address he wants for the display. It is highly recommended to change the IP address from the default.

Once the user has accessed the Ethernet tab of the display webpage, configure the parameters manually or activate the DHCP protocol for the display to request all the network parameters automatically. When clicking the button "validate", the system saves the changes and reboots. If the parameters are put manually, the work is finished.

On the other side, the display may have changed the IP address. This IP address can be checked (and changed) through parameters or the "Display Discoverer". The DHCP can be left enabled or disabled. If the user modifies the IP address, the DHCP protocol will be disabled.

```
                           ┌──────────────────┐
                           │  Go to the web   │
                           └──────────────────┘
                                     │
                                     ▼
                           ┌──────────────────┐
                           │ Go to Ethernet tab│
                           └──────────────────┘
          Automatic configuration        Manual configuration
                 ┌───────────────────┐        ┌───────────────────┐
                 │ Activate the DHCP │        │ Write parameters in│
                 │ option and let the│        │ the fields and save│
                 │  display reset    │        └───────────────────┘
                 └───────────────────┘
                          │
                          ▼
  ┌───────────────┐  IP valid  ┌───────────────┐
  │ Change the IP │◄───────────│  Check the IP │
  │ through       │            └───────────────┘
  │ parameter     │                   │
  │ menú or the   │              IP not valid
  │ "Display      │                   ▼
  │ Discoverer"   │            ┌───────────────┐
  └───────────────┘            │ Go to the web,│
                               │ Ethernet tab  │
                               └───────────────┘
                                      │
                                      ▼
                               ┌───────────────┐
                               │ Disable the DHCP│
                               │ option and save│
                               └───────────────┘
```
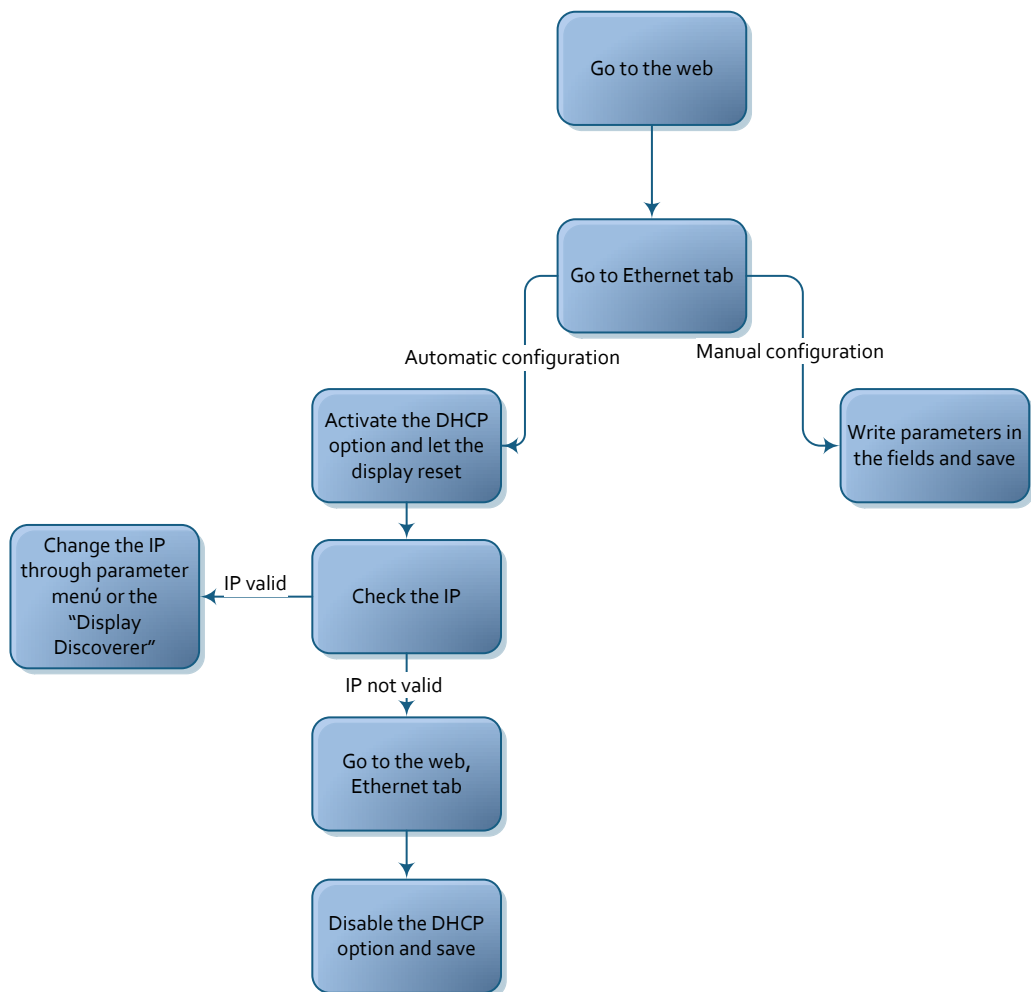
Ethernet network

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

- Configure net parameters
- Sync: no

Time and date introduction by user, if necessary

10:28

Ethernet network

One display with GPS

- Review parameter A: GPS signal
- Sync: GPS

Review parameter A from the web

10:28

Ethernet network
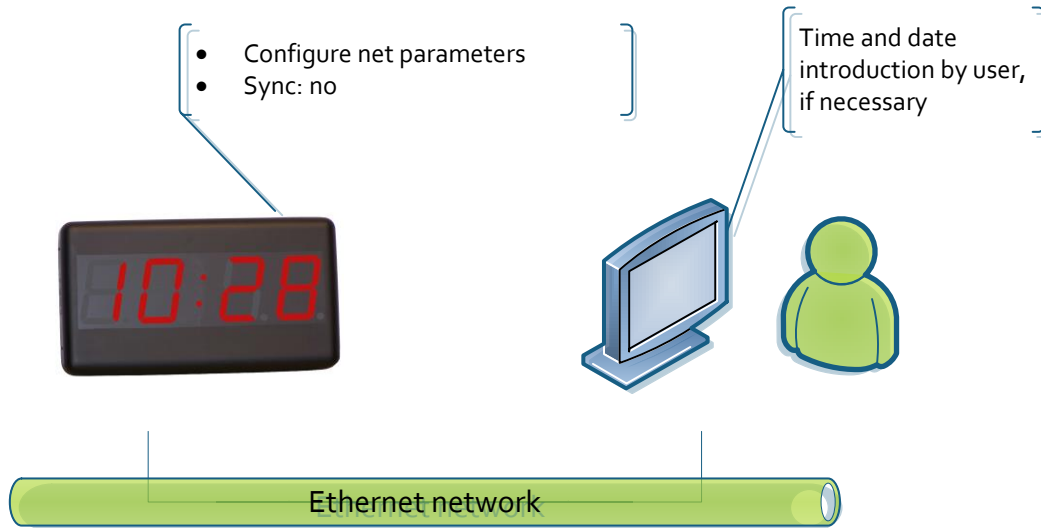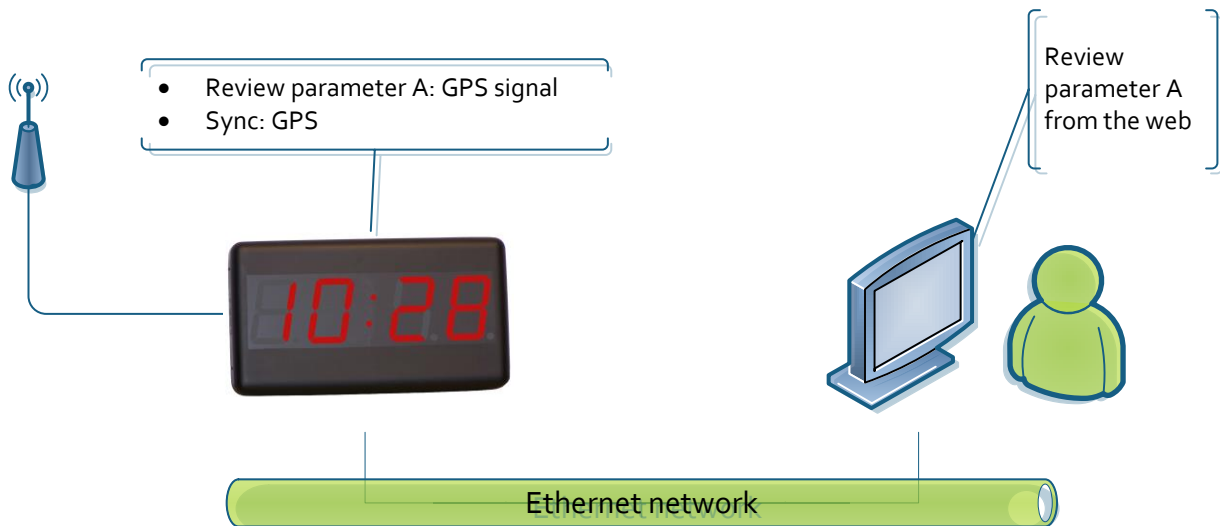
One display. SNTP sync

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

- Configure net parameters
- Sync: SNTP
- Write the server addres in the field.

SNTP server

Ethernet network

- Configure net parameters
- Sync: SNTP
- Write the server addres in the field.

SNTP server

Ethernet network
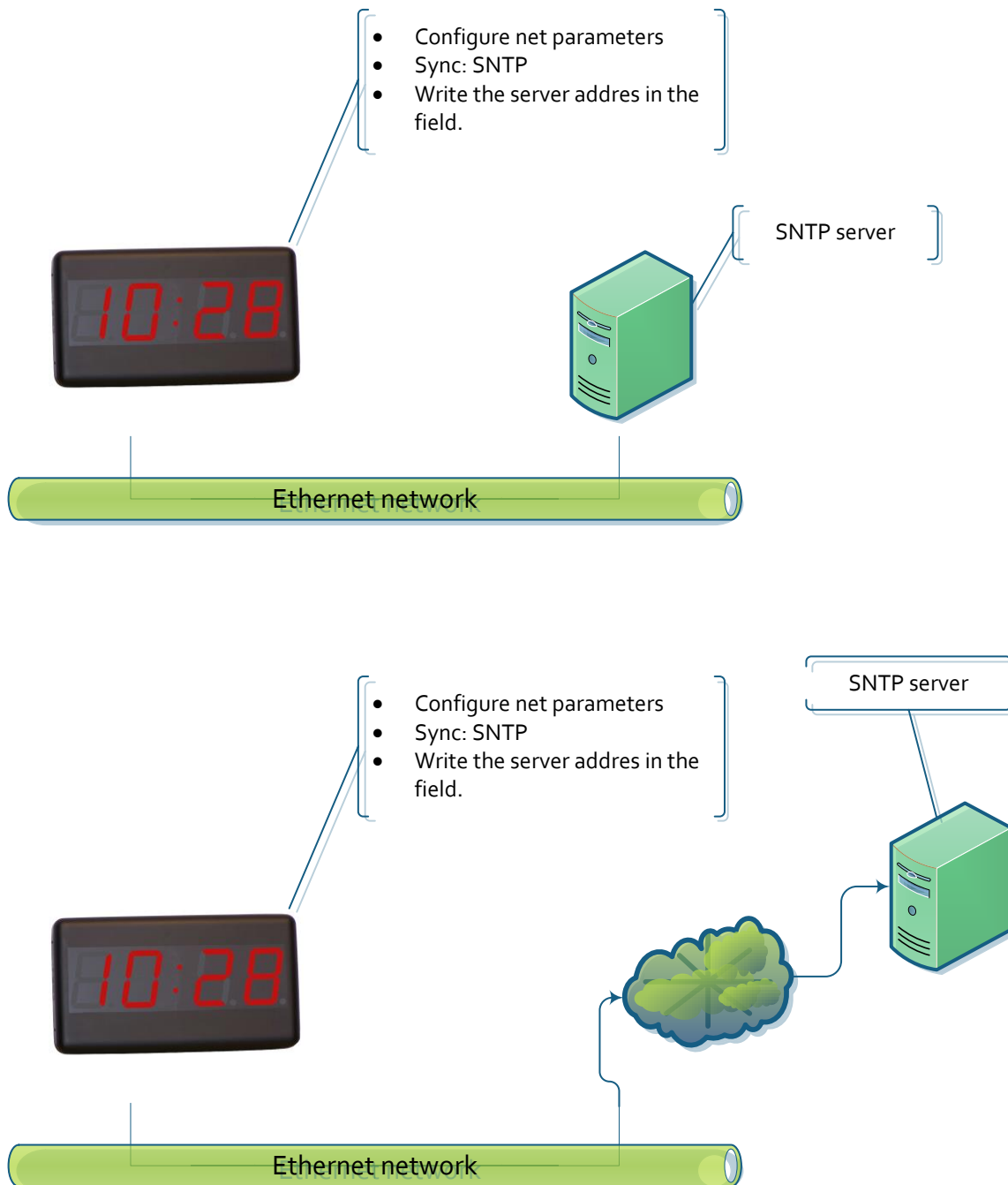
Networks with more than one display

Sync through a display with GPS

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

Server display
- Configure net parameters
- Sync: GPS
- DHCP: no.

Client display
- Configure net parameters
- Sync: Display Ethernet
- Write the display server addres in the field.

Ethernet network

Client display
- Configure net parameters
- Sync: Display Ethernet
- Write the display server addres in the field.
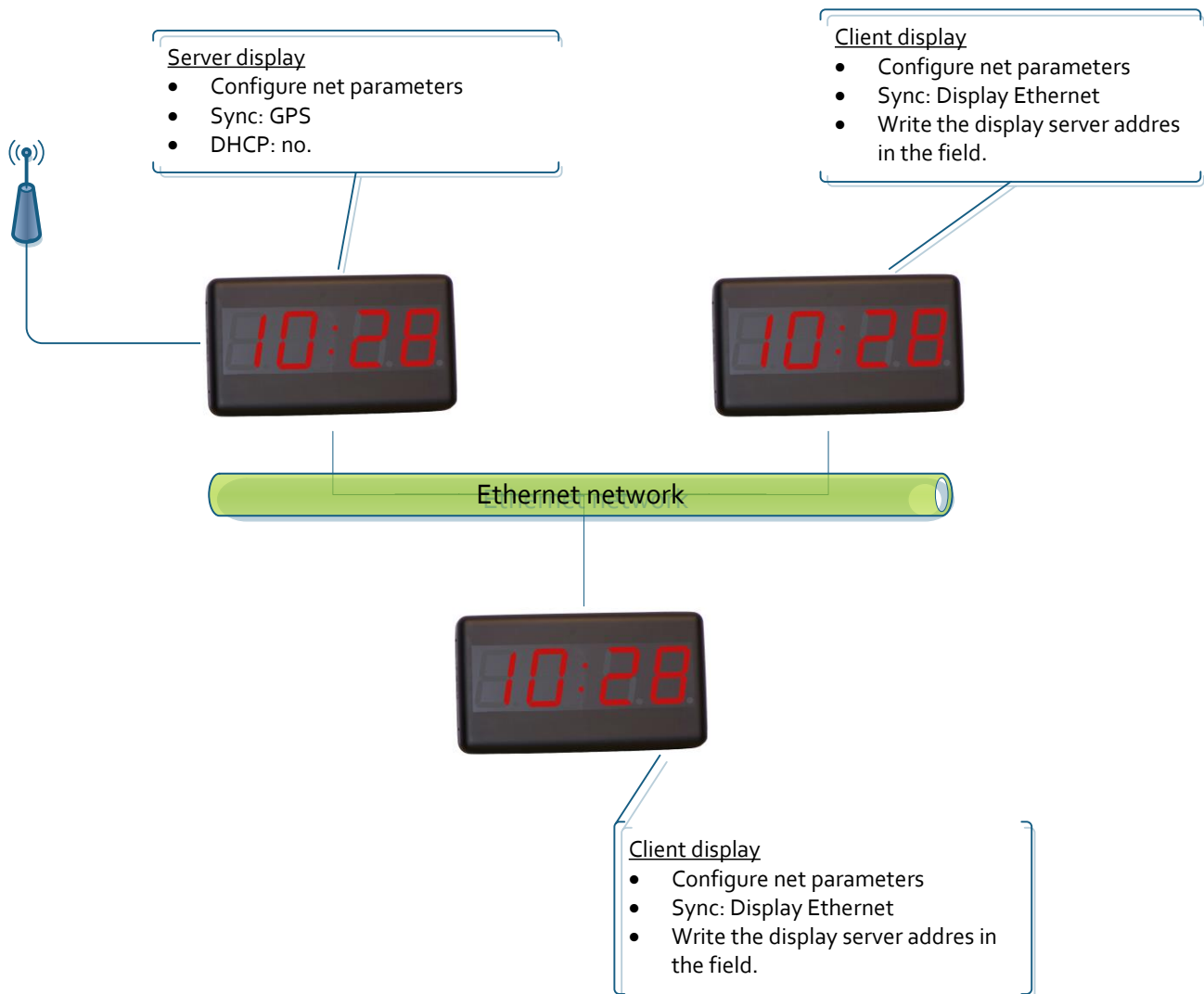
Sync through SNTP. Only one display connects to the SNTP server.

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

Server display
- Configure net parameters
- Sync: SNTP
- Write the server addres in the field.
- DHCP: no.

SNTP server

Ethernet network

Client display
- Configure net parameters
- Sync: Display Ethernet
- Write the display server addres in the field.

Client display
- Configure net parameters
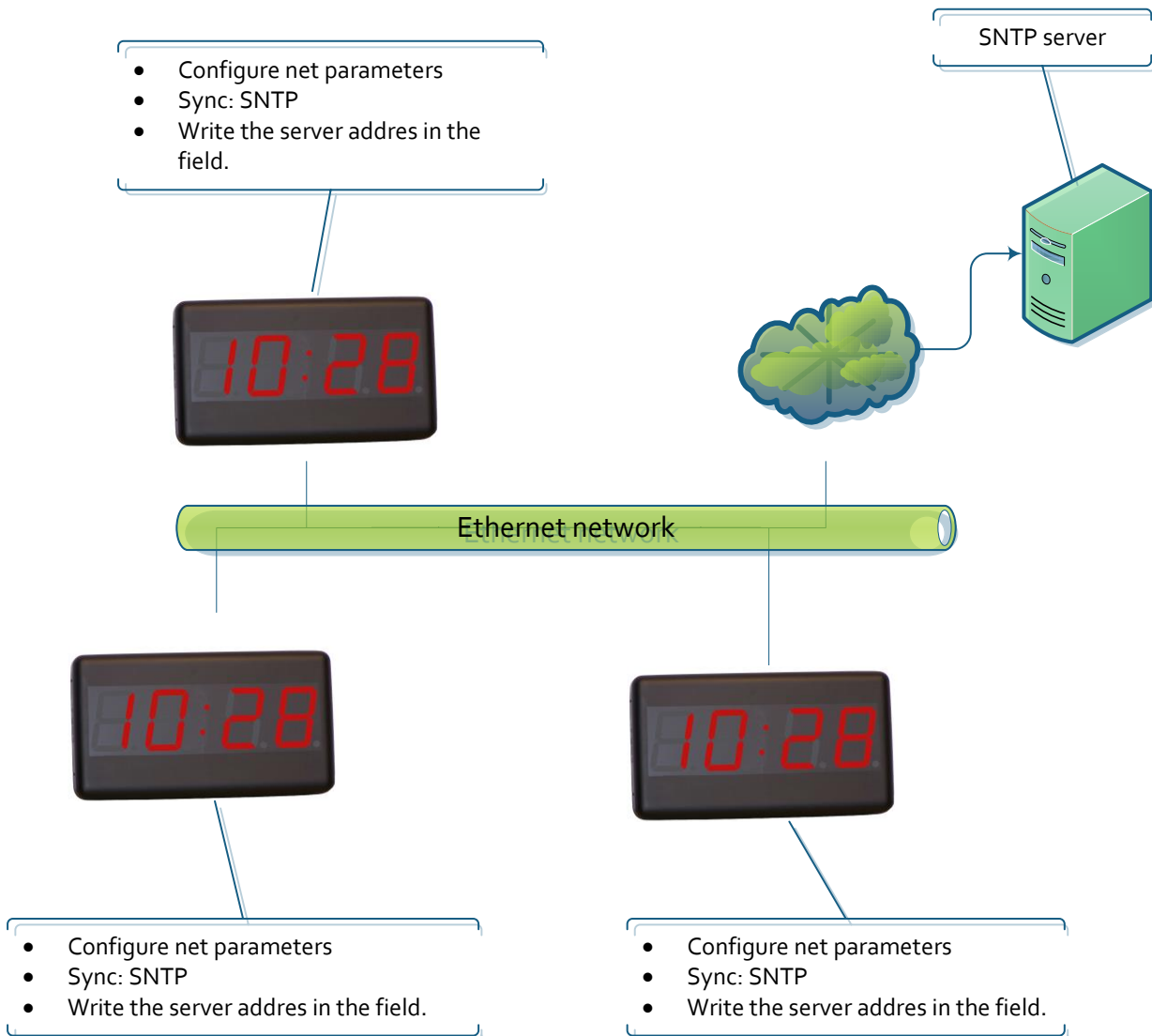- Sync: Display Ethernet
- Write the display server addres in the field.
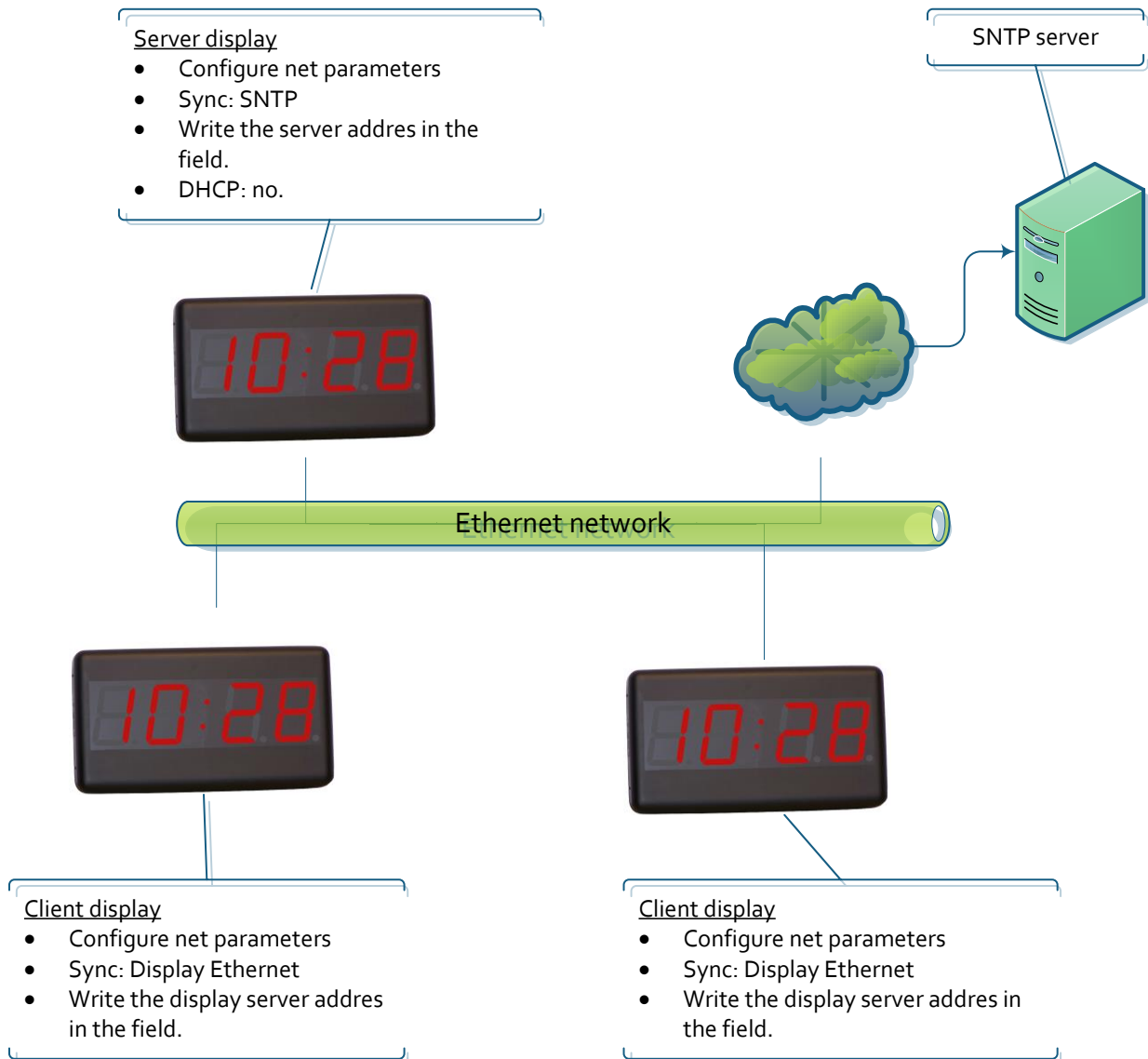
Sync through SNTP. All displays connect to the SNTP server

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

SNTP server

- Configure net parameters
- Sync: SNTP
- Write the server addres in the field.

10:28

Ethernet network

10:28

10:28

- Configure net parameters
- Sync: SNTP
- Write the server addres in the field.

- Configure net parameters
- Sync: SNTP
- Write the server addres in the field.

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		
Time programming	F H		

Display time request

Frame

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

	Code	End of block
ACII	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	

Time programming

Frame

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

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

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

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 GPs signal quality can be checked at the main page of the web.
- If the user wants to sync the display with the GPS, enter at the tab configuration and select "GPS" on the "Time sync origin" selector

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 form 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 $C \in$

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-10SRNE+2R in all versions.
Model : DC-10SRNE+4R 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

Alicia Alarcia
Technical Director