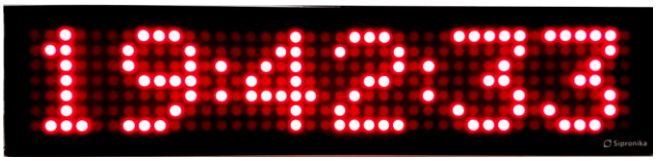
DU65/ND

LED Display with Ethernet Interface



User Manual

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1. IMPORTANT SAFETY INSTRUCTIONS

WARNING! Read the section that follows very carefully before installing your equipment. It gives the safety instructions to follow during installation.

WARNING! Terminals are **hazardous live** - the external **wiring** connected to these **terminals** requires installation by an **instructed person** or the use of ready-made leads or cords.

The equipment is a class 1 – equipment and must be connected to an earthed outlet (TN Power System).

This device does not have a primary power switch. A power protection system (circuit-breaker or disconnecting switch), that is easy to access must be built into the wiring installation. This device must support the nominal voltage and current values specified on the clock.

After disconnection from the mains, device remains readily operable.

In Europe: to comply with European regulations on the protection of persons and the environment, you must dispose of this equipment in a collection site provided for this purpose (separately from household waste). Contact your reseller, collection site or the competent local authorities for more information.

Modifying or opening the product without the consent of the Customer service department will void the warranty.
All maintenance operation shall be conducted with power shut off, including systems connected on inputs or outputs if any.

The equipment has been evaluated for use in office environment (pollution degree 2) and may be only used in this environment. For use in rooms with a higher pollution degree more stringent requirements are applicable.

Apparatus shall not be exposed to dripping or splashing water and no objects filled with liquids, such as vases, shall be placed on the apparatus.

Electrical Hazard – Failure to follow the instructions may result in electric shock and injury to persons.

Danger – risk of damage to equipment if the instructions are not followed.

Sipronika d.o.o. disclaims all responsibility in case of accident or damage caused by an improper use of the product.

2. INTRODUCTION

The DU65/ND display is designed for displaying time, date, data and messages using TCP/IP Ethernet connection. The messages can be displayed in static or blinking form. On the display, up to approx. 6 characters can be shown simultaneously.

The display can be connected to an Ethernet network through its RJ45 connector, through which the programming of messages can be executed. The messages are programmed on a personal computer or other device capable of TCP/IP communication and sent to display using a protocol described later in this manual.

The DU65/ND can also receive and display FDM data which are sent by the FDM module.

NTP protocol is used for time synchronization.

Fig. 1: DU65 - front view.

3. MOUNTING AND CONNECTION OF DU65/ND

3.1 Mounting

The standard, single-sided version of the DU65/ND display is adapted for wall mounting. For this purpose, two right-angle brackets, with screws and wall plugs are enclosed in the package.

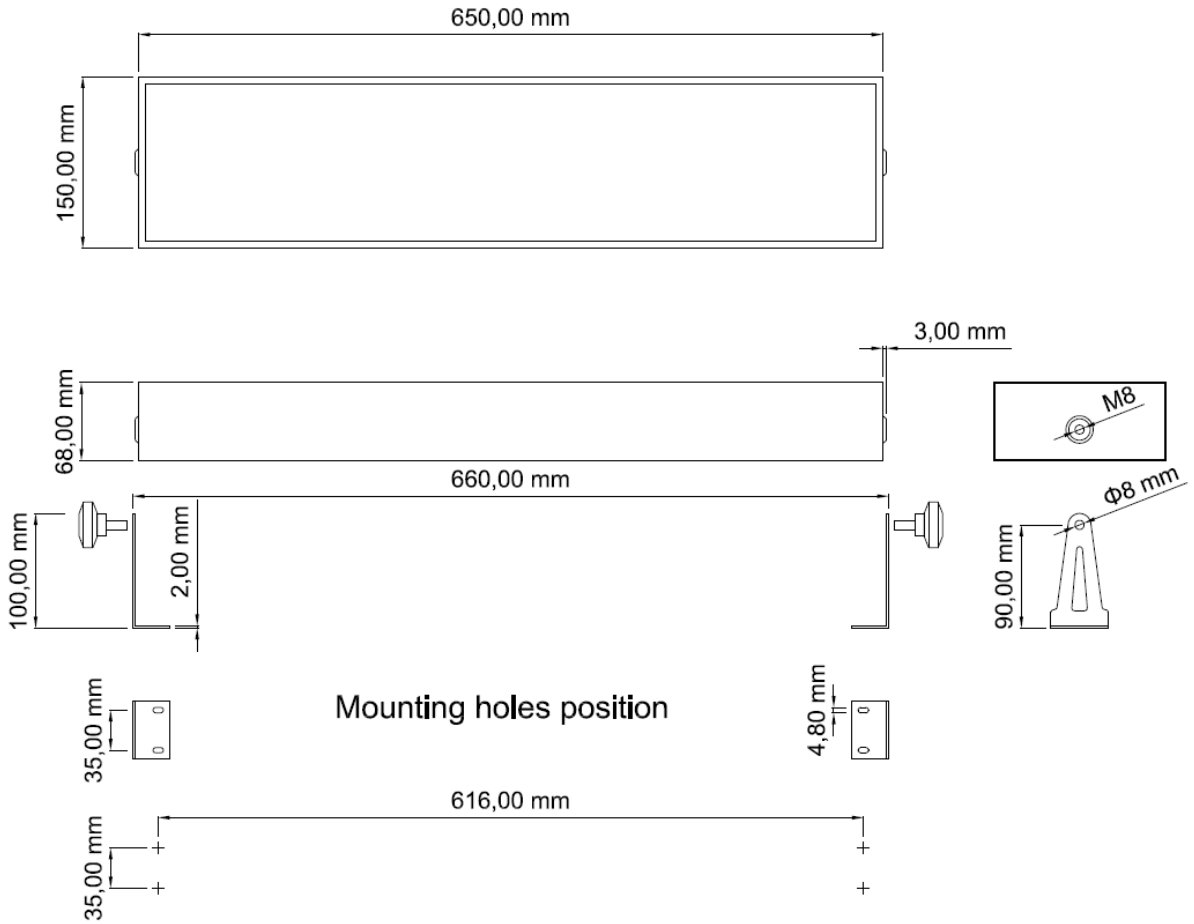


Fig. 2: DU65/ND dimensions and positions of mounting holes.

3.2 Connection and operation of the display

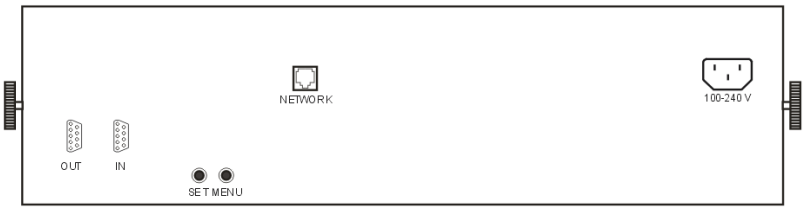


Fig. 3: A view of the display's rear panel.

On the display's rear side there are various connectors and two pushbuttons:

NETWORK	Network connector RJ45, Ethernet 10Base-T/100Base-TX
OUT	Optional output for time string telegrams: RS-232 and 20 mA - current loop; connector: DE9-female
MENU, SET	Pushbuttons for performing various settings of the display: time, brightness, IP address, time zone …
100 – 240 V	Euro-socket for the mains connection
IN	Auxiliary input – for service purposes only; RS-232; connector: DE9-female

Connect the DU65/ND to the mains power. As it has no "power-on" switch, it will start functioning immediately (in a few seconds). You must also connect the device to the Ethernet network. The connector for the Ethernet connection is installed at the rear of the enclosure. It is labelled “Network”.

Immediately after turning it on, it will display either the time or the date, depending on how it is set. When FDM data starts arriving, it will display it according to the settings. If there is any ASCII text coming, it will display it.

The connector labelled OUT, when using a specific firmware version, transmits serial time strings which can be used for test or synchronisation purposes. The connection can be realized in two different ways:

- RS232: for short distances (of up to 15 m);
- 20-mA current loop, active or passive mode

3.3 Modes of operation

NTP synchronized display

It can synchronize its internal clock with an external NTP server. If the set server is not available, it will try to connect and synchronize with the next one from the list. It’s possible to set up to three NTP servers. When the time is synchronized, the column between the minutes and the seconds will stop blinking. NTP client is active all the time. Because of the limited space, the display can only show

either time or date. You can select the default display content in the menu bye use of pushbuttons or remotely, using the Message Editor program.

FDM data monitor

The display can show frequency, time deviation or frequency deviation of power grid. It can get this data from the FDM module which is usually built into Meinberg time server. The display can receive “Old standard FDM strings” on network port number 10001. Check the timeserver documentation for correct settings. If FDM data is unavailable for more than approximately two minutes, the display will start showing the time or date.

ASCII messages

The display can show also short text messages, for example system demand or any other relevant messages. In chapter 6 you can find more details about the protocol used for sending messages.

4. SETTINGS – USING MENU AND SET BUTTONS

The pushbuttons labelled MENU and SET on the back side of the device, can be used to set the time, date, brightness, display mode, time zones, times of transitions from the standard time to the Daylight-Saving Time and vice versa, IP network settings, NTP time servers' addresses and format of the displayed time. The display saves all the settings in its memory and uses them the next time it is turned on.

The setting is performed according to the following procedure:

- choose the desired setting by pressing the MENU pushbutton,
- if you press the SET pushbutton, the current value of the setting chosen is displayed; the character/digit than you can change at that time is blinking,
- by pressing the SET pushbutton for a longer time, you can change the setting at the blinking place,
- by pressing the SET pushbutton for a short time, you are moved to the next place/digit,
- once you are satisfied with the setting, press the MENU pushbutton to save the setting,
- if you do not press any pushbutton for more than 30 seconds, the display will return to the normal displaying of time and messages; the setting chosen last (except for the brightness) will not be saved.

4.1 Description of menus

TIME, DATE
Here you can set the display's date and time with an accuracy of one second. The time you have set will be adopted when you press the MENU pushbutton. If the display is synchronized with the NTP server, this setting will soon be overridden by the NTP server time. So, it is recommended to use this setting only in case of standalone operation, without connection to NTP server.

S/N
If you press the SET button, the display's serial number is displayed. It's used for identification of the display in the Message Editor program which can be used to perform setting. The number is written also at the display's rear; it cannot be altered.

MODE
After pressing the set button, a submenu for selecting the operating mode will appear. On the left side, you can select the default display which can be either time or date, and on the right, you can select which FDM data should be displayed. It's possible to choose between:
FR – frequency, TD – time deviation, FD – frequency deviation.

BRIG
Here you can select the display's brightness. The degrees you can choose, range from 1 (the lowest brightness) to 3 (the highest brightness).

ZONE W, ZONE S
Within these menus, you can set the difference between the local time and the UTC. You can set the algebraic sign, the hours and the minutes. The display calculates the local time according to the formula: local time = UTC + the difference. For Central Europe, the difference amounts to +01:00 for the standard time (ZONE W), and +02:00 (ZONE S) for the Daylight-Saving Time. If you wish to display the UTC time, set both values to +00:00. In Europe, these times are also called winter and summer time.

W/S D, W/S T, S/W D, S/W T
Here you can set the date and the hour of the automatic transition from the standard time to the Daylight-Saving Time (Summer Time) and vice versa.
You can set the exact transition moment for the current year, or universally – for several years. In the case of the universal setting, you set a day of the week to 7 (=Sunday) and a date containing two asterisks ('**') in place of the year. The transition will happen when the chosen day of the week comes for the first time, provided the then date is later than the one set or equal to it.

Example:
In Central Europe, the transition is put into effect on the last Sunday in March, at 02:00:00 AM (local time). Universal (default) settings are:

W/S D: 25.03.7** and **W/S T: 02:00:00**.

The transition from the Daylight-Saving Time to the standard time is put into effect on the last Sunday in October at 03:00:00 (local time). Universal (default) settings are:

S/W D: 25.10. 7 and S/W T: 03:00:00.**

On the other hand, the settings valid only for the year 2025 are the following:
30.03.25 * 02:00:00 and 26.10.25 * 03:00:00.
With these settings, next year it will be necessary to set the transition times anew.

IP ADDRESS, SUBNET MASK, DEFAULT GATEWAY
For the device to operate correctly on a network, it must have a unique IP address on the network.

The display's IP address, subnet mask, and default gateway should be set in accordance with the data of the existing network to which you intend to connect the display.
A DHCP client is integrated in the display, which can set alone in relation with a DHCP server (if provided in the network) all the proper network settings. The DHCP client is activated if “DHCP: Y” is chosen. If “DHCP: N” is chosen, the client is switched off and all the network settings should be set manually.

If DHCP is switched on, then menus »subnet mask« and »default gateway« can only be inspected but not changed.

By default, DHCP is enabled.

You can discover the unit by using the default DHCP name which defaults to dispXXXX. Replace XXXX with the last 4 digits of the display's serial number. For example, if the S/N is 10280568, then the default DHCP name is disp0568. The display should respond to the command "ping disp0568".

NTP SERVER 1, NTP SERVER 2, NTP SERVER 3

Using the SNTP protocol, the display can set its internal clock automatically. For this purpose, it must have access to a NTP time server. In these menus, IP addresses of up to 3 NTP servers can be set. The display is synchronized by the first available server. A setting "0.0.0.0" means that the server is not set.

EXIT

If you press the SET pushbutton, the display returns to the normal displaying of time, date, data or messages. If there were changes in settings, you'll have to confirm that you really want to apply them. If you press the MENU button, the display begins a new circle of settings.

5. CHANGING SETTINGS REMOTELY

5.1 General

The **Message Editor** program can be used to perform various display's settings remotely via network and to send messages to the VP100/20 displays. This document describes only those settings and menus which are relevant to the DU65/ND display. It is verified that the program operates under Microsoft Windows 10 and 11.

5.2 Installation

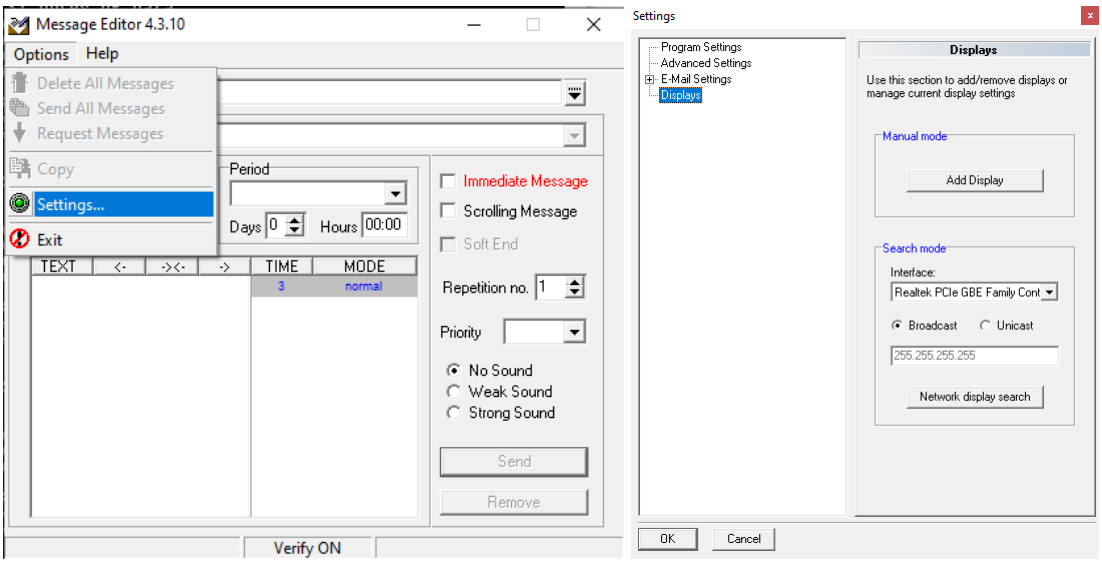
You can download Message Editor from https://sipronika.si/downloads/. Run "medxxxx_setup.exe" setup program. Xxx is usually replaced by version number. In case of the DU65/ND, version 4.3.10 or higher is required.

In the installation program, choose the language and the folder in which you want to install the program, as well as the program group into which the icons will be installed. When the program is run for the first time, all the default settings are set. The program menus are displayed in the language chosen during the installation.

Program communicates with the display using **TCP** protocol on port **8000** and UDP on ports **54324** and **54325**. An eventual firewall must allow this type of communication otherwise the program cannot work properly.

5.3 Description of menus

5.3.1 Options menu



Settings
It is possible to set/change two types of parameters: those of the program and those of the display.

Program Settings
You can choose the language of the programming interface (the file containing definitions of the expressions/ terms used, in the chosen language). For older versions it's possible to set also PC's serial port which should be used for communication with the display.

Advanced Settings, E-Mail Settings

Advanced Settings and E-mail settings cannot be used with the DU65/ND.

Displays
To establish communication with a display, the display should be added to a list in this submenu. In this submenu also some other settings can be adjusted. Each of the displays can also be removed from the list.

When adding displays in the program there are two possibilities how to do it:

- manually or
- automatically (recommended)

Each display can be manually added by clicking the button »Add Display«. Accordingly, all the network parameters, serial number and name should be set manually. This option is useful especially when dealing with older versions of the displays, which do not support an automatic search.

When adding a new display, you must enter for it the following basic data:

- the display's name – choose any one you like; however, it is obligatory that you enter it (a name is important especially when several displays are connected: it is exactly through their

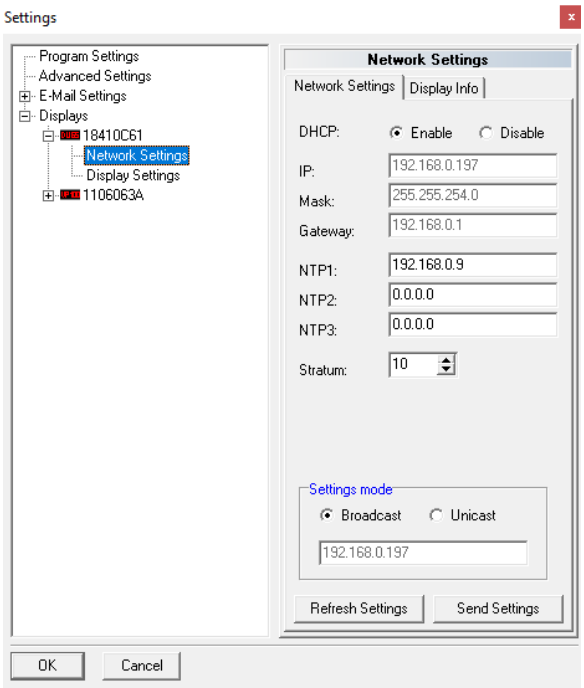
respective names that you have access to individual displays in the network; default name equals to display's serial number.

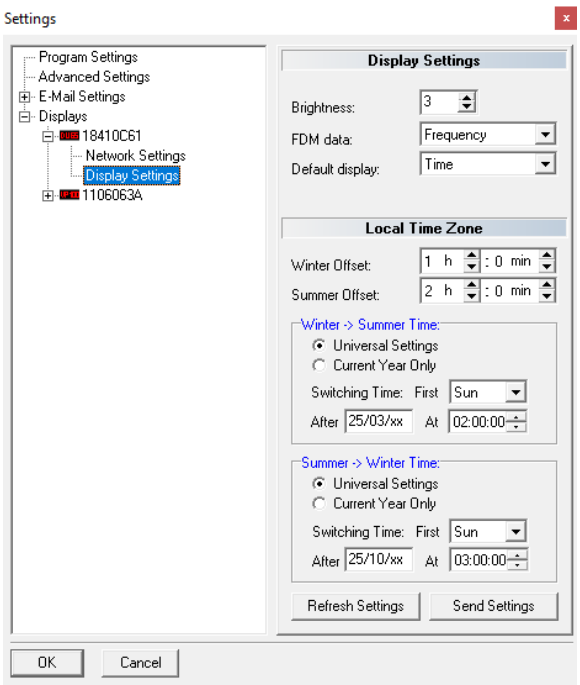
- serial number – it is fixed and unchangeable for each display. You can find it in the display's menu or read it on the back of the case.
- IP Address – the address determined by the existing network, which you have entered in the display. Example: 192.168.0.25. With the displays that do not have a network connection (using only the serial port) you should leave this field empty.

The **automatic** search is started by clicking the button »Network display search«. The program returns a number for the displays found. All newly found displays are added to the display list.

If a name of a certain display on the list is being selected, on the right side its name, serial number and IP address are being shown.

In the submenu »**Network Settings**« the display network settings are listed and edited. All current settings are confirmed by clicking »Refresh settings«. The new settings are inserted into provided fields. You can select either DHCP or static IP address for the display. You can also enter up to three NTP server addresses and display's stratum. It must be higher than the one of the NTP server. Otherwise, the display won't synchronize.





In the submenu »**Display info**« the display's type, software version and MAC address of the network interface are listed. Here it's possible also to update the display's firmware.

By clicking on »**Display settings**« the following display settings are being provided: Brightness, FDM data, Default display, Daylight Saving and Time Zones. Meaning of these settings is described in chapter "Settings – using menu and set pushbuttons". Under FDM data you can choose what type of data provided by the FDM module sending "**Old Standard FDM String**", shall be displayed: frequency, time deviation or frequency deviation. Under "Default display" you can choose either time or date to be displayed.

By clicking on »Send settings« the settings are sent to the display. They will be stored in its permanent memory. By clicking »Refresh settings« the current settings are being listed.

Exit

This command is used to close the program. All the settings remain on the hard disk and are used at the next starting of the program.

6. COMMUNICATION PROTOCOL

6.1 General description of the protocol

Besides the time and date, the display can also show messages. For sending messages and commands, a personal computer or another device capable of TCP/IP communication can be used.
A simple way to start and test the communication is to use a PC with a suitable program which can establish a raw TCP/IP connection on port number **10001** with the display, e.g. a free, open source Realterm* can do the job.

All strings must start with a STX character and end with an ETX character.

<STX> ... Start of Text 0x2
<ETX> ... End of Text 0x3

ASCII character set is used in all strings. Max string length (of any type) is 128 characters. Only first 6 characters of text will be displayed. The rest is ignored.

Detailed description of messages and command strings can be found below.

Example:

Let's assume that the display's IP address is 192.168.1.200.
To open a connection in Realterm, type 192.168.1.200:10001 in text box under Port menu. Click on button Open. Status indicator shall now indicate that the device is connected.

6.2 Requesting the display's time

<STX><S><?><ETX>

Display responds with the following string: <STX>HH:MM:SS;DD.MM.YYS<ETX>

Meaning of the characters is as follows:
HH:MM:SS ... hours:minutes:seconds

* http://realterm.sourceforge.net/

DD.MM.YY ... day of month, month, year
S ... Daylight Saving Time (DST). There are two possible values: 'S' - DST, space (0x20) - no DST

6.3 Displaying text

<STX><T><HH:MM:SS><ASCII TEXT<ETX>

<HH:MM:SS> determines how long the text will be shown on the display.
"00:00:00" represents "forever".

Max value: 99:99:99 which equals 362439 sec (4 days 4 hrs 40 min 39 sec)

Texts can be up to 6 characters long. If incoming string contains a longer text, only first 6 characters will be shown!

If a new message is sent before the duration of the last (currently active) message has expired, the new message is displayed immediately (with its new duration).

While in the menu (manual settings by pushbuttons), text strings are not accepted!

Examples:

If you want to display "Hello!" for 10 seconds, you will send:

<STX>T00:00:10Hello!<ETX>

6.4 Modifiers

<B> ... blink

If you put a <B> behind <STX>, the following message would be blinking with a 1 second interval.

Example:

If you want to display "Hello", blinking, for 1 minute 30 seconds, you will send:

<STX>BT00:01:30Hello<ETX>.

6.5 ID_Command

<STX>ID?<ETX>

Display responds with the following answer:

<STX>ID:<display type> 0x20 <display size> 0x20 <firmware version><ETX>

Length of the answer is not strictly defined. There is always a space character (0x20) between individual elements of the string.

Example:

<STX>ID:DU65/ND 1x6 v2.001<ETX>

7. TECHNICAL DATA

Displaying characteristics:	up to 6 characters at a time, height of characters: 100 mm, pixel diameter: 10 mm, colour: red
Network interface:	10Base-T/100Base-TX Ethernet 10/100Mbit; connector: RJ45
Output:	DE9 female connector; RS-232 or 20 mA current loop (passive/active) - selectable by jumpers
Baud rate:	9600 bps
Framing:	7E2: 7 data bits, even parity, 2 stop bits
Internal clock:	Accuracy $\pm 3\times10^{-6}$ - in the case of autonomous operation, after the clock has been disconnected from the NTP time server.
Battery backup:	In case of a power failure, the internal battery keeps time up to 10 years following the date of production.
Power supply:	100 – 240 V AC / 43 – 60 Hz
Power consumption:	7 W typ, 13 W max
Fuse:	Internal, built in power supply
Dimensions:	650 mm × 150 mm × 68 mm (not including mounting brackets)
Weight:	4.1 kg (including mounting brackets)
Protection class:	IP30
Temperature range:	0..50° C