

# **VP100/20NET DISPLAY**

## **Technical Instructions**

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## 1. INTRODUCTION

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The VP100/20 NET display is designed for displaying **time** and **messages**.

The time is displayed in the following format: day of the week, day of the month, month, hours, minutes, and seconds. The messages can be displayed in the static, blinking or scrolling form. On the display, up to 20 characters can be displayed simultaneously.

The display can be connected to a network through its **Ethernet RJ-45** connector, through which the programming of messages and the time synchronization with the **NTP server** are executed. The messages are programmed on a personal computer which is connected to the network and on which the Message Editor program is installed (the program is enclosed in the package).



Fig. 1: Front view.

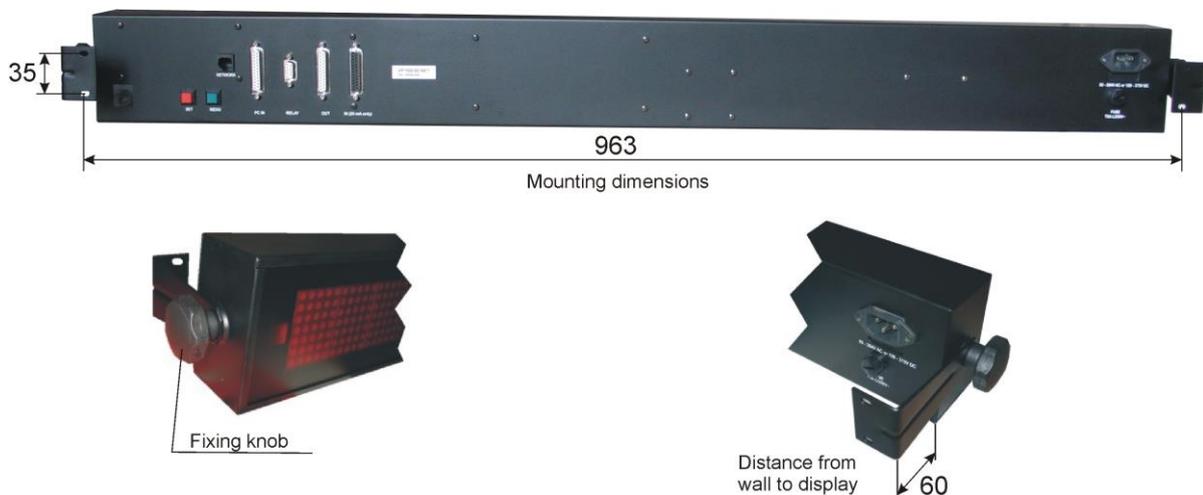
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## 2. MOUNTING AND CONNECTION OF VP100/20NET

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### 2.1 Mounting

The regular, single-type display VP100/20 NET is adapted for the wall mounting. For this purpose, two right-angled carriers, with screws and wall plugs are enclosed in the package. The double-type display is designed for the ceiling mounting.



**Fig. 2:** Wall mounting, all dimensions in mm.

### 2.2 Connection and operation of the display

Connect VP100/20 NET to the mains. As it has no "power-on" switch, it will start functioning immediately. 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 labeled "Network". The time is displayed following the introductory text. If after the device's last turning-off the internal memory-supporting battery has been discharged, all messages stored in the display will be deleted.

Immediately after the device has been switched on, a dot is displayed between the date and the hour, which means that the display has not yet been synchronized with the NTP server's time. Using

the two keys at the display's rear or the Message Editor program, it is necessary to set the display's IP address, the sub-network's mask, the default gateway and the NTP server's IP address on the occasion of the first turning on. These settings are of vital importance for successful programming of messages and for time synchronization via the network.

When the communication between the display and the NTP server has been established, the display's internal clock will become synchronized, and the dot appearing between the date and the time of the day will disappear.

If there is a DHCP server provided in the network, all of the settings can be managed by the server – the DHCP client should be switched on in the menu (this is also the default setting). All the network settings can be remotely controlled by Message Editor program (MED), which alone seeks for the all displays connected to the local network. The message programming and time synchronization of the display are not possible without prior proper network settings.

### *2.3 OUT connector, the connection diagrams*

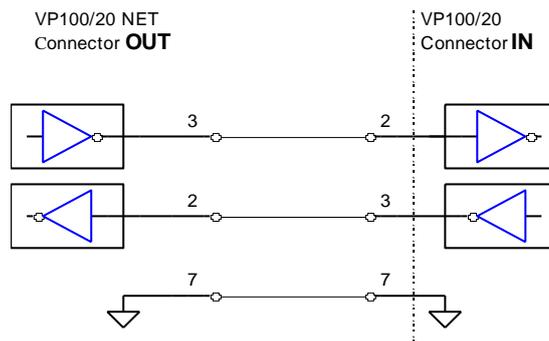
To the connector labeled OUT you can connect another VP100/20-type display (a version without a network interface), provided it is set to a baud rate of 9600 and to the **8N1** data format. The connection can be realized in two different ways:

- using RS232: for short distances (of up to 15 m);
- using 20-mA current loop: for longer distances between the two displays.

You can choose between these two connection alternatives by means of jumpers inside the display.

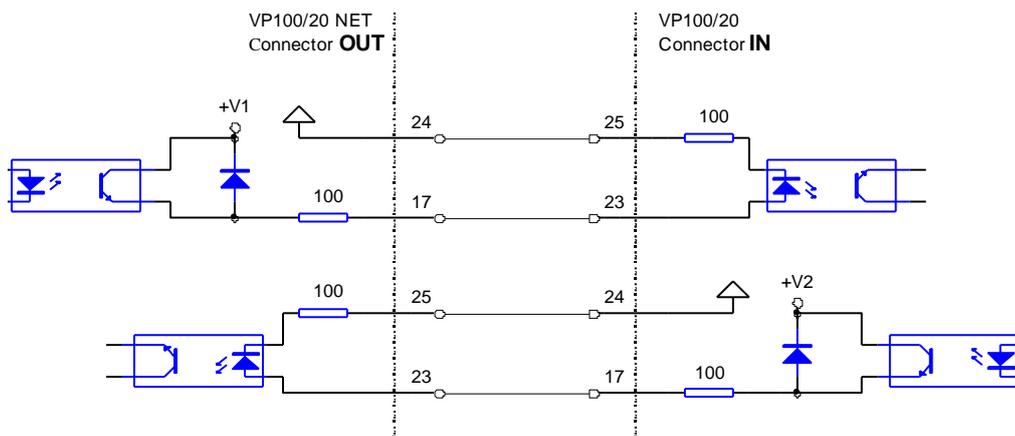
**WARNING**  
**Please make sure to unplug the device  
before opening the enclosure!**

In order to be able to manipulate the jumpers, it is necessary to open the enclosure: please unscrew the four screws that hold the cover on its right side, pull out the cover, and pull out the plexiglas piece and the small blocking plate. Unscrew the screws holding the displaying plates in their middle. Pull out carefully the right displaying plate. Before pulling it out completely, you must unplug the flat cable from its socket and interrupt pull apart the contacts of the power supply cable. As a result, the jumpers on the microcontroller board become accessible. After setting them appropriately, close the enclosure, proceeding in the reverse order.



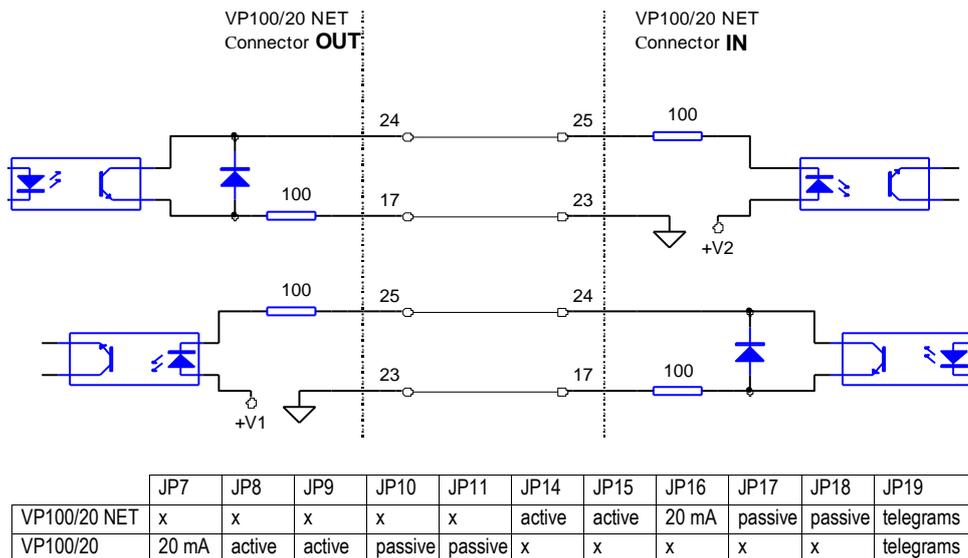
	JP7	JP16	JP19
VP100/20 NET	x	RS232	telegrams
VP100/20	RS232	x	telegrams

**Fig. 3:** The use of RS232 for the connection between the VP100/20 NET and the ordinary VP100/20. The table shows the setting of jumpers in both displays.



	JP7	JP8	JP9	JP10	JP11	JP14	JP15	JP16	JP17	JP18	JP19
VP100/20 NET	x	x	x	x	x	passive	passive	20 mA	active	active	telegrams
VP100/20	20 mA	passive	passive	active	active	x	x	x	x	x	telegrams

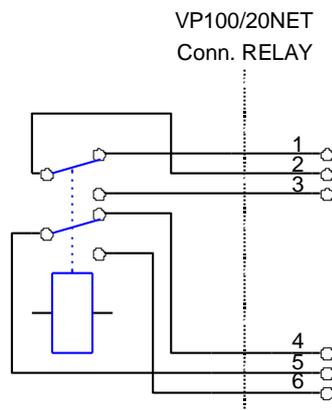
**Fig. 4:** The use of 20 mA current loop; here the outputs are active, and the inputs passive.



**Fig. 5:** The use of 20 mA current loop; here the outputs are passive, and the inputs active.

## 2.4 Contacts of the relay

To the relay's connection terminals you can connect an external sound source, which will provide sound accompaniment for the messages for which the "loud sound" option is checked. The figure below shows the arrangement of the connection terminals.



**Fig. 6:** The relay's connection terminals.

## 3. SETTINGS, THE USE OF THE KEYS "MENU" AND "SET"

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The keys labeled MENU and SET at the display's rear can be used to set the time, language, brightness, time zone, times of transitions from the standard time to the Daylight Saving Time and vice versa, the display's IP address, the subnetwork's mask, the default gateway and the NTP server's IP address. 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 key;
- if you press the SET key, the current value of the setting chosen is displayed; the character/digit that you can change at that time is blinking;
- by pressing the SET key for a longer time, you can change the setting at the blinking place,
- by pressing the SET key for a short time, you are moved to the next place/digit,
- once you are satisfied with the setting, press the MENU key to save the setting,
- if you do not press any key for more than 30 seconds, the display will return to the normal displaying of time and messages; the setting chosen last (with the exception of the brightness) will not be saved.

**WARNING:** While you perform the setting procedure, the communication with the Personal Computer is interrupted – the sending of messages and settings is not possible.

### 3.1 *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 key. If the display is connected with the NTP server, the time received from the server will prevail.

#### **LANGUAGE**

In this menu you can choose the language that will be used for displaying the date and the time; the abbreviations of the names of months and days of the week will be displayed in the language you have chosen here.

#### **BRIGHTNESS**

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

## **SERIAL NUMBER**

If you press the SET key, the display's serial number is displayed; it is significant for the programming of messages: you must enter it while working with the message-programming program (see the chapter on the programming of messages). The number is written also at the display's rear; it can not be altered.

## **TIME ZONE**

Within this menu, 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, and +02:00 for the Daylight Saving Time. If you wish to display the UTC time, set both values to +00:00.

## **WINTER/SUMMER, SUMMER/WINTER**

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 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). The universal (default) setting is: **SUN 25.03.\*\* 02:00:00**.

The transition from the Daylight Saving Time to the standard time is put into effect on the last Sunday in October. The universal (default) setting is: **SUN 25.10.\*\* 03:00:00**.

On the other hand, the settings valid only for the year 2005 are the following:

\*\*\* 27.03.05 02:00:00 and \*\*\* 30.10.05 03:00:00.

With these settings, next year it will be necessary to set the transition times anew.

## **IP ADDRESS, SUBNET MASK, DEFAULT GATEWAY**

The display's IP address, subnet mask, and default gateway are 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.

## **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 the 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.

## **TIME FORMAT**

In newer versions it's possible to display time in various formats. In this menu you can choose between two formats:

- Day of week, day of month, month, hours : minutes : seconds  
Example: MON 12. MAY 10:15:30
  
- Day of year, day of month, month, hours : minutes : seconds  
Example: 132 12. MAY 10:15:30

**EXIT**

If you press the SET key, the display returns to the normal displaying of time and messages. However, if you press the MENU key, the display begins a new circle of settings.

## 4. PROGRAMMING OF MESSAGES

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### 4.1 General

Besides the time, the display can display also messages. For the programming and sending of messages, a personal computer and the **Message Editor** program are used. It is verified that the program operates under Microsoft Windows 98, 2000 and XP.

### 4.2 Installation

Insert the CD in the drive and run "med437a\_setup.exe" setup program.

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 can not work properly.

### 4.3 A short description of the message-programming procedure

After the program has been installed, you must "add" at least one display by specifying its name, serial number, and IP address. With the versions having no network connection, instead of the IP address you must specify the computer's serial interface (COM1 or COM2), through which the communication with the display will take place.

After the basic settings have been executed, individual messages should be programmed according to the following procedure:

- select the target display,
- select the message's consecutive number, ranging from 1 to 31,

- specify the displaying mode: a running or a static/flashing message,
- enter the message's text,
- specify the time of displaying: "immediately" or at a specified time,
- specify the number of repetitions for the message,
- specify the time period between the repeating appearances of the message,
- specify the message's priority: in the event that the specified displaying times for individual messages overlap, the message with the higher priority will be displayed,
- select the type of the audio accompaniment: "without", "weak", "loud",
- once you are satisfied with the format and the settings, send the message to the display by clicking the **Send** button.

The messages can be sent to the display also via e-mail. The message must be of the text format (and not of the HTML format) while its subject line must contain predetermined character sequences on the basis of which the software recognizes the message type (See the Options menu -> E-mail settings). A message received through e-mail is stored as the message No. 0 in the program; however, it can not be changed manually by means of the program. Every message received through e-mail must be confirmed by a press of the large button (Confirm Message) which appears instead of the Send button after reception of the message. In the event that a new message arrives via e-mail before the previous message has been confirmed, the displaying of the previous message is interrupted, and the message received last is displayed. After the last message received has been confirmed the displaying of the previous one continues. The program records also a log of messages received by e-mail. The log is located in the directory in which the program has been installed, in the text-format file EmailLog.txt. Into it, all the messages received by e-mail, their confirmations, and any problems occurring in the communication with the POP (e-mail) server are recorded.

Each display has its own serial number and its own name – you can give it any name you like within the MED program.

The display sends confirmations of having received messages. In the MED program, you can switch on/off the operation mode of waiting for the confirmation.

**Attention:** during the setting mode of operation, the display does not send confirmations of the reception of messages! So if the waiting for the confirmation is activated, do not program the display while executing its settings.

## 4.4 The programming interface

The programming interface is divided into four divisions. In the above division, you can choose between individual displays (at the **Display** caption) and the messages to be displayed on them (at the **Message** caption); underneath, on the left side, the time settings are performed, and on the right side the remaining settings of the messages. In the left lower part there is a window in which the messages are written and edited.

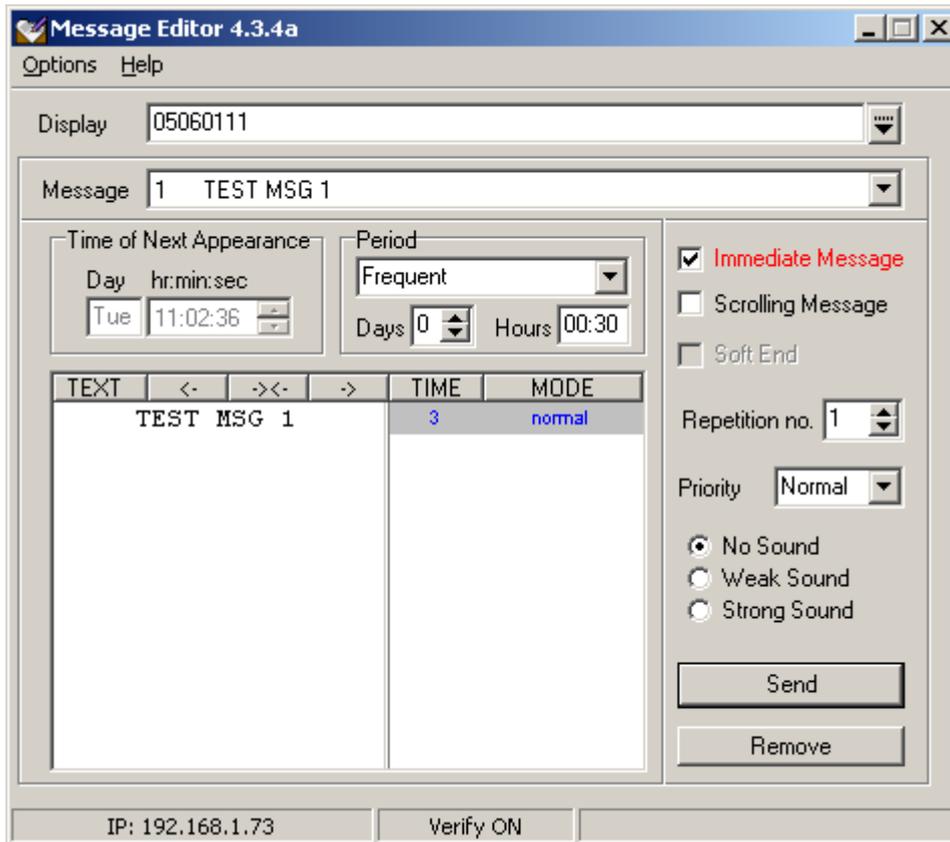
In the continuation, individual elements of the programming interface are described.

### Display

Here you can choose the display to which you want to send the messages. You can give the displays any names you like, using the menus Options->Settings->Displays.

### Message

Here you can specify the consecutive number of the message that you wish to program, edit or cancel, ranging from 1 to 31.



### Time of Next Appearance

For every message, you can specify the precise time of the message's first displaying. The time is entered using the fields "Day" and "hour:minute:second". The day of the week can be entered either using the day's consecutive number (1 stands for Monday) or by entering the first three letters<sup>1</sup> of the day's name. If you enter "xxx" as the day, the day of the week will not affect the displaying.

Example:

If you enter "xxx" and "15:23:30", the message will be displayed for the first time at the time entered right, regardless of the day of the week; on the other hand, if you enter "Mon" "15:23:20", the message will be displayed on Monday for the first time.

### Period

Every message can be either displayed only once or repeated periodically – in the latter case you must specify the corresponding period of repetition (the time between individual repetitions). The period can be specified with a step of 1 minute in the range from 1 minute to 1 week. If you want the message to be displayed only once, set the period to 0.

### Immediate Message

Select this option if you want the message to be displayed immediately. When displayed for the first time, such message will override any other message being displayed, regardless of the priority; the priority will, however, be taken into consideration at any subsequent displayings.

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<sup>1</sup> The abbreviation depends on the language chosen.

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### Scrolling Message

The message will be displayed in a scrolling mode. The number of consecutive times a text can be repeated is equal to the number set under "No. of Repetitions".

### Soft End

If this option is activated, at the end of the running message 20 blank characters will be added – this way all the message's characters will be able to »travel« over the whole displaying field, from the right to the left. Reading the message will be facilitated. Because of the advantages mentioned, we recommend that this option is activated at all times.

### Sound

As regards the audio accompaniment of the message, you can choose between three alternatives:

- no sound,
- a weak sound – the audio accompaniment will be performed by the built-in buzzer,
- a loud sound – besides the internal buzzer, also the relay is activated; the relay can switch on an external alarm.

### No. of repetitions

The value entered in this field determines how many times in succession (without interruption) the message should be repeated. You can choose any number between 1 (no repetition) and 9.

### Priority

For every message, a priority should be specified. You can choose between three alternatives: low, normal, and high.

The priority of messages is important in the event that for two or more messages the specified displaying time is the same, or the displaying time specified for a message starts while another message is being displayed. The higher-priority message will »override« the lower-priority messages. If the messages' priorities are equal, the one with the lowest consecutive number will be displayed.

### Send

By clicking this button, you can send the message to the display. If the reception confirmation is activated, the sending will be repeated if it has not been successful. If even after some repetitions the confirmation has not been received, an error message will appear.

### Remove

By this button, a selected message can be cancelled from the display.

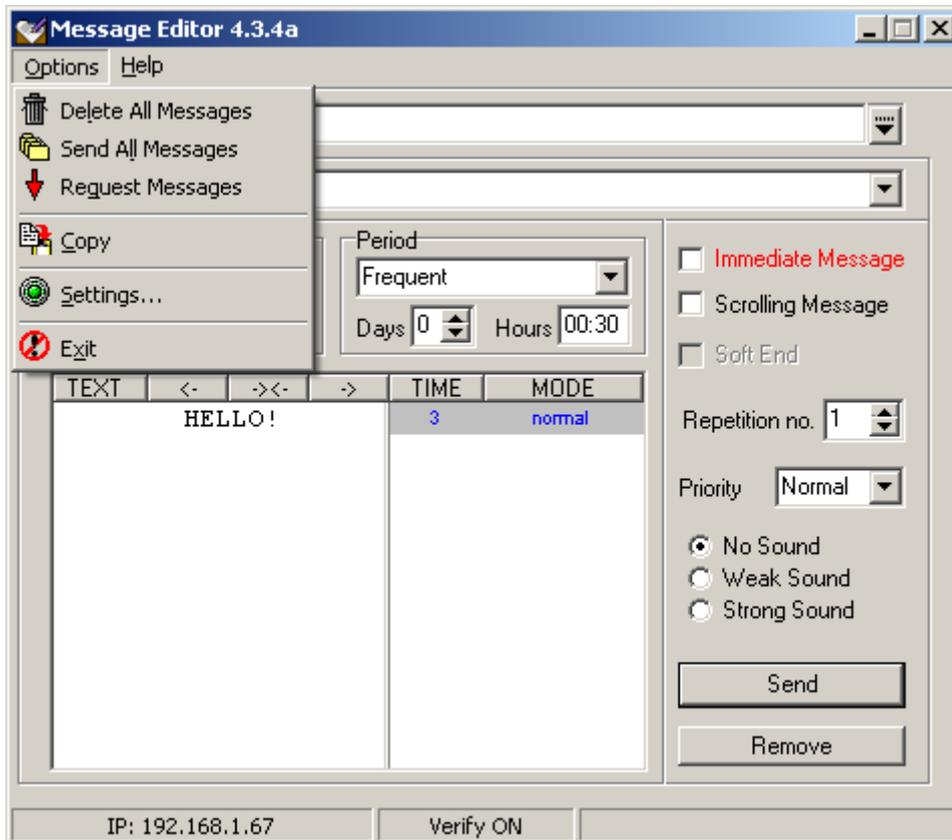
### Entering and editing of the message's contents

The contents of a message should be entered into the big editing field located in the lower left part. In the event of a normal, static message, one line of text in the editing field (20 characters) corresponds to one line on the display. The lines will be displayed one after the other. Altogether, there can be up to 11 of them. For every line, you can specify the time (from 1 s to 59 s) and the mode of displaying – static or flashing. This can be done on the right side of the field, in the columns Time and Mode. The contents of individual lines can be aligned with the left or the right margin, or centered, by clicking the corresponding symbol on the field's upper part: <- , -><- or ->.

A running message can have up to 241 characters. If the option "soft end" is selected, the length is limited to 221 characters. The contents of a message with a "soft end" will "travel" over the whole display and »disappear« into the left side.

## 4.5 Description of menus

### 4.5.1 Options menu



#### Delete All Messages

This command deletes all messages from the chosen display.

#### Send All Messages

This command sends to the selected display all the messages entered through the PC.

#### Request Messages

As a result of this command, the chosen display will send to the PC all the active messages stored in its memory.

#### Copy

With this command, you can transfer all the messages from one display to another. In the process of copying, all the messages stored in the target display are completely overridden. For example, if you wish to transfer the messages from Display A to Display B, first select Display A, then select Display B, and finally execute the Copy command.

#### Settings

It is possible to set/change three types of parameters: those of the program, those of the display, and those of the messages received via e-mail.

## Program Settings

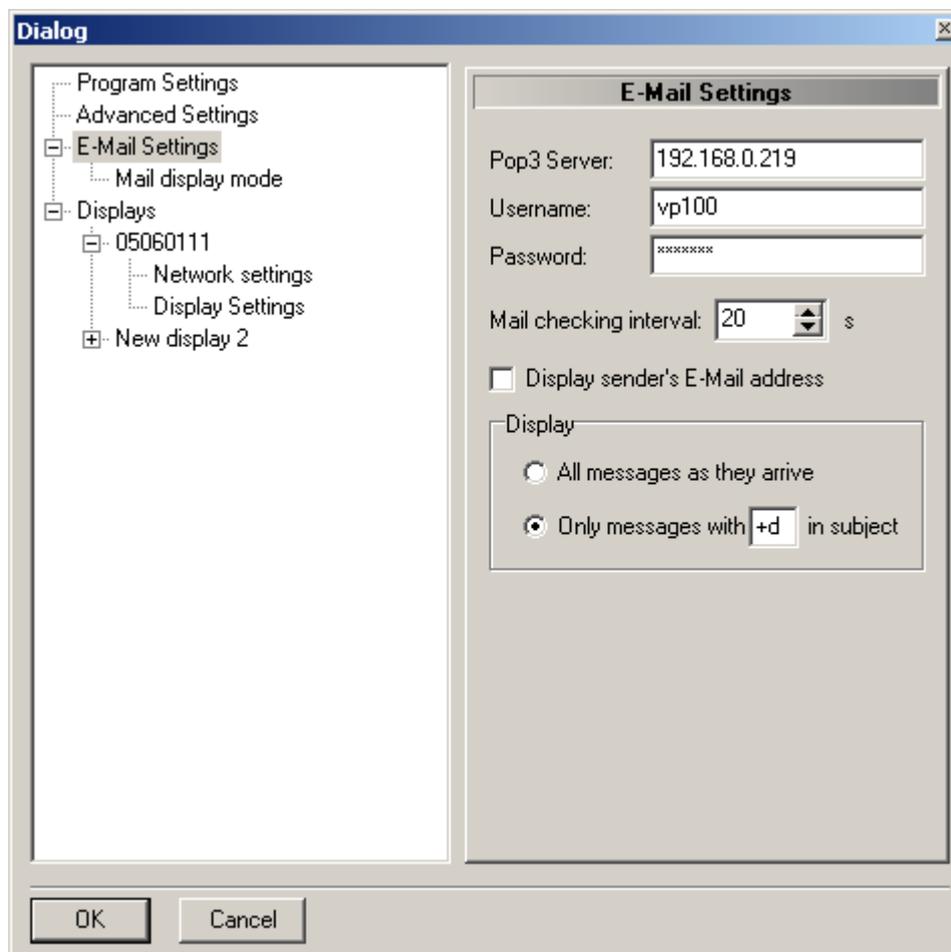
You can choose the language of the programming interface (the file containing definitions of the expressions/ terms used, in the chosen language) and the serial port to which the display is connected. In the case of displays with a specified IP address, the serial-port selection has no effect.

## Advanced Settings

If you check the option »Request Messages on Startup«, the program will immediately after starting establish a connection with the display, and transfer the active messages from it. In order to have access to the other settings, you must first enter the following **password**: Triglav. Within the dialog box that appears after a successful entering of the password, you can set:

- the operation mode of waiting for a confirmation of the message's reception (Wait for Display to Respond). The default setting: activated.
- The number of repetitions (Number of Retries). The number determines how many times the sending of a message will be retried in the event that it has failed the first time. The default value: 3.
- the setting of the serial-transmission format (Port Settings). It affects only the displays which are connected directly to the PC's serial port. The default setting: 8,N,1.
- TCP/IP port. The default value: 8000.

## E-Mail Settings



Into the first three fields, the e-mail server address (POP3 Server), the username and the password must be entered. The time specified in Mail Checking Interval is the interval (in seconds) between the program's consecutive checks of the new messages at the address mentioned above. If the Mail Checking Interval is set to 0, the program does not communicate with e-mail server. If the box

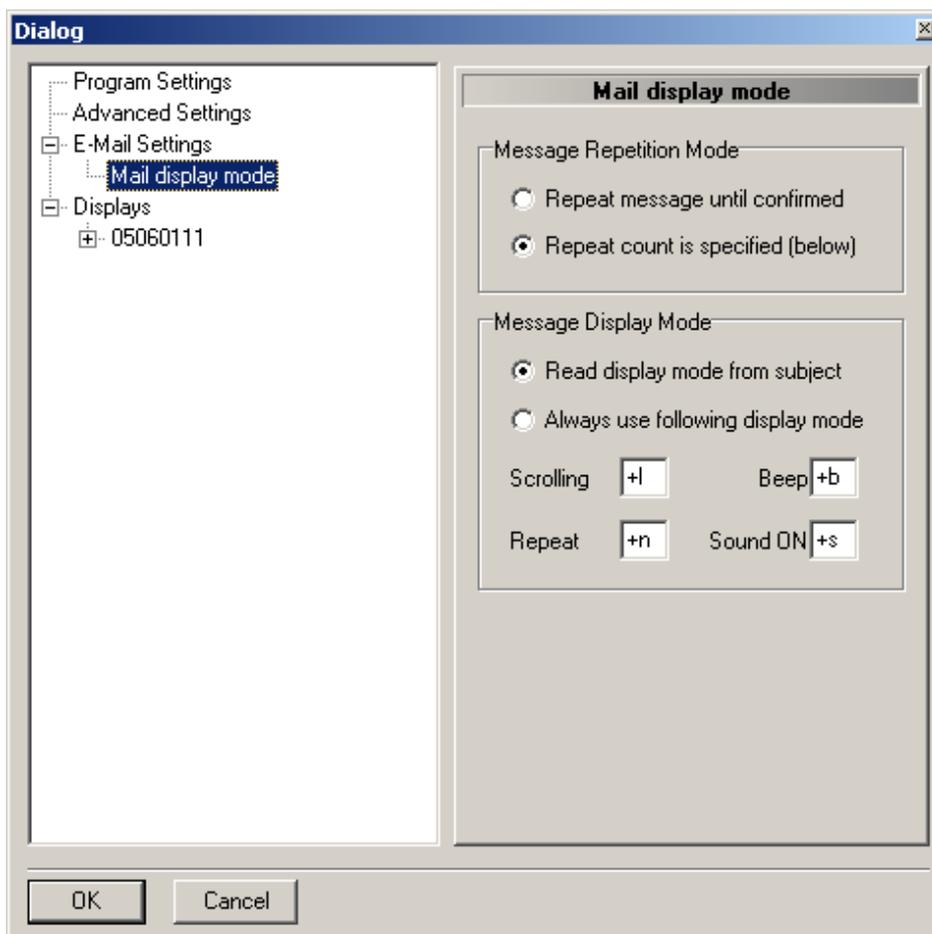
»Display Sender's E-Mail Address« is checked, the sender's address will also be shown on the display, in front of the message itself.

In the menu »Display« there is an option to choose which emails are shown: either all, or those which include »+d« in the subject.

In the submenu »Mail display mode« it is set which and how emails are shown. The choice of how the emails are shown is up to the sender by setting »Read display mode from subject«. The other possibility is to set this option in the program for all emails by choosing "Always use following display mode".

### Message Repetition Mode

If the option »Repeat message until confirmed« is chosen, the received email is occurring until the user confirms the reception by clicking the »Confirm email« button. The number of occurrences can be limited: either through Message Editor or by the email subject.



### Message Display Mode

If the choice is left to the sender, the option »Read display mode from subject« should be set. The email subject should include proper strings, which correspond to those set in the Message Editor. The following parameters can be set:

- scrolling message (Scrolling), default: +l,
- beep when an email occurs (Beep), default: +b
- beep and switching of built-in relay (Sound ON), default: +s
- number of email occurrences (Repeat), default: +n; in the subject a number should be given along with the defined string, e.g. +n5 for 5 occurrences.

### Example:

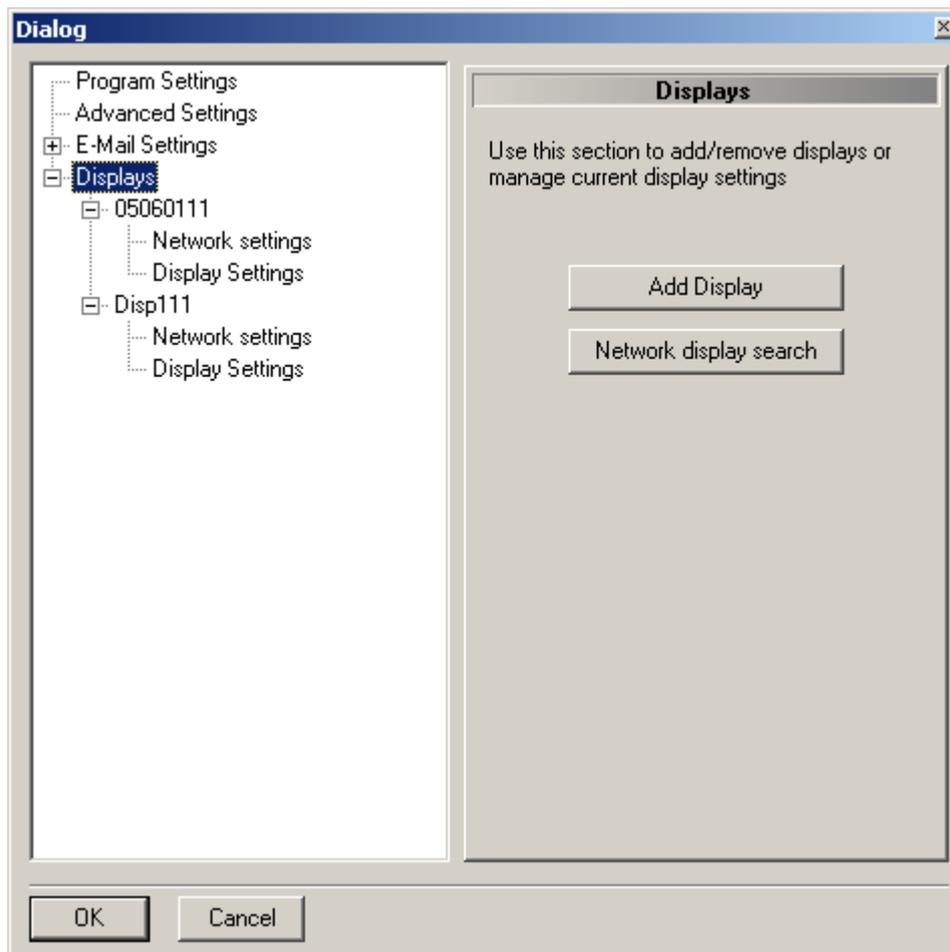
A sender wants a scrolling message with a beep and 3 occurrences. The e-mail's subject should, according to the settings shown on the figure above, include: +l, +b, +n3 and (depending on the settings) additional +d. The subject is for example: »A message to display +d +l +b +n3«.

If the option »Always use following display mode« is chosen, all the received messages are shown in the way, which is set fixed. In this case all proper fields are marked and in the field »Repeat« the number of occurrences is given.

### Displays

In order 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.

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.

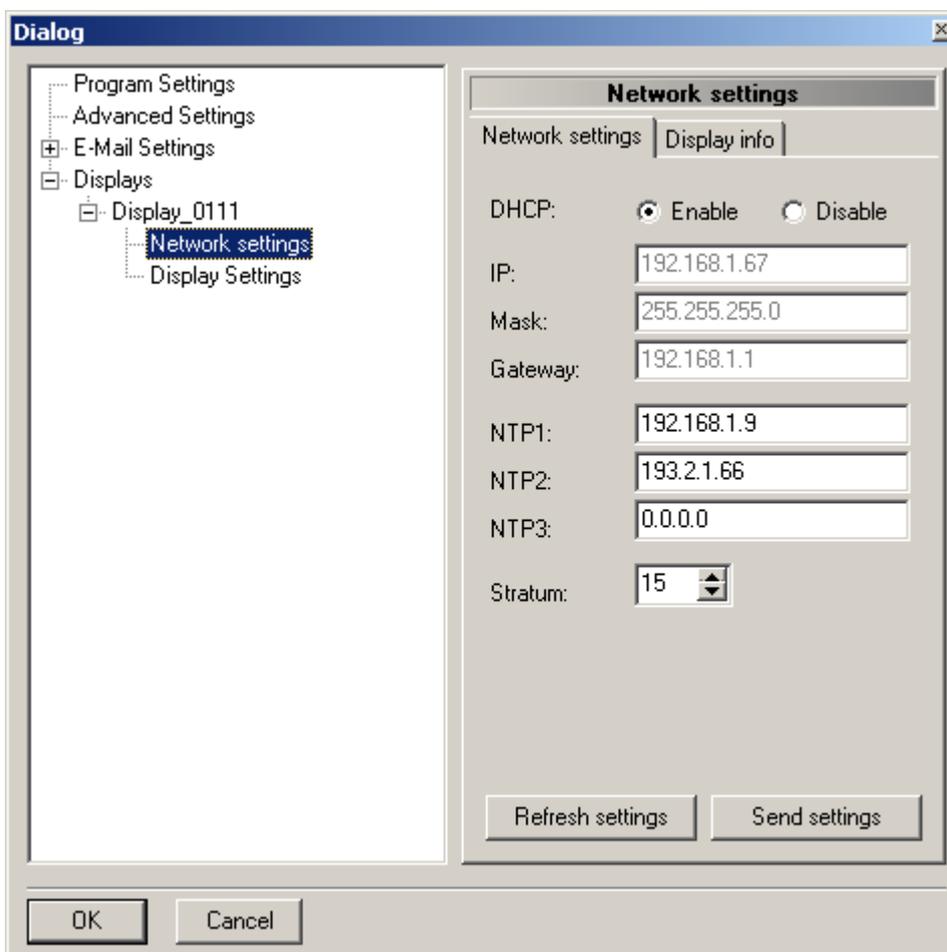
When adding a new display, you must enter for it the following basic data:

- 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);
- serial number – it is fixed and unchangeable for each display. You can find it in the display's menu or read it at the enclosure's rear;
- 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 new 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.



The fields NTP1, NTP2 and NTP3 are provided for IP addresses of the timeservers. It is necessary to insert at least one IP address. The addresses of the timeservers which are not currently used should be set to 0.0.0.0.

A stratum between 1 and 15 can be assigned to each display. The stratum of a NTP server should be lower than the display's stratum, otherwise the synchronization can not be established. By clicking »Send settings« the settings are sent to the display.

In the submenu »Display info« the display's type, software version and MAC address of the network interface are listed.

By clicking on »Display settings« the following display settings are being provided: Brightness, Language, Daylight Saving and Time Zone.

By clicking on »Send settings« the settings are sent to the display. By clicking »Refresh settings« the current settings are being listed.

### **Exit**

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

## 5. THE DISPLAY'S REAR, D-SUB CONNECTORS

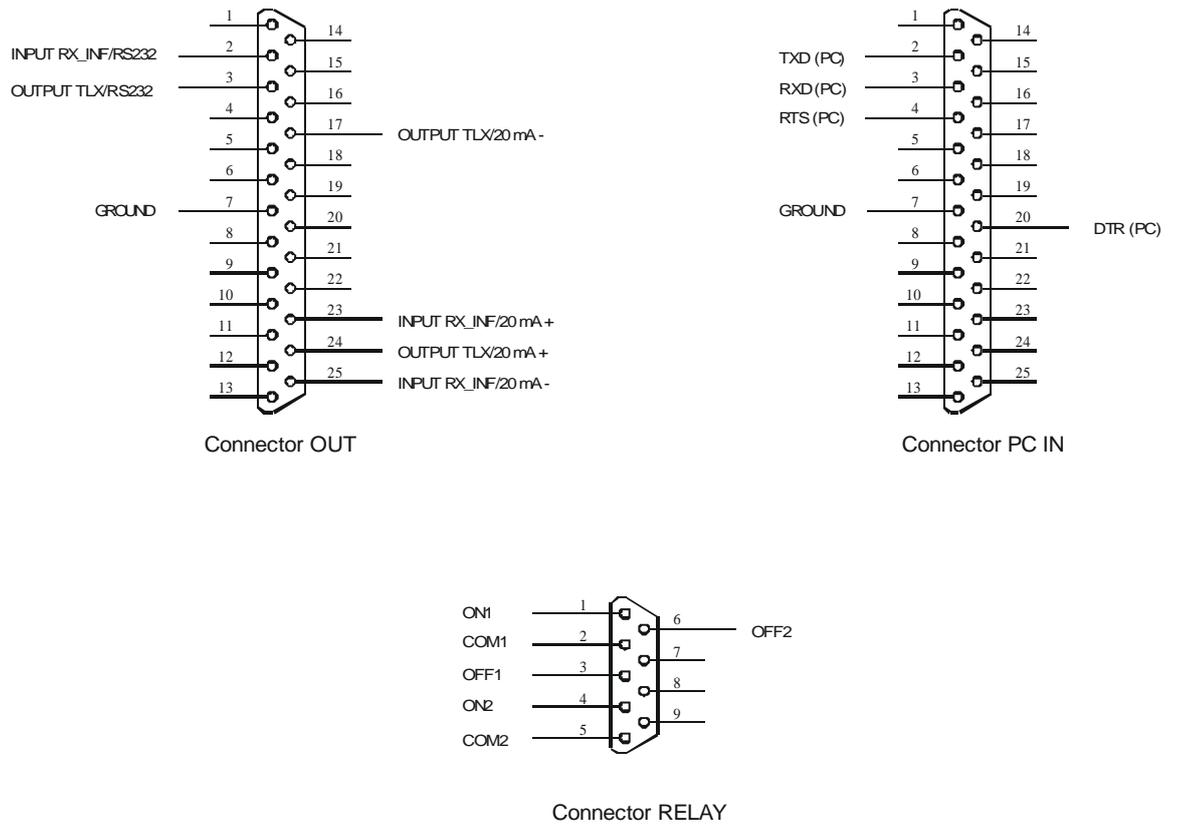
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**Fig. 7:** A view of the display's rear

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

<b>NETWORK</b>	Network connector RJ-45, Ethernet 10Base-T/100Base-TX
<b>OUT</b>	Output for the time and message telegrams: RS-232 and 20 mA - current loop; connector: DB25,
<b>MENU, SET</b>	Keys for performing various settings of the display: time, brightness, language, time zone, network settings ...
<b>RELAY</b>	Output with the terminals of a relay which can close the circuit when the messages are displayed; connector: DB 9
<b>FUSE</b>	Fuse – 5 A, slow blow;
<b>230 V</b>	Euro-socket for the mains connection;
<b>PC IN , IN</b>	Auxiliary inputs – for service purposes only;



**Fig. 8:** The pins on the display's connectors.

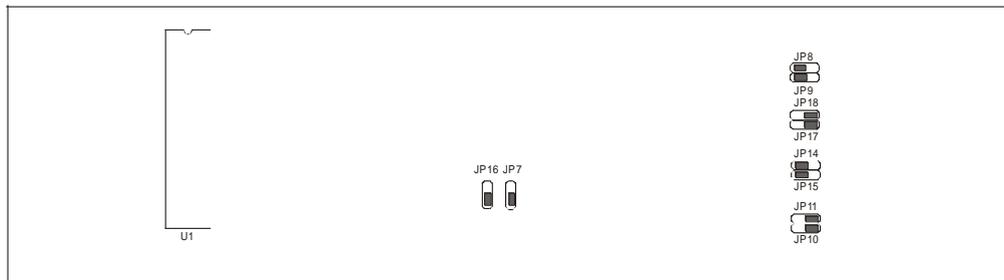
## 6. TECHNICAL DATA

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<b>Displaying characteristics:</b>	up to 20 characters at a time, height of characters: 50 mm, format of characters: 5x7, pixel diameter: 5 mm, color: red or green
<b>Network interface:</b>	10Base-T/100Base-TX Ethernet 10/100Mbit; connector: RJ 45
<b>Outputs:</b>	Selectable by jumpers: RS-232/20 mA (passive/active); DB25 female connector
<b>Output-telegram format:</b>	32 ASCII characters, once per minute <Stx>D:23.05.09;T:6;U:11.45.24;#*S!<Etx>
<b>Baud rate:</b>	9600 bps (output signals)
<b>Framing:</b>	8N1 – 8 data bits, no parity, 1 stop bit
<b>Relay output:</b>	2 normally closed contacts and 2 normally open contacts, Relay: Matsushita DS2Y Max. allowed load: 0.3 A (at 125 V AC), 0.3 A (at 110 V DC), 1 A (at 30 V DC), DB9 female connector
<b>Number of messages:</b>	31+1
<b>Length of messages:</b>	up to 241 characters in the case of the running messages, up to 220 characters in the case of the static, one-line messages
<b>Internal clock:</b>	Accuracy: $\pm 2 \times 10^{-5}$ (in the case of autonomous operation); battery-powered (after the display has been turned off)
<b>Battery backup:</b>	In case of a power failure, the internal clock runs up to 10 years following the date of production; the messages remain in the memory for at least 100 hours after the display has been turned off
<b>Power supply:</b>	85 – 264 V AC / 43 – 60 Hz or 120 – 375 V DC
<b>Consumption:</b>	up to 40 W
<b>Fuse:</b>	T 5 A L/250 V–
<b>Dimensions:</b>	996 mm × 100 mm × 60 mm (not including the mounting carriers)
<b>Weight:</b>	5,3 kg
<b>Protection class:</b>	IP30
<b>Temperature range:</b>	0..50° C

## 7. ARRANGEMENT OF JUMPERS

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### Function of jumpers:

<b>JP14, JP15</b>	RX_INFO input – confirmation of the message's reception (20 mA current loop): <b>active</b> / passive
<b>JP16</b>	selection of the RX_INFO input: <b>RS232</b> / 20 mA current loop
<b>JP17, JP18</b>	time-telegram output (20mA current loop): <b>passive</b> / active
<b>JP7, JP8, JP9, JP10, JP11</b>	reserved (do not change)

### The jumpers are shown in the following (default) positions:

<b>JP14</b>	active
<b>JP15</b>	active
<b>JP16</b>	RS232
<b>JP17</b>	passive
<b>JP18</b>	passive