



## LED Matrix Panel

**User Documentation for this variants:**

*Ethernet (EGM);*

*RS-485 (EGM)*



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## 1. Preface

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Dear Customer,

We sincerely thank you for choosing EGMedical, s.r.o. products.

Our company's products stem from years of experience in the development and manufacturing of electronic devices across a wide range of fields, including electronic systems, voice applications, industrial control, robotics, automation, telecommunications, and communication technology. This guide will assist you in installing, using, and maintaining the product correctly. We are confident that EGMedical's product will serve you without any issues.

Before leaving our development laboratories, our products undergo comprehensive functionality and quality testing. However, if you encounter any issues with our goods, we are here to help you resolve them.

EGMedical provides a warranty for all its products, which applies only to products used in accordance with the instructions and safety guidelines. Interventions and repairs to the products should be performed by authorized EGMedical technicians, unless explicitly stated otherwise. Please note that adjustments to product settings or hardware system interventions may significantly affect its performance and lifespan.

This user manual has been prepared based on our knowledge and experience. Please be aware that our products are constantly evolving and improving, so you may encounter modifications in the future that are not described in this manual.

Sincerely,

Ing. Ivo Stražil, R&D manager | CEO

## 2. Communication Parameter Setup

### 2.1. Ethernet configuration (EGM)

For Ethernet connectivity, the Wiznet WIZ107SR controller is utilized. The configuration of the controller can be performed using the WIZ107SR / WIZ108SR Config Tool for Windows v1.4.4.1, available at:

[https://www.egmenergo.cz/wp-content/uploads/2023/07/wiz107\\_108\\_config\\_tool.zip](https://www.egmenergo.cz/wp-content/uploads/2023/07/wiz107_108_config_tool.zip)

The default IP address is 192.168.1.216, with DHCP disabled. To initially connect the program to the display, click on the Search icon in the toolbar and confirm by clicking the Search button in the dialog without filling in additional fields. The standard TCP communication port is number 5000. Switching to UDP connection is possible by selecting the UDP option in the Select operation mode for the device frame (see Fig. 2.1).

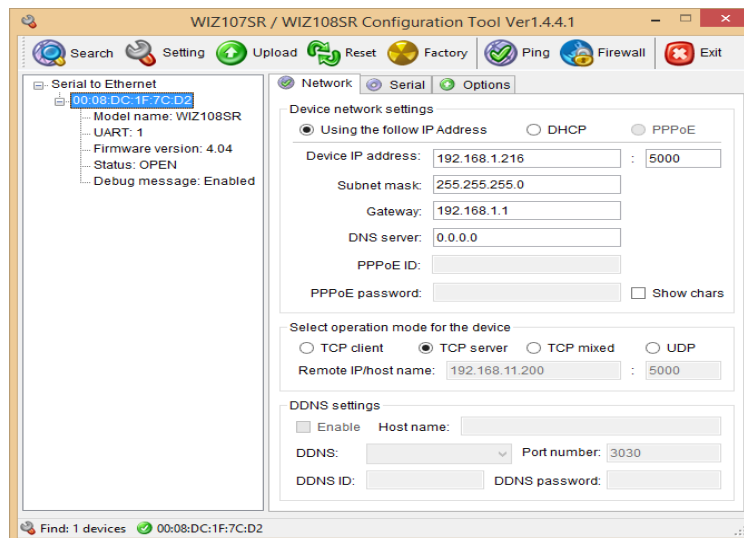


Fig. 2.1: Setting up the Network Interface

### 2.2. RS-485 configuration (EGM)

If it is necessary to control the device via the RS-485 bus, set the communication speed of the transmitting device to 9600 bps, using the 8N1 format. Connect the bus conductors to the A, B, GND terminals on the controller board. The controller board comes standard with a bus termination resistor installed.

To apply changes to the time zone, it's necessary to restart the device. This can be done by clicking on the Restart Device button in the Reset section.

### 3. Protocol description

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After being powered on, the display enters its standby mode, consuming its idle current (which varies based on panel size), and waits for commands.

Control is carried out by transmitting datagrams over the RS-485 or ETHERNET interface using the UDP or TCP protocol to the IP address of the target device (the device operates as a UDP or TCP server, accepting connections).

A datagram contains a message that carries one or more commands. The datagram has a general format: <STX><Addr><message><ETX> where:

- <STX> is 0x02 (1 byte – start of message)
- <Addr> is 0x01 (1 byte – internal address of the panel)
- <message> up to 1450 bytes of transmitted data
- <ETX> is 0x03 (1 byte – end of message)

Message Content:

<0x01><command><param1><param2>....<ETB><0x02><command><param1><param2>....<ETB><0x03><param1><param2>....<ETB> where:

- <0x01> block number – sequential number of the command block with parameters
- <command> two-character identification of the command
- <paramX> sequence of parameters belonging to the command
- <ETB> block end marker (1 byte 0x17)

The maximum length of a command with parameters is 248 B (1000 B for displays wider than 160 px).

Example of a datagram (the command with parameters is indicated in italics):

```
$02$01$01DWN01P00000000E00960016B8$17$03
```

(unprintable characters are represented as \$xx, where xx corresponds to the hexadecimal value)

#### 3.1. Commands

Parameters of commands are always preceded by a letter. The order of parameters is fixed, and all parameters must be used. If the number of characters of a parameter is specified (e.g., N## or Pxxxxyyy), it's necessary to maintain the specified character count by padding with leading zeros (e.g., N01).

The coordinate system used has its origin at point (0, 0) in the top-left corner of the display surface.

**DC** – cancellation of all defined display windows (without parameters)

**DW** – defining a text display window

Parameters:

N##            Numeric index of a defined display window within the **range of 00 – 09**.

Pxxxxyyy      Position of the start of the text window – its top left corner

(Note: The origin of the panel's coordinate system is considered as the top left corner, x – horizontally, y – vertically)

Exxxxxyyy position of the end of the text window – its bottom right corner

Bn text alignment in the window, where:

n='1' right alignment

n='2' text centered

n='3' left alignment

n='8' text in the window is scrolling

enabled only for subsequent display using the EX command), max. text length is 127 characters (250 characters for displays wider than 128 px), a maximum of 2 scrolling texts can be displayed simultaneously on the board (8 characters for displays wider than 128 px)

Creating a window definition does not erase the window area. For erasing, use the EC command, or erasure will occur with every text rendering or during the display of scrolling text.

Windows can overlap: when entering static text using the EX command, the last used window is always in the foreground. When using scrolling text, the scrolling text will always be in the foreground.

Example sequence of commands (without wrapping into messages/datagrams) for defining window no. 99 and displaying the text "Hello world" in this window.

- DWN01P00000000E00960016B2
- EXN01C0000F9T Hello world
  - (send with Win-1250 encoding)

**EC** – clear the content of the display window

Parameters:

N## window index

**EX** – write text into the display window

Parameters:

N## window index

C#### supplementary display function index (see below)

F# font set (see below)

Ttext displayed text (at least 1 character; standard character set for diacritics Windows 1250)

(RTC commands are available only on special order)

**ET** – display real-time clock in the given text window (always in 24h format); the command turns on continuous display of real-time clock from the display unit. It can be stopped by the EC command on the specified window.

Parameters:

N##	window index
C####	supplementary display function index (see below)
F#	font set (see below)
D#	time format (value 0 – 3)
•	0 – HH:MM:SS,
•	1 – HH:MM ,
•	2 – SSSS (special format for time output in seconds),
•	3 – SSSS,S (increments every 0.2 seconds)

**ES** – control command for setting special time output in seconds.

Parameters:

N##	window index
T####	initial value of the time counter (only relevant for the following parameter U9, otherwise input T0000)
U#	direction of time counting in second intervals (0 – stop, 1 – up, 2 – down, 9 – set)

Before using this command, set the designated display window to counting mode using the ET command with the D2 parameter. Then, use the ES command to set the counter, and activate it using the ET command. The display unit will automatically show the data. Multiple windows with such definitions can be created simultaneously. Setting U9 does not change the direction of the counting. The counter runs even if its value is not displayed in the respective window.

(RTC commands are available only on special order)

**ED** – Displaying Real-Time Date Information from the RT Display Unit.

Parameters:

N##	window index
C####	supplementary display function index (see below)
F#	font set (see below)
D#	time format (value 0 – 1) 0 – DD.MM.YY, 1 – DD.MM.YYYY

**TB** – setting the display brightness

Parameters:

B###	desired brightness in the range of 0 – 255 (higher value = higher brightness) The default brightness after restarting the display is set to approximately 50%.
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(RTC commands are available only on special order)

**TC** – setting the internal clock of the display



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Parameters:

H## hours  
M## minutes  
S## seconds  
D## days  
M## months  
R## years (last two digits)

The display is not equipped with clock backup, it is recommended to send the TC command at least once every 24 hours and always after restarting the display.

**LG** – drawing a line

Parameters:

O# Orientation 0: Horizontal, 1: Vertical  
A### Minimum in the X axis or Y axis (horizontal resp. vertical line)  
B### maximum in the X axis or Y axis (horizontal resp. vertical line)  
C### Position in the Y axis or X axis (horizontal resp. vertical line)  
B# color:  
1: draw red line, 2: draw green line, 3: draw yellow line (red+green),  
0: erase line

Coordinates for the LG command are calculated from the lower left corner of the display.

**TN** – Tunneling of commands of the standard ASCII protocol of EGMedical displays (for service purposes only)

## 4. Font sets (excluding Cyrillic)

### 4.1. Fonts sets without Cyrillic – default fonts in the device

Font number	Font	Encoding / Note
0	4x6 Recommended setting C=0**	Windows – 1250 real height 6 px
1	9x15 Recommended setting C=3**	Windows – 1250 real usable height 16 px
2	9x15 Bold Recommended setting C=3**	Windows – 1250 real usable height 16 px
3	Helvetica 08 Recommended setting C=3**	Partial support of Czech characters real usable height 8 px
4	7x13 Recommended setting C=3**	Windows – 1250 real usable height 12 px
5	7x13 Bold Recommended setting C=3**	Windows – 1250 real usable height 12 px
6	10x20 Recommended setting C=16**	Windows – 1250 real usable height 16 px with bottom cropping
7	9x18 Bold Recommended setting C=16**	Windows – 1250 real usable height 16 px
8	8x13 Italic Recommended setting C=3**	Windows – 1250 real usable height 13 px
9	6x13 Recommended setting C=3**	Windows – 1250 real usable height 12 px
10	6x13 Bold Recommended setting C=3**	Windows – 1250 real usable height 12 px
11	6x9 Recommended setting C=3**	Windows – 1250 real usable height 7 px
12	5x8 Recommended setting C=3**	Windows – 1250 real usable height 6 px
13	Big font 24px	without support of Czech characters*
14	Big font 24px Bold	without support of Czech characters*
15	Big font 24px	without support of Czech characters*
16	Big font 24px Bold	without support of Czech characters*
17	Big font 32px	without support of Czech characters*
18	Big font 32px Bold	without support of Czech characters*
19	empty	

\* - Fonts are only loaded in displays with a minimum height of 32 px.

\*\* - indicates the Recommended setting in the Additional Display Functions field to make optimal use of the available line height.

For selecting fonts number 10 – 19, it is necessary to activate option 32 in the "additional display functions" field. In the command parameters, then input the font number from 0 – 9.

## 4.2. Additional Display Functions

In the field of Additional Display Functions for commands (parameter "C" of text display functions), we choose functions that modify the display for the given text window. We use a value that is the sum of the selected options.

Option	Function
1	Shift 1st line in the window 4px upwards (diacritics may be truncated)
2	Shift 1st line in the window 2px downwards (can be used simultaneously with option 1: shift 2px upwards)
4	Narrower spacing between lines by 1px when line breaks
8	Narrower spacing between lines by 3px when line breaks (can be used simultaneously with option 4)
16	Shift 1st line in the window 6px upwards (diacritics may be truncated) (can be combined with options 1 and 2)
32	Font No. 10 – 19 will be used when selecting font No. 0 – 9
64	Red font will be used (if option 64 or 128 is not active, green font is chosen)
128	Yellow font will be used (red + green glow simultaneously)
256	Switches to KOI-8 fonts (only on displays with installed Cyrillic)

## 5. Fonts sets (including Cyrillic)

### 5.1. Cyrillic Settings and Support – Displaying the Cyrillic Alphabet (Azбуka)

Displays with Cyrillic support have fonts installed that include the KOI-8B character set. This character set contains both Latin letters (in the regular positions of the ASCII 7-bit table) and the complete Cyrillic alphabet. However, it's not possible to display Czech characters with diacritics in this character set.

To display text using the KOI-8B character set, use option 256 in the Additional Display Functions.

Character Set:

			83	è												
			B3	È												
C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF	
Ю	а	б	ц	д	е	ф	г	х	и	й	к	л	м	н	о	
D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF	
п	я	р	с	т	у	ж	в	ь	ы	э	ш	э	щ	ч	ъ	
E0	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF	
Ю	А	Б	Ц	Д	Е	Ф	Г	Х	И	Й	К	Л	М	Н	О	
F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF	
п	я	р	с	т	у	ж	в	ь	ы	э	ш	э	щ	ч	ъ	

## 5.2. Fonts sets with Cyrillic

In devices with Cyrillic support, the following additional fonts are loaded, which the device will use when setting the Additional Display Function option to 256:

Font number	Font	Encoding / Note
0	5x8 Recommended setting C=0**	KOI-8B real height 6 px
1	6x10 Recommended setting C=0**	KOI-8B real usable height 8 px
2	6x13 Recommended setting C=0**	KOI-8B real usable height 13 px
3	6x13 Bold Recommended setting C=0**	KOI-8B real usable height 13 px
4	6x9 Recommended setting C=0**	KOI-8B real usable height 10 px
5	7x14 Recommended setting C=0**	KOI-8B real usable height 14 px
6	7x14B Recommended setting C=0**	KOI-8B real usable height 14 px
7	8x13 Recommended setting C=0**	KOI-8B real usable height 13 px
8	empty	
9	8x16 Recommended setting C=2**	KOI-8B real usable height 16 px
10	empty	
11	9x15 Recommended setting C=2**	KOI-8B real usable height 16 px
12	9x15 Bold Recommended setting C=2**	KOI-8B real usable height 16 px
13	9x18 Recommended setting C=2**	KOI-8B real usable height 16 px with bottom cropping
14	9x18 Bold Recommended setting C=2**	KOI-8B real usable height 16 px with bottom cropping

\*\* - Specifies the Recommended setting in the Additional Display Functions field to optimally utilize the available line height (of course, further adding 256 for the font selection with Cyrillic characters).



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## 6. Examples of complete datagrams

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In the examples, non-printable characters are indicated as \$XX, where XX is the hexadecimal value of the character. The examples can be directly copied, for instance, into a terminal program like Terminal by Bray, which correctly interprets these input characters.

```
$02$01$01TBB255$17$03
```

Setting brightness to maximum level.

```
$02$01$01DWN01P00000000E00960016B8$17$03
```

Defining a display window (0,0) – (96,16) with scrolling text.

```
$02$01$01EXN01C0418F4TBukvy: $A3 $B3 $C0 $F0 $FF $17$03
```

Displaying a sample of the Cyrillic alphabet in the display window.

```
$02$01$01LGO0A070B090C012B3$17$03
```

Drawing a line graphically – a line in the range (70,12) - (90,12).

## 7. Contact Information

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For any issues, feedback, or possible commendations, please contact the address provided below. Thank you.

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