

# DEVICE OPERATION MANUAL

## Universal Industrial Text Display

### 1. Introduction

The device is designed to cooperate with industrial and computer systems which require displaying texts sent by these systems. Data are sent by the simple communication protocol Serial RGB or by the MODBUS RTU protocol. The display supports characters appearing in English, Polish, Russian, German, Czech, Slovak, Hungarian, Ukrainian, Lithuanian, Latvian, Norwegian, Swedish, French, Dutch, and special characters. Moreover, it supports digits of fixed width enabling the presentation of numerical results, e.g. of weight measurement, the number of counted items, etc.

### 2. Display communication interfaces

The display can receive data through the following interfaces:

- Ethernet (available optionally, two-way communication),
- RS485 (two-way communication),
- RS422 (two-way communication),
- RS232 (one-way communication),
- current loop 20 mA.

The two-way communication in the following interfaces: RS485, RS422 and Ethernet enables getting the confirmation of receiving data by the display.

The device works with the Serial RGB protocol by default. An optional protocol is MODBUS RTU (only for the RS422/RS485 interface, after prior configuration of the device).

To communicate by means of serial interfaces, addressing the display is used. After the device is started for the first time, the default address is 0 (default Serial RGB protocol). Changing the address is described in Section 3. The function of addressing enables sending data to the selected device when several displays are parallelly connected to the data source. The target address is given in the data frame sent to the display. When the data are to be sent to all devices connected to the bus, the address byte in the data frame assumes the value 255 (for the Serial RGB protocol) and 0 (for the MODBUS RTU protocol). It is a, so called, broadcast address. For the communication through the Ethernet interface (available optionally) addressing is skipped, because devices are addressed by means of an IP address.

For the communication through the Ethernet, data are transferred only by means of the Serial RGB protocol. The default parameters are as follows: protocol UDP or TCP, on port 2101.

### 3. Configuring the display

The display can be configured by:

- Embedded User menu,
- Configuration frames sent by means of the MODBUS RTU protocol (serial interfaces),
- Configuration frames sent by means of the Serial RGB protocol (serial interfaces and the Ethernet).

To **check current display operation settings**, you should:

- Use the embedded User menu described in Section 4 option „info”.

To **activate the display MODBUS RTU/Serial RGB protocol for serial interfaces (RS485, RS422, RS232, CL)**, you should:

- Use the embedded User menu described in Section 4 option „proto”.

To **change the parameters of serial interfaces (RS485, RS422, RS232, CL)**, you should perform an activity described in one of the following subsections:

- Use the embedded User menu described in Section 4 option „proto”,
- For the MODBUS RTU protocol, send the User command frame.

To **change the display address for serial interfaces (RS485, RS422, RS232, CL)**, you should perform an activity described in one of the one of the following subsections:

- Use the embedded User menu described in Section 4 option „proto”,
- For the Serial RGB protocol, send the configuration frame,
- For the MODBUS RTU protocol, send the frame of a single register write.

To check the display address for serial interfaces (RS485, RS422, RS232, CL), you should perform an activity described in one of the following subsections:

- Use the embedded User menu described in Section 4 option „addr”,
- For the Serial RGB protocol, send the frame of displaying address,
- For the MODBUS RTU protocol, send the User command frame.

To change the settings of the display network layer (a device with the Ethernet interface), you should:

- Use the embedded TELNET menu described in Section 6.

To change the display brightness profile, you should:

- For the Serial RGB protocol, send the configuration frame,
- For the MODBUS RTU protocol, send the frame of a single register write command.

To change the displayed content, you should perform an activity described in one of the following subsections:

- For the Serial RGB protocol, send the frame of text transmission,
- For the MODBUS RTU protocol, send the frame of a multiple registers write.

## 4. Embedded User menu

The microbutton, used to operate the menu, is located inside the display casing. It is described as “DEF” (Fig. 8.1 and 8.2). Before you start the configuration process, you must disassemble the device casing.

**NOTICE!** Before you start disassembling the casing, disconnect the device from the power supply. This activity should be performed with special caution, due to the danger of electric shock.

The User menu has the following options:

- info,
- addr,
- proto,
- reset.

To activate the specific option, keep the microbutton pressed until the description of this option appears (an inscription: „info”, „addr”, „proto” or „reset”). You can select an option when you release the microbutton at the moment of displaying its name. If the button is released at the moment of blanking the descriptions in between displaying the subsequent items, the display will return to its normal operation mode.

The option „info” allows displaying the device software version. For devices with the Ethernet interface, network layer settings are presented (the IP address, network mask, and communication port). Then, regardless of the device version, the information about the current serial interface operation mode and the device address is displayed.

The option „addr” allows you to choose a display address for the currently operating communication protocol. After this option is entered, the currently used address will be displayed. Editing the address value is done by consecutive changes of three digits included in it (000 - 255). The currently edited digit is blinking. You can change it by shortly pressing the microbutton. To confirm, keep the microbutton pressed for a long time (until the next digit starts blinking). When the last digit has been edited, keeping the microbutton pressed for a long time will result in saving its value and displaying the inscription „Saved”. When the User is inactive for 30 seconds, the “menu” option is left automatically.

The option „proto” allows the configuration of the device communication protocol for serial interfaces. By shortly pressing the microbutton, you can choose one of the following protocols:

- RGB Serial,
- MODBUS RTU.

You can confirm it by keeping the microbutton pressed as long as the option allowing you to select parity, a number of stop bits appears:

- 8N1 (lack of parity control, 1 stop bit),
- 8E1 (Even parity control, 1 stop bit),
- 8O1 (Odd parity control, 1 stop bit),
- 8N2 (lack of parity control, 2 stop bits).

You can confirm it by keeping the microbutton pressed as long as the option allowing you to select the transmission speed appears:

- 300 bps,
- 600 bps,
- 1200 bps,
- 2400 bps,
- 4800 bps,
- 9600 bps,
- 14400 bps,
- 19200 bps,
- 28800 bps,
- 38400 bps,
- 57600 bps,
- 76800 bps,
- 115200 bps.

You can confirm the selected protocol by keeping the microbutton pressed for a long time (until the inscription „Saved” appears). When the User is inactive for 30 seconds, the “menu” option is left automatically.

The „reset” option allows you to restore the serial interface default settings (Serial RGB, 8N1, 9600 bps, address: 0) and the network layer for devices with the Ethernet (IP address: 192.168.0.11, network mask: 255.255.255.0, communication port: 2101). To restore the default settings, you should, during the normal device operation, press the microbutton and keep it pressed until the inscription: “reset” appears. Keep the button pressed until the inscription „reset” starts blinking, and do not release it until the information: “default” is displayed. Releasing the button before the inscription: „default” is displayed will result in canceling the process of restoring the default settings and the display will continue operating according to the previously accepted parameters. Downloading new network settings is possible only by means of the embedded telnet menu described in Section 6.

## 5. Display communication protocol - Serial RGB and MODBUS RTU

To receive the specification, please contact the manufacturer of this device. The MODBUS RTU protocol is denoted as R003, and Serial RGB as R004. When you select the communication protocol, you should bear in mind that, according to the general specification, MODBUS RTU needs two-way communication to work properly (only the communication through RS422 and RS485 is supported).

## 6. Changing the display network settings

Editing network settings concerns the LAN. Such configuration is possible only in the displays able to communicate through the Ethernet. It is possible by means of the menu accessible through TELNET. To gain the access to the menu, you should connect with the display (default IP number: 192.168.0.11) on port 23, by means of the TCP protocol. You can gain it by entering the command *telnet 192.168.0.11* into the Windows console. During the connection process, the user will be asked to enter the password. The default password is “dbps” (may be changed). Next, the list of available options will be displayed:

MENU:

0: Telnet echo	4: Save settings
1: Change IP number	5: Actual settings
2: Change subnet mask	6: Change telnet password
3: Change display port	7: Exit

By selecting the number assigned to the option and pressing the **Enter** button, you can edit the device parameters. To apply the changes, you must use the option „4: Save settings”, then the display will disconnect and restart with the new settings. The option “0: Telnet echo” deserves special attention: some programs enabling the communication by means of the telnet do not display characters entered by the User on the screen. This option allows activating an echo, which results in displaying the characters entered by the User. The echo is inactive by default.

It is possible to display current network settings on the LED display. To do it, keep the microbutton located on the display printed circuit board (near the LEDs signaling the connection with the LAN) pressed for about one second, till the inscription: “info” is shown on the display. Next, you should release it and, then, the device IP number, net mask and the port on which the display communicates will be displayed.

To restore the factory settings of the network layer, keep the microbutton pressed as long as the inscription: „reset” appears on the display, and, then, release the button. The display will return to the default settings.

## 7. Detecting the device in the LAN

If the display has been connected to the LAN, detecting its presence is possible due to the RGB Devicer program. It allows defining the device IP address, network layer, MAC number, software version and other parameters.

## 8. Connectors of displays for weighing scales

In Table 8.1. there is a description of the UPWT-1 and UPWT-2 display connectors. The connectors are accessible after disassembling the casing.

**NOTICE!** Before you start disassembling the casing, disconnect the device from the power supply. This activity should be performed with special caution, due to the danger of electric shock.

**Tab. 8.1.** List of the UPWT-1 and UPWT-2 display connectors

Interface / Function	Connector designation	Remarks
Thermometer	5V	Power line for the thermometer
	T	Data line for the thermometer
	GND	GND line for the thermometer
Digital current loop 20 mA	CA	CL line of the current loop
	CK	GND line of the current loop

Interface / Function	Connector designation	Remarks
RS232	RA	RXD line of the interface RS232
	RK	GND line of the interface RS232
RS485 RS422	A	Reversing line of the interface RS485 and RS422
	B	Non-reversing line of the interface RS485 and RS422
	GND	GND line of the interface RS485 and RS422 to use at risk of the appearance of a significant difference between the potentials of the display mass and the controlling device mass
Ethernet (option)	TX+	Pin no. 1 of the plug RJ-45
	TX-	Pin no. 2 of the plug RJ-45
	RX+	Pin no. 3 of the plug RJ-45
	RX-	Pin no. 6 of the plug RJ-45
230 VAC power supply	L	Phase conductor of the 230 VAC network (only for UPWT-2)
	N	Neutral conductor of the 230 VAC network (only for UPWT-2)
	PE	Protective conductor of the 230 VAC network (only for UPWT-2)

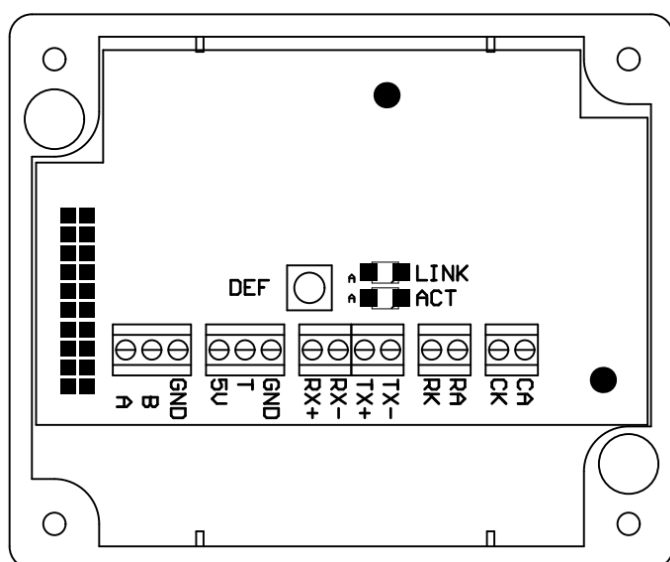


Fig. 8.1. UPTW-1 display connectors

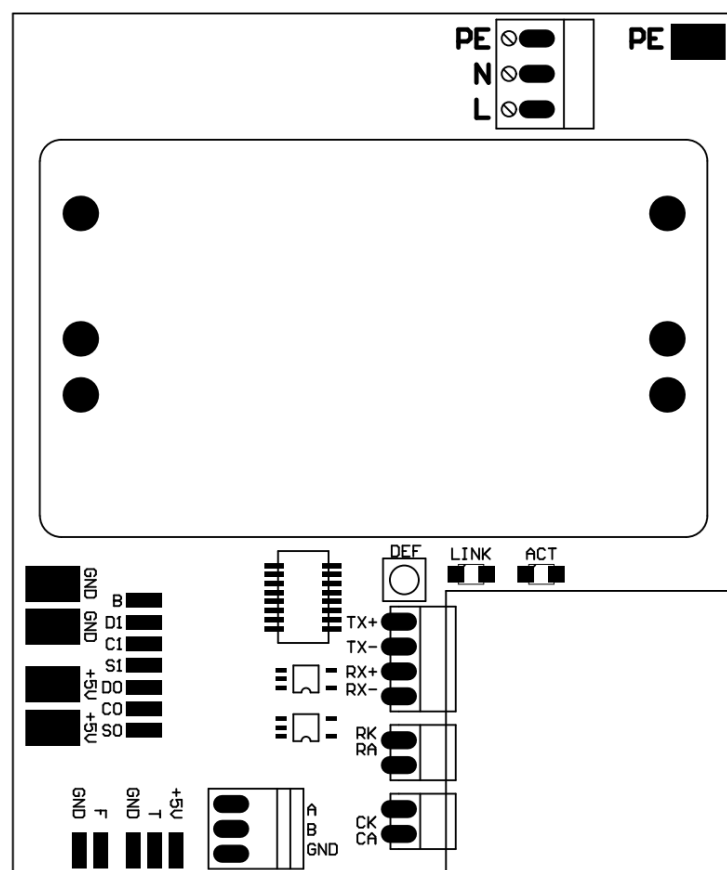


Fig. 8.2. UPTW-2 display connectors

## 9. Tables of the display characters

Every character included in the User text is defined by two bytes – the Most Significant Byte and the Less Significant Byte. The Most Significant Byte defines the table of characters to which the character belongs, while the Less Significant Byte defines the code of the character. For example, the character string „łąka” describes the data string: 1, 13, 1, 1, 0, 107, 0, 97. In the tables from Tab. 9.1. to Tab. 9.14., there are tables of the characters supported by the display (including the characters appearing in English, Polish, Russian, German, Czech, Slovak, Hungarian, Ukrainian, Lithuanian, Latvian, Norwegian, Swedish, French, Dutch,, and special characters).

In the table of standard characters there are special characters. The characters 142 and 143 allow you to change the typeface of the displayed inscription, while the character 140 is the symbol of a thermometer. In the displayed text, it will be replaced by the temperature measured by the device.

**Tab. 9.1.** Table of standard characters (table code: 0)

Code	Character	Code	Character	Code	Character	Code	Character	Code	Character
0	none	29	\$	58	:	87	W	116	t
1	\$	30	\$	59	;	88	X	117	u
2	\$	31	\$	60	<	89	Y	118	v
3	\$	32	spc	61	=	90	Z	119	w
4	\$	33	!	62	>	91	[	120	x
5	\$	34	"	63	?	92	\	121	y
6	\$	35	#	64	@	93	]	122	z
7	\$	36	\$	65	A	94	^	123	{
8	\$	37	%	66	B	95	_	124	
9	\$	38	&	67	C	96	`	125	}
10	\$	39	'	68	D	97	a	126	~
11	\$	40	(	69	E	98	b	127	\$
12	\$	41	)	70	F	99	c	128	\$
13	\$	42	*	71	G	100	d	129	Rightwards arrow
14	\$	43	+	72	H	101	e	130	Leftwards arrow
15	\$	44	,	73	I	102	f	131	Downwards arrow
16	\$	45	-	74	J	103	g	132	Upwards arrow
17	\$	46	.	75	K	104	h	133	€
18	\$	47	/	76	L	105	i	134	£
19	\$	48	0	77	M	106	j	135	°
20	\$	49	1	78	N	107	k	136	Not defined
21	\$	50	2	79	O	108	l	137	Not defined
22	\$	51	3	80	P	109	m	138	Pause 1sec
23	\$	52	4	81	Q	110	n	139	Clear the display
24	\$	53	5	82	R	111	o	140	Symbol of the thermometer
25	\$	54	6	83	S	112	p	141	Vertical bar (1px)
26	\$	55	7	84	T	113	q	142	Changing the typeface to Thin
27	\$	56	8	85	U	114	r	143	Changing the typeface to Bold
28	\$	57	9	86	V	115	s		

**Tab. 9.2.** Table of Polish characters (table code: 1)

Code	Character	Code	Character	Code	Character	Code	Character
0	none	5	ń	10	Ą	15	Ó
1	ą	6	ó	11	Ć	16	Ś
2	ć	7	ś	12	Ę	17	Ż
3	ę	8	ź	13	Ł	18	Ź
4	ł	9	ż	14	Ń		

**Tab. 9.3.** Table of Russian characters (table code: 2)

Code	Character	Code	Character	Code	Character	Code	Character	Code	Character
0	none	11	м	22	ы	33	з	44	ц
1	б	12	н	23	ь	34	и	45	ч
2	в	13	п	24	э	35	й	46	ш
3	г	14	т	25	ю	36	к	47	щ
4	д	15	у	26	я	37	л	48	ъ
5	ж	16	ф	27	ё	38	м	49	ы
6	з	17	ц	28	б	39	н	50	ь
7	и	18	ч	29	в	40	п	51	э
8	й	19	ш	30	г	41	т	52	ю
9	к	20	щ	31	д	42	у	53	я
10	л	21	ъ	32	ж	43	ф	54	ё

**Tab. 9.4.** Table of German characters (table code: 3)

Code	Character	Code	Character	Code	Character
0	none	3	ö	6	Ä
1	ß	4	ü	7	Ö
2	ä	5	ß	8	Ü

**Tab. 9.5.** Table of Czech characters (table code: 4)

Code	Character	Code	Character	Code	Character
0	none	11	ť	22	Ň
1	á	12	ú	23	Ó
2	č	13	ů	24	Ř
3	ď	14	ý	25	Š
4	é	15	ž	26	Ť
5	č	16	Á	27	Ú
6	í	17	Č	28	Ů
7	ň	18	Ď	29	Ý
8	ó	19	É	30	Ž
9	ř	20	Ě		
10	š	21	Í		

**Tab. 9.6.** Table of Slovak characters (table code: 5)

Code	Character	Code	Character	Code	Character	Code	Character
0	none	9	ň	18	Á	27	Ó
1	á	10	ó	19	Ä	28	Ö
2	ä	11	ô	20	Č	29	Ř
3	č	12	í	21	Ď	30	Š
4	ď	13	š	22	É	31	Ť
5	é	14	ť	23	Í	32	Ú
6	í	15	ú	24	Ľ	33	Ý
7	l	16	ý	25	Ľ	34	Ž
8	ĺ	17	ž	26	Ň		

**Tab. 9.7.** Table of Hungarian characters (table code: 6)

Code	Character	Code	Character	Code	Character	Code	Character
0	none	5	ö	10	Á	15	Ő
1	á	6	ó	11	É	16	Ú
2	é	7	ú	12	Í	17	Ü
3	í	8	ü	13	Ó	18	Ű
4	ó	9	ű	14	Ö		

**Tab. 9.8.** Table of Ukrainian characters (table code: 7)

Code	Character	Code	Character	Code	Character
0	brak	2	e	5	Е
1	р	4	Г	6	ї

**Tab. 9.9.** Table of Lithuanian characters (table code: 8)

Code	Character	Code	Character	Code	Character	Code	Character
0	none	5	j	10	Ą	15	Š
1	ą	6	š	11	Č	16	ų
2	č	7	ų	12	Ę	17	Ū
3	ę	8	ū	13	Ė	18	Ž
4	ė	9	ž	14	Į		

**Tab. 9.10.** Table of Latvian characters (table code: 9)

Code	Character	Code	Character	Code	Character	Code	Character
0	none	6	ķ	12	Ā	18	ļ
1	ā	7	ļ	13	Č	19	ņ
2	č	8	ņ	14	Ē	20	š
3	ē	9	š	15	Ģ	21	ū
4	ģ	10	ū	16	Ī	22	ž
5	ī	11	ž	17	Ķ		

**Tab. 9.11.** Table of Norwegian characters (table code: 10)

Code	Character	Code	Character
0	none	4	Æ
1	æ	5	Ø
2	ø	6	Å
3	å		

**Tab. 9.12.** Table of Swedish characters (table code: 11)

Code	Character	Code	Character
0	none	4	Å
1	å	5	Ä
2	ä	6	Ö
3	ö		

**Tab. 9.13.** Table of French characters (table code: 12)

Code	Character	Code	Character	Code	Character
0	none	9	ï	18	È
1	à	10	ô	19	É
2	â	11	œ	20	Ê
3	ç	12	ù	21	Ë
4	é	13	û	22	Ï
5	è	14	À	23	Ï
6	ë	15	Ã	24	Œ
7	ê	16	Ç	25	Ù
8	î	17	É	26	Û

**Tab. 9.14.** Table of Dutch characters (table code: 13)

Code	Character	Code	Character
0	none	9	À
1	à	10	Ç
2	ç	11	É
3	é	12	È
4	è	13	Ë
5	ë	14	Ï
6	ï	15	Ù
7	ù	16	Ö
8	ö		

Additionally, characters of fixed width are supported. These fonts are dedicated to weighing scales systems: normal1, normal2, bold1, bold2 and bold3. Table codes referring to the fonts are listed in Table 9.15, while characters corresponding to the codes are presented in Table 9.16:

**Tab. 9.15.** List of table codes of dedicated characters of fixed width:

Font	Table code
normal1	20
normal2	21
bold1	22
bold2	23
bold3	24

**Tab. 9.16.** Table of dedicated characters of fixed width (table codes: 20, 21, 22, 23, 24):

Code	Character	Code	Character
0	'0'	6	'6'
1	'1'	7	'7'
2	'2'	8	'8'
3	'3'	9	'9'
4	'4'	10	'k'
5	'5'	11	'g'