ICON PROCESS CONTROLS TVL Series Tank Level Display and Controller Owner's Manual

Contents

ICON PROCESS CONTROLS TVL Series Tank Level Display and Controller

Specifications

General

- **Display:** Displayed Values Stability Transmission Parameters Protection Class

Input Signal Supply

- **Standard Voltage:** Current: 4-20mA 0-20mA 0-5V* 0-10V* 85 – 260V AC/DC 16 – 35V AC, 19 – 50V DC*

Output Signal Supply

- **Standard Voltage:** Passive current output * 2 x Relays (5A) 1 x Relay (5A) + 4-20mA 24VDC 4-20mA (Operating Range Max. 2.8 – 24mA)

Performance

- **Accuracy:** According to IEC 60770 – Limit Point Adjustment Non-Linearity Hysteresis Repeatability

Temperatures

- **Operating** Temperatures

Materials Wetted

- **Housing:** Polycarbonate

Part Number

- TVL-550-1821
- TVL-550-1829

Product Usage Instructions

Basic Requirements

- Do not use the unit in areas threatened with excessive shocks, vibrations, dust, humidity, corrosive gasses, and oils.
- Do not use the unit in areas where there is a risk of explosions.
- Do not use the unit in areas with significant temperature variations, or exposure to condensation, or ice.
- The manufacturer is not responsible for any damages caused by inappropriate installation, not maintaining the proper environmental conditions, and using the unit contrary to its assignment.
- If there is a risk of a serious threat to safety in case of unit malfunction, additional independent systems should be used.
- The unit uses dangerous voltage; ensure it is switched off and disconnected from power before troubleshooting.
- Avoid disassembling, repairing, or modifying the unit yourself.
- Defective units should be submitted for repairs at an authorized service center.

Front Panel Description

- The front panel includes features like Alarm LED indicators, an Infrared Receiver, a Bright Large Display, Programming Buttons, and Function Push Buttons.

Wiring Diagram

- Refer to the wiring diagram for proper installation. Ensure correct connections based on the relay configuration and sensor input/output requirements.

WIRE INSTALLATION

- To prevent interference in industrial installations, follow appropriate measures to ensure the unit operates correctly.

FAQ

Q: Can I repair the unit myself if it malfunctions?

A: No, do not attempt to repair or modify the unit yourself.

Defective units should be submitted for repairs at an authorized service center.

Q: What should I do if the unit is exposed to extreme temperatures?

A: Do not use the unit in areas with significant temperature variations, exposure to condensation, or ice. Ensure proper environmental conditions for optimal performance.

- Read the user's manual carefully before starting to use the unit.
- Producer reserves the right to implement changes without prior notice.

Symbol Explanation

This symbol denotes especially important guidelines concerning the installation and operation of the device. Not complying with the guidelines denoted by this symbol may cause an accident, damage or equipment destruction.

Basic Requirements

User Safety

- Do not use the unit in areas threatened with excessive shocks, vibrations, dust, humidity, corrosive gasses, and oils.
- Do not use the unit in areas where there is a risk of explosions.
- Do not use the unit in areas with significant temperature variations, or exposure to condensation or ice.
- The manufacturer is not responsible for any damages caused by inappropriate installation, not maintaining the proper environmental conditions, and using the unit contrary to its assignment.
- If in the case of a unit malfunction, there is a risk of a serious threat to the safety of people or property additional, independent systems and solutions to prevent such a threat must be used.
- The unit uses dangerous voltage that can cause a lethal accident. The unit must be switched off and disconnected from the power supply before starting the installation of troubleshooting (in the case of malfunction).
- Do not attempt to disassemble, repair, or modify the unit yourself. The unit has no user-serviceable parts.
- Defective units must be disconnected and submitted for repairs at an authorized service center.

Specifications

General	
Display	LED | 4 x 20mm High | Red | Adjustable Brightness
Displayed Values	-999 ± 9999 | -99999 ± 999999*
Stability	50 ppm | °C
Transmission Parameters	1200…115200 bit/s, 8N1 / 8N2
Protection Class	NEMA 4X | IP67

Input Signal | Supply	
Standard	Current: 4-20mA | 0-20mA | 0-5V* | 0-10V*
Voltage	85 – 260V AC/DC | 16 – 35V AC, 19 – 50V DC*

Output Signal | Supply	
Standard	2 x Relays (5A) | 1 x Relay (5A) + 4-20mA
Voltage	24VDC
Passive current output *	4-20mA | (Operating Range Max. 2.8 – 24mA)

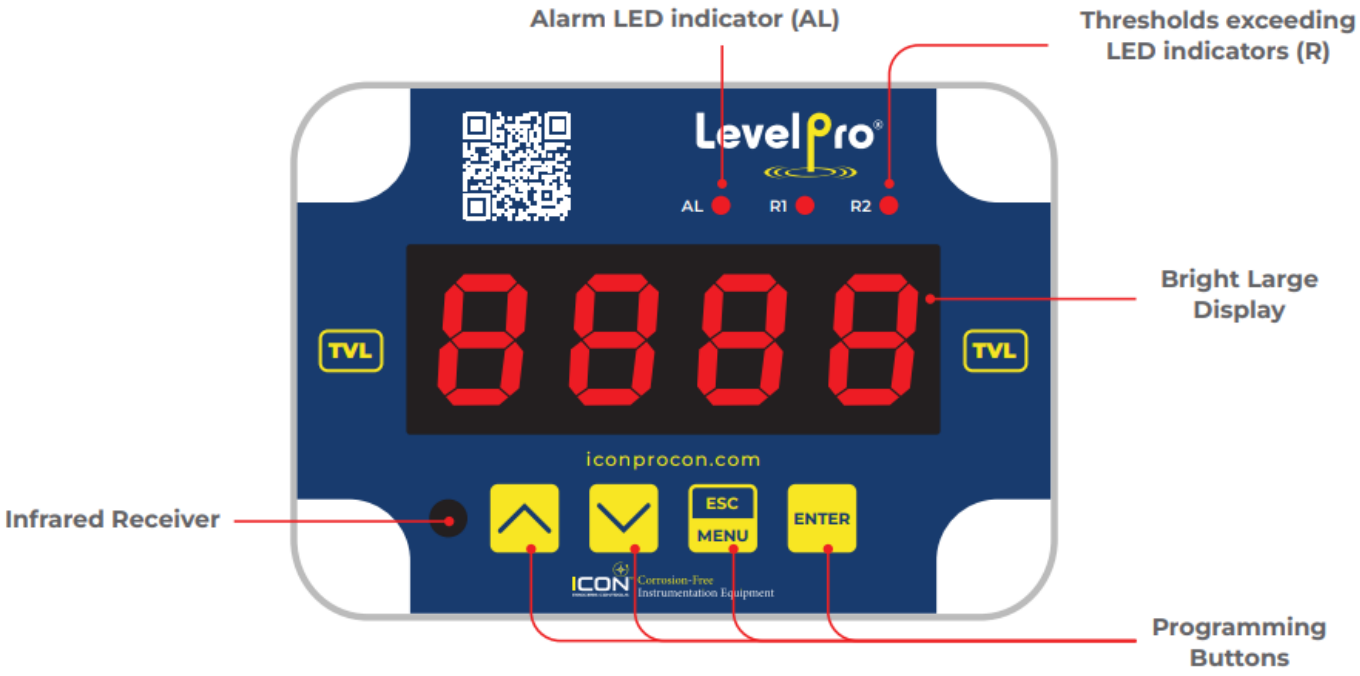
Performance	
Accuracy	0.1% @ 25°C One Digit
Accuracy According to IEC 60770 – Limit Point Adjustment | Non-Linearity | Hysteresis | Repeatability	

Temperatures	
Operating Temperatures	-40 – 158°F | -40 – 70°C

Materials | Wetted	
Housing	Polycarbonate

Part Number	**Input**	**Output**
TVL-550-1821	4-20mA	2 Relay
TVL-550-1829	4-20mA	4-20mA + 1 Relay

Front Panel Description



Function of Push Buttons

Symbol used in the manual : [ESC/MENU]

- ESC MENU **Functions:**
- Enter to main menu (press and hold for at least 2 seconds.)
- Exit the current Screen and Enter to the previous menu (or measure mode)
- Cancel the changes made in the parameter being edited

Symbol used in the manual : [ENTER]

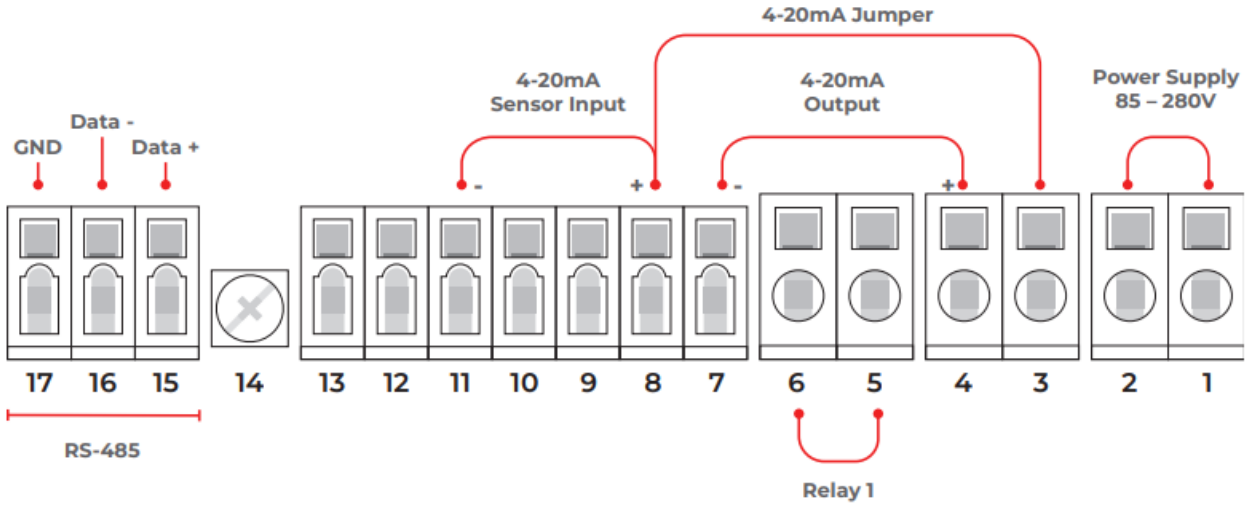
- ENTER **Functions:**
- Start to edit the parameter
- Enter into the sub-menu
- Confirmation of changes made in the parameter being edited

Symbol used in the manual : [ ] [ ]

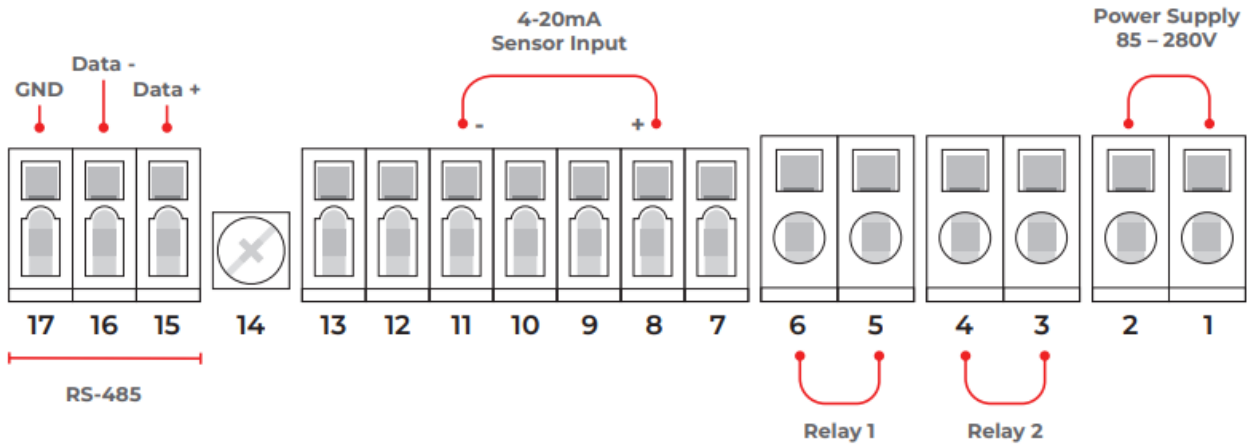
- **Functions:**
- Change of the present menu
- Modification of the parameter value
- Change of the display mode

Wiring Diagram

One RELAY CONFIGURATION One 4-20mA OUTPUT



2 RELAY CONFIGURATION



WIRE INSTALLATION

- Insert screwdriver and push wire locking mechanism open
- Insert wire
- Remove screwdriver

- Due to possible significant interference in industrial installations, appropriate measures assuring the correct operation of the unit must be applied.
- The unit is not equipped with an internal fuse or power supply circuit breaker.

- For this reason, an external time-delay cut-out fuse with a small nominal current value must be used (recommended bipolar, max. 2A) and a power supply circuit breaker located near the unit.
- In the case of using a monopolar fuse, it must be mounted on the phase cable.

Programming 4-20mA Input

Calculating 4-20mA Input

SENSOR TYPE	20mA Set Point
Submersible	Range of sensor / Specific Gravity = 20mA
Ultrasonic	Tank Height
Radar	Tank Height

Programming Relays

RS485 Modbus Programming

THE MODBUS PRO TOCOL HANDLING

- **Transmission parameters:** 1 start bit, 8 data bits, 1 or 2 stop bits (2 bits are sent, 1 and 2 bits are accepted when received), no parity control
- Baud rate: selectable from 1200 to 115200 bits/second
- **Transmission protocol**: MODBUS RTU compatible
- The device parameters and display value are available via the RS-485 interface, as HOLDING-type registers (numeric values are given in U2 code) of Modbus RTU protocol. The registers (or groups of the registers) can be read by the 03h function and written by 06h (single registers) or 10h (group of the registers) according to Modbus RTU specification. Maximum group size for 03h and 10h functions can not exceed 16 registers (for single frame).
- The device interprets the broadcast messages but then does not send the answers.

LIST OF REGISTERS

Register	*Write*	*Range*	*Register description*
01h	No	-999 ÷ 9999	Measurement value (no decimal point)
02h	No	0h, A0h, 60h	The status of the current measurement; **0h** – data valid; **A0h** – top border of the measurement range is exceeded; **60h** – bottom border of the measurement range is exceeded;
03h	Yes	0 ÷ 3	"**Pnt** " parameter in the "**InPt**" menu (decimal point position) **0** – " **0**"; **1** – " **0.0**"; **2** – " **0.00**"; **3** – "**0.000**"
04h	Yes	see descr.	State of the relays and alarm LED (binary format) (1 – on, 0 – off): **000000 00 000e00ba a** – relay R1; **b** – relay R2; **e** – alarm LED; If written, only **a**, and **b** bits are important (others are ignored) these bits all ow the user to control the relays via the RS-485 interface
05h[1]	Yes	0h ÷ 1800h	State of active current output, expressed in 1/256 mA units – it means that the high byte expresses the integer part and the low byte fractional part of the desired output current.
	Yes	2CCh÷1800h	State of passive current output, expressed in 1/256 mA units – it means th at the high byte expresses the integer part and the low byte fractional part of the desired output current.
	Yes	0h ÷ 1600h	State of active voltage output, expressed in 1/512 V units – it means that h igh byte express integer part, and low byte fractional part of desired output voltage.
06h	No	-999 ÷ 9999	Peak (drop) value (no decimal point)
10h	Yes	0 ÷ 5	"**tyPE**" parameter in the "**InPt**" menu (nominal input range). **0** – 0-20 mA ra nge; **1** – 4-20 mA range; **2** – 0-10 V range; **3** – 2-10 V range; **4** – 0-5 V ran ge; **5** – 1-5 V range
11h	Yes	0 ÷ 5	"**CHAr**" parameter in the "**InPt**" menu (characteristic type) **0** – linear; **1** – square; **2** – square root; **3** – user-defined; **4** – volume characteristics of a c ylindrical tank in the vertical position; **5** – volume characteristics of a cylind rical tank in the horizontal position
12h	Yes	0 ÷ 5	"**FiLt**" parameter in the "**InPt**" menu (measurement filtering rate)

RS485 Modbus Programming

Register	*Write*	*Range*	*Register description*
13h	Yes	0 ÷ 3	"**Pnt** "parameter in "**InPt**" menu (the copy of 03h register, decimal point po sition) **0** – " **0**"; **1** – " **0.0**"; **2** – " **0.00**"; **3** – "**0.000**"
14h	Yes	-999 ÷ 9999	"**Lo C**" parameter in "**InPt**" menu, no decimal point included
15h	Yes	-999 ÷ 9999	"**Hi C**" parameter in the "**InPt**" menu, no decimal point included
16h	Yes	0 ÷ 999	"**Lo r**" parameter in the "**InPt**" menu, in 0.1%
17h	Yes	0 ÷ 199	"**Hi r**" parameter in the "**InPt**" menu, in 0.1%

19h	Yes	0 ÷ 9999	“**t h1**” parameter in the “**InPt**” menu, no decimal point included
1Ah	Yes	0 ÷ 9999	“**t h2**” parameter in the “**InPt**” menu, no decimal point included
1Bh	Yes	0 ÷ 9999	“**t h3**” parameter in the “**InPt**” menu, no decimal point included
1Ch	Yes	0 ÷ 9999	“**t d**” parameter in the “**InPt**” menu, no decimal point included
1Dh	Yes	0 ÷ 9999	“**t Sn**” parameter in the “**InPt**” menu, no decimal point included
1Eh	Yes	0 ÷ 9999	“**t Sh**” parameter in the “**InPt**” menu, no decimal point included
20h[2]	Yes	0 ÷ 199	Device address
21h	No	21F0h	Device identification code (ID)
22h[3]	Yes	0 ÷ 7	**“bAud”** parameter in **“rS”** menu (baud rate); **0** – 1200 baud; **1** – 2400 baud; **2** – 4800 baud; **3** – 9600 baud; **4** – 19200 baud; **5** – 38400 baud; **6** – 57600 baud; **7** – 115200 baud
23h[4]	Yes	0 ÷ 1	**“mbAc”** parameter in **“rS”** menu (permission to write registers via RS-485 interface); **0** – write denied ; **1** – write allowed
24h	Yes	see descr.	Parameters of “**SECU**” menu (binary format (0 – „**oFF**”, 1 – „**on**”): **bit 0** – “**A r1**” parameter; **bit 1** – “**A r2**” parameter
25h	Yes	0 ÷ 5	**“rESP”** parameter in **“rS”** menu (additional response delay); **0** – no additional delay; **1** – ”**10c**” option; **2** – ”**20c**” option; **3** – ”**50c**” option; **4** – ”**100c**” option; **5** – ”**200c**” option;
27h	Yes	0 ÷ 99	**“mbtO”** parameter in **“rS”** menu (maximum delay between received frames); **0** – no delay checking; **1** ÷ **99** – maximum delay expressed in seconds
2Dh	Yes	1 ÷ 8	“**Bri**” parameter (display brightness); **1** – the lowest brightness; **8** – the highest brightness
2Fh	Yes	0 ÷ 1	“**Edit**” parameter (numerical parameters edit mode); **0** – „**dig**” mode; **1** – „**SLid**” mode
30h	Yes	-999 ÷ 9999	“**SEtP**” parameter in “**rEL1**” menu, no decimal point included
31h	Yes	-999 ÷ 999	“**HySt**” parameter in “**rEL1**” menu, no decimal point included
32h	Yes	0 ÷ 5	“**modE**” parameter in the “**rEL1**” menu: **0** – “**no**” mode; **1** – “**on**” mode; **2** – “**of**” mode; **3** – “**in**” mode; **4** – “**out**” mode; **5** – “**mod**” mode

33h	Yes	0 ÷ 999	**The "t on"** parameter in the **"rEL1"** menu, expressed in tenth of seconds or tenth of minutes depends on the **"unit"** parameter – register no. 35h)

RS485 Modbus Programming

Register	***Write***	***Range***	***Register description***
34h	Yes	0 ÷ 999	**The "toFF"** parameter in the **"rEL1"** menu, expressed in a tenth of seconds or tenth of minutes depends on the **"unit"** parameter – register no. 35h)
35h	Yes	0 ÷ 1	**"unit"** parameter in the **"rEL1"** menu: **0** – seconds; **1** – minutes
36h	Yes	0 ÷ 2	**"AL"** parameter in the **"rEL1"** menu: **0** – no changes; **1** – on; **2** – off
37h	Yes	-999 ÷ 9999	"**SEt2**" parameter in "**rEL1**" menu, no decimal point included
38h	Yes	-999 ÷ 9999	"**SEtP**" parameter in "**rEL2**" menu, no decimal point included
39h	Yes	-999 ÷ 999	"**HySt**" parameter in "**rEL2**" menu, no decimal point included
3Ah	Yes	0 ÷ 5	"**modE**" parameter in the "**rEL2**" menu: **0** – "**no**" mode; **1** – "**on**" mode; **2** – "**of**" mode; **3** – "**in**" mode; **4** – "**out**" mode; **5** – "**mode**" mode
3Bh	Yes	0 ÷ 999	**"t on"** parameter in the **"rEL2"** menu, expressed in a tenth of seconds or tenth of minutes depending on the **"unit"** parameter – register no. 3Dh)
3Ch	Yes	0 ÷ 999	**"toFF"** parameter in the **"rEL2"** menu, expressed in the tenth of seconds or tenth of minutes depending on the **"unit"** parameter – register no. 3Dh)
3Dh	Yes	0 ÷ 1	**"unit"** parameter in the **"rEL2"** menu: **0** – seconds; **1** – minutes
3Eh	Yes	0 ÷ 2	**"AL"** parameter in the **"rEL2"** menu: **0** – no changes; **1** – on; **2** – off
3Fh	Yes	-999 ÷ 9999	"**SEt2**" parameter in "**rEL2**" menu, no decimal point included
50h	Yes	0 ÷ 1	"**modE**" parameter in "**HOLd**" menu (type of detected changes): **0** – peaks; **1** – drops
51h	Yes	0 ÷ 9999	"**PEA**" parameter in "**HOLd**" menu (minimum detectable change, no decimal point included)
52h	Yes	0 ÷ 199	"**Time**" parameter in the "**HOLd**" menu, maximum peaks' (or drops') display time expressed in seconds
53h	Yes	0 ÷ 1	"**HdiS**" parameter in the "**HOLd**" menu: **0** – "**rEAL**" mode; **1** – "**HOLd**" mode

54h	Yes	0 ÷ 1	“**H r1**” parameter in “**HOLd**” menu : **0** – “**rEAL**” mode; **1** – “**HOLd**” mode
55h	Yes	0 ÷ 1	“**H r2**” parameter in “**HOLd**” menu: **0** – “**rEAL**” mode; **1** – “**HOLd**” mode
58h[1]	Yes	0 ÷ 1	“**HOut**” parameter in the “**HOLd**” menu: **0** – “**rEAL**” mode; **1** – “**HOLd**” mode
70h[5]	Yes	-999 ÷ 1999	The value of the „**X**” coordinate of point **no. 1** of the user-defined characteristic, expressed in 0.1%
71h[5]	Yes	-999 ÷ 9999	The value of the „**Y**” coordinate of point **no. 1** of the user-defined characteristic, no decimal point included
72h[5] ÷ 95h[5]			Further pairs of „**X**” – „**Y**” coordinates of points **no. 2** ÷ **19** of the user-defined characteristic

RS485 Modbus Programming

Register	*Write*	*Range*	*Register description*
96h[5]	Yes	-999 ÷ 1999	The value of the „**X**" coordinate of point **no. 20** of the user-defined characteristics, expressed in 0.1%
97h[5]	Yes	-999 ÷ 9999	The value of the „**Y**" coordinate of point **no. 20** of the user-defined characteristics, no decimal point included
A0h[1]	Yes	0 ÷ 3	"**Omod**" parameter in the "**OUtP**" menu (active current output mode) **0** – current output disabled; **1** – current output enabled with **4÷20mA** mode; **2** – current output enabled with **0÷20mA** mode; **3** – current output controlled via RS-485 interface
	Yes	0 ÷ 2	"**Omod**" parameter in "**OUtP**" menu (passive current output mode) **0** – current output disabled; **1** – current output enabled with **4÷20mA** mode; **2** – current output controlled via RS-485 interface
	Yes	0 ÷ 5	"**Omod**" parameter in "**OUtP**" menu (active voltage output mode) **0** – voltage output disabled; **1** – voltage output enabled with **0÷5V** mode; **2** – voltage output enabled with **1÷5V** mode; **3** – voltage output enabled with **0÷10V** mode; **4** – voltage output enabled with **2÷10V** mode; **5** – voltage output controlled via RS-485 interface
A1h[1]	Yes	-999 ÷ 9999	"**OUtL**" parameter in "**OUtP**" menu, no decimal point included
A2h[1]	Yes	-999 ÷ 9999	"**OUtH**" parameter in the "**OUtP**" menu, no decimal point included
A3h[1]	Yes	0 ÷ 999	"**Lo r**" parameter in the "**OUtP**" menu, for active current output and active voltage output, expressed in 0.1%
	Yes	0 ÷ 299	"**Lo r**" parameter in the "**OUtP**" menu for passive current output, expressed in 0.1%
A4h[1]	Yes	0 ÷ 199	"**Hi r**" parameter in the "**OUtP**" menu for active and passive current output, expressed in 0.1%
	Yes	0 ÷ 99	"**Hi r**" parameter in the "**OUtP**" menu for active voltage output, expressed in 0.1%
A5h[1]	Yes	0 ÷ 3	"**AL**" parameter in the "**OUtP**" menu (active current output value on critical exception): **0** – no change; **1** – 22.1 mA; **2** – 3.4 mA; **3** – 0 mA
	Yes	0 ÷ 2	"**AL**" parameter in the "**OUtP**" menu (passive current output value on critical exception): **0** – no change; **1** – 22.1 mA; **2** – 3.4 mA
	Yes	0 ÷ 5	"**AL**" parameter in the "**OUtP**" menu (active voltage output value on critical exception): **0** – no change; **1** – 11 V; **2** – 5.5; **3** – 1.2 V; **4** – 0.6 V; **5** – 0 V

1. these registers are active only if the device is equipped with current or voltage output
2. after writing to register no 20h the device responds with an "old" address in the message.
3. after writing to register no 22h the device responds with the new baud rate.
4. the value of the "mbAc" parameter is also connected to write to this register, so it is possible to block writes, but impossible to unblock writes via the RS-485 interface, The unblocking of the writes is possible from the menu level only.
5. the pairs of „X -Y" coordinates may be defined for any free point. The pair is "free" (it means that a particular

point is not defined) if the „X” coordinate of this point is equal to 8000h. After writing both X and Y coordinates the point is defined and used in the calculation of the result. The coordinates of any point can be changed at any time.

TRANSMISSION ERRORS DESCRIPTION

- If an error occurs while writing or reading of single register, then the device sends an error code according to Modbus RTU specifications (example message no 1).

Error codes:

- **01h** – illegal function (only functions 03h, 06h and 10h are available),
- **02h** – illegal register address
- **03h** – illegal data value
- **08h** – no write permission (see: “mbAc” parameter)
- **A0h** – exceed of upper border of input range
- **60h** – exceed of lower border of input range
- **A0h** and 60h codes can appear only during reg. 01h is reading by 03h function (read of a single register).

EXAMPLES OF QUERY/ANSWER FRAMES

- Examples apply for device with address 1. All values are represent hexadecimal.

Field description:

- **ADDR** Device address on Modbus network
- **FUNC** Function code
- **REG H, L** Starting address (address of the first register to read/write, Hi and Lo byte)
- **COUNT H, L** No. of registers to read/write (Hi and Lo byte)
- **BYTE C** Data byte count in answer frame
- **DATA H, L** Data byte (Hi and Lo byte)
- **CRC L, H** CRC error check (Hi and Lo byte)

Read of the displayed value (measurement), SRP-N118 device address = 01h:

ADDR	FUNC	REG H, L		COUNT H, L		CRC L, H	
01	03	00	01	00	01	D5	CA

a) The answer (we assume that the measured result is not out of range)

ADDR	FUNC	BYTE C	DATA H, L		CRC L, H	
01	03	02	00	F	F8	04

- **DATA HL** – displayed value = 255, no decimal point.
- Decimal point position can be read from reg. 03h

b) The answer (if an error occurs).

ADDR	FUNC	ERROR	CRC L, H	
01	83	60	41	18

ERROR – error code = 60h, the bottom border of the measurement range is exceeded

Read of device ID code

ADDR	FUNC	REG H, L		COUNT H, L		CRC L, H	
01	03	00	21	00	01	D4	00

The answer:

ADDR	FUNC	BYTE C	DATA H, L		CRC L, H	
01	03	02	21	F0	A0	50

DATA – identification code (21F0h)

Change of the device address from 1 to 2 (write to reg. 20h)

ADDR	FUNC	REG H, L		DATA H, L		CRC L, H	
01	06	00	20	00	02	09	C1

- **DATA** H – 0
- **DATA** L – new device address (2)

The answer (the same as the message):

ADDR	FUNC	REG H, L		DATA H, L		CRC L, H	
01	06	00	20	00	02	09	C1

Change of baud rate of all devices connected to the net (BROADCAST message).

ADDR	FUNC	REG H, L		COUNT H, L		CRC L, H	
00	06	00	22	00	04	29	D2

- **DATA H –** 0
- **DATA** L – 4, new baud rate 19200 baud
- The device does not reply to BROADCAST-type messages.

Read registers 1, 2, and 3 in one message (example of reading many registries in one frame):

ADDR	FUNC	REG H, L		COUNT H, L		CRC L, H	
01	03	00	01	00	03	54	0B

COUNT L – the count of being read registers (max.16)

The answer:

ADDR	FUNC	BYTE C	DATA H1,L1		DATA H2,L2		DATA H3,L3		CRC L, H	
01	03	06	00	0A	00	00	00	01	78	B4

- **DATA H1,** L1 – reg. 01h (10 – displayed value ”1.0”),

- **DATA H2,** L2 – reg. 02h (0 – no errors),
- **DATA H3,** L3 – reg. 03h (1 – decimal point position ” 0.0”).
- There is no full implementation of the Modbus Protocol in the device. The functions presented above are available only.

DEFAULT AND USERS SETTINGS LIST

Parameter	***Description***	***Default value***	***User's value***	***Dec. page***
Parameters of relay R1 operation (“rEL1” menu)				
SEtP	Relay R1 threshold	20.0		29
SEt2	Relay R1 second threshold	40.0		29
HYSt	Hysteresis of relay R1	0.0		29
modE	The operation mode of relay R1	on		29
t on	Turn on a delay of relay R1	0.0		30
toFF	Turn off the delay of relay R1	0.0		30
unit	Unit of **“t on”**, and **“toFF”** parameters of relay R1	SEC		30
AL	Reaction to critical situation of relay R1	oFF		30
Parameters of relay R2 operation (“rEL2” menu)				
SEtP	Relay R2 threshold	40.0		29
SEt2	Relay R2 second threshold	60.0		29
HYSt	Hysteresis of relay R2	0.0		29
modE	The operation mode of relay R2	on		29
t on	Turn on the delay of relay R2	0.0		30
toFF	Turn off the delay of relay R2	0.0		30
unit	Unit of **“t on”**, and **“toFF”** parameters of relay R2	SEC		30
AL	Reaction to critical situation of relay R2	oFF		30
Configuration of measurement input (“input” menu)				

tYPE	Input mode	„4-20”		31
CHAr	Conversion characteristic mode	Lin		31
FiLt	Filtering ratio	0		31
Pnt	Decimal point position	0.0		31
Lo C	Minimum displayed value (for nominal range)	000.0		32
Hi C	Maximum displayed value (for nominal range)	100.0		32
t h1	Height (length) first part of the tank	00.00		32
t h2	Height (length) second part of the tank	00.00		32
t h3	Height (length) third part of the tank	00.00		32
t d	Tank diameter	00.01		32
t Sn	Distance between sensor and bottom of the tank	00.00		32
t Sh	Height of the sensor	20.00		32
Lo r	Extension of the bottom of the nominal input range	5.0 (%)		35

Parameter	***Description***	***Default value***	***User’s value***	***Dec. page***
Hi r	Extension of the top of the nominal input range	5.0 (%)		35
Current output configuration (“OUtP” menu)				
Omod	Current output mode	„4-20” (mA)		37
OUtL	Display value for 4 mA current output	0.0		37
OUtH	Display value for 20 mA current output	100.0		37
Lo r	Extension of the bottom of the nominal output range	5.0 (%)		38
Hi r	Extension of the top of the nominal output range	5.0 (%)		38

AL	Current output value on critical exception	22.1 (mA)		38
Display Parameters				
bri	Display brightness	bri6		38
Configuration of peaks detection function (“HOLd” menu)				
modE	Kind of detected changes	norm		39
PEA	Minimum detected change	0.0		39
Time	Maximum time of peak displaying	0.0		39
HdiS	The type of displayed value	HOLd		39
H r1	Source of relay R1, and LED R1 control	rEAL		39
H r2	Source of relay R2, and LED R2 control	rEAL		39
HOut	Source of current output control	rEAL		39
Settings of access to the configuration parameters (“SECu” menu)				
A r1	Permission to changes of relay R1 threshold without the user password knowledge	on		39
A r2	Permission to changes of relay R2 threshold without the user password knowledge	on		39
RS 485 interface configuration (menu “rS”)				
Address	Device address	0		40
bAud	Baud rate	9.6		40
MBA	Permission to changes of configuration registers	on		40

MB to	Maximum delay between received messages	0		40
rESP	Additional delay of answer transmission	Std		40
Configuration of numerical parameters edition				
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Documents / Resources

	ICON PROCESS CONTROLS TVL Series Tank Level Display and Controller [pdf] Owner's Manual TVL Series Tank Level Display and Controller, TVL Series, Tank Level Display and Controller, Display and Controller, Controller

References

- User Manual