TR-4 Galvanic Isolated Load Cell Amplifier

User Manual

ESİT

TR-4 Galvanic Isolated Load Cell Amplifier

User Manual

Esit Technical Service
Esit Turkey Support line

Istanbul
Phone: Direct Line 0216 585 18 88 / 0216 585 18 18 Ext: 141 /142
Fax : 0216 585 18 89

Hendek
Phone: 0264 614 16 41 / 0264 614 16 42
Fax : 0264 614 16 43

Izmir
Phone: 0232 433 02 99
Fax : 0232 433 12 42

Ankara
Phone: 0312 397 01 10
Fax : 0312 397 07 73

Adana
Phone 0322 428 11 71
Fax : 0322 428 11 72

Esit Istanbul Head Office
Address Nişantepe Mahallesi Gelin Çiçeği Sokak No:36 Çekmeköy 34794 Istanbul
Phone: 0216 585 18 18
Fax : 0216 585 18 19
E-mail: esit@esit.com.tr - servis@esit.com.tr

Caution

- Do not power the device without ensuring that the device connections are made in accordance with this manual.
- Do not open the box or connect or disconnect the device without disconnecting it from the power source.
- Be careful not to lay the load cell and communication cables too close to power lines.
- Be careful not to crush the wires.
- Operate the device within the specified temperature range.
- The device has been developed for indoor use. It should not be exposed to direct sunlight, rain and other external factors.

Table of Contents

Preamble 5
Technical Specifications 6
Features 6
Cable Connections 7
Introduction of Keys 8
Menu List 9
Menu Usage 10
1. Communication 10
1.1. Serial 10
1.2. USB 11
1.3. Wireless 11
2. Relays 12
2.1. Relay1 12
2.2. Relay2 13
3. Scale 13
3.1. Capacity 13
3.2. Zero Limit 13
3.3. Resolution 13
3.4. Unit 13
3.5. Stability ..... **Hata! Yer işareti tanımlanmamış.**
3.6. Internal Count (mV/V) 14
3.7. Tare 14
4. Analog 14
4.1. Load Maximum 14
4.2. Load Minimum 14
4.3. mA Maximum 14
4.4. mA Minimum 14
4.5. V Maximum 14
4.6. V Minimum 14
5. Calibration 15
5.1. Zero Calibration 15
5.2. Load Calibration 15
5.3. Digital Calibration 15
6. Filter 17
6.1. Settings 17

6.1.1. Response time 17
6.1.2. Vibration 17
6.1.3. Stability Delay 17
6.1.4. ADCHZ 17
6.1.5. Average Count 18
7. General 18
7.1. Language 18
7.2. Password 18
7.3. Factory Setting 18
7.4. Serial Number 18
7.5. Version 18
Warning & Error & Message Numbers 19
Modbus Commands 20
Modbus Addresses 20
Modbus Command Functions 26
Modbus Calibration Process Steps 27
Modbus Error codes 28

Preamble

Esit TR-4 is a microprocessor-based transmitter that processes load cell signals for industrial use. It is used as a signal converter in PLC or similar industrial control devices in weighing, blending, level controlling and process controlling applications. It is possible to control independent systems of simple on-off, fill-unload automations by means of two user-adjustable relay outputs. At the same time, 2 relays can be controlled via Modbus. The rail mounting case creates integrity with other panel components and facilitates connections.

This user manual contains sample explanations on the installation and use of TR4.

All written and visual materials in this user manual are owned by ESİT Elektronik A.Ş.

Technical Specifications

Model	TR4
Load Cell Input	8 (350 ohms)
A/D Speed (/second)	400 Hz
Supply Voltage	12-24VDC
Screen	0.91 inch Oled Panel
Communication (Standard)	SERIAL - USB
Communication (Optional)	Wi-Fi, Bluetooth
Operating Temperature	0 / +50C

Features

- Multiple language support,
- 3 push button type keys,
- Easy-to-understand use and set menu system,
- Possibility to connect up to 8 load cells,
- 2 x 2A relay outputs
- RS485/RS232 communication
- 2 x optional independent RS485 outputs (Relay 2 and RS232 cannot be used)
- Software update via USB cable
- Configuring device settings via Bluetooth
- Modbus RTU communication via Wi-Fi
- Digital calibration
- Analog output adjustable as mA and V
- Possibility to connect 4 or 6 cable load cells
- Calibration protection with software password

Cable Connections

6-wire Load Cell Connection

Esit Colours		
1	Sense -	Orange
2	Sense +	Blue
3	Signal -	Red
4	Signal +	White
5	Ext -	Black
6	Ext +	Green

4-wire Load Cell Connection

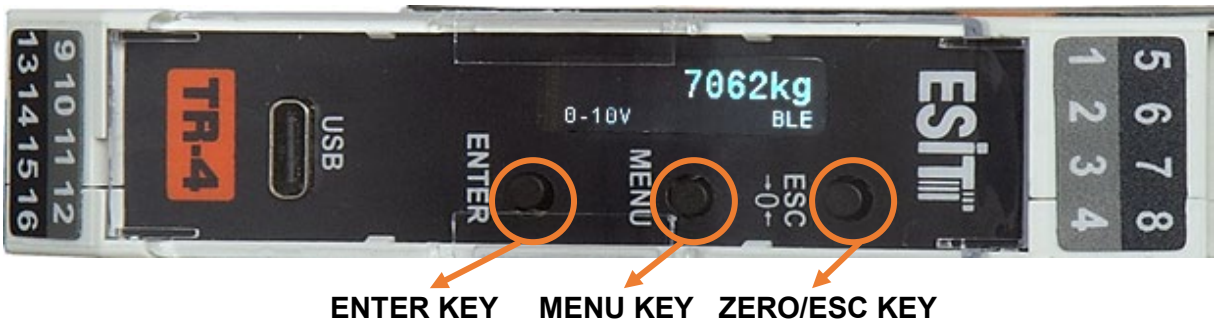
Esit Colours		
1	Sense -	Black
2	Sense +	Green
3	Signal -	Red
4	Signal +	White
5	Ext -	Black
6	Ext +	Green

Note: In 4-wire Loadcell Connection, Connect Sense - terminal to Ext - terminal and Sense+ terminal to Ext + terminal.

12	Rx/B	RS232 Rx terminal / RS485 B terminal
11	Tx/A	RS232 Tx terminal / RS485 A terminal
10	Rs232 Gnd	RS232 Gnd terminal
9	Relay 2	Relay 2 output terminal

16	Relay Common	Relay common terminal
15	Relay 1	Relay 1 output terminal
14	Power +	12-24 VDC +
13	Power -	12-24 VDC -

Introduction of Keys



“ENTER” KEY	**“MENU” KEY**	“ZERO/ESC” **KEY**
• Taring while on the weight screen • Confirming while in the menu.	• Access to menu • Switching between menus • Changes digits while the value is in the entered menu.	• Move up the menu • Zeroing while on the weight screen • Changes the numerical value while the value is in the entered menu.

Explanation of the process of switching to parameters in the menus and entering numerical values

- You can enter the menu list by pressing the “MENU” key
- The “MENU” key is also used to switch between menus.
- Press the “ENTER” key to enter the desired menu.
- To exit the menu and return to the previous menu, press the “ZERO/ESC” key.

The process of entering values in menus where numerical values must be entered;

- The value of the current digit is changed by pressing the “ZERO/ESC” key. When you hold down the key, the value of the current digit will become zero.
- The digits are changed by pressing the “MENU” key.
- The entered value is confirmed by pressing the “ENTER” key.

Menu List

Main menu		Sub Menu		Sub Menu operation					
1	Comm	1	Serial	Mode	Device ID	Baudrate	Bit	Parity	
		2	USB	Mode	Period				
		3	Wireless	Type	IP				
2	Relay	1	Relay1	Control	Setval	Hysteresis	Contact	Open Delay	Close Delay
		2	Relay2	Control	Setval	Hysteresis	Contact	Open Delay	Close Delay
3	Scale	1	Capacity						
		2	Zero Limit						
		3	Step	Multiplier	Step Value				
		4	Unit						
		5	Stability						
		6	Internal count						
		7	Tare						
4	Analogue	1	Current	Load Maximum	Load Minimum	mA Maximum	mA Minimum		
		2	Voltage	Load Maximum	Load Minimum	V Maximum	V Minimum		
5	Calibration	1	Zero Calibration						
		2	Load Calibration						
		3	Digital Calibration	Type	Capacity	Weight	mV/V		
6	Filter	1	Settings	Type	Response time	Vibration	Stbltydelay	ADCHZ	Avg. count
7	General	1	Language						
		2	Password	Using Mode	Password to use				
		3	Factory Setting						
		4	Serial Number						
		5	Version						

Menu Usage

1. Communication

The indicator is the communication menu. The mode of communication is selected from this menu.

Whether the device will be RS232 or RS485 is shown on the label on the side of the box. The device should be powered off while changing this setting.

Under the communication menu, “SERIAL (RS485-RS232), USB and wireless communication settings can be changed.

1.1. Serial

This is the menu where serial communication settings will be made.

1.1.1. Mode

This is the menu where the mode of serial communication is selected. The position of the communication switch on the motherboard must be adjusted according to the mode to be selected.

- Off
- Continuous: The device continuously sends weight data through the selected communication port according to the selected communication parameters.
- Modbus: The device responds to queries made to the device ID entered from the menu in Modbus RTU mode. Modbus commands, addresses, modbus calibration steps and error codes are listed on page 20.

1.1.2. Device ID

- It is the device ID used in Modbus communication.
- Appears if the communication mode is Modbus. Otherwise it does not appear in the menu list.
- It can take values between 0-255. (There can be a maximum of 32 devices on the line.)

1.1.3. Baudrate

This is the menu where the communication speed is selected.

- 1200
- 2400
- 4800
- 9600
- 19200
- 38400
- 57600
- 115200

1.1.4. Bit

It is the length of 1 byte of data in the serial communication protocol.

- 7
- 8

1.1.5. Parity

It is used to verify the content of the data packet.

- None
- Even
- Odd

1.2. USB

If communication will be ensured via USB, the settings in this menu must be made.

1.2.1. Mode

- Off
- Continuous: If the USB communication mode is selected continuously, the 1.2.2 PERIOD menu opens.

1.2.2. Period

It is the sending period of weight data.

- 5 Hz
- 10 Hz
- 15 Hz
- 20 Hz
- 50 Hz

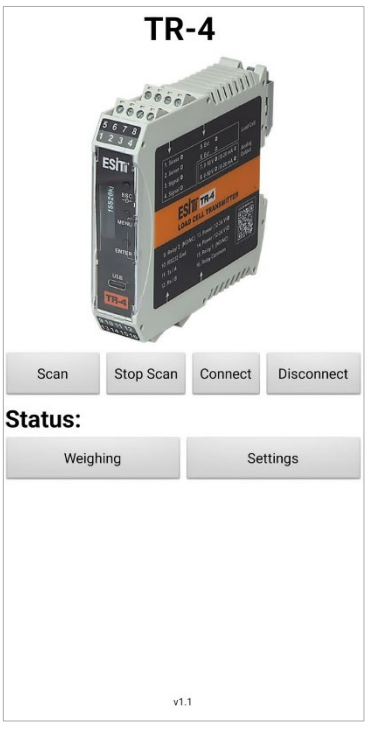
1.3. Wireless

This is the menu where the wireless communication type is selected.

1.3.1. Bluetooth

When the communication type Bluetooth is selected on the indicator, weight tracking and menu settings can be changed by connecting via the 'TR4 Bluetooth' mobile application.

The 'TR4 Bluetooth' mobile application on the side can be seen. The application login screen and its use are explained below, supported by visuals.



- Bluetooth devices are scanned by pressing 'Scan' in the application. When your Bluetooth device is found, a connection is established between the TR4 indicator and your mobile device by pressing 'Connect'.

- By pressing the 'Weighing' button, you can switch to the weight screen. Weight information can be read here.

- By pressing the 'Settings' button, you can go to the settings screen. All settings within the indicator can be accessed here, and the desired changes can be made via the mobile application.

Main Screen | Scanning Screen | Weighing Screen | Setting Screen

1.3.2. Wifi

When Wifi is selected as the communication type on the indicator, the indicator indicates an IP on the screen according to the WiFi it is connected to. Communication can be made using this IP address.

Connect to wifi

In order to connect the indicator to WiFi, you must first connect to the indicator via the mobile application via Bluetooth. After the Bluetooth connection is established, the Communication menu is selected by clicking the 'Settings' button. Click on wireless from the submenus of the communication menu.

> Settings > Communication > Wireless

Here, the name and password of the wifi you want to connect to are written in the 'SSID' and 'Password' fields. When wifi is selected from the wireless communication menu on the indicator, the indicator searches for the wifi source with the entered name and password, and when it finds and connects, it prints the IP address on the screen through which wifi communication can be made with the indicator.

1.3.3. Off

This is the parameter to be selected if wireless communication will not be used.

2. Relays

This is the menu where relay settings are made. This indicator has 2 relays which are Relay1 and Relay2.

2.1. Relay1

2.1.1. Control

This is the submenu where the desired relay control type is selected.

- Modbus : Relays are controlled via Modbus.
- TR4 : Relays are controlled with the values in the menu.

If TR4 is selected, the menu parameters that need to be adjusted are;

2.1.2. Setval

This is the submenu where the weight value for which the relay contact will be controlled will be entered.

2.1.3. Hysteresis

This is the submenu where the difference between the on and off value of the relay or the return loss amount is entered.

2.1.4. Contact

- Norm. Open
- Norm. Close

Norm. Close: When the weight value of the indicator is below the value entered in menu 2.1.2, the contacts of the relay are closed.

Norm. Open: When the weight value of the indicator is below the value entered in menu 2.1.2, the contacts of the relay are open.

2.1.5. Open Delay

It determines how long it takes for the relay to open when the condition required for the relay contact to open occurs.

Delay times: It can be selected as 0, 0.2, 0.4, 0.6, 0.8, 1, 2, 3, 4, 5 (sec).

2.1.6. Close Delay

It determines how long it takes for the relay to close when the condition required for the relay contact to close occurs.

Delay times: It can be selected as 0, 0.2, 0.4, 0.6, 0.8, 1, 2, 3, 4, 5 (sec).

2.2. Relay2

Relay2 menu is the same as Relay1 menu.

3. Scale

3.1. Capacity

This is the menu where the maximum capacity of the load cell connected to the indicator is entered.

3.2. Zero Limit

It is the maximum reset value that can be reset via the device or with the modbus command. This value is determined according to capacity. If a reset is performed at a value above this value, a warning will appear on the device screen and the operation will not be performed.

- 1% Capacity
- 2% Capacity
- 10% Capacity
- 100% Capacity

3.3. Resolution

This is the menu where the walking step of the weight information to be observed on the indicator is set. It is set by entering the multiplier value and increment step value.

3.4. Unit

The selection of the weight unit is made in this submenu.

- kg - Kilogram
- g - Gram
- lb – Pound
- mV/V
- mV

3.5. Stability

This is the menu where it is determined whether the weight is expected to be stable during the zeroing or taring process of the device. If “Standby” is selected, tare or reset cannot be performed until the device is stable.

3.6. Internal Count (mV/V)

This is the submenu where the instantaneous internal count value of the weight on the load cell is displayed. Its unit is mV/V.

3.7. Tare

This is the menu where you can choose whether the tare will be on or off. If the tare option is turned on the device, tare can be taken with the "Enter" key or via Modbus.

- On
- Off

4. Analog

This is the menu where the parameters of the analog output is determined.

The type of analog output (Current or voltage) is set by the button position on the card, it is shown on the label on the side of the box. The device must not be running while making this setting.

4.1. Load Maximum

This is the submenu where the maximum load capacity (weight value corresponding to the end value of the analog output) value is entered.

4.2. Load Minimum

This is the submenu where the minimum load capacity (weight value corresponding to the initial value of the analog output) value is entered.

4.3. mA Maximum

This is the submenu where the end current value of the analog output is entered. (Max : 21.5 mA)

4.4. mA Minimum

This is the submenu where the initial current value of the analog output is entered. (Min: 0 mA)

4.5. V Maximum

This is the submenu where the end voltage value of the analog output is entered. (Max : 11.5 V)

4.6. V Minimum

This is the submenu where the initial voltage value of the analog output is entered. (Min: 0 V)

5. Calibration

This is the menu where indicator calibration settings are made. If use password is selected in the General menu (Menu 7.2), the user is asked to enter a password in the first stage of the calibration menus.

5.1. Zero Calibration

- The Zero Calibration submenu is entered via the Calibration menu.
- The text “WILLBEZERO” appears on the screen.
- The weight on the Load Cell is taken away. Then it is confirmed by pressing the “ENTER” key.
- The action bar begins to fill on the device screen. Data is collected during this period.
- At the end of the period, the average value appears on the screen. Press the “ENTER” key to confirm the internal count to zero. Menu Key is used to repeat zero calibration. If you do not want to save the zero calibration, you can go back to the top menu by pressing the “ZERO/ESC” key.

5.2. Load Calibration

- The Load Calibration submenu is entered via the Calibration menu.
- The text “LOADING” appears on the screen.
- A known weight is placed on the Load Cell. Then it is confirmed by pressing the “ENTER” key.
- The action bar begins to fill on the device screen. Data is collected during this period.
- At the end of the period, the average value appears on the screen. Press the “ENTER” Key to confirm the internal count of the load cell. The Menu Key can be pressed to collect data again. If you do not want to save the load calibration, you can go back to the top menu by pressing the “ZERO/ESC” Key.
- After the average value is confirmed on the screen, the screen where the value of the weight on the load cell must be entered appears. The weight value is entered here.
- After entering the weight value, the value is confirmed by pressing the “ENTER” key. At the end of the calibration, the text "CALIBRATION SUCCESS" appears on the screen.

5.3. Digital Calibration

- In the calibration menu, the digital calibration submenu is selected.
- “TYPE” selection is made depending on which type of digital calibration will be used. If the load on the system is known but the tare value is unknown, "WEIGHT" should be selected in this menu. If the load on the system is unknown but the tare value is known, "TARE" is selected.
- The capacity value of the system is entered. If the system consists of a single load cell, the capacity of the load cell is entered. If the system consists of more than one load cell, the total capacity of the load cells is entered in this menu.
- The “TARE” or “WEIGHT” value selected according to the digital calibration type is entered in this menu.
- The mv/V value in the certificate of the load cell used in the system is entered. If there is more than one load cell in the system, the mV/V values should be averaged and entered.

- After all values are entered, the confirmation step appears on the screen to perform the calibration. Then, it is confirmed by pressing the “ENTER” button and calibration is performed.

6. Filter

6.1. Settings

This is the menu where the filter will be selected.

- Off : There is no filter, ADC speed and decision time selection is made. (ADCHZ, Decision Time)
- Custom : Response time and vibration use custom values based on options. (Response Time, Vibration, Stability Delay)
- Moving Average: Filtering is done according to ADC speed and average number of samples. (ADCHZ, Average Count, Stability Delay)

6.1.1. Response time

The response time of the weighing device to weight change is filtered by selecting one of the options.

- Fast : It is selected if an immediate response is desired. It reacts in a millisecond.
- Slow : It is selected if a slow response is desired. It reacts in seconds.

6.1.2. Vibration

From the vibration options, the one closest to the vibration condition in the environment is selected and filtering is done that will least affect the weighing.

- Low : There is no vibration in the environment.
- Medium : There are machines that work around the environment and create vibration; The object being weighed is liquid.
- High : There is a vibration source such as a mixer in the environment or on the weighed object.

6.1.3. Stability Delay

If the weight changes less than the walking step within the selected decision period, the weight unit indicating inactivity becomes visible on the TR4 screen.

Options;

- Short (0.5sec): The current measurement value is monitored for 0.5 seconds.
- Medium (1.0sec): The current measurement value is monitored for 1 seconds.
- Long (2.0sec): The current measurement value is monitored for 2 seconds.

6.1.4. ADCHZ

It is the sampling rate of the device.

- 6 Hz
- 12 Hz
- 25 Hz
- 50 Hz
- 100 Hz
- 200 Hz
- 400 Hz

6.1.5. Average Count

This is the menu where the number of sample pieces to be averaged is selected.

- 2
- 4
- 8
- 16
- 32
- 64
- 128

7. General

7.1. Language

This is the submenu where language selection is made.

- Turkish
- English

7.2. Password

7.2.1. Mode

This is the menu where you can determine whether a password will be required for calibration.

- Use
- Don't Use

7.2.2. New Password

This is the menu where the new password to be used is determined if the mode "Use" is selected. This password is used in calibration and when entering the password menu if the password mode "Use" is selected. The default password is “111111”.

7.3. Factory Setting

This is the menu where Factory Settings will be loaded. Except calibration, all other parameters are set to default value.

7.4. Serial Number

This is the menu where the indicator serial number is displayed.

7.5. Version

This is the menu where the indicator version number is displayed.

Warning & Error & Message Numbers

Number	WARNING MESSAGES
101	NEGATIVE LOAD
102	CAN NOT TARE
103	TARE ACTIVE
104	BUTTON ENTER STUCK
105	BUTTON ESC STUCK
106	BUTTON MENU STUCK
107	TARE OFF

Number	INFO MESSAGES
51	RESETING EEPROM
52	CALIB. SUCCESS
53	SAVE SUCCESFULL
54	ZEROCALIBSUCCESS
55	WIFI/BLE INIT
56	INCORRECT PASSWORD
59	NON-STABLE

Number	ERROR MESSAGES
1	ZERO LIMIT
2	MAXIMUM LOAD
3	WIFI/BLE ERROR
4	VALUE IS INCORRECT

Modbus Commands

Modbus Commands	
3	Reading Holding Registers
6	Preset Single Register
16	Preset Multiple Register

Modbus Addresses

Address	Word	Explanation	
0 (Y)	1	Command: It is explained in detail in Table 1 Command	
1 (/O)	6	Not used	
7 (/O)	1	Status: Described in detail in Table 2 Status	
8 (/O)	2	Display Value	
10 (/O)	2	Tare Value	
12 (/O)	2	Gross Value	
14 (/O)	2	Not used.	
16 (/O)	2	Tare Value (Internal count)	
18 (/O)	2	Not used	
20 (/O)	2	User Zero (Internal Count)	
22 (/O)	2	Not used	
24 (/O)	4	Not used	
28 (/O)	2	ADC Internal count (Filtered)	
30 (/O)	2	ADC Internal count	
32 (/O)	2	ADC mV/V(*10000)	
34 (Y/O)	1	Communication Mode	
		decimal	Explanation
		0	OFF
		1	CONTINUOUS
		2	MODBUS
35 (Y/O)	1	Communication ID is the device number using MODBUS communication. It can take values between 0 - 255.	
36 (Y/O)	1	Communication Speed	
		decimal	Explanation
		0	1200 Baudrate
		1	2400 Baudrate
		2	4800 Baudrate
		3	9600 Baudrate
		4	19200 Baudrate
		5	38400 Baudrate
		6	57600 Baudrate
		7	115200 Baudrate
37 (Y/O)	1	Communication Data Length:	
		decimal	Explanation
		0	7 bit
		1	8 bit

38 (Y/O)	1	Communication Parity:	
		decimal	Explanation
		0	NONE
		1	Even
		2	Odd
39(Y/O)	1	Period	
		0	10 Hz
		1	50 Hz
		2	100 Hz
		3	400 Hz
40(/O)	6	Not used, active when 2nd serial port is open	
46 (Y/O)	1	USB Communication Mode:	
		Decimal	Explanation
		0	Off
		1	Continuous
47 (Y/O)	1	USB PERIOD	
		Decimal	Explanation
		0	5 Hz
		1	10 Hz
		2	15 Hz
		3	20 Hz
		4	50 Hz
48 (/O)	1	Wireless Type	
		0	Off
		1	Bluetooth
		2	Wifi
49 (/O)	1	Wireless Operating Status	
		0	Wireless not active
		1	Bluetooth active
		2	Wifi active network connected
50 (Y/O)	12	Access point name to connect to wifi	
62 (Y/O)	12	Access point password to connect to wifi	
74 (Y/O)	1	Relay1 Control:	
		Decimal	On
		0	Relay1 Control is via MODBUS.
		1	Relay1 is controlled according to the parameters in TR4.
75 (Y/O)	2	First Relay Set Value: It determines the Set Value of the First Relay. (x1000)	
77 (Y/O)	2	First Relay Hysteresis Setting: The difference between the on and off value of the relay or the amount of return loss (x1000)	

79 (Y/O)	1	First Relay Direction Setting	
		Decimal	Explanation
		0	Normally Open Contact (NO) will be closed above the Set value
		1	Normally Closed Contact (NC) will be open above the Set value
80 (Y/O)	1	First Relay Opening Delay Time	
		Decimal	Explanation
		0	0 second
		1	0.2 seconds
		2	0.4 seconds
		3	0.6 seconds
		4	0.8 seconds
		5	1 second
		6	2 seconds
		7	3 seconds
		8	4 seconds
		9	5 seconds
81 (Y/O)	1	First Relay Closing Time: Same indices as on delay	
82 (Y/O)	1	Relay2 Control:	
		Decimal	Explanation
		0	Relay2 Control is via MODBUS.
		1	Relay2 is controlled according to the parameters in TR4.
83 (Y/O)	2	Second Relay Set Value: It determines the Set Value of the Second Relay. (x1000)	
85 (Y/O)	2	Second Relay Hysteresis Setting: The difference between the on and off value of the relay or the amount of return loss (x1000)	
87 (Y/O)	1	Second Relay Direction Setting	
		Decimal	Explanation
		0	Normally Open Contact (NO) will be closed above the Set value
		1	Normally Closed Contact (NC) will be open above the Set value
88 (Y/O)	1	Second Relay Opening Delay Time	
		Decimal	Explanation
		0	0 second
		1	0.2 seconds
		2	0.4 seconds
		3	0.6 seconds
		4	0.8 seconds
		5	1 second
		6	2 seconds
		7	3 seconds
		8	4 seconds
		9	5 seconds

89 (Y/O)	1	Second Relay closing time has the same indices as opening delay	
90 (/O)	1	Analog output type	
		0	The switch is in the 0-10V position
		1	The switch is in the 4-20mA position
91 (Y/O)	2	DAC Output maximum weight value (x1000)	
93 (Y/O)	2	DAC Output minimum weight value (x1000)	
95 (Y/O)	1	DAC Output maximum mA value (0-215) (x10)	
96 (Y/O)	1	DAC Output minimum mA value (0-215) (x10)	
97 (Y/O)	1	DAC Output maximum V value (0-115) (x10)	
98 (Y/O)	1	DAC Output minimum V value (0-115) (x10)	
99 (Y/O)	2	Calibration Value: It can take values between (0 – 999999999). (x1000)	
101 (/O)	2	It is set as the 10000 times of the calibration coefficient.	
103(Y/O)	2	Digital calibration mv/v(*100000)	
105	1	Not used	
106 (Y)	1	Calibrate	
		Decimal	Explanation
		2	Saves the zero calibration.
		3	Saves the load calibration.
		4	It performs the known digital calibration of tare and saves it.
		5	It performs a digital calibration of the known weight and records it.
107 (Y/O)	1	Filter Type	
		0	OFF
		1	Custom(response -vibration entered)
		2	Moving Average Filter
108 (Y/O)	1	ADC HZ (Cannot be written if the filter type is special)	
		Decimal	Explanation
		0	6 Hz
		1	12 Hz
		2	25 Hz
		3	50 Hz
		4	100 Hz
		5	200 Hz
		6	400 Hz
109 (Y/O)	1	Moving average count	
		0	2
		1	4
		2	8
		3	16
		4	32
		5	64
		6	128

110 (Y/O)	1	Response time	
		Decimal	Explanation
		0	Fast
		1	Slow
111 (Y/O)	1	Vibration	
		Decimal	Explanation
		0	High
		1	Medium
		2	Low
112 (Y/0)	1	Decision Time	
		Decimal	Explanation
		0	SHORT(0.5s)
		1	MEDIUM(1s)
		2	LONG(2s)
113 (Y/O)	2	MAX (Weighing Capacity Setting): This value is the maximum measurement value allowed to be displayed on the screen. (max. 999999999)(x1000)	
115 (Y/O)	1	Zero Limit	
		Decimal	Explanation
		0	It can be reset up to 1% of scale capacity.
		1	It can be reset up to 2% of scale capacity.
		2	It can be reset up to 10% of scale capacity.
		3	unlimited
116 (Y/O)	1	Resolution Multiplier	
		Decimal	Explanation
		0	1000
		1	100
		2	10
		3	1
		4	0.1
		5	0.01
		6	0,001
117 (Y/O)	1	STEP (Increment Step Setting)	
		Decimal	Explanation
		0	e = 1 * Resolution Multiplier
		1	e = 2 * Resolution Multiplier
		2	e = 5 * Resolution Multiplier
118(/O)	1	Device point Location (calculated from increment steps)	
		Decimal	Explanation
		0	1234
		1	123.4
		2	12.34
		3	1,234
119 (Y/O)	1	UNIT (Indicator Unit)	
		Decimal	Explanation
		0	kg
		1	g
		2	lb
		3	mv/v
		4	mv

120 (Y/O)	1	Stability	
		Decimal	Explanation
		0	Do not wait stability
		1	Wait for stability
121 (Y/O)	1	Tare	
		Decimal	Explanation
		0	On: Taring function is active.
		1	Off: Taring function is passive.
122 (Y/O)	1	Language(Device language selection.)	
		Decimal	Explanation
		0	English
		1	Turkish
123 (Y/O)	1	Password Mode	
		0	Use
		1	Don't Use
124 (Y)	2	Password entry address (calibration, password mode, new password address depends on this password.)	
126 (Y)	2	Enter new password (set if old password is correct)	
128(/O)	2	Serial Number	
130(/O)	1	Software Version	
131 (Y/O)	1	It represents relay outputs. (Relay controls are used when in Modbus.)	

Table 3

Y: Writable
O: Readable.

NOTE: In 2-word fields, the register with the lowest number has the highest value. For example: When Max is set to 10'000'000, register 113=152 and register 114=38528.
152x65536 + 34463 = 10’000’000

Modbus Command Functions

Address number 0 is the command register. The table below describes the operations performed in response to the values written to this address.

Decimal	Command
5	Zero Command: If the weight value is within the reset limit, it resets.
6	TARE/UNTARE Command: If there is a tare, it releases, otherwise performs taring.
13	Restarting the Device
14	Resetting to Factory Settings: The device turns to factory settings.
15	The device starts Software Update mode.

Table 1 Command

STATUS

BIT	**Explanation**
0	Not used
1	Not used
2	Not used
3	Not used
4	1: Weight is above the maximum value, 0: Weight is below the maximum value
5	1: There is absolute zero, 0: There is no absolute zero
6	1: Stable, 0:Unstable
7	Not used.
8	1: Resetting cannot be done, 0: Resetting can be done.
9	1: No Taring, 0: Taring
10	1: Tare, 0: No tare
11	1: First relay contacts are in closed position, 0: First relay contacts in open position
12	1: Second relay contacts in closed position, 0: Second relay contacts in open position
13	Not used.
14	Not used
15	Not used

Table 2 Status

131. Modbus Address															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	0
														Relay 2	Relay 1

Table 3

1: Relay contact closed

0: Relay contact open

Modbus Calibration Process Steps

Zero Calibration:

- The load cell is placed in unloaded position.
- The value “2” is written to address 106. It returns the Acknowledge(0x05) code and starts zero calibration. It collects data for zero calibration for 10 seconds and completes zero calibration at the end of the period. During this period, queries made via Modbus will not be answered.

Load Calibration:

- The calibration weight value is written to address 99, which is 1000 times the weight value to be calibrated.
- The load cell is loaded with the amount of load to be calibrated. The value “3” is written to address 106. It returns the Acknowledge(0x05) code and starts zero calibration. It collects data for load calibration for 10 seconds and completes the load calibration at the end of the period. During this period, queries made via Modbus will not be answered.

Digital Calibration:

- 1000 times the weight value is written to address 99 for weight digital calibration, and the tare weight value is written to address 99.
- The mV/V value in the load cell's certificate is entered as a multiple of 100000 at address 103. If there is more than one load cell in the system, the mV/V values should be averaged and entered.
- The capacity value of system 113 is written as multiplied by 1000. If the system consists of more than one load cell, the total capacity of the load cells is entered in this menu.
- "4" or "5" is written to address 106, depending on the type of digital calibration. It returns the Acknowledge(0x05) code and starts its digital calibration. It collects data for digital calibration for 10 seconds and completes the digital calibration at the end of the period. During this period, queries made via Modbus will not be answered.

Modbus Error codes

Error Functions	Code (Decimal)	Explanation
Illegal Function	1	3: Reading Holding Registers 6: Preset Single Register 16: Preset Multiple Register It is produced if you want to perform operations with a function code other than Multiple Record writing functions.
Illegal Data Address	2	This is the error code generated if a transaction is attempted outside the addresses provided to the user. If you want to write to a read-only address used, this error code is generated.
Illegal Data Value	3	It tells you that the value written to the address is invalid for that address.
Acknowledge	5	The TR4 device accepted the request and processed it, but it will take some time to complete the process.

A Nişantepe Mh. Gelin Çiçeği Sk. No:36 Çekmeköy 34794 İstanbul T (216) 585 1818 F (216) 585 1819 W www.esit.com.tr