

LCA2 Load Cell Amplifier

User Manual



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Amplifier

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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.

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Overview



Esit LCA2 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.

This user manual contains sample explanations on the installation and use of LCA2.

All written and visual materials in this user manual are owned by Esit Electronic Inc.

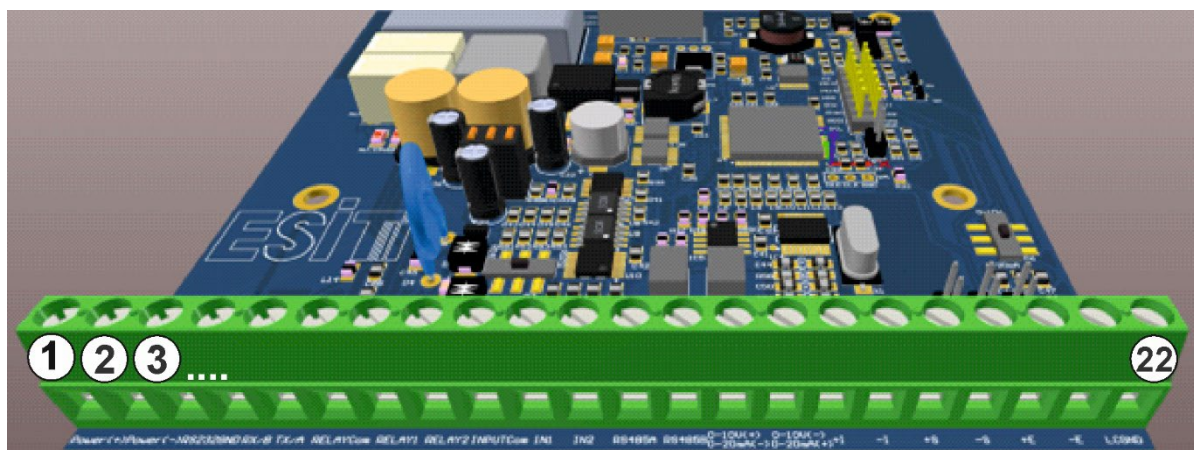
Technical Specifications

Model	LCA2
Load Cell Input	8 (350 ohms)
A/D Speed (/second)	6 - 400 Hz
Supply Voltage	12 - 24VDC
Screen	2.23-inch Oled Panel
Communication (Standard)	RS-232/RS-485 and RS485
Communication (Optional)	RS-422
Operating Temperature	-10°C / +50°C

Features

- Multiple language support,
- Dust and humidity-proof membrane type keyboard,
- Easy-to-understand use and set menu system,
- Possibility to connect up to 8 load cells,
- 2 x 2A relay outputs,
- Real-time date and time for calibration log,
- 2 isolated inputs,
- Remote access to all internal parameters (Modbus)
- RS485/RS-232 and RS-485 communication,
- Digital calibration,
- Analog output adjustable as mA and V,
- Possibility to connect 4 or 6 cable load cells

Cable Connections

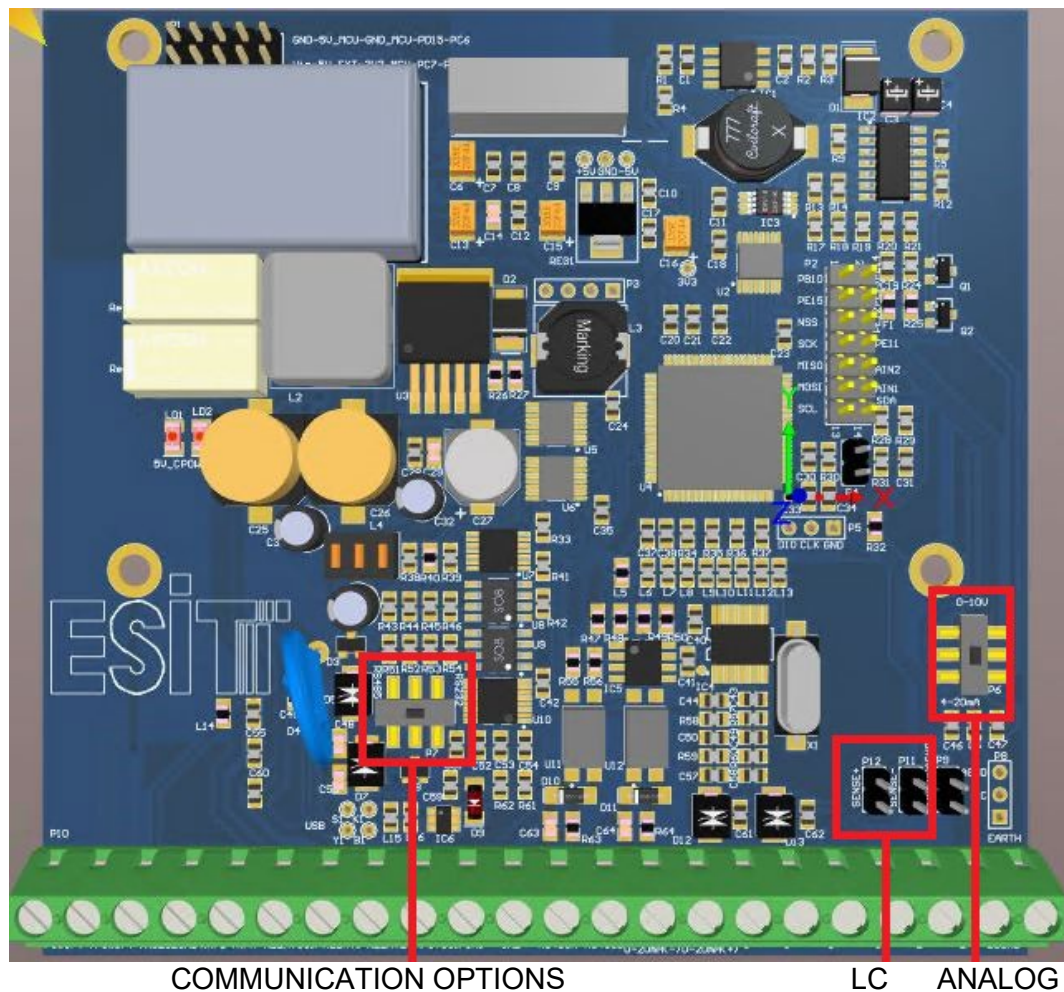


POWER	1	Power (+)	12-24 VDC (+)
	2	Power (-)	12-24 VDC (-)
COMM.	3	RS-232 GND	RS-232 Gnd terminal
	4	RX/B	RS-232 Rx terminal / RS-485 B terminal (Selectable Figure 1)
	5	TX/A	RS-232 Tx terminal / RS-485 A terminal (Selectable Figure 1)
RELAY	6	RELAYCom	Relay common terminal
	7	RELAY1	Relay 1 output terminal
	8	RELAY2	Relay 2 output terminal
INPUT	9	INPUTCom	Digital input Gnd
	10	IN1	Digital input 1(+)
	11	IN2	Digital input 2(+)
COMM.	12	RS-485A	RS-485 A terminal
	13	RS-485B	RS-485 B terminal
ANALOG	14	0-10V(+)/ 0-20mA(-)	0-10V analog output(+)/0-20mA analog output(-) (Selectable Figure 1)
	15	0-10V(-) / 0-20mA(+)	0-10V analog output(-)/0-20mA analog output(+) (Selectable Figure 1)

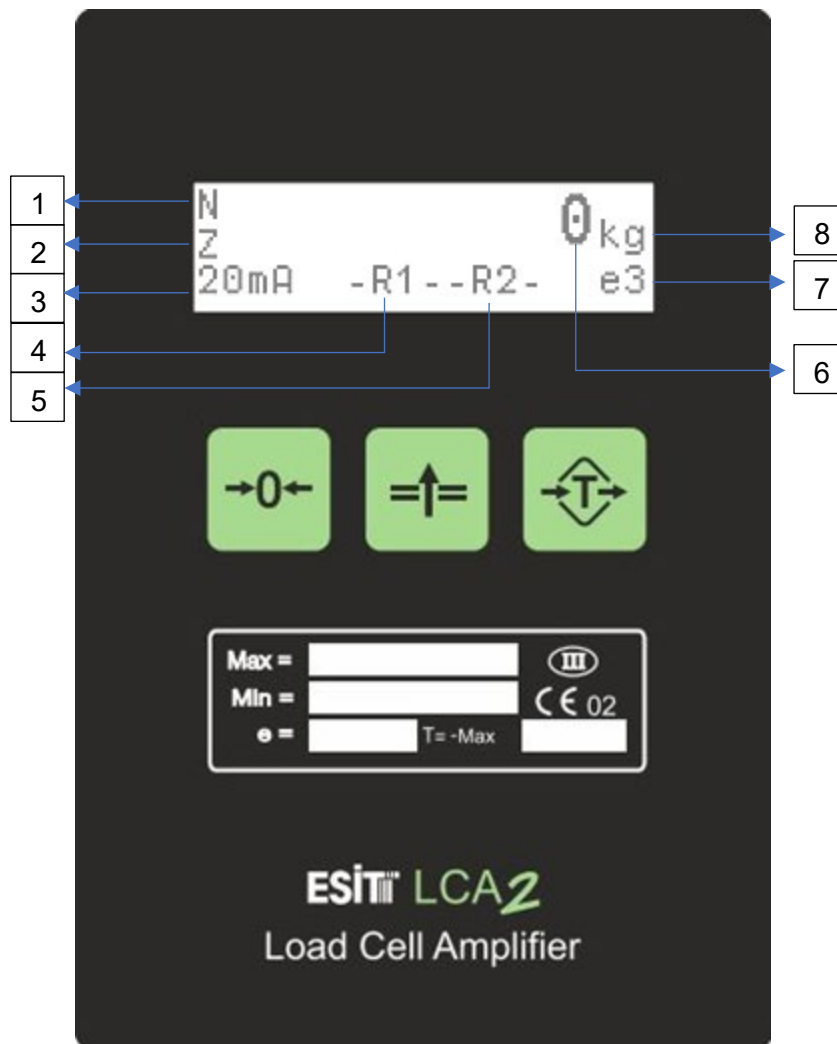
LOADCELL	16	+I	Signal + (Esit Colours: White)
	17	-I	Signal - (Esit Colours: Red)
	18	+S	Sense + (Esit Colours: Blue)
	19	-S	Sense - (Esit Colours: Orange)
	20	+E	Ext + (Esit Colours: Green)
	21	-E	Ext - (Esit Colours: Black)
	22	LCGND	Loadcell Shield

Note: In 4-wire Loadcell Connection, Connect Sense - terminal to Ext - terminal and Sense+ terminal to Ext + terminal or short circuit the Jumper P12 and P11 on the bottom right side of the PCB. (Figure 1)

Figure 1



Introduction of Main Screen



1	"NET" Shows that the tare has been removed and the displayed value is the net value.
2	Indicates that deviation from zero is less than 1/4e ("RESOLUTION")
3	Shows that type of the analog output.
4/5	Visible when the relay contacts are closed.
6	Weight on scales
7	Indicates current weighing range. It is displayed when the scale type is selected as "MUL.RANGE"(MULTI RANGE) or "MUL.INTER(MULTI INTERVAL)
8	Shows the unit of the scale. It is visible when the scale is stable.

Introduction of Keys


ZERO/ESC KEY
MENU KEY
ENTER KEY

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

1. Menu List

Main menu		Sub Menu		Sub Menu operation					
1	COMM	1	1. SERIAL	MODE	DEVICE ID	BAUDRATE	BIT	PARITY	PERIOD
		2	2. SERIAL	MODE	DEVICE ID	BAUDRATE	BIT	PARITY	PERIOD
2	RELAY	1	RELAY1	CONTROL	SETVAL	HYSTERESIS	CONTACT	OPEN DELAY	CLOSE DELAY
		2	RELAY2	CONTROL	SETVAL	HYSTERESIS	CONTACT	OPEN DELAY	CLOSE DELAY
3	INPUT	1	INPUT1						
		2	INPUT2						
3	SCALE	1	SEC.TYPE						
		2	CAPACITY						
		3	SCALE TYPE	SCALETYPE	UPPERZONE	LOWERZONE			
		4	ZERO	ZEROMODE	ZERO LIMIT	POW.ONLIMIT			
		5	RESOLUTION	MULTIPLIER	STEPVALUE				
		6	UNIT						
		7	STABILITY						
		8	INNERCOUNT						
		9	TARE						
4	ANALOG	1	CURRENT	LOAD MAXIMUM	LOAD MINIMUM	mA MAXIMUM	mA MINIMUM		
		2	VOLTAGE	LOAD MAXIMUM	LOAD MINIMUM	V MAXIMUM	V MINIMUM		
5	CALIBRATION	1	ZERO CALIB.						
		2	LOAD CALIB.						
		3	DIGI CALIB.	TYPE	CAPACITY	WEIGHT	mV/V		
		4	CALIB. LOG						
6	FILTER	1	SETTING	TYPE	ADCHZ	AVG.COUNT	RESPONSE	VIBRATION	STBLTYDELAY
7	GENERAL	1	LANGUAGE						
		2	PASSWORD	MODE	NEW PASS				
		3	FACTORYDEF						
		4	SERALNUMBER						
		5	VERSION						
		6	DATE-TIME						

Menu Usage

1. COMM(Communication)

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

“1- SERIAL” communication protocol is selected as RS232 or RS485 with the switch on the card. The device should be powered off while changing this setting.

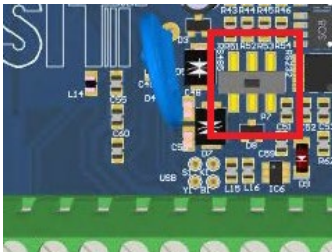
Under the communication menu, “1-SERIAL” (RS-485/RS-232) and “2-SERIAL”(RS-485) communication settings can be changed.

1.1.1-SERIAL

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

1.1.1.1. 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.(only “1-SERIAL”)



- OFF
- CONTINUOUS: The device periodically 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 24.

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

1.1.6. PERIOD

It is the sending period of weight data. Appears if the communication mode is "CONTINUOUS". Otherwise, it does not appear in the menu list.

- 10 Hz
- 50 Hz
- 100 Hz
- 400 Hz

2. RELAY

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.
- LCA : Relays are controlled with the values in the menu.

If LCA 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: When the weight value of the indicator is below the value entered in "SETVAL", the contacts of the relay are open.
- NORM.CLOSED: When the weight value of the indicator is below the value entered in "SETVAL", the contacts of the relay are closed.

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. INPUT

3.1. INPUT1

This is the menu where input settings are made. This indicator has 2 inputs which are “INPUT1” and “INPUT2”. Related on input selection is set this parameter.

- TARE: The device performs taring operation when input signal is detected.
- CLEAR TARE: The device performs clearing tare operation when input signal is detected.
- ZERO: The device performs zeroing operation when input signal is detected.
- DISABLE: The input is not active.

3.2. INPUT2

“INPUT2” menu is the same as “INPUT1” menu.

4. SCALE

4.1. SEC. TYPE (SECURITY TYPE)

This is the menu where the weighing device security settings are entered.

- LEGALFORTRD(LEGAL FOR TRADE): Weighing parameters and calibration cannot be changed. (Legal For Trade)
- CALIB.LOCK(CALIBRATION LOCKED): Weighing parameters can be changed but the calibration cannot be changed. (Legal For Trade)
- UNLOCKED: Weighing parameters and calibration can be changed.(Not Legal For Trade)

4.2. CAPACITY

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

4.3. SCALE TYPE

4.3.1. SCALE TYPE

This is the submenu where the scale type of the weighing device is selected.

- SINGLE: The weighing device with a single scale interval and capacity.
- MUL.INTER.(MULTI INTERVAL): In this operation there are 3 different scale intervals and capacities. There is a different scale interval in each capacity range.
- MUL.RANGE(MULTI RANGE): In this operation there are 3 different scale intervals and capacities. There is a different scale interval in each capacity range.

4.3.2. UPPER ZONE

This is the submenu where the weight value for 2. Scale interval is entered. It is activated when the scale type is selected as "MUL.INTER." (MULTI INTERVAL) or "MUL.RANGE" (MULTI RANGE)

4.3.3. LOWER ZONE

This is the submenu where the weight value for 1. Scale interval is entered. It is activated when the scale type is selected as "MUL.INTER." (MULTI INTERVAL) or "MUL.RANGE" (MULTI RANGE)

Explanation For MUL.INTER(MULTI INTERVAL):

In this operation there are 3 different scale intervals and capacities. There is a different scale interval in each capacity range;

Weight < "LOWER ZONE" + 9e1 -> e1 (the first zone scale interval)

"LOWER ZONE" + 9e1 < Weight < "UPPER ZONE" + 9e2 -> e2 = 2*e1 (the second zone scale interval)

"UPPER ZONE" + 9e1 < Weight < "CAPACITY" + 9e3 -> e3 = 2*e2 (the third zone scale interval)

"e1" scale interval is determined with "RESOLUTION" parameter. e2 and e3 are determined automatically. If the respective zone capacity +9e is observed when the weight is increased, it is proceeded to the next scale interval. When the weight is decreasing, it is decreased to the previous scale interval when it is shifted from the upmost zone to the lowest one or from the lower zone to the 1. zone. The scale interval can be the multiples of 1,2 and 5. For example when e1=2, e2=2*e1=2*2=4 and calculated as 5 which is the next scale interval.

Explanation For MUL.RANGE(MULTI RANGE):

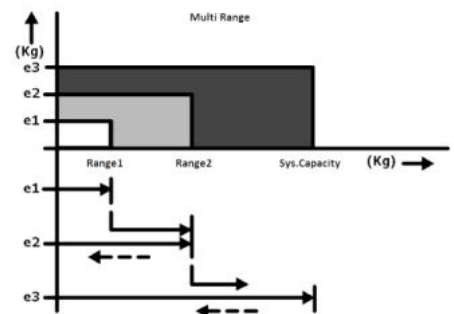
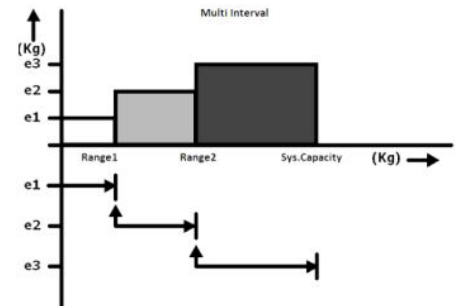
In this operation there are 3 different scale intervals and capacities. There is a different scale interval in each capacity range;

e1 (first zone scale interval): is determined with "RESOLUTION" parameter

e2 = 2*e1 (the second zone scale interval): is determined automatically

e3 = 2*e2 (the third zone scale interval): is determined automatically

If the respective zone capacity +9e is observed when the weight is increased, it is proceeded to the next scale interval. However, the scale interval does not change when shifting from the 3. zone to the 2. one or from the 2. zone to the 1. one when the weight is decreasing. It is shifted to e1 when the weight is below 0,5 e(i). The scale interval can be the multiples of 1,2 and 5. For example when e1=2, e2=2*e1=2*2=4 and calculated as 5 which is the next scale interval. It is shifted to 3 partition operation mode when the measuring type is selected as "MUL.INTER " or " MUL.RANGE ". In such case, following menus are displayed respectively in order to determine the upper and lower Zone limits. In multi partition systems "CAPACITY">" UPPER ZONE">" LOWER ZONE" must be entered.



4.4. ZERO

This is the menu where zero settings are made

4.4.1. ZERO MODE

- MANUAL: Zeroing is only made by using key "ZERO/ESC KEY"
- ZEROTRACK.(ZERO TRACKING): The shifts in the weight value are zeroed as long as the gross value is zero.
- POWERONZERO: The option of zeroing at start-up. It operates with the % ratio selected in "POW.ONLIMIT" menu. "ZEROTRACK."is also active.
- F.AUTOZERO(FULL AUTOMATIC ZERO): It is the full automatic zeroing option. "POWERONZERO" is also active. In case of stability, The screen is set to zero in the % ratio as selected in "ZERO LIMIT" menu once in every 3 seconds.

4.4.2. ZERO LIMIT

Zeroing is made if the weight value of less than selected percent of the capacity. If a Zero is performed at a value above this value, a warning will appear on the device screen and the operation will not be performed. If "SEC.TYPE"(SECURITY TYPE) is selected "LEGALFORTRD"(LEGAL FOR TRADE), this parameter automatically changes %2.

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

4.4.3. POW.ONLIMIT(POWER ON ZERO LIMIT)

Determines at which percent of the "CAPACITY" value will the zeroing be made at first start-up of the device. If "SEC.TYPE"(SECURITY TYPE) is selected "LEGALFORTRD"(LEGAL FOR TRADE), this parameter automatically changes %10.

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

4.5. RESOLUTION

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

4.5.1. MULTIPLIER

It can be selected as 1000, 100, 10, 1, 0.1, 0.01, 0.001.

4.5.2. STEPVALUE

It can be selected as "MULTIPLIER"*1, "MULTIPLIER"*2, "MULTIPLIER"*5.

4.6. UNIT

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

- kg - Kilogram
- g - Gram
- lb – Pound

- mV/V
- mV

4.7. 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.

- NO WAIT: Taring and zeroing are made regardless of stability
- WAIT: Taring or zeroing cannot be performed until the device is stable.

4.8. INNERCOUNT (mV/V) (INNER COUNT)

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

4.9. 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.

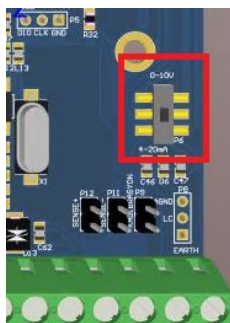
- ON
- OFF

NOTE: If the device “SEC.TYPE”(SECURITY TYPE) is “LEGALFORTRD”(Legal For Trade), All parameters in the “SCALE” section (except the “INNERCOUNT”) cannot be changed while the calibration jumper is short circuit.(Figure 1)

5. ANALOG

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

5.1. CURRENT/VOLTAGE



The type of analog output (CURRENT or VOLTAGE) is set by the switch position on the card. The device should be powered off while changing this setting.

5.1.1. LOADMAXIMUM

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

5.1.2. LOADMINIMUM

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

5.1.3. mA MAXIMUM

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

5.1.4. mA MINIMUM

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

5.1.5. V MAXIMUM

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

5.1.6. V MINIMUM

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

6. CALIBRATION

This is the menu where indicator calibration settings are made.

If the device "SEC.TYPE"(SECURITY TYPE) is "LEGALFORTRD"(Legal for trade) or CALIB.LOCK(CALIBRATION LOCKED, Device cannot be calibrated while calibration jumper is short circuit.(Figure 1)

If use password is selected in the 8.2, the user is asked to enter a password in the first stage of the calibration menus.

6.1.ZERO CALIB. (ZERO CALIBRATION)

- The "ZERO CALIB." submenu is entered via the "CALIBRATION" menu.
- The text "WILLBEZERO" appears on the screen.
- The weight on the Load Cell is unloaded. 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.

6.2.LOAD CALIB. (LOAD CALIBRATION)

- The "LOAD CALIB." submenu is entered via the "CALIBRATION" menu.
- The text "LOADING" appears on the screen.
- A known weight is loaded 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.

6.3.DIGI CALIB. (DIGITAL CALIBRATION)

- In the "CALIBRATION" menu, the "DIGI CALIB." 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.

6.4. CALIB. LOG(CALIBRATION LOGS)

This is the menu where last calibration date and total calibration count are shown.

CALIBRATION JUMPER

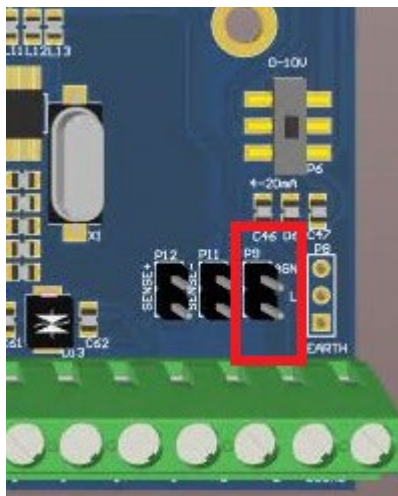


Figure 2

If “SEC.TYPE”(SECURITY TYPE) is “LEGALFORTRD”(Legal for trade) or CALIB.LOCK(CALIBRATION LOCKED, Device cannot be calibrated while calibration jumper is short circuit.

If “SEC.TYPE”(SECURITY TYPE) is “LEGALFORTRD”(Legal for trade), “SCALE” parameters cannot be changed while calibration jumper is short circuit.

7. FILTER

7.1.SETTING

This is the menu where the filter will be selected.

7.1.1. TYPE

- OFF : There is no filter, “ADC HZ” and “STBLTYDELAY”(STABILITY DELAY) selection are made.
- CUSTOM: “RESPONSE” and “VIBRATION” use custom values based on options.
- MOVINGAVG:(MOVING AVERAGE) Filtering is done according to “ADC HZ” and “AVG.COUNT”(AVERAGE COUNT)

7.1.2. ADCHZ

It is the sampling rate of the device.

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

7.1.3. AVG.COUNT (AVERAGE COUNT)

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

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

7.1.4. RESPONSE

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.

7.1.5. 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.

7.1.6. STBLTYDELAY (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 LCA screen.

Options;

- **SHORT (0.5s):** The current measurement value is monitored for 0.5 seconds.
- **MEDIUM (1s):** The current measurement value is monitored for 1 seconds.
- **LONG (2s):** The current measurement value is monitored for 2 seconds.

8. GENERAL

8.1. LANGUAGE

This is the submenu where language selection is made.

- **ENGLISH**
- **TURKISH**

8.2. PASSWORD

8.2.1. MODE

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

- **USE**
- **NOT USING**

8.2.2. NEWPASSWORD

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".

8.3. FACTORYDEF (FACTORY DEFAULT)

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

8.4. SERALNUMBER (SERIAL NUMBER)

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

8.5. VERSION

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

8.6. DATE-TIME

This is the menu where the date and time are displayed and set.

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	RESETTING EEPROM
52	CALIB. SUCCESS
53	SAVE SUCCESFULL
54	ZEROCALIBSUCCESS
56	INCORRECT PASSWORD
59	NON-STABLE
60	CALJUMPERINSERTED

Number	ERROR MESSAGES
1	ZERO LIMIT
2	MAXIMUM LOAD
4	VALUE IS INCORRECT
5	MINIMUM LOAD

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.(1.SERIAL)
		Decimal Explanation
		0 OFF
		1 CONTINUOUS
35 (Y/O)	1	2 MODBUS
		Communication ID is the device number using MODBUS communication. It can take values between 0 - 255.(1.SERIAL)
		Communication Speed(1.SERIAL)
		Decimal Explanation
36 (Y/O)	1	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(1.SERIAL)
		Decimal Explanation
		0 7 bit
		1 8 bit

38 (Y/O)	1	Communication Parity(1.SERIAL)	
		Decimal	Explanation
		0	NONE
		1	Even
		2	Odd
39(Y/O)	1	Communication Period(1.SERIAL)	
		Decimal	Explanation
		0	10 Hz
		1	50 Hz
		2	100 Hz
		3	400 Hz
40(Y/O)	1	Communication Mode(2.SERIAL)	
		Decimal	Explanation
		0	OFF
		1	CONTINUOUS
		2	MODBUS
41 (Y/O)	1	Communication ID is the device number using MODBUS communication. It can take values between 0 - 255.(2.SERIAL)	
42 (Y/O)	1	Communication Speed(2.SERIAL)	
		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
43 (Y/O)	1	Communication Data Length:(2.SERIAL)	
		Decimal	Explanation
		0	7 bit
		1	8 bit
44 (Y/O)	1	Communication Parity:(2.SERIAL)	
		Decimal	Explanation
		0	NONE
		1	Even
		2	Odd
45 (Y/O)	1	Communication Period(2.SERIAL)	
		Decimal	Explanation
		0	10 Hz
		1	50 Hz
		2	100 Hz
46	28	Not Using	
74 (Y/O)	1	Relay1 Control:	
		Decimal	Explanation
		0	Relay1 Control is via MODBUS.
		1	Relay1 is controlled according to the parameters in LCA2.

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 LCA2.
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	
		Decimal	Explanation
		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	
		Decimal	Explanation
		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	
		Decimal	Explanation
		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
112 (Y/O)	1	Stability Time	
		Decimal	Explanation
		0	SHORT(0.5s)
		1	MEDIUM(1s)
113 (Y/O)	2	2	
		LONG(2s)	
		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 zero up to 1% of scale capacity.
		1	It can be zero up to 2% of scale capacity.
		2	It can be zero up to 10% of scale capacity.
116 (Y/O)	1	3	
		unlimited	
		Resolution Multiplier	
		Decimal	Explanation
		0	1000
		1	100
		2	10
		3	1
117 (Y/O)	1	4	
		0.1	
		5	
		0.01	
		6	
		0,001	
		STEP (Increment Step Setting)	
		Decimal	Explanation
118(/O)	1	0	e = 1 * Resolution Multiplier
		1	e = 2 * Resolution Multiplier
		2	e = 5 * Resolution Multiplier
		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	
		Decimal	Explanation
		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.

 $152 \times 65536 + 34463 = 10'000'000$

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 zero limit, sets current weight to zero
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: Zeroing cannot be done, 0: Zeroing 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
										Input 2	Input 1			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 LCA2 device accepted the request and processed it, but it will take some time to complete the process.



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