LCA
Load Cell Amplifier

MDK-LCA-R00-060602

USER MANUAL

Ver: 1.0.2

08-20-2002

17/09/2004

CONTENTS

OVERVIEW

LCA (**L**oad **C**ell **A**mplifier) is a smart signal converter which is designed for harsh industrial environments. The most distinctive feature of LCA is, its ability to expose all of its parameters using the MODBUS protocol.

Features:

- High internal resolution
- Digital filter
- Linearization
- Temperature compensation
- ModBus protocol
- Internal voltage supply circuitry is isolated from the external voltage supply
- Isolated communication lines
- Temperature sensor
- LCD display
- 2 relay outputs
- 4-20mA Analog output module
- Eeprom memory for user Set-Up and Calibration information.
- 24-bits Resolution
- MODBUS protocol
- IP-66 protection class for industrial applications

1 SPECIFICATIONS

1.1 TECHNICAL SPECIFICATIONS

- Easily adjustable parameter and calibration menu by keypad
- Up to 160 mV/V input range
- Gain adjustment according to sensor output
- Sense compensation
- Works with 12-24 Volt supply (DC / AC)
- Up to 8 Load cells are connectable
- Industrial IP 66 protection class case
- Remote control, parameter Set-Up and Calibration

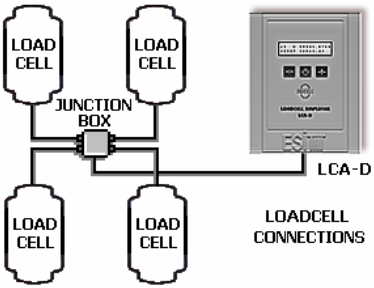
Model	LCA
Input	DC voltage: -1,60 Volt to 1,60 Volt
A/D Speed (/second)	50
Display Resolution	1/100.000
Display	LCD (2x16 character)
Maximum Range	7 digit (-9999999 to +9999999)
Communication	RS-232C / RS-485 selectable
Optional Futures	4-20mA analog output, 2 relay outputs
Load cell Excitation	250mA (8 load cell) at 10 VDC
Power Supply	12-24 Volt DC / AC
Weighing Accuracy	10000d
EMC	EN 55011:2002 Emission - Class, EN 45501:1992/AC:1993 Metrological Aspects of Non-Automatic weighing Instruments. Passed with tests; Electrostatic Discharges (ESD), Radiated AM Field, Electrical Fast Transient (EFT)/Burst Transients, Power Supply Voltage Variations, Dips and Interruptions by KEMA

1.2 SYSTEM REQUIREMENTS

A power supply and a sensor (Load cell) are required for standard connection. And additional modules for proper using;

- **JUNCTION BOX:** If the system consists of more than one

load cell, then a junction box is used for gathering the load cell outputs to the LCA device.



- **COMPUTER (PC):** If a computer will be used for monitoring the measured value as indicator (in **LCA-X** model) or both PC and LCA device (in **LCA-D** model) will display the measured value, then a computer with standard configuration will be required.

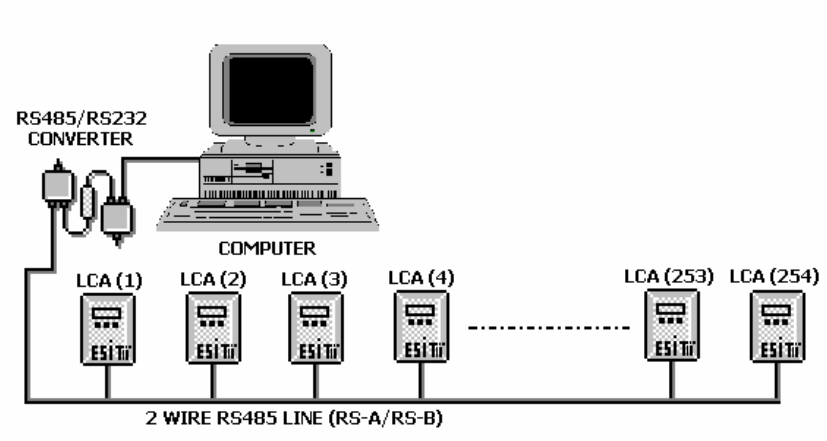
Minimum Configuration: P100MHz processor, 8Mb RAM, 500Mb hard-disc and at least an RS232 port.

And also if there is a network system, a Network adapter is required to work with the Network workgroup.

(**NOTE:** According to the selected PC Software, minimum configuration can be changed. If there is only measurement transfer to the PC or user operations (Tare, Zero etc.) from LCA devices with PC program, minimum configuration and operation system is enough to execute. Otherwise if there is a data record, computer should work on power-on state continuously and automatically records the weighing data. For this reason, the PC should have the qualifications that can work with safety operating systems WinNT, Win2000 or similar and enough hard-disc capability.)

- **RS232/485 CONVERTER:** If RS-485 communication base will be used for communication an **RS232/485 Converter** must be used between PC and device(s) to adapt device(s) and computer.

(**NOTE:** To communicate with more than one device at the same bus, RS-485 Communication must be used. Furthermore, because of long distance between devices and PC, RS-485 communication must be used. For 0-50 meters RS-232, more than 50 meters RS-485 communication must be preferred)



1.3 ELECTRONICAL STRUCTURE

LCA indicator uses 16-bit PIC 18C252 IC micro controller that has 16 kWord (32 kByte) ROM memory and 1532 bytes RAM. There is an Eeprom memory (2048 byte) for user setup and calibration history information. All calibration parameters and digital linearization and compensation tables are kept in this memory.

There is a key place inside of LCA indicator. When the jumper on state, the key is short circuited, calibration and related parameters can be changed. When the jumper is open circuited then calibration and related parameter setups are prohibited (Other optional parameters can be changed any time).

After calibration and parameter set-up, this jumper should be left in open-circuit state. This protection key is placed inside of LCA device and the cover must be unlocked to short-circuit this jumper.

1.4 OPERATING SPECIFICATIONS

- Following functions can be adjusted by keypad.
    1. Accessing to the device identity information.
    2. Screen parameters can be changed.
    3. Calibration process can be done.
    4. Digital filtering and communication parameters can be adjusted.
    5. **Zero** and **Tare** operations can be done.
- No-motion detection.
- Center of **Zero** detection.
- Warning above maximum allowable value and other error conditions (Related error message appears on the screen, "**ErrXX**").
- All parameters and calibration process can be changed from remote point.

1.5 DISPLAY SPECIFICATIONS

- LCD screen shows the following data:
    1. 7 digit measurement result
    2. Net/Gross symbol (N**-0.000050kg**)
    3. Tare value (T **1.000000**)
    4. Relay state (**1, 2**)
    5. Level of scaling (**e1 / e2**)
    6. No-motion state (**S**)
    7. Center-of-Zero (**Z**)
- Displaying measurement with decimal point (1.000000kg)
- Wide view angle screen
- LCD backlighting

1.6 CONTROL SPECIFICATIONS (OPTION)

- **4-20 mA or 0-10V analog output (16 bits resolution)**

This module supplies self-calibrated adjustable current output. It can easily be configured for the required range. (📖 See, **5.1.5 #OUTPUT SETUP**)

- **Relay option**

LCA indicator has two optional relay outputs. Relay contacts can be adapted as NormallyClosed/NormallyOpen. (📖 See, **5.1.5 #OUTPUT SETUP**)

- **Digital Input**

LCA indicator has two optically isolated digital inputs. This feature is for proper using.

1.7 PHYSICAL DIMENSIONS

LCA-D

Dimensions	
Width	130 mm
Height	171 mm
Depth	50 mm

LCA-X

Dimensions	
Width	130 mm
Height	171 mm
Depth	50 mm

1.8 CERTIFICATES

LCA indicator passed KEMA EMC tests with success.

KEMA

CERTIFICATE

ELECTROMAGNETIC COMPATIBILITY

Applicant	:	**ESIT ELEKTRONIK SISTEMLER LTD. STI.**
Contact person	:	**Mr. Murat Gunal**
Address	:	**Muhurdar Cad. No:91 Kadikoy**
Postal code, Place	:	**81300 Istanbul**
Country	:	**Turkey**
Manufacturer	:	**ESIT ELEKTRONIK SISTEMLER LTD. STI.**
Address	:	**Muhurdar Cad. No:91 Kadikoy**
Postal code, Place	:	**81300 Istanbul**
Country	:	**Turkey**
Electrical apparatus	:	**Load cell amplifier**
Trademark	:	**ESIT**
Type designation	:	**LCA**
Environment	:	**Residential, commercial, light industrial**

EN 45501:1992/AC:1993	Metrological Aspects of Non-Automatic Weighing Instrument
EN 61000-4-2:1995	Electrostatic discharge (ESD) immunity
EN 61000-4-3:1996	Radiated Electro-Magnetic field immunity
EN 61000-4-4:1995	Electrical fast transient (EFT) immunity
EN 61000-4-11:1994	Immunity to supply voltage variations, dips and interruptions

The undersigned declares that the described products meet the essential requirements of the above mentioned standard, based on a non-recurrent examination.
The results are recorded in our test report with reference 2023591-QUA/EMC 02-4529.

KEMA Quality B.V.
(Competent Body EMC)
Arnhem, 06 September, 2002

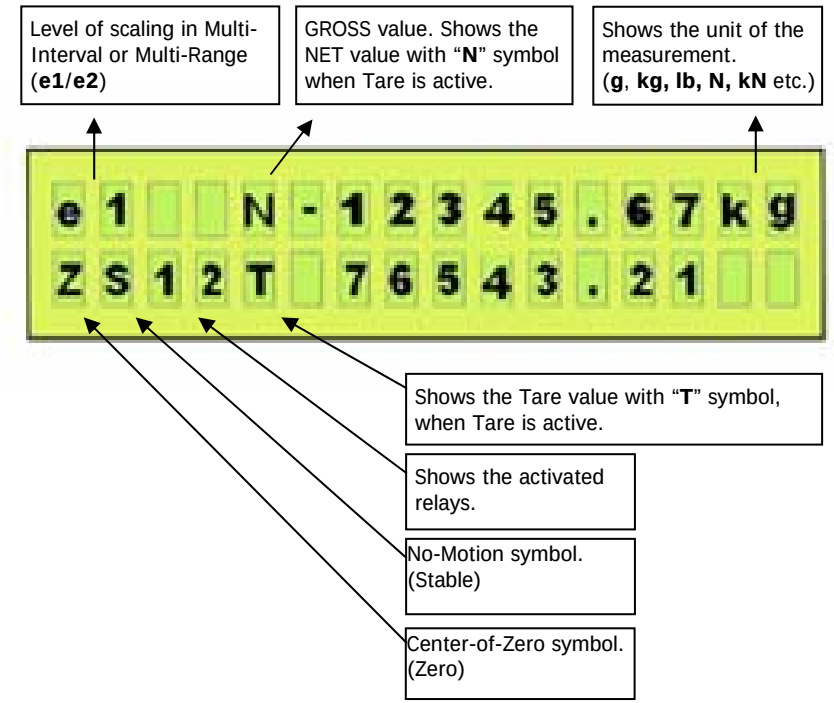
A.T. van der Meijden

Certificate No. **2023591-QUA/EMC 02-4530**

Integral publication of this certificate and adjoining reports is allowed

KEMA Quality B.V.
Utrechtseweg 310, 6812 AR Arnhem. P.O. Box 5185, 6802 ED Arnhem, The Netherlands.
Telephone +31 26 3 56 2010, Telefax +31 26 3 52 5800.

2 SCREEN APPEARANCE



2.1 DISPLAY SYMBOLS

No-Motion (**S**): If there is stability on the platform, then '**S**' symbol appears on the screen.

Center-of-Zero (**Z**): If displayed value is zero and the internal count is within ±1/4d, '**Z**' symbol appears on the screen.

Relay1 State (**1**): This symbol appears on the screen when Relay1 is activated.

Relay2 State (**2**): This symbol appears on the screen when Relay2 is activated.

Net (**N**): Appears on the screen when Tare is active. Notifies that displayed value is NET.

Tare (**T**): Shows current Tare value.

Unit (**g, kg, mV/V...**): Shows the measurement unit in use. Can be changed in set-up menu.

Scale Type (**e1**): Indicates that measured value is in first scale interval range when Scale Type is Multi-Interval or Multi-Range. (Not shown in Single-Interval mode)

Scale Type (**e2**): Indicates that measured value is in second scale interval range when Scale Type is Multi-Interval or Multi-Range. (Not shown in Single-Interval mode)

2.2 KEYS

Zero Key: Makes screen value 0 (zero) if within allowable limits.

Tare Key: Sets current screen value as Tare value or disables the previous Tare value. Works as toggle.

Function: If this button is pressed for 3 seconds or more, then Parameter Set-Up menu appears on the screen.
(📖 See. **5 LCA INDICATOR WORKING DIAGRAM**)

3 ASSEMBLING and POWER-UP

LCA Indicator has internal connection terminals. Relevant connections are done with these terminals. There is an explanation on the LCA board that represents the meaning of each terminal. Beginning with left side to right side on the LCA board (1 to 22) each terminal meaning is given below:

1. **POWER+** : Power Supply (+ Pin for DC Supply)
2. **POWER0** : Power Supply (– Pin for DC Supply)
3. **GROUND** : Earth for device body.
4. **RS Rx/A** : Rx pin for RS-232, A pin for RS-485
5. **RS Tx/B** : Tx pin for RS-232, B pin for RS-485
6. **RELAYC** : Common pin for both Relays.
7. **RELAY1** : Contact connection for Relay1.
8. **RELAY2** : Contact connection for Relay2.
9. **INPUTC** : Common pin for digital inputs.
10. **INPUT1** : Digital input 1 (Opto isolated).
11. **INPUT2** : Digital input 2 (Opto isolated).
12. **ANALOG+** : + Power supply for 4-20 mA or Pulse Input.
13. **PULSEIN** : + Connection for 4-20 mA analog output.
14. **4/20mA** : 4-20 mA analog output.
15. **ANALOG-** : – Power supply for 4-20 mA or Pulse Input.
16. **SHIELD** : Load cell ground connection (Same point with devices internal ground)
17. **–S** : -Sense Load cell
18. **–E** : -Excitation Load cell
19. **–I** : -Input Load cell
20. **+S** : +Sense Load cell
21. **+E** : +Excitation Load cell
22. **+I** : +Input Load cell

It is enough to connect Power (1:**Power+**, 2:**Power0**) and Load cell (17..22, **-S**, **-E**, **-I**, **+S**, **+E and +I**) connections to device terminals for stand alone working as minimum requirements (📖 **Section 1.2, MINIMUM REQUIREMENTS**). When LCA device is first energized "**ROM VERSION NO**" appears on the screen and tests memory functions, then displays normal measurement screen.

3.1 Start Up

When LCA is powered up, measured value appears on the screen. This value comes from previously saved calibration and user zero point values. Also if there is a linearization and/or temperature compensation, screen value depends on these tables. Zero point moves to last saved user zero value.

3.2 Indicator Value Range

The result of the measurement can be from "–Max.-9e" to "Max.+9e" value (according to Gross value). If the screen value exceeds over these values then related screen message is shown (measured value will not be shown).

3.3 Zero Process

A new zero reference can be processed by pressing Zero key. Also screen value equals to zero and Center of Zero symbol ('**Z**') appears on the screen.

Allowable Zero Limits: %4 of maximum value (OIML IR76, 4.5.1)

Zero operation can only be set when screen value is GROSS. If there is a tared value (Screen showing **Net** value) then Zero process cannot be executed.

3.4 Automatic Zero

No permission to automatic zero.

3.5 Units

LCA indicator can be Set Up with different unit alternatives for the measured unit. This units are "**kg**", "**lb**", "**t**", "**g**", "**oz**", "**N**", "**kN**", "**mV/V**", "**V**" and "**mb**" (📖 See, **5.1.2 #DISPLAY SETUP**). This Set Up can be done by keypad or by MODBUS.

3.6 Tare (Semi-Automatic Tare)

Current screen value (Gross) becomes Tare value when **Tare** () key pressed. If tare is active, '**N**' symbol appears on the measurement screen, which indicates that the value on the screen is NET value. Tare value appears on the second line with '**T**' symbol.

When Tare is active, if there is a stable condition with Net value (bigger than 1), Tare value will be set to zero after a zero or negative measurement (Gross) confirmed.

NOTE: If screen value is unstable (There is a motion condition, no '**S**' symbol) or screen value is negative, and then tare process is prohibited.

Pressing Tare () key again cancels Tare value.
Tare operation can be done by MODBUS, too.

3.7 Numerical Tare

LCA indicator does not support getting known tare values from memory feature.

3.8 Date and Time

Production date, calibration date and number of calibration-processed information are kept in Eeprom memory. While during calibration process, calibrating PC program automatically saves the new calibration date to the memory. There is no Real Time Clock module inside of LCA devices.

3.9 Program Version

Program revision number appears on the screen when start-up occurs.

4 SAFETY PRECAUTIONS

- After all connections are completed, power-up the device. Do not modify the current connections while device is powered up and working.
- Please operate with the notified temperature ranges.
- Always use the power supply given together with the indicator or a similar one with specifications.

5 LCA INDICATOR WORKING DIAGRAM

If Function () key is pressed for 3 seconds or more, then menu screen appears. There are six headline menus and they are as follows:

- #IDENTITY
- #DISPLAY SETUP
- #CALIBRATION
- #INPUT SETUP
- #OUTPUT SETUP
- #COMM SETUP

Meaning of the keys (**Exit Menu Enter**) appears on the second line of screen when one of these headlines are listed. Menu screen looks like as follows:

#IDENTITY
Exit Menu Entr

According to this logic, each key meaning is stated below.

 **Exit:** The Zero key is used. When this key is pressed, menu screen goes off and returns to normal measurement screen.

 **Menu:** The Tare key is used. Menu screen switches to next headline of menu when this button is pressed. (**#IDENTITY, #DISPLAY SETUP, #CALIBRATION, #INPUT SETUP, #OUTPUT SETUP, COMM SETUP**)

 **Enter**: The Function key is used. When this key is pressed on the menu screen, related parameter setup screen is displayed.

One of these headlines can be selected by pressing Function () key. Meaning of the parameter and parameter number that is to be modified or read from the screen, appears on the LCD's upper line. The parameter's alternatives or parameter value will be

displayed on the second line of LCD. Related parameter digit blinks and helps us which digit is about to be changed.

EXAMPLE:

If parameter 16 (P16) "**#INPUT SETUP**", "**P16:Input Range**" is wanted to be changed, then, first Function () key must be pressed for 3 seconds or more to enter the menu screen. Later, menu screen appears on the LCD as below:

```
#IDENTITY
 Exit Menu Entr
```

Pressing Tare () key on this menu screen causes switching the other headlines. Switch to the **#INPUT SETUP** headline by pressing Tare () key. Screen appearance will be as follows when this headline appeared on the screen:

```
#INPUT SETUP
 Exit Menu Entr
```

After then, enter to the parameter entry screen by pressing Function () key. LCD appearance will be as below:

```
P16:Input Range
   1 ↵2.50 mV/V
```

The alternatives from 0 to 7 can be switched by pressing Zero () key. Changeable parameter alternative blinks and the meaning of the alternative is seen next to the number. When Function () key is pressed, selected parameter value is saved and parameter screen switches to the next parameter screen. The alternatives that belong to this parameter are:

ALTERN	↵	MEANING
0	↵	1,25 mV/V
1	↵	2,50 mV/V
2	↵	5,00 mV/V

3 ↵ 10,0 mV/V
4 ↵ 20,0 mV/V
5 ↵ 40,0 mV/V
6 ↵ 80,0 mV/V
7 ↵ 160 mV/V

5.1 Parameters and Their Meanings

5.1.1 #IDENTITY:

This headline contains some identity information about the device. These parameters are previously generated values in the factory and each of these parameters cannot be change by keypad or ModBus. The topics included in this headline are; serial number, ROM version, number of calibration times, PC software version that used for calibration process and calibration date information. These are:

P00:Serial Num: Shows the device's serial number. Screen appearance will be as follows:

P00:Serial Num
0000012 —

Since this is an unchangeable value, cursor blinks on the right bottom of the LCD.

Passing to the next parameter screen is by pressing Function () key.

P01:ROM VERSION: Shows micro-controller's software version. Screen appearance will be as follows:

P01:Rom Version
0000010 —

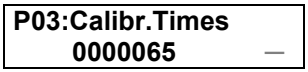
Passing to the next parameter screen is by pressing Function () key.

P02:CustomerCode: Specific number for customers. Screen appearance will be as follows:

P02:CustomerCode
0000001 —

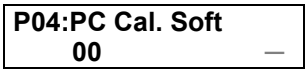
Passing to the next parameter screen is by pressing Function () key.

P03:Calibr.Times: This information shows number of calibration done. (Automatically incremented when calibration is done). Screen appearance will be as follows:



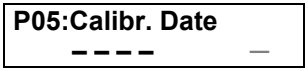
Passing to the next parameter screen is by pressing Function () key.

P04:PC Cal. Soft.: Personal code or PC software version number that the calibration process was made by. (The calibrating PC program automatically writes its own code to this area. If calibration is made by keypad, this value automatically sets itself to 0 [zero]). Screen appearance will be as follows:



Passing to the next parameter screen is by pressing Function () key.

P05:Calibr.Date: Calibration date information. The PC software that calibration made by, writes the calibration date to this area. If calibration process is made by keypad then this value will be displayed as "**----**" (unchangeable value). Screen appearance will be as follows:



Passing to the next parameter screen is by pressing Function () key. (This is the last parameter screen. So, device returns to the headline screen)

5.1.2 #DISPLAY SETUP:

This headline contains parameters about decimal point position, measurement unit, scale type, Max, Max1, Max2 and step (e1/e2) values.

P06:Decimal Pt: Decimal point position adjustment. Maximum display value is 7 digit (9999999). According to this, alternatives are from 0 to 6.

ALTERN ↵ MEANING

0 ↵ 9999999 (no decimal point)
1 ↵ 999999.9 (decimal point on 1st digit)
.. ↵ .. (.....)
6 ↵ 9.999999 (decimal point on 6th digit)

(**NOTE:** Alternatives above 7 will not be displayed)
Screen appearance will be as follows:

```
P06:Decimal Pt
     2
```

The digit, that is about to be changed, blinks for indicating the changeable value. The number on the flashing digit increases by pressing Zero (→0←) key. Selected value is accepted by pressing Function (=↑=) key and next parameter screen is shown.

P07:Unit Set: Measurement unit (g, kg, br, mV/V) for measured quantity. Alternatives from 0 to 9 and their meanings will be shown on the LCD screen. Screen appearance will be as follows:

```
P07:Unit Set
     2↵kg
```

The new set value is blinks and meaning of the parameter is shown next to this value. The number on the flashing digit is increased by pressing Zero (→0←) key. Alternatives and meanings are like as:

ALTERN ↵ MEANING

0 ↵g
1 ↵kg
2 ↵t
3 ↵oz

4 ↵lb
5 ↵N
6 ↵kN
7 ↵mV/V
8 ↵V
9 ↵(no unit)

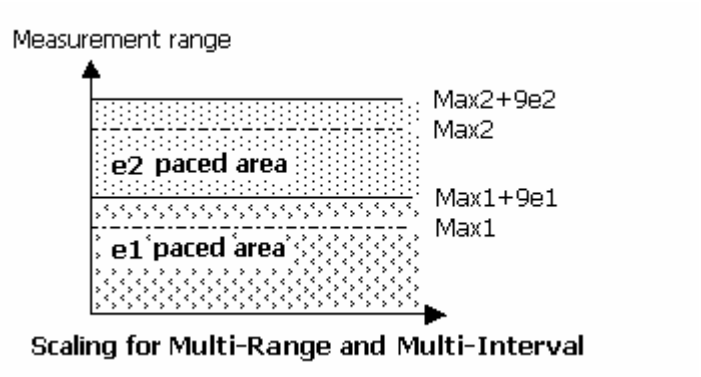
Selected value is accepted by pressing Function ( ) key and next parameter screen is shown.

P08:Scale Type: Scale Type for the measurement is determined in this parameter by choosing one of the alternatives from Single-Interval, Multi-Interval or Multi-Range. If there are two different steps for the measurement, selection must be Multi-Interval or Multi-Range. Screen appearance will be as follows:

P08:Scale Type
0↵Single

The new set value blinks and meaning of the parameter shown next to this value. The number on the flashing digit is increased by pressing Zero ( ) key. Related alternatives and means are like as:

ALTERN ↵ MEANING
0 ↵ Single
1 ↵ Mult Int
2 ↵ Mult Rng



Scaling for Multi-Range and Multi-Interval

As can be understood from the figure in above, when one of multi modes are used, measurement area can be evaluated as two

different areas. According to this, passing value from 1st area to 2nd area is at “Max1+9e1”. As known in Single Mode, when the maximum (“Max+9e”) value exceeds then “Maximum” error message is displayed. In Multi modes, two different areas are separated with their own “Max” and “e” (Max1, e1 and Max2, e2) values. In Multi-Interval mode, e1 step value is valid from 0 (zero) to ‘Max1+9e1’ and from ‘Max1+9e1 to ‘Max2+9e2’ e2 step is valid. In Multi-Range mode: e1 step value is valid from 0 (zero) to ‘Max1+9e1’ and e2 step is valid from ‘Max1+9e1 to ‘Max2+9e2’ too. But, there is no return from e2 to e1 on the ‘Max1+9e1’ value. Passing e2 step to e1 occurs when the screen value is Zero or negative (Absolute Zero).

NOTE: If one of multi modes is chosen, **Max1** and **e1** alternatives are shown in the following parameter set up screens, too. If Single-Interval is chosen, then only **Max** (maximum value) and **e** (step) values are shown on the parameter Set-up menu.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P09:(e1) Step: This step value is valid from 0 to “Max1+9e1” screen value (first-interval area) in Multi-Interval or Multi-Range selected measurements. Screen value increases or decreases with this step value. It can be 1, 2, 5, 10, 20 or 50.

If Single-Interval scale type is selected then this parameter screen message looks like “**P09:(e) Step**” or if Multi-Interval or Multi-Range is selected then the screen message looks like “**P09:(e1) Step**”. Screen appearance will be as follows:

P09:(e1) Step
0↵1

The new set value blinks and meaning of the parameter is shown next to this value. The number on the flashing digit is increased by pressing Zero () key. Related alternatives and means are like as:

ALTERN ↵ MEANING
0 ↵ 1
1 ↵ 2
2 ↵ 5
3 ↵ 10
4 ↵ 20

5 ↵ 50

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P10:Max1 Value: When the measurement area is evaluated as two different areas (Multi-Range or Multi-Interval), there is a transition value (Max1) from e1-paced area to e2-paced area. (This parameter setup menu will not shown in Single-Interval mode) Screen appearance will be as follows:

P10:Max1 Value
00150.00 kg

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Measurement unit will be displayed on the right corner of LCD.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P11:(e2) Step: Step value for Multi-Range and Multi-Interval modes in second interval area (1, 2, 5, 10, 20 or 50). (If Single-Interval mode is selected then this parameter setup menu will not be displayed). Screen appearance will be as follows:

P11:(e2) Step
2↵5

The new set value blinks and meaning of the parameter is shown next to this value. The number on the flashing digit is increased by pressing Zero () key.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P12:Max2 Value: Maximum value. This is the maximum screen value that can be displayed for the measurement. If one of

Multi modes are chosen then screen appearance will look like "**P12:Max2 Value**", otherwise the screen appearance will look like "**P12:Max Value**". Screen appearance will be as follows:

```
P12:Max2 Value
     00500.00      kg
```

The new set value that is about to be changed blinks. The number on the flashing digit can be increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Measurement unit will be displayed on the right corner of LCD. Selected value is accepted by pressing Function () key and next parameter screen is shown.

5.1.3 #CALIBRATION:

In this menu calibration process is done. Also this screen can be used for monitoring internal counts. If you do not want to change anything then choose '**No**' alternative, otherwise calibration can be modified or corrupted.

P13:Set ZERO?: In this section calibration zero is saved to the device non-volatile memory. On this parameter, screen appearance looks like as follows;

```
P13:Set ZERO?
     Yes      1476
```

In this setup screen, "**Yes**" or "**No**" alternatives can be selected by pressing Zero () key. Internal counts appear on the right bottom of LCD. **Calibration Zero** can be set by pressing Function () key while "**Yes**" alternative is active on the screen. There will be no changes to **Calibration Zero** if "**No**" alternative on the screen.

P14:Set LOAD?: In this screen, calibrating value is determined. Screen appearance looks like as follows:

```
P14:Set LOAD?
    Yes      132476
```

"**Yes**" or "**No**" alternatives can be selected by pressing Zero () key. Internal counts appear on the right bottom of LCD. If Function () key is pressed while "**Yes**" alternative is active on the screen the secondary calibration screen is displayed for calibration process. There is no change to the **Calibration** area if "**No**" alternative was selected

(NOTE: If this parameter screen is passed with "**No**" selection, "**P15:SCALE VALUE**" menu will not be shown)

P15:SCALE VALUE: Determines the value that to is to be scaled as the reference value. Screen appearance will be as follows:

```
P15:SCALE VALUE
    00100.00    kg
```

The new set value that is about to be changed blinks. The number on the flashing digit can be increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Measurement unit appears on the right corner of LCD.

On this screen, the value that is to be scaled is given for current internal counts. This is the value for the reference known value that the calibration is done.

Selected value is accepted by pressing Function () key. Calibration process is completed.

EXAMPLE:

After the calibration Zero is set, if there is a value like as above ('132476') on the screen, choosing "Yes" alternative and then pressing Function () key, brings "P15:SCALE VALUE" to the screen. On this screen, setting "10000" as scaling value, means that calibrate this internal count (132476) to 10000 screen value.

5.1.4 #INPUT SETUP:

This menu item contains digital filtering, input range (mV/V) and temperature parameters.

P16:Input Range: Determines input range (1,25 - 2,50 - ..160mV/V). Appropriate analogue input signal is chosen according to the sensor type. Screen appearance will be as follows:

P16:Input Range
0↵**1.25 mV**

The new set value blinks and meaning of the parameter is shown next to this value. The number on the flashing digit is increased by pressing Zero (→0←) key. Related alternatives and means are as:

ALTERN	↵MEANING
0	↵1,25 mV/V
1	↵2,50 mV/V
2	↵5,00 mV/V
3	↵10,0 mV/V
4	↵20,0 mV/V
5	↵40,0 mV/V
6	↵80,0 mV/V
7	↵160 mV/V

Selected value is accepted by pressing Function (=↑=) key and next parameter screen is shown.

P17:Filter Size: Amount of measurement for arithmetical average calculation (0..3).
Each A/D conversion result is kept in buffer memory for average calculation. According to this, amount of measurement can be changed by this parameter. Screen appearance will be as follows:

P17:Filter Size
3

The new set value flashes and meaning of the parameter is shown next to this value. The number on the flashing digit is increased by pressing Zero (→0←) key.

(Buffer Size = 4x2^n, n: alternative)

Related alternatives and means are as:

ALTERN	↵MEANING
0	↵4 average
1	↵8 average
2	↵16 average
3	↵32 average

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P18:Flt.Toleranc: Amount of unstable internal counts for digital filtering can be determined with this parameter (0..9). Variations on internal counts can be compensated with this parameter. This parameter determines the permitted amount of internal counts between one after another measurement. The new measured value will be ignored when internal count value exceeds previous value by this tolerance value. (Number of rejected measurements can be determined in "**P19:Escape Count**")
Screen appearance will be as follows:

P18:Flt.Toleranc
5

The new set value blinks and the number on the flashing digit is increased by pressing Zero (→0←) key.

(8x2^n, n: Selected value)

Related alternatives and means are like as:

ALTERN	↵MEANING
0	↵8 count
1	↵16 count
2	↵32 count
3	↵64 count
4	↵128 count
5	↵256 count
6	↵512 count
7	↵1024 count
8	↵2048 count
9	↵4096 count

Selected value is accepted by pressing Function (=↑=) key and next parameter screen is shown.

P19:Escape Count: Number of measurements that is to be ignored when the measured value is over than the limit in parameter ("**P18:Flt.Toleranc**"). According to this value (0-.99), if following measurements exceeds the limit value then adapting to the new value is facilitated. This means, new screen value exists after this.
This condition can be explained like as:

There is a system with maximum 100kg capacity. Changing on the platform with 5kg weight will cause soft transition to the new value or fast response at once to the new value? If fast response

required than **P18** and **P19** parameters must be set to smaller values. In this way, new value is ignored for a little time than buffered old values are cleared and adapted to the new value. Otherwise new measured values are kept on adding in the average buffer. In this way adapting to the new value is slower. Screen appearance will be as follows:

P19:Escape Count
05

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Selected value is accepted by pressing Function () key and next parameter screen is shown.

P33: Temp.Compens: This parameter determines whether the temperature compensation is ON or OFF (Yes/No). Temperature sensor can be activated by choosing the 'Yes' alternative. In this way current temperature value appears on the right corner of LCD. This parameter especially determines temperature compensation is operating on state or not. This means that digital compensation is on!!! Temperature compensation is a specific application for sensors and each sensor has its own multiplier constant values that is found during manufacturing. If current sensor is changed with a new one then the values used previously become invalid. Be careful about the tables that temperature compensation uses. If you are not sure about your compensation table values, choose 'No' alternative. Screen appearance will be as follows:

P33:Temp.Compens
Yes 39˚C

In this setup screen, "**Yes**" or "**No**" alternative can be determined by pressing Zero () key. Selected value is accepted by pressing Function () key and next parameter screen is shown.

5.1.5 #OUTPUT SETUP:

This menu contains information about relay setting and 4-20 mA analog output setup.

P20:SP1 NET/GRS: Set point 1 NET or GROSS. This parameter determines the value that used with Relay1 is NET value or GROSS value. If NET alternative is chosen then Relay1 is activated with respect to the NET value. Screen appearance will be as follows:

```
P20:SP1 NET/GRS
    0↵NET
```

In this setup screen, alternatives can be changed by pressing Zero (→0←) key. Related alternatives and means are as:

ALTERN	↵MEANING
0	↵NET (Net value)
1	↵GRS (Gross value)

Selected value is accepted by pressing Function (=↑=) key and next parameter screen is shown.

P21:SP1 Value: Set Point for Relay1 (7 digit). Screen appearance will be as follows:

```
P21:SP1 Value
    00050.00      kg
```

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero (→0←) key. By pressing Tare (⇨) key, flashing digit moves to the next digit. Measurement unit will be displayed on the right corner of LCD.

Selected value is accepted by pressing Function (=↑=) key and next parameter screen is shown.

P22:SP1 Abv/Belw: Activation condition for Relay1 is determined in this parameter screen. Relay1 can energize above the value that stated in "**P21:SP1 Value**" or below. Screen appearance will be as follows:

P22:SP1 Abv/Belw
0↵Above

Transition between alternatives can be done by pressing Zero () key. Related alternatives and means are like as:

ALTERN ↵MEANING
0 ↵Above (Above the Set value)
1 ↵Below (Below the Set value)

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P23:SP2 NET/GRS: Set point 2 NET or GROSS. This parameter determines the value that used with Relay2 is NET value or GROSS value. If NET alternative chosen then Relay2 is energized with NET value. Screen appearance will be as follows:

P23:SP2 NET/GRS
0↵NET

In this setup screen, alternatives can be changed by pressing Zero () key. Related alternatives and means are like as:

ALTERN ↵MEANING
0 ↵NET (Net value)
1 ↵GRS (Gross value)

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P24:SP2 Value: Set Point for Relay1 (7 digit). Screen appearance will be as follows:

P24:SP2 Value
00250.00 kg

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Measurement unit will be displayed on the right corner of LCD.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P25:SP2 Abv/Belw : Activation condition for Relay2 is determined in this parameter screen. Relay2 can energize above the value that stated in "**P24:SP2 Value**" or below. Screen appearance will be as follows:

```
P25:SP2 Abv/Belw
   0↵Above
```

Transition between alternatives can be done by pressing Zero () key. Related alternatives and means are like as:

ALTERN	↵MEANING	
0	↵Above	(Above the Set value)
1	↵Below	(Below the Set value)

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P26:SP Delay: 100ms sensitive delay for Relays. Up to 25.5 second can be determined with this parameter (00.0-25.5 sc). Screen appearance will be as follows:

```
P26:SP Delay
   00.5          sc
```

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Unit of value will be displayed on the right corner of LCD.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P27:AN Net/Gross : Analog output (4-20 mA) can work according to GROSS or NET value. Screen appearance will be as follows:

P27:AN NET/GRS
0↵NET

Alternatives can be changed by pressing Zero () key. Related alternatives and means are like as:

ALTERN	↵MEANING
0	↵NET (Net value)
1	↵GRS (Gross value)

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P28:Analog From: Determines the analog outputs starting point (00,000...31,999 mA). When screen value is Zero (Net or Gross value, according to the selected value in "**P27:AN Net/Gross**") then analog output value will be as stated in this parameter. Screen appearance will be as follows:

P28:Analog From
20.000 mA

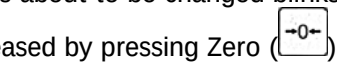
The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Unit of value will be displayed on the right corner of LCD.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

(This value (Analog From) is output when measured value is Zero (0) and must be less than "Analog To" value (Output when screen value is "Analog Maximum" that stated in parameter **P30:Analog Max**)

P29:Analog To..: Determines the analog output end point (00,000...31,999 mA). When screen value is equal or greater than Analog Maximum value (**P30:Analog Max**) (Net or Gross value, according to the selected value in "**P27:AN Net/Gross**") then analog output value will be as stated in this parameter. Screen appearance will be as follows:

P29:Analog To..
04.000 mA

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Unit of value will be displayed on the right corner of LCD.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

Attention:

These values can be set as:

0	→ 4 mA (Analog From)
Analog Max	→ 20 mA (Analog To)

or,

0	→ 20 mA (Analog From)
Analog Max	→ 4 mA (Analog To)

P30:Analog Max: Maximum value for analog output. When screen value is equal or greater than "Analog Max" (Net or Gross value, according to the selected value in "**P27:AN Net/Gross**") analog output value will be as stated in "**P29:Analog To..**". Screen appearance will be as follows:

P30:Analog Max
010.000 kg

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Measurement unit will be displayed on the right corner of LCD.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

5.1.6 #COMM SETUP:

In this menu communication parameters can be set (ModBus ID, Protocol, baud rate, bits, parity, stop bits, response delay, timeout delay).

P34:Modbus ID Nr: This value determines the device's communication address on the communication line (Bus ID number). Can be set from 1 to 254.

Attention: Number 0 and 255 are used for special applications.

ModBus ID=0 → **Continuous Mode**
ModBus ID=255 → **Future Applications**

Screen appearance will be as follows:

P34:Modbus ID Nr
000

If ID Number is set as 0, then signed (**+**,**-**) measured value is tranferred via the serial port continuously. Transmitting format is Ascii and finally "**CR**" (character 13) character is sent.

For example transmitting the measured value as "1204kg" is transmitted like as:

'**+**'(43), '**0**'(48), '**0**'(48), '**0**'(48), '**1**'(49), '**2**'(50), '**0**'(48), '**4**'(52), chr(13)

P34:Modbus ID
255

If ID Number=255 then communication parameters are forced to work with known parameters **1200,n,8b,1s** in **RTU** protocol.

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Unit of value will be displayed on the right corner of LCD.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P35:CommProtocol: Protocol selection for Modbus communication mode.
(**NOT:** If Modbus ID Number was selected as 0 (continuous mode) then this parameter screen is not shown.)

Screen appearance will be as follows:

P35:CommProtocol
0 ↵**R**

Alternatives can be changed by pressing Zero () key. Related alternatives and means are as:

ALTERN	↵MEANING	
0	↵R	(RTU mode)
1	↵A	(ASCII mode)

In shortly, according to MODBUS protocol: there are two ASCII character represents to a byte in ASCII mode. For example character 0hAF in hex denoted, is transmitted as 'A' and 'F' characters and their start-stop characters in ASCII mode. In RTU mode, each byte is treated as one byte. For example character 0hAF is transmitted as 0xAF (decimal→175) and there are no start or stop characters in RTU mode. Determining start and stop conditions for MODBUS frames, timing between one data after another is checked.
(examine MODBUS protocol for RTU and ASCII concepts.)

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P36:Baudrate: Communication speed selection (1200..9600). It is recommended to use lower speeds for long distances and noisy interfaces.
Screen appearance will be as follows:

P36:Baudrate
0↵**1200**

Alternatives can be changed by pressing Zero () key. Related alternatives and means are:

ALTERN ↵MEANING
0 ↵1200
1 ↵2400
2 ↵4800
3 ↵9600

Selected value is accepted by pressing Function (=↑=) key and next parameter screen is shown.

P37:Comm. Bits: Number of bits that to be used in communication (7bit/8bit).
Screen appearance will be as follows:

P37:Comm. Bits
1↵8b

Alternatives can be changed by pressing Zero (→0←) key. Related alternatives and means are like as:

ALTERN ↵MEANING
0 ↵7b
1 ↵8b

Selected value is accepted by pressing Function (=↑=) key and next parameter screen is shown.

P38:Comm. Parity: Communication parity bit selection (none, even, odd parity)
Screen appearance will be as follows:

P38:Comm.Parity
0↵n

Alternatives can be changed by pressing Zero (→0←) key. Related alternatives and means are as:

ALTERN ↵MEANING
0 ↵n (no parity)
1 ↵o (odd parity)
2 ↵e (even parity)

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P39:Comm. Stop: Communication stop bit selection (1stop, 2stop).
Screen appearance will be as follows:

```
P39:Comm. Stop
    0↵1s
```

Alternatives can be changed by pressing Zero () key. Related alternatives and means are as:

ALTERN	↵MEANING	
0	↵1s	(1 stop)
1	↵2s	(2 stop)

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P40:Resp. Delay: Response delay.
Screen appearance will be as follows:

```
P40:Resp. Delay
    008       ms
```

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Unit of value will be displayed on the right corner of LCD.

The values that are available in the parameter are:

0..255ms in 1200 baud (max 255ms),
0..127ms in 2400 baud (max 127ms),
0.. 63ms in 4800 baud (max 63ms),
0.. 31ms in 9600 baud (max 31ms).

If the value that is to be adjusted for this parameter is over than maximum value than screen appearance will be as follows:

Err:Resp. Delay
008 ms

In this case the value that entered must be changed with a valid value.

Selected value is accepted by pressing Function () key and next parameter screen is shown.

P41:TimeOut Dly.: Timeout delay. When there is an error in communication, device waits for time out delay to end and then prepares communication to ready state. Screen appearance will be as follows:

P41:TimeOut Dly.
008 ms

The new set value that is about to be changed blinks. The number on the flashing digit is increased by pressing Zero () key. By pressing Tare () key, flashing digit moves to the next digit. Unit of value will be displayed on the right corner of LCD.

The values that available in parameter are:

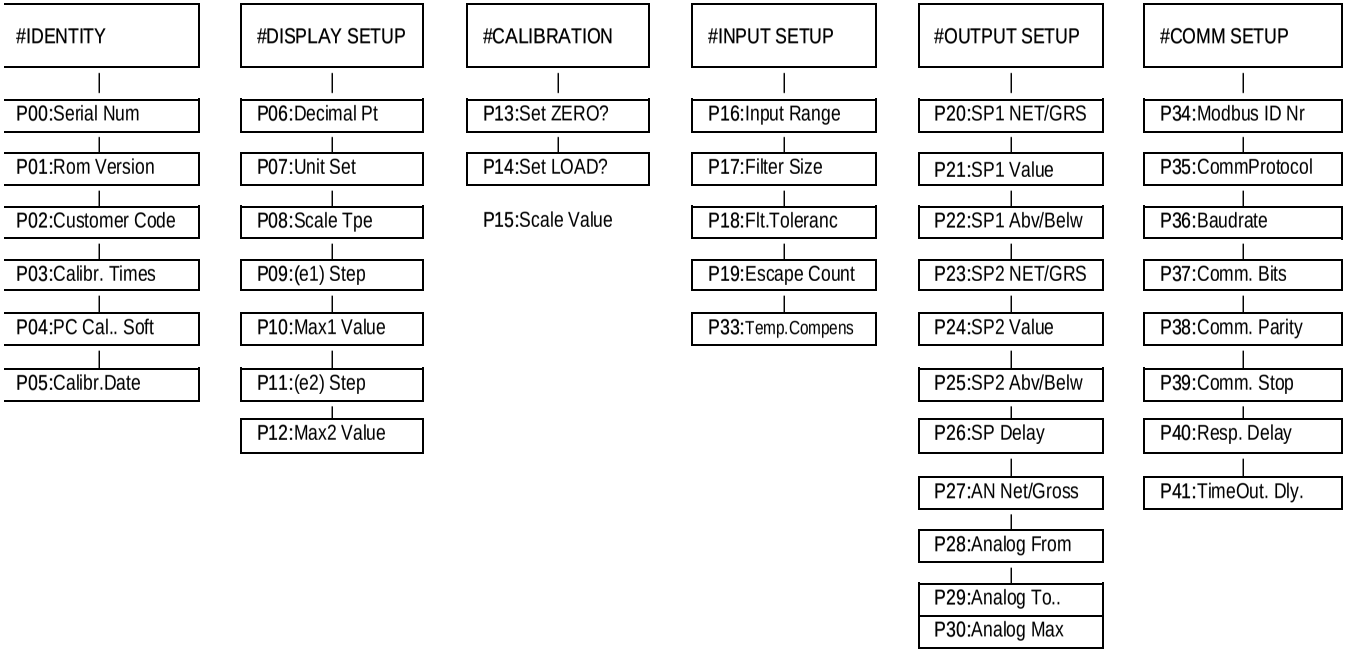
12..255ms in 1200 baud (max 255ms),
6...127ms in 1200 baud (max 127ms),
3.....63ms in 1200 baud (max 63ms),
2.....31ms in 1200 baud (max 31ms)

If the value that to be adjusted for this parameter is over than maximum value than screen appearance will be as follows:

Err:TimeOut Dly.
008 ms

In this case the value that entered must be changed with a valid value.

Selected value is accepted by pressing Function () key and next parameter screen is shown.


#IDENTITY
P00:Serial Num
P01:Rom Version
P02:Customer Code
P03:Calibr. Times
P04:PC Cal.. Soft
P05:Calibr.Date
#DISPLAY SETUP
P06:Decimal Pt
P07:Unit Set
P08:Scale Tpe
P09:(e1) Step
P10:Max1 Value
P11:(e2) Step
P12:Max2 Value
#CALIBRATION
P13:Set ZERO?
P14:Set LOAD?
P15:Scale Value
#INPUT SETUP
P16:Input Range
P17:Filter Size
P18:Flt.Toleranc
P19:Escape Count
P33:Temp.Compens
#OUTPUT SETUP
P20:SP1 NET/GRS
P21:SP1 Value
P22:SP1 Abv/Belw
P23:SP2 NET/GRS
P24:SP2 Value
P25:SP2 Abv/Belw
P26:SP Delay
P27:AN Net/Gross
P28:Analog From
P29:Analog To..
P30:Analog Max
#COMM SETUP
P34:Modbus ID Nr
P35:CommProtocol
P36:Baudrate
P37:Comm. Bits
P38:Comm. Parity
P39:Comm. Stop
P40:Resp. Delay
P41:TimeOut. Dly.

5.2 WEIGHT CALIBRATION

Follow the topics arranged below for performing calibration process correctly:

- After all connections have been done, the indicator should be kept in power for at least 10 minutes before starting calibration process.
- If possible, during this wait time, load and unload the weight for a few times.
- Keep away all obstacles that may prevent load to be sensed by the platform.
- The reference weight should better be approved by. authorities.
- The calibration weight should better be at least half of the capacity.

Please contact authorized Esit service personnel for detailed calibration procedure

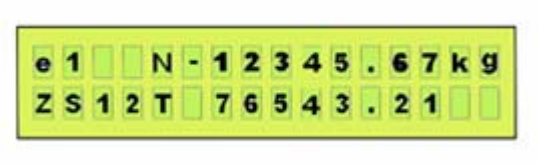
Please contact authorized Esit service personnel for detailed calibration procedure

Please contact authorized Esit service personnel for detailed calibration procedure

Please contact authorized Esit service personnel for detailed calibration procedure

6 NORMAL WEIGHING

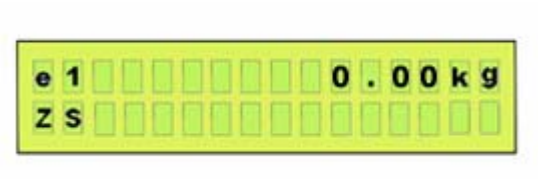
To return to the normal measurement screen, press Zero (→0←) key when menu screen is active. In the menu screen, each key's meaning explained under the upper side of keys. Therefore "**Exit**" operation is represented with Zero (→0←) key. LCA device's ROM version number is shown on LCD screen for a while and then starts to operate with normal measurement mode when LCA is powered up.



6.1 Resetting Screen Value to Zero

To reset screen value to zero, Zero (→0←) key is pressed. In order to perform this function, the indicator should be in no-motion (stable) state which can be realized with the "**S**" symbol on the LCD. And also Tare is not active. Permission for zeroing screen value is limited with **%4** of Maximum capacity. Otherwise an error message appears on the screen (See. Error Messages, **ERROR-3**,**ZERO LIMIT**).

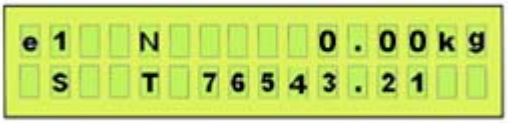
After the zero has been set, the Center-of-Zero point sign ("**Z**") appears on the left side of LCD.



6.2 Activating Tare

Tare (⇥T⇤) key is pressed to make the screen value as Tare value. When there is an unstable condition (There is no "**S**" symbol on the screen) this key is ignored. When Tare is activated, the display value will be zero and tared value is shown on the second line of LCD

with "**T**" symbol. Also "**N**" symbol appears on the front of screen value. This means, measured value is Net value.



- In order to Tare a value, the screen value must be positive.

(There is no permission to Tare with negative value and if there is a tared value then there is no zeroing operation)

- When Tare is active, Zero key is ignored.

6.3 Disabling Tare Value

Pressing Tare () key again while Tare is active, will disable the Tare function. When tare is not active "**T**" symbol and tared value on the second line of LCD goes off. The value on the screen is now Gross value.

7 ERROR MESSAGES

Because of wrong usage or some error conditions LCA device displays the following messages:

ERROR-3 "**ZERO LIMIT**"
Cannot perform Zeroing. This value cannot be set to zero by pressing Zero () key. Because, there is a limitation for zeroing with maximum of %4. Can be done with **Zero Calibration**.

ERROR-50 "**CALIB.KEY!**"
Calibration key is disabled. To perform this operation, modification should be done on the LCA board.

ERROR-1 "**MAXIMUM!!!**"
Screen value is over. (Over than Max+9e, **Max:**Maximum capacity, **e**: step value)

ERROR-22 "**Eeprom Mem**"
Non-volatile memory error. Please call service.

ERROR-90 "**CONV.TOUT!**"
ADC conversion is timed out. Chip not responding. Please call service.

ERROR-5 "**ADC RANGE!**"
Internal counts are in over state. Check ADC gain setup.

ERROR-91 "**TEMP.TOUT!**"
Time out for temperature sensor. Not responding. Call service.

ERROR-99 "**WATCHDOG!** "
There is an unknown soft lock occurred and device automatically RESET itself.

8 PROBLEMS and SOLUTIONS

☹ Nothing on screen and no backlight.

☺ No energy is given to the device. The plug may be loose or power is off. Check the voltages.

☹ LCA can not communicate with electronic device connected (PC,PLC..).

☺ Check the communication parameters and cables. The parameters must be same configured with the electronic device that LCA is connected (Protocol, baudrate, bits, parity, stop bits and Modbus ID number must be same if works as Modbus Slave device).
Check the cable and RS232/485 converter if used.

☹ Weight can not be seen.

☺ There can be a calibration error or wrong connection in Load-cell cable. May need to perform calibration again.

☹ Can not enter some menu topics.

☺ Check whether calibration key jumper is linstalled.

☹ Keys not functioning.

☺ Check whether any key is left pressed.

☹ Weight can not be reset to zero.

☺ If the no-motion state is not achieved and '**S**' symbol is not the LCD screen then Zeroise operation can not be performed. Increase the Digital Filtering values or increase the step value. If zeroise operation can not perform while '**S**' (stable) symbol on the LCD screen then Zero (

) key is broken. Call service.

9 POWER SUPPLY SPECIFICATIONS

	VOLT	POWER
1	12V	5W
2	24V	5W

Use one of the specified power supplies for LCA indicator.

Isolation voltage minimum 2000 V.

10 Operating Temperature

Temperature Range: -10..50 °C

11 LOADCELL CONNECTION

There are two power lines and two output lines on the Load cell cables. Some load cells has additional sense lines. The colors on the Esit Load cell cables and meanings are explained as follows:

For 6 wired load cell cable:

COLOR	**MEANING**
Shield	Cover (Blendage, Shield)
Red	- Output
White	+Output
Black	- Excitation
Green	+Excitation
Orange (Yellow)	- Sense
Blue	+Sense

Load cell cables can be 4 wired or 6 wired. When 4 wired load cell cable used then there are no Sense Lines (Orange and Blue). Because of this, these pins on LCA terminal must be shorted with Power (Excitation) lines. [Jumper from +Sense (**+S**) to +Power (**+E**) and from –Sense (**-S**) to –Power (**-E**)]

If the system consists of more than one load cell, then a junction box is used for gathering the load cell outputs to the LCA device.

For 4 wired load cell cable:

COLOR	**MEANING**
Shield	Cover (Blendage, Shield)
Red	- Output
White	+Output
Black	- Excitation
Green	+Excitation

After checking the correct connection is supplied, power up the device.

12 COMMUNICATION CONNECTIONS

LCA Communication Line Connection (**RS-232** standard);

RS Rx/A → Rx (Receive)
RS Tx/B → Tx (Transmit)
GROUND → Gnd

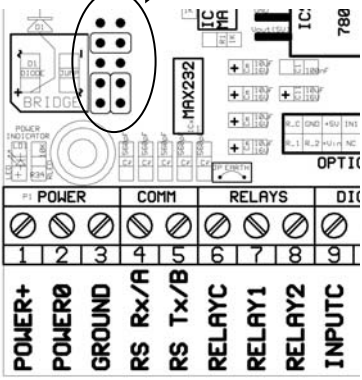
LCA Communication Line Connection (**RS-485** standard);

RS Rx/A ↔ RS A (Master device, PC etc..)
RS Tx/B ↔ RS B (Master device, PC etc..)

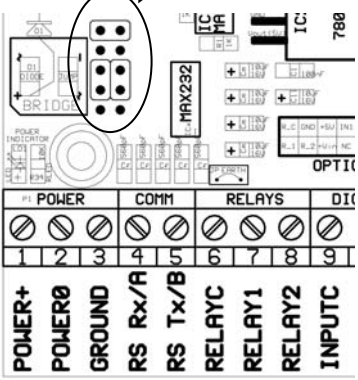
12.1 Communication Jumpers Settings:

Please install the jumpers as stated below.

RS232 Communication Interface



RS485 Communication Interface



13 OPTION

LCA device has a 4-20 mA analog output and two-relay outputs as optional alternatives.

13.1 ANALOG OUTPUT OPTION

LCA indicator has a 4-20 mA analog output as option. D/A module doesn't need to be calibrated and offset adjusted. Analog output range can be adjusted for the required output range and can achieve **16** bit resolution.

Adjusting 4-20 mA Module:

At first, relational analog output parameter must be set correctly. For doing this, selection for NET or GROSS value (**P27**), start point of analog output (**P28**), end point for analog output (**P29**) and maximum value for Analog output (**P30**)should be done. Setting these parameters are shown below;

Pressing Function (=↑=) key for 3 seconds or more, than menu screen will appear on the LCD. Switch to the "**#OUTPUT SETUP**" menu by pressing Tare (⇔) key and then press Function (=↑=) key to enter this menu item. Skip parameters from P20 to P26 by pressing Function (=↑=) key.

P27:AN NET/GRS: This parameter determines the analog output will reflect the Net or Gross value. Gross or Net alternative can be changed by pressing Zero (→0←) key. (📖 See. **5.1.5 #OUTPUT SETUP**)

P28 :Analog From : When the screen value is Zero (According to the selection on **P27: NET/GRS**), this value will be output. This value can be set from 0.000 mA to 31.999 mA.
(📖 See. **5.1.5 #OUTPUT SETUP**)

P29 :Analog To.. : When the screen value is Maximum (**P12 :Max Value**), analog output will be as defined in this section.
(📖 See. **5.1.5 #OUTPUT SETUP**)

If an error or bigger value over than 31.999, entered values will not be saved and an error message ("**Err**") will appear on the left corner of LCD. Screen appearance will be as follows:

Err:Analog From
32.000 mA

The entered value should be corrected with true value.

Example:

If the required analog output is,

15 mA for the "**0**" screen value,

5 mA for the "**Analog Max**" screen value

and analog output will reflect the **Net** value, than parameters should be adjusted as follows;

(**Analog Max** value that can be found in **P30** represents the Max value for 4/20mA output)

P27:AN Gross/Net; **0→Nt**

P28:Analog From; **15.000**mA

P29:Analog To..: **05.000** mA

NOT:

Analog output setup can be done as,

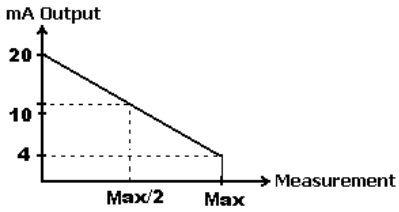
0 → 4 mA (Analog From)

Analog Max → 20 mA (Analog To..),

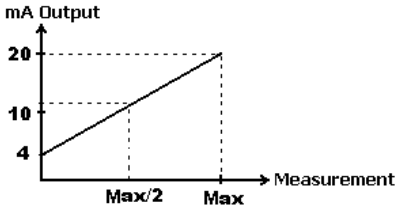
And also can be done as,

0 → 20 mA (Analog From)

Analog Max → 4 mA (Analog To..)



Working Diagram From 20mA to 4mA

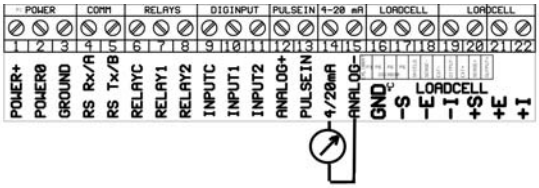


Working Diagram From 4mA to 20mA

Analog ouput module is optically isolated from the power of LCA and Loadcell power lines. Principle of this module is based on adjustable resistance on the lines. Because of this reason external power circuit should

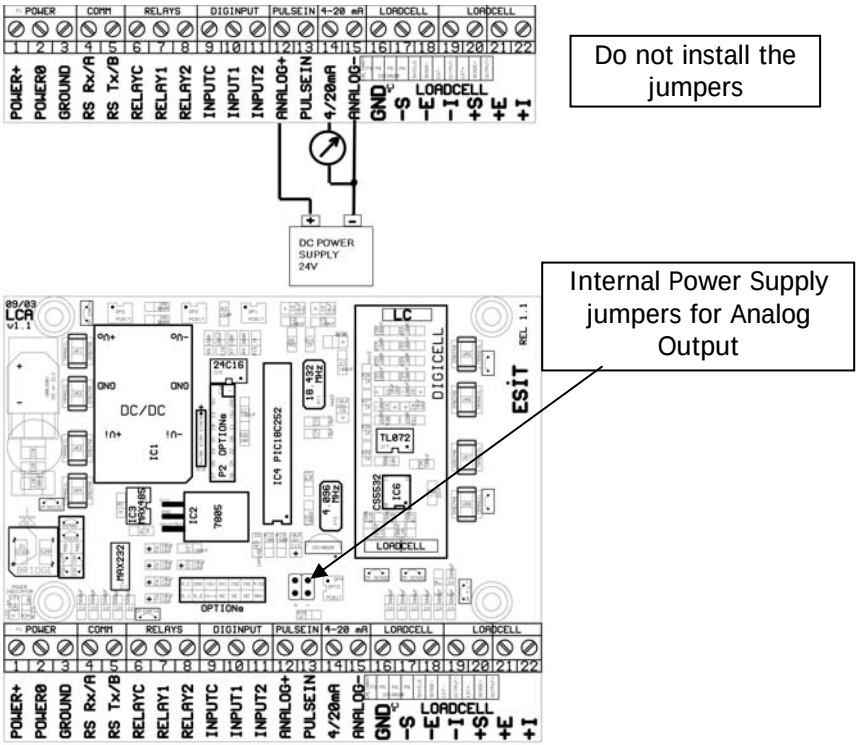
be used for this operation. And also, internal power supply unit can be used for the power of the 4-20mA analog output. In this case isolation between analog module and power lines of LCA is not meet.

Using internal Power Supply for 4/20mA Analog Output.



Install the jumpers

Using External Power Supply for 4/20mA Analog Output.



Do not install the jumpers

Internal Power Supply jumpers for Analog Output

13.2 RELAY OPTION

LCA indicator has two relay outputs that support **2A** current at **220V**. Each relay can be set with following method:

Pressing Function () key for 3 seconds or more, than menu screen will appear on the LCD. Switch to the "**#OUTPUT SETUP**" menu by pressing Tare () key and then press Function () key to enter this menu headline.

P20:SP1 NET/GRS: Relational value for Relay1 output (**Net** or **Gross** value)

(📖 See. 6.1.5 "**#OUTPUT SETUP**")

P21:SP1 Value: Set point value for Relay1.

(📖 See. 6.1.5 "**#OUTPUT SETUP**").

P22:SP1 Abv/Belw: Activating method for Relay1. Relay1 will activate above or below the set point value (defined in **P21**).

(📖 See. 6.1.5 "**#OUTPUT SETUP**").

P23:SP2 NET/GRS: Operations on "P20:SP1 NET/GRS" are done again for Relay2.

P24:SP2 Value: Operations on "P21:SP1 Value" are done again for Relay2.

P25:SP2 Abv/Belw: Operations on "P22:SP1 Abv/Belw" are done again for Relay2.

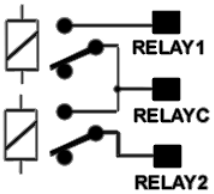
P26:SP Delay: Delay time for the relay outputs. Delay value affects each relays in the same way with 100ms steps.

(📖 See. 6.1.5 "**#OUTPUT SETUP**")

Example:

If the value on P26 is set as "01.0", this means each relay will be energized over the set point value and there will be a delay of about 1 second.

NOTE: After the **Set Point** value is exceeded and delay time has finished then the relay will be energized, if the relay should be deactivated, it is done so immediately.



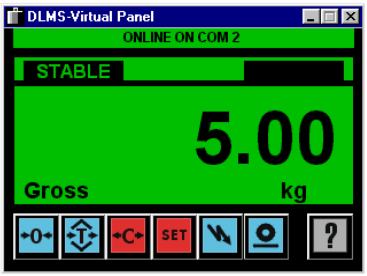
14 PC SOFTWARES

There exist 2 softwares for LCA indicator:

- **Dlms_VP (Virtual Panel)**: Communicates with one LCA device and can setup all user changeable parameters.
- **Dlms_NW (NetWork):** Communicates with more than one device and can setup all user changeable parameters on each device.

DLMS VP: (VIRTUAL PANEL)

DIGITAL **L**OADCELL **M**EASUREMENT **S**YSTEM **V**IRTUAL **P**ANEL

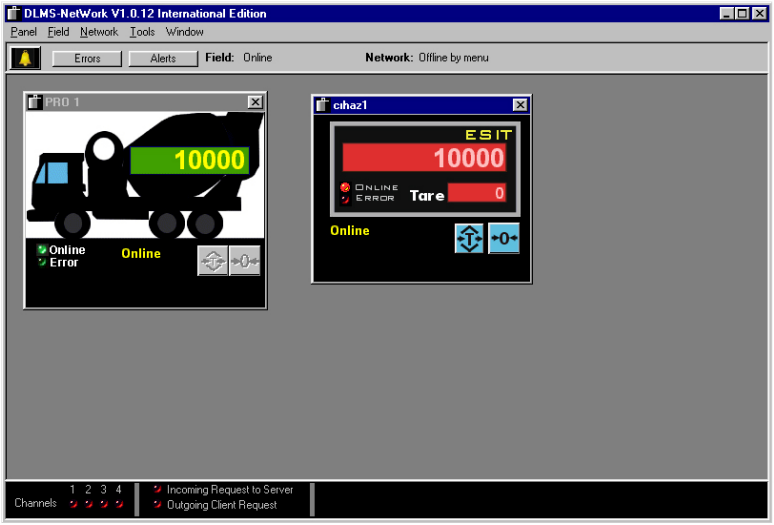


This PC software is single user purposed. Measurement on LCA device can be monitored and also all changeable parameters on the device can accessed (scaling, calibration, communication format and parameters, unit selection, optional setups etc.). **Dlms_VP** software can communicate with only one LCA device. If there is an RS485 bus then Dlms_VP can connect to each device on the bus separately.

This PC software can record the measured values in selected periods. So, **Dlms_VP** can achieve automatical logging. (📖 Please see **DLMS_VP User Manual** for detailed information)

DLMS NW: (NETWORK)

DIGITAL **L**OADCELL **M**EASUREMENT **S**YSTEM **N**ET**W**ORK



Dlms_NW communicates with more than one device and can setup all user changeable parameters on each device. This PC software shares own data with other computers on the Network. According to this, each device on the system, even connected on the different computers, can be displayed on every computer.

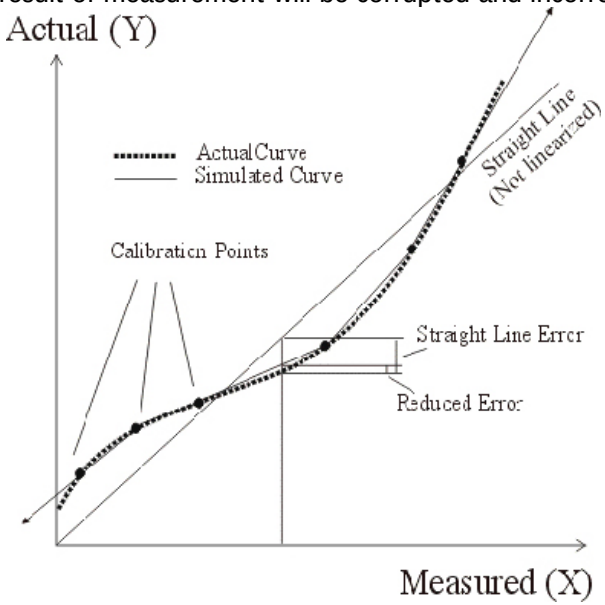
In a system that uses **Dlms_NW**, each LCA indicator or LCA's formed as group (using the same RS845 line) is connected to PC' s serial (RS232) port. Each port on the PC can be connected to another LCA device or LCA group. So, each Serial Port on the PC can be connected to the own bus with different baud rates and protocols. The PC shares all data to the other PCs on the Network. (📖 See. **DLMS_NW User Manuel**)

15 DIGITAL LINEARIZATION

To regulate the sensor in a non-linear system or to get a different curve in a proper measurement zone, **Digital Linearization** process is done.

Digital linearization process consists of 5 areas with 6 points. According to this, each zone (between two selected point) is accepted as linear. Linearization operation is done for each area. At the end of process, there is a linearized result with 6 linearization points in 5 areas. As can be understood from the figure below, if there is only one area (two points) then the erroneous measurements can be done. Because of this reason, the system can get more reliable results with 6 pointed linearization process in non-linear systems and the errors will be reduced to minimum.

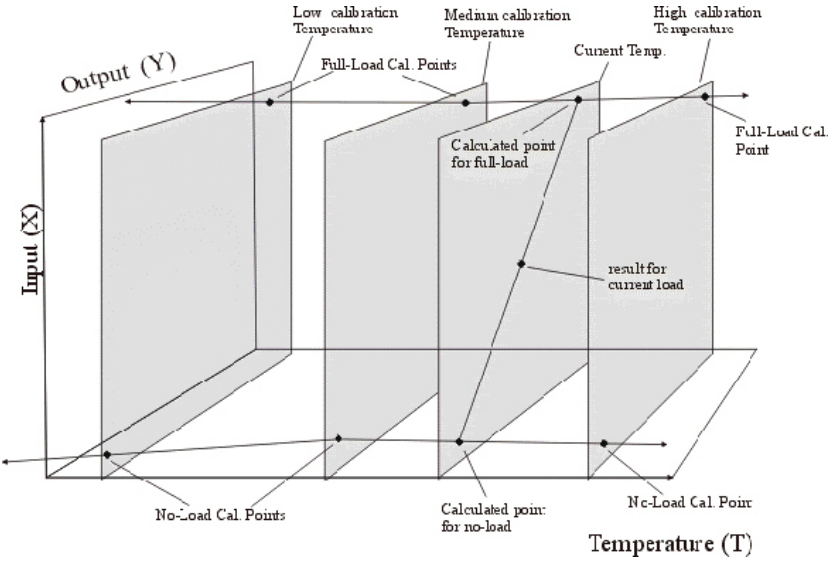
NOTE: If the sensor is changed in the digital linearized non-linear systems, the linearization coefficients for the new sensor must be defined to the LCA device because each sensor has its own curve and own coefficients. If these definitions for the new sensor are not done, then the result of measurement will be corrupted and incorrect.



16 TEMPERATURE COMPENSATION

If the system is temperature sensitive, then temperature compensation process can be done for 3 different temperature values.

Manufacturer defines these values during pre-adjustment. Also these values shape like digital linearization process and can corrupt the result of measurement even using sensors with same model and same company. Because of this reason temperature compensation process must be done again or be disabled when the sensor is changed. If you are not sure about the sensor that was changed or the compensation table, cancel the temperature compensation from the menu screen (📖 See. 6.1.4 "**#INPUT SETUP**"). In this case coefficients related with teperature will be omitted.



17 COMMUNICATION STRUCTURE

LCA indicator uses **MODBUS** protocol (Slave RTU or SLAVE ASCII) and **Continuous Communication Mode**. Standard version of LCA always includes the MODBUS protocol. (🕮 Bkz. 6.1.6 "**#COMM SETUP**")

17.1 PHYSICAL STRUCTURE

There are two alternatives for communication layer:

1-) **RS232C**, three wired communication (Full-Duplex mode)

2-) **RS485**, two wired communication (Half-Duplex mode purposed)

Only one of them can be selectable. If you want to use only one LCA with a PC then RS232 alternative can be chosen. Otherwise with RS485 interface an RS485/RS232 converter must be used between PC and the LCA device.

Computers and PC compatible devices contains one or more RS232C port (as Master),

LCA indicator has one RS232 or RS485 port (as Slave)

Universal RS232C/RS485 Converters must be used for signal conversion between these protocols.

17.2 LCA Indicator RS485 Specifications

Media	RS-485 (2 wired half duplex)
Protection	Automotive class Protection of A & B Lines by varistors.
Isolation	Communication lines are not isolated from supply voltage. Isolation between supply voltage and the internal power supply.
Termination	No internal termination or polarization (End-Device must be terminated externally).

17.2.1 Data Structure

RS232C Framing used for communications.

Baud rates	1200, 2400, 4800, 9600
Parity	None, Even, Odd
Data Bits	7, 8
Stop Bits	1, 2
Limitations on communication Set-up	Combination 2 stop, 8 bit, parity is not allowed Combination 1 stop, 7 bit, no parity is not allowed

17.2.2 Application Layer

SLAVE SPECIFICATIONS (For LCA devices)

Protocol	MODBUS SLAVE ASCII or MODBUS SLAVE RTU
RESPONSE TIME	**Additional delay before response:** 0-31.5ms Selectable 500uS steps in 9600BPS 0-63.5ms Selectable 500uS steps in 4800BPS 0-127ms Selectable 500uS steps in 2400BPS 0-255ms Selectable 1mS steps in 1200BPS
Time Out	Timeout utilized as reply timeout in RTU protocol (slave replies after the timeout specified) Utilized as cancel/error timeout for ASCII protocol (slave terminates communication if there is no EOL character received after last character reception) 1.5ms-31.5ms Selectable 500uS steps in 9600bps 3ms-63.5ms Selectable 500uS steps in 4800bps 6ms-127ms Selectable 500uS steps in 2400bps 12ms-255ms Selectable 1mS steps in 1200bps
Reply Timing Error	+2mS (maximum)

AVAILABLE MODBUS COMMANDS

3	Read holding registers (RAM area)
6	Preset single register
16	Preset multiple registers

LIMITATIONS FOR MODBUS

LCA Buffer Size	**30 bytes can be written or read in one ModBus cycle** Each ASCII number (2 chars) treated as 1 byte Each byte of RTU byte treated as 1 byte

(🕮 Please examine **MODBUS** protocol for more information)

18 TERMS

Saturation Point: Maximum value for A/D converter input range.

Internal Counts: Digital equivalent for Analog signal.

Indicator: Device measuring the analogue signal.

LCD: Liquid Crystal Display.

Load-cell: Sensor that converts weight to electrical signal.

ModBus: Special Communication protocol.

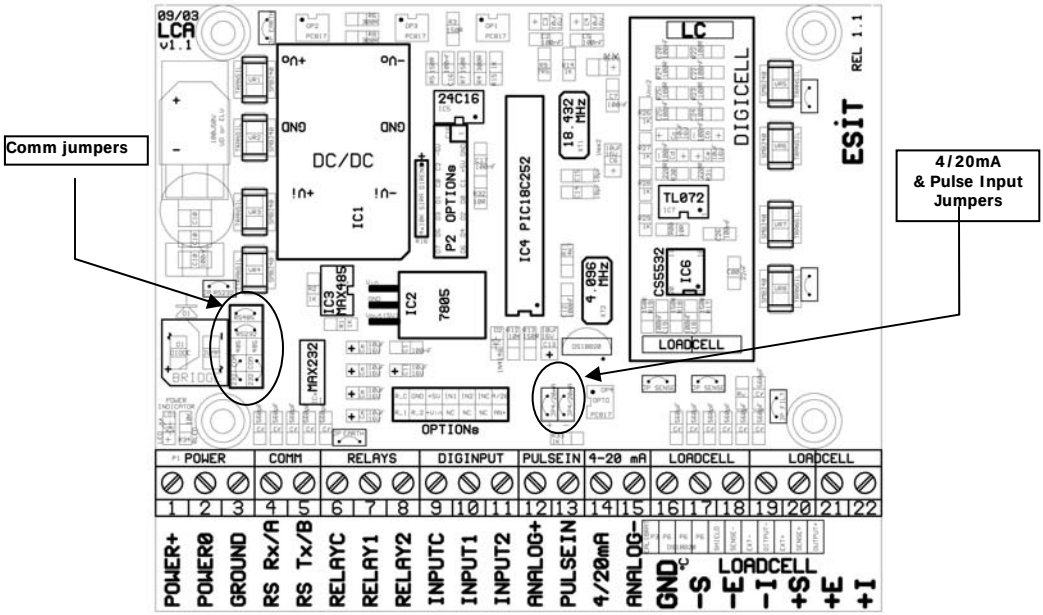
Option: Offered feature as preference of the user.

PLC: Programmable Logic Controller.

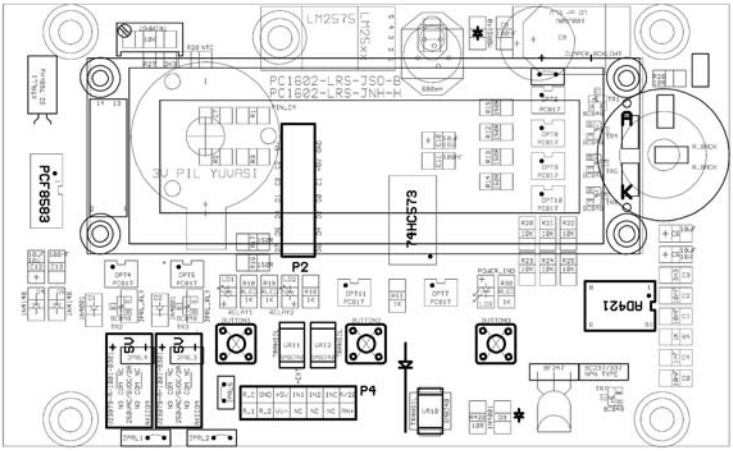
Protocol : Communication format.

Sensor: Converter that converts from physical force to the electrical signal (i.e. load cell).

19 DRAWINGS



LCA Mainboard



LCA Optionboard

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