![Parsmega - industrial automation]

User Manual

Weight Indicator

PM-LD31

Version: 1.1   Release Date: 01/31/2023

Contnts

1. Introduction

1.1 The purpose of the manual

This manual contains all the information needed to set up, install, wiring and communicate with the PM-LD01 module.

1.2 Technical knowledge required

In order to understand this booklet, a basic acquaintance with electrical topics is required.

1.3 Manual validation

This booklet is valid for this specification.

MODEL	Hardware	Software
PM-LD31	V2.1	V12.0

1.4 Technical support

To get technical support through the following contact:

❖ Email: **info@parsmega.com**

❖ Phone: **+98 21 91009955**

❖ WhatsApp: **+98 9981122566**

2 Safety tips

- Starting the module by non-experts and ignoring the commands may cause serious damage to the module.
- This module does not directly pose a risk to human life.
- The use of this module is not approved for use in life-threatening devices.

3   Description

3.1   Basic description

PM-LD31 is a multipurpose and flexible load cell display transmitter that has the ability to read weight.

This module has the ability to connect to a computer and control equipment such as (HMI and PLC).

Due to the special features designed in this module, you can easily have a modern weight measurement system.

3.2   Module Uses

This weight display and reading module is a very suitable option for applications where a weight or force sensor is used. Such as:

- Road scale
- Bag filler
- Packaging machines
- Transit weighing
- Tensile and compression testing machines
- Weighing the elevator cabin

3.3   Technical Specification

- Isolated RS485 serial communication with MODBUS protocol support (RTU, ASCII)
- Wide range of RS485 port baud rate (from 2400 to 230400)
- Wide sampling range
- Weight reading with an accuracy of 1:100,000
- Ability to define 10 programs (profiles)
- Ability to define 5 load cells and maintain calibration of all load cells
- Automatic calibration without the need for weight calibration
- relay outputs
- 2 digital inputs with user adjustable functions
- Analog output 0-5 and 0-10 volts 0-20 and 4-20 mA
- Ability to display load cell output voltage (for load cell testing)

- The working temperature range is -30 ~ +50 degrees Celsius

3.4   Indicator Dimension

The dimensions of the indicator are 75 x 96 x 48.

4   Installation

4.1   Observe EMC items

This product is designed and manufactured to work in industrial environments. However, for proper operation, you should check and eliminate the issues that cause the module to malfunction.

4.2   Cases that cause system malfunctions

- Electromagnetic field
- Telecommunication cables
- Power circuit cable

4.3   Things to consider

4.3.1   Convenient ground connection

- When installing the module on the panel body, make sure that the panel body is connected to the ground.
- All ineffective metal parts are (firmly) grounded.
- When connecting varnished wires to ground connection, remove the varnish from that part.

4.3.2   Appropriate wiring method

- Divide your system cables into different groups (high voltage, power supply, and signal, analog).
- Always transfer the power cable from another duct.
- Always place your analog cables close to the body of the panel and rails (which are grounded).

4.3.3   Cable shield connection

- Make sure the shields are properly grounded.
- Try to keep a small part of the cable without a shield.

5 Connection and Panel Indicator

All connections of this module are screws.
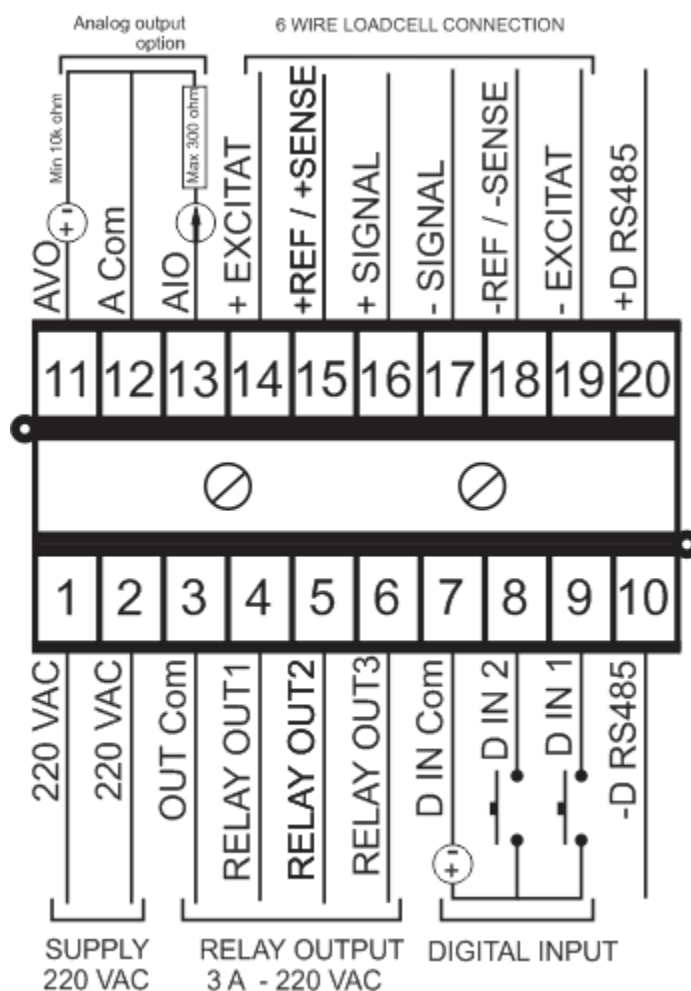
View of indicator connection

5.1 Connections group

The connections of this module include 6 main groups:

- Power
- Digital Inputs
- Digital Outputs
- Serial RS485
- Analog output
- Load cell

5.2 Power Supply Connection

The suitable power supply for this module is 220 VAC. Observe safety precautions when connecting and using the module.

Terminal 1: 220 VAC

Terminal 2: 220 VAC

5.3 Digital Input Conection

This module has 4 digital inputs as follows:

Label	Application
D IN1	Digital input1
D IN2	Digital input2
D IN Com	Common digital inputs

- A voltage level of 16 to 24 volts is required to activate the digital inputs.
- According to the customer's request, this voltage can be changed.
- For each input, a specific function can be defined, when the input is activated, the corresponding function is performed. This topic will be fully discussed in the digital input parameters section.
- Inputs will be activated on the rising edge.

The wiring method is as follows:

❖ Sink (Low active)
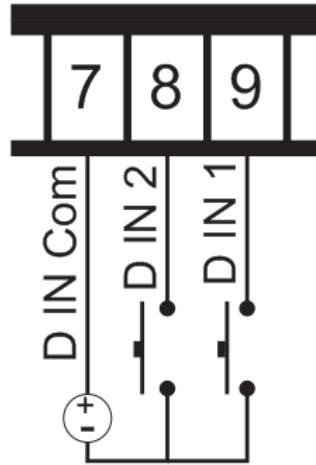
❖ Source (High Active)
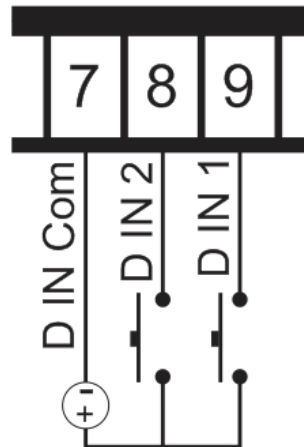
5.4   Output Connection

⚠ Notice
Be sure to know the status of the outputs before connecting them. During the initial setup, all the outputs may be active.

This module has three relay outputs as follows:

Label	Apllication
Relay Out1	Output relay 1
Relay Out2	Output relay 2
Relay Out3	Output relay 3
Out Com	Common outputs

- The maximum acceptable contact current of the output relays is 3A at 220 VAC voltage.
- The activation of the outputs depends on the setting of the parameters, which will be discussed in the parameters section.

How to wire relay outputs
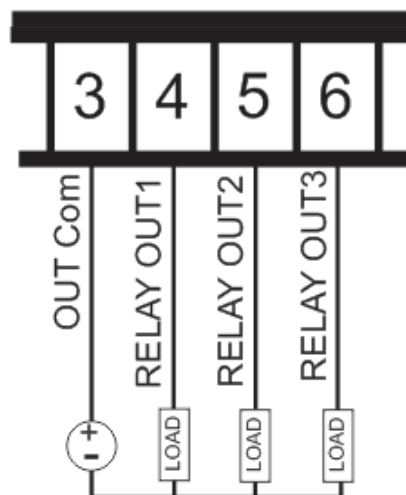
- It should be noted that in the wiring schematic of the relay outputs, the positive and negative signs are for display only and the common signal type is not important.

5.5 Analog Output

⚠️ Notice
Be sure to know the status of the analog output before connecting it. At the time of initial setup, the analog output may have a value.

Lable	Function
AVO	Analog voltage output
AIO	Analog current output
ACom	Output analog return path

Analog output has several modes:

- 4~20 mA
- 0~20 mA
- 0~5   V
- 0~10 V

Note: In current mode, the maximum resistance in series with the loop is 300 ohms.

Note: In voltage mode, the minimum load resistance is 1 kilo ohm.

5.6 Load Cell Connection

Load cells with the following capabilities can be connected to this module:

- Output voltage mV/V 1 to 7mV/V
- Load cell excitation voltage in this device is 5 volts.

Lable	Function
+ EXCITAT	Positive excitation voltage of the sensor
+REF / +SENSE	The positive reference voltage of the sensor measurement
+ SIGNAL	Positive output voltage of the sensor
- SIGNAL	The negative voltage of the sensor output
-REF / -SENSE	The negative voltage of the sensor measurement reference
- EXCITAT	Negative excitation voltage

The figure below is a technical view of a load cell
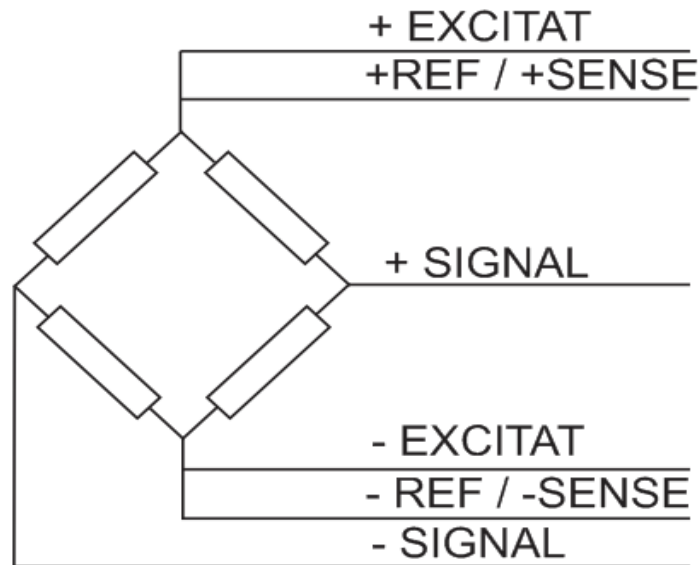
- It should be noted that the only way to secure the cable against noise is to properly connect the shield to the ground.
- Only a few centimeters of the end of the cable should be left without the shield and at the same point the shield should be connected to the ground connection with a strong clamp.
- Below is how to connect 6-wire load cell and 4-wire load cell to the indicator. In the 4-wire mode, the connection point of the -EXCITAT and -REF / -SENSE wires are connected to each other, as well as the connection point of the +EXCITAT and +REF / +SENSE wires to each other.
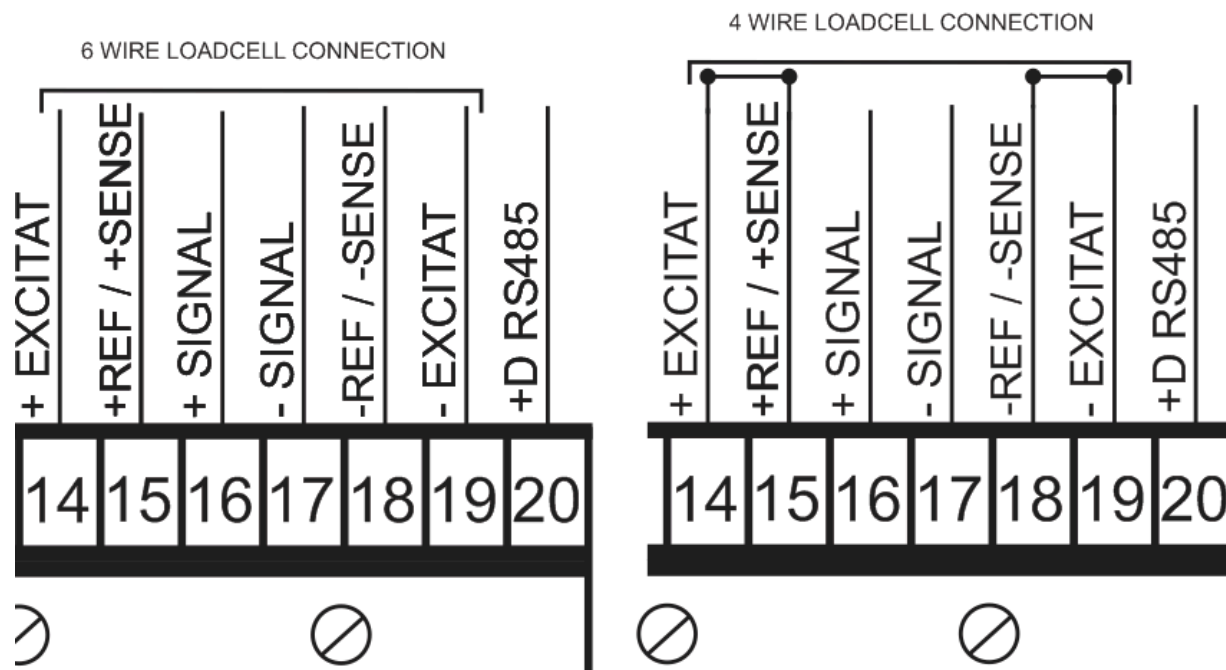
5.7   RS485 Serial Connection

This module is equipped with an RS485 serial port on which the MODBUS (RTU, ASCII) protocol is implemented.

RS485 port isolation specifications:

±10 kV ESD protection

Label	Function
+ D RS485	Positive data
- D RS485	Negative data

5.8   Indicator Panel

This indicator module has 4 push buttons and 4 LEDs.

The keys have different and adjustable functions in different situations, and the LEDs can show different states, which can be selected in the indicator settings section of these parameters.

1- Indicator

2- LED status display

3- Enter key (or Tare, this function can be adjusted)

4- LED status display

5- Shift key (or Tare Reset, this function is adjustable)

6- LED status display

7- Down key (or Capture, this function can be adjusted)

8- LED status display

9- Up key (or Max Reset, this function can be adjusted)

The following table shows the functions of the keys in different menus and situations

Keys	When setting the parameter		Inside the settings menu		Out of the settings menu	
	to keep	push	to keep	push	to keep	push
Enter/Tare	Confirm parameter changes	Cancel parameter change	Enter the selected menu	Return to previous menu	Enter the settings menu	Tare*
◄ Shift / Tare Reset	Shift between parameter digits	Shift between parameter digits	---	---	---	Reset Tare*
▲ Up / Capture	Continuously increase the parameter	Increase the parameter	Go quickly to the upper menu	Go to the menu above	---	Start*
▼ Down Max Reset	Continuous decrease the parameter	Parameter reduction	Go quickly to the lower menu	Go to the bottom of the menu - more	---	Stop*

The duration of holding the key to confirm the function is 3 seconds.

The defined functions are default and can be changed by the user. For more information, read the indicator settings section.

6 Indicator Menus & Parameter

- All parameters are set with default values at the time of purchase.
- You can also do this with the reset command.
- The length of all variables is word
- Some parameters require a reboot to take effect.
- The parameters and menus of the device have different categories for settings, which we will explain further and their parameters. In the next table, we see the general structure of the menus.

6.1 General structure table of menus

Coññ	CALI b	dI n	doUt	AoUt	dI bSEt	rSFCt
I d	LCPro	dI n I	SPPro	AotYP	roY	rSCoñ
bAUd	CALñd	dI n2	SPñod	Ao SrC	FrAC	rSñdL
PArI tY	LC SEn		SPLEu	ñI n SC	EntCñ	
StoPb	LCCAP		SPhYS	ñAHSC	ShtCñ	
rtUAS	LCnUñ		SPo I	AorEG	UPCñ	
	CALZr		SPo2		dYnCñ	
	CALY I		SPo3		LEdñd	
	CALY2		dEAdY I		StEP	
	trñAH		dEAdY2		LI ñEn	
	trñI n		dEAdY3		LLI ñ	
	FI LFr		o IFoC			
	FI Lñd		o2FoC			
	FI LnU		o3FoC			
	I YFrC		LStSP			
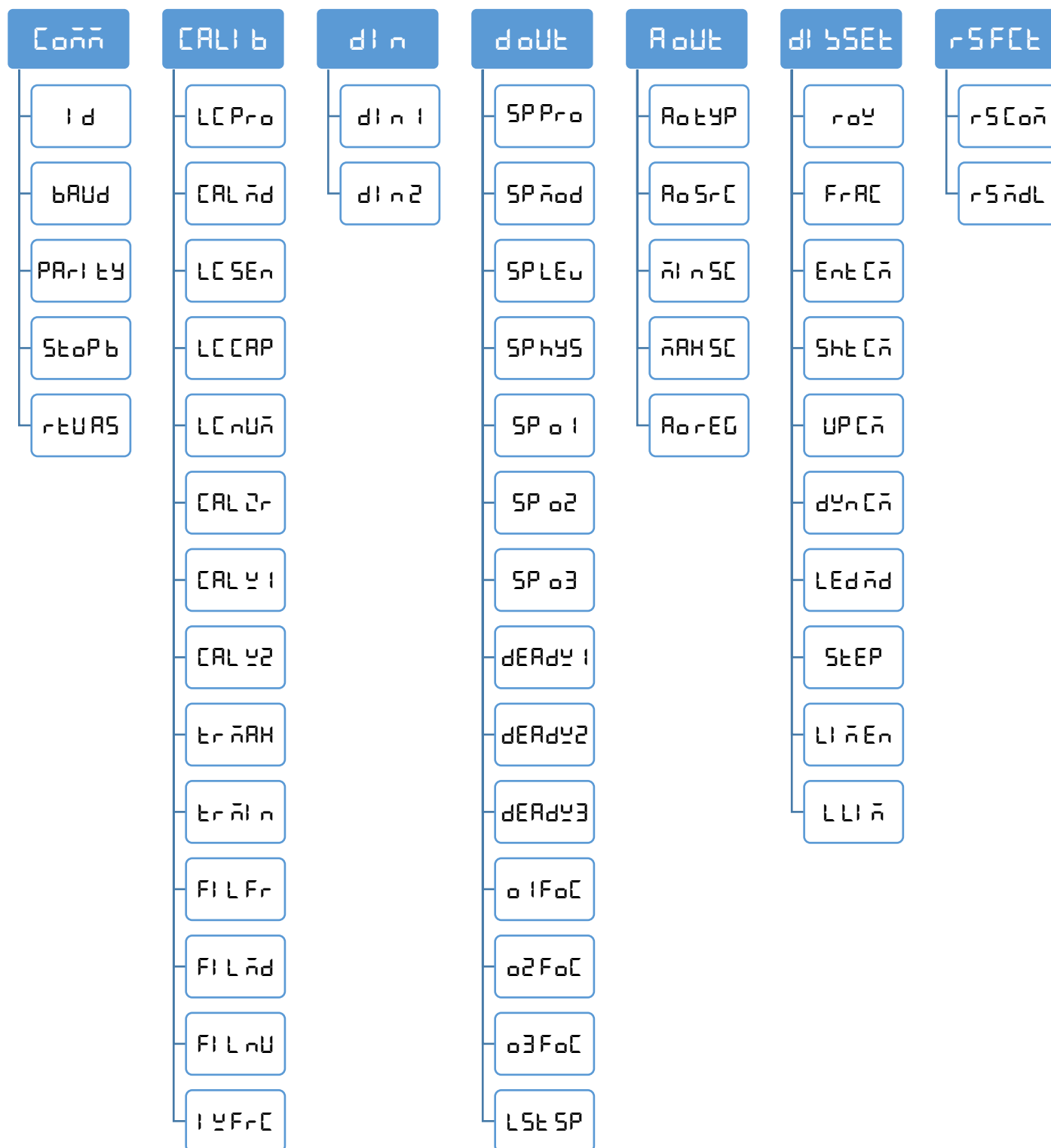
1- To enter the settings, you need to hold the $EntEr$ key for 3 seconds. After entering the settings, the word $Conn$ is displayed on the top line, which is the first category of settings and related to the communication settings of the device.

2- Now you can select other settings with the ▲/▼ key.

3- After selecting the setting category, you can enter the parameters of that setting category by holding the $EntEr$ key.

4- If you select and enter the $Conn$ settings category, the term Id will be displayed. Which represents the value of the Id parameter of the device's Modbus connection.

5- Now you can select other parameters with ▲/▼ keys.

6- After selecting the parameter, you can edit the value of that parameter by holding the $EntEr$ key.

7- Assuming selection and entering the parameter Id, the value of the parameter will start flashing.

8- Now you can use the ▲/▼ keys to change the value of the parameter and use the ◄ key to select more valuable digits (tens, hundredths or hundredths and tenths in decimal numbers) to change.

1- After setting the appropriate value, you can save the parameter by holding the $EntEr$ key. The word "$SAuEd$" is also displayed to confirm the operation.

Notes:

- In each step, by pressing the $EntEr$ key, you can go back to the previous step, exit the settings menu, or cancel saving the parameter value.

- Parameter values have a predefined limit, for example, the value of the $Conn$->Id parameter can be selected between 1 and 247.

6.2 Communication settings menu and parameter (**Conn**)

In the **Conn** menu, it is related to serial communication settings, in which there are the following sub-menus:

- **Id** (Device ID): In Modbus communication, every device connected to the bus has a unique ID.

- **bAUd** (Baud Rate): RS485 serial data transmission speed can be set in this menu.

- **PArity** (Parity Bit): In this menu, the parity bit of RS485 serial communication can be set.

- **StoPb** (Stop Bit): In this menu, the number of RS485 serial communication stop bits can be set.

- **rtUAS** (RTU/ASCII): In this menu, RTU or ASCII type of Modbus communication is selected.

Note that the system must be reset once to apply the above parameters.

Communication parameters menu table

Menu Title	Parameter Menu	Default
Id	1-247	1
bAUd	2400 4800 9600 14400 19200 28800 38400 57600 76800 115200 230400	9600
PArity	none = nonE odd = odd even = EuEn	even
StoPb	1stop bit = 1bit 2 stop bit = 2bit	bit 1
rtUAS	RTU = rtU ASCII (8bit) = ASCII	RTU

Address table of communication parameters

Title	Variable Type	The Length	Reading Writing	Address	Description	Default
ID	Unsigned int	1	RW	40001 0 d 0 h	1~247	1
Baud Rate	Unsigned int	1	RW	40002 1 d 1 h	0~10 0=2400 1=4800 2=9600 3=14400 4=19200 5=28800 6=38400 7=57600 8=76800 9=115200 10=230400	2
parity	Unsigned int	1	RW	40003 2 d 2 h	0=none 1=odd 2=even	2
Stop bit	Unsigned int	1	RW	40004 3 d 3 h	0=1 bit 1=2 bit	0
Mode	Unsigned int	1	RW	40005 4 d 4 h	0=RTU 1=ASCII (8bit)	0

6.3 Calibration menu and parameters (CALIb)

In the calibration menu, it is related to the calibration settings and setting the specifications of the load cell. The sub-menus of this menu are:

- ᴸᴄ ᴾʳᴼ (Load cell Profile): In this device, it is possible to define a calibration profile for S load cells.

For example:

We have 2 different load cells, number one is 50 kg and number two is 100 kg.

First, we set the ⌷⌷ ⌷⌷⌷ parameter to ⌷⌷ ⌷⌷ ⌷ and perform the calibration steps for that load cell.

To define the second load cell, the same steps as above are repeated, only instead of ⌷⌷ ⌷⌷ ⌷, we write ⌷⌷ ⌷⌷⌷ option in LC Pro.

In this way, ⌷⌷ ⌷⌷ ⌷ profile has 50 kg load cell calibration values and ⌷⌷ ⌷⌷⌷ profile has 100 kg load cell calibration values.

Now, to call any of the profiles, just set the ⌷⌷ ⌷⌷⌷ parameter equal to the value of the profile.

Note: If you do not need to connect and replace different load cells, do not change this parameter.

• ⌷⌷⌷ ⌷⌷ (Calibration Mode): For each load cell, it is possible to calibrate in two ways:

1- Automatic calibration using the values of the calibration sheet with the load cell

2- Weight calibration using reference weight

For automatic calibration, set ⌷⌷⌷ ⌷⌷ to ⌷⌷⌷⌷ and for weight calibration to ⌷⌷⌷ ⌷⌷⌷.

For automatic calibration, three parameters ⌷⌷ ⌷⌷⌷, ⌷⌷ ⌷⌷⌷ and ⌷⌷ ⌷⌷⌷ should be entered.

For weight calibration, ⌷⌷⌷ ⌷ ⌷, ⌷⌷⌷ ⌷⌷ and ⌷⌷⌷ ⌷⌷ parameters should be entered according to the calibration instructions.

In general, calibration with reference weight is more accurate than automatic calibration mode.

• ⌷⌷ ⌷⌷⌷ (Load Cell Sensitivity): It is the amount of voltage that the load cell puts at its maximum capacity for each excitation volt in the output, whose unit is mV/V. which is included in the load cell calibration sheet.

- ⌐⌐ ⌐⌐⌐ (Load Cell Capacity): It is the working capacity of the load cell, which is included in the load cell calibration sheet.

- LC nUm (Load Cell Number): The number of load cells connected in parallel to the module can be determined by this parameter.

- CAL Zr (Zero): By entering this parameter and saving it, zeroing will be done. It should be noted that the value of the parameter cannot be changed and only saving it is enough to perform zeroing.

- CAL Y1 (Calibration Weight 1): For calibration, you must place a reference weight whose exact mass you know on the load cell, then enter the weight value in the Calibration Weight 1 parameter and confirm.

- CAL Y2 (Calibration Weight 2): For calibration, you must place a reference weight whose exact mass you know on the load cell, then enter the weight value in the Calibration Weight 2 parameter and confirm.

Note: The calibration guide section explains how to calibrate using both methods.

- tr mAH (Tare Max Limit): This parameter is to limit the Tare weight, if the total weight given is greater than this parameter, the Tare operation will not be performed.

- tr mIn (Tare min Limit): This parameter is to limit the Tare weight, if the total weight given is less than this parameter, the Tare operation will not be performed.

Note: Tare Max Limit and Tare min Limit parameters are to avoid applying excessive force to the load cell. If the weight on the load cell exceeds this value, the device does not allow the user to reset the weight to zero, for example, if a 50 kg load cell is connected to the device and the Tare Max Limit is equal to 40 kg, if the weight is more than 40 kg Yes, the weight does not become zero by executing the command SafarTare.

- FIL Fr (Filter Frequency): This parameter sets the sampling frequency of the analog signal. It should be noted that the higher value of this number

increases the speed of sampling and decreases its accuracy. It is necessary to choose the right amount for different uses.

• FI L �ünd (Filter Mode): to select the type of filter function. (In this model, as a Moving filter, this parameter is set to 0 and cannot be changed).

• FI L nU (Filter Number): This parameter is used to determine the number of averaging samples. For example, if this parameter is equal to 10, the length of the averaging array is equal to 10, and the averaging is done from the last 10 samples. Of course, in the averaging process, the newest sample enters the array and the oldest sample is removed from it, until the effect of the new sample appears in the filter output. To be it should be noted that the higher value of this number decreases the speed of weight changes and increases its accuracy. It is necessary to choose the right amount for different uses.

• I YFrC (Integer weight fraction): In the Integer weight register (in the reading parameters section), the weight value is correctly displayed. Using this variable, you can determine the number of numbers that must be correctly displayed after the decimal point.

The menu table of calibration parameters and the address table of calibration parameters are as follows.

Calibration parameters menu table

Menu Title	Parameters Menu	Defualt
LC Pro Lodcell profile	**LC Pr 1** = Load cell profile number1 **LC Pr2** =Load cell profile number2 **LC Pr3** = Load cell profile number3 **LC Pr4** = Load cell profile number4 **LC Pr5** = Load cell profile number5	**LC Pr 1**
CAL md Calibration mode	**AtUo** = Automatic calibration **YEI Ght** = Weighing calibration	**AtUo**
LC SEn Output voltage per volt	It is included in the load cell calibration sheet.	2.001 mv/v
LC CAP Load cell weight capacity	It is included in the load cell calibration sheet.	50 kg
LC nUm Number of connected load cells	Number of load cells used to measure weight.	1
CAL Zr Zero calibration	By entering this parameter and saving it, zeroing will be done.	____
CAL Y1 Weighing calibration1	Enter and read the calibration reference weight point one	0 Kg
CAL Y2 Weighing calibration2	Enter and read the calibration reference weight point two	50 Kg
tr mAH the upper range of tare	The maximum weight allowed for tare operation	20 kg
tr mIn the lower range of tare	The lowest weight allowed for tare operation	-10 kg

FILFr Sampling frequency	4.7 hz 10 hz 20 hz 30 hz 40 hz 50 hz 60 hz 96 hz 120 hz 150 hz 200 hz 240 hz 300 hz 400 hz 600 hz 800 hz 960 hz 1200 hz 1600 hz 2400 hz 4800 hz	50 hz
FILmd Filter type	unchangeable	--
FILnU The number of averaging samples	To determine the number of averaging sample	10
I4FrC Number of decimals	Decimal numbers that are converted to integers in the integer variable	3

The address of the parameters of the load cell:

Title	Variable Type	The Length	Writing Ability	Address	Description	Default
Load cell Profile	unsigned int	1	RW	40109 108 d 6C h	0~4	0
Output voltage per volt	float	2	RW	40051 50 d 32 h	mv/v	2
Load cell weight capacity	float	2	RW	40053 52 d 34 h	kg	50
Number of connected load cells	Unsigned int	1	RW	40055 54 d 36 h	-	1

Address of calibration parameters:

Title	Writing Ability	The Length	Variable Type	Address	Description	Default
Calibration mode	RW	1	unsigned int	40077 76 d 4C h	0=Automatic Mode 1= Weight Mode	0
The value of the first calibration reference weight	RW	2	float	40078 77 d 4D h	kg	0
The value of the second calibration reference weight	RW	2	float	40080 79 d 4F h	kg	0

The address of parameters related to the range of Tare:

Title	Variable Type	The Length	Writing Ability	Address	Description	Default
Low tare weight range	float	2	RW	40068 67 d 43 h	kg	-5
High tear weight range	float	2	RW	40070 69 d 68 h	kg	50

The address of parameters related to correct and variable decimal weight:

Title	Variable Type	The Length	Writing Ability	Address	Description	Default
Channel 1 net weight	signed long	2	R	40146 145 d 91 h	-	-
fraction	Unsigned int	1	RW	40148 147 d 93 h	0~6	3

The address of the sampling filter parameters:

Title	Variable Type	The Length	Writing Ability	Address	Description	Default
The number of averaging samples	Unsigned int	1	RW	40044 43 d 2B h	2~50	10
Sampling frequency	Unsigned int	1	RW	40045 44 d 2C h	0=4.7 1=10 2=20 3=30 4=40 5=50 6=60 7=96 8=120 9=150 10=200 11=240 12=300 13=400 14=600 15=800 16=960 17=1200 18=1600 19=2400 20=4800	0
Filter Type	Unsigned int	1	RW	40046 45 d 2D h	0=simple 1=smart	unchangeable

6.4   Menu and parameters of digital inputs (d I n)

The device has 2 digital inputs. A specific function can be defined for each digital input. For this purpose, a parameter has been assigned to each input. You can also view the status of the inputs through serial communication and use them as an independent input. For each of the functions, there is a

corresponding code, by placing that code in the corresponding parameter of each input, the desired function is executed when the inputs are activated.

Note: The performance of the inputs is with a rising edge, and the level of the input remaining active does not mean that the command is always executed.

- d𝟣n𝟣: code related to the first input function
- d𝟣n2: code related to the function of the second input

Menu table of digital input parameters

Menu Title	Parameter Menu	Default
d𝟣n𝟣	nonE = No function tArE = Tare ZEro = Zero tArrS = Tare Reset m-mrS = Max & Min Weight Reset CAPtr = Weight Capture Trig CAL1 b1 = Calibrate 1 CALI b2 = Calibrate 2 CLrSo = Calibration Restore oACt = Output Activator in the mode where the outputs are in IndPn2 and Inbt2 modes (in the menu section and relay output parameters)	nonE
d𝟣n2	Same as d𝟣n𝟣	nonE

Title	Writing Ability	The Length	Variable Type	Address	Description	Default
Input 1 command	RW	1	Unsigned int	40121 120 d 78 h	0 = None 1 = Tare 2 = Zero 3 = Tare Reset 4 = Max & Min Weight Reset 5 = Weight Capture Trig 6 = Calibrate 1 7 = Calibrate 2 Calibration=8 Restore 9 =Output Activator	None
Second 1 command	RW	1	Unsigned int	40122 121 d 79 h	Same as input 1 command	None
Inputs display	R	1	Unsigned int	40016 15 d F h	-	-

Note: through serial communication and by reading the "input status display parameter", it is possible to check whether the inputs are activated or not. In this parameter, the first input is in the LSB.

6.5   Relay outputs menu and parameters (d oUt)

- **SP Pro**: **SET point profile**: Another feature of this module is to define a profile for output set points. Imagine you have given three set points to the module and you are using it, but you want to set a few more different set points and when you only need Call them. For example, a packaging machine is working, the set points are given to the module and its output is used, now when the product is changed, you need to change the set points,

for this purpose, it is enough to change the ⎓⎓ ⎓⎓⎓ SP Pro parameter value. and select the appropriate profile to replace the new set point values. Currently, up to 10 profiles can be defined (0~9).

- SP ⎓⎓⎓⎓: **SET point** The device has three relay outputs, the outputs are triggered based on the comparison of the base weights (bEt Poi nt) with the net weight parameter.

There are 5 modes for activating outputs:

- I ndPn I: **Independent Mode 1** In this mode, each independent output from other set points is compared only with its corresponding set point, if the value of the net weight is smaller than the weight of the set point, the corresponding output is activated, other wise it is deactivated.

    Net Weight < Set Point X -> Outx On

    Net Weight > Set Point X -> Outx Off

Example:

Out 1	Net Weight	Set Point 1
on	11 Kg	12 Kg
off	13 Kg	12 Kg

I n bt I:Mode 1 In between

In this case, the net weight is compared with the next and previous Set Point values. And if it is located between each of the set points, the corresponding output is activated. The table below shows how to compare and activate the outputs.

Comparison	Out 1	Out 2	Out 3
Net Weight<S.P1	On	Off	Off
S.P1<Net Weight<S.P2	Off	On	Off
S.P2<Net Weight<S.P3	Off	Off	On

IndPn2: Independent Mode 2 is similar to **IndPn1** (Independent Mode 1) in terms of weight comparison logic to activate the outputs. **W**ith the difference that two other parameters are effective in activating and deactivating the outputs. This mode is used in devices where the outputs need to be activated with a single command, so that in order to activate the comparison of the outputs with the net weight, one of the inputs must first give the activation command to the device and the device starts comparing the weight with set points and when the weight reaches one of the Set Points (which can be selected), all the outputs are disabled and the net weight is no longer compared with the Set Points.

To activate the comparison of the outputs, one of the inputs must be activated. For this purpose, the function code of one of the inputs must be defined (in the "menu and parameters of digital inputs" section) as **oACt** Output Activator. In this way, the desired input must be activated first, then the net weight is compared with the Set Points.

To disable the output comparison and disable the outputs in this mode, in the "Relay Outputs Menu and Parameters" section and in the **LSt SP** Last Output sub-menu, the number of the last Set Point that must be compared is determined by doing this when the net weight When it reaches the value specified in the set point, the comparison of the net weight with the set point is disabled, and all the outputs are disabled, and to repeat the comparison process, the output comparison activation command must be issued again through the digital input.

SErIAL: Serial Mode In this mode, the outputs are activated and deactivated independently of the weight and through serial communication. "Relay outputs" that if the number 1 is written in the parameter corresponding to each output, the output is activated and is deactivated by writing zero. If this mode is active, the outputs can be activated and deactivated from the panel through the sub-menus in the "Relay Outputs Menu and Parameters" section (sub-menus **o1 FoC o2FoC o3FoC**).

SPLEu: Set Point Level The level type of the outputs can be changed through this parameter, that is, the outputs can be set as Normally Open or Normally Close.

SPhYS: Set Point Hysteresis is intended to prevent outputs from playing when a Hysteresis is turned off. The performance is such that when the output is

activated at the time of shutdown, the weight of the set point is subtracted from the Hysteresis value and compared with the net value, and if the net weight is less than the result of the subtraction of the Set Point and Hysteresis, the desired output is not is activated This parameter can be considered as zero.
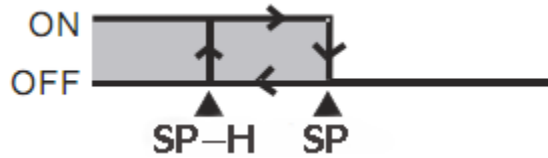
SP o 1: Set point1 In this menu, a set weight value is placed for the first output, which is compared with the net weight, and the result of the comparison is applied to the output of relay one.

SP o2: Set point2 In this menu, a set weight value is placed for the second output, which is compared with the net weight, and the result of the comparison is applied to the second relay output.

SP o3: Set point3 In this menu, a set weight value is placed for the third output, which is compared with the net weight, and the result of the comparison is applied to the third relay output.

dEAdY 1 : Dead Weight1 The dead weight associated with Set point 1 is set in this menu.

dEAdY2 : Dead Weight2 The dead weight associated with Set point 2 is set in this menu.

dEAdY3 : Dead Weight3 The dead weight associated with Set point 3 is set in this menu.

In some cases, in weighing systems, there is an air gap between the main source and the weighing system (for example, the air gap between the hopper and the weighing chamber).

In order to eliminate the effect of this weight on the road (so-called dead weight), a parameter with the same name is embedded in the module, which has an independent value for each Set Point.

The value of Dead Weight also changes for each profile, that is, an independent Dead Weight is saved for each Set Point.

- **o1FoC** : output1 Force, this parameter can be used to test the output of relay **1**, for this purpose, we put it in the section "menu and parameters of relay outputs" under the **SP mod** menu in **SErIAL** serial mode.

- **o2FoC** : output1 Force, this parameter can be used to test the output of relay **2**, for this purpose, we put it in the section "menu and parameters of relay outputs" under the **SP mod** menu in **SErIAL** serial mode.

- **o3FoC** : output1 Force, this parameter can be used to test the output of relay **3**, for this purpose, we put it in the section "Relay Outputs Menu and Parameters" under the **SP mod** menu in **SErIAL** serial mode.

- **LSt SP** : Last Set Point, if one of In bt2: Mode 2 In between or **IndPn2** : Independent Mode 2 is selected in the "Relay Outputs Menu and Parameters" section under the **SP mod** menu, in this menu, the number of the last Set Point, which is The net weight is compared and determined.

In the following, the menu table and the address table of the parameters of the output section are shown:

Table of relay output menus

Menu Title	Menu Parameter	Default
SP Pro Set point Profile	**ProF 1**= Output settings profile 1 **ProF2**= Output settings profile 2 **ProF3**= Output settings profile 3 **ProF4**= Output settings profile 4 **ProF5**= Output settings profile 5 **ProF6**= Output configuration profile 6 **ProF7**= Output Settings Profile 7 **ProF8**= Output configuration profile 8 **ProF9** = output settings profile 9 **ProF 10**= Output settings profile 10	**ProF 1**
SP mod Set point comparison mode	**IndPn 1**= independent comparison mode one **In bt 1** = comparison mode between one **IndPn2**= independent comparison mode two **In bt2** = comparison mode between two **SErIAL** = serial mode	**IndPn 1**
SPLEu Change output performance level	**dISAbLE**=outputs Normally Open mode **EnAbLE** = Outputs in Normally Close mode	**dISAbL**
SP hyS Setpoint hysteresis value	This value is considered as hysteresis for all outputs.	**0**
SP o1 Set point 1	Set point 1	**0**
SP o2 Set point 2	Set point 2	**1**
SP o3 Set point 3	Set point 3	**2**
dEAdy 1 Dead weight 1	Dead weight 1	**0**
dEAdy2 Dead weight 2	Dead weight 2	**0**

dEAdУ3 Dead weight 3	Dead weight 3	0
o 1FoC Output test1	oFF = Active on = Deactivate	oFF
o2FoC Output test2	oFF = Active on = Deactivate	oFF
o3FoC Output test3	oFF = Active on = Deactivate	oFF
LSt SP Last base weight	If SP nod is set to I ndPn2 or I n bt2, using this parameter, you can specify after which relay the weighing operation is terminated and wait for the restart command. SP o 1 = Set Point 1 as the last base weight SP o2 = Set Point 2 as the last base weight SP o3 = Set Point 3 as the last base weight	SP o3

Address table of relay output parameters

Title	Variable Type	The Length	Writing Ability	Address	Description	Default
SET POINT 1	float	2	RW	40088 87 d 57 h	kg	2
SET POINT 2	float	2	RW	40090 89 d 59 h	kg	2
SET POINT 3	float	2	RW	40092 91 d 5B h	Kg	2
Profile number	unsigned int	1	RW	40096 95 d 5F h	0~10	0
Hysteresis	float	2	RW	40097 96 d 60 h	kg	1

Inverse	unsigned int	1	RW	40099 98 d 62 h	0= Disable 1= Enable	0
Mode comparison	unsigned int	1	RW	40100 99 d 63 h	0=independent1 1=in between1 2=independent2 3=in between2 4=serial	0
Dead weight 1	float	2	RW	40101 100 d 64 h	-	0
Dead weight 2	float	2	RW	40103 102 d 66 h	-	0
Dead weight 3	float	2	RW	40105 104 d 68 h	-	0
Last Setpoint	Unsigned int	1	RW	40110 109 d 6D h	0= Set Point1 0= Set Point1 0= Set Point1	
Out1 Serial force	Unsigned int	1	RW	40022 21 d 15 h	0= off 1=on	-
Out2 Serial force	Unsigned int	1	RW	40023 22 d 16 h	0= off 1=on	-
Out3 Serial force	Unsigned int	1	RW	40024 23 d 17 h	0= off 1=on	-
Digital outputs	Unsigned int	1	R	40017 16 d 10 h	You can check whether the outputs are active or inactive. The first output is at LSB.	outputs

Using Out Serial Force parameters, if the output comparison mode is defined as serial, the digital outputs can be stimulated and the outputs act independently of the weight and like an output card.
This feature is very useful for you during startup. For example, using this feature, you can be sure of the correct wiring of your system

6.6 Menu and display parameters and keyboard (dI SSEt)

roУ: Row, with this parameter, you can select the variable that should be displayed. For example, you can choose net weight, reference weight, etc.

FrAC: Fraction This parameter specifies the number of variable decimals displayed. For example, if the read weight is equal to 123.456, if 0 is selected for this parameter, the number 123 will be displayed, and if 2 is selected for this parameter, the number 123.45 will be displayed.

Note: If it is not possible to display the selected number of decimals, the number of decimals will be corrected automatically. For example, if the value of the parameter is 3 in the above example, it will be displayed as 123.456, but if the weight changes and reaches the value of 1234.567, the number will be displayed as 1234.56.

Ent Cm: Enter Key Command This parameter specifies the function of the first key (Menu/Tare) in the mode outside the menus. This is the default value for Tare.

Sht Cm: Shift Key Command This parameter specifies the function of the second key (◄/Reset Tare) in the mode outside the menus. This is the default value for Tare Reset.

UP Cm: Up Key Command This parameter specifies the function of the third key (▼) in the mode outside the menus. This is the default value for Capture Trige.

dУn Cm: Down Key4 Command This parameter specifies the function of the fourth key (▲) in the mode outside the menus. This value is by default for Max min Reset.

LEd md (LED Mode): This parameter determines the performance of the LEDs of the display, if the status of the outputs is o StAt, and if the status of the inputs is I StAt, and if PnL is kg, the parameters specified on the panel are in kg units. And in the case of PnL g, it displays the specified parameters on the panel with the gram unit.

StEP: This parameter defines the steps of display changes. For example, if the weight is in kilograms, and this parameter is equal to **0.005**, the weight increase or decrease will be in steps of **5** grams. In other words, changes of less than **5** grams will not affect the display.

- **LI ᴬEn** (Limit Enable): It is inactive.
- **L LI ᴬ** (Low Limit): It is inactive.

Table of display menus and keyboard:

Menu Title	Menu Parameter	Default
roᵞ Display Parameter	**nEt ᵞ** = The net weight is displayed **Grob ᵞ** = The gross weight is displayed **ᴬAH ᵞ** = Maximum net weight is displayed **nEt ᵞ** = Minimum net weight is displayed **nEt ᵞ** = Capture Weight is displayed **di StA** = The status of the inputs is displayed **do StA** = The output status is displayed **LCᴬu** = The output voltage of the load cell is displayed	**nEt ᵞ**
FrAC Decimal number of display	The number of decimal places of the displayed number is specified from 0 to 5	**3**
Ent Cᴬ Enter key function code	**nonE** = No Function **tArE** = Tare execute command **ZEro** = Zero execute command **tAr rS** = Tare Reset **ᴬ-ᴬrS** = Max & Min Weight **CAP tr** = Weight Capture Trig **CALI b 1** = Calibrate 1 **CALI b2** = Calibrate 2 **CL rSo** = Calibration Restore	**tArE**
Sht CA Shift key function code	Like the function code of the enter key	**tAr rS**
UP CA Up key function code	Like the function code of the enter key	**ᴬ-ᴬrS**

dYn CA Down key function code	Like the function code of the enter key	CAP tr
LEd �md Led display mode	o StAt =Display the status of the outputs I StAt =Display the status of the inputs PnL tG =Display the specified parameters on the panel and the kilogram unit PnL G =Display the specified parameters on the panel and Gram unit	o StAt
StEP display levels	The display shows certain intervals of changes (display levels).	I
LI ᴍEn	It is deactive	--
L I Lᴍ	It is deactive	--

Address table of display parameters and keyboard:

Title	Variable Type	The Length	Writing Ability	Address	Description
Row Display variable	unsigned int	1	RW	40182 181 d B5 h	0~7 0=Net Weight 1=Gross Weight 2=Max Weight 3=Min Weight 4=Capture Weight 5=Input State 6=Output State 7=Loadcel Voltage
Fraction Number of decimals	unsigned int	1	RW	40183 182 d B6 h	0~5
Step display step	float	2	RW	40187 186 d BA h	Kg
Enter Enter key command	unsigned int	1	RW	40189 188 d BC h	0~8 0 = None 1 = Tare 2 = Zero 3 = Tare Reset 4 = Max & Min Weight Reset 5 = Weight Capture Trig 6 = Calibrate 1 7 = Calibrate 2 8 = Calibration Restore
Shift Shift key command	unsigned int	1	RW	40190 189 d BD h	0~8 Enter same key
Up Up key command	unsigned int	1	RW	40191 190 d BE h	0~8 Enter same key
Down Down key command	unsigned int	1	RW	40192 191 d BF h	0~8 Enter same key

LED LED Mode	unsigned int	1	RW	401193 192 d C0 h	0=Output State 1=Input State 2=panel & Kg unit 3=panel & g unit

6.7   Menu and analog output parameters (Ａ oUＬ)

The analog output signal of the device includes 0-5V, 0-10V, 0-20mA and 4-20mA signals. The device has the ability to create an analog output signal based on net weight or total weight. In addition, the output analog signal can be controlled through serial, in which case the output analog acts as an independent card.

- **Ａo ＬＹＰＥ** : Analog Out Type This parameter is used to select the analog output type. Usable output modes are 0~5V, 0~10V, 0~20ma, 4~20ma.

- **Ａo Ｓｒc** : Analog Out Source With this parameter, the analog output source is selected. This source can be net weight, reference weight, or Modbus serial register.

- **ṁＩ n ＳＣ** : Minimum Scale This parameter specifies the weight value for which the analog output will be at its lowest value. This value can be positive, negative or greater than Maximum Scale.

- **ṁＡＨ ＳＣ** : Maximum Scale This parameter specifies the weight value for which the analog output will be at its maximum value. This value can be positive, negative or smaller than Minimum Scale.

- **Ａo ｒＥＧ** : Analog out Register In this parameter, the analog output serial register value is available and the analog output value can be changed.

Table of analog output menus:

Menu Title	Menu Parameter	Default
ЯₒᵗЧP Output analog signal type	**0-5ᵤ** =0–50 V **0-10ᵤ** =0–10 V **0-20ₘЯ** =0–20 mA **4-20ₘЯ** =4–20 mA	**0-5ᵤ**
Яₒ 5ᵣС The basis of the output analog signal	**nЕᵗ Ч** = Net weight of analog base output **GᵣₒЅЧ** = The overall weight of the output analog base **SЕᵣ АL** = Output analog based serial register	**nЕᵗ Ч**
ₘⁱ n SC The lowest scale weight	Minimum weight to scale analog output	**0**
ₘЯҢ SC The most scale weight	Maximum weight to scale analog output	**50ᵏG**
Яₒᵣ ЕG Serial register	Analog output Serial register	**0**

Address table of analog output parameters:

Title	Variable Type	The Length	Writing Ability	Address	Description	Default
Analog Out Source	Unsigned int	1	RW	40133 132 d 84 h	0~2 0=Net Weight 1=Gross Weight 3=Serial Register	0
Analog Out Max Scale	Float	2	RW	40134 133 d 85 h	--	50
Analog Out min Scale	Float	2	RW	40236 135 d 87 h	--	0
Analog Out Serial Register	Unsigned int	1	RW	40138 137 d 89 h	--	0

| Analog Out Type | Unsigned int | 1 | RW | 40139 138 d 8A h | 0=0-5V 1=0-10V 2=0-20mA 3=4-20mA | 1 |
| The numerical equivalent of an analog signal | Unsigned int | 1 | R | 40018 17 d 11 h | This parameter is only for displaying the numerical value of the output analog signal. | - |

6.8   menu and parameters to return to factory settings (ⲅ5Ⅎ⊏Ⴀ)

In this menu, there is the ability to return all the settings of the device to the default state, in addition, the serial communication settings can only be returned to the default state. For this, it is enough to enter the relevant menu, first the reload option will be displayed, then the Enter key will be held for more than three seconds to confirm the reset action, after that the phrase "Off on" will be displayed with a flashing face. Exit the relevant menu and turn the device off and on to reset.

• ⲅ5⊏oⲙ (Communication Reset to Factory): This option is used to reset serial communication settings.

• ⲅ5ⲙdL : Mdule

Return to factory settings menu table:

Menu Title	Menu Parameter	Default
RS Com reset serial settings	**reload =** Restore serial communication settings	--
RS Mdl Reset all settings	**reload =** Restore all device settings	--

6.9 Module information parameter

This parameter can only be accessed through serial communication and cannot be seen through the indicator menus.

All the following parameters are read only

Title	Variable Type	The Length	Writing Ability	Address	Description	Default
Firmware ver	Float	2	R	40007 6 d 6 h		
Hardware ver	Float	2	R	40009 8 d 8 h		
Model	Unsigned int	1	R	40011 10 d A h		
Serial number	Unsigned long	2	R	40012 11 d B h		

6.10 Weight Parameters

Title	Variable Type	The Length	Writing Ability	Address	Description	Default
Gross weight	float	2	R	40026 25 d 19 h	kg	-
net weight	float	2	R	40028 27 d 1B h	kg	-
tare weight	float	2	R	40030 29 d 1D h	kg	-
Unfiltered ADC data	u long	2	R	40032 31 d 1E h	-	-

Filtered raw adc data	u long	2	R	40034 33 d 21 h	-	-
input voltage millivolts	float	2	R	40036 35 d 23 h	mv	-
The most weight	float	2	R	40159 158 d 9E h	kg	
The least weight	float	2	R	40161 160 d A0 h	kg	
Current weight	float	2	R	40163 162 d A2 h	kg	
Weight difference at a certain time Delta W	float	2	R	173	deactive	
Specific time for weight difference Delta t	Unsigned int	1	RW	172	deactive	5
Rate of change of weight	float	2	R	175	deactive	-

• Gross weight displays all the weight on the load cell.

• Net weight indicates the total weight minus the tare weight.

Tare weight is the weight of the sole or tare.

Unfiltered ADC data is the raw value read from the ADC.

• Filtered raw data read from ADC.

• It is the voltage that appeared at the output of the load cell. This value is in millivolts.

• The two registers of the highest and lowest weight are constantly monitoring the net weight, and if the current weight is more or less, these two registers replace the previous value with the new value. (An instruction is also included to reset the content of both registers with the weight of the same moment)

• The function of the current weight register is that by sending the corresponding code (Capture), the current weight is placed in this register.

• In cases where it is necessary to read the amount of weight change in a specific time unit, the weight difference and time difference registers are placed. Also, the register of the weight change rate per unit of time is obtained from the division of the above registers and is provided to the user.

• In cases where weight reading is required in "Long" format, the following table is provided.

It should be noted that the fraction value is determined by the user.

For example, if the weight value is 1.235 kg and the fraction value is 3, the corresponding register content will be 1235.

Title	Variable Type	The length	Writing Ability	Address	Description	Defualt
Net weight of channel 1	signed long	2	R	40146 145 d 91 h	-	-
fraction	Unsigned int	1	RW	40148 147 d 93 h	0~6	3

6.11 Commands List

All commands are written in a register, the specifications of that register are as follows.

All commands will be executed after 500 milliseconds at most.

Title	Variable Type	The length	Writing Ability	Address	Description	Defualt
Command register	Unsigned int	1	W	40062 61 d 3D h	-	-

The list of command as follows:

Number	function	code
1	None No function	0
2	Tare	1
3	Zero	2
4	Tare Reset	3
5	Reset Max and Min Weight	4
6	Capture current weight	5
7	Calibration trigger 1	6
8	Calibration trigger 2	7
9	Calibration Restore	8
10	Activate output Activator Independent2-In Between2	9
11	Communication Reset to factory setting	10
12	Reset to factory setting	11

All values are in decimal.

Number 1: None
No function (default value)

Number 2: Tare
With this command, the current weight on the load cell is considered as the Tare weight and is dumped in the Tare weight register.

Note that before applying this command, you must set the zero limit values

Tare High limitation and Low tare limitation have been set correctly.

The order is applied only if the gross weight is in the following range.

Low Tare limitation < Gross weight < High Limitation

Number 3: Zero
This command is used to zero the total weight and net weight.

It is recommended to use this command only during calibration and use Tare command at other times.

Number 4: Tare Reseet
This command is used to zero the weight value of the stone fragment.

Number 5: Reset Max and Min Weight
By executing this command, the highest and lowest weight registers will be set with the current weight value.

Number 6: Capture current weight
By executing this command, the current weight will be placed in the current weight register.

Number 7: Calibration trigger 1 Perform the first stage of weight calibration
In weight calibration, calibration is done in 2 steps.

This command will perform the first stage of weight calibration.
In the first step, the maximum value of 5% of the load cell range should be written in the Calibration Weight 1 register, then the same amount of weight should be placed on the weighing system, and then this command would be sent.
For this, you need to send the value of 7 decimals to the Command register.

Number 8: Calibration trigger 2 to perform the second stage of weight calibration
This command will perform the second stage of calibration

At this stage, a specific weight should be at least 50% of the total weight on the weighing system; And the exact amount of this weight has been poured on the Calibration Weight 2 register. At this stage, you can do this by sending 7 decimal numbers to the instruction register.

Number 9: Calibration restore
This command returns the last calibration coefficient. This command is only for weight calibration and is not related to automatic calibration.

Number 10: Output Activator
If one of the In bt2: Mode 2 In between or ⌐ ⌐dPn2: Independent Mode 2 modes is selected in the "Relay Outputs Menu and Parameters" section under the 5P Mod menu by sending this command (if the base weight of each output is greater than the net weight be) the outputs are activated.

Number 11: return the settings of serial communication parameters to the default mode

You can use this command in cases where you want to restore only the serial communication settings to their original state. For this purpose, the value of 10 decimals must be sent to the instruction register

After sending this command, you need to turn the module off and on again for the changes to take effect

Number 12: Return to the initial settings
In cases where you need to return the module to the initial settings, you can send this command

 •Note that the parameters of the communication group also return to their default values

 •After sending this command, you need to turn the module off and on again for the changes to take effect.

7   Transmitter Setting Software

In order to set up and monitor the transmitter, a computer program has been prepared by Pars Mega Company, which includes all the features of the transmitter.

7.1   Introduction

By running the program, the following page will open at first:
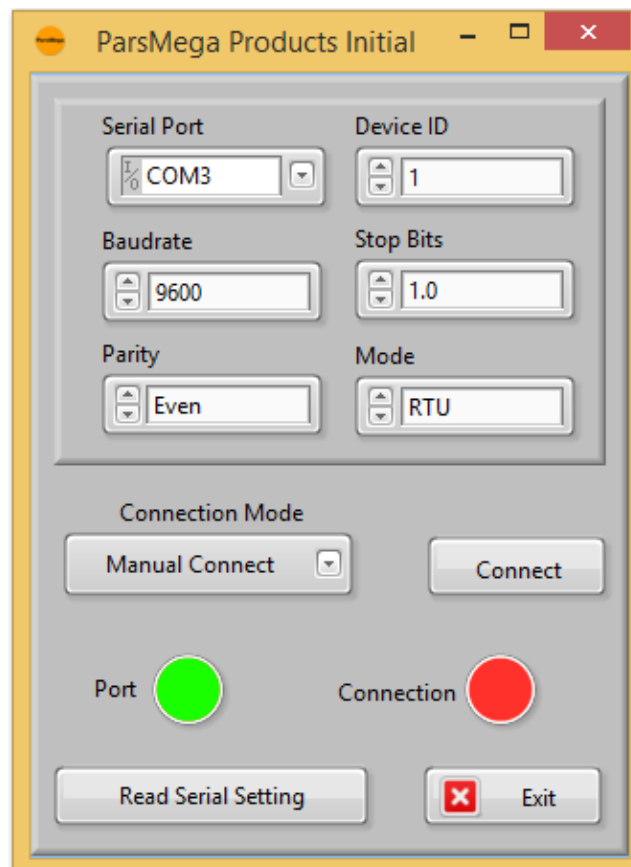
Serial Port: The number of the serial port to which the transmitter is connected.

When the correct port is selected, the Port indicator will turn green.

Device ID: ID of the transmitter, which is 1 by default in the transmitter.

Baud Rate: The baud rate of serial communication is 9600 by default.

Stop Bit: The Stop bit specifier is in serial communication and is 1 bit by default.

Parity: The serial communication parity parameter is even by default.

When the connection is established, the Connection indicator will turn green and this page will be closed automatically and the main page of the program will be opened.

Read Serial Setting: If you do not know what settings are on the device and communication is not established, press this button to go to another page where it is possible to read these parameters.
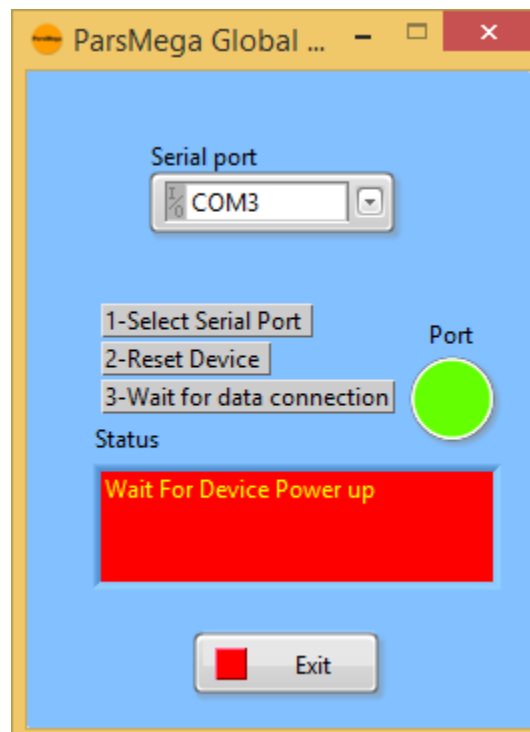
If you have pressed the "**Read Serial Setting**" button on the previous page, the above page will open. After opening this page, first select the port (if selected correctly, the port will be green) and then turn the device off and on. After reading these values, this page is closed and the main page is opened.

7.2 Main Menu
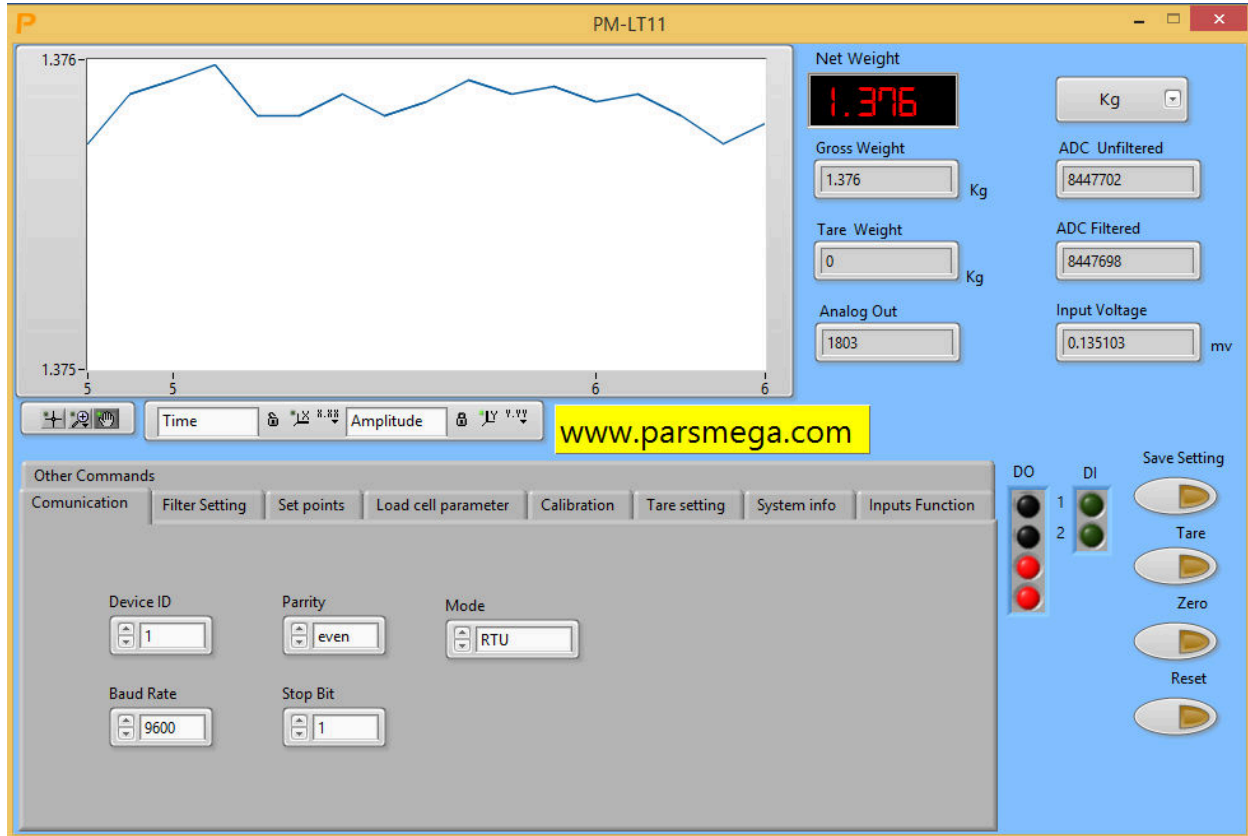
The **Save** Setting button is for saving the settings.

The **Tare** button is for Tare.

The **Reset** button is for restarting.

Transmitter variable values

- ADC Unfiltered Raw ADC value without applying filter
- ADC Filtered Raw ADC value with filter applied
- Gross Weight Total weight amount
- Net Weight
- Tare Weight
- Input Voltage The output voltage value of the load cell
- Analog Out Analog output value

Adjustable transmitter values

7.2.1 Setting related to RS485 serial communication

Note that in order to apply changes to serial communication settings, the transmitter needs to be reset once.

7.2.2 Filter related settings

Filter Mode is a type of filter that can be simple or intelligent Moving.

Smart Filter Update is the automatic setting of the smart filter that is explained in the filter parameters section.

After pressing this button for **10 seconds**, the system should be in a state without tension and conflict.

Sample Number is the number of samples to filter.

Frequency is the sampling rate.

It should be noted that by increasing the sampling speed, the accuracy of sampling decreases.

7.2.3   Settings related to digital outputs

These parameters are fully explained in "6.10 Set points parameters".

7.2.4   Settings related to load cell values

Output Sensitivity is the amount of voltage that the load cell puts in the output at its maximum range for each excitation volt. You can find this value with the same name in the load cell sheet.

Max Capacity is the maximum working range of the load cell.

Number of Load cells is the number of parallelized load cells.

7.2.5 Settings related to calibration

Be sure to hit the Save button after completing the calibration.

To perform weight calibration, perform the following steps:

1- Set Calibration Mode to Weight calibration
2- Putting the system in idle mode and pressing the ZERO button.
3- Placing a load with a specific weight on the weighing system (up to 5% of the total range of the load cell)
   (In this section, you can use no load mode, in this case, enter the value 0 as "Calibration weight 1" in the next section.
4- Entering the exact weight of the load in Calibration weight 1
5- Hitting the Calibration button 1
6- Placing a load with a specified weight on the weighing system (at least 50% of the total range of the load cell)
7- Entering the exact weight of the load in Calibration weight 2
8- Hit the Calibration button 2
9- Save calibration

For automatic calibration, perform the following steps:

1- Enter the load cell values in the Load cell Parameter field.
2- Set Calibration Mode to Automatic Calibration.
3- Save calibration