Installation and Operation Manual

Load Cell Central

1-800-LOADCEL

# version 0.1

# CSLL-2 A+B CSLL-2 A+B+C CSLL-2 A+B+C+D

# LOAD LIMITING DEVICE



2014/30/EU (EMC) - EN 61010-1:2010 2006/42/EC ( Machinery Directive )

Load Cell Central follows a policy of continuous improvement and reserves the right to change specifications without notice. © 2017

# **SYMBOLS**

The following symbols are used in this manual to draw the reader's attention to important points:



Caution! Risk of electric shock.



Caution! This operation must be performed by specialist personnel.



Pay particular attention to the following points.



Further information.

### **GUARANTEE**

12 months from the delivery document date. The guarantee covers only defected parts and includes the replacement parts and labor. All shipping and packing costs are paid by the customer. It is possible to have the repair in guarantee on condition that the returned product has not been transformed, damaged or repaired without authorization. No guarantee is applicable on returned products without the original label and/or serial number. No guarantee against misuse.

Batteries: LCC provides 1 year guarantee from the date of delivery note, against material defects or battery manufacturing faults.

### Disposal of Waste Equipment by Users in Private Household in North America

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other



household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at this time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the reseller.

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# **RECOMMENDATIONS FOR CORRECT INSTALLATION OF WEIGHT INDICATORS**

- The entry into the cable board of cells must be independent (on one side or the other of the board) and directly connected to the terminal board of the device without breaking by bearing terminal boards or passing through troughs containing other cables.
- Use the "RC " filters on the instrument-driven coils of the remote control switches.
- Avoid inverter, if inevitable, use filters and separate with sheets.
- In case of 230Vac supply, use a 380/230Vac transformer avoiding to use the 380Vac phase and the neutral.
- The installer of the board is responsible for securing the electrical safety of the indicators.
- It is a good norm to let the indicators always switch on to prevent the formation of condensation.

# TECHNICAL FEATURES (single **CSLL-**2)

Power supply	24 VDC +/- 15 %
Max consumption	.4 A
Insulation	Class III
Humidity (condensate free)	85 %
Operating temperature	-10°C – +50°C
Storage temperature	-20°C – +60°C
Weight display	Six-digit semialphanumeric, 7 segment Led (h 14 mm)
Led	5 Led
Keyboard	4 keys
Dimensions	115 mm x 93 mm x depth 65 mm
Mounting	DIN or OMEGA rail
Load cell power supply	5 VDC (max 4 load cells 350 Ohm)
Linearity	< 0.01% Full Scale
Thermal drift	< 0.001% Full Scale / °C
Converter A/D	24 bit
Internal division	until +/- 99999
Display range	0 - 60000
Measure range	Min: $-2 \text{ mV}$ to $+2 \text{mV}$
	Max: – 19.5 mV to + 19.5 mV
Digital filter	0.1 Hz to 10 Hz
Readings/second	10/sec.
Decimals	0 – 3
Display increments	x 1 x 2 x 5 x 10 x 20 x 50 x 100
	N° 2 relays (NA) max 24 VDC/VAC ; 0.5 A
	N° 1 relay (exchange contact) max 24 VDC/VAC ; 0.5 A
Logic input	N° 1 optoisolated
Serial ports	RS232 or RS485
Max cable lenght	5m (Rs232) - 500m (Rs485)
Serial Protocols	Monodirectional protocols for PC/PLC and remote displays
Baud rate	2400, 9600, 19200, 38400, 57600,115200 selectable

#### **INSTRUMENT OPERATION**

The system is composed by two or more CSLL-2 connected via RS485.

SETTINGS: A+B = 2 INSTRUMENTS A+B+C = 3 INSTRUMENTS A+B+C+D = 4 INSTRUMENTS

Each instrument has 3 set-points; the Set2 and Set3 change when the weight displayed on the instrument exceeds the set value, while the Set1 changes when the total weight of the instruments exceeds the set value.

The relays are normally energized, when a set point has been passed, the related relay is deenergized.

It is also possible to display the total weight (A+B+C+D) by means of a remote display.

#### **DISPLAYINGS & ERROR MESSAGES**

When programming is not in progress, the display shows the relevant weight in lb, kg, or tons. In certain conditions the following messages are displayed:

""	Weight higher than maximum capacity (over 9 divisions). During the total weight displaying, it means that one of single weights exceed 5 digits.	
""	Weight out of negative measure range.	
"No - Con"	Weight signal absent or off – probably wrong load cell connection.	
"No-Com"	During the total weight displaying, indicates the lack of serial communication between instruments.	

# **ELECTRICAL CONNECTIONS**



For four-wire load cells connection jumper terminal 1 with 4, terminal 2 with 3.

The load cell shield must be connected to terminal 1 (- Excitation).

### LED DIAGNOSTICS

L1 = "net" function activated L2 = Steady weight L3 = output 1 activated L4 = output 2 activated

L5 = output 3 activated

CONNECTION BETWEEN MORE CSLL-2 IN RS485



# **KEY FUNCTIONS**



### **OPERATING FUNCTIONS :**

KEY	FUNCTION
PRG + SET	(keeping pressed) Access to the set-points programming.
- 0 -	(keeping pressed) Zero-setting for small variations
FUN	(short pressed) Switching the display of the weight revealed by single instrument with the display of total weight revealed by instruments CSLL-2 connected. The weight is flashing, press the key again to return to the weight of single instrument.
PRG + FUN	(keeping pressed) Access to the set-up menu

#### MENU MENAGEMENT :

KEY	FUNCTION
1	Select the next menu item
$\leftarrow$	Select the previous menu item
$\leftrightarrow$	Exit from submenu item and return to previous item / exit menu.
$\rightarrow$	enter selected menu item

# SETTING DATA :

KEY	FUNCTION
↑	Increase the value of the blinking digit
$\downarrow$	Decrease the value of the blinking digit
$\leftrightarrow$	Select the next digit during the parameters setting phase
$\leftarrow$	Exit and confirm values entered in parameters

# SELECTION DATA:

KEY	FUNCTION
Ť	Select the next item
$\downarrow$	Select the previous item
$\rightarrow$	Exit and save the displayed item



Switch on the instrument and wait for five minutes until all components reach a stable temperature. Check that the display value is positive and increments when weight is applied on the container. If the reading is negative or the instrument displays the message "- - - - -" check load cell connections and ensure correct cell positioning (loading position).



Ensure that the container is empty and during the initial display phase, press **PRG** followed by **FUN** and keep pressed for 3 seconds for access to the main set-up menu and display:

*"ConSt"*, press the SET key to display:

*"CALIbr"*, press **PRG** to display the message *"CAL"* alternated with the weight value, press **- 0** - to zero-set the system tare, press **PRG** to return to the main menu and display "CALIbr", press **- 0** - to return to the weight display.

# **INSTRUMENT CALIBRATED IN LABORATORY**

Set values: "CAPAC"(

); " SEnSIt" (

); "*dIVIS"*(

).

In this case the instrument is supplied pre-calibrated; proceed with a calibration check.

# INSTRUMENT CALIBRATION CHECK:

Ensure that the container is empty and that the instrument displays zero. Place a significant amount of products in the container (equal to at least 50% of the maximum quantity to be weighed) and ensure that the instrument indicates the correct value.

- If there is a significant difference <u>between the displayed value and effective amount</u> (greater than 1-2%) check that this is not caused by a mechanical fault and check the electrical connections of the cell and the cell loading position.

- If the difference is not significant but around 1-2% proceed with WEIGHT DISPLAY CORRECTION VIA KEYBOARD (see next paragraph).

# WEIGHT DISPLAY CORRECTION VIA KEYBOARD:

If the instrument indicates a weight that is different from actual product weight inside the container, proceed as follows:

Press **PRG** followed by **FUN** and keep pressed for 3 seconds for access to the main set-up menu and display:

*"ConSt"*, press the SET key to display:

*"CALIbr"*, press **PRG** to display the message *"CAL"* alternated with the weight value, press -0 - and keep it pressed to show the displayed value, enter the correct value of the product by using the **SET** and **FUN** keys to increase or decrease the value and -0 - to move to the next digit. Check no other weight is applied and confirm by pressing **PRG**, the message "*CAL*" alternated with the weight returns on display; to return to the main menu press **PRG**, the message "*CALibi*" will be displayed again, then press -0 - to return to the weight displaying.

# INSTRUMENT TO CALIBRATE

In this case the instrument has been supplied not calibrated; proceed with its CALIBRATION (THEORETICAL or SAMPLE WEIGHT), TARE ZERO-SETTING and CALIBRATION CHECK procedures.

#### CALIBRATION PARAMETERS (submenu "ConSt")

"CAPAC" (kg, only whole numbers) : Full scale load cells, it is used for Theoretical Calibration togheter with "SEnSI." and "dIVIS" parameters.

"SEnSI." (mV/V): Load cell sensitivity, it is used for Theoretical instrument Calibration together with "CAPAC" and "dIVIS" parameters.

"dIVIS" (Divisions) : System's resolution.

# THEORETICAL INSTRUMENT CALIBRATION

The entry of "CAPAC", "SEnSI." and "dIVIS" " parameters, enables instrument calibration without the need for a sample weight. Obviously the calibration settings should be tested with a known quantity of product.

Press **PRG** followed by **FUN** and keep pressed for 3 seconds for access to the main set-up menu and display:

*"ConSt"*, press **PRG**, the following will appear:

*"tarat",* press **PRG**, the following will appear:

*"PaSSUd"* (for 3 seconds), then the "0 0 0 0" message will appear, digit the password "2792" to access to the calibration parameters, then confirm with **PRG**, the following will appear:

" *CAPAC*" (full scale) Press **PRG** and then set the full scale for the load cells in integral values without decimals.

Example: if there a three load cells with a rated capacity of 300 kg , and the required resolution is 0.1 kg , set this parameter to 900.

After setting the value, confirm by pressing **PRG** then press **SET** to display:

"SEnSIt", press PRG and set load cell sensitivity expressed in mV with 4 decimal points. For load cells with sensitivity 2mV/V, set 2.0000 (for example: for 3 load cell with sensitivity 1.9800mV, 1.9600mV, 1.9900mV, set 1.9766mV).

After setting the value, confirm by pressing **PRG**, the "SEnSIt" message appers, press -0-, "tarat" appears, then press **SET** to display :

*"dIVIS"* (0.0001 to 100) press **PRG** and select the resolution value by using **SET**. Each time resolution is modified the zero-setting and full scale in the memory are calculated automatically. Resolutions that are incompatible with calibration parameters or settings in the memory are not accepted.

After setting the value, confirm by pressing **PRG** then press **SET** for two times to return to the weight display.

The "dIVIS" parameter must be the same for all instruments CSLL-2 connected together.

### On completion of THEORETICAL CALIBRATION proceed as follows :

- **RESET THE TARE** (see paragraph <u>TARE ZERO-SETTING</u>).
- CHECK CALIBRATION (see paragraph INSTRUMENT CALIBRATION CHECK).
- <u>if necessary</u> CORRECT WEIGHT VIA KEYBOARD (see paragraph WEIGHT DISPLAY CORRECTION VIA KEYBOARD).



Press **PRG** followed by **FUN** and keep pressed for 3 seconds to display:

*"ConSt"*, press the SET key to display :

*"CALIbr"*, press **PRG** to display the message *"CAL"* alternated with the weight value, press - 0 - to zero-set the system tare (only for steady weight).

Press  $\underline{SET}$ , the "*000000*" message will show, place a significant amount of products (equal to at least 50% of the maximum quantity to be weighed ), enter the value by using keys  $\underline{SET}$  and  $\underline{FUN}$  to increase or decrease the value and  $\underline{-0}$  to move to the next digit.

After setting the value and checking that no other factors affect the container, press  $\overrightarrow{PRG}$  to confirm and the "*CAL*" message, alternated with the weight, returns on display.

Press **PRG** to return to the main menu, the message "*CALIbr*" will be displayed again, then press **- 0** - to return to the weight displaying.

If the instrument is switched off without exiting the set-up menu, the program settings are not saved.

# SET-POINT PROGRAMMING

Press **PRG** and **SET** at the same time to access set-point programming:

Display	Description
"SEt 1"	Programming set-point output 1. The value programmed in this parameter is compared with the total weight acquired by the instruments CSLL-2
"dEL 1"	Intervention delay in output 1 in tenths of a second
"SEt 2"	Programming set-point output 2
"dEL 2"	Intervention delay in output 2 in tenths of a second
"SEt 3"	Programming set-point output 3
"PoL 3"	Programming intervention polarity of logic output 3 Pess PRG to enter this selection and choose by using SET the positive (POSIT) or negative (NEGAT) intervention.
"dEL 3"	Intervention delay in output 3 in tenths of a second

If the set-point value is = 0, the related output is never activated.

Press - 0 - to exit and save the changes.

The relays are normally energized.

When a set point has been passed, the related relay is de-energized.

All the relays alarm (they de-energize) whenever there are breakages in the cell cable.

# WEIGHT ZERO-SETTING FOR LITTLE CHANGES

This operation is performed to correct small changes away from zero by the instrument. Press -0 - for 3 seconds or close the relevant input to reset zero in the instrument, the gross weight is set to zero. It is possible to repeat the operation several times.

Resetting of the gross weight is not performed in the following conditions:

- Instable weight (the weight is not established within 3 secs. by the reset command).
- Gross weight is greater (positively or negatively) than 200 divisions.

Nothing happens when it is tried to reset more than this.

In case of black-out, the gross weight setting to zero will be lost.

# NET INPUT

By closing the NET logic input it is possible the NET WEIGHT function.

Warning: the set-point thresholds work on gross weight (for example: capacity overhead travelling crane).

In case of black-out, the gross weight setting to zero will not be lost.

# SET-UP MENU

# **KEY FUNCTIONS:**

KEY	FUNCTION
<b>↑</b>	Select the next menu item
$\rightarrow$	Select the previous menu item
$\leftrightarrow$	Exit from submenu item and return to previous item / exit menu.
¥	enter selected menu item

# OVERVIEW OF SET-UP MENU

Press **PRG** and **FUN** at the same time for 3 seconds to access main menu:

DISPLAY	FUNCTION
"CONST"	Theoretical calibration and programming of calibration parameters
"CALIBR"	Tare zero-setting and full scale calibration with sample weight
"PARAM"	Programming of weighing parameters (filter, stabilization; automatic zero-setting).
"SERIA"	Serial output configuration (continuous / from PC, address).

# Submenu "Const":

DISPLAY	FUNCTION
"CAPAC"	Programming the nominal load of load cells (kg)
"SEnSIt"	Programming the load cell sensitivity
"DIVIS"	Selection of the division value

# Submenu "PArAM"

DISPLAY	FUNCTION	
"FILtEr-"	Weight filter parameter (from 0 to 9). 0 = most rapid response, 9 = maximum filter.	(standard 2)
"STABIL"	Weight stabilization factor (from 0 to 4) 0 = very accurate stability, $4 =$ stability accepted rapidly.	(standard 2)
"AUto-0"	Autozero threshold on activation, expressed as a weight value	
"0 TRAC"	Zero-tracking ( 0 to 4) 0 = disabled ; 4=max zero-tracking	(standard 0)

# Submenu "SErIA":

DISPLAY	FUNCTION	
"BAUD"	Baud rate, options available: 2400;9600;19200;38400;57600;115200	( standard 9600 )
"ForMAt"	Data format of serial string	
"n. Str	Select the number of instruments connected.	
"AddrES"	Select the address (A,B,C,D).	

# PROGRAMMING AND SETTINGS (SET-UP MENU)

To access the main menu, press **PRG** and **FUN** simultaneously for 3 seconds, to display:

"ConSt"

This section enables programming of calibration parameters and theoretical calibration

# "CALIbr"

This section enables system tare reset, new calibration with a sample weight, or correction of the display if the instrument displays a value other than the actual weight in the container (see paragraphs: TARE ZERO-SETTING, WEIGHT DISPLAY CORRECTION VIA KEYBOARD, CALIBRATION WITH SAMPLE WEIGHT).

# "PArAM"

Press **PRG** to enter the submenu and display:

"FiLtEr" (Filter to reduce weight oscillations). It is possible to set a value from 0 to 9 (standard: 4).

The digital weight filter may be increased or reduced. In the first case the response of the weight on the display is slowed down, which allows re-absorption of oscillations or vibrations on the weighing system. In the second case a rapid response for weight variations is obtained.

To program the digital filter factor choose one of these values:

Value	Response in frequency
0	5 Hz
1	4 Hz
2	3 Hz
3	2 HZ
4	1 Hz
5	0.8 Hz
6	0.6 Hz
7	0.4 Hz
8	0.2 Hz
9	0.1 Hz

Press  $\leftrightarrow$  to exit.

With the filter = 0 there is minimum intervention of the digital filter. With the filter = 9 there is maximum intervention of the digital filter. To display the value press  $\overline{PRG}$ , to modify it use  $\overline{SET}$  or  $\overline{FUN}$ . Confirm the new value by pressing  $\overline{PRG}$ , then press  $\overline{SET}$ , the following will appear:

"StABIL" (weight stabilization factor). It is possible to set a value between 0 and 4 (standard: 2). Stable weight is shown when the LED on the right of the panel lights up. This condition may be determined with different degrees of accuracy and at different rates of speed. Maximum accuracy is obtained by setting the stability value as 0.

To display the value press  $\overline{PRG}$ , to modify it use  $\overline{SET}$  or  $\overline{FUN}$ . Confirm the new value by pressing  $\overline{PRG}$ , then press  $\overline{SET}$ , the following will appear:

"Auto 0" (autozero threshold). On activation of the instrument, if the weight displayed is lower that the set value in this section, the value is reset

To deactive this function set the parameter to zero.

To set to zero, the weight must be stable: if at switch-on the weight does not stabilize within 3 seconds, the autozero function is not run.

To display the value press  $\underline{PRG}$ , to modify it use  $\underline{SET}$  or  $\underline{FUN}$ . Confirm the new value by pressing  $\underline{PRG}$ , then press  $\underline{SET}$ , the following will appear:

*"O trAC" (zero-tracking ).* To enable the zero-tracking set divisions from 0 to 4. When the balance is empty, the zero-tracking device maintains the zero indication within certain limits automatically; it compensates for slow variations of weight. Corrections made are cancelled when the instrument is switched off, the maximum correction limit is the autozero threshold. To deactive this function set the parameter to zero.

When the scales are empty, the instrument automatically corrects small and slow weight variations (positive or negative) against the scale zero. The maximum correction limits (sum of continuous variations) are -1% and +3% of the useful capacity (if programmed).

Value	Description
0	Zero-tracking function excluded
1	Minimum zero-tracking
2	Medium-level zero-tracking (standard)
3	High level zero-tracking
4	Maximum-level zero-tracking

#### "SErlA"

The instrument is equipped with a RS232 serial port and a RS422/RS485 port. The following setting applies to both serial ports.

Press **PRG** to display :

*"bAud" (baud rate standard: 9600)* press PRG to display the value, then press SET to set the baud rate : *2400 9600 19200 38400 57600 115200.* 

To display the value press  $\overline{PRG}$ , to modify it use  $\overline{SET}$  or  $\overline{FUN}$ . Confirm the new value by pressing  $\overline{PRG}$ , then press  $\overline{SET}$ , the following will appear:

*"ForMAt"* (Format standard: n-8-1) press PRG, set the desired format by using SET (n-8-2 , E-7-1 , E-8-1, o-7-1, o-8-1)

To display the value press **PRG**, to modify it use **SET**. Confirm the new value by pressing **PRG**, then press **SET**, the following will appear:

"n Str" Select the number of instruments connected:

"2" for A + B "3" for A + B + C "4" for A + B + C + D

To display the value press **PRG**, to modify it use **SET**. Confirm the new value by pressing **PRG**, then press **SET**, the following will appear:

*"AddrES" (instrument address).* Set the address of each instrument ( A / B / C / D). The instruments must have different addresses and consecutive starting from the address A

To display the value, press PRG, and to modify use keys SET or FUN. Confirm the new value by pressing PRG, then press -0 to return to the main menu. Press -0 to come back to the weight displaying.

# CONTINUOUS TRANSMISSION PROTOCOL

Communication parameters:

Baud rate: 9600 Data length: 8 bit Bit stop: 1 Parity: none

In this protocol the following string is transmitted:

STX <ID> <NET> <GROSS> ETX <CK> EOT

In which :

STX = start of text ( 02h ASCII) ID = instrument identification ('A' = ASCII 41h or 'B' (ASCII 42h) or 'C' (ASCII 43h) or 'D' (ASCII 42h). NET / GROSS = fields are composed of 6 ASCII characters with values from "0" to "9" (30h and 39h), without spaces or decimal points. In case of negative weight the first character of the field is "-" (2Dh).

EXT = End of text ( 3 ASCII)

CK = 2 ASCII checksum characters calculated considering the characters between STX and EOT excluded. The checksum value is obtained from the calculation of XOR (or exclusive) of the 8-bit ASCII codes of the characters considered. This obtains a character expressed in hexadecimals with two digits that can have the values from "0" to "9" and from "A" to "F". "ck ck" is the ASCII code of the two hexadecimal digits.

EOT = End of transmit (4 ASCII)

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