**PROGRAMMABLE
ELECTRONIC DEVICE**

CE1_AD/P2

**technical specifications
electrical connections
calibration
installation and operating notes**

ver.   1.10.12

CE1_AD/P2: **programmable electronic device for load cells weighing systems**
CE1_AD/P2 collects, processes and displays an analog signal (usually by one or more load cells).
Simple steps from the front keyboard to program the main operating parameters: acquisition and visualization mode, calibration, intervention thresholds ....
RS232 serial interface for data transfer to a remote device (PC or printer)

TECHNICAL SPECIFICATIONS

|	
Power supply	*230 Vac - 50/60 Hz*
Power consumption	*max 6 W*
Power output	*10 VDC; max. 4 load cells 350 Ohm 4-wire*
	12 Vdc, 100 mA max for sensors or control signals
Display	*6 digit, 7-segment red led, h. 14 mm*
A/D converter Resolution	*16 bit (> 60.000 counts)*
Analog input	*0 - 20 mV*
Remote control input	*(NPN or PNP) optically isolated*
Logic output	*Electromechanical relay (on demand)*
Protection class	*IP54*
Serial Interface	*RS-232C (bidirectional)*
Programming	*4-button keyboard scratch resistant polycarbonate*
Calibration	*By keyboard*
Connections	*Removable screw terminal block (p. 5.08 mm)*
Dimension	*DIN 96 X 48 X 130 mm, built-in self-extinguishing material*
Overall depth	*137 mm (including terminal block)*
Operating temperature	-10 - +40 ° C

1 – ELECTRICAL CONNECTIONS

13-pin removable terminal block plug horizontal

TERMINAL NUMBER	CODE	DESCRIPTION
1-2	**230 Vac**	Power supply: 230 Vac, 50/60 Hz
3	**Tx**	**Serial interface RS232**: Transmitter
4	**Rx**	Receiver
5	**Gnd**	Gnd
6	**In1**	Input NPN (not used)
7	**In2**	Input NPN: Enabling Memory Weighing
		When it is closed to '-' (terminal 9), the weight detected is stored and it can be request through serial port once the contact is open again. (the contact closure is signaled showing 'P' letter in the leftmost display)
8	**+**	Power supply output: 12 Vcc, max 100mA
9	**-**	" "
10	**A +**	Power load cells: +
11	**S +**	Signal load cells: +
12	**S -**	Signal load cells: -
13	**A -**	Power load cells: -

load cells connection
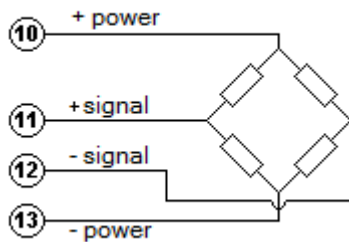
serial interface RS232

PC Conn. 9 p   PC Conn. 25 p
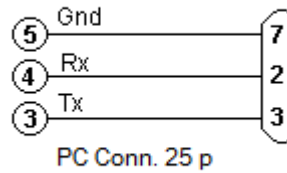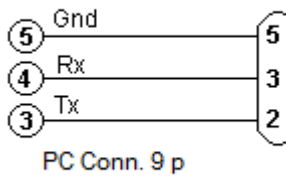
2 – <u>KEYBOARD AND KEYS FUNCTION</u>

Signaling LEDs: **yellow** = programming phase
                 green = stable weight
                 red = calibration phase

2.1 – DESCRIPTION

The keyboard on the front allows you to:
- recall and edit the working parameters during the *programming phase*
- device calibration

It is composed of 4 keys activated by *click*; the function are described below:

a – *Programming phase*

🟥 **Opens and closes the programming of numerical values**

🟩 **Reset the selected digit**

🔽 **Select the digit to be changed**

🔼 **Edit the selected digit by one unit increase**

b – *Calibration and other functions*

🟩 **Zero Detecting: storage TARE**

🔽 **Displaying GROSS WEIGHT**

🔼 **Opening calibration cycle**

2.2 - PROGRAMMING INSTRUCTIONS

The programming phase is signaled by the LED 1 on : YELLOW
The working parameters consists of groups of 4 numeric values the meaning of which is described in the following paragraphs.

To access the programming phase momentarily press the 🟥 key
- the display shows the first group of parameters in the form: < **n   a b c d** >
   where: n = progressive number of parameter's group
          abcd = numeric value
- the flashing digit is the one selected to be modified

- change the selected digit by pressing 🔼 key: the change occurs by one unit increase (from 0 to 9)

- use 🔽 key to select the following digit: for each activation of the key, selection
   takes place from right to left

- use 🟩 key to reset the selected digit

Once you have composed the desired values, press again the 🟥 key to access to the next group until the completion of the sequence: 1 YELLOW LED turns off and the net weight display.

→ to set the value of the sample-weight hold the 🟥 *key pressed for 3 seconds.*

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2.3 - OPERATING PARAMETERS

2.3.1 - Setting 1: sampling mode

1		A	B	C	D

A - <u>band width stability:</u>   - the weight is considered stable (led 2 GREEN on) if more consecutive samples included in an interval of amplitude proportional to < **+/- A** > (see also D parameter)
- settable values: 0….9
- recommended values: **2** - **3**

B – <u>sample acquisition:</u>   - sample acquisition mode
- settable values : 0….6
- usually set the value: **6**

C – <u>samples number detected:</u>   - the weight displayed is the average result of a number of samples proportional to < **C** >
- settable values: 0….6
- recommended values: **4** - **5**

D – <u>stability time:</u>   - the displayed weight is considered stable if the condition detected by the parameter < A > is maintained for a time proportional to < D >
- settable values: 0….5. With higher values corresponds to a weighing longer cycle
- recommended values: **3** - **4**

2.3.2 – Setting 2: baud/rate, decimal point, auto-tare, sampling interval

2		E	F	G	H

E - <u>baud/rate:</u>   - serial interface RS232 baud rate
- **0** -> 1200 baud
  1 -> 2400 "
  2 -> 4800 "
  3 -> 9600 "
- the remaining part of the serial protocol is fixed at **N, 8, 1**

F – <u>decimal number:</u>   - number of digits after the decimal point for the weight display
- settable values: 0….3 (**XXXXXX, XXXXX.X, XXXX.XX, XXX.XXX**)

G – <u>auto-tare:</u>   - if the value of the net weight detected differs from the last stored tare value by an amount proportional to < G >, **zero** is displayed.
- settable values: 0….9 (*0 values disable this function*)
- a set unit is approximately equal to 0.01% of full scale

H - <u>sampling interval:</u> - is a proportional time to the reading of the simple signal (for specific applications)
- usually set to **1**

2.3.3 - Setting 3: sample weight

3		P	P	P	P

< P P P P > represents the sample weight to set in the calibration phase
To this setting you can access automatically during the calibration phase or by holding

the key for at least 3 seconds.

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3 – CALIBRATION - WEIGHT FEATURES

3.1 - Calibration

The proper functioning of the device requires an accurate calibration operation, to run through the following steps:

1 - Set the parameters that fix the operating modes
   Whenever you change these parameters, you should run a new calibration.

2 - Make sure there is only the weighing support on the load cells then press the
   ▲ key for at least 3 seconds then release.
   The RED LED 3 lights on (shows the calibration phase)

3 - When the displayed value is stable (led 2 GREEN on) press the ■ key.
   Start a cycle of *acquisition and storage* of the **tare** system.
   On the leftmost digit of the display appears the character < **t** >
   Wait for < **t** > disappears and the display shows <**0 0 0 0**> stably

4 - Put a known value sample weight on the weighing support.
   Wait until the displayed value is stable.

5 - Press again the ▲ key:
   The display shows: < **3**   P P P P >
   The device is ready for setting the sample weight.

6 - Following the procedures described above, set the value of the sample weight.

7 - Press the ■ key to close the calibration phase and store the measured values and settings.

8 - The display shows the *net weight* detected.

3.2 - Function usually displayed

Once carried out an accurate calibration and after every start, the function usually displayed is *net weight detected*.

3.3 - TARE detection and storage

Every time you request, you can detect and restore the Tare System

activating the operation by pressing the ■ key
On the leftmost digit of the display appears the character < t >
Wait to < t > disappears and the display shows < **0 0 0 0** > stably.

3.4 – GROSS WEIGHT

Press the ▼ key: on the leftmost digit of the display appear the character < **L** > and the total weight on the load cells.

Press the ▼ key again to end the function.
This function is not available during programming or calibration phase.

4 – RS232 SERIAL COMMUNICATION

4.1 - Overview

The device has **RS232 serial interface** which allows the data exchange with a Personal Computer (or other compatible device).
Especially, on request by the Personal Computer, CE1 *sends the displayed* *net weight.*
Communication protocol: **baud rate**.(see E parameter, setting 2)
N, 8, 1
The data exchange takes place via **strings,** whose general structure is:

a –Request from the PC
< **start string**> + < **command** > + < **end string** > or only < **command** >

b – Answer by CE1…
< start string > + < **command** > + < **data string** > + < **control char.** > + < **end string** >

- **start string** hexadecimal character **2** Hex = **2** decimal (**stx**)
- **command** ASCII alphabetic character
- **data string** 5 numeric ASCII characters
- **control char.** the EX-OR of the data string characters (**LRC**)
- **end string** hexadecimal character **0D** Hex **= 13** decimal (**cr**)

*The **data string** contains the 5 least significant digits of the net weight*

4.2 - Request NET WEIGHT

The PC sends the request of 3 characters:
< **stx, P, cr** >
or 1 character:
< **P** >
The selection of the number of characters by CE1 occurs automatically

CE1 replies with 9 characters string:
< **stx**, **P**, **p0**, **p1**, **p2**, **p3**, **p4**, **LRC**, **cr** >
where p0….p4 are the 5 least significant digits net weight displayed

4.3 - Request STABLE NET WEIGHT

The PC sends the request of 3 characters:
< **stx**, **S**, **cr** >
or 1 character:
< **S** >
The selection of the number of characters by CE1 occurs automatically

When the detected weight becomes stable, CE1 sends a 9 characters string:
< **stx**, **P**, **s0**, **s1**, **s2**, **s3**, **s4**, **LRC**, **cr** >
where p0….p4 are the 5 least significant digits net weight displayed

4.4 - Request STORED NET WEIGHT

The Net Weight Stored is the one detected while closing the input In1 (terminal 7)
The PC sends the request of 3 characters: < **stx, p, cr** > (**p** lowercase)
or 1 character: < **p** > " "
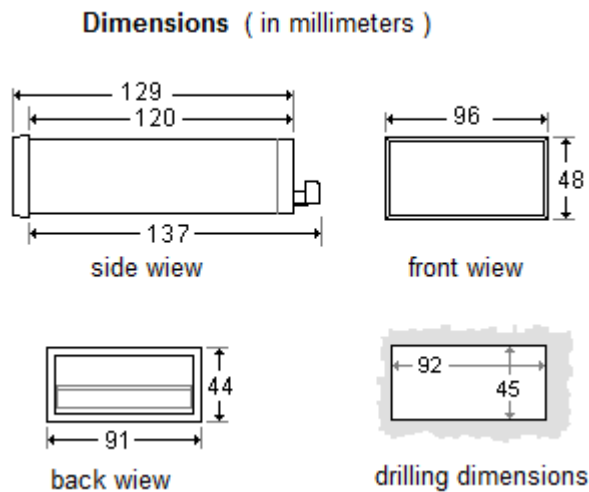The selection of the number of characters by CE1 occurs automatically

CE1 replies with a 9 characters string:
< **stx**, **p**, **p0**, **p1**, **p2**, **p3**, **p4**, **LRC**, **cr** >
where p0….p4 are the 5 least significant digits weight displayed

5 - DIMENSIONS

Dimensions (in millimeters)

side wiew

front wiew

back wiew

drilling dimensions

6 - OPERATING CONDITIONS

This device is built in accordance with the European Directive on EMC (89/336) with regard to arrangements on Electromagnetic Compatibility contained in EN 50081-2 and EN 50082-2.

PLEASE NOTE: the various devices installation in a system does not imply the system is automatically in accordance to the norms; the designer has to ensure the system is consistent with current regulations.

The device efficiency is achieved by connecting external components (transducers, control signals, ..),the user is responsible for the installation.

It is therefore recommended:
- install the device, the transducers, the control connection and the power supply away from power circuits, transformers, power switch, inverters, and all devices that do not comply with regulations in relating to electromagnetic compatibility
- carry out wiring with cables as short as possible, and shielded in separate housings especially for the connection of transducers and of the serial line RS232

S.C.D. sas disclaims any liability for damage caused by, even partially, the specifications here reported or by any inaccuracies or interpretation. *S.C.D.* reserve the right to change, without notice, in whole or in part, the characteristics of this device and the documentation that illustrates the specifications.

Warranty: This equipment is guaranteed for 12 months from the delivery date about the manufacturing defects or defects in the components used. The warranty is void if the unit is tempered without permission or if they are not comply with the installation instructions.

Summary