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NICOL SCALES & MEASUREMENT IS AN ISO ACCREDITED CALIBRATION COMPANY THAT HAS PROVIDED CALIBRATION, REPAIR AND SALES OF ALL TYPES OF WEIGHING AND MEASUREMENT PRODUCTS SINCE 1931.

SCT-4X-PROFINET

Quick Start Guide

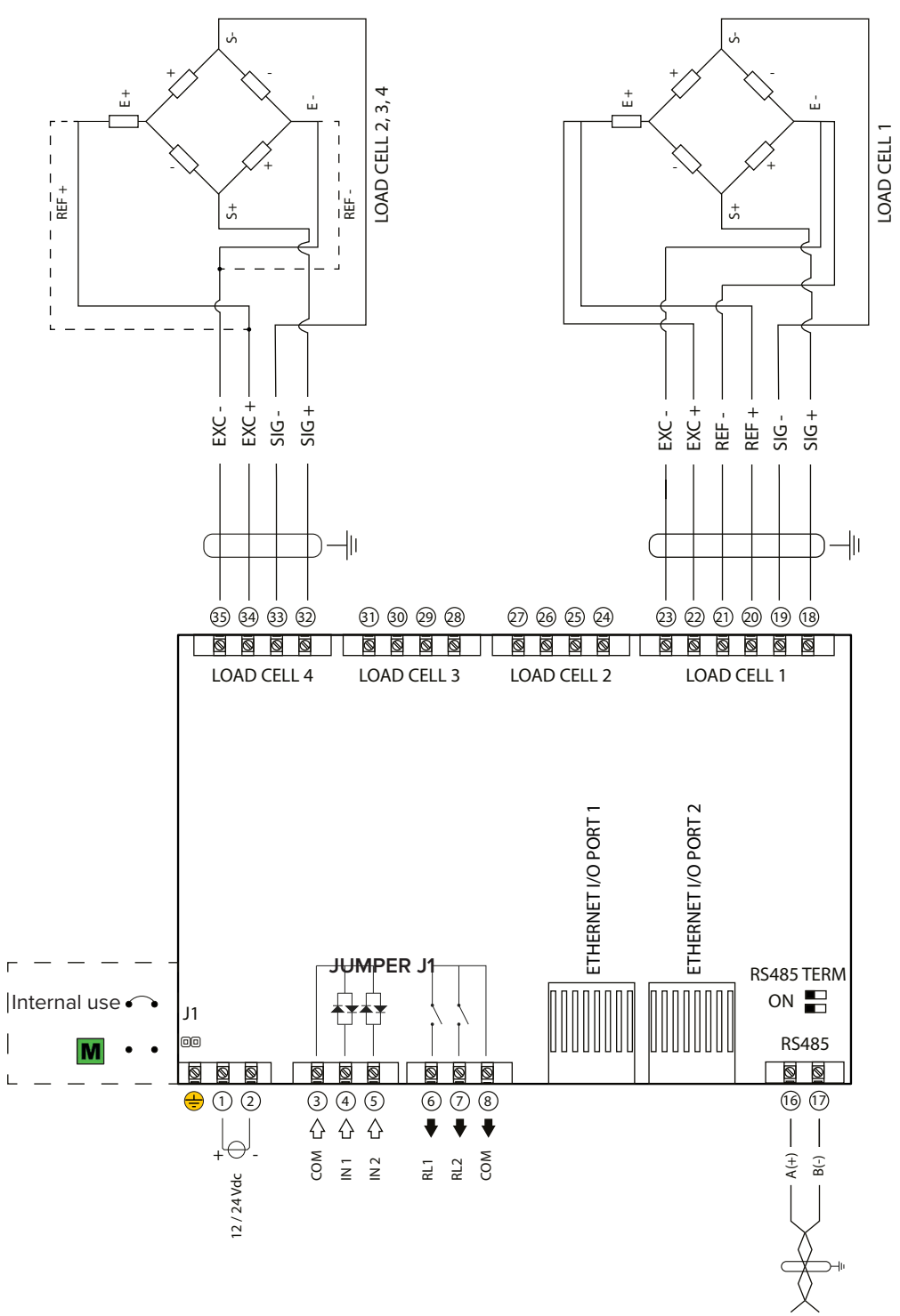


RICE LAKE®
WEIGHING SYSTEMS

May 25, 2023

PN 219721 Rev A

1. Electrical Schematic



In LOAD CELL 2, 3, 4 connect:
SEN + to EXC +
SEN - to EXC -

The single SENSE circuit compensates all 4 load cells.

Load cells excitation: 5 V.
Load cells output: 6 mV/V max.

For UL approved models: equipment to be powered by 12 to 24 Vdc LPS or Class 2 power source.

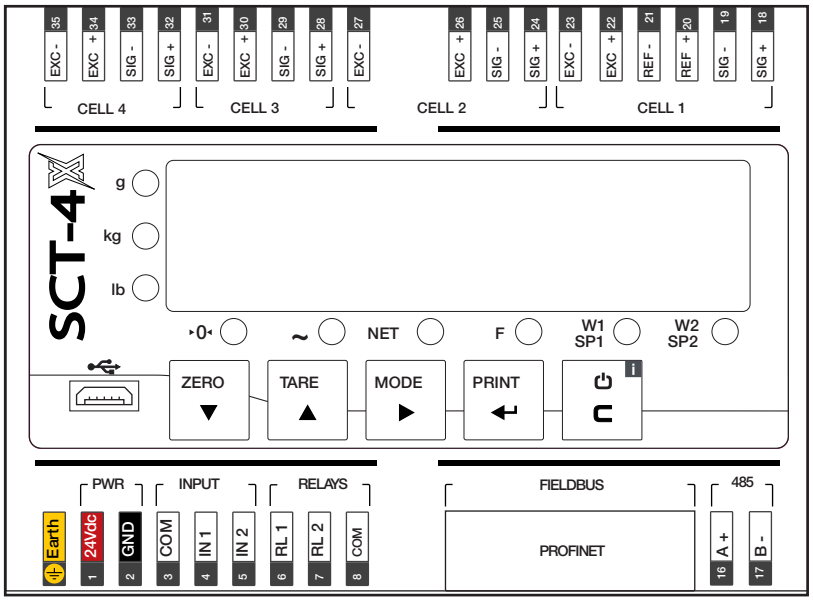
CONSUMPTION:
4.5 W max.

INPUT: 12 to 48 Vdc

OUTPUT: 48Vac or 60Vdc, 0.5 A max

Manuals are available from Rice Lake Weighing Systems at www.ricelake.com/manuals
Warranty information is available at www.ricelake.com/warranties

2. Key Functions



Configuration menu	
▼	Decreases digit / Scrolls down.
▲	Increases digit / Scrolls up.
▶	Enters the setup. Selects digit to modify.
↵	Enters a step / Confirms.
C	Clears / Exits a step (no save).

Weighing mode	
▼	Clears the displayed gross weight.
▲	Short press: executes semiautomatic tare. Long press: allows to enter known tare.
▶	Long press: switches between scales (only in Mode 2 “ ind.Ch”).
↵	Short press: executes data transmission on the printer serial port. Long press: Setpoint configuration.
C	ON/Standby of the instrument.

3. Indicator Light Descriptions

0	Weight on zero.
~	Unstable weight.
NET	A tare is active.
F	A function is active.
W1 SP1	Digital output 1 is active.
W2 SP2	Digital output 2 is active.

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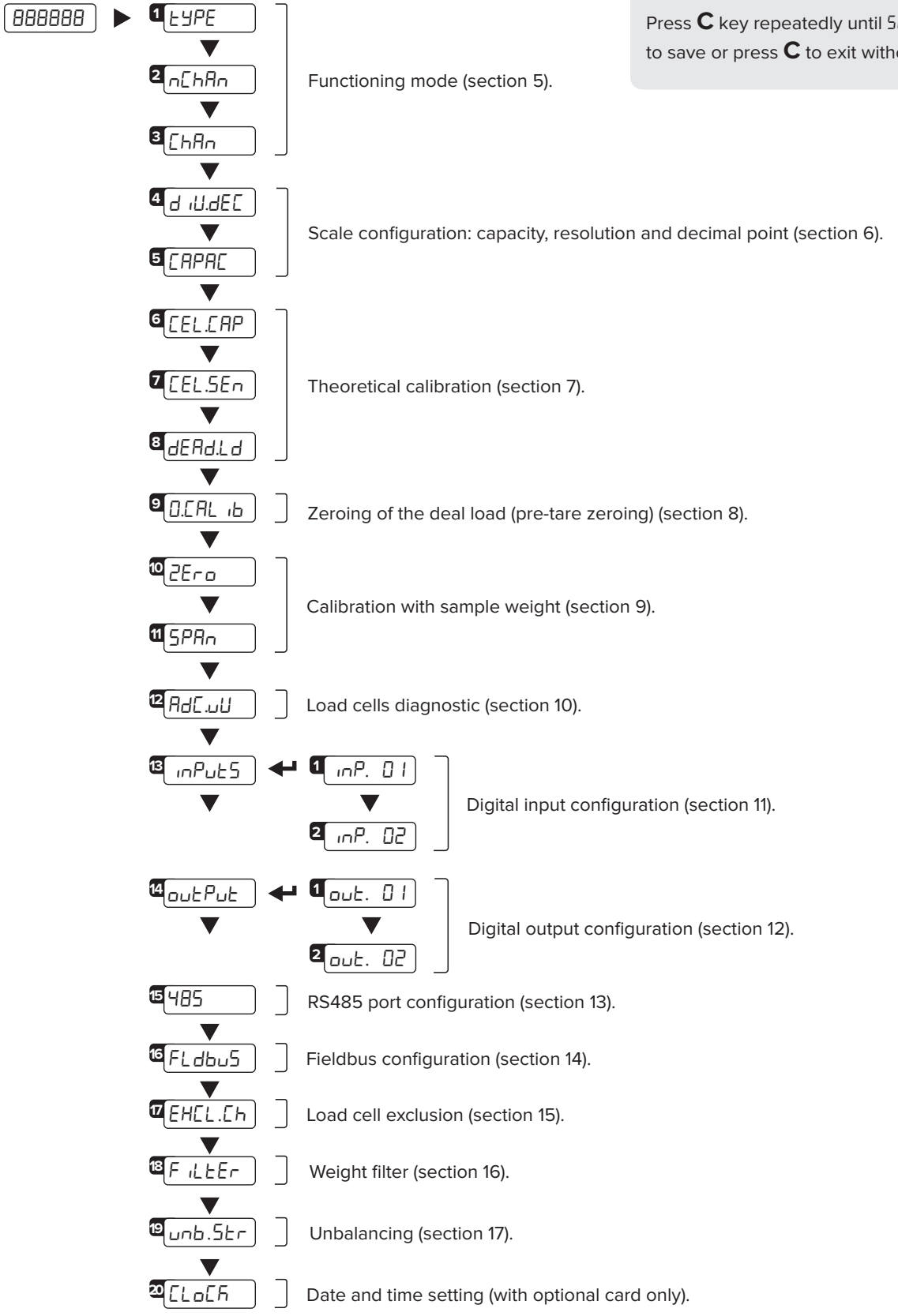
4. Configuration Menu

1. Reboot the weight transmitter

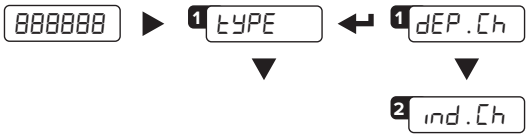
2. Press the ▶ key when display shows the 888888 message:

HOW TO EXIT THE MENU AND SAVE YOUR CONFIGURATION

Press **C** key repeatedly until SAVE? appears; press ↵ to save or press **C** to exit without saving.



5. Function Mode



Digital equalization box mode.

Multi-scale mode.

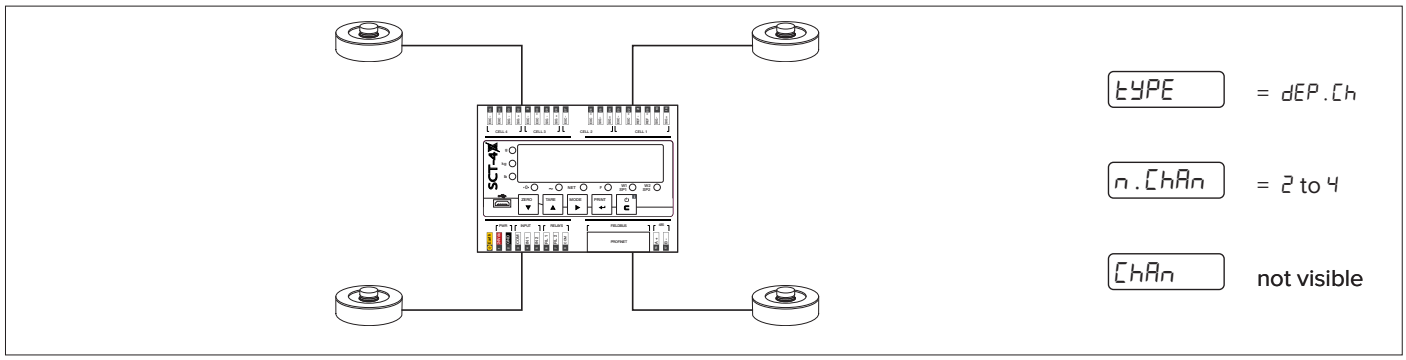


Set the number of active channels.

Select the channel to be programmed (for ind.Ch mode only).

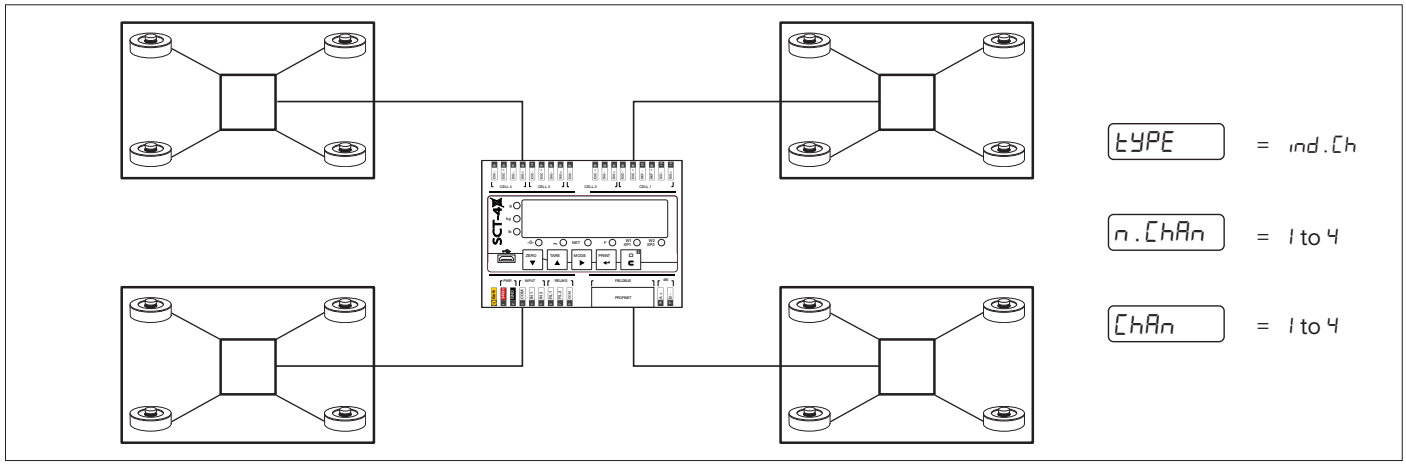
MODE 1 "DEP.CH"

Allows to connect directly the load cells, equalize them (if necessary) and transmit each load cell data and the total weight through Fieldbus.



MODE 2 "IND.CH"

Allows to manage up to 4 independent scales and transmit all data of each scale through Fieldbus.



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6. Maximum Scale Capacity, Increment and Decimal Point Settings

888888 ▶ ...

▼

4 d iU.dEC — Set the decimal point position and the minimum scale increment*1
(0.001 - 0.002 - 0.005 - 0.01 - 0.02 - 0.05 - 0.1 - 0.2 - 0.5 - 1 - 2 - 5 - 10 - 20 - 50).

▼

5 CAPAC — Set the maximum scale capacity*2 *(max 999999).*

Examples:

For a 60000 lb scale, with 2 lb increment:
d iU.dEC = 2
CAPAC = 60000

For a 10000 g scale, with 0.1 g increment:
d iU.dEC = 0.1
CAPAC = 10000.0

For a 3000 lb scale, with 0.05 lb increment:
d iU.dEC = 0.05
CAPAC = 3000.00

*1 *Increment = the amount that the scale will increment by as weight is added or removed.*
*2 *Maximum capacity = the maximum weight that can be measured using the scale you are creating.*

7. Theoretical Calibration

888888 ▶ ...

▼

6 CEL.CAP — Set the total load cells capacity *(up to 999999).*

▼

7 CEL.SEn — Set the load cells sensitivity *(up to 999999).* ✱

▼

8 dEAd.Ld — Dead load weight *(from -9999.9 to 99999.9).*

1. Set d iU.dEC and CAPAC (section 4).

2. Set in CEL.CAP the total load cells capacity *(sum of the nominal load cell capacities).*

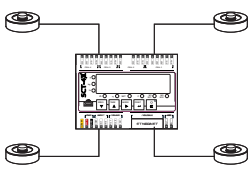
3. Set in CEL.SEn the theoretical signal value of the load cells. ✱

4. Enter in dEAd.Ld step. The display shows the theoretical dead load value. Modify the value and/or confirm with ↵.

5. Save calibration (Press **C** key many times until SAVE? message will appear, then press ↵ to confirm).

✱

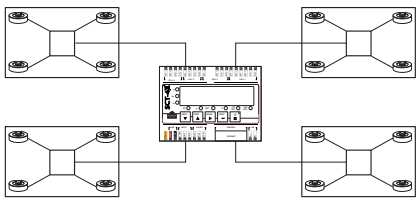
MODE 1 "DEP.CH"



Insert in CEL.SEn parameter, the load cells sensitivity sum value:

(mV/V cell1) + (mV/V cell2) + (mV/V cell3) + (mV/V cell4)

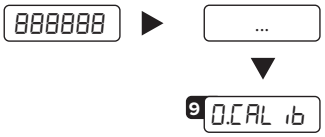
MODE 2 "IND.CH"



For each scale to calibrate, insert in CEL.SEn parameter the average sensitivity value of the load cells:

$$\frac{(\text{mV/V cell1}) + (\text{mV/V cell2}) + \ldots + (\text{mV/V cell}n)}{n}$$

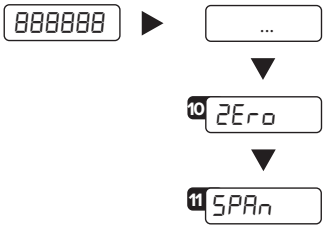
8. Zeroing Mechanic Tare (pre-tare zeroing)



Zeroing of the pre-tare (or mechanical tare).

This functionality allows to zero the weigh of the scale structure (e.g. empty silo, conveyor, etc.) without changing the calibration in memory.

9. Calibration with Sample Weight



Zero point acquisition.

Sample weight acquisition.

1. Unload the scale.

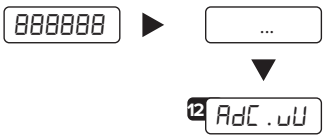
2. Enter the 2Ero step to adjust the zero point.

3. Load the scale with span weight.

4. Enter the SPAn step, type the span weight value and press ↵ to adjust.

5. Save adjustment (Press **C** key many times until SAVE? message will appear, then press ↵ to confirm).

10.Load Cell Diagnostics (µV/V)

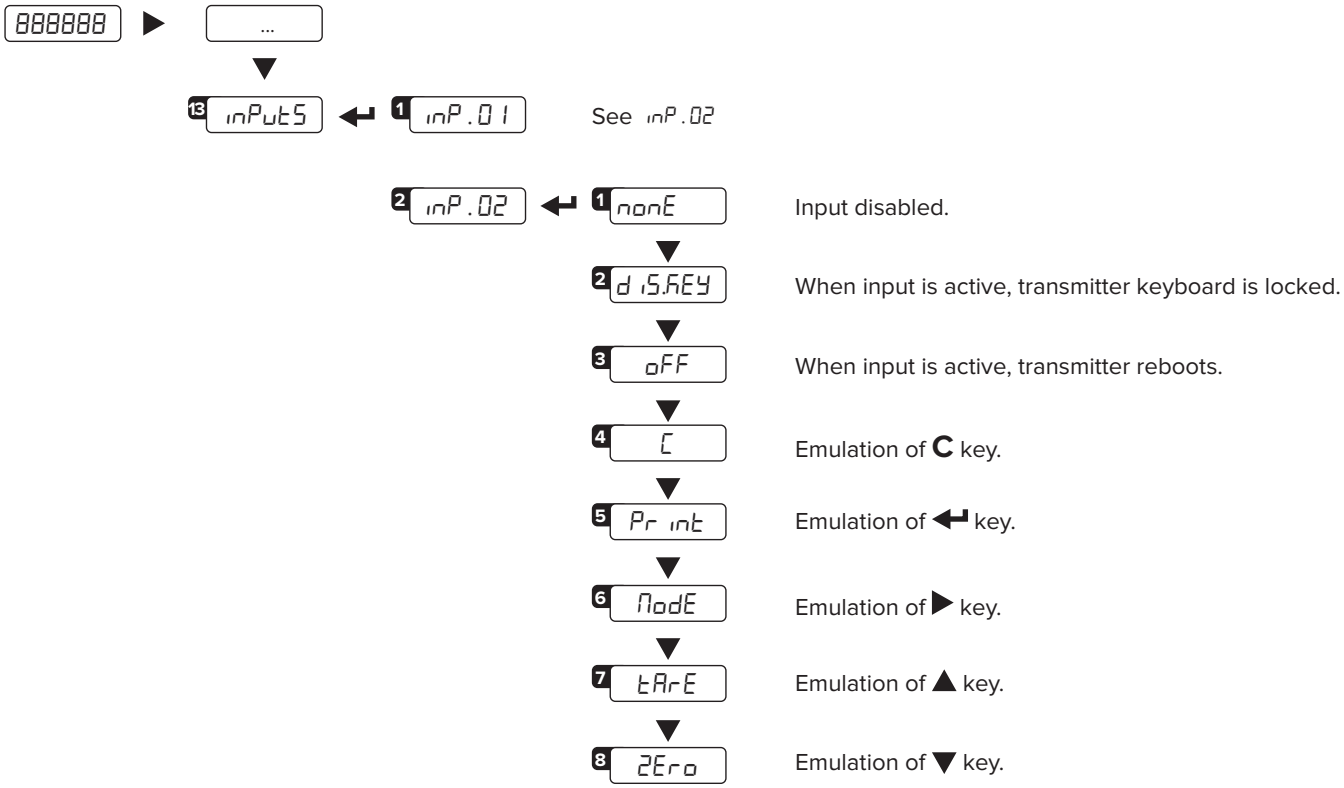


It allows to verify signal of each channel. It must be included into the range 0 to 3 mV/V. Signal have to be stable and it have to increase by increasing the weight on the scale.

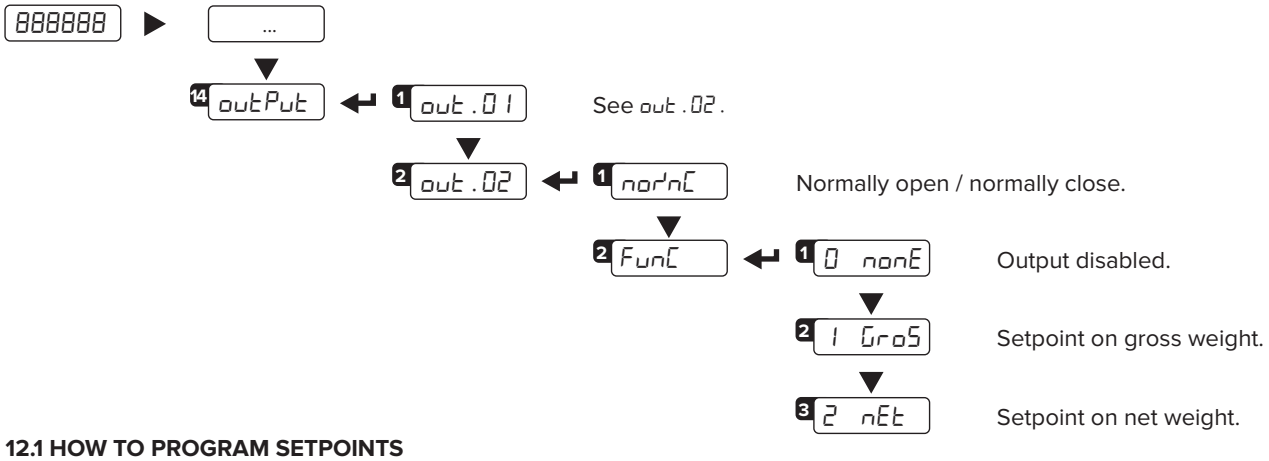
i With more channels connected, it's possible to scroll between channels with keys ▼ and ▲.

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11. Inputs Settings



12. Outputs Settings



12.1 HOW TO PROGRAM SETPOINTS

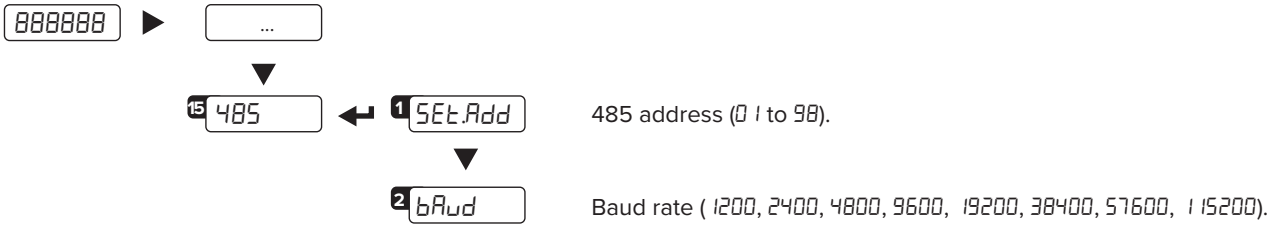
1. In weighing mode, press ↵ for 3 second.

2. Select the setpoint to modify:

- 5.1 on — Set the output 1 setpoint value.
- 5.2 on ↵ — Set the output 2 setpoint value.

3. Press **C** key to save and exit the menu.

13. RS485 Port

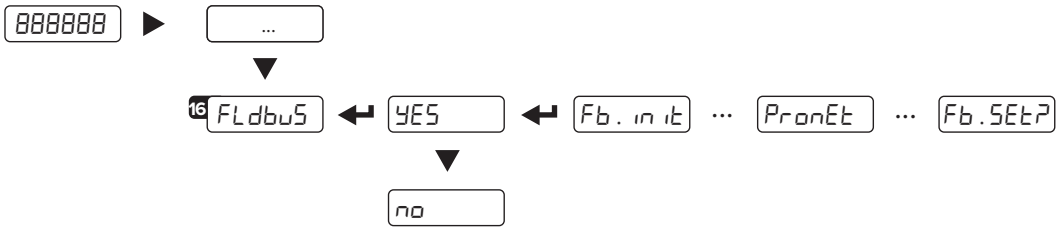


485 address (*0 1* to *98*).

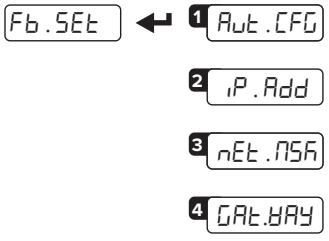
Baud rate (*1200*, *2400*, *4800*, *9600*, *19200*, *38400*, *57600*, *1 15200*).

i The RS485 port is configured by default to communicate in Modbus RTU.

14. Fieldbus Settings



Set the IP address:



Dynamic IP address.

Static IP address.

Subnet mask.

Default gateway.

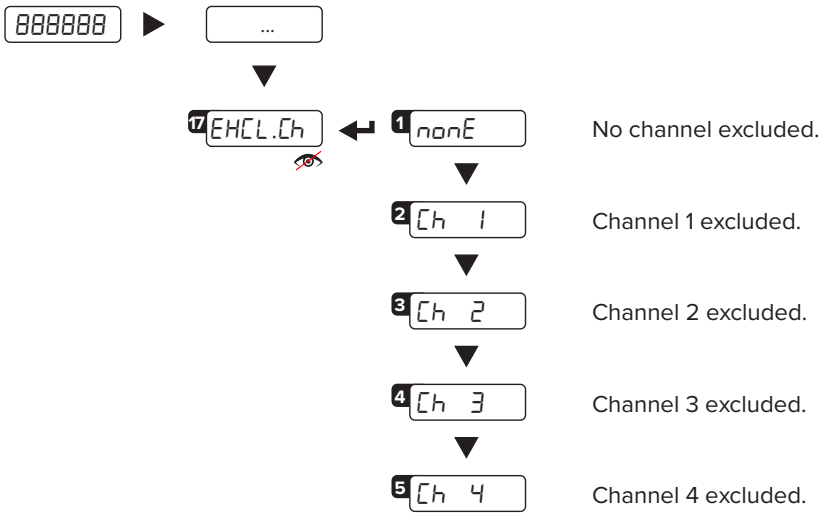
i The name of the Profinet node to use in the project linked to the network master node is provided by **dini-<IP4>**, <IP4> being the last Byte of the IP address incorporated in the device configuration, also when dynamic IP is used. Ex. IP - 192.168.1.10, the node name will be **dini-010**.

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15. Load Cell Exclusion (for dependent channel systems)

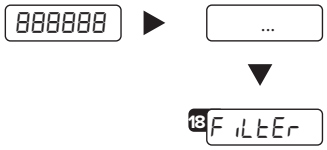
If a load cell is broken, it's possible to temporarily exclude the channel where it is connected and continue to weigh, pending replacement.

⚠ **WARNING:** this operation reduces the accuracy of the weighing system. We recommend use for liquid weighing or in applications where the load is evenly distributed.



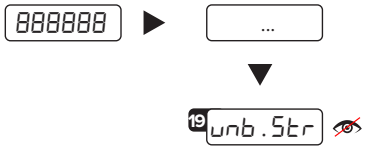
Visible only in dEP.Ch mode.

16. Weight filter



The active weight filter is displayed, alternating with the weight value.
Press ▲ and ▼ keys to scroll through the available filters (from slowest to fastest, F1 to F10).

17. Unbalancing

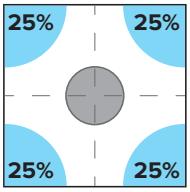


Visible only in dEP.Ch mode.

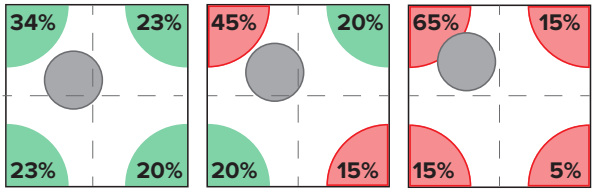
The instrument has an active unbalance function as standard that signals if the load is unevenly distributed, compared to the condition saved via step Str.unb.

Imbalance occurs when the load distribution percentage value on a cell deviates by at least 10% for more than 3 seconds.

Example:



Condition saved



The unbalance condition is signaled via Modbus / Fieldbus or a digital output (refer to the complete manual to set the output).

i

This function is only available if EHCL .Ch = nonE.
Use this function only in systems where the load is evenly distributed.

18.Programming Errors

MESSAGE	DESCRIPTION	SOLUTION
PrEC.	Calibration error	First calibrate the zero point (ZEro), then proceed with sample weight acquisition (SPAn) (section 9).
Err.Pnt	Calibration error	Check the connection of the load cell. Verify the load cell signal is stable, valid and greater than the previously acquired point.
Er 11	Calibration error	Increase the calibration weight.
Er 12	Calibration error	Check the signal from the load cell increases when weight is incremented on the scale.
Er 37	Calibration error	Repeat calibration and verify capacity and division have been correctly set.
Er 39	Instrument not configured	Transmitter needs to be configurated.
C.Er.36	Calibration error	Verify the signal from the load cell is not negative.
C.Er.37	Calibration error	Verify the signal from the load cell is not negative.
Err.Not	Weight unstable	Check in AdC .dU parameter that the signal is stable. If the connection of the cells is with 4 wires, check that the sense jumpers are inserted.
AdC .Err	A/D converter error	Converter failure. Reboot the instrument.
CEL .Err	Global load cell error	Signal anomaly: check the load cells connection.
Er .CEL . 1 ... Er .CEL .4	Load cell error	Signal anomaly: check the indicated load cell connection.

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19. Profinet

19.1 PROFINET REGISTERS - dEP.Ch / ind.ch (1 SCALE)

Data	Byte	DESCRIPTION
Gross weight	0 (MSB)	Bytes 1, 2, 3 and 4 contain the Gross Weight value.
	1	
	2	
	3 (LSB)	
Net weight	4 (MSB)	Bytes 5, 6, 7 and 8 contain the Net Weight value.
	5	
	6	
	7 (LSB)	
Input status register	8 (MSB)	Bit 15 (msb) Active channel. Bit 14 Active channel. Bit 13 No function. Bit 12 No function. Bit 11 No function. Bit 10 No function. Bit 9 Status of input n. 2. Bit 8 (lsb) Status of input n. 1.
	9 (LSB)	Bit 7 (msb) 1 = Scale unloaded (gross weight = 0). Bit 6 Tare PT (1 = PT tare is active). Bit 5 Tare (1 = Tare is active). Bit 4 Overload condition (0 = No; 1 = Overload). Bit 3 Underload condition (0 = No; 1 = Underload). Bit 2 Weight Stability (0 = Unstable; 1 = Stable). Bit 1 Gross Weight Polarity (0 = "+"; 1 = "-"). Bit 0 (lsb) Net Weight Polarity (0 = "+"; 1 = "-").
Command status register	10 (MSB)	Last received command.
	11 (LSB)	Bit 7 (msb) Last command result. Bit 6 Last command result. Bit 5 Last command result. Bit 4 Last command result. Bit 3 Counting of processed commands. Bit 2 Counting of processed commands. Bit 1 Counting of processed commands. Bit 0 (lsb) Counting of processed commands.
Output status register	12 (MSB)	No Function.
	13 (LSB)	Bit 7 (msb) No function. ... ... Bit 2 No function. Bit 1 Digital output 2 status (0 = OFF; 1 = ON). Bit 0 (lsb) Digital output 1 status (0 = OFF; 1 = ON).
Selected page	14 (MSB)	Shows the value of the selected page (3001).
	15 (LSB)	
µV Channel 1	16 (MSB)	Bytes 16 and 17 contain the µV value of the channel 1.
	17 (LSB)	
µV Channel 2	18 (MSB)	Bytes 18 and 19 contain the µV value of the channel 2.
	19 (LSB)	
µV Channel 3	20 (MSB)	Bytes 20 and 21 contain the µV value of the channel 3.
	21 (LSB)	
µV Channel 4	22 (MSB)	Bytes 22 and 23 contain the µV value of the channel 4.
	23 (LSB)	

Bit 15	Bit 14	Active Channel
0	0	Channel 1
0	1	Channel 2
1	0	Channel 3
1	1	Channel 4

19.2 PROFINET REGISTERS - ind.ch (4 SCALES)

<table>
<tr><th>Data</th><th>Byte</th><th colspan="2">DESCRIPTION</th></tr>
<tr><td rowspan="2">Status register scale 1</td><td>0 (MSB)</td><td>Bit 15 (msb)
Bit 14
Bit 13
Bit 12
Bit 11
Bit 10
Bit 9
Bit 8 (lsb)</td><td>Not used.
Not used.
Not used.
Scale active (0 = “no”; 1 = “yes”).
Decimals (00 = 0; 01 = 1; 10 = 2; 11 = 3)

Unit of Measure (00 = “g”; 01 = “kg”; 10 = “t”; 11 = “lb”).</td></tr>
<tr><td>1 (LSB)</td><td>Bit 7 (msb)
Bit 6
Bit 5
Bit 4
Bit 3
Bit 2
Bit 1
Bit 0 (lsb)</td><td>Tare PT (1 = PT tare is active).
Tare (1 = Tare is active).
Net Weight Polarity (0 = “+”; 1 = “-”).
1 = Scale unloaded (gross weight = 0).
Overload condition (0 = No; 1 = overload).
Underload condition (0 = No; 1 = underload).
Stability (0 = “unstable”; 1 = “stable”).
Gross Weight Polarity (0 = “+”; 1= “-”).</td></tr>
<tr><td rowspan="2">Status register scale 2</td><td>2 (MSB)</td><td colspan="2" rowspan="2">Same as Status register scale 1.</td></tr>
<tr><td>3 (LSB)</td></tr>
<tr><td rowspan="2">Status register scale 3</td><td>4 (MSB)</td><td colspan="2" rowspan="2">Same as Status register scale 1.</td></tr>
<tr><td>5 (LSB)</td></tr>
<tr><td rowspan="2">Status register scale 4</td><td>6 (MSB)</td><td colspan="2" rowspan="2">Same as Status register scale 1.</td></tr>
<tr><td>7 (LSB)</td></tr>
<tr><td rowspan="2">Input status register</td><td>8 (MSB)</td><td>Bit 15 (msb)
Bit 14
Bit 13
Bit 12
Bit 11
Bit 10
Bit 9
Bit 8 (lsb)</td><td>Active channel.
Active channel.
No function.
No function.
No function.
No function.
Status of input n. 2.
Status of input n. 1.

<table><tr><th>Bit 15</th><th>Bit 14</th><th>Active Channel</th></tr><tr><td>0</td><td>0</td><td>Channel 1</td></tr><tr><td>0</td><td>1</td><td>Channel 2</td></tr><tr><td>1</td><td>0</td><td>Channel 3</td></tr><tr><td>1</td><td>1</td><td>Channel 4</td></tr></table></td></tr>
<tr><td>9 (LSB)</td><td colspan="2">No function.</td></tr>
<tr><td rowspan="2">Command status register</td><td>10</td><td colspan="2" rowspan="2">Same as Command status register page 10.</td></tr>
<tr><td>11 (LSB)</td></tr>
<tr><td rowspan="2">Output status register</td><td>12 (MSB)</td><td colspan="2" rowspan="2">Same as Output status register page 10.</td></tr>
<tr><td>13</td></tr>
<tr><td rowspan="2">Selected page</td><td>14</td><td colspan="2" rowspan="2">Shows the value of the selected page (2000).</td></tr>
<tr><td>15 (LSB)</td></tr>
<tr><td rowspan="4">Gross weight scales 1, 2, 3 and 4</td><td>16, 20, 24, 28 (MSB)</td><td colspan="2" rowspan="4">Bytes 16, 17, 18 and 19 contain the Gross Weight of scale 1.
Bytes 20, 21, 22 and 23 contain the Gross Weight of scale 2.
Bytes 24, 25, 26 and 27 contain the Gross Weight of scale 3.
Bytes 28, 29, 30 and 31 contain the Gross Weight of scale 4.</td></tr>
<tr><td>17, 20, 24, 29</td></tr>
<tr><td>18, 22, 26, 30</td></tr>
<tr><td>19, 23, 27, 31 (LSB)</td></tr>
</table>

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19.3 PROFINET REGISTERS FOR COMMAND SENDING

<table>
<tr><th>Data</th><th>Byte</th><th>DESCRIPTION</th></tr>
<tr><td>Not used</td><td>0</td><td>Always 0.</td></tr>
<tr><td>Command</td><td>1</td><td>Main available commands:
<table>
<tr><th>Value</th><th>Command</th></tr>
<tr><td>00 Hex</td><td>No command</td></tr>
<tr><td>01 Hex</td><td>Scale zeroing</td></tr>
<tr><td>02 Hex</td><td>Tare</td></tr>
<tr><td>03 Hex</td><td>Preset Tare</td></tr>
<tr><td>0A Hex</td><td>Setpoint 1 setting</td></tr>
<tr><td>0B Hex</td><td>Setpoint 2 setting</td></tr>
<tr><td>19 Hex</td><td>Digital output setting</td></tr>
<tr><td>22 Hex</td><td>Reboot the weight transmitter</td></tr>
</table></td></tr>
<tr><td rowspan="4">Parameter 1</td><td>2 (MSB)</td><td rowspan="4">First parameter of the command.
Parameter is always expressed in absolute mode (no decimals, no sign).</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td></tr>
<tr><td>5 (LSB)</td></tr>
<tr><td rowspan="4">Parameter 2</td><td>6 (MSB)</td><td rowspan="4">Second parameter of the command.
Parameter is always expressed in absolute mode (no decimals, no sign).</td></tr>
<tr><td>7</td></tr>
<tr><td>8</td></tr>
<tr><td>9 (LSB)</td></tr>
<tr><td rowspan="3"></td><td>10 (MSB)</td><td rowspan="3">Used in advanced configuration, refer to the complete Fieldbus manual for further information.</td></tr>
<tr><td>...</td></tr>
<tr><td>31 (LSB)</td></tr>
</table>

EXAMPLE 1

For zeroing the weight on the scale:

2. Set the command in byte 2

Byte	Value
1	00 Hex
2	01 Hex

EXAMPLE 2

For setting a preset tare of 1000 lb:

1. Set the tare value in parameter 1 (byte 3, 4, 5, 6)
2. Set the command in byte 2

Byte	Value
1	00 Hex
2	03 Hex
3 (MSB)	00 Hex
4	00 Hex
5	03 Hex
6 (LSB)	E8 Hex

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WEIGHING SYSTEMS

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