SCT-4X-AN

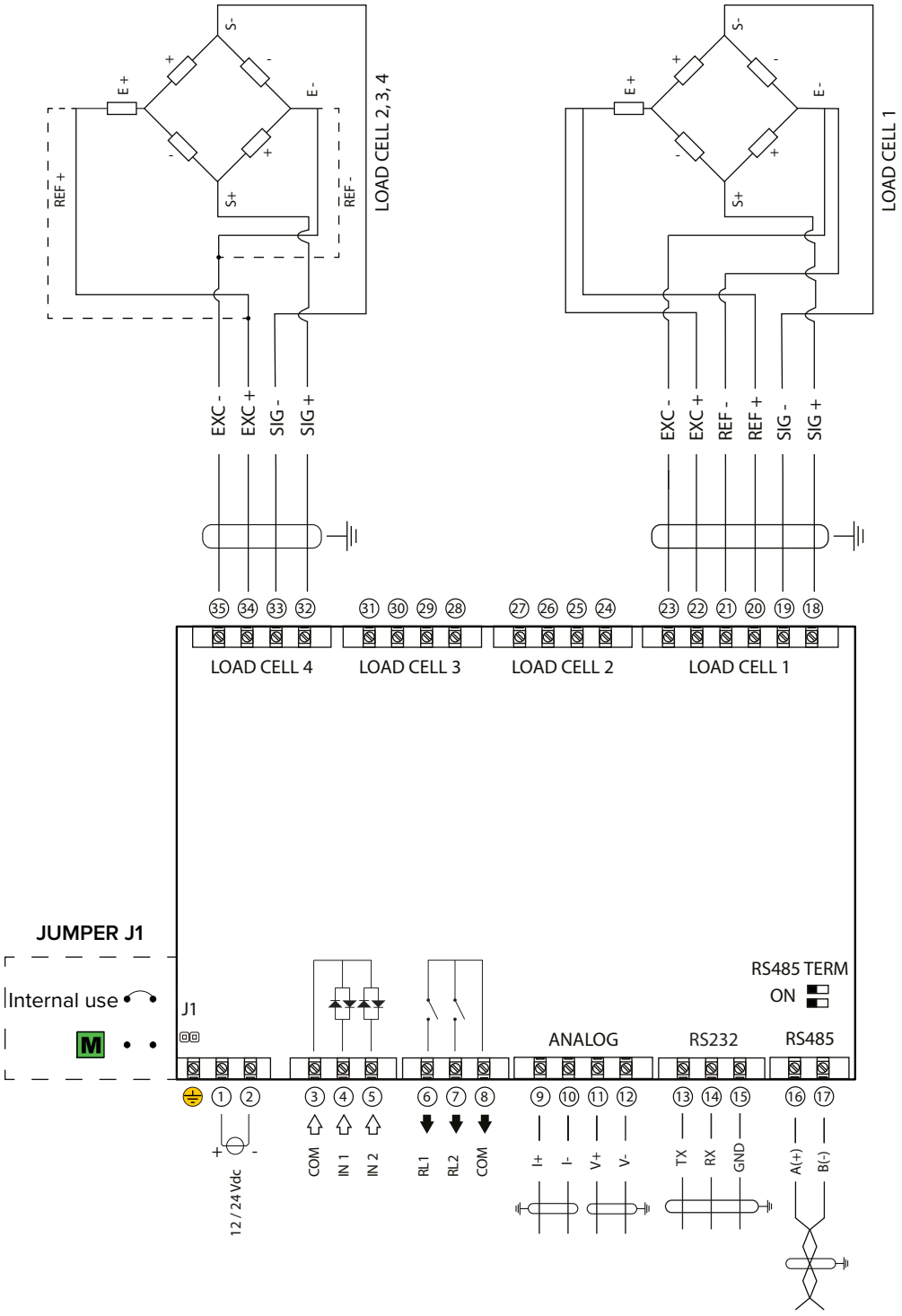
Quick Start Guide

RICE LAKE®
WEIGHING SYSTEMS

May 25, 2023

PN 219722 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

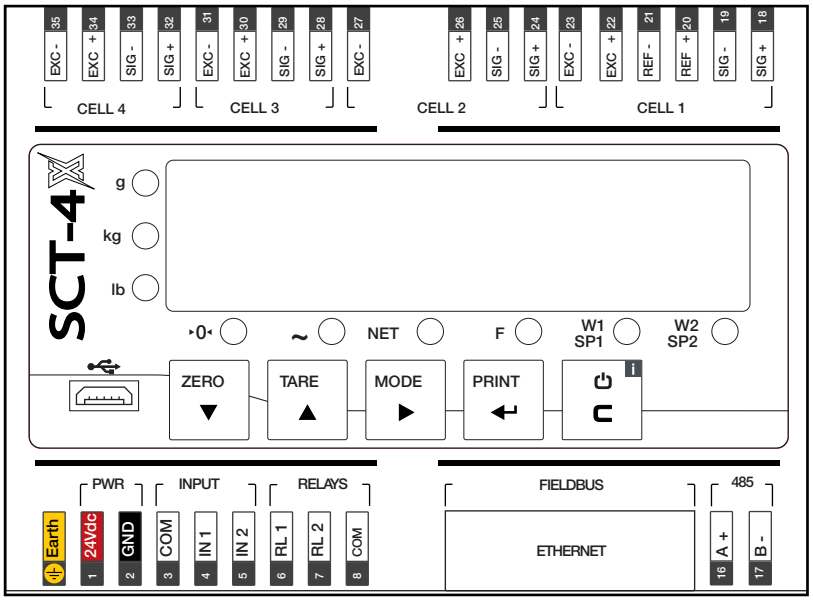
OUTPUT: 48Vac or 60Vdc, 0.5 A max

Max resistance on current analog output: 300 Ω

Min resistance on voltage analog output: 1 kΩ

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

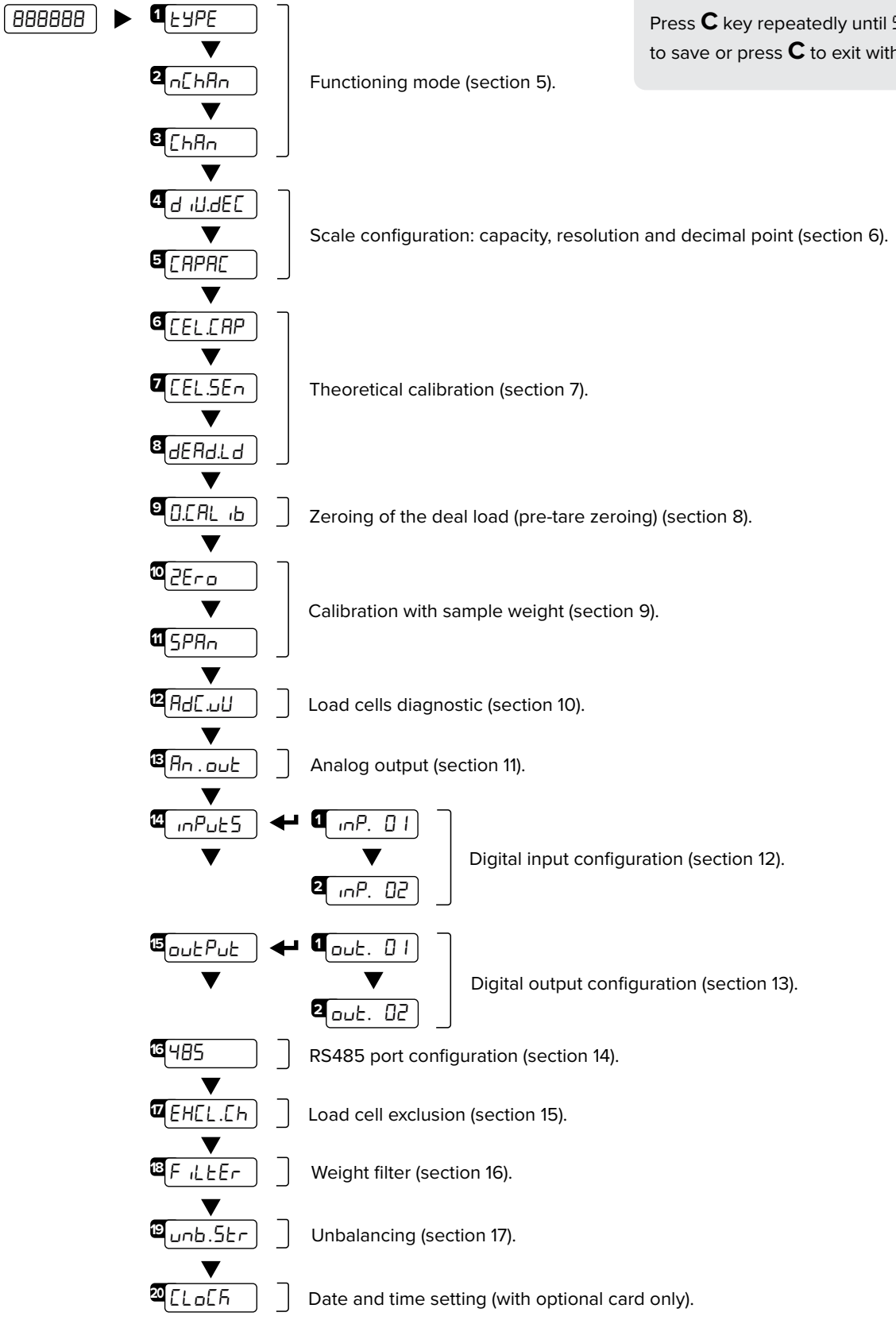
›0‹	Weight on zero.
~	Unstable weight.
NET	A tare is active.
F	A function is active.
W1 SP1	Digital output 1 is active.
W2 SP2	Digital output 2 is active.

4. Configuration Menu

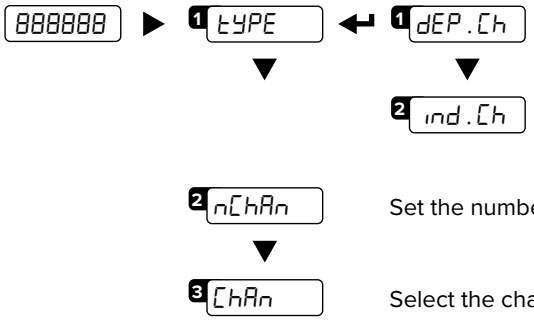
1. Reboot the weight transmitter
2. Press the ▶ key when display shows the 888888 message:

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.

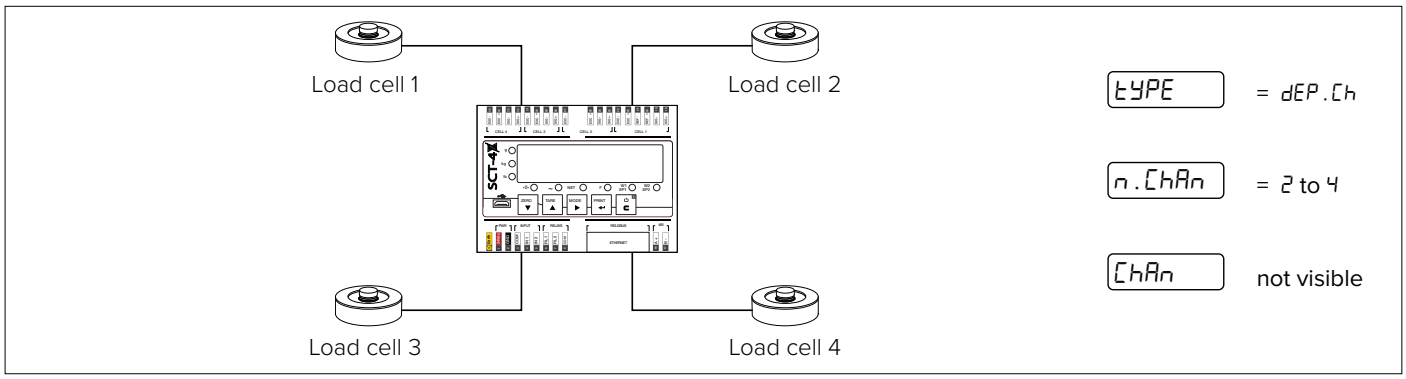
Multi-scale mode.

Set the number of active channels.

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

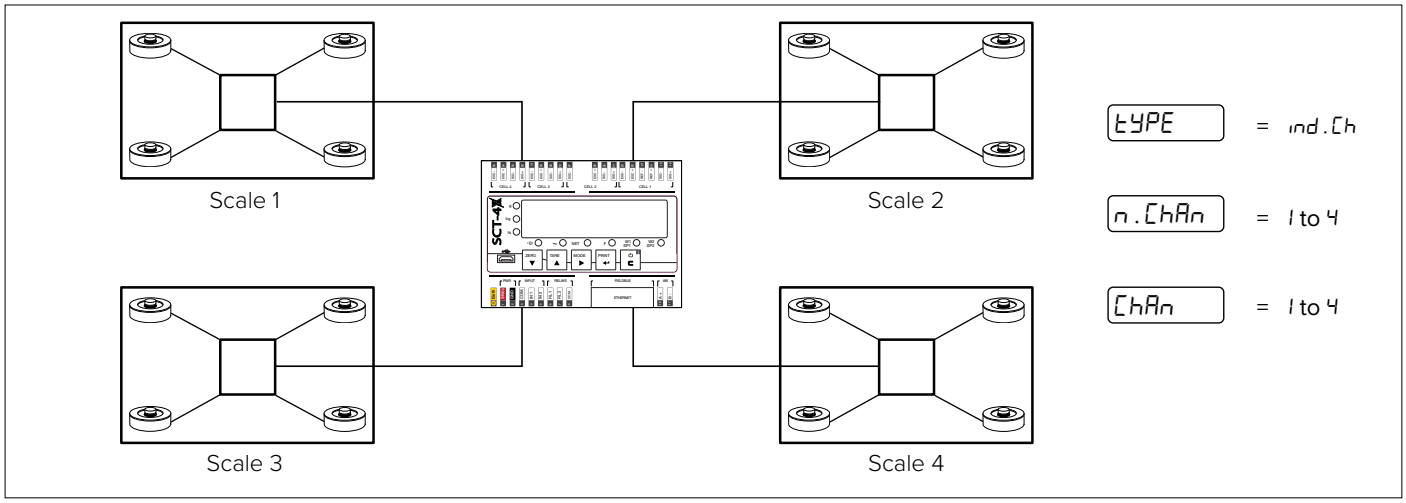
MODE 1 "DEP.CH"

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.



6. Maximum Scale Capacity, Increment and Decimal Point Settings

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▼

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

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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).*

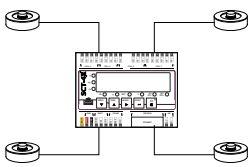
3. Set in CEL.SEn the theoretical signal value of the load cells. ✱

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

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

✱

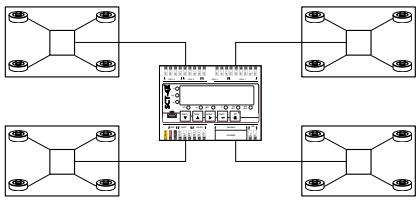
MODE 1 "DEP.CH"



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. Zero Mechanical Tare (pre-tare zeroing)

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▼

9 0.CAL ib — 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

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▼

10 ZEro — Zero point acquisition.

▼

11 SPAn — Sample weight acquisition.

1. Unload the scale.

2. Enter the ZEro 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 SAVEP message will appear, then press ↵ to confirm).

10. Load Cell Diagnostics (µV/V)

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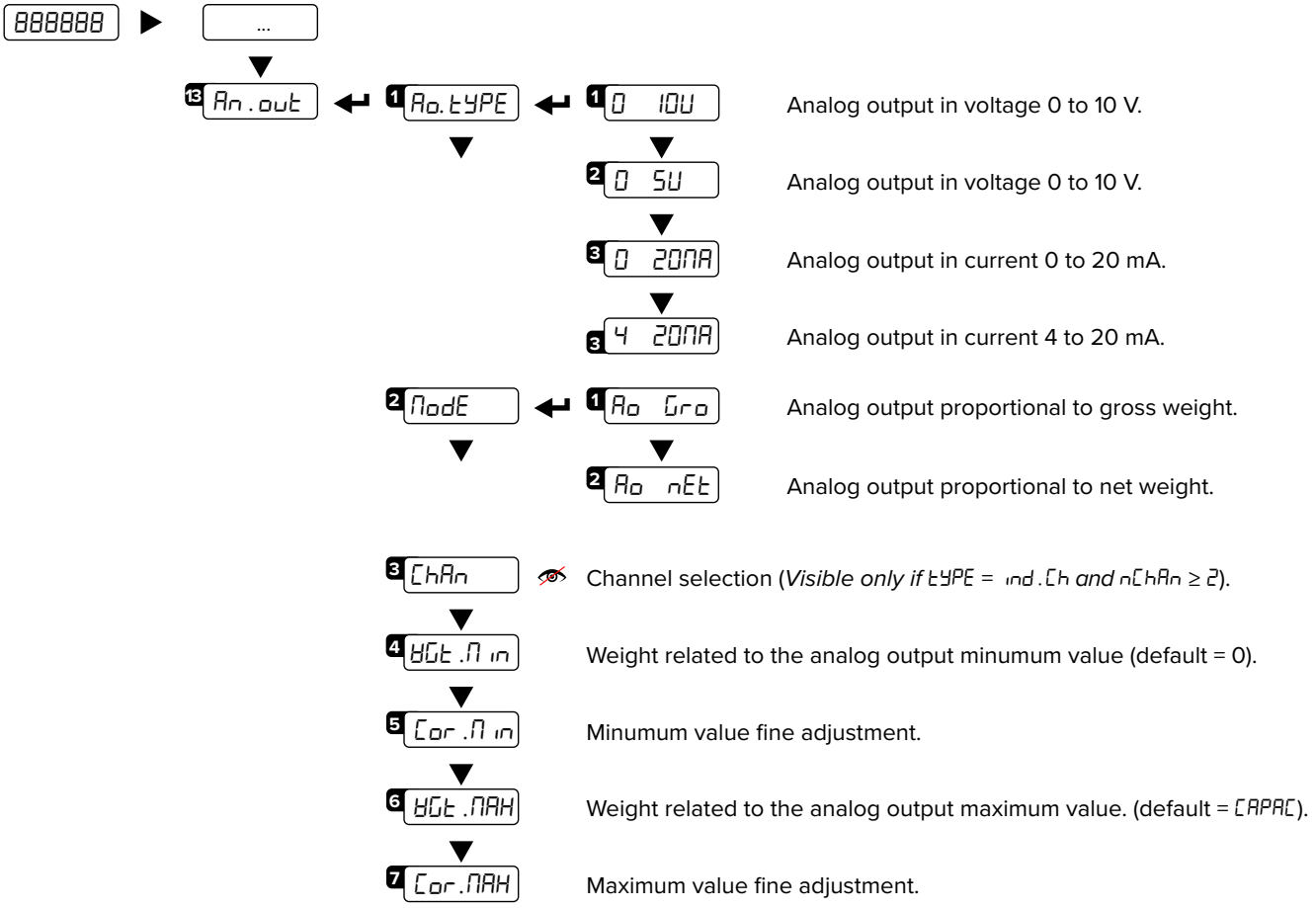
▼

12 AdC.uU

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 ▲.

11. Analog Output

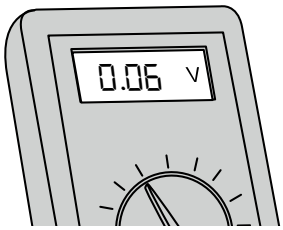


11.1 ANALOG OUTPUT FINE ADJUSTMENT

1. Connect a multimeter to pin 9 (+) and 10 (-) for the current analog output or 11 (+) and 12 (-) for the voltage analog output.
2. Follow the procedure:

A. Enter the parameter Cor.0.

B. Check the value on the multimeter



C. Use ▲ and ▼ keys to increase or decrease the output value on the multimeter.

By keeping the ▲ or ▼ key pushed, the value will change faster.

Confirm with ↵.

D. Repeat the operation from point "**A**" for Cor.MAX parameter.

E. Save setting (Press **C** key many times until SAVEP message will appear, then press ↵ to confirm).

11.2 EXAMPLES

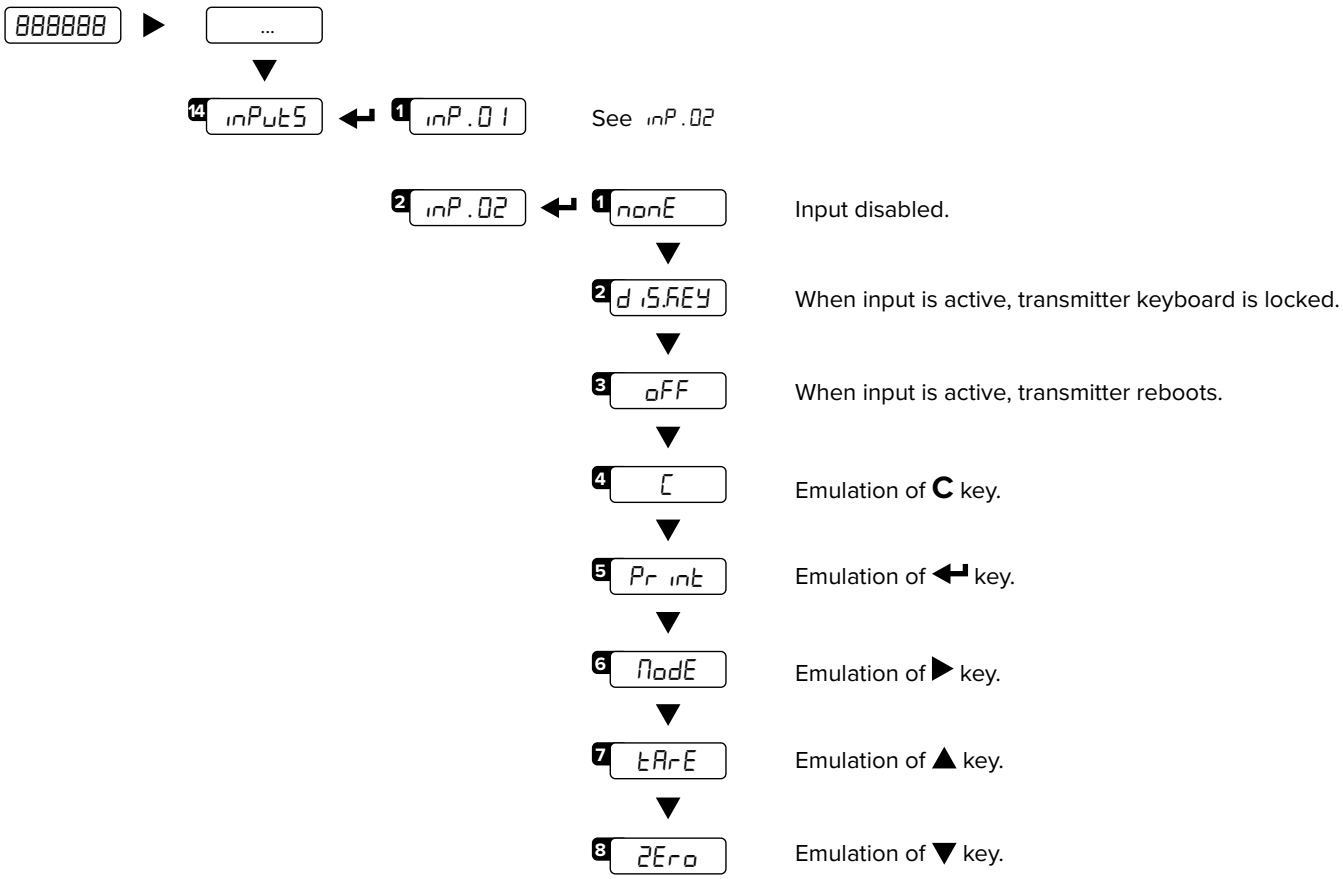
Analog output setting for gross weight at 10 V with a 1000 lb scale:

- Connect a multimeter to pins 11 (+) e 12 (-).
- Select 0- 10 U in the parameter Ao.tYPE.
- Select Ao Gro in the parameter ModE.
- Select the channel (if necessary) in the parameter ChAn.
- Set the weight at 0 V in the parameter WGt.0 in (default = 0 lb).
- Set the weight at 10 V in the parameter WGt.MAX (default = 1000 lb).
- Correct, if necessary, the output values as shown in section 11.2.

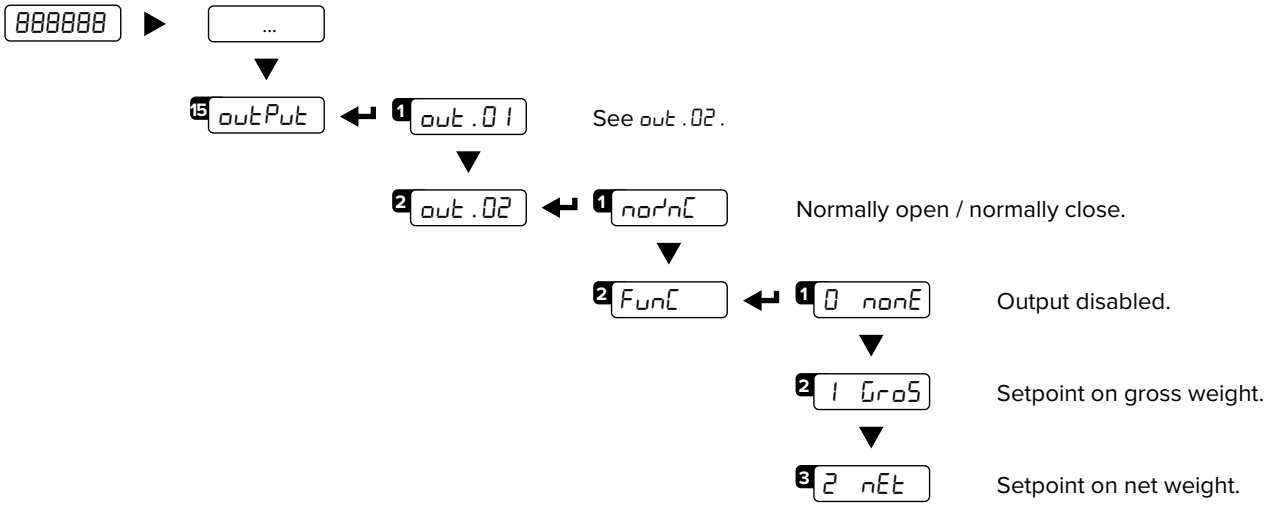
Analog output setting for net weight at 4 20 mA with a 20000 lb scale:

- Connect a multimeter to pins 9 (+) e 10 (-).
- Select 4-20.mA in the parameter Ao.tYPE.
- Select Ao nEt in the parameter ModE.
- Select the channel (if necessary) in the parameter ChAn.
- Set the weight at 4 mA in the parameter WGt.0 in (default = 0 lb).
- Set the weight at 20 mA in the parameter WGt.MAX (default = 20000 lb).
- Correct, if necessary, the output values as shown in section 11.2.

12. Input Settings



13. Output Settings



13.1 HOW TO PROGRAM SETPOINTS

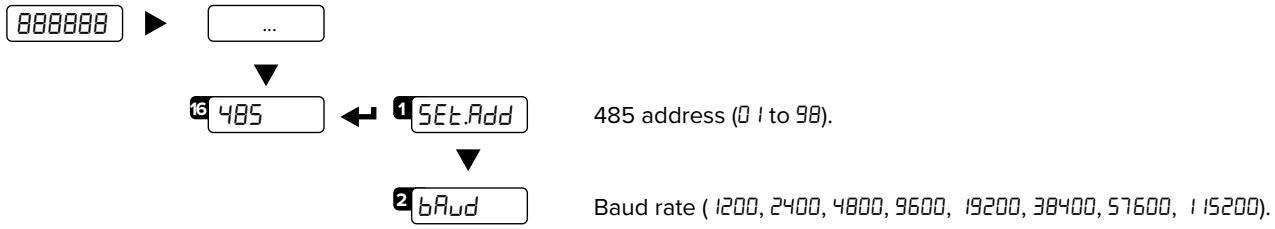
1. In weighing mode, press ↵ for 3 second.

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.

14. RS485 Port

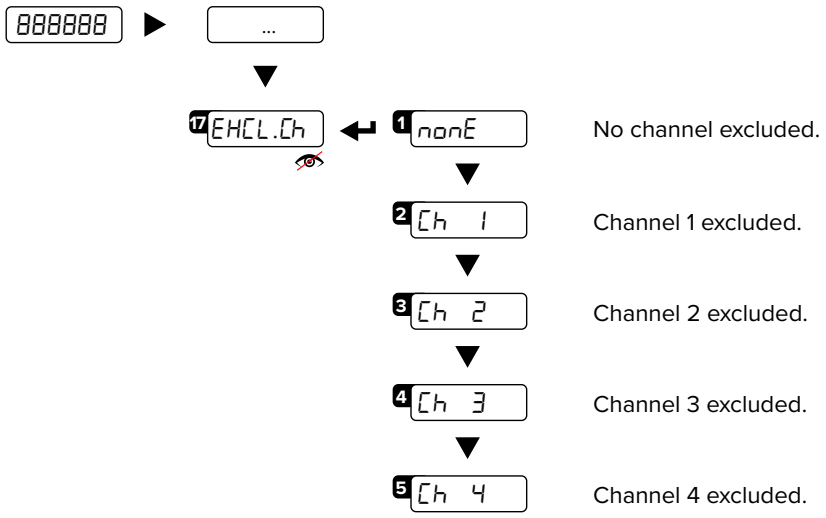


The RS485 port is configured by default to communicate in Modbus RTU (section 18).

15.Load Cell Exclusion (for dependent channel systems)

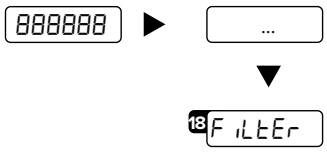
If a load cell is broken, it's possible to temporarily exclude the channel where it is connected and continue to weigh, pending replacement.

⚠ **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.



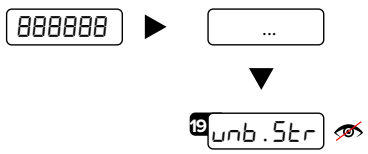
Visible only in dEP.Ch mode.

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

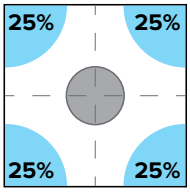


Visible only in dEP.Ch mode.

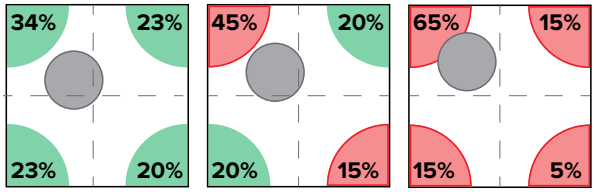
The instrument has an active unbalance function as standard that signals if the load is unevenly distributed, compared to the condition saved via step Str.unb.

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

Example:



Saved Condition



The unbalance condition is signalled 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 (*2Ero*), 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.uU* 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.

19. Modbus

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

<table>
<tr><th>Data</th><th>Register</th><th colspan="2">DESCRIPTION</th></tr>
<tr><td rowspan="2">Gross weight</td><td>30001</td><td colspan="2" rowspan="2">Gross Weight value.</td></tr>
<tr><td>30002</td></tr>
<tr><td rowspan="2">Net weight</td><td>30003</td><td colspan="2" rowspan="2">Net Weight value.</td></tr>
<tr><td>30004</td></tr>
<tr><td rowspan="2">Input status register</td><td rowspan="2">30005</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>Bit 7 (msb)
Bit 6
Bit 5
Bit 4
Bit 3
Bit 2
Bit 1
Bit 0 (lsb)</td><td>1 = Scale unloaded (gross weight = 0).
Tare PT (1 = PT tare is active).
Tare (1 = Tare is active).
Overload condition (0 = No; 1 = Overload).
Underload condition (0 = No; 1 = Underload).
Weight Stability (0 = Unstable; 1 = Stable).
Gross Weight Polarity (0 = “+”; 1 = “-”).
Net Weight Polarity (0 = “+”; 1 = “-”).</td></tr>
<tr><td rowspan="2">Command status register</td><td rowspan="2">30006</td><td colspan="2">Last received command.</td></tr>
<tr><td>Bit 7 (msb)
Bit 6
Bit 5
Bit 4
Bit 3
Bit 2
Bit 1
Bit 0 (lsb)</td><td>Last command result.
Last command result.
Last command result.
Last command result.
Counting of processed commands.
Counting of processed commands.
Counting of processed commands.
Counting of processed commands.</td></tr>
<tr><td rowspan="2">Output status register</td><td rowspan="2">30007</td><td colspan="2">No Function.</td></tr>
<tr><td>Bit 7 (msb)
...
Bit 2
Bit 1
Bit 0 (lsb)</td><td>No function.
...
No function.
Digital output 2 status (0 = OFF; 1 = ON).
Digital output 1 status (0 = OFF; 1 = ON).</td></tr>
<tr><td>µV Channel 1</td><td>30111</td><td colspan="2">µV value of the channel 1.</td></tr>
<tr><td>µV Channel 2</td><td>30112</td><td colspan="2">µV value of the channel 2.</td></tr>
<tr><td>µV Channel 3</td><td>30113</td><td colspan="2">µV value of the channel 3.</td></tr>
<tr><td>µV Channel 4</td><td>30114</td><td colspan="2">µV value of the channel 4.</td></tr>
</table>

19.2 MODBUS REGISTERS - ind.ch (4 SCALES)

Data	Register	DESCRIPTION	
Status register scale 1	40202	Bit 15 (msb) Bit 14 Bit 13 Bit 12 Bit 11 Bit 10 Bit 9 Bit 8 (lsb)	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”).
		Bit 7 (msb) Bit 6 Bit 5 Bit 4 Bit 3 Bit 2 Bit 1 Bit 0 (lsb)	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= “-”).
Gross weight scale 1	40203 40204	Gross Weight of scale 1.	
Status register scale 2	40205	Same as Status register scale 1.	
Gross weight scale 2	40206 40207	Gross Weight of scale 2.	
Status register scale 3	40208	Same as Status register scale 1.	
Gross weight scale 3	40209 40210	Gross Weight of scale 3.	
Status register scale 4	40211	Same as Status register scale 1.	
Gross weight scale 4	40212 40213	Gross Weight of scale 4.	
Net weight scale 1	40214 40215	Net Weight of scale 1.	
Net weight scale 2	40216 40217	Net Weight of scale 2.	
Net weight scale 3	40218 40219	Net Weight of scale 3.	
Net weight scale 4	40220 40221	Net Weight of scale 4.	

19.3 MODBUS REGISTERS FOR COMMAND SENDING

<table>
<tr><th>Data</th><th>Register</th><th>DESCRIPTION</th></tr>
<tr><td>Command</td><td>40001</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="2">Parameter 1</td><td>40002</td><td rowspan="2">First parameter of the command.
Parameter is always expressed in absolute mode (no decimals, no sign).</td></tr>
<tr><td>40003</td></tr>
<tr><td rowspan="2">Parameter 2</td><td>40004</td><td rowspan="2">Second parameter of the command.
Parameter is always expressed in absolute mode (no decimals, no sign).</td></tr>
<tr><td>40005</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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