CMC
Tension · Control · Integration

Amplifier Instruction Manual

Range: **Advance**

Type: **AO8051**

Revision: **V1.2**

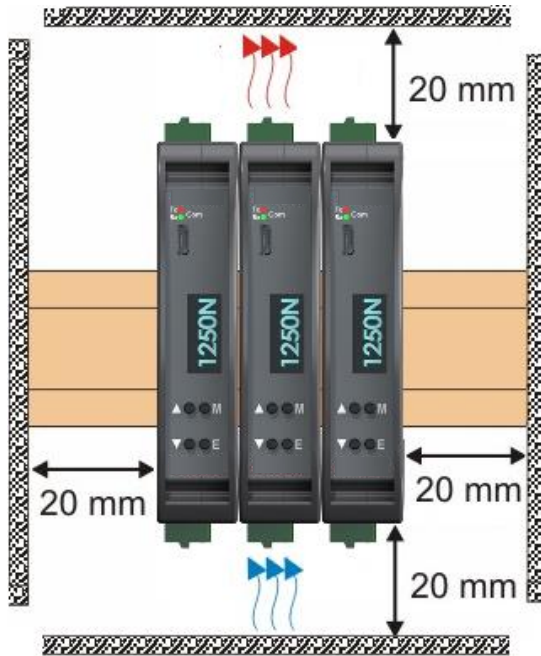# Contents

1. General Description

The Advance range AO8051 amplifier is an all-digital amplifier designed to meet all requirements of tension sensing within industries that are handling: printing applications, converting, paper, foil, narrow web, labels, ribbon, wire and other weight systems. The Advance range AO805x works with our range of Cleveland Kidder Classic, Ultra and Advance transducers, it also works with all other variants known to us.

RS485 4 pol Connector

Output Connector

Supply Connector

USB Status LEDs

Mini USB for Setup

Display for Actual Value and Setup parameters

Menu navigation buttons UP, DOWN, MENU and ENTER

Channel 1 Load Cell Input

Channel 2 Load Cell Input
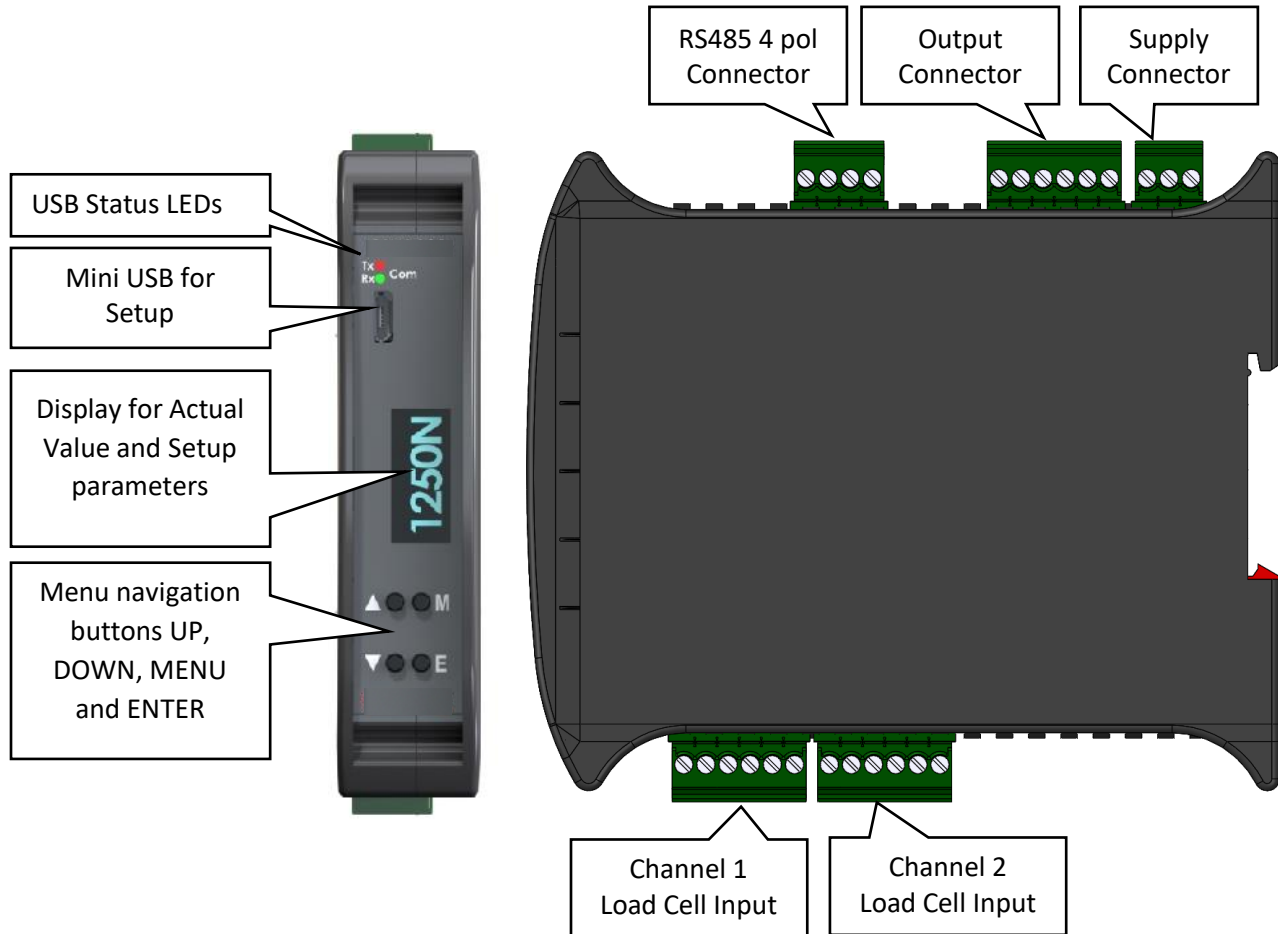
The installation and calibration has been simplified due to the internal recognition feature the output automatically adjusts to the load cell input. The internal filters give a steady display output and a balanced output signal, for easier handling of the actual data reading.

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2. Installation

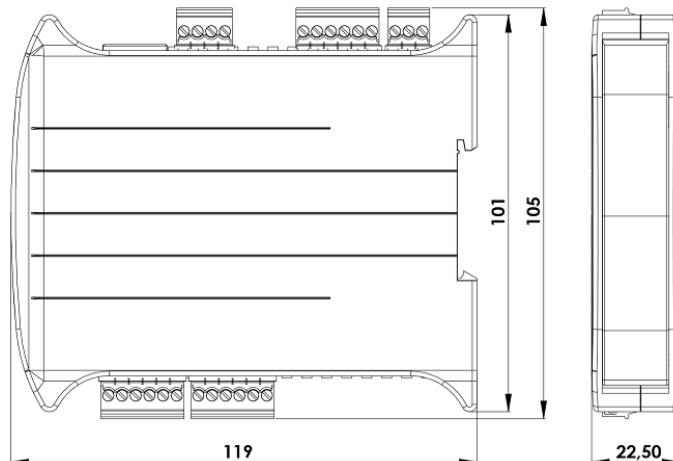### 2.1   Selection of Amplifier Location

The controller must be installed in a dry, ventilated, non-hazardous, vibration free location. Preferably inside an electrical cabinet and out of reach of the machine operator. The amplifier is designed to be mounted onto a standard 35mm wide DIN rail (EN 50022) inside a larger cabinet. For ease of installation, all the external connections are via plug in screw terminals, and numbered terminals. Wire end ferrules are suggested for good practice.

The supply to the amplifier is +24V DC, fused to a maximum of 2A. The DC zero should be connected to the 0V common line, which in turn is connected to a clean earth point.

The tension transducer(s) must be installed in accordance with the procedures from the transducer handbook. Particularly with regard to the web wrap angle and load line orientation.

Always use screened cable for connecting the transducer. If the cable is extended, the screen must be 'followed through'. The screen should be connected to earth at the amplifier end only. The screen is NOT connected at the transducer end so as to avoid earth loops. display.
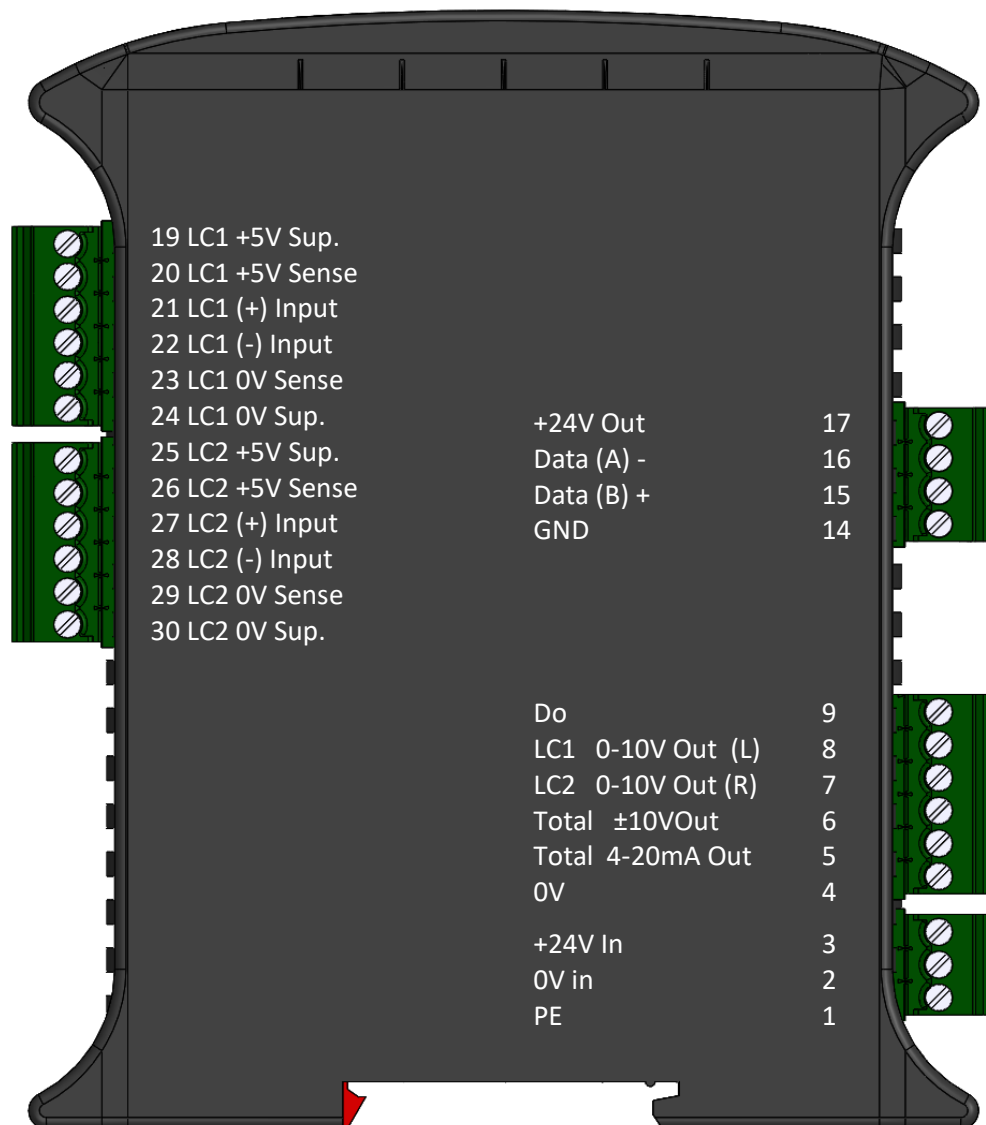
2.2   Mechanical Dimensions

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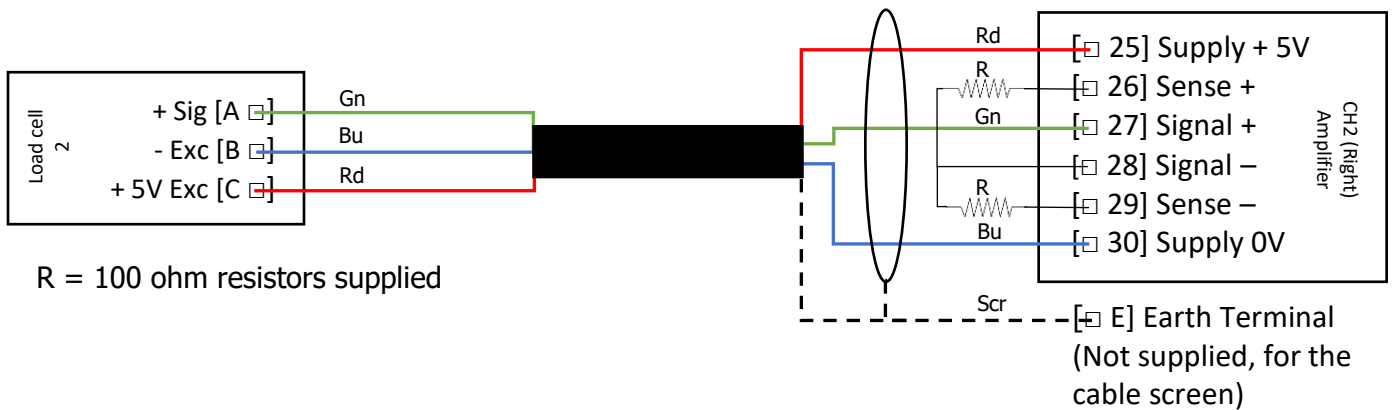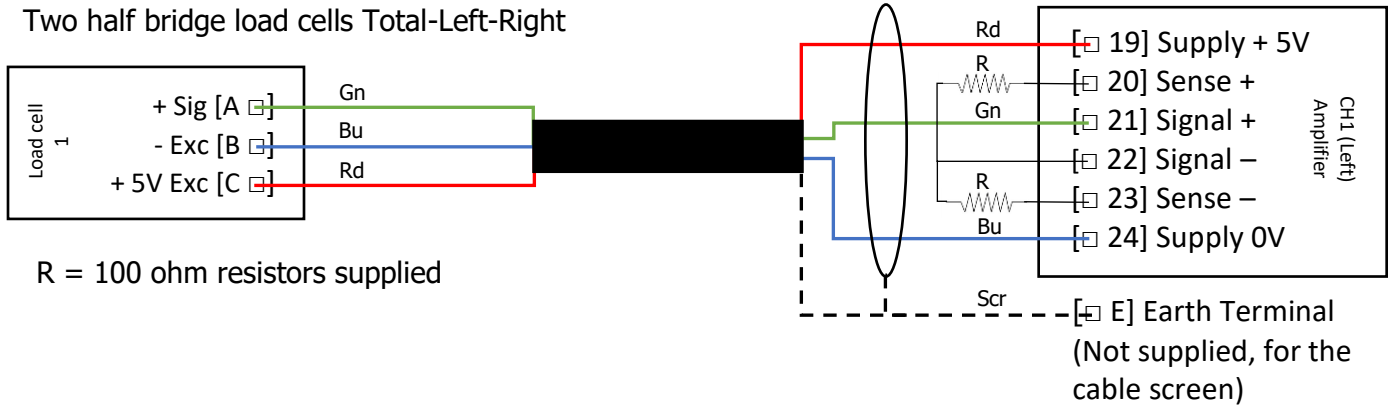
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3. Connections

3.1   Terminal Layout

The Advance Range AO8051 amplifier is a dual channel load cell amplifier with Modbus RS485 RTU it is designed for applications with 1 or 2 semiconductor half bridge load cells and 1 or 2 foil gauge full bridge load cells mounted in parallel to provide a calibrated total tension output. With the possibility to mount one load cell in LC1-Left and another load cell LC2-Right terminal blocks it is possible to achieve a "Total-Left-Right" measurement of tension in the web. All load cell connection cables are mounted in a pair of 6 pin plug screw terminal. The output alternatives are 2 x 0-10V, 1 x ± 10V and 1 x 4-20mA**.**

```
19 LC1 +5V Sup.
20 LC1 +5V Sense
21 LC1 (+) Input
22 LC1 (-) Input
23 LC1 0V Sense
24 LC1 0V Sup.              +24V Out        17
25 LC2 +5V Sup.            Data (A) -       16
26 LC2 +5V Sense          Data (B) +        15
27 LC2 (+) Input           GND              14
28 LC2 (-) Input
29 LC2 0V Sense
30 LC2 0V Sup.

                           Do               9
                           LC1  0-10V Out  (L)   8
                           LC2  0-10V Out (R)    7
                           Total  ±10VOut   6
                           Total  4-20mA Out 5
                           0V               4

                           +24V In          3
                           0V in            2
                           PE               1
```

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3.2 Transducer Half Bridge Wiring Configurations

Two half bridge load cells Total-Left-Right

Load cell 1

+ Sig [A ▣]   Gn
- Exc [B ▣]   Bu
+ 5V Exc [C ▣]   Rd

R = 100 ohm resistors supplied

Rd   [▣ 19] Supply + 5V
R
Gn   [▣ 20] Sense +
      [▣ 21] Signal +
      [▣ 22] Signal –
R   [▣ 23] Sense –
Bu   [▣ 24] Supply 0V

CH1 (Left) Amplifier

Scr   [▣ E] Earth Terminal
(Not supplied, for the
cable screen)

Load cell 2

+ Sig [A ▣]   Gn
- Exc [B ▣]   Bu
+ 5V Exc [C ▣]   Rd

R = 100 ohm resistors supplied

Rd   [▣ 25] Supply + 5V
R
Gn   [▣ 26] Sense +
      [▣ 27] Signal +
      [▣ 28] Signal –
R   [▣ 29] Sense –
Bu   [▣ 30] Supply 0V

CH2 (Right) Amplifier

Scr   [▣ E] Earth Terminal
(Not supplied, for the
cable screen)

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3.3 Transducer Full Bridge Wiring Configurations

Two full bridge load cells for Total-Left-Right

Load cell 1
+ Sig [4]   Yl
- Exc [3]   Bu
+ 5V Exc [1]   Rd
- Sig [2]   Gn

Rd
Yl
Gn
Bu
Scr

CH1 (Left) Amplifier
[19] Supply + 5V
[20] Sense +
[21] Signal +
[22] Signal –
[23] Sense –
[24] Supply 0V

[E] Earth Terminal
(Not supplied, for the cable screen)

Load cell 2
+ Sig [4]   Yl
- Exc [3]   Bu
+ 5V Exc [1]   Rd
- Sig [2]   Gn

Rd
Yl
Gn
Bu
Scr

CH2 (Right) Amplifier
[25] Supply + 5V
[26] Sense +
[27] Signal +
[28] Signal –
[29] Sense –
[30] Supply 0V

[E] Earth Terminal
(Not supplied, for the cable screen)

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4. Setup and Calibration

4.1 Device Terminology

DIAG	Diagnostic
SW. VER	Software version; actual software version
LOADC.	Load Cell
LCTYPE	Load Cell type based on type of gauge
SLC	Strain gauge Load Cell 120 Ω semiconductor resistance
FLC	Foil gauge Load Cell 350 Ω resistance
G1-G128	Gain factor gives a selectable input range
LCMODE	How the Load Cell is connected
STD	Standard gives an average reading if two Load Cells are connected
TLR	Total-Left-Right gives a separate reading on each of two Load Cells connected, so the "Total" average reading, Left-side and Right-side reading are all available
TARE	Zero calibration without tension on the Load Cell
CAL	Calibration; with a known weight giving tension to the Load Cell
UNIT	The selected display and calibration weighing unit
N (kg)	Actual tension displayed in N and the physical calibration weight given in Kg.
N (lbs)	Actual tension displayed in N and the physical calibration weight given in lbs.
Kg	Actual tension displayed in Kg and the physical calibration weight given in Kg.
Lbs	Actual tension displayed in lbs and the physical calibration weight given in lbs.
%	Actual tension displayed in % and the physical calibration weight given in % of max tension
MAX. W	Max weight (tension) to be entered in selected display unit
CAL. W	Calibration weight to be entered in the selected calibration unit
FILT	The filter is selectable for analogue outputs "Ao1", "Ao2" and "Ao4", all in one, output "Ao3" has no filter. The filter is based on a sampling frequency of 1 Khz and the filter is the average reading of the selected number of samples.
Alarm level	Level in % of max. tension when the alarm is activated. Connected to output "D0" and has a pre-set value of 5%.
Alarm delay	Select the delay in seconds before "Alarm" is activated.

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4.2 Menu Tree

0.0 N

Go to menu press "E" and return press "M" up to 2 sec.

To select press ▽ △

MAIN
DIAG
SETUP

DIAG
SW. VER
TENSION

TENSION
TOTAL
LEFT
RIGHT

SW. VER
OWA200
0.00.01

SETUP
LO ADC.

LO ADC.
TYPE
MODE
TARE
CAL
FILT
ALARM

ALARM
LEVEL
DELAY

FILTER
ENTER
FILTER
LENGTH
1000

LCCAL
UNIT
MAX. W
CAL W
DO CAL

LCTARE
DO TARE

LCMODE
STD
TLR

LCTYPE
SLC
FLC
G1
G8
G16
G32
G64
G128

LC. ALM
ENTER
ALARM
LEVEL
IN %
          0.0

UNIT
N (kg)
N (lbs)
Kg
Lbs
%

LC. ALM
ENTER
ALARM
DELAY
IN s
          0.0

MAX. W
ENTER
MAX W
IN
N
          50.0

CAL W
ENTER
CAL W
IN
Kg
          5.0

LCCAL
DO CAL

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4.3 Gain

The Advance Range AO8051 amplifier has a range of pre-set selectable gain settings as shown below.

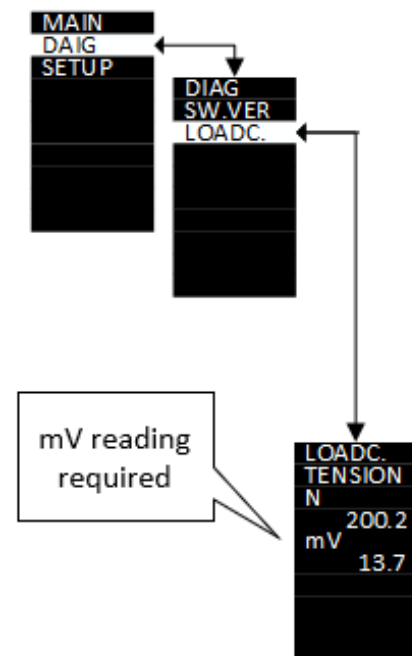|	
G1	± 4.9V
G8	± 614mV
G16, SLC	± 306Mv (Half Bridge 120 Ohm)
G32	± 153mV
G64	± 76mV
G128, FLC	± 38mV (Full Bridge 350, 720, 1K Ohm)

It is important that the correct gain is selected before the calibration process is started, failure to do so my result in 'Err' being displayed after 'Calc in progress' when pressing 'E' for 'DO CAL'. This error is a result of the input mV reading from the transducers exceeding the selected gain value prior to the calculation.

4.4 Determining the Gain

In order to determine the gain the following process should be carried out:

1. Wire the amplifier supply and load cell channel input(s) correctly as per section 3.2 Transducer Half Bridge Wiring Configurations or 3.3 Transducer Full Bridge Wiring Configurations and allow the amplifier to power up.
2. Place the full load you require on the load cells (This can be done with known weights and straps following the correct web path of the load cell roller(s)).
3. Go to **'DIAG'** > **'LOADC.'** > Look at the mV value displayed, this is the raw mV input into the amplifier.
4. Your Gain setting must be higher than this Mv setting.

mV reading required

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4.5 Calibration Process
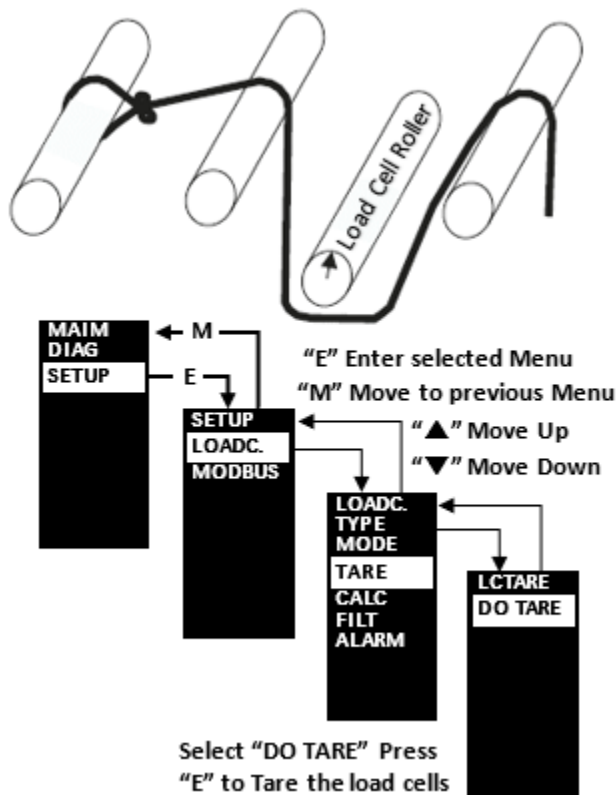
4.5.1 Type Selection (Gain)

With reference to section 4.4 Determining the Gain from the home screen go to **'SETUP'** > **'LOADC.'** > **'TYPE'** and select the gain that applies.

4.5.2 Mode Selection (STD single channel or dual channel for TLR)

Go to **'SETUP'** > **'LOADC.'** > **'MODE'** and ensure **'STD'** is selected, this configuration is for single channel amplifiers (A8050) or to use only a single channel of a dual channel amplifier variant (AO8051 or AO8052).

4.5.3 Tare the Load Cell Roller

Loosen or remove the web so no tension is applied to the Load cell roller and ensure the correct roller of the application is fitted to the transducers. Follow the procedure outlined below.

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4.5.4 Calibrate the Load Cell Roller

From the main menu go to **'SETUP'** > **'LOADC..'** > **'CALC'** > **'UNIT'** and select the engineering units the user requires for input and the display.

From the main menu go to **'SETUP'** > **'LOADC.'** > **'CALC'** > **'MAX. W'** and set the maximum web tension for the application.
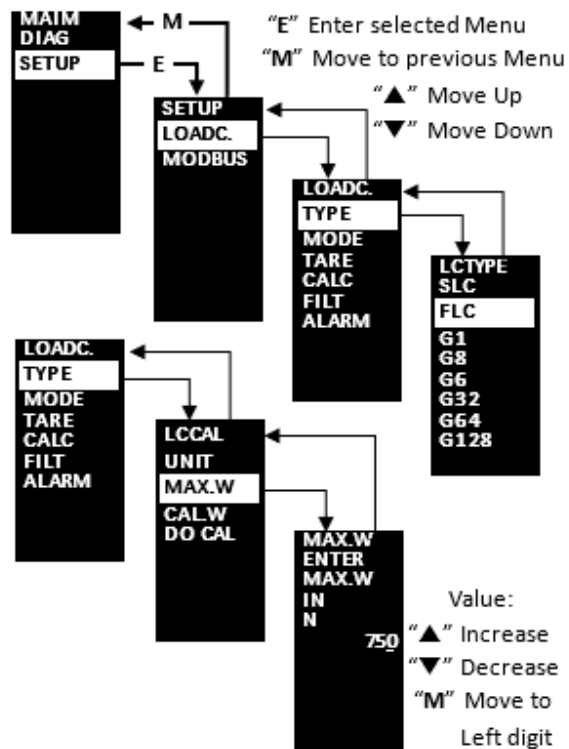
From the main menu go to **'SETUP'** > **'LOADC.'** > **'CALC'** > **'CAL.W'** and apply 100% of the web tension to the web.
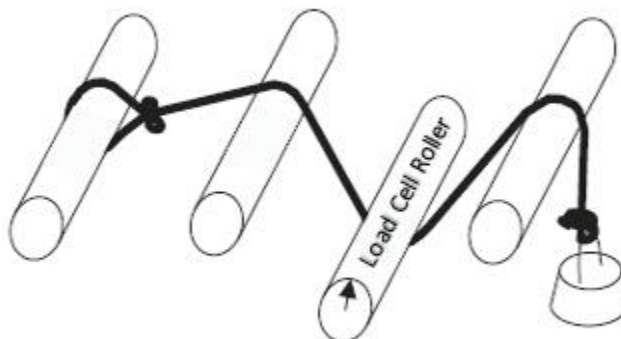
Thread a rope over the centre of the Load cell roller following the path of the web. Fasten one end of the rope and apply known weight to the other end.

Menu system:
use the [M, E, ▲ & ▼] buttons on the front

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5. Technical Data

Individual Features	AO8050	AO8051	AO8052
Mini USB-port for programming	X	X	X
Modbus RTU/RS485	X	X	X
Total-Left-Right (TLR) load measurement		X	X
Modbus TCP/IP Ethernet			X

AO805(X) Technical Data

Supply

Power Supply Voltage	24VDC +/-15%

Inputs

Measure range	+/-39mV to +/-4.96V
Number of load cells Semiconductor	4x 120 Ohms (Half Bridge)
Number of load cells Strain Gauge	4x 350 Ohms (Full Bridge)
Load cells sensitivity	+/-1mV/V to +/-100mV/V
Conversion per second	1.000/s
Response time	1ms

Outputs

Analogue Outputs	1x 0-10v (2x TLR), 1x +/-0-10v and 1x 4-20mA

Supply Voltage Outputs

Tension Transducers	5VDC

Temperature

Operating Range	-20°…+60°C

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