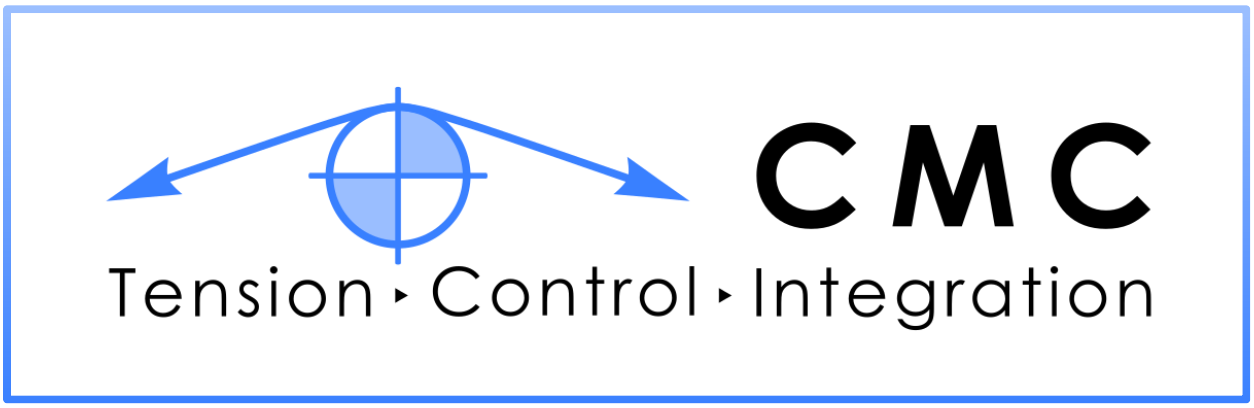


Amplifier Instruction Manual

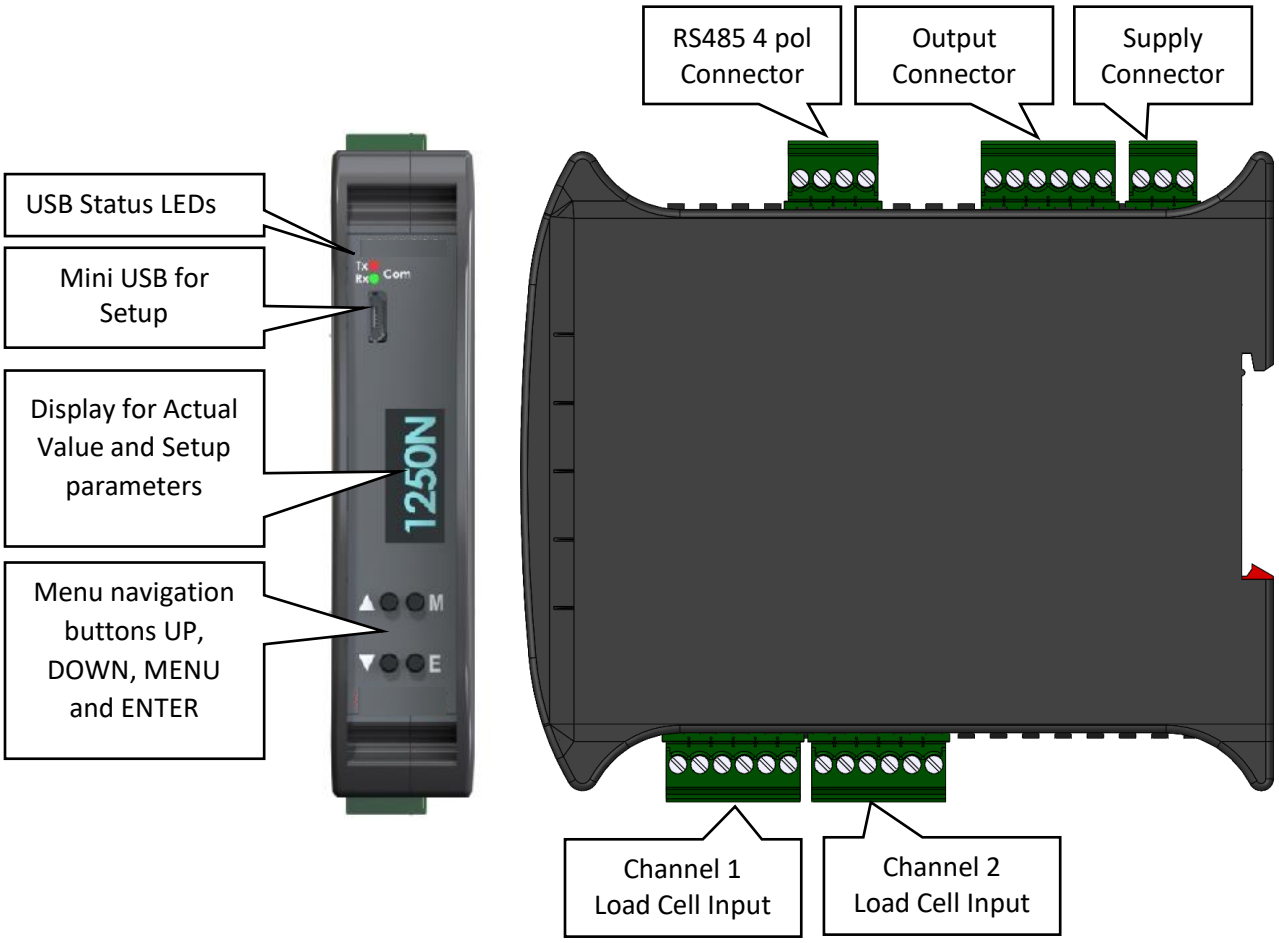
Range: Advance

Type: AO8052

Revision: V1.2

1. General Description

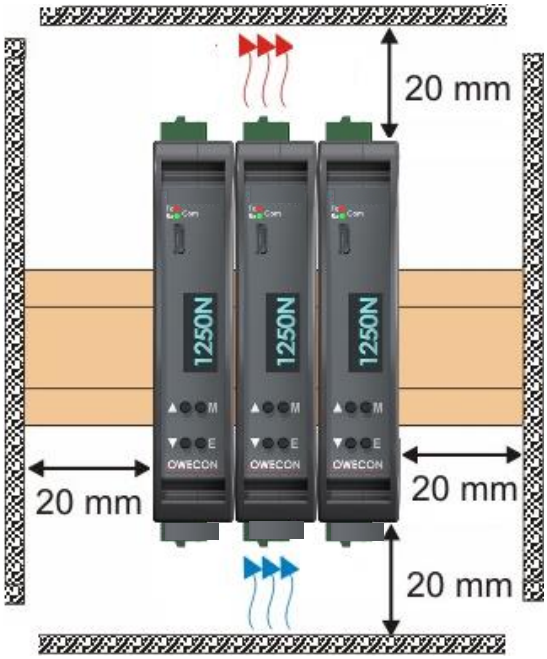
The Advance range AO8052 amplifier is an all-digital amplifier designed to meet all requirements of tension sensing within industries that are handling: printing applications, converting, paper, foil, narrow web, labels, ribbon, wire and other weight systems. The Advance range AO805x works with our range of Cleveland Kidder Classic, Ultra and Advance transducers, it also works with all other variants known to us.



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.

2. Installation

2.1 Selection of Amplifier Location



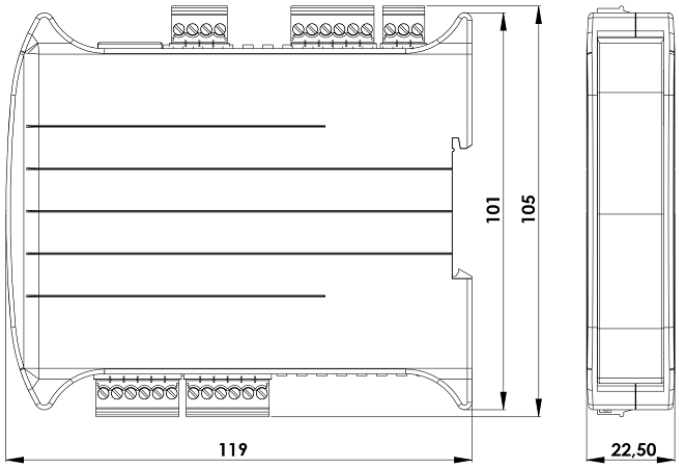
The controller must be installed in a dry, ventilated, non-hazardous, vibration free location. Preferably inside an electrical cabinet and out of reach of the machine operator. The amplifier is designed to be mounted onto a standard 35mm wide DIN rail (EN 50022) inside a larger cabinet. For ease of installation, 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.

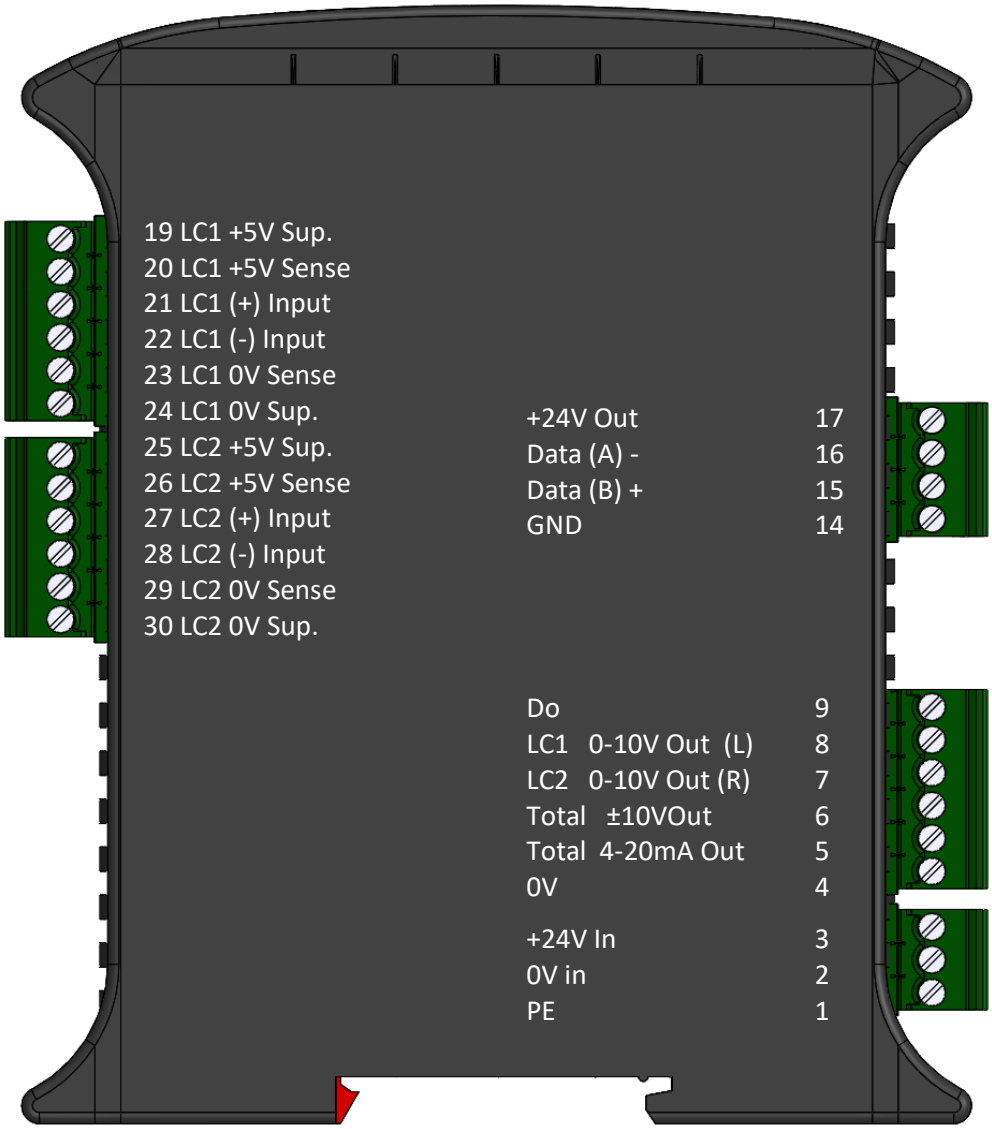
2.2 Mechanical Dimensions



3. Connections

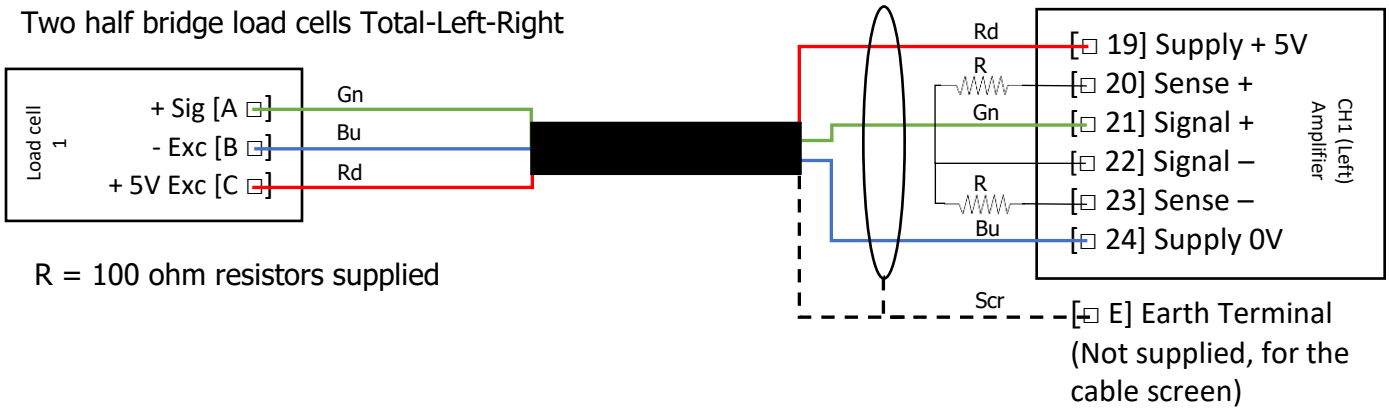
3.1 Terminal Layout

The Advance Range AO8052 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**.**

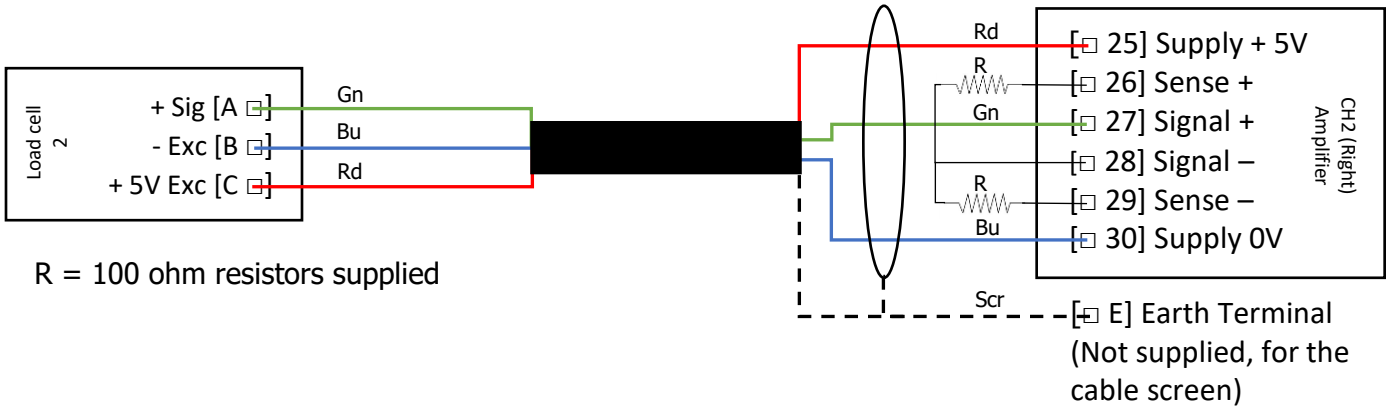


3.2 Transducer Half Bridge Wiring Configurations

Two half bridge load cells Total-Left-Right



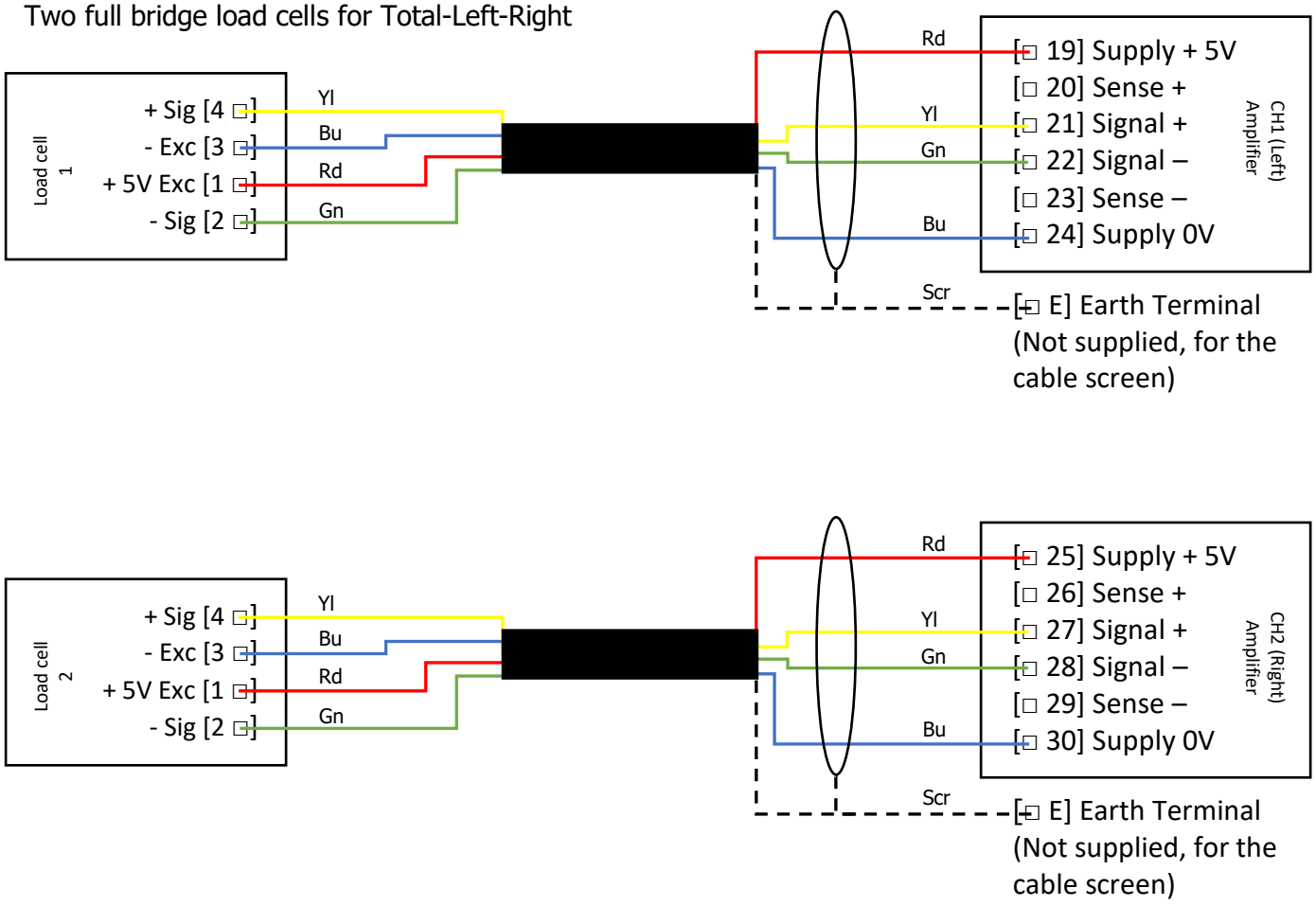
R = 100 ohm resistors supplied



R = 100 ohm resistors supplied

3.3 Transducer Full Bridge Wiring Configurations

Two full bridge load cells for Total-Left-Right

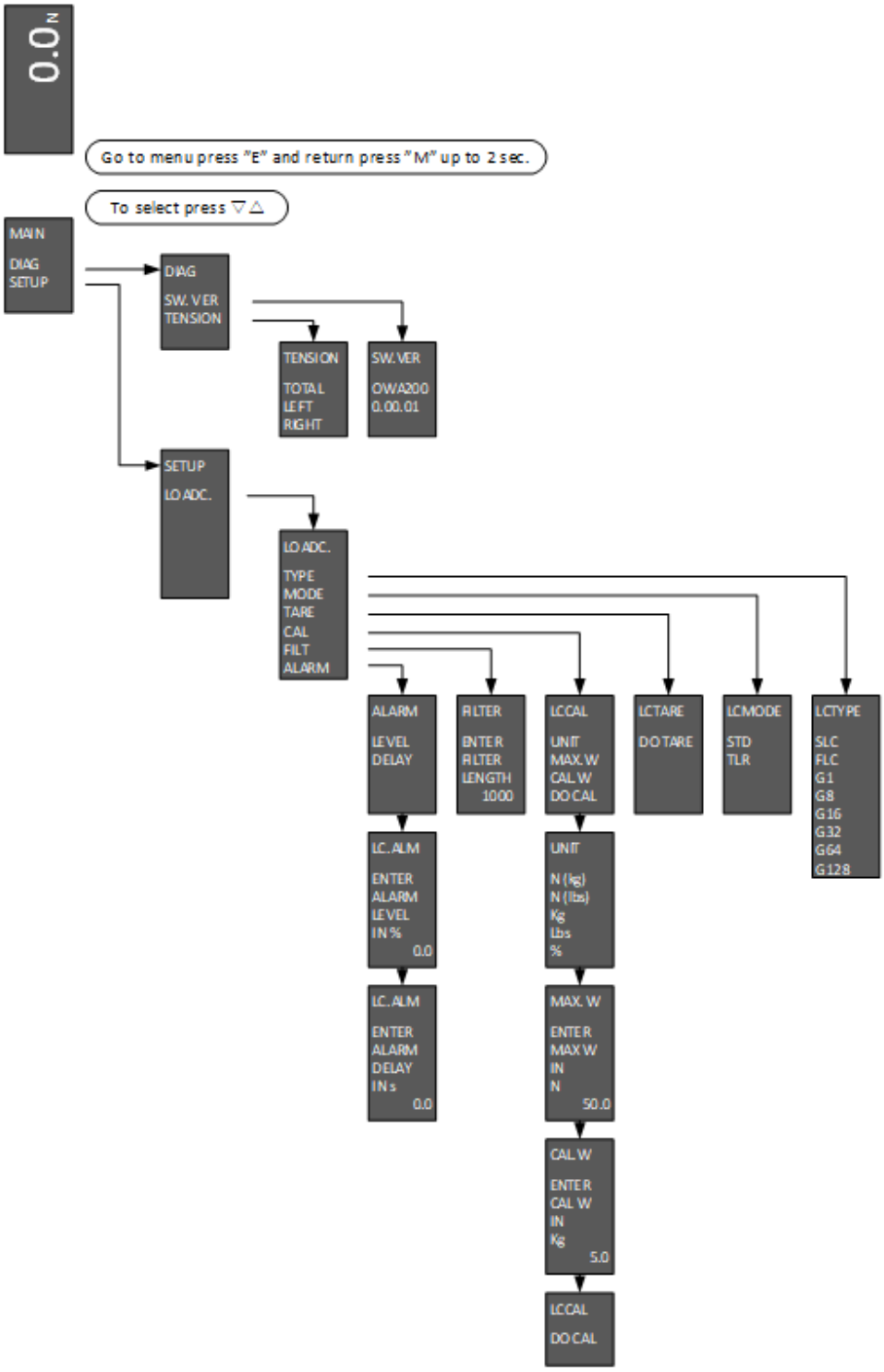


4. Setup and Calibration

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.

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
LC. ALM
ENTER
ALARM
DELAY
IN s
0.0
UNIT
N (kg)
N (lbs)
Kg
Lbs
%
MAX. W
ENTER
MAX W
IN
N
50.0
CAL W
ENTER
CAL W
IN
Kg
5.0
LCCAL
DO CAL

4.3 Gain

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

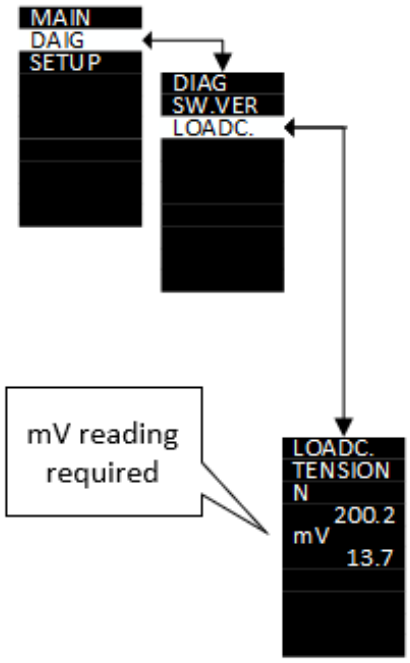
G1	± 4.9V
G8	± 614mV
G16, SLC	± 306Mv (Half Bridge 120 Ohm)
G32	± 153mV
G64	± 76mV
G128, FLC	± 38mV (Full Bridge 350, 720, 1K Ohm)

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.



4.5 Calibration Process

4.5.1 Type Selection (Gain)

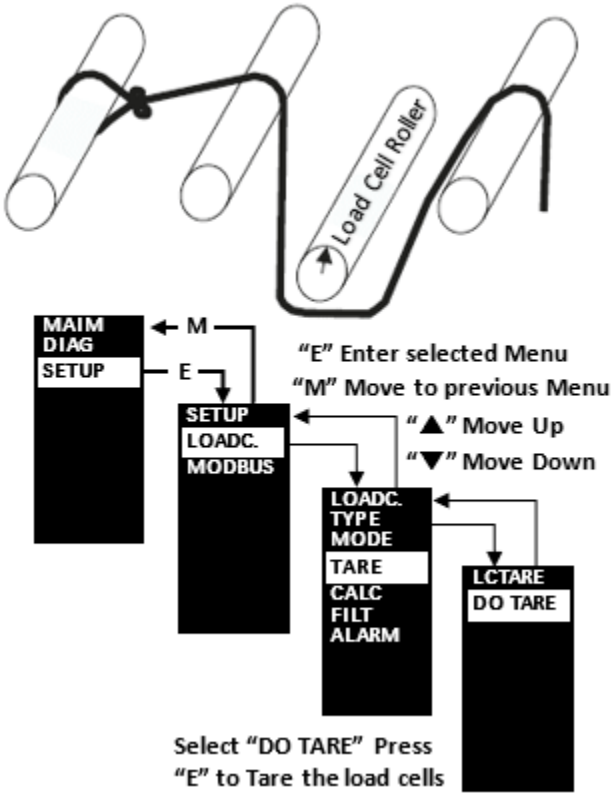
With reference to section 4.4 Determining the Gain from the home screen go to **'SETUP'** > **'LOADC.'** > **'TYPE'** and select the gain that applies.

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.

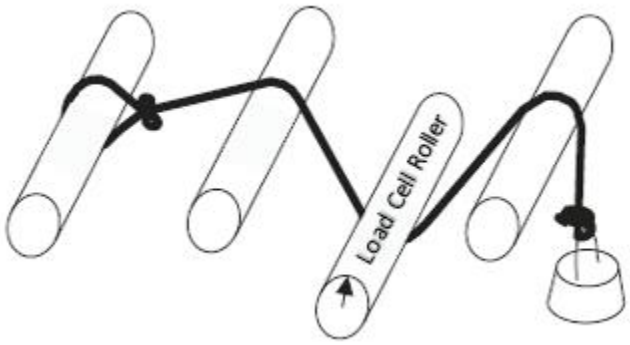


4.5.4 Calibrate the Load Cell Roller

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

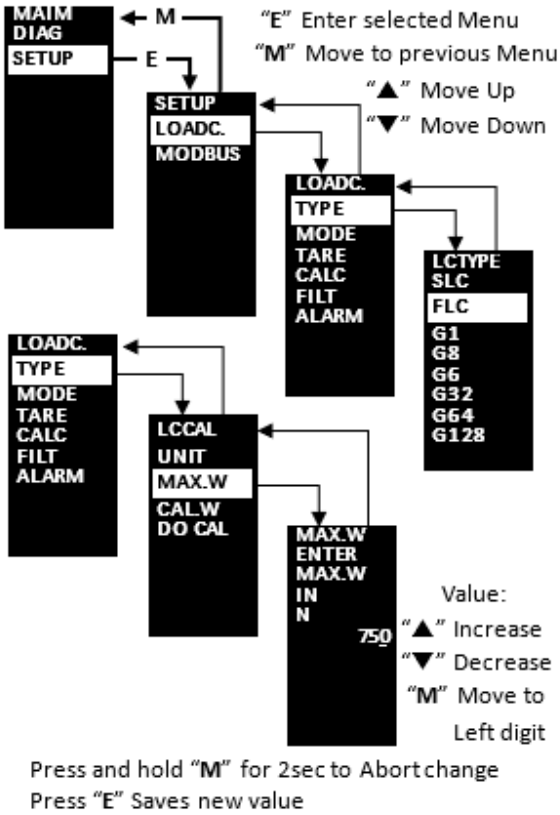
From the main menu go to **'SETUP'** > **'LOADC.'** > **'CALC'** > **'MAX. W'** and set the maximum web tension for the application.

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



Press and hold "**M**" for 2sec to Abort change
Press "**E**" Saves new value

5. Communication

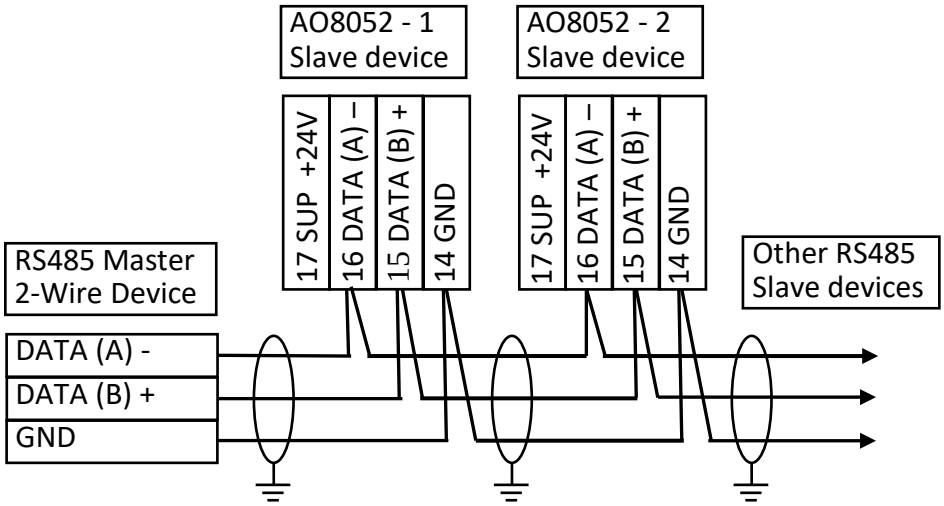
The Advance Range AO8052 amplifier supports Modbus Slave protocols RTU and optional TCP

5.1 Modbus RTU RS485

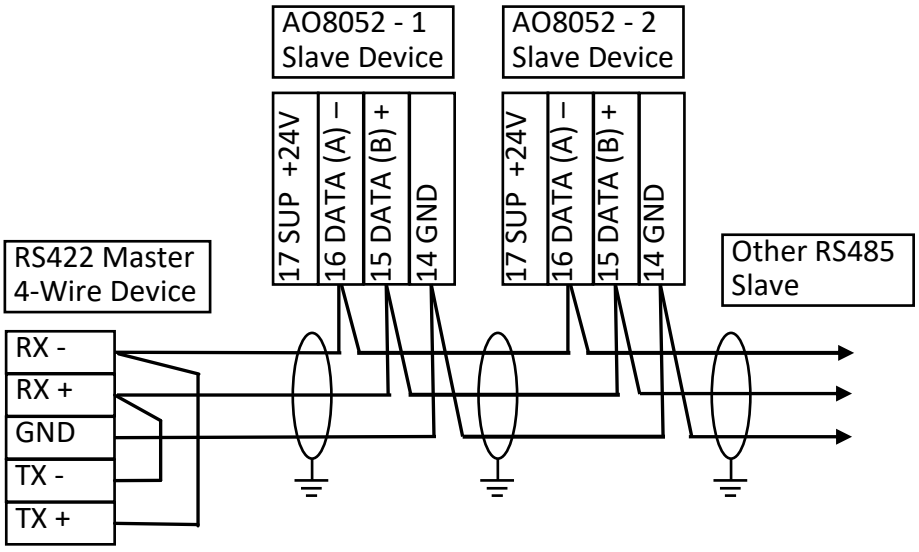
Modbus is a serial communication protocol developed by Modicon published by Modicon® in 1979 for use with its programmable logic controllers (PLCs). In simple terms, it is a method used for transmitting information over serial lines between electronic devices. The device requesting the information is called the Modbus Master and the devices supplying information are Modbus Slaves. In a standard Modbus network, there is one Master and up to 247 Slaves, each with a unique Slave Address from 1 to 247

The Modbus RTU Master sends data on the two data lines while all Modbus RTU Slave devices listen. The Modbus RTU Slave recognises itself as the destination of the message, then it becomes the sender and sends the response. The Modbus RTU Master becomes a listener after finishing transmission to get the response from the Modbus RTU Slave. Transmissions like this are known as Half Duplex communications.

5.1.1 Wiring diagram with 2-wire master



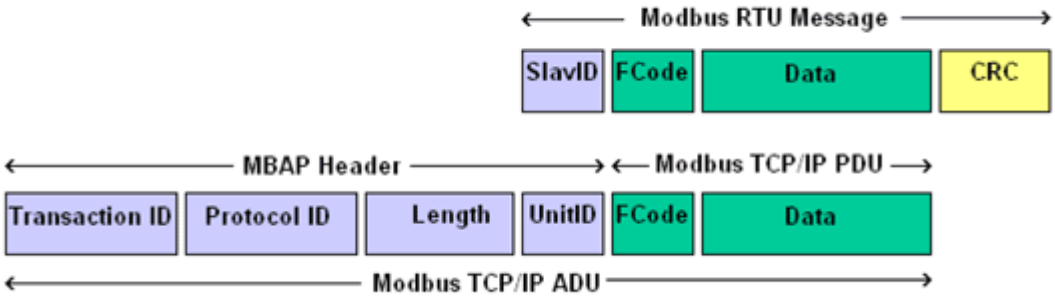
5.1.2 Wiring diagram with 4-wire master



5.2 Modbus TCP/IP

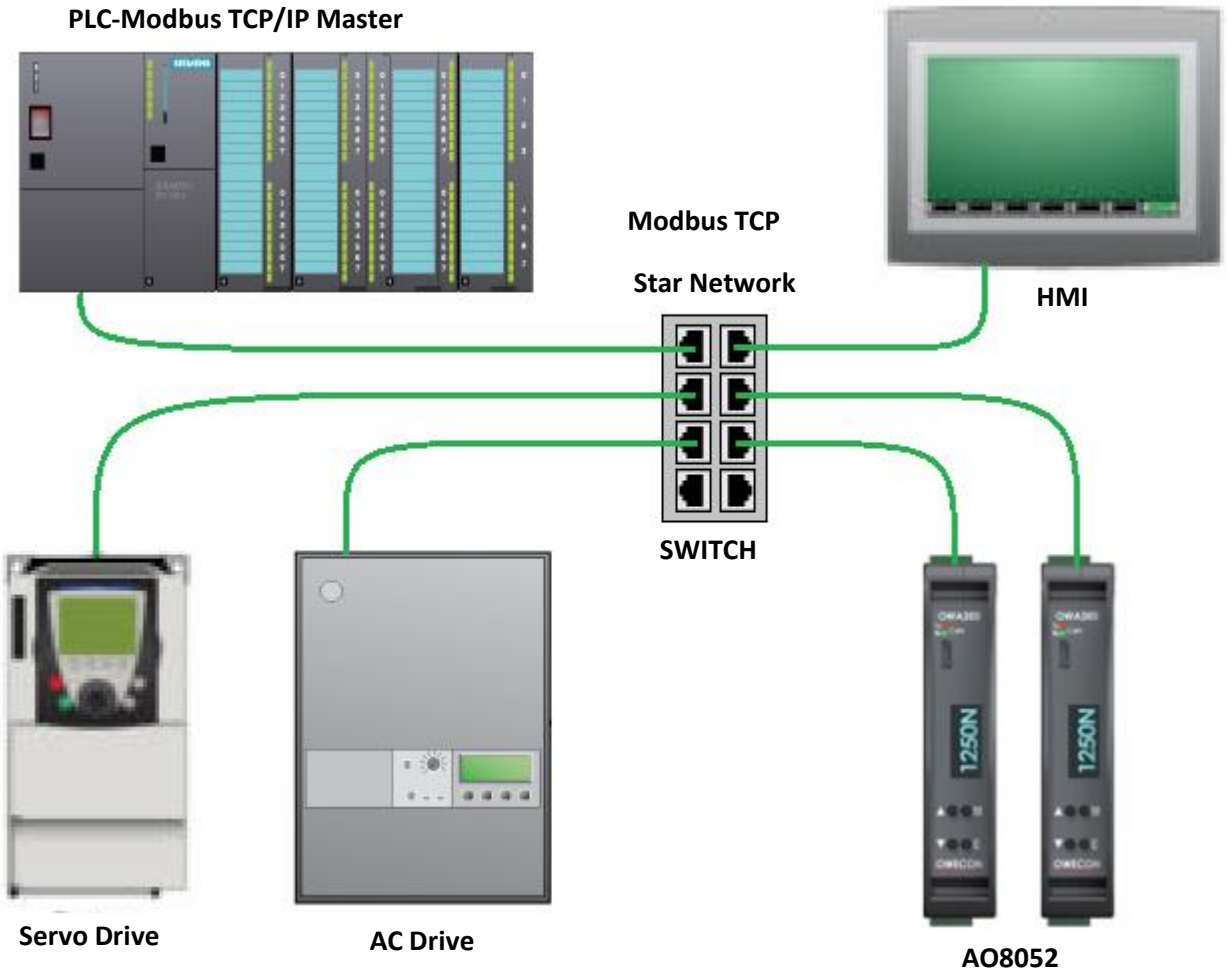
TCP is Transmission Control Protocol and IP is Internet Protocol. These protocols are used together and are the transport protocol for the internet. When MODBUS information is sent using these protocols, the data is passed to TCP where additional information is attached and given to IP.

The basic difference between MODBUS RTU and MODBUS TCP (Also known as MODBUS IP, MODBUS EtherNet, and MODBUS TCP/IP) is that MODBUS TCP runs on an Ethernet physical layer and Modbus RTU is a serial level protocol.

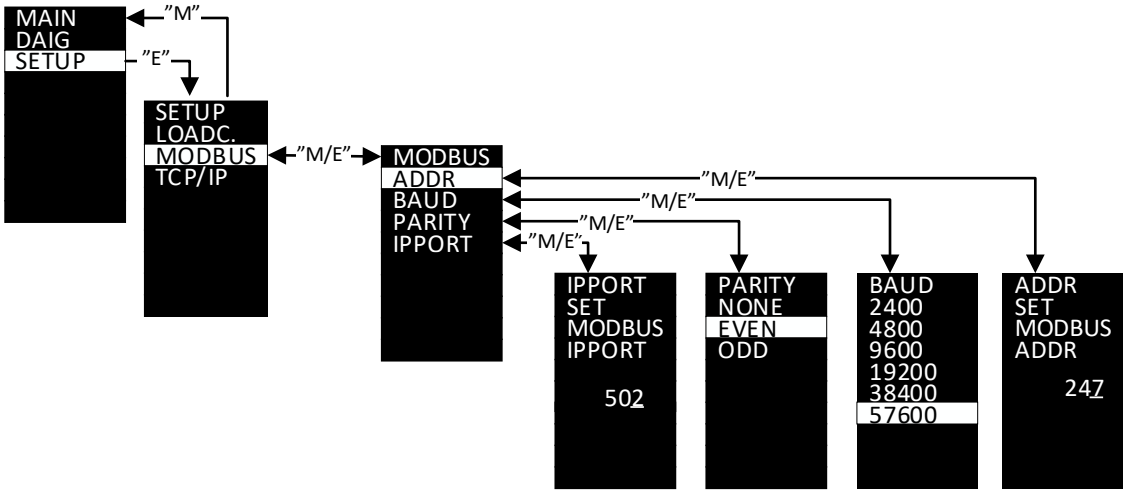


5.2.1 Network Installation

The AO8052 uses IEEE 802.3 100BaseT hardware standard. This means it runs at 10/100Mbaud on twisted pair wiring rated Category 5 or higher and uses RJ45 connectors. Twisted pair networks generally use a star topology, which means that each device is wired to a **single switch device**, as illustrated below:

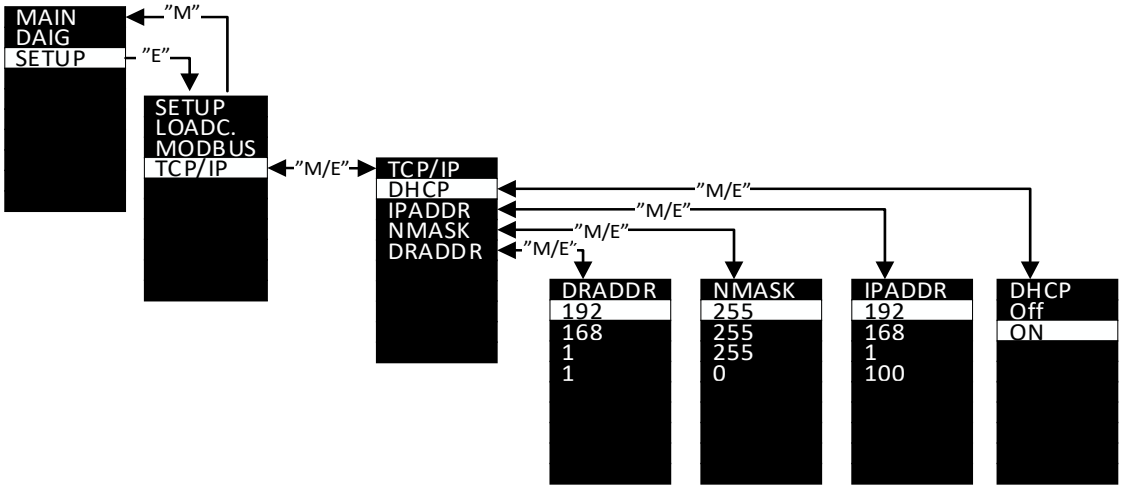


5.2.2 Menu tree RTU



MODBUS	:	Menu for Modbus Setup
ADDR	:	Modbus slave ID (1-247)
BAUD	:	Baud rate 2400 - 57600
PARITY	:	NONE, EVEN or ODD, must be the same as the master
IPPORT	:	the protocol uses Port 502 as local port in the Modbus TCP server

5.2.3 Menu tree TCP



TCP/IP	:	Menu for Ethernet Setup
DHCP	:	ON: Dynamic assigned IP Address from the network. OFF: Static IP Address
IPADDR	:	IP Address (192.168.1.100)
NMASK	:	Network Mask (255.255.255.0)
DRADDR	:	Gateway (192.168.1.1)

5.3 Modbus RTU and TCP Holding Parameters

The Advanced AO8052 amplifier uses a Holding register (Analog values, variables) 400000 – 465534 is INT16

Address	Block	Description	Type	Range	Notes
400009	System	System Command (2=Save NV data)	Int16 R/W	0-9 2: Save to Flash	
401801	Load Cell	Calibrated output from Load Cell 1	Int16, Ro	-30000 to 30000 -300.00% to 300.00%	
401802	Load Cell	Calibrated output from Load Cell 2	Int16, Ro	-30000 to 30000 -300.00% to 300.00%	
401803	Load Cell	Calibrated total output from Load Cell 1+2	Int16, Ro	-30000 to 30000 -300.00% to 300.00%	
401804	Load Cell	Filtered Left Tension	Int16, Ro	-30000 to 30000 -300.00% to 300.00%	
401805	Load Cell	Filtered Right Tension	Int16, Ro	-30000 to 30000 -300.00% to 300.00%	
401806	Load Cell	Status codes	Int16, Ro	0 to 255 0: OK 201: Calibrating	
401807	Load Cell	Error bit	Int16, Ro	0-1	Error at Tare
401812	Load Cell	Filtered Total Tension	Int16, Ro	-30000 to 30000 -300% to 300%	
401813	Load Cell	Left Load Cell raw input	Int16, Ro	-32768 to 32767 -327.68 to 327.67mV	Measure the raw mV from the Load Cells
401814	Load Cell	Left Load Cell raw input	Int16, Ro	-32768 to 32767 -327.68 to 327.67mV	Measure the raw mV from the Load Cells
401820	Load Cell	Cal value	Int16, R/W	1000 to 10000 10% to 100%	Percent of full scale
401830	Load Cell	Bit to auto Tare	Int16, R/W	0 - 1	Write 1 to auto tare
401831	Load Cell	Bit to auto Calibrate	Int16, R/W	0 - 1	Write 1 to Auto calibrate
401844	Load Cell	Output 1 and 2 filter	Int16, R/W	1 to 10000 Samples	Sampling middling via stak
401853	Load Cell	Display filter	Int16, R/W	10 to 10000 Samples	Sampling middling via stak
	Modbus	Modbus slave address	Int16, R/W	1-247	Default: 247 ”DATABITS=8” ”STOPBITS=1”

402302	Modbus	Modbus slave baud rate	Int16, R/W	0 to 32767 24: 2400 48: 4800 96: 9600 192: 19200 384: 38400 576: 57600	Default: 576
402303	Modbus	Modbus slave parity	INT16	0: NONE 1: EVEN 2:ODD	Default: EVEN

6. 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