LI401 Digital Level Controller

Operation
& Installation Manual

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LI401 OPERATIONS MANUAL

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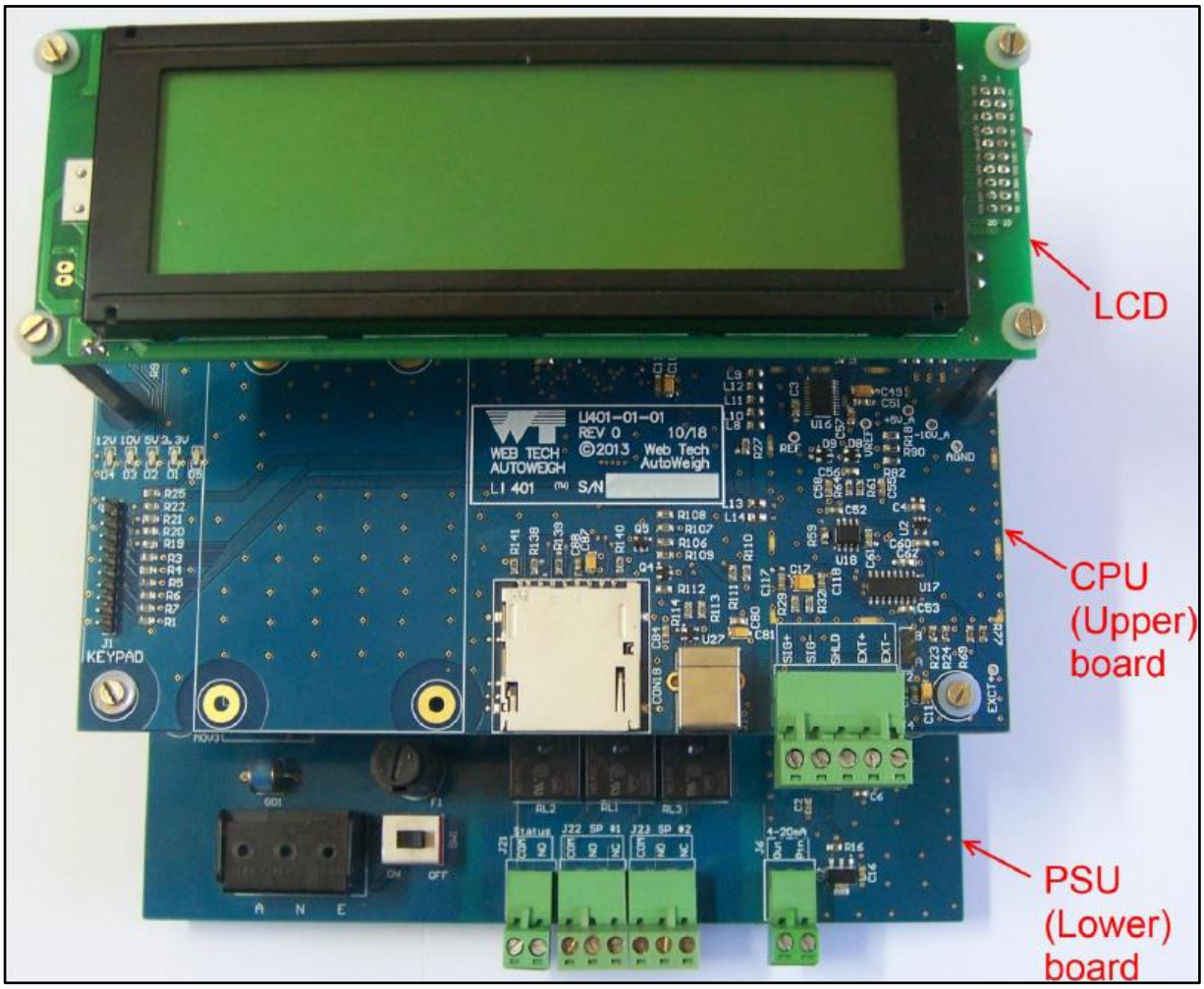
Introduction

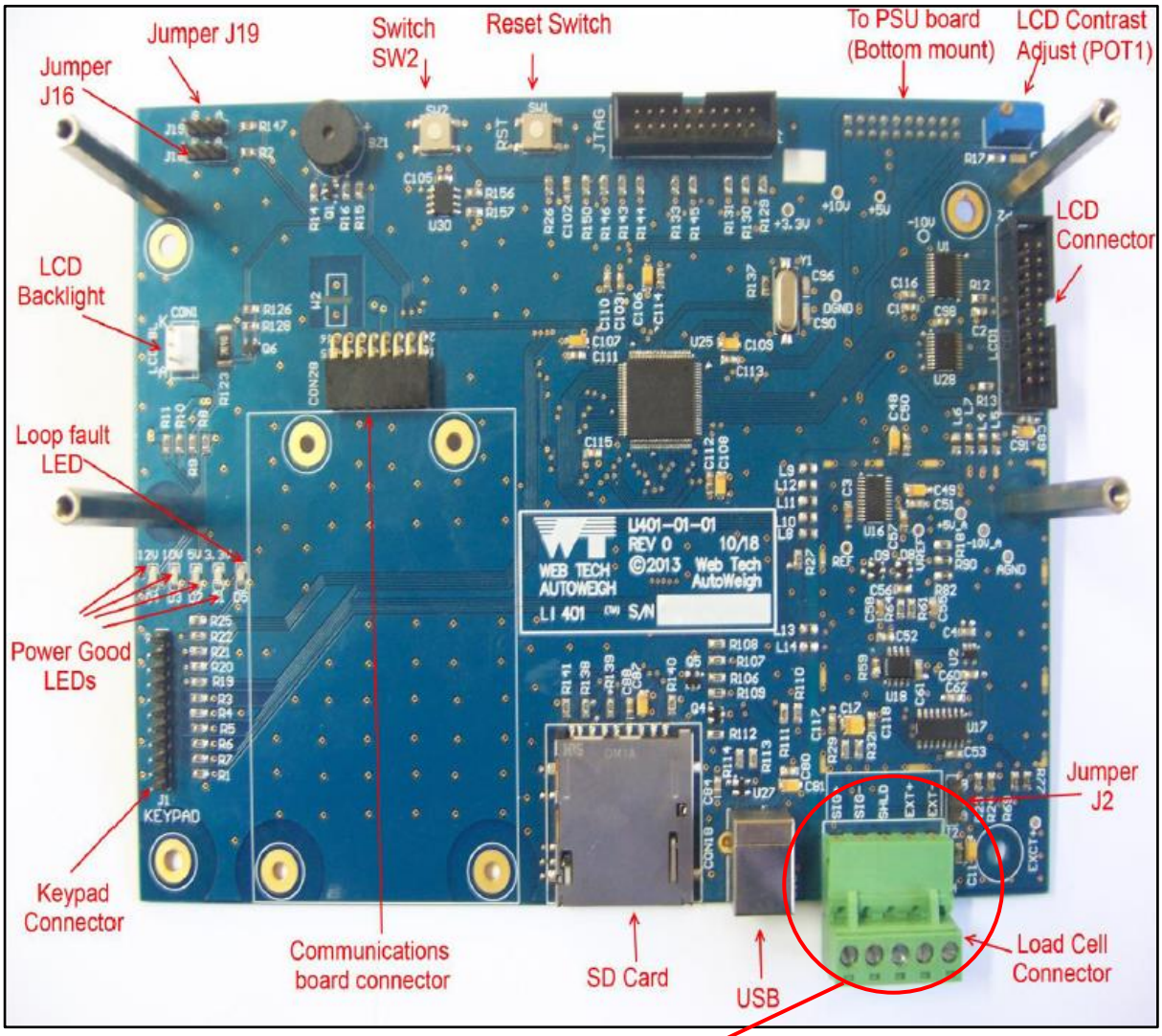
The LI401 Digital Indicator, is a microcontroller based instrument providing continuous measurement of material levels within silos and storage vessels for both new and existing applications. The instrument's user interface and indication of material level is displayed via a graphical LCD. The instrument provides an isolated 4-20mA current loop to directly indicate the level of product inside a vessel, two programmable setpoints with mechanical relays to control external devices and a dedicated system healthy relay. The LI401 is designed with optional fieldbus communication plug-in card for protocols such as Ethernet-IP, Modbus-TCP, DeviceNet and Profibus.

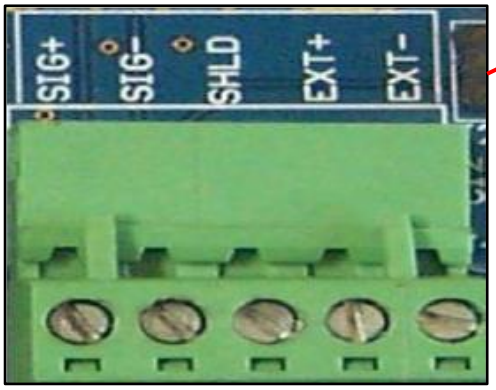


The unit consists of two printed circuit boards (PCB), the CPU and PSU. There are optional communications boards for fieldbus protocols.

The CPU board consists of terminal connector for connecting full-bridge or half-bridge sensors (depending on specification at time of order). SD card (up to 4gb) slot for logging data with pre-set period.

CPU Board:





NOTES:

- Load cell excitation voltage 10V DC is supplied from the LI401.
- The “Power Good LEDs” indicate the status of different power rails.
- 4 – 20mA LED turns on when there is current flowing through the 4 – 20mA output.
- “LCD Contrast (POT1)” is used to adjust the LCD contrast.

Load Cell Connector Details for CPU Board:

SIG+	Load cell signal +
SIG-	Load cell signal -
SHLD	Shield
EXC+	Load cell excitation + (10V)
EXC-	Load cell excitation –

Jumper Details:

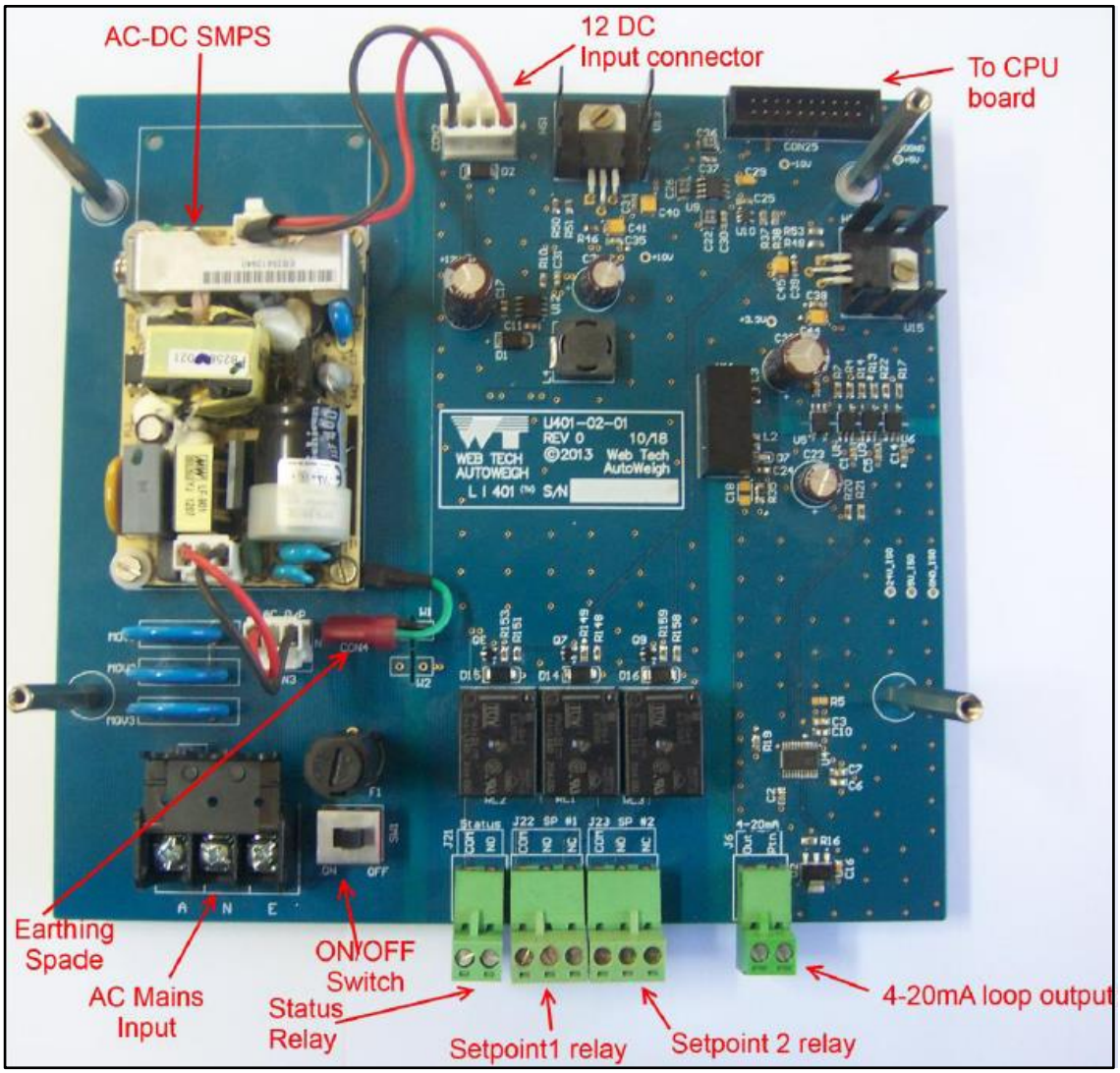
Jumper	Position A	Position B
J2	Default (or no jumper).	Used in case of half bridge load cell.

IMPORTANT: System must be powered OFF before changing the jumpers.

Hardware Details

The PSU board consists of a black Molex terminal block to connect the power terminal; this will either be 240VAC or 24VDC depending on specification at time of order, a three wire connection terminal blocks for digital signal outputs and a single two way terminal block for isolated 4-20mA current loop output.

PSU Board:



Connector Details for PSU Board:

Connector	Connector Marking	Function
Power – AC Input	A	Live
	N	Neutral
	E	Earth
Power – DC Input	+	Positive
	-	Negative
	E	Earth
Relays (Setpoint 1 and Setpoint 2)	Com	Common
	NO	Normally Opened
	NC	Normally Closed

Connector	Connector Marking	Function
Status relay	Com	Common
	NO	Normally Open
4 – 20mA current loop	Out	Out (positive)
	Rtn	Return (negative)

User Interface

The LI401 level indicator uses a membrane keypad and a graphical LCD as the user interface.

Keypad Operation:

All the functions are configured using the keypad and follows the same programming sequence structure.

KEY/S	FUNCTION
Numerical keys (0-9)	▪ Entering numerical values ▪ Selecting options from the main menu
Decimal point (.)	▪ Entering numerical values
Clear (C)	▪ Clearing entered data ▪ Deleting saved data files

Directional arrows (▲, ▶, ▼, ◀)	▪ Moving the cursor (highlighted line) ▪ Toggle through pre-set options/values
SAVE	▪ Confirm and save any entered/changed data and return to the previous screen.
ABORT	▪ Discard any entered/changed data and return to the previous screen ▪ Return to previous screen
HOME	▪ Returns you to the home screen
MENU	▪ Accessing the main menu from the home screen
ENTER	▪ Selecting highlighted options from the menus ▪ Selecting values to edit ▪ Switching between the two home screen displays

The user generally follows the same sequence for navigating and editing parameters in LI401. The main menu is accessed by pressing the MENU key from the home screen. There are eleven options in the main menu and each one is given a numerical value. The user can access particular screens/sections via two methods: firstly by pressing the number shown alongside the menu option on the keypad, or secondly by pressing the ENTER key with the particular option highlighted. The directional arrows (▲,▶,▼,◀) are used to move the cursor around the main menu and all other menus/sections of the LI401. The ENTER key is used to access the highlighted option and the ABORT key is used to go back to the previous screen.

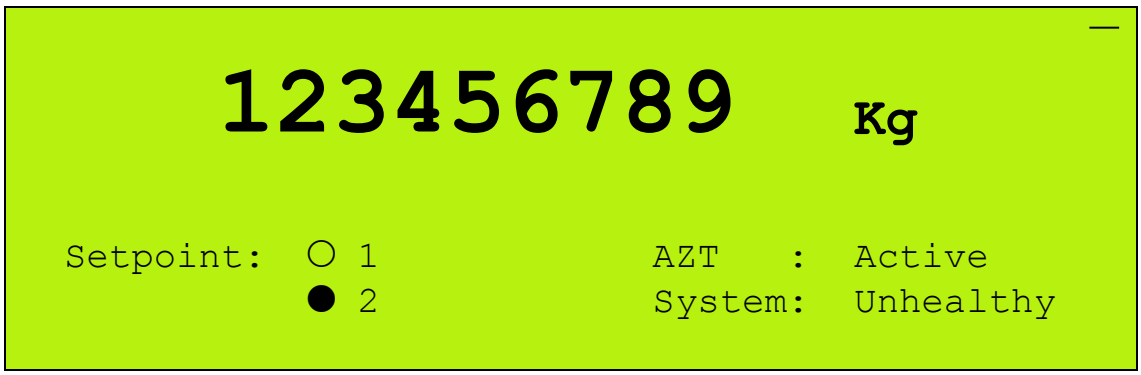
To edit a parameter, the user should navigate the cursor to the value. If the value cannot be highlighted then the parameter is fixed. With the value/parameter highlighted, press the ENTER key to engage the editable field. The cursor will disappear meaning you have engaged the editable field. Use either the directional arrows or the number pad (depending on the application) to edit the parameter. When the required value has been selected/entered press the ENTER key to exit the editable field and the cursor will reappear. The parameter the user just entered will be confirmed once the SAVE key is pressed. Multiple parameters in a screen/section can be changed in this way. If the ABORT key is pressed instead of the SAVE key, all the changed parameters will be discarded.

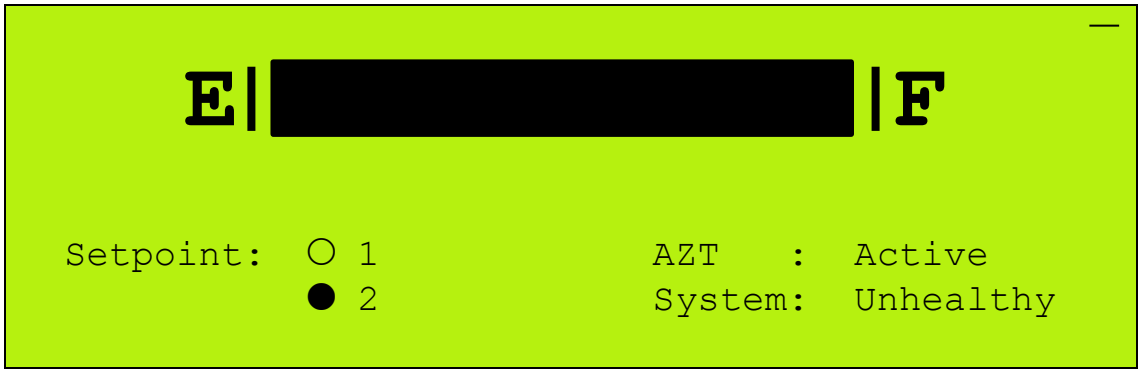
NOTE: The LI401 is equipped with a keypad timeout of 120 seconds. This means that once a key has been pressed, the user has 120 seconds to press the next key before the timeout is triggered and the indicator exits the current screen and returns to the home screen. The LCD backlight turns off if no key is pressed for five minutes.

NOTE: If the user is in an editable field then the ABORT key is disabled. The ENTER key must be pressed to exit the editable field.

Home Screen

The LI401 has two variations of the home screen, numerical and bar graph. The numerical display shows the current weight up to three decimal places, while the bar graph display shows the current weight relative to the programmed maximum capacity. The home screen is shown upon powering up the LI401. Press the ENTER key to switch between the two home screen variations.





The home screen also displays the current status of the two setpoints. The following symbols indicate the status of the setpoint:

○ = Deactivated
● = Activated

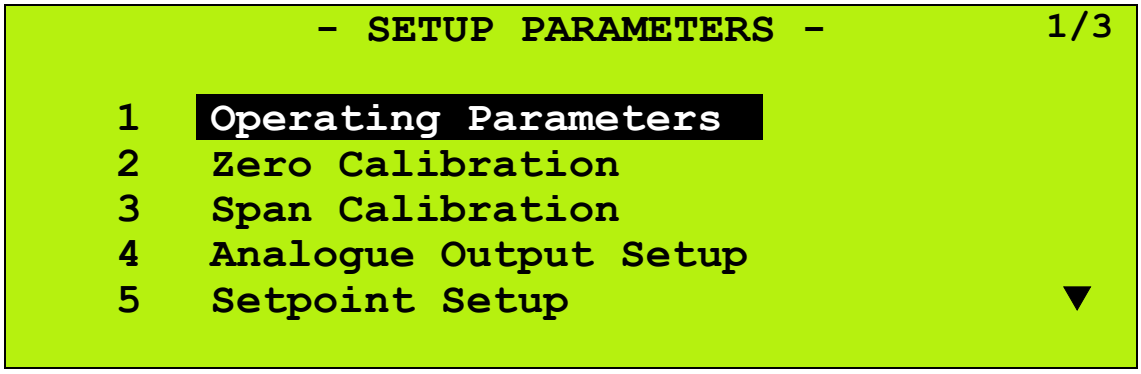
See the “Setpoint Setup” section for instructions on setpoint configuration.

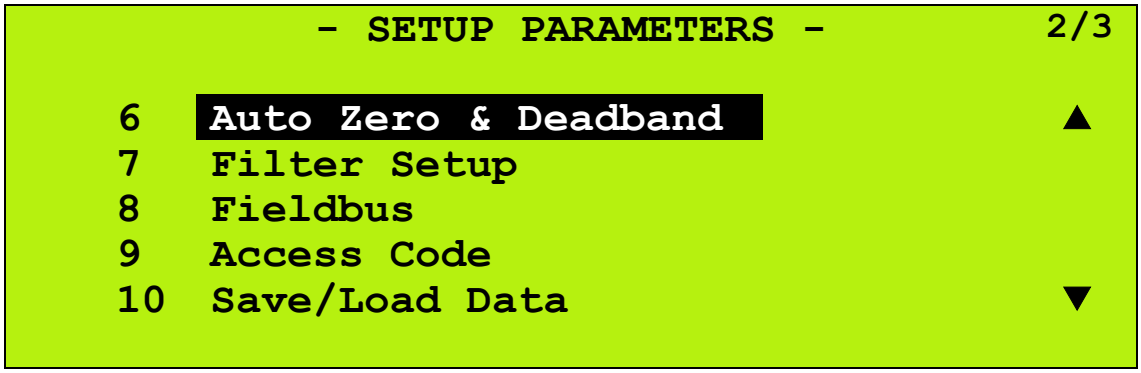
Auto Zero Tracking (AZT) status is also shown as active or inactive depending on the user’s configuration. See the “Auto Zero Tracking & Deadband” section for setup and further details.

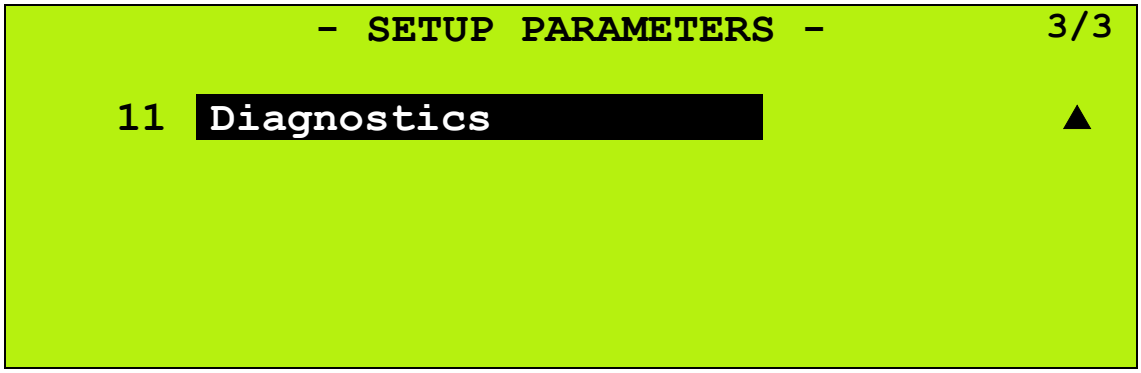
System status will always be healthy unless a fault is detected with the weight in which case the status becomes unhealthy.

Main Menu

The main menu is accessed by pressing the MENU key whilst in the home screen. The main menu consists of eleven numbered options. Use the ▲ and ▼ keys to move the cursor up and down the menu and press the ENTER key to access a highlighted section. Alternatively you can press the associated number on the keypad and wait for the screen to change. The eleven menu options are spread over three screens as shown below. A fraction in the top right hand corner of each screen indicates where you are on the list. Press the HOME key or the ABORT key to return to the home screen.

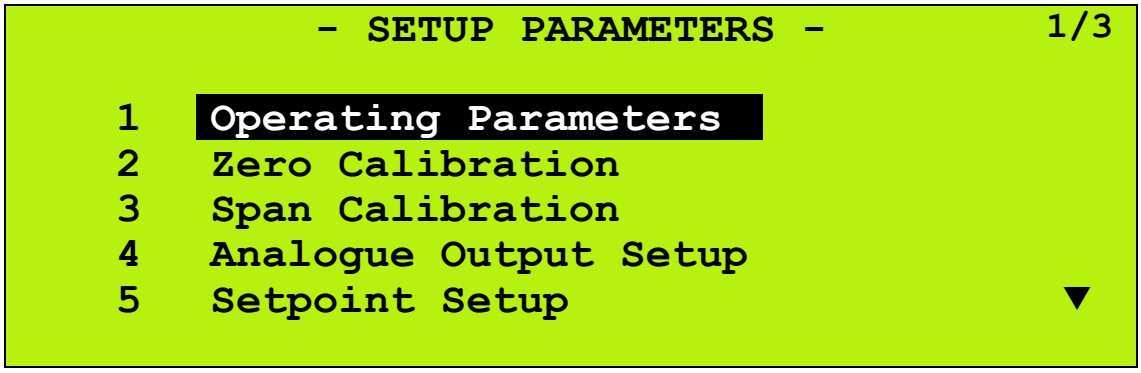


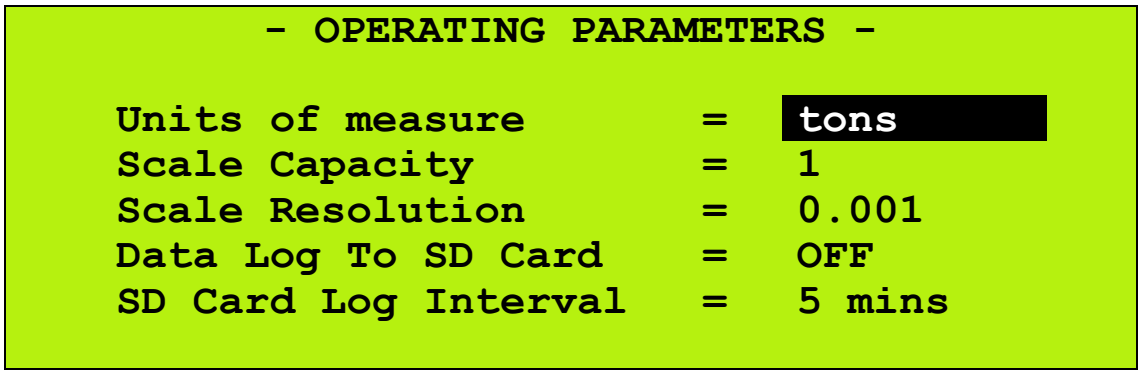




Operating Parameters

To access the operating parameters, move the cursor to “Operating Parameters” on the main menu and press the ENTER key. Alternatively, press the number 2 on the keypad.



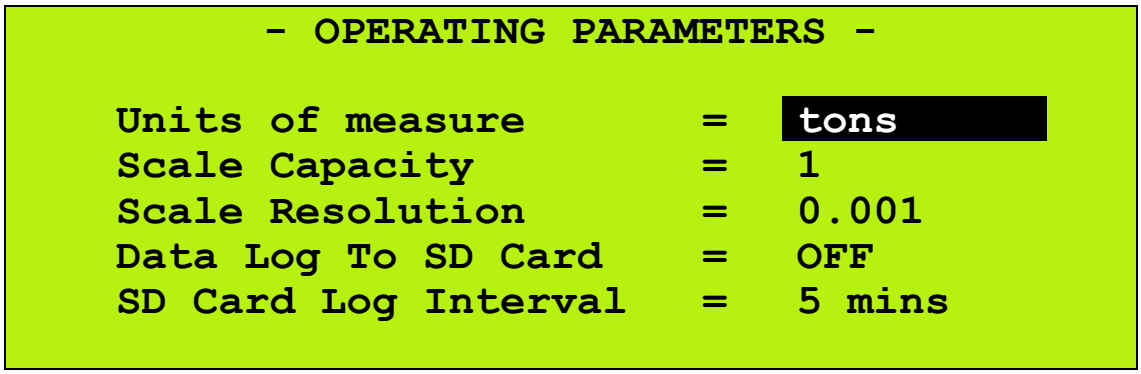


There are five entry points in the operating parameters menu. Use the ▲ and ▼ keys to navigate through the menu.

Units of Measure:

The LI401 can display weight in a variety of units. The units selected are purely for display purposes and play no role in the instrument operation or calibration. There are nine units available to choose from. The available units are:

- Ounces
- Pounds
- Tons
- Gallons
- Percent
- Grams
- Kilograms
- Tonnes
- Litres



To select the required units, press the ENTER key with the units field highlighted. With the field selected use the ◀ and ▶ keys to toggle between the options. Once the required units are shown on the screen, press the ENTER key to exit the field. The new units will be confirmed once the SAVE key has been pressed.

```
        - OPERATING PARAMETERS -

Units of measure        =   kilograms
Scale Capacity          =   1
Scale Resolution        =   0.001
Data Log To SD Card     =   OFF
SD Card Log Interval    =   5 mins
```

Scale Capacity:

The scale capacity is used to perform certain scaling calculations and also determines the upper limit for all subsequent settings. To edit the scale capacity, move the cursor to the "Scale Capacity" option and press the ENTER key.

```
        - OPERATING PARAMETERS -

Units of measure        =   kilograms
Scale Capacity          =   1
Scale Resolution        =   0.001
Data Log To SD Card     =   OFF
SD Card Log Interval    =   5 mins
```

```
        - OPERATING PARAMETERS -

Units of measure        =   kilograms
Scale Capacity          =   1000
Scale Resolution        =   0.001
Data Log To SD Card     =   OFF
SD Card Log Interval    =   5 mins
```

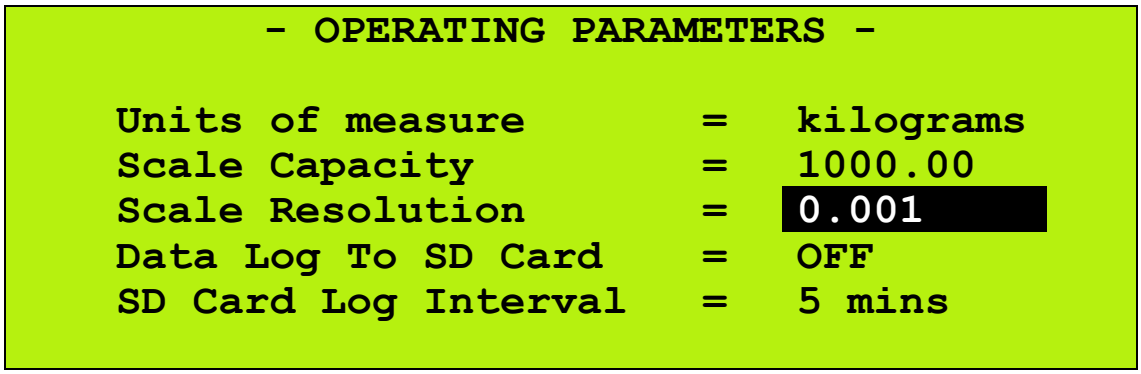
Enter the desired capacity using the number keypad and press the ENTER key again to exit the editable field. The new capacity will be confirmed when the SAVE key is pressed.

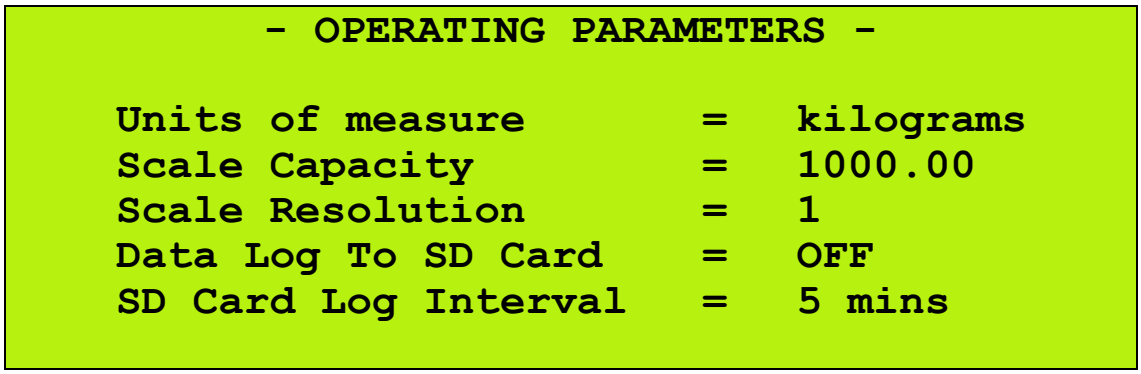
Scale Resolution:

The LI401 allows the operator to select the resolution of the weight displayed on the home screen. There are five resolutions to choose from:

- 10
- 0.1
- 0.001
- 1
- 0.01

To select the required resolution, press the ENTER key with the resolution option highlighted. Use the ◀ and ▶ keys to toggle between the resolutions.



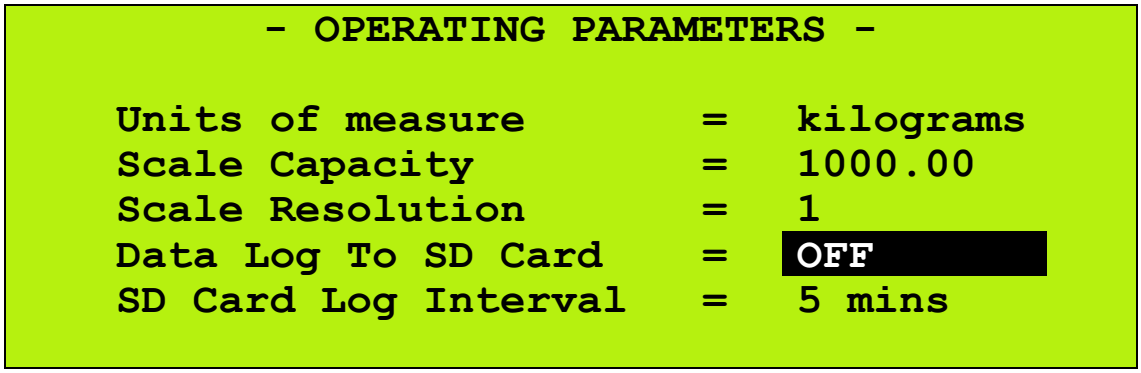


Once the required resolution is displayed, press the ENTER key to exit the editable field. The units will be confirmed once the SAVE key has been pressed.

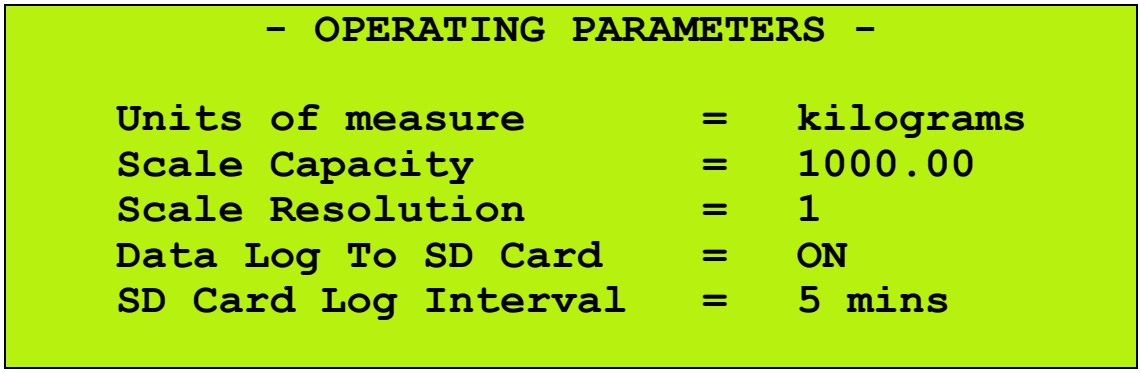
Data Log to SD Card:

If an SD card is inserted, this feature allows the operator to enable or disable the data log entry to the SD card. To enable/disable the data log entry, move the cursor to the "Data Log To SD Card" option and press the ENTER key. There are two options:

- OFF (data log entry disabled)
- ON (data log entry enabled)

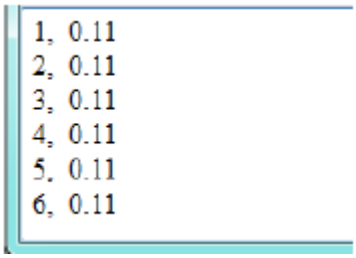


Use the ◀ and ▶ keys to toggle between ON and OFF until the required setting is displayed.



Once the required setting is displayed, press the ENTER key to exit the editable field. The new setting will be confirmed once the SAVE key has been pressed.

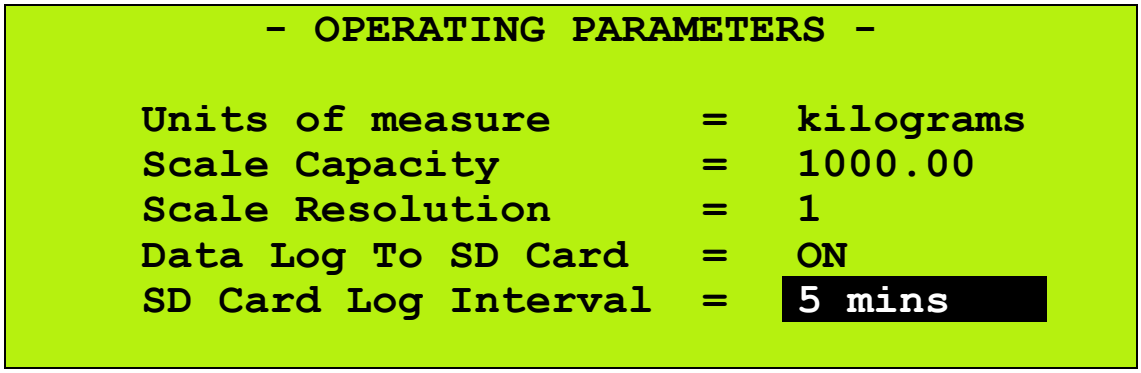
The data will be logged to a file named “log.csv” in the root folder of the SD card. If the file already exists then new data will be appended to it. If the file does not already exist then LI401 will create a new file. The “log.csv” file will contain data in the following format when opened using notepad:



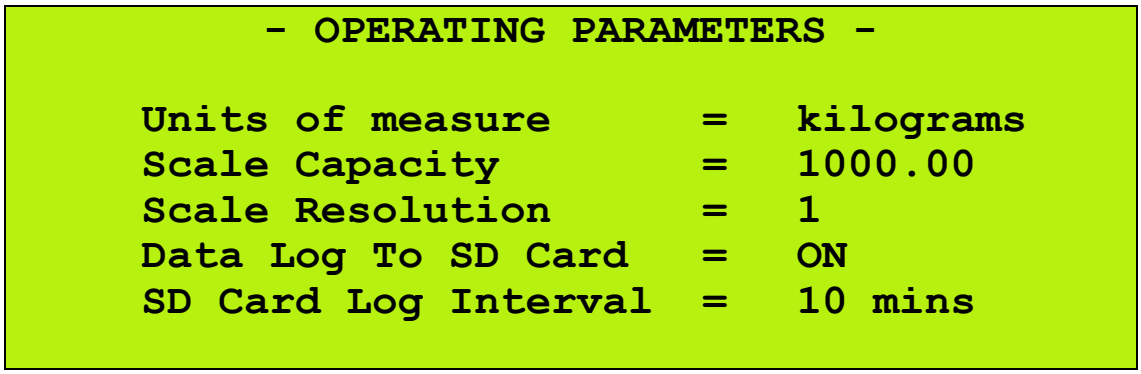
The logged information contains two numbers. The first is a counter which increments continuously and the second is the weight as shown on the LI401 home screen. Each reading starts on a new line.

SD Card Log Interval:

If an SD card is inserted and the data log entry is enabled, the log interval can be set. The log interval is the time interval that data is entered into the “log.csv” file. The minimum and maximum time intervals that can be set are 5 minutes and 999 minutes respectively. To edit the log interval, press the ENTER key with the “SD Card Log Interval” option highlighted.



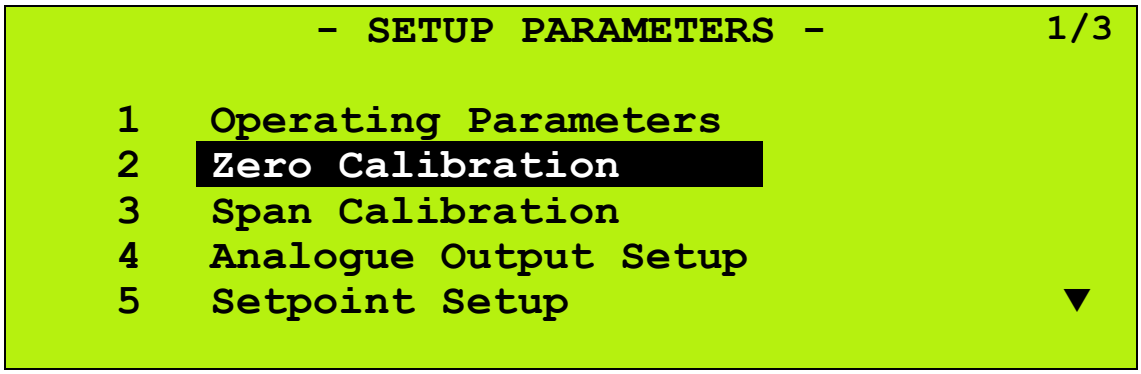
Enter a value between 5 and 999 using the keypad and press the ENTER key to exit the field. The new log interval will be confirmed when the SAVE key is pressed.

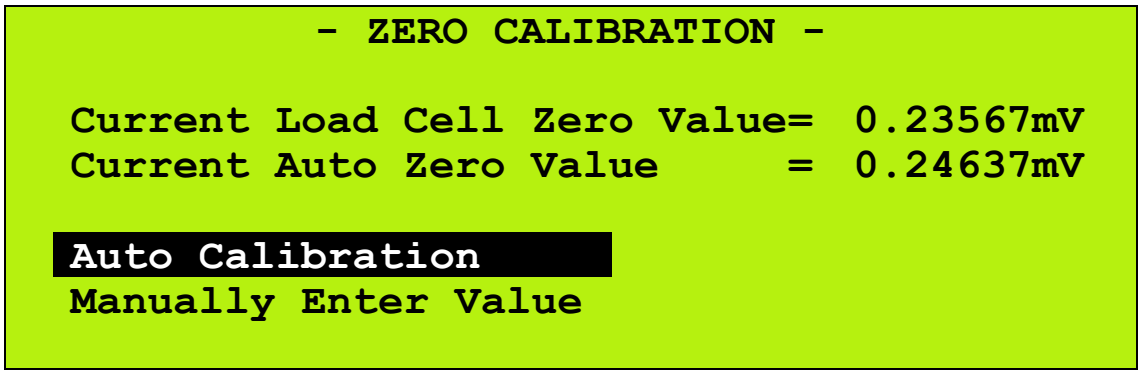


Zero Calibration

The performance of LI401 depends upon the accuracy with which the zero and span calibrations are carried out. The zero calibration should be performed first, when the storage vessel is preferably empty or at a low level. The zero calibration tells the LI401 that the load cell output corresponds to an empty or close to empty storage vessel. The second operation, the span calibration, is performed ideally when the vessel is full. LI401 uses the information gathered from the zero and span calibrations to calculate the current bin level.

To access the zero calibration, move the cursor to “Zero Calibration” on the main menu and press the ENTER key. Alternatively, press the number 2 on the keypad.

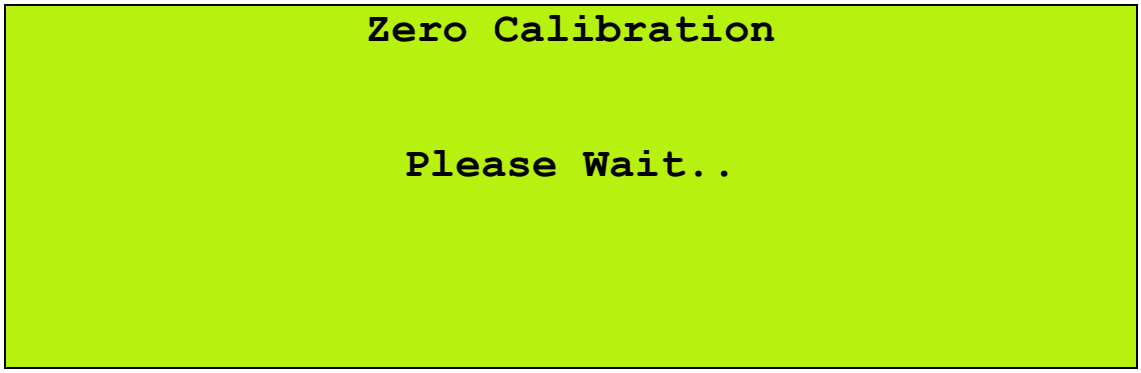


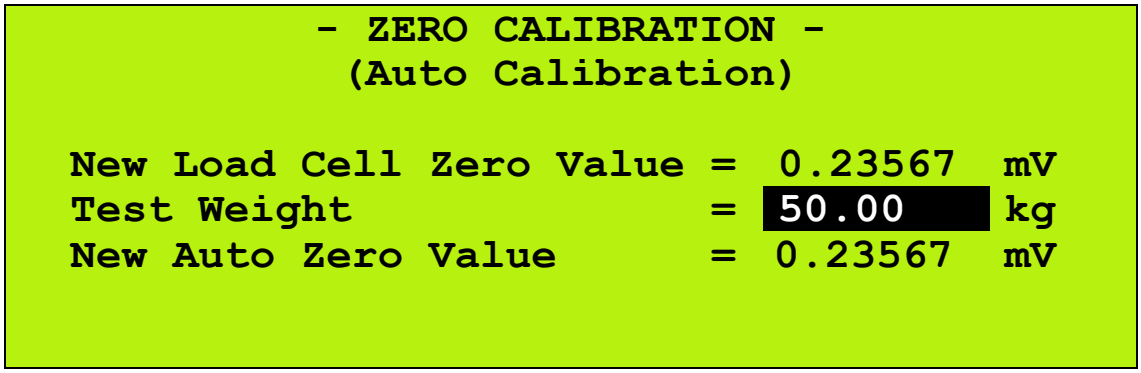


Upon entering the zero calibration menu, the current load cell zero value and current auto zero value are shown. There are two methods of performing the zero calibration: manual and automatic.

Automatic Zero Calibration:

To perform the automatic zero calibration, ensure the vessel is either empty or close to empty prior to selecting auto zero calibration. Press the ENTER key with “Auto Calibration” highlighted and the LI401 will read the vessel’s weight. The following screen will be displayed for a few seconds while it calibrates.



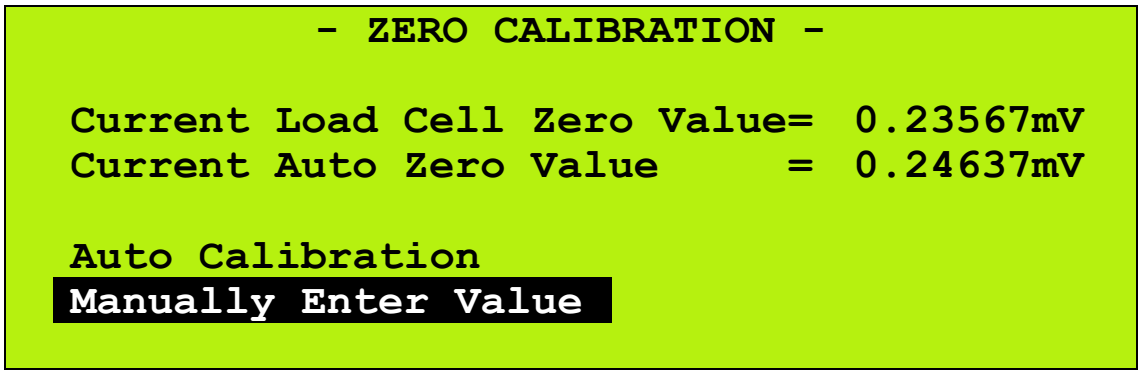


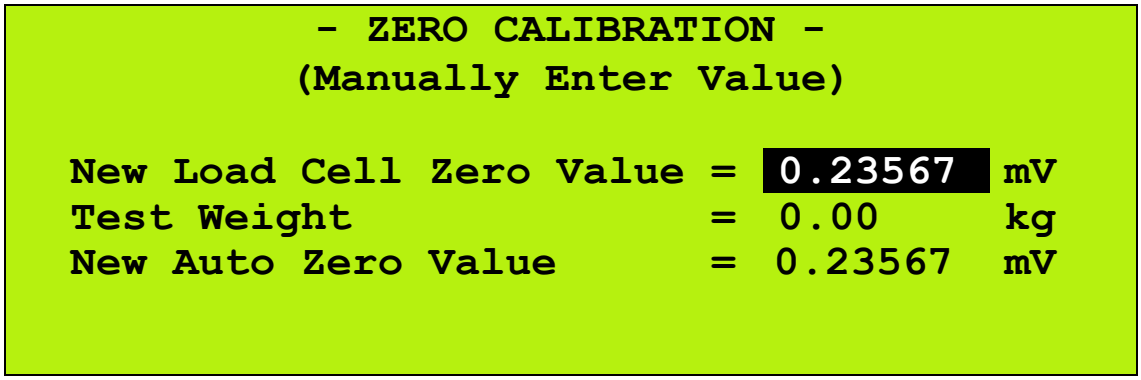
Press ENTER to access the "Test Weight" editable field. If the calibration was performed with the vessel completely empty the test weight would be zero. However the LI401 can be calibrated with a known quantity of product remaining within the vessel. In such circumstance, the weight of the remaining product will be your test weight. Enter the test weight and press the ENTER key to exit the field. The zero calibration will be confirmed once the SAVE key has been pressed.

NOTE: Before pressing "Auto Calibration" please ensure that the weight within the vessel is known in order to be entered as the "Test Weight".

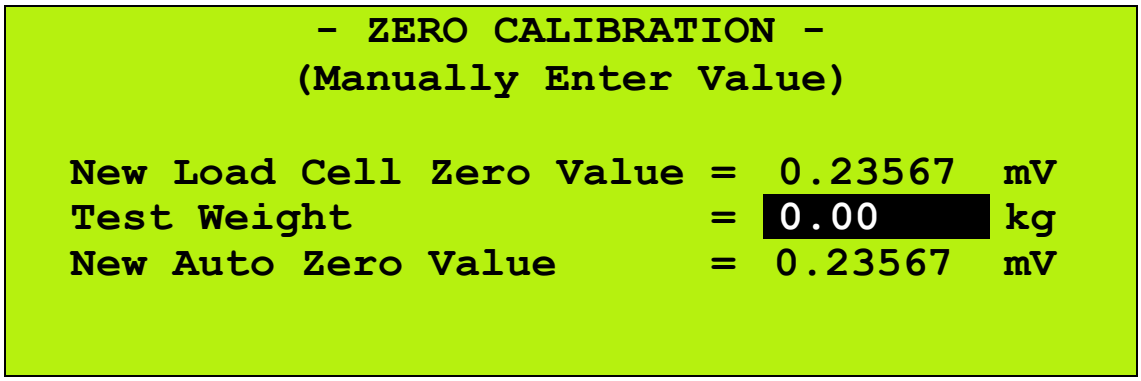
Manual Zero Calibration:

To manually perform the zero calibration, press the ENTER key with "Manually Enter Value" highlighted.





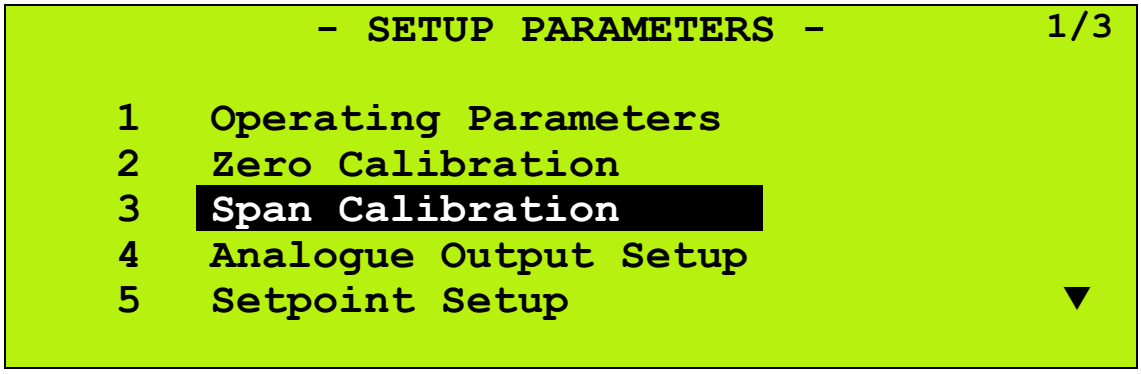
From this screen you can manually enter the load cell zero value. Pressing the ENTER key to engage the editable field and enter the load cell zero value using the keypad. The test weight can also be edited from this screen. The new values will be confirmed when the SAVE key is pressed.

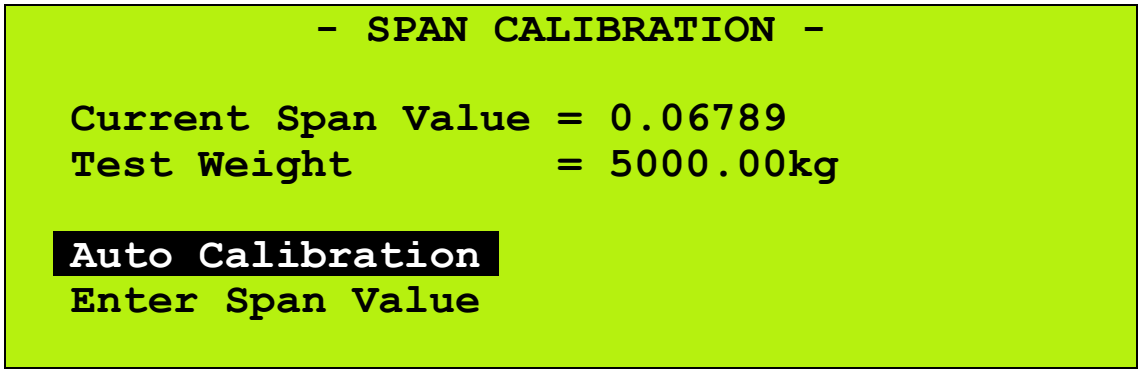


Span Calibration

The span calibration maps the load cell readings to a known weight. Using values attained from this calibration together with the zero calibration, the LI401 is able to measure the weight of the vessel. A span calibration can be performed when the vessel is full or has a known weight.

To access the span calibration, move the cursor to “Span Calibration” on the main menu and press the ENTER key. Alternatively, press the number 3 on the keypad.



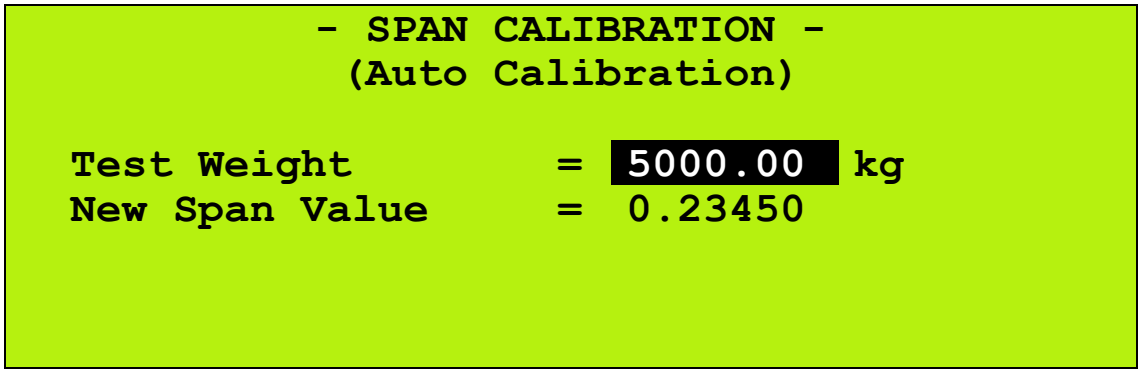


On the span calibration screen the current span value and test weight are displayed. The span calibration can be performed either automatically or manually.

NOTE: To get accurate weight values it is recommended that the span calibration is performed with a load cell output value > 2mV.

Automatic Span Calibration:

To perform the automatic span calibration, press the ENTER key with “Auto Calibration” highlighted.

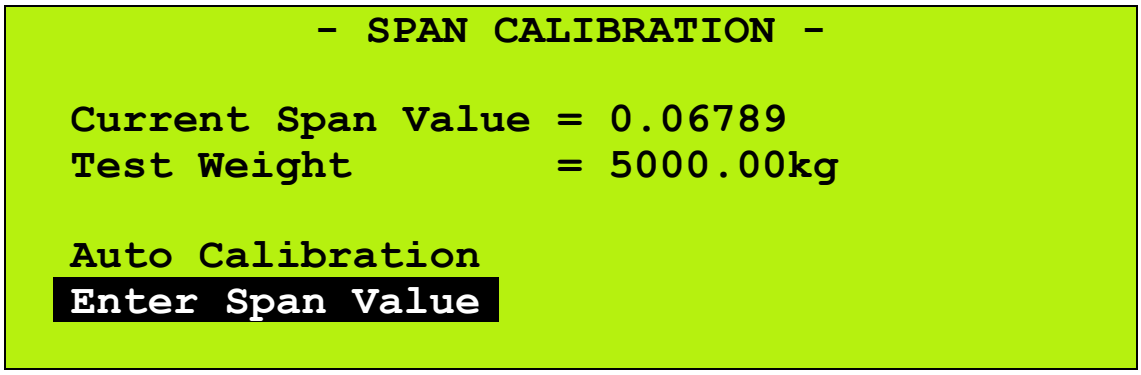


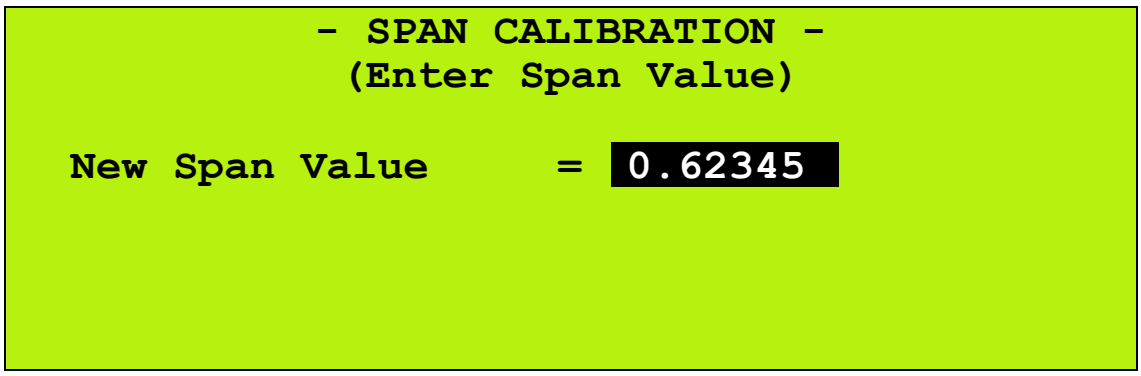
To attain a new span value, enter the test weight value and press the ENTER key. The new span value will be calculated and displayed on the screen. Press the SAVE key to confirm the new span value or press the ABORT key to exit without saving.

NOTE: Before carrying out the span calibration, make sure that the storage vessel is carrying the test weight.

Manual Span Calibration:

To manually enter a new span value, press the ENTER key with "Enter Span Value" highlighted.





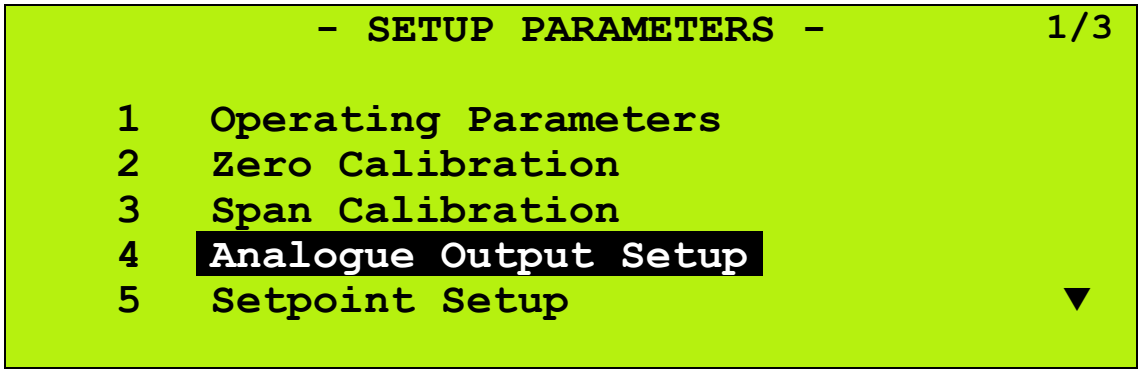
To change the span value, press the ENTER key to engage the editable field. Enter the new span value using the keypad and press ENTER again to exit the field. Press SAVE to confirm the new span value and return to the setup parameters menu or press ABORT to cancel the span value entry.

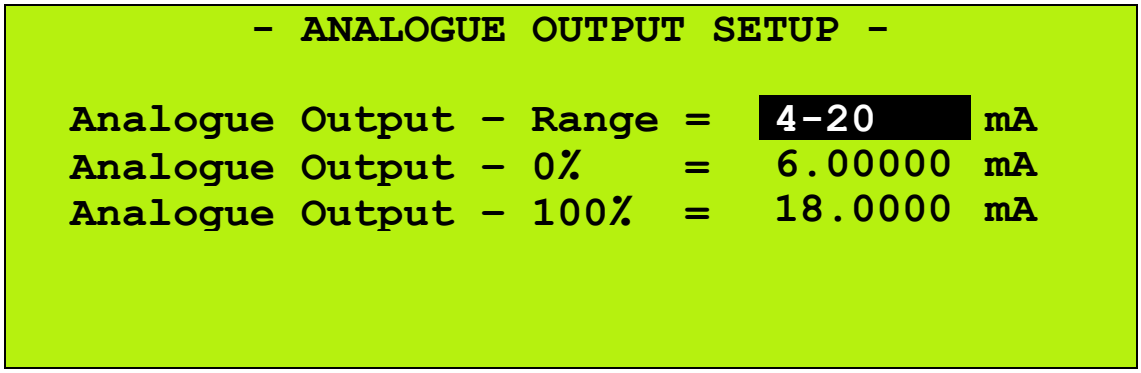
Analogue Output Setup

The LI401 supports two output current ranges:

- 4 – 20 mA
- 0 – 24 mA

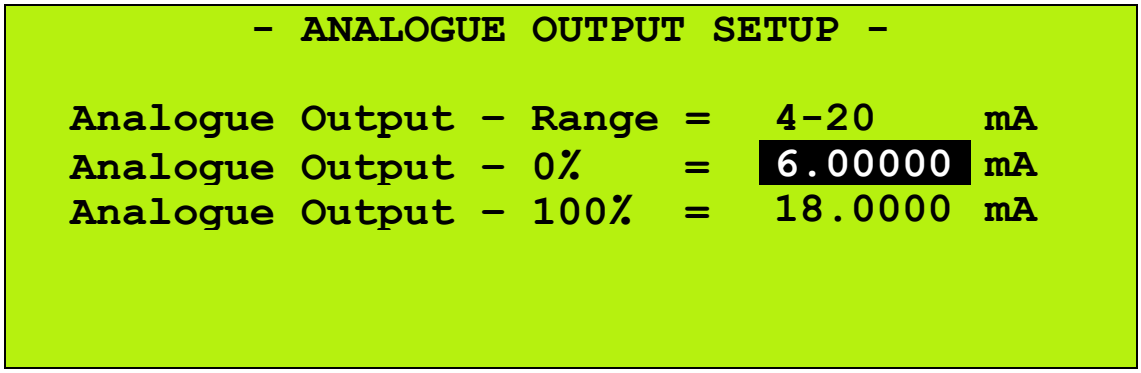
To change the output current range, move the cursor to “Analogue Output Setup” on the main menu and press the ENTER key. Alternatively, press the number 4 on the keypad.





Press the ENTER key with the analogue output range selected and use the ◀ and ▶ keys to select the desired output range. Press the ENTER key to exit the field. The analogue output range will be confirmed when the SAVE key is pressed.

You can further customise the minimum and maximum output within the selected range by manually setting the 0% and 100% output values. To edit these, scroll down to each respective value and press the ENTER key. Enter the required value using the keypad and press the ENTER key to exit the editable field. The new values will be confirmed when the SAVE key is pressed.



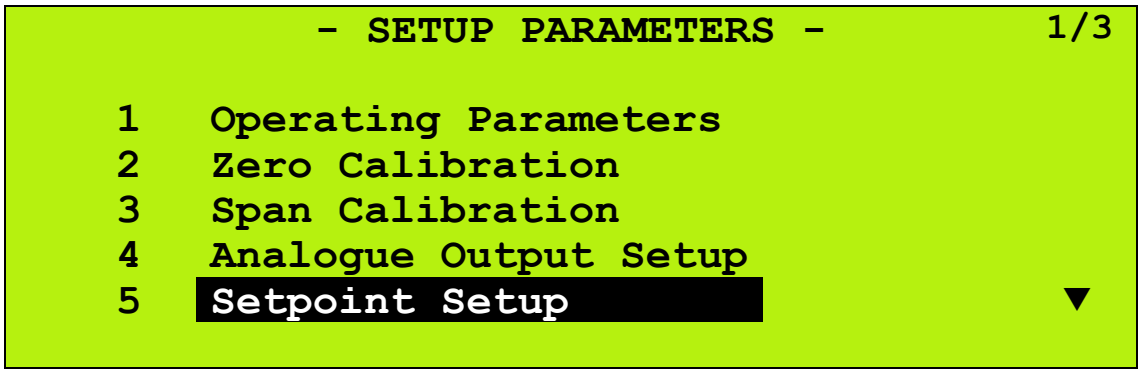
Setpoint Setup

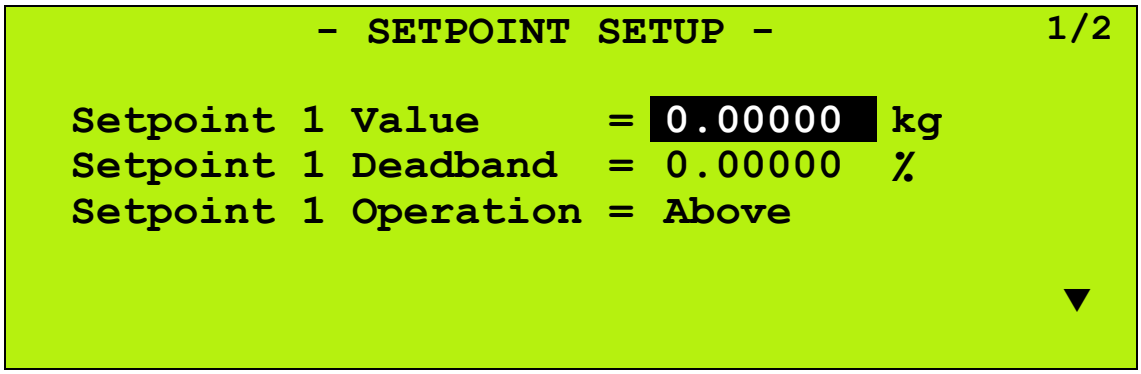
The LI401 has two fully programmable setpoints. These setpoints may be used to operate external equipment at predetermined bin levels. The LI401 has a mechanical relay corresponding to each setpoint.

Each setpoint requires three parameter inputs for correct operation:

1. The setpoint value at which the relay operates.
2. The setpoint deadband which defines the hysteresis between when the relays turn on and off.
3. The operation which determines the state of the relay when it is above or below the setpoint.

To configure the setpoints, move the cursor to "Setpoint Setup" on the main menu and press the ENTER key. Alternatively, press the number 5 on the keypad.





The first page displays the setup parameters for Setpoint 1 and the second page displays the setup parameters for Setpoint 2. You can scroll down to the second page using the arrows. The setup procedure for Setpoint 1 and Setpoint 2 is identical.

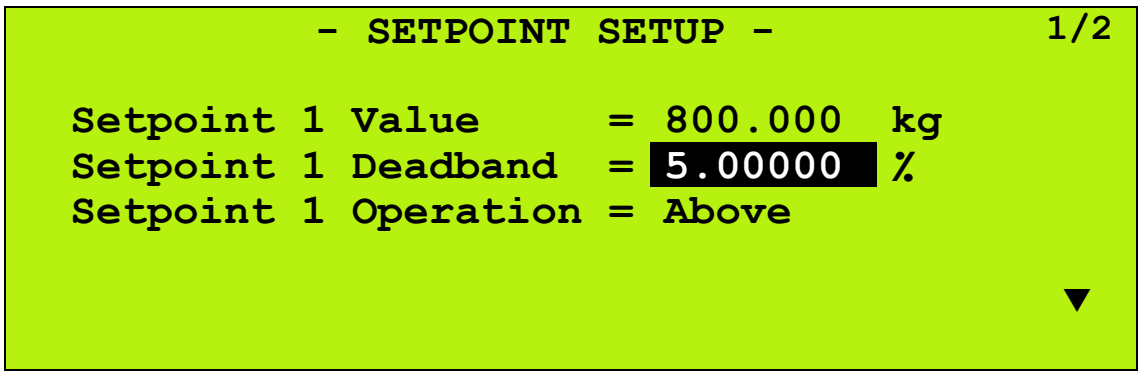
Setpoint Value:

The setpoint value allows the operator to program the level at which the setpoint relays will activate. To set the value, press the ENTER key with the setpoint value highlighted and enter the required number using the keypad. Press the ENTER key to exit the field. The new value will be confirmed once the SAVE key is pressed.

NOTE: If the operator enters a value greater than the scale capacity, the scale capacity is taken as the setpoint value.

Setpoint Deadband:

The setpoint deadband allows the operator to program the hysteresis between when the relays turn on and off. To set the deadband value, press the ENTER key with the setpoint deadband value highlighted and enter the desired percentage using the keypad.



Press the ENTER key again to exit the editable field. The new value will be confirmed once the SAVE key is pressed.

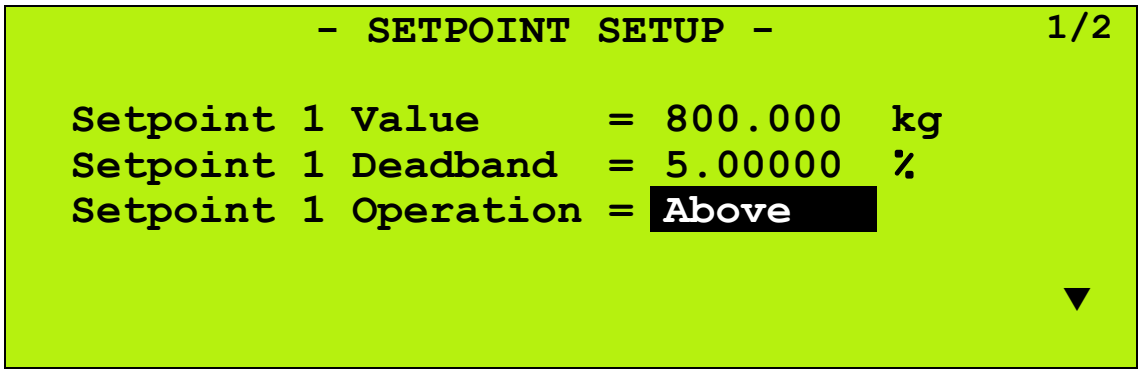
Setpoint Operation:

The setpoint operation allows the operator to define the polarity of the setpoint relays. Each setpoint can have either of two polarity settings:

- Above
- Below

The "Above" operation means the setpoint relay will de-energise if the level is at or below the setpoint and energise when the level is at or above the setpoint value plus the setpoint deadband. The "Below" operation means the setpoint relay will energise if the level is at or below the setpoint and de-energise if the level is at or above the setpoint value plus the setpoint deadband.

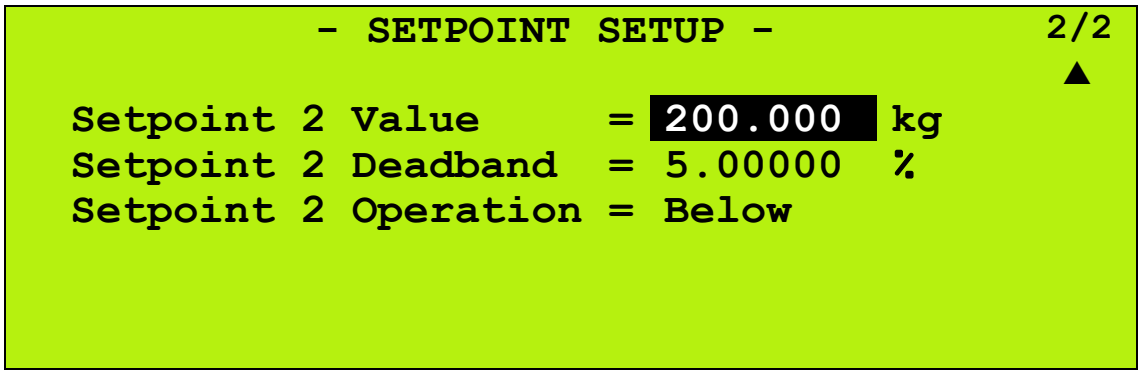
To set the operation, press the ENTER key with the setpoint operation setting highlighted and use the ◀ and ▶ keys to toggle between the two options.



Press the ENTER key again to exit the editable field. The new polarity will be confirmed when the SAVE key is pressed. The operation of the setpoint and deadband is summarised in the table below.

RELAY STATE	OPERATION	
	Above	**Below**
Energised	Setpoint	Setpoint
De-energised	Setpoint – deadband	Setpoint + deadband

The setup procedure for Setpoint 2 is identical to Setpoint 1. The setup screen for Setpoint 2 is shown below.



Auto Zero Tracking & Deadband

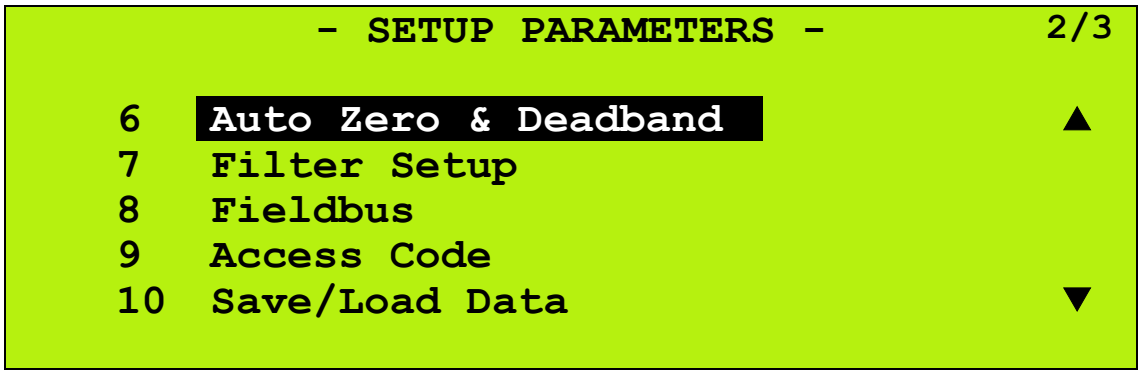
The LI401 has an auto-zero tracking (AZT) facility which enables it to automatically adjust the system "zero" to compensate for accumulated build-ups in the storage vessels "empty" condition. The auto-zero function works by sensing when the bin level has dropped below a user defined threshold. Should the bin level then remain static for a period of time, LI401 assumes that this now represents the new "empty" condition and removes any remaining offset. This operation is performed whenever the level in the storage vessel drops below the programmed threshold. The auto-zero function can be disabled at any time.

The LI401 also permits the entry of a maximum correction parameter. When the accumulated offset correction exceeds this parameter, the LI401 displays the fault condition on the LCD but continues to provide bin level information. This facility alerts the operator to the fact that the auto-zero function has accumulated to a sizable offset. While this does not necessarily indicate a system fault, it does highlight a situation which warrants further investigation. This fault condition requires manual resetting of the AZT Value.

There are four parameters required for AZT:

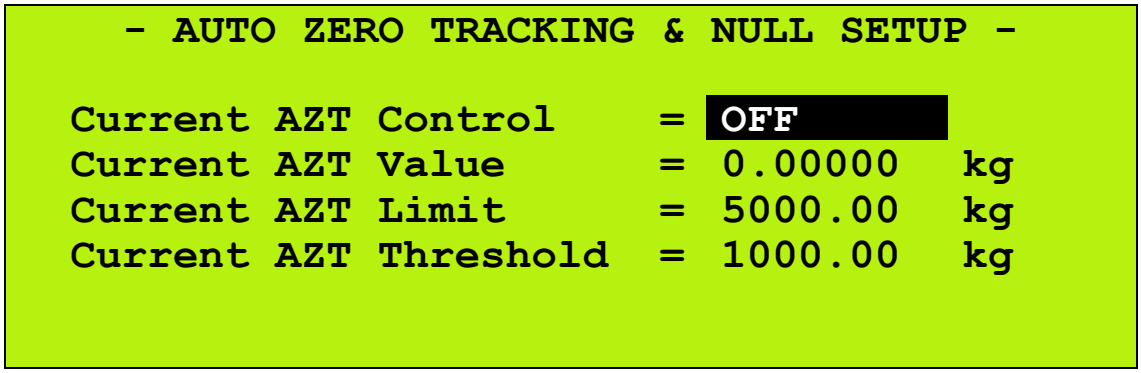
- AZT control
- AZT limit
- AZT value
- AZT threshold value

To set up the AZT, move the cursor to "Auto Zero & Deadband" on the main menu and press the ENTER key. Alternatively, press the number 6 on the keypad.



AZT Control:

To turn the AZT on or off, press the ENTER key with the current AZT control setting highlighted and use the ◀ and ▶ keys to toggle between the two options. Press the ENTER key to exit the field. The new setting will be confirmed when the SAVE key is pressed.

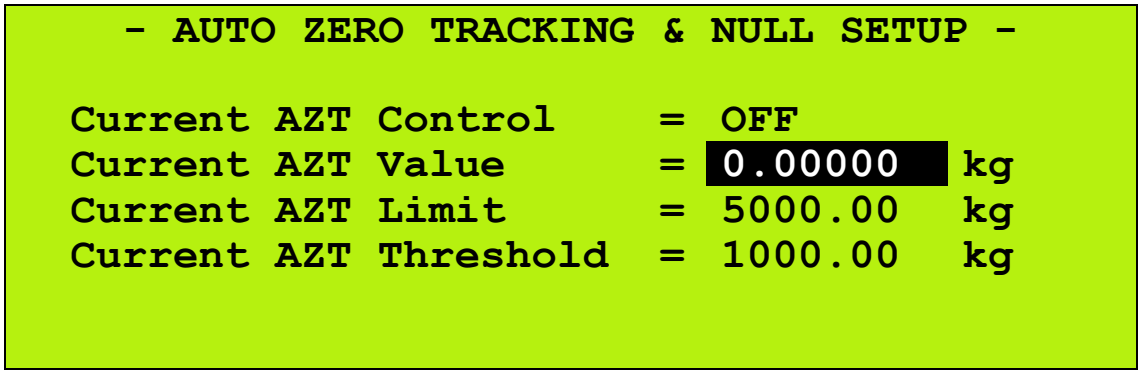


AZT Value:

The AZT value keeps a record of how far the present zero has deviated from the original zero which was determined during the zero and span calibrations. An auto-zero fault can occur when the accumulated “AZT Value” exceeds the maximum user defined “AZT Limit”. The fault condition can be identified when the word “Healthy” in the bottom right corner of the LCD on the home screen is replaced by the word "Unhealthy". The status relay is energised when the system is unhealthy and is de-energised when the system is healthy. The LI401 will continue to provide level information while in this fault condition.

Once an auto-zero fault has occurred, it is recommended that the bin be examined to ascertain if a problem exists. Look for an excessive build-up of material on the storage vessel, or any other reason as to why the empty vessel weight should have changed by an amount equal to or greater than the AZT limit. If the auto-zero fault is due to modifications to the storage vessel or permanent product build-up it is recommended that a zero calibration is performed. This procedure allows the LI401 to establish the new "empty” vessel condition and clear the auto-zero fault.

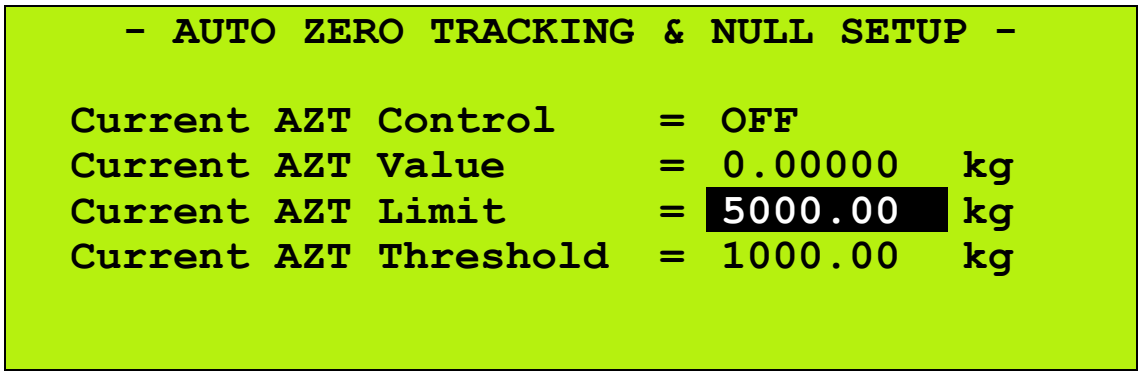
To reset the AZT, press the ENTER key with the current AZT value field highlighted.



Enter the new value using the keypad and press the ENTER key again to exit the editable field. It is recommended that the AZT value be reset to zero. The new value will be confirmed when the SAVE key is pressed.

AZT Limit:

The AZT limit parameter allows the user to program what is considered to be the maximum allowable deviation before an auto-zero fault occurs.



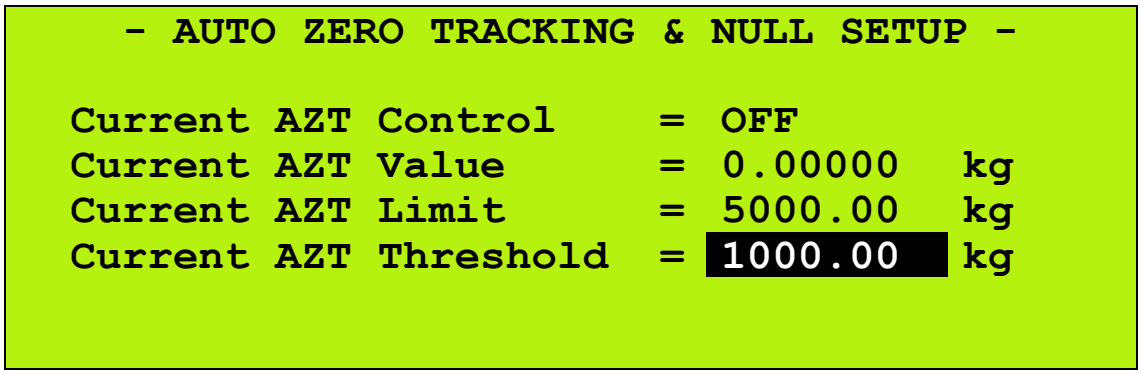
To set the AZT limit, press the ENTER key with the current AZT limit value highlighted. Enter the new value using the keypad and press the ENTER key again to exit the field. The new AZT limit will be confirmed when the SAVE key is pressed.

NOTE: If the limit entered is greater than the scale capacity, then the scale capacity is taken as the AZT limit.

AZT Threshold:

The AZT threshold is a user defined level at which the auto-zero function becomes active. This threshold is usually set to a very low level.

To set the AZT threshold, press the ENTER key with the AZT threshold value highlighted.



Enter the new value using the keypad and press the ENTER key to exit the editable field. The new threshold will be confirmed when the SAVE key is pressed.

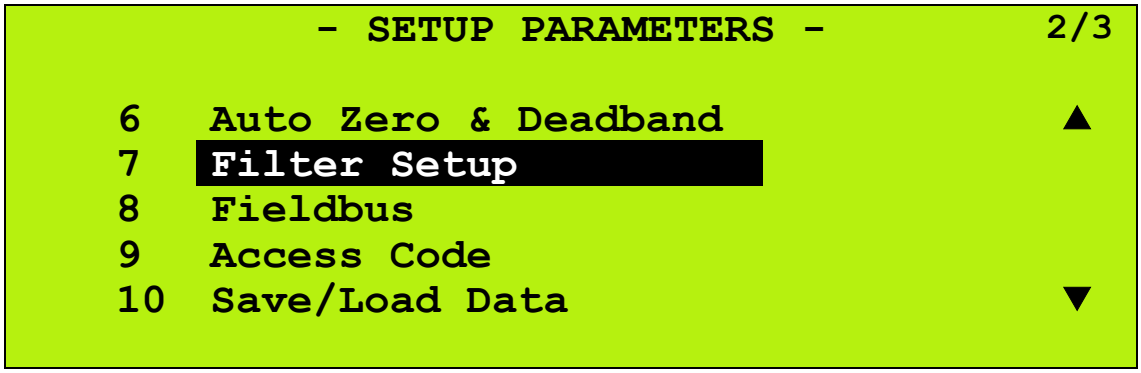
NOTE: If the value entered is greater than the vessel capacity value, then the vessel capacity is taken as the AZT deadband value.

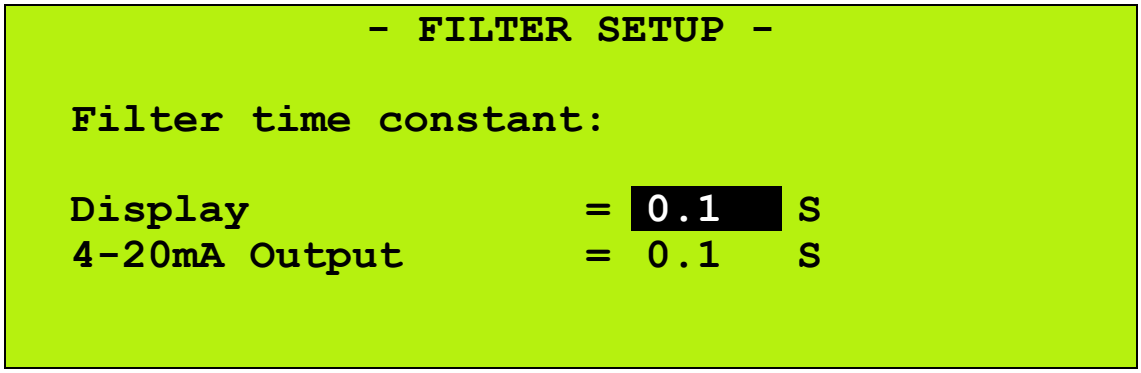
Filter Setup

The LI401 is equipped with a filter output facility which enables it to adjust the system output with the filter setup times. There are two filters:

- Analogue output filter
- 4 – 20 mA output filter

The filters are “moving average” filter types. To set up the filters, move the cursor to “Filter Setup” on the main menu and press the ENTER key. Alternatively, press the number 7 on the keypad.





Display Filter:

To configure the display filter, press the ENTER key with the display filter value highlighted. This filter takes an average of all the weight values during the set time period and displays this average value on the home screen. Enter the new value using the keypad and press the ENTER key to exit the field. The new time constant will be confirmed when the SAVE key is pressed.

4 – 20 mA Output Filter:

To configure the 4 – 20 mA output filter, press the ENTER key with the 4 – 20 mA output value highlighted. This filter takes an average of all the current loop values during the set time period and outputs this average value via the 4 – 20 mA current loop. Enter the new value using the keypad and press the ENTER key to exit the field. The new time constant will be confirmed when the SAVE key is pressed.

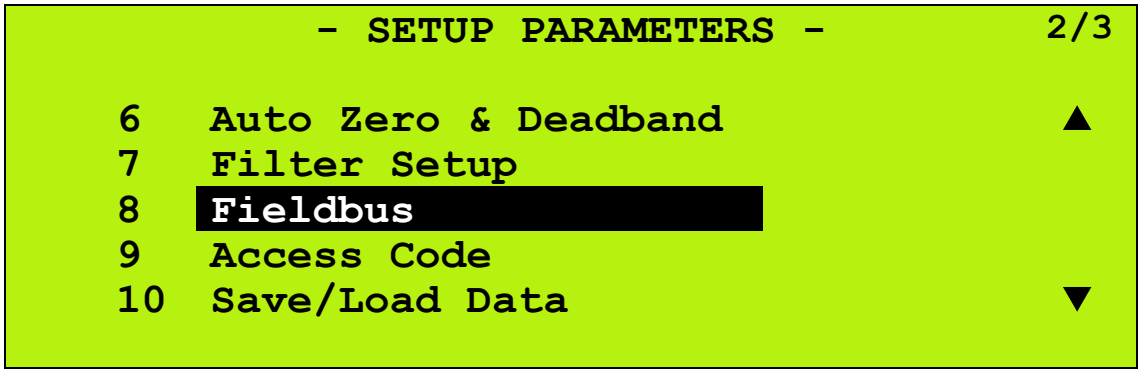
Fieldbus

There are four communications options for the LI401:

- RS232
- Profibus
- Ethernet
- DeviceNet

The communication option is enabled by connecting the appropriate communication PCB to the CPU board. The LI401 automatically recognises the type of communication PCB installed. It will assume RS232 as default if no other communication PCB is detected.

The fieldbus communications can be set up from the "Fieldbus" option in the Setup Screen. Depending on which communication PCB is installed on the LI401, it displays the appropriate setup screen. To configure the connected communications option, move the cursor to "Fieldbus" on the main menu and press the ENTER key. Alternatively, press the number 8 on the keypad.

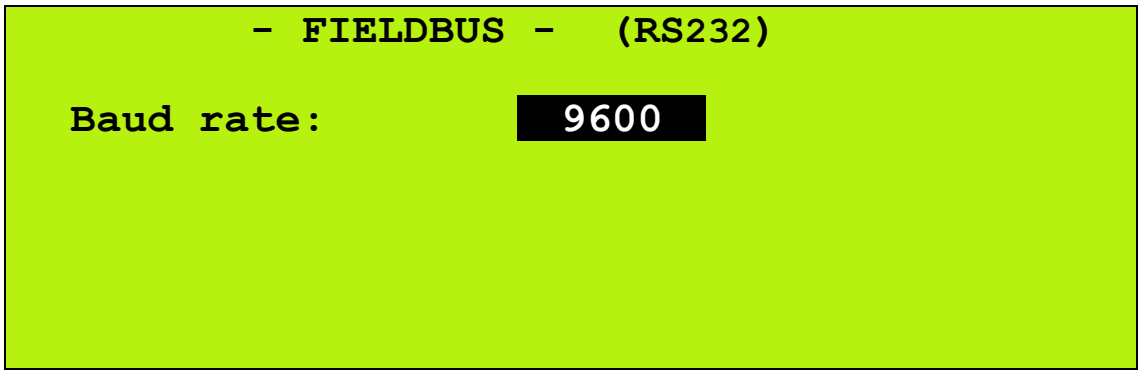


IMPORTANT NOTE: Whenever the communication settings are changed, the LI401 must be powered OFF and then back ON. The communication PCB must be connected to the LI401 only when it is powered OFF.

RS232:

By default the LI401 uses the USB (type-B) connector to communicate via RS232 protocol. To change the UART (RS232) baud rate, press the ENTER key with the baud rate field highlighted and use the ◀ and ▶ keys to toggle between the options. There are five options:

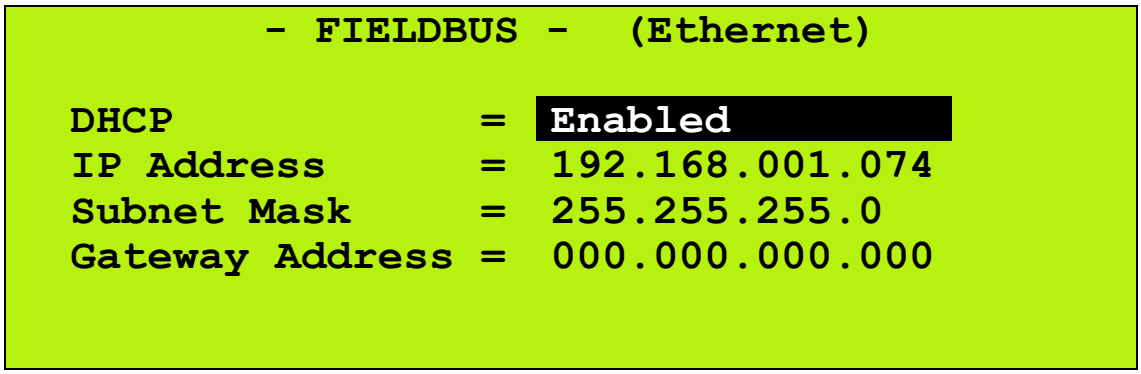
- 9600
- 38400
- 115200
- 19200
- 57600



Once the desired baud rate has been selected, press the ENTER key again to exit the editable field. The new baud rate will be confirmed when the SAVE key is pressed.

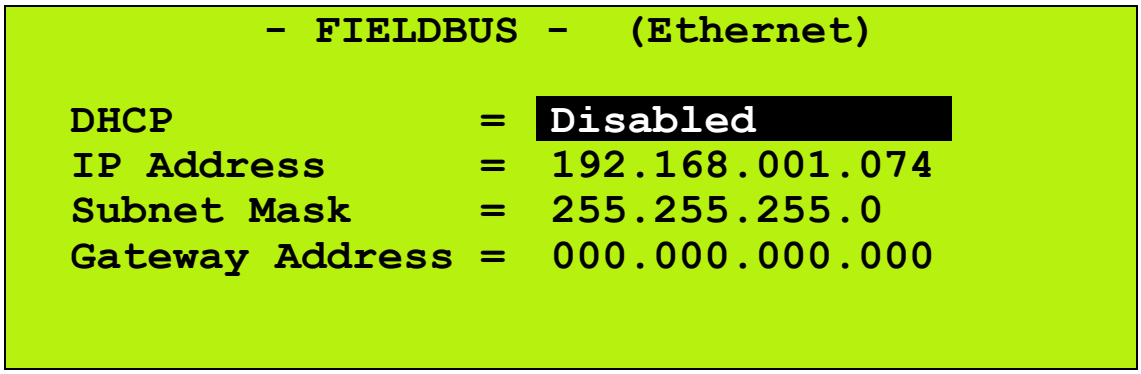
Ethernet:

If an Ethernet communications PCB has been installed the following data input screen is used to set up LI401 to communicate over the Ethernet network.

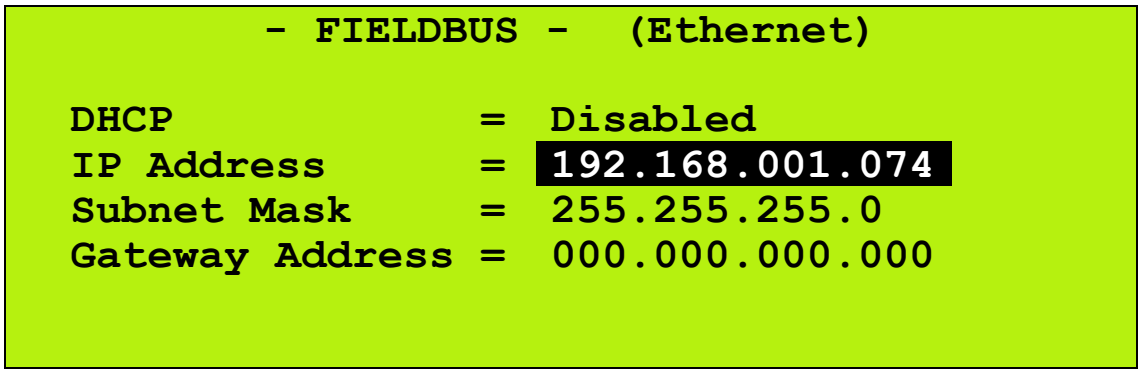


The IP address, subnet mask and gateway address can only be manually changed when the DHCP is disabled. When the DHCP is enabled, the other parameters are obtained automatically from the DHCP server on the network and will not be editable by the operator.

To enable/disable the DHCP, press the ENTER key with the DHCP field highlighted and use the ◀ and ▶ keys to toggle between the two options. Press the ENTER key to exit the field.



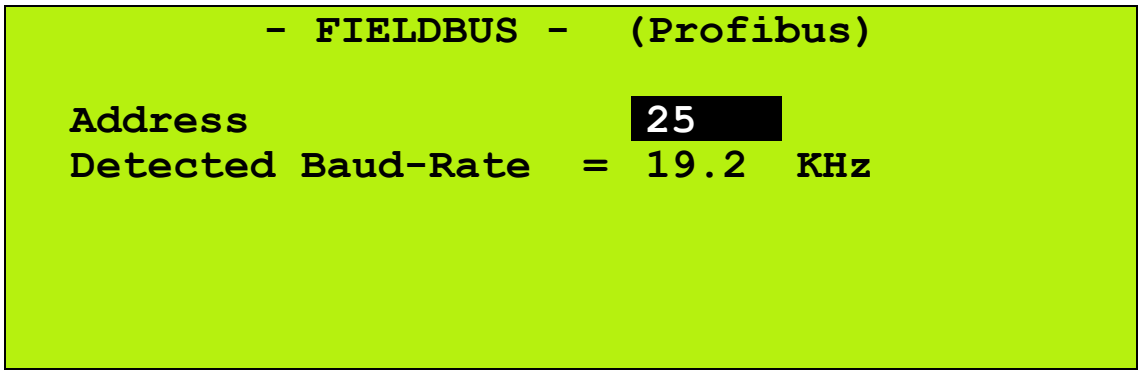
Once the DHCP is disabled, scroll down to the other options to edit them manually. To edit the IP address, press the ENTER key with the IP address field highlighted.



Manually enter the IP address using the keypad. Once the IP address is entered, press the ENTER key again to exit the editable field. The new IP address will be confirmed once the SAVE key is pressed. Follow the same procedure to edit both the subnet mask and gateway address.

Profibus:

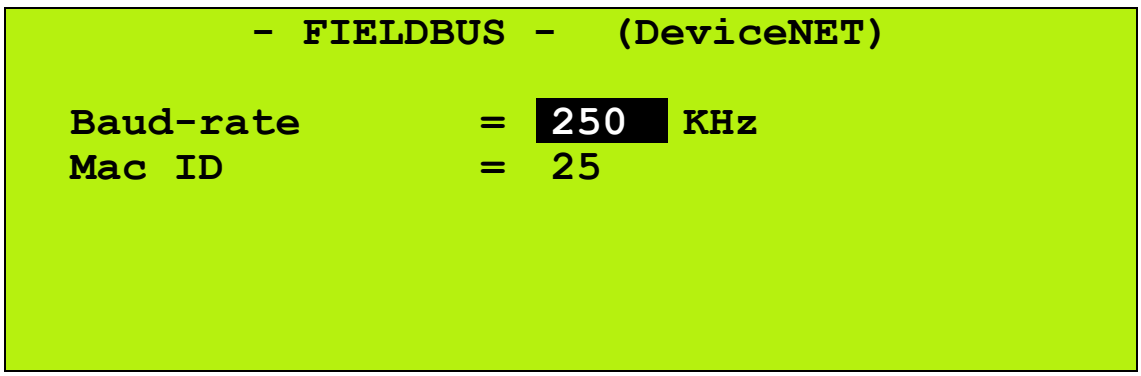
If a Profibus communications PCB has been installed the following data input screen is used to set up LI401 to communicate over the Profibus network.



To change the node address, press the ENTER key with the address value highlighted. Enter a value between 0 – 126 using the keypad. If a value greater than 126 is entered, the value will be automatically reverted to 126. Press the ENTER key again to exit the editable field. The new address will be confirmed when the SAVE key is pressed.

DeviceNet:

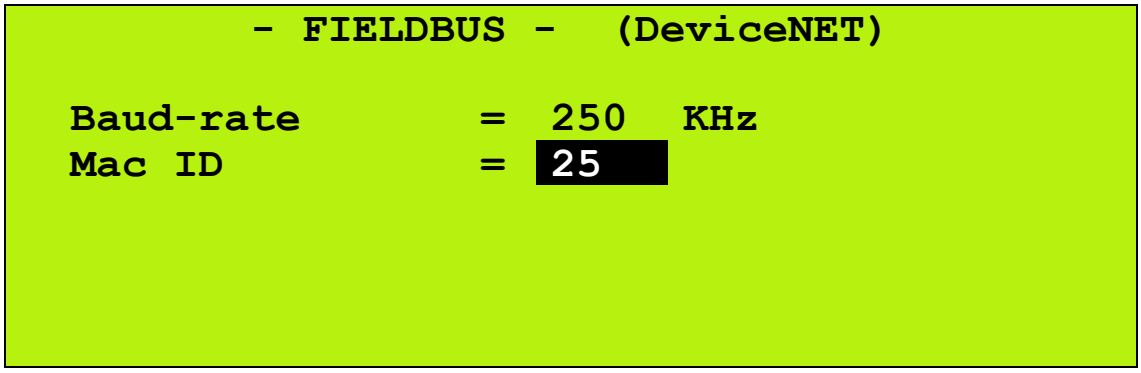
If a DeviceNet communications PCB has been installed the following data input screen is used to set up LI401 to communicate over the DeviceNet network.



To change the DeviceNet baud rate, press the ENTER key with baud-rate highlighted and use the ◀ and ▶ keys to toggle between the options. There are three options:

- 500 kbps
- 125 kbps
- 250 kbps

Once the desired baud rate has been selected, press the ENTER key to exit the editable field. The new baud rate will be confirmed when the SAVE key is pressed.

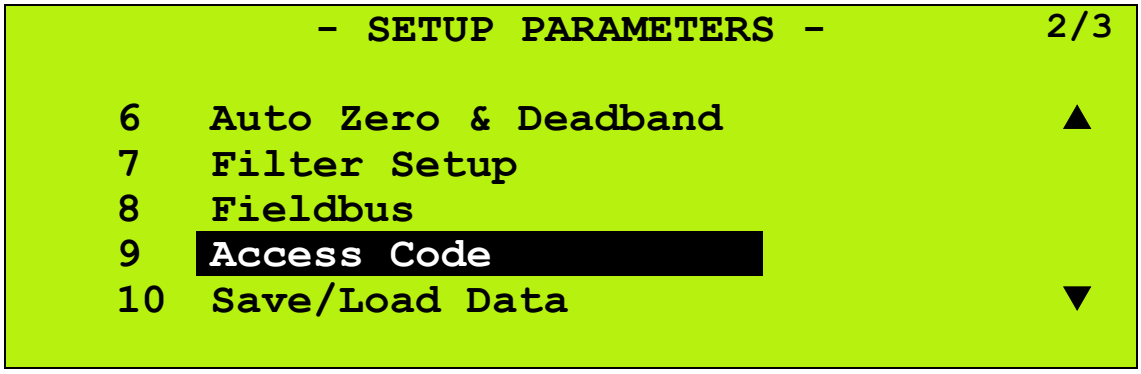


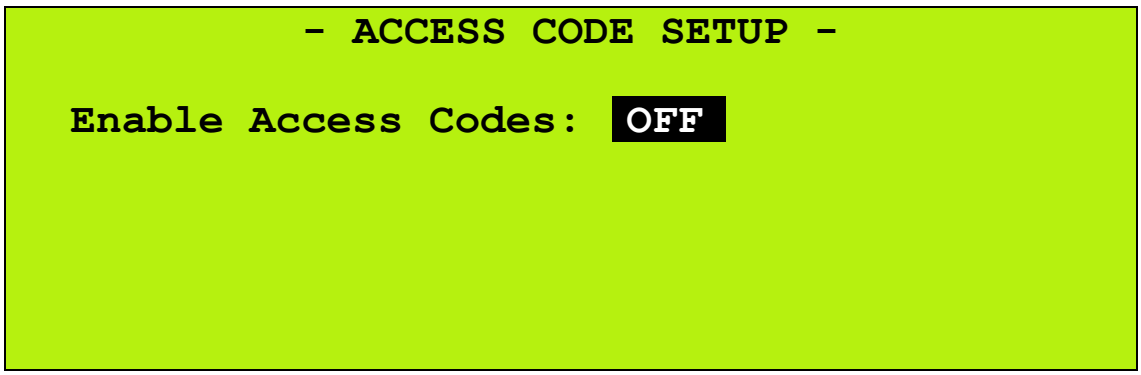
To change the Mac ID, press the ENTER key with the Mac ID field highlighted. Enter a value between 0 – 63 using the keypad. If a value greater than 63 is entered, the value will automatically be reverted to 63. Once the Mac ID has been entered, press the ENTER key again to exit the field. The new Mac ID will be confirmed when the SAVE key is pressed.

Access Code

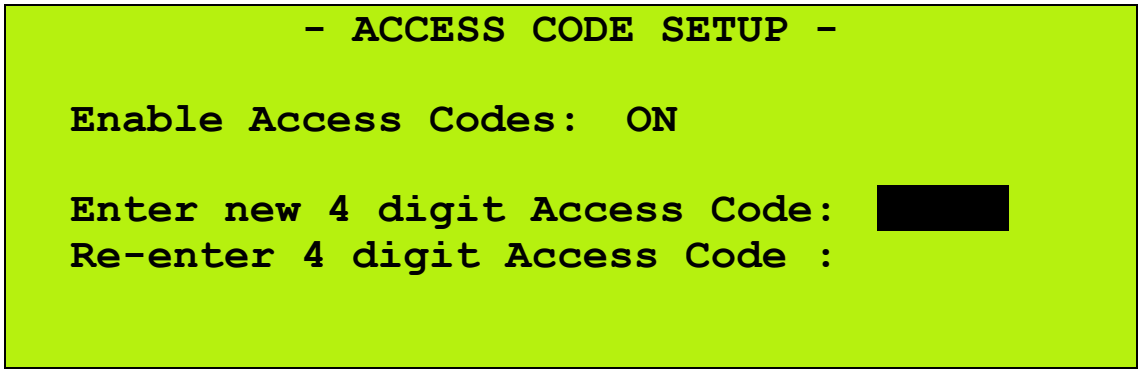
The LI401 is equipped with a security feature which prevents unauthorised access to the setup and calibration routines. If this feature is activated, the operator must enter a four digit pin code to gain access to the setup routines.

To activate and set up this security feature, move the cursor to “Access Code” on the main menu and press the ENTER key. Alternatively, press the number 9 on the keypad. If the feature has not been activated the following screen will be shown.

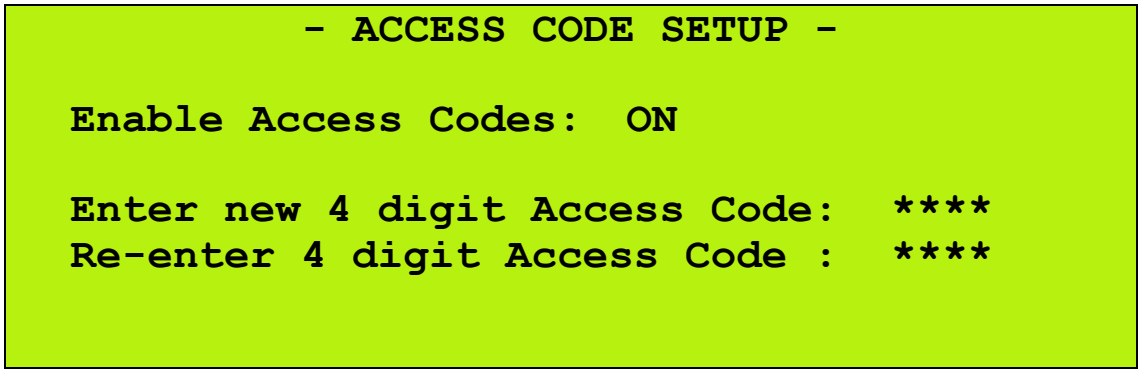




The current status of the access code is shown. By default the access code will be OFF. To change the status from OFF to ON, press the ENTER key and use the ◀ and ▶ keys to toggle between the two options. Press the ENTER key again to confirm. The screen will now prompt the user to enter a four digit pin.



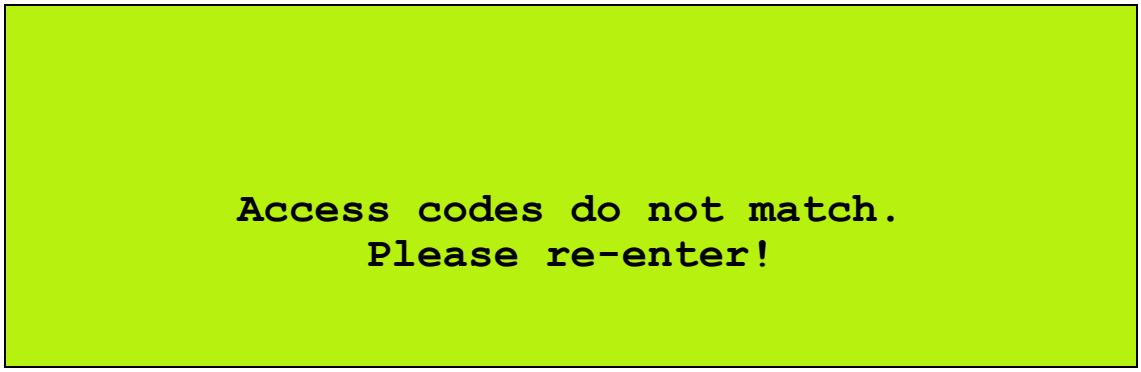
Press the ENTER key to program the access code. Enter your four digit pin using the keypad and press the ENTER key again to exit the editable field. Move the cursor the down and repeat the process using the same four digit pin.



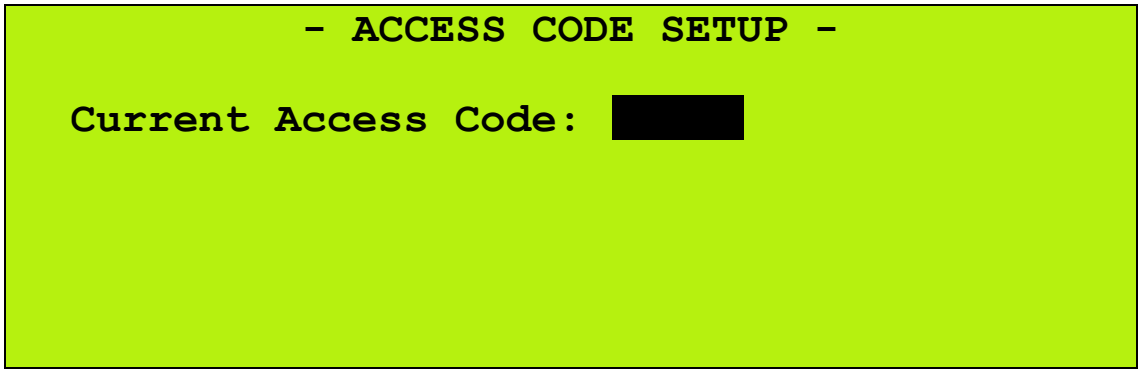
The LI401 will then compare the two access codes and if they are the same it will prompt you to either confirm your pin selection or abort the process.

Press the SAVE key to confirm the pin and activate the access code or press the ABORT key to cancel the access code setup.

If the access codes entered are not the same, the following message is displayed and the access code will not be saved.

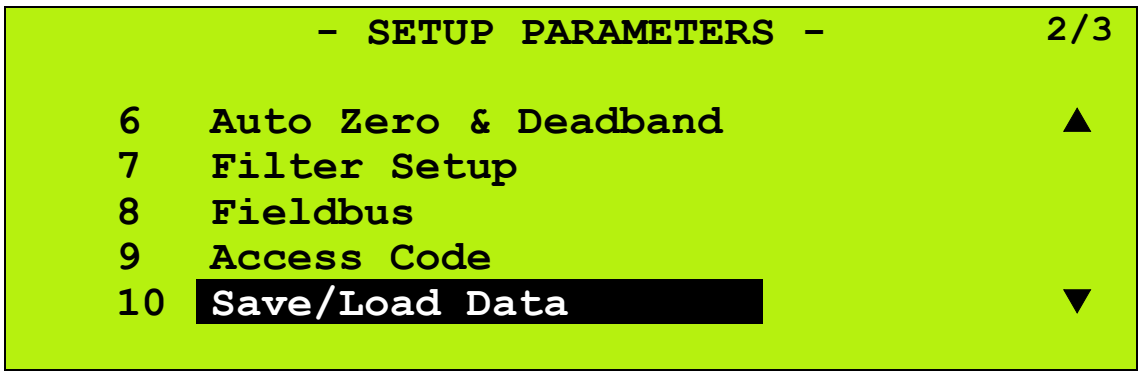


If the access code has already been activated and the operator wants to disable the feature or change the pin, the following screen will be shown when the operator selects the access code option from the main menu. Here the operator will need to enter the current pin before the status or pin can be edited.


- ACCESS CODE SETUP -
Current Access Code:

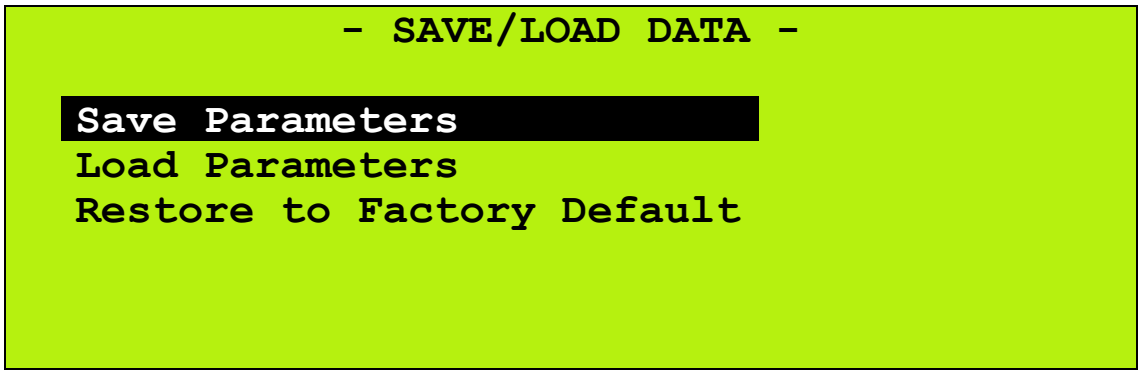
Save/Load Data

Configuration parameters and calibration data from the LI401 can be saved to or uploaded from an SD card. To access the save/load menu, move the cursor to “Save/Load Data” on the main menu and press the ENTER key. Alternatively, enter the number 10 using the keypad.

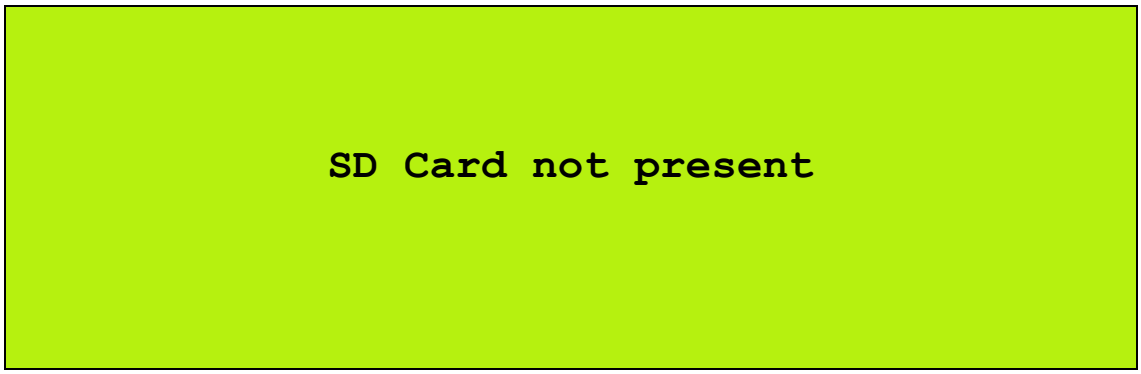


NOTE: SD cards with capacities up to 32GB are supported and they should be formatted using either the FAT or FAT32 format (commonly the default format for SD cards).

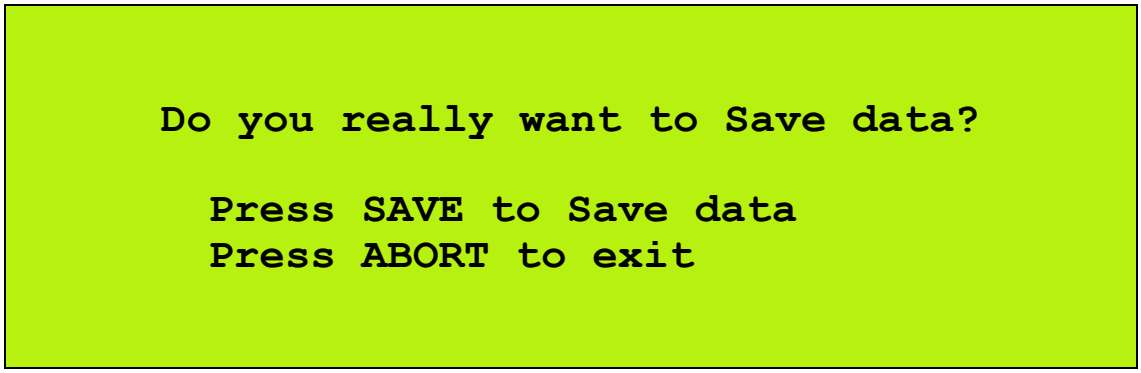
Save Parameters:



To save the current LI401 parameters to an inserted SD card, press the ENTER key with the first option “Save Parameters” highlighted. If no SD card is inserted, the following error message will be displayed.



If an SD card is inserted, the following screen will be displayed. From this screen, press the SAVE key to continue or the ABORT key to exit.

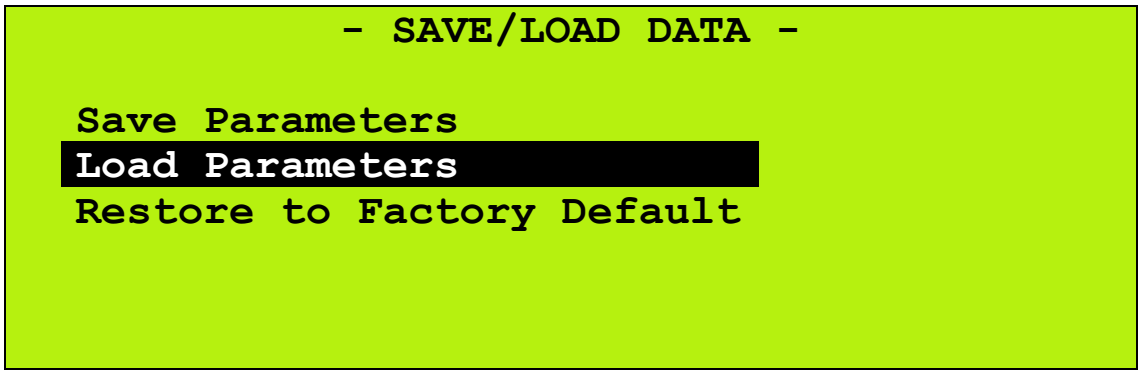


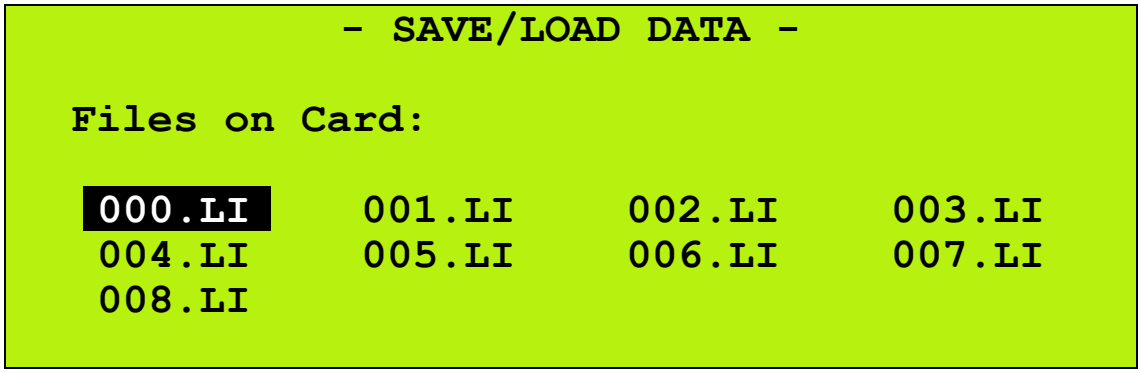
If the SAVE key is pressed, LI401 will create a new file with the stored parameters. The maximum number of files that can be stored on an SD card is ten. The file created will be named "00x.LI", where x is the first available number from 0 – 9 (e.g. 000.LI – 009.LI).

NOTE: If all ten files have been created on an SD card and the operator attempts to save data to the same card, then the following error message will appear: "Error: File limit of 10 files exceeded. Please delete a file & retry". One of the files must first be deleted before the data can be saved.

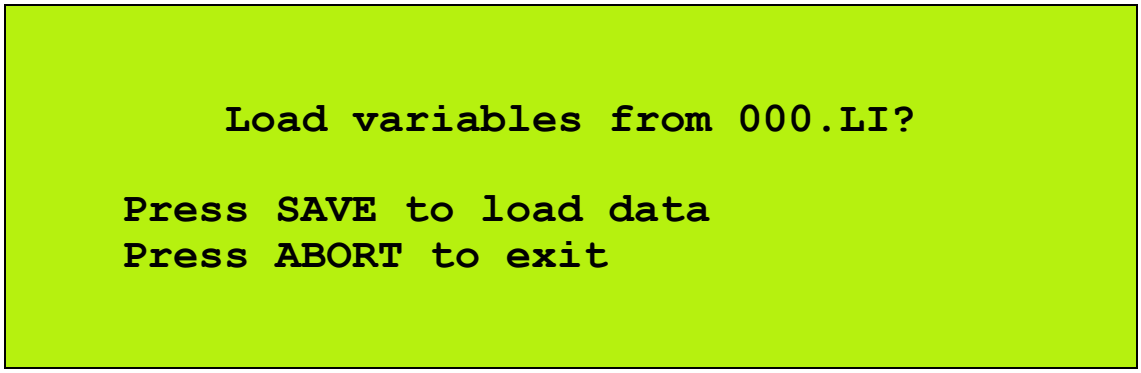
Load Parameters:

To load data from an SD card to the LI401, scroll to "Load Parameters" and press the ENTER key. The following screen lists the available data files that have previously been saved on the card. In the example below there are nine data files to choose from that have been saved previously.





Use the directional arrows to select a data file. Press the ENTER key when the required file is highlighted to restore settings from that file to the LI401. The following confirmation screen will be displayed once the ENTER key has been pressed.

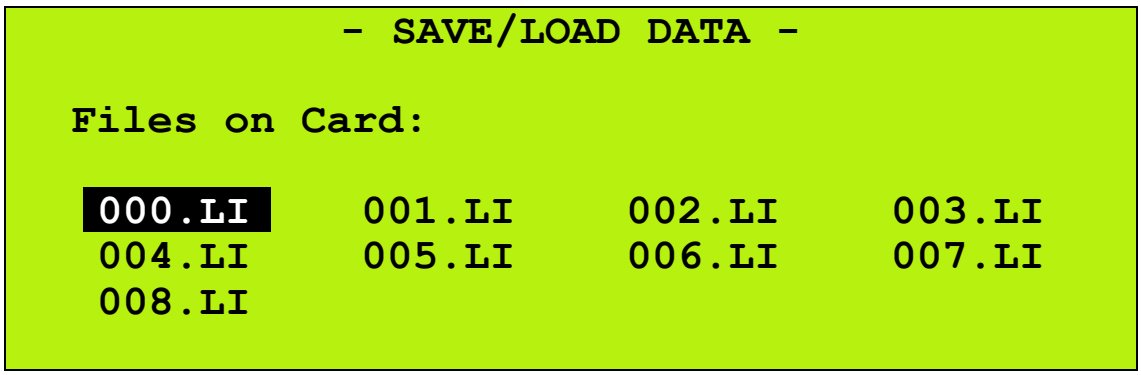


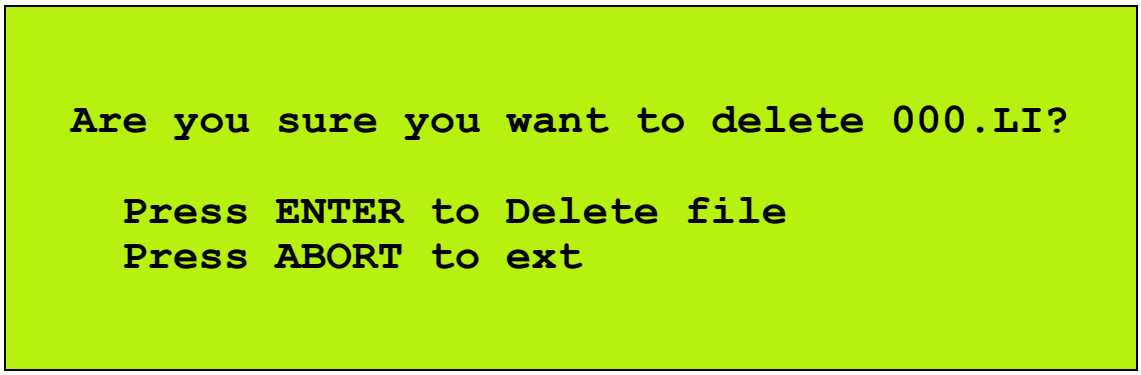
Press the SAVE key to restore settings from the selected data file to LI401 or press the ABORT key to cancel.

NOTE: The device must be powered OFF and back ON again after loading settings from the SD card.

Deleting Data Files:

To delete data files stored on the SD card, enter the load parameters screen. Use the arrow keys to select the required data file and press the clear (C) key to delete the file. LI401 will then ask you to confirm the deletion of the data file.

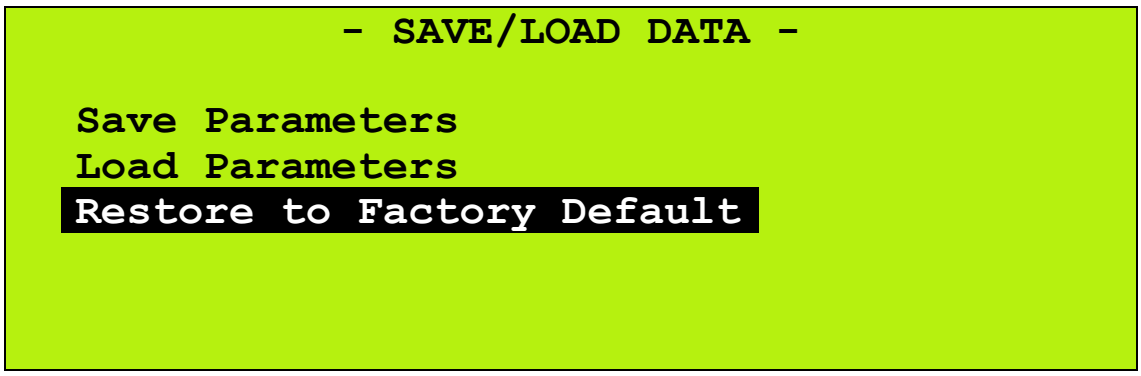




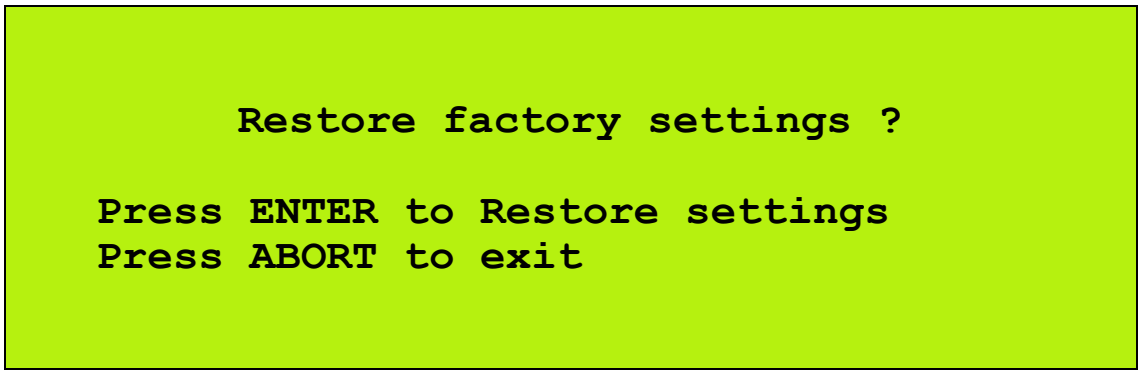
To confirm and delete the file, press the ENTER key. Press the ABORT key to cancel.

Restore Factory Default Settings:

You can restore the LI401 back to factory default settings from the save/load menu. Press the ENTER key with “Restore to Factory Default” highlighted.



The following confirmation screen will be displayed. To restore the factory default settings, press the ENTER key. Press the ABORT key to cancel.

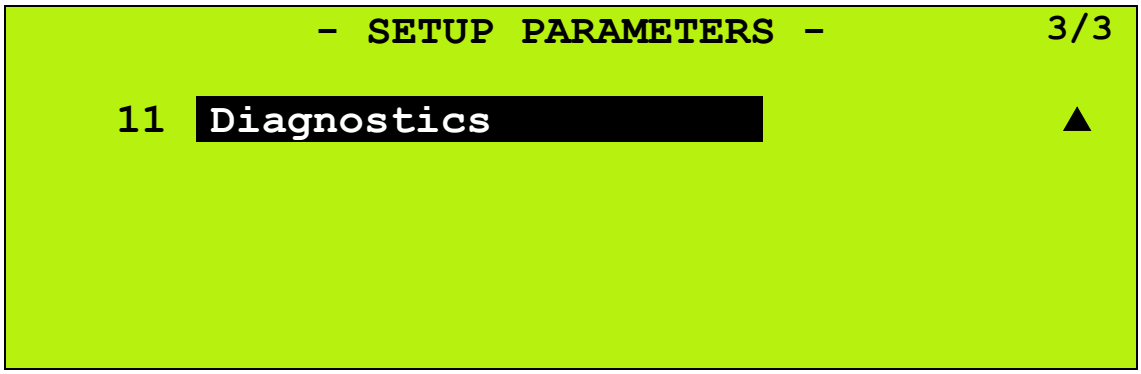


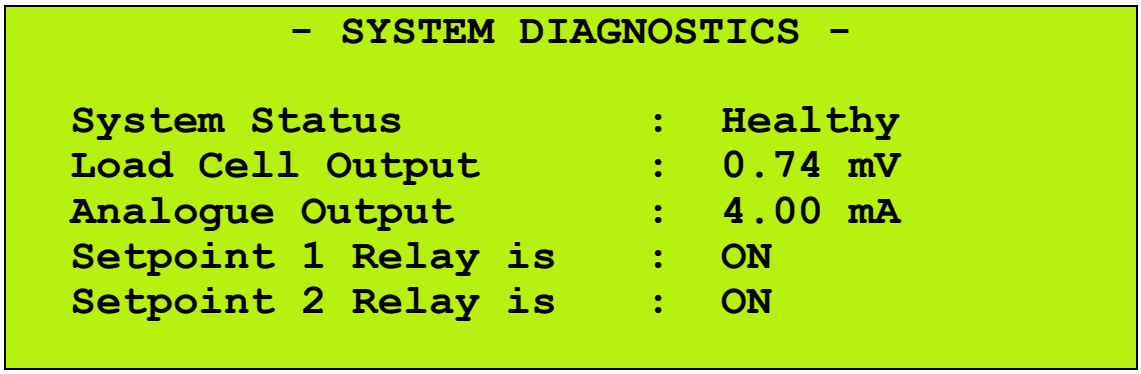
Diagnostics

The diagnostics menu is used to display the LI401 outputs. There are five variables:

- System status
- Analogue output
- Setpoint 2 relay status
- Load cell output
- Setpoint 1 relay status

To access the LI401 diagnostics, move the cursor to “Diagnostics” on the main menu and press the ENTER key. Alternatively, enter the number 11 using the keypad. The information displayed here is for viewing purposes only.





USB

A USB flash drive can be used to transfer weight data from the LI401 to a PC by following these steps:

1. Connect the LI401 to the PC using a USB cable.

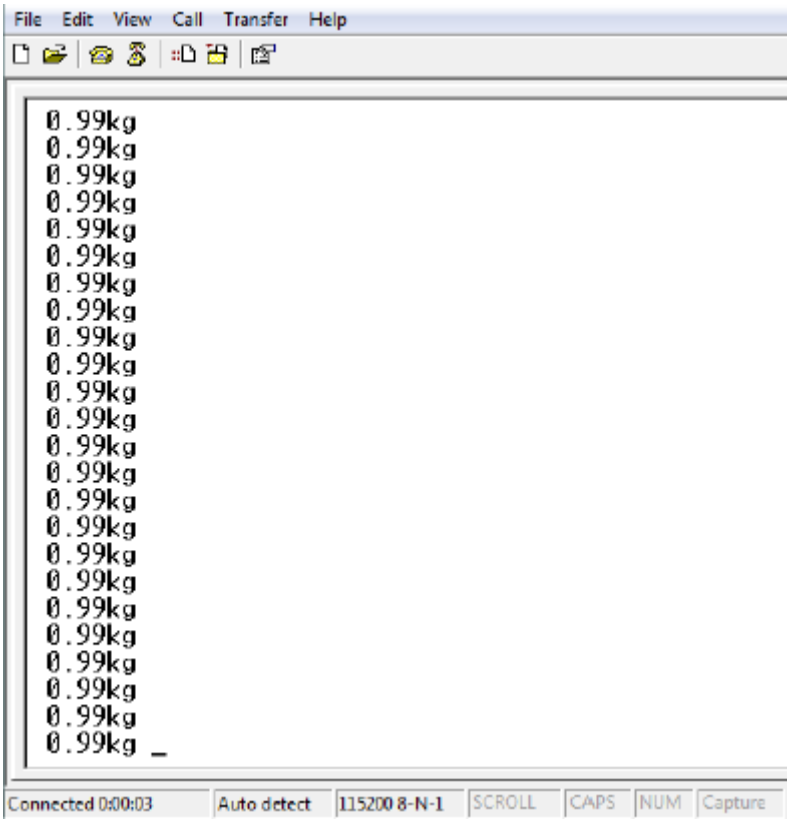
2. When windows prompts for the drivers, browse and select the supplied driver file.

3. The device will be enumerated as a “Model 401 Level Indicator” and will have a COM port associated with it.

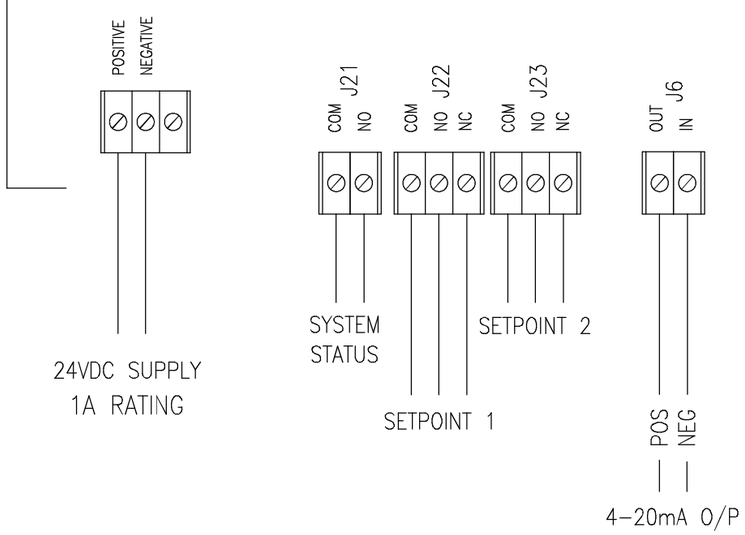
4. Open the COM port in serial terminal software such as HyperTerminal with the following settings:

   - 115200 bps
   - 8 bits
   - No parity
   - 1 stop bit
   - No flow control

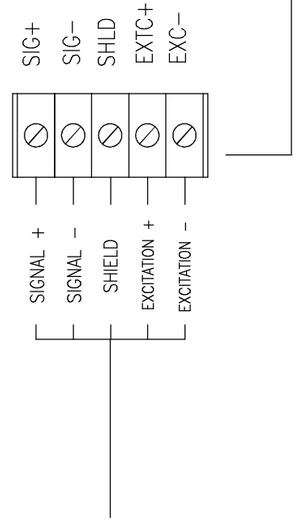
5. The weight along with the units will be displayed on the serial terminal software continuously as shown below (each reading shown on a new line).



POWER SUPPLY BOARD
(BOTTOM BOARD)



CPU BOARD
(TOP BOARD)



REVISIONS

A: 11/2/16
ORIGINAL ISSUE

DRAWN	L.H.
CHECKED	L.H.
APPROVED	L.H.
DATE APP'D	–
SCALE	N.T.S.
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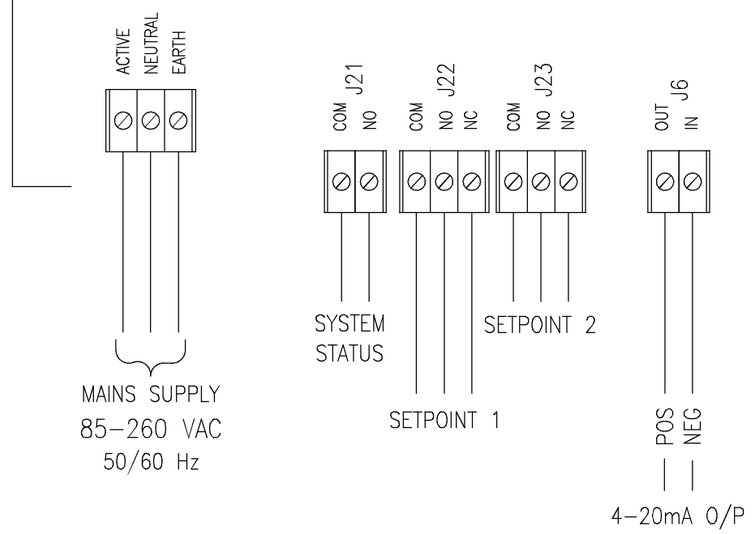
SIZE	DRAWING No.	
A1	NUMBER LI401– DC	REV. A
	CUSTOMER	
	PROJECT	
	CAD FILE	

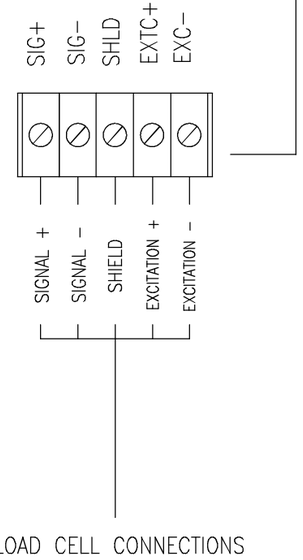
TITLE
MODEL LI401 ELECTRICAL CONNECTION DIAGRAM – 24VDC SUPPLY VERSION.

ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

POWER SUPPLY BOARD
(BOTTOM BOARD)



CPU BOARD
(TOP BOARD)



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SIZE	DRAWING No.	
A1	NUMBER LI401– AC	REV. A
	CUSTOMER	
	PROJECT	
	CAD FILE	

TITLE
MODEL LI401 ELECTRICAL CONNECTION DIAGRAM – AC SUPPLY VERSION.

ALL DIMENSIONS IN MILLIMETRES
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