

User manual

8 Channel Interface Box

V1.10

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1. Introduction



Eight channel interface box provides maximum flexibility to the system integrators so as to combine varying probes, scales in to a single system and get digital data through single interface. The device directly gives scaled measurement values in millimeters up to the selected resolution.

This reduces the external interface components and system integrators can focus on single device for achieving the best results. This system comes with digital input which can be used to control SPM cycle from host.

Another advantage added to system is that multiple such units can be cascaded in chained manner where more number of probes are used. No configuration in such cases. The device automatically detects and send data to host, even any Hybrid combination is allowed i.e. inductive probe interface unit can be cascaded with air gauging unit or counter unit.

2. Features

- Probe type: Full bridge or half bridge inductive probe (PETERHIRT/TESA make half/full bridge LVDT probes)
- Data interface: Serial RS232
- This system provides 4 digital input
- Communication protocols: ASCII continuous transmission

- Configuration: Through serial interface using configuration software utility
- Can connect to PETERHIRT/TESA make half/full bridge LVDT probes.
- Can be calibrated on site using utility software.
- Default baud rate for a system 19200, we can set to maximum 115200 Baud rate using utility.
- This system also useful for air gauging applications.
- Can be easily calibrated on site using software utility
- Can be easily interfaced with .NET utility through library
- Additional provision provided, multiple such units can be cascaded in chained fashion where multiple probes are used.
- It's possible to set scaled resolution using software utility.

3. Specifications

a. Functional specifications

- Communication settings: RS232 interface, no parity, 8 data bits, one stop bit
- Baud rate: Settable as 9600, 19200, 38400, 57600, 115200 (Factory default is 19200)
- Data frame interval: Settable from 20mSec to 200mSec in steps of 1mSec (Factory default is 50mSec)
- Resolution options for probe: 0.01micron, 0.1micron, 0.5micron, 1micron
- Measurement range for probe: $\pm 1\text{mm}$, $\pm 1.5\text{mm}$, $\pm 2\text{mm}$, $\pm 2.5\text{mm}$, $\pm 3\text{mm}$
- Optional temperature monitoring channel:

b. Electrical specifications

- Power supply: 150VAC to 265VAC, 50/60Hz. Fused with 1A slow blow glass fuse. A stable earth point is must for proper operation of the device

- Probe excitation: 2.5Vpp sine wave. 10 KHz for full bridge LVDT, 13 KHz for half bridge Tesa compatible probes. (Other factory options available on request)
- Digital input: 0 to 30V optically isolated
- Digital output: Potential free, sink output. Upto 150mA sink capacity.

c. Performance specifications

Following performance specifications have been identified at test lab when all the power supply specifications and operating conditions are at nominal values. These values may vary depending upon the field conditions. Proper care must be taken when high precision gauging is required.

a. Accuracy

±0.1% within linear operation of inductive probe (1micron over the range of 1mm)

b. Drift

0.3micron over a period of 1hour

c. Repeatability

After power cycle: 0.2micron

After mechanical movement: 0.2micron.

d. Stability

±0.15micron of nominal measured value at fixed position

e. Maximum sampling time

a. For inductive probe: 1mSec (1000samples per second)

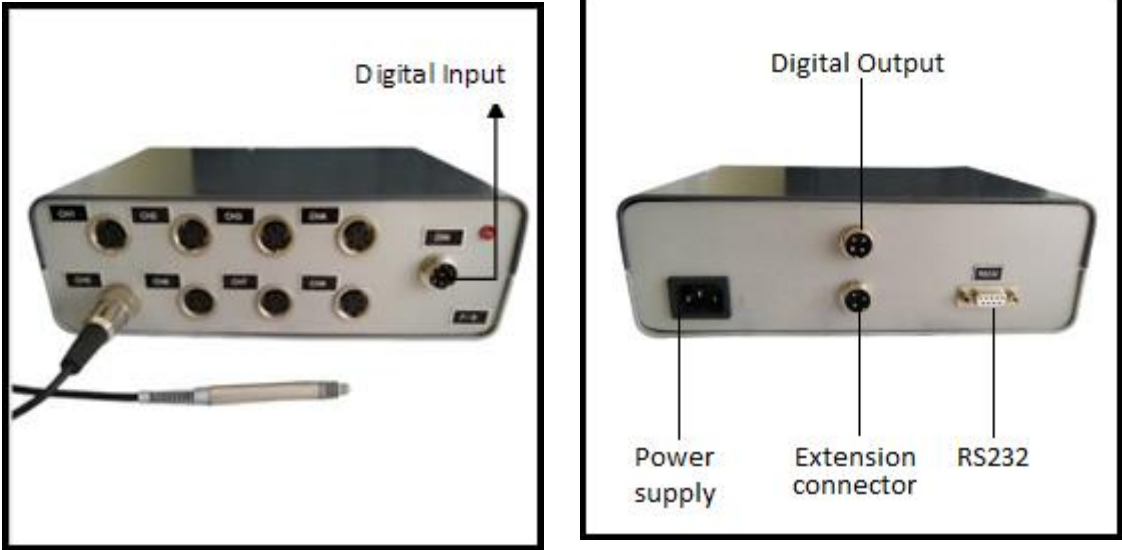
f. Warm-up time

The device must be allowed to stabilize for at least 60seconds before actually using the measurement reading from the connected probes. Although instrument requires much less time to stabilize, it is good practice to allow some spare time after power on. The warm-up delay may not be required when instrument is powered off and then on within short time.

d. Mechanical specification

8Ch LVDT Interface Box: 75mm (H) * 230mm (W) * 170mm (D)

4. Connection details:



Serial Communication Port

Interface box has D sub miniature 9pin female connector for serial interface. Below are pin details for this connector. If the interface box is being connected to computer’s serial port, one to one straight three core cable is required.

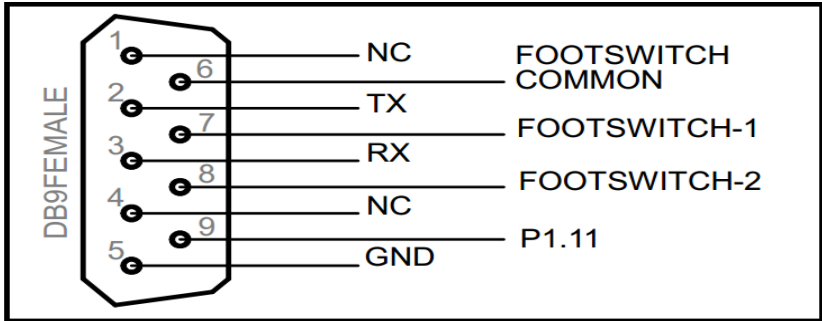


Figure-1

DB9 PIN	SIGNAL NAME
1	NC
2	TXD RS232
3	RXD RS232
4	NC
5	GND
6	Foot-switch common
7	Foot-switch-1
8	Foot-switch-2
9	P1.11
Case	Connected to GROUND

Table-1

Table-1 Terminology

NC: Do not make any electrical connection to these pins. Some or all of these pins might be used for internal testing and factory settings.

GND: Supply negative

Warning: Wrong connection or over voltage at any of the D type connector pin may permanently damage the device

Extension connector

Interface box has mx 3pin male connector for extension interface. Using this feature user can cascade up to 5 interface units. For extension purpose DB9MALE to 3pinMX female three core cable is required. Below are pin details for this cable Figure-2. Cascading of interface shown in Figure-3

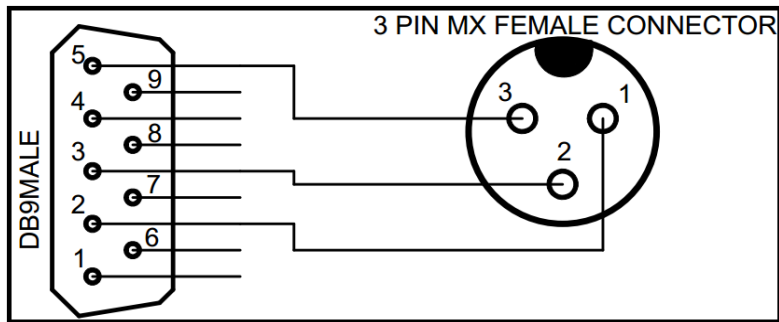


Figure-2

PIN NUMBER	SIGNAL NAME
1	RXD
2	TXD
3	GND

Table-2

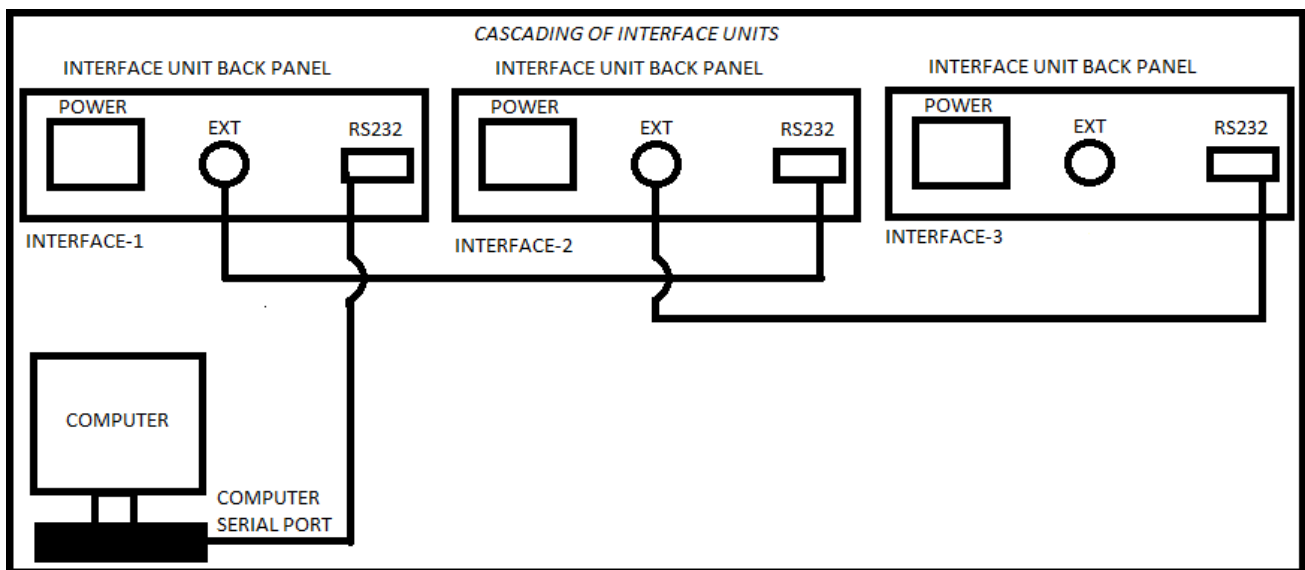


Figure-3

Digital input connector

Interface box has round isolated DIN 8pin male connector for Digital input. Any PNP type sensor or active high output signal can be used as digital inputs. Input range is 0V to 30VDC .5VDC considered as logic high. Below pin details of digital input connector

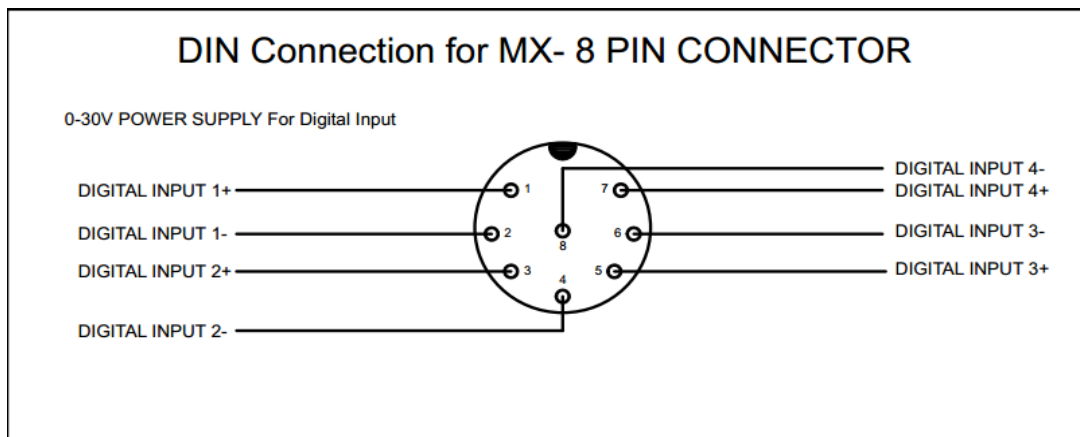


Figure -4

PIN NUMBER	SIGNAL NAME
1	Digital input 1+
2	Digital input 1-
3	Digital input 2+
4	Digital input 2-
5	Digital input 3+
6	Digital input 3-
7	Digital input 4+
8	Digital input 4-

Table-3

Warning: Wrong connection or over voltage at any of the DIN connector pin may permanently damage the device

Digital Output

Interface box has round isolated DOUT 6pin male connector for Digital output. User can control output devices using digital outputs. For proper working of digital outputs user should connect only +24VDC supply, other than +24VDC supply digital output misbehave.

Below pin details of digital output connector and wiring connections figure-5.

PIN NUMBER	SIGNAL NAME
1	+24VDC
2	Ground
3	Out-1
4	Out-2
5	Out-3
6	Out-4

Table -4

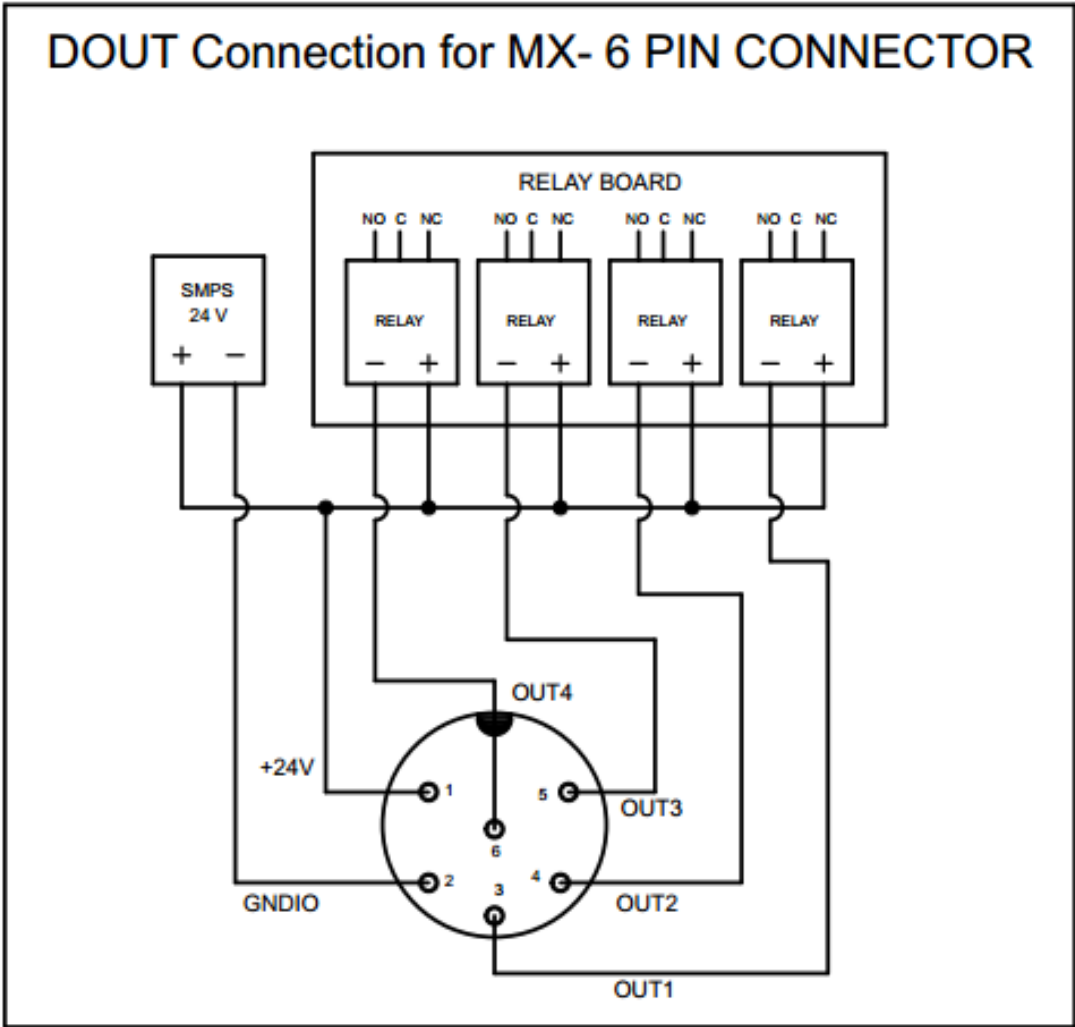


Figure-5

Warning: Wrong connection or over voltage at DOUT connector pin may damage the device permanently.

5. Installation Notes

Interface box comes with communication cable and power supply cable. Depending upon the customized configuration, it may also include temperature sensors, encoder bridge cables and probes.

- First step install the testing software on the computer. Please make sure that the computer on which the software is being installed has at least one serial communications port available.
- To start with, connect the power cable on the back side of the device and put into 3pin wall socket of 230VAC. Connect communication cable to port named RS232 on the back side of the device. The other end of communication cable is to be connected to computer's serial port. Now, device can be powered on. To check for the measured probe readings, open the interface box software by clicking on its icon.
- The window as shown in image-1 will open. Select the serial port and press Connect button. The window will start showing the probe readings along with its bar chart representation as shown in the image-1.

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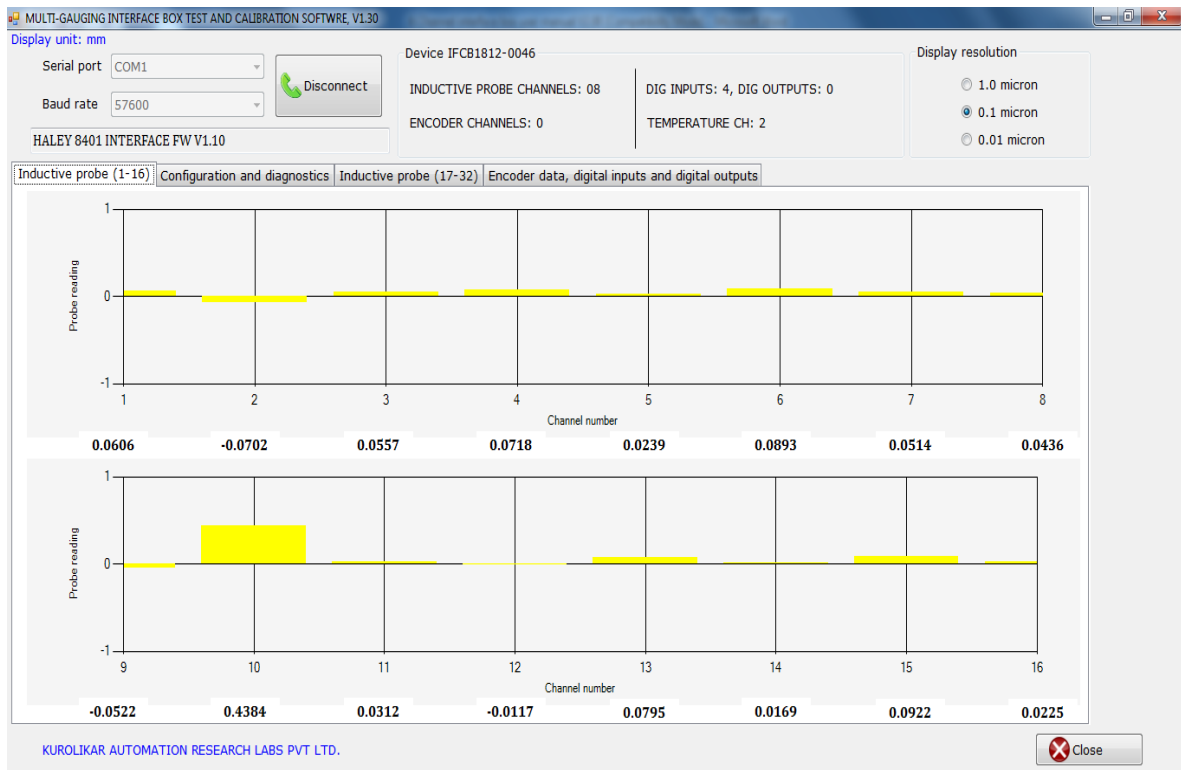


Image-1

Do's

- ✓ Check input AC supply voltage it should be 230VAC
- ✓ After power on check the indicator LED on device is turning on or not.
- ✓ After successful turning on device.
- ✓ Do mastering of component first. Otherwise it will shows the wrong component reading.

Don'ts

- ✓ Do not keep the device on wet surface it may cause electric shock hazard and may damage the device.
- ✓ Do not try to open device it may cause electric shock hazard.
- ✓ Do not make wrong connections for DIN, DOUT, EXT, RS232 connectors.
- ✓ Do not give over voltage to device and its DIN, DOUT, EXT, RS232 ports.

Troubleshooting Guide

Symptom: Device is not powering on.

Cause : Device is not getting Supply.

Troubleshoot: Check the device is getting input AC supply within the
Range 150VAC to 265VAC, 50/60Hz

Symptom: Device power on but not communicating with the PC

Cause : COM port selection is wrong or Baud rate selection is wrong.

Troubleshoot: First check “COM” port selection is right. User should find the
“COM” port from PC->control panel->Device manager->Ports .If the selected
“COM” port is right then check for the communication baud rate.

Symptom: Device power on but not communicating with the PC

Cause : Serial cable from device to PC not connected or may have wrong
connections.

Troubleshoot: First check the serial cable is connected, if connected then check
connections as per **Table-1**.

Symptom: Digital inputs are not operating.

Cause : Digital input connector may not be connected or wrong connections
of digital input pins.

Troubleshoot: First check DIN connector is properly connected, if connected
then check DIN connector connections are as per **Table-2**.

Symptom: Digital outputs are not operating.

Cause : Digital output connector may not be connected or wrong connections
of digital output pins.

Troubleshoot: First check DOUT connector is properly connected, if connected
then check DOUT connector connections are as per **Table-3**.

Symptom: Cascading of interface units fails.

Cause : Interface unit which is connected to the PC is unable to get data of cascaded unit's data

Troubleshoot 1: -First check the cascaded units are powered on. Check all units are properly cascaded using DB9 to 3pin MX female cascading cable (fig-2.0) if all units are properly connected using cascading cables then also cascading fails then check the cascading cable connections are as per **Table-2**.

Troubleshoot 2: Check the baud rate of the cascaded devices are same, if not then set all devices baud rate to the same value (example-19200, 38400, 57600...etc.) using **Configuration Iface** utility software.

Troubleshoot 3: Sampling time of all cascaded devices should be same, if not then set all devices sampling time to the same value (example- 20ms, 25ms, 50ms... etc) using **Configuration Iface** utility software.

Symptom: Probe readings not showing for some channels or all channels

Cause : Device not getting probe signals.

Troubleshoot 1: Check LVDT probe is correctly connected to the interface unit.

Troubleshoot 2: Check the LVDT probe is full bridge or half bridge. If the device is full bridge LVDT supported then user must connect only full bridge LVDT probe and same is applicable for the half bridge LVDT supported device. Connecting half bridge LVDT probe to the full bridge LVDT supported device will not give readings and same is applicable for half bridge device.

Symptom: Wrong measurement readings.

Cause : Wrong calibration of device or device not calibrated at all.

Troubleshoot: In this case user should have to do mastering of the interface device using correct higher and lower masters. For doing device mastering user should use Interface Box software utility which is provided by KARLPL or user can download it from <http://www.automationresearchlabs.com/> . For mastering read *How to Do Mastering*

6. Data transmission frame format

A data frame is sent over RS232 port at predefined interval. All the data is in ASCII format and can be viewed on hyper terminal. Default interval setting is 50mSec and default baud rate is 19200. The data frame is always terminated by ASCII code of carriage return.

7. Software utilities

a. Device Configuration utility

Configuration Iface utility provides facility to modify factory default setting such as system baud rate, Transmission time interval, probe resolution, higher and lower masters as per the user requirement.

STEP1: Check all necessary files are available in calibration Configuration Iface utility so that it work properly. Below all necessary file used for calibration utility.

STEP2: Open Configuration iface software.

Select com port and desired baud rate of device and click on connect button.




Name	Date modified	Type	Size
 Configuration Iface	5/2/2019 12:02 PM	Application	135 KB
 ErrLog	5/2/2019 12:00 PM	Text Document	0 KB
 License.lic	12/22/2018 6:38 PM	LIC File	1 KB

Image-2

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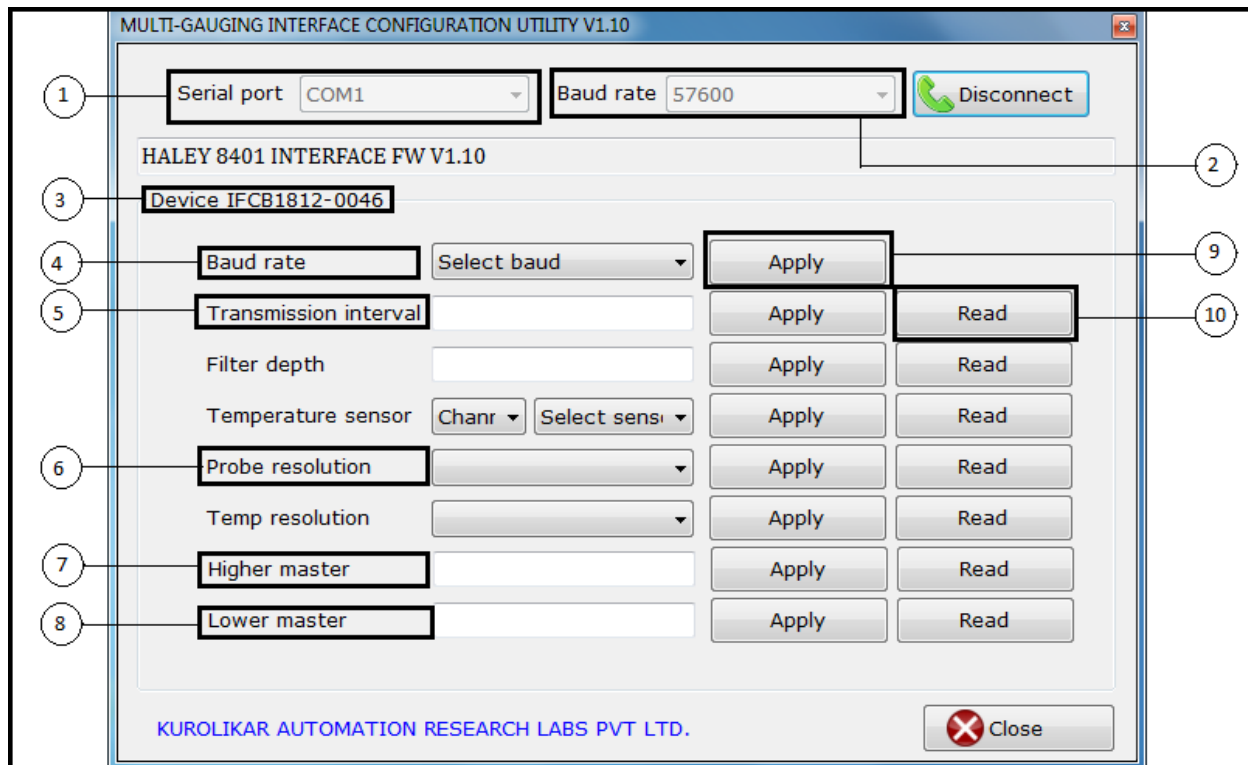


Image-3

1. Serial port- Select serial communication port from drop down option
2. Baud rate- select communication baud rate of device
3. Device- serial number
4. Baud rate- User can modify existing baud rate of device, from drop down selection select desired baud value and to apply click on apply button.
5. Transmission interval - User can set transmission interval according to end application requirement, transmission interval is in mili-seconds (example-25ms,50ms, 100ms...etc.)
6. Probe resolution -user can modify probe resolution from drop down selection.
7. Higher master-Enter higher master value and click on Apply button. Example-for +500 micron master enter 0.050 value, for +100micron 0.100.
8. Lower master-Enter lower master value and click on Apply. Example-for - 500 micron master enter -0.50 value, for -100 micron -0.10.
9. Apply- This button used to save changes after any modification in values.
10. Read- This button is used to read current values of parameters.

b. Probe Interface utility.

To use probe interface utility check all necessary files are available in probe utility folder Mentioned below.



Name	Date modified	Type	Size
 KARLPLLib.dll	12/8/2018 3:38 PM	Application extens...	42 KB
 WindowsApplication1	12/29/2018 1:23 PM	Application	57 KB

Image-4

This utility shows the current reading for all channels. Using this utility user can collect 4000 samples for all channels which are stored in csv file.

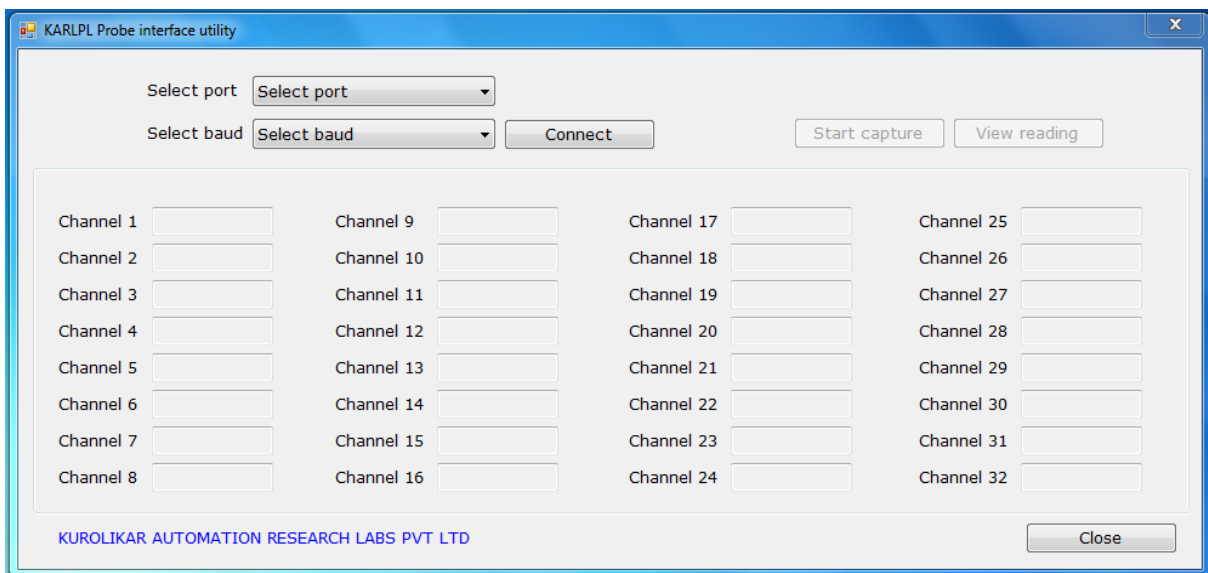


Image-5

Select port, select baud and click on connect button.

Start capture - Start capturing of probe reading.

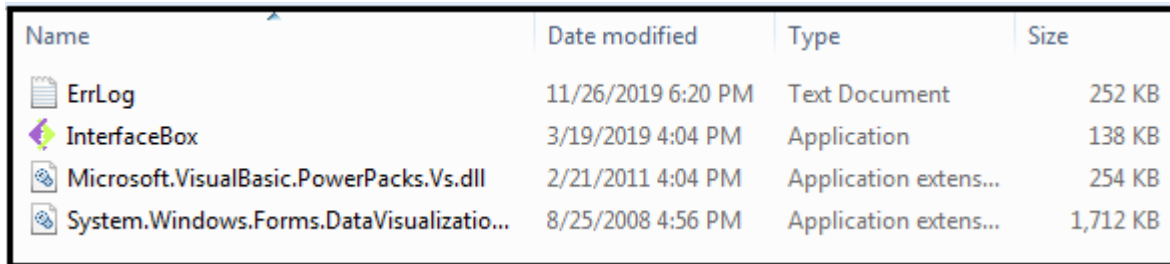
Stop capture - Stop capturing of probe readings.

View reading - for saving captured readings in csv file user must click on view readings immediately after stop capture. If user clicked on start capture immediately after stop capture then previously collected samples data are cleared without saving to csv file and new reading capturing started. For saving captured readings click on

view readings. One dialog box will open asks for save samples, click on **Yes** button to save samples. Select location where to save csv file and click on **SAVE**.

c. Calibration utility guide and how to do mastering of interface device

Step 1: To use interface utility check all the necessary files are available in interface folder, mentioned below.



Name	Date modified	Type	Size
ErrLog	11/26/2019 6:20 PM	Text Document	252 KB
InterfaceBox	3/19/2019 4:04 PM	Application	138 KB
Microsoft.VisualBasic.PowerPacks.Vs.dll	2/21/2011 4:04 PM	Application extens...	254 KB
System.Windows.Forms.DataVisualizatio...	8/25/2008 4:56 PM	Application extens...	1,712 KB

Image-6

Step2: Open interface box utility, power on device and select serial port and select desired Baud rate which is applicable, Default baud rate 19200 and click on connect button.

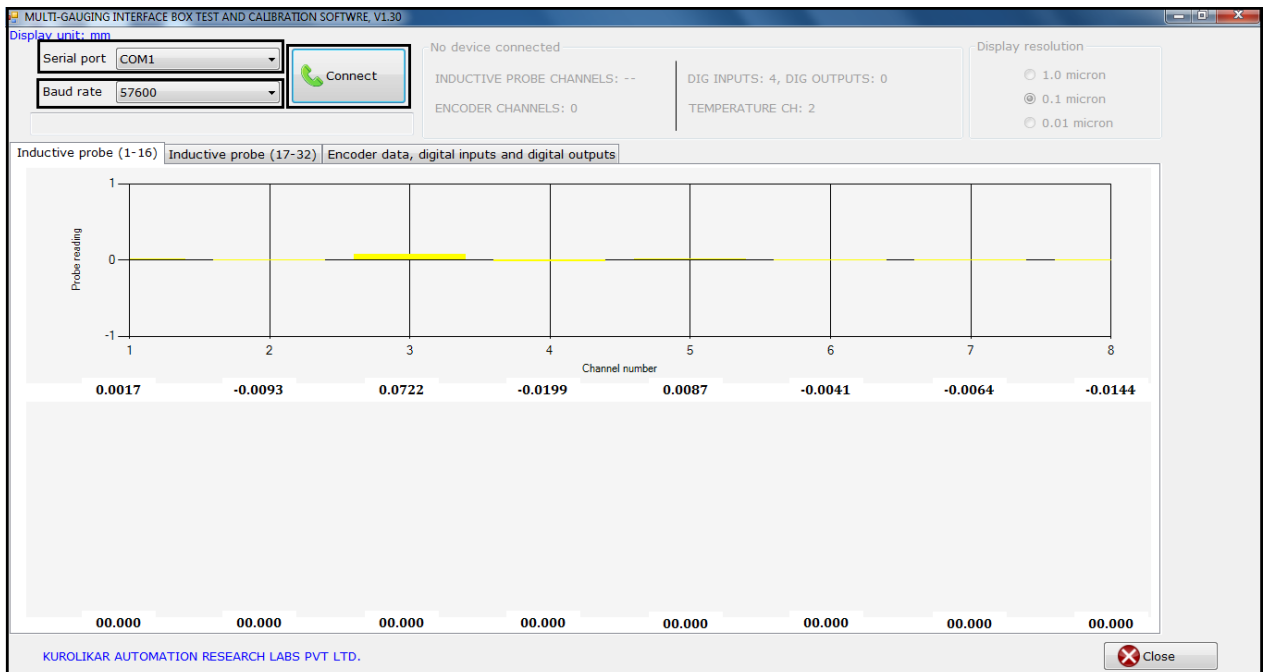


Image-7

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Step3: After clicked on connect button user can see the number of inductive probe channels, digital I/O, Temperature channel ,Encoders channels and device serial number as highlighted in below image.

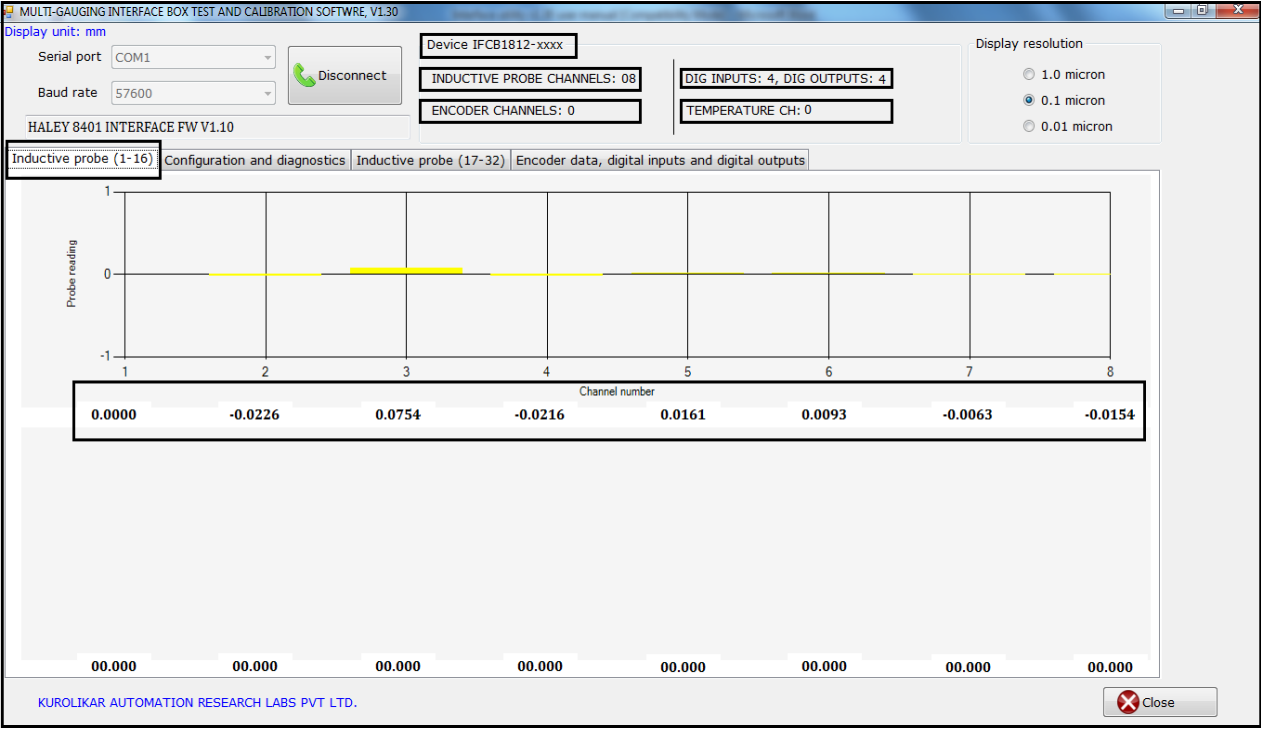


Image-8

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Step 4: After successful connection user need to configure the device from configuration and diagnostics option. Click inside highlighted box and type configureme in small letters without any space and press enter key.

NOTE - configureme is not visible when typing into highlighted box.

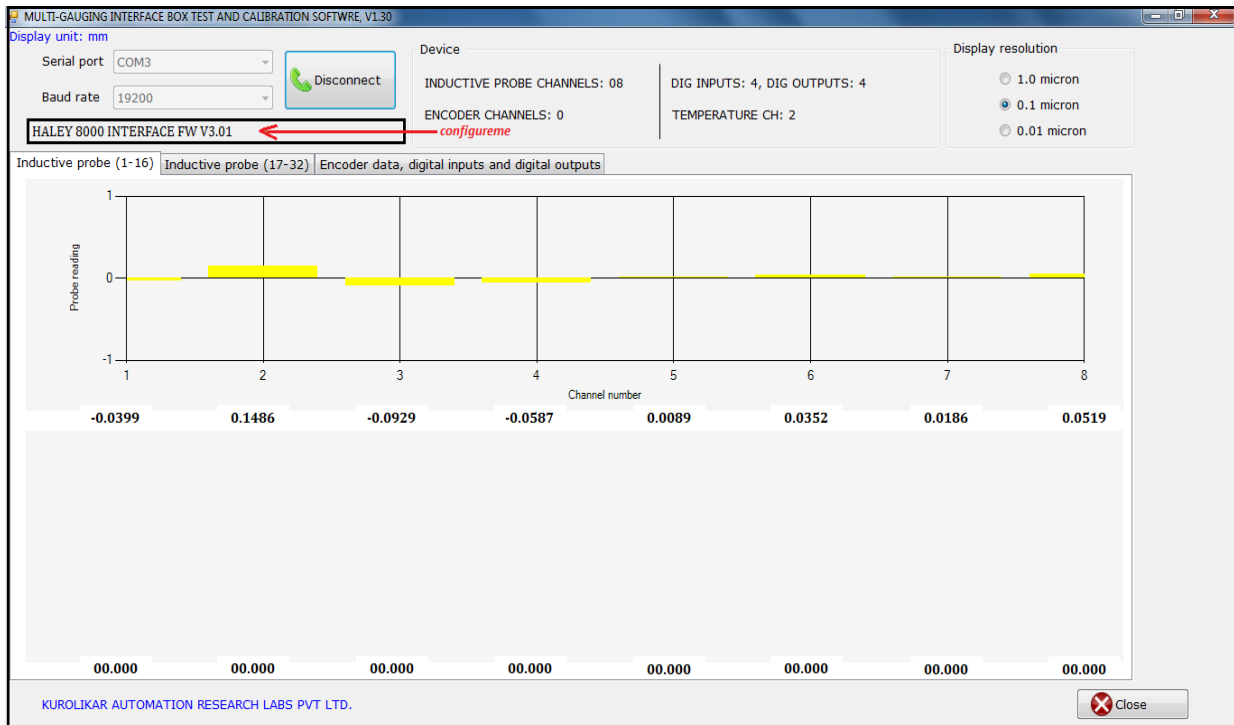


Image-9

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Step 5: configuration and diagnostics tab opened as highlighted in below image.
Click on this tab.

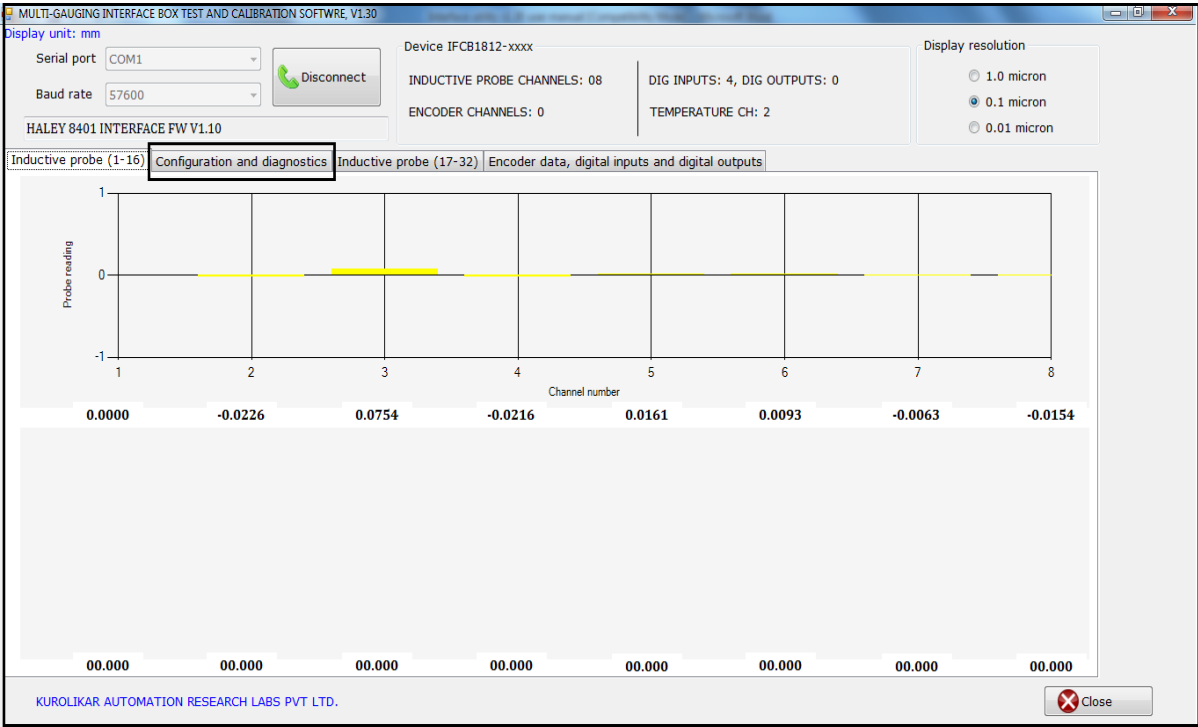


Image-10

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Step 6: In configuration and diagnostics window, user can see received data frame, ADC count, M1, M2, ADC mode, read offset as highlighted in below image.

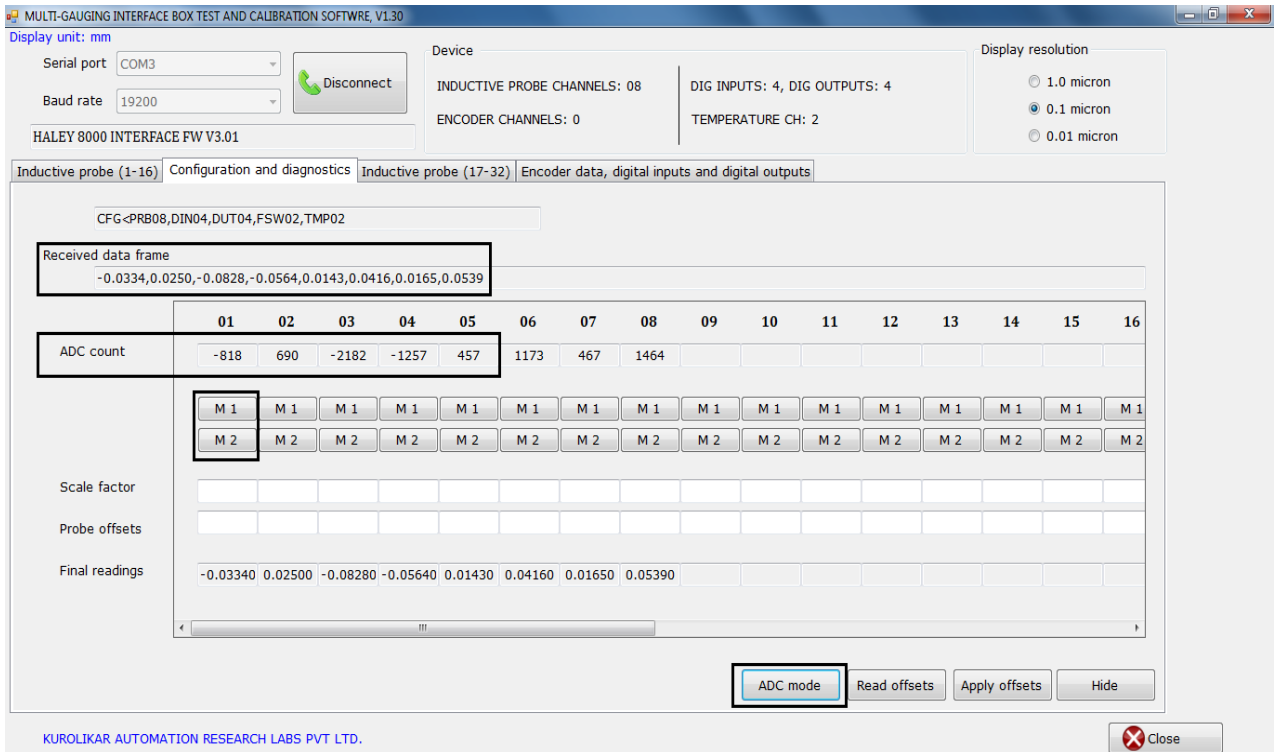


Image-11

Received data frames – All received data shown into this frame

ADC Count- shows the ADC counts of LVDT probes for respective channels

M1- Master-1 button to save higher master value

M2 – Master-2 button to save lower master value

ADC mode – To show probes ADC counts for mastering purpose click on ADC mode button

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Step 7: Connect LVDT probes to channels and click on **ADC mode** button which shows ADC count for respective channel. Fully released probe will give -30000 ADC counts and fully pressed probe will give +32768 ADC counts as shown below images.

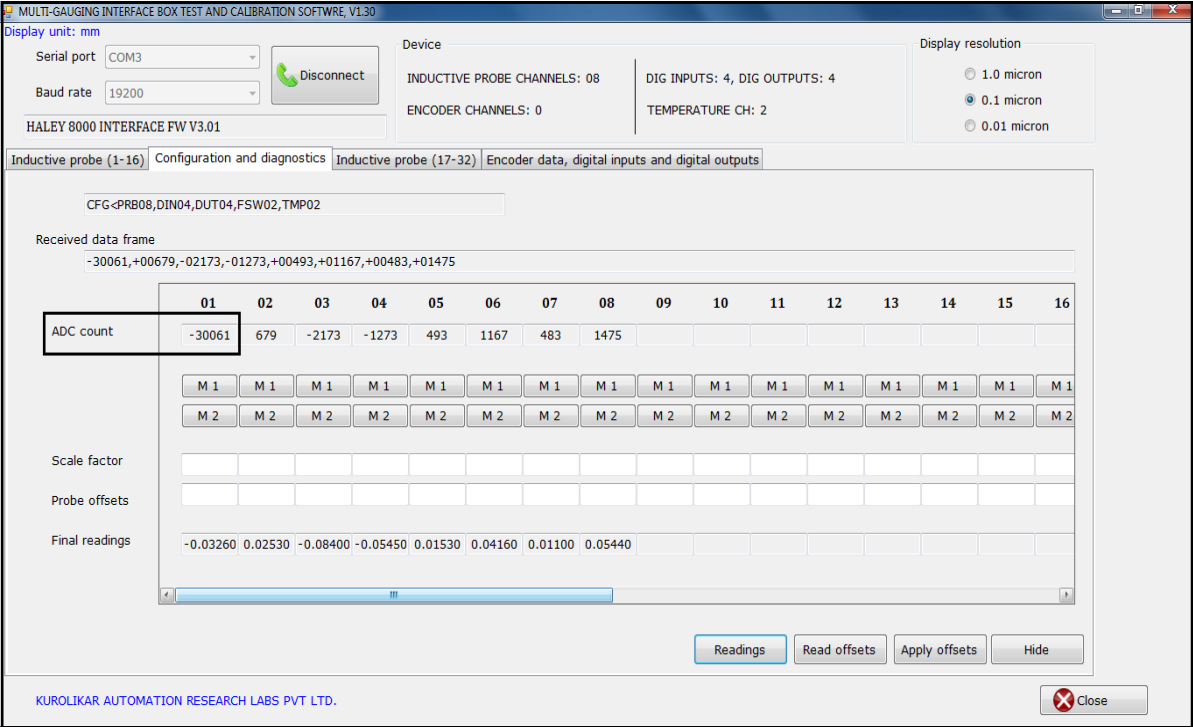


Image-12

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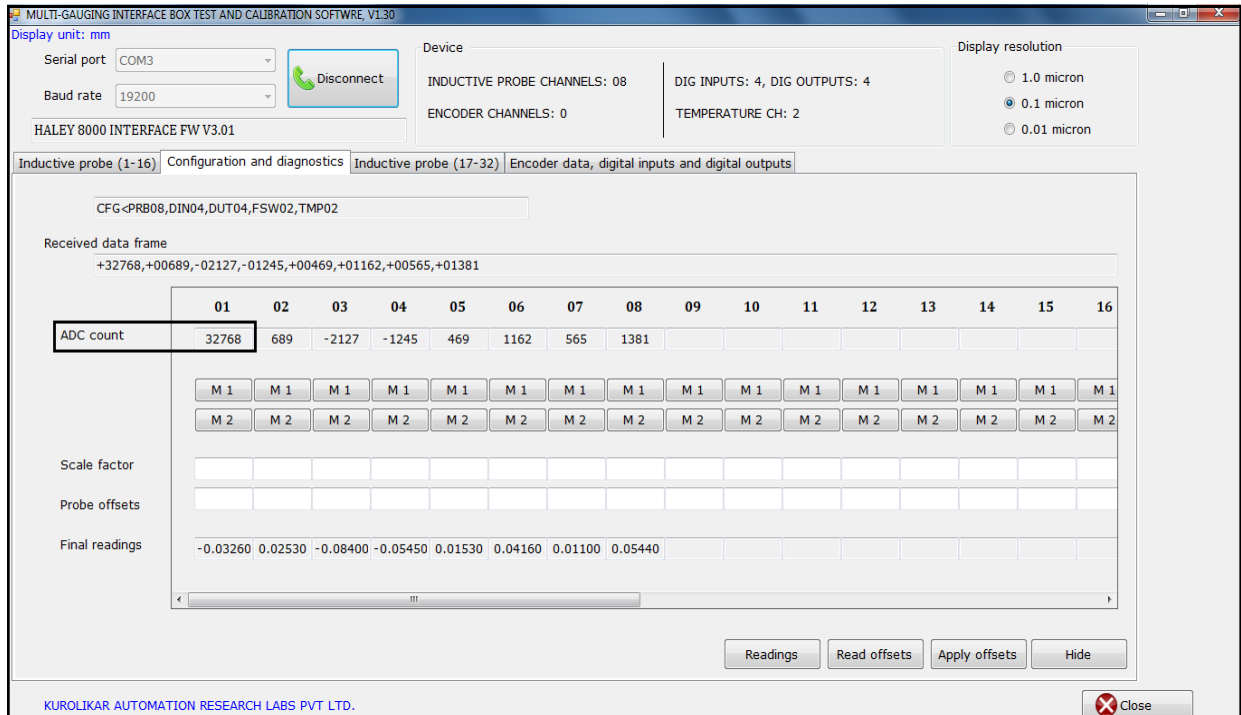


Image-13

Step 8: For doing mastering of all channels follow given below steps

1. First ensure that probes are connected to all channels
2. Check all probes are giving proper ADC counts as mentioned in **step-7**.
3. Set each probes to the zero ADC counts ,this is the procedure to set zero reference
4. After successful setting of zero reference load higher master and click on M1button and wait for few seconds.
5. Load lower master and click on M2 button and wait for few seconds.
6. Mastering is done. Apply same procedure for all channels of interface unit.

WARRANTY STATEMENT

All the products are covered under warranty for a period of 12 months against manufacturing defects, workmanship and malfunction under normal operating conditions. The warranty is subject to the terms and conditions mentioned below.

1. The warranty commences from the date of sale for a period of 12 months irrespective of the actual installation date.
2. The warranty is against manufacturing defects and any subsequent malfunction of the instrument during the normal operation. The warranty shall not be applicable in case of accidental damage, damage due to wrong operation, connection or conditions that are out of normal operating specifications.
3. KARL PL, at its discretion may repair or replace the product depending on the condition of instrument, availability of spare parts and type of failure.
4. In case of warranty claim, the warranty period will not be extended and remains same as stated earlier from the date of sale.
5. Maximum liability of KARL PL remains up to repair or replacement of the product only. Any damages or losses raised out of use of the instrument are not covered by this warranty. In any case, cost of the product will not be refunded.
6. In case of warranty claim, the product should be sent over to KARL PL immediately after noticing the defect or failure. A detailed note of operating conditions in which fault occurred will be helpful in rectifying the defect.
7. Do not try to open or repair the instrument on your own. Warranty will stand null and void in such case. Products with tampered warranty seal will not be considered for warranty claims and regular service charges will be applicable.
8. In all claims, the company's decision will be final and legally binding.
9. Any and all disputes are subject to pune jurisdiction only.

Kurolikar Automation Research Labs Pvt Ltd
#226, Laxmi colony, Lane No.5 ,Behindmanish
market,Hadapsar, Pune – 411028.
www.AutomationResearchLabs.com
Email: sales@AutomationResearchLabs.com