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RAINBOW DISPLAY UNIT

This document is applicable for software versions to **V2.30 and later**.

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1. Introduction



The SPADE series **TFT** display is a unit for dimensional measurement with high precision and accuracy. With built-in two, four and six and eight channels of inductive probe or air gauge input, different dimensional measurement can be taken and a combined result can be generated through relays. The device is fully customizable and configurable. Even the number of inputs can be extended using expansion interface device.

The device can be connected to digital input/output expansion unit to have up to 24 digital inputs and outputs. The device has three built in relays for asserting result signal. All the reports can be directly exported to desired file format with number of filtering options. Instructions are also displayed at the bottom of each screen to guide the operator. These two features make the unit very easy to use. User-friendly screens with color graphics or digital pictures display icons for simple menu selection.

2. Features

- 7" or 10" Color TFT display for clear viewing and graphical presentations.
- Dual Interface Touch + keyboard and mouse operation.
- 3 built-in relays for fixture result (**ACCEPT** / **REWORK** / **REJECT**).
- Rainbow unit ensures a friendly interface with clear layout and user-friendly messages, making operation easy for all users.
- **Low Air Pressure Alert***: Rainbow unit includes a low air pressure alert feature, ensuring users are promptly notified if the air pressure falls below a specified threshold. This proactive warning helps prevent issues related to insufficient air pressure during the monitoring process. (* Separate digital pressure switch required).
- **Safe shut down***: Protects the device in case of a power outage by automatically shutting down the device.
- **The air is automatically cut off after selecting the setting.**
- **SPC Features**: Min, Max, Range, Avg, Cp, Cpk, Pp, PPK, Std Deviation, Mean etc.
- **Dynamic charts** for comprehensive analysis:
 1. Run Chart
 2. X-bar R Chart
 3. X-bar S Chart
- **Operation Mode**: Rainbow unit offers flexibility in parameter checking by providing five distinct modes:
 1. Manual
 2. Simultaneous
 3. Random_ Independent
 4. Random_ Mandatary
 5. Sequential
- **Easy Report Generation**: Rainbow unit simplifies the process of creating reports through its user-friendly interface. Users can effortlessly generate comprehensive reports in CSV format for data manipulation for easy sharing and viewing.
- **Auto correction command (Script)** can be sent through RS232, Ethernet interface.
- **Advance feature of onsite firmware updation.**
- **Mastering** can be configured on hourly basis.
- **Setable Shift timings.**
- Grading option fully configurable with relay output for each grade through external IO expansion for up to 12 grades.
- External IO expansion can also be used for separate relay output for any selected parameter. Up to 16 external outputs are available.
- **SPC Features**: Histogram, Line chart, Cp, Cpk, Pp, PPK, Std Deviation, Mean deviation etc.
- Metric/Inch measurement unit
- 16GB of internal storage where large number of readings can be stored. Stores measurement results with time stamp.
- **Manual/AutoSave/ Auto Sense facility.**
- Results can be exported in .CSV format through USB port directly.
- Password protection for all settings.
- Serial number has modes as AUTOMATIC, MANUAL ENTRY and SCANNER input. When SCANNER mode is selected, barcode or QR code scanner can be directly connected to device for serial number.
- In AUTOMATIC mode, serial number increments internally and can reset on daily, monthly, and yearly basis or at preset batch count.
- User selectable communication channels viz Ethernet and RS232.
- TCP/IP protocol over Ethernet allows sending data to server or cloud computer.

- Number of input channels can be increased by attaching standard IO interface device.
- Built-in auto-correction options to directly connect device to CNC machine. Binary, BCD, Direct program script options of auto-correction are supported.
- Auto correction command (Script) can be sent through RS232, Ethernet.
- There are three modes for serial number
 1. **Automatic mode:** Serial number increments automatically after every checked component.
 2. **Manual mode:** Before starting measurement of any new component, the software will wait for operator to enter serial number manually.
 3. **Scanner mode:** Before starting measurement of any new component, the software prompts operator to scan serial number using barcode scanner.

3. Specifications

a. Functional specifications

- Communication settings: RS232 interface, no parity, 8 data bits, one stop bit.
- Baud rate: Settable as 4800, 9600, 19200, 38400, 57600(Factory default is 19200).
- Resolution options for probe: 0.01micron, 0.1micron, 0.5micron, 1micron.
- Measurement range for probe: Any.
- Measurement mode: CUR, MIN, MAX, TIR, AVG.
- Measurement type: Absolute and Relative.

b. Electrical specifications

- Power supply: 12V 3A external adapter supplied with device.
- Measurement inputs: Can be connected with any standard KARLPL interface unit of Full Bridge LVDT, Half bridge probe, Pneumatic channel or any combination of those. Up to 16 measurement input channels are supported.
- Up to 16 stations are supported each containing 16 fixtures. At a time, any one station is active.
- Each fixture can have up to 16 parameters. Hence a wide variety of combinations can be covered in this device.
- Parameters are fully configurable and formula for each parameter can be separately edited.
- Output: 3 built-in relays for fixture result (ACCEPT / REWORK / REJECT).

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.

- **Accuracy**
 $\pm 0.1\%$ within linear operation of inductive probe (1micron over the range of 1mm).
- **Drift**
0.3micron over a period of 1hour.
- **Repeatability**
After power cycle: 0.2micron.
After mechanical movement: 0.2micron.
- **Stability**
 ± 0.15 micron of nominal measured value at fixed position
- **Maximum sampling time**
For inductive probe: 1mSec (1000samples per second).

- **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

- Dimension(mm) W X H X L: 60mm X 170mm X 270mm (Probe unit),
: 280mm X 230mm X240mm (Air unit).

4. Screen Functionality

4.1 Home Screen

This home screen is password protected. When user click on Product Settings, Fixture Settings and General Settings the system will ask for password, as shown in following figure 2.

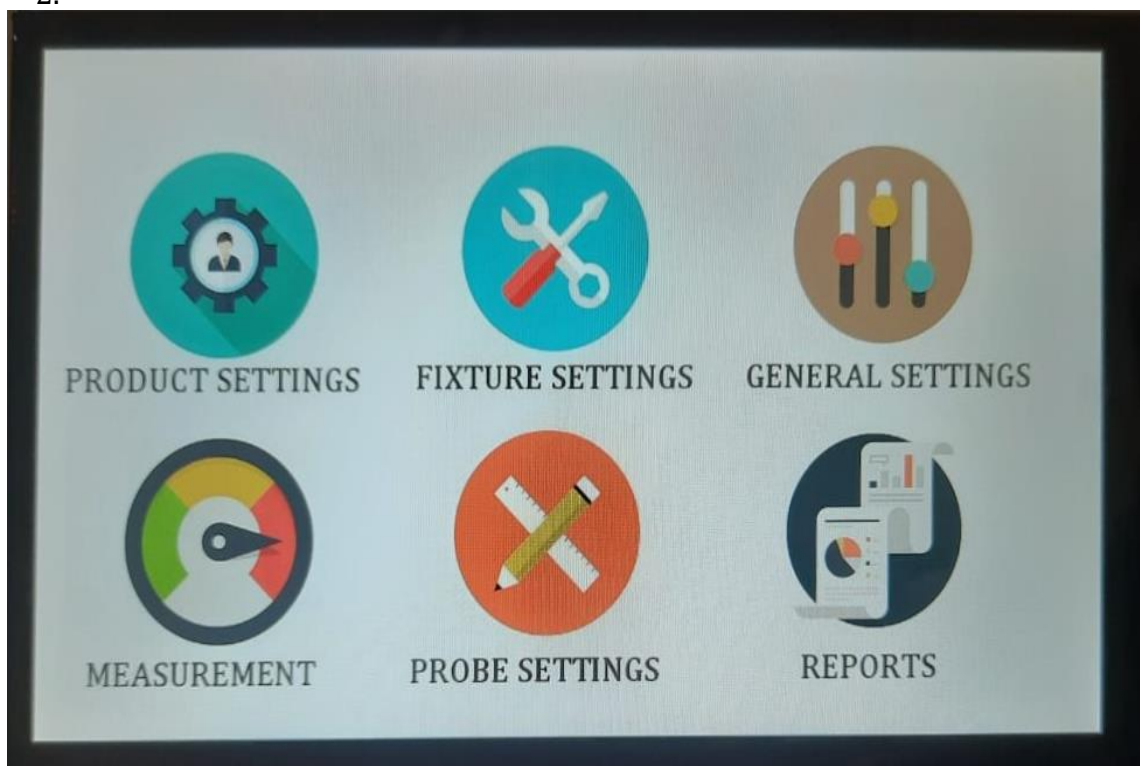


Figure 1

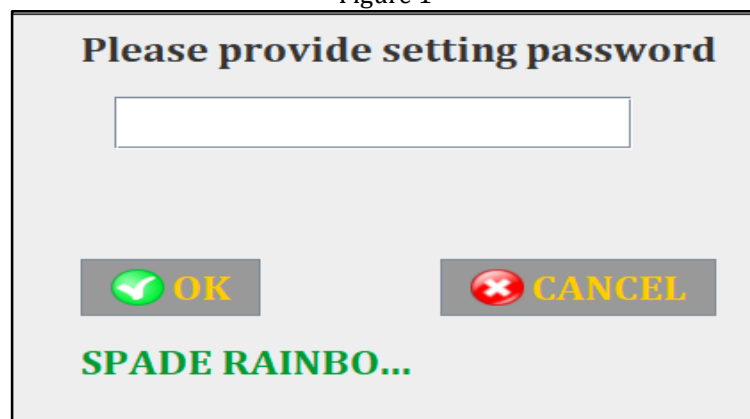


Figure 2

The default password for fixture settings is 1234 and for product settings and General settings the default password is 4321. Only the administrator has rights to change the password.

So please take care while changing the default password. If the password is matching the respective window will be open. If password does not match the following fig shows the message wrong password authentication required. Please enter the correct password and go to respective menus.

- This is the home screen of 7" TFT Display unit. There are 6 menus.

4.1.1 PRODUCT SETTINGS

This menu is used for Product Settings. The product settings menu is password protected. User must know a password to open the product settings windows for modification. The password is valid for super user only. Operator cannot modify the product settings.

4.1.2 FIXTURE SETTINGS

This menu is used for Fixture Settings. The fixture settings menu is password protected. Supervisor must know a password to open a fixture settings windows for modification. The password is valid for supervisor only. Operator cannot modify the fixture settings.

4.1.3 GENERAL SETTINGS

This menu is used for General settings. Where user can modify the password of product settings window, fixture settings windows.

4.1.4 MEASUREMENT

This menu is used to go to the measurement screen. Which is the live screen and main screen, where user can see the component readings.

4.1.5 PROBE SETTINGS

This menu is used for Probe Settings. Where user can see he individual readings of probe.

4.1.6 REPORTS

This menu is used to see the results. We will see the brief details in next topic.

4.1.1 PRODUCT SETTINGS

Figure 3

Above figure3 shows the product settings where user can set the following fields.

- **Product Number:** Station number is used for selecting station number for which user want to configure as per their requirement. User can select product number from 1 to 16.
- **Product Name:** This field is used to set the product name as per user choice. User can set the name up to 25 characters.
- **Serial Prefix:** Serial prefix is used to set the prefix for serial number such as JOB0001, PART0001, COMPONENT0001 etc. JOB, PART, COMPONENT are some of the common prefixes used for serial numbers. User can set prefix as per user choice.
- **Serial mode:** There are 3 options in serial mode. User can select form drop down menu.
 - **Auto:** Serial number increments automatically after every checked component.
 - **Manual:** If manual mode is selected user have to enter serial number for every measurement cycle manually.
 - **Scanner:** If scanner mode is selected user can capture serial number using scanner.

PRODUCT SETTINGS

Product Number: 1 No.of Fixtures: 1

Product Name: PRODUCT01 Operation Mode: MANUAL

Serial Prefix: Relay on Time: 4 Seconds

Serial Mode: Auto Current Serial: 000001 **Reset Serial**

Sr.Reset Mode: Select Batch Quantity: 500 **Reset Production Counter**

Enable Prev Stat: ☐ **Reset Message Counter**

Reset production: Manual

Hours interval: 0

Display Message: MESSAGE NOT SET

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON. **SAVE**

Figure 4

All the result of measurements is saved against specified serial number for future reference.

- **Serial reset mode:** There are 5 serial reset mode options available. Users can select options from the drop-down menu as per their requirements, as shown in Figure 5.
 - **Daily:** Serial number mode daily automatically reset and set to auto serial mode.
 - **Monthly:** Serial number mode monthly automatically reset and set to auto serial mode.
 - **Yearly:** Serial number mode yearly automatically reset and set to auto serial mode.
 - **Batch Wise:** Serial number mode after completions of batch size automatically reset and set to auto serial mode.
 - **Never:** serial number mode never reset.

Figure 5

- **No of fixtures:** Under any particular station user can set valid number of fixtures as per user's requirement. User can set maximum fixture number is 16.

Example: If user want to use 3 fixtures under station 1 then select 3 from drop down menu and save.

- **Operation Modes: Rainbow unit** offers flexibility in parameter checking by providing Five distinct modes:

For example, fixture 1 has 2 parameters and fixture 2 has 2 parameters.

- **Manual:**

In manual mode, manually check all parameters.

1. 'LOAD' component message shown on screen.
2. Load the component.
3. 'FIX1 CYCLE RUNNING. PRESS FOOTSWITCH /ENTR TO CAPTURE' message shown on screen.
4. To save the result, press FOOTSWITCH /ENTR button.
5. 'LOAD COMPONENT IN NEXT FIXTURE AND PRESS FOOTSWITCH' message shown on screen.
6. Load the component.
7. 'FIX2 CYCLE RUNNING. PRESS FOOTSWITCH /ENTR TO CAPTURE' message shown on screen.
8. To save the result, press FOOTSWITCH /ENTR button.
9. 'LOAD COMPONENT IN NEXT FIXTURE AND PRESS FOOTSWITCH' message shown on screen.

- **Simultaneous:**

Enable auto sense for parameter 1 in fixture 1. All parameters have been loaded into the component. Parameter 1 from fixture 1 was loaded into the component. All parameters sensed automatically.

1. 'LOAD COMPONENT TO START CYCLE' message shown on screen.
2. Load the component.
3. 'CYCLE RUNNING' message shown on screen.
4. Automatically result save.

- **Random_ Independent:**

Randomly check all parameters. The first check is for parameter 2 in fixture1, and the next check is for parameter 1 in fixture1.

1. 'CHECK PARAMETERS IN ANY ORDER FOR FIX1.0 DONE' message shown on screen.
2. Load the component.
3. 'ALL PARAMETERS DONE.PRESS FOOTSWITCH TO SAVE' message shown on screen.
4. To save the result, press FOOTSWITCH.
5. 'FIX1 COMPLETED.REMOVE ALL PLUGS FROM COMPONENT'.
6. 'CHECK PARAMETERS IN ANY ORDER FOR FIX2.0 DONE' message shown on screen.
7. Load the component.
8. 'ALL PARAMETERS DONE.PRESS FOOTSWITCH TO SAVE' message shown on screen.
9. To save the result, press FOOTSWITCH.
10. 'FIX2 COMPLETED.REMOVE ALL PLUGS GROM COMPONENT'.

- **Random_ Mandatory:**

Random mandatory check of all components one by one.

1. CHECK PARAMETERS IN ANY ORDER FOR FIX1.0 DONE' message shown on screen.
2. Load the component.
3. 'ALL PARAMETERS DONE.SAVING RESULT' message shown on screen.
4. 'FIX1 COMPLETED.REMOVE ALL PLUGS GROM COMPONENT'.
5. 'CHECK PARAMETERS IN ANY ORDER FOR FIX2.0 DONE' message shown on screen.
6. Load the component.
7. 'ALL PARAMETERS DONE.SAVING RESULT' message shown on screen.
8. 'FIX2 COMPLETED.REMOVE ALL PLUGS GROM COMPONENT'.

- **Sequential:**

It senses one channel after another and back to the first channel.

1. 'WAITING FOR PARAM1 CYCLE'.
2. Load the component.
3. 'FIX1:PARAM1 CYCLE RUNNING' Automatic result save.
4. 'ALL PARAMETERS DONE'.
5. 'WAITING FOR PARAM1 CYCLE'.
6. Load the component.
7. 'FIX2:PARAM1 CYCLE RUNNING' Automatic result save.
8. 'ALL PARAMETERS DONE'.

PRODUCT SETTINGS

Product Number: 1

Product Name: PRODUCT01

Serial Prefix:

Serial Mode: Auto

Sr.Reset Mode: Never

Enable Prev Station Interlink ☐

Reset production counters on: Manual

Hours interval: 0

Display Message: MESSAGE NOT SET

No.of Fixtures: 1

Operation Mode: MANUAL

Relay on Time: MANUAL

Current Serial:

Batch Quantity:

Reset Serial

Reset Production Counter

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

SAVE

Figure 6

- **Relay on time:** If a non-zero value is specified for this setting. The result relay will remain ON for the specified seconds. If this value is zero, the relay will be ON according to the result until the plugs are restored.
- **Current serial:** Current serial is a current serial number. Starts from 0001.
- **Reset Serial** Reset the serial number.
- **Batch Quantity:** This field is used to set batch quantity of production.
- **Enable Prev. Station Interlink:**
- **Reset production counters:** This option is used to reset the production counters.
 - Manual
 - Shift change
 - Date change
 - Serial reset

PRODUCT SETTINGS [HOME](#)

Product Number No.of Fixtures

Product Name Operation Mode

Serial Prefix Relay on Time Seconds

Serial Mode Current Serial [Reset Serial](#)

Sr.Reset Mode Batch Quantity

Enable Prev Station Interlink ☐

[Reset Production Counter](#)

Reset production counters on

Hours interval [Reset Message Counter](#)

Display Message

[CHANGE REQUIRED](#) [SAVE BUTTON.](#) [SAVE](#)

Figure 7

- **Reset Message Counter:** Reset the message counter.
- **Display Count & Display Message:** When the display count is reached, a message will be displayed to the user. For example, the display count is 500. After 500 counts reach the settable user message is displayed on screen.
- **Save:** After any modification in settings to apply modification user need to click on save button.

4.1.2 Fixture and its parameters

This screen is used to set the fixture and its parameter settings. General settings are categorized in five tabs.

- A Fixture Settings
- B Parameter configuration
- C Auto sense
- D Parameter relay
- E Auto correction

Figure 8

A Fixture Settings

This screen is used to set the fixture and its parameter settings.

- **Fixture number:** Select the fixture number to change the settings of fixture fields.
- **Fixture Name:** This field is used to set the fixture name as per user choice.
- **Display Type:**
 - Value Boxes
 - Dial
- **Valid parameters:** This setting is used to set the no of parameters of fixture. User can set valid parameters for any fixture up to 10. Based upon valid parameters value that many number of parameter boxes shown at measurement screen.
- **Cycle time:** This setting is used to set the cycle time of fixture to take the measurement of component. The cycle time is in seconds. If user set the cycle time 0 then, the cycle is running continuously till the user press the enter button or footswitch.
- **Enable Data Send:** If the check box is checked, this feature is used to send the data on RS232 port or Ethernet port of computer.
- **Grade Parameters:** This setting is used for parameter grading. If user want to decide the grade of the parameter then select the grade parameter option.

How to use of Grade Parameters:

Example: Assuming measurement range is from 0 micron to +500micron, so

grading will be as follow.

Grade low value in micron	Grade high value in micron	Grade
50	100	A
101	150	B
151	200	C

Table 1

Figure 9

- **Mastering Type:** User will select the mastering type for single master or double master, as shown in figure 10.

Figure 10

- **Total Grades:** This field is used for grade deciding parameters of fixture.
- **Display unit:** User can select the unit of fixture in mm or inch, as shown in figure 11.

Product: PRODUCT01

HOME

FIXTURE SETTINGS | **PARAMETER CONFIGURATION** | **AUTO SENSE** | **PARAMETER RELAY** | **AUTO CORRECTION**

View and change settings for fixture 1 Display Type Value Boxes

Fixture Name Fix 1 Mastering Type Double

Valid Parameters 1 Total Grades 0

Cycle Time 0 Display Unit mm

Send result data ☐ Save msmt data ☒

Grade Parameter Select Otherwise Grade Select

Select grade to view and change settings Select

Display Name Relay For Grade Select

Grade Low Value Grade High Value

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON. **SAVE**

Figure 11

- **Data save enable:** If the check box is checked, this feature is used to save the data to view in report.
- **Otherwise Grade:**
For example -Grade low value: -0.010, Grade high value: 0.010, Display name: Grade A, otherwise grade: Grade D.
The result is 0.036. The grade will be displayed as D.
- **Select grade to view and change settings:** - here user want to select the grade numbers the Grade is from Grade 1 to Grade 16.

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

View and change settings for fixture 1 Display Type Value Boxes

Fixture Name Fix 1
 Mastering Type Double

Valid Parameters 1
 Total Grades 0

Cycle Time 0
 Display Unit mm

Send result data ☐
 Save msmt data ☒
 Halt on fail ☐

Grade Parameter Select
 Otherwise Grade

Select grade to view and change settings Select

Display Name

Grade Low Value

CHANGE REQUIRED SETTINGS AND PR
SAVE

- **Display name:** Display name for grade as per user choice.
- **Grade high value:** This is the grade parameter higher value.
- **Relay for grade:** User can select the relay for grade. There is a provision 16 grades and 16 relays.

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

View and change settings for fixture 1 Display Type Value Boxes

Fixture Name Fix 1
 Mastering Type Double

Valid Parameters 1
 Total Grades 0

Cycle Time 0
 Display Unit mm

Send result data ☐
 Save msmt data ☒
 Halt on fail ☐

Grade Parameter Select
 Otherwise Grade

Select grade to view and change settings Select

Display Name

Grade Low Value

Relay For Grade Select

Grade High Value Select

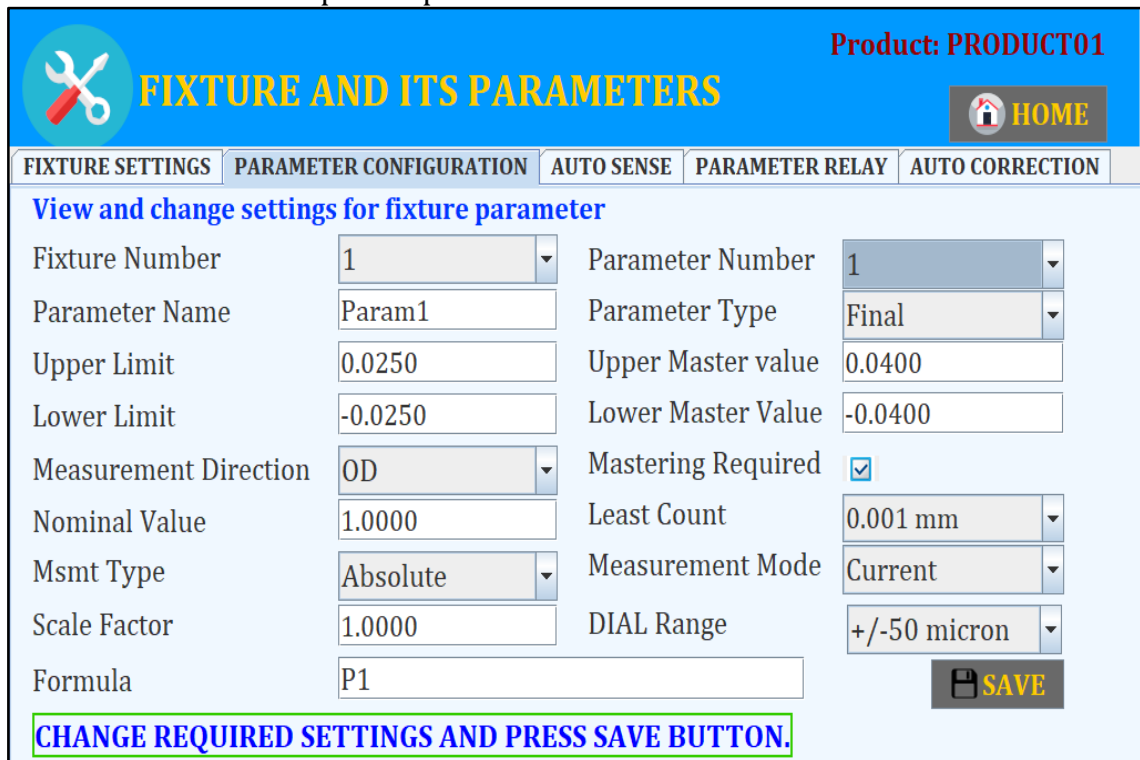
CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTO

Figure 12

- **Grade low value:** This is the grade parameter lower value.
- **Save:** The user fills all the data and click on save button.

B Parameter Configuration

The next tab in fixture and parameters is parameter settings. The user can enter parameter data of component. Below figure shows the default data of parameter configuration. Now user can fill the data of respective parameters. For each fixture user can be set up to 16 parameters.



Product: PRODUCT01

FIXTURE AND ITS PARAMETERS

HOME

FIXTURE SETTINGS | **PARAMETER CONFIGURATION** | AUTO SENSE | PARAMETER RELAY | AUTO CORRECTION

View and change settings for fixture parameter

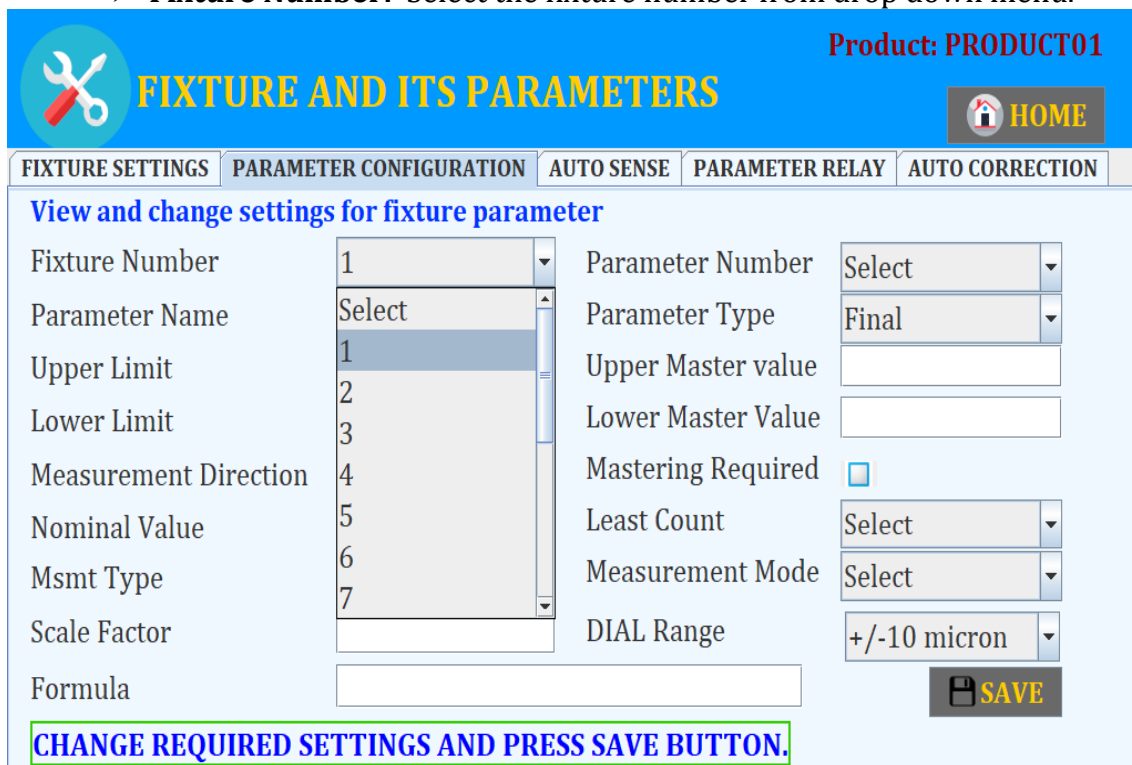
Fixture Number	1	Parameter Number	1
Parameter Name	Param1	Parameter Type	Final
Upper Limit	0.0250	Upper Master value	0.0400
Lower Limit	-0.0250	Lower Master Value	-0.0400
Measurement Direction	OD	Mastering Required	☒
Nominal Value	1.0000	Least Count	0.001 mm
Msmt Type	Absolute	Measurement Mode	Current
Scale Factor	1.0000	DIAL Range	+/-50 micron
Formula	P1		

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

SAVE

Figure 13

➤ **Fixture Number:** Select the fixture number from drop down menu.



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FIXTURE AND ITS PARAMETERS

HOME

FIXTURE SETTINGS | **PARAMETER CONFIGURATION** | AUTO SENSE | PARAMETER RELAY | AUTO CORRECTION

View and change settings for fixture parameter

Fixture Number	1	Parameter Number	Select
Parameter Name	Select	Parameter Type	Final
Upper Limit	1	Upper Master value	
Lower Limit	2	Lower Master Value	
Measurement Direction	3	Mastering Required	☐
Nominal Value	4	Least Count	Select
Msmt Type	5	Measurement Mode	Select
Scale Factor	6	DIAL Range	+/-10 micron
Formula	7		

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

SAVE

Figure 14

➤ **Parameter Number:** Select the parameter number to be configure.

Figure 15

- **Parameter Name:** User can set the parameter name as per user choice.
- **Parameter Type:** There are two types of parameter 1. Final 2. Intermediate
- **Upper Limit:** Upper limit is used to set the upper value of component. Upper limit is master basic Size plus tolerance.
Example: if upper master size is +500 micron then upper limit will be +505 micron, so in this example we considered 5 micron as upper side tolerance value.
- **Upper master value:** This is the upper master value of component.
- **Lower limit:** Lower limit is used to set the lower value of component. lower limit is basic size minus tolerance.
Example: if upper master size is -500 micron then lower limit will be +495 micron, so in this example we considered -5 micron as lower side tolerance value.
- **Lower master value:** This is the lower master value of component.
- **Measurement direction:** Measurement direction has 2 options OD and ID.

- **ID- Internal Diameter**
- **OD- Outer Diameter**

Final results are dependent on these selections.

If measurement direction is ID in that case readings goes above higher limit values result will Be REJECT, and if readings go below lower limit values result will be **REWORK**.

If measurement direction is OD in that case readings goes above higher limit values result will Be REWORK and if readings go below lower limit values result will be **REJECT**.

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

View and change settings for fixture parameter

Fixture Number	1	Parameter Number	1
Parameter Name	Param1	Parameter Type	Final
Upper Limit	0.0250	Upper Master value	0.0400
Lower Limit	-0.0250	Lower Master Value	-0.0400
Measurement Direction	OD	Mastering Required	☒
Nominal Value	Select	Least Count	0.001 mm
Msmt Type	ID	Measurement Mode	Current
Scale Factor	OD	DIAL Range	+/-50 micron
Formula	P1		

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 16

- **Mastering required:** if user want to use this parameter for mastering then please check the check box. If the check box is unchecked means mastering of that parameter is not required.
- **Nominal Value:** The nominal value lies between upper and lower limits. And nominal size lies between these limits.
- **Least count:** The smallest value that can be measured by the measuring instrument is called its least count. User can set the count for 0.001micron, 0.0001micron, 0.005 micron, 0.0005 micron.

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

View and change settings for fixture parameter

Fixture Number	1	Parameter Number	1
Parameter Name	Param1	Parameter Type	Final
Upper Limit	0.0250	Upper Master value	0.0400
Lower Limit	-0.0250	Lower Master Value	-0.0400
Measurement Direction	OD	Mastering Required	☒
Nominal Value	1.0000	Least Count	0.001 mm
Msmt Type	Absolute	Measurement Mode	Select
Scale Factor	1.0000	DIAL Range	0.0001 mm
Formula	P1		

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 17

- **Measurement Type:** There are two modes absolute and relative, as shown in figure 18.

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FIXTURE SETTINGS **PARAMETER CONFIGURATION** **AUTO SENSE** **PARAMETER RELAY** **AUTO CORRECTION**

View and change settings for fixture parameter

Fixture Number	1	Parameter Number	1
Parameter Name	Param1	Parameter Type	Final
Upper Limit	0.0250	Upper Master value	0.0400
Lower Limit	-0.0250	Lower Master Value	-0.0400
Measurement Direction	OD	Mastering Required	☒
Nominal Value	1.0000	Least Count	0.001 mm
Msmt Type	Absolute	Measurement Mode	Current
Scale Factor	Select	DIAL Range	+/-50 micron
Formula	Absolute		
	Relative		
	Binary		

CHANGE REQUIRED SE **SS SAVE BUTTON.** **SAVE**

Figure 18

- **Measurement mode:** There are 6 measurement modes, as shown in figure 19.
- **Current:** In current mode actual current moments readings are shown as result.
 - **Min:** In min mode lowest reading during measurement cycle is captured and displayed as result.
 - **Max:** In max mode highest reading during measurement cycle is captured and displayed as result.
 - **Average:** In average mode average of all readings are shown as result.
 - **TIR:** In TIR mode total traverse of readings during measurement cycle are shown as result.

FIXTURE AND ITS PARAMETERS

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FIXTURE SETTINGS

PARAMETER CONFIGURATION

AUTO SENSE

PARAMETER RELAY

AUTO CORRECTION

View and change settings for fixture parameter

Fixture Number	1	Parameter Number	1
Parameter Name	Param1	Parameter Type	Final
Upper Limit	0.0250	Upper Master value	0.0400
Lower Limit	-0.0250	Lower Master Value	-0.0400
Measurement Direction	OD	Mastering Required	☒
Nominal Value	1.0000	Least Count	0.001 mm
Msmt Type	Absolute	Measurement Mode	Current
Scale Factor	1.0000	DIAL Range	Select Current Min Max
Formula	P1		

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 19

- **Scale factor:** Scale factor value is multiplying factor for obtained result during measurement cycle.
- **Dial Range:** There are 5 options in the dial range set, as shown in figure 20.
 - +/-10micron
 - +/-25micron
 - +/-50micron
 - +/-75micron
 - +/-100micron.

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

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PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

View and change settings for fixture parameter

Fixture Number	1	Parameter Number	1
Parameter Name	Param1	Parameter Type	Final
Upper Limit	0.0250	Upper Master value	0.0400
Lower Limit	-0.0250	Lower Master Value	-0.0400
Measurement Direction	OD	Mastering Required	☒
Nominal Value	1.0000	Least Count	0.001 mm
Msmt Type	Absolute	Measurement Mode	Current
Scale Factor	1.0000	DIAL Range	+/-50 micron
Formula	P1		

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 20

- **Formula:** User can enter formula for every parameter as per their requirement. User should have taken care during applying formula for parameters, if wrong formula applied results are undefined.

C Auto Sense

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

Fixture Number	1	Auto Sense Parameter	Parameter1
Enable Auto Sensing	☐		
Sense Direction	Above	Auto Sense Delay	1 Sec
Limit ADC count	0	Air ON Channel	None
Open Plug Count	7500	Auto save Dealy	2 Sec

Enable Auto Save After Accept ☐

Enable Auto Save After Reject ☐

Enable Auto Save After Rework ☐

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 21

- **Fixture Number:** Select the fixture number under which auto sense parameter is

Product: **PRODUCT01**

FIXTURE AND ITS PARAMETERS

HOME

FIXTURE SETTINGS | PARAMETER CONFIGURATION | AUTO SENSE | PARAMETER RELAY | AUTO CORRECTION

Fixtue Number: Select

Enable Auto Sensing: Select

Sense Direction: 1

Limit ADC count: 2

Open Plug Count: 3

4

5

6

7

Auto Sense Parameter: Select

Auto Sense Delay: Sec

Air ON Channel: None

Auto save Dealy: Sec

Enable Auto Save After Accept: ☐

Enable Auto Save After Reject: ☐

Enable Auto Save After Rework: ☐

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 22

- **Enable Auto Sensing:** Check this option to enable auto sense feature.

Product: **PRODUCT01**

FIXTURE AND ITS PARAMETERS

HOME

FIXTURE SETTINGS | PARAMETER CONFIGURATION | AUTO SENSE | PARAMETER RELAY | AUTO CORRECTION

Fixtue Number: 1

Enable Auto Sensing: ☒

Sense Direction: Above

Limit ADC count: 0

Open Plug Count: 7500

Auto Sense Parameter: Parameter1

Auto Sense Delay: 1 Sec

Air ON Channel: None

Auto save Dealy: 2 Sec

Enable Auto Save After Accept: ☐

Enable Auto Save After Reject: ☐

Enable Auto Save After Rework: ☐

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 23

- **Auto sense parameter:** Select the parameter that will be monitored for auto-sensing, as shown in figure 24.

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

Fixture Number Select

Enable Auto Sensing ☐

Sense Direction Above

Limit ADC count

Open Plug Count

Enable Auto Save After Accept ☐

Enable Auto Save After Reject ☐

Enable Auto Save After Rework ☐

Auto Sense Parameter Select

Select

Parameter1

Parameter2

Parameter3

Parameter4

Parameter5

Parameter6

Parameter7

Auto Sense Delay Sec

Air ON Channel None

Auto save Dealy Sec

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 24

- **Sense direction:** select the auto sense direction Above or Below. If the cycle start trigger is expected when the value goes above idle value, select Above. Otherwise select Below, as shown in figure 25.

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

Fixture Number Select

Enable Auto Sensing ☐

Sense Direction Above

Limit ADC count Above

Open Plug Count Below

Enable Auto Save After Accept ☐

Enable Auto Save After Reject ☐

Enable Auto Save After Rework ☐

Auto Sense Parameter Select

Auto Sense Delay Sec

Air ON Channel None

Auto save Dealy Sec

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 25

- **Auto Sense delay in seconds:** This is the time that must pass before the auto sense is confirmed to start measurement cycle. Auto sense feature can be combined with auto save feature. In this case, the results of the cycle are automatically saved for the selected result case. The auto save feature can be enabled separately for each type of result.

If none of the auto save option is selected, the user has to press foot switch to save the results of that cycle.

- **Limit ADC count:** For proper working of auto sensing user must enter limit value. device will sense the limit value entered by user and accordingly starts the measurement cycle.
- **Open plug count:** To measure the open plug count, remove the plug in master then show the ADC count and this ADC count enter here.
- **Air on Channel:** Select air on parameter, as shown in figure 26.

Figure 26

- **Auto Save Delay:** Auto save delay can be set or can be disabled. The part's dimensions are automatically saved according to the set delay.
- **Enable Auto save after Accept:** Enabling this feature saves accept status automatically.
- **Enable Auto save after Reject:** Enabling this feature saves reject status automatically.
- **Enable Auto save after Rework:** Enabling this feature saves rework status automatically.

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

Fixture Number

Enable Auto Sensing ☐

Sense Direction

Limit ADC count

Open Plug Count

Enable Auto Save After Accept ☒

Enable Auto Save After Reject ☒

Enable Auto Save After Rework ☒

Auto Sense Parameter

Auto Sense Delay Sec

Air ON Channel

Auto save Dealy Sec

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 27

- **Save:** After any modification in settings to apply modification user need to click on save button.

D Parameter Relay

FIXTURE AND ITS PARAMETERS

Product: PRODUCT01

FIXTURE SETTINGS
PARAMETER CONFIGURATION
AUTO SENSE
PARAMETER RELAY
AUTO CORRECTION

Fixture Number

Enable Relay Operation ☐

ACCEPT RELAY

REWORK RELAY

REJECT RELAY

Parameter Number

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 28

This feature is used to set to enable relay operation for each parameter. If relay operation is enabled, relay number can be separately selected for each type of result. Please note, IO expansion must be connected in cascade mode after probe interface device for relays to get operated. A maximum of 24 relays can be operated. After all,

setting please click on save button to save settings of parameter relay. The following window will show the message after successful data saving.

- **Fixture Number:** Select the fixture number under which parameter relay is to be configured.

Figure 29

- **Parameter Number:** Select the parameter that will be monitored for parameter relay, as shown in figure 30.

Figure 30

- **Enable Relay Operation:** If relay operation is enabled, relay number can be separately selected for each type of result as shown in figure 31.

Product: PRODUCT01

FIXTURE AND ITS PARAMETERS

HOME

FIXTURE SETTINGS | PARAMETER CONFIGURATION | AUTO SENSE | **PARAMETER RELAY** | AUTO CORRECTION

Fixture Number: 1 | Parameter Number: 1

Enable Relay Operation: ☒

ACCEPT RELAY: 1

REWORK RELAY: 2

REJECT RELAY: 3

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON. SAVE

Figure 31

- **Accept, Rework, Reject Relay:** Select the relay in accept reject and rework results.

Product: PRODUCT01

FIXTURE AND ITS PARAMETERS

HOME

FIXTURE SETTINGS | PARAMETER CONFIGURATION | AUTO SENSE | **PARAMETER RELAY** | AUTO CORRECTION

Fixture Number: Select | Parameter Number: Select

Enable Relay Operation: ☐

ACCEPT RELAY: No Relay

REWORK RELAY: No Relay

REJECT RELAY: No Relay

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON. SAVE

Figure 32

- **Save:** After any modification in settings to apply modification user need to click on save button

E Auto Correction

Figure 33

- **Fixture Number:** Select the Fixture number for auto correction.

Figure 34

- **Enable Auto correction:** Check this option to enable auto correction feature.

Figure 35

- **Parameter Number:** - This field is used to set parameter number.

Figure 36

- **Communication Channel:** Select the communication Channel for auto correction. There are 5 communication channels available.



Product: **PRODUCT01**

FIXTURE AND ITS PARAMETERS

HOME

FIXTURE SETTINGSPARAMETER CONFIGURATIONAUTO SENSEPARAMETER RELAYAUTO CORRECTION

Fixture Number

1

Enable Auto Correction

☐

Communication Channel

BCD Output

Parameter Number

BCD Output

Destination IP

Binary o/p

Port

RS232

Script

TCP CLIENT

TCP SERVER

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 37

- BCD Output
- Binary O/P
- RS232 Communication



Product: **PRODUCT01**

FIXTURE AND ITS PARAMETERS

HOME

FIXTURE SETTINGSPARAMETER CONFIGURATIONAUTO SENSEPARAMETER RELAYAUTO CORRECTION

Fixture Number

1

Enable Auto Correction

☐

Communication Channel

RS232

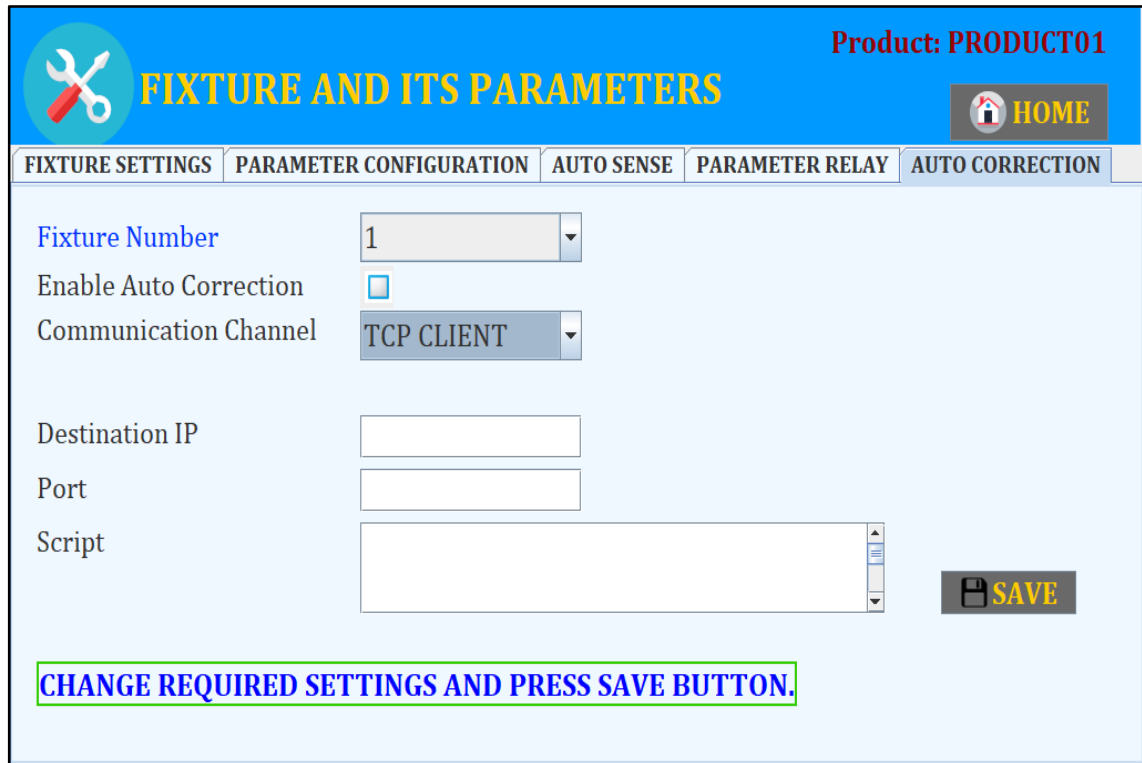
Script

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 38

- TCP Client



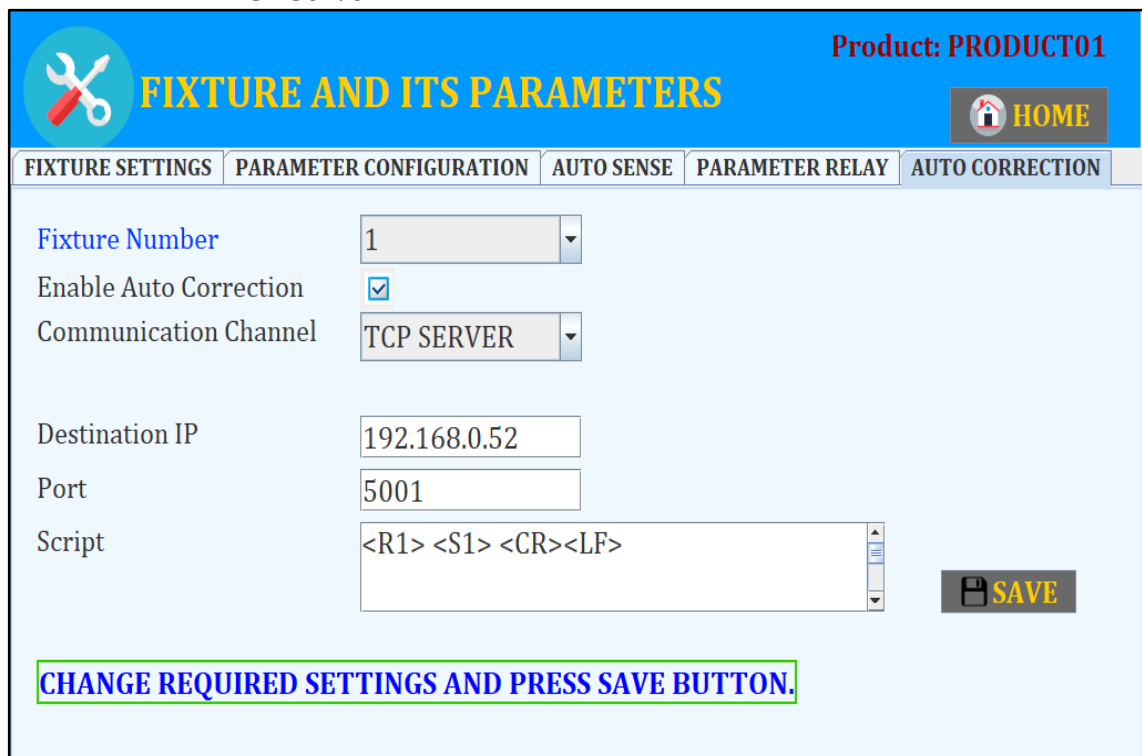
The screenshot shows a web interface titled "FIXTURE AND ITS PARAMETERS" with a blue header. In the top right corner, it says "Product: PRODUCT01" and has a "HOME" button. Below the header is a navigation bar with five tabs: "FIXTURE SETTINGS", "PARAMETER CONFIGURATION", "AUTO SENSE", "PARAMETER RELAY", and "AUTO CORRECTION". The "PARAMETER CONFIGURATION" tab is selected. The main content area has a light blue background and contains the following fields:

- Fixture Number:** A dropdown menu with "1" selected.
- Enable Auto Correction:** An unchecked checkbox.
- Communication Channel:** A dropdown menu with "TCP CLIENT" selected.
- Destination IP:** An empty text input field.
- Port:** An empty text input field.
- Script:** A large text area with a scrollbar, currently empty.
- SAVE:** A button with a floppy disk icon and the text "SAVE".

At the bottom of the form, there is a green-bordered box containing the text: "CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON."

Figure 39

- TCP Server



The screenshot shows the same web interface as Figure 39, but for TCP Server configuration. The "PARAMETER CONFIGURATION" tab is still selected. The fields are populated as follows:

- Fixture Number:** A dropdown menu with "1" selected.
- Enable Auto Correction:** A checked checkbox.
- Communication Channel:** A dropdown menu with "TCP SERVER" selected.
- Destination IP:** A text input field containing "192.168.0.52".
- Port:** A text input field containing "5001".
- Script:** A large text area with a scrollbar containing the text "<R1> <S1> <CR><LF>".
- SAVE:** A button with a floppy disk icon and the text "SAVE".

At the bottom of the form, there is a green-bordered box containing the text: "CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON."

Figure 40

- **Destination IP:** - The desired host or IP Address to which user wants to send the data.
- **Port:** Port number to which the data should be sent to on the IP address.
- **Script:** Script is the message user want to send on the IP address or host.

4.1.3 General Settings

General settings are categorized in three tabs.

- A Common Settings
- B SPC Settings
- C RTC Settings
- D Communication Settings
- E Advanced

It should be noted that, if any of general settings are modified, the unit must be power cycled. Make sure to wait for few seconds after saving setting, before power cycling the device.

A Common Settings

The below is the screen for Common Settings where user can change the common setting such as Device name, setting password admin password, server IP address, TPC port etc. for current Product.

SYSTEM SETTINGS HOME

COMMON SETTINGS SPC SETTINGS RTC SETTINGS COMMUNICATION SETTINGS ADVANCED

Device should be power cycled for new settings to take effect.

Device Name	RAINBOW V0220	Current product	1	Clear Previous
Server IP		TCP Port	2786	Log ☐
Buzzer	ON	Log Enable	☒ EXPORT	
Cycle Footswitch	1	Log Level	WARNING	
Master Footswitch	2	Reset Footswitch	3	
Setting Password	****	Admin Password	****	
Low Air Input	NONE	Air cut off relay	RELAY 4	
		Air cut off time	NONE	Seconds
			RELAY 4	
			RELAY 5	
			RELAY 6	

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTT **AVE**

Figure 41

SYSTEM SETTINGS

HOME

COMMON SETTINGS
SPC SETTINGS
RTC SETTINGS
COMMUNICATION SETTINGS
ADVANCED

Device should be power cycled for new settings to take effect.

Device Name	RAINBOW V0220	Current product	1	Clear Previous
Server IP		TCP Port	2786	Log ☐
Buzzer	ON	Log Enable	☒	EXPORT
Cycle Footswitch	ON OFF	Log Level	WARNING	
Master Footswitch	2	Reset Footswitch	3	
Setting Password	****	Admin Password	****	
Low Air Input	NONE	Air cut off relay	RELAY 4	
		Air cut off time	0	Seconds

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.
 SAVE

Figure 42

SYSTEM SETTINGS

HOME

COMMON SETTINGS
SPC SETTINGS
RTC SETTINGS
COMMUNICATION SETTINGS
ADVANCED

Device should be power cycled for new settings to take effect.

Device Name	RAINBOW V0220	Current product	1	Clear Previous
Server IP		TCP Port	2786	Log ☐
Buzzer	ON	Log Enable	☒	EXPORT
Cycle Footswitch	1	Log Level	WARNING	
Master Footswitch	2	Reset Footswitch	INFO EVENT WARNING ERROR CRITICAL	
Setting Password	****	Admin Password	****	
Low Air Input	NONE	Air cut off relay		
		Air cut off time		Seconds

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.
 SAVE

Figure 43



SYSTEM SETTINGS

 HOME

COMMON SETTINGSSPC SETTINGSRTC SETTINGSCOMMUNICATION SETTINGSADVANCED

Device should be power cycled for new settings to take effect.

Device Name	RAINBOW V0220	Current product	1	Clear Previous
Server IP		TCP Port	2786	Log ☐
Buzzer	ON	Log Enable	☒	 EXPORT
Cycle Footswitch	1	Log Level	WARNING	
Master Footswitch	2	Reset Footswitch	3	
Setting Password	****	Admin Password	****	
Low Air Input	NONE	Air cut off relay	RELAY 4	
	NONE	Air cut off time	0	Seconds
	Built-in			
	DIN 1			
	DIN 2			

CHANGE REQUIRED TO PRESS SAVE BUTTON. SAVE

Figure 44

B SPC Setting

SPC related user settings can be provided here.

The screenshot shows the 'SYSTEM SETTINGS' interface with the 'SPC SETTINGS' tab selected. The page has a blue header with a logo and a 'HOME' button. Below the header are tabs for 'COMMON SETTINGS', 'SPC SETTINGS', 'RTC SETTINGS', 'COMMUNICATION SETTINGS', and 'ADVANCED'. The 'SPC SETTINGS' section contains two input fields: 'SPC Batch Size' (value 25) and 'Chart Record Length' (value 25), and 'SubGroup Size' (value 5). A green-bordered box contains the text 'CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.' and a 'SAVE' button is to its right. At the bottom, there are labels for 'Platform ID', 'FW Version' (value RAINBOW V2.31), 'Device Sr.', and 'Local IP'.

SYSTEM SETTINGS	
COMMON SETTINGS SPC SETTINGS RTC SETTINGS COMMUNICATION SETTINGS ADVANCED	
SPC SETTINGS	
SPC Batch Size	25
Chart Record Length	25
SubGroup Size	5
CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.	
SAVE	
Platform ID	Device Sr.
FW Version RAINBOW V2.31	Local IP

Figure 45

C RTC Setting

RTC settings are used to change the real time clock settings the user can set Hour Minute and seconds. The clock is 24 hours' clock. So user must have to enter clock as 24hours clock timings. Below example shows you how to set the time and date.

Hour 15 **Minute 26** **Seconds 56**
Day 17 **Month 09** **Year 19**

SYSTEM SETTINGS

HOME

COMMON SETTINGS SPC SETTINGS **RTC SETTINGS** COMMUNICATION SETTINGS ADVANCED

RTC SETTINGS

Hour Minute Seconds

Day Month Year

First shift start time

Second shift start time

Third shift start time

APPLY

Save

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 46

D Communication Setting

SYSTEM SETTINGS

HOME

COMMON SETTINGS SPC SETTINGS RTC SETTINGS **COMMUNICATION SETTINGS** ADVANCED

Channel for sending measurement data

TCP Client

Data Format KARLPL XML

Local IP Setting

IP Acquisition STATIC IP

IP Address 192.168.0.50

SubNet Mask 255.255.255.0

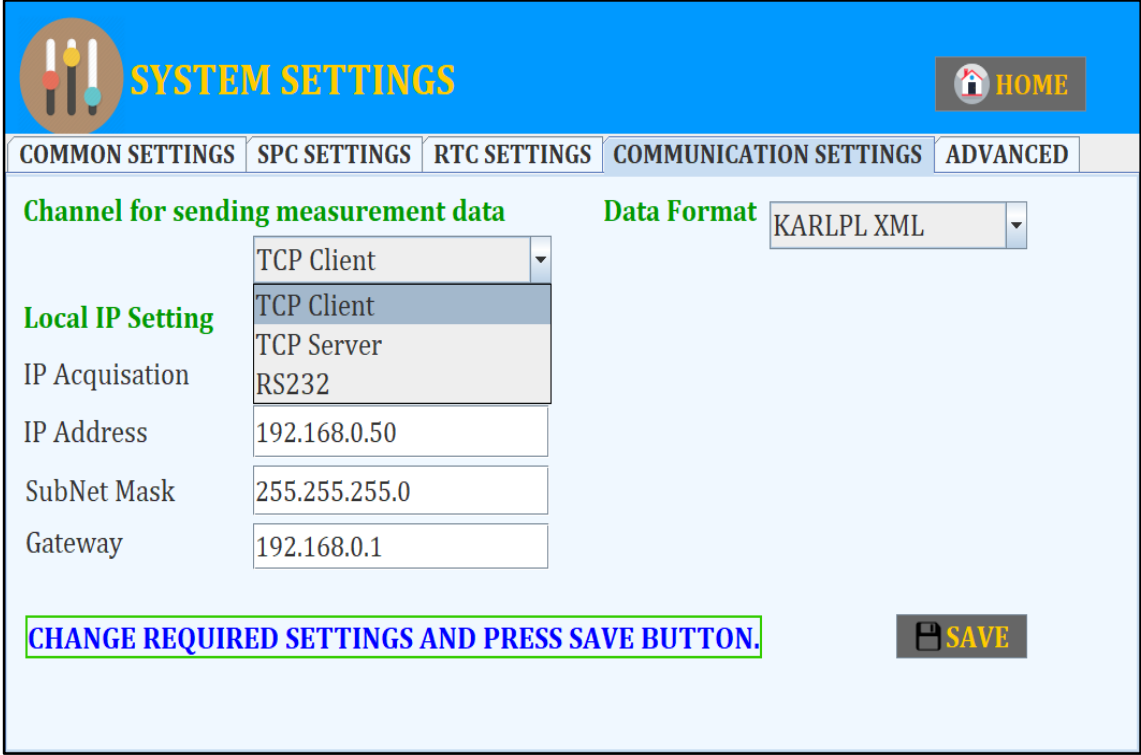
Gateway 192.168.0.1

SAVE

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 47

- There are 3 different **channels for sending measurement data**, as shown in figure 48.
- RS232 communication
 - TCP Client
 - TCT Server



SYSTEM SETTINGS

HOME

COMMON SETTINGS SPC SETTINGS RTC SETTINGS COMMUNICATION SETTINGS ADVANCED

Channel for sending measurement data Data Format KARLPL XML

Local IP Setting

IP Acquisition TCP Client

IP Address 192.168.0.50

SubNet Mask 255.255.255.0

Gateway 192.168.0.1

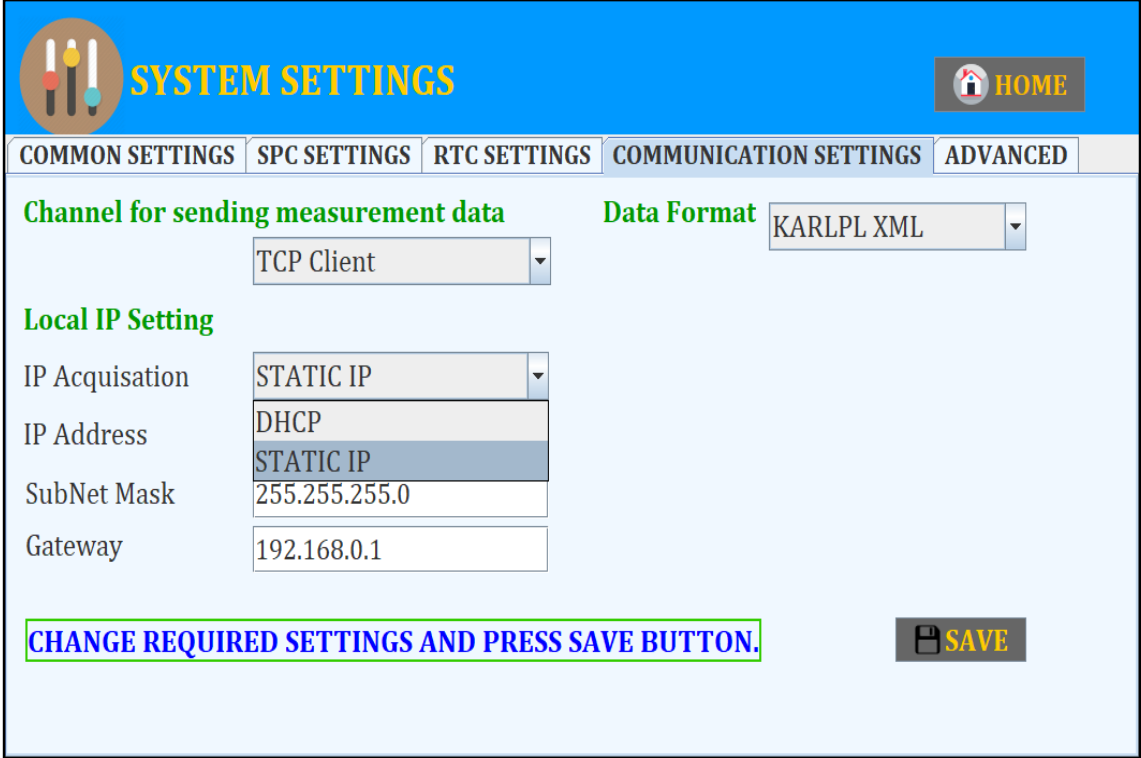
CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

SAVE

Figure 48

- Ethernet in Communication settings **local IP settings** are of two types, as show in figure 49.

- DHCP Server
- Static IP



SYSTEM SETTINGS

HOME

COMMON SETTINGS SPC SETTINGS RTC SETTINGS COMMUNICATION SETTINGS ADVANCED

Channel for sending measurement data Data Format KARLPL XML

Local IP Setting

IP Acquisition STATIC IP

IP Address DHCP

SubNet Mask 255.255.255.0

Gateway 192.168.0.1

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

SAVE

Figure 49

User can manually set communication settings either DHCP Server or Static IP.

- **IP Acquisition:**

- **DHCP Server:** If the local network has DHCP server present, select this option to obtain IP address automatically. New IP address can be seen on Common settings tab of System settings window.
- **Static IP:** This option needs to be selected if IP related settings are to be provided manually. Please get this information from your network administrator.
- **IP Address:** This is applicable only when Static IP option is selected. This is the IP address of this device that will be used while communicating with other Ethernet devices on network.
- **Subnet mask:** A subnet mask basically gives information on network and host portion of the address. It also helps to identify which part of IP address is reserved for the network and which part is available for host use. As the name indicates, the subnet mask is used to subdivide a network into smaller more manageable chunks.
- **Gateway:** A gateway is a piece of networking hardware used in telecommunications for telecommunications networks that allows data to flow from one discrete network to another.
- **Data Format:** User can Select any one data format from the Dropdown1. KARLPL XML or Q-DAS(DFQ).

The screenshot shows the 'SYSTEM SETTINGS' window with the 'COMMUNICATION SETTINGS' tab selected. The window has a blue header with a logo and a 'HOME' button. Below the header are tabs for 'COMMON SETTINGS', 'SPC SETTINGS', 'RTC SETTINGS', 'COMMUNICATION SETTINGS', and 'ADVANCED'. The 'Channel for sending measurement data' is set to 'TCP Client'. The 'Data Format' dropdown is open, showing 'KARLPL XML' and 'Q-DAS (DFQ)'. Under 'Local IP Setting', 'IP Acquisition' is set to 'STATIC IP', and the 'IP Address', 'SubNet Mask', and 'Gateway' fields are filled with '192.168.0.50', '255.255.255.0', and '192.168.0.1' respectively. A blue box at the bottom contains the text 'CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.', and a 'SAVE' button is located to its right.

SYSTEM SETTINGS	
COMMON SETTINGS SPC SETTINGS RTC SETTINGS COMMUNICATION SETTINGS ADVANCED	
Channel for sending measurement data	Data Format
TCP Client	KARLPL XML
	KARLPL XML
	Q-DAS (DFQ)
Local IP Setting	
IP Acquisition	STATIC IP
IP Address	192.168.0.50
SubNet Mask	255.255.255.0
Gateway	192.168.0.1
CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.	
SAVE	

Figure 50

E Advanced

Under the Advanced tab, update the software version. Select the file and click on the upgrade button to update the software version.

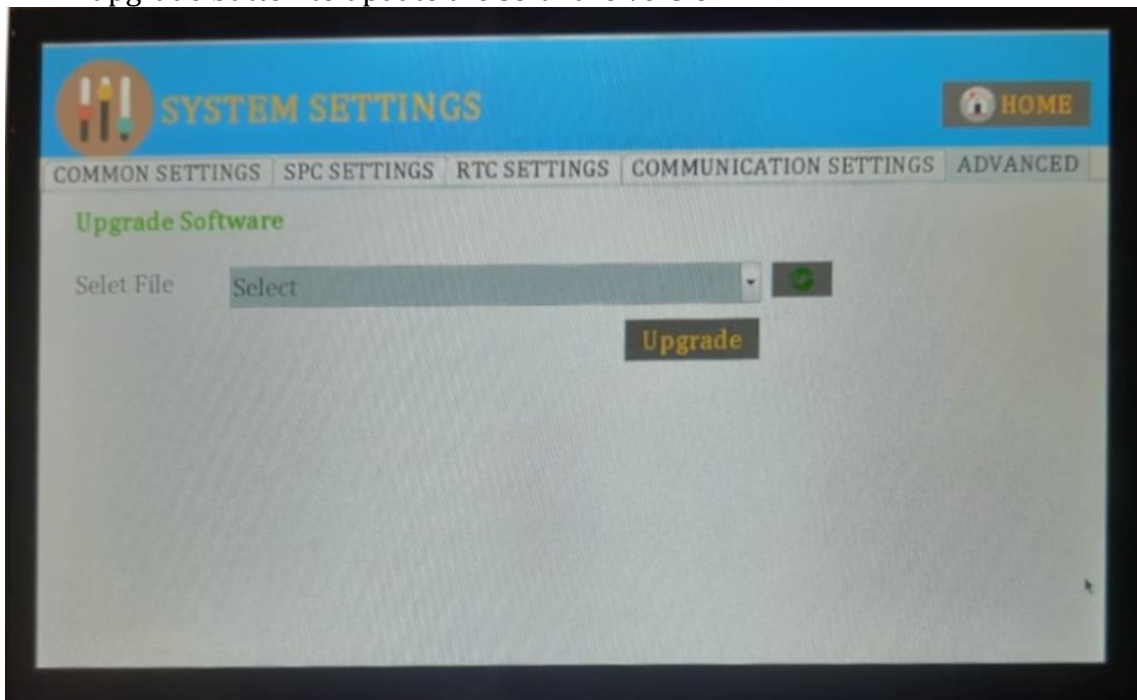


Figure 51

4.1.4 Measurement screen

This is the main screen reading screen. Where the user can view the respective parameter data. The four parameter data are shown in dials and line charts, and above the four parameter data are displayed in boxes. At the top of the screen user can see the product name, fixture name, serial no, and current date. On the right side of the screen, the user can see the unit of the fixture, the current shift, the result, and grade. Master, home, and previous are buttons. The Accept, Reject and Rework counts will be displayed till now.

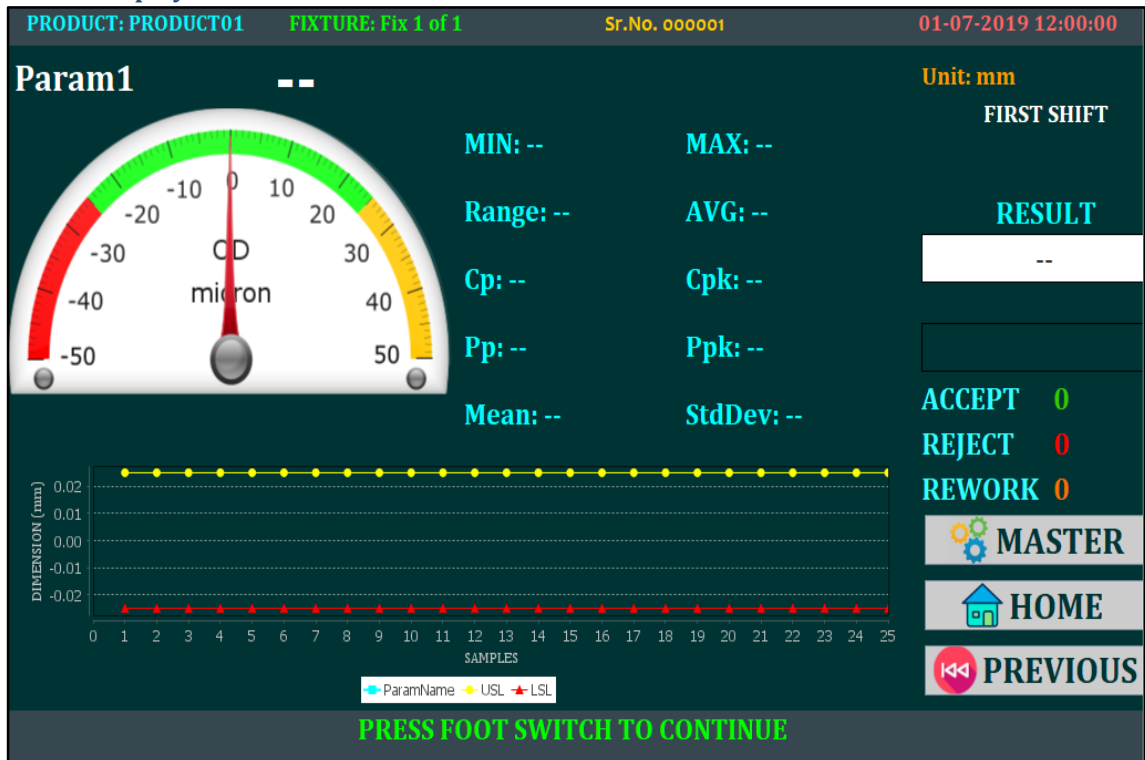


Figure 52

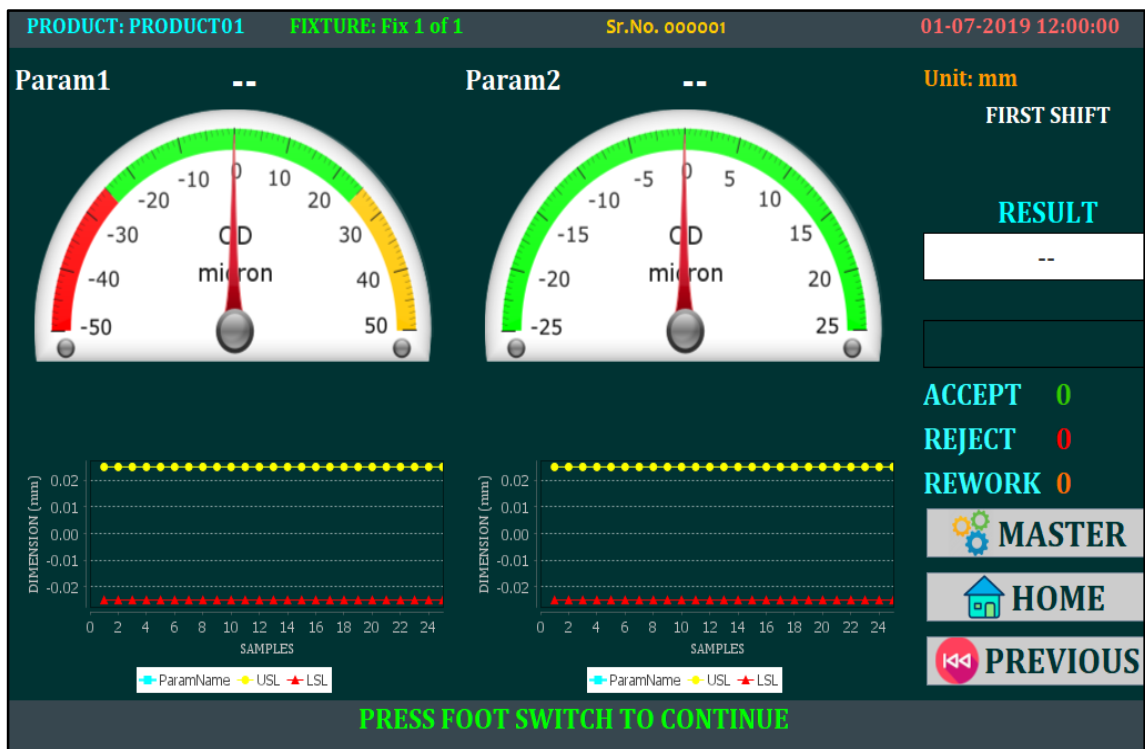


Figure 53

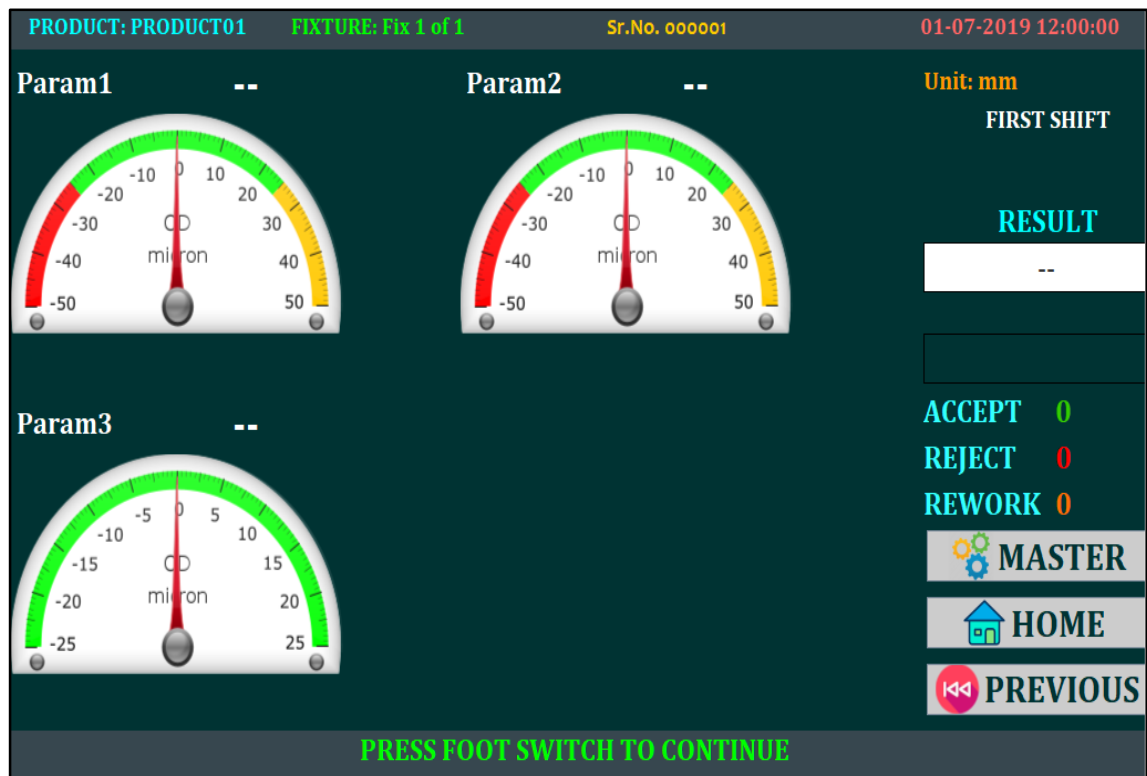


Figure 54

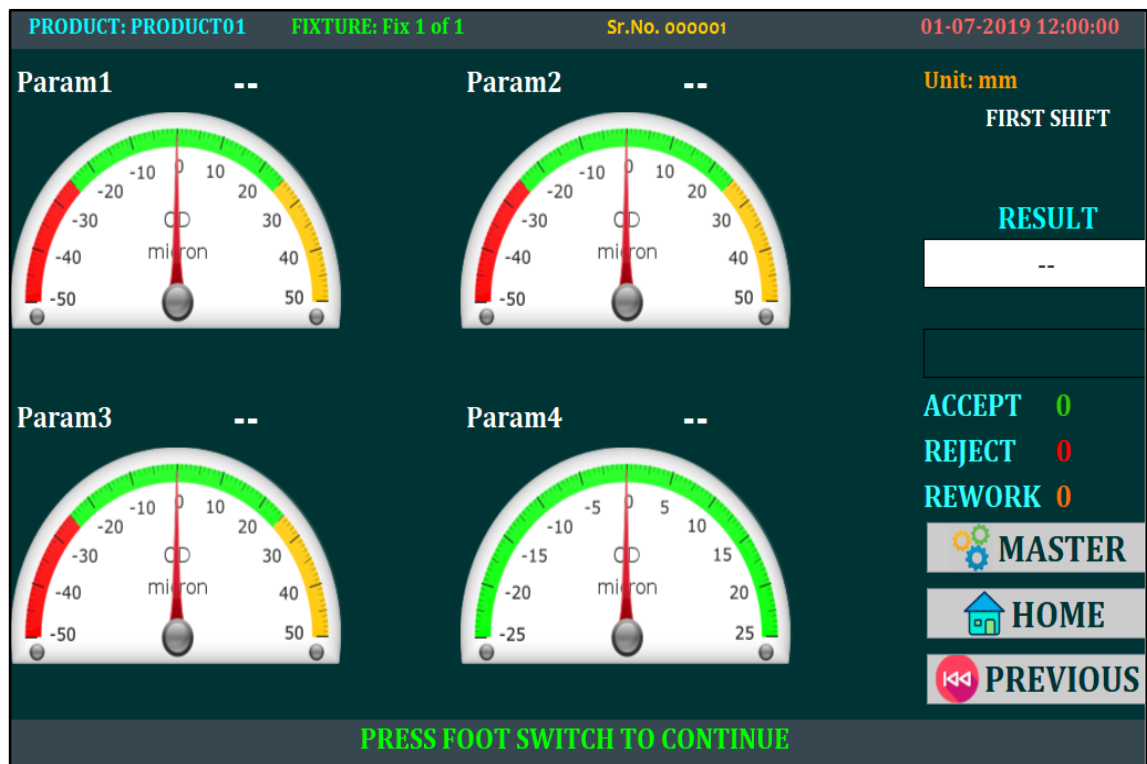


Figure 55

PRODUCT: PRODUCT01		FIXTURE: Fix 1 of 1	Sr.No. 000001	01-07-2019 12:00:00
Param1 (CURRENT)	Param2 (CURRENT)	Unit: mm		
		FIRST SHIFT		
Param3 (CURRENT)	Param4 (CURRENT)	RESULT		
Param5 (CURRENT)	Param6 (CURRENT)			
Param7 (CURRENT)	Param8 (CURRENT)	ACCEPT 0		
		REJECT 0		
Param9 (CURRENT)	Param10 (CURRENT)	REWORK 0		
		MASTER		
		HOME		
		PREVIOUS		
PRESS FOOT SWITCH TO CONTINUE				

Figure 56

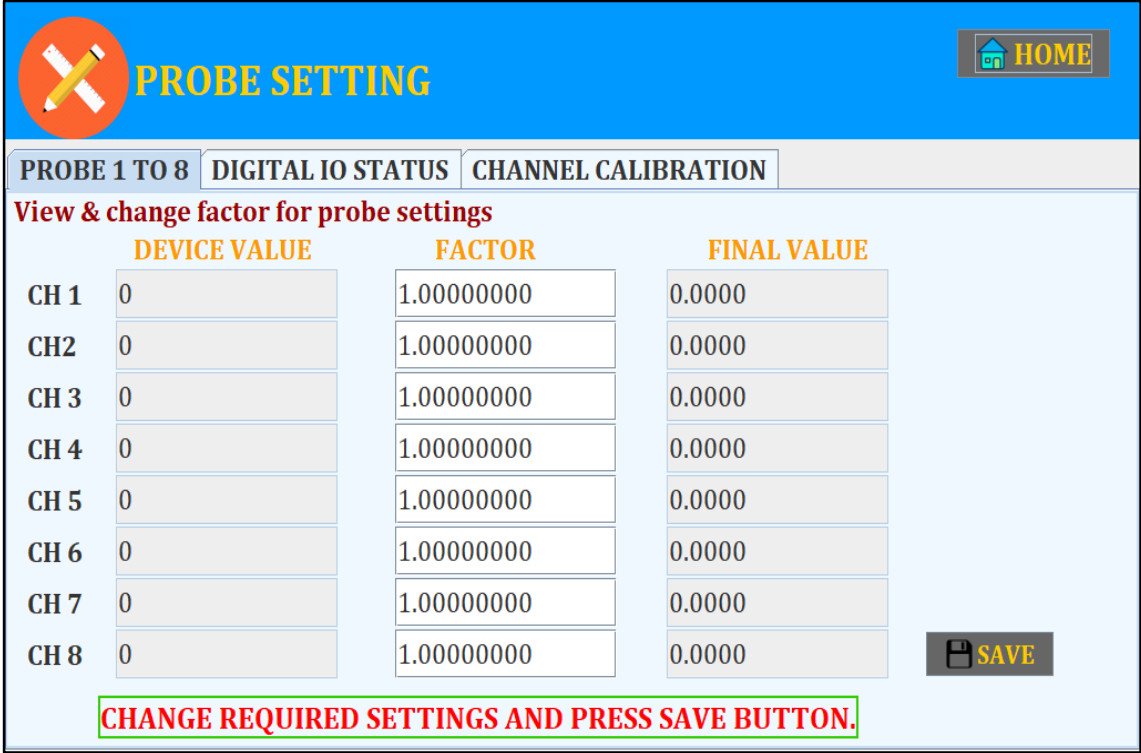
4.1.5 Probe Settings

Probe settings are categorized in three tabs.

- A Probe 1 to 8
- B Digital IO status
- C Channel calibration

A Probe 1 to 8

The device values, factors, and final values of 8 probe channels are shown here. Change the required setting and press the save button.



The screenshot shows the 'PROBE SETTING' screen with a blue header. A 'HOME' button is in the top right. Below the header are three tabs: 'PROBE 1 TO 8' (selected), 'DIGITAL IO STATUS', and 'CHANNEL CALIBRATION'. The main area is titled 'View & change factor for probe settings'. It contains a table with 8 rows (CH 1 to CH 8) and 3 columns: 'DEVICE VALUE', 'FACTOR', and 'FINAL VALUE'. Each row has input fields for these values. A 'SAVE' button is at the bottom right. A red text box at the bottom says 'CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.'

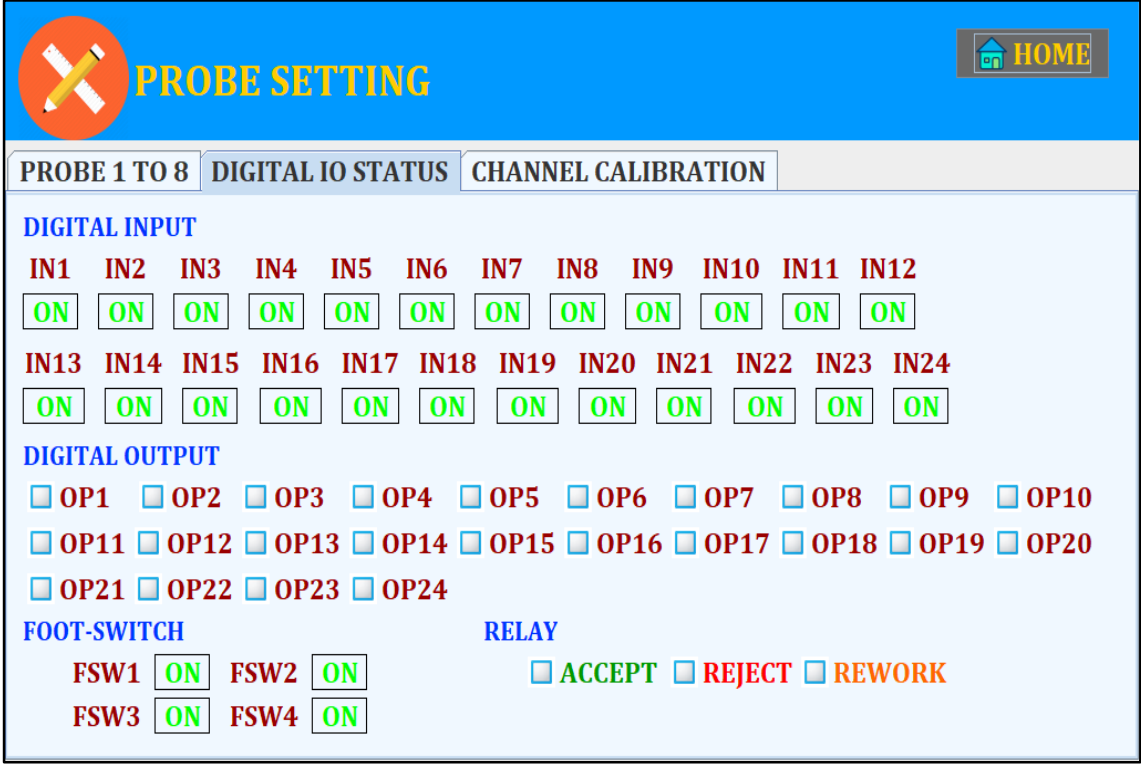
	DEVICE VALUE	FACTOR	FINAL VALUE
CH 1	0	1.00000000	0.0000
CH2	0	1.00000000	0.0000
CH 3	0	1.00000000	0.0000
CH 4	0	1.00000000	0.0000
CH 5	0	1.00000000	0.0000
CH 6	0	1.00000000	0.0000
CH 7	0	1.00000000	0.0000
CH 8	0	1.00000000	0.0000

CHANGE REQUIRED SETTINGS AND PRESS SAVE BUTTON.

Figure 57

B Digital IO status

Digital Input Digital Output The below screen shows the digital input output and footswitch and relay status. Here user can see the 24 digital input and 24 digital output status. ON Indicates that digital input is ON and OFF Indicates that digital Input is OFF. The footswitch is also same. The checkmark indicates digital output ON else OFF



The screenshot shows the 'PROBE SETTING' screen with a blue header bar containing a pencil icon and the title. A 'HOME' button is in the top right. Below the header is a navigation bar with three tabs: 'PROBE 1 TO 8', 'DIGITAL IO STATUS', and 'CHANNEL CALIBRATION'. The 'DIGITAL IO STATUS' tab is selected. The screen is divided into two main sections: 'DIGITAL INPUT' and 'DIGITAL OUTPUT'. The 'DIGITAL INPUT' section shows 24 inputs (IN1 to IN24) arranged in two rows of 12. Each input has a green 'ON' button. The 'DIGITAL OUTPUT' section shows 24 outputs (OP1 to OP24) arranged in three rows of 8. Each output has a blue 'OFF' button. Below the 'DIGITAL OUTPUT' section is the 'FOOT-SWITCH' section with four switches (FSW1 to FSW4), each with a green 'ON' button. To the right of the 'FOOT-SWITCH' section is the 'RELAY' section with three buttons: 'ACCEPT' (green), 'REJECT' (red), and 'REWORK' (orange).

PROBE SETTING HOME

PROBE 1 TO 8 **DIGITAL IO STATUS** **CHANNEL CALIBRATION**

DIGITAL INPUT

IN1 IN2 IN3 IN4 IN5 IN6 IN7 IN8 IN9 IN10 IN11 IN12

IN13 IN14 IN15 IN16 IN17 IN18 IN19 IN20 IN21 IN22 IN23 IN24

DIGITAL OUTPUT

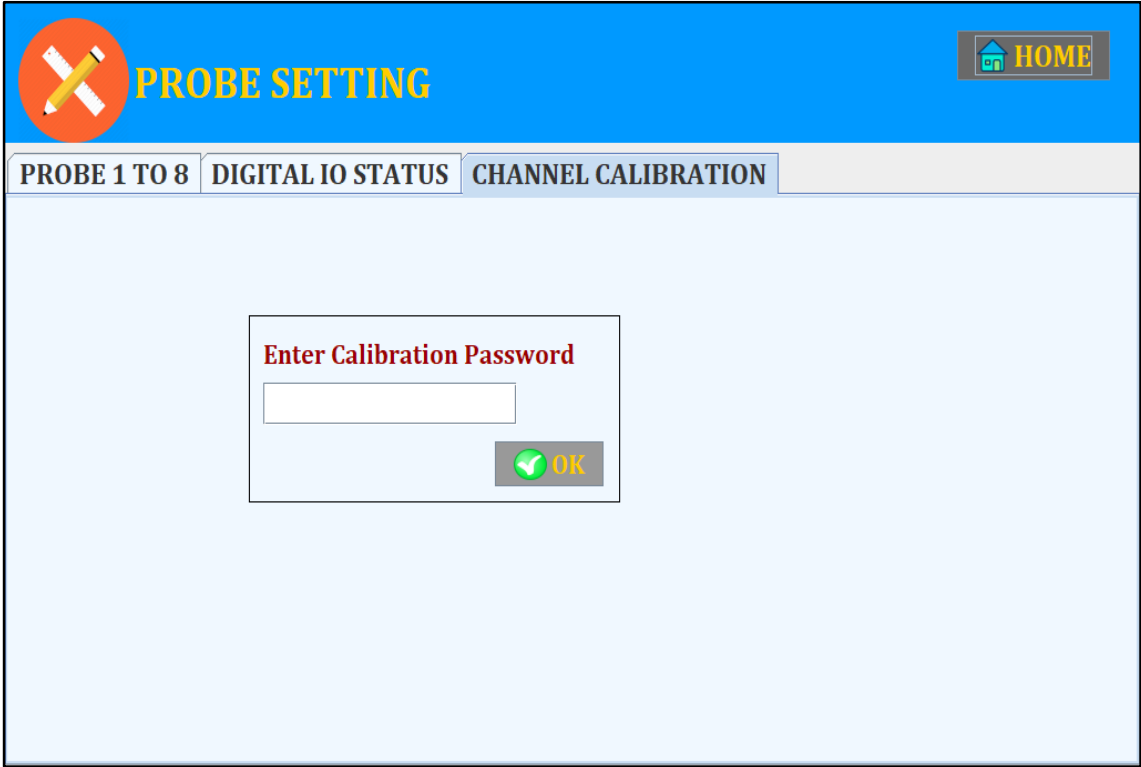
FOOT-SWITCH **RELAY**

FSW1 FSW2

FSW3 FSW4

Figure 58

C Channel calibration



The screenshot shows the 'CHANNEL CALIBRATION' screen. It has the same blue header bar and navigation bar as Figure 58. The 'CHANNEL CALIBRATION' tab is selected. The main area of the screen is light blue and contains a white box with the text 'Enter Calibration Password'. Below the text is a text input field. To the right of the input field is a green 'OK' button with a checkmark icon.

PROBE SETTING HOME

PROBE 1 TO 8 **DIGITAL IO STATUS** **CHANNEL CALIBRATION**

Enter Calibration Password

Figure 59

 **PROBE SETTING**  HOME

PROBE 1 TO 8DIGITAL IO STATUSCHANNEL CALIBRATION

Channel Calibration

SELECT

Raw Value

Range reference

0.500

Scale factor

1.0000

Scaled value

 **Accept Lower reference**

 **Calculate factor**

SELECT CHANNEL FOR CALIBRATION. SAVE AFTER CALIBRATION.

 **SAVE**

Figure 60

 **PROBE SETTING**  HOME

PROBE 1 TO 8DIGITAL IO STATUSCHANNEL CALIBRATION

Channel Calibration

SELECT

Raw Value

SELECT

Range reference

CH 1

Scale factor

CH 2

Scaled value

CH 3

CH 4

CH 5

CH 6

CH 7

 **Accept Lower reference**

 **Calculate factor**

SELECT CHANNEL FOR CALIBRATION. SAVE AFTER CALIBRATION.

 **SAVE**

Figure 61

4.1.6 Reports

Below window shows the result. Here user can filter the data date wise and ACCEPT, REJECT AND REWORK status of production. Once you click on SHOW RESULT Button the selected date wise and status wise data will be shown.

➤ **Product:** Select the product that has been added to the product settings.

The screenshot shows a web application window titled "RESULTS". At the top right, there are buttons for "EXPORT TO CSV" and "HOME". Below these, a red banner says "SELECT DATE TO VIEW REPORT". The main interface has a left sidebar with a "PRODUCT" dropdown menu (currently showing "Select") and a "REPORT" dropdown menu (showing a list of products: PRODUCT01 through PRODUCT07). To the right of the sidebar, there are input fields for "DATE" (showing "01-Jul-2019") and "FILTER" (showing "ALL"), along with "SHOW" and "DELETE" buttons. Below these controls is a table with columns: "Sr.No.", "Fix.", "Grade", and several "Para..." columns. The table is currently empty.

Figure 62

➤ **Date:** Select the month, date, and year report to view.

➤ **Filter:** Select the report type to view.

- All
- accept
- reject

Figure 63

- **Show button-** To select the first product, select the month, date and week report to view, and select the filter to see whether the part is accepted or rejected. After clicking on the 'show' button, this report will be shown. Show in figure 21.
- **Delete button-** To delete the report, click on the 'Delete' button.
Here are two options
 - A Report
 - B Statistics

A Report

Click on the find button and its product report will be shown here as shown in figure 64.



Figure 64

B Statistics

By selecting the fixture and parameter, a graph will be displayed. Here are three tab ,as shown in figure 65.

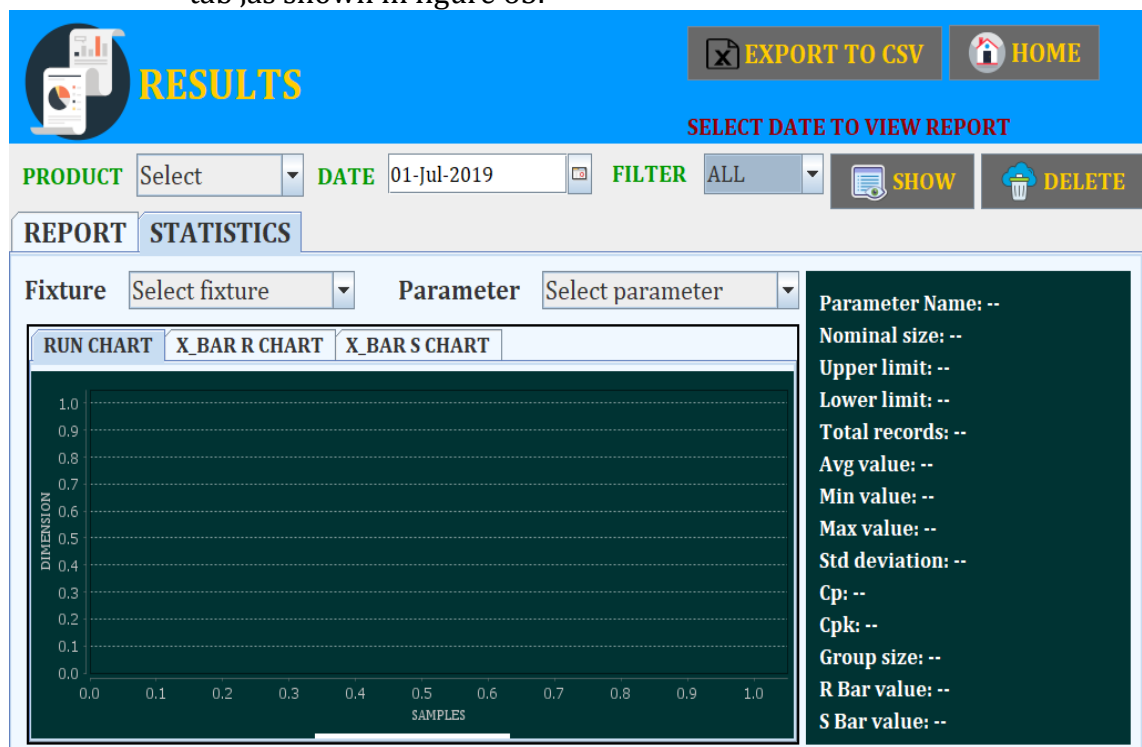


Figure 65

- **Fixture:** Select the fixture number in the statistics tab.
- **Parameter:** Select the parameter in the statistics tab, as shown in figure 66.

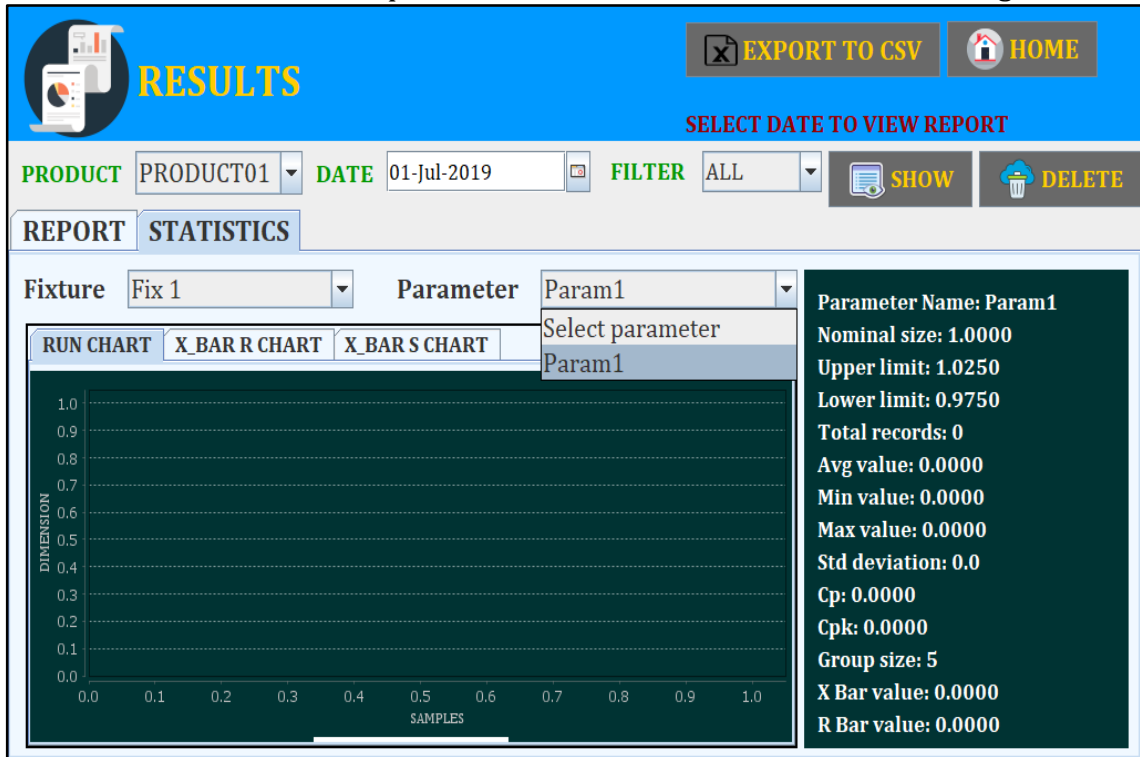


Figure 66

- Run chart
- X_bar R Chart
- X_bar S Chart

- Run chart

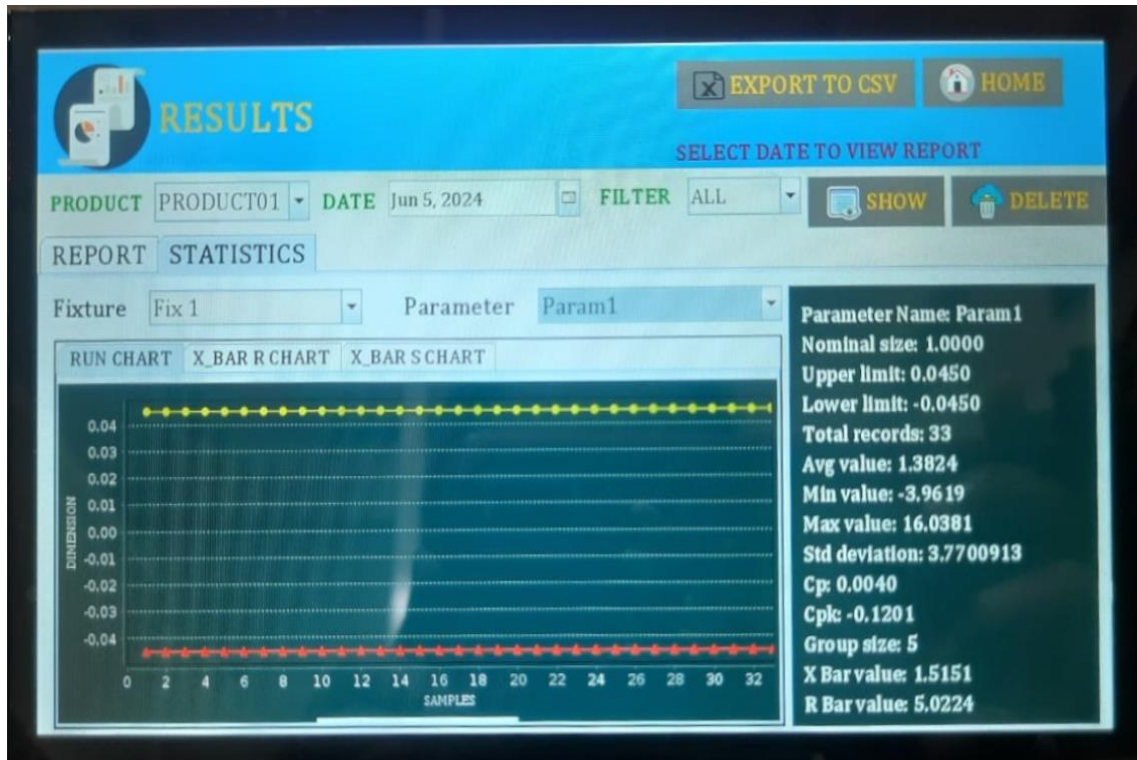


Figure 67

- X_bar R Chart



Figure 68

- $\bar{X}$ -R Chart

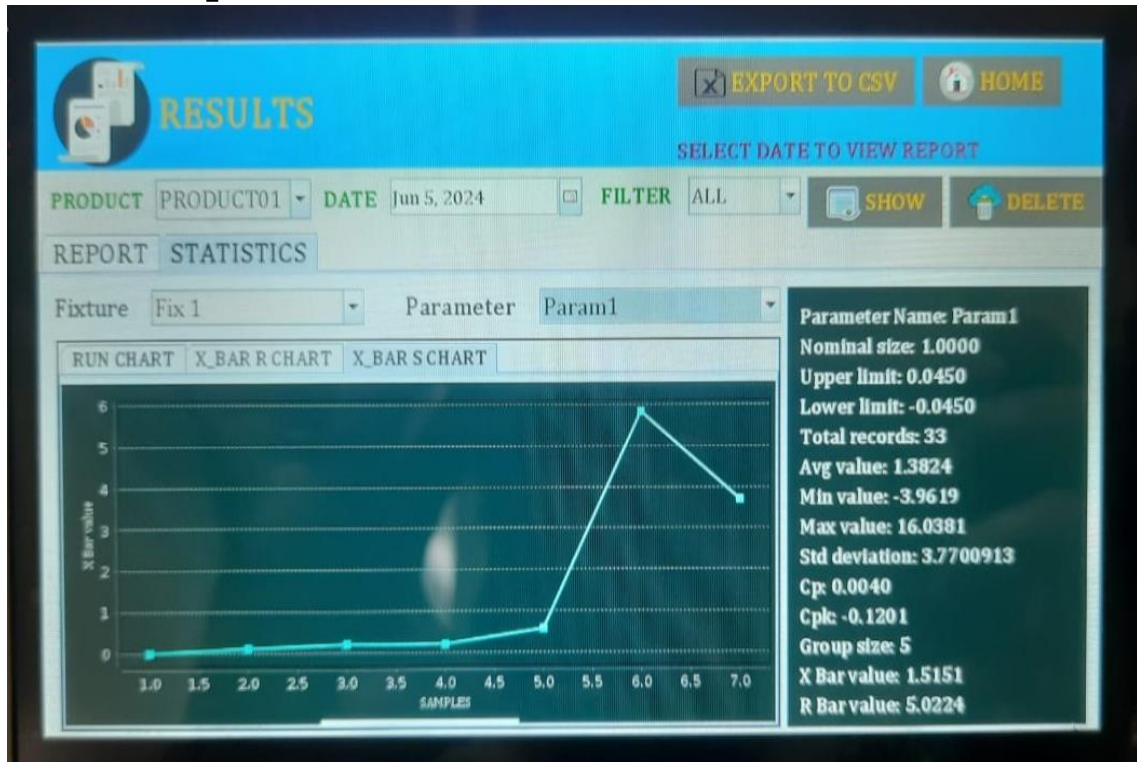


Figure 69

If user want to export data, there is an EXPORT CSV button. User can use pen drive or any USB Storage media to export the data. The exported file is in .CSV format. If user want to convert it to excel user can take the CSV file and convert it to excel or .XLS format.

4.2 MASTERING

Mastering are categorized in two tabs.

- A Simultaneous mastering
- B Step calibration

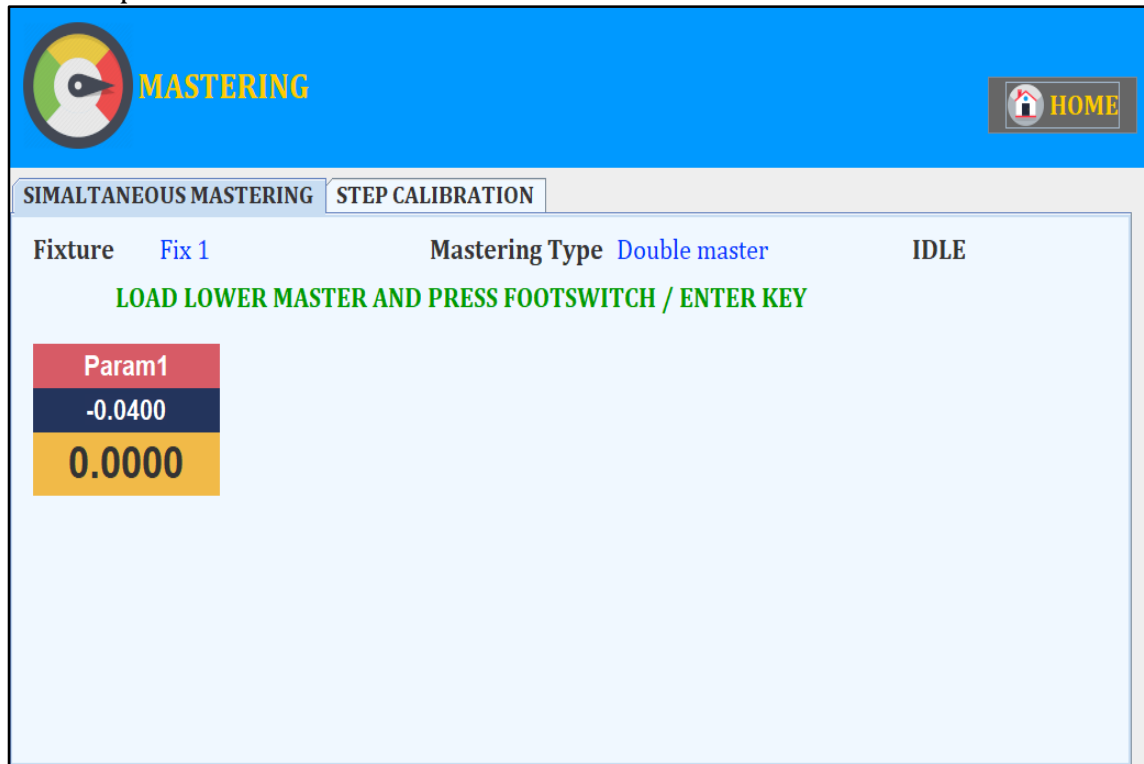


Figure 70

A Simultaneous mastering

➤ Double Mastering

Note: When two reference masters are available for measurement, choosing double mastering is required for calibration. This is mandatory step. Double mastering must be done at least once before doing single mastering

1. Select double mastering.
2. The screen will display 'LOAD HIGHER MASTER AND PRESS FOOTSWATICH/ENT KEY.
3. After load higher master, press the footswitch/ENT key, and the screen will show 'CAPTURING '.
4. The screen displays 'LOAD LOWER MASTER AND PRESS FOOTSWATICH/ENT KEY.
5. After load lower master, press the footswitch/ENT key, and the screen will show 'CAPTURING '.
6. The message "MASTERING DONE" will display.

➤ Single Mastering

Note: When there is only one reference master available, choose single master mode. Single mastering will work only when double mastering is already done at least once for that program

1. Select single mastering.
2. The screen will display 'LOAD MASTER' AND PRESS FOOTSWATICH/ENT KEY.
3. After placing the plug into the master, press the footswitch/ENT key, and the screen will show 'CAPTURING '.
4. The message "MASTERING DONE" will display.

B Step calibration

Below window used for step calibration. Default all buttons are disabled.

The screenshot shows the 'MASTERING' software interface with the 'STEP CALIBRATION' tab selected. The 'Fixture Number' is set to 1 and the 'Parameter' is set to 1. The 'Mastering Type' is 'Double master' and the 'Parameter Name' is 'Param1'. The 'Probe Value' is 0.0000, 'Lower Value' is -0.0400, 'Higher master' is 0.0400, and 'Calibrated Value' is 1.0000. Two buttons, 'ACCEPT LOWER MASTER' and 'ACCEPT HIGHER MASTER', are visible. Below the input fields, there is a red text prompt 'SELECT FIXTURE AND PARAMETER FOR CALIBRATION' and a 'RESET CALIBRATION' button.

Figure 71

Once you select the fixture number and parameter number. The all buttons are now enable. If user want to reset the calibration for selected parameter press the reset calibration button. The calibration will be reset. And shows the default value.

The screenshot shows the 'MASTERING' software interface with the 'STEP CALIBRATION' tab selected. The 'Fixture Number' and 'Parameter' dropdown menus are set to 'Select'. The 'Mastering Type' is 'Select' and the 'Parameter Name' is 'Parameter 1'. The 'Probe Value' is 2, 'Lower Value' is 4, 'Higher Value' is 5, and 'Calibrated Value' is 6. Two buttons, 'ACCEPT LOWER MASTER' and 'ACCEPT HIGHER MASTER', are visible. Below the input fields, there is a red text prompt 'SELECT FIXTURE AND PARAMETER FOR CALIBRATION' and a 'RESET CALIBRATION' button.

Figure 72

MASTERING

HOME

SIMALTANEOUS MASTERING

STEP CALIBRATION

Fixture Number

Select

Mastering Type

Double Master

Probe Value

Lower Value

Higher Value

Calibrated Value

Parameter

Select

Parameter Name

Select

1

2

3

4

5

6

7

ACCEPT

ACCEPT

TER

TER

SELECT FIXTURE AND PARAMETER FOR CALIBRATION

RESET CALIBRATION

Figure 73

5. Connection details

➤ Result status relay connection

9 Pin round Connector	Relay Connection	Relay
1	NC	ACCEPT Relay
2	CMN	
3	NO	
4	NC	REJECT Relay
5	CMN	
6	NO	
7	NC	REWORK Relay
8	CMN	
9	NO	

Table 2

➤ Foot-switch connection

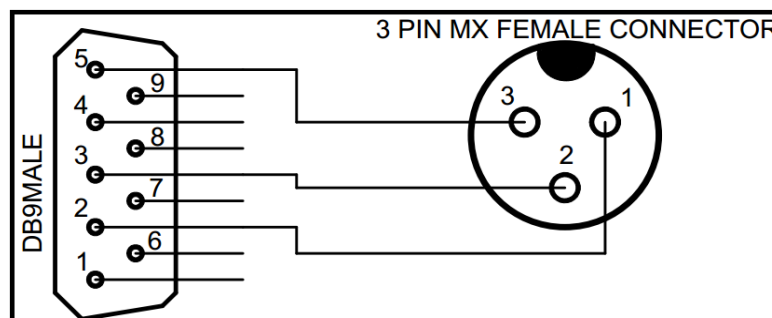
4 Pin round connector	Connection
1	Common
2	Footswitch-1
3	Footswitch-2
4	NC

Table 3

- To operate Foot-switch-1 connect one terminal of switch to common (pin1 of 4pin connector) and another terminal to Foot-switch-1 (pin2 of 4pin mx male connector)
- To operate Foot-switch-2 connect one terminal of switch to common (pin1 of 4pin mx male connector) and another terminal to Foot-switch-2(pin3 of 4pin mx male connector)

➤ Extension/cascading cable connections

Display Unit has mx 3pin male connector for extension interface. Using this feature user can cascade up to 5 interface units. For extension purpose DB9MALE to 3pin female three core cable is required. Below are pin details for this cable figure 3.



3-Pin round Male Connector On Backside	DB9 Female
1	RXD
2	TXD
3	GND

Table 1

➤ Serial Communication Port

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

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

Table 2

- **Table 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.

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.

```
<DEVICE>
VER=V2.30
NAME=RAINBOW V0220
PRODUCT=PRODUCT01
SERIAL=000011
TIMESTAMP=2024-06-01 17:55:40
<FIXTURE01>
RESULT=ACCEPT
PARAM1=0.040, ACCEPT
PARAM2=00045, ACCEPT
</FIXTURE01>
</DEVICE>
```

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. MICRONBEATS Metrology Solutions, 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 MICRONBEATS Metrology Solutions 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 MICRONBEATS Metrology Solutions 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.

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