As a part of our environment protection policy, we do not offer printed copy of this document. We strongly dicourage priting of documents unless absolutely necessary.

PROGAUGE DISPLAY UNIT

This document is applicable to firmware versions **V1.21 and V2.20**

USAGE NOTICE

The specifications and features mentioned in this document are available at the time this document was prepared. Utmost care has been taken to maintain accuracy and consistency of the information. However, MICRONBEATS Metrology solutions does not guarantee this document to be free from errors and use of the information is at sole responsibility of the user. MICROBEATS Metrology solutions reserves the right to change or modify this document at any time without prior notice.

Product models

Model Number	Model No. Description	Salient features
ProGAUGE AR22V0	Two Air input, Two result tricolor display unit	**Base model** • Two rows,0.56" tricolor, six-digit display. • 16x2 LCD display. • Two relays (Accept and reject). • No RTC. • No internal storage. • No Auto-offset correction port.
ProGAUGE AR22V1	Two Air input, Two result tricolor display unit	**In addition to base model** • Internal RTC • Up to 10500 records internal storage. • Three relays (Accept, Reject, Rework). • Auto offset correction port. • Auto-correction script support on RS232 • Auto Save and Auto Sense facility.
ProGAUGE AR22V2	Two Air input, Two result tricolor display unit	**All Features of ProGAUGE AR22V1** • Built-in air saver
ProGAUGE PR22V0	Two probe input, Two result tricolor display unit	**Base model** • Two rows,0.56" tricolor, six-digit display. • 16x2 LCD display. • Two relays (Accept and reject). • No RTC. • No internal storage. • No Auto-offset correction port.
ProGAUGE PR22V1	Two probe input, Two result tricolor display unit	**In addition to base model** • Internal RTC • Up to 10500 records internal storage. • Three relays (Accept, Reject, Rework). • Auto offset correction port. • Auto-correction script support on RS232 • Auto Save and Auto Sense facility.

Table of Contents

1. Introduction

The **ProGAUGE** series covers **two channel and two result** tricolor display unit, suitable for gauging applications, especially for multi-gauging systems. A display unit that can deliver excellent and precise performance. The bright tricolor digits and large font on the LCD. The tri-color digit changes color between green, red and yellow depending on the component status- **ACCEPT**, **REJECT** and **REWORK**. Virtually maintenance free, these devices have been in use over many years in industry delivering excellent measurement performance in varying industrial environments.

The display unit can be used for various measuring fixtures such as bores, shaft diameter, cylindrical work piece, ovality, and roundness.

2. Features

- 0.56" Tricolor digit display for showing measured value.
- 16X2 Big font alphanumeric LCD display for settings and configuration.
- Up to 10500 records internal storage capacity with timestamp and program number.
- Metric/Inch measurement unit.
- Built-in real time clock. Low battery warning feature for timely replacement of battery.
- **Accept** /**Reject** /**Rework** output relay.
- Built-in air saver (This feature can be enabled or disabled according to the requirement).
- Auto correction (This feature can be enabled or disabled according to the requirement).
- Rejection BIN interlock (This feature can be enabled or disabled according to the requirement).
- Up to 16 manually selectable program settings.
- 0.1µm, 0.2µm, 0.5µm, 1µm, 2µm, 5µm, 10µm Least count options
- Absolute/relative measurement.
- RS232 for computer connectivity.
- AutoSave and Auto Sense facility.
- Additional RS232 serial port for auto-correction communication or connecting IO expansion board.

3. Specification

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: ±1mm, ±2mm, ±4mm.
- Range for pneumatic Gauge- ±80micron.

b. Electrical specifications

- Power supply: 110VAC 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 and 13 KHz for half bridge.
- Probe Compatibility: TESA / PETER HIRT / SOLARTRON / DONG-DO / BAKER.
- Output: 3 relay outputs.

c. Performance specification

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**
  ±0.1% within linear operation of inductive probe (1micron over the range of 1mm)
- **Repeatability**
  After power cycle: 0.2micron
  After mechanical movement: 0.2micron
- **Stability**
  ±0.1micron 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

- 271mm (L) X 190mm (W) X 138mm (H)

4. Keypad functionality

- There are six keys on keypad

I. UP Arrow Navigation Key

This key is used for scrolling options when entering system settings mode. This key is also useful when entering digit values into the program setting mode.

II. DOWN Arrow Navigation Key

To return to the previous screen, use the down key.

III. Right Arrow/NEXT Navigation Key

To move to the next system setting option without saving the changes made while in the system settings mode, use this key.
This key is also useful when you are in the program setting mode. When entering values for different parameters such as LSL, USL, nominal value, higher master, lower master, etc. While entering digit values, use this key to move from the left decimal place to the right decimal place.

IV. SET key

This key is used to enter into the system setting mode. For entering into the system setting mode first turn off the device press and hold “SET” key then turn on device and hold the set key until you see on screen message “SYSTEM SETTINGS ENTR TO CONTINUE”.

V. ENT key

This key has dual functionality. When in setting mode, the 'ENT (enter)' key is used to enter the setting mode, save the selected values of the current option, and move to the next option. When in measurement mode, the 'ENT (enter)' key is used to transmit the current measurement data to the PC via serial communication.

VI. CLR Key

To clear the current screen, click on the CLR key.

VII. M1 key

M1 key is used to enter mastering mode. Entering into mastering, press the M1 key first. The message shown on screen 'PLACE PLUG IN HIGHER MASTER.' After placing the plug into the higher master, press the 'M1' key to save the M1 master value.

VIII. M2 key

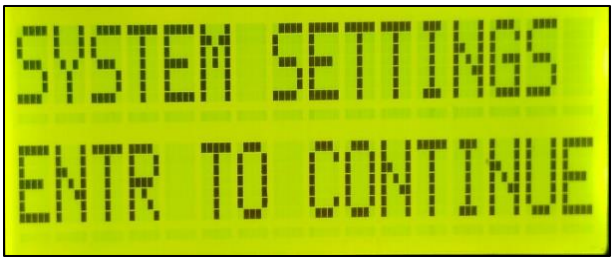
The message shown on screen 'PLACE PLUG IN LOWER MASTER.' After placing the plug into the lower master, press the 'M2' key to save the M2 master value.

5. Screen functionality

- **DEVICE NAME**

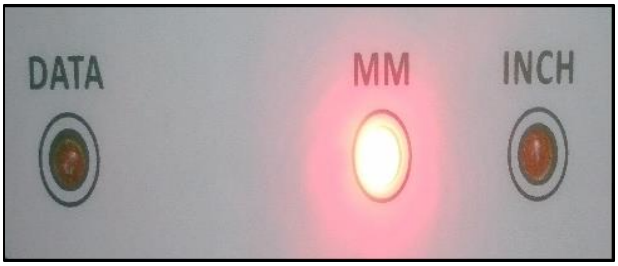
- **SYSTEM SETTING**

This is menu where you can configure your device. For entering into system settings mode, turn off the device and press and hold the "SET" key and turn on the device. keep pressing the "SET" key until it will show "SYSTEM SETTINGS ENTR TO CONTINUE", then press "ENT" key.

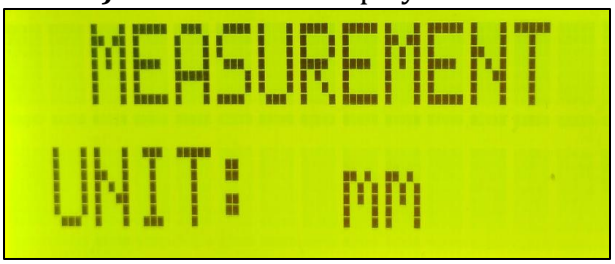


I. MEASUREMENT UNIT

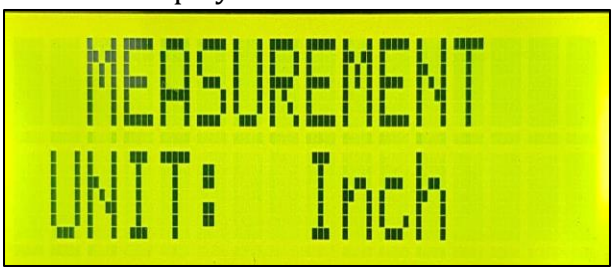
This is the measurement unit selection option.



- **MM- (millimeter)**- Select mm to display the final results in millimeters.

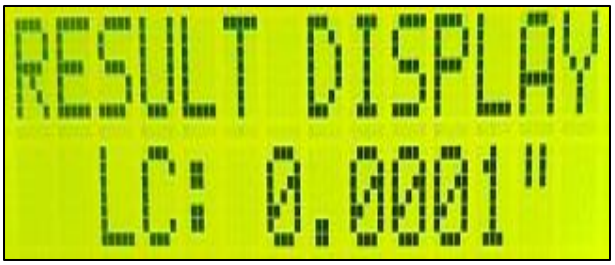


- **Inch-** Select inch to display the final results in millimeters.



II. RESULT DISPLAY LC

- When metric unit is selected
  0.001mm, 0.002mm, 0.005mm,0.010mm,0.0001mm, 0.0002mm, 0.0005mm.
- When Inch unit is selected
  0.0001", 0.0002",0.0005".0.001", 0.00001",0.00002, 0.00005".



III. COMMUNICATION BAUD RATE

Using this option, select the baud rate for the communication between the display device and the computer. The communication baud rates are 4800, 9600, 19200, 38400, and 57600

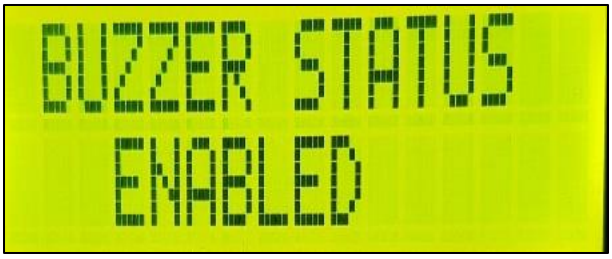
- **19200**

For selecting your desired baud, scroll using "UP^" key and then press "ENT (enter)" for saving the baud setting.

IV. BUZZER STATUS

This feature provides you audio indication on key press.

- **ENABLED**



- **DISABLED**

For selection scroll "UP^" and press "ENT" key for saving your selection.

V. AUTO-SENSE MODE

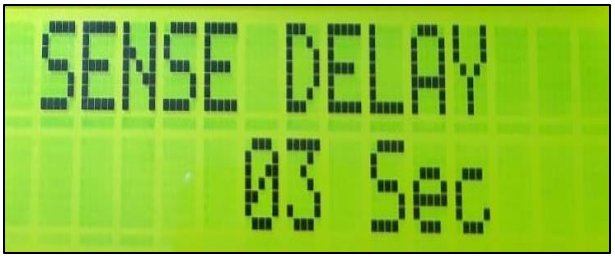
The auto-sense concept in multigauging refers to the ability of the gauge to automatically detect the dimensions of the part being measured. The sense delay and auto save delay screens will appear if the auto sense mode is selected as sequential or random.

- **SEQUENTIAL**
  In sequential mode, both channels are auto sensed separately. It senses one channel after another and back to the first channel.

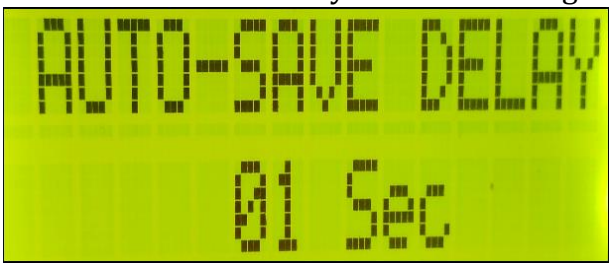
- **RANDOM**
  In random mode, both channels are auto sensed separately.

- **OFF**
  If the auto sense is off, the sense delay and auto save delay screen will not appear.

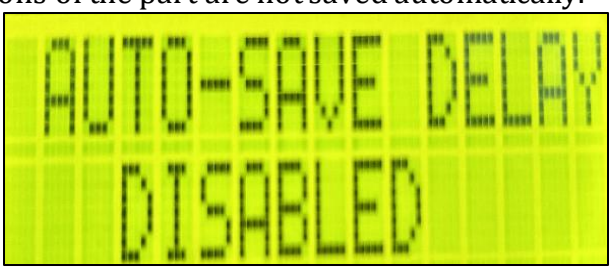
- **SENSE DELAY**
  Sense delay can be set from 1 second to 10 seconds. The part's dimension is measured automatically based on the set delay.



- **AUTO-SAVE DELAY**
  Note: For firmware version V1.21, the auto-save screen is not applicable.
  Auto save delay can be set from 1 seconds to 25 seconds or can be disabled. The part's dimensions are automatically saved according to the set delay.



The dimensions of the part are not saved automatically.



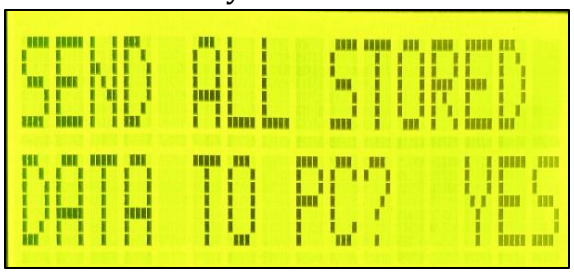
- **AUTO CORRECTION**
  Can be used to automatically correct the offset value based on the multi gauge measurement. The upper and lower limits for auto correction can be set at closer. Auto correction types are BCD and Binary
  Ex-Desired DIN-20.000mm
  Measured value-20.015mm
  Error-0.015mm/15 µ

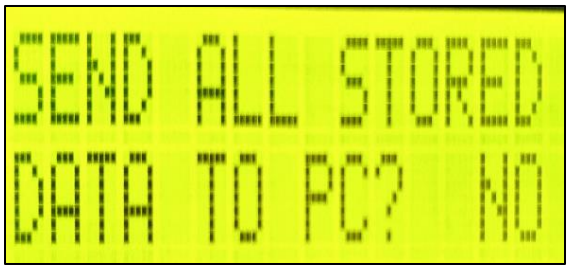
VI. DEVICE ID

This feature provides you to manage or identify your display device. You can give device identification number for you ease. This device id is recorded into each transmitted data frame, using this device id you can bifurcate particular device data from your database. You can set minimum "001" and maximum device id is "100".

VII. SEND ALL STORED DATA TO PC?

This feature provides you facility to transmit stored measurement data to the PC via serial communication for analysis or report generation. If you want to send data Press "ENT" key and wait.

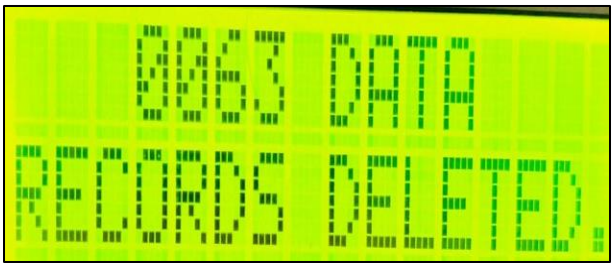




Then press "If you don't want to send the data NEXT→"key to move to the next option.

VIII. DELETE ALL STORED DATA?

This feature provides you to erase all you recorded measurement data permanently. Once you deleted your all data there is no way to get it back. So be careful when you delete data. If you want to delete all your data, then press "ENT" key. Data will be successfully deleted.



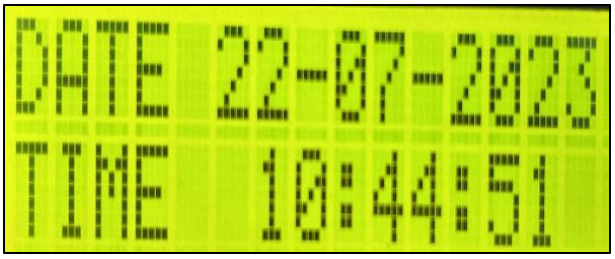
If you don't want to delete all your data then press "NEXT→"key for moving to next option without deleting data.

IX. DATE TIME

Current date and time is displayed. If required, user can change it as shown on following screen

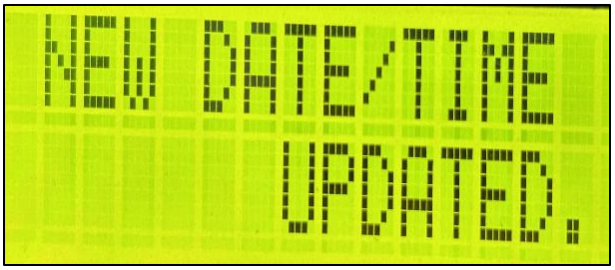
RTC: It gives us time as well as date information.

Low Battery: If the battery drops below approximately 2.5V, a low battery error message will be displayed.



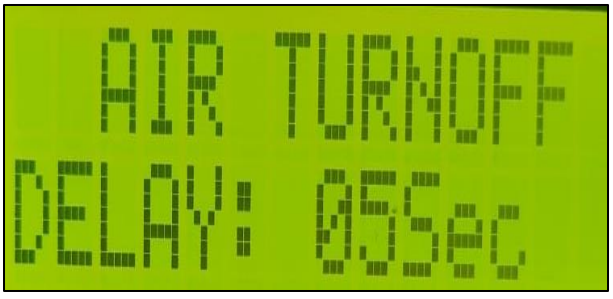
X. NEW DATE/TIME UPDATED.

Can update Date and time.



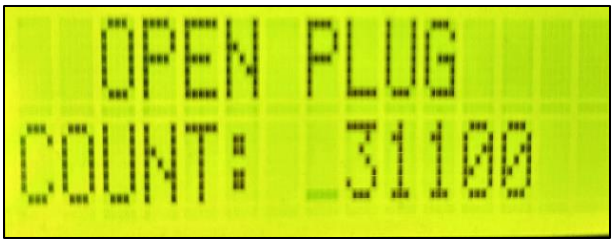
XI.AIR TURNOFF DELAY

Air turnoff delay can be set from 5 seconds to 50 seconds, or disabled.



XII. 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.



XIII. SYSTEM INFORMATION SCREEN

➢ PROGRAM SETTING

Whenever you turn on the device you will get only two options on screen, ADC count and Manual program select. You can switch between options by pressing "NEXT→" Key.

I. ADC COUNT

Shows the ADC count readings on the seven segment LED display.

II. MANUAL PROGRAM SELECT "01"

Using this option, you can load the parameters value for any program. For selecting program scroll up using "^UP" arrow key and press "ENT" key.

After entering into program settings you will get following parameters.

III. MASTERING

- **DOUBLE**

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

- **SINGLE**

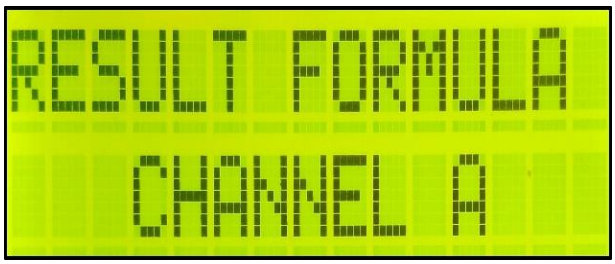
  When there is only one reference master available, choose single master mode. Single mastering will work only when double mastering is already done at least once for that program.

IV. UPDATE RESULT SETTING

Can make changes in RES1 and RES2

V. Result Formula

- **Channel A** – If entered formula is "A" then result shows only considering channel A value.



- **Channel B** – If entered formula is "B" then result shows only considering channel B value.

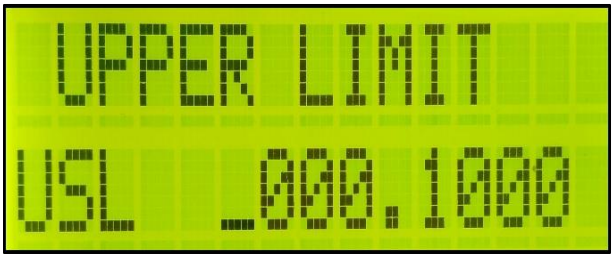
- **DISABLED**

VI. NOMINAL VALUE

000.000 is default nominal value. User need to enter nominal value of the components to be used for measurement. Nominal value is used for showing measurement result in absolute mode only. For relative display mode, nominal value is not required. The nominal value between upper and lower limits.

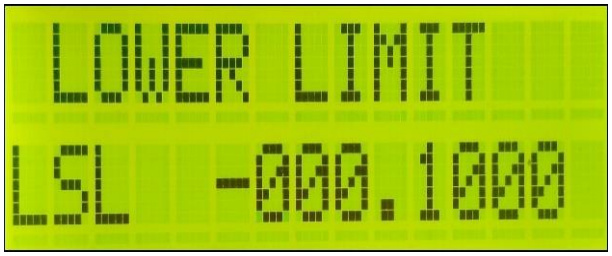
VII. UPPER LIMIT

This is upper specified limit of the dimensional measurement. When measurement value is above this limit, the component is for rework or reject depending upon direction.



XI. LOWER LIMIT

This is lower specified limit of the dimensional measurement. When measurement value is below this limit, the component is for rework or reject depending upon direction.



XII. MEASUREMENT MODE

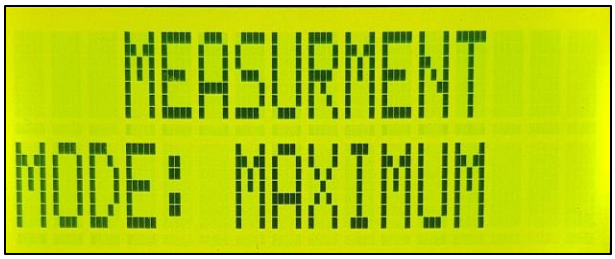
There are five measurement modes

- **CURRENT**
  In Current mode actual current moments readings are shown as result.

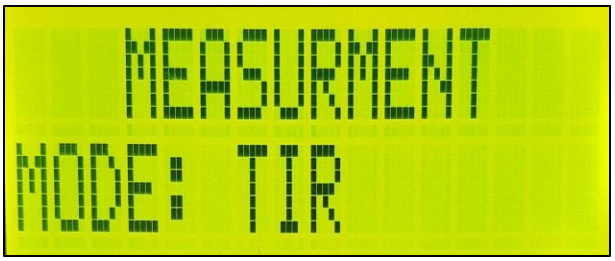
- **AVERAGE**
  In Average mode average of all readings are shown as result

- **MINIMUM**
  In Min mode lowest reading of measurement cycle is captured and displayed as result.

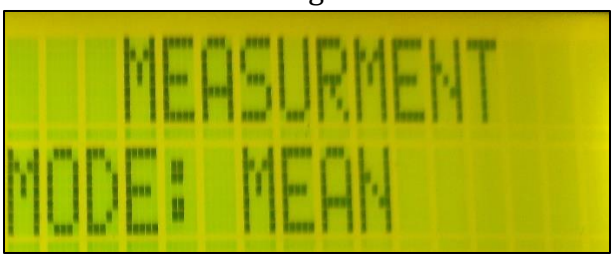
- **MAXIMUM**
  In Max mode highest reading of measurement cycle is captured and displayed as result.



- **TIR**
  In TIR mode total traverse of readings during measurement cycle are shown as result.

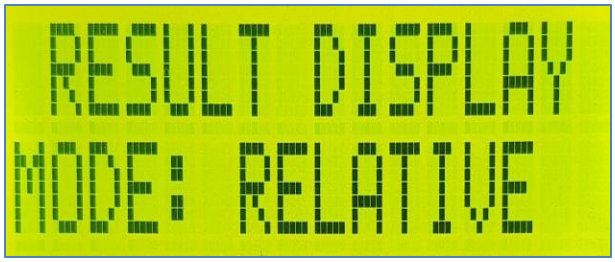


- **MEAN**
  In Mean mode mean of all readings are shown as result



XIII. RESULT DISPLAY MODE

- **RELATIVE**
  In this mode nominal value will not be considered for final result display. Direct measurement value is shown on display as final result.



- **ABSOLUTE**
  In this mode nominal value will be added to the obtained measurement value and then final result will be displayed.

XIV. LOWER MASTER VALUE

Enter the actual value of the lower master that was mentioned on the lower master component.

XV. HIGHER MASTER VALUE

Enter the actual value of the higher master that was mentioned on the higher master component.

XVI. MEASURING DIRECTION

Final results are dependent on these selections

- **ID (Internal Diameter)**
  For measuring internal diameter of component choose this option else results are different. 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.
  EX-ID=15.20 mm
  If ID is 15.25mm then Reject Condition
  If ID is 15.15mm then Rework Condition

- **OD (Outer Diameter)**
  For measuring outer diameter of component choose this option else results are different. 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.
  EX-OD=20.20 mm
  If OD is 20.30mm then Rework Condition
  If OD is 20.10mm then Reject Condition
- **RANGE**
  If the user wants to check and accept components only within a certain range, and all components outside of that range are rejected, then select this option.

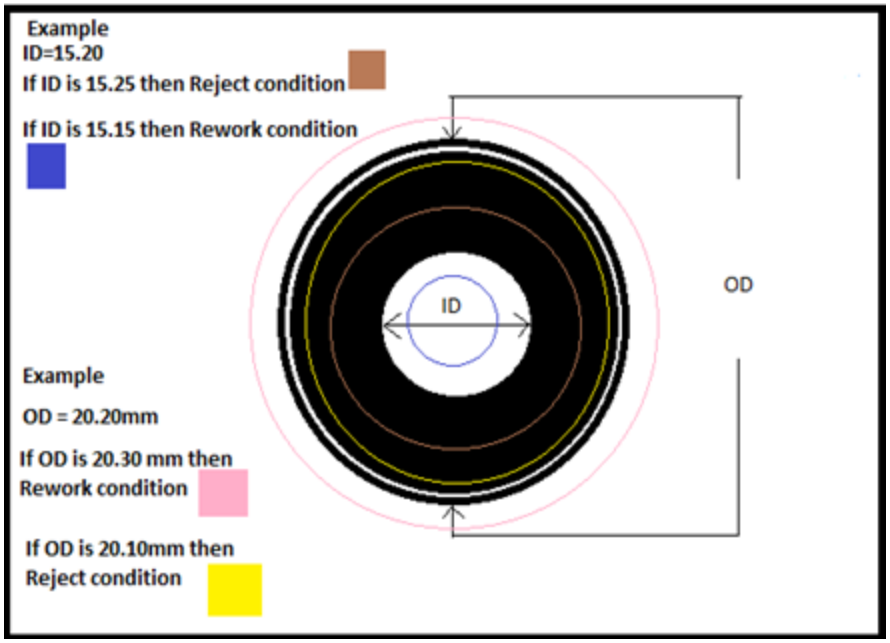
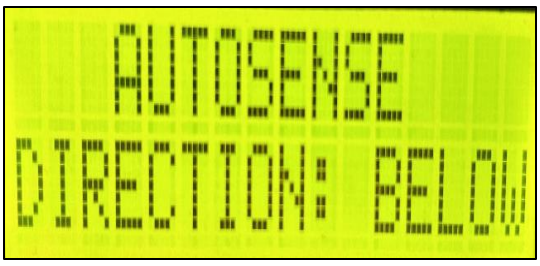


Figure 1

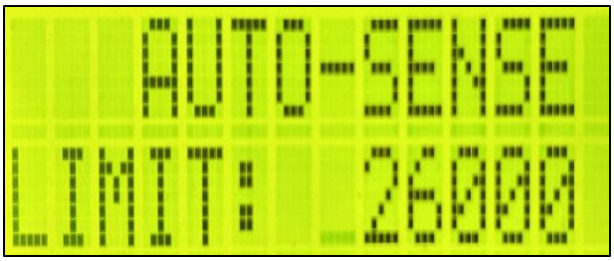
XVII. AUTO SENSE DIRECTION

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.



XVIII. AUTO SENSE LIMIT

When an auto sense limit is entered, the cycle will start automatically after the limit is reached.



XIX. RES 1 DONE SET RES2?

- **YES**
  If RES2 is set, select YES.

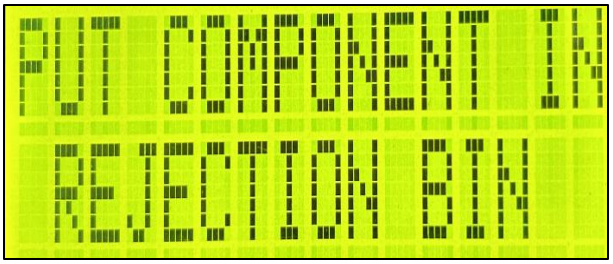
- **NO**
  If RES2 is not set, select NO.

Note: If RES 1 is done. To set RES 2, repeat the process of setting RES1.

XX. SETTING COMPLETE

➢ RESULT MODE

I. PUT COMPONENT REJECTION BIN



6. Many peripherals can be connected to a Spade ProGAUGE display unit

Send the data to the computer through the serial port.

The outputs of the display unit can be monitored on GPIO

ProGAUGE DISPLAY UNIT

The CNC/VMC machine will operate according to the input received from the Progauge display unit.

If the result of Progauge display unit is accepted, then the tower lamp will be green.
If the result of Progauge display unit is Rework, then the tower lamp will be orange.
If the result of Progauge display unit is Reject, then the tower lamp will be red.

Figure 2

7. How to do mastering

- Double Mastering

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

  1. Select double mastering.
  2. Pressing M1, the screen will show the message 'PLACE PLUG IN HIGHER MASTER'.
  3. After placing the plug into the higher master, press the M1 key, and the screen will show the message 'PROGRAM 01 CAPTURING M1'.
  4. The screen will show the message 'PLACE PLUG IN LOWER MASTER'.
  5. After placing the plug into the lower master, press the M2 key and the screen will show the message 'PROGRAM 01 CAPTURING M2.'
  6. The message "MASTERING DONE ENTER TO SAVE" 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. Pressing M1, the screen will show the message 'PLACE PLUG IN MASTER'
  3. After placing the plug into the master, press the M1 key, and the screen will show the message 'PROGRAM 01 CAPTURING M1'.
  4. The message "MASTERING DONE ENTER TO SAVE" will display.

8. Connection Detail

➢ Result status relay connection

8 Pin round Connector	Channels	Relay
1	Channel 1	CMN
2		Accept
3		Reject
4		Rework
5	Channel 2	CMN
6		Accept
7		Reject
8		Rework

Table 1

➢ Foot-switch connection

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

Table 2

- 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 units. For extension purpose DB9MALE to 3pin female three core cable is required. Below are pin details for this cable figure 3.

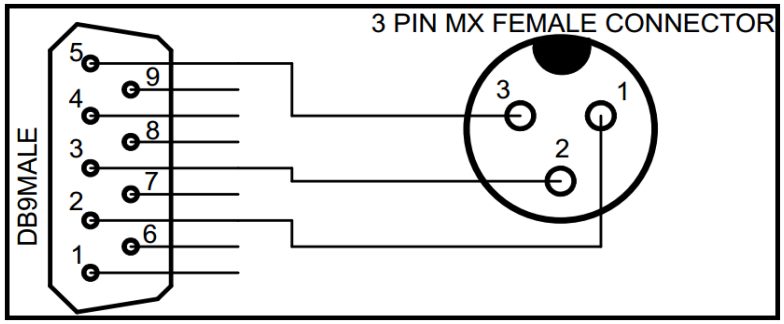


Figure 3

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

Table 3

➢ 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-4

- **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.

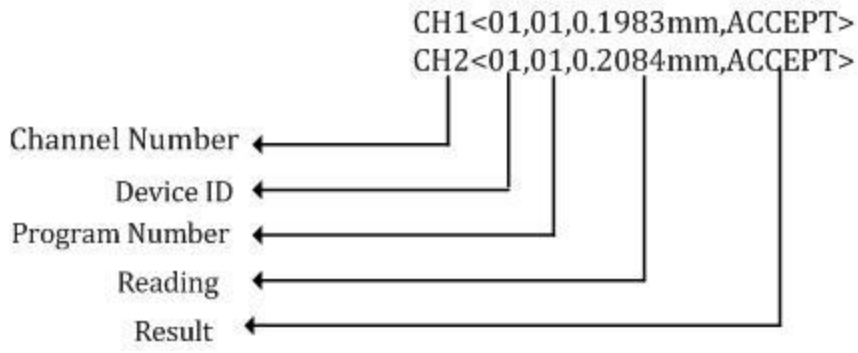
9. Measurement Cycle for Auto Program selection

For Auto program selection mode GPIO device should be properly connected to the display device. If GPIO device is not connected "INPUT EXTENSION NOT RESPONDING" error message shows on display screen.

- To start measurement cycle first check all the plugs are within the proximity of the sensor/rest position.
- Lift any one plug at a time then its respective program will be automatically selected.
- Put lifted plug into its respective component for measurement.
- Measurement status will be displayed on screen as Accept, Reject or Rework.
- Press "ENT" key or press foot switch once for saving the cycle result status into the device and at same time transmitting over serial port.
- Put plug back to its rest position.
- One measurement cycle completed.
- Repeat same procedure for all plugs.

10. 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.



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.

Micronbeats Metrology Solutions
#226, Laxmi colony, Lane No.5,
Behind Manish
market, Hadapsar, Pune – 411028.
www.Micronbeats.com
Email: sales@micronbeats.com