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EDMUNDS GAGES

Accu-Touch™ Amplifier

Instruction Manual



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Accu-Touch™ Use

Step 1 – Locate the Accu-touch™ amplifier and respective gage where parts can be best measured.

Step 2 – Connect the power cord to the rear of amplifier and then to the power outlet. Attach a suitable air line from the air supply to the inlet of Accu-touch™ filter, if applicable. Attach any LVDT cables from tooling to the rear of amplifier noting proper location of connectors. Also attach any air lines from the tooling to the front of the Accu-touch™ docking unit, if applicable, noting their proper connection.

Step 3 – Turn on the power switch located at rear of the amplifier near the power cord. Turn on the air supply pressure if applicable.

Step 4 – Have all the specific information concerning your part measurement available i.e. max & min check sizes and max & min master calibrated sizes.

Step 5 – Setup Accu-touch™ features as described in section 1 & 2, if necessary.

Step 6 – Calibrate Accu-touch™ using procedures listed in section 5, 6 & 7.

Step 7 – Measure parts.

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Preface

The Accu-Touch™ amplifier is a “comparative” type gaging amplifier displaying the results on a flat panel touch screen. Precision is (6µ) inch with accuracy being .5% of full scale (LVDT) and .1% full scale (AIR). Linearity will be .25% full scale.

The Accu-Touch™ amplifier is designed to be used with Edmunds LVDT gage probes and also two master system air tooling when used with the optional “docking unit”. No inference to compatibility with other types or brands of LVDT probes is implied or guaranteed.

The unit comes with a one year warranty from date of factory shipment. Damage caused by shipping, handling, “unclean” electrical power, contaminated compressed air supply or mis-use voids any warranty. Tampering with internal components and loading software programs also violates the warranty.

Basic

Amplifier (4) input	p/n E7204
Amplifier (4) input w/formula generator	p/n E7204A
Docking unit (1) input	p/n E7110
Docking unit (2) input	p/n E7120
Docking unit (3) input	p/n E7130
Docking unit (4) input	p/n E7140

Accessories

Coalescing Filter	p/n P-NUM-F32E-04AM
Memory Stick	p/n 4570642
Auto-Air shutoff (1 & 2 inputs)	p/n 5917040
Auto-Air shutoff (3 & 4 inputs)	p/n 5917041
USB 2-pedal Footswitch	p/n 5917035

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Definitions

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Hardware

Front view



Amplifier

Touch screen

Front USB port - data offload only

Zero adjusting screw

Mag adjusting screw

Air hose, tooling connection

Docking unit air gaging – optional

Rear view



Power on/off switch

RS232C serial port
LVDT ports
rear USB port - data offload
or optional data send/TIR
reset footswitch

LVDT jumper cable,
docking unit to amplifier

Air supply inlet

Filter

Regulator

Auto-air shutoff connection - optional

What you need

5.1 - Utilities: [*1]electrical power – 110/240 VAC, 50/60 HZ.
[*2]Compressed air supply – 60 PSI & 3 CFM minimum.

5.2 - Reference material: units of measure – English/Metric
upper and lower part limits
setting master [*3]calibrated sizes

5.3 - Measuring tooling: LVDT probes – open setup
electronic bore plug – I.D. measurement
electronic ring gage – O.D. measurement
air plug – I.D. measurement
air ring – O.D. measurement
special gage

5.4 – Setting masters: max & min or [*4]zero size masters -
gageblocks or other types of masters – for electronic "open" setup gaging
ring type – for electronic or air gaging of I.D.'s
cylindrical OD type – for electronic or air gaging of O.D.'s

Footnotes:

1.) electrical power should be "clean" and stable without large fluctuations otherwise internal damage of electrical components can occur voiding warranty. In such cases a isolation transformer is recommended.
2.) Clean & dry compressed air is required. Normal compressed air (shop air) can contaminate the docking units effecting stability of the readings and voiding warranty. In such cases a coalescing air filter is recommended to be installed on the inlet to the docking unit. The elements in this filter require periodic checking and replacement.
3.) Certifications by a traceable calibration lab are recommended to ensure the setup and results of calibration are as accurate as possible.
4.) A zero or nominal master can be used but not recommended by Edmunds Gages for electronic gaging only. Two masters are required for air gaging.

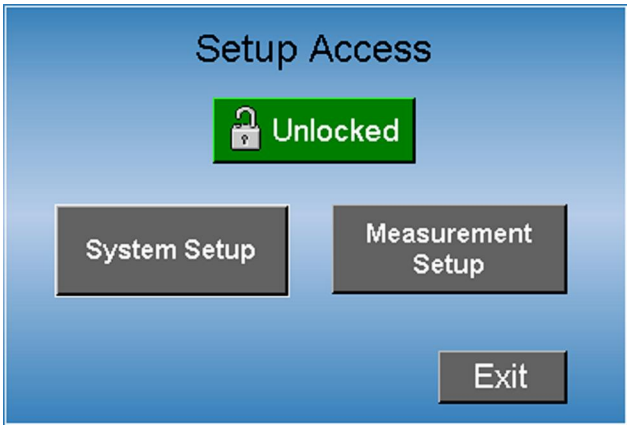
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Setup – section 1

1.1 – Main screen - shown with 4 check results.

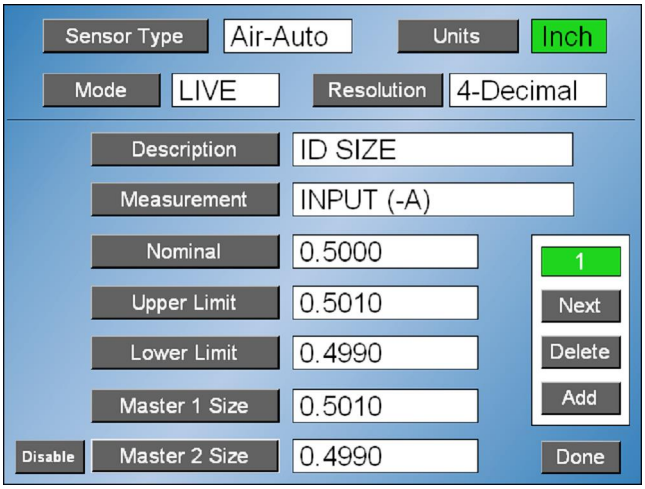


1.2 - For a new setup, touch “Setup”, “Setup Access” menu appears.



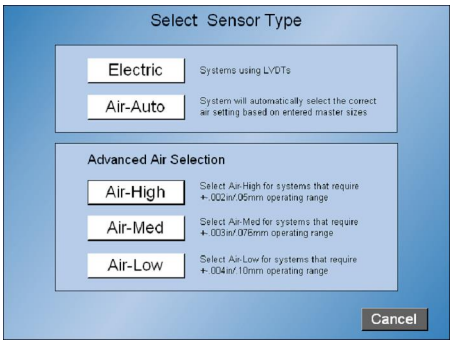
1.2.1 – Touch “Measurement Setup”, setup now appears - if unlocked or if password protection has not been enabled.

1.2.2- The (11) selectable items related to for your use are available to be selected or entered by touching each software key.



Features – section 2

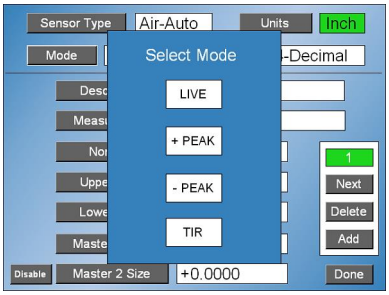
2.1 - **Sensor type** – touch to select "electric" for electronic gaging or air-auto for air gaging.



2.2 - **Units** – touch "inch" or "mm" based on application.

2.3 - **Resolution** – touch as many times as necessary to select [3]resolution required for application. Two to six decimal place resolutions available.

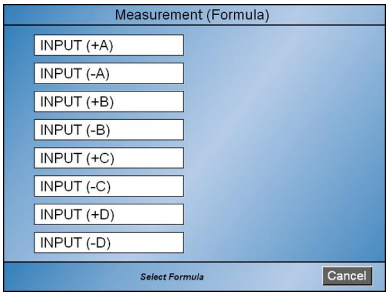
2.4 - **Mode -** touch and select by touching one of four available methods of displaying the reading. "Live", "TIR", "+PEAK", "-PEAK".



2.5 - **Description** – touch and enter letters, numbers or characters using software keyboard to give a name for this measurement feature, ten maximum. Touch "Done" when complete.

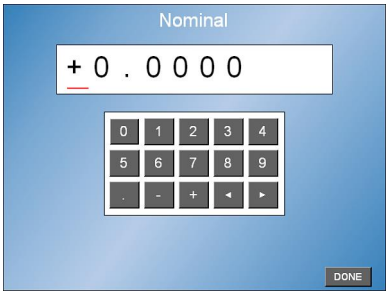


2.6 - **Measurement** – touch and select by touching input based on which connection is being used for this feature being measured. Note LVDT cable connection on rear of amplifier and [4]polarity of application.

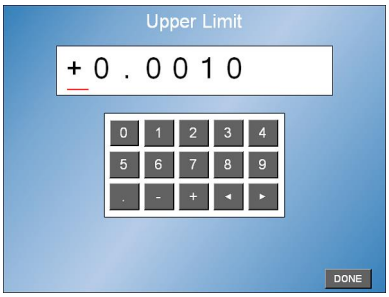


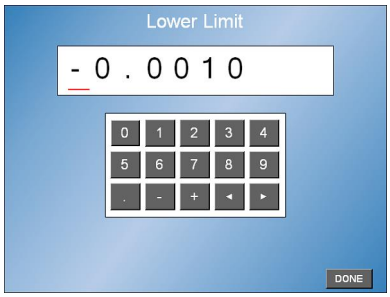
Features - continued

2.7 - [5]**Nominal** – touch and enter the nominal size of your application using the software keyboard as a “whole” number if using absolute method or zero’s if using deviation method. Touch “Done” when complete.

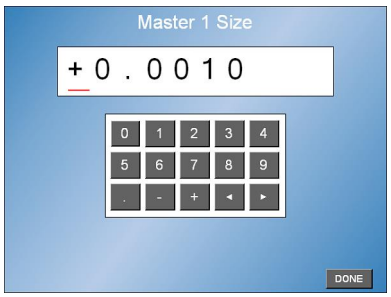


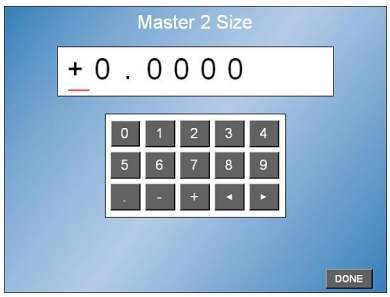
2.8 - **Upper limit/Lower limit** – touch and enter the upper and lower limits of the [*6]part tolerance using the software keyboard. Enter upper & lower limits as deviation (+/-) from zero or both as “whole” numbers matching “nominal” setup, do not mix. Touch “Done” when complete each time.





2.9 - **Master 1 size/Master 2 size** – touch and enter master 1 always maximum size & master 2 always minimum size of the masters using software keyboard. Use sizes from certifications if masters are out of original tolerance gages were manufactured to. Enter both max & min sizes as deviation from zero or both as “whole” numbers matching “nominal” and “part limits”, do not mix. Touch “Done” when complete each time. If using a single master for electronic gaging only, use Master 1 and touch “disable” for Master 2.



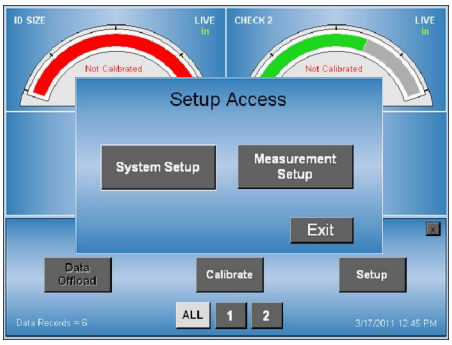


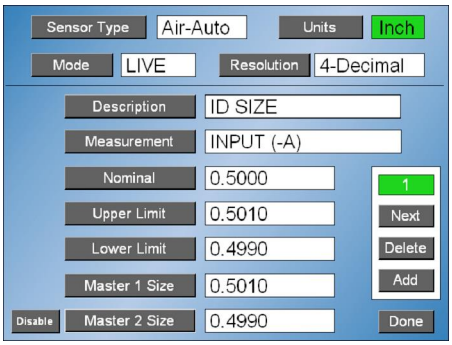
2.10 - **Additional checks** - If more than one measurement is to be setup, touch “add” key and repeat above setups for each measurement. If not, touch “done” key and proceed to calibration.

Measurement (Formula) – section 3

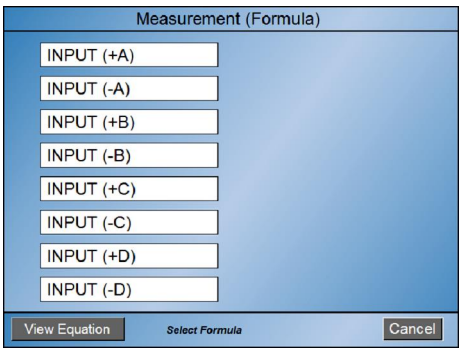
3.1 – Formulas – if the standard measurement choices shown under "Measurement" do not apply or if a special combination of inputs or formulas are required, the formula generator option is available. The formula generator is available on base version E7204A. Upgrade to this version is available for purchased.

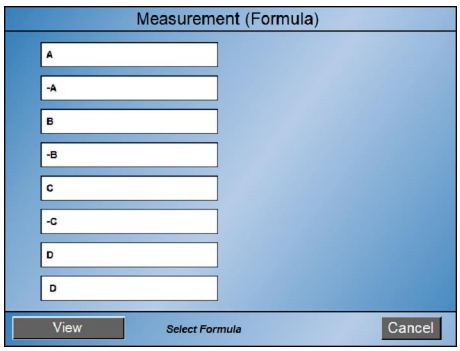
3.1.1 – Measurement – the available formulas can be viewed in the Measurement setup. Touch the Setup software key and Setup Access menu appears. Enter the password if required, if not touch the Measurement Setup key to display the first check.





3.1.2 – Touch the Measurement software key to display the available Measurement formulas. If one of the formulas shown can be used for the application, touch to select it which will exit you to the check menu. Touch Next for other checks and repeat the process. Touch the Done key when finished. Use the "View Equation" so see the actual mathematical equation assigned to the formula.



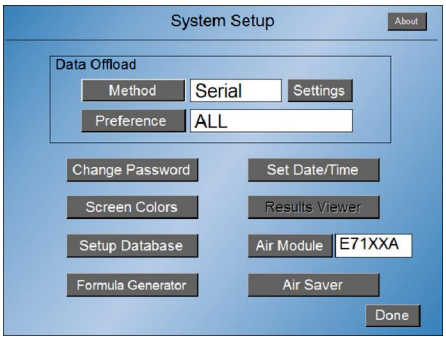


3.1.3 – If none of the available formulas is applicable, the special Formula Generator options will be required. Touch the Cancel key to exit to the check menu and touch the Done key to exit to main menu.

Measurement (Formula) – continued

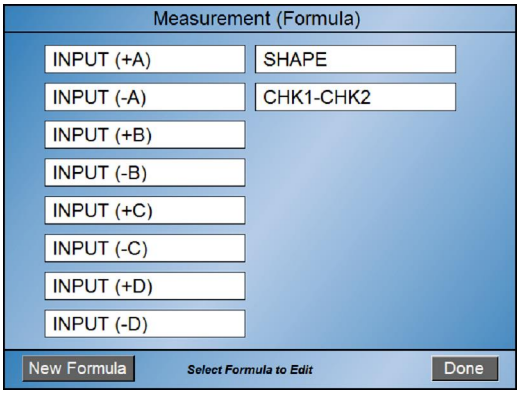
3.2.1 – Formula Generator - Touch the Setup software key and Setup Access menu appears. Enter the password if required, if not touch the System Setup key to display System Setup.

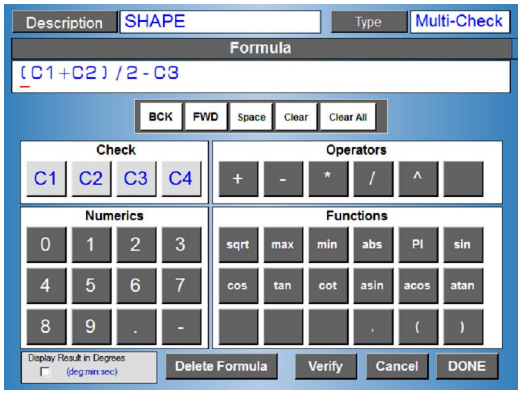




3.2.2 – If the optional Formula Generator (base version E7204A) has been purchased, the Formula Generator key will be present. Touch this key to view the existing formulas.

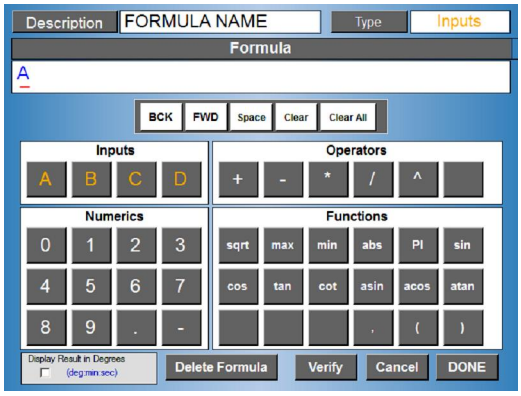
3.2.3 – Existing formulas – touch each to review their function should they be applicable. Touch Done key each time to exit their function.





Measurement (Formula) – continued

3.2.4 – If one of the existing formulas is not appropriate, touch the New Formula software key at the lower left of the screen and formula generator screen allowing the creation of the formula appears.
See (**Appendix A – Formula Generator)** for complete description.

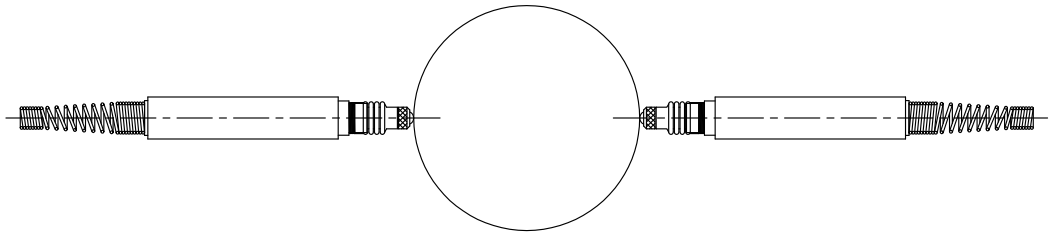


3.2.5 - Gaging formulas – need to be understood as applied to the application before the formula generator can be utilized. The Formula generator allows Inputs or Checks to be algebraically combined.

For electronic gaging applications using LVDTs, the gaging formula will be dependent upon the specific gaging application.

Gaging probes used within any system are strategically mounted to contact the work piece at specified locations to perform measurements. The number of probes used and their position determine the construction of the formula.

Two directly opposing LVDT probes combined to measure the OD of a shaft would each have a polarity and mag number of (+) 1.000. The probes normal operation defines the polarity as (+) when the tip is depressed. Thus as the diameter grows, the probes are depressed providing positive readings indicating a larger part diameter. The formula in this case would be “A+B” where LVDT probes are connected to “A” and “B” inputs.



Measurement (Formula) – continued

It may be necessary to apply a multiplier to the probes outputs depending on the application. The multiplier is determined by the number of probes used to perform the measurement or to correct any chordal error if they are not equally spaced. Examples:

(2) LVDTS – directly opposed, polarity/mag = (+) 1.000
Formula = A+B

(3) LVDTS – 120 degrees equally space, polarity/mag = (+) .667
Formula = (A*.667) + (B*.667) + (C*.667) or (A+B+C)*.667

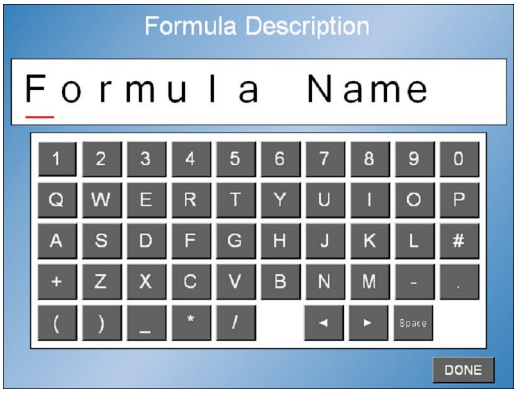
(4) LVDTS – 90 degrees equally space, polarity/mag = (+) .5
Formula = (A*.5) + (B*.5) + (C*.5) + (D*.5) or " (A+B+C+D)*.5

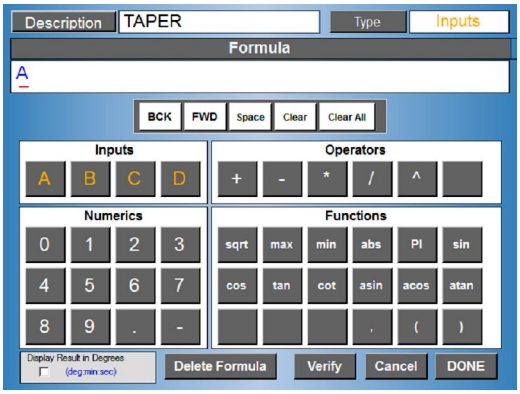
For air gaging applications, the gaging formula will always be (+)1.000 outside measurements and (-)1.000 for inside measurements. The formulas would be "A" and "-A"

Checks can also be combine algebraically. As an example, air plug that measures a part ID at two elevations with one labeled as the large diameter using input A and displays as Check #1 while the other labeled as the small diameter measured using input B and displays as Check #2. The difference then being Taper as Check #3 can be defined as Check #1 minus Check #2.

Check #1, Large Diameter - Formula = A
Check #2, Small Diameter - Formula = B
Check #3, Taper - Formula = C1 - C2

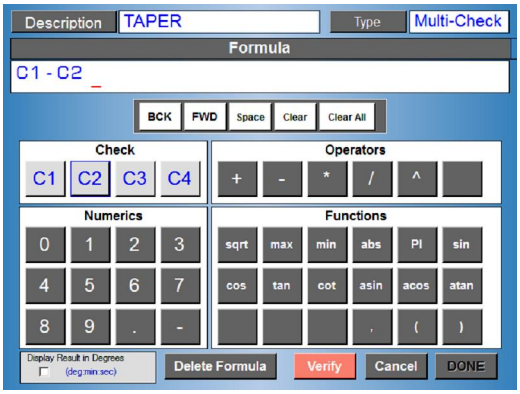
3.2.6 – Example – to create the "Taper" formula, start by touching the Description key to enter a Formula name. A software keyboard will popup allowing up to (14) alpha/numeric characters to be selected. Touch the Done key when finished.





Measurement (Formula) – continued

3.2.6.1 – Select the “Type” key to select the “Multi-Check” format instead of the default “Input” format. Enter the formula “C1-C2” by selecting C1 under “Check” selection box. Select minus “-“ under the “Operators” selection box. Select C2 under the “Check” selection box.

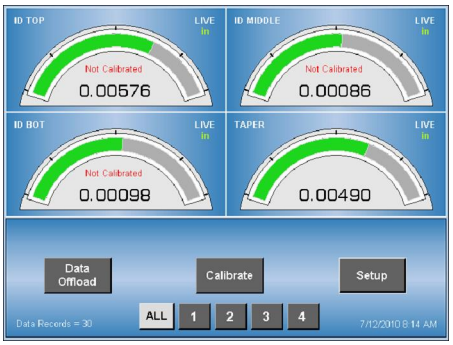


3.2.6.2 – Once the formula has been entered, touch the Verify key. This will verify the formula has been entered correctly and can be used by the system. Note that the formula must be verified before you can select “Done” and exit the screen.

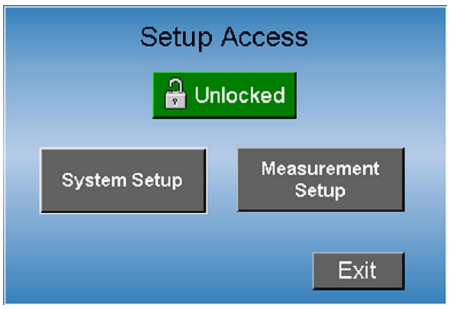


Database setup – section 4

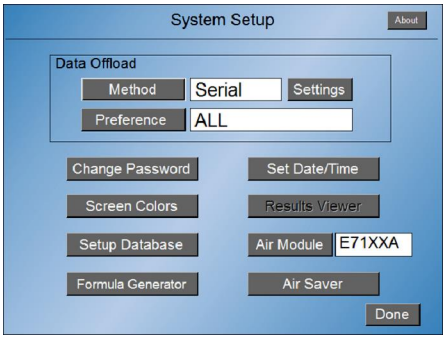
4.1 - Copies of the entire setups can be stored onboard of the Accutouch amplifier for future use. With optional version setups can be Exported/Imported to USB drive.



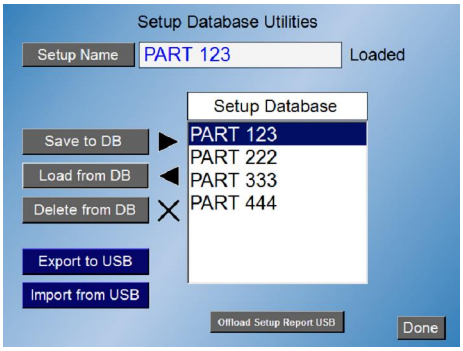
4.1.1 – storing new setups - touch “Setup”, “Setup Access” menu appears.



Touch “System Setup” key, System Setup” menu now appears[1] (if unlocked or if password protection has not been enabled).

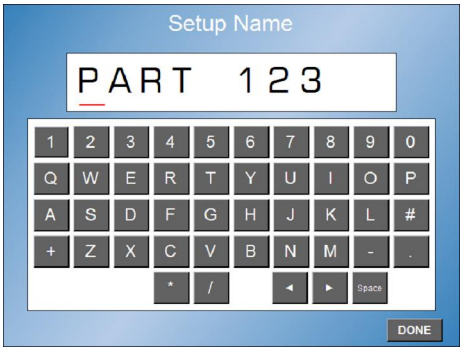


Touch the “Setup Database” key and the menu to store setups appears.

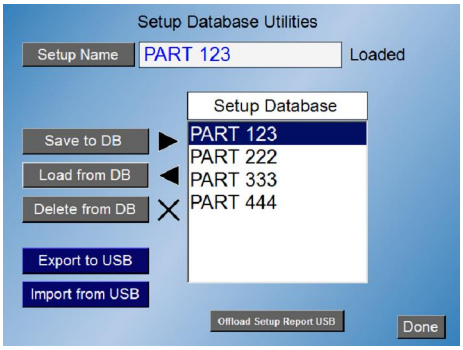


Database setup - continued

4.1.2 – Naming Setup - the first step is to name the new setup by touching the Setup Name key. A software keyboard will appear allowing up to ten alpha numeric characters to be selected. Once finished press the Done key.



4.1.3 – Saving a Setup - the setup can be saved to the Accu-touch™ memory by touching the "Save to DB" key. Once saved the name will appear in the list. Touch the "Done" key when finished which will exit you out one level to the "System Setup" menu. If complete, touch the "Done" key and the main screen will appear.



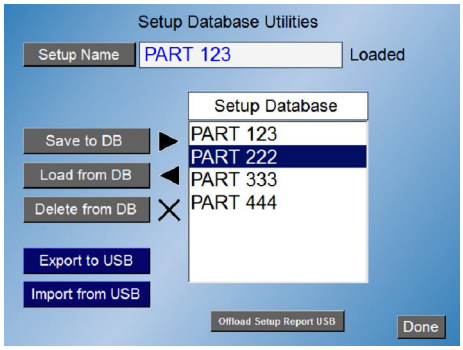
4.1.4 – Recalling existing setups – select the setup needing to be loaded by touching the setup name shown or scrolling down or up to the setup name required. Once the required setup name is highlighted, touch the "Load from DB" key and the system will respond with a warning before overwriting the existing setup. If loading a new program, touch the YES key and the setup will load with a "Load Complete" message when finished. Touch the "OK" key and if finished, touch the "Done" key. If not, touch the NO key and select the appropriate name. Touch Done key to exit.

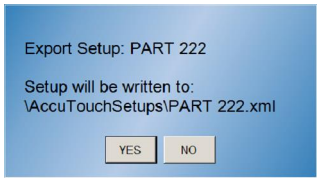
4.1.5 – Deleting an existing setup – touch the setup name or scroll down to the setup name using the side bar until it is highlighted. Touch the Delete from DB key and a pop up warning menu will appear asking "Delete Setup : XYZ Deleted From Database? YES NO" . If this is the setup to delete, touch the YES key. If not touch the NO key and select the appropriate name. Touch Done key to exit.

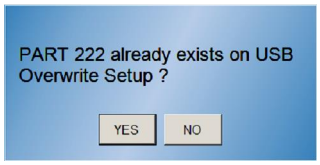
Database setup - continued

4.2 – Export/Import Setups (option included on E7204A units)
The export/import option provides the ability to export and import setups to/from a qualified USB drive. This option is useful when there is a need to copy a setup from one Accu-touch™ unit to another. It also provides a way to backup the setups externally incase setup parameters accidentally get changed or corrupt.

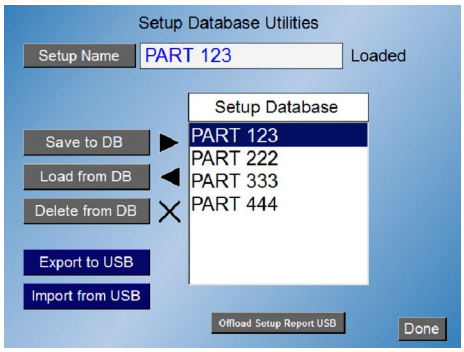
4.2.1 - Export Setup – Insert Edmunds qualified USB drive into either USB ports. Select the setup to export by touching the setup name shown or scrolling down or up to the setup name required. Once the required setup name is highlighted, touch the "Export to USB" key and the system will respond with a "YES" "NO" prompt to confirm. If the setup already exists on the USB drive, a warning before overwriting the existing setup will be displayed. The setups will be exported to "AccuTouchSetups" directory on the USB drive. The "AccuTouchSetups" directory will be created if does not already exists.

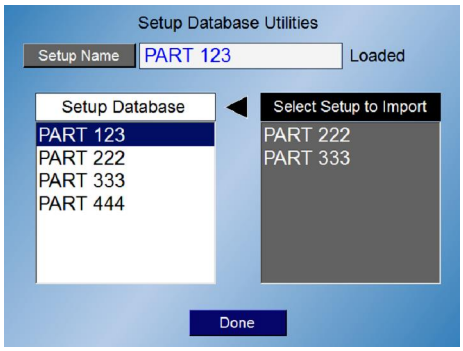




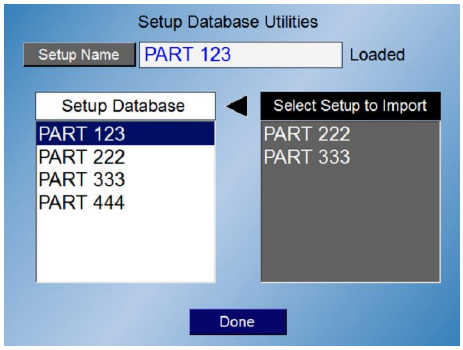


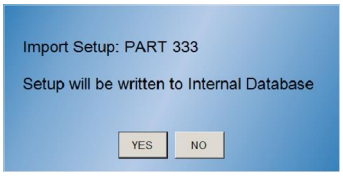
4.2.2 – Import a Setup - Insert Edmunds qualified USB drive into either USB ports. The USB drive must contain valid setup file(s) located in "AccuTouchSetups" directory on the USB drive. Touch the "Import from USB" key and the system will display the available setups for import that are located on the USB drive.

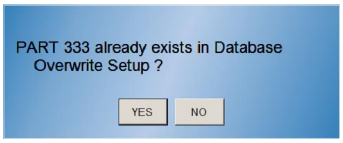




Select the setup to import by touching the setup name shown or scrolling down or up to the setup name required. The system will respond with a “YES” “NO” prompt to confirm. . If the setup already exists in the internal database a warning before overwriting the existing setup will be displayed.





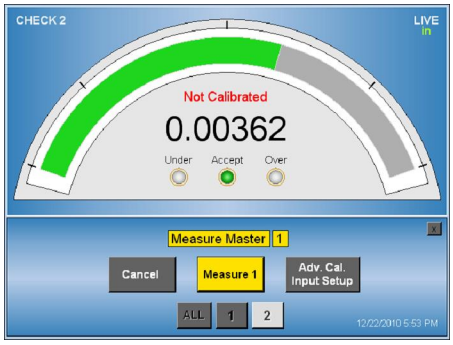


Manual calibration – section 5

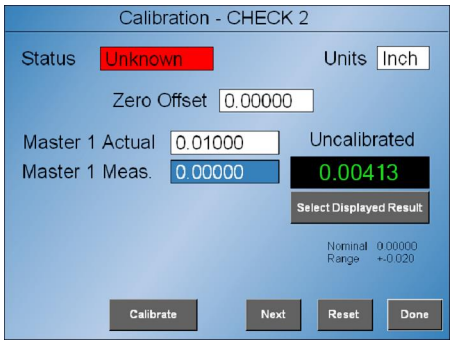
5.1 - Manual adjustment – performed first time gage is used with amplifier.



5.1.1.1- **Electronic gaging - "single master"**, touch "Calibrate" key and "Measure 1" will appear.



5.1.1.2 -Touch "Adv Cal Input Setup" key and the manual calibration menu appears. Touch "select displayed results" if necessary to display "Uncalibrated".



5.1.1.3 - The Uncalibrated reading is now displayed in the digital window. Place the master on the gage and read the value. If the reading is within (200x) of the resolution selected of the zero master calibrated size, touch the "Reset" key and then the "Done" key. If not, manually adjust the LVDT gagehead to change the digital reading so it is. Touch the "Reset" key and then the "Done" key when complete or "Next" for another check and repeat this process.

5.1.1.4- Once complete, go to Software Calibration section 6.

Manual calibration - continued

5.1.2.1- **Electronic gaging "two master"**, touch "Calibrate" key and "Measure 1" will appear (as previously shown).

5.1.2.2 - Touch "Adv Cal Input Setup" key and the manual calibration menu appears. Touch "select displayed results" if necessary to display "Uncalibrated" (as previously shown).

5.1.2.3 - The uncalibrated reading is now displayed in the digital window. Place Master 1 on the gage and read its value. If the reading is within 200x of the resolution selected of the masters calibrated size, replace it with Master 2. If it is not within this limit, manually adjust the LVDT gagehead to change the digital reading of Master 1 so it is. Once adjustment for Master 1 is complete, replace it with Master 2 and read what its size is. If the difference displayed between Master 1 & Master 2 is within 25% of the actual spread, touch the "Reset" key and then the "Done" key when complete or "Next" for another check and repeat this process. If the spread is not within this limit, there is a mechanical issue with the gage that needs to be addressed before continuing.

5.1.3.1- **Air gaging "two master"**, touch "Calibrate" key and "Measure 1" will appear (as previously shown).

5.1.3.2- Touch "Adv Cal Input Setup" key and the manual calibration menu appears. Touch "select displayed results" if necessary to display "Uncalibrated" (as previously shown) .

5.1.3.3- The uncalibrated reading is now displayed in the digital window. Place Master 1 on the gage and read its value. If the reading is within 200x of the resolution selected of the masters calibrated size, replace it with Master 2. If it is not within this limit, manually adjust the "zero" screw on the a/e docking unit so it is. Once adjustment for Master 1 is complete, replace it with Master 2 and read what its size is. If the difference displayed between Master 1 and Master 2 is within 50% of the actual spread, touch the "Reset" key and then the "Done" key when complete or "Next" for another check and repeat this process. If the spread is not within this limit, the "mag" or "spread" needs to be adjusted. Go to Section 5 "Setting Pneumatic Mag" for instructions.

5.1.3.4- Once complete, go to Software Calibration section 7.

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Setting pneumatic mag – section 6

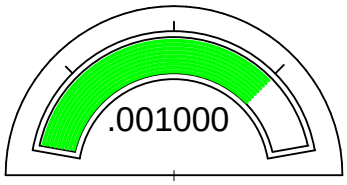
6. **- Adjusting pneumatic mag & zero**

example: *Master 1 = .001; Master 2 = -.001*

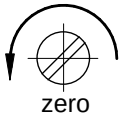
Note: when first purchased new with tooling, these settings will be pre-adjusted for the tooling .

6.1.1 -If first time setup, turn both mag (M) & zero (Z) screws carefully clockwise until they stop and unscrew both counterclockwise 2 ½ full turns as start point. If not, proceed to step 6.2.1

6.2.1 –**set max size** - place the max size master on the air gage covering the nozzles. Turn the (Z) zero screw until digital reading is close or equal to max master size.

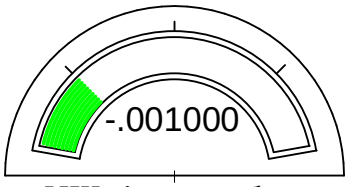


MAX size = good



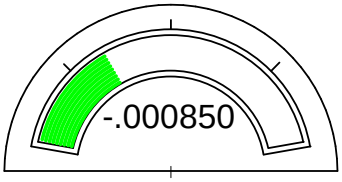


6.3.1 – **set min size** - remove the max size master and place the min size master on the air gage covering the nozzles. If the digital reading is close or equal to the min master size, proceed to software calibration. Repeat steps 5.2.1 & 5.3.1 for other inputs. If not, proceed to step 5.3.2.

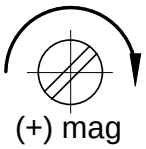


MIN size = good

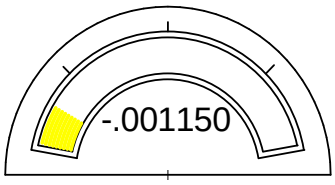
6.3.2 - **set mag (spread too short)** - If the digital reading for the min master size is larger than it should be, the spread is “short”, mag adjustment is required.



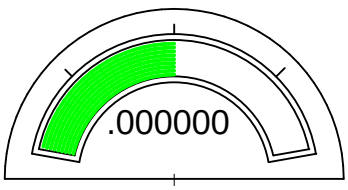
MIN size = too large



Turn the (M) mag screw CW to increase the mag until the reading displayed goes beyond the min master actual size. For an ID hole measurement (airplug), the reading will need to be even larger than first seen. For an O.D. shaft measurement (air ring/air snap) the reading will need to be smaller than the min master size.



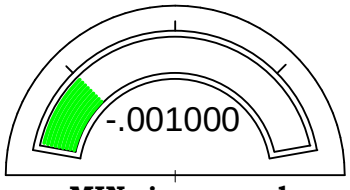
air ring (air snap)



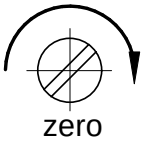
airplug

Setting pneumatic mag - continued

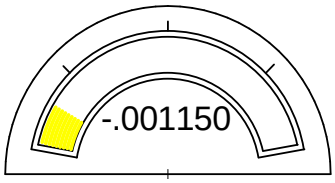
Then turn the (Z) zero screw in the same direction as the (M) mag screw was just turned until the digital reading is close to or equal to the min master size.



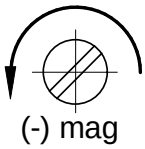
MIN size = good



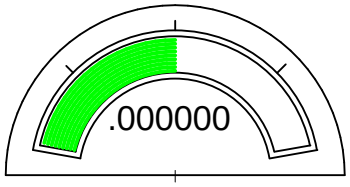
6.3.3 - **set mag (spread too long)** - If the digital reading for the min master size is smaller than it should be, the spread is "long", mag adjustment is required.



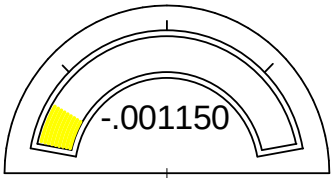
MIN size = too small



Turn the (M) mag screw CCW to decrease the mag until the reading displayed goes beyond the min master actual size. For an ID hole measurement (airplug), the reading will need to be smaller than the min master size. For an O.D. shaft measurement (air ring/air snap) the reading will need to be even larger than the reading first seen.

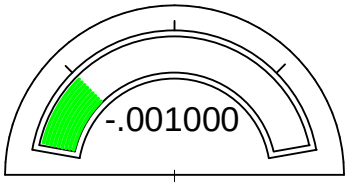


air ring (air snap)

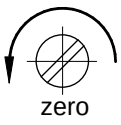


airplug

Then turn the (Z) zero screw in the same direction as the (M) mag screw was just turned until the digital reading is close to or equal to the min master size.



MIN size = good

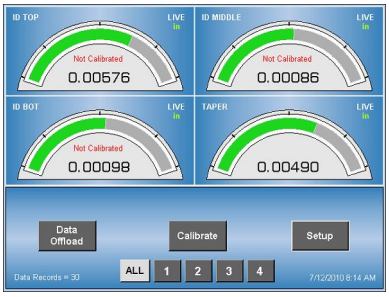


6.3.4 - Repeat steps 6.3.2 or 6.3.3 by switching both masters as required until the max and min sizes display correctly. **Once completed proceed to the "software calibration".**

Software calibration – section 7

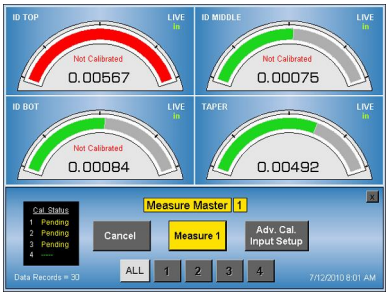
7.1- - If this is the first time the gaging is being used with this readout, the following software calibration procedure can be utilized after manual calibration has been verified. If this is not the first time, the manual calibration procedure is not necessary.

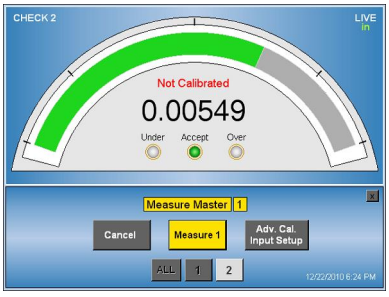
7.1.1- For multiple check gaging applications, either one check or all checks can be calibrated at one time. Multiple checks to be calibrated at the same time must all be two master or single master types Combinations must be calibrated separately.





7.2.1- **Electronic gaging "single" master**, touch the "Calibrate" key and "Measure 1" will appear.

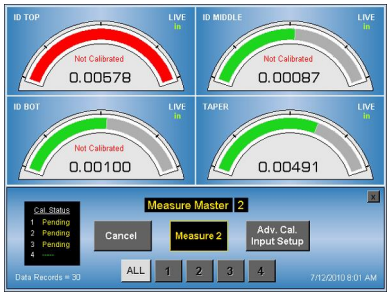


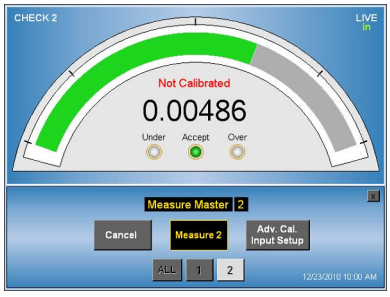


7.2.2- Place the master on the gage and touch the "Measure 1" key, "[7]calibrated" appears. Parts can now be measured.

7.3.1- **Electronic & air gaging "two" master"**, touch the "Calibrate" key and "Measure 1" will appear (as shown above).

7.3.2 - Place Master 1 on the gage. Touch the "Measure 1" key to take its reading. "Measure 2" now appears.



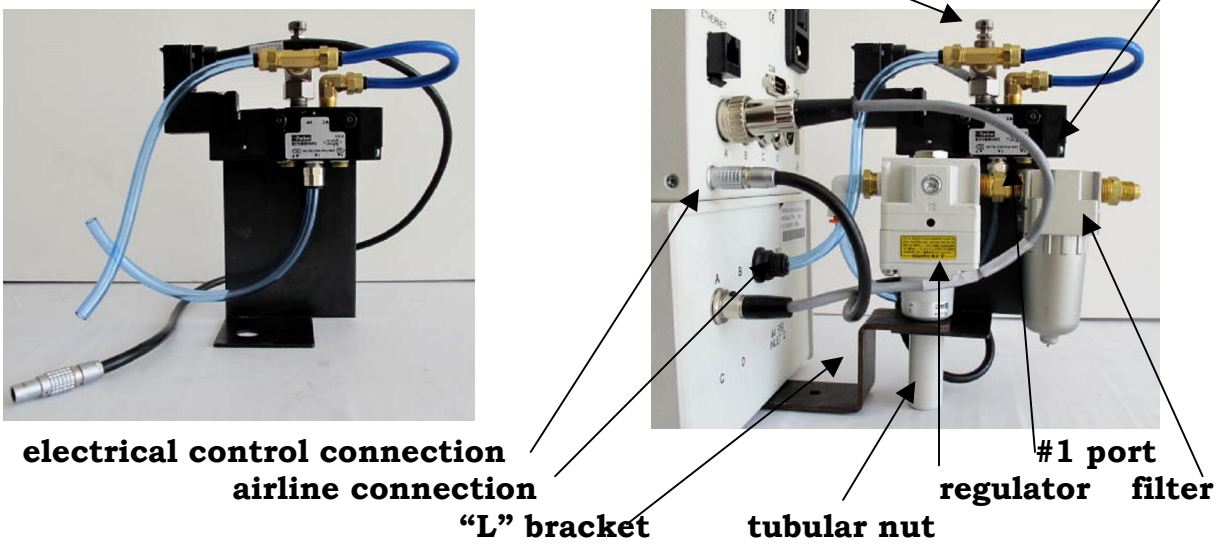


7.3.3- Replace Master 1 with Master 2 on the gage. Touch the "Measure 2" key and "[8]calibrated" appears. Parts can now be measured.

Auto-air shutoff setup – section 8

8.1 – This feature can be used with air gaging when the amplifier is Model #E7204 with the capability to control the Edmunds auto air shut-off package. This combination of hardware and software allows the supply air pressure to be automatically cut down by approximately 85% of its normal volume when not in use. This air pressure will automatically be reset to full pressure when the air gage is inserted back in a master or part. Calibration is not effected due to the air drop being performed after the precision regulator.

8.1.1 - Hardware – with a compatible amplifier the air shut-off hardware is mounted to the rear of the unit across the filter regulator.



8.1.1.1 – If already installed, proceed to section 7.1.2 to setup the software.

8.1.1.2 – If the hardware has not been installed – With the power and air pressure turned off, disconnect the existing air line from the regulator outlet to the inlet at the back of the Accutouch.

8.1.1.3 - Remove the tubular nut holding the regulator to the "L" shaped bracket.

8.1.1.4 - Insert the air line from the regulator outlet to the #1 port on the lower side of the air valve.

8.1.1.5 - Mount the shut-off assembly to the filter/regulator assembly by sliding the sheet metal bracket over the threaded shank of the regulator while holding the filter/regulator inplace. Attach the threaded tubular nut and hand tight to secure.

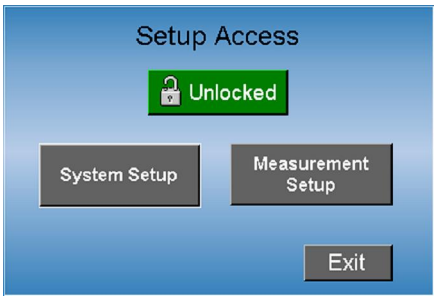
8.1.1.6 - Attach the air line from the outlet of the air valve to the inlet of the Accutouch.

8.1.1.7 - Attach the electrical control cable coming from the air valve to the back of the Accutouch.

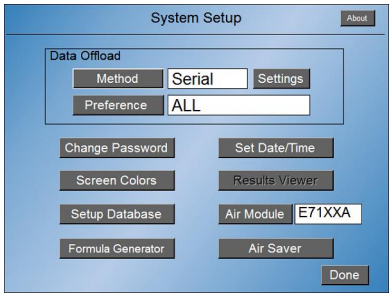
Auto-air shutoff setup - continued

8.1.2 – Software – the auto-air feature is enabled or disabled under the System Setup menu. Touch the Setup software key on the main menu and a pop-up menu, Setup Access will display.

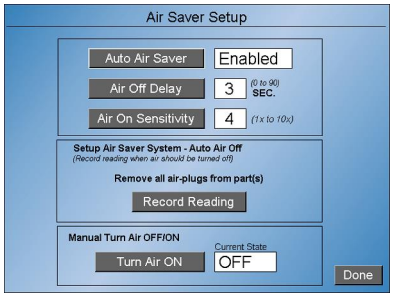




8.1.2.1 - If password protected, enter password first and then Touch System Setup. If not, touch the "System Setup" key and the setup menu appears. Press the Air Saver key and the Air Saver Setup menu appears. There are (5) features in the Auto Saver Setup menu that can be accessed.



8.1.2.2 –Enable/disable - touch the Auto Air Saver key to toggle choices.



8.1.2.3 – Air Off Delay – touch this key to select a time delay of between 0 to 90 seconds. This time period sets the delay between the air supply will being reduced from the point that the air gage is withdrawn from a part or master.

8.1.2.4 – Air On Sensitivity – touch this key to select a time delay of between 0 to 10 seconds. This time period sets the delay between the air pressure being restored to full after the air gage has be inserted into a part or master.

8.1.2.5 – Record Reading – touch this key with the air gage blowing air to atmosphere with no part or master engaged. This feature is used to establish the saturation limit for a particular air gage.

Auto-air shutoff setup - continued

8.1.2.6 – Turn Air ON/OFF – touch this key to manually over-ride the settings and turn the air on or off.

8.1.3 – Manual adjustment – the “silver” colored knurled adjusting need valve on the air shut-off valve will need to be adjusted each time a different air gage is used with this readout. The adjustment is to set the trip point where the software senses the gage & part are engaged or dis-engaged.

8.1.3.1 – Utilize the following steps **only** after the mag & zero have been set for each air gage.

8.1.3.2 – After the five features have been selected in section 7.1.2, exit out to the main menu by touching the Done key in the lower right hand corner of the screen. Touch it once to exit the Air Saver setup and touch it again to exit the System Setup menu.

8.1.3.3 – Once in the main menu displaying the radial bargraph, remove any parts or masters from the air gage allowing it to blow air pressure to atmosphere. Manually turn the knurled knob clockwise until you feel the screw bottom out.

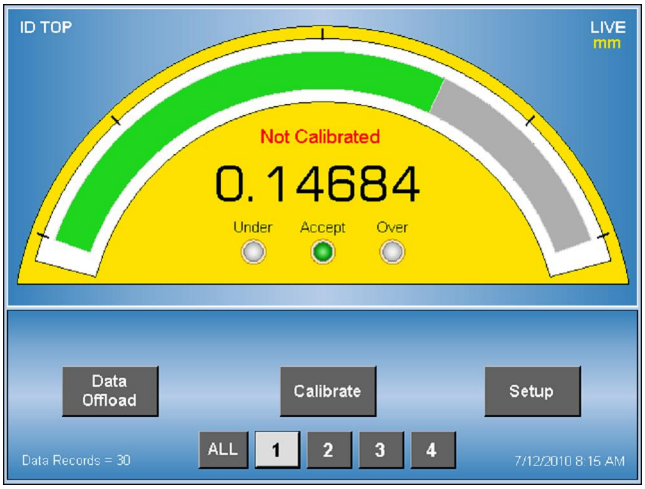
8.1.3.4 – Turn the knurled knob counterclockwise slowly until you hear the air pressure come on and stop. Turn the knurled knob clockwise until the air pressure shut-offs again and stop.

8.1.3.5 - Insert a part or master and the air pressure should turn back on.

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Measuring – section 9

9.1 – Once successfully calibrated, the amplifier then can be used to measure parts.



9.1.1 – The display can be selected to show a single measurement or up to four measurements, if setup, at one time. If multiple measurements are setup, touch the screen or the software keys at the bottom of the screen to select.

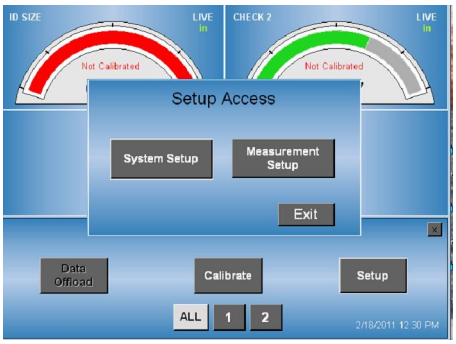


9.1.2 – Applications using “live” modes enable the radial bargraph and digital numbers to change in real time. T.I.R.; +PEAK or –PEAK lock the radial bargraph & digital value to that dynamic feature seen as the part is scanned with the gage. Each time a part is loaded, touch the “RESET” software key or the optional footswitch to reset the display and start measuring.

9.1.3 – The Accutouch displays the part condition in a digital format; radial bargraph & status lights i.e. under/good/over.

Data offload setup – section 10

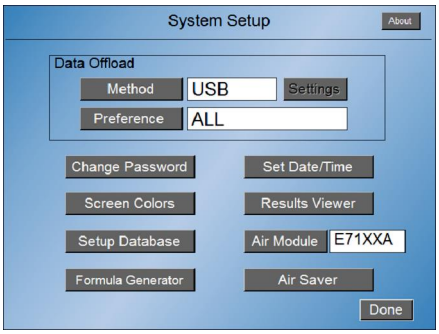
10.1 – At anytime, the readings being displayed can be offloaded to either USB ports, front or back, if an Edmunds qualified USB drive is installed or to an external device thru the 9 pin serial port at the rear of the unit. No onboard data storage capability is available.



10.2 – USB setup– touch the setup software key and a pop-up menu, Setup Access, will display. If password protected, enter password first and then touch System Setup. At the top of the System Setup menu there is a Method key to select the type of output.

10.2.1 - If SERIAL is shown, touch the Method key until USB is shown and follow section 9.1.2.2.

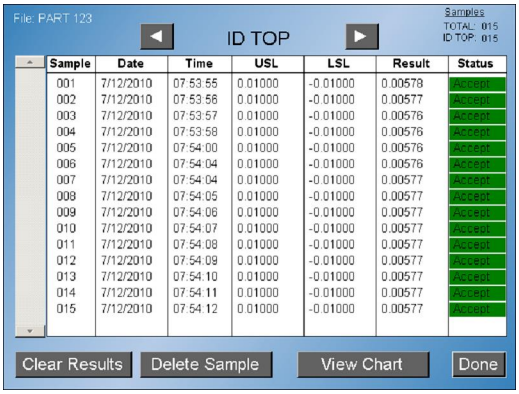
10.2.2 - If USB is shown, selection is complete. Another key labeled Preference is listed below the Method key allowing Single Viewed or ALL to be selected. If multiple measurements are setup, all measurements can be offloaded at one time regardless of how many are displayed or only one measurement is offloaded of the one displayed. Touch Preference key to select choice. Touch DONE key at the lower right corner of the screen when finished exiting to the main menu.

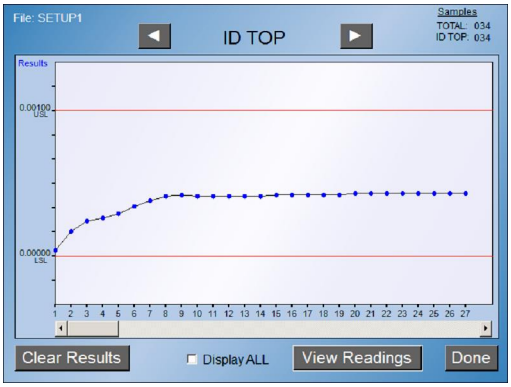


10.2.3 - After loading a Edmunds qualified USB drive into either USB port , data can be offloaded at any time. Touch the DATA OFFLOAD key and the color will change to green if successfully transferred. If the Data offload setup has been correctly chosen and a compatible USB drive installed, the Data Offload key will change momentarily to green. If not the color will be RED and a Offload Error message will momentarily show in a popup menu.

Data offload setup - continued

10.2.4 - The data on the USB drive can be viewed by going to the System Setup menu as previously described. Once in the System Setup menu, touch the RESULTS VIEWER key and all data on the USB drive will show. The data can be viewed in the column format or the chart format.



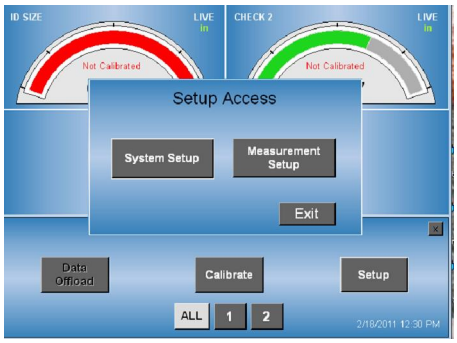


10.2.5 – Offload data format is in a comma delimited text file. A file will be created if it does not already exist. The results records will be appended to the file if it already exists. The name of the file created will be the same as the Setup Name programmed in the AccuTouchTM Setup Database Utilities screen. The default file name is “AccuTouch.txt”

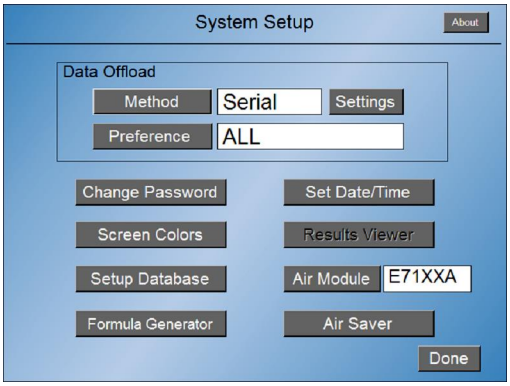
Basic format – (7) features per check:
date,time,check name,upper part limit,lower part limit,actual reading,condition, <CR><LF>

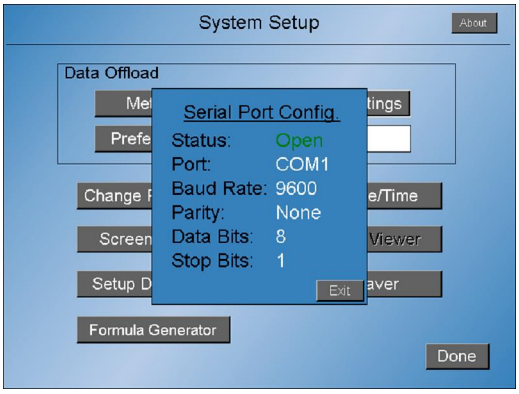
Examples:
One Check setup, system configured to offload ALL checks or Single Viewed
12/29/2009,14:47:19,CHECK 1,0.00100,-0.00100,0.00388,Over<CR><LF>
OR
Two Checks setup, system configured to offload ALL
12/29/2009,14:47:19,CHECK 1,0.00100,-0.00100,0.00388,Over,CHECK 2,0.01000,-0.01000,0.00388,Accept <CR><LF>
OR
Two Checks setup, system configured to offload Single Viewed Check 1
12/29/2009,14:47:19,CHECK 1,0.00100,-0.00100,0.00388,Over,,,,, <CR><LF>
OR
Two Checks setup, system configured to offload Single Viewed Check 2
12/29/2009,14:47:19,,,,,,CHECK 2,0.0100,-0.0100,0.00388,Accept <CR><LF>

Data offload - continued



10.3 – Serial setup – touch the setup software key and a pop-up menu, Setup Access, will display. If password protected, enter password first and then touch System Setup.





10.3.1 - At the top of the System Setup menu there is a Method key to select the type of output. If anything but SERIAL is shown, touch the METHOD key until Serial displays. If Serial already displays touch the Settings key to view the serial communication settings. These settings cannot be changed so the settings on the mating device must be identical to these for communication to be successful.
10.3.2 – Note that a “null” modem 9 pin female x female cable is required to tie this amplifier to the mating device.
10.3.3 – When finished touch the Exit key to close the settings window and touch the DONE software key to exit to the main menu.

Basic format – (4) features per check:
check name,actual reading,units,status,<CR><LF>

Examples:

One Check setup, system configured to offload ALL checks or Single Viewed
CHECK 1,-0.000020,in,Accept,<CR><LF>
OR
Two Checks setup, system configured to offload AL checks
CHECK 1,-0.000020,in, Accept,CHECK 2,-0.000020,in,Under<CR><LF>
OR
Two Checks setup, system configured to offload viewed check (check 1 viewed)
CHECK 1,-0.000020,in,Accept,,,,<CR><LF>
OR
Two Checks setup, system configured to offload viewed check (check 2 viewed)
,,,,CHECK 2,-0.000018,in,Under<CR><LF>

Data offload - continued

10.3.4 - The RS232C serial port provides a path to communicate to external devices such as a Data Collector, Personal Computer (PC), or serial printer. The RS232C male connector is a standard 9-pin “D” style and is located on the back of the Accutouch amplifier. The following pins on the connector are utilized for communications:

Accutouch		Null modem Cable	External Device
Pin 1 =	Chassis Ground.	⟷	Chassis Ground.
Pin 2 =	Receive (RXD)	⟷	(TXD) Transmit.
Pin 3 =	Transmit (TXD)	⟷	(RXD) Receive.
Pin 5 =	Signal Ground	⟷	Signal Ground.

10.3.5 - The Serial Port Parameters on the Accutouch are fixed and as such the external device needs to be configured to the following:

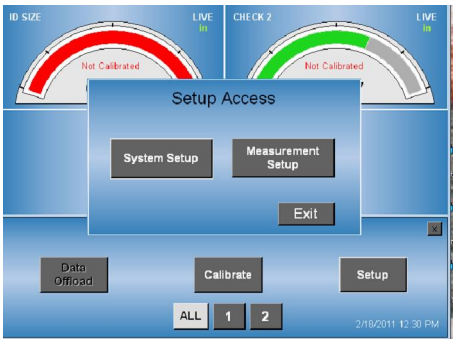
Port #	COM 1
Baud rate	9600
Parity	None
Data Bits	8
Stop Bits	1



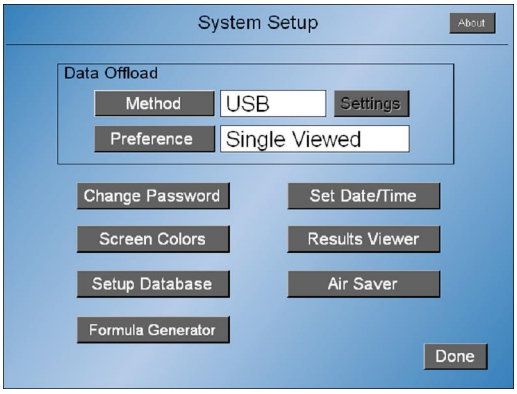
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Reports – section 11

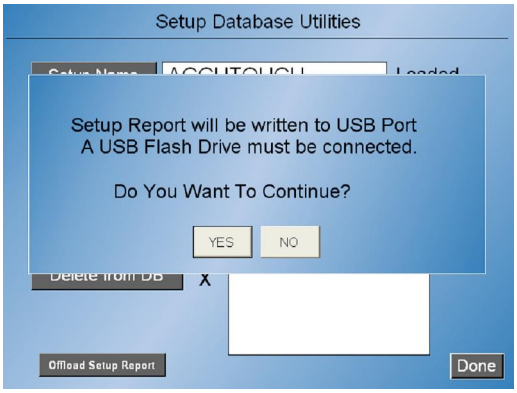
11 – A copy of the complete setup can be offloaded to a USB drive for record purposes.



11.1 – Touch the setup software key and a pop-up menu, Setup Access, will display. If password protected, enter password first and then touch System Setup.



11.2 – Touch the Setup Database software key at the lower left part of the screen. The Setup Database Utilities screen will appear with a Offload Setup Report software key present at the lower left part of the screen



11.3 – Touch the Offload Setup Report key and a popup window will appear confirming the need for the USB drive to be attached. If no drive is available at this time or this feature is not going to be finished, touch the NO key, which will revert back to the Setup Database Utilities screen and exit by touching the Done key twice.

Reports – continued

11.4 – If the report is to be offloaded, ensure the USB drive is installed and touch the YES key. If the drive is recognized and there is not an existing copy, the message will change to “Report Completed Successfully”. Touch the OK key and the Done key twice to exit out.

11.5 - Should the drive not be installed or recognized, an error message will display indicating such. Touch the OK key and exit out by touching the Done key twice until a compatible drive is available.

10.1.6 - If the drive is compatible and installed but a copy already exists, a message indicating such will appear asking if an overwrite is permissible. If so touch the YES key and exit, otherwise touch the NO key and exit. Remove the USB drive and change the existing file name if it is to be retained on the same drive.

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example:

---------- SETUP REPORT ----------

---- Date-Time Printed ----
Date: 3/14/2011
Time: 1:42 PM

---- AccuTouch Unit ----
Serial Number: 0123456
Release Date: 10/06/10
Software Version: 1.5.0.4

---- System Setup ----
Setup Name: DEFAULT
Offload Type: USB
Offload Preference: USB

---- Check Setup ----
Number of Checks: 2

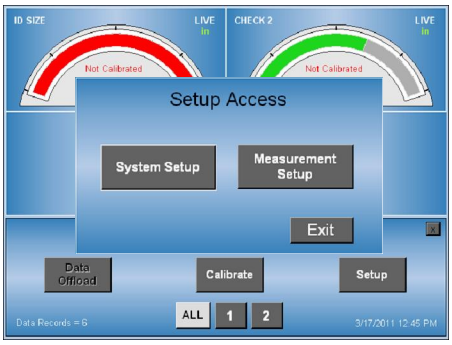
--- Check 1 (CHECK 1) ---
Sensor Type: Electric
Resolution: 5-Decimal
Units: Inch
Description: CHECK 1
Mode: LIVE
Measurement: INPUT (+A)
Nominal: 1.574000
Master 1 Size: 1.575400
Master 2 Size: 0.000000
USL: 1.575350
LSL: 1.574950
Master 2 Enabled: True

--- Check 2 (CHECK 2) ---
Sensor Type: Electric
Resolution: 5-Decimal
Units: Inch
Description: CHECK 2
Mode: LIVE
Measurement: INPUT (+A)
Nominal: 0.000000
Master 1 Size: 0.010000
Master 2 Size: 0.000000
USL: 0.010000
LSL: -0.010000
Master 2 Enabled: True

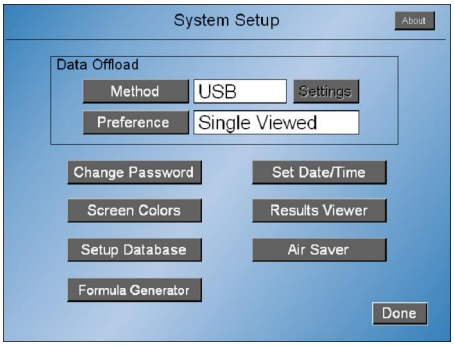
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Utilities section 12 - passwords

12.1 – Password protection – is available to prevent unauthorized changes to be made to the setup. When enabled, the Measurement Setup will only be allowed to be “viewed”. Access to the System setup will be allowed but only the Setup Database and the Results viewer can be accessed. Only loading new setups from the Setup Database is allowed as well as offloading the Setup report. Data on the USB drive can be viewed using the Results Viewer. Data can be offloaded to the USB drive or serial port without entering the password. All other features are protected from change and/or view.
12.1.1 – Touch the Setup software key and Setup Access menu appears.



12.1.2 - Entering a password – As the password has not been enabled yet, touch the System Setup key, System Setup menu displays.

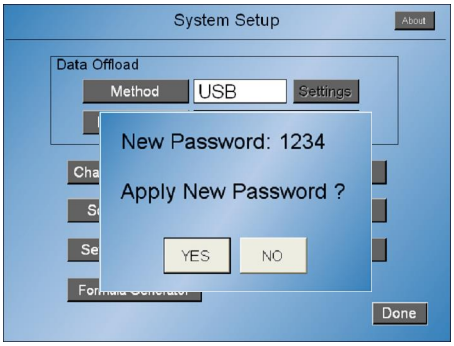


12.1.2.1 – Touch the Change Password key and a software keyboard appears, Enter New Password. Enter a password constructed of up to any (4) alpha numeric characters. A master password can be obtained from Edmunds Gages to override this password should it be lost or forgotten





***Note**- this master password can never be changed so only authorized personnel should have access to it.



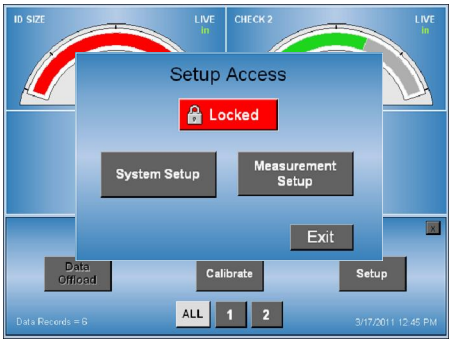
12.1.2.2 – Once the selected password has been entered, touch the DONE key at the lower right hand location on the screen and a popup message will ask if the new password should be enabled. Touch YES to proceed or NO to cancel selection. Touch the DONE key to exit to the main menu.



12.1.3 – Enabling the Password – Touch the Setup key and the Setup Access window will appear showing the Unlocked software key. To enable the password, touch the Unlocked key and a Lock Setup Access popup window question appears. Touch YES key to enable the password or NO key to exit.



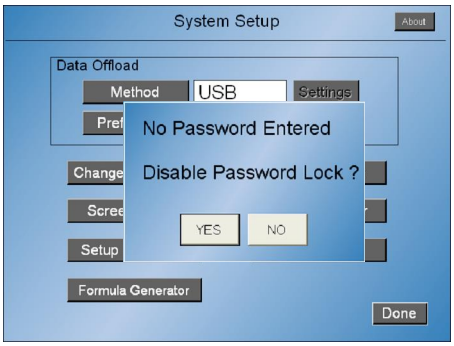
12.1.3.1 – If YES, the UNLOCKED key will now appear as Locked in a red box. Touch the EXIT key to return to the main menu. This action will require the password to be entered until unlocked or cancelled.



12.1.3.2 - If NO, the Unlocked key will remain green and all access is allowed.



12.1.4 – Removing password protection – with the Unlocked key showing, touch the System Setup key and then the Change Password key. With the password showing as in section 11.2.1, touch the "Space" key to delete the password. Touch the Done key and a popup warning message will appear.



12.1.4.1 – Touch the YES key to remove the password protection option. Touch the NO key to cancel and retain the option of enabling it.

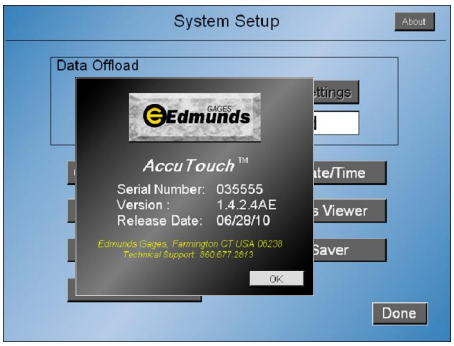
12.1.5 – Removing password protection – with the Locked key showing, touch the Locked key and the Enter Password software keyboard appears. Enter the password or the master password and touch the DONE key when done. The Unlocked key will now appear. Following steps 11.2.1 & 11.2.2, delete the password as required.

Utilities – “ABOUT”

12.2 – “ABOUT” – is the feature that lists the serial number, software version and release date of the operating system loaded on the Accutouch amplifier.
12.2.1 – Touch the Setup software key and Setup Access menu appears.



12.2.2 - Touch the System Setup key, System Setup menu displays, with or without a password enabled.



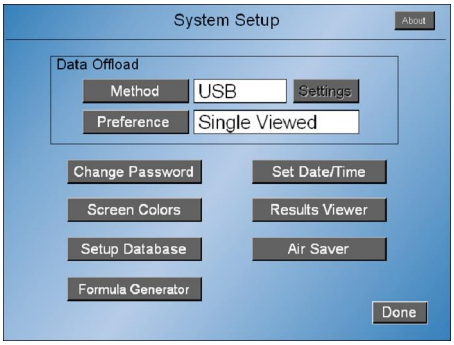
12.2.3 – Touch the ABOUT key located at the upper right hand corner of the screen. A popup window will appear showing the detail of the software. Touch the OK key when review is finished. Touch the DONE key to exit to the main menu.

Utilities – “setting date & time”

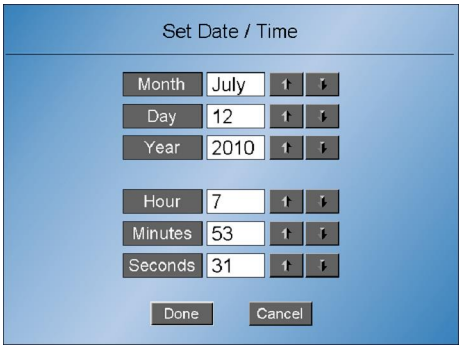
12.3 – Date & Time – can be set or adjusted in the System Setup menu.
12.3.1 – Touch the Setup software key and Setup Access menu appears.



12.3.2 - Enter the password, if required, after touching the Locked key and then the DONE key. Otherwise if not locked touch the System Setup key and the System Setup menu displays.



12.3.3 – Touch the Set Date/Time key located and a popup window will appear showing the Set Date/Time feature.



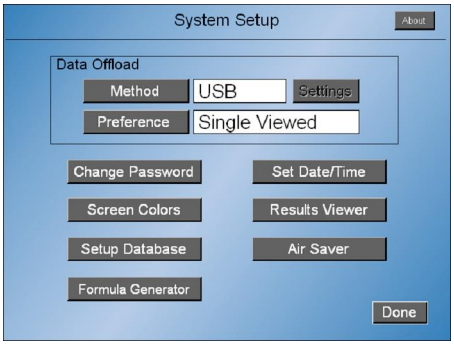
12.3.4 – Touch the arrow keys located at the right of each feature to change. Touch the Done key when finished to save. Touch the Cancel key to delete any changes made. Touch the DONE key to exit to the main menu.

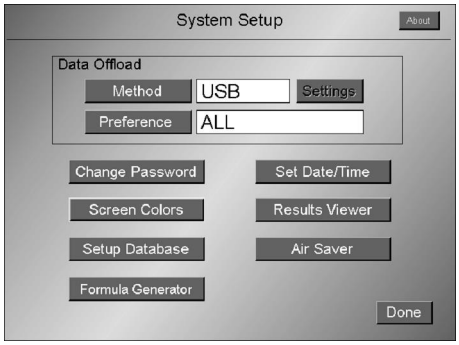
Utilities – “Screen Colors”

12.4 – Screen colors – the background color can be set to either the default blue color or an optional gray in the System Setup menu.
12.4.1 – Touch the Setup software key and Setup Access menu appears.



12.4.2 - Enter the password, if required, after touching the Locked key and then the DONE key. Otherwise if not locked touch the System Setup key and the System Setup menu displays.





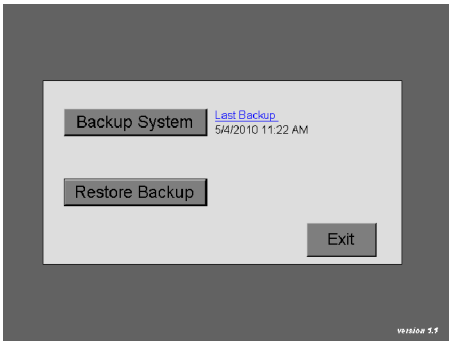
12.4.3 – Touch the Screen colors key and the background color will alternate between the blue and gray colors.

12.4.4 – Touch the Done key when finished to save and exit to the main menu.

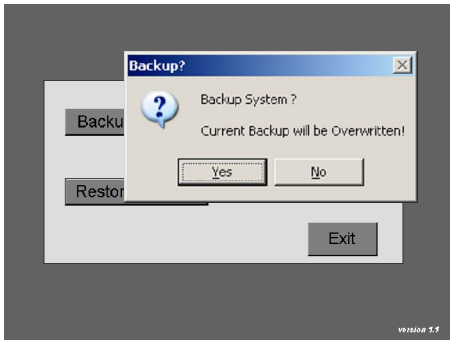
Utilities – backing up

12.5 – The operating system can be backed in the amplifier as a safeguard in case the active version ever becomes corrupted and inoperable. If an issue does arise, the system can be restored by loading a stored copy from memory.
12.5.1 – To utilize this feature, power off and on the amplifier. On power up, as the software is loading, a Backup/Restore Utility-Press Here message will momentarily display. Touch the “press here” message if this feature is to be utilized or ignore allowing the software to fully load. Once touched, the Backup/Restore menu will display.



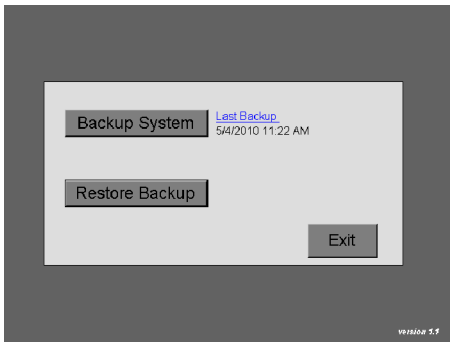


12.5.2 – Backing up – the last time the software was backed up will be listed near the Backup System software key. Touch this key to start the backup process. A Backup warning message will appear providing an opportunity to stop this overwrite of the previous backup stored in memory. Touch the No key to stop the process and return to the Backup/Restore menu.



12.5.2.1 – Touch the Yes key to continue. When complete, a Backup Complete message will appear. Touch the OK software key to return to the Backup/Restore menu.

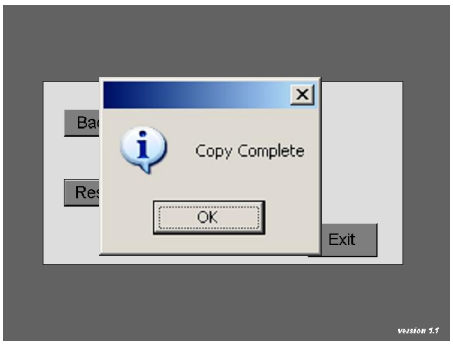




12.5.3 – Restoring backup – Touch this key to start the restore process. A Restore System warning message will appear providing an opportunity to stop this overwrite of the running copy. Touch the No key to stop the process and return to the Backup/Restore menu.



12.5.3.1 – Touch the Yes key to continue. When complete, a Copy Complete message will appear. Touch the OK software key to return to the Backup/Restore menu.



12.5.4 – Touch the Exit software key to allow the amplifier to fully load.

Notes

1.) If “Locked” key appears, touch “Locked” and enter the password. Touch “done” when complete. Obtain password from authorized individual to unlock.
2.) Advanced air settings are available if the air tooling is non-standard or worn. Use only if calibration fails and manual adjustment is correct.
3.) Resolution selected will effect total range available to use for measurement. Air gaging readings will saturate at maximum limits of application, not necessarily as listed. These limits are determined by the actual air gage.

decimal places	**electronic gaging range**	**air gaging range**
2 or 3	+/-.040” max	+/-.004” max
4 or 5	+/-.020” max	+/-.004” max
6	+/-.005” max	+/-.004” max

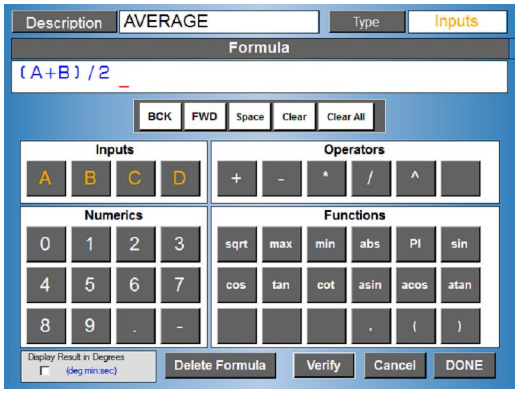
4.) Polarity is always (-) for ID gaging and (+) for OD gaging.

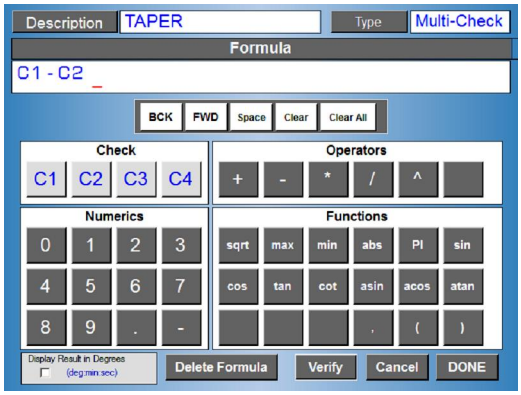


*The ability to apply a polarity to an input allows the result to be commonly displayed, regardless if the surface being measured is an ID of a hole or gap or the OD of a diameter or the distance between two parallel surfaces. As the gage measures the change to the part surface, without the polarity feature the displayed result of one type would be opposite of expected.

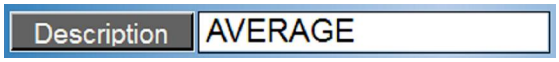
5.) Nominal setup available only on latest version software. Nominal can be the “zero” between the max & min master/part sizes; the “zero” of a single master application or the “zero” size of a non-bilateral tolerance application. Nominal only sets the zero on the display.
6.) Part limits control only the status of the part measurement, good/bad, by displaying the condition and changing the color of the radial bar.
7.) If “zero error” appears, return to manual adjustment procedure and adjust LVDT position closer to nominal master. If air gaging, adjust “zero” screw on docking unit to read Master 1 closer to actual size.
8.) If “mag error” appears, return to manual adjustment and address mechanical issue if electronic gaging. If air gaging, adjust spread closer to actual using “mag” & “zero” screws in docking unit.
9.) “Inactive” message – When looking at the inputs, if the reading from either the air gage of the LVDT does not move more than +/-.000070” within approximately 5 minutes, an “Inactive” message is displayed. This message indicates either the air pressure to the air system is turned off or there is an issue with the LVDT which is not providing a expected voltage input to the amplifier.

Appendix A – Formula Generator



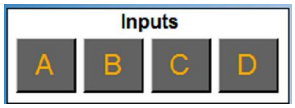


Description: Description of formula – 14 character max.

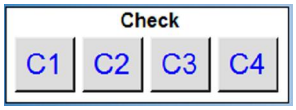


Type: Type can be set to either “Inputs” or “Multi-Check”.

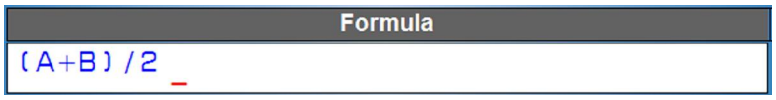
Inputs: If the formula is to be based off sensor (LVDT or Air probe) the type should be set to “Inputs”. When the type is set to “Inputs” selections “A”,”B”,”C”,”D” will be available to enter into the formula.



Multi-Check: If the formula is to be based off previous measurement (Check) the type should be set to “Multi-Check”. When the type is set to “Multi-Check” selections “C1”, “C2”, “C3”, “C4” will be available to enter into the formula. For example if Check #1 and Check #2 measure a shaft diameter at two different points the taper can be calculated by a Multi-Check using the formula as follows: C1 - C2 (Check #1 minus Check #2)



Formula: The formula is a mathematical expression that is used to compute the results and can be assigned to a Check. The formula can contain more than one Input or Check, Operator, Function or combination there of. A formula can be a maximum of 36 characters.

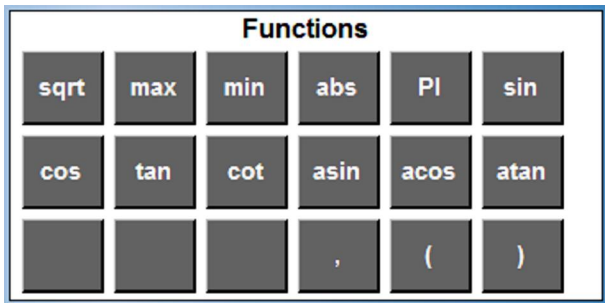


Operators: Mathematical operators that can be used in formula.



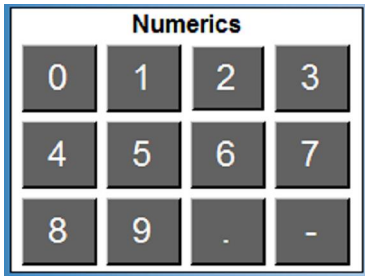
+ : addition
- : subtraction or negative
* : multiplication
/ : division
^ : raise to the power of, example 4^2 = 16

Functions: Mathematical functions that can be used in formula. All functions that return an angle value are in Radians.

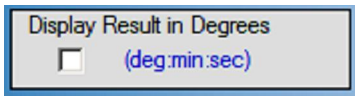


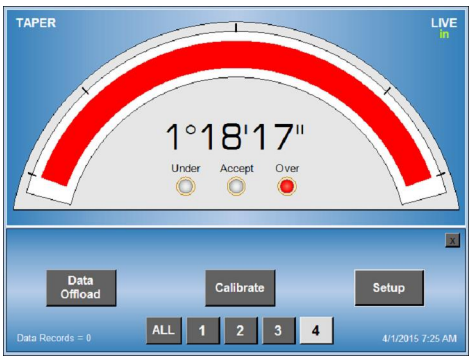
sqrt	: Square Root,	example sqrt(25) = 5
max	: Maximum value,	example max(4,9) = 9 , Max function be used in Multi-Check formula, max(C1,C2) will return greater of C1,C2.
min	: Minimum value,	example max(4,9) = 4 Min function be used in Multi-Check formula, min(C1,C2) will return lesser of C1,C2.
abs	: Absolute Value,	example abs(-3) = 3
PI	: Pi	example Pi = 3.14159 approx.
sin	: Sine	example sin(Pi) = 0
cos	: Cosine	example cos(Pi) = -1
tan	: Tangent	example tan(Pi) = 0
cot	: Cotangent	example cot(1) = 0.642
asin	: arc sine	example asin(1) = 1.570
acos	: arc cosine	example acos(-1) = 3.141
atan	: arc tangent	example atan(0) = 0

Numerics: Numbers that can be used in formula.



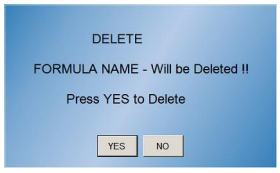
Display Results in Degrees: If the formula has been programmed to return an angle measurement, the results can be displayed in degrees (deg:min:sec) format. If this option is not selected the results will be display as decimal degree. Note that functions will return angle values in radians and will have to be converted to degrees in the formula by multiplying result by (180/Pi).





Delete Formula: Selecting the "Delete Formula" button will delete the current formula. A prompt will be displayed before the formula is deleted for user confirmation.





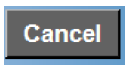
Verify Formula: The formula must be verified before the screen can be closed and the formula saved permanently. Whenever the formula has been changed, the "Verify" button will be highlighted red and the "Done" button will be disabled. The operator will be required to verify the formula by selecting the "Verify" button. If the formula is correct a message will display "Formula Verified". If the formula contains errors, a message will be display "Error In Formula" followed by description of the error.







Cancel: When "Cancel" button is selected the screen will close and any changes from the time the screen was open **will be lost**.



DONE: When "Done" button is selected the screen will close and the formula will be saved.



Definitions

Absolute is the part size displayed as a whole number.

An **A/E (Air to Electric)** transducer converts changes in pneumatic pressure into an electrical signal.

LIVE is a function that displays the reading as a constantly changing value in real time.

A part **Check** is an input or combination of inputs expressed with a gaging mode to exhibit a part characteristic.

Calibration is a procedure used to manually or automatically set the magnification and zero shift for a check by comparing actual gage readings to known certified sizes of a master or masters.

Deviation is the part size displayed as a variation from the nominal or zero size.

A gaging **Formula** allows the user to add, subtract, multiply, or divide inputs from transducers A, B, C, and D.

A **Function** defines how an input or check will be displayed on the readout. Function options are LIVE, +PEAK, -PEAK, & TIR.

The **MAG** setting on the A/E signal conditioning module sets the gain between the max & min sizes

A **Gage** is a mechanical device used to measure part characteristics.

Gage Readings are the input values obtained during the gage cycle.

An **Input** is the assigned name given to a signal that is to be utilized in a check.

An **LVDT (Linear Variable Differential Transformer)** is an electromechanical transducer that converts the linear motion of its contact tip to an DC voltage which can be interpreted by a readout device.

Master 1 (max size) is a precision replica of the part surface to be measured manufactured to the upper specification limit of the part feature.

Master 2 (min size) is a precision replica of the part surface to be measured manufactured to the lower specification limit of the part feature.

A **Multiplier** is part of the check formula. The input reading is multiplied by the this factor. Typically determined by the number of probes used to perform the measurement or (1) if used for pneumatic gaging

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Definitions - continued

Polarity is the (+) or (-) indicator applied to the magnification of an input to correctly display that reading based upon the direction the input value changes.

In **+PEAK** (or **-PEAK)** modes display the largest or smallest size reading seen during the movement of the part after it has been reset.

An **R & R** is a statistical study performed on a gage to determine the gages repeatability and reproducibility.

Repeatability is the measurement variation of a gage when used by one operator or under one set of environmental conditions.

Reproducibility is the variation in measurement averages of a gage when used by more than one operator or under varying environmental conditions.

The **Resolution** of a gage is the smallest significant digit of the measurement data that is displayed.

In **TIR** (Total Indicator Reading) mode the difference between the largest and smallest readings measured is displayed.

A **Zero (or Mean) Master** is a precision replica of the part surface to be measured manufactured to the nominal dimension of the part feature.

Trouble shooting

Error	Common causes
Unit will not turn on	Incorrect supply voltage No supply voltage Blown fuse in Amplifier rear power connector. Fault in Amplifier power switch
Pneumatic mag & zero for air tooling cannot be set	Contamination in A/E docking unit Damaged air tooling or wear on nozzles. Incorrect air supply pressure. Faulty or incorrect setting of the regulator Air leaks in air lines or connections from air tooling to docking unit.
LVDT not responding	Improper connection to amplifier. Faulty LVDT. Input setup incorrect
A/E input not responding	Incorrect or no air supply pressure Faulty regulator Improper connection to docking unit Input setup incorrectly setup.
Gage reads opposite of expect value	Input polarity incorrectly selected.
Bargraph & digital readings off scale high or low	Resolution incorrectly selected Part is out of tolerance/ Incorrect masters for application LVDT mis-adjusted
Bargraph & digital readings indicate out of tolerance condition for good part	Upper & lower LIMITS not set properly Damaged gage tooling
Bargraph not responding in real time	Incorrect mode selected

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