# 100S READOUTS
## FOR TURNING APPLICATIONS


ACU-RITE

REFERENCE MANUAL

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## General



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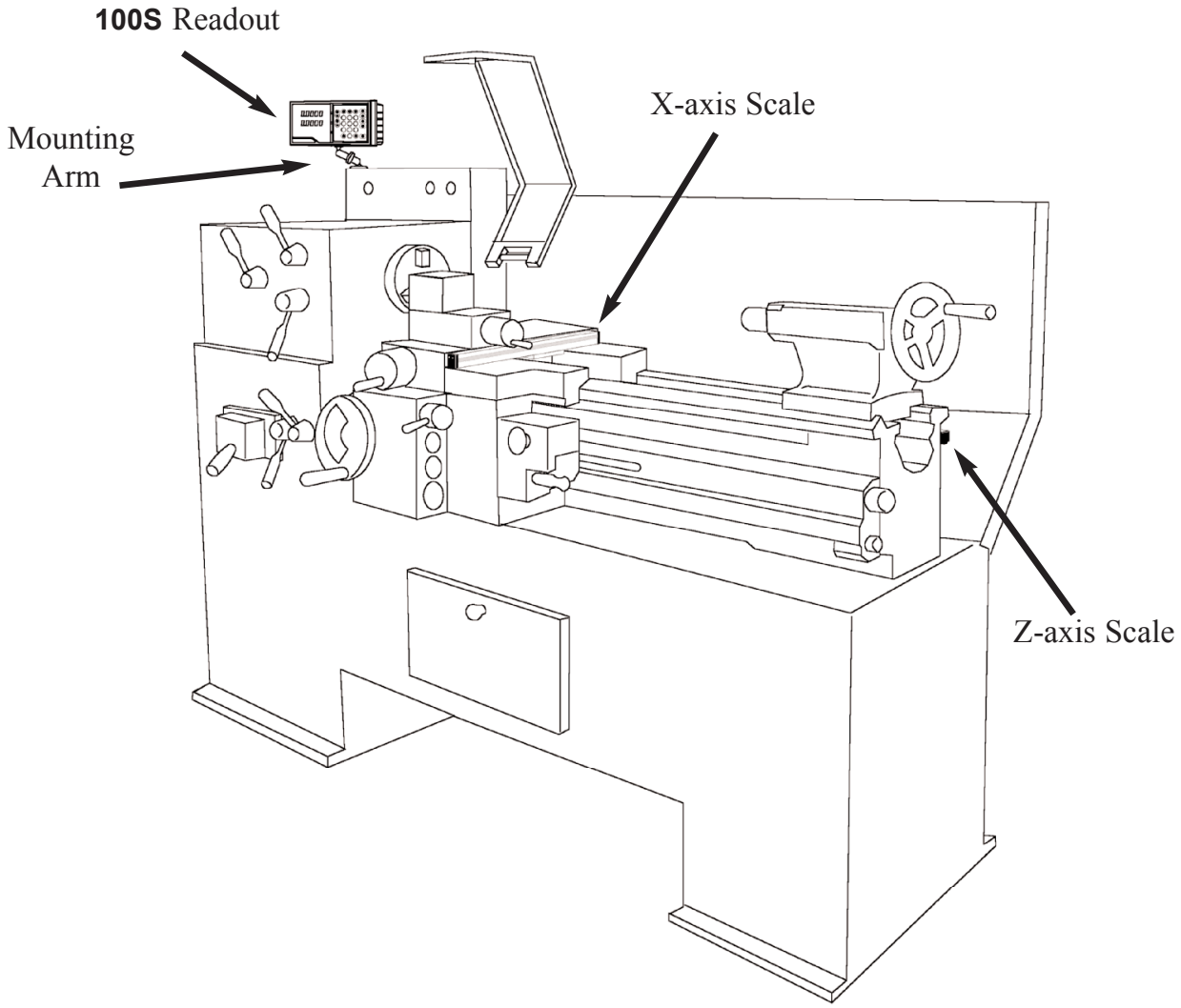
## Reference

## Overview

This manual will guide you through the installation, setup, and operation of the **100S** system. Use it to get your system up and running "out of the box" and as a quick reference guide for your day-to-day operations.

Here's how a typical machine will look after the installation is complete:



# Preparation

## Packing List

Verify that you have received all of the components for your system:

- Readout instructions
- Installation instructions
- Mounting arm
- **ENC 125** scales
  - Cable mounting hardware
  - Scale mounting hardware
- Warranty card

If a component is missing, contact your **100S** distributor immediately for replacement.

## Warranty Records

Complete the warranty card included with your **100S** system.
The readout's catalog and serial numbers are on the back of the display; the scale's catalog number is on the scale assembly label; and the serial number is on the scale case.

Copy the information here for your own records and mail the warranty card as soon as possible.

Distributor: _____

Address: _____

Telephone: _____

| | Catalog No. | Serial No. |
|---|---|---|
| Readout | _____ | _____ |
| Axis #1: | _____ | _____ |
| Axis #2: | _____ | _____ |
| Axis #3: | _____ | _____ |

Date of Purchase: _____

## Installing the Scales

Please see the manual included with the scale for installation instructions.

## Installing the Readout

Follow the readout installation instructions that are included with your mounting arm bracket kit. The electrical specifications for the readout are listed on pg. 28.

## Power Up

Press the switch on the back of the readout to power up the system. A series of tests will check that the display, keypad, and memory are all working properly.

If a problem is detected, an error code will appear on the screen. (Error messages and solutions are listed on pgs. 26 - 27.) It is important to note that the **E1 message** will appear every time you power up your system and does not indicate a problem. It merely indicates that the system had lost power. To acknowledge the message, press the **CLEAR** key and proceed to the DRO mode.

*Note:* If the E1 message appears at any other time during normal operation, refer to pg. 26 for possible problems and solutions.

## Display Saver

When the system is not used for more than 90 minutes, a decimal point will “scroll” across the X-axis display, indicating that the display saver has been activated. The display saver, like a screen saver on a computer monitor, will help prolong the life of your readout.

If the display saver has been activated, press any key on the readout or move any axis to return to the normal DRO view.

## Parameter Setup

There are five to six parameters that you can define on your system:

- Display resolution (diS)
- Linear error compensation (LEC)
- Scale resolution (rES)
- Scale count directions (Ct dir)
- Input 3 ON/OFF (InPUt 3) 2+ units only
- Position Recall (recall)

Establish each setting the first time you power up the system. You can change the parameters later by returning to Setup and then using the **ENTER** key to scroll to the appropriate category.

Anytime you change the linear error compensation, or count direction for an axis, the absolute and incremental displays for that axis will be reset to 0. If you change these settings, you'll need to reestablish the datum point.

When in the Setup mode, use the **CLEAR** key when you want to back-space, restore the previous value or access the previous parameter.

## Display Resolution

The display resolution determines how detailed each scale's position will be displayed on the readout. Use the setting that best suits each job.

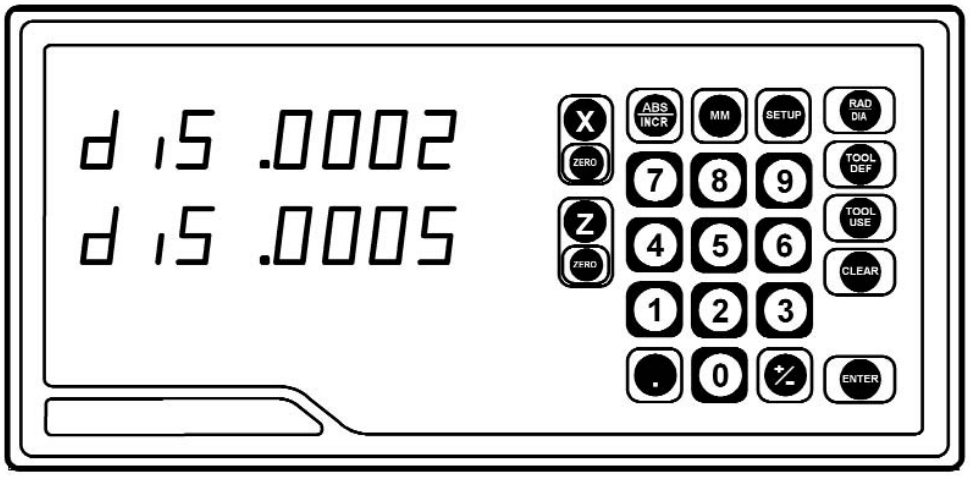
To change the display resolution:

- Press the **SETUP** key. ("diS" will show on the display.)

- Press the **X** or **Z** key for the display you want to change.

  For 10µm scales, the display resolution will toggle between 0.01 mm (0.0005") and 0.02 mm (0.001"). For 5µm scales, it will toggle between 0.005 mm (0.0002") and 0.01 mm (0.0005"). For 1µm scales, it will toggle between 0.001 mm (0.00005") and 0.002 mm (0.0001").

- After you complete setting your display resolution, press **ENTER** to continue with setup or press **ENTER** then **SETUP** to return to the normal DRO display.



## Linear Error Compensation

With **100S**, you can compensate for machine tool wear. If you know the linear error compensation (LEC) value in parts-per-million (PPM), you can enter it directly.

If you don't know the LEC, use the formula on the next page to determine the value for each axis.

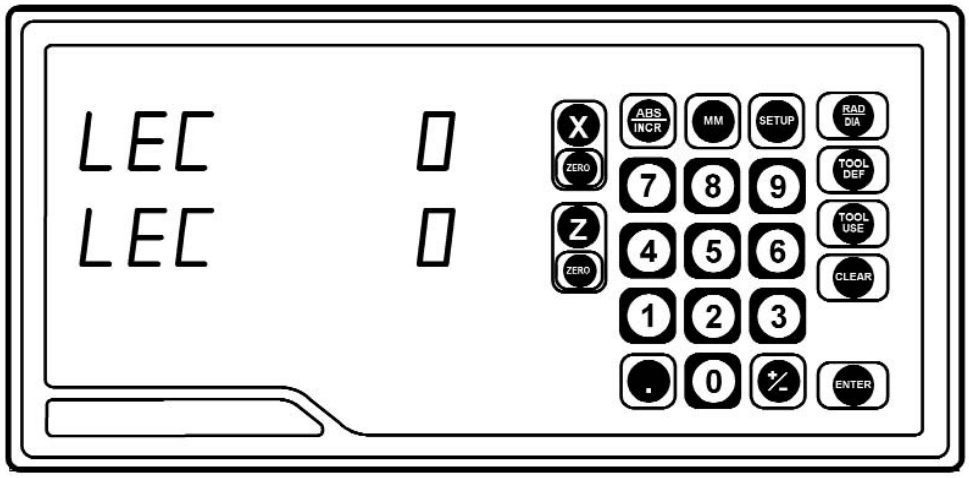
To change the linear error compensation:

- Move to the "Linear Error Compensation" display in the Setup mode. (Press **SETUP** and then the **ENTER** key until "LEC" appears).

- Press the **X** or **Z** key for the axis you want to change. **100S** will display the current LEC value for that axis.

- Using the keypad, enter the linear error compensation factor (in PPM), followed by the ± key for negative values. The number must be within -9999 and 9999 (use whole numbers). The formula for calculating the value is on the next page.

- After you complete setting your LEC, press **ENTER** to continue with setup or press **ENTER** then **SETUP** to return to the normal DRO display.



## How to Determine the Linear Error Compensation

Follow this procedure for each axis:

- In the DRO mode.
- Place a standard of known length on the machine. Make sure it's parallel with the axis being measured.
- Put the readout in the absolute display mode (**ABS/INCR** key).
- Using an indicator, locate one end of the standard.
- Press the **ZERO** key twice for the axis you are measuring. "0" should appear on the display.
- Move the indicator along the axis until it reaches the opposite end of the standard.
- Write down the length that is shown on the readout display for that axis.
- Use the formula below to calculate the LEC for the axis you just measured. Enter the result in the LEC parameter (previous page).

*Note:* If the measured length is greater than the standard length the LEC value will be negative.

### Formula

S = Standard length
M = Measured length

$$LEC = \left( \frac{S - M}{M} \right) \times 1{,}000{,}000$$

### Example

If the length of the standard you used is 10" and the measured length is 9.995", then the LEC for that axis is 500 parts-per-million (PPM).

$$LEC = \left( \frac{10 - 9.995}{9.995} \right) \times 1{,}000{,}000$$

$$LEC = 500 \text{ PPM}$$

(rounded to the nearest whole number)

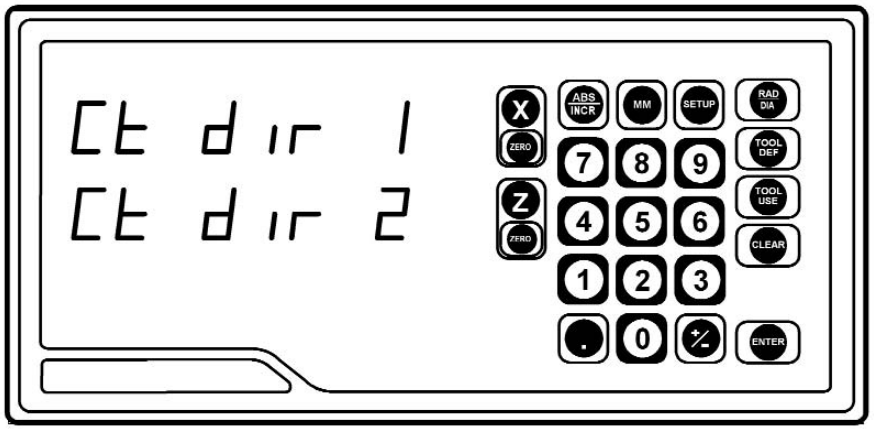
## Count Direction

Use the count direction setting to define the positive counting direction for each scale. The direction will be displayed as a “1” or a “2” (the numbers are not assigned to a particular direction). You only need to change the count direction if the scale is counting in the negative direction during a positive move, or vice versa.

Refer to Conventions on pg. 32 for more guidelines.

To change the count direction:

- Move to the “Count Direction” display in the Setup mode. (Press **SETUP** and then the **ENTER** key until “Ct dir” appears).
- Press the appropriate axis key (**X** or **Z**). The current count direction (1 or 2) will appear.
- After you complete setting your count direction, press **ENTER** to continue with setup or press **ENTER** then **SETUP** to return to the normal DRO display.



## Scale Resolution

To ensure accurate readings, the scale resolution shown for each axis must correspond with the resolution of the scales on your machine.

To change the scale resolution:

- If necessary, choose "Scale Resolution" from the Setup menu. (Press **SETUP** and then the **ENTER** key until the screen appears).
- Press the appropriate axis key (X, Y or Z) until the appropriate resolution appears. Choose 0.01 mm for 10µm (0.0005") scales, 0.005 mm for 5µm (0.0002") and 0.001 mm for 1µm (0.00005")scales.
- Repeat the procedure for each axis.
- Press **ENTER** to continue with Setup.

## Input 3 On/Off (2+ units only)

This parameter allows you to activate the third input. When this input is enabled, Inputs 2 and 3 will be coupled on the Z-axis (both scales will count on the Z-axis). The Input 3 scale must have the same scale resolution as the Input 2 scale.

When Input 3 is enabled, additional parameters will need to be setup. Refer to the procedures on pages 6-8 for setting up the Linear Error Compensation and Count Direction Setup functions.

## Position Recall

- Set this parameter to the ON position to store the last position of each axis when power is turned off.

## Testing the Scales

Follow these steps to confirm that the scale has been installed properly. The Counting Test will confirm the scale's electrical operation, and the Repeatability Test will check the installation integrity.

### Counting Test

- Move the table along each axis, one at a time. Check that the readout correctly displays the table's movement. If it doesn't, then the scale resolution you selected may not be accurate. Refer to Scale Resolution, pg. 9.

### Repeatability Test

- Locate a magnetic base and dial indicator on the end of the scale. Zero the readout and the indicator.

- Move the axis through the full travel and return the dial to "0." The readout should also read 0 (±0.0005" for 10µm scales; ±0.0002" for 5µm scales; ±0.00005" for 1µm scales). If it doesn't, then the scale cable may be loose, or the scale, mounting bracket, or reading head may need to be tightened or realigned.

- Repeat these steps for each scale.

## Power On Position Recovery

With the **100S** there are two means of position recovery, Position Recall and Reference Mark Evaluation.

## Position Recall

When this feature is active (see setup parameters) the last displayed position is stored in memory when power is lost or turned off. When power is restored, the stored position is recalled and displayed.

Note: *Any movement that occurs while power is off will be lost. Whenever power has been off it is recommended that you re-establish workpiece datums using the Reference Mark Evaluation procedure below).*

## Reference Mark Evaluation

**ENC 125** encoders contain internal reference marks, approximately 4" apart along the length of the encoder. These marks enable you to easily re-locate your correct position after a power interruption. You relocate your position, relative to the last established datums, by traversing across one reference mark on each encoder. You must find a convenient reference mark on each encoder prior to establishing your datums, and then use those same marks during the evaluation procedure, after a power interruption, to re-establish your position relative to your datums.

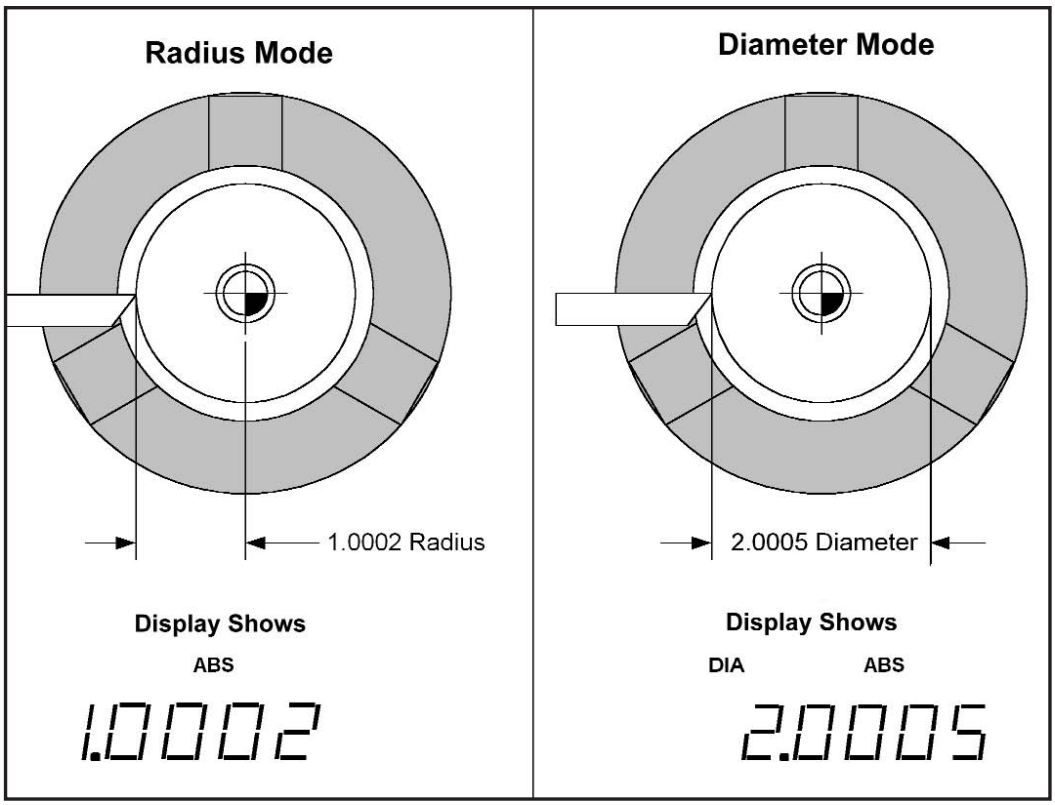
To perform Reference Mark Evaluation:

- Move near the appropriate reference mark.
- Press and hold the **DECIMAL** key until the decimal points on the displays start to flash
- Move slowly past the reference mark until the readout recalls its position.
- Repeat for each axis.

## Radius and Diameter

Pressing the **RAD/DIA** key lets you view the X-axis dimension either as a radius or as a diameter.

Display resolution is affected by the **RAD/DIA** key.



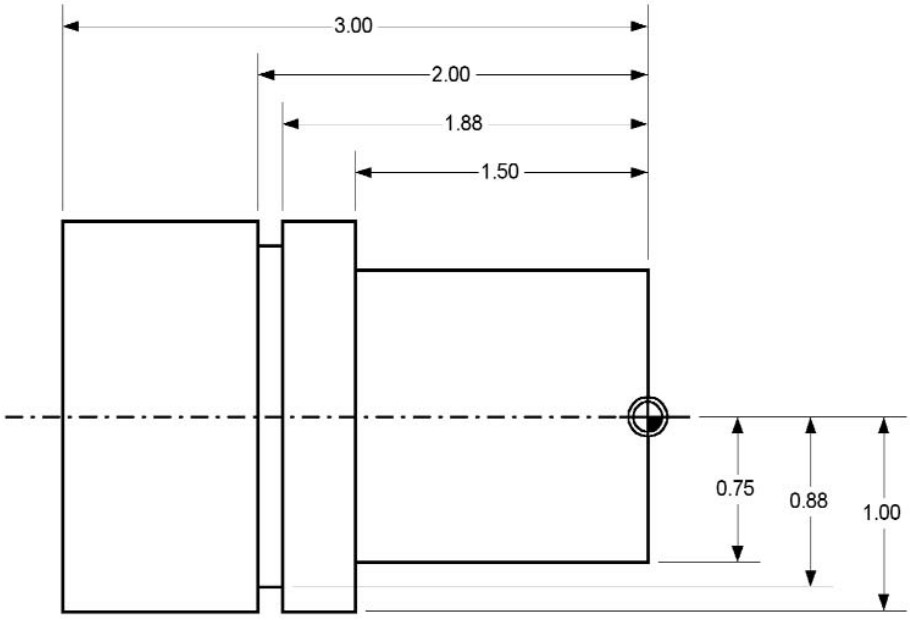
## Setting the Datum (Absolute Zero)

**100S** allows you to measure both absolute and incremental dimensions. A dimension measured from the point you define as the datum is an absolute dimension. A dimension measured from any other point on your print is an incremental dimension.

Datum, also known as absolute zero or workpiece zero, is the reference point from which **100S** will base all of your part's coordinates. When the readout is in the ABS mode, it is actually measuring the distance from the datum to the machine axis' current position.

You will need to establish a datum for every job. Your datum may already be identified on your print; if it isn't, then establish a datum that allows you to measure most of your part's dimensions directly, with the least number of calculations.

All of the dimensions in the drawing below are based from the datum.



To set the datum at the tool's current position:

- Position the workpiece in the chuck. Move the tool until it is positioned at the location where you would like to establish the datum.

- Using the **ABS/INCR** key, select the absolute (ABS) mode.

- Press the X-axis **ZERO** key twice to establish the current X-axis position as the datum. Repeat for the Z-axis.

To set the datum using an offset:

- Using the **ABS/INCR** key, select the absolute (ABS) mode. Also check that the proper measurement (inch or mm) is selected.

- Using **RAD/DIA** key, select the Radius mode.

- Move the tool to a known point, i.e. the outside diameter of the workpiece or the face of the workpiece.

- Press the **ZERO** key once for the axis (X or Z) for which you are entering a dimension.

- Using the keypad, enter the distance from your tool's current location to the point you want to establish as the datum. Include a decimal point (.) and minus (-) sign when necessary.

- Press the **ZERO** key for the other axis, or press **ENTER** to return to the DRO display.

## Example:
## Setting Up Your Job

1. Place your workpiece into the chuck.

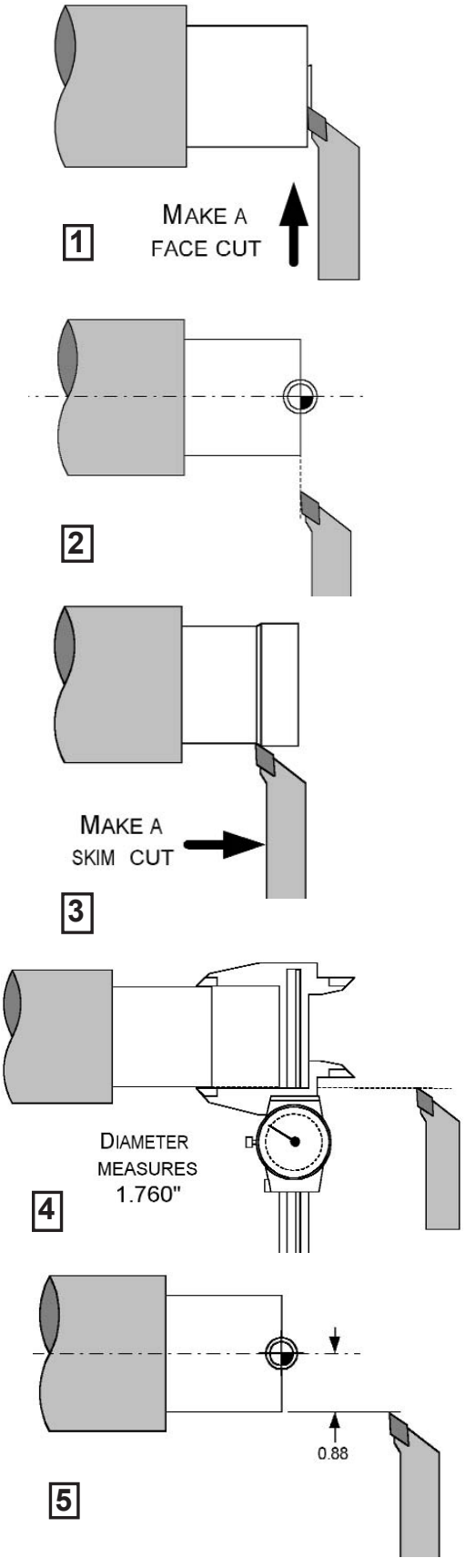
2. Make a face cut and clear the work piece by backing the tool off in the X-axis only. Do not move the Z-axis. (Fig. 1)

3. Zero the Z-axis by pressing the Z-zero key twice. (Fig. 2)

4. Make a skim cut on the diameter of the workpiece and clear the work-piece by backing the tool away in the Z-axis. Do not move the X-axis. (Fig. 3)

5. Measure the diameter of the work-piece. (Fig. 4)

6. Press the X-axis zero key once, then using the keypad, press the **RAD/DIA** key to select diameter and enter the diameter of the workpiece, then press **ENTER**. (Fig. 5)



## Incremental Dimensions

As we described earlier, incremental dimensions are measured from the current tool position. If your tool is currently at 2” and you want to move an additional 3.125”, you would select the incremental mode, zero out the axis, and move the axis until the display reads 3.125.

An example of how to measure using incremental dimensions is shown on the next page.

To use an incremental dimension:

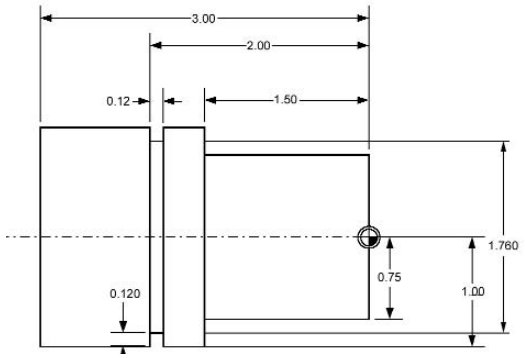
- Move the machine axis to the point from where you want to measure an incremental distance.
- Use the **ABS/INCR** key to select the incremental (INCR) mode on the readout. Also check that the proper measurement (inch or mm) is selected.
- Press the **ZERO** key below the axis(es) from which you are measuring.
- Move the machine axis. **100S** will display the machine axis’ position in relation to the incremental “0” point(s) for the axis(es) you chose.

After you have reached the position you want and have machined the part, you can “zero” each axis again and then measure from that location to the next point on your workpiece or press **ABS/INCR** to return to the absolute mode.

# Example: Incremental Dimensions

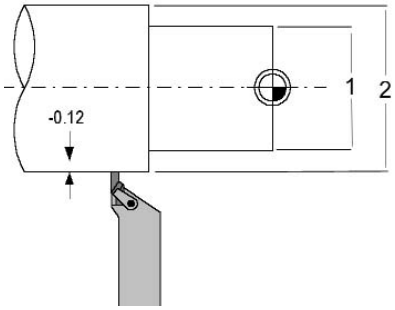
Let's say that your print looks like this:

## Using Incremental Zero



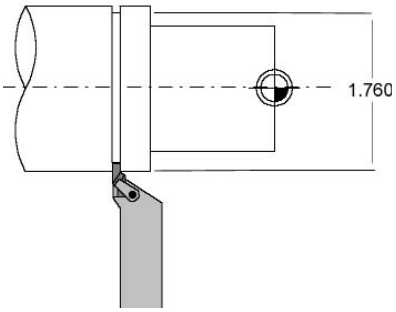

In order to cut a groove to a depth of 0.120" from the 1" radius, it is necessary to establish a zero at 1". This can be done using the incremental mode without changing the Datum. Follow these steps:

1. Ensure you are in RAD mode (DIA LED will be off).
2. Move the tool until the readout display shows that the X-axis = 1.0000" and the Z-axis = 2.0000" in the absolute mode.
3. Press the **ABS/INCR** key to switch to the incremental mode.
4. Press the X-axis **ZERO** and the Z-axis **ZERO** keys.
5. Begin cutting until the X-axis reads -0.1200".




## Using Incremental Dimension Presets

In addition to setting incremental zero at the current tool position, you can also preset the incremental zero from the current tool position. Enter the distance and direction you wish to move in relation to your current position. Follow these steps:




1. Ensure the DIA LED is off
2. Move the tool until the readout display shows that the X-axis = 1.000" and the Z-axis = 2.0000" in the absolute mode.
3. Press the **ABS/INCR** to switch to the incremental mode.
4. Press the **X** key ensure the INCR LED is lit and press the following key sequence: **- . 1 2 ENTER**.
5. The X-axis display will show 0.1200".
6. Begin cutting until the X-axis reads 0.0000".

## Using Absolute Dimension Presets

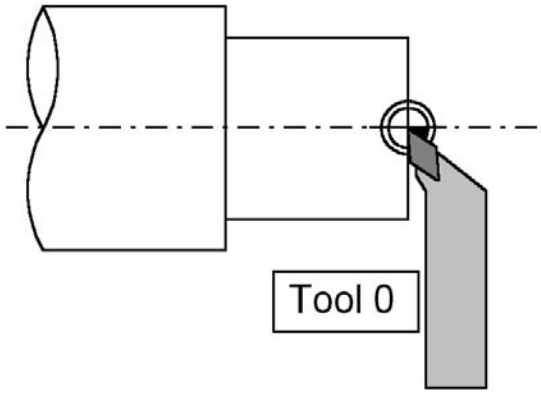
You can also preset an absolute dimension from the current tool position. Enter the distance and direction you wish to move in relation to your current position. Follow these steps:

1. Move the tool away from the workpiece.
2. Press the **ABS/INCR** to switch to the incremental mode and ensure the diameter LED is on.
3. Press the **X key,** ensure the ABS LED is lit and press the following key sequence: **1.760, ENTER**.
4. Press Z key, ensure the ABS LED is lit and press the following key sequence: **2.0, ENTER**.
5. To begin cutting, move Z to 0, then move X to 0.

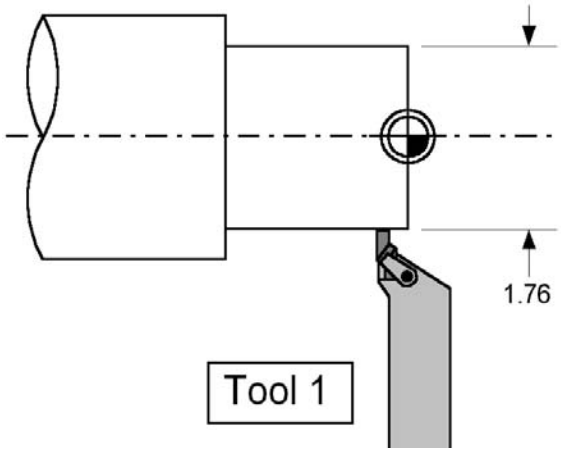
## Tool Offset

The **100S** can store the dimensional offset of an additional tool. This allows you to use two tools without having to reestablish zero as you change between them. In order for this feature to work, the tools must be able to repeat their location when they are changed (Repeatable tooling). To use this feature you must first select the tool number (either 0 or 1).

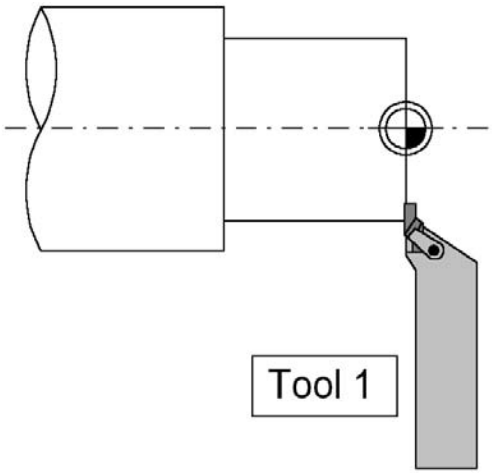
1. Place your first tool in the tool holder.
2. Press the **TOOL USE** key.
3. Press **0** to select the first tool, then press **ENTER**.
4. Set the Datum (Absolute Zero) for all axes using this tool. See page 13.




5. Change the tool to the second tool you will be using.
6. Press **TOOL USE** and enter the number **1** for the second tool.
7. Touch this tool to a diameter of known size.

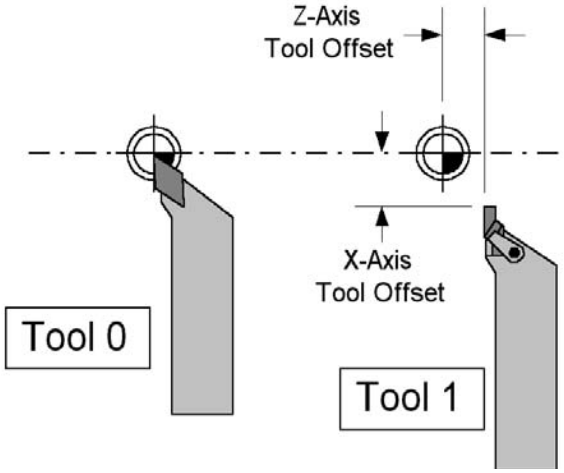



8. Press the **TOOL DEF** key and press the **X** key.
9. Press the **RAD/DIA** key to select diameter if not already selected.
10. Enter the known diameter. Press **ENTER**.




11. Move the tool so that it touches a face of known length.
12. Press the **TOOL DEF** key and press the **Z** key.
13. Enter 0 if the tool is at Datum or enter the distance the tool is from Datum by using the **±** key if the tool is in the negative direction. Press **ENTER**.

*Note*: Both tools are now set. To switch between them, change the tool on your lathe, then press the **TOOL USE** key, and select the appropriate tool number.



## Troubleshooting Introduction

Refer to this troubleshooting guide whenever you have questions or concerns about the operation of your **100S** system.

This guide is arranged in three columns entitled Symptom, Probable Cause and Recommended Corrective Action. The symptoms are listed in the order of the most common, easiest to check, and least expensive to correct.

First locate the symptom that best describes the problem you are trying to solve. Then identify the probable cause that most closely matches the problem and implement the recommended corrective action.

If a problem persists or cannot be resolved using this manual, contact your **100S** distributor for further assistance.

| Symptom | Probable Cause | Recommended Corrective Action |
|---|---|---|
| **Screen is blank** | No power to the readout | Check that the power switch on the back of the console is "on."<br><br>Check that the readout's power cord is properly connected to the power supply.<br><br>Check the fuse. (Located below the power switch).<br><br>Check that the power source meets the specifications required by your system (pg. 28). |
| | LED failure | Contact your **100S** distributor for repair/ replacement procedures. |
| **Decimal point scrolls across display** | System has been idle for approximately 90 minutes and is in "display saver"mode | Press any key or move the cross slide to return to the previous screen. |
| **Dashes appear on screen** | Display overflow | The value entered exceeds the display's 8-character capability. Enter a value with less than 8 characters.<br><br>*(cont'd next page)* |

| Symptom | Probable Cause | Recommended Corrective Action |
|---|---|---|
| **Dashes appear on screen** *(cont'd)* | Display overflow | Move the axis toward the "0" position. As the scale counts down, the display will show the correct position. |
| **Error message (E1) appears** | Power loss occurred | This is a normal message at power up. If the message appears at any other time during operation, a problem may have occurred. Refer to pg. 26 for details. |
| **Error messages (E2-E56) appear** | Causes vary | Turn the system "off" and then "on" again, using the switch on the back of the readout. If an error (besides E1) is still detected when the system is powered up, contact your **100S** distributor for repair/replacement procedures. Refer to pgs. 26 - 27 for a list of error messages. |
| **Keys not working properly** | Invalid key press | Turn the system "off" and then "on" again, using the switch on the back of the readout. If an error (besides E1) is detected when the system is powered up, contact your **100S** distributor for repair/replacement procedures. Refer to pg. 26-27 for a list of error messages. |

| Symptom | Probable Cause | Recommended Corrective Action |
|---|---|---|
| **Scale won't count** | Loose cable | Check that the scale cable is securely connected to the readout. |
| | Wrong input | Check that the scale cable is connected to the correct input on the back of the readout. |
| | Scale not installed properly | Check the scale and reading head for proper installation (refer to scale installation instructions). |
| | The scale's reading head is not working properly | Unplug the scale from the readout and plug it into an input for another axis. If the scale still does not count, the reading head may need to be replaced. If the scale counts on the other axis then the display may need to be replaced. See LED Failure. |
| **Scale counts, but not correctly** | Wrong count direction | Change the count direction (pg. 8). |
| | Scale not installed properly | Check the scale and reading head for proper installation (refer to scale installation instructions). Clean the scale, if necessary. |

| Symptom | Probable Cause | Recommended Corrective Action |
|---|---|---|
| **Setup does not save values** | Improper procedure | Press the **ENTER** key after each parameter value is entered. If you press another key instead, the new value may not be saved. Refer to pgs. 4 - 10 for proper procedures. |
| **Numbers don't appear/are faded on the display** | LED failure | Turn the system "off" and then "on" again, using the switch on the back of the readout. If this does not correct the problem, contact your **100S** distributor for repair/replacement procedures. |

## Error Messages (General)

When **100S** is powered up, it will run a series of tests to ensure that the software is working properly. If an error message appears, refer to the charts below for a diagnosis and solution.

| | |
|---|---|
| **E1** | A power loss has occurred. This message will appear every time you power up the system and can be cleared by pressing the **CLEAR** key. If the E1 message appears at any time other than at power up, a power interruption has occurred and your current position may be lost. Re-establish the datum if necessary. If the problem persists, contact your distributor for repair/replacement procedures. |
| **E2** | An EEPROM memory error has occurred. Press the **CLEAR** key to acknowledge the error. The datum and setup information may be lost. These areas should be checked and reestablished upon power up. If the problem persists, contact your distributor for repair/replacement procedures. |
| **E3** | A ROM memory error has occurred. Press the **CLEAR** key to acknowledge the error. If the system does not operate properly, contact your **100S** distributor for repair/replacement procedures. |
| **E4** | A random access memory (RAM) error has occurred. Press the **CLEAR** key to acknowledge the error. If the system does not operate properly, contact your **100S** distributor for repair/replacement procedures. |
| **E9** | A scale miscount error (invalid waveform) has occurred. The E9 message will appear on the axis that has the error. Press **CLEAR** to reset the axis(es). Your current position may be lost. Re-establish the datum if necessary. If the system does not operate properly, contact your **100S** distributor for repair/replacement procedures. |

## Error Messages (Keypad Test)

The messages below indicate that a problem was found during the keypad test at startup. If an error message appears, turn the system off, press the appropriate key to release it back into position, and then restart the system. (Or you can press the **CLEAR** key to clear the error message.) If the key does not work during normal operation, contact your distributor for repair/replacement procedures.

| | | | |
|---|---|---|---|
| **E11** | **SETUP** key | **E35** | **5** key |
| **E12** | **RAD/DIA** key | **E36** | **4** key |
| **E15** | **MM** key | **E38** | **Z** key |
| **E16** | **ABS/INCR** key | **E41** | **3** key |
| **E18** | **X** key | **E45** | **2** key |
| **E21** | **9** key | **E46** | **1** key |
| **E22** | **TOOL DEF** key | **E48** | **ZERO** key for the Z-axis |
| **E25** | **8** key | **E51** | **±** key |
| **E26** | **7** key | **E54** | **ENTER** key |
| **E28** | **ZERO** key for the X-axis | **E55** | **0** key |
| **E31** | **6** key | **E56** | **Decimal point (.)** key |
| **E32** | **TOOL USE** key | | |
| **E33** | **CLEAR** key | | |

## Electrical Specifications

Follow these specifications when installing your **100S** system.

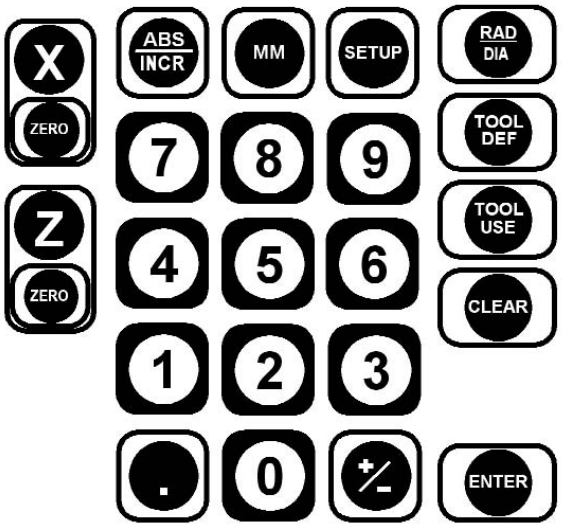
| Characteristic | Specification |
|---|---|
| Operating conditions | 0° to 40°C (32° to 104°F)<br>25% to 85% relative humidity<br>(non-condensing) |
| Storage conditions | -40° to 60°C (-40° to 140°F)<br>25% to 85% relative humidity<br>(non-condensing) |
| Input requirements:<br>Voltage<br>Frequency<br>Current | <br>100 - 240 V~<br>50 - 60Hz<br>25 VA max |
| Fuse | 500mA, slo-blo |
| Encoder input | Position signals: channels A & B<br>TTL square wave signal in quadrature<br>(90° nominal phase relationship)<br>Maximum input rate: 70 kHz |
| Size | 9.875” x 4.679” x 4.75” |
| Weight | 4 lbs., 2 oz. |
| Mounting | Bottom; two 1/4”-20 threaded inserts |
| FCC compliance | This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. |
| CE compliance | For Europe |
| ETL compliance<br>ETLc compliance | For United States<br>For Canada |

## Factory Default Settings

| | |
|---|---|
| **Display Resolution** | (0.0005"/0.01 mm for 10µm scale) |
| **Linear Error Compensation** | 0 parts per million |
| **Count Direction** | 1 |
| **Scale Resolution** | 10µm |
| **Input 3** | Off |
| **Position Recall** | Off |
| **Tool Offset** | Tool 1 X = 0 , Z = 0<br>Tool 0 X = 0 , Z = 0 |
| **Display Units** | Inches |
| **Display Mode** | ABS (absolute dimensions) |
| **Radius/Diameter** | Radius |

## Keypad

Here's an overview of the **100S** keypad. Each key's function is described below.




| | |
|---|---|
| **X, Z** | Correspond with the scales on the X-,and Z-axes. Used to specify a change to a particular axis. |
| **ZERO** | These keys reset the incremental or absolute display position at "0" for the corresponding axis. |
| **ABS/INCR** | Used to switch between absolute (ABS) and incremental (INCR) measurements. The active mode will be displayed at the top of the DRO display. |
| **MM** | Press this key to switch the **X** and **Z** displays between English and metric units. |
| **SETUP** | Provides access to the display resolution, linear error compensation and scale count direction. |
| **RAD/DIA** | Used to switch between radius (RAD) and diameter (DIA) dimensions. The DIA indicator will light up when diameter is displayed. |

| | |
|---|---|
| **TOOL DEF** | Used to establish tool offset. |
| **TOOL USE** | To establish which tool offset will be used. |
| **CLEAR** | Acts as backspace key during numeric entry; otherwise, it clears or cancels the last operation. |
| **ENTER** | Completes numeric operations; selects next parameter in SETUP. |
| **±** | Changes the sign of the entered value from positive (+) to negative (-) or vice versa. Numbers are positive unless a (-) appears in front of them. |
| **.** | Decimal point can be used during numeric entry. This is also used to initiate a reference mark evaluation. |
| **0-9** | Used to enter a distance. |

## Conventions

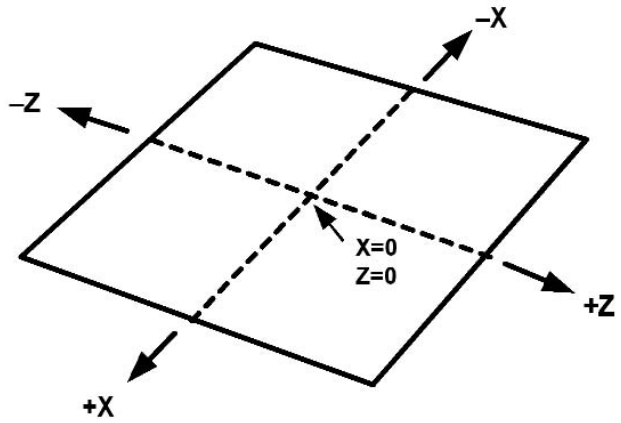
This section identifies the standard conventions that apply to your **100S** system.

### Count Direction

**100S** uses positive and negative numbers to display the position of the tool along each axis. The graphic below shows a typical setup for the positive and negative count directions for the X-and Z-axes on a lathe. All of the examples in this manual are based upon this setup.

**X-axis:**
The axis will move away from the center for a positive count direction.

**Z-axis:**
The axis will move away from the spindle for a positive count direction.



# Warranty

ACU-RITE Companies, Inc. Products and accessories are warranted against defects in material and workmanship for a period of three (3) years from the date of purchase. ACU-RITE will, at its option and expense, repair or replace any part of the ACU-RITE product that fails to meet this warranty. This warranty covers both materials and factory labor. In addition, authorized ACU-RITE service representatives will provide service labor (field service) for a period of one (1) year at no charge. Notice of the claimed defect must be received by ACU-RITE within the warranty period.

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**ACU-RITE Readout Systems are manufactured in the USA**

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