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Always Committed to Quality Technology & Innovation

**ES-3 DRO Counter
Operation Manual**

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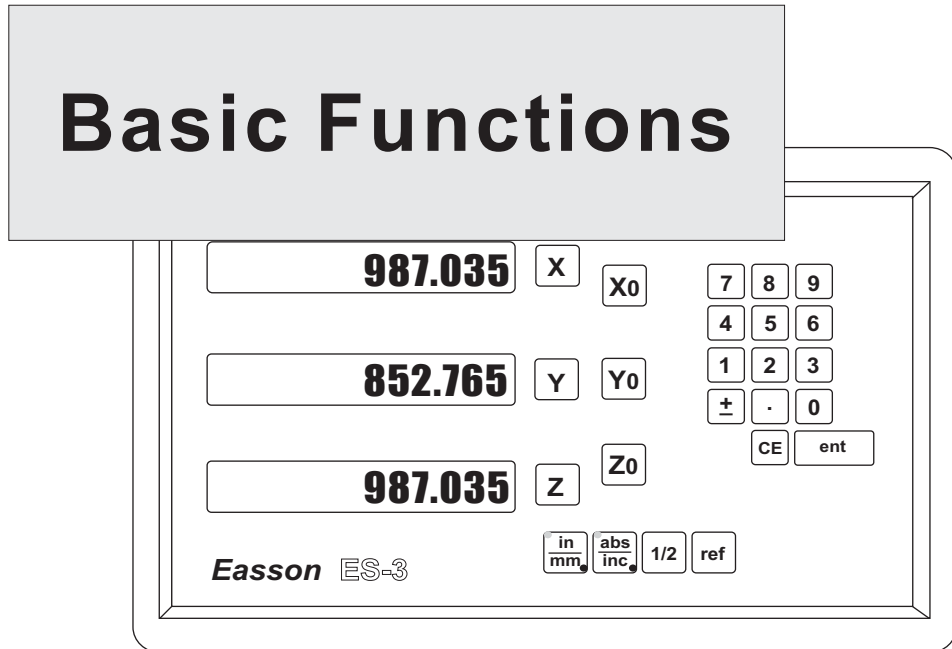
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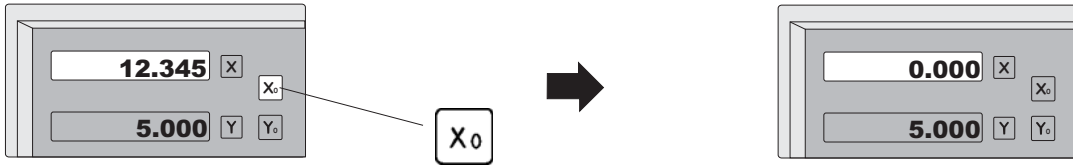
Basic Functions



Set Display to Zero

Purpose : Set the current position for that axis to zero

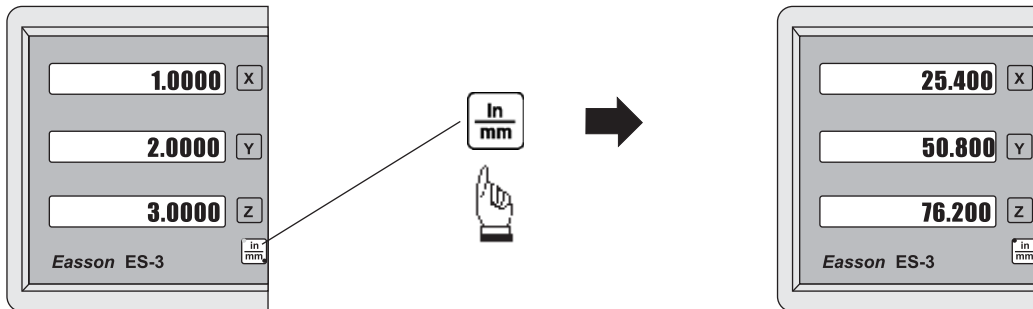
Example : To set the current **X Axis** position to zero



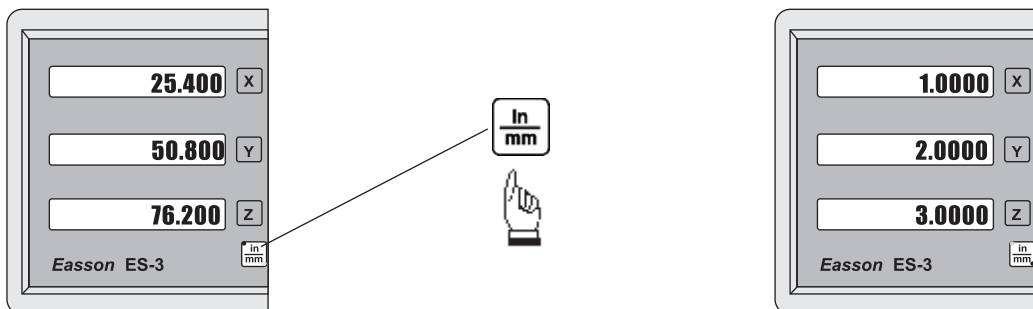
Inch / Metric Display Conversion

Purpose : Switches between inch and metric display

Example 1 : Currently in **inch** display, to switch to **metric** display



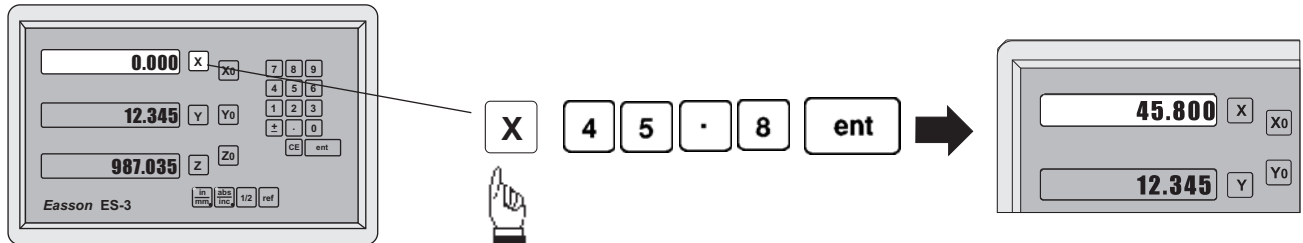
Example 2 : Currently in **metric** display, to switch to **inch** display



Enter Dimensions

Purpose : Set the current position for that axis to an entered Dimension

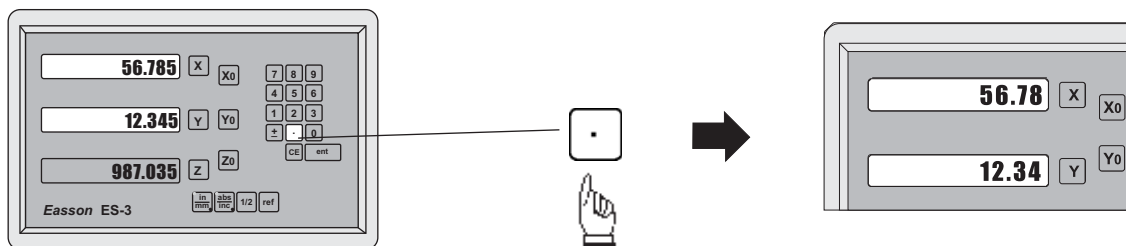
Example : To set the current **X Axis** position to **45.800 mm**



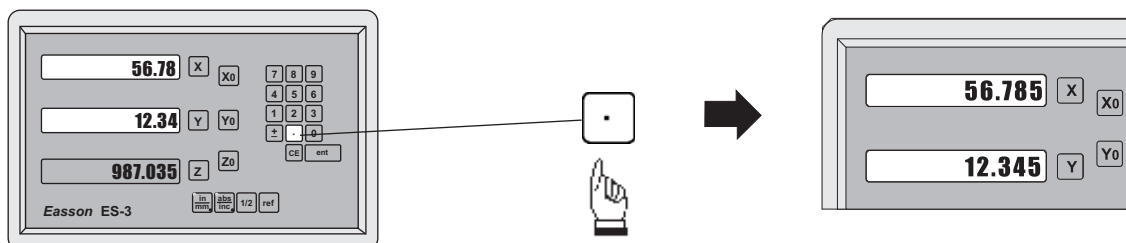
0.005 / 0.01 resolution display switches

Purpose : Switches between 0.005mm/(0.0002") and 0.01mm(0.0004") resolution display

Example 1 : Currently in 0.005mm display resolution, to switch to 0.01mm display resolution



Example 2 : Currently in 0.01mm display resolution, to switch to 0.005mm display resolution



ABS / INC Coordinates display switches

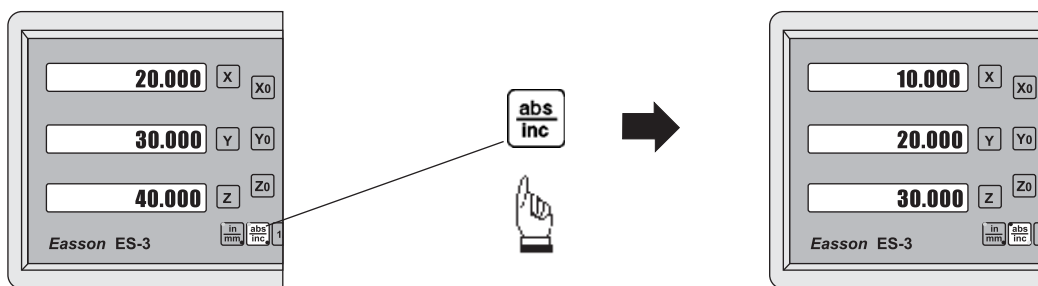
Purpose : ES-3 provides two sets of basic coordinate display, they are **ABS** (absolute) and **INC** (incremental) displays.

During machining operations, the operator can *store the work piece datum (zero position) in ABS coordinate, then switch to INC coordinate to continue machining operations.*

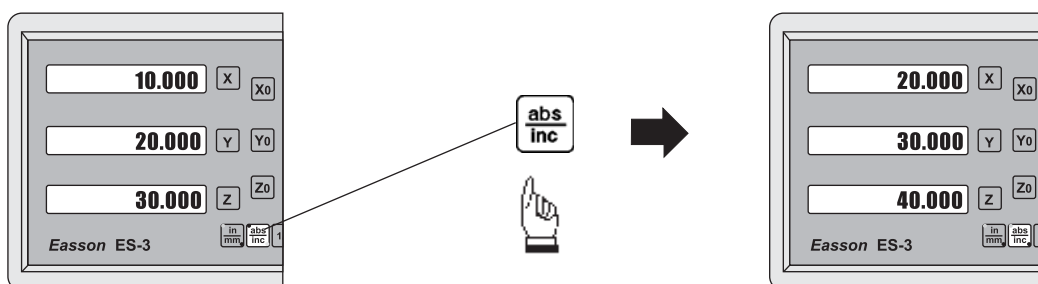
The operator is then free to zero the axes or preset any dimensions into any axis in INC coordinate for relative position machining. The work piece datum (work piece zero position) is still retained in ABS coordinate by the ES-3.

Operator can then toggle between ABS (absolute) and INC (incremental) coordinates without losing the work piece datum (work piece zero position).

Example 1 : Currently in **ABS** display coordinate, to switch to **INC** display coordinate



Example 2 : Currently in **INC** display coordinate, to switch to **ABS** display coordinate

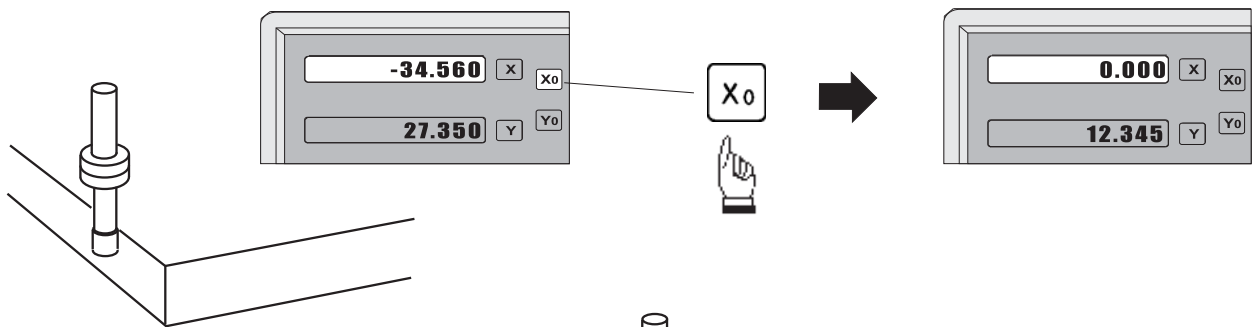


Centre-find

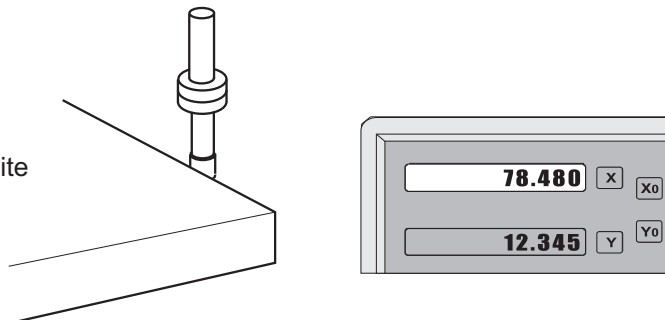
Purpose : ES-3 provides the centre-find function by halving the current display coordinate, so that the zero point of the work piece is located at the centre of the work piece.

Example : To set the X Axis zero point at the centre of the work piece.

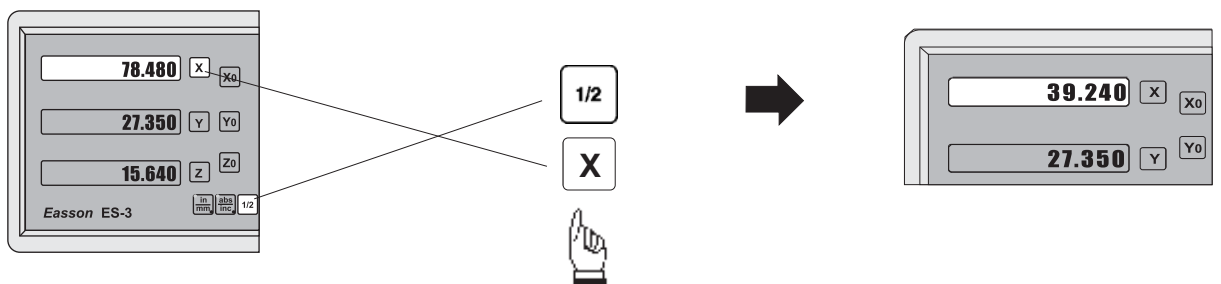
Step 1 : Locate the edge finder at one end of the work piece, then zero the X Axis.



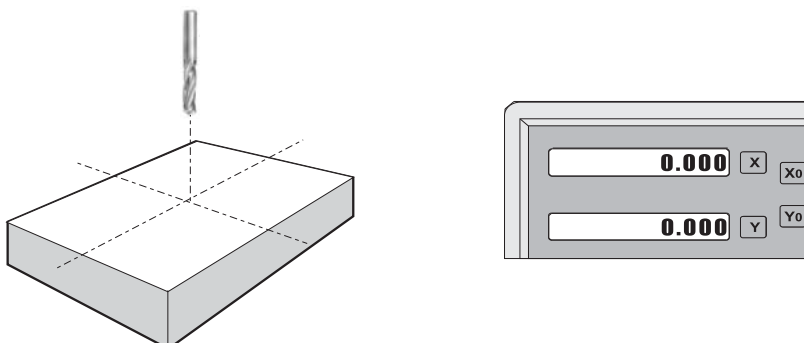
Step 2 : Locate the edge finder at the opposite end of the work piece.



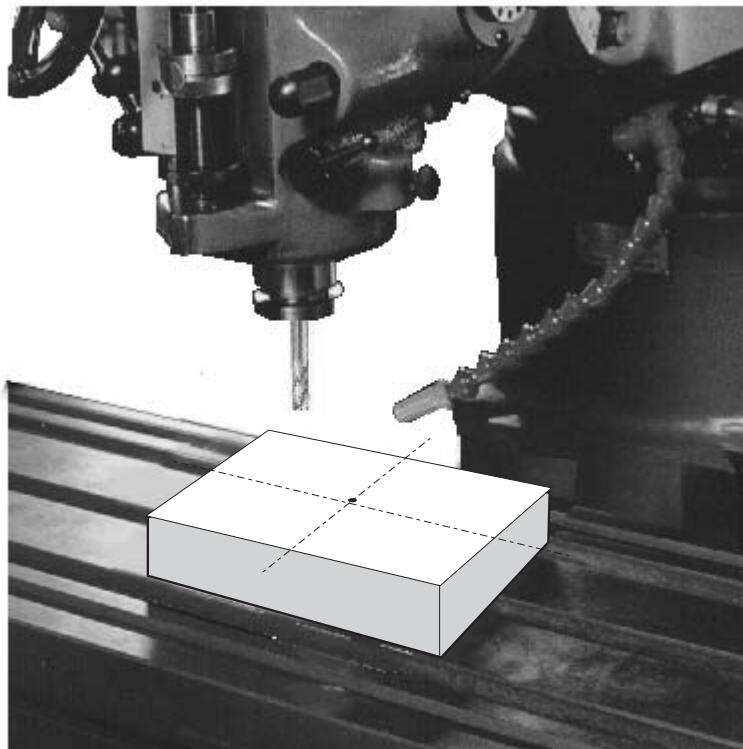
Step 3 : Then half the display coordinate using centre-find function as per follows:



Now the X Axis zero point (0.000) is located at the X centre of the work piece.



ref datum memory



ref datum memory function

function : During the daily machining process, it is very common that the machining cannot be completed within one working shift, and hence the DRO has to be switched off, or less commonly, a power failure occurs whilst machining which leads to loss of the work piece datum (work piece zero position). The re-establishment of work piece datum using edge finder or other method inevitably introduces machining inaccuracies, because it is not possible to re-establish the work piece datum exactly at the previous position.

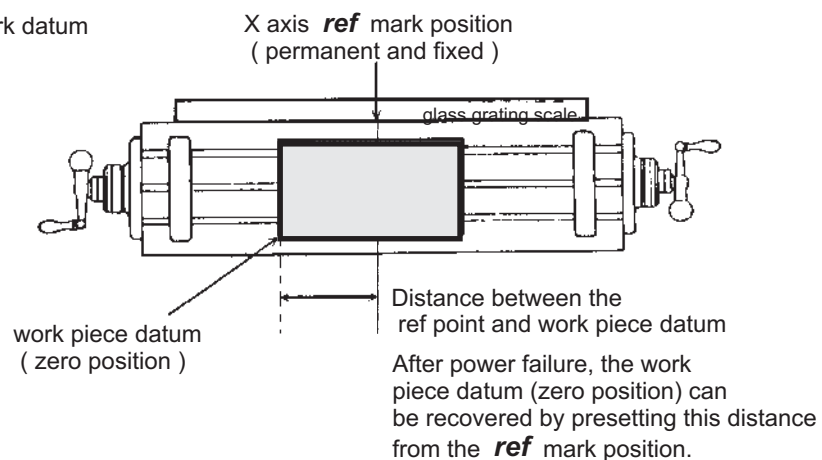
To allow the recovery of work piece datum very accurately, with no need to re-establish the work piece datum using an edge finder or other methods, every transducer has a reference point location to provide a datum point memory function.

The working principal of the *ref* datum memory function is as follows.

- There are a permanent and fixed mark (position) on the transducer, normally called *ref* mark or *ref* point..

Since this *ref* point position is permanent and fixed, it will never change or disappear when the DRO system is switched off. Therefore, we simply need to store the distance between the *ref* point and the work piece datum (zero position) in DRO's memory. Then, in case of the power failure or the ES-2 being switched off, we can recover the work piece datum (zero position) by presetting the display zero position as the stored distance from the *ref* point.

Example : to store the X axis work datum



Operation : ES-3 provides one of the most easy-to-use *ref* datum memory function.

There is no need to store the relative distance between the *ref* mark and your work datum zero into the ES-3, whenever you alter the zero position of ABS coordinate, such as by zeroing, centre find, coordinate preset or etc., ES-3 will automatically store the relative distance between ABS zero and the *ref* mark location into ES-3's memory.

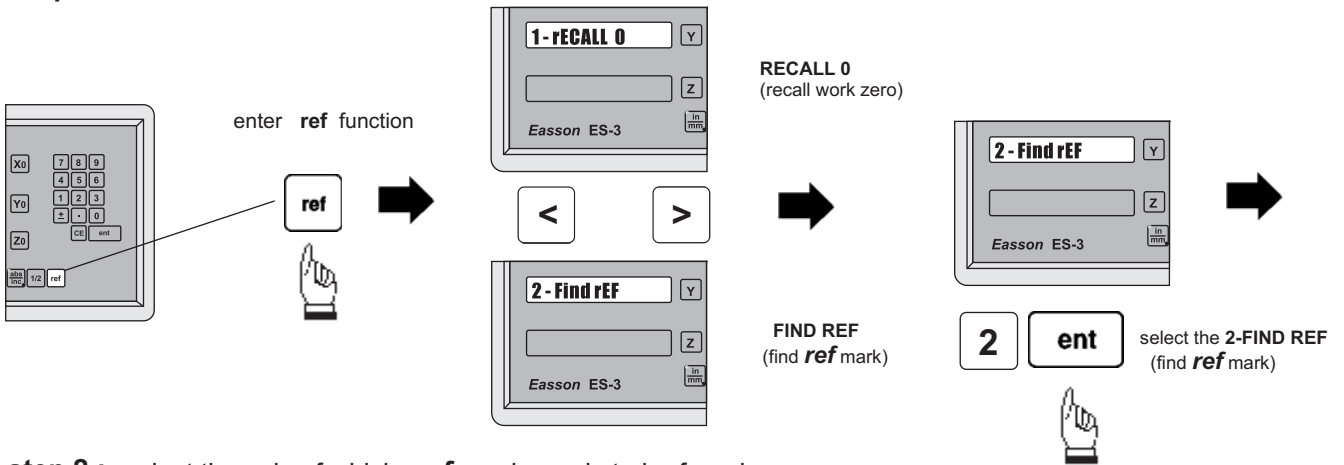
In daily operation, operator simply needs to locate the *ref* mark position whenever they switch on the ES-3 to let it know where the *ref* mark position is, then ES-3 will automatically do the work datum storage on its' own . In the case of a power failure or the ES-3 being switched off, the operator can recover the work piece datum easily by using the **RECALL 0** procedure.

Find the scale's *ref* mark position (FIND REF)

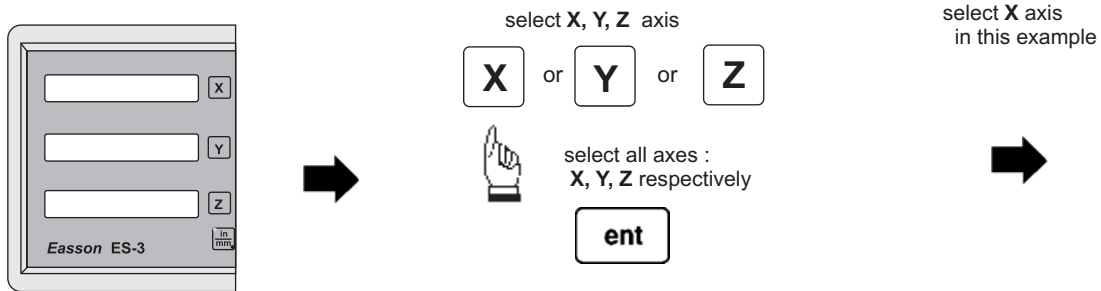
function : In ref datum memory function, the **ES-3** will automatically store the relative distance between the *ref* mark position and the work piece datum (zero position) whenever the operator alter the **ABS** zero position, such as zeroing, centre find, co-ordinate preset or etc...

Therefore, the **ES-3** needs to store the *ref* mark position prior to any machining operation. So that the loss of the work piece datum (zero position) is avoided during any accidental or unexpected events, such as power failure or etc.. it is recommend that the operator finds the *ref* mark position using the (**FIND REF**) function whenever he switches on the **ES-3**.

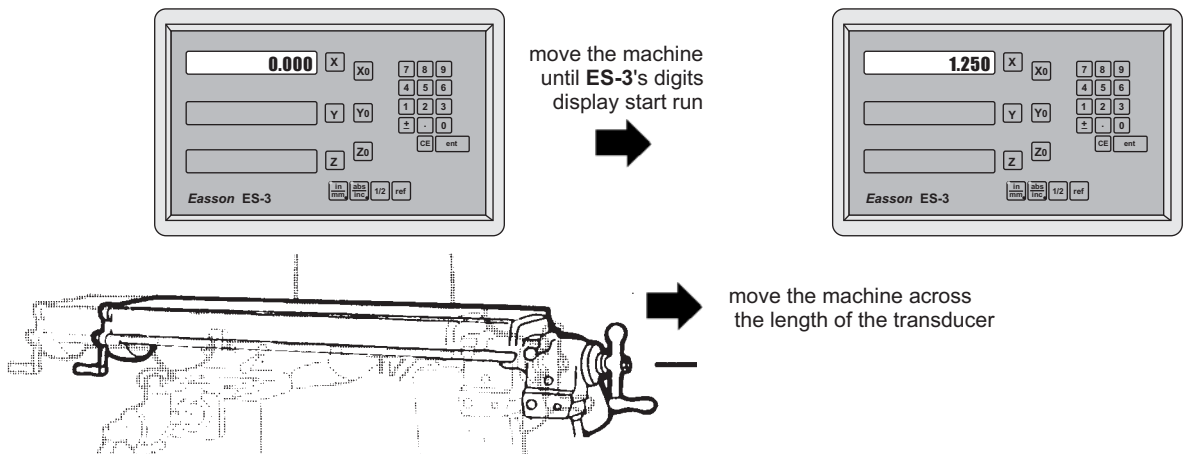
step 1 : To enter the ref function, select the **FIND REF** (find *ref* mark)



step 2 : select the axis of which *ref* mark needs to be found



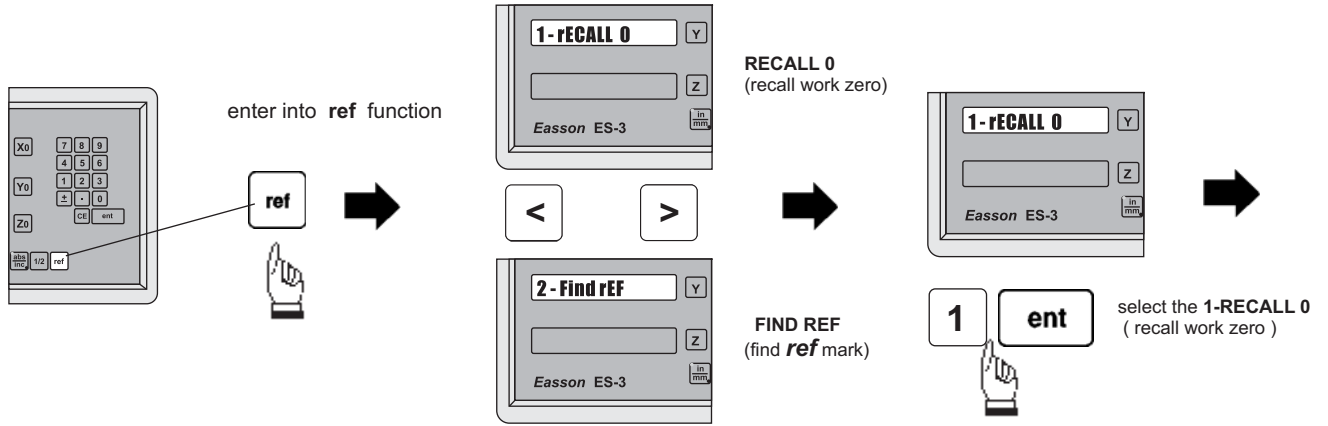
step 3 : move the machine reader head across the length of the transducer until digits display in ES-3 start to count.



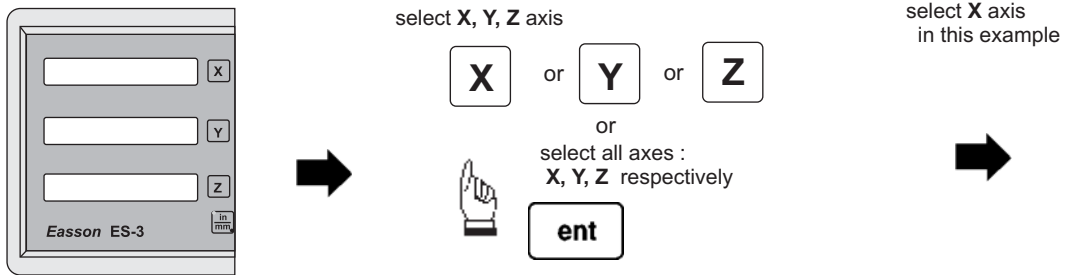
Recall the work datum zero (**RECALL 0**)

function : If the ref point is lost for any reason, the work piece datum can be recovered by **RECALL 0** function as follows:.

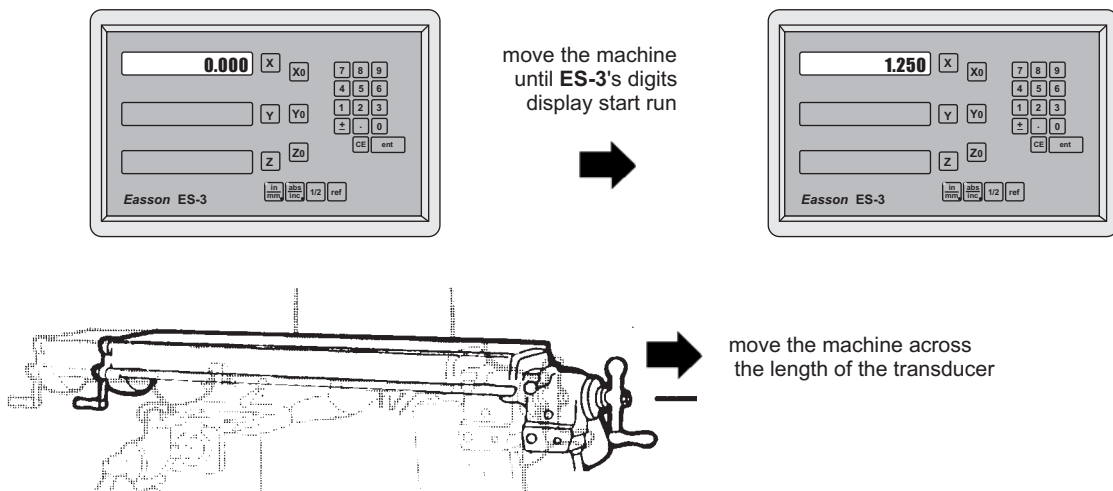
step 1 : enter into the **ref** function, select the **RECALL 0** (recall work piece zero)



step 2 : select the axis of which work datum (zero position) needed to be recovered

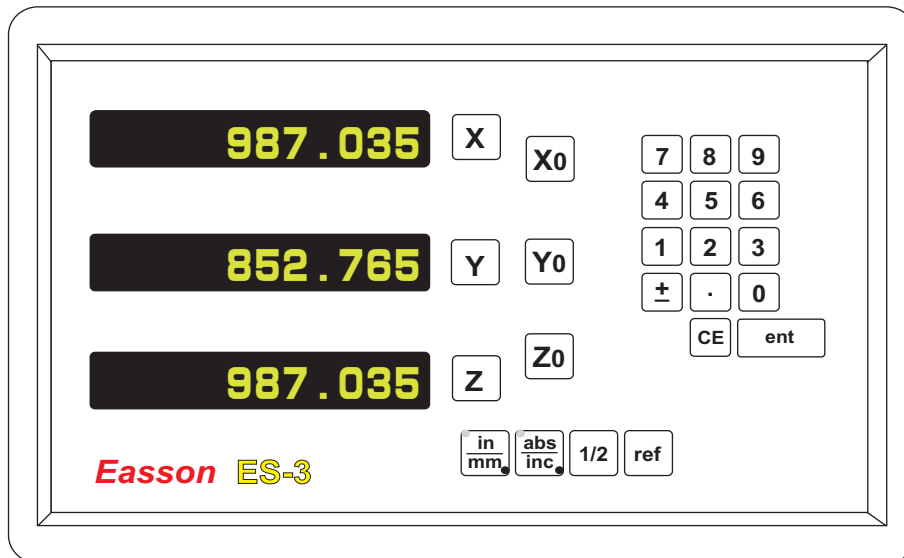


step 3 : move the machine across the length of the transducer until the **ES-3** display starts to count, then the work piece datum is recovered

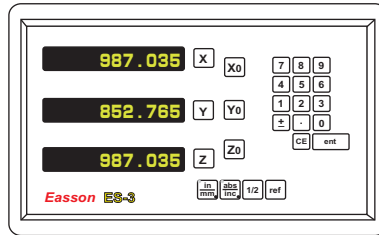


ES-3

Digital Readout Setup Function



ES-3 ORIGINAL PARAMETER RESET FUNCTION

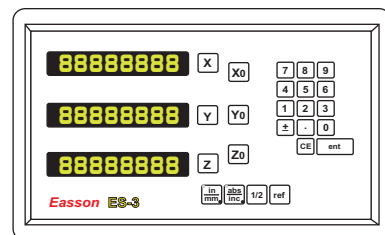


Some inscrutable cases or improper operations cause the chaos of parameter, then you need to initialize the parameter to reset the system.

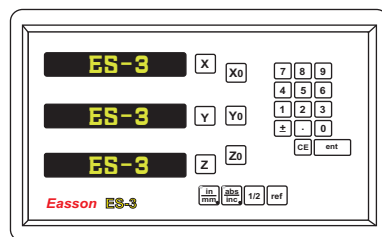
Operational procedure :


- (1) Turn off the ES-3.
- (2) Power on ES-3 once again, when "ES-3" moving in display window, please press "8" key then ES-3 enters into the RESET function.

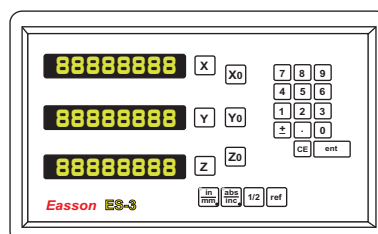
power on the DRO, then DRO starts the self-test function



when "ES-3" appears in display window, please press "  " key.



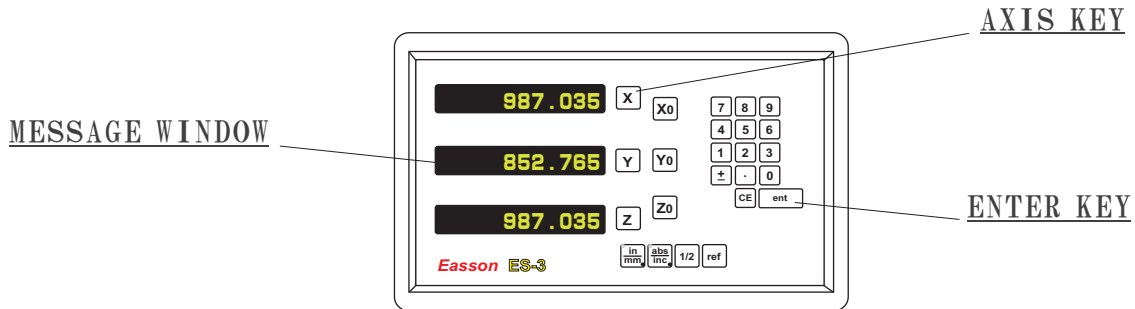
after press "  " key, the word "8" can appear and continuously move in display window.



- (3). When enter into the RESET function, the word "8" appears and continuously moves in display window. After the word "8" moves 2~3 trips, the DRO will complete the reset.

- (4). Turn off the DRO after complete the reset, then power on DRO once again.

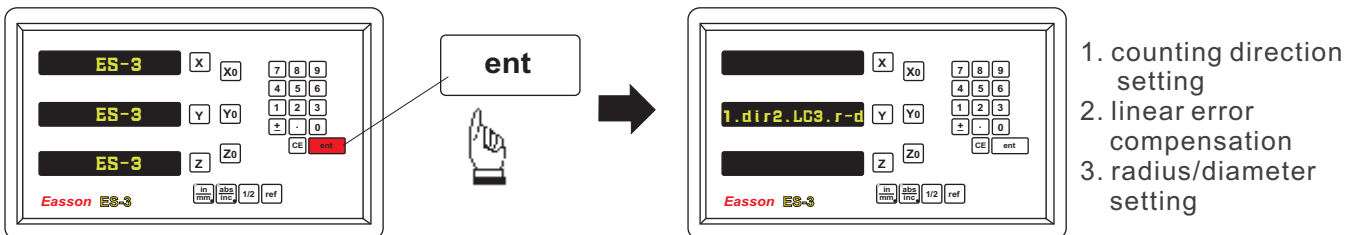
ES-3 SETUP FUNCTION



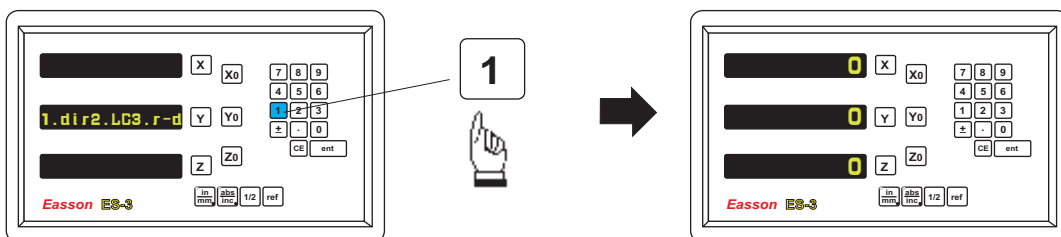
During changing the different program version IC or some abnormal voltages and operations, you need to SETUP the DRO.

Procedure :

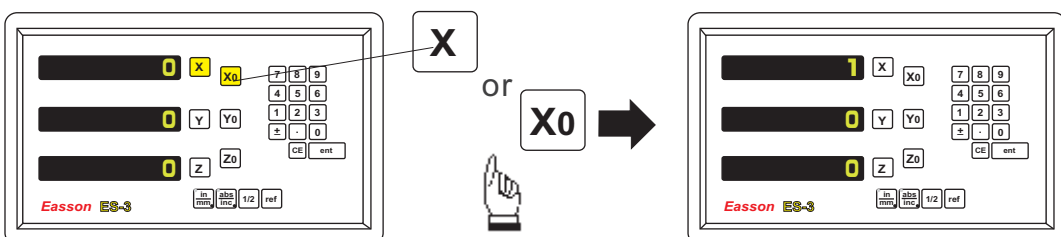
- 1). Turn off the ES-3.
- 2). Power on the ES-3 once again, when the message "ES-3" showing in the MESSAGE WINDOW, please **ent** key immediately then the DRO ES-3 starts entering into the SETUP function.



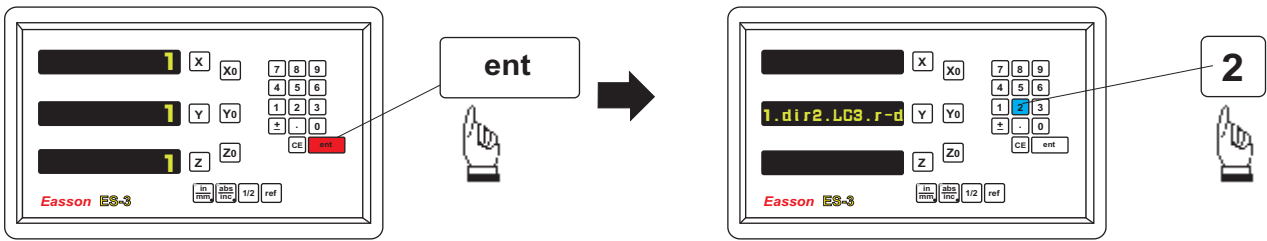
- 3). Press **1** key into the "dir" (counting direction) function, the 0 represents a positive, 1 represents a negative.



press **X** or **X0** key to set up a negative direction "1" for X Axis, make a same procedure for Y Axis and Z Axis.



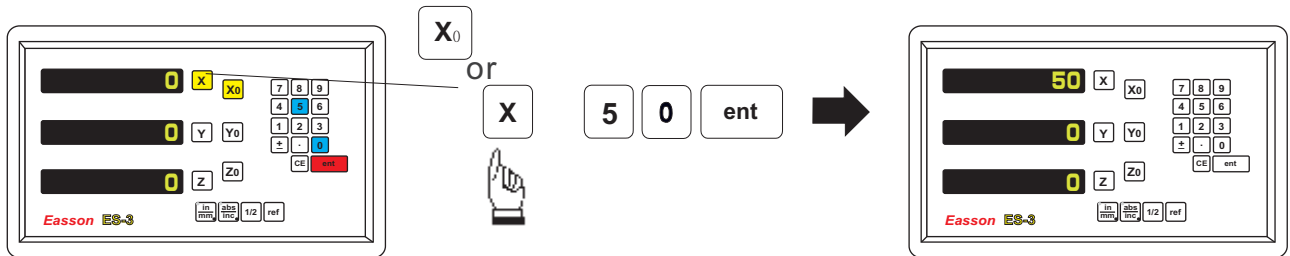
- 4). Press **ent** key to make your setting, then press **2** key into the "LC" (linear compensation) function.



The formula of linear error compensation :
 error value \times -(1000/measuring length) = compensation value
 (ML) measuring length unit = mm, error unit = μ m

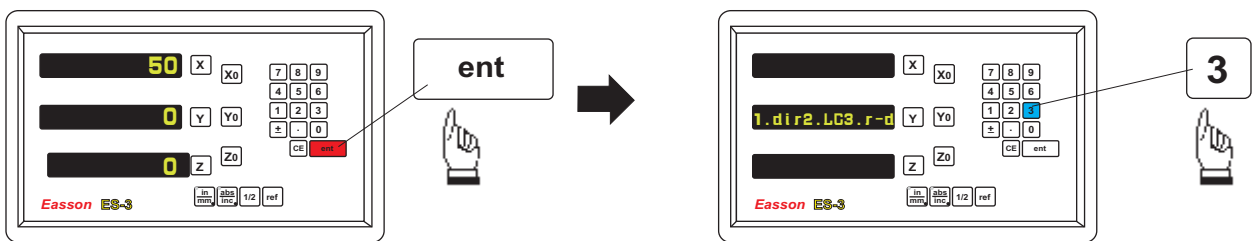
Example :

ML = 500mm Error = -15μ m
 -15μ m \times -(1000/500) = 30μ m
 the compensation value is 30μ m



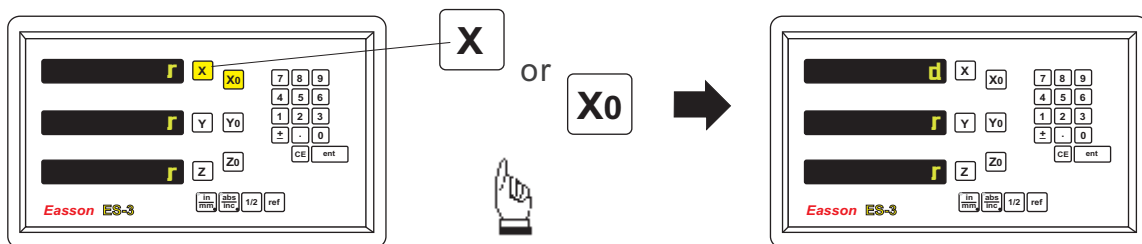
If set up the linear compensation value of X Axis = 30, through the AXIS key make a same procedure for Y Axis and Z Axis.

- 5). Press **ent** key to make your setting, then press **3** key into the "r-d" (radius/diameter) function.



d-Diameter r-Radius

Press **X** or **X0** key to set up X Axis to "d", make a same procedure for Y Axis and Z Axis.



- 6). Press **ent** key to make your setting.
 7). Turn off the counter after change the parameter of setup mode then power on the counter. the setting is enable now.