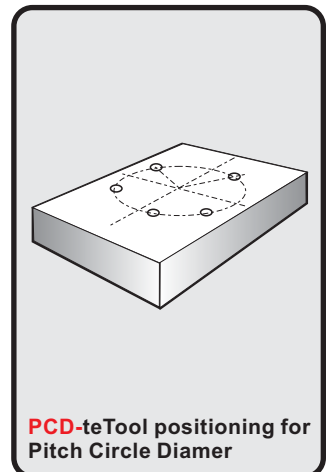
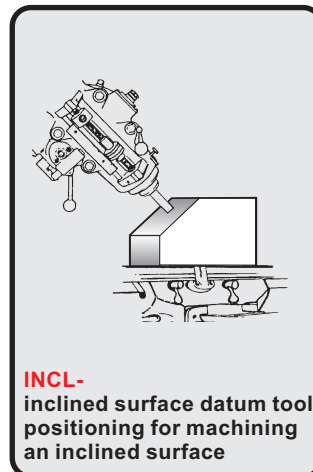
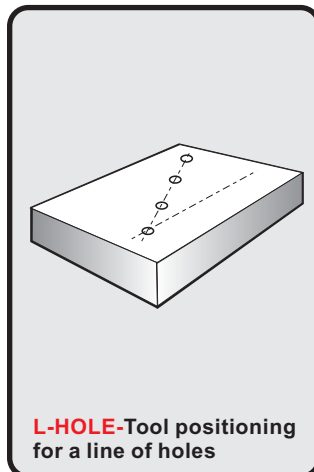
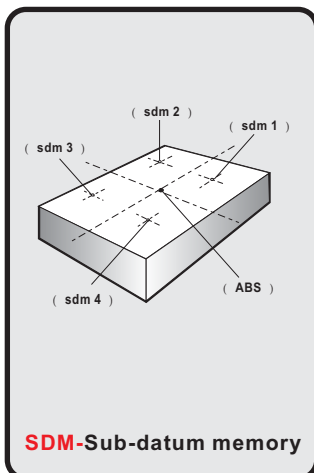
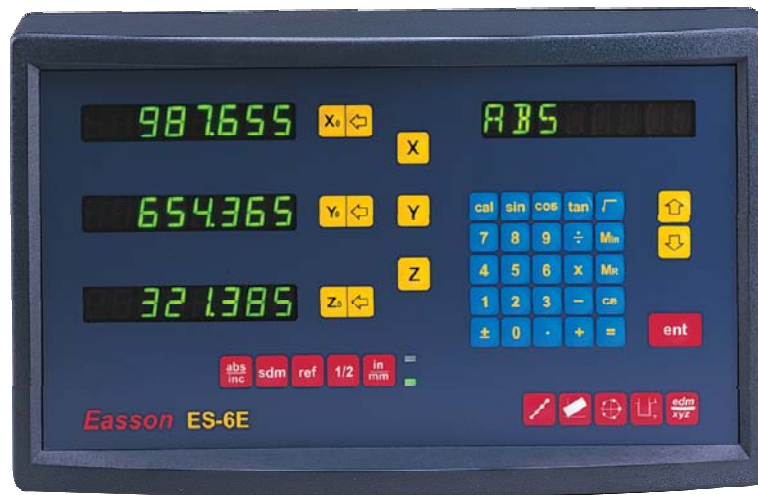


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Easson-TW Digital Readout System

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ES-6E DRO Counter Operation Manual



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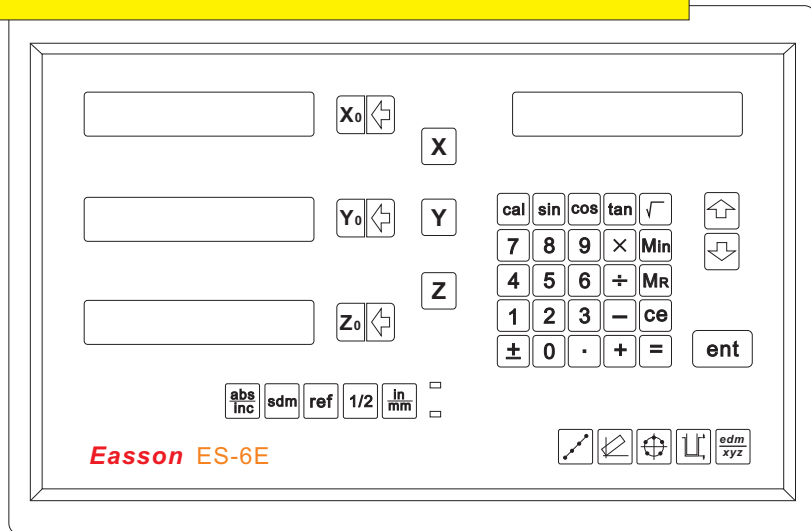
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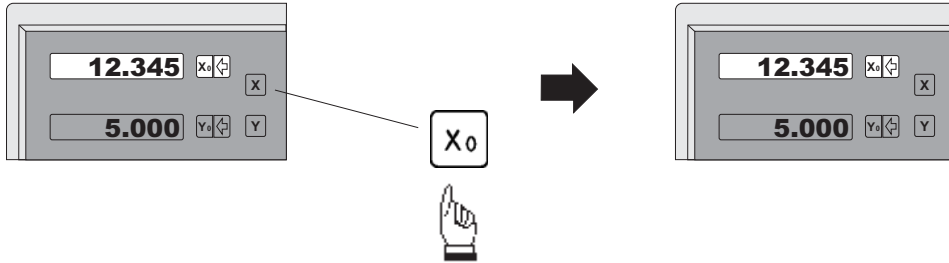
Basic Functions



Set Display to Zero

Purpose : Set the current position for that axis to zero

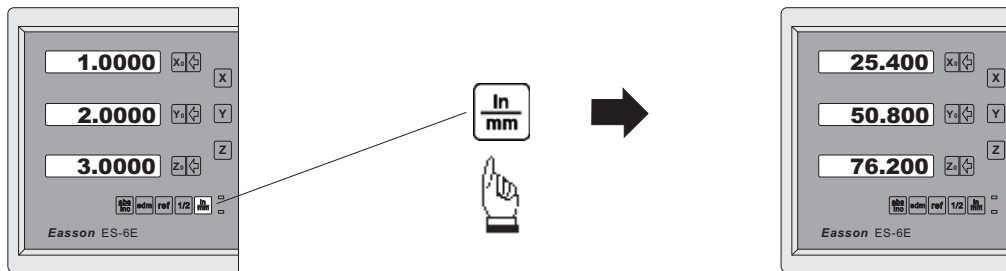
Example : To set the current **X Axis** position to zero



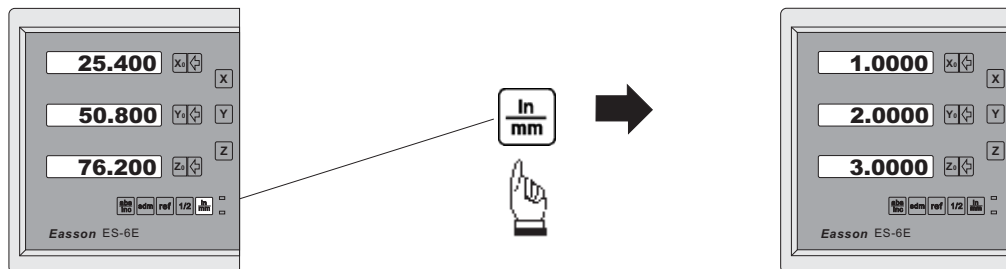
Inch / Metric Display Conversion

Purpose : Switches between inch and metric display

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



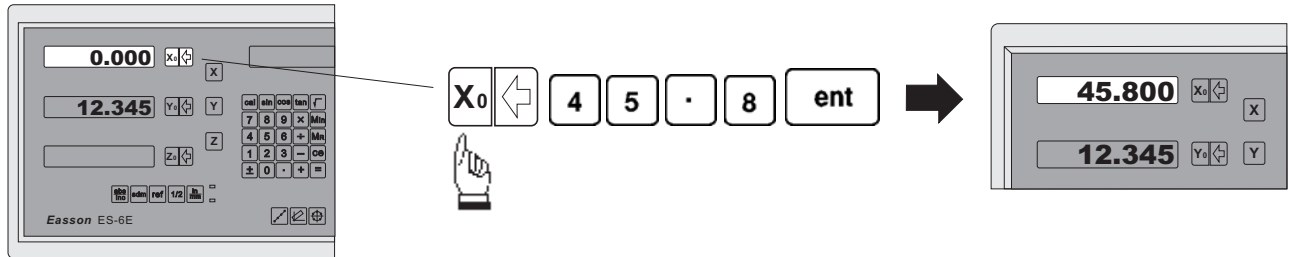
Example 2 : Currently in **metric** display, to switch to **inch** display



Enter Dimensions

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

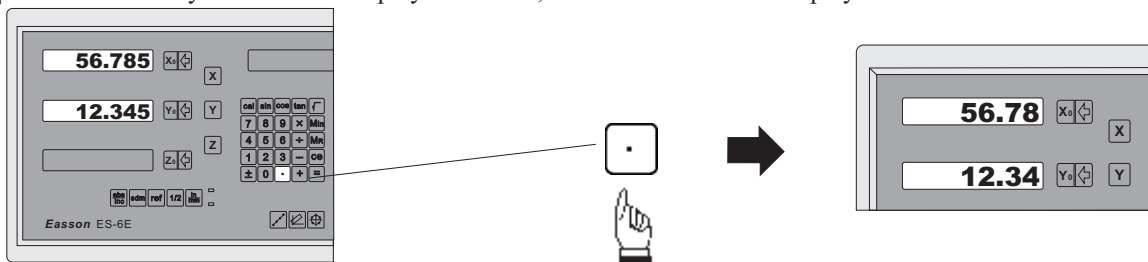
Example : To set the current **X Axis** position to **45.800 mm**



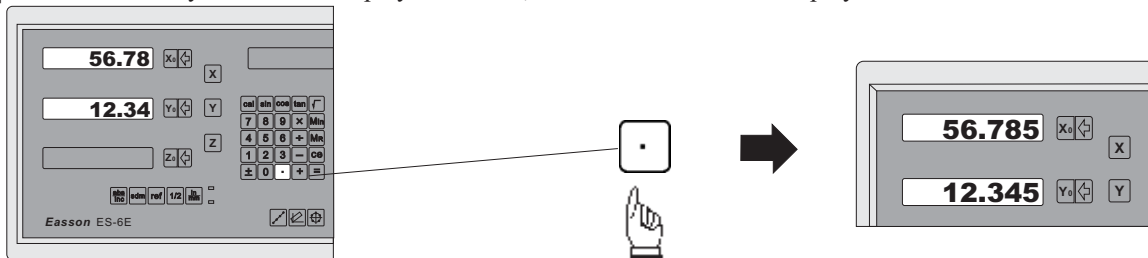
0.005 / 0.01 resolution display switches

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

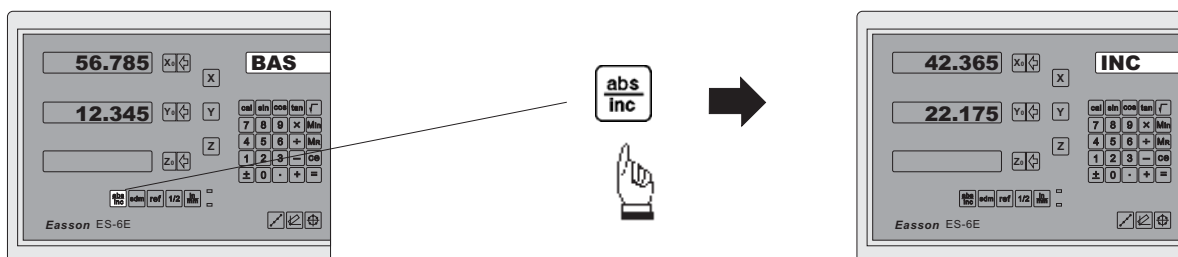
Purpose : ES-6E provides two sets of basic coordinate display, they are **ABS** (absolute) and **INC** (incremental) displays.

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.*

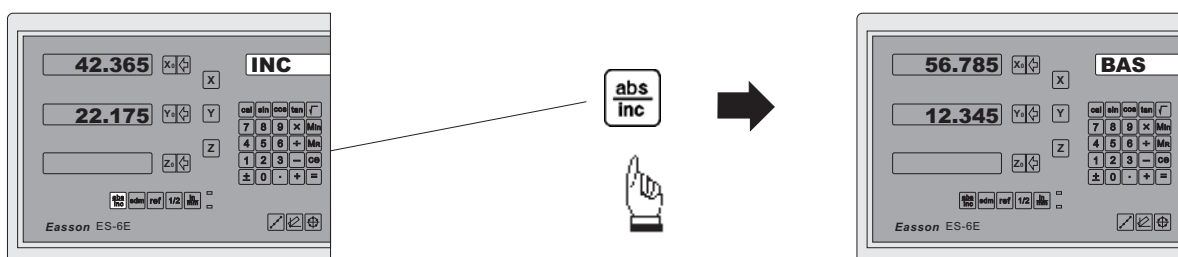
The operator is then free to zero the axes or preset any dimensions into any axis in INC coordinate for relative position machining. The work piece datum (work piece zero position) is still retained in ABS coordinate by the **ES-6E**.

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

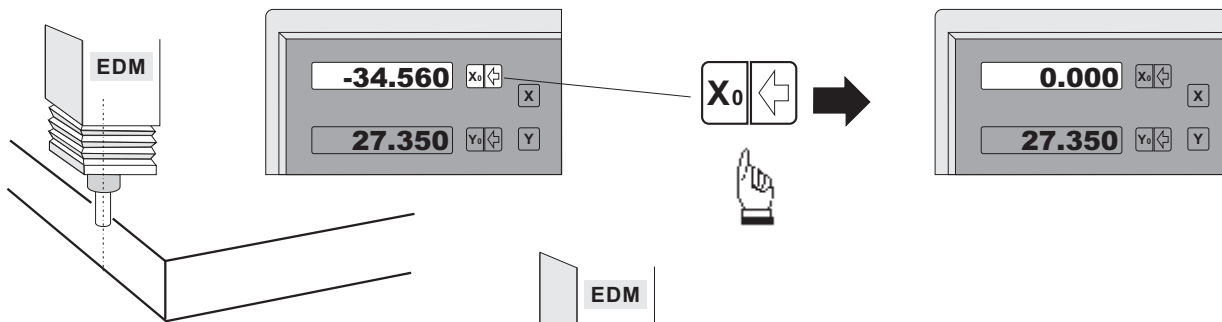


Centre-find

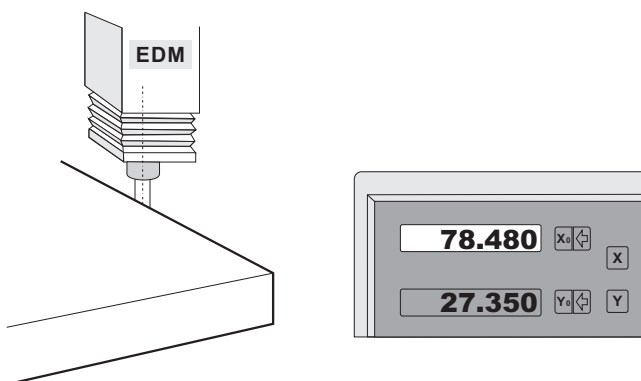
Purpose : ES-6E provides the centre-find function by halving the current display coordinate, so that the zero point of the work piece is located at the centre of the work piece.

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

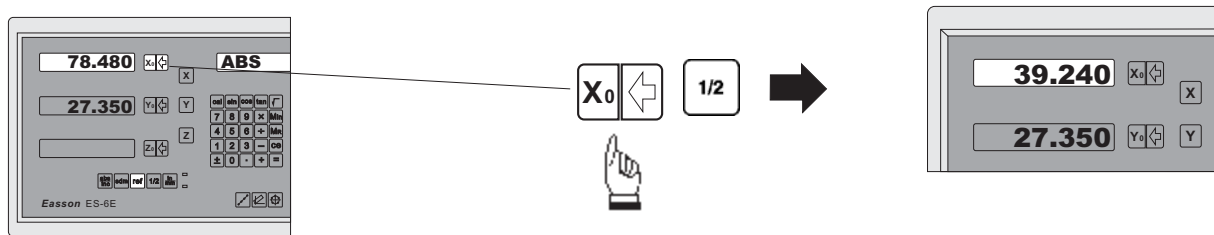
Step 1 : Locate the edge finder at one end of the work piece, then zero the X Axis.



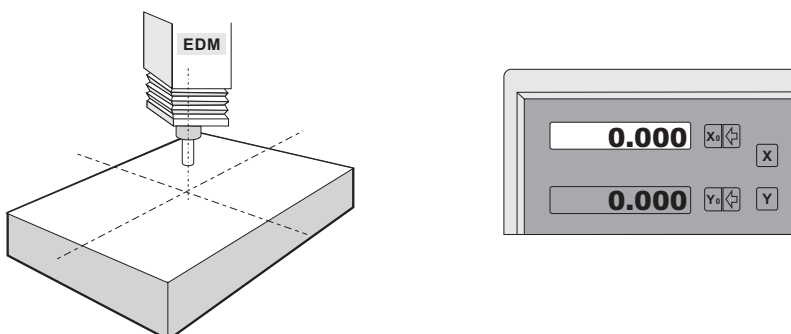
Step 2 : Locate the edge finder at the other end of the work piece.



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.



SLEEP FUNCTION

Purpose : Although the power consumption of **ES-6E** is very low, for the purpose of environmental protection (power saving) and to prolong its service life , the **ES-6E** provides sleep function which permits the operator to put the **ES-6E** into sleep mode (power saving mode) when they have to leave the machine for a short period of time such as lunch time, receiving a TEL call or etc.

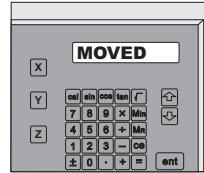
When **ES-6E** is in sleep mode, it will switch off all LED display (which consumes the most power) but still keep the transducer operational, therefore, the operator will not lose the work datum even if the machine has been moved whilst the **ES-6E** was in sleep mode.
The Sleep function is offering the following advantages :

- Saves unnecessary power usage, heat generation and prolongs the **ES-6E** service life.
- When **ES-6E** is in sleep mode, it seems that the **ES-6E** has been switched off, therefore, it is less attractive for other people to tamper with in the absence of the operator from the machine

Example : To put the **ES-6E** in sleep mode



In case the machine has been moved whilst the **ES-6E** was in sleep mode, the message display will show the error message "MOVED" as a warning signal.



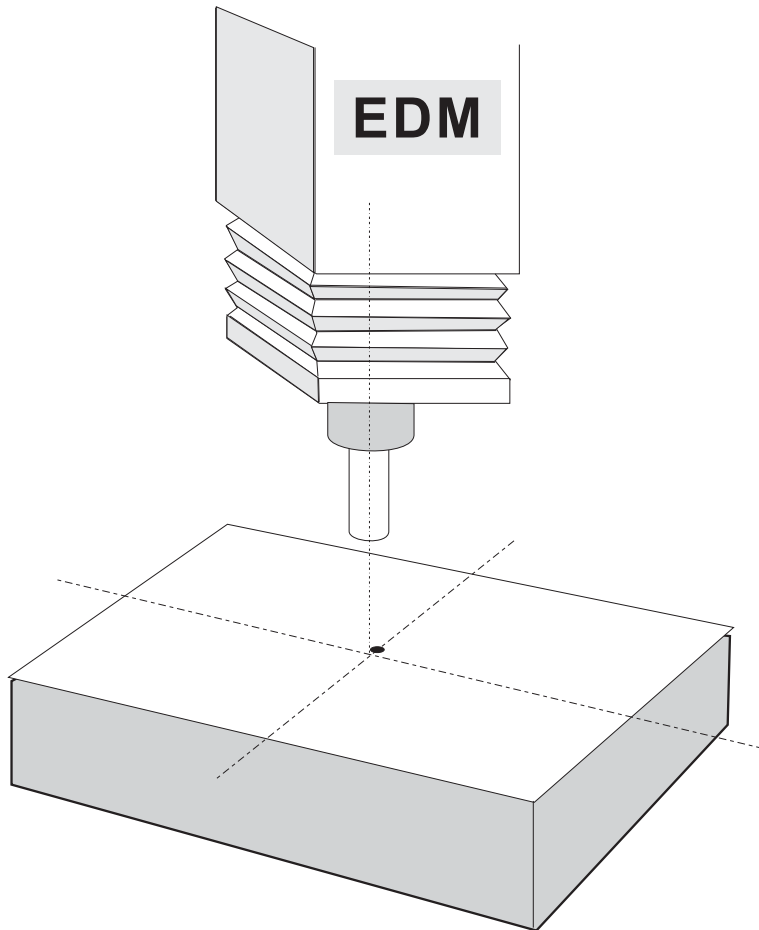
In case the machine has been used with the keyboard whilst the **ES-1** was in sleep mode, the message display will show the error message "KEYED" as a warning signal.



To resume the **ES-6E** from sleep mode.



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.

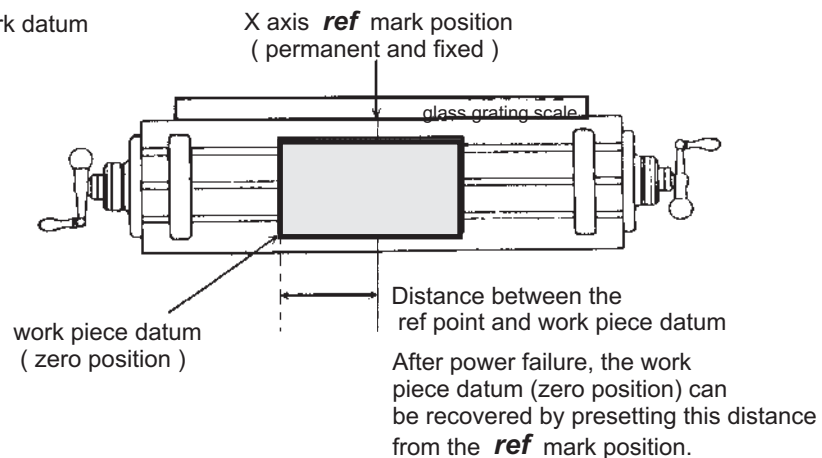
To allow the recovery of work piece datum very accurately, with no need to re-establish the work piece datum using an edge finder or other methods, every transducer has a reference point location to provide a datum point memory function.

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-6E 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-6E 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-6E, whenever you alter the zero position of ABS coordinate, such as by zeroing, centre find, coordinate preset or etc., ES-6E will automatically store the relative distance between ABS zero and the *ref* mark location into ES-6E's memory.

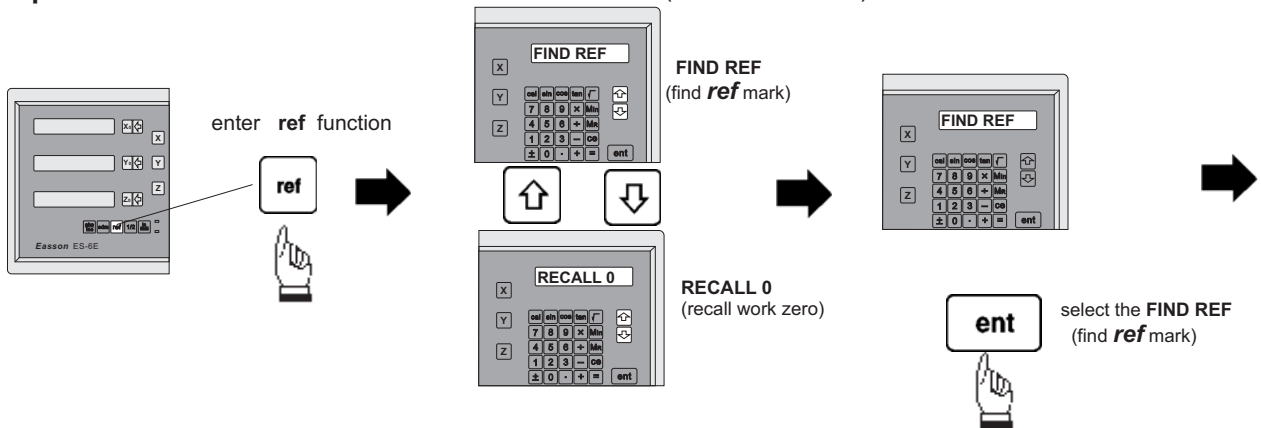
In daily operation, operator simply needs to locate the *ref* mark position whenever they switch on the ES-6E to let it know where the *ref* mark position is, then ES-6E will automatically do the work datum storage on its' own . In the case of a power failure or the ES-6E being switched off, the operator can recover the work piece datum easily by using the **RECALL 0** procedure.

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

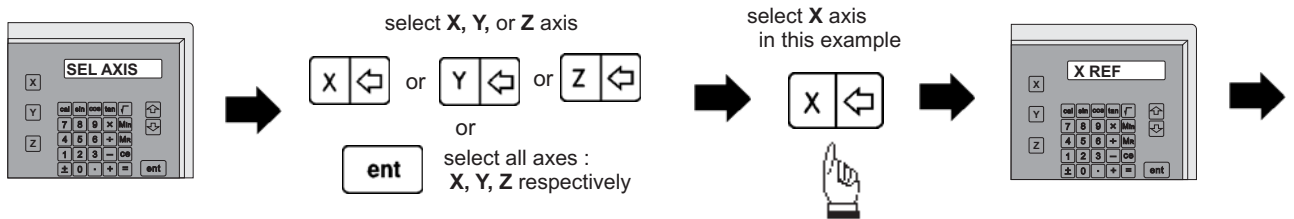
function : In ref datum memory function, the **ES-6E** will automatically store the relative distance between the *ref* mark position and the work piece datum (zero position) whenever the operator alter the **ABS** zero position, such as zeroing, centre find, co-ordinate preset or etc...

Therefore, the **ES-6E** 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-6E**.

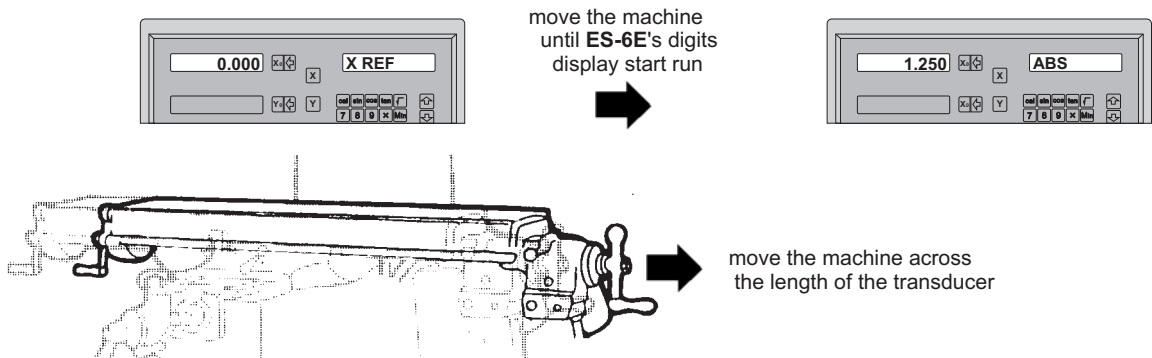
step 1 : To enter the ref function, select the **FIND REF** (find *ref* mark)



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



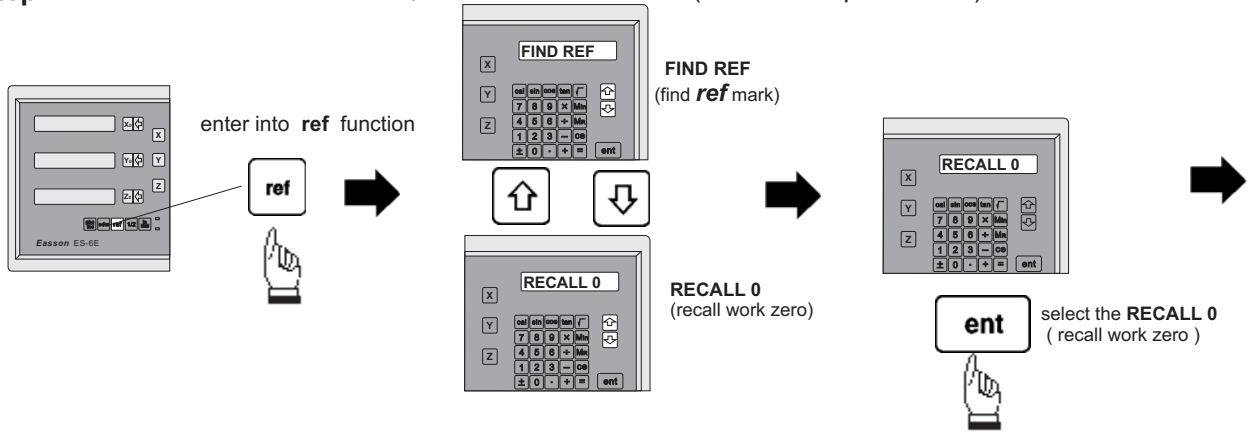
step 3 : move the machine reader head across the length of the transducer until digits display in ES-6E start to count.



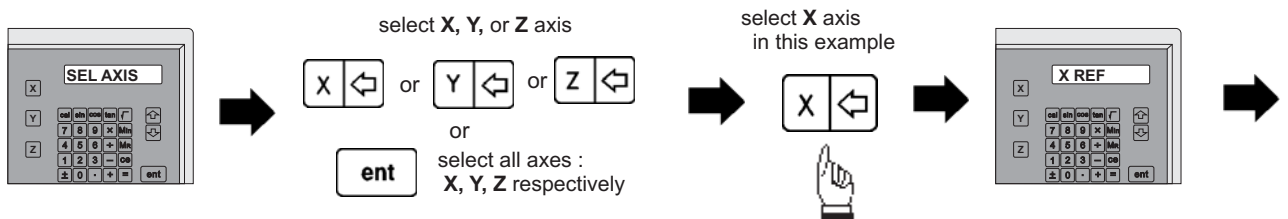
Recall the work datum zero (**RECALL 0**)

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

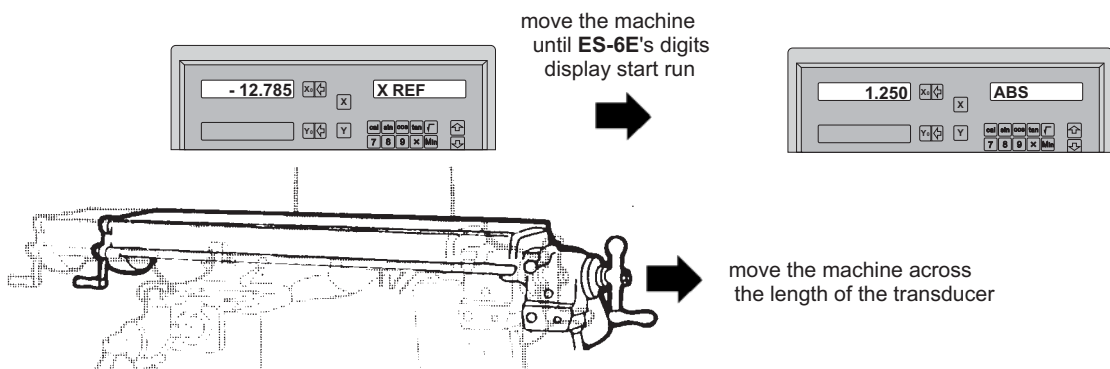
step 1 : enter into the **ref** function, select the **RECALL 0** (recall work piece zero)



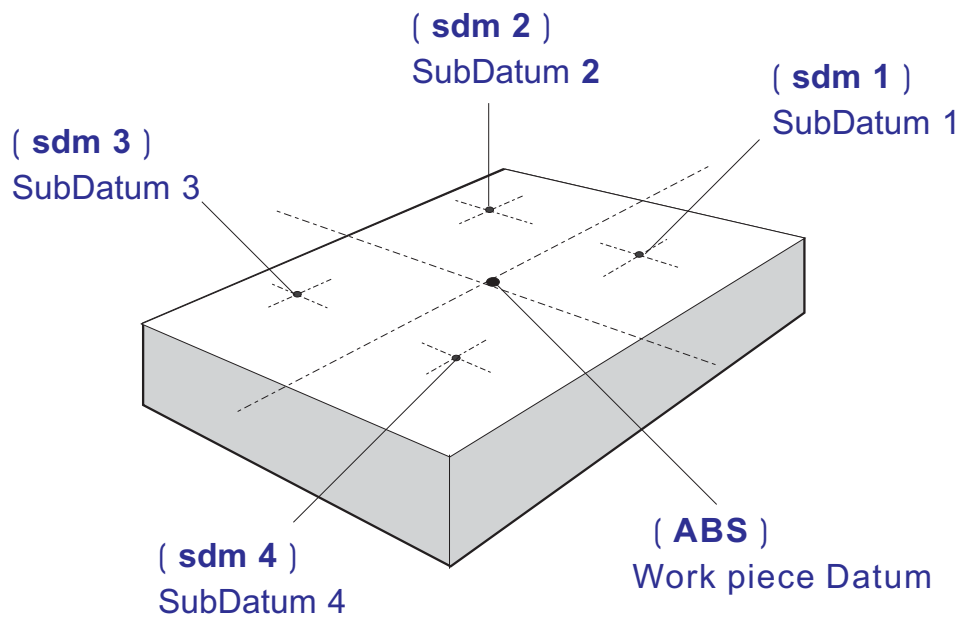
step 2 : select the axis of which work datum (zero position) needed to be recovered



step 3 : move the machine across the length of the transducer until the **ES-6E** display starts to count, then the work piece datum is recovered



199 SubDatum Function



199 SubDatum function

Purpose : Most DRO cabinet on the market provide just two set of work co-ordinates - ABS/INC. It was found that ABS/INC was inadequate and inconvenient to use, and, particularly in the case of complex machining or repetitive work, which needed more than just two sets of working co-ordinates.

ABS / INC operation has the following shortfalls :

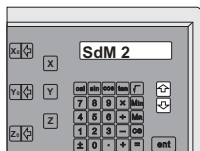
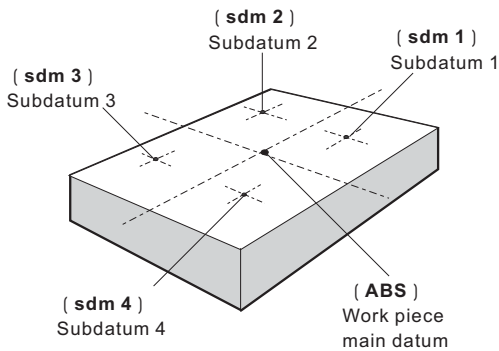
- In much machining work, the work-piece machining dimensions are derived from more than two datums, therefore, the operator has to switch between ABS and INC to set up the machining datums time after time. This process is very time consuming and prone to error.
- In the case of batch machining of repetitive work, the operator has to set up and calculate all the machining positions time after time.

ES-6E provides a 199 subdatum (sdm) memory to cope with the shortfalls of ABS/INC. SdM function does not just simply provide 199 sets of INC co-ordinates, it is specially designed to provide much more convenient features for the operator to cope with repetitive work. The difference between INC and SdM is as follows.:

1. INC is independent of ABS and will not follow any change in ABS zero point. All sdm co-ordinates are relative to the ABS coordinates, so, all SdM positions will move together when the ABS zero position changes.
2. All SdM relative distance data to ABS can be entered directly into ES-6E memory using the keypad. No need for any additional calculations.

SdM application in a work piece that has more than one datum.

Operator can store all the work subdatums in ES-6E's memory as per follows.



or



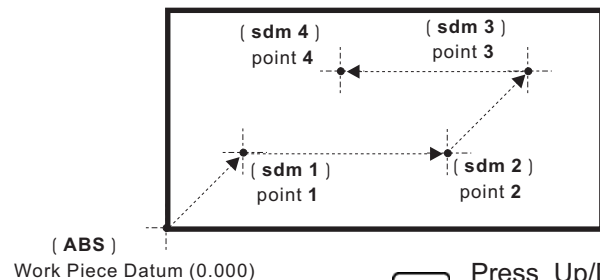
Operator then can switch between the subdatums directly by pressing key

No need to refer back to ABS coordinate and set up the subdatums from their relative distance from ABS point

SdM application on the repetitive batch machining of parts

Because all sdm subdatums (0.000) are relative to ABS zero, so, for any repetitive work, the operator just needs to set up the first work piece zero at ABS and store the machining position in subdatum zero.

For anymore repetitive parts, just set up the 2nd, 3rd.. work piece zero at ABS, then all the machining positions will reappear



or



Press Up/Down key to go to machining points

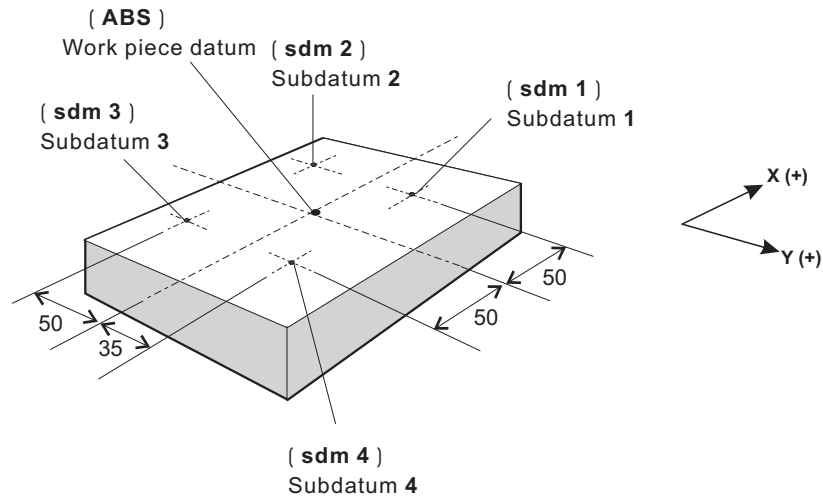
move the machine to display = 0.000, then machining location reached

199 SubDatum function

Application example:

To set up four subdatum zero (SdM 1 to SdM 4) the following two methods can be used

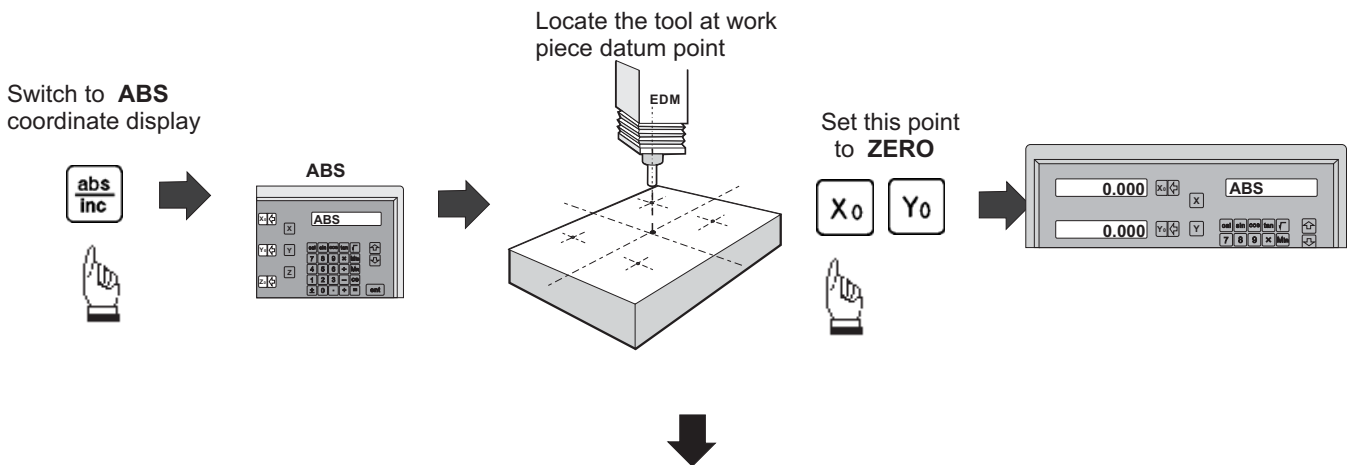
- Either 1. Move machine to required subdatum position, then zero SdM display coordinates
- Or 2. Directly key in the sdm zero position co-ordinates (co-ordinate relative to ABS zero)



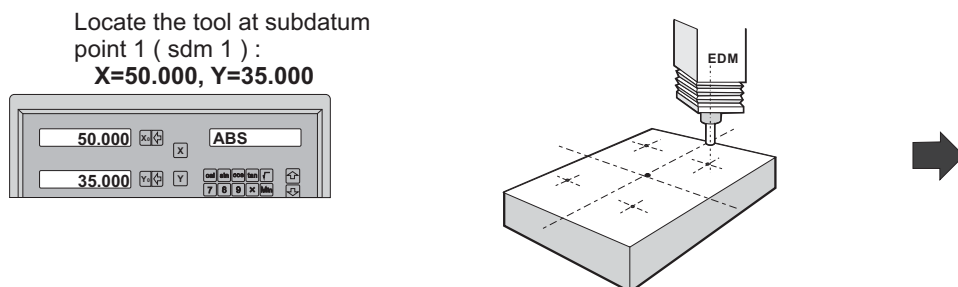
Method 1 : Move machine to required subdatum position, then zero SdM display coordinate

Set up the work piece datum in ABS co-ordinate, move the machine to the required subdatum position, then zero SdM display co-ordinate.

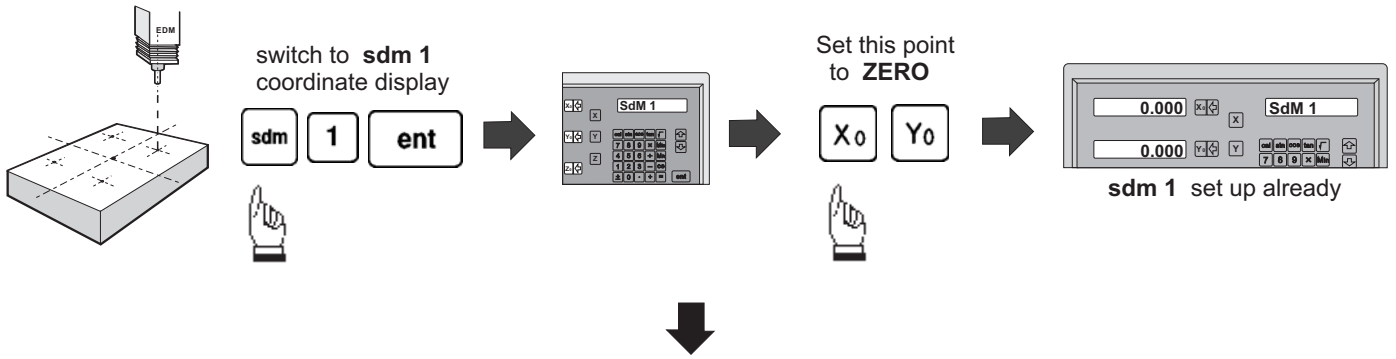
Step 1 : Set up the work piece datum in ABS co-ordinate



Step 2 : Set up the subdatum point 1 (sdm1)



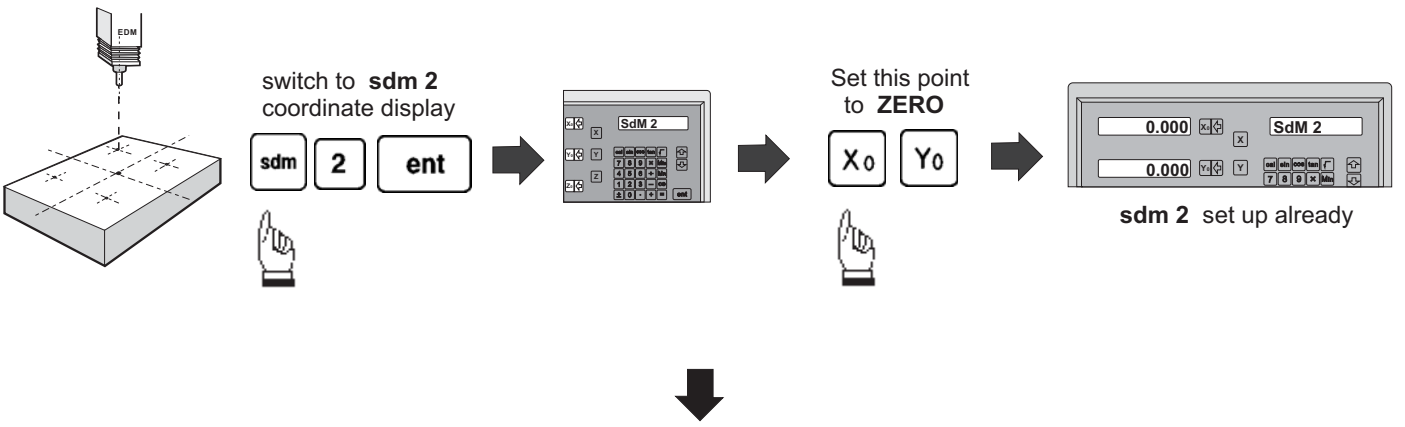
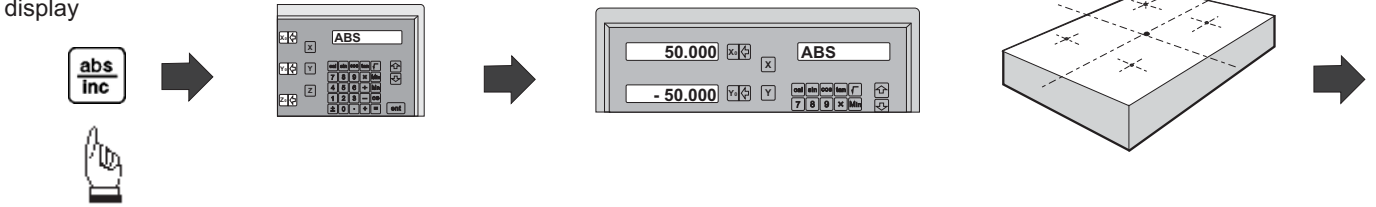
199 SubDatum function



Step 3 : Set up the subdatum point 2 (sdm 2)

switch back to **ABS** coordinate display

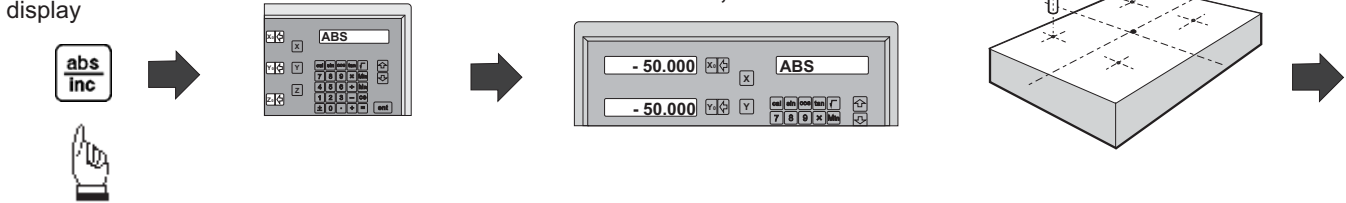
Locate the tool at subdatum point 2 (sdm 2) :
X=50.000, Y=-50.000



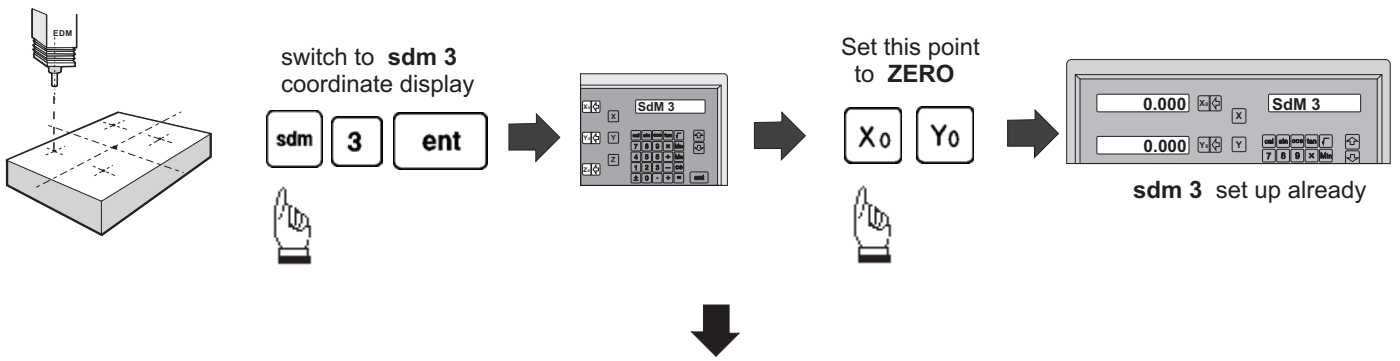
Step 4 : Set up the subdatum point 3 (sdm 3)

switch back to **ABS** coordinate display

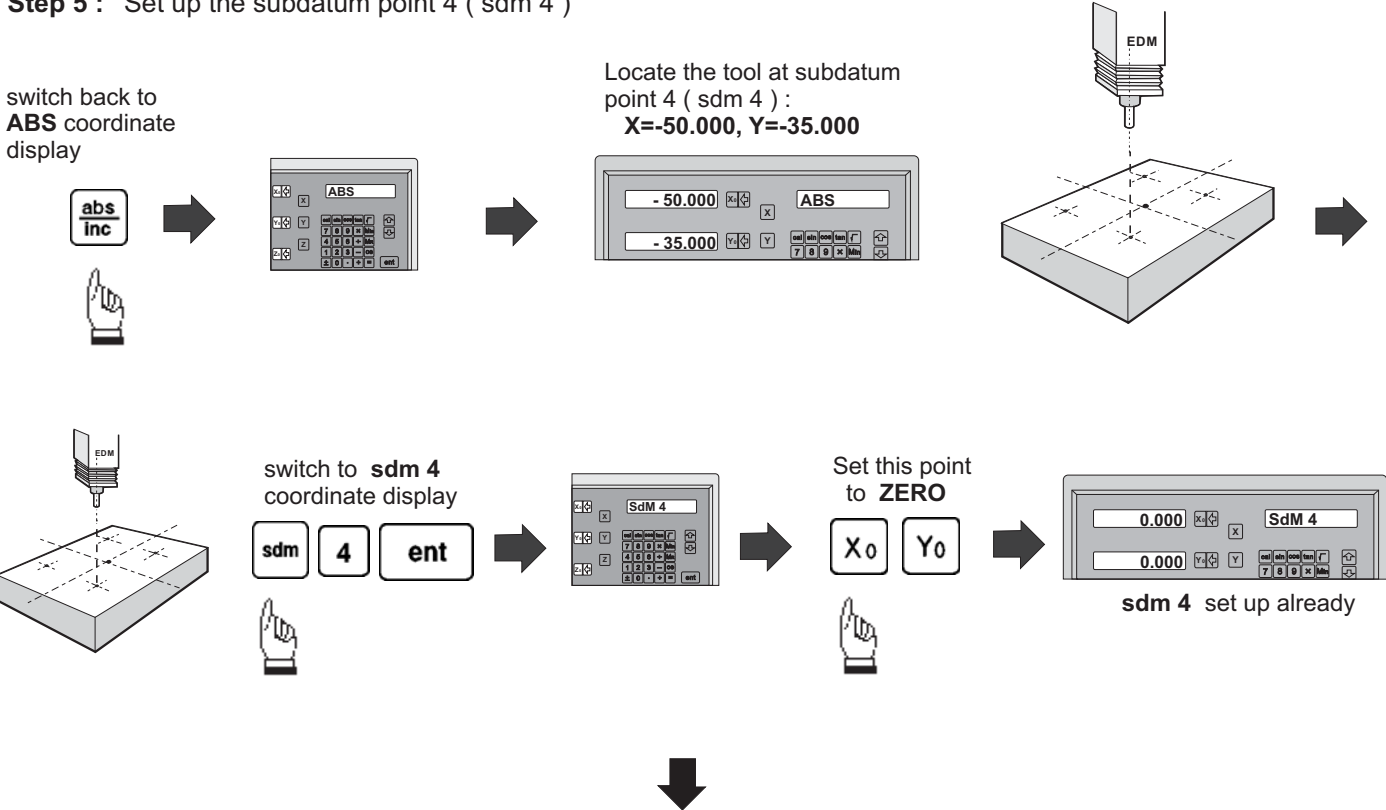
Locate the tool at subdatum point 3 (sdm 3) :
X=-50.000, Y=-50.000





199 SubDatum function



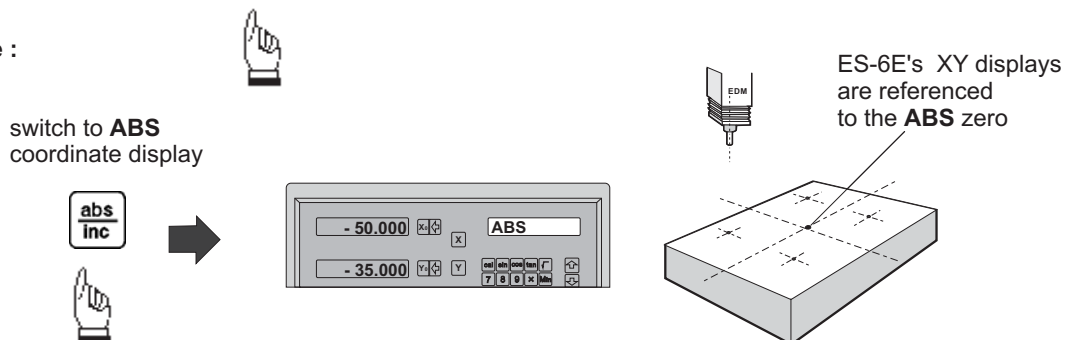
Step 5 : Set up the subdatum point 4 (sdm 4)



All the four subdatum points have already been set up

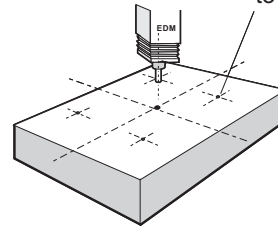
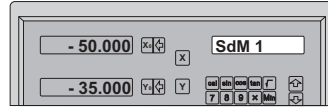
Operator can  or  to directly switch to the required subdatum (**sdm**) coordinate

Example :



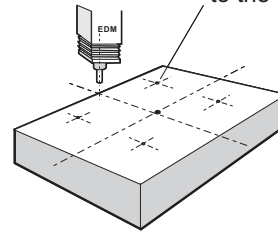
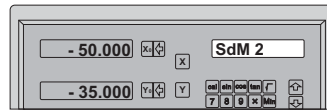
199 SubDatum function

switch to next (**up**)
sdm coordinate display



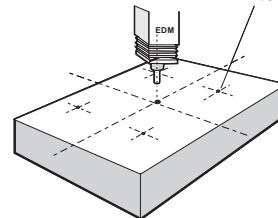
ES-6E's XY displays
are referenced
to the **sdm 1** zero

switch to next (**up**)
sdm coordinate display



ES-6E's XY displays
are referenced
to the **sdm 2** zero

switch to previous (**down**)
sdm coordinate display



ES-6E's XY displays
are referenced
to the **sdm 1** zero

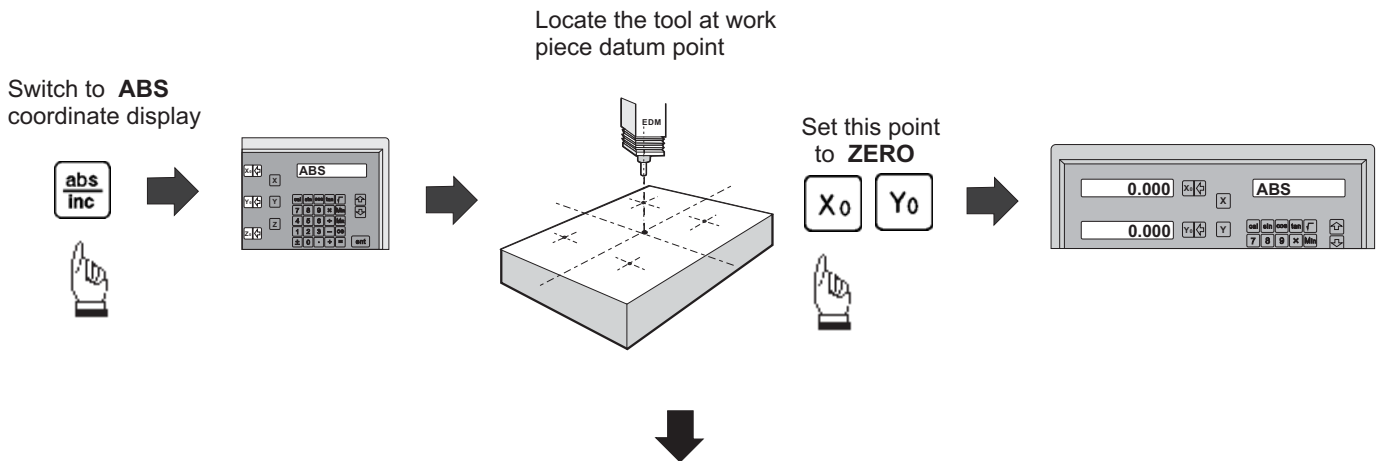
199 SubDatum function

In a case where many subdatum (sdm) points need to be set up, the operator will find that the method of **direct keying in the of SdM zero position co-ordinates (co-ordinate relative to ABS zero)** is much quicker and less prone to error.

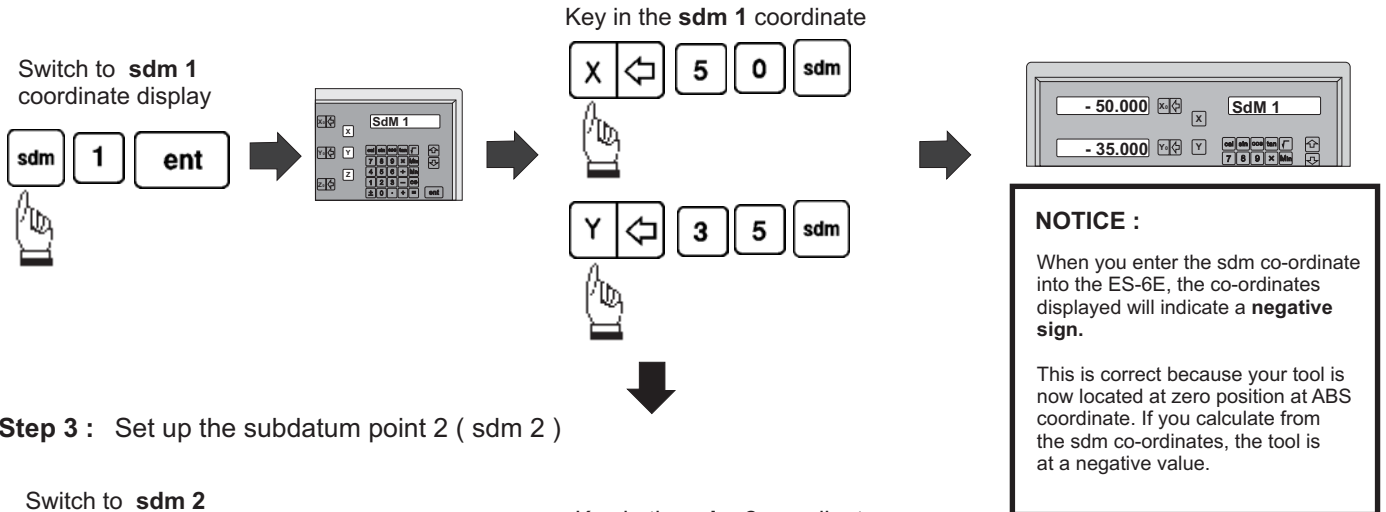
Mthod 2 : Direct keying in the of SdM zero position co-ordinate (co-ordinate relative to ABS zero)

Set up the work piece datum (ZERO) at ABS co-ordinate, then move the tool located at the work piece datum (ABS zero point) and directly key in all subdatum point co-ordinates (the relative position to ABS zero) using the keypad.

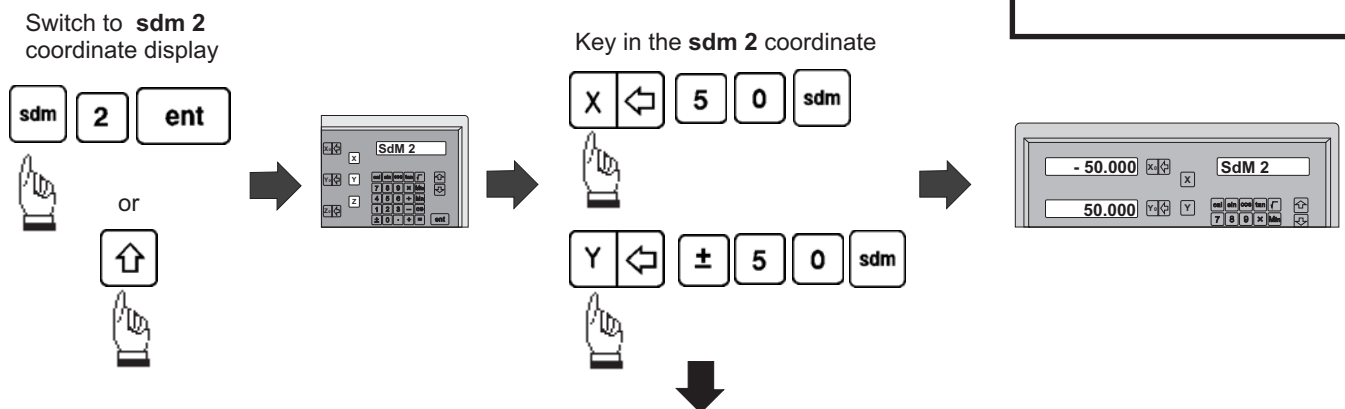
Step 1 : Set up the work piece datum in ABS coordinate



Step 2 : Set up the subdatum point 1 (sdm 1)



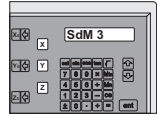
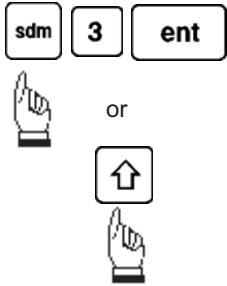
Step 3 : Set up the subdatum point 2 (sdm 2)



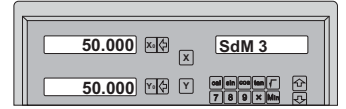
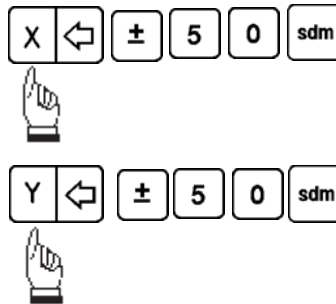
199 SubDatum function

Step 4 : Set up the subdatum point 3 (sdm 3)

Switch to **sdm 3** coordinate display

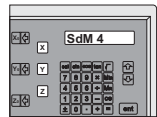
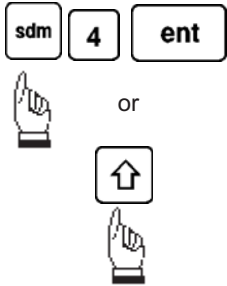


Key in the **sdm 3** coordinate

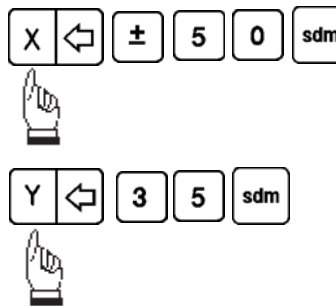


Step 5 : Set up the subdatum point 4 (sdm 4)

Switch to **sdm 4** coordinate display



Key in the **sdm 4** coordinate

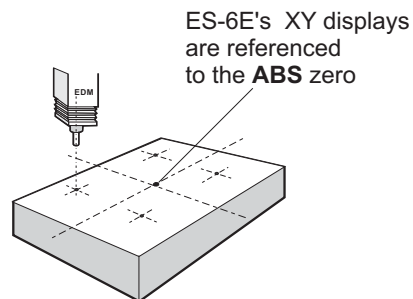


All the four subdatum points have already been set up

Operator can ↑ or ↓ to directly switch to the required subdatum (sdm) coordinate

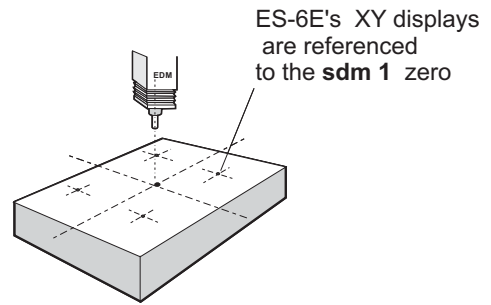
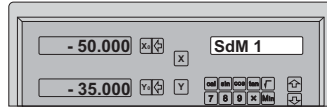
Example :

switch to **ABS** coordinate display

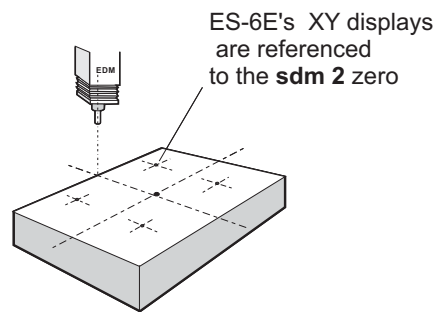
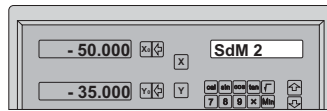


199 SubDatum function

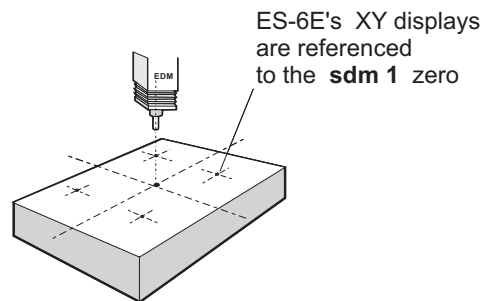
switch to next (**up**)
sdm coordinate display



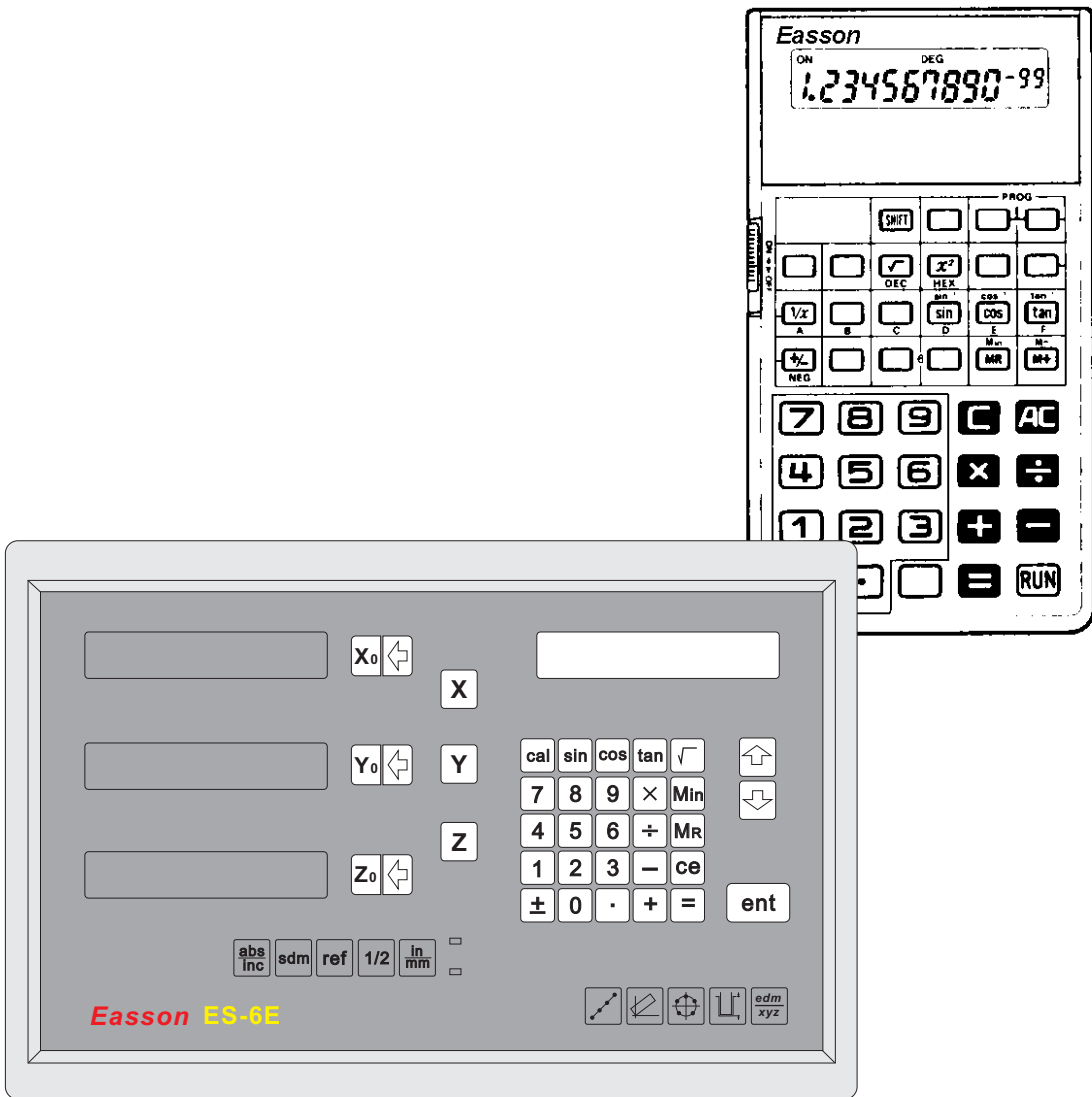
switch to next (**up**)
sdm coordinate display



switch to previous (**down**)
sdm coordinate display



Built- in Calculator



Built in Calculator

Function : A calculator is used frequently during a manual machining process..

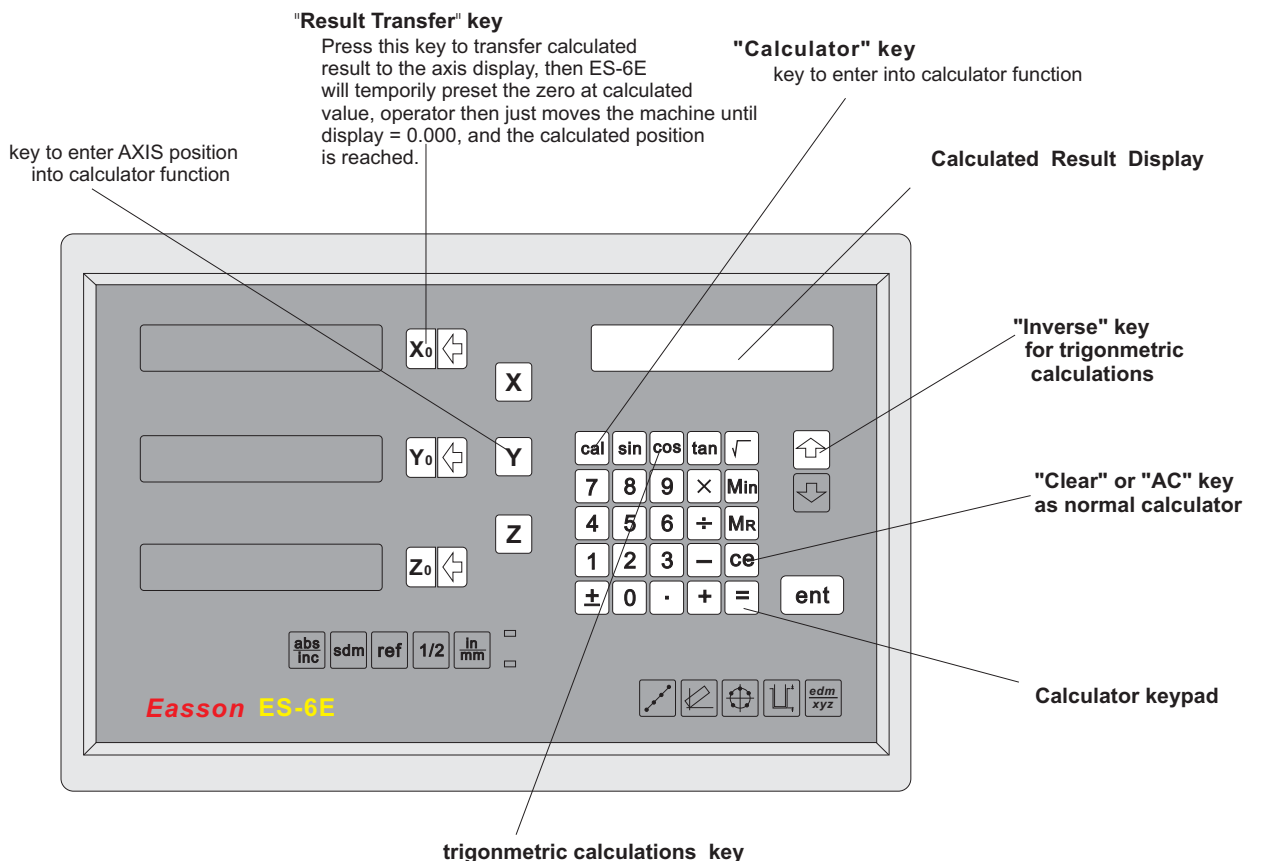
ES-6E is the first DRO that has a built-in calculator

The built-in calculator of the ES-6E not only provides normal mathematical calculations such as add, subtract, multiply & divide, it also provides useful trigonometric calculations that are frequently required during a machining process such as **SIN, COS, TAN, SQRT** and also *inv SIN, inv COS, inv TAN, SQUARE...*

In addition a major feature of the calculator of the ES-6E is "**Result Transfer**", in that all calculated results from the calculator of ES-6E can be "transferred" to any axis to enable you to position the tool. After the result has been transferred to an axis, the ES-6E will **temporarily** preset the zero position at the calculated value, enabling the operator to simply move the machine back to axis display = 0.000, leaving the tool positioned at the calculated coordinate .

The built-in calculator offers the following advantages :

1. Operations are the same as commercially available calculators and it is easy to use ;
2. The calculated result can be directly transferred to any axis, eliminating the need to make notes of a calculation on paper, thus saving time and avoiding errors;
3. No unnecessary down-time in finding or sharing calculators whenever you need one to make calculations.



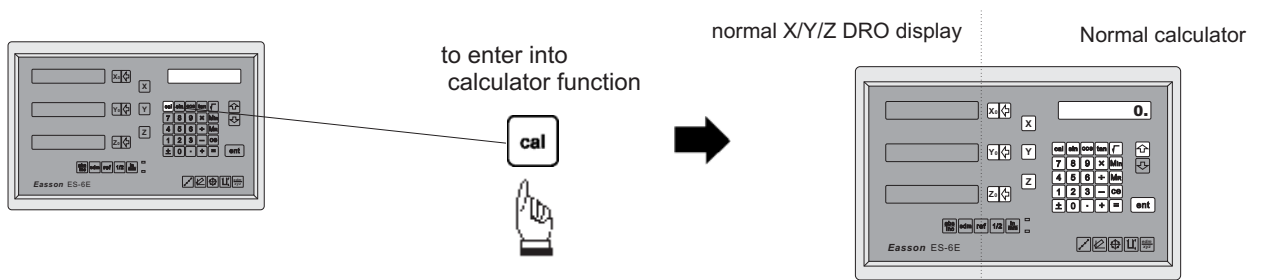
Key layout of the built-in calculator

Built in Calculator

Example :

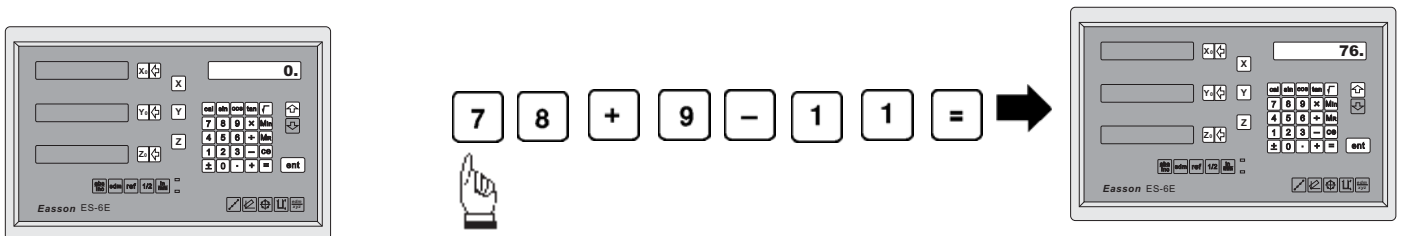
Working principle of ES-6E's calculator function

when the ES-6E is put in calculator mode, the operation of ES-6E actually divided into two parts as follows



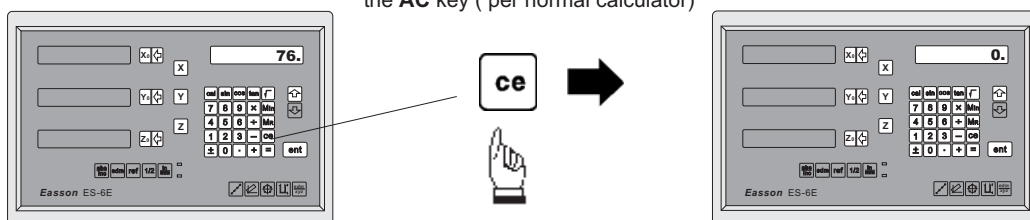
The operations of ES-6E's built-in calculator is the same as other ordinary calculators

i.e. Basic mathematics - add ; subtract : $78 + 9 - 11 = 76$

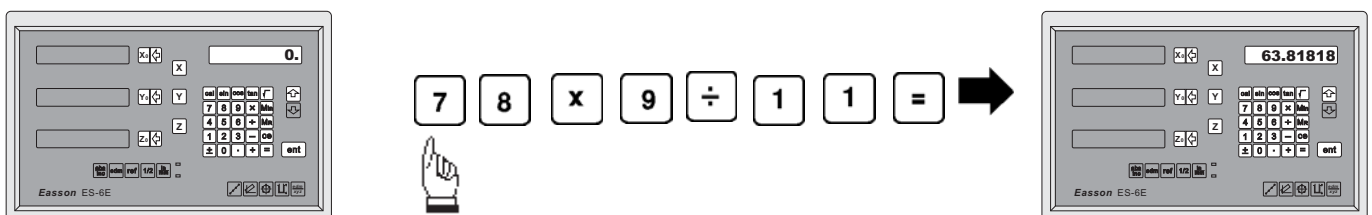


Clear - Restart the calculation

The ES-6E uses the **CE** key instead of the **AC** key (per normal calculator)

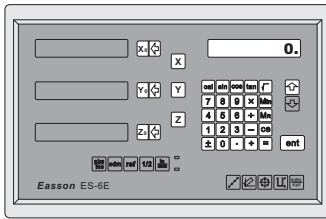


i.e. Basic mathematics - multiply, division : $78 \times 9 / 11 = 63.81818$

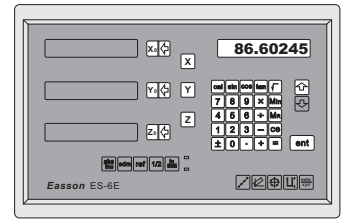


Built-in Calculator

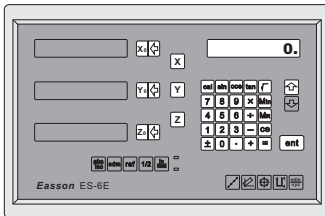
i.e. Trigonometric calculation - **COS** : $100 \times \cos 30^\circ = 86.602540$



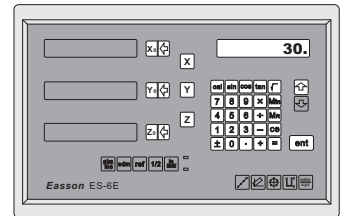
1 0 0 x 3 0 COS =



i.e. Trigonometric calculation - **inverse SIN** : $\sin^{-1} 0.5 = 30^\circ$

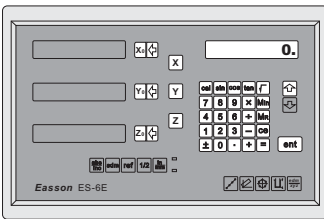


. 5 ↑ SIN



Result Transfer

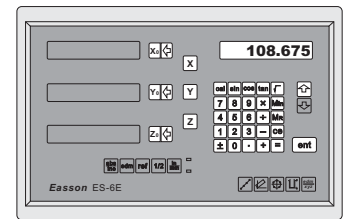
i.e. : To move the tool at the position of X axis coordinate : $105 \times 1.035 = 108.675$



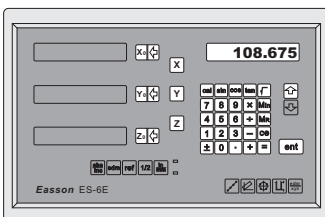
1 0 5 x 1 . 0 3 5 =



to calculate : 105×1.035

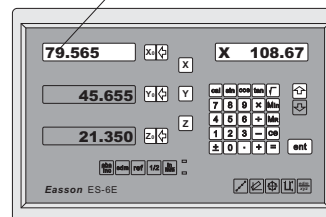


transfer the calculated result : 108.675 onto the X axis for tool positioning



to transfer calculated result to X axis

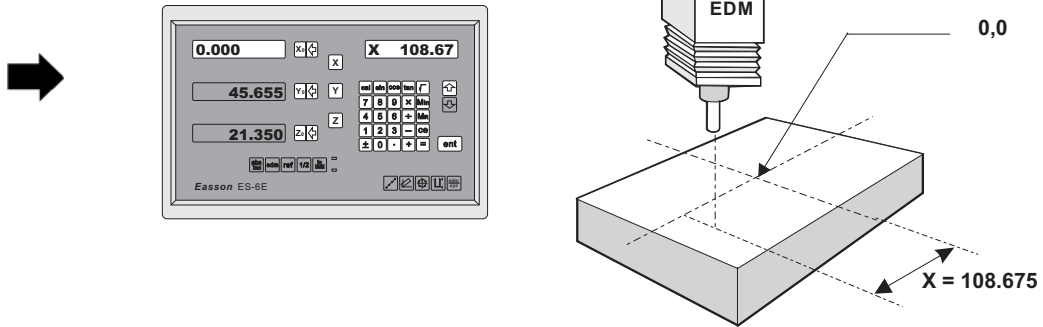
X 0



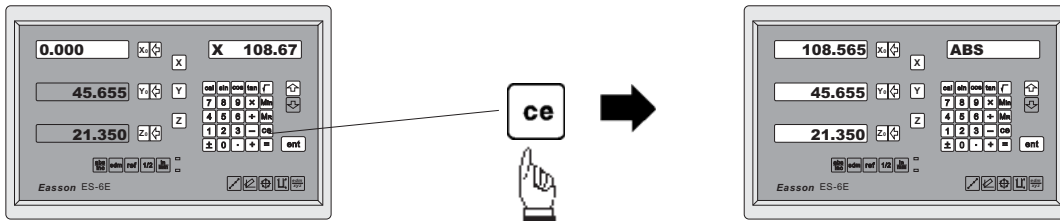
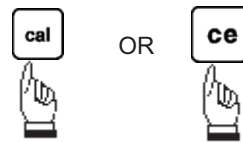
X axis zero position is now temporarily preset at X = 108.675

Built-in Calculator

Move the machine to X display = 0.000
then it is at the position of X = 108.675



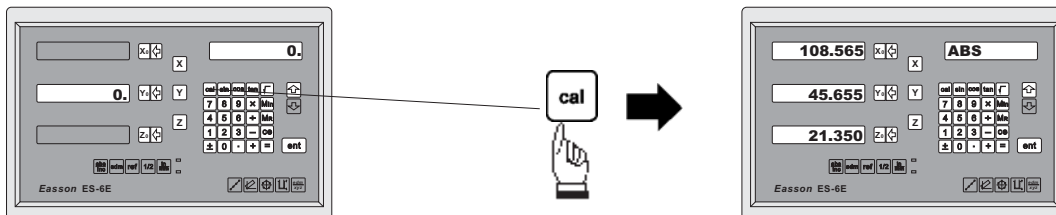
The tool is now at the position of the calculated result
(X = 108.675 in the above example)
To get back to normal coordinate display to continue
the machining



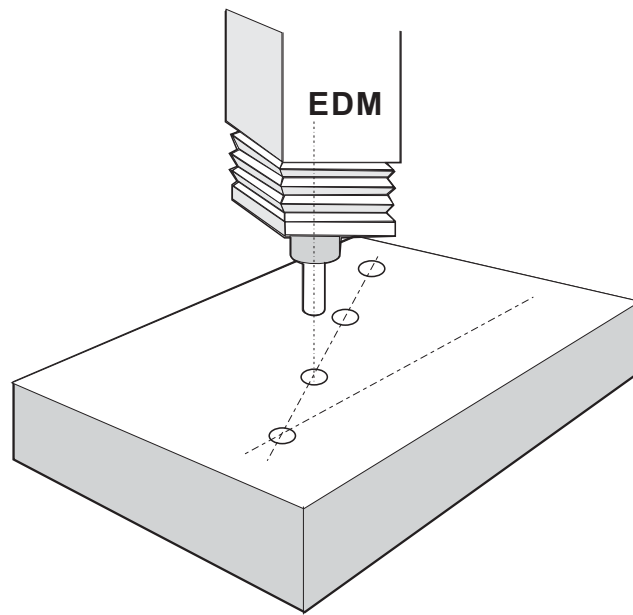
When you are in calculator mode, you can



to exit the calculator mode, to return to normal coordinate display to continue the machining.



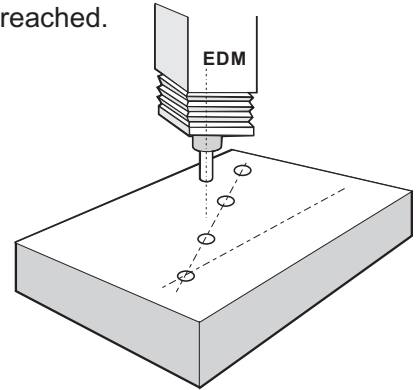
LHOLE - Tool positioning for a Line of Holes



LHOLE - Tool positioning for a Line of Holes

Function : ES-6E provides LHOLE function for drilling a line of holes. Simply enter the machining parameters below (following the step by step guides that are displayed on the ES-6E's message screens), and the ES-6E will calculate all the hole position co-ordinates and temporarily preset the hole position coordinates to zero (0.000). The operator then moves the machine until the display axes = 0.000, then the Line of Holes start-position is reached.

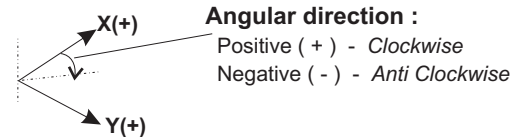
- Line Angle (**LIN ANG**)
- Line Distance (**LIN DIST**)
- No.of Holes (**NO. HOLE**)



After the above machining parameters are entered into ES-6E, it presets all the Line Hole positions to 0.000

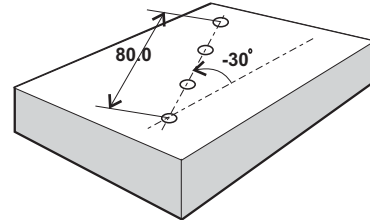
Operator can press or to select

the Line Hole, and then move the machine to display = 0.000, then the Line Hole position is reached



Example

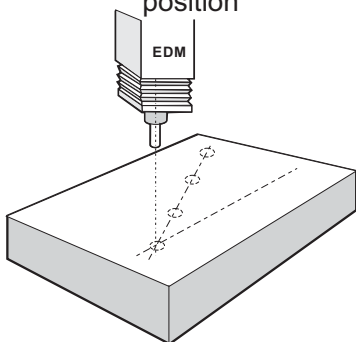
Line Angle (**LIN ANG**)..... - 30 degree (Anti-clockwise)
 Line Distance (**LIN DIST**)..... 80.00 mm
 No. of Holes (**NO. HOLE**)..... 4



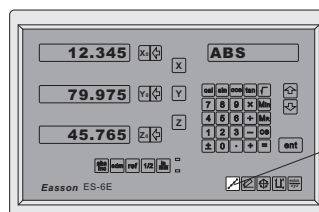
step 1 : The LHOLE function starts by using the current tool position as the starting point, therefore, locate the tool at the **first** LINE HOLE position



to enter the **LHOLE** function



locate the tool at the **first** Line Hole position



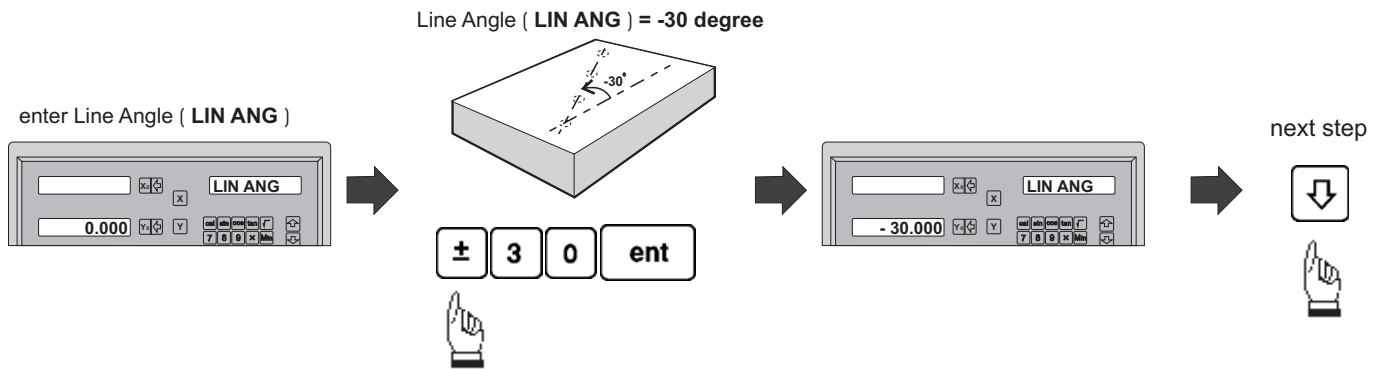
to enter the **LHOLE** function



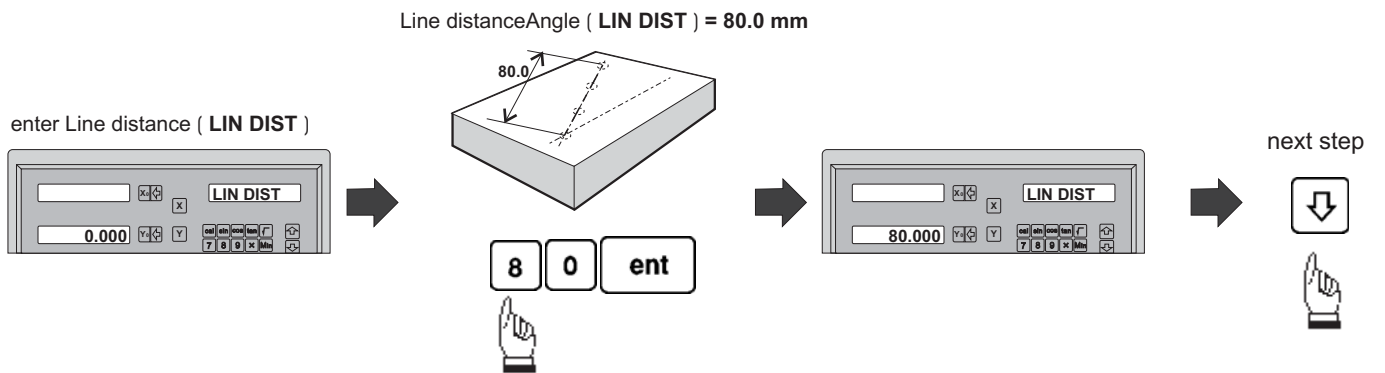
enter the Line Angle (**LIN ANG**)



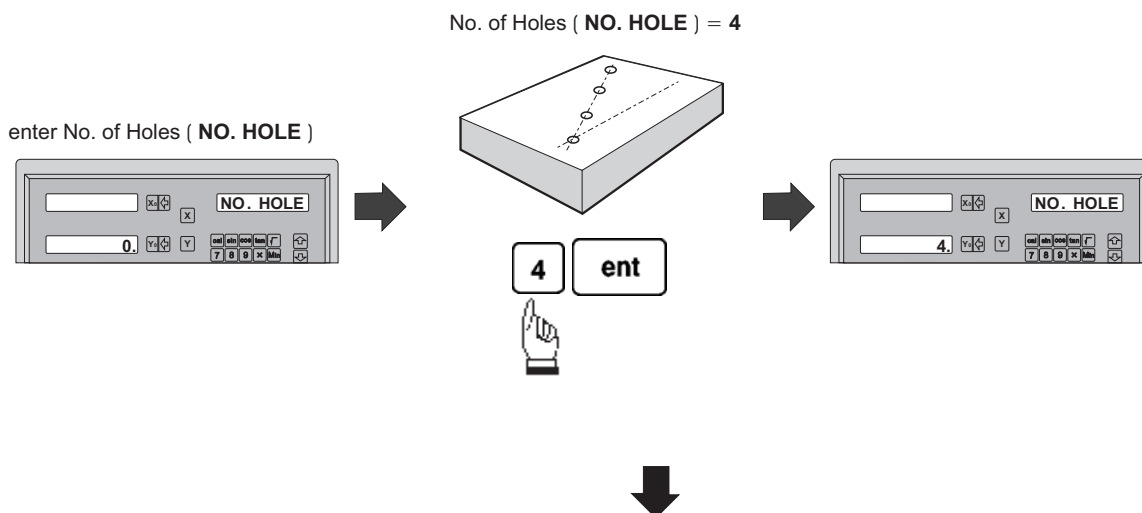
step 2 : Enter Line Angle (LIN ANG)





step 3 : Enter Line distance (LIN DIST)






step 4 : Enter No. of Holes (NO. HOLE)



LHOLE - Tool positioning for a Line of Holes

➔ All LHOLE machining parameters are already entered into ES-6E  to enter into LHOLE drilling mode 

Operator can  or  to select the Line Hole, then move the machine to display = 0.000, then the Line Hole position is reached. 

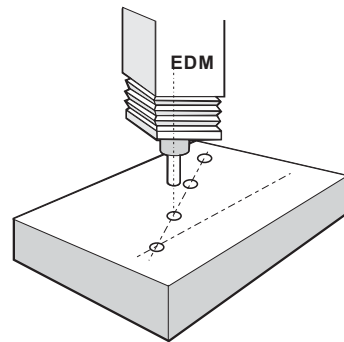
Next Line Hole



move the machine to display = 0.000



HOLE 2 = Line Hole no. 2



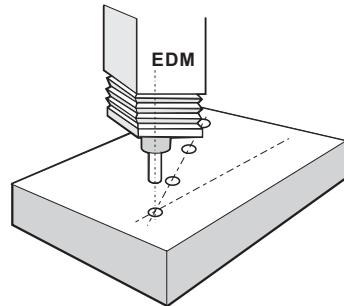
Last Line Hole



move the machine to display = 0.000



HOLE 1 = Line Hole no. 1



If the operator wants to check or verify that the ES-6E's LHOLE calculation is correct, or wants to temporarily exit the LHOLE function cycle (ie swap to normal XYZ display). The operation is as follows :

presently in LHOLE cycle



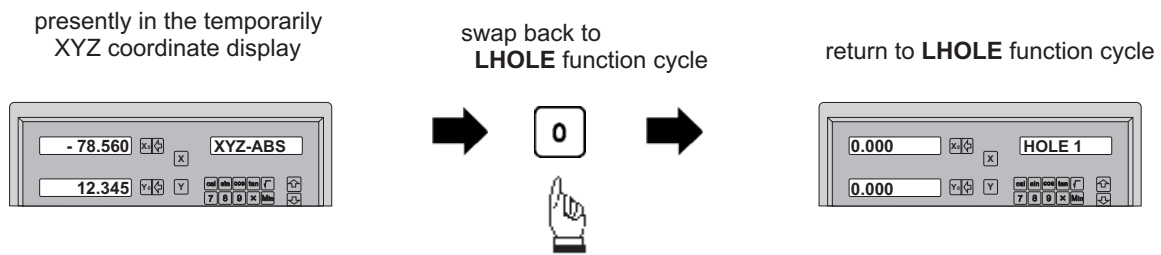
temporarily *swap* to normal XYZ coordinate display



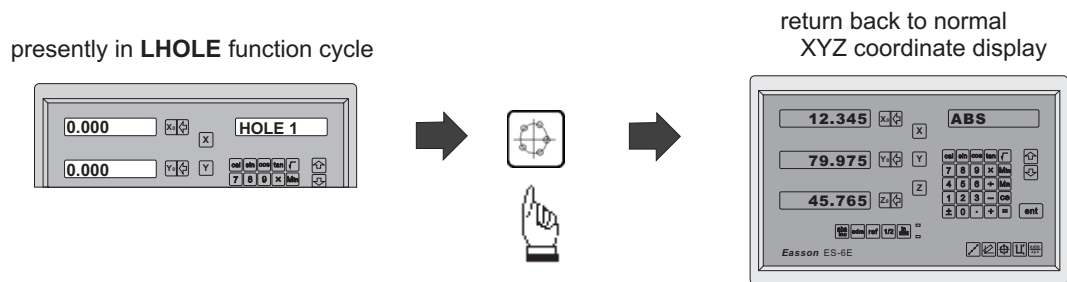
temporarily return to XYZ coordinate display



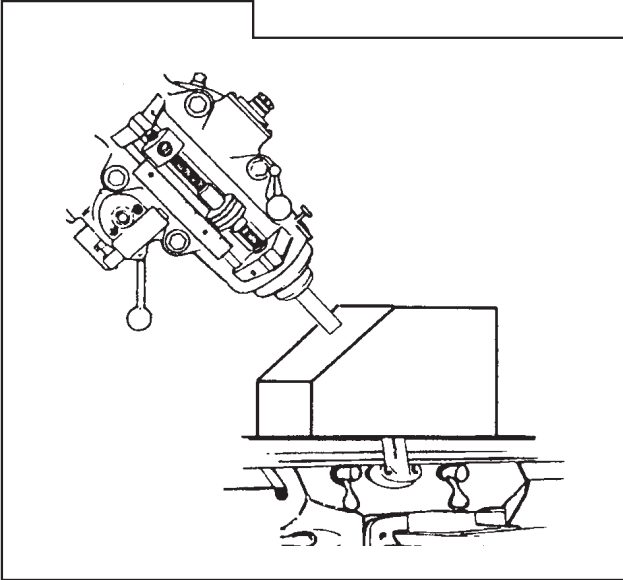
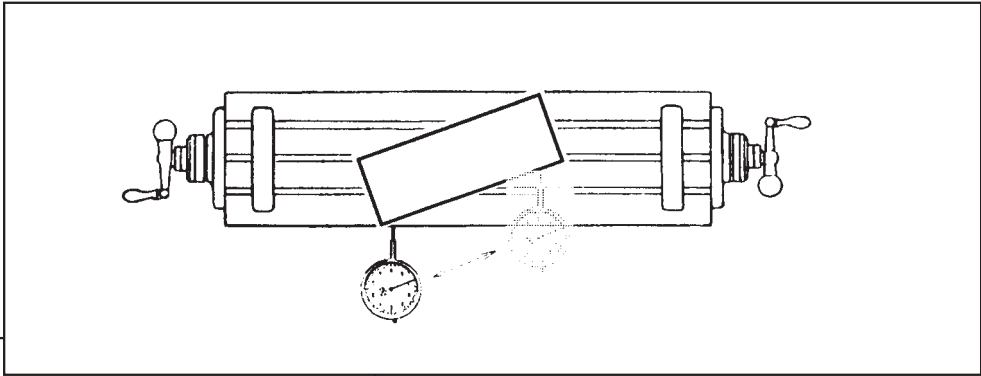
swap back to LHOLE cycle to continue the Line Holes drilling operation



After the Line Holes drilling operation is completed, and to leave the LHOLE function cycle, follow the procedure below



INCL - Inclined surface datum tool positioning



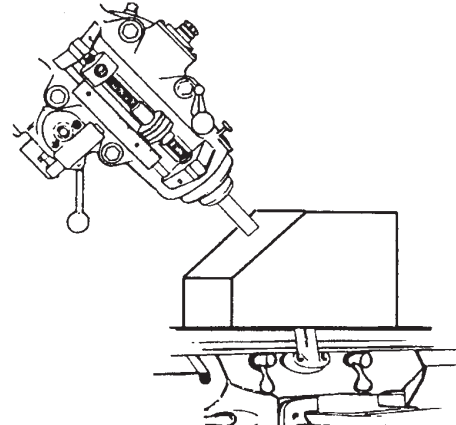
INCL - Inclined surface datum tool positioning

Function : During a machining process, it is quite common to machine an inclined surface.

If the work piece is small or the accuracy requirement is quite low, the operator can simply work on an incline or rotary table to machine the inclined working surface easily.

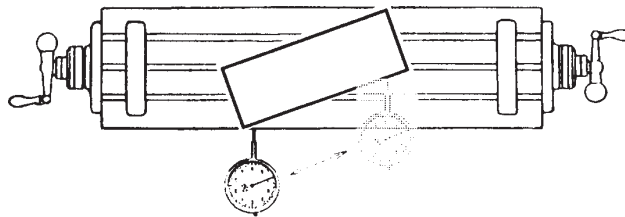
However, when the **work piece is too big** to be installed onto the incline table, or the **accuracy requirement is high**, the only solution is to calculate the machining points or datuming points using the mathematical method. This is generally very time consuming.

The ES-6E provides easy-to-use **INCL** function to help the operator for precision inclined surface datuming and machining.

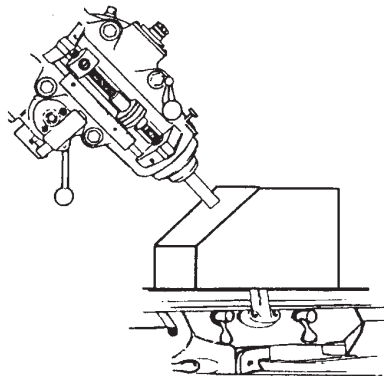


Application of the INCL function are as follows :

A) XY plane - to accurately datum the work piece at an inclined angle



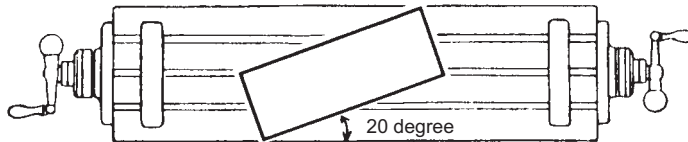
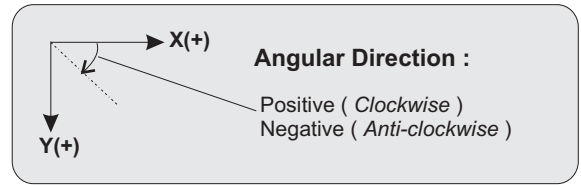
B) XZ/YZ plane - Machine an inclined surface



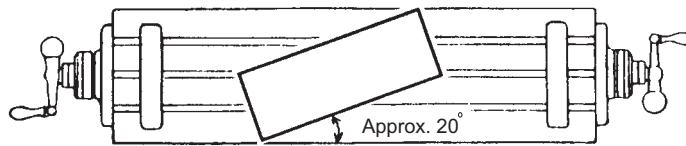
INCL - Inclined surface datum tool positioning

Example :

To accurately datum the work piece at a 20 degree angle on the XY plane

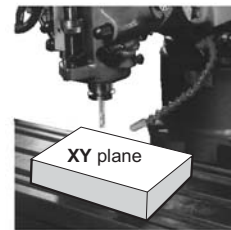
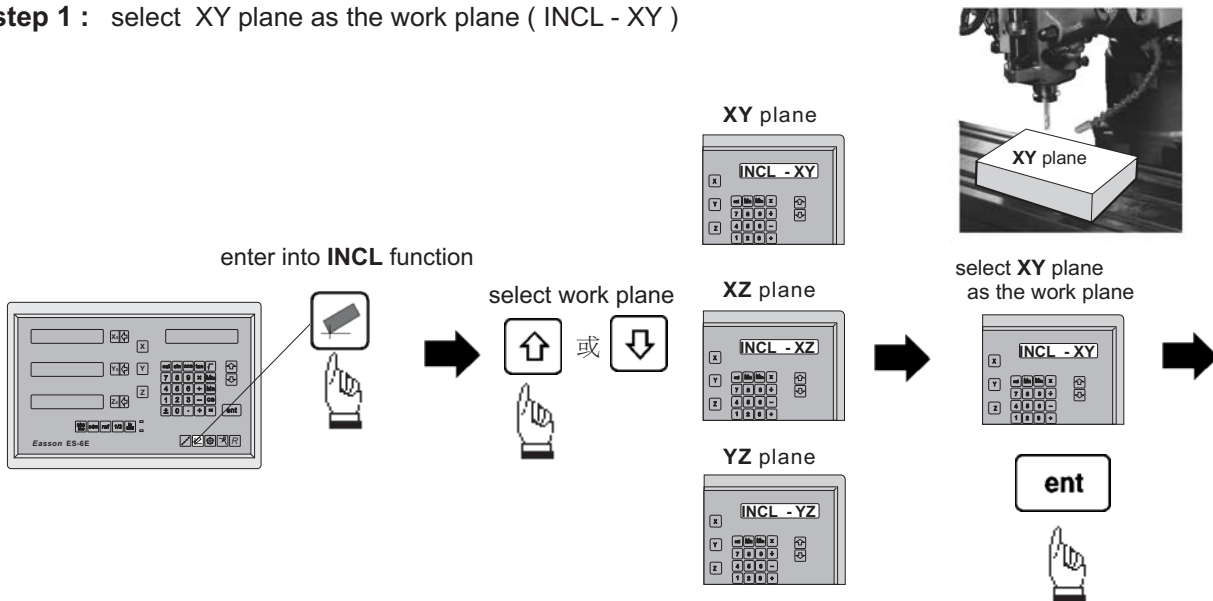


Operational procedure



Install the work piece onto an rotary table at approxiately 20 degree.

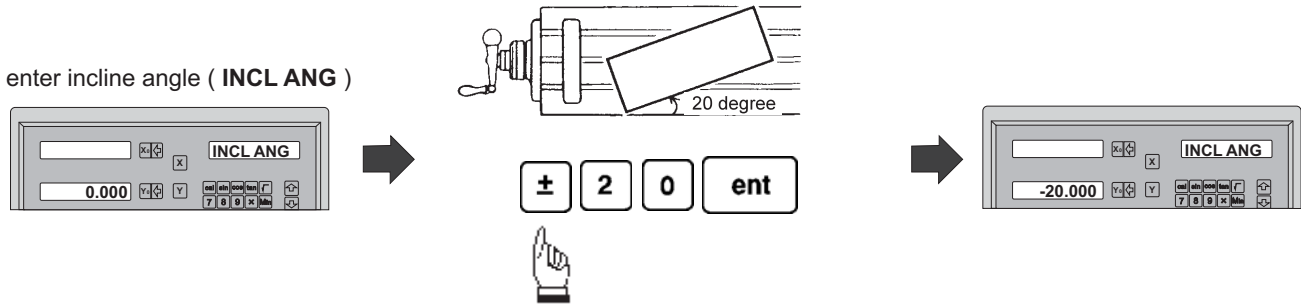
step 1 : select XY plane as the work plane (INCL - XY)



INCL - Inclined surface datum tool positioning

step 2 : enter incline angle (**INCL ANG**)

incline angle (**INCL ANG**) = -20 degree



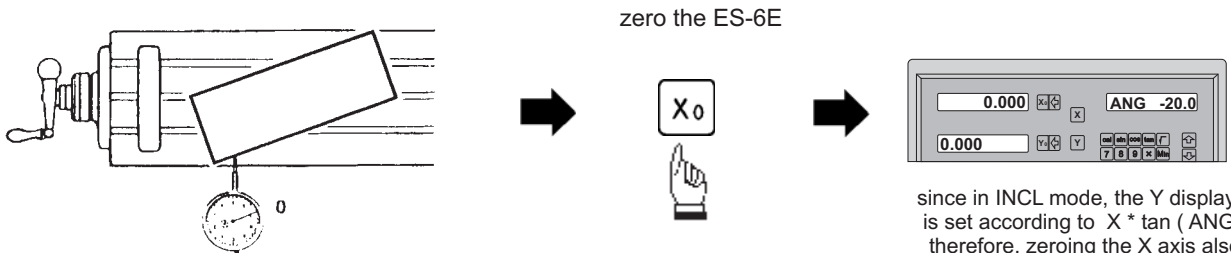
All INCL machining parameters already entered into ES-6E



to enter into INCL datuming mode



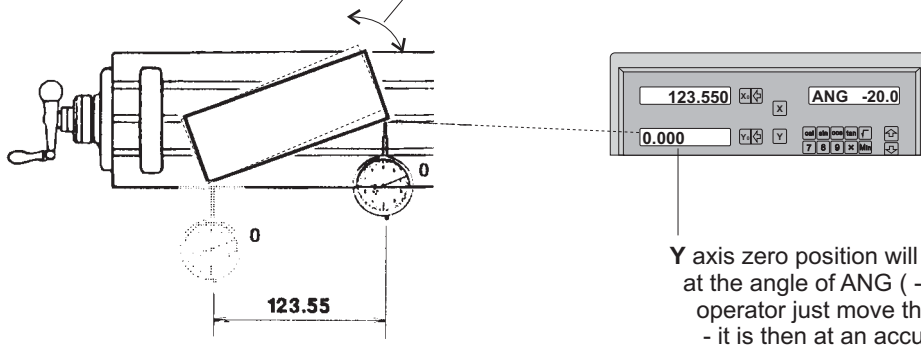
A) zero the dial indicator on one end of the work piece



zero the ES-6E

since in INCL mode, the Y display is set according to $X * \tan (ANG)$, therefore, zeroing the X axis also clear the Y axis.

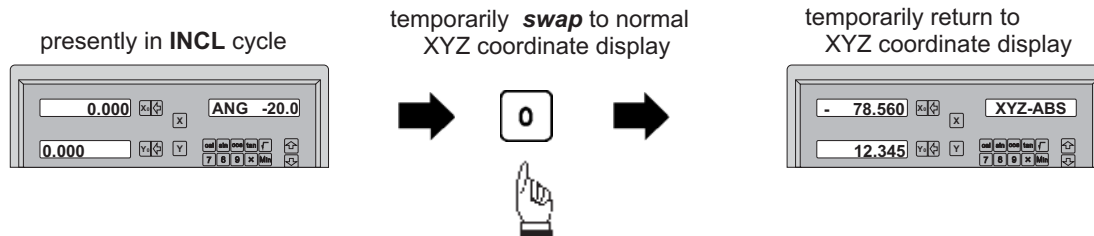
B) After move the machine to Y axis display = 0.000, then the Y axis position is accurately posited at 20 degree. operator can fine tune the work piece incline angle until the dial indicator at zero.



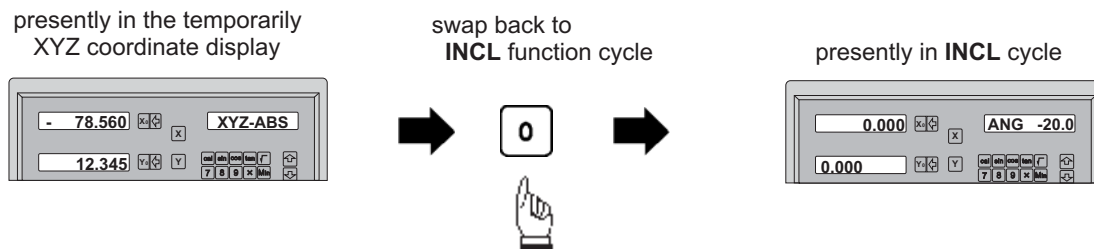
Y axis zero position will follow the X axis position at the angle of ANG (-20 degree in this example) operator just move the Y axis to display = 0.000 - it is then at an accurate 20 degree position

During the incline angle alignment, angular adjustment of any one end of the work piece will affect the the position on the other end, the above angular alignment procedure A) & B) has to be carried out iteratively until operator is satisfied with the angular alignment achieved.

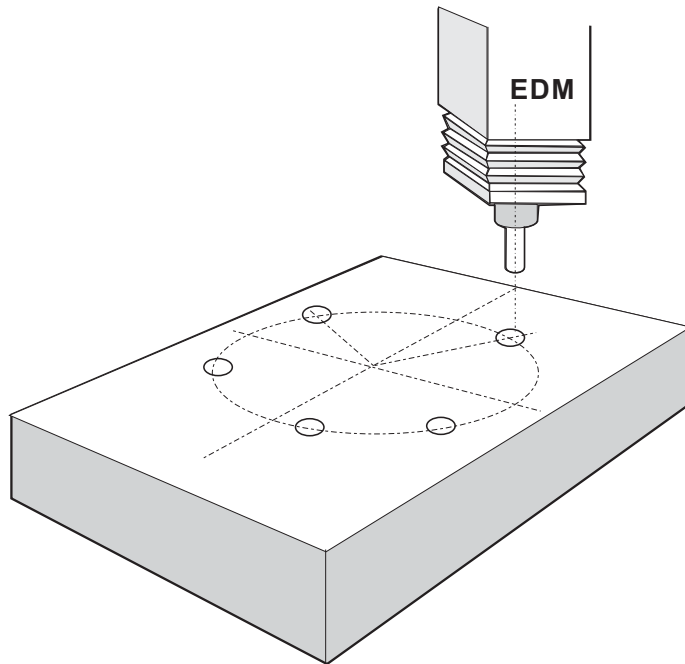
If the operator wants to check or verify if ES-1's INCL calculation is correct, or wants to temporarily exit the INCL function cycle (swap to normal XYZ display). The operation are as follows .:



swap back to INCL cycle to continue the **INCL** incline angle alignment

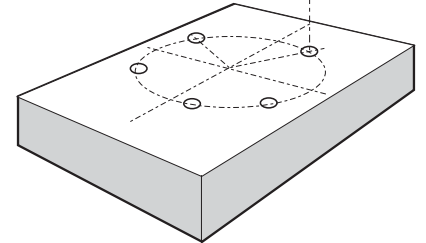
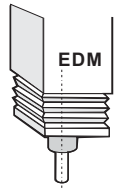


PCD - Tool positioning for Pitch Circle Diameter



PCD - Tool positioning for Pitch Circle Diameter

Function : ES-6E provides a PCD function to for drilling holes around a Pitch Circle Diameter. The operator simply enters the following machining parameters in accordance with the step by step guides shown on the ES-6E's message display,. The ES-6E will then calculate all the pitch hole position coordinates and temporarily preset the hole position coordinates to zero (0.000). The operator then moves the machine until the display axes = 0.000 and the pitch hole position is reached.

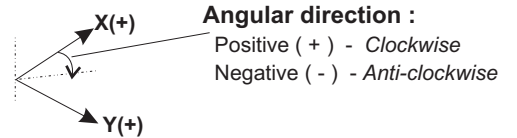


- Centre (**CENTRE**)
- Diameter (**DIA**)
- No. of Holes (**NO. HOLE**)
- Start Angle (**ST. ANG**)
- End Angle (**END. ANG**)

After the above machining parameters are entered into ES-6E, it presets all the pitch hole positions to 0.000

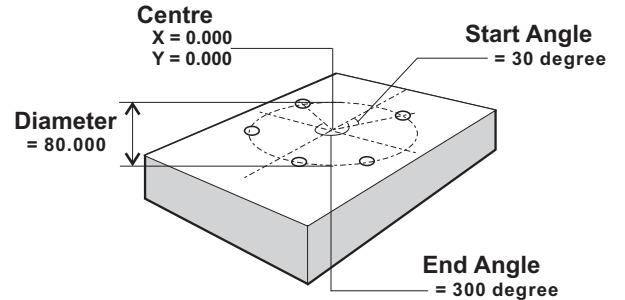
Operator can press  or  to select


the pitch hole, and then move the machine to display = 0.000 - the pitch hole position is then reached

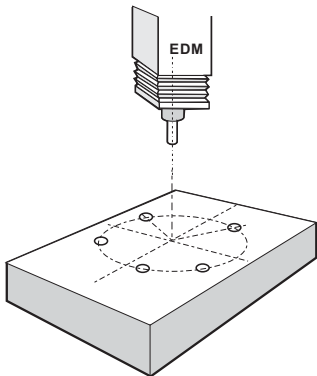


Example

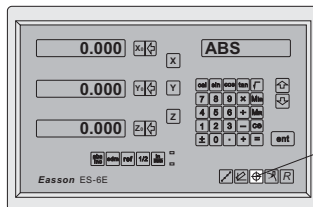
Centre Coordinate (**CENTRE**) **X= 0.000, Y=0.000**
 Diameter (**DIA**) **80.000mm**
 No. of Holes (**NO. HOLE**) **5 holes**
 Start Angle (**ST. ANG**) **30 degree** (clockwise)
 End Angle (**END. ANG**)..... **300 degree** (clockwise)



step 1 : Set up the work piece datum (work piece zero)  to enter the **PCD** function



set up work piece datum



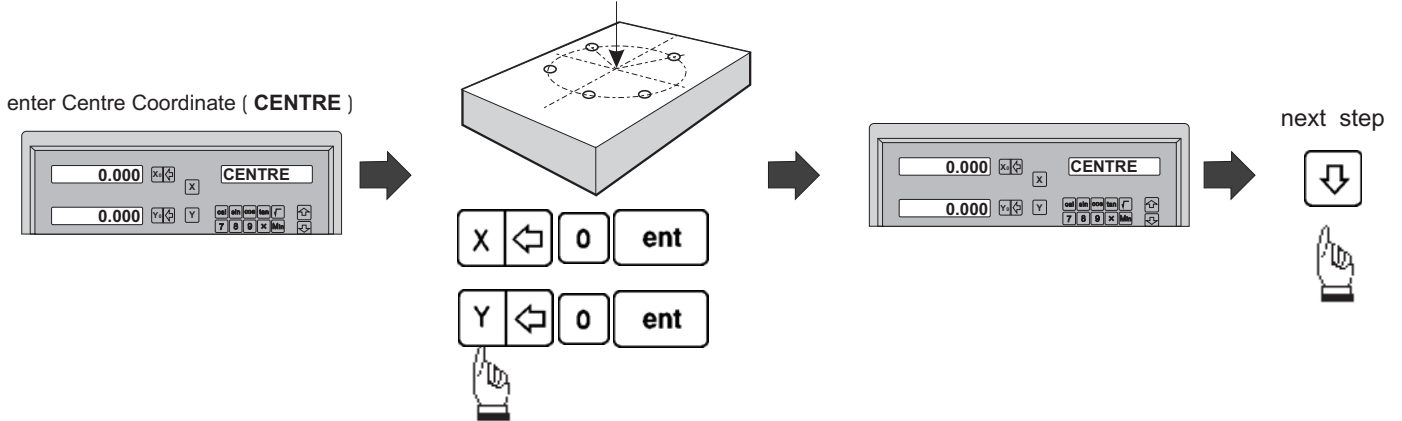
to enter the **PCD** function



enter the **CENTRE** coordinate

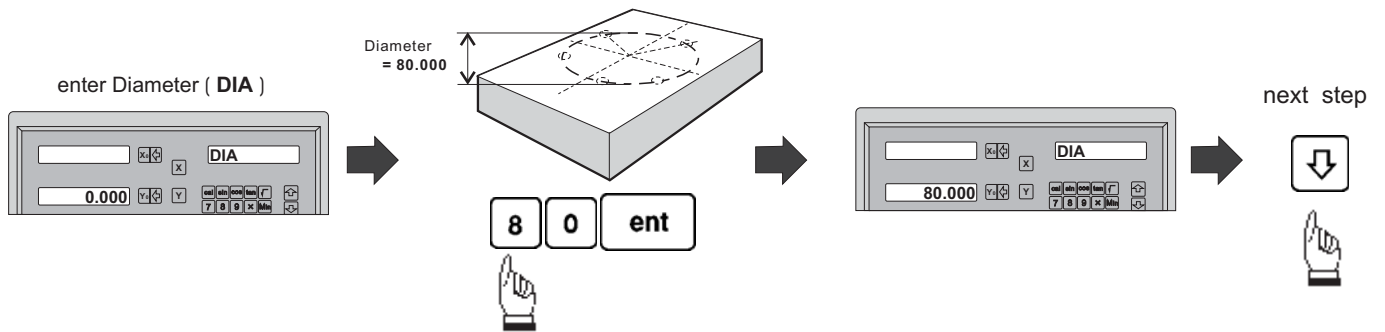
step 2 : Enter Centre Coordinate (CENTRE)

Centre Coordinate (CENTRE) : X=0.000, Y=0.000



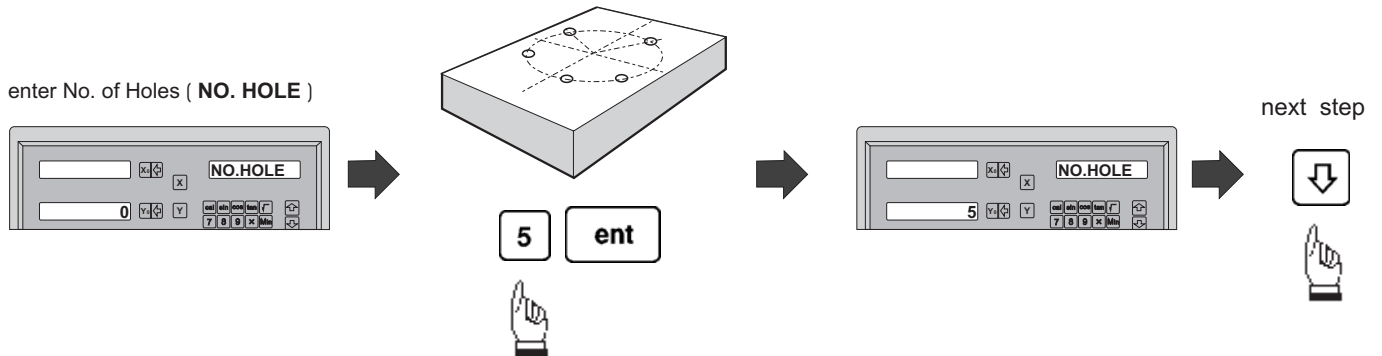
step 3 : Enter Diameter (DIA)

Diameter (DIA) = 80 mm



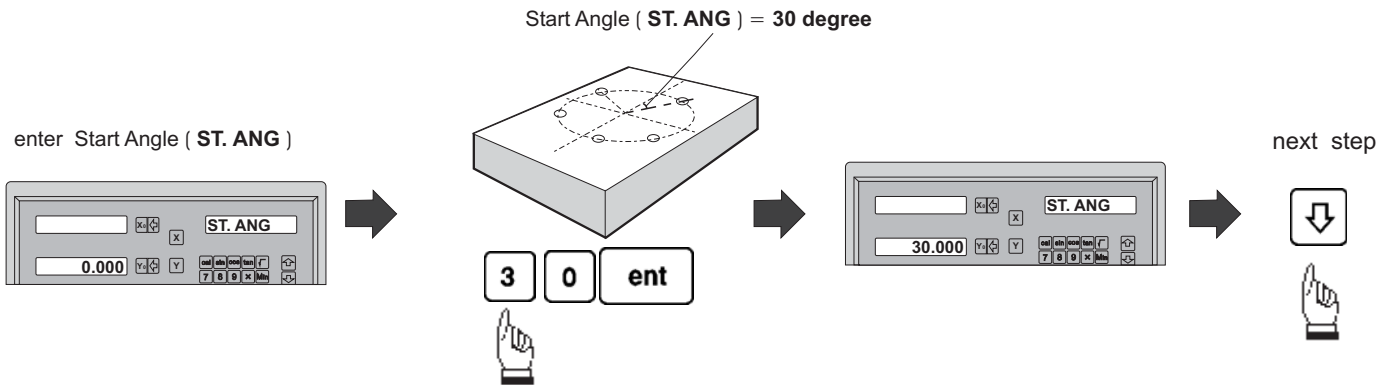
step 4 : Enter No. of Holes (NO. HOLE)

No. of Holes (NO. HOLE) = 5

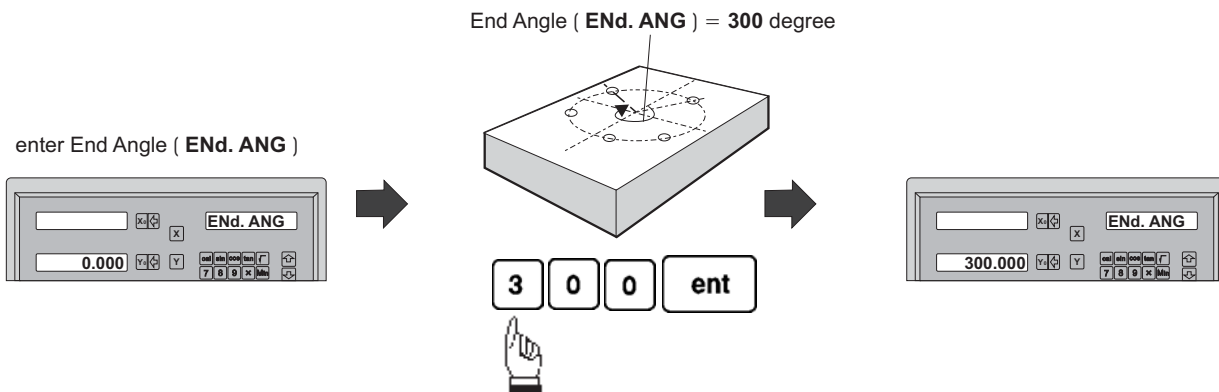




PCD - Tool positioning for Pitch Circle Diameter




step 5 : Enter the Start Angle (ST. ANG)

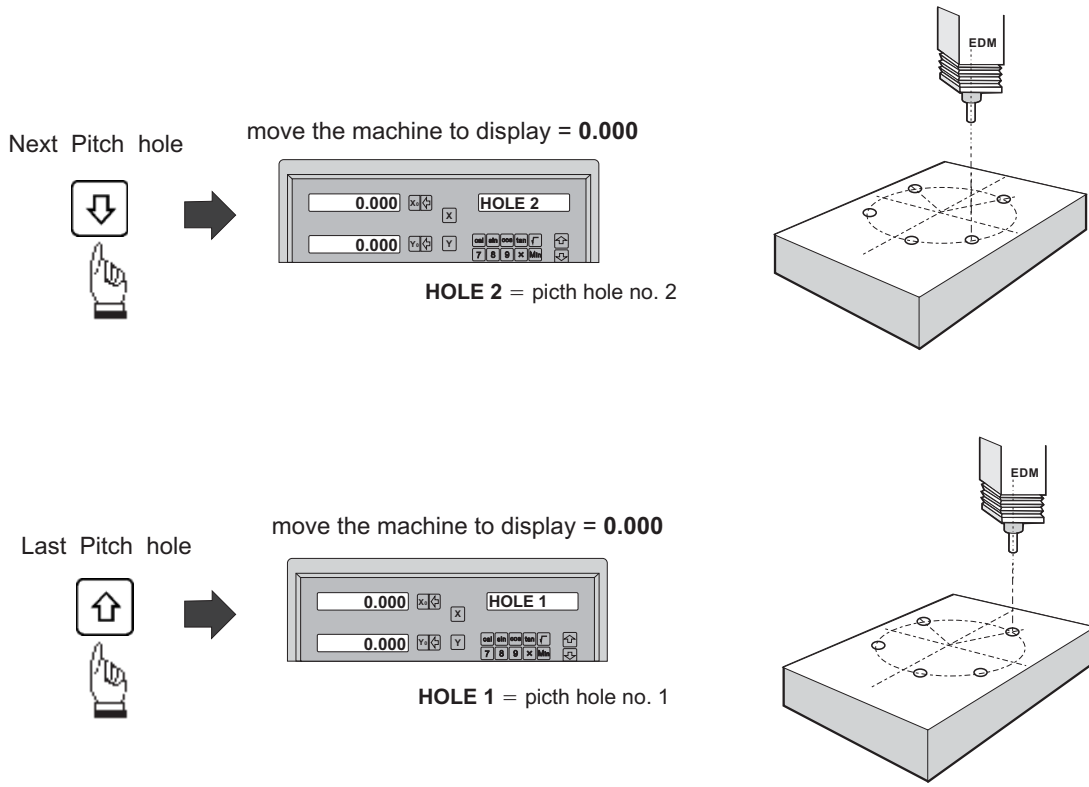


step 6 : Enter the End Angle (ENd. ANG)

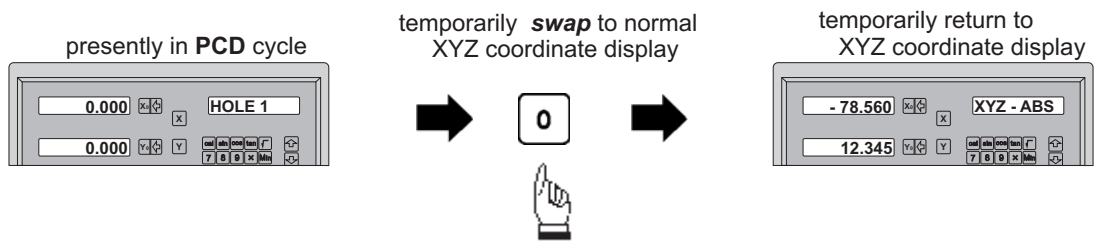


All PCD machining parameters are already entered into ES-6E  to enter into PCD drilling mode 

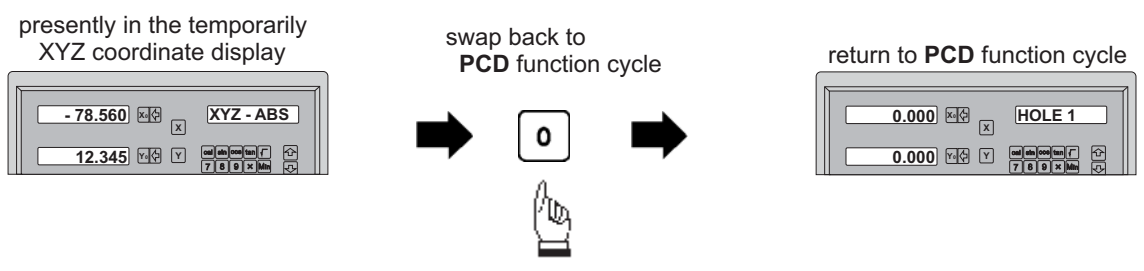
Operator can  or  to select the pitch hole, then move the machine to display = 0.000, to reach the pitch hole position 



Anytime the operator wants to check or verify that the **PCD** calculation is correct, or wants to temporarily exit the **PCD** function cycle (swap to normal XYZ display). The operations are as follows :



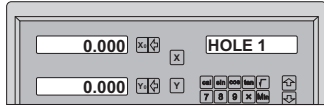
swap back to PCD cycle to continue the **PCD** hole drilling



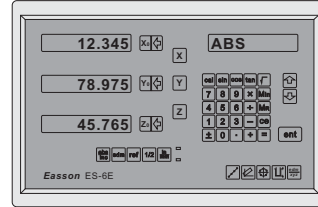
PCD - Tool positioning for Pitch Circle Diameter

To leave the PCD function, after the PCD hole drilling operation is completed follow the under-mentioned procedure:

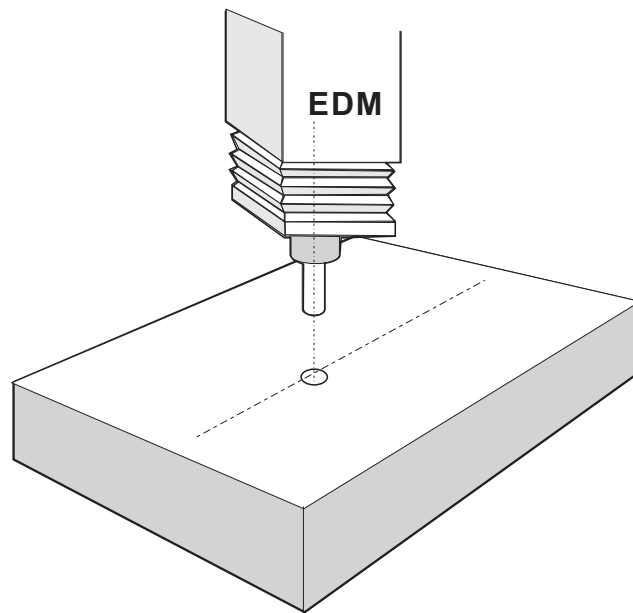
presently in **PCD** function cycle



returns to normal
XYZ coordinate display



EDM Function



EDM Function

EDM function :

ES-6E provides the most complete function on EDM (electric discharge machine)

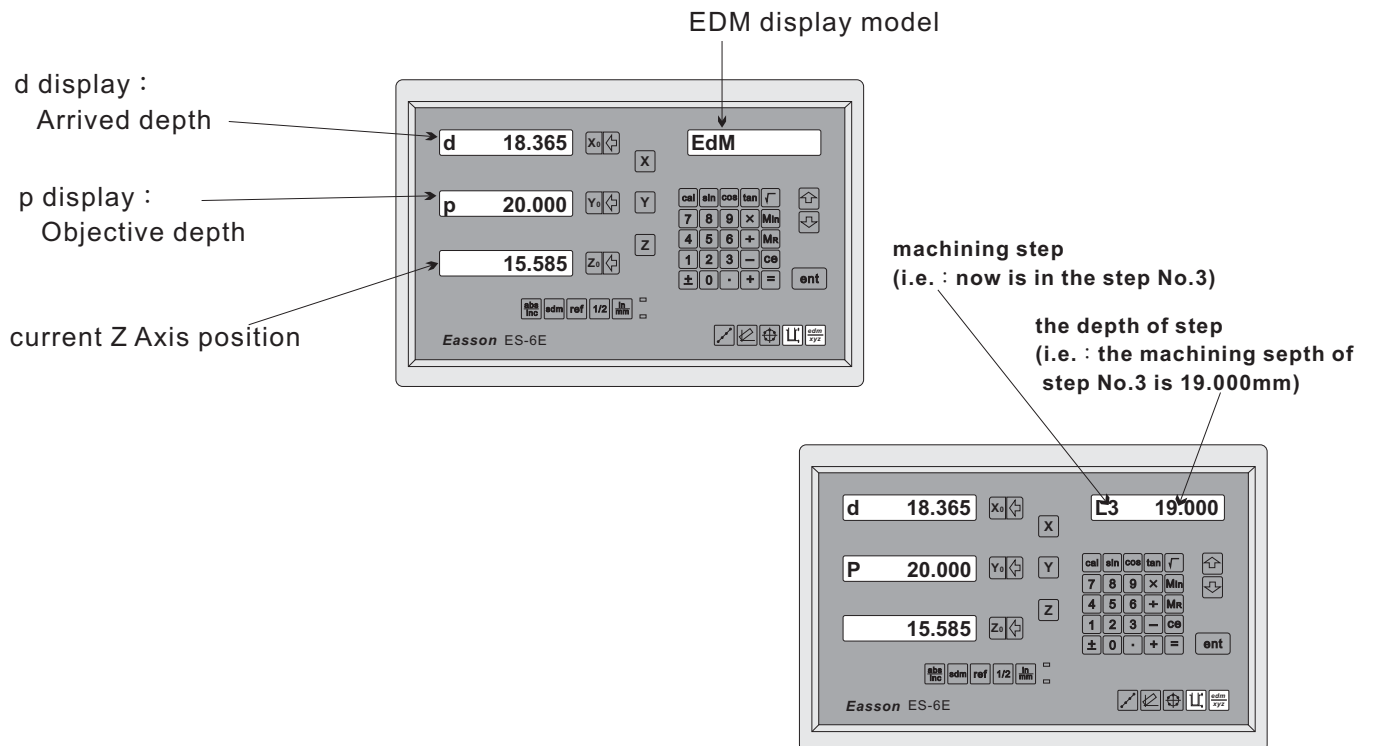
- EDM professional display
- Single-step machining
- Multi-step machining

EDM Professional Display

During the electric discharge process, X and Y Axis do not move, only Z Axis moves up and down continuously, so the most important thing is to control the machining depth of Z Axis electrode during the whole process for operators.

But, if Z Axis moves up and down continuously, for operators it is hard to assess the depth that current electrode has machined, in order to easily know the depth of current electrode, ES-6E provides the EDM professional display.

EDM professional display for single-step machining



Currently ES-6E is in the normal XYZ display, if want to switch to EDM professional display, please press



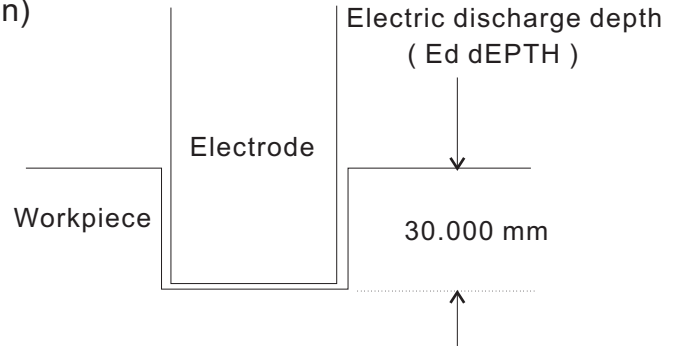
Currently ES-6E is in EDM professional display, if want to switch to the normal XYZ display, please press



EDM Single-Step Machining Example

Example : The machining depth of workpiece is 30.000mm
(the surface of workpiece is zero position)

ES-6E provides the easiest function to stop automatically, when electrode arrived the objective depth, ES-6E will appear a message to stop the EDM.



Example : Electric discharge depth (Ed dDEPTH) = 30.000mm

Operation procedure

Step 1 : Enter into the EDM function

enter the electric discharge depth (Ed dDEPTH)

set up surface of workpiece :
Z = 0.000mm

to enter the EDM setting function

Step 2 : Enter the electric discharge depth (Ed dDEPTH)

set up the electric discharge depth completely ES-6E enter into the EDM professional display automatically, and start machining immediately.

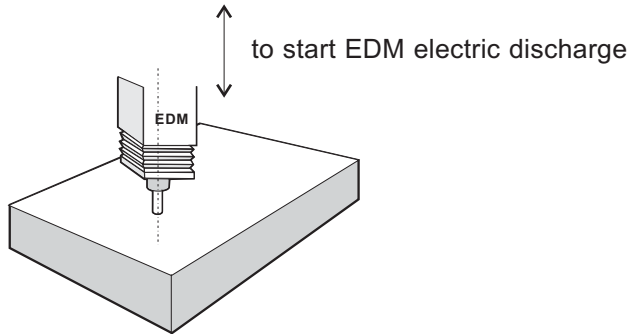
enter the electric discharge depth (Ed dDEPTH)

Electric discharge depth (Ed dDEPTH)

3 0 ent

EDM Single-Step Machining Example

Step 3 : Start the EDM to machine



Operators want to check the XYZ positions to assure the XY positions are not moved during the machining process, or in order to compensate the error that the losing of electrode caused, operators must change the depth of Z Axis, so ES-6E provides a simple switch to help operators to machine easily, check and change the depth.

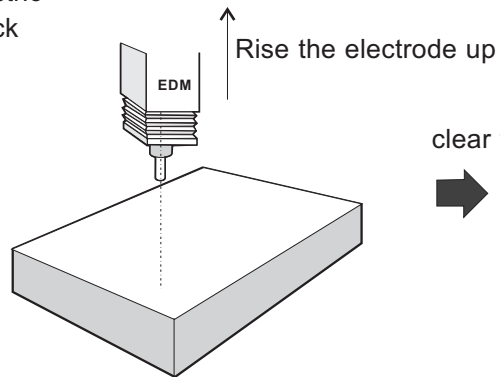
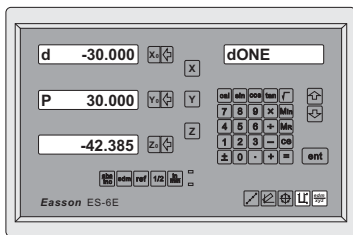
Currently ES-6E is in EDM professional display, if want to switch to the normal XYZ display, please press

Currently ES-6E is in the normal XYZ display, if want to switch to EDM professional display, please press

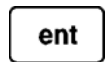
When (d display) machines to (p display), it means that the objective depth has arrived, ES-6E will appear a message to stop and lock the EDM, and ES-6E appears the following display, it means the electric discharge has completed.

Step 4 : After the EDM machining completed, the procedure as follows

when d display arrives to p display, it means the electric discharge has completed, and ES-6E will stop and lock the EDM.



clear the lock of Z Axis

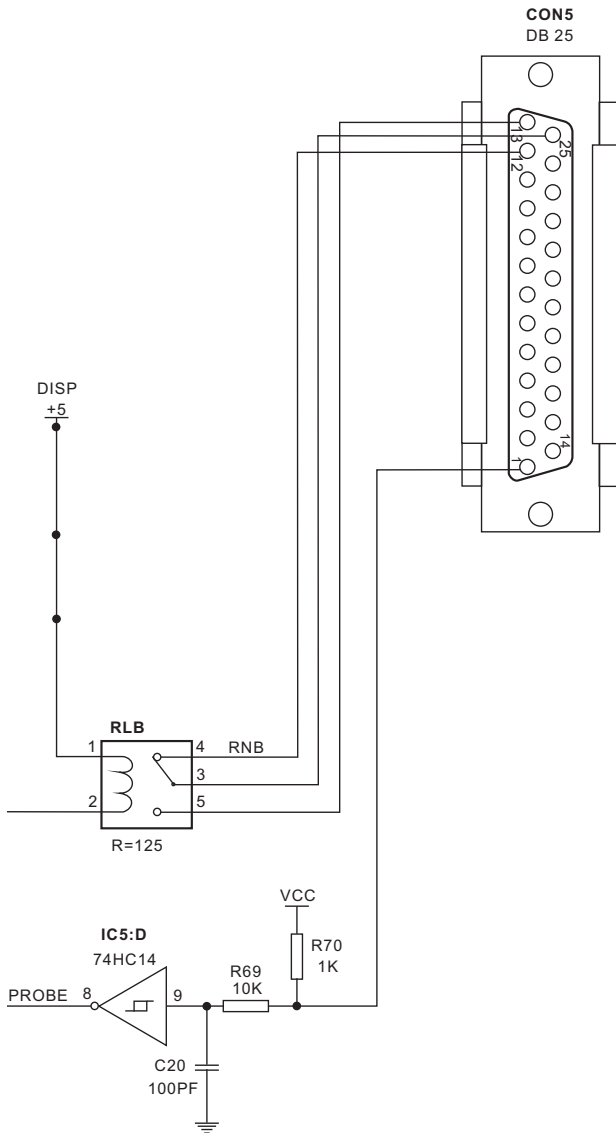


Note :

When ES-6E is in the normal XYZ display, even if Z Axis has arrived the objective electric discharge depth (Ed dEPTh), ES-6E will not stop the EDM, This design is to make operators set up Z Axis zero point at will, and cannot be limited by last machining depth.

Output Wiring Diagram

ES-6E provides a **DB25** connecting socket for external control purpose, the pin assignment as below :

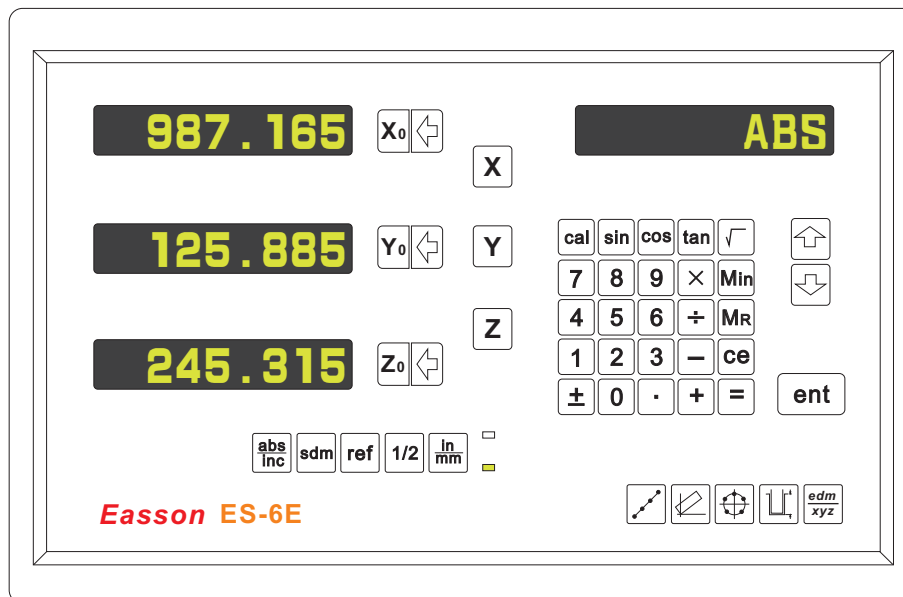


NO (Normal Open) : PIN 25 and PIN 12

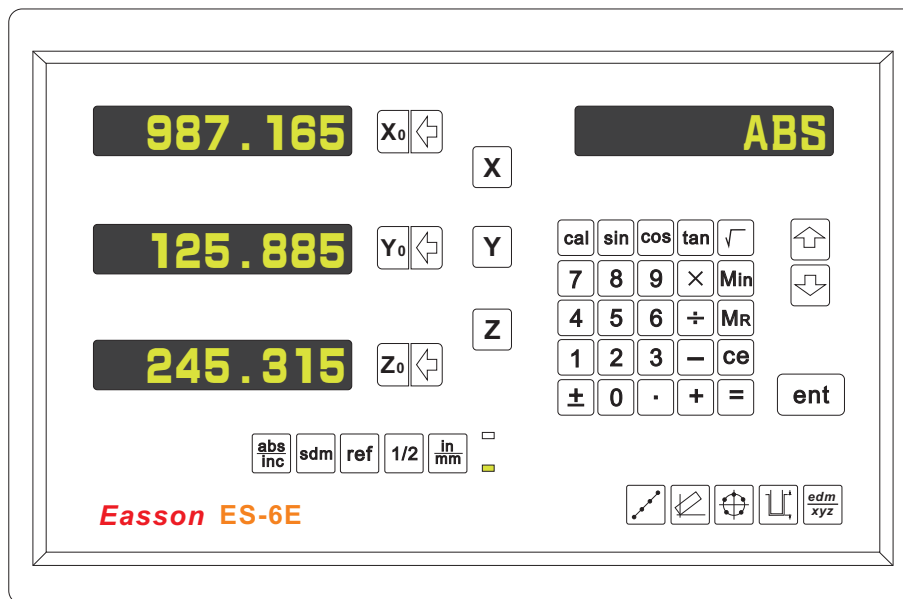
NC (Normal Close) : PIN 25 and PIN 13

ES-6E

Digital Readout Setup Function



ES-6E ORIGINAL PARAMETER RESET FUNCTION

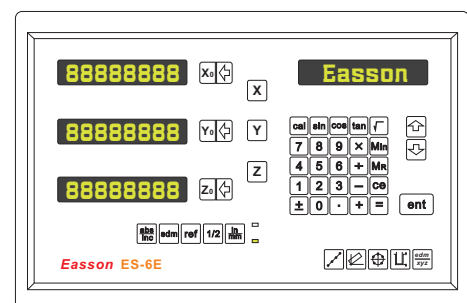


Some inscrutable cases or improper operations cause the chaos of parameter, then you need to initialize the parameter to reset the system.

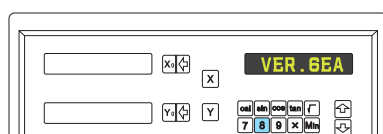
Operational procedure :

- (1) Turn off the ES-6E.
- (2) Power on ES-6E once again, when "ES-6E" moving in display window, please press "8" key then ES-6E enters into the RESET function.

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

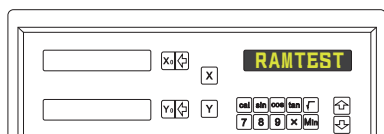


when "VER.6" appears in display window, please press " 8 " key.

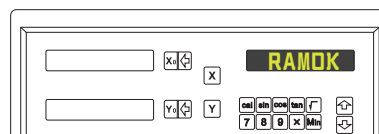


when some messages are displayed over, the DRO enters into the RESET function.

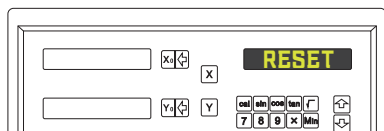
(3) When enter into the RESET function, ES-6E will display :



display "RAM TEST" that means the RAM is testing

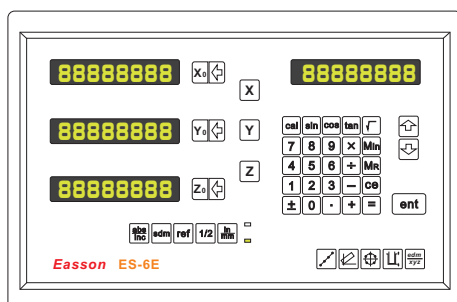


if the RAM function is normal , ES-6E can display "RAM OK"



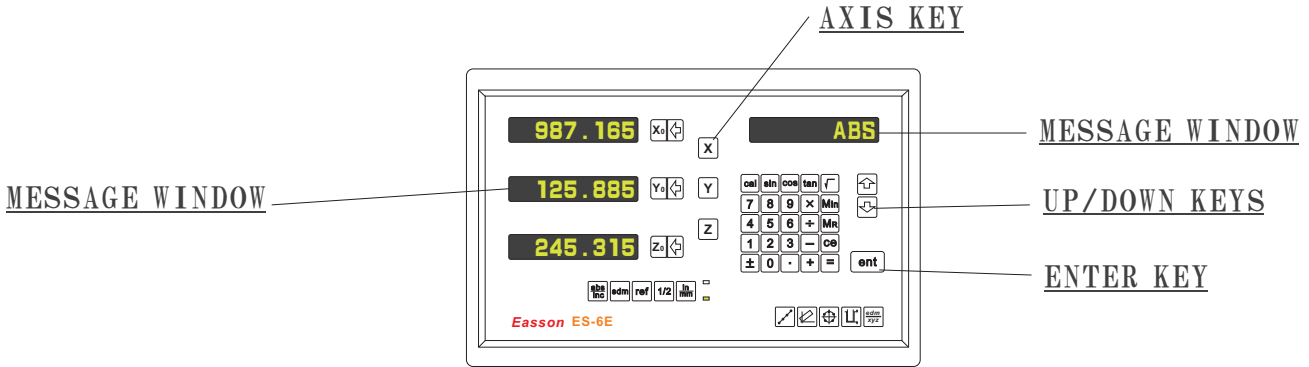
display "RESET" that means the parameter has reset

(4) The reset of parameter has completed then start to enter into the test procedure of display light.



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

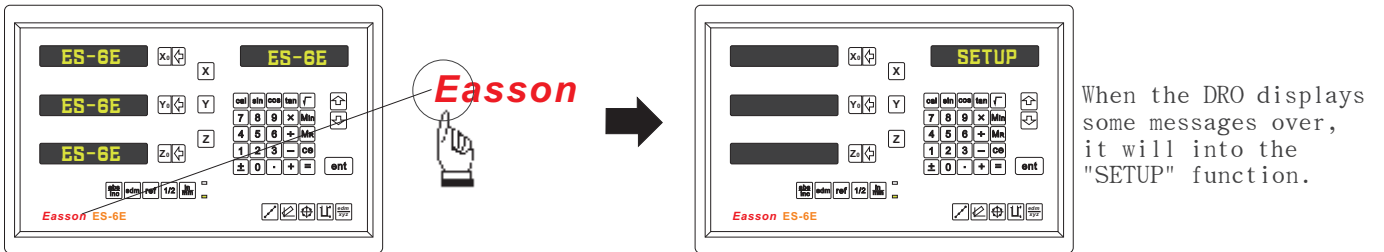
ES - 6E SETUP FUNCTION



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-6E.
- 2). Power on the ES-6E once again, when the message "ES-6E" showing in the MESSAGE WINDOW, please press the letter E of the Easson logo in the left bottom of the key panel immediately, then the DRO ES-6E starts entering into the SETUP function.

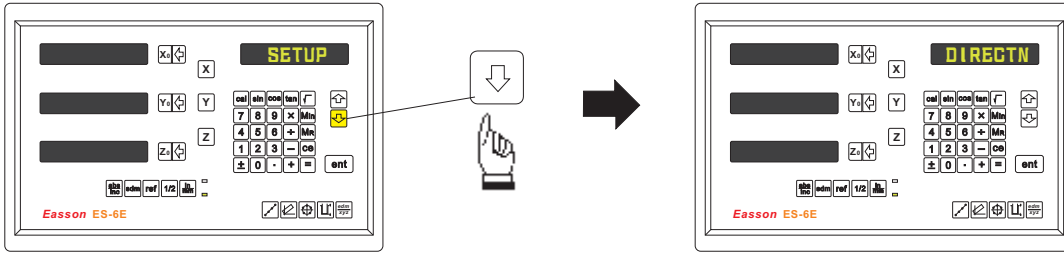


The SETUP procedure is written in a menu mode which enables you to scroll through the top level options and enter, configure and exit the sub-functions as they arise.

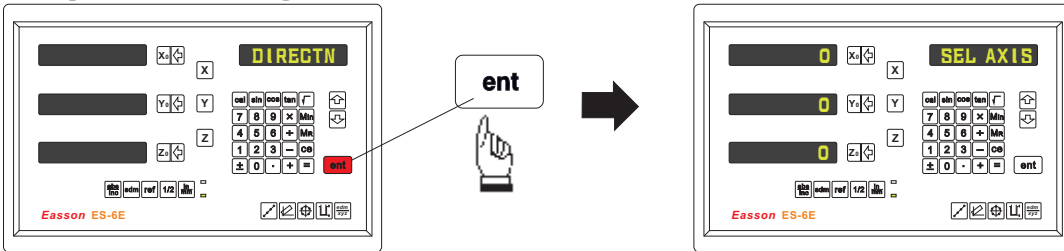
The top level menu headers in order are as follows :

<p>DIRECTIN LIN COMP REF SIGN OUTPUT NORMAL QUIT</p>	<p>specifies the direction of count for each axis permits linear error compensation to be input specifies the signal of the reference point for each axis sets up the "PULSE" or "LOCK" signal returns the DRO settings to the factory preset values exits the SETUP function to proceed to normal working</p>
--	--

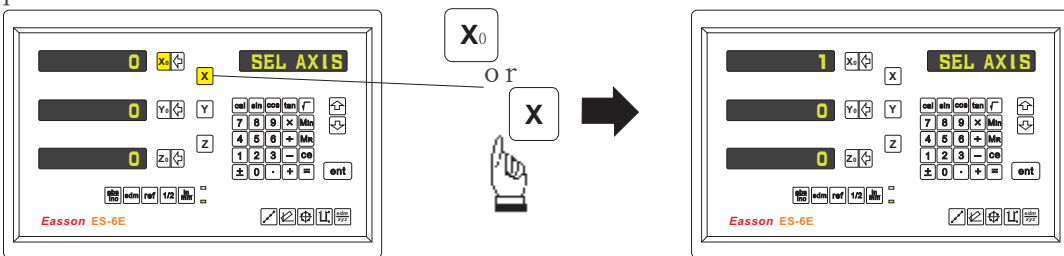
3.) Press  key to select the "DIRECTN" (counting direction) function. Press  key to return to the last function.




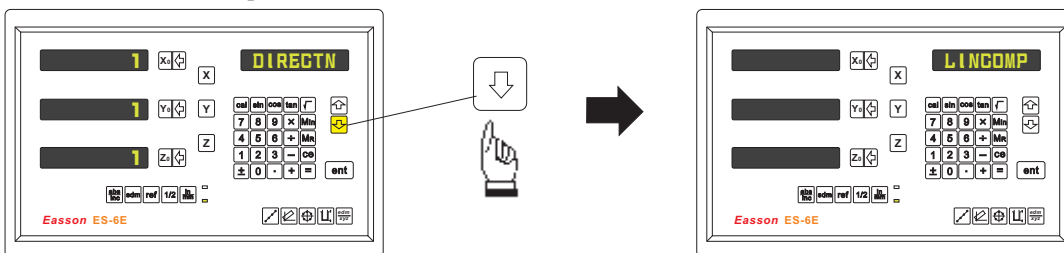
Press **ent** key into the direction setting function, the 0 represents a positive, 1 represents a negative.



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



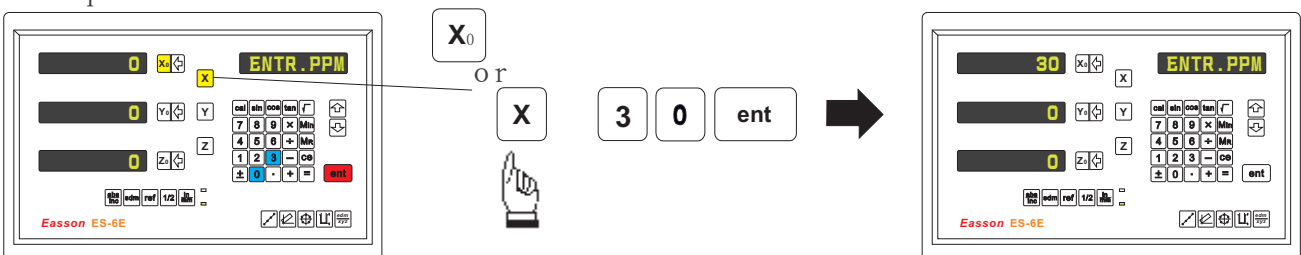
4.) Press **ent** key to make your setting, then press  key to select the "LIN COMP" (linear compensation) function.




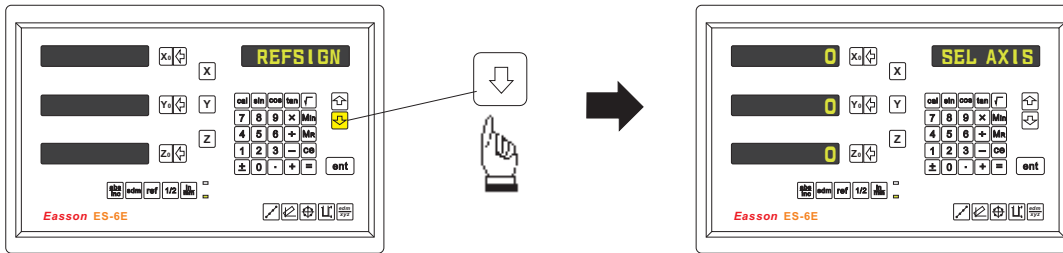
Press **ent** key into the linear error compensation function, the formula as below:
 error value X $-(1000/\text{measuring length}) = \text{compensation value}$
 (ML) measuring length unit = mm, error unit = μm
 Example :

$$\begin{aligned} \text{ML} &= 500\text{mm} & \text{Error} &= -15 \mu\text{m} \\ -15 \mu & \times -(1000/500) & &= 30 \mu\text{m} \\ \text{the compensation value is } & & & 30 \mu\text{m} \end{aligned}$$

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



5.) Press **ent** key to make your setting, then press  key to select the "REF SIGN" function.



Press the UP/DOWN keys until the word "REF SIGH" is shown in the MESSAGE WINDOW, Press the ENTER key to access the next menu level. Press the DOWN key once and the message "SEL AXIS" appears in the MESSAGE WINDOW. Press the individual axis key and enter a 0 or 1 in accordance with the instructions below. Press the ENTER key to store the value. Press the UP/DOWN keys to move to the next menu item. In the market there are many gratings using a 20 μm pitch. There are two types of electronic signal which generate the reference point. The first associates the signal with a rise in voltage, the second with a drop.

Example 1



REF SIGN = 0
Normal Voltage = 0V
At ref point = 5V

Suppliers-Easson, Mitutoyo, Futaba


When fitting an EASSON scale always set to 0

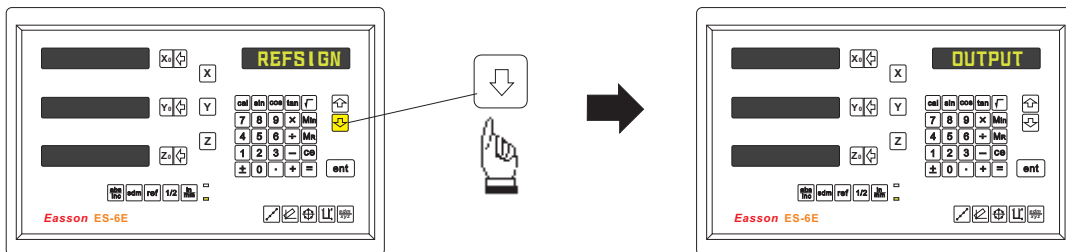
Example 2



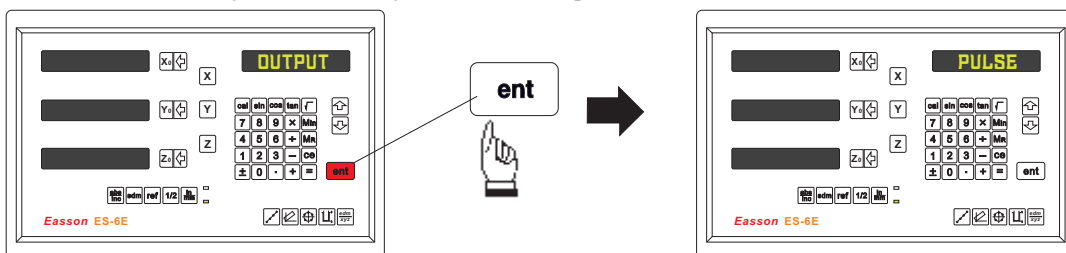
REF SIGN = 1
Normal Voltage = 5V
At ref point = 0V

Suppliers-Fagor

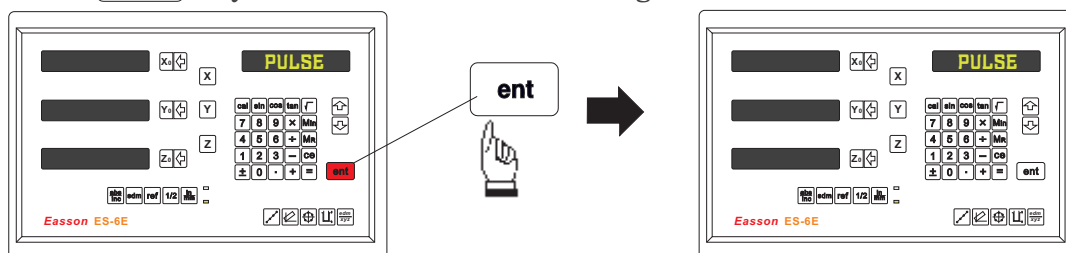
6.) Press **ent** key to make your setting, then press  key to select the "OUTPUT" function.



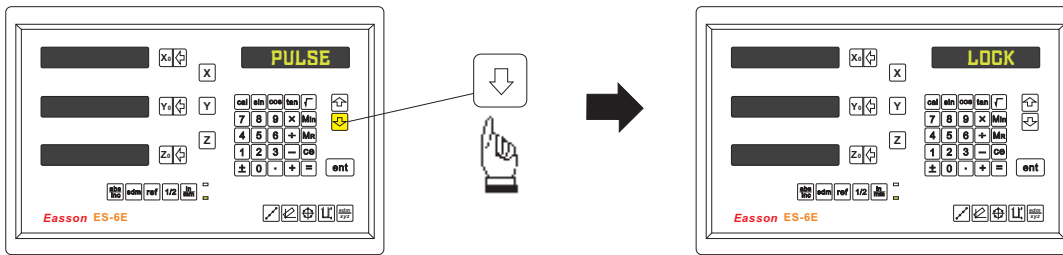
Press **ent** key to make your setting, i.e. To select the "PULSE" signal.



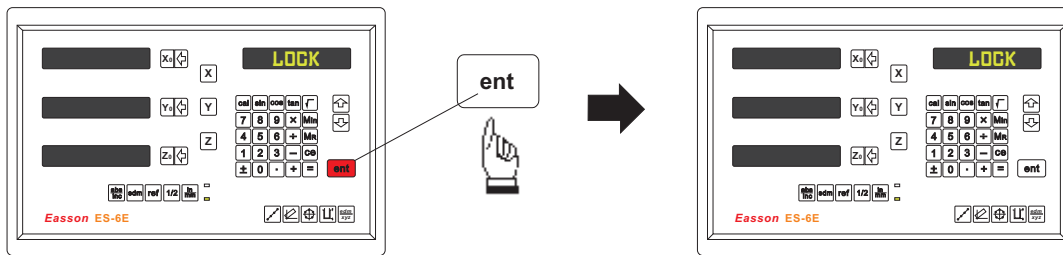
Press **ent** key into the "PULSE" setting function.





Press  key to select the "LOCK" signal.

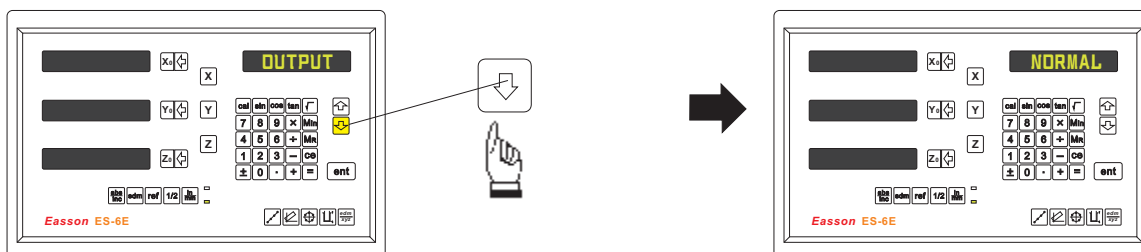



Press  key into the "lock" setting function.

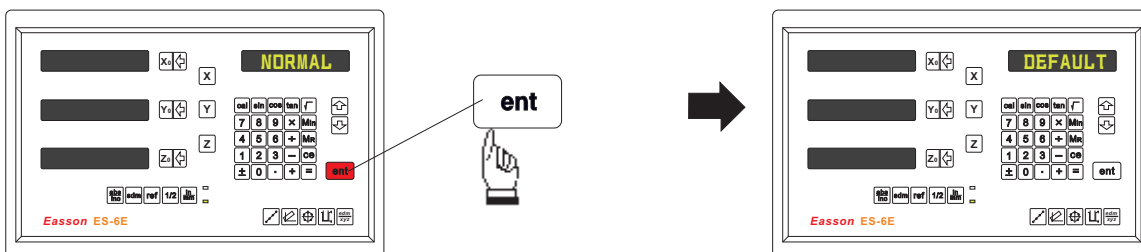


When Z Axis arrives the objective position, ES-6E EDM will have two types of Stop Model and it is usually set up to PULSE signal. If you use PULSE signal to stop the machine and it doesn't work, now you can change the setup model to set to LOCK signal.


7.) Press  key to make your setting, then press  key to select the "NORMAL" function.

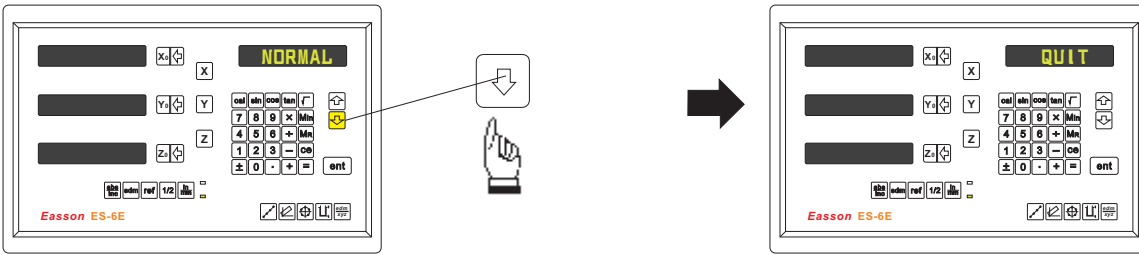


Press  key into the setting function, the message "DEFAULT" is shown in the MESSAGE WINDOW.

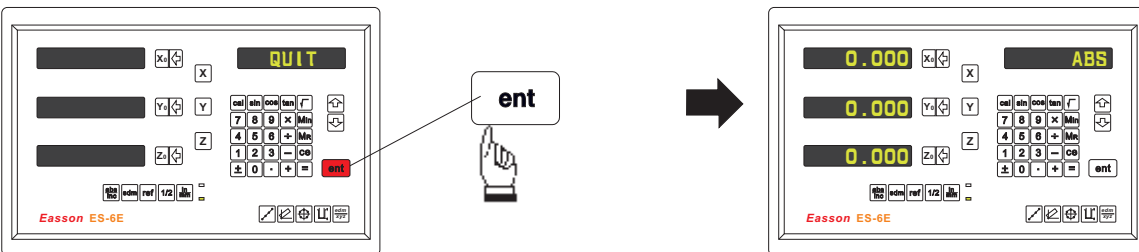


After entering the SETUP mode shown overleaf, push the UP/DOWN keys on the keypad until the word "NORMAL" is shown in the MESSAGE WINDOW. Press the ENTER key to access the next menu level. Press the DOWN key once and the message "DEFAULT" appears in the MESSAGE WINDOW. By pressing the ENTER key the software is restored to default level. Press the UP/DOWN keys to move to the next menu item.

8.) Press **ent** key to make your setting, then press  key to select the "QUIT" function.



Press **ent** key to make your selection, then the DRO will exit the SETUP function and return to the "ABS" state.



By pressing the ENTER key the DRO exits the SETUP program and is ready for machining operations. If use the error compensation function, you must turn off the DRO then power on the DRO again, otherwise your compensated value will invalid.

