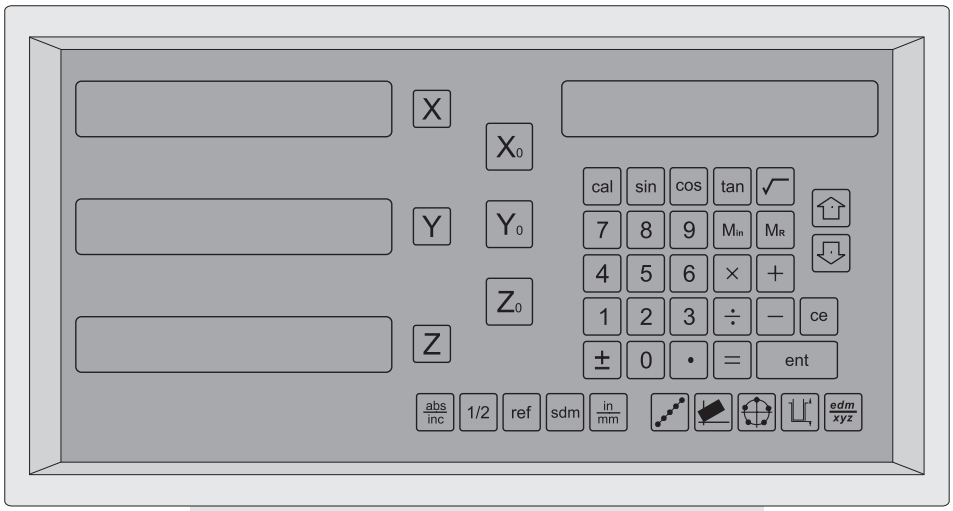
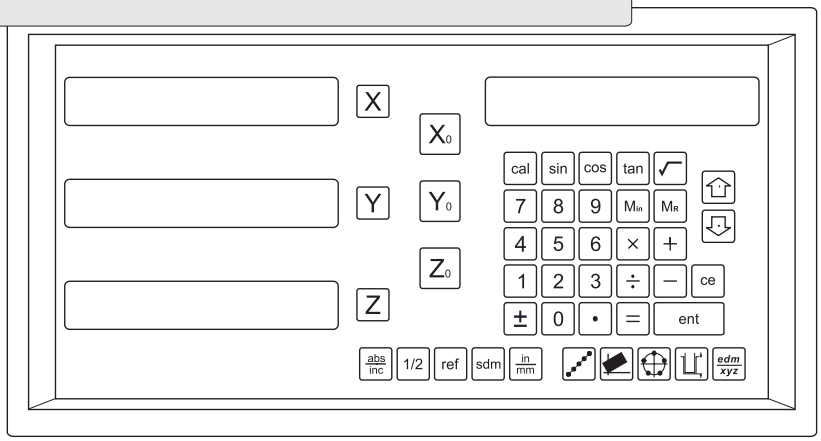



*Always Committed to Quality, Technology & Innovation*

# ES-8EDM
# Digital Readout System
# Operation Manual

## Content

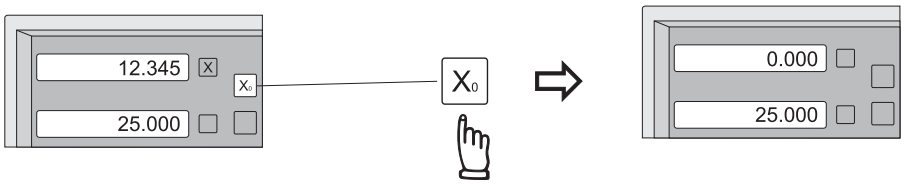
# Basic Functions



## Set Display to Zero

**Purpose :** Set the Current position for that axis to zero

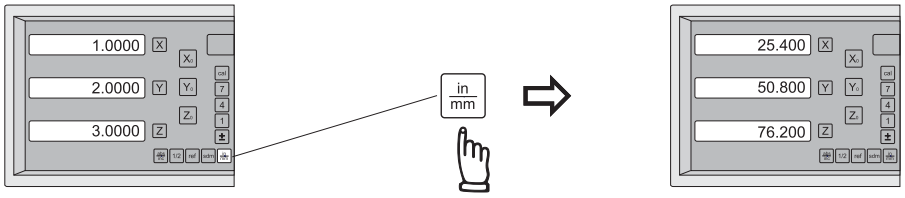
**Example :** To set the current **X Axis** position to zero



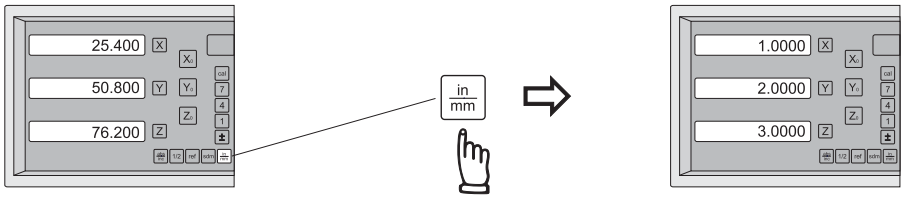

## Inch/Metric Display Conversion

**Purpose :** Switches between inch and metric display

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



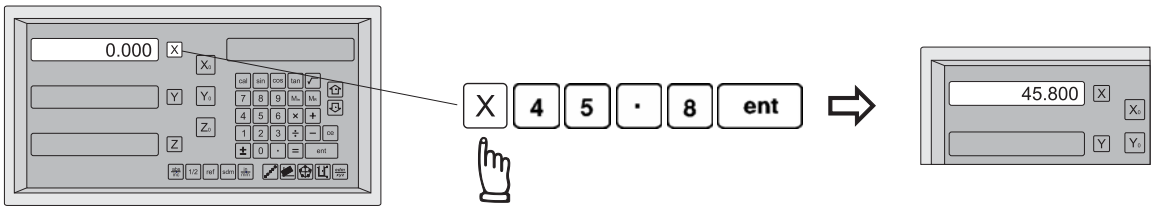

**Example 2 :** Currently in **metric** display, to switch to **inch** display




## Enter Dimensions

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

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

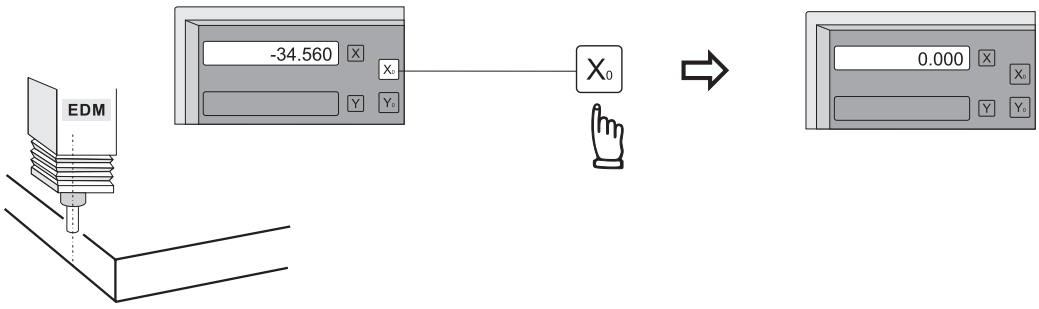


## Centre Find

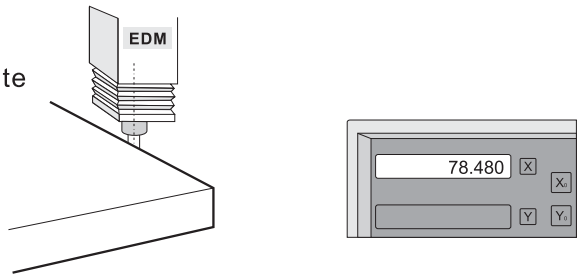
**Purpose :** Counter provide centre find function by halfing the current display coordinate, so that the zero Point of the work piece is located at the centre of the work piece.

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

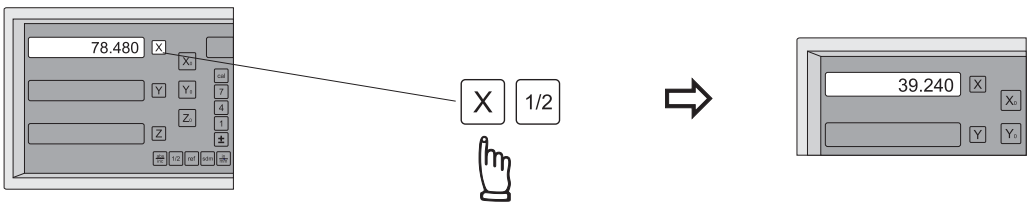
**Step 1:** Locate the edge finder at one end of the work piece,then zero the X Axis.



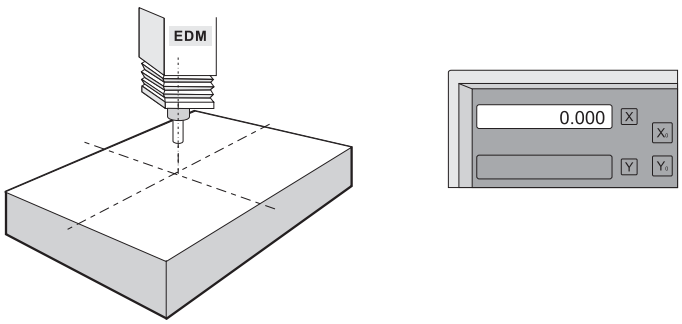

**Step 2:** Locate the edge finder at the opposite end of the work piece.




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




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



## ABS/INC Coordinates display switches

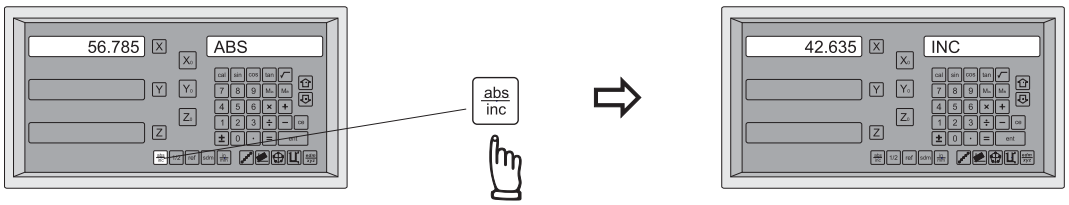
**Purpose : Counter** provides two sets of basic coordinates display, they are **ABS** (absolute) and **INC** (incremental)displays.

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

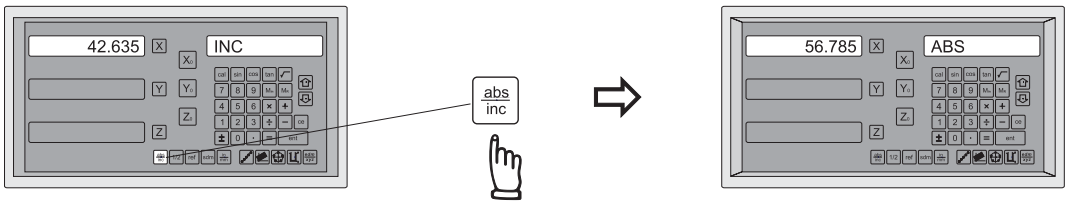
Then the operator is free to zeroing the axes or preset any dimensions into any axis in INC coordinate for any relative position machining. The work piece datum (work piece zero position) is still keep in ABS coordinate if Counter.

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

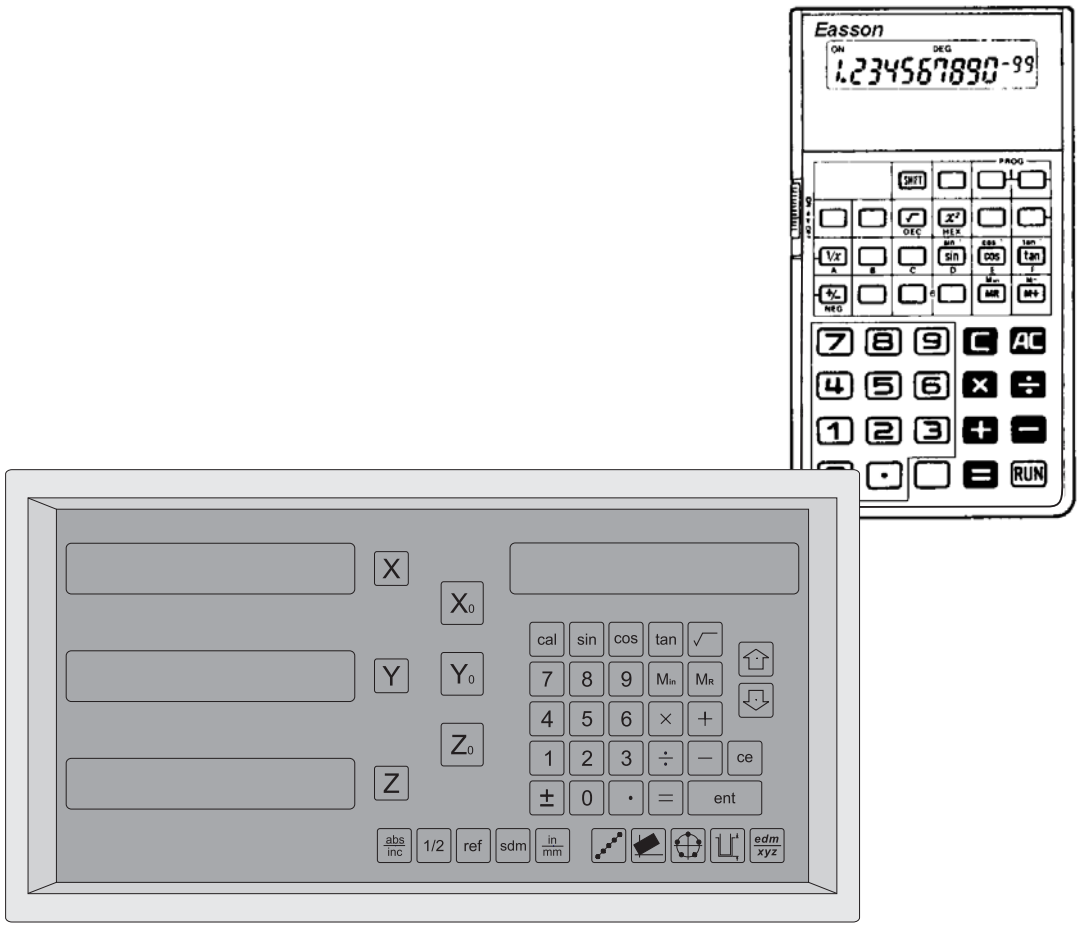
**Example1 :** Currently in **ABS** display coordinate, to switch to **INC** display coordinate




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



# Built in Calculator



## Built in Calculator

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

The built in calculator of Counter not only provides normal mathematical calculations such as add,substract,multiply,division,it also provide useful trigonmetric calculations that are frequently required during machining process such as **SIN, COS, TAN, SQRT** and also inv **SIN,** inv **COS,** inv **TAN, SQUARE...**

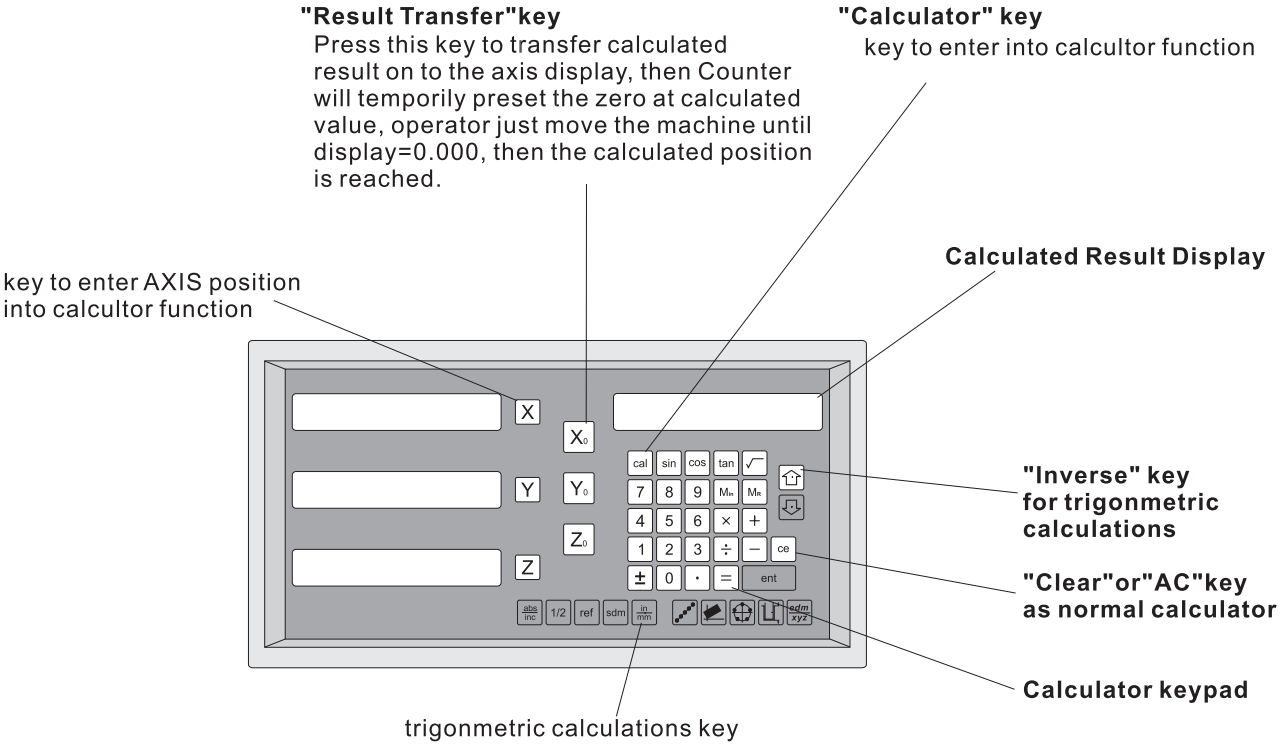
More than that, the major feature of the built in calculator of Counter is"**Result Transfer"** all calculated result from the built in calculator of Counter can be"transferred"on any axis to posit your tool. After the result transferred on to any axis, the Counter will ***temporarily*** preset the zero position at the calculated value, operator simply move the machine to axis display=0.000,then the tool is posited at the coordinate of calculated result.

The built-in calculator offers following advantages:

.Operations are same as commerically availiable calculators, easy to use and no need to learn

.Calculated result can be directly transfered on to any axis, no need to mark down the Calculated result on the paper, time saving and much less mistake.

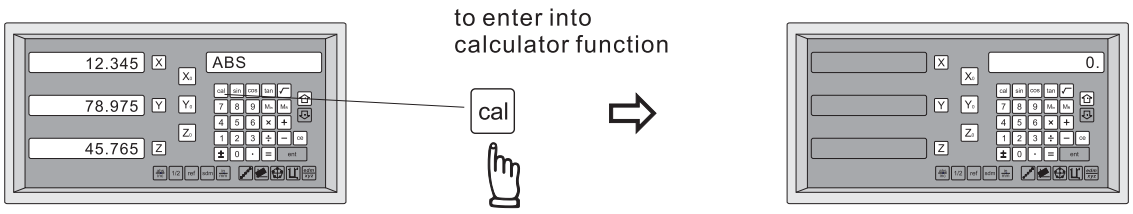
.No unnecessary down time in finding or sharing the calculators whenever you need one to calculate.




**Key layout of the built in calculator**

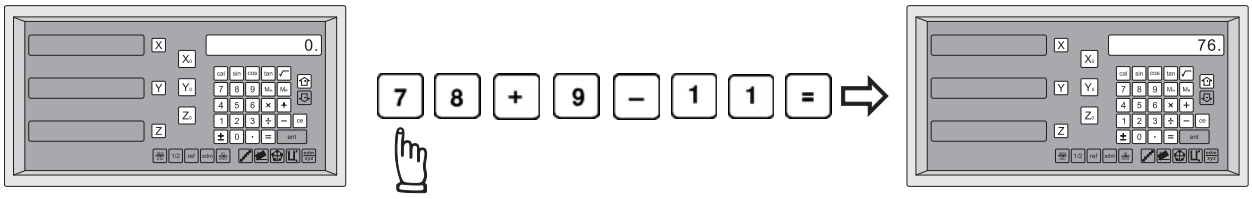
# Built in Calculator

**Example:**



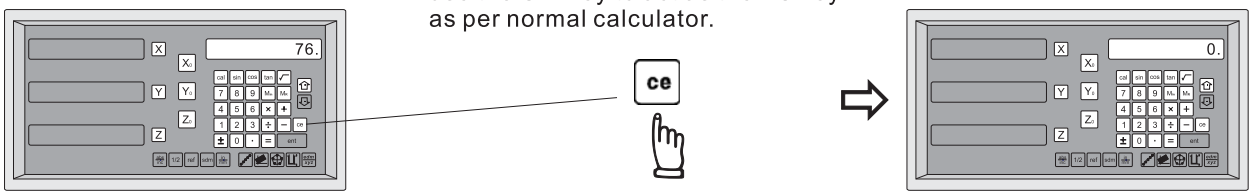

**The operations of Counter built-in calculator is same as common available commerical calculator**

**i.e** Basic mathematics **-add**; **substract**: 78+9-11=76

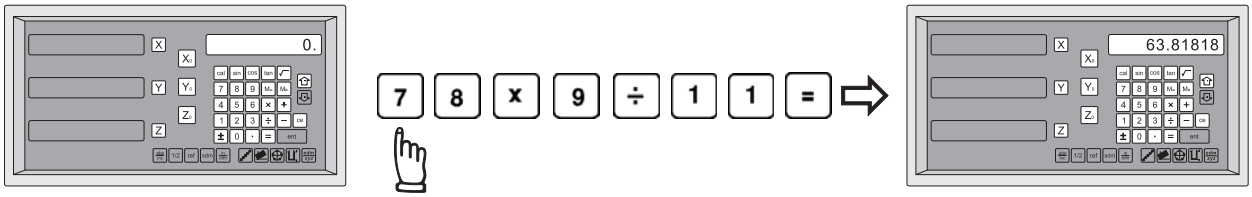



**Clear-Restart the calculation**

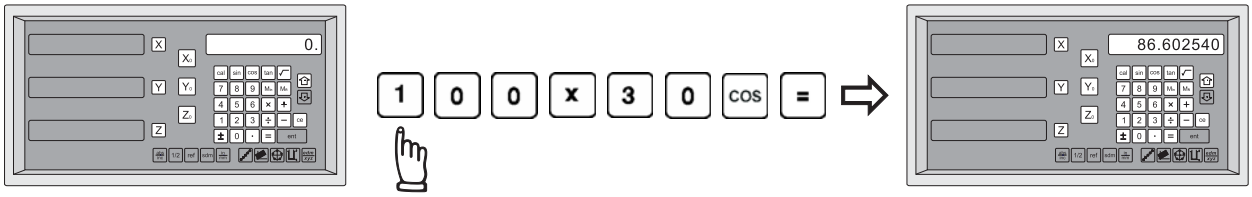
Since Counter do not have AC key-as per normal calculator, therefore, Counter use the CE key to act as the AC key as per normal calculator.




**I.e** Basic mathematics **-multiply, division**: 78x9/11=63.81818

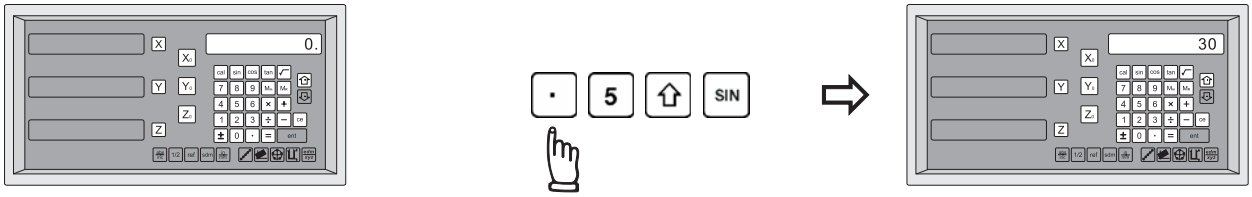



**i.e** Trigonometric calculation-COS:100XCOS 30°= 86.602540



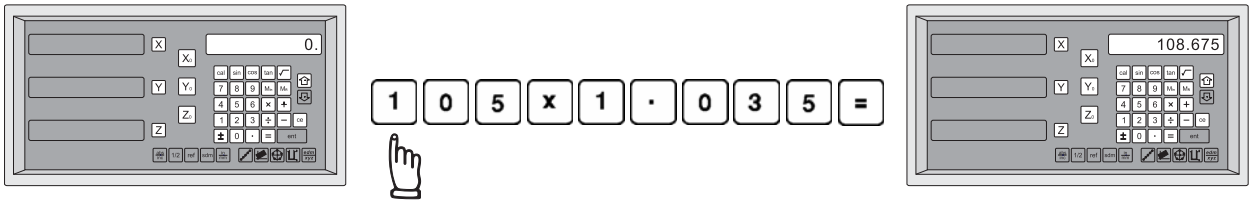
## Built in Calculator

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



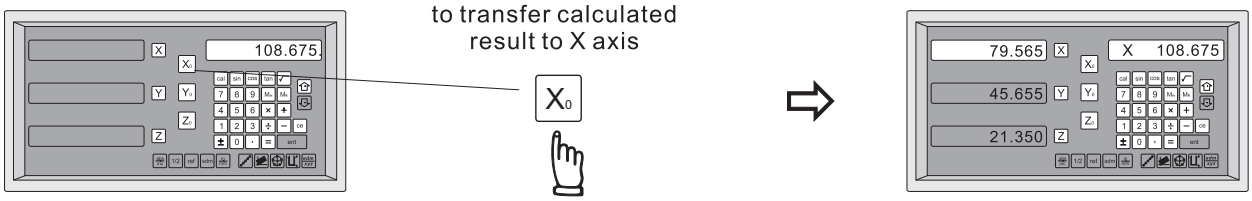

## Result Transfer

**i.e To move the tool at the position of X axis coordinate:** 105x1.035=108.675

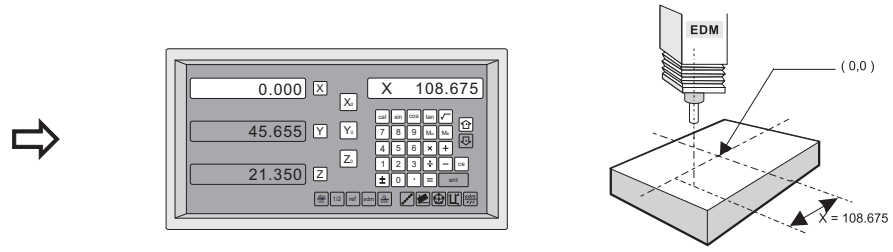



transfer the calculated result:108.675
onto X axis for tool positioning

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

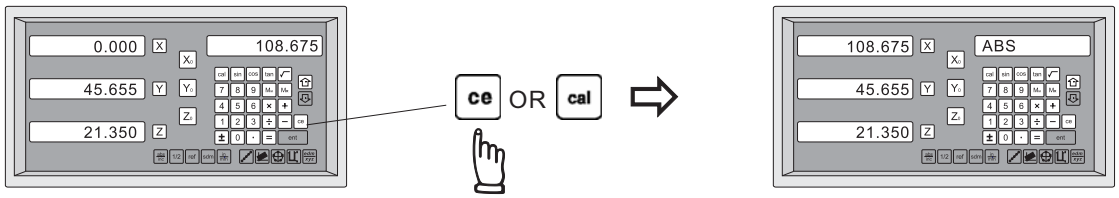



Move the machine to X display=0.000
then it is at the position of X=108.675

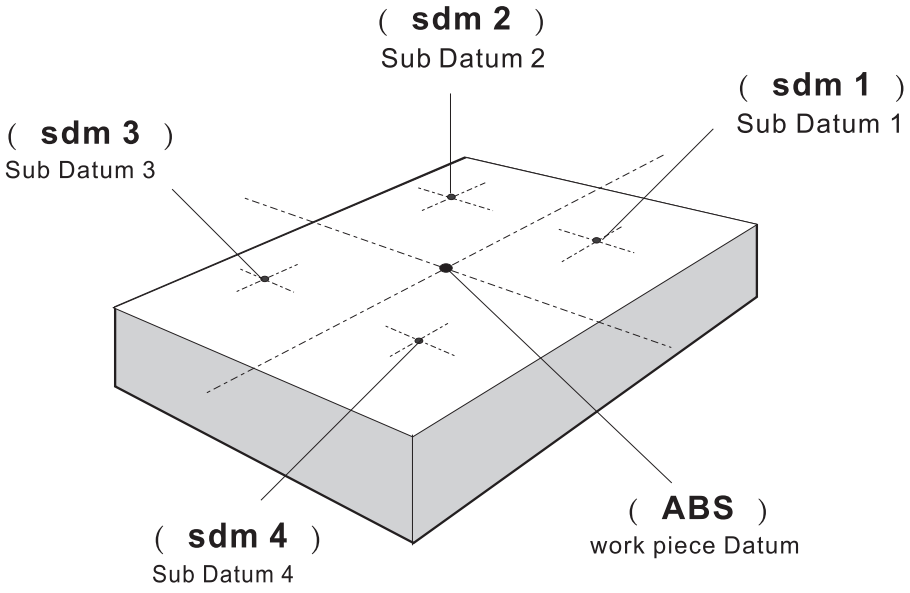



The tool now ia at the position of the calculated result
(X=108.675 in the above example)
To return back to normal coordinate display to continue
the machining

cal OR ce



# 199SubDatum Function



## 199 SubDatum Function

**Purpose :** Most DRO cabinet in the market just provides two set of work coordinates-ABS/INC,however, it was found that in case of a bit more complicated machining or machining a small batch of repeative parts, just two set of work coordinate-ABS/INC is inadquate and not convenience enough to use.

ABS/INC have following shortfalls:

- In many machining, the work piece machining dimensions are come from more than two datum, therefore, operator have to switches between ABS and INC to set up the machining datums times after times. The process is time consuming and easy to make mistakes.

-In case of batch machining of repeative work, operator have to set up and calculate all machining positions times after times.

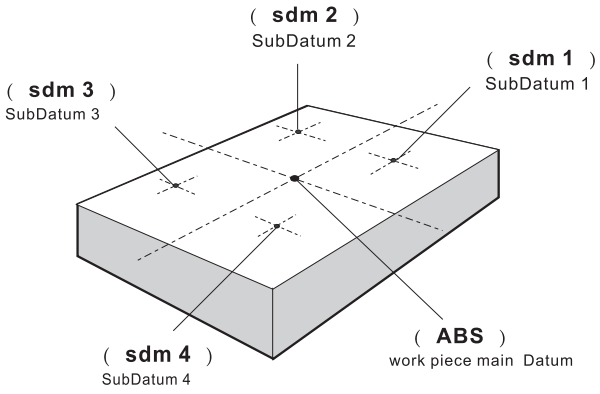
Counter provides199 subdatum(sdm)memory to cope with the above shortfalls of ABS/INC,however, SdM functions is not just simply provides more 199 set of INC coordinate, it is specially designed to provide much more convenience features to the operator to cope with repeative works. Followings are the difference between INC and SdM.

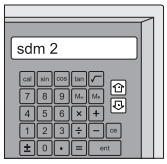
1. INC is independent of ABS, it won't follow any change in ABS zero point. However, all sdm coordinate are relative to ABS coordinate, all SdM position will shift together with the ABS zero position change.

2. All SdM relative distance to ABS can be enter directly into Counter using the keypad. No need of any calculation.

**sdm application in the work piece that have more that one datums.**

Operator can store all the work subdatums in Counter memory as per follows.




or

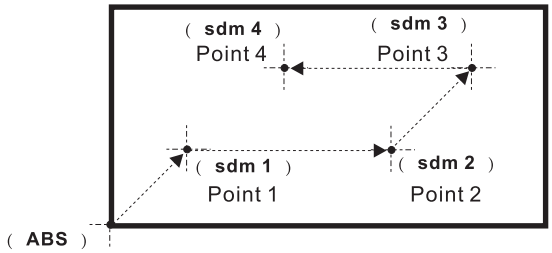
Operator than can switches between the subdatums directly by pressing key

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

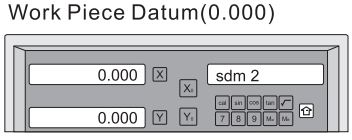
**sdm application on batch machining of repeative works**

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

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




Work Piece Datum(0.000)




Press Up/Down key to go to machining points

or

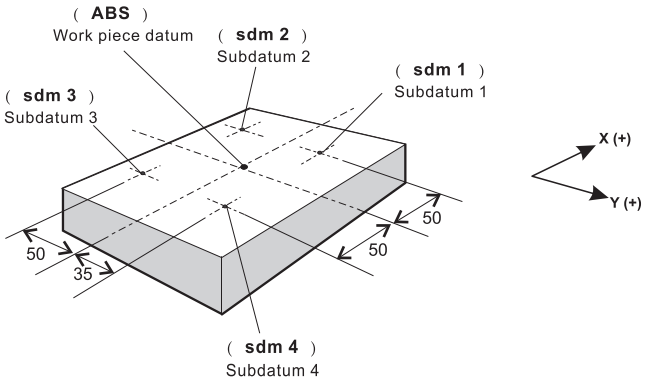
move the machine to display=0.000, then machining location reached

# 199 SubDatum Function

## Application example:

To set up the four subdatum zero(SdM1 to SdM4)as follows, followings two methods can be used

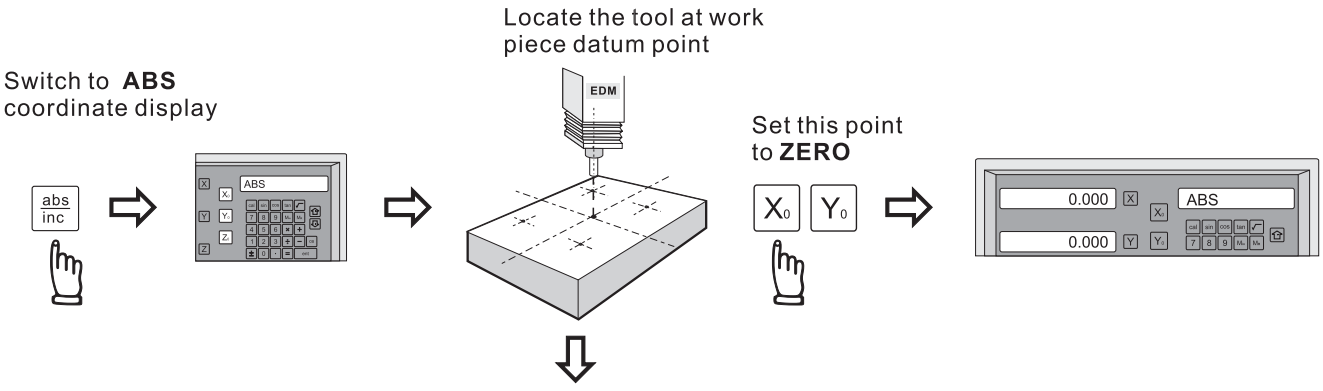
1.Move machine to required subdatum position, then zero SdM display coordinate
2.Direct key in the sdm zero position coordinate(coordinate relative to ABS zero)




## Method1:Move machine to required subdatum position, then zero SdM display coordinate

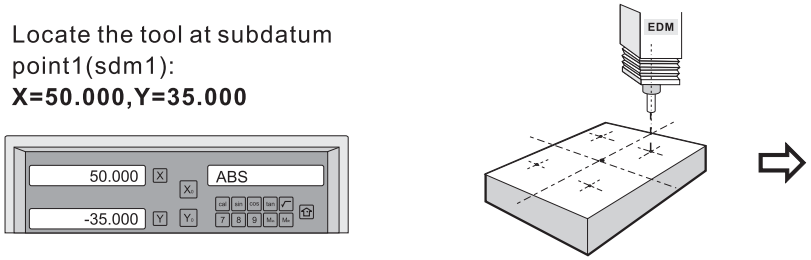
Set up the work piece datum in ABS coordinate, then move the machine to required subdatum position, then zero SdM display coordinate accordingly.

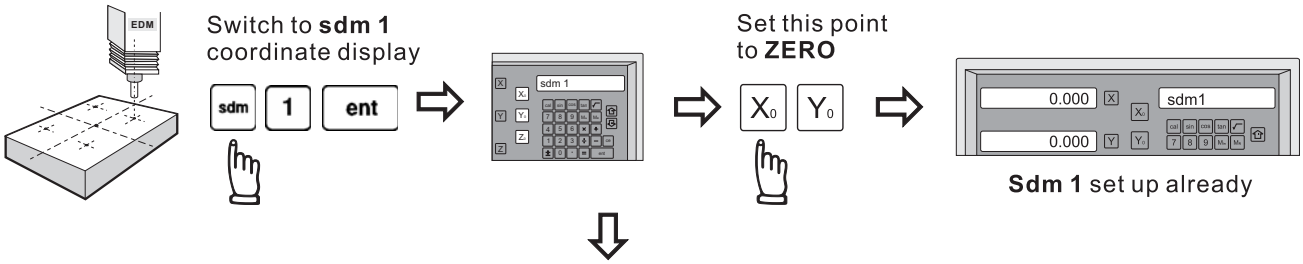
**Step 1:** Set up the work piece datum in ABS coordinate



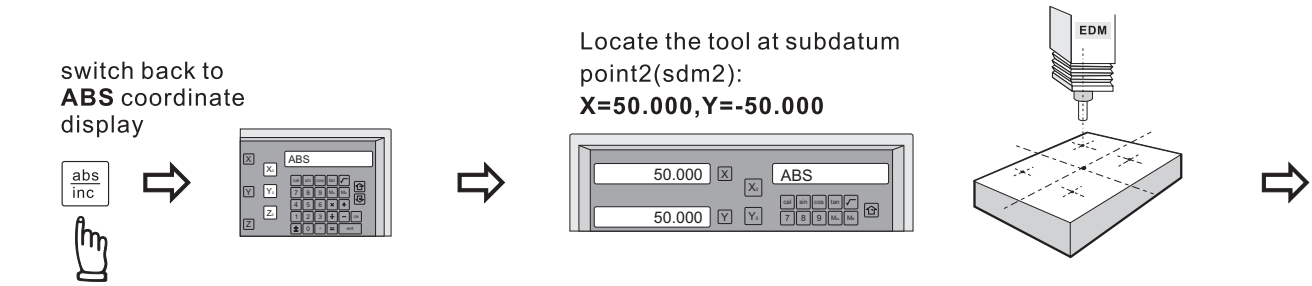

**Step 2:** Set up the subdatum point1(sdml)

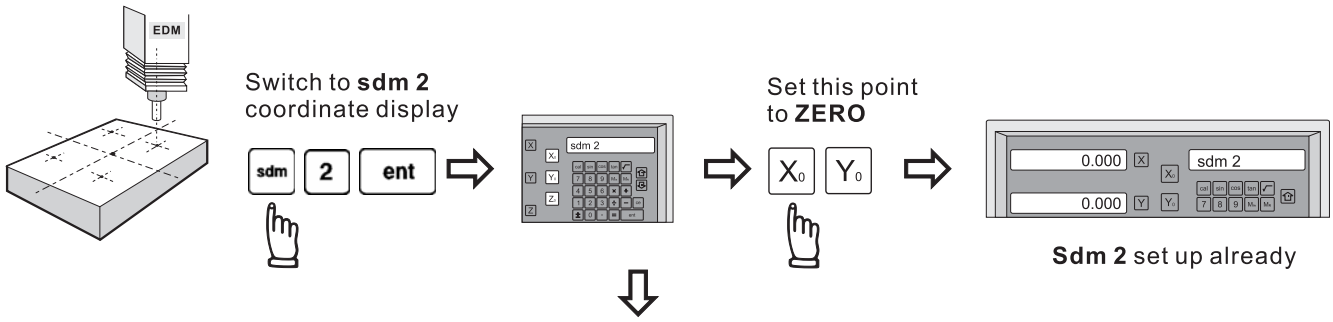
Locate the tool at subdatum point1(sdm1):
**X=50.000,Y=35.000**



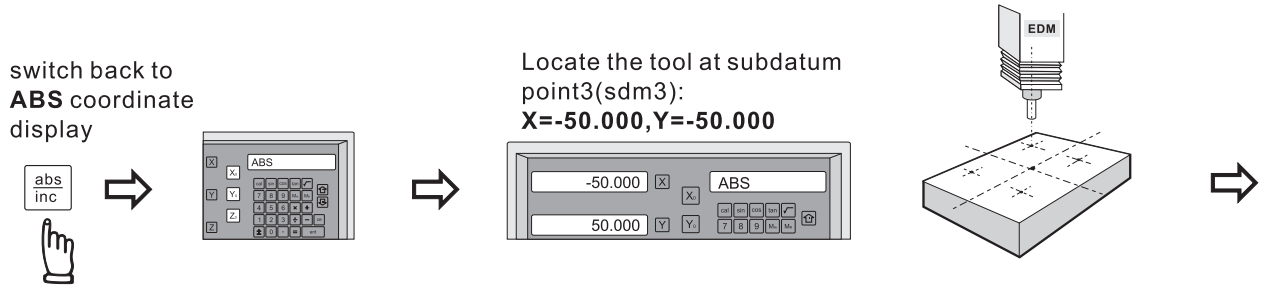


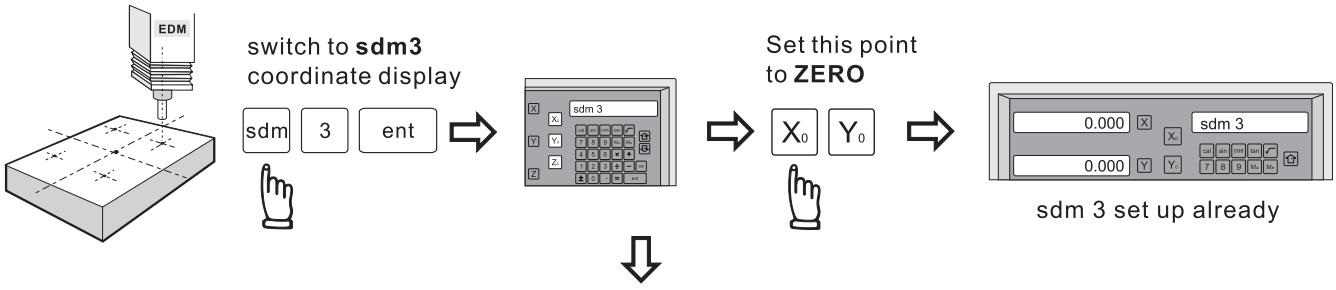

**Step 3:** Set up the subdatum point2(sdm2)



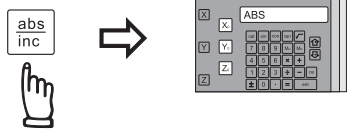

**Step 4:** Set up the subdatum point3(sdm3)



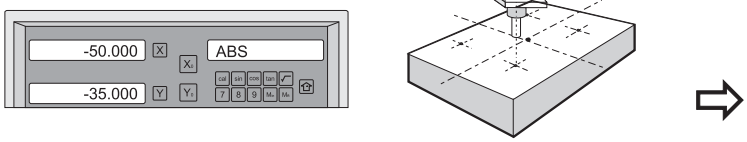



**Step 5:** Set up the subdatum point 4(sdm4)

switch back to **ABS** coordinate display

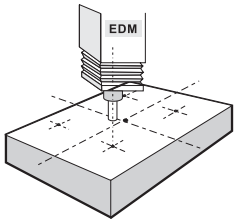



Locate the tool at subdatum point4(sdm4):
**X=-50.000,Y=-35.000**

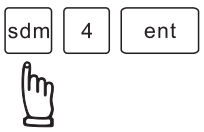


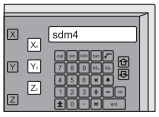




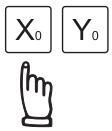


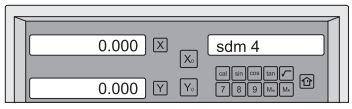

switch to **sdm 4** coordinate display




Set this point to **ZERO**




sdm 4 set up already

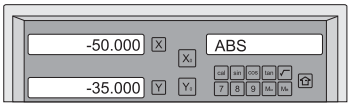
## All the four subdatum points have already been set up

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

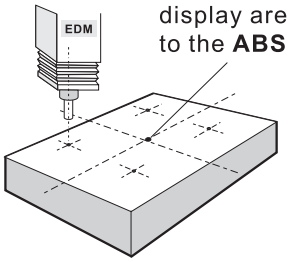


**Example**

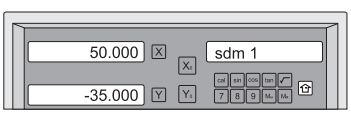
Switch to **ABS** coordinate display

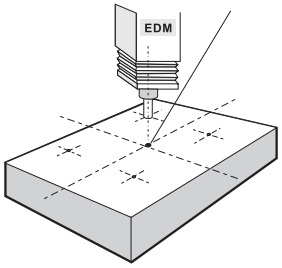

Presently,Counter's XY display are referenced to the **ABS** zero

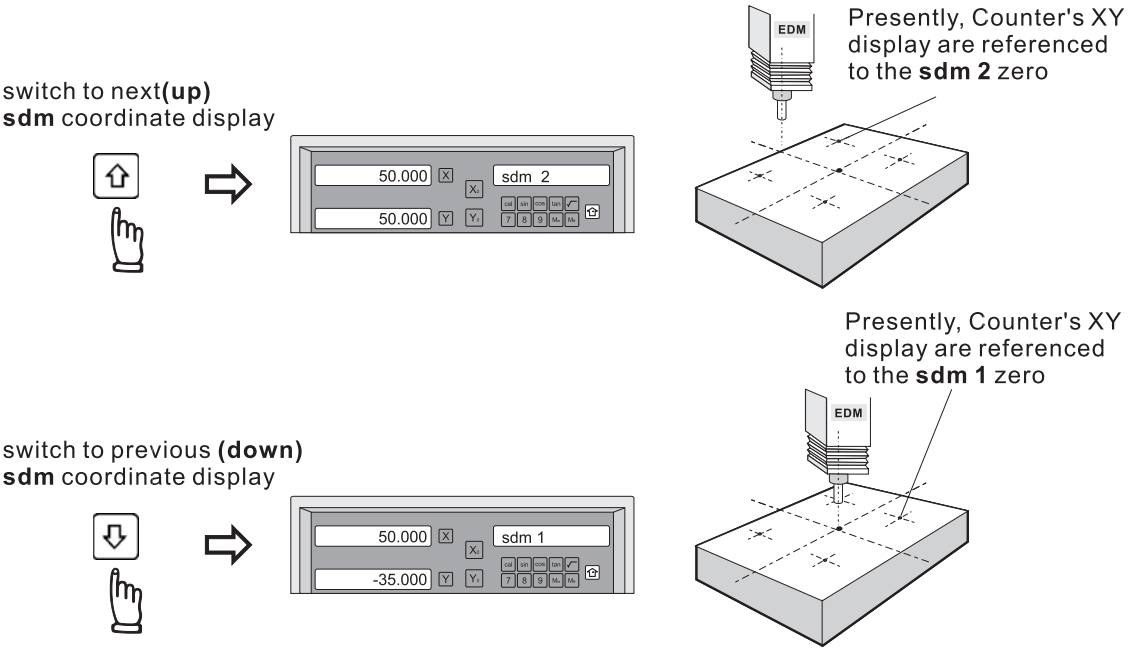



Switch to next (**up**) **sdm** coordinate display


Presently,Counter's XY display are referenced to the **sdm 1** zero



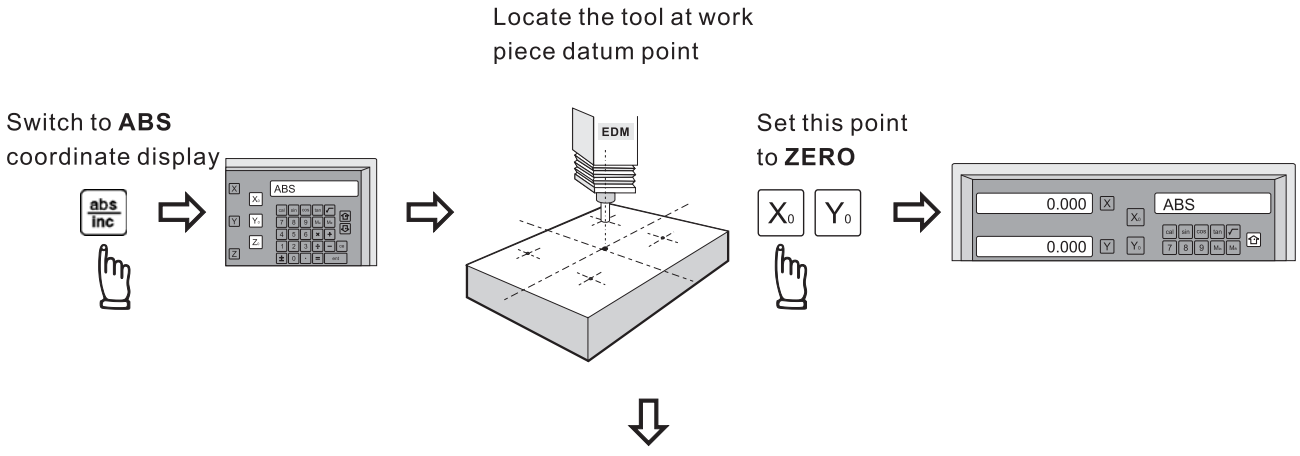



In case of many subdatum (sdm)points needed to be set up,operator will find that the method of **direct key in the sdm zero position coordinates (coordinate relative to ABS zero)**is meuch more quicker and less mistake.

## Mtheod 2 :Direct key in the sdm zero position coordinate (coordinate relative to ABS zero)

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

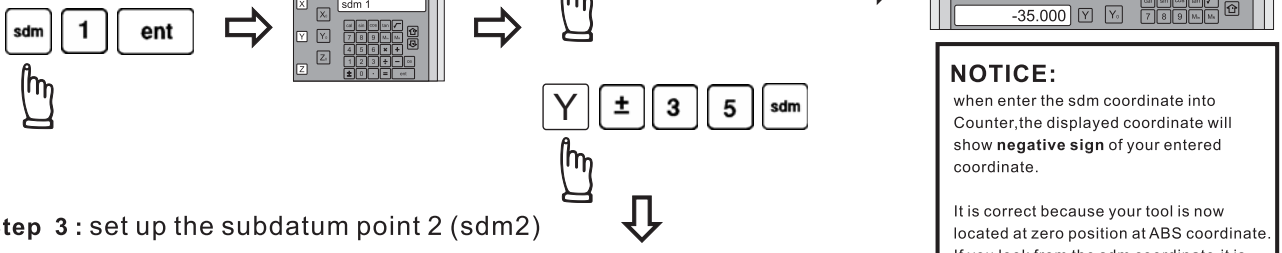
**Step 1** : set up the work piece datum in ABS coordinate



**Step 2 :** set up the subdatum point 1 (sdm 1)

key in the **sdm 1** coordinate

swithch to **sdm 1**
coordinate display



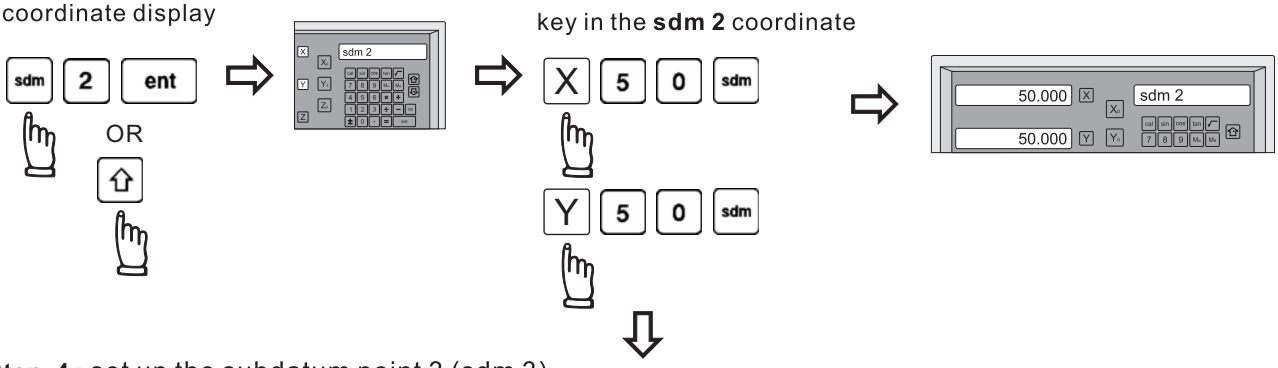

**NOTICE:**
when enter the sdm coordinate into Counter,the displayed coordinate will show **negative sign** of your entered coordinate.

It is correct because your tool is now located at zero position at ABS coordinate. If you look from the sdm coordinate,it is right at the negative value of the sdm zero position coordinate.

**Step 3 :** set up the subdatum point 2 (sdm2)

swithch to **sdm 2**
coordinate display

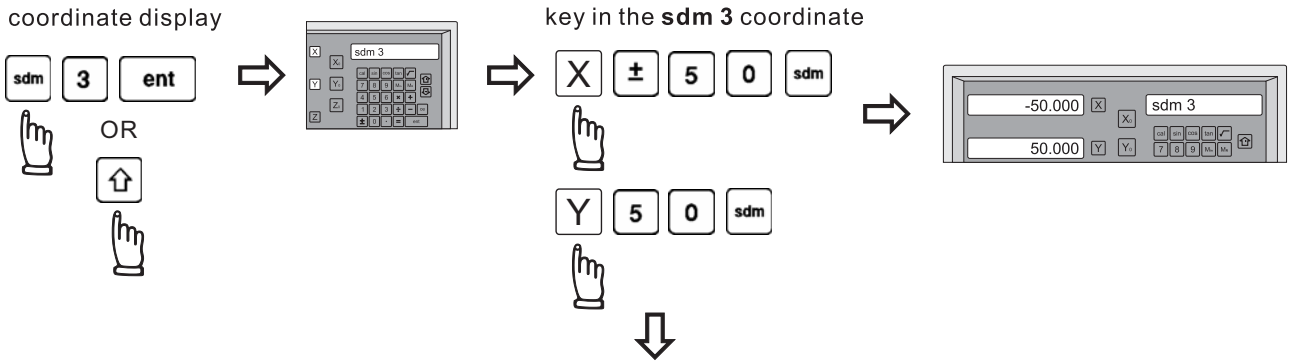
key in the **sdm 2** coordinate




**Step 4 :** set up the subdatum point 3 (sdm 3)

swithch to **sdm 3**
coordinate display

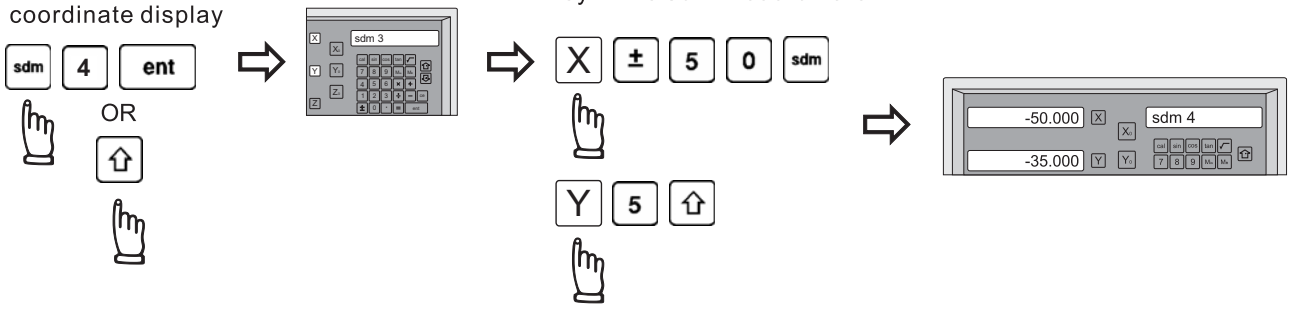
key in the **sdm 3** coordinate




**Step 5 :** set up the subdatum point 4 (sdm 4)

swithch to **sdm 4**
coordinate display

key in the **sdm 4** coordinate



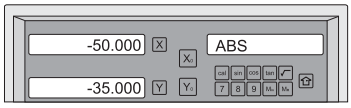
## 199 SubDatum Function

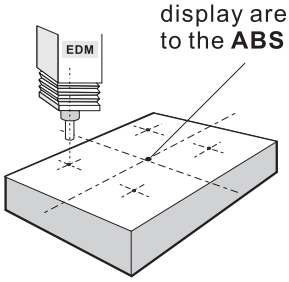
## All the four subdatum points have already been ste up

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

### Example

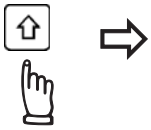
Switch to **ABS** coordinate display

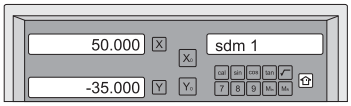


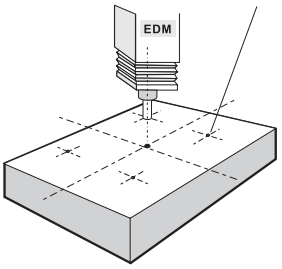




Presently,Counter'sXY display are referenced to the **ABS** zero

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

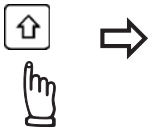


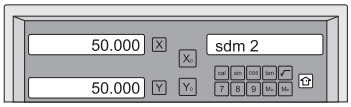


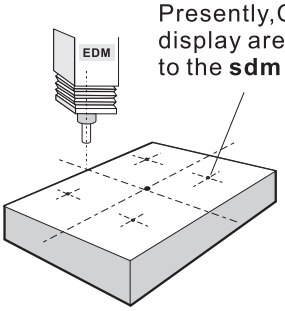




Presently,Counter'sXY display are referenced to the **sdm 1** zero

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

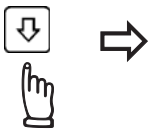


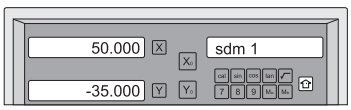


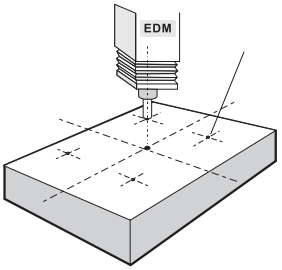




Presently,Counter'sXY display are referenced to the **sdm 2** zero

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

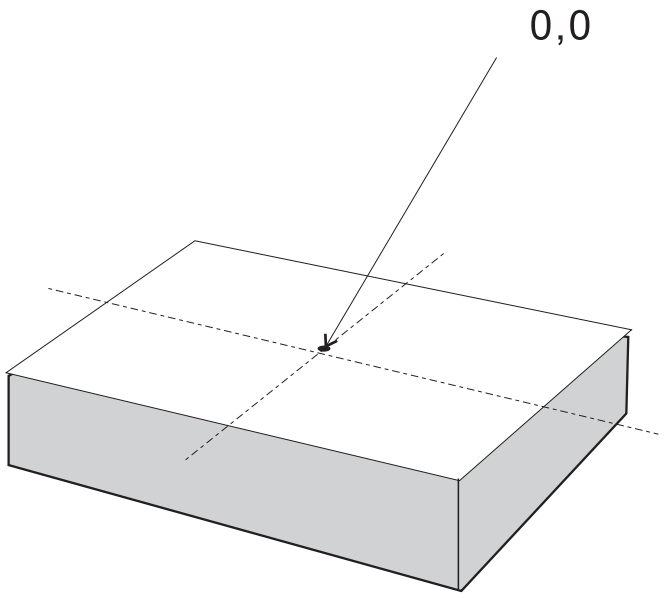





Presently,Counter'sXY display are referenced to the **sdm 1** zero

# ***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 work shift,and hence the DRO have to be switched off after work, or power failure happen during the machining process which is leading to lost of the work piece datum(work piece zero position),the re-establishment of work piece datum using edge finder or other method is
inevitably induce higher machining inaccuracy because it is not possible to re-establish the work piece datum exactly at the previous position.

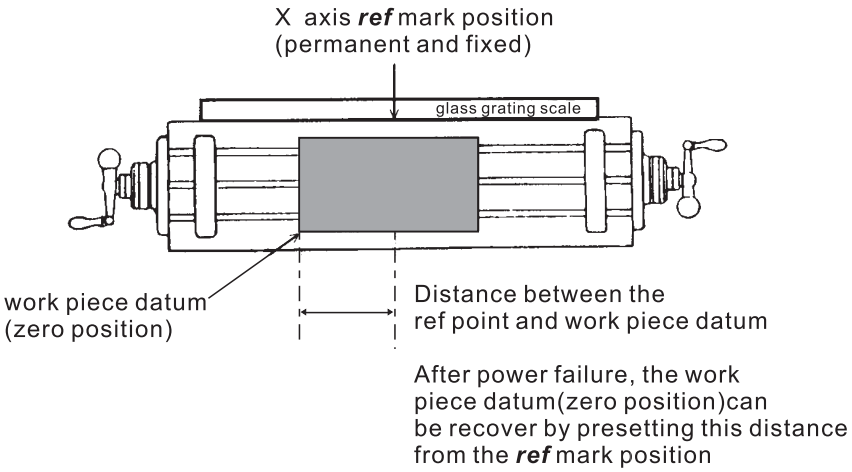
To allow the recovery of work piece datum very accurately and no need to re-establish the work piece datum using edge finder or other methods, every glass grating scale have a ref point location which is is equipped with ref position to provide datum point memory function.

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

**-There are a permanent and fixed mark (position) in the center of every glass grating scale, 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 Counter 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 :** **Counter** provides one of the most easy to used ***ref*** datum memory function

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

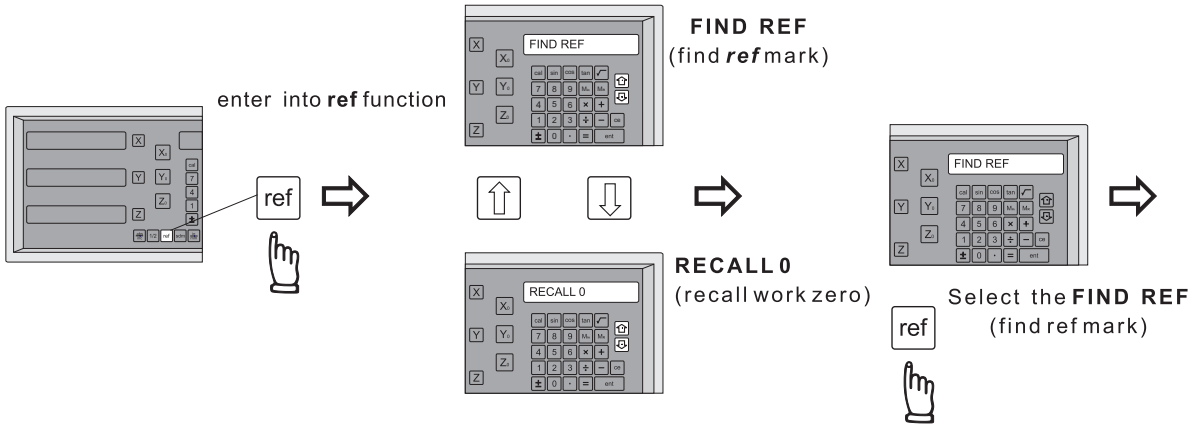
In daily operation, operator simply need to find the ***ref*** mark position whenever they switch on the Counter to let Counter know where the **ref** mark position is, then Counter will automatically do the work datum storage on its 'own whenever you alter the ***ABS*** zero position. In case power failure or the Counter switched off, the operator can recover the work piece datum easily by the **RECALL 0** procedure.

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

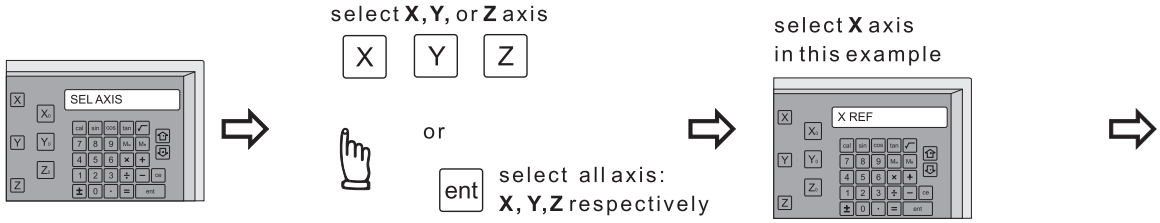
**Function:** Because in **Counter**'s ***ref*** datum memory function, **Counter** will automatically store the relative distance between the ***ref*** mark position and the work piece datum (zero position)whenever the operator alter the **ABS** zero position ,such as zeroing, center find, coordinate preset or etc...

Therefore, **Counter** need to know where the ***ref*** mark position in prior to machining operation. In order to avoid the lost of work piece datum (zero Position) during any accidential or unexpected events, such as power failure or etc.. It is highly recommend that operator find the ref mark position using the **(FIND REF)**function whenever they switch on the **Counter**

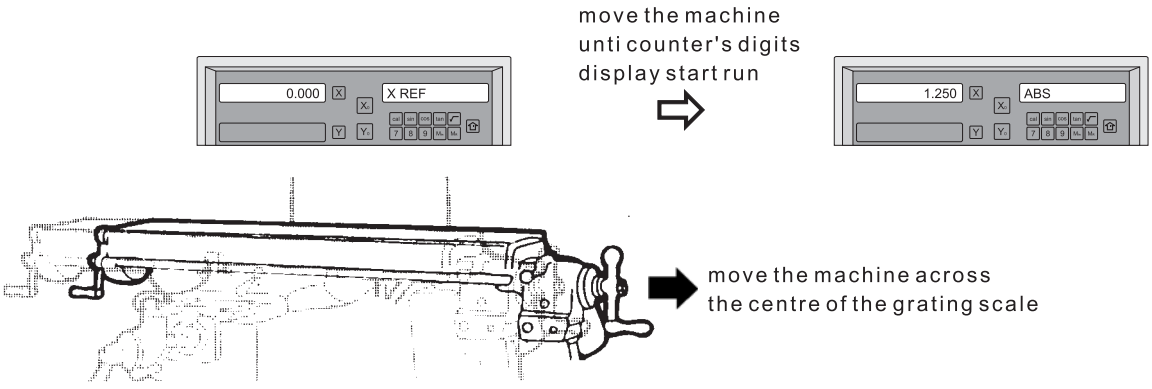
**Step 1 :** enter into the ref function, select the **FUND REF** (find ***ref*** mark)




**Step 2 :** select the axis of which ***ref*** mark needed to be found



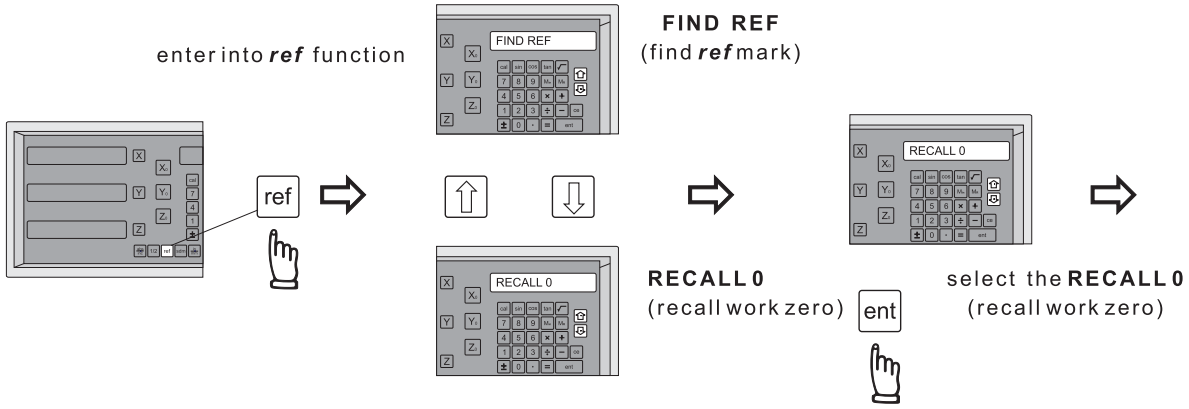

**Step 3 :** move the machine across the center of the glass grating scale until digits display in counter start run.



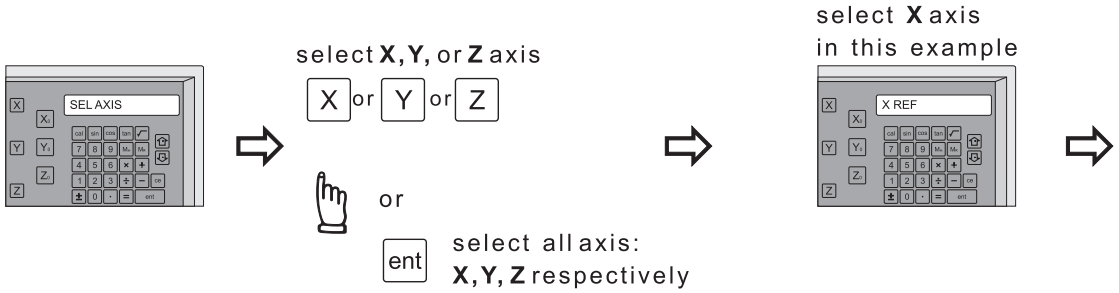
## recall the work datum zero (RECALL 0)

**Function:** after lost of the work piece datum due to power failure or switch off of counter, the work piece datum can be recover by **RECALL 0** function as per following procedures.

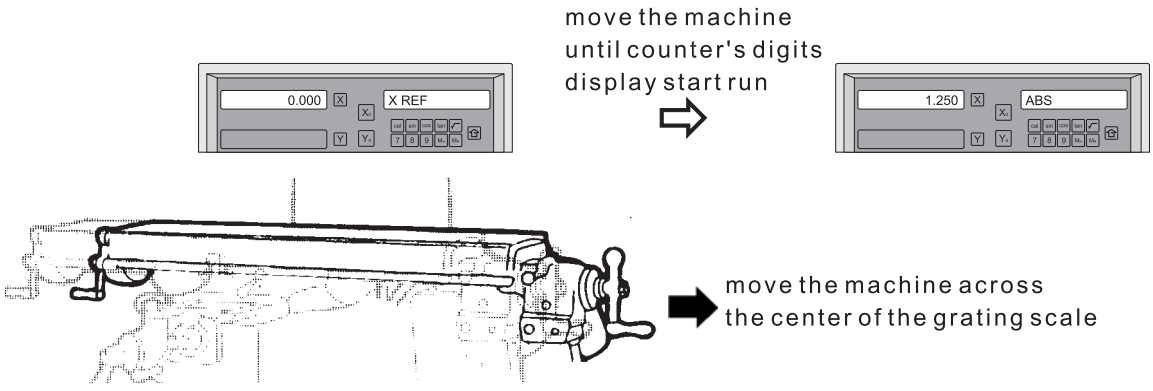
**Step 1:** enter into the ***ref*** function, select the **RECALL 0** (recall work piece zero)



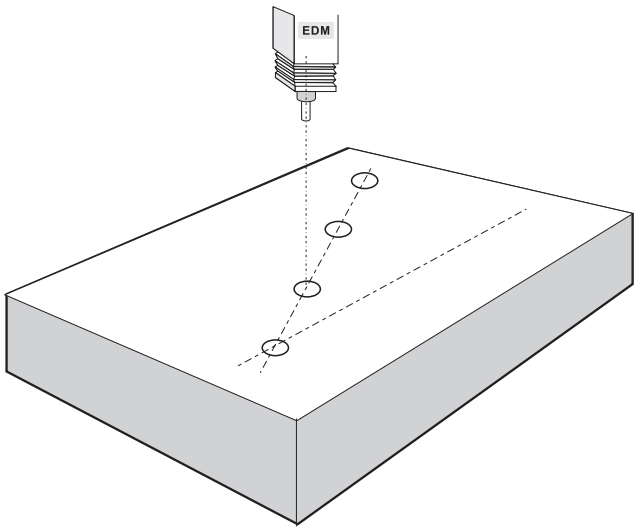

**Step 2:** Select the axis of which work datum (zero position) needed to be recovered




**Step 3:** move the machine across the center of the glass grating scale until digits display in Counter start run, then the work piece datum is recovered

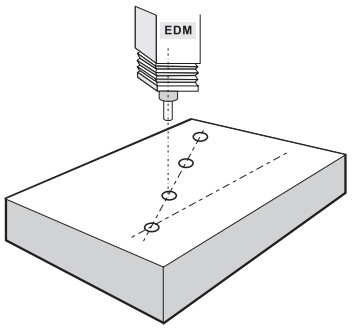


# **LHOLE** -Tool positioning for Line Holes



## **LHOLE** -Tool positioning for Line Holes

**Function:** Counter provides LH OLE function to for the hole drilling along a Line. Operator simply enter following machining parameters as per the step by step guides that indicated on the Counter's message display, then the Counter will calculate all the holes position coordinate and temporarily preset those holes position coordinates to zero(0.000),operator move the machine until the display axes=0.000,then the Line Holes position is reached.

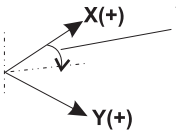



-Line Angle **(LIN ANG)**
-Line Distance **(LIN DIST)**
-No. Of Holes **(No.HOLE)**

After the above machining parameters entered into Counter, Counter preset all the Line Hole positions to 0.000

Operator can press ⇧ or ⇩ to select

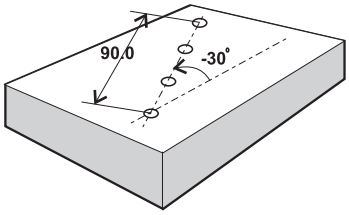
the Line Hole, and then move the machine to display =0.000 , then the Line Hole position is reached




**Angular direction:**
Positive(+)-Clockwise
Negative(-)-Counter Clockwise

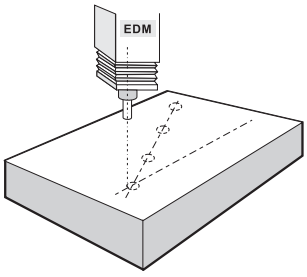
## Example

Line Angle **(LIN ANG)**.....**-30** degree (Counter Clockwise)
Line Distance **(LIN DIST)**.....**80.000mm**
No.of Holes **(No.HOLE)**.....**4**

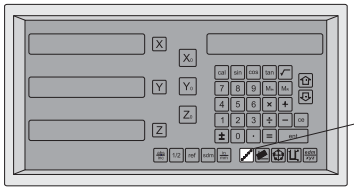



**Step 1:** Since the **LHOLE** function start use the current tool position as the starting point, therefore, locate the tool at the ***First*** LINE HOLE position

to enter the **LHOLE** function

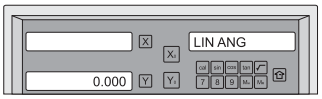



locate the tool at the *first* Line Hole position



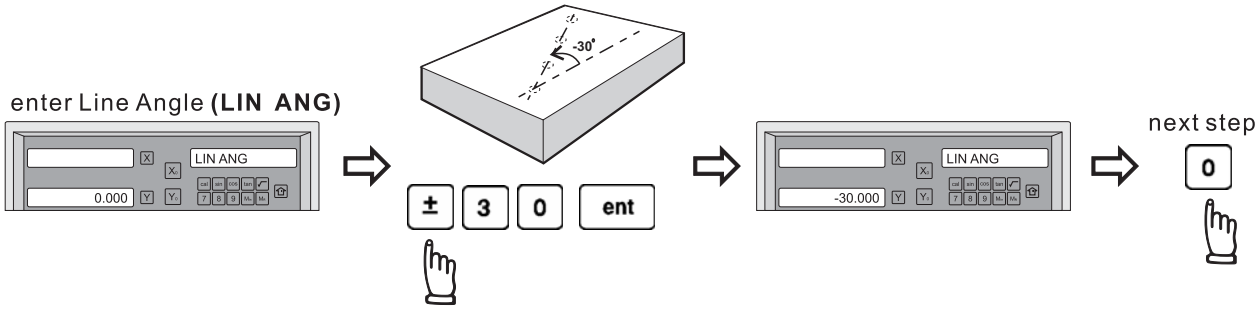
to enter the **LHOLE** function

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



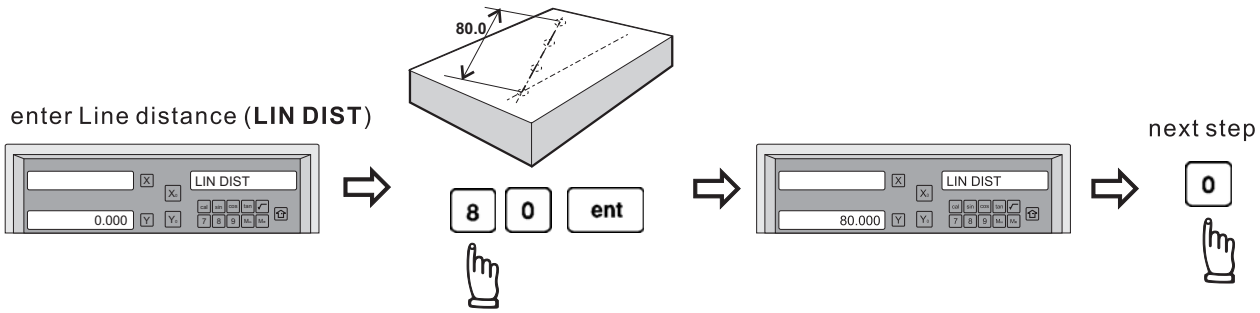
**Step 2:** Enter Line Angle **(LIN ANG)**

Line Angle **(LIN ANG)=-30 degree**



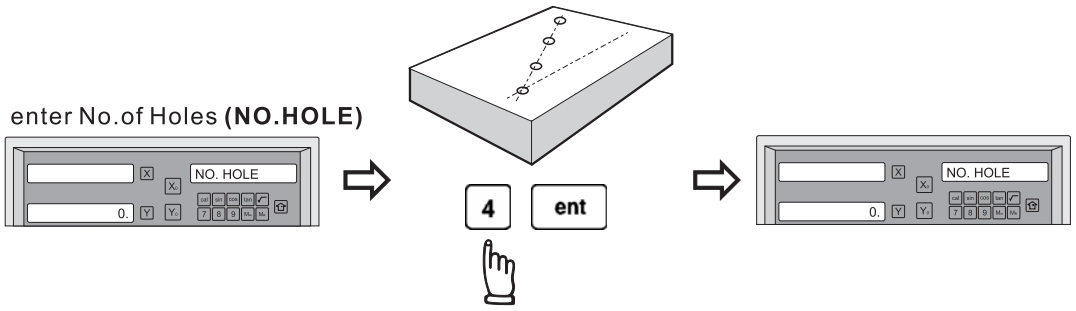

**Step 3:** Enter Line distance(**LIN DIST**)

Line distance Angle(**LIN DIST**)=80.00




**Step 4:** Enter No.of Holes **(NO.HOLE)**

No.of Holes (**NO.HOLE**)=4




**All LHOLE machining parameters already entered into Counter** ⇩ **to enter into LHOLE drilling mode**

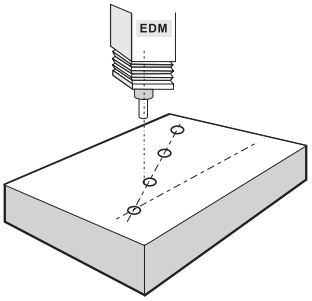
Operator can ⇧ or ⇩ to select the Line Hole,then move the machine to display=0.000,then the Line Hole position is reached.

## **LHOLE** -Tool positioning for Line Holes

Next Line Hole

move the machine to display =0.000

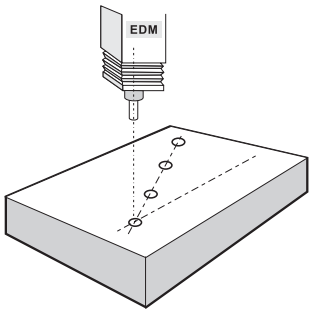

HOLE 2=Line Hole no.2




Last line Hole

move the machine to display=0.000

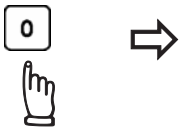

HOLE 1=Line Hole no.1



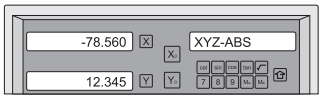

Anytime the operator want to check or verify if Counter's LHOLE calculation correct or not, or want to temporarily exit the LHOLE function cycle (swap to normal XYZ display).Operation are as follows:.

presently in **LHOLE** cycle


temporarily ***swap*** to normal XYZ coordinate display

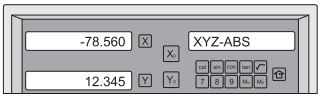



temporarily return to XYZ coordinate display

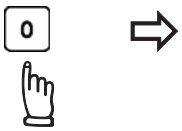



***Swap back*** to LHOLE cycle to continue the Line Holes drilling operation

presently in the temporarily XYZ coordinate display



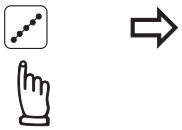

Swap back to **LHOLE** function cycle



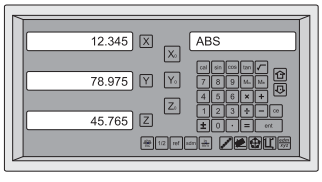

return to **LHOLE** function cycle


After the Line Holes drilling operation completed, to quit from the LHOLE function cycle, procedure are as follows

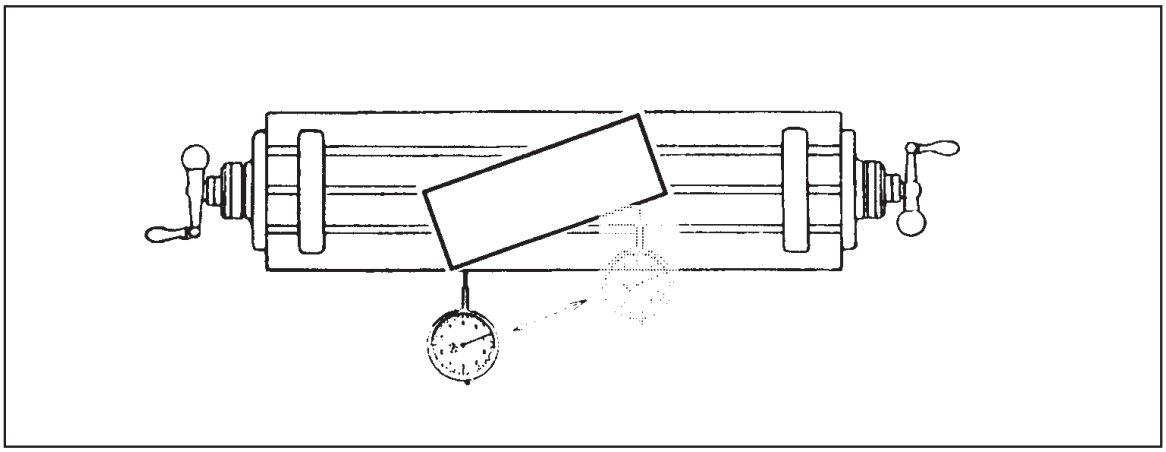
Presently in **LHOLE** function cycle

return back to normal **XYZ** coordinate display



# **INCL** -Inclined surface datum tool positioning



## **INCL** -Inclined surface datum tool positioning

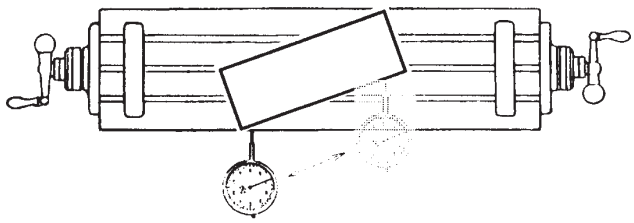
**Function:** During daily machining process, it is quite common to machine an inclined surface.

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

However, when the **work piece too big** tobe installed onto the an incline table or the **accuracy requirement is high.** The only solution is to calculate the machining points or datuming points using mathematical method. But it is time consuming. Counter provide easy to use **INCL** 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



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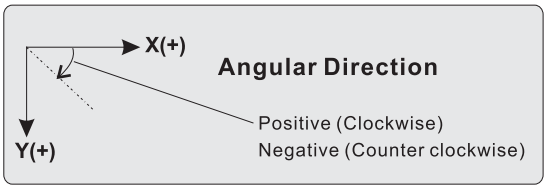
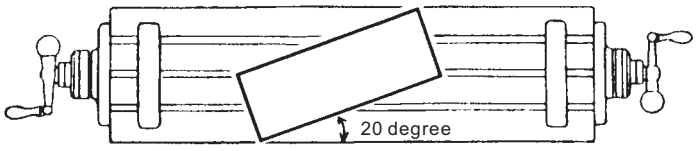
**Example :**

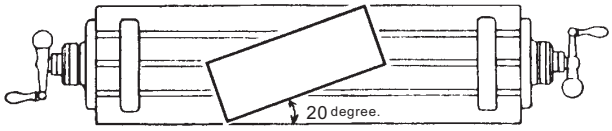
To accurately datum the work piece at 20 degree on XY plane



# **INCL** -Inclined surface datum tool positioning

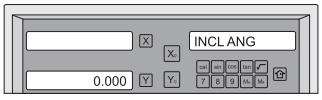
**Step 1:** Install the work piece onto an rotary table at approxiately 20 degree.

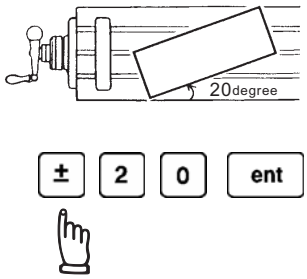


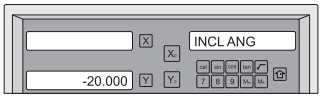

**Step 2:** enter incline angle (**INCL ANG**)

Incline angle **(INCL ANG)=20** degree

enter incline angle**(INCL ANG)**

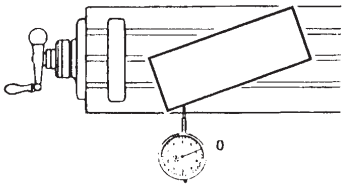


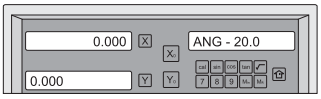

**All INCL machining parameters already entered into Counter** ⇩ **to enter into INCL datuming mode**

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

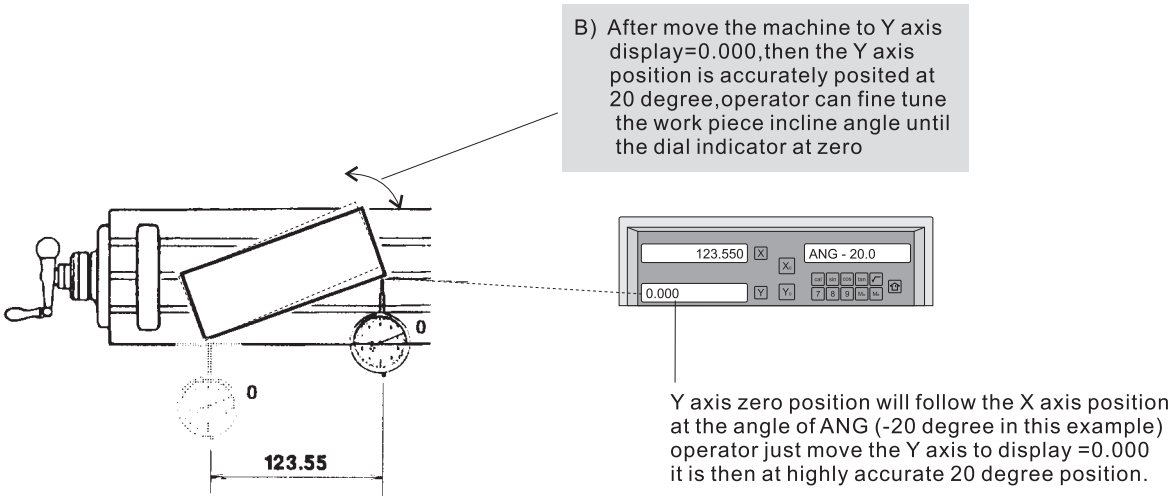



zero the Counter

$X_0$

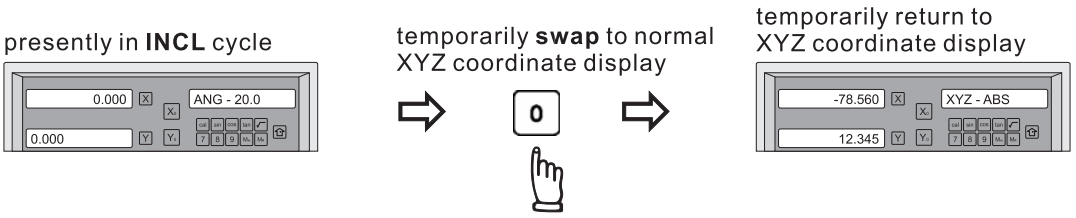



Since in INCL mode, the Y display is set according to X *tan (ANG), therefore, zeroing the X axis also clear the Y axis.

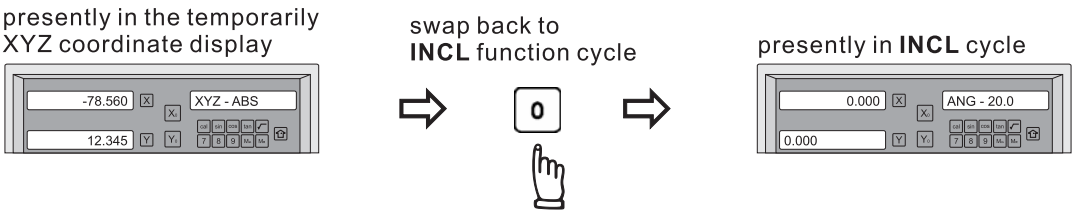



Since during the incline angle alignment, angular adjustment of any one end of the work piece will affect the the position on the other end. Therefore, the above angular alignment procedure A)&B)have to be carried out iteratively until operator satisfy with the angular alignment achieved.

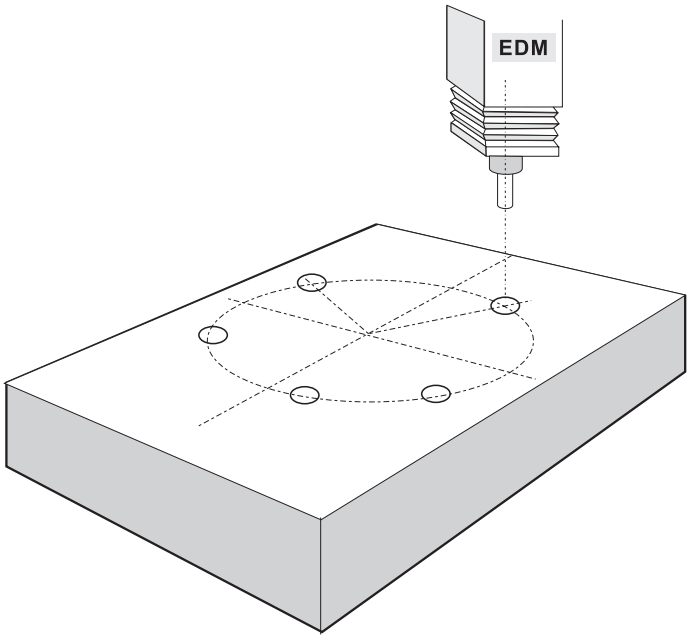
Anytime the operator want to check or verify if Counter's INCL calcuation correct or not, or want to temporarily exit the INCL function cycle (swap to normal XYZ display ).Operation are as follows:.




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

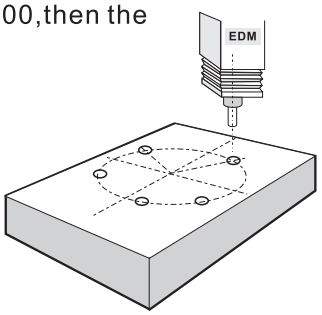


# **PCD** -Tool positioning for Pitch Circle Diameter



## **PCD** -Tool positioning for Pitch Circle Diameter

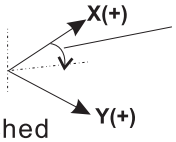
**Function:** Counter provides PCD function to for the hole drilling along the Pitch Circle Diameter. Operator simply enter following machining parameters as per the step by step guides that indicated on the Counter's message display, then the Counter will calculate all the pitch holes position coordinate and temporarily preset those holes position coordinates to zero (0.000),operator move the machine until the display axes=0.000,then the pitch holes 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 entered into Counter, Counter preset all the pitch hole positions to 0.000

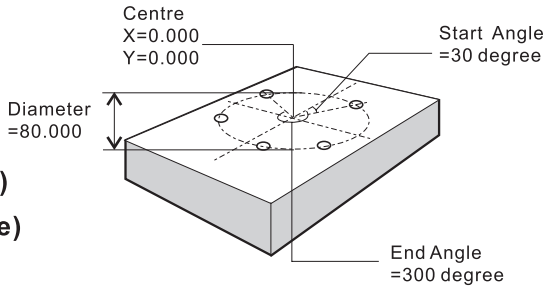
Operator can press ⇧ or ⇩ to select the pitch hole, and then move the machine to display=0.000, then the pitch hole position is reached



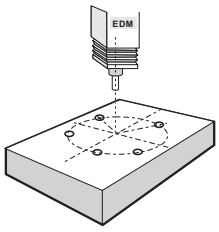

**Angular direction:**
positive (+)-Clockwise
Negative(-)-Counter Clockwise

### Example

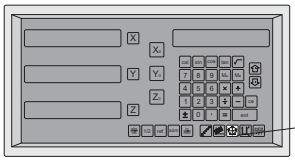
Centre Coordinate **(CENTRE)**.....**X=0.000,Y=0.000**
Diameter **(DIA)**.....**80.000mm**
No.of Holes**(NO.HOLE)**.....**5holes**
Start Angle**(ST.ANG)**.....**30 degree(clockwise)**
End Angle**(END.ANG)**.....**300 degree(clockwise)**



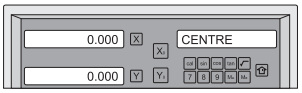

**step1:** Setup the work piece datum(work piece zero) ⊕ to enter the **PCD** function




set up work piece datum



to enter the **PCD** function

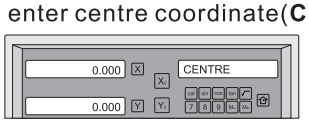


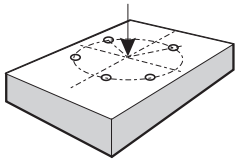

enter the **CENTRE** coordinate

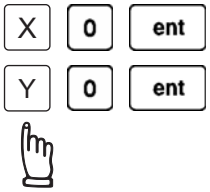
**Step2:** Enter Centre Coordinate **(CENTRE)**

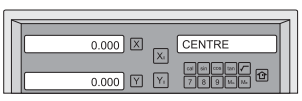
Centre Coordinate **(CENTRE)**:**X=0.000,Y=0.000**

enter centre coordinate(**CENTRE**)



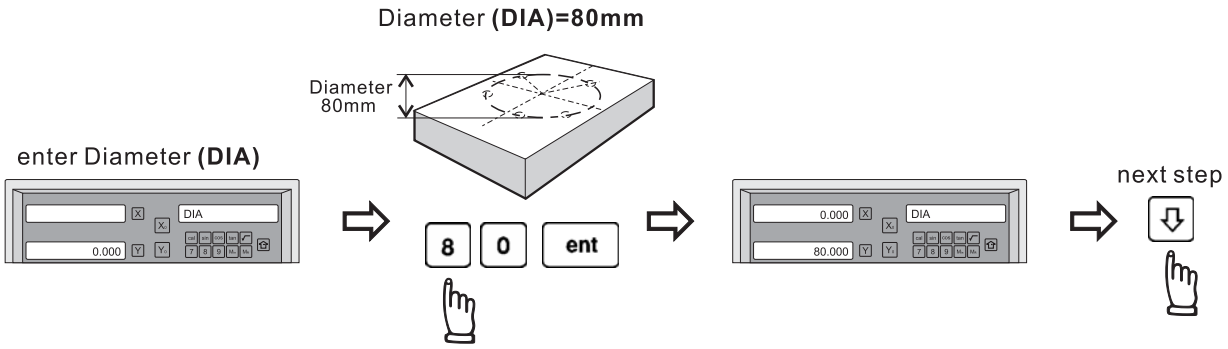





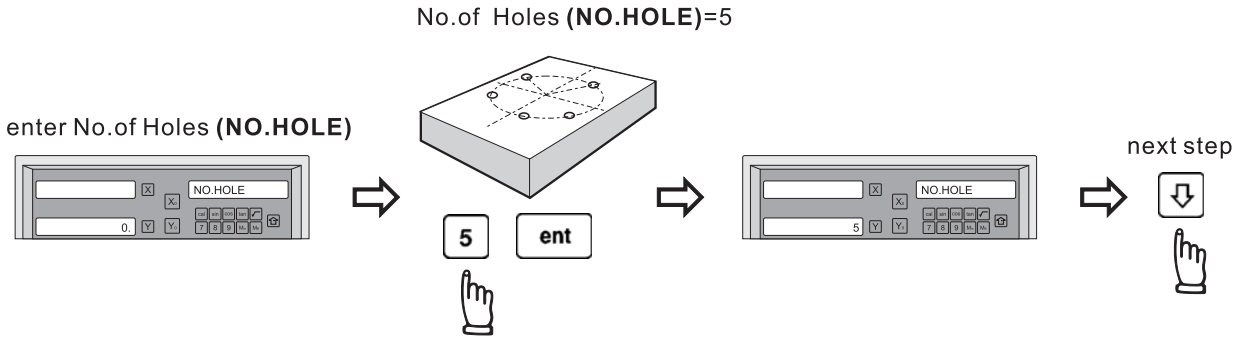




next step

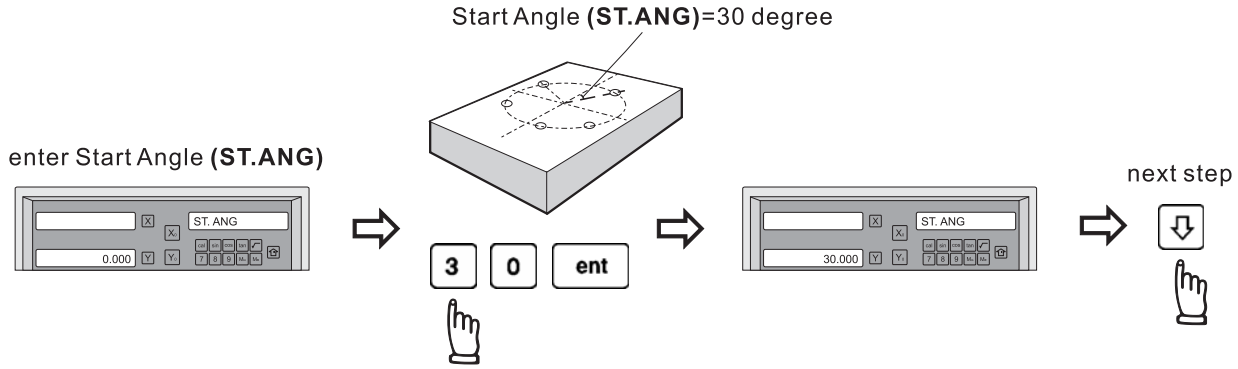
**Step 3:** Enter Diameter **(DIA)**



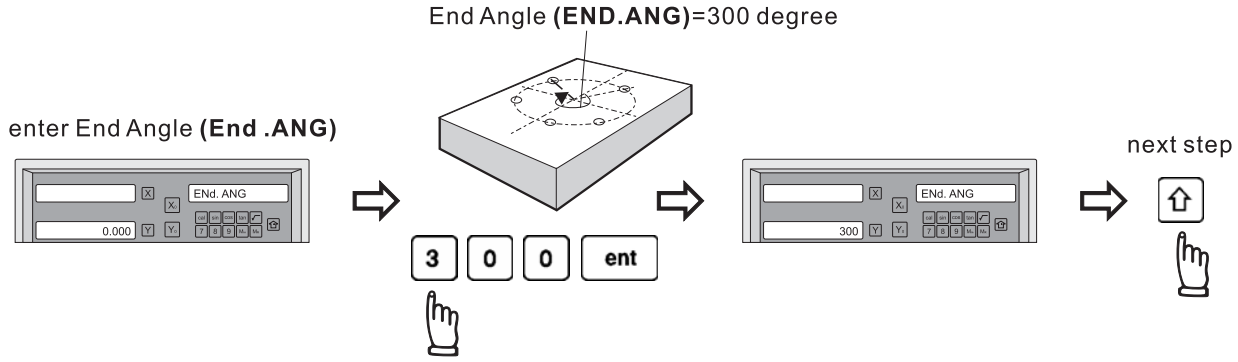

**Step 4:** Enter No.of Holes (NO.HOLE)




**Step 5:** Enter the Start Angle **(ST.ANG)**



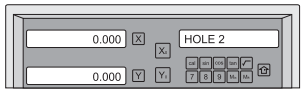

**Step 6:** Enter the End Angle **(END.ANG)**



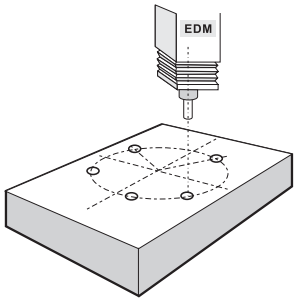
**All PCD machining parameters [⇩] to enter into PCD drilling mode already entered into Counter**

Operator can [⇧] or [⇩] to select the pitch hole, then move the machine to display=0.000,then the pitch hole position is reached.

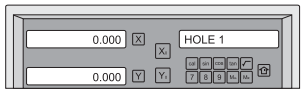
Next pitch hole [⇩] ⇨ move the machine to display=**0.000**



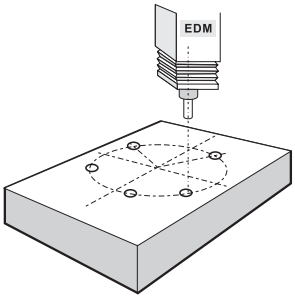

HOLE 2=picth hole no.2




Last Pitch hole [⇩] ⇨ move the machine to display=**0.000**

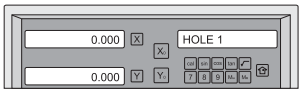



HOLE 1=picth hole no.1



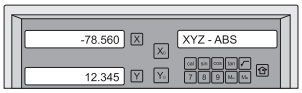

Any time the operator want to check or verify if Counter' s**PCD** calculation correct or not, or want to temporarily exit the **PCD** function cycle(swap to normal XYZ display).Operation are as follows:.

presently in **PCD** cycle



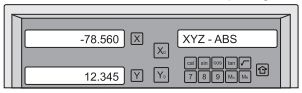

temporarily ***swap*** to normal **XYZ** coordinate display ⇨ [0] ⇨

temporarily return to XYZ coordinate display



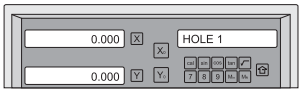

***swap back*** to PCD cycle to continue the **PCD** hole drilling

presently in the temporarily XYZ coordinate display



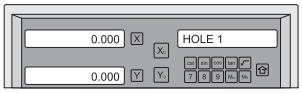

swap back to **PCD** function cycle ⇨ [0] ⇨

return to **PCD** function cycle



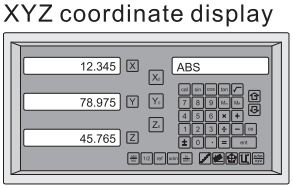

After the PCD hole drilling operation completed, to quit from the PCD function cycle, procedure are as follows

presently in **PCD** function cycle

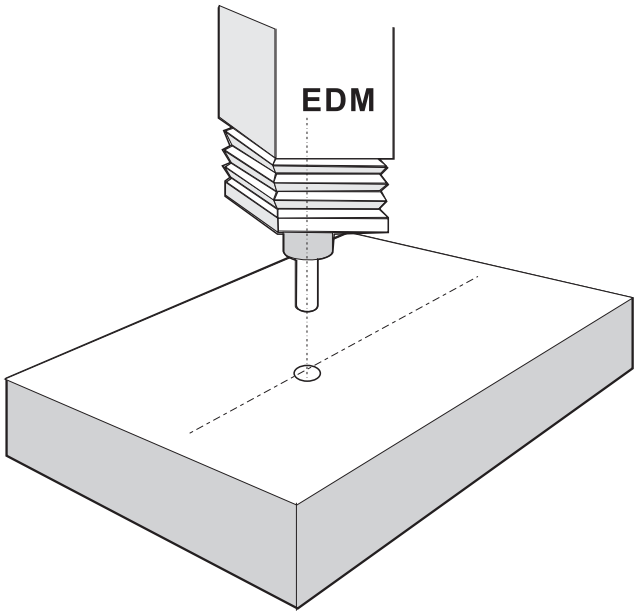



⇨ ⇨

return back to normal XYZ coordinate display



# EDM Functions



## **EDM** Functions features :

**ES-8EDM** provides all necessary DRO functions for **EDM** operation, features are as follows

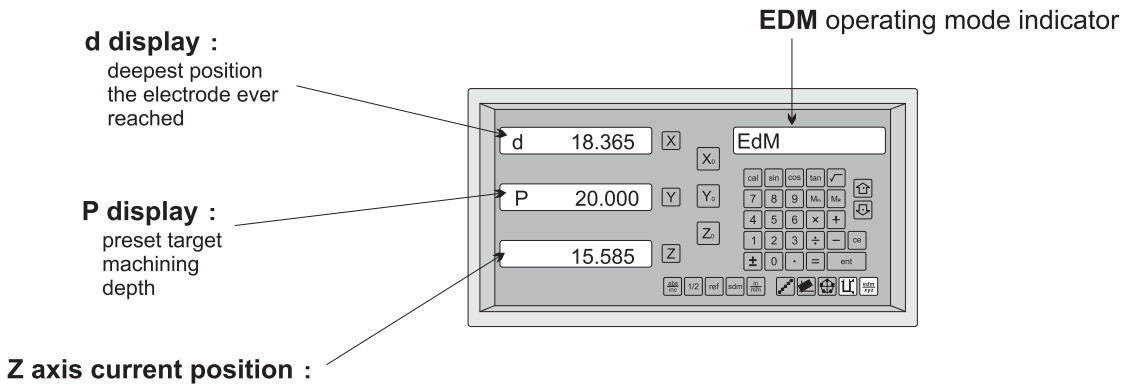
. **EDM** operating display
. relay output for depth control

# **EDM** operating display

In EDM operation, the X & Y axes of the EDM machine is not move during the whole machining process, whereas the Z axis is keep moving up & down, the most important mission of the EDM machining is control the depth of the machining precisely .

Since the Z axis is keep moving up & down during the whole machining process, it is very difficult for the operator to decide the depth of electrode, ES-8EDM provides specialized EDM operating display to show the deepest position that the electrode have ever reached and the target machining depth. It greatly help the operator to understand and control the EDM machining process.

**EDM** operating display



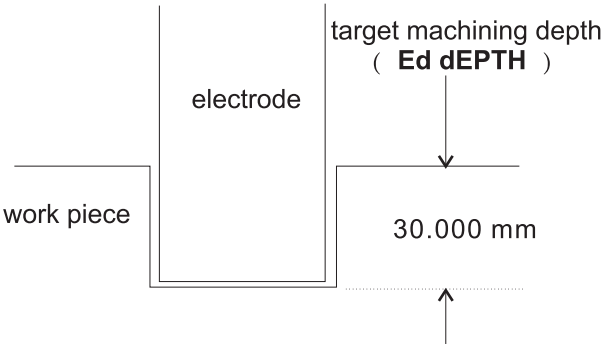

if **ES-8EDM** currently in normal **XYZ** display, to swap to **EDM** operating display, press edm/xyz

if **ES-8EDM** currently in **EDM** operating display, to swap to normal **XYZ** display, press edm/xyz

## Relay output for depth control

**Example : To machine a work piece to the depth of 30.000mm**
( work piece surface Z axis coordinate is set to zero '0.000"mm )

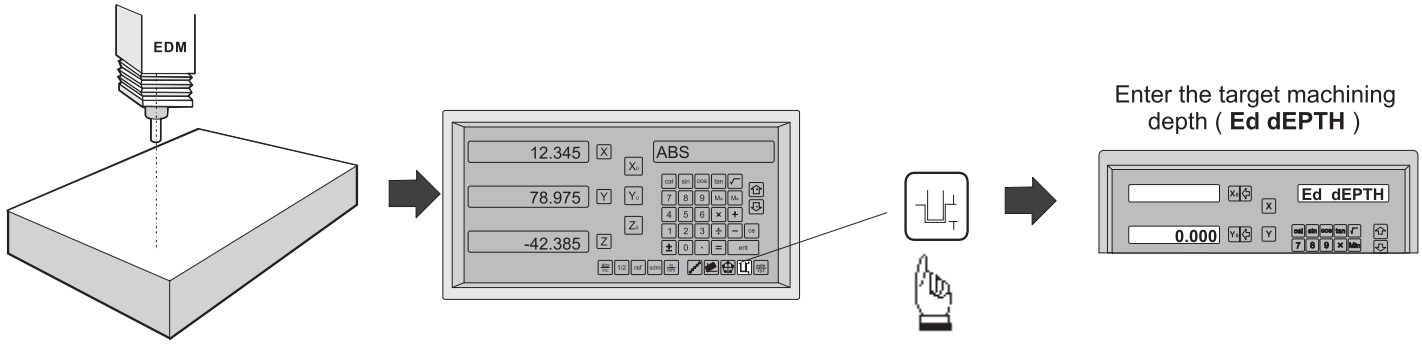
ES8-EDM provides relay output to stop the EDM machine automatically once the electrode reached the target machining depth.




example : target machine depth ( **Ed dEPTH** ) = 30.000mm

## Operating procedure

**Step 1 :** Enter in EDM dunctioon

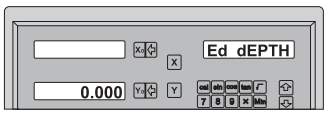


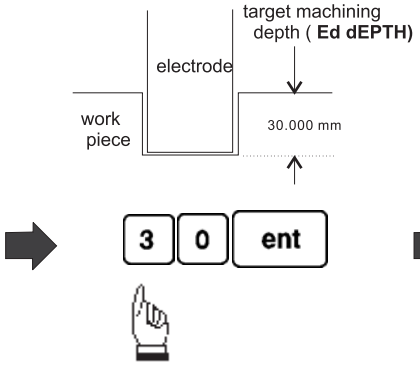

work piece Z coordinate set to zero
Z = 0.000mm

press **EDM** function key
to enter into **EDM** function

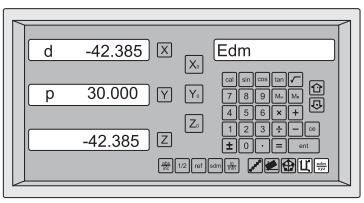
**Step 2 :** Enter the target machining depth ( **Ed dEPTH** )

Enter the target machining depth ( **Ed dEPTH** )

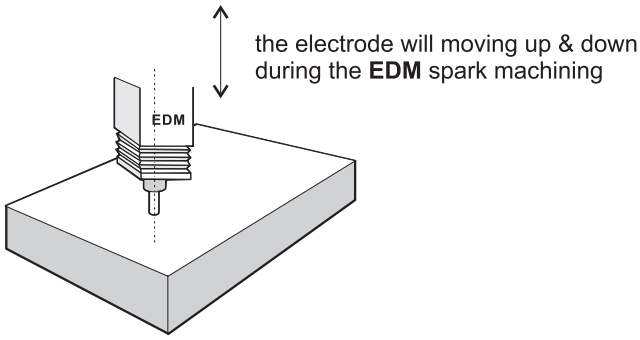



target machining depth entry completed, **ES-8 EDM** then automatically swap to **EDM** operating display, and ready for spark machining.



**Step 3** : start the **EDM** machine for spark machining, once the target machining depth reached, the **EDM** will stop operation automatically.




During the spark machining process, operator may need to know if X/Y axes have moved during the long machining process, **ES-8 EDM** allow the operator to shuttle between the normal XYZ display and the **EDM** operating display, so that the operator can check and verify the machining process. Also, the target machining depth can change during the machining process, so that operator can compensate for the electrode copper loss.

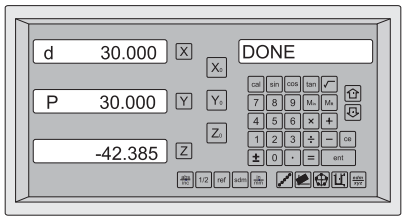
if **ES-8EDM** currently in normal **XYZ** display, to swap to **EDM** operating display, press edm/xyz

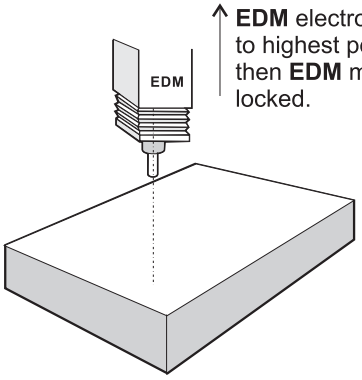
if **ES-8EDM** currently in **EDM** operating display, to swap to normal **XYZ** display, press edm/xyz

When ( **d** display - deepest position of electrode ) reached the ( **P** display - target machining depth ), it means the electrode have reached the requested machining depth, **ES-8 EDM** then trigger a relay output to stop and lock the **EDM** machine, that means EDM machining have completed.

**Step 4** : **EDM** machining completed, ES-8 **EDM** stop and lock the **EDM** machine, to release the machine for locking, procedure are as follows.

**d** display = **P** display, **EDM** machine locked by **ES-8 EDM** relay output




ent

press "ent" key to release the lock,

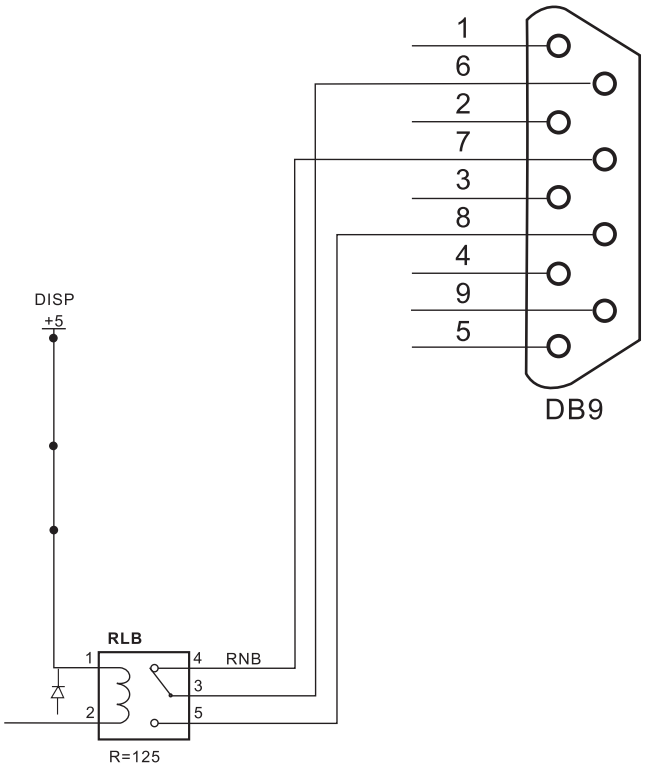
## relay output connecting diagram for ES-8 EDM

**EDM relay output connecting diagram :**

When the Z axis position ( electrode ) reached the target machining depth, **ES-8 EDM** will trigger a relay output signal to the **EDM** machine. The **EDM** machine must connected to ES-8 **EDM** correctly, the connecting diagram are as follows

## Relay output circuit for ES-8 EDM

*The are an DB9 female connector in the rear of **ES-8 EDM** DRO, the relay output circuit are as follows.*




Because most **EDM** machine are equipped with big capacitors in their power circuit, therefore, they normally not affected by short power black out which may be caused by storming weather or the voltage drop triggered by the start up of a big machine in the same power line or etc.. However, DRO are not equipped with big capacitor and hence much more sensitive to power failure and will reset after power failure. In the case if the **EDM** machine won't reset but the DRO reset during **EDM** machining operation, the DRO will lost the Z axis electrode position during the reset , it will cause a mistaken machining.

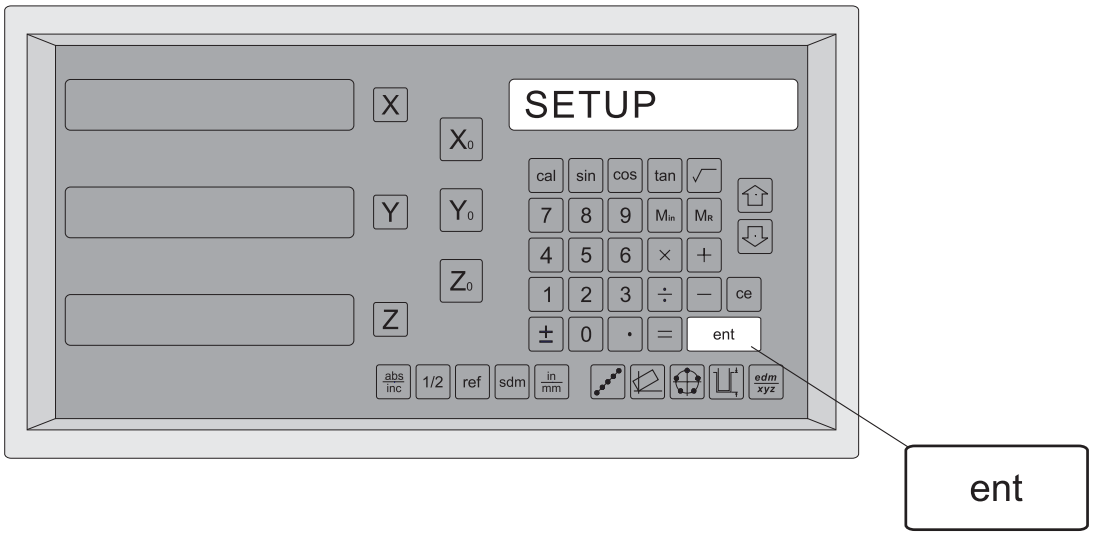
To avoid such problem, **ES-8 EDM** using the opposite output design. *In case the **ES-8 EDM** lost power or being reset, it's output always in "Activate" state to stop and lock the **EDM** machine to avoid any possible mistaken machining.*

**Connecting Pin Configuration :**

. Normally "Open", Activated "Close" : Pin 6 & 7

. Normally "Close", Activated "Open" : Pin 6 & 8

# Parameters Setup



## A) Parameters Reset

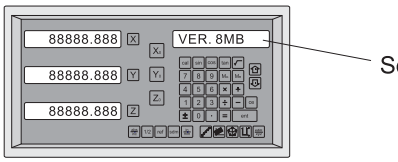
Each ES-8 is configured as it leaves the factory, however, all parameters memory are backup by the internal battery which can only last 30 days after power switched off. Therefore, if the ES-8 have been power off for more than 30 days, the ES-8 parameters might have to reset or reconfigured. Followings are the parameter reset procedure for ES-8.

### Operating Procedure :

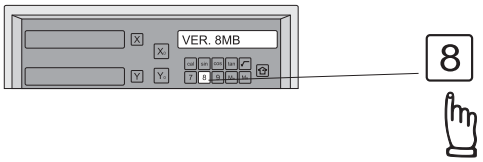
**1) Switch off the ES-8**

**2) Switch on the ES-8, after switching on with the software version "VER. **" showing in the MESSAGE window, press the number "8" key to enter the parameters reset function.**

ES-8 proceeds a self test on electronics circuit after switching on




With the software version number displayed on the message window, for example "VER. 8M B" press [8] to enter into the reset function



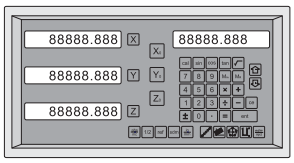

**3) After entered into the reset function, ES-8 will proceed a "RAM TEST" to test all RAM memory, and also reset all RAM memory to 0. Finally resume all factory default settings.**


ES-8 displays "RAM TEST" means RAM test is in progress


ES-8 displays "RAM OK" means RAM memory tested OK.


ES-8 displays "RESET" means all parameters have been resumed tofactory default settings

**4) Reset completed, the ES-8 will proceed LED display test until switched off.**




Reset completed and ES-8 enters into a endless LED test to let operator know if there is any missing segment in LEDs, you can switched off the ES-8 if you found no missing segment in the display LEDs.

## B) Parameters Setup

Each ES-8 is configured as it leaves the factory, however, in order to enable each ES-8 to be individually set up for particular machine and application, following SETUP procedure is used

The SETUP procedure is written in a menu mode which enable you to scroll through the top level options and enter, configure and exit the sub-functions as they arise. Press the **"UP"** or **"DOWN"** keys to scroll through the menus selections.

The top level menu headers in order are as follows:

**DIRECTN** specifies the direction of count for each axis

**LIN COMP** permits linear error compensation to be input

**OUTPUT** relay output signal type.

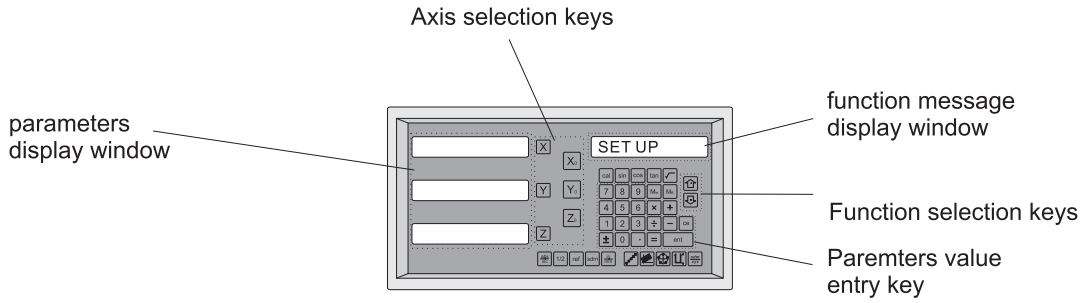
*There are two type of relay output signal from ES-8 are available, they are lock signal and pulse signal.*

*The lock signal type means once the electrode reached the target machining depth, the relay output keep activated until the "ent" key press ;*

*The pulse type signal means once the electrode reached the target machining depth, the relay output activated a pulse output of 0.1sec. ;*

**QUIT** exit the SETUP function.

**Followings are the control keys that are used in the SETUP function.**

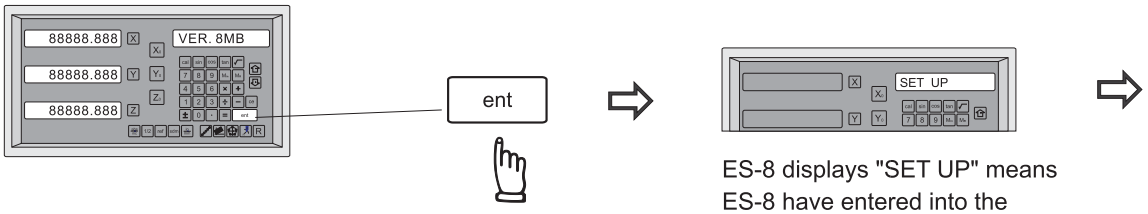



## Operating Procedure of SETUP function :

To enter into the SETUP procedure, after switching on with software version showing in the MESSAGE window, press the "ent" key to enter into the SETUP function.

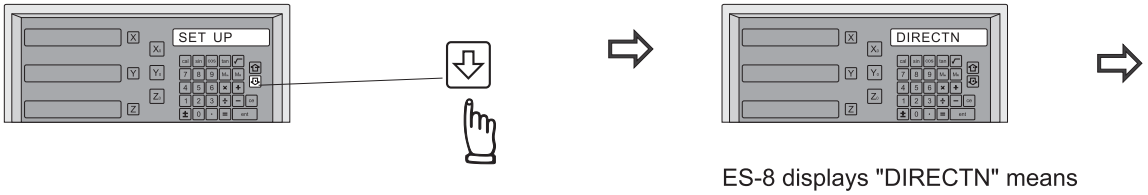
**1) Switch off the ES-8**

**2) Switch on the ES-8, after switching on with the software version "VER. **" showing in the MESSAGE window, press the number "ent" key to enter the parameters reset function.**



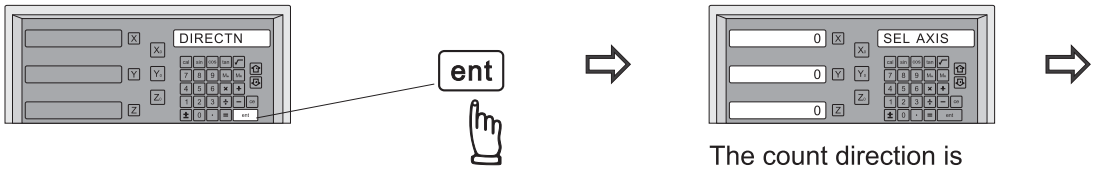

ES-8 displays "SET UP" means ES-8 have entered into the SETUP function..

**2) Press ⇩ or ⇧ key to select next function in the menu, the next function after the SETUP is "DIRECTN" which specifies the direction of count for each axis.**




ES-8 displays "DIRECTN" means ES-8 is currently in count direction count entry function.

Press **ent** to select the "DIRECTN" entry function

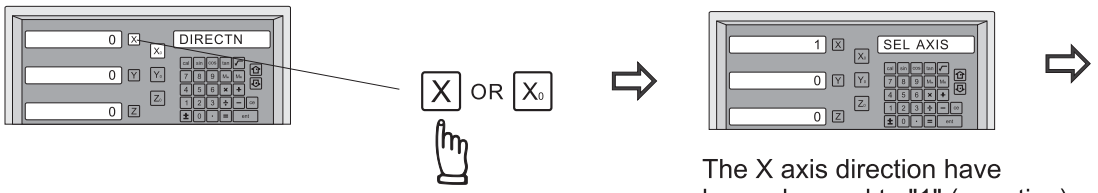



The count direction is represented by "0" or "1" in the axis display window.

The "0' represents a positive, 1 represents a negative. Press the "ent" key to make your selection.

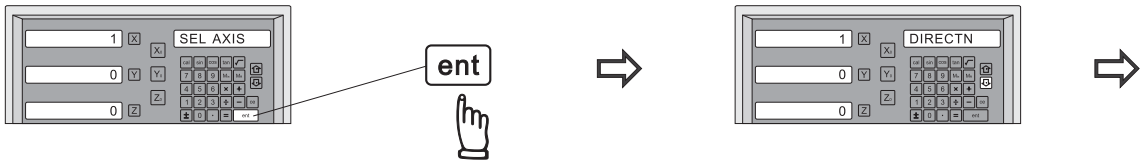
For example, if you want to make a change in the count direction of X axis, procedure is as follows.

Press **X** or **X₀** to select the X axis, if current is "0", the count direction will be toggled to "1", same procedure applied to Y and Z axis.

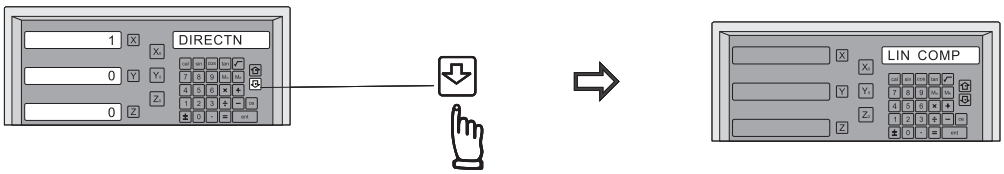



The X axis direction have been changed to "1" (negative).

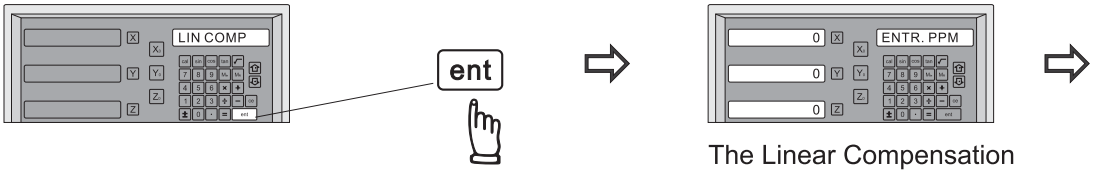
then press **ent** to exit from the "DIRECTN" entry function to return to the top level menu.




**3) Press ⇩ or ⇧ key to select next function in the menu, the next function after the "DIRECTN" is "LIN COMP" which specifies the linear compensation for each axis.**



Press **ent** to select the "LIN COMP" entry function




The Linear Compensation value is displayed on the ES-8.

The linear compensation value is specified in PPM [ P(arts) P(er) M(illion) ], method of calculation for PPM are as follows.

1. Measure the error using a step gauge or other device (e.g. gauge block) of an accuracy level on grade higher than the measuring step. If you are measuring on a 5um scale, the accuracy level of your measurement standard should be one grade higher ideally, such as 1um resolution or etc.

2. The error must be recorded in microns (um)
   ( e.g. we record an error of 19um over a length of 500mm )

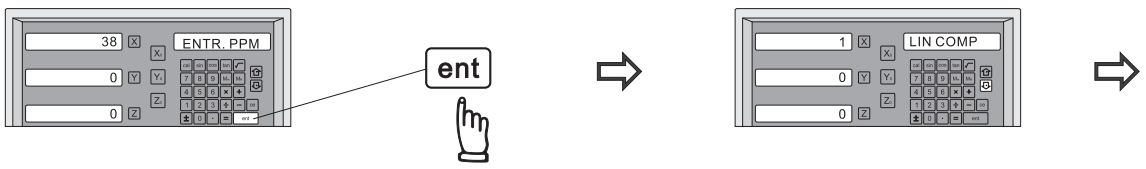
3. Project the error over the 1 meter length ( 1000mm)
   (e.g. in the above example, if measurement is 1 meter - 1000mm, the error will be
   19um X ( 1000/500 ) = 38 um )

4. Find the direction of error, if the DRO display longer than the step gauge, out compensation value is negative and vice versa.

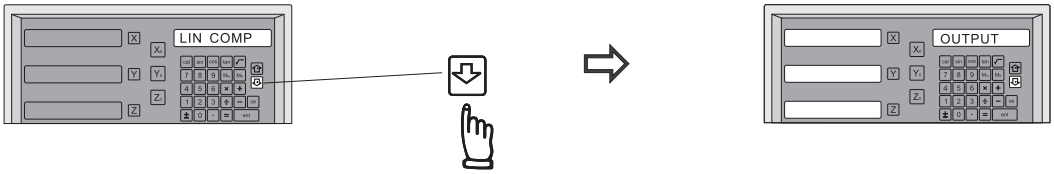
5. The PPM value is micron error extrapolated over a meter , The M(illion) referred to in calculation is the 1 million microns to the meter.
   ( e.g. in our above example the entry would be 38 )

In the above example, the error measurement is in X axis, the DRO display shorter than the step guage, therefore, the compensation value in PPM is +38. To entry this parameter into ES-8, procedures are as follows


then press **ent** to exit from the "LIN COMP" entry function to return to the top level menu.



**4) Press ⇩ or ⇧ key to select next function in the menu, the next function after the "LIN COMP" is "OUTPUT" which specifies relay output signal type.**

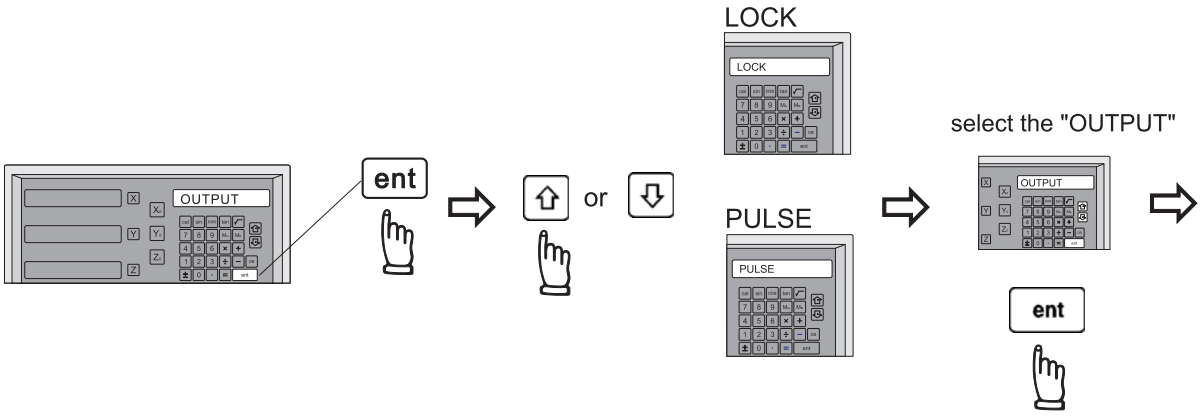



*There are two type of relay output signal from ES-8 are available, they are lock signal and pulse signal.*

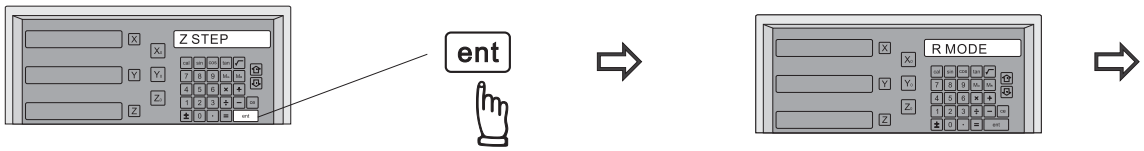
*The lock signal type means once the electrode reached the target machining depth, the relay output keep activated until the "ent" key press ;*

*The pulse type signal means once the electrode reached the target machining depth, the relay output activated a pulse output of 0.1sec. ;*

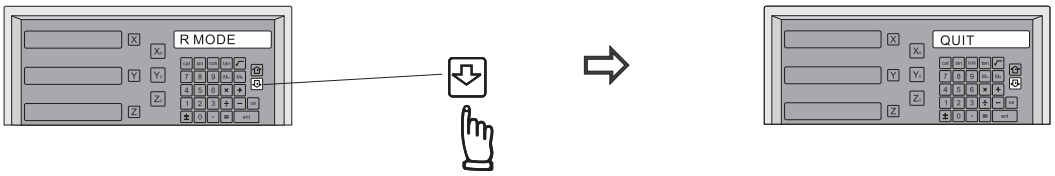
Press "ent" to enter into the OUTPUT select, then press "up" or "down" key to select the "LOCK" or "PULSE" interpolation method. press the "ent" key to confirm the selection (e.g. To select the "Z STEP" in the example listed below)



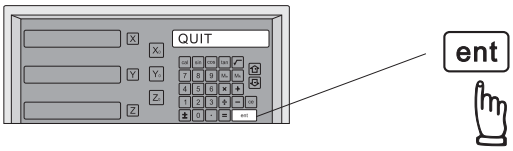
then press ent to exit from the "OUTPUT" entry function to return to the top level menu.




**74) Press ⇩ or ⇧ key to select next function in the menu, the next function after the "OUTPUT" is "QUIT" exits the SETUP function to proceed to normal working.**




press ent to quit from the SETUP function.




***Please notice that the ES-8 must be switched off after quit from the setup function, otherwise, the new parameters setting will not effected.***