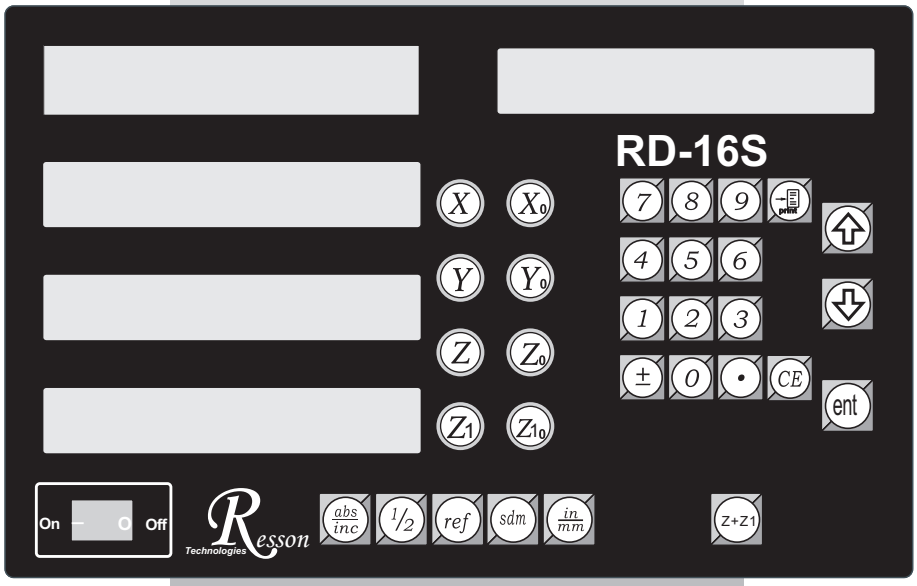
Resson Technologies

The People that Always Committed to Quality, Technology & Innovation



RD-16S

Digital Readout System
Operation Manual
(Standard)

Resson Technologies Co., Ltd.

Notes in Operation

Note before using this display !

- Use the defined voltage

  The rated power voltage supplied to this display should be 100V~230V, select correct voltage supply and try best supplying the power from lighting power line!

  Since the power circuit would become unstable under frequent power on/off and cause instant strong interference or even power shutdown; take special note on it!

- Ground the display!

  To guaranty user safety and stable & reliable system work, we strongly request user connecting the attached ground line (3-m yellow-green cable packed in the packaged box to the FC terminal at back of display to make good grounding connection!

- Insert each axis optic rule into correct position before turning on display; if doing the turn inversely, it might burn out the electronic devices in the optic ruler!

- Do not operate this display in elevated ambient temperature or under high humidity!
- Do not operate this display in strong electric field, magnetic field or noisy environment, or by electric machine that would be the main reason making system act in error!
- Use dry, soft cloth to wipe cleaning display surface!
- For stain hard to remove, use soft cloth wet by neutral detergent to clean it up!
- Do not use gasoline, diesel fuel, kerosene or alcohol to wipe cleaning the display surface!
- Do not use compressing air gun to blow display and optic scale assembly since it would blow oil, moisture, dust or chips into them from seam and cause system unstable and damage!

Elaborate maintenance, correct operation;

Extend operation lifetime and stabilize work performed

Thanks for buying our product! To use it correctly, read this Operation Manual carefully and in details.

RD-16S Specification :

Number of axes : 4

Reslution : 0.05/0.02/0.01/0.005/0.002/0.001/0.0005/0.0002/0.0001mm

Display function : 8-digit LED

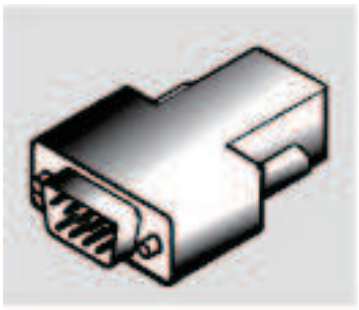
Response speed : 60m (198.6feet)/min

Quantizing error : ±1 count

Power source : AC100V～240V / 50～60Hz / 20VA

Temperature fange : Service:0～40℃ / Storage:-20～70℃

Linear Encoter (Scales) Electrical connector :



D-sub 9 pins connector

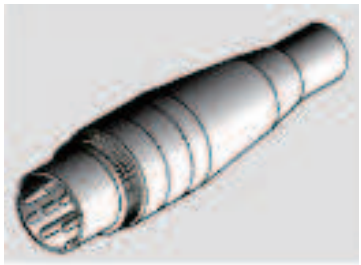
TTL

PIN	SIGNALS
1	N/C
2	0V
3	N/C
4	Inner shield
5	N/C
6	A
7	5V
8	B
9	R

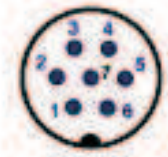
N/C : No Connection

RS422

PIN	SIGNALS
1	A-
2	0V
3	B-
4	Inner shield
5	R-
6	A+
7	5V
8	B+
9	R+



DIN 7 pins connector

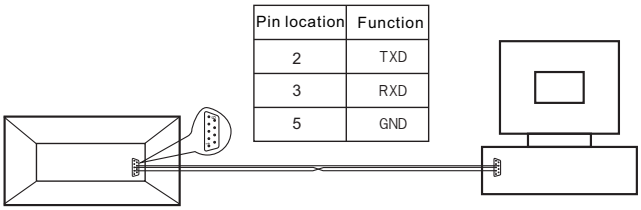


PIN	SIGNALS
1	0V
2	N/C
3	A
4	B
5	5V
6	R
7	Inner shield

N/C : No Connection

RS232 output port

This display has RS232-C output port facilitating user to print out the measuring result or connect it to a computer; the port's picture is as below.



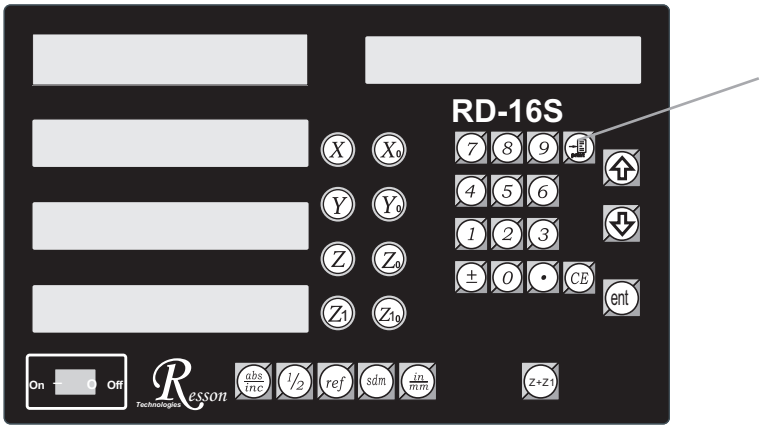
Pin location	Function
2	TXD
3	RXD
5	GND

The display's RS232 output port transmission parameters are:

RAUD RATE : 57600/19200/9600/4800/2400/1200bps
DATA : 8 data bits
STOP BITS : 1 stop bit

Through the display's RS232 output port, we can output display data to a computer or send the output or reset command to display from the computer; such as asking axis X to reset CX, axis Y to reset CY and axis Z to reset CZ.

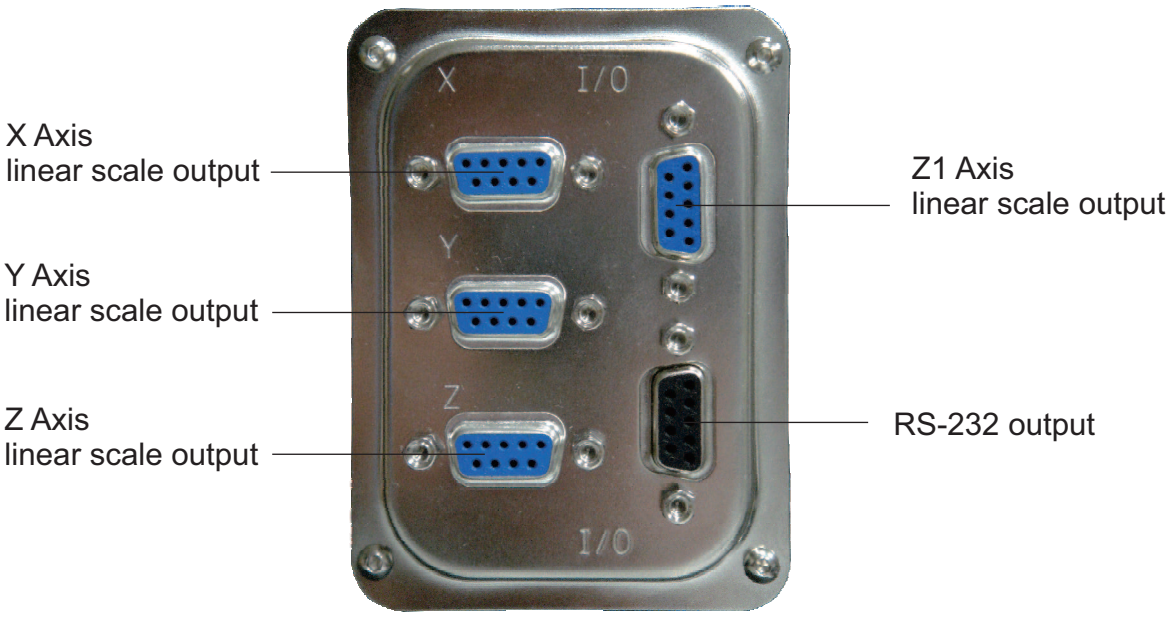
RS232 output function



Press print to output display data; and set the "print" option to "on"; to apply two-way communication, set the "print" option to off.

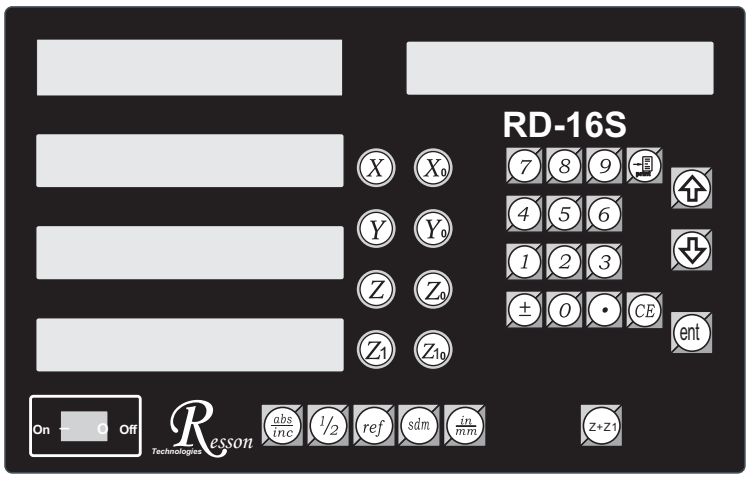
User may select EPSON LQ-300+RS232 as the working printer; set speed to 19200bps and turn on the print to standby.

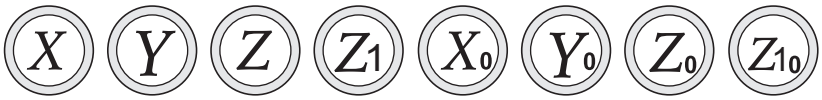
The back shell plug seat of DRO.

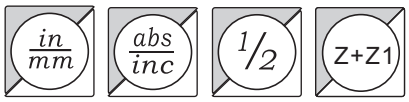


Content

Basic Functions



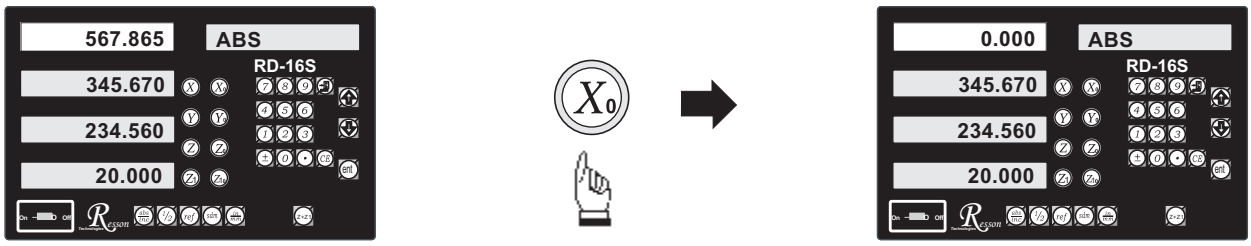




Set Display to Zero

Purpose : Set the current position for that axis to zero

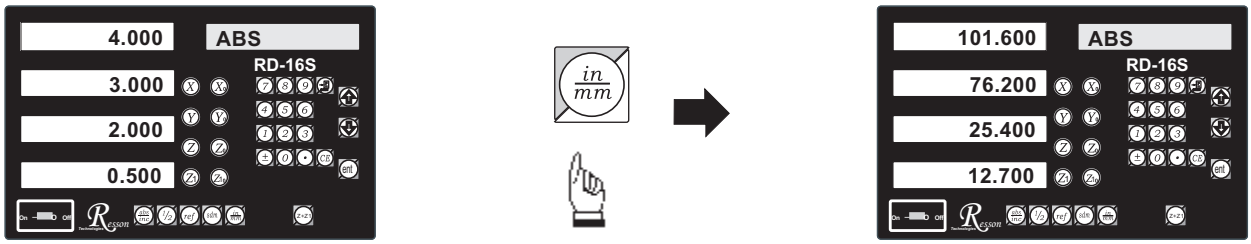
Example : To set the current **X Axis** position to **zero**



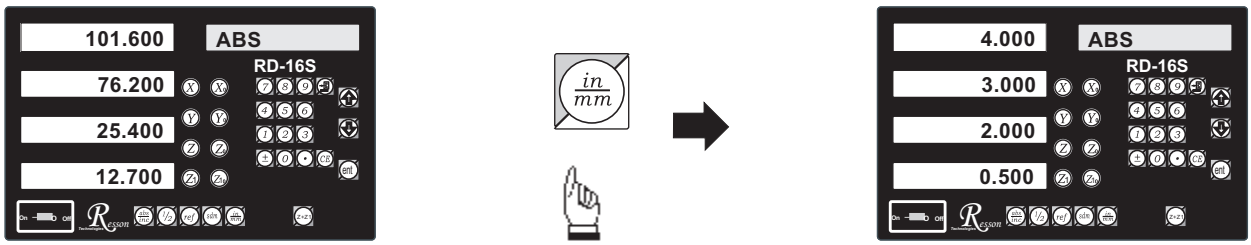
Inch / Metric Display Conversion

Purpose : Switches between inch and metric display

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



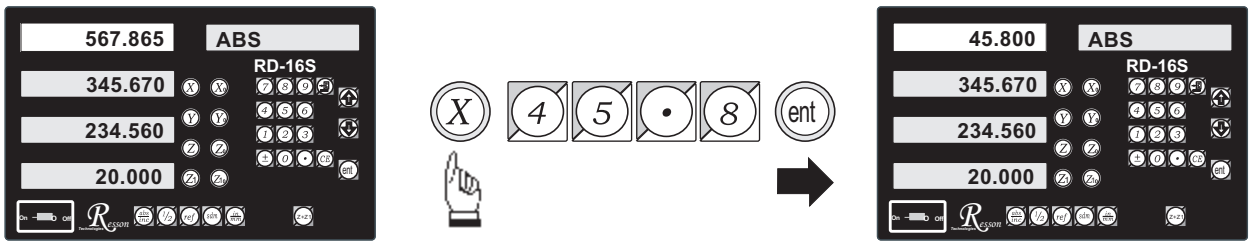
Example 2 : Currently in **metric** display, to switch to **inch** display



Enter Dimensions

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

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



ABS / INC Coordinates display switches

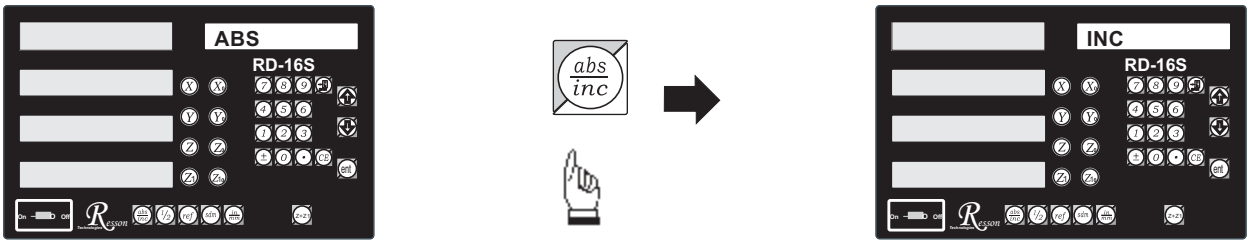
Purpose : **RD-16S** provides two sets of basic coordinate display, they are **ABS** (absolute) and **INC** (incremental) displays.

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.*

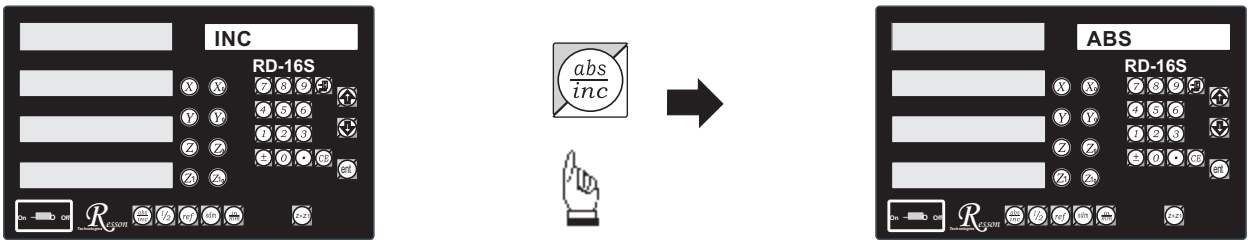
The operator is then free to zero the axes or preset any dimensions into any axis in **INC** coordinate for relative position machining. The work piece datum (work piece zero position) is still retained in **ABS** coordinate by the **RD-16S**.

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

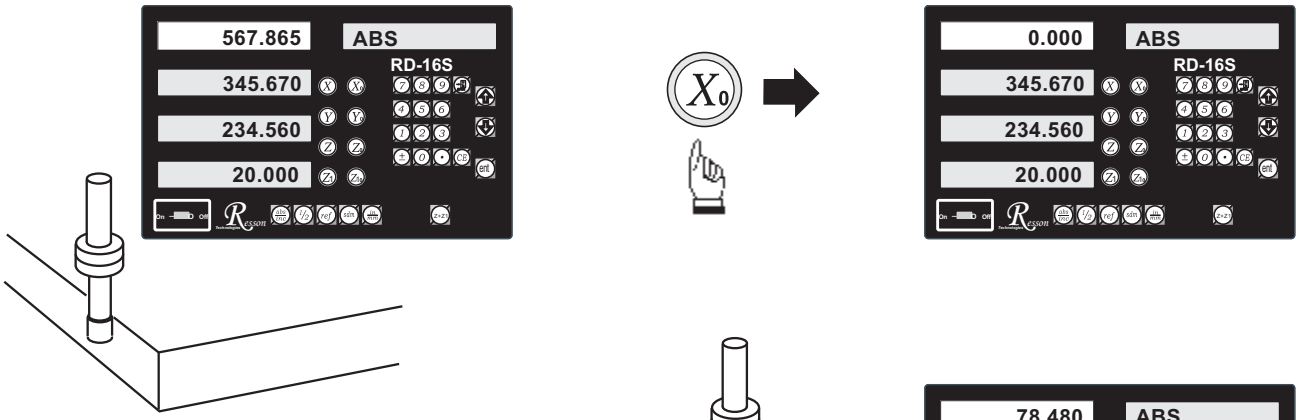


Centre-find

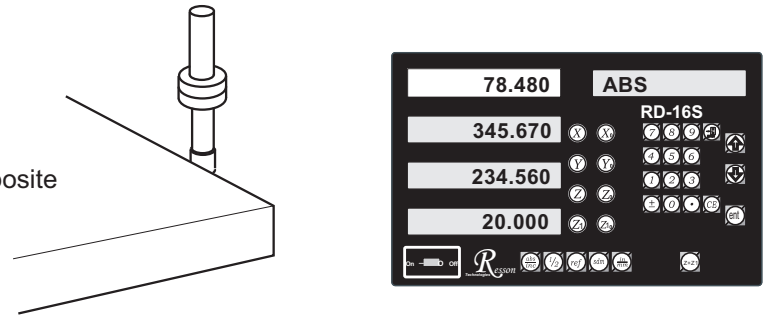
Purpose : **RD-16S** provides the centre-find function by halving the current display coordinate, so that the zero point of the work piece is located at the centre of the work piece.

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

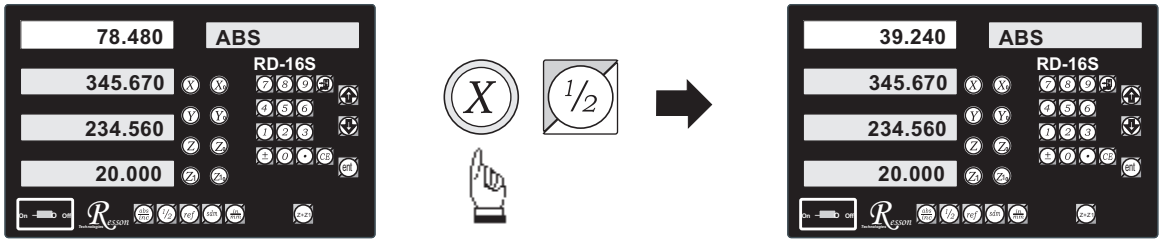
Step 1 : Locate the edge finder at one end of the work piece, then zero the X Axis.



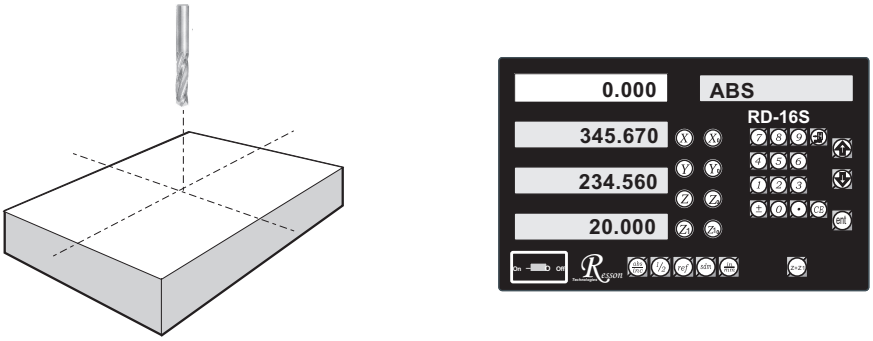
Step 2 : Locate the edge finder at the opposite end of the work piece.



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



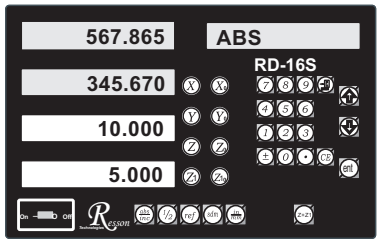
Now the X Axis zero point (0.000) is located at the X centre of the work piece.



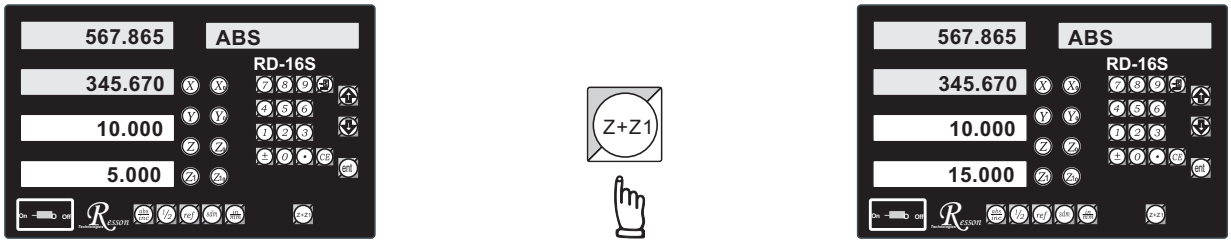
Z+Z1 Sum-up

Function: RD-16S three-axis DRO can sum up the Z-axis and Z1-axis; user can switch over between Z-axis and Z1-axis timely through the function key and they can be displayed independently or in sum.

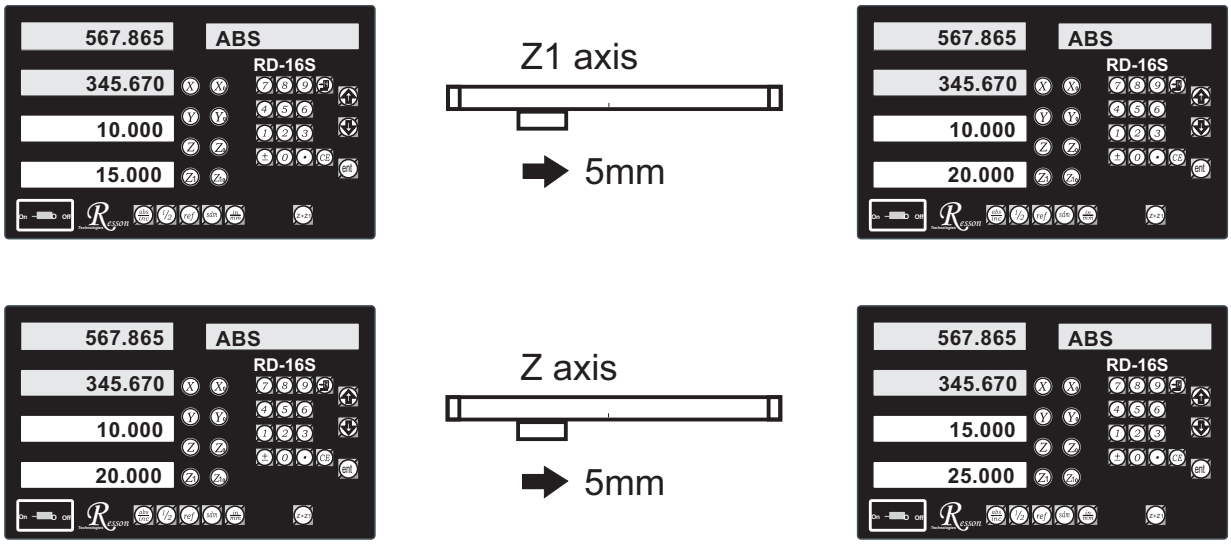
Example: Z-axis 10.000, Z1-axis 5.000
When reading them alone,
the display is



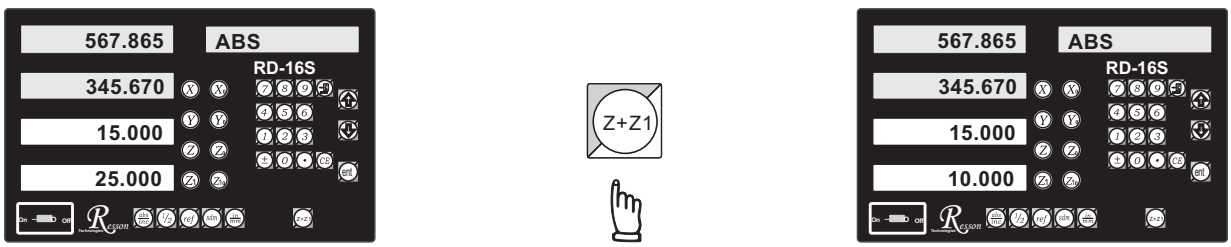
A. Press (Z+T) , the display now will add Z-axis data to Z1-axis window; while using (Z+T) function, Z-axis window still can display Z-axis dimension independently.



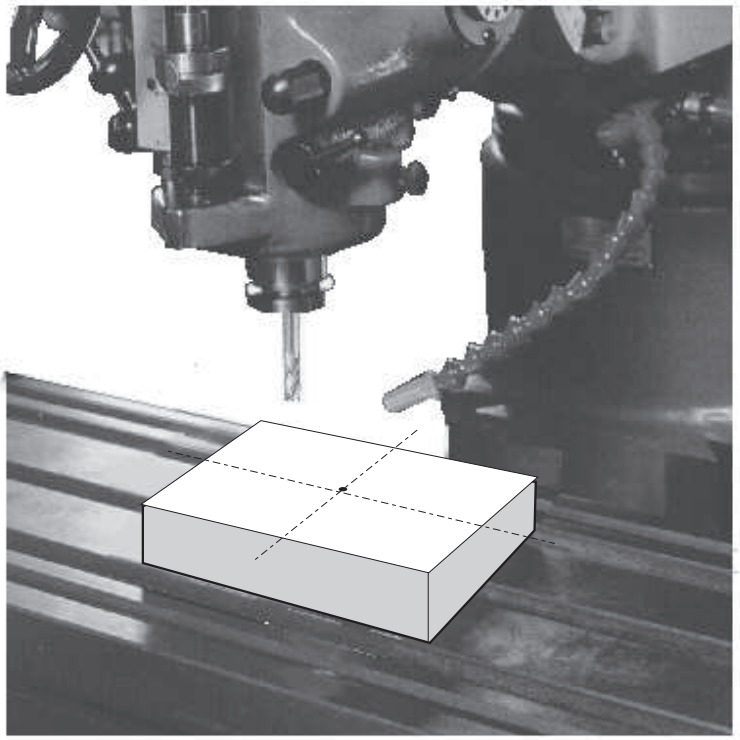
B. While Z1-axis moves forward for 5mm, Z1-axis will display 15mm; then, move Z-axis forward for another 5mm, now, the Z-axis window will display 15mm and Z1-axis displays 25mm.



C. Press (Z+T) to end the Z+Z1 sum-up function and return to independent mode.



ref datum memory



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.

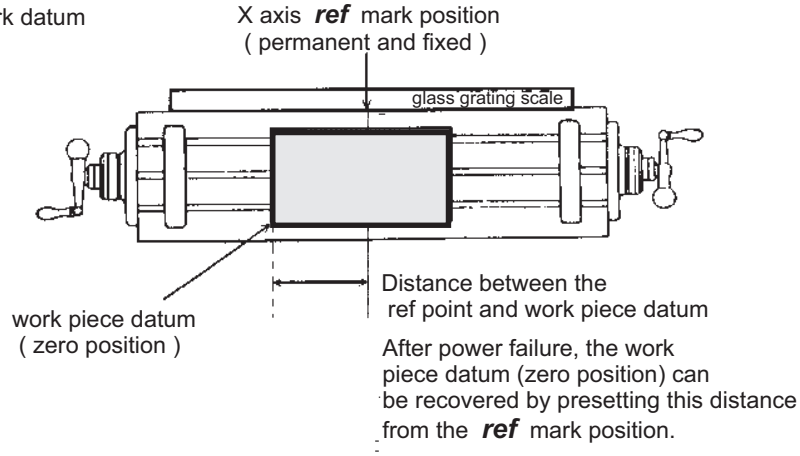
To allow the recovery of work piece datum very accurately, with no need to re-establish the work piece datum using an edge finder or other methods, every transducer has a reference point location to provide a datum point memory function.

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 RD-16S 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 : **RD-16S** 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 **RD-16S**, *whenever you alter the zero position of **ABS** coordinate, such as by zeroing, centre find, coordinate preset or etc.., **RD-16S** will automatically store the relative distance between **ABS** zero and the **ref** mark location into **RD-16S**'s memory.*

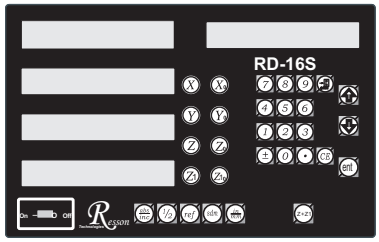
In daily operation, operator simply needs to locate the ***ref*** mark position whenever they switch on the **RD-16S** to let it know where the ***ref*** mark position is, then **RD-16S** will automatically do the work datum storage on its' own . In the case of a power failure or the **RD-16S** being 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**)

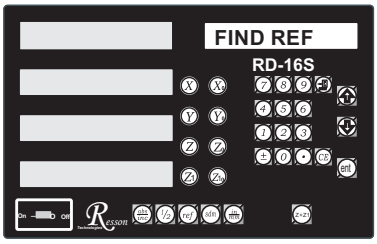
function : In ref datum memory function, the **RD-16S** will automatically store the relative distance between the ***ref*** mark position and the work piece datum (zero position) whenever the operator alter the **ABS** zero position, such as zeroing, centre find, co-ordinate preset or etc...

Therefore, the **RD-16S** 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 accidential 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 **RD-16S**.

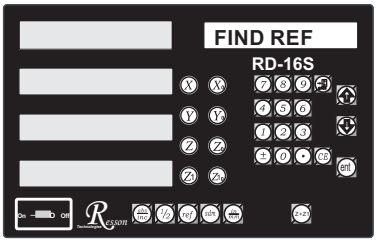
step 1 : To enter the ref function, select the **FIND REF** (find ***ref*** mark)



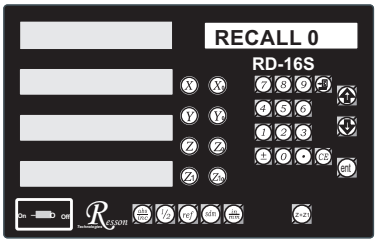
enter into **ref** function



FIND REF
(find ***ref*** mark)

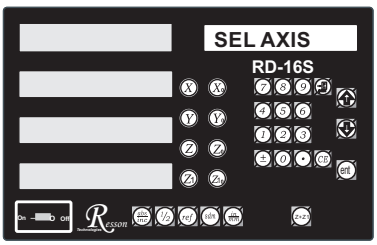


select the **FIND REF**
(find ***ref*** mark)

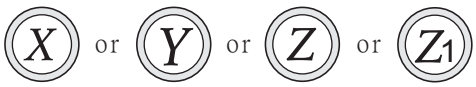


RECALL 0
(recall work zero)

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



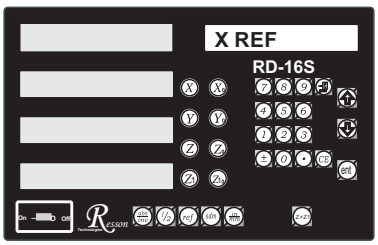
select **X, Y, Z, Z1** axis



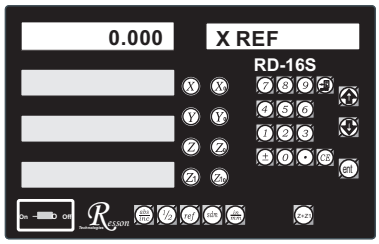
or

select all axes :
X, Y, Z, respectively

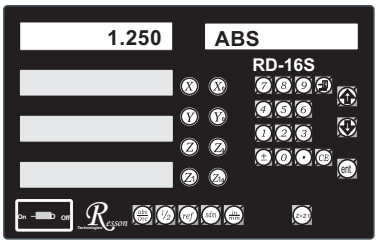
select **X** axis
in this example

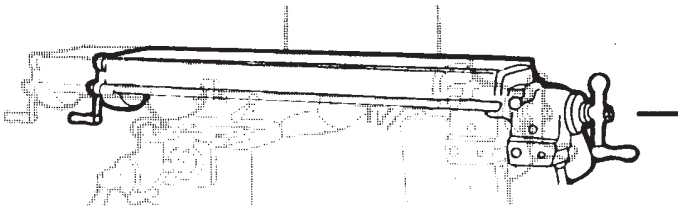


step 3 : move the machine reader head across the length of the transducer until digits display in **RD-16S** start to count.



move the machine until **RD-16**'s digits display start run



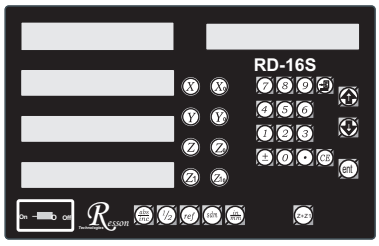


move the machine across the length of the transducer

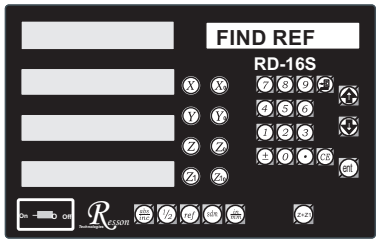
Recall the work datum zero (**RECALL 0**)

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

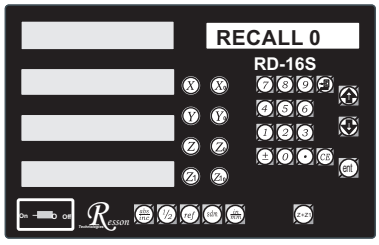
step 1 : enter into the **ref** function, select the **RECALL 0** (recall work piece zero)

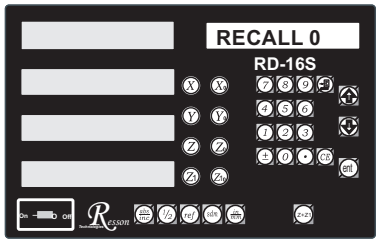


enter into **ref** function



FIND REF
(find ***ref*** mark)

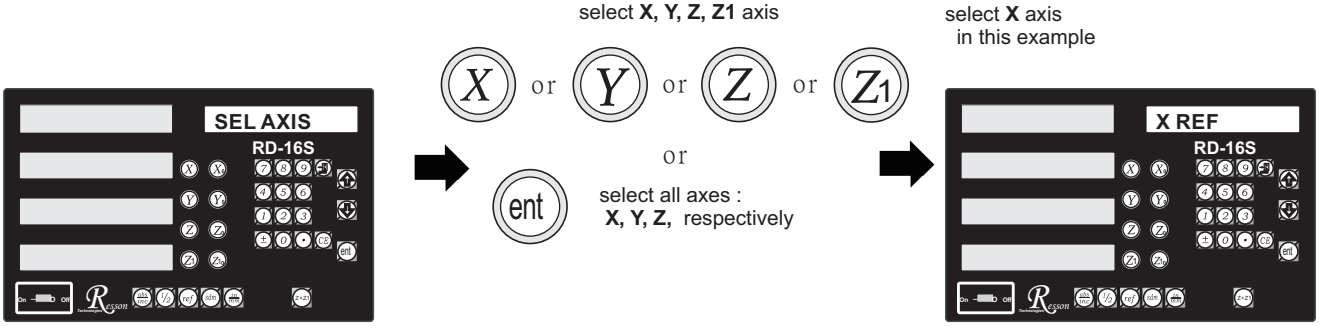




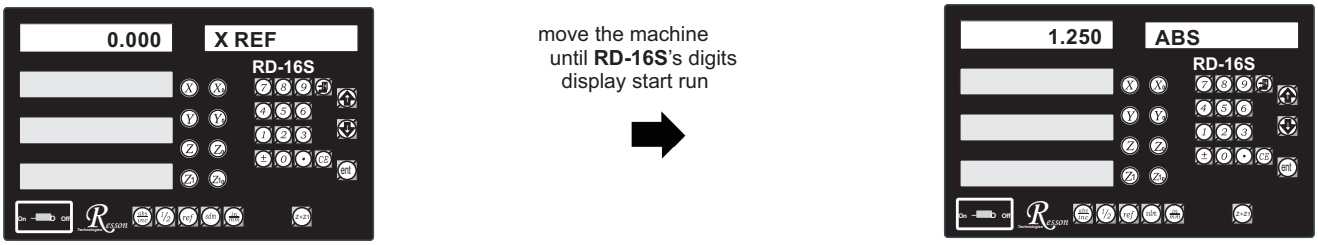
RECALL 0
(recall work zero)

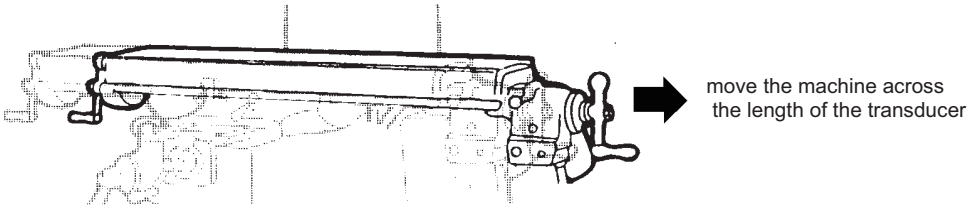
select the **RECALL 0**
(recall work zero)

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

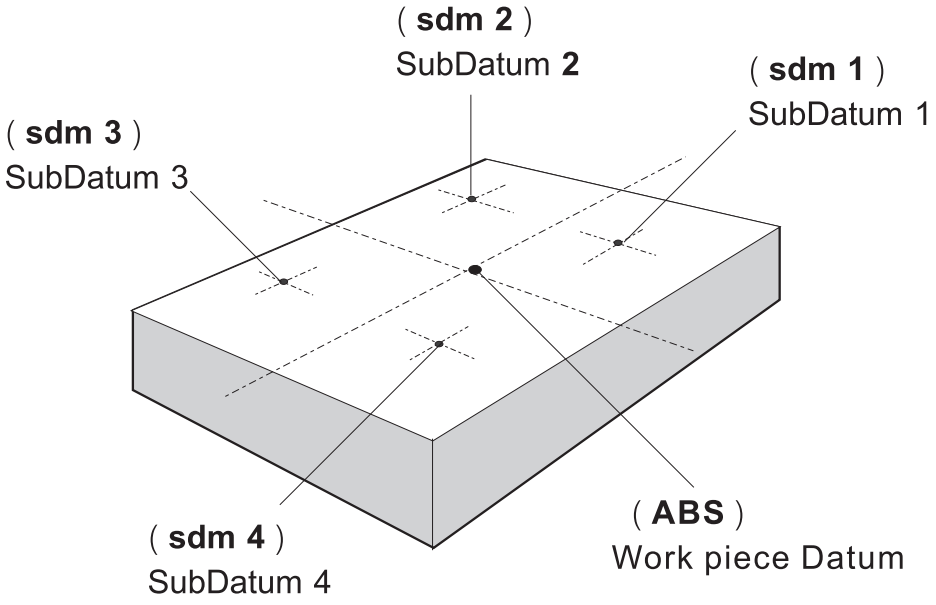


step 3 : move the machine across the length of the transducer until the **RD-16S** display starts to count, then the work piece datum is recovered





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.

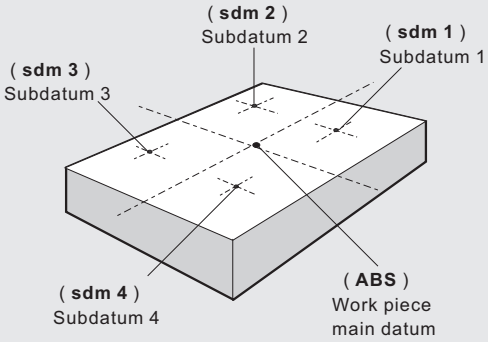
RD-16S provides a **199** subdatum (**SdM**) memory to cope with the shortfalls of **ABS/INC**. **SdM** function does not just simply provide **199** sets of **INC** co-ordinates, it is specially designed to provide much more convenient features for the operator to cope with repetitive work.
The difference between **INC** and **SdM** is as follows:.

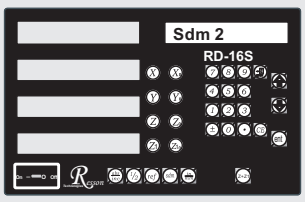
1. **INC** is independent of **ABS** and will not follow any change in **ABS** zero point. All **SdM** co-ordinates are relative to the **ABS** coordinates, so, all **SdM** positions will move together when the **ABS** zero position changes.

2. All **SdM** relative distance data to **ABS** can be entered directly into **RD-16S** memory using the keypad. No need for any additional calculations.

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

Operator can store all the work subdatums in RD-16's memory as per follows.





Operator then can switch between the subdatums directly by pressing key

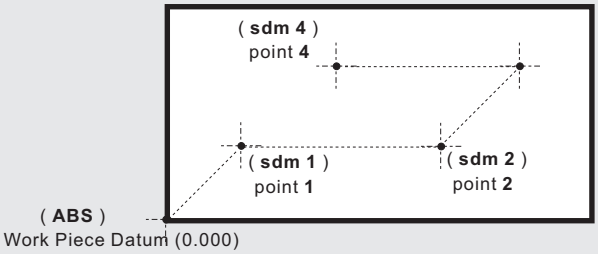
or

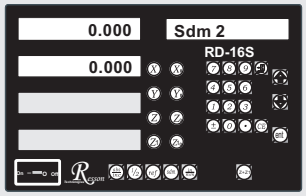
No need to refer back to ABS coordinate and set up the subdatums from their relative distance from ABS point

SdM application on the repetitive batch machining of parts

Because all sdm subdatums (0.000) are relative to ABS zero, so, for any repeative 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 repeative parts, just set up the 2nd, 3rd.. work piece zero at ABS, then all the machining positions will reappear





Press Up/Down key to go to machining points

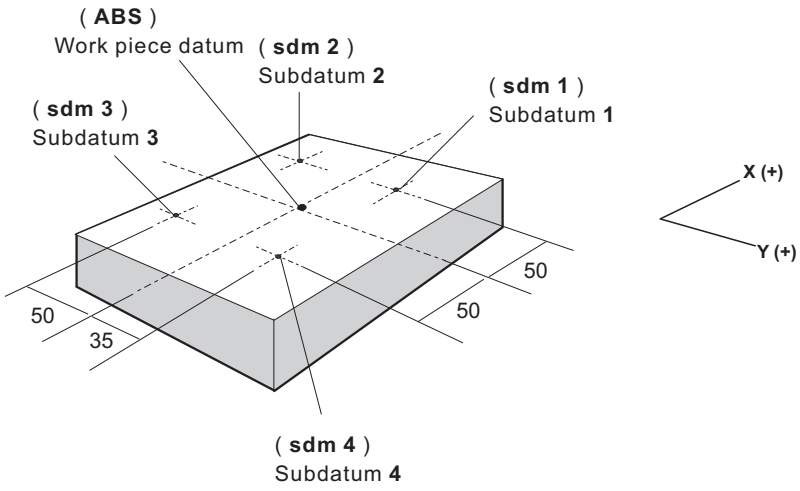
or

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

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)

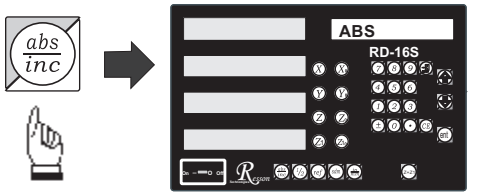


Method 1 : Move machine to required subdatum position, then zero SdM display coordinate

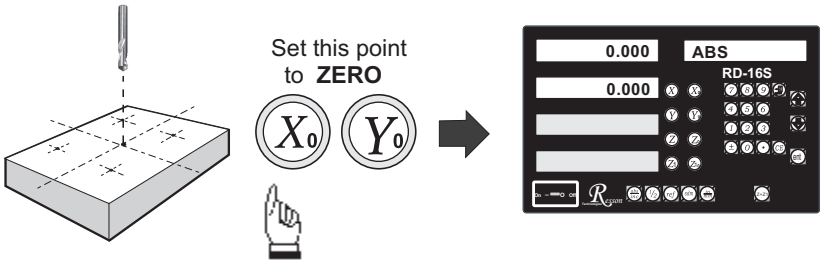
Set up the work piece datum in **ABS** co-ordinate, move the machine to the required subdatum position, then zero **SdM** display co-ordinate.

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

Switch to **ABS** coordinate display

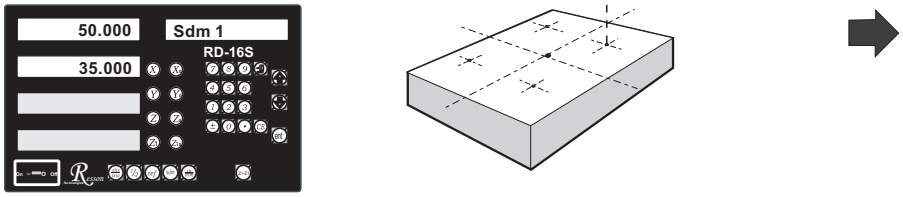


Locate the tool at work piece datum point

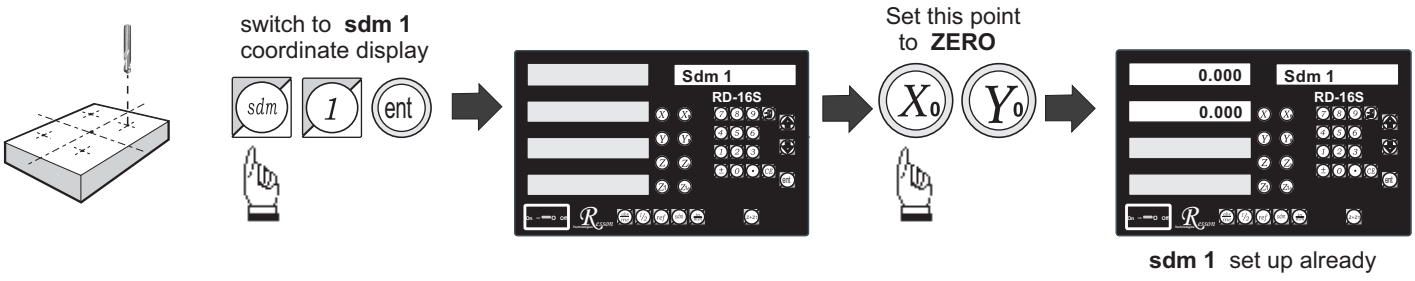


Step 2 : Set up the subdatum point **1** (sdm1)

Locate the tool at subdatum point 1 (sdm 1) :
X=50.000, Y=35.000

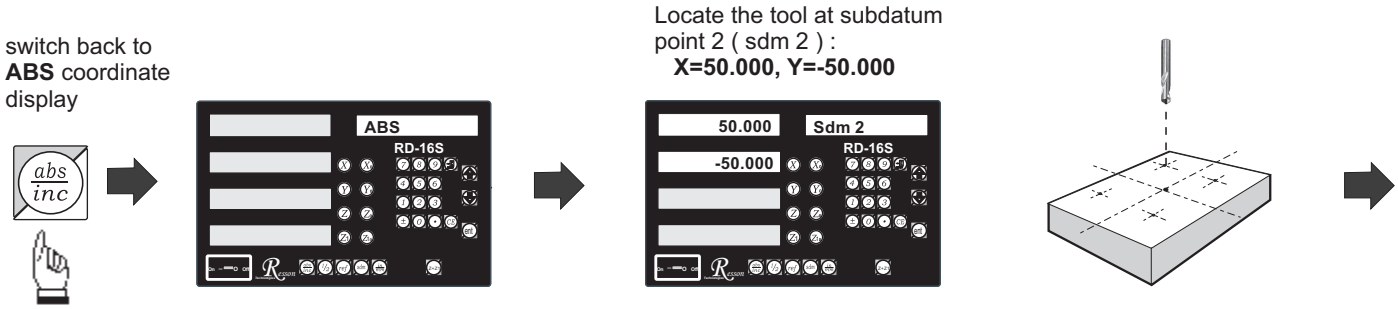


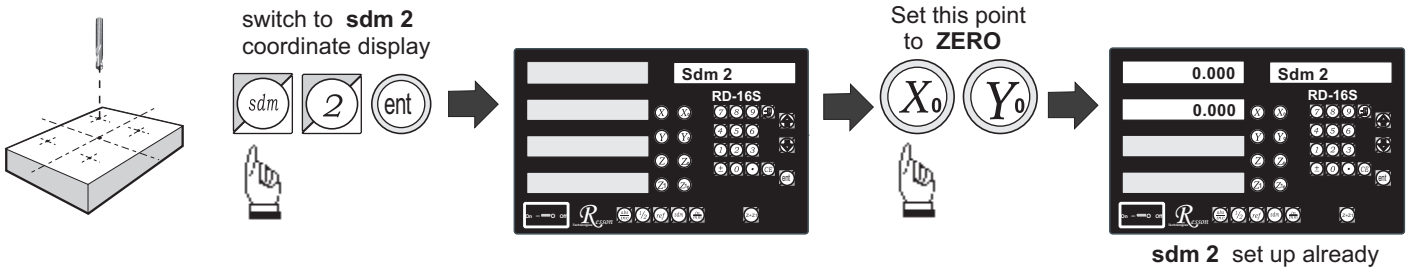
199 SubDatum function



sdm 1 set up already

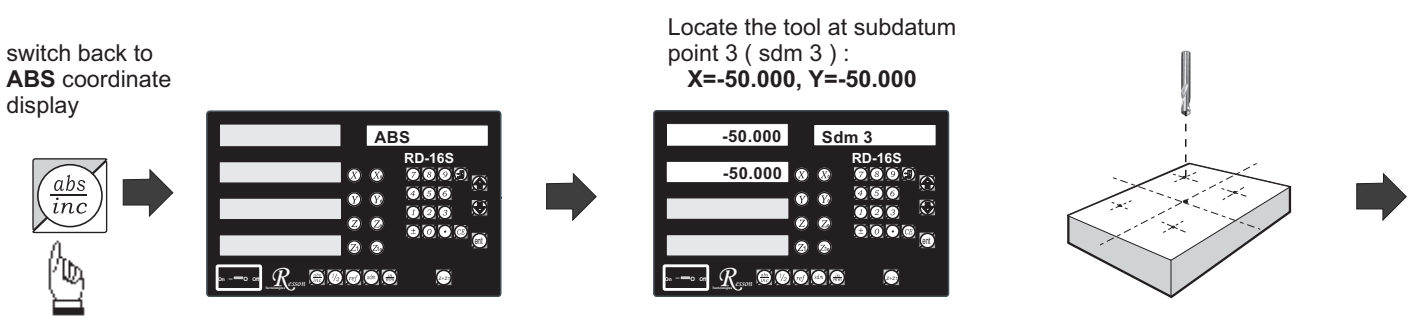
Step 3 : Set up the subdatum point 2 (sdm 2)

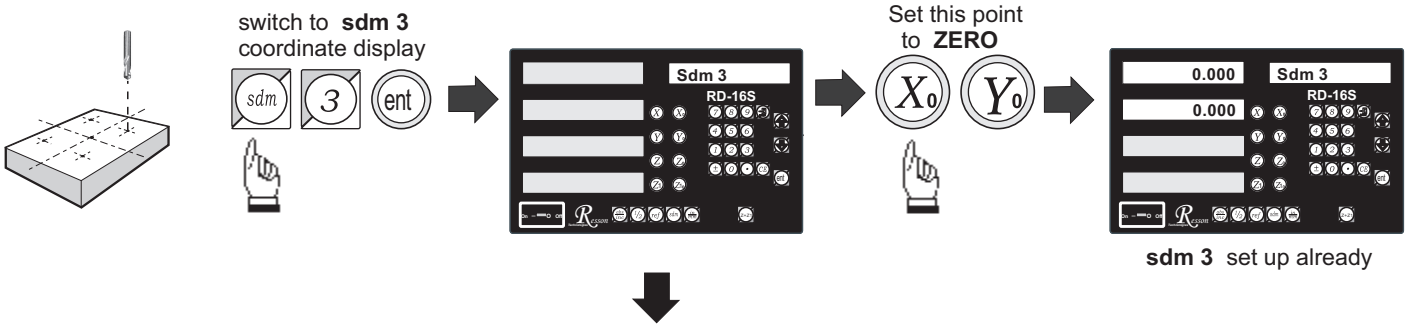




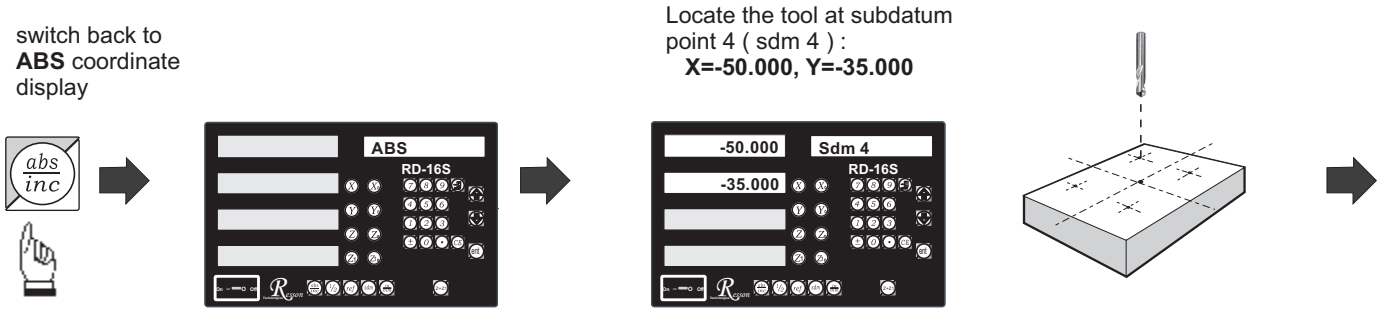
sdm 2 set up already

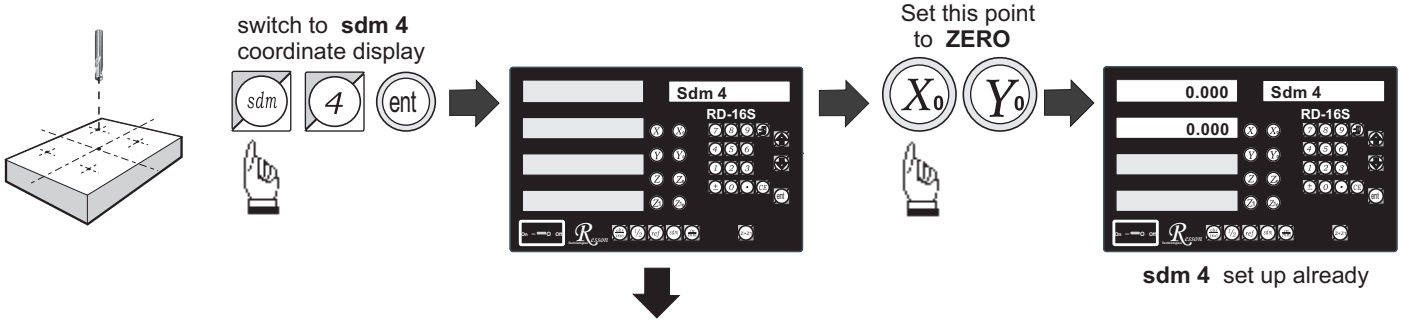
Step 4 : Set up the subdatum point 3 (sdm 3)





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

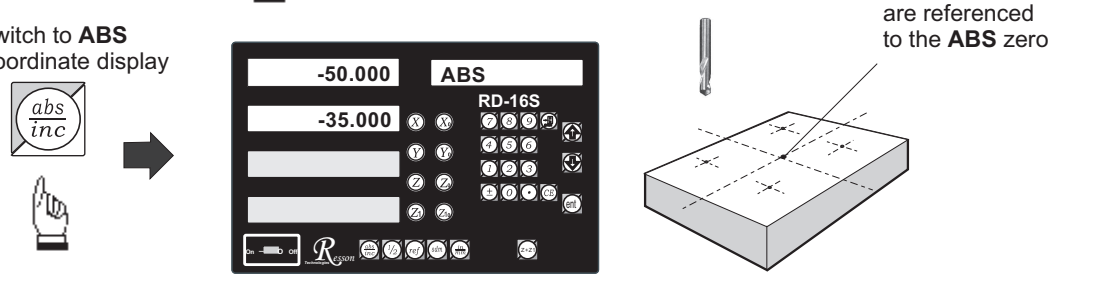




All the four subdatum points have already been set up

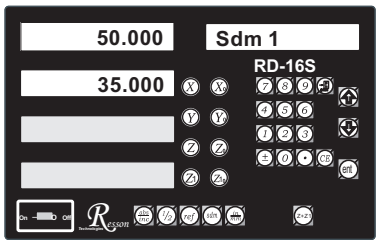
Operator can or to directly switch to the required subdatum (**sdm**) coordinate

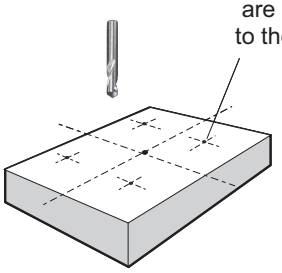
Example :



199 SubDatum function

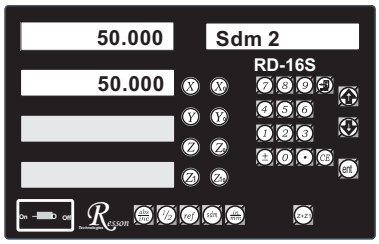
switch to next (**up**)
sdm coordinate display

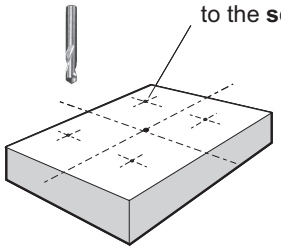




RD-16S's XY displays
are referenced
to the **sdm 1** zero

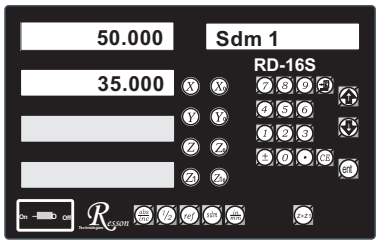
switch to next (**up**)
sdm coordinate display

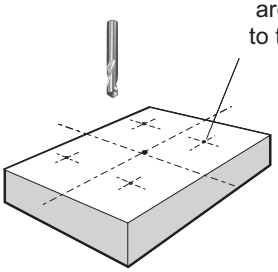




RD-16S's XY displays
are referenced
to the **sdm 2** zero

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





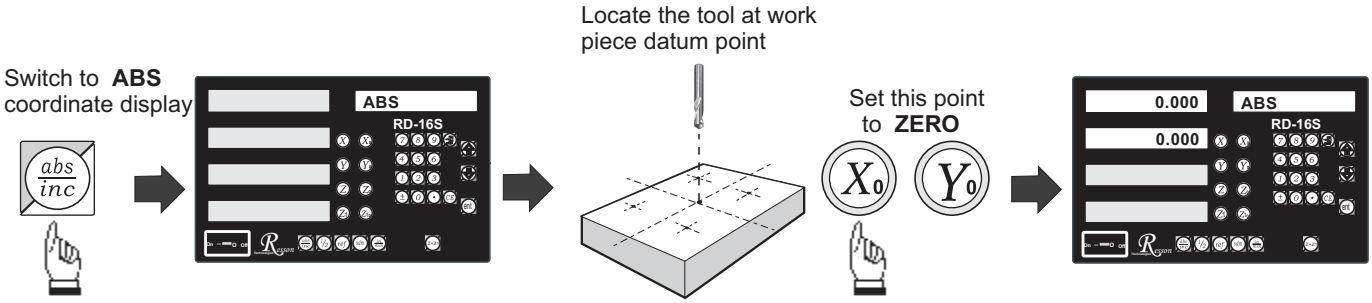
RD-16S's XY displays
are referenced
to the **sdm 1** zero

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.

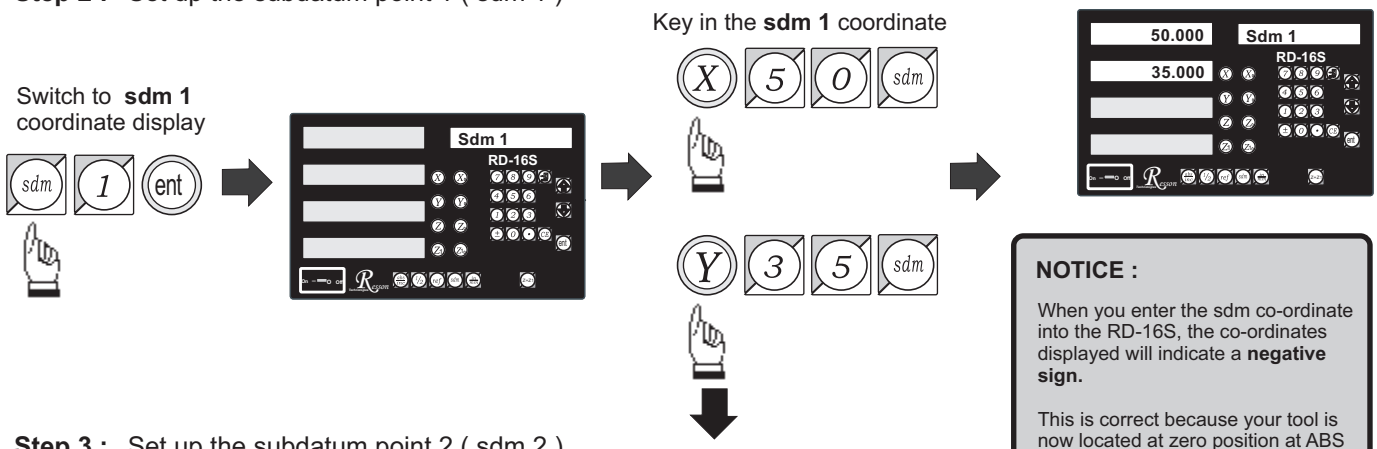
Mtheod 2 : Direct keying in the of SdM zero position co-ordinate (co-ordinate relative to ABS zero)

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)

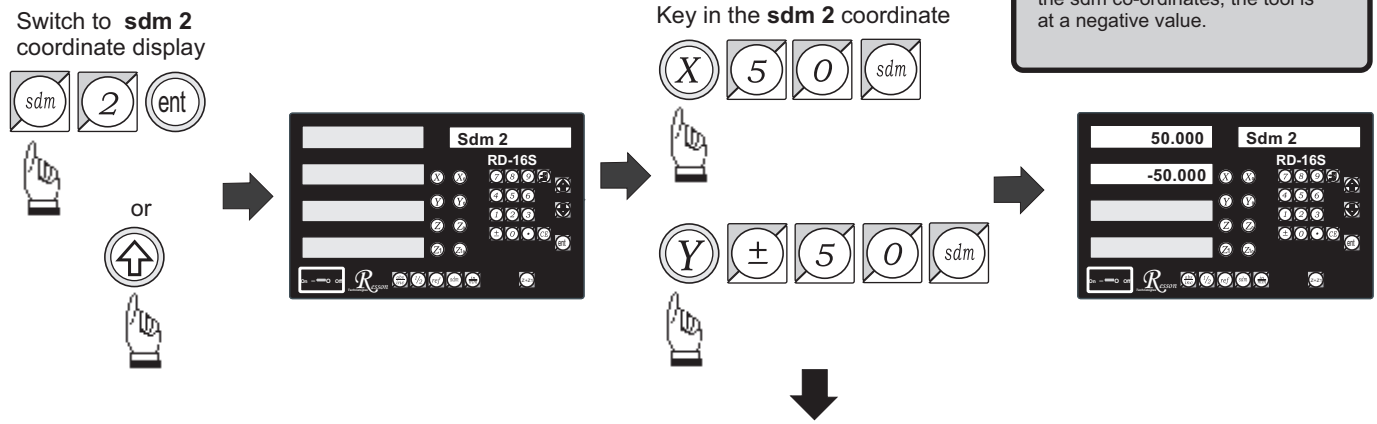


NOTICE :

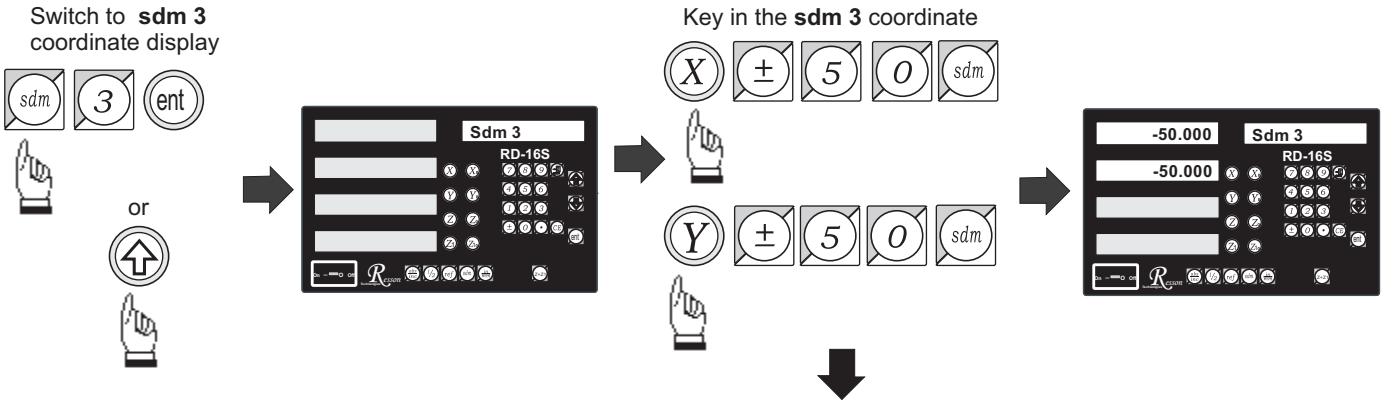
When you enter the sdm co-ordinate into the RD-16S, the co-ordinates displayed will indicate a **negative sign.**

This is correct because your tool is now located at zero position at ABS coordinate. If you calculate from the sdm co-ordinates, the tool is at a negative value.

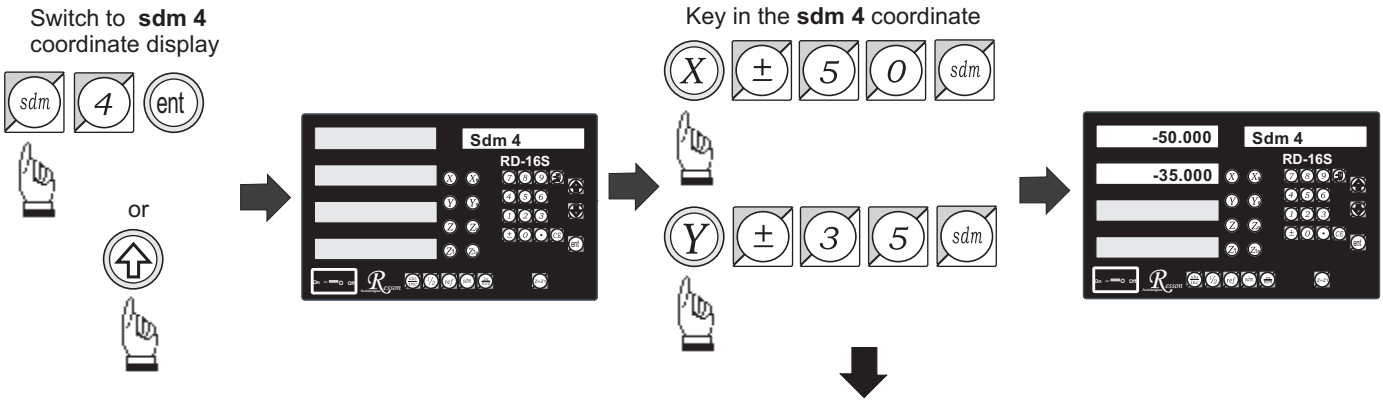
Step 3 : Set up the subdatum point 2 (sdm 2)



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



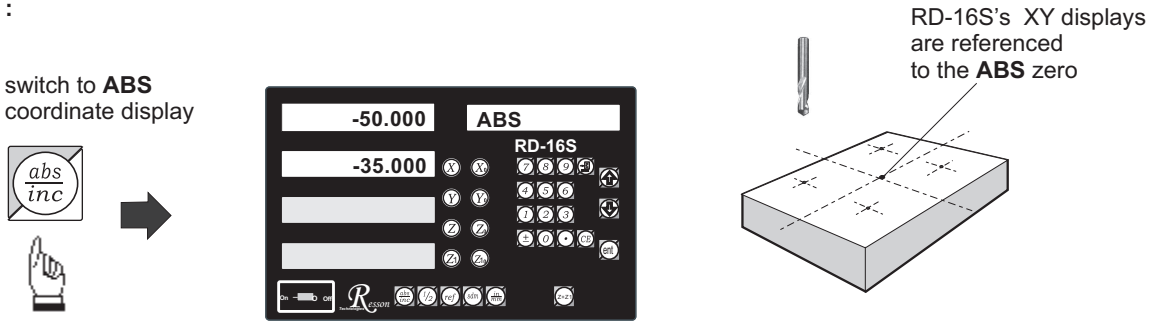
Step 5 : Set up the subdatum point 4 (sdm 4)



All the four subdatum points have already been set up

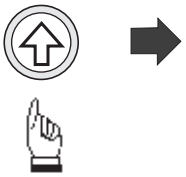
Operator can or to directly switch to the required subdatum (**sdm**) coordinate

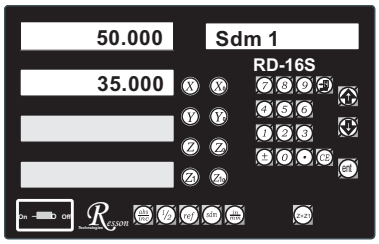
Example :



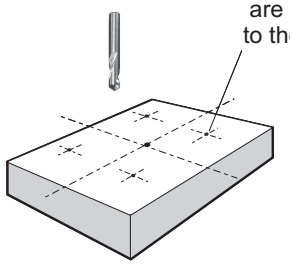
199 SubDatum function

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

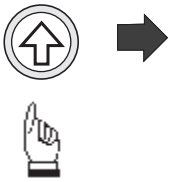


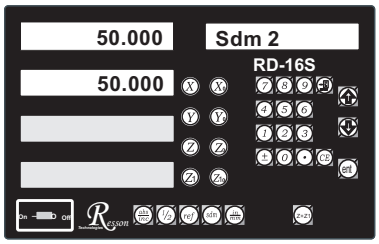


RD-16S's XY displays
are referenced
to the **sdm 1** zero

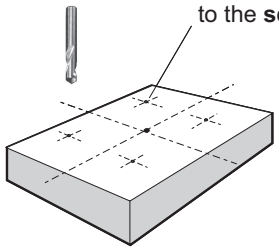


switch to next (**up**)
sdm coordinate display

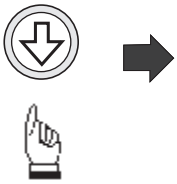


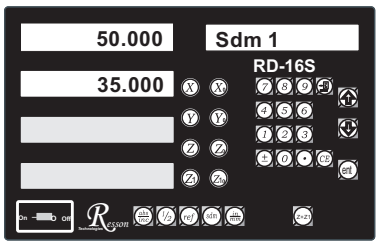


RD-16S's XY displays
are referenced
to the **sdm 2** zero

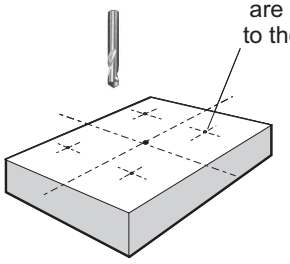


switch to previous (**down**)
sdm coordinate display

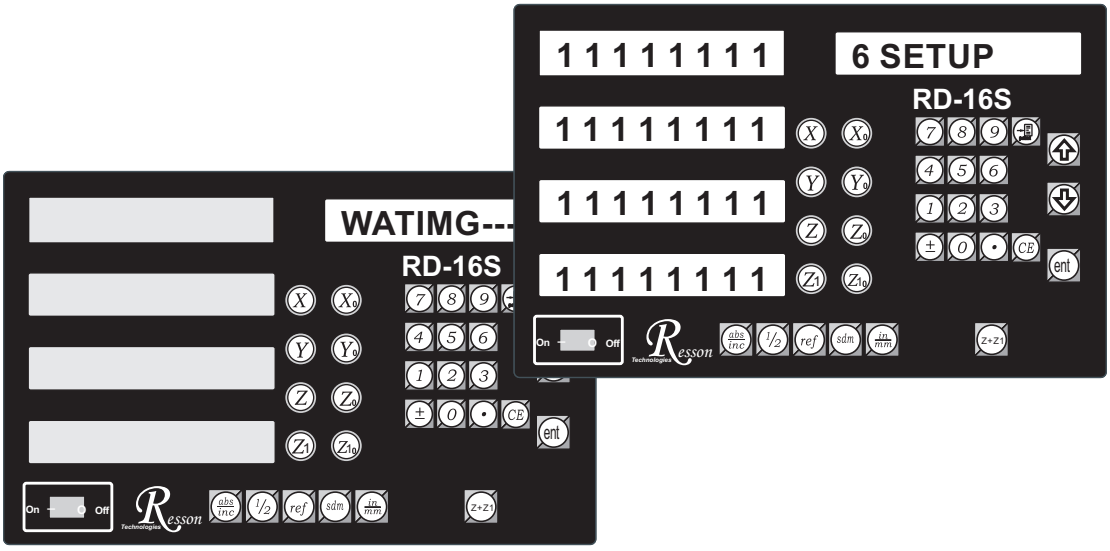




RD-16S's XY displays
are referenced
to the **sdm 1** zero

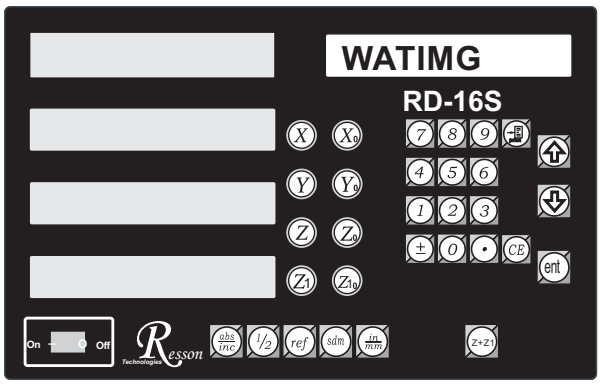


RD-16S
Parameters Setup



BAUD SET ..... set up RS232 transmission baud.
BEEP ON/OFF ..... turn on/off printer.
BEEP ON/OFF ..... turn on/off beeper.
RESOLUTE ..... set up Linear scale resolution.
CP ERROR ..... compensate Linear scale error
LINEAR P ..... compensate linear error.
NL ERROR ..... compensate nonlinear error (point compensation)
DIRECT ..... set up direction.
EXIT ..... end and exit.

Reset display's original parameter (RESET)



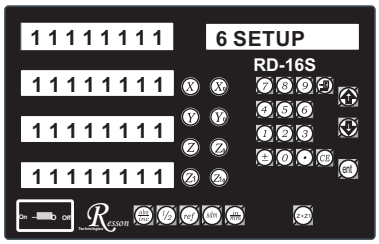
When the DRO is under the impact of abnormal voltage, or user's improper operation that cause parameter setting in error, it needs to default simple working parameters by resetting them to default value from memory. Yet, before parameter reset, check if there is any parameter value set in already; if so, write down the setting data and set it up after reset.

Operation steps:

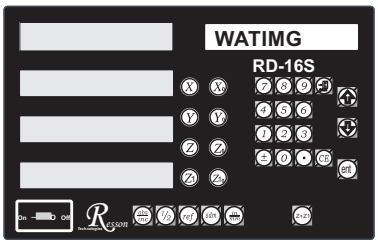
1) . Turn off the DRO power.

2) . Turn on the DRO; when "11111111" test signal is shown in the display window, press "0" and the display start performing "reset".

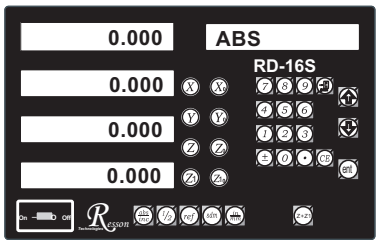
While turning on the display, it will perform self diagnosis and test; press 0



3). 1.When parameters reset, "WATING" will show on the display.



"WAITING --" is shown as parameter reset is underway.

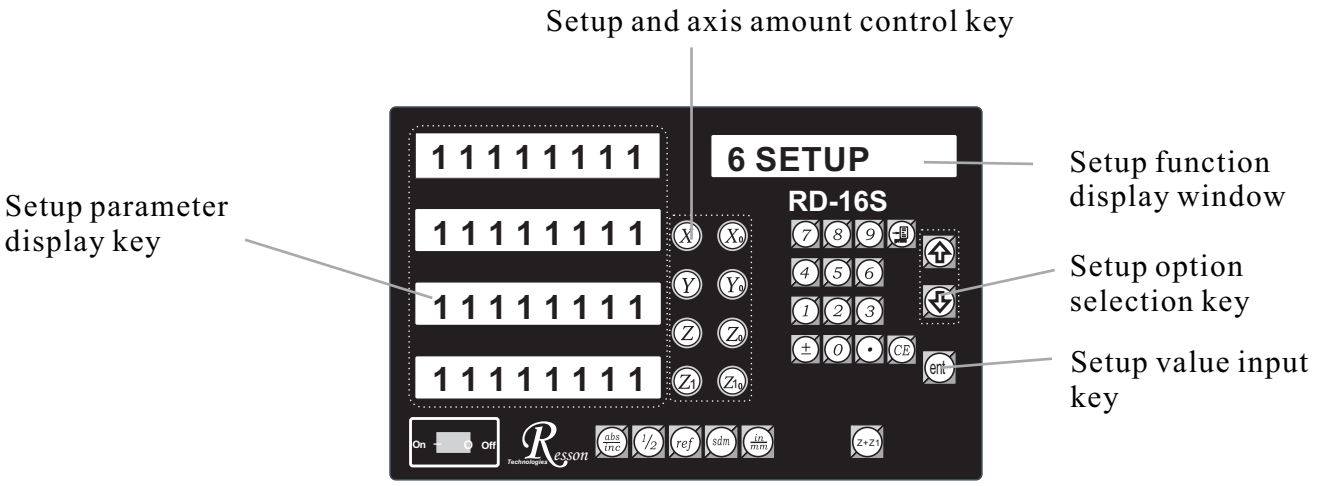


After coming backing to normal mode, the parameter reset process is complete.

Set up new parameters in display (SETUP)

When DRO-change IC is under the impact of abnormal voltage or improper operation, which cause the default disturbed; or user wants to change production process and needs to modify the default value, it needs to set up DRO and reset function values in memory.

DRO in the display and related key locations in the SETUP process:



Operation steps:

1) 1.Turn off the DRO power.

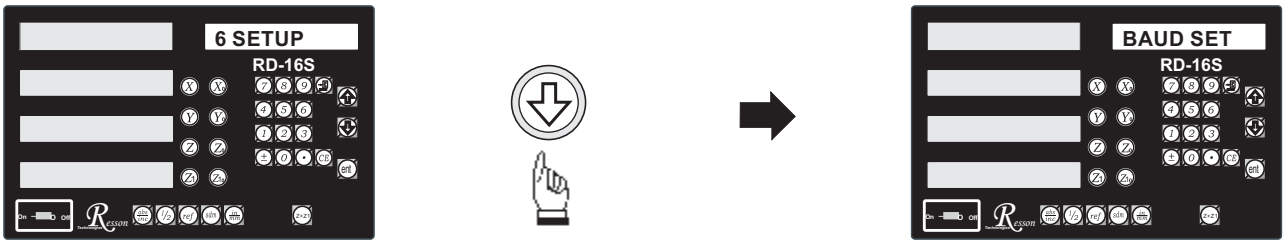
2) Turn on the DRO; when self-diagnosis test signal is shown in the display window, press 6 and the display start performing "setup"

The setup procedure is designed to option menu mode; the Definition List facilitates user to apply the following options.

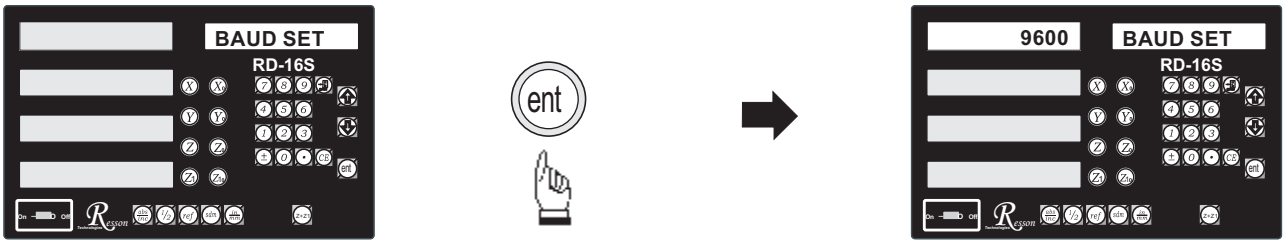
The first layer functions are, in turn, defined as below:

BAUD SET ..... set up RS232 transmission baud.
BEEP ON/OFF ..... turn on/off printer.
BEEP ON/OFF ..... turn on/off beeper.
RESOLUTE ..... set up Linear scale resolution.
CP ERROR ..... compensate Linear scale error
LINEAR P ..... compensate linear error.
NL ERROR ..... compensate nonlinear error (point compensation)
DIRECT ..... set up direction.
EXIT ..... end and exit.

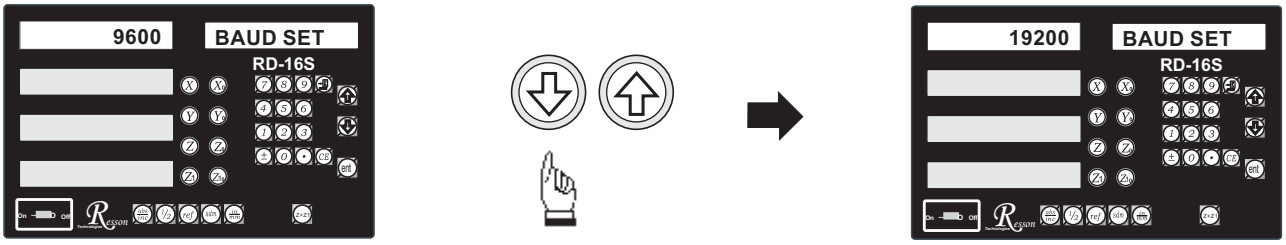
3) Press ⇩ to "BAUD SET".



Press ent to enter the setting of RS232 transmission baud.

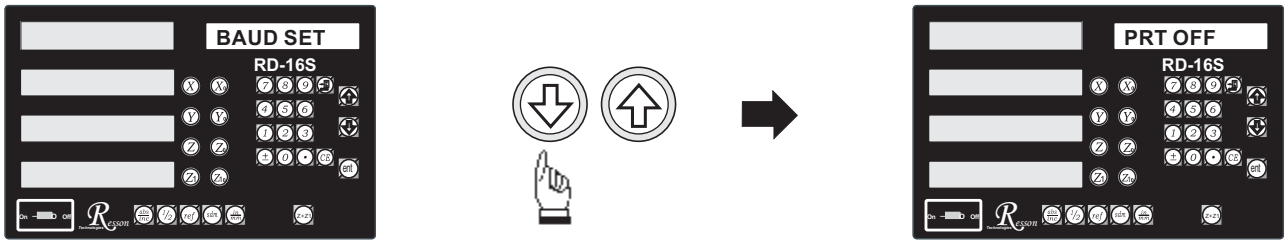


Press ⇩ or ⇧ to select the correct baud speed from 1200/2400/4800/9600/19200/57600.

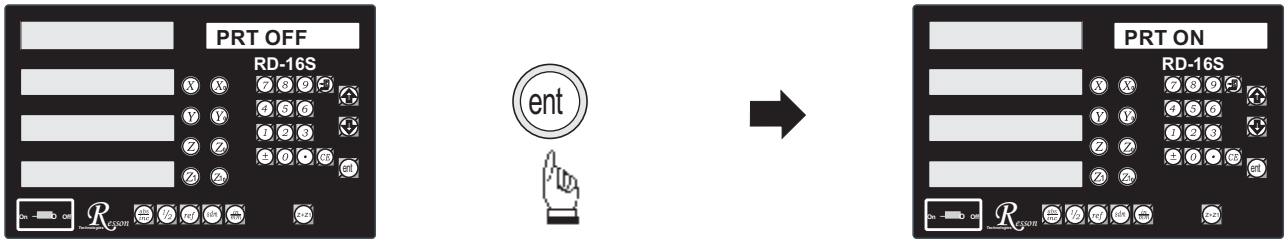


After baud speed is selected, press ent to end up this setting function.

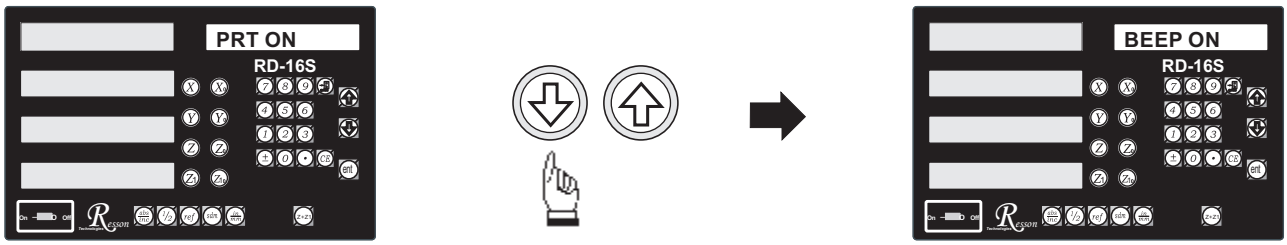
4) Press ⇩ or ⇧ and move to "PRT ON/OFF".



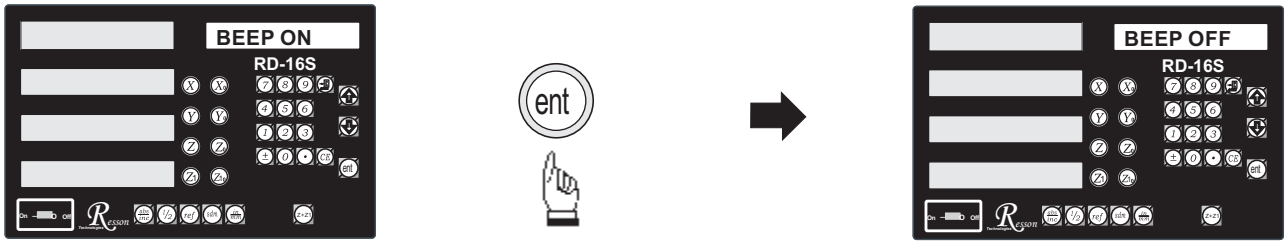
Directly press ent to change over OFF & ON.



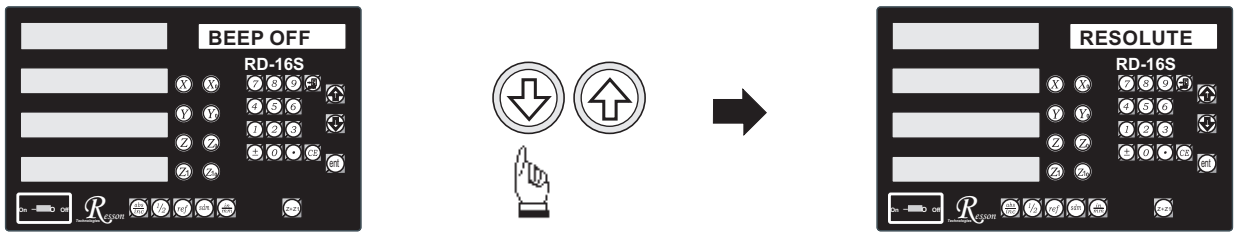
5) Press ⇩ or ⇧ and move to "BEEP ON/OFF".



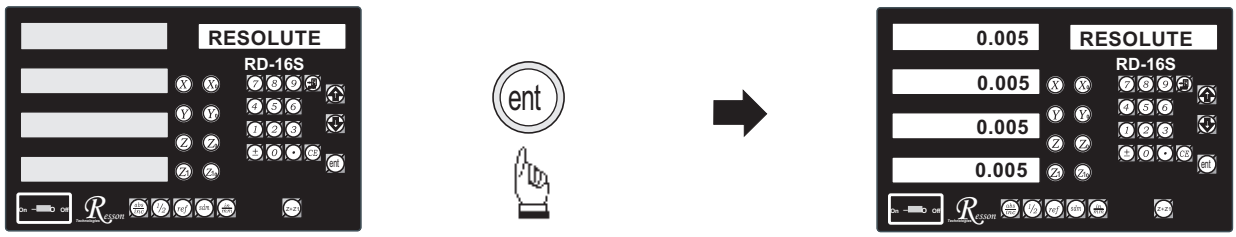
Directly press ent to change over OFF or ON.



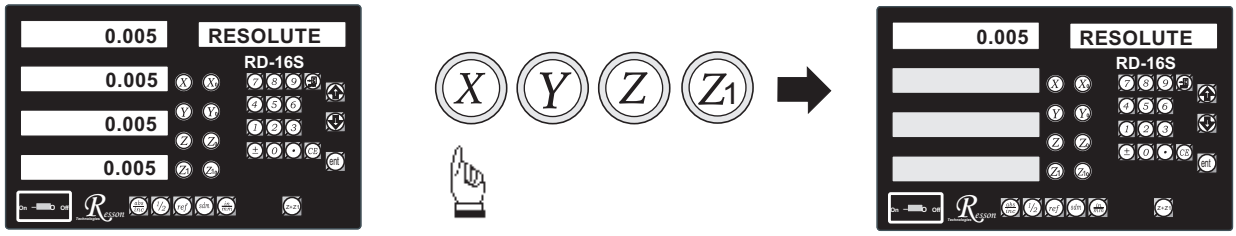
6) Press ⇩ or ⇧ and move to “RESOLUTE”.



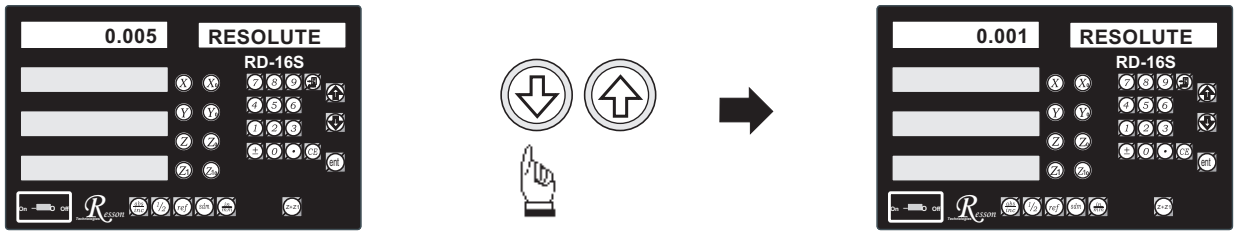
Press ent to enter the linear scale resolute setup.



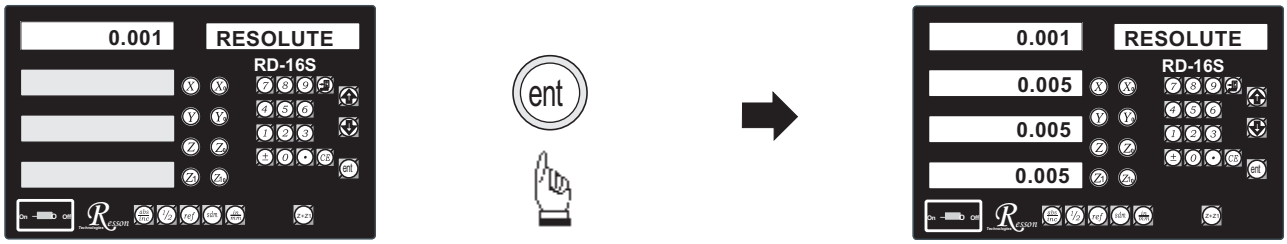
Press the axis going to be changed: X 、Y 、Z 。Z1



Press ⇩ or ⇧ to switch to the correct resolution value from ：0.05/0.02/0.01/0.005/0.002 / 0.001/0.0005/0.0002/0.0001mm.

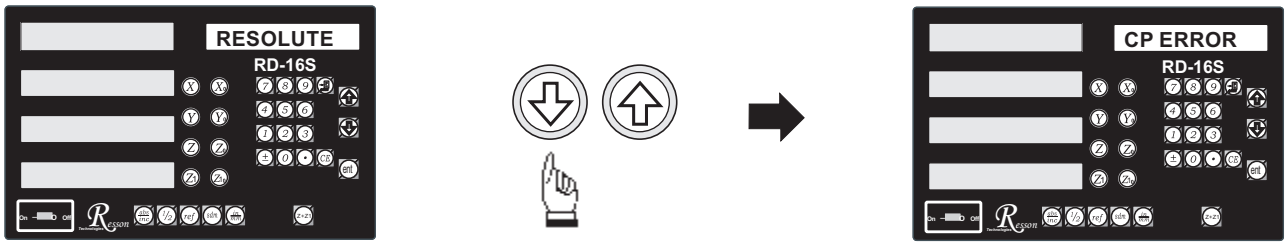


Press (ent) to end up this axis's setup

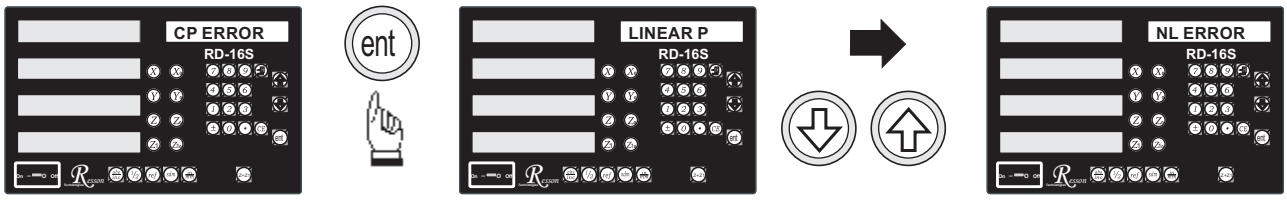


Then, press (ent) to end up the linear scale resolute setup procedure.

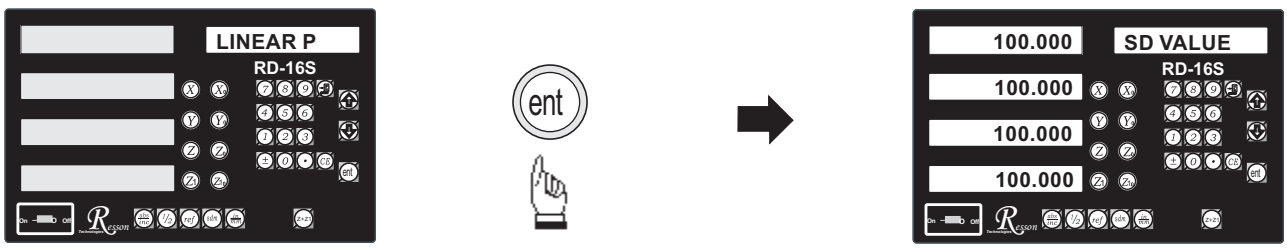
7) Press (▽) or (△) to "CP ERROR" (error compensation).



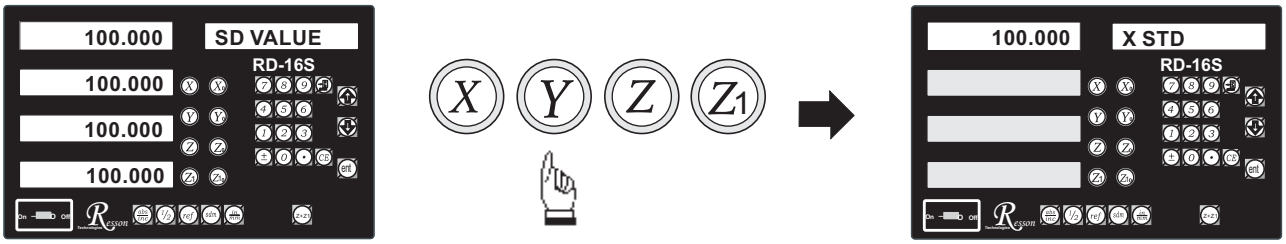
Press (ent) to enter the compensation setup; you can press (▽) or (△) to switch between the "LINEAR P" (linear compensation) mode and "NL ERROR" (nonlinear compensation) mode; choose one alternatively.



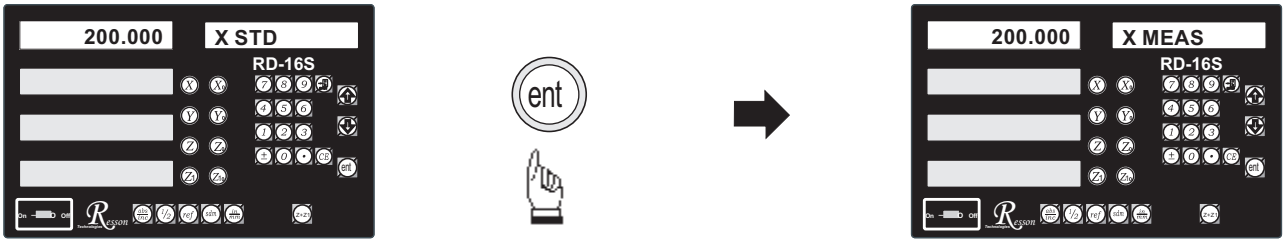
While selecting "LINEAR P", press (ent) to enter the linear compensation process.



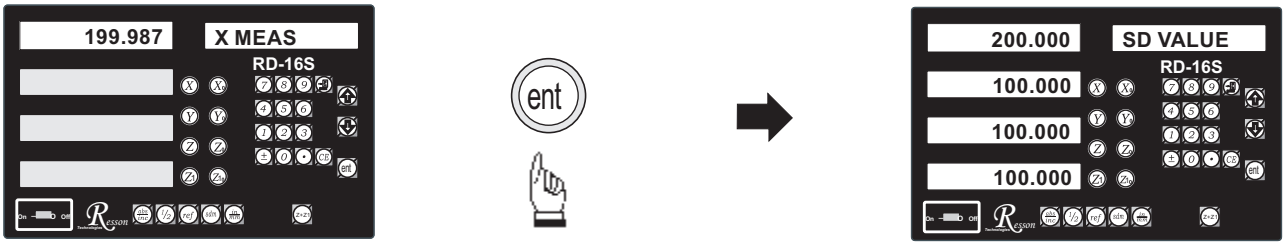
Press the axis (X)、(Y)、(Z) or (Z1) under compensation.



Input the length measured and press (ent)

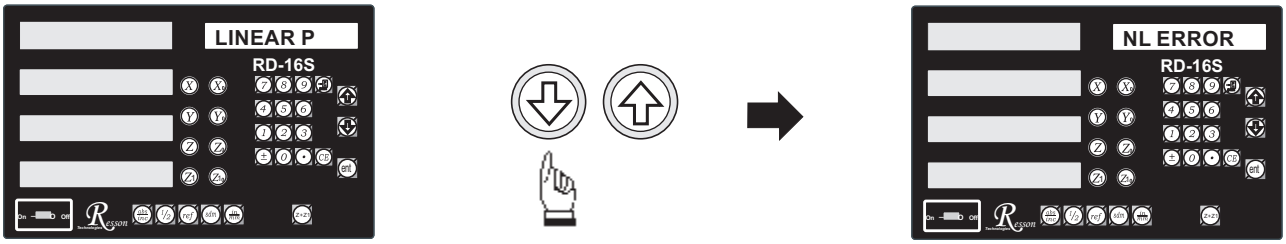


Input the actual length and press (ent).

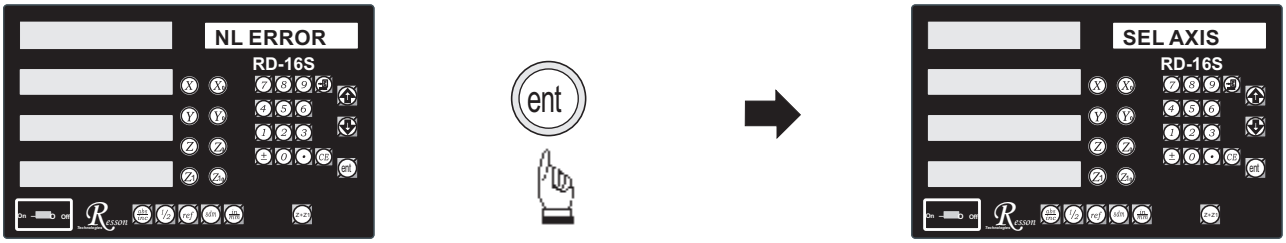


Press other axis (Y) or (Z) or (Z1) under change and follow the above procedure to operate; after the compensation procedure is done, press (ent) to end up the compensation of linear scale.

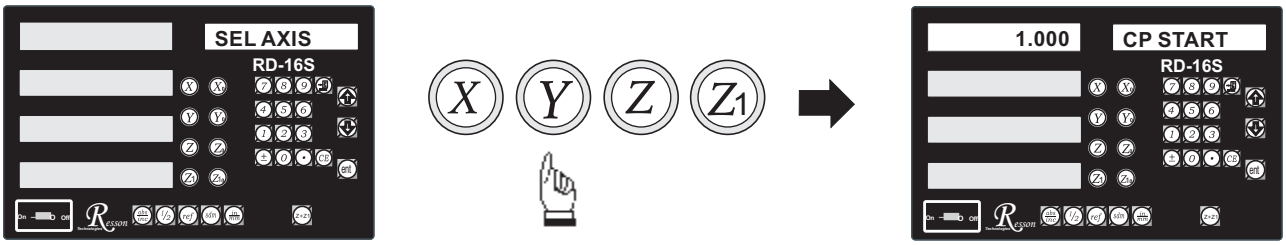
Press  or  to switch to “NL ERROR” (nonlinear compensation).



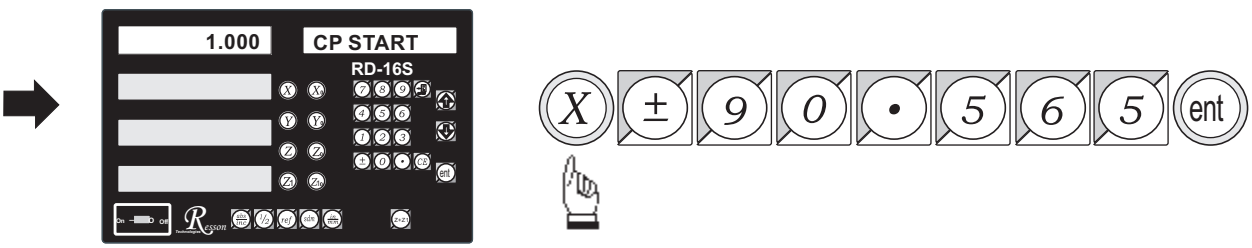
Press  to enter the nonlinear compensation setup.



Press the axis    or  under compensation.

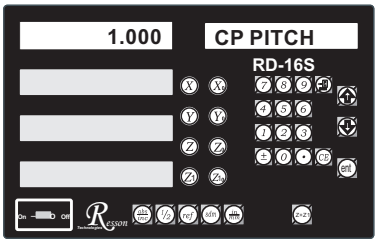


Input CP START



Input CP START

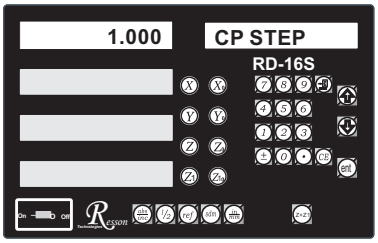
Next step



X 1 0 ent

Input CP STEP

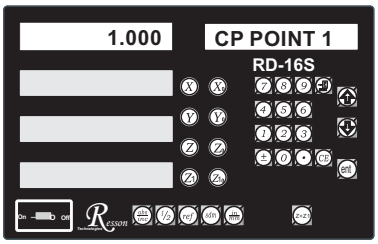
Next step



X 2 0 ent

After entering the "Point 1" status, press the up/down key to select the measuring result at the point selected.

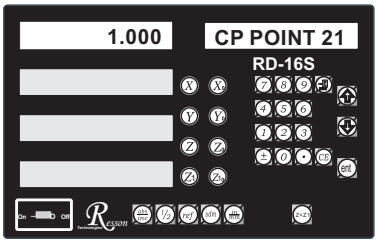
Input the measuring result.



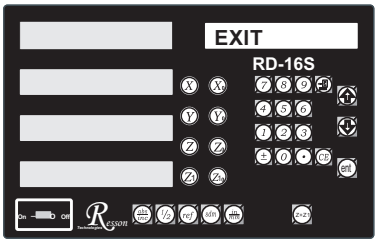
-----The measuring result----- ent

After all data inputs are done, press CE to exit.

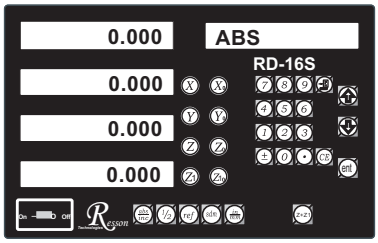
CE



Press up/down key till EXIT appears.

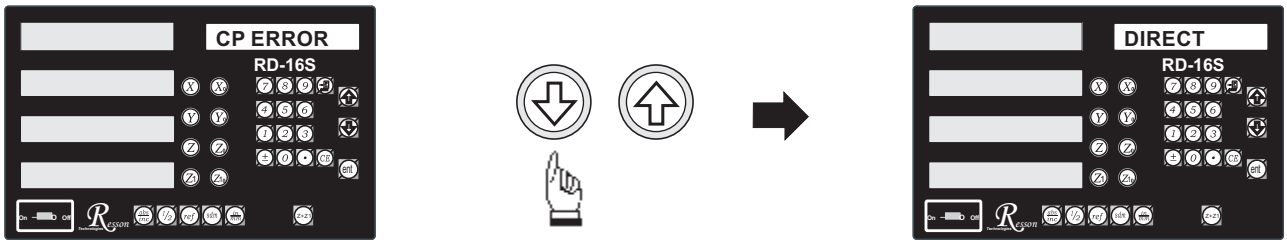


ent

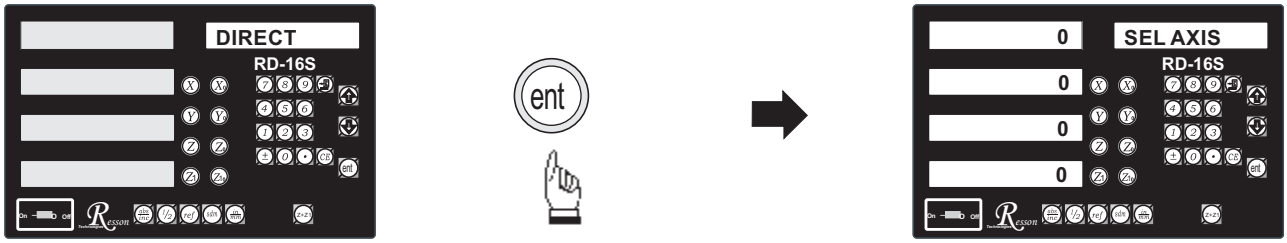


If use the error compensation function, you must turn off the DRO then power on the DRO again, otherwise your compensated value will invalid.

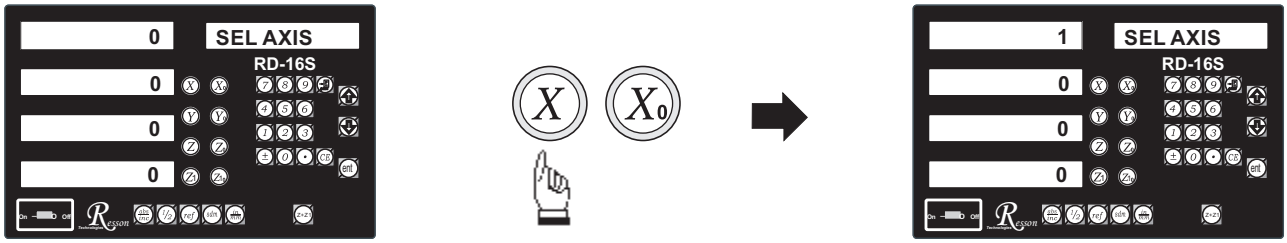
8) Press ↓ or ↑ to move the "DIRECT" (direction setup).



Press ent to enter direction setup mode. "0" means in positive direction whereas "1" means the negative direction.



Press X or X_0 to set up X-axis to "1" (negative direction); and do it to Y- & Z-axis similarly.



9) Press ent to exit; and ↓ or ↑ to "EXIT" and end up the parameter setup.