Resson Technologies

The People that Always Committed to Quality, Technology & Innovation

RD-15L

Digital Readout System
Operation Manual
(Lathe)

Resson Technologies Co., Ltd.

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;

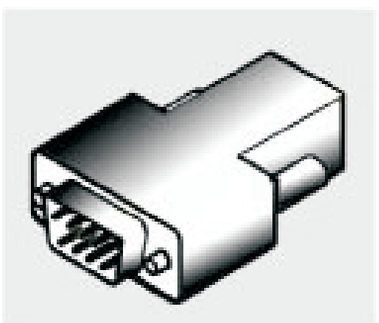
Extend operation lifetime and stabilize work performed

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

RD-15L Specification :

Number of axes : 1、2、3
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

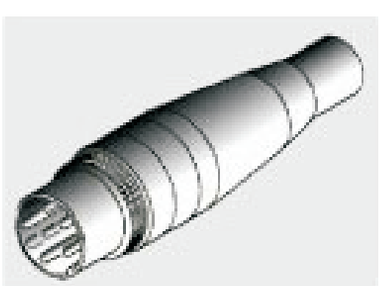
TTL

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

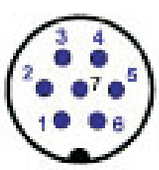
N/C : No Connection

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

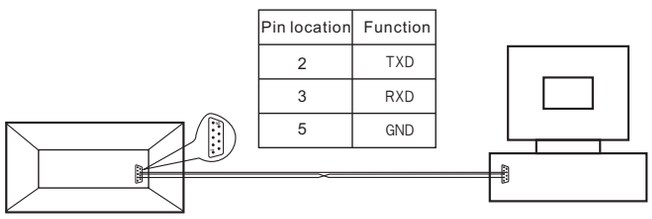


PIN	SIGNALS
1	0V
2	N/C
3	A
4	B
5	5V
6	R
7	Inner shield

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.



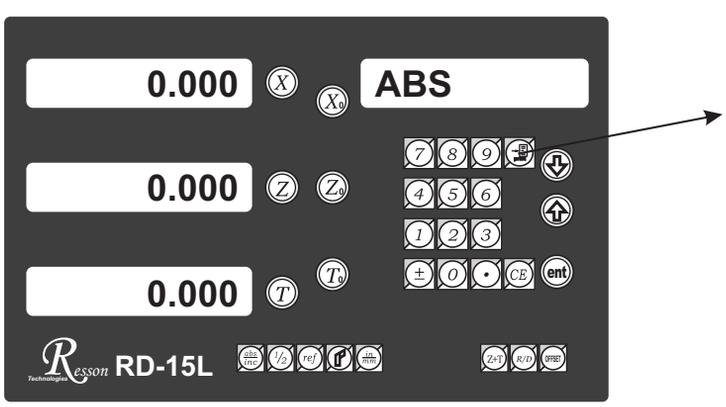
Pin location	Function
2	TXD
3	RXD
5	GND

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.

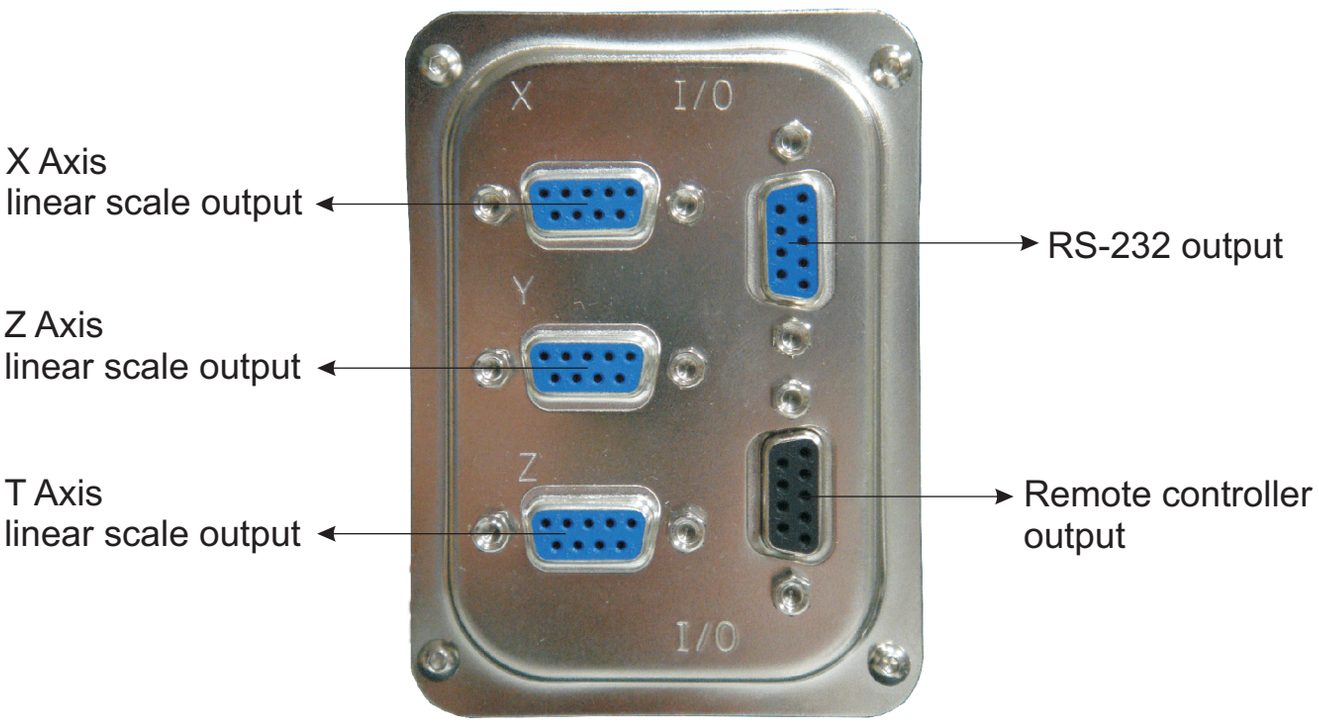
RS232 output function



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

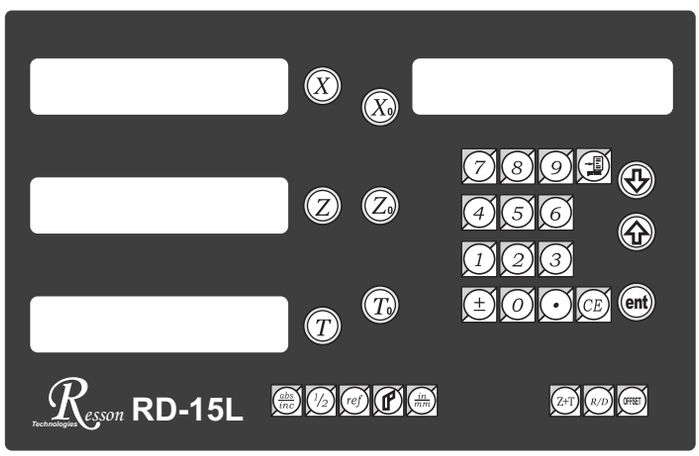
User may select EPSON LQ-300+RS232 as the working printer; set speed to 19200bps and turn on the print to standby.

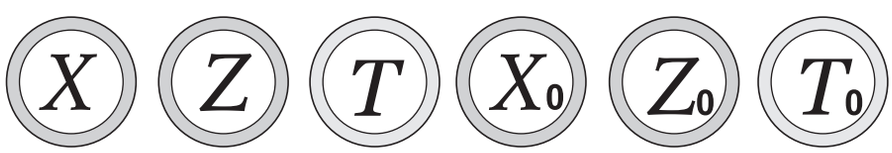
The back shell plug seat of DRO.

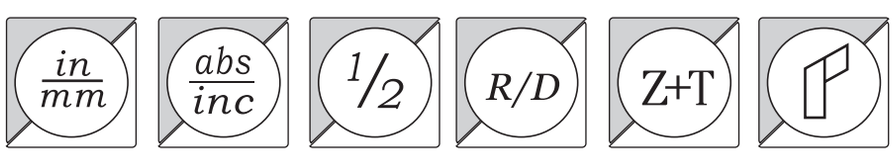


Content

Basic Functions



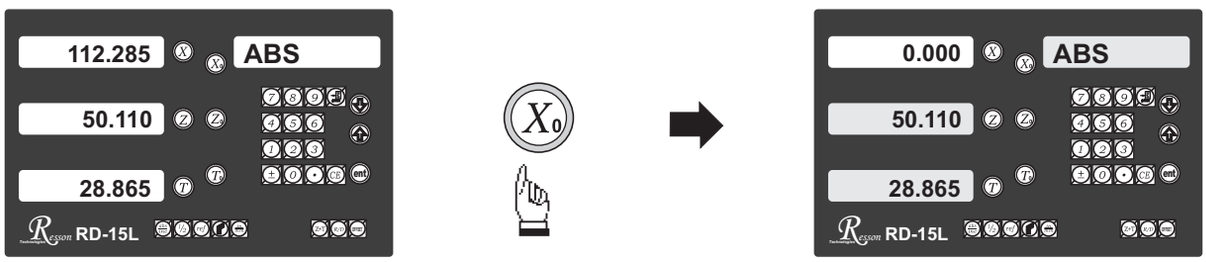




Set Display to Zero

Purpose : Set the current position for that axis to zero

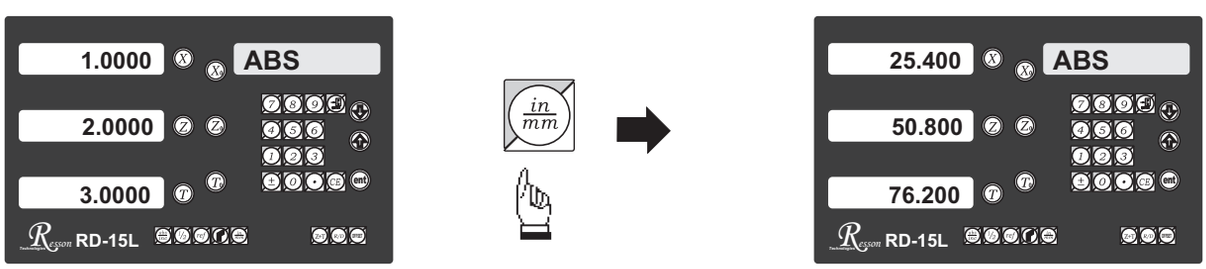
Example : To set the current **X Axis** position to **zero**



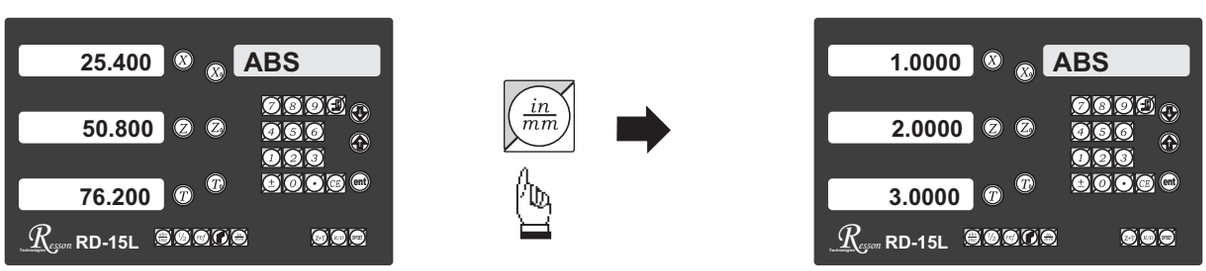
Inch / Metric Display Conversion

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



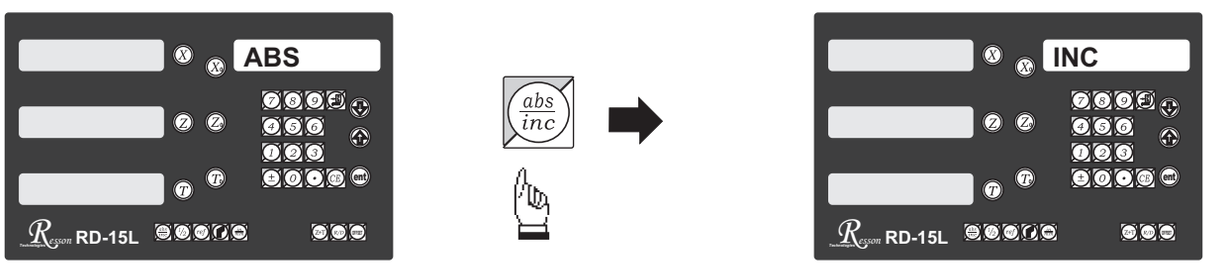
Purpose : **RD-15L** provides two sets of basic coordinate display, they are **ABS** (absolute) and **INC** (incremental) displays.

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.*

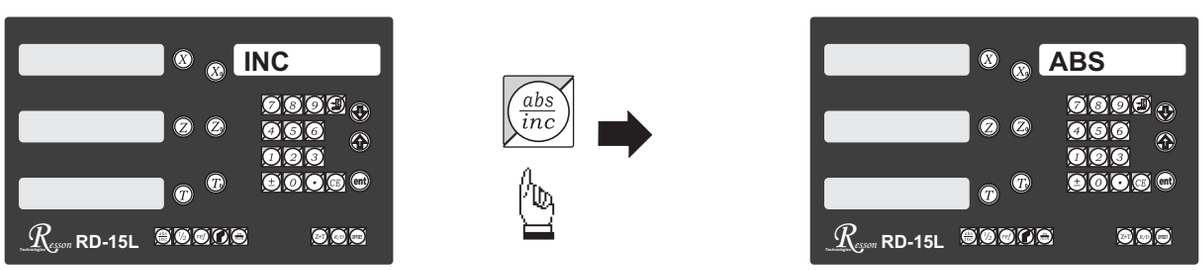
The operator is then free to zero the axes or preset any dimensions into any axis in **INC** coordinate for relative position machining. The work piece datum (work piece zero position) is still retained in **ABS** coordinate by the **RD-15L**.

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



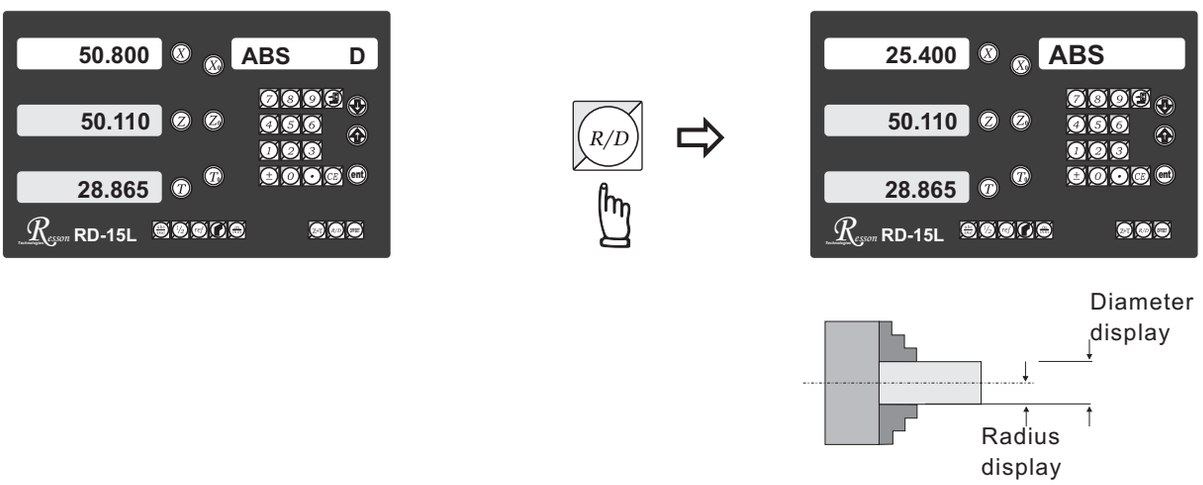
Example 2 : Currently in **INC** display coordinate, to switch to **ABS** display coordinate



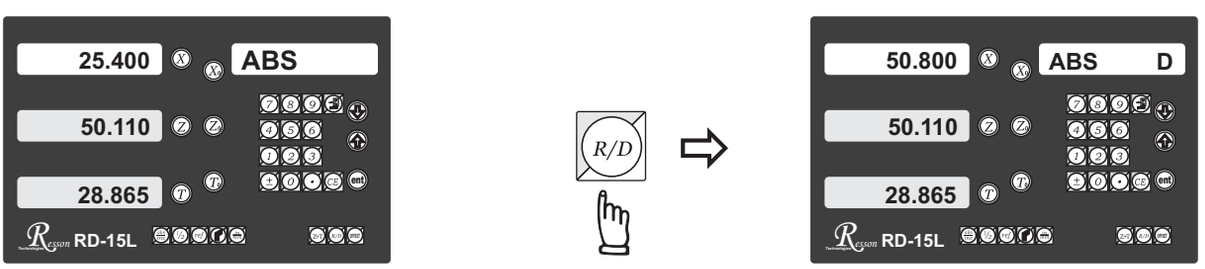
Radius/Diameter Display for X Axis

Purpose ： **During the machining on lathe, because the turned part's size reduced at twice as much as the actual X axis cross feed increment. Therefore, to obtain a direct diameter reading of the part that being machined, the readout offers Radius/Diameter display for X axis.**

Example 1 ： Currently in **Radius** display, to switch to **Diameter** display



Example 2 ： Currently in **Diameter** display, to switch to **Radius** display



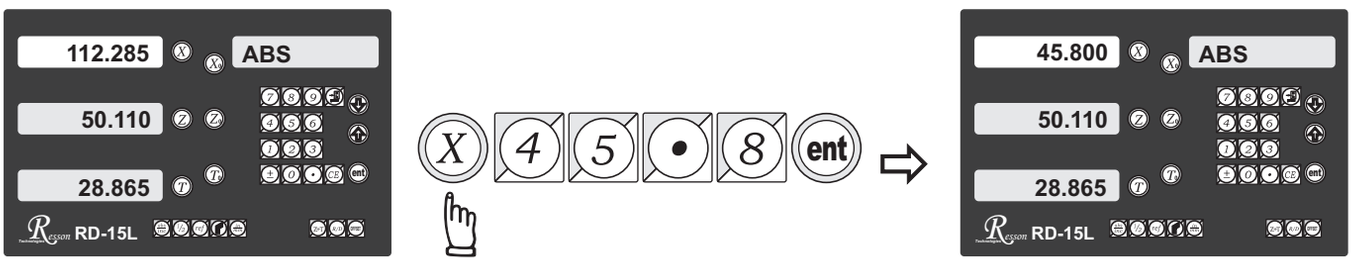
In Diameter display mode, the readout display double of the x axis increment.

During the Diameter display, a 'd' appears on the leftmost X axis digit display to indicate the readout is in Diameter display mode. Also, the display resolution is 0.01mm rather than 0.005mm as in Radius display mode.

Dimension Preset

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

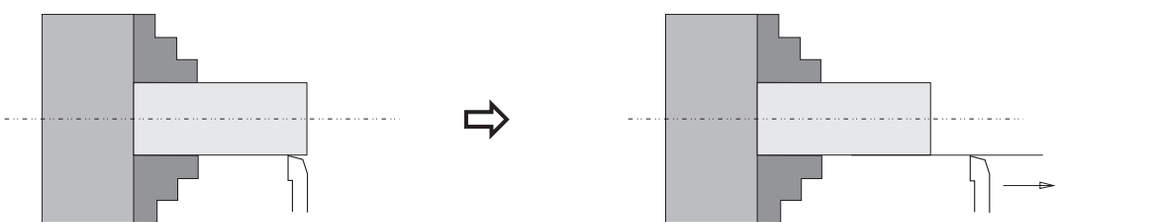
Example : To set the current **X Axis** position to **45.800mm**



Application Tips : The dimension preset function provides a very convenience way to monitor your cross feed machining, the X axis machining.

a) Switch the readout to Diameter (D) display for X axis.

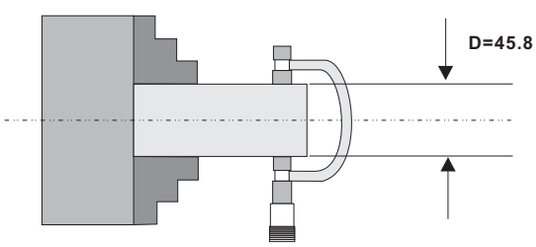
b) Make a slight first cut at the work piece, after finished this first cut, move the tool away from the work piece along the Z axis, it is important that don' t move the X axis at all in roder to keep the X axis right at the cutposition.



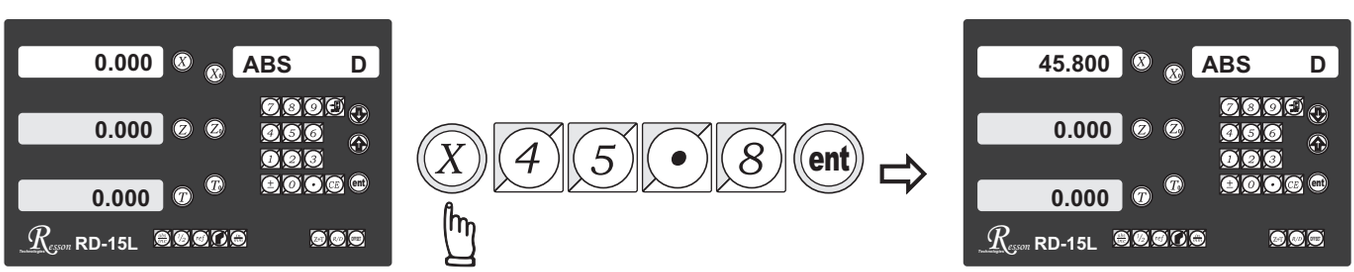
Make the first slight cut at the work piece

Move the tool away from the work piece without any move in the x axis

c) measure the work piece by a caliper .(i.e. The measured diameter of the work piece is 45.80mm)



d) Enter the measured diameter into the readout by the dimension preset function.



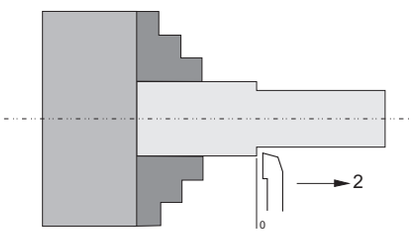
e) Since the X axis tool position is now at the first cut position, by presetting the present tool position as the measured diameter, then from now on, whatever dimension shown on the readout is the actual diameter dimension in the work piece.

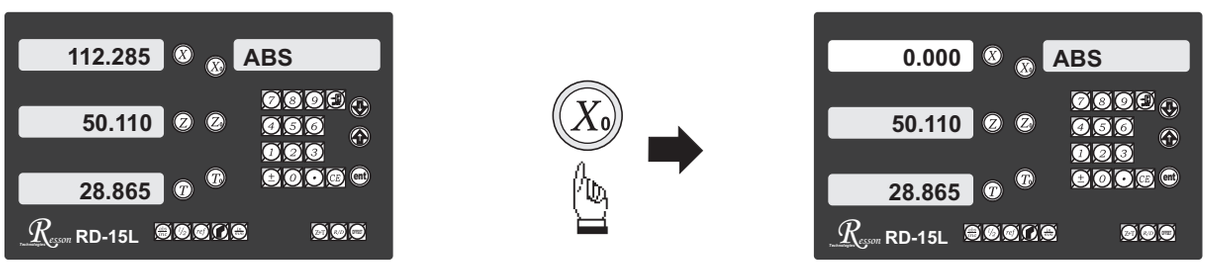
Center Find

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

Example ： To set the Z Axis zero point at the center of the work piece

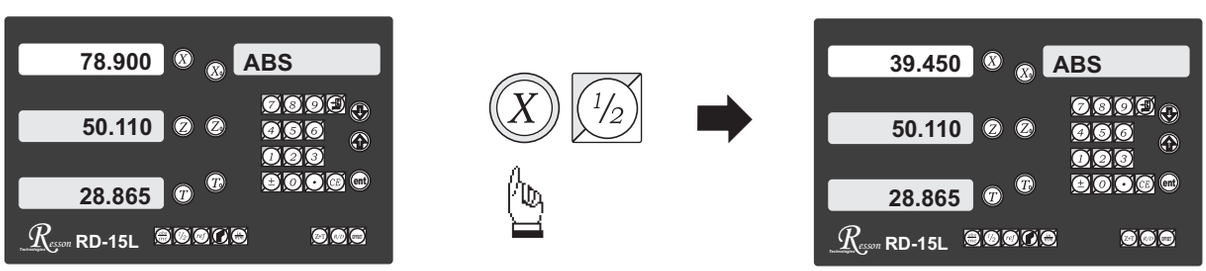
Step 1 ： Locate the edge finder at one end of the work piece, then zero the Z Axis.



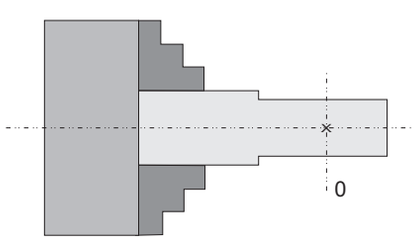


Step 2 ： Locate the edge finder at the opposite end of the work piece.

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



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

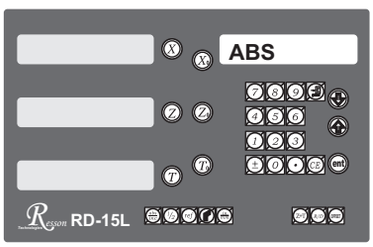


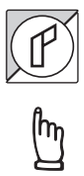
Insert tool's compensation value

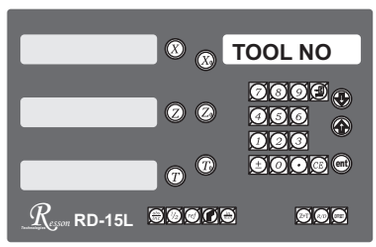
Function: The tool compensation is applied to compensate the tool's wear-out of lathe in cutting process; user can follow the variety of tool making different compensation value.

1. Input tool compensation value.

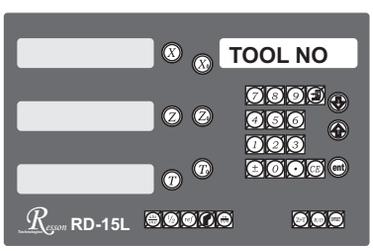
A. Press  to enter tool selection option.

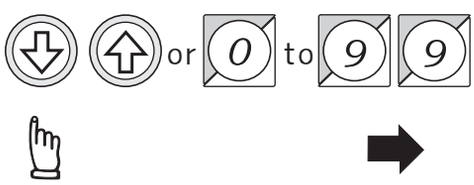


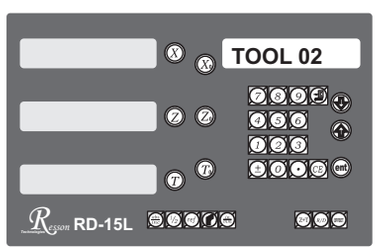




B. Press numerical keys directly  or  to pick up the targeted tool.

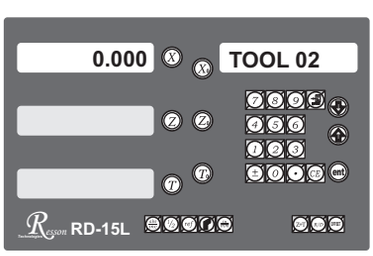


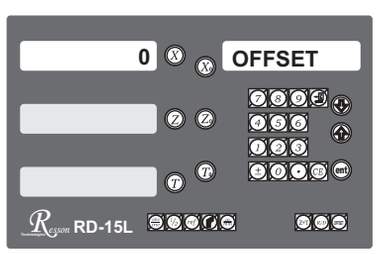




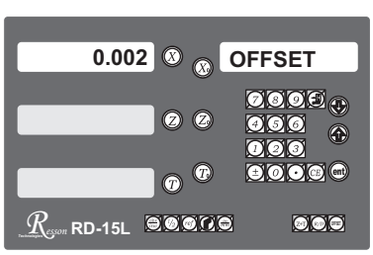
PS. In case of entering the tool compensation mode under ABS, user can input the compensation location to TOOL 00 .

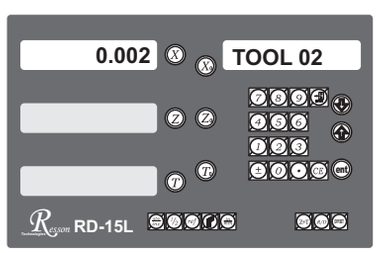
C. Press  and input compensation value.



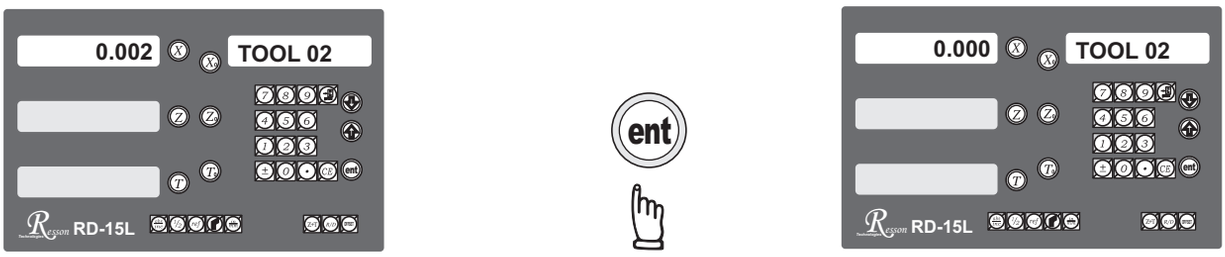


D. After input is done, press  to complete the setting.



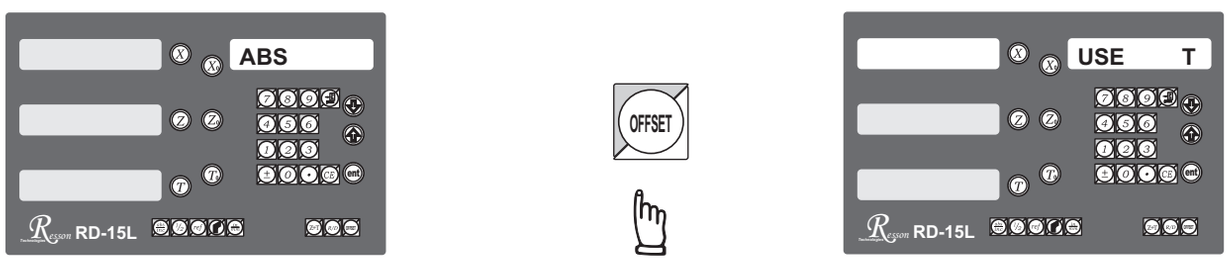


E. Press once again (ent) to enter the tool selection option.

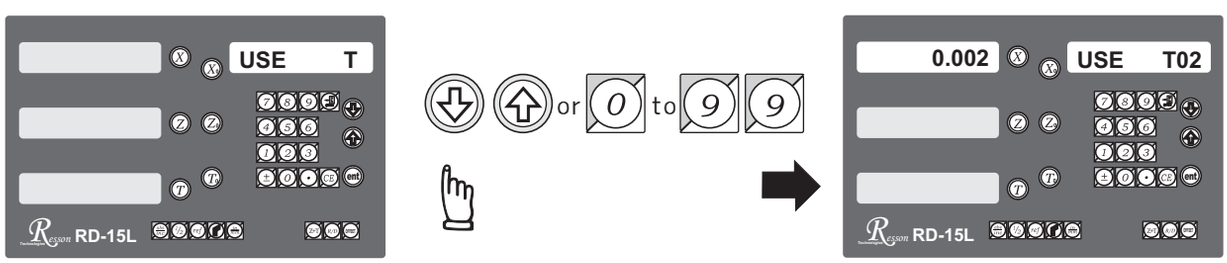


2. Apply tool compensation.

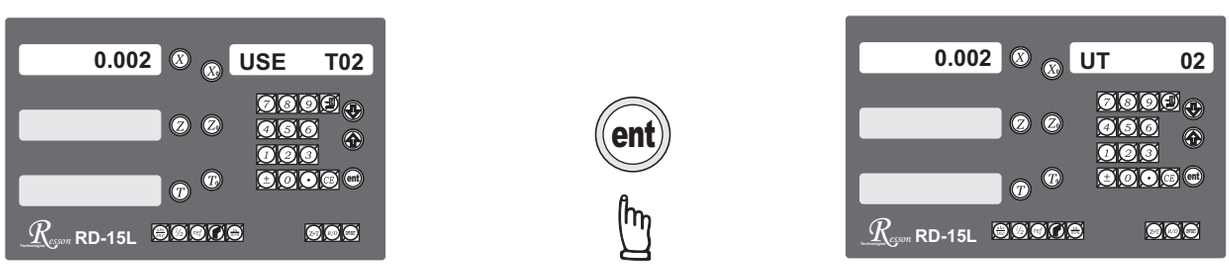
A. Press (OFFSET) to enter tool compensation mode.



B. 1.Press (↓) (↑) or numerical keys to select tool number.

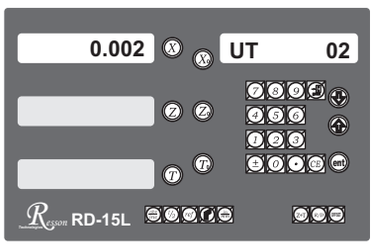


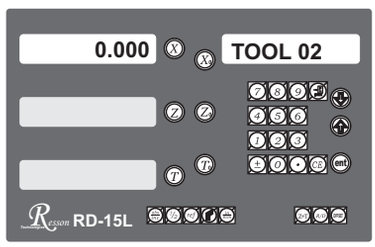
C. Press (ent) to enter tool compensation function for the tool under use.



D. To end up the tool compensation mode, press 

once more.





PS. Regardless what tool is under selection (TOOL 12, for instance), press “OFFSET” to make tool compensation first; and select the target tool (TOOL 10, for instance), system then will adjust to TOOL 10 from TOOL 12 automatically since the offset compensation and tool number is correspondent.

Example: Parameters inputting as following.

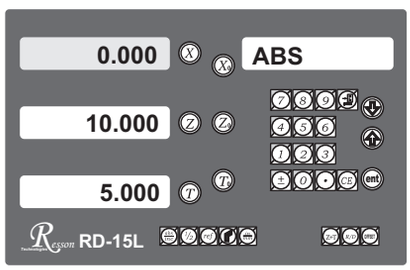
Tool	Position coordinate	Offset (compensation)
TOOL 11	11.000	0.011
TOOL 12	12.000	0.012
TOOL 13	13.000	0.013

The current tool is TOOL 11
X-axis will display 11.000 (no tool compensation)
Press OFFSET (tool compensation is applied)
Select TOOL 13, and
X-axis now displays 13.013, not 11.013.

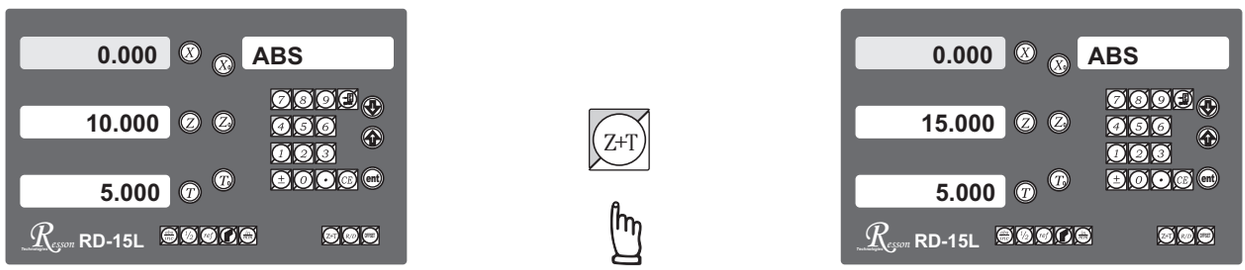
Z+T Sum-up

Function: RD-15L three-axis DRO can sum up the Z-axis and T-axis; user can switch over between Z-axis and T-axis timely through the function key and they can be displayed independently or in sum.

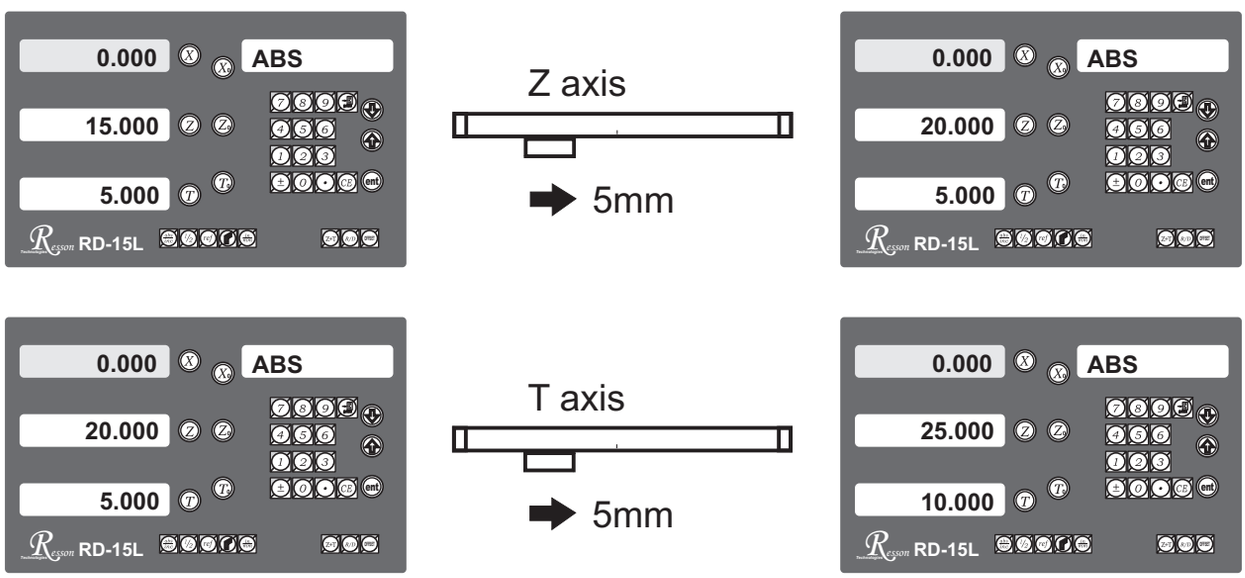
Example: Z-axis 10.000, T-axis 5.000
When reading them alone, the display is



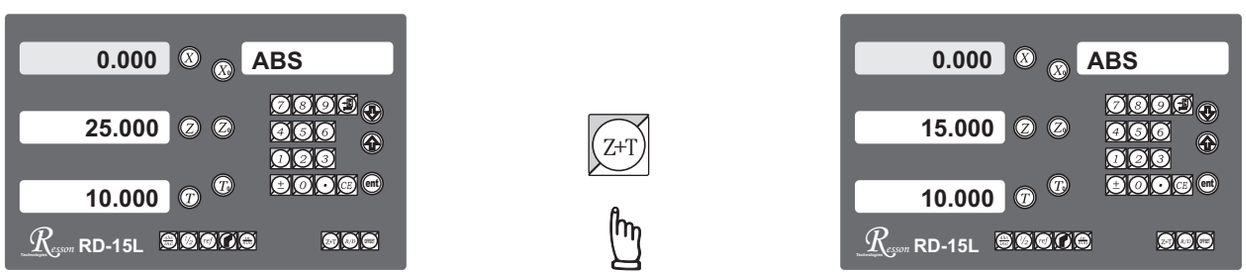
A. Press Z+T, the display now will add T-axis data to Z-axis window; while using Z+T function, T-axis window still can display T-axis dimension independently.



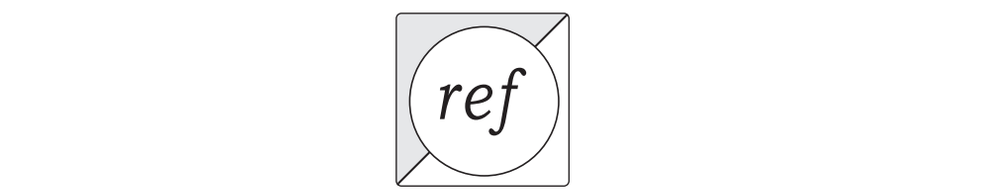
B. While Z-axis moves forward for 5mm, Z-axis will display 20mm; then, move T-axis forward for another 5mm, now, the Z-axis window will display 25mm and T-axis displays 10mm.

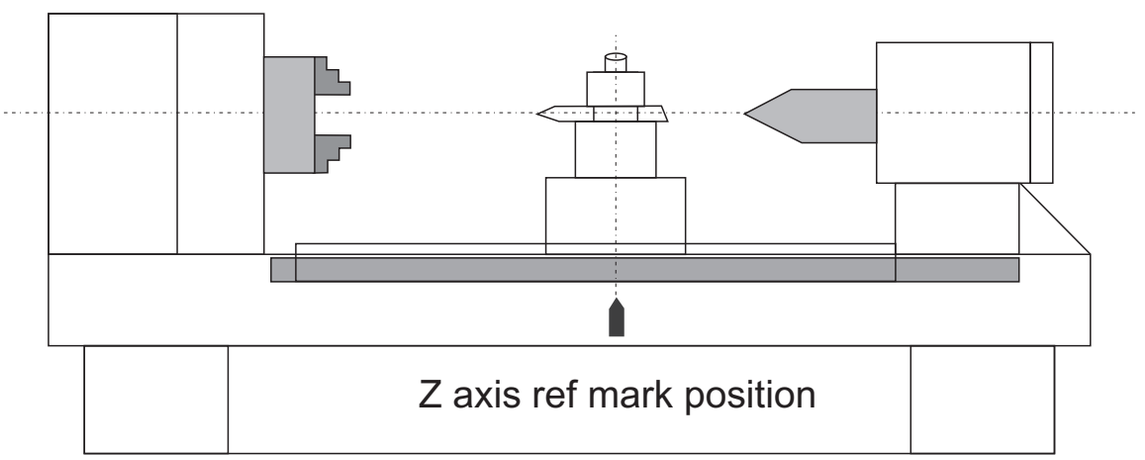


C. Press Z+T to end the Z+T sum-up function and return to independent mode.



ref datum memory





Function ： During the daily machining process, it is very common that the machining cannot be completed within one 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.

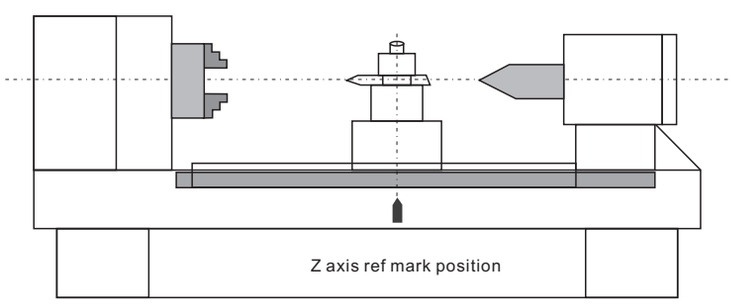
To allow the recovery of work piece datum very accurately and no need to re-establish the work piece datum using edge finder or other methods, every glass grating scale have a ref point location which is is equipped with ref position to provide datum point memory function.

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

-There are a permanent and fixed mark (position) in the centre 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 z axis work datum



Operation ： Counter provides one of the most easy to used ***ref*** datum memory function.

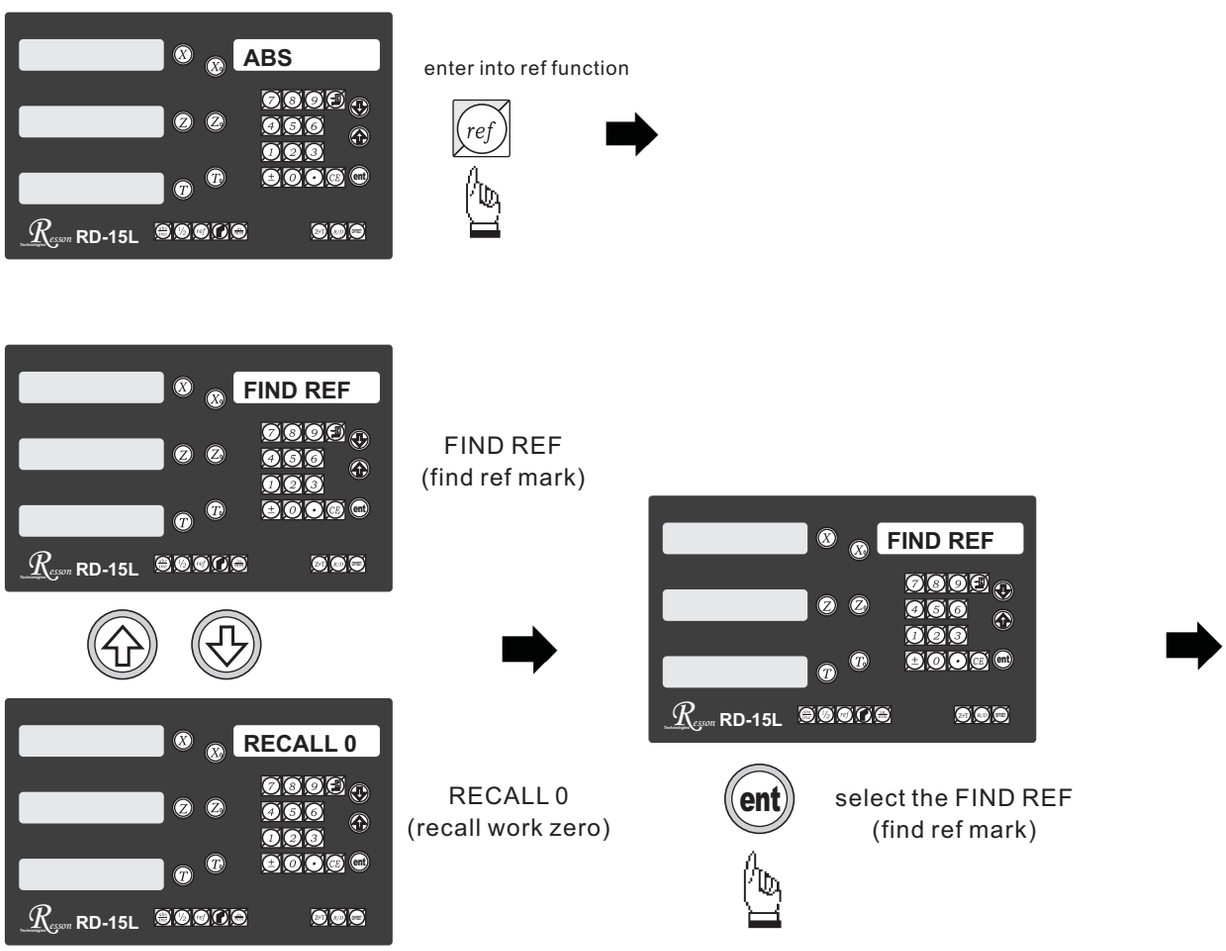
There is no need to store the relative distance between the ***ref*** mark and your work datum zero into Counter, whenever you alter the zero position of **ABS** coordinate , such as by zeroing, centre find, coordinate preset or etc.., Counter will automatically store the relative distance between **ABS**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

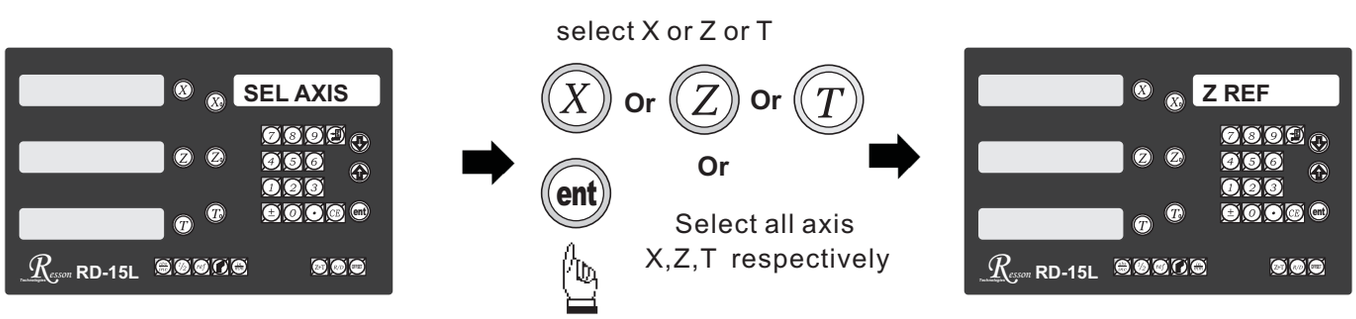
Function : Because in Counter's ref datum memory function, Counter will automatically store the relative distance between the ***ref*** mark position and the work piece datum (zero position) whenever the operator alter the **ABS** zero position, such as zeroing, centre find,coordinate preset or etc....

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 accidental 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.

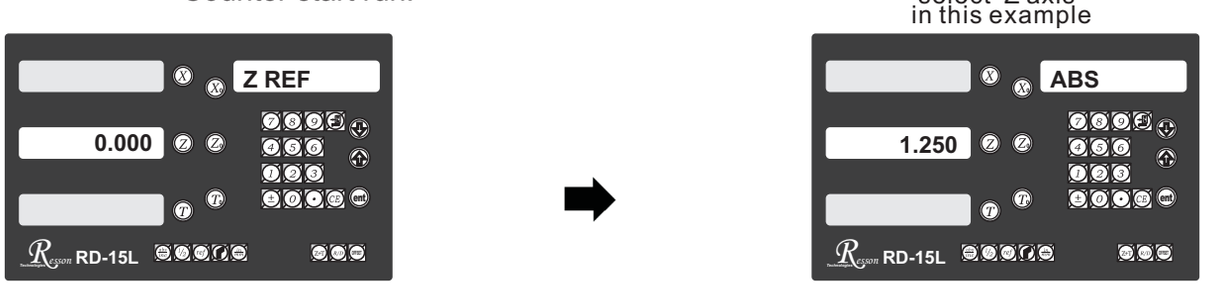
Setp 1 : Enter into the ref function, select the **FIND REF** (find ***ref*** mark)

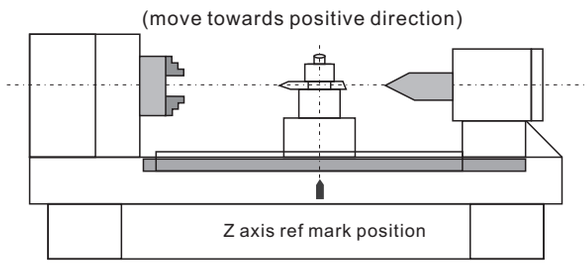


Step 2 : select the axis of which ref mark needed to be found



Step 3 : Move the machine across the center of the glass grating scale until digits display in Counter start run.



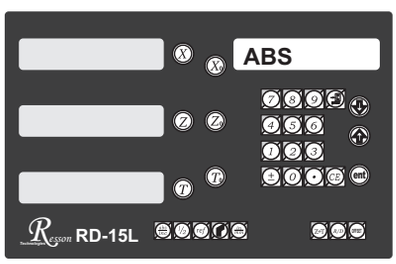


move the machine across
the center of the grating scale
(towards positive direction)

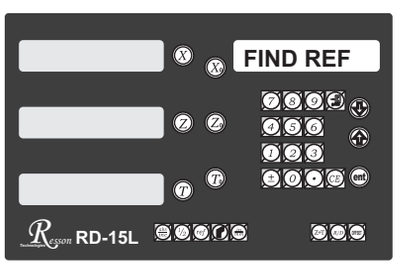
Recall the work datum zero (**RECALL 0**)

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

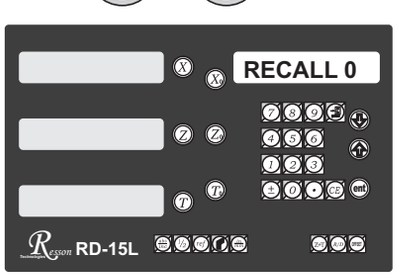
Step 1 : enter into the ***ref*** function, select the **RECALL 0** (recall work piece zero)



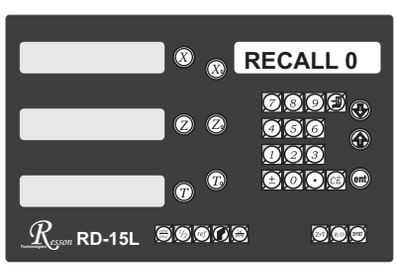
enter into ref function



FIND REF
(find ref mark)

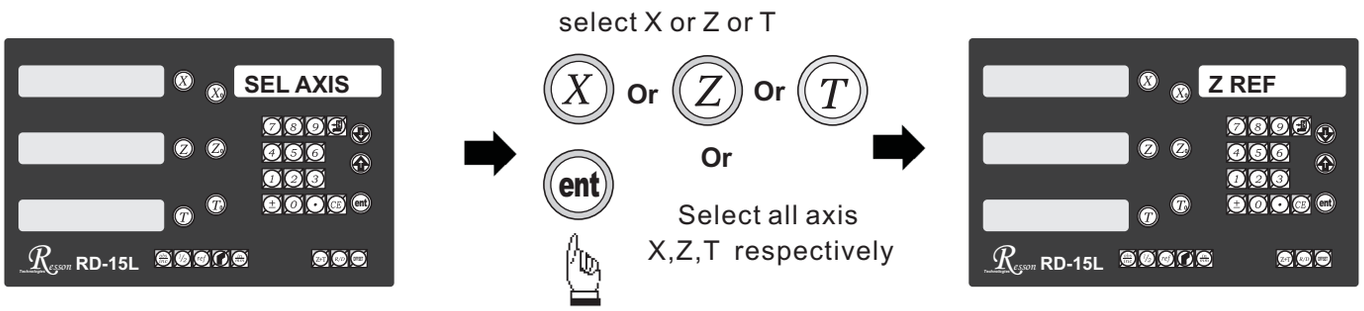


RECALL 0
(recall work zero)

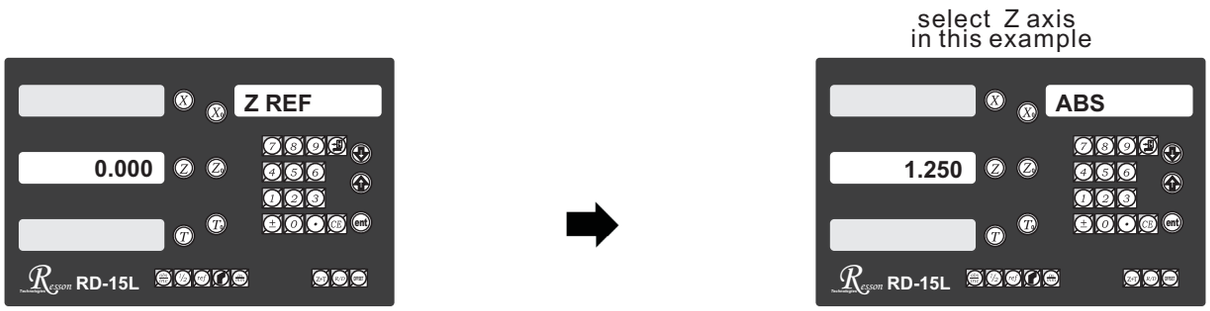


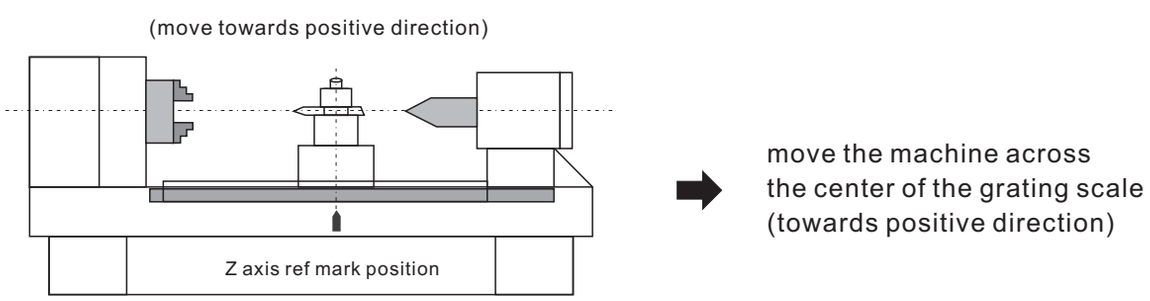
select the recall 0
(recall work zero)

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

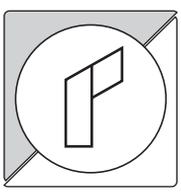


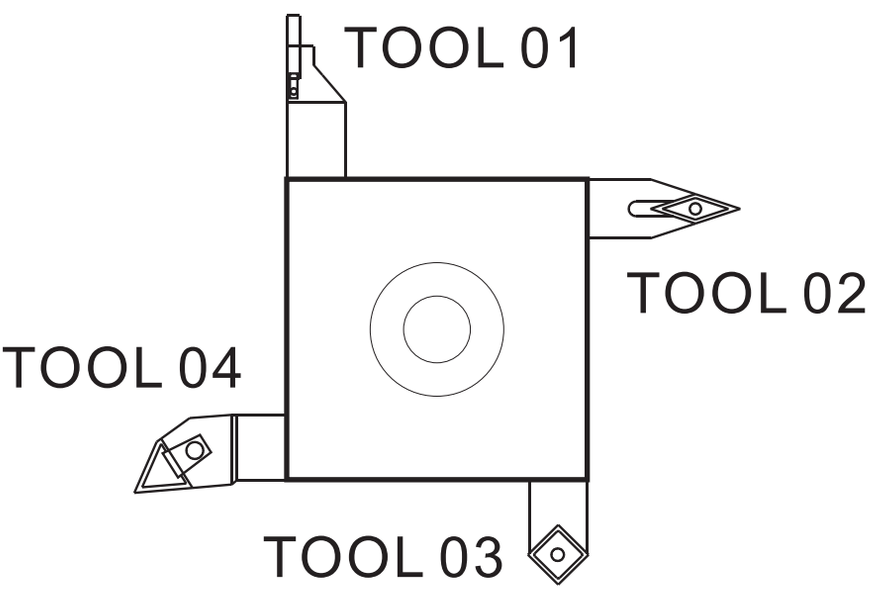
Step 3 ： Move the machine across the centre of the glass grating scale until digits display in Counter start run, then work piece datum is recovered.





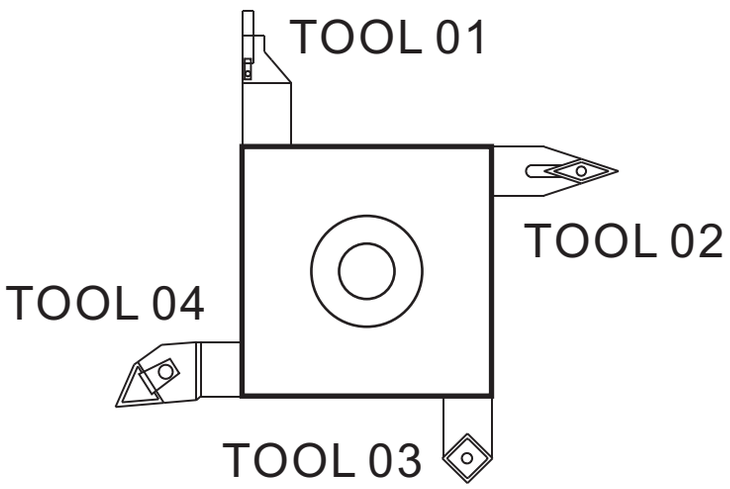
199 Tools memory





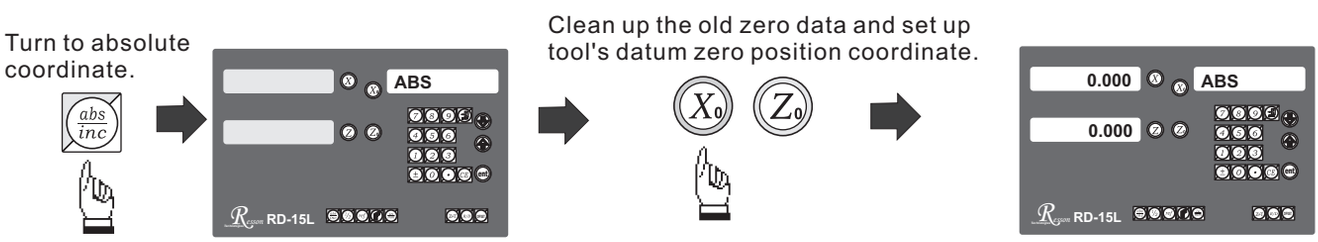
TOOL application:

Tool's aux original point: it can set the original points of tools in different dimensions and sizes to identical one as facilitating to make fast moving to the required coordinate while applying different tools.



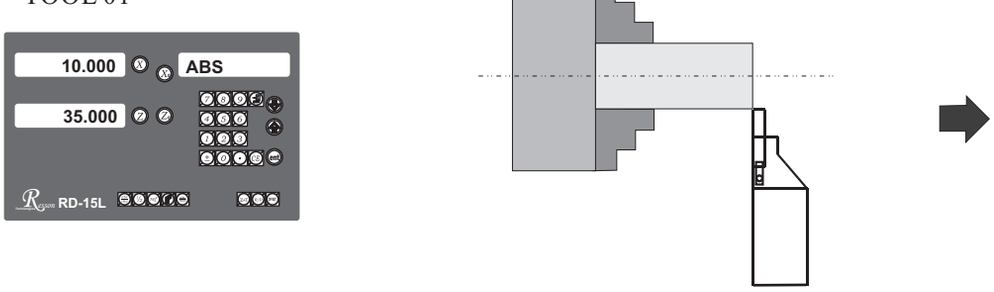
First, set up the absolute coordinate of work piece datum zero; then, move the tool to zero point directly and turn to  cleaning up data and memorize the zero point.

Step 1: set the datum zero position of tool to absolute coordinate.

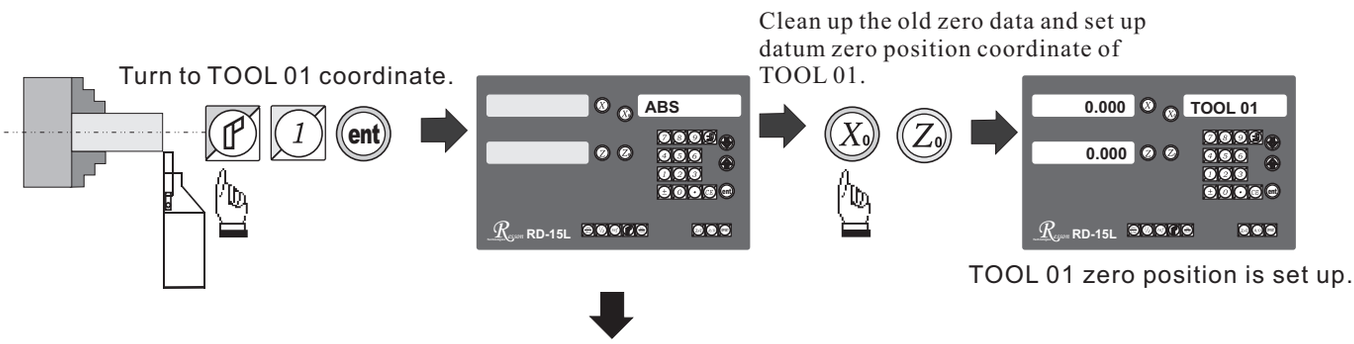


Step 2: set up the original point of No.1 tool.

Move machine to position:
X=10.000，Z=35.000
TOOL 01

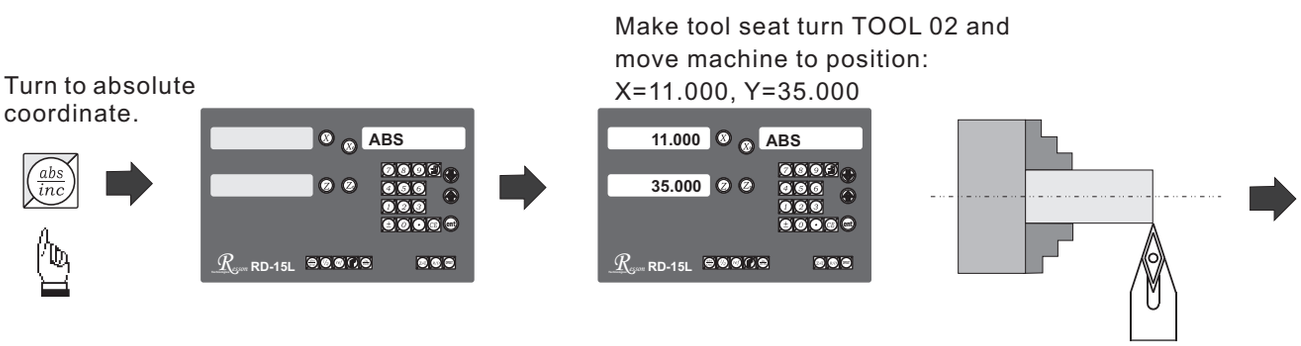


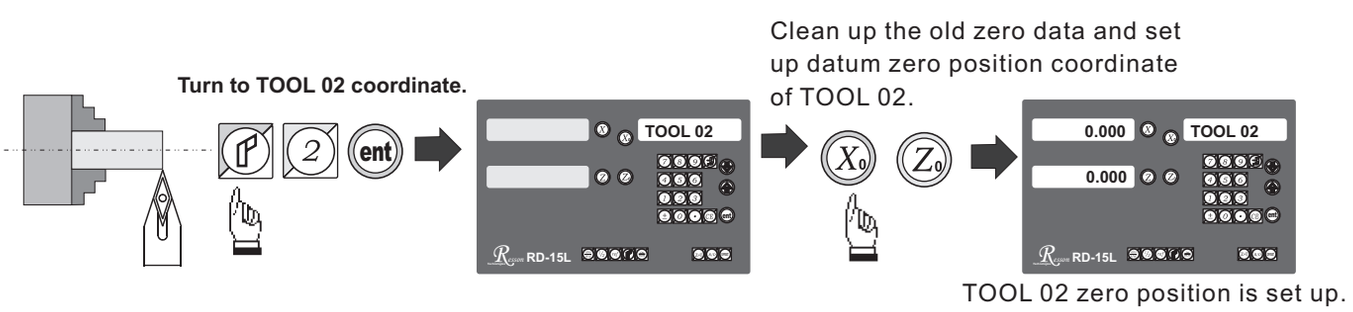
Set up 199 tools' coordinates (TOOL)



TOOL 01 zero position is set up.

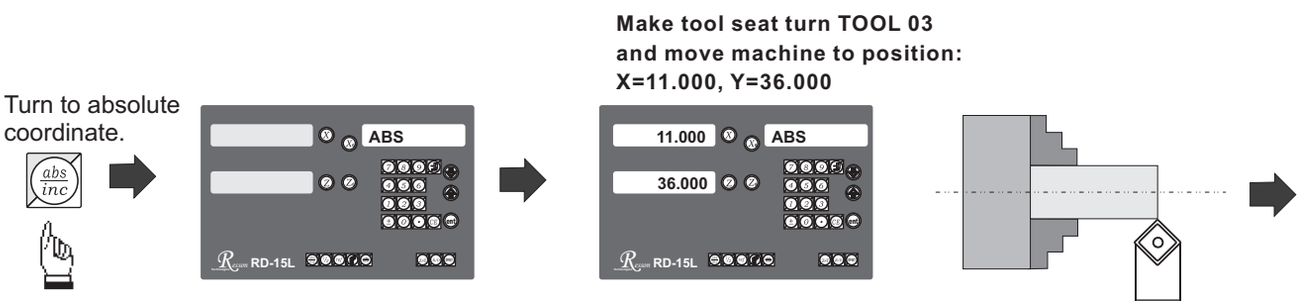
Step 3: set up the original point of No.2 tool.



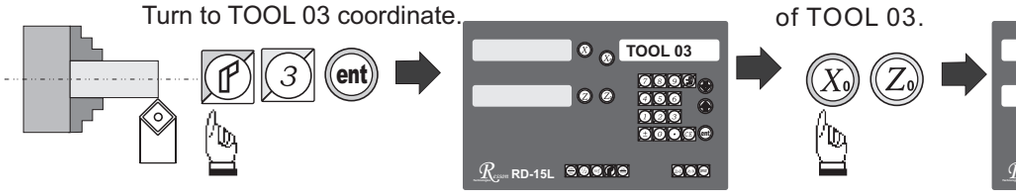


TOOL 02 zero position is set up.

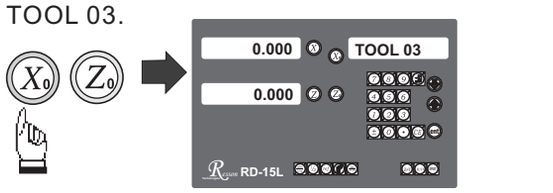
Step 4: set up the original point of No.3 tool.



Turn to TOOL 03 coordinate.



Clean up the old zero data and set up datum zero position coordinate of TOOL 03.

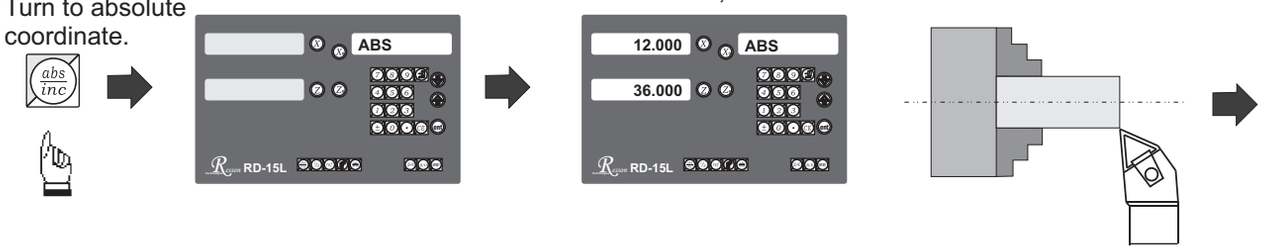


TOOL 03 zero position is set up.

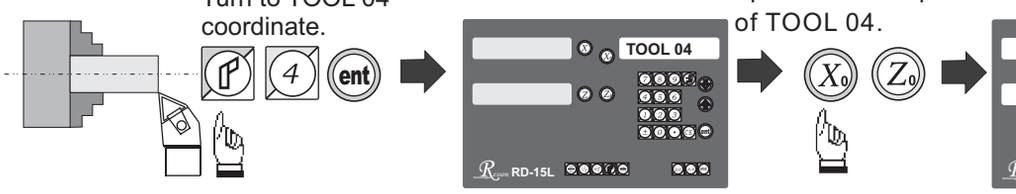
Step 5: set up the original point of No.4 tool.

Turn to absolute coordinate.

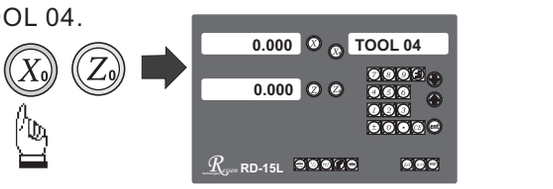
Make tool seat turn TOOL 04 and move machine to position: X=12.000, Y=36.000



Turn to TOOL 04 coordinate.



Clean up the old zero data and set up datum zero position coordinate of TOOL 04.

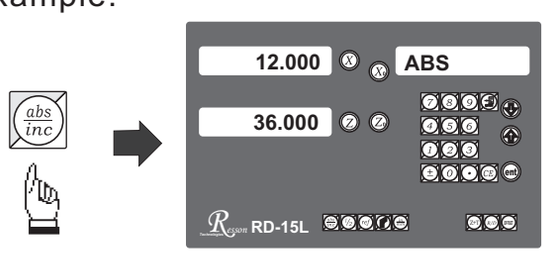


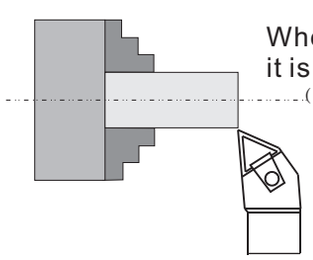
TOOL 04 zero position is set up.

Four aux zero coordinates of tool now are set up.

User can press ⇧ or ⇩ to convert the coordinate displayed to each aux zero coordinate.

Example:

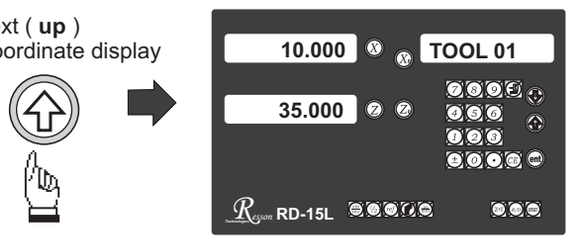


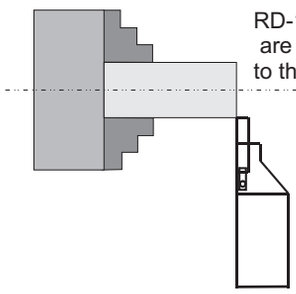


When zero point appears, it is at the absolute zero point.

Set up 199 tools' coordinates (TOOL)

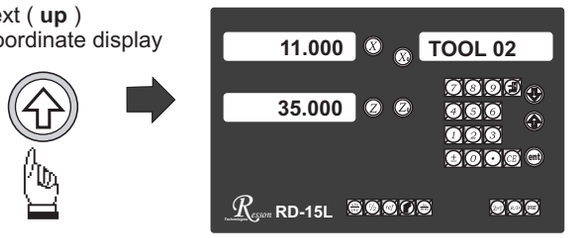
switch to next (**up**)
TOOL 01 coordinate display

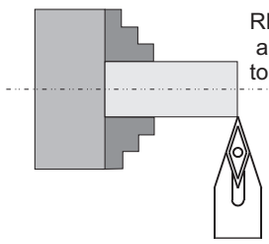




RD-15S's XZ displays are referenced to the TOOL **01** zero

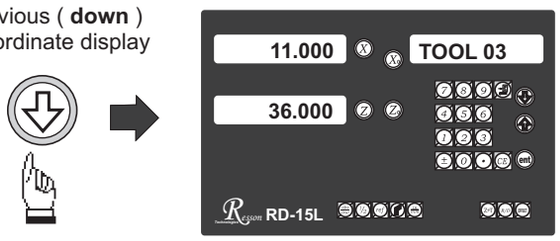
switch to next (**up**)
TOOL 02 coordinate display

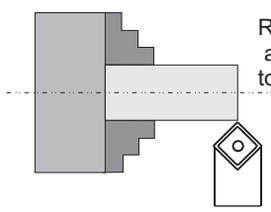




RD-15S's XZ displays are referenced to the TOOL **02** zero

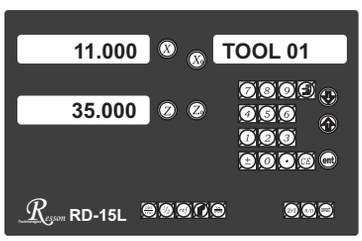
switch to previous (**down**)
TOOL 03 coordinate display

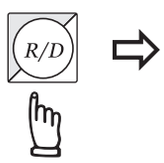


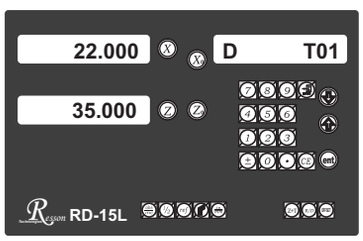


RD-15S's XZ displays are referenced to the TOOL **03** zero

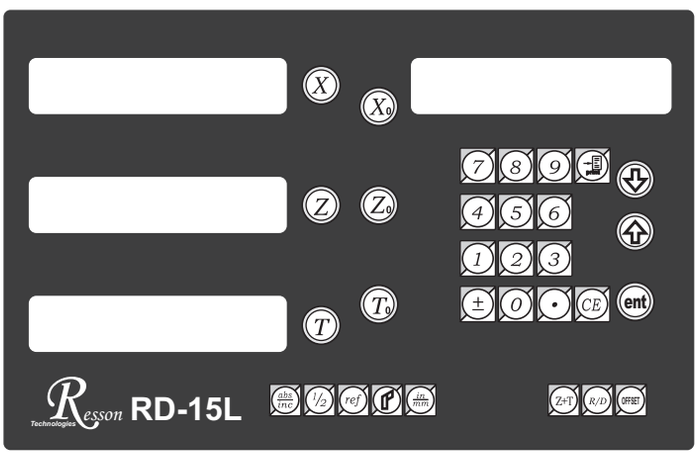
If the X-axis coordinate is switched to diameter indication, the display window then will make varied display ways.





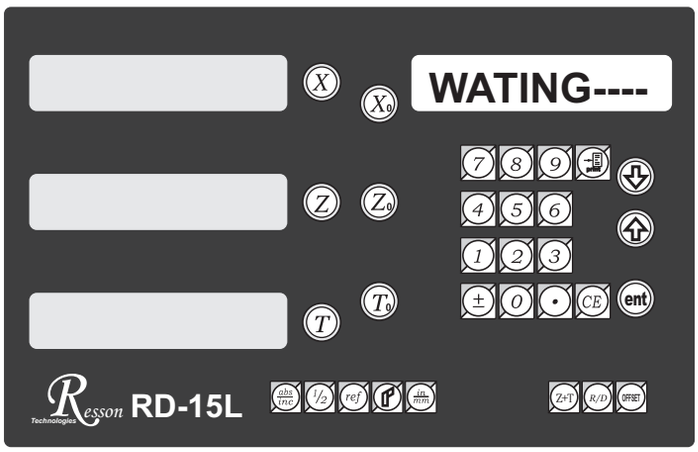


RD-15L Parameters Setup



BAUD SET ..... set up RS232 transmission baud.
PRT 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)



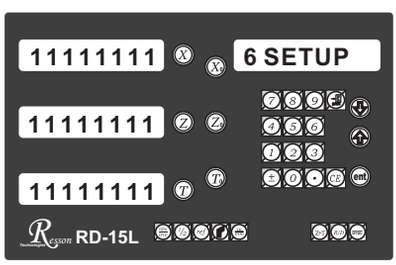
When the DRO is under the impact of abnormal voltage, or user's improper operation that cause parameter setting in error, it needs to default simple working parameters by resetting them to default value from memory. Yet, before parameter reset, check if there is any parameter value set in already; if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

Operation steps:

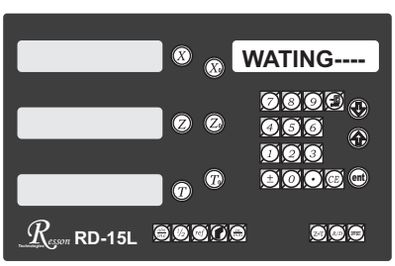
1) . Turn off the DRO power.

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.



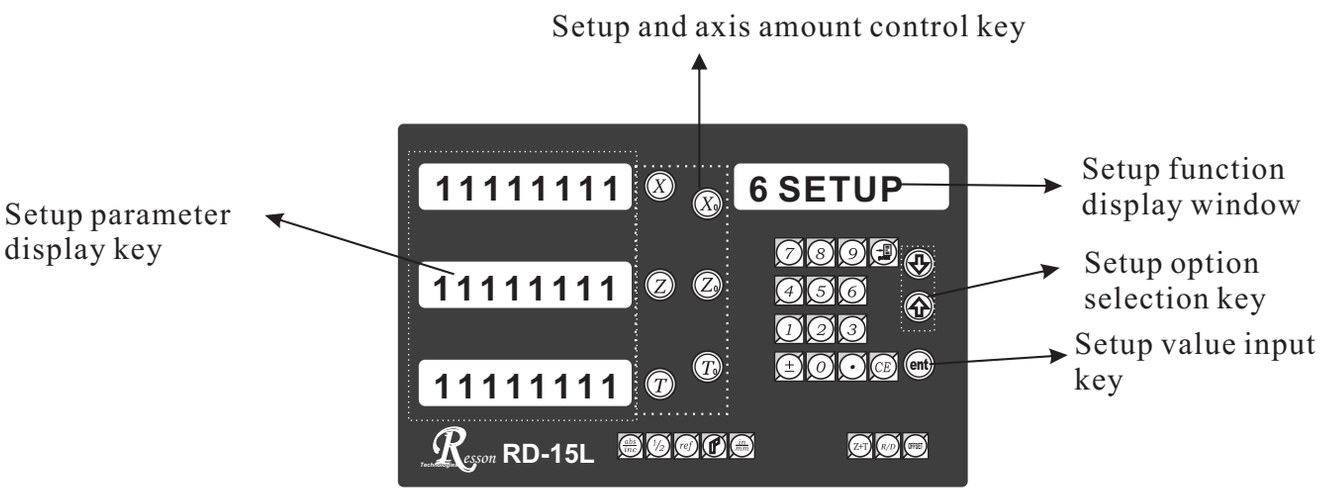
“WAITING --” is shown as parameter reset is underway.

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.

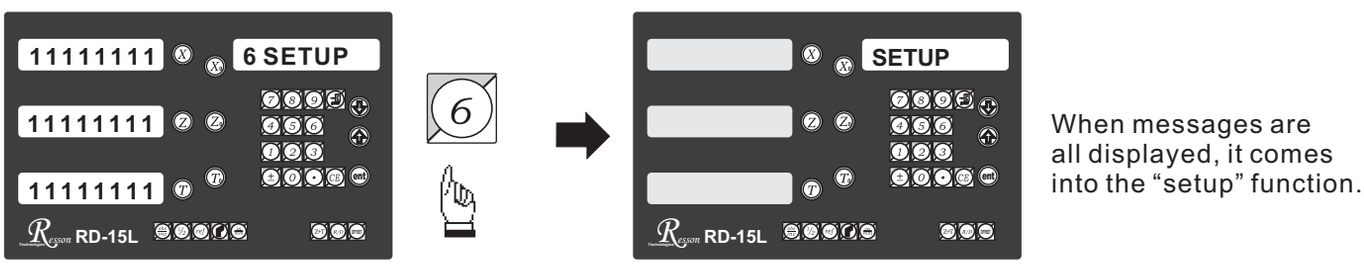
DRO in the display and related key locations in the SETUP process:



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"



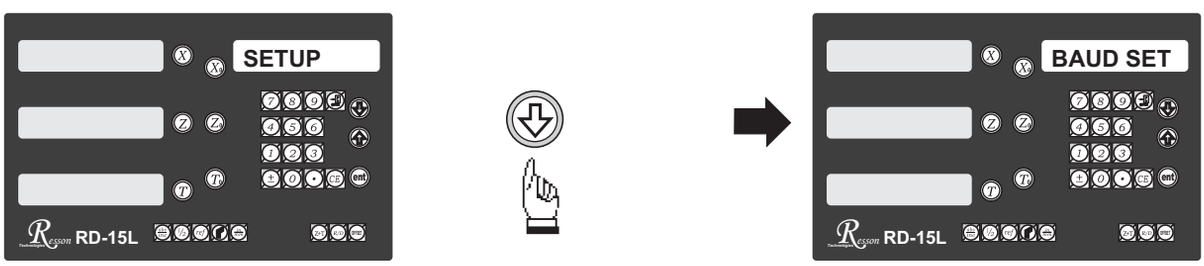
When messages are all displayed, it comes into the "setup" function.

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

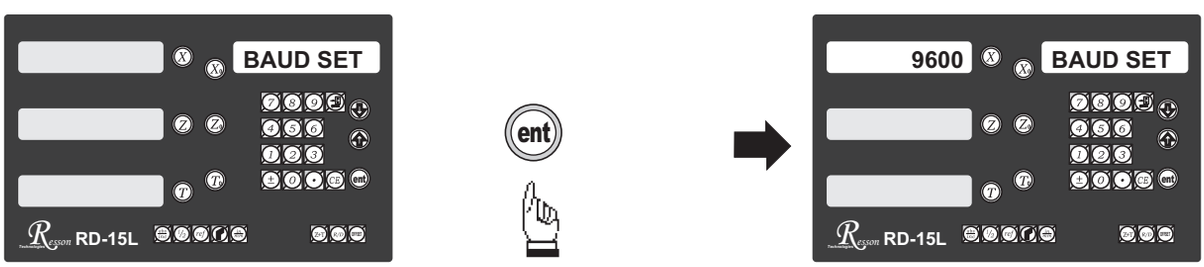
The first layer functions are, in turn, defined as below:

BAUD SET ..... set up RS232 transmission baud.
PRT 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.

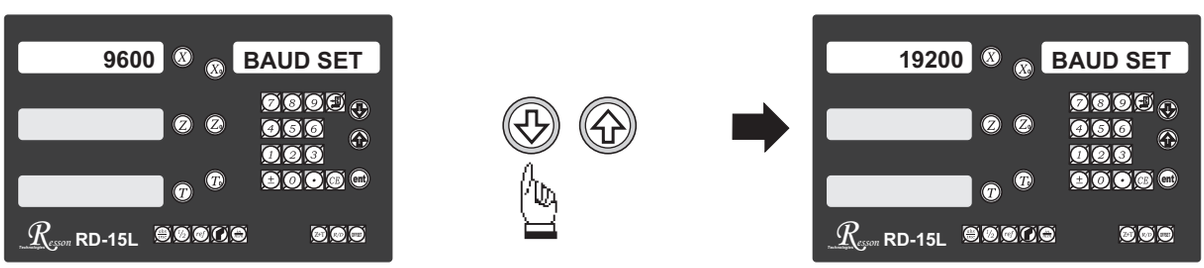
3) Press ⇩ to "BAUD SET".



Press ent to enter the setting of RS232 transmission baud.



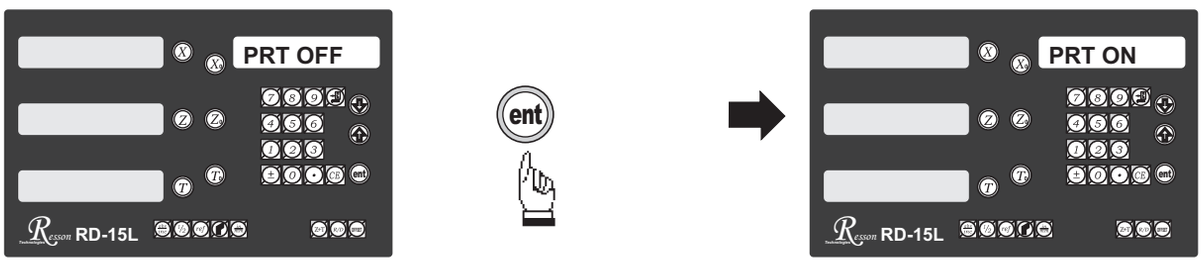
Press ⇩ or ⇧ to select the correct baud speed from 1200/2400/4800/9600/19200/57600.



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

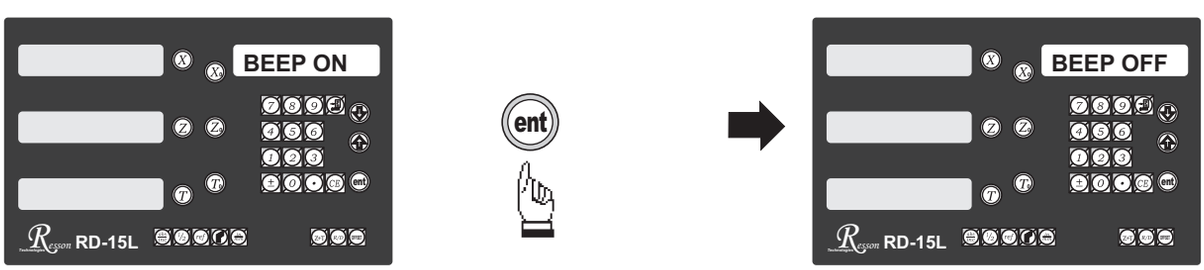
4) Press ⇩ or ⇧ and move to “PRT ON/OFF”.

Directly press ent to change over OFF & ON.



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

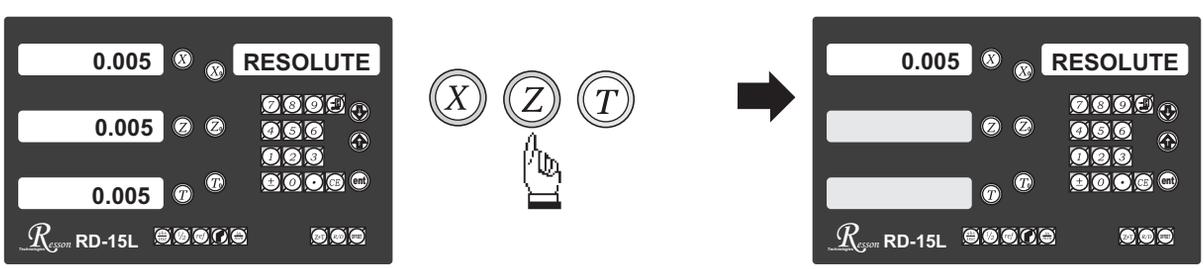
Directly press ent to change over OFF or ON.



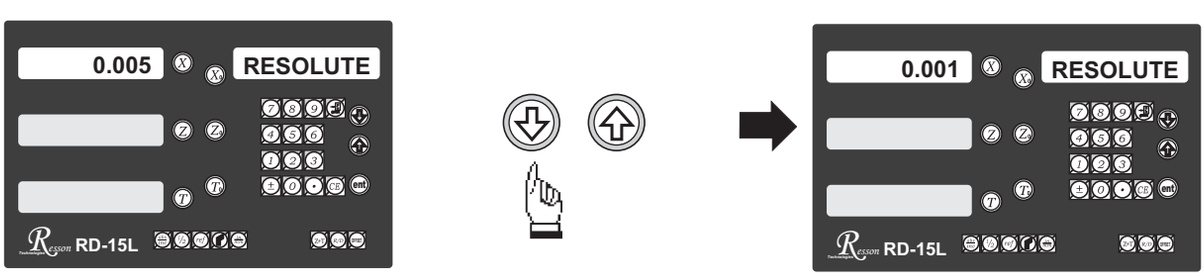
6) Press ↓ or ↑ and move to "RESOLUTE".

Press ent to enter the linear scale resolute setup.

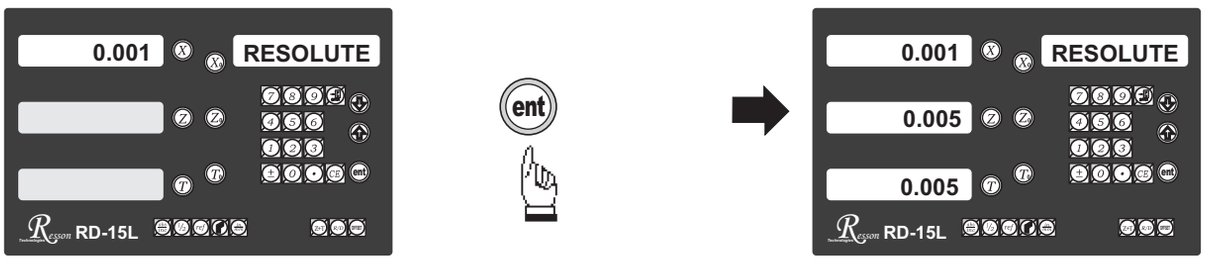
Press the axis going to be changed: X 、 Z 、 T



Press ↓ or ↑ to switch to the correct resolution value from 0.01/0.005/0.002/ 0.001/0.0005/0.0002/0.0001



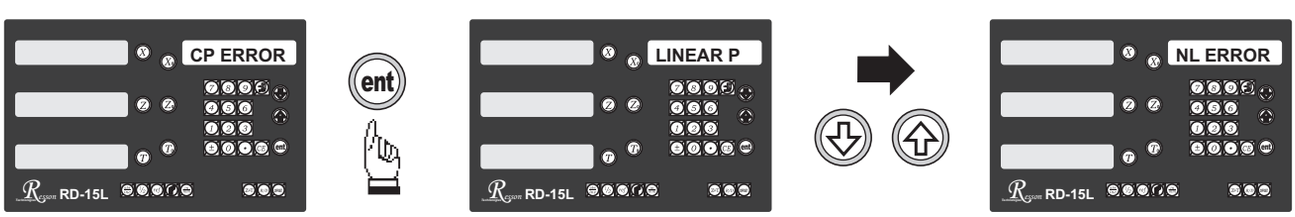
Press (ent) to end up this axis's setup



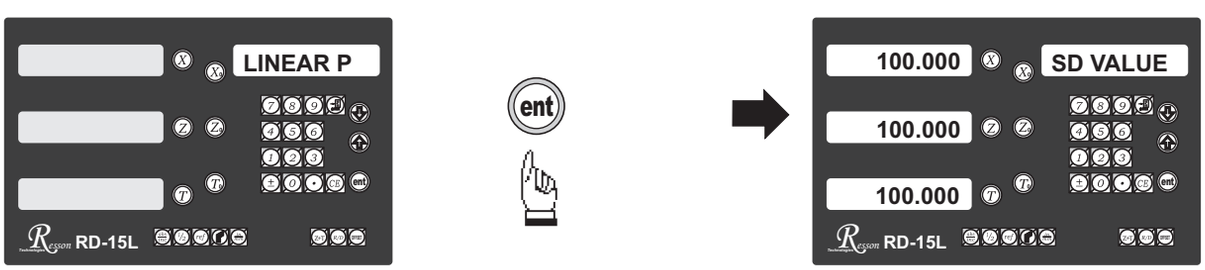
Then, press (ent) to end up the linear scale resolute setup procedure.

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

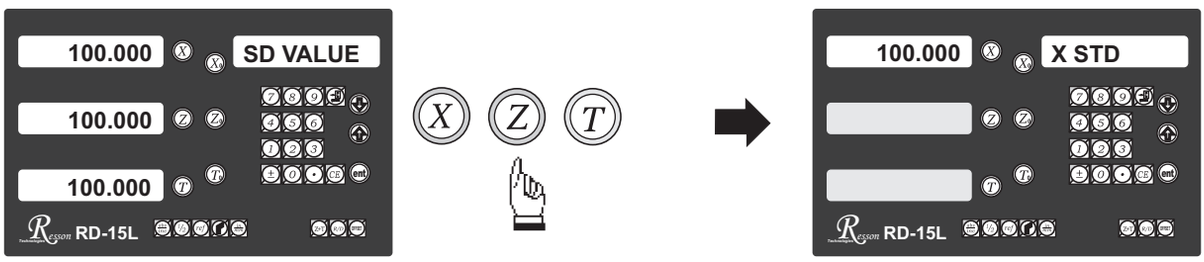
Press (ent) to enter the compensation setup; you can press (▽) or (△) to switch between the "LINEAR P" (linear compensation) mode and "NL ERROR" (nonlinear compensation) mode; choose one alternatively.



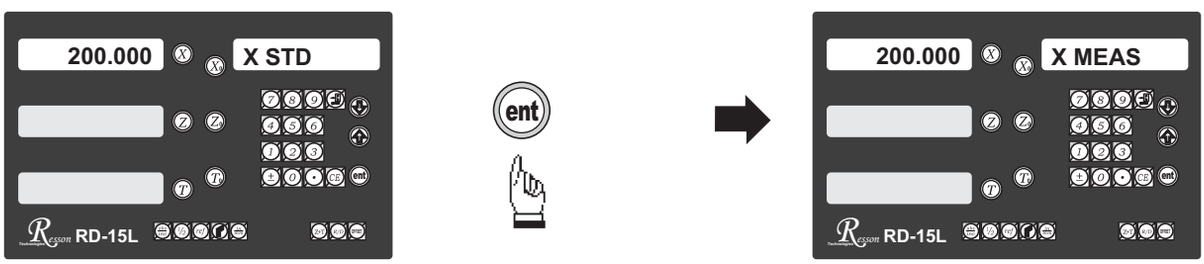
While selecting "LINEAR P", press (ent) to enter the linear compensation process.



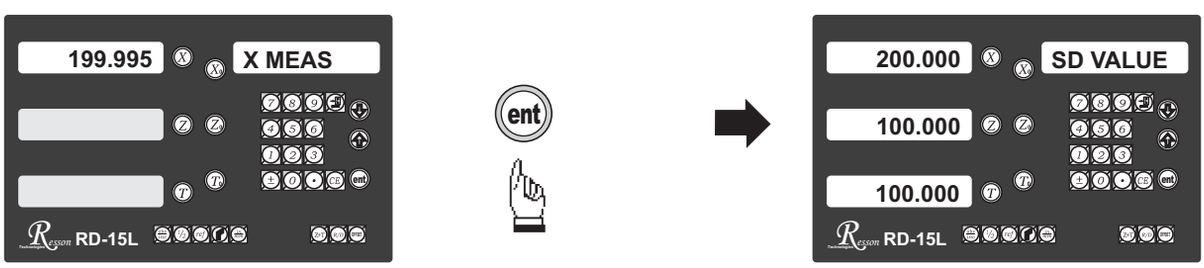
Press the axis (X) , (Z) or (T) under compensation.



Input the length measured and press (ent) .



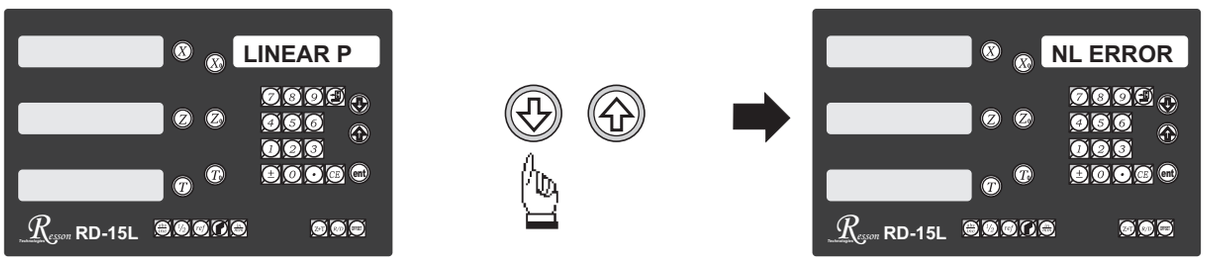
Input the actual length and press (ent) .



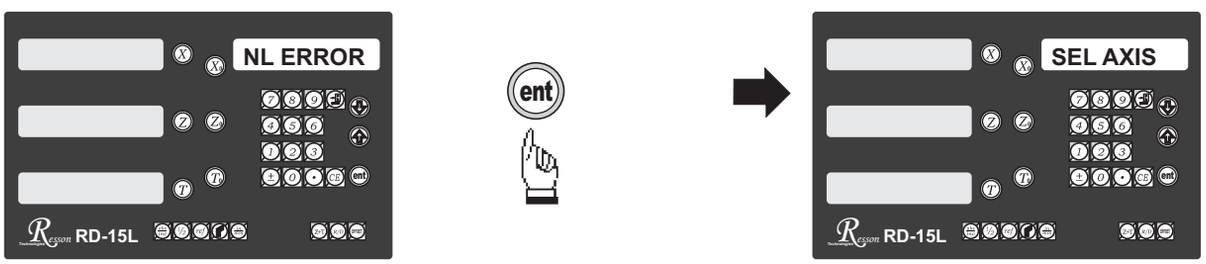
Press other axis (Z) or (T) under change and follow the above procedure to operate;

after the compensation procedure is done, press (ent) to end up the compensation of linear scale.

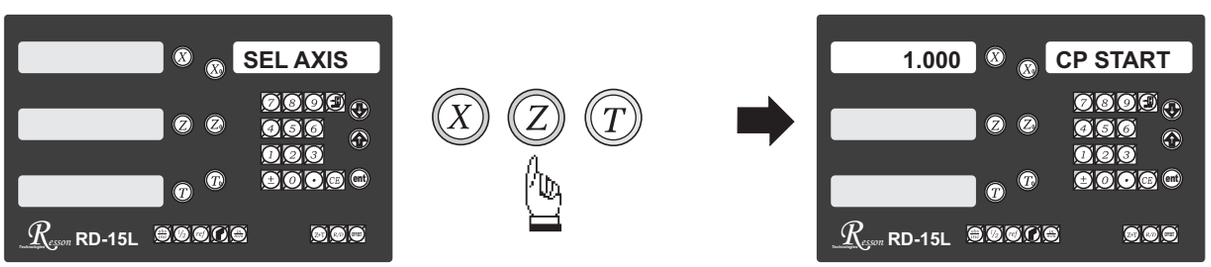
Press ⇩ or ⇧ to switch to “NL ERROR” (nonlinear compensation).



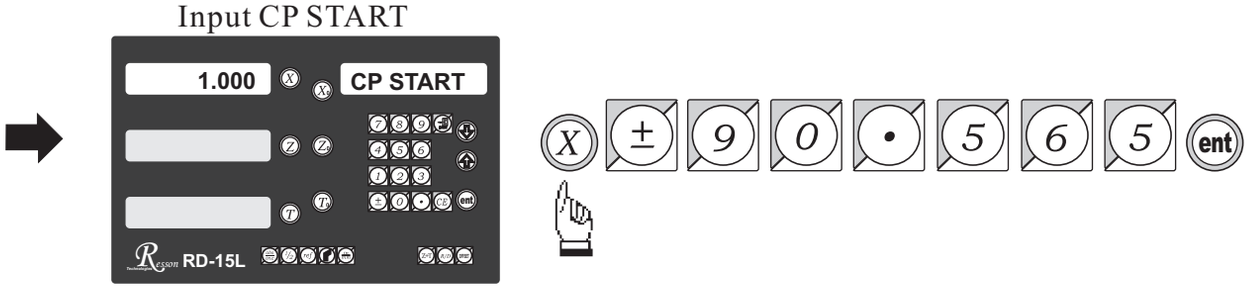
Press ent to enter the nonlinear compensation setup.



Press the axis X , Z or T under compensation.

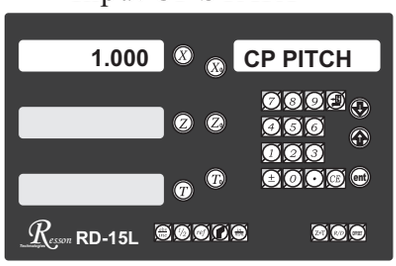


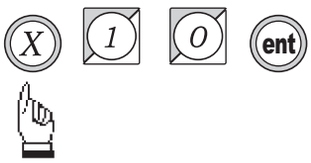
Input CP START



Input CP START

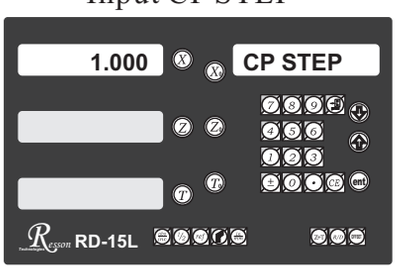
Next step

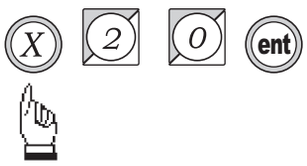




Input CP STEP

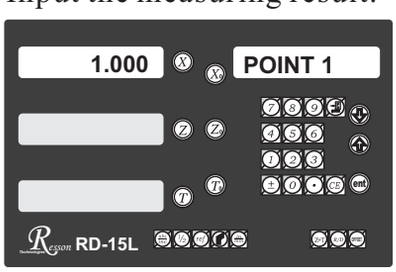
Next step





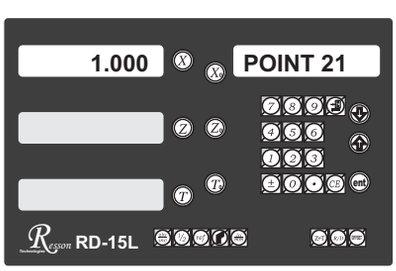
After entering the “Point 1” status, press the up/down key to select the measuring result at the point selected.

Input the measuring result.

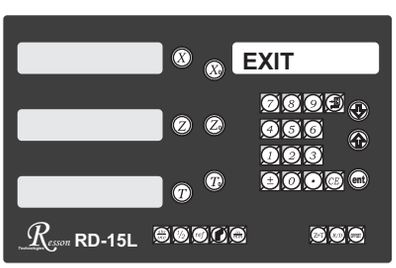


- - - - - The measuring result - - - - -

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

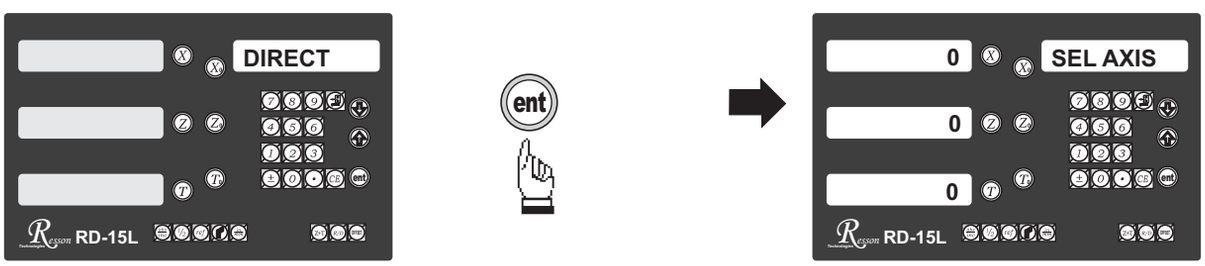


Press up/down key till EXIT appears.

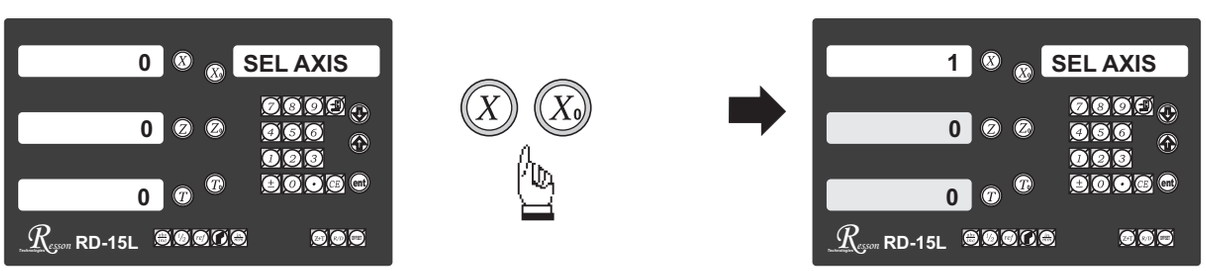


8) Press ⇩ or ⇧ to move the "DIRECT" (direction setup).

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.