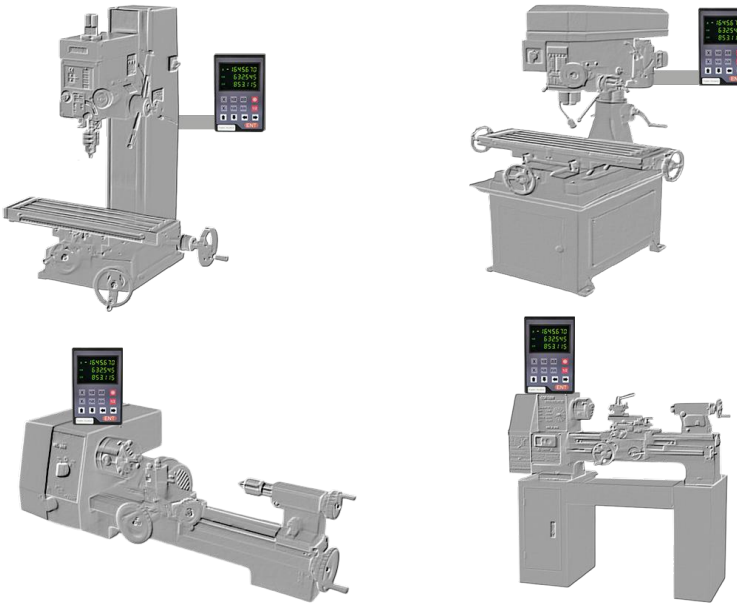
Mini LED

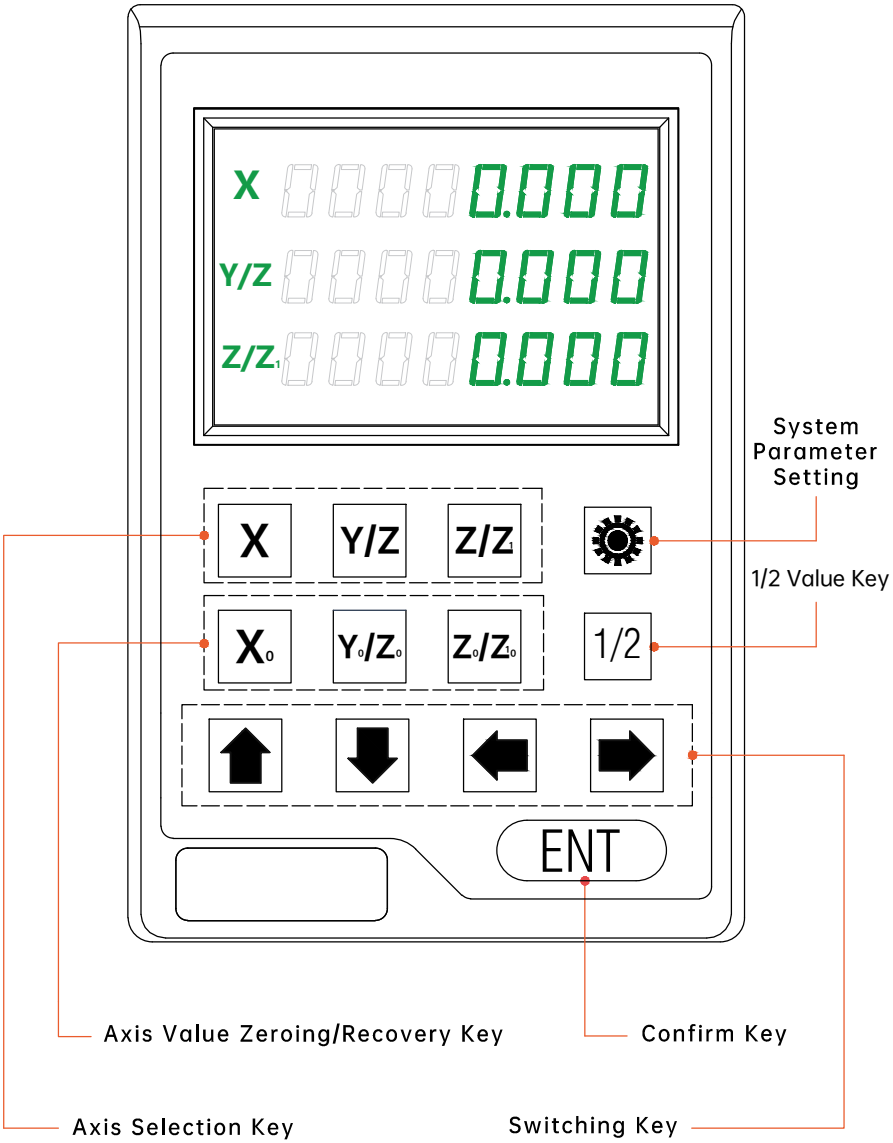
DIGITAL READOUT

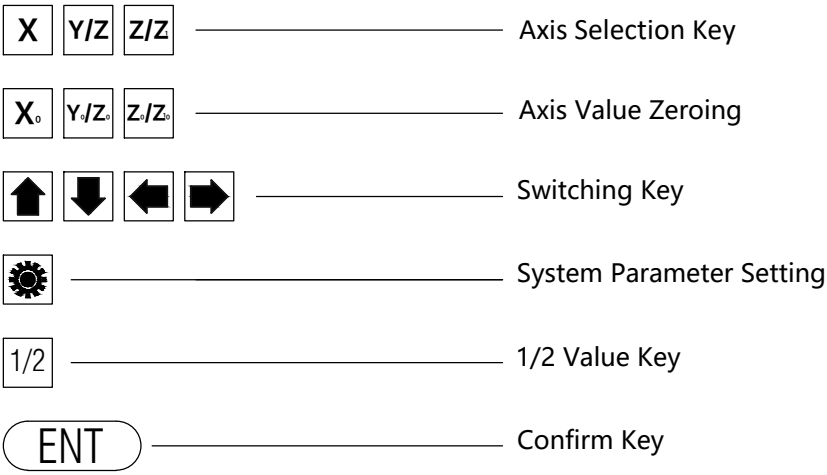


Driven by Innovation

Operation Manual

(Version 2.0)


X
Y/Z
Z/Z1
0.000
0.000
0.000
X
Y/Z
Z/Z1
X0
Y0/Z0
Z0/Z0
1/2
ENT
System Parameter Setting
1/2 Value Key
Axis Value Zeroing/Recovery Key
Confirm Key
Axis Selection Key
Switching Key


X
Y/Z
Z/Z
Axis Selection Key
X0
Y0/Z0
Z0/Z0
Axis Value Zeroing
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1/2 Value Key
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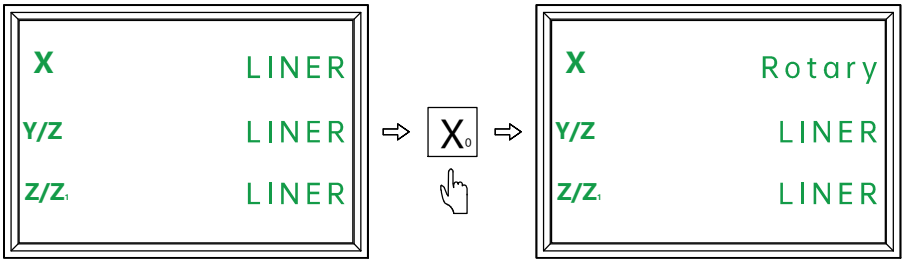
1. System Parameter Setting

Press the button,the DRO will display the system parameter setting interface. System Parameter Setting includes: 1. Encoder type setting 2.Resolution setting 3.Counting direction setting 4. MM/INCH conversion 5.Axis number setting 6.Machine type setting

1.1 Encoder type setting

(LINER indicates linear encoder.Rotary indicates rotary encoder)



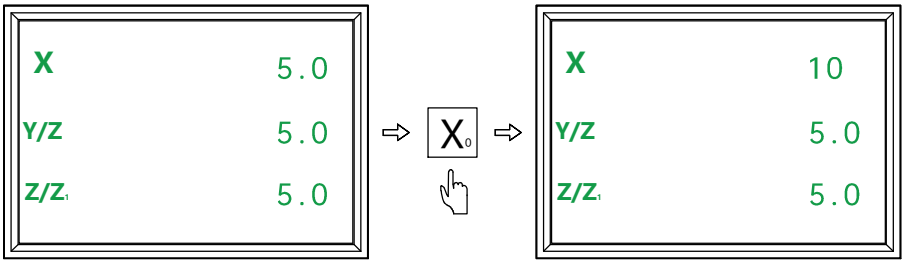
Press X0 Y0/Z0 Z0/Z0 to change the encoder type.

Press to enter the next parameter setting, or press ENT to exit.

1.2 Resolution setting

(1) The fixed resolution of linear encoder includes:
0.1um,0.2um,0.5um,1um,2um,2.5um,5um,10um,20um,50um.

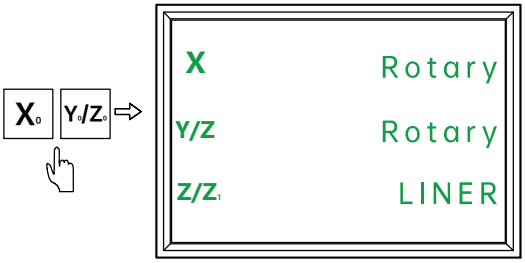
Press X0 Y0/Z0 Z0/Z0 to change the resolution for each axis.



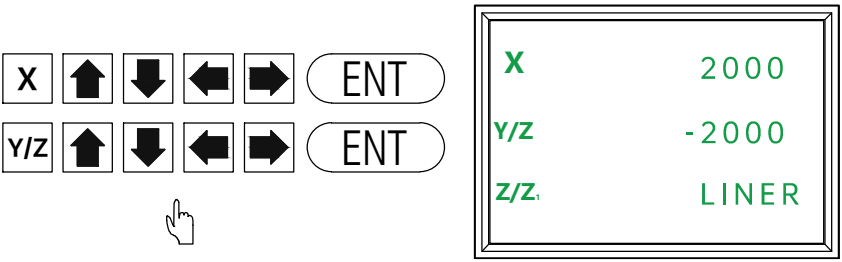
(2) For setting the resolution of rotary encoder, we need to input the corresponding resolution(ppr).There are two ways for displaying. When the positive number has been input,the displaying will be as degree.When the minus number has been input,the displaying will be as degree /minutes /seconds.

Example:The resolution of rotary encoder is 2000ppr.

Set the encoder type be rotary.



Input 2000 as the resolution of X axis.Input-2000 as the resolution of Y axis.

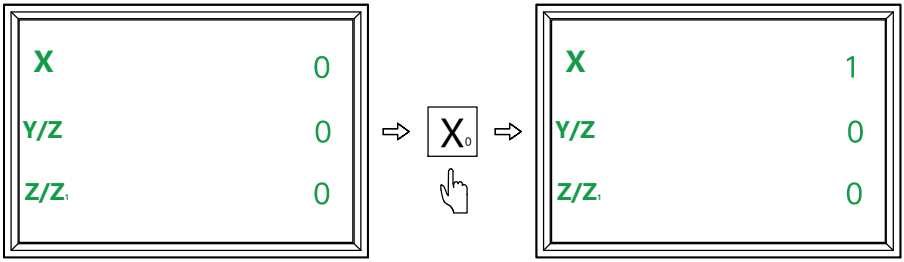


Press → to enter the next parameter setting, or press ENT to exit.

1.3 Counting direction setting

The counting direction can be reversed in this DRO.When any axis displaying 0,it indicates this axis counts as positive direction.When any axis displaying 1,it indicates this axis counts as negative direction.

The operations are shown as below:



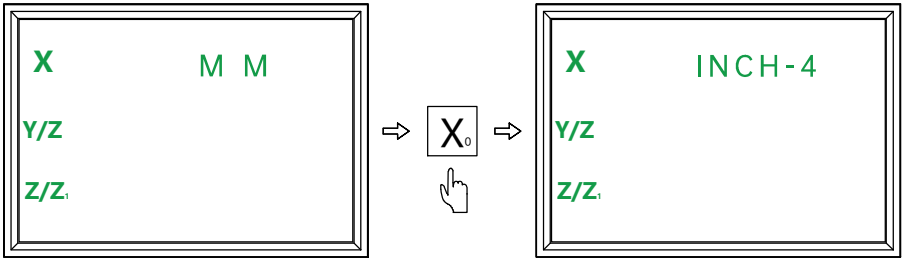
Press X0 Y0/Z0 Z0/Z0 to change the counting direction of X,Y,Z axis.

Press ➡ to enter the next parameter setting, or press ENT to exit.

1.4 MM/INCH conversion

When entering the MM/INCH setting interface,Press X0 to switch among the MM model,4 digits under INCH model and 5 digits under INCH model.The default is MM model.Operator could set accordingly.

Setting method as below:



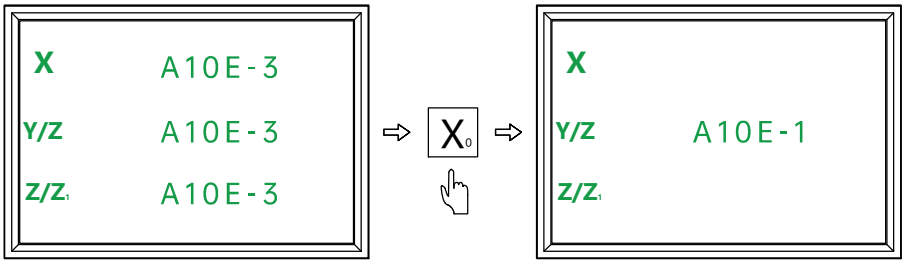
Press ➡ to enter the next parameter setting, or press ENT to exit.

1.5 Axis number setting

The number of displaying axis could be set in this DRO.For example,if the DRO gets 3 axis displaying.We could turn off 1 or 2 axis of the three to make it be 1 or 2 axis displaying.

Once entered the axis number setting,press [X0] to set the number of axis.

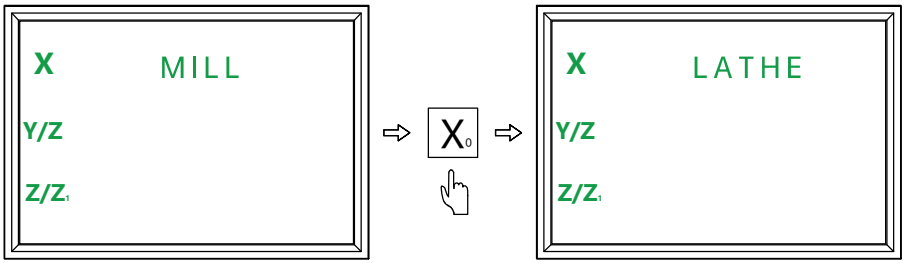
The operations are shown as below:



Press [→] to enter the next parameter setting, or press [ENT] to exit.

1.6 Machine type setting

When entering the machine type setting,Press [X0] button to switch the type among milling,lathe and grinder.Operator could set accordingly.



Press [ENT] to exit.

2.1 Zero,Value Recovery

- **Zero**

  Pressing the zero button,operator could zero the value on windows.

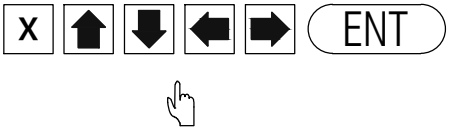
- **Value Recovery**

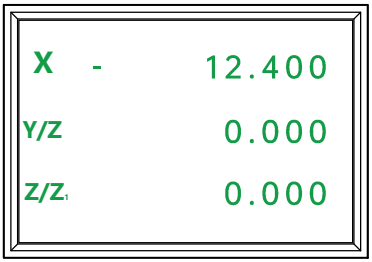
  When the value displayed on windows has been zeroed wrongly, pressing zero button again could get back the former value.

2.2 Coordinate Inputting

Function: operator could set any axis to be target value.

Example: Set the current position of X axis to be 12.4.



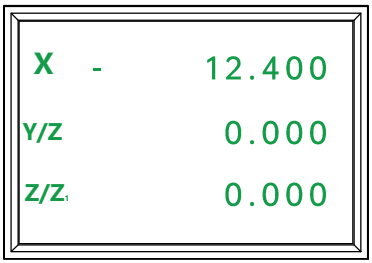


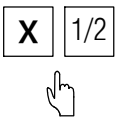
Remark: Press ◄ ► to select the digit position, press ▲ ▼ to set the value of the current position.

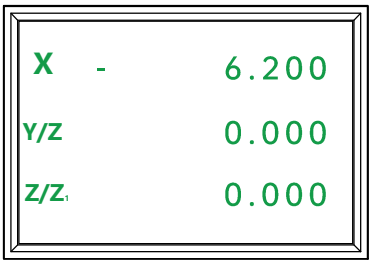
2.3 1/2 Function

Function: The DRO supports the centering function which could divide the current value to be the half. This could set the machining zero point to be in the center of the workpiece.

Operation: Press X and press 1/2 to set the value of this axis to be the half.(same operation to the rest axis)







2.4 Power-off Memory

In case of sudden power off during the machining process,the DRO gets the data memorize function.

Once the power on,the date before power off will recover automatically.

2.5 Linear Compensation

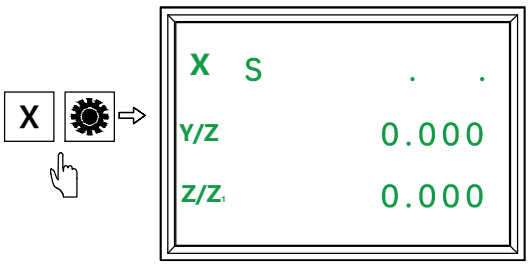
Function: This function could compensate the initial error of the linear scale to improve the overall accuracy.

Operation: Zero the axis which will be compensated, traverse the linear scale and measure the actual moved length with a more accurate measuring instrument. Then enter the linear compensation function interface and input the actual moving length.

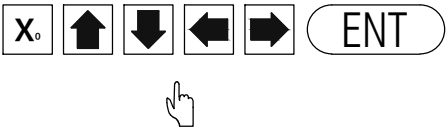
Example: Take 1000mm of X axis as an example. (Same operation to Y and Z axis)

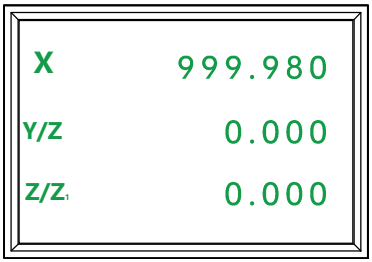
Step 1: Press [X0] to zero the value of X axis. Traverse linear scale to be 1000mm as displayed on the DRO. Then measure the actual moving length.(Assume the actual moving length is 999.980)

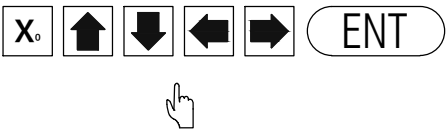
Step 2: Press [X] and press [⚙] to enter the linear compensation function.

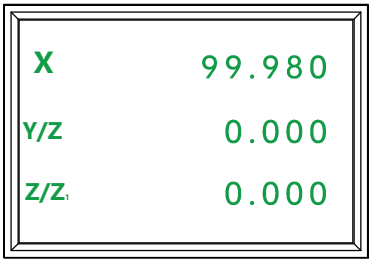


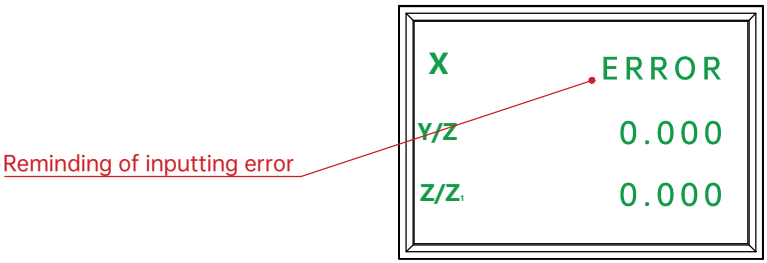
Step 3: Press [X0] and input the actual moving length of 999.980.Press [ENT] to confirm. At this time, the system will calculate the compensation value automatically. If the compensation value is among the allowed range, the system will do the compensation and exit. If the compensation value is beyond the allowed range, there will be a reminding to alarm.
(as below picture)



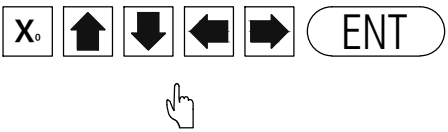


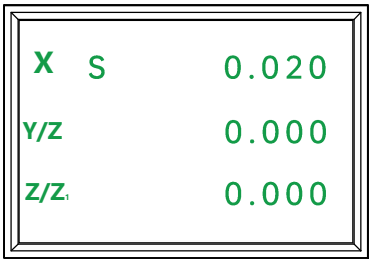






Remark: Operator could also calculate the compensation value with the formula, and then input the compensation value accordingly. It will be same operation for step 1 and 2. When coming to step 3, operator should switch the way to input the value directly. Then press ENT to exit the compensation function.(As below picture)





Note: Formula for compensated value:

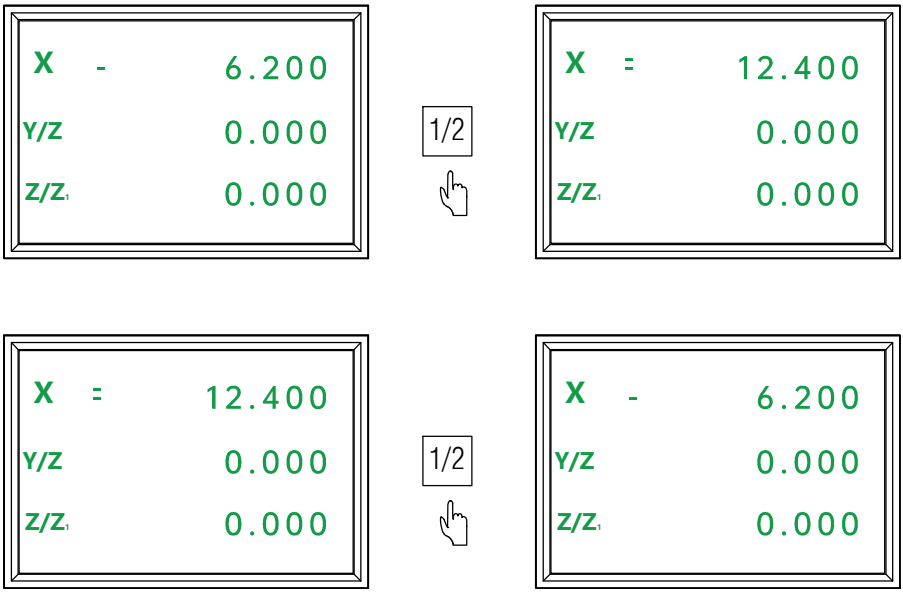
Compensation Value =

(Actual length - DRO Displayed length) / (Actual Length/1000) mm/m

Compensation range: -1.9mm/m to +1.9mm/m

2.6 Radius and Diameter Conversion (Applying to Lathe)

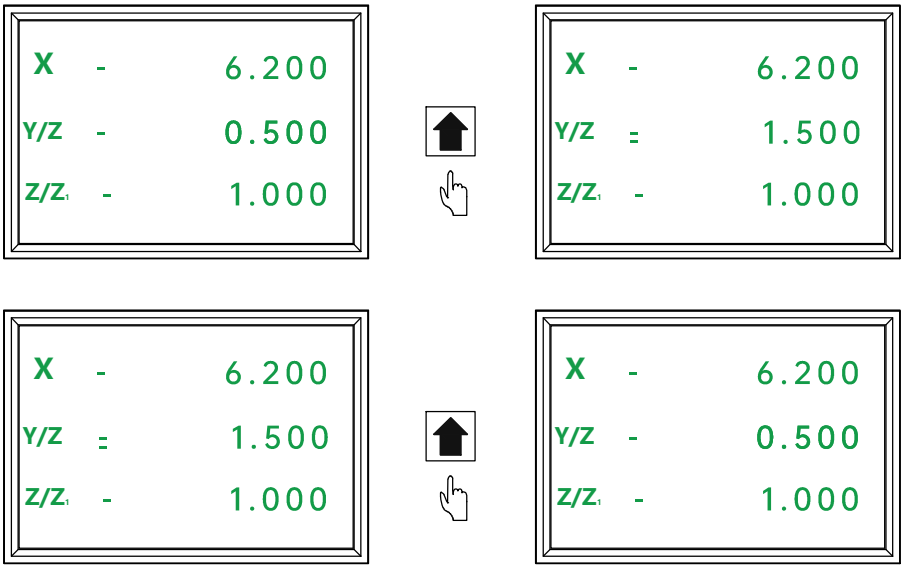
When the machine type has been set to be lathe, 1/2 button will be proceeded as radius and diameter conversion function. Press 1/2 to set the X axis as diameter, there will be a symbol of to remind the displaying as diameter. Pressing 1/2 again could switch the displaying to be radius. At this time, the symbol of will disappear.



2.7 Axis Summing Function (Applying to 3 axis Lathe)

When the machine type has been set as lathe for 3 axis, operator could set to display the combined value of Y and Z axis on the Y axis.

Press  to display the combined value of Y and Z axis on Y axis, there will be a symbol of  to remind on Y axis. Pressing  again to get back to normal display. The symbol of  will display at this time.



3.1 Parameter

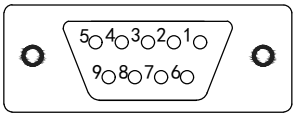
- **Voltage:** AC 80V--240V ; 50-60HZ
- **Power:** 15W
- **Displaying:** LED
- **Working Temperature:** -10℃--60℃
- **Storage Temperature:** -30℃--70℃
- **Relative Humidity:** <90% (25) >
- **Axis Number:** 1 axis,2 axis,3 axis
- **Input Signal:** 5V TTL/5V RS422
- **Input signal Frequency:** <1MHZ
- **Resolution (Linear Encoder):** 0.1 um, 0.2 um, 0.5 um, 1 um, 2 um, 2.5 um, 5 um, 10 um, 20 um, 25 um, 50 um, 100 um
- **Highest Resolution(Rotary Encoder):** <1000000ppr
- **Weight:** 1.5 KGS
- **Dimension:** 155*102*60 mm
- **DB9 Pin diagram**

DB9-5V TTL

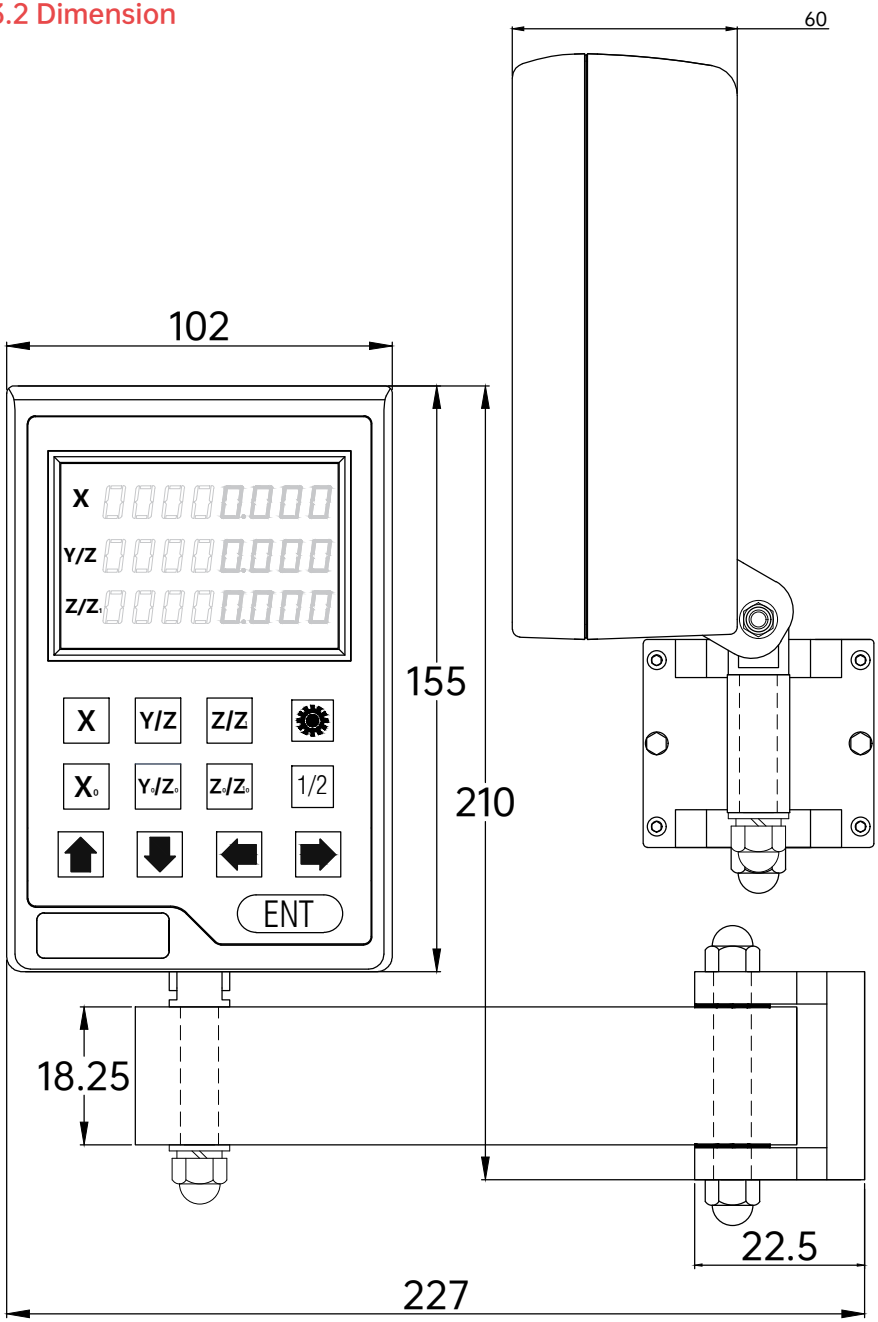
Pin	1	2	3	4	5	6	7	8	9
Signal	Empty	0V	Empty	Empty	Empty	A	+5V	B	Z
Color		Black				Yellow	Red	Green	Brown

DB9-5V RS422

Pin	1	2	3	4	5	6	7	8	9
Signal	A-	0V	B-	Empty	Z-	A	+5V	B	Z
Color	Orange	Black	Blue		White	Yellow	Red	Green	Brown



3.2 Dimension



3.3 : RS232 serial communication protocol

Communication Protocol: Baud Rate 115200,8，N，1

Generally, it takes the"41H""61H"，"53H"as examples.

1. Sending data continuously: PC sends hexadecimal(41H) to Digital Readout, Digital Readout sends data continuously to PC.
2. Sending data one time, PC sends hexadecimal(61H) to Digital Readout, Digital Readout sends data one time to PC.
3. Stopping sending data: When Digital Readout received 53H, it will stop sending data to PC.
4. Other keys definition, please refer the following table

Data format

Data ASCII

ASCII Code array format

[axis sign bit] [value] [value] [value] [value] [value] [value]

[value] [value] [value] [value] [value] [0X0D] [0X0A]

The decimal point is not fixed which will change as the resolution changes.

Example:

X+1234.567 (resolution=1,2,5,10) (three decimal places)

[X] [blank] [blank] [blank] [1] [2] [3] [4] [.] [5] [6] [7] [0X0D] [0x0A]

Y-123.4567 (resolution=0.1, 0.2, 0.5) (four decimal places)

[Y] [blank] [blank] [-] [1] [2] [3] [.] [4] [5] [6] [7] [0X0D] [0x0A]

Z 12.34567 (I/N=I inch I/M=M metric)(five decimal places)

[Z] [blank] [blank] [blank] [1] [2] [.] [3] [4] [5] [6] [7] [0X0D] [0x0A]

Angle display:

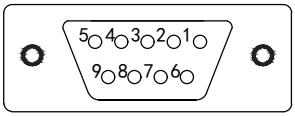
X+123.4567° (Angle display)

[X] [blank] [blank] [blank] [1] [2] [3] [4] [.] [5] [6] [7] [0X0D] [0x0A]

Y-123°45′57″ (Angle display with unit of degree,minutes and seconds)

[X] [-] [1] [2] [3] [.] [4] [5] ['] [5] [6] ["] [0X0D] [0x0A]

Transmission Connecting Way



2.PIN:TXD
3.PIN:RXD
4.PIN:GND

RS232 serial communication protocol key table

Virtual key table:

Character	Function	Function explanation
0x61(a)	Send data once	Send data
0x41(A)	Send data continuously	Send data
0x53(S)	Stop sending data	Stop sending data
0xa1	Send data one time for X axis	Send data
0xa2	Send data one time for Y axis	Send data
0xa3	Send data one time for Z axis	Send data

Key Table:

Character	Corresponding key	Character
0x58(X)	X	X axis input
0x59(Y)	Y	Y axis input
0x5a(Z)	Z	Z axis input
0x78(x)	X0	X zeroing key
0x79(y)	Y0	Y zeroing key
0x7a(z)	Z0	Z zeroing key
0x52(R)	→	Right move code
0x4c(L)	←	Left move code
0x50(P)	↑	Up move code
0x44(D)	↓	Down move code
0x4D(M)		System setting
0xf8	1/2	1/2function key
0x45(E)	ENT	Data input

3.4 Troubleshooting

The following troubleshootings are just the preliminary methods.
If the problems still exist, please do not dismantle the DRO by yourself,
but contact our company or the dealers for help in time.

Faults	Fault Causes	Solutions
The DRO doesn't display anything	1. The power is not on ? 2. The power switch is not closed ? 3. The supply voltage is not appropriate 4. The internal supply of the linear scale is in short circuit.	1. Check whether the power line and power plug are plugged in. 2. Close the power switch. 3. Make sure the supply voltage between 80V-260V. 4. Pull out the connector of the linear scale.
One axis of the DRO doesn't count	1. Operate the machine after swapping with the linear scale of another axis. 2. Some special functions of the DRO are being used.	1. If counting, it's the fault of the linear scale; if not, it's the fault of the DRO. 2. Exit the special function
The counting of DRO is not accurate (it can't zero)	1. The linear scale isn't installed according to the requirements or the accuracy is not enough. 2. After being used for a long time, the vibration of the machine tool makes the fixed reading head or the screws loosen. 3. The accuracy of the machine tool is not good. 4. The DRO resolution isn't consistent with the linear scale.	1. Reinstall the linear scale and adjust the level. 2. Tighten all the fixed screws. 3. Overhaul the machine tool. 4. Reset the DRO resolution.
The counting of DRO is in error,The displayed operation distance isn't consistent with the actual distance	1. The machine tool and the DRO shell are not connected to earth. 2. The accuracy of the machine tool is not good. 3. The running speed of the machine tool is too fast. 4. The linear scale isn't installed according to the requirements and the accuracy is not enough. 5. The DRO resolution isn't consistent with the linear scale. 6. The operating size unit is not consistent with the displayed Metric/British units. 7. The linear error compensation setting of the DRO is not appropriate. 8. The linear scale exceeds the operating range of length or the read head is broken.	1. Connect the machine tool and the DRO shell to earth. 2. Overhaul the machine tool. 3. Reduce the running speed of the machine tool. 4. Reinstall the linear scale and adjust the level. 5. Reset the DRO resolution. 6. Switch the displayed Metric/British units. 7. Reset the linear error compensation of the DRO. 8. Repair the linear scale.

Faults	Fault Causes	Solutions
The linear scale doesn't count	1. The linear scale exceeds the operating range of length or the read head is broken. 2. The read head of linear scale rubs the ruler shell leading to the aluminum scraps accumulated. 3. The gap between the read head of linear scale and the ruler body is too wide. 4. The metal tubes of the linear scale are damaged, which causing the short circuit or disconnection in internal wiring.	1. Repair the linear scale 2. Repair the linear scale 3. Repair the linear scale 4. Repair the linear scale
The linear scale doesn't count sometimes	1. The small box of the linear scale is separated from the steel ball. 2. The grating glass in the read head of the grating ruler is abraded. 3. There is dirt on the grating glass in the shell of the linear scale. 4. The elasticity of small box spring in the read head of the linear scale is not enough.	1. Repair the linear scale 2. Repair the linear scale 3. Repair the linear scale 4. Repair the linear scale

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